

Keysight X-Series Signal Analyzer

This manual provides documentation for the following

X-Series Analyzers:

PXA Signal Analyzer N9030A

MXA Signal Analyzer N9020A

EXA Signal Analyzer N9010A

CXA Signal Analyzer N9000A

N9071A & W9071A
GSM/EDGE
Measurement
Application User's &
Programmer's
Reference

Notices

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1 About the Analyzer

The X-Series signal analyzer measures and monitors complex RF and microwave signals. Analog baseband analysis is available on MXA. The analyzer integrates traditional spectrum measurements with advanced vector signal analysis to optimize speed, accuracy, and dynamic range. The analyzer has Windows 7[®] built in as an operating system, which expands its usability.

With a broad set of applications and demodulation capabilities, an intuitive user interface, outstanding connectivity and powerful one-button measurements, the analyzer is ideal for both R&D and manufacturing engineers working on cellular, emerging wireless communications, general purpose, aerospace and defense applications.

Installing Application Software

If you want to install a measurement application after your initial hardware purchase, you need only to license it. All of the available applications are loaded in your analyzer at the time of purchase.

Thus, when you purchase a new application, you will receive an entitlement certificate that you can use to obtain a license key for that application. To activate the new measurement application, enter the license key that you obtain into the Signal Analyzer.

For the latest information on Keysight Signal Analyzer measurement applications and upgrade kits, visit the following internet URL.

http://www.agilent.com/find/sa_upgrades

Viewing a License Key

Measurement applications that you purchased with your instrument have been installed and activated at the factory before shipment. The instrument requires a unique License Key for every measurement application purchased. The license key is a hexadecimal string that is specific to your measurement application, instrument model number and serial number. It enables you to install, or reactivate, that particular application.

Press **System, Show, System** to display the measurement applications that are currently licensed in your analyzer.

Go to the following location to view the license keys for the installed measurement applications:

C:\Program Files\Agilent\Licensing

You may want to keep a copy of your license key in a secure location. To do this, you can print out a copy of the display showing the license numbers. If you should lose your license key, call your nearest Keysight Technologies service or sales office for assistance.

Obtaining and Installing a License Key

If you purchase an additional application that requires installation, you will receive an "Entitlement Certificate", which may be redeemed for a license key for one instrument. To obtain your license key, follow the instructions that accompany the certificate.

Installing a license key for the selected application can be done automatically using a USB memory device. To do this, you copy the license file to the USB memory device, at the root level. Follow the instructions that come with your software installation kit.

Installing a license key can also be done manually using the built-in license management application, which may be found via the instrument front panel keys at **System, Licensing. . .**, or on-disk at:

C:\Programming Files\Agilent\Licensing

You can also use these procedures to reinstall a license key that has been accidentally deleted, or lost due to a memory failure.

Updating Measurement Application Software

All the software applications were loaded at the time of original instrument manufacture. It is a good idea to regularly update your software with the latest available version. This helps to ensure that you receive

any improvements and expanded functionality.

Because the software was loaded at the initial purchase, further additional measurement applications may now be available. If the application you are interested in licensing is not available, you will need to do a software update. (To display a list of installed applications, press **System, Show, System.**)

Check the appropriate page of the Keysight web site for the latest available software versions, according to the name of your instrument, as follows:

http://www.agilent.com/find/pxa_software

http://www.agilent.com/find/mxa_software

http://www.agilent.com/find/exa_software

http://www.agilent.com/find/cxa_software

You can load the updated software package into the analyzer from a USB drive, or directly from the internet. An automatic loading program is included with the files.

X-Series Options and Accessories

You can view an online list of available Options and Accessories for your instrument as follows:

1. Browse to one of the following URLs, according to the product name of your analyzer:

www.agilent.com/find/cxa

www.agilent.com/find/exa

www.agilent.com/find/mxa

www.agilent.com/find/pxa

2. The home page for your instrument appears (in some cases, you may see an initial splash screen containing a button named View the Webpage, which you should click to display the home page).
3. Locate the Options tab, as highlighted in the example below, which shows the home page for the MXA.



4. Click the Options tab, to display a list of available options and accessories for your instrument.

Front-Panel Features

The instrument's Front-panel features are fully detailed in the section "Front-Panel Features" (under the chapter "Front and Rear Panel Features") of the document:

[Getting Started Guide](#)

If you are viewing this information as a Help file in the instrument, then you can click on the link above to open the PDF document.

Display Annotations

Display Annotations are fully detailed under the chapter "Front and Rear Panel Features" of the document:

[Getting Started Guide](#)

If you are viewing this information as a Help file in the instrument, then you can click on the link above to open the PDF document.

Rear-Panel Features

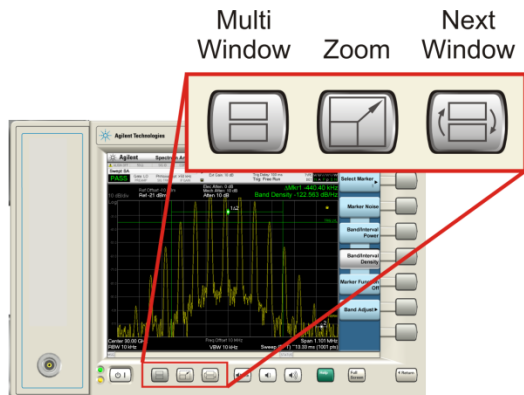
The instrument's Rear-panel features are fully detailed in the section "Rear-Panel Features" (under the chapter "Front and Rear Panel Features") of the document:

[Getting Started Guide](#)

If you are viewing this information as a Help file in the instrument, then you can click on the link above to open the PDF document.

Window Control Keys

The instrument provides three front-panel keys for controlling windows. They are Multi Window, Zoom, and Next Window. These are all “immediate action” keys.



Multi-Window



The Multi Window front-panel key will toggle you back and forth between the Normal View and the last Multi Window View (Zone Span, Trace Zoom or Spectrogram) that you were in, when using the Swept SA measurement of the Spectrum Analyzer Mode. It remembers which View you were in through a Preset. This “previous view” is set to Zone Span on a Restore Mode Defaults.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Zoom

Zoom is a toggle function. Pressing this key once increases the size of the selected window. Pressing the key again returns the window to the original size.

When Zoom is on for a window, that window will get the entire primary display area. The zoomed window, since it is the selected window, is outlined in green.

Zoom is local to each Measurement. Each Measurement remembers its Zoom state. The Zoom state of each Measurement is part of the Mode’s state.

NOTE

Data acquisition and processing for the other windows continues while a window is zoomed, as does all SCPI communication with the other windows.

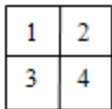
Remote Command	<code>:DISPlay:WINDow:FORMat:ZOOM</code>
-----------------------	--

Remote Command	:DISPlay:WINDow:FORMat:TILE
Example	:DISP:WIND:FORM:ZOOM sets zoomed :DISP:WIND:FORM:TILE sets un-zoomed
Preset	TILE
Initial S/W Revision	Prior to A.02.00

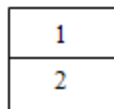
Next Window

Selects the next window of the current view. When the Next Window key is pressed, the next window in the order of precedence becomes selected. If the selected window was zoomed, the next window will also be zoomed.

The window numbers are as follows. Note that these numbers also determine the order of precedence (that is, Next Window goes from 1 to 2, then 2 to 3, etc.):



Four window display



Two window display

RTSA measurements:

Only two windows are available in the Spectrogram view under the Spectrum measurement and up to three windows are available in the Power vs. Time measurement, depending on the view set up.

Remote Command	:DISPlay:WINDow[:SElect] <number> :DISPlay:WINDow[:SElect]?
Example	:DISP:WIND 1
Preset	1
Min	1
Max	If <number> is greater than the number of windows, limit to <number of windows>
Initial S/W Revision	Prior to A.02.00

One and only one window is always selected. The selected window has the focus; this means that all window-specific key presses apply only to that window. You can tell which window is selected by the thick green border around it. If a window is not selected, its boundary is gray.

If a window in a multi-window display is zoomed it is still outlined in green. If there is only one window, the green outline is not used. This allows the user to distinguish between a zoomed window and a display with only one window.

The selected window is local to each Measurement. Each Measurement remembers which window is selected. The selected window for each Measurement is remembered in Mode state.

NOTE

When this key is pressed in Help Mode, it toggles focus between the table of contents window and the topic pane window.

Full Screen

When Full Screen is pressed the measurement window expands horizontally over the entire instrument display. The screen graticule area expands to fill the available display area.

It turns off the display of the softkey labels, however the menus and active functions still work. (Though it would obviously be very hard to navigate without the key labels displayed.) Pressing Full Screen again while Full Screen is in effect cancels Full Screen.

Note that the banner and status lines are unaffected. You can get even more screen area for your data display by turning off the Meas Bar (in the Display menu) which also turns off the settings panel.

Full Screen is a Meas Global function. Therefore it is cancelled by the Preset key.

Key Path	Display
Remote Command	:DISPlay:FSCReen[:STAtE] OFF ON 0 1 :DISPlay:FSCReen[:STAtE]?
Preset	Unaffected by Preset but set to Off by Restore Misc Defaults or shutdown and restart
State Saved	Not saved in instrument state.
Backwards Compatibility SCPI	:DISPlay:MENU[:STAtE] OFF ON 0 1 This emulates ESA full screen functionality, which is the same as the FSCReen command in PSA except that the sense of on/off is reversed (that is, OFF means the menus are OFF, so Fullscreen is ON) and the default is ON (meaning Fullscreen is OFF).
Backwards Compatibility Notes	In ESA/PSA, Full Screen was turned on with a softkey, so pressing any other key turned Full Screen off. In the X-Series, because a hardkey is provided to turn this function on and off, pressing any other key no longer turns off Full Screen
Initial S/W Revision	Prior to A.02.00

Display Enable (Remote Command Only)

Turns the display on/off, including the display drive circuitry. The backlight stays lit so you can tell that the instrument is on. The display enable setting is mode global. The reasons for turning the display off are three:

- To increase speed as much as possible by freeing the instrument from having to update the display
- To reduce emissions from the display, drive circuitry
- For security purposes

If you have turned off the display:

- and you are in local operation, the display can be turned back on by pressing any key or by sending the SYSTem:DEFaults MISC command or the DISPlay:ENABle ON (neither *RST nor SYSTem:PRESet enable the display.)
- and you are in remote operation, the display can be turned back on by pressing the Local or Esc keys or by sending the SYSTem:DEFaults MISC command or the DISPlay:ENABle ON (neither *RST nor SYSTem:PRESet enable the display.)

and you are using either the SYSTem:KLOCK command or GPIB local lockout, then no front-panel key press will turn the display back on. You must turn it back on remotely.

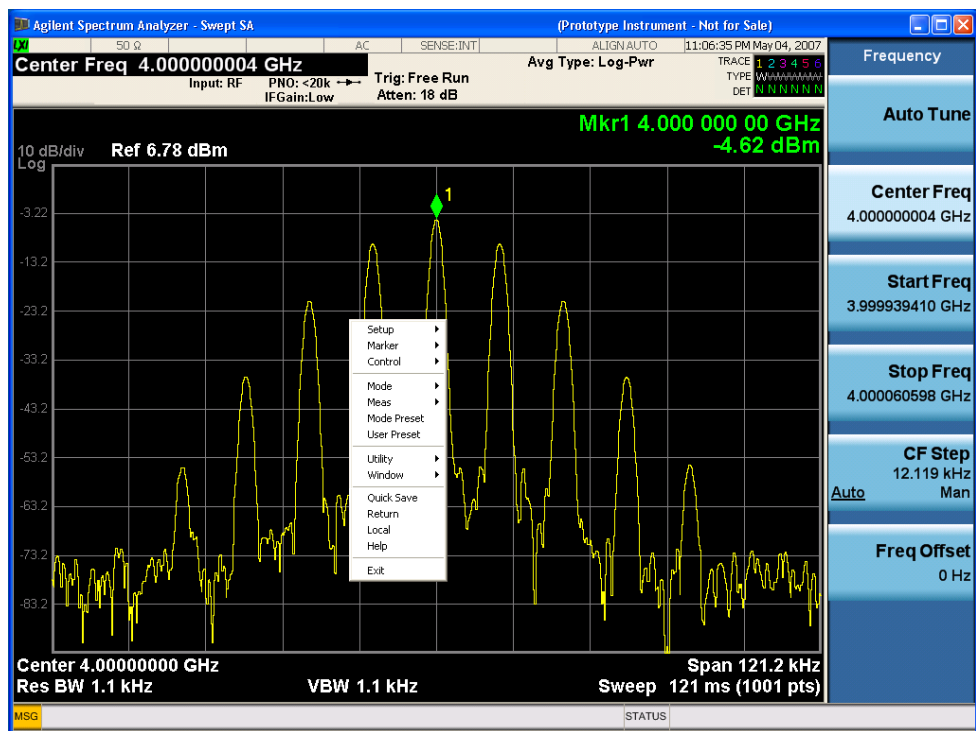
Remote Command	:DISPlay:ENABle OFF ON 0 1 :DISPlay:ENABle?
Example	DISP:ENAB OFF
Couplings	DISP:ENAB OFF turns Backlight OFF and DISP:ENAB ON turns Backlight ON. However, settings of Backlight do not change the state of DISP:ENAB
Preset	On Set by SYST:DEF MISC, but Not affected by *RST or SYSTem:PRESet.
State Saved	Not saved in instrument state.
Backwards Compatibility Notes	SYST:PRES no longer turns on DISPlay:ENABle as it did in legacy analyzers
Initial S/W Revision	Prior to A.02.00

Mouse and Keyboard Control

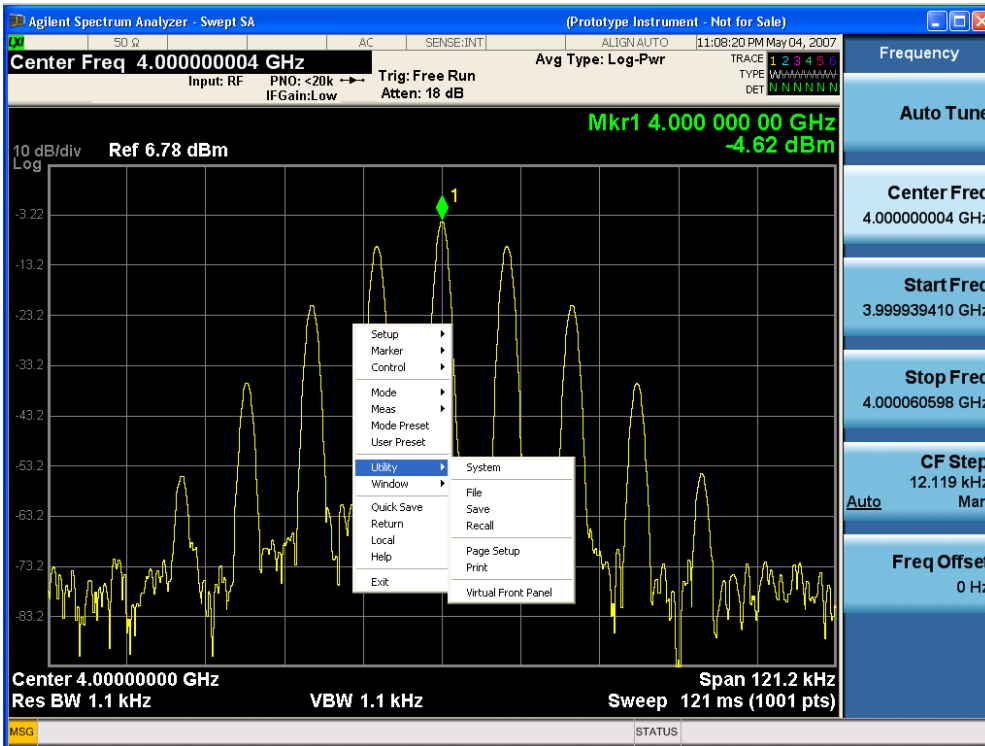
If you do not have access to the instrument front-panel, there are several ways that a mouse and PC Keyboard can give you access to functions normally accessed using the front-panel keys.

Right-Click

If you plug in a mouse and right-click on the analyzer screen, a menu will appear as below:

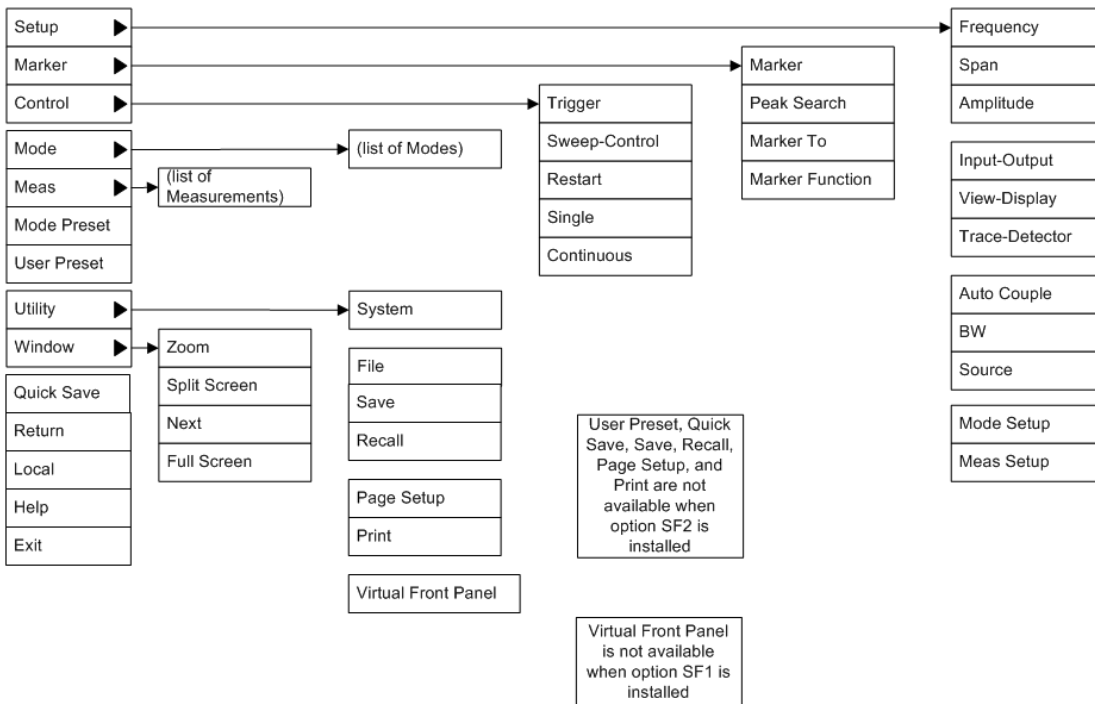


Placing the mouse on one of the rows marked with a right arrow symbol will cause that row to expand, as for example below where the mouse is hovered over the “Utility” row:



This method can be used to access any of the front-panel keys by using a mouse; as for example if you are accessing the instrument through Remote Desktop.

The array of keys thus available is shown below:



PC Keyboard

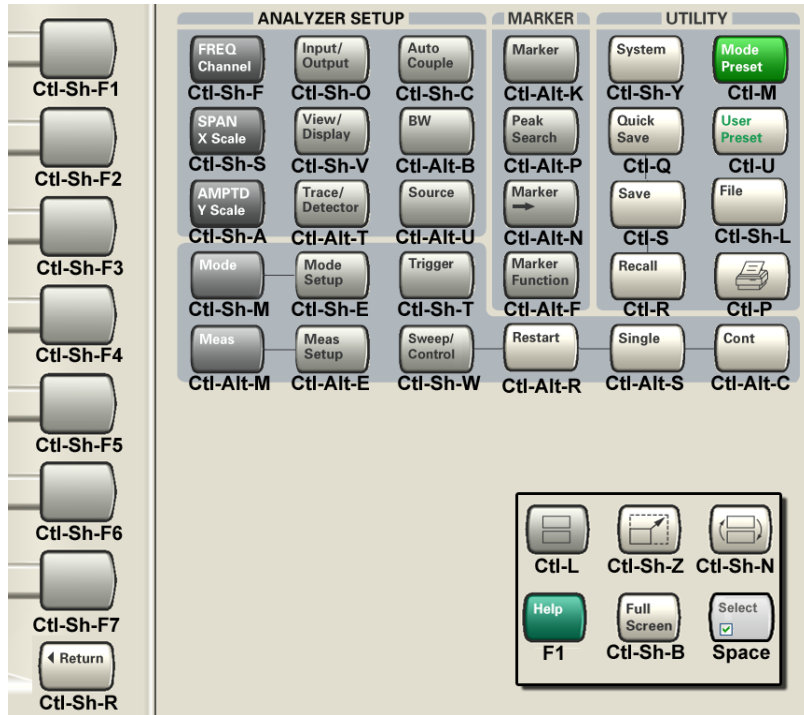
If you have a PC keyboard plugged in (or via Remote Desktop), certain key codes on the PC keyboard map to front-panel keys on the GPSA front panel. These key codes are shown below:

Front-panel key	Key code
Frequency	CTRL+SHIFT+F
Span	CTRL+SHIFT+S
Amplitude	CTRL+SHIFT+A
Input/Output	CTRL+SHIFT+O
View/Display	CTRL+SHIFT+V
Trace/Detector	CTRL+ALT+T
Auto Couple	CTRL+SHIFT+C
Bandwidth	CTRL+ALT+B
Source	CTRL+ALT-U
Marker	CTRL+ALT+K
Peak Search	CTRL+ALT+P
Marker To	CTRL+ALT+N
Marker Function	CTRL+ALT+F
System	CTRL+SHIFT+Y
Quick Save	CTRL+Q
Save	CTRL+S
Recall	CTRL+R
Mode Preset	CTRL+M
User Preset	CTRL+U
Print	CTRL+P
File	CTRL+SHIFT+L
Mode	CTRL+SHIFT+M
Measure	CTRL+ALT+M
Mode Setup	CTRL+SHIFT+E
Meas Setup	CTRL+ALT+E
Trigger	CTRL+SHIFT+T
Sweep/Control	CTRL+SHIFT+W
Restart	CTRL+ALT+R
Single	CTRL+ALT+S
Cont	CTRL+ALT+C
Zoom	CTRL+SHIFT+Z
Next Window	CTRL+SHIFT+N
Split Screen	CTRL+L

Front-panel key	Key code
Full Screen	CTRL+SHIFT+B
Return	CTRL+SHIFT+R
Mute	Mute
Inc Audio	Volume Up
Dec Audio	Volume Down
Help	F1
Control	CTRL
Alt	ALT
Enter	Return
Cancel	Esc
Del	Delete
Backspace	Backspace
Select	Space
Up Arrow	Up
Down Arrow	Down
Left Arrow	Left
Right Arrow	Right
Menu key 1	CTRL+SHIFT+F1
Menu key 2	CTRL+SHIFT+F2
Menu key 3	CTRL+SHIFT+F3
Menu key 4	CTRL+SHIFT+F4
Menu key 5	CTRL+SHIFT+F5
Menu key 6	CTRL+SHIFT+F6
Menu key 7	CTRL+SHIFT+F7
Backspace	BACKSPACE
Enter	ENTER
Tab	Tab
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
0	0

1 About the Analyzer
 Mouse and Keyboard Control

This is a pictorial view of the table:



Instrument Security & Memory Volatility

If you are using the instrument in a secure environment, you may need details of how to clear or sanitize its memory, in compliance with published security standards of the United States Department of Defense, or other similar authorities.

For X-Series analyzers, this information is contained in the document "Security Features and Document of Volatility". This document is not included in the Documentation CD, or the instrument's on-disk library, but it may be downloaded from Keysight's web site.

To obtain a copy of the document, click on or browse to the following URL:

<http://www.agilent.com/find/security>

To locate and download the document, select Model Number "N9020A", then click "Submit". Then, follow the on-screen instructions to download the file.

2 About the GSM/EDGE Measurement Application

This document provides information on using the GSM/EDGE Measurement Application in the Agilent X Series Signal Analyzer.

What Does GSM/EDGE Application Do?

This Mode includes eleven measurements:

- Burst Power
- GMSK Power vs. Time
- GMSK Phase & Frequency
- GMSK Output RF Spectrum
- GMSK Transmit Band Spur
- EDGE Power vs. Time
- EDGE EVM
- EDGE RF Output Spectrum
- EDGE Transmit Band Spur
- Monitor Spectrum
- Waveform

3 Programming the Analyzer

This section provides introductory information about the programming documentation included with your product.

- ["What Programming Information is Available?" on page 104](#)
- ["STATus Subsystem " on page 144](#)
- ["IEEE 488.2 Common Commands" on page 186](#)

What Programming Information is Available?

The X-Series Documentation can be accessed through the Additional Documentation page in the instrument Help system and is included on the Documentation DVD shipped with the instrument. It can also be found online at: http://www.agilent.com/find/mxa_manuals.

The following resources are available to help you create programs for automating your X-Series measurements:

Resource	Description
X-Series Programmer's Guide	<p>Provides general SCPI programming information on the following topics:</p> <ul style="list-style-type: none">• Programming the X-Series Applications• Programming fundamentals• Programming examples <p>Note that SCPI command descriptions for measurement applications are not in this book, but are in the User's and Programmer's Reference.</p>
User's and Programmer's Reference manuals	<p>Describes all front-panel keys and softkeys, including SCPI commands for a measurement application. Note that:</p> <ul style="list-style-type: none">• Each measurement application has its own User's and Programmer's Reference.• The content in this manual is duplicated in the instrument's Help (the Help that you see for a key is identical to what you see in this manual).
Embedded Help in your instrument	<p>Describes all front-panel keys and softkeys, including SCPI commands, for a measurement application. Note that the content that you see in Help when you press a key is identical to what you see in the User's and Programmer's Reference.</p>
X-Series Getting Started Guide	<p>Provides valuable sections related to programming including:</p> <ul style="list-style-type: none">• Licensing New Measurement Application Software - After Initial Purchase• Configuring instrument LAN Hostname, IP Address, and Gateway Address• Using the Windows Remote Desktop to connect to the instrument remotely• Using the Embedded Web Server Telnet connection to communicate SCPI <p>This printed document is shipped with the instrument.</p>
Keysight Application Notes	<p>Printable PDF versions of pertinent application notes.</p>
Keysight VISA User's Guide	<p>Describes the Keysight Virtual Instrument Software Architecture (VISA) library and shows how to use it to develop I/O applications and instrument drivers on Windows PCs.</p>

List of SCPI Commands

```

*CAL?
*CLS
*ESE <integer>
*ESE?
*ESR?
*IDN?
*OPC
*OPC?
*OPT?
*RCL <register#>
*RST
*SAV <register#>
*SRE <integer>
*SRE?
*STB?
*TRG
*TST?
*WAI
ABORT
CALCulate:BPOWer:MARKer:AOff
CALCulate:BPOWer:MARKer[1]|2|...|12:FUNCTION:RESult?
CALCulate:BPOWer:MARKer[1]|2|...|12:MODE
CALCulate:BPOWer:MARKer[1]|2|...|12:TRACe
CALCulate:BPOWer:MARKer[1]|2|...|12:X:POSition
CALCulate:BPOWer:MARKer[1]|2|...|12:Y?
CALCulate:CLIMits:FAIL?
CALCulate:DATA<n>:COMPRESS? BLOCK | CFIT | MAXimum | MINimum | MEAN |
DMEan | RMS | RMSCuBEd | SAMPLe | SDEVIation | PPHase[, <soffset>[,
<length>[, <roffset>[, <rlimit>]]]]
CALCulate:DATA[n]?
CALCulate:DATA[1]|2|...|6:PEAKs? <threshold>, <excursion>[, AMPLitude |
FREQuency | TIME[, ALL | GTDLIne | LTDLine]]
CALCulate:DATA[1]|2|...|6:PEAKs? <threshold>, <excursion>[, AMPLitude |
FREQuency | TIME]
CALCulate:EEVM:LIMit:BTS:EXTRemE:EVMP95 <real>
CALCulate:EEVM:LIMit:BTS:EXTRemE:EVMP95?
CALCulate:EEVM:LIMit:BTS:EXTRemE:FERRor <real>
CALCulate:EEVM:LIMit:BTS:EXTRemE:FERRor?
CALCulate:EEVM:LIMit:BTS:EXTRemE:IQOOffset <real>
CALCulate:EEVM:LIMit:BTS:EXTRemE:IQOOffset?
CALCulate:EEVM:LIMit:BTS:EXTRemE:PEVM <real>
CALCulate:EEVM:LIMit:BTS:EXTRemE:PEVM?
CALCulate:EEVM:LIMit:BTS:EXTRemE:PPERror GMSK, <real>
CALCulate:EEVM:LIMit:BTS:EXTRemE:PPERror? GMSK
CALCulate:EEVM:LIMit:BTS:EXTRemE:REVM <real>
CALCulate:EEVM:LIMit:BTS:EXTRemE:REVM?
CALCulate:EEVM:LIMit:BTS:EXTRemE:REVM:HSRate QPSK, <real>
CALCulate:EEVM:LIMit:BTS:EXTRemE:REVM:HSRate QAM32, <real>
CALCulate:EEVM:LIMit:BTS:EXTRemE:REVM:HSRate QAM16, <real>
CALCulate:EEVM:LIMit:BTS:EXTRemE:REVM:HSRate? QPSK

```

```
CALCulate:EEVM:LIMit:BTS:EXTRemE:REVM:HSRate? QAM16
CALCulate:EEVM:LIMit:BTS:EXTRemE:REVM:HSRate? QAM32
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CALCulate:EEVM:LIMit:BTS:EXTRemE:REVM:NSRate? AQPSK1
CALCulate:EEVM:LIMit:BTS:EXTRemE:REVM:NSRate? AQPSK
CALCulate:EEVM:LIMit:BTS:EXTRemE:REVM:NSRate? QAM32
CALCulate:EEVM:LIMit:BTS:EXTRemE:REVM:NSRate? QAM16
CALCulate:EEVM:LIMit:BTS:EXTRemE:REVM:NSRate? AQPSK2
CALCulate:EEVM:LIMit:BTS:EXTRemE:RPError GMSK, <real>
CALCulate:EEVM:LIMit:BTS:EXTRemE:RPError? GMSK
CALCulate:EEVM:LIMit:BTS:NORMal:EVMP95 <real>
CALCulate:EEVM:LIMit:BTS:NORMal:EVMP95?
CALCulate:EEVM:LIMit:BTS:NORMal:FError <real>
CALCulate:EEVM:LIMit:BTS:NORMal:FError?
CALCulate:EEVM:LIMit:BTS:NORMal:IQOffset <real>
CALCulate:EEVM:LIMit:BTS:NORMal:IQOffset?
CALCulate:EEVM:LIMit:BTS:NORMal:PEVM <real>
CALCulate:EEVM:LIMit:BTS:NORMal:PEVM?
CALCulate:EEVM:LIMit:BTS:NORMal:PPERror GMSK, <real>
CALCulate:EEVM:LIMit:BTS:NORMal:PPERror? GMSK
CALCulate:EEVM:LIMit:BTS:NORMal:REVM <real>
CALCulate:EEVM:LIMit:BTS:NORMal:REVM?
CALCulate:EEVM:LIMit:BTS:NORMal:REVM:HSRate QAM16, <real>
CALCulate:EEVM:LIMit:BTS:NORMal:REVM:HSRate QAM32, <real>
CALCulate:EEVM:LIMit:BTS:NORMal:REVM:HSRate QPSK, <real>
CALCulate:EEVM:LIMit:BTS:NORMal:REVM:HSRate? QAM16
CALCulate:EEVM:LIMit:BTS:NORMal:REVM:HSRate? QPSK
CALCulate:EEVM:LIMit:BTS:NORMal:REVM:HSRate? QAM32
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CALCulate:EEVM:LIMit:BTS:NORMal:REVM:NSRate AQPSK1, <real>
CALCulate:EEVM:LIMit:BTS:NORMal:REVM:NSRate AQPSK, <real>
CALCulate:EEVM:LIMit:BTS:NORMal:REVM:NSRate? QAM16
CALCulate:EEVM:LIMit:BTS:NORMal:REVM:NSRate? AQPSK1
CALCulate:EEVM:LIMit:BTS:NORMal:REVM:NSRate? AQPSK2
CALCulate:EEVM:LIMit:BTS:NORMal:REVM:NSRate? AQPSK
CALCulate:EEVM:LIMit:BTS:NORMal:REVM:NSRate? QAM32
CALCulate:EEVM:LIMit:BTS:NORMal:RPError GMSK, <real>
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CALCulate:EEVM:LIMit:MBTS:EXTRemE:FError <real>
CALCulate:EEVM:LIMit:MBTS:EXTRemE:FError?
CALCulate:EEVM:LIMit:MBTS:NORMal:FError <real>
CALCulate:EEVM:LIMit:MBTS:NORMal:FError?
CALCulate:EEVM:LIMit:MS:EXTRemE:EVMP95 <real>
CALCulate:EEVM:LIMit:MS:EXTRemE:EVMP95?
CALCulate:EEVM:LIMit:MS:EXTRemE:FError <real>
CALCulate:EEVM:LIMit:MS:EXTRemE:FError?
CALCulate:EEVM:LIMit:MS:EXTRemE:IQOffset <real>
```

```

CALCulate:EEVM:LIMit:MS:EXTRemE:IQOOffset?
CALCulate:EEVM:LIMit:MS:EXTRemE:PEVM <real>
CALCulate:EEVM:LIMit:MS:EXTRemE:PEVM?
CALCulate:EEVM:LIMit:MS:EXTRemE:PPERror GMSK, <real>
CALCulate:EEVM:LIMit:MS:EXTRemE:PPERror? GMSK
CALCulate:EEVM:LIMit:MS:EXTRemE:REVM <real>
CALCulate:EEVM:LIMit:MS:EXTRemE:REVM?
CALCulate:EEVM:LIMit:MS:EXTRemE:REVM:HSRate QAM32, <real>
CALCulate:EEVM:LIMit:MS:EXTRemE:REVM:HSRate QPSK, <real>
CALCulate:EEVM:LIMit:MS:EXTRemE:REVM:HSRate QAM16, <real>
CALCulate:EEVM:LIMit:MS:EXTRemE:REVM:HSRate? QAM32
CALCulate:EEVM:LIMit:MS:EXTRemE:REVM:HSRate? QPSK
CALCulate:EEVM:LIMit:MS:EXTRemE:REVM:HSRate? QAM16
CALCulate:EEVM:LIMit:MS:EXTRemE:REVM:NSRate QAM16, <real>
CALCulate:EEVM:LIMit:MS:EXTRemE:REVM:NSRate QAM32, <real>
CALCulate:EEVM:LIMit:MS:EXTRemE:REVM:NSRate? QAM32
CALCulate:EEVM:LIMit:MS:EXTRemE:REVM:NSRate? QAM16
CALCulate:EEVM:LIMit:MS:EXTRemE:RPERror GMSK, <real>
CALCulate:EEVM:LIMit:MS:EXTRemE:RPERror? GMSK
CALCulate:EEVM:LIMit:MS:NORMal:EVMP95 <real>
CALCulate:EEVM:LIMit:MS:NORMal:EVMP95?
CALCulate:EEVM:LIMit:MS:NORMal:FERRor <real>
CALCulate:EEVM:LIMit:MS:NORMal:FERRor?
CALCulate:EEVM:LIMit:MS:NORMal:IQOOffset <real>
CALCulate:EEVM:LIMit:MS:NORMal:IQOOffset?
CALCulate:EEVM:LIMit:MS:NORMal:PEVM <real>
CALCulate:EEVM:LIMit:MS:NORMal:PEVM?
CALCulate:EEVM:LIMit:MS:NORMal:PPERror GMSK, <real>
CALCulate:EEVM:LIMit:MS:NORMal:PPERror? GMSK
CALCulate:EEVM:LIMit:MS:NORMal:REVM <real>
CALCulate:EEVM:LIMit:MS:NORMal:REVM?
CALCulate:EEVM:LIMit:MS:NORMal:REVM:HSRate QAM16, <real>
CALCulate:EEVM:LIMit:MS:NORMal:REVM:HSRate QAM32, <real>
CALCulate:EEVM:LIMit:MS:NORMal:REVM:HSRate QPSK, <real>
CALCulate:EEVM:LIMit:MS:NORMal:REVM:HSRate? QAM16
CALCulate:EEVM:LIMit:MS:NORMal:REVM:HSRate? QAM32
CALCulate:EEVM:LIMit:MS:NORMal:REVM:HSRate? QPSK
CALCulate:EEVM:LIMit:MS:NORMal:REVM:NSRate QAM32, <real>
CALCulate:EEVM:LIMit:MS:NORMal:REVM:NSRate QAM16, <real>
CALCulate:EEVM:LIMit:MS:NORMal:REVM:NSRate? QAM32
CALCulate:EEVM:LIMit:MS:NORMal:REVM:NSRate? QAM16
CALCulate:EEVM:LIMit:MS:NORMal:RPERror GMSK, <real>
CALCulate:EEVM:LIMit:MS:NORMal:RPERror? GMSK
CALCulate:EEVM:LIMit:PBTS:EXTRemE:FERRor <real>
CALCulate:EEVM:LIMit:PBTS:EXTRemE:FERRor?
CALCulate:EEVM:LIMit:PBTS:NORMal:FERRor <real>
CALCulate:EEVM:LIMit:PBTS:NORMal:FERRor?
CALCulate:EEVM:LIMit:TEST[:STATe] OFF | ON | 0 | 1
CALCulate:EEVM:LIMit:TEST[:STATe]?
CALCulate:EEVM:LIMit:TYPE NORMal | EXTRemE
CALCulate:EEVM:LIMit:TYPE?
CALCulate:EEVM:MARKer:AOff
CALCulate:EEVM:MARKer:COUPle[:STATe] ON | OFF | 1 | 0

```

```
CALCulate:EEVM:MARKer:COUple[:STATE]?  
CALCulate:EEVM:MARKer[1]|2|...4:FUNCTion:RESult?  
CALCulate:EEVM:MARKer[1]|2|...12:MAXimum  
CALCulate:EEVM:MARKer[1]|2|...12:MINimum  
CALCulate:EEVM:MARKer[1]|2|...12:REFerence <integer>  
CALCulate:EEVM:MARKer[1]|2|...12:REFerence?  
CALCulate:EEVM:MARKer[1]|2|...12:STATE OFF | ON | 0 | 1  
CALCulate:EEVM:MARKer[1]|2|...12:STATE?  
CALCulate:EEVM:MARKer[1]|2|...12:TRACe POLar | MERRor | PERRor | EVM |  
MAXMerror | MINMerror | MAXPerror | MINPerror | MAXEvm | MINEvm  
CALCulate:EEVM:MARKer[1]|2|...12:TRACe?  
CALCulate:EEVM:MARKer[1]|2|...12:X <real>  
CALCulate:EEVM:MARKer[1]|2|...12:X?  
CALCulate:EEVM:MARKer[1]|2|...12:X:POSition <integer>  
CALCulate:EEVM:MARKer[1]|2|...12:X:POSition?  
CALCulate:EEVM:MARKer[1]|2|...12:Y?  
CALCulate:EORFspectr:MARKer:AOFF  
CALCulate:EORFspectr:MARKer:COUple[:STATE] ON | OFF | 1 | 0  
CALCulate:EORFspectr:MARKer:COUple[:STATE]?  
CALCulate:EORFspectr:MARKer[1]|2|...4:FUNCTion:RESult?  
CALCulate:EORFspectr:MARKer[1]|2|...12:MAXimum  
CALCulate:EORFspectr:MARKer[1]|2|...12:MINimum  
CALCulate:EORFspectr:MARKer[1]|2|...12:MODE POSition | DELTA | OFF  
CALCulate:EORFspectr:MARKer[1]|2|...12:MODE?  
CALCulate:EORFspectr:MARKer[1]|2|...12:REFerence <integer>  
CALCulate:EORFspectr:MARKer[1]|2|...12:REFerence?  
CALCulate:EORFspectr:MARKer[1]|2|...12:STATE OFF | ON | 0 | 1  
CALCulate:EORFspectr:MARKer[1]|2|...12:STATE?  
CALCulate:EORFspectr:MARKer[1]|2|...12:TRACe RFEMod | RFESwitching |  
SPEMod | LIMMod  
CALCulate:EORFspectr:MARKer[1]|2|...12:TRACe?  
CALCulate:EORFspectr:MARKer[1]|2|...12:X <real>  
CALCulate:EORFspectr:MARKer[1]|2|...12:X?  
CALCulate:EORFspectr:MARKer[1]|2|...12:X:POSition <integer>  
CALCulate:EORFspectr:MARKer[1]|2|...12:X:POSition?  
CALCulate:EORFspectr:MARKer[1]|2|...12:Y?  
CALCulate:EPVTime:LIMit:TEST[:STATE] OFF | ON | 0 | 1  
CALCulate:EPVTime:LIMit:TEST[:STATE]?  
CALCulate:EPVTime:MARKer:AOFF  
CALCulate:EPVTime:MARKer:COUple[:STATE] ON | OFF | 1 | 0  
CALCulate:EPVTime:MARKer:COUple[:STATE]?  
CALCulate:EPVTime:MARKer[1]|2|...4:FUNCTion:RESult?  
CALCulate:EPVTime:MARKer[1]|2|...12:MAXimum  
CALCulate:EPVTime:MARKer[1]|2|...12:MINimum  
CALCulate:EPVTime:MARKer[1]|2|...12:MODE POSition | DELTA | OFF  
CALCulate:EPVTime:MARKer[1]|2|...12:MODE?  
CALCulate:EPVTime:MARKer[1]|2|...12:REFerence <integer>  
CALCulate:EPVTime:MARKer[1]|2|...12:REFerence?  
CALCulate:EPVTime:MARKer[1]|2|...12:STATE OFF | ON | 0 | 1  
CALCulate:EPVTime:MARKer[1]|2|...12:STATE?  
CALCulate:EPVTime:MARKer[1]|2|...12:TRACe RFENvelope | UMASK | LMASK |  
MAXRfenvelop | MINRfenvelop
```

```

CALCulate:EPVTime:MARKer[1]|2|...12:TRACe?
CALCulate:EPVTime:MARKer[1]|2|...12:X <real>
CALCulate:EPVTime:MARKer[1]|2|...12:X?
CALCulate:EPVTime:MARKer[1]|2|...12:X:POSition <integer>
CALCulate:EPVTime:MARKer[1]|2|...12:X:POSition?
CALCulate:EPVTime:MARKer[1]|2|...12:Y?
CALCulate:ETSPur:LIMit:TEST ABSolute | RELative
CALCulate:ETSPur:LIMit:TEST?
CALCulate:ETSPur:LIMit[:UPPer][:DATA] <real>
CALCulate:ETSPur:LIMit[:UPPer][:DATA]?
CALCulate:ETSPur:MARKer:AOFF
CALCulate:ETSPur:MARKer:COUPle[:STATe] ON | OFF | 1 | 0
CALCulate:ETSPur:MARKer:COUPle[:STATe]?
CALCulate:ETSPur:MARKer[1]|2|...4:FUNCTion:RESult?
CALCulate:ETSPur:MARKer[1]|2|...12:MAXimum
CALCulate:ETSPur:MARKer[1]|2|...12:MINimum
CALCulate:ETSPur:MARKer[1]|2|...12:MODE POSition | DELTa | OFF
CALCulate:ETSPur:MARKer[1]|2|...12:MODE?
CALCulate:ETSPur:MARKer[1]|2|...12:REFerence <integer>
CALCulate:ETSPur:MARKer[1]|2|...12:REFerence?
CALCulate:ETSPur:MARKer[1]|2|...12:STATE OFF | ON | 0 | 1
CALCulate:ETSPur:MARKer[1]|2|...12:STATE?
CALCulate:ETSPur:MARKer[1]|2|...12:TRACe SPECTrum | ULIMit
CALCulate:ETSPur:MARKer[1]|2|...12:TRACe?
CALCulate:ETSPur:MARKer[1]|2|...12:X <real>
CALCulate:ETSPur:MARKer[1]|2|...12:X?
CALCulate:ETSPur:MARKer[1]|2|...12:X:POSition <integer>
CALCulate:ETSPur:MARKer[1]|2|...12:X:POSition?
CALCulate:ETSPur:MARKer[1]|2|...12:Y?
CALCulate:MONitor:MARKer:AOFF
CALCulate:MONitor:MARKer:COUPle[:STATe] ON | OFF | 1 | 0
CALCulate:MONitor:MARKer:COUPle[:STATe]?
CALCulate:MONitor:MARKer[1]|2|...|12:FUNCTion NOISe | BPOWer | BDENsity |
OFF
CALCulate:MONitor:MARKer[1]|2|...|12:FUNCTion?
CALCulate:MONitor:MARKer[1]|2|...|12:FUNCTion:BAND:LEFT <freq>
CALCulate:MONitor:MARKer[1]|2|...|12:FUNCTion:BAND:LEFT?
CALCulate:MONitor:MARKer[1]|2|...|12:FUNCTion:BAND:RIGHT <freq>
CALCulate:MONitor:MARKer[1]|2|...|12:FUNCTion:BAND:RIGHT?
CALCulate:MONitor:MARKer[1]|2|...|12:FUNCTion:BAND:SPAN <freq>
CALCulate:MONitor:MARKer[1]|2|...|12:FUNCTion:BAND:SPAN?
CALCulate:MONitor:MARKer[1]|2|...|12:FUNCTion:RESult?
CALCulate:MONitor:MARKer[1]|2|...|12:MAXimum
CALCulate:MONitor:MARKer[1]|2|...|12:MODE POSition | DELTa | OFF
CALCulate:MONitor:MARKer[1]|2|...|12:MODE?
CALCulate:MONitor:MARKer[1]|2|...|12:REFerence <integer>
CALCulate:MONitor:MARKer[1]|2|...|12:REFerence?
CALCulate:MONitor:MARKer[1]|2|...|12:TRACe <integer>
CALCulate:MONitor:MARKer[1]|2|...|12:TRACe?
CALCulate:MONitor:MARKer[1]|2|...|12:X <freq>
CALCulate:MONitor:MARKer[1]|2|...|12:X?
CALCulate:MONitor:MARKer[1]|2|...|12:X:POSition <real>
CALCulate:MONitor:MARKer[1]|2|...|12:X:POSition?

```

```

CALCulate:MONitor:MARKer[1]|2|...|12:Y?
CALCulate:ORFSpectrum:MARKer:AOff
CALCulate:ORFSpectrum:MARKer:COUple[:STATE] ON | OFF | 1 | 0
CALCulate:ORFSpectrum:MARKer:COUple[:STATE]?
CALCulate:ORFSpectrum:MARKer[1]|2|...|4:FUNction:RESult?
CALCulate:ORFSpectrum:MARKer[1]|2|...|12:MAXimum
CALCulate:ORFSpectrum:MARKer[1]|2|...|12:MINimum
CALCulate:ORFSpectrum:MARKer[1]|2|...|12:MODE POSition | DELTa | OFF
CALCulate:ORFSpectrum:MARKer[1]|2|...|12:MODE?
CALCulate:ORFSpectrum:MARKer[1]|2|...|12:REFerence <integer>
CALCulate:ORFSpectrum:MARKer[1]|2|...|12:REFerence?
CALCulate:ORFSpectrum:MARKer[1]|2|...|12:TRACe RFEMod | RFESwitching |
SPEMod | LIMMod
CALCulate:ORFSpectrum:MARKer[1]|2|...|12:TRACe?
CALCulate:ORFSpectrum:MARKer[1]|2|...|12:X <real>
CALCulate:ORFSpectrum:MARKer[1]|2|...|12:X?
CALCulate:ORFSpectrum:MARKer[1]|2|...|12:X:POSition <integer>
CALCulate:ORFSpectrum:MARKer[1]|2|...|12:X:POSition?
CALCulate:ORFSpectrum:MARKer[1]|2|...|12:Y?
CALCulate:PFError:LIMit:BTS:FERRor <real>
CALCulate:PFError:LIMit:BTS:FERRor?
CALCulate:PFError:LIMit:BTS:PPHase <real>
CALCulate:PFError:LIMit:BTS:PPHase?
CALCulate:PFError:LIMit:BTS:RPHase <real>
CALCulate:PFError:LIMit:BTS:RPHase?
CALCulate:PFError:LIMit:MBTS:FERRor <real>
CALCulate:PFError:LIMit:MBTS:FERRor?
CALCulate:PFError:LIMit:MS:FERRor <real>
CALCulate:PFError:LIMit:MS:FERRor?
CALCulate:PFError:LIMit:MS:PPHase <real>
CALCulate:PFError:LIMit:MS:PPHase?
CALCulate:PFError:LIMit:MS:RPHase <real>
CALCulate:PFError:LIMit:MS:RPHase?
CALCulate:PFError:LIMit:PBTS:FERRor <real>
CALCulate:PFError:LIMit:PBTS:FERRor?
CALCulate:PFError:LIMit:TEST[:STATE] OFF | ON | 0 | 1
CALCulate:PFError:LIMit:TEST[:STATE]?
CALCulate:PFError:MARKer:AOff
CALCulate:PFError:MARKer:COUple[:STATE] ON | OFF | 1 | 0
CALCulate:PFError:MARKer:COUple[:STATE]?
CALCulate:PFError:MARKer[1]|2|...|4:FUNction:RESult?
CALCulate:PFError:MARKer[1]|2|...|12:MAXimum
CALCulate:PFError:MARKer[1]|2|...|12:MODE POSition | DELTa | OFF
CALCulate:PFError:MARKer[1]|2|...|12:MODE?
CALCulate:PFError:MARKer[1]|2|...|12:REFerence <integer>
CALCulate:PFError:MARKer[1]|2|...|12:REFerence?
CALCulate:PFError:MARKer[1]|2|...|12:TRACe PERRor | PFError | RFENvelope |
POLar
CALCulate:PFError:MARKer[1]|2|...|12:TRACe?
CALCulate:PFError:MARKer[1]|2|...|12:X <real>
CALCulate:PFError:MARKer[1]|2|...|12:X?
CALCulate:PFError:MARKer[1]|2|...|12:X:POSition <integer>
CALCulate:PFError:MARKer[1]|2|...|12:X:POSition?

```

```

CALCulate:PFError:MARKer[1]|2|...12:Y?
CALCulate:PVTime:LIMit:TEST[:STATE] OFF | ON | 0 | 1
CALCulate:PVTime:LIMit:TEST[:STATE]?
CALCulate:PVTime:MARKer:AOff
CALCulate:PVTime:MARKer:COUple[:STATE] ON | OFF | 1 | 0
CALCulate:PVTime:MARKer:COUple[:STATE]?
CALCulate:PVTime:MARKer[1]|2|...4:FUNction:RESult?
CALCulate:PVTime:MARKer[1]|2|...12:MAXimum
CALCulate:PVTime:MARKer[1]|2|...12:MINimum
CALCulate:PVTime:MARKer[1]|2|...12:MODE POSition | DELTa | OFF
CALCulate:PVTime:MARKer[1]|2|...12:MODE?
CALCulate:PVTime:MARKer[1]|2|...12:REFerence <integer>
CALCulate:PVTime:MARKer[1]|2|...12:REFerence?
CALCulate:PVTime:MARKer[1]|2|...12:STATE OFF | ON | 0 | 1
CALCulate:PVTime:MARKer[1]|2|...12:STATE?
CALCulate:PVTime:MARKer[1]|2|...12:TRACe RFENvelope | UMASK | LMASK |
MAXRfenvelop | MINRfenvelop
CALCulate:PVTime:MARKer[1]|2|...12:TRACe?
CALCulate:PVTime:MARKer[1]|2|...12:X <real>
CALCulate:PVTime:MARKer[1]|2|...12:X?
CALCulate:PVTime:MARKer[1]|2|...12:X:POSition <integer>
CALCulate:PVTime:MARKer[1]|2|...12:X:POSition?
CALCulate:PVTime:MARKer[1]|2|...12:Y?
CALCulate:TSPur:LIMit:TEST ABSolute | RELative
CALCulate:TSPur:LIMit:TEST?
CALCulate:TSPur:LIMit[:UPPer][:DATA] <real>
CALCulate:TSPur:LIMit[:UPPer][:DATA]?
CALCulate:TSPur:MARKer:AOff
CALCulate:TSPur:MARKer:COUple[:STATE] ON | OFF | 1 | 0
CALCulate:TSPur:MARKer:COUple[:STATE]?
CALCulate:TSPur:MARKer[1]|2|...4:FUNction:RESult?
CALCulate:TSPur:MARKer[1]|2|...12:MAXimum
CALCulate:TSPur:MARKer[1]|2|...12:MODE POSition | DELTa | OFF
CALCulate:TSPur:MARKer[1]|2|...12:MODE?
CALCulate:TSPur:MARKer[1]|2|...12:REFerence <integer>
CALCulate:TSPur:MARKer[1]|2|...12:REFerence?
CALCulate:TSPur:MARKer[1]|2|...12:STATE OFF | ON | 0 | 1
CALCulate:TSPur:MARKer[1]|2|...12:STATE?
CALCulate:TSPur:MARKer[1]|2|...12:TRACe SPECTrum | ULIMit
CALCulate:TSPur:MARKer[1]|2|...12:TRACe?
CALCulate:TSPur:MARKer[1]|2|...12:X <real>
CALCulate:TSPur:MARKer[1]|2|...12:X?
CALCulate:TSPur:MARKer[1]|2|...12:X:POSition <integer>
CALCulate:TSPur:MARKer[1]|2|...12:X:POSition?
CALCulate:TSPur:MARKer[1]|2|...12:Y?
CALCulate:TXPower:MARKer:AOff
CALCulate:TXPower:MARKer:COUple[:STATE] ON | OFF | 1 | 0
CALCulate:TXPower:MARKer:COUple[:STATE]?
CALCulate:TXPower:MARKer[1]|2|...|12:FUNction:RESult?
CALCulate:TXPower:MARKer[1]|2|...|12:MAXimum
CALCulate:TXPower:MARKer[1]|2|...|12:MODE POSition | DELTa | OFF
CALCulate:TXPower:MARKer[1]|2|...|12:MODE?
CALCulate:TXPower:MARKer[1]|2|...|12:REFerence <integer>

```

3 Programming the Analyzer

List of SCPI Commands

```
CALCulate:TXPower:MARKer[1]|2|...|12:REfERENCE?
CALCulate:TXPower:MARKer[1]|2|...|12:TRACe RFENvelope | MAXHold | MINHold
CALCulate:TXPower:MARKer[1]|2|...|12:TRACe?
CALCulate:TXPower:MARKer[1]|2|...|12:X:POSition <real>
CALCulate:TXPower:MARKer[1]|2|...|12:X:POSition?
CALCulate:TXPower:MARKer[1]|2|...|12:Y?
CALCulate:WAVeform:MARKer:AOFF
CALCulate:WAVeform:MARKer:COUple[:STATe] ON | OFF | 1 | 0
CALCulate:WAVeform:MARKer:COUple[:STATe]?
CALCulate:WAVeform:MARKer[1]|2|...|12:FUNCTion BPOWER | BDENsity | OFF
CALCulate:WAVeform:MARKer[1]|2|...|12:FUNCTion?
CALCulate:WAVeform:MARKer[1]|2|...|12:FUNCTion:BAND:LEfT <time>
CALCulate:WAVeform:MARKer[1]|2|...|12:FUNCTion:BAND:LEfT?
CALCulate:WAVeform:MARKer[1]|2|...|12:FUNCTion:BAND:RIgHT <time>
CALCulate:WAVeform:MARKer[1]|2|...|12:FUNCTion:BAND:RIgHT?
CALCulate:WAVeform:MARKer[1]|2|...|12:FUNCTion:BAND:SPAN <time>
CALCulate:WAVeform:MARKer[1]|2|...|12:FUNCTion:BAND:SPAN?
CALCulate:WAVeform:MARKer[1]|2|...|12:FUNCTion:RESult?
CALCulate:WAVeform:MARKer[1]|2|...|12:MAXimum
CALCulate:WAVeform:MARKer[1]|2|...|12:MAXimum:NEXT
CALCulate:WAVeform:MARKer[1]|2|...|12:MINimum
CALCulate:WAVeform:MARKer[1]|2|...|12:MODE POSition | DELTA | OFF
CALCulate:WAVeform:MARKer[1]|2|...|12:MODE?
CALCulate:WAVeform:MARKer[1]|2|...|12:REfERENCE <integer>
CALCulate:WAVeform:MARKer[1]|2|...|12:REfERENCE?
CALCulate:WAVeform:MARKer[1]|2|...|12:STATE OFF | ON | 0 | 1
CALCulate:WAVeform:MARKer[1]|2|...|12:STATE?
CALCulate:WAVeform:MARKer[1]|2|...|12:TRACe RFENvelope | I | Q | IQ
CALCulate:WAVeform:MARKer[1]|2|...|12:TRACe?
CALCulate:WAVeform:MARKer[1]|2|...|12:X <time>
CALCulate:WAVeform:MARKer[1]|2|...|12:X?
CALCulate:WAVeform:MARKer[1]|2|...|12:X:POSition <real>
CALCulate:WAVeform:MARKer[1]|2|...|12:X:POSition?
CALCulate:WAVeform:MARKer[1]|2|...|4:X:SPAN
CALCulate:WAVeform:MARKer[1]|2|...|12:Y?
CALibration[:ALL]
CALibration[:ALL]?
CALibration:AUTO ALERt
CALibration:AUTO ON | PARTial | OFF
CALibration:AUTO?
CALibration:AUTO:ALERt TTEMPerature | DAY | WEEK | NONE
CALibration:AUTO:ALERt?
CALibration:AUTO:MODE ALL | NRF
CALibration:AUTO:MODE?
CALibration:AUTO:TIME:OFF?
CALibration:DATA:BACKup <filename>
CALibration:DATA:DEFault
CALibration:DATA:REStore <filename>
CALibration:EXPIred?
CALibration:FREQuency:REfERENCE:COARse <integer>
CALibration:FREQuency:REfERENCE:COARse
CALibration:FREQuency:REfERENCE:COARse?
CALibration:FREQuency:REfERENCE:FINE <integer>
```



```

CALibration:FREQuency:REFErence:FINE?
CALibration:FREQuency:REFErence:MODE CALibrated | USER
CALibration:FREQuency:REFErence:MODE?
CALibration:IQ:FLATness:I
CALibration:IQ:FLATness:IBAR
CALibration:IQ:FLATness:I | IBAR | Q | QBAR:TIME?
CALibration:IQ:FLATness:Q
CALibration:IQ:FLATness:QBAR
CALibration:IQ:ISOLation
CALibration:IQ:ISOLation:TIME?
CALibration:IQ:PROBE:I
CALibration:IQ:PROBE:IBar
CALibration:IQ:PROBE:I | IBAR | Q | QBAR:TIME?
CALibration:IQ:PROBE:I | Q:CLEar
CALibration:IQ:PROBE:Q
CALibration:IQ:PROBE:QBar
CALibration:NFLoor
CALibration:NFLoor?
CALibration:NRF
CALibration:NRF?
CALibration:REFErence:CLOCK?
CALibration:REFErence:CLOCK:END?
CALibration:REFErence:CLOCK:INITialize?
CALibration:RF
CALibration:RF?
CALibration:RFPSelector:ALERT ON | OFF | 0 | 1
CALibration:RFPSelector:ALERT?
CALibration:RFPSelector:CONDUCTed
CALibration:RFPSelector:CONDUCTed?
CALibration:RFPSelector:FULL
CALibration:RFPSelector:FULL?
CALibration:RFPSelector:RADiated
CALibration:RFPSelector:RADiated?
CALibration:RFPSelector:SCHEDuler:RECurrence DAY | WEEK | OFF
CALibration:RFPSelector:SCHEDuler:RECurrence?
CALibration:RFPSelector:SCHEDuler:RECurrence:DAY SUN | MON | TUE | WED |
THU | FRI | SAT
CALibration:RFPSelector:SCHEDuler:RECurrence:DAY?
CALibration:RFPSelector:SCHEDuler:RECurrence:WEEK <integer>
CALibration:RFPSelector:SCHEDuler:RECurrence:WEEK?
CALibration:RFPSelector:SCHEDuler:STATE ON | OFF | 0 | 1
CALibration:RFPSelector:SCHEDuler:STATE?
CALibration:RFPSelector:SCHEDuler:TASK T1 | T2 | T3
CALibration:RFPSelector:SCHEDuler:TASK?
CALibration:RFPSelector:SCHEDuler:TIME:NEXT?
CALibration:RFPSelector:SCHEDuler:TIME:START "date", "time"
CALibration:RFPSelector:SCHEDuler:TIME:START?
CALibration:SOURce:STATE OFF | ON | 0 | 1
CALibration:SOURce:STATE?
CALibration:TEMPerature:CURREnt?
CALibration:TEMPerature:LALL?
CALibration:TEMPerature:LPreselector?
CALibration:TEMPerature:LRF?

```

3 Programming the Analyzer

List of SCPI Commands

```
CALibration:TEMPerature:NFLoor?
CALibration:TEMPerature:RFPSelector:LCONducted?
CALibration:TEMPerature:RFPSelector:LRADiated?
CALibration:TIME:ELAPsed:NFLoor?
CALibration:TIME:LALL?
CALibration:TIME:LPReselector?
CALibration:TIME:LRF?
CALibration:TIME:NFLoor?
CALibration:TIME:REFerence:CLOCK?
CALibration:TIME:RFPSelector:LCONducted?
CALibration:TIME:RFPSelector:LRADiated?
CALibration:YTF
CALibration:YTF?
CONF FSC
CONFigure?
CONFigure:EEVM
CONFigure:EEVM
CONFigure:EEVM:NDEFault
CONFigure:EORFspectr
CONFigure:EORFspectr
CONFigure:EORFspectr:NDEFault
CONFigure:EPVTime
CONFigure:EPVTime
CONFigure:EPVTime:NDEFault
CONFigure:ETSPur
CONFigure:ETSPur
CONFigure:ETSPur:NDEFault
CONFigure:MONitor
CONFigure:MONitor
CONFigure:MONitor:NDEFault
CONFigure:ORFSpectrum
CONFigure:ORFSpectrum
CONFigure:ORFSpectrum:NDEFault
CONFigure:PFERror
CONFigure:PFERror
CONFigure:PFERror:NDEFault
CONFigure:PVTime
CONFigure:PVTime
CONFigure:PVTime:NDEFault
CONFigure:TSPur
CONFigure:TSPur
CONFigure:TSPur:NDEFault
CONFigure:TXPower
CONFigure:TXPower|BPOWer
CONFigure:TXPower|BPOWer:NDEFault
CONFigure:WAVEform
CONFigure:WAVEform
CONFigure:WAVEform:NDEFault
COUple ALL | NONE
DISPlay:<measurement>:ANNOtation:TITLe:DATA <string>
DISPlay:<measurement>:ANNOtation:TITLe:DATA?
DISPlay:ACTivefunc[:STATe] ON | OFF | 1 | 0
DISPlay:ACTivefunc[:STATe]?
```

```

DISPlay:ANNotation:MBAR[:STATE] OFF | ON | 0 | 1
DISPlay:ANNotation:MBAR[:STATE]?
DISPlay:ANNotation:SCREen[:STATE] OFF | ON | 0 | 1
DISPlay:ANNotation:SCREen[:STATE]?
DISPlay:BACKlight ON | OFF
DISPlay:BACKlight?
DISPlay:BACKlight:INTensity <integer>
DISPlay:BACKlight:INTensity?
DISPlay:EEVM:SDERotation[:STATE] OFF | ON | 0 | 1
DISPlay:EEVM:SDERotation[:STATE]?
DISPlay:EEVM:SDOTs[:STATE] OFF | ON | 0 | 1
DISPlay:EEVM:SDOTs[:STATE]?
DISPlay:EEVM:TEXT:TFUNit SECond | SYMBol
DISPlay:EEVM:TEXT:TFUNit?
DISPlay:EEVM:VIEW:NSElect <integer>
DISPlay:EEVM:VIEW:NSElect?
DISPlay:EEVM:VIEW[:SElect] POLar | ERRor | DBITs
DISPlay:EEVM:VIEW[:SElect]?
DISPlay:EEVM:VIEW2:WINDow[1]:TRACe:MAXHold[:STATE] ON | OFF | 1 | 0
DISPlay:EEVM:VIEW2:WINDow[1]:TRACe:MAXHold[:STATE]?
DISPlay:EEVM:VIEW2:WINDow[1]:TRACe:MINHold[:STATE] ON | OFF | 1 | 0
DISPlay:EEVM:VIEW2:WINDow[1]:TRACe:MINHold[:STATE]?
DISPlay:EEVM:VIEW[1]:WINDow2:TRACe:POLar VC | VECTor | CONSTln
DISPlay:EEVM:VIEW[1]:WINDow2:TRACe:POLar?
DISPlay:EEVM:VIEW2:WINDow[1]|2|3:TRACe:X[:SCALE]:COUPle ON | OFF | 1 | 0
DISPlay:EEVM:VIEW2:WINDow[1]|2|3:TRACe:X[:SCALE]:COUPle?
DISPlay:EEVM:VIEW2:WINDow[1]|2|3:TRACe:X[:SCALE]:PDIVision <real>
DISPlay:EEVM:VIEW2:WINDow[1]|2|3:TRACe:X[:SCALE]:PDIVision?
DISPlay:EEVM:VIEW2:WINDow[1]|2|3:TRACe:X[:SCALE]:RLEVel <real>
DISPlay:EEVM:VIEW2:WINDow[1]|2|3:TRACe:X[:SCALE]:RLEVel?
DISPlay:EEVM:VIEW2:WINDow[1]|2|3:TRACe:X[:SCALE]:RPOSITION LEFT | CENTER |
RIGHT
DISPlay:EEVM:VIEW2:WINDow[1]|2|3:TRACe:X[:SCALE]:RPOSITION?
DISPlay:EEVM:VIEW2:WINDow[1]|2|3:TRACe:Y[:SCALE]:COUPle ON | OFF | 1 | 0
DISPlay:EEVM:VIEW2:WINDow[1]|2|3:TRACe:Y[:SCALE]:COUPle?
DISPlay:EEVM:VIEW2:WINDow[1]|3:TRACe:Y[:SCALE]:PDIVision <real>
DISPlay:EEVM:VIEW2:WINDow2:TRACe:Y[:SCALE]:PDIVision <real>
DISPlay:EEVM:VIEW2:WINDow2:TRACe:Y[:SCALE]:PDIVision?
DISPlay:EEVM:VIEW2:WINDow[1]|3:TRACe:Y[:SCALE]:PDIVision?
DISPlay:EEVM:VIEW2:WINDow[1]|3:TRACe:Y[:SCALE]:RLEVel <real>
DISPlay:EEVM:VIEW2:WINDow2:TRACe:Y[:SCALE]:RLEVel <real>
DISPlay:EEVM:VIEW2:WINDow[1]|3:TRACe:Y[:SCALE]:RLEVel?
DISPlay:EEVM:VIEW2:WINDow2:TRACe:Y[:SCALE]:RLEVel?
DISPlay:EEVM:VIEW2:WINDow[1]|2|3:TRACe:Y[:SCALE]:RPOSITION TOP | CENTER |
BOTTom
DISPlay:EEVM:VIEW2:WINDow[1]|2|3:TRACe:Y[:SCALE]:RPOSITION?
DISPlay:ENABLE OFF | ON | 0 | 1
DISPlay:ENABLE?
DISPlay:EORFSpectr:VIEW:NSElect <integer>
DISPlay:EORFSpectr:VIEW:NSElect?
DISPlay:EORFSpectr:VIEW[:SElect] RSUMmary | CINformation
DISPlay:EORFSpectr:VIEW[:SElect]?

```

3 Programming the Analyzer

List of SCPI Commands

```
DISPlay:EORFspectr:VIEW[1]|2:WINDow[1]:TRACe:X[:SCALe]:COUPlE 0 | 1 | OFF
| ON
DISPlay:EORFspectr:VIEW[1]|2:WINDow[1]:TRACe:X[:SCALe]:COUPlE?
DISPlay:EORFspectr:VIEW2:WINDow[1]:TRACe:X[:SCALe]:PDIVision <freq>
DISPlay:EORFspectr:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:PDIVision <time>
DISPlay:EORFspectr:VIEW2:WINDow[1]:TRACe:X[:SCALe]:PDIVision?
DISPlay:EORFspectr:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:PDIVision?
DISPlay:EORFspectr:VIEW2:WINDow[1]:TRACe:X[:SCALe]:RLEVel <freq>
DISPlay:EORFspectr:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RLEVel <time>
DISPlay:EORFspectr:VIEW2:WINDow[1]:TRACe:X[:SCALe]:RLEVel?
DISPlay:EORFspectr:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RLEVel?
DISPlay:EORFspectr:VIEW[1]|2:WINDow[1]:TRACe:X[:SCALe]:RPOSition LEFT |
CENTer | RIGHT
DISPlay:EORFspectr:VIEW[1]|2:WINDow[1]:TRACe:X[:SCALe]:RPOSition?
DISPlay:EORFspectr:VIEW[1]|2:WINDow[1]:TRACe:Y[:SCALe]:COUPlE 0 | 1 | OFF
| ON
DISPlay:EORFspectr:VIEW[1]|2:WINDow[1]:TRACe:Y[:SCALe]:COUPlE?
DISPlay:EORFspectr:VIEW[1]|2:WINDow[1]:TRACe:Y[:SCALe]:PDIVision <rel_
ampl>
DISPlay:EORFspectr:VIEW[1]|2:WINDow[1]:TRACe:Y[:SCALe]:PDIVision?
DISPlay:EORFspectr:VIEW[1]|2:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <real>
DISPlay:EORFspectr:VIEW[1]|2:WINDow[1]:TRACe:Y[:SCALe]:RLEVel?
DISPlay:EORFspectr:VIEW[1]|2:WINDow[1]:TRACe:Y[:SCALe]:RPOSition TOP |
CENTer | BOTTom
DISPlay:EORFspectr:VIEW[1]|2:WINDow[1]:TRACe:Y[:SCALe]:RPOSition?
DISPlay:EPVTime:LIMit:MASK OFF | ON | 0 | 1
DISPlay:EPVTime:LIMit:MASK?
DISPlay:EPVTime:VIEW:NSElect <integer>
DISPlay:EPVTime:VIEW:NSElect?
DISPlay:EPVTime:VIEW[:SElect] ALL | BOTH | MSLot
DISPlay:EPVTime:VIEW[:SElect]?
DISPlay:EPVTime:VIEW[1]:WINDow[1]:TRACe:MAXHold[:STATe] ON | OFF | 1 | 0
DISPlay:EPVTime:VIEW[1]:WINDow[1]:TRACe:MAXHold[:STATe]?
DISPlay:EPVTime:VIEW[1]:WINDow[1]:TRACe:MINHold[:STATe] ON | OFF | 1 | 0
DISPlay:EPVTime:VIEW[1]:WINDow[1]:TRACe:MINHold[:STATe]?
DISPlay:EPVTime:VIEW[1]|3:WINDow[1]:TRACe:X[:SCALe]:COUPlE 0 | 1 | OFF |
ON
DISPlay:EPVTime:VIEW2:WINDow[1]|2:TRACe:X[:SCALe]:COUPlE 0 | 1 | OFF | ON
DISPlay:EPVTime:VIEW2:WINDow[1]|2:TRACe:X[:SCALe]:COUPlE?
DISPlay:EPVTime:VIEW[1]|3:WINDow[1]:TRACe:X[:SCALe]:COUPlE?
DISPlay:EPVTime:VIEW[1]|3:WINDow[1]:TRACe:X[:SCALe]:PDIVision <time>
DISPlay:EPVTime:VIEW2:WINDow[1]|2:TRACe:X[:SCALe]:PDIVision <time>
DISPlay:EPVTime:VIEW[1]|3:WINDow[1]:TRACe:X[:SCALe]:PDIVision?
DISPlay:EPVTime:VIEW2:WINDow[1]|2:TRACe:X[:SCALe]:PDIVision?
DISPlay:EPVTime:VIEW[1]|3:WINDow[1]:TRACe:X[:SCALe]:RLEVel <time>
DISPlay:EPVTime:VIEW2:WINDow[1]|2:TRACe:X[:SCALe]:RLEVel <time>
DISPlay:EPVTime:VIEW2:WINDow[1]|2:TRACe:X[:SCALe]:RLEVel?
DISPlay:EPVTime:VIEW[1]|3:WINDow[1]:TRACe:X[:SCALe]:RLEVel?
DISPlay:EPVTime:VIEW[1]|3:WINDow[1]:TRACe:X[:SCALe]:RPOSition LEFT |
CENTer | RIGHT
DISPlay:EPVTime:VIEW2:WINDow[1]|2:TRACe:X[:SCALe]:RPOSition LEFT | CENTer
| RIGHT
```

```

DISPlay:EPVTime:VIEW[1]|3:WINDow[1]:TRACe:X[:SCALe]:RPOSition?
DISPlay:EPVTime:VIEW2:WINDow[1]|2:TRACe:X[:SCALe]:RPOSition?
DISPlay:EPVTime:VIEW[1]|3:WINDow[1]:TRACe:Y[:SCALe]:COUPlE 0 | 1 | OFF |
ON
DISPlay:EPVTime:VIEW2:WINDow[1]|2:TRACe:Y[:SCALe]:COUPlE 0 | 1 | OFF | ON
DISPlay:EPVTime:VIEW2:WINDow[1]|2:TRACe:Y[:SCALe]:COUPlE?
DISPlay:EPVTime:VIEW[1]|3:WINDow[1]:TRACe:Y[:SCALe]:COUPlE?
DISPlay:EPVTime:VIEW[1]|3:WINDow[1]:TRACe:Y[:SCALe]:PDIVision <rel_ampl>
DISPlay:EPVTime:VIEW2:WINDow[1]|2:TRACe:Y[:SCALe]:PDIVision <rel_ampl>
DISPlay:EPVTime:VIEW2:WINDow[1]|2:TRACe:Y[:SCALe]:PDIVision?
DISPlay:EPVTime:VIEW[1]|3:WINDow[1]:TRACe:Y[:SCALe]:PDIVision?
DISPlay:EPVTime:VIEW2:WINDow[1]|2:TRACe:Y[:SCALe]:RLEVel <real>
DISPlay:EPVTime:VIEW[1]|3:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <real>
DISPlay:EPVTime:VIEW[1]|3:WINDow[1]:TRACe:Y[:SCALe]:RLEVel?
DISPlay:EPVTime:VIEW2:WINDow[1]|2:TRACe:Y[:SCALe]:RLEVel?
DISPlay:EPVTime:VIEW2:WINDow[1]|2:TRACe:Y[:SCALe]:RPOSition TOP | CENTER |
BOTTOm
DISPlay:EPVTime:VIEW[1]|3:WINDow[1]:TRACe:Y[:SCALe]:RPOSition TOP | CENTER
| BOTTOm
DISPlay:EPVTime:VIEW2:WINDow[1]|2:TRACe:Y[:SCALe]:RPOSition?
DISPlay:EPVTime:VIEW[1]|3:WINDow[1]:TRACe:Y[:SCALe]:RPOSition?
DISPlay:FSCReen[:STATe] OFF | ON | 0 | 1
DISPlay:FSCReen[:STATe]?
DISPlay:MENU[:STATe] OFF | ON | 0 | 1
DISPlay:MONitor:VIEW:WINDow:TRACe[1]|2|3:CLear
DISPlay:MONitor:VIEW:WINDow:TRACe:CLear:ALL
DISPlay:MONitor:VIEW:WINDow:TRACe[1]|2|3:TYPE
DISPlay:MONitor:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPlE 0 | 1 | OFF | ON
DISPlay:MONitor:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPlE?
DISPlay:MONitor:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision <rel_ampl>
DISPlay:MONitor:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision?
DISPlay:MONitor:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <real>
DISPlay:MONitor:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel?
DISPlay:MONitor:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOSition TOP | CENTER |
BOTTOm
DISPlay:MONitor:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOSition?
DISPlay:ORFSpectrum:VIEW:NSElect <integer>
DISPlay:ORFSpectrum:VIEW:NSElect?
DISPlay:ORFSpectrum:VIEW[:SElect] RSUMmary | CINformation
DISPlay:ORFSpectrum:VIEW[:SElect]?
DISPlay:ORFSpectrum:VIEW[1]|2:WINDow[1]:TRACe:X[:SCALe]:COUPlE 0 | 1 | OFF
| ON
DISPlay:ORFSpectrum:VIEW[1]|2:WINDow[1]:TRACe:X[:SCALe]:COUPlE?
DISPlay:ORFSpectrum:VIEW2:WINDow[1]:TRACe:X[:SCALe]:PDIVision <freq>
DISPlay:ORFSpectrum:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:PDIVision <time>
DISPlay:ORFSpectrum:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:PDIVision?
DISPlay:ORFSpectrum:VIEW2:WINDow[1]:TRACe:X[:SCALe]:PDIVision?
DISPlay:ORFSpectrum:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RLEVel <time>
DISPlay:ORFSpectrum:VIEW2:WINDow[1]:TRACe:X[:SCALe]:RLEVel <freq>
DISPlay:ORFSpectrum:VIEW2:WINDow[1]:TRACe:X[:SCALe]:RLEVel?
DISPlay:ORFSpectrum:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RLEVel?

```

```

DISPlay:ORFSpectrum:VIEW[1]|2:WINDow[1]:TRACe:X[:SCALe]:RPOSition LEFT |
CENTer | RIGHT
DISPlay:ORFSpectrum:VIEW[1]|2:WINDow[1]:TRACe:X[:SCALe]:RPOSition?
DISPlay:ORFSpectrum:VIEW[1]|2:WINDow[1]:TRACe:Y[:SCALe]:COUPlE 0 | 1 | OFF
| ON
DISPlay:ORFSpectrum:VIEW[1]|2:WINDow[1]:TRACe:Y[:SCALe]:COUPlE?
DISPlay:ORFSpectrum:VIEW[1]|2:WINDow[1]:TRACe:Y[:SCALe]:PDIVision <rel_
ampl>
DISPlay:ORFSpectrum:VIEW[1]|2:WINDow[1]:TRACe:Y[:SCALe]:PDIVision?
DISPlay:ORFSpectrum:VIEW[1]|2:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <real>
DISPlay:ORFSpectrum:VIEW[1]|2:WINDow[1]:TRACe:Y[:SCALe]:RLEVel?
DISPlay:ORFSpectrum:VIEW[1]|2:WINDow[1]:TRACe:Y[:SCALe]:RPOSition TOP |
CENTer | BOTTOm
DISPlay:ORFSpectrum:VIEW[1]|2:WINDow[1]:TRACe:Y[:SCALe]:RPOSition?
DISPlay:PFERror:BDOTs[:STATe] ON | OFF | 1 | 0
DISPlay:PFERror:BDOTs[:STATe]?
DISPlay:PFERror:VIEW:NSElect <integer>
DISPlay:PFERror:VIEW:NSElect?
DISPlay:PFERror:VIEW[:SElect] POLar | ERRor | DBITs
DISPlay:PFERror:VIEW[:SElect]?
DISPlay:PFERror:VIEW[1]:WINDow2:TRACe:POLar VC | VECTor | CONSTln
DISPlay:PFERror:VIEW[1]:WINDow2:TRACe:POLar?
DISPlay:PFERror:VIEW[1]:WINDow[1]|2|3:TRACe:X[:SCALe]:COUPlE ON | OFF | 1
| 0
DISPlay:PFERror:VIEW[1]:WINDow[1]|2|3:TRACe:X[:SCALe]:COUPlE?
DISPlay:PFERror:VIEW[1]:WINDow[1]|2:TRACe:X[:SCALe]:PDIVision <real>
DISPlay:PFERror:VIEW[1]:WINDow3:TRACe:X[:SCALe]:PDIVision <time>
DISPlay:PFERror:VIEW[1]:WINDow[1]|2:TRACe:X[:SCALe]:PDIVision?
DISPlay:PFERror:VIEW[1]:WINDow3:TRACe:X[:SCALe]:PDIVision?
DISPlay:PFERror:VIEW[1]:WINDow3:TRACe:X[:SCALe]:RLEVel <time>
DISPlay:PFERror:VIEW[1]:WINDow[1]|2:TRACe:X[:SCALe]:RLEVel <real>
DISPlay:PFERror:VIEW[1]:WINDow3:TRACe:X[:SCALe]:RLEVel?
DISPlay:PFERror:VIEW[1]:WINDow[1]|2:TRACe:X[:SCALe]:RLEVel?
DISPlay:PFERror:VIEW[1]:WINDow[1]|2|3:TRACe:X[:SCALe]:RPOSition LEFT |
CENTer | RIGHT
DISPlay:PFERror:VIEW[1]:WINDow[1]|2|3:TRACe:X[:SCALe]:RPOSition?
DISPlay:PFERror:VIEW[1]:WINDow[1]|2|3:TRACe:Y[:SCALe]:COUPlE ON | OFF | 1 |
0
DISPlay:PFERror:VIEW[1]:WINDow[1]|2|3:TRACe:Y[:SCALe]:COUPlE?
DISPlay:PFERror:VIEW[1]:WINDow[1]|2:TRACe:Y[:SCALe]:PDIVision <real>
DISPlay:PFERror:VIEW[1]:WINDow3:TRACe:Y[:SCALe]:PDIVision <rel_ampl>
DISPlay:PFERror:VIEW[1]:WINDow3:TRACe:Y[:SCALe]:PDIVision?
DISPlay:PFERror:VIEW[1]:WINDow[1]|2:TRACe:Y[:SCALe]:PDIVision?
DISPlay:PFERror:VIEW[1]:WINDow3:TRACe:Y[:SCALe]:RLEVel <real>
DISPlay:PFERror:VIEW[1]:WINDow[1]|2:TRACe:Y[:SCALe]:RLEVel <real>
DISPlay:PFERror:VIEW[1]:WINDow3:TRACe:Y[:SCALe]:RLEVel?
DISPlay:PFERror:VIEW[1]:WINDow[1]|2:TRACe:Y[:SCALe]:RLEVel?
DISPlay:PFERror:VIEW[1]:WINDow[1]|2|3:TRACe:Y[:SCALe]:RPOSition TOP |
CENTer | BOTTOm
DISPlay:PFERror:VIEW[1]:WINDow[1]|2:TRACe:Y[:SCALe]:RPOSition?
DISPlay:PVTime:LIMit:MASK OFF | ON | 0 | 1
DISPlay:PVTime:LIMit:MASK?

```

```

DISPlay:PVTime:VIEW:NSElect <integer>
DISPlay:PVTime:VIEW:NSElect?
DISPlay:PVTime:VIEW[:SElect] ALL | BOTH | MSLot
DISPlay:PVTime:VIEW[:SElect]?
DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:MAXHold[:STATE] ON | OFF | 1 | 0
DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:MAXHold[:STATE]?
DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:MINHold[:STATE] ON | OFF | 1 | 0
DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:MINHold[:STATE]?
DISPlay:PVTime:VIEW[1]|3:WINDow[1]:TRACe:X[:SCALE]:COUPle 0 | 1 | OFF | ON
DISPlay:PVTime:VIEW2:WINDow[1]|2:TRACe:X[:SCALE]:COUPle 0 | 1 | OFF | ON
DISPlay:PVTime:VIEW[1]|3:WINDow[1]:TRACe:X[:SCALE]:COUPle?
DISPlay:PVTime:VIEW2:WINDow[1]|2:TRACe:X[:SCALE]:COUPle?
DISPlay:PVTime:VIEW[1]|3:WINDow[1]:TRACe:X[:SCALE]:PDIVision <time>
DISPlay:PVTime:VIEW2:WINDow[1]|2:TRACe:X[:SCALE]:PDIVision <time>
DISPlay:PVTime:VIEW[1]|3:WINDow[1]:TRACe:X[:SCALE]:PDIVision?
DISPlay:PVTime:VIEW2:WINDow[1]|2:TRACe:X[:SCALE]:PDIVision?
DISPlay:PVTime:VIEW2:WINDow[1]|2:TRACe:X[:SCALE]:RLEVel <time>
DISPlay:PVTime:VIEW[1]|3:WINDow[1]:TRACe:X[:SCALE]:RLEVel <time>
DISPlay:PVTime:VIEW[1]|3:WINDow[1]:TRACe:X[:SCALE]:RLEVel?
DISPlay:PVTime:VIEW2:WINDow[1]|2:TRACe:X[:SCALE]:RLEVel?
DISPlay:PVTime:VIEW2:WINDow[1]|2:TRACe:X[:SCALE]:RPOStion LEFT | CENTER |
RIGHT
DISPlay:PVTime:VIEW[1]|3:WINDow[1]:TRACe:X[:SCALE]:RPOStion LEFT | CENTER
| RIGHT
DISPlay:PVTime:VIEW[1]|3:WINDow[1]:TRACe:X[:SCALE]:RPOStion?
DISPlay:PVTime:VIEW2:WINDow[1]|2:TRACe:X[:SCALE]:RPOStion?
DISPlay:PVTime:VIEW2:WINDow[1]|2:TRACe:Y[:SCALE]:COUPle 0 | 1 | OFF | ON
DISPlay:PVTime:VIEW[1]|3:WINDow[1]:TRACe:Y[:SCALE]:COUPle 0 | 1 | OFF | ON
DISPlay:PVTime:VIEW[1]|3:WINDow[1]:TRACe:Y[:SCALE]:COUPle?
DISPlay:PVTime:VIEW2:WINDow[1]|2:TRACe:Y[:SCALE]:COUPle?
DISPlay:PVTime:VIEW2:WINDow[1]|2:TRACe:Y[:SCALE]:PDIVision <rel_ampl>
DISPlay:PVTime:VIEW[1]|3:WINDow[1]:TRACe:Y[:SCALE]:PDIVision <rel_ampl>
DISPlay:PVTime:VIEW[1]|3:WINDow[1]:TRACe:Y[:SCALE]:PDIVision?
DISPlay:PVTime:VIEW2:WINDow[1]|2:TRACe:Y[:SCALE]:PDIVision?
DISPlay:PVTime:VIEW2:WINDow[1]|2:TRACe:Y[:SCALE]:RLEVel <real>
DISPlay:PVTime:VIEW[1]|3:WINDow[1]:TRACe:Y[:SCALE]:RLEVel <real>
DISPlay:PVTime:VIEW2:WINDow[1]|2:TRACe:Y[:SCALE]:RLEVel?
DISPlay:PVTime:VIEW[1]|3:WINDow[1]:TRACe:Y[:SCALE]:RLEVel?
DISPlay:PVTime:VIEW2:WINDow[1]|2:TRACe:Y[:SCALE]:RPOStion TOP | CENTER |
BOTTom
DISPlay:PVTime:VIEW[1]|3:WINDow[1]:TRACe:Y[:SCALE]:RPOStion TOP | CENTER
| BOTTom
DISPlay:PVTime:VIEW2:WINDow[1]|2:TRACe:Y[:SCALE]:RPOStion?
DISPlay:PVTime:VIEW[1]|3:WINDow[1]:TRACe:Y[:SCALE]:RPOStion?
DISPlay:TSPur:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:COUPle 0 | 1 | OFF | ON
DISPlay:TSPur:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:COUPle?
DISPlay:TSPur:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:PDIVision <rel_ampl>
DISPlay:TSPur:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:PDIVision?
DISPlay:TSPur:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:RLEVel <real>
DISPlay:TSPur:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:RLEVel?
DISPlay:TSPur:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:RPOStion TOP | CENTER |
BOTTom

```

```
DISPlay:TSPur:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOSition?
DISPlay:TXPower:BARGraph[:STATe] ON | OFF | 1 | 0
DISPlay:TXPower:BARGraph[:STATe]?
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:MAXHold[:STATe] ON | OFF | 1 | 0
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:MAXHold[:STATe]?
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:MINHold[:STATe] ON | OFF | 1 | 0
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:MINHold[:STATe]?
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:COUPle 0 | 1 | OFF | ON
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:COUPle?
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:PDIVision <time>
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:PDIVision?
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RLEVel <time>
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RLEVel?
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RPOSition LEFT | CENTER
| RIGHT
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RPOSition?
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPle 0 | 1 | OFF | ON
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPle?
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision <rel_ampl>
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision?
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <real>
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel?
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOSition TOP | CENTER |
BOTTom
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOSition?
DISPlay:WAVEform:VIEW:NSElect <integer>
DISPlay:WAVEform:VIEW:NSElect?
DISPlay:WAVEform:VIEW[:SElect] RFENvelope | IQ
DISPlay:WAVEform:VIEW[:SElect]?
DISPlay:WAVEform:VIEW[1]|2:WINDow[1]:TRACe:X[:SCALe]:COUPle 0 | 1 | OFF |
ON
DISPlay:WAVEform:VIEW[1]|2:WINDow[1]:TRACe:X[:SCALe]:COUPle?
DISPlay:WAVEform:VIEW[1]|2:WINDow[1]:TRACe:X[:SCALe]:PDIVision <time>
DISPlay:WAVEform:VIEW[1]|2:WINDow[1]:TRACe:X[:SCALe]:PDIVision?
DISPlay:WAVEform:VIEW[1]|2:WINDow[1]:TRACe:X[:SCALe]:RLEVel <time>
DISPlay:WAVEform:VIEW[1]|2:WINDow[1]:TRACe:X[:SCALe]:RLEVel?
DISPlay:WAVEform:VIEW[1]|2:WINDow[1]:TRACe:X[:SCALe]:RPOSition LEFT |
CENTER | RIGHT
DISPlay:WAVEform:VIEW[1]|2:WINDow[1]:TRACe:X[:SCALe]:RPOSition?
DISPlay:WAVEform:VIEW[1]|2:WINDow[1]:TRACe:Y[:SCALe]:COUPle 0 | 1 | OFF |
ON
DISPlay:WAVEform:VIEW[1]|2:WINDow[1]:TRACe:Y[:SCALe]:COUPle?
DISPlay:WAVEform:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision <rel_ampl>
DISPlay:WAVEform:VIEW2:WINDow[1]:TRACe:Y[:SCALe]:PDIVision <voltage>
DISPlay:WAVEform:VIEW2:WINDow[1]:TRACe:Y[:SCALe]:PDIVision?
DISPlay:WAVEform:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision?
DISPlay:WAVEform:VIEW2:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <voltage>
DISPlay:WAVEform:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <ampl>
DISPlay:WAVEform:VIEW2:WINDow[1]:TRACe:Y[:SCALe]:RLEVel?
DISPlay:WAVEform:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel?
DISPlay:WAVEform:VIEW2:WINDow[1]:TRACe:Y[:SCALe]:RPOSition TOP | CENTER |
BOTTom
```



```

DISPlay:WAVEform:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:RPOsition TOP | CENTER
| BOTTOm
DISPlay:WAVEform:VIEW2:WINDow[1]:TRACe:Y[:SCALE]:RPOsition?
DISPlay:WAVEform:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:RPOsition?
DISPlay:WINDow[1]:ANNOtation[:ALL] OFF | ON | 0 | 1
DISPlay:WINDow[1]:ANNOtation[:ALL]?
DISPlay:WINDow:FORMat:TILE
DISPlay:WINDow:FORMat:ZOOM
DISPlay:WINDow[:SElect] <number>
DISPlay:WINDow[:SElect]?
DISPlay:WINDow[1]:TRACe:GRATICule:GRID[:STATE] OFF | ON | 0 | 1
DISPlay:WINDow[1]:TRACe:GRATICule:GRID[:STATE]?
FETCh:EEVM[n]?
FETCh:EORFspectr[n]?
FETCh:EPVTime[n]?
FETCh:ETSPur[n]?
FETCh:MONitor[n]?
FETCh:ORFSpectrum[n]?
FETCh:PFERror[n]?
FETCh:PVTime[n]?
FETCh:TSPur[n]?
FETCh:TXPower|BPOwer[n]?
FETCh:WAVEform[n]?
FORMat:BORDER NORMAl | SWAPped
FORMat:BORDER?
FORMat[:TRACe][:DATA] ASCii | INTeger, 32 | REAL, 32 | REAL, 64
FORMat[:TRACe][:DATA]?
GLOBal:DEFault
GLOBal:FREQUency:CENTER[:STATE] 1 | 0 | ON | OFF
GLOBal:FREQUency:CENTER[:STATE]?
HCOPY:ABORT
HCOPY[:IMMediate]
INITiate:CONTinuous OFF | ON | 0 | 1
INITiate:CONTinuous?
INITiate:EEVM
INITiate:EORFspectr
INITiate:EPVTime
INITiate:ETSPur
INITiate[:IMMediate]
INITiate:MONitor
INITiate:ORFSpectrum
INITiate:PAUSE
INITiate:PFERror
INITiate:PVTime
INITiate:REStart
INITiate:RESume
INITiate:TSPur
INITiate:TXPower|BPOwer
INITiate:WAVEform
INPut:COUPLing AC | DC
INPut:COUPLing?
INPut:COUPLing:I|Q DC | LFR1 | LFR2
INPut:COUPLing:I|Q?

```

3 Programming the Analyzer

List of SCPI Commands

```
INPut:IMPedance:IQ U50 | B50 | U1M | B1M
INPut:IMPedance:IQ?
INPut:IMPedance:REfERENCE <integer>
INPut:IMPedance:REfERENCE?
INPut[1]:IQ:BALEncoded[:STATE] OFF | ON | 0 | 1
INPut[1]:IQ:BALEncoded[:STATE]?
INPut:IQ[:I]:DIFFerential OFF | ON | 0 | 1
INPut:IQ[:I]:DIFFerential?
INPut[1]:IQ[:I]:IMPedance LOW | HIGH
INPut[1]:IQ[:I]:IMPedance?
INPut:IQ:MIRROred OFF | ON | 0 | 1
INPut:IQ:MIRROred?
INPut:IQ:Q:DIFFerential OFF | ON | 0 | 1
INPut:IQ:Q:DIFFerential?
INPut[1]:IQ:Q:IMPedance LOW | HIGH
INPut[1]:IQ:Q:IMPedance?
INPut[1]:IQ:TYPE IQ | I | Q
INPut[1]:IQ:TYPE?
INPut:MIXer EXTErnal | INTernal
INPut:MIXer?
INPut:OFFSet:I|Q <voltage>
INPut:OFFSet:I|Q?
INST:NSEL 102
INST:NSEL 105
INSTrument:CATalog?
INSTrument:COUple:DEFault
INSTrument:COUple:FREQuency:CENTEr ALL | NONE
INSTrument:COUple:FREQuency:CENTEr?
INSTrument:DEFault
INSTrument:NSElect <integer>
INSTrument:NSElect?
INSTrument[:SElect] GSM
INSTrument[:SElect] SA | RTSA | SEQAN | EMI | BASIC | WCDMA | EDGE GSM |
WIMAX OFDMA | VSA | PNOISE | NFIGure | ADEMOD | BTooth | TDSCDMA | CDMA2K |
CDMA1XEV | LTE | LTETDD | LTEAFDD | LTEATDD | MSR | DVB | DTMB | DCATV |
ISDBT | CMMB | WLAN | CWLAN | CWIMAXOFDM | WIMAXFIXED | IDEN | RLC |
SCPILC | VSA89601
INSTrument[:SElect] RECEiver
INSTrument[:SElect] 'SA' | 'PNOISE' | 'EDGE' | 'GSM' | 'BASIC'
INSTrument[:SElect] SANalyzer
INSTrument[:SElect]?
INST:SEL SCPILC
INST:SEL LTETDD
INST:SEL EMI
INST:SEL LTE
MEASure:EEVM[n]?
MEASure:EORFSpectr[n]?
MEASure:EPVTime[n]?
MEASure:ETSPur[n]?
MEASure:MONitor[n]?
MEASure:ORFSpectrum[n]?
MEASure:PFError[n]?
```

```

MEASure:PVTime[n]?
MEASure:TSPur[n]?
MEASure:TXPower|BPOWer[n]?
MEASure:WAVEform[n]?
MMEMemory:CATalog? [<directory_name>]
MMEMemory:CDIRectory [<directory_name>]
MMEMemory:CDIRectory?
MMEMemory:COpy <string>, <string>[, <string>, <string>]
MMEMemory:COpy:DEvice <source_string>, <dest_string>
MMEMemory:DATA <file_name>, <data>
MMEMemory:DATA? <file_name>
MMEMemory:DELeTe <file_name>[, <directory_name>]
MMEMemory:LOAD:STATE <filename>
MMEMemory:LOAD:STATE 1, <filename>
MMEMemory:MDIRectory <directory_name>
MMEMemory:MOVE <string>, <string>[, <string>, <string>]
MMEMemory:RDIRectory <directory_name>
MMEMemory:REGister:STATE:LABel <regnumber>, "label"
MMEMemory:REGister:STATE:LABel? <regnumber>
MMEMemory:STORE:RESults <string>
MMEMemory:STORE:RESults:MTABLE|PTABLE|SPECTrogram <filename>
MMEMemory:STORE:SCReen <filename>
MMEMemory:STORE:SCReen:THEME TDColor | TDMonochrome | FColor | FMonochrome
MMEMemory:STORE:SCReen:THEME?
MMEMemory:STORE:STATE <filename>
MMEMemory:STORE:STATE 1, <filename>
OUTPut:ANALog OFF | SVIDeo | LOGVideo | LINVideo | DAUDio
OUTPut:ANALog?
OUTPut:ANALog:AUTO OFF | ON | 0 | 1
OUTPut:ANALog:AUTO?
OUTPut:AUX SIF | AIF | LOGVideo | OFF
OUTPut:AUX?
OUTPut:AUX:AIF <value>
OUTPut:AUX:AIF?
OUTPut:DBUS[1][:STATE] ON | OFF | 1 | 0
OUTPut:DBUS[1][:STATE]?
PVT:LIM:TEST 0
PVT:LIM:TEST?
READ:EEVM[n]?
READ:EORFspectr[n]?
READ:EPVTime[n]?
READ:ETSPur[n]?
READ:MONitor[n]?
READ:ORFSpectrum[n]?
READ:PFERror[n]?
READ:PVTime[n]?
READ:TSPur[n]?
READ:TXPower|BPOWer[n]?
READ:WAVEform[n]?
[:SENSe]:<measurement>:TRIGger:SOURce
[:SENSe]:<measurement>:TRIGger:SOURce IF
[:SENSe]:ACPR:TRIGger:SOURce
[:SENSe]:BPOWer:AVERage:COUNT

```

```
[ :SENSe]:BPOWer:AVERAge:TCONTRol
[ :SENSe]:BPOWer:AVERAge:TYPE
[ :SENSe]:BPOWer:METHod
[ :SENSe]:BPOWer:THReshold
[ :SENSe]:CHANnel:ARFCn|RFCHannel <integer>
[ :SENSe]:CHANnel:ARFCn|RFCHannel?
[ :SENSe]:CHANnel:ARFCn|RFCHannel:BOTTom
[ :SENSe]:CHANnel:ARFCn|RFCHannel:MIDDLE
[ :SENSe]:CHANnel:ARFCn|RFCHannel:TOP
[ :SENSe]:CHANnel:BURSt NORMAl | SYNC | ACCess | HSRate | MIXed
[ :SENSe]:CHANnel:BURSt?
[ :SENSe]:CHANnel:CARRier:BASE:CLASs SC | MC
[ :SENSe]:CHANnel:CARRier:BASE:CLASs?
[ :SENSe]:CHANnel:CARRier:BASE:CLASs:AUTO ON | OFF | 1 | 0
[ :SENSe]:CHANnel:CARRier:BASE:CLASs:AUTO?
[ :SENSe]:CHANnel:CARRier:COUNT <integer>
[ :SENSe]:CHANnel:CARRier:COUNT?
[ :SENSe]:CHANnel:CARRier:FALLocation
[ :SENSe]:CHANnel:CARRier:FALLocation?
[ :SENSe]:CHANnel:CARRier:FALLocation:NCONtiguous:ABPoint <integer>
[ :SENSe]:CHANnel:CARRier:FALLocation:NCONtiguous:ABPoint?
[ :SENSe]:CHANnel:CARRier:FALLocation:NCONtiguous:FSEParation <freq>
[ :SENSe]:CHANnel:CARRier:FALLocation:NCONtiguous:FSEParation?
[ :SENSe]:CHANnel:CARRier:LIST:COUPle OFF | ON | 0 | 1, ...
[ :SENSe]:CHANnel:CARRier:LIST:COUPle?
[ :SENSe]:CHANnel:CARRier:LIST:INTerval <freq>, ...
[ :SENSe]:CHANnel:CARRier:LIST:INTerval?
[ :SENSe]:CHANnel:CARRier:LIST:PPResent YES | NO, ...
[ :SENSe]:CHANnel:CARRier:LIST:PPResent?
[ :SENSe]:CHANnel:CARRier:RCARRier <integer>
[ :SENSe]:CHANnel:CARRier:RCARRier?
[ :SENSe]:CHANnel:SLOT <integer>
[ :SENSe]:CHANnel:SLOT?
[ :SENSe]:CHANnel:SLOT:AUTO OFF | ON | 0 | 1
[ :SENSe]:CHANnel:SLOT:AUTO?
[ :SENSe]:CHANnel:TSCode <integer>
[ :SENSe]:CHANnel:TSCode?
[ :SENSe]:CHANnel:TSCode:AUTO OFF | ON | 0 | 1
[ :SENSe]:CHANnel:TSCode:AUTO?
[ :SENSe]:CORRection:BTS[:RF]:GAIN <rel_ampl>
[ :SENSe]:CORRection:BTS[:RF]:GAIN?
[ :SENSe]:CORRection:BTS[:RF]:LOSS <rel_ampl>
[ :SENSe]:CORRection:BTS[:RF]:LOSS?
[ :SENSe]:CORRection:IMPedance[:INPut][:MAGNitude] 50 | 75
[ :SENSe]:CORRection:IMPedance[:INPut][:MAGNitude]?
[ :SENSe]:CORRection:IQ:I:GAIN <rel_ampl>
[ :SENSe]:CORRection:IQ:I:GAIN?
[ :SENSe]:CORRection:IQ:I|Q:ATTenuation <rel_ampl>
[ :SENSe]:CORRection:IQ:I|Q:ATTenuation?
[ :SENSe]:CORRection:IQ:I|Q:ATTenuation:RATio <real>
[ :SENSe]:CORRection:IQ:I|Q:ATTenuation:RATio?
[ :SENSe]:CORRection:IQ[:I]:SKEW <seconds>
[ :SENSe]:CORRection:IQ[:I]:SKEW?
```

```

[:SENSE]:CORREction:IQ:Q:GAIN <rel_ampl>
[:SENSE]:CORREction:IQ:Q:GAIN?
[:SENSE]:CORREction:IQ:Q:SKEW <seconds>
[:SENSE]:CORREction:IQ:Q:SKEW?
[:SENSE]:CORREction:MS[:RF]:GAIN <rel_ampl>
[:SENSE]:CORREction:MS[:RF]:GAIN?
[:SENSE]:CORREction:MS[:RF]:LOSS <rel_ampl>
[:SENSE]:CORREction:MS[:RF]:LOSS?
[:SENSE]:CORREction:NOISE:FLOOR ON | OFF | 1 | 0
[:SENSE]:CORREction:NOISE:FLOOR?
[:SENSE]:CORREction:OFFSET[:MAGNitude]
[:SENSE]:CORREction:SA[:RF]:GAIN <rel_ampl>
[:SENSE]:CORREction:SA[:RF]:GAIN?
[:SENSE]:EEVM:AVERAGE:COUNT <integer>
[:SENSE]:EEVM:AVERAGE:COUNT?
[:SENSE]:EEVM:AVERAGE[:STATE] OFF | ON | 0 | 1
[:SENSE]:EEVM:AVERAGE[:STATE]?
[:SENSE]:EEVM:AVERAGE:TCONTROL EXPONENTIAL | REPEAT
[:SENSE]:EEVM:AVERAGE:TCONTROL?
[:SENSE]:EEVM:BSYNC:PMODULATION:ALIGNMENT OFF | ON | 0 | 1
[:SENSE]:EEVM:BSYNC:PMODULATION:ALIGNMENT?
[:SENSE]:EEVM:BSYNC:SOURCE TSEQUENCE | RFBURST | PMODULATION | NONE
[:SENSE]:EEVM:BSYNC:SOURCE?
[:SENSE]:EEVM:DROOP OFF | ON | 0 | 1
[:SENSE]:EEVM:DROOP?
[:SENSE]:EEVM:FERROR:TRANGE WIDE | NORMAL
[:SENSE]:EEVM:FERROR:TRANGE?
[:SENSE]:EEVM:IF:GAIN:AUTO[:STATE] ON | OFF | 1 | 0
[:SENSE]:EEVM:IF:GAIN:AUTO[:STATE]?
[:SENSE]:EEVM:IF:GAIN[:STATE] ON | OFF | 1 | 0
[:SENSE]:EEVM:IF:GAIN[:STATE]?
[:SENSE]:EEVM:SDOTS[:STATE]
[:SENSE]:EORFSPECTR:AVERAGE:COUNT <integer>
[:SENSE]:EORFSPECTR:AVERAGE:COUNT?
[:SENSE]:EORFSPECTR:AVERAGE:FAST[:STATE] OFF | ON | 0 | 1
[:SENSE]:EORFSPECTR:AVERAGE:FAST[:STATE]?
[:SENSE]:EORFSPECTR:AVERAGE:MODULATION:TYPE LOG | RMS
[:SENSE]:EORFSPECTR:AVERAGE:MODULATION:TYPE?
[:SENSE]:EORFSPECTR:AVERAGE[:STATE] OFF | ON | 0 | 1
[:SENSE]:EORFSPECTR:AVERAGE[:STATE]?
[:SENSE]:EORFSPECTR:BANDWIDTH[:RESOLUTION]:MODULATION:CARRIER <freq>
[:SENSE]:EORFSPECTR:BANDWIDTH[:RESOLUTION]:MODULATION:CARRIER?
[:SENSE]:EORFSPECTR:BANDWIDTH[:RESOLUTION]:MODULATION:CARRIER:AUTO OFF |
ON | 0 | 1
[:SENSE]:EORFSPECTR:BANDWIDTH[:RESOLUTION]:MODULATION:CARRIER:AUTO?
[:SENSE]:EORFSPECTR:BANDWIDTH[:RESOLUTION]:MODULATION:OFFSET:CLOSE <freq>
[:SENSE]:EORFSPECTR:BANDWIDTH[:RESOLUTION]:MODULATION:OFFSET:CLOSE?
[:SENSE]:EORFSPECTR:BANDWIDTH[:RESOLUTION]:MODULATION:OFFSET:FAR[1] <freq>
[:SENSE]:EORFSPECTR:BANDWIDTH[:RESOLUTION]:MODULATION:OFFSET:FAR[1]?
[:SENSE]:EORFSPECTR:BANDWIDTH[:RESOLUTION]:MODULATION:OFFSET:IM:FAR2
<freq>
[:SENSE]:EORFSPECTR:BANDWIDTH[:RESOLUTION]:MODULATION:OFFSET:IM:FAR2?
[:SENSE]:EORFSPECTR:BANDWIDTH[:RESOLUTION]:SWITCHING:CARRIER <freq>

```

```
[ :SENSe ]:EORFspectr:BAWdwidth[:RESolution]:SWITching:CARRier?
[ :SENSe ]:EORFspectr:BAWdwidth[:RESolution]:SWITching:OFFSet:CLoSe <freq>
[ :SENSe ]:EORFspectr:BAWdwidth[:RESolution]:SWITching:OFFSet:CLoSe?
[ :SENSe ]:EORFspectr:BAWdwidth[:RESolution]:SWITching:OFFSet:FAR <freq>
[ :SENSe ]:EORFspectr:BAWdwidth[:RESolution]:SWITching:OFFSet:FAR?
[ :SENSe ]:EORFspectr:BFRequency <freq>
[ :SENSe ]:EORFspectr:BFRequency?
[ :SENSe ]:EORFspectr:BWIDth[:RESolution]:MODulation:CARRier
[ :SENSe ]:EORFspectr:BWIDth[:RESolution]:MODulation:OFFSet:CLoSe
[ :SENSe ]:EORFspectr:BWIDth[:RESolution]:MODulation:OFFSet:FAR
[ :SENSe ]:EORFspectr:BWIDth[:RESolution]:SWITching:CARRier
[ :SENSe ]:EORFspectr:BWIDth[:RESolution]:SWITching:OFFSet:CLoSe
[ :SENSe ]:EORFspectr:BWIDth[:RESolution]:SWITching:OFFSet:FAR
[ :SENSe ]:EORFspectr:CARRier:PREFerence:TYPE REF | MAX
[ :SENSe ]:EORFspectr:CARRier:PREFerence:TYPE?
[ :SENSe ]:EORFspectr:DETEctor:SWITching:FAST[:STATE] ON | OFF | 1 | 0
[ :SENSe ]:EORFspectr:DETEctor:SWITching:FAST[:STATE]?
[ :SENSe ]:EORFspectr:FREQuency:SYNThesis[:STATE] 2 | 3
[ :SENSe ]:EORFspectr:FREQuency:SYNThesis[:STATE]?
[ :SENSe ]:EORFspectr:IMPOrder <integer>
[ :SENSe ]:EORFspectr:IMPOrder?
[ :SENSe ]:EORFspectr:LIST:MODulation:APPLy RELative|BOTH|ABSolute, ...
[ :SENSe ]:EORFspectr:LIST:MODulation:APPLy?
[ :SENSe ]:EORFspectr:LIST:MODulation:BAWdwidth <freq>, ...
[ :SENSe ]:EORFspectr:LIST:MODulation:BAWdwidth?
[ :SENSe ]:EORFspectr:LIST:MODulation:BWIDth
[ :SENSe ]:EORFspectr:LIST:MODulation[:FREQuency] <freq>, ...
[ :SENSe ]:EORFspectr:LIST:MODulation[:FREQuency]?
[ :SENSe ]:EORFspectr:LIST:MODulation:LOFFset:ABSolute <rel_ampl>, ...
[ :SENSe ]:EORFspectr:LIST:MODulation:LOFFset:ABSolute?
[ :SENSe ]:EORFspectr:LIST:MODulation:LOFFset[:RCARRier] <rel_ampl>, ...
[ :SENSe ]:EORFspectr:LIST:MODulation:LOFFset[:RCARRier]?
[ :SENSe ]:EORFspectr:LIST:MODulation:STATE OFF|ON|0|1, ...
[ :SENSe ]:EORFspectr:LIST:MODulation:STATE?
[ :SENSe ]:EORFspectr:LIST:SELEct CUSTom | SHORt | STANdard | LCUSTom
[ :SENSe ]:EORFspectr:LIST:SELEct?
[ :SENSe ]:EORFspectr:LIST:SWITching:APPLy RELative|BOTH|ABSolute, ...
[ :SENSe ]:EORFspectr:LIST:SWITching:APPLy?
[ :SENSe ]:EORFspectr:LIST:SWITching:BAWdwidth <freq>, ...
[ :SENSe ]:EORFspectr:LIST:SWITching:BAWdwidth?
[ :SENSe ]:EORFspectr:LIST:SWITching:BWIDth
[ :SENSe ]:EORFspectr:LIST:SWITching[:FREQuency] <freq>, ...
[ :SENSe ]:EORFspectr:LIST:SWITching[:FREQuency]?
[ :SENSe ]:EORFspectr:LIST:SWITching:LOFFset:ABSolute <rel_ampl>, ...
[ :SENSe ]:EORFspectr:LIST:SWITching:LOFFset:ABSolute?
[ :SENSe ]:EORFspectr:LIST:SWITching:LOFFset[:RCARRier] <rel_ampl>, ...
[ :SENSe ]:EORFspectr:LIST:SWITching:LOFFset[:RCARRier]?
[ :SENSe ]:EORFspectr:LIST:SWITching:STATE OFF|ON|0|1, ...
[ :SENSe ]:EORFspectr:LIST:SWITching:STATE?
[ :SENSe ]:EORFspectr:MCARRier:BEXTension <freq>
[ :SENSe ]:EORFspectr:MCARRier:BEXTension?
[ :SENSe ]:EORFspectr:MCARRier:LCUSTom:LIST:COFREquency <freq>, ...
[ :SENSe ]:EORFspectr:MCARRier:LCUSTom:LIST:COFREquency?
```

```

[:SENSE]:EORFspectr:MCARrier:LEXception:LIST:FREQuency <freq>, ...
[:SENSE]:EORFspectr:MCARrier:LEXception:LIST:FREQuency?
[:SENSE]:EORFspectr:MCARrier:LEXception:RULE FIXED | CUSTom
[:SENSE]:EORFspectr:MCARrier:LEXception:RULE?
[:SENSE]:EORFspectr:MCARrier:LEXception[:STATE] OFF | ON | 0 | 1
[:SENSE]:EORFspectr:MCARrier:LEXception[:STATE]?
[:SENSE]:EORFspectr:MEASure MULTiple | SINGle | SWEPT
[:SENSE]:EORFspectr:MEASure?
[:SENSE]:EORFspectr:MODulation:RPOWer <ampl>
[:SENSE]:EORFspectr:MODulation:RPOWer?
[:SENSE]:EORFspectr:MODulation:RPOWer:AUTO[:STATE] OFF | ON | 0 | 1
[:SENSE]:EORFspectr:MODulation:RPOWer:AUTO[:STATE]?
[:SENSE]:EORFspectr:NCONtiguous:REGion INNER | OUTER
[:SENSE]:EORFspectr:NCONtiguous:REGion?
[:SENSE]:EORFspectr:OFRequency <freq>
[:SENSE]:EORFspectr:OFRequency?
[:SENSE]:EORFspectr:REFErence:AVERage[:AUTO] ON | OFF | 1 | 0
[:SENSE]:EORFspectr:REFErence:AVERage[:AUTO]?
[:SENSE]:EORFspectr:REFErence:AVERage:COUNT <integer>
[:SENSE]:EORFspectr:REFErence:AVERage:COUNT?
[:SENSE]:EORFspectr:SWITching:RPOWer
[:SENSE]:EORFspectr:SWITching:RPOWer <ampl>
[:SENSE]:EORFspectr:SWITching:RPOWer:AUTO[:STATE] OFF | ON | 0 | 1
[:SENSE]:EORFspectr:SWITching:RPOWer:AUTO[:STATE]?
[:SENSE]:EORFspectr:SWITching:RPOWer:TYPE AVERage | MAXHold
[:SENSE]:EORFspectr:SWITching:RPOWer:TYPE?
[:SENSE]:EORFspectr:TYPE MODulation | MSWitching | SWITching |
FFModulation
[:SENSE]:EORFspectr:TYPE?
[:SENSE]:EORFspectr:TYPE:MODulation[:METHod] DIScrete | SWEep
[:SENSE]:EORFspectr:TYPE:MODulation[:METHod]?
[:SENSE]:EORFspectr:WBNoise ON | OFF | 1 | 0
[:SENSE]:EORFspectr:WBNoise?
[:SENSE]:EPVTime:AVERage:COUNT <integer>
[:SENSE]:EPVTime:AVERage:COUNT?
[:SENSE]:EPVTime:AVERage[:STATE] OFF | ON | 0 | 1
[:SENSE]:EPVTime:AVERage[:STATE]?
[:SENSE]:EPVTime:AVERage:TCONtrol EXPOntial | REPeat
[:SENSE]:EPVTime:AVERage:TCONtrol?
[:SENSE]:EPVTime:AVERage:TYPE LOG | RMS | MAXimum | MINimum | MXMinimum
[:SENSE]:EPVTime:AVERage:TYPE?
[:SENSE]:EPVTime:BANDwidth[:RESolution] <bandwidth>
[:SENSE]:EPVTime:BANDwidth[:RESolution]?
[:SENSE]:EPVTime:BANDwidth[:RESolution]:TYPE FLATtop | GAUSSian
[:SENSE]:EPVTime:BANDwidth[:RESolution]:TYPE?
[:SENSE]:EPVTime:BSYNc:SLENgth EVEN | INTeger
[:SENSE]:EPVTime:BSYNc:SLENgth?
[:SENSE]:EPVTime:BSYNc:SOURce TSEQuence | RFBurst | NONE
[:SENSE]:EPVTime:BSYNc:SOURce?
[:SENSE]:EPVTime:BWIDth[:RESolution]
[:SENSE]:EPVTime:BWIDth[:RESolution]:TYPE
[:SENSE]:EPVTime:IF:GAIN:AUTO[:STATE] ON | OFF | 1 | 0
[:SENSE]:EPVTime:IF:GAIN:AUTO[:STATE]?

```

3 Programming the Analyzer

List of SCPI Commands

```
[ :SENSe]:EPVTime:IF:GAIN[:STATe] ON | OFF | 1 | 0
[ :SENSe]:EPVTime:IF:GAIN[:STATe]?
[ :SENSe]:EPVTime:LIMit:TEST
[ :SENSe]:EPVTime:MASK:CUSTom[:TYPE] FASLot | AASLots
[ :SENSe]:EPVTime:MASK:CUSTom[:TYPE]?
[ :SENSe]:EPVTime:MASK:LIST:LOWer:ABSolute <real>, ...
[ :SENSe]:EPVTime:MASK:LIST:LOWer:ABSolute?
[ :SENSe]:EPVTime:MASK:LIST:LOWer:POINTs?
[ :SENSe]:EPVTime:MASK:LIST:LOWer:RELative <rel_ampl>, ...
[ :SENSe]:EPVTime:MASK:LIST:LOWer:RELative?
[ :SENSe]:EPVTime:MASK:LIST:LOWer:TIME <seconds>, ...
[ :SENSe]:EPVTime:MASK:LIST:LOWer:TIME?
[ :SENSe]:EPVTime:MASK:LIST:UPPer:ABSolute <real>, ...
[ :SENSe]:EPVTime:MASK:LIST:UPPer:ABSolute?
[ :SENSe]:EPVTime:MASK:LIST:UPPer:POINTs?
[ :SENSe]:EPVTime:MASK:LIST:UPPer:RELative <rel_ampl>, ...
[ :SENSe]:EPVTime:MASK:LIST:UPPer:RELative?
[ :SENSe]:EPVTime:MASK:LIST:UPPer:TIME <seconds>, ...
[ :SENSe]:EPVTime:MASK:LIST:UPPer:TIME?
[ :SENSe]:EPVTime:MASK:RPOWER <ampl>
[ :SENSe]:EPVTime:MASK:RPOWER?
[ :SENSe]:EPVTime:MASK:RPOWER:AUTO[:STATe] OFF | ON | 0 | 1
[ :SENSe]:EPVTime:MASK:RPOWER:AUTO[:STATe]?
[ :SENSe]:EPVTime:MASK:RPOWER:OFFSet <rel_ampl>
[ :SENSe]:EPVTime:MASK:RPOWER:OFFSet?
[ :SENSe]:EPVTime:MASK:RPOWER:TYPE UPART | MAMBLE | ESTimated | TBITS
[ :SENSe]:EPVTime:MASK:RPOWER:TYPE?
[ :SENSe]:EPVTime:MASK:SElect STANdard | CUSTom
[ :SENSe]:EPVTime:MASK:SElect?
[ :SENSe]:EPVTime:MASK[:UPART]:LOWer:HSRate QAM16 | QAM32, <rel_ampl>
[ :SENSe]:EPVTime:MASK[:UPART]:LOWer:HSRate? QAM16 | QAM32
[ :SENSe]:EPVTime:MASK[:UPART]:LOWer:NORMal QAM16 | QAM32, <rel_ampl>
[ :SENSe]:EPVTime:MASK[:UPART]:LOWer:NORMal? QAM16 | QAM32
[ :SENSe]:EPVTime:MTIME
[ :SENSe]:EPVTime:PCLevel
[ :SENSe]:EPVTime:SWEEp:TIME <integer>
[ :SENSe]:EPVTime:SWEEp:TIME?
[ :SENSe]:ETSPur:AVERage:COUNT <integer>
[ :SENSe]:ETSPur:AVERage:COUNT?
[ :SENSe]:ETSPur:AVERage[:STATe] OFF | ON | 0 | 1
[ :SENSe]:ETSPur:AVERage[:STATe]?
[ :SENSe]:ETSPur:AVERage:TCONtrol EXPonential | REPEAT
[ :SENSe]:ETSPur:AVERage:TCONtrol?
[ :SENSe]:ETSPur:AVERage:TYPE LOG | MAXimum | RMS
[ :SENSe]:ETSPur:AVERage:TYPE?
[ :SENSe]:ETSPur:DETEctor:AUTO ON | OFF | 1 | 0
[ :SENSe]:ETSPur:DETEctor:AUTO?
[ :SENSe]:ETSPur:DETEctor[:FUNction] AVERage | POSitive
[ :SENSe]:ETSPur:DETEctor[:FUNction]?
[ :SENSe]:ETSPur:IF:GAIN:AUTO[:STATe] ON | OFF | 1 | 0
[ :SENSe]:ETSPur:IF:GAIN:AUTO[:STATe]?
[ :SENSe]:ETSPur:IF:GAIN[:STATe] ON | OFF | 1 | 0
[ :SENSe]:ETSPur:IF:GAIN[:STATe]?
```



```

[:SENSE]:ETSPur:TRACe AVERAge | MAXHold | AUTO
[:SENSE]:ETSPur:TRACe?
[:SENSE]:ETSPur:TXBand DEFault | CUSTom
[:SENSE]:ETSPur:TXBand?
[:SENSE]:ETSPur:TXBand:RANGe <freq>, ...
[:SENSE]:ETSPur:TXBand:RANGe?
[:SENSE]:ETSPur:TYPE EXAMine | FULL
[:SENSE]:ETSPur:TYPE?
[:SENSE]:FEED RF | AIQ | EMIXer
[:SENSE]:FEED IQ | IONLy | QONLy
[:SENSE]:FEED AREFERENCE
[:SENSE]:FEED?
[:SENSE]:FEED?
[:SENSE]:FEED:AREFERENCE REF50 | REF4800 | OFF
[:SENSE]:FEED:AREFERENCE?
[:SENSE]:FEED:IQ:TYPE IQ | IONLy | QONLy
[:SENSE]:FEED:IQ:TYPE?
[:SENSE]:FREQuency:CENTer <freq>
[:SENSE]:FREQuency:CENTer?
[:SENSE]:FREQuency:EMIXer:CENTer <freq>
[:SENSE]:FREQuency:EMIXer:CENTer?
[:SENSE]:FREQuency:IQ:CENTer <freq>
[:SENSE]:FREQuency:IQ:CENTer?
[:SENSE]:FREQuency:RF:CENTer <freq>
[:SENSE]:FREQuency:RF:CENTer?
[:SENSE]:MIXer:BAND A | Q | U | V | W | NA | ND | NE | NF | NG | NJ | NK |
NQ | NU | NV | NW | NY | NEXT | DD | DF | DG | DJ | DK | DQ | DV | DW | DY
| DEXT | MA | ME | MU | MCOAX | USB
[:SENSE]:MIXer:BAND?
[:SENSE]:MIXer:BIAS <real>
[:SENSE]:MIXer:BIAS?
[:SENSE]:MIXer:BIAS:STATE OFF | ON | 0 | 1
[:SENSE]:MIXer:BIAS:STATE?
[:SENSE]:MIXer:CIFLoss <rel_ampl>
[:SENSE]:MIXer:CIFLoss?
[:SENSE]:MIXer:HARMonic <integer>
[:SENSE]:MIXer:HARMonic?
[:SENSE]:MIXer:LODoubler ON | OFF | 0 | 1
[:SENSE]:MIXer:LODoubler?
[:SENSE]:MIXer:TTYPE SINGLE | HARMonic | DOUBler
[:SENSE]:MIXer:TTYPE?
[:SENSE]:MONitor:AVERAge:COUNT <integer>
[:SENSE]:MONitor:AVERAge:COUNT?
[:SENSE]:MONitor:AVERAge[:STATE] OFF | ON | 0 | 1
[:SENSE]:MONitor:AVERAge[:STATE]?
[:SENSE]:MONitor:AVERAge:TCONtrol EXPonential | REPeat
[:SENSE]:MONitor:AVERAge:TCONtrol?
[:SENSE]:MONitor:BANDwidth[:RESolution] <freq>
[:SENSE]:MONitor:BANDwidth[:RESolution]?
[:SENSE]:MONitor:BANDwidth[:RESolution]:AUTO OFF | ON | 0 | 1
[:SENSE]:MONitor:BANDwidth[:RESolution]:AUTO?
[:SENSE]:MONitor:BANDwidth:VIDeo <bandwidth>
[:SENSE]:MONitor:BANDwidth:VIDeo?

```

3 Programming the Analyzer

List of SCPI Commands

```
[ :SENSe]:MONitor:BANDwidth:VIDeo:AUTO ON | OFF | 1 | 0
[ :SENSe]:MONitor:BANDwidth:VIDeo:AUTO?
[ :SENSe]:MONitor:BANDwidth:VIDeo:RATio <real>
[ :SENSe]:MONitor:BANDwidth:VIDeo:RATio?
[ :SENSe]:MONitor:BANDwidth:VIDeo:RATio:AUTO OFF | ON | 0 | 1
[ :SENSe]:MONitor:BANDwidth:VIDeo:RATio:AUTO?
[ :SENSe]:MONitor:BWIDth[:RESolution]
[ :SENSe]:MONitor:BWIDth:VIDeo
[ :SENSe]:MONitor:BWIDth:VIDeo:RATio
[ :SENSe]:MONitor:DETEctor:AUTO ON | OFF | 1 | 0
[ :SENSe]:MONitor:DETEctor:AUTO?
[ :SENSe]:MONitor:DETEctor[:FUNction]
[ :SENSe]:MONitor:DETEctor:TRACe AVERAge | NEGAtive | NORMAl | POSitive |
SAMPle
[ :SENSe]:MONitor:DETEctor:TRACe?
[ :SENSe]:MONitor:FREQUency:SPAN <freq>
[ :SENSe]:MONitor:FREQUency:SPAN?
[ :SENSe]:MONitor:FREQUency:SPAN:BANDwidth[:RESolution]:RATio <integer>
[ :SENSe]:MONitor:FREQUency:SPAN:BANDwidth[:RESolution]:RATio?
[ :SENSe]:MONitor:FREQUency:SPAN:BANDwidth[:RESolution]:RATio:AUTO OFF | ON
| 0 | 1
[ :SENSe]:MONitor:FREQUency:SPAN:BANDwidth[:RESolution]:RATio:AUTO?
[ :SENSe]:MONitor:FREQUency:SPAN:BWIDth[:RESolution]:RATio
[ :SENSe]:MONitor:FREQUency:SPAN:FULL
[ :SENSe]:MONitor:FREQUency:SPAN:PREVious
[ :SENSe]:MONitor:SWEep:POINts <integer>
[ :SENSe]:MONitor:SWEep:POINts?
[ :SENSe]:MONitor:SWEep:TIME <time>
[ :SENSe]:MONitor:SWEep:TIME?
[ :SENSe]:MONitor:SWEep:TIME:AUTO OFF | ON | 0 | 1
[ :SENSe]:MONitor:SWEep:TIME:AUTO?
[ :SENSe]:ORFSpectrum:AVERAge:COUNT <integer>
[ :SENSe]:ORFSpectrum:AVERAge:COUNT?
[ :SENSe]:ORFSpectrum:AVERAge:FAST[:STATe] OFF | ON | 0 | 1
[ :SENSe]:ORFSpectrum:AVERAge:FAST[:STATe]?
[ :SENSe]:ORFSpectrum:AVERAge:MODulation:TYPE LOG | RMS
[ :SENSe]:ORFSpectrum:AVERAge:MODulation:TYPE?
[ :SENSe]:ORFSpectrum:AVERAge[:STATe] OFF | ON | 0 | 1
[ :SENSe]:ORFSpectrum:AVERAge[:STATe]?
[ :SENSe]:ORFSpectrum:BANDwidth[:RESolution]:MODulation:CARRier <freq>
[ :SENSe]:ORFSpectrum:BANDwidth[:RESolution]:MODulation:CARRier?
[ :SENSe]:ORFSpectrum:BANDwidth[:RESolution]:MODulation:CARRier:AUTO OFF |
ON | 0 | 1
[ :SENSe]:ORFSpectrum:BANDwidth[:RESolution]:MODulation:CARRier:AUTO?
[ :SENSe]:ORFSpectrum:BANDwidth[:RESolution]:MODulation:OFFSet:CLOSe <freq>
[ :SENSe]:ORFSpectrum:BANDwidth[:RESolution]:MODulation:OFFSet:CLOSe?
[ :SENSe]:ORFSpectrum:BANDwidth[:RESolution]:MODulation:OFFSet:FAR <freq>
[ :SENSe]:ORFSpectrum:BANDwidth[:RESolution]:MODulation:OFFSet:FAR?
[ :SENSe]:ORFSpectrum:BANDwidth[:RESolution]:MODulation:OFFSet:IM:FAR2
<freq>
[ :SENSe]:ORFSpectrum:BANDwidth[:RESolution]:MODulation:OFFSet:IM:FAR2?
[ :SENSe]:ORFSpectrum:BANDwidth[:RESolution]:SWITChing:CARRier <freq>
```

```

[:SENSE]:ORFSpectrum:BANDwidth[:RESolution]:SWITching:CARRier?
[:SENSE]:ORFSpectrum:BANDwidth[:RESolution]:SWITching:OFFSet:CLOSE <freq>
[:SENSE]:ORFSpectrum:BANDwidth[:RESolution]:SWITching:OFFSet:CLOSE?
[:SENSE]:ORFSpectrum:BANDwidth[:RESolution]:SWITching:OFFSet:FAR <freq>
[:SENSE]:ORFSpectrum:BANDwidth[:RESolution]:SWITching:OFFSet:FAR?
[:SENSE]:ORFSpectrum:BFRequency <freq>
[:SENSE]:ORFSpectrum:BFRequency?
[:SENSE]:ORFSpectrum:BWIDth[:RESolution]:MODulation:CARRier
[:SENSE]:ORFSpectrum:BWIDth[:RESolution]:MODulation:OFFSet:CLOSE
[:SENSE]:ORFSpectrum:BWIDth[:RESolution]:MODulation:OFFSet:FAR
[:SENSE]:ORFSpectrum:BWIDth[:RESolution]:SWITching:CARRier
[:SENSE]:ORFSpectrum:BWIDth[:RESolution]:SWITching:OFFSet:CLOSE
[:SENSE]:ORFSpectrum:BWIDth[:RESolution]:SWITching:OFFSet:FAR
[:SENSE]:ORFSpectrum:CARRier:PREFerence:TYPE REF | MAX
[:SENSE]:ORFSpectrum:CARRier:PREFerence:TYPE?
[:SENSE]:ORFSpectrum:DETEctor:SWITching:FAST[:STATE] ON | OFF | 1 | 0
[:SENSE]:ORFSpectrum:DETEctor:SWITching:FAST[:STATE]?
[:SENSE]:ORFSpectrum:FREQuency:SYNThesis[:STATE] 2 | 3
[:SENSE]:ORFSpectrum:FREQuency:SYNThesis[:STATE]?
[:SENSE]:ORFSpectrum:IMPOrder <integer>
[:SENSE]:ORFSpectrum:IMPOrder?
[:SENSE]:ORFSpectrum:LIST:MODulation:APPLY RELative|BOTH|ABSolute, ...
[:SENSE]:ORFSpectrum:LIST:MODulation:APPLY?
[:SENSE]:ORFSpectrum:LIST:MODulation:BANDwidth <freq>, ...
[:SENSE]:ORFSpectrum:LIST:MODulation:BANDwidth?
[:SENSE]:ORFSpectrum:LIST:MODulation:BWIDth
[:SENSE]:ORFSpectrum:LIST:MODulation[:FREQuency] <freq>, ...
[:SENSE]:ORFSpectrum:LIST:MODulation[:FREQuency]?
[:SENSE]:ORFSpectrum:LIST:MODulation:LOFFset:ABSolute <rel_ampl>, ...
[:SENSE]:ORFSpectrum:LIST:MODulation:LOFFset:ABSolute?
[:SENSE]:ORFSpectrum:LIST:MODulation:LOFFset[:RCARRier] <rel_ampl>, ...
[:SENSE]:ORFSpectrum:LIST:MODulation:LOFFset[:RCARRier]?
[:SENSE]:ORFSpectrum:LIST:MODulation:STATE OFF|ON|0|1, ...
[:SENSE]:ORFSpectrum:LIST:MODulation:STATE?
[:SENSE]:ORFSpectrum:LIST:SELEct CUSTom | SHORt | STANdard | LCUSTom
[:SENSE]:ORFSpectrum:LIST:SELEct?
[:SENSE]:ORFSpectrum:LIST:SWITching:APPLY RELative|BOTH|ABSolute, ...
[:SENSE]:ORFSpectrum:LIST:SWITching:APPLY?
[:SENSE]:ORFSpectrum:LIST:SWITching:BANDwidth <freq>, ...
[:SENSE]:ORFSpectrum:LIST:SWITching:BANDwidth?
[:SENSE]:ORFSpectrum:LIST:SWITching:BWIDth
[:SENSE]:ORFSpectrum:LIST:SWITching[:FREQuency] <freq>, ...
[:SENSE]:ORFSpectrum:LIST:SWITching[:FREQuency]?
[:SENSE]:ORFSpectrum:LIST:SWITching:LOFFset:ABSolute <rel_ampl>, ...
[:SENSE]:ORFSpectrum:LIST:SWITching:LOFFset:ABSolute?
[:SENSE]:ORFSpectrum:LIST:SWITching:LOFFset[:RCARRier] <rel_ampl>, ...
[:SENSE]:ORFSpectrum:LIST:SWITching:LOFFset[:RCARRier]?
[:SENSE]:ORFSpectrum:LIST:SWITching:STATE OFF|ON|0|1, ...
[:SENSE]:ORFSpectrum:LIST:SWITching:STATE?
[:SENSE]:ORFSpectrum:MCARRier:BEXTension <freq>
[:SENSE]:ORFSpectrum:MCARRier:BEXTension?
[:SENSE]:ORFSpectrum:MCARRier:LCUSTom:LIST:COFREquency <freq>, ...
[:SENSE]:ORFSpectrum:MCARRier:LCUSTom:LIST:COFREquency?

```

```

[:SENSe]:ORFSpectrum:MCARrier:LEXception:LIST:FREQuency <freq>, ...
[:SENSe]:ORFSpectrum:MCARrier:LEXception:LIST:FREQuency?
[:SENSe]:ORFSpectrum:MCARrier:LEXception:RULE FIXED | CUSTom
[:SENSe]:ORFSpectrum:MCARrier:LEXception:RULE?
[:SENSe]:ORFSpectrum:MCARrier:LEXception[:STATe] OFF | ON | 0 | 1
[:SENSe]:ORFSpectrum:MCARrier:LEXception[:STATe]?
[:SENSe]:ORFSpectrum:MEASure MULTiple | SINGLE | SWEPT
[:SENSe]:ORFSpectrum:MEASure?
[:SENSe]:ORFSpectrum:MODulation:RPOWER <ampl>
[:SENSe]:ORFSpectrum:MODulation:RPOWER?
[:SENSe]:ORFSpectrum:MODulation:RPOWER:AUTO[:STATe] OFF | ON | 0 | 1
[:SENSe]:ORFSpectrum:MODulation:RPOWER:AUTO[:STATe]?
[:SENSe]:ORFSpectrum:NCONTiguous:REGion INNER | OUTER
[:SENSe]:ORFSpectrum:NCONTiguous:REGion?
[:SENSe]:ORFSpectrum:OFRequency <freq>
[:SENSe]:ORFSpectrum:OFRequency?
[:SENSe]:ORFSpectrum:REFeRence:AVERAge[:AUTO] ON | OFF | 1 | 0
[:SENSe]:ORFSpectrum:REFeRence:AVERAge[:AUTO]?
[:SENSe]:ORFSpectrum:REFeRence:AVERAge:COUNT <integer>
[:SENSe]:ORFSpectrum:REFeRence:AVERAge:COUNT?
[:SENSe]:ORFSpectrum:SWITching:RPOWER <ampl>
[:SENSe]:ORFSpectrum:SWITching:RPOWER?
[:SENSe]:ORFSpectrum:SWITching:RPOWER:AUTO[:STATe] OFF | ON | 0 | 1
[:SENSe]:ORFSpectrum:SWITching:RPOWER:AUTO[:STATe]?
[:SENSe]:ORFSpectrum:TYPE MODulation | MSWitching | SWITching |
FFModulation
[:SENSe]:ORFSpectrum:TYPE?
[:SENSe]:ORFSpectrum:TYPE:MODulation[:METHod] DIScrete | SWEep
[:SENSe]:ORFSpectrum:TYPE:MODulation[:METHod]?
[:SENSe]:ORFSpectrum:WBNoise ON | OFF | 1 | 0
[:SENSe]:ORFSpectrum:WBNoise?
[:SENSe]:PFError:AVERAge:COUNT <integer>
[:SENSe]:PFError:AVERAge:COUNT?
[:SENSe]:PFError:AVERAge[:STATe] OFF | ON | 0 | 1
[:SENSe]:PFError:AVERAge[:STATe]?
[:SENSe]:PFError:AVERAge:TCONtrol EXPonential | REPeat
[:SENSe]:PFError:AVERAge:TCONtrol?
[:SENSe]:PFError:AVERAge:TYPE MEAN | MAXimum
[:SENSe]:PFError:AVERAge:TYPE?
[:SENSe]:PFError:BSYNc:SOURce RFBurst | TSEquence
[:SENSe]:PFError:BSYNc:SOURce?
[:SENSe]:PFError:IF:GAIN:AUTO[:STATe] ON | OFF | 1 | 0
[:SENSe]:PFError:IF:GAIN:AUTO[:STATe]?
[:SENSe]:PFError:IF:GAIN[:STATe] ON | OFF | 1 | 0
[:SENSe]:PFError:IF:GAIN[:STATe]?
[:SENSe]:POWER[:RF]:ATTenuation <rel_ampl>
[:SENSe]:POWER[:RF]:ATTenuation?
[:SENSe]:POWER[:RF]:ATTenuation:AUTO OFF | ON | 0 | 1
[:SENSe]:POWER[:RF]:ATTenuation:AUTO?
[:SENSe]:POWER[:RF]:ATTenuation:STEP[:INCRement] 10 dB | 2 dB
[:SENSe]:POWER[:RF]:ATTenuation:STEP[:INCRement]?
[:SENSe]:POWER[:RF]:EATTenuation <rel_ampl>
[:SENSe]:POWER[:RF]:EATTenuation?

```

```

[:SENSE]:POWER[:RF]:EATTenuation:STATE OFF | ON | 0 | 1
[:SENSE]:POWER[:RF]:EATTenuation:STATE?
[:SENSE]:POWER[:RF]:GAIN:BAND LOW | FULL
[:SENSE]:POWER[:RF]:GAIN:BAND?
[:SENSE]:POWER[:RF]:GAIN[:STATE] OFF | ON | 0 | 1
[:SENSE]:POWER[:RF]:GAIN[:STATE]?
[:SENSE]:POWER[:RF]:MMW:PADJust
[:SENSE]:POWER[:RF]:MW:PADJust
[:SENSE]:POWER[:RF]:MW:PATH STD | LNPath | MPBypass | FULL
[:SENSE]:POWER[:RF]:MW:PATH?
[:SENSE]:POWER[:RF]:MW:PRESelector[:STATE] ON | OFF | 0 | 1
[:SENSE]:POWER[:RF]:MW:PRESelector[:STATE]?
[:SENSE]:POWER[:RF]:PADJust <freq>
[:SENSE]:POWER[:RF]:PADJust?
[:SENSE]:POWER[:RF]:PADJust:PRESelector MWAVe | MMWave | EXTERNAL
[:SENSE]:POWER[:RF]:PADJust:PRESelector?
[:SENSE]:POWER[:RF]:PCENTER
[:SENSE]:POWER[:RF]:RANGE:AUTO ON | OFF | 1 | 0
[:SENSE]:POWER[:RF]:RANGE:AUTO?
[:SENSE]:POWER[:RF]:RANGE:OPTimize IMMEDIATE
[:SENSE]:POWER[:RF]:RANGE:OPTimize:ATTenuation OFF | ELECTRICAL | COMBINED
[:SENSE]:POWER[:RF]:RANGE:OPTimize:ATTenuation?
[:SENSE]:PVTime:AVERAGE:COUNT <integer>
[:SENSE]:PVTime:AVERAGE:COUNT?
[:SENSE]:PVTime:AVERAGE[:STATE] OFF | ON | 0 | 1
[:SENSE]:PVTime:AVERAGE[:STATE]?
[:SENSE]:PVTime:AVERAGE:TCONTROL EXPONENTIAL | REPEAT
[:SENSE]:PVTime:AVERAGE:TCONTROL?
[:SENSE]:PVTime:AVERAGE:TYPE LOG | RMS | MAXIMUM | MINIMUM | MXMINIMUM
[:SENSE]:PVTime:AVERAGE:TYPE?
[:SENSE]:PVTime:BANDwidth[:RESolution] <bandwidth>
[:SENSE]:PVTime:BANDwidth[:RESolution]?
[:SENSE]:PVTime:BANDwidth[:RESolution]:TYPE FLATTOP | GAUSSIAN
[:SENSE]:PVTime:BANDwidth[:RESolution]:TYPE?
[:SENSE]:PVTime:BSYNc:SLENgth EVEN | INTEGER
[:SENSE]:PVTime:BSYNc:SLENgth?
[:SENSE]:PVTime:BSYNc:SOURce TSEQUENCE | RFBURST | NONE
[:SENSE]:PVTime:BSYNc:SOURce?
[:SENSE]:PVTime:BWIDth[:RESolution]
[:SENSE]:PVTime:BWIDth[:RESolution]:TYPE
[:SENSE]:PVTime:CDATA ON | OFF | 1 | 0
[:SENSE]:PVTime:CDATA?
[:SENSE]:PVTime:IF:GAIN:AUTO[:STATE] ON | OFF | 1 | 0
[:SENSE]:PVTime:IF:GAIN:AUTO[:STATE]?
[:SENSE]:PVTime:IF:GAIN[:STATE] ON | OFF | 1 | 0
[:SENSE]:PVTime:IF:GAIN[:STATE]?
[:SENSE]:PVTime:MASK:LIST:LOWer:ABSolute <real>, ...
[:SENSE]:PVTime:MASK:LIST:LOWer:ABSolute?
[:SENSE]:PVTime:MASK:LIST:LOWer:POINTs?
[:SENSE]:PVTime:MASK:LIST:LOWer:RELative <rel_ampl>, ...
[:SENSE]:PVTime:MASK:LIST:LOWer:RELative?
[:SENSE]:PVTime:MASK:LIST:LOWer:TIME <seconds>, ...
[:SENSE]:PVTime:MASK:LIST:LOWer:TIME?

```

```
[ :SENSe]:PVTime:MASK:LIST:UPPer:ABSolute <real>, ...
[ :SENSe]:PVTime:MASK:LIST:UPPer:ABSolute?
[ :SENSe]:PVTime:MASK:LIST:UPPer:POINts?
[ :SENSe]:PVTime:MASK:LIST:UPPer:RELative <rel_ampl>, ...
[ :SENSe]:PVTime:MASK:LIST:UPPer:RELative?
[ :SENSe]:PVTime:MASK:LIST:UPPer:TIME <seconds>, ...
[ :SENSe]:PVTime:MASK:LIST:UPPer:TIME?
[ :SENSe]:PVTime:MASK:SElect STANdard | CUSTom
[ :SENSe]:PVTime:MASK:SElect?
[ :SENSe]:PVTime:MTIME
[ :SENSe]:PVTime:PCLevel
[ :SENSe]:PVTime:SWEEP:TIME <integer>
[ :SENSe]:PVTime:SWEEP:TIME?
[ :SENSe]:RADio:CARRier:HOP OFF | ON | 0 | 1
[ :SENSe]:RADio:CARRier:HOP?
[ :SENSe]:RADio:CARRier:NUMBER SINGLE | MULTiple
[ :SENSe]:RADio:CARRier:NUMBER?
[ :SENSe]:RADio:CARRier:NUMBER:AUTO ON | OFF | 1 | 0
[ :SENSe]:RADio:CARRier:NUMBER:AUTO?
[ :SENSe]:RADio:CARRier[:TYPE] BURSt | CONTinuous
[ :SENSe]:RADio:CARRier[:TYPE] ?
[ :SENSe]:RADio:DEvIce BTS | MS
[ :SENSe]:RADio:DEvIce?
[ :SENSe]:RADio:DEvIce:BASE[:TYPE] NORMAl | MICRo | MICR1 | MICR2 | MICR3 |
PICO | PICO1
[ :SENSe]:RADio:DEvIce:BASE[:TYPE]?
[ :SENSe]:RADio:PCLevel <integer>
[ :SENSe]:RADio:PCLevel?
[ :SENSe]:RADio:PCLevel:AUTO 0 | 1 | OFF | ON
[ :SENSe]:RADio:PCLevel:AUTO?
[ :SENSe]:RADio:PSHape NARRow | WIDE
[ :SENSe]:RADio:PSHape?
[ :SENSe]:RADio:STANdard:BAND PGSM | EGSM | RGSM | DCS1800 | PCS1900 |
GSM450 | GSM480 | GSM700 | GSM850 | TGSM810
[ :SENSe]:RADio:STANdard:BAND?
[ :SENSe]:ROSCillator:BANDwidth WIDE | NARRow
[ :SENSe]:ROSCillator:BANDwidth?
[ :SENSe]:ROSCillator:COUpling NORMAl | NACQuisition
[ :SENSe]:ROSCillator:COUpling?
[ :SENSe]:ROSCillator:EXtErnal:FREQuency <freq>
[ :SENSe]:ROSCillator:EXtErnal:FREQuency?
[ :SENSe]:ROSCillator:SOURce INTernal | EXtErnal
[ :SENSe]:ROSCillator:SOURce?
[ :SENSe]:ROSCillator:SOURce:TYPE INTernal | EXtErnal | SENSE | PULSe
[ :SENSe]:ROSCillator:SOURce:TYPE?
[ :SENSe]:SIDentify:MODE ISUPpress | ISHift
[ :SENSe]:SIDentify:MODE?
[ :SENSe]:SIDentify[:STATE] OFF | ON | 0 | 1
[ :SENSe]:SIDentify[:STATE]?
[ :SENSe]:SWEEP:EGATE:CONTRol EDGE | LEVEL
[ :SENSe]:SWEEP:EGATE:CONTRol?
[ :SENSe]:SWEEP:EGATE:DELay <time>
[ :SENSe]:SWEEP:EGATE:DELay?
```

```

[:SENSE]:SWEep:EGATE:DELay:COMPensation:TYPE OFF | SETTled | GDELay
[:SENSE]:SWEep:EGATE:DELay:COMPensation:TYPE?
[:SENSE]:SWEep:EGATE:EXTernal[1]|2:LEVel <voltage>
[:SENSE]:SWEep:EGATE:EXTernal[1]|2:LEVel?
[:SENSE]:SWEep:EGATE:HOLDoff <time>
[:SENSE]:SWEep:EGATE:HOLDoff?
[:SENSE]:SWEep:EGATE:HOLDoff:AUTO OFF | ON | 0 | 1
[:SENSE]:SWEep:EGATE:HOLDoff:AUTO?
[:SENSE]:SWEep:EGATE:LENGth <time>
[:SENSE]:SWEep:EGATE:LENGth?
[:SENSE]:SWEep:EGATE:MINFast?
[:SENSE]:SWEep:EGATE:POLarity NEGative | POSitive
[:SENSE]:SWEep:EGATE:POLarity?
[:SENSE]:SWEep:EGATE:SOURce EXTernal1 | EXTernal2 | LINE | FRAME | RFBurst
[:SENSE]:SWEep:EGATE:SOURce?
[:SENSE]:SWEep:EGATE[:STATE] OFF | ON | 0 | 1
[:SENSE]:SWEep:EGATE[:STATE]?
[:SENSE]:SWEep:EGATE:TIME <time>
[:SENSE]:SWEep:EGATE:TIME?
[:SENSE]:SWEep:EGATE:VIEW ON | OFF | 1 | 0
[:SENSE]:SWEep:EGATE:VIEW?
[:SENSE]:SWEep:EGATE:VIEW:STARt <time>
[:SENSE]:SWEep:EGATE:VIEW:STARt?
[:SENSE]:SWEep:TIME:GATE:LEVel HIGH | LOW
[:SENSE]:SWEep:TIME:GATE:LEVel?
[:SENSE]:SYNC:ALIGNment GSM | HBIT
[:SENSE]:SYNC:ALIGNment?
[:SENSE]:SYNC:BURSt:RFAMplitude:DELay <time>
[:SENSE]:SYNC:BURSt:RFAMplitude:DELay?
[:SENSE]:SYNC:BURSt:STHReshold <rel_ampl>
[:SENSE]:SYNC:BURSt:STHReshold?
[:SENSE]:SYNC:CONFigure:METhod FORCe | DISCard
[:SENSE]:SYNC:CONFigure:METhod?
[:SENSE]:SYNC:HSRate:MODulation QPSK | QAM16 | QAM32
[:SENSE]:SYNC:HSRate:MODulation?
[:SENSE]:SYNC:HSRate:MODulation:AUTO ON | OFF | 1 | 0
[:SENSE]:SYNC:HSRate:MODulation:AUTO?
[:SENSE]:SYNC:NORMal:MODulation GMSK | EPSK | QAM16 | QAM32 | AQPSK
[:SENSE]:SYNC:NORMal:MODulation?
[:SENSE]:SYNC:NORMal:MODulation:AQPSk:ALPHa:ARCTan <real>
[:SENSE]:SYNC:NORMal:MODulation:AQPSk:ALPHa:ARCTan?
[:SENSE]:SYNC:NORMal:MODulation:AQPSk:ALPHa:SCPIr <real>
[:SENSE]:SYNC:NORMal:MODulation:AQPSk:ALPHa:SCPIr?
[:SENSE]:SYNC:NORMal:MODulation:AUTO ON | OFF | 1 | 0
[:SENSE]:SYNC:NORMal:MODulation:AUTO?
[:SENSE]:SYNC:NORMal:MODulation:AUTO:AQPSk INCLude | EXCLude
[:SENSE]:SYNC:NORMal:MODulation:AUTO:AQPSk?
[:SENSE]:TSPur:AVERage:COUNT <integer>
[:SENSE]:TSPur:AVERage:COUNT?
[:SENSE]:TSPur:AVERage[:STATE] OFF | ON | 0 | 1
[:SENSE]:TSPur:AVERage[:STATE]?
[:SENSE]:TSPur:AVERage:TCONtrol EXPonential | REPeat
[:SENSE]:TSPur:AVERage:TCONtrol?

```

3 Programming the Analyzer

List of SCPI Commands

```
[ :SENSe]:TSPur:AVERAge:TYPE LOG | MAXimum | RMS
[ :SENSe]:TSPur:AVERAge:TYPE?
[ :SENSe]:TSPur:DETEctor:AUTO ON | OFF | 1 | 0
[ :SENSe]:TSPur:DETEctor:AUTO?
[ :SENSe]:TSPur:DETEctor[:FUNction] AVERAge | POSitive
[ :SENSe]:TSPur:DETEctor[:FUNction]?
[ :SENSe]:TSPur:IF:GAIN:AUTO[:STATe] ON | OFF | 1 | 0
[ :SENSe]:TSPur:IF:GAIN:AUTO[:STATe]?
[ :SENSe]:TSPur:IF:GAIN[:STATe] ON | OFF | 1 | 0
[ :SENSe]:TSPur:IF:GAIN[:STATe]?
[ :SENSe]:TSPur:TRACe AVERAge | MAXHold | AUTO
[ :SENSe]:TSPur:TRACe?
[ :SENSe]:TSPur:TXBand DEFault | CUSTom
[ :SENSe]:TSPur:TXBand?
[ :SENSe]:TSPur:TXBand:RANGe <freq>, ...
[ :SENSe]:TSPur:TXBand:RANGe?
[ :SENSe]:TSPur:TYPE EXAMine | FULL
[ :SENSe]:TSPur:TYPE?
[ :SENSe]:TXPower:AVERAge:COUNT <integer>
[ :SENSe]:TXPower:AVERAge:COUNT?
[ :SENSe]:TXPower:AVERAge[:STATe] OFF | ON | 0 | 1
[ :SENSe]:TXPower:AVERAge[:STATe]?
[ :SENSe]:TXPower:AVERAge:TCONtrol EXPonential | REPeat
[ :SENSe]:TXPower:AVERAge:TCONtrol?
[ :SENSe]:TXPower:AVERAge:TYPE LOG | RMS
[ :SENSe]:TXPower:AVERAge:TYPE LOG | MAXimum | MINimum | RMS
[ :SENSe]:TXPower:AVERAge:TYPE?
[ :SENSe]:TXPower:AVERAge:TYPE?
[ :SENSe]:TXPower:BANDwidth[:RESolution] <bandwidth>
[ :SENSe]:TXPower:BANDwidth[:RESolution]?
[ :SENSe]:TXPower:BANDwidth:TYPE GAUSSian | FLATtop
[ :SENSe]:TXPower:BANDwidth:TYPE?
[ :SENSe]:TXPower:BURSt:AUTO ON | OFF | 1 | 0
[ :SENSe]:TXPower:BURSt:AUTO?
[ :SENSe]:TXPower:BURSt:WIDTh <time>
[ :SENSe]:TXPower:BURSt:WIDTh?
[ :SENSe]:TXPower:BWIDth[:RESolution]
[ :SENSe]:TXPower:BWIDth:TYPE
[ :SENSe]:TXPower:IF:GAIN:AUTO[:STATe] OFF | ON | 0 | 1
[ :SENSe]:TXPower:IF:GAIN:AUTO[:STATe]?
[ :SENSe]:TXPower:IF:GAIN[:STATe] ON | OFF | 1 | 0
[ :SENSe]:TXPower:IF:GAIN[:STATe]?
[ :SENSe]:TXPower:METHod THReshold | BWIDth | SINGle
[ :SENSe]:TXPower:METHod THReshold | BWIDth
[ :SENSe]:TXPower:METHod?
[ :SENSe]:TXPower:METHod?
[ :SENSe]:TXPower:SWEep:TIME <integer>
[ :SENSe]:TXPower:SWEep:TIME?
[ :SENSe]:TXPower:THReshold <real>
[ :SENSe]:TXPower:THReshold?
[ :SENSe]:TXPower:THReshold:TYPE ABSolute | RELative
[ :SENSe]:TXPower:THReshold:TYPE?
[ :SENSe]:WAVEform:ADC:DITHer:AUTO[:STATe] OFF | ON | 0 | 1
```



```

[:SENSe]:WAVeform:ADC:DITHer:AUTO[:STATe]?
[:SENSe]:WAVeform:ADC:DITHer[:STATe] OFF | ON | 0 | 1
[:SENSe]:WAVeform:ADC:DITHer[:STATe]?
[:SENSe]:WAVeform:AVERAge:COUNT <integer>
[:SENSe]:WAVeform:AVERAge:COUNT?
[:SENSe]:WAVeform:AVERAge[:STATe] OFF | ON | 0 | 1
[:SENSe]:WAVeform:AVERAge[:STATe]?
[:SENSe]:WAVeform:AVERAge:TACount <integer>
[:SENSe]:WAVeform:AVERAge:TACount?
[:SENSe]:WAVeform:AVERAge:TCONTRol EXPonential | REPEat
[:SENSe]:WAVeform:AVERAge:TCONTRol?
[:SENSe]:WAVeform:AVERAge:TYPE LOG | MAXimum | MINimum | RMS | SCALar
[:SENSe]:WAVeform:AVERAge:TYPE?
[:SENSe]:WAVeform:AVERAge:TYPE:AUTO[:STATe] ON | OFF | 1 | 0
[:SENSe]:WAVeform:AVERAge:TYPE:AUTO[:STATe]?
[:SENSe]:WAVeform:BANDwidth|BWIDth[:RESolution]:TYPE
[:SENSe]:WAVeform:BANDwidth[:RESolution]
[:SENSe]:WAVeform:BANDwidth:SHAPE
[:SENSe]:WAVeform:BWIDth[:RESolution]
[:SENSe]:WAVeform:BWIDth:SHAPE
[:SENSe]:WAVeform:DIF:BANDwidth <freq>
[:SENSe]:WAVeform:DIF:BANDwidth?
[:SENSe]:WAVeform:DIF:FILTer:ALPHa <real>
[:SENSe]:WAVeform:DIF:FILTer:ALPHa?
[:SENSe]:WAVeform:DIF:FILTer:BANDwidth <freq>
[:SENSe]:WAVeform:DIF:FILTer:BANDwidth?
[:SENSe]:WAVeform:DIF:FILTer:BANDwidth:AUTO ON | OFF | 1 | 0
[:SENSe]:WAVeform:DIF:FILTer:BANDwidth:AUTO?
[:SENSe]:WAVeform:DIF:FILTer:TYPE GAUSSian | FLATtop | SNYQuist |
RSNYquist | RCOSine | RRCosine
[:SENSe]:WAVeform:DIF:FILTer:TYPE GAUSSian | FLATtop
[:SENSe]:WAVeform:DIF:FILTer:TYPE?
[:SENSe]:WAVeform:DIF:FILTer:TYPE?
[:SENSe]:WAVeform:FREQuency:SYNThesis:AUTO[:STATe] OFF | ON | 0 | 1
[:SENSe]:WAVeform:FREQuency:SYNThesis:AUTO[:STATe]?
[:SENSe]:WAVeform:FREQuency:SYNThesis[:STATe] 1 | 2 | 3
[:SENSe]:WAVeform:FREQuency:SYNThesis[:STATe]?
[:SENSe]:WAVeform:IF:GAIN:AUTO[:STATe] ON | OFF | 1 | 0
[:SENSe]:WAVeform:IF:GAIN:AUTO[:STATe]?
[:SENSe]:WAVeform:IF:GAIN:OFFSet <rel_ampl>
[:SENSe]:WAVeform:IF:GAIN:OFFSet?
[:SENSe]:WAVeform:IF:GAIN[:STATe] AUTOrange | LOW | HIGH
[:SENSe]:WAVeform:IF:GAIN[:STATe]?
[:SENSe]:WAVeform:PDITHer
[:SENSe]:WAVeform:SRATE <freq>
[:SENSe]:WAVeform:SRATE?
[:SENSe]:WAVeform:SWEep:TIME <time>
[:SENSe]:WAVeform:SWEep:TIME?
[:SENSe]:WAVeform:WBIF:ADC:DITHer
[:SENSe]:WAVeform:WBIF:FILTer:ALPHa
[:SENSe]:WAVeform:WBIF:FILTer:BANDwidth <real>
[:SENSe]:WAVeform:WBIF:FILTer:BANDwidth?

```

```
[ :SENSe]:WAVEform:WBIF:FILTer[:TYPE] GAUSSian | NONE | NYQuist | RNYQuist
| RCOSine | RRCosine
[:SENSe]:WAVEform:WBIF:FILTer[:TYPE]?
STATus:OPERation:CONDition?
STATus:OPERation:ENABle <integer>
STATus:OPERation:ENABle?
STATus:OPERation[:EVENT]?
STATus:OPERation:NTRansition <integer>
STATus:OPERation:NTRansition?
STATus:OPERation:PTRansition <integer>
STATus:OPERation:PTRansition?
STATus:PRESet
STATus:QUESTionable:CALibration:CONDition?
STATus:QUESTionable:CALibration:ENABle <integer>
STATus:QUESTionable:CALibration:ENABle?
STATus:QUESTionable:CALibration[:EVENT]?
STATus:QUESTionable:CALibration:EXTended:FAILure:CONDition?
STATus:QUESTionable:CALibration:EXTended:FAILure:ENABle <integer>
STATus:QUESTionable:CALibration:EXTended:FAILure:ENABle?
STATus:QUESTionable:CALibration:EXTended:FAILure[:EVENT]?
STATus:QUESTionable:CALibration:EXTended:FAILure:NTRansition <integer>
STATus:QUESTionable:CALibration:EXTended:FAILure:NTRansition?
STATus:QUESTionable:CALibration:EXTended:FAILure:PTRansition <integer>
STATus:QUESTionable:CALibration:EXTended:FAILure:PTRansition?
STATus:QUESTionable:CALibration:EXTended:NEEDed:CONDition?
STATus:QUESTionable:CALibration:EXTended:NEEDed:ENABle <integer>
STATus:QUESTionable:CALibration:EXTended:NEEDed:ENABle?
STATus:QUESTionable:CALibration:EXTended:NEEDed[:EVENT]?
STATus:QUESTionable:CALibration:EXTended:NEEDed:NTRansition <integer>
STATus:QUESTionable:CALibration:EXTended:NEEDed:NTRansition?
STATus:QUESTionable:CALibration:EXTended:NEEDed:PTRansition <integer>
STATus:QUESTionable:CALibration:EXTended:NEEDed:PTRansition?
STATus:QUESTionable:CALibration:NTRansition <integer>
STATus:QUESTionable:CALibration:NTRansition?
STATus:QUESTionable:CALibration:PTRansition <integer>
STATus:QUESTionable:CALibration:PTRansition?
STATus:QUESTionable:CALibration:SKIPPed:CONDition?
STATus:QUESTionable:CALibration:SKIPPed:ENABle <integer>
STATus:QUESTionable:CALibration:SKIPPed:ENABle?
STATus:QUESTionable:CALibration:SKIPPed[:EVENT]?
STATus:QUESTionable:CALibration:SKIPPed:NTRansition <integer>
STATus:QUESTionable:CALibration:SKIPPed:NTRansition?
STATus:QUESTionable:CALibration:SKIPPed:PTRansition <integer>
STATus:QUESTionable:CALibration:SKIPPed:PTRansition?
STATus:QUESTionable:CONDition?
STATus:QUESTionable:ENABle <integer>
STATus:QUESTionable:ENABle?
STATus:QUESTionable[:EVENT]?
STATus:QUESTionable:FREQuency:CONDition?
STATus:QUESTionable:FREQuency:ENABle <integer>
STATus:QUESTionable:FREQuency:ENABle?
STATus:QUESTionable:FREQuency[:EVENT]?
STATus:QUESTionable:FREQuency:NTRansition <integer>
```

```

STATUS:QUESTIONABLE:FREQUENCY:NTRANSITION?
STATUS:QUESTIONABLE:FREQUENCY:PTRANSITION <integer>
STATUS:QUESTIONABLE:FREQUENCY:PTRANSITION?
STATUS:QUESTIONABLE:INTEGRITY:CONDITION?
STATUS:QUESTIONABLE:INTEGRITY:ENABLE <integer>
STATUS:QUESTIONABLE:INTEGRITY:ENABLE?
STATUS:QUESTIONABLE:INTEGRITY[:EVENT]?
STATUS:QUESTIONABLE:INTEGRITY:NTRANSITION <integer>
STATUS:QUESTIONABLE:INTEGRITY:NTRANSITION?
STATUS:QUESTIONABLE:INTEGRITY:PTRANSITION <integer>
STATUS:QUESTIONABLE:INTEGRITY:PTRANSITION?
STATUS:QUESTIONABLE:INTEGRITY:SIGNAL:CONDITION?
STATUS:QUESTIONABLE:INTEGRITY:SIGNAL:ENABLE <integer>
STATUS:QUESTIONABLE:INTEGRITY:SIGNAL:ENABLE?
STATUS:QUESTIONABLE:INTEGRITY:SIGNAL[:EVENT]?
STATUS:QUESTIONABLE:INTEGRITY:SIGNAL:NTRANSITION <integer>
STATUS:QUESTIONABLE:INTEGRITY:SIGNAL:NTRANSITION?
STATUS:QUESTIONABLE:INTEGRITY:SIGNAL:PTRANSITION <integer>
STATUS:QUESTIONABLE:INTEGRITY:SIGNAL:PTRANSITION?
STATUS:QUESTIONABLE:INTEGRITY:UNCALIBRATED:CONDITION?
STATUS:QUESTIONABLE:INTEGRITY:UNCALIBRATED:ENABLE
STATUS:QUESTIONABLE:INTEGRITY:UNCALIBRATED:ENABLE?
STATUS:QUESTIONABLE:INTEGRITY:UNCALIBRATED[:EVENT]?
STATUS:QUESTIONABLE:INTEGRITY:UNCALIBRATED:NTRANSITION <integer>
STATUS:QUESTIONABLE:INTEGRITY:UNCALIBRATED:NTRANSITION?
STATUS:QUESTIONABLE:INTEGRITY:UNCALIBRATED:PTRANSITION <integer>
STATUS:QUESTIONABLE:INTEGRITY:UNCALIBRATED:PTRANSITION?
STATUS:QUESTIONABLE:NTRANSITION <integer>
STATUS:QUESTIONABLE:NTRANSITION?
STATUS:QUESTIONABLE:POWER:CONDITION?
STATUS:QUESTIONABLE:POWER:ENABLE <integer>
STATUS:QUESTIONABLE:POWER:ENABLE?
STATUS:QUESTIONABLE:POWER[:EVENT]?
STATUS:QUESTIONABLE:POWER:NTRANSITION <integer>
STATUS:QUESTIONABLE:POWER:NTRANSITION?
STATUS:QUESTIONABLE:POWER:PTRANSITION <integer>
STATUS:QUESTIONABLE:POWER:PTRANSITION?
STATUS:QUESTIONABLE:PTRANSITION <integer>
STATUS:QUESTIONABLE:PTRANSITION?
STATUS:QUESTIONABLE:TEMPERATURE:CONDITION?
STATUS:QUESTIONABLE:TEMPERATURE:ENABLE <integer>
STATUS:QUESTIONABLE:TEMPERATURE:ENABLE?
STATUS:QUESTIONABLE:TEMPERATURE[:EVENT]?
STATUS:QUESTIONABLE:TEMPERATURE:NTRANSITION <integer>
STATUS:QUESTIONABLE:TEMPERATURE:NTRANSITION?
STATUS:QUESTIONABLE:TEMPERATURE:PTRANSITION <integer>
STATUS:QUESTIONABLE:TEMPERATURE:PTRANSITION?
SYSTEM:APPLICATION:CATALOG[:NAME]?
SYSTEM:APPLICATION:CATALOG[:NAME]:COUNT?
SYSTEM:APPLICATION:CATALOG:OPTION? <model>
SYSTEM:APPLICATION:CATALOG:REVISION? <model>
SYSTEM:APPLICATION[:CURRENT][:NAME]?
SYSTEM:APPLICATION[:CURRENT]:OPTION?

```

3 Programming the Analyzer

List of SCPI Commands

```
SYSTem:APPLication[:CURRent]:REVision?
SYSTem:COMMunicate:GPIB[1][:SELf]:ADDRes <integer>
SYSTem:COMMunicate:GPIB[1][:SELf]:ADDRes?
SYSTem:COMMunicate:GPIB[1][:SELf]:CONTROLLER[:ENABLE] ON | OFF | 0 | 1
SYSTem:COMMunicate:GPIB[1][:SELf]:CONTROLLER[:ENABLE]?
SYSTem:COMMunicate:LAN:SCPI:HISLip:ENABLE OFF | ON | 0 | 1
SYSTem:COMMunicate:LAN:SCPI:HISLip:ENABLE?
SYSTem:COMMunicate:LAN:SCPI:SICL:ENABLE OFF | ON | 0 | 1
SYSTem:COMMunicate:LAN:SCPI:SICL:ENABLE?
SYSTem:COMMunicate:LAN:SCPI:SOCKET:CONTROl?
SYSTem:COMMunicate:LAN:SCPI:SOCKET:ENABLE OFF | ON | 0 | 1
SYSTem:COMMunicate:LAN:SCPI:SOCKET:ENABLE?
SYSTem:COMMunicate:LAN:SCPI:TELNet:ENABLE OFF | ON | 0 | 1
SYSTem:COMMunicate:LAN:SCPI:TELNet:ENABLE?
SYSTem:COMMunicate:USB:CONNEction?
SYSTem:COMMunicate:USB:PACKets?
SYSTem:COMMunicate:USB:STATUs?
SYSTem:CONFIgure[:SYSTem]?
SYSTem:DATE "<year>, <month>, <day>"
SYSTem:DATE?
SYSTem:DEFault [ALL] | ALIGn | INPut | MISC | MODes | PON
SYSTem:ERRor[:NEXT]?
SYSTem:ERRor:OVERload[:STATE] 0 | 1 | OFF | ON
SYSTem:ERRor:VERBoSe OFF | ON | 0 | 1
SYSTem:ERRor:VERBoSe?
SYSTem:HELP:HEADers?
SYSTem:HID?
SYSTem:IDN <string>
SYSTem:IDN?
SYSTem:KLOCK OFF | ON | 0 | 1
SYSTem:KLOCK?
SYSTem:LKEY <"OptionInfo">, <"LicenseInfo">
SYSTem:LKEY? <"OptionInfo">
SYSTem:LKEY:DELeTe <"OptionInfo">, <"LicenseInfo">
SYSTem:LKEY:LIST?
SYSTem:MRELay:COUNT?
SYSTem:OPTions?
SYSTem:PDOWn [NORMal | FORCe]
SYSTem:PON:APPLication:LLIST <stringofINSTrument:SElectnames>
SYSTem:PON:APPLication:LLIST?
SYSTem:PON:APPLication:VMEMory[:AVAILable]?
SYSTem:PON:APPLication:VMEMory:TOTAL?
SYSTem:PON:APPLication:VMEMory:USED?
SYSTem:PON:APPLication:VMEMory:USED:NAME? <INSTrument:SElectname>
SYSTem:PON:ETIME?
SYSTem:PON:MODE SA | BASIC | ADEMOD | NFIGURE | PNOISE | CDMA2K | TDSCDMA
| VSA | VSA89601 | WCDMA | WIMAXOFDMA
SYSTem:PON:MODE?
SYSTem:PON:TIME?
SYSTem:PON:TYPE MODE | USER | LAST
SYSTem:PON:TYPE PRESet
SYSTem:PON:TYPE?
SYSTem:PRESet
```

```

SYSTEM:PRESet:TYPE FACTory | MODE | USER
SYSTEM:PRESet:TYPE?
SYSTEM:PRESet:USER
SYSTEM:PRESet:USER:ALL
SYSTEM:PRESet:USER:SAVE
SYSTEM:PRINT:THEME TDColor | TDMonochrome | FCOLOR | FMONochrome
SYSTEM:PRINT:THEME?
SYSTEM:PUP:PROcEss
SYSTEM:SECurity:USB:WPRotect[:ENABLE] ON | OFF | 0 | 1
SYSTEM:SECurity:USB:WPRotect[:ENABLE]?
SYSTEM:SHOW OFF | ERRor | SYSTem | HARDWare | LXI | HWStatistics |
ALIGNment | SOFTware | CAPPLication
SYSTEM:SHOW?
SYSTEM:TEMPerature:HEXTreme?
SYSTEM:TEMPerature:LEXTreme?
SYSTEM:TIME "<hour>, <minute>, <second>"
SYSTEM:TIME?
SYSTEM:VERSion?
TRACE:MONitor:CLEar [TRACE1] | TRACE2 | TRACE3
TRACE:MONitor:CLEar:ALL
TRACE[1]|2|3:MONitor:DISPlay[:STATE] ON | OFF | 0 | 1
TRACE[1]|2|3:MONitor:DISPlay[:STATE]?
TRACE[1]|2|3:MONitor:TYPE WRITe | AVERAge | MAXHold | MINHold
TRACE[1]|2|3:MONitor:TYPE?
TRACE[1]|2|3:MONitor:UPDate[:STATE] ON | OFF | 0 | 1
TRACE[1]|2|3:MONitor:UPDate[:STATE]?
TRIGger:<measurement>[:SEQuence]:IQ:SOURce EXTernal1 | EXTernal2 |
IMMediate | IQMag | IDEMod | QDEMod | IINPut | QINPut | AIQMag
TRIGger:<measurement>[:SEQuence]:IQ:SOURce?
TRIGger:<measurement>[:SEQuence]:RF:SOURce EXTernal1 | EXTernal2 |
IMMediate | LINE | FRAME | RFBurst | VIDEo | IF | ALARm | LAN | TV
TRIGger:<measurement>[:SEQuence]:RF:SOURce?
TRIGger:<measurement>[:SEQuence]:SOURce EXTernal1 | EXTernal2 | IMMediate
| LINE | FRAME | RFBurst | VIDEo | IF | ALARm | LAN | IQMag | IDEMod |
QDEMod | IINPut | QINPut | AIQMag | TV
TRIGger:<measurement>[:SEQuence]:SOURce?
TRIGger[:SEQuence]:ATRigger <time>
TRIGger[:SEQuence]:ATRigger?
TRIGger[:SEQuence]:ATRigger:STATe OFF | ON | 0 | 1
TRIGger[:SEQuence]:ATRigger:STATe?
TRIGger[:SEQuence]:DELay <time>
TRIGger[:SEQuence]:DELay?
TRIGger[:SEQuence]:DELay:STATe OFF | ON | 0 | 1
TRIGger[:SEQuence]:DELay:STATe?
TRIGger[:SEQuence]:EXTernal1:DELay <time>
TRIGger[:SEQuence]:EXTernal2:DELay <time>
TRIGger[:SEQuence]:EXTernal:DELay
TRIGger[:SEQuence]:EXTernal1:DELay?
TRIGger[:SEQuence]:EXTernal2:DELay?
TRIGger[:SEQuence]:EXTernal1:DELay:STATe OFF | ON | 0 | 1
TRIGger[:SEQuence]:EXTernal2:DELay:STATe OFF | ON | 0 | 1
TRIGger[:SEQuence]:EXTernal2:DELay:STATe?

```

3 Programming the Analyzer

List of SCPI Commands

```
TRIGger[:SEquence]:EXternal1:DELay:STATe?
TRIGger[:SEquence]:EXternal1:LEVel <level>
TRIGger[:SEquence]:EXternal:LEVel
TRIGger[:SEquence]:EXternal2:LEVel
TRIGger[:SEquence]:EXternal2:LEVel?
TRIGger[:SEquence]:EXternal1:LEVel?
TRIGger[:SEquence]:EXternal:SLOPe
TRIGger[:SEquence]:EXternal1:SLOPe POSitive | NEGative
TRIGger[:SEquence]:EXternal2:SLOPe POSitive | NEGative
TRIGger[:SEquence]:EXternal1:SLOPe?
TRIGger[:SEquence]:EXternal2:SLOPe?
TRIGger[:SEquence]:FRAME:ADJust <time>
TRIGger[:SEquence]:FRAME:DELay <time>
TRIGger[:SEquence]:FRAME:DELay?
TRIGger[:SEquence]:FRAME:DELay:STATe OFF | ON | 0 | 1
TRIGger[:SEquence]:FRAME:DELay:STATe?
TRIGger[:SEquence]:FRAME:EXternal1:LEVel
TRIGger[:SEquence]:FRAME:EXternal2:LEVel
TRIGger[:SEquence]:FRAME:EXternal2:SLOPe
TRIGger[:SEquence]:FRAME:EXternal1:SLOPe
TRIGger[:SEquence]:FRAME:OFFSet <time>
TRIGger[:SEquence]:FRAME:OFFSet?
TRIGger[:SEquence]:FRAME:OFFSet:DISPlay:RESet
TRIGger[:SEquence]:FRAME:PERiod <time>
TRIGger[:SEquence]:FRAME:PERiod?
TRIGger[:SEquence]:FRAME:RFBurst:LEVel:ABSolute
TRIGger[:SEquence]:FRAME:RFBurst:SLOPe
TRIGger[:SEquence]:FRAME:SYNC EXternal
TRIGger[:SEquence]:FRAME:SYNC EXternal1 | EXternal2 | RFBurst | OFF
TRIGger[:SEquence]:FRAME:SYNC?
TRIGger[:SEquence]:FRAME:SYNC:HOLDoff <time>
TRIGger[:SEquence]:FRAME:SYNC:HOLDoff?
TRIGger[:SEquence]:FRAME:SYNC:HOLDoff:STATe OFF | ON | 0 | 1
TRIGger[:SEquence]:FRAME:SYNC:HOLDoff:STATe?
TRIGger[:SEquence]:HOLDoff <time>
TRIGger[:SEquence]:HOLDoff?
TRIGger[:SEquence]:HOLDoff:STATe OFF | ON | 0 | 1
TRIGger[:SEquence]:HOLDoff:STATe?
TRIGger[:SEquence]:HOLDoff:TYPE NORMAl | ABOVE | BELow
TRIGger[:SEquence]:HOLDoff:TYPE?
TRIGger[:SEquence]:IF:LEVel
TRIGger[:SEquence]:IF:LEVel?
TRIGger[:SEquence]:IF:SLOPe NEGative | POSitive
TRIGger[:SEquence]:IF:SLOPe?
TRIGger[:SEquence]:LINE:DELay <time>
TRIGger[:SEquence]:LINE:DELay?
TRIGger[:SEquence]:LINE:DELay:STATe OFF | ON | 0 | 1
TRIGger[:SEquence]:LINE:DELay:STATe?
TRIGger[:SEquence]:LINE:SLOPe POSitive | NEGative
TRIGger[:SEquence]:LINE:SLOPe?
TRIGger[:SEquence]:OFFSet <time>
TRIGger[:SEquence]:OFFSet?
TRIGger[:SEquence]:OFFSet:STATe OFF | ON | 0 | 1
```

```

TRIGger[:SEQuence]:OFFSet:STATe?
TRIGger[:SEQuence]:RFBurst:DELAy <time>
TRIGger[:SEQuence]:RFBurst:DELAy?
TRIGger[:SEQuence]:RFBurst:DELAy:STATe OFF | ON | 0 | 1
TRIGger[:SEQuence]:RFBurst:DELAy:STATe?
TRIGger[:SEQuence]:RFBurst:LEVel
TRIGger[:SEQuence]:RFBurst:LEVel:ABSolute <ampl>
TRIGger[:SEQuence]:RFBurst:LEVel:ABSolute?
TRIGger[:SEQuence]:RFBurst:LEVel:RELative <rel_ampl>
TRIGger[:SEQuence]:RFBurst:LEVel:RELative?
TRIGger[:SEQuence]:RFBurst:LEVel:TYPE ABSolute | RELative
TRIGger[:SEQuence]:RFBurst:LEVel:TYPE?
TRIGger[:SEQuence]:RFBurst:SLOPe POSitive | NEGative
TRIGger[:SEQuence]:RFBurst:SLOPe?
TRIGger[:SEQuence]:SLOPe POSitive | NEGative
TRIGger[:SEQuence]:SLOPe?
TRIGger[:SEQuence]:SOURCe EXTernal
TRIGger[:SEQuence]:VIDeo:DELAy <time>
TRIGger[:SEQuence]:VIDeo:DELAy?
TRIGger[:SEQuence]:VIDeo:DELAy:STATe OFF | ON | 0 | 1
TRIGger[:SEQuence]:VIDeo:DELAy:STATe?
TRIGger[:SEQuence]:VIDeo:LEVel <ampl>
TRIGger[:SEQuence]:VIDeo:LEVel?
TRIGger[:SEQuence]:VIDeo:SLOPe POSitive | NEGative
TRIGger[:SEQuence]:VIDeo:SLOPe?
TRIGger|TRIGger1|TRIGger2[:SEQuence]:OUTPut HSWP | MEASuring | MAIN | GATE
| GTRigger | OEVEN | SPOint | SSweep | SSETtled | S1Marker | S2Marker |
S3Marker | S4Marker | OFF
TRIGger|TRIGger1|TRIGger2[:SEQuence]:OUTPut?
TRIGger|TRIGger1|TRIGger2[:SEQuence]:OUTPut:POLarity POSitive | NEGative
TRIGger|TRIGger1|TRIGger2[:SEQuence]:OUTPut:POLarity?

```

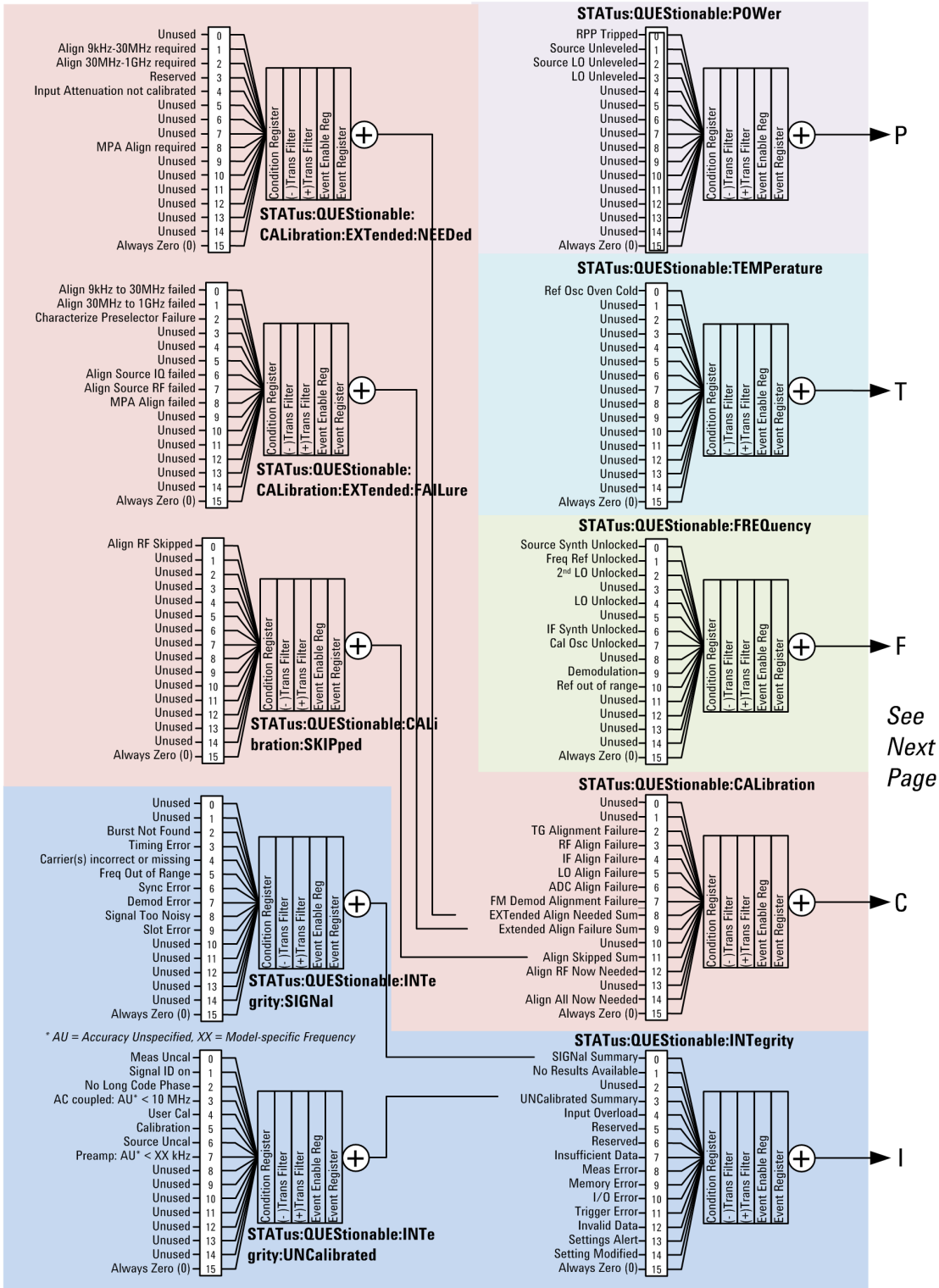
STATus Subsystem

The following diagram provides a graphical overview of the entire X-Series Status Register System.

For readability, the diagram is split into two sections:

- ["X-Series Status Register System \(1\) " on page 145](#)
- ["X-Series Status Register System \(2\) " on page 146](#)

X-Series Status Register System (1)

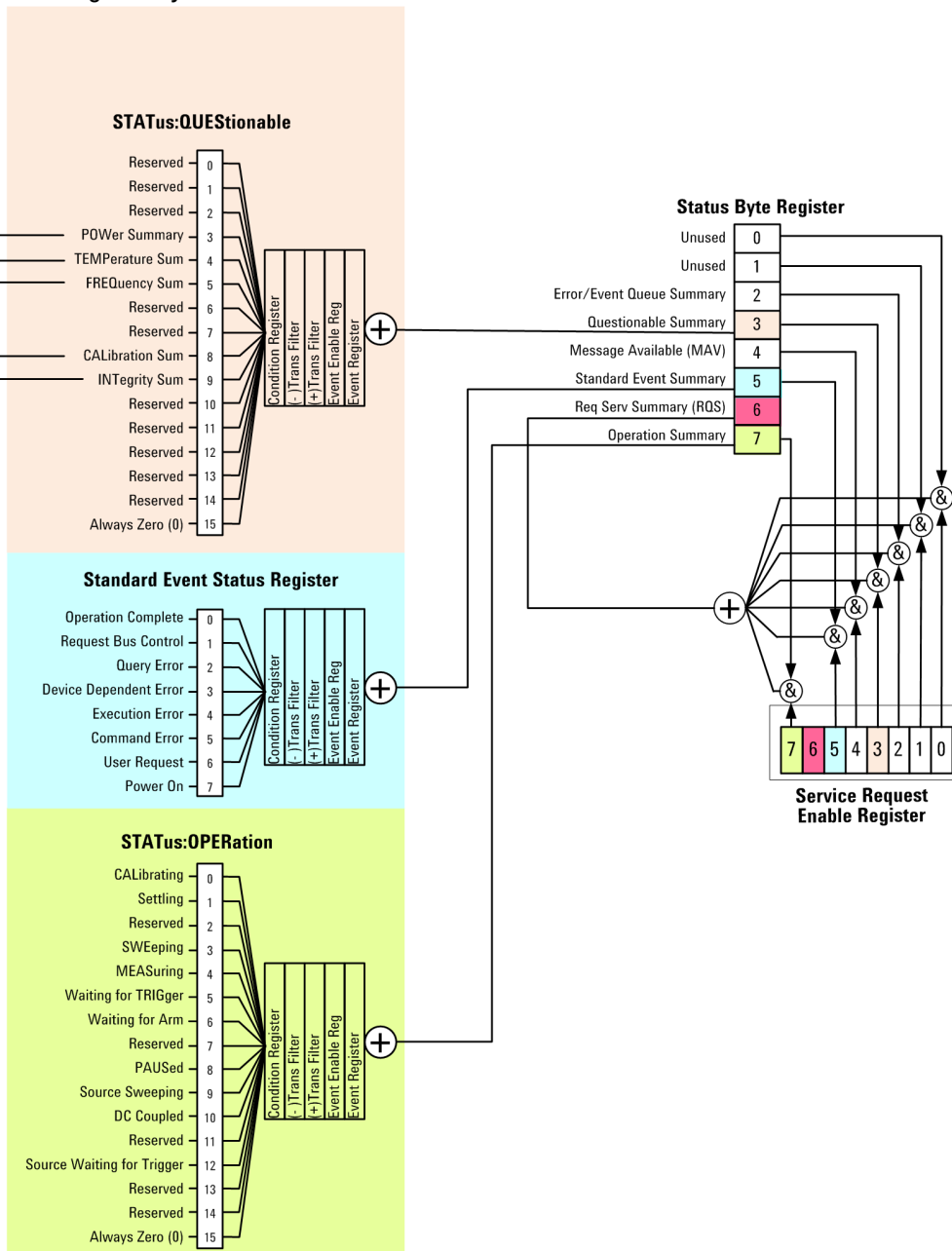


See
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X-Series Status Register System (2)

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Detailed Description

The STATus subsystem remote commands set and query the status hardware registers. This system of registers monitors various events and conditions in the instrument. Software written to control the instrument may need to monitor some of these events and conditions.

NOTE

All status register commands are sequential. Most commands can be started immediately and will overlap with any existing commands that are already running. This is not true of status commands. All the commands in the spectrum analyzer are assumed to be overlapped unless a command description specifically says that it is sequential.

What Are Status Registers

The status system contains multiple registers that are arranged in a hierarchical order. The lower-level status registers propagate their data to the higher-level registers in the data structures by means of summary bits. The status byte register is at the top of the hierarchy and contains general status information for the instrument's events and conditions. All other individual registers are used to determine the specific events or conditions. For a diagram of the registers and their interconnections, see above.

The operation and questionable status registers are sets of registers that monitor the overall instrument condition. They are accessed with the STATus:OPERation and STATus:QUEStionable commands in the STATus command subsystem. Each register set is made up of five registers:

- Condition Register—It reports the real-time state of the signals monitored by this register set. There is no latching or buffering for a condition register.
- Positive Transition Register—This filter register controls which signals will set a bit in the event register when the signal makes a low to high transition (when the condition bit changes from 0 to 1).
- Negative Transition Register—This filter register controls which signals will set a bit in the event register when the signal makes a high to low transition (when the condition bit changes from 1 to 0).
- Event Register—It latches any signal state changes, in the way specified by the filter registers. Bits in the event register are never cleared by signal state changes. Event registers are cleared when read. They are also cleared by *CLS and by presetting the instrument.
- Event Enable Register—It controls which of the bits, being set in the event register, will be summarized as a single output for the register set. Summary bits are then used by the next higher register.

The STATus:QUEStionable registers report abnormal operating conditions. The status register hierarchy is:

1. The summary outputs from the six STATus:QUEStionable:<keyword> detail registers are inputs to the STATus:QUEStionable register.
2. The summary output from the STATus:QUEStionable register is an input to the Status Byte Register. See the overall system in Figure at the beginning of this section.

The STATus:OPERation register set has no summarized inputs. The inputs to the STATus:OPERation:CONDition register indicate the real time state of the instrument. The STATus:OPERation:EVENT register summary output is an input to the Status Byte Register.

What Are Status Register SCPI Commands

Most monitoring of the instrument conditions is done at the highest level using the IEEE common commands indicated below. Complete command descriptions are available in the IEEE commands section at the beginning of the language reference. Individual status registers can be set and queried using the commands in the STATus subsystem of the language reference.

- *CLS (clear status) clears the status byte by emptying the error queue and clearing all the event registers.
- *ESE, *ESE? (event status enable) sets and queries the bits in the enable register part of the standard event status register.
- *ESR? (event status register) queries and clears the event register part of the standard event status register.

- *OPC, *OPC? (operation complete) sets the standard event status register to monitor the completion of all commands. The query stops any new commands from being processed until the current processing is complete, then returns a '1'.
- *PSC, *PSC? (power-on state clear) sets the power-on state so that it clears the service request enable register and the event status enable register at power on.
- *SRE, *SRE? (service request enable) sets and queries the value of the service request enable register.
- *STB? (status byte) queries the value of the status byte register without erasing its contents.

How to Use the Status Registers

A program often needs to be able to detect and manage error conditions or changes in instrument status. There are two methods you can use to programmatically access the information in status registers:

- The polling method
- The service request (SRQ) method

In the polling method, the instrument has a passive role. It only tells the controller that conditions have changed when the controller asks the right question. In the SRQ method, the instrument takes a more active role. It tells the controller when there has been a condition change without the controller asking. Either method allows you to monitor one or more conditions.

The polling method works well if you do not need to know about changes the moment they occur. The SRQ method should be used if you must know immediately when a condition changes. To detect a change using the polling method, the program must repeatedly read the registers.

Use the SRQ method when:

- you need time-critical notification of changes
- you are monitoring more than one device which supports SRQs
- you need to have the controller do something else while waiting
- you can't afford the performance penalty inherent to polling

Use polling when:

- your programming language/development environment does not support SRQ interrupts
- you want to write a simple, single-purpose program and don't want the added complexity of setting up an SRQ handler
- To monitor a condition:
 - a. Determine which register contains the bit that reports the condition.
 - b. Send the unique SCPI query that reads that register.
 - c. Examine the bit to see if the condition has changed.

You can monitor conditions in different ways.

- Check the current instrument hardware and firmware status.

Do this by querying the condition registers which continuously monitor status. These registers represent the current state of the instrument. Bits in a condition register are updated in real time. When the condition monitored by a particular bit becomes true, the bit is set to 1. When the condition becomes false, the bit is reset to 0.

- Monitor a particular condition (bit).

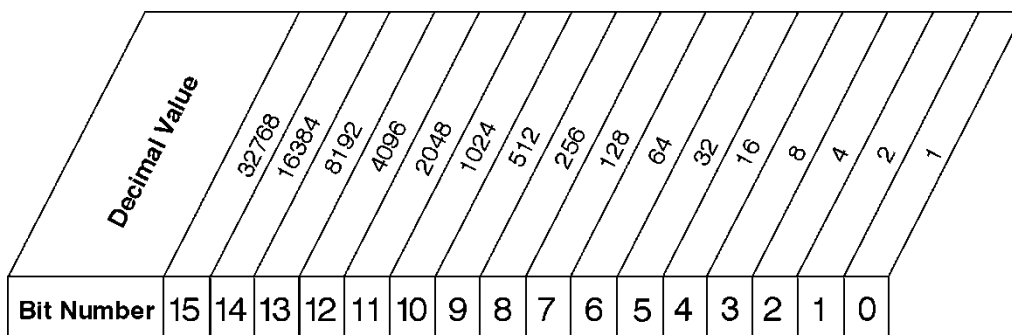
You can enable a particular bit(s), using the event enable register. The instrument will then monitor that particular condition(s). If the bit becomes true (0 to 1 transition) in the event register, it will stay set until the event register is cleared. Querying the event register allows you to detect that this condition occurred even if the condition no longer exists. The event register can only be cleared by querying it or sending the *CLS command.

- Monitor a particular type of change in a condition (bit).
 - The transition registers are preset to register if the condition goes from 0 to 1 (false to true, or a positive transition).
 - This can be changed so the selected condition is detected if the bit goes from 1 to 0 (true to false, or a negative transition).
 - It can also be set for both types of transitions occurring.
 - Or it can be set for neither transition. If both transition registers are set to 0 for a particular bit position, that bit will not be set in the event register for either type of change.

Using a Status Register

Each bit in a register is represented by a numerical value based on its location. See figure below. This number is sent with the command to enable a particular bit. If you want to enable more than one bit, you would send the sum of all the bits that you want to monitor.

Figure: Status Register Bit Values



STATUS:OPERation:ENABLE <num>
 STATUS:OPERation:ENABLE?

Standard Operation Event Enable Register

ck730a

Bit 15 is not used to report status.

Example 1:

1. To enable bit 0 and bit 6 of standard event status register, you would send the command *ESE 65 because 1 + 64 = 65.

2. The results of a query are evaluated in a similar way. If the *STB? command returns a decimal value of 140, ($140 = 128 + 8 + 4$) then bit 7 is true, bit 3 is true and bit 2 is true.

Example 2:

1. Suppose you want to know if an Auto-trigger Timeout occurs, but you only cared about that specific condition. So you would want to know what was happening with bit 10 in the Status Questionable Integrity register, and not about any other bits.
2. It's usually a good idea to start by clearing all the status registers with *CLS.
3. Sending the STAT:QUES:INT:ENAB 1024 command lets you monitor only bit 10 events, instead of the default monitoring all the bits in the register. The register default is for positive transition events (0 to 1 transition). That is, when an auto-trigger timeout occurs. If instead, you wanted to know when the Auto-trigger timeout condition is cleared, then you would set the STAT:QUES:INT:PTR 0 and the STAT:QUES:INT:NTR 32767.
4. So now the only output from the Status Questionable Integrity register will come from a bit 10 positive transition. That output goes to the Integrity Sum bit 9 of the Status Questionable register.
5. You can do a similar thing with this register to only look at bit 9 using, STAT:QUES:ENAB 512.
6. The Status Questionable register output goes to the "Status Questionable Summary" bit 3 of the Status Byte Register. The output from this register can be enabled using the *SRE 8 command.
7. Finally, you would use the serial polling functionality available for the particular bus/software that you are using to monitor the Status Byte Register. (You could also use *STB? to poll the Status Byte Register.)

Using the Service Request (SRQ) Method

Your language, bus, and programming environment must be able to support SRQ interrupts. (For example, BASIC used with VXI-11.3 (GPIB over LAN). When you monitor a condition with the SRQ method, you must:

1. Determine which bit monitors the condition.
2. Determine how that bit reports to the request service (RQS) bit of the status byte.
3. Send SCPI commands to enable the bit that monitors the condition and to enable the summary bits that report the condition to the RQS bit.
4. Enable the controller to respond to service requests.

When the condition changes, the instrument sets its RQS bit. The controller is informed of the change as soon as it occurs. As a result, the time the controller would otherwise have used to monitor the condition can be used to perform other tasks. Your program determines how the controller responds to the SRQ.

Generating a Service Request

To use the SRQ method, you must understand how service requests are generated. Bit 6 of the status byte register is the request service (RQS) bit. The *SRE command is used to configure the RQS bit to report changes in instrument status. When such a change occurs, the RQS bit is set. It is cleared when the status byte register is queried using *SRE? (with a serial poll.) It can be queried without erasing the contents with *STB?.

When a register set causes a summary bit in the status byte to change from 0 to 1, the instrument can initiate the service request (SRQ) process. However, the process is only initiated if both of the following conditions are true:

- The corresponding bit of the service request enable register is also set to 1.
- The instrument does not have a service request pending. (A service request is considered to be pending between the time the instrument's SRQ process is initiated and the time the controller reads the status byte register.)

The SRQ process sets the SRQ true. It also sets the status byte's request service (RQS) bit to 1. Both actions are necessary to inform the controller that the instrument requires service. Setting the SRQ line only informs the controller that some device on the bus requires service. Setting the RQS bit allows the controller to determine which instrument requires service.

If your program enables the controller to detect and respond to service requests, it should instruct the controller to perform a serial poll when the SRQ is set true. Each device on the bus returns the contents of its status byte register in response to this poll. The device who's RQS bit is set to 1 is the device that requested service.

When you read the instrument's status byte register with a serial poll, the RQS bit is reset to 0. Other bits in the register are not affected.

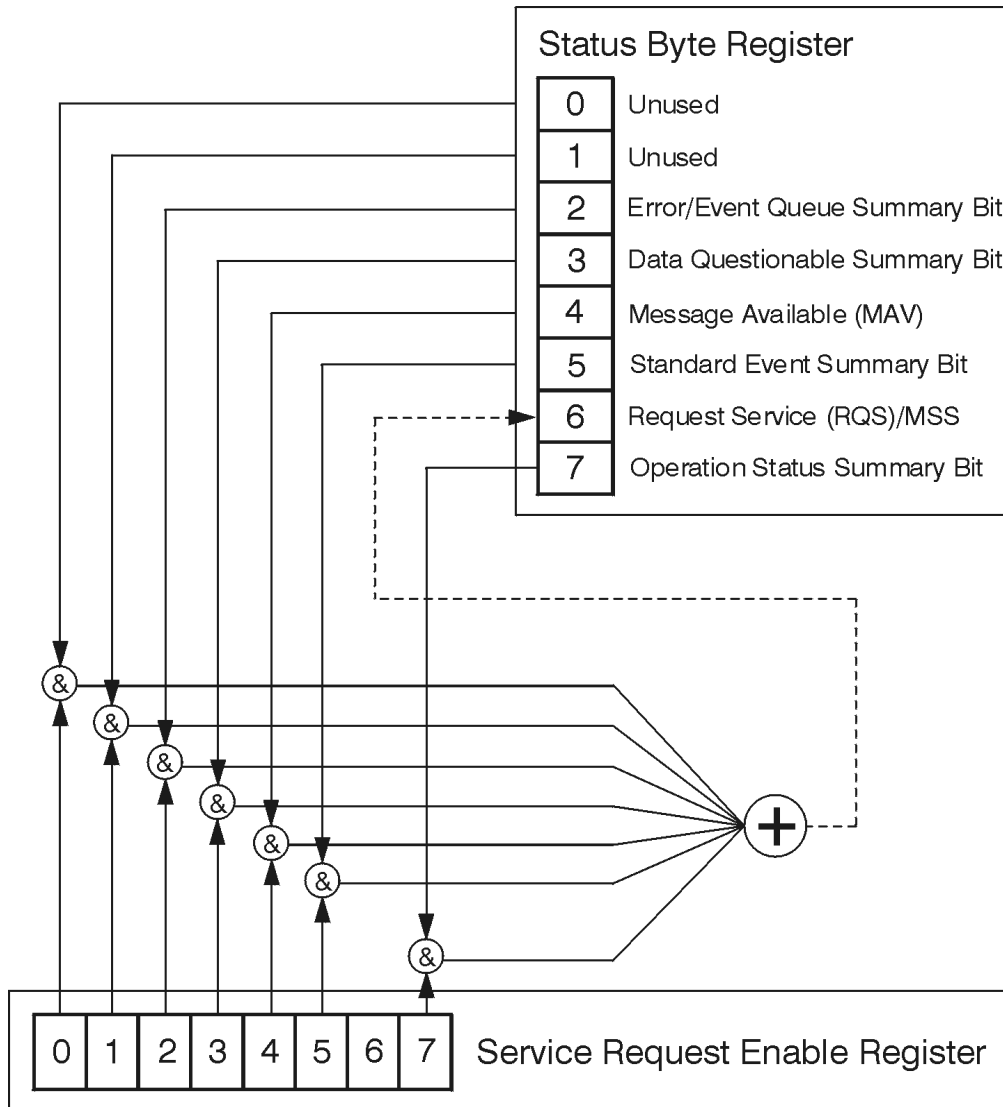
If the status register is configured to SRQ on end-of-measurement and the measurement is in continuous mode, then restarting a measurement (INIT command) can cause the measuring bit to pulse low. This causes an SRQ when you have not actually reached the "end-of-measurement" condition. To avoid this:

1. Set INITiate:CONTinuous off.
2. Set/enable the status registers.
3. Restart the measurement (send INIT).

Status Register System

The hardware status registers are combined to form the instrument status system. Specific status bits are assigned to monitor various aspects of the instrument operation and status. See the diagram of the status system above for information about the bit assignments and status register interconnections.

The Status Byte Register



ck776a

The RQS bit is read and reset by a serial poll. The same bit position (MSS) is read, non-destructively by the *STB? command. If you serial poll bit 6 it is read as RQS, but if you send *STB it reads bit 6 as MSS. For more information refer to IEEE 488.2 standards, section 11.

Bit Number	7	6	5	4	3	2	1	0
Description	Standard Operation Status Summary Bit	Request Service (RQS) Summary Bit	Standard Event Status Summary Bit	Message Available (MAV)	Data Questionable Status Summary Bit	Error/Event Queue Summary Bit	Unused	Unused

*STB?

Status Byte Register

ck725a

Bit	Description
0, 1	These bits are always set to 0.
2	A 1 in this bit position indicates that the SCPI error queue is not empty which means that it contains at least one error message.
3	A 1 in this bit position indicates that the data questionable summary bit has been set. The data questionable event register can then be read to determine the specific condition that caused this bit to be set.
4	A 1 in this bit position indicates that the instrument has data ready in the output queue. There are no lower status groups that provide input to this bit.
5	A 1 in this bit position indicates that the standard event summary bit has been set. The standard event status register can then be read to determine the specific event that caused this bit to be set.
6	A 1 in this bit position indicates that the instrument has at least one reason to report a status change. This bit is also called the master summary status bit (MSS).
7	A 1 in this bit position indicates that the standard operation summary bit has been set. The standard operation event register can then be read to determine the specific condition that caused this bit to be set.

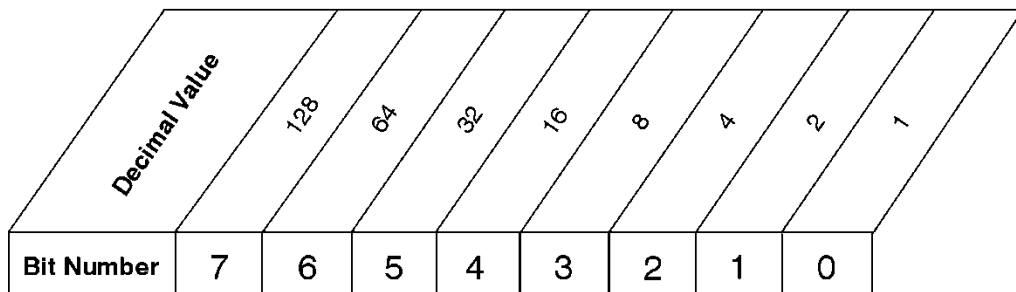
To query the status byte register, send the command *STB?. The response will be the decimal sum of the bits which are set to 1. For example, if bit number 7 and bit number 3 are set to 1, the decimal sum of the 2 bits is 128 plus 8. So the decimal value 136 is returned. The *STB command does not clear the status register.

In addition to the status byte register, the status byte group also contains the service request enable register. This register lets you choose which bits in the status byte register will trigger a service request.

Send the *SRE <integer> command where <integer> is the sum of the decimal values of the bits you want to enable plus the decimal value of bit 6. For example, assume that you want to enable bit 7 so that whenever the standard operation status register summary bit is set to 1 it will trigger a service request. Send the command *SRE 192 (because 192 = 128 + 64). You must always add 64 (the numeric value of RQS

bit 6) to your numeric sum when you enable any bits for a service request. The command *SRE? returns the decimal value of the sum of the bits previously enabled with the *SRE <integer> command.

The service request enable register presets to zeros (0).

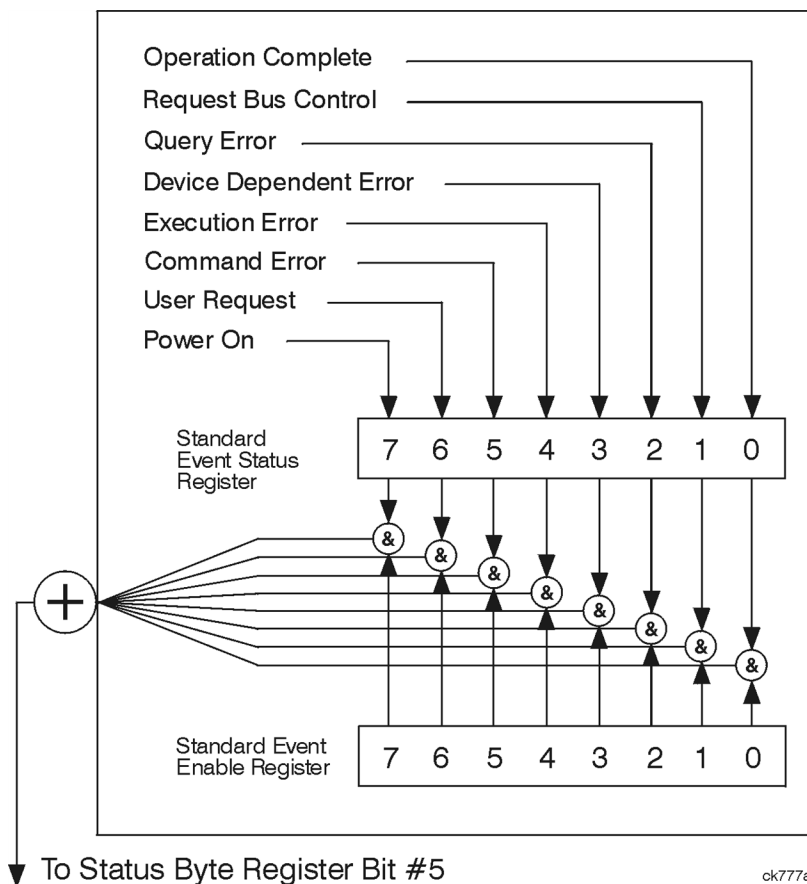


*SRE <num>
 *SRE?

Service Request Enable Register

ck726a

Standard Event Status Register



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The standard event status register contains the following bits:

Description	<i>Power On</i>	<i>User Request Key (Local)</i>	<i>Command Error</i>	<i>Execution Error</i>	<i>Device Dependent Error</i>	<i>Query Error</i>	<i>Request Control</i>	<i>Operation Complete</i>
Bit Number	7	6	5	4	3	2	1	0

*ESR?

Standard Event Status Register

ck727a

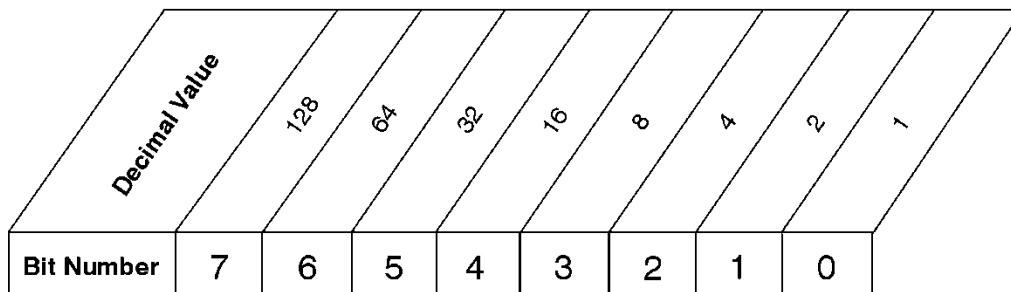
Bit	Description
0	A 1 in this bit position indicates that all pending operations were completed following execution of the *OPC command.
1	This bit is for GPIB handshaking to request control. Currently it is set to 0 because there are no implementations where the spectrum analyzer controls another instrument.
2	A 1 in this bit position indicates that a query error has occurred. Query errors have SCPI error numbers from -499 to -400.
3	A 1 in this bit position indicates that a device dependent error has occurred. Device dependent errors have SCPI error numbers from -399 to -300 and 1 to 32767.
4	A 1 in this bit position indicates that an execution error has occurred. Execution errors have SCPI error numbers from -299 to -200.
5	A 1 in this bit position indicates that a command error has occurred. Command errors have SCPI error numbers from -199 to -100.
6	A 1 in this bit position indicates that the LOCAL key has been pressed. This is true even if the instrument is in local lockout mode.
7	A 1 in this bit position indicates that the instrument has been turned off and then on.

The standard event status register is used to determine the specific event that set bit 5 in the status byte register. To query the standard event status register, send the command *ESR?. The response will be the decimal sum of the bits which are enabled (set to 1). For example, if bit number 7 and bit number 3 are enabled, the decimal sum of the 2 bits is 128 plus 8. So the decimal value 136 is returned.

In addition to the standard event status register, the standard event status group also contains a standard event status enable register. This register lets you choose which bits in the standard event status register will set the summary bit (bit 5 of the status byte register) to 1. Send the *ESE <integer> command where <integer> is the sum of the decimal values of the bits you want to enable. For example, to enable bit 7 and bit 6 so that whenever either of those bits is set to 1, the standard event status summary bit of the status

byte register will be set to 1, send the command *ESE 192 (128 + 64). The command *ESE? returns the decimal value of the sum of the bits previously enabled with the *ESE <integer> command.

The standard event status enable register presets to zeros (0).



*ESE <num>
 *ESE?

Standard Event Status Enable Register

ck728a

Operation and Questionable Status Registers

The operation and questionable status registers are registers that monitor the overall instrument condition. They are accessed with the STATus:OPERation and STATus:QUEStionable commands in the STATus command subsystem. See the figure at the beginning of this chapter.

Operation Status Register

The operation status register monitors the current instrument measurement state. It checks to see if the instrument is calibrating, sweeping, or waiting for a trigger. For more information see the *OPC? command located in the IEEE Common Commands section.

Bit	Condition	Operation
0	Calibrating	The instrument is busy executing its Align Now process
3	Sweeping	The instrument is busy taking a sweep.
4	Measuring	The instrument is busy making a measurement. Measurements often require multiple sweeps. They are initiated by keys under the MEASURE key or with the MEASure group of commands. The bit is valid for most X-Series Modes.
5	Waiting for trigger	The instrument is waiting for the trigger conditions to be met, then it will trigger a sweep or measurement.

Questionable Status Register

The questionable status register monitors the instrument's condition to see if anything questionable has happened to it. It is looking for anything that might cause an error or a bad measurement like a hardware problem, an out of calibration situation, or a unusual signal. All the bits are summary bits from lower-level event registers.

Bit	Condition	Operation
-----	-----------	-----------

3	Power summary	The instrument hardware has detected a power unlevelled condition.
4	Temperature summary	The instrument is still warming up.
5	Frequency summary	The instrument hardware has detected an unlocked condition or a problem with the external frequency reference.
8	Calibration summary	The instrument has detected a hardware problem while doing the automatic internal alignment process.
9	Integrity summary	The instrument has detected a questionable measurement condition such as: bad timing, bad signal/data, timeout problem, signal overload, or "meas uncal".

STATus Subsystem Command Descriptions

The STATus subsystem controls the SCPI-defined instrument status reporting structures. Each status register has a set of five commands used for querying or masking that particular register.

Numeric values for bit patterns can be entered using decimal or hexadecimal representations. (i.e. 0 to 32767 is equivalent to #H0 to #H7FFF. It is also equal to all ones, 111111111111111) See the SCPI Basics information about using bit patterns for variable parameters.

Operation Register

"Operation Condition Query" on page 157

"Operation Enable" on page 158

"Operation Event Query" on page 158

"Operation Negative Transition" on page 158

"Operation Positive Transition" on page 159

Operation Condition Query

This query returns the decimal value of the sum of the bits in the Status Operation Condition register.

NOTE The data in this register is continuously updated and reflects the current conditions.

Mode	All
Remote Command	:STATus:OPERation:CONDition?
Example	STAT:OPER:COND?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Operation Enable

This command determines which bits in the Operation Event register, will set the Operation Status Summary bit (bit 7) in the Status Byte Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

NOTE The preset condition is to have all bits in this enable register set to 0. To have any Operation Events reported to the Status Byte Register, one or more bits need to be set to 1.

Mode	All
Remote Command	:STATus:OPERation:ENABle <integer> :STATus:OPERation:ENABle?
Example	STAT:OPER:ENAB 1 Sets the register so that Align Now operation will be reported to the Status Byte Register.
Preset	0
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Operation Event Query

This query returns the decimal value of the sum of the bits in the Operation Event register.

NOTE The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

Mode	All
Remote Command	:STATus:OPERation[:EVENT]?
Example	STAT:OPER?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Operation Negative Transition

This command determines which bits in the Operation Condition register will set the corresponding bit in the Operation Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:OPERation:NTRansition <integer> :STATus:OPERation:NTRansition?
Example	STAT:OPER:NTR 1 Align Now operation complete will be reported to the Status Byte Register.
Preset	0
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Operation Positive Transition

This command determines which bits in the Operation Condition register will set the corresponding bit in the Operation Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:OPERation:PTRansition <integer> :STATus:OPERation:PTRansition?
Example	STAT:OPER:PTR 1 Align Now operation beginning will be reported to the Status Byte Register.
Preset	32767
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Preset the Status Byte

Sets bits in most of the enable and transition registers to their default state. It presets all the Transition Filters, Enable Registers, and the Error/Event Queue Enable. It has no effect on Event Registers, Error/Event QUEUE, IEEE 488.2 ESE, and SRE Registers as described in IEEE Standard 488.2–1992, IEEE Standard Codes, Formats, Protocols, and Common Commands for Use with ANSI/IEEE Std 488.1–1987. New York, NY, 1992.

Remote Command	:STATus:PRESet
Example	STAT:PREs
Initial S/W Revision	Prior to A.02.00

Questionable Register

"Questionable Condition " on page 160

"Questionable Enable " on page 160

"Questionable Event Query " on page 161

"Questionable Negative Transition " on page 161

"Questionable Positive Transition" on page 161

Questionable Condition

This query returns the decimal value of the sum of the bits in the Questionable Condition register.

NOTE The data in this register is continuously updated and reflects the current conditions.

Mode	All
Remote Command	:STATus:QUEStionable:CONDition?
Example	STAT:QUES:COND?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Enable

This command determines which bits in the Questionable Event register will set the Questionable Status Summary bit (bit3) in the Status Byte Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

NOTE The preset condition is all bits in this enable register set to 0. To have any Questionable Events reported to the Status Byte Register, one or more bits need to be set to 1. The Status Byte Event Register should be queried after each measurement to check the Questionable Status Summary (bit 3). If it is equal to 1, a condition during the test may have made the test results invalid. If it is equal to 0, this indicates that no hardware problem or measurement problem was detected by the analyzer.

Mode	All
Remote Command	:STATus:QUEStionable:ENABle <integer> :STATus:QUEStionable:ENABle?
Example	STAT:OPER:PTR 1 Align Now operation beginning will be reported to the Status Byte Register.
Preset	0
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Event Query

This query returns the decimal value of the sum of the bits in the Questionable Event register.

NOTE

The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

Mode	All
Remote Command	:STATus:QUESTionable[:EVENT]?
Example	STAT:QUES?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Negative Transition

This command determines which bits in the Questionable Condition register will set the corresponding bit in the Questionable Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUESTionable:NTRansition <integer> :STATus:QUESTionable:NTRansition?
Example	STAT:QUES:NTR 16 Temperature summary 'questionable cleared' will be reported to the Status Byte Register.
Preset	0
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Positive Transition

This command determines which bits in the Questionable Condition register will set the corresponding bit in the Questionable Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
------	-----

Remote Command	:STATus:QUEStionable:PTRansition <integer> :STATus:QUEStionable:PTRansition?
Example	STAT:QUES:PTR 16 Temperature summary 'questionable asserted' will be reported to the Status Byte Register.
Preset	32767
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Register

"Questionable Calibration Condition " on page 162

"Questionable Calibration Enable " on page 162

"Questionable Calibration Event Query " on page 163

"Questionable Calibration Negative Transition " on page 163

"Questionable Calibration Positive Transition " on page 164

Questionable Calibration Condition

This query returns the decimal value of the sum of the bits in the Questionable Calibration Condition register.

NOTE

The data in this register is continuously updated and reflects the current conditions.

Mode	All
Remote Command	:STATus:QUEStionable:CALibration:CONDition?
Example	STAT:QUES:CAL:COND?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Enable

This command determines which bits in the Questionable Calibration Condition Register will set bits in the Questionable Calibration Event register, which also sets the Calibration Summary bit (bit 8) in the Questionable Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

Mode	All
Remote Command	:STATus:QUESTionable:CALibration:ENABle <integer> :STATus:QUESTionable:CALibration:ENABle?
Example	STAT:QUES:CAL:ENAB 16384 Can be used to query if an alignment is needed, if you have turned off the automatic alignment process.
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Event Query

This query returns the decimal value of the sum of the bits in the Questionable Calibration Event register.

NOTE

The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

Mode	All
Remote Command	:STATus:QUESTionable:CALibration[:EVENT]?
Example	STAT:QUES:CAL?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Negative Transition

This command determines which bits in the Questionable Calibration Condition register will set the corresponding bit in the Questionable Calibration Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUESTionable:CALibration:NTRansition <integer> :STATus:QUESTionable:CALibration:NTRansition?
Example	STAT:QUES:CAL:NTR 16384 Alignment is not required.
Preset	0
Min	0

Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Positive Transition

This command determines which bits in the Questionable Calibration Condition register will set the corresponding bit in the Questionable Calibration Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUESTionable:CALibration:PTRansition <integer> :STATus:QUESTionable:CALibration:PTRansition?
Example	STAT:QUES:CAL:PTR 16384 Alignment is required.
Preset	32767
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Skipped Register

"Questionable Calibration Skipped Condition " on page 164

"Questionable Calibration Skipped Enable " on page 165

"Questionable Calibration Skipped Event Query " on page 165

"Questionable Calibration Skipped Negative Transition " on page 166

"Questionable Calibration Skipped Positive Transition " on page 166

Questionable Calibration Skipped Condition

This query returns the decimal value of the sum of the bits in the Questionable Calibration Skipped Condition register.

NOTE The data in this register is continuously updated and reflects the current conditions.

Mode	All
Remote Command	:STATus:QUESTionable:CALibration:SKIpped:CONDition?

Example	STAT:QUES:CAL:SKIP:COND?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Skipped Enable

This command determines which bits in the Questionable Calibration Skipped Condition Register will set bits in the Questionable Calibration Skipped Event register, which also sets bit 11 of the Questionable Calibration Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

Mode	All
Remote Command	:STATus:QUESTionable:CALibration:SKIPped:ENABle <integer> :STATus:QUESTionable:CALibration:SKIPped:ENABle?
Example	STAT:QUES:CAL:SKIP:ENAB 1 Can be used to query if an EMI alignment skipped condition is detected
Preset	32767
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Skipped Event Query

This query returns the decimal value of the sum of the bits in the Questionable Calibration Event register.

NOTE

The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

Mode	All
Remote Command	:STATus:QUESTionable:CALibration:SKIPped[:EVENT]?
Example	STAT:QUES:CAL:SKIP?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Skipped Negative Transition

This command determines which bits in the Questionable Calibration Skipped Condition register will set the corresponding bit in the Questionable Calibration Skipped Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUEStionable:CALibration:SKIpped:NTRansition <integer> :STATus:QUEStionable:CALibration:SKIpped:NTRansition?
Example	STAT:QUES:CAL:SKIP:NTR 1 Align RF skipped is not required.
Preset	0
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Skipped Positive Transition

This command determines which bits in the Questionable Calibration Skipped Condition register will set the corresponding bit in the Questionable Calibration Skipped Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUEStionable:CALibration:SKIpped:PTRansition <integer> :STATus:QUEStionable:CALibration:SKIpped:PTRansition?
Example	STAT:QUES:CAL:SKIP:PTR 1 Align RF skipped is required.
Preset	32767
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Extended Failure Register

"Questionable Calibration Extended Failure Condition " on page 167

"Questionable Calibration Extended Failure Enable " on page 167

"Questionable Calibration Extended Failure Event Query " on page 167

"Questionable Calibration Extended Failure Negative Transition " on page 168

"Questionable Calibration Extended Failure Positive Transition " on page 168

Questionable Calibration Extended Failure Condition

This query returns the decimal value of the sum of the bits in the Questionable Calibration Extended Failure Condition register.

NOTE The data in this register is continuously updated and reflects the current conditions.

Mode	All
Remote Command	:STATus:QUEStionable:CALibration:EXTended:FAILure:CONDition?
Example	STAT:QUES:CAL:EXT:FAIL:COND?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Extended Failure Enable

This command determines which bits in the Questionable Calibration Extended Failure Condition Register will set bits in the Questionable Calibration Extended Failure Event register, which also sets bit 9 of the Questionable Calibration Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

Mode	All
Remote Command	:STATus:QUEStionable:CALibration:EXTended:FAILure:ENABle <integer> :STATus:QUEStionable:CALibration:EXTended:FAILure:ENABle?
Example	STAT:QUES:CAL:EXT:FAIL:ENAB 1 Can be used to query if an EMI conducted alignment is needed.
Preset	32767
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Extended Failure Event Query

This query returns the decimal value of the sum of the bits in the Questionable Calibration Extended Failure Event register.

NOTE The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

Mode	All
Remote Command	:STATus:QUESTionable:CALibration:EXTended:FAILure[:EVENT]?
Example	STAT:QUES:CAL:EXT:FAIL?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Extended Failure Negative Transition

This command determines which bits in the Questionable Calibration Extended Failure Condition register will set the corresponding bit in the Questionable Calibration Extended Failure Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUESTionable:CALibration:EXTended:FAILure:NTRansition <integer> :STATus:QUESTionable:CALibration:EXTended:FAILure:NTRansition?
Example	STAT:QUES:CAL:EXT:FAIL:NTR 1 EMI conducted align failure is not required.
Preset	0
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Extended Failure Positive Transition

This command determines which bits in the Questionable Calibration Extended Failure Condition register will set the corresponding bit in the Questionable Calibration Extended Failure Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUESTionable:CALibration:EXTended:FAILure:PTRansition <integer> :STATus:QUESTionable:CALibration:EXTended:FAILure:PTRansition?
Example	STAT:QUES:CAL:EXT:FAIL:PTR 1 EMI conducted align failure is required.
Preset	32767
Min	0
Max	32767

Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Extended Needed Register

"Questionable Calibration Extended Needed Condition " on page 169

"Questionable Calibration Extended Needed Enable " on page 169

"Questionable Calibration Extended Needed Event Query " on page 170

"Questionable Calibration Extended Needed Negative Transition " on page 170

"Questionable Calibration Extended Needed Positive Transition " on page 171

Questionable Calibration Extended Needed Condition

This query returns the decimal value of the sum of the bits in the Questionable Calibration Extended Needed Condition register.

NOTE The data in this register is continuously updated and reflects the current conditions.

Mode	All
Remote Command	:STATus:QUESTionable:CALibration:EXTended:NEEDed:CONDition?
Example	STAT:QUES:CAL:EXT:NEED:COND?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Extended Needed Enable

This command determines which bits in the Questionable Calibration Extended Needed Condition Register will set bits in the Questionable Calibration Extended Needed Event register, which also sets bit 14 of the Questionable Calibration Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

Mode	All
Remote Command	:STATus:QUESTionable:CALibration:EXTended:NEEDed:ENABle <integer> :STATus:QUESTionable:CALibration:EXTended:NEEDed:ENABle?
Example	STAT:QUES:CAL:EXT:NEED:ENAB 2 Can be used to query if an EMI conducted alignment is needed.
Preset	32767
Min	0

Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Extended Needed Event Query

This query returns the decimal value of the sum of the bits in the Questionable Calibration Extended Needed Event register.

NOTE

The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

Mode	All
Remote Command	:STATus:QUESTionable:CALibration:EXTended:NEEDed[:EVENT]?
Example	STAT:QUES:CAL:EXT:NEED?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Extended Needed Negative Transition

This command determines which bits in the Questionable Calibration Extended Needed Condition register will set the corresponding bit in the Questionable Calibration Extended Needed Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUESTionable:CALibration:EXTended:NEEDed:NTRansition <integer> :STATus:QUESTionable:CALibration:EXTended:NEEDed:NTRansition?
Example	STAT:QUES:CAL:EXT:NEED:NTR 2 Align EMI conducted is not required.
Preset	0
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Extended Needed Positive Transition

This command determines which bits in the Questionable Calibration Extended Needed Condition register will set the corresponding bit in the Questionable Calibration Extended Needed Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUEStionable:CALibration:EXTended:NEEDED:PTRansition <integer> :STATus:QUEStionable:CALibration:EXTended:NEEDED:PTRansition?
Example	STAT:QUES:CAL:EXT:NEED:PTR 2 Align EMI conducted is required.
Preset	32767
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Frequency Register

"Questionable Frequency Condition " on page 171

"Questionable Frequency Enable " on page 172

"Questionable Frequency Event Query " on page 172

"Questionable Frequency Negative Transition " on page 172

"Questionable Frequency Positive Transition " on page 173

Questionable Frequency Condition

This query returns the decimal value of the sum of the bits in the Questionable Frequency Condition register.

NOTE The data in this register is continuously updated and reflects the current conditions.

Mode	All
Remote Command	:STATus:QUEStionable:FREQuency:CONDition?
Example	STAT:QUES:FREQ:COND?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Frequency Enable

This command determines which bits in the Questionable Frequency Condition Register will set bits in the Questionable Frequency Event register, which also sets the Frequency Summary bit (bit 5) in the Questionable Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

Mode	All
Remote Command	:STATus:QUEStionable:FREQuency:ENABle <integer> :STATus:QUEStionable:FREQuency:ENABle?
Example	STAT:QUES:FREQ:ENAB 2 Frequency Reference Unlocked will be reported to the Frequency Summary of the Status Questionable register.
Preset	32767
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Frequency Event Query

This query returns the decimal value of the sum of the bits in the Questionable Frequency Event register.

NOTE

The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

Mode	All
Remote Command	:STATus:QUEStionable:FREQuency[:EVENT]?
Example	STAT:QUES:FREQ?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Frequency Negative Transition

This command determines which bits in the Questionable Frequency Condition register will set the corresponding bit in the Questionable Frequency Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
------	-----

Remote Command	:STATus:QUESTionable:FREQuency:NTRansition <integer> :STATus:QUESTionable:FREQuency:NTRansition?
Example	STAT:QUES:FREQ:NTR 2 Frequency Reference 'regained lock' will be reported to the Frequency Summary of the Status Questionable register.
Preset	0
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Frequency Positive Transition

This command determines which bits in the Questionable Frequency Condition register will set the corresponding bit in the Questionable Frequency Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUESTionable:FREQuency:PTRansition <integer> :STATus:QUESTionable:FREQuency:PTRansition?
Example	STAT:QUES:FREQ:PTR 2 Frequency Reference 'became unlocked' will be reported to the Frequency Summary of the Status Questionable register.
Preset	32767
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Integrity Register

"Questionable Integrity Condition " on page 173

"Questionable Integrity Enable " on page 174

"Questionable Integrity Event Query " on page 174

"Questionable Integrity Negative Transition " on page 175

"Questionable Integrity Positive Transition " on page 175

Questionable Integrity Condition

This query returns the decimal value of the sum of the bits in the Questionable Integrity Condition register.

NOTE

The data in this register is continuously updated and reflects the current conditions.

Mode	All
Remote Command	:STATus:QUESTionable:INTEgrity:CONDition?
Example	STAT:QUES:INT:COND?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Integrity Enable

This command determines which bits in the Questionable Integrity Condition Register will set bits in the Questionable Integrity Event register, which also sets the Integrity Summary bit (bit 9) in the Questionable Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

Mode	All
Remote Command	:STATus:QUESTionable:INTEgrity:ENABle <integer> :STATus:QUESTionable:INTEgrity:ENABle?
Example	STAT:QUES:INT:ENAB 8 Measurement Uncalibrated Summary will be reported to the Integrity Summary of the Status Questionable register.
Preset	32767
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Integrity Event Query

This query returns the decimal value of the sum of the bits in the Questionable Integrity Event register.

NOTE

The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

Mode	All
Remote Command	:STATus:QUESTionable:INTEgrity[:EVENT]?
Example	STAT:QUES:INT?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Integrity Negative Transition

This command determines which bits in the Questionable Integrity Condition register will set the corresponding bit in the Questionable Integrity Event register when the condition register bit has a negative transition (1 to 0)

The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUEStionable:INTEgrity:NTRansition <integer> :STATus:QUEStionable:INTEgrity:NTRansition?
Example	STAT:QUES:INT:NTR 8 Measurement 'regained calibration' Summary will be reported to the Integrity Summary of the Status Questionable register.
Preset	0
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Integrity Positive Transition

This command determines which bits in the Questionable Integrity Condition register will set the corresponding bit in the Questionable Integrity Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUEStionable:INTEgrity:PTRansition <integer> :STATus:QUEStionable:INTEgrity:PTRansition?
Example	STAT:QUES:INT:PTR 8 Measurement 'became uncalibrated' Summary will be reported to the Integrity Summary of the Status Questionable register.
Preset	32767
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Integrity Signal Register

"Questionable Integrity Signal Condition" on page 176

"Questionable Integrity Signal Enable" on page 176

"Questionable Integrity Signal Event Query" on page 177

"Questionable Integrity Signal Negative Transition" on page 177

"Questionable Integrity Signal Positive Transition" on page 177

Questionable Integrity Signal Condition

This query returns the decimal value of the sum of the bits in the Questionable Integrity Signal Condition register.

NOTE The data in this register is continuously updated and reflects the current conditions.

Mode	All
Remote Command	:STATus:QUESTionable:INTEgrity:SIGNal:CONDition?
Example	STAT:QUES:INT:SIGN:COND?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Integrity Signal Enable

This command determines which bits in the Questionable Integrity Signal Condition Register will set bits in the Questionable Integrity Signal Event register, which also sets the Integrity Summary bit (bit 9) in the Questionable Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

Mode	All
Remote Command	:STATus:QUESTionable:INTEgrity:SIGNal:ENABle <integer> :STATus:QUESTionable:INTEgrity:SIGNal:ENABle?
Example	STAT:QUES:INT:SIGN:ENAB 4 Burst Not Found will be reported to the Integrity Summary of the Status Questionable register.
Preset	32767
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Integrity Signal Event Query

This query returns the decimal value of the sum of the bits in the Questionable Integrity Signal Event register.

NOTE

The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

Mode	All
Remote Command	:STATus:QUESTionable:INTEgrity:SIGNal[:EVENT]?
Example	STAT:QUES:INT:SIGN?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Integrity Signal Negative Transition

This command determines which bits in the Questionable Integrity Signal Condition register will set the corresponding bit in the Questionable Integrity Signal Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUESTionable:INTEgrity:SIGNal:NTRansition <integer> :STATus:QUESTionable:INTEgrity:SIGNal:NTRansition?
Example	STAT:QUES:INT:SIGN:NTR 4 Burst found will be reported to the Integrity Summary of the Status Questionable register.
Preset	0
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Integrity Signal Positive Transition

This command determines which bits in the Questionable Integrity Signal Condition register will set the corresponding bit in the Questionable Integrity Signal Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUEStionable:INTEgrity:SIGNal:PTRansition <integer> :STATus:QUEStionable:INTEgrity:SIGNal:PTRansition?
Example	STAT:QUES:INT:SIGN:PTR 4 Burst not found will be reported to the Integrity Summary of the Status Questionable register.
Preset	32767
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Integrity Uncalibrated Register

"Questionable Integrity Uncalibrated Condition " on page 178

"Questionable Integrity Uncalibrated Enable " on page 178

"Questionable Integrity Uncalibrated Event Query " on page 179

"Questionable Integrity Uncalibrated Negative Transition " on page 179

"Questionable Integrity Uncalibrated Positive Transition " on page 180

Questionable Integrity Uncalibrated Condition

This query returns the decimal value of the sum of the bits in the Questionable Integrity Uncalibrated Condition register.

NOTE

The data in this register is continuously updated and reflects the current conditions.

Mode	All
Remote Command	:STATus:QUEStionable:INTEgrity:UNCalibrated:CONDition?
Example	STAT:QUES:INT:UNC:COND?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Integrity Uncalibrated Enable

This command determines which bits in the Questionable Integrity Uncalibrated Condition Register will set bits in the Questionable Integrity Uncalibrated Event register, which also sets the Data Uncalibrated Summary bit (bit 3) in the Questionable Integrity Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

Mode	All
Remote Command	:STATus:QUEStionable:INTEgrity:UNCalibrated:ENABle :STATus:QUEStionable:INTEgrity:UNCalibrated:ENABle?
Example	STAT:QUES:INT:UNC:ENAB 1 Oversweep (Meas Uncal) will be reported to the Integrity Summary of the Status Questionable register.
Preset	32767
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Integrity Uncalibrated Event Query

This query returns the decimal value of the sum of the bits in the Questionable Integrity Uncalibrated Event register.

NOTE

The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

Mode	All
Remote Command	:STATus:QUEStionable:INTEgrity:UNCalibrated[:EVENT]?
Example	STAT:QUES:INT:UNC?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Integrity Uncalibrated Negative Transition

This command determines which bits in the Questionable Integrity Uncalibrated Condition register will set the corresponding bit in the Questionable Integrity Uncalibrated Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUEStionable:INTEgrity:UNCalibrated:NTRansition <integer> :STATus:QUEStionable:INTEgrity:UNCalibrated:NTRansition?
Example	STAT:QUES:INT:UNC:NTR 1 Oversweep cleared will be reported to the Integrity Summary of the Status Questionable register.

Preset	0
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Integrity Uncalibrated Positive Transition

This command determines which bits in the Questionable Integrity Uncalibrated Condition register will set the corresponding bit in the Questionable Integrity Uncalibrated Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUEStionable:INTEgrity:UNCalibrated:PTRansition <integer> :STATus:QUEStionable:INTEgrity:UNCalibrated:PTRansition?
Example	STAT:QUES:INT:UNC:PTR 1 Oversweep (Meas Uncal) occurred will be reported to the Integrity Summary of the Status Questionable register.
Preset	32767
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Power Register

"Questionable Power Condition " on page 180

"Questionable Power Enable " on page 181

"Questionable Power Event Query " on page 181

"Questionable Power Negative Transition " on page 182

"Questionable Power Positive Transition " on page 182

Questionable Power Condition

This query returns the decimal value of the sum of the bits in the Questionable Power Condition register.

NOTE

The data in this register is continuously updated and reflects the current conditions.

Mode	All
Remote Command	:STATus:QUESTionable:POWer:CONDition?
Example	STAT:QUES:POW:COND?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Power Enable

This command determines which bits in the Questionable Power Condition Register will set bits in the Questionable Power Event register, which also sets the Power Summary bit (bit 3) in the Questionable Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

Mode	All
Remote Command	:STATus:QUESTionable:POWer:ENABle <integer> :STATus:QUESTionable:POWer:ENABle?
Example	STAT:QUES:POW:ENAB 32 50 MHz Input Pwr too High for Cal will be reported to the Power Summary of the Status Questionable register.
Preset	32767
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Power Event Query

This query returns the decimal value of the sum of the bits in the Questionable Power Event register.

NOTE

The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

Mode	All
Remote Command	:STATus:QUESTionable:POWer[:EVENT]?
Example	STAT:QUES:POW?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Power Negative Transition

This command determines which bits in the Questionable Power Condition register will set the corresponding bit in the Questionable Power Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUESTionable:POWer:NTRansition <integer> :STATus:QUESTionable:POWer:NTRansition?
Example	STAT:QUES:POW:NTR 32 50 MHz Input Power became OK for Cal will be reported to the Power Summary of the Status Questionable register.
Preset	0
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Power Positive Transition

This command determines which bits in the Questionable Power Condition register will set the corresponding bit in the Questionable Power Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUESTionable:POWer:PTRansition <integer> :STATus:QUESTionable:POWer:PTRansition?>
Example	STAT:QUES:POW:PTR 32 50 MHz Input Power became too high for Cal will be reported to the Power Summary of the Status Questionable register.
Preset	32767
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Temperature Register

"Questionable Temperature Condition" on page 183

"Questionable Temperature Enable" on page 183

"Questionable Temperature Event Query" on page 183

"Questionable Temperature Negative Transition" on page 184

"Questionable Temperature Positive Transition" on page 184

Questionable Temperature Condition

This query returns the decimal value of the sum of the bits in the Questionable Temperature Condition register.

NOTE

The data in this register is continuously updated and reflects the current conditions.

Mode	All
Remote Command	:STATus:QUEStionable:TEMPerature:CONDition?
Example	STAT:QUES:TEMP:COND?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Temperature Enable

This command determines which bits in the Questionable Temperature Condition Register will set bits in the Questionable Temperature Event register, which also sets the Temperature Summary bit (bit 4) in the Questionable Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

Mode	All
Remote Command	:STATus:QUEStionable:TEMPerature:ENABle <integer> :STATus:QUEStionable:TEMPerature:ENABle?
Example	STAT:QUES:TEMP:ENAB 1 Reference Oscillator Oven Cold will be reported to the Temperature Summary of the Status Questionable register.
Preset	32767
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Temperature Event Query

This query returns the decimal value of the sum of the bits in the Questionable Temperature Event register.

NOTE

The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared

Mode	All
Remote Command	:STATus:QUEStionable:TEMPerature[:EVENT]?
Example	STAT:QUES:TEMP?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Temperature Negative Transition

This command determines which bits in the Questionable Temperature Condition register will set the corresponding bit in the Questionable Temperature Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUEStionable:TEMPerature:NTRansition <integer> :STATus:QUEStionable:TEMPerature:NTRansition?
Example	STAT:QUES:TEMP:NTR 1 Reference Oscillator Oven not cold will be reported to the Temperature Summary of the Status Questionable register.
Preset	0
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Temperature Positive Transition

This command determines which bits in the Questionable Temperature Condition register will set the corresponding bit in the Questionable Temperature Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUEStionable:TEMPerature:PTRansition <integer> :STATus:QUEStionable:TEMPerature:PTRansition?
Example	STAT:QUES:TEMP:PTR 1 Reference Oscillator Oven became cold will be reported to the

	Temperature Summary of the Status Questionable register.
Preset	32767
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

IEEE 488.2 Common Commands

The instrument supports the following subset of IEEE 488.2 Common Commands, as defined in Chapter 10 of [IEEE Standard 488.2-1992](#). As indicated in the detailed descriptions, some of these commands correspond directly to instrument front-panel key functionality, while others are available only as remote commands.

Command	Description
*CAL?	Align Now "All " on page 351
*CLS	"Clear Status " on page 188
*ESE	"Standard Event Status Enable " on page 188
*ESE?	
*ESR?	"Standard Event Status Register Query " on page 189
*IDN?	"Identification Query " on page 189
*OPC	"Operation Complete " on page 190
*OPC?	
*OPT?	"Query Instrument Options " on page 191
*RCL	"Recall Instrument State " on page 191
*RST	"*RST (Remote Command Only)" on page 192
*SAV	"Save Instrument State " on page 192
*SRE	"Service Request Enable " on page 192
*SRE?	
*STB?	"Status Byte Query " on page 193
*TRG	"Trigger " on page 193
*TST?	"Self Test Query " on page 193
*WAI	"Wait-to-Continue " on page 194

All

(In MXE the key label is "All (plus RF Presel 20 Hz – 3.6 GHz)")Immediately executes an alignment of all subsystems In MXE, the Align Now All is followed by additionally aligning the RF Preselector section, so in MXE, the key label contains the parenthetical note "(plus RF Presel 20 Hz – 3.6 GHz)". The instrument stops any measurement currently underway, performs the alignment, then restarts the measurement from the beginning (similar to pressing the Restart key).

If an interfering user signal is present at the RF Input, the alignment is performed on all subsystems except the RF. After completion, the Error Condition message "Align skipped: 50 MHz interference" or "Align skipped: 4.8 GHz interference" is generated. In addition the Error Condition message "Align Now, RF required" is generated, and bits 11 and 12 are set in the Status Questionable Calibration register.

The query form of the remote commands (:CALibration[:ALL]? or *CAL?) invokes the alignment of all subsystems and returns a success or failure value. An interfering user signal is not grounds for failure; if the

alignment was able to succeed on all portions but unable to align the RF because of an interfering signal, the resultant will be the success value.

Successful completion of Align Now, All will clear the “Align Now, All required” Error Condition, and clear bit 14 in the Status Questionable Calibration register. It will also begin the elapsed time counter for Last Align Now, All Time, and capture the Last Align Now, All Temperature.

In the MXE, successful completion will also clear the “Align 20 Hz to 30 MHz required” Error Condition, the “Align 30 MHz to 3.6 GHz required” Error Condition, and the “Align 20 Hz to 3.6 GHz required” Error Condition, and clear bits 1 and bit 2 and clear the bit 1 in the Status Questionable Calibration Extended Needed register.

If the Align RF subsystem succeeded in aligning (no interfering signal present), the elapsed time counter begins for Last Align Now, RF Time, and the temperature is captured for the Last Align Now, RF Temperature. In addition the Error Conditions “Align skipped: 50 MHz interference” and “Align skipped: 4.8 GHz interference” are cleared, the Error Condition “Align Now, RF required” is cleared, and bits 11 and 12 are cleared in the Status Questionable Calibration register

Align Now, All can be interrupted by pressing the Cancel (ESC) front-panel key or remotely with Device Clear followed by the :ABORt SCPI command. When this occurs the Error Condition message “Align Now, All required” is generated, and bit 14 is set in the Status Questionable Condition register. This is because new alignment data may be employed for an individual subsystem, but not a cohesive set of data for all subsystems.

In many cases, you might find it more convenient to change alignments to Normal, instead of executing Align Now, All. When the Auto Align process transitions to Normal, the analyzer will immediately start to update only the alignments that have expired, thus efficiently restoring the alignment process.

Key Path	System, Alignments, Align Now
Mode	All
Remote Command	:CALibration[:ALL] :CALibration[:ALL]?
Example	:CAL
Notes	:CALibration[:ALL]? returns 0 if successful :CALibration[:ALL]? returns 1 if failed :CALibration[:ALL]? is the same as *CAL? While Align Now, All is performing the alignment, bit 0 in the Status Operation register is set. Completion, or termination, will clear bit 0 in the Status Operation register. This command is sequential; it must complete before further SCPI commands are processed. Interrupting the alignment from remote is accomplished by invoking Device Clear followed by the :ABORt command. Successful completion will clear bit 14 in the Status Questionable Calibration register. An interfering user signal is not grounds for failure of Align Now, All. However, bits 11 and 12 are set in the Status Questionable Calibration register to indicate Align Now, RF is required. An interfering user supplied signal will result in the instrument requiring an Align Now, RF with the interfering signal removed.
Couplings	Initializes the time for the Last Align Now, All Time. Records the temperature for the Last Align Now, All Temperature.

	If Align RF component succeeded, initializes the time for the Last Align Now, RF Time. If Align RF component succeeded, records the temperature for the Last Align Now, RF Temperature.
Status Bits/OPC dependencies	Bits 11, 12, or 14 may be set in the Status Questionable Calibration register.
Initial S/W Revision	Prior to A.02.00

Mode	All
Remote Command	*CAL?
Example	*CAL?
Notes	*CAL? returns 0 if successful *CAL? returns 1 if failed :CALibration[:ALL]? is the same as *CAL? See additional remarks described with :CALibration[:ALL]? Everything about :CALibration[:ALL]? is synonymous with *CAL? including all conditions, status register bits, and couplings
Initial S/W Revision	Prior to A.02.00

Clear Status

Clears the status byte register. It does this by emptying the error queue and clearing all bits in all of the event registers. The status byte register summarizes the states of the other registers. It is also responsible for generating service requests.

Key Path	No equivalent key. Related key System, Show Errors, Clear Error Queue
Remote Command	*CLS
Example	*CLS Clears the error queue and the Status Byte Register.
Notes	For related commands, see the SYSTem:ERRor[:NEXT]? command. See also the STATus:PRESet command and all commands in the STATus subsystem.
Status Bits/OPC dependencies	Resets all bits in all event registers to 0, which resets all the status byte register bits to 0 also.
Backwards Compatibility Notes	In general the status bits used in the X-Series status system will be backwards compatible with ESA and PSA. However, note that all conditions will generate events that go into the event log, and some will also generate status bits.
Initial S/W Revision	Prior to A.02.00

Standard Event Status Enable

Selects the desired bits from the standard event status enable register. This register monitors I/O errors and synchronization conditions such as operation complete, request control, query error, device

dependent error, status execution error, command error, and power on. The selected bits are OR'd to become a summary bit (bit 5) in the byte register which can be queried.

The query returns the state of the standard event status enable register.

Key Path	No equivalent key. Related key System, Show Errors, Clear Error Queue
Remote Command	*ESE <integer> *ESE?
Example	*ESE 36 Enables the Standard Event Status Register to monitor query and command errors (bits 2 and 5). *ESE? Returns a 36 indicating that the query and command status bits are enabled.
Notes	For related commands, see the STATus subsystem and SYSTem:ERRor[:NEXT]? commands.
Preset	255
State Saved	Not saved in state.
Min	0
Max	255
Status Bits/OPC dependencies	Event Enable Register of the Standard Event Status Register.
Initial S/W Revision	Prior to A.02.00

Standard Event Status Register Query

Queries and clears the standard event status event register. (This is a destructive read.) The value returned is a hexadecimal number that reflects the current state (0/1) of all the bits in the register.

Remote Command	*ESR?
Example	*ESR? Returns a 1 if there is either a query or command error, otherwise it returns a zero.
Notes	For related commands, see the STATus subsystem commands.
Preset	0
Min	0
Max	255
Status Bits/OPC dependencies	Standard Event Status Register (bits 0 – 7).
Initial S/W Revision	Prior to A.02.00

Identification Query

Returns a string of instrument identification information. The string will contain the model number, serial number, and firmware revision.

The response is organized into four fields separated by commas. The field definitions are as follows:

- Manufacturer

- Model
- Serial number
- Firmware version

Key Path	No equivalent key. See related key System, Show System.
Remote Command	*IDN?
Example	*IDN? Returns instrument identification information, such as: Keysight Technologies, N9020A, US01020004, A.01.02
Initial S/W Revision	Prior to A.02.00

Operation Complete

The *OPC command sets bit 0 in the standard event status register (SER) to “1” when pending operations have finished, that is when all overlapped commands are complete. It does not hold off subsequent operations. You can determine when the overlapped commands have completed either by polling the OPC bit in SER, or by setting up the status system such that a service request (SRQ) is asserted when the OPC bit is set.

The *OPC? query returns a “1” after all the current overlapped commands are complete. So it holds off subsequent commands until the “1” is returned, then the program continues. This query can be used to synchronize events of other instruments on the external bus.

Remote Command	*OPC *OPC?
Example	INIT:CONT 0 Selects single sweeping. INIT:IMM Initiates a sweep. *OPC? Holds off any further commands until the sweep is complete.
Status Bits/OPC dependencies	Not global to all remote ports or front panel. *OPC only considers operation that was initiated on the same port as the *OPC command was issued from. *OPC is an overlapped command, but *OPC? is sequential.
Backwards Compatibility Notes	<ol style="list-style-type: none"> 1. The ESA/PSA/VSA products do not meet all the requirements for the *OPC command specified by IEEE 488.2. This is corrected for X-Series. This will sometimes cause behavior that is not backward compatible, but it will work as customers expect. 2. Commands such as, *OPC/*OPC?/*WAI/*RST used to be global. They considered front panel operation in conjunction with the GPIB functionality. Now they are evaluated on a per channel basis. That is, the various rear panel remote ports and the front panel i/o are all considered separately. Only the functionality initiated on the port where the *OPC was sent, is considered for its operation. 3. *OPC used to hold off until the operation bits were cleared. Now it holds off until all overlapping commands are completed. Also, earlier instruments did not wait for completion of all processes, only the ones identified here (in the STATus:OPERation register): Calibrating: monitored by PSA, ESA, VSA (E4406A) Sweeping: monitored by PSA, ESA, VSA (E4406A) Waiting for Trigger: monitored by PSA, ESA, VSA (E4406A)

	Measuring: monitored by PSA and ESA (but not in all Modes). Paused: monitored by VSA (E4406A). Printing: monitored by VSA (E4406A). Mass memory busy: monitored by VSA (E4406A).
Initial S/W Revision	Prior to A.02.00

Query Instrument Options

Returns a string of all the installed instrument options. It is a comma separated list with quotes, such as: "503,P03,PFR".

To be IEEE compliant, this command should return an arbitrary ascii variable that would not begin and end with quotes. But the quotes are needed to be backward compatible with previous SA products and software. So, the actual implementation will use arbitrary ascii. But quotes will be sent as the first and last ascii characters that are sent with the comma-separated option list.

Remote Command	*OPT?
Initial S/W Revision	Prior to A.02.00

Recall Instrument State

This command recalls the instrument state from the specified instrument memory register.

- If the state being loaded has a newer firmware revision than the revision of the instrument, no state is recalled and an error is reported
- If the state being loaded has an equal firmware revision than the revision of the instrument, the state will be loaded.
- If the state being loaded has an older firmware revision than the revision of the instrument, the instrument will only load the parts of the state that apply to the older revision.

Remote Command	*RCL <register #>
Example	*RCL 7 Recalls the instrument state that is currently stored in register 7.
Notes	Registers 0 through 6 are accessible from the front panel in menu keys for Recall Registers.
Min	0
Max	127
Status Bits/OPC dependencies	The command is sequential.
Initial S/W Revision	Prior to A.02.00

*RST (Remote Command Only)

*RST is equivalent to :SYST:PRES;:INIT:CONT OFF, which is a Mode Preset in the Single measurement state. This remote command is preferred over Mode Preset remote command - :SYST:PRES, as optimal remote programming occurs with the instrument in the single measurement state.

Remote Command	*RST
Example	*RST
Notes	Sequential Clears all pending OPC bits and the Status Byte is set to 0.
Couplings	A *RST will cause the currently running measurement to be aborted and cause the default measurement to be active. *RST gets the mode to a consistent state with all of the default couplings set.
Backwards Compatibility Notes	In legacy analyzers *RST did not set the analyzer to Single, but in the X-Series it does, for compliance with the IEEE 488.2 specification. In the X-Series, *RST does not do a *CLS (clear the status bits and the error queue). In legacy analyzers, *RST used to do the equivalent of SYSTem:PRESet, *CLS and INITiate:CONTinuous OFF. But to be 488.2 compliant, *RST in the X-Series does not do a *CLS.
Initial S/W Revision	Prior to A.02.00

Save Instrument State

This command saves the current instrument state and mode to the specified instrument memory register.

Remote Command	*SAV <register #>
Example	*SAV 9 Saves the instrument state in register 9.
Notes	Registers 0 through 6 are accessible from the front panel in menu keys for Save Registers.
Min	0
Max	127
Status Bits/OPC dependencies	The command is sequential.
Initial S/W Revision	Prior to A.02.00

Service Request Enable

This command enables the desired bits of the service request enable register.

The query returns the value of the register, indicating which bits are currently enabled.

Remote Command	*SRE <integer> *SRE?
Example	*SRE 22 Enables bits 1, 2, and 4 in the service request enable register.

Notes	For related commands, see the STATus subsystem and SYSTem:ERRor[:NEXT]? commands.
Preset	0
Min	0
Max	255
Status Bits/OPC dependencies	Service Request Enable Register (all bits, 0 - 7).
Initial S/W Revision	Prior to A.02.00

Status Byte Query

Returns the value of the status byte register without erasing its contents.

Remote Command	*STB?
Example	*STB? Returns a decimal value for the bits in the status byte register. For example, if a 16 is returned, it indicates that bit 5 is set and one of the conditions monitored in the standard event status register is set.
Notes	See related command *CLS.
Status Bits/OPC dependencies	Status Byte Register (all bits, 0 - 7).
Initial S/W Revision	Prior to A.02.00

Trigger

This command triggers the instrument. Use the :TRIGger[:SEQuence]:SOURce command to select the trigger source.

Key Path	No equivalent key. See related keys Single and Restart.
Remote Command	*TRG
Example	*TRG Triggers the instrument to take a sweep or start a measurement, depending on the current instrument settings.
Notes	See related command :INITiate:IMMediate.
Initial S/W Revision	Prior to A.02.00

Self Test Query

This query performs the internal self-test routines and returns a number indicating the success of the testing. A zero is returned if the test is successful, 1 if it fails.

Remote Command	*TST?
Example	*TST? Runs the self-test routines and returns 0=passed, 1=some part failed.
Initial S/W Revision	Prior to A.02.00

Wait-to-Continue

This command causes the instrument to wait until all overlapped commands are completed before executing any additional commands. There is no query form for the command.

Remote Command	*WAI
Example	INIT:CONT OFF; INIT;*WAI Sets the instrument to single sweep. Starts a sweep and waits for its completion.
Status Bits/OPC dependencies	Not global to all remote ports or front panel. *OPC only considers operation that was initiated on the same port as the *OPC command was issued from.
Initial S/W Revision	Prior to A.02.00

4 Input/Output Functions

Input/Output

The Input/Output features are common across multiple Modes and Measurements. These common features are described in this section. See the Measurement description for information on features that are unique.

The Input/Output key accesses the keys that control the Input/Output parameters of the instrument. In general, these are functions associated with external connections to the analyzer, either to the inputs or the outputs. Since these connections tend to be fairly stable within a given setup, in general, the input/output settings do not change when you Preset the analyzer.

Other functions related to the input/output connections, but which tend to change on a measurement by measurement basis, can be found under the Trigger and AMPTD Y Scale keys. In addition, some of the digital I/O bus configurations can be found under the System key.

NOTE

The functions in the Input/Output menu are "global" (common) to all Modes (applications). But individual Input/Output functions only appear in a Mode if they apply to that Mode. Functions that apply to a Mode but not to all measurements in the Mode may be grayed-out in some measurements.

["Input/Output variables - Preset behavior" on page 197](#)

The Input Port selection is the first menu under the Input/Output key:

Key Path	Front-panel key
Remote Command	<code>[:SENSe] :FEED RF AIQ EMIXer</code> <code>[:SENSe] :FEED?</code>
Example	<code>:FEED RF</code> <code>:FEED?</code>
Couplings	The <code>[:SENSe] :FEED RF</code> command turns the calibrator OFF
Preset	This setting is unaffected by a Preset or power cycle. It survives a Mode Preset and mode changes. It is set to RF on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
State Saved	Saved in instrument state
Backwards Compatibility SCPI	<code>[:SENSe] :FEED AREFERENCE</code> In the PSA the calibrator was one of the inputs and selected using the AREF parameter to the same <code>:FEED</code> command that switched the inputs. In the X-Series it is controlled in a separate menu and overrides the input selection. For code compatibility the <code>[:SENSe] :FEED AREFERENCE</code> command is provided, and is aliased to <code>[:SENSe] :FEED :AREF REF50</code> , which causes the input to be switched to the 50 MHz calibrator. The <code>[:SENSe] :FEED RF</code> command switches the input back to the RF port and turns the calibrator OFF, thus providing full compatibility with the PSA calibrator function. Note that after sending this, the query <code>[:SENSe] :FEED?</code> will NOT return "AREF" but instead the currently selected input.
Backwards Compatibility SCPI	<code>[:SENSe] :FEED IQ IONLy QONLy</code> <code>[:SENSe] :FEED?</code> The parameters <code>IQ IONLy QONLy</code> are supported for backwards compatibility with the E44406A. <code>[:SENSe] :FEED IQ</code> aliases to <code>[:SENSe] :FEED :IQ :TYPE IQ</code> <code>[:SENSe] :FEED IONLy</code> aliases to <code>[:SENSe] :FEED :IQ :TYPE IONLy</code>

	<p>[;SENSe]:FEED QONLy aliases to [;SENSe]:FEED:IQ:TYPE QONLy</p> <p>The query [;SENSe]:FEED? will always returns AIQ whatever the type of legacy parameters IQ IONLy QONLy has been used.</p>
Backwards Compatibility Notes	<p>Most of the settings in the X-Series Input/Output system, including External Gain, Amplitude Corrections settings and data, etc., are shared by all modes and are not changed by a mode switch. Furthermore, most variables in the Input/Output system key are not affected by Mode Preset. Both of these behaviors represent a departure from legacy behavior.</p> <p>In the X-Series. Input/Output settings are reset by using the "Restore Input/Output Defaults" function. They can also be reset to their default values through the System->Restore System Defaults-> In/Out Config key or through the System ->Restore System Defaults -> All key (and corresponding SCPI).</p> <p>While this matches most use cases better, it does create some code compatibility issues. For example, Amplitude Corrections are no longer turned off by a Mode Preset, but instead by using the "Restore Input/Output Defaults" key/SCPI.</p> <p>Although Input/Output settings are not part of each Mode's State, they are saved in the Save State files, so that all of the instrument settings can be recalled with Recall State, as in legacy instruments.</p>
Initial S/W Revision	Prior to A.02.00
Remote Command	<p>:INPut:MIXer EXTernal INTernal</p> <p>:INPut:MIXer?</p>
Example	<p>INP:MIX INT</p> <p>INP:MIX?</p>
Notes	<p>In legacy analyzers you choose between the Internal mixer or an External Mixer. In the X-Series, the External Mixer is one of the choices for the Input and is selected using the FEED command (:SENSe:FEED EXTMIxer).</p> <p>For compatibility, the INPut:MIXer EXTernal INTernal legacy command is mapped as follows:</p> <ol style="list-style-type: none"> 1. When INPut:MIXer EXTernal is received, SENSe:FEED EMIXer is executed. 2. When INPut:MIXer INTernal is received, SENSe:FEED RF is executed. 3. When INPut:MIXer? is received, the response will be INT if any input other than the external mixer is selected and EXT if the external mixer is selected
Preset	INT
Backwards Compatibility Notes	<p>PSA supports the following SCPI Command :</p> <p>:INPut:MIXer:TYPE PRESelected UNPReselect</p> <p>:INPut:MIXer:TYPE?</p> <p>PXA does not support the :INPut:MIXer:TYPE command.</p>
Initial S/W Revision	A.08.01

Input/Output variables - Preset behavior

Virtually all the input/output settings are NOT a part of mode preset. They can be set to their default value

by one of the three ways:

- by using the Restore Input/Output Defaults key on the first page of the input/output menu,
- by using the System->Restore System Defaults->Input/Output Settings or,
- by using the System -> Restore System Defaults->All. Also, they survive a Preset and a Power cycle.

A very few of the Input/Output settings do respond to a Mode Preset; for example, if the Calibrator is on it turns off on a Preset, and if DC coupling is in effect it switches to AC on a Preset. These exceptions are made in the interest of reliability and usability, which overrides the need for absolute consistency. Exceptions are noted in the SCPI table for the excepted functions.

RF Input

Selects the front-panel RF input port to be the analyzer signal input. If RF is already selected, pressing this key accesses the RF input setup functions.

Key Path	Input/Output
Example	[:SENSe]:FEED RF
Couplings	The act of connecting the U7227A USB Preamplifier to one of the analyzer's USB ports will cause the Input to automatically switch to the RF Input. If the RF Calibrator is on, it is turned off. Subsequently disconnecting the USB Preamp from USB does not change the Input selection nor restore the previous selection.
Readback	The RF input port, RF coupling, and current input impedance settings appear on this key as: "XX, YY, ZZ" where XX is RF, RF2, RFIO1, RFIO2, depending on what input is selected (only appears on analyzers with multiple RF inputs) YY is AC or DC ZZ is 50Ω or 75Ω
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.14.00

Input Z Correction

Sets the input impedance for unit conversions. This affects the results when the y-axis unit is voltage or current units (dBmV, dBμV, dBμA, V, A), but not when it is power units (dBm, W). The impedance you select is for computational purposes only, since the actual impedance is set by internal hardware to 50 ohms. Setting the computational input impedance to 75 ohms is useful when using a 75 ohm to 50 ohm adapter to measure a 75 ohm device on an analyzer with a 50 ohm input impedance.

There are a variety of ways to make 50 to 75 ohm transitions, such as impedance transformers or minimum loss pads. The choice of the solution that is best for your measurement situation requires balancing the amount of loss that you can tolerate with the amount of measurement frequency range that you need. If you are using one of these pads/adaptors with the Input Z Corr function, you might also want to use the Ext Gain key. This function is used to set a correction value to compensate for the gain (loss) through your pad. This correction factor is applied to the displayed measurement values.

Key Path	Input/Output, RF Input
Remote Command	[:SENSe] :CORRection:IMPedance [:INPut] [:MAGNitude] 50 75 [:SENSe] :CORRection:IMPedance [:INPut] [:MAGNitude] ?
Example	CORR:IMP 75 sets the input impedance correction to 75 ohms. CORR:IMP?
Couplings	In the N9000A option C75, when RF Input 2 is selected, the Input Z Correction will automatically change to 75 ohms. You may then change it to whatever is desired. When the main RF Input is selected, the Input Z Correction will automatically change to 50 ohms. You may then change it to whatever is desired.
Preset	This is unaffected by a Preset but is set to 50 ohms on a "Restore Input/Output Defaults" or "Restore System Defaults->All" Some instruments/options may have 75 ohms available.
State Saved	Saved in instrument state
Readback	50 Ω or 75 Ω . Current setting reads back to the RF key.
Initial S/W Revision	Prior to A.02.00

RF Coupling

Specifies alternating current (AC) or direct current (DC) coupling at the analyzer RF input port. Selecting AC coupling switches in a blocking capacitor that blocks any DC voltage present at the analyzer input. This decreases the input frequency range of the analyzer, but prevents damage to the input circuitry of the analyzer if there is a DC voltage present at the RF input.

In AC coupling mode, you can view signals below the corner frequency of the DC block, but below a certain frequency the amplitude accuracy is not specified. The frequency below which specifications do not apply is:

X-Series Model	Lowest Freq for meeting specs when AC coupled	Lowest Freq for meeting specs when DC coupled
N9000A-503/507	100 kHz	n/a
N9000A-C75 Input 2	1 MHz	n/a
N9000A-513/526	10 MHz	9 kHz
N9010A	10 MHz	9 kHz
N9020A	10 MHz	20 Hz
N9030A	10 MHz	3 Hz

Some amplitude specifications apply only when coupling is set to DC. Refer to the appropriate amplitude specifications and characteristics for your analyzer.

When operating in DC coupled mode, ensure protection of the analyzer input circuitry by limiting the DC part of the input level to within 200 mV of 0 Vdc. In AC or DC coupling, limit the input RF power to +30 dBm (1 Watt).

Key Path	Input/Output, RF Input
Remote Command	:INPut:COUPling AC DC :INPut:COUPling?
Example	INP:COUP DC
Dependencies	This key does not appear in models that are always AC coupled. When the SCPI command to set DC coupling is sent to these models, it results in the error "Illegal parameter value; This model is always AC coupled" In these models, the SCPI query INP:COUP? always returns AC. This key does not appear in models that are always DC coupled. When the SCPI command to set AC coupling is sent to these models, it results in the error "Illegal parameter value; This instrument is always DC coupled" In these models, the SCPI query INP:COUP? always returns DC.
Preset	AC on models that support AC coupling On models that are always DC coupled, such as millimeter wave models (frequency ranges 30 GHz and above), the preset is DC.
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

External Mixer

This key allows you to choose an External Mixer through which to apply signal input to the analyzer. When chosen, the LO/IF port becomes the input to the analyzer.

External Mixing requires option EXM. The External Mixer key will not appear unless option EXM is installed. The presence of the LO/IF connector alone does not indicate that you have Option EXM licensed. To verify that option EXM is installed, press System, Show, System.

When External Mixer is selected, the Center Freq key controls the setting of the Center Freq in external mixing, which is separate from the settings of Center Freq for the RF Input or BBIQ. Each input retains its unique settings for Center Freq. A unique SCPI command is provided solely for the external mixing Center Freq (see the Center Freq key description), which only affects the External Mixer CF, although sending the generic Center Freq command while External Mixer is selected also controls the External Mixer CF.

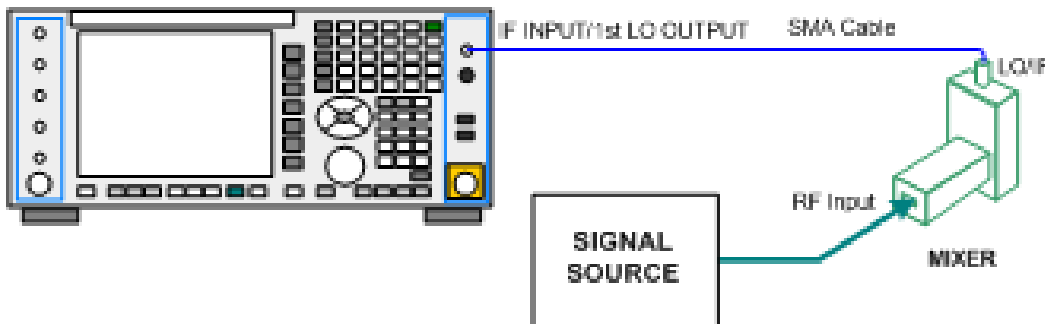
See ["More Information" on page 201](#)

Key Path	Input/Output
Example	:FEED EMIX
Notes	Not all measurements support the use of the External Mixer input. When External Mixer is selected in a measurement that does not support it, the "No result; Meas invalid with Ext Mixing" error condition occurs.
Dependencies	Unless option EXM is present, the External Mixer key is blanked, and all SCPI commands associated with menus accessed by this key return an error

	Manual FFT mode is available with external mixing, but not with Signal ID.
Preset	All settings under this key are returned to their default state when Restore Input/Output Defaults is pressed.
State Saved	All settings under this key, and all Frequency settings, are remembered when you go out of External Mixer, so that when External Mixer is chosen again, all the external mixer functions will retain their previous settings, with the exception of Signal ID which is set to OFF (Signal ID is also set to Off unless External Mixer is the selected Input).
Readback Text	The readback text on this key shows the currently selected mixer, in square brackets.
Backwards Compatibility Notes	Unlike PSA, all external mixer settings including Center Frequency are retained when you go in and out of External Mixing. Also, Preset does not take you out of External Mixing (Restore Input/Output Defaults does).
Initial S/W Revision	A.08.01

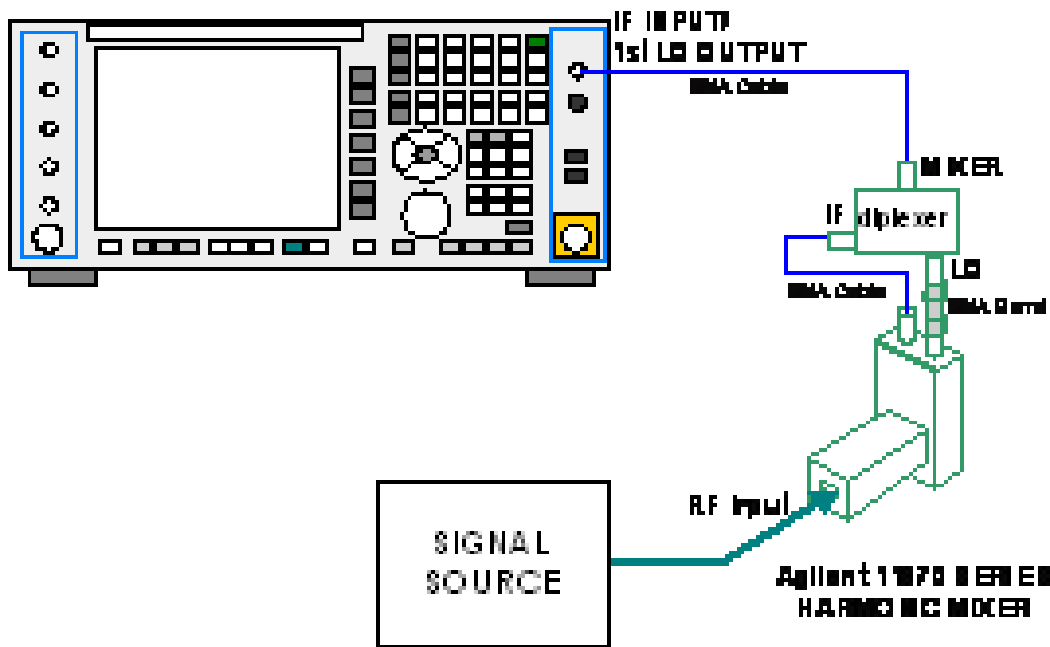
More Information

X-series analyzers have a combined LO Out/IF In connection, whereas earlier analyzers used separate ports for the LO Out and the IF in. Internal diplexers in the analyzer and the mixer simplify the connection for the user – only a single SMA cable is required.



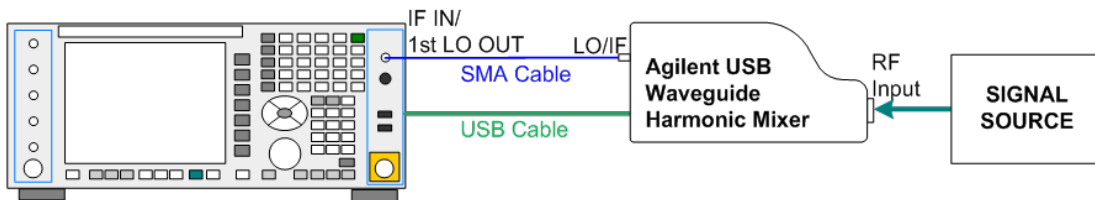
Legacy HP/Agilent and some third party mixers have separate LO In and IF out connections. This requires you to use an external diplexer to connect these mixers. A diplexer can easily be purchased for this purpose (for example, Diplexer Model # DPL.26 or # DPL.313B from OML Inc., Morgan Hill CA)

The connection diagram for such a legacy mixer is:



In addition, External Mixing in the X-Series supports the new Agilent M1970 series of Harmonic Mixers, which provide a USB connection for download of calibration data and additional control.

The connection diagram for one of the Agilent USB mixers is:



External Mixing is only supported in certain Modes and Measurements in the X-Series, as shown in the table below:

Mode	Measurements	Sig ID (Image Suppress only)
Spectrum Analyzer	Swept SA	Y*
	TOI	Y
	Harmonics	N
	Spurious Emissions	Y
	Channel Power	Y
	Occupied BW	Y
	ACP	Y
	Spectrum Emissions Mask	Y
	CCDF	N

	Burst Power	N
	List Sweep	N
Phase Noise	Monitor Spectrum	Y
	Log Plot	Y
	Spot Frequency	N
	Waveform	N
I/Q Analyzer	Complex Spectrum	N
	Waveform	N
Vector Signal Analyzer	Vector Analysis	N
	Analog Demod	N
	Digital Demod	N

* the Swept SA measurement also supports Image Shift

Ext Mix Setup

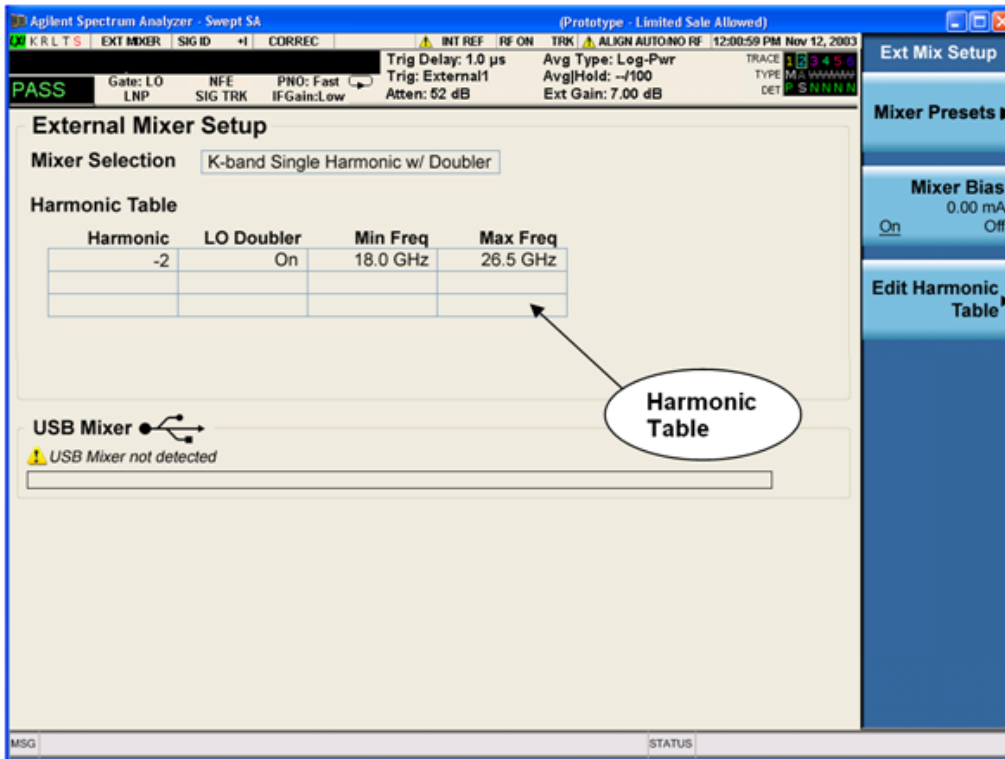
This menu lets you select the mixer type, and lets you configure your mixer (if necessary). While in this menu, and any of its submenus, the External Mixer Setup screen appears, showing you the current settings for the selected mixer. These settings may be dependent on which IF path is currently in use, whether a + or – harmonic is currently selected, etc.

To apply any amplitude correction factors needed to correct mixer flatness, you enter values into one of the Correction tables (under Input/Output, Corrections). The correction conversion loss values can be extracted from data supplied with the mixer or from manual measurements you make to determine the conversion loss. Note that the correction applied by the Correction tables is global to the analyzer; therefore you should make sure to turn off the External Mixer corrections when you are not using the External Mixer input.

NOTE

The Agilent USB Mixers automatically give their flatness data to the analyzer, and the correction is applied internally. No correction needs to be entered by the user, and the correction does not appear in the user-accessible Corrections tables. The user is free to enter additional corrections into the Correction tables under Input/Output, Corrections.

Key Path	Input/Output, External Mixer
State Saved	All settings in the Mixer Setup are part of the Input/Output system, and hence are saved whenever State is saved.
Readback Text	The readback line on this key shows the currently selected mixer, in square brackets.
Initial S/W Revision	A.08.01
Modified at S/W Revision	A.08.50



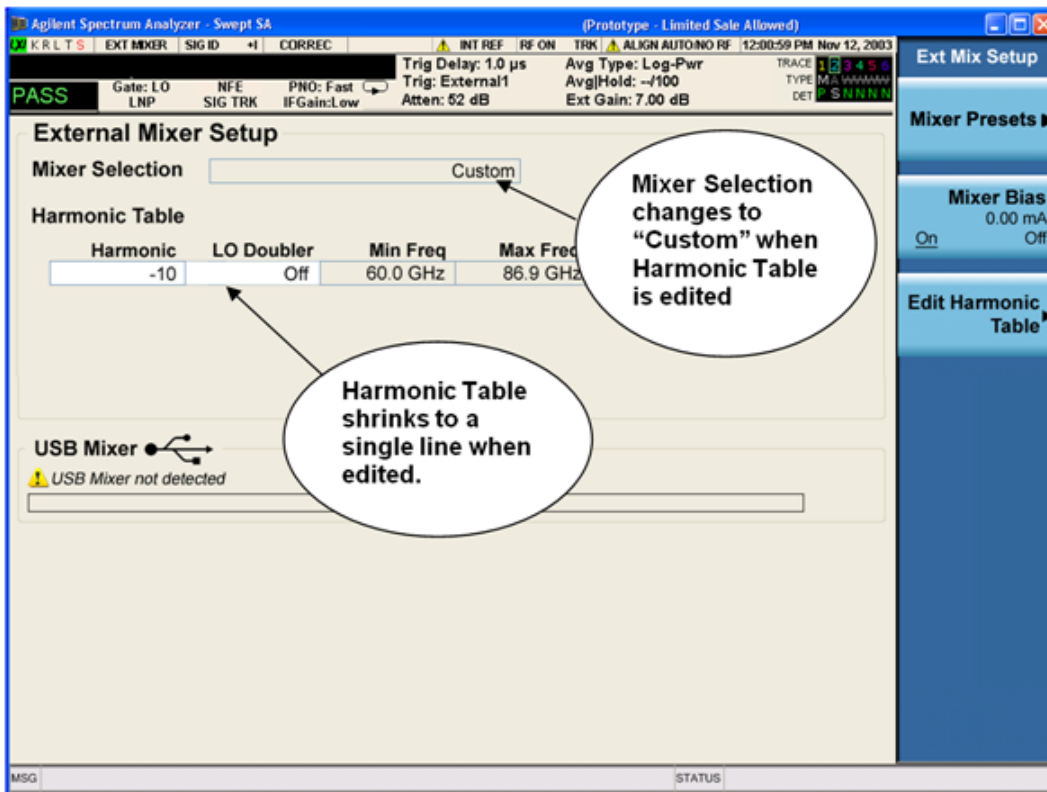
The External Mixer Setup screen looks like this

The current Mixer selection (the current or most recently connected USB Mixer, or the most recent Mixer Preset, or “Custom” if the user has modified the setup) reads out at the top of this screen.

The Harmonic Table currently being used reads out below the Mixer Selection. It shows each range being used for the current mixer. Note that a band may be made up of up to 3 ranges. Each range represents a choice of mixer harmonic and doubler state. When you select a Mixer Preset, it sets the analyzer Start and Stop frequency to the values shown in the Harmonic Table; Start Freq is set to the Min Freq for the bottom range, and Stop Freq is set to the Max Freq for the top range. In many cases you can exceed these nominal values; the absolute maximum and minimum frequency for each preset are shown in the tables that accompany the key descriptions for the Mixer Presets.

NOTE

If the current measurement has a limited Span available to it, and cannot achieve the Span shown in the table ($\text{Span} = \text{Stop Freq} - \text{Start Freq}$), the analyzer uses the maximum Span the measurement allows, and sets the Center Freq to the midpoint of the Start and Stop Freq values in the Harmonic Table.



You may customize the Harmonic Table, but when you do this the analyzer goes into “single harmonic” mode. You may enter the harmonic number and whether to use the doubler or not, but now range switching is not supported, so you can only have one harmonic.

When you edit the Harmonic Table, the Mixer Selection changes to “Custom.” To change it back you must go back into the Mixer Presets menu and select a Preset.

When you edit the Harmonic Table, the nominal Min Freq and Max Freq that are available will usually be different than the Preset you were using; and the absolute frequency limits will change as well. This may result in a change to your Start and/or Stop Freq, if the current values fall outside the new range, requiring you to retune your Center Freq to get your signal back in the center.

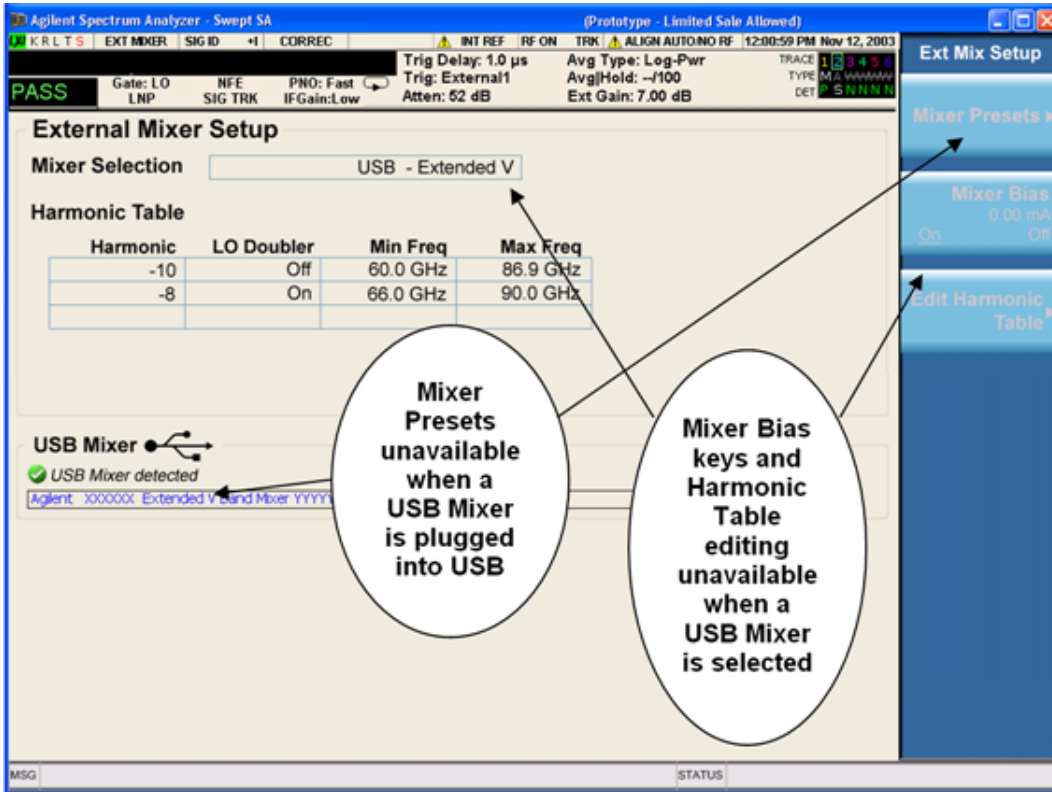
The analyzer supports the Agilent M1970 Series Harmonic Mixers with USB connection. While in External Mixing, if one of these mixers is plugged in to a USB port, it is automatically detected and displayed in the “USB Mixer” area of the setup screen, including its model number and serial number.

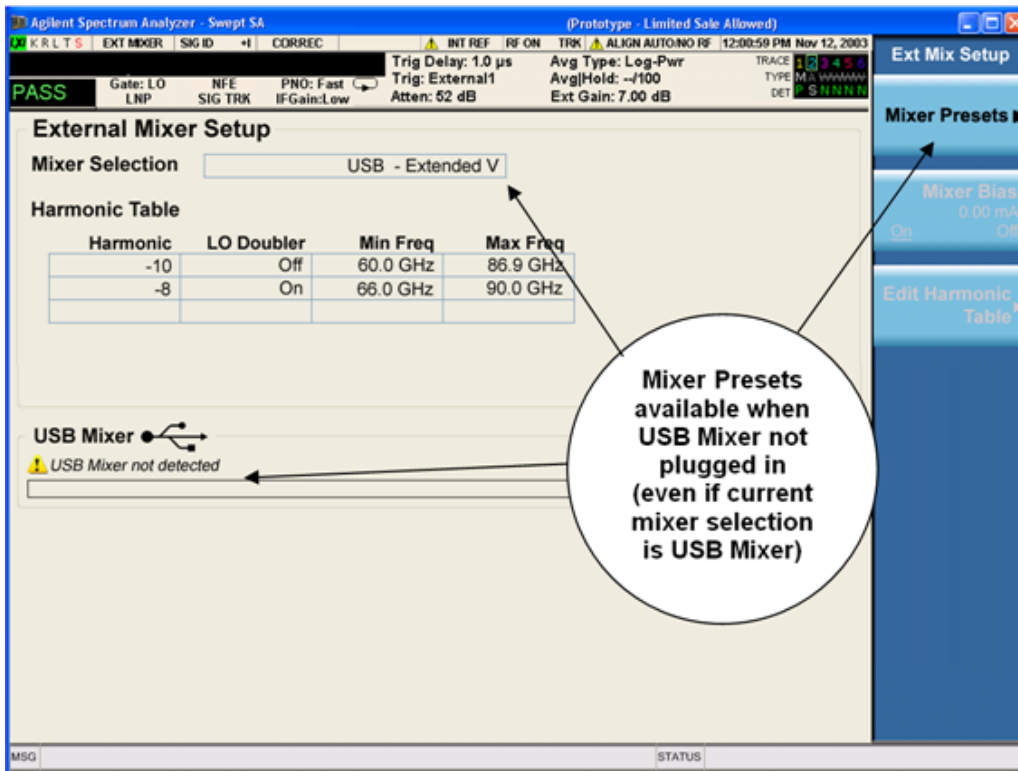
The analyzer assumes that if you plug a mixer into the USB, that is the mixer you want to use. Therefore:

1. If a USB mixer is connected to the USB port, the Mixer Presets menu is grayed out, as none of the presets make sense with a USB Mixer connected. Note that once the analyzer has acquired the USB Mixer, the mixer selection will remain if it is subsequently unplugged from the USB, allowing you to plug it back in with no change to your settings. However, once you unplug it, the Mixer Presets key will stop being grayed out, allowing you to preset to a different mixer.
2. When Restore Input/Output Defaults is performed, if an Agilent USB Mixer is plugged into the analyzer’s USB port, the Mixer Selection remains unchanged.

3. When recalling an instrument state, if an Agilent USB Mixer is plugged into the analyzer's USB port, and the Mixer Selection in the recalled state is for a USB Mixer that does not match the mixer currently plugged in, you will have to unplug your mixer and then plug it back in to get the analyzer to recognize your mixer.

As long as the selection in Ext Mixer Setup shows one of the USB mixers, both the Mixer Bias and Edit Harmonic Table keys will be grayed out.





Only one USB Mixer is supported at a time. To switch to a different USB Mixer, disconnect the one that is no longer being used prior to connecting a new one.

The Mixer Selection displayed and softkey readback for the Agilent M1970 series mixers is:

Mixer Model	Mixer Selection display on Setup Screen	Readback on softkeys
Agilent M1970E: Option 001: 60 to 90 GHz Waveguide Harmonic Mixer	USB - M1970E E-Band	USB Mixer E-Band
Agilent M1970V Option 001: 50 to 75 GHz Waveguide Harmonic Mixer	USB - M1970V-001 V-Band	USB Mixer V-Band
Agilent M1970V Option 002: 50 to 80 GHz Waveguide Harmonic Mixer	USB - M1970V-002 Extended V-Band	USB Mixer Extended V
Agilent M1970W: 75 to 110 GHz Waveguide Harmonic Mixer	USB - M1970W W-Band	USB Mixer W-Band

The Agilent USB mixer essentially acts as a “remote front end” and is fully calibrated over the specified frequency range, without requiring any user interaction. This is particularly useful at high mm-wave frequencies, where cable loss is typically quite large, and it is desirable to bring the front end right up to the device under test, rather than bringing the mm-wave signal to the analyzer using a lossy and uncalibrated cable or waveguide connection.

Connecting the mixer to the USB port on the analyzer switches you to External Mixing, aborts the current measurement, and initiates an alignment of the mixer. A popup message, “USB Mixer connected” appears on the display. When a USB mixer and the LO/IF cable are connected the alignment is performed. When the alignment begins, an “Aligning” popup replaces the previous message on the display. When the alignment completes, the current measurement restarts.

Mixer Presets

This menu lets you preset the mixer setup for the particular type of mixer that you are using.

These presets are divided into four groups:

- one for Agilent legacy mixers,
- three for general purpose mixers:
 - o presets that use a single harmonic and no doubling
 - o presets that use a single harmonic but double the LO
 - o presets that use multiple harmonics

Note that the IF/LO port provides a 3.8–14 GHz LO in two bands: 3.8–8.7 (LO fundamental), and 8.6–14 GHz (doubled LO).

In most cases, once you have executed the preset, you will not need to adjust any further settings.

Key Path	Input/Output, External Mixer, Ext Mix Setup
Remote Command	[:SENSe]:MIXer:BAND A Q U V W NA ND NE NF NG NJ NK NQ NU NV NW NY NEXT DD DF DG DJ DK DQ DV DW DY DEXT MA ME MU MCOAX USB [:SENSe]:MIXer:BAND?
Example	:MIX:BAND A :MIX:BAND?
Notes	A Q U V W select Agilent 11970 mixer presets NA ND NE NF NG NJ NK NQ NU NV NW NY NEXT select single harmonic, non-doubled LO presets DD DF DG DJ DK DQ DV DW DY DEXT select single harmonic, doubled LO presets MA ME MU MCOAX select multiple harmonic presets All of these presets are detailed in their respective key descriptions The query form of this command returns the most recent preset, UNLESS the harmonic table has been edited after the preset was executed. If the harmonic table has been edited it returns CUSTOM The command USB will refresh the USB mixer connection and automatically detect the mixer band. The query form of this command returns the following if an Agilent USB Mixer is plugged into the analyzer’s USB port: USB E Agilent E-Band USB Mixer USB V Agilent V-Band USB Mixer USB VEXT Agilent Extended V-Band USB Mixer USB W Agilent W-Band USB Mixer Note that the parameters CUSTOM, USB V, USB VEXT, and USB W are query responses only, and cannot be sent TO the analyzer.

	<p>The following cross-reference matches the mixer band designators used by Agilent to the EIA waveguide designations:</p> <p>EIAAgilentFreq Range</p> <p>WR-28 A26.5 – 40 GHz</p> <p>WR-22 Q33 – 50 GHz</p> <p>WR-19 U40 – 60 GHz</p> <p>WR-15 V50 – 75 GHz</p> <p>WR-12 E60 – 90 GHz</p> <p>WR-10 W75 – 110 GHz</p> <p>WR-8 F90 – 140 GHz</p> <p>WR-6 D110 – 170 GHz</p> <p>WR-5 G140 – 220 GHz</p> <p>WR-3 J220 – 325 GHz</p>
Preset	<p>When Restore Input/Output Defaults is performed, an “A” mixer preset is also issued (11970A band), unless an Agilent USB Mixer is plugged into the analyzer’s USB port, in which case the Mixer Selection remains unchanged.</p> <p>When using Agilent USB Mixers, if a Restore All Defaults (SCPI command SYSTem:DEFault) has been performed, either remove and reinsert the USB cable or press the Refresh USB Mixer Connection softkey.</p>
Backwards Compatibility Notes	<p>The [:SENSE]:MIXer:BAND command was used in PSA and ESA to select the mixer band. In the X-Series, only the legacy parameters A, Q, U, V, and W are honored, and they preset the analyzer to match the corresponding Agilent 11970 legacy mixer. Parameters D, E, F, G, J, K, Y, which were accepted in ESA and PSA, return an error if sent. If you are using a mixer in one of these bands, you should study the tables of presets and choose the appropriate preset to match your application. Also the USER parameter is no longer accepted, as the control model for mixer customization is very different in the X-Series.</p>
Initial S/W Revision	A.08.01
Modified at S/W Revision	A.14.00

Agilent 11970

This menu allows you to preset for one of the models in the HP/Agilent 11970 series.

Because the X-Series has an LO range of 3.8 – 14 GHz, and older analyzers had an LO range of 3.0 – 6.8 GHz, the harmonic numbers used in the X-Series may differ from those used on older analyzers for the same mixers. Additionally, some of the 11970 mixers cannot be operated over their full range with the X-Series without switching harmonics. Consequently, you will find that some of the bands (A-Band, for example) are broken into two ranges for use with the X-Series.

See ["More Information" on page 210](#)

Key Path	Input/Output, External Mixer, Ext Mix Setup, Mixer Presets
Example	MIX:BAND A
Initial S/W Revision	A.08.01

More Information

Below are the 11970A presets. The 11970U and the 11970W use a single harmonic. The other three switch harmonics mid-band. Both harmonic ranges are shown in the table. None of these mixers use LO doubling.

The 11970 K-band mixer and the 11974 preselected mixer series are not supported.

Preset	Readout in setup screen	Readback on softkeys	Range	Harm #	RF start	RF stop	RF center
A-band	Agilent 11970A	Agilent 11970A	1	-6	26.5	30.45	28.475
			2	-8	30.35	40	35.175
Q-band	Agilent 11970Q	Agilent 11970Q	1	-8	33	40.8	36.9
			2	-10	39.8	50	44.9
U-band	Agilent 11970U	Agilent 11970U	..	-10	40	60	50
V-band	Agilent 11970V	Agilent 11970V	1	-12	50	66	58
			2	-14	53	75	64
W-band	Agilent 11970W	Agilent 11970W	..	-18	75	110	92.5

Single Harmonic

These presets choose a setup that uses a single harmonic and no doubling for the LO.

Key Path	Input/Output, External Mixer, Ext Mix Setup, Mixer Presets
Example	MIX:BAND NA
Initial S/W Revision	A.08.01

These are the presets for single harmonic operation with no doubler:

Mixer	Readout in setup screen	Readback on softkeys	Harm #	RF start	RF stop	RF center
K-band	K-band Single Harmonic, no doubler	Sngl harm LOx1 K-band	-4	18	26.5	22.25
A-band	A-band Single Harmonic, no doubler	Sngl harm LOx1 A-band	-6	26.5	40	33.25
D-band	D-band Single Harmonic, no doubler	Sngl harm LOx1 D-band	-20	110	170	140
E-band	E-band Single Harmonic, no doubler	Sngl harm LOx1 E-band	-12	60	90	75
F-band	F-band Single Harmonic, no doubler	Sngl harm LOx1	-18	90	140	115

Mixer	Readout in setup screen	Readback on softkeys	Harm #	RF start	RF stop	RF center
		F-band				
Q-band	Q-band Single Harmonic, no doubler	Sngl harm LOx1 Q-band	-6	33	50	41.5
U-band	U-band Single Harmonic, no doubler	Sngl harm LOx1 U-band	-8	40	60	50
V-band	V-band Single Harmonic, no doubler	Sngl harm LOx1 V-band	-10	50	75	62.5
W-band	W-band Single Harmonic, no doubler	Sngl harm LOx1 W-band	-14	75	110	92.5
G-band	G-band Single Harmonic, no doubler	Sngl harm LOx1 G-band	-26	140	220	180
Y-band	Y-band Single Harmonic, no doubler	Sngl harm LOx1 Y-band	-30	170	260	215
J-band	J-band Single Harmonic, no doubler	Sngl harm LOx1 J-band	-38	220	325	272.5
Extended	Extended Single Harmonic, no doubler	Sngl harm LOx1 Extended	-40	155	345	250

Single Harmonic w/doubler

These presets choose a setup that uses a single harmonic and doubling for the LO.

Key Path	Input/Output, External Mixer, Ext Mix Setup, Mixer Presets
Example	MIX:BAND DW
Initial S/W Revision	A.08.01

These are the presets for single harmonic operation with LO doubling:

Mixer	Readout in setup screen	Readback on softkeys	Harm #	RF start	RF stop	RF center
D-band	D-band Single Harmonic w/doubler	Sngl harm LOx2 K-band	-14	110	170	140
F-band	F-band Single Harmonic w/doubler	Sngl harm LOx2 A-band	-10	90	140	115
G-band	G-band Single Harmonic w/doubler	Sngl harm LOx2 A-band	-16	140	220	180
J-band	J-band Single	Sngl harm LOx2	-24	220	325	272.5

Mixer	Readout in setup screen	Readback on softkeys	Harm #	RF start	RF stop	RF center
	Harmonic w/doubler	A-band				
K-band	K-band Single Harmonic w/doubler	Sngl harm LOx2 A-band	-2	18	26.5	22.25
Q-band	Q-band Single Harmonic w/doubler	Sngl harm LOx2 A-band	-4	33	50	41.5
V-band	V-band Single Harmonic w/doubler	Sngl harm LOx2 A-band	-6	50	75	62.5
W-band	W-band Single Harmonic w/doubler	Sngl harm LOx2 A-band	-8	75	110	92.5
Y-band	Y-band Single Harmonic w/doubler	Sngl harm LOx2 A-band	-20	170	260	215
Extended	Extended Single Harmonic w/doubler	Sngl harm LOx2 A-band	-28	245	390	317.5

Multiple Harmonics

These presets choose a setup that uses multiple harmonics and may or may not use doubling for the LO.

Key Path	Input/Output, External Mixer, Ext Mix Setup, Mixer Presets
Example	MIX:BAND MA
Initial S/W Revision	A.08.01

These are the presets for multiple harmonic operation:

Mixer	Readout in setup screen	Readback on softkeys	Range	Harm #	Dblr?	RF start	RF stop	RF Center
A-band	A-band Multiple Harmonic	Multi harm A-band	1	-4	N	26.5	34.1	30.3
			2	-4	Y	33.1	40	36.55
E-band	E-band Multiple Harmonic	Multi harm E-band	1	-6	Y	60	83	71.5
			2	-8	Y	65	90	77.5
U-band	U-band Multiple Harmonic	Multi harm U-band	1	-6	N	40	51.5	45.75
			2	-6	Y	49.5	60	54.75
Coaxial	Coaxial Multiple Harmonic	Multi harm Coaxial	1	-4	N	26.5	34	30.25
			2	-4	Y	32.5	55	43.75
			3	-6	Y	50	70	60

Mixer Bias

Adjusts an internal bias source for use with external mixers. The bias signal is present on the center conductor of the IF input connector on the front panel. The shunt current range is from -10 mA to 10 mA and it can be set whether Mixer Bias state is On or Off, but it will only be applied if it is On.

The bias remains as set if the user switches to another input (e.g., the RF Input).

Key Path	Input/Output, External Mixer, Ext Mix Setup
Remote Command	[:SENSe]:MIXer:BIAS <real> [:SENSe]:MIXer:BIAS? [:SENSe]:MIXer:BIAS:STATe OFF ON 0 1 [:SENSe]:MIXer:BIAS:STATe?
Example	:MIX:BIAS 0 :MIX:BIAS? MIX:BIAS:STAT 0 MIX:BIAS:STAT?
Preset	This is unaffected by Preset but is set to OFF and 0 on a "Restore Input/Output Defaults"
State Saved	Saved in instrument state
Min	-10 mA
Max	10 mA
Initial S/W Revision	A.08.01

Edit Harmonic Table

This menu lets you directly configure the Harmonic number and LO Doubler state of your mixer by editing the Harmonic Table. The Harmonic Table can be configured:

- as a single row (meaning only one harmonic number is used and the LO Doubler is either on or off),
- as two rows where the harmonic number switches between the first row and the second, or
- as two rows where the LO Doubler state switches between the first row and the second

When you press the Edit Harmonic Table key, a dialog appears on the display informing you that when you edit the Harmonic Table you will go into Custom mixer mode, and that to undo your changes you must go to the Mixer Presets menu and choose the preset appropriate for your mixer. You may cancel out of this dialog and not enter the Edit Harmonic Table menu. If you choose to enter the menu, the Mixer Selection changes to "Custom".

In Custom mode, your maximum start and stop frequencies are strictly set by the LO range and the harmonic number you have chosen. The undoubled LO range is approximately $3.8 - 8.7$ GHz, and (for LO's that support doubling) the doubled range is approximately $8.0 - 14.0$ GHz. That range times the harmonic you have selected will determine your tuning range. If your frequency is currently outside that range when you edit the Harmonic Table, your frequency will be changed to fall at the edge of the range. To change it back you must go into the Mixer Presets menu and select a Preset.

Whenever you are in the Edit Harmonic Table menu, the editable fields in the table have a white background, indicating that they can be edited. These fields vary depending on the Table Type.

Table Type	Fields you can edit
Single Row	Harmonic and LO Doubler cells
Harmonic Switching	Harmonic and LO Doubler cells (only the first row)
Doubler Switching	Harmonics cell (only the first row)

Note that you cannot add or delete rows from the table; you can only modify the rows that are already there.

Key Path	Input/Output, External Mixer, Ext Mix Setup
Initial S/W Revision	A.08.01
Modified at S/W Revision	A.09.491

Table Type

This parameter determines which type of configuration you want the Custom Mixer to be. You can choose Single Row, Harmonic Switching, or Doubler Switching. See detail under each of these keys.

Key Path	Input/Output, External Mixer, Ext Mix Setup, Edit Harmonic Table
Remote Command	<code>[:SENSe] :MIXer :TTYPe SINGle HARMonic DOUBler</code> <code>[:SENSe] :MIXer :TTYPE ?</code>
Example	<code>:MIX:TTYP SING</code>
Couplings	When you change the Table Type, the Mixer Selection changes to "Custom"
Preset	Depends on the current Mixer Preset. This is unaffected by Mode Preset, but on a "Restore Input/Output Defaults" the Mixer is preset to 11970A, for which the Table Type is Harmonic Switching
State Saved	Saved in instrument state
Initial S/W Revision	A.09.491

Single Row

In the Single Row type, the External Mixer always stays in the same Harmonic Number and the LO Doubler is either on or off and does not change state during a sweep. You may change the Harmonic Number and you may change the state of the Doubler.

Key Path	Input/Output, External Mixer, Ext Mix Setup, Edit Harmonic Table, Table Type
Example	<code>:MIX:TTYP SING</code>
State Saved	Saved in instrument state
Initial S/W Revision	A.09.491

Harmonic Switching

In the Harmonic Switching type, the External Mixer switches the Harmonic Number in the middle of the sweep. The Lo Doubler may be on or off but it is the same for both Harmonic Numbers. You can set the initial Harmonic Number, and when it switches it decrements by two when the harmonic is negative and increments by two when the harmonic is positive. For example, if you set the initial number to -6, when it switches it will go to -8. If you set the harmonic number to 8 when it switches it will go to 10.

Key Path	Input/Output, External Mixer, Ext Mix Setup, Edit Harmonic Table, Table Type
Example	:MIX:TTYP HARM
State Saved	Saved in instrument state
Initial S/W Revision	A.09.491

Doubler Switching

In the Doubler Switching type, the External Mixer switches the doubler from Off to On in the middle of the sweep. You can set the Harmonic Number but it stays the same for the Doubler Off state as for the Doubler On state. The LO Doubler key is grayed out in this table type.

Key Path	Input/Output, External Mixer, Ext Mix Setup, Edit Harmonic Table, Table Type
Example	:MIX:TTYP DOUB
State Saved	Saved in instrument state
Initial S/W Revision	A.09.491

Harmonic

This lets you enter the Harmonic value with its associated sign (mixing mode).

The harmonic number is a signed integer, where the sign has the meaning of choosing between positive and negative mixing products. Desired mixing products occur at an IF frequency which equals the difference between the RF frequency (f_{RF}) and the LO frequency (Nf_{LO}). When this difference is positive, we can say $f_{IF} = f_{RF} - Nf_{LO}$. When this difference is negative, we can say $f_{IF} = Nf_{LO} - f_{RF}$. Thus, a negative harmonic means the analyzer will be tuned such that the harmonic of the LO is higher than the indicated frequency by the frequency of the first IF. A positive harmonic means the analyzer will be tuned such that the harmonic of the LO is lower than the indicated frequency by the frequency of the first IF.

Key Path	Input/Output, External Mixer, Ext Mix Setup, Edit Harmonic Table
Remote Command	[:SENSe] :MIXer:HARMonic <integer> [:SENSe] :MIXer:HARMonic?
Example	:MIX:HARM -28 :MIX:HARM?
Notes	The query returns the harmonic value of the first row of the harmonic table.

Couplings	When you set a value for the Harmonic via SCPI, the Mixer Selection changes to "Custom"
Preset	This is unaffected by Mode Preset, but on a "Restore Input/Output Defaults" editing is turned off, the Harmonic Table returns to normal, and the Mixer is preset to 11970A, which has -6 in the first row of its Harmonic Table
State Saved	Saved in instrument state
Min	-400
Max	400
Initial S/W Revision	A.08.01
Modified at S/W Revision	A.09.491

LO Doubler

This lets you enter the LO Doubler setting. The LO Doubler setting controls the choice of the LO doubler state for LO's that support doubled operation.

In LO's that support doubling, the fundamental band is approximately 3.8 – 8.7 GHz, and the doubled band is approximately 8.0 – 14 GHz. The higher LO frequency can result in a lower mixer harmonic and reduced mixer conversion loss.

Key Path	Input/Output, External Mixer, Ext Mix Setup, Edit Harmonic Table
Remote Command	<code>[:SENSe] :MIXer :LODoubler ON OFF 0 1</code> <code>[:SENSe] :MIXer :LODoubler?</code>
Example	<code>:MIX:LOD 0</code> <code>:MIX:LOD?</code>
Notes	The query returns the doubler value of the first row of the harmonic table.
Dependencies	This key is grayed out and set to Off when Table Type is set to Doubler Switching.
Couplings	When you set a value for the doubler setting via SCPI, the Mixer Selection changes to "Custom"
Preset	This is unaffected by Mode Preset, but on a "Restore Input/Output Defaults" editing is turned off, the Harmonic Table returns to normal, and the Mixer is preset to 11970A, which has the doubler Off in the first row of its Harmonic Table
State Saved	Saved in instrument state
Initial S/W Revision	A.08.01
Modified at S/W Revision	A.09.491

Refresh USB Mixer Connection

This operation re-reads the USB devices and refreshes connection to Agilent USB mixers. This operation is the same as physically removing and reinserting the mixer's USB connection.

Key Path	Input/Output, External Mixer, Ext Mix Setup
Example	<code>:MIX:BAND USB</code>

Notes	When using Agilent USB Mixers, if a Restore All Defaults (SCPI command SYSTEM:DEFAult) has been perform, either remove and reinsert the USB cable or press the Refresh USB Mixer Connection softkey.
Initial S/W Revision	A.14.00

Signal ID On/Off

Activates or deactivates an algorithm that aids with the identification of multiple responses

Toggles the Signal ID (signal identification) function On or Off. This function lets you identify multiple responses of a single input signal that are generated when using un-preselected external mixers. The use of mixers without pre-selecting filters offers the advantage of improved receiver sensitivity because of the absence of the filter insertion loss, but results in multiple responses due to images and undesired harmonic mixing products.

While in Signal ID, basic spectrum analyzer functions work normally (for example, you can change Span normally), but some functions are disabled (for example, some traces are unavailable).

There are two forms of Signal ID, Image Suppress and Image Shift. Choose the one most appropriate for your application. For Image Shift, an LO-shifted and an unshifted trace are taken in Trace 1 and Trace 2 and displayed together. Any peaks that are not the same in both traces are images. For Image Suppress, image cancellation is performed in the background using two hidden traces, and the result displayed in Trace 1, which shows only the valid signals.

Key Path	Input/Output, External Mixer
Remote Command	[:SENSe] :SIDentify [:STATe] OFF ON 0 1 [:SENSe] :SIDentify [:STATe] ?
Example	:SID 0 :SID ?
Notes	Signal ID uses data from two successive sweeps. Therefore, if the analyzer is in single sweep mode, two sweep triggers are used to generate the data needed for signal identification.
Dependencies	Signal ID is not available in some measurements. If the Signal ID key does not appear or is grayed out while in your measurement, then it is not available. Because Signal ID uses data from two successive sweeps, several trace and sweep functions are grayed out in Signal ID. See the documentation for your measurement for details on which trace keys are grayed out. Signal ID is not available with Signal Track so Signal ID will be grayed out if in Signal Track. Signal ID will be turned off when External Mixer is turned off. Signal ID cannot be turned on when using internal mixing. Rules for auto coupling of the Sweep and FFT keys are changed with Signal ID on. For both the dynamic range case and the speed case, swept is chosen whenever any form of Signal ID is on. If Manual FFT is selected, the Signal ID key is grayed out. Whenever Signal ID is on, a warning message will be generated If Signal ID is selected in a measurement that does not support it, a warning message is generated
Couplings	The Auto Rules for detector selection select Normal for all active traces when Signal ID is turned on.

Preset	This is unaffected by Preset but is set to OFF on a "Restore Input/Output Defaults"
Initial S/W Revision	A.08.01

Signal ID Mode

Lets you set which Signal ID mode you will use, either Image Suppress or Image Shift.

Key Path	Input/Output, External Mixer
Remote Command	[:SENSe] :SIDentify:MODE ISUPpress ISHift [:SENSe] :SIDentify:MODE?
Example	:SID:MODE ISUP :SID:MODE?
Preset	This is unaffected by Preset but is set to ISUPpress on a "Restore Input/Output Defaults"
State Saved	Saved in instrument state
Initial S/W Revision	A.08.01

Image Suppress

The Image Suppress mode of Signal ID mathematically removes all image and multiple responses of signals present at the mixer input. Two hidden sweeps are taken in succession. The second sweep is offset in LO frequency by $2*IF/N$. For each point in each trace, the smaller amplitude from the two traces is taken and placed in that point in Trace 1. Responses of each trace that lie on top of one another will remain and are valid signals, others are images and are suppressed. The action of taking the smaller of the two traces will make the average noise level lower in all points that do not have an image, thus reducing the accuracy of the measurement of noise and noise-like signals.

NOTE

This function takes control of and uses Trace 1. Any data in Trace 1 prior to activating Image Suppress will be lost.

Key Path	Input/Output, External Mixer, Signal ID Mode
Example	:SID:MODE ISUP
Notes	In Image Suppress Mode, synchronization is ensured by first turning off Signal ID, initiating a single sweep, then turning on Signal ID followed by two single sweeps.
Couplings	In Image Suppress the Peak detector is auto-selected to improve the image suppression effectiveness.
Initial S/W Revision	A.08.01
Modified at S/W Revision	A.09.491

Image Shift

Like the Image Suppress mode, Image Shift is a two sweep sequence. The data from the first sweep is placed in Trace 1 and the data from the second (LO frequency shifted by $2*IF/N$) sweep is placed in Trace 2.

On alternate sweeps, the alternate trace (trace 2) is placed in front of trace 1. This way, you can see a signal at the same place on alternate sweeps, showing in yellow (trace1) and blue (trace2). Signal responses of Trace 1 and Trace 2 that have the same horizontal position are considered to be in the current band and therefore can be analyzed with the amplitude and frequency measurement systems of the SA. All other responses are invalid and should be ignored.

NOTE

This function takes control of and uses Trace 1 and Trace 2. Any data in these traces prior to activating Image Shift will be lost.

Key Path	Input/Output, External Mixer, Signal ID Mode
Example	:SID:MODE ISH
Notes	To synchronize in Image Shift Mode, turn off Signal ID and then initiate a single sweep. Then turn on Signal ID and initiate two single sweeps. The results of the first sweep after Signal ID is turned on are available in Trace 1. The next sweep is shifted and the data from that sweep is available in Trace 2. The unshifted and shifted data can then be compared.
Couplings	Trace 2 is turned off when Image Shift is turned Off.
Initial S/W Revision	A.08.01

Cable IF Loss

The loss at the IF in the IF/LO cable can be compensated for with this function, by entering the loss in dB for your cable.

The cable loss will depend on the IF frequency. The IF frequency varies depending on which IF path your measurement is using. For best accuracy, characterize your cable's loss for the IF frequency or frequencies you will be using.

IF Frequencies:

10 MHz path: 322.5 MHz

25 MHz path: 322.5 MHz

40 MHz path: 250 MHz

140 MHz path: 300 MHz

Key Path	Input/Output, External Mixer
Key Path	Input/Output, External Mixer, Calibrate Mixer
Remote Command	[:SENSe] :MIXer :CIFLoss <rel_ampl> [:SENSe] :MIXer :CIFLoss?
Example	:MIX:CIFL 0.23 DB :MIX:CIFL?
Preset	0.26 dB
State Saved	Saved in instrument state
Min	-100
Max	100
Initial S/W Revision	A.08.01

I/Q

This feature is not available unless the **"Baseband I/Q (Option BBA)"** on page 220 is installed.

Selects the front-panel I/Q input ports to be the analyzer signal input. If I/Q is already selected, pressing this key accesses the I/Q setup menu.

Key Path	Input/Output
Mode	BASIC, CDMA2K, EDGE GSM, TDSCDMA, VSA89601, WIMAX OFDMA, LTE, LTE TDD, LTE FDD, LTE TDD, DCATV, DTMB (CTTB), DVB-T/H with T2, CMMB, ISDBT, WCDMA, VXA, CDMA1XEV
Example	FEED AIQ
Notes	Not all measurements support the use of the I/Q signal input. When I/Q is selected in a measurement that does not support it, the "No Result; Meas invalid with I/Q inputs" error condition message appears. This is error 135
Initial S/W Revision	Prior to A.02.00

Baseband I/Q (Option BBA)

The Baseband I/Q functionality is a hardware option. It is option BBA. If the option is not installed, none of the I/Q functionality is enabled.

The Baseband I/Q has four input ports and one output port. The input ports are I, I-bar, Q, and Q-bar. The I and I-bar together compose the I channel and the Q and Q-bar together compose the Q channel. Each channel has two modes of operation, Single-Ended (also called "unbalanced") and Differential Input (also called "balanced"). When in Single-Ended operation, only the main port (I or Q) is used and the complementary port (I-bar or Q-bar) is ignored. When in Differential Input mode, both main and complementary ports are used.

The input settings (range, attenuation, skew, impedance, external gain) apply to the channels, not the individual ports.

The system supports a variety of 1 M Ω input passive probes as well as the Agilent 113x Series active differential probes using the Infinimax probe interface.

The Agilent 113x Series active probes can be used for both single ended and differential measurements. In either case a single connection is made for each channel (on either the I or Q input). The input is automatically configured to 50 Ω single ended and the probe power is supplied through the Infinimax interface. The probe can be configured for a variety of input coupling and low frequency rejection modes. In addition, a wide range of offset voltages and probe attenuation accessories are supported at the probe interface. The active probe has the advantage that it does not significantly load the circuit under test, even with unity gain probing.

With passive 1 M Ω probes, the probe will introduce a capacitive load on the circuit, unless higher attenuation is used at the probe interface. Higher attenuation reduces the signal level and degrades the signal-to-noise-ratio of the measurement. Passive probes are available with a variety of attenuation values for a moderate cost. Most Agilent passive probes can be automatically identified by the system, setting the input impedance setting required as well as the nominal attenuation. For single ended

measurements a single probe is used for each channel. Other passive probes can be used, with the attenuation and impedance settings configured manually.

For full differential measurements, the system supports probes on each of the four inputs. The attenuation of the probes should be the same for good common mode rejection and channel match.

Both active and passive probes in single ended and differential configurations can be calibrated. This calibration uses the Cal Out BNC connection and a probe connection accessory. The calibration achieves excellent absolute gain flatness in a probed measurement. It matches both the gain and frequency response of the I and Q channels as well as any delay skew, resulting in high accuracy in derived measurements such as Error Vector Magnitude (EVM).

When a probe is connected a status message will be displayed. The message will indicate if calibration data is available or not. Calibration data is saved for each type of probe (including "none") for each port and will be reapplied whenever that type of probe is re-connected to the same port. For probes with EEPROM identification, the calibration data will be stored based on the unique probe identifier and will reapply data for that particular probe if it is available. The data will not follow a probe from one port to another. For probes without EEPROM identification, the instrument cannot distinguish between different probes of the same type and it will use the data from the last calibration for that probe type on that port.

When in differential mode, both the main and complementary probes are expected to be of the same type.

In some situations, the I and Q channels should be configured identically. In other situations it is convenient to control them independently. Some menus have a "Q Same as I" setting that will cause the Q channel configuration to mirror the I channel configuration, avoiding the overhead of double data entry when the channels should be the same.

The output port is for calibrating the I/Q input ports, although it can also be manually controlled.

There are two types of calibrations available: cable calibration and probe calibration. The cable calibration will guide the user through connecting each input port in turn. All ports must be calibrated together. The probe calibration is done for a specific channel (I or Q). If in Single-Ended mode, only the main port is calibrated. When in Differential Input mode, the user is guided through calibrating both main and complementary ports.

The front panel I/Q port LEDs indicate the current state of that port. On (green) indicates it is active, and off (dark) indicates it is not in use. For example, the Cal Out port LED is on if and only if there is signal coming out of that port.

The input is a context and some parameters have separate values for each context. The SCPI for these parameters has an optional "[:RF|I|Q]" node. If the specific context is omitted, the command acts on the current input context's value. Here are the parameters that are input context sensitive:

- Center Frequency
- Trigger Source

It is important to distinguish between the I and Q input ports and the displayed I and Q data values. The I and Q input ports feed into a digital receiver that does digital tuning and filtering. The I and Q data seen by the user (either on the display or through SCPI) corresponds to the real ("I") and the imaginary ("Q") output from the digital receiver. When the input path is I+jQ or I Only and the center frequency is 0 Hz the I input ends up in as the real output from the receiver and appears as "I" data. Likewise, when the input path is I+jQ and the center frequency is 0 Hz, the Q input ends up as the imaginary output from the receiver and appears as "Q" data. However, when the input path is Q Only, the Q input is sent to the receiver as $Q+j0$, so

the receiver output has the Q input coming out on the real output, and so in Q Only, the signal from the Q input port appears as the "I" data. Another situation where the I and Q data do not necessarily correspond directly to the I and Q inputs is when the center frequency is non-zero. The digital processing involved in the tuning is a complex operation. This will result in I Only data appearing as both "I" and "Q" data, the same as that signal would appear if seen through the RF input port.

Baseband I/Q Remote Language Compatibility

For the Agilent E4406A VSA Series Transmitter Tester, Option B7C provided baseband I/Q inputs. Code compatibility has been provided to allow many of the commands for option B7C to function properly with the X-Series. The X-Series has hardware differences and additional capabilities (e.g., E4406A does not have independent settings of I & Q nor does it provide for probe calibrations) which make 100% compatibility impossible.

1. The following commands are supported:

:CALibration:IQ:FLATness

:INPut:IMPedance:IQ U50|B50|U1M|B1M

:INPut:IMPedance:REFerence <integer>

2. The [:SENSe]:FEED RF|IQ|IONLY|QONLY|AREFERENCE|IFALIGN command supports all parameters except IFALIGN. The FEED? query will return only RF|AIQ|AREF.

3. The following commands are not supported:

:CALibration:GIQ

:CALibration:IQ:CMR

:INPut:IQ:ALIGN OFF|ON|0|1

The Rohde & Schwarz FSQ-B71 also provides baseband I/Q inputs. A certain amount of code compatibility is provided in the X-Series, however hardware differences make this a somewhat limited set.

Supported:

The "<1|2>" is supported as "[1]".

INPut<1|2>:IQ:BALanced[:STATe] ON | OFF

INPut<1|2>:IQ:TYPE I | Q | IQ

INPut<1|2>:IQ:IMPedance LOW | HIGH

Not Supported:

INPut<1|2>:SElect AIQ | RF

TRACe<1|2>:IQ:DATA:FORMat COMPatible | IQBLock | IQPair>

TRACe<1|2>:IQ:DATA:MEMory? <offset samples>, <# of samples>

TRACe<1|2>:IQ:DATA?

TRACe<1|2>:IQ:SET <filter type>, <rbw>, <sample rate>, <trigger source>, <trigger slope>, <pretrigger samples>, <# of samples>

TRACe<1|2>:IQ:SRATe 10.0kHz to 81.6MHz

TRACe<1|2>:IQ[:STATe] ON|OFF

The Rohde & Schwarz FMU has the following SCPI, which is not supported (these commands start/abort the probe calibration procedure, which is manually interactive from the front panel):

CALibration:ABORt

CALibration:PROBe[:START]

I/Q Path

Selects which I/Q input channels are active. The LED next to each I/Q input port will be on when that port is active.

The analysis bandwidth for each channel is the same as that of the instrument. For example, the base N9020A has a bandwidth of 10 MHz. With I/Q input the I and Q channels would each have an analysis bandwidth of 10 MHz, giving 20 MHz of bandwidth when the I/Q Path is I+jQ. With option B25, the available bandwidth becomes 25 MHz, giving 25 MHz each to I and Q and 50 MHz to I+jQ.

I/Q voltage to power conversion processing is dependent on the I/Q Path selected.

- With I+jQ input we know that the input signal may not be symmetrical about 0 Hz, because it has a complex component. Therefore, above 0 Hz only the positive frequency information is displayed, and below 0 Hz only the negative frequency information is displayed.
- With all other Input Path selections, the input signal has no complex component and therefore is always symmetrical about 0 Hz. In this case, by convention, the power conversion shows the combined voltage for both the positive and negative frequencies. The information displayed below 0 Hz is the mirror of the information displayed above 0 Hz. This results in a power reading 6.02 dB higher (for both) than would be seen with only the positive frequency voltage. Note also that, in this case the real signal may have complex modulation embedded in it, but that must be recovered by further signal processing.

Key Path	Input/Output, I/Q
Remote Command	[:SENSe] :FEED:IQ:TYPE IQ IONLy QONLy [:SENSe] :FEED:IQ:TYPE?
Example	Set the input to be both the I and Q channels, combined as I + j * Q. FEED:IQ:TYPE IQ
Preset	IQ
State Saved	Yes This is unaffected by a Preset but is set to the default value on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
Range	I+jQ I Only Q Only
Readback Text	I+jQ I Only Q Only
Initial S/W Revision	Prior to A.02.00

Remote Command	:INPut [1] :IQ:TYPE IQ I Q
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	:INPut [1] :IQ:TYPE?
Notes	For R&S FSQ-B71 compatibility
Preset	IQ
Initial S/W Revision	Prior to A.02.00

I+jQ

Sets the signal input to be both the I and Q channels. The I and Q channel data will be combined as $I + j * Q$.

Key Path	Input/Output, I/Q, I/Q Path
Example	Set the input to be both the I and Q channels, combined as $I + j * Q$. FEED:IQ:TYPE IQ
Initial S/W Revision	Prior to A.02.00

I Only

Sets the signal input to be only the I channel. The Q channel will be ignored. The data collected is still complex. When the center frequency is 0 the imaginary part will always be zero, but for any other center frequency both the real and imaginary parts will be significant.

Key Path	Input/Output, I/Q, I/Q Path
Example	Set the input to be only the I channel. FEED:IQ:TYPE IONL
Initial S/W Revision	Prior to A.02.00

Q Only

Sets the signal input to be only the Q channel. The I channel will be ignored. The Q channel will be sent to the digital receiver block as $Q+j0$. The receiver's output is still complex. When the center frequency is 0 the imaginary part will always be zero, but for any other center frequency both the real and imaginary parts will be significant. Note that since the receiver's real output is displayed as the "I" data, when the center frequency is 0, the Q Only input appears as the "I" data.

Key Path	Input/Output, I/Q, I/Q Path
Example	Set the input to be only the Q channel. FEED:IQ:TYPE QONL
Initial S/W Revision	Prior to A.02.00

I Setup

Access the channel setup parameters for the I channel.

Key Path	Input/Output, I/Q
Initial S/W Revision	Prior to A.02.00

I Differential Input

Selects differential input on or off for the I channel. For differential input (also called balanced input), the analyzer uses both main and complementary ports. When differential input is off (also called single-ended or unbalanced input), the analyzer uses only the main port.

Key Path	Input/Output, I/Q, I Setup
Remote Command	:INPut:IQ[:I]:DIFFerential OFF ON 0 1 :INPut:IQ[:I]:DIFFerential?
Example	Put the I channel in Differential Input mode INP:IQ:DIFF ON
Notes	When I Differential Input = On, the analyzer will check for attenuation mismatches between the I and I-bar ports. If the difference in attenuation values exceeds 0.5 dB a Settings Alert error condition, error 159 will be set. When I Differential Input = On, and IQ Path is I+jQ, the Q Differential input must also be On. Similarly, when I Differential Input = Off, and IQ Path is I+jQ, the Q Differential input must also be Off. If the states of the two inputs do not match, an error condition message is generated, 159;Settings Alert;I/Q mismatch:Differential.
Couplings	Some active probes include built-in differential capability. When one of these probes is sensed, this key is disabled. Since the differential capability is handled in the probe, the Analyzer will use only the main port and the key will show that the Analyzer's Differential Input mode is Off (indicating that the complementary port is not in use). When Q Same as I is On, the value set for I will also be copied to Q.
Preset	Off
State Saved	Yes This is unaffected by a Preset but is set to the default value on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
Range	Off On
Initial S/W Revision	Prior to A.02.00

Remote Command	:INPut [1] :IQ:BALanced[:STATe] OFF ON 0 1 :INPut [1] :IQ:BALanced[:STATe] ?
Notes	For R&S FSQ-B71 compatibility, with no independent settings for the I and Q channels. Therefore, it is tied only to the I channel and does not provide an equivalent for the Q channel. For proper operation of the backwards compatibility command Q Same as I should be set to On.
Preset	OFF
Initial S/W Revision	Prior to A.02.00

I Input Z

Selects the input impedance for the I channel. The impedance applies to both the I and I-bar ports.

The input impedance controls the hardware signal path impedance match. It is not used for converting voltage to power. The voltage to power conversion always uses the Reference Z parameter. The Reference Z parameter applies to both I and Q channels.

Key Path	Input/Output, I/Q, I Setup
Remote Command	:INPut [1]:IQ[:I]:IMPedance LOW HIGH :INPut [1]:IQ[:I]:IMPedance?
Example	Set the I channel input impedance to 1 M Ω INP:IQ:IMP HIGH
Notes	LOW = 50 Ω , HIGH = 1 M Ω When IQ Path is I+jQ, the I Input Z setting must be the same as the Q Input Z setting. If the settings of the two inputs do not match, an error condition message is generated, 159;Settings Alert;I/Q mismatch:Input Z.
Couplings	Input impedance is a built-in characteristic of a probe. Therefore, whenever a probe is sensed, this key is disabled and the value is set to match the probe. When no probe is sensed on Q and Q Same as I is On, the value set for I will also be copied to Q.
Preset	LOW
State Saved	Yes This is unaffected by a Preset but is set to the default value on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
Range	50 Ω 1 M Ω
Initial S/W Revision	Prior to A.02.00

I Skew

Sets the skew factor for the I channel. The skew will shift the channel's data in time. Use this to compensate for differences in the electrical lengths of the input paths due to cabling.

Key Path	Input/Output, I/Q, I Setup
Remote Command	[:SENSe]:CORRection:IQ[:I]:SKEW <seconds> [:SENSe]:CORRection:IQ[:I]:SKEW?
Example	Delay the data for the I channel by 10 ns. CORR:IQ:SKEW 10 ns
Preset	0
State Saved	Yes This is unaffected by Preset but is set to the default value on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
Range	0 s to 100 ns

Min	0 s
Max	+100 ns
Initial S/W Revision	Prior to A.02.00

I Probe

Access the probe setup parameters for the I channel. See "[I/Q Probe Setup](#)" on page 231.

Key Path	Input/Output, I/Q, I Setup
State Saved	No
Readback Text	[<I port probe id> This is reporting the type of probe sensed on the I port. There is no parameter for overriding what is sensed.
Initial S/W Revision	Prior to A.02.00

Combined Differential/Input Z (Remote Command Only)

This is Remote Command only (no front panel) and is for backwards compatibility only. It combines the Differential Input and Input Z selections into a single SCPI command.

Remote Command	:INPut:IMPedance:IQ U50 B50 U1M B1M :INPut:IMPedance:IQ?
Example	:INPut:IMPedance:IQ U50 This is equivalent to the following two SCPI commands: :INP:IQ:DIFF OFF :INP:IQ:IMP 50
Notes	<p>Provided for E4406A code compatibility.</p> <p>The enum values translate as follows:</p> <p>U50: Differential Input = Off, Input Z = 50Ω</p> <p>B50: Differential Input = On, Input Z = 50Ω</p> <p>U1M: Differential Input = Off, Input Z = 1 MΩ</p> <p>B1M: Differential Input = On, Input Z = 1 MΩ</p> <p>This command is for backwards compatibility. It combines the Input Z (50Ω or 1 MΩ) parameter with the Differential Input (Off = "Unbalanced", On = "Balanced") parameter into a single enumeration.</p> <p>This backwards compatibility SCPI command was for an instrument without independent settings for the I and Q channels. Therefore, it is tied only to the I channel and does not provide an equivalent for the Q channel. For proper operation of the backwards compatibility command Q Same as I should be set to On.</p> <p>Also, note the subtle difference between this SCPI command and the backwards compatibility command for Input Z. The Input Z SCPI has "IQ" before "IMP" while this command has that order reversed.</p>

Couplings	This command does not have an independent parameter, but instead is tied to the Differential Input and Input Z parameters. The coupling for those parameters apply to this command too.
Preset	U50
Initial S/W Revision	Prior to A.02.00

Q Setup

Access the channel setup parameters for the Q channel.

Key Path	Input/Output, I/Q
Readback Text	When Q Same as I is On the readback is "Q Same as I".
Initial S/W Revision	Prior to A.02.00

Q Same as I

Many, but not all, usages require the I and Q channels have an identical setup. To simplify channel setup, the Q Same as I will cause the Q channel parameters to be mirrored from the I channel. That way you only need to set up one channel (the I channel). The I channel values are copied to the Q channel, so at the time Q Same as I is turned off the I and Q channel setups will be identical. This does not apply to Probe settings or to parameters that are determined by the probe.

Key Path	Input/Output, I/Q, Q Setup
Remote Command	:INPut:IQ:MIRRored OFF ON 0 1 :INPut:IQ:MIRRored?
Example	Turn off the mirroring of parameters from I to Q. INP:IQ:MIRR OFF
Couplings	Only displayed for the Q channel. When Yes, the I channel values for some parameters are mirrored (copied) to the Q channel. However, when a parameter is determined by the type of probe and a probe is sensed, the probe setting is always used and the I channel setting is ignored. The following parameters are mirrored: Differential Input (when not determined by probe) Input Z (when not determined by probe)
Preset	This is unaffected by a Preset but is set to the default value (Q Same as I set to "On") on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
State Saved	Saved in instrument state
Range	On Off
Readback Text	"Q Same as I" when On, otherwise none.
Initial S/W Revision	Prior to A.02.00

Q Differential Input

Selects differential input on or off for the Q channel. For differential input (also called balanced input), the analyzer uses both the Q and Q-bar ports. When differential input is off (also called single-ended or unbalanced input), the analyzer uses only the Q port.

Key Path	Input/Output, I/Q, Q Setup
Remote Command	:INPut:IQ:Q:DIFFerential OFF ON 0 1 :INPut:IQ:Q:DIFFerential?
Example	Put the Q channel in Differential Input mode INP:IQ:Q:DIFF ON
Notes	When Differential Input = On, the analyzer will check for attenuation mismatches between the Q and Q-bar ports. If the difference in attenuation values exceeds 0.5 dB a Settings Alert error condition, error 159 will be set. When Q Differential Input = On, and IQ Path is I+jQ, the I Differential input must also be On. Similarly, when Q Differential Input = Off, and IQ Path is I+jQ, the I Differential input must also be Off. If the states of the two inputs do not match, an error condition message is generated, 159;Settings Alert;I/Q mismatch:Differential.
Couplings	Some active probes include built-in differential capability. When one of these probes is sensed, this key is disabled. Since the differential capability is handled in the probe, the Analyzer will use only the main port and the key will show that the Analyzer's Differential Input mode is Off (indicating that the complementary port not in use). When a differential probe is not sensed and Q Same as I is On, the value set for I will be copied to Q. This key is disabled when Q Same as I is On.
Preset	Off
State Saved	Yes This is unaffected by a Preset but is set to the default value on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
Range	Off On
Initial S/W Revision	Prior to A.02.00

Q Input Z

Selects the input impedance for the Q channel. The impedance applies to both the Q and Q-bar ports.

The input impedance controls the hardware signal path impedance match. It is not used for converting voltage to power. The voltage to power conversion always uses the Reference Z parameter. The Reference Z parameter applies to both I and Q channels.

Key Path	Input/Output, I/Q, Q Setup
Remote Command	:INPut [1] :IQ:Q:IMPedance LOW HIGH :INPut [1] :IQ:Q:IMPedance?
Example	Set the Q channel input impedance to 1 M Ω INP:IQ:Q:IMP HIGH

Notes	LOW = 50 Ω , HIGH = 1 M Ω When IQ Path is I+jQ, the I Input Z setting must be the same as the Q Input Z setting. If the settings of the two inputs do not match, an error condition message is generated, 159;Settings Alert;I/Q mismatch:Input Z.
Couplings	Input impedance is a built-in characteristic of a probe. Therefore, whenever a probe is sensed, this key is disabled and the value is set to match the probe. When no probe is sensed and Q Same as I is On, the value set for I will also be copied to Q. This key is disabled when Q Same as I is On.
Preset	LOW
State Saved	Yes This is unaffected by Preset but is set to the default value on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
Range	50 Ω 1 M Ω
Initial S/W Revision	Prior to A.02.00

Q Skew

Sets the skew factor for the Q channel. The skew will shift the channel's data in time. Use this to compensate for differences in the electrical lengths of the input paths due to cabling and probes.

Key Path	Input/Output, I/Q, Q Setup
Remote Command	[:SENSe] :CORRection:IQ:Q:SKEW <seconds> [:SENSe] :CORRection:IQ:Q:SKEW?
Example	Delay the data for the Q channel by 10 ns. CORR:IQ:Q:SKEW 10 ns
Preset	0
State Saved	Yes This is unaffected by a Preset but is set to the default value on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
Range	0 s to 100 ns
Min	0 s
Max	+100 ns
Initial S/W Revision	Prior to A.02.00

Q Probe

Accesses the probe setup parameters for the Q channel. See "[I/Q Probe Setup](#)" on page 231.

Key Path	Input/Output, I/Q, Q Setup
State Saved	No

Readback Text	[<Q port probe id> This is reporting the type of probe sensed on the Q port. There is no parameter for overriding what is sensed.
Initial S/W Revision	Prior to A.02.00

Reference Z

Sets the value of the impedance to be used in converting voltage to power for the I and Q channels. This does not change the hardware's path impedance (see "[I Input Z](#)" on page 226).

Key Path	Input/Output, I/Q
Remote Command	: INPut: IMPedance: REference <integer> : INPut: IMPedance: REference?
Example	Set the I/Q reference impedance to 50 Ω INP:IMP:REF 50
Preset	50 Ω
State Saved	Yes This is unaffected by a Preset but is set to the default value on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
Range	1 Ω to 1 M Ω
Min	1 Ω
Max	1 M Ω
Initial S/W Revision	Prior to A.02.00

I/Q Probe Setup

The set of I/Q probe setup parameters will change based on the type of probe that is sensed. All probe types have the Attenuation parameter, and all probe types can be calibrated. The remaining parameters are only available for some probe types and will not be shown when not available. The probe type is determined by and reported for only for the I and Q ports, never the I-bar or Q-bar ports. The menu title will be "<ch>: <probe id>", where "<ch>" is either "I" or "Q" and "<probe id>" is the type of probe. For example, for the I Probe setup with an Agilent 1130A probe connected to the I port, the title will be "I: 1130A".

Probe calibration data is stored for each probe type for each channel. When no probe is sensed, the probe type "Unknown" is used, and this is also treated like a probe type with its own calibration data. When a probe is changed, the calibration data for that probe type for that port is restored. An advisory message will be displayed showing the new probe type and the calibration status. The calibration data is stored permanently (survives a power cycle) and is not affected by a Preset or any of the Restore commands. When the probe has EEPROM identification (most newer Agilent probes have this), the calibration data is stored by probe serial number and port, so if you have two probes of the same type, the correct calibration data will be used for each. For probes that do not have EEPROM identification, the calibration data is stored by probe type and port and the instrument cannot distinguish between different probes of the same type. In

all cases (with or without EEPROM identification), the calibration data is port specific, so it will not follow a specific probe from port to port if the probe is moved.

The "Unknown" probe type is used whenever no probe is sensed. When no calibration data exists for "Unknown" the latest cable calibration data is used (see "[I/Q Guided Calibration](#)" on page 260).

Attenuation

The attenuation is part of the calibration data stored with the probe type and is initially the value that was returned by the last calibration. You can modify this value and any changes will be stored with the calibration data and will survive power cycles and presets. When a probe calibration is performed the attenuation value will be overwritten by the calibration.

Key Path	Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe
Remote Command	<code>[:SENSe] :CORRection:IQ:I Q:ATTenuation:RATio <real></code> <code>[:SENSe] :CORRection:IQ:I Q:ATTenuation:RATio?</code>
Example	Set the attenuation for the current I probe to 100.00:1. CORR:IQ:I:ATT:RAT 100
Notes	Each probe type has its own attenuation setting. As probes are changed the attenuation value will reflect the new probe's setting. Changing the attenuation affects only the current probe type's setting and leaves all others unchanged. When the IQ Path is I+jQ, the Q probe attenuation setting must match the I Probe attenuation setting within 1 dB. If this is not the case, an error condition message is generated, 159;Settings Alert;I/Q mismatch:Attenuation.
Preset	Each probe type has its own default. The default for the "Unknown" probe type is 1:1.
State Saved	Saved with probe calibration data. It survives a power cycle and is not affected by a Preset or Restore.
Range	0.001 to 10000
Min	0.001
Max	10000
Initial S/W Revision	Prior to A.02.00

This is an alternate form of the SCPI that allows input as a power instead of a ratio.

Remote Command	<code>[:SENSe] :CORRection:IQ:I Q:ATTenuation <rel_ampl></code> <code>[:SENSe] :CORRection:IQ:I Q:ATTenuation?</code>
Example	Set the attenuation for the current I probe type to 100.00:1. CORR:IQ:I:ATT 20 dB
Range	-60 dB to +80 dB
Min	-60 dB
Max	+80 dB
Initial S/W Revision	Prior to A.02.00

Offset

Some active probes have DC offset capability. When one of these probes is connected this control will be visible. The signal is adjusted for the DC offset before entering the analyzer's port. This allows for removal of a DC offset before reaching the analyzer's input port voltage limits. For example, a signal that varies 1 V peak-to-peak with a DC offset equal to the analyzer's max input voltage would exceed the input limits of the analyzer for half its cycle. Removing the DC offset allows the analyzer to correctly process the entire signal.

Key Path	Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe
Remote Command	:INPut:OFFSet:I Q <voltage> :INPut:OFFSet:I Q?
Example	Remove a DC offset of -0.5 V from the I channel input. INP:OFFS:I -0.5
Notes	Only some probe types support Offset. For those that do, each probe type has its own Offset setting. As probes are changed the Offset value will reflect the new probe's setting. Changing the Offset affects only the current probe type's setting and leaves all others unchanged.
Preset	0 V
State Saved	Saved with probe calibration data. It survives power cycle and is not affected by Preset or Restore.
Range	-18 V to +18 V
Min	-18 V
Max	+18 V
Initial S/W Revision	Prior to A.02.00

Coupling

Some probe types allow coupling to reject low frequencies. This will filter out the DC component of a signal that is composed of a DC bias plus some AC signal. This control is visible only for probe types that have this capability.

Key Path	Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe
Remote Command	:INPut:COUPling:I Q DC LFR1 LFR2 :INPut:COUPling:I Q?
Example	Set the probe to low frequency rejection below 1.7 Hz. INP:COUP:I LFR1
Notes	Only some probe types support Coupling. For those that do, each probe type has its own Coupling setting. As probes are changed the Coupling value will reflect the new probe's setting. Changing the Coupling affects only the current probe type's setting and leaves all others unchanged.
Preset	DC
State Saved	Saved with probe calibration data. It survives a power cycle and is not affected by a Preset or Restore.
Range	DC AC 1.7 Hz LFR1 AC 0.14 Hz LFR2
Readback Text	DC LFR1 LFR2
Initial S/W Revision	Prior to A.02.00

DC

Turns off low frequency rejection, allowing signals down to DC.

Key Path	Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe, Coupling
Example	Turn off low frequency rejection on the I channel INP:COUP:I DC
Initial S/W Revision	Prior to A.02.00

LFR1

Turns on low frequency rejection, rejecting signal component lower than 1.7 Hz.

Key Path	Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe, Coupling
Example	Turn on low frequency rejection on the I channel for frequencies lower than 1.7 Hz INP:COUP:I LFR1
Initial S/W Revision	Prior to A.02.00

LFR2

Turns on low frequency rejection, rejecting signal component lower than 0.14 Hz.

Key Path	Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe, Coupling
Example	Turn on low frequency rejection on the I channel for frequencies lower than 0.14 Hz INP:COUP:I LFR2
Initial S/W Revision	Prior to A.02.00

Calibrate

Invokes the guided probe calibration. The guided probe calibration is context sensitive and depends on the channel (I or Q) and the Differential Input state. The calibration is only performed on the selected channel. When Differential Input is on, both the probe attached to the main port and the probe attached to the complementary port are calibrated. When Differential Input is off, only the probe attached to the main port is calibrated. See "[I/Q Guided Calibration](#)" on page 260.

Key Path	Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe, Coupling
Readback Text	The last calibration date, or if no calibration exists, "(empty)". Last: <cal date> <cal time> Example: Last: 8/22/2007

1:02:49 PM

Initial S/W Revision Prior to A.02.00

Clear Calibration

Clears the calibration data for the current port and probe. It does not clear the data for other probe types or other ports. If the sensed probe has EEPROM identification, only the data for that specific probe is cleared. After this command has completed, the probe calibration state will be the same as if no probe calibration had ever been performed for the specified channel and probe. The probe attenuation will be the default value for that probe type and the Cable Calibration frequency response corrections will be used. This command is dependent on the Differential Input state. When Differential Input is on, both the data for the probe attached to the main port and the data for the probe attached to the complementary port are cleared. When Differential Input is off, only data for the probe attached to the main port is cleared.

Key Path	Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe
Remote Command	:CALibration:IQ:PROBe:I Q:CLEar
Example	Clear the calibration data for the I channel and the current probe (with EEPROM identification) or probe type (without EEPROM identification). :CAL:IQ:PROBe:I:CLE
Initial S/W Revision	Prior to A.02.00

I/Q Cable Calibrate...

The I/Q cable calibration creates correction data for each of the front panel I/Q ports. This calibration data is used whenever no probe specific calibration data is available. It is important that all ports are calibrated using the same short BNC cable so that the data is comparable from port to port.

The guided calibration (front panel only) will show connection diagrams and guide you through the isolation calibration and calibrating each port. The calibration data for each port is stored separately, so as soon as a port is calibrated that data is saved and will be used. If you press "Exit" to exit the calibration process, the data for the ports already completed will still be used. It is recommended that a calibration be completed once started, or if exited, that it be properly done before the next use of the I/Q ports. The "Next" button will perform the calibration for the current port and then proceed to the next step in the calibration procedure. The "Back" button will return to the prior port in the procedure. Both keys and dialog buttons are supplied for ease of use. The dialog buttons are for mouse use and the softkeys for front panel use.

The calibration can also be done via SCPI, but no connection diagrams will be shown. You will have to make the correct connections before issuing each port calibration command. Again, it is recommended that all ports be calibrated at the same time.

The instrument state remains as it was prior to entering the calibration procedure except while a port is actually being calibrated. Once a port is calibrated it returns to the prior state. A port calibration is in process only from the time the "Next" button is pressed until the next screen is shown. For SCPI, this corresponds to the time from issuing the CAL:IQ:FLAT:I|B|Q|QB command until the operation is complete.

For example, if the prior instrument state is Cal Out = Off, Input = I+jQ, and Differential = Off, then up until the time the "Next" button is pressed the I Input and Q Input LEDs are on and the Cal Out, I-bar Input and Q-bar Input LEDs are off. Once the "Next" button is pressed for the I port calibration, only the Cal Out and I Input LEDs will be on and the others will be off. When the screen progresses to the next step ("Next" button again enabled), the prior state is restored and only the I Input and Q Input LEDs are on (Cal Out is off again).

The last calibration date and time for each port will be displayed. Any calibrations that are more than a day older than the most recent calibration will be displayed with the color amber.

Key Path	Input/Output, I/Q
Initial S/W Revision	Prior to A.02.00

RF Calibrator

Lets you choose a calibrator signal to look at or turns the calibrator "off".

Key Path	Input/Output
Remote Command	[:SENSe] :FEED:AREFERENCE REF50 REF4800 OFF [:SENSe] :FEED:AREFERENCE?
Example	FEED:AREF REF50 selects the 50 MHz amplitude reference as the signal input. FEED:AREF REF4800 selects the 4.8 GHz amplitude reference as the signal input FEED:AREF OFF turns the calibrator "off" (switches back to the selected input – RF or I/Q)
Dependencies	Selecting an input (RF or I/Q) turns the Calibrator OFF. This is true whether the input is selected by the keys or with the [:SENSe] :FEED command. The 4.8 GHz internal reference is only available in some models and frequency range options. If the 4.8 GHz reference is not present, the 4.8 GHz softkey will be blanked, and if the REF4800 parameter is sent, the analyzer will generate an error.
Couplings	When one of the calibrator signals is selected, the analyzer routes that signal (an internal amplitude reference) to the analyzer, and changes the main input selection to RF so the calibrator signal can be seen. When you turn the calibrator off it does not switch back to the previously selected input.
Preset	OFF
State Saved	Saved in instrument state
Readback	Off, 50 MHz, 4.8 GHz
Initial S/W Revision	Prior to A.02.00

Remote Command	:CALibration:SOURce:STATe OFF ON 0 1 :CALibration:SOURce:STATe?
Notes	For ESA backwards compatibility. In the ESA the calibrator was a separate output which you connected to the input and switched on with this command. In the X-Series, the ON parameter is aliased to the [SENSe]:FEED:AREF REF50 command and the

OFF parameter is aliased to [SENSe]:FEED:AREF OFF.
When CALibration:SOURce:STATe? is received, 1 will be returned if any of the references is selected and 0 if the Calibrator is "Off"

Preset OFF

Initial S/W Revision Prior to A.02.00

50 MHz

Selects the 50 MHz internal reference as the input signal.

Key Path Input/Output, RF Calibrator

Example :FEED:AREF REF50

Readback 50 MHz

Initial S/W Revision Prior to A.02.00

4.8 GHz

Selects the 4.8 GHz internal reference as the input signal.

Key Path Input/Output, RF Calibrator

Example :FEED:AREF REF4800

Dependencies The 4.8 GHz internal reference is only available in some models and frequency range options. If the 4.8 GHz reference is not present, the 4.8 GHz softkey will be blanked, and if the REF4800 parameter is sent, the analyzer will generate an error.

Readback 4.8 GHz

Initial S/W Revision Prior to A.02.00

Modified at S/W Revision A.03.00

Off

Switches the input back to the selected input (RF or I/Q)

Key Path Input/Output, RF Calibrator

Example :FEED:AREF OFF

Readback Off

Initial S/W Revision Prior to A.02.00

External Gain

Compensates for gain or loss in the measurement system outside the spectrum analyzer. The External Gain is subtracted from the amplitude readout (or the loss is added to the amplitude readout). So, the displayed signal level represents the signal level at the output of the device-under-test, which can be the input of an external device that provides gain or loss.

Entering an External Gain value does not affect the Reference Level, therefore the trace position on screen changes, as do all of the values represented by the trace data. Thus, the values of exported trace data, queried trace data, marker amplitudes, trace data used in calculations such as N dB points, trace math, peak threshold, etc., are all affected by External Gain. Changing the External Gain, even on a trace that is not updating, will immediately change all of the above, without new data needing to be taken.

NOTE

Changing the External Gain causes the analyzer to immediately stop the current sweep and prepare to begin a new sweep. The data will not change until the trace data updates because the offset is applied to the data as it is taken. If a trace is exported with a nonzero External Gain, the exported data will contain the trace data with the offset applied.

In the Spectrum Analyzer mode, a Preamp is the common external device providing gain or loss. In a measurement application mode like GSM or W-CDMA, the gain or loss could be from a BTS (Base Transceiver Station) or an MS (Mobile Station). So in the Spectrum Analyzer mode MS and BTS would be grayed out and the only choice would be Ext Preamp. Similarly in some of the digital communications applications, Ext Preamp will be grayed out and you would have a choice of MS or BTS.

Key Path	Input/Output
Couplings	The Ext Preamp, MS, and BS keys may be grayed out depending on which measurement is currently selected. If any of the grayed out keys are pressed, or the equivalent SCPI command is sent, an advisory message is generated.
Readback	1-of-N selection [variable]
Initial S/W Revision	Prior to A.02.00

Ext Preamp

This function is similar to the reference level offset function. Both affect the displayed signal level. Ref Lvl Offset is a mathematical offset only, no analyzer configuration is affected. Ext Preamp gain is used when determining the auto-coupled value of the Attenuator. The External Gain value and the Maximum Mixer Level settings are both part of the automatic setting equation for the RF attenuation setting. (10 dB of Attenuation is added for every 10 dB of External Gain.)

Note that the Ref Lvl Offset and Maximum Mixer Level are described in the Amplitude section. They are reset by the instrument Preset. The External Preamp Gain is reset by the "Restore Input/Output Defaults" or "Restore System Defaults->All functions. . The External Gain is subtracted from the amplitude readout so that the displayed signal level represents the signal level at the output of the device-under-test, which is the input of the external device that is providing gain or loss.

["More Information" on page 239](#)

Key Path	Input/Output, External Gain
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Remote Command	<code>[:SENSe] :CORRection:SA[:RF]:GAIN <rel_ampl></code> <code>[:SENSe] :CORRection:SA[:RF]:GAIN?</code>
Example	CORR:SA:GAIN 10 sets the Ext Gain value to 10 dB CORR:SA:GAIN -10 sets the Ext Gain value to -10 dB (that is, an attenuation of 10 dB)
Notes	Does not auto return.
Dependencies	The reference level limits are determined in part by the External Gain/Atten, Max Mixer Level, and RF Atten. This key is grayed out in Modes that do not support External Gain
Preset	This is unaffected by Preset but is set to 0 dB on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
State Saved	Saved in instrument state
Min	-120 dB
Max	120 dB
Readback	Preamp Gain, <Ext Gain value> dB
Backwards Compatibility SCPI	<code>[:SENSe] :CORRection:OFFSet[:MAGNitude]</code> The legacy "Ext Preamp Gain" key is now called "Ext Gain" and the sub-menu has choices of Ext Preamp MS BTS for backwards compatibility.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.14.00

More Information

The U7227A USB Preamplifier is an accessory for the X-Series Signal Analyzer that provides gain externally, and whose gain settings are automatically loaded into the analyzer over USB whenever it is connected to one of the analyzer's USB ports.

While the USB Preamplifier is plugged into one of the analyzer's USB ports, the analyzer will consider it to be in the signal path of the RF Input and will apply the calibration data from the USB Preamp to measurements taken at the RF Input (on 2 input boxes, it will be considered to be in the signal path of RF Input 1; it is not supported for RF Input 2).

The USB Preamplifier contains its own cal data. This includes a noise trace suitable for use with NFE, for those models which support NFE. The act of connecting the Preamp to USB will cause the cal data to be downloaded from the preamp. When this happens an informational message is provided saying "Cal data loaded from USB Preamp". The analyzer will then automatically apply the calibration factors loaded from the Preamp in any measurement that supports the USB Preamp.

The External Preamp Gain setting may still be used, even though it is not required for the USB Preamp (since the USB Preamp supplies its own gain data to the analyzer which is applied automatically). Connecting the USB Preamp does not change the External Preamp Gain setting, however unless you have another gain or attenuation element in the signal path, the appropriate setting for External Preamp Gain is 0 dB.

Overload detection and reporting will apply when the USB preamplifier is connected to USB. The USB Preamplifier has its own overload detector which reports overloads to the instrument over USB. This generates an error condition, "Input Overload;USB Preamp."

If, while the USB Preamp is connected to USB, a measurement is selected that does not support the USB preamplifier, the "No result; Meas invalid with Preamp" error condition is generated.

MS

Sets an external gain/attenuation value for MS (Mobile Station) tests.

Key Path	Input/Output, External Gain
Remote Command	<code>[:SENSe]:CORRection:MS[:RF]:GAIN <rel_ampl></code> <code>[:SENSe]:CORRection:MS[:RF]:GAIN?</code>
Example	<code>CORR:MS:GAIN 10</code> sets the Ext Gain value to 10 dB <code>CORR:MS:GAIN -10</code> sets the Ext Gain value to -10 dB (that is, a loss of 10 dB.)
Notes	Does not auto return.
Dependencies	The reference level limits are determined in part by the External Gain, Max Mixer Level, RF Atten This key is grayed out in modes that do not support MS.
Preset	This is unaffected by a Preset but is set to 0 dB on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
State Saved	Saved in instrument state.
Min	-100 dB
Max	100 dB
Readback	MS, <Ext Gain value> dB
Initial S/W Revision	Prior to A.02.00

Remote Command	<code>[:SENSe]:CORRection:MS[:RF]:LOSS <rel_ampl></code> <code>[:SENSe]:CORRection:MS[:RF]:LOSS?</code>
Example	<code>CORR:MS:LOSS 10</code> sets the Ext Gain value to -10 dB, and subsequently querying :LOSS will give 10 dB <code>CORR:MS:LOSS -10</code> sets the Ext Gain value to 10 dB, and subsequently querying :LOSS will give -10 dB
Notes	A positive value of <rel_ampl> in the above command means a loss and a negative value indicates a gain. Anytime :LOSS is set it sets :GAIN to the negative value of the parameter sent. Anytime :LOSS is queried it gives the negative of :GAIN
Preset	This is unaffected by a Preset but is set to 0 dB on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
Min	100 dB
Max	-100 dB
Initial S/W Revision	Prior to A.02.00

BTS

Sets an external attenuation value for BTS (Base Transceiver Station) tests.

Key Path	Input/Output, External Gain
Remote Command	<code>[:SENSe] :CORRection:BTS[:RF]:GAIN <rel_ampl></code> <code>[:SENSe] :CORRection:BTS[:RF]:GAIN?</code>
Example	CORR:BTS:GAIN 10 sets the Ext Gain value to 10 dB CORR:BTS:GAIN -10 sets the Ext Gain value to -10 dB (that is, a loss of 10 dB.)
Notes	Does not auto return.
Dependencies	The reference level limits are determined in part by the External Gain, Max Mixer Level, RF Atten This key is grayed out in modes that do not support BTS.
Preset	This is unaffected by a Preset but is set to 0 dB on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
State Saved	Saved in instrument state.
Min	-100 dB
Max	100 dB
Readback	BTS, <Ext Gain value> dB
Initial S/W Revision	Prior to A.02.00

Remote Command	<code>[:SENSe] :CORRection:BTS[:RF]:LOSS <rel_ampl></code> <code>[:SENSe] :CORRection:BTS[:RF]:LOSS?</code>
Example	CORR:BTS:LOSS 10 sets the Ext Gain value to -10 dB, and subsequently querying :LOSS will give 10 dB CORR:BTS:LOSS -10 sets the Ext Gain value to 10 dB, and subsequently querying :LOSS will give -10 dB
Notes	A positive value of <rel_ampl> in the above command means a loss and a negative value indicates a gain. Anytime :LOSS is set it sets :GAIN to the negative value of the parameter sent. Anytime :LOSS is queried it gives the negative of :GAIN
Preset	This is unaffected by a Preset but is set to 0 dB on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
Min	100 dB
Max	-100 dB
Initial S/W Revision	Prior to A.02.00

I Ext Gain

This function affects the I channel input. However, when Q Gain in I+jQ is set to Same as I Gain, this value is applied to both I and Q channel inputs.

Key Path	Input/Output, External Gain
Remote Command	<code>[:SENSe]:CORRection:IQ:I:GAIN <rel_ampl></code> <code>[:SENSe]:CORRection:IQ:I:GAIN?</code>
Example	Set the I Ext Gain to 10 dB <code>CORR:IQ:I:GAIN 10</code> Set the I Ext Gain to -10 dB (that is, a loss of 10 dB.) <code>CORR:IQ:I:GAIN -10</code>
Dependencies	Not available unless option BBA is installed
Preset	0 dB This is unaffected by a Preset but is set to 0 dB on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
State Saved	Saved in instrument state.
Min	-100 dB
Max	100 dB
Readback Text	I Gain, <I Ext Gain> dB
Initial S/W Revision	Prior to A.02.00

Q Ext Gain

This function affects the Q channel input.

Key Path	Input/Output, External Gain
Remote Command	<code>[:SENSe]:CORRection:IQ:Q:GAIN <rel_ampl></code> <code>[:SENSe]:CORRection:IQ:Q:GAIN?</code>
Example	Set the Q Ext Gain to 10 dB <code>CORR:IQ:Q:GAIN 10</code> Set the Q Ext Gain to -10 dB (that is, a loss of 10 dB.) <code>CORR:IQ:Q:GAIN -10</code>
Dependencies	Not available unless option BBA is installed.
Preset	0 dB This is unaffected by a Preset but is set to 0 dB on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
State Saved	Saved in instrument state
Min	-100 dB

Max	100 dB
Readback Text	Q Gain, <I Ext Gain> dB
Initial S/W Revision	Prior to A.02.00

Restore Input/Output Defaults

This selection causes the group of settings and data associated with the Input/Output key to be a reset to their default values. In addition, when a Source is installed, licensed and selected, Restore Input/Output defaults will initiate a Source Preset.

This level of Restore System Defaults does not affect any other system settings or mode settings and does not cause a mode switch. All the features described in this section are reset using this key, including Input Corrections and Data (described in the Corrections section).

Key Path	Input/Output
Example	:SYST:DEF INP presets all the Input/Output variables to their factory default values.
Notes	Refer to the Utility Functions for information about Restore System Defaults and the complete description of the :SYSTem:DEfault INPut: command.
Initial S/W Revision	Prior to A.02.00

Freq Ref In

Specifies the frequency reference as being the internal reference at the rear panel input labeled EXT REF IN, a 1 pulse per second signal at the EXT REF IN input,, external reference or sensing the presence of a signal at the EXT REF IN input.

When the frequency reference is set to internal, the internal 10 MHz reference is used even if an external reference is connected.

When the frequency reference is set to external, the instrument will use the external reference. However, if there is no external signal present, or it is not within the proper amplitude range, a condition error message is generated. When the external signal becomes valid, the error is cleared.

When the frequency reference is set to Pulse, the instrument expects a 1 pulse per second signal at the EXT REF IN input. The instrument uses this signal to adjust the frequency of the internal reference.

If Sense is selected, the instrument checks whether a signal is present at the external reference connector. If it senses a signal within 5 ppm of the External Ref Freq (as set on the External Ref Freq softkey), it will automatically switch to the external reference. If it senses a 1 pulse per second signal, it enters Pulse mode, wherein the signal is used to adjust the internal reference. When no signal is present, it automatically switches to the internal reference. No message is generated as the reference switches between pulse, external and internal. The monitoring of the external reference occurs approximately on 1 millisecond intervals, and never occurs in the middle of a measurement acquisition, only at the end of the measurement (end of the request).

If for any reason the instrument's frequency reference is not able to obtain lock, Status bit 1 in the Questionable Frequency register will be true and a condition error message is generated. When lock is

regained, Status bit 1 in the Questionable Frequency register will be cleared and the condition error will be cleared.

If an external frequency reference is being used, you must enter the frequency of the external reference if it is not exactly 10 MHz. The External Ref Freq key is provided for this purpose.

Key Path	Input/Output
Remote Command	<code>[[:SENSe]:ROSCillator:SOURce:TYPE INTernal EXTernal SENSe PULSe [:SENSe]:ROSCillator:SOURce:TYPE?</code>
Dependencies	The PULSe parameter, and support of the 1 pps signal at the EXT REF IN input, are not available in firmware prior to A.13.00. They are also not available in some model numbers. If not available, the Pulse key will be blank, and sending the PULSe parameter via SCPI will generate an error:
Preset	This is unaffected by a Preset but is set to SENSe on a "Restore Input/Output Defaults" or "Restore System Defaults->All".
State Saved	Saved in instrument state.
Status Bits/OPC dependencies	STATus:QUESTionable:FREQuency bit 1 set if unlocked.
Backwards Compatibility Notes	Freq Ref In was not saved in state in the legacy instruments. It is a part of state in the X-Series.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.14.00

Remote Command	<code>[[:SENSe]:ROSCillator:SOURce?</code>
Notes	<p>The query <code>[SENSe]:ROSCillator:SOURce?</code> returns the current switch setting. This means:</p> <ol style="list-style-type: none"> 1. If it was set to SENSe but there is no external reference nor 1 pps signal so the instrument is actually using the internal reference, then this query returns INTernal and not SENSe. 2. If it was set to SENSe and there is an external reference present, the query returns EXTernal and not SENSe. 3. If it was set to SENSe and there is a 1 pps signal present, the query returns PULSe and not SENSe. 4. If it was set to EXTernal, then the query returns "EXTernal" 5. If it was set to INTernal, then the query returns "INTernal". 6. If it was set to PULSe, then the query returns "PULSe"
Preset	SENSe
Backwards Compatibility Notes	<p>The query <code>[[:SENSe]:ROSCillator:SOURce?</code> was a query-only command in ESA which always returned whichever reference the instrument was using. The instrument automatically switched to the ext ref if it was present.</p> <p>In PSA (which had no sensing) the command <code>[[:SENSe]:ROSCillator:SOURce</code> set the reference (INT or EXT), so again its query returned the actual routing.</p> <p>Thus the query form of this command is 100% backwards compatible with both instruments.</p>
Initial S/W Revision	Prior to A.02.00

Remote Command	<code>[:SENSe]:ROSCillator:SOURce INTernal EXTernal</code>
Notes	For PSA compatibility the command form is provided and is directly mapped to <code>[:SENSe]:ROSCillator:SOURce:TYPE</code>
Initial S/W Revision	Prior to A.02.00

Sense

If Sense is selected, the instrument checks whether a signal is present at the external reference connector. If it senses a signal within 5 ppm of the External Ref Freq (as set on the External Ref Freq softkey), it will use this signal as an External Reference. If it senses a 1 pulse per second signal, it will use this signal to adjust the internal reference by adjusting the User setting of the Timebase DAC. When no signal is present, it automatically switches to the internal reference.

Key Path	Input/Output, Freq Ref In
Example	<code>:ROSC:SOUR:TYPE SENS</code>
Couplings	If set to SENSE and the analyzer senses a 1 pulse per second signal, it sets the System, Alignments, Timebase DAC setting to "User". This setting survives Preset and Power Cycle but is set to "Calibrated" on a System, Restore Defaults, Align or a System, Restore Defaults, All
Readback	Sense
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.14.00

Internal

The internal reference is used. A 1 pps signal at the EXT REF IN port, or a signal there between 1 and 50 MHz, will cause a warning triangle to appear in the settings panel next to the word "INTERNAL", but will otherwise be ignored.

Key Path	Input/Output, Freq Ref In
Example	<code>:ROSC:SOUR:TYPE INT</code>
Readback	Internal
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.14.00

External

The external reference is used.

Key Path	Input/Output, Freq Ref In
Example	<code>:ROSC:SOUR:TYPE EXT</code>

Readback	External
Initial S/W Revision	Prior to A.02.00

Ext Ref Freq

This key tells the analyzer the frequency of the external reference. When the external reference is in use (either because the reference has been switched to External or because the Reference has been switched to Sense and there is a valid external reference present) this information is used by the analyzer to determine the internal settings needed to lock to that particular external reference signal.

For the instrument to stay locked, the value entered must be within 5 ppm of the actual external reference frequency. So it is important to get it close, or you risk an unlock condition.

Note that this value only affects the instrument's ability to lock. It does not affect any calculations or measurement results. See "Freq Offset" in the Frequency section for information on how to offset frequency values.

Key Path	Input/Output, Freq Ref In
Remote Command	<code>[:SENSe]:ROSCillator:EXTErnal:FREQuency <freq></code> <code>[:SENSe]:ROSCillator:EXTErnal:FREQuency?</code>
Example	ROSC:EXT:FREQ 20 MHz sets the external reference frequency to 20 MHz, but does not select the external reference. ROSC:SOUR:TYPE EXT selects the external reference.
Dependencies	Still available with Internal or Pulse selected, to allow setup for when External is in use. However, the setting has no effect if the Internal Reference is in use (Freq Ref In set to Internal, Pulse, or SENSE:INT or SENSE:PULSE).
Preset	This is unaffected by a Preset but is set to 10 MHz on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
Min	CXA: 10 MHz EXA: 10 MHz MXA: 1 MHz PXA: 1 MHz N8973B, N8974B, N8975B, or N8976B: 10 MHz
Max	CXA: 10 MHz EXA: 10 MHz EXA with option R13: 20 MHz MXA: 50 MHz PXA: 50 MHz N8973B, N8974B, N8975B, or N8976B: 10 MHz

Default Unit	Hz
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.14.00

External Reference Lock BW

This control lets you adjust the External Reference phase lock bandwidth. This control is available in some models of the X-Series.

The PXA variable reference loop bandwidth allows an external reference to be used and have the analyzer close-in phase noise improved to match that of the reference. This could result in an improvement of tens of decibels. The choice of "Wide" or "Narrow" affects the phase noise at low offset frequencies, especially 4 to 400 Hz offset. When using an external reference with superior phase noise, we recommend setting the external reference phase-locked-loop bandwidth to wide (60 Hz), to take advantage of that superior performance. When using an external reference with inferior phase noise performance, we recommend setting that bandwidth to narrow (15 Hz). In these relationships, inferior and superior phase noise are with respect to -134 dBc/Hz at 30 Hz offset from a 10 MHz reference. Because most reference sources have phase noise behavior that falls off at a rate of 30 dB/decade, this is usually equivalent to -120 dBc/Hz at 10 Hz offset.

Key Path	Input/Output, Freq Ref In
Scope	Mode Global
Remote Command	[:SENSe] :ROSCillator :BANDwidth WIDE NARRow [:SENSe] :ROSCillator :BANDwidth ?
Example	ROSC :BAND WIDE
Dependencies	Still available with Internal or Pulse selected, to allow setup for when External is in use. However, the setting has no effect if the Internal Reference is in use (Freq Ref In set to Internal, Pulse, or SENSE:INT or SENSE:PULSE). This key only appears in analyzers equipped with the required hardware.
Preset	This is unaffected by a Preset but is set to Narrow on a "Restore Input/Output Defaults" or "Restore System Defaults -> All"
State Saved	Saved in Input/Output state.
Initial S/W Revision	A.04.00
Modified at S/W Revision	A.14.00

External Ref Coupling

Only appears with option ERC installed and licensed.

This function lets you couple the sweep system of the analyzer to the state of the External Reference. If Normal is selected, data acquisition proceeds regardless of the state of the External Reference. When you select Ext Ref Out Of Range Stops Acquisition, the data acquisition (sweep or measurement) stops when

either the "521, External ref out of range" or the "503, Frequency Reference unlocked" error message is asserted. Note that this will only take place if the Freq Ref In selection is External.

With the acquisition stopped, the data display will stop updating (even if this occurs in the middle of a sweep or measurement) and no data will be returned to a READ? or MEASure? query; that is, these queries will not complete because the analyzer will not respond to them. Furthermore, no response will be generated to a *WAI? or *OPC? query.

Proper SCPI sequences are shown below, which will always fail to return if the acquisition stops during the requested sweep or measurement. Note that, for predictable operation of this function, it is best to operate the analyzer in single measurement mode (INIT:CONT OFF), because if operating in continuous mode, the analyzer may respond to the above queries even after the acquisition stops, with data left over from the previous acquisition.

:INIT:CONT OFF

:INIT:IMM;*OPC?

--

:INIT:CONT OFF

:INIT:IMM;*WAI?

--

:INIT:CONT OFF

:READ?

--

:INIT:CONT OFF

:MEASure?

When the acquisition ceases, in addition to the error condition(s) described above, a popup error message will be generated informing you that the acquisition has ceased due to an invalid external reference. This message will stay on the screen while the acquisition is suspended.

External reference problem.

Data acquisition suspended.

**To resume data acquisition, fix the
problem and press the Restart key**

OR

Press the following keys:

**Input/Output, More 1 of 2, Freq Ref In,
External Ref Coupling, Normal**

OR

**Input/Output, More 1 of 2,
Freq Ref In, Internal**

If you press the Restart key this message will be taken off the screen and a new acquisition will be attempted. If the External Reference problem persists the message will re-appear. You can also remove the message by changing back to the Normal setting of Sweep/Ext Ref Coupling, or by pressing Freq Ref In, Internal, or Freq Ref In, Sense, or Restore Input/Output Defaults.

The setting of External Ref Coupling is persistent across power-cycling and is not reset with a Preset. It is reset to the default state (Normal) when Restore Input/Output Defaults is invoked, which will also restart normal data acquisition.

The detection of invalid external reference is under interrupt processing. If the external reference becomes invalid then returns to valid in too short a time, no error condition will be detected or reported and therefore the acquisition will not be stopped.

Key Path	Input/Output, Freq Ref In
Mode	All
Remote Command	[:SENSe] :ROSCillator :COUPling NORMal NACquisition [:SENSe] :ROSCillator :COUPling ?
Preset	This setting is persistent: it survives power-cycling or a Preset and is reset with Restore Input/Output defaults.
State Saved	Not saved in instrument state
Readback	Normal Stop Acq
Initial S/W Revision	A.02.00

Output Config

Accesses keys that configure various output settings, like the frequency reference output, trigger output and analog output.

Key Path	Input/Output
Backwards Compatibility Notes	In ESA there was not a user interface to enable the Video Output (Analog Output), Trigger Output, or Gate Output. In the X-Series each of these physical connectors requires configuration, thus the user interface has been added for X-Series, along with the potential for an output you think is always on to be switched off.
Initial S/W Revision	Prior to A.02.00

Trig Out

Select the type of output signal that will be output from the Trig 1 Out, or Trig 2 Out connectors.

Key Path	Input/Output, Output Config
Remote Command	:TRIGger TRIGger1 TRIGger2 [:SEQuence] :OUTPut HSWP MEASuring MAIN GATE GTRigger OEVEN SPOint SSWeep SSEttled S1Marker S2Marker S3Marker S4Marker OFF :TRIGger TRIGger1 TRIGger2 [:SEQuence] :OUTPut ?

Example	TRIG:OUTP HSWP TRIG2:OUTP GATE
Dependencies	The second Trigger output (Trig 2 Out) does not appear in all models; in models that do not support it, the Trig 2 Out key is blanked, and sending the SCPI command for this output generates an error, "Hardware missing; Not available for this model number" In models that do not support the Trigger 2 output, this error is returned if trying to set Trig 2 Out and a query of Trig 2 Out returns OFF.
Preset	Trigger 1: Sweeping (HSWP) Trigger 2: Gate This is unaffected by a Preset but is preset to the above values on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00

Polarity

Sets the output to the Trig 1 Out, or Trig 2 Out, connector to trigger on either the positive or negative polarity.

Key Path	Input/Output, Output Config, Trig 1/2 Output
Remote Command	:TRIGger TRIGger1 TRIGger2[:SEquence]:OUTPut:POLarity POSitive NEGative :TRIGger TRIGger1 TRIGger2[:SEquence]:OUTPut:POLarity?
Example	TRIG1:OUTP:POL POS
Preset	This is unaffected by a Preset but is set to POSitive on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00

Off

Selects no signal to be output to the Trig 1 Out, or Trig 2 Out, connector.

Key Path	Input/Output, Output Config, Trig 1/2 Output
Example	TRIG1:OUTP OFF
Readback	Off
Initial S/W Revision	Prior to A.02.00

Sweeping (HSWP)

Selects the Sweeping Trigger signal to be output to the Trig 1 Out, or Trig 2 Out, connector when a measurement is made. This signal has historically been known as "HSWP" (High = Sweeping), and is 5 V TTL level with 50 ohm output impedance.

Key Path	Input/Output, Output Config, Trig 1/2 Output
Example	TRIG1:OUTP HSWP
Readback	Sweeping
Initial S/W Revision	Prior to A.02.00

Measuring

Selects the Measuring trigger signal to be output to the Trig 1 Out, or Trig 2 Out, connector. This signal is true while the Measuring status bit is true.

Key Path	Input/Output, Output Config, Trig 1/2 Output
Example	TRIG1:OUTP MEAS
Readback	Measuring
Initial S/W Revision	Prior to A.02.00

Main Trigger

Selects the current instrument trigger signal to be output to the Trig 1 Out, or Trig 2 Out, connector.

Key Path	Input/Output, Output Config, Trig 1/2 Output
Example	TRIG1:OUTP MAIN
Readback	Main Trigger
Initial S/W Revision	Prior to A.02.00

Gate Trigger

Selects the gate trigger signal to be output to the Trig 1 Out, or Trig 2 Out, connector. This is the source of the gate timing, not the actual gate signal.

Key Path	Input/Output, Output Config, Trig 1/2 Output
Example	TRIG1:OUTP GTR
Readback	Gate Trigger
Initial S/W Revision	Prior to A.02.00

Gate

Selects the gate signal to be output to the Trig 1 Out, or Trig 2 Out, connector. The gate signal has been delayed and its length determined by delay and length settings. When the polarity is positive, a high on the Trig 1 Out, or Trig 2 Out, represents the time the gate is configured to pass the signal.

Key Path	Input/Output, Output Config, Trig 1/2 Output
Example	TRIG1:OUTP GATE
Readback	Gate
Initial S/W Revision	Prior to A.02.00

Source Point Trigger

Selects the gate signal to be output to the Trig 1 Out, or Trig 2 Out, connector for use as the Point Trigger when operating an external source in Tracking mode. When Ext Trigger 1 is selected as the Point Trigger under Source, the Source Point Trigger under Trig1 Out automatically gets selected. Similarly, when Ext Trigger 2 is selected as the Point Trigger under Source, the Source Point Trigger key under Trig 2 Out automatically gets selected

Key Path	Input/Output, Output Config, Trig 1/2 Output
Example	TRIG1:OUTP SPO
Readback	Source Point
Initial S/W Revision	Prior to A.02.00

Odd/Even Trace Point

Selects either the odd or even trace points as the signal to be output to the Trig 1 Out, or Trig 2 Out, connector when performing swept spectrum analysis. When the polarity is positive, this output goes high during the time the analyzer is sweeping past the first point (Point 0) and every other following trace point. The opposite is true if the polarity is negative.

Key Path	Input/Output, Output Config, Trig 1/2 Output
Example	TRIG1:OUTP OEV
Readback	Odd/Even
Initial S/W Revision	Prior to A.02.00

Analog Out

This menu lets you control which signal is fed to the "Analog Out" connector on the analyzer rear panel.

See ["More Information" on page 253](#)

Key Path	Input/Output, Output Config
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Remote Command	:OUTPut:ANALog OFF SVIDeo LOGVIdeo LINVIdo DAUDio :OUTPut:ANALog?
Example	OUTP:ANAL SVIDeo ! causes the analog output type to be Screen Video
Preset	This is unaffected by Preset but is set to DAUDio on a "Restore Input/Output Defaults" or "Restore System Defaults->All
Preset	OFF
State Saved	Saved in Input/Output State
Readback line	1-of-N selection [variable]
Backwards Compatibility Notes	Prior to A.04.00, OFF was the default functionality except when in the Analog Demod application or with Tune and Listen, in which case it was DAUDio, and there was no selection menu. So for backwards compatibility with earlier X-Series firmware versions, Auto (:OUTP:ANAL:AUTO ON) will duplicate the prior behavior. The DNWB and SANalyzer parameters, which were legal in PSA but perform no function in the X-Series, are accepted without error.
Initial S/W Revision	A.04.00

More Information

The table below gives the range for each output.

Analog Out	Nominal Range exc. (10% overrange)	Scale Factor	Notes
Off	0 V		
Screen Video	0 – 1 V open circuit	10%/division	8566 compatible
Log Video	0 – 1 V terminated	1/(192.66 dB/V)	dB referenced to mixer level, 1V out for –10 dBm at the mixer.
Linear Video	0 – 1 V terminated	100%/V	Linear referenced to Ref Level, 1 V out for RF envelope at the Ref Level.
Demod Audio	(varies with analyzer setting)		

Auto

Selects the Auto state for the Analog Output menu. In this state, the Analog Output will automatically be set to the most sensible setting for the current mode or measurement.

If you make a selection manually from the Analog Out menu, this selection will remain in force until you change it (or re-select Auto), even if you go to a mode or measurement for which the selected output does not apply.

Key Path	Input/Output, Output Config, Analog Out
Remote Command	OUTPut:ANALog:AUTO OFF ON 0 1 OUTPut:ANALog:AUTO?
Example	OUTP:ANAL:AUTO ON
Preset	ON
State Saved	Saved in Input/Output State
Initial S/W Revision	A.04.00

Off

Turns off the analog output.

Key Path	Input/Output, Output Config, Analog Out
Example	OUTP:ANAL OFF ! causes the analog output to be off
Readback Text	Off
Initial S/W Revision	A.04.00

Screen Video

Selects the analog output to be the screen video signal. In this mode, the pre-detector data is output to the Analog Out connector. The output looks very much like the trace displayed on the analyzer's screen, and depends on the Log/Lin display Scale, Reference Level, and dB per division, but is not influenced by the selected detector or any digital flatness corrections or trace post-processing (like Trace Averaging).

Note that this mode is similar to the Analog Output of the HP 8566 family and the Video Out (opt 124) capability of the Agilent PSA analyzer (E444x), although there are differences in the behavior.

Key Path	Input/Output, Output Config, Analog Out
Example	OUTP:ANAL SVID
Dependencies	<p>Because the Screen Video output uses one of the two IF processing channels, only one detector is available while Screen Video is selected. All active traces will change to use the same detector as the selected trace when Screen Video is activated.</p> <p>Screen Video output is not available while any EMI Detector is selected (Quasi Peak, RMS Average or EMI Average), because these detectors use both IF processing channels. Consequently, if the user chooses an EMI Detector, there will be no Screen Video output.</p> <p>The output holds at its last value during an alignment and during a marker count. After a sweep:</p> <ul style="list-style-type: none"> • If a new sweep is to follow (as in Continuous sweep mode), the output holds at its last value during the retrace before the next sweep starts. If the analyzer is in zero-span, there is no retrace, as the analyzer remains tuned to the Center Frequency and does not sweep. Therefore, in zero-span, the output simply remains live between display updates. • If no new sweep is to follow (as in Single sweep mode), the output remains live, and continues to show the pre-detector data

	This function depends on optional capability; the key will be blanked and the command will generate an "Option not available" error unless you have Option YAV or YAS licensed in your instrument.
Couplings	Screen Video output changes while in FFT Sweeps, so for measurements that use exclusively FFT Sweeps, or if the user manually chooses FFT Sweeps, the Screen Video output will look different than it does in swept mode.
Readback Text	Screen Video
Backwards Compatibility Notes	See " Backwards Compatibility: " on page 255, below.
Initial S/W Revision	A.04.00

Backwards Compatibility:

The Screen Video function is intended to be very similar to the 8566 Video Output and the PSA Option 124. However, unlike the PSA, it is not always on; it must be switched on by the Screen Video key. Also, unlike the PSA, there are certain dependencies (detailed above) – for example, the Quasi Peak Detector is unavailable when Screen Video is on.

Furthermore, the PSA Option 124 hardware was unipolar and its large range was padded to be exactly right for use as a Screen Video output. In the X-Series, the hardware is bipolar and has a wider range to accommodate the other output choices. Therefore, the outputs won't match up exactly and users may have to modify their setup when applying the X-Series in a PSA application.

Log Video (RF Envelope, Ref=Mixer Level)

Selects the analog output to be the log of the video signal. In this mode, the pre-detector data is output to the Analog Out connector with a Log scaling. The output is referenced to the current level at the mixer, does not depend on display settings like Reference Level or dB per division, and it is not influenced by the selected detector or any digital flatness corrections or trace post-processing (like Trace Averaging), but does change with input attenuation.

The output is designed so that full scale (1 V) corresponds to –10 dBm at the mixer. The full range (0–1 V) covers 192.66 dB ; thus, 0 V corresponds to –202.66 dBm at the mixer.

Key Path	Input/Output, Output Config, Analog Out
Example	OUTP:ANAL LOGV
Dependencies	<p>Because the Log Video output uses one of the two IF processing channels, only one detector is available while Screen Video is selected. All active traces will change to use the same detector as the selected trace when Log Video is activated.</p> <p>Log Video output is not available while any EMI Detector is selected (Quasi Peak, RMS Average or EMI Average), because these detectors use both IF processing channels. Consequently, if the user chooses an EMI Detector, there will be no Log Video output.</p> <p>The output holds at its last value during an alignment, during a marker count, and during retrace (after a sweep and before the next sweep starts).</p> <p>This function depends on optional capability. The key will be blanked and the command will generate an "Option not available" error unless you have Option YAV licensed in your instrument.</p>
Couplings	Log Video output changes while in FFT Sweeps, so for measurements that use exclusively FFT

	Sweeps, or if the user manually chooses FFT Sweeps, the Log Video output will look different than it does in swept mode.
Readback Text	Log Video
Initial S/W Revision	A.04.00

Linear Video (RF Envelope, Ref=Ref Level)

Selects the analog output to be the envelope signal on a linear (voltage) scale. In this mode, the pre-detector data is output to the Analog Out connector with a Linear scaling. The output is based on the current Reference Level, and is not influenced by the selected detector or any digital flatness corrections or trace post-processing (like Trace Averaging).

The scaling is set so that 1 V output occurs with an instantaneous video level equal to the reference level, and 0 V occurs at the bottom of the graticule. This scaling gives you the ability to control the gain without having another setup control for the key. But it requires you to control the look of the display (the reference level) in order to control the analog output.

This mode is ideal for looking at Amplitude Modulated signals, as the linear envelope effectively demodulates the signal.

Key Path	Input/Output, Output Config, Analog Out
Example	OUTP:ANAL LINV
Dependencies	<p>Because the Linear Video output uses one of the two IF processing channels, only one detector is available while Linear Video is selected. All active traces will change to use the same detector as the selected trace when Log Video is activated.</p> <p>Linear Video output is not available while any EMI Detector is selected (Quasi Peak, RMS Average or EMI Average), because these detectors use both IF processing channels. Consequently, if the user chooses an EMI Detector, there will be no Linear Video output.</p> <p>The output holds at its last value during an alignment and during a marker count and during retrace (after a sweep and before the next sweep starts).</p> <p>This function depends on optional capability; the key will be blanked and the command will generate an "Option not available" error unless you have Option YAV licensed in your instrument.</p>
Couplings	Linear Video output changes while in FFT Sweeps, so for measurements that use exclusively FFT Sweeps, or if the user manually chooses FFT Sweeps, the Linear Video output will look different than it does in swept mode.
Readback Text	Linear Video
Initial S/W Revision	A.04.00

Demod Audio

Selects the analog output to be the demodulation of the video signal.

When Demod Audio is selected, the demodulated audio signal appears at this output whenever the Analog Demod application is demodulating a signal or when Analog Demod Tune and Listen is operating in the Swept SA measurement.

When Analog Out is in the Auto state, this output is auto-selected when in the Analog Demod mode or when Analog Demod Tune and Listen is operating in the Swept SA measurement.

If any other Analog Output is manually selected when in the Analog Demod mode or when Analog Demod Tune and Listen is operating in the Swept SA measurement, a condition warning message appears.

Key Path	Input/Output, Output Config, Analog Out
Example	OUTP:ANAL DAUD
Dependencies	<p>This key only appears if the Analog Demod application (N9063A), the N6141A or W6141A application, or Option EMC is installed and licensed, otherwise the key will be blanked and the command will generate an “Option not available” error.</p> <p>The output holds at its last value during an alignment and during a marker count. It is not held between sweeps, in order for Tune and Listen to work properly.</p> <p>When Demod Audio is the selected Analog Output:</p> <ul style="list-style-type: none"> • all active traces are forced to use the same detector. • CISPR detectors (QPD, EMI Avg, RMS Avg) are unavailable
Readback Text	Demod Audio
Initial S/W Revision	Prior to A.02.00 (this was the default functionality, and there was no selection)
Modified at S/W Revision	A.04.00

Digital Bus

This menu allows you to configure the LVDS connector located on the rear panel of the instrument. It is a unidirectional link of real time data at a 90 MSa/s rate. The ADC is sampling a 22.5 MHz IF.

The data that appears on this port is raw, uncorrected ADC samples, unless you have option RTL. With option RTL, you get fully corrected I/Q data.

This connector will only be active when the Narrowband IF Path is currently in use.

Key Path	Input/Output, Output Config
Initial S/W Revision	A.04.00

Bus Out On/Off

When Bus Out is on, all acquisitions are streamed to the output port including acquisitions for internal purposes such as Alignment. The internal processing and routing of acquisitions continues as usual and is unaffected by the state of Bus Out.

When Bus Out is off, no signal appears on the LVDS port.

Key Path	Input/Output, Output Config, Digital Bus
Scope	Mode Global
Remote Command	:OUTPut:DBUS[1][:STATE] ON OFF 1 0 :OUTPut:DBUS[1][:STATE]?

Example	OUTP:DBUS ON
Preset	This is unaffected by a Preset but is set to Off on a "Restore Input/Output Defaults" or "Restore System Defaults -> All"
State Saved	Saved in Input/Output State
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.04.00

Aux IF Out

This menu controls the signals that appear on the SMA output on the rear panel labeled "AUX IF OUT"

The Aux IF Out functionality is only valid for RF and External Mixer inputs. When using the External Mixing path, the Aux IF Out levels (for all three Options CR3, CRP, and ALV) will be uncalibrated because the factory default Aux IF level was set to accommodate the expected IF levels for the RF path.

Key Path	Input/Output, Output Config
Remote Command	:OUTPut:AUX SIF AIF LOGVideo OFF :OUTPut:AUX?
Dependencies	The softkey does not appear in models that do not support the Aux IF Out.
Preset	This is unaffected by a Preset but is set to OFF on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
State Saved	Saved in Input/Output state
Readback line	1-of-N selection [variable]
Backwards Compatibility Notes	In the PSA, the IF output has functionality equivalent to the "Second IF" function in the X-Series' Aux IF Out menu. In the X-Series, it is necessary to switch the Aux IF Out to "Second IF" to get this functionality, whereas in PSA it is always on, since there are no other choices. Hence a command to switch this function to "Second IF" will have to be added by customers migrating from PSA who use the IF Output in PSA.
Initial S/W Revision	A.04.00

Off

In this mode nothing comes out of the "AUX IF OUT" connector on the rear panel. The connector appears as an open-circuit (that is, it is not terminated in any way).

Key Path	Input/Output, Output Config, Aux IF Out
Example	OUTP:AUX OFF causes the aux output type to be off
Readback Text	Off
Initial S/W Revision	A.04.00

Second IF

In this mode the 2nd IF output is routed to the rear panel connector. The annotation on the key shows the current 2nd IF frequency in use in the analyzer.

The frequency of the 2nd IF depends on the current IF signal path as shown in the table below:

IF Path Selected	Frequency of "Second IF" Output
10 MHz	322.5 MHz
25 MHz	322.5 MHz
40 MHz	250 MHz
140 MHz	300 MHz

The signal quality, such as signal to noise ratio and phase noise, are excellent in this mode.

Key Path	Input/Output, Output Config, Aux IF Out
Example	OUTP:AUX SIF causes the aux output type to be Second IF
Dependencies	Does not appear unless Option CR3 is installed.
Readback Text	Second IF
Initial S/W Revision	A.04.00

Arbitrary IF

In this mode the 2nd IF output is mixed with a local oscillator and mixer to produce an arbitrary IF output between 10 MHz and 75 MHz with 500 kHz resolution. The phase noise in this mode will not be as good as in Second IF mode.

The IF output frequency is adjustable, through an active function which appears on the Arbitrary IF selection key, from 10 MHz to 75 MHz with 500 kHz resolution.

The bandwidth of this IF output varies with band and center frequency, but is about 40 MHz at the -3 dB width. When the output is centered at lower frequencies in its range, signal frequencies at the bottom of the bandwidth will "fold". For example, with a 40 MHz bandwidth (20 MHz half-bandwidth), and a 15 MHz IF center, a signal -20 MHz relative to the spectrum analyzer center frequency will have a relative response of about -3 dB with a frequency 20 MHz below the 15 MHz IF center. This -5 MHz frequency will fold to become a +5 MHz signal at the IF output. Therefore, lower IF output frequencies are only useful with known band-limited signals.

Key Path	Input/Output, Output Config, Aux IF Out
Example	OUTP:AUX AIF causes the aux output type to be the Arbitrary IF
Dependencies	Does not appear unless Option CRP is installed.
Readback Text	Arbitrary IF
Initial S/W Revision	A.04.00

Key Path	Input/Output, Output Config, Aux IF Out
Scope	Mode Global
Remote Command	:OUTPut:AUX:AIF <value> :OUTPut:AUX:AIF?
Example	:OUTP:AUX:AIF 50 MHZ
Preset	This is unaffected by a Preset but is set to 70 MHz on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
State Saved	Saved in Input/Output State
Min	10 MHz
Max	75 MHz
Default Unit	Hz
Initial S/W Revision	A.04.00

Fast Log Video

In this mode the 2nd IF output is passed through a log amp and the log envelope of the IF signal is sent to the rear panel. The open circuit output level varies by about 25 mV per dB, with a top-of-screen signal producing about 1.6 Volts. The output impedance is nominally 50 ohms.

This mode is intended to meet the same needs as Option E4440A-H7L Fast Rise Time Video Output on the Agilent E4440A PSA Series, allowing you to characterize pulses with fast rise times using standard measurement suites on modern digital scopes.

Key Path	Input/Output, Output Config, Aux IF Out
Example	OUTP:AUX LOGVideo causes the aux output type to be Fast Log Video
Dependencies	Does not appear unless Option ALV is installed. The output is off during an alignment but not during a marker count, and is not blanked during retrace (after a sweep and before the next sweep starts).
Readback Text	Fast Log Video
Initial S/W Revision	A.04.00

I/Q Guided Calibration

Calibrating the Baseband I/Q ports requires several steps and manual connections. The Guided Calibration will interactively step you through the required steps, displaying diagrams to help with the connections. The steps will vary depending on the setup.

In the Guided Calibration windows, the date and time of the last calibration are displayed. If any of the items listed are displayed in yellow, this indicates that the calibration for that item is inconsistent with the latest calibration, and you should complete the entire calibration process before you exit the calibration.

I/Q Isolation Calibration

The I/Q Isolation Calibration must be run before calibrating any port with either the I/Q Cable Calibration or I/Q Probe Calibration. This calibration is performed with nothing connected to any of the front panel I/Q ports. This is the first step in both the I/Q Cable Calibration and the I/Q Probe Calibration.

Next

Perform the I/Q Isolation calibration.

Key Path	Input/Output, I/Q, I/Q Cable Calibration
Remote Command	:CALibration:IQ:ISOLation
Example	CAL:IQ:ISOL
Notes	All front panel I/Q ports must not be connected to anything.
Notes	All cables and probes should be disconnected from the I/Q ports before issuing the SCPI command.
State Saved	No.
Initial S/W Revision	Prior to A.02.00

Exit

Exits the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

Key Path	Input/Output, I/Q, I/Q Cable Calibration
Notes	Using the Exit button will not restore the calibration data to the state prior to entering the guided calibration. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. When the calibration may be left in an inconsistent state, a confirmation dialog will be displayed (see "Exit Confirmation" on page 272).
Initial S/W Revision	Prior to A.02.00

I/Q Isolation Calibration Time (Remote Command Only)

Returns the last date and time that the I/Q Isolation Calibration was performed. This is a remote query command only.

Remote Command	:CALibration:IQ:ISOLation:TIME?
Example	:CAL:IQ:ISOL:TIME?
Notes	This returns 6 integer values: year, month, day, hour, minute, second. When no calibration has been performed, all values will be 0.
Initial S/W Revision	A.02.00

I/Q Cable Calibrate...

The I/Q cable calibration creates correction data for each of the front panel I/Q ports. This calibration data is used whenever no probe specific calibration data is available. It is important that all ports are calibrated using the same short BNC cable so that the data is comparable from port to port.

The guided calibration (front panel only) will show connection diagrams and guide you through the isolation calibration and calibrating each port. The calibration data for each port is stored separately, so as soon as a port is calibrated that data is saved and will be used. If you press "Exit" to exit the calibration process, the data for the ports already completed will still be used. It is recommended that a calibration be completed once started, or if exited, that it be properly done before the next use of the I/Q ports. The "Next" button will perform the calibration for the current port and then proceed to the next step in the calibration procedure. The "Back" button will return to the prior port in the procedure. Both keys and dialog buttons are supplied for ease of use. The dialog buttons are for mouse use and the softkeys for front panel use.

The calibration can also be done via SCPI, but no connection diagrams will be shown. You will have to make the correct connections before issuing each port calibration command. Again, it is recommended that all ports be calibrated at the same time.

The instrument state remains as it was prior to entering the calibration procedure except while a port is actually being calibrated. Once a port is calibrated it returns to the prior state. A port calibration is in process only from the time the "Next" button is pressed until the next screen is shown. For SCPI, this corresponds to the time from issuing the CAL:IQ:FLAT:|I|B|Q|QB command until the operation is complete.

For example, if the prior instrument state is Cal Out = Off, Input = I+jQ, and Differential = Off, then up until the time the "Next" button is pressed the I Input and Q Input LEDs are on and the Cal Out, I-bar Input and Q-bar Input LEDs are off. Once the "Next" button is pressed for the I port calibration, only the Cal Out and I Input LEDs will be on and the others will be off. When the screen progresses to the next step ("Next" button again enabled), the prior state is restored and only the I Input and Q Input LEDs are on (Cal Out is off again).

The last calibration date and time for each port will be displayed. Any calibrations that are more than a day older than the most recent calibration will be displayed with the color amber.

Key Path	Input/Output, I/Q
Initial S/W Revision	Prior to A.02.00

I Port

The I port calibration is performed with the front panel's I port connected via a short BNC cable to the Cal Out port. The guided calibration will show a diagram of the required connections.

Back

Return to the prior step in the calibration procedure.

Key Path	Input/Output, I/Q, Q Setup, Q Probe, Calibrate
Initial S/W Revision	Prior to A.02.00

Next

Perform the I port calibration.

Key Path	Input/Output, I/Q, I/Q Cable Calibrate...
Remote Command	:CALibration:IQ:FLATness:I
Example	CAL:IQ:FLAT:I
Notes	The recommended procedure is to use the same BNC cable to calibrate all I/Q ports. All I/Q ports should be calibrated sequentially during the procedure. The calibration data is saved as soon as the port is calibrated and will survive power cycles. It is not reset by any preset or restore data commands.
Notes	The I port must be connected to the Cal Out port before issuing the SCPI command.
State Saved	No.
Initial S/W Revision	Prior to A.02.00

Exit

Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

Key Path	Input/Output, I/Q, I/Q Cable Calibrate...
Notes	Using the Exit button will not restore the calibration data to the state prior to entering the guided calibration. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. When the calibration may be left in an inconsistent state, a confirmation dialog will be displayed (see "Exit Confirmation" on page 272).
Initial S/W Revision	Prior to A.02.00

I-bar Port

The I-bar port calibration is performed with the front panel's I-bar port connected via a short BNC cable to the Cal Out port. The guided calibration will show a diagram of the required connections.

Back

Return to the prior step in the calibration procedure.

Key Path	Input/Output, I/Q, I/Q Cable Calibration
Notes	Using the Back button will not restore the calibration data to a prior state. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. The Back button allows the user to go back to a prior step to redo that calibration step.
Initial S/W Revision	Prior to A.02.00

Next

Perform the I-bar port calibration.

Key Path	Input/Output, I/Q, I/Q Cable Calibrate...
Remote Command	:CALibration:IQ:FLATness:IBAR
Example	CAL:IQ:FLAT:IBAR
Notes	The recommended procedure is to use the same BNC cable to calibrate all I/Q ports. All I/Q ports should be calibrated sequentially during the procedure. The calibration data is saved as soon as the port is calibrated and will survive power cycles. It is not reset by any preset or restore data commands.
Notes	The I-bar port must be connected to the Cal Out port before issuing the SCPI command.
State Saved	No
Initial S/W Revision	Prior to A.02.00

Exit

Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

Key Path	Input/Output, I/Q, I/Q Cable Calibrate...
Notes	Using the Exit button will not restore the calibration data to the state prior to entering the guided calibration. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. When the calibration may be left in an inconsistent state, a confirmation dialog will be displayed (see "Exit Confirmation" on page 272).
Initial S/W Revision	Prior to A.02.00

Q Port

The Q port calibration is performed with the front panel's Q port connected via a short BNC cable to the Cal Out port. The guided calibration will show a diagram of the required connections.

Back

Return to the prior step in the calibration procedure.

Key Path	Input/Output, I/Q, I/Q Cable Calibrate...
Notes	Using the Back button will not restore the calibration data to a prior state. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. The Back button allows the user to go back to a prior step to redo that calibration step.
Initial S/W Revision	Prior to A.02.00

Next

Perform the Q port calibration.

Key Path	Input/Output, I/Q, I/Q Cable Calibrate...
Remote Command	:CALibration:IQ:FLATness:Q
Example	CAL:IQ:FLAT:Q
Notes	The recommended procedure is to use the same BNC cable to calibrate all I/Q ports. All I/Q ports should be calibrated sequentially during the procedure. The calibration data is saved as soon as the port is calibrated and will survive power cycles. It is not reset by any preset or restore data commands.
Notes	The Q port must be connected to the Cal Out port before issuing the SCPI command.
State Saved	No
Initial S/W Revision	Prior to A.02.00

Exit

Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

Key Path	Input/Output, I/Q, I/Q Cable Calibrate...
Notes	Using the Exit button will not restore the calibration data to the state prior to entering the guided calibration. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. When the calibration may be left in an inconsistent state, a confirmation dialog will be displayed (see "Exit Confirmation" on page 272).
Initial S/W Revision	Prior to A.02.00

Q-bar Port

The Q-bar port calibration is performed with the front panel's Q-bar port connected via a short BNC cable to the Cal Out port. The guided calibration will show a diagram of the required connections.

Back

Return to the prior step in the calibration procedure.

Key Path	Input/Output, I/Q, I/Q Cable Calibrate...
Notes	Using the Back button will not restore the calibration data to a prior state. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. The Back button allows the user to go back to a prior step to redo that calibration step.
Initial S/W Revision	Prior to A.02.00

Next

Perform the Q-bar port calibration.

Key Path	Input/Output, I/Q, I/Q Cable Calibrate...
Remote Command	:CALibration:IQ:FLATness:QBAR
Example	CAL:IQ:FLAT:QBAR
Notes	The recommended procedure is to use the same BNC cable to calibrate all I/Q ports. All I/Q ports should be calibrated sequentially during the procedure. The calibration data is saved as soon as the port is calibrated and will survive power cycles. It is not reset by any preset or restore data commands.
Notes	The Q-bar port must be connected to the Cal Out port before issuing the SCPI command.
State Saved	No
Initial S/W Revision	Prior to A.02.00

Exit

Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

Key Path	Input/Output, I/Q, I/Q Cable Calibrate...
Notes	Using the Exit button will not restore the calibration data to the state prior to entering the guided calibration. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. When the calibration may be left in an inconsistent state, a confirmation dialog will be displayed (see " Exit Confirmation " on page 272).
Initial S/W Revision	Prior to A.02.00

I/Q Cable Calibration Time (Remote Command Only)

Returns the last date and time that the I/Q Cable Calibration was performed for a specific port. This is a remote query command only.

Remote Command	:CALibration:IQ:FLATness:I IBAR Q QBAR:TIME?
Example	:CAL:IQ:FLAT:I:TIME?
Notes	This returns 6 integer values: year, month, day, hour, minute, second. When no calibration has been performed, all values will be 0.
Initial S/W Revision	A.02.00

I/Q Probe Calibration

The I/Q probe calibration creates correction data for one of the front panel I/Q channels. When the probe has EEPROM identification, the data is unique to that specific probe. When the probe does not have

EEPROM identification, the data will be used for all probes of the same type. The data is also unique to the channel, so calibration data for the I channel will not be used for the Q channel and vice versa.

The guided calibration (front panel only) will show connection diagrams and guide the user through the I/Q Isolation Calibration and through calibrating each port. The calibration data for each port is stored separately, so as soon as a port is calibrated that data is saved and will be used. If a user presses "Exit" to exit the calibration process, the data for the port already completed will still be used. It is recommended that a calibration be completed once started, or if exited, that it be properly done before the next use of the probe. The "Next" button will perform the calibration for the current port and then proceed to the next step in the calibration procedure. The "Back" button will return to the prior port in the procedure. Both softkeys and dialog buttons are supplied for ease of use. The dialog buttons are for mouse use and the softkeys for front panel use.

The calibration can also be done via SCPI, but no connection diagrams will be shown. The user will have to make the correct connections before issuing each port calibration command. Again, it is recommended that all ports be calibrated at the same time.

For Active probes or when Differential is Off, only the main port is calibrated, otherwise both the main and complementary ports are calibrated.

The instrument state remains as it was prior to entering the calibration procedure except while a port is actually being calibrated. Once a port is calibrated it returns to the prior state. A port calibration is in process only from the time the "Next" button is pressed until the next screen is shown. For SCPI, this corresponds to the time from issuing the CAL:IQ:PROB:|I|B|Q|QB command until the operation is complete.

For example, if the prior instrument state is Cal Out = Off, Input = I+jQ, and Differential = Off, then up until the time the "Next" button is pressed the I Input and Q Input LEDs are on and the Cal Out, I-bar Input and Q-bar Input LEDs are off. Once the "Next" button is pressed for the I port calibration, only the Cal Out and I Input LEDs will be on and the others will be off. When the screen progresses to the next step ("Next" button again enabled), the prior state is restored and only the I Input and Q Input LEDs are on (Cal Out is off again).

The last calibration date and time for each relevant port will be displayed. For passive probes with Differential On, any calibration that is more than a day older than the most recent calibration will be displayed with the color amber.

I Port

The I port calibration is performed with the probe body attached to the front panel's I port and the probe tip connected via an adapter to the Cal Out port. The guided calibration will show a diagram of the required connections.

Show Adapter

Show a connection diagram and instructions for the probe and adapter. See ["Show Adapter Screen" on page 272](#).

Key Path	Input/Output, I/Q, I Setup, I Probe, Calibrate
Notes	Either a passive or an active probe adapter diagram will be shown, depending on the type of probe attached.
Initial S/W Revision	Prior to A.02.00

Back

Return to the prior step in the calibration procedure.

Key Path	Input/Output, I/Q, Q Setup, Q Probe, Calibrate
Initial S/W Revision	Prior to A.02.00

Next

Perform the I port calibration.

Key Path	Input/Output, I/Q, I Setup, I Probe, Calibrate
Remote Command	:CALibration:IQ:PROBe:I
Example	CAL:IQ:PROB:I
Notes	The I port must be connected to the Cal Out port before issuing the SCPI command. The calibration data is saved as soon as the port is calibrated and will survive power cycles. It is not reset by any preset or restore data commands.
State Saved	No
Initial S/W Revision	Prior to A.02.00

Exit

Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

Key Path	Input/Output, I/Q, I Setup, I Probe, Calibrate
Notes	Using the Exit button will not restore the calibration data to the state prior to entering the guided calibration. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. When the calibration may be left in an inconsistent state, a confirmation dialog will be displayed (see "Exit Confirmation" on page 272).
Initial S/W Revision	Prior to A.02.00

I-bar Port

The I-bar port calibration is performed with the probe body attached to the front panel's I-bar port and the probe tip connected via an adapter to the Cal Out port. The I-bar probe calibration is only available for passive probes with Differential On. The guided calibration will show a diagram of the required connections.

Show Adapter

Show a connection diagram and instructions for the probe and adapter. See ["Show Adapter Screen" on page 272](#).

Key Path	Input/Output, I/Q, I Setup, I Probe, Calibrate
Notes	Either a passive or an active probe adapter diagram will be shown, depending on the type of probe attached.
Initial S/W Revision	Prior to A.02.00

Back

Return to the prior step in the calibration procedure.

Key Path	Input/Output, I/Q, I Setup, I Probe, Calibrate
Notes	Using the Back button will not restore the calibration data to a prior state. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. The Back button allows the user to go back to a prior step to redo that calibration step.
Initial S/W Revision	Prior to A.02.00

Next

Perform the I-bar port calibration.

Key Path	Input/Output, I/Q, I Setup, I Probe, Calibrate
Remote Command	:CALibration:IQ:PROBe:IBar
Example	CAL:IQ:PROB:IB
Notes	The I-bar port must be connected to the Cal Out port before issuing the SCPI command. The calibration data is saved as soon as the port is calibrated and will survive power cycles. It is not reset by any preset or restore data commands.
State Saved	No
Initial S/W Revision	Prior to A.02.00

Exit

Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

Key Path	Input/Output, I/Q, I Setup, I Probe, Calibrate
Notes	Using the Exit button will not restore the calibration data to the state prior to entering the guided calibration. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. When the calibration may be left in an inconsistent state, a confirmation dialog will be displayed (see " Exit Confirmation " on page 272).
Initial S/W Revision	Prior to A.02.00

Q Port

The Q port calibration is performed with the probe body attached to the front panel's Q port and the probe tip connected via an adapter to the Cal Out port. The guided calibration will show a diagram of the required connections.

Show Adapter

Show a connection diagram and instructions for the probe and adapter. See ["Show Adapter Screen" on page 272](#).

Key Path	Input/Output, I/Q, Q Setup, Q Probe, Calibrate
Notes	Either a passive or an active probe adapter diagram will be shown, depending on the type of probe attached.
Initial S/W Revision	Prior to A.02.00

Back

Return to the prior step in the calibration procedure.

Key Path	Input/Output, I/Q, Q Setup, Q Probe, Calibrate
Initial S/W Revision	Prior to A.02.00

Next

Perform the Q port calibration.

Key Path	Input/Output, I/Q, Q Setup, Q Probe, Calibrate
Remote Command	:CALibration:IQ:PROB:Q
Example	CAL:IQ:PROB:Q
Notes	The Q port must be connected to the Cal Out port before issuing the SCPI command. The calibration data is saved as soon as the port is calibrated and will survive power cycles. It is not reset by any preset or restore data commands.
State Saved	No
Initial S/W Revision	Prior to A.02.00

Exit

Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

Key Path	Input/Output, I/Q, Q Setup, Q Probe, Calibrate
Notes	Using the Exit button will not restore the calibration data to the state prior to entering the guided calibration. Once a port is calibrated the data is stored immediately and the only way to change it is

to redo the calibration step.

When the calibration may be left in an inconsistent state, a confirmation dialog will be displayed (see ["Exit Confirmation" on page 272](#)).

Initial S/W Revision	Prior to A.02.00
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Q-bar Port

The Q-bar port calibration is performed with the probe body attached to the front panel's Q-bar port and the probe tip connected via an adapter to the Cal Out port. The Q-bar probe calibration is only available for passive probes with Differential On. The guided calibration will show a diagram of the required connections.

Show Adapter

Show a connection diagram and instructions for the probe and adapter. See ["Show Adapter Screen" on page 272](#).

Key Path	Input/Output, I/Q, Q Setup, Q Probe, Calibrate
Notes	Either a passive or an active probe adapter diagram will be shown, depending on the type of probe attached.
Initial S/W Revision	Prior to A.02.00

Back

Return to the prior step in the calibration procedure.

Key Path	Input/Output, I/Q, Q Setup, Q Probe, Calibrate
Notes	Using the Back button will not restore the calibration data to a prior state. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. The Back button allows the user to go back to a prior step to redo that calibration step.
Initial S/W Revision	Prior to A.02.00

Next

Perform the Q-bar port calibration.

Key Path	Input/Output, I/Q, Q Setup, Q Probe, Calibrate
Remote Command	:CALibration:IQ:PROBe:QBar
Example	CAL:IQ:PROB:QB
Notes	The Q-bar port must be connected to the Cal Out port before issuing the SCPI command. The calibration data is saved as soon as the port is calibrated and will survive power cycles. It is not reset by any preset or restore data commands.
State Saved	No
Initial S/W Revision	Prior to A.02.00

Exit

Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

Key Path	Input/Output, I/Q, Q Setup, Q Probe, Calibrate
Notes	Using the Exit button will not restore the calibration data to the state prior to entering the guided calibration. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. When the calibration may be left in an inconsistent state, a confirmation dialog will be displayed (see "Exit Confirmation" on page 272).
Initial S/W Revision	Prior to A.02.00

Show Adapter Screen

When one of the Probe Calibration Show Adapter buttons is pressed, a diagram of the probe with its adapter will be shown. Depending on the type of probe attached, either the Passive Probe Adapter or the Active Probe Adapter diagram will be shown.

I/Q Probe Calibration Time (Remote Command Only)

Return the last date and time that the I/Q Probe Calibration was performed for a specific port. This is a remote query command only.

Remote Command	:CALibration:IQ:PROBe:I IBAR Q QBAR:TIME?
Example	:CAL:IQ:PROB:I:TIME?
Notes	This returns 6 integer values: year, month, day, hour, minute, second. When no calibration has been performed, all values will be 0. The value is specific to both the port and probe, so the value will change as probes are connected or disconnected.
Initial S/W Revision	A.02.00

Exit Confirmation

When Exit is pressed during one of the calibration routines, the calibration may be in an inconsistent state with some of the ports having newly measured calibration data and others with old data. If this is the case, a dialog box will appear to confirm that the user really wants to exit. A "Yes" answer will exit the calibration procedure, leaving potentially inconsistent calibration data in place. A "No" answer will return to the calibration procedure.

5 Mode Functions

Mode

The Mode key allows you to select the available measurement applications or “Modes”. Modes are a collection of measurement capabilities packaged together to provide an instrument personality that is specific to your measurement needs. Each application software product is ordered separately by Model Number and must be licensed to be available. Once an instrument mode is selected, only the commands that are valid for that mode can be executed.

NOTE

Key operation can be different between modes. The information displayed in Help is about the current mode.

To access Help for a different Mode you must first exit Help (by pressing the Cancel (Esc) key). Then select the desired mode and re-access Help.

For more information on Modes, preloading Modes, and memory requirements for Modes, see ["More Information" on page 275](#)

Key Path	Front-panel key
Remote Command	:INSTrument[:SElect] SA RTSA SEQAN EMI BASIC WCDMA EDGE GSM WIMAXOFDMA VSA PNOISE NFIGure ADEMOD BTooth TDSCDMA CDMA2K CDMA1XEV LTE LTETDD LTEAFDD LTEATDD MSR DVB DTMB DCATV ISDBT CM MB WLAN CWLAN CWIMAXOFDM WIMAXFIXED IDEN RLC SCPI LC VSA89601 :INSTrument[:SElect]?
Example	:INST SA
Notes	The available parameters are dependent upon installed and licensed applications resident in the instrument. Parameters given here are an example, specific parameters are in the individual Application. A list of the valid mode choices is returned with the INST:CAT? Query.
Preset	This is unaffected by a Preset but is set on a “Restore System Defaults->All” to: For N9038A: EMI For N8973B, N8974B, N8975B, or N8976B: NFIG For all other models: SA
State Saved	Saved in instrument state
Backwards Compatibility SCPI	:INSTrument[:SElect] GSM provided for backwards compatibility. Mapped to EDGE GSM.
Backwards Compatibility SCPI	:INSTrument[:SElect] SANalyzer provided for ESU compatibility. When this command is received, the analyzer aliases it to the following: INST:SEL SCPI LC This results in the analyzer being placed in SCPI Language Compatibility Mode, in order to emulate

	the ESU Spectrum Analyzer Mode.
Backwards Compatibility SCPI	:INSTrument[:SElect] RECeiver provided for ESU compatibility. When this command is received, the analyzer aliases it to the following: :INST:SEL EMI :CONF FSC This results in the analyzer being placed in the EMI Receiver Mode, running the Frequency Scan measurement, in order to emulate the ESU Receiver Mode.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.13.00

Example	:INST 'SA'
Notes	The query is not a quoted string. It is an enumeration as indicated in the Instrument Select table above. The command must be sequential: i.e. continued parsing of commands cannot proceed until the instrument select is complete and the resultant SCPI trees are available.
Backwards Compatibility SCPI	:INSTrument[:SElect] 'SA' 'PNOISE' 'EDGE' 'GSM' 'BASIC'
Initial S/W Revision	Prior to A.02.00

More Information

The Mode name appears on the banner after the word “Agilent” followed by the Measurement Title. For example, for the Spectrum Analyzer mode with the Swept SA measurement running:



It is possible to specify the order in which the Modes appear in the Mode menu, using the Configure Applications utility (System, Power On, Configure Applications). It is also possible, using the same utility, to specify a subset of the available applications to load into memory at startup time, which can significantly decrease the startup time of the analyzer. During runtime, if an application that is not loaded into memory is selected (by either pressing that applications Mode key or sending that applications :INST:SEL command over SCPI), there will be a pause while the Application is loaded. During this pause a message box that says “Loading application, please wait...” is displayed.

Each application (Mode) that runs in the X-Series signal analyzers consumes virtual memory. The various applications consume varying amounts of virtual memory, and as more applications run, the memory consumption increases. Once an application is run, some of its memory remains allocated even when it is not running, and is not released until the analyzer program (xSA.exe) is shut down.

Agilent characterizes each Mode and assigns a memory usage quantity based on a conservative estimate. There is a limited amount of virtual memory available to applications (note that this is virtual memory and is independent of how much physical RAM is in the instrument). The instrument keeps track of how much

memory is being used by all loaded applications – which includes those that preloaded at startup, and all of those that have been run since startup.

When you request a Mode that is not currently loaded, the instrument looks up the memory estimate for that Mode, and adds it to the residual total for all currently loaded Modes. If there is not enough virtual memory to load the Mode, a dialog box and menu will appear that gives you four options:

1. Close and restart the analyzer program without changing your configured preloads. This may free up enough memory to load the requested Mode, depending on your configured preloads
2. Clear out all preloads and close and restart the analyzer program with only the requested application preloaded, and with that application running. This choice is guaranteed to allow you to run the requested application; but you will lose your previously configured preloads. In addition, there may be little or no room for other applications, depending on the size of the requested application.
3. Bring up the Configure Applications utility in order to reconfigure the preloaded apps to make room for the applications you want to run (this will then require restarting the analyzer program with your new configuration). This is the recommended choice because it gives you full flexibility to select exactly what you want.
4. Exit the dialog box without doing anything, which means you will be unable to load the application you requested.

In each case except 4, this will cause the analyzer software to close, and you will lose all unsaved traces and results.

If you attempt to load a mode via SCPI that will exceed memory capacity, the Mode does not load and an error message is returned:

```
-225,"Out of memory;Insufficient resources to load Mode (mode name)"
```

where “mode name” is the SCPI parameter for the Mode in question, for example, SA for Spectrum Analyzer Mode.

Application Mode Number Selection (Remote Command Only)

Select the measurement mode by its mode number. The actual available choices depend upon which applications are installed in your instrument. The modes appear in this table in the same order they appear in the Mode menu (if the order is not changed by the Configure Applications utility found in the System, Power On menu). See ["Detailed List of Modes" on page 281](#) for Mode details.

The Mode Number is the parameter for use with the :INSTrument:NSElect command. The Mode Parameter is the parameter for use with the :INSTrument[:SElect] command.

Mode	Mode Number	Mode Parameter
Spectrum Analyzer	1	SA
Real Time Spectrum Analyzer	107	RTSA
Sequence Analyzer	400	SEQAN
EMI Receiver	141	EMI
I/Q Analyzer (Basic)	8	BASIC
WCDMA with HSPA+	9	WCDMA

GSM/EDGE/EDGE Evo	13	EDGE GSM
802.16 OFDMA (WiMAX/WiBro)	75	WIMAX OFDMA
Vector Signal Analyzer (VSA)	100	VSA
Phase Noise	14	PNOISE
Noise Figure	219	NFIGure
Analog Demod	234	ADEM0D
Bluetooth	228	BT00th
TD-SCDMA with HSPA/8PSK	211	TDSCDMA
cdma2000	10	CDMA2K
1xEV-DO	15	CDMA1XEV
LTE	102	LTE
LTE TDD	105	LTETDD
LTE-Advanced FDD	107	LTEAFDD
LTE-Advanced TDD	108	LTEATDD
MSR	106	MSR
DVB-T/H with T2	235	DVB
DTMB (CTTB)	236	DTMB
Digital Cable TV	238	DCATV
ISDB-T	239	ISDBT
CMMB	240	CMMB
WLAN	217	WLAN
Combined WLAN	19	CWLAN
Combined Fixed WiMAX	81	CWIMAXOFDM
802.16 OFDM (Fixed WiMAX)	104	WIMAXFIXED
iDEN/WiDEN/MotoTalk	103	IDEN
Remote Language Compatibility	266	RLC
SCPI Language Compatibility	270	SCPILC
89601 VSA	101	VSA89601

Remote Command :INSTRument:NSElect <integer>

:INSTRument:NSElect?

Example :INST:NSEL 1

Notes SA mode is 1

The command must be sequential: i.e. continued parsing of commands cannot proceed until the instrument select is complete and the resultant SCPI trees are available.

Preset	Not affected by Preset. Set to default mode (1 for SA mode) following Restore System Defaults.
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00

Application Mode Catalog Query (Remote Command Only)

Returns a string containing a comma separated list of names of all the installed and licensed measurement modes (applications). These names can only be used with the :INSTrument[:SElect] command.

Remote Command	:INSTrument:CATalog?
Example	:INST:CAT?
Notes	Query returns a quoted string of the installed and licensed modes separated with a comma. Example: "SA,PNOISE,WCDMA"
Backwards Compatibility Notes	VSA (E4406A) :INSTrument:CATalog? returned a list of installed INSTrument:SElect items as a comma separated list of string values: "BASIC","GSM","EDGEgsm","CDMA","NADC","PDC","WCDMA","CDMA2K","CDMA1XEV","IDEN","WIDEN","WLAN","SERVICE" X-Series uses the ESA/PSA compatible query of a string contain comma separated values: "SA,PNOISE,NFIGURE,BASIC,CDMA,CDMA2K,WCDMA,CDMA1XEV,EDGEgsm,GSM,NADC,PDC,TDSCDMA,DMODULATION,WLAN"
Initial S/W Revision	Prior to A.02.00

Application Identification (Remote Commands Only)

Each entry in the Mode Menu will have a Model Number and associated information: Version, and Options. This information is displayed in the Show System screen. The corresponding SCPI remote commands are defined here.

["Current Application Model " on page 278](#)

["Current Application Revision" on page 279](#)

["Current Application Options" on page 279](#)

Current Application Model

Returns a string that is the Model Number of the currently selected application (mode).

Remote Command	:SYSTem:APPLication[:CURRent] [:NAME] ?
Example	:SYST:APPL?
Notes	Query returns a quoted string that is the Model Number of the currently selected application (Mode).

	Example: "N9060A" String length is 6 characters.
Preset	Not affected by Preset
State Saved	Not saved in state, the value will be the selected application when a Save is done.
Initial S/W Revision	Prior to A.02.00

Current Application Revision

Returns a string that is the Revision of the currently selected application (mode).

Remote Command	:SYSTem:APPLication[:CURRent]:REVision?
Example	:SYST:APPL:REV?
Notes	Query returns a quoted string that is the Revision of the currently selected application (Mode). Example: "1.0.0.0" String length is a maximum of 23 characters. (each numeral can be an integer + 3 decimal points)
Preset	Not affected by a Preset
State Saved	Not saved in state, the value will be the selected application when a Save is done.
Initial S/W Revision	Prior to A.02.00

Current Application Options

Returns a string that is the Options list of the currently selected application (Mode).

Remote Command	:SYSTem:APPLication[:CURRent]:OPTion?
Example	:SYST:APPL:OPT?
Notes	Query returns a quoted string that is the Option list of the currently selected application (Mode). The format is the name as the *OPT? or SYSTem:OPTion command: a comma separated list of option identifiers. Example: "1FP,2FP" String length is a maximum of 255 characters.
Preset	Not affected by a Preset
State Saved	Not saved in state per se, the value will be the selected application when a Save is invoked.
Initial S/W Revision	Prior to A.02.00

Application Identification Catalog (Remote Commands Only)

A catalog of the installed and licensed applications (Modes) can be queried for their identification.

"Application Catalog Number of Entries" on page 280

"Application Catalog Model Numbers" on page 280

"Application Catalog Revision" on page 280

"Application Catalog Options" on page 281

Application Catalog Number of Entries

Returns the number of installed and licensed applications (Modes).

Remote Command	:SYSTem:APPLication:CATalog[:NAME]:COUNT?
Example	:SYST:APPL:CAT:COUN?
Preset	Not affected by Preset
State Saved	Not saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Application Catalog Model Numbers

Returns a list of Model Numbers for the installed and licensed applications (Modes).

Remote Command	:SYSTem:APPLication:CATalog[:NAME]?
Example	:SYST:APPL:CAT?
Notes	Returned value is a quoted string of a comma separated list of Model Numbers. Example, if SAMS and Phase Noise are installed and licensed: "N9060A,N9068A" String length is COUNT * 7 - 1. (7 = Model Number length + 1 for comma. -1 = no comma for the 1st entry.)
Preset	Not affected by a Preset
State Saved	Not saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Application Catalog Revision

Returns the Revision of the provided Model Number.

Remote Command	:SYSTem:APPLication:CATalog:REVision? <model>
Example	:SYST:APPL:CAT:REV? 'N9060A'
Notes	Returned value is a quoted string of revision for the provided Model Number. The revision will be a null-string ("") if the provided Model Number is not installed and licensed. Example, if SAMS is installed and licensed: "1.0.0.0"

Preset	Not affected by a Preset.
State Saved	Not saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Application Catalog Options

Returns a list of Options for the provided Model Number

Remote Command	:SYSTem:APPLication:CATalog:OPTion? <model>
Example	:SYST:APPL:CAT:OPT? 'N9060A'
Notes	Returned value is a quoted string of a comma separated list of Options, in the same format as *OPT? or :SYSTem:OPTion?. If the provided Model Number is not installed and licensed a null-string ("") will be returned. Example, if SAMS is installed and licensed: "2FP" String length is a maximum of 255 characters.
Preset	Not affected by a Preset
State Saved	Not saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Detailed List of Modes

This section contains an alphabetical list of Modes available in the X-Series, along with a brief description of each Mode.

Note that with the exception of the 89601 VSA, only licensed applications appear in the Mode menu. The 89601 will always appear, because it's licensing is handled differently.

1xEV-DO

Selects the 1xEV-DO mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL CDMA1XEV INST:NSEL 15
Initial S/W Revision	Prior to A.02.00

802.16 OFDMA (WiMAX/WiBro)

Selects the OFDMA mode for general purpose measurements of WiMAX signals. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL WIMAXOFDMA INST:NSEL 75
Initial S/W Revision	Prior to A.02.00

802.16 OFDM (Fixed WiMAX)

Selects the 802.16 OFDM (Fixed WiMAX) mode. This mode allows modulation quality measurements of signals that comply with IEEE 802.16a–2003 and IEEE 802.16–2004 standards, with flexibility to measure nonstandard OFDM formats. Along with the typical digital demodulation measurement results, several additional 802.16 OFDM unique trace data formats and numeric error data results provide enhanced data analysis.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL WIMAXFIXED INST:NSEL 104
Initial S/W Revision	A.02.00

89601 VSA

Selecting the 89601 VSA mode will start the 89600 VSA software. The 89600 VSA software is powerful, PC-based software, offering the industry's most sophisticated general purpose and standards specific signal evaluation and troubleshooting tools for R&D engineers. Even for proprietary and non-standard signals in SATCOM or MILCOM applications, you can make signal quality measurements with customized IQ constellation. Reach deeper into signals, gather more data on signal problems, and gain greater insight.

- Over 35 general-purpose analog and digital demodulators ranging from 2FSK to 4096QAM
- Flexible and custom IQ and OFDM signal analysis for single carrier
- Standards specific modulation analysis including:
 - Cellular: GSM/EDGE, cdma2000, W-CDMA, TD-SCDMA, LTE(FDD/TDD),
 - LTE-Advanced and more

- Wireless networking: 802.11a/b/g, 802.11n, 802.ac, 802.16 WiMAX (fixed/mobile), WiSUN (MR-FSK PHY)
- RFID
- Digital satellite video and other satellite signals, radar, LMDS
- Up to 400K bin FFT, for the highest resolution spectrum analysis
- A full suite of time domain analysis tools, including signal capture and playback, time gating, and CCDF measurements
- 20 simultaneous trace displays and the industry's most complete set of marker functions
- Easy-to-use Microsoft ® Windows ® graphical user interface

For more information see the Agilent 89600 Series VSA web site at www.agilent.com/find/89600vsa

To learn more about how to use the 89600 VSA running in the X-Series, after the 89600 VSA software is running, open the 89600 VSA Help and open the "About Agilent X-Series Signal Analyzer with 89600 VSA Software" help topic.

Key Path	Mode
Example	INST:SEL VSA89601 INST:NSEL 101
Initial S/W Revision	Prior to A.02.00

Analog Demod

Selects the Analog Demod mode for making measurements of AM, FM and phase modulated signals.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL ADEMODO INST:NSEL 234
Initial S/W Revision	Prior to A.02.00

Bluetooth

Selects the Bluetooth mode for Bluetooth specific measurements. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL BT

	INST:NSEL 228
Initial S/W Revision	A.06.01

cdma2000

Selects the cdma2000 mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL CDMA2K INST:NSEL 10
Initial S/W Revision	Prior to A.02.00

CMMB

Selects the CMMB mode for measurements of digital video signals using this format. There are several power and demod measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL CMMB INST:NSEL 240
Initial S/W Revision	A.03.00

Combined WLAN

Selects the CWLAN mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL CWLAN INST:NSEL 19
Initial S/W Revision	A.02.00

Combined Fixed WiMAX

Selects the Combined Fixed WiMAX mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL CWIMAXOFDM INST:NSEL 81
Initial S/W Revision	A.02.00

Digital Cable TV

Selects the Digital Cable TV mode for measurements of digital cable television systems. There are several power and demod measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL DCATV INST:NSEL 238
Initial S/W Revision	A.07.00

DTMB (CTTB)

Selects the DTMB (CTTB) mode for measurements of digital video signals using this format. There are several power and demod measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL DTMB INST:NSEL 236
Initial S/W Revision	A.02.00

DVB-T/H with T2

Selects the DVB-T/H mode for measurements of digital video signals using this format. There are several power and demod measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL DVB INST:NSEL 235
Initial S/W Revision	A.02.00
Modified at S/W Revision	A.07.00

EMI Receiver

The EMI Receiver Mode makes EMC measurements. Several measurements are provided to aid the user in characterizing EMC performance of their systems, including looking at signals with CISPR-16 compliant detectors, performing scans for interfering signals, and determining and charting interfering signals over time.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL EMI INST:NSEL 141
Initial S/W Revision	A.07.01

GSM/EDGE/EDGE Evo

Selects the GSM with EDGE mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL EDGE GSM INST:NSEL 13
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.02.00

iDEN/WiDEN/MOTOTalk

Selects the iDEN/WiDEN/MOTOTalk mode for general purpose measurements of iDEN and iDEN-related signals. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL IDEN INST:NSEL 103
Initial S/W Revision	A.02.00

IQ Analyzer (Basic)

The IQ Analyzer Mode makes general purpose frequency domain and time domain measurements. These measurements often use alternate hardware signal paths when compared with a similar measurement in the Signal Analysis Mode using the Swept SA measurement. These frequency domain and time domain measurements can be used to output I/Q data results when measuring complex modulated digital signals.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL BASIC INST:NSEL 8
Initial S/W Revision	Prior to A.02.00

ISDB-T

Selects the ISDB-T mode for measurements of digital video signals using this format. There are several power and demod measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL ISDBT INST:NSEL 239
Initial S/W Revision	A.03.00

LTE

Selects the LTE mode for general purpose measurements of signals following the LTE FDD standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL LTE INST:NSEL 102
Initial S/W Revision	Prior to A.02.00

LTE TDD

Selects the LTE TDD mode for general purpose measurements of signals following the LTE TDD standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL LTE TDD INST:NSEL 105
Initial S/W Revision	A.03.00

LTE-Advanced FDD

As LTE-Advanced FDD and LTE modes are converged into one single application, the single softkey under Mode menu is designed to select the covered mode. The display mode of the LTE and LTE-Advanced FDD are distinguished by the licenses.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL LTEAFDD INST:NSEL 107
Notes	When the N9080A/80B-1FP exists, the display mode name is LTE. When the N9080A/80B-1FP and N9080B-2FP all exist, the display mode name is LTE FDD & LTE-A FDD.
Backwards Compatibility SCPI	INST:SEL LTE INST:NSEL 102
Initial S/W Revision	A.14.00
Modified at S/W Revision	A.14.50

LTE-Advanced TDD

As LTE-Advanced TDD and LTE TDD modes are converged into one single application, the single softkey under Mode menu is designed to select the covered mode. The display mode of the LTE TDD and LTE-

Advanced TDD are distinguished by the licenses.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL LTEATDD INST:NSEL 108
Notes	When the N9082A/82B-1FP exists, the display mode name is LTE TDD. When the N9082A/82B-1FP and N9082B-2FP all exist, the display mode name is LTE TDD & LTE-A TDD.
Backwards Compatibility SCPI	INST:SEL LTETDD INST:NSEL 105
Initial S/W Revision	A.14.00
Modified at S/W Revision	A.14.50

MSR

Selects the MSR mode. The MSR mode makes several measurements for Cellular Communication devices that can be configured with multiple radio formats simultaneously following the 3GPP standard of Multi-Standard Radio, including GSM/EDGE, WCDMA/HSPA+ and LTE.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL MSR INST:NSEL 106
Initial S/W Revision	A.09.491

Noise Figure

The Noise Figure mode provides pre-configured measurements for making general purpose measurements of device noise figure.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL NFIGURE INST:NSEL 219
Initial S/W Revision	Prior to A.02.00

Phase Noise

The Phase Noise mode provides pre-configured measurements for making general purpose measurements of device phase noise.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL PNOISE or INST:NSEL 14
Initial S/W Revision	Prior to A.02.00

Real Time Spectrum Analyzer

The Real Time Spectrum Analyzer (RTSA) mode provides real-time signal analysis, very high probability-of-intercept for intermittent signals with appropriate triggers.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL RTSA or INST:NSEL 107
Initial S/W Revision	A.13.00

Remote Language Compatibility

The Remote Language Compatibility (RLC) mode provides remote command backwards compatibility for the 8560 series of spectrum analyzers, known as legacy spectrum analyzers.

NOTE After changing into or out of this mode, allow a 1 second delay before sending any subsequent commands.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL RLC Or INST:NSEL 266
Initial S/W Revision	Prior to A.02.00

SCPI Language Compatibility

The SCPI Language Compatibility mode provides remote language compatibility for SCPI-based instruments, such as the Rohde and Schwartz FSP and related series of spectrum analyzers.

NOTE After changing into or out of this mode, allow a 1 second delay before sending any subsequent commands.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL SCPILC Or INST:NSEL 270
Initial S/W Revision	A.06.00

Spectrum Analyzer

Selects the Spectrum Analyzer mode for general purpose measurements. There are several measurements available in this mode. General spectrum analysis measurements, in swept and zero span, can be done using the first key in the Meas menu, labeled Swept SA. Other measurements in the Meas Menu are designed to perform specialized measurement tasks, including power and demod measurements.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL SA INST:NSEL 1
Initial S/W Revision	Prior to A.02.00

TD-SCDMA with HSPA/8PSK

Selects the TD-SCDMA mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL TDSCDMA INST:NSEL 211
Initial S/W Revision	Prior to A.02.00

Vector Signal Analyzer (VXA)

The N9064A (formerly 89601X) VXA Vector signal and WLAN modulation analysis application provides solutions for basic vector signal analysis, analog demodulation, and digital demodulation. The digital demodulation portion of N9064A allows you to perform measurements on standard-based formats such as cellular, wireless networking and digital video as well as general purpose flexible modulation analysis for wide range of digital formats, FSK to 1024QAM, with easy-to-use measurements and display tools such as constellation and eye diagram, EVM traces and up to four simultaneous displays. Analog baseband analysis is available using the MXA and PXA with option BBA. Option 3FP WLAN has been discontinued.

N9064A honors existing 89601X licenses with all features and functionalities found on X-Series software versions prior to A.06.00. Specifically:

N9064A-1 is equivalent to 89601X-205

N9064A-2 is equivalent to 89601X-AYA

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL VSA INST:NSEL 100
Initial S/W Revision	Prior to A.02.00

W-CDMA with HSPA+

Selects the W-CDMA with HSPA+ mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL WCDMA INST:NSEL 9
Initial S/W Revision	Prior to A.02.00

WLAN

Selects the WLAN mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
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Example	INST:SEL WLAN INST:NSEL 217
Initial S/W Revision	A.09.491

Mode Setup

The Mode Setup menu contains setup functions that are global across the entire Mode. These functions are independent of which measurement is currently running - they are global to all measurements in the mode, or "Meas Global." The Mode Setup functions are not the only Meas Global functions in the analyzer; for example, the Trigger Setup functions are Meas Global, and there are even Mode Global functions (that is, the same for all Modes) in the Input/Output menu, but the fact that they are all Meas Global is a distinguishing characteristic of the Mode Setup functions.

The Mode Setup menu also contains the Restore Mode Defaults key. Most Meas Global functions are restored to their preset values by Mode Preset, however some variables are more persistent and are not preset until the Restore Mode Defaults key is pressed.

There are also a few Meas Global variables (for example, Global Center Frequency) that can be switched to be Mode Global, that is, the same for all modes. The keys under the Global Settings key control whether these variables are Mode Global or not.

In the Spectrum Analyzer mode, the Mode Setup functions include which radio standard and/or EMC standard is in use and how it is configured. A set of CISPR EMC presets is available as well.

The EMC keys require either the N6141A or W6141A application or Option EMC to be installed and licensed.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Radio

Accesses the Radio setup menu.

Key Path	Mode Setup
Initial S/W Revision	Prior to A.02.00

Band

Selects the standard variant that applies to the radio to be tested.

Key	SCPI	Band
P-GSM	PGSM	Primary GSM in the 900 MHz band
E-GSM	EGSM	Extended GSM in the 900 MHz band
R-GSM	RGSM	Railway GSM in the 900 MHz band
DCS 1800	DCS1800	DSC1800 band; also known as GSM-1800
PCS 1900	PCS1900	PCS1900 band; also known as GSM-1900
GSM 450	GSM450	GSM450 band

GSM 480	GSM480	GSM480 band
GSM 700	GSM700	GSM700 band
GSM 850	GSM850	GSM850 band, for IS-136HS
T-GSM 810	TGSM810	T-GSM 810 band

Key Path	Mode Setup, Radio
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :RADio:STANdard:BAND PGSM EGSM RGSM DCS1800 PCS1900 GSM450 GSM480 GSM700 GSM850 TGSM810 [:SENSe] :RADio:STANdard:BAND?
Example	RAD:STAN:BAND PGSM RAD:STAN:BAND?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	PGSM
State Saved	Saved in instrument state.
Range	P-GSM E-GSM R-GSM DCS 1800 PCS 1900 GSM 450 GSM 480 GSM 700 GSM 850 T-GSM 810
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.07.00

Device

Selects the type of radio device to be tested.

BTS - Base station transmitter test

MS - Mobile station transmitter test

Key Path	Mode Setup, Radio
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :RADio:DEVIce BTS MS [:SENSe] :RADio:DEVIce?
Example	RAD:DEV BTS RAD:DEV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	BTS
State Saved	Saved in instrument state.
Range	BTS MS
Initial S/W Revision	Prior to A.02.00

BTS Type

Selects the type of base station to be tested.

Key	SCPI	Type
Normal	NORMal	Normal BTS.
Micro1	MICR1 MICRo	Micro 1 BTS. Note: SCPI enumeration 'MICRo' is kept for backward compatibility. It is equivalent to 'MICR1'.
Micro2	MICR2	Micro 2 BTS.
Micro3	MICR3	Micro 3 BTS.
Pico1	PICO1 PICO	Pico 1 BTS. Note: SCPI enumeration 'PICO' is kept for backward compatibility. It's equivalent to 'PICO1'.

Key Path	Mode Setup, Radio
Mode	GSM
Scope	Meas Global
Remote Command	<code>[[:SENSe]:RADio:DEvIce:BASE[:TYPE] NORMal MICRo MICR1 MICR2 MICR3 PICO PICO1</code> <code>[[:SENSe]:RADio:DEvIce:BASE[:TYPE]?</code>
Example	<code>RAD:DEV:BASE PICO1</code> <code>RAD:DEV:BASE?</code>
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Preset	NORMal
State Saved	Saved in instrument state.
Range	Normal Micro1 Micro2 Micro3 Pico1
Initial S/W Revision	Prior to A.02.00

Freq Hopping

Turns the carrier hopping mode on and off. If frequency hopping is turned on, the instrument ignores the bursts when the frequency is hopped off the selected channel frequency. Thus, only valid data is included in the results.

This parameter applies only to the following measurements:

- GMSK/EDGE Transmit Power measurement
- GMSK/EDGE Power vs. Time measurement

- GSMK/EDGE Output RF Spectrum measurement
- GSMK Phase & Frequency Error measurement
- EDGE EVM measurement

Key Path	Mode Setup, Radio
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :RADio :CARRier :HOP OFF ON 0 1</code> <code>[:SENSe] :RADio :CARRier :HOP ?</code>
Example	<code>RAD:CARR:HOP ON</code> <code>RAD:CARR:HOP ?</code>
Notes	This functionality does not affect Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

Carrier

Selects the type of RF carrier on the device to be tested. You need to select 'Cont' if all 8 slots are active in the frame and the carrier has no gaps between the slots.

Key	SCPI	Description
Burst	BURSt	For single or multi slotted burst carrier signal.
Cont	CONTinuous	For continuous multi slot carrier signal.

This parameter applies only to the following measurements:

- GSMK/EDGE Power vs. Time measurement
- GSMK Phase & Frequency Error measurement
- EDGE EVM measurement

The GSMK/EDGE Power vs. Time measurement does not support full continuous multi-slot signals (no gap between two adjacent slots).

EDGE EVM will skip burst search for Multi-Slot signals.

Key Path	Mode Setup, Radio
Mode	GSM

Scope	Meas Global
Remote Command	[:SENSe] :RADio:CARRier [:TYPE] BURSt CONTInuous [:SENSe] :RADio:CARRier [:TYPE] ?
Example	RAD:CARR BURS RAD:CARR?
Notes	This functionality does not affect Combined GSM/EDGE measurement. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	BURSt
State Saved	Saved in instrument state.
Range	Burst Cont
Initial S/W Revision	Prior to A.02.00

Pwr Ctrl Lvl (PCL)

Allows you to choose the power control level (PCL) of the transmitter.

Selection	SCPI	Description
AutoRange	ON 1	PCL is determined by the measured carrier power level, and is used to determine the test limits. Since PCL is an integer number, the value is determined by the nearest Target Carrier Power level. For example, if the measured carrier power level is +35.9 dBm in a GSM 400 system, the nearest Target Carrier Power is 35 dBm, so the PCL will be set to 4. If the measured carrier power level is just the center between Target Carrier Power like 34.0 dBm, the PCL will be determined by the higher Target Carrier Power (in this case, 35 dBm, PCL:4).
Man	OFF 0	User defined PCL is used to determine the test limits.

This parameter applies only to the following measurements:

- GMSK/EDGE Power vs. Time measurement
- GMSK/EDGE Output RF Spectrum measurement

This parameter applies only when the selected "[Device](#)" on page 295 is MS.

Target Carrier Power [dBm]	Power Control Level
39	2
37	3
35	4
33	5

Target Carrier Power [dBm]	Power Control Level
31	6
29	7
27	8
25	9
23	10
21	11
19	12
17	13
15	14
13	15
11	16
9	17
7	18
5	19

Power Control Level for GSM 400, GSM 900, GSM 850 and GSM 700

Target Carrier Power [dBm]	Power Control Level
36	29
34	30
32	31
30	0
28	1
26	2
24	3
22	4
20	5
18	6
16	7
14	8
12	9
10	10
8	11
6	12
4	13
2	14
0	15

Power Control Level for DCS 1800

Target Carrier Power [dBm]	Power Control Level
33	30
32	31
30	0
28	1
26	2
24	3
22	4
20	5
18	6
16	7
14	8
12	9
10	10
8	11
6	12
4	13
2	14
0	15

Power Control Level for PCS 1900

Key Path	Mode Setup, Radio
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe]:RADio:PCLevel <integer> [:SENSe]:RADio:PCLevel? [:SENSe]:RADio:PCLevel:AUTO 0 1 OFF ON [:SENSe]:RADio:PCLevel:AUTO?
Example	RAD:PCL 3 RAD:PCL? RAD:PCL:AUTO ON RAD:PCL:AUTO?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Applicable only for Power vs. Time and Output RF Spectrum measurements.

	Unavailable unless selected " Device " on page 295 is MS.
Preset	1 ON
State Saved	Saved in instrument state.
Min	0
Max	40
Backwards Compatibility SCPI	[:SENSe] :EPVTime :PCLevel [:SENSe] :PVTime :PCLevel
Initial S/W Revision	Prior to A.02.00

Demod

Accesses the Demod setup menu.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Time Slot

Selects On or Off for slot searching. Generally, this feature is only valid in external and periodic timer trigger source modes that triggers every frame since another trigger source does not have the information that identifies the head of the frame. When Timeslot is set to On, the demodulation measurement is made on the nth timeslot specified by the trigger point + n timeslots, where n is the selected timeslot value 0 to 7.

This functionality is the same as Time Slot under the Freq/Channel menu.

Key Path	Mode Setup, Demod FREQ Channel
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :SLOT <integer> [:SENSe] :CHANnel :SLOT? [:SENSe] :CHANnel :SLOT :AUTO OFF ON 0 1 [:SENSe] :CHANnel :SLOT :AUTO?
Example	CHAN:SLOT 0 CHAN:SLOT? CHAN:SLOT:AUTO OFF CHAN:SLOT:AUTO?
Notes	This functionality does not affect Combined GSM/EDGE measurement. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	0

	OFF
State Saved	Saved in instrument state.
Min	0
Max	7
Initial S/W Revision	Prior to A.02.00

Burst Type

Sets the burst type that the analyzer will search for and to which it will synchronize.

This functionality is the same as Burst Type under the FREQ Channel menu.

Key	SCPI	Description
Sync (SCH)	SYNC	Burst length = 142 symbols Extended training sequences for CTS and COMPACT synchronization bursts are not supported.
Access (RACH)	ACcEss	Burst length = 88 symbols Alternative training (synchronization) sequence "TS1" and "TS2" are supported only in GSMK Power vs. Time.
Normal - NB (TCH & CCH)	NORMAl	Burst length = 142 symbols Softkey label will be changed to 'Normal - NB' form 'Normal'
Higher Symbol Rate - HB (TCH & CCH)	HSRate	Burst length = 169 symbols This selection key is only shown when theN9071A-3FP license is installed.
Mixed (NB/HB for TSC sync)	MIXed	Enables auto detection between Normal (NB) and HSR (HB) TCH & CCH EDGE Burst. This selection key is only shown when theN9071A-3FP license is installed.

Measurement synchronization capability (Burst Sync = Training Seq)

	Sync	Access	Normal	HSR	Mixed
			GMSK	8PSK	
				16QAM	
				32QAM	
				AQPSK	
GMSK Phase & Freq Error measurement	Yes	Yes	Yes	No	N/A
GMSK Power vs. Time measurement	Yes	Yes	Yes	No	(measures as Normal GMSK when selected)

GMSK Output RF Spectrum measurement (when Trigger Source is Periodic Timer and Sync Source is Off)	No	No	Yes	No		
EDGE EVM measurement	No	No	No	Yes	Yes	Yes
EDGE Power vs. Time measurement	Yes	Yes	Yes	Yes	Yes	Yes
EDGE Output RF Spectrum measurement (when Trigger Source is Periodic Timer and Sync Source is Off.)	No	No	Yes	Yes	Yes	Yes

Key Path	Mode Setup, Demod FREQ Channel
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :BURSt NORMal SYNC ACCess HSRate MIXed [:SENSe] :CHANnel :BURSt?
Example	CHAN:BURS NORM CHAN:BURS?
Notes	This functionality does not affect the Combined GSM/EDGE measurement. Higher Symbol Rate and Mixed selections are only available when the N9071A-3FP license is installed. Otherwise these menu keys are blank. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Higher Symbol Rate and Mixed selection keys are not shown unless N9071A-3FP is installed. When unlicensed and SCPI is sent, an undefined header error is returned. When "Mixed" is selected, the Burst Sync menu key under the Meas Setup menu will be grayed out and Training Sequence (TSC) will be used for synchronization. The sync algorithm always runs in Training Sequence (TSC) synchronization because the Burst Type can be determined by looking at TSC in the signal. Original selection of Burst Sync will become effective again when the Burst Type selection is changed from "Mixed" to another one.
Preset	NORMal
State Saved	Saved in instrument state.
Range	Sync (SCH) Access (RACH) Normal - NB (TCH & CCH) Higher Symbol Rate - HB (TCH & CCH) Mixed (NB/HB for TSC sync)
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

TSC (Std)

Allows you to select the Training Sequence Code that determines which burst is to be measured. Applicable only when Burst Sync is set to Training Sequence in the measurement. In the case of AQPSK, this parameter specifies TSC number of VAMOS sub-channel A. TSC of VAMOS sub-channel B is ignored.

This functionality is the same as TSC under the FREQ Channel menu.

This parameter applies only to the following measurements:

- GMSK/EDGE Power vs. Time measurement
- GMSK Phase & Frequency Error measurement
- EDGE EVM measurement

Selection	SCPI	Description
AutoDet	ON 1	The measurement is made on the first burst found to have any one of the valid TSCs in the range of 0 to 7. The measurement may be made on various timeslots if more than one timeslot has one of the 8 valid TSCs.
Man	OFF 0	The measurement is made on the first burst found to have the selected TSC. TSC numbers in the range of 0 to 7 can be selected. The measurement may be made on various timeslots if more than one timeslot has this same TSC.

Key Path	Mode Setup, Demod FREQ Channel
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe]:CHANnel:TSCode <integer> [:SENSe]:CHANnel:TSCode? [:SENSe]:CHANnel:TSCode:AUTO OFF ON 0 1 [:SENSe]:CHANnel:TSCode:AUTO?
Example	CHAN:TSC 3 CHAN:TSC? CHAN:TSC:AUTO 1 CHAN:TSC:AUTO?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. When Sync or Access is selected as Burst Type, this key is grayed out.
Preset	0 ON
State Saved	Saved in instrument state.
Min	0
Max	7
Initial S/W Revision	Prior to A.02.00

Mod Scheme

This functionality applies only to the following measurements.

- EDGE EVM measurement
- EDGE Power vs. Time measurement
- GMSK/EDGE Output RF Spectrum measurement

When Mod Scheme is set to Auto, the measurements automatically determines which Modulation Scheme the input signal is using.

Key Path	Mode Setup, Demod
Initial S/W Revision	A.02.00

Normal - NB

Selects the Modulation Scheme (modulation type) for Normal Burst that the analyzer will search for when Auto mode is selected. In manual mode, you may select the desired modulation type from the list.

Key Path	Mode Setup, Demod, Mod Scheme
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :SYNC:NORMal:MODulation:AUTO ON OFF 1 0</code> <code>[:SENSe] :SYNC:NORMal:MODulation:AUTO?</code>
Example	<code>SYNC:NORM:MOD:AUTO 1</code> <code>SYNC:NORM:MOD:AUTO?</code>
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Couplings	ON automatically changes to OFF when GMSK, 8PSK, 16QAM, 32QAM or AQPSK is selected.
Preset	ON
State Saved	Saved in instrument state.
Readback Text	EDGE NB: AutoDet
Initial S/W Revision	A.02.00
Modified at S/W Revision	A.06.00

Key Path	Mode Setup, Demod, Mod Scheme, Normal - NB
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :SYNC:NORMal:MODulation GMSK EPSK QAM16 QAM32 AQPSK</code> <code>[:SENSe] :SYNC:NORMal:MODulation?</code>
Example	<code>SYNC:NORM:MOD GMSK</code> <code>SYNC:NORM:MOD?</code>
Notes	You must be in the GSM mode to use this command. Use :INSTRUMENT:SElect to set the mode.
Dependencies	16QAM, 32QAM and AQPSK are available only when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, illegal parameter value error is returned.
Preset	EPSK
State Saved	Saved in instrument state.

Range	GMSK 8PSK 16QAM 32QAM AQPSK
Initial S/W Revision	A.02.00
Modified at S/W Revision	A.06.00

HSR - HB

Selects the Modulation Scheme (modulation type) for HSR Burst that the analyzer will search for when Auto mode is selected. In manual mode, you may select the desired modulation type from the list.

Key Path	Mode Setup, Demod, Mod Scheme
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] : SYNC : HSRate : MODulation : AUTO ON OFF 1 0 [:SENSe] : SYNC : HSRate : MODulation : AUTO ?
Example	SYNC:HSR:MOD:AUTO 1 SYNC:HSR:MOD:AUTO?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error is returned.
Couplings	ON automatically changes to OFF when QPSK, 16QAM or 32QAM is selected.
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	A.02.00

Key Path	Mode Setup, Demod, Mod Scheme, HSR - HB
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] : SYNC : HSRate : MODulation QPSK QAM16 QAM32 [:SENSe] : SYNC : HSRate : MODulation ?
Example	SYNC:HSR:MOD QAM32 SYNC:HSR:MOD?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error is returned.
Preset	QAM16
State Saved	Saved in instrument state.
Range	QPSK 16QAM 32QAM
Initial S/W Revision	A.02.00

Config Manual Sync Method

Selects the behavior type of synchronization and measurement for the Mod Scheme selected in NB or HB. This method is applicable in EDGE EVM and EDGE Power vs Time when Burst Sync is set to Training Sequence (by default).

- **Force Selected Method on All Slots:** In EDGE Power vs Time, the selected Mod Scheme is forced to use the synchronization method regardless of the input signal format. In EDGE EVM, the Mod Scheme is forced to use the demodulation method in addition to (as well as) the synchronization method. When the selected Mod Scheme does not match the input signal format (for example, if the selected Mode Scheme is 8PSK and the input signal format is 16QAM), a large EVM number or sync error may be observed.
- **Discard Non-Matching Slots:** Performs auto synchronization and picks up the value when the detected Mod Scheme matches the manually selected Mod Scheme. For example, if a signal that contains 8PSK, 16QAM and 32QAM formats is fed and the selected Mod Scheme is 16QAM, the analyzer will report measurement results of 16QAM only.

Key Path	Mode Setup, Demod, Mod Scheme
Mode	GSM
Remote Command	[:SENSe] :SYNC:CONFigure:METhod FORCe DISCard [:SENSe] :SYNC:CONFigure:METhod?
Example	SYNC:CONF:METH FORC SYNC:CONF:METH?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error is returned. Grayed out when the license is installed and both of Mod Scheme Normal and HSR are set to AutoDet.
Preset	DISC
State Saved	Saved in instrument state.
Range	Force Selected Method on All Slots Discard Non-Matching Slots
Readback Text	Force Method Discard Mismatch
Initial S/W Revision	A.02.00

AQPSK AutoDet

Selects whether to include auto modulation scheme detection of AQPSK or not. When Include, AQPSK is detectable when Burst Type is either Normal or Mixed and when EDGE Modulation Scheme Auto Detection for Normal Burst is enabled.

Auto detection of AQPSK requires some calculation time and excluding it may speed up EDGE EVM and PVT measurements. When Alpha of AQPSK is close to 0 or 90 degrees, it is like a normal burst GMSK. In

this case, the auto mod scheme detection algorithm may not work very well and AQPSK could be identified as GMSK or 8PSK.

Key	SCPI	Description
Include	ON	Include AQPSK in auto detectable mod schemes of normal bursts.
Exclude	OFF	Exclude AQPSK in auto detectable mod schemes of normal bursts.

This parameter applies only to the following measurements:

- EDGE EVM measurement
- EDGE Power vs. Time measurement

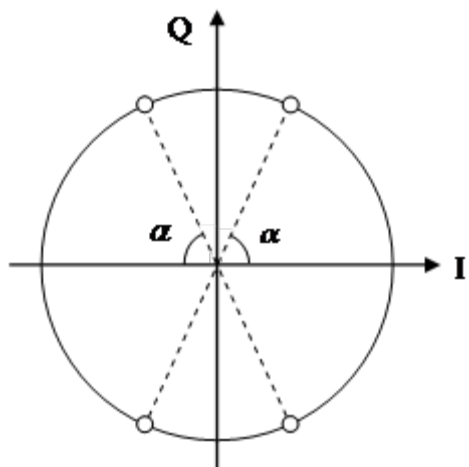
Key Path	Mode Setup, Demod
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] : SYNC : NORMal : MODulation : AUTO : AQPSk INCLude EXCLude [:SENSe] : SYNC : NORMal : MODulation : AUTO : AQPSk ?
Example	SYNC:NORM:MOD:AUTO:AQPS INCL SYNC:NORM:MOD:AUTO:AQPS?
Notes	This key appears only when N9071A–3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error is returned. The “AQPSK AutoDet” key is in the Mode Setup menu, but only EDGE EVM and EDGE PVT measurements support this feature. In other measurements, this setting is not applicable. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Unavailable when Modulation Scheme Auto Detection for Normal Burst is off and Modulation Scheme for Normal Burst is set to AQPSK.
Preset	EXCLude
State Saved	Saved in instrument state.
Range	Include Exclude
Initial S/W Revision	A.06.00

AQPSK SCPIR

Allows you to set Subchannel Power Imbalance Ratio (SCPIR) of AQPSK. SCPIR is defined in 3GPP TS 45.004 as

$$SCPIR = 20 \times \log_{10}(\tan(\alpha)) \text{ dB}$$

Symbol state IQ points of AQPSK is determined by α in the equation above as depicted in the following figure.



Key Path	Mode Setup, Demod, Mod Scheme
Mode	GSM
Scope	Meas Global
Remote Command	<code>[[:SENSe]:SYNC:NORMal:MODulation:AQPSk:ALPHa:SCPIr <real></code> <code>[[:SENSe]:SYNC:NORMal:MODulation:AQPSk:ALPHa:SCPIr?</code>
Example	<code>SYNC:NORM:MOD:AQPS:ALPH:SCP 10.0</code> <code>SYNC:NORM:MOD:AQPS:ALPH:SCP?</code>
Notes	This functionality does not affect Combined GSM/EDGE measurement. You must be in the GSM mode to use this command. Use <code>INSTRument:SElect</code> to set the mode. This key appears only when the N9071A-3FP license is installed. When it is unlicensed and this SCPI command is sent, a setting conflict error is returned.
Couplings	Change <code>[[:SENSe]:SYNC:NORMal:MODulation:AQPSk:ALPHa:ARCTan</code> to <code>10SCPIR/20</code> .
Preset	0.0
State Saved	Saved in instrument state.
Min	-10.0
Max	10.0
Default Unit	dB
Initial S/W Revision	A.07.00

AQPSK Alpha SCPI for Backward Compatibility

Mode	EDGE GSM
Scope	Meas Global
Remote Command	<code>[[:SENSe]:SYNC:NORMal:MODulation:AQPSk:ALPHa:ARCTan <real></code> <code>[[:SENSe]:SYNC:NORMal:MODulation:AQPSk:ALPHa:ARCTan?</code>
Example	<code>SYNC:NORM:MOD:AQPS:ALPH:ARCT 3.0</code> <code>SYNC:NORM:MOD:AQPS:ALPH:ARCT?</code>

Notes	This functionality does not affect Combined GSM/EDGE measurement. You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode. This key is obsolete since AQPSK Alpha is set by SCPIR. This SCPI command is available only when the N9071A-3FP license is installed. When it is unlicensed and this SCPI command is sent, a setting conflict error is returned.
Couplings	Change [:SENSe]:SYNC:NORMal:MODulation:AQPSk:ALPHA:SCPIr to $20\log_{10}(\tan(\alpha))$.
Preset	1.0
State Saved	Saved in instrument state.
Min	0.316227766 = $10^{-10/20}$
Max	3.162277660 = $10^{10/20}$
Initial S/W Revision	A.06.00
Modified at S/W Revision	A.07.00

Burst Search Threshold

Sets the relative power threshold from the peak power, which is used by the burst alignment algorithm to determine the burst rising edge and falling edge.

Key Path	Mode Setup, Demod
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe]:SYNC:BURSt:STHReshold <rel_ampl> [:SENSe]:SYNC:BURSt:STHReshold?
Example	SYNC:BURS:STHR -20 SYNC:BURS:STHR?
Notes	This functionality does not affect Combined GSM/EDGE measurement. You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Preset	-30
State Saved	Saved in instrument state.
Min	-200
Max	-0.01
Initial S/W Revision	Prior to A.02.00

HSR Pulse Shaping Filter

Selects the pulse shaping filter for higher symbol rate (HSR) signals. This menu key is available only when the N9071A-3FP license is installed.

This functionality applies only to the following measurements:

- EDGE EVM measurement
- EDGE Power vs. Time measurement
- GMSK/EDGE Output RF Spectrum measurement

Key	SCPI	Filter Option
Narrow	NARRow	Use the Spectrally Narrow Pulse Shaping Filter.
Wide	WIDE	Use the Spectrally Wide Pulse Shaping Filter.

Key Path	Mode Setup, Demod
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :RADio :PSHape NARRow WIDE</code> <code>[:SENSe] :RADio :PSHape ?</code>
Example	RAD:PSH WIDE RAD:PSH?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error is returned.
Preset	NARRow
State Saved	Saved in instrument state.
Range	Narrow Wide
Initial S/W Revision	A.02.00

Burst Align

Selects the sync alignment to be either to the GSM standard or the standard offset by 1/2 bit behind.

Key	SCPI	Description
GSM	GSM	Uses the burst alignment as defined in the GSM specifications.
1/2 Bit Offset	HBIT	Shifts the burst alignment by 1/2 bit, which corresponds to an earlier interpretation of the GSM standard. This selection applies to the Power vs. Time and the Phase and Frequency Error measurements.

Key Path	Mode Setup, Demod
Mode	GSM
Scope	Meas Global

Remote Command	<code>[:SENSe] :SYNC:ALIGnment GSM HBIT</code> <code>[:SENSe] :SYNC:ALIGnment?</code>
Example	<code>SYNC:ALIG HBIT</code> <code>SYNC:ALIG?</code>
Notes	You must be in the GSM mode to use this command. Use <code>INSTRument:SElect</code> to set the mode.
Preset	GSM
State Saved	Saved in instrument state.
Range	GSM 1/2 Bit Offset
Initial S/W Revision	Prior to A.02.00

Carrier BPF

Selects whether to use the carrier bandpass filter.

Key Path	FREQ Channel, Multi Carrier SetupMode Setup, Demod
Mode	GSM
Remote Command	<code>[:SENSe] :RADio:CARRier:NUMBer:AUTO ON OFF 1 0</code> <code>[:SENSe] :RADio:CARRier:NUMBer:AUTO?</code>
Example	<code>RAD:CARR:NUMB:AUTO 1</code> <code>RAD:CARR:NUMB:AUTO?</code>
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	ON automatically changes to OFF when Multiple or Single is selected as Carrier BPF Type.
Preset	ON
State Saved	Saved in instrument state.
Range	Auto Man
Initial S/W Revision	A.06.00

Carrier BPF Type

Opens a menu of keys that allows you to select the type of the bandpass filter. When carriers other than the signal of interest are present, especially if they are strong, they can interfere with the measurement, making it difficult to sync and producing artificially high EVM results. When this condition exists, toggle from Single to Multi. A band-limited filter will help reduce the measurement interference.

BPF Type	Description
MULTiple	Enable multi carrier tolerance filter.
SINGle	Disable multi carrier tolerance filter

This parameter applies only to the following measurements:

- GSMK Phase & Frequency Error measurement
- EDGE EVM measurement
- GSMK Power vs. Time
- EDGE Power vs. Time

Key Path	FREQ Channel, Multi Carrier Setup, Carrier BPFMode Setup, Demod, Carrier BPF
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :RADio :CARRier :NUMBer SINGLE MULTiple</code> <code>[:SENSe] :RADio :CARRier :NUMBer?</code>
Example	<code>RAD:CARR:NUMB SING</code> <code>RAD:CARR:NUMB?</code>
Notes	The Carrier Bandpass Filter key is in the Mode Setup menu, but only EDGE EVM and GSM PFER measurements support this feature. In other measurements, this setting is not applicable. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Preset	SINGLE
State Saved	Saved in instrument state.
Range	Single Multi
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

RF Sync Delay

Adjusts the “T0” point which has been measured in each measurement. This adjustment does not apply if the Burst Sync key (in each measurement’s Meas Setup menu) is set to None.

This parameter applies only to the GSMK/EDGE Power vs. Time measurement.

Key Path	Mode Setup, Demod
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :SYNC :BURSt :RFAMplitude :DELay <time></code> <code>[:SENSe] :SYNC :BURSt :RFAMplitude :DELay?</code>
Example	<code>SYNC:BURS:RFAM:DEL -10us</code> <code>SYNC:BURS:RFAM:DEL?</code>
Notes	This functionality does not affect Combined GSM/EDGE measurement. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.

Preset	0
State Saved	Saved in instrument state.
Min	-5 ms
Max	5 ms
Default Unit	ms
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

Noise Reduction

See "[Noise Reduction](#)" on page 314 for details.

Key Path	Mode Setup
Initial S/W Revision	Prior to A.02.00

Noise Floor Extension

See "[Noise Floor Extension](#)" on page 314 for details.

Key Path	Mode Setup
Initial S/W Revision	Prior to A.02.00

Noise Reduction

Noise Reduction accesses a menu for configuring the noise compensation of the instrument. This menu only appears in models that support Noise Reduction.

Key Path	Mode Setup
Initial S/W Revision	A.04.00

Noise Floor Extension

Turns on the Noise Floor Extension function. When this function is On, the expected noise power of the analyzer (derived from a factory calibration) is subtracted from the trace data. This will usually reduce the apparent noise level by about 10 dB in low band, and 8 dB in high band (>~3.6 GHz).

Noise Floor Extension works with any RBW, VBW, detector, any setting of Average Type, any amount of trace averaging, and any signal type. It is ineffective when the trace is not smoothed (smoothing processes include narrow VBWs, trace averaging, and long sweep times with the detector set to Average or Peak). It works best with extreme amounts of smoothing, and with the average detector, with the Average Type set to Power.

NOTE

Noise Floor Extensions has no effect unless the RF Input is selected, therefore it does nothing when External Mixing is selected.

In those cases where the cancellation is ineffective, it nonetheless has no undesirable side-effects. There is no significant speed impact to having Noise Floor Extension on.

The best accuracy is achieved when substantial smoothing occurs in each point before trace averaging. Thus, when using the average detector, results are better with long sweep times and fewer trace averages. When using the sample detector, the VBW filter should be set narrow with less trace averaging, instead of a wide VBW filter with more trace averaging.

See "[More Information](#)" on page 315

Key Path	Mode Setup, Noise Reduction
Scope	Meas Global
Remote Command	<code>[:SENSe] :CORRection:NOISe:FLOOr ON OFF 1 0</code> <code>[:SENSe] :CORRection:NOISe:FLOOr?</code>
Example	CORR:NOIS:FLO ON
Dependencies	This key only appears in instruments with the NFE or NF2 license installed. In all others, the key does not appear, however the SCPI command will be accepted without error (but will have no effect).
Couplings	When NFE is enabled in any mode manually, a prompt will be displayed reminding you to perform the Characterize Noise Floor operation if it is needed. If NFE is enabled through SCPI and a Characterize Noise Floor operation is needed, an error will be entered in the system error queue.
Preset	Unaffected by Mode Preset. Turned off by Restore Mode Defaults.
State Saved	No
Initial S/W Revision	A.04.00

More Information

The analyzer is characterized in the factory (or during a field calibration) with a model of the noise, referred to the input mixer, versus frequency in each band and path combination. Bands are 0 (low band) and 1 through 4 (high band) in a 26.5 GHz instrument, for example. Paths include normal paths, preamp paths, the electronic attenuator, etc.

In most band/path combinations, the noise can be well characterized based on just two parameters and the analyzer frequency response before compensation for frequency-dependent losses.

After the noise density at the input mixer is estimated, the effects of the input attenuator, RBW, detector, etc. are computed to get the estimated input-port-referred noise level.

In the simplest case, the measured power (signal plus analyzer noise) in each display point (bucket) is compensated by subtracting the estimated noise power, leaving just the signal power. This is the operation when the detector is Average and the Average Type is set to Power.

In other cases, operation is often not quite as good but still highly effective. With peak detection, the noise floor is estimated based on the RBW and the duration of the bucket using the same equations used in the noise marker function. The voltage of the noise is subtracted from the voltage of the observed signal-plus-

noise measurement to compute the estimated signal voltage. The peak detector is one example of processing that varies with detector to give good estimates of the signal level without the analyzer noise.

For best operation, the average detector and the power scale are recommended, as already stated. Peak detection for pulsed-RF can still give excellent effectiveness. FFT analysis does not work well, and does not do NFE well, with pulsed-RF signals, so this combination is not recommended. Negative peak detection is not very useful, either. Sample detection works well, but is never better than the average detector because it doesn't smooth as well. The Normal detector is a combination of peak and negative peak behaviors, and works about as well as these.

For best operation, extreme smoothing is desirable, as already stated. Using narrow VBWs works well, but using very long bucket durations and the average detector works best. Reducing the number of trace points will make the buckets longer.

For best operation, the power scale (Average Type = Power) is optimum. When making CW measurements in the presence of noise without NFE, averaging on the decibel scale has the advantage of reducing the effect of noise. When using NFE, the NFE does an even better job than using the log scale ever could. Using NFE with the log scale is not synergistic, though; NFE with the power scale works a little better than NFE with log averaging type.

The results from NFE with internal preamp can often be lower than the theoretical noise in a signal source at room temperature, a noise density of -174 dBm/Hz. This is expected and useful behavior, because NFE is designed to report the amount of input signal that is in excess of the thermal noise, not the amount that includes the thermal noise. This can be a useful behavior because thermal noise often interferes with what you want to measure, instead of being part of what you want to measure. Note that NFE is not adequately accurate to always be able to read below kTB.

On instruments with the NF2 license installed, the calibrated Noise Floor used by Noise Floor Extensions should be refreshed periodically. Agilent recommends that the Characterize Noise Floor operation be performed after the first 500 hours of operation, and once every calendar year. The key to perform this is located in the System, Alignments, Advanced menu. If you have not done this yourself at the recommended interval, then when you turn on Noise Floor Extensions, the analyzer will prompt you to do so with a dialog that says:

"This action will take several minutes to perform. Please disconnect all cables from the RF input and press Enter to proceed. Press ESC to cancel, or Postpone to postpone for a week."

If you Cancel, you will be prompted again the next time you turn NFE on. If you postpone, you will be prompted again after a week passes and you then turn NFE on.

Restore Mode Defaults

Resets the state for the currently active mode by resetting the mode persistent settings to their factory default values, clearing mode data and by performing a Mode Preset. This function will never cause a mode switch. This function performs a full preset for the currently active mode; whereas, Mode Preset performs a partial preset. Restore Mode Defaults does not affect any system settings. System settings are reset by the Restore System Defaults function. This function does reset mode data; as well as settings.

Key Path	Mode Setup
Remote Command	:INSTrument:DEFault
Example	:INST:DEF

Notes	Clears all pending OPC bits. The Status Byte is set to 0. A message comes up saying: "If you are sure, press key again".
Couplings	A Restore Mode Defaults will cause the currently running measurement to be aborted and causes the default measurement to be active. It gets the mode to a consistent state with all of the default couplings set.
Initial S/W Revision	Prior to A.02.00

Preset Type (Remote Command Only)

As stated in the Backward Compatibility section, to be compatible with ESA/PSA the PRESet:TYPE command will be implemented as a no-op.

Mode	All
Remote Command	:SYSTem:PRESet:TYPE FACTory MODE USER :SYSTem:PRESet:TYPE?
Example	:SYST:PRE:TYPE FACT
Notes	This command is supported for backward compatibility only. It is a no-op which does not change the behavior of any preset operation.
Preset	This is unaffected by Preset but is set to Mode on a "Restore System Defaults->All"
State Saved	No
Initial S/W Revision	Prior to A.02.00

Global Settings

Opens a menu that allows you to switch certain Meas Global parameters to a Mode Global state. These switches apply to all Modes that support global settings. No matter what Mode you are in when you set the "Global Center Frequency" switch to on, it applies to all Modes that support Global Settings.

Key Path	Mode Setup
Initial S/W Revision	Prior to A.02.00

Global Center Freq

The software maintains a Mode Global value called "Global Center Freq".

When the Global Center Freq key is switched to On in any mode, the current mode's center frequency is copied into the Global Center Frequency, and from then on all modes that support global settings use the Global Center Frequency. So you can switch between any of these modes and the Center Freq will remain unchanged.

Adjusting the Center Freq of any mode which supports Global Settings, while Global Center Freq is On, will modify the Global Center Frequency.

When Global Center Freq is turned Off, the Center Freq of the current mode is unchanged, but now the Center Freq of each mode is once again independent.

When Mode Preset is pressed while Global Center Freq is On, the Global Center Freq is preset to the preset Center Freq of the current mode.

This function is reset to Off when the Restore Defaults key is pressed in the Global Settings menu, or when System, Restore Defaults, All Modes is pressed.

Key Path	Mode Setup, Global Settings
Scope	Mode Global
Remote Command	:INSTrument:COUPle:FREQuency:CENTer ALL NONE :INSTrument:COUPle:FREQuency:CENTer?
Example	INST:COUP:FREQ:CENT ALL INST:COUP:FREQ:CENT?
Preset	Set to Off on Global Settings, Restore Defaults and System, Restore Defaults, All Modes
Range	On Off
Initial S/W Revision	Prior to A.02.00

Remote Command	:GLOBal:FREQuency:CENTer[:STATe] 1 0 ON OFF :GLOBal:FREQuency:CENTer[:STATe]?
Preset	Off
Initial S/W Revision	Prior to A.02.00

Restore Defaults

This key resets all of the functions in the Global Settings menu to Off. This also occurs when System, Restore Defaults, All Modes is pressed.

Key Path	Mode Setup, Global Settings
Remote Command	:INSTrument:COUPle:DEFault
Example	INST:COUP:DEF
Backwards Compatibility SCPI	:GLOBal:DEFault
Initial S/W Revision	Prior to A.02.00

6 System Functions

File

Opens a menu that enables you to access various standard and custom Windows functions. Press any other front-panel key to exit

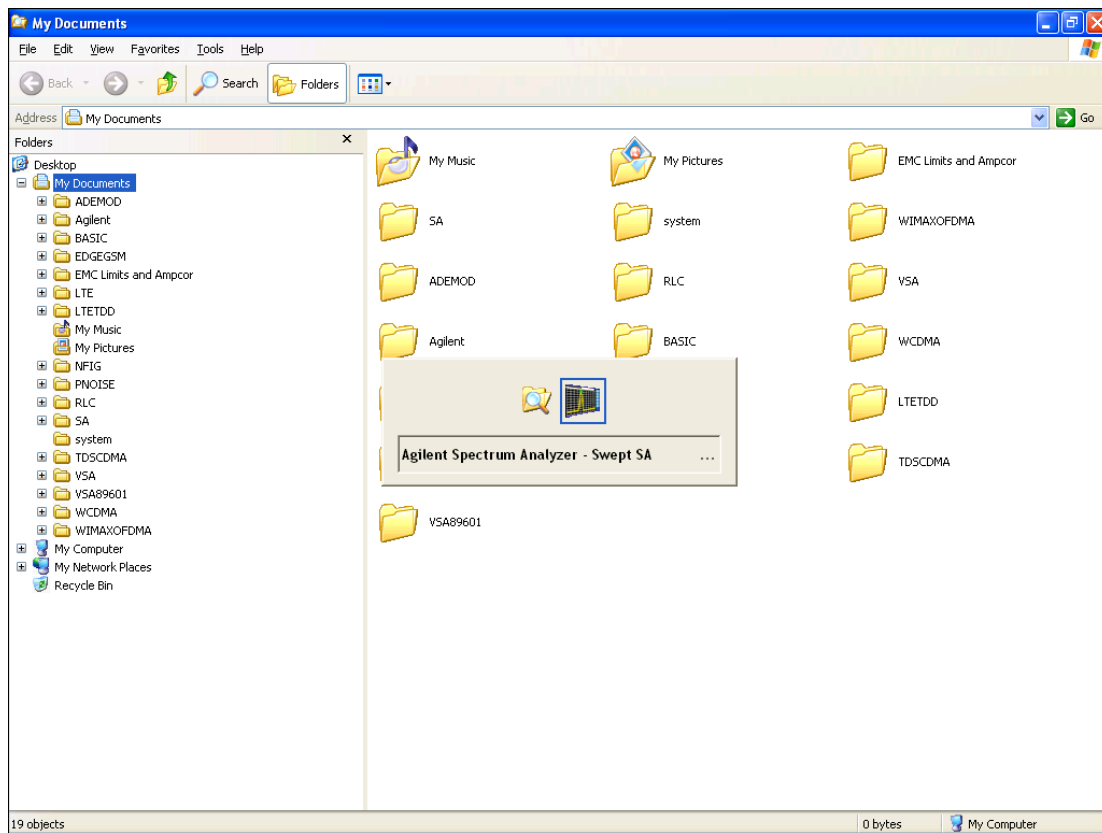
Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

File Explorer

Opens the standard Windows File Explorer. The File Explorer opens in the My Documents directory for the current user.

The File Explorer is a separate Windows application, so to return to the analyzer once you are in the File Explorer, you may either:

Exit the File Explorer by clicking on the red X in the upper right corner, with a mouse



Or use Alt-Tab: press and hold the Alt key and press and release the Tab key until the Analyzer logo is showing in the window in the center of the screen, as shown above, then release the Alt key.

The ability to access File Explorer is not available if Option SF1 is installed.

Key Path	File
Initial S/W Revision	Prior to A.02.00

Print

The Print key opens a Print dialog for configured printing (for example, to the printer of your choice). Refer to your Microsoft Windows Operating System manual for more information.

Maximize/Restore Down

These keys allow the Instrument Application to be maximized and then restored to its prior state. Only one of the two keys is visible at a time. When not already maximized the Maximize Application key is visible, and when maximized, the Restore Down Application key is visible and replaces the Maximize Application key.

Maximize

This key allows you to Maximize the Instrument Application, which causes the analyzer display to fill the screen. Once the application is maximized, this key is replaced by the Restore Down key.

Key Path	File
Mode	All
Notes	No equivalent remote command for this key.
State Saved	No
Initial S/W Revision	A.05.01

Restore Down

This key allows you to Restore Down the Instrument Application and reverses the action taken by Maximize. This key is only visible when the application has been maximized, and after the Restore Down action has been completed this key is replaced by the Maximize key.

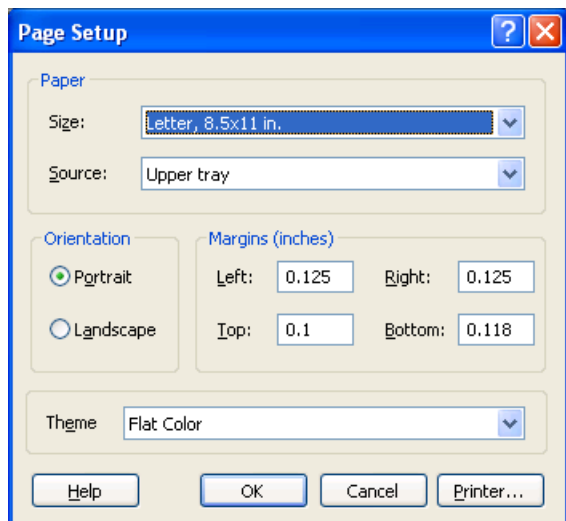
Key Path	File
Mode	All
Notes	No equivalent remote command for this key.
State Saved	No
Initial S/W Revision	A.05.01

Page Setup

The Page Setup key brings up a Windows Page Setup dialog that allows you to control aspects of the pages sent to the printer when the PRINT hardkey is pressed.

Key Path	File
Initial S/W Revision	Prior to A.02.00

Paper size, the printer paper source, the page orientation and the margins are all settable. Just like any standard Windows dialog, you may navigate the dialog using the front-panel keys, or a mouse. There are no SCPI commands for controlling these parameters.



Also contained in this dialog is a drop-down control that lets you select the Theme to use when printing. For more on Themes, see information under View/Display, Display, System Display Settings, Theme. The Theme control has a corresponding SCPI command.

Parameter Name	Print Themes
Parameter Type	Enum
Mode	All
Remote Command	:SYSTem:PRINt:THEMe TDCOLOR TDMonochrome FCOLOR FMONochrome :SYSTem:PRINt:THEMe?
Example	:SYST:PRIN:THEM FCOL
Setup	:SYSTem:DEFault MISC
Preset	FCOL; not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes.
State Saved	No
Initial S/W Revision	Prior to A.02.00

Print

This front-panel key is equivalent to performing a File, Print, OK. It immediately performs the currently configured Print to the Default printer.

The :HCOPY command is equivalent to pressing the PRINT key. The HCOPY:ABORT command can be used to abort a print which is already in progress. Sending HCOPY:ABORT will cause the analyzer to stop sending data to the printer, although the printer may continue or even complete the print, depending on how much data was sent to the printer before the user sent the ABORT command.

Key Path	Front-panel key
Remote Command	:HCOPY[:IMMEDIATE]
Initial S/W Revision	Prior to A.02.00

Key Path	SCPI command only
Remote Command	:HCOPY:ABORT
Initial S/W Revision	Prior to A.02.00


Restore Down

This key allows you to Restore Down the Instrument Application and reverses the action taken by Maximize. This key is only visible when the application has been maximized, and after the Restore Down action has been completed this key is replaced by the Maximize key.

Key Path	File
Mode	All
Notes	No equivalent remote command for this key.
State Saved	No
Initial S/W Revision	A.05.01

Minimize

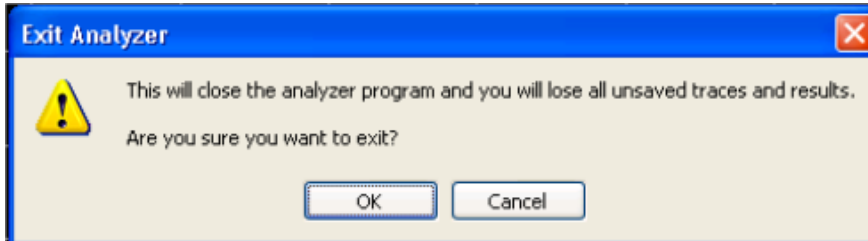
The Minimize key causes the analyzer display to disappear down into the task bar, allowing you to see the

Windows Desktop. You can use Alt-Tab (press and hold the Alt  key and press and release the Tab key) to restore the analyzer display.

Key Path	File
Mode	All
Notes	No equivalent remote command for this key.
State Saved	No
Initial S/W Revision	A.05.01

Exit

This key, when pressed, will exit the Instrument Application. A dialog box is used to confirm that you intended to exit the application:



Key Path	File
Mode	All
Notes	The Instrument Application will close. No further SCPI commands can be sent. Use with caution!
Initial S/W Revision	Prior to A.02.00

Print

This front-panel key is equivalent to performing a File, Print, OK. It immediately performs the currently configured Print to the Default printer.

The :HCOPY command is equivalent to pressing the PRINT key. The HCOPY:ABORT command can be used to abort a print which is already in progress. Sending HCOPY:ABORT will cause the analyzer to stop sending data to the printer, although the printer may continue or even complete the print, depending on how much data was sent to the printer before the user sent the ABORT command.

Key Path	Front-panel key
Remote Command	:HCOPY[:IMMEDIATE]
Initial S/W Revision	Prior to A.02.00

Key Path	SCPI command only
Remote Command	:HCOPY:ABORT
Initial S/W Revision	Prior to A.02.00

System

Opens a menu of keys that access various configuration menus and dialogs.

Key Path	Front-panel key
Notes	No remote command for this key specifically.
Initial S/W Revision	Prior to A.02.00

Show

Accesses a menu of choices that enable you to select the information window you want to view.

Key Path	System
Mode	All
Remote Command	:SYSTem:SHOW OFF ERRor SYSTem HARDware LXI HWSTatistics ALIGNment SOFTware CAPplication :SYSTem:SHOW?
Example	:SYST:SHOW SYST
Notes	This command displays (or exits) the various System information screens.
Preset	OFF
State Saved	No
Range	OFF ERRor SYSTem HARDware LXI HWSTatistics ALIGNment SOFTware CAPplication
Initial S/W Revision	Prior to A.02.00

Errors

There are two modes for the Errors selection, History and Status.

The list of errors displayed in the Errors screen does not automatically refresh. You must press the Refresh key or leave the screen and return to it to refresh it.

History brings up a screen displaying the event log in chronological order, with the newest event at the top. The history queue can hold up to 100 messages (if a message has a repeat count greater than 1 it only counts once against this number of 100). Note that this count bears no relation to the size of the SCPI queue. If the queue extends onto a second page, a scroll bar appears to allow scrolling with a mouse. Time is displayed to the second.

Status brings up a screen summarizing the status conditions currently in effect. Note that the time is displayed to the second.

The fields on the Errors display are:

Type (unlabeled) - Displays the icon identifying the event or condition as an error or warning.

ID - Displays the error number.

Message - Displays the message text.

Repeat (RPT) - This field shows the number of consecutive instances of the event, uninterrupted by other events. If an event occurs 5 times with no other intervening event, the value of repeat will be 5.

If the value of Repeat is 1 the field does not display. If the value of Repeat is >1, the time and date shown are those of the most recent occurrence. If the value of repeat reaches 999,999 it stops there.

Time - Shows the most recent time (including the date) at which the event occurred.

Key Path	System, Show
Mode	All
Remote Command	:SYSTem:ERRor[:NEXT]?
Example	:SYST:ERR?
Notes	The return string has the format: “<Error Number>,<Error>” Where <Error Number> and <Error> are those shown on the Show Errors screen
Backwards Compatibility Notes	In some legacy analyzers, the Repeat field shows the number of times the message has repeated since the last time the error queue was cleared. In the X-Series, the Repeat field shows the number of times the error has repeated since the last intervening error. So the count may very well be different than in the past even for identical signal conditions Unlike previous analyzers, in the X-Series all errors are reported through the Message or Status lines and are logged to the event queue. They never appear as text in the graticule area (as they sometimes do in previous analyzers) and they are never displayed in the settings panel at the top of the screen (as they sometimes do, by changing color, in previous analyzers). As a consequence of the above, the user can only see one status condition (the most recently generated) without looking at the queue. In the past, at least in the Spectrum Analyzer, multiple status conditions might display on the right side of the graticule. In general, there is no backwards compatibility specified or guaranteed between the error numbers in the X-Series and those of earlier products. Error, event, and status processing code in customers' software will probably need to be rewritten to work with X-Series. In the legacy analyzers, some conditions report as errors and others simply turn on status bits. Conditions that report as errors often report over and over as long as the condition exists. In the X-series, all conditions report as start and stop events. Consequently, software that repeatedly queries for a condition error until it stops reporting will have to be rewritten for the X-series.
Initial S/W Revision	Prior to A.02.00

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Key Path	System, Show, Errors
Initial S/W Revision	Prior to A.02.00

Next Page

Next Page and Previous Page menu keys move you between pages of the log, if it fills more than one page. These keys are grayed out in some cases:

- If on the last page of the log, the Next Page key is grayed-out
- If on the first page of the log, the Previous Page key is grayed-out.
- If there is only one page, both keys are grayed out.

Key Path	System, Show, Errors
Initial S/W Revision	Prior to A.02.00

History

The History and Status keys select the Errors view. The Status key has a second line that shows a number in [square brackets]. This is the number of currently open status items.

Key Path	System, Show, Errors
Initial S/W Revision	Prior to A.02.00

Verbose SCPI On/Off

When you turn Verbose SCPI on, additional information is returned when you send the :SYSTem:ERRor? query. The additional information consists of the characters that stimulated the error. This can aid you in debugging your test programs by indicating where in the parsing of a SCPI command the instrument encountered an invalid command or query.

Specifically, with Verbose SCPI on, the SYSTem:ERRor? query is expanded to show the SCPI data received, with the indicator <Err> at the point in the stream that the error occurred.

Verbose SCPI has no effect on the Show Errors screen or front panel Message Line; it only changes the response to the :SYST:ERR? query.

See the example below, where the invalid command "SENS:BOGUS" is sent:

Normal response to :SYST:ERR (using the Telnet window):

```
SCPI> SENS:BOGUS
```

```
SCPI> SYST:ERR?
```

```
-113,"Undefined header"
```

Now after turning on Verbose SCPI:

```
SCPI> SYST:BOGUS
```

```
SCPI> SYST:ERR?
```

```
-113,"Undefined header;SYST:BOGUS<Err>"
```


Key Path	System, Show, Errors
Mode	All
Remote Command	:SYSTem:ERRor:VERBose OFF ON 0 1 :SYSTem:ERRor:VERBose?
Example	:SYST:ERR:VERB ON
Preset	This is unaffected by Preset but is set to OFF on a "Restore System Defaults->Misc"
State Saved	No
Range	On Off
Initial S/W Revision	Prior to A.02.00

Refresh

When pressed, refreshes the Show Errors display.

Key Path	System, Show, Errors
Initial S/W Revision	Prior to A.02.00

Clear Error Queue

This clears all errors in all error queues.

Note the following:

- Clear Error Queue does not affect the current status conditions.
- Mode Preset does not clear the error queue.
- Restore System Defaults will clear all error queues.
- *CLS only clears the queue if it is sent remotely and *RST does not affect any error queue.
- Switching modes does not affect any error queues.

Key Path	System, Show, Errors
Initial S/W Revision	Prior to A.02.00

Status

See "[History](#)" on page 328.

Input Overload Enable (Remote Command Only)

Input Overload errors are reported using the Input Overload status bit (bit 12 in the Measurement Integrity status register). Input Overloads (for example, ADC Overload errors) can come and go with great frequency, generating many error events (for example, for signals just on the verge of overload), and so are

not put into the SCPI error queue by default. Normally the status bit is the only way for detecting these errors remotely.

It is possible to enable Input Overload reporting to the SCPI queue, by issuing the :SYSTem:ERRor:OVERload ON command. To return to the default state, issue the :SYSTem:ERRor:OVERload OFF command. In either case, Input Overloads always set the status bit.

NOTE

For versions of firmware before A.10.01, the Input Overload was only a Warning and so was never available in the SCPI queue, although it did set the status bit. For A.10.01 and later, the Input Overload is an error and can be enabled to the SCPI queue using this command.

Key Path	SCPI only
Remote Command	:SYSTem:ERRor:OVERload[:STATe] 0 1 OFF ON
Example	:SYST:ERR:OVER 1 Enable overload errors
Preset	Set to OFF by Restore Misc Defaults (no Overload errors go to SCPI)
State Saved	Saved in instrument state.
Initial S/W Revision	A.10.01

System

The System screen is formatted into three groupings: product descriptive information, options tied to the hardware, and software products:

```

<Product Name> <Product Description>
Product Number: N9020A
Serial Number: US46220924
Firmware Revision: A.01.01
Computer Name: <hostname>
Host ID: N9020A,US44220924

N9020A-503      Frequency Range to 3.6 GHz
N9020A-PFR     Precision Frequency Reference
N9020A-P03     Preamp 3.6 GHz

N9060A-2FP     Spectrum Analysis Measurement Suite  1.0.0.0
N9073A-1FP     WCDMA                               1.0.0.0
N9073A-2FP     WCDMA with HSDPA                      1.0.0.0
    
```

The Previous Page is grayed-out if the first page of information is presently displayed. The Next Page menu key is grayed-out if the last page is information is presently displayed.

Key Path	System, Show
----------	--------------

Mode	All
Example	SYST:SHOW SYST
Backwards Compatibility Notes	The hardware statistics that are displayed in the PSA Show System screen have been moved to a dedicated Show Hardware Statistics screen in the Service Menu.
Initial S/W Revision	Prior to A.02.00

Show System contents (Remote Command Only)

A remote command is available to obtain the contents of the Show System screen (the entire contents, not just the currently displayed page).

Remote Command	:SYSTem:CONFigure[:SYSTem]?
Example	:SYST:CONF?
Notes	The output is an IEEE Block format of the Show System contents. Each line is separated with a new-line character.
Initial S/W Revision	Prior to A.02.00

Hardware

The show hardware screen is used to view details of the installed hardware. This information can be used to determine versions of hardware assemblies and field programmable devices, in the advent of future upgrades or potential repair needs.

The screen is formatted into two groupings: product descriptive information and hardware information. The hardware information is listed in a table format:

6 System Functions System

Hardware Information

MXA Signal Analyzer
 Product Number: N9020A
 Serial Number: US46220107
 Firmware Revision: A.01.14

Assembly Name	Part #	Serial #	Mat Rev	Rev	OF Rev	Hw Id	Misc
Analog IF	E441060104	78060200131	003	0	C	15	
YIG Tuned Filter	50877305	11061500550	005	0	A	11	
Digital IF	E441060105	78060100559	003	0	F	14	
Front End Controller	E441060101	78060100147	004	2	A	8	
Low Band Switch	E441060170	78060800346	005	1	A	10	
LO Synthesizer	E441060102	78060100226	003	3	G	2	
Reference	E441060108	78060300420	004	1	C	16	
Front End	E441060154	13062800820	010	2	B	9	

The Previous Page is grayed-out if the first page of information is presently displayed. The Next Page menu is grayed-out if the last page is information is presently displayed.

Key Path	System, Show
Mode	All
Example	SYST:SHOW HARD
Initial S/W Revision	Prior to A.02.00

LXI

This key shows you the product number, serial number, firmware revision, computer name, IP address, Host ID, LXI Class, LXI Version, MAC Address, and the Auto-MDIX Capability.

Key Path	System, Show
Initial S/W Revision	Prior to A.02.00

System Remote Commands (Remote Commands Only)

The commands in this section have no front-panel key equivalent.

"System Powerdown (Remote Command Only)" on page 403

"List installed Options (Remote Command Only)" on page 404

"Lock the Front-panel keys (Remote Command Only)" on page 404

"List SCPI Commands (Remote Command Only)" on page 404

"SCPI Version Query (Remote Command Only)" on page 405

"Date (Remote Command Only)" on page 405

"Time (Remote Command Only)" on page 405

Initial S/W Revision	Prior to A.02.00
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System Powerdown (Remote Command Only)

Remote Command	SYSTem:PDOWn [NORMal FORCe]
-----------------------	-----------------------------

Notes	Shuts down the instrument in the normal way (NORMal) or forced way (FORCe). In case there is another application with modified data pending for saving, the application prompt the user. The system waits until the user responds in the normal mode. It will go off after 20 seconds of wait in the force mode and all data will be lost.
-------	--

List installed Options (Remote Command Only)

Lists the installed options that pertain to the instrument (signal analyzer). .

Mode	All
------	-----

Remote Command	:SYSTem:OPTions?
-----------------------	------------------

Example	:SYST:OPT?
----------------	------------

Notes	The return string is a comma separated list of the installed options. For example: "503,P03,PFR" :SYSTem:OPTions? and *OPT? are the same.
-------	---

State Saved	No
-------------	----

Initial S/W Revision	Prior to A.02.00
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Lock the Front-panel keys (Remote Command Only)

Disables the instrument keyboard to prevent local input when the instrument is controlled remotely. Annunciation showing a "K" for 'Klock" (keyboard lock) alerts the local user that the keyboard is locked. Klock is similar to the GPIB Local Lockout function; namely that no front-panel keys are active with the exception of the Power Standby key. (The instrument is allowed to be turned-off if Klock is ON.) The Klock command is used in remote control situations where Local Lockout cannot be used.

Although primary intent of Klock is to lock-out the front panel, it will lock-out externally connected keyboards through USB. Klock has no effect on externally connected pointing devices (mice).

The front panel 'Local' key (Cancel/Esc) has no effect if Klock is ON.

Mode	All
Remote Command	:SYSTem:KLOCK OFF ON 0 1 :SYSTem:KLOCK?
Example	:SYST:KLOC ON
Notes	Keyboard lock remains in effect until turned-off or the instrument is power-cycled
Preset	Initialized to OFF at startup, unaffected by Preset
State Saved	No
Initial S/W Revision	Prior to A.02.00

List SCPI Commands (Remote Command Only)

Outputs a list of the valid SCPI commands for the currently selected Mode.

Remote Command	:SYSTem:HELP:HEADers?
Example	:SYST:HELP:HEAD?
Notes	The output is an IEEE Block format with each command separated with the New-Line character (hex 0x0A)
Initial S/W Revision	Prior to A.02.00

SCPI Version Query (Remote Command Only)

Returns the SCPI version number with which the instrument complies. The SCPI industry standard changes regularly. This command indicates the version used when the instrument SCPI commands were defined.

Remote Command	:SYSTem:VERSion?
Example	:SYST:VERS?
Initial S/W Revision	Prior to A.02.00

Date (Remote Command Only)

The recommended access to the Date, Time, and Time zone of the instrument is through the Windows native control (Control Panel or accessing the Task Bar). You may also access this information remotely, as shown in this command and Time (below).

Sets or queries the date in the instrument.

Mode	All
Remote Command	:SYSTem:DATE "<year>,<month>,<day>" :SYSTem:DATE?

Example	:SYST:DATE "2006,05,26"
Notes	<p><year> is the four digit representation of year. (for example, 2006)</p> <p><month> is the two digit representation of year. (for example. 01 to 12)</p> <p><day> is the two digit representation of day. (for example, 01 to 28, 29, 30, or 31) depending on the month and year</p> <p>Unless the current account has Power User or Administrator privileges, an error will be generated by this command and no action will be taken.</p>
Initial S/W Revision	Prior to A.02.00

Time (Remote Command Only)

Sets or queries the time in the instrument.

Mode	All
Remote Command	<pre>:SYSTem:TIME "<hour>,<minute>,<second>"</pre> <pre>:SYSTem:TIME?</pre>
Example	:SYST:TIME "13,05,26"
Notes	<p><hour> is the two digit representation of the hour in 24 hour format</p> <p><minute> is the two digit representation of minute</p> <p><second> is the two digit representation of second</p> <p>Unless the current account has Power User or Administrator privileges, an error will be generated by this command and no action will be taken.</p>
Initial S/W Revision	Prior to A.02.00

Power On

Enables you to select how the instrument should power on. The options are: Mode and Input/Output Defaults, User Preset and Last State.

Key Path	System
Mode	All
Remote Command	<pre>:SYSTem:PON:TYPE MODE USER LAST</pre> <pre>:SYSTem:PON:TYPE?</pre>
Example	:SYST:PON:TYPE MODE
Preset	This is unaffected by a Preset but is set to Mode on a "Restore System Defaults->All"
State Saved	No
Backwards Compatibility SCPI	<pre>:SYSTem:PON:TYPE PRESet</pre> <p>the "PRESet" parameter is supported for backward compatibility only and behaves the same as MODE.</p>
Backwards Compatibility	The Preset Type key in legacy analyzers has been removed, and the Power On toggle key has been

Notes	replaced by this 1-of-N key in the System menu.
Initial S/W Revision	Prior to A.02.00

Mode and Input/Output Defaults

When the analyzer is powered on in Mode and Input/Output Defaults, it performs a Restore Mode Defaults to all modes in the instrument and also performs a Restore Input/Output Defaults.

Persistent parameters (such as Amplitude Correction tables or Limit tables) are not affected at power on, even though they are normally cleared by Restore Input/Output Defaults and/or Restore Mode Defaults.

Key Path	System, Power On
Mode	All
Example	SYST:PON:TYPE MODE
Readback Text	Defaults
Initial S/W Revision	Prior to A.02.00

User Preset

Sets Power On to User Preset. When the analyzer is powered on in User Preset, it will User Preset each mode and switch to the power-on mode. Power On User Preset will not affect any settings beyond what a normal User Preset affects.

NOTE

An instrument could never power up for the first time in User Preset.

Key Path	System, Power On
Mode	All
Example	SYST:PON:TYPE USER
Readback Text	User Preset
Backwards Compatibility Notes	Power On User Preset will cause the instrument to power up in the power-on mode, not the last mode the instrument was in prior to shut down. Also, Power On User Preset will User Preset all modes. This does not exactly match legacy behavior.
Initial S/W Revision	Prior to A.02.00

Last State

Sets Power On to **Last**. When the analyzer is powered on, it will put all modes in the last state they were in prior to when the analyzer was put into Power Standby and it will wake up in the mode it was last in prior to powering off the instrument. The saving of the active mode prior to shutdown happens behind the scenes when a controlled shutdown is requested by using the front panel power Standby key or by using the remote command SYSTem:PDOWn. The non-active modes are saved as they are deactivated and recalled by Power On Last State.

NOTE

An instrument can never power up for the first time in Last.

If line power to the analyzer is interrupted, for example by pulling the line cord plug or by switching off power to a test rack, Power On Last State may not work properly. For proper operation, Power On Last State depends on you shutting down the instrument using the Standby key or the SYSTem:PDOWn SCPI command. This will ensure the last state of each mode is saved and can be recalled during a power up.

Key Path	System, Power On
Mode	All
Example	SYST:PON:TYPE LAST
Notes	Power on Last State only works if you have done a controlled shutdown prior to powering on in Last. If a controlled shutdown is not done when in Power On Last State, the instrument will power up in the last active mode, but it may not power up in the active mode's last state. If an invalid mode state is detected, a Mode Preset will occur. To control the shutdown under remote control use the :SYSTem:PDOWn command.
Readback Text	Last State
Backwards Compatibility Notes	It is no longer possible to power-up the analyzer in the last mode the analyzer was running with that mode in the preset state. (ESA/PSA SYST:PRESET:TYPE MODE with SYST:PON:PRESET) You can power-on the analyzer in the last mode the instrument was running in its last state (SYST:PON:TYPE LAST), or you can specify the mode to power-up in its preset state (SYST:PON:MODE <mode>).
Initial S/W Revision	Prior to A.02.00

Power On Application

Accesses a menu that lists the available Modes and lets you select which Mode is to be the power-on application.

This application is used for Power On Type “Mode and Input/Output Defaults” and Restore System Defaults All.

Key Path	System, Power On
Mode	All
Remote Command	:SYSTem:PON:MODE SA BASIC ADEMOD NFIGURE PNOISE CDMA2K TDSCDMA VSA VSA89601 WCDMA WIMAXOFDMA :SYSTem:PON:MODE?
Example	SYST:PON:MODE SA
Notes	The list of possible modes (and remote parameters) to choose from is dependent on which modes are installed in the instrument.
Preset	This is unaffected by a Preset but is set on a “Restore System Defaults->All” to: For N9038A: EMI For N8973B, N8974B, N8975B, or N8976B: NFIG

	For all other models: SA
State Saved	No
Initial S/W Revision	Prior to A.02.00

Configure Applications

The Configure Applications utility can be used to:

- select applications for preload
- determine how many applications can fit in memory at one time
- specify the order of the Modes in the Mode menu.

This utility consists of a window with instructions, a set of “Select Application” checkboxes, a “fuel bar” style memory gauge, and keys that help you set up your configuration.

For more information, see the following topics:

["Preloading Applications" on page 338](#)

["Access to Configure Applications utility" on page 339](#)

["Virtual memory usage" on page 339](#)

Key Path	System, Power On
Example	:SYST:SHOW CAPP Displays the Config Applications screen
Initial S/W Revision	A.02.00

Preloading Applications

During runtime, if a Mode that is not preloaded is selected using the Mode menu or sending SCPI commands, there will be a pause while the Application is loaded. During this pause a message that says “Loading application, please wait ...” is displayed. Once loaded, the application stays loaded, so the next time you select it during a session, there is no delay.

Preloading enables you to “preload” at startup, to eliminate the runtime delay. Preloading an application will cause it to be loaded into the analyzer’s memory when the analyzer program starts up. If you do this, the delay will increase the time it takes to start up the analyzer program, but this may be preferable to having to wait the first time you select an application. Note that, once an application is loaded into memory, it cannot be unloaded without exiting and restarting the analyzer program.

Note that there are more applications available for the X-Series than can fit into Windows Virtual Memory. By allowing you to choose which licensed applications to load at startup, the Configure Applications utility allows you to make optimal use of your memory.

Access to Configure Applications utility

A version of the utility runs the first time you power up the analyzer after purchasing it from Agilent. The utility automatically configures preloads so that as many licensed applications as possible are preloaded while keeping the total estimated virtual memory usage below the limit. This auto-configuration only takes place at the very first run, and after analyzer software upgrades.

You may, at any time, manually call up the Configure Applications utility by pressing System, Power On, Configure Applications, to find a configuration that works best for you, and then restart the analyzer program.

The utility may also be called if, during operation of the analyzer, you attempt to load more applications than can fit in memory at once.

Virtual memory usage

There are more applications available for the X-Series than can fit into memory at any one time, so the Configure Applications utility includes a memory tracker that serves two purposes:

1. It will not let you preload more applications than will fit into memory at once.
2. You can determine how many of your favorite applications can reside in memory at one time.

The utility provides a graphical representation of the amount of memory (note that the memory in question here is Virtual memory and is a limitation imposed by the operating system, not by the amount of physical memory you have in your analyzer). You select applications to preload by checking the boxes on the left. Checked applications preload at startup. The colored fuel bar indicates the total memory required when all the checked applications are loaded (either preloaded or selected during runtime).

Here is what the fuel bar colors mean:

RED: the applications you have selected cannot all fit into the analyzer's memory. You must deselect applications until the fuel bar turns yellow.

YELLOW: the applications you have selected can all fit into the analyzer's memory, but there is less than 10% of the memory left, probably not enough to load any other applications, either via preload or by selecting a Mode while the analyzer is running..

GREEN: The indicator is green when <90% of the memory limit is consumed. This means the applications you have selected can all fit into the analyzer's memory with room to spare. You will likely be able to load one or more other applications without running out of memory.

Select All

Marks all applications in the selection list. This allows you to enable all applications licensed on the instrument for pre-loading, or is a convenience for selecting all applications in one operation and then letting you deselect individual applications.

Key Path	System, Power On, Configure Applications
Initial S/W Revision	A.02.00

Deselect All

Clears the marks from all applications in the selection list, except the Power On application. The Power On application cannot be eliminated from the pre-load list.

Key Path	System, Power On, Configure Applications
Initial S/W Revision	A.02.00

Move Up

The application list is the order that applications appear in the Mode Menu. This key enables you to shift the selected application up in the list, thus moving the selected application earlier in the Mode Menu.

Key Path	System, Power On, Configure Applications
Initial S/W Revision	A.02.00

Move Down

The application list is the order that applications appear in the Mode Menu. This key enables you to shift the selected application down in the list, thus moving the selected application later in the Mode Menu.

Key Path	System, Power On, Configure Applications
Initial S/W Revision	A.02.00

Select/Deselect

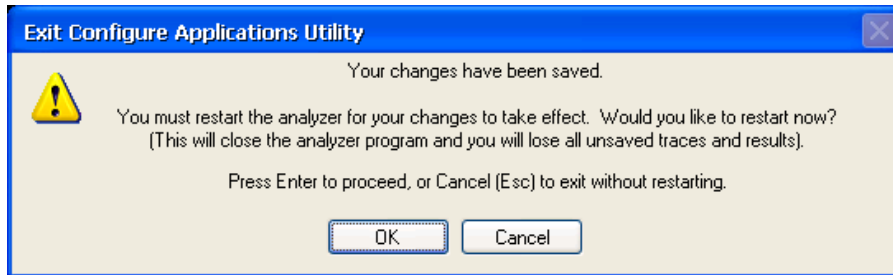
Toggles the currently highlighted application in the list.

Key Path	System, Power On, Configure Applications
Initial S/W Revision	A.02.00

Save Changes and Exit

Applies the configuration of the applications list. The marked applications will be pre-loaded in memory the next time the instrument application is started, and the order of the applications in the list will be the order of the applications in the Mode Menu.

After saving your changes, the analyzer asks you if you would like it to restart so that your changes can take effect (see dialog box, below). If you choose not to restart, the changes will not take effect until the next time you shut down and restart the analyzer.



Key Path	System, Power On, Configure Applications
Remote Command	:SYSTem:PUP:PROcEss
Example	:SYST:PUP:PROC This is the SCPI command for restarting the analyzer. You must Wait after this command for the instrument application to restart
Notes	The softkey will be grayed-out when the virtual memory of the selected applications exceeds 100% of the limit.
Notes	You cannot use *WAI or *OPC? to synchronize operation after a restart. This command stops and restarts the instrument application, thus the SCPI operation is terminated and restarted. A remote program must use fixed wait time to resume sending commands to the instrument. The wait time will be dependent upon which applications are pre-loaded.
Initial S/W Revision	A.02.00
Modified at S/W Revision	A.04.00

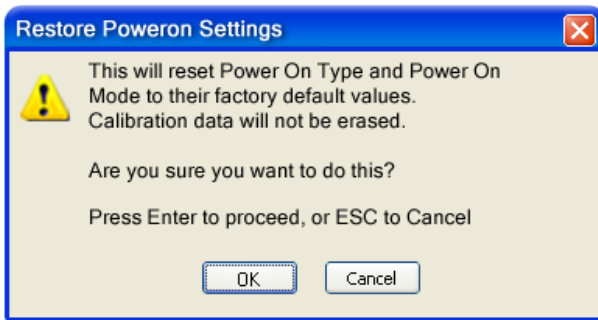
Exit Without Saving

Pressing this key will exit the Configure Applications utility without saving your changes.

Key Path	System, Power On, Configure Applications
Initial S/W Revision	A.02.00
Modified at S/W Revision	A.04.00

Restore Power On Defaults

This selection causes the Power On Type and Power On Application settings to be a reset to their default values. This level of Restore System Defaults does not affect any other system settings, mode settings and does not cause a mode switch. The Power On key, under the Restore System Defaults menu, causes the same action.



If you press any key other than OK or Enter, it is construed as a Cancel, because the only path that will actually cause the reset to be executed is through OK or Enter.

Key Path	System, Power On
Example	:SYST:DEF PON
Initial S/W Revision	Prior to A.02.00

Configure Applications - Instrument boot-up

At start-up of the analyzer program a dialog box similar to the one under the System, Power On, Configure Applications key will be displayed allowing you to choose which licensed applications are to be loaded. This dialog will only be displayed if the memory required to pre-load all of the licensed applications exceeds the Virtual Memory available.

Configure Applications - Windows desktop

The Configure Applications Utility may be run from the Windows Desktop. The utility is launched by double-



clicking the icon on the desktop, which brings-up a dialog box similar to the one under the System, Power On, Configure Applications key, allowing you to choose which licensed applications are to be loaded when the analyzer program starts up. This dialog box has mouse buttons on it that do the job the softkeys normally do in the System, Power On, Configure Applications menu.

Configure Applications - Remote Commands

The following topics provide details on using remote commands to configure the list of applications you want to load into the instrument memory or query the Virtual Memory utilization for your applications.

- "Configuration list (Remote Command Only)" on page 343
- "Configuration Memory Available (Remote Command Only)" on page 343
- "Configuration Memory Total (Remote Command Only)" on page 343
- "Configuration Memory Used (Remote Command Only)" on page 343
- "Configuration Application Memory (Remote Command Only)" on page 344

Configuration list (Remote Command Only)

This remote command is used to set or query the list of applications to be loaded in-memory.

Remote Command	:SYSTem:PON:APPLication:LLISt <string of INSTRument:SElect names> :SYSTem:PON:APPLication:LLISt?
Example	:SYST:PON:APPL:LLIS "SA,BASIC,WCDMA"
Notes	<string of INSTRument:SElect names> are from the enums of the :INSTRument:SElect command. The order of the <INSTRument:SElect names> is the order that the applications are loaded into memory, and the order that they appear in the Mode Menu. Error message -225 "Out of Memory" is reported when more applications are listed than can reside in Virtual Memory. When this occurs, the existing applications load list is unchanged.
Preset	Not affected by Preset
State Saved	Not saved in instrument state
Initial S/W Revision	A.02.00

Configuration Memory Available (Remote Command Only)

This remote command is used to query the amount of Virtual Memory remaining.

Remote Command	:SYSTem:PON:APPLication:VMEMory[:AVAILable]?
Example	:SYST:PON:APPL:VMEM?
Preset	Not affected by Preset
Initial S/W Revision	A.02.00

Configuration Memory Total (Remote Command Only)

This remote command is used to query the limit of Virtual Memory allowed for applications.

Remote Command	:SYSTem:PON:APPLication:VMEMory:TOTAL?
Example	:SYST:PON:APPL:VMEM:TOT?
Preset	Not affected by Preset
Initial S/W Revision	A.02.00

Configuration Memory Used (Remote Command Only)

This remote command is a query of the amount of Virtual Memory used by all measurement applications.

Remote Command	:SYSTem:PON:APPLication:VMEMory:USED?
Example	:SYST:PON:APPL:VMEM:USED?
Preset	Not affected by Preset
Initial S/W Revision	A.02.00

Configuration Application Memory (Remote Command Only)

This remote command is used to query the amount of Virtual Memory a particular application consumes.

Remote Command	:SYSTem:PON:APPLication:VMEMory:USED:NAME? <INSTrument:SElect name>
Example	:SYST:PON:APPL:VMEM:USED:NAME? CDMA2K
Notes	<INSTrument:SElect name> is from the enums of the :INSTrument:SElect command Value returned will be 0 (zero) if the name provided is invalid.
Preset	Not affected by Preset
Initial S/W Revision	Prior to A.02.00

Alignments

The Alignments Menu controls and displays the automatic alignment of the instrument, and provides the ability to restore the default alignment values.

The current setting of the alignment system is displayed in the system Settings Panel along the top of the display, including a warning icon for conditions that may cause specifications to be impacted.



Key Path	System
Initial S/W Revision	Prior to A.02.00

Auto Align

Configures the method for which the automatic background alignment is run.

Automatic background alignments are run periodically between measurement acquisitions. The instrument's software determines when alignments are to be performed to maintain warranted operation. The recommended setting for Auto Align is Normal.

An Auto Align execution cannot be aborted with the Cancel (ESC) key. To interrupt an Auto Align execution, select Auto Align Off.

Key Path	System, Alignments
Mode	All
Remote Command	:CALibration:AUTO ON PARTial OFF :CALibration:AUTO?
Example	:CAL:AUTO ON
Notes	While Auto Align is executing, bit 0 of Status Operation register is set.
Couplings	Auto Align is set to Off if Restore Align Data is invoked.

Preset	This is unaffected by Preset but is set to ON upon a “Restore System Defaults->Align”.
State Saved	No
Status Bits/OPC dependencies	When Auto Align is executing, bit 0 in the Status Operational register is set.
Backwards Compatibility SCPI	:CALibration:AUTO ALERt Parameter ALERt is for backward compatibility only and is mapped to PARTial
Backwards Compatibility Notes	<ol style="list-style-type: none"> 1. ESA SCPI for Auto Align is :CALibration:AUTO <Boolean>. The command for X-Series is an enumeration. Thus the parameters of “0” and “1” are not possible in X-Series. 2. Similarly, the ESA SCPI for :CALibration:AUTO? returned the Boolean value 1 or 0, in X-Series it is an Enumeration (string). Thus, queries by customer applications into numeric variables will result in an error 3. In PSA Auto Align OFF was not completely off, it is equivalent to PARTial in X-Series. In X-Series, OFF will be fully OFF. This means users of PSA SCPI who choose OFF may see degraded performance and should migrate their software to use PARTial.
Initial S/W Revision	Prior to A.02.00

Normal

Auto Align, Normal turns on the automatic alignment of all measurement systems. The Auto Align, Normal selection maintains the instrument in warranted operation across varying temperature and over time.

If the condition “Align Now, All required” is set, transition to Auto Align, Normal will perform the required alignments and clear the “Align Now, All required” condition and then continue with further alignments as required to maintain the instrument adequately aligned for warranted operation.

When Auto Align, Normal is selected the Auto Align Off time is set to zero.

When Auto Align, Normal is selected the Settings Panel indicates ALIGN AUTO.

Key Path	System, Alignments, Auto Align
Mode	All
Example	:CAL:AUTO ON
Notes	<p>Alignment processing as a result of the transition to Normal will be executed sequentially. Thus, *OPC? or *WAI following CAL:AUTO ON will return when the alignment processing is complete.</p> <p>The presence of an external signal may interfere with the RF portion of the alignment. If so, the Error Condition message “Align skipped: 50 MHz interference” or “Align skipped: 4.8 GHz interference” is reported, and bit 11 is set in the Status Questionable Calibration register. After the interfering signal is removed, subsequent alignment of the RF will clear the condition, and clear bit 11 in the Status Questionable Calibration register.</p>
Readback Text	Normal
Status Bits/OPC dependencies	An interfering user signal may prevent automatic alignment of the RF subsystem. If this occurs, the Error Condition message “Align skipped: 50 MHz interference” or “Align skipped: 4.8 GHz interference” is reported, the Status Questionable Calibration bit 11 is set, and the alignment proceeds. When a subsequent alignment of the RF subsystem succeeds, either by the next cycle of automatic alignment or from an Align Now, RF, the Error Condition and Status Questionable

	Calibration bit 11 are cleared.
Initial S/W Revision	Prior to A.02.00

Partial

Auto Align, Partial disables the full automatic alignment and the maintenance of warranted operation for the benefit of improved measurement throughput. Accuracy is retained for the Resolution Bandwidth filters and the IF Passband, which is critical to FFT accuracy, demodulation, and many measurement applications. With Auto Align set to Partial, you are now responsible for maintaining warranted operation by updating the alignments when they expire. The Auto Align, Alert mechanism will notify you when alignments have expired. One solution to expired alignments is to perform the Align All, Now operation. Another is to return the Auto Align selection to Normal.

Auto Align, Partial is recommended for measurements where the throughput is so important that a few percent of improvement is more valued than an increase in the accuracy errors of a few tenths of a decibel. One good application of Auto Align, Partial would be an automated environment where the alignments can be called during overhead time when the device-under-test is exchanged.

When Auto Align, Partial is selected the elapsed time counter begins for Auto Align Off time.

When Auto Align, Partial is selected the Settings Panel indicates ALIGN PARTIAL with a warning icon. The warning icon is to inform the operator that they are responsible for maintaining the warranted operation of the instrument

Key Path	System, Alignments, Auto Align
Mode	All
Example	:CAL:AUTO PART
Notes	Auto Align Partial begins the elapsed time counter for Auto Align Off time.
Readback Text	Partial
Initial S/W Revision	Prior to A.02.00

Off

Auto Align, Off disables automatic alignment and the maintenance of warranted operation, for the benefit of maximum measurement throughput. With Auto Align set to Off, you are now responsible for maintaining warranted operation by updating the alignments when they expire. The Auto Align, Alert mechanism will notify you when alignments have expired. One solution to expired alignments is to perform the Align All, Now operation. Another is to return the Auto Align selection to Normal.

The Auto Align, Off setting is rarely the best choice, because Partial gives almost the same improvement in throughput while maintaining the warranted performance for a much longer time. The choice is intended for unusual circumstances such as the measurement of radar pulses where you might like the revisit time to be as consistent as possible.

When Auto Align, Off is selected the Auto Align Off time is initialized and the elapsed time counter begins.

When Auto Align, Off is selected the Settings Panel indicates ALIGN OFF with a warning icon. The warning icon is to inform the operator that they are responsible for maintaining the warranted operation of the instrument:

Key Path	System, Alignments, Auto Align
Mode	All
Example	:CAL:AUTO OFF
Notes	Auto Align Off begins the elapsed time counter for Auto Align Off time.
Couplings	Auto Align is set to Off if Restore Align Data is invoked.
Readback Text	Off
Initial S/W Revision	Prior to A.02.00

All but RF

Auto Align, All but RF, configures automatic alignment to include or exclude the RF subsystem. (Eliminating the automatic alignment of the RF subsystem prevents the input impedance from changing. The normal input impedance of 50 ohms can change to an open circuit when alignments are being used. Some devices under test do not behave acceptably under such circumstances, for example by showing instability.) When Auto Align, All but RF ON is selected, the operator is responsible for performing an Align Now, RF when RF-related alignments expire. The Auto Align, Alert mechanism will notify the operator to perform an Align Now, All when the combination of time and temperature variation is exceeded.

When Auto Align, All but RF ON is selected the Settings Panel indicates ALIGN AUTO/NO RF with a warning icon (warning icon is intended to inform the operator they are responsible for the maintaining the RF alignment of the instrument):

Key Path	System, Alignments, Auto Align
Mode	All
Remote Command	:CALibration:AUTO:MODE ALL NRF :CALibration:AUTO:MODE?
Example	:CAL:AUTO:MODE NRF
Preset	This is unaffected by Preset but is set to ALL on a "Restore System Defaults->Align".
State Saved	No
Readback Text	RF or NRF
Initial S/W Revision	Prior to A.02.00

Alert

The instrument will signal an Alert when conditions exist such that you will need to perform a full alignment (for example, Align Now, All). The Alert can be configured in one of four settings; Time & Temperature, 24 hours, 7 days, or None. A confirmation is required when a selection other than Time & Temperature is chosen. This prevents accidental deactivation of alerts.

With Auto Align set to Normal, the configuration of Alert is not relevant because the instrument's software maintains the instrument in warranted operation.

Key Path	System, Alignments, Auto Align
Mode	All
Remote Command	:CALibration:AUTO:ALERt TTEMperature DAY WEEK NONE :CALibration:AUTO:ALERt?
Example	:CAL:AUTO:ALER TTEM
Notes	The alert that alignment is needed is the setting of bit 14 in the Status Questionable Calibration register.
Preset	This is unaffected by Preset but is set to TTEMperature on a "Restore System Defaults->Align".
State Saved	No
Status Bits/OPC dependencies	The alert is the Error Condition message "Align Now, All required" and bit 14 is set in the Status Questionable Calibration register.
Initial S/W Revision	Prior to A.02.00

Time & Temperature

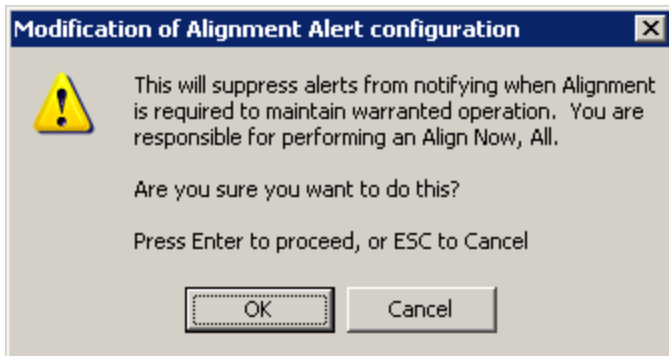
With Auto Align Alert set to Time & Temperature the instrument will signal an alert when alignments expire due to the combination of the passage of time and changes in temperature. The alert is the Error Condition message "Align Now, All required". If this choice for Alert is selected, the absence of an alert means that the analyzer alignment is sufficiently up-to-date to maintain warranted accuracy.

Key Path	System, Alignments, Auto Align, Alert
Mode	All
Example	:CAL:AUTO:ALER TTEM
Readback Text	Time & Temp
Status Bits/OPC dependencies	Bit 14 is set in the Status Questionable Calibration register.
Initial S/W Revision	Prior to A.02.00

24 hours

With Auto Align Alert set to 24 Hours the instrument will signal an alert after a time span of 24 hours since the last successful full alignment (for example, Align Now, All or completion of a full Auto Align). You may choose this selection in an environment where the temperature is stable on a daily basis at a small risk of accuracy errors in excess of the warranted specifications. The alert is the Error Condition message "Align Now, All required".

For front-panel operation, confirmation is required to transition into this setting of Alert. The confirmation dialog is:



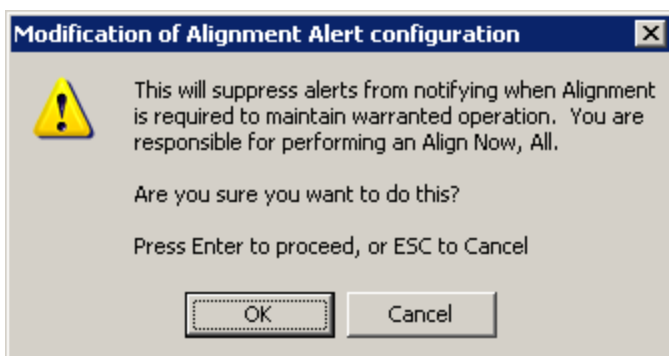
No confirmation is required when Alert is configured through a remote command.

Key Path	System, Alignments, Auto Align, Alert
Mode	All
Example	:CAL:AUTO:ALER DAY
Readback Text	24 hours
Status Bits/OPC dependencies	Bit 14 is set in the Status Questionable Calibration register.
Initial S/W Revision	Prior to A.02.00

7 days

With Auto Align Alert is set to 7 days the instrument will signal an alert after a time span of 168 hours since the last successful full alignment (for example, Align Now, All or completion of a full Auto Align). You may choose this selection in an environment where the temperature is stable on a weekly basis, at a modest risk of accuracy degradations in excess of warranted performance. The alert is the Error Condition message “Align Now, All required”.

For front panel operation, confirmation is required for the customer to transition into this setting of Alert. The confirmation dialog is:



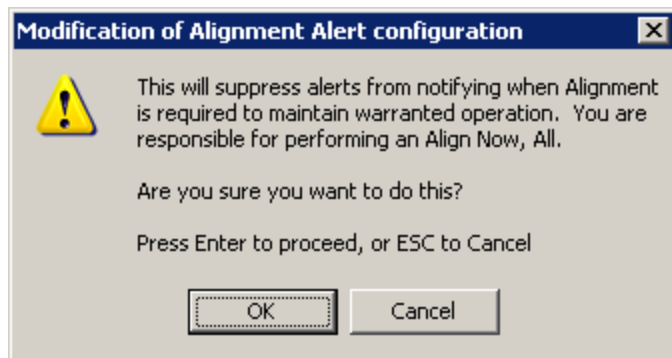
No confirmation is required when Alert is configured through a remote command.

Key Path	System, Alignments, Auto Align, Alert
Mode	All
Example	:CAL:AUTO:ALER WEEK
Readback Text	7 days
Status Bits/OPC dependencies	Bit 14 is set in the Status Questionable Calibration register.
Initial S/W Revision	Prior to A.02.00

None

With Auto Align Alert set to None the instrument will not signal an alert. This is provided for rare occasions where you are making a long measurement which cannot tolerate Auto Align interruptions, and must have the ability to capture a screen image at the end of the measurement without an alert posted to the display. Agilent does not recommends using this selection in any other circumstances, because of the risk of accuracy performance drifting well beyond expected levels without the operator being informed.

For front panel operation, confirmation is required to transition into this setting of Alert. The confirmation dialog is:



No confirmation is required when Alert is configured through a remote command.

Key Path	System, Alignments, Auto Align, Alert
Mode	All
Example	:CAL:AUTO:ALER NONE
Initial S/W Revision	Prior to A.02.00

Execute Expired Alignments (Remote Command Only)

Alignments can be expired in the situation where Auto Align is in the state of Partial or Off. This feature runs the alignments that have expired. This is different than performing an Align All, Now operation. Align All, Now performs an alignment of all subsystems regardless of whether they are needed or not, with Execute Expired Alignments, only the individual subsystems that have become due are aligned.

Mode	All
Remote Command	:CALibration:EXPIred?
Example	:CAL:EXP?
Notes	:CALibration:EXPIred? returns 0 if successful :CALibration:EXPIred? returns 1 if failed
Initial S/W Revision	Prior to A.02.00

Align Now

Accesses alignment processes that are immediate action operations. They perform complete operations and run until they are complete.

Key Path	System, Alignments
Initial S/W Revision	Prior to A.02.00

All

(In MXE the key label is “All (plus RF Presel 20 Hz – 3.6 GHz)”)Immediately executes an alignment of all subsystems In MXE, the Align Now All is followed by additionally aligning the RF Preselector section, so in MXE, the key label contains the parenthetical note “(plus RF Presel 20 Hz – 3.6 GHz)”. The instrument stops any measurement currently underway, performs the alignment, then restarts the measurement from the beginning (similar to pressing the Restart key).

If an interfering user signal is present at the RF Input, the alignment is performed on all subsystems except the RF. After completion, the Error Condition message “Align skipped: 50 MHz interference” or “Align skipped: 4.8 GHz interference” is generated. In addition the Error Condition message “Align Now, RF required” is generated, and bits 11 and 12 are set in the Status Questionable Calibration register.

The query form of the remote commands (:CALibration[:ALL]? or *CAL?) invokes the alignment of all subsystems and returns a success or failure value. An interfering user signal is not grounds for failure; if the alignment was able to succeed on all portions but unable to align the RF because of an interfering signal, the resultant will be the success value.

Successful completion of Align Now, All will clear the “Align Now, All required” Error Condition, and clear bit 14 in the Status Questionable Calibration register. It will also begin the elapsed time counter for Last Align Now, All Time, and capture the Last Align Now, All Temperature.

In the MXE, successful completion will also clear the “Align 20 Hz to 30 MHz required” Error Condition, the “Align 30 MHz to 3.6 GHz required” Error Condition, and the “Align 20 Hz to 3.6 GHz required” Error Condition, and clear bits 1 and bit 2 and clear the bit 1 in the Status Questionable Calibration Extended Needed register.

If the Align RF subsystem succeeded in aligning (no interfering signal present), the elapsed time counter begins for Last Align Now, RF Time, and the temperature is captured for the Last Align Now, RF Temperature. In addition the Error Conditions “Align skipped: 50 MHz interference” and “Align skipped: 4.8

GHz interference” are cleared, the Error Condition “Align Now, RF required” is cleared, and bits 11 and 12 are cleared in the Status Questionable Calibration register

Align Now, All can be interrupted by pressing the Cancel (ESC) front-panel key or remotely with Device Clear followed by the :ABORt SCPI command. When this occurs the Error Condition message “Align Now, All required” is generated, and bit 14 is set in the Status Questionable Condition register. This is because new alignment data may be employed for an individual subsystem, but not a cohesive set of data for all subsystems.

In many cases, you might find it more convenient to change alignments to Normal, instead of executing Align Now, All. When the Auto Align process transitions to Normal, the analyzer will immediately start to update only the alignments that have expired, thus efficiently restoring the alignment process.

Key Path	System, Alignments, Align Now
Mode	All
Remote Command	:CALibration[:ALL] :CALibration[:ALL]?
Example	:CAL
Notes	:CALibration[:ALL]? returns 0 if successful :CALibration[:ALL]? returns 1 if failed :CALibration[:ALL]? is the same as *CAL? While Align Now, All is performing the alignment, bit 0 in the Status Operation register is set. Completion, or termination, will clear bit 0 in the Status Operation register. This command is sequential; it must complete before further SCPI commands are processed. Interrupting the alignment from remote is accomplished by invoking Device Clear followed by the :ABORt command. Successful completion will clear bit 14 in the Status Questionable Calibration register. An interfering user signal is not grounds for failure of Align Now, All. However, bits 11 and 12 are set in the Status Questionable Calibration register to indicate Align Now, RF is required. An interfering user supplied signal will result in the instrument requiring an Align Now, RF with the interfering signal removed.
Couplings	Initializes the time for the Last Align Now, All Time. Records the temperature for the Last Align Now, All Temperature. If Align RF component succeeded, initializes the time for the Last Align Now, RF Time. If Align RF component succeeded, records the temperature for the Last Align Now, RF Temperature.
Status Bits/OPC dependencies	Bits 11, 12, or 14 may be set in the Status Questionable Calibration register.
Initial S/W Revision	Prior to A.02.00

Mode	All
Remote Command	*CAL?
Example	*CAL?
Notes	*CAL? returns 0 if successful

	<p>*CAL? returns 1 if failed</p> <p>:CALibration[:ALL]? is the same as *CAL?</p> <p>See additional remarks described with :CALibration[:ALL]?</p> <p>Everything about :CALibration[:ALL]? is synonymous with *CAL? including all conditions, status register bits, and couplings</p>
Initial S/W Revision	Prior to A.02.00

All but RF

(In MXE the key label is “All but RF (not including RF Presel)”)

Immediately executes an alignment of all subsystems except the RF subsystem . The instrument will stop any measurement currently underway, perform the alignment, and then restart the measurement from the beginning (similar to pressing the Restart key). This can be used to align portions of the instrument that are not impacted by an interfering user input signal.

This operation might be chosen instead of All if you do not want the device under test to experience a large change in input impedance, such as a temporary open circuit at the analyzer input.

The query form of the remote commands (:CALibration:NRF?) will invoke the alignment and return a success or failure value.

Successful completion of Align Now, All but RF will clear the “Align Now, All required” Error Condition, and clear bit 14 in the Status Questionable Calibration register. If “Align Now, All required” was in effect prior to executing the All but RF, the Error Condition message “Align Now, RF required” is generated and bit 12 in the Status Questionable Calibration register is set. It will also begin the elapsed time counter for Last Align Now, All Time, and capture the Last Align Now, All Temperature.

Align Now, All but RF can be interrupted by pressing the Cancel (ESC) front-panel key or remotely with Device Clear followed by the :ABORt SCPI command. When this occurs the Error Condition message “Align Now, All required” is generated, and bit 14 is set in the Status Questionable Condition register. This is because new alignment data may be used for an individual subsystem, but not a full new set of data for all subsystems.

In models with the RF Preselector, such as the N9038A, the “All but RF” alignment will execute an alignment of all subsystems except the RF subsystem of the Spectrum Analyzer, as well as the system gain of the RF Preselector.

Key Path	System, Alignments, Align Now
Mode	All
Remote Command	:CALibration:NRF :CALibration:NRF?
Example	:CAL:NRF
Notes	:CALibration:NRF? returns 0 if successful :CALibration:NRF? returns 1 if failed While Align Now, All but RF is performing the alignment, bit 0 in the Status Operation register is set. Completion, or termination, will clear bit 0 in the Status Operation register.

	<p>This command is sequential; it must complete before further SCPI commands are processed. Interrupting the alignment from remote is accomplished by invoking Device Clear followed by the :ABORt command.</p> <p>Successful completion will clear bit 14 in the Status Questionable Calibration register and set bit 12 if invoked with “Align Now, All required”.</p>
Couplings	<p>Initializes the time for the Last Align Now, All Time.</p> <p>Records the temperature for the Last Align Now, All Temperature.</p>
Status Bits/OPC dependencies	Bits 12 or 14 may be set in the Status Questionable Calibration register.
Initial S/W Revision	Prior to A.02.00

RF

(In MXE the key label is “RF Only”)

Immediately executes an alignment of the RF subsystem . The instrument stops any measurement currently underway, performs the alignment, then restarts the measurement from the beginning (similar to pressing the Restart key).

This operation might be desirable if the alignments had been set to not include RF alignments, or if previous RF alignments could not complete because of interference which has since been removed.

If an interfering user signal is present at the RF Input, the alignment will terminate and generate the Error Condition message “Align skipped: 50 MHz interference” or “Align skipped: 4.8 GHz interference”, and Error Condition “Align Now, RF required”. In addition, bits 11 and 12 will be set in the Status Questionable Calibration register.

The query form of the remote commands (:CALibration:RF?) will invoke the alignment of the RF subsystem and return a success or failure value. An interfering user signal is grounds for failure.

Successful completion of Align Now, RF will begin the elapsed time counter for Last Align Now, RF Time, and capture the Last Align Now, RF Temperature.

Align Now, RF can be interrupted by pressing the Cancel (ESC) front-panel key or remotely with Device Clear followed by the :ABORt SCPI command. When this occurs, the Error Condition message “Align Now, RF required” is generated, and bit 12 is set in the Status Questionable Condition register. None of the new alignment data is used.

In models with the RF Preselector, such as the N9038A, the RF alignment will execute an alignment of the RF subsystem of the Spectrum Analyzer, as well as the RF subsystem on RF Preselector path.

Key Path	System, Alignments, Align Now
Mode	All
Remote Command	:CALibration:RF :CALibration:RF?
Example	:CAL:RF
Notes	:CALibration:RF? returns 0 if successful

:CALibration:RF? returns 1 if failed (including interfering user signal)

While Align Now, RF is performing the alignment, bit 0 in the Status Operation register is set. Completion, or termination, will clear bit 0 in the Status Operation register.

This command is sequential; it must complete before further SCPI commands are processed. Interrupting the alignment from remote is accomplished by invoking Device Clear followed by the :ABORT command.

Successful completion clears the Error Conditions “Align skipped: 50 MHz interference” and “Align skipped: 4800 MHz interference” and the Error Conditions “Align RF failed” and “Align Now, RF required”, and clears bits 3, 11, and 12 in the Status Questionable Calibration register.

A failure encountered during alignment will generate the Error Condition message “Align RF failed” and set bit 3 in the Status Questionable Calibration register.

An interfering user signal will result in bits 11 and 12 to be set in the Status Questionable Calibration register to indicate Align Now, RF is required.

An interfering user supplied signal will result in the instrument requiring an Align Now, RF with the interfering signal removed.

Couplings

Initializes the time for the Last Align Now, RF Time.

Records the temperature for the Last Align Now, RF Temperature.

Status Bits/OPC dependencies

Bits 11, 12, or 14 may be set in the Status Questionable Calibration register.

Initial S/W Revision

Prior to A.02.00

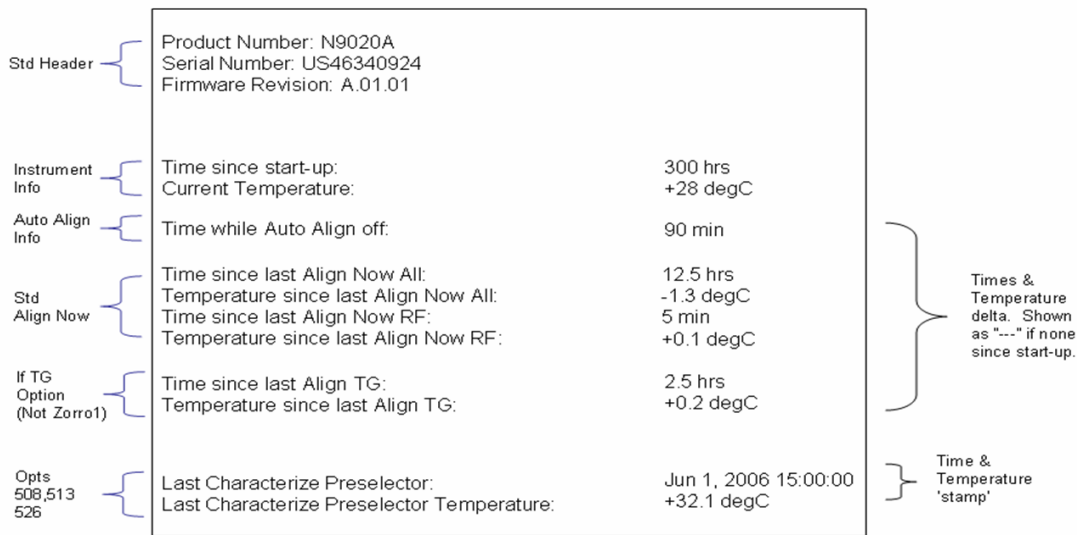
Show Alignment Statistics

Shows alignment information you can use to ensure that the instrument is operating in a specific manner. The Show Alignment Statistics screen is where you can view time and temperature information.

Values which are displayed are only updated when the Show Alignment Statistics screen is invoked, they are not updated while the Show Alignment Statistics screen is being displayed. The remote commands that access this information obtain current values.

An example of the Show Alignment Statistics screen would be similar to:

6 System Functions
System



A successful Align Now, RF will set the Last Align RF temperature to the current temperature, and reset the Last Align RF time. A successful Align Now, All or Align Now, All but RF will set the Last Align Now All temperature to the current temperature, and reset the Last Align Now All time. A successful Align Now, All will also reset the Last Align RF items if the RF portion of the Align Now succeeded.

Key Path	System, Alignments
Mode	All
Notes	The values displayed on the screen are only updated upon entry to the screen and not updated while the screen is being displayed.
Initial S/W Revision	Prior to A.02.00

Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
Remote Command	:SYSTem:PON:TIME?
Example	:SYST:PON:TIME?
Notes	Value is the time since the most recent start-up in seconds.
State Saved	No
Initial S/W Revision	Prior to A.02.00

Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
Remote Command	:CALibration:TEMPerature:CURRent?
Example	:CAL:TEMP:CURR?

Notes	Value is in degrees Centigrade. Value is invalid if using default alignment data (Align Now, All required)
State Saved	No
Initial S/W Revision	Prior to A.02.00

Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
Remote Command	:CALibration:TIME:LALL?
Example	:CAL:TIME:LALL?
Notes	Value is the elapsed time, in seconds, since the last successful Align Now, All or Align Now, All but RF was executed.
State Saved	No
Initial S/W Revision	Prior to A.02.00

Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
Remote Command	:CALibration:TEMPerature:LALL?
Example	:CAL:TEMP:LALL?
Notes	Value is in degrees Centigrade at which the last successful Align Now, All or Align Now, All but RF was executed.
State Saved	No
Initial S/W Revision	Prior to A.02.00

Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
Remote Command	:CALibration:TIME:LRF?
Example	:CAL:TIME:LRF?
Notes	Value is the elapsed time, in seconds, since the last successful Align Now, RF was executed, either individually or as a component of Align Now, All.
State Saved	No
Initial S/W Revision	Prior to A.02.00

Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All

Remote Command	:CALibration:TEMPerature:LRF?
Example	:CAL:TEMP:LRF?
Notes	Value is in degrees Centigrade at which the last successful Align Now, RF was executed, either individually or as a component of Align Now, All.
State Saved	No
Initial S/W Revision	Prior to A.02.00

Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
Remote Command	:CALibration:TIME:LPReselector?
Example	:CAL:TIME:LPR?
Notes	Value is the date and time the last successful Characterize Preselector was executed. The date is separated from the time by a space character. Returns "" if no Characterize Preselector has ever been performed on the instrument.
Dependencies	In models that do not include preselectors, this command is not enabled and any attempt to set or query will yield an error.
State Saved	No
Initial S/W Revision	Prior to A.02.00

Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
Remote Command	:CALibration:TEMPerature:LPReselector?
Example	:CAL:TEMP:LPR?
Notes	Value is in degrees Centigrade at which the last successful Characterize Preselector was executed.
Dependencies	In models that do not include preselectors, this command is not enabled and any attempt to set or query will yield an error.
State Saved	No
Initial S/W Revision	Prior to A.02.00

Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
Remote Command	:CALibration:AUTO:TIME:OFF?
Example	:CAL:AUTO:TIME:OFF?
Notes	Value is the elapsed time, in seconds, since Auto Align has been set to Off or Off with Alert. The value is 0 if Auto Align is ALL or NORF.
State Saved	No
Initial S/W Revision	Prior to A.02.00

Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
Remote Command	:CALibration:TIME:RFPSector:LCONducted?
Example	:CAL:TIME:RFPS:LCON?
Notes	Values are the date and time the last successful Align Now, 20 Hz – 30 MHz was executed. The date is separated from the time by a semi-colon character.
State Saved	No

Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
Remote Command	:CALibration:TEMPerature:RFPSector:LCONducted?
Example	:CAL:TEMP:RFPS:LCON?
Notes	Value is in degrees Centigrade at which the last successful Align Now, 20 Hz – 30 MHz was executed.
State Saved	No

Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
Remote Command	:CALibration:TIME:RFPSector:LRADiated?
Example	:CAL:TIME:RFPS:LRAD?
Notes	Value is the date and time the last successful Align Now, 30 MHz – 3.6 GHz was executed. The date is separated from the time by a semi-colon character.
State Saved	No

Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
Remote Command	:CALibration:TEMPerature:RFPSector:LRADiated?
Example	:CAL:TEMP:RFPS:LRAD?
Notes	Value is in degrees Centigrade at which the last successful Align Now, 30 MHz – 3.6 GHz was executed.
State Saved	No

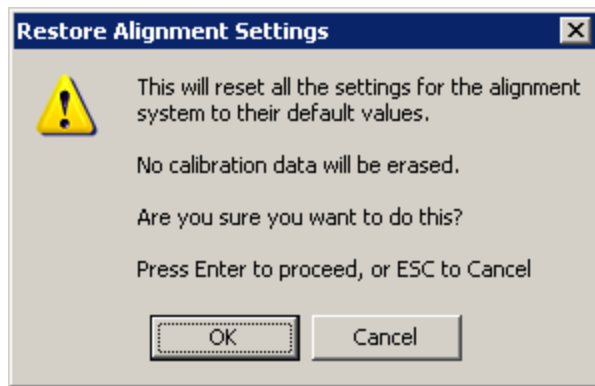
Key Path	Visual annotation in the Show Alignment Statistics screen
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Mode	All
Remote Command	:CALibration:RFPSelector:SCHeuler:TIME:NEXT? This query returns data using the following format "YYYY/MM/DD; HH:MM:SS"
Example	:CAL:RFPS:SCH:TIME:NEXT?
Notes	The next run time will be updated based on the start date/time and recurrence set by the users. "date" is representation of the date the task will run in the form of "YYYY/MM/DD" where: <ul style="list-style-type: none"> -YYYY is the four digit representation of year. (for example, 2009) -MM is the two digit representation of month. (for example, 01 to 12) -DD is the two digit representation of the day. (for example, 01 to 28, 29, 30 or 31 depending on the month and year) "Time" is a representation of the time of day the task will run in the form of "HH:MM:SS" where: <ul style="list-style-type: none"> -HH is the two digit representation of the hour in 24 hour format -MM is the two digit representation of minute -SS is the two digit representation of seconds For model N9038A only.
State Saved	No

Restore Align Defaults

Initializes the alignment user interface settings, not alignment data, to the factory default values. Align Now, All must be executed if the value of the Timebase DAC results in a change.

For front panel operation, you are prompted to confirm action before setting the alignment parameters to factory defaults:



The parameters affected are:

Parameter	Setting
Timebase DAC	Calibrated
Timebase DAC setting	Calibrated value
Auto Align State	Normal (if the instrument is not operating with default alignment data, Off otherwise)

Auto Align All but RF	Off
Auto Align Alert	Time & Temperature

Key Path	System, Alignments
Mode	All
Example	:SYST:DEF ALIG
Notes	Alignment processing that results as the transition to Auto Alignment Normal will be executed sequentially; thus *OPC? or *WAI will wait until the alignment processing is complete.
Initial S/W Revision	Prior to A.02.00

Backup or Restore Align Data...

Opens the utility for backing-up or restoring the alignment data.

Alignment data for the instrument resides on the hard drive in a database. Agilent uses high quality hard drives; however it is highly recommended the alignment data be backed-up to storage outside of the instrument. Additionally, for customers who use multiple CPU Assemblies or multiple disk drives, the alignment that pertains to the instrument must be transferred to the resident hard drive after a CPU or hard drive is replaced. This utility facilitates backing-up and restoring the alignment data.

NOTE

This utility allows the operator to navigate to any location of the Windows file system. It is intended that the operator use a USB memory device or Mapped Network Drive to back up the alignment data to storage outside of the instrument.

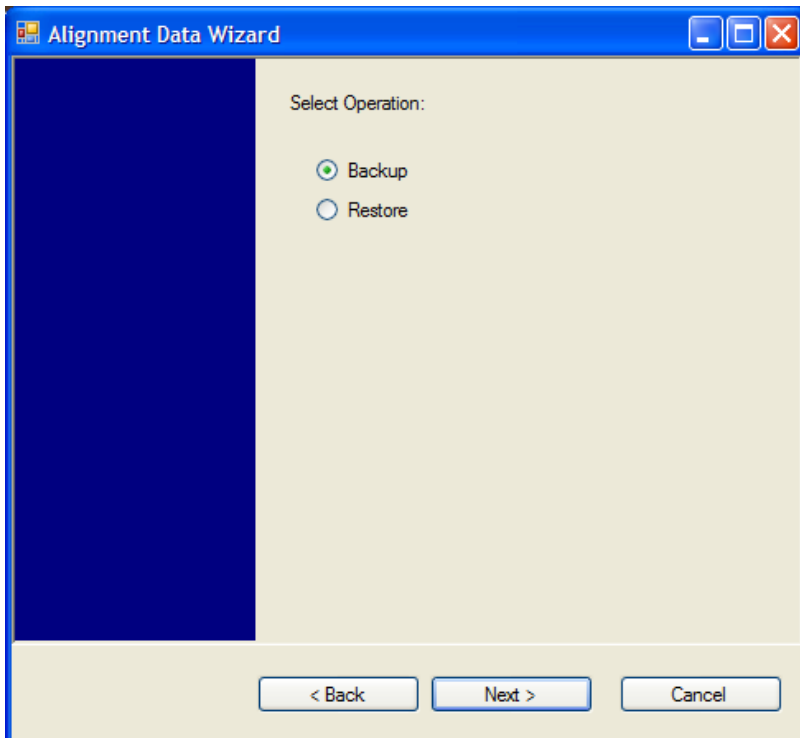
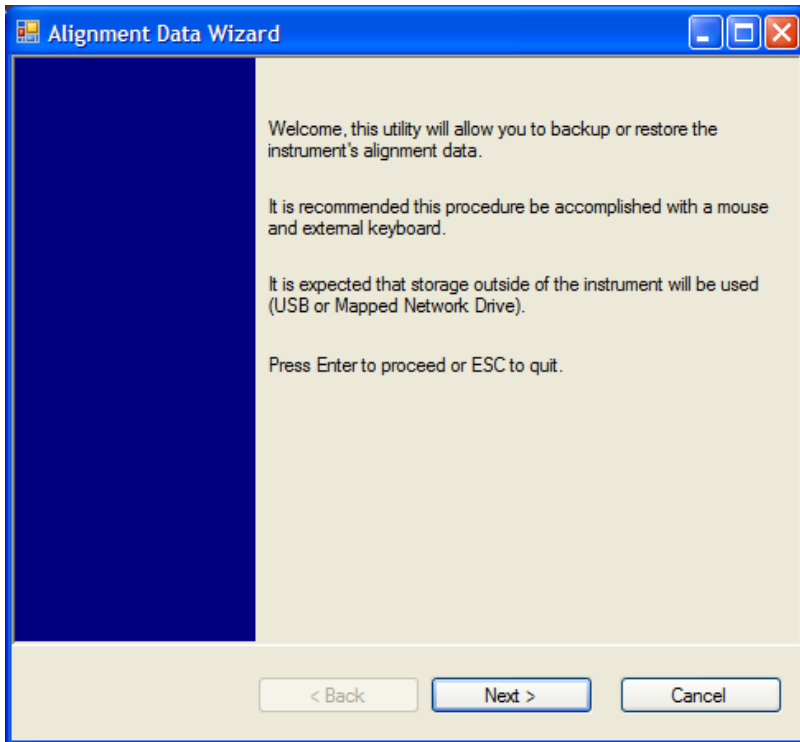
Key Path	System, Alignments
Initial S/W Revision	A.02.00

Key Path	System, Alignments
Mode	All
Remote Command	:CALibration:DATA:DEFault
Example	:CAL:DATA:DEF
Couplings	Sets Auto Align to Off. Sets bit 14 in the Status Questionable Calibration register. The Error Condition message "Align Now, All required" is generated.
Initial S/W Revision	Prior to A.02.00

Alignment Data Wizard

The Backup or Restore Alignment Data wizard guides you through the operation of backing-up or restoring the alignment data.

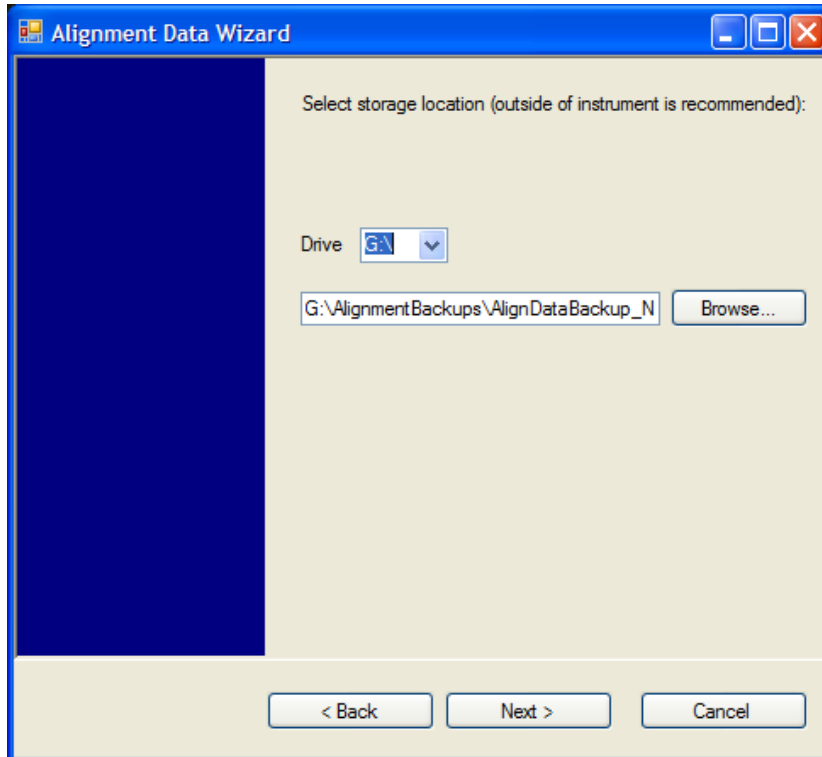
The following dialogue boxes operates without a mouse or external keyboard when you use the default file names.



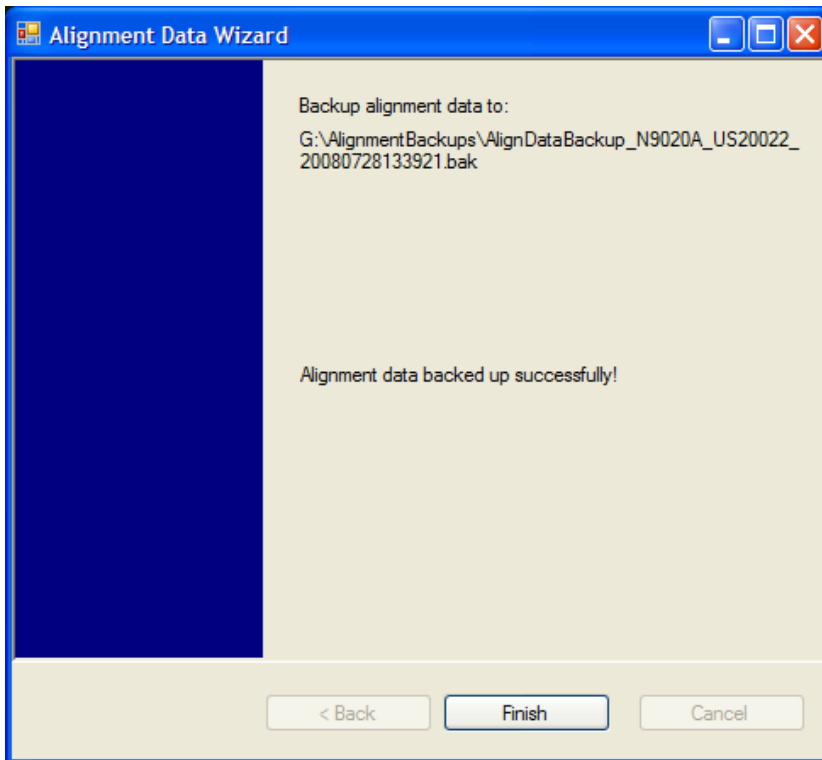
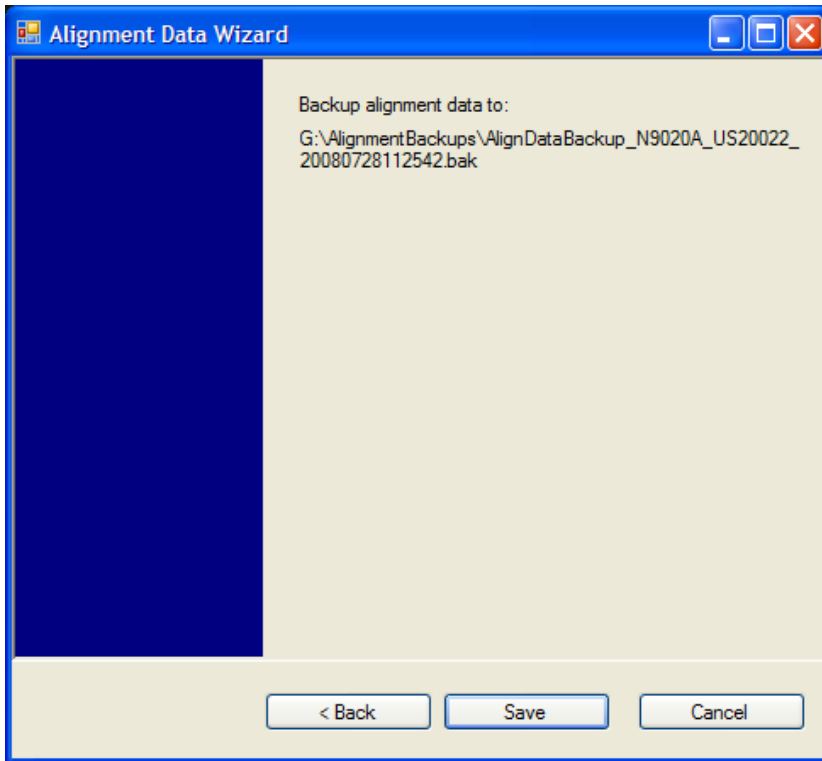
The backup screen indicates the approximate amount of space required to contain the backup file.

The default file name will be AlignDataBackup_<model number>_<serial number>_<date in YYYYMMDDHHMMSS>.bak.

The default backup location will be first drive identified as an external drive (USB or LAN) if such is available; if not, the internal D: partition will be selected.

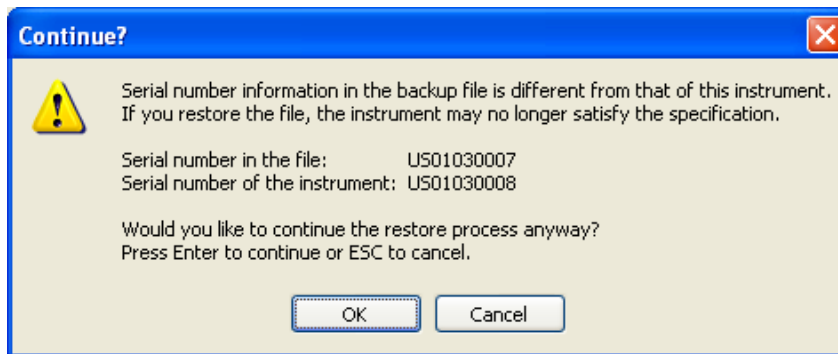


Changing the drive letter will also modify the path displayed in the box below. When this step is first loaded, the drive drop-down menu is populated with connected drives, which provide the user with write access. If there are many unreachable network drives connected to the instrument, this step can take a few seconds. If a USB drive is present, it will be selected by default. The path defaults to the AlignmentBackups folder, and a filename is automatically created in the form of AlignDataBackup_<model>_<serial number>_<date><time>. When the "Next >" button is pressed, you will be prompted to create a new folder if the chosen path does not yet exist.

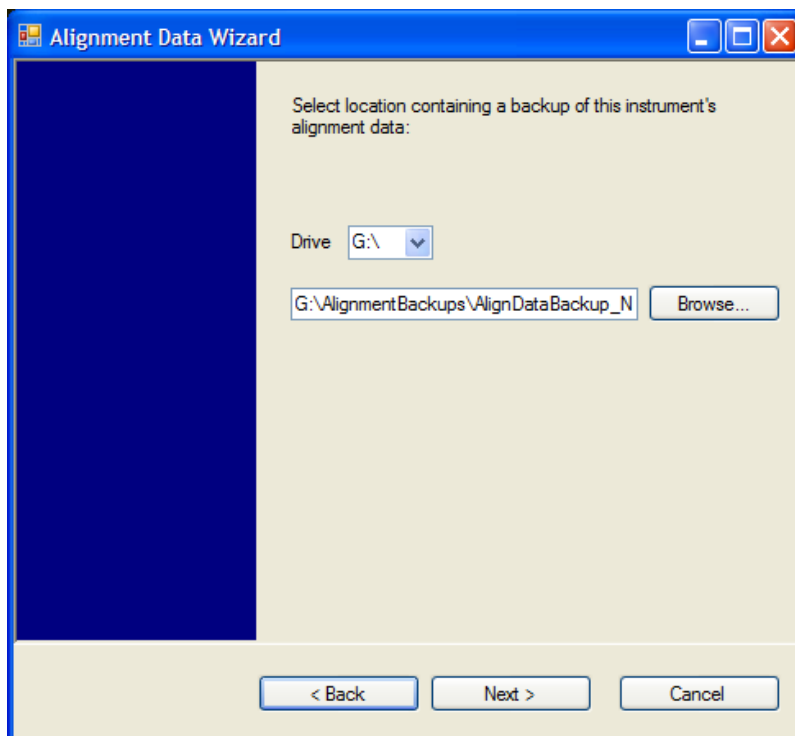


The restore operation checks the validity of the restore file using the database's built-in file validation. If the restore file is corrupt, the existing alignment data will remain in use.

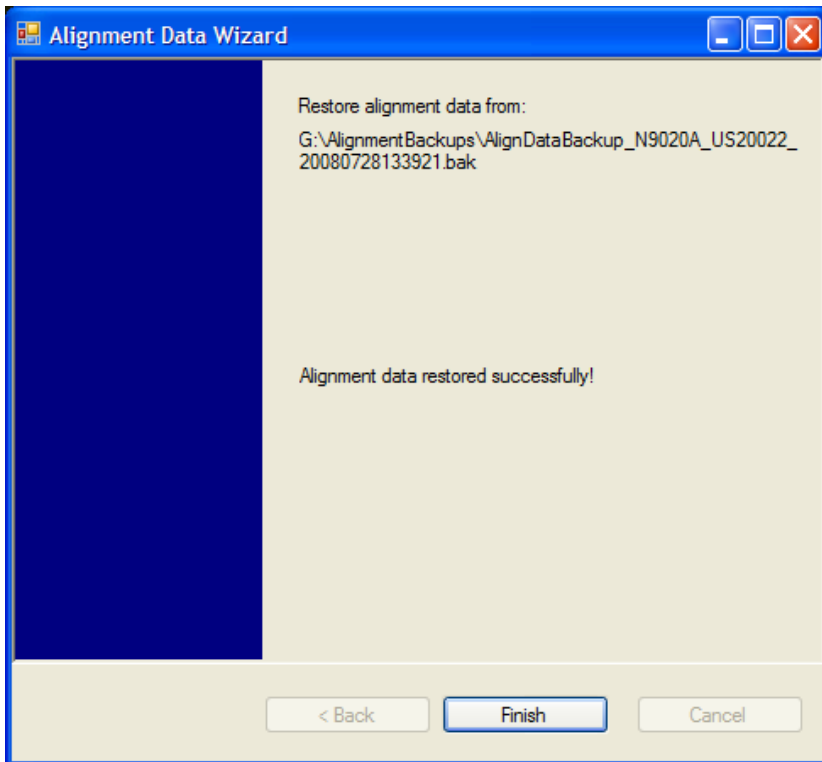
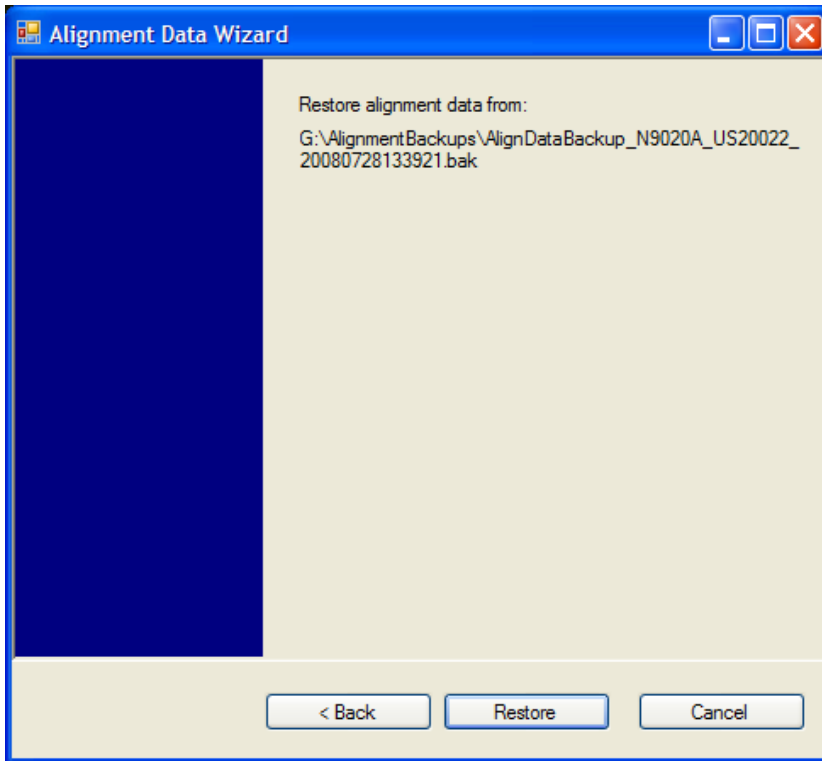
If the serial number information in the backup file being restored is different from that of the instrument, the following message appears (the serial number shown are examples):



The default restore location will be first drive identified as an external drive (USB or LAN) if such is available; if not, the internal D: partition will be selected. The default restore file will be the most recent file that matches the default backup file name format: AlignDataBackup_<model number>_<serial number>_<date>.bak



Changing the drive letter also modifies the path displayed in the box below. When this step is first loaded, the drive drop-down menu is populated with connected drives, which provide you with read access. The path defaults to the AlignBackups folder. The most recent *.bak file in the folder will also be selected by default.



Perform Backup (Remote Command Only)

Invokes an alignment data backup operation to the provided Folder.

NOTE

It is recommended that the Folder provided is outside of the instrument (USB or Mapped Network Drive).

Remote Command	:CALibration:DATA:BACKup <filename>
Example	:CAL:DATA:BACK "F:\AlignDataBackup_N9020A_US00000001_2008140100.bak"
Initial S/W Revision	A.02.00

Perform Restore (Remote Command Only)

Invokes an alignment data restore operation from the provided filename.

Remote Command	:CALibration:DATA:RESTore <filename>
Example	:CAL:DATA:REST "F:\ AlignDataBackup_N9020A_US00000001_2008140100.bak "
Initial S/W Revision	A.02.00

Advanced

Accesses alignment processes that are immediate action operations that perform operations that run until complete. Advanced alignments are performed on an irregular basis, or require additional operator interaction

Key Path	System, Alignments
Initial S/W Revision	Prior to A.02.00

Characterize Preselector

The Preselector tuning curve drifts over temperature and time. Recognize that the Amplitude, Presel Center function adjusts the preselector for accurate amplitude measurements at an individual frequency. Characterize Preselector improves the amplitude accuracy by ensuring the Preselector is approximately centered at all frequencies without the use of the Amplitude, Presel Center function. Characterize Preselector can be useful in situations where absolute amplitude accuracy is not of utmost importance, and the throughput savings or convenience of not performing a Presel Center is desired. Presel Center is required prior to any measurement for best (and warranted) amplitude accuracy.

Agilent recommends that the Characterize Preselector operation be performed yearly as part of any calibration, but performing this operation every three months can be worthwhile.

Characterize Preselector immediately executes a characterization of the Preselector, which is a YIG-tuned filter (YTF). The instrument stops any measurement currently underway, performs the characterization, then restarts the measurement from the beginning (similar to pressing the Restart key).

The query form of the remote commands (:CALibration:YTF?) will invoke the alignment of the YTF subsystem and return a success or failure value.

A failure encountered during alignment will generate the Error Condition message "Characterize Preselector failure" and set bit 3 in the STATus:QUEStionable:CALibration:EXTended:FAILure status register. Successful completion of Characterize Preselector will clear this Condition. It will also begin the

elapsed time counter for Last Characterize Preselector Time, and capture the Last Characterize Preselector Temperature.

The last Characterize Preselector Time and Temperature survives across the power cycle as this operation is performed infrequently.

NOTE

The Characterize Preselector function can be interrupted by pressing the Cancel (ESC) front-panel key or remotely with Device Clear followed by the :ABORt SCPI command. None of the new characterization data is then used. However, since the old characterization data is purged at the beginning of the characterization, you now have an uncharacterized preselector. You should re-execute this function and allow it to finish before making any further preselected measurements.

Key Path	System, Alignments, Advanced
Mode	All
Remote Command	:CALibration:YTF :CALibration:YTF?
Example	:CAL:YTF
Notes	:CALibration:YTF? returns 0 if successful :CALibration:YTF? returns 1 if failed (including interfering user signal) While Advanced, Characterize Preselector is performing the alignment, bit 0 in the Status Operation register is set. Completion, or termination, will clear bit 0 in the Status Operation register. This command is sequential; it must complete before further SCPI commands are processed. Interrupting the alignment from remote is accomplished by invoking Device Clear followed by the :ABORt command. Successful completion will clear bit 9 in the Status Questionable Calibration register. A failure encountered during alignment will generate the Error Condition message "Characterize Preselector failed" and set bit 9 in the Status Questionable Calibration register. For Options that support frequencies > 3.6 GHz only.
Dependencies	This key does not appear in models that do not contain preselectors. In these models the SCPI command is accepted without error but no action is taken.
Couplings	Initializes the time for the Last Characterize Preselector Time. Records the temperature for the Last Characterize Preselector Temperature.
Initial S/W Revision	Prior to A.02.00

Characterize Reference Clock

Characterizing the reference clock is calibrating the Reference Input Phase with the External Reference Output. This feature is only available when either option DP2 or B40 is present. It requires connecting the 10 MHz OUT to the EXT REF IN port with a BNC cable before running the characterization.

See ["Front panel guided calibration sequence" on page 370](#)

Key Path	System, Alignments, Advanced
Mode	All

Remote Command	:CALibration:REFErence:CLOCK?
Example	:CAL:REF:CLOC:INIT? //connect cable :CAL:REF:CLOC? //disconnect cable :CAL:REF:CLOC:END?
Notes	:CALibration:REFErence:CLOCK? returns 0 if successful :CALibration:REFErence:CLOCK? returns 1 if failed
Dependencies	Option DP2 or B40
Couplings	Initializes the time for the Last Characterize Reference Clock Time. Records the temperature for the Last Characterize Reference Clock Temperature. Expected to be run after :CAL:REF:CLOC:INIT, and before :CAL:REF:CLOC:END.
Initial S/W Revision	A.13.00

Parameter Name	Characterize Reference Clock Initialization
Mode	All
Remote Command	:CALibration:REFErence:CLOCK:INITialize?
Example	:CAL:REF:CLOC:INIT?
Notes	:CALibration:REFErence:CLOCK:INIT? returns 0 if successful :CALibration:REFErence:CLOCK:INIT? returns 1 if failed
Dependencies	Option DP2 or B40
Couplings	Expected to be run before sending the :CAL:REF:CLOC? command. This will stop the current measurement when it has completed (does not abort the current data acquisition), and it will prepare the instrument for the expected cabling.
Force Restart	Yes
Initial S/W Revision	A.12.00

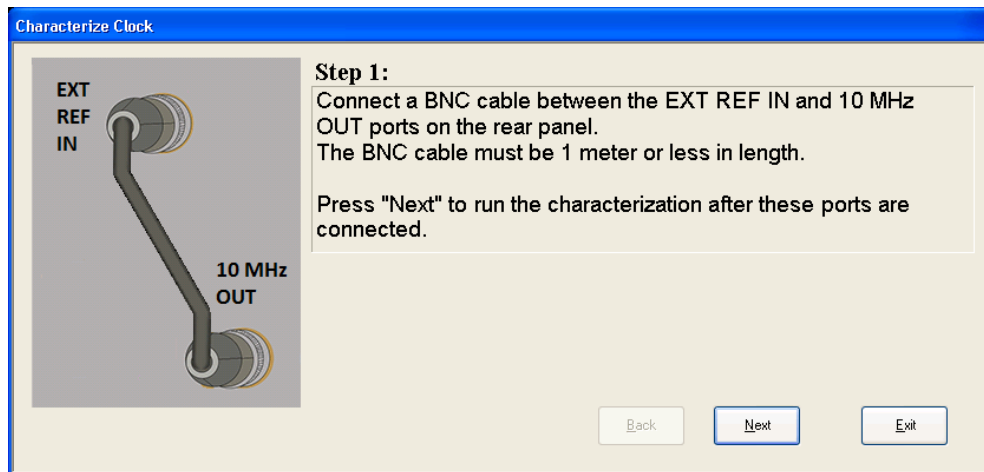
Parameter Name	Characterize Reference Clock End
Mode	All
Remote Command	:CALibration:REFErence:CLOCK:END?
Example	:CAL:REF:CLOC:END?
Notes	:CALibration:REFErence:CLOCK:END? returns 0 if successful :CALibration:REFErence:CLOCK:END? returns 1 if failed
Dependencies	Option DP2 or B40
Couplings	Expected to be run after sending the :CAL:REF:CLOC? command, and after removing the cable used in that Characterize Reference Clock step. This will resume any queued measurements, and it concludes the reference clock characterization.
Force Restart	Yes
Initial S/W Revision	A.12.00

Parameter Name	Last Characterize Reference Clock
Key Path	Visual annotation in the Show Alignment Statistics screen
Parameter Type	String
Mode	All
Remote Command	:CALibration:TIME:REFeRence:CLOCK?
Example	:CAL:TIME:REFeRence:CLOCK?
Notes	Value is the date and time the last successful Characterize Reference Clock was executed. The date is separated from the time by a space character. Returns "" if Characterize Reference Clock has never been performed on the instrument.
Dependencies	Option DP2 or B40
State Saved	No
Initial S/W Revision	A.12.00

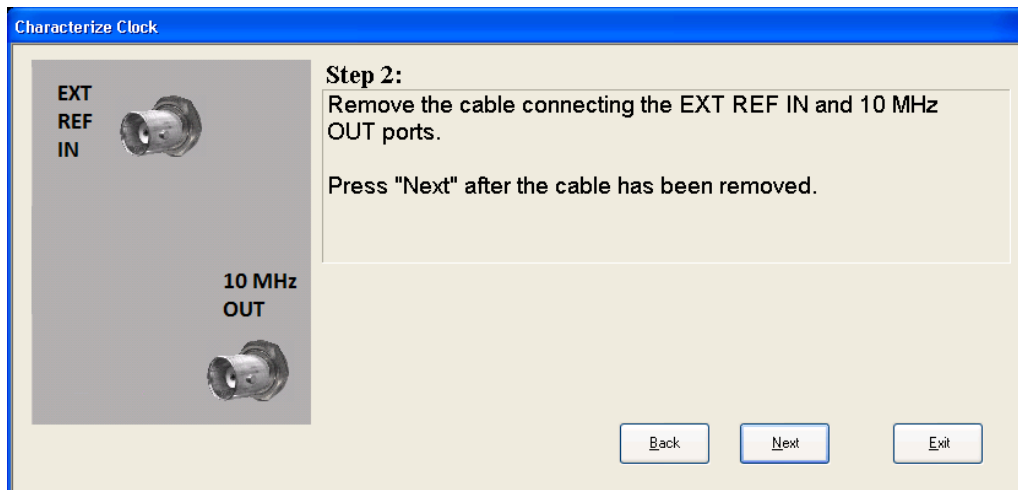
Front panel guided calibration sequence

When selecting "Characterize Reference Clock" through the front panel, the following form will be shown.

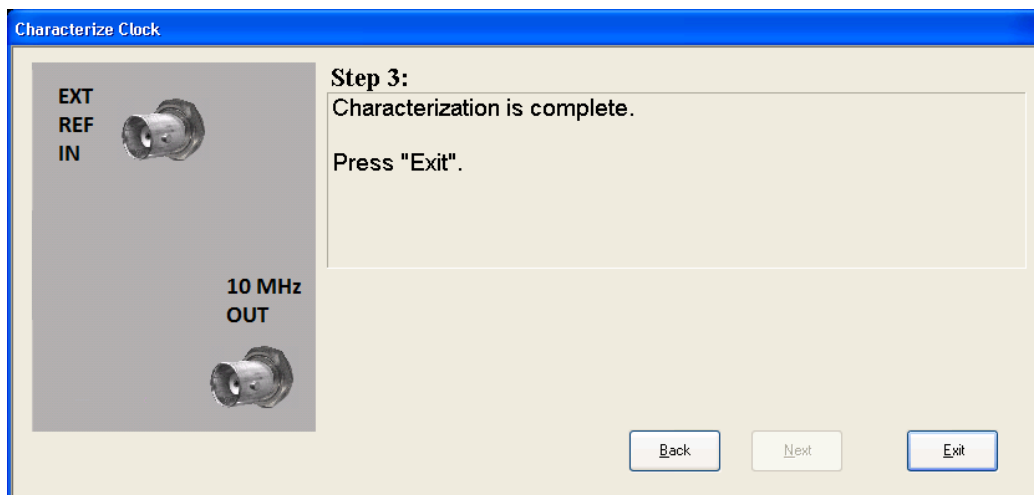
Step 1 of the guided calibration sequence:



Step 2 of the guided calibration sequence:



Step 3 of the guided calibration sequence:



Characterize Noise Floor

On instruments with the NF2 license installed, the calibrated Noise Floor used by Noise Floor Extensions should be refreshed periodically. To do this, press the Characterize Noise Floor key. When you press this key, the instrument stops any measurement currently underway, and a dialog appears with an OK and Cancel button which says:

"This action will take several minutes to perform. Please disconnect all cables from the RF input and press Enter to proceed. Press ESC to cancel."

When you press Enter or OK, the characterization proceeds. After the characterization, the analyzer restarts the measurement from the beginning (similar to pressing the Restart key). The characterization takes many minutes to run.

The noise floor model used by NFE includes an estimation of the temperature behavior of the noise floor, but this is only an estimation. The noise floor changes little with the age of the components. However, even small changes in the estimated level of the noise floor can make large changes in the effective noise floor, because the effective noise floor is the error in the estimation of the noise floor. Agilent recommends that

the Characterize Noise Floor operation be performed when the analyzer is operating at an ambient temperature that is significantly different than the ambient temperature at which this alignment was last run. In addition, Agilent recommends that the Characterize Noise Floor operation be performed after the first 500 hours of operation, and once every calendar year.

The noise floor model from the last operation of Characterize Noise Floor survives across the power cycle.

NOTE

The Characterize Noise Floor function can be interrupted by pressing the Cancel (ESC) front-panel key or remotely with Device Clear followed by the :ABORt SCPI command. None of the new characterization data is then used. However, since the old characterization data is purged at the beginning of the characterization, you now have an uncharacterized noise floor. You should re-execute this function and allow it to finish before making any further measurements with NFE. Until you do, the analyzer will display a “Characterize Noise Floor required” message and set bit 12 in the Status Questionable Calibration register (STATus:QUESTionable:CALibration:EXTended:NEEDED).

Key Path	System, Alignments, Advanced
Mode	All
Remote Command	:CALibration:NFLoor :CALibration:NFLoor?
Example	:CAL:NFL
Notes	:CALibration:NFLoor? returns 0 if successful :CALibration:NFLoor? returns 1 if failed (including interfering user signal) While Characterize Noise Floor is performing the alignment, bit ? in the Status Operation register is set. Completion, or termination, will clear bit ? in the Status Operation register. This command is sequential; it must complete before further SCPI commands are processed. Interrupting the alignment from remote is accomplished by invoking Device Clear followed by the :ABORt command. A failure encountered during characterization will generate the Error Condition message “Characterize Noise Floor failed” message and set bit ? in the Status Questionable Calibration register. Successful completion will clear bit ? in the Status Questionable Calibration register.
Dependencies	This key does not appear in models that do not contain NFE. In these models the SCPI command is accepted without error but no action is taken.
Couplings	Successful completion of Characterize Noise Floor will begin the elapsed time counter or the Last Characterize Noise Floor Time.
Initial S/W Revision	A.14.00

Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
Remote Command	:CALibration:TIME:NFLoor?
Example	:CAL:TIME:NFL?
Notes	Value is the date and time the last successful Characterize Noise Floor was executed. The date is separated from the time by a space character. Returns “” if no Characterize Noise Floor has ever been performed on the instrument.

Dependencies	In models that do not include NFE, this command is not enabled and any attempt to set or query will yield an error.
State Saved	No
Initial S/W Revision	A.14.00

Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
Remote Command	:CALibration:TEMPerature:NFLoor?
Example	:CAL:TEMP:NFL?
Notes	Value is the temperature of the last successful Characterize Noise Floor was executed. Returns "" if no Characterize Noise Floor has ever been performed on the instrument.
Dependencies	In models that do not include NFE, this command is not enabled and any attempt to set or query will yield an error.
State Saved	No
Initial S/W Revision	A.14.00

Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
Remote Command	:CALibration:TIME:ELAPsed:NFLoor?
Example	:CAL:TIME:ELAP:NFL?
Notes	Value is the elapsed time the instrument was powered-on since the last successful Characterize Noise Floor was executed. Returns "" if no Characterize Noise Floor has ever been performed on the instrument.
Dependencies	In models that do not include NFE, this command is not enabled and any attempt to set or query will yield an error.
State Saved	No
Initial S/W Revision	A.14.00

Timebase DAC

Allows control of the internal 10 MHz reference oscillator timebase. This may be used to adjust for minor frequency alignment between the signal and the internal frequency reference. This adjustment has no effect if the instrument is operating with an External Frequency Reference.

If the value of the Timebase DAC changes (by switching to Calibrated from User with User set to a different value, or in User with a new value entered) an alignment may be necessary. The alignment system will take appropriate action; which will either invoke an alignment or cause an Alert.

Key Path	System, Alignments
Mode	All
Remote Command	:CALibration:FREQuency:REFerence:MODE CALibrated USER :CALibration:FREQuency:REFerence:MODE?
Example	:CAL:FREQ:REF:MODE CAL
Notes	If the value of the timebase is changed the alignment system automatically performs an alignment or alerts that an alignment is due. If the value of the timebase is changed the alignment system automatically performs an alignment or alerts that an alignment is due.
Preset	This is unaffected by Preset but is set to CALibrated on a "Restore System Defaults->Align".
State Saved	No
Initial S/W Revision	Prior to A.02.00

Calibrated

Sets the Timebase DAC to the value established during factory or field calibration. The value displayed on the menu key is the calibrated value.

Key Path	System, Alignments, Timebase DAC
Mode	All
Example	:CAL:FREQ:REF:MODE CAL
Readback Text	[xxx] < where xxx is the calibrated value
Initial S/W Revision	Prior to A.02.00

User

Allows setting the Timebase DAC to a value other than the value established during the factory or field calibration. The value displayed on the menu key is the calibrated value.

Key Path	System, Alignments, Timebase DAC
Mode	All
Example	:CAL:FREQ:REF:MODE USER
Readback Text	xxx < where xxx is the Timebase DAC setting
Initial S/W Revision	Prior to A.02.00

Key Path	System, Alignments, Timebase DAC
Mode	All
Remote Command	:CALibration:FREQuency:REFerence:FINE <integer>

	:CALibration:FREQuency:REFeRence:FINE?
Example	:CAL:FREQ:REF:FINE 8191
Notes	If the value of the timebase is changed the alignment system automatically performs an alignment or alerts that an alignment is due.
Couplings	Setting :CAL:FREQ:REF:FINE sets :CAL:FREQ:REF:MODE USER
Preset	This is unaffected by Preset but is set to the factory setting on a "Restore System Defaults->Align".
State Saved	No
Min	0
Max	16383
Backwards Compatibility SCPI	:CALibration:FREQuency:REFeRence:COARse ESA hardware contained two DAC controls for the Timebase. In X-Series the command :CALibration:FREQuency:REFeRence:FINE is the method for adjusting the timebase. The :COARse command is provided as an alias to :FINE.
Initial S/W Revision	Prior to A.02.00

Remote Command	:CALibration:FREQuency:REFeRence:COARse <integer> :CALibration:FREQuency:REFeRence:COARse?
Example	:CAL:FREQ:REF:COAR 8191
Notes	This is an alias for CAL:FREQ:REF:FINE any change to COARse is reflected in FINE and vice-versa. See CAL:FREQ:REF:FINE for description of functionality.
Couplings	Setting :CAL:FREQ:REF:COAR sets :CAL:FREQ:REF:MODE USER
Initial S/W Revision	Prior to A.02.00

RF Preselector

This menu and all of its submenus are only available in models with the RF Preselector, such as the N9038A.

See ["Align Now, 20 Hz to 30 MHz" on page 376](#)

See ["Align Now, 30 MHz to 3.6 GHz" on page 377](#)

See ["Align Now, 20 Hz to 3.6 GHz" on page 378](#)

See ["Alert" on page 379](#)

Key Path	System, Alignments
Initial S/W Revision	Prior to A.08..00

Align Now, 20 Hz to 30 MHz

Immediately executes an alignment of the receiver subsystem. The receiver will stop any measurement currently underway, perform an Align Now All, then perform the RF Preselector alignment, and then restart the measurement from the beginning (similar to pressing the Restart key).

The query form of the remote commands (:CALibration:RFPSelector:CONDucted?) will invoke the alignment of the RF Preselector on Conducted Band and return a success or failure value. Successful completion will clear the “Align 20 Hz to 30 MHz required” Error Condition, and clear the bit 1 in the Status Questionable Calibration Extended Needed register. The elapsed time counter will begin for Last Align Now, Conducted Time, and the temperature is captured for the Last Align Now, Conducted Temperature. The alignment can be interrupted by pressing the Cancel (ESC) front-panel key or remotely with Device Clear followed by the :ABORt SCPI command. When this occurs, the Error Condition “Align 20 Hz to 30 MHz required” is set because new alignment data may be employed for an individual subsystem, but not a cohesive set of data for all subsystems.

The “Align 20 Hz to 30 MHz required” Error Condition will appear when this alignment has expired. User is now responsible to perform the Align Now, 20 Hz to 30 MHz in order to keep the receiver in warranted operation. This alignment can only be performed by user as it is not part of the Auto Align process.

Key Path	System, Alignments, RF Preselector, Align Now
Mode	All
Remote Command	:CALibration:RFPSelector:CONDucted :CALibration:RFPSelector:CONDucted?
Example	:CAL:RFPS:COND
Notes	For model N9038A only. :CALibration:RFPSelector:CONDucted? Return 0 if successful :CALibration:RFPSelector:CONDucted? Return 1 if failed When Align 20 Hz to 30 MHz is performing the alignment, bit 0 in the Status Operation register is set. Completion, or termination, will clear bit 0 in the Status Operation register. This command is sequential; it must complete before further SCPI commands are processed. Interrupting the alignment from remote is accomplished by invoking Device Clear followed by the :ABORt command. Successful completion will clear bit 1 in the Status Questionable Calibration Extended Needed register and bit 0 in Status Questionable Calibration Extended Failure register. A failure encountered during alignment will set the Error Condition “20 Hz to 30 MHz Alignment Failure” and set both bit 1 in the Status Questionable Calibration Extended Needed register and bit 9 in Status Questionable Calibration register.
Dependencies	This key does not appear in other than N9038A models, setting or querying the SCPI will generate an error.
Couplings	Initializes the time for the Last Align Conducted Now, Conducted Time. Records the temperature for the Last Align Conducted Now, Conducted Temperature.
Status Bits/OPC Dependencies	Bit 8 or 9 may be set in the Status Questionable Calibration register. Bit 1 may be set in the Status Questionable Calibration Extended Needed register. Bit 0 may be set in the Status Questionable Calibration Extended Failure register.
Initial S/W Revision	A.08.00

Align Now, 30 MHz to 3.6 GHz

Immediately executes an alignment of the receiver subsystem. The receiver will stop any measurement currently underway, perform an Align Now All, then perform the RF Preselector alignment, and then restart the measurement from the beginning (similar to pressing the Restart key).

The query form of the remote commands (:CALibration:RFPSelector:RADiated?) will invoke the alignment of the RF Preselector on Radiated Band and return a success or failure value. Successful completion will clear the “Align 30 MHz to 3.6 GHz required” Error Condition, and clear the bit 2 in the Status Questionable Calibration Extended Needed register. The elapsed time counter will begin for Last Align Now, Radiated Time, and the temperature is captured for the Last Align Now, Radiated Temperature. The alignment can be interrupted by pressing the Cancel (ESC) front-panel key or remotely with Device Clear followed by the :ABORt SCPI command. When this occurs, the Error Condition “Align 30 MHz to 3.6 GHz required” is set because new alignment data may be employed for an individual subsystem, but not a cohesive set of data for all subsystems.

The “Align 30 MHz to 3.6 GHz required” Error Condition will appear when this alignment has expired. User is now responsible to perform the Align Now, 30 MHz to 3.6 GHz in order to keep the receiver in warranted operation. This alignment can only be performed by user as it is not part of the Auto Align process.

Key Path	System, Alignments, RF Preselector, Align Now
Mode	All
Remote Command	:CALibration:RFPSelector:RADiated :CALibration:RFPSelector:RADiated?
Example	:CAL:RFPS:RAD
Notes	For model N9038A only. :CALibration:RFPSelector:RADiated? Return 0 if successful :CALibration:RFPSelector:RADiated? Return 1 if failed When Align 30 MHz to 3.6 GHz is performing the alignment, bit 0 in the Status Operation register is set. Completion, or termination, will clear bit 0 in the Status Operation register. This command is sequential; it must complete before further SCPI commands are processed. Interrupting the alignment from remote is accomplished by invoking Device Clear followed by the :ABORt command. Successful completion will clear bit 2 in the Status Questionable Calibration Extended Needed register and bit 1 in Status Questionable Calibration Extended Failure register. A failure encountered during alignment will set the Error Condition “30 MHz to 3.6 GHz Alignment Failure” and set both bit 2 in the Status Questionable Calibration Extended Needed register and bit 9 in Status Questionable Calibration register.
Dependencies	This key does not appear in other than N9038A models, setting or querying the SCPI will generate an error.
Couplings	Initializes the time for the Last Align Radiated Now, Radiated Time. Records the temperature for the Last Align Radiated Now, Radiated Temperature.
Status Bits/OPC Dependencies	Bit 8 or 9 may be set in the Status Questionable Calibration register. Bit 2 may be set in the Status Questionable Calibration Extended Needed register. Bit 1 may be set in the Status Questionable Calibration Extended Failure register.
Initial S/W Revision	A.08.00

Align Now, 20 Hz to 3.6 GHz

Immediately executes an alignment of the receiver subsystem. The receiver will stop any measurement currently underway, perform an Align Now All, then perform the RF Preselector alignment, and then restart the measurement from the beginning (similar to pressing the Restart key).

The query form of the remote commands (:CALibration:RFPSelector:FULL?) will invoke the alignment of the RF Preselector on both Conducted and Radiated Band and return a success or failure value. Successful completion will clear the “Align 20 Hz to 3.6 GHz required” Error Condition, and clear the bit 1 and bit 2 in the Status Questionable Calibration Extended Needed register. The elapsed time counter will begin for Last Align Now, Conducted Time and Last Align Now Radiated Time and the temperature is captured for Last Align Now, Conducted Temperature and Last Align Now, Radiated Temperature. The alignment can be interrupted by pressing the Cancel (ESC) front-panel key or remotely with Device Clear followed by the :ABORt SCPI command. When this occurs, the Error Condition “Align 20 Hz to 3.6 GHz required” is set because new alignment data may be employed for an individual subsystem, but not a cohesive set of data for all subsystems.

The “Align 20 Hz to 3.6 GHz required” Error Condition will appear when this alignment has expired. It is now your responsibility to perform the Align Now, 20 Hz to 3.6 GHz to keep the receiver in warranted operation. This alignment can only be performed by the user as it is not part of the Auto Align process.

Key Path	System, Alignments, RF Preselector, Align Now
Mode	All
Remote Command	:CALibration:RFPSelector:FULL :CALibration:RFPSelector:FULL?
Example	:CAL:RFPS:FULL
Notes	For model N9038A only. :CALibration:RFPSelector:FULL? Return 0 if successful :CALibration:RFPSelector:FULL? Return 1 if failed When Align 20 Hz to 3.6 GHz is performing the alignment, bit 0 in the Status Operation register is set. Completion, or termination, will clear bit 0 in the Status Operation register. This command is sequential; it must complete before further SCPI commands are processed. Interrupting the alignment from remote is accomplished by invoking Device Clear followed by the :ABORt command. Successful completion will clear bit 1, bit 2 in the Status Questionable Calibration Extended Needed register and bit 0, bit 1 in Status Questionable Calibration Extended Failure register. A failure encountered during alignment will set the Error Condition “20 Hz to 3.6 GHz Alignment Failure” and set bit 1, bit 2 in the Status Questionable Calibration Extended Needed register and bit 9 in Status Questionable Calibration register.
Dependencies	This key only appears in N9038A models, setting or querying the SCPI in other models will generate an error.
Couplings	Initializes the time for the Last Align Conducted Now, Conducted Time. Initializes the time for the Last Align Radiated Now, Radiated Time. Records the temperature for the Last Align Conducted Now, Conducted Temperature.

	Records the temperature for the Last Align Radiated Now, Radiated Temperature.
Status Bits/OPC Dependencies	Bit 8 or 9 may be set in the Status Questionable Calibration register. Bit 1 and 2 may be set in the Status Questionable Calibration Extended Needed register. Bit 0 and 1 may be set in the Status Questionable Calibration Extended Failure register.
Initial S/W Revision	A.08.00

Alert

Setting Alert to ON/OFF will enable/disable the display of RF Preselector alignment required message on the status line. The instrument will power up with Alert On mode.

Key Path	System, Alignments, RF Preselector
Mode	All
Remote Command	:CALibration:RFPSelector:ALERt ON OFF 0 1 :CALibration:RFPSelector:ALERt?
Example	:CAL:RFPS:ALER OFF
Notes	For model N9038A only. Error Condition will be generated when the alert is On and any of the RF Preselector alignments has expired.
Preset	This is unaffected by Preset, but is set to ON on a "Restore System Defaults->Align".
State Saved	No
Initial S/W Revision	A.08.00

Schedule Setup

Enables you to schedule a task to run automatically at the background based on the recurrence and time set in the scheduler. Make sure that the Instrument's local time is accurate as the Scheduler relies on this information to execute the task.

Key Path	System, Alignments, RF Preselector
Initial S/W Revision	A.08.00

Task

There are 3 task that can be selected for the scheduler to run.

Task 1 is the 20 Hz to 30 MHz alignment

Task 2 is the 30 MHz to 3.6 GHz alignment

Task 3 is the 20 Hz to 3.6 GHz alignment.

Key Path	System, Alignments, RF Preselector, Schedule Setup
Mode	All
Remote Command	:CALibration:RFPSelector:SCHeDuler:TASK T1 T2 T3 :CALibration:RFPSelector:SCHeDuler:TASK?
Example	:CAL:RFPS:SCH:TASK T1
Notes	Changing the task will not reset the Scheduler time and the alignment is based on the current scheduled configuration to occur. For model N9038A only.
Preset	This is unaffected by Preset but is set to T3 on a "Restore System Defaults->Align".
State Saved	No
Range	Task 1 Task 2 Task 3
Initial S/W Revision	A.08.00

Date/Time

Enables you to configure the scheduler to run a task starting from this date and time. The date and time rely on the instrument's local time to execute a scheduled task. The date is based on the format "YYYY/MM/DD" and the time is based on a 24 hour clock.

Key Path	System, Alignments, RF Preselector, Schedule Setup
Mode	All
Remote Command	:CALibration:RFPSelector:SCHeDuler:TIME:STARt "date","time" :CALibration:RFPSelector:SCHeDuler:TIME:STARt? This query returns data using the following format "YYYY/MM/DD; HH:MM:SS"
Example	:CAL:RFPS:SCH:TIME:STAR "2009/8/20", "12:00:00"
Notes	"date" is representation of the date the task will run in the form of "YYYY/MM/DD" where: <ul style="list-style-type: none"> -YYYY is the four digit representation of year. (for example, 2009) -MM is the two digit representation of month. (for example, 01 to 12) -DD is the two digit representation of the day. (for example, 01 to 28, 29, 30 or 31 depending on the month and year) "time" is a representation of the time of day the task will run in the form of "HH:MM:SS" where: <ul style="list-style-type: none"> -HH is the two digit representation of the hour in 24 hour format -MM is the two digit representation of minute -SS is the two digit representation of seconds For model N9038A only.
Preset	This is unaffected by Preset but is set to Current date and 00:00:00 on a "Restore System Defaults->Align".
State Saved	No
Initial S/W Revision	A.08.00

Date

Enables you to configure the date of the scheduled task. The SCPI command to configure the date and time parameters of the scheduler is the same; however, they each have their own front-panel control.

Key Path	System, Alignments, RF Preselector, Schedule Setup, Date/Time
Notes	See " Date/Time " on page 380. For model N9038A only.
Preset	This is unaffected by Preset but is set to Current date and 00:00:00 on a "Restore System Defaults->Align".
State Saved	No
Initial S/W Revision	A.08.00

Time

Enables you to configure the time of the scheduled task. The SCPI command to configure the date and time parameters of the scheduler is the same; however, they each have their own front panel-control.

Key Path	System, Alignments, RF Preselector, Schedule Setup, Date/Time
Notes	See " Date/Time " on page 380 . For model N9038A only.
Preset	This is unaffected by Preset but is set to Current date and 00:00:00 on a "Restore System Defaults->Align".
State Saved	No
Initial S/W Revision	A.08.00

Recurrence

Enables you to configure the scheduler to run the task recurrently on a scheduled date and time. You can schedule it to run daily, weekly or alternate weeks.

Key Path	System, Alignments, RF Preselector, Schedule Setup
Mode	All
Remote Command	:CALibration:RFPSelector:SCHeduler:RECurrence DAY WEEK OFF :CALibration:RFPSelector:SCHeduler:RECurrence?
Example	:CAL:RFPS:SCH:REC DAY
Notes	For model N9038A only.
Preset	This is unaffected by Preset but is set to OFF on a "Restore System Defaults->Align".
State Saved	No
Range	DAY WEEK OFF
Initial S/W Revision	A.08.00

Every N Weeks

Enables you to configure the scheduler to run the task on a day in every number of week's duration.

Key Path	System, Alignments, RF Preselector, Schedule Setup, Recurrence
Initial S/W Revision	A.08.00

N of Weeks

Enables you to set the number of weeks that the scheduler will wait to trigger a task.

Key Path	System, Alignments, RF Preselector, Schedule Setup, Recurrence, Every N Weeks
Mode	All
Remote Command	:CALibration:RFPSelector:SCHeduler:REcurrence:WEEK <integer> :CALibration:RFPSelector:SCHeduler:REcurrence:WEEK?
Example	:CAL:RFPS:SCH:REC:WEEK 2
Notes	New scheduled date to run the alignment task will get updated when this parameter is changed. For model N9038A only.
Preset	This is unaffected by Preset but is set to 1 on a "Restore System Defaults->Align".
State Saved	No
Range	1-52
Min	1
Max	52
Initial S/W Revision	A.08.00

Day

Enables you to set the Day of the Week the scheduler will run a scheduled task.

Key Path	System, Alignments, RF Preselector, Schedule Setup, Recurrence, Every N Weeks
Mode	All
Remote Command	:CALibration:RFPSelector:SCHeduler:REcurrence:DAY SUN MON TUE WED THU FRI SAT :CALibration:RFPSelector:SCHeduler:REcurrence:DAY?
Example	:CAL:RFPS:SCH:REC:DAY SUN
Notes	For model N9038A only.
Preset	This is unaffected by Preset but is set to SUN on a "Restore System Defaults->Align".
State Saved	No
Range	Sunday Monday Tuesday Wednesday Thursday Friday Saturday
Initial S/W Revision	A.08.00

Scheduler

Setting the Scheduler to ON will trigger the execution of the scheduled task based on the recurrence and time set in the scheduler since the last successful of the specific alignment. A warning condition of “RF Preselector alignment scheduler is ON” will be appeared when the scheduler is set to ON. OFF will turn off the Scheduler from running any scheduled task.

Key Path	System, Alignments, RF Preselector
Mode	All
Remote Command	:CALibration:RFPreselector:Scheduler:STATe ON OFF 0 1 :CALibration:RFPreselector:Scheduler:STATe?
Example	:CAL:RFPS:SCH:STAT OFF
Notes	For model N9038A only.
Preset	This is unaffected by Preset but is set to OFF on a “Restore System Defaults->Align”.
State Saved	No
Initial S/W Revision	A.08.00

I/O Config

Activates a menu for identifying and changing the I/O configuration for remote control.

Key Path	System
Initial S/W Revision	Prior to A.02.00

GPIB

Activates a menu for configuring the GPIB I/O port.

Key Path	System, I/O Config
Initial S/W Revision	A.02.00

GPIB Address

Select the GPIB remote address.

Key Path	System, I/O Config, GPIB
Mode	All
Remote Command	:SYSTem:COMMunicate:GPIB[1][:SELF]:ADDRess <integer> :SYSTem:COMMunicate:GPIB[1][:SELF]:ADDRess?
Example	:SYST:COMM:GPIB:ADDR 17
Notes	Changing the Address on the GPIB port requires all further communication to use the new address.

Preset	This is unaffected by Preset but is set to 18 on a “Restore System Defaults->Misc”
State Saved	No
Range	0 to 30
Min	0
Max	30
Initial S/W Revision	Prior to A.02.00

GPIO Controller

Sets the GPIO port into controller or device mode. In the normal state, GPIO controller is disabled, which allows the analyzer to be controlled by a remote computer. When GPIO Controller is enabled, the instrument can run software applications that use the instrument's computer as a GPIO controller; controlling devices connected to the instrument's GPIO port.

NOTE

When GPIO Controller is enabled, the analyzer application itself cannot be controlled over GPIO. In this case it can easily be controlled via LAN or USB. The GPIO port cannot be a controller and device at the same time. Only one controller can be active on the GPIO bus at any given time. If the analyzer is the controller, an external PC cannot be a controller.

To control the instrument from the software that is performing GPIO controller operation, you can use an internal TCP/IP connection to the analyzer application. Use the address TCIP0:localhost:inst0:INSTR to send SCPI commands to the analyzer application.

Key Path	System, I/O Config, GPIO
Mode	All
Scope	Mode Global
Remote Command	:SYSTem:COMMunicate:GPIO[1][:SELF]:CONTroller[:ENABLE] ON OFF 0 1 :SYSTem:COMMunicate:GPIO[1][:SELF]:CONTroller[:ENABLE]?
Example	:SYST:COMM:GPIO:CONT ON Will set GPIO port to Controller
Notes	When the instrument becomes the Controller bit 0 in the Standard Event Status Register is set (and when the instrument relinquishes Controller capability bit 0 is cleared in the Standard Event Status Register).
Preset	This is unaffected by Preset but is set to OFF on a “Restore System Defaults->Misc”
State Saved	No
Range	Disabled Enabled
Initial S/W Revision	A.02.00

Disabled

Disables the GPIO Controller capability, this is the default (or normal) setting.

Key Path	System, I/O Config, GPIB, GPIB Controller
Example	:SYST:COMM:GPIB:CONT OFF Will set GPIB port to Device
Initial S/W Revision	A.02.00

Enabled

Enables the GPIB Controller capability.

Key Path	System, I/O Config, GPIB, GPIB Controller
Example	:SYST:COMM:GPIB:CONT ON Will set GPIB port to Controller
Initial S/W Revision	A.02.00

SCPI LAN

Activates a menu for identifying and changing the SCPI over a LAN configuration. There are a number of different ways to send SCPI remote commands to the instrument over LAN. It can be a problem to have multiple users simultaneously accessing the instrument over the LAN. These keys limit that somewhat by disabling the telnet, socket, and/or SICL capability.

Key Path	System, I/O Config
Initial S/W Revision	Prior to A.02.00

SCPI Telnet

Turns the SCPI LAN telnet capability On or Off allowing you to limit SCPI access over LAN through telnet.

Key Path	System, I/O Config, SCPI LAN
Mode	All
Remote Command	:SYSTem:COMMunicate:LAN:SCPI:TELNet:ENABle OFF ON 0 1 :SYSTem:COMMunicate:LAN:SCPI:TELNet:ENABle?
Example	:SYST:COMM:LAN:SCPI:TELN:ENAB OFF
Preset	This is unaffected by Preset but is set to ON with a "Restore System Defaults->Misc"
State Saved	No
Range	On Off
Initial S/W Revision	Prior to A.02.00

SCPI Socket

Turns the capability of establishing Socket LAN sessions On or Off. This allows you to limit SCPI access over LAN through socket sessions.

Key Path	System, I/O Config, SCPI LAN
Mode	All
Remote Command	:SYSTem:COMMunicate:LAN:SCPI:SOCKet:ENABle OFF ON 0 1 :SYSTem:COMMunicate:LAN:SCPI:SOCKet:ENABle?
Example	:SYST:COMM:LAN:SCPI:SOCK:ENAB OFF
Preset	This is unaffected by a Preset but is set to ON with a "Restore System Defaults->Misc"
State Saved	No
Range	On Off
Initial S/W Revision	Prior to A.02.00

SICL Server

Turns the SICL server capability On or Off, enabling you to limit SCPI access over LAN through the SICL server. (SICL IEEE 488.2 protocol.)

Parameter	Description	Setting
Maximum Connections	The maximum number of connections that can be accessed simultaneously	5
Instrument Name	The name (same as the remote SICL address) of your analyzer	inst0
Instrument Logical Unit	The unique integer assigned to your analyzer when using SICL LAN	8
Emulated GPIB Name	The name (same as the remote SICL address) of the device used when communicating with your analyzer	gpib7
Emulated GPIB Logical Unit	The unique integer assigned to your device when it is being controlled using SICL LAN	8
Emulated GPIB Address	The emulated GPIB address assigned to your transmitter tester when it is a SICL server (the same as your GPIB address)	18

Key Path	System, I/O Config, SCPI LAN
Mode	All
Remote Command	:SYSTem:COMMunicate:LAN:SCPI:SICL:ENABle OFF ON 0 1 :SYSTem:COMMunicate:LAN:SCPI:SICL:ENABle?
Example	:SYST:COMM:LAN:SCPI:SICL:ENAB OFF
Preset	This is unaffected by Preset, but is set to ON with a "Restore System Defaults->Misc"
State Saved	No
Range	On Off
Initial S/W Revision	Prior to A.02.00

HiSLIP Server

Turns the HiSLIP server capability On or Off, enabling you to limit SCPI access over LAN through the HiSLIP server.

HiSLIP stands for High Speed LAN Instrument Protocol and is part of the IVI–6.1 specification.

Here is an example of a VISA connection string used to connect to the HiSLIP Server on an X-Series Spectrum Analyzer:

```
TCPIP0::a-n9030a-93016::hislip0::INSTR
```

In the example above, hislip0 is the HiSLIP device name that VISA users must include in their HiSLIP VISA Address strings. Your HiSLIP device name may be different depending on your VISA settings.

Key Path	System, I/O Config, SCPI LAN
Mode	All
Remote Command	:SYSTem:COMMunicate:LAN:SCPI:HISLip:ENABle OFF ON 0 1 :SYSTem:COMMunicate:LAN:SCPI:HISLip:ENABle?
Example	:SYST:COMM:LAN:SCPI:HISL:ENAB OFF
Preset	This is unaffected by Preset, but is set to ON with a “Restore System Defaults-> Misc”
State Saved	No
Range	On Off
Initial S/W Revision	A.11.00

SCPI Socket Control Port (Remote Command Only)

Returns the TCP/IP port number of the control socket associated with the SCPI socket session. This query enables you to obtain the unique port number to open when a device clear is to be sent to the instrument. Every time a connection is made to the SCPI socket, the instrument creates a peer control socket. The port number for this socket is random. The user must use this command to obtain the port number of the control socket. To force a device clear on this socket, open the port and send the string “DCL ” to the instrument.

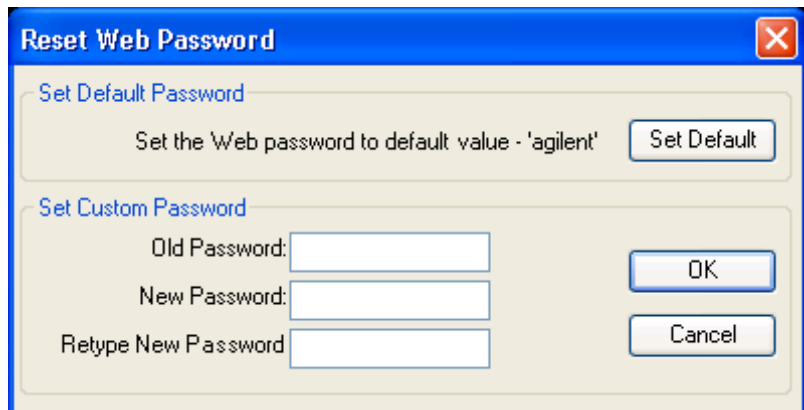
If this SCPI command is sent to a non SCPI Socket interface, then 0 is returned.

Mode	All
Remote Command	:SYSTem:COMMunicate:LAN:SCPI:SOCKet:CONTRol?
Example	:SYST:COMM:LAN:SCPI:SOCK:CONT?
Preset	This is unaffected by Preset or “Restore System Defaults-> Misc”.
State Saved	No
Range	0 to 65534
Min	0
Max	65534
Initial S/W Revision	Prior to A.02.00

Reset Web Password

The embedded web server contains certain capability which are password protected; modifying the LAN configuration of the instrument, and access to web pages that can change the settings of the instrument. The default password from the factory is 'agilent' (without the quotes). The control provided here is the means to set the web password as the user desires, or to reset the password to the factory default.

Selecting Reset web password brings up a control for resetting the password as the user desires, or to the factory default. A keyboard is required to change the password from the factory default of 'agilent' or to set a new password that contains alphabetic characters. The control is:



If this control is entered without an external keyboard or mouse connected, you can cancel the control by pressing the Cancel (ESC) front-panel key.

Key Path	System, I/O Config
Mode	All
Initial S/W Revision	Prior to A.02.00

LXI

Opens a menu that allows you to access the various LXI configuration properties.

Key Path	System, I/O Config
Initial S/W Revision	Prior to A.02.00

LAN Reset

Resets the LAN connection.

Key Path	System, I/O Config, LXI
Initial S/W Revision	Prior to A.02.00

System IDN Response

This key allows you to specify a response to the *IDN? query, or to return the analyzer to the Factory response if you have changed it.

To choose the factory-set response, press the Factory key.

To specify your own response, press the User key, and enter your desired response.

Key Path	System, I/O Config
Mode	All
Remote Command	:SYSTem:IDN <string> :SYSTem:IDN?
Notes	<ul style="list-style-type: none"> • This affects the response given in all Modes of the Analyzer, unless the current Mode has also specified a custom response, in which case the current Mode's custom IDN response takes precedence over the System's, but only while that Mode is the current Mode.. • It survives shutdown and restart of the software and therefore survives a power cycle • Null string as parameter restores the Factory setting
Preset	This is unaffected by Preset but is set to the original factory setting on a "Restore System Defaults->Misc"
State Saved	No
Initial S/W Revision	A.06.00

Factory

This key selects the factory setting, for example:

"Agilent Technologies,N9020A,MY00012345,A.05.01"

where the fields are manufacturer, model number, serial number, firmware revision.

Key Path	System, I/O Config, IDN Response
Example	:SYST:IDN "" null string, restores the factory setting
Initial S/W Revision	A.06.0

User

This key allows you to specify your own response to the *IDN? query. You may enter your desired response with the Alpha Editor or a plugin PC keyboard.

When you press this key, the active function becomes the current User string with the cursor at the end. This makes it easy to edit the existing string.

If you enter a null string (for example, by clearing the User String while editing and then pressing Done) the analyzer automatically reverts to the Factory setting.

Key Path	System, I/O Config, IDN Response
Example	:SYST:IDN "XYZ Corp, Model 12, 012345, A.01.01" user specified response
Initial S/W Revision	A.06.00

Query USB Connection (Remote Command Only)

Enables you to determine the speed of the USB connection.

Mode	All
Remote Command	:SYSTem:COMMunicate:USB:CONNectioN?
Example	:SYST:COMM:USB:CONN?
Notes	NONE - Indicates no USB connection has been made. LSPeed - Indicates a USB low speed connection (1.5 Mbps). This is reserved for future use, the T+M488 protocol is not supported on low speed connections. HSPeed - Indicates that a USB high speed connection (480 Mbps) has been negotiated. FSPeed - Indicates that a USB full speed connection (12 Mbps) has been negotiated.
State Saved	No
Range	NONE LSPeed HSPeed FSPeed
Initial S/W Revision	Prior to A.02.00

USB Connection Status (Remote Command Only)

Enables you to determine the current status of the USB connection.

Mode	All
Remote Command	:SYSTem:COMMunicate:USB:STATus?
Example	:SYST:COMM:USB:STAT?
Notes	SUSPended - Indicates that the USB bus is currently in its suspended state. The bus is in the suspended state when: <ul style="list-style-type: none"> • The bus is not connected to any controller • The controller is currently powered off • The controller has explicitly placed the USB device into the suspended state. When in the suspended state, no USB activity, including start of frame packets are received. ACTive - Indicates that the USB device is in the active state. When the device is in the active state, it is receiving periodic start of frames but it isn't necessarily receiving or transmitting data.
State Saved	No
Range	SUSPended ACTive
Initial S/W Revision	Prior to A.02.00

USB Packet Count (Remote Command Only)

Enables you to determine the number of packets received and transmitted on the USB bus.

Mode	All
Remote Command	:SYSTem:COMMunicate:USB:PACKets?
Example	:SYST:COMM:USB:PACK?
Notes	Two integers are returned. The first is the number of packets received since application invocation, the second is the number of packets transmitted since application invocation. If no packets have been received or transmitted the response is 0,0. The packet count is initialized to 0,0 when the instrument application is started.
State Saved	No
Initial S/W Revision	Prior to A.02.00

Restore Defaults

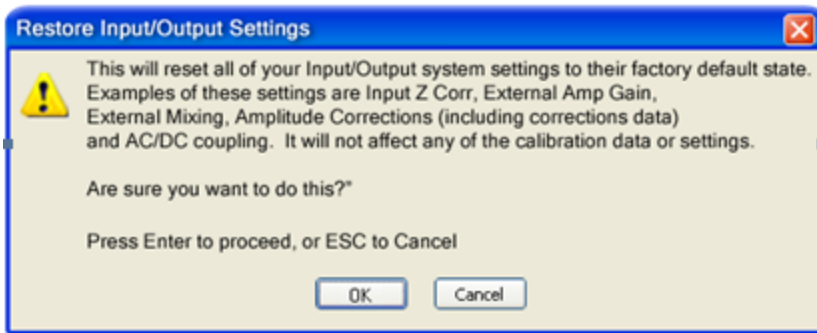
Provides incremental initialization of the system setting groups along with supporting a comprehensive reset of the entire instrument back to a factory default state. The menu selections are the groups of system settings and when one is selected, that particular group of system settings is reset back to their default values.

Key Path	System
Mode	All
Remote Command	:SYSTem:DEFault [ALL] ALIGn INPut MISC MODes PON
Example	SYST:DEF
State Saved	No
Initial S/W Revision	Prior to A.02.00

Restore Input/Output Defaults

Causes the group of settings and data associated with Input/Output front-panel key to be a reset to their default values. This level of Restore System Defaults does not affect any other system settings, mode settings and does not cause a mode switch. .

Confirmation is required to restore the Input/Output setting. The confirmation dialog is:

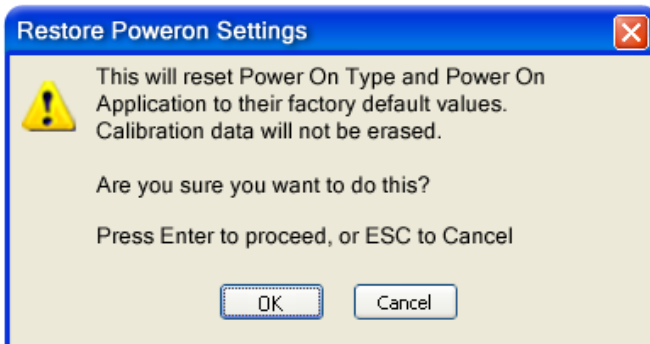


Key Path	System, Restore System Defaults
Example	:SYST:DEF INP
Initial S/W Revision	Prior to A.02.00

Restore Power On Defaults

This selection causes the Power On settings to be a reset to their default value. This level of Restore System Defaults does not affect any other system settings, mode settings and does not cause a mode switch. The Power On settings and their default values are Power On Type reset to Mode and Input/Output Defaults and Power On Application reset to whatever the factory set as its default value.

Confirmation is required to restore the factory default values. The confirmation dialog is:



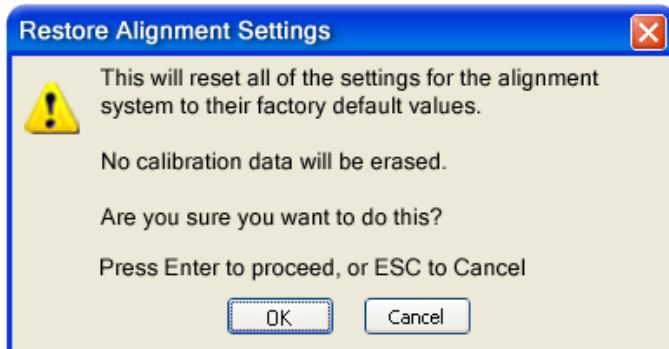
Key Path	System, Restore System Defaults
Example	:SYST:DEF PON
Initial S/W Revision	Prior to A.02.00

Restore Align Defaults

This selection causes the Alignment system settings to be a reset to their default values. This does not affect any Alignment data stored in the system. This level of Restore System Defaults does not affect any other system settings, mode settings and does not cause a mode switch.

After performing this function, it may impact the auto-alignment time of the instrument until a new alignment baseline has been established.

Confirmation is required to restore the factory default values. The confirmation dialog is:



Key Path	System, Restore System Defaults
Example	:SYST:DEF ALIG
Initial S/W Revision	Prior to A.02.00

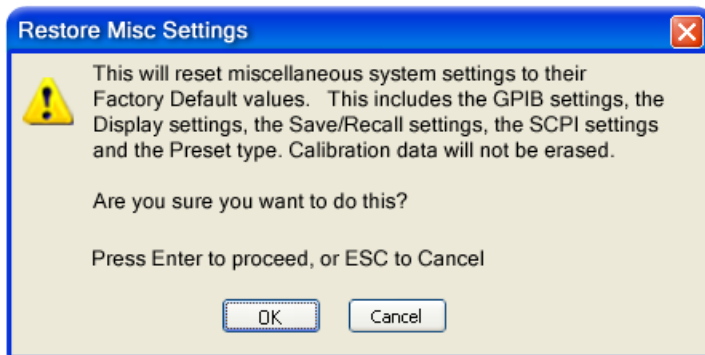
Restore Misc Defaults

This selection causes miscellaneous system settings to be reset to their default values. With this reset, you lose the GPIB address and it is reset to 18, so this should be used with caution. This level of Restore System Defaults does not affect any other system settings, mode settings and does not cause a mode switch. This miscellaneous group contains the rest of the settings that have not been part of the other Restore System Defaults groups. The following table is a complete list of settings associated with this group:

Miscellaneous Setting	Default Value
Verbose SCPI	Off
The SYST:PRES:TYPE	MODE
Auto File Name Number	000
Save Type	State
State Save To	Register 1
Screen Save To	SCREEN000.png
DISP:ENABLE	ON
Full Screen	Off
SCPI Telnet	ON
SCPI Socket	ON
SICL Server	ON
Softkey Language	English

Miscellaneous Setting	Default Value
System Annotation	ON
Display Theme	TDColor
System IDN Response	Factory result of *IDN?
Display Intensity	100
Display Backlight	ON
GPIB Address	18

Confirmation is required to restore the factory default values. The confirmation dialog is:

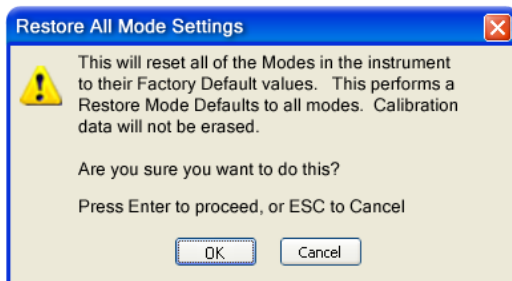


Key Path	System, Restore System Defaults
Example	:SYST:DEF MISC
Initial S/W Revision	Prior to A.02.00

Restore Mode Defaults (All Modes)

This selection resets all of the modes in the instrument back to their default state just as a Restore Mode Defaults does and it switches the instrument to the power-on mode and causes the default measurement for the power-on mode to be active. This level of Restore System Defaults does not affect any system settings, but it does affect the state of all modes and does cause a mode switch unless the instrument was already in the power-on mode.

Confirmation is required to restore the factory default values. The confirmation dialog is:

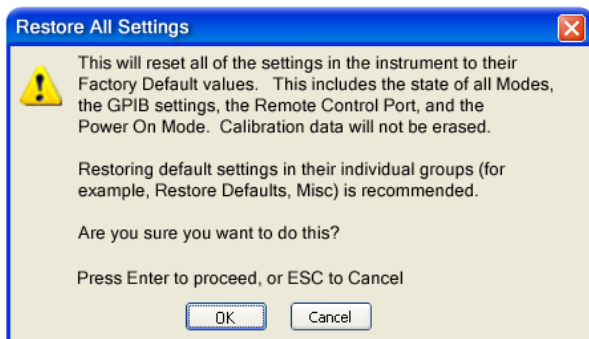


Key Path	System, Restore System Defaults
Example	:SYST:DEF MOD
Couplings	An All Mode will cause the currently running measurement to be aborted, mode switch to the power-on mode and activate the default measurement for the power-on mode.. It gets the mode to a consistent state with all of the default couplings set.
Initial S/W Revision	Prior to A.02.00

All

This performs a comprehensive reset of ALL analyzer settings to their factory default values. It resets all of the system setting groups, causes a Restore Mode Defaults for all modes in the instrument, and switches back to the power-on mode. It does not affect the User Preset file or any user saved files.

Confirmation is required to restore the factory default values. The confirmation dialog is:



NOTE

If you are using an Agilent USB External Mixer, then you will need to perform a Refresh USB Mixer Connection after Restoring All Defaults.

Key Path	System, Restore System Defaults
Example	:SYST:DEF ALL
Notes	If using Agilent USB External Mixer, perform a Refresh USB Mixer Connection (SCPI command :MIX:BAND USB) following a Restore All Defaults.
Couplings	An All will cause the currently running measurement to be aborted and get all modes to a consistent state, so it is unnecessary to couple any settings.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.14.00

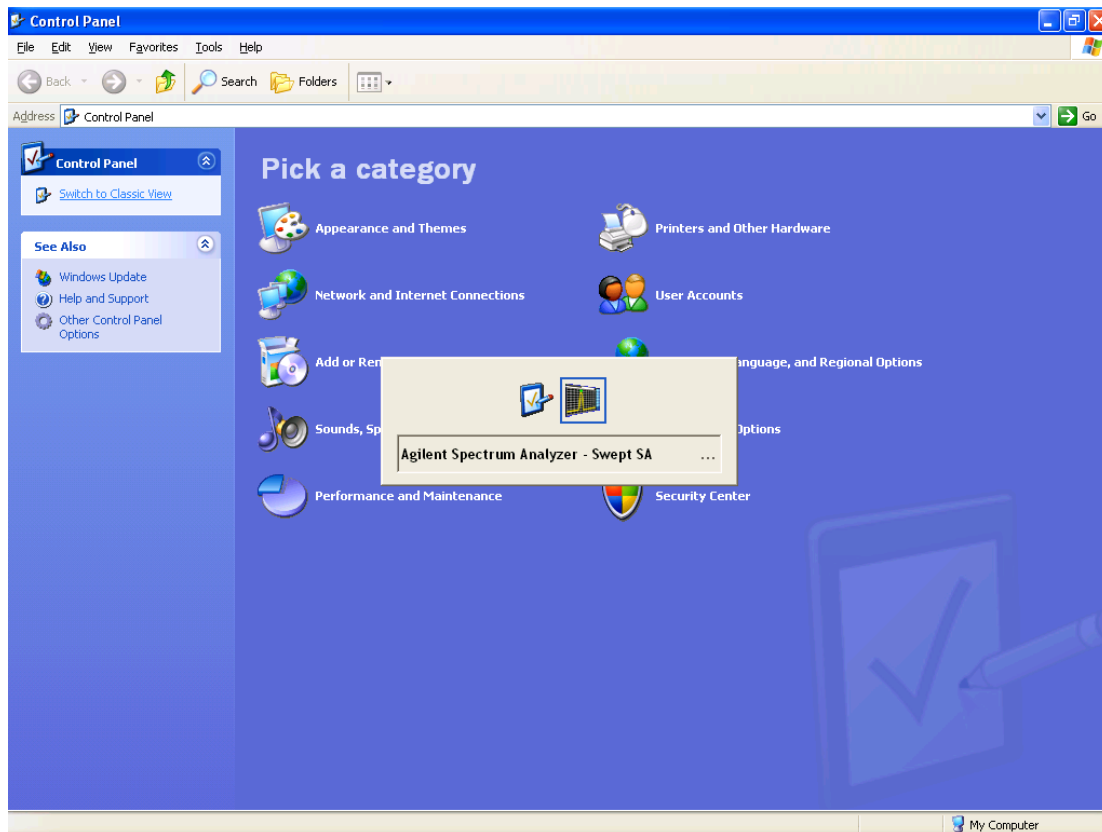
Control Panel...

Opens the Windows Control Panel. The Control Panel is used to configure certain elements of Windows that are not configured through the hardkey/softkey System menus.

NOTE This feature is not available if option SF1 is installed.

The Control Panel is a separate Windows application, so to return to the analyzer once you are in the Control Panel, you may either:

Exit the Control Panel by clicking on the red X in the upper right hand corner, with a mouse



Or use Alt-Tab: press and hold the Alt key and press and release the Tab key until the Analyzer logo is showing in the window in the center of the screen, as above, then release the Alt key.

Key Path	System
Notes	No remote command for this key.
Initial S/W Revision	Prior to A.02.00

Licensing...

Opens the license explorer.

NOTE

This feature is not available if option SF1 is installed.

For Help on this key, select Help in the menu bar at the top of the license explorer window.

Key Path	System
Notes	No equivalent remote command for this key.
Backwards Compatibility Notes	In ESA the SCPI command for displaying the Show Licenses screen is: :SYSTem:CONFIgure:LKEY:STATe OFF ON 0 1 :SYSTem:CONFIgure:LKEY:STATe? There are no equivalent SCPI commands in the X-Series for displaying the License Explorer.
Initial S/W Revision	Prior to A.02.00

Remote Command :SYSTem:LKEY <"OptionInfo">, <"LicenseInfo">

Example SYST:LKEY "N9073A-1FP",
"027253AD27F83CDA5673A9BA5F427FDA5E4F25AEB1017638211AC9F60D9C639FE539735909C551DE0A91"

Notes The <"OptionInfo"> contains the feature and the version. You must specify the feature but can omit the version. If you omit the version, the system regards it as the latest one, since the system knows which version is supported for each feature.

The <"LicenseInfo"> contains the signature, the expiration date, and serial number for transport if transportable. You must specify the signature, but you can omit the other information. If you omit the expiration date, the system regards it as permanent. If you omit the serial number, the system regards it as non-transportable. As a result, this supports reverse compatibility.

Initial S/W Revision Prior to A.02.00

Remote Command :SYSTem:LKEY:DELeTe <"OptionInfo">,<"LicenseInfo">

Example SYST:LKEY:DEL 'N9073A-1FP',
"027253AD27F83CDA5673A9BA5F427FDA5E4F25AEB1017638211AC9F60D9C639FE539735909C551DE0A91"

Notes The <"OptionInfo"> contains the feature and the version. You must specify the feature but can omit the version. If you omit the version, the system regards it as the latest one, if more than one version is installed.

The <"LicenseInfo"> contains the signature, the expiration date, and whether or not be transportable. You must specify the signature, but you can omit the other information. If you omit the expiration date, the system regards it as permanent. If you omit the transportability, the system regards it as non-transportable. As a result, this supports reverse compatibility.

Initial S/W Revision Prior to A.02.00

Remote Command	:SYSTem:LKEY:LIST?
Notes	<p>Return Value: An <arbitrary block data> of all the installed instrument licenses. The format of each license is as follows. <Feature>,<Version>,<Signature>,<Expiration Date>,<Serial Number for Transport> Return Value Example: #3136 N9073A-1FP,1.000,B043920A51CA N9060A-2FP,1.000,4D1D1164BE64 N9020A-508,1.000,389BC042F920 N9073A-1F1,1.000,5D71E9BA814C,13-aug-2005 <arbitrary block data> is: #NMMM<data> Where: N is the number of digits that describes the number of MMM characters. For example if the data was 55 bytes, N would be 2. MMM would be the ASCII representation of the number of bytes. In the previous example, N would be 55. <data> ASCII contents of the data</p>
Initial S/W Revision	Prior to A.02.00

Remote Command	:SYSTem:LKEY? <"OptionInfo">
Example	SYST:LKEY? "N9073A-1FP"
Notes	<p>The <"OptionInfo"> contains the feature and the version. You must specify the feature but can omit the version. If you omit the version, the system regards it as the latest one. Return Value: <"LicenseInfo"> if the license is valid, null otherwise. <"LicenseInfo"> contains the signature, the expiration date, and serial number if transportable. Return Value Example: "B043920A51CA"</p>
Initial S/W Revision	Prior to A.02.00

Remote Command	:SYSTem:HID?
Notes	Return value is the host ID as a string
Initial S/W Revision	Prior to A.02.00

Security

Accesses capabilities for operating the instrument in a security controlled environment.

Key Path	System
Initial S/W Revision	A.04.00

USB

The Windows operating system can be configured to disable write access to the USB ports for users who are in a secure environment where transferring data from the instrument is prohibited. This user interface is a convenient way for the customer to disable write access to USB.

Key Path	System, Security
Mode	All
Scope	Mode Global
Remote Command	:SYSTem:SECurity:USB:WPRotect[:ENABLE] ON OFF 0 1 :SYSTem:SECurity:USB:WPRotect[:ENABLE]?
Example	:SYST:SEC:USB:WPR ON Will set USB ports to Read-only
Notes	When the USB ports are in Read-only mode then no data can be stored to USB, including the internal USB memory used for a back-up location for the calibration data.
Dependencies	This key is grayed-out unless the current user has administrator privileges.
Preset	This is unaffected by Preset or any Restore System Defaults. An Agilent Recovery will set the USB to write protect OFF
State Saved	No
Range	Read-Write Read only
Initial S/W Revision	A.04.00

Read-Write

Selection for allowing full read-write access to the USB ports.

Key Path	System, Security, USB
Example	:SYST:SEC:USB:WPR OFF Will set USB ports to Read-Write
Initial S/W Revision	A.04.00

Read only

Selection for disabling write access to the USB ports.

Key Path	System, Security, USB	
Example	:SYST:SEC:USB:WPR ON	Will set USB ports to Read only
Initial S/W Revision	A.04.00	

Diagnostics

The Diagnostics key in the System menu gives you access to basic diagnostic capabilities of the instrument.

Key Path	System
Initial S/W Revision	Prior to A.02.00

Show Hardware Statistics

Provides a display of various hardware statistics. The statistics include the following:

- Mechanical relay cycles
- High and Low temperature extremes
- Elapsed time that the instrument has been powered-on (odometer)

The display should appear listing the statistics, product number, serial number, and firmware revision.

Hardware Statistical Information	
Agilent MXA Signal Analyzer	
Product Number: N9020A	
Serial Number: US00061145	
Instrument S/W Revision: A.12.00	
Revision Date: 7/11/2012 12:11:10 PM	
Component Name	Value
MechAtten #1 Count Total	457304
Calibrator Switch Cycles	105953
AC/DC Switch Cycles	114240
2 dB #1 Mechanical Atten Cycles	112655
2 dB #2 Mechanical Atten Cycles	124456
MechAtten #2 Count Total	472265
6 dB Mechanical Atten Cycles	115302
10 dB Mechanical Atten Cycles	93602
20 dB Mechanical Atten Cycles	144781
30 dB Mechanical Atten Cycles	118580
Low Noise Path Switch	45668
Preselector Bypass Cycles	31133
High temperature operating extreme	45.75
Low temperature operating extreme	-23.9375
Elapsed Time (On-Time)(hours)	134164

In some CXA models this field is called "Fixed Aten"

Some CXA models omit these fields

Only shown if LNP installed

Only shown if MPB installed

The CXA models in which the AC/DC Switch field is called Fixed Aten and that omit the mechanical attenuation fields are the N9000A–503/507 models.

Modular HWs only have time and temperature information in Show Hardware Statistics.

The data will be updated only when the Show Hardware Statistics menu key is pressed, it will not be updated while the screen is displayed.

The tabular data should be directly printable.

Key Path	System, Diagnostics
Mode	All
Notes	The values displayed on the screen are only updated upon entry to the screen and not updated while the screen is being displayed.
Initial S/W Revision	Prior to A.02.00

SCPI for Show Hardware Statistics (Remote Commands Only)

Each of the hardware statistic items can be queried via SCPI.

- "Query the Mechanical Relay Cycle Count" on page 402
- "Query the Operating Temperature Extremes" on page 402
- "Query the Elapsed Time since 1st power on" on page 402

Query the Mechanical Relay Cycle Count

Return the count of mechanical relay cycles. For N9038A model, there are additional 2 Mechanical Relays which are <N9038A Input2>, <N9038A Bypass>.

Remote Command	:SYSTem:MRELay:COUNT?
Example	:SYST:MREL:COUN?
Notes	<p>Query Only</p> <p>The return value is a comma separated list of the individual counts for each mechanical relay.</p> <p>The position of the relays in the list is: “<Cal Signal>,<AC/DC>,<2dB #1 Atten>,<2dB #2 Atten>,<6dB Atten>,<10dB Atten>,<20dB Atten>,<30dB Atten>,<Fixed Atten>,<Low Noise Path Switch>,<Presel Bypass>,<N9038A Input2>,<N9038A Bypass>”</p> <p>Items in the list not pertaining to your particular hardware configuration will return as -999 for those items.</p>
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.08.00

Query the Operating Temperature Extremes

Returns the low operating temperature extreme value. The value survives a power-cycle and is the temperature extreme encountered since the value was reset by the factory or service center.

Mode	All
Remote Command	:SYSTem:TEMPerature:LEXTreme?
Example	:SYST:TEMP:LEXT?
Notes	Value is in degrees Celsius at which the lowest operating temperature has been recorded since 1st power-up.
State Saved	No
Initial S/W Revision	Prior to A.02.00

Mode	All
Remote Command	:SYSTem:TEMPerature:HEXTreme?
Example	:SYST:TEMP:HEXT?
Notes	Value is in degrees Celsius at which the highest operating temperature has been recorded since 1st power-up.
State Saved	No
Initial S/W Revision	Prior to A.02.00

Query the Elapsed Time since 1st power on

Returns the elapsed on-time in minutes since 1st power-on.

Remote Command	:SYSTem:PON:ETIMe?
Example	:SYST:PON:ETIM?
Notes	Query Only
Initial S/W Revision	Prior to A.02.00

Internet Explorer...

This key launches Microsoft Internet Explorer. A mouse and external keyboard are highly desired for using Internet Explorer. When Internet Explorer is running, close Internet Explorer to return focus to the Instrument Application (or use Alt-Tab).

NOTE This feature is not available if option SF1 is installed.

Key Path	System
Mode	All
Notes	No equivalent remote command for this key.
Initial S/W Revision	A.05.01

System Remote Commands (Remote Commands Only)

The commands in this section have no front-panel key equivalent.

["System Powerdown \(Remote Command Only\)" on page 403](#)

["List installed Options \(Remote Command Only\)" on page 404](#)

["Lock the Front-panel keys \(Remote Command Only\)" on page 404](#)

["List SCPI Commands \(Remote Command Only\)" on page 404](#)

["SCPI Version Query \(Remote Command Only\)" on page 405](#)

["Date \(Remote Command Only\)" on page 405](#)

["Time \(Remote Command Only\)" on page 405](#)

Initial S/W Revision	Prior to A.02.00
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System Powerdown (Remote Command Only)

Remote Command	SYSTem:PDOWn [NORMal FORCe]
Notes	Shuts down the instrument in the normal way (NORMal) or forced way (FORCe). In case there is another application with modified data pending for saving, the application prompt the user. The system waits until the user responds in the normal mode. It will go off after 20 seconds of wait in the force mode and all data will be lost.

List installed Options (Remote Command Only)

Lists the installed options that pertain to the instrument (signal analyzer).

Mode	All
Remote Command	:SYSTem:OPTions?
Example	:SYST:OPT?
Notes	The return string is a comma separated list of the installed options. For example: "503,P03,PFR" :SYSTem:OPTions? and *OPT? are the same.
State Saved	No
Initial S/W Revision	Prior to A.02.00

Lock the Front-panel keys (Remote Command Only)

Disables the instrument keyboard to prevent local input when the instrument is controlled remotely. Annunciation showing a "K" for 'Klock" (keyboard lock) alerts the local user that the keyboard is locked. Klock is similar to the GPIB Local Lockout function; namely that no front-panel keys are active with the exception of the Power Standby key. (The instrument is allowed to be turned-off if Klock is ON.) The Klock command is used in remote control situations where Local Lockout cannot be used.

Although primary intent of Klock is to lock-out the front panel, it will lock-out externally connected keyboards through USB. Klock has no effect on externally connected pointing devices (mice).

The front panel 'Local' key (Cancel/Esc) has no effect if Klock is ON.

Mode	All
Remote Command	:SYSTem:KLOCK OFF ON 0 1 :SYSTem:KLOCK?
Example	:SYST:KLOC ON
Notes	Keyboard lock remains in effect until turned-off or the instrument is power-cycled
Preset	Initialized to OFF at startup, unaffected by Preset
State Saved	No
Initial S/W Revision	Prior to A.02.00

List SCPI Commands (Remote Command Only)

Outputs a list of the valid SCPI commands for the currently selected Mode.

Remote Command	:SYSTem:HELP:HEADers?
Example	:SYST:HELP:HEAD?
Notes	The output is an IEEE Block format with each command separated with the New-Line character (hex

	0x0A)
Initial S/W Revision	Prior to A.02.00

SCPI Version Query (Remote Command Only)

Returns the SCPI version number with which the instrument complies. The SCPI industry standard changes regularly. This command indicates the version used when the instrument SCPI commands were defined.

Remote Command	:SYSTem:VERSion?
Example	:SYST:VERS?
Initial S/W Revision	Prior to A.02.00

Date (Remote Command Only)

The recommended access to the Date, Time, and Time zone of the instrument is through the Windows native control (Control Panel or accessing the Task Bar). You may also access this information remotely, as shown in this command and Time (below).

Sets or queries the date in the instrument.

Mode	All
Remote Command	:SYSTem:DATE "<year>,<month>,<day>" :SYSTem:DATE?
Example	:SYST:DATE "2006,05,26"
Notes	<year> is the four digit representation of year. (for example, 2006) <month> is the two digit representation of year. (for example. 01 to 12) <day> is the two digit representation of day. (for example, 01 to 28, 29, 30, or 31) depending on the month and year Unless the current account has Power User or Administrator privileges, an error will be generated by this command and no action will be taken.
Initial S/W Revision	Prior to A.02.00

Time (Remote Command Only)

Sets or queries the time in the instrument.

Mode	All
Remote Command	:SYSTem:TIME "<hour>,<minute>,<second>" :SYSTem:TIME?
Example	:SYST:TIME "13,05,26"

Notes	<hour> is the two digit representation of the hour in 24 hour format <minute> is the two digit representation of minute <second> is the two digit representation of second Unless the current account has Power User or Administrator privileges, an error will be generated by this command and no action will be taken.
Initial S/W Revision	Prior to A.02.00

7 Trigger Functions

Trigger

Accesses a menu of keys to control the selection of the trigger source and the setup of each of the trigger sources. The analyzer is designed to allow triggering from a number of different sources, for example, Free Run, Video, External, RF Burst, and so forth.

The TRIG:SOURCe command (below) will specify the trigger source for the currently selected input (RF or I/Q). If you change inputs, the new input remembers the trigger source it was last programmed to for the current measurement, and uses that trigger source. You can directly set the trigger source for each input using the TRIGger:RF:SOURce and TRIGger:IQ:SOURce commands (later in this section). When in External Mixing, the analyzer uses the RF trigger source.

Note the inclusion of the <measurement> parameter in the command below. Because each measurement remembers its own Trigger Source, the command must be qualified with the measurement name. Note that for the Swept SA measurement this is not the case; for backwards compatibility, no <measurement> parameter is used when setting the Trigger Source for the Swept SA measurement.

See ["Trigger Source Presets" on page 409](#)

See ["RF Trigger Source" on page 412](#)

See ["I/Q Trigger Source" on page 413](#)

See ["More Information" on page 414](#)

Key Path	Front-panel key
Remote Command	<pre>:TRIGger:<measurement>[:SEquence]:SOURce EXTernal1 EXTernal2 IMMediate LINE FRAMe RFBurst VIDeo IF ALARm LAN IQMag IDEMod QDEMod IINPut QINPut AIQMag TV :TRIGger:<measurement>[:SEquence]:SOURce?</pre> <p>where <measurement> is the measurement for which you wish to set the Source (blank for the Swept SA measurement)</p>
Example	<pre>TRIG:ACP:SOUR EXT1</pre> <p>Selects the external 1 trigger input for the ACP measurement and the selected input</p> <pre>TRIG:SOUR VID</pre> <p>Selects video triggering for the Swept SA (SANalyzer) measurement in the Spectrum Analyzer mode. For SAN, do not use the <measurement> keyword. Only send this form in the Spectrum Analyzer mode or you will get an Undefined Header error</p>
Notes	<p>Not all measurements have all the trigger sources available to them. Check the trigger source documentation for your specific measurement to see what sources are available.</p> <p>Not all trigger sources are available for each input. See the "RF Trigger Source" on page 412 and "I/Q Trigger Source" on page 413 commands for detailed information on which trigger sources are available for each input.</p> <p>Other trigger-related commands are found in the INITiate and ABORt SCPI command subsystems.</p> <p>*OPC should be used after requesting data. This will hold off any subsequent changes to the selected trigger source, until after the sweep is completed and the data is returned.</p> <p>Available ranges and presets can vary from mode to mode.</p>
Dependencies	<p>In some models, there is no second External input. In these models, the External 2 key is blanked and</p>

	the EXternal2 parameter will generate a "Hardware missing; Not available for this model number" message.
Preset	See table below
Status Bits/OPC dependencies	The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.
Backwards Compatibility SCPI	:TRIGger[:SEquence]:SOURce EXTernal For backward compatibility, the parameter EXTernal is mapped to EXTernal1
Backwards Compatibility SCPI	[:SENSe]:<measurement>:TRIGger:SOURce This backwards compatibility alias command is provided for ESA/PSA compatibility This backwards compatibility command does not apply to the Swept SA measurement, for that just use :TRIGger:SOURce This backwards compatibility command does not apply to the monitor spectrum, log plot and spot frequency measurements
Backwards Compatibility SCPI	[:SENSe]:<measurement>:TRIGger:SOURce IF In earlier instruments, the parameter IF was used by apps for the video trigger, so using the IF parameter selects VIDeo triggering. Sending IF in the command causes VID to be returned to a query.
Backwards Compatibility SCPI	[:SENSe]:ACPr:TRIGger:SOURce This backwards Compatibility SCPI command is provided to support the same functionality as [:SENSe]:ACPr:TRIGger:SOURce (PSA W-CDMA, PSA cdma2000 and PSA 1xEVDO) due to the fact that the ACPr node conflicts with the ACPower node.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Trigger Source Presets

Here are the Trigger Source Presets for the various measurements:

Meas	Mode	Preset for RF	Preset for IQ	Notes
Swept SA	SA	IMM	IQ not supported	
CHP	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, DVB-T/H, DTMB, LTE, LTETDD, CMMB, ISDB-T, Digital Cable TV, MSR	IMM	IQ not supported	
OBW	SA, WCDMA, C2K, WIMAX OFDMA,	1xEVDO: EXT1 others: IMM	IQ not supported	For 1xEVDO mode, the trigger source is coupled with the gate state, as well as the gate

	TD-SCDMA, 1xEVDO, LTE, LTETDD, CMMB, ISDB-T, MSR			source. When the trigger source changes to RFBurst, External1 or External2, the gate state is set to on, and the gate source is set identically with the trigger source. When the trigger source changes to IMMEDIATE, VIDEO, LINE, FRAME or IF, the gate state is set to off.
CCDF	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, DTMB, LTE, LTETDD, CMMB, ISDB-T, Digital Cable TV, MSR	WIMAX OFDMA: RFBurst LTETDD: BTS: External 1 MS: Periodic Timer TD-SCDMA and 1xEV-DO: BTS: External 1 MS: RFBurst SA, WCDMA, C2K, LTE, CMMB, ISDB-T, DVB-T/H, DTMB, Digital Cable TV, MSR: IMMEDIATE	TD-SCDMA and 1xEV-DO: BTS: External 1 MS: IQMag LTETDD: BTS: External 1 MS: Periodic Timer Others: IMM	For TD-SCDMA: Trigger source is coupled with radio device. When radio device changes to BTS, trigger source will be changed to EXTERNAL1. When radio device changes to MS, trigger source will be set as RFBurst for RF or IQ Mag for BBIQ. When TriggerSource is RFBurst or IQ Mag, Measure Interval is grayed out.
ACP	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB, LTE, LTETDD, CMMB, ISDB-T, Digital Cable TV, MSR	IMM	IQ not supported	
Tx Power	SA, GSM, TD-SCDMA	SA, GSM: RFBurst TD-SCDMA: EXTERNAL	IMM	TD-SCDMA doesn't support the Line and Periodic Timer parameters. When the mode is TD-SCDMA, if the Radio Device is switched to BTS, the value will be changed to External 1 and if the Radio device is switched to MS, the value will be changed to RFBurst
SPUR	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, LTE, LTETDD, MSR	IMM	IQ not supported	
SEM	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-	1xEVDO(BTS): EXTERNAL1 All others: IMMEDIATE	IQ not supported	

	T/H, DTMB, LTE, LTETDD, CMMB, ISDB-T, Digital Cable TV, MSR			
CDP	WCDMA	IMM	IMM	
RHO	WCDMA	IMM	IMM	
PCON	WCDMA	IMM	IMM	
QPSK	WCDMA, C2K, 1xEVDO	All except CDMA1xEVDO: IMMediate CDMA1xEVDO: EXT1	IMM	
MON	All except SA and BASIC	IMM	IQ not supported	
WAV		LTETDD: BTS: External 1 MS: Periodic Timer GSM/EDGE: RFBurst All others: IMMediate	LTETDD: BTS: External 1 MS: Periodic Timer GSM/EDGE: IQMag All others: IMMMediate	
PVT	WIMAXOFDMA	RFB	IMM	
EVM	WIMAXOFDMA, DVB-T/H, DTMB, LTE, LTETDD, CMMB, ISDB-T, Digital Cable TV	All but CMMB: IMM CMMB: Periodic Timer	All but CMMB: IMM CMMB: External 1	LTE, LTETDD supports Free Run, Video and External 1 only.
SPEC	BASIC	IMM	IMM	
LOG Plot	PN	IMM	IQ not supported	
Spot Freq	PN	IMM	IQ not supported	
GMSK PVT	EDGE/GSM	RFB	IMM	
GMSK PFER	EDGE/GSM	RFB	IQMag	
GMSK ORFS	EDGE/GSM	RF Burst	IQ not supported	
EDGE PVT	EDGE/GSM	RFB	IMM	

EDGE EVM	EDGE/GSM	RFB	IQMag
EDGE ORFS	EDGE/GSM	Periodic Timer	IQ not supported
Combined WCDMA	WCDMA	IMM	IQ not supported
Combined GSM	EDGE/GSM	RFB	IQ not supported
List Power Step	WCDMA, EDGE/GSM	IMM	IQ not supported
Transmit On/Off Power	LTETDD	LTETDD: BTS: External 1 MS: Periodic Timer	LTETDD: BTS: External 1 MS: Periodic Timer
Transmit Analysis	BLUETOOTH	RFB	IQ not supported
Adjacent Channel Power	BLUETOOTH	IMM	IQ not supported
LE In-band Emissions	BLUETOOTH	IMM	IQ not supported
EDR In-band Spurious Emissions	BLUETOOTH	Periodic Timer	IQ not supported
Conformance EVM	LTE, LTETDD, MSR	IMM	IMM

RF Trigger Source

The RF Trigger Source command selects the trigger to be used for the specified measurement when RF is the selected input. The RF trigger source can be queried and changed even while another input is selected, but it is inactive until RF becomes the selected input.

Note the inclusion of the <measurement> parameter in the command below. Because each measurement remembers its own Trigger Source, the command must be qualified with the measurement name. Note that for the Swept SA measurement this is not the case; for backwards compatibility, no <measurement> parameter is used when setting the Trigger Source for the Swept SA measurement.

Remote Command	:TRIGger:<measurement>[:SEquence]:RF:SOURce EXTernal1 EXTernal2 IMMEDIATE LINE FRAME RFBurst VIDEO IF ALARm LAN TV :TRIGger:<measurement>[:SEquence]:RF:SOURce?
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Example	TRIG:ACP:RF:SOUR EXT1 Selects the external 1 trigger input for the ACP measurement and the RF input
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	<p>TRIG:RF:SOUR VID</p> <p>Selects video triggering for the SANalyzer measurement and the RF input. For SAN, do not use the <measurement> keyword.</p>
Notes	<p>Not all measurements have all the trigger sources available to them. Check the trigger source documentation for your specific measurement to see what sources are available.</p> <p>Not all trigger sources are available for each input. For the RF Trigger Source, the following trigger sources are available:</p> <ul style="list-style-type: none"> –IMMediate - free run triggering –VIDeo - triggers on the video signal level –LINE - triggers on the power line signal –EXTernal1 (or EXTernal) - triggers on an externally connected trigger source marked “Trigger 1 In” on the rear panel –EXTernal2 - triggers on an externally connected trigger source marked “Trigger 2 In” on the front panel. In some models, there is no second External input. In these models, the External 2 key is blanked and the EXTernal2 parameter will generate a “Hardware missing; Not available for this model number” message –RFBurst - triggers on the bursted frame –FRAMe - triggers on the periodic timer –IF (video) - same as video, for backwards compatibility only <p>*OPC should be used after requesting data. This will hold off any subsequent changes to the selected trigger source, until after the sweep is completed and the data is returned.</p> <p>Available ranges, and presets can vary from mode to mode.</p>
Status Bits/OPC dependencies	<p>The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.</p>
Initial S/W Revision	Prior to A.02.00

I/Q Trigger Source

This command selects the trigger to be used for the specified measurement when I/Q (which requires option BBA) is the selected input. The I/Q trigger source can be queried and changed even while another input is selected, but it is inactive until I/Q becomes the selected input.

Remote Command	<pre>:TRIGger:<measurement>[:SEquence]:IQ:SOURce EXTernal1 EXTernal2 IMMediate IQMag IDEMod QDEMod IINPut QINPut AIQMag :TRIGger:<measurement>[:SEquence]:IQ:SOURce?</pre>
Example	<p>TRIG:WAVeform:SOUR IQM</p> <p>Selects I/Q magnitude triggering for the IQ Waveform measurement and the I/Q input</p>
Notes	<p>Not all measurements have all the trigger sources available to them. Check the trigger source documentation for your specific measurement to see what sources are available.</p> <p>Not all trigger sources are available for each input. For the I/Q Trigger Source, the following trigger sources are available:</p>

	<ul style="list-style-type: none"> –IMMediate - free run triggering –EXternal1 (or EXternal) - triggers on an externally connected trigger source on the rear panel –EXternal2 - triggers on an externally connected trigger source on the front panel –IQMag - triggers on the magnitude of the I/Q signal –IDEMod - triggers on the I/Q signal's demodulated I voltage –QDEMod - triggers on the I/Q signal's demodulated Q voltage –IINPut - triggers on the I channel's ADC voltage –QINPut - triggers on the Q channel's ADC voltage –AIQMag - triggers on the magnitude of the auxiliary receiver channel I/Q signal <p>*OPC should be used after requesting data. This will hold off any subsequent changes to the selected trigger source, until after the sweep is completed and the data is returned.</p> <p>Available ranges, and from mode to mode presets can vary</p>
Status Bits/OPC dependencies	The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.
Initial S/W Revision	Prior to A.02.00

More Information

The trigger menus let you select the trigger source and trigger settings for a sweep or measurement. In triggered operation (basically, any trigger source other than Free Run), the analyzer will begin a sweep or measurement only with the selected trigger conditions are met, generally when your trigger source signal meets the specified trigger level and polarity requirements. (In FFT measurements, the trigger controls when the data acquisition begins for FFT conversion.)

For each of the trigger sources, you may define a set of operational parameters or settings which will be applied when that source is selected as the current trigger source. Examples of these settings are Trigger Level, Trigger Delay, and Trigger Slope. You may apply different settings for each source; so, for example, you could have a Trigger Level of 1v for External 1 trigger and –10 dBm for Video trigger.

Once you have established the settings for a given trigger source, they generally will remain unchanged for that trigger source as you go from measurement to measurement within a Mode (although the settings do change as you go from Mode to Mode). Furthermore, the trigger settings within a Mode are the same for the **Trigger** menu, the **Gate Source** menu, and the **Sync Source** menu that is part of the **Periodic Timer Trigger Setup** menu. That is, if **Ext1** trigger level is set to 1v in the **Trigger** menu, it will appear as 1v in both the **Gate Source** and the **Sync Source** menus. For these reasons the trigger settings commands are not qualified with the measurement name, the way the trigger source commands are.

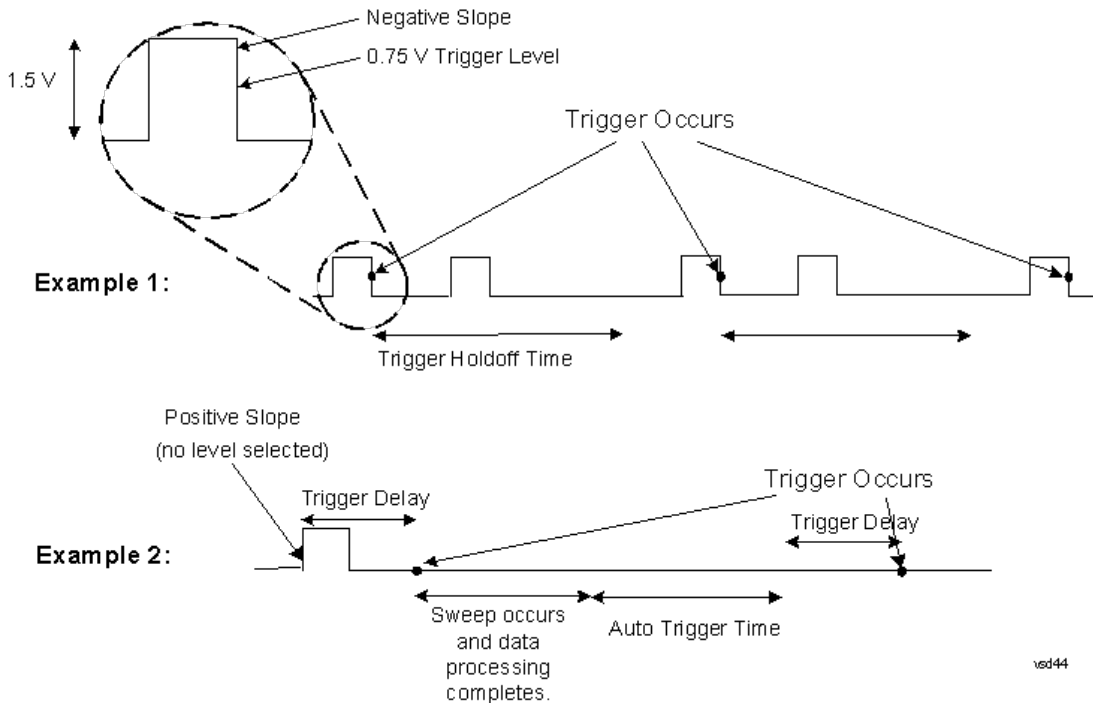
The settings setup menu can be accessed by pressing the key for the current trigger source a second time. For example, one press of Video selects the Video trigger as the source. The Video key becomes highlighted and the hollow arrow on the key turns black. Now a second press of the key takes you into the Video Trigger Setup menu.

Trigger Setup Parameters:

The following examples show trigger setup parameters using an external trigger source.

Example 1 illustrates the trigger conditions with negative slope and no trigger occurs during trigger Holdoff time.

Example 2 illustrates the trigger conditions with positive slope, trigger delay, and auto trigger time.



Free Run

Pressing this key, when it is not selected, selects free-run triggering. Free run triggering occurs immediately after the sweep/measurement is initiated.

Key Path	Trigger
Example	TRIG:SOUR IMM Swept SA measurement TRIG:<meas>:SOUR IMM Measurements other than Swept SA
State Saved	Saved in instrument state
Status Bits/OPC dependencies	The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.
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Video (IF Envelope)

Pressing this key, when it is not selected, selects the video signal as the trigger. The Video trigger condition is met when the video signal (the filtered and detected version of the input signal, including both RBW and VBW filtering) crosses the video trigger level.

NOTE

When the detector selected for all active traces is the average detector, the video signal for triggering does not include any VBW filtering.

The video trigger level is shown as a labeled line on the display. The line is displayed as long as video is the selected trigger source.

Pressing this key, when it is already selected, accesses the video trigger setup functions.

Key Path	Trigger
Example	TRIG:SOUR VID Swept SA measurement TRIG:<meas>:SOUR VID Measurements other than Swept SA
Notes	Log Plot and Spot Frequency measurements do not support Video Trigger
Dependencies	Video trigger is allowed in average detector mode.
State Saved	Saved in instrument state
Status Bits/OPC dependencies	The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.
Backwards Compatibility Notes	In the past, the Average detector was not available when Video triggering was on, and consequently, functions that set the detector to average (such as Marker Noise or Band/Intvl Power) were not available when the video trigger was on. Similarly, Video triggering was not available when the detector was Average. In the X-Series, these restrictions are removed.
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Trigger Level

Sets a level for the video signal trigger. When the video signal crosses this level, with the chosen slope, the trigger occurs. This level is displayed with a horizontal line only if **Video** is the selected trigger source.

Key Path	Trigger, Video
Remote Command	:TRIGger[:SEquence]:VIDeo:LEVel <ampl> :TRIGger[:SEquence]:VIDeo:LEVel?
Example	TRIG:VID:LEV -40 dBm
Notes	When sweep type = FFT, the video trigger uses the amplitude envelope in a bandwidth wider than the FFT width as a trigger source. This might often be useful, but does not have the same relationship between the displayed trace and the trigger level as in swept triggering. Amplitude Corrections are not taken into account by the Video Trig Level. For example, if you have

given yourself effective gain with an amplitude correction factor, the Video Trigger will not fire until you have dropped the trigger line that far below the displayed signal level, rather than simply dropping it down to the displayed signal level.

Note that other corrections, specifically External Gain and Ref Level Offset, modify the actual trace data as it is taken and therefore ARE taken into account by Trig Level.

Couplings	This same level is used for the Video trigger source in the Trigger menu and for the Video selection in the Gate Source menu.
Preset	Set the Video Trigger Level -25 dBm on Preset. When the Video Trigger Level becomes the active function, if the value is off screen, set it to either the top or bottom of screen, depending on which direction off screen it was.
State Saved	Saved in instrument state
Min	-170 dBm
Max	+30 dBm
Default Unit	Depends on the current selected Y axis unit
Backwards Compatibility SCPI	:TRIGger[:SEquence]:IF:LEVel :TRIGger[:SEquence]:IF:LEVel?
Backwards Compatibility Notes	This alias is provided for backward compatibility with VSA/PSA comms apps.
Initial S/W Revision	Prior to A.02.00

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

Key Path	Trigger, Video
Remote Command	:TRIGger[:SEquence]:VIDeo:SLOPe POSitive NEGative :TRIGger[:SEquence]:VIDeo:SLOPe?
Example	TRIG:VID:SLOP NEG
Preset	POSitive
State Saved	Saved in instrument state
Backwards Compatibility SCPI	:TRIGger[:SEquence]:IF:SLOPe NEGative POSitive :TRIGger[:SEquence]:IF:SLOPe? For backward compatibility with VSA/PSA comms apps
Backwards Compatibility Notes	The legacy :TRIGger[:SEquence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers.
Initial S/W Revision	Prior to A.02.00

Remote Command	:TRIGger[:SEquence]:SLOPe POSitive NEGative :TRIGger[:SEquence]:SLOPe?
Example	TRIG:SLOP NEG
Preset	POSitive
State Saved	Saved in instrument state
Backwards Compatibility Notes	In ESA/PSA, the Trigger Slope was global to all triggers. In the X-Series, the slope can be set individually for each Trigger Source. For backward compatibility, the global SLOPe command updates all instances of trigger slope (VID, LINE, EXT1, EXT2, TV, RFB). The query returns the trigger slope setting of the currently selected trigger source.
Initial S/W Revision	Prior to A.02.00

Trig Delay

Controls a time delay during that the analyzer will wait to begin a sweep after meeting the trigger criteria. You can use negative delay to pre-trigger the instrument in the time domain or FFT, but not in swept spans.

Key Path	Trigger, Video
Remote Command	:TRIGger[:SEquence]:VIDeo:DELaY <time> :TRIGger[:SEquence]:VIDeo:DELaY? :TRIGger[:SEquence]:VIDeo:DELaY:STATe OFF ON 0 1 :TRIGger[:SEquence]:VIDeo:DELaY:STATe?
Example	TRIG:VID:DEL:STAT ON TRIG:VID:DEL 100 ms
Notes	Video trigger delay may be set to negative values, in time domain, FFT and even swept. It makes intuitive sense in time domain and works well in FFT mode where the bandwidth of the filter before the video trigger is about 1.25 span. In swept spans, negative settings of Trig Delay are treated as a zero setting within the internal hardware and the advisory message "Neg. Trig Delay unavailable in Swept Mode, zero delay used." is generated when such a delay is set.
Preset	Off, 1 us
State Saved	Saved in instrument state
Min	-150 ms
Max	+500 ms
Default Unit	s
Backwards Compatibility Notes	! For backward compatibility with VSA/PSA comms apps :TRIGger[:SEquence]:IF:DELaY :TRIGger[:SEquence]:DELaY The legacy :TRIGger[:SEquence]:DELaY command affects the delay for the VID, LINE, EXT1, EXT2, and RFB triggers.
Initial S/W Revision	Prior to A.02.00

Remote Command	:TRIGger[:SEquence]:DELay <time> :TRIGger[:SEquence]:DELay? :TRIGger[:SEquence]:DELay:STATE OFF ON 0 1 :TRIGger[:SEquence]:DELay:STATE?
Example	TRIG:DEL 1 ms
Preset	1 us
State Saved	Saved in instrument state
Backwards Compatibility Notes	In ESA/PSA, the Trigger Delay was global to all triggers. In the X-Series, the delay can be set individually for each Trigger Source. For backward compatibility, the global DELay command updates all instances of trigger slope (VID, LINE, EXT1, EXT2) except TV and RFBurst. The query returns the trigger delay setting of the currently selected trigger source.
Initial S/W Revision	Prior to A.02.00

Remote Command	:TRIGger[:SEquence]:OFFSet <time> :TRIGger[:SEquence]:OFFSet? :TRIGger[:SEquence]:OFFSet:STATE OFF ON 0 1 :TRIGger[:SEquence]:OFFSet:STATE?
Example	TRIG:OFFS ON TRIG:OFFS -100 ms
Notes	These are ESA commands for trigger offset that allowed you to use a positive or negative delay when in zero span and in a Res BW \geq 1 kHz. For ESA compatibility, X-series analyzers keep track of this offset and adds it to the Trigger Delay for VIDEo, LINE, EXTernal1 or EXTernal2 whenever the value is sent to the hardware, if in Zero Span and RBW \geq 1 kHz.
Preset	Off, 0 s
State Saved	Saved in instrument state
Min	-11 s
Max	+11 s
Initial S/W Revision	Prior to A.02.00

Line

Pressing this key, when it is not selected, selects the line signal as the trigger. A new sweep/measurement will start synchronized with the next cycle of the line voltage. Pressing this key, when it is already selected, access the line trigger setup menu.

Key Path	Trigger
Example	TRIG:SOUR LINE Swept SA measurement TRIG:<meas>:SOUR LINE Measurements other than Swept SA
Dependencies	Line trigger is not available when operating from a "dc power source", for example, when the

	instrument is powered from batteries.
State Saved	Saved in instrument state
Status Bits/OPC dependencies	The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.
Initial S/W Revision	Prior to A.02.00

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

Key Path	Trigger, Line
Remote Command	:TRIGger[:SEquence]:LINE:SLOPe POSitive NEGative :TRIGger[:SEquence]:LINE:SLOPe?
Example	TRIG:LINE:SLOP NEG
Preset	POSitive
State Saved	Saved in instrument state
Backwards Compatibility Notes	The legacy :TRIGger[:SEquence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers.
Initial S/W Revision	Prior to A.02.00

Trig Delay

Controls a time delay during which the analyzer will wait to begin a sweep after meeting the trigger criteria. You can use negative delay to pre-trigger the instrument in time domain or FFT, but not in swept spans.

Key Path	Trigger, Line
Remote Command	:TRIGger[:SEquence]:LINE:DELay <time> :TRIGger[:SEquence]:LINE:DELay? :TRIGger[:SEquence]:LINE:DELay:STATe OFF ON 0 1 :TRIGger[:SEquence]:LINE:DELay:STATe?
Example	TRIG:LINE:DEL:STAT ON TRIG:LINE:DEL 100 ms
Notes	Video trigger delay may be set to negative values, in time domain, FFT and even swept. It makes intuitive sense in time domain and works well in FFT mode where the bandwidth of the filter before the video trigger is about 1.25 span. In swept spans, negative settings of Trig Delay are treated as a

	zero setting within the internal hardware and the advisory message "Neg. Trig Delay unavailable in Swept Mode, zero delay used." is generated when such a delay is set.
Preset	Off, 1.000 us
State Saved	Saved in instrument state
Min	-150 ms
Max	500 ms
Default Unit	S
Backwards Compatibility Notes	The legacy :TRIGger[:SEQuence]:DELay command affects the delay for the VID, LINE, EXT1, EXT2, and RFB triggers. The legacy :TRIGger[:SEQuence]:OFFSet command is supported for the VIDeo, LINE, EXT1, and EXT2 triggers.
Initial S/W Revision	Prior to A.02.00

External 1

Pressing this key, when it is not selected, selects an external input signal as the trigger. A new sweep/measurement will start when the external trigger condition is met using the external 1 input connector on the rear panel.

Pressing this key, when it is already selected, accesses the external 1 trigger setup menu.

Key Path	Trigger
Example	TRIG:SOUR EXT1 Swept SA measurement TRIG:<meas>:SOUR EXT1 Measurements other than Swept SA
Dependencies	Grayed out if in use by Point Trigger in the Source Setup menu. Forced to Free Run if already selected and Point Trigger is set to External 1.
State Saved	Saved in instrument state
Status Bits/OPC dependencies	The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.
Initial S/W Revision	Prior to A.02.00

Trigger Level

Sets the value where the external 1 trigger input will trigger a new sweep/measurement.

Key Path	Trigger, External 1
Remote Command	:TRIGger[:SEQuence]:EXTernal1:LEVel <level>

	:TRIGger[:SEquence]:EXTernal1:LEVel?
Example	TRIG:EXT1:LEV 0.4 V
Couplings	This same level is used for the Ext1 trigger source in the Trigger menu, for the Ext1 selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the Ext1 selection in the Gate Source menu.
Preset	1.2 V
State Saved	Saved in instrument state
Min	-5 V
Max	5 V
Default Unit	V
Backwards Compatibility SCPI	:TRIGger[:SEquence]:EXTernal:LEVel
Backwards Compatibility SCPI	For backward compatibility, the parameter EXTernal is mapped to EXTernal1
Backwards Compatibility SCPI	:TRIGger[:SEquence]:FRAMe:EXTernal1:LEVel
Initial S/W Revision	Prior to A.02.00

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

Key Path	Trigger, External 1
Remote Command	:TRIGger[:SEquence]:EXTernal1:SLOPe POSitive NEGative :TRIGger[:SEquence]:EXTernal1:SLOPe?
Example	TRIG:EXT1:SLOP NEG
Couplings	This same slope is used in the Ext1 selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu).
Preset	POSitive
State Saved	Saved in instrument state
Backwards Compatibility SCPI	:TRIGger[:SEquence]:EXTernal:SLOPe
Backwards Compatibility SCPI	For backward compatibility, the parameter EXTernal is mapped to EXTernal1
Backwards Compatibility SCPI	:TRIGger[:SEquence]:FRAMe:EXTernal1:SLOPe
Backwards Compatibility Notes	The legacy :TRIGger[:SEquence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers.
Initial S/W Revision	Prior to A.02.00

Trig Delay

Controls a time delay during which the analyzer will wait to begin a sweep after meeting the trigger criteria. You can use negative delay to pre-trigger the instrument in time domain or FFT, but not in swept spans.

Key Path	Trigger, External 1
Remote Command	:TRIGger[:SEQuence]:EXTernal1:DELAy <time> :TRIGger[:SEQuence]:EXTernal1:DELAy? :TRIGger[:SEQuence]:EXTernal1:DELAy:STATe OFF ON 0 1 :TRIGger[:SEQuence]:EXTernal1:DELAy:STATe?
Example	TRIG:EXT1:DEL:STAT ON TRIG:EXT1:DEL 100 ms
Notes	Video trigger delay may be set to negative values, in time domain, FFT and even swept. It makes intuitive sense in time domain and works well in FFT mode where the bandwidth of the filter before the video trigger is about 1.25 span. In swept spans, negative settings of Trig Delay are treated as a zero setting within the internal hardware and the advisory message "Neg. Trig Delay unavailable in Swept Mode, zero delay used." is generated when such a delay is set.
Preset	Off, 1.000 us
State Saved	Saved in instrument state
Min	-150 ms
Max	+500 ms
Default Unit	s
Backwards Compatibility SCPI	:TRIGger[:SEQuence]:EXTernal:DELAy For backward compatibility, the parameter EXTernal is mapped to EXTernal1
Backwards Compatibility Notes	The legacy :TRIGger[:SEQuence]:DELAy command affects the delay for the VID, LINE, EXT1, EXT2, and RFB triggers. The legacy :TRIGger[:SEQuence]:OFFSet command is supported for the VIDeO, LINE, EXT1, and EXT2 triggers.
Initial S/W Revision	Prior to A.02.00

External 2

Pressing this key, when it is not selected, selects an external input signal as the trigger. A new sweep/measurement will start when the external trigger condition is met using the external 2 input connector. The external trigger 2 input connector is on the rear panel.

Pressing this key, when it is already selected, accesses the external 2 trigger setup menu.

Key Path	Trigger
Example	TRIG:SOUR EXT2 Swept SA measurement TRIG:<meas>:SOUR EXT2 Measurements other than Swept SA
Dependencies	In some models, there is no second External input. In these models, the External 2 key is blanked and

	<p>the EXTERNAL2 parameter will generate a "Hardware missing; Not available for this model number" message.</p> <p>Grayed out if in use by Point Trigger in the Source Setup menu.</p> <p>Forced to Free Run if already selected and Point Trigger is set to External 2.</p>
State Saved	Saved in instrument state
Status Bits/OPC dependencies	The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Trigger Level

Sets the value where the external 2 trigger input will trigger a new sweep/measurement.

Key Path	Trigger, External 2
Remote Command	:TRIGger[:SEquence]:EXTernal2:LEVel :TRIGger[:SEquence]:EXTernal2:LEVel?
Example	TRIG:EXT2:LEV 1.1 V
Couplings	This same level is used for the Ext2 trigger source in the Trigger menu, for the Ext2 selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the Ext2 selection in the Gate Source menu.
Preset	1.2 V
State Saved	Saved in instrument state
Min	-5 V
Max	5 V
Default Unit	V
Backwards Compatibility SCPI	:TRIGger[:SEquence]:FRAME:EXTernal2:LEVel
Initial S/W Revision	Prior to A.02.00

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

Key Path	Trigger, External 2
Remote Command	:TRIGger[:SEquence]:EXTernal2:SLOPe POSitive NEGative

	:TRIGger[:SEquence]:EXTernal2:SLOPe?
Example	TRIG:EXT2:SLOP NEG
Couplings	This same slope is used in the Ext2 selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu).
Preset	POSitive
State Saved	Saved in instrument state
Backwards Compatibility SCPI	:TRIGger[:SEquence]:FRAMe:EXTernal2:SLOPe
Backwards Compatibility Notes	The legacy :TRIGger[:SEquence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers.
Initial S/W Revision	Prior to A.02.00

Trig Delay

Controls a time delay during which the analyzer will wait to begin a sweep after meeting the trigger criteria. You can use negative delay to pre-trigger the instrument in time domain or FFT, but not in swept spans.

Key Path	Trigger, External 2
Remote Command	:TRIGger[:SEquence]:EXTernal2:DELAy <time> :TRIGger[:SEquence]:EXTernal2:DELAy? :TRIGger[:SEquence]:EXTernal2:DELAy:STATe OFF ON 0 1 :TRIGger[:SEquence]:EXTernal2:DELAy:STATe?
Example	TRIG:EXT2:DEL:STAT ON TRIG:EXT2:DEL 100 ms
Notes	Video trigger delay may be set to negative values, in time domain, FFT and even swept. It makes intuitive sense in time domain and works well in FFT mode where the bandwidth of the filter before the video trigger is about 1.25 span. In swept spans, negative settings of Trig Delay are treated as a zero setting within the internal hardware and the advisory message "Neg. Trig Delay unavailable in Swept Mode, zero delay used." is generated when such a delay is set.
Preset	Off, 1.000 us
State Saved	Saved in instrument state
Min	-150 ms
Max	500 ms
Default Unit	s
Backwards Compatibility Notes	The legacy :TRIGger[:SEquence]:DELAy command affects the delay for the VID, LINE, EXT1, EXT2, and RFB triggers. The legacy :TRIGger[:SEquence]:OFFSet command is supported for the VIDeO, LINE, EXT1, and EXT2 triggers.
Initial S/W Revision	Prior to A.02.00

RF Burst

Pressing this key, when it is not selected, selects the RF Burst as the trigger. A new sweep/measurement will start when an RF burst envelope signal is identified from the signal at the RF Input connector. Pressing this key, when it is already selected, accesses the RF Burst trigger setup menu.

In some models, a variety of burst trigger circuitry is available, resulting in various available burst trigger bandwidths. The analyzer automatically chooses the appropriate trigger path based on the hardware configuration and other settings of the analyzer.

Key Path	Trigger
Example	TRIG:SOUR RFB Swept SA measurement TRIG:<meas>:SOUR RFB Measurements other than Swept SA
State Saved	Saved in instrument state
Status Bits/OPC dependencies	The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.
Backwards Compatibility Notes	The legacy command: :TRIGger[:SEQuence]:RFBurst:FSElectivity[:STATe] OFF ON 0 1 is not supported in the X-Series, as the hardware to do Frequency Selective burst triggers does not exist in X-Series.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.04.00

Absolute Trigger Level

Sets the absolute trigger level for the RF burst envelope.

When using the External Mixing path, the Absolute Trigger Level is uncalibrated because the factory default was set to accommodate the expected IF levels for the RF path.

Key Path	Trigger, RF Burst
Scope	Meas Global
Remote Command	:TRIGger[:SEQuence]:RFBurst:LEVel:ABSolute <ampl> :TRIGger[:SEQuence]:RFBurst:LEVel:ABSolute?
Example	TRIG:RFB:LEV:ABS 10 dBm sets the trigger level of the RF burst envelope signal to the absolute level of 10 dBm
Notes	Sending this command does not switch the setting from relative to absolute; to switch it you need to send the :TRIGger[:SEQuence]:RFBurst:LEVel:TYPE command, below. Amplitude Corrections are not taken into account by the Absolute Trigger Level. For example, if you have given yourself effective gain with an amplitude correction factor, the Absolute Trigger will not fire until you have set the trigger level that far below the displayed signal level, rather than simply to

	the displayed signal level. This is only true for Amplitude Corrections, not External Gain or Ref Level Offset functions. If mode is Bluetooth, the default value is -50 dBm.
Couplings	This same level is used for the RF Burst trigger source in the Trigger menu, for the RF Burst selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the RF Burst selection in the Gate Source menu
Preset	-20 dBm
State Saved	Saved in instrument state
Min	-200 dBm
Max	100 dBm
Default Unit	depends on the current selected Y-Axis unit
Backwards Compatibility SCPI	:TRIGger[:SEquence]:FRAMe:RFBurst:LEVel:ABSolute
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.04.00

Key Path	Trigger, RF Burst
Remote Command	:TRIGger[:SEquence]:RFBurst:LEVel:TYPE ABSolute RELative :TRIGger[:SEquence]:RFBurst:LEVel:TYPE?
Example	TRIG:RFB:LEV:TYPE REL sets the trigger level type of the RF burst trigger to Relative.
Preset	ABSolute
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.04.00

Relative Trigger Level

Sets the relative trigger level for the RF burst envelope.

In some models, the relative burst trigger function is implemented in hardware. In other models, without the advanced triggering hardware required, the relative burst trigger function is implemented in software in some measurements, and is unavailable in other measurements.

When implemented in software, the relative RF Burst trigger function is implemented as follows:

1. The measurement starts with the absolute RF Burst trigger setting. If it cannot get a trigger with that level, auto trigger fires and the acquisition starts anyway. After the acquisition, the measurement searches for the peak in the acquired waveform and saves it.

2. Now, in the next cycle of the measurement, the measurement determines a new absolute RF Burst level based on the peak value from the first measurement and the Relative RF Burst Trigger Level (always 0 or negative dB) set by the user. The following formula is used:
 3. absolute RF Burst level = peak level of the previous acquisition + relative RF Burst level
 4. If the new absolute RF Burst level differs from the previous by more than 0.5 dB, the new level is sent to the hardware; otherwise it is not updated (to avoid slowing down the acquisition)
- Steps 2 and 3 repeat for subsequent measurements.

Key Path	Trigger, RF Burst
Scope	Meas Global
Remote Command	:TRIGger[:SEquence]:RFBurst:LEVel:RELative <rel_ampl> :TRIGger[:SEquence]:RFBurst:LEVel:RELative?
Example	TRIG:RFB:LEV:REL -10 dB sets the trigger level of the RF burst envelope signal to the relative level of -10 dB
Notes	Sending this command does not switch the setting from absolute to relative; to switch it you need to send the :TRIGger[:SEquence]:RFBurst:LEVel:TYPE command, above. The relative trigger level is not available in some measurements. In those measurements the RELative parameter, and the :TRIGger[:SEquence]:RFBurst:LEVel:TYPE command (above), will generate an error if sent.
Dependencies	This key is grayed out and Absolute Trigger Level selected if the required hardware is not present in your analyzer and the current measurement does not support Relative triggering.
Preset	-6 dB GSM: -25 dB
State Saved	Saved in instrument state
Min	-45 dB
Max	0 dB
Default Unit	dB or dBc
Backwards Compatibility SCPI	:TRIGger[:SEquence]:RFBurst:LEVel This legacy command is aliased to :TRIGger[:SEquence]:RFBurst:LEVel:RELative because the PSA had ONLY relative burst triggering
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.04.00

Trigger Slope

It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

Key Path	Trigger, RF Burst
Remote Command	:TRIGger[:SEquence]:RFBurst:SLOPe POSitive NEGative :TRIGger[:SEquence]:RFBurst:SLOPe?

Example	TRIG:RFB:SLOP NEG
Couplings	This same slope is used in the RF Burst selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu).
Preset	POSitive
State Saved	Saved in instrument state
Backwards Compatibility SCPI	:TRIGger[:SEQuence]:FRAMe:RFBurst:SLOPe
Backwards Compatibility Notes	The legacy :TRIGger[:SEQuence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers.
Initial S/W Revision	Prior to A.02.00

Trig Delay

Controls a time delay during which the analyzer will wait to begin a sweep after meeting the trigger criteria. You can use negative delay to pre-trigger the instrument in time domain or FFT, but not in swept spans.

Key Path	Trigger, RF Burst
Remote Command	:TRIGger[:SEQuence]:RFBurst:DELay <time> :TRIGger[:SEQuence]:RFBurst:DELay? :TRIGger[:SEQuence]:RFBurst:DELay:STATe OFF ON 0 1 :TRIGger[:SEQuence]:RFBurst:DELay:STATe?
Example	TRIG:RFB:DEL:STAT ON TRIG:RFB:DEL 100 ms
Notes	Video trigger delay may be set to negative values, in time domain, FFT and even swept. It makes intuitive sense in time domain and works well in FFT mode where the bandwidth of the filter before the video trigger is about 1.25 span. In swept spans, negative settings of Trig Delay are treated as a zero setting within the internal hardware and the advisory message "Neg. Trig Delay unavailable in Swept Mode, zero delay used." is generated when such a delay is set.
Preset	Off, 1.000 us
State Saved	Saved in instrument state
Min	-150 ms
Max	500 ms
Default Unit	s
Backwards Compatibility Notes	The legacy :TRIGger[:SEQuence]:DELay command affects the delay for the VID, LINE, EXT1, EXT2, and RFB triggers.
Initial S/W Revision	Prior to A.02.00

Periodic Timer (Frame Trigger)

Pressing this key, when it is not selected, selects the internal periodic timer signal as the trigger. Triggering occurrences are set by the **Period** parameter, which is modified by the **Sync Source** and **Offset**. Pressing this key, when it is already selected, accesses the periodic timer trigger setup functions.

If you do not have a sync source selected (it is Off), then the internal timer will not be synchronized with any external timing events.

Key Path	Trigger
Example	TRIG:SOUR FRAM Swept SA measurement
	TRIG:< meas>:SOUR FRAM Measurements other than Swept SA
State Saved	Saved in instrument state
Readback	[Sync: <value of Sync Source>], for example, [Sync: External 1]
Status Bits/OPC dependencies	The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.
Initial S/W Revision	Prior to A.02.00

Periodic Timer Triggering:

This feature selects the internal periodic timer signal as the trigger. Trigger occurrences are set by the **Periodic Timer** parameter, which is modified by the **Sync Source** and **Offset**.

The figure below shows the action of the periodic timer trigger. Before reviewing the figure, we'll explain some uses for the periodic trigger.

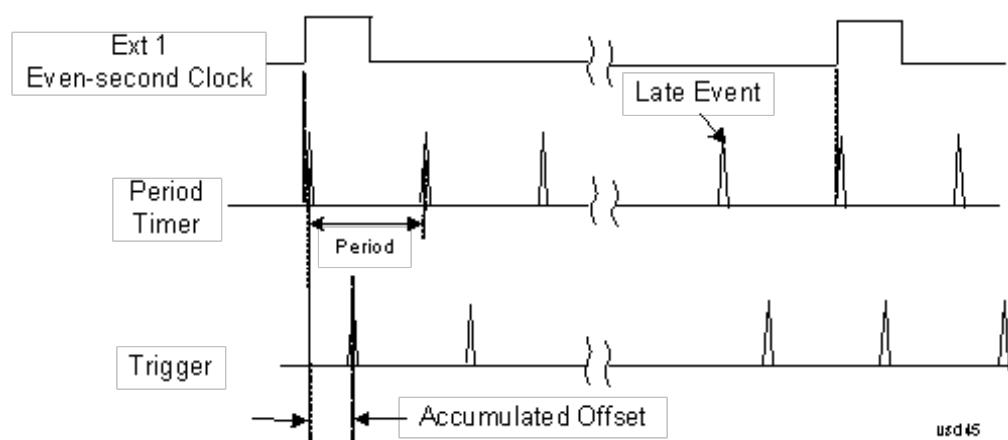
A common application is measuring periodic burst RF signals for which a trigger signal is not easily available. For example, we might be measuring a TDMA radio which bursts every 20 ms. Let's assume that the 20 ms period is very consistent. Let's also assume that we do not have an external trigger source available that is synchronized with the period, and that the signal-to-noise ratio of the signal is not high enough to provide a clean RF burst trigger at all of the analysis frequencies. For example, we might want to measure spurious transmissions at an offset from the carrier that is larger than the bandwidth of the RF burst trigger. In this application, we can set the Periodic Timer to a 20.00 ms period and adjust the offset from that timer to position our trigger just where we want it. If we find that the 20.00 ms is not exactly right, we can adjust the period slightly to minimize the drift between the period timer and the signal to be measured.

A second way to use this feature would be to use **Sync Source** temporarily, instead of **Offset**. In this case, we might tune to the signal in a narrow span and use the RF Burst trigger to synchronize the periodic timer. Then we would turn the sync source off so that it would not miss-trigger. Miss-triggering can occur when we are tuned so far away from the RF burst trigger that it is no longer reliable.

A third example would be to synchronize to a signal that has a reference time element of much longer period than the period of interest. In some CDMA applications, it is useful to look at signals with a short periodicity, by synchronizing that periodicity to the "even-second clock" edge that happens every two

seconds. Thus, we could connect the even-second clock trigger to Ext1 and use then Ext1 as the sync source for the periodic timer.

The figure below illustrates this third example. The top trace represents the even-second clock. It causes the periodic timer to synchronize with the leading edge shown. The analyzer trigger occurs at a time delayed by the accumulated offset from the period trigger event. The periodic timer continues to run, and triggers continue to occur, with a periodicity determined by the analyzer time base. The timer output (labeled "late event") will drift away from its ideal time due to imperfect matching between the time base of the signal being measured and the time base of the analyzer, and also because of imperfect setting of the period parameter. But the synchronization is restored on the next even-second clock event. ("Accumulated offset" is described in the in the **Offset** function section.)



Period

Sets the period of the internal periodic timer clock. For digital communications signals, this is usually set to the frame period of your current input signal. In the case that sync source is not set to OFF, and the external sync source rate is changed for some reason, the periodic timer is synchronized at the every external synchronization pulse by resetting the internal state of the timer circuit.

Key Path	Trigger, Periodic Timer
Remote Command	:TRIGger[:SEquence]:FRAMe:PERiod <time> :TRIGger[:SEquence]:FRAMe:PERiod?
Example	TRIG:FRAM:PER 100 ms
Dependencies	The invalid data indicator turns on when the period is changed, until the next sweep/measurement completes.
Couplings	The same period is used in the Gate Source selection of the period timer.
Preset	20 ms GSM: 4.615383
State Saved	Saved in instrument state
Min	100.000 ns
Max	559.0000 ms
Default Unit	S
Initial S/W Revision	Prior to A.02.00

Offset

Adjusts the accumulated offset between the periodic timer events and the trigger event. Adjusting the accumulated offset is different than setting an offset, and requires explanation.

The periodic timer is usually not synchronized with any external events, so the timing of its output events has no absolute meaning. Since the timing relative to external events (RF signals) is important, you need to be able to adjust (offset) it. However, you have no direct way to see when the periodic timer events occur. All that you can see is the trigger timing. When you want to adjust the trigger timing, you will be changing the internal offset between the periodic timer events and the trigger event. Because the absolute value of that internal offset is unknown, we will just call that the accumulated offset. Whenever the Offset parameter is changed, you are changing that accumulated offset. You can reset the displayed offset using Reset Offset Display. Changing the display does not change the value of the accumulated offset, and you can still make additional changes to accumulated offset.

To avoid ambiguity, we define that an increase in the "offset" parameter, either from the knob or the SCPI adjust command, serves to delay the timing of the trigger event.

Key Path	Trigger, Periodic Timer
Remote Command	:TRIGger[:SEquence]:FRAMe:OFFSet <time> :TRIGger[:SEquence]:FRAMe:OFFSet?
Example	TRIG:FRAM:OFFS 1.2 ms
Notes	<p>The front panel interface (for example, the knob), and this command, adjust the accumulated offset, which is shown on the active function display. However, the actual amount sent to the hardware each time the offset is updated is the delta value, that is, the current accumulated offset value minus the previous accumulated offset value. Note that the accumulated offset value is essentially arbitrary; it represents the accumulated offset from the last time the offset was zeroed (with the Reset Offset Display key).</p> <p>Note that this command does not change the period of the trigger waveform. Note also that Offset is used only when the sync source is set to OFF, otherwise delay is used, see section "Trig Delay" on page 440.</p> <p>An increase in the "offset" parameter, either from the knob or the SCPI adjust command, serves to delay the timing of the trigger event.</p>
Notes	<p>When the SCPI command is sent the value shown on the key (and the Active Function, if this happens to be the active function) is updated with the new value. However, the actual amount sent to the hardware is the delta value, that is, the current accumulated offset value minus the previous accumulated offset value.</p> <p>The SCPI query simply returns the value currently showing on the key.</p>
Dependencies	The invalid data indicator turns on when the offset is changed, until the next sweep/measurement completes.
Couplings	The same offset is used in the Gate Source selection of the period timer.
Preset	0 s
State Saved	Saved in instrument state
Min	-10.000 s
Max	10.000 s

Default Unit	S
Initial S/W Revision	Prior to A.02.00

Offset Adjust (Remote Command Only)

This remote command does not work at all like the related front panel keys. This command lets you advance the phase of the frame trigger by the amount you specify.

It does not change the period of the trigger waveform. If the command is sent multiple times, it advances the phase of the frame trigger an additional amount each time it is sent. Negative numbers are permitted.

Remote Command	:TRIGger[:SEquence]:FRAMe:ADJust <time>
Example	TRIG:FRAM:ADJ 1.2 ms
Notes	Note also that Offset is used only when the sync source is set to OFF, otherwise delay is used, see section "Trig Delay" on page 440 An increase in the "offset" parameter, either from the knob or the SCPI adjust command, serves to delay the timing of the trigger event.
Notes	The front panel interface (for example, the knob) and the :TRIG:FRAM:OFFS command adjust the accumulated offset, which is shown on the active function display. However, the actual amount sent to the hardware is the delta value, that is, the current offset value minus the previous offset value. When the SCPI command is sent the value shown on the key (and the Active Function, if this happens to be the active function) is updated by increasing it (or decreasing it if the value sent is negative) by the amount specified in the SCPI command. This is a "command only" SCPI command, with no query.
Dependencies	The invalid data indicator turns on when the offset is changed, until the next sweep/measurement completes.
Couplings	The same offset is used in the Gate Source selection of the period timer.
Preset	0 s
State Saved	Saved in instrument state
Min	-10.000 s
Max	10.000 s
Default Unit	S
Initial S/W Revision	Prior to A.02.00

Reset Offset Display

Resets the value of the periodic trigger offset display setting to 0.0 seconds. The current displayed trigger location may include an offset value defined with the Offset key. Pressing this key redefines the currently displayed trigger location as the new trigger point that is 0.0 s offset. The Offset key can then be used to add offset relative to this new timing.

Key Path	Trigger, Periodic Timer
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Remote Command	:TRIGger[:SEquence]:FRAMe:OFFSet:DISPlay:RESet
Example	TRIG:FRAM:OFFS:DISP:RES
Initial S/W Revision	Prior to A.02.00

Sync Source

Selects a signal source for you to synchronize your periodic timer trigger to, otherwise you are triggering at some arbitrary location in the frame. Synchronization reduces the precision requirements on the setting of the period.

For convenience you may adjust the level and slope of the selected sync source in a conditional branch setup menu accessed from the Sync Source menu. Note that these settings match those in the **Trigger** and **Gate Source** menus; that is, each trigger source has only one value of level and slope, regardless of which menu it is accessed from.

Key Path	Trigger, Periodic Timer
Remote Command	:TRIGger[:SEquence]:FRAMe:SYNC EXTernal1 EXTernal2 RFBurst OFF :TRIGger[:SEquence]:FRAMe:SYNC?
Example	TRIG:FRAM:SYNC EXT2
Dependencies	In some models, there is no second External input. In these models, the External 2 key is blanked and the EXTernal2 parameter will generate a “Hardware missing; Not available for this model number” message.
Preset	Off GSM/EDGE, MSR,LTE,LTETDD: RFBurst
State Saved	Saved in instrument state
Readback	The current setting is read back to this key and it is also Readback to the previous Periodic Timer trigger key.
Backwards Compatibility SCPI	:TRIGger[:SEquence]:FRAMe:SYNC EXTernal For backward compatibility, the parameter EXTernal is mapped to EXTernal1
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00, A.14.00

Off

Turns off the sync source for your periodic trigger. With the sync source off, the timing will drift unless the signal source frequency is locked to the analyzer frequency reference.

Key Path	Trigger, Periodic Timer, Sync Source
Example	TRIG:FRAM:SYNC OFF
Readback	Off
Initial S/W Revision	Prior to A.02.00

External 1

Pressing this key, when it is not selected, selects an external input signal as the trigger. A new sweep/measurement will start when the external trigger condition is met using the external 1 input connector on the rear panel.

Pressing this key, when it is already selected, accesses the external 1 trigger setup menu.

Key Path	Trigger
Example	TRIG:SOUR EXT1 Swept SA measurement TRIG:<meas>:SOUR EXT1 Measurements other than Swept SA
Dependencies	Grayed out if in use by Point Trigger in the Source Setup menu. Forced to Free Run if already selected and Point Trigger is set to External 1.
State Saved	Saved in instrument state
Status Bits/OPC dependencies	The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.
Initial S/W Revision	Prior to A.02.00

Trigger Level

Sets the value where the external 1 trigger input will trigger a new sweep/measurement.

Key Path	Trigger, External 1
Remote Command	:TRIGger[:SEquence]:EXTernal1:LEVel <level> :TRIGger[:SEquence]:EXTernal1:LEVel?
Example	TRIG:EXT1:LEV 0.4 V
Couplings	This same level is used for the Ext1 trigger source in the Trigger menu, for the Ext1 selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the Ext1 selection in the Gate Source menu.
Preset	1.2 V
State Saved	Saved in instrument state
Min	-5 V
Max	5 V
Default Unit	V
Backwards Compatibility SCPI	:TRIGger[:SEquence]:EXTernal:LEVel For backward compatibility, the parameter EXTernal is mapped to EXTernal1
Backwards Compatibility SCPI	:TRIGger[:SEquence]:FRAMe:EXTernal1:LEVel
Initial S/W Revision	Prior to A.02.00

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

Key Path	Trigger, External 1
Remote Command	:TRIGger[:SEquence]:EXTErnal1:SLOPe POSitive NEGative :TRIGger[:SEquence]:EXTErnal1:SLOPe?
Example	TRIG:EXT1:SLOP NEG
Couplings	This same slope is used in the Ext1 selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu).
Preset	POSitive
State Saved	Saved in instrument state
Backwards Compatibility SCPI	:TRIGger[:SEquence]:EXTErnal:SLOPe For backward compatibility, the parameter EXTErnal is mapped to EXTErnal1
Backwards Compatibility SCPI	:TRIGger[:SEquence]:FRAME:EXTErnal1:SLOPe
Backwards Compatibility Notes	The legacy :TRIGger[:SEquence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers.
Initial S/W Revision	Prior to A.02.00

External 2

Pressing this key, when it is not selected, selects an external input signal as the trigger. A new sweep/measurement will start when the external trigger condition is met using the external 2 input connector. The external trigger 2 input connector is on the rear panel.

Pressing this key, when it is already selected, accesses the external 2 trigger setup menu.

Key Path	Trigger
Example	TRIG:SOUR EXT2 Swept SA measurement TRIG:<meas>:SOUR EXT2 Measurements other than Swept SA
Dependencies	In some models, there is no second External input. In these models, the External 2 key is blanked and the EXTErnal2 parameter will generate a "Hardware missing; Not available for this model number" message. Grayed out if in use by Point Trigger in the Source Setup menu. Forced to Free Run if already selected and Point Trigger is set to External 2.
State Saved	Saved in instrument state
Status Bits/OPC dependencies	The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message

("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.

Initial S/W Revision Prior to A.02.00

Modified at S/W Revision A.03.00

Trigger Level

Sets the value where the external 2 trigger input will trigger a new sweep/measurement.

Key Path	Trigger, External 2
Remote Command	:TRIGger[:SEquence]:EXTernal2:LEVel :TRIGger[:SEquence]:EXTernal2:LEVel?
Example	TRIG:EXT2:LEV 1.1 V
Couplings	This same level is used for the Ext2 trigger source in the Trigger menu, for the Ext2 selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the Ext2 selection in the Gate Source menu.
Preset	1.2 V
State Saved	Saved in instrument state
Min	-5 V
Max	5 V
Default Unit	V
Backwards Compatibility SCPI	:TRIGger[:SEquence]:FRAMe:EXTernal2:LEVel
Initial S/W Revision	Prior to A.02.00

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

Key Path	Trigger, External 2
Remote Command	:TRIGger[:SEquence]:EXTernal2:SLOPe POSitive NEGative :TRIGger[:SEquence]:EXTernal2:SLOPe?
Example	TRIG:EXT2:SLOP NEG
Couplings	This same slope is used in the Ext2 selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu).
Preset	POSitive
State Saved	Saved in instrument state
Backwards Compatibility SCPI	:TRIGger[:SEquence]:FRAMe:EXTernal2:SLOPe

Backwards Compatibility Notes	The legacy :TRIGger[:SEQuence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers.
Initial S/W Revision	Prior to A.02.00

RF Burst

Pressing this key, when it is not selected, selects the RF Burst as the trigger. A new sweep/measurement will start when an RF burst envelope signal is identified from the signal at the RF Input connector. Pressing this key, when it is already selected, accesses the RF Burst trigger setup menu.

In some models, a variety of burst trigger circuitry is available, resulting in various available burst trigger bandwidths. The analyzer automatically chooses the appropriate trigger path based on the hardware configuration and other settings of the analyzer.

Key Path	Trigger
Example	TRIG:SOUR RFB Swept SA measurement TRIG:< meas>:SOUR RFB Measurements other than Swept SA
State Saved	Saved in instrument state
Status Bits/OPC dependencies	The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.
Backwards Compatibility Notes	The legacy command: :TRIGger[:SEQuence]:RFBurst:FSElectivity[:STATe] OFF ON 0 1 is not supported in the X-Series, as the hardware to do Frequency Selective burst triggers does not exist in X-Series.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.04.00

Absolute Trigger Level

Sets the absolute trigger level for the RF burst envelope.

When using the External Mixing path, the Absolute Trigger Level is uncalibrated because the factory default was set to accommodate the expected IF levels for the RF path.

Key Path	Trigger, RF Burst
Scope	Meas Global
Remote Command	:TRIGger[:SEQuence]:RFBurst:LEVel:ABSolute <ampl> :TRIGger[:SEQuence]:RFBurst:LEVel:ABSolute?
Example	TRIG:RFB:LEV:ABS 10 dBm

	sets the trigger level of the RF burst envelope signal to the absolute level of 10 dBm
Notes	<p>Sending this command does not switch the setting from relative to absolute; to switch it you need to send the <code>:TRIGger[:SEquence]:RFBurst:LEVel:TYPE</code> command, below.</p> <p>Amplitude Corrections are not taken into account by the Absolute Trigger Level. For example, if you have given yourself effective gain with an amplitude correction factor, the Absolute Trigger will not fire until you have set the trigger level that far below the displayed signal level, rather than simply to the displayed signal level. This is only true for Amplitude Corrections, not External Gain or Ref Level Offset functions.</p> <p>If mode is Bluetooth, the default value is -50 dBm.</p>
Couplings	This same level is used for the RF Burst trigger source in the Trigger menu, for the RF Burst selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the RF Burst selection in the Gate Source menu
Preset	-20 dBm
State Saved	Saved in instrument state
Min	-200 dBm
Max	100 dBm
Default Unit	depends on the current selected Y-Axis unit
Backwards Compatibility SCPI	<code>:TRIGger[:SEquence]:FRAMe:RFBurst:LEVel:ABSolute</code>
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.04.00

Key Path	Trigger, RF Burst
Remote Command	<code>:TRIGger[:SEquence]:RFBurst:LEVel:TYPE ABSolute RELative</code> <code>:TRIGger[:SEquence]:RFBurst:LEVel:TYPE?</code>
Example	TRIG:RFB:LEV:TYPE REL sets the trigger level type of the RF burst trigger to Relative.
Preset	ABSolute
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.04.00

Trigger Slope

It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

Key Path	Trigger, RF Burst
Remote Command	<code>:TRIGger[:SEquence]:RFBurst:SLOPe POSitive NEGative</code> <code>:TRIGger[:SEquence]:RFBurst:SLOPe?</code>

Example	TRIG:RFB:SLOP NEG
Couplings	This same slope is used in the RF Burst selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu).
Preset	POSitive
State Saved	Saved in instrument state
Backwards Compatibility SCPI	:TRIGger[:SEQuence]:FRAMe:RFBurst:SLOPe
Backwards Compatibility Notes	The legacy :TRIGger[:SEQuence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers.
Initial S/W Revision	Prior to A.02.00

Trig Delay

This setting delays the measurement timing relative to the Periodic Timer.

Key Path	Trigger, Periodic Timer
Remote Command	:TRIGger[:SEQuence]:FRAMe:DELay <time> :TRIGger[:SEQuence]:FRAMe:DELay? :TRIGger[:SEQuence]:FRAMe:DELay:STATe OFF ON 0 1 :TRIGger[:SEQuence]:FRAMe:DELay:STATe?
Notes	Note that delay is used when the sync source is not set to OFF. If the sync source is set to OFF, offset is used.
Preset	Off, 1.000 us
State Saved	Saved in instrument state
Min	-150 ms
Max	+500 ms
Default Unit	s
Initial S/W Revision	Prior to A.02.00

Auto/Holdoff

Opens up a menu that lets you adjust Auto Trigger and Trigger Holdoff parameters

Key Path	Trigger
Readback line	Displays a summary of the Auto Trig and Holdoff settings, in square brackets First line: Auto Off or Auto On Second Line: "Hldf" followed by: <ul style="list-style-type: none"> • If Holdoff is Off, readback Off • If Holdoff On and Type = Normal, readback value

- If Holdoff On and Type = Above, readback value followed by AL
- If Holdoff On and Type = Below, readback value followed by BL
- If Holdoff Type selection is not supported by the current measurement, Holdoff Type is always Normal

Initial S/W Revision	A.02.00
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Auto Trig

Sets the time that the analyzer will wait for the trigger conditions to be met. If they are not met after that much time, then the analyzer is triggered anyway.

Key Path	Trigger, Auto/Holdoff
Remote Command	:TRIGger[:SEquence]:ATRigger <time> :TRIGger[:SEquence]:ATRigger? :TRIGger[:SEquence]:ATRigger:STATE OFF ON 0 1 :TRIGger[:SEquence]:ATRigger:STATE?
Example	TRIG:ATR:STAT ON TRIG:ATR 100 ms
Notes	The "time that the analyzer will wait" starts when the analyzer is ready for a trigger, which may be hundreds of ms after the data acquisition for a sweep is done. The "time" ends when the trigger condition is satisfied, not when the delay ends.
Preset	Off, 100 ms
State Saved	Saved in instrument state
Min	1 ms
Max	100 s
Default Unit	s
Initial S/W Revision	Prior to A.02.00

Trig Holdoff

Sets the holdoff time between triggers. When the trigger condition is satisfied, the trigger occurs, the delay begins, and the holdoff time begins. New trigger conditions will be ignored until the holdoff time expires. For a free-running trigger, the holdoff value is the minimum time between triggers.

Key Path	Trigger, Auto/Holdoff
Remote Command	:TRIGger[:SEquence]:HOLDoFF <time> :TRIGger[:SEquence]:HOLDoFF? :TRIGger[:SEquence]:HOLDoFF:STATE OFF ON 0 1 :TRIGger[:SEquence]:HOLDoFF:STATE?
Example	TRIG:HOLD:STAT ON

	TRIG:HOLD 100 ms
Dependencies	Unavailable if the selected Input is BBIQ. If this is the case, the key is grayed out if it is pressed the informational message “Feature not supported for this Input” is displayed. If the SCPI command is sent, the error “Settings conflict; Feature not supported for this Input” is generated.
Preset	Off, 100 ms
State Saved	Saved in instrument state
Min	0 s
Max	0.5 s
Default Unit	s
Initial S/W Revision	Prior to A.02.00

Holdoff Type

Lets you set the Trigger Holdoff Type.

NOTE

Holdoff Type is not supported by all measurements. If the current measurement does not support it, this key will be blank and the Holdoff Type will be Normal. If the Holdoff Type SCPI is sent while in such a measurement, the SCPI will be accepted and the setting remembered, but it will have no effect until a measurement is in force that supports Holdoff Type.

Trigger Holdoff Type functionality:

- NORMal
- This is the “oscilloscope” type of trigger holdoff, and is the setting when the Holdoff Type key does not appear. In this type of holdoff, no new trigger will be accepted until the holdoff interval has expired after the previous trigger.
- ABOVE
- If the trigger slope is positive, a trigger event is generated only if the signal characteristic of interest crosses the trigger threshold (with positive slope) and then remains above the threshold for at least the holdoff time. For negative slope, the trigger event is generated if the signal characteristic crosses the threshold (with negative slope) after having been above the threshold for at least the holdoff time. In either case, the trigger event is associated with the time the level was crossed.
- BELow
- If the trigger slope is positive, a trigger event is generated only if the signal characteristic of interest crosses the trigger threshold (with positive slope) after having been below the threshold for at least the holdoff time. For negative slope, the trigger event is generated if the signal characteristic crosses the threshold (with negative slope) and then remains below the threshold for at least the holdoff time. In either case, the trigger event is associated with the time the level was crossed.

Key Path	Trigger, Auto/Holdoff
Remote Command	:TRIGger[:SEquence]:HOLDoff:TYPE NORMal ABOVE BELow :TRIGger[:SEquence]:HOLDoff:TYPE?

Example	TRIG:HOLD:TYPE NORM
Preset	All modes but GSM/EDGE: Normal GSM/EDGE: Below
State Saved	Saved in instrument state
Initial S/W Revision	A.02.00

8 EDGE Power vs Time Measurement

Power vs. Time measures the mean transmit power during the “useful” part of bursts, and verifies that the power ramp fits within the defined mask. The “useful “ part of the burst is defined as, the 147 bits centered on the transition from bit 13 to bit 14 (the “TO” time point) of the 26 bit training sequence. The Power vs. Time measurement also lets you view the rise, fall, and the “useful” part of the bursts. Using the Multi-Slot function, up to eight slots in a frame can be viewed at one time.

This topic contains the following sections:

["Measurement Commands for EDGE Power vs Time" on page 446](#)

["Remote Command Results for EDGE Power vs Time" on page 447](#)

See also: ["Custom Limit Mask \(Remote Commands Only\)" on page 536](#)

Measurement Commands for EDGE Power vs Time

The following commands and queries are used to retrieve the measurement results:

`:CONFigure:EPVTime`

`:CONFigure:EPVTime:NDEFault`

`:INITiate:EPVTime`

`:FETCh:EPVTime[n]?`

`:READ:EPVTime[n]?`

`:MEASure:EPVTime[n]?`

For more measurement related commands, see the section ["Remote Measurement Functions" on page 2301](#).

Remote Command Results for EDGE Power vs Time

For the queries listed above, the results returned depend on the value of n, as follows.

n	Results Returned
0	Returns unprocessed I/Q trace data, as a series of comma-separated trace points, in volts. The I values are listed first in each pair, using the 0 through even-indexed values. The Q values are the odd-indexed values.
not specified or n = 1	Returns the following comma-separated scalar results: <ol style="list-style-type: none"> Sample time is a floating point number that represents the time between samples when using the trace queries (n=0,2,etc.). Power single burst is the mean power (in dBm) across the useful part of the selected burst in the most recently acquired data, or in the last data acquired at the end of a set of averages. If averaging is on, the power is for the last burst. Power averaged is the power (in dBm) of N averaged bursts, if averaging is on. The power is averaged across the useful part of the burst. Average m is a single burst from the acquired trace. If there are multiple bursts in the acquired trace, only one burst is used for average m. This means that N traces are acquired to make the complete average. If averaging is off, the value of power averaged is the same as the power single burst value. Number of samples is the number of data points in the captured signal. This number is useful when performing a query on the signal (i.e. when n=0,2,etc.). Start is the index of the data point at the start of the useful part of the burst Stop is the index of the data point at the end of the useful part of the burst TO is the index of the data point where t0 occurred Burst width is the width of the burst measured at .3dB below the mean power in the useful part of the burst. Maximum value is the maximum value of the most recently acquired data (in dBm). Minimum value is the minimum value of the most recently acquired data (in dBm). Burst search threshold is the value (in dBm) of the threshold where a valid burst is identified, after the data has been acquired. IQ point delta is the number of data points offset that are internally applied to the useful data in traces n=2,3,4. You must apply this correction value to find the actual location of the Start, Stop, or TO values. (e.g. for n=2, Start (for the IQ trace data) = Start + IQ_point_delta)
2	Returns comma-separated trace points of the Measure Trace data. These data points are floating point numbers representing the power of the signal (in dBm). There are N data points, where N is the number of samples. The period between the samples is defined by the sample time.
3	Returns comma-separated points of the upper mask (in dBm) of the measured slots configured by Meas Time. The measured slots can be seen in Multi Slot view in View/Display.
4	Returns comma-separated points of the lower mask (in dBm) of the measured slots configured by Meas Time. The measured slots can be seen in Multi Slot view in View/Display.
7	Returns useful part power level values for the 8 slots in the current frame (in dBm).
8	Returns comma-separated trace points of the Max Hold Trace data (in dBm) of the measured slots configured by Meas Time. The measured slots can be seen in Multi Slot view in View/Display. There are N data points, where N is the number of samples. The period between the samples is defined by the sample time. This command is available only when the Max Hold Trace State is ON.

n	Results Returned
9	<p>Returns comma-separated trace points of the Min Hold Trace data (in dBm) of the measured slots configured by Meas Time. The measured slots can be seen in Multi Slot view in View/Display.</p> <p>There are N data points, where N is the number of samples. The period between the samples is defined by the sample time.</p> <p>This command is available only when the Min Hold Trace State is ON.</p>
10	<p>Returns the following comma-separated scalar results:</p> <ol style="list-style-type: none"> 1. Sample time is a floating point number that represents the time between samples when using the trace queries (n=0,2,etc.). 2. Power single burst is the mean power (in dBm) across the useful part of the selected burst in the most recently acquired data, or in the last data acquired at the end of a set of averages. If averaging is on, the power is for the last burst. 3. Power averaged is the power (in dBm) of N averaged bursts, if averaging is on. The power is averaged across the useful part of the burst. Average m is a single burst from the acquired trace. If there are multiple bursts in the acquired trace, only one burst is used for average m. This means that N traces are acquired to make the complete average. If averaging is off, the value of power averaged is the same as the power single burst value. 4. Number of samples is the number of data points in the captured signal. This number is useful when performing a query on the signal (i.e. when n=0,2,etc.). 5. Start is the index of the data point at the start of the useful part of the burst 6. Stop is the index of the data point at the end of the useful part of the burst 7. T0 is the index of the data point where t0 occurred 8. Burst width is the width of the burst measured at .3dB below the mean power in the useful part of the burst. 9. Maximum value is the maximum value of the most recently acquired data (in dBm). 10. Minimum value is the minimum value of the most recently acquired data (in dBm). 11. Burst search threshold is the value (in dBm) of the threshold where a valid burst is identified, after the data has been acquired. 12. IQ point delta is the number of data points offset that are internally applied to the useful data in traces n=2,3,4. You must apply this correction value to find the actual location of the Start, Stop, or T0 values. (e.g. for n=2, Start (for the IQ trace data) = Start + IQ_point_delta) 13. 1st Error point is the time (in second) which indicates the point on the X Scale where the first failure of a signal was detected. Use a marker to locate this point in order to examine the nature of the failure. If the limit passes, returned data has no meaning. 14. Detected TSC is the most recently detected TSC. The returned value is 0~7 (Burst Type : Normal/Higher Symbol Rate (HSR)) if TSC detected. If TSC not detected, the returned value is -999.0. If Amptd or NONE(Power vs Time only) specified in Sync Type, the returned value is -999.0. In multi slot condition, the returned value is the detected TSC of the specified slot(Time Slot ON) or the first evaluated slot(Time Slot OFF).

n	Results Returned
NOTE	<p>The returned value in Sync (Synchronization Burst) is:</p> <p>10 if (BN42, BN43..BN105) = (1,0,1,1,1,0,0,1,0,1,1,0,0,0,1,0,0,0,0,0,1,0,0,0,0,0,1, 1,1,1,0,0,1,0,1,1,0,1,0,1,0,0,0,1,0,1,0,1,1,1,0,1,1,0,0,0,0,1,1,0,1,1)</p> <p>11 if (BN42, BN43..BN105) = (1,1,1,0,1,1,1,0,0,1,1,0,1,0,1,1,0,0,1,0,1,0,0,0,0,0,1,1,1,1,0,1, 1,1,1,0,1,0,0,0,1,1,1,1,1,0,1,1,0,0,1,0,1,1,0,0,0,1,0,1,0,1)</p> <p>12 if (BN42, BN43..BN105) = (1,1,1,0,1,1,0,0,0,0,1,1,0,1,1,1,0,1,0,1,0,0,0,1,0,1,0,1,1,0, 1,0,0,1,1,1,1,0,0,0,0,0,1,0,0,0,0,0,1,0,0,0,1,1,0,1,0,0,1,1,1,0)</p> <p>The returned value in Access (Access Burst) is:</p> <p>20 if (BN8, BN9..BN48) = (0,1,0,0,1,0,1,1,0,1,1,1,1,1,1,1,0,0,1,1,0,0,1,1,0,1,0,1,0,1,0,0,0,1,1,1,1,0,0,0)</p> <p>21 if (BN8, BN9..BN48) = (0,1,0,1,0,1,0,0,1,1,1,1,1,0,0,0,1,0,0,0,0,1,1,0,0,0,1,0,1,1,1,0,0,1,0,0,1,1,0,1)</p> <p>22 if (BN8, BN9..BN48) = (1,1,1,0,1,1,1,1,0,0,1,0,0,1,1,1,0,1,0,1,0,1,1,0,0,0,0,1,1,0,1,1,0,1,1,1,0,1,1,1)</p> <p>The returned value in AQPSK is more than or equal to 100100. Its first three digits represent TSC of VAMOS subchannel A. The second three digits represent VAMOS subchannel B. TSCs of TSC set 1 and TSC set 2 correspond to 100 to 107 and 200 to 207 respectively. Thus the returned value is ([TSC num of VAMOS subchannel A] * 1000 + [TSC num of VAMOS subchannel B]). For example, if measured AQPSK signal has TSC 3 of set1 on VAMOS subchannel A and TSC 5 of TSC set2 on VAMOS B, returned value is 103205.</p>
15.	<p>Detected Mod scheme is the most recently detected modulation scheme. The returned value is as follows: 0 for GMSK, 1 for Normal Burst (NB) 8PSK, 2 for NB 16QAM, 3 for NB 32QAM, 10 for AQPSK, 11 for Higher symbol rate Burst (HB) QPSK, 12 for HB 16QAM, 13 for HB 32QAM</p>
16.	<p>Estimated Carrier Power (ECP) in dBm</p>
17.	<p>Midamble Power Averaged is the midamble power (in dBm) of N averaged bursts, if averaging is on. The power is averaged across the training sequence part of the burst.</p>
18.	<p>Mask Ref Power is the reference power (in dBm) of PVT mask of the selected burst.</p>
19.	<p>Reserved for future use – the value returned is -999.0 (floating point)</p>
12	<p>Returns comma-separated trace points of the Measure Trace data. These data points are floating point numbers representing the power of the signal (in dBm). The slot is identified by Time Slot if its state is on. Or it is the first measured slot if Time Slot state is off. This single slot can be seen in Burst view in View/Display.</p>
13	<p>Returns comma-separated points of the upper mask (in dBm) of the single slot. The slot is identified by Time Slot if its state is on. Or it is the first measured slot if Time Slot state is off. This single slot can be seen in Burst view in View/Display.</p>
14	<p>Returns comma-separated points of the lower mask (in dBm) of the single slot. The slot is identified by Time Slot if its state is on. Or it is the first measured slot if Time Slot state is off. This single slot can be seen in Burst view in View/Display.</p>

n	Results Returned
17	Returns Estimated Carrier Power (ECP) level values for the eight slots in the current frame (in dBm)
18	<p>Returns comma-separated trace points of the Max Hold Trace data (in dBm) of the single slot. The slot is identified by Time Slot if its state is on. Or it is the first measured slot if Time Slot state is off. This single slot can be seen in Burst view in View/Display.</p> <p>There are N data points, where N is the number of samples. The period between the samples is defined by the sample time.</p> <p>This command is available only when the Max Hold Trace State is ON.</p>
19	<p>Returns comma-separated trace points of the Min Hold Trace data (in dBm) of the single slot. The slot is identified by Time Slot if its state is on. Or it is the first measured slot if Time Slot state is off. This single slot can be seen in Burst view in View/Display.</p> <p>There are N data points, where N is the number of samples. The period between the samples is defined by the sample time.</p> <p>This command is available only when the Min Hold Trace State is ON.</p>
20	<p>Returns comma-separated integer numbers which represent modulation scheme of last measured slots. The returned value is as follows.</p> <p>0 for GMSK, 1 for Normal Burst (NB) 8PSK, 2 for NB 16QAM, 3 for NB 32QAM, 10 for AQPSK, 11 for Higher symbol rate Burst (HB) QPSK, 12 for HB 16QAM, 13 for HB 32QAM</p>
21	Returns comma-separated integer numbers of TSC of last measured slots. Returned values are translated to integer numbers in the same way as 14th element of n=10, Detected TSC.
22	Returns comma-separated numbers of midamble part power values for the eight slots in the current frame (in dBm).
23	Returns comma-separated numbers of mask reference power values for the eight slots (in dBm). Returned values depend on Ref Pwr Type selection and can be either useful part, midamble, estimated or tail bit powers averaged over N bursts.
24	<p>Returns the following scalar results:</p> <ol style="list-style-type: none"> 1. Detected TSC on VAMOS subchannel A is the most recently detected TSC on VAMOS subchannel A. The returned value is 0~7 if TSC of AQPSK burst detected. If not detected, the returned value is -999.0. If Amptd or NONE (Power vs Time only) specified in Sync Type, the returned value is -999.0. In multi slot condition, the returned value is the detected TSC of the specified slot(Time Slot ON) or the first evaluated slot(Time Slot OFF). 2. Detected TSC on VAMOS subchannel B is the most recently detected TSC on VAMOS subchannel B. The returned value is 0~7 if TSC of TSC set 1 detected and 200 ~ 207 if TSC of TSC set 2 detected. If not detected, the returned value is -999.0. If Amptd or NONE (Power vs Time only) specified in Sync Type, the returned value is -999.0. In multi slot condition, the returned value is the detected TSC of the specified slot(Time Slot ON) or the first evaluated slot(Time Slot OFF).

Key Path	Meas
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

AMPTD Y Scale

Accesses a menu of functions that enable you to set the vertical scale parameters. These functions control how data on the vertical (Y) axis is displayed and control instrument settings that affect the vertical axis.

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Ref Value

Allows you to set the absolute power reference by Burst, Multi-slot and Rise & Fall views.

Key Path	AMPTD Y Scale
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Ref Value (Burst view and Multi-slot view)

Allows you to set the absolute power reference.

Key Path	AMPTD Y Scale
Mode	GSM
Remote Command	:DISPlay:EPVTime:VIEW[1] 3:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <real> :DISPlay:EPVTime:VIEW[1] 3:WINDow[1]:TRACe:Y[:SCALe]:RLEVel?
Example	DISP:EPVT:VIEW:WIND:TRAC:Y:RLEV 5 DISP:EPVT:VIEW:WIND:TRAC:Y:RLEV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. SubOpCode: EPVTime:VIEW[1]:WINDow[1]: Burst view RF Envelope window EPVTime:VIEW3:WINDow[1]: Multi-slot view RF Envelope window
Couplings	When Auto Scaling is On, this value is automatically determined by the measurement result. When the user sets this value manually, Auto Scaling automatically changes to Off.
Preset	10 dBm 0.00 dBm
State Saved	Saved in instrument state.
Min	-250.0
Max	250.0
Default Unit	dBm
Initial S/W Revision	Prior to A.02.00

Ref Value (Rise & Fall view)

Allows you to set the absolute power reference.

Key Path	AMPTD Y Scale
Mode	GSM
Remote Command	:DISPlay:EPVTime:VIEW2:WINDow[1] 2:TRACe:Y[:SCALe]:RLEVel <real> :DISPlay:EPVTime:VIEW2:WINDow[1] 2:TRACe:Y[:SCALe]:RLEVel?
Example	DISP:EPVT:VIEW:WIND:TRAC:Y:RLEV 5 DISP:EPVT:VIEW:WIND:TRAC:Y:RLEV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. SubOpCode: EPVTime:VIEW2:WINDow[1]: Rising RF Envelope window EPVTime:VIEW2:WINDow2: Falling RF Envelope window
Couplings	When Auto Scaling is On, this value is automatically determined by the measurement result. When the user sets this value manually, Auto Scaling automatically changes to Off.
Preset	0.00 dBm
State Saved	Saved in instrument state.
Min	-250.0
Max	250.0
Default Unit	dBm
Initial S/W Revision	Prior to A.02.00

Attenuation

This menu controls the attenuator functions and interactions between the attenuation system components.

There are two attenuator configurations in the X-Series. One is a dual attenuator configuration consisting of a mechanical attenuator and an optional electronic attenuator. The other configuration uses a single attenuator with combined mechanical and electronic sections that controls all the attenuation functions. Different models in the X-Series come with different configurations.

See "[Dual Attenuator Configurations:](#)" on page 453

See "[Single Attenuator Configuration:](#)" on page 453

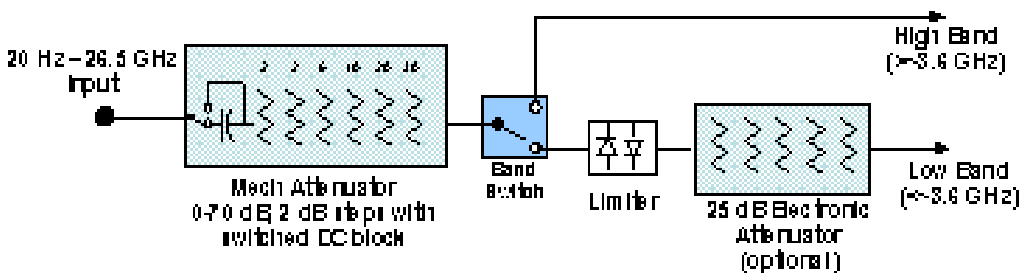
Most Attenuation settings are the same for all measurements – they do not change as you change measurements. Settings like these are called “Meas Global” and are unaffected by Meas Preset.

Key Path	AMPTD Y Scale
Scope	Meas Global
Dependencies	In measurements that support the I/Q inputs, this key is unavailable when I/Q is the selected input, and is replaced by the Range key in that case.

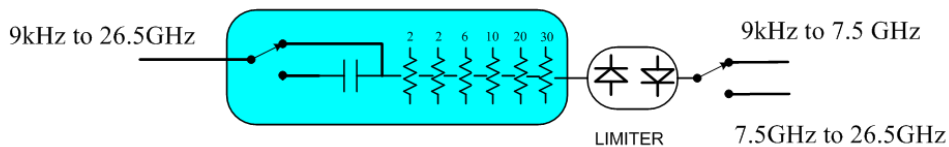
Readback Line	Contains a summary in [] brackets of the current total attenuation. See the descriptions of the , " (Mech) Atten " on page 2242, and "Enable Elec Atten" on page 2244 keys for more detail on the contributors to the total attenuation. Note that when "Pre-Adjust for Min Clip" is on, this value can change at the start of every measurement.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Dual Attenuator Configurations:

Configuration 1: Mechanical attenuator + optional electronic attenuator

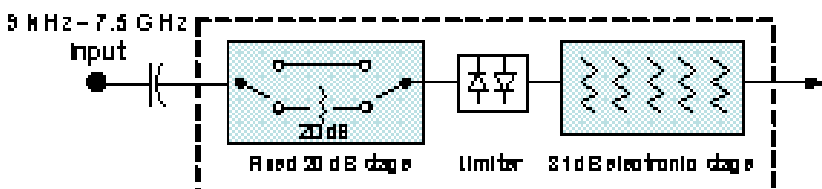


Configuration 2: Mechanical attenuator, no optional electronic attenuator

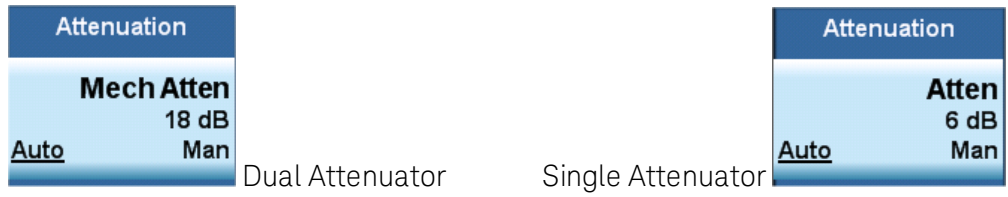


(note that Configuration 2 is not strictly speaking a dual-section attenuator, since there is no electronic section available. However, it behaves exactly like Configuration 1 without the Electronic Attenuator option EA3, therefore for the sake of this document it is grouped into the "Dual Attenuator" configuration)

Single Attenuator Configuration:



You can tell which attenuator configuration you have by pressing the Attenuation key, which (in most Modes) opens the Attenuation menu. If the first key in the Attenuation menu says Mech Atten you have the dual attenuator configuration. If the first key says Atten you have the single attenuator configuration.



In the single attenuator configuration, you control the attenuation with a single control, as the fixed stage has only two states. In the dual attenuator configuration, both stages have significant range so you are given separate control of the mechanical and electronic attenuator stages.

When you have the dual attenuator configuration, you may still have only a single attenuator, because unless option EA3 (the Electronic Attenuator option) is available, and you purchase it, you will have only the mechanical attenuator.

(Mech) Atten

This key is labeled Mech Atten in dual attenuator models and Atten in single attenuator models. In the dual attenuator configuration, this key only affects the mechanical attenuator.

This key lets you modify the attenuation applied to the RF input signal path. This value is normally auto coupled to the Ref Level, the Internal Preamp Gain, any External Gain that is entered, and the Max Mixer Level, as described in the table below.

See "[Attenuator Configurations and Auto/Man](#)" on page 455

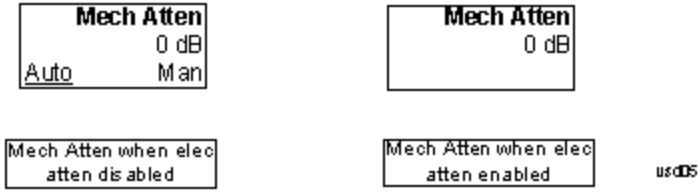
Key Path	AMPTD Y Scale, Attenuation
Remote Command	<pre>[:SENSe]:POWer[:RF]:ATTenuation <rel_ampl> [:SENSe]:POWer[:RF]:ATTenuation? [:SENSe]:POWer[:RF]:ATTenuation:AUTO OFF ON 0 1 [:SENSe]:POWer[:RF]:ATTenuation:AUTO?</pre>
Example	<p>POW:ATT 20</p> <p>Dual attenuator configuration: sets the mechanical attenuator to 20 dB</p> <p>Single attenuator mode: sets the main attenuation to 20 dB (see below for definition of "main" attenuation).</p> <p>If the attenuator was in Auto, it sets it to Manual.</p>
Dependencies	<p>Some measurements do not support the Auto setting of (Mech) Atten. In these measurements, the Auto/Man selection is not available, and the Auto/Man line on the key disappears.</p> <p>In dual attenuator configurations, when the electronic attenuator is enabled, the mechanical attenuator has no auto setting and the Auto/Man line on the key disappears. The state of Auto/Man is remembered and restored when the electronic attenuator is once again disabled. This is described in more detail in the "Enable Elec Atten" on page 2244 key description.</p> <p>See "Attenuator Configurations and Auto/Man" on page 455 for more information on the Auto/Man functionality of Attenuation.</p>
Couplings	<p>When (Mech) Atten is in Auto, it uses the following algorithm to determine a value:</p> <p>If the USB Preamp is connected to USB, use 0 dB.</p> <p>Otherwise, Atten = ReferenceLevel + PreAmpGain + ExternalGain - RefLevelOffset - MaxMixerLevel</p>

	<p>+ IF Gain.</p> <p>Limit this value to be between 6 dB and the Max value. No value below 6 dB can ever be chosen by Auto.</p> <p>The resulting value is rounded up to the largest value possible given the attenuation step setting. That is, 50.01 dB would change to 60 dB (for a 10 dB attenuation step).</p> <p>The “IF Gain” term in the equation above is either 0 dB or +10 dB, depending on the settings of FFT IF Gain, Swept IF Gain, max Ref Level and the Auto/Man setting of Mech Atten.</p> <p>In External Mixing and BBIQ, where the Attenuator is not in the signal path, the Attenuator setting changes as described above when (Mech) Atten is in Auto, but no changes are made to the actual attenuator hardware setting until the input is changed back to the RF Input.</p>
Preset	<p>The preset for Mech Attenuation is “Auto.”</p> <p>The Auto value of attenuation is: CXA, EXA, MXA and PXA: 10 dB</p>
State Saved	Saved in instrument state
Min	<p>0 dB</p> <p>The attenuation set by this key cannot be decreased below 6 dB with the knob or step keys. To get to a value below 6 dB it has to be directly entered from the keypad or via SCPI. This protects from adjusting the attenuation to a dangerously small value which can put the instrument at risk of damage to input circuitry. However, if the current mechanical attenuation is below 6 dB it can be increased with the knob and step keys, but not decreased.</p>
Max	<p>CXA N9000A–503/507: 50 dB CXA N9000A–513/526: 70dB EXA: 60 dB MXA and PXA: 70 dB</p> <p>In the single attenuator configuration, the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB.</p>
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Attenuator Configurations and Auto/Man

As described in the Attenuation key description, there are two distinct attenuator configurations available in the X-Series, the single attenuator and dual attenuator configurations. In dual attenuator configurations, we have the mechanical attenuation and the electronic attenuation, and the current total attenuation is the sum of the electronic + mechanical attenuation. In single attenuator configurations, we refer to the attenuation set using the (Mech) Atten key (or POW:ATT SCPI) as the “main” attenuation; and the attenuation that is set by the SCPI command POW:EATT as the “soft” attenuation (the POW:EATT command is honored even in the single attenuator configuration, for compatibility purposes). Then the current total attenuation is the sum of the main + soft attenuation. See the Elec Atten key description for more on “soft” attenuation.

In the dual attenuator configuration, when the electronic attenuator is enabled, there is no Auto/Man functionality for the mechanical attenuator, and the third line of the key label (the Auto/Man line) disappears:



Enable Elec Atten

Enables the Electronic Attenuator.

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear. These advantages primarily aid in remote operation and are negligible for front panel use. See ["Using the Electronic Attenuator: Pros and Cons" on page 458](#) for a detailed discussion of the pros and cons of using the electronic attenuator.

For the single attenuator configuration, for SCPI backwards compatibility, the “soft” attenuation feature replaces the dual attenuator configuration’s electronic attenuator. All the same couplings and limitations apply. See ["Attenuator Configurations and Auto/Man" on page 2244](#)

See ["More Information" on page 457](#)

Key Path	AMPTD Y Scale, Attenuation
Remote Command	[:SENSe] :POWer [:RF] :EATTenuation :STATe OFF ON 0 1 [:SENSe] :POWer [:RF] :EATTenuation :STATe ?
Example	POW:EATT:STAT ON
Dependencies	<p>This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no “electronic attenuator” there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a “soft” attenuation as described in "Attenuator Configurations and Auto/Man" on page 2244.</p> <p>The electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable above 3.6 GHz. Therefore, if the Stop Frequency of the analyzer is > 3.6 GHz then the Enable Elec Atten key will be OFF and grayed out.</p> <p>If the Internal Preamp is on, meaning it is set to Low Band or Full, the electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable. In this case the Enable Elec Atten key will be OFF and grayed out.</p> <p>If either of the above is true, if the SCPI command is sent, an error indicating that the electronic attenuator is unavailable will be sent.</p> <p>If the electronic/soft Attenuator is enabled, then the Stop Freq of the analyzer is limited to 3.6 GHz and the Internal Preamp is unavailable.</p> <p>The SCPI-only “soft” electronic attenuation for the single-attenuator configuration is not available in all measurements; in particular, it is not available in the Swept SA measurement.</p>
Couplings	Enabling and disabling the Electronic Attenuator affects the setting of the Mechanical Attenuator (in

	dual attenuator configurations). This is described in more detail below this table.
Preset	OFF for Swept SA measurement; ON for all other measurements that support the electronic attenuator
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

More Information

Mechanical Attenuator Transition Rules

When the Electronic Attenuator is enabled, the Mechanical Attenuator transitions to a state that has no Auto function. Below are the rules for transitioning the Mechanical Attenuator. NOTE that the information below ONLY applies to the dual attenuator configurations, and ONLY when the Electronic Attenuator is installed:

When the Electronic Attenuation is enabled from a disabled state:

- The Mechanical Attenuator is initialized to 10 dB (this is its optimal performance setting). You can then set it as desired with SCPI, numeric keypad, step keys, or knob, and it behaves as it normally would in manual mode
- The Auto/Man state of (Mech) Atten is saved
- The Auto/Man line on the (Mech) Atten key disappears and the auto rules are disabled
- The Electronic Attenuator is set to 10 dB less than the previous value of the Mechanical Attenuator, within the limitation that it must stay within the range of 0 to 24 dB of attenuation.

Examples in the dual attenuator configuration:

- Mech Atten at 20 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 10 dB. New total attenuation equals the value before Elec Atten enabled.
- Mech Atten at 0 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 0 dB. New total attenuation does not equal the value before Elec Atten enabled.
- Mech Atten at 40 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 24 dB. New total attenuation does not equal the value before Elec Atten enabled.

When the Electronic Attenuation is disabled from an enabled state:

- The Elec Atten key is grayed out
- The Auto/Man state of (Mech) Atten is restored
- If now in Auto, (Mech) Atten recouples
- If now in Man, (Mech) Atten is set to the value of total attenuation that existed before the Elec Atten was disabled. The resulting value is rounded up to the smallest value possible given the (Mech) Atten Step setting - (That is, 57 dB changes to 58 dB when (Mech) Atten Step is 2 dB.)

Using the Electronic Attenuator: Pros and Cons

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear.

The “finer steps” advantage of the electronic attenuator is beneficial in optimizing the alignment of the analyzer dynamic range to the signal power in the front panel as well as remote use. Thus, you can achieve improved relative signal measurement accuracy. Compared to a mechanical attenuator with 2 dB steps, the 1 dB resolution of the electronic attenuator only gives better resolution when the odd-decibel steps are used. Those odd-decibel steps are less accurately calibrated than the even-decibel steps, so one tradeoff for this superior relative accuracy is reduced absolute amplitude accuracy.

Another disadvantage of the electronic attenuator is that the spectrum analyzer loses its “Auto” setting, making operation less convenient.

Also, the relationship between the dynamic range specifications (TOI, SHI, compression and noise) and instrument performance are less well-known with the electrical attenuator. With the mechanical attenuator, TOI, SHI and compression threshold levels increase dB-for-dB with increasing attenuation, and the noise floor does as well. With the electronic attenuator, there is an excess attenuation of about 1 to 3 dB between 0 and 3.6 GHz, making the effective TOI, SHI, and so forth, less well known. Excess attenuation is the actual attenuation relative to stated attenuation. Excess attenuation is accounted for in the analyzer calibration

Elec Atten

Controls the Electronic Attenuator in dual attenuator configurations. This key does not appear in single attenuator configurations, as the control of both the mechanical and electronic stages of the single attenuator is integrated into the single Atten key.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	[:SENSe] :POWer [:RF] :EATTenuation <rel_amp1> [:SENSe] :POWer [:RF] :EATTenuation?
Notes	Electronic Attenuation’s specification is defined only when Mechanical Attenuation is 6 dB.
Dependencies	This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no “electronic attenuator” there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a “soft” attenuation as described in "Attenuator Configurations and Auto/Man" on page 2244 . The “soft” attenuation is treated as an addition to the “main” attenuation value set by the Atten softkey or the POW:ATT SCPI command and affects the total attenuation displayed on the Attenuation key and the Meas Bar. When Enable Elec Atten is off or grayed out, the Elec Atten key is grayed out.
Preset	0 dB
State Saved	Saved in instrument state
Min	0 dB
Max	Dual attenuator configuration: 24 dB Single attenuator configuration: the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if

	the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Adjust Atten for Min Clip

Sets the combination of mechanical and electronic attenuation and gain based on the current measured signal level so that clipping will be at a minimum.

This is an "immediate action" function, that is, it executes once, when the key is pressed.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	<code>[:SENSe] :POWer [:RF] :RANGe :OPTimize IMMEDIATE</code>
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Pre-Adjust for Min Clip

If this function is on, it does the adjustment described under "[Adjust Atten for Min Clip](#)" on page 2247 each time a measurement restarts. Therefore, in Continuous measurement mode, it only executes before the first measurement.

In dual attenuator models, you can set Elec+Mech Atten, in which case both attenuators participate in the autoranging, or Elec Atten Only, in which case the mechanical attenuator does not participate in the autoranging. This latter case results in less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	<code>[:SENSe] :POWer [:RF] :RANGe :OPTimize :ATTenuation OFF ELECTRical COMBined</code> <code>[:SENSe] :POWer [:RF] :RANGe :OPTimize :ATTenuation?</code>
Notes	The SCPI parameter ELECTRical sets this function to On in single attenuator models. The SCPI parameter COMBined is mapped to ELECTRical in single attenuator models; if you send COMBined, it sets the function to On and returns ELEC to a query.
Dependencies	This key only appears in Dual Attenuator models with an Electronic Attenuator installed. In instruments with Dual Attenuator model, when Enable Elec Atten is off or grayed out, the Pre-Adjust for Min Clip key is grayed out.
Preset	OFF for Swept SA measurement; ON for all other measurements that support Pre-Adjust for Min Clip

State Saved	Saved in instrument state
Range	Dual attenuator models: Off Elec Atten Only Mech + Elec Atten Single attenuator models: Off On
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Remote Command	<code>[:SENSe] :POWer [:RF] :RANGe :AUTO ON OFF 1 0</code> <code>[:SENSe] :POWer [:RF] :RANGe :AUTO?</code>
Notes	ON aliases to "Elec Atten Only" (:POW:RANG:OPT:ATT ELEC) OFF aliases to "Off" (:POW:RANG:OPT:ATT OFF) The query :POW:RANG:AUTO? returns true if :POW:RANG:OPT:ATT is not "Off"
Initial S/W Revision	Prior to A.02.00

Off

Turns Pre-Adjust for Min Clip off. This is the default setting.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip
Example	:POW:RANG:OPT:ATT OFF
Initial S/W Revision	Prior to A.02.00

Elec Atten Only

Selects only the electric attenuator to participate in auto ranging. This offers less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip
Example	:POW:RANG:OPT:ATT ELEC
Initial S/W Revision	Prior to A.02.00

Mech + Elec Atten

In dual attenuator models, this selects both attenuators participate in the autoranging.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip
Example	:POW:RANGe:OPT:ATT COMB
Initial S/W Revision	Prior to A.02.00

(Mech) Atten Step

This controls the step size used when making adjustments to the input attenuation.

This key is labeled Mech Atten Step in dual attenuator models and Atten Step in single attenuator models. In the dual attenuator configuration, this key only affects the step size of the mechanical attenuator.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	[:SENSe] :POWer [:RF] :ATTenuation :STEP [:INCRement] 10 dB 2 dB [:SENSe] :POWer [:RF] :ATTenuation :STEP [:INCRement] ?
Example	POW:ATT:STEP 2
Notes	Note this feature works like a 1-N choice from the front panel, but it takes a specific value (in dB) when used remotely. The only valid values are 2 and 10.
Dependencies	Blanked in CXA and EXA if option FSA (2 dB steps) is not present. If blanked, attempts to set it via SCPI will yield an error.
Couplings	When the attenuation step size changes, the current mechanical attenuation value is adjusted (if necessary) to be quantized to the new step size. That is, if step is set to 10 dB, mech atten is increased if necessary so it is a multiple of 10 dB
Preset	PXA and MXA: 2 dB EXA and CXA: 10 dB (2 dB with option FSA)
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Scale/Div

Allows you to enter a numeric value to change the vertical display sensitivity by Burst, Multi-slot and Rise & Fall views.

Key Path	AMPTD Y Scale
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Scale/Div (Burst view and Multi-slot view)

Allows you to enter a numeric value to change the vertical display sensitivity.

Key Path	AMPTD Y Scale
Mode	GSM
Remote Command	:DISPlay:EPVTime:VIEW[1] 3:WINDow[1]:TRACe:Y[:SCALe]:PDIVision <rel_ ampl> :DISPlay:EPVTime:VIEW[1] 3:WINDow[1]:TRACe:Y[:SCALe]:PDIVision?
Example	DISP:EPVT:VIEW:WIND:TRAC:Y:PDIV 10 DISP:EPVT:VIEW:WIND:TRAC:Y:PDIV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. Subopcode: VIEW[1]:WINDow[1]: Burst view RF Envelope window VIEW3:WINDow[1]: Multi-slot view RF Envelope window
Couplings	When Auto Scaling is On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scaling automatically changes to Off.
Preset	10.00
State Saved	Saved in instrument state.
Min	0.1
Max	20.0
Initial S/W Revision	Prior to A.02.00

Scale/Div (Rise & Fall view)

Allows you to enter a numeric value to change the vertical display sensitivity.

Key Path	AMPTD Y Scale
Mode	GSM
Remote Command	:DISPlay:EPVTime:VIEW2:WINDow[1] 2:TRACe:Y[:SCALe]:PDIVision <rel_ ampl> :DISPlay:EPVTime:VIEW2:WINDow[1] 2:TRACe:Y[:SCALe]:PDIVision?
Example	DISP:EPVT:VIEW:WIND:TRAC:Y:PDIV 10 DISP:EPVT:VIEW:WIND:TRAC:Y:PDIV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. Subopcode: VIEW2:WINDow[1]: Rising RF Envelope window VIEW2:WINDow2: Falling RF Envelope window
Couplings	When Auto Scaling is On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scaling automatically changes to Off.
Preset	10.00

State Saved	Saved in instrument state.
Min	0.1
Max	20.0
Initial S/W Revision	Prior to A.02.00

Presel Center

When this key is pressed, the centering of the preselector filter is adjusted to optimize the amplitude accuracy at the frequency of the selected marker. If the selected marker is not on when Presel Center is pressed, the analyzer will turn on the selected marker, perform a peak search, and then perform centering on the marker's center frequency. If the selected marker is already on and between the start and stop frequencies of the analyzer, the analyzer performs the preselector calibration on that marker's frequency. If the selected marker is already on, but outside the frequency range between Start Freq and Stop Freq, the analyzer will first perform a peak search, and then perform centering on the marker's center frequency.

The value displayed on the Presel Adjust key will change to reflect the new preselector tuning (see Presel Adjust).

A number of considerations should be observed to ensure proper operation. See ["Proper Preselector Operation" on page 464](#).

Key Path	AMPTD Y Scale
Remote Command	[:SENSe] :POWer [:RF] :PCENter
Example	POW:PCEN
Notes	Note that the rules outlined above under the key description apply for the remote command as well as the key. The result of the command is dependent on marker position, and so forth. Any message shown by the key press is also shown in response to the remote command.
Dependencies	<ul style="list-style-type: none"> • Grayed out if the microwave preselector is off.) • If the selected marker's frequency is below Band 1, advisory message 0.5001 is generated and no action is taken. • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0. • Grayed out in the Spectrogram View.
Couplings	<p>The active marker position determines where the centering will be attempted.</p> <p>If the analyzer is in a measurement such as averaging when centering is initiated, the act of centering the preselector will restart averaging but the first average trace will not be taken until the centering is completed.</p>
Status Bits/OPC dependencies	<p>When centering the preselector, *OPC will not return true until the process is complete and a subsequent measurement has completed, nor will results be returned to a READ or MEASure command.</p> <p>The Measuring bit should remain set while this command is operating and should not go false until the subsequent sweep/measurement has completed.</p>

Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Proper Preselector Operation

A number of considerations should be observed to ensure proper operation:

1. If the selected marker is off, the analyzer will turn on a marker, perform a peak search, and adjust the preselector using the selected marker's frequency. It uses the "highest peak" peak search method unqualified by threshold or excursion, so that there is no chance of a 'no peak found' error. It continues with that peak, even if it is the peak of just noise. Therefore, for this operation to work properly, there should be a signal on screen in a preselected range for the peak search to find.
2. If the selected marker is already on, the analyzer will attempt the centering at that marker's frequency. There is no preselector for signals below about 3.6 GHz, therefore if the marker is on a signal below 3.6 GHz, no centering will be attempted and an advisory message generated
3. In some models, the preselector can be bypassed. If it is bypassed, no centering will be attempted in that range and a message will be generated.

Preselector Adjust

Allows you to manually adjust the preselector filter frequency to optimize its response to the signal of interest. This function is only available when **"Presel Center"** on page 2250 is available.

For general purpose signal analysis, using Presel Center is recommended. Centering the filter minimizes the impact of long-term preselector drift. Presel Adjust can be used instead to manually optimize the preselector. One application of manual optimization would be to peak the preselector response, which both optimizes the signal-to-noise ratio and minimizes amplitude variations due to small (short-term) preselector drifting.

Key Path	AMPTD Y Scale
Scope	Meas Global
Remote Command	<code>[:SENSe] :POWer [:RF] :PADJust <freq></code> <code>[:SENSe] :POWer [:RF] :PADJust?</code>
Example	POW:PADJ 100KHz POW:PADJ?
Notes	The value on the key reads out to 0.1 MHz resolution.
Dependencies	<ul style="list-style-type: none"> • Grayed out if microwave preselector is off.) • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0. • Grayed out in the Spectrogram View.

Preset	0 MHz
State Saved	The Presel Adjust value set by Presel Center, or by manually adjusting Presel Adjust, is not saved in instrument state, and does not survive a Preset or power cycle.
Min	-500 MHz
Max	500 MHz
Default Unit	Hz
Backwards Compatibility SCPI	[:SENSe]:POWer[:RF]:MW:PADJust [:SENSe]:POWer[:RF]:MMW:PADJust PSA had multiple preselectors, but the X-Series has only one. These commands simply alias to [:SENSe]:POWer[:RF]:PADJust
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Remote Command	[:SENSe]:POWer[:RF]:PADJust:PRESelector MWAVE MMWave EXTERNAL [:SENSe]:POWer[:RF]:PADJust:PRESelector?
Notes	PSA had multiple preselectors, and you could select which preselector to adjust. Since the X-Series has only one mm/uW preselector, the preselector selection softkey is no longer available. However, to provide backward compatibility, we accept the legacy remote commands. The command form has no effect, the query always returns MWAVE
Initial S/W Revision	Prior to A.02.00

μW Path Control

The μW Path Control functions include the μW Preselector Bypass (Option MPB) and Low Noise Path (Option LNP) controls in the High Band path circuits.

When the μW Preselector is bypassed, the user has better flatness, but will be subject to spurs from out of band interfering signals. When the Low Noise Path is enabled, the analyzer automatically switches around certain circuitry in the high frequency bands which can contribute to noise, when it is appropriate based on other analyzer settings.

For most applications, the preset state is Standard Path, which gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear out in the hardware switches. For applications that utilize the wideband IF paths, the preset state is the μW Preselector Bypass path, if option MPB is present. This is because, when using a wideband IF such as the 140 MHz IF, the μW Preselector's bandwidth can be narrower than the available IF bandwidth, causing degraded amplitude flatness and phase linearity, so it is desirable to bypass the preselector in the default case.

Users may choose Low Noise Path Enable. It gives a lower noise floor, especially in the 21–26.5 GHz region, though without improving many measures of dynamic range, and without giving the best possible noise floor. The preamp, if purchased and used, gives better noise floor than does the Low Noise Path,

however its compression threshold and third-order intercept are much poorer than that of the non-preamp Low Noise Path. There are some applications, typically for signals around -30 dBm, for which the third-order dynamic range of the standard path is good enough, but the noise floor is not low enough even with 0 dB input attenuation. When the third-order dynamic range of the preamp path is too little and the noise floor of the standard path is too high, the Low Noise Path can provide the best dynamic range.

Key Path	AMPTD Y Scale
Mode	SA, BASIC, PNOISE, VSA , LTE, LTETDD
Scope	Meas Global
Remote Command	[:SENSe] :POWer [:RF] :MW:PATH STD LNPath MPBypass FULL [:SENSe] :POWer [:RF] :MW:PATH?
Example	:POW:MW:PATH LNP Enables the Low Noise path
Notes	If a Presel Center is performed, the analyzer will momentarily switch to the Standard Path, regardless of the setting of μ W Path Control The DC Block will always be switched in when the low noise path is switched in, to protect succeeding circuitry from DC. Note that this does not mean “when the low noise path is enabled” but when, based on the Low Noise Path rules, the path is actually switched in. This can happen when the selection is Low Noise Path Enable . In the case where the DC Block is switched in the analyzer is now AC coupled. However, if the user has selected DC coupling, the UI will still behave as though it were DC coupled, including all annunciation, warnings, status bits, and responses to SCPI queries. This is because, based on other settings, the analyzer could switch out the low noise path at any time and hence go back to being DC coupled. Alignment switching ignores the settings in this menu, and restores them when finished.
Dependencies	Unavailable in BBIQ and External Mixing
Preset	All modes other than IQ Analyzer mode and VXA: STD IQ Analyzer, VXA and WLAN mode: MPB option present and licensed: MPB MPB option not present and licensed: STD
State Saved	Save in instrument state
Readback	Value selected in the submenu
Initial S/W Revision	A.04.00
Modified at S/W Revision	A.10.00

Standard Path

This path gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear in the hardware switches, particularly in remote test scenarios where both low band and high band setups will follow in rapid succession.

In this path, the bypass of the low band/high band switch and microwave preamp is never activated, which can cause some noise degradation but preserves the life of the bypass switch.

Key Path	AMPTD Y Scale, μ W Path Control
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Example	:POW:MW:PATH STD
Readback Text	Standard Path
Initial S/W Revision	A.04.00

μW Preselector Bypass

This key toggles the preselector bypass switch for band 1 and higher. When the microwave preselect is on, the signal path is preselected. When the microwave preselector is off, the signal path is not preselected. The preselected path is the normal path for the analyzer.

The preselector is a tunable bandpass filter which prevents signals away from the frequency of interest from combining in the mixer to generate in-band spurious signals (images). The consequences of using a preselector filter are its limited bandwidth, the amplitude and phase ripple in its passband, and any amplitude and phase instability due to center frequency drift.

Option MPB or pre-selector bypass provides an unpreselected input mixer path for certain X-Series signal analyzers with frequency ranges above 3.6 GHz. This signal path allows a wider bandwidth and less amplitude variability, which is an advantage when doing modulation analysis and broadband signal analysis. The disadvantage is that, without the preselector, image signals will be displayed. Another disadvantage of bypassing the preselector is increased LO emission levels at the front panel input port.

Image responses are separated from the real signal by twice the 1st IF. For IF Paths of 10 MHz and 25 MHz, the 1st IF is 322.5 MHz, so the image response and the real signal will be separated by 645 MHz. The 1st IF will be different for other IF Path settings. When viewing a real signal and its corresponding image response in internal mixing, the image response will be to the left of the real signal.

Also, the image response and the real signal typically have the same amplitude and exhibit the same shape factor.

However, if Option FS1, Fast Sweep Capability, is enabled, the image response in the Swept SA measurement will appear lower in amplitude and have a much wider shape factor compared to the real signal.

Key Path	AMPTD Y Scale, μW Path Control
Example	:POW:MW:PATH MPB
Dependencies	Key is blanked if current mode does not support it. Key is grayed out if mode supports it but current measurement does not support it. Key is blank unless Option MPB is present and licensed. If SCPI command sent when MPB not present, error -241, "Hardware missing; Option not installed" is generated.
Readback Text	μW Preselector Bypass
Initial S/W Revision	A.04.00

Remote Command	[:SENSe] :POWer [:RF] :MW:PRESelector [:STATe] ON OFF 0 1 [:SENSe] :POWer [:RF] :MW:PRESelector [:STATe] ?
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Example	:POW:MW:PRES OFF Bypasses the microwave preselector
Notes	The ON parameter sets the STD path (:POW:MW:PATH STD) The OFF parameter sets path MPB (:POW:MW:PATH MPB)
Preset	ON

Internal Preamp

Accesses a menu of keys that control the internal preamps. Turning on the preamp gives a better noise figure, but a poorer TOI to noise floor dynamic range. You can optimize this setting for your particular measurement.

The instrument takes the preamp gain into account as it sweeps. If you sweep outside of the range of the preamp the instrument will also account for that. The displayed result will always reflect the correct gain.

For some measurements, when the preamp is on and any part of the displayed frequency range is below the lowest frequency for which the preamp has specifications, a warning condition message appears in the status line. For example, for a preamp with a 9 kHz lowest specified frequency: "Preamp: Accy unspec'd below 9 kHz".

Key Path	AMPTD Y Scale
Scope	Meas Global
Remote Command	[:SENSe] :POWer [:RF] :GAIN [:STATe] OFF ON 0 1 [:SENSe] :POWer [:RF] :GAIN [:STATe] ?
Dependencies	Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the key is not shown. The preamp is not available when the electronic/soft attenuator is enabled.
Couplings	The act of connecting the U7227A USB Preamplifier to one of the analyzer's USB ports will cause the Internal Preamp to be switched on. When this happens an informational message will be generated: "Internal Preamp turned on for optimal operation with USB Preamp." Note that if the Internal Preamp was already on, there will be no change to the setting, but if it was Off it will be switched On, to Full Range. Note that this same action occurs when the SA mode is selected while the USB Preamp is connected to one of the analyzer's USB ports, if it is the first time that the SA mode has run since powerup, or if the last time the SA mode was running the USB Preamp was NOT connected. Subsequently disconnecting the USB Preamp from USB does not change the Internal Preamp setting nor restore the previous setting.
Preset	OFF
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.14.00

Key Path	AMPTD Y Scale, Internal Preamp
Scope	Meas Global
Remote Command	<code>[:SENSe] :POWer [:RF] :GAIN:BAND LOW FULL</code> <code>[:SENSe] :POWer [:RF] :GAIN:BAND?</code>
Dependencies	Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the key is not shown. If a POW:GAIN:BAND FULL command is sent when a low band preamp is available, the preamp band parameter is to LOW instead of FULL, and an "Option not installed" message is generated.
Preset	LOW
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00

Off

Turns the internal preamp off

Key Path	AMPTD Y Scale, Internal Preamp
Example	<code>:POW:GAIN OFF</code>
Readback	Off
Initial S/W Revision	Prior to A.02.00

Low Band

Sets the internal preamp to use only the low band.

The frequency range of the installed (optional) low-band preamp is displayed in square brackets on the Low Band key label.

Key Path	AMPTD Y Scale, Internal Preamp
Example	<code>:POW:GAIN ON</code> <code>:POW:GAIN:BAND LOW</code>
Readback	Low Band
Initial S/W Revision	Prior to A.02.00

Full Range

Sets the internal preamp to use its full range. The low band (0–3.6 GHz or 0–3GHz, depending on the model) is supplied by the low band preamp and the frequencies above low band are supplied by the high band preamp.

The frequency range of the installed (optional) preamp is displayed in square brackets on the Full Range key label. If the high band option is not installed the Full Range key does not appear.

Key Path	AMPTD Y Scale, Internal Preamp
Example	:POW:GAIN ON :POW:GAIN:BAND FULL
Readback	Full Range
Initial S/W Revision	Prior to A.02.00

Ref Position

Allows you to set the display reference position to Top, Center, or Bottom by Burst, Multi-slot and Rise & Fall views.

Key Path	AMPTD Y Scale
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Ref Position (Burst view and Multi-slot view)

Allows you to set the display reference position to Top, Center, or Bottom.

Key Path	AMPTD Y Scale
Mode	GSM
Remote Command	:DISPlay:EPVTime:VIEW[1] 3:WINDow[1]:TRACe:Y[:SCALE]:RPOSition TOP CENTer BOTTom :DISPlay:EPVTime:VIEW[1] 3:WINDow[1]:TRACe:Y[:SCALE]:RPOSition?
Example	DISP:EPVT:VIEW:WIND:TRAC:Y:RPOS CENT DISP:EPVT:VIEW:WIND:TRAC:Y:RPOS?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. Subopcode: VIEW[1]:WINDow[1]: Burst view RF Envelope window VIEW3:WINDow[1]: Multi-slot view RF Envelope window
Preset	TOP
State Saved	Saved in instrument state.
Range	Top Ctr Bot
Initial S/W Revision	Prior to A.02.00

Ref Position (Rise & Fall view)

Allows you to set the display reference position to Top, Center, or Bottom.

Key Path	AMPTD Y Scale
Mode	GSM
Remote Command	:DISPlay:EPVTime:VIEW2:WINDow[1] 2:TRACe:Y[:SCALe]:RPOSition TOP CENTer BOTTom :DISPlay:EPVTime:VIEW2:WINDow[1] 2:TRACe:Y[:SCALe]:RPOSition?
Example	DISP:EPVT:VIEW:WIND:TRAC:Y:RPOS CENT DISP:EPVT:VIEW:WIND:TRAC:Y:RPOS?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. Subopcode: VIEW2:WINDow[1]: Rising RF Envelope window VIEW2:WINDow2: Falling RF Envelope window
Preset	TOP
State Saved	Saved in instrument state.
Range	Top Ctr Bot
Initial S/W Revision	Prior to A.02.00

Auto Scaling

Allows you to toggle Y axis auto scaling function between On and Off by Burst, Multi-slot and Rise & Fall views.

Key Path	AMPTD Y Scale
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Auto Scaling (Burst view and Multi-slot view)

Allows you to toggle Y axis auto scaling function between On and Off.

Key Path	AMPTD Y Scale
Mode	GSM
Remote Command	:DISPlay:EPVTime:VIEW[1] 3:WINDow[1]:TRACe:Y[:SCALe]:COUPlE 0 1 OFF ON :DISPlay:EPVTime:VIEW[1] 3:WINDow[1]:TRACe:Y[:SCALe]:COUPlE?
Example	DISP:EPVT:VIEW:WIND:TRAC:Y:COUP 0 DISP:EPVT:VIEW:WIND:TRAC:Y:COUP?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. Subopcode: VIEW[1]:WINDow[1]: Burst view RF Envelope window VIEW3:WINDow[1]: Multi-slot view RF Envelope window

Couplings	When Auto Scaling is On, upon pressing the Restart front-panel key, this function automatically determines the scale per division and reference values based on the measurement results. When you set a value either "Ref Value" on page 451 or "Ref Position" on page 470 manually, this parameter is set to 'Off' automatically.
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

Auto Scaling (Rise & Fall view)

Allows you to toggle Y axis auto scaling function between On and Off.

Key Path	AMPTD Y Scale
Mode	GSM
Remote Command	:DISPlay:EPVTime:VIEW2:WINDow[1] 2:TRACe:Y[:SCALe]:COUPlE 0 1 OFF ON :DISPlay:EPVTime:VIEW2:WINDow[1] 2:TRACe:Y[:SCALe]:COUPlE?
Example	DISP:EPVT:VIEW:WIND:TRAC:Y:COUP 0 DISP:EPVT:VIEW:WIND:TRAC:Y:COUP?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. Subopcode: VIEW2:WINDow[1]: Rising RF Envelope window VIEW2:WINDow2: Falling RF Envelope window
Couplings	When Auto Scaling is On, upon pressing the Restart front-panel key, this function automatically determines the scale per division and reference values based on the measurement results. When you set a value either "Ref Value" on page 451 or "Ref Position" on page 470 manually, this parameter is set to 'Off' automatically.
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

Auto Couple

The Auto Couple feature provides a quick and convenient way to automatically couple multiple instrument settings. This helps ensure accurate measurements and optimum dynamic range. When the Auto Couple feature is activated, either from the front panel or remotely, all parameters of the current measurement that have an Auto/Manual mode are set to Auto mode and all measurement settings dependent on (or coupled to) the Auto/Man parameters are automatically adjusted for optimal performance.

However, the Auto Couple key actions are confined to the current measurement only. It does not affect other measurements in the mode, and it does not affect markers, marker functions, or trace or display attributes.

See "[More Information](#)" on page 473

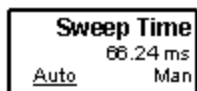
Key Path	Front-panel key
Remote Command	:COUPle ALL NONE
Example	:COUP ALL
Notes	:COUPle ALL puts all Auto/Man parameters in Auto mode (equivalent to pressing the Auto Couple key). :COUPLE NONE puts all Auto/Man parameters in manual mode. It decouples all the coupled instrument parameters and is not recommended for making measurements.
Initial S/W Revision	Prior to A.02.00

More Information

There are two types of functions that have Auto/Manual modes.

Auto/Man Active Function keys

An Auto/Man toggle key controls the binary state associated with an instrument parameter by toggling between Auto (where the parameter is automatically coupled to the other parameters it is dependent upon) and Man (where the parameter is controlled independent of the other parameters), as well as making the parameter the active function. The current mode is indicated on the softkey with either Auto or Man underlined as illustrated below.

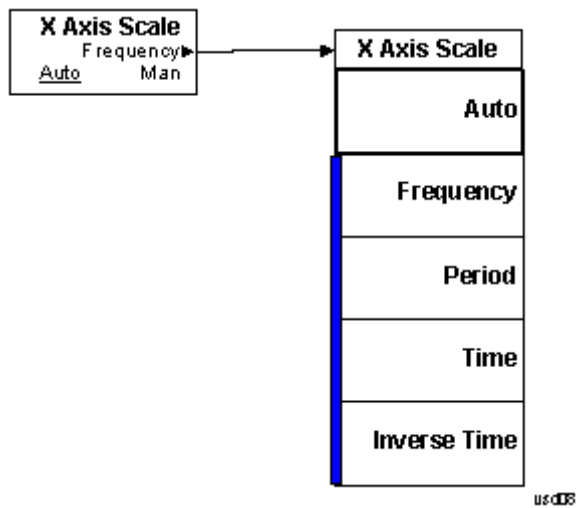


uscIT

Auto/Man 1-of-N keys

An Auto/Man 1-of-N key allows you to manually pick from a list of parameter values, or place the function in Auto, in which case the value is automatically selected (and indicated) as shown below. If in Auto, Auto is underlined on the calling key. If in manual operation, manual is indicated on the calling key. But the calling key does not actually toggle the function, it simply opens the menu.

8 EDGE Power vs Time Measurement
Auto Couple



BW

Accesses a menu that enables you to control the information bandwidth functions of the instrument. You can also select the filter type for the measurement.

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Info BW

Sets the information bandwidth. This is the bandwidth used for the power measurement. The bandwidth is ideally wide enough to pass all the power of the bursted signal, while not being so wide that it passes noise that reduces the dynamic range and the accuracy of low level measurements.

This is an advanced control that normally does not need to be changed. Setting this to a value other than the factory default may cause invalid measurement results.

Key Path	BW
Mode	GSM
Remote Command	<code>[:SENSe] :EPVTime :BANDwidth [:RESolution] <bandwidth></code> <code>[:SENSe] :EPVTime :BANDwidth [:RESolution] ?</code>
Example	EPVT:BAND 1000 EPVT:BAND?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Preset	510 kHz
State Saved	Saved in instrument state.
Min	1 kHz
Max	Hardware Dependent: No Option = 10 MHz WB (25 MHz or wider) = 25MHz
Backwards Compatibility SCPI	<code>[:SENSe] :EPVTime :BWIDth [:RESolution]</code>
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

Filter Type

Allows you to select the type of resolution bandwidth filter. Besides the familiar Gaussian filter shape, there are certain special filter types, such as Flat Top, that are desirable under certain conditions.

This is an advanced control that normally does not need to be changed. Setting this to a value other than the factory default may cause invalid measurement results.

Key Path	BW
Mode	GSM
Remote Command	<code>[:SENSe] :EPVTime :BANDwidth [:RESolution] :TYPE FLATtop GAUSSian</code> <code>[:SENSe] :EPVTime :BANDwidth [:RESolution] :TYPE?</code>
Example	EPVT:BAND:TYPE GAUS EPVT:BAND:TYPE?
Notes	FLATtop – a filter with a flat amplitude response, which provides the best amplitude accuracy. GAUSSian – a filter with Gaussian characteristics, which provides the best pulse response. Selects the type of filter, either Gaussian or Flat (Flattop). Gaussian is the best choice when looking at the overall burst or the rising and falling edges, as it has excellent pulse response. Even though they have a 5.5% wider noise bandwidth for the same –3 dB bandwidth as a flat top filter, that is only 0.23 dB more noise, and their step response is much cleaner and free of overshooting and ringing. If you want to precisely examine just the useful part of the burst, choose Flat. This is an advanced control that normally does not need to be changed. Setting this to a value other than the factory default, may cause invalid measurement results.
Preset	GAUSSian
State Saved	Saved in instrument state.
Range	Gaussian Flattop
Backwards Compatibility SCPI	<code>[:SENSe] :EPVTime :BWIDth [:RESolution] :TYPE</code>
Initial S/W Revision	Prior to A.02.00

Cont (Continuous Measurement/Sweep)

Sets the analyzer for Continuous measurement operation. The single/continuous state is Meas Global so the setting will affect all measurements. If you are Paused, pressing Cont does a Resume.

Key Path	Front-panel key
Remote Command	:INITiate:CONTinuous OFF ON 0 1 :INITiate:CONTinuous?
Example	:INIT:CONT 0 puts analyzer in Single measurement operation. :INIT:CONT 1 puts analyzer in Continuous measurement operation
Preset	ON (Note that SYST:PRESet sets INIT:CONT to ON but *RST sets INIT:CONT to OFF)
State Saved	Saved in instrument state
Backwards Compatibility Notes	For Spectrum Analysis mode in ESA and PSA, there is no Cont hardkey, instead there is a Sweep Single/Cont key. In these analyzers, switching the Sweep Single/Cont key from Single to Cont restarts averages (displayed average count reset to 1), but does not restart Max Hold and Min Hold. The X-Series has Single and Cont keys in place of the SweepSingleCont key. In the X-Series, if in single measurement, the Cont key (and INIT:CONT ON) switches to continuous measurement, but never restarts a measurement and never resets a sweep.
Initial S/W Revision	Prior to A.02.00

In Swept SA Measurement (Spectrum Analysis Mode):

The analyzer takes repetitive sweeps, averages, measurements, etc., when in Continuous mode. When the average count reaches the Average/Hold Number the count stops incrementing, but the analyzer keeps sweeping. See the Trace/Detector section for the averaging formula used both before and after the Average/Hold Number is reached. The trigger condition must be met prior to each sweep. The type of trace processing for multiple sweeps, is set under the Trace/Detector key, with choices of Trace Average, Max Hold, or Min Hold.

In Other Measurements/Modes:

With Avg/Hold Num (in the Meas Setup menu) set to Off or set to On with a value of 1, a sweep is taken after the trigger condition is met; and the analyzer continues to take new sweeps after the current sweep has completed and the trigger condition is again met. However, with Avg/Hold Num set to On with a value >1, multiple sweeps (data acquisitions) are taken for the measurement. The trigger condition must be met prior to each sweep. The sweep is not stopped when the average count k equals the number N set for Avg/Hold Num is reached, but the number k stops incrementing. A measurement average usually applies to all traces, marker results, and numeric results. But sometimes it only applies to the numeric results.

If the analyzer is in Single measurement, pressing the Cont key does not change k and does not cause the sweep to be reset; the only action is to put the analyzer into Continuous measurement operation.

If it is already in continuous sweep:

the INIT:CONT 1 command has no effect

8 EDGE Power vs Time Measurement Cont (Continuous Measurement/Sweep)

the INIT:CONT 0 command will place the analyzer in Single Sweep but will have no effect on the current sequence until $k = N$, at which point the current sequence will stop and the instrument will go to the idle state.

File

See "File" on page 320

FREQ/Channel

Accesses a menu of keys that allows you to control the Frequency parameters of the instrument.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

ARFCN

Sets the analyzer to a frequency that corresponds to the ARFCN (Absolute RF Channel Number). Used to enter the channel to be measured for the selected band. If the Center Freq value entered does not exactly correlate with an ARFCN, the softkey label changes to display the closest ARFCN to the selected frequency, along with a > or < symbol indicating whether the frequency is above or below that ARFCN.

Key Path	FREQ Channel
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :ARFCn RFCHannel <integer></code> <code>[:SENSe] :CHANnel :ARFCn RFCHannel ?</code>
Example	CHAN:ARFC 3 CHAN:ARFC?
Notes	This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not available (blank).
Couplings	Coupled with Center Frequency . Setting ARFCN sets Center Freq to the value corresponding to that ARFCN. BMT Freq choice changes this parameter.
Preset	1
State Saved	Saved in instrument state.
Range	Different for each BAND as follows: E-GSM: 0 to 124, and 975 to 1023 P-GSM: 1 to 124 R-GSM: 0 to 124(MS), and 955 to 1023(BTS) DCS1800: 512 to 885 PCS1900: 512 to 810 GSM450: 259 to 293 GSM480: 306 to 340 GSM700: 438 to 516 GSM850: 128 to 251 T-GSM 810: 350 to 425

Min	Different for each BAND as follows: E-GSM: 0(MS), and 975(BTS) P-GSM: 1 R-GSM: 0(MS), and 955(BTS) DCS1800: 512 PCS1900: 512 GSM450: 259 GSM480: 306 GSM700: 438 GSM850: 128 T-GSM 810: 350
Max	Different for each BAND as follows: E-GSM: 124(MS), and 1023(BTS) P-GSM: 124 R-GSM: 124(MS), and 1023(BTS) DCS1800: 885 PCS1900: 810 GSM450: 293 GSM480: 340 GSM700: 516 GSM850: 251 T-GSM 810: 425
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.07.00

Center Freq

Sets the center frequency to be measured for the selected band. It is coupled with ARFCN – setting Center Freq sets ARFCN to the channel corresponding to that frequency.

For more information, see the section "[Center Freq](#)" on page 2269.

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

Time Slot

This functionality is the same as that of the corresponding key in the Demod menu. See "[Time Slot](#)" on page 2288 for details.

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

Burst Type

This functionality is the same as that of the corresponding key in the Demod menu. See ["Burst Type" on page 2289](#) for details.

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

TSC (Std)

This functionality is the same as that of the corresponding key in the Demod menu. See ["TSC \(Std\)" on page 2291](#) for details.

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

Center Freq

Sets the frequency that corresponds to the horizontal center of the graticule (when frequency Scale Type is set to linear). While adjusting the Center Frequency the Span is held constant, which means that both Start Frequency and Stop Frequency will change.

Pressing Center Freq also sets the frequency entry mode to Center/Span. In Center/Span mode, the center frequency and span values are displayed below the graticule, and the default active function in the Frequency menu is Center Freq.

The center frequency setting is the same for all measurements within a mode, that is, it is Meas Global. Some modes are also able to share a Mode Global center frequency value. If this is the case, the Mode will have a Global Settings key in its Mode Setup menu.

The Center Freq function sets (and queries) the Center Frequency for the currently selected input. If your analyzer has multiple inputs, and you select another input, the Center Freq changes to the value for that input. SCPI commands are available to directly set the Center Freq for a specific input.

Center Freq is remembered as you go from input to input. Thus you can set a Center Freq of 10 GHz with the RF Input selected, change to BBIQ and set a Center Freq of 20 MHz, then switch to External Mixing and set a Center Freq of 60 GHz, and when you go back to the RF Input the Center Freq will go back to 10 GHz; back to BBIQ and it is 20 MHz; back to External Mixing and it is 60 GHz.

See ["RF Center Freq" on page 485](#)

See [Ext Mix Center Freq](#)

See ["I/Q Center Freq" on page 487](#)

See ["Center Frequency Presets" on page 484](#)

Key Path	FREQ Channel
Scope	Meas Global
Remote Command	<code>[:SENSe] :FREQuency:CENTer <freq></code> <code>[:SENSe] :FREQuency:CENTer?</code>
Example	FREQ:CENT 50 MHz FREQ:CENT UP changes the center frequency to 150 MHz if you use FREQ:CENT:STEP 100 MHz to set the center frequency step size to 100 MHz FREQ:CENT?
Notes	This command sets either the RF or I/Q Center Frequency depending on the selected input. For RF input it is equivalent to FREQ:RF:CENT For I/Q input it is equivalent to FREQ:IQ:CENT Preset and Max values are dependent on Hardware Options (5xx) If no terminator (e.g. MHz) is sent the terminator Hz is used. If a terminator with unit other than Frequency is used, an invalid suffix error message is generated.
Dependencies	The Center Frequency can be limited by Start or Stop Freq limits, if the Span is so large that Start or Stop reach their limit.
Couplings	When operating in "swept span", any value of the Center Frequency or Span that is within the frequency range of the analyzer is allowed when the value is being set through the front panel numeric key pad or the SCPI command. The other parameter is forced to a different value if needed, to keep the Start and the Stop Frequencies within the analyzer's frequency range
Preset	Depends on instrument maximum frequency, mode, measurement, and selected input. See " Center Frequency Presets " on page 484 and " RF Center Freq " on page 485 and Ext Mix Center Freq and " I/Q Center Freq " on page 487.
State Saved	Saved in instrument state
Min	Depends on instrument maximum frequency, mode, measurement, and selected input.. See " Center Frequency Presets " on page 484 and " RF Center Freq " on page 485 and " I/Q Center Freq " on page 487.
Max	Depends on instrument maximum frequency, mode, measurement, and selected input.. See " Center Frequency Presets " on page 484 and " RF Center Freq " on page 485 and " I/Q Center Freq " on page 487.
Default Unit	Hz
Status Bits/OPC Dependencies	Non-overlapped
Initial S/W Revision	Prior to A.02.00

Center Frequency Presets

The following table provides the Center Frequency Presets for the Spectrum Analyzer mode, and the Max Freq, for the various frequency options:

Freq Option	CF after Mode Preset	Stop Freq after Mode Preset	Max Freq (can't tune above)
503 (all but N9000A)	1.805 GHz	3.6 GHz	3.7 GHz
503 (N9000A)	1.505 GHz	3.0 GHz	3.08 GHz
507 (all but N9000A)	3.505 GHz	7.0 GHz	7.1 GHz
507 (N9000A)	3.755 GHz	7.5 GHz	7.58 GHz
508 (all but N9038A)	1.805 GHz	3.6 GHz	8.5 GHz
508 (N9038A)	4.205 GHz	8.4 GHz	8.5 GHz
513	6.805 GHz	13.6 GHz	13.8 GHz
526 (all but N9000A and N9038A)	13.255 GHz	26.5 GHz	27.0 GHz
526 (N9000A)	13.255 GHz	26.5 GHz	26.55 GHz
526 (N9038A)	1.805 GHz	3.6 GHz	27.0 GHz
532	16.005 GHz	32.0 GHz	32.5 GHz
543	21.505 GHz	43.0 GHz	TBD
544	22.005 GHz	44.0 GHz	44.5 GHz
550	25.005 GHz	50.0 GHz	51 GHz

Input 2:

Model	CF after Mode Preset	Stop Freq after Mode Preset	Max Freq (can't tune above)
N9000A opt C75	0.7505GHz	1.5 GHz	1.58 GHz
N9038A	505 MHz	1 GHz	1.000025 GHz

Tracking Generator Frequency Limits (N9000A only):

Tracking Generator Option	Min Freq (clips to this freq when turn TG on and can't tune below while TG on)	If above this Freq, Stop Freq clipped to this Freq when TG turned on	Max Freq (can't tune above) while TG on
T03	9 kHz	3.0 GHz	3.08 GHz
T06	9 kHz	6.0 GHz	6.05 GHz

The following table shows the Center Frequency Presets for modes other than Spectrum Analyzer:

Mode	CF Preset for RF
WCDMA	1 GHz
WIMAXOFDMA,	1 GHz
BASIC	1 GHz
ADEMOD	1 GHz
VSA	1 GHz
TDSCDMA	1 GHz
PNOISE	1 GHz
LTE	1 GHz
LTETDD	1 GHz
MSR	1 GHz
GSM	935.2 MHz
NFIGURE	1.505 GHz

RF Center Freq

SCPI command for specifying the RF Center Frequency. This command will set the Center Frequency to be used when the RF input is selected, even if the RF input is not the input that is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

Scope	Meas Global
Remote Command	<code>[:SENSe] :FREQuency:RF:CENTer <freq></code> <code>[:SENSe] :FREQuency:RF:CENTer?</code>
Example	FREQ:RF:CENT 30 MHz
Notes	This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode.
Dependencies	If the electronic/soft attenuator is enabled, any attempt to set Center Frequency such that the Stop

	Frequency would be >3.6 GHz fails and results in an advisory message. If the equivalent SCPI command is sent, this same message is generated as part of a “-221, Settings conflict” warning. If Source Mode is set to Tracking, and the Max or Min Center Freq is therefore limited by the limits of the source, a warning message is generated, “Data out of range;clipped to source max/min” if these limits are exceeded. Note that for an external source, these limits can be affected by the settings of Source Numerator, Source Denominator and Power Sweep.
Preset	See table above
State Saved	Saved in instrument state.
Min	-79.999995 MHz, unless Source Mode is set to Tracking, in which case it is limited by the minimum frequency of the Source
Max	See table above. Basically instrument maximum frequency – 5 Hz. Note that, if the Source Mode is set to Tracking, the effective instrument maximum frequency may be limited by the source maximum frequency. If the knob or step keys are being used, also depends on the value of the other three interdependent parameters Span, Start Frequency and Stop Frequency
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Ext Mix Center Freq

SCPI command for specifying the External Mixer Center Frequency. This command will set the Center Frequency to be used when the External Mixer is selected, even if the External Mixer input is not the input which is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

Scope	Meas Global
Remote Command	<code>[:SENSe] :FREQuency:EMIXer:CENTer <freq></code> <code>[:SENSe] :FREQuency:EMIXer:CENTer?</code>
Example	<code>:FREQ:EMIX:CENT 60 GHz</code> <code>:FREQ:EMIX:CENT?</code>
Notes	This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode.
Couplings	When returning to External Mixing after having been switched to one of the other inputs (e.g., RF), you will come back into the settings that you had when you left External Mixing. So you will come back to the band you were in with the Center Frequency that you had. However, Span is not an input-dependent parameter, therefore you will bring the span over from the other input. Therefore, the analyzer comes back with the span from the previous input, limited as necessary by the current mixer setup.
Preset	When a Mode Preset is performed while in External Mixing, the Start frequency of the current Mode is set to the nominal Min Freq of the lowest harmonic range in the Harmonic Table for the current mixer setup. Similarly, the Stop frequency of the current Mode is set to the nominal Max Freq of the highest harmonic range in the Harmonic Table. The Center Freq thus presets to the point arithmetically equidistant from these two frequencies.

	<p>If the current measurement has a limited Span available to it, and cannot achieve the Span shown in the table (Span=Stop Freq - Start Freq), the analyzer uses the maximum Span the measurement allows, and still sets the Center Freq to the midpoint of the Start and Stop Freq values in the Harmonic Table.</p> <p>When Restore Input/Output Defaults is performed, the mixer presets to the 11970A, whose Start and Stop frequencies are 26.5 and 40 GHz respectively. The center of these two frequencies is 33.25 GHz.</p> <p>Therefore, after a Restore Input/Output Defaults, if you go into External Mixing and do a Mode Preset while in the Spectrum Analyzer Mode, the resulting Center Freq is 33.25 GHz.</p>
State Saved	Saved in instrument state.
Min	The minimum frequency in the currently selected mixer band + 5 Hz
Max	The maximum frequency in the currently selected mixer band - 5 Hz If the knob or step keys are being used, also depends on the value of the other three interdependent parameters Span, Start Frequency and Stop Frequency
Initial S/W Revision	A.08.01

I/Q Center Freq

SCPI command for specifying the I/Q Center Frequency. This command will set the Center Frequency to be used when the I/Q input is selected, even if the I/Q input is not the input which is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

Scope	Meas Global
Remote Command	[:SENSe] :FREQuency:IQ:CENTer <freq> [:SENSe] :FREQuency:IQ:CENTer?
Example	FREQ:IQ:CEN: 30 MHz
Notes	This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode.
Preset	0 Hz
State Saved	Saved in instrument state.
Min	-40.049995 MHz
Max	40.049995 MHz
Initial S/W Revision	Prior to A.02.00

BMT Freq

Enables quick selection from a subset of the available ARFCN numbers for the Top, Middle, or Bottom frequency in the selected band.

Key Path	FREQ Channel
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Mode	GSM
Scope	Meas Global
Notes	This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this.
Dependencies	When I/Q Input is selected, this key is not available (blank).
Couplings	BMT choice changes ARFCN and Center Freq. Chosen ARFCN will be displayed on each menu key.
Range	Top Middle Bottom
Initial S/W Revision	Prior to A.02.00

BMT Freq Top

Sets the analyzer to the frequency of the highest ARFCN (Absolute RF Channel Number) of the selected radio band.

Key Path	FREQ Channel, BMT Freq
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :ARFCn RFCHannel :TOP
Example	CHAN:ARFC:TOP
Notes	<ol style="list-style-type: none"> This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not displayed.
Couplings	Change [:SENSe]:CHANnel:ARFCn RFCHannel as follows: E-GSM: 124 P-GSM: 124 R-GSM: 124 DCS 1800: 885 PCS 1900: 810 GSM 450: 293 GSM 480: 340 GSM 700: 516 GSM 850: 251 T-GSM 810: 425 Change BMT ARFCN to BMT FreqTOP. Change [:SENSe]:FREQuency:CENTer as follows: E-GSM: 959.800 MHz P-GSM: 959.800 MHz R-GSM: 959.800 MHz

	DCS 1800: 1879.80 MHz
	PCS 1900: 1989.80 MHz
	GSM 450: 467.400 MHz
	GSM 480: 495.800 MHz
	GSM 700: 792.800 MHz
	GSM 850: 893.800 MHz
	T-GSM810: 866.000 MHz
State Saved	No
Initial S/W Revision	Prior to A.02.00

BMT Freq Middle

Sets the analyzer to the frequency of the middle ARFCN (Absolute RF Channel Number) of the selected radio band.

Key Path	FREQ Channel, BMT Freq
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel:ARFCn RFChannel:MIDDLE</code>
Example	CHAN:ARFC:MIDD
Notes	<ol style="list-style-type: none"> 1. This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. 2. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not displayed.
Couplings	<p>Change <code>[:SENSe] :CHANnel:ARFCn RFChannel</code> as follows:</p> <p>E-GSM: 38 P-GSM: 63 R-GSM: 28</p> <p>DSC 1800: 699 PCS 1900: 661 GSM 450: 276 GSM 480: 323 GSM 700: 477 GSM 850: 190 T-GSM 810: 388</p> <p>Change BMT ARFCN to BMT FreqMIDDLE.</p> <p>Change <code>[:SENSe] :FREQuency:CENTer</code> as follows:</p> <p>E-GSM: 942.600 MHz P-GSM: 947.600 MHz R-GSM: 940.600 MHz</p>

	DCS 1800: 1842.60 MHz
	PCS 1900: 1960.00 MHz
	GSM 450: 464.000 MHz
	GSM 480: 492.400 MHz
	GSM 700: 755.000 MHz
	GSM 850: 881.600 MHz
	T-GSM 810: 858.600 MHz
State Saved	No
Initial S/W Revision	Prior to A.02.00

BMT Freq Bottom

Sets the analyzer to the frequency of the lowest ARFCN (Absolute RF Channel Number) of the selected radio band.

Key Path	FREQ Channel, BMT Freq
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :ARFCn RFCHannel :BOTTom</code>
Example	CHAN:ARFC:BOTT
Notes	<ol style="list-style-type: none"> 1. This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. 2. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not displayed.
Couplings	Change [:SENSe]:CHANnel:ARFCn RFCHannel as follows: E-GSM: 975 P-GSM: 1 R-GSM: 955 DCS 1800: 512 PCS 1900: 512 GSM 450: 259 GSM 480: 306 GSM 700: 438 GSM 850: 128 T-GSM 810: 350 Change BMT ARFCN to BMT FreqBOTTOM. Change [:SENSe]:FREQuency:CENTer as follows: E-GSM: 925.200 MHz P-GSM: 935.200 MHz R-GSM: 921.200 MHz

	DCS 1800: 1805.20 MHz
	PCS 1900: 1930.20 MHz
	GSM 450: 460.600 MHz
	GSM 480: 489.000 MHz
	GSM 700: 747.2 MHz
	GSM 850: 869.200 MHz
	T-GSM 810: 851.000 MHz
State Saved	No
Initial S/W Revision	Prior to A.02.00

Carrier Setup

Allows you to set carrier parameters.

Key Path	FREQ Channel
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Initial S/W Revision	A.06.00
Modified at S/W Revision	A.14.00

Carriers

Defines the number of carriers.

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :COUNT <integer></code> <code>[:SENSe] :CHANnel :CARRier :COUNT?</code>
Example	CHAN:CARR:COUN 3 CHAN:CARR:COUN?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Couplings	This can change when the SCPI command of the Carrier Power Present or the Carrier Interval is sent.
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	16

Initial S/W Revision	A.06.00
Modified at S/W Revision	A.13.00

Reference Carrier

Defines the reference active carrier. The Reference Carrier frequency point is always aligned with the Measurement Global Center Frequency. The minimum value 1 specifies the lowest frequency carrier among the active carriers. The maximum value specifies the highest frequency carrier among the active carriers.

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :RCARrier <integer></code> <code>[:SENSe] :CHANnel :CARRier :RCARrier ?</code>
Example	CHAN:CARR:RCAR 3 CHAN:CARR:RCAR ?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	The maximum value depends on the number of carriers. If you set it to more than the number of carriers, it's clipped to the number of carriers. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Couplings	When you decrease the number of carriers to a value which is less than this value, this is clipped to the value.
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	Number of carriers
Initial S/W Revision	A.06.00

Configure Carriers

Opens a menu of keys that allows you to configure carriers.

Key Path	FREQ Channel, Multi Carrier Setup
Dependencies	This key is grayed out when there is only one carrier. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Initial S/W Revision	A.06.00

Select Carrier

Selects a carrier to configure.

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	The maximum value depends on the number of carriers. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned. This parameter is unavailable when there is only one carrier.
Couplings	This value can change when you decrease the number of carriers.
Preset	1
State Saved	No
Min	1
Max	Number of carriers
Initial S/W Revision	A.06.00

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe]:CHANnel:CARRier:LIST:COUPle OFF ON 0 1, ... [:SENSe]:CHANnel:CARRier:LIST:COUPle?
Example	CHAN:CARR:LIST:COUP OFF CHAN:CARR:LIST:COUP?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	When Couple is selected, the carrier settings are coupled to carrier #1. Coupled parameters are Carrier Power Present, Carrier Interval. When a setting is changed, the couple is set to Man automatically. Carrier #1 is always set to couple and cannot be changed. Couple/Man selection on the Carrier key is not displayed when selected carrier number is #1.
Preset	ON
State Saved	No
Range	Couple Man
Initial S/W Revision	A.06.00

Carrier Power Present

Specifies whether each of carriers is active or not.

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :CARRier :LIST :PPResent YES NO, ... [:SENSe] :CHANnel :CARRier :LIST :PPResent?
Example	CHAN:CARR:LIST:PPR YES CHAN:CARR:LIST:PPR?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. Missing values are not permitted, therefore if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Dependencies	This parameter is unavailable when there is only one carrier. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	Coupled to the number of carriers. When the SCPI command is sent, the number of carriers will be set to the number of entries in the parameter list.
Preset	YES
State Saved	Saved in instrument state.
Range	Yes No
Initial S/W Revision	A.06.00

Carrier Interval

Specifies the frequency interval between the Carrier #n and #n+1 center frequencies.

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :CARRier :LIST :INTerval <freq>, ... [:SENSe] :CHANnel :CARRier :LIST :INTerval?
Example	CHAN:CARR:LIST:INT 600k CHAN:CARR:LIST:INT?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. The softkey for the last carrier (say, #N) is grayed out.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned. This parameter is unavailable when there is only one carrier.
Couplings	Coupled to the number of carriers. When the SCPI command is sent, the number of carriers will be

	set to the number of entries in the parameter list. Changing Carrier Interval might affect the Span.
Preset	600kHz
State Saved	Saved in instrument state.
Min	400 kHz
Max	100 MHz
Initial S/W Revision	A.06.00
Modified at S/W Revision	A.07.00, A.08.00

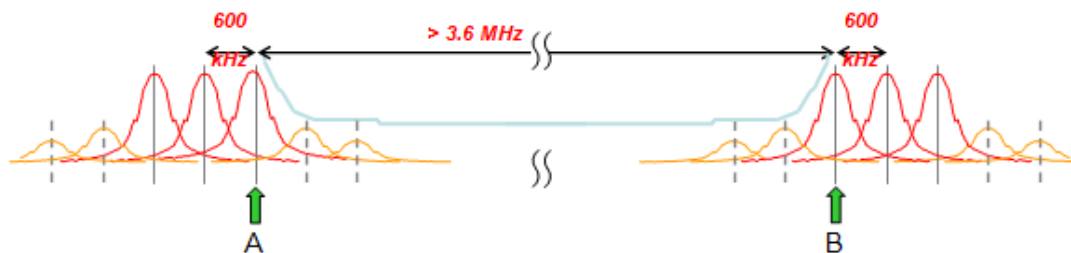
Carrier Frequency Allocation

Specifies the carrier frequency allocation. There are two types of allocation, contiguous and non-contiguous. Non-Contiguous frequency allocation is defined as an allocation where two groups of frequencies are separated with at least [3.6] MHz carrier separation between the innermost carriers. In case of the non-contiguous frequency allocation, tests will be measured between the uppermost carrier A of the lower frequency group and the lowermost carrier B of the upper frequency group.

See ["An example of non-contiguous frequency allocation" on page 496](#)

Key Path	FREQ Channel, Multi Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe]:CHANnel:CARRier:FALLocation</code> <code>CONTiguous NCONTiguous</code> <code>[:SENSe]:CHANnel:CARRier:FALLocation?</code>
Example	<code>CHAN:CARR:FALL NCON</code> <code>CHAN:CARR:FALL?</code>
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This menu key is available only when the number of carriers is more than one. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Preset	CONTiguous
State Saved	Saved in instrument state.
Range	Contiguous Non-Contiguous
Readback Text	CONTiguous NCONTiguous
Initial S/W Revision	A.07.00

An example of non-contiguous frequency allocation



Non-Contiguous

Opens a menu of keys that allows you to set non-contiguous frequency allocation parameters.

Key Path	FREQ Channel, Multi Carrier Setup, Carr Freq Alloc
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Initial S/W Revision	A.07.00

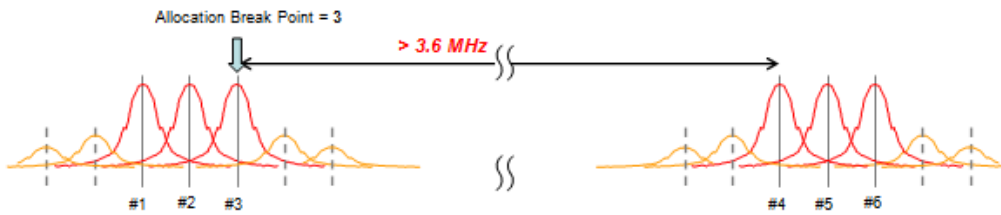
Allocation Break Pt

Specifies an allocation break point that is a sequence (or index) number of the uppermost carrier in the lower frequency group.

See ["An example of allocation break point" on page 498](#)

Key Path	FREQ Channel, Multi Carrier Setup, Carr Freq Alloc, Non-Contiguous
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :FALlocation :NCONtiguous :ABPoint <integer></code> <code>[:SENSe] :CHANnel :CARRier :FALlocation :NCONtiguous :ABPoint ?</code>
Example	<code>CHAN:CARR:FALL:NCON:ABP 3</code> <code>CHAN:CARR:FALL:NCON:ABP ?</code>
Notes	You must be in the GSM mode to use this command. Use <code>INSTRument:SElect</code> to set the mode.
Dependencies	The maximum value depends on the number of carriers. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	This value can change when you decrease the number of carriers.
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	Number of carriers - 1
Initial S/W Revision	A.07.00
Modified at S/W Revision	A.13.00

An example of allocation break point



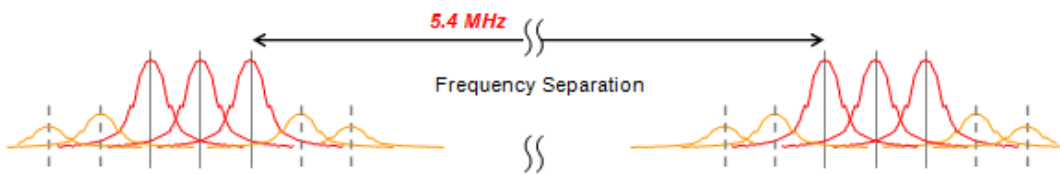
Freq Separation

Specifies frequency separation between the innermost of carriers.

See ["An example of frequency separation" on page 499](#)

Key Path	FREQ Channel, Multi Carrier Setup, Carr Freq Alloc, Non-Contiguous
Mode	GSM
Scope	Meas Global
Remote Command	<code>[[:SENSe]:CHANnel:CARRier:FALLocation:NCONtiguous:FSEParation <freq></code> <code>[[:SENSe]:CHANnel:CARRier:FALLocation:NCONtiguous:FSEParation?</code>
Example	<code>CHAN:CARR:FALL:NCON:FSEP 5.4M</code> <code>CHAN:CARR:FALL:NCON:FSEP?</code>
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	Changing Frequency Separation might affect the Span
Preset	5.4 MHz
State Saved	Saved in instrument state.
Min	3.6 MHz
Max	100 MHz
Initial S/W Revision	A.07.00

An example of frequency separation



Carrier BPF

Selects whether to use the carrier bandpass filter.

Key Path	FREQ Channel, Multi Carrier SetupMode Setup, Demod
Mode	GSM
Remote Command	<code>[:SENSe] :RADio :CARRier :NUMBer :AUTO ON OFF 1 0</code> <code>[:SENSe] :RADio :CARRier :NUMBer :AUTO ?</code>
Example	<code>RAD:CARR:NUMB:AUTO 1</code> <code>RAD:CARR:NUMB:AUTO ?</code>
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	ON automatically changes to OFF when Multiple or Single is selected as Carrier BPF Type.
Preset	ON
State Saved	Saved in instrument state.
Range	Auto Man
Initial S/W Revision	A.06.00

Carrier BPF Type

Opens a menu of keys that allows you to select the type of the bandpass filter. When carriers other than the signal of interest are present, especially if they are strong, they can interfere with the measurement, making it difficult to sync and producing artificially high EVM results. When this condition exists, toggle from Single to Multi. A band-limited filter will help reduce the measurement interference.

BPF Type	Description
MULTiple	Enable multi carrier tolerance filter.
SINGle	Disable multi carrier tolerance filter

This parameter applies only to the following measurements:

- GMSK Phase & Frequency Error measurement
- EDGE EVM measurement
- GMSK Power vs. Time

- EDGE Power vs. Time

Key Path	FREQ Channel, Multi Carrier Setup, Carrier BPFMode Setup, Demod, Carrier BPF
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe]:RADio:CARRier:NUMBer SINGLE MULTiple [:SENSe]:RADio:CARRier:NUMBer?
Example	RAD:CARR:NUMB SING RAD:CARR:NUMB?
Notes	The Carrier Bandpass Filter key is in the Mode Setup menu, but only EDGE EVM and GSM PFER measurements support this feature. In other measurements, this setting is not applicable. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Preset	SINGLE
State Saved	Saved in instrument state.
Range	Single Multi
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

BTS Class

Selects a BTS class.

BTS Class	Definition
MC	Multicarrier BTS is defined as a class of BTS, characterized by the ability to, in addition to single carrier operation, process two or more carriers in common active RF components simultaneously, either in multicarrier transmitter only or, in both multicarrier transmitter and multicarrier receiver.
SC	Single carrier BTS is defined as a class of BTS, characterized by the ability to process one carrier in single carrier BTSs, not belonging to a Multicarrier BTS class.

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Remote Command	[:SENSe]:CHANnel:CARRier:BASE:CLASs:AUTO ON OFF 1 0 [:SENSe]:CHANnel:CARRier:BASE:CLASs:AUTO?
Example	CHAN:CARR:BASE:CLAS:AUTO 1 CHAN:CARR:BASE:CLAS:AUTO?
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.

Couplings	ON automatically changes to OFF when Multicarrier Class (MC) or Single carrier Class (SC) is selected as BTS Class.
Preset	ON
State Saved	Saved in instrument state.
Range	Auto Man
Initial S/W Revision	A.14.00
<hr/>	
Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :CARRier :BASE :CLASs SC MC [:SENSe] :CHANnel :CARRier :BASE :CLASs?
Example	CHAN:CARR:BASE:CLAS MC CHAN:CARR:BASE:CLAS?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. Selection C1 and C2 are supported for backwards compatibility. When "C1" or "C2" is passed as SCPI command parameter, the BTS Class Auto is set to ON. As a result, it's converted to "SC" if the number of carriers is one, and otherwise "MC."
Dependencies	This parameter is available when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Preset	SC
State Saved	Saved in instrument state.
Range	Single Carrier Multi Carrier
Initial S/W Revision	A.06.00
Modified at S/W Revision	A.10.01, A14.00

Time Slot

Selects On or Off for slot searching. Generally, this feature is only valid in external and periodic timer trigger source modes that triggers every frame since another trigger source does not have the information that identifies the head of the frame. When Timeslot is set to On, the demodulation measurement is made on the nth timeslot specified by the trigger point + n timeslots, where n is the selected timeslot value 0 to 7.

This functionality is the same as Time Slot under the Freq/Channel menu.

Key Path	Mode Setup, Demod FREQ Channel
Mode	GSM

Scope	Meas Global
Remote Command	[:SENSe]:CHANnel:SLOT <integer> [:SENSe]:CHANnel:SLOT? [:SENSe]:CHANnel:SLOT:AUTO OFF ON 0 1 [:SENSe]:CHANnel:SLOT:AUTO?
Example	CHAN:SLOT 0 CHAN:SLOT? CHAN:SLOT:AUTO OFF CHAN:SLOT:AUTO?
Notes	This functionality does not affect Combined GSM/EDGE measurement. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	0 OFF
State Saved	Saved in instrument state.
Min	0
Max	7
Initial S/W Revision	Prior to A.02.00

Burst Type

Sets the burst type that the analyzer will search for and to which it will synchronize.

This functionality is the same as Burst Type under the FREQ Channel menu.

Key	SCPI	Description
Sync (SCH)	SYNC	Burst length = 142 symbols Extended training sequences for CTS and COMPACT synchronization bursts are not supported.
Access (RACH)	ACcEss	Burst length = 88 symbols Alternative training (synchronization) sequence "TS1" and "TS2" are supported only in GSMK Power vs. Time.
Normal - NB (TCH & CCH)	NORMAl	Burst length = 142 symbols Softkey label will be changed to 'Normal - NB' form 'Normal'
Higher Symbol Rate - HB (TCH & CCH)	HSRate	Burst length = 169 symbols This selection key is only shown when theN9071A-3FP license is installed.
Mixed (NB/HB for TSC sync)	MIXed	Enables auto detection between Normal (NB) and HSR (HB) TCH & CCH EDGE Burst. This selection key is only shown when theN9071A-3FP license is installed.

Measurement synchronization capability (Burst Sync = Training Seq)

	Sync	Access	Normal		HSR	Mixed
			GMSK	8PSK		
				16QAM		
				32QAM		
				AQPSK		
GMSK Phase & Freq Error measurement	Yes	Yes	Yes	No	N/A	
GMSK Power vs. Time measurement	Yes	Yes	Yes	No	(measures as Normal GMSK when selected)	
GMSK Output RF Spectrum measurement (when Trigger Source is Periodic Timer and Sync Source is Off)	No	No	Yes	No		
EDGE EVM measurement	No	No	No	Yes	Yes	Yes
EDGE Power vs. Time measurement	Yes	Yes	Yes	Yes	Yes	Yes
EDGE Output RF Spectrum measurement (when Trigger Source is Periodic Timer and Sync Source is Off.)	No	No	Yes	Yes	Yes	Yes

Key Path	Mode Setup, Demod FREQ Channel
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :BURSt NORMal SYNC ACCess HSRate MIXed [:SENSe] :CHANnel :BURSt ?
Example	CHAN:BURS NORM CHAN:BURS?
Notes	This functionality does not affect the Combined GSM/EDGE measurement. Higher Symbol Rate and Mixed selections are only available when the N9071A-3FP license is installed. Otherwise these menu keys are blank. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Higher Symbol Rate and Mixed selection keys are not shown unless N9071A-3FP is installed. When unlicensed and SCPI is sent, an undefined header error is returned. When "Mixed" is selected, the Burst Sync menu key under the Meas Setup menu will be grayed out and Training Sequence (TSC) will be used for synchronization. The sync algorithm always runs in Training Sequence (TSC) synchronization because the Burst Type can be determined by looking at TSC in the signal. Original selection of Burst Sync will become effective again when the Burst Type selection is changed from "Mixed" to another one.
Preset	NORMal
State Saved	Saved in instrument state.
Range	Sync (SCH) Access (RACH) Normal - NB (TCH & CCH) Higher Symbol Rate - HB (TCH & CCH) Mixed (NB/HB for TSC sync)

Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

TSC (Std)

Allows you to select the Training Sequence Code that determines which burst is to be measured. Applicable only when Burst Sync is set to Training Sequence in the measurement. In the case of AQPSK, this parameter specifies TSC number of VAMOS sub-channel A. TSC of VAMOS sub-channel B is ignored.

This functionality is the same as TSC under the FREQ Channel menu.

This parameter applies only to the following measurements:

- GMSK/EDGE Power vs. Time measurement
- GMSK Phase & Frequency Error measurement
- EDGE EVM measurement

Selection	SCPI	Description
AutoDet	ON 1	The measurement is made on the first burst found to have any one of the valid TSCs in the range of 0 to 7. The measurement may be made on various timeslots if more than one timeslot has one of the 8 valid TSCs.
Man	OFF 0	The measurement is made on the first burst found to have the selected TSC. TSC numbers in the range of 0 to 7 can be selected. The measurement may be made on various timeslots if more than one timeslot has this same TSC.

Key Path	Mode Setup, Demod FREQ Channel
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe]:CHANnel:TSCode <integer> [:SENSe]:CHANnel:TSCode? [:SENSe]:CHANnel:TSCode:AUTO OFF ON 0 1 [:SENSe]:CHANnel:TSCode:AUTO?
Example	CHAN:TSC 3 CHAN:TSC? CHAN:TSC:AUTO 1 CHAN:TSC:AUTO?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. When Sync or Access is selected as Burst Type, this key is grayed out.
Preset	0 ON

State Saved	Saved in instrument state.
Min	0
Max	7
Initial S/W Revision	Prior to A.02.00

Input/Output

See "[Input/Output](#)" on page 196

Marker

Accesses a menu that enables you to select, set up and control the markers for the current measurement.

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Select Marker

Displays 12 markers available for selection.

Key Path	Marker
Initial S/W Revision	Prior to A.02.00

Marker Type

Sets the marker control mode as described under Normal, Delta and Off, below. All interactions and dependencies detailed under the key description are enforced when the remote command is sent.

Key Path	Marker
Mode	GSM
Remote Command	:CALCulate:EPVTime:MARKer[1] 2 ...12:MODE POSITION DELTA OFF :CALCulate:EPVTime:MARKer[1] 2 ...12:MODE?
Example	CALC:EPVT:MARK:MODE OFF CALC:EPVT:MARK:MODE?
Notes	If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules. At the same time, Marker X Axis Value appears on the Active Function area. Default Active Function: the active function for the selected marker's current control mode. If the current control mode is Off, there is no active function and the active function is turned off. Active Function Display: the marker X axis value entered in the active function area displays the marker value to its full entered precision. You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Preset	OFF
State Saved	Saved in instrument state.
Range	Normal Delta Off
Initial S/W Revision	Prior to A.02.00

Marker X Axis Value (Remote Command Only)

Sets the marker X Axis value in the current marker X Axis Scale unit. It has no effect if the control mode is Off, but is the SCPI equivalent of entering an X value if the control mode is Normal or Delta.

Mode	GSM
Remote Command	:CALCulate:EPVTime:MARKer[1] 2 ...12:X <real> :CALCulate:EPVTime:MARKer[1] 2 ...12:X?
Example	CALC:EPVT:MARK3:X 0 CALC:EPVT:MARK3:X?
Notes	If no suffix is sent, uses the fundamental units for the current marker X Axis Scale. If a suffix is sent that does not match the current marker X Axis Scale unit, an error "Invalid suffix" is generated. The query returns the marker's absolute X Axis value if the control mode is Normal, or the offset from the marker's reference marker if the control mode is Delta. The query is returned in the fundamental units for the current marker X Axis scale: Hz for Frequency and Inverse Time, seconds for Period and Time. If the marker is Off the response is not a number. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	Max value will be changed by Meas Time parameter value.
Preset	After a preset, all markers are turned OFF, so Marker X Axis Value query returns Not a Number (NaN).
State Saved	No
Min	-9.9E37
Max	9.9E37
Initial S/W Revision	Prior to A.02.00

Marker X Axis Position (Remote Command Only)

Sets the marker X position in trace points. It has no effect if the control mode is Off, but is the SCPI equivalent of entering a value if the control mode is Normal or Delta except in trace points rather than X Axis Scale units. The entered value is immediately translated into the current X Axis Scale units for setting the value of the marker.

Mode	GSM
Remote Command	:CALCulate:EPVTime:MARKer[1] 2 ...12:X:POSition <integer> :CALCulate:EPVTime:MARKer[1] 2 ...12:X:POSition?
Example	CALC:EPVT:MARK10:X:POS 0 CALC:EPVT:MARK10:X:POS?
Notes	The query returns the marker's absolute X Axis value in trace points if the control mode is Normal, or the offset from the marker's reference marker in trace points if the control mode is Delta. If the marker is Off the response is not a number. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	Max value would be changed by Sweep/Meas Time parameter value.
Preset	After a preset, all markers are turned OFF, so Marker X Axis Value query returns Not a Number

	(NAN).
State Saved	No
Min	-9.9E37
Max	9.9E37
Initial S/W Revision	Prior to A.02.00

Marker Y Axis Value (Remote Command Only)

Returns the marker Y Axis value in the current marker Y Axis unit.

The “result” of a marker is the value which is displayed on the second line of the Marker Result block. To properly interpret the returned value the remote programmer must also know what the analyzer’s Y-Axis Unit is set to as described below.

A marker can have up to two results, only one of which is displayed or returned on a query, as follows:

- Absolute result: every marker has an absolute result, which, for Normal and Delta markers, is the Y-axis value of the trace point the marker is currently on.

The absolute result is displayed in the result block or returned on a query unless the marker control mode is Delta.

- Relative result: if a marker’s control mode is Delta, the **relative** result is displayed in the result block or returned on a query. This is the ratio of the Absolute Result of a delta marker to the Absolute Result of its reference marker.

Mode	GSM
Remote Command	:CALCulate:EPVTime:MARKer[1] 2 ...12:Y?
Example	CALC:EPVT:MARK11:Y?
Notes	The query returns the marker Y-axis result. If the marker is Off the response is not a number. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	0
State Saved	No
Backwards Compatibility SCPI	:CALCulate:EPVTime:MARKer[1] 2 ...4:FUNCTION:RESult?
Initial S/W Revision	Prior to A.02.00

Properties

Accesses a menu that allows you to set marker properties and to access the marker trace menu.

Key Path	Marker
Initial S/W Revision	Prior to A.02.00

Select Marker

Displays 12 markers available for selection.

Key Path	Marker
Initial S/W Revision	Prior to A.02.00

Relative To

Selects the marker that the selected marker is relative to (its reference marker).

Key Path	Marker, Properties
Mode	GSM
Remote Command	:CALCulate:EPVTime:MARKer[1] 2 ...12:REFerence <integer> :CALCulate:EPVTime:MARKer[1] 2 ...12:REFerence?
Example	CALC:EPVT:MARK:REF 2 CALC:EPVT:MARK:REF?
Notes	A marker cannot be relative to itself so that choice is grayed out, and if sent from SCPI generates error -221: "Settings conflict; marker cannot be relative to itself." You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. When queried a single value is returned (the specified marker numbers relative marker).
Preset	2 3 4 5 6 7 8 9 10 11 12 1
State Saved	Saved in instrument state.
Min	1
Max	12
Initial S/W Revision	Prior to A.02.00

Marker Trace

Assigns the specified marker to the designated trace.

Key Path	Marker, Properties
Mode	GSM
Remote Command	:CALCulate:EPVTime:MARKer[1] 2 ...12:TRACe RFENvelope UMASk LMASk MAXRfenvelop MINRfenvelop :CALCulate:EPVTime:MARKer[1] 2 ...12:TRACe?
Example	CALC:EPVT:MARK:TRAC LMAS CALC:EPVT:MARK:TRAC?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Upper Mask and Lower Mask are available when "Limit Mask" on page 618 under View/Display is On.

	Max Hold RF Envelop is only available when Max Trace is set to On. Min Hold RF Envelop is only available when Min Hold Trace is set to On. Otherwise, the menu keys are grayed out and the commands are unavailable.
Preset	RFENvelope
State Saved	Saved in instrument state.
Range	RF Envelope Upper Mask Lower Mask Max Hold RF Envelope Min Hold RF Envelope
Initial S/W Revision	Prior to A.02.00

Select Marker

Displays 12 markers available for selection. See ["Select Marker" on page 510](#).

Key Path	Marker, Properties
Initial S/W Revision	Prior to A.02.00

Couple Markers

When this function is **On**, moving any marker causes an equal X Axis movement of every other marker which is not Off. By “equal X Axis movement” we mean that we preserve the difference between each marker’s X Axis value (in the fundamental x-axis units of the trace that marker is on) and the X Axis value of the marker being moved (in the same fundamental x-axis units).

This may result in markers going off screen.

Key Path	Marker
Mode	GSM
Remote Command	:CALCulate:EPVTime:MARKer:COUPle[:STATe] ON OFF 1 0 :CALCulate:EPVTime:MARKer:COUPle[:STATe]?
Example	CALC:EPVT:MARK:COUP ON CALC:EPVT:MARK:COUP?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

All Markers Off

Turns off all markers.

Key Path	Marker
Mode	GSM
Remote Command	:CALCulate:EPVTime:MARKer:AOff
Example	CALC:EPVT:MARK:AOff
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Initial S/W Revision	Prior to A.02.00

Marker State (Backward Compatibility/Remote Command Only)

Sets or queries the state of a marker. Setting a marker which is OFF to state ON or 1 puts it in Normal mode and places it at the center of the screen.

Mode	EDGE GSM
Remote Command	:CALCulate:EPVTime:MARKer[1] 2 ...12:STATe OFF ON 0 1 :CALCulate:EPVTime:MARKer[1] 2 ...12:STATe?
Example	CALC:EPVT:MARK3:STAT ON CALC:EPVT:MARK3:STAT?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

Marker Function

There is no functionality for this Front-panel key in this measurement. When pressed, this key displays a blank menu.

Key Path	Front-panel key
Mode	EDGE GSM

Marker To

There is no functionality for this key in this measurement. When pressed, this key displays a blank menu.

Key Path	Front-panel key
Mode	EDGE GSM

Meas

The information in this section is common to all measurements. For key and remote command information for a specific measurement, refer to the section that describes the measurement of interest.

Measurements available under the Meas key are specific to the current Mode.

When viewing Help for measurements, note the following:

NOTE

Operation for some keys differs between measurements. The information displayed in Help pertains to the current measurement. To see how a key operates in a different measurement, exit Help (press the Cancel Esc key), select the measurement, then reenter Help (press the Help key) and press that key.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Remote Measurement Functions

This section contains the following topics:

"Measurement Group of Commands" on page 2302

"Current Measurement Query (Remote Command Only)" on page 2304

"Limit Test Current Results (Remote Command Only)" on page 2304

"Data Query (Remote Command Only)" on page 2304

"Calculate/Compress Trace Data Query (Remote Command Only)" on page 2305

"Calculate Peaks of Trace Data (Remote Command Only)" on page 2310

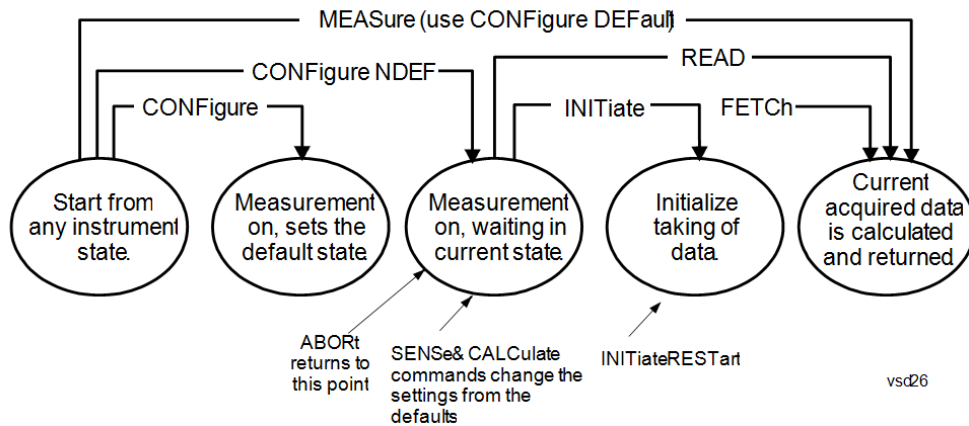
Hardware-Accelerated Fast Power Measurement (Remote Command Only)

"Format Data: Numeric Data (Remote Command Only)" on page 2311

"Format Data: Byte Order (Remote Command Only)" on page 2312

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Measurement Group of Commands



Measure Commands:

:MEASure:<measurement>[n]?

This is a fast single-command way to make a measurement using the factory default instrument settings. These are the settings and units that conform to the Mode Setup settings (e.g. radio standard) that you have currently selected.

- Stops the current measurement (if any) and sets up the instrument for the specified measurement using the factory defaults
- Initiates the data acquisition for the measurement
- Blocks other SCPI communication, waiting until the measurement is complete before returning results.
- If the function does averaging, it is turned on and the number of averages is set to 10.
- After the data is valid it returns the scalar results, or the trace data, for the specified measurement. The type of data returned may be defined by an [n] value that is sent with the command.
- The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available.
- ASCII is the default format for the data output. (Older versions of Spectrum Analysis and Phase Noise mode measurements only use ASCII.) The binary data formats should be used for handling large blocks of data since they are smaller and faster than the ASCII format. Refer to the FORMat:DATA command for more information.

If you need to change some of the measurement parameters from the factory default settings you can set up the measurement with the CONFigure command. Use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to change the settings. Then you can use the READ? command to initiate the measurement and query the results.

If you need to repeatedly make a given measurement with settings other than the factory defaults, you can use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to set up the measurement. Then use the READ? command to initiate the measurement and query results.

Measurement settings persist if you initiate a different measurement and then return to a previous one. Use READ:<measurement>? if you want to use those persistent settings. If you want to go back to the default settings, use MEASure:<measurement>?.

Configure Commands:

:CONFigure:<measurement>

This command stops the current measurement (if any) and sets up the instrument for the specified measurement using

the factory default instrument settings. It does not initiate the taking of measurement data unless INIT:CONTinuous is ON. If you change any measurement settings after using the CONFigure command, the READ command can be used to initiate a measurement without changing the settings back to their defaults.

In the Swept SA measurement in Spectrum Analyzer mode the CONFigure command also turns the averaging function on and sets the number of averages to 10 for all measurements.

:CONFigure: <measurement>: NDEFault stops the current measurement and changes to the specified measurement. It does not change the settings to the defaults. It does not initiate the taking of measurement data unless INIT:CONTinuous is ON.

The CONFigure? query returns the current measurement name.

The CONFigure:CATalog? query returns a quoted string of all licensed measurement names in the current mode. For example, "SAN, CHP, OBW, ACP, PST, TXP, SPUR, SEM, LIST".

Fetch Commands:

:FETCh:<measurement>[n]?

This command puts selected data from the most recent measurement into the output buffer. Use FETCh if you have already made a good measurement and you want to return several types of data (different [n] values, for example, both scalars and trace data) from a single measurement. FETCh saves you the time of re-making the measurement. You can only FETCh results from the measurement that is currently active, it will not change to a different measurement. An error message is reported if a measurement other than the current one is specified.

If you need to get new measurement data, use the READ command, which is equivalent to an INITiate followed by a FETCh.

The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used for handling large blocks of data since they are smaller and transfer faster than the ASCII format. (FORMat:DATA)

FETCh may be used to return results other than those specified with the original READ or MEASure command that you sent.

INITiate Commands:

:INITiate:<measurement>

This command is not available for measurements in all the instrument modes:

- Initiates a trigger cycle for the specified measurement, but does not output any data. You must then use the FETCh<meas> command to return data. If a measurement other than the current one is specified, the instrument will switch to that measurement and then initiate it.
 - For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. If you send INIT:ACP? it will change from channel power to ACP and will initiate an ACP measurement.
 - Does not change any of the measurement settings. For example, if you have previously started the ACP measurement and you send INIT:ACP? it will initiate a new ACP measurement using the same instrument settings as the last time ACP was run.
 - If your selected measurement is currently active (in the idle state) it triggers the measurement, assuming the trigger conditions are met. Then it completes one trigger cycle. Depending upon the measurement and the number of averages, there may be multiple data acquisitions, with multiple trigger events, for one full trigger cycle. It also holds off additional commands on GPIB until the acquisition is complete.
-

READ Commands:

:READ:<measurement>[n]?

- Does not preset the measurement to the factory default settings. For example, if you have previously initiated the ACP
-

measurement and you send READ:ACP? it will initiate a new measurement using the same instrument settings.

- Initiates the measurement and puts valid data into the output buffer. If a measurement other than the current one is specified, the instrument will switch to that measurement before it initiates the measurement and returns results.
 - For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. Then you send READ:ACP? It will change from channel power back to ACP and, using the previous ACP settings, will initiate the measurement and return results.
 - Blocks other SCPI communication, waiting until the measurement is complete before returning the results
 - If the optional [n] value is not included, or is set to 1, the scalar measurement results will be returned. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used when handling large blocks of data since they are smaller and faster than the ASCII format. (FORMat:DATA)
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Current Measurement Query (Remote Command Only)

This command returns the name of the measurement that is currently running.

Remote Command	:CONFigure?
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Example	CONF?
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Limit Test Current Results (Remote Command Only)

Queries the status of the current measurement limit testing. It returns a 0 if the measured results pass when compared with the current limits. It returns a 1 if the measured results fail any limit tests.

Remote Command	:CALCulate:CLIMits:FAIL?
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Example	CALC:CLIM:FAIL? queries the current measurement to see if it fails the defined limits. Returns a 0 or 1: 0 it passes, 1 it fails.
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Data Query (Remote Command Only)

Returns the designated measurement data for the currently selected measurement and subopcode.

n = any valid subopcode for the current measurement. See the measurement command results table for your current measurement, for information about what data is returned for the subopcodes.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. (See the format command descriptions under Input/Output in the Analyzer Setup section.)

Remote Command	:CALCulate:DATA[n]?
Notes	The return trace depends on the measurement. In CALCulate:<meas>:DATA[n], n is any valid subopcode for the current measurement. It returns the same data as the FETCH:<measurement>? query where <measurement> is the current measurement.
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Calculate/Compress Trace Data Query (Remote Command Only)

Returns compressed data for the currently selected measurement and sub-opcode [n].

n = any valid sub-opcode for that measurement. See the MEASure:<measurement>? command description of your specific measurement for information on the data that can be returned.

The data is returned in the current Y Axis Unit of the analyzer. The command is used with a sub-opcode <n> (default=1) to specify the trace. With trace queries, it is best if the analyzer is not sweeping during the query. Therefore, it is generally advisable to be in Single Sweep, or Update=Off.

This command is used to compress or decimate a long trace to extract and return only the desired data. A typical example would be to acquire N frames of GSM data and return the mean power of the first burst in each frame. The command can also be used to identify the best curve fit for the data.

Remote Command	:CALCulate:DATA<n>:COMPRESS? BLOCK CFIT MAXimum MINimum MEAN DMEan RMS RMSCubed SAMPLE SDEVIation PPHase [,<soffset> [,<length>[,<roffset>[,<rlimit>]]]]
Example	To query the mean power of a set of GSM bursts: Supply a signal that is a set of GSM bursts. Select the IQ Waveform measurement (in IQ Analyzer Mode). Set the sweep time to acquire at least one burst. Set the triggers such that acquisition happens at a known position relative to a burst. Then query the mean burst levels using, CALC:DATA2:COMP? MEAN, 24e-6, 526e-6 (These parameter values correspond to GSM signals, where 526e-6 is the length of the burst in the slot and you just want 1 burst.)
Notes	The command supports 5 parameters. Note that the last 4 (<soffset>, <length>, <roffset>, <rlimit>) are optional. But these optional parameters must be entered in the specified order. For example, if you want to specify <length>, then you must also specify <soffset>. See details below for a definition of each of these parameters. This command uses the data in the format specified by FORMat:DATA, returning either binary or ASCII data.
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- BLOCK or block data - returns all the data points from the region of the trace data that you specify. For example, it could be used to return the data points of an input signal over several timeslots, excluding the portions of the trace data that you do not want. (This is x,y pairs for trace data and I,Q pairs for complex data.)

- CFIT or curve fit - applies curve fitting routines to the data. <soffset> and <length> are required to define the data that you want. <roffset> is an optional parameter for the desired order of the curve equation. The query will return the following values: the x-offset (in seconds) and the curve coefficients ((order + 1) values).

MIN, MAX, MEAN, DME, RMS, RMSC, SAMP, SDEV and PPH return one data value for each specified region (or <length>) of trace data, for as many regions as possible until you run out of trace data (using <roffset> to specify regions). Or they return the number of regions you specify (using <rlimit>) ignoring any data beyond that.

- MINimum - returns the minimum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the minimum magnitude of the I/Q pairs is returned.
- MAXimum - returns the maximum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the maximum magnitude of the I/Q pairs is returned.
- MEAN - returns a single value that is the arithmetic mean of the data point values (in dB/ dBm) for the specified region(s) of trace data. For I/Q trace data, the mean of the magnitudes of the I/Q pairs is returned. See the following equations.

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NOTE

If the original trace data is in dB, this function returns the arithmetic mean of those log values, not log of the mean power which is a more useful value. The mean of the log is the better measurement technique when measuring CW signals in the presence of noise. The mean of the power, expressed in dB, is useful in power measurements such as Channel Power. To achieve the mean of the power, use the RMS option.

Equation 1

Mean Value of Data Points for Specified Region(s)

$$MEAN = \frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 2

Mean Value of I/Q Data Pairs for Specified Region(s)

$$MEAN = \frac{1}{n} \sum_{X_i \in \text{region}(s)} |X_i|$$

where $|X_i|$ is the magnitude of an I/Q pair, and n is the number of I/Q pairs in the specified region(s).

- DMEan - returns a single value that is the mean power (in dB/ dBm) of the data point values for the specified region(s) of trace data. See the following equation:

Equation 3

DMEan Value of Data Points for Specified Region(s)

$$\text{DME} = 10 \times \log_{10} \left(\frac{1}{n} \sum_{X_i \in \text{region}(s)} 10^{\frac{X_i}{10}} \right)$$

- RMS - returns a single value that is the average power on a root-mean-squared voltage scale (arithmetic rms) of the data point values for the specified region(s) of trace data. See the following equation.

NOTE For I/Q trace data, the rms of the magnitudes of the I/Q pairs is returned. See the following equation. This function is very useful for I/Q trace data. However, if the original trace data is in dB, this function returns the rms of the log values which is not usually needed.

Equation 4

RMS Value of Data Points for Specified Region(s)

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i^2}$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 5

RMS Value of I/Q Data Pairs for Specified Region(s)

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region(s).

Once you have the rms value for a region of trace data (linear or I/Q), you may want to calculate the mean power. You must convert this rms value (peak volts) to power in dBm:

$$10 \times \log[10 \times (\text{rms value})^2]$$

- SAMPLe - returns the first data value (x,y pair) for the specified region(s) of trace data. For I/Q trace data, the first I/Q pair is returned.
- SDEViation - returns a single value that is the arithmetic standard deviation for the data point values for the specified region(s) of trace data. See the following equation.
- For I/Q trace data, the standard deviation of the magnitudes of the I/Q pairs is returned. See the following equation.

Equation 6

Standard Deviation of Data Point Values for Specified Region(s)

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (X_i - \bar{X})^2}$$

where X_i is a data point value, \bar{X} is the arithmetic mean of the data point values for the specified region (s), and n is the number of data points in the specified region(s).

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (|X_i| - \bar{X})^2}$$

where $|X_i|$ is the magnitude of an I/Q pair, \bar{X} is the mean of the magnitudes for the specified region(s), and n is the number of data points in the specified region(s).

- PPHase - returns the x,y pairs of both rms power (dBm) and arithmetic mean phase (radian) for every specified region and frequency offset (Hz). The number of pairs is defined by the specified number of regions. This parameter can be used for I/Q vector ($n=0$) in Waveform (time domain) measurement and all parameters are specified by data point in PPHase.

The rms power of the specified region may be expressed as:

$$\text{Power} = 10 \times \log [10 \times (\text{RMS I/Q value})] + 10.$$

The RMS I/Q value (peak volts) is:

$$\sqrt{\frac{1}{n} \sum_{X_i \in \text{region}} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region.

The arithmetic mean phase of the specified region may be expressed as:

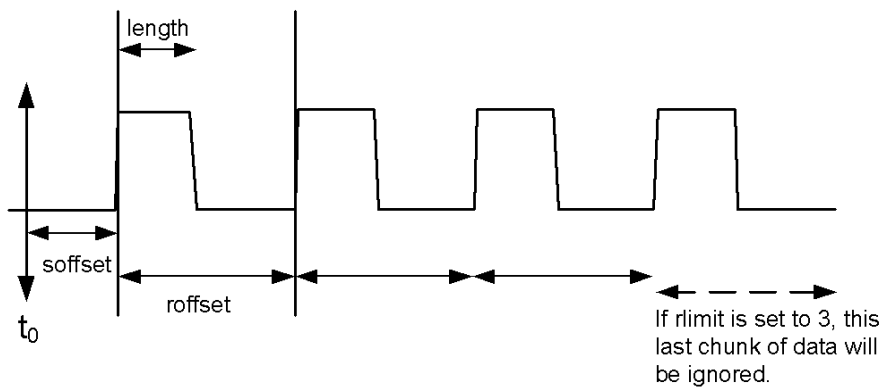
$$\frac{1}{n} \sum_{Y_i \in \text{region}} Y_i$$

where Y_i is the unwrapped phase of I/Q pair with applying frequency correction and n is the number of I/Q pairs in the specified region.

The frequency correction is made by the frequency offset calculated by the arithmetic mean of every specified region's frequency offset. Each frequency offset is calculated by the least square method against the unwrapped phase of I/Q pair.

Sample Trace Data - Constant Envelope

(See below for explanation of variables.)



Sample Trace Data - Not Constant Envelope

(See below for explanation of variables.)



<soffset> - start offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It specifies the amount of data at the beginning of the trace that will be ignored before the decimation process starts. It is the time or frequency change from the start of the trace to the point where you want to start using the data. The default value is zero.

<length> - is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines how much data will be compressed into one value. This parameter has a default value equal to the current trace length.

<roffset> - repeat offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines the beginning of the next field of trace elements to be compressed. This is relative to the beginning of the previous field. This parameter has a default value equal to the <length> variable. Note that this parameter is used for a completely different purpose when curve fitting (see CFIT above).

<rlimit> - repeat limit is an optional integer. It specifies the number of data items that you want returned. It will ignore any additional items beyond that number. You can use the Start offset and the Repeat limit to pick out exactly what part of the data you want to use. The default value is all the data.

Calculate Peaks of Trace Data (Remote Command Only)

Returns a list of all the peaks for the currently selected measurement and sub-opcode [n]. The peaks must meet the requirements of the peak threshold and excursion values.

n = any valid sub-opcode for the current measurement. See the MEASure:<measurement> command description of your specific measurement for information on the data that can be returned.

The command can only be used with specific sub-opcodes with measurement results that are trace data. Both real and complex traces can be searched, but complex traces are converted to magnitude in dBm. In many measurements the sub-opcode n=0, is the raw trace data which cannot be searched for peaks. And Sub-opcode n=1, is often calculated results values which also cannot be searched for peaks.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. If the format is set to INT,32, it returns REAL,32 data.

The command has four types of parameters:

- Threshold (in dBm)
- Excursion (in dB)
- Sorting order (amplitude, frequency, time)
- Optional in some measurements: Display line use (all, > display line, < display line)

Remote Command	<p>For Swept SA measurement:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME[,ALL GTDLine LTDLine]]</pre> <p>For most other measurements:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME]</pre>
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Example	<p>Example for Swept SA measurement in Spectrum Analyzer Mode:</p> <p>CALC:DATA4:PEAK? -40, 10, FREQ, GTDL This will identify the peaks of trace 4 that are above -40 dBm, with excursions of at least 10 dB. The peaks are returned in order of increasing frequency, starting with the lowest frequency. Only the peaks that are above the display line are returned.</p> <p>Query Results 1:</p> <p>With FORMat:DATA REAL, 32 selected, it returns a list of floating-point numbers. The first value in the list is the number of peak points that are in the following list. A peak point consists of two values: a peak amplitude followed by its corresponding frequency (or time).</p> <p>If no peaks are found the peak list will consist of only the number of peaks, (0).</p>
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Notes	<p><n> - is the trace that will be used</p> <p><threshold> - is the level below which trace data peaks are ignored. Note that the threshold value is required and is always used as a peak criterion. To effectively disable the threshold criterion for this command, provide a substantially low threshold value such as -200 dBm. Also note that the threshold value used in this command is independent of and has no effect on the threshold value stored under the Peak Criteria menu.</p> <p><excursion> - is the minimum amplitude variation (rise and fall) required for a signal to be identified as peak. Note that the excursion value is required and is always used as a peak criterion. To effectively disable the excursion criterion for this command, provide the minimum value of 0.0 dB. Also note that the excursion value used in this command is independent of and has no effect on the</p>
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excursion value stored under the Peak Criteria menu.

Values must be provided for threshold and excursion. The sorting and display line parameters are optional (defaults are AMPLitude and ALL).

Note that there is always a Y-axis value for the display line, regardless of whether the display line state is on or off. It is the current Y-axis value of the display line which is used by this command to determine whether a peak should be reported. Sorting order:

AMPLitude - lists the peaks in order of descending amplitude, with the highest peak first (default if optional parameter not sent)

FREQUency - lists the peaks in order of occurrence, left to right across the x-axis.

TIME - lists the peaks in order of occurrence, left to right across the x-axis.

Peaks vs. Display Line:

ALL - lists all of the peaks found (default if optional parameter not sent).

GTDLine (greater than display line) - lists all of the peaks found above the display line.

LTDLine (less than display line) - lists all of the peaks found below the display line.

Initial S/W Revision Prior to A.02.00

Format Data: Numeric Data (Remote Command Only)

This command specifies the format of the trace data input and output. It specifies the formats used for trace data during data transfer across any remote port. It affects only the data format for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]?, :CALCulate:DATA[n]? and FETCh:SANalyzer[n]? commands and queries.

Remote Command :FORMat[:TRACe][:DATA] ASCii|INTeger,32|REAL,32 |REAL,64
:FORMat[:TRACe][:DATA]?

Notes The query response is:
ASCii: ASC,8
REAL,32: REAL,32
REAL,64: REAL,64
INTeger,32: INT,32

When the numeric data format is REAL or ASCii, data is output in the current Y Axis unit. When the data format is INTeger, data is output in units of m dBm (.001 dBm).

The INT,32 format returns binary 32-bit integer values in internal units (m dBm), in a definite length block.

Dependencies Sending a data format spec with an invalid number (for example, INT,48) generates no error. The analyzer simply uses the default (8 for ASCii, 32 for INTeger, 32 for REAL).

Sending data to the analyzer which does not conform to the current FORMat specified, results in an error. Sending ASCII data when a definite block is expected generates message -161 "Invalid Block Data" and sending a definite block when ASCII data is expected generates message -121 "Invalid Character in Number".

Preset ASCii

Backwards Compatibility Notes Note that the INT,32 format is only applicable to the command, TRACe:DATA. This preserves backwards compatibility for the Swept SA measurement. For all other commands/queries which honor FORMat:DATA, if INT,32 is sent the analyzer will behave as though it were set to REAL,32.

Initial S/W Revision Prior to A.02.00

The specs for each output type follow:

ASCIi - Amplitude values are in ASCII, in the current Y Axis Unit, one ASCII character per digit, values separated by commas, each value in the form:

SX.YYYYYEsZZ

Where:

S = sign (+ or -)

X = one digit to left of decimal point

Y = 5 digits to right of decimal point

E = E, exponent header

s = sign of exponent (+ or -)

ZZ = two digit exponent

REAL,32 - Binary 32-bit real values in the current Y Axis Unit, in a definite length block.

REAL,64 - Binary 64-bit real values in the current Y Axis Unit, in a definite length block.

Format Data: Byte Order (Remote Command Only)

This command selects the binary data byte order for data transfer and other queries. It controls whether binary data is transferred in normal or swapped mode. This command affects only the byte order for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]? , :CALCulate:DATA[n]? and FETCh:SANalyzer[n]? commands and queries.

By definition any command that says it uses FORMat:DATA uses any format supported by FORMat:DATA.

The NORMal order is a byte sequence that begins with the most significant byte (MSB) first, and ends with the least significant byte (LSB) last in the sequence: 1|2|3|4. SWAPped order is when the byte sequence begins with the LSB first, and ends with the MSB last in the sequence: 4|3|2|1.

Remote Command	:FORMat:BORDER NORMal SWAPped :FORMat:BORDER?
Preset	NORMal
Initial S/W Revision	Prior to A.02.00

Meas Setup

Displays the measurement setup menu for the currently selected measurement.

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Avg/Hold Num

Sets the number of bursts that are averaged. After the specified number of bursts (average counts), the averaging mode (termination control) setting determines the averaging action.

Key Path	Meas Setup
Mode	GSM
Remote Command	[:SENSe]:EPVTime:AVERage:COUNT <integer> [:SENSe]:EPVTime:AVERage:COUNT? [:SENSe]:EPVTime:AVERage[:STATe] OFF ON 0 1 [:SENSe]:EPVTime:AVERage[:STATe]?
Example	EPVT:AVER:COUN 3 EPVT:AVER:COUN? EPVT:AVER 1 EPVT:AVER?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Preset	10 OFF
State Saved	Saved in instrument state.
Min	1
Max	10000
Initial S/W Revision	Prior to A.02.00

Avg Mode

Selects the type of termination control used for the averaging function. This selection only affects the averaging after the number of N averages is reached (set using the Averages, Avg Bursts, or Avg Number key).

Mode	SCPI	Description
Exponential averaging	EXPOnential	When Measure is set at Cont, data acquisitions continue indefinitely. After N averages, exponential averaging is used with a weighting factor of N (the displayed average count stops at N). Exponential averaging weights new data

Mode	SCPI	Description
		more than old data, which allows tracking of slow-changing signals. The weighting factor N is set using the Averages, Avg Bursts key.
Repeat averaging	REPeat	When Measure is set at Cont, data acquisitions continue indefinitely. After N averages is reached, all previous result data is cleared and the average count is set back to 1. This is equivalent to being in Measure Single and pressing the Restart key when the Single measurement finishes.

Key Path	Meas Setup
Mode	GSM
Remote Command	[:SENSe] :EPVTime :AVERAge :TCONtrol EXPonential REPEAT [:SENSe] :EPVTime :AVERAge :TCONtrol ?
Example	EPVT:AVER:TCON REP EPVT:AVER:TCON?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	EXPonential
State Saved	Saved in instrument state.
Range	Exp Repeat
Initial S/W Revision	Prior to A.02.00

Avg Type

Selects the averaging type, according to the following alternatives:

Key	SCPI	Type
Pwr Avg (RMS)	RMS	True power averaging that is equivalent to taking the RMS value of the voltage. It is the most accurate type of averaging.
Log-Pwr Avg (Video)	LOG	Simulates the traditional spectrum analyzer type of averaging by averaging the log of the power.
None	MAXimum	Keeps track of the maximum values.
None	MINimum	Keeps track of the minimum values.
None	MXMinimum	Keeps track of the maximum and minimum values.

Key Path	Meas Setup
Mode	GSM
Remote Command	[:SENSe] :EPVTime :AVERAge :TYPE LOG RMS MAXimum MINimum MXMinimum [:SENSe] :EPVTime :AVERAge :TYPE ?
Example	EPVT:AVER:TYPE RMS

	EPVT:AVER:TYPE?
Notes	Maximum Minimum Max&Min can be selected only via SCPI. You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Couplings	Selecting MAXimum MINimum MXMinimum forces to visible "Max Hold Trace" on page 595 or and "Min Hold Trace" on page 595. Measure Trace stays in RMS or Video average state.
Preset	LOG
State Saved	Saved in instrument state.
Range	Pwr Avg(RMS) Log-Pwr Avg(Video)
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

Meas Time

Allows you to measure more than one timeslot. Enter a value in integer increments of "slots" with a range of 1 to 8. The actual measure time, in μs , is set somewhat longer than the specified number of slots, to view the complete burst.

Key Path	Meas Setup
Mode	GSM
Remote Command	[:SENSe] :EPVTime :SWEep :TIME <integer> [:SENSe] :EPVTime :SWEep :TIME?
Example	EPVT:SWE:TIME 8 EPVT:SWE:TIME?
Notes	The actual sweep time may be slightly larger than required SweepTime due to limited trace point resolution, this is a hardware dependency. You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Couplings	Scale/Div of X scale of Multi Slot View varies according to this value. Scale/Div should be adjusted to show set meas time.
Preset	1 slot
State Saved	Saved in instrument state.
Min	1
Max	8
Backwards Compatibility SCPI	[:SENSe] :EPVTime :MTime
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.02.00

Burst Sync

Allows you to choose the source used to synchronize the measurement to the “T0” point of the EDGE burst. The “T0” point is defined as the time point of the transition from bit 13 to bit 14 of the midamble training sequence for a given time slot. The Burst Search Threshold setting (in the Mode Setup keys under Demod menu) applies to both Training Seq and RF Amptd. Pressing the Burst Sync key brings up a menu with some or all of the following choices:

- Training Seq (SCPI: TSEquence)
- RF Amptd (SCPI: RFBurst)
- None (SCPI: NONE)

The modulation scheme auto detection doesn't work when either RF Amptd or None is selected. Burst Type and the modulation schemes for NB and HB determine the mask type used in this case.

Key Path	Meas Setup
Mode	GSM
Remote Command	[:SENSe] :EPVTime :BSYNc :SOURce TSEquence RFBurst NONE [:SENSe] :EPVTime :BSYNc :SOURce ?
Example	EPVT:BSYN:SOUR NONE EPVT:BSYN:SOUR?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When Burst Type in the Mode Setup menu is set to Mixed, this menu key is grayed out and Training Sequence (TSC) is used for synchronization. The "Training Seq" is shown on Meas Bar. The sync algorithm always runs in Training Sequence (TSC) synchronization mode in case of "Mixed" because Burst Type can be determined by looking at TSC in the signal. Original selection of Burst Sync becomes effective again when Burst Type selection is changed from "Mixed" to another one. If the selected Burst Sync is "NONE", the key " Timeslot Length " on page 535 becomes active. Otherwise the key is grayed-out.
Preset	TSEquence
State Saved	Saved in instrument state.
Range	Training Seq RF Amptd None
Initial S/W Revision	Prior to A.02.00

IF Gain

To take full advantage of the RF dynamic range of the analyzer, a switched IF amplifier with approximately 10 dB of gain is available. When it can be turned on without an overload, the dynamic range is always better with it on than off. The IF Gain key can be used to set the IF Gain function to Auto, or to On (the extra 10 dB) or Off. These settings affect sensitivity and IF overloads.

Key Path	Meas Setup
Initial S/W Revision	Prior to A.02.00

IF Gain Auto

Activates the auto rules for IF Gain

Key Path	Meas Setup
Mode	GSM
Remote Command	[:SENSe] :EPVTime : IF : GAIN : AUTO [: STATe] ON OFF 1 0 [:SENSe] :EPVTime : IF : GAIN : AUTO [: STATe] ?
Example	EPVT:IF:GAIN:AUTO ON EPVT:IF:GAIN:AUTO?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Couplings	When either the auto attenuation works (for example, with electrical attenuator), or the optimize mechanical attenuator range is requested, the IF Gain setting is changed as following rule. 'auto' sets IF Gain High under any of the following conditions: the input attenuator is set to 0 dB, the preamp is turned on, or the Max Mixer Level is -20 dBm or lower. For other settings, auto sets IF Gain to Low.
Preset	OFF
State Saved	Saved in instrument state.
Range	Auto Man
Initial S/W Revision	Prior to A.02.00

IF Gain State

Selects the range of IF gain.

Key Path	Meas Setup, IF Gain
Mode	GSM
Remote Command	[:SENSe] :EPVTime : IF : GAIN [: STATe] ON OFF 1 0 [:SENSe] :EPVTime : IF : GAIN [: STATe] ?
Example	EPVT:IF:GAIN ON EPVT:IF:GAIN?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode. where ON = high gain OFF = low gain
Couplings	Couple to "IF Gain Auto" on page 531 force it to Man.
Preset	OFF
State Saved	Saved in instrument state.
Range	Low Gain (Best for Large Signals) High Gain (Best Noise Level)
Initial S/W Revision	Prior to A.02.00

Limit Test

Turns on or off limit pass/fail testing. Does not affect the limit line display.

Key Path	Meas Setup
Mode	GSM
Remote Command	:CALCulate:EPVTime:LIMit:TEST[:STATe] OFF ON 0 1 :CALCulate:EPVTime:LIMit:TEST[:STATe]?
Example	CALC:EPVT:LIM:TEST ON CALC:EPVT:LIM:TEST?
Notes	If set to On, the measurement results are checked against the PVT Limit parameter to see if they meet the limit requirements. If set to Off, the PASS/FAIL indicator on the Meas Bar goes blank. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Backwards Compatibility SCPI	[:SENSe]:EPVTime:LIMit:TEST
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.02.00

Limit Mask

Allows you to select Limit Mask type, against which the measured data is compared.

For custom, see also:

- ["Lower Mask Absolute Amplitude Levels" on page 537](#)
- ["Lower Mask Points" on page 537](#)
- ["Lower Mask Relative Amplitude Levels" on page 538](#)
- ["Lower Mask Time Points" on page 538](#)
- ["Upper Mask Absolute Amplitude Levels" on page 539](#)
- ["Upper Mask Points" on page 539](#)
- ["Upper Mask Relative Amplitude Levels" on page 539](#)
- ["Upper Mask Time Points" on page 540](#)

Key	SCPI	Mask
Standard	STANdard	The measurement algorithm uses standard-defined limit mask.
Custom	CUSTom	The measurement algorithm uses user-defined custom limit mask.

Key Path	Meas Setup
Mode	GSM
Remote Command	<code>[:SENSe] :EPVTime:MASK:SElect STANdard CUSTom</code> <code>[:SENSe] :EPVTime:MASK:SElect?</code>
Example	EPVT:MASK:SEL STAN EPVT:MASK:SEL?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	STANdard
State Saved	Saved in instrument state.
Range	Std Custm
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.02.00

Advanced

Accesses advanced features. These features are recommended for use only by advanced users.

Key Path	Meas Setup
Initial S/W Revision	A.02.00

Ref Pwr Type

Pressing the Ref Pwr Type key allows you to choose the type of a reference power used for a limit mask. Pressing this key brings up a menu with some or all of the following choices:

- Useful Part (SCPI: UPART)
- Midamble (SCPI: MAMBLE)
- Estimated (SCPI: ESTimated)
- Tailbits (SCPI: TBITs)

Key Path	Meas Setup, Advanced
Mode	GSM
Remote Command	<code>[:SENSe] :EPVTime:MASK:RPOwer:TYPE UPART MAMBLE ESTimated TBITs</code> <code>[:SENSe] :EPVTime:MASK:RPOwer:TYPE?</code>

Example	EPVT:MASK:RPOW:TYPE UPAR EPVT:MASK:RPOW:TYPE?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	If the Burst Sync is set to "TSEQUence", the soft key "Estimated" becomes enabled. Otherwise the key is unavailable.
Preset	UPARt
State Saved	Saved in instrument state.
Range	Useful Part Midamble Estimated Tailbits
Initial S/W Revision	A.02.00
Modified at S/W Revision	A.03.00

Ref Power

Allows you to manually set the reference power for time mask.

Key Path	Meas Setup, Advanced
Mode	GSM
Remote Command	[:SENSe] :EPVTime:MASK:RPOWer <ampl> [:SENSe] :EPVTime:MASK:RPOWer? [:SENSe] :EPVTime:MASK:RPOWer:AUTO [:STATe] OFF ON 0 1 [:SENSe] :EPVTime:MASK:RPOWer:AUTO [:STATe] ?
Example	EPVT:MASK:RPOW -20 EPVT:MASK:RPOW? EPVT:MASK:RPOW:AUTO 0 EPVT:MASK:RPOW:AUTO?
Preset	-10 ON
State Saved	Saved in instrument state.
Min	-200
Max	200
Initial S/W Revision	A.02.00

Ref Pwr Offset

Allows you to set the reference power offset for time mask. The upper/lower mask amplitude level is calculated by adding the offset to the reference power for the specified mask reference power type. The offset doesn't have impact on the reference power displayed in the numeric results window. This UI is available only when the reference power state is set to AUTO.

Key Path	Meas Setup, Advanced
Mode	GSM
Remote Command	<code>[:SENSe] :EPVTime:MASK:RPOWer:OFFSet <rel_ampl></code> <code>[:SENSe] :EPVTime:MASK:RPOWer:OFFSet?</code>
Example	EPVT:MASK:RPOW:OFFS 1 EPVT:MASK:RPOW:OFFS?
Couplings	If the Ref Power State is set to "MAN", this soft key is grayed-out.
Preset	0
State Saved	Saved in instrument state.
Min	-200
Max	200
Initial S/W Revision	A.03.00

Timeslot Length

Allows you to change how the limit mask applies for each slot, when in a multi-slot measurement.

Key	SCPI	Operation
Even	EVEN	The measurement algorithm generates limit mask with the same slot length. All slots have 156.25 symbol
Not Even	INTEger	The measurement algorithm generates limit mask for slot 0 and 4 with slot length 157 symbol. And, the algorithm generates limit mask for slot 1, 2, 3, 5, 6, 7 with slot length 156 symbol. Slot 0 here is simply the first slot in the captured data, not the absolute slot determined by training sequence number.

Key Path	Meas Setup, Advanced
Mode	GSM
Remote Command	<code>[:SENSe] :EPVTime:BSYNc:SLENgth EVEN INTEger</code> <code>[:SENSe] :EPVTime:BSYNc:SLENgth?</code>
Example	EPVT:BSYN:SLEN INT EPVT:BSYN:SLEN?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This parameter is available only when the Burst Sync type is None. Otherwise it is grayed out.
Preset	INTEger
State Saved	Saved in instrument state.
Range	Even Not Even

Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.02.00

Custom Mask Slot

Allows you to choose whether Custom Mask is applied to the 1st active slot only or to all active slots.

Key Path	Meas Setup, Advanced
Mode	GSM
Remote Command	[:SENSe] :EPVTime :MASK :CUSTom [:TYPE] FASLot AASLots [:SENSe] :EPVTime :MASK :CUSTom [:TYPE] ?
Example	EPVT:MASK:CUST AASL EPVT:MASK:CUST?
Preset	AASLots
State Saved	Saved in instrument state.
Range	To First Active Slot Only To All Active Slots
Readback Text	First Active Slot All Active Slots
Initial S/W Revision	A.07.00

Meas Preset

Restores all the measurement parameters to their default values.

Key Path	Meas Setup
Mode	GSM
Remote Command	:CONFigure:EPVTime
Example	CONF:EPVT
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode
Initial S/W Revision	Prior to A.02.00

Custom Limit Mask (Remote Commands Only)

The following Remote Only commands in this section define the custom limit mask:

- ["Lower Mask Absolute Amplitude Levels" on page 537](#)
- ["Lower Mask Points" on page 537](#)
- ["Lower Mask Relative Amplitude Levels" on page 538](#)
- ["Lower Mask Time Points" on page 538](#)
- ["Upper Mask Absolute Amplitude Levels" on page 539](#)

- "Upper Mask Points" on page 539
- "Upper Mask Relative Amplitude Levels" on page 539
- "Upper Mask Time Points" on page 540

Lower Mask Absolute Amplitude Levels

Allows you to enter a power level for any of your mask line segments that require an absolute minimum power limit in addition to its relative limit. Each time a measurement is made, the Ref Level is determined. As the power of the Ref Level changes, all of the relative mask power levels change by the same amount.

Each relative limit is then compared to the Ref Level and an equivalent absolute power level is calculated. This power level is compared to the specified absolute limit for each line segment. If this calculated relative limit is lower than the specified absolute limit, then the value of the absolute limit is used for this segment. Therefore, if the absolute reference limit is set to a very low value, the calculated value of the reference limit is never lower, and the specified relative limit is always used for the segment.

Every time point you defined with EPVT:MASK:LOW:TIME must have a power value defined in the same order.

Remote Command	[:SENSe] :EPVTime:MASK:LIST:LOWer:ABSolute <real>, ... [:SENSe] :EPVTime:MASK:LIST:LOWer:ABSolute?
Example	EPVT:MASK:LIST:LOW:ABS 0,-10,-60 EPVT:MASK:LIST:LOW:ABS?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	Relative Amplitude Levels are also changed when this value has been set.
Preset	-200,-200
State Saved	Saved in instrument state.
Min	-200 dBm
Max	100 dBm
Initial S/W Revision	Prior to A.02.00

Lower Mask Points

Queries the number of elements in the lower mask. This value is determined by the number of time points entered by EPVT:MASK:LIST:LOW:TIME.

Remote Command	[:SENSe] :EPVTime:MASK:LIST:LOWer:POINTs?
Example	EPVT:MASK:LIST:LOW:POIN?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. Query only.
Initial S/W Revision	Prior to A.02.00

Lower Mask Relative Amplitude Levels

Allows you to enter the relative power level for each horizontal line segment in the lower limit mask. There should be a power level for each time point entered using [:SENSe]:EPVTime:MASK:LIST:LOWer:TIME, and they must be entered in the same order. These power levels are all relative to the defined Reference Power Level (the average power in the useful part of the data). When an upper and lower limit mask have been defined, the Reference Power Level is the mid-point between these two limits at time T0.

Any portion of the signal that has no limit line segment defined for it defaults to a very low limit (-100dB relative to the reference power). This keeps the measurement from indicating a failure for that portion of the data.

Remote Command	[:SENSe]:EPVTime:MASK:LIST:LOWer:RELative <rel_ampl>, ... [:SENSe]:EPVTime:MASK:LIST:LOWer:RELative?
Example	EPVT:MASK:LIST:LOW:REL -200,-200 EPVT:MASK:LIST:LOW:REL?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	Absolute Amplitude Levels are also changed when this value has been set.
Preset	-200,-200
State Saved	Saved in instrument state.
Min	-200
Max	200
Initial S/W Revision	Prior to A.02.00

Lower Mask Time Points

Allows you to enter the time points that define the horizontal line segments for the lower limit. A reference point designated "t0" is at the center of the useful data (usually the center of the burst). Each line segment to the right of the t0 reference point is designated as a positive time value and each segment to the left of t0 reference point is a negative time value.

First enter positive values in sequence starting from t0, then negative values in sequence starting from t0.

Remote Command	[:SENSe]:EPVTime:MASK:LIST:LOWer:TIME <seconds>, ... [:SENSe]:EPVTime:MASK:LIST:LOWer:TIME?
Example	EPVT:MASK:LIST:LOW:TIME 1,1 EPVT:MASK:LIST:LOW:TIME?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	1,-1
State Saved	Saved in instrument state.
Min	-1 s
Max	1 s
Initial S/W Revision	Prior to A.02.00

Upper Mask Absolute Amplitude Levels

Allows you to enter a power level for any of your mask line segments that require an absolute minimum power limit in addition to its relative limit. Each time a measurement is made, the Ref Level is determined (This is the power level of the useful part of the burst, or midway between the upper/lower masks). Remember that, as the power of the Ref Level changes, all of the relative mask power levels changes by the same amount.

Each relative limit is then compared to the Ref Level and an equivalent absolute power level is calculated. This power level is compared to the specified absolute limit for each line segment. If this calculated relative limit is higher than the specified absolute limit, then the value of the absolute limit is used for this segment. Therefore, if the absolute reference limit is set to a very low value (-200 dBm), the calculated value of the reference limit is never lower, and the specified relative limit is always used for the segment.

Every time point you defined with EPVT:MASK:UPP:TIME must have a power value defined in the same order.

Remote Command	<code>[:SENSe] :EPVTime:MASK:LIST:UPPer:ABSolute <real>, ...</code> <code>[:SENSe] :EPVTime:MASK:LIST:UPPer:ABSolute?</code>
Example	EPVT:MASK:LIST:UPP:ABS -200, -200, -58, -200, -200, -200, -200, -58, -200 EPVT:MASK:LIST:UPP:ABS?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Couplings	Relative Amplitude Levels are also changed when this value has been set.
Preset	-200,-200
State Saved	Saved in instrument state.
Min	-200
Max	100
Initial S/W Revision	Prior to A.02.00

Upper Mask Points

Queries the number of elements in the upper mask. This value is determined by the number of time points entered by EPVT:MASK:LIST:UPP:TIME.

Remote Command	<code>[:SENSe] :EPVTime:MASK:LIST:UPPer:POINts?</code>
Example	EPVT:MASK:LIST:UPP:POIN?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode. Query only.
Initial S/W Revision	Prior to A.02.00

Upper Mask Relative Amplitude Levels

Allows you to enter the relative power level for each horizontal line segment in the upper limit mask. There should be a power level for each time point entered using [:SENSe]:EPVTime:MASK:LIST:UPPer:TIME, and

they must be entered in the same order. These power levels are all relative to the defined Reference Power Level (the average power in the useful part of the data). When an upper and lower limit mask have been defined, the Reference Power Level is the mid-point between these two limits.

Remote Command	<code>[:SENSe] :EPVTime :MASK :LIST :UPPer :RELative <rel_ampl>, ...</code> <code>[:SENSe] :EPVTime :MASK :LIST :UPPer :RELative?</code>
Example	<code>EPVT:MASK:LIST:UPP:REL 4, -32, -48, 100, 4, 7, -25, -43, 100</code> <code>EPVT:MASK:LIST:UPP:REL?</code>
Notes	You must be in the GSM mode to use this command. Use <code>INSTRument:SElect</code> to set the mode.
Couplings	Absolute Amplitude Levels are also changed when this value has been set.
Preset	100,100
State Saved	Saved in instrument state.
Min	-200
Max	200
Initial S/W Revision	Prior to A.02.00

Upper Mask Time Points

Allows you to enter the time points that define the horizontal line segments for the upper limit. A reference point designated “t0” is at the center of the useful data (usually the center of the burst). Each line segment to the right of the t0 reference point is designated as a positive time value and each segment to the left of t0 is a negative time value.

First enter positive values in sequence starting from t0, then the negative values in sequence starting from t0.

We recommend that you select a large time value for your first and last mask points (for example, -1 and +1 second). This guarantees that you have defined a limit for all the measured data.

Remote Command	<code>[:SENSe] :EPVTime :MASK :LIST :UPPer :TIME <seconds>, ...</code> <code>[:SENSe] :EPVTime :MASK :LIST :UPPer :TIME?</code>
Example	<code>EPVT:MASK:LIST:UPP:TIME 1,-1</code> <code>EPVT:MASK:LIST:UPP:TIME?</code>
Notes	You must be in the GSM mode to use this command. Use <code>INSTRument:SElect</code> to set the mode.
Preset	1,-1
State Saved	Saved in instrument state.
Min	-1 s
Max	1 s
Initial S/W Revision	Prior to A.02.00

Lower Limit within Useful Part (Remote Commands Only)

Limit Mask Useful Part Lower Normal

According to the Standards, the lower limit within the useful part of normal duration bursts (NB) is seen as undefined for 16-QAM and 32-QAM. The lower limit (red in the Figure 1) is set to -200 by default. This command allows you to set the lower limit as you like. Only SCPI remote command is supported. Note that the lower limit is shared in the BTS and MS modes.

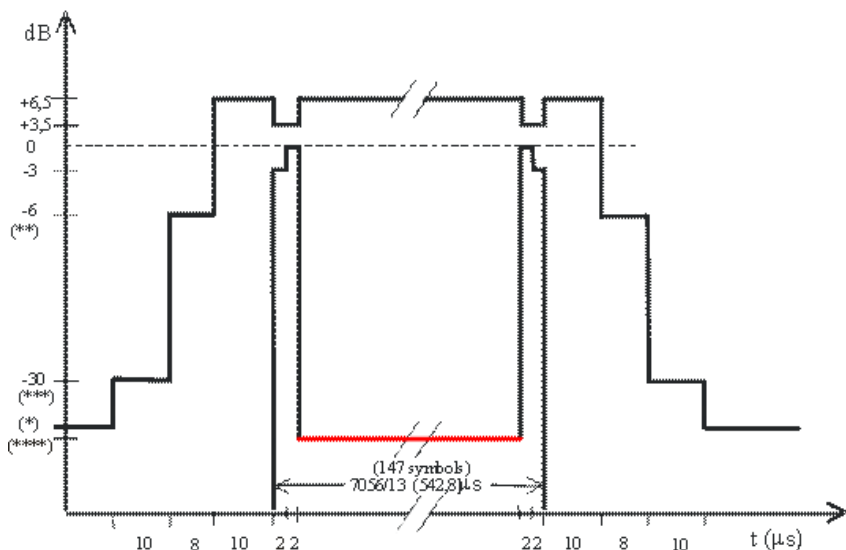


Figure 1 0-1 Time mask for normal duration bursts (NB) at 16-QAM and 32-QAM modulation at normal symbol rate

Mode	GSM
Remote Command	<code>[:SENSe]:EPVTime:MASK[:UPART]:LOWer:NORMal QAM16 QAM32, <rel_ampl></code> <code>[:SENSe]:EPVTime:MASK[:UPART]:LOWer:NORMal? QAM16 QAM32</code>
Example	<code>EPVT:MASK:LOW:NORM QAM16, -40</code> <code>EPVT:MASK:LOW:NORM? QAM16</code>
Notes	You must be in the GSM mode to use this command. Use <code>INSTRument:SElect</code> to set the mode.
Preset	-200
State Saved	Saved in instrument state.
Min	-200
Max	200
Initial S/W Revision	A.02.00

Limit Mask Useful Part Lower Higher Symbol Rate

According to the Standards, the lower limit within the useful part for higher symbol rate bursts (HB) is seen as undefined for 16-QAM and 32-QAM. The lower limit (red in the Figure 2) is set to -200 by default. This

command allows you to set the lower limit as you like. Only SCPI remote command is supported. Note that the lower limit is shared in the BTS and MS modes and in the narrow and wide pulse shaping filter modes.

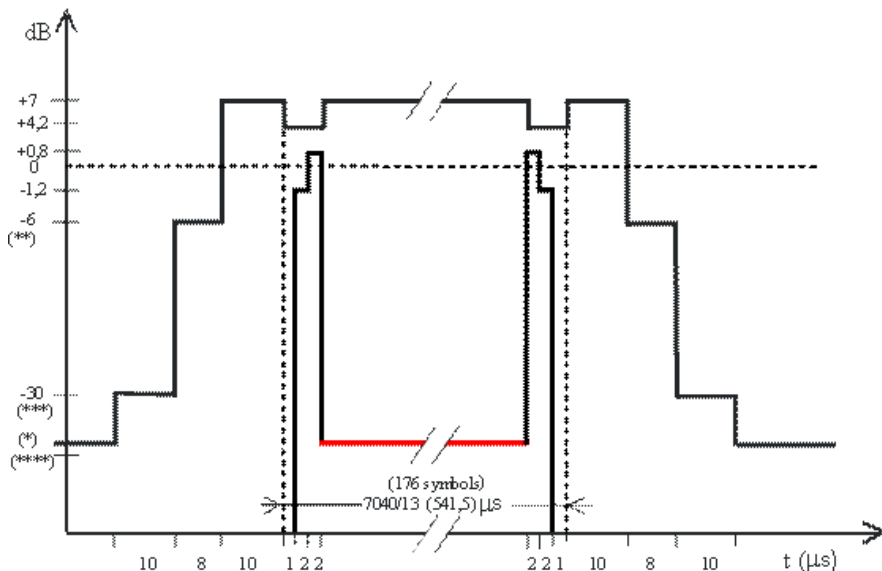


Figure 2 0-2 Time mask for higher symbol rate bursts (HB) at 16-QAM and 32-QAM modulation with narrow pulse shaping filter

Mode	GSM
Remote Command	[[:SENSE]:EPVTime:MASK[:UPart]:LOWer:HSRate QAM16 QAM32, <rel_ampl> [:SENSE]:EPVTime:MASK[:UPart]:LOWer:HSRate? QAM16 QAM32
Example	EPVT:MASK:LOW:HSR QAM16, -40 EPVT:MASK:LOW:HSR? QAM16
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	-200
State Saved	Saved in instrument state.
Min	-200
Max	200
Initial S/W Revision	A.02.00

Mode

See "Mode" on page 274

Mode Preset

Returns the active mode to a known state.

Mode Preset does the following for the currently active mode:

- Aborts the currently running measurement.
- Brings up the default menu for the mode, with no active function.
- Sets measurement Global settings to their preset values for the active mode only.
- Activates the default measurement.
- Brings up the default menu for the mode.
- Clears the input and output buffers.
- Sets Status Byte to 0.

Mode Preset does not:

- Cause a mode switch
- Affect mode persistent settings
- Affect system settings

See "[How-To Preset](#)" on page 545 for more information.

Key Path	Front-panel key
Remote Command	:SYSTem:PRESet
Example	:SYST:PRES
Notes	*RST is preferred over :SYST:PRES for remote operation. *RST does a Mode Preset, as done by the :SYST:PRES command, and it sets the measurement mode to Single measurement rather than Continuous for optimal remote control throughput. Clears all pending OPC bits. The Status Byte is set to 0.
Couplings	A Mode Preset aborts the currently running measurement, activates the default measurement, and gets the mode to a consistent state with all of the default couplings set.
Backwards Compatibility Notes	In the X-Series, the legacy "Factory Preset" has been replaced with Mode Preset, which only presets the currently active mode, not the entire instrument. In the X-Series, the way to preset the entire instrument is by using System, Restore System Defaults All, which behaves essentially the same way as restore System Defaults does on ESA and PSA. There is also no "Preset Type" as there is on the PSA. There is a green Mode Preset front-panel key that does a Mode Preset and a white-with-green-letters User Preset front-panel key that does a User Preset. The old PRESet:TYPE command is ignored (without generating an error), and SYST:PRES without a parameter does a Mode Preset, which should cover most backward code compatibility issues. The settings and correction data under the Input/Output front-panel key (examples: Input Z Corr, Ext Amp Gain, etc.) are no longer part of any Mode, so they will not be preset by a Mode Preset. They are preset using Restore Input/Output Defaults, Restore System Defaults All. Note that because User Preset does a Recall State, and all of these settings are saved in State, they ARE recalled when using

	User Preset.
Initial S/W Revision	Prior to A.02.00

How-To Preset

The table below shows all possible presets, their corresponding SCPI commands and front-panel access (key paths). Instrument settings depend on the current measurement context. Some settings are local to the current measurement, some are global (common) across all the measurements in the current mode, and some are global to all the available modes. In a similar way, restoring the settings to their preset state can be done within the different contexts.

Auto Couple - is a measurement local key. It sets all Auto/Man parameter couplings in the measurement to Auto. Any Auto/Man selection that is local to other measurements in the mode will not be affected.

Meas Preset - is a measurement local key. Meas Preset resets all the variables local to the current measurement except the persistent ones.

Mode Preset - resets all the current mode's measurement local and measurement global variables except the persistent ones.

Restore Mode Defaults - resets ALL the Mode variables (and all the Meas global and Meas local variables), including the persistent ones.

Type Of Preset	SCPI Command	Front Panel Access
Auto Couple	:COUPlE ALL	Auto Couple front-panel key
Meas Preset	:CONFIgure:<Measurement>	Meas Setup Menu
Mode Preset	:SYSTem:PRESet	Mode Preset (green key)
Restore Mode Defaults	:INSTrument:DEFault	Mode Setup Menu
Restore All Mode Defaults	:SYSTem:DEFault MODEs	System Menu; Restore System Default Menu
*RST	*RST	not possible (Mode Preset with Single)
Restore Input/Output Defaults	:SYSTem:DEFault INPut	System Menu; Restore System Default Menu
Restore Power On Defaults	:SYSTem:DEFault PON	System Menu; Restore System Default Menu
Restore Alignment Defaults	:SYSTem:DEFault ALIGn	System Menu; Restore System Default Menu
Restore Miscellaneous Defaults	:SYSTem:DEFault MISC	System Menu; Restore System Default Menu
Restore All System Defaults	:SYSTem:DEFault [ALL] :SYSTem:PRESet:PERSistent	System Menu; Restore System Default Menu
User Preset	:SYSTem:PRESet:USER	User Preset Menu
User Preset All Modes	:SYSTem:PRESet:USER:ALL	User Preset Menu

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Mode Preset

Power On Mode Preset	:SYSTem:PON:TYPE MODE	System Menu
Power On User Preset	:SYSTem:PON:TYPE USER	System Menu
Power On Last State	:SYSTem:PON:TYPE LAST	System Menu

Mode Setup

See ["Mode Setup" on page 294](#)

Peak Search

Places the selected marker on the trace point with the maximum y-axis value for that marker's trace. Pressing Peak Search with the selected marker off causes the selected marker to be set to Normal, then a peak search is immediately performed.

Key Path	Front-panel key
Mode	GSM
Remote Command	:CALCulate:EPVTime:MARKer[1] 2 ...12:MAXimum
Example	CALC:EPVT:MARK2:MAX
Initial S/W Revision	Prior to A.02.00

Min Peak Search (Backwards Compatibility/Remote Command Only)

Mode	GSM
Remote Command	:CALCulate:EPVTime:MARKer[1] 2 ...12:MINimum
Example	CALC:EPVT:MARK:MIN
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Initial S/W Revision	Prior to A.02.00

Print

See "Print" on page 325

Quick Save

The Quick Save front-panel key repeats the most recent save that was performed from the Save menu, with the following exceptions:

- Register saves are not remembered as Saves for the purpose of the Quick Save function
- If the current measurement does not support the last non-register save that was performed, an informational message is generated, “File type not supported for this measurement”

Quick Save repeats the last type of qualified save (that is, a save qualified by the above criteria) in the last save directory by creating a unique filename using the Auto File Naming algorithm described below.

If Quick Save is pressed after startup and before any qualified Save has been performed, the Quick Save function performs a Screen Image save using the current settings for Screen Image saves (current theme, current directory), which then becomes the “last save” for the purpose of subsequent Quick Saves.

The Auto File Naming feature automatically generates a file name for use when saving a file. The filename consists of a prefix and suffix separated by a dot, as is standard for the Windows® file system. A default prefix exists for each of the available file types:

Type	Default Prefix	Menu
State	State_	(Save/Recall)
Trace + State	State_	(Save/Recall)
Screen	Screen_	(Save/Recall)
Amplitude Corrections	Ampcor_	(Import/Export)
Traces	Trace_	(Import/Export)
Limit Lines	LLine_	(Import/Export)
Measurement Result	MeasR_	(Import/Export)
Capture Buffer	CapBuf_	(Import/Export)

A four digit number is appended to the prefix to create a unique file name. The numbering sequence starts at 0000 within each Mode for each file type and updates incrementally to 9999, then wraps to 0000 again. It remembers where it was through a Mode Preset and when leaving and returning to the Mode. It is reset by Restore Misc Defaults and Restore System Defaults and subsequent running of the instrument application. So, for example, the first auto file name generated for State files is State_0000.state. The next is State_0001, and so forth.

One of the key features of Auto File Name is that we guarantee that the Auto File Name will never conflict with an existing file. The algorithm looks for the next available number. If it gets to 9999, then it looks for holes. If it find no holes, that is no more numbers are available, it gives an error.

For example, if when we get to State_0010.state there is already a State_0010.state file in the current directory, it advances the counter to State_0011.state to ensure that no conflict will exist (and then it verifies that State_0011.state also does not exist in the current directory and advances again if it does, and so forth).

If you enter a file name for a given file type, then the prefix becomes the filename you entered instead of the default prefix, followed by an underscore. The last four letters (the suffix) are the 4-digit number.

For example, if you save a measurement results file as “fred.csv”, then the next auto file name chosen for a measurement results save will be fred_0000.csv.

NOTE

Although 0000 is used in the example above, the number that is used is actually the current number in the Meas Results sequence, that is, the number that would have been used if you had not entered your own file name.

NOTE

If the filename you entered ends with _dddd, where d=any number, making it look just like an auto file name, then the next auto file name picks up where you left off with the suffix being dddd + 1.

Key Path	Front-panel key
Notes	No remote command for this key specifically.
Initial S/W Revision	Prior to A.02.00

Recall

The Recall menu lets you choose what you want to recall, and where you want to recall it from. Among the types of files you can recall are **States and Traces**. In addition, an Import (Data) option lets you recall a number of data types stored in CSV files (as used by Excel and other spreadsheet programs).

The default paths for Recall are data type dependent and are the same as for the Save key.

Key Path	Front-panel key
Notes	<p>No remote command for this key specifically, but the :MMEM:LOAD command is available for specific file types. An example is :MMEM:LOAD:STATE <filename>.</p> <p>If you try to recall a State file for a mode that is not licensed or not available in the instrument, an error message will occur and the state will not change.</p>
Backwards Compatibility Notes	<p>In legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly (since User Preset is actually loading a state), it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, “state” always includes all of this data; so whenever state is loaded, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p>
Backwards Compatibility Notes	<p>Recall for the X-Series supports backward compatibility in the sense that you can recall a state file from any X-Series model number and any version of X-Series software. This is only possible if part of the recalling process goes through a limiting step after recalling the mode settings, at least for settings that may vary with version number, model number, option and license differences. If you try to recall a state file onto an instrument with less capability than what was available on the instrument during the save, the recall will ignore the state it doesn't support and it will limit the recalled setting to what it allows.</p> <p>Example: if the saved state includes preamp ON, but the recalling instrument does not have a preamp; the preamp is limited to OFF. Conversely, if you save a state without a preamp, the preamp is OFF in the state file. When this saved file is recalled on an instrument with a licensed preamp, the preamp is changed to OFF. Another example is if the saved state has center frequency set to 20 GHz, but the instrument recalling the saved state is a different model and only supports 13.5 GHz. In this case, the center frequency is limited along with any other frequency based settings. Since the center frequency can't be preserved in this case, the recall limiting tries to at least preserve span to keep the measurement setup as intact as possible.</p> <p>It may be appropriate to issue a warning if the state is limited on the recall; warnings do not go out to SCPI so this would only affect the manual user.</p> <p>Note that there is no state file compatibility outside of the X-Series. For example, you cannot recall a state file from ESA or PSA.</p>
Initial S/W Revision	Prior to A.02.00

State

The Recall State menu lets you choose a register or file from which to recall the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings that were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the

additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, GPIB address) are not affected by either a Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

Since each state file is only for one Mode, the settings for other Modes are unaffected when it is loaded. Recall State will cause a mode switch if the state being recalled is not from the current active mode.

After the recall completes, the message "File <filename> recalled" or "Recalled State Register <register number>" is displayed.

For rapid recalls, the State menu lists 16 registers that you can choose from to recall. Pressing a Register key initiates the recall. You can also select a file from which to recall.

The default path for all State Files is:

My Documents\<<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

See "[More Information](#)" on page 554.

Key Path	Recall
Mode	All
Remote Command	:MMEMory:LOAD:STATe <filename>
Example	:MMEM:LOAD:STAT "myState.state" This recalls the file myState.state on the default path
Example	MMEM:LOAD:STAT "MyStateFile.state" This loads the state file data (on the default file directory path) into the instrument state.
Notes	<p>When you pick a file to recall, the analyzer first verifies that the file is recallable in the current instrument by checking the software version and model number of the instrument. If everything matches, a full recall proceeds by aborting the currently running measurement, clearing any pending operations, and then loading the State from the saved state file. You can open state files from any mode, so recalling a State file switches to the mode that was active when the save occurred. After switching to the mode of the saved state file, mode settings and data (if any for the mode) are loaded with values from the saved file. The saved measurement of the mode becomes the newly active measurement and the data relevant to the measurement (if there is any) is recalled.</p> <p>If there is a mismatch between file version or model number or instrument version or model number, the recall function tries to recall as much as possible and returns a warning message. It may limit settings that differ based on model number, licensing or version number.</p> <p>After recalling the state, the Recall State function does the following:</p> <ul style="list-style-type: none"> • Makes the saved measurement for the mode the active measurement. • Clears the input and output buffers. • Status Byte is set to 0. • Executes a *CLS <p>If the file specified is empty an error is generated. If the specified file does not exist, another error is generated. If there is a mismatch between the file and the proper file type, an error is generated. If</p>

	there is a mismatch between file version or model number or instrument version or model number, a warning is displayed. Then it returns to the State menu and File Open dialog goes away. After the Recall, the analyzer exits the Recall menu and returns to the previous menu.
Backwards Compatibility SCPI	:MMEMory:LOAD:STATe 1,<filename> For backwards compatibility, the above syntax is supported. The "1" is simply ignored.
Initial S/W Revision	Prior to A.02.00

More Information

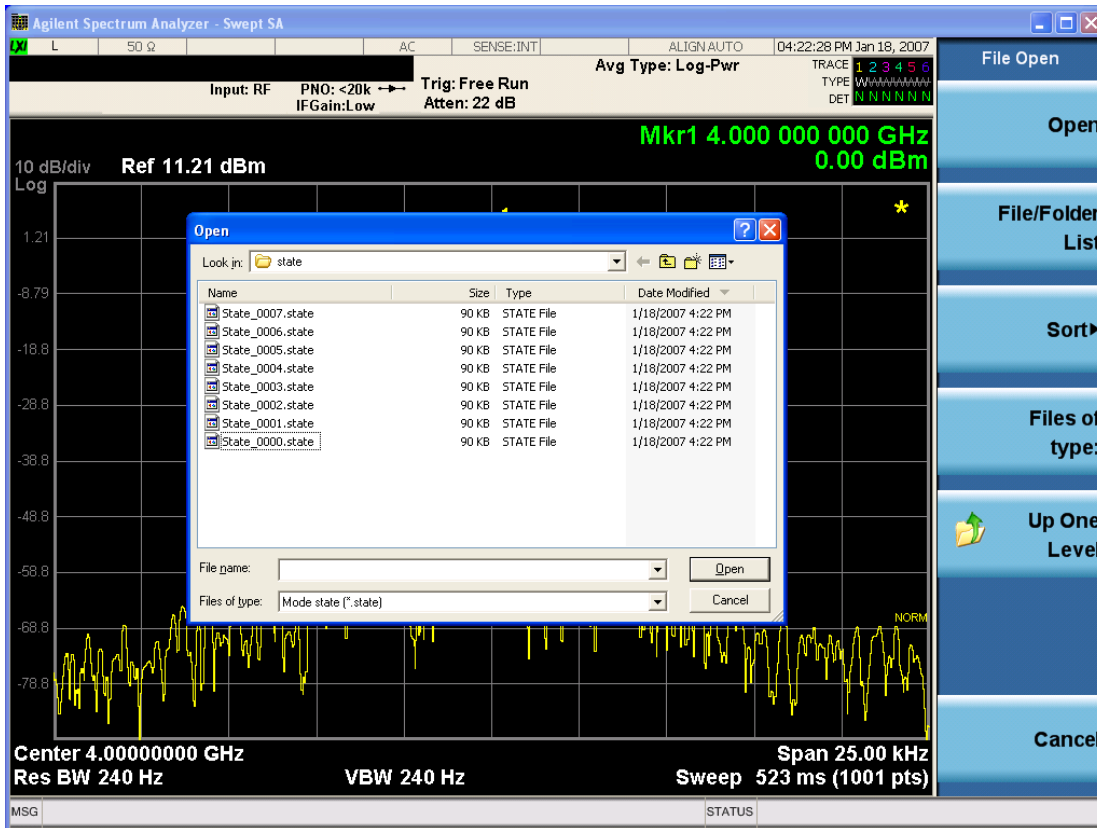
In measurements that support saving Traces, for example, Swept SA, the Trace data is saved along with the State in the State file. When recalling the State, the Trace data is recalled as well. Traces are recalled exactly as they were stored, including the writing mode and update and display modes. If a Trace was updating and visible when the State was saved, it will come back updating and visible, and its data will be rewritten right away. When you use State to save and recall traces, any trace whose data must be preserved should be placed in View or Blank mode before saving.

The following table describes the Trace Save and Recall possibilities:

You want to recall state and one trace's data, leaving other traces unaffected.	Save Trace+State from 1 trace. Make sure that no other traces are updating (they should all be in View or Blank mode) when the save is performed.	On Recall, specify the trace you want to load the one trace's data into. This trace will load in View. All other traces' data will be unaffected, although their trace mode will be as it was when the state save was performed.
You want to recall all traces	Save Trace+State from ALL traces.	On Recall, all traces will come back in View (or Blank if they were in Blank or Background when saved)
You want all traces to load exactly as they were when saved.	Save State	On recall, all traces' mode and data will be exactly as they were when saved. Any traces that were updating will have their data immediately overwritten.

From File...

When you press "From File", the analyzer brings up a Windows dialog and a menu entitled "File Open." This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



Listed below are the functions of the various fields in the dialog, and the corresponding softkeys:

Open

Performs the recall of the specified file. While the recall is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Look In.

Look In

The Look In field shows the path from which the file will be recalled and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Look In field** first uses the last path from the Save As dialog **Save In:** path for that same file type. There is no softkey for directly navigating to the Look In field, but you can use the left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

Sort

Accesses a menu that enables you to sort the files within the File Open dialog. Only one sorting type can be selected at a time and the sorting happens immediately. The sorting types are By Date, By Name, By extension, and By Size.

Files of Type

This field shows the file suffix for the type of file you have selected to recall. For example, if you navigated here while recalling State, "Mode state (*.state)" is in the field. If you navigated here while recalling Trace, ""Mode state (*.trace)" is in the field. If you navigated here while importing a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown menu, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Open** request to be cancelled. The ESC key does the same thing.

Key Path	Recall, State
Notes	Brings up the Open dialog for recalling a State Save Type
Initial S/W Revision	Prior to A.02.00

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

For more information and the SCPI command, see Edit Register Names under the Save, State function.

Key Path	Recall, State
Mode	All
Dependencies	N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending the SCPI command generates an error, -221, "Settings conflict;Option not available"
Initial S/W Revision	A.11.00

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last

modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

Key Path	Recall, State
Example	*RCL 1
Range	1–16 from front panel, 1–128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State, Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	Prior to A.11.00

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

Key Path	Recall, State
Example	*RCL 1
Range	1-16 from front panel, 1-128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State,Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	Prior to A.11.00

Restart

The Restart function restarts the current sweep, or measurement, or set of averaged/held sweeps or measurements. If you are Paused, pressing Restart does a Resume.

The Restart function is accessed in several ways:

- Pressing the Restart key
- Sending the remote command INIT:IMMEDIATE
- Sending the remote command INIT:RESTART

See "[More Information](#)" on page 559

Key Path	Front-panel key
Remote Command	:INITiate[:IMMEDIATE] :INITiate:RESTART
Example	:INIT:IMM :INIT:REST
Notes	:INITiate:RESTART and :INITiate:IMMEDIATE perform exactly the same function.
Couplings	Resets average/hold count k. For the first sweep overwrites all active (update=on) traces with new current data. For application modes, it resets other parameters as required by the measurement.
Status Bits/OPC dependencies	This is an Overlapped command. The STATUS:OPERation register bits 0 through 8 are cleared. The STATUS:QUESTIONable register bit 9 (INTEgrity sum) is cleared. The SWEEPING bit is set. The MEASURING bit is set.
Backwards Compatibility Notes	For Spectrum Analysis mode in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart trace averages (displayed average count reset to 1) for a trace in Clear Write, but did not restart Max Hold and Min Hold. In the X-Series, the Restart hardkey and the INITiate:RESTART command restart not only Trace Average, but MaxHold and MinHold traces as well. For wireless comms modes in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart every measurement, which includes all traces and numeric results. There is no change to this operation.
Initial S/W Revision	Prior to A.02.00

More Information

The **Restart** function first aborts the current sweep/measurement as quickly as possible. It then resets the sweep and trigger systems, sets up the measurement and initiates a new data measurement sequence with a new data acquisition (sweep) taken once the trigger condition is met.

If the analyzer is in the process of aligning when **Restart** is executed, the alignment finishes before the restart function is performed.

Even when set for Single operation, multiple sweeps may be taken when Restart is pressed (for example, when averaging/holding is on). Thus when we say that **Restart** "restarts a measurement," we may mean:

- It restarts the current sweep
- It restarts the current measurement
- It restarts the current set of sweeps if any trace is in Trace Average, Max Hold or Min Hold
- It restarts the current set of measurements if Averaging, or Max Hold, or Min Hold is on for the measurement
- depending on the current settings.

With **Average/Hold Number** (in **Meas Setup** menu) set to 1, or Averaging off, or no trace in Trace Average or Hold, a single sweep is equivalent to a single measurement. A single sweep is taken after the trigger condition is met; and the analyzer stops sweeping once that sweep has completed. However, with **Average/Hold Number** >1 and at least one trace set to **Trace Average, Max Hold, or Min Hold (SA Measurement)** or **Averaging on (most other measurements)**, multiple sweeps/data acquisitions are taken for a single measurement. The trigger condition must be met prior to each sweep. The sweep is stopped when the average count k equals the number N set for **Average/Hold Number**. A measurement average usually applies to all traces, marker results, and numeric results; but sometimes it only applies to the numeric results.

Once the full set of sweeps has been taken, the analyzer will go to idle state. To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command `CALC:AVER:TCON UP`.

Save

The Save menu lets you choose what you want to save and where you want to save it. Among the types of files you can save are **States**, **Traces**, and **Screen Images**. In addition, an Export (Data) option lets you save a number of data types as CSV files for easy import into Excel and other spreadsheet programs.

Key Path	Front-panel key
Mode	All
Notes	No remote command for this key specifically, but the :MMEM:STORe command is available for specific file types. An example is :MMEM:STOR:STATe <filename>.
Initial S/W Revision	Prior to A.02.00

State

The Save State menu lets you choose a register or file for saving the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings which were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, Verbose SCPI) are not affected by either Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

After the save completes, the message "File <filename> saved" or "State Register <register number> saved" is displayed.

For rapid saving, the State menu lists 16 registers to save to. Pressing a Register key initiates the save. You can also select a file to save to.

The default path for all State Files is:

My Documents\<<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

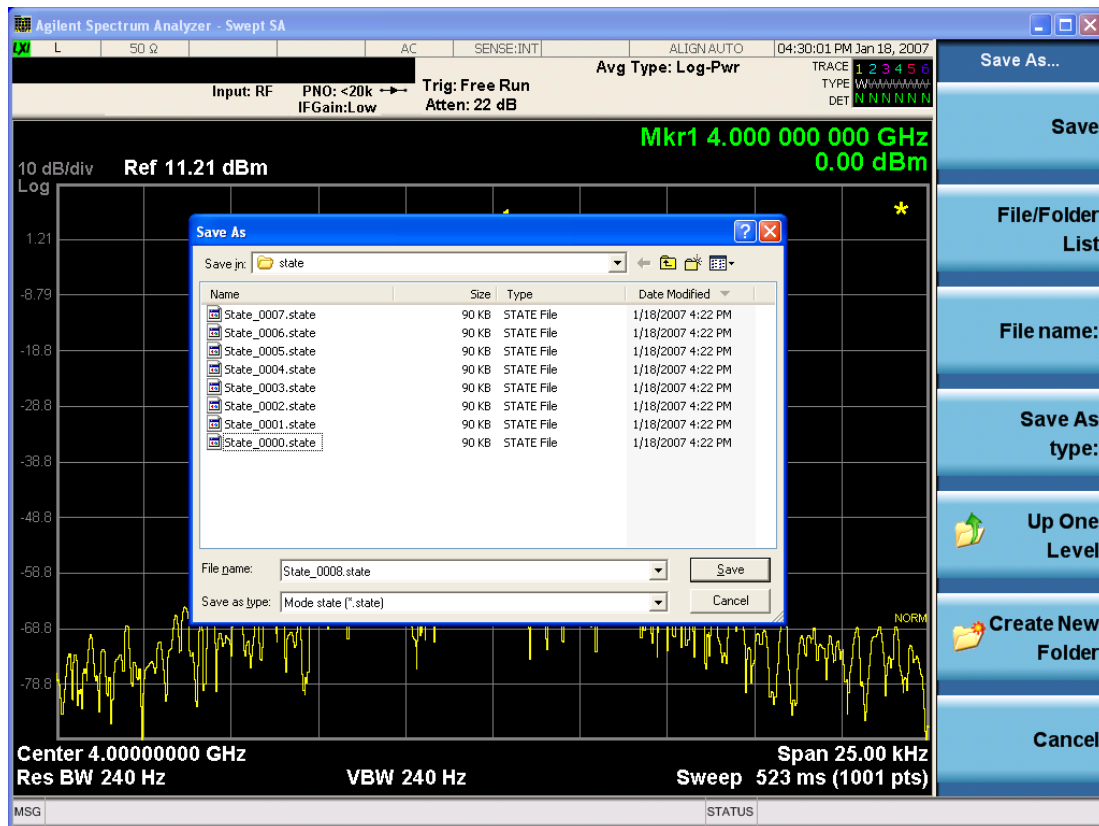
Key Path	Save
Mode	All
Remote Command	:MMEMory:STORe:STATe <filename>
Example	MMEM:STOR:STATe "MyStateFile.state" This stores the current instrument state data in the file MyStateFile.state in the default directory.
Notes	Both single and double quotes are supported for any filename parameter over remote. After saving to a register, that register's menu key is updated with the date the time, unless a custom label has been entered for that key. After saving to a register, you remain in the Save State menu, so that you can see the Register key

update. After saving to a file, the analyzer automatically returns to the previous menu and any Save As dialog goes away.

Backwards Compatibility SCPI	:MMEMory:STORe:STATe 1,<filename>
Initial S/W Revision	Prior to A.02.00

To File . . .

When you press “To File”, the analyzer brings up a Windows dialog and a menu entitled “Save As.” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



The Listed below

are the functions of the various fields in the dialog, and the corresponding softkeys:

Save

Performs the save to the specified file of the selected type. If the file already exists, a dialog will appear that allows you to replace the existing file by selecting OK, or you can Cancel the request. If you select OK, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade.

While the save is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Save In.

Save In

The Save In field shows the path to which the file will be saved and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Save In field** defaults to the default path for this type of file and remembers the last path you used to save this type of file. There is no softkey for directly navigating to the Save In field but you can use left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

File Name

The File Name field is initially loaded with an automatically generated filename specific to the appropriate Save Type. The automatically generated filename is guaranteed not to conflict with any filename currently in the directory. You may replace or modify this filename using the File Name key. See the ["Quick Save " on page 2328](#) documentation for more on the automatic file naming algorithm.

When you press the File Name key the analyzer displays the Alpha Editor. Use the knob to choose the letter to add and the front-panel Enter key to add the letter to the file name. The BK character moves you back and the FW character moves you forward in the filename. The Select key on the front panel generates a space character. When you are done entering the filename press the Done softkey. This returns back to the **File Open** dialog and menu, but does not cause the save to occur.

Save As Type

This field shows the file suffix for the type of file you have selected to save. For example, if you navigated here while saving State, "Mode state (*.state)" is in the field. If you navigated here from saving Trace, ""Mode state (*.trace)" is in the field. If you navigated here while exporting a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Create New Folder

This key corresponds to the icon of a folder with the "*" that is in the tool bar of the dialog. When pressed, a new folder is created in the current directory with the name **New Folder** and you can enter a new folder name using the Alpha Editor.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Save As** request to be cancelled. The ESC key does the same thing.

Key Path	Save, State
Mode	All
Notes	Brings up Save As dialog for saving a State Save Type
Initial S/W Revision	Prior to A.02.00

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

See ["More Information" on page 564](#)

Key Path	Save, State
Mode	All
Remote Command	:MMEMory:REGister:STATe:LABel <reg number>,"label" :MMEMory:REGister:STATe:LABel? <reg number>
Example	:MMEM:REG:STAT:LAB 1,"my label"
Notes	<reg number> is an integer from 1 to 16. If the SCPI specifies an invalid register number an error message is generated, -222,"Data out of range;Invalid register label number" "label" is a string from 0 to 30 characters in length. If a label exceeds 30 characters, an error message is generated, -150,"String data error;Label clipped to 30 characters" "label" of length 0 erases the custom label and restores the default (time and date) label. E.g.: :MMEM:REG:STAT:LAB 1,""
Dependencies	N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending this command generates an error, -221,"Settings conflict;Option not available"
Preset	The names are unaffected by Preset or power cycle but are set to the default label (time and date) on a "Restore System Defaults->Misc"
Initial S/W Revision	A.11.00

More Information

When you edit one of the register names, the time and date field will be replaced by the custom name.

If you delete all the characters in the custom name, it restores the default (time and date).

The register names are stored within the state files, but they are not part of the instrument state; that is, once you have edited a register name, loading a new state will not change that register name. Another consequence of this is that the names will be persistent through a power cycle. Also, if a named state file is transferred to another analyzer, it will bring its custom name along with it.

If you try to edit the name of an empty register, the analyzer will first save the state to have a file to put the name in. If you load a named state file into an analyzer with older firmware it will ignore the metadata.

The *SAV and *RCL commands will not be affected by the custom register names, nor will the MMEM commands.

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

Key Path	Save, State
Mode	All
Example	*SAV 1
Range	1–16 from front panel, 1–128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.11.00

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

Key Path	Save, State
Mode	All
Example	*SAV 1
Range	1-16 from front panel, 1-128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.11.00

Data (Export)

Exporting a data file stores data from the current measurement to mass storage files. The Export Menu only contains data types that are supported by the current measurement.

Since the commonly exported data files are in .csv format, the data can be edited by you prior to importing. This allows you to export a data file, manipulate the data in Excel (the most common PC Application for manipulating .csv files) and then import it.

Selecting an Export Data menu key will not actually cause the exporting to occur, since the analyzer still needs to know where you wish to save the data. Pressing the Save As key in this menu brings up the Save As dialog and Save As menu that allows you to specify the destination file and directory. Once a filename has been selected or entered in the Open menu, the export will occur as soon as the Save key is pressed.

Key Path	Save
Mode	All
Notes	The menu is built from whatever data types are available for the mode. So the key locations in the sub menu will vary. No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:STORe commands.
Dependencies	If a file type is not used by a certain measurement, that type is grayed out for that measurement. The key for a file type will not show at all if there are no measurements in the Mode that support it.
Preset	Is not affected by a Preset or shutdown, but is reset during Restore Mode Defaults
Readback	The data type that is currently selected
Initial S/W Revision	Prior to A.02.00

Measurement Results

Pressing this key selects Meas Results as the data type to be exported. Pressing the key a second time brings up the Meas Results menu, which allows you to select which **Meas Result** to save. In the Swept SA measurement, there are three types of Measurement Results files: Peak Table, Marker Table and Spectrogram.

See "Meas Results File Contents" on page 567.

See "Marker Table" on page 567.

See "Peak Table" on page 570.

See "Spectrogram" on page 573

Remote Command	:MMEMory:STORe:RESults:MTABle PTABle SPEctrogram <filename>
Example	:MMEM:STOR:RES:MTAB "myResults.csv" Saves the results from the current marker table to the file myResults.csv in the current path. :MMEM:STOR:RES:PTAB "myResults.csv" Saves the results from the current peak table to the file myResults.csv in the current path. :MMEM:STOR:RES:SPEC "myResults.csv" Saves the results from the current Spectrogram display to the file myResults.csv in the current path. The default path is My Documents\SA\data\SAN\results
Notes	If the save is initiated via SCPI, and the file already exists, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade. Both single and double quotes are supported for any filename parameter over SCPI.
Dependencies	If a save of Marker Table results is requested and the Marker Table is not on, no file is saved and a message is generated If a save of Peak Table results is requested and the Peak Table is not on, no file is saved and a message is generated If a save of Spectrogram results is requested and the Spectrogram is not on, no file is saved and a message is generated. The Spectrogram choice only appears if option EDP is licensed.
Preset	Not part of Preset, but is reset to Peak Table by Restore Mode Defaults. Survives a shutdown.
Initial S/W Revision	Prior to A.02.00

Meas Results File Contents

All files are .csv files. The following section details the data in each file type.

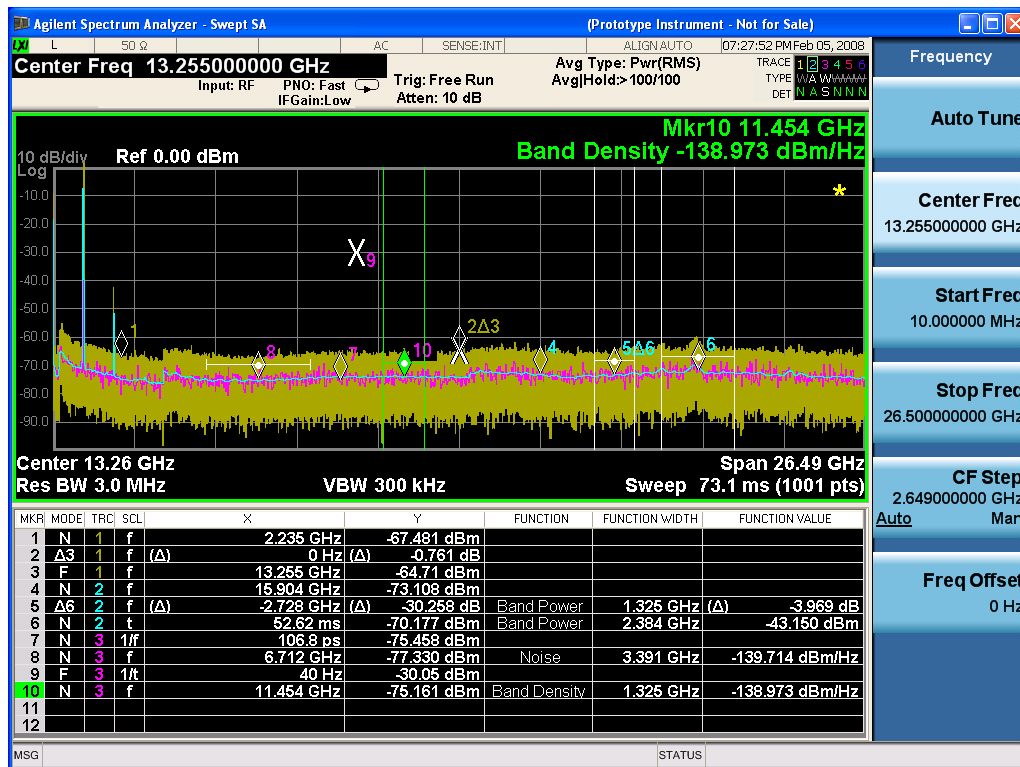
Marker Table

This section discusses the Marker Table Meas Results file format.

Imagine that, at the point where a Marker Table Meas Result is requested, the following screen is showing:

8 EDGE Power vs Time Measurement

Save



Then the Meas Results file, when opened, would show the following data:

MeasurementResult

Swept SA

A.01.40_R0017 N9020A

526 B25 PFR 1
P26 EA3

Result Type Marker Table

Ref Level 0

Number of Points 1001

Sweep Time 0.0662666
67

Start Frequency 10000000

Stop Frequency 26500000
000

Average Count 0

Average Type LogPower
(Video)

RBW 3000000

RBW Filter	Gaussian
RBW Filter BW	3dB
VBW	3000000
Sweep Type	Swept
X Axis Scale	Lin
PreAmp State	Off
PreAmp Band	Low
Trigger Source	Free
Trigger Level	1.2
Trigger Slope	Positive
Trigger Delay	1.00E-06
Phase Noise Optimization	Fast
Swept If Gain	Low
FFT If Gain	Autorange
RF Coupling	AC
FFT Width	411900
Ext Ref	10000000
Input	RF
RF Calibrator	Off
Attenuation	10
Ref Level Offset	0
External Gain	0
X Axis Units	Hz
Y Axis Units	dBm

DATA									
MKR	MODE	TR C	SCL	X	Y	FUNCTI ON	FUNCTIO N WIDTH	FUNCTI ON VALUE	FUNCTI ON UNIT
1	Normal	1	Freque ncy	2.2350E+09	- 67.481	Off	0.0000E+00	0	None
2	Delta3	1	Freque ncy	0.0000E+00	- 0.761	Off	0.0000E+00	0	None
3	Fixed	1	Freque ncy	1.3255E+10	- 64.71	Off	0.0000E+00	0	None
4	Normal	2	Freque ncy	1.5904E+10	- 73.1	Off	0.0000E+00	0	None

08									
5	Delta7	2	Frequency	-2.7280E+09	-30.258	Band Power	1.3250E+06	-3.969	dB
6	Normal	2	Time	5.2620E-02	-70.177	Band Power	2.3840E+06	-43.15	dBm
7	Normal	3	Period	1.0680E-10	-75.458	Off	0.0000E+00	0	None
8	Normal	3	Frequency	6.7120E+09	-77.33	Noise	3.3910E+06	-139.714	dBm/Hz
9	Fixed	3	Inverse Time	4.0000E+01	-30.05	Off	0.0000E+00	0	None
10	Normal	3	Frequency	1.1454E+10	-75.161	Band Density	1.3250E+06	-138.973	dBm/Hz
11	Off	1	Frequency	0.0000E+00	0	Off	0.0000E+00	0	None
12	Off	1	Frequency	0.0000E+00	0	Off	0.0000E+00	0	None

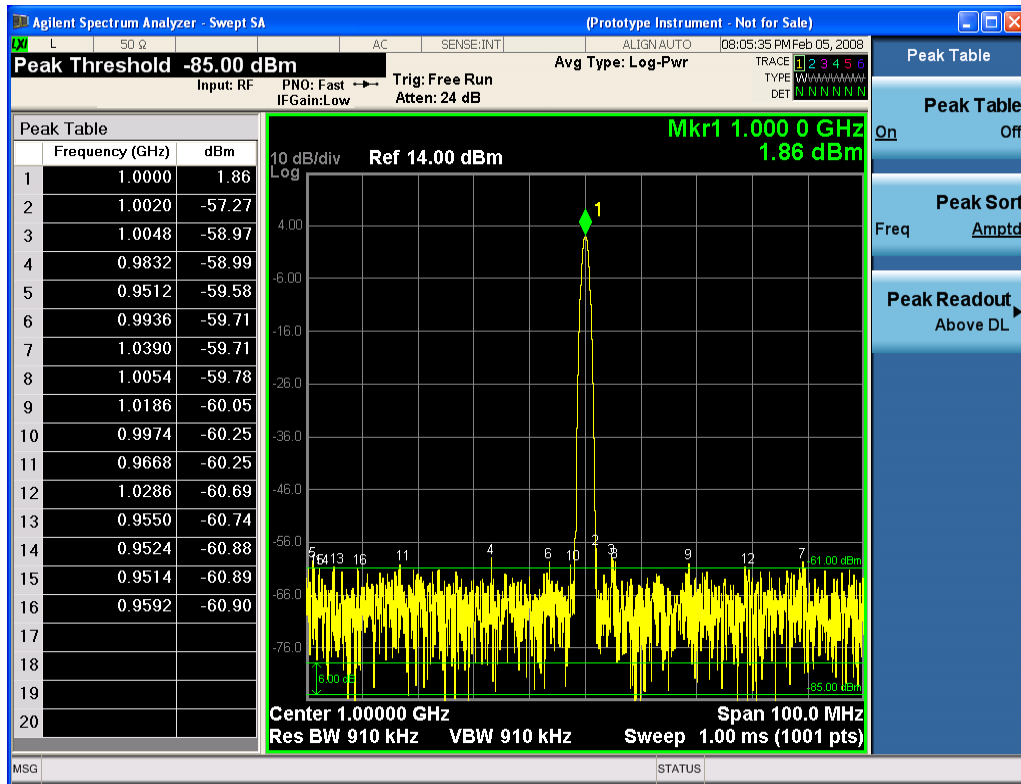
The numbers appear in the file exactly as they appear onscreen. If it says 11.454 GHz onscreen, then in the file it is 11.454E+09.

The metadata header is very similar to the metadata used in the trace data .csv files. See Trace File Contents. The only new information concerns the 1-of-N fields in the marker table itself.

Peak Table

This section discusses the Peak Table Meas Results file format.

Imagine that, at the point where a Marker Table Meas Result is requested, the following screen is showing:



Then the Meas Results file, when opened, would show the header data (the same as for the Marker Table except that the Result Type is Peak Table) ending with a few fields of specific interest to Peak Table users:

- Peak Threshold
- Peak Threshold State (On|Off)
- Peak Excursion
- Peak Excursion State (On|Off)
- Display Line
- Peak Readout (All|AboveDL|BelowDL)
- Peak Sort (Freq|Amptd)

These fields are then followed by the data for the Peak Table itself.

Note that the label for the Frequency column changes to Time in 0 span.

Here is what the table for the above display looks like:

MeasurementResult	
Swept SA	
A.01.40_R0017	N9020A
526 B25 PFR P26 EA3	1

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Save

Result Type	Peak Table
Ref Level	0
Number of Points	1001
Sweep Time	0.066266667
Start Frequency	10000000
Stop Frequency	26500000000
Average Count	0
Average Type	LogPower(Video)
RBW	3000000
RBW Filter	Gaussian
RBW Filter BW	3dB
VBW	3000000
Sweep Type	Swept
X Axis Scale	Lin
PreAmp State	Off
PreAmp Band	Low
Trigger Source	Free
Trigger Level	1.2
Trigger Slope	Positive
Trigger Delay	1.00E-06
Phase Noise Optimization	Fast
Swept If Gain	Low
FFT If Gain	Autorange
RF Coupling	AC
FFT Width	411900
Ext Ref	10000000
Input	RF
RF Calibrator	Off
Attenuation	10
Ref Level Offset	0
External Gain	0
X Axis Units	Hz
Y Axis Units	dBm
Peak Threshold	-85
Peak Threshold State	On
Peak Excursion	6
Peak Excursion State	On

Display Line	-61	
Peak Readout	AboveDL	
Peak Sort	Amptd	
DATA		
Peak	Frequency	Amplitude
1	1.0000E+06	1.86
2	1.0020E+06	-57.27
3	1.0048E+06	-58.97
4	9.8320E+05	-58.99
5	9.5120E+05	-59.58
6	9.9360E+05	-59.71
7	1.0390E+06	-59.71
8	1.0054E+06	-59.78
9	1.1086E+06	-60.05
10	9.9740E+05	-60.25
11	9.6680E+05	-60.25
12	1.0286E+06	-60.69
13	9.5500E+05	-60.74
14	9.5240E+05	-60.88
15	9.5140E+05	-60.89
16	9.5920E+05	-60.90
17		
18		
19		
20		

Spectrogram

This section discusses the Spectrogram Results file format. The Spectrogram choice only appears if option EDP is licensed.

The Spectrogram results are the same as a Trace data export, except that instead of having just one trace's data, all 300 traces appear one after the other.

Each trace has its own data mark; the data for Spectrogram Trace 0 follows the row marked DATA, the data for Spectrogram Trace 1 follows the row marked DATA1, for Spectrogram Trace 2 follows the row marked DATA2, and so on.

Each DATA row has a timestamp in the second column (as of firmware revision A.11.01). So, for example, if Trace 0 had a relative start time of 1729.523 sec, then the first DATA row would look like this:

DATA,1729.523

And if Trace 13 had a relative start time of 100.45 sec, then the fourteenth data row would look like:

DATA13,100.453

To find the absolute time for the relative timestamps of each trace, the last row before the first DATA row gives the absolute start time of the Spectrogram, in the form YYYYMMDDHHMMSS

So, for example, if the absolute start time is 13:23:45:678 on January 30, 2012, this row would look like:

Start Time,20120130132345678

NOTE The resolution of the absolute time stored is 1 ms, which matches up with the fact that the fastest sweep time is also 1 ms. However, there is no specification for the absolute accuracy of the clock in the analyzer, nor is there any facility provided to allow the user to set this time to any particular degree of accuracy.

Traces that have not yet been filled in the Spectrogram display are empty; there is no DATA header for them. The file ends after the last non-empty trace.

Imagine that, at the point where a Spectrogram Meas Result is requested, the following screen is showing:



For the purpose of this example, we have set the Average/Hold Number to 10, thus we have only traces 0 thru 10. The Spectrogram was started at 02:28:08:700 pm on April 25, 2012 (that is, 700 ms after 2:28:08 pm), although the screen dump itself shows a different time, as it was taken ten minutes after the

Spectrogram data. Trace 0 is showing a start time of 5.30 seconds, meaning 5.3 seconds after the Spectrogram started (trace 10 has a start time of 0, as it was the first trace taken but has now rolled up into the tenth trace slot).

The Meas Results file, when opened, shows the header data and ten traces of trace data. Below is an extract from the result file for the above display. Note the start time of 20120425142808700 showing in the last row before the first DATA row, and the relative time of 5.299231048 showing in the first DATA row:

Result Type	Spectrogram
MeasResult	
Swept SA	
A.11.00.01	N9020A
503 508 513 526 ALL ALV B1C B1X B25 B2X B40 BAB BBA CR3 CRP DP2 DRD EA3 EDP EMC EP1 ERC ESC ESP EXM FSA HBA K03 LFE MPB P03 P08 P13 P26 PFR RTL RTS S40 SB1 SEC SM1 UK6 YAS YAV	1
Segment	0
Number of Points	1001
Sweep Time	0.523333333
Start Frequency	5999984415
Stop Frequency	6000009415
Average Count	0
Average Type	LogPower(Video)
RBW	240
RBW Filter	Gaussian
RBW Filter BW	3dB
VBW	240
Sweep Type	Swept
X Axis Scale	Lin
PreAmp State	Off
PreAmp Band	Low
Trigger Source	Free
Trigger Level	1.2
Trigger Slope	Positive
Trigger Delay	0
Phase Noise Optimization	Wide
Swept If Gain	Low
FFT If Gain	Autorange
RF Coupling	AC

Save

Result Type	Spectrogram
FFT Width	411900
Ext Ref	10000000
Input	RF
RF Calibrator	Off
Attenuation	14
Ref Level Offset	0
External Gain	0
Trace Type	Clearwrite
Detector	Normal
Trace Math	Off
Trace Math Oper1	Trace5
Trace Math Oper2	Trace6
Trace Math Offset	0
Trace Name	Trace1
X Axis Units	Hz
Y Axis Units	dBm
Start Time	20120425142808700
DATA	5.299231048
5999984415	-76.34749519
5999984440	-77.28097006
5999984465	-75.32317869
5999984490	-73.64417681
5999984515	-72.67154604

o

o

o

6000009315	-77.94423277
6000009340	-79.51829697
6000009365	-78.46108961
6000009390	-78.46108957
6000009415	-76.59570596
DATA2	4.708697055
5999984415	-80.98197882
5999984440	-80.98197879

5999984465	-75.83142132
5999984490	-74.02712079
5999984515	-73.57213005

O
O
O

6000009315	-75.9183103
6000009340	-79.53787488
6000009365	-78.82602191
6000009390	-78.82602188
6000009415	-76.37486709
DATA10	0
5999984415	-75.56751112
5999984440	-75.76485645
5999984465	-76.67718717
5999984490	-78.79238489
5999984515	-83.72680212

O
O
O

6000009315	-71.3942461
6000009340	-72.28308332
6000009365	-73.92684489
6000009390	-75.45548832
6000009415	-75.17904815

Save As . . .

When you press “Save As”, the analyzer brings up a Windows dialog and a menu entitled “**Save As.**” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[To File . . .](#)" on page 2340 in Save, State for a full description of this dialog and menu.

The default path for saving files is:

For all of the Trace Data Files:

My Documents\<<mode name>\data\traces

For all of the Limit Data Files:

My Documents\<<mode name>\data\limits

For all of the Measurement Results Data Files:

My Documents\<<mode name>\data\<<measurement name>\results

For all of the Capture Buffer Data Files:

My Documents\<<mode name>\data\captureBuffer

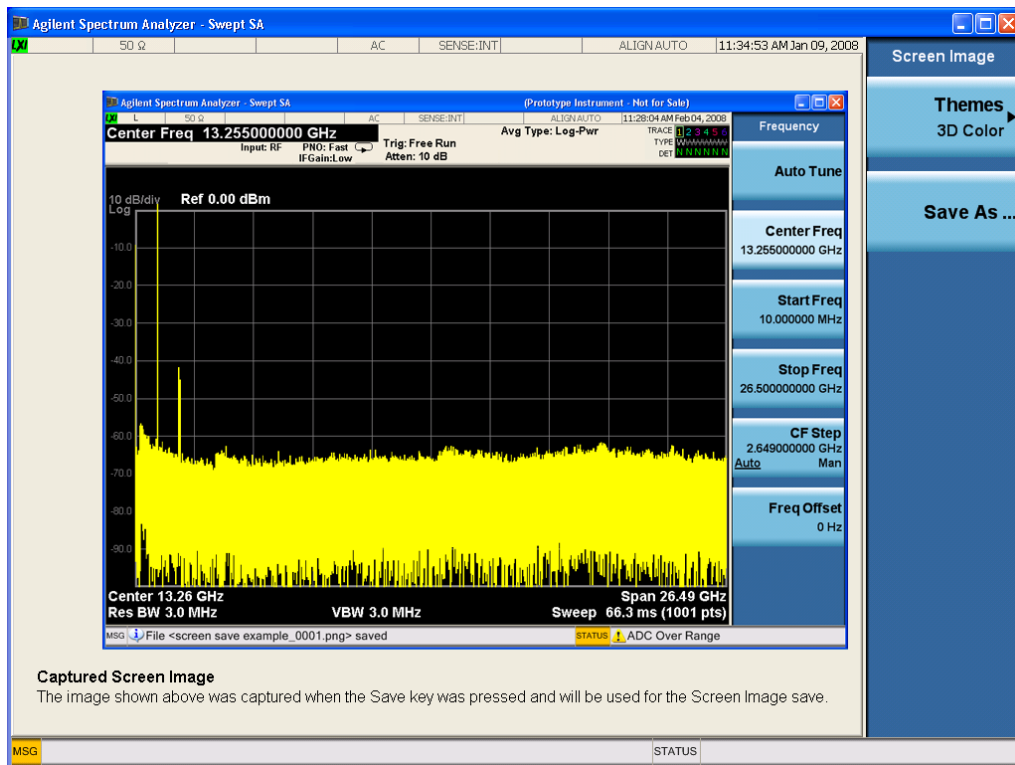
Key Path	Save, Data
Mode	All
Notes	The key location is mode-dependent and will vary. Brings up the Save As dialog for saving a <mode specific> Save Type. The save is performed immediately and does not wait until the measurement is complete.
Initial S/W Revision	Prior to A.02.00

Screen Image

Pressing Screen Image accesses a menu of functions that enable you to specify a format and location for the saved screen image. It brings up a menu that allows you to specify the color scheme of the Screen Image (Themes) or navigate to the Save As dialog to perform the actual save.

Screen Image files contain an exact representation of the analyzer display. They cannot be loaded back onto the analyzer, but they can be loaded into your PC for use in many popular applications.

The image to be saved is actually captured when the Save front panel key is pressed, and kept in temporary storage to be used if you ask for a Screen Image save. When the Screen Image key is pressed, a "thumbnail" of the captured image is displayed, as shown below:



When you continue on into the Save As menu and complete the Screen Image save, the image depicted in the thumbnail is the one that gets saved, showing the menus that were on the screen before going into the Save menus. The save is performed immediately and does not wait until the measurement is complete.

After you have completed the save, the Quick Save front-panel key lets you quickly repeat the last save performed, using an auto-named file, with the current screen data.

NOTE

For versions previous to A.01.55, if you initiate a screen image save by navigating through the Save menus, the image that is saved will contain the Save menu softkeys, not the menus and the active function that were on the screen when you first pressed the Save front panel key.

Key Path	Save
Mode	All
Remote Command	:MMEMory:STORe:SCReem <filename>
Example	:MMEM:STOR:SCR "myScreen.png" This stores the current screen image in the file MyScreenFile.png in the default directory.
Initial S/W Revision	Prior to A.02.00

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

Key Path	Save, Screen Image
Remote Command	:MMEMory:STORe:SCReem:THEMe TDColor TDMonochrome FCOLor FMONochrome :MMEMory:STORe:SCReem:THEMe?
Example	:MMEM:STOR:SCR:THEM TDM
Preset	3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes.
Readback	3D Color 3D Mono Flat Color Flat Mono
Backwards Compatibility Notes	In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical.
Initial S/W Revision	Prior to A.02.00

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDC
Readback	3D Color
Initial S/W Revision	Prior to A.02.00

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDM
Readback	3D Mono
Initial S/W Revision	Prior to A.02.00

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

Key Path	Save, Screen Image, Themes
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Example	MMEM:STOR:SCR:THEM FCOL
Readback	Flat Color
Initial S/W Revision	Prior to A.02.00

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FMON
Readback	Flat Mono
Initial S/W Revision	Prior to A.02.00

Save As...

When you press "Save As", the analyzer brings up a Windows dialog and a menu entitled "**Save As.**" This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[To File . . .](#)" on page 2340 in Save, State for a full description of this dialog and menu.

The default path for Screen Images is

My Documents\`<mode name>`\screen.

where `<mode name>` is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

Key Path	Save, Screen Image
Notes	Brings up Save As dialog for saving a Screen Image Save Type
Initial S/W Revision	Prior to A.02.00

Mass Storage Catalog (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:CATalog? [<code><directory_name></code>]
Notes	<p>The string must be a valid logical path.</p> <p>Queries disk usage information (drive capacity, free space available) and obtains a list of files and directories in a specified directory in the following format:</p> <p><code><numeric_value>,<numeric_value>,{<file_entry>}</code></p> <p>It returns two numeric parameters and as many strings as there are files and directories. The first parameter indicates the total amount of storage currently used in bytes. The second parameter</p>

	<p>indicates the total amount of storage available, also in bytes. The <file_entry> is a string. Each <file_entry> indicates the name, type, and size of one file in the directory list:</p> <p><file_name>,<file_type>,<file_size></p> <p>As the windows file system has an extension that indicates file type, <file_type> is always empty. <file_size> provides the size of the file in bytes. For directories, <file_entry> is surrounded by square brackets and both <file_type> and <file_size> are empty</p>
Initial S/W Revision	Prior to A.02.00

Mass Storage Change Directory (Remote Command Only)

Key path	SCPI Only
Remote Command	<pre>:MMEMory:CDIRectory [<directory_name>] :MMEMory:CDIRectory?</pre>
Notes	<p>The string must be a valid logical path.</p> <p>Changes the default directory for a mass memory file system. The <directory_name> parameter is a string. If no parameter is specified, the directory is set to the *RST value.</p> <p>At *RST, this value is set to the default user data storage area, that is defined as System.Environment.SpecialFolder.Personal.</p> <p>Query returns full path of the default directory.</p>
Initial S/W Revision	Prior to A.02.00

Mass Storage Copy (Remote Command Only)

Key path	SCPI Only
Remote Command	<pre>:MMEMory:COPY <string>,<string>[,<string>,<string>]</pre>
Notes	<p>The string must be a valid logical path.</p> <p>Copies an existing file to a new file or an existing directory to a new directory.</p> <p>Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.</p> <p>The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.</p> <p>This command will generate an "access denied" error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.</p>

Mass Storage Device Copy (Remote Command Only)

This command transfers data to/from a file and a peripheral device.

Key path	SCPI Only
Remote Command	:MMEMory:COpy:DEvice <source_string>,<dest_string>
Notes	<p>The strings must be a valid logical path or a valid device keyword. If the dest_string is a device keyword, the data is copied from the source file to the device. If the source_string is a device keyword, the data is copied to the source file from the device.</p> <p>Valid device keywords are: SNS (smart noise source)</p> <p>An error is generated if the file or device is not found.</p>

Mass Storage Delete (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:DElete <file_name>[,<directory_name>]
Notes	<p>The string must be a valid logical path.</p> <p>Removes a file from the specified directory. The <file_name> parameter specifies the file name to be removed. This command will generate an “access denied” error if the file is in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.</p>
Initial S/W Revision	Prior to A.02.00

Mass Storage Data (Remote Command Only)

Creates a file containing the specified data OR queries the data from an existing file.

Key path	SCPI Only
Remote Command	:MMEMory:DATA <file_name>, <data> :MMEMory:DATA? <file_name>
Notes	<p>The string must be a valid logical path.</p> <p>The command form is MMEMory:DATA <file_name>,<data>. It loads <data> into the file <file_name>. <data> is in 488.2 block format. <file_name> is string data.</p> <p>The query form is MMEMory:DATA? <file_name> with the response being the associated <data> in block format.</p>
Initial S/W Revision	Prior to A.02.00

Mass Storage Make Directory (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:MDIRectory <directory_name>
Notes	<p>The string must be a valid logical path.</p> <p>Creates a new directory. The <directory_name> parameter specifies the name to be created.</p>

	This command will generate an “access denied” error if the new directory would be in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.
Initial S/W Revision	Prior to A.02.00

Mass Storage Move (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:MOVE <string>,<string>[,<string>,<string>]
Notes	<p>The string must be a valid logical path.</p> <p>Moves an existing file to a new file or an existing directory to a new directory.</p> <p>Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.</p> <p>The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.</p> <p>This command will generate an “access denied” error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.</p>
Initial S/W Revision	Prior to A.02.00

Mass Storage Remove Directory (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:RDIRECTory <directory_name>
Notes	<p>The string must be a valid logical path.</p> <p>Removes a directory. The <directory_name> parameter specifies the directory name to be removed. All files and directories under the specified directory shall also be removed.</p> <p>This command will generate an “access denied” error if the folder is a restricted folder (e.g., C:\Windows) or is in a restricted folder and the current user does not have Power User or Administrator privileges.</p>
Initial S/W Revision	Prior to A.02.00

Single (Single Measurement/Sweep)

Sets the analyzer for Single measurement operation. The single/continuous state is Meas Global, so the setting will affect all the measurements. If you are Paused, pressing Single does a Resume.

See ["More Information" on page 585](#)

Key Path	Front-panel key
Example	:INIT:CONT OFF
Notes	See Cont key description.
Backwards Compatibility Notes	<p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey and the INITiate:IMM switched from continuous measurement to single measurement and restarted sweeps and averages (displayed average count reset to 1), but did not restart Max Hold and Min Hold. In the X-Series, the Single hardkey and the INITiate:IMM command initiate a sweep/ measurement/ average sequence/hold sequence including MaxHold and MinHold.</p> <p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey restarted the sweep regardless of whether or not you were in an active sweep or sweep sequence. In the X-Series, Restart does this but Single only restarts the sweep or sweep sequence if you are in the idle state.</p> <p>INIT[:IMM] in ESA & PSA Spectrum Analysis Mode does an implied ABORT. In some other PSA Modes, INIT[:IMM] is ignored if not in the idle state. . The X-Series follows the ESA/PSA SA Mode model, which may cause some Modes to have compatibility problems.</p>
Initial S/W Revision	Prior to A.02.00

More Information

See ["Restart" on page 2337](#) for details on the INIT:IMMEDIATE (Restart) function.

If you are already in single sweep, the INIT:CONT OFF command has no effect.

If you are already in Single Sweep, then pressing the Single key in the middle of a sweep does not restart the sweep or sequence. Similarly, pressing the Single key does not restart the sweep or sequence if the sweep is not in the idle state (for example, if you are taking a very slow sweep, or the analyzer is waiting for a trigger). Instead, it results in a message. "Already in Single, press Restart to initiate a new sweep or sequence". Even though pressing the Single key in the middle of a sweep does not restart the sweep, sending INIT:IMMEDIATE does reset it.

To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command CALC:AVER:TCON UP.

Source

There is no Source control functionality for this measurement. When this key is pressed, the screen either displays a blank menu, or the previously-selected menu remains unchanged.

Key Path	Front-panel key
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SPAN X Scale

Accesses a menu of functions that enable you to set the horizontal scale parameters

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Ref Value

Allows you to set the display X reference value by Burst, Multi-slot and Rise & Fall views.

Key Path	Span X Scale
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Ref Value (Burst view and Multi-slot view)

Allows you to set the display X reference value.

Key Path	SPAN X Scale
Mode	GSM
Remote Command	:DISPlay:EPVTime:VIEW[1] 3:WINDow[1]:TRACe:X[:SCALe]:RLEVel <time> :DISPlay:EPVTime:VIEW[1] 3:WINDow[1]:TRACe:X[:SCALe]:RLEVel?
Example	DISP:EPVT:VIEW:WIND:TRAC:X:RLEV 1 DISP:EPVT:VIEW:WIND:TRAC:X:RLEV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	If the "Auto Scaling" on page 590 is On, this value is automatically determined by the measurement result. When you set a value manually, "Auto Scaling" on page 590 automatically changes to Off.
Preset	-65.0 us -67 us
State Saved	Saved in instrument state.
Min	-1.00 s
Max	1.00 s
Initial S/W Revision	Prior to A.02.00

Ref Value (Rise & Fall view)

Allows you to set the display X reference value.

Key Path	SPAN X Scale
Mode	GSM
Remote Command	:DISPlay:EPVTime:VIEW2:WINDow[1] 2:TRACe:X[:SCALe]:RLEVel <time> :DISPlay:EPVTime:VIEW2:WINDow[1] 2:TRACe:X[:SCALe]:RLEVel?
Example	DISP:EPVT:VIEW2:WIND2:TRAC:X:RLEV 1 DISP:EPVT:VIEW2:WIND2:TRAC:X:RLEV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	If the "Auto Scaling" on page 590 is On, this value is automatically determined by the measurement result. When you set a value manually, "Auto Scaling" on page 590 automatically changes to Off.
Preset	0 s 542.8 us
State Saved	Saved in instrument state.
Min	-1.00 s
Max	1.00 s
Initial S/W Revision	Prior to A.02.00

Scale/Div

Allows you to set the display X scale/division value by Burst, Multi-slot and Rise & Fall views.

Key Path	Span X Scale
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Scale/Div (Burst view and Multi-slot view)

Allows you to set the display X scale/division value.

Key Path	Span X Scale
Mode	GSM
Remote Command	:DISPlay:EPVTime:VIEW[1] 3:WINDow[1]:TRACe:X[:SCALe]:PDIVision <time> :DISPlay:EPVTime:VIEW[1] 3:WINDow[1]:TRACe:X[:SCALe]:PDIVision?
Example	DISP:EPVT:VIEW:WIND:TRAC:X:PDIV 1ms DISP:EPVT:VIEW:WIND:TRAC:X:PDIV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	If the "Auto Scaling" on page 590 is On, this value is automatically determined by the measurement result. When you set a value manually, "Auto Scaling" on page 590 automatically changes to Off.
Preset	70.00 us 84.00 us
State Saved	Saved in instrument state.

Min	1.00 ns
Max	1.00 s
Initial S/W Revision	Prior to A.02.00

Scale/Div (Rise & Fall view)

Allows you to set the display X scale/division value.

Key Path	Span X Scale
Mode	GSM
Remote Command	:DISPlay:EPVTime:VIEW2:WINDow[1] 2:TRACe:X[:SCALe]:PDIVision <time> :DISPlay:EPVTime:VIEW2:WINDow[1] 2:TRACe:X[:SCALe]:PDIVision?
Example	DISP:EPVT:VIEW2:WIND2:TRAC:X:PDIV 1ms DISP:EPVT:VIEW2:WIND2:TRAC:X:PDIV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	If the "Auto Scaling" on page 590 is On, this value is automatically determined by the measurement result. When you set a value manually, "Auto Scaling" on page 590 automatically changes to Off.
Preset	10.00 us
State Saved	Saved in instrument state.
Min	1.00 ns
Max	1.00 s
Initial S/W Revision	Prior to A.02.00

Ref Position

Allows you to set the display reference position to Left, Center or Right by Burst, Multi-slot and Rise & Fall views.

Key Path	Span X Scale
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Ref Position (Burst view and Multi-slot view)

Allows you to set the display reference position to Left, Center or Right.

Key Path	SPAN X Scale
Mode	GSM
Remote Command	:DISPlay:EPVTime:VIEW[1] 3:WINDow[1]:TRACe:X[:SCALe]:RPOsition LEFT

	CENTER RIGHT :DISPlay:EPVTime:VIEW[1] 3:WINDow[1]:TRACe:X[:SCALe]:RPOSition?
Example	DISP:EPVT:VIEW:WIND:TRAC:X:RPOS LEFT DISP:EPVT:VIEW:WIND:TRAC:X:RPOS?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	LEFT
State Saved	Saved in instrument state.
Range	Left Ctr Right
Initial S/W Revision	Prior to A.02.00

Ref Position (Rise & Fall view)

Allows you to set the display reference position to Left, Center or Right.

Key Path	SPAN X Scale
Mode	GSM
Remote Command	:DISPlay:EPVTime:VIEW2:WINDow[1] 2:TRACe:X[:SCALe]:RPOSition LEFT CENTER RIGHT :DISPlay:EPVTime:VIEW2:WINDow[1] 2:TRACe:X[:SCALe]:RPOSition?
Example	DISP:EPVT:VIEW2:WIND2:TRAC:X:RPOS LEFT DISP:EPVT:VIEW2:WIND2:TRAC:X:RPOS?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	CENTER
State Saved	Saved in instrument state.
Range	Left Ctr Right
Initial S/W Revision	Prior to A.02.00

Auto Scaling

Allows you to toggle the scale coupling function between On and Off by Burst, Multi-slot and Rise & Fall views.

Key Path	Span X Scale
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Auto Scaling (Burst view and Multi-slot view)

Allows you to toggle the scale coupling function between On and Off.

Key Path	Span X Scale
Mode	GSM
Remote Command	:DISPlay:EPVTime:VIEW[1] 3:WINDow[1]:TRACe:X[:SCALe]:COUPlE 0 1 OFF ON :DISPlay:EPVTime:VIEW[1] 3:WINDow[1]:TRACe:X[:SCALe]:COUPlE?
Example	DISP:EPVT:VIEW:WIND:TRAC:X:COUP OFF DISP:EPVT:VIEW:WIND:TRAC:X:COUP?
Notes	Upon pressing the Restart front-panel key, the scale coupling function automatically determines the scale per division and reference values based on the measurement results if this parameter is set to On. When you set a value to either " Ref Value " on page 587 or " Scale/Div " on page 588 manually, X Auto Scaling automatically changes to Off. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

Auto Scaling (Rise & Fall view)

Allows you to toggle the scale coupling function between On and Off.

Key Path	Span X Scale
Mode	GSM
Remote Command	:DISPlay:EPVTime:VIEW2:WINDow[1] 2:TRACe:X[:SCALe]:COUPlE 0 1 OFF ON :DISPlay:EPVTime:VIEW2:WINDow[1] 2:TRACe:X[:SCALe]:COUPlE?
Example	DISP:EPVT:VIEW:WIND:TRAC:X:COUP OFF DISP:EPVT:VIEW:WIND:TRAC:X:COUP?
Notes	Upon pressing the Restart front-panel key, the scale coupling function automatically determines the scale per division and reference values based on the measurement results if this parameter is set to On. When you set a value to either " Ref Value " on page 587 or " Scale/Div " on page 588 manually, X Auto Scaling automatically changes to Off. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

Sweep/Control

Accesses a menu that enables you to configure the Sweep and Control functions of the analyzer, such as Sweep Time and Gating.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Pause/Resume

Pauses a measurement after the current data acquisition is complete.

When Paused, the label on the key changes to Resume. Pressing Resume un-pauses the measurement. When you are Paused, pressing Restart, Single or Cont does a Resume.

Key Path	Sweep/Control
Remote Command	:INITiate:PAUSE
Dependencies	Grayed out in Measurements that do not support Pausing. Blanked in Modes that do not support Pausing.
Initial S/W Revision	Prior to A.02.00

Key Path	Sweep/Control
Remote Command	:INITiate:RESume
Dependencies	Grayed out in Measurements that do not support Pausing. Blanked in Modes that do not support Pausing.
Initial S/W Revision	Prior to A.02.00

Abort (Remote Command Only)

This command is used to stop the current measurement. It aborts the current measurement as quickly as possible, resets the sweep and trigger systems, and puts the measurement into an "idle" state. If the analyzer is in the process of aligning when ABORT is sent, the alignment finishes before the abort function is performed. So ABORT does not abort an alignment.

If the analyzer is set for Continuous measurement, it sets up the measurement and initiates a new data measurement sequence with a new data acquisition (sweep) taken once the trigger condition is met.

If the analyzer is set for Single measurement, it remains in the "idle" state until an :INIT:IMM command is received.

Remote Command	:ABORT
Example	:ABOR

Notes	<p>If :INITiate:CONTinuous is ON, then a new continuous measurement will start immediately; with sweep (data acquisition) occurring once the trigger condition has been met.</p> <p>If :INITiate:CONTinuous is OFF, then :INITiate:IMMediate is used to start a single measurement; with sweep (data acquisition) occurring once the trigger condition has been met.</p>
Dependencies	<p>For continuous measurement, ABORt is equivalent to the Restart key.</p> <p>Not all measurements support the abort command.</p>
Status Bits/OPC dependencies	<p>The STATus:OPERation register bits 0 through 8 are cleared.</p> <p>The STATus:QUESTionable register bit 9 (INTEgrity sum) is cleared.</p> <p>Since all the bits that feed into OPC are cleared by the ABORt, the ABORt will cause the *OPC query to return true.</p>
Initial S/W Revision	<p>Prior to A.02.00</p>

System

See "[System](#)" on page 326

Trace/Detector

Accesses a menu that enables you to show (On) or hide (Off) the Max Hold Trace and Min Hold Trace. Max/Min Hold Traces will be held during the averaging cycle.

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Max Hold Trace

This key enables you to show (On) or hide (Off) the Max Hold Trace.

Key Path	Trace/Detector
Mode	GSM
Remote Command	:DISPlay:EPVTime:VIEW[1]:WINDow[1]:TRACe:MAXHold[:STATe] ON OFF 1 0 :DISPlay:EPVTime:VIEW[1]:WINDow[1]:TRACe:MAXHold[:STATe]?
Example	DISP:EPVT:VIEW:WIND:TRAC:MAXH ON DISP:EPVT:VIEW:WIND:TRAC:MAXH?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	Selecting [:SENSe]:EPVTime:AVERAge:TYPE MAXimum MXMinimum forces this parameter to ON.
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

Min Hold Trace

This key enables you to show (On) or hide (Off) the Min Hold Trace.

Key Path	Trace/Detector
Mode	GSM
Remote Command	:DISPlay:EPVTime:VIEW[1]:WINDow[1]:TRACe:MINHold[:STATe] ON OFF 1 0 :DISPlay:EPVTime:VIEW[1]:WINDow[1]:TRACe:MINHold[:STATe]?
Example	DISP:EPVT:VIEW:WIND:TRAC:MINH ON DISP:EPVT:VIEW:WIND:TRAC:MINH?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.

8 EDGE Power vs Time Measurement
Trace/Detector

Couplings	Selecting [:SENSE]:EPVTime:AVERage:TYPE MINimum MXMinimum forces this parameter to ON.
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

Trigger

See ["Trigger" on page 408](#)

Free Run

See ["Free Run " on page 415](#)

Video

See ["Video \(IF Envelope\) " on page 416](#)

Trigger Level

See ["Trigger Level " on page 416](#)

Trig Slope

See ["Trig Slope " on page 417](#)

Trig Delay

See ["Trig Delay " on page 418](#)

Line

See ["Line " on page 1321](#)

Trig Slope

See ["Trig Slope " on page 1321](#)

Trig Delay

See ["Trig Delay " on page 420](#)

External 1

See ["External 1 " on page 1333](#)

Trigger Level

See ["Trigger Level " on page 1333](#)

Trig Slope

See ["Trig Slope " on page 1334](#)

Trig Delay

See ["Trig Delay " on page 423](#)

External 2

See ["External 2 " on page 1335](#)

Trigger Level

See ["Trigger Level "](#) on page 1335

Trig Slope

See ["Trig Slope "](#) on page 1336

Trig Delay

See ["Trig Delay "](#) on page 425

RF Burst

See ["RF Burst "](#) on page 1336

Absolute Trigger

See ["Absolute Trigger Level"](#) on page 1337

Relative Trigger

See ["Relative Trigger Level"](#) on page 1326

Trig Slope

See ["Trigger Slope "](#) on page 1338

Trig Delay

See ["Trig Delay "](#) on page 429

Periodic Timer

See ["Periodic Timer \(Frame Trigger\) "](#) on page 1328

Period

See ["Period "](#) on page 1329

Offset

See ["Offset "](#) on page 1330

Offset Adjust (Remote Command Only)

See ["Offset Adjust \(Remote Command Only\)"](#) on page 1331

Reset Offset Display

See ["Reset Offset Display "](#) on page 1332

Sync Source

See ["Sync Source "](#) on page 1332

Off

See ["Off "](#) on page 1333

External 1

See ["External 1 "](#) on page 1333

Trigger Level

See ["Trigger Level "](#) on page 1333

Trig Slope

See ["Trig Slope "](#) on page 1334

External 2

See ["External 2 "](#) on page 1335

Trigger Level

See ["Trigger Level "](#) on page 1335

Trig Slope

See ["Trig Slope "](#) on page 1336

RF Burst

See ["RF Burst "](#) on page 1336

Absolute Trigger

See ["Absolute Trigger Level"](#) on page 1337

Trig Slope

See ["Trigger Slope "](#) on page 1338

Trig Delay

See ["Trig Delay"](#) on page 440

Auto/Holdoff

See ["Auto/Holdoff "](#) on page 440

Auto Trig

See ["Auto Trig "](#) on page 441

Trig Holdoff

See ["Trig Holdoff "](#) on page 441

Holdoff Type

See ["Holdoff Type"](#) on page 442

User Preset

Accesses a menu that gives you the following three choices:

- User Preset – recalls a state previously saved using the Save User Preset function.
- User Preset All Modes – presets all of the modes in the analyzer
- Save User Preset– saves the current state for the current mode

Key Path	Front-panel key
Backwards Compatibility Notes	<p>User Preset is actually loading a state, and in legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, “state” always includes all of this data; so whenever state is loaded, or User Preset is executed, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p> <p>On ESA and PSA, User Preset affected the entire instrument’s state. In the X-Series, User Preset only recalls the state for the active mode. There is a User Preset file for each mode. User Preset can never cause a mode switch as it can in legacy analyzers. If you want to recall all modes to their user preset file state, you will need to do a User Preset after mode switching into each mode.</p> <p>User Preset recalls mode state which can now include data like traces; whereas on ESA and PSA, User Preset did not affect data.</p>
Initial S/W Revision	Prior to A.02.00

User Preset

User Preset sets the state of the currently active mode back to the state that was previously saved for this mode using the Save User Preset menu key or the SCPI command, SYST:PRES:USER:SAV. It not only recalls the Mode Preset settings, but it also recalls all of the mode persistent settings, and the Input/Output system setting that existed at the time Save User Preset was executed.

If a Save User Preset has not been done at any time, User Preset recalls the default user preset file for the currently active mode. The default user preset files are created if, at power-on, a mode detects there is no user preset file. There will never be a scenario when there is no user preset file to restore. For each mode, the default user preset state is the same state that would be saved if a Save User Preset is performed in each mode right after doing a Restore Mode Default and after a Restore Input/Output Defaults.

The User Preset function does the following:

- Aborts the currently running measurement.
- Sets the mode State to the values defined by Save User Preset.
- Makes the saved measurement for the currently running mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

Key Path	User Preset
Remote Command	:SYSTem:PRESet:USER
Example	:SYST:PRES:USER:SAVE:SYST:PRES:USER
Notes	:SYST:PRES:USER:SAVE is used to save the current state as the user preset state. Clears all pending OPC bits. The Status Byte is set to 0. Pressing the User Preset front-panel key while already in the User Preset menu will cause the User Preset to get executed
Couplings	A user preset will cause the currently running measurement to be aborted and cause the saved measurement to be active. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved.
Initial S/W Revision	Prior to A.02.00

User Preset All Modes

Recalls all of the User Preset files for each mode, switches to the power-on mode, and activates the saved measurement from the power-on mode User Preset file.

NOTE

When the instrument is secured, all of the user preset files are converted back to their default user preset files.

The User Preset function does the following:

- Aborts the currently running measurement.
- Switches the Mode to the power-on mode.
- Restores the User Preset files for each mode.
- Makes the saved measurement for the power-on mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

Key Path	User Preset
Remote Command	:SYSTem:PRESet:USER:ALL
Example	:SYST:PRES:USER:SAVE:SYST:PRES:USER:ALL
Notes	Clears all pending OPC bits. The Status Byte is set to 0. :SYST:PRES:USER:SAVE is used to save the current state as the user preset state.
Couplings	A user preset will cause the currently running measurement to be aborted, cause a mode switch to the power-on mode, and cause the saved measurement to be active in the power-on mode. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved.
Initial S/W Revision	Prior to A.02.00

Save User Preset

Saves the currently active mode and its State. You can recall this User Preset file by pressing the User Preset menu key or sending the SYST:PRES:USER remote command. This same state is also saved by the Save State function.

Key Path	User Preset
Remote Command	:SYSTem:PRESet:USER:SAVE
Example	:SYST:PRES:USER:SAVE
Notes	:SYST:PRES:SAVE creates the same file as if the user requested a *SAV or a MMEM:STOR:STAT, except User Preset Save does not allow the user to specify the filename or the location of the file.
Initial S/W Revision	Prior to A.02.00

View/Display

Accesses a menu of functions that enable you to:

- Set the display parameters for the current measurement
- Select the View

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Display

The Display menu is common to most measurements, and is used for configuring items on the display. Some Display menu settings apply to all the measurements in a mode, and some only to the current measurement. Those under the System Display Settings key apply to all measurements in all modes.

Key Path	Display
Key Path	View/Display
Initial S/W Revision	Prior to A.02.00

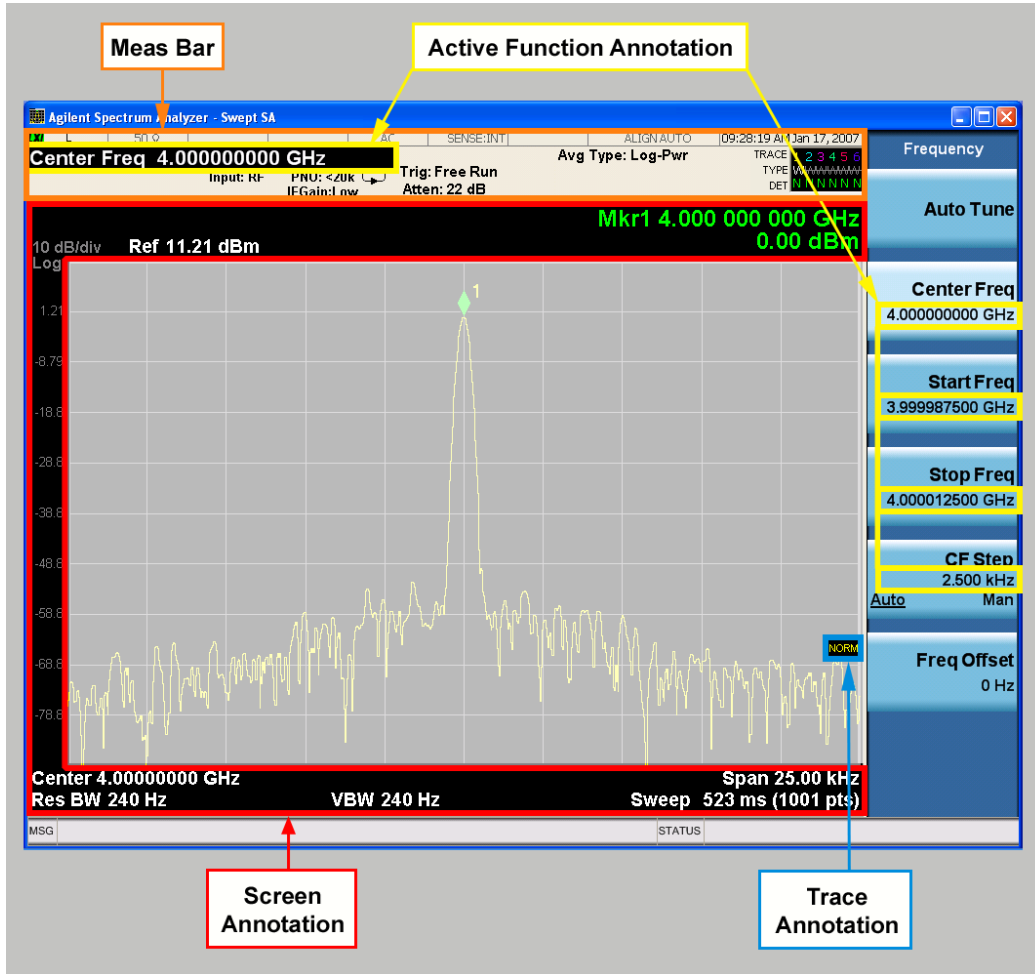
Annotation

Turns on and off various parts of the display annotation. The annotation is divided up into four categories:

1. Meas Bar: This is the measurement bar at the top of the screen. It does not include the settings panel or the Active Function. Turning off the Meas Bar turns off the settings panel and the Active Function. When the Meas Bar is off, the graticule area expands to fill the area formerly occupied by the Meas Bar.
2. Screen Annotation: this is the annotation and annunciation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) This does NOT include the marker number or the N dB result. When off, the graticule expands to fill the entire graticule area.
3. Trace annotation: these are the labels on the traces, showing their detector (or their math mode).
4. Active Function annotation: this is the active function display in the meas bar, and all of the active function values displayed on softkeys.

See the figure below. Each type of annotation can be turned on and off individually.

8 EDGE Power vs Time Measurement
View/Display



Key Path	View/Display, Display
Initial S/W Revision	Prior to A.02.00

Meas Bar On/Off

This function turns the Measurement Bar on and off, including the settings panel. When off, the graticule area expands to fill the area formerly occupied by the Measurement Bar.

Key Path	View/Display, Display, Annotation
Remote Command	:DISPlay:ANNOtation:MBAR[:STATe] OFF ON 0 1 :DISPlay:ANNOtation:MBAR[:STATe]?
Example	DISP:ANN:MBAR OFF
Dependencies	Grayed out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset	On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off.
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Screen

This controls the display of the annunciation and annotation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) and the y-axis annotation. This does NOT include marker annotation (or the N dB result). When off, the graticule expands to fill the entire graticule area, leaving only the 1.5% gap above the graticule as described in the Trace/Detector chapter.

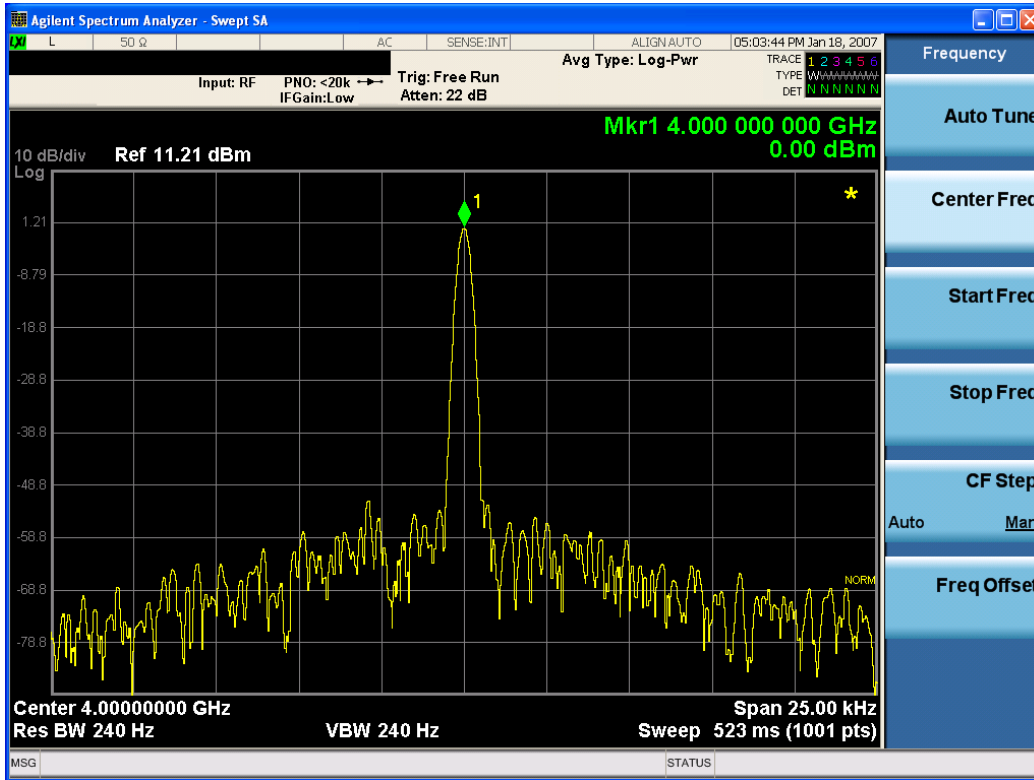
Key Path	View/Display, Display, Annotation
Remote Command	:DISPlay:ANNotation:SCReen[:STATe] OFF ON 0 1 :DISPlay:ANNotation:SCReen[:STATe]?
Example	DISP:ANN:SCR OFF
Dependencies	Grayed-out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset	On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Active Function Values On/Off

Turns on and off the active function display in the Meas Bar, and all of the active function values displayed on the softkeys.

Note that all of the softkeys that have active functions have these numeric values blanked when this function is on. This is a security feature..

8 EDGE Power vs Time Measurement
View/Display



Key Path	View/Display, Display, Annotation
Remote Command	:DISPlay:ACTivefunc[:STATE] ON OFF 1 0 :DISPlay:ACTivefunc[:STATE] ?
Example	DISP:ACT OFF
Dependencies	Grayed out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset	On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Title

Displays menu keys that enable you to change or clear a title on your display.

Key Path	View/Display, Display
Initial S/W Revision	Prior to A.02.00

Change Title

Writes a title into the "measurement name" field in the banner, for example, "Swept SA".

Press Change Title to enter a new title through the alpha editor. Press Enter or Return to complete the entry. Press ESC to cancel the entry and preserve your existing title.

The display title will replace the measurement name. It remains for this measurement until you press Change Title again, or you recall a state, or a Preset is performed. A title can also be cleared by pressing Title, Clear Title.

NOTE

Notice the inclusion of the <measurement> parameter in the command below. Because each measurement remembers the Display Title, the command must be qualified with the measurement name. For the Swept SA measurement this is not the case; no <measurement> parameter is used when changing the Display Title for the Swept SA measurement.

Key Path	View/Display, Display, Title
Mode	All
Remote Command	:DISPlay:<measurement>:ANNotation:TITLe:DATA <string> :DISPlay:<measurement>:ANNotation:TITLe:DATA?
Example	DISP:ANN:TITL:DATA "This Is My Title" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "This Is My Title" This example is for Measurements other than Swept SA. Both set the title to: This Is My Title
Notes	Pressing this key cancels any active function. When a title is edited the previous title remains intact (it is not cleared) and the cursor goes at the end so that characters can be added or BKSP can be used to go back over previous characters.
Preset	No title (measurement name instead)
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Clear Title

Clears a title from the front-panel display. Once cleared, the title cannot be retrieved. After the title is cleared, the current Measurement Name replaces it in the title bar.

Key Path	View/Display, Display, Title
Example	The following commands clear the title and restore the measurement's original title: DISP:ANN:TITL:DATA "" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "" This example is for ACP; in measurements other than Swept SA the measurement name is required.
Notes	Uses the :DISPlay:<measurement>:ANNotation:TITLe:DATA <string> command with an empty string (in the Swept SA, the <measurement> is omitted).
Preset	Performed on Preset.
Initial S/W Revision	Prior to A.02.00

Graticule

Pressing Graticule turns the display graticule On or Off. It also turns the graticule y-axis annotation on and off.

Key Path	View/Display, Display
Remote Command	:DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe] OFF ON 0 1 :DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe]?
Example	DISP:WIND:TRAC:GRAT:GRID OFF
Notes	The graticule is the set of horizontal and vertical lines that make up the grid/divisions for the x-axis and y-axis.
Preset	On
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00

System Display Settings

These settings are "Mode Global" – they affect all modes and measurements and are reset only by Restore Misc Defaults or Restore System Defaults under System.

Key Path	View/Display, Display
Initial S/W Revision	Prior to A.02.00

Annotation Local Settings

This is a Mode Global override of the meas local annotation settings. When it is All Off, it forces ScreenAnnotation, Meas Bar, Trace, and Active Function Values settings to be OFF for all measurements in all modes. This provides the security based "annotation off" function of previous analyzers; hence it uses the legacy SCPI command.

When it is All Off, the Screen, Meas Bar, Trace, and Active Function Values keys under the Display, Annotation menu are grayed out and forced to Off. When Local Settings is selected, you are able to set the local annotation settings on a measurement by measurement basis.

Key Path	View/Display, Display, System Display Settings
Remote Command	:DISPlay:WINDow[1]:ANNotation[:ALL] OFF ON 0 1 :DISPlay:WINDow[1]:ANNotation[:ALL]?
Example	:DISP:WIND:ANN OFF
Preset	On (Set by Restore Misc Defaults)
State Saved	Not saved in instrument state.
Backwards Compatibility Notes	The WINDow parameter and optional subopcode is included for backwards compatibility but ignored – all windows are equally affected.
Initial S/W Revision	Prior to A.02.00

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

Key Path	Save, Screen Image
Remote Command	:MMEMory:STORe:SCReem:THEMe TDColor TDMonochrome FCOLOR FMONochrome :MMEMory:STORe:SCReem:THEMe?
Example	:MMEM:STOR:SCR:THEM TDM
Preset	3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes.
Readback	3D Color 3D Mono Flat Color Flat Mono
Backwards Compatibility Notes	In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical.
Initial S/W Revision	Prior to A.02.00

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDC
Readback	3D Color
Initial S/W Revision	Prior to A.02.00

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDM
Readback	3D Mono
Initial S/W Revision	Prior to A.02.00

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FCOL
Readback	Flat Color
Initial S/W Revision	Prior to A.02.00

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FMON
Readback	Flat Mono
Initial S/W Revision	Prior to A.02.00

Backlight

Accesses the display backlight on/off keys. This setting may interact with settings under the Windows "Power" menu.

When the backlight is off, pressing ESC, TAB, SPACE, ENTER, UP, DOWN, LEFT, RIGHT, DEL, BKSP, CTRL, or ALT turns the backlight on without affecting the application. Pressing any other key will turn backlight on and could potentially perform the action as well.

Key Path	View/Display, Display, System Display Settings
Remote Command	:DISPlay:BACKlight ON OFF :DISPlay:BACKlight?
Preset	ON (Set by Restore Misc Defaults)
Initial S/W Revision	Prior to A.02.00

Backlight Intensity

An active function used to set the backlight intensity. It goes from 0 to 100 where 100 is full on and 0 is off. This value is independent of the values set under the Backlight on/off key.

Key Path	View/Display, Display, System Display Settings
Remote Command	:DISPlay:BACKlight:INTensity <integer> :DISPlay:BACKlight:INTensity?
Example	DISP:BACK:INT 50

Preset	100 (Set by Restore Misc Defaults)
Min	0
Max	100
Initial S/W Revision	Prior to A.02.00

View Selection

Accesses a menu that allows you to select the desired view of the measurement.

For details of Remote Commands associated with the measurement's views, see the following sections:

["View Selection by name \(Remote Command Only\)." on page 611](#)

["View Selection by number \(Remote Command Only\)" on page 612](#)

The following view selections are available:

- Burst (SCPI: ALL) – views the entire burst of interest as determined by the current trigger source, burst sync, training sequence, and timeslot settings. To view a different burst of interest you must set these parameters for the selected timeslot. To view multiple slots, use the Multi-Slot key described below. For full details, see ["Burst View" on page 612](#).
- Rise & Fall (SCPI: BOTH) – zooms in on the rising and falling portions of the burst being tested. For full details, see ["Rise & Fall View" on page 616](#).
- Multi-Slot (SCPI: MSLot) – views the entire sweep as specified by the current Meas Time setting. Power levels for each active slot are listed in a table below the timeslot display. For full details, see ["Multi-Slot View" on page 617](#).

View Selection by name (Remote Command Only).

Key Path	View/Display
Mode	GSM
Remote Command	:DISPlay:EPVTime:VIEW[:SElect] ALL BOTH MSLot :DISPlay:EPVTime:VIEW[:SElect]?
Example	DISP:EPVT:VIEW:SEL ALL DISP:EPVT:VIEW:SEL?
Preset	ALL
State Saved	Saved in instrument state.
Range	Burst Rise & Fall Multi-Slot
Initial S/W Revision	Prior to A.02.00

View Selection by number (Remote Command Only)

Mode	GSM
Remote Command	:DISPlay:EPVTime:VIEW:NSElect <integer> :DISPlay:EPVTime:VIEW:NSElect?
Example	DISP:EPVT:VIEW:NSEL 3 DISP:EPVT:VIEW:NSEL?
Notes	1: Burst 2: Rise & Fall 3: Multi-Slot You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	3
Initial S/W Revision	Prior to A.02.00

Burst View

Shows power vs. time and mask result for the EDGE burst. This view has two windows:

- ["RF Envelope Window" on page 613](#)
- ["Numeric Results Window " on page 614](#)

For details of the associated Remote Commands, see ["View Selection" on page 611](#).

The figure below shows an example of the Burst View.

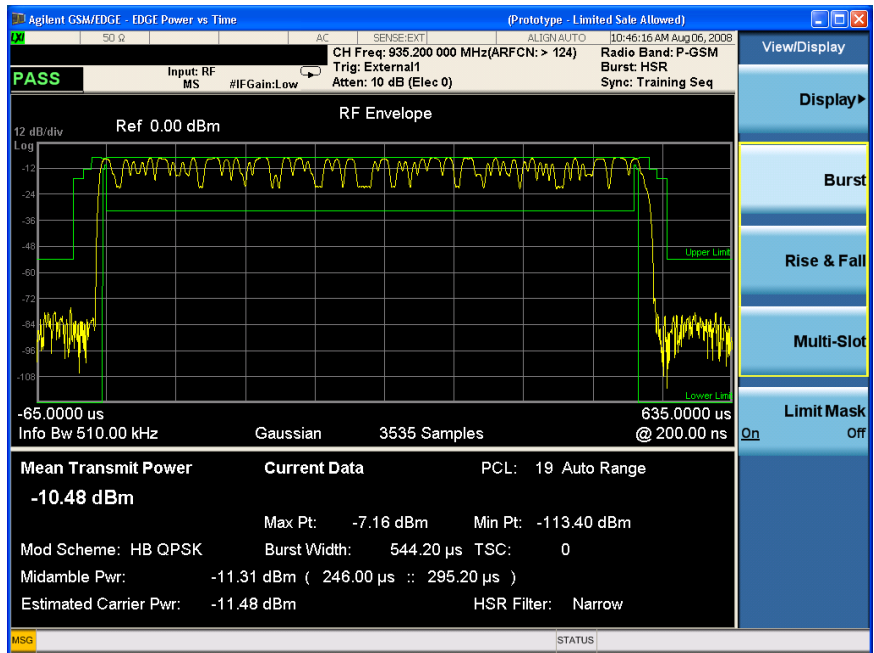


Figure 0-3 Burst View for EDGE Power vs. Time Measurement

RF Envelope Window

Shows the trace and mask lines. Max Hold Trace and Min Hold Trace are not shown in the figure above.

The following tables provide details of the traces and masks.

Measured Trace

Marker Trace	Yes
Corresponding Trace	n=7
Color	Yellow

Max Hold Trace

Marker Trace	Yes
Corresponding Trace	n=8
Color	Water Blue

Min Hold Trace

Marker Trace	Yes
Corresponding Trace	n=9
Color	Magenta

Upper Mask

Marker Trace	Yes
Corresponding Trace	n=3
Color	Green

Lower Mask

Marker Trace	Yes
Corresponding Trace	n=4
Color	Green

Numeric Results Window

Name	Corresponding Trace	Description	Display Format
Mean Transmit Power	n=1, 3rd	The power of N averaged bursts, if averaging is on. The power is averaged across the useful part of the burst. If there are multiple bursts in the acquired trace, only one burst is used for average. This means that N traces are acquired to make the complete average. If "Avg/Hold Num" on page 527 is off or the number is 1, this number is the power averaged across the useful part of the most recently acquired data	##.## dBm
Mean Transmit Power (Current Data)	n=1, 2nd	The power averaged across the useful part of the most recently acquired data. If "Avg/Hold Num" on page 527 is off or the number is 1, the trace disappears from the window since the number is identical to the Mean Transmit Power above.	##.## dBm
Max Pt (Current Data)	n=1, 9th	The maximum value of the most recently acquired data.	##.## dBm
Min Pt (Current data)	n=1, 10th	The minimum value of the most recently acquired data.	##.## dBm
Mod Scheme	N=10,15th	The modulation scheme used for a burst signal of a specified time slot.	"NB GMSK", "NB 8PSK", "NB 16QAM", "NB 32QAM", "HB QPSK", "HB 16QAM", "HB 32QAM",

Name	Corresponding Trace	Description	Display Format
			"ACCESS", or "SYNC"
Burst Width	n=1, 8th	The width of the burst measured at -3 dB below the mean power in the useful part of the burst.	###.## μs
Midamble Pwr	None	The (Mask Reference) Power is the average power in dBm of the middle 16 symbols in the midamble. The times displayed are the corresponding start and stop times of the middle 16 symbols.	###.## dBm (###.# μs: ###.# μs)
1st Error Pt	n=1, 13th	The time which indicates the point on the X Scale where the first failure of a signal was detected. Use a marker to locate this point in order to examine the nature of the failure. If the limit passes, disappear from the window.	##.## μs
PCL	None	Power Control Level that determined by the Mean Transmit Power and used to determine the limit mask. Since PCL is a Measurement Global parameter, [:SENSe]:RADio:PCL, refer to the section Mode Functionality. Auto disappears when [:SENSe]:RADio:PCL:STATe is set to 0 Off.	PCL: ## Auto
Detected TSC	None	The most recently detected TSC. The returned value is 0~7 (Burst Type : Normal/Higher Symbol Rate (HSR)) if TSC detected. If TSC not detected, the returned value is -999.0. In multi slot condition, the returned value is the detected TSC of the specified slot (Time Slot ON) or the first evaluated slot (Time Slot OFF). The returned value is 10~12 if Synchronization burst. The returned value is 20~22 if Access burst.	TSC: ##
Estimated Carrier Pwr	N=10, 16th	Estimated Carrier Power calculated from the specified time slot.	###.##dBm
HSR Filter	None	The specified pulse shaping filter used for higher symbol rate modulation	"Narrow" or "Wide"

Key Path	View/Display
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Rise & Fall View

This view has three windows:

1. Rising RF Envelope Window. The parameters of this window are identical to those of the RF Window in the "Burst View" on page 612.
2. Falling RF Envelope Window. The parameters of this window are identical to those of the RF Window in the "Burst View" on page 612.
3. Numeric Results Window. The parameters of this window are identical to those of the Numeric Results Window in the "Burst View" on page 612.

For details of the associated Remote Command, see "View Selection" on page 611.

The figure below shows an example of the Rise & Fall View.

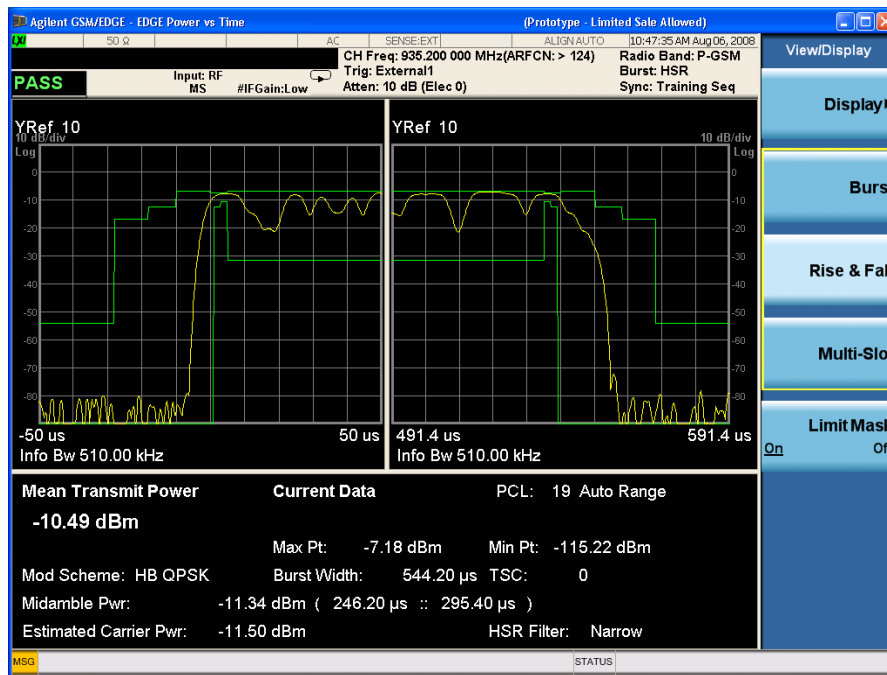


Figure 0-4 Rise & Fall View for EDGE Power vs. Time Measurement

Key Path	View/Display
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Multi-Slot View

This view has two windows.

- "RF Envelope Window" on page 617
- "Numeric Results Window" on page 617

For details of the associated Remote Command, see "View Selection" on page 611.

The figure below shows an example of the Multi Slot View.

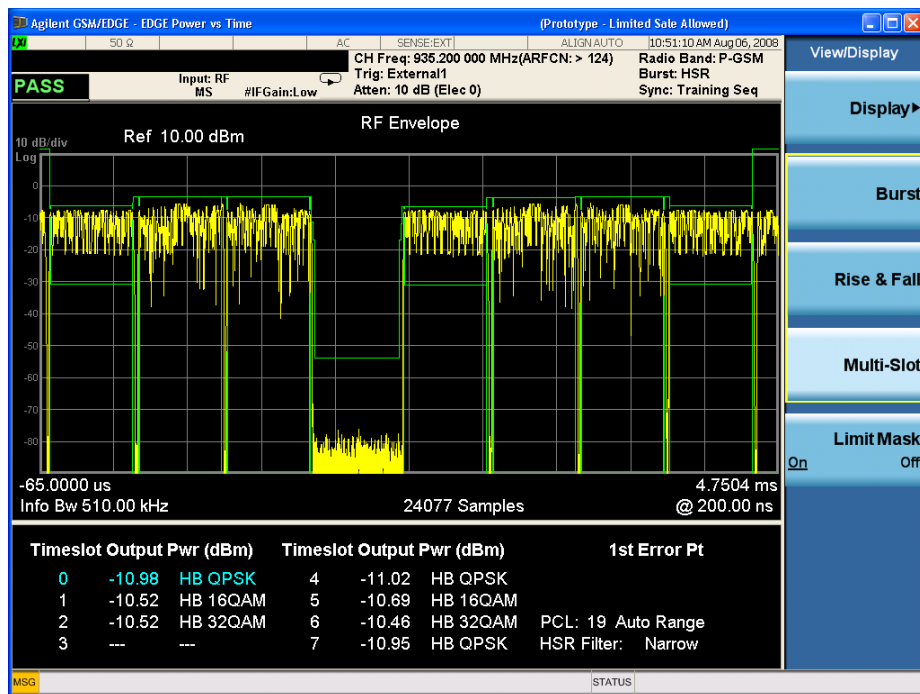


Figure 0-5 Multi Slot View for EDGE Power vs. Time Measurement

RF Envelope Window

The parameters of this window are identical to those of the RF Window in the "Burst View" on page 612.

Numeric Results Window

The output power of multi slots whose number is defined by Meas Time.

Name	Corresponding Trace	Description	Display Format
1st Error Pt	None	The time which indicates the point on the X Scale where the first failure of a signal was detected. Use a marker to locate this point in order to examine the nature of the failure.	##.## μs
Timeslot Output Pwr	n=7	Power level values for each slot in the current frame	##.## dBm

Name	Corresponding Trace	Description	Display Format
Mod Scheme	None	The modulation scheme used for a burst signal of each time slot. If burst isn't found at a time slot, the word "---" is displayed.	"NB GMSK", "NB 8PSK", "NB 16QAM", "NB 32QAM", "HB QPSK", "HB 16QAM", "HB 32QAM", "ACCESS", "SYNC", or "___"
PCL	None	Power Control Level that determined by the Mean Transmit Power and used to determine the limit mask. Since PCL is a Measurement Global parameter, [:SENSe]:RADio:PCL, refer to the section Mode Functionality. Auto disappears when [:SENSe]:RADio:PCL:STATe is set to 0 Off.	PCL: ## Auto
HSR Filter	None	The specified pulse shaping filter used for higher symbol rate modulation	"Narrow" or "Wide"

Key Path	View/Display
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Limit Mask

This setting is used to show (On) or hide (Off) the limit mask that is displayed on the graticule. It also disables limit checking.

NOTE This does not affect any calculation taking place.

Key Path	View/Display
Mode	GSM
Remote Command	:DISPlay:EPVTime:LIMit:MASK OFF ON 0 1 :DISPlay:EPVTime:LIMit:MASK?
Example	DISP:EPVT:LIM:MASK 1 DISP:EPVT:LIM:MASK?
Notes	This parameter only hides or shows the limit mask line on the display. PASS/FAIL limit check would be done if " Limit Test " on page 532 is set to On whether Limit Mask state is set to On or Off.

	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

9 EDGE EVM Measurement

EVM (Error Vector Magnitude) is the measure of modulation quality for EDGE. Since EDGE uses $3\pi/8$ PSK modulation, the transmitter's phase, frequency, and amplitude accuracy are critical to the communications system's performance. EVM also ultimately affects range.

For more details, see ["EDGE EVM Measurement Description" on page 629](#).

This topic contains the following sections:

["Measurement Commands for EDGE EVM" on page 622](#)

["Remote Command Results for EDGE EVM" on page 623](#)

Measurement Commands for EDGE EVM

The following commands and queries can be used to retrieve the measurement results:

```
:CONFigure:EEVM  
:CONFigure:EEVM:NDEFault  
:INITiate:EEVM  
:FETCh:EEVM[n]?  
:READ:EEVM[n]?  
:MEASure:EEVM[n]?
```

For more measurement related commands, see the section ["Remote Measurement Functions" on page 2301](#).

Remote Command Results for EDGE EVM

For the queries listed above, the results returned depend on the value of n, as follows.

n	Results Returned
0	Returns unprocessed I/Q trace data, as a data array of comma-separated trace points, in volts. The sample rate is 637.5 kHz when Option DP2, B40 or wider IF Bandwidth option is installed. Otherwise the sample rate is 2.5 MHz.
1 (default)	Returns the following scalar results: <ol style="list-style-type: none"> 1. RMS 95th %ile EVM – a floating point number (in percent) of EVM over 95% of the entire measurement area. 2. Average RMS EVM – a floating point number (in percent) of EVM over the entire measurement area. 3. Maximum RMS EVM – a floating point number (in percent) of highest EVM over the entire measurement area. 4. Average Peak EVM – a floating point number (in percent) of the average of the peak EVMs. Take the peak EVMs from each burst and average them together. 5. Maximum Peak EVM – a floating point number (in percent) of the maximum peak EVM. Take the peak EVMs from each burst and identify the highest peak. 6. Symbol position of the peak EVM – an integer number of the symbol position where the peak EVM error is detected. 7. Average Magnitude error – a floating point number (in percent) of average magnitude error over the entire measurement area. 8. Maximum Magnitude error – a floating point number (in percent) of maximum magnitude error over the entire measurement area. 9. Average Phase error – a floating point number (in degree) of average phase error over the entire measurement area. 10. Maximum Phase error – a floating point number (in degree) of maximum phase error over the entire measurement area. 11. Average Frequency error – a floating point number (in Hz) of the frequency error in the measured signal. 12. Maximum Frequency error – a floating point number (in Hz) of the highest frequency error in the measured signal. 13. Average I/Q origin offset – a floating point number (in dB) of the I and Q error (magnitude squared) offset from the origin. 14. Amplitude Droop Error – a floating point number (in dB) of the amplitude droop measured across the 142 symbol burst. 15. Trigger to T0 – a floating-point number (in sec) of the time interval between the trigger point to T0. T0 means the transition time from symbol 13 to symbol 14 of the midamble training sequence for each time slot.
2	Returns a series of floating point numbers (in percent) that represent each sample in the EVM vector trace for the last slot. The first number is the symbol 0 decision point and there is 1 point per symbol.
3	Returns a series of floating point numbers (in percent) that represent each sample in the

n	Results Returned
	magnitude error vector trace for the last slot. The first number is the symbol 0 decision point and there is 1 point per symbol.
4	Returns a series of floating point numbers (in degree) that represent each sample in the phase error vector trace for the last slot. The first number is the symbol 0 decision point and there is 1 point per symbol.
5	<p>Returns a series of floating point numbers that alternately represent I and Q pairs of the final corrected measured data for the last slot. The magnitude of each I and Q pair are normalized to 1.0. The first number is the in-phase (I) sample of symbol 0 decision point and the second is the quadrature-phase (Q) sample of symbol 0 decision point. As in the EVM, there is 1 point per symbol, so the series of numbers is:</p> <p>1st number = I of the symbol 0 decision point 2nd number = Q of the symbol 0 decision point ... (2) + 1 (or 3rd) number = I of the symbol 1 decision point (2) + 2 (or 4th) number = Q of the symbol 1 decision point ... (2) x N + 1 number = I of the symbol N decision point (2) x N + 2 number = Q of the symbol N decision point</p>
6	<p>Returns comma-separated scalar values of pass/fail (0.0 = passed, 1.0 = failed) results determined by testing EVM.</p> <ol style="list-style-type: none"> 1. Test results of RMS EVM 2. Test results of Peak EVM 3. Test results of 95%ile EVM 4. Test results of I/Q Origin Offset 5. Test results of Frequency Error
7	<p>Returns a series of integer values that represent the demoded symbols of the final corrected measured data for the last slot.</p> <p>bit/symbol is represented as a value between</p> <p>0 - 7 (octal) : 8PSK 142 symbols 0 - 3 (octal) : QPSK 169 symbols 0 - 15 (decimal) : 16QAM 169 symbols 0 - 31 (decimal) : 32QAM 169 symbols</p> <p>When AQPSK, it returns a series of floating point numbers that alternately represent demod bits of VAMOS subchannel pairs measured for the last slot. The first number is the VAMOS subchannel A bit and the second is the subchannel B bit of symbol 0. The series of numbers is:</p> <p>1st number = Subchannel A symbol 0 bit 2nd number = Subchannel B symbol 0 bit 3rd number = Subchannel A symbol 1 bit 4th number = Subchannel B symbol 1 bit ... 2 x 141 + 1 = Subchannel A symbol 141 bit</p>

n	Results Returned
	2 x 141+2 = Subchannel B symbol 141 bit
8	<p>Returns the following scalar results:</p> <ol style="list-style-type: none"> 1. RMS 95th %ile EVM – a floating point number (in percent) of EVM over 95% of the entire measurement area. 2. Average RMS EVM – a floating point number (in percent) of EVM over the entire measurement area. 3. Maximum RMS EVM – a floating point number (in percent) of highest EVM over the entire measurement area. 4. Average Peak EVM – a floating point number (in percent) of the average of the peak EVMs. Take the peak EVMs from each burst and average them together. 5. Maximum Peak EVM – a floating point number (in percent) of the maximum peak EVM. Take the peak EVMs from each burst and identify the highest peak. 6. Symbol position of the peak EVM – an integer number of the symbol position where the peak EVM error is detected. 7. Average RMS Magnitude error – a floating point number (in percent) of average RMS magnitude error over the entire measurement area. 8. Maximum RMS Magnitude error – a floating point number (in percent) of maximum RMS magnitude error over the entire measurement area. 9. Average RMS Phase error – a floating point number (in degree) of average RMS phase error over the entire measurement area. 10. Maximum RMS Phase error – a floating point number (in degree) of maximum RMS phase error over the entire measurement area. 11. Average Frequency error – a floating point number (in Hz) of the frequency error in the measured signal. 12. Maximum Frequency error – a floating point number (in Hz) of the highest frequency error in the measured signal. 13. Average/I/Q origin offset – a floating point number (in dB) of the I and Q error (magnitude squared) offset from the origin. 14. Amplitude Droop Error – a floating point number (in dB) of the amplitude droop measured across the 142 symbol burst. 15. Trigger to T0 - a floating-point number (in sec) of the time interval between the trigger point to T0. T0 means the transition time from symbol 13 to symbol 14 of the midamble training sequence for each time slot. 16. Timing Offset of AM/PM path - a floating number (in sec) of the averaged time interval between Amplitude Modulation path and Phase Modulation path. When GMSK is measured, this timing offset value is 0, which will be included in the average calculation. 17. Detected TSC is the most recently detected TSC. The returned value is 0~7 (Burst Type : Normal), 10 (Burst Type : Sync), 20 (Burst Type :Access) if TSC detected. If TSC not detected, the returned value is -999.0. If Amptd or NONE (Power vs. Time only) specified in Sync Type, the returned value is -999.0. In multi slot condition, the returned value is the detected TSC of the specified slot (Time Slot ON) or the first evaluated slot (Time Slot OFF). <p>The returned value in AQPSK is more than or equal to 100100. Its first three digits</p>

n	Results Returned
	<p>represent TSC of VAMOS subchannel A. The second three digits represent VAMOS subchannel B. TSCs of TSC set 1 and TSC set 2 correspond to 100 to 107 and 200 to 207 respectively. Thus the returned value is $([\text{TSC num of VAMOS subchannel A}] * 1000 + [\text{TSC num of VAMOS subchannel B}])$. For example, if measured AQPSK signal has TSC 3 of set1 on VAMOS subchannel A and TSC 5 of TSC set2 on VAMOS B, returned value is 103205.</p> <p>The returned value is 200 ~ 207, $([\text{TSC num}] + 200)$, if one of Set2 TSCs is detected.</p> <p>18. Detected Mod Scheme (0:GMSK, 1:NB 8PSK, 2:NB 16QAM, 3:NB 32QAM, 10:NB AQPSK, 11:HB QPSK, 12:HB 16QAM, 13:HB 32QAM) Note that values except for GMSK and 8PSK return only when N/W9071A-3FP is installed.</p> <p>19. Maximum I/Q origin offset – a floating point number (in dB) of the I and Q error (magnitude squared) offset from the origin. If averaging is ON, this is the max hold number of the individual IQ Offset</p> <p>20. Average Absolute Peak Phase error – a floating point number (in percent) of the average of the absolute peak phase errors. Take the peak phase error from each burst and average them together.</p> <p>21. Maximum Absolute Peak Phase error – a floating point number (in percent) of the maximum absolute peak phase error. Take the peak phase errors from each burst and identify the highest peak.</p> <p>22. Reserved for future use (floating point) – the value returned is -999.0.</p>
9	<p>Returns series of floating point numbers that alternately represent I and Q pairs of the final corrected derotated measured data for the last slot. The magnitude of each I and Q pair are normalized to 1.0. The first number is the in-phase (I) sample of symbol 0 decision point and the second is the quadrature-phase (Q) sample of symbol 0 decision point. As in the EVM, there is 1 point per symbol, so the series of numbers is:</p> <p>1st number = I of the symbol 0 decision point 2nd number = Q of the symbol 0 decision point...</p> <p>(2) +1 (or 3rd) number = I of the symbol 1 decision point</p> <p>(2) +2 (or 4th) number = Q of the symbol 1 decision point...</p> <p>(2) * N + 1 number = I of the symbol N decision point</p> <p>(2) * N + 2 number = Q of the symbol N decision point</p>
10	<p>Returns series of floating point numbers (in percent) that represent each sample in Max Hold of the EVM vector trace for the last slot. The first number is the symbol 0 decision point and there is 1 point per symbol.</p> <p>This command is available only when the Max Hold Trace State is ON.</p>
11	<p>Returns series of floating point numbers (in percent) that represent each sample in Min Hold of the EVM vector trace for the last slot. The first number is the symbol 0 decision point and there is 1 point per symbol. This command is available only when the Min Hold Trace State is ON.</p>
12	<p>Returns series of floating point numbers (in percent) that represent each sample in Max Hold of the magnitude error vector trace for the last slot. The first number is the symbol 0 decision point and there is 1 point per symbol. This command is available only when the Max Hold Trace State is ON.</p>
13	<p>Returns series of floating point numbers (in percent) that represent each sample in Min</p>

n	Results Returned
	Hold of the magnitude error vector trace for the last slot. The first number is the symbol 0 decision point and there is 1 point per symbol. This command is available only when the Min Hold Trace State is ON.
14	Returns series of floating point numbers (in degree) that represent each sample in Max Hold of the phase error vector trace for the last slot. The first number is the symbol 0 decision point and there is 1 point per symbol. This command is available only when the Max Hold Trace State is ON.
15	Returns series of floating point numbers (in degree) that represent each sample in Min Hold of the phase error vector trace for the last slot. The first number is the symbol 0 decision point and there is 1 point per symbol. This command is available only when the Min Hold Trace State is ON.
16	Returns series of integer values that represent the demoded symbols of VAMOS subchannel A of the final corrected measured data for the last slot.
17	Returns series of integer values that represent the demoded symbols of VAMOS subchannel B of the final corrected measured data for the last slot.
18	Reserved for future use
19	Reserved for future use
20	Returns series of integer values that represent the demoded payload symbols of VAMOS subchannel A of the final corrected measured data for the last slot.
21	Returns series of integer values that represent the demoded payload symbols of VAMOS subchannel B of the final corrected measured data for the last slot.
22	Reserved for future use
23	Reserved for future use
24	<p>Returns the following scalar results:</p> <ol style="list-style-type: none"> 1. Detected TSC on VAMOS subchannel A is the most recently detected TSC on VAMOS subchannel A. The returned value is 0~7 if TSC of AQPSK burst detected. If not detected, the returned value is -999.0. If Amptd or NONE (Power vs. Time only) is specified in Sync Type, the returned value is -999.0. In multi slot condition, the returned value is the detected TSC of the specified slot (Time Slot ON) or the first evaluated slot (Time Slot OFF). 2. Detected TSC on VAMOS subchannel B is the most recently detected TSC on VAMOS subchannel B. The returned value is 0~7 if TSC of TSC set 1 detected and 200 ~ 207 if TSC of TSC set 2 detected. If not detected, the returned value is -999.0. If Amptd or NONE (Power vs. Time only) is specified in Sync Type, the returned value is -999.0. In multi slot condition, the returned value is the detected TSC of the specified slot (Time Slot ON) or the first evaluated slot (Time Slot OFF).
25	<p>Returns comma-separated scalar values of pass/fail (0.0 = passed, 1.0 = failed) results determined by testing EVM.</p> <ol style="list-style-type: none"> 1. Test results of RMS EVM 2. Test results of Peak EVM 3. Test results of 95%ile EVM 4. Test results of I/Q Origin Offset 5. Test results of Frequency Error

n	Results Returned
	6. Test results of RMS Phase Error
	7. Test results of Peak Phase Error
	The tests for RMS and Peak Phase Errors are done only when mod scheme of last measured slot is GMSK. When not GMSK, pass value is returned.

EDGE EVM Measurement Description

EDGE receivers rely on the quality of the $3\pi/8$ PSK modulation signal to achieve the expected carrier to noise ratio. A transmitter with high EVM will often still be able to support phone calls during a functional test. However, it will tend to provide difficulty for mobiles trying to maintain service at the edge of the cell with low signal levels or under difficult fading and Doppler conditions.

Key Path	Meas
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

AMPTD Y Scale

Accesses a menu of functions that enable you to set the vertical scale parameters. These functions control how data on the vertical (Y) axis is displayed and control instrument settings that affect the vertical axis.

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Ref Value

Allows you to set reference value by error vector magnitude or phase error.

Key Path	AMPTD Y Scale
Mode	GSM
Initial S/W Revision	Prior to A.02.00

Key Path	AMPTD Y Scale
Mode	GSM
Remote Command	:DISPlay:EEVM:VIEW2:WINDow[1] 3:TRACe:Y[:SCALe]:RLEVel <real> :DISPlay:EEVM:VIEW2:WINDow[1] 3:TRACe:Y[:SCALe]:RLEVel?
Example	DISP:EEVM:VIEW2:WIND:TRAC:Y:RLEV 10 DISP:EEVM:VIEW2:WIND:TRAC:Y:RLEV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	When Auto Scaling is On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scaling automatically changes to Off.
Preset	0
State Saved	No
Min	-500
Max	500
Initial S/W Revision	Prior to A.02.00

Key Path	AMPTD Y Scale
Mode	GSM
Remote Command	:DISPlay:EEVM:VIEW2:WINDow2:TRACe:Y[:SCALe]:RLEVel <real> :DISPlay:EEVM:VIEW2:WINDow2:TRACe:Y[:SCALe]:RLEVel?
Example	DISP:EEVM:VIEW2:WIND2:TRAC:Y:RLEV 2 DISP:EEVM:VIEW2:WIND2:TRAC:Y:RLEV?

Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	When Auto Scaling is On, this value is automatically determined by the measurement result. When the user sets this value manually, Auto Scaling automatically changes to Off.
Preset	0
State Saved	No
Min	-36000
Max	36000
Initial S/W Revision	Prior to A.02.00

Attenuation

This menu controls the attenuator functions and interactions between the attenuation system components.

There are two attenuator configurations in the X-Series. One is a dual attenuator configuration consisting of a mechanical attenuator and an optional electronic attenuator. The other configuration uses a single attenuator with combined mechanical and electronic sections that controls all the attenuation functions. Different models in the X-Series come with different configurations.

See ["Dual Attenuator Configurations:" on page 631](#)

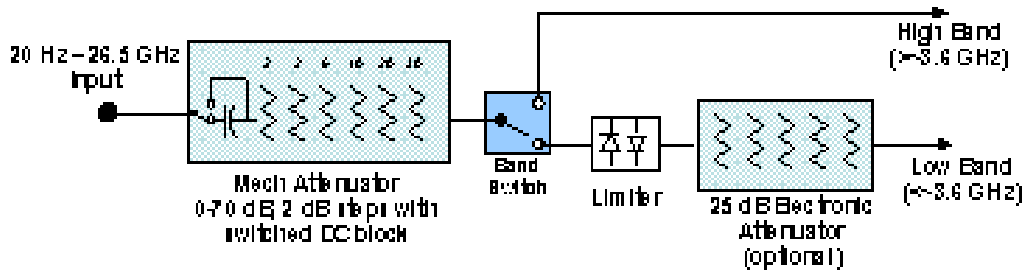
See ["Single Attenuator Configuration:" on page 632](#)

Most Attenuation settings are the same for all measurements – they do not change as you change measurements. Settings like these are called “Meas Global” and are unaffected by Meas Preset.

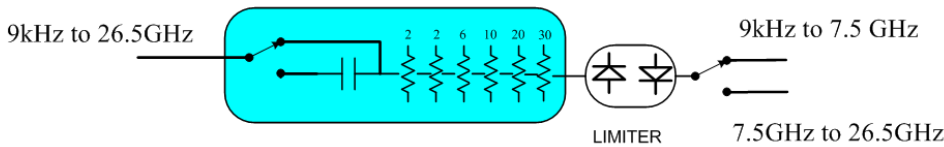
Key Path	AMPTD Y Scale
Scope	Meas Global
Dependencies	In measurements that support the I/Q inputs, this key is unavailable when I/Q is the selected input, and is replaced by the Range key in that case.
Readback Line	Contains a summary in [] brackets of the current total attenuation. See the descriptions of the , " (Mech) Atten " on page 2242, and " Enable Elec Atten " on page 2244 keys for more detail on the contributors to the total attenuation. Note that when "Pre-Adjust for Min Clip" is on, this value can change at the start of every measurement.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Dual Attenuator Configurations:

Configuration 1: Mechanical attenuator + optional electronic attenuator

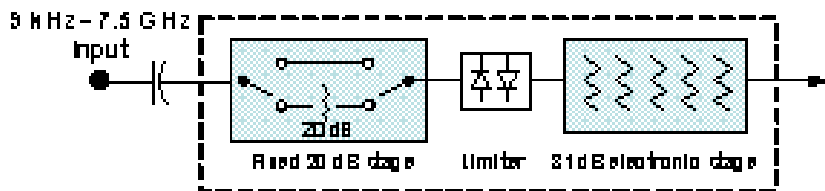


Configuration 2: Mechanical attenuator, no optional electronic attenuator

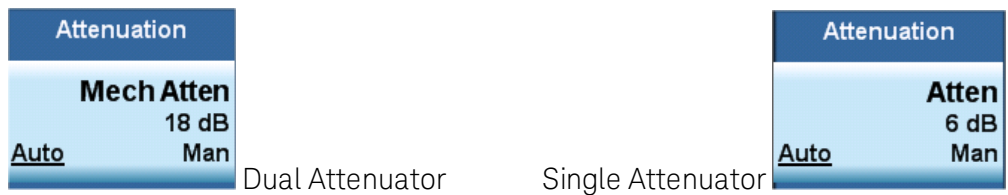


(note that Configuration 2 is not strictly speaking a dual-section attenuator, since there is no electronic section available. However, it behaves exactly like Configuration 1 without the Electronic Attenuator option EA3, therefore for the sake of this document it is grouped into the “Dual Attenuator” configuration)

Single Attenuator Configuration:



You can tell which attenuator configuration you have by pressing the Attenuation key, which (in most Modes) opens the Attenuation menu. If the first key in the Attenuation menu says Mech Atten you have the dual attenuator configuration. If the first key says Atten you have the single attenuator configuration.



In the single attenuator configuration, you control the attenuation with a single control, as the fixed stage has only two states. In the dual attenuator configuration, both stages have significant range so you are given separate control of the mechanical and electronic attenuator stages.

When you have the dual attenuator configuration, you may still have only a single attenuator, because unless option EA3 (the Electronic Attenuator option) is available, and you purchase it, you will have only the mechanical attenuator.

(Mech) Atten

This key is labeled Mech Atten in dual attenuator models and Atten in single attenuator models. In the dual attenuator configuration, this key only affects the mechanical attenuator.

This key lets you modify the attenuation applied to the RF input signal path. This value is normally auto coupled to the Ref Level, the Internal Preamp Gain, any External Gain that is entered, and the Max Mixer Level, as described in the table below.

See ["Attenuator Configurations and Auto/Man" on page 634](#)

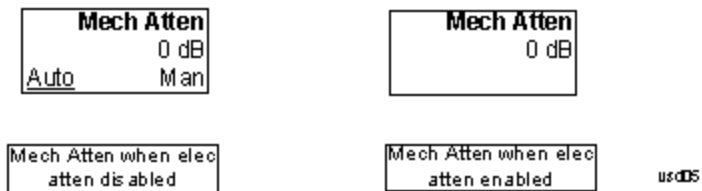
Key Path	AMPTD Y Scale, Attenuation
Remote Command	[:SENSe]:POWer[:RF]:ATTenuation <rel_ampl> [:SENSe]:POWer[:RF]:ATTenuation? [:SENSe]:POWer[:RF]:ATTenuation:AUTO OFF ON 0 1 [:SENSe]:POWer[:RF]:ATTenuation:AUTO?
Example	POW:ATT 20 Dual attenuator configuration: sets the mechanical attenuator to 20 dB Single attenuator mode: sets the main attenuation to 20 dB (see below for definition of "main" attenuation). If the attenuator was in Auto, it sets it to Manual.
Dependencies	Some measurements do not support the Auto setting of (Mech) Atten. In these measurements, the Auto/Man selection is not available, and the Auto/Man line on the key disappears. In dual attenuator configurations, when the electronic attenuator is enabled, the mechanical attenuator has no auto setting and the Auto/Man line on the key disappears. The state of Auto/Man is remembered and restored when the electronic attenuator is once again disabled. This is described in more detail in the "Enable Elec Atten" on page 2244 key description. See "Attenuator Configurations and Auto/Man" on page 634 for more information on the Auto/Man functionality of Attenuation.
Couplings	When (Mech) Atten is in Auto, it uses the following algorithm to determine a value: If the USB Preamp is connected to USB, use 0 dB. Otherwise, $Atten = ReferenceLevel + PreAmpGain + ExternalGain - RefLevelOffset - MaxMixerLevel + IF\ Gain$. Limit this value to be between 6 dB and the Max value. No value below 6 dB can ever be chosen by Auto. The resulting value is rounded up to the largest value possible given the attenuation step setting. That is, 50.01 dB would change to 60 dB (for a 10 dB attenuation step). The "IF Gain" term in the equation above is either 0 dB or +10 dB, depending on the settings of FFT IF Gain, Swept IF Gain, max Ref Level and the Auto/Man setting of Mech Atten. In External Mixing and BBIQ, where the Attenuator is not in the signal path, the Attenuator setting changes as described above when (Mech) Atten is in Auto, but no changes are made to the actual attenuator hardware setting until the input is changed back to the RF Input.
Preset	The preset for Mech Attenuation is "Auto." The Auto value of attenuation is: CXA, EXA, MXA and PXA: 10 dB

State Saved	Saved in instrument state
Min	0 dB The attenuation set by this key cannot be decreased below 6 dB with the knob or step keys. To get to a value below 6 dB it has to be directly entered from the keypad or via SCPI. This protects from adjusting the attenuation to a dangerously small value which can put the instrument at risk of damage to input circuitry. However, if the current mechanical attenuation is below 6 dB it can be increased with the knob and step keys, but not decreased.
Max	CXA N9000A-503/507: 50 dB CXA N9000A-513/526: 70dB EXA: 60 dB MXA and PXA: 70 dB In the single attenuator configuration, the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Attenuator Configurations and Auto/Man

As described in the Attenuation key description, there are two distinct attenuator configurations available in the X-Series, the single attenuator and dual attenuator configurations. In dual attenuator configurations, we have the mechanical attenuation and the electronic attenuation, and the current total attenuation is the sum of the electronic + mechanical attenuation. In single attenuator configurations, we refer to the attenuation set using the (Mech) Atten key (or POW:ATT SCPI) as the “main” attenuation; and the attenuation that is set by the SCPI command POW:EATT as the “soft” attenuation (the POW:EATT command is honored even in the single attenuator configuration, for compatibility purposes). Then the current total attenuation is the sum of the main + soft attenuation. See the Elec Atten key description for more on “soft” attenuation.

In the dual attenuator configuration, when the electronic attenuator is enabled, there is no Auto/Man functionality for the mechanical attenuator, and the third line of the key label (the Auto/Man line) disappears:



Enable Elec Atten

Enables the Electronic Attenuator.

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear. These advantages primarily aid in remote operation and are negligible

for front panel use. See ["Using the Electronic Attenuator: Pros and Cons" on page 636](#) for a detailed discussion of the pros and cons of using the electronic attenuator.

For the single attenuator configuration, for SCPI backwards compatibility, the “soft” attenuation feature replaces the dual attenuator configuration’s electronic attenuator. All the same couplings and limitations apply. See ["Attenuator Configurations and Auto/Man" on page 2244](#)

See ["More Information" on page 635](#)

Key Path	AMPTD Y Scale, Attenuation
Remote Command	[:SENSe] :POWer [:RF] :EATTenuation:STATE OFF ON 0 1 [:SENSe] :POWer [:RF] :EATTenuation:STATE?
Example	POW:EATT:STAT ON
Dependencies	<p>This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no “electronic attenuator” there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a “soft” attenuation as described in "Attenuator Configurations and Auto/Man" on page 2244.</p> <p>The electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable above 3.6 GHz. Therefore, if the Stop Frequency of the analyzer is > 3.6 GHz then the Enable Elec Atten key will be OFF and grayed out.</p> <p>If the Internal Preamp is on, meaning it is set to Low Band or Full, the electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable. In this case the Enable Elec Atten key will be OFF and grayed out.</p> <p>If either of the above is true, if the SCPI command is sent, an error indicating that the electronic attenuator is unavailable will be sent.</p> <p>If the electronic/soft Attenuator is enabled, then the Stop Freq of the analyzer is limited to 3.6 GHz and the Internal Preamp is unavailable.</p> <p>The SCPI-only “soft” electronic attenuation for the single-attenuator configuration is not available in all measurements; in particular, it is not available in the Swept SA measurement.</p>
Couplings	Enabling and disabling the Electronic Attenuator affects the setting of the Mechanical Attenuator (in dual attenuator configurations). This is described in more detail below this table.
Preset	OFF for Swept SA measurement; ON for all other measurements that support the electronic attenuator
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

More Information

Mechanical Attenuator Transition Rules

When the Electronic Attenuator is enabled, the Mechanical Attenuator transitions to a state that has no Auto function. Below are the rules for transitioning the Mechanical Attenuator. NOTE that the information

below ONLY applies to the dual attenuator configurations, and ONLY when the Electronic Attenuator is installed:

When the Electronic Attenuation is enabled from a disabled state:

- The Mechanical Attenuator is initialized to 10 dB (this is its optimal performance setting). You can then set it as desired with SCPI, numeric keypad, step keys, or knob, and it behaves as it normally would in manual mode
- The Auto/Man state of (Mech) Atten is saved
- The Auto/Man line on the (Mech) Atten key disappears and the auto rules are disabled
- The Electronic Attenuator is set to 10 dB less than the previous value of the Mechanical Attenuator, within the limitation that it must stay within the range of 0 to 24 dB of attenuation.

Examples in the dual attenuator configuration:

- Mech Atten at 20 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 10 dB. New total attenuation equals the value before Elec Atten enabled.
- Mech Atten at 0 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 0 dB. New total attenuation does not equal the value before Elec Atten enabled.
- Mech Atten at 40 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 24 dB. New total attenuation does not equal the value before Elec Atten enabled.

When the Electronic Attenuation is disabled from an enabled state:

- The Elec Atten key is grayed out
- The Auto/Man state of (Mech) Atten is restored
- If now in Auto, (Mech) Atten recouples
- If now in Man, (Mech) Atten is set to the value of total attenuation that existed before the Elec Atten was disabled. The resulting value is rounded up to the smallest value possible given the (Mech) Atten Step setting - (That is, 57 dB changes to 58 dB when (Mech) Atten Step is 2 dB.)

Using the Electronic Attenuator: Pros and Cons

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear.

The “finer steps” advantage of the electronic attenuator is beneficial in optimizing the alignment of the analyzer dynamic range to the signal power in the front panel as well as remote use. Thus, you can achieve improved relative signal measurement accuracy. Compared to a mechanical attenuator with 2 dB steps, the 1 dB resolution of the electronic attenuator only gives better resolution when the odd-decibel steps are used. Those odd-decibel steps are less accurately calibrated than the even-decibel steps, so one tradeoff for this superior relative accuracy is reduced absolute amplitude accuracy.

Another disadvantage of the electronic attenuator is that the spectrum analyzer loses its “Auto” setting, making operation less convenient.

Also, the relationship between the dynamic range specifications (TOI, SHI, compression and noise) and instrument performance are less well-known with the electrical attenuator. With the mechanical

attenuator, TOI, SHI and compression threshold levels increase dB-for-dB with increasing attenuation, and the noise floor does as well. With the electronic attenuator, there is an excess attenuation of about 1 to 3 dB between 0 and 3.6 GHz, making the effective TOI, SHI, and so forth, less well known. Excess attenuation is the actual attenuation relative to stated attenuation. Excess attenuation is accounted for in the analyzer calibration

Elec Atten

Controls the Electronic Attenuator in dual attenuator configurations. This key does not appear in single attenuator configurations, as the control of both the mechanical and electronic stages of the single attenuator is integrated into the single Atten key.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	[:SENSe] :POWer [:RF] :EATTenuation <rel_ampl> [:SENSe] :POWer [:RF] :EATTenuation?
Notes	Electronic Attenuation's specification is defined only when Mechanical Attenuation is 6 dB.
Dependencies	This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no "electronic attenuator" there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a "soft" attenuation as described in "Attenuator Configurations and Auto/Man" on page 2244 . The "soft" attenuation is treated as an addition to the "main" attenuation value set by the Atten softkey or the POW:ATT SCPI command and affects the total attenuation displayed on the Attenuation key and the Meas Bar. When Enable Elec Atten is off or grayed out, the Elec Atten key is grayed out.
Preset	0 dB
State Saved	Saved in instrument state
Min	0 dB
Max	Dual attenuator configuration: 24 dB Single attenuator configuration: the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Adjust Atten for Min Clip

Sets the combination of mechanical and electronic attenuation and gain based on the current measured signal level so that clipping will be at a minimum.

This is an "immediate action" function, that is, it executes once, when the key is pressed.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	<code>[:SENSe] :POWer [:RF] :RANGe:OPTimize IMMEDIATE</code>
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Pre-Adjust for Min Clip

If this function is on, it does the adjustment described under "[Adjust Atten for Min Clip](#)" on page 2247 each time a measurement restarts. Therefore, in Continuous measurement mode, it only executes before the first measurement.

In dual attenuator models, you can set Elec+Mech Atten, in which case both attenuators participate in the autoranging, or Elec Atten Only, in which case the mechanical attenuator does not participate in the autoranging. This latter case results in less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	<code>[:SENSe] :POWer [:RF] :RANGe:OPTimize:ATTenuation OFF ELECTrical COMBined</code> <code>[:SENSe] :POWer [:RF] :RANGe:OPTimize:ATTenuation?</code>
Notes	The SCPI parameter ELECTrical sets this function to On in single attenuator models. The SCPI parameter COMBined is mapped to ELECTrical in single attenuator models; if you send COMBined, it sets the function to On and returns ELEC to a query.
Dependencies	This key only appears in Dual Attenuator models with an Electronic Attenuator installed. In instruments with Dual Attenuator model, when Enable Elec Atten is off or grayed out, the Pre-Adjust for Min Clip key is grayed out.
Preset	OFF for Swept SA measurement; ON for all other measurements that support Pre-Adjust for Min Clip
State Saved	Saved in instrument state
Range	Dual attenuator models: Off Elec Atten Only Mech + Elec Atten Single attenuator models: Off On
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Remote Command	<code>[:SENSe] :POWer [:RF] :RANGe:AUTO ON OFF 1 0</code> <code>[:SENSe] :POWer [:RF] :RANGe:AUTO?</code>
Notes	ON aliases to "Elec Atten Only" (:POW:RANG:OPT:ATT ELEC)

	OFF aliases to "Off" (:POW:RANG:OPT:ATT OFF) The query :POW:RANG:AUTO? returns true if :POW:RANG:OPT:ATT is not "Off"
Initial S/W Revision	Prior to A.02.00

Off

Turns Pre-Adjust for Min Clip off. This is the default setting.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip
Example	:POW:RANGe:OPT:ATT OFF
Initial S/W Revision	Prior to A.02.00

Elec Atten Only

Selects only the electric attenuator to participate in auto ranging. This offers less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip
Example	:POW:RANGe:OPT:ATT ELEC
Initial S/W Revision	Prior to A.02.00

Mech + Elec Atten

In dual attenuator models, this selects both attenuators participate in the autoranging.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip
Example	:POW:RANGe:OPT:ATT COMB
Initial S/W Revision	Prior to A.02.00

(Mech) Atten Step

This controls the step size used when making adjustments to the input attenuation.

This key is labeled Mech Atten Step in dual attenuator models and Atten Step in single attenuator models. In the dual attenuator configuration, this key only affects the step size of the mechanical attenuator.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	<code>[:SENSe] :POWer [:RF] :ATTenuation :STEP [:INCRement] 10 dB 2 dB</code> <code>[:SENSe] :POWer [:RF] :ATTenuation :STEP [:INCRement] ?</code>
Example	POW:ATT:STEP 2
Notes	Note this feature works like a 1-N choice from the front panel, but it takes a specific value (in dB) when used remotely. The only valid values are 2 and 10.
Dependencies	Blanked in CXA and EXA if option FSA (2 dB steps) is not present. If blanked, attempts to set it via SCPI will yield an error.
Couplings	When the attenuation step size changes, the current mechanical attenuation value is adjusted (if necessary) to be quantized to the new step size. That is, if step is set to 10 dB, mech atten is increased if necessary so it is a multiple of 10 dB
Preset	PXA and MXA: 2 dB EXA and CXA: 10 dB (2 dB with option FSA)
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Range

Accesses the Range menu to change baseband I/Q gain settings. This key has a readback text that describes gain range value.

This is only available when the selected input is IQ. For more details, see Range.

Key Path	AMPTD/Y Scale
Initial S/W Revision	Prior to A.02.00

Scale/Div

Sets the Y scale per division on the display, using percent (EVM) or degrees (Phase Error).

Key Path	AMPTD Y Scale
Mode	GSM
Initial S/W Revision	Prior to A.02.00

Key Path	AMPTD Y Scale
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Mode	GSM
Remote Command	:DISPlay:EEVM:VIEW2:WINDow[1] 3:TRACe:Y[:SCALe]:PDIVision <real> :DISPlay:EEVM:VIEW2:WINDow[1] 3:TRACe:Y[:SCALe]:PDIVision?
Example	DISP:EEVM:VIEW2:WIND:TRAC:Y:PDIV 2 DISP:EEVM:VIEW2:WIND:TRAC:Y:PDIV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	When Auto Scaling is On, this value is automatically determined by the measurement result. When the user sets this value manually, Auto Scaling automatically changes to Off.
Preset	1
State Saved	No
Min	0.1
Max	50.0
Initial S/W Revision	Prior to A.02.00

Key Path	AMPTD Y Scale
Mode	GSM
Remote Command	:DISPlay:EEVM:VIEW2:WINDow2:TRACe:Y[:SCALe]:PDIVision <real> :DISPlay:EEVM:VIEW2:WINDow2:TRACe:Y[:SCALe]:PDIVision?
Example	DISP:EEVM:VIEW2:WIND2:TRAC:Y:PDIV 2 DISP:EEVM:VIEW2:WIND2:TRAC:Y:PDIV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	When Auto Scaling is On, this value is automatically determined by the measurement result. When the user sets this value manually, Auto Scaling automatically changes to Off.
Preset	1.0
State Saved	No
Min	0.01
Max	3600
Initial S/W Revision	Prior to A.02.00

Presel Center

When this key is pressed, the centering of the preselector filter is adjusted to optimize the amplitude accuracy at the frequency of the selected marker. If the selected marker is not on when Presel Center is pressed, the analyzer will turn on the selected marker, perform a peak search, and then perform centering on the marker's center frequency. If the selected marker is already on and between the start and stop frequencies of the analyzer, the analyzer performs the preselector calibration on that marker's frequency. If the selected marker is already on, but outside the frequency range between Start Freq and Stop Freq, the analyzer will first perform a peak search, and then perform centering on the marker's center frequency.

The value displayed on the Presel Adjust key will change to reflect the new preselector tuning (see Presel Adjust).

A number of considerations should be observed to ensure proper operation. See "[Proper Preselector Operation](#)" on page 642.

Key Path	AMPTD Y Scale
Remote Command	[:SENSe] :POWer [:RF] :PCENter
Example	POW:PCEN
Notes	Note that the rules outlined above under the key description apply for the remote command as well as the key. The result of the command is dependent on marker position, and so forth. Any message shown by the key press is also shown in response to the remote command.
Dependencies	<ul style="list-style-type: none"> • Grayed out if the microwave preselector is off.) • If the selected marker's frequency is below Band 1, advisory message 0.5001 is generated and no action is taken. • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0. • Grayed out in the Spectrogram View.
Couplings	<p>The active marker position determines where the centering will be attempted.</p> <p>If the analyzer s in a measurement such as averaging when centering is initiated, the act of centering the preselector will restart averaging but the first average trace will not be taken until the centering is completed.</p>
Status Bits/OPC dependencies	<p>When centering the preselector, *OPC will not return true until the process is complete and a subsequent measurement has completed, nor will results be returned to a READ or MEASure command.</p> <p>The Measuring bit should remain set while this command is operating and should not go false until the subsequent sweep/measurement has completed.</p>
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Proper Preselector Operation

A number of considerations should be observed to ensure proper operation:

1. If the selected marker is off, the analyzer will turn on a marker, perform a peak search, and adjust the preselector using the selected marker's frequency. It uses the "highest peak" peak search method unqualified by threshold or excursion, so that there is no chance of a 'no peak found' error. It continues with that peak, even if it is the peak of just noise. Therefore, for this operation to work properly, there should be a signal on screen in a preselected range for the peak search to find.
2. If the selected marker is already on, the analyzer will attempt the centering at that marker's frequency. There is no preselector for signals below about 3.6 GHz, therefore if the marker is on a signal below 3.6 GHz, no centering will be attempted and an advisory message generated

3. In some models, the preselector can be bypassed. If it is bypassed, no centering will be attempted in that range and a message will be generated.

Preselector Adjust

Allows you to manually adjust the preselector filter frequency to optimize its response to the signal of interest. This function is only available when "Presel Center" on page 2250 is available.

For general purpose signal analysis, using Presel Center is recommended. Centering the filter minimizes the impact of long-term preselector drift. Presel Adjust can be used instead to manually optimize the preselector. One application of manual optimization would be to peak the preselector response, which both optimizes the signal-to-noise ratio and minimizes amplitude variations due to small (short-term) preselector drifting.

Key Path	AMPTD Y Scale
Scope	Meas Global
Remote Command	<code>[:SENSe] :POWer [:RF] :PADJust <freq></code> <code>[:SENSe] :POWer [:RF] :PADJust?</code>
Example	POW:PADJ 100KHz POW:PADJ?
Notes	The value on the key reads out to 0.1 MHz resolution.
Dependencies	<ul style="list-style-type: none"> • Grayed out if microwave preselector is off.) • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0. • Grayed out in the Spectrogram View.
Preset	0 MHz
State Saved	The Presel Adjust value set by Presel Center, or by manually adjusting Presel Adjust, is not saved in instrument state, and does not survive a Preset or power cycle.
Min	-500 MHz
Max	500 MHz
Default Unit	Hz
Backwards Compatibility SCPI	<code>[:SENSe] :POWer [:RF] :MW :PADJust</code> <code>[:SENSe] :POWer [:RF] :MMW :PADJust</code> PSA had multiple preselectors, but the X-Series has only one. These commands simply alias to <code>[:SENSe] :POWer [:RF] :PADJust</code>
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Remote Command	<code>[:SENSe] :POWer [:RF] :PADJust :PRESelector MWAVE MMWave EXTERNAL</code>
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	<code>[:SENSe] :POWer [:RF] :PADJust :PRESelector?</code>
Notes	PSA had multiple preselectors, and you could select which preselector to adjust. Since the X-Series has only one mm/uW preselector, the preselector selection softkey is no longer available. However, to provide backward compatibility, we accept the legacy remote commands. The command form has no effect, the query always returns MWAVE
Initial S/W Revision	Prior to A.02.00

μW Path Control

The μW Path Control functions include the μW Preselector Bypass (Option MPB) and Low Noise Path (Option LNP) controls in the High Band path circuits.

When the μW Preselector is bypassed, the user has better flatness, but will be subject to spurs from out of band interfering signals. When the Low Noise Path is enabled, the analyzer automatically switches around certain circuitry in the high frequency bands which can contribute to noise, when it is appropriate based on other analyzer settings.

For most applications, the preset state is Standard Path, which gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear out in the hardware switches. For applications that utilize the wideband IF paths, the preset state is the μW Preselector Bypass path, if option MPB is present. This is because, when using a wideband IF such as the 140 MHz IF, the μW Preselector's bandwidth can be narrower than the available IF bandwidth, causing degraded amplitude flatness and phase linearity, so it is desirable to bypass the preselector in the default case.

Users may choose Low Noise Path Enable. It gives a lower noise floor, especially in the 21–26.5 GHz region, though without improving many measures of dynamic range, and without giving the best possible noise floor. The preamp, if purchased and used, gives better noise floor than does the Low Noise Path, however its compression threshold and third-order intercept are much poorer than that of the non-preamp Low Noise Path. There are some applications, typically for signals around –30 dBm, for which the third-order dynamic range of the standard path is good enough, but the noise floor is not low enough even with 0 dB input attenuation. When the third-order dynamic range of the preamp path is too little and the noise floor of the standard path is too high, the Low Noise Path can provide the best dynamic range.

Key Path	AMPTD Y Scale
Mode	SA, BASIC, PNOISE, VSA , LTE, LTETDD
Scope	Meas Global
Remote Command	<code>[:SENSe] :POWer [:RF] :MW :PATH STD LNPath MPBypass FULL</code> <code>[:SENSe] :POWer [:RF] :MW :PATH?</code>
Example	<code>:POW:MW:PATH LNP</code> Enables the Low Noise path
Notes	If a Presel Center is performed, the analyzer will momentarily switch to the Standard Path, regardless of the setting of μW Path Control The DC Block will always be switched in when the low noise path is switched in, to protect succeeding circuitry from DC. Note that this does not mean “when the low noise path is enabled” but when, based on the Low Noise Path rules, the path is actually switched in. This can happen when the

selection is Low Noise Path Enable . In the case where the DC Block is switched in the analyzer is now AC coupled. However, if the user has selected DC coupling, the UI will still behave as though it were DC coupled, including all annunciation, warnings, status bits, and responses to SCPI queries. This is because, based on other settings, the analyzer could switch out the low noise path at any time and hence go back to being DC coupled.

Alignment switching ignores the settings in this menu, and restores them when finished.

Dependencies	Unavailable in BBIQ and External Mixing
Preset	All modes other than IQ Analyzer mode and VXA: STD IQ Analyzer, VXA and WLAN mode: MPB option present and licensed: MPB MPB option not present and licensed: STD
State Saved	Save in instrument state
Readback	Value selected in the submenu
Initial S/W Revision	A.04.00
Modified at S/W Revision	A.10.00

Standard Path

This path gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear in the hardware switches, particularly in remote test scenarios where both low band and high band setups will follow in rapid succession.

In this path, the bypass of the low band/high band switch and microwave preamp is never activated, which can cause some noise degradation but preserves the life of the bypass switch.

Key Path	AMPTD Y Scale, μ W Path Control
Example	:POW:MW:PATH STD
Readback Text	Standard Path
Initial S/W Revision	A.04.00

μ W Preselector Bypass

This key toggles the preselector bypass switch for band 1 and higher. When the microwave preselect is on, the signal path is preselected. When the microwave preselector is off, the signal path is not preselected. The preselected path is the normal path for the analyzer.

The preselector is a tunable bandpass filter which prevents signals away from the frequency of interest from combining in the mixer to generate in-band spurious signals (images). The consequences of using a preselector filter are its limited bandwidth, the amplitude and phase ripple in its passband, and any amplitude and phase instability due to center frequency drift.

Option MPB or pre-selector bypass provides an unpreselected input mixer path for certain X-Series signal analyzers with frequency ranges above 3.6 GHz. This signal path allows a wider bandwidth and less amplitude variability, which is an advantage when doing modulation analysis and broadband signal

analysis. The disadvantage is that, without the preselector, image signals will be displayed. Another disadvantage of bypassing the preselector is increased LO emission levels at the front panel input port.

Image responses are separated from the real signal by twice the 1st IF. For IF Paths of 10 MHz and 25 MHz, the 1st IF is 322.5 MHz, so the image response and the real signal will be separated by 645 MHz. The 1st IF will be different for other IF Path settings. When viewing a real signal and its corresponding image response in internal mixing, the image response will be to the left of the real signal.

Also, the image response and the real signal typically have the same amplitude and exhibit the same shape factor.

However, if Option FS1, Fast Sweep Capability, is enabled, the image response in the Swept SA measurement will appear lower in amplitude and have a much wider shape factor compared to the real signal.

Key Path	AMPTD Y Scale, μ W Path Control
Example	:POW:MW:PATH MPB
Dependencies	Key is blanked if current mode does not support it. Key is grayed out if mode supports it but current measurement does not support it. Key is blank unless Option MPB is present and licensed. If SCPI command sent when MPB not present, error -241, "Hardware missing; Option not installed" is generated.
Readback Text	μ W Preselector Bypass
Initial S/W Revision	A.04.00

Remote Command	[:SENSe] :POWer [:RF] :MW:PRESelector [:STATe] ON OFF 0 1 [:SENSe] :POWer [:RF] :MW:PRESelector [:STATe] ?
Example	:POW:MW:PRES OFF Bypasses the microwave preselector
Notes	The ON parameter sets the STD path (:POW:MW:PATH STD) The OFF parameter sets path MPB (:POW:MW:PATH MPB)
Preset	ON

Internal Preamp

Accesses a menu of keys that control the internal preamps. Turning on the preamp gives a better noise figure, but a poorer TOI to noise floor dynamic range. You can optimize this setting for your particular measurement.

The instrument takes the preamp gain into account as it sweeps. If you sweep outside of the range of the preamp the instrument will also account for that. The displayed result will always reflect the correct gain.

For some measurements, when the preamp is on and any part of the displayed frequency range is below the lowest frequency for which the preamp has specifications, a warning condition message appears in the status line. For example, for a preamp with a 9 kHz lowest specified frequency: "Preamp: Accy unspec'd below 9 kHz".

Key Path	AMPTD Y Scale
Scope	Meas Global
Remote Command	[:SENSe] :POWer [:RF] :GAIN [:STATe] OFF ON 0 1 [:SENSe] :POWer [:RF] :GAIN [:STATe] ?
Dependencies	Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the key is not shown. The preamp is not available when the electronic/soft attenuator is enabled.
Couplings	The act of connecting the U7227A USB Preamplifier to one of the analyzer's USB ports will cause the Internal Preamp to be switched on. When this happens an informational message will be generated: "Internal Preamp turned on for optimal operation with USB Preamp." Note that if the Internal Preamp was already on, there will be no change to the setting, but if it was Off it will be switched On, to Full Range. Note that this same action occurs when the SA mode is selected while the USB Preamp is connected to one of the analyzer's USB ports, if it is the first time that the SA mode has run since powerup, or if the last time the SA mode was running the USB Preamp was NOT connected. Subsequently disconnecting the USB Preamp from USB does not change the Internal Preamp setting nor restore the previous setting.
Preset	OFF
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.14.00

Key Path	AMPTD Y Scale, Internal Preamp
Scope	Meas Global
Remote Command	[:SENSe] :POWer [:RF] :GAIN :BAND LOW FULL [:SENSe] :POWer [:RF] :GAIN :BAND?
Dependencies	Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the key is not shown. If a POW:GAIN:BAND FULL command is sent when a low band preamp is available, the preamp band parameter is to LOW instead of FULL, and an "Option not installed" message is generated.
Preset	LOW
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00

Off

Turns the internal preamp off

Key Path	AMPTD Y Scale, Internal Preamp
Example	:POW:GAIN OFF
Readback	Off
Initial S/W Revision	Prior to A.02.00

Low Band

Sets the internal preamp to use only the low band.

The frequency range of the installed (optional) low-band preamp is displayed in square brackets on the Low Band key label.

Key Path	AMPTD Y Scale, Internal Preamp
Example	:POW:GAIN ON :POW:GAIN:BAND LOW
Readback	Low Band
Initial S/W Revision	Prior to A.02.00

Full Range

Sets the internal preamp to use its full range. The low band (0–3.6 GHz or 0–3GHz, depending on the model) is supplied by the low band preamp and the frequencies above low band are supplied by the high band preamp.

The frequency range of the installed (optional) preamp is displayed in square brackets on the Full Range key label. If the high band option is not installed the Full Range key does not appear.

Key Path	AMPTD Y Scale, Internal Preamp
Example	:POW:GAIN ON :POW:GAIN:BAND FULL
Readback	Full Range
Initial S/W Revision	Prior to A.02.00

Ref Position

Allows you to set the reference position.

Key Path	AMPTD Y Scale
Mode	GSM
Remote Command	:DISPlay:EEVM:VIEW2:WINDow[1] 2 3:TRACe:Y[:SCALE]:RPOsition TOP CENTer BOTTom

	:DISPlay:EEVM:VIEW2:WINDow[1] 2 3:TRACe:Y[:SCALe]:RPOSition?
Example	DISP:EEVM:VIEW2:WIND3:TRAC:Y:RPOS TOP DISP:EEVM:VIEW2:WIND3:TRAC:Y:RPOS?
Notes	Preset\Default is window dependent as follows: View – I/Q Error, Window – Mag Error: Ctr View – I/Q Error, Window – Phase Error: Ctr View – I/Q Error, Window – EVM: Bot You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	CENT CENT BOTT
State Saved	No
Range	Top Ctr Bot
Initial S/W Revision	Prior to A.02.00

Auto Scaling

Allows you to toggle the Auto Scaling function between On and Off.

Key Path	AMPTD Y Scale
Mode	GSM
Remote Command	:DISPlay:EEVM:VIEW2:WINDow[1] 2 3:TRACe:Y[:SCALe]:COUPlE ON OFF 1 0 :DISPlay:EEVM:VIEW2:WINDow[1] 2 3:TRACe:Y[:SCALe]:COUPlE?
Example	DISP:EEVM:VIEW2:WIND3:TRAC:Y:COUP ON DISP:EEVM:VIEW2:WIND3:TRAC:Y:COUP?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	When Auto Scaling is On, upon pressing the Restart front-panel key, this function automatically determines the scale per division and reference values based on the measurement results. When you set the value of either " Ref Value " on page 630 or " Scale/Div " on page 640 manually, this parameter is set to 'Off' automatically.
Preset	ON
State Saved	No
Range	On Off
Initial S/W Revision	Prior to A.02.00

Auto Couple

The Auto Couple feature provides a quick and convenient way to automatically couple multiple instrument settings. This helps ensure accurate measurements and optimum dynamic range. When the Auto Couple feature is activated, either from the front panel or remotely, all parameters of the current measurement that have an Auto/Manual mode are set to Auto mode and all measurement settings dependent on (or coupled to) the Auto/Man parameters are automatically adjusted for optimal performance.

However, the Auto Couple key actions are confined to the current measurement only. It does not affect other measurements in the mode, and it does not affect markers, marker functions, or trace or display attributes.

See "[More Information](#)" on page 650

Key Path	Front-panel key
Remote Command	:COUPle ALL NONE
Example	:COUP ALL
Notes	:COUPle ALL puts all Auto/Man parameters in Auto mode (equivalent to pressing the Auto Couple key). :COUPLE NONE puts all Auto/Man parameters in manual mode. It decouples all the coupled instrument parameters and is not recommended for making measurements.
Initial S/W Revision	Prior to A.02.00

More Information

There are two types of functions that have Auto/Manual modes.

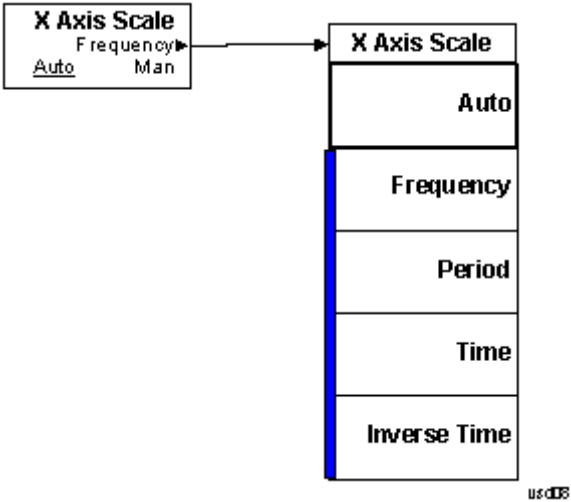
Auto/Man Active Function keys

An Auto/Man toggle key controls the binary state associated with an instrument parameter by toggling between Auto (where the parameter is automatically coupled to the other parameters it is dependent upon) and Man (where the parameter is controlled independent of the other parameters), as well as making the parameter the active function. The current mode is indicated on the softkey with either Auto or Man underlined as illustrated below.



Auto/Man 1-of-N keys

An Auto/Man 1-of-N key allows you to manually pick from a list of parameter values, or place the function in Auto, in which case the value is automatically selected (and indicated) as shown below. If in Auto, Auto is underlined on the calling key. If in manual operation, manual is indicated on the calling key. But the calling key does not actually toggle the function, it simply opens the menu.



BW

There is no functionality for this front-panel key in this measurement. Pressing this key displays a blank key menu.

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Cont (Continuous Measurement/Sweep)

Sets the analyzer for Continuous measurement operation. The single/continuous state is Meas Global so the setting will affect all measurements. If you are Paused, pressing Cont does a Resume.

Key Path	Front-panel key
Remote Command	:INITiate:CONTinuous OFF ON 0 1 :INITiate:CONTinuous?
Example	:INIT:CONT 0 puts analyzer in Single measurement operation. :INIT:CONT 1 puts analyzer in Continuous measurement operation
Preset	ON (Note that SYST:PRESet sets INIT:CONT to ON but *RST sets INIT:CONT to OFF)
State Saved	Saved in instrument state
Backwards Compatibility Notes	For Spectrum Analysis mode in ESA and PSA, there is no Cont hardkey, instead there is a Sweep Single/Cont key. In these analyzers, switching the Sweep Single/Cont key from Single to Cont restarts averages (displayed average count reset to 1), but does not restart Max Hold and Min Hold. The X-Series has Single and Cont keys in place of the SweepSingleCont key. In the X-Series, if in single measurement, the Cont key (and INIT:CONT ON) switches to continuous measurement, but never restarts a measurement and never resets a sweep.
Initial S/W Revision	Prior to A.02.00

In Swept SA Measurement (Spectrum Analysis Mode):

The analyzer takes repetitive sweeps, averages, measurements, etc., when in Continuous mode. When the average count reaches the Average/Hold Number the count stops incrementing, but the analyzer keeps sweeping. See the Trace/Detector section for the averaging formula used both before and after the Average/Hold Number is reached. The trigger condition must be met prior to each sweep. The type of trace processing for multiple sweeps, is set under the Trace/Detector key, with choices of Trace Average, Max Hold, or Min Hold.

In Other Measurements/Modes:

With Avg/Hold Num (in the Meas Setup menu) set to Off or set to On with a value of 1, a sweep is taken after the trigger condition is met; and the analyzer continues to take new sweeps after the current sweep has completed and the trigger condition is again met. However, with Avg/Hold Num set to On with a value >1, multiple sweeps (data acquisitions) are taken for the measurement. The trigger condition must be met prior to each sweep. The sweep is not stopped when the average count k equals the number N set for Avg/Hold Num is reached, but the number k stops incrementing. A measurement average usually applies to all traces, marker results, and numeric results. But sometimes it only applies to the numeric results.

If the analyzer is in Single measurement, pressing the Cont key does not change k and does not cause the sweep to be reset; the only action is to put the analyzer into Continuous measurement operation.

If it is already in continuous sweep:

the INIT:CONT 1 command has no effect

9 EDGE EVM Measurement
Cont (Continuous Measurement/Sweep)

the INIT:CONT 0 command will place the analyzer in Single Sweep but will have no effect on the current sequence until $k = N$, at which point the current sequence will stop and the instrument will go to the idle state.

File

See "File" on page 320

FREQ/Channel

Accesses a menu of keys that allows you to control the Frequency parameters of the instrument.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

ARFCN

Sets the analyzer to a frequency that corresponds to the ARFCN (Absolute RF Channel Number). Used to enter the channel to be measured for the selected band. If the Center Freq value entered does not exactly correlate with an ARFCN, the softkey label changes to display the closest ARFCN to the selected frequency, along with a > or < symbol indicating whether the frequency is above or below that ARFCN.

Key Path	FREQ Channel
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :ARFCn RFCHannel <integer></code> <code>[:SENSe] :CHANnel :ARFCn RFCHannel ?</code>
Example	CHAN:ARFC 3 CHAN:ARFC?
Notes	This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not available (blank).
Couplings	Coupled with Center Frequency . Setting ARFCN sets Center Freq to the value corresponding to that ARFCN. BMT Freq choice changes this parameter.
Preset	1
State Saved	Saved in instrument state.
Range	Different for each BAND as follows: E-GSM: 0 to 124, and 975 to 1023 P-GSM: 1 to 124 R-GSM: 0 to 124(MS), and 955 to 1023(BTS) DCS1800: 512 to 885 PCS1900: 512 to 810 GSM450: 259 to 293 GSM480: 306 to 340 GSM700: 438 to 516 GSM850: 128 to 251 T-GSM 810: 350 to 425

Min	Different for each BAND as follows: E-GSM: 0(MS), and 975(BTS) P-GSM: 1 R-GSM: 0(MS), and 955(BTS) DCS1800: 512 PCS1900: 512 GSM450: 259 GSM480: 306 GSM700: 438 GSM850: 128 T-GSM 810: 350
Max	Different for each BAND as follows: E-GSM: 124(MS), and 1023(BTS) P-GSM: 124 R-GSM: 124(MS), and 1023(BTS) DCS1800: 885 PCS1900: 810 GSM450: 293 GSM480: 340 GSM700: 516 GSM850: 251 T-GSM 810: 425
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.07.00

Center Freq

Sets the center frequency to be measured for the selected band. It is coupled with ARFCN – setting Center Freq sets ARFCN to the channel corresponding to that frequency.

For more information, see the section ["Center Freq" on page 2269](#).

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

Time Slot

This functionality is the same as that of the corresponding key in the Demod menu. See ["Time Slot" on page 2288](#) for details.

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

Burst Type

This functionality is the same as that of the corresponding key in the Demod menu. See ["Burst Type" on page 2289](#) for details.

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

TSC (Std)

This functionality is the same as that of the corresponding key in the Demod menu. See ["TSC \(Std\)" on page 2291](#) for details.

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

Center Freq

Sets the frequency that corresponds to the horizontal center of the graticule (when frequency Scale Type is set to linear). While adjusting the Center Frequency the Span is held constant, which means that both Start Frequency and Stop Frequency will change.

Pressing Center Freq also sets the frequency entry mode to Center/Span. In Center/Span mode, the center frequency and span values are displayed below the graticule, and the default active function in the Frequency menu is Center Freq.

The center frequency setting is the same for all measurements within a mode, that is, it is Meas Global. Some modes are also able to share a Mode Global center frequency value. If this is the case, the Mode will have a Global Settings key in its Mode Setup menu.

The Center Freq function sets (and queries) the Center Frequency for the currently selected input. If your analyzer has multiple inputs, and you select another input, the Center Freq changes to the value for that input. SCPI commands are available to directly set the Center Freq for a specific input.

Center Freq is remembered as you go from input to input. Thus you can set a Center Freq of 10 GHz with the RF Input selected, change to BBIQ and set a Center Freq of 20 MHz, then switch to External Mixing and set a Center Freq of 60 GHz, and when you go back to the RF Input the Center Freq will go back to 10 GHz; back to BBIQ and it is 20 MHz; back to External Mixing and it is 60 GHz.

See ["RF Center Freq" on page 661](#)

See [Ext Mix Center Freq](#)

See ["I/Q Center Freq" on page 663](#)

See ["Center Frequency Presets" on page 660](#)

Key Path	FREQ Channel
Scope	Meas Global
Remote Command	<code>[:SENSe] :FREQuency:CENTer <freq></code> <code>[:SENSe] :FREQuency:CENTer?</code>
Example	FREQ:CENT 50 MHz FREQ:CENT UP changes the center frequency to 150 MHz if you use FREQ:CENT:STEP 100 MHz to set the center frequency step size to 100 MHz FREQ:CENT?
Notes	This command sets either the RF or I/Q Center Frequency depending on the selected input. For RF input it is equivalent to FREQ:RF:CENT For I/Q input it is equivalent to FREQ:IQ:CENT Preset and Max values are dependent on Hardware Options (5xx) If no terminator (e.g. MHz) is sent the terminator Hz is used. If a terminator with unit other than Frequency is used, an invalid suffix error message is generated.
Dependencies	The Center Frequency can be limited by Start or Stop Freq limits, if the Span is so large that Start or Stop reach their limit.
Couplings	When operating in "swept span", any value of the Center Frequency or Span that is within the frequency range of the analyzer is allowed when the value is being set through the front panel numeric key pad or the SCPI command. The other parameter is forced to a different value if needed, to keep the Start and the Stop Frequencies within the analyzer's frequency range
Preset	Depends on instrument maximum frequency, mode, measurement, and selected input. See " Center Frequency Presets " on page 660 and " RF Center Freq " on page 661 and Ext Mix Center Freq and " I/Q Center Freq " on page 663.
State Saved	Saved in instrument state
Min	Depends on instrument maximum frequency, mode, measurement, and selected input.. See " Center Frequency Presets " on page 660 and " RF Center Freq " on page 661 and " I/Q Center Freq " on page 663.
Max	Depends on instrument maximum frequency, mode, measurement, and selected input.. See " Center Frequency Presets " on page 660 and " RF Center Freq " on page 661 and " I/Q Center Freq " on page 663.
Default Unit	Hz
Status Bits/OPC Dependencies	Non-overlapped
Initial S/W Revision	Prior to A.02.00

Center Frequency Presets

The following table provides the Center Frequency Presets for the Spectrum Analyzer mode, and the Max Freq, for the various frequency options:

Freq Option	CF after Mode Preset	Stop Freq after Mode Preset	Max Freq (can't tune above)
503 (all but N9000A)	1.805 GHz	3.6 GHz	3.7 GHz
503 (N9000A)	1.505 GHz	3.0 GHz	3.08 GHz
507 (all but N9000A)	3.505 GHz	7.0 GHz	7.1 GHz
507 (N9000A)	3.755 GHz	7.5 GHz	7.58 GHz
508 (all but N9038A)	1.805 GHz	3.6 GHz	8.5 GHz
508 (N9038A)	4.205 GHz	8.4 GHz	8.5 GHz
513	6.805 GHz	13.6 GHz	13.8 GHz
526 (all but N9000A and N9038A)	13.255 GHz	26.5 GHz	27.0 GHz
526 (N9000A)	13.255 GHz	26.5 GHz	26.55 GHz
526 (N9038A)	1.805 GHz	3.6 GHz	27.0 GHz
532	16.005 GHz	32.0 GHz	32.5 GHz
543	21.505 GHz	43.0 GHz	TBD
544	22.005 GHz	44.0 GHz	44.5 GHz
550	25.005 GHz	50.0 GHz	51 GHz

Input 2:

Model	CF after Mode Preset	Stop Freq after Mode Preset	Max Freq (can't tune above)
N9000A opt C75	0.7505GHz	1.5 GHz	1.58 GHz
N9038A	505 MHz	1 GHz	1.000025 GHz

Tracking Generator Frequency Limits (N9000A only):

Tracking Generator Option	Min Freq (clips to this freq when turn TG on and can't tune below while TG on)	If above this Freq, Stop Freq clipped to this Freq when TG turned on	Max Freq (can't tune above) while TG on
T03	9 kHz	3.0 GHz	3.08 GHz
T06	9 kHz	6.0 GHz	6.05 GHz

The following table shows the Center Frequency Presets for modes other than Spectrum Analyzer:

Mode	CF Preset for RF
WCDMA	1 GHz
WIMAXOFDMA,	1 GHz
BASIC	1 GHz
ADEMOD	1 GHz
VSA	1 GHz
TDSCDMA	1 GHz
PNOISE	1 GHz
LTE	1 GHz
LTETDD	1 GHz
MSR	1 GHz
GSM	935.2 MHz
NFIGURE	1.505 GHz

RF Center Freq

SCPI command for specifying the RF Center Frequency. This command will set the Center Frequency to be used when the RF input is selected, even if the RF input is not the input that is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

Scope	Meas Global
Remote Command	<code>[:SENSe] :FREQuency:RF:CENTer <freq></code> <code>[:SENSe] :FREQuency:RF:CENTer?</code>
Example	FREQ:RF:CENT 30 MHz
Notes	This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode.
Dependencies	If the electronic/soft attenuator is enabled, any attempt to set Center Frequency such that the Stop

	Frequency would be >3.6 GHz fails and results in an advisory message. If the equivalent SCPI command is sent, this same message is generated as part of a “-221, Settings conflict” warning. If Source Mode is set to Tracking, and the Max or Min Center Freq is therefore limited by the limits of the source, a warning message is generated, “Data out of range;clipped to source max/min” if these limits are exceeded. Note that for an external source, these limits can be affected by the settings of Source Numerator, Source Denominator and Power Sweep.
Preset	See table above
State Saved	Saved in instrument state.
Min	-79.999995 MHz, unless Source Mode is set to Tracking, in which case it is limited by the minimum frequency of the Source
Max	See table above. Basically instrument maximum frequency – 5 Hz. Note that, if the Source Mode is set to Tracking, the effective instrument maximum frequency may be limited by the source maximum frequency. If the knob or step keys are being used, also depends on the value of the other three interdependent parameters Span, Start Frequency and Stop Frequency
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Ext Mix Center Freq

SCPI command for specifying the External Mixer Center Frequency. This command will set the Center Frequency to be used when the External Mixer is selected, even if the External Mixer input is not the input which is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

Scope	Meas Global
Remote Command	<code>[:SENSe] :FREQuency:EMIXer:CENTer <freq></code> <code>[:SENSe] :FREQuency:EMIXer:CENTer?</code>
Example	<code>:FREQ:EMIX:CENT 60 GHz</code> <code>:FREQ:EMIX:CENT?</code>
Notes	This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode.
Couplings	When returning to External Mixing after having been switched to one of the other inputs (e.g., RF), you will come back into the settings that you had when you left External Mixing. So you will come back to the band you were in with the Center Frequency that you had. However, Span is not an input-dependent parameter, therefore you will bring the span over from the other input. Therefore, the analyzer comes back with the span from the previous input, limited as necessary by the current mixer setup.
Preset	When a Mode Preset is performed while in External Mixing, the Start frequency of the current Mode is set to the nominal Min Freq of the lowest harmonic range in the Harmonic Table for the current mixer setup. Similarly, the Stop frequency of the current Mode is set to the nominal Max Freq of the highest harmonic range in the Harmonic Table. The Center Freq thus presets to the point arithmetically equidistant from these two frequencies.

	<p>If the current measurement has a limited Span available to it, and cannot achieve the Span shown in the table (Span=Stop Freq - Start Freq), the analyzer uses the maximum Span the measurement allows, and still sets the Center Freq to the midpoint of the Start and Stop Freq values in the Harmonic Table.</p> <p>When Restore Input/Output Defaults is performed, the mixer presets to the 11970A, whose Start and Stop frequencies are 26.5 and 40 GHz respectively. The center of these two frequencies is 33.25 GHz.</p> <p>Therefore, after a Restore Input/Output Defaults, if you go into External Mixing and do a Mode Preset while in the Spectrum Analyzer Mode, the resulting Center Freq is 33.25 GHz.</p>
State Saved	Saved in instrument state.
Min	The minimum frequency in the currently selected mixer band + 5 Hz
Max	The maximum frequency in the currently selected mixer band - 5 Hz If the knob or step keys are being used, also depends on the value of the other three interdependent parameters Span, Start Frequency and Stop Frequency
Initial S/W Revision	A.08.01

I/Q Center Freq

SCPI command for specifying the I/Q Center Frequency. This command will set the Center Frequency to be used when the I/Q input is selected, even if the I/Q input is not the input which is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

Scope	Meas Global
Remote Command	[:SENSe] :FREQuency:IQ:CENTer <freq> [:SENSe] :FREQuency:IQ:CENTer?
Example	FREQ:IQ:CEN: 30 MHz
Notes	This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode.
Preset	0 Hz
State Saved	Saved in instrument state.
Min	-40.049995 MHz
Max	40.049995 MHz
Initial S/W Revision	Prior to A.02.00

BMT Freq

Enables quick selection from a subset of the available ARFCN numbers for the Top, Middle, or Bottom frequency in the selected band.

Key Path	FREQ Channel
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Mode	GSM
Scope	Meas Global
Notes	This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this.
Dependencies	When I/Q Input is selected, this key is not available (blank).
Couplings	BMT choice changes ARFCN and Center Freq. Chosen ARFCN will be displayed on each menu key.
Range	Top Middle Bottom
Initial S/W Revision	Prior to A.02.00

BMT Freq Top

Sets the analyzer to the frequency of the highest ARFCN (Absolute RF Channel Number) of the selected radio band.

Key Path	FREQ Channel, BMT Freq
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :ARFCn RFCHannel :TOP
Example	CHAN:ARFC:TOP
Notes	<ol style="list-style-type: none"> 1. This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. 2. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not displayed.
Couplings	Change [:SENSe]:CHANnel:ARFCn RFCHannel as follows: E-GSM: 124 P-GSM: 124 R-GSM: 124 DCS 1800: 885 PCS 1900: 810 GSM 450: 293 GSM 480: 340 GSM 700: 516 GSM 850: 251 T-GSM 810: 425 Change BMT ARFCN to BMT FreqTOP. Change [:SENSe]:FREQuency:CENTer as follows: E-GSM: 959.800 MHz P-GSM: 959.800 MHz R-GSM: 959.800 MHz

	DCS 1800: 1879.80 MHz
	PCS 1900: 1989.80 MHz
	GSM 450: 467.400 MHz
	GSM 480: 495.800 MHz
	GSM 700: 792.800 MHz
	GSM 850: 893.800 MHz
	T-GSM810: 866.000 MHz
State Saved	No
Initial S/W Revision	Prior to A.02.00

BMT Freq Middle

Sets the analyzer to the frequency of the middle ARFCN (Absolute RF Channel Number) of the selected radio band.

Key Path	FREQ Channel, BMT Freq
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel:ARFCn RFCHannel:MIDDLE</code>
Example	CHAN:ARFC:MIDD
Notes	<ol style="list-style-type: none"> 1. This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. 2. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not displayed.
Couplings	<p>Change <code>[:SENSe] :CHANnel:ARFCn RFCHannel</code> as follows:</p> <p>E-GSM: 38 P-GSM: 63 R-GSM: 28</p> <p>DSC 1800: 699 PCS 1900: 661 GSM 450: 276 GSM 480: 323 GSM 700: 477 GSM 850: 190 T-GSM 810: 388</p> <p>Change BMT ARFCN to BMT FreqMIDDLE.</p> <p>Change <code>[:SENSe] :FREQuency:CENTer</code> as follows:</p> <p>E-GSM: 942.600 MHz P-GSM: 947.600 MHz R-GSM: 940.600 MHz</p>

	DCS 1800: 1842.60 MHz
	PCS 1900: 1960.00 MHz
	GSM 450: 464.000 MHz
	GSM 480: 492.400 MHz
	GSM 700: 755.000 MHz
	GSM 850: 881.600 MHz
	T-GSM 810: 858.600 MHz

State Saved	No
Initial S/W Revision	Prior to A.02.00

BMT Freq Bottom

Sets the analyzer to the frequency of the lowest ARFCN (Absolute RF Channel Number) of the selected radio band.

Key Path	FREQ Channel, BMT Freq
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :ARFCn RFCHannel :BOTTom</code>
Example	CHAN:ARFC:BOTT
Notes	<ol style="list-style-type: none"> 1. This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. 2. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not displayed.
Couplings	Change [:SENSe]:CHANnel:ARFCn RFCHannel as follows: E-GSM: 975 P-GSM: 1 R-GSM: 955 DCS 1800: 512 PCS 1900: 512 GSM 450: 259 GSM 480: 306 GSM 700: 438 GSM 850: 128 T-GSM 810: 350 Change BMT ARFCN to BMT FreqBOTTom. Change [:SENSe]:FREQuency:CENTer as follows: E-GSM: 925.200 MHz P-GSM: 935.200 MHz R-GSM: 921.200 MHz

	DCS 1800: 1805.20 MHz
	PCS 1900: 1930.20 MHz
	GSM 450: 460.600 MHz
	GSM 480: 489.000 MHz
	GSM 700: 747.2 MHz
	GSM 850: 869.200 MHz
	T-GSM 810: 851.000 MHz
State Saved	No
Initial S/W Revision	Prior to A.02.00

Carrier Setup

Allows you to set carrier parameters.

Key Path	FREQ Channel
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Initial S/W Revision	A.06.00
Modified at S/W Revision	A.14.00

Carriers

Defines the number of carriers.

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :COUNT <integer></code> <code>[:SENSe] :CHANnel :CARRier :COUNT?</code>
Example	CHAN:CARR:COUN 3 CHAN:CARR:COUN?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Couplings	This can change when the SCPI command of the Carrier Power Present or the Carrier Interval is sent.
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	16

Initial S/W Revision	A.06.00
Modified at S/W Revision	A.13.00

Reference Carrier

Defines the reference active carrier. The Reference Carrier frequency point is always aligned with the Measurement Global Center Frequency. The minimum value 1 specifies the lowest frequency carrier among the active carriers. The maximum value specifies the highest frequency carrier among the active carriers.

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :RCARrier <integer></code> <code>[:SENSe] :CHANnel :CARRier :RCARrier ?</code>
Example	CHAN:CARR:RCAR 3 CHAN:CARR:RCAR?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	The maximum value depends on the number of carriers. If you set it to more than the number of carriers, it's clipped to the number of carriers. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Couplings	When you decrease the number of carriers to a value which is less than this value, this is clipped to the value.
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	Number of carriers
Initial S/W Revision	A.06.00

Configure Carriers

Opens a menu of keys that allows you to configure carriers.

Key Path	FREQ Channel, Multi Carrier Setup
Dependencies	This key is grayed out when there is only one carrier. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Initial S/W Revision	A.06.00

Select Carrier

Selects a carrier to configure.

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	The maximum value depends on the number of carriers. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned. This parameter is unavailable when there is only one carrier.
Couplings	This value can change when you decrease the number of carriers.
Preset	1
State Saved	No
Min	1
Max	Number of carriers
Initial S/W Revision	A.06.00

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe]:CHANnel:CARRier:LIST:COUPle OFF ON 0 1, ... [:SENSe]:CHANnel:CARRier:LIST:COUPle?
Example	CHAN:CARR:LIST:COUP OFF CHAN:CARR:LIST:COUP?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	When Couple is selected, the carrier settings are coupled to carrier #1. Coupled parameters are Carrier Power Present, Carrier Interval. When a setting is changed, the couple is set to Man automatically. Carrier #1 is always set to couple and cannot be changed. Couple/Man selection on the Carrier key is not displayed when selected carrier number is #1.
Preset	ON
State Saved	No
Range	Couple Man
Initial S/W Revision	A.06.00

Carrier Power Present

Specifies whether each of carriers is active or not.

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :CARRier :LIST :PPResent YES NO, ... [:SENSe] :CHANnel :CARRier :LIST :PPResent?
Example	CHAN:CARR:LIST:PPR YES CHAN:CARR:LIST:PPR?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. Missing values are not permitted, therefore if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Dependencies	This parameter is unavailable when there is only one carrier. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	Coupled to the number of carriers. When the SCPI command is sent, the number of carriers will be set to the number of entries in the parameter list.
Preset	YES
State Saved	Saved in instrument state.
Range	Yes No
Initial S/W Revision	A.06.00

Carrier Interval

Specifies the frequency interval between the Carrier #n and #n+1 center frequencies.

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :CARRier :LIST :INTerval <freq>, ... [:SENSe] :CHANnel :CARRier :LIST :INTerval?
Example	CHAN:CARR:LIST:INT 600k CHAN:CARR:LIST:INT?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. The softkey for the last carrier (say, #N) is grayed out.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned. This parameter is unavailable when there is only one carrier.
Couplings	Coupled to the number of carriers. When the SCPI command is sent, the number of carriers will be

	set to the number of entries in the parameter list. Changing Carrier Interval might affect the Span.
Preset	600kHz
State Saved	Saved in instrument state.
Min	400 kHz
Max	100 MHz
Initial S/W Revision	A.06.00
Modified at S/W Revision	A.07.00, A.08.00

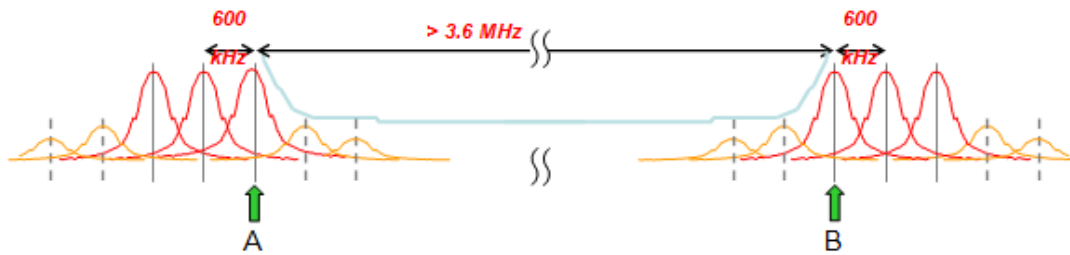
Carrier Frequency Allocation

Specifies the carrier frequency allocation. There are two types of allocation, contiguous and non-contiguous. Non-Contiguous frequency allocation is defined as an allocation where two groups of frequencies are separated with at least [3.6] MHz carrier separation between the innermost carriers. In case of the non-contiguous frequency allocation, tests will be measured between the uppermost carrier A of the lower frequency group and the lowermost carrier B of the upper frequency group.

See ["An example of non-contiguous frequency allocation" on page 672](#)

Key Path	FREQ Channel, Multi Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :FALLocation</code> CONTiguous NCONTiguous <code>[:SENSe] :CHANnel :CARRier :FALLocation?</code>
Example	CHAN:CARR:FALL NCON CHAN:CARR:FALL?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This menu key is available only when the number of carriers is more than one. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Preset	CONTiguous
State Saved	Saved in instrument state.
Range	Contiguous Non-Contiguous
Readback Text	CONTiguous NCONTiguous
Initial S/W Revision	A.07.00

An example of non-contiguous frequency allocation



Non-Contiguous

Opens a menu of keys that allows you to set non-contiguous frequency allocation parameters.

Key Path	FREQ Channel, Multi Carrier Setup, Carr Freq Alloc
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Initial S/W Revision	A.07.00

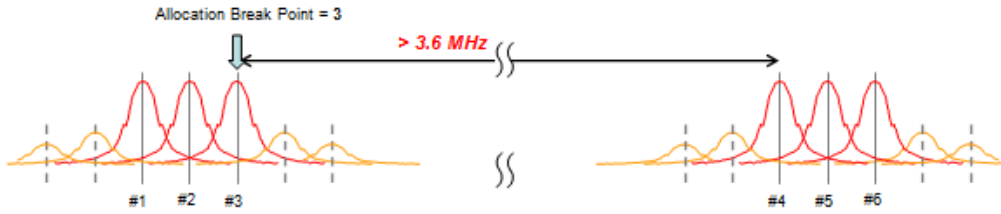
Allocation Break Pt

Specifies an allocation break point that is a sequence (or index) number of the uppermost carrier in the lower frequency group.

See ["An example of allocation break point" on page 674](#)

Key Path	FREQ Channel, Multi Carrier Setup, Carr Freq Alloc, Non-Contiguous
Mode	GSM
Scope	Meas Global
Remote Command	<code>[[:SENSe]:CHANnel:CARRier:FALlocation:NCONtiguous:ABPoint <integer></code> <code>[[:SENSe]:CHANnel:CARRier:FALlocation:NCONtiguous:ABPoint?</code>
Example	<code>CHAN:CARR:FALL:NCON:ABP 3</code> <code>CHAN:CARR:FALL:NCON:ABP?</code>
Notes	You must be in the GSM mode to use this command. Use <code>INSTRument:SElect</code> to set the mode.
Dependencies	The maximum value depends on the number of carriers. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	This value can change when you decrease the number of carriers.
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	Number of carriers - 1
Initial S/W Revision	A.07.00
Modified at S/W Revision	A.13.00

An example of allocation break point



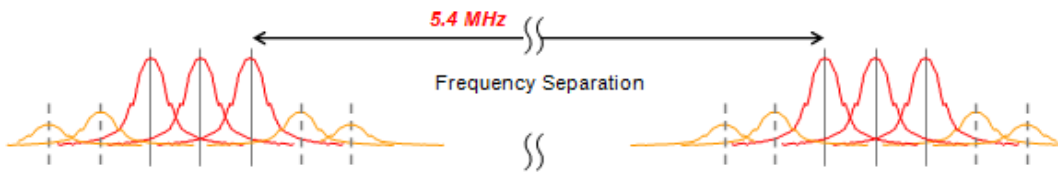
Freq Separation

Specifies frequency separation between the innermost of carriers.

See ["An example of frequency separation" on page 675](#)

Key Path	FREQ Channel, Multi Carrier Setup, Carr Freq Alloc, Non-Contiguous
Mode	GSM
Scope	Meas Global
Remote Command	<code>[[:SENSe]:CHANnel:CARRier:FALLocation:NCONtiguous:FSEParation <freq></code> <code>[[:SENSe]:CHANnel:CARRier:FALLocation:NCONtiguous:FSEParation?</code>
Example	<code>CHAN:CARR:FALL:NCON:FSEP 5.4M</code> <code>CHAN:CARR:FALL:NCON:FSEP?</code>
Notes	You must be in the GSM mode to use this command. Use <code>INSTRument:SElect</code> to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	Changing Frequency Separation might affect the Span
Preset	5.4 MHz
State Saved	Saved in instrument state.
Min	3.6 MHz
Max	100 MHz
Initial S/W Revision	A.07.00

An example of frequency separation



Carrier BPF

Selects whether to use the carrier bandpass filter.

Key Path	FREQ Channel, Multi Carrier SetupMode Setup, Demod
Mode	GSM
Remote Command	<code>[:SENSe] :RADio :CARRier :NUMBer :AUTO ON OFF 1 0</code> <code>[:SENSe] :RADio :CARRier :NUMBer :AUTO ?</code>
Example	<code>RAD:CARR:NUMB:AUTO 1</code> <code>RAD:CARR:NUMB:AUTO ?</code>
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	ON automatically changes to OFF when Multiple or Single is selected as Carrier BPF Type.
Preset	ON
State Saved	Saved in instrument state.
Range	Auto Man
Initial S/W Revision	A.06.00

Carrier BPF Type

Opens a menu of keys that allows you to select the type of the bandpass filter. When carriers other than the signal of interest are present, especially if they are strong, they can interfere with the measurement, making it difficult to sync and producing artificially high EVM results. When this condition exists, toggle from Single to Multi. A band-limited filter will help reduce the measurement interference.

BPF Type	Description
MULTiple	Enable multi carrier tolerance filter.
SINGle	Disable multi carrier tolerance filter

This parameter applies only to the following measurements:

- GMSK Phase & Frequency Error measurement
- EDGE EVM measurement
- GMSK Power vs. Time

- EDGE Power vs. Time

Key Path	FREQ Channel, Multi Carrier Setup, Carrier BPFMode Setup, Demod, Carrier BPF
Mode	GSM
Scope	Meas Global
Remote Command	[[:SENSe]:RADio:CARRier:NUMBer SINGLE MULTiple [:SENSe]:RADio:CARRier:NUMBer?
Example	RAD:CARR:NUMB SING RAD:CARR:NUMB?
Notes	The Carrier Bandpass Filter key is in the Mode Setup menu, but only EDGE EVM and GSM PFER measurements support this feature. In other measurements, this setting is not applicable. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Preset	SINGLE
State Saved	Saved in instrument state.
Range	Single Multi
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

BTS Class

Selects a BTS class.

BTS Class	Definition
MC	Multicarrier BTS is defined as a class of BTS, characterized by the ability to, in addition to single carrier operation, process two or more carriers in common active RF components simultaneously, either in multicarrier transmitter only or, in both multicarrier transmitter and multicarrier receiver.
SC	Single carrier BTS is defined as a class of BTS, characterized by the ability to process one carrier in single carrier BTSs, not belonging to a Multicarrier BTS class.

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Remote Command	[[:SENSe]:CHANnel:CARRier:BASE:CLASs:AUTO ON OFF 1 0 [:SENSe]:CHANnel:CARRier:BASE:CLASs:AUTO?
Example	CHAN:CARR:BASE:CLAS:AUTO 1 CHAN:CARR:BASE:CLAS:AUTO?
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.

Couplings	ON automatically changes to OFF when Multicarrier Class (MC) or Single carrier Class (SC) is selected as BTS Class.
Preset	ON
State Saved	Saved in instrument state.
Range	Auto Man
Initial S/W Revision	A.14.00

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :CARRier :BASE :CLASs SC MC [:SENSe] :CHANnel :CARRier :BASE :CLASs?
Example	CHAN:CARR:BASE:CLAS MC CHAN:CARR:BASE:CLAS?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. Selection C1 and C2 are supported for backwards compatibility. When "C1" or "C2" is passed as SCPI command parameter, the BTS Class Auto is set to ON. As a result, it's converted to "SC" if the number of carriers is one, and otherwise "MC."
Dependencies	This parameter is available when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Preset	SC
State Saved	Saved in instrument state.
Range	Single Carrier Multi Carrier
Initial S/W Revision	A.06.00
Modified at S/W Revision	A.10.01, A14.00

Time Slot

Selects On or Off for slot searching. Generally, this feature is only valid in external and periodic timer trigger source modes that triggers every frame since another trigger source does not have the information that identifies the head of the frame. When Timeslot is set to On, the demodulation measurement is made on the nth timeslot specified by the trigger point + n timeslots, where n is the selected timeslot value 0 to 7.

This functionality is the same as Time Slot under the Freq/Channel menu.

Key Path	Mode Setup, Demod FREQ Channel
Mode	GSM

Scope	Meas Global
Remote Command	[:SENSe]:CHANnel:SLOT <integer> [:SENSe]:CHANnel:SLOT? [:SENSe]:CHANnel:SLOT:AUTO OFF ON 0 1 [:SENSe]:CHANnel:SLOT:AUTO?
Example	CHAN:SLOT 0 CHAN:SLOT? CHAN:SLOT:AUTO OFF CHAN:SLOT:AUTO?
Notes	This functionality does not affect Combined GSM/EDGE measurement. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	0 OFF
State Saved	Saved in instrument state.
Min	0
Max	7
Initial S/W Revision	Prior to A.02.00

Burst Type

Sets the burst type that the analyzer will search for and to which it will synchronize.

This functionality is the same as Burst Type under the FREQ Channel menu.

Key	SCPI	Description
Sync (SCH)	SYNC	Burst length = 142 symbols Extended training sequences for CTS and COMPACT synchronization bursts are not supported.
Access (RACH)	ACcEss	Burst length = 88 symbols Alternative training (synchronization) sequence "TS1" and "TS2" are supported only in GSMK Power vs. Time.
Normal - NB (TCH & CCH)	NORMal	Burst length = 142 symbols Softkey label will be changed to 'Normal - NB' form 'Normal'
Higher Symbol Rate - HB (TCH & CCH)	HSRate	Burst length = 169 symbols This selection key is only shown when theN9071A-3FP license is installed.
Mixed (NB/HB for TSC sync)	MIXed	Enables auto detection between Normal (NB) and HSR (HB) TCH & CCH EDGE Burst. This selection key is only shown when theN9071A-3FP license is installed.

Measurement synchronization capability (Burst Sync = Training Seq)

	Sync	Access	Normal		HSR	Mixed
			GMSK	8PSK		
				16QAM		
				32QAM		
				AQPSK		
GMSK Phase & Freq Error measurement	Yes	Yes	Yes	No	N/A	
GMSK Power vs. Time measurement	Yes	Yes	Yes	No	(measures as Normal GMSK when selected)	
GMSK Output RF Spectrum measurement (when Trigger Source is Periodic Timer and Sync Source is Off)	No	No	Yes	No		
EDGE EVM measurement	No	No	No	Yes	Yes	Yes
EDGE Power vs. Time measurement	Yes	Yes	Yes	Yes	Yes	Yes
EDGE Output RF Spectrum measurement (when Trigger Source is Periodic Timer and Sync Source is Off.)	No	No	Yes	Yes	Yes	Yes

Key Path	Mode Setup, Demod FREQ Channel
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :BURSt NORMal SYNC ACCess HSRate MIXed [:SENSe] :CHANnel :BURSt ?
Example	CHAN:BURS NORM CHAN:BURS?
Notes	This functionality does not affect the Combined GSM/EDGE measurement. Higher Symbol Rate and Mixed selections are only available when the N9071A-3FP license is installed. Otherwise these menu keys are blank. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Higher Symbol Rate and Mixed selection keys are not shown unless N9071A-3FP is installed. When unlicensed and SCPI is sent, an undefined header error is returned. When "Mixed" is selected, the Burst Sync menu key under the Meas Setup menu will be grayed out and Training Sequence (TSC) will be used for synchronization. The sync algorithm always runs in Training Sequence (TSC) synchronization because the Burst Type can be determined by looking at TSC in the signal. Original selection of Burst Sync will become effective again when the Burst Type selection is changed from "Mixed" to another one.
Preset	NORMal
State Saved	Saved in instrument state.
Range	Sync (SCH) Access (RACH) Normal - NB (TCH & CCH) Higher Symbol Rate - HB (TCH & CCH) Mixed (NB/HB for TSC sync)

Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

TSC (Std)

Allows you to select the Training Sequence Code that determines which burst is to be measured. Applicable only when Burst Sync is set to Training Sequence in the measurement. In the case of AQPSK, this parameter specifies TSC number of VAMOS sub-channel A. TSC of VAMOS sub-channel B is ignored.

This functionality is the same as TSC under the FREQ Channel menu.

This parameter applies only to the following measurements:

- GMSK/EDGE Power vs. Time measurement
- GMSK Phase & Frequency Error measurement
- EDGE EVM measurement

Selection	SCPI	Description
AutoDet	ON 1	The measurement is made on the first burst found to have any one of the valid TSCs in the range of 0 to 7. The measurement may be made on various timeslots if more than one timeslot has one of the 8 valid TSCs.
Man	OFF 0	The measurement is made on the first burst found to have the selected TSC. TSC numbers in the range of 0 to 7 can be selected. The measurement may be made on various timeslots if more than one timeslot has this same TSC.

Key Path	Mode Setup, Demod FREQ Channel
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe]:CHANnel:TSCode <integer> [:SENSe]:CHANnel:TSCode? [:SENSe]:CHANnel:TSCode:AUTO OFF ON 0 1 [:SENSe]:CHANnel:TSCode:AUTO?
Example	CHAN:TSC 3 CHAN:TSC? CHAN:TSC:AUTO 1 CHAN:TSC:AUTO?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. When Sync or Access is selected as Burst Type, this key is grayed out.
Preset	0 ON

State Saved	Saved in instrument state.
Min	0
Max	7
Initial S/W Revision	Prior to A.02.00

Input/Output

See "[Input/Output](#)" on page 196

Marker

Accesses the Marker menus.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Select Marker

Displays 12 markers available for selection.

Key Path	Marker
Initial S/W Revision	Prior to A.02.00

Marker X Axis Value (Remote Command Only)

Sets the marker X Axis value in the current marker X Axis Scale unit. It has no effect if the control mode is Off, but is the SCPI equivalent of entering an X value if the control mode is Normal or Delta.

Mode	GSM
Remote Command	:CALCulate:EEVM:MARKer[1] 2 ...12:X <real> :CALCulate:EEVM:MARKer[1] 2 ...12:X?
Example	CALC:EEVM:MARK3:X 0 CALC:EEVM:MARK3:X?
Notes	If no suffix is sent, uses the fundamental units for the current marker X Axis Scale. If a suffix is sent that does not match the current marker X Axis Scale unit, an error "Invalid suffix" is generated. The query returns the marker's absolute X Axis value if the control mode is Normal, or the offset from the marker's reference marker if the control mode is Delta. The query is returned in the fundamental units for the current marker X Axis scale: Hz for Frequency and Inverse Time, seconds for Period and Time. If the marker is Off the response is not a number. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	Max value will be changed.
Preset	After a preset, all markers are turned OFF, so Marker X Axis Value query returns a Not A Number (NAN).
State Saved	No
Min	-9.9E37
Max	9.9E37
Initial S/W Revision	Prior to A.02.00

Marker X Axis Position (Remote Command Only)

Sets the marker X position in trace points. It has no effect if the control mode is Off, but is the SCPI equivalent of entering a value if the control mode is Normal or Delta except in trace points rather than X Axis Scale units. The entered value is immediately translated into the current X Axis Scale units for setting the value of the marker.

Mode	GSM
Remote Command	:CALCulate:EEVM:MARKer[1] 2 ...12:X:POSition <integer> :CALCulate:EEVM:MARKer[1] 2 ...12:X:POSition?
Example	CALC:EEVM:MARK10:X:POS 0 CALC:EEVM:MARK10:X:POS?
Notes	The query returns the marker's absolute X Axis value in trace points if the control mode is Normal, or the offset from the marker's reference marker in trace points if the control mode is Delta. If the marker is Off the response is not a number. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	After a preset, all markers are turned OFF, so a Marker X Axis Value query returns a Not A Number (NAN).
State Saved	No
Min	-9.9E37
Max	9.9E37
Initial S/W Revision	Prior to A.02.00

Marker Y Axis Value (Remote Command Only)

Returns the marker Y Axis value in the current marker Y Axis unit.

The "result" of a marker is the value which is displayed on the second line of the Marker Result block. To properly interpret the returned value the remote programmer must also know what the analyzer's Y-Axis Unit is set to as described below.

A marker can have up to two results, only one of which is displayed or returned on a query, as follows:

- **Absolute result:** every marker has an absolute result and it is simply:

For Normal and Delta markers, the Y-axis value of the trace point the marker is currently on.

The absolute result is displayed in the result block or returned on a query unless the marker control mode is Delta.

- **Relative result:** if a marker's control mode is Delta, the relative result is displayed in the result block or returned on a query. This is the ratio of the Absolute Result of a delta marker to the Absolute Result of its reference marker.

Mode	GSM
Remote Command	:CALCulate:EEVM:MARKer[1] 2 ...12:Y?

Example	CALC:EEVM:MARK11:Y?
Notes	The query returns the marker Y-axis result. If the marker is Off the response is not a number. If 'Polar' is selected for Marker Trace, it returns the values of 'I' and 'Q' at the same time. You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Preset	0
State Saved	No
Backwards Compatibility SCPI	:CALCulate:EEVM:MARKer[1] 2 ...4:FUNction:RESult?
Initial S/W Revision	Prior to A.02.00

Properties

Accesses a menu that allows you to set marker properties and to access the marker trace menu.

Key Path	Marker
Initial S/W Revision	Prior to A.02.00

Select Marker

Displays 12 markers available for selection.

Key Path	Marker
Initial S/W Revision	Prior to A.02.00

Relative To

Selects the marker the selected marker will be relative to (its reference marker).

Key Path	Marker, Properties
Mode	GSM
Remote Command	:CALCulate:EEVM:MARKer[1] 2 ...12:REFerence <integer> :CALCulate:EEVM:MARKer[1] 2 ...12:REFerence?
Example	CALC:EEVM:MARK:REF 2 CALC:EEVM:MARK:REF?
Notes	A marker cannot be relative to itself so that choice is grayed out, and if sent from SCPI generates error -221: "Settings conflict; marker cannot be relative to itself." You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode. When queried a single value is returned (the specified marker number's relative marker).
Preset	2 3 4 5 6 7 8 9 10 11 12 1

State Saved	Saved in instrument state.
Min	1
Max	12
Initial S/W Revision	Prior to A.02.00

Marker Trace

Assigns the specified marker to the designated trace.

Key Path	Marker, Properties
Mode	GSM
Remote Command	:CALCulate:EEVM:MARKer[1] 2 ...12:TRACe POLar MERRor PERRor EVM MAXMerror MINMerror MAXPerror MINPerror MAXEvm MINEvm :CALCulate:EEVM:MARKer[1] 2 ...12:TRACe?
Example	CALC:EEVM:MARK:TRAC PERR CALC:EEVM:MARK:TRAC?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	EVM
State Saved	Saved in instrument state.
Range	IQ Polar Mag Error Phase Error EVM Max Hold Mag Error Min Hold Mag Error Max Hold Phase Error Min Hold Phase Error Max Hold EVM Min Hold EVM
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.02.00

Couple Markers

When this function is On, moving any marker causes an equal X Axis movement of every other marker which is not Off. By “equal X Axis movement” we mean that we preserve the difference between each marker’s X Axis value (in the fundamental x-axis units of the trace that marker is on) and the X Axis value of the marker being moved (in the same fundamental x-axis units). This may result in markers going off screen.

Key Path	Marker
Mode	GSM
Remote Command	:CALCulate:EEVM:MARKer:COUple[:STATe] ON OFF 1 0 :CALCulate:EEVM:MARKer:COUple[:STATe]?
Example	CALC:EEVM:MARK:COUP ON CALC:EEVM:MARK:COUP?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.

Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

All Markers Off

Turns off all markers.

Key Path	Marker
Mode	GSM
Remote Command	:CALCulate:EEVM:MARKer:AOFF
Example	CALC:EEVM:MARK:AOFF
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Initial S/W Revision	Prior to A.02.00

Marker State (Backward Compatibility/Remote Command Only)

Sets or queries the state of a marker. Setting a marker which is OFF to state ON or 1 puts it in Normal mode and places it at the center of the screen.

Mode	EDGE GSM
Remote Command	:CALCulate:EEVM:MARKer[1] 2 ...12:STATE OFF ON 0 1 :CALCulate:EEVM:MARKer[1] 2 ...12:STATE?
Example	CALC:EEVM:MARK3:STAT ON CALC:EEVM:MARK3:STAT?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

Marker Function

There is no functionality for this front-panel key in this measurement. Pressing this key displays a blank key menu.

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Marker To

There is no functionality for this front-panel key in this measurement. Pressing this key displays a blank key menu.

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Meas

The information in this section is common to all measurements. For key and remote command information for a specific measurement, refer to the section that describes the measurement of interest.

Measurements available under the Meas key are specific to the current Mode.

When viewing Help for measurements, note the following:

NOTE

Operation for some keys differs between measurements. The information displayed in Help pertains to the current measurement. To see how a key operates in a different measurement, exit Help (press the Cancel Esc key), select the measurement, then reenter Help (press the Help key) and press that key.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Remote Measurement Functions

This section contains the following topics:

["Measurement Group of Commands" on page 2302](#)

["Current Measurement Query \(Remote Command Only\)" on page 2304](#)

["Limit Test Current Results \(Remote Command Only\)" on page 2304](#)

["Data Query \(Remote Command Only\)" on page 2304](#)

["Calculate/Compress Trace Data Query \(Remote Command Only\)" on page 2305](#)

["Calculate Peaks of Trace Data \(Remote Command Only\)" on page 2310](#)

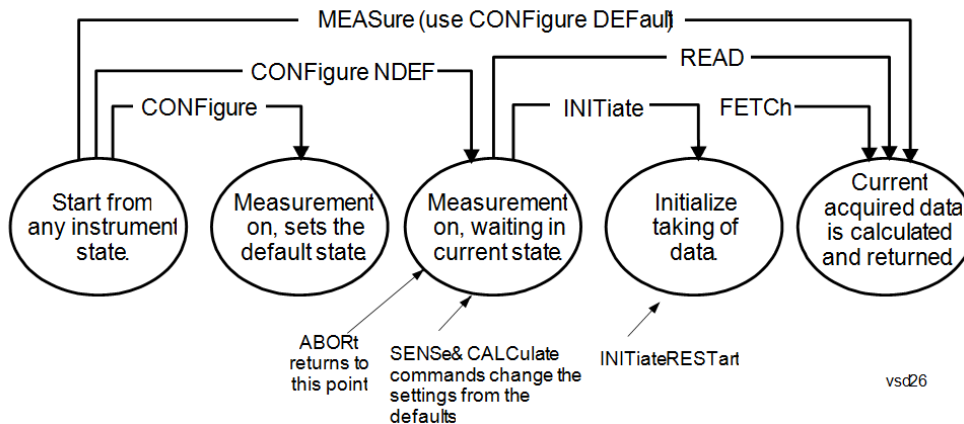
[Hardware-Accelerated Fast Power Measurement \(Remote Command Only\)](#)

["Format Data: Numeric Data \(Remote Command Only\)" on page 2311](#)

["Format Data: Byte Order \(Remote Command Only\)" on page 2312](#)

Initial S/W Revision	Prior to A.02.00
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Measurement Group of Commands



Measure Commands:

:MEASure:<measurement>[n]?

This is a fast single-command way to make a measurement using the factory default instrument settings. These are the settings and units that conform to the Mode Setup settings (e.g. radio standard) that you have currently selected.

- Stops the current measurement (if any) and sets up the instrument for the specified measurement using the factory defaults
- Initiates the data acquisition for the measurement
- Blocks other SCPI communication, waiting until the measurement is complete before returning results.
- If the function does averaging, it is turned on and the number of averages is set to 10.
- After the data is valid it returns the scalar results, or the trace data, for the specified measurement. The type of data returned may be defined by an [n] value that is sent with the command.
- The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available.
- ASCII is the default format for the data output. (Older versions of Spectrum Analysis and Phase Noise mode measurements only use ASCII.) The binary data formats should be used for handling large blocks of data since they are smaller and faster than the ASCII format. Refer to the FORMat:DATA command for more information.

If you need to change some of the measurement parameters from the factory default settings you can set up the measurement with the CONFigure command. Use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to change the settings. Then you can use the READ? command to initiate the measurement and query the results.

If you need to repeatedly make a given measurement with settings other than the factory defaults, you can use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to set up the measurement. Then use the READ? command to initiate the measurement and query results.

Measurement settings persist if you initiate a different measurement and then return to a previous one. Use READ:<measurement>? if you want to use those persistent settings. If you want to go back to the default settings, use MEASure:<measurement>?.

Configure Commands:

:CONFigure:<measurement>

This command stops the current measurement (if any) and sets up the instrument for the specified measurement using

the factory default instrument settings. It does not initiate the taking of measurement data unless INIT:CONTinuous is ON. If you change any measurement settings after using the CONFigure command, the READ command can be used to initiate a measurement without changing the settings back to their defaults.

In the Swept SA measurement in Spectrum Analyzer mode the CONFigure command also turns the averaging function on and sets the number of averages to 10 for all measurements.

:CONFigure: <measurement>: NDEFault stops the current measurement and changes to the specified measurement. It does not change the settings to the defaults. It does not initiate the taking of measurement data unless INIT:CONTinuous is ON.

The CONFigure? query returns the current measurement name.

The CONFigure:CATalog? query returns a quoted string of all licensed measurement names in the current mode. For example, "SAN, CHP, OBW, ACP, PST, TXP, SPUR, SEM, LIST".

Fetch Commands:

:FETCh:<measurement>[n]?

This command puts selected data from the most recent measurement into the output buffer. Use FETCh if you have already made a good measurement and you want to return several types of data (different [n] values, for example, both scalars and trace data) from a single measurement. FETCh saves you the time of re-making the measurement. You can only FETCh results from the measurement that is currently active, it will not change to a different measurement. An error message is reported if a measurement other than the current one is specified.

If you need to get new measurement data, use the READ command, which is equivalent to an INITiate followed by a FETCh.

The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used for handling large blocks of data since they are smaller and transfer faster than the ASCII format. (FORMat:DATA)

FETCh may be used to return results other than those specified with the original READ or MEASure command that you sent.

INITiate Commands:

:INITiate:<measurement>

This command is not available for measurements in all the instrument modes:

- Initiates a trigger cycle for the specified measurement, but does not output any data. You must then use the FETCh<meas> command to return data. If a measurement other than the current one is specified, the instrument will switch to that measurement and then initiate it.
 - For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. If you send INIT:ACP? it will change from channel power to ACP and will initiate an ACP measurement.
 - Does not change any of the measurement settings. For example, if you have previously started the ACP measurement and you send INIT:ACP? it will initiate a new ACP measurement using the same instrument settings as the last time ACP was run.
 - If your selected measurement is currently active (in the idle state) it triggers the measurement, assuming the trigger conditions are met. Then it completes one trigger cycle. Depending upon the measurement and the number of averages, there may be multiple data acquisitions, with multiple trigger events, for one full trigger cycle. It also holds off additional commands on GPIB until the acquisition is complete.
-

READ Commands:

:READ:<measurement>[n]?

- Does not preset the measurement to the factory default settings. For example, if you have previously initiated the ACP
-

measurement and you send READ:ACP? it will initiate a new measurement using the same instrument settings.

- Initiates the measurement and puts valid data into the output buffer. If a measurement other than the current one is specified, the instrument will switch to that measurement before it initiates the measurement and returns results.
 - For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. Then you send READ:ACP? It will change from channel power back to ACP and, using the previous ACP settings, will initiate the measurement and return results.
 - Blocks other SCPI communication, waiting until the measurement is complete before returning the results
 - If the optional [n] value is not included, or is set to 1, the scalar measurement results will be returned. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used when handling large blocks of data since they are smaller and faster than the ASCII format. (FORMat:DATA)
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Current Measurement Query (Remote Command Only)

This command returns the name of the measurement that is currently running.

Remote Command	:CONFigure?
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Example	CONF?
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Limit Test Current Results (Remote Command Only)

Queries the status of the current measurement limit testing. It returns a 0 if the measured results pass when compared with the current limits. It returns a 1 if the measured results fail any limit tests.

Remote Command	:CALCulate:CLIMits:FAIL?
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Example	CALC:CLIM:FAIL? queries the current measurement to see if it fails the defined limits. Returns a 0 or 1: 0 it passes, 1 it fails.
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Data Query (Remote Command Only)

Returns the designated measurement data for the currently selected measurement and subopcode.

n = any valid subopcode for the current measurement. See the measurement command results table for your current measurement, for information about what data is returned for the subopcodes.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. (See the format command descriptions under Input/Output in the Analyzer Setup section.)

Remote Command	:CALCulate:DATA[n]?
Notes	The return trace depends on the measurement. In CALCulate:<meas>:DATA[n], n is any valid subopcode for the current measurement. It returns the same data as the FETCH:<measurement>? query where <measurement> is the current measurement.
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Calculate/Compress Trace Data Query (Remote Command Only)

Returns compressed data for the currently selected measurement and sub-opcode [n].

n = any valid sub-opcode for that measurement. See the MEASure:<measurement>? command description of your specific measurement for information on the data that can be returned.

The data is returned in the current Y Axis Unit of the analyzer. The command is used with a sub-opcode <n> (default=1) to specify the trace. With trace queries, it is best if the analyzer is not sweeping during the query. Therefore, it is generally advisable to be in Single Sweep, or Update=Off.

This command is used to compress or decimate a long trace to extract and return only the desired data. A typical example would be to acquire N frames of GSM data and return the mean power of the first burst in each frame. The command can also be used to identify the best curve fit for the data.

Remote Command	:CALCulate:DATA<n>:COMPRESS? BLOCK CFIT MAXimum MINimum MEAN DMEan RMS RMSCubed SAMPLE SDEVIation PPHase [,<soffset> [,<length>[,<roffset>[,<rlimit>]]]]
Example	To query the mean power of a set of GSM bursts: Supply a signal that is a set of GSM bursts. Select the IQ Waveform measurement (in IQ Analyzer Mode). Set the sweep time to acquire at least one burst. Set the triggers such that acquisition happens at a known position relative to a burst. Then query the mean burst levels using, CALC:DATA2:COMP? MEAN, 24e-6, 526e-6 (These parameter values correspond to GSM signals, where 526e-6 is the length of the burst in the slot and you just want 1 burst.)
Notes	The command supports 5 parameters. Note that the last 4 (<soffset>, <length>, <roffset>, <rlimit>) are optional. But these optional parameters must be entered in the specified order. For example, if you want to specify <length>, then you must also specify <soffset>. See details below for a definition of each of these parameters. This command uses the data in the format specified by FORMat:DATA, returning either binary or ASCII data.
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- BLOCK or block data - returns all the data points from the region of the trace data that you specify. For example, it could be used to return the data points of an input signal over several timeslots, excluding the portions of the trace data that you do not want. (This is x,y pairs for trace data and I,Q pairs for complex data.)

- CFIT or curve fit - applies curve fitting routines to the data. <soffset> and <length> are required to define the data that you want. <roffset> is an optional parameter for the desired order of the curve equation. The query will return the following values: the x-offset (in seconds) and the curve coefficients ((order + 1) values).

MIN, MAX, MEAN, DME, RMS, RMSC, SAMP, SDEV and PPH return one data value for each specified region (or <length>) of trace data, for as many regions as possible until you run out of trace data (using <roffset> to specify regions). Or they return the number of regions you specify (using <rlimit>) ignoring any data beyond that.

- MINimum - returns the minimum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the minimum magnitude of the I/Q pairs is returned.
- MAXimum - returns the maximum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the maximum magnitude of the I/Q pairs is returned.
- MEAN - returns a single value that is the arithmetic mean of the data point values (in dB/ dBm) for the specified region(s) of trace data. For I/Q trace data, the mean of the magnitudes of the I/Q pairs is returned. See the following equations.

-

NOTE

If the original trace data is in dB, this function returns the arithmetic mean of those log values, not log of the mean power which is a more useful value. The mean of the log is the better measurement technique when measuring CW signals in the presence of noise. The mean of the power, expressed in dB, is useful in power measurements such as Channel Power. To achieve the mean of the power, use the RMS option.

Equation 1

Mean Value of Data Points for Specified Region(s)

$$\text{MEAN} = \frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 2

Mean Value of I/Q Data Pairs for Specified Region(s)

$$\text{MEAN} = \frac{1}{n} \sum_{X_i \in \text{region}(s)} |X_i|$$

where $|X_i|$ is the magnitude of an I/Q pair, and n is the number of I/Q pairs in the specified region(s).

- DMEan - returns a single value that is the mean power (in dB/ dBm) of the data point values for the specified region(s) of trace data. See the following equation:

Equation 3

DMEan Value of Data Points for Specified Region(s)

$$\text{DME} = 10 \times \log_{10} \left(\frac{1}{n} \sum_{X_i \in \text{region}(s)} 10^{\frac{X_i}{10}} \right)$$

- RMS - returns a single value that is the average power on a root-mean-squared voltage scale (arithmetic rms) of the data point values for the specified region(s) of trace data. See the following equation.

NOTE For I/Q trace data, the rms of the magnitudes of the I/Q pairs is returned. See the following equation. This function is very useful for I/Q trace data. However, if the original trace data is in dB, this function returns the rms of the log values which is not usually needed.

Equation 4

RMS Value of Data Points for Specified Region(s)

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i^2}$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 5

RMS Value of I/Q Data Pairs for Specified Region(s)

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region(s).

Once you have the rms value for a region of trace data (linear or I/Q), you may want to calculate the mean power. You must convert this rms value (peak volts) to power in dBm:

$$10 \times \log[10 \times (\text{rms value})^2]$$

- SAMPLe - returns the first data value (x,y pair) for the specified region(s) of trace data. For I/Q trace data, the first I/Q pair is returned.
- SDEViation - returns a single value that is the arithmetic standard deviation for the data point values for the specified region(s) of trace data. See the following equation.
- For I/Q trace data, the standard deviation of the magnitudes of the I/Q pairs is returned. See the following equation.

Equation 6

Standard Deviation of Data Point Values for Specified Region(s)

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (X_i - \bar{X})^2}$$

where X_i is a data point value, \bar{X} is the arithmetic mean of the data point values for the specified region (s), and n is the number of data points in the specified region(s).

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (|X_i| - \bar{X})^2}$$

where $|X_i|$ is the magnitude of an I/Q pair, \bar{X} is the mean of the magnitudes for the specified region(s), and n is the number of data points in the specified region(s).

- PPHase - returns the x,y pairs of both rms power (dBm) and arithmetic mean phase (radian) for every specified region and frequency offset (Hz). The number of pairs is defined by the specified number of regions. This parameter can be used for I/Q vector ($n=0$) in Waveform (time domain) measurement and all parameters are specified by data point in PPHase.

The rms power of the specified region may be expressed as:

$$\text{Power} = 10 \times \log [10 \times (\text{RMS I/Q value})] + 10.$$

The RMS I/Q value (peak volts) is:

$$\sqrt{\frac{1}{n} \sum_{X_i \in \text{region}} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region.

The arithmetic mean phase of the specified region may be expressed as:

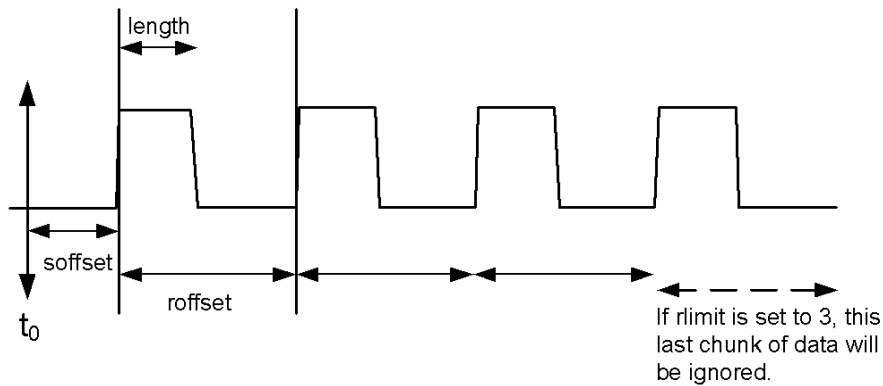
$$\frac{1}{n} \sum_{Y_i \in \text{region}} Y_i$$

where Y_i is the unwrapped phase of I/Q pair with applying frequency correction and n is the number of I/Q pairs in the specified region.

The frequency correction is made by the frequency offset calculated by the arithmetic mean of every specified region's frequency offset. Each frequency offset is calculated by the least square method against the unwrapped phase of I/Q pair.

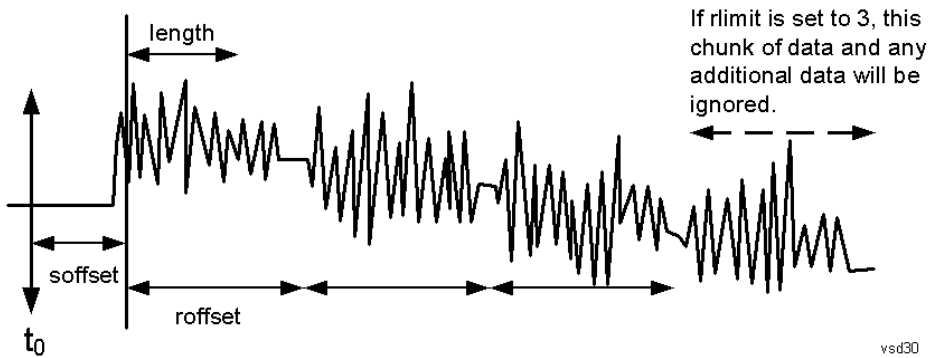
Sample Trace Data - Constant Envelope

(See below for explanation of variables.)



Sample Trace Data - Not Constant Envelope

(See below for explanation of variables.)



<soffset> - start offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It specifies the amount of data at the beginning of the trace that will be ignored before the decimation process starts. It is the time or frequency change from the start of the trace to the point where you want to start using the data. The default value is zero.

<length> - is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines how much data will be compressed into one value. This parameter has a default value equal to the current trace length.

<roffset> - repeat offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines the beginning of the next field of trace elements to be compressed. This is relative to the beginning of the previous field. This parameter has a default value equal to the <length> variable. Note that this parameter is used for a completely different purpose when curve fitting (see CFIT above).

<rlimit> - repeat limit is an optional integer. It specifies the number of data items that you want returned. It will ignore any additional items beyond that number. You can use the Start offset and the Repeat limit to pick out exactly what part of the data you want to use. The default value is all the data.

Calculate Peaks of Trace Data (Remote Command Only)

Returns a list of all the peaks for the currently selected measurement and sub-opcode [n]. The peaks must meet the requirements of the peak threshold and excursion values.

n = any valid sub-opcode for the current measurement. See the MEASure:<measurement> command description of your specific measurement for information on the data that can be returned.

The command can only be used with specific sub-opcodes with measurement results that are trace data. Both real and complex traces can be searched, but complex traces are converted to magnitude in dBm. In many measurements the sub-opcode n=0, is the raw trace data which cannot be searched for peaks. And Sub-opcode n=1, is often calculated results values which also cannot be searched for peaks.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. If the format is set to INT,32, it returns REAL,32 data.

The command has four types of parameters:

- Threshold (in dBm)
- Excursion (in dB)
- Sorting order (amplitude, frequency, time)
- Optional in some measurements: Display line use (all, > display line, < display line)

Remote Command	<p>For Swept SA measurement:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME[,ALL GTDLline LTDLine]]</pre> <p>For most other measurements:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME]</pre>
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Example	<p>Example for Swept SA measurement in Spectrum Analyzer Mode:</p> <p>CALC:DATA4:PEAK? -40, 10, FREQ, GTDL This will identify the peaks of trace 4 that are above -40 dBm, with excursions of at least 10 dB. The peaks are returned in order of increasing frequency, starting with the lowest frequency. Only the peaks that are above the display line are returned.</p> <p>Query Results 1:</p> <p>With FORMat:DATA REAL, 32 selected, it returns a list of floating-point numbers. The first value in the list is the number of peak points that are in the following list. A peak point consists of two values: a peak amplitude followed by its corresponding frequency (or time).</p> <p>If no peaks are found the peak list will consist of only the number of peaks, (0).</p>
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Notes	<p><n> - is the trace that will be used</p> <p><threshold> - is the level below which trace data peaks are ignored. Note that the threshold value is required and is always used as a peak criterion. To effectively disable the threshold criterion for this command, provide a substantially low threshold value such as -200 dBm. Also note that the threshold value used in this command is independent of and has no effect on the threshold value stored under the Peak Criteria menu.</p> <p><excursion> - is the minimum amplitude variation (rise and fall) required for a signal to be identified as peak. Note that the excursion value is required and is always used as a peak criterion. To effectively disable the excursion criterion for this command, provide the minimum value of 0.0 dB. Also note that the excursion value used in this command is independent of and has no effect on the</p>
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excursion value stored under the Peak Criteria menu.

Values must be provided for threshold and excursion. The sorting and display line parameters are optional (defaults are AMPLitude and ALL).

Note that there is always a Y-axis value for the display line, regardless of whether the display line state is on or off. It is the current Y-axis value of the display line which is used by this command to determine whether a peak should be reported

Sorting order:

AMPLitude - lists the peaks in order of descending amplitude, with the highest peak first (default if optional parameter not sent)

FREQuency - lists the peaks in order of occurrence, left to right across the x-axis.

TIME - lists the peaks in order of occurrence, left to right across the x-axis.

Peaks vs. Display Line:

ALL - lists all of the peaks found (default if optional parameter not sent).

GTDLine (greater than display line) - lists all of the peaks found above the display line.

LTDLine (less than display line) - lists all of the peaks found below the display line.

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Format Data: Numeric Data (Remote Command Only)

This command specifies the format of the trace data input and output. It specifies the formats used for trace data during data transfer across any remote port. It affects only the data format for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]?, :CALCulate:DATA[n]? and FETCh:SANalyzer [n]? commands and queries.

Remote Command :FORMat [:TRACe] [:DATA] ASCii | INTeger, 32 | REAL, 32 | REAL, 64
:FORMat [:TRACe] [:DATA] ?

Notes The query response is:
ASCii: ASC,8
REAL,32: REAL,32
REAL,64: REAL,64
INTeger,32: INT,32

When the numeric data format is REAL or ASCii, data is output in the current Y Axis unit. When the data format is INTeger, data is output in units of m dBm (.001 dBm).

The INT,32 format returns binary 32-bit integer values in internal units (m dBm), in a definite length block.

Dependencies Sending a data format spec with an invalid number (for example, INT,48) generates no error. The analyzer simply uses the default (8 for ASCii, 32 for INTeger, 32 for REAL).

Sending data to the analyzer which does not conform to the current FORMat specified, results in an error. Sending ASCII data when a definite block is expected generates message -161 "Invalid Block Data" and sending a definite block when ASCII data is expected generates message -121 "Invalid Character in Number".

Preset ASCii

Backwards Compatibility Notes Note that the INT,32 format is only applicable to the command, TRACe:DATA. This preserves backwards compatibility for the Swept SA measurement. For all other commands/queries which honor FORMat:DATA, if INT,32 is sent the analyzer will behave as though it were set to REAL,32.

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The specs for each output type follow:

ASCIi - Amplitude values are in ASCII, in the current Y Axis Unit, one ASCII character per digit, values separated by commas, each value in the form:

SX.YYYYYEsZZ

Where:

S = sign (+ or -)

X = one digit to left of decimal point

Y = 5 digits to right of decimal point

E = E, exponent header

s = sign of exponent (+ or -)

ZZ = two digit exponent

REAL,32 - Binary 32-bit real values in the current Y Axis Unit, in a definite length block.

REAL,64 - Binary 64-bit real values in the current Y Axis Unit, in a definite length block.

Format Data: Byte Order (Remote Command Only)

This command selects the binary data byte order for data transfer and other queries. It controls whether binary data is transferred in normal or swapped mode. This command affects only the byte order for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]? , :CALCulate:DATA[n]? and FETCh:SANalyzer[n]? commands and queries.

By definition any command that says it uses FORMat:DATA uses any format supported by FORMat:DATA.

The NORMal order is a byte sequence that begins with the most significant byte (MSB) first, and ends with the least significant byte (LSB) last in the sequence: 1|2|3|4. SWAPped order is when the byte sequence begins with the LSB first, and ends with the MSB last in the sequence: 4|3|2|1.

Remote Command	:FORMat:BORDER NORMal SWAPped :FORMat:BORDER?
Preset	NORMal
Initial S/W Revision	Prior to A.02.00

Meas Setup

Displays the measurement setup menu for the currently selected measurement.

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Avg /Hold Num

Sets the number of data acquisitions that will be averaged. After the specified number of average counts, the average mode (termination control) setting determines the average action.

Key Path	Meas Setup
Mode	GSM
Remote Command	<pre>[:SENSe] :EEVM:AVERage:COUNT <integer> [:SENSe] :EEVM:AVERage:COUNT? [:SENSe] :EEVM:AVERage [:STATe] OFF ON 0 1 [:SENSe] :EEVM:AVERage [:STATe] ?</pre>
Example	<pre>EEVM:AVER:COUN 3 EEVM:AVER:COUN? EEVM:AVER ON EEVM:AVER?</pre>
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Couplings	When this value is changed, Avg State is set to On.
Preset	10 OFF
State Saved	Saved in instrument state.
Min	1
Max	10000
Initial S/W Revision	Prior to A.02.00

Avg Mode

Selects the type of termination control used to averaging. This determines the averaging action after the specified number of data acquisitions (average count) is reached.

- Exponential averaging – When Measure is set at Cont, data acquisitions continue indefinitely. After N averages, exponential averaging is used with a weighting factor of N (the displayed average count stops at N). Exponential averaging weights new data more than old data, which allows tracking of slow-changing signals. The weighting factor N is set using the Averages, Avg Bursts key.

- Repeat averaging – When Measure is set at Cont, data acquisitions continue indefinitely. After N averages is reached, all previous result data is cleared and the average count is set back to 1. This is equivalent to being in Measure Single and pressing the Restart key when the Single measurement finishes.

Key Path	Meas Setup
Mode	GSM
Remote Command	[:SENSe] :EEVM:AVERage:TCONtrol EXPonential REPeat [:SENSe] :EEVM:AVERage:TCONtrol?
Example	EEVM:AVER:TCON REP EEVM:AVER:TCON?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Preset	REPeat
State Saved	Saved in instrument state.
Range	Exp Repeat
Initial S/W Revision	Prior to A.02.00

Burst Sync

Select the method of synchronizing the measurement to the bursts.

- Training Sequence (TSEQuence) – The burst synchronization performs a demodulation of the burst and determines the start and stop of the useful part of the burst based on the midamble training sync sequence.
- RFBurst – The burst synchronization approximates the start and stop of the useful part of the burst without demodulation of the burst.
- Polar Modulation – The burst synchronization performs a demodulation of the burst and determines the start and stop of the useful part of the burst based on the midamble training sync sequence. (It's same as "Training Seq") The measurement start searching training sequence both on amplitude path and phase path to make synchronization
- None – The measurement is performed without searching burst.

Key Path	Meas Setup
Mode	GSM
Remote Command	[:SENSe] :EEVM:BSYNc:SOURce TSEQuence RFBurst PMODulation NONE [:SENSe] :EEVM:BSYNc:SOURce?
Example	EEVM:BSYNC:SOUR RFB EEVM:BSYNC:SOUR?
Dependencies	When Burst Type in the Mode Setup menu is set to Mixed, this menu key is grayed out and Training Sequence (TSC) is used for synchronization. "Training Seq" is shown on the Meas Bar. The sync algorithm always runs in Training Sequence (TSC) synchronization mode in case of "Mixed" because the Burst Type can be determined by looking at TSC in the signal. Original selection of Burst Sync

	becomes effective again when the Burst Type selection is changed from "Mixed" to another one. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	TSEquence
State Saved	Saved in instrument state.
Range	Training Seq RF Amptd Polar Modulation None
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.02.00

IF Gain

To take full advantage of the RF dynamic range of the analyzer, a switched IF amplifier with approximately 10 dB of gain is available. When it can be turned on without an overload, the dynamic range is always better with it on than off. The IF Gain key can be used to set the IF Gain function to Auto, or to On (the extra 10 dB) or Off. These settings affect sensitivity and IF overloads.

This functionality only applies to the RF input. It does not apply to baseband I/Q input.

Key Path	Meas Setup, Advanced,
Initial S/W Revision	Prior to A.02.00

IF Gain Auto

Activates the auto rules for IF Gain

Key Path	Meas Setup, IF Gain
Mode	GSM
Remote Command	[:SENSe] :EEVM:IF:GAIN:AUTO [:STATe] ON OFF 1 0 [:SENSe] :EEVM:IF:GAIN:AUTO [:STATe] ?
Example	EEVM:IF:GAIN:AUTO ONEEVM:IF:GAIN:AUTO?
Notes	IF Gain only applies to the RF input. It does not apply to baseband I/Q input. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	When either the auto attenuation works (for example, with electrical attenuator), or the Optimize Mechanical Attenuator range is requested, the IF Gain setting is changed according to the following rule. 'auto' sets IF Gain High under any of the following conditions: <ul style="list-style-type: none"> • the input attenuator is set to 0 dB, • the preamp is turned on, • the Max Mixer Level is -20 dBm or lower. For other settings, auto sets IF Gain to Low.
Preset	OFF

State Saved	Saved in instrument state.
Range	Auto Man
Initial S/W Revision	Prior to A.02.00

IF Gain State

Key Path	Meas Setup, IF Gain
Mode	GSM
Remote Command	[:SENSe] :EEVM:IF:GAIN [:STATe] ON OFF 1 0 [:SENSe] :EEVM:IF:GAIN [:STATe] ?
Example	EEVM:IF:GAIN ONEEVM:IF:GAIN?
Notes	IF Gain only applies to the RF input. It does not apply to baseband I/Q input. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. where ON = high gain OFF = low gain
Couplings	Couple to IF Gain Auto, force it to Man.
Preset	OFF
State Saved	Saved in instrument state.
Range	Low Gain (Best for Large Signals) High Gain (Best Noise Level)
Initial S/W Revision	Prior to A.02.00

Limits

Accesses a menu that enables you to set the Limit Test to on or off and the Test Condition to a normal or extreme limit table.

Key Path	Meas Setup
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Limit Test

Turns on or off limit pass/fail testing.

Key Path	Meas Setup, Limits
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:TEST [:STATe] OFF ON 0 1 :CALCulate:EEVM:LIMit:TEST [:STATe] ?

Example	CALC:EEVM:LIM:TEST ON CALC:EEVM:LIM:TEST?
Notes	When set to Off, the PASS/FAIL indicator on the Meas Bar goes blank. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

Test Condition

This measurement could have different limit tables for different test environment, Normal and Extreme. This parameter allows you to select which limit table to be modified and used for the judgement.

Key Path	Meas Setup, Limits
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:TYPE NORMal EXTReme :CALCulate:EEVM:LIMit:TYPE?
Example	CALC:EEVM:LIM:TYPE NORM CALC:EEVM:LIM:TYPE?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	NORMal
State Saved	Saved in instrument state.
Range	Norm Extreme
Initial S/W Revision	Prior to A.02.00

RMS EVM

Accesses the menu to set the limit for the RMS EVM measurement pass/fail test per burst.

Key Path	Meas Setup, Mode, Limits
Mode	GSM
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.02.00

NB 8PSK

Sets the limit of the 8PSK burst for the RMS EVM measurement pass/fail test.

Device is BTS, Test Condition is Normal

Key Path	Meas Setup, Limits, RMS EVM
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:BTS:NORMal:REVM <real> :CALCulate:EEVM:LIMit:BTS:NORMal:REVM?
Example	CALC:EEVM:LIM:BTS:NORM:REVM 12 CALC:EEVM:LIM:BTS:NORM:REVM?
Notes	On MUI operation, for example, if the selected device is BTS and Test Condition is Extreme, test limit that can be set from front panel are those for BTS and Extreme condition. But a remote command can set each test limit without setting the radio device and test condition because it contains the information of the radio device and test condition. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	7.0
State Saved	Saved in instrument state.
Min	0.0
Max	100.0
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.02.00

Device is BTS, Test Condition is Extreme

Key Path	Meas Setup, Limits, RMS EVM
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:BTS:EXTReMe:REVM <real> :CALCulate:EEVM:LIMit:BTS:EXTReMe:REVM?
Example	CALC:EEVM:LIM:BTS:EXTR:REVM 15 CALC:EEVM:LIM:BTS:EXTR:REVM?
Notes	On MUI operation, for example, if the selected device is BTS and Test Condition is Extreme, test limit that can be set from front panel are those for BTS and Extreme condition. But a remote command can set each test limit without setting the radio device and test condition because it contains the information of the radio device and test condition. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	8.0
State Saved	Saved in instrument state.
Min	0.0
Max	100.0
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.02.00

Device is MS, Test Condition is Normal

Key Path	Meas Setup, Limits, RMS EVM
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:MS:NORMal:REVM <real> :CALCulate:EEVM:LIMit:MS:NORMal:REVM?
Example	CALC:EEVM:LIM:MS:NORM:REVM 20 CALC:EEVM:LIM:MS:NORM:REVM?
Notes	On MUI operation, for example, if the selected device is BTS and Test Condition is Extreme, test limit that can be set from front panel are those for BTS and Extreme condition. But a remote command can set each test limit without setting the radio device and test condition because it contains the information of the radio device and test condition. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	9.0
State Saved	Saved in instrument state.
Min	0.0
Max	100.0
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.02.00

Device is MS, Test Condition is Extreme

Key Path	Meas Setup, Limits, RMS EVM
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:MS:EXTReme:REVM <real> :CALCulate:EEVM:LIMit:MS:EXTReme:REVM?
Example	CALC:EEVM:LIM:MS:EXTR:REVM 15 CALC:EEVM:LIM:MS:EXTR:REVM?
Notes	On MUI operation, for example, if the selected device is BTS and Test Condition is Extreme, test limit that can be set from front panel are those for BTS and Extreme condition. But a remote command can set each test limit without setting the radio device and test condition because it contains the information of the radio device and test condition. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	10.0
State Saved	Saved in instrument state.
Min	0.0
Max	100.0
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.02.00

NB 16QAM

Sets the limit of the normal symbol rate 16QAM burst for the RMS EVM Measurement pass/fail test.

Device is BTS, Test Condition is Normal

Key Path	Meas Setup, Limits, RMS EVM
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:BTS:NORMal:REVM:NSRate QAM16, <real> :CALCulate:EEVM:LIMit:BTS:NORMal:REVM:NSRate? QAM16
Example	CALC:EEVM:LIM:BTS:NORM:REVM:NSR QAM16, 12 CALC:EEVM:LIM:BTS:NORM:REVM:NSR? QAM16
Notes	On MUI operation, for example, if the selected device is BTS and Test Condition is Extreme, test limit that can be set from front panel are those for BTS and Extreme condition. But a remote command can set each test limit without setting the radio device and test condition because it contains the information of the radio device and test condition.. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Blanked when the N/W9071A-3FP license is not installed.
Preset	5.0
State Saved	Saved in instrument state.
Min	0.0
Max	100.0
Initial S/W Revision	A.02.00

Device is BTS, Test Condition is Extreme

Key Path	Meas Setup, Limits, RMS EVM
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:BTS:EXTreme:REVM:NSRate QAM16, <real> :CALCulate:EEVM:LIMit:BTS:EXTreme:REVM:NSRate? QAM16
Example	CALC:EEVM:LIM:BTS:EXTR:REVM:NSR QAM16, 15 CALC:EEVM:LIM:BTS:EXTR:REVM:NSR? QAM16
Notes	On MUI operation, for example, if the selected device is BTS and Test Condition is Extreme, test limit that can be set from front panel are those for BTS and Extreme condition. Meanwhile, a remote command can set each test limit without setting the radio device and test condition because it contains the information of the radio device and test condition. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Blanked when the N/W9071A-3FP license is not installed.
Preset	6.0
State Saved	Saved in instrument state.
Min	0.0

Max	100.0
Initial S/W Revision	A.02.00

Device is MS, Test Condition is Normal

Key Path	Meas Setup, Limits, RMS EVM
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:MS:NORMal:REVM:NSRate QAM16, <real> :CALCulate:EEVM:LIMit:MS:NORMal:REVM:NSRate? QAM16
Example	CALC:EEVM:LIM:MS:NORM:REVM:NSR QAM16, 20 CALC:EEVM:LIM:MS:NORM:REVM:NSR? QAM16
Notes	On MUI operation, for example, if the selected device is BTS and Test Condition is Extreme, test limit that can be set from front panel are those for BTS and Extreme condition. Meanwhile, a remote command can set each test limit without setting the radio device and test condition because it contains the information of the radio device and test condition. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Blanked when the N/W9071A-3FP license is not installed.
Preset	7.0
State Saved	Saved in instrument state.
Min	0.0
Max	100.0
Initial S/W Revision	A.02.00
Modified at S/W Revision	A.04.00

Device is MS, Test Condition is Extreme

Key Path	Meas Setup, Limits, RMS EVM
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:MS:EXTReme:REVM:NSRate QAM16, <real> :CALCulate:EEVM:LIMit:MS:EXTReme:REVM:NSRate? QAM16
Example	CALC:EEVM:LIM:MS:EXTR:REVM:NSR QAM16, 15 CALC:EEVM:LIM:MS:EXTR:REVM:NSR? QAM16
Notes	On MUI operation, for example, if the selected device is BTS and Test Condition is Extreme, test limit that can be set from front panel are those for BTS and Extreme condition. Meanwhile, a remote command can set each test limit without setting the radio device and test condition because it contains the information of the radio device and test condition. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Blanked when the N/W9071A-3FP license is not installed.

Preset	8.0
State Saved	Saved in instrument state.
Min	0.0
Max	100.0
Initial S/W Revision	A.02.00
Modified at S/W Revision	A.04.00

NB 32QAM

Sets the limit of the normal symbol rate 32QAM burst for the RMS EVM Measurement pass/fail test.

Device is BTS, Test Condition is Normal

Key Path	Meas Setup, Limits, RMS EVM
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:BTS:NORMal:REVM:NSRate QAM32, <real> :CALCulate:EEVM:LIMit:BTS:NORMal:REVM:NSRate? QAM32
Example	CALC:EEVM:LIM:BTS:NORM:REVM:NSR QAM32, 12 CALC:EEVM:LIM:BTS:NORM:REVM:NSR? QAM32
Notes	On MUI operation, for example, if the selected device is BTS and Test Condition is Extreme, test limit that can be set from front panel are those for BTS and Extreme condition. Meanwhile,a remote command can set each test limit without setting the radio device and test condition because it contains the information of the radio device and test condition. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Blanked when the N/W9071A-3FP license is not installed.
Preset	5.0
State Saved	Saved in instrument state.
Min	0.0
Max	100.0
Initial S/W Revision	A.02.00

Device is BTS, Test Condition is Extreme

Key Path	Meas Setup, Limits, RMS EVM
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:BTS:EXTReMe:REVM:NSRate QAM32, <real> :CALCulate:EEVM:LIMit:BTS:EXTReMe:REVM:NSRate? QAM32
Example	CALC:EEVM:LIM:BTS:EXTR:REVM:NSR QAM32, 15 CALC:EEVM:LIM:BTS:EXTR:REVM:NSR? QAM32

Notes	<p>On MUI operation, for example, if the selected device is BTS and Test Condition is Extreme, test limit that can be set from front panel are those for BTS and Extreme condition.</p> <p>Meanwhile, a remote command can set each test limit without setting the radio device and test condition because it contains the information of the radio device and test condition.</p> <p>You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.</p>
Dependencies	Blanked when the N/W9071A-3FP license is not installed.
Preset	6.0
State Saved	Saved in instrument state.
Min	0.0
Max	100.0
Initial S/W Revision	A.02.00

Device is MS, Test Condition is Normal

Key Path	Meas Setup, Limits, RMS EVM
Mode	GSM
Remote Command	<pre>:CALCulate:EEVM:LIMit:MS:NORMal:REVM:NSRate QAM32, <real></pre> <pre>:CALCulate:EEVM:LIMit:MS:NORMal:REVM:NSRate? QAM32</pre>
Example	<pre>CALC:EEVM:LIM:MS:NORM:REVM:NSR QAM32, 20</pre> <pre>CALC:EEVM:LIM:MS:NORM:REVM:NSR? QAM32</pre>
Notes	<p>On MUI operation, for example, if the selected device is BTS and Test Condition is Extreme, test limit that can be set from front panel are those for BTS and Extreme condition.</p> <p>Meanwhile, a remote command can set each test limit without setting the radio device and test condition because it contains the information of the radio device and test condition.</p> <p>You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.</p>
Dependencies	Blanked when the N/W9071A-3FP license is not installed.
Preset	7.0
State Saved	Saved in instrument state.
Min	0.0
Max	100.0
Initial S/W Revision	A.02.00
Modified at S/W Revision	A.04.00

Device is MS, Test Condition is Extreme

Key Path	Meas Setup, Limits, RMS EVM
Mode	GSM
Remote Command	<pre>:CALCulate:EEVM:LIMit:MS:EXTRemE:REVM:NSRate QAM32, <real></pre>

	:CALCulate:EEVM:LIMit:MS:EXTRemE:REVM:NSRate? QAM32
Example	CALC:EEVM:LIM:MS:EXTR:REVM:NSR QAM32, 15 CALC:EEVM:LIM:MS:EXTR:REVM:NSR? QAM32
Notes	On MUI operation, for example, if the selected device is BTS and Test Condition is Extreme, test limit that can be set from front panel are those for BTS and Extreme condition. Meanwhile, a remote command can set each test limit without setting the radio device and test condition because it contains the information of the radio device and test condition. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Blanked when the N/W9071A-3FP license is not installed.
Preset	8.0
State Saved	Saved in instrument state.
Min	0.0
Max	100.0
Initial S/W Revision	A.02.00
Modified at S/W Revision	A.04.00

HB QPSK

Sets the limit of the QPSK burst for the RMS EVM Measurement pass/fail test.

Device is BTS, Test Condition is Normal

Key Path	Meas Setup, Limits, RMS EVM
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:BTS:NORMal:REVM:HSRate QPSK, <real> :CALCulate:EEVM:LIMit:BTS:NORMal:REVM:HSRate? QPSK
Example	CALC:EEVM:LIM:BTS:NORM:REVM:HSR QPSK, 12 CALC:EEVM:LIM:BTS:NORM:REVM:HSR? QPSK
Notes	On MUI operation, for example, if the selected device is BTS and Test Condition is Extreme, test limit that can be set from front panel are those for BTS and Extreme condition. Meanwhile, a remote command can set each test limit without setting the radio device and test condition because it contains the information of the radio device and test condition. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Blanked when the N/W9071A-3FP license is not installed.
Preset	7.0
State Saved	Saved in instrument state.
Min	0.0
Max	100.0
Initial S/W Revision	A.02.00

Device is BTS, Test Condition is Extreme

Key Path	Meas Setup, Limits, RMS EVM
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:BTS:EXTReme:REVM:HSRate QPSK, <real> :CALCulate:EEVM:LIMit:BTS:EXTReme:REVM:HSRate? QPSK
Example	CALC:EEVM:LIM:BTS:EXTR:REVM:HSR QPSK, 15 CALC:EEVM:LIM:BTS:EXTR:REVM:HSR? QPSK
Notes	On MUI operation, for example, if the selected device is BTS and Test Condition is Extreme, test limit that can be set from front panel are those for BTS and Extreme condition. Meanwhile, a remote command can set each test limit without setting the radio device and test condition because it contains the information of the radio device and test condition. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Blanked when the N/W9071A-3FP license is not installed.
Preset	8.0
State Saved	Saved in instrument state.
Min	0.0
Max	100.0
Initial S/W Revision	A.02.00

Device is MS, Test Condition is Normal

Key Path	Meas Setup, Limits, RMS EVM
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:MS:NORMal:REVM:HSRate QPSK, <real> :CALCulate:EEVM:LIMit:MS:NORMal:REVM:HSRate? QPSK
Example	CALC:EEVM:LIM:MS:NORM:REVM:HSR QPSK, 20 CALC:EEVM:LIM:MS:NORM:REVM:HSR? QPSK
Notes	On MUI operation, for example, if the selected device is BTS and Test Condition is Extreme, test limit that can be set from front panel are those for BTS and Extreme condition. Meanwhile, a remote command can set each test limit without setting the radio device and test condition because it contains the information of the radio device and test condition. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Blanked when the N/W9071A-3FP license is not installed.
Preset	9.0
State Saved	Saved in instrument state.
Min	0.0
Max	100.0
Initial S/W Revision	A.02.00

Device is MS, Test Condition is Extreme

Key Path	Meas Setup, Limits, RMS EVM
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:MS:EXTRemE:REVM:HSRate QPSK, <real> :CALCulate:EEVM:LIMit:MS:EXTRemE:REVM:HSRate? QPSK
Example	CALC:EEVM:LIM:MS:EXTR:REVM:HSR QPSK, 15 CALC:EEVM:LIM:MS:EXTR:REVM:HSR? QPSK
Notes	On MUI operation, for example, if the selected device is BTS and Test Condition is Extreme, test limit that can be set from front panel are those for BTS and Extreme condition. Meanwhile, a remote command can set each test limit without setting the radio device and test condition because it contains the information of the radio device and test condition. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Blanked when the N/W9071A-3FP license is not installed.
Preset	10.0
State Saved	Saved in instrument state.
Min	0.0
Max	100.0
Initial S/W Revision	A.02.00

HB 16QAM

Sets the limit of the higher symbol rate 16QAM burst for the RMS EVM Measurement pass/fail test.

Device is BTS, Test Condition is Normal

Key Path	Meas Setup, Limits, RMS EVM
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:BTS:NORMal:REVM:HSRate QAM16, <real> :CALCulate:EEVM:LIMit:BTS:NORMal:REVM:HSRate? QAM16
Example	CALC:EEVM:LIM:BTS:NORM:REVM:HSR QAM16, 12 CALC:EEVM:LIM:BTS:NORM:REVM:HSR? QAM16
Notes	On MUI operation, for example, if the selected device is BTS and Test Condition is Extreme, test limit that can be set from front panel are those for BTS and Extreme condition. Meanwhile, a remote command can set each test limit without setting the radio device and test condition because it contains the information of the radio device and test condition.. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Blanked when the N/W9071A-3FP license is not installed.
Preset	4.0
State Saved	Saved in instrument state.
Min	0.0

Max	100.0
Initial S/W Revision	A.02.00

Device is BTS, Test Condition is Extreme

Key Path	Meas Setup, Limits, RMS EVM
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:BTS:EXTReme:REVM:HSRate QAM16, <real> :CALCulate:EEVM:LIMit:BTS:EXTReme:REVM:HSRate? QAM16
Example	CALC:EEVM:LIM:BTS:EXTR:REVM:HSR QAM16, 15 CALC:EEVM:LIM:BTS:EXTR:REVM:HSR? QAM16
Notes	On MUI operation, for example, if the selected device is BTS and Test Condition is Extreme, test limit that can be set from front panel are those for BTS and Extreme condition. Meanwhile, a remote command can set each test limit without setting the radio device and test condition because it contains the information of the radio device and test condition. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Blanked when the N/W9071A-3FP license is not installed.
Preset	5.0
State Saved	Saved in instrument state.
Min	0.0
Max	100.0
Initial S/W Revision	A.02.00

Device is MS, Test Condition is Normal

Key Path	Meas Setup, Limits, RMS EVM
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:MS:NORMal:REVM:HSRate QAM16, <real> :CALCulate:EEVM:LIMit:MS:NORMal:REVM:HSRate? QAM16
Example	CALC:EEVM:LIM:MS:NORM:REVM:HSR QAM16, 20 CALC:EEVM:LIM:MS:NORM:REVM:HSR? QAM16
Notes	On MUI operation, for example, if the selected device is BTS and Test Condition is Extreme, test limit that can be set from front panel are those for BTS and Extreme condition. Meanwhile, a remote command can set each test limit without setting the radio device and test condition because it contains the information of the radio device and test condition. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Blanked when the N/W9071A-3FP license is not installed.
Preset	100% (TBD in 3GPP)

State Saved	Saved in instrument state.
Min	0.0
Max	100.0
Initial S/W Revision	A.02.00

Device is MS, Test Condition is Extreme

Key Path	Meas Setup, Limits, RMS EVM
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:MS:EXTReme:REVM:HSRate QAM16, <real> :CALCulate:EEVM:LIMit:MS:EXTReme:REVM:HSRate? QAM16
Example	CALC:EEVM:LIM:MS:EXTR:REVM:HSR QAM16, 15 CALC:EEVM:LIM:MS:EXTR:REVM:HSR? QAM16
Notes	On MUI operation, for example, if the selected device is BTS and Test Condition is Extreme, test limit that can be set from front panel are those for BTS and Extreme condition. Meanwhile, a remote command can set each test limit without setting the radio device and test condition because it contains the information of the radio device and test condition. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Blanked when the N/W9071A-3FP license is not installed.
Preset	100% (TBD in 3GPP)
State Saved	Saved in instrument state.
Min	0.0
Max	100.0
Initial S/W Revision	A.02.00

HB 32QAM

Sets the limit of the higher symbol rate 32QAM burst for the RMS EVM Measurement pass/fail test.

Device is BTS, Test Condition is Normal

Key Path	Meas Setup, Limits, RMS EVM
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:BTS:NORMal:REVM:HSRate QAM32, <real> :CALCulate:EEVM:LIMit:BTS:NORMal:REVM:HSRate? QAM32
Example	CALC:EEVM:LIM:BTS:NORM:REVM:HSR QAM32, 12 CALC:EEVM:LIM:BTS:NORM:REVM:HSR? QAM32
Notes	On MUI operation, for example, if the selected device is BTS and Test Condition is Extreme, test limit that can be set from front panel are those for BTS and Extreme condition.

	<p>Meanwhile, a remote command can set each test limit without setting the radio device and test condition because it contains the information of the radio device and test condition.</p> <p>You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.</p>
Dependencies	Blanked when the N/W9071A-3FP license is not installed.
Preset	4.0
State Saved	Saved in instrument state.
Min	0.0
Max	100.0
Initial S/W Revision	A.02.00

Device is BTS, Test Condition is Extreme

Key Path	Meas Setup, Limits, RMS EVM
Mode	GSM
Remote Command	<pre>:CALCulate:EEVM:LIMit:BTS:EXTReme:REVM:HSRate QAM32, <real></pre> <pre>:CALCulate:EEVM:LIMit:BTS:EXTReme:REVM:HSRate? QAM32</pre>
Example	<pre>CALC:EEVM:LIM:BTS:EXTR:REVM:HSR QAM32, 15</pre> <pre>CALC:EEVM:LIM:BTS:EXTR:REVM:HSR? QAM32</pre>
Notes	<p>On MUI operation, for example, if the selected device is BTS and Test Condition is Extreme, test limit that can be set from front panel are those for BTS and Extreme condition.</p> <p>Meanwhile, a remote command can set each test limit without setting the radio device and test condition because it contains the information of the radio device and test condition.</p> <p>You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.</p>
Dependencies	Blanked when the N/W9071A-3FP license is not installed.
Preset	5.0
State Saved	Saved in instrument state.
Min	0.0
Max	100.0
Initial S/W Revision	A.02.00

Device is MS, Test Condition is Normal

Key Path	Meas Setup, Limits, RMS EVM
Mode	GSM
Remote Command	<pre>:CALCulate:EEVM:LIMit:MS:NORMal:REVM:HSRate QAM32, <real></pre> <pre>:CALCulate:EEVM:LIMit:MS:NORMal:REVM:HSRate? QAM32</pre>
Example	<pre>CALC:EEVM:LIM:MS:NORM:REVM:HSR QAM32, 20</pre> <pre>CALC:EEVM:LIM:MS:NORM:REVM:HSR? QAM32</pre>

Notes	<p>On MUI operation, for example, if the selected device is BTS and Test Condition is Extreme, test limit that can be set from front panel are those for BTS and Extreme condition.</p> <p>Meanwhile, a remote command can set each test limit without setting the radio device and test condition because it contains the information of the radio device and test condition.</p> <p>You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.</p>
Dependencies	Blanked when the N/W9071A-3FP license is not installed.
Preset	100% (TBD in 3GPP)
State Saved	Saved in instrument state.
Min	0.0
Max	100.0
Initial S/W Revision	A.02.00

Device is MS, Test Condition is Extreme

Key Path	Meas Setup, Limits, RMS EVM
Mode	GSM
Remote Command	<pre>:CALCulate:EEVM:LIMit:MS:EXTReme:REVM:HSRate QAM32, <real></pre> <pre>:CALCulate:EEVM:LIMit:MS:EXTReme:REVM:HSRate? QAM32</pre>
Example	<pre>CALC:EEVM:LIM:MS:EXTR:REVM:HSR QAM32, 15</pre> <pre>CALC:EEVM:LIM:MS:EXTR:REVM:HSR? QAM32</pre>
Notes	<p>On MUI operation, for example, if the selected device is BTS and Test Condition is Extreme, test limit that can be set from front panel are those for BTS and Extreme condition.</p> <p>Meanwhile, a remote command can set each test limit without setting the radio device and test condition because it contains the information of the radio device and test condition.</p> <p>You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.</p>
Dependencies	Blanked when the N/W9071A-3FP license is not installed.
Preset	100% (TBD in 3GPP)
State Saved	Saved in instrument state.
Min	0.0
Max	100.0
Initial S/W Revision	A.02.00

NB AQPSK Low SCPIR

Sets the limit of the normal symbol rate AQPSK burst for the RMS EVM Measurement pass/fail test when the absolute value of Subchannel Power Imbalance Ratio, |SCPIR| is equal to or less than 8.0 dB.

Device is BTS, Test Condition is Normal

Key Path	Meas Setup, Limits, RMS EVM
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:BTS:NORMal:REVM:NSRate AQPSK1, <real> :CALCulate:EEVM:LIMit:BTS:NORMal:REVM:NSRate? AQPSK1
Example	CALC:EEVM:LIM:BTS:NORM:REVM:NSR AQPSK1, 12 CALC:EEVM:LIM:BTS:NORM:REVM:NSR? AQPSK1
Notes	On MUI operation, for example, if the selected device is BTS and Test Condition is Extreme, test limits that can be set from the front panel are those for BTS and Extreme condition. Meanwhile, a remote command can set each test limit without setting the radio device and test condition because it contains the information of the radio device and test condition. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Blanked when the EDGE Evolution N/W9071A-3FP license is not installed.
Preset	7.0
State Saved	Saved in instrument state.
Min	0.0
Max	100.0
Backwards Compatibility SCPI	:CALCulate:EEVM:LIMit:BTS:NORMal:REVM:NSRate AQPSK, <real> :CALCulate:EEVM:LIMit:BTS:NORMal:REVM:NSRate? AQPSK
Initial S/W Revision	A.11.01

Device is BTS, Test Condition is Extreme

Key Path	Meas Setup, Limits, RMS EVM
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:BTS:EXTreme:REVM:NSRate AQPSK1, <real> :CALCulate:EEVM:LIMit:BTS:EXTreme:REVM:NSRate? AQPSK1
Example	CALC:EEVM:LIM:BTS:EXTR:REVM:NSR AQPSK1, 15 CALC:EEVM:LIM:BTS:EXTR:REVM:NSR? AQPSK1
Notes	On MUI operation, for example, if the selected device is BTS and Test Condition is Extreme, test limit that can be set from front panel are those for BTS and Extreme condition. Meanwhile, a remote command can set each test limit without setting the radio device and test condition because it contains the information of the radio device and test condition. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Blanked when the N/W9071A-3FP license is not installed.
Preset	8.0

State Saved	Saved in instrument state.
Min	0.0
Max	100.0
Backwards Compatibility SCPI	:CALCulate:EEVM:LIMit:BTS:EXTRemE:REVM:NSRate AQPSK, <real> :CALCulate:EEVM:LIMit:BTS:EXTRemE:REVM:NSRate? AQPSK
Initial S/W Revision	A.11.01

NB AQPSK High SCPIR

Sets the limit of the normal symbol rate AQPSK burst for the RMS EVM Measurement pass/fail test when the absolute value of Subchannel Power Imbalance Ratio, |SCPIR| is greater than 8.0 dB.

Device is BTS, Test Condition is Normal

Key Path	Meas Setup, Limits, RMS EVM
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:BTS:NORMal:REVM:NSRate AQPSK2, <real> :CALCulate:EEVM:LIMit:BTS:NORMal:REVM:NSRate? AQPSK2
Example	CALC:EEVM:LIM:BTS:NORM:REVM:NSR AQPSK2, 12 CALC:EEVM:LIM:BTS:NORM:REVM:NSR? AQPSK2
Notes	On MUI operation, for example, if the selected device is BTS and Test Condition is Extreme, test limits that can be set from the front panel are those for BTS and Extreme condition. Meanwhile, a remote command can set each test limit without setting the radio device and test condition because it contains the information of the radio device and test condition. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Blanked when the EDGE Evolution N/W9071A-3FP license is not installed.
Preset	5.0
State Saved	Saved in instrument state.
Min	0.0
Max	100.0
Initial S/W Revision	A.11.01

Device is BTS, Test Condition is Extreme

Key Path	Meas Setup, Limits, RMS EVM
Mode	GSM

Remote Command	:CALCulate:EEVM:LIMit:BTS:EXTReme:REVM:NSRate AQPSK2, <real> :CALCulate:EEVM:LIMit:BTS:EXTReme:REVM:NSRate? AQPSK2
Example	CALC:EEVM:LIM:BTS:EXTR:REVM:NSR AQPSK2, 15 CALC:EEVM:LIM:BTS:EXTR:REVM:NSR? AQPSK2
Notes	On MUI operation, for example, if the selected device is BTS and Test Condition is Extreme, test limit that can be set from front panel are those for BTS and Extreme condition. Meanwhile, a remote command can set each test limit without setting the radio device and test condition because it contains the information of the radio device and test condition. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Blanked when the N/W9071A-3FP license is not installed.
Preset	6.0
State Saved	Saved in instrument state.
Min	0.0
Max	100.0
Initial S/W Revision	A.11.01

Peak EVM

Sets the limit for the Peak EVM measurement pass/fail test.

Key Path	Meas Setup, Limits
Mode	GSM
Initial S/W Revision	Prior to A.02.00

Peak EVM (Device is BTS, Test Condition is Normal)

Key Path	Meas Setup, Limits
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:BTS:NORMal:PEVM <real> :CALCulate:EEVM:LIMit:BTS:NORMal:PEVM?
Example	CALC:EEVM:LIM:BTS:NORM:PEVM 12 CALC:EEVM:LIM:BTS:NORM:PEVM?
Notes	This parameter can only be set using the front-panel "Limits" key if the device selected by the "Device" key is BTS and the "Test Condition" is Normal. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	22.0
State Saved	Saved in instrument state.
Min	0.0
Max	100.0
Initial S/W Revision	Prior to A.02.00

Peak EVM (Device is BTS, Test Condition is Extreme)

Key Path	Meas Setup, Limits
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:BTS:EXTRemE:PEVM <real> :CALCulate:EEVM:LIMit:BTS:EXTRemE:PEVM?
Example	CALC:EEVM:LIM:BTS:EXTR:PEVM 15 CALC:EEVM:LIM:BTS:EXTR:PEVM?
Notes	This parameter can only be set using the front-panel "Limits" key if the device selected by the "Device" key is BTS and the "Test Condition" is Extreme. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	22.0
State Saved	Saved in instrument state.
Min	0.0
Max	100.0
Initial S/W Revision	Prior to A.02.00

Peak EVM (Device is MS, Test Condition is Normal)

Key Path	Meas Setup, Limits
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:MS:NORMal:PEVM <real> :CALCulate:EEVM:LIMit:MS:NORMal:PEVM?
Example	CALC:EEVM:LIM:MS:NORM:PEVM 20 CALC:EEVM:LIM:MS:NORM:PEVM?
Notes	This parameter can only be set using the front-panel "Limits" key if the device selected by the "Device" key is MS and the "Test Condition" is Normal. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	30.0
State Saved	Saved in instrument state.
Min	0.0
Max	100.0
Initial S/W Revision	Prior to A.02.00

Peak EVM (Device is MS, Test Condition is Extreme)

Key Path	Meas Setup, Limits
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Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:MS:EXTReme:PEVM <real> :CALCulate:EEVM:LIMit:MS:EXTReme:PEVM?
Example	CALC:EEVM:LIM:MS:EXTR:PEVM 15 CALC:EEVM:LIM:MS:EXTR:PEVM?
Notes	This parameter can only be set using the front-panel “Limits” key if the device selected by the “Device” key is MS and the “Test Condition” is Extreme. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	30.0
State Saved	Saved in instrument state.
Min	0.0
Max	100.0
Initial S/W Revision	Prior to A.02.00

95%ile EVM

Sets the limit for the 95%ile EVM measurement pass/fail test.

Key Path	Meas Setup, Mode, Limits
Mode	GSM
Initial S/W Revision	Prior to A.02.00

95%ile EVM (Device is BTS, Test Condition is Normal)

Key Path	Meas Setup, Limits
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:BTS:NORMal:EVMP95 <real> :CALCulate:EEVM:LIMit:BTS:NORMal:EVMP95?
Example	CALC:EEVM:LIM:BTS:NORM:EVMP95 12 CALC:EEVM:LIM:BTS:NORM:EVMP95?
Notes	This parameter can only be set using the front-panel “Limits” key if the device selected by the “Device” key is BTS and the “Test Condition” is Normal. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	11.0
State Saved	Saved in instrument state.
Min	0.0
Max	100.0
Initial S/W Revision	Prior to A.02.00

95%ile EVM (Device is BTS, Test Condition is Extreme)

Key Path	Meas Setup, Limits
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:BTS:EXTReme:EVMP95 <real> :CALCulate:EEVM:LIMit:BTS:EXTReme:EVMP95?
Example	CALC:EEVM:LIM:BTS:EXTR:EVMP95 15 CALC:EEVM:LIM:BTS:EXTR:EVMP95?
Notes	This parameter can only be set using the front-panel “Limits” key if the device selected by the “Device” key is BTS and the “Test Condition” is Extreme. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	11.0
State Saved	Saved in instrument state.
Min	0.0
Max	100.0
Initial S/W Revision	Prior to A.02.00

95%ile EVM (Device is MS, Test Condition is Normal)

Key Path	Meas Setup, Limits
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:MS:NORMal:EVMP95 <real> :CALCulate:EEVM:LIMit:MS:NORMal:EVMP95?
Example	CALC:EEVM:LIM:MS:NORM:EVMP95 20 CALC:EEVM:LIM:MS:NORM:EVMP95?
Notes	This parameter can only be set using the front-panel “Limits” key if the device selected by the “Device” key is MS and the “Test Condition” is Normal. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	15.0
State Saved	Saved in instrument state.
Min	0.0
Max	100.0
Initial S/W Revision	Prior to A.02.00

95%ile EVM (Device is MS, Test Condition is Extreme)

Key Path	Meas Setup, Limits
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:MS:EXTReme:EVMP95 <real>

	:CALCulate:EEVM:LIMit:MS:EXTReme:EVMP95?
Example	CALC:EEVM:LIM:MS:EXTR:EVMP95 15 CALC:EEVM:LIM:MS:EXTR:EVMP95?
Notes	This parameter can only be set using the front-panel "Limits" key if the device selected by the "Device" key is MS and the "Test Condition" is Extreme. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	15.0
State Saved	Saved in instrument state.
Min	0.0
Max	100.0
Initial S/W Revision	Prior to A.02.00

I/Q Origin Offset

Sets the limit for the I/Q Origin Offset measurement pass/fail test.

Key Path	Meas Setup, Limits
Mode	GSM
Initial S/W Revision	Prior to A.02.00

I/Q Origin Offset (Device is BTS, Test Condition is Normal)

Key Path	Meas Setup, Limits
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:BTS:NORMal:IQOOffset <real> :CALCulate:EEVM:LIMit:BTS:NORMal:IQOOffset?
Example	CALC:EEVM:LIM:BTS:NORM:IQOO -12 CALC:EEVM:LIM:BTS:NORM:IQOO?
Notes	This parameter can only be set using the front-panel "Limits" key if the device selected by the "Device" key is BTS and the "Test Condition" is Normal. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	-35
State Saved	Saved in instrument state.
Min	-100.0
Max	0.0
Initial S/W Revision	Prior to A.02.00

I/Q Origin Offset (Device is BTS, Test Condition is Extreme)

Key Path	Meas Setup, Limits
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:BTS:EXTReme:IQOOffset <real> :CALCulate:EEVM:LIMit:BTS:EXTReme:IQOOffset?
Example	CALC:EEVM:LIM:BTS:EXTR:IQOO -15 CALC:EEVM:LIM:BTS:EXTR:IQOO?
Notes	This parameter can only be set using the front-panel "Limits" key if the device selected by the "Device" key is BTS and the "Test Condition" is Extreme. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	-35.0
State Saved	Saved in instrument state.
Min	-100.0
Max	0.0
Initial S/W Revision	Prior to A.02.00

I/Q Origin Offset (Device is MS, Test Condition is Normal)

Key Path	Meas Setup, Limits
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:MS:NORMal:IQOOffset <real> :CALCulate:EEVM:LIMit:MS:NORMal:IQOOffset?
Example	CALC:EEVM:LIM:MS:NORM:IQOO -20 CALC:EEVM:LIM:MS:NORM:IQOO?
Notes	This parameter can only be set using the front-panel "Limits" key if the device selected by the "Device" key is MS and the "Test Condition" is Normal. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	-30.0
State Saved	Saved in instrument state.
Min	-100.0
Max	0.0
Initial S/W Revision	Prior to A.02.00

I/Q Origin Offset (Device is MS, Test Condition is Extreme)

Key Path	Meas Setup, Limits
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:MS:EXTReme:IQOOffset <real>

	:CALCulate:EEVM:LIMit:MS:EXTRemE:IQOOffset?
Example	CALC:EEVM:LIM:MS:EXTR:IQOO -15 CALC:EEVM:LIM:MS:EXTR:IQOO?
Notes	This parameter can only be set using the front-panel "Limits" key if the device selected by the "Device" key is MS and the "Test Condition" is Extreme. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	-30.0
State Saved	Saved in instrument state.
Min	-100.0
Max	0.0
Initial S/W Revision	Prior to A.02.00

Freq Error

Sets the limit for the Frequency Error measurement pass/fail test.

Key Path	Meas Setup, Limits
Mode	GSM
Initial S/W Revision	Prior to A.02.00

Freq Error (Device is BTS, BTS Type is Normal, Test Condition is Normal)

Key Path	Meas Setup, Limit
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:BTS:NORMal:FERRor <real> :CALCulate:EEVM:LIMit:BTS:NORMal:FERRor?
Example	CALC:EEVM:LIM:BTS:NORM:FERR 0.1 CALC:EEVM:LIM:BTS:NORM:FERR?
Notes	This parameter can only be set using the front-panel "Limits" key if the device selected by the "Device" key is BTS and the "BTS Type" is Normal or Micro and the "Test Condition" is Normal. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	0.05
State Saved	Saved in instrument state.
Min	0.0
Max	50.0
Initial S/W Revision	Prior to A.02.00

Freq Error (Device is BTS, BTS Type is Normal, Test Condition is Extreme)

Key Path	Meas Setup, Limit
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:BTS:EXTReme:FERRor <real> :CALCulate:EEVM:LIMit:BTS:EXTReme:FERRor?
Example	CALC:EEVM:LIM:BTS:EXTR:FERR 0.1 CALC:EEVM:LIM:BTS:EXTR:FERR?
Notes	This parameter can only be set using the front-panel "Limits" key if the device selected by the "Device" key is BTS and the "BTS Type" is Normal or Micro and the "Test Condition" is Extreme. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	0.05
State Saved	Saved in instrument state.
Min	0.0
Max	50.0
Initial S/W Revision	Prior to A.02.00

Freq Error (Device is BTS, BTS Type is Micro, Test Condition is Normal)

Key Path	Meas Setup, Limit
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:MBTS:NORMal:FERRor <real> :CALCulate:EEVM:LIMit:MBTS:NORMal:FERRor?
Example	CALC:EEVM:LIM:MBTS:NORM:FERR 0.1 CALC:EEVM:LIM:MBTS:NORM:FERR?
Notes	This parameter can only be set using the front-panel "Limits" key if the device selected by the "Device" key is BTS and the "BTS Type" is Normal or Micro and the "Test Condition" is Normal. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	0.05
State Saved	Saved in instrument state.
Min	0.0
Max	50.0
Initial S/W Revision	Prior to A.02.00

Freq Error (Device is BTS, BTS Type is Micro, Test Condition is Extreme)

Key Path	Meas Setup, Limit
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:MBTS:EXTReme:FERRor <real>

	:CALCulate:EEVM:LIMit:MBTS:EXTRemE:FERRor?
Example	CALC:EEVM:LIM:MBTS:EXTR:FERR 0.1 CALC:EEVM:LIM:MBTS:EXTR:FERR?
Notes	This parameter can only be set using the front-panel "Limits" key if the device selected by the "Device" key is BTS and the "BTS Type" is Normal or Micro and the "Test Condition" is Extreme. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	0.05
State Saved	Saved in instrument state.
Min	0.0
Max	50.0
Initial S/W Revision	Prior to A.02.00

Freq Error (Device is BTS, BTS Type is Pico, Test Condition is Normal)

Key Path	Meas Setup, Limit
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:PBTS:NORMal:FERRor <real> :CALCulate:EEVM:LIMit:PBTS:NORMal:FERRor?
Example	CALC:EEVM:LIM:PBTS:NORM:FERR 0.1 CALC:EEVM:LIM:PBTS:NORM:FERR?
Notes	This parameter can only be set using the front-panel "Limits" key if the device selected by the "Device" key is BTS and the "BTS Type" is Pico and the "Test Condition" is Normal. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	0.1
State Saved	Saved in instrument state.
Min	0.0
Max	50.0
Initial S/W Revision	Prior to A.02.00

Freq Error (Device is BTS, BTS Type is Pico, Test Condition is Extreme)

Key Path	Meas Setup, Limit
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:PBTS:EXTRemE:FERRor <real> :CALCulate:EEVM:LIMit:PBTS:EXTRemE:FERRor?
Example	CALC:EEVM:LIM:PBTS:EXTR:FERR 0.2 CALC:EEVM:LIM:PBTS:EXTR:FERR?
Notes	This parameter can only be set using the front-panel "Limits" key if the device selected by

	the “Device” key is BTS and the “BTS Type” is Pico and the “Test Condition” is Extreme. You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Preset	0.1
State Saved	Saved in instrument state.
Min	0.0
Max	50.0
Initial S/W Revision	Prior to A.02.00

Freq Error (Device is MS, Test Condition is Normal)

Key Path	Meas Setup, Limit
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:MS:NORMal:FERRor <real> :CALCulate:EEVM:LIMit:MS:NORMal:FERRor?
Example	CALC:EEVM:LIM:MS:NORM:FERR 0.1 CALC:EEVM:LIM:MS:NORM:FERR?
Notes	This parameter can only be set using the front-panel “Limits” key if the device selected by the “Device” key is MS and the “Test Condition” is Normal. You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Preset	0.1
State Saved	Saved in instrument state.
Min	0.0
Max	50.0
Initial S/W Revision	Prior to A.02.00

Freq Error (Device is MS, Test Condition is Extreme)

Key Path	Meas Setup, Limit
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:MS:EXTRemE:FERRor <real> :CALCulate:EEVM:LIMit:MS:EXTRemE:FERRor?
Example	CALC:EEVM:LIM:MS:EXTR:FERR 0.2 CALC:EEVM:LIM:MS:EXTR:FERR?
Notes	This parameter can only be set using the front-panel “Limits” key if the device selected by the “Device” key is MS and the “Test Condition” is Extreme. You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Preset	0.1

State Saved	Saved in instrument state.
Min	0.0
Max	50.0
Initial S/W Revision	Prior to A.02.00

RMS Phase Error GMSK

Sets the limit of the normal symbol rate GMSK burst for the RMS Phase Error Measurement pass/fail test.

RMS Phase Error GMSK (Device is BTS, Test Condition is Normal)

Key Path	Meas Setup, Limits
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:BTS:NORMal:RPERror GMSK, <real> :CALCulate:EEVM:LIMit:BTS:NORMal:RPERror? GMSK
Example	CALC:EEVM:LIM:BTS:NORM:RPER GMSK, 0.5 CALC:EEVM:LIM:BTS:NORM:RPER? GMSK
Notes	This parameter can only be set using the front-panel "Limits" key if the device selected by the "Device" key is BTS and the "Test Condition" is Normal. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	5
State Saved	Saved in instrument state.
Min	0
Max	180
Initial S/W Revision	A.06.00

RMS Phase Error GMSK (Device is BTS, Test Condition is Extreme)

Key Path	Meas Setup, Limits
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:BTS:EXTReme:RPERror GMSK, <real> :CALCulate:EEVM:LIMit:BTS:EXTReme:RPERror? GMSK
Example	CALC:EEVM:LIM:BTS:EXTR:RPER GMSK, 5 CALC:EEVM:LIM:BTS:EXTR:RPER? GMSK
Notes	This parameter can only be set using the front-panel "Limits" key if the device selected by the "Device" key is BTS and the "Test Condition" is Extreme. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	5.0

State Saved	Saved in instrument state.
Min	0
Max	180
Initial S/W Revision	A.06.00

RMS Phase Error GMSK (Device is MS, Test Condition is Normal)

Key Path	Meas Setup, Limits
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:MS:NORMal:RPERror GMSK, <real> :CALCulate:EEVM:LIMit:MS:NORMal:RPERror? GMSK
Example	CALC:EEVM:LIM:MS:NORM:RPER GMSK, 7 CALC:EEVM:LIM:MS:NORM:RPER? GMSK
Notes	This parameter can only be set using the front-panel "Limits" key if the device selected by the "Device" key is MS and the "Test Condition" is Normal. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	5.0
State Saved	Saved in instrument state.
Min	0.0
Max	100.0
Initial S/W Revision	A.06.00

RMS Phase Error GMSK (Device is MS, Test Condition is Extreme)

Key Path	Meas Setup, Limits
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:MS:EXTRemE:RPERror GMSK, <real> :CALCulate:EEVM:LIMit:MS:EXTRemE:RPERror? GMSK
Example	CALC:EEVM:LIM:MS:EXTR:RPER GMSK, 5 CALC:EEVM:LIM:MS:EXTR:RPER? GMSK
Notes	This parameter can only be set using the front-panel "Limits" key if the device selected by the "Device" key is MS and the "Test Condition" is Extreme. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	5.0
State Saved	Saved in instrument state.
Min	0
Max	180
Initial S/W Revision	A.06.00

Peak Phase Error GMSK

Sets the limit of the normal symbol rate GMSK burst for the Peak Phase Error Measurement pass/fail test.

Peak Phase Error GMSK (Device is BTS, Test Condition is Normal)

Key Path	Meas Setup, Limits
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:BTS:NORMal:PPERror GMSK, <real> :CALCulate:EEVM:LIMit:BTS:NORMal:PPERror? GMSK
Example	CALC:EEVM:LIM:BTS:NORM:PPER GMSK, 20 CALC:EEVM:LIM:BTS:NORM:PPER? GMSK
Notes	This parameter can only be set using the front-panel "Limits" key if the device selected by the "Device" key is BTS and the "Test Condition" is Normal. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	20
State Saved	Saved in instrument state.
Min	0
Max	180
Initial S/W Revision	A.06.00

Peak Phase Error GMSK (Device is BTS, Test Condition is Extreme)

Key Path	Meas Setup, Limits
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:BTS:EXTreme:PPERror GMSK, <real> :CALCulate:EEVM:LIMit:BTS:EXTreme:PPERror? GMSK
Example	CALC:EEVM:LIM:BTS:EXTR:PPER GMSK, 20 CALC:EEVM:LIM:BTS:EXTR:PPER? GMSK
Notes	This parameter can only be set using the front-panel "Limits" key if the device selected by the "Device" key is BTS and the "Test Condition" is Extreme. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	20.0
State Saved	Saved in instrument state.
Min	0
Max	180
Initial S/W Revision	A.06.00

Peak Phase Error GMSK (Device is MS, Test Condition is Normal)

Key Path	Meas Setup, Limits
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:MS:NORMal:PPERror GMSK, <real> :CALCulate:EEVM:LIMit:MS:NORMal:PPERror? GMSK
Example	CALC:EEVM:LIM:MS:NORM:PPER GMSK, 7 CALC:EEVM:LIM:MS:NORM:PPER? GMSK
Notes	This parameter can only be set using the front-panel “Limits” key if the device selected by the “Device” key is MS and the “Test Condition” is Normal. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	20.0
State Saved	Saved in instrument state.
Min	0.0
Max	100.0
Initial S/W Revision	A.06.00

Peak Phase Error GMSK (Device is MS, Test Condition is Extreme)

Key Path	Meas Setup, Limits
Mode	GSM
Remote Command	:CALCulate:EEVM:LIMit:MS:EXTReme:PPERror GMSK, <real> :CALCulate:EEVM:LIMit:MS:EXTReme:PPERror? GMSK
Example	CALC:EEVM:LIM:MS:EXTR:PPER GMSK, 5 CALC:EEVM:LIM:MS:EXTR:PPER? GMSK
Notes	This parameter can only be set using the front-panel “Limits” key if the device selected by the “Device” key is MS and the “Test Condition” is Extreme. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	20.0
State Saved	Saved in instrument state.
Min	0
Max	180
Initial S/W Revision	A.06.00

Droop Compensation

Turns Droop Compensation on or off. Droop Compensation corrects amplitude variations across a burst. You may want to turn off this compensation so you can see the changes in the measured magnitude error. Droop can result from signal impairments like a power amplifier problem.

Key Path	Meas Setup, More
Mode	GSM
Remote Command	[:SENSe] :EEVM:DROp OFF ON 0 1 [:SENSe] :EEVM:DROp?
Example	EEVM:DRO ON EEVM:DRO?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

Freq Error Tolerance Rng

Toggles between Wide and Normal settings for Frequency Error tolerance. To accurately demodulate complex signals which require more stringent tolerance for frequency error, Normal can be selected. For use with signals that are simpler with greater frequency error tolerance, Wide can be selected.

Key Path	Meas Setup
Mode	GSM
Remote Command	[:SENSe] :EEVM:FERRor:TRANge WIDE NORMal [:SENSe] :EEVM:FERRor:TRANge?
Example	EEVM:FERR:TRAN NORM EEVM:FERR:TRAN?
Preset	WIDE
State Saved	Saved in instrument state.
Range	Wide Normal
Initial S/W Revision	A.02.00

Polar Mod Align

Turns On/Off polar modulation alignment.

Key Path	Meas Setup, More
Mode	GSM
Remote Command	[:SENSe] :EEVM:BSYNc:PMODulation:ALIGNment OFF ON 0 1 [:SENSe] :EEVM:BSYNc:PMODulation:ALIGNment?
Example	EEVM:BSYNC:PMOD:ALIG OFF EEVM:BSYNC:PMOD:ALIG?

Notes	Available only when " Burst Sync " on page 703 is set to Polar Modulation. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

Meas Preset

Restores all the measurement parameters to their default values.

Key Path	Meas Setup, More
Mode	GSM
Remote Command	:CONFigure:EEVM
Example	CONF:EEVM
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Initial S/W Revision	Prior to A.02.00

Mode

See "[Mode](#)" on page 274

Mode Preset

Returns the active mode to a known state.

Mode Preset does the following for the currently active mode:

- Aborts the currently running measurement.
- Brings up the default menu for the mode, with no active function.
- Sets measurement Global settings to their preset values for the active mode only.
- Activates the default measurement.
- Brings up the default menu for the mode.
- Clears the input and output buffers.
- Sets Status Byte to 0.

Mode Preset does not:

- Cause a mode switch
- Affect mode persistent settings
- Affect system settings

See "[How-To Preset](#)" on page 740 for more information.

Key Path	Front-panel key
Remote Command	:SYSTem:PRESet
Example	:SYST:PRES
Notes	*RST is preferred over :SYST:PRES for remote operation. *RST does a Mode Preset, as done by the :SYST:PRES command, and it sets the measurement mode to Single measurement rather than Continuous for optimal remote control throughput. Clears all pending OPC bits. The Status Byte is set to 0.
Couplings	A Mode Preset aborts the currently running measurement, activates the default measurement, and gets the mode to a consistent state with all of the default couplings set.
Backwards Compatibility Notes	In the X-Series, the legacy "Factory Preset" has been replaced with Mode Preset, which only presets the currently active mode, not the entire instrument. In the X-Series, the way to preset the entire instrument is by using System, Restore System Defaults All, which behaves essentially the same way as restore System Defaults does on ESA and PSA. There is also no "Preset Type" as there is on the PSA. There is a green Mode Preset front-panel key that does a Mode Preset and a white-with-green-letters User Preset front-panel key that does a User Preset. The old PRESet:TYPE command is ignored (without generating an error), and SYST:PRES without a parameter does a Mode Preset, which should cover most backward code compatibility issues. The settings and correction data under the Input/Output front-panel key (examples: Input Z Corr, Ext Amp Gain, etc.) are no longer part of any Mode, so they will not be preset by a Mode Preset. They are preset using Restore Input/Output Defaults, Restore System Defaults All. Note that because User Preset does a Recall State, and all of these settings are saved in State, they ARE recalled when using

	User Preset.
Initial S/W Revision	Prior to A.02.00

How-To Preset

The table below shows all possible presets, their corresponding SCPI commands and front-panel access (key paths). Instrument settings depend on the current measurement context. Some settings are local to the current measurement, some are global (common) across all the measurements in the current mode, and some are global to all the available modes. In a similar way, restoring the settings to their preset state can be done within the different contexts.

Auto Couple - is a measurement local key. It sets all Auto/Man parameter couplings in the measurement to Auto. Any Auto/Man selection that is local to other measurements in the mode will not be affected.

Meas Preset - is a measurement local key. Meas Preset resets all the variables local to the current measurement except the persistent ones.

Mode Preset - resets all the current mode's measurement local and measurement global variables except the persistent ones.

Restore Mode Defaults - resets ALL the Mode variables (and all the Meas global and Meas local variables), including the persistent ones.

Type Of Preset	SCPI Command	Front Panel Access
Auto Couple	:COUPle ALL	Auto Couple front-panel key
Meas Preset	:CONFigure:<Measurement>	Meas Setup Menu
Mode Preset	:SYSTem:PRESet	Mode Preset (green key)
Restore Mode Defaults	:INSTrument:DEFault	Mode Setup Menu
Restore All Mode Defaults	:SYSTem:DEFault MODes	System Menu; Restore System Default Menu
*RST	*RST	not possible (Mode Preset with Single)
Restore Input/Output Defaults	:SYSTem:DEFault INPUt	System Menu; Restore System Default Menu
Restore Power On Defaults	:SYSTem:DEFault PON	System Menu; Restore System Default Menu
Restore Alignment Defaults	:SYSTem:DEFault ALIGn	System Menu; Restore System Default Menu
Restore Miscellaneous Defaults	:SYSTem:DEFault MISC	System Menu; Restore System Default Menu
Restore All System Defaults	:SYSTem:DEFault [ALL] :SYSTem:PRESet:PERsistent	System Menu; Restore System Default Menu
User Preset	:SYSTem:PRESet:USER	User Preset Menu
User Preset All Modes	:SYSTem:PRESet:USER:ALL	User Preset Menu

Power On Mode Preset	:SYSTem:PON:TYPE MODE	System Menu
Power On User Preset	:SYSTem:PON:TYPE USER	System Menu
Power On Last State	:SYSTem:PON:TYPE LAST	System Menu

Mode Setup

See "[Mode Setup](#)" on page 294

Peak Search

Places the selected marker on the trace point with the maximum y-axis value for that marker's trace. Pressing Peak Search with the selected marker off causes the selected marker to be set to Normal, then a peak search is immediately performed.

If Marker Trace of selected marker is POL, peak search will not be performed.

Key Path	Front-panel key
Mode	GSM
Remote Command	:CALCulate:EEVM:MARKer [1] 2 . . . 12 :MAXimum
Example	CALC:EEVM:MARK2:MAX
Initial S/W Revision	Prior to A.02.00

Min Peak Search (Backward Compatibility/Remote Command Only)

Mode	GSM
Remote Command	:CALCulate:EEVM:MARKer [1] 2 . . . 12 :MINimum
Example	CALC:EEVM:MARK:MIN
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Initial S/W Revision	Prior to A.02.00

9 EDGE EVM Measurement
Print

Print

See ["Print" on page 325](#)

Quick Save

The Quick Save front-panel key repeats the most recent save that was performed from the Save menu, with the following exceptions:

- Register saves are not remembered as Saves for the purpose of the Quick Save function
- If the current measurement does not support the last non-register save that was performed, an informational message is generated, “File type not supported for this measurement”

Quick Save repeats the last type of qualified save (that is, a save qualified by the above criteria) in the last save directory by creating a unique filename using the Auto File Naming algorithm described below.

If Quick Save is pressed after startup and before any qualified Save has been performed, the Quick Save function performs a Screen Image save using the current settings for Screen Image saves (current theme, current directory), which then becomes the “last save” for the purpose of subsequent Quick Saves.

The Auto File Naming feature automatically generates a file name for use when saving a file. The filename consists of a prefix and suffix separated by a dot, as is standard for the Windows® file system. A default prefix exists for each of the available file types:

Type	Default Prefix	Menu
State	State_	(Save/Recall)
Trace + State	State_	(Save/Recall)
Screen	Screen_	(Save/Recall)
Amplitude Corrections	Ampcor_	(Import/Export)
Traces	Trace_	(Import/Export)
Limit Lines	LLine_	(Import/Export)
Measurement Result	MeasR_	(Import/Export)
Capture Buffer	CapBuf_	(Import/Export)

A four digit number is appended to the prefix to create a unique file name. The numbering sequence starts at 0000 within each Mode for each file type and updates incrementally to 9999, then wraps to 0000 again. It remembers where it was through a Mode Preset and when leaving and returning to the Mode. It is reset by Restore Misc Defaults and Restore System Defaults and subsequent running of the instrument application. So, for example, the first auto file name generated for State files is State_0000.state. The next is State_0001, and so forth.

One of the key features of Auto File Name is that we guarantee that the Auto File Name will never conflict with an existing file. The algorithm looks for the next available number. If it gets to 9999, then it looks for holes. If it find no holes, that is no more numbers are available, it gives an error.

For example, if when we get to State_0010.state there is already a State_0010.state file in the current directory, it advances the counter to State_0011.state to ensure that no conflict will exist (and then it verifies that State_0011.state also does not exist in the current directory and advances again if it does, and so forth).

If you enter a file name for a given file type, then the prefix becomes the filename you entered instead of the default prefix, followed by an underscore. The last four letters (the suffix) are the 4-digit number.

For example, if you save a measurement results file as “fred.csv”, then the next auto file name chosen for a measurement results save will be fred_0000.csv.

NOTE

Although 0000 is used in the example above, the number that is used is actually the current number in the Meas Results sequence, that is, the number that would have been used if you had not entered your own file name.

NOTE

If the filename you entered ends with _dddd, where d=any number, making it look just like an auto file name, then the next auto file name picks up where you left off with the suffix being dddd + 1.

Key Path	Front-panel key
Notes	No remote command for this key specifically.
Initial S/W Revision	Prior to A.02.00

Recall

The Recall menu lets you choose what you want to recall, and where you want to recall it from. Among the types of files you can recall are **States and Traces**. In addition, an Import (Data) option lets you recall a number of data types stored in CSV files (as used by Excel and other spreadsheet programs).

The default paths for Recall are data type dependent and are the same as for the Save key.

Key Path	Front-panel key
Notes	<p>No remote command for this key specifically, but the :MMEM:LOAD command is available for specific file types. An example is :MMEM:LOAD:STATe <filename>.</p> <p>If you try to recall a State file for a mode that is not licensed or not available in the instrument, an error message will occur and the state will not change.</p>
Backwards Compatibility Notes	<p>In legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly (since User Preset is actually loading a state), it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, “state” always includes all of this data; so whenever state is loaded, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p>
Backwards Compatibility Notes	<p>Recall for the X-Series supports backward compatibility in the sense that you can recall a state file from any X-Series model number and any version of X-Series software. This is only possible if part of the recalling process goes through a limiting step after recalling the mode settings, at least for settings that may vary with version number, model number, option and license differences. If you try to recall a state file onto an instrument with less capability than what was available on the instrument during the save, the recall will ignore the state it doesn't support and it will limit the recalled setting to what it allows.</p> <p>Example: if the saved state includes preamp ON, but the recalling instrument does not have a preamp; the preamp is limited to OFF. Conversely, if you save a state without a preamp, the preamp is OFF in the state file. When this saved file is recalled on an instrument with a licensed preamp, the preamp is changed to OFF. Another example is if the saved state has center frequency set to 20 GHz, but the instrument recalling the saved state is a different model and only supports 13.5 GHz. In this case, the center frequency is limited along with any other frequency based settings. Since the center frequency can't be preserved in this case, the recall limiting tries to at least preserve span to keep the measurement setup as intact as possible.</p> <p>It may be appropriate to issue a warning if the state is limited on the recall; warnings do not go out to SCPI so this would only affect the manual user.</p> <p>Note that there is no state file compatibility outside of the X-Series. For example, you cannot recall a state file from ESA or PSA.</p>
Initial S/W Revision	Prior to A.02.00

State

The Recall State menu lets you choose a register or file from which to recall the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings that were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the

additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, GPIB address) are not affected by either a Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

Since each state file is only for one Mode, the settings for other Modes are unaffected when it is loaded. Recall State will cause a mode switch if the state being recalled is not from the current active mode.

After the recall completes, the message "File <filename> recalled" or "Recalled State Register <register number>" is displayed.

For rapid recalls, the State menu lists 16 registers that you can choose from to recall. Pressing a Register key initiates the recall. You can also select a file from which to recall.

The default path for all State Files is:

My Documents\<<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

See ["More Information" on page 749](#).

Key Path	Recall
Mode	All
Remote Command	:MMEMory:LOAD:STATe <filename>
Example	:MMEM:LOAD:STAT "myState.state" This recalls the file myState.state on the default path
Example	MMEM:LOAD:STAT "MyStateFile.state" This loads the state file data (on the default file directory path) into the instrument state.
Notes	<p>When you pick a file to recall, the analyzer first verifies that the file is recallable in the current instrument by checking the software version and model number of the instrument. If everything matches, a full recall proceeds by aborting the currently running measurement, clearing any pending operations, and then loading the State from the saved state file. You can open state files from any mode, so recalling a State file switches to the mode that was active when the save occurred. After switching to the mode of the saved state file, mode settings and data (if any for the mode) are loaded with values from the saved file. The saved measurement of the mode becomes the newly active measurement and the data relevant to the measurement (if there is any) is recalled.</p> <p>If there is a mismatch between file version or model number or instrument version or model number, the recall function tries to recall as much as possible and returns a warning message. It may limit settings that differ based on model number, licensing or version number.</p> <p>After recalling the state, the Recall State function does the following:</p> <ul style="list-style-type: none"> • Makes the saved measurement for the mode the active measurement. • Clears the input and output buffers. • Status Byte is set to 0. • Executes a *CLS <p>If the file specified is empty an error is generated. If the specified file does not exist, another error is generated. If there is a mismatch between the file and the proper file type, an error is generated. If</p>

	there is a mismatch between file version or model number or instrument version or model number, a warning is displayed. Then it returns to the State menu and File Open dialog goes away. After the Recall, the analyzer exits the Recall menu and returns to the previous menu.
Backwards Compatibility SCPI	:MMEMory:LOAD:STATe 1,<filename> For backwards compatibility, the above syntax is supported. The "1" is simply ignored.
Initial S/W Revision	Prior to A.02.00

More Information

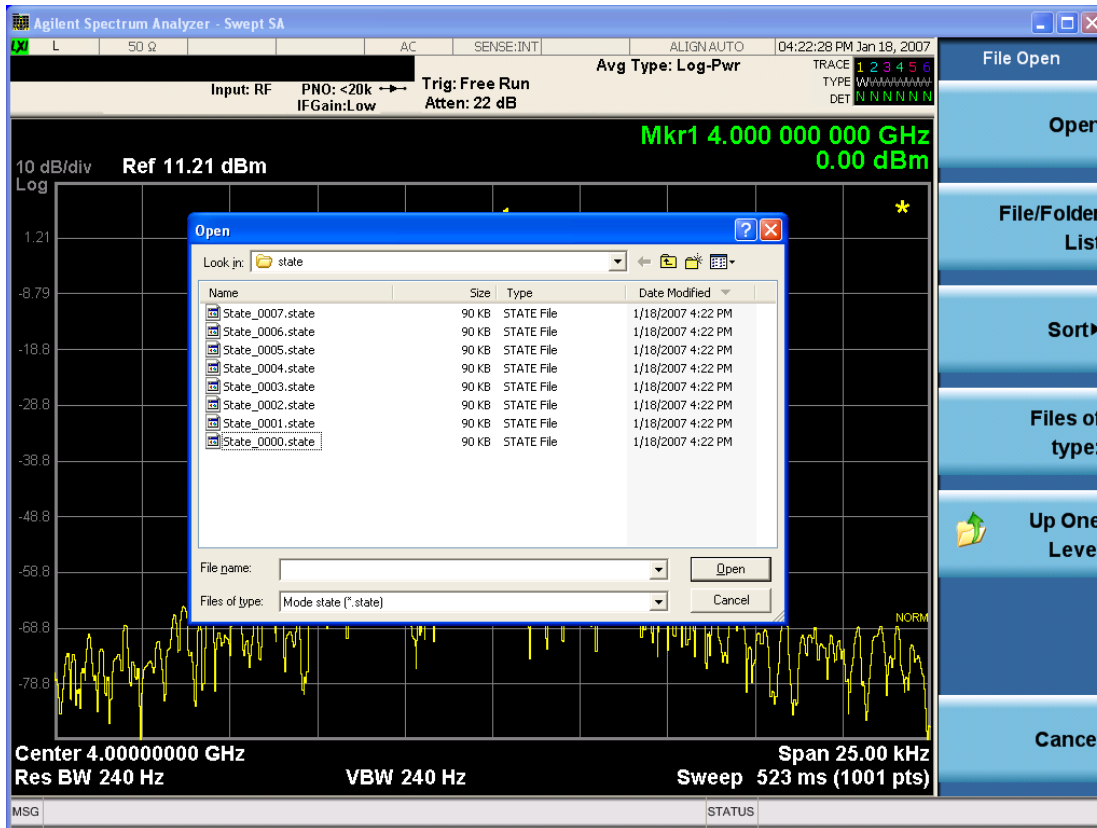
In measurements that support saving Traces, for example, Swept SA, the Trace data is saved along with the State in the State file. When recalling the State, the Trace data is recalled as well. Traces are recalled exactly as they were stored, including the writing mode and update and display modes. If a Trace was updating and visible when the State was saved, it will come back updating and visible, and its data will be rewritten right away. When you use State to save and recall traces, any trace whose data must be preserved should be placed in View or Blank mode before saving.

The following table describes the Trace Save and Recall possibilities:

You want to recall state and one trace's data, leaving other traces unaffected.	Save Trace+State from 1 trace. Make sure that no other traces are updating (they should all be in View or Blank mode) when the save is performed.	On Recall, specify the trace you want to load the one trace's data into. This trace will load in View. All other traces' data will be unaffected, although their trace mode will be as it was when the state save was performed.
You want to recall all traces	Save Trace+State from ALL traces.	On Recall, all traces will come back in View (or Blank if they were in Blank or Background when saved)
You want all traces to load exactly as they were when saved.	Save State	On recall, all traces' mode and data will be exactly as they were when saved. Any traces that were updating will have their data immediately overwritten.

From File...

When you press "From File", the analyzer brings up a Windows dialog and a menu entitled "File Open." This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



Listed below are the functions of the various fields in the dialog, and the corresponding softkeys:

Open

Performs the recall of the specified file. While the recall is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Look In.

Look In

The Look In field shows the path from which the file will be recalled and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Look In field** first uses the last path from the Save As dialog **Save In:** path for that same file type. There is no softkey for directly navigating to the Look In field, but you can use the left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

Sort

Accesses a menu that enables you to sort the files within the File Open dialog. Only one sorting type can be selected at a time and the sorting happens immediately. The sorting types are By Date, By Name, By extension, and By Size.

Files of Type

This field shows the file suffix for the type of file you have selected to recall. For example, if you navigated here while recalling State, "Mode state (*.state)" is in the field. If you navigated here while recalling Trace, ""Mode state (*.trace)" is in the field. If you navigated here while importing a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown menu, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Open** request to be cancelled. The ESC key does the same thing.

Key Path	Recall, State
Notes	Brings up the Open dialog for recalling a State Save Type
Initial S/W Revision	Prior to A.02.00

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

For more information and the SCPI command, see Edit Register Names under the Save, State function.

Key Path	Recall, State
Mode	All
Dependencies	N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending the SCPI command generates an error, -221, "Settings conflict;Option not available"
Initial S/W Revision	A.11.00

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last

modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

Key Path	Recall, State
Example	*RCL 1
Range	1–16 from front panel, 1–128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State, Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	Prior to A.11.00

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

Key Path	Recall, State
Example	*RCL 1
Range	1-16 from front panel, 1-128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State,Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	Prior to A.11.00

Restart

The Restart function restarts the current sweep, or measurement, or set of averaged/held sweeps or measurements. If you are Paused, pressing Restart does a Resume.

The Restart function is accessed in several ways:

- Pressing the Restart key
- Sending the remote command INIT:IMMEDIATE
- Sending the remote command INIT:RESTART

See "[More Information](#)" on page 754

Key Path	Front-panel key
Remote Command	:INITiate[:IMMEDIATE] :INITiate:RESTART
Example	:INIT:IMM :INIT:REST
Notes	:INITiate:RESTART and :INITiate:IMMEDIATE perform exactly the same function.
Couplings	Resets average/hold count k. For the first sweep overwrites all active (update=on) traces with new current data. For application modes, it resets other parameters as required by the measurement.
Status Bits/OPC dependencies	This is an Overlapped command. The STATUS:OPERATION register bits 0 through 8 are cleared. The STATUS:QUESTIONABLE register bit 9 (INTEGRITY sum) is cleared. The SWEEPING bit is set. The MEASURING bit is set.
Backwards Compatibility Notes	For Spectrum Analysis mode in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart trace averages (displayed average count reset to 1) for a trace in Clear Write, but did not restart Max Hold and Min Hold. In the X-Series, the Restart hardkey and the INITiate:RESTART command restart not only Trace Average, but MaxHold and MinHold traces as well. For wireless comms modes in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart every measurement, which includes all traces and numeric results. There is no change to this operation.
Initial S/W Revision	Prior to A.02.00

More Information

The **Restart** function first aborts the current sweep/measurement as quickly as possible. It then resets the sweep and trigger systems, sets up the measurement and initiates a new data measurement sequence with a new data acquisition (sweep) taken once the trigger condition is met.

If the analyzer is in the process of aligning when **Restart** is executed, the alignment finishes before the restart function is performed.

Even when set for Single operation, multiple sweeps may be taken when Restart is pressed (for example, when averaging/holding is on). Thus when we say that **Restart** "restarts a measurement," we may mean:

- It restarts the current sweep
- It restarts the current measurement
- It restarts the current set of sweeps if any trace is in Trace Average, Max Hold or Min Hold
- It restarts the current set of measurements if Averaging, or Max Hold, or Min Hold is on for the measurement
- depending on the current settings.

With **Average/Hold Number** (in **Meas Setup** menu) set to 1, or Averaging off, or no trace in Trace Average or Hold, a single sweep is equivalent to a single measurement. A single sweep is taken after the trigger condition is met; and the analyzer stops sweeping once that sweep has completed. However, with **Average/Hold Number** >1 and at least one trace set to **Trace Average, Max Hold, or Min Hold (SA Measurement)** or **Averaging on (most other measurements)**, multiple sweeps/data acquisitions are taken for a single measurement. The trigger condition must be met prior to each sweep. The sweep is stopped when the average count k equals the number N set for **Average/Hold Number**. A measurement average usually applies to all traces, marker results, and numeric results; but sometimes it only applies to the numeric results.

Once the full set of sweeps has been taken, the analyzer will go to idle state. To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command `CALC:AVER:TCON UP`.

Save

The Save menu lets you choose what you want to save and where you want to save it. Among the types of files you can save are **States**, **Traces**, and **Screen Images**. In addition, an Export (Data) option lets you save a number of data types as CSV files for easy import into Excel and other spreadsheet programs.

Key Path	Front-panel key
Mode	All
Notes	No remote command for this key specifically, but the :MMEM:STOR:STATe <filename> command is available for specific file types. An example is :MMEM:STOR:STATe <filename>.
Initial S/W Revision	Prior to A.02.00

State

The Save State menu lets you choose a register or file for saving the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings which were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, Verbose SCPI) are not affected by either Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

After the save completes, the message "File <filename> saved" or "State Register <register number> saved" is displayed.

For rapid saving, the State menu lists 16 registers to save to. Pressing a Register key initiates the save. You can also select a file to save to.

The default path for all State Files is:

My Documents\<<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

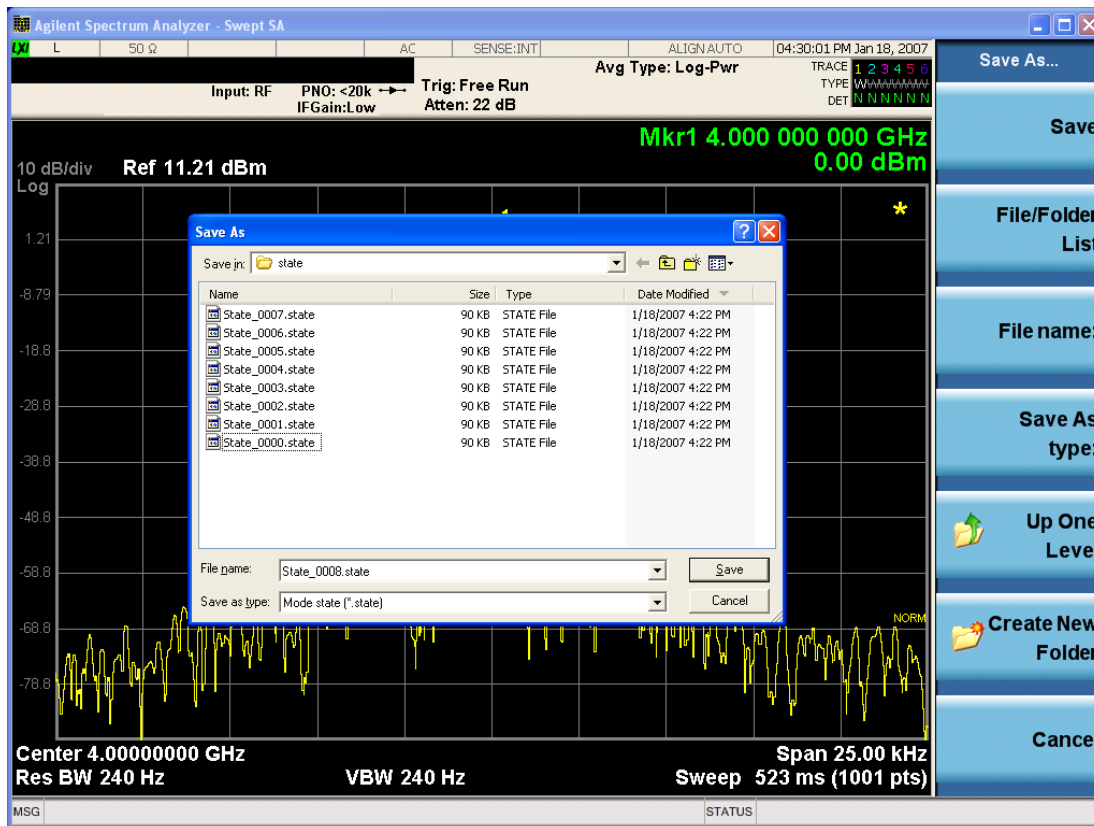
Key Path	Save
Mode	All
Remote Command	:MMEMory:STORe:STATe <filename>
Example	MMEM:STOR:STATe "MyStateFile.state" This stores the current instrument state data in the file MyStateFile.state in the default directory.
Notes	Both single and double quotes are supported for any filename parameter over remote. After saving to a register, that register's menu key is updated with the date the time, unless a custom label has been entered for that key. After saving to a register, you remain in the Save State menu, so that you can see the Register key

update. After saving to a file, the analyzer automatically returns to the previous menu and any Save As dialog goes away.

Backwards Compatibility SCPI	:MMEMoRY:STORe:STATe 1,<filename>
Initial S/W Revision	Prior to A.02.00

To File . . .

When you press “To File”, the analyzer brings up a Windows dialog and a menu entitled “**Save As.**” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



The Listed below

are the functions of the various fields in the dialog, and the corresponding softkeys:

Save

Performs the save to the specified file of the selected type. If the file already exists, a dialog will appear that allows you to replace the existing file by selecting OK, or you can Cancel the request. If you select OK, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade.

While the save is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Save In.

Save In

The Save In field shows the path to which the file will be saved and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Save In field** defaults to the default path for this type of file and remembers the last path you used to save this type of file. There is no softkey for directly navigating to the Save In field but you can use left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

File Name

The File Name field is initially loaded with an automatically generated filename specific to the appropriate Save Type. The automatically generated filename is guaranteed not to conflict with any filename currently in the directory. You may replace or modify this filename using the File Name key. See the ["Quick Save " on page 2328](#) documentation for more on the automatic file naming algorithm.

When you press the File Name key the analyzer displays the Alpha Editor. Use the knob to choose the letter to add and the front-panel Enter key to add the letter to the file name. The BK character moves you back and the FW character moves you forward in the filename. The Select key on the front panel generates a space character. When you are done entering the filename press the Done softkey. This returns back to the **File Open** dialog and menu, but does not cause the save to occur.

Save As Type

This field shows the file suffix for the type of file you have selected to save. For example, if you navigated here while saving State, "Mode state (*.state)" is in the field. If you navigated here from saving Trace, ""Mode state (*.trace)" is in the field. If you navigated here while exporting a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Create New Folder

This key corresponds to the icon of a folder with the "*" that is in the tool bar of the dialog. When pressed, a new folder is created in the current directory with the name **New Folder** and you can enter a new folder name using the Alpha Editor.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Save As** request to be cancelled. The ESC key does the same thing.

Key Path	Save, State
Mode	All
Notes	Brings up Save As dialog for saving a State Save Type
Initial S/W Revision	Prior to A.02.00

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

See ["More Information" on page 759](#)

Key Path	Save, State
Mode	All
Remote Command	:MMEMory:REGister:STATe:LABel <reg number>,"label" :MMEMory:REGister:STATe:LABel? <reg number>
Example	:MMEM:REG:STAT:LAB 1,"my label"
Notes	<reg number> is an integer from 1 to 16. If the SCPI specifies an invalid register number an error message is generated, -222,"Data out of range;Invalid register label number" "label" is a string from 0 to 30 characters in length. If a label exceeds 30 characters, an error message is generated, -150,"String data error;Label clipped to 30 characters" "label" of length 0 erases the custom label and restores the default (time and date) label. E.g.: :MMEM:REG:STAT:LAB 1,""
Dependencies	N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending this command generates an error, -221,"Settings conflict;Option not available"
Preset	The names are unaffected by Preset or power cycle but are set to the default label (time and date) on a "Restore System Defaults->Misc"
Initial S/W Revision	A.11.00

More Information

When you edit one of the register names, the time and date field will be replaced by the custom name.

If you delete all the characters in the custom name, it restores the default (time and date).

The register names are stored within the state files, but they are not part of the instrument state; that is, once you have edited a register name, loading a new state will not change that register name. Another consequence of this is that the names will be persistent through a power cycle. Also, if a named state file is transferred to another analyzer, it will bring its custom name along with it.

If you try to edit the name of an empty register, the analyzer will first save the state to have a file to put the name in. If you load a named state file into an analyzer with older firmware it will ignore the metadata.

The *SAV and *RCL commands will not be affected by the custom register names, nor will the MMEM commands.

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

Key Path	Save, State
Mode	All
Example	*SAV 1
Range	1–16 from front panel, 1–128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.11.00

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

Key Path	Save, State
Mode	All
Example	*SAV 1
Range	1-16 from front panel, 1-128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.11.00

Data (Export)

Exporting a data file stores data from the current measurement to mass storage files. The Export Menu only contains data types that are supported by the current measurement.

Since the commonly exported data files are in .csv format, the data can be edited by you prior to importing. This allows you to export a data file, manipulate the data in Excel (the most common PC Application for manipulating .csv files) and then import it.

Selecting an Export Data menu key will not actually cause the exporting to occur, since the analyzer still needs to know where you wish to save the data. Pressing the Save As key in this menu brings up the Save As dialog and Save As menu that allows you to specify the destination file and directory. Once a filename has been selected or entered in the Open menu, the export will occur as soon as the Save key is pressed.

Key Path	Save
Mode	All
Notes	The menu is built from whatever data types are available for the mode. So the key locations in the sub menu will vary. No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:STORe commands.
Dependencies	If a file type is not used by a certain measurement, that type is grayed out for that measurement. The key for a file type will not show at all if there are no measurements in the Mode that support it.
Preset	Is not affected by a Preset or shutdown, but is reset during Restore Mode Defaults
Readback	The data type that is currently selected
Initial S/W Revision	Prior to A.02.00

Measurement Results

Pressing this key selects Meas Results as the data type to be exported. Pressing the key a second time brings up the Meas Results menu, which allows you to select which **Meas Result** to save. In the Swept SA measurement, there are three types of Measurement Results files: Peak Table, Marker Table and Spectrogram.

See "[Meas Results File Contents](#)" on page 762.

See "[Marker Table](#)" on page 762.

See "[Peak Table](#)" on page 765.

See "[Spectrogram](#)" on page 768

Remote Command	:MMEMory:STORe:RESults:MTABle PTABle SPEctrogram <filename>
Example	:MMEM:STOR:RES:MTAB "myResults.csv" Saves the results from the current marker table to the file myResults.csv in the current path. :MMEM:STOR:RES:PTAB "myResults.csv" Saves the results from the current peak table to the file myResults.csv in the current path. :MMEM:STOR:RES:SPEC "myResults.csv" Saves the results from the current Spectrogram display to the file myResults.csv in the current path. The default path is My Documents\SA\data\SAN\results
Notes	If the save is initiated via SCPI, and the file already exists, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade. Both single and double quotes are supported for any filename parameter over SCPI.
Dependencies	If a save of Marker Table results is requested and the Marker Table is not on, no file is saved and a message is generated If a save of Peak Table results is requested and the Peak Table is not on, no file is saved and a message is generated If a save of Spectrogram results is requested and the Spectrogram is not on, no file is saved and a message is generated. The Spectrogram choice only appears if option EDP is licensed.
Preset	Not part of Preset, but is reset to Peak Table by Restore Mode Defaults. Survives a shutdown.
Initial S/W Revision	Prior to A.02.00

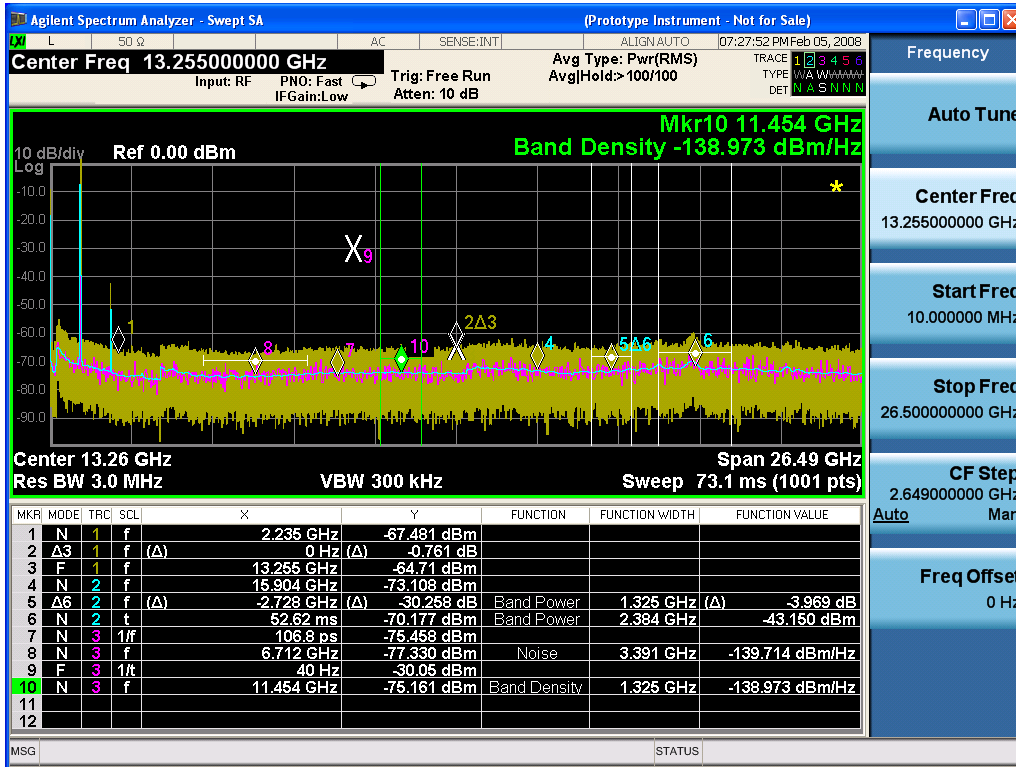
Meas Results File Contents

All files are .csv files. The following section details the data in each file type.

Marker Table

This section discusses the Marker Table Meas Results file format.

Imagine that, at the point where a Marker Table Meas Result is requested, the following screen is showing:



Then the Meas Results file, when opened, would show the following data:

MeasurementR result	
Swept SA	
A.01.40_R0017	N9020A
526 B25 PFR	1
P26 EA3	
Result Type	Marker Table
Ref Level	0
Number of Points	1001
Sweep Time	0.0662666 67
Start Frequency	10000000
Stop Frequency	26500000 000
Average Count	0
Average Type	LogPower (Video)
RBW	3000000

RBW Filter	Gaussian
RBW Filter BW	3dB
VBW	3000000
Sweep Type	Swept
X Axis Scale	Lin
PreAmp State	Off
PreAmp Band	Low
Trigger Source	Free
Trigger Level	1.2
Trigger Slope	Positive
Trigger Delay	1.00E-06
Phase Noise Optimization	Fast
Swept If Gain	Low
FFT If Gain	Autorange
RF Coupling	AC
FFT Width	411900
Ext Ref	10000000
Input	RF
RF Calibrator	Off
Attenuation	10
Ref Level Offset	0
External Gain	0
X Axis Units	Hz
Y Axis Units	dBm

DATA									
MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	FUNCTION UNIT
1	Normal	1	Frequency	2.2350E+09	-67.481	Off	0.0000E+00	0	None
2	Delta3	1	Frequency	0.0000E+00	-0.761	Off	0.0000E+00	0	None
3	Fixed	1	Frequency	1.3255E+10	-64.71	Off	0.0000E+00	0	None
4	Normal	2	Frequency	1.5904E+10	-73.1	Off	0.0000E+00	0	None

08									
5	Delta7	2	Frequency	- 2.7280E+ 09	- 30.2 58	Band Power	1.3250E+ 06	-3.969	dB
6	Normal	2	Time	5.2620E- 02	- 70.1 77	Band Power	2.3840E+ 06	-43.15	dBm
7	Normal	3	Period	1.0680E- 10	- 75.4 58	Off	0.0000E+ 00	0	None
8	Normal	3	Frequency	6.7120E+ 09	- 77.3 3	Noise	3.3910E+ 06	- 139.71 4	dBm/Hz
9	Fixed	3	Inverse Time	4.0000E+ 01	- 30.0 5	Off	0.0000E+ 00	0	None
10	Normal	3	Frequency	1.1454E+ 10	- 75.1 61	Band Density	1.3250E+ 06	- 138.97 3	dBm/Hz
11	Off	1	Frequency	0.0000E+ 00	0	Off	0.0000E+ 00	0	None
12	Off	1	Frequency	0.0000E+ 00	0	Off	0.0000E+ 00	0	None

The numbers appear in the file exactly as they appear onscreen. If it says 11.454 GHz onscreen, then in the file it is 11.454E+09.

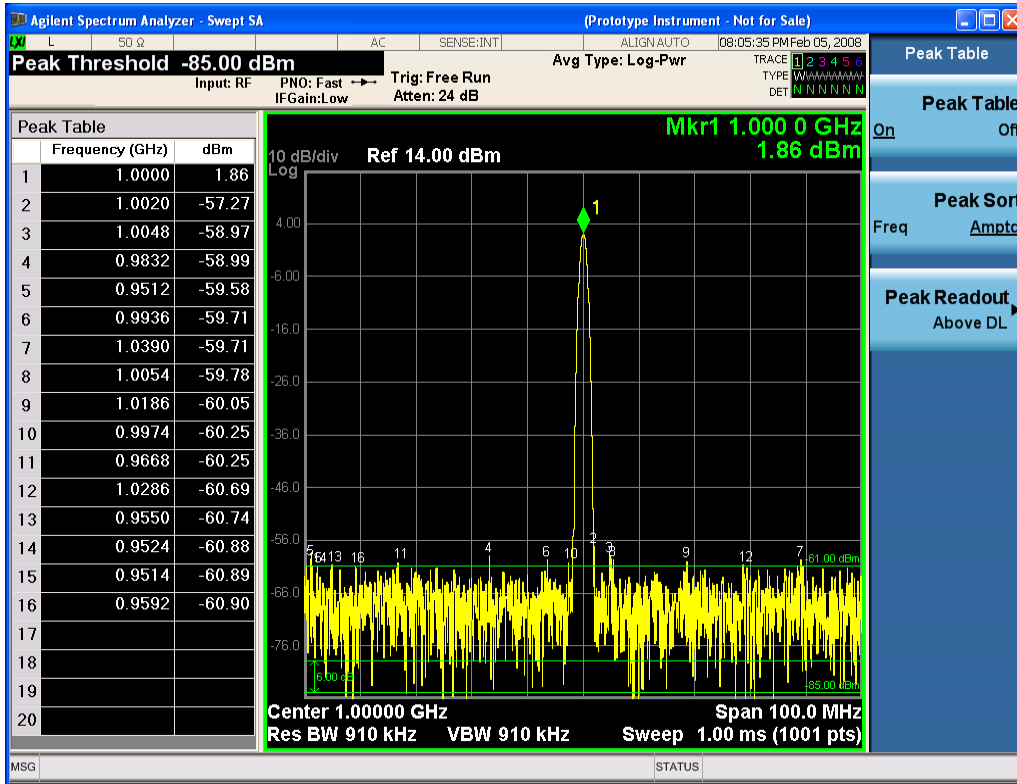
The metadata header is very similar to the metadata used in the trace data .csv files. See Trace File Contents. The only new information concerns the 1-of-N fields in the marker table itself.

Peak Table

This section discusses the Peak Table Meas Results file format.

Imagine that, at the point where a Marker Table Meas Result is requested, the following screen is showing:

9 EDGE EVM Measurement
Save



Then the Meas Results file, when opened, would show the header data (the same as for the Marker Table except that the Result Type is Peak Table) ending with a few fields of specific interest to Peak Table users:

- Peak Threshold
- Peak Threshold State (On|Off)
- Peak Excursion
- Peak Excursion State (On|Off)
- Display Line
- Peak Readout (All|AboveDL|BelowDL)
- Peak Sort (Freq|Amptd)

These fields are then followed by the data for the Peak Table itself.

Note that the label for the Frequency column changes to Time in 0 span.

Here is what the table for the above display looks like:

MeasurementResult	
Swept SA	
A.01.40_R0017	N9020A
526 B25 PFR P26 EA3	1

Result Type	Peak Table
Ref Level	0
Number of Points	1001
Sweep Time	0.066266667
Start Frequency	10000000
Stop Frequency	26500000000
Average Count	0
Average Type	LogPower(Video)
RBW	3000000
RBW Filter	Gaussian
RBW Filter BW	3dB
VBW	3000000
Sweep Type	Swept
X Axis Scale	Lin
PreAmp State	Off
PreAmp Band	Low
Trigger Source	Free
Trigger Level	1.2
Trigger Slope	Positive
Trigger Delay	1.00E-06
Phase Noise Optimization	Fast
Swept If Gain	Low
FFT If Gain	Autorange
RF Coupling	AC
FFT Width	411900
Ext Ref	10000000
Input	RF
RF Calibrator	Off
Attenuation	10
Ref Level Offset	0
External Gain	0
X Axis Units	Hz
Y Axis Units	dBm
Peak Threshold	-85
Peak Threshold State	On
Peak Excursion	6
Peak Excursion State	On

Display Line	-61	
Peak Readout	AboveDL	
Peak Sort	Amptd	
DATA		
Peak	Frequency	Amplitude
1	1.0000E+06	1.86
2	1.0020E+06	-57.27
3	1.0048E+06	-58.97
4	9.8320E+05	-58.99
5	9.5120E+05	-59.58
6	9.9360E+05	-59.71
7	1.0390E+06	-59.71
8	1.0054E+06	-59.78
9	1.1086E+06	-60.05
10	9.9740E+05	-60.25
11	9.6680E+05	-60.25
12	1.0286E+06	-60.69
13	9.5500E+05	-60.74
14	9.5240E+05	-60.88
15	9.5140E+05	-60.89
16	9.5920E+05	-60.90
17		
18		
19		
20		

Spectrogram

This section discusses the Spectrogram Results file format. The Spectrogram choice only appears if option EDP is licensed.

The Spectrogram results are the same as a Trace data export, except that instead of having just one trace's data, all 300 traces appear one after the other.

Each trace has its own data mark; the data for Spectrogram Trace 0 follows the row marked DATA, the data for Spectrogram Trace 1 follows the row marked DATA1, for Spectrogram Trace 2 follows the row marked DATA2, and so on.

Each DATA row has a timestamp in the second column (as of firmware revision A.11.01). So, for example, if Trace 0 had a relative start time of 1729.523 sec, then the first DATA row would look like this:

DATA,1729.523

And if Trace 13 had a relative start time of 100.45 sec, then the fourteenth data row would look like:

DATA13,100.453

To find the absolute time for the relative timestamps of each trace, the last row before the first DATA row gives the absolute start time of the Spectrogram, in the form YYYYMMDDHHMMSS

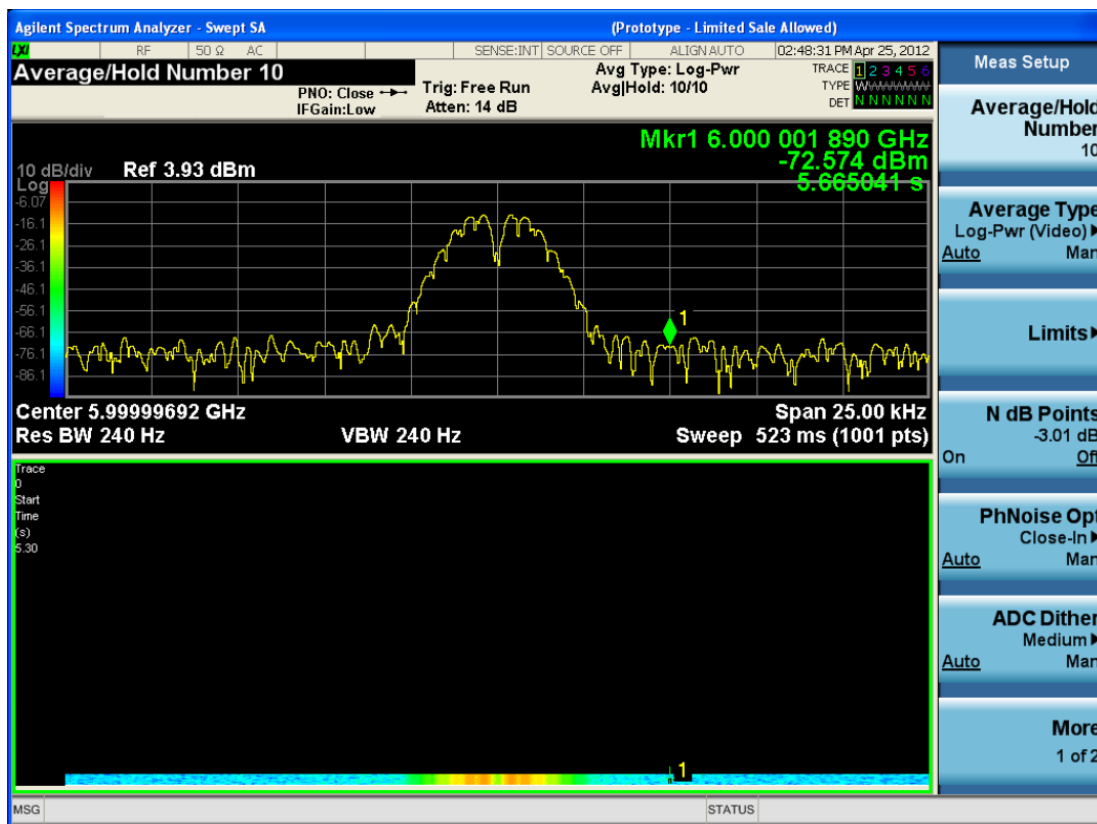
So, for example, if the absolute start time is 13:23:45:678 on January 30, 2012, this row would look like:

Start Time,20120130132345678

NOTE The resolution of the absolute time stored is 1 ms, which matches up with the fact that the fastest sweep time is also 1 ms. However, there is no specification for the absolute accuracy of the clock in the analyzer, nor is there any facility provided to allow the user to set this time to any particular degree of accuracy.

Traces that have not yet been filled in the Spectrogram display are empty; there is no DATA header for them. The file ends after the last non-empty trace.

Imagine that, at the point where a Spectrogram Meas Result is requested, the following screen is showing:



For the purpose of this example, we have set the Average/Hold Number to 10, thus we have only traces 0 thru 10. The Spectrogram was started at 02:28:08:700 pm on April 25, 2012 (that is, 700 ms after 2:28:08 pm), although the screen dump itself shows a different time, as it was taken ten minutes after the

Spectrogram data. Trace 0 is showing a start time of 5.30 seconds, meaning 5.3 seconds after the Spectrogram started (trace 10 has a start time of 0, as it was the first trace taken but has now rolled up into the tenth trace slot).

The Meas Results file, when opened, shows the header data and ten traces of trace data. Below is an extract from the result file for the above display. Note the start time of 20120425142808700 showing in the last row before the first DATA row, and the relative time of 5.299231048 showing in the first DATA row:

Result Type	Spectrogram
MeasResult	
Swept SA	
A.11.00.01	N9020A
503 508 513 526 ALL ALV B1C B1X B25 B2X B40 BAB BBA CR3 CRP DP2 DRD EA3 EDP EMC EP1 ERC ESC ESP EXM FSA HBA K03 LFE MPB P03 P08 P13 P26 PFR RTL RTS S40 SB1 SEC SM1 UK6 YAS YAV	1
Segment	0
Number of Points	1001
Sweep Time	0.523333333
Start Frequency	5999984415
Stop Frequency	6000009415
Average Count	0
Average Type	LogPower(Video)
RBW	240
RBW Filter	Gaussian
RBW Filter BW	3dB
VBW	240
Sweep Type	Swept
X Axis Scale	Lin
PreAmp State	Off
PreAmp Band	Low
Trigger Source	Free
Trigger Level	1.2
Trigger Slope	Positive
Trigger Delay	0
Phase Noise Optimization	Wide
Swept If Gain	Low
FFT If Gain	Autorange
RF Coupling	AC

Result Type	Spectrogram
FFT Width	411900
Ext Ref	10000000
Input	RF
RF Calibrator	Off
Attenuation	14
Ref Level Offset	0
External Gain	0
Trace Type	Clearwrite
Detector	Normal
Trace Math	Off
Trace Math Oper1	Trace5
Trace Math Oper2	Trace6
Trace Math Offset	0
Trace Name	Trace1
X Axis Units	Hz
Y Axis Units	dBm
Start Time	20120425142808700
DATA	5.299231048
5999984415	-76.34749519
5999984440	-77.28097006
5999984465	-75.32317869
5999984490	-73.64417681
5999984515	-72.67154604

- o
- o
- o

6000009315	-77.94423277
6000009340	-79.51829697
6000009365	-78.46108961
6000009390	-78.46108957
6000009415	-76.59570596
DATA2	4.708697055
5999984415	-80.98197882
5999984440	-80.98197879

5999984465	-75.83142132
5999984490	-74.02712079
5999984515	-73.57213005

0
0
0

6000009315	-75.9183103
6000009340	-79.53787488
6000009365	-78.82602191
6000009390	-78.82602188
6000009415	-76.37486709
DATA10	0
5999984415	-75.56751112
5999984440	-75.76485645
5999984465	-76.67718717
5999984490	-78.79238489
5999984515	-83.72680212

0
0
0

6000009315	-71.3942461
6000009340	-72.28308332
6000009365	-73.92684489
6000009390	-75.45548832
6000009415	-75.17904815

Save As . . .

When you press “Save As”, the analyzer brings up a Windows dialog and a menu entitled “**Save As.**” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[To File . . .](#)" on page 2340 in Save, State for a full description of this dialog and menu.

The default path for saving files is:

For all of the Trace Data Files:

My Documents\`<mode name>`\data\traces

For all of the Limit Data Files:

My Documents\`<mode name>`\data\limits

For all of the Measurement Results Data Files:

My Documents\`<mode name>`\data\`<measurement name>`\results

For all of the Capture Buffer Data Files:

My Documents\`<mode name>`\data\captureBuffer

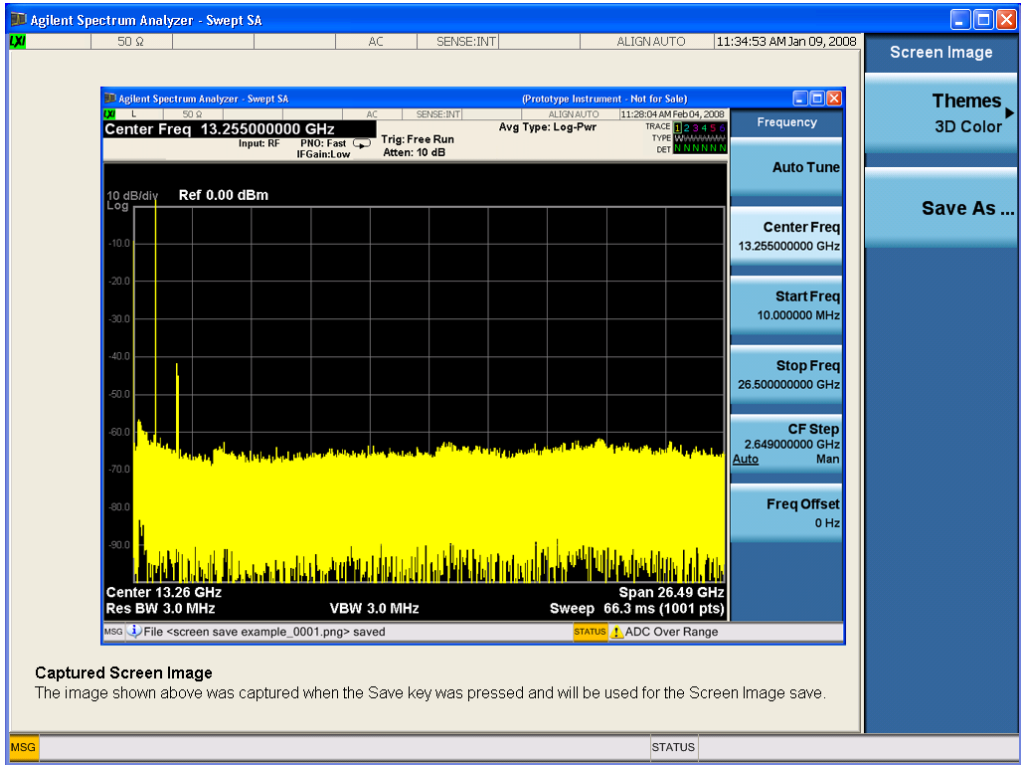
Key Path	Save, Data
Mode	All
Notes	The key location is mode-dependent and will vary. Brings up the Save As dialog for saving a <code><mode specific></code> Save Type. The save is performed immediately and does not wait until the measurement is complete.
Initial S/W Revision	Prior to A.02.00

Screen Image

Pressing Screen Image accesses a menu of functions that enable you to specify a format and location for the saved screen image. It brings up a menu that allows you to specify the color scheme of the Screen Image (Themes) or navigate to the Save As dialog to perform the actual save.

Screen Image files contain an exact representation of the analyzer display. They cannot be loaded back onto the analyzer, but they can be loaded into your PC for use in many popular applications.

The image to be saved is actually captured when the Save front panel key is pressed, and kept in temporary storage to be used if you ask for a Screen Image save. When the Screen Image key is pressed, a "thumbnail" of the captured image is displayed, as shown below:



When you continue on into the Save As menu and complete the Screen Image save, the image depicted in the thumbnail is the one that gets saved, showing the menus that were on the screen before going into the Save menus. The save is performed immediately and does not wait until the measurement is complete.

After you have completed the save, the Quick Save front-panel key lets you quickly repeat the last save performed, using an auto-named file, with the current screen data.

NOTE

For versions previous to A.01.55, if you initiate a screen image save by navigating through the Save menus, the image that is saved will contain the Save menu softkeys, not the menus and the active function that were on the screen when you first pressed the Save front panel key.

Key Path	Save
Mode	All
Remote Command	:MMEMory:STORe:SCReen <filename>
Example	:MMEM:STOR:SCR "myScreen.png" This stores the current screen image in the file MyScreenFile.png in the default directory.
Initial S/W Revision	Prior to A.02.00

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

Key Path	Save, Screen Image
Remote Command	:MMEMory:STORe:SCReEn:THEMe TDColor TDMonochrome FCOLOR FMONochrome :MMEMory:STORe:SCReEn:THEMe?
Example	:MMEM:STOR:SCR:THEM TDM
Preset	3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes.
Readback	3D Color 3D Mono Flat Color Flat Mono
Backwards Compatibility Notes	In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical.
Initial S/W Revision	Prior to A.02.00

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDC
Readback	3D Color
Initial S/W Revision	Prior to A.02.00

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDM
Readback	3D Mono
Initial S/W Revision	Prior to A.02.00

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

Key Path	Save, Screen Image, Themes
----------	----------------------------

Example	MMEM:STOR:SCR:THEM FCOL
Readback	Flat Color
Initial S/W Revision	Prior to A.02.00

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FMON
Readback	Flat Mono
Initial S/W Revision	Prior to A.02.00

Save As...

When you press “Save As”, the analyzer brings up a Windows dialog and a menu entitled “**Save As.**” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[To File . . .](#)" on page 2340 in Save, State for a full description of this dialog and menu.

The default path for Screen Images is

My Documents\<mode name>\screen.

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

Key Path	Save, Screen Image
Notes	Brings up Save As dialog for saving a Screen Image Save Type
Initial S/W Revision	Prior to A.02.00

Mass Storage Catalog (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:CATalog? [<directory_name>]
Notes	<p>The string must be a valid logical path.</p> <p>Queries disk usage information (drive capacity, free space available) and obtains a list of files and directories in a specified directory in the following format:</p> <p><numeric_value>,<numeric_value>,{<file_entry>}</p> <p>It returns two numeric parameters and as many strings as there are files and directories. The first parameter indicates the total amount of storage currently used in bytes. The second parameter</p>

indicates the total amount of storage available, also in bytes. The <file_entry> is a string. Each <file_entry> indicates the name, type, and size of one file in the directory list:

<file_name>,<file_type>,<file_size>

As the windows file system has an extension that indicates file type, <file_type> is always empty. <file_size> provides the size of the file in bytes. For directories, <file_entry> is surrounded by square brackets and both <file_type> and <file_size> are empty

Initial S/W Revision Prior to A.02.00

Mass Storage Change Directory (Remote Command Only)

Key path SCPI Only

Remote Command :MMEMory:CDIRectory [<directory_name>]
 :MMEMory:CDIRectory?

Notes The string must be a valid logical path.

Changes the default directory for a mass memory file system. The <directory_name> parameter is a string. If no parameter is specified, the directory is set to the *RST value.

At *RST, this value is set to the default user data storage area, that is defined as System.Environment.SpecialFolder.Personal.

Query returns full path of the default directory.

Initial S/W Revision Prior to A.02.00

Mass Storage Copy (Remote Command Only)

Key path SCPI Only

Remote Command :MMEMory:COPY <string>,<string>[,<string>,<string>]

Notes The string must be a valid logical path.

Copies an existing file to a new file or an existing directory to a new directory.

Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.

The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.

This command will generate an "access denied" error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.

Mass Storage Device Copy (Remote Command Only)

This command transfers data to/from a file and a peripheral device.

Key path	SCPI Only
Remote Command	:MMEMory:COpy:DEvice <source_string>,<dest_string>
Notes	The strings must be a valid logical path or a valid device keyword. If the dest_string is a device keyword, the data is copied from the source file to the device. If the source_string is a device keyword, the data is copied to the source file from the device. Valid device keywords are: SNS (smart noise source) An error is generated if the file or device is not found.

Mass Storage Delete (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:DELeTe <file_name>[,<directory_name>]
Notes	The string must be a valid logical path. Removes a file from the specified directory. The <file_name> parameter specifies the file name to be removed. This command will generate an "access denied" error if the file is in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.
Initial S/W Revision	Prior to A.02.00

Mass Storage Data (Remote Command Only)

Creates a file containing the specified data OR queries the data from an existing file.

Key path	SCPI Only
Remote Command	:MMEMory:DATA <file_name>, <data> :MMEMory:DATA? <file_name>
Notes	The string must be a valid logical path. The command form is MMEMory:DATA <file_name>,<data>. It loads <data> into the file <file_name>. <data> is in 488.2 block format. <file_name> is string data. The query form is MMEMory:DATA? <file_name> with the response being the associated <data> in block format.
Initial S/W Revision	Prior to A.02.00

Mass Storage Make Directory (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:MDIRectory <directory_name>
Notes	The string must be a valid logical path. Creates a new directory. The <directory_name> parameter specifies the name to be created.

	This command will generate an “access denied” error if the new directory would be in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.
Initial S/W Revision	Prior to A.02.00

Mass Storage Move (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:MOVE <string>,<string>[,<string>,<string>]
Notes	<p>The string must be a valid logical path.</p> <p>Moves an existing file to a new file or an existing directory to a new directory.</p> <p>Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.</p> <p>The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.</p> <p>This command will generate an “access denied” error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.</p>
Initial S/W Revision	Prior to A.02.00

Mass Storage Remove Directory (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:RDIRECTory <directory_name>
Notes	<p>The string must be a valid logical path.</p> <p>Removes a directory. The <directory_name> parameter specifies the directory name to be removed. All files and directories under the specified directory shall also be removed.</p> <p>This command will generate an “access denied” error if the folder is a restricted folder (e.g., C:\Windows) or is in a restricted folder and the current user does not have Power User or Administrator privileges.</p>
Initial S/W Revision	Prior to A.02.00

Single (Single Measurement/Sweep)

Sets the analyzer for Single measurement operation. The single/continuous state is Meas Global, so the setting will affect all the measurements. If you are Paused, pressing Single does a Resume.

See ["More Information" on page 780](#)

Key Path	Front-panel key
Example	:INIT:CONT OFF
Notes	See Cont key description.
Backwards Compatibility Notes	<p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey and the INITiate:IMM switched from continuous measurement to single measurement and restarted sweeps and averages (displayed average count reset to 1), but did not restart Max Hold and Min Hold. In the X-Series, the Single hardkey and the INITiate:IMM command initiate a sweep/ measurement/ average sequence/hold sequence including MaxHold and MinHold.</p> <p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey restarted the sweep regardless of whether or not you were in an active sweep or sweep sequence. In the X-Series, Restart does this but Single only restarts the sweep or sweep sequence if you are in the idle state.</p> <p>INIT[:IMM] in ESA & PSA Spectrum Analysis Mode does an implied ABORT. In some other PSA Modes, INIT[:IMM] is ignored if not in the idle state. . The X-Series follows the ESA/PSA SA Mode model, which may cause some Modes to have compatibility problems.</p>
Initial S/W Revision	Prior to A.02.00

More Information

See ["Restart" on page 2337](#) for details on the INIT:IMMEDIATE (Restart) function.

If you are already in single sweep, the INIT:CONT OFF command has no effect.

If you are already in Single Sweep, then pressing the Single key in the middle of a sweep does not restart the sweep or sequence. Similarly, pressing the Single key does not restart the sweep or sequence if the sweep is not in the idle state (for example, if you are taking a very slow sweep, or the analyzer is waiting for a trigger). Instead, it results in a message. "Already in Single, press Restart to initiate a new sweep or sequence". Even though pressing the Single key in the middle of a sweep does not restart the sweep, sending INIT:IMMEDIATE does reset it.

To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command CALC:AVER:TCON UP.

Source

There is no Source control functionality for this measurement. When this key is pressed, the screen either displays a blank menu, or the previously-selected menu remains unchanged.

Key Path	Front-panel key
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SPAN X Scale

Accesses a menu of functions that enable you set the horizontal scale parameters.

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Ref Value

Allows you to set X reference value.

Key Path	SPAN X Scale
Mode	GSM
Remote Command	:DISPlay:EEVM:VIEW2:WINDow[1] 2 3:TRACe:X[:SCALe]:RLEVel <real> :DISPlay:EEVM:VIEW2:WINDow[1] 2 3:TRACe:X[:SCALe]:RLEVel?
Example	DISP:EEVM:VIEW2:WIND3:TRAC:X:RLEV 1 DISP:EEVM:VIEW2:WIND3:TRAC:X:RLEV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. Unit is Symbol(s).
Couplings	When the Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.
Preset	0.0
State Saved	Saved in instrument state.
Min	0.0
Max	5000000.0
Initial S/W Revision	Prior to A.02.00

Scale/Div

Allows you to change the horizontal scale.

Key Path	SPAN X Scale
Mode	GSM
Remote Command	:DISPlay:EEVM:VIEW2:WINDow[1] 2 3:TRACe:X[:SCALe]:PDIVision <real> :DISPlay:EEVM:VIEW2:WINDow[1] 2 3:TRACe:X[:SCALe]:PDIVision?
Example	DISP:EEVM:VIEW2:WIND:TRAC:X:PDIV 1.2 DISP:EEVM:VIEW2:WIND:TRAC:X:PDIV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. Unit is Symbol(s).

Couplings	When the Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.
Preset	14.10
State Saved	Saved in instrument state.
Range	1.0 to 500000.0
Min	1.0
Max	500000.0
Initial S/W Revision	Prior to A.02.00

Ref Position

Allows you to set the reference position.

Key Path	SPAN X Scale
Mode	GSM
Remote Command	:DISPlay:EEVM:VIEW2:WINDow[1] 2 3:TRACe:X[:SCALe]:RPOSition LEFT CENTER RIGHT :DISPlay:EEVM:VIEW2:WINDow[1] 2 3:TRACe:X[:SCALe]:RPOSition?
Example	DISP:EEVM:VIEW2:WIND3:TRAC:X:RPOS CENT DISP:EEVM:VIEW2:WIND3:TRAC:X:RPOS?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	LEFT
State Saved	Saved in instrument state.
Range	Left Ctr Right
Initial S/W Revision	Prior to A.02.00

Auto Scaling

Allows you to toggle the Auto Scaling function between On and Off.

Key Path	SPAN X Scale
Mode	GSM
Remote Command	:DISPlay:EEVM:VIEW2:WINDow[1] 2 3:TRACe:X[:SCALe]:COUPle ON OFF 1 0 :DISPlay:EEVM:VIEW2:WINDow[1] 2 3:TRACe:X[:SCALe]:COUPle?
Example	DISP:EEVM:VIEW2:WIND:TRAC:X:COUP ON DISP:EEVM:VIEW2:WIND:TRAC:X:COUP?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	Upon pressing the Restart front-panel key, the scale coupling function automatically determines the

	scale per division and reference values based on the measurement results if this parameter is set to On. When you set a value to either Ref Value or Scale/Div manually, X Auto Scaling automatically changes to Off..
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

Sweep/Control

Accesses a menu that enables you to configure the Sweep and Control functions of the analyzer, such as Sweep Time and Gating.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Pause/Resume

Pauses a measurement after the current data acquisition is complete.

When Paused, the label on the key changes to Resume. Pressing Resume un-pauses the measurement. When you are Paused, pressing Restart, Single or Cont does a Resume.

Key Path	Sweep/Control
Remote Command	:INITiate:PAUSE
Dependencies	Grayed out in Measurements that do not support Pausing. Blanked in Modes that do not support Pausing.
Initial S/W Revision	Prior to A.02.00

Key Path	Sweep/Control
Remote Command	:INITiate:RESume
Dependencies	Grayed out in Measurements that do not support Pausing. Blanked in Modes that do not support Pausing.
Initial S/W Revision	Prior to A.02.00

Abort (Remote Command Only)

This command is used to stop the current measurement. It aborts the current measurement as quickly as possible, resets the sweep and trigger systems, and puts the measurement into an "idle" state. If the analyzer is in the process of aligning when ABORT is sent, the alignment finishes before the abort function is performed. So ABORT does not abort an alignment.

If the analyzer is set for Continuous measurement, it sets up the measurement and initiates a new data measurement sequence with a new data acquisition (sweep) taken once the trigger condition is met.

If the analyzer is set for Single measurement, it remains in the "idle" state until an :INIT:IMM command is received.

Remote Command	:ABORT
Example	:ABOR

Notes	<p>If :INITiate:CONTInuous is ON, then a new continuous measurement will start immediately, with sweep (data acquisition) occurring once the trigger condition has been met.</p> <p>If :INITiate:CONTInuous is OFF, then :INITiate:IMMEDIATE is used to start a single measurement; with sweep (data acquisition) occurring once the trigger condition has been met.</p>
Dependencies	<p>For continuous measurement, ABORt is equivalent to the Restart key.</p> <p>Not all measurements support the abort command.</p>
Status Bits/OPC dependencies	<p>The STATus:OPERation register bits 0 through 8 are cleared.</p> <p>The STATus:QUEStionable register bit 9 (INTegrity sum) is cleared.</p> <p>Since all the bits that feed into OPC are cleared by the ABORt, the ABORt will cause the *OPC query to return true.</p>
Initial S/W Revision	Prior to A.02.00

System

See "System" on page 326

Trace/Detector

Accesses a menu that enables you to view or hide Max Hold Trace and Min Hold Trace.

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Max Hold Trace

This key allows you to view or hide Max Hold Trace on the Mag Error/Phase Error/EVM window in I/Q Error view. Max Hold Traces will be held during the averaging cycle.

Key Path	Trace/Detector
Mode	GSM
Remote Command	:DISPlay:EEVM:VIEW2:WINDow[1]:TRACe:MAXHold[:STATe] ON OFF 1 0 :DISPlay:EEVM:VIEW2:WINDow[1]:TRACe:MAXHold[:STATe] ?
Example	DISP:EEVM:VIEW2:WIND:TRAC:MAXH ON DISP:EEVM:VIEW2:WIND:TRAC:MAXH?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	A.02.00

Min Hold Trace

This key allows you to view or hide Min Hold Trace on the Mag Error/Phase Error/EVM window in I/Q Error view. Min Hold Traces will be held during the averaging cycle.

Key Path	Trace/Detector
Mode	GSM
Remote Command	:DISPlay:EEVM:VIEW2:WINDow[1]:TRACe:MINHold[:STATe] ON OFF 1 0 :DISPlay:EEVM:VIEW2:WINDow[1]:TRACe:MINHold[:STATe] ?
Example	DISP:EEVM:VIEW2:WIND:TRAC:MINH ON DISP:EEVM:VIEW2:WIND:TRAC:MINH?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	OFF

State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	A.02.00

Trigger

See ["Trigger" on page 408](#)

Free Run

See ["Free Run " on page 415](#)

Video

See ["Video \(IF Envelope\) " on page 416](#)

Trigger Level

See ["Trigger Level " on page 416](#)

Trig Slope

See ["Trig Slope " on page 417](#)

Trig Delay

See ["Trig Delay " on page 418](#)

Line

See ["Line " on page 1321](#)

Trig Slope

See ["Trig Slope " on page 1321](#)

Trig Delay

See ["Trig Delay " on page 420](#)

External 1

See ["External 1 " on page 1333](#)

Trigger Level

See ["Trigger Level " on page 1333](#)

Trig Slope

See ["Trig Slope " on page 1334](#)

Trig Delay

See ["Trig Delay " on page 423](#)

External 2

See ["External 2 " on page 1335](#)

Trigger Level

See ["Trigger Level "](#) on page 1335

Trig Slope

See ["Trig Slope "](#) on page 1336

Trig Delay

See ["Trig Delay "](#) on page 425

RF Burst

See ["RF Burst "](#) on page 1336

Absolute Trigger

See ["Absolute Trigger Level"](#) on page 1337

Relative Trigger

See ["Relative Trigger Level"](#) on page 1326

Trig Slope

See ["Trigger Slope "](#) on page 1338

Trig Delay

See ["Trig Delay "](#) on page 429

Periodic Timer

See ["Periodic Timer \(Frame Trigger\) "](#) on page 1328

Period

See ["Period "](#) on page 1329

Offset

See ["Offset "](#) on page 1330

Offset Adjust (Remote Command Only)

See ["Offset Adjust \(Remote Command Only\)"](#) on page 1331

Reset Offset Display

See ["Reset Offset Display "](#) on page 1332

Sync Source

See ["Sync Source "](#) on page 1332

Off

See ["Off "](#) on page 1333

External 1

See ["External 1 "](#) on page 1333

Trigger Level

See ["Trigger Level "](#) on page 1333

Trig Slope

See ["Trig Slope "](#) on page 1334

External 2

See ["External 2 "](#) on page 1335

Trigger Level

See ["Trigger Level "](#) on page 1335

Trig Slope

See ["Trig Slope "](#) on page 1336

RF Burst

See ["RF Burst "](#) on page 1336

Absolute Trigger

See ["Absolute Trigger Level"](#) on page 1337

Trig Slope

See ["Trigger Slope "](#) on page 1338

Trig Delay

See ["Trig Delay"](#) on page 440

Auto/Holdoff

See ["Auto/Holdoff "](#) on page 440

Auto Trig

See ["Auto Trig "](#) on page 441

Trig Holdoff

See ["Trig Holdoff "](#) on page 441

Holdoff Type

See ["Holdoff Type"](#) on page 442

User Preset

Accesses a menu that gives you the following three choices:

- User Preset – recalls a state previously saved using the Save User Preset function.
- User Preset All Modes – presets all of the modes in the analyzer
- Save User Preset– saves the current state for the current mode

Key Path	Front-panel key
Backwards Compatibility Notes	<p>User Preset is actually loading a state, and in legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, “state” always includes all of this data; so whenever state is loaded, or User Preset is executed, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p> <p>On ESA and PSA, User Preset affected the entire instrument’s state. In the X-Series, User Preset only recalls the state for the active mode. There is a User Preset file for each mode. User Preset can never cause a mode switch as it can in legacy analyzers. If you want to recall all modes to their user preset file state, you will need to do a User Preset after mode switching into each mode.</p> <p>User Preset recalls mode state which can now include data like traces; whereas on ESA and PSA, User Preset did not affect data.</p>
Initial S/W Revision	Prior to A.02.00

User Preset

User Preset sets the state of the currently active mode back to the state that was previously saved for this mode using the Save User Preset menu key or the SCPI command, SYST:PRES:USER:SAV. It not only recalls the Mode Preset settings, but it also recalls all of the mode persistent settings, and the Input/Output system setting that existed at the time Save User Preset was executed.

If a Save User Preset has not been done at any time, User Preset recalls the default user preset file for the currently active mode. The default user preset files are created if, at power-on, a mode detects there is no user preset file. There will never be a scenario when there is no user preset file to restore. For each mode, the default user preset state is the same state that would be saved if a Save User Preset is performed in each mode right after doing a Restore Mode Default and after a Restore Input/Output Defaults.

The User Preset function does the following:

- Aborts the currently running measurement.
- Sets the mode State to the values defined by Save User Preset.
- Makes the saved measurement for the currently running mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

Key Path	User Preset
Remote Command	:SYSTem:PRESet:USER
Example	:SYST:PRES:USER:SAVE:SYST:PRES:USER
Notes	:SYST:PRES:USER:SAVE is used to save the current state as the user preset state. Clears all pending OPC bits. The Status Byte is set to 0. Pressing the User Preset front-panel key while already in the User Preset menu will cause the User Preset to get executed
Couplings	A user preset will cause the currently running measurement to be aborted and cause the saved measurement to be active. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved.
Initial S/W Revision	Prior to A.02.00

User Preset All Modes

Recalls all of the User Preset files for each mode, switches to the power-on mode, and activates the saved measurement from the power-on mode User Preset file.

NOTE

When the instrument is secured, all of the user preset files are converted back to their default user preset files.

The User Preset function does the following:

- Aborts the currently running measurement.
- Switches the Mode to the power-on mode.
- Restores the User Preset files for each mode.
- Makes the saved measurement for the power-on mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

Key Path	User Preset
Remote Command	:SYSTem:PRESet:USER:ALL
Example	:SYST:PRES:USER:SAVE:SYST:PRES:USER:ALL
Notes	Clears all pending OPC bits. The Status Byte is set to 0. :SYST:PRES:USER:SAVE is used to save the current state as the user preset state.
Couplings	A user preset will cause the currently running measurement to be aborted, cause a mode switch to the power-on mode, and cause the saved measurement to be active in the power-on mode. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved.
Initial S/W Revision	Prior to A.02.00

Save User Preset

Saves the currently active mode and its State. You can recall this User Preset file by pressing the User Preset menu key or sending the SYST:PRES:USER remote command. This same state is also saved by the Save State function.

Key Path	User Preset
Remote Command	:SYSTem:PRESet:USER:SAVE
Example	:SYST:PRES:USER:SAVE
Notes	:SYST:PRES:SAVE creates the same file as if the user requested a *SAV or a MMEM:STOR:STAT, except User Preset Save does not allow the user to specify the filename or the location of the file.
Initial S/W Revision	Prior to A.02.00

View/Display

Accesses a menu of functions that enable you to set the display parameters and select the view.

See ["Display" on page 2374](#) for the display settings.

See ["View Selection" on page 804](#) for details of view selection.

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Display

The Display menu is common to most measurements, and is used for configuring items on the display. Some Display menu settings apply to all the measurements in a mode, and some only to the current measurement. Those under the System Display Settings key apply to all measurements in all modes.

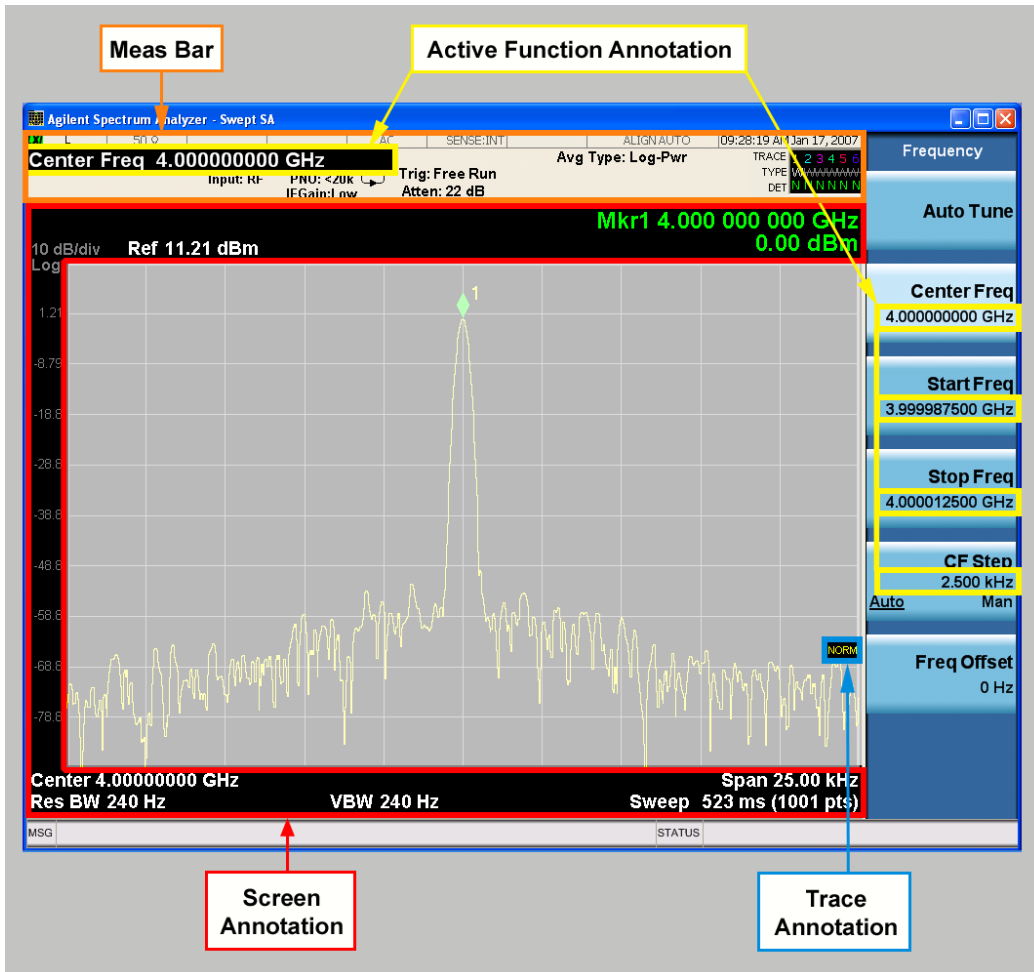
Key Path	Display
Key Path	View/Display
Initial S/W Revision	Prior to A.02.00

Annotation

Turns on and off various parts of the display annotation. The annotation is divided up into four categories:

1. Meas Bar: This is the measurement bar at the top of the screen. It does not include the settings panel or the Active Function. Turning off the Meas Bar turns off the settings panel and the Active Function. When the Meas Bar is off, the graticule area expands to fill the area formerly occupied by the Meas Bar.
2. Screen Annotation: this is the annotation and annunciation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) This does NOT include the marker number or the N dB result. When off, the graticule expands to fill the entire graticule area.
3. Trace annotation: these are the labels on the traces, showing their detector (or their math mode).
4. Active Function annotation: this is the active function display in the meas bar, and all of the active function values displayed on softkeys.

See the figure below. Each type of annotation can be turned on and off individually.



Key Path	View/Display, Display
Initial S/W Revision	Prior to A.02.00

Meas Bar On/Off

This function turns the Measurement Bar on and off, including the settings panel. When off, the graticule area expands to fill the area formerly occupied by the Measurement Bar.

Key Path	View/Display, Display, Annotation
Remote Command	:DISPlay:ANNotation:MBAR[:STATE] OFF ON 0 1 :DISPlay:ANNotation:MBAR[:STATE]?
Example	DISP:ANN:MBAR OFF
Dependencies	Grayed out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset	On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off.
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Screen

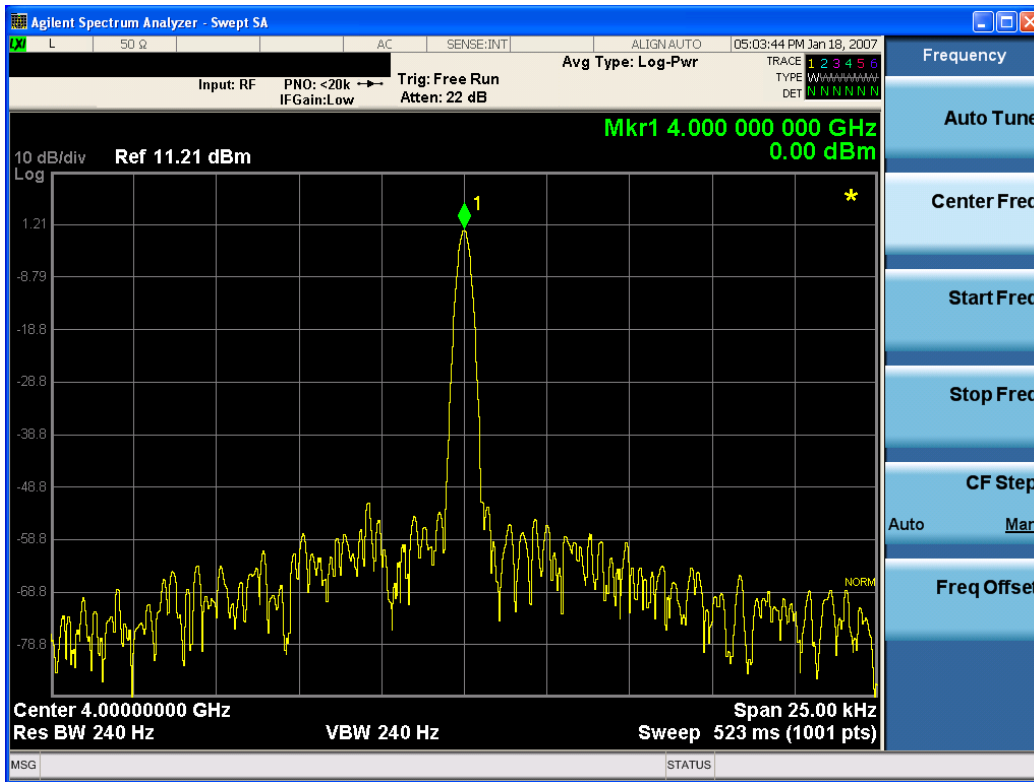
This controls the display of the annunciation and annotation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) and the y-axis annotation. This does NOT include marker annotation (or the N dB result). When off, the graticule expands to fill the entire graticule area, leaving only the 1.5% gap above the graticule as described in the Trace/Detector chapter.

Key Path	View/Display, Display, Annotation
Remote Command	:DISPlay:ANNotation:SCReen[:STATe] OFF ON 0 1 :DISPlay:ANNotation:SCReen[:STATe]?
Example	DISP:ANN:SCR OFF
Dependencies	Grayed-out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset	On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Active Function Values On/Off

Turns on and off the active function display in the Meas Bar, and all of the active function values displayed on the softkeys.

Note that all of the softkeys that have active functions have these numeric values blanked when this function is on. This is a security feature..



Key Path	View/Display, Display, Annotation
Remote Command	:DISPlay:ACTivefunc[:STATE] ON OFF 1 0 :DISPlay:ACTivefunc[:STATE]?
Example	DISP:ACT OFF
Dependencies	Grayed out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset	On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Title

Displays menu keys that enable you to change or clear a title on your display.

Key Path	View/Display, Display
Initial S/W Revision	Prior to A.02.00

Change Title

Writes a title into the "measurement name" field in the banner, for example, "Swept SA".

Press Change Title to enter a new title through the alpha editor. Press Enter or Return to complete the entry. Press ESC to cancel the entry and preserve your existing title.

The display title will replace the measurement name. It remains for this measurement until you press Change Title again, or you recall a state, or a Preset is performed. A title can also be cleared by pressing Title, Clear Title.

NOTE

Notice the inclusion of the <measurement> parameter in the command below. Because each measurement remembers the Display Title, the command must be qualified with the measurement name. For the Swept SA measurement this is not the case; no <measurement> parameter is used when changing the Display Title for the Swept SA measurement.

Key Path	View/Display, Display, Title
Mode	All
Remote Command	:DISPlay:<measurement>:ANNotation:TITLe:DATA <string> :DISPlay:<measurement>:ANNotation:TITLe:DATA?
Example	DISP:ANN:TITL:DATA "This Is My Title" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "This Is My Title" This example is for Measurements other than Swept SA. Both set the title to: This Is My Title
Notes	Pressing this key cancels any active function. When a title is edited the previous title remains intact (it is not cleared) and the cursor goes at the end so that characters can be added or BKSP can be used to go back over previous characters.
Preset	No title (measurement name instead)
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Clear Title

Clears a title from the front-panel display. Once cleared, the title cannot be retrieved. After the title is cleared, the current Measurement Name replaces it in the title bar.

Key Path	View/Display, Display, Title
Example	The following commands clear the title and restore the measurement's original title: DISP:ANN:TITL:DATA "" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "" This example is for ACP; in measurements other than Swept SA the measurement name is required.
Notes	Uses the :DISPlay:<measurement>:ANNotation:TITLe:DATA <string> command with an empty string (in the Swept SA, the <measurement> is omitted).
Preset	Performed on Preset.
Initial S/W Revision	Prior to A.02.00

Graticule

Pressing Graticule turns the display graticule On or Off. It also turns the graticule y-axis annotation on and off.

Key Path	View/Display, Display
Remote Command	:DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe] OFF ON 0 1 :DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe]?
Example	DISP:WIND:TRAC:GRAT:GRID OFF
Notes	The graticule is the set of horizontal and vertical lines that make up the grid/divisions for the x-axis and y-axis.
Preset	On
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00

System Display Settings

These settings are "Mode Global" – they affect all modes and measurements and are reset only by Restore Misc Defaults or Restore System Defaults under System.

Key Path	View/Display, Display
Initial S/W Revision	Prior to A.02.00

Annotation Local Settings

This is a Mode Global override of the meas local annotation settings. When it is All Off, it forces ScreenAnnotation, Meas Bar, Trace, and Active Function Values settings to be OFF for all measurements in all modes. This provides the security based "annotation off" function of previous analyzers; hence it uses the legacy SCPI command.

When it is All Off, the Screen, Meas Bar, Trace, and Active Function Values keys under the Display, Annotation menu are grayed out and forced to Off. When Local Settings is selected, you are able to set the local annotation settings on a measurement by measurement basis.

Key Path	View/Display, Display, System Display Settings
Remote Command	:DISPlay:WINDow[1]:ANNOtation[:ALL] OFF ON 0 1 :DISPlay:WINDow[1]:ANNOtation[:ALL]?
Example	:DISP:WIND:ANN OFF
Preset	On (Set by Restore Misc Defaults)
State Saved	Not saved in instrument state.
Backwards Compatibility Notes	The WINDow parameter and optional subopcode is included for backwards compatibility but ignored – all windows are equally affected.
Initial S/W Revision	Prior to A.02.00

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

Key Path	Save, Screen Image
Remote Command	:MMEMory:STORe:SCReen:THEMe TDColor TDMonochrome FCOLor FMONochrome :MMEMory:STORe:SCReen:THEMe?
Example	:MMEM:STOR:SCR:THEM TDM
Preset	3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes.
Readback	3D Color 3D Mono Flat Color Flat Mono
Backwards Compatibility Notes	In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical.
Initial S/W Revision	Prior to A.02.00

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDC
Readback	3D Color
Initial S/W Revision	Prior to A.02.00

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDM
Readback	3D Mono
Initial S/W Revision	Prior to A.02.00

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FCOL
Readback	Flat Color
Initial S/W Revision	Prior to A.02.00

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FMON
Readback	Flat Mono
Initial S/W Revision	Prior to A.02.00

Backlight

Accesses the display backlight on/off keys. This setting may interact with settings under the Windows "Power" menu.

When the backlight is off, pressing ESC, TAB, SPACE, ENTER, UP, DOWN, LEFT, RIGHT, DEL, BKSP, CTRL, or ALT turns the backlight on without affecting the application. Pressing any other key will turn backlight on and could potentially perform the action as well.

Key Path	View/Display, Display, System Display Settings
Remote Command	:DISPlay:BACKlight ON OFF :DISPlay:BACKlight?
Preset	ON (Set by Restore Misc Defaults)
Initial S/W Revision	Prior to A.02.00

Backlight Intensity

An active function used to set the backlight intensity. It goes from 0 to 100 where 100 is full on and 0 is off. This value is independent of the values set under the Backlight on/off key.

Key Path	View/Display, Display, System Display Settings
Remote Command	:DISPlay:BACKlight:INTensity <integer> :DISPlay:BACKlight:INTensity?
Example	DISP:BACK:INT 50

Preset	100 (Set by Restore Misc Defaults)
Min	0
Max	100
Initial S/W Revision	Prior to A.02.00

View Selection

You can select the desired measurement view from the following:

1. **I/Q Measured Polar Graph** (SCPI: POLar|CONStIn) – Provides a view of numeric results and a polar vector graph.

Window 1: Numeric Results

Window 2: I/Q Polar Graph

For more details of each window, see "[I/Q Measured Polar Graph](#)" on page 805.

2. **I/Q Error** (SCPI: ERRor|QUAD) – Provides a combination view including

Window 1: Magnitude Error

Window 2: Phase Error

Window 3: EVM

Window 4: Numeric Results

For more details of each window, see "[I/Q Error](#)" on page 810. Any of these windows can be selected (using the Next Window key) and made full size (using the Zoom key).

3. **Data Bits** (SCPI: DBITs) – Provides a view of the numeric results and data bits with the sync word (TSC) highlighted. For more details, see "[Data Bits](#)" on page 813.

Key Path	View/Display
Mode	GSM
Remote Command	:DISPlay:EEVM:VIEW[:SElect] POLar ERRor DBITs :DISPlay:EEVM:VIEW[:SElect]?
Example	DISP:EEVM:VIEW:SEL QUAD DISP:EEVM:VIEW:SEL?
Notes	- POLar: I/Q Measured Polar Graph - ERRor: I/Q Error - DBITs: Data Bits You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	View Selection by number must be coupled with this parameter value. Selecting POLar changed DISP:EEVM:VIEW:WIND2:TRAC:POL to VC.

Preset	POLar
State Saved	Saved in instrument state.
Range	I/Q Measured Polar Graph I/Q Error Data Bits
Initial S/W Revision	Prior to A.02.00

View Selection by number (Remote Command Only)

You can select the desired view by specifying the view number. For multi-window views, each window can be selected using the Next Window key, and made full size using the Zoom key.

1. **I/Q Measured Polar Graph** (SCPI: 1) – Provides a view of numeric results and a polar vector graph.
2. **I/Q Error** (SCPI: 2) – Provides a combination view including:
3. **Data Bits** (SCPI: 3) – Provides a view of the numeric results and data bits with the sync word (TSC) highlighted.

Mode	GSM
Remote Command	:DISPlay:EEVM:VIEW:NSElect <integer> :DISPlay:EEVM:VIEW:NSElect?
Example	DISP:EEVM:VIEW:NSEL 3 DISP:EEVM:VIEW:NSEL?
Notes	1: I/Q Measured Polar Graph 2: IQ Error 3: Data Bits You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	View Selection must be coupled with this parameter value.
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	3
Initial S/W Revision	Prior to A.02.00

I/Q Measured Polar Graph

For the Remote Commands, see ["View Selection" on page 804](#) and ["View Selection by number \(Remote Command Only\)" on page 805](#).

This topic includes the following sections, which provide details of this view's windows, as shown in the examples below:

["Graph window" on page 808](#)

["Metric window" on page 808](#)

Below: Example View with Vector and Constellation Traces

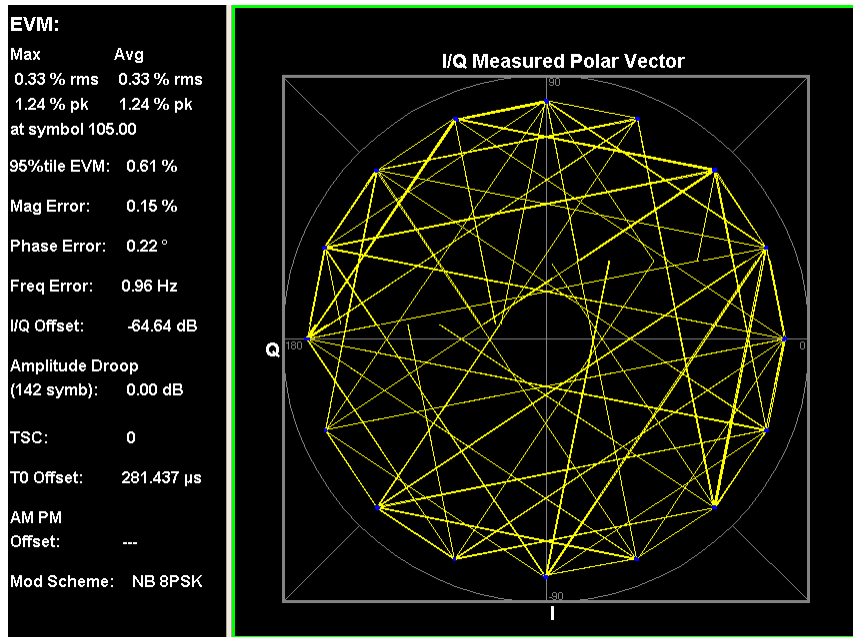


Figure 0-1 I/Q Measured Polar Graph view (Vector Constellation) for EDGE EVM Measurement

Below: Example View with Vector Trace Only

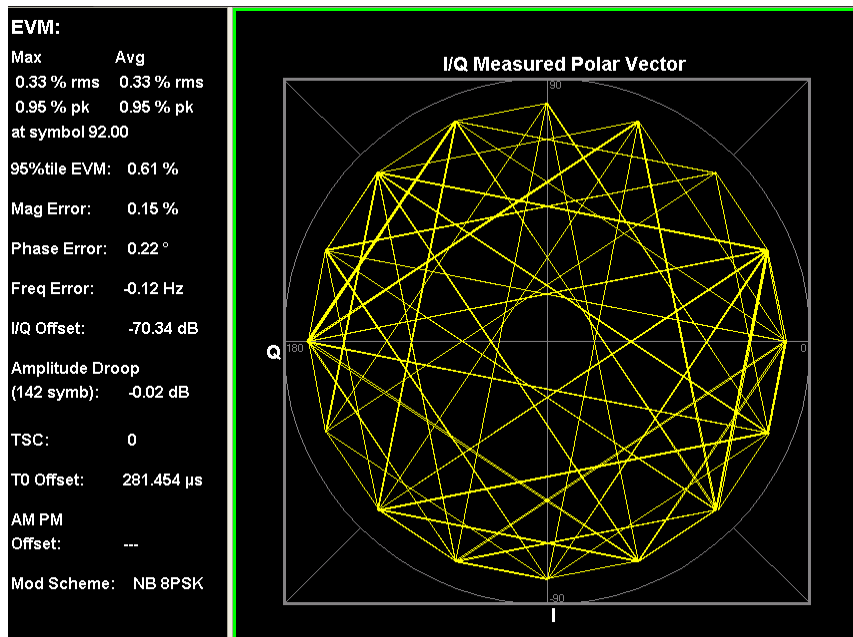


Figure 0-2 I/Q Measured Polar Graph view (Vector Only) for EDGE EVM Measurement

Below: Example View with Constellation Trace Only

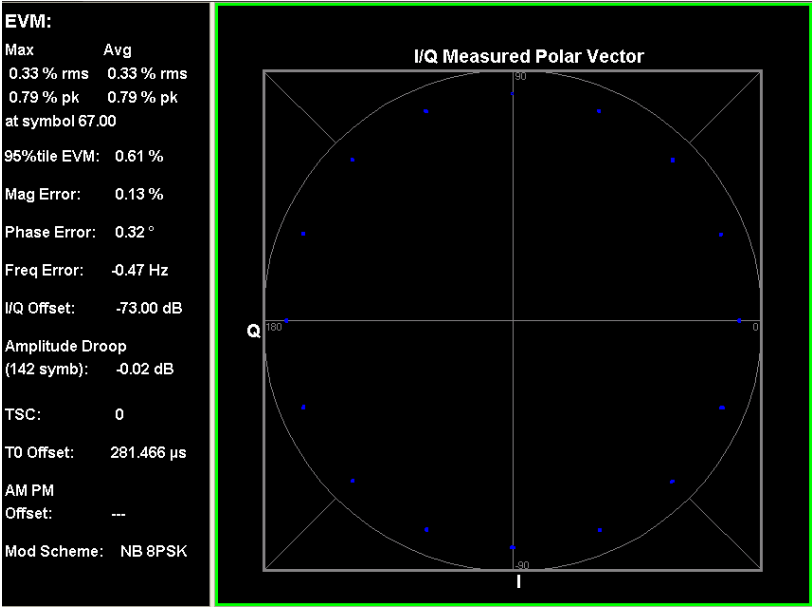


Figure 0-3 I/Q Measured Polar Graph view (Constellation Only) for EDGE EVM Measurement
Below: Example View with Vector and Constellation Traces (Symbol Derotated)

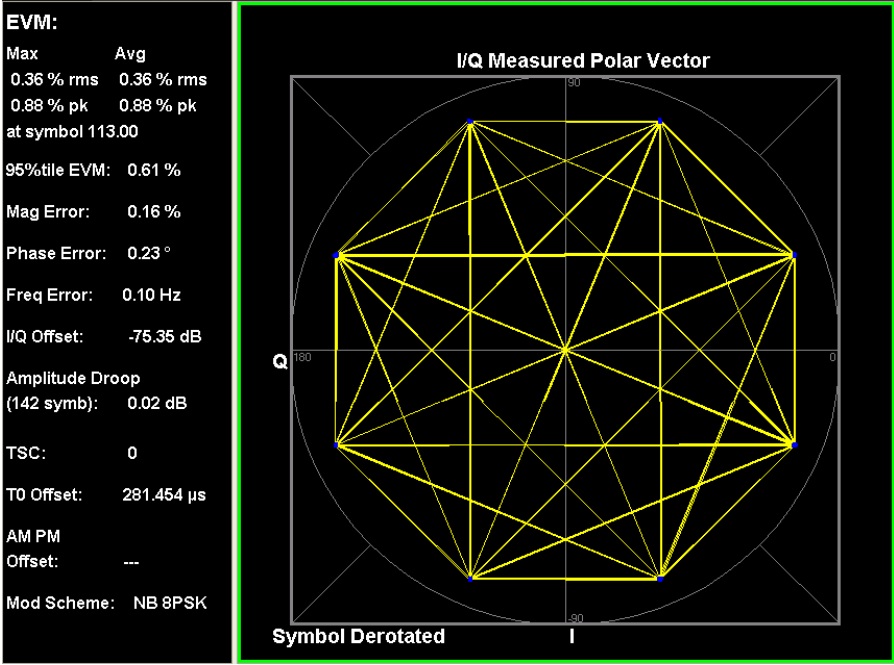


Figure 0-4 I/Q Measured Polar Graph view (Symbol Derotated) for EDGE EVM Measurement

Key Path	View/Display
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.02.00

Graph window

Marker Operation	No
Corresponding Trace	Series of float point numbers that alternately represent I and Q pairs of the final corrected measured data for the last slot. (n=5)

Metric window

Name	Corresponding Results	Display Format
EVM rms (Max)	n=1 3rd Maximum RMS EVM	9.99 % rms
EVM rms (Avg)	n=1 2nd RMS EVM	9.99 % rms
EVM Pk (Max)	n=1 5th Maximum peak EVM	9.99 % pk
EVM Pk (Avg)	n=1 4th Peak EVM	9.99 % pk
Symbol position of the peak EVM	n=1 6th Symbol position of Peak EVM.	99
95%ile EVM	n=1 1st RMS 95th %ile EVM	9.99 %
Mag Error	n=1 7th Magnitude error	9.99 %
Phase Error	n=1 9th Phase error	9.99 °
Freq Error	n=1 11th Frequency error	-999.99 Hz
I/Q Offset	n=1 13th I/Q origin offset	-99.99 dB
Amplitude Droop	n=1 14th Amplitude droop error	-99.99 dB
T0 Offset	n=1 15th Trigger to T0	0.000 us 0.000 symbols
AMPM Offset	n=1 16th AMPM Offset	0.000 us 0.0000 symbols
Mod Scheme	n=8 18th Modulation Scheme	NB 8PSK

NOTE

The value of 'TO Offset' and 'AM PM Offset' is displayed by 'sec' and both 'Symbol' unit. (The figure above does not show this. See the Data Bits figure.)

I/Q Polar Vect/Constln

I/Q Polar Vector/Constellation provides options that allow you to change the format of the polar vector graph. The following display options are available:

- Vector and Constellation (SCPI: VC)
- Vector Only (SCPI: VECTor)
- Constellation Only (SCPI: CONSTln)

Key Path	View/Display, I/Q Measured Polar Graph
Mode	GSM
Remote Command	:DISPlay:EEVM:VIEW[1]:WINDow2:TRACe:POLar VC VECTor CONSTln :DISPlay:EEVM:VIEW[1]:WINDow2:TRACe:POLar?
Example	DISP:EEVM:VIEW:WIND2:TRAC:POL VC DISP:EEVM:VIEW:WIND2:TRAC:POL?
Notes	VC : Vect & Constln VECTor: Vector CONSTln : Constellation You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	DISP:EEVM:VIEW POL changes this parameter to POL. DISP:EEVM:VIEW CONS changes this parameter to CONS.
Preset	VC
State Saved	Saved in instrument state.
Range	Vect & Constln Vector Constellation
Initial S/W Revision	Prior to A.02.00

Time Offset Unit

Toggles the unit of Time Offset result between Symbol and Second.

Key Path	View/Display, Display
Mode	GSM
Remote Command	:DISPlay:EEVM:TEXT:TFUNit SECond SYMBol :DISPlay:EEVM:TEXT:TFUNit?
Example	DISP:EEVM:TEXT:TFUN SEC DISP:EEVM:TEXT:TFUN?
Notes	This command only affects the display result. Results returned by remote commands are always expressed in units of "SYMBol".

Preset	SEC
State Saved	Saved in instrument state.
Range	sec symbols
Initial S/W Revision	Prior to A.02.00

I/Q Symbol Derotation

Allows you to derotate I/Q symbols.

- On: Derotate I/Q Symbols.
- Off: No I/Q Symbol derotation.

Key Path	View/Display, I/Q Measured Polar Graph
Mode	GSM
Remote Command	:DISPlay:EEVM:SDERotation[:STATe] OFF ON 0 1 :DISPlay:EEVM:SDERotation[:STATe]?
Example	DISP:EEVM:SDER ON DISP:EEVM:SDER?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

I/Q Error

For the Remote Commands, see ["View Selection" on page 804](#) and ["View Selection by number \(Remote Command Only\)" on page 805](#).

This topic includes the following sections, which provide details of this view's windows, as shown in the examples below:

["Mag Error window" on page 811](#)

["Phase Error window" on page 811](#)

["EVM window" on page 811](#)

["Metric window" on page 812](#)

Below: Example I/Q Error View

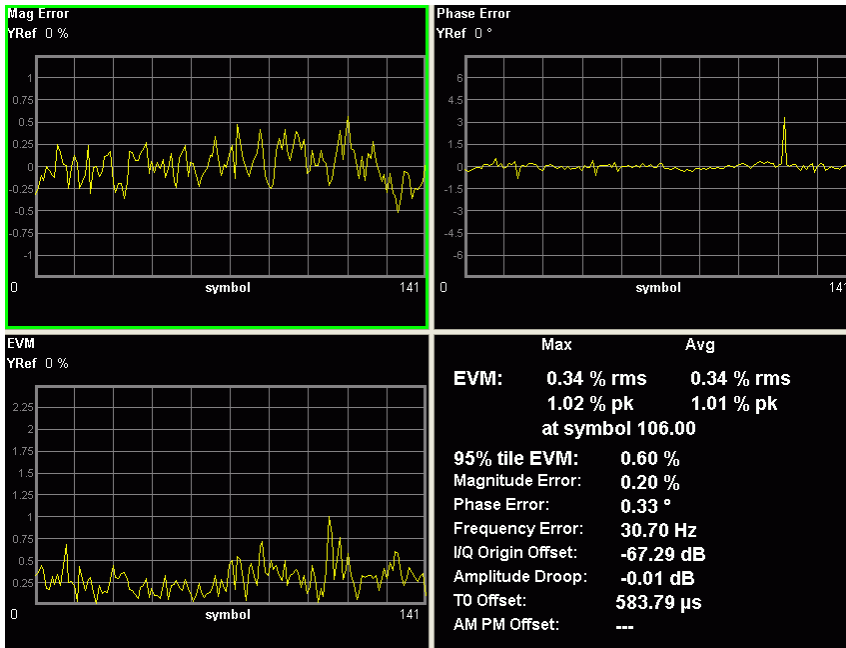


Figure 0-5 I/Q Error view for EDGE EVM Measurement

Key Path	View/Display
Initial S/W Revision	Prior to A.02.00

Mag Error window

Marker Operation	Yes
Corresponding Trace	Series of floating point numbers (in percent) that represent each sample in the magnitude error vector trace for the last slot. (n=3)

Phase Error window

Marker Operation	Yes
Corresponding Trace	Series of floating point numbers (in degree) that represent each sample in the phase error vector trace for the last slot. (n=4)

EVM window

Marker Operation	Yes
Corresponding Trace	Series of floating point numbers (in percent) that represent each sample in the EVM vector trace for the last slot. (n=2)

Metric window

Name	Corresponding Results	Display Format
EVM [rms] (Max)	n=1 3rd Maximum RMS EVM	9.99 % rms
EVM [rms] (Avg)	n=1 2nd RMS EVM	9.99 % rms
EVM [pk] (Max)	n=1 5th Maximum peak EVM	9.99 % pk
EVM [pk] (Avg)	n=1 4th Peak EVM	9.99 % pk
Symbol position of the peak EVM	n=1 6th Symbol position of Peak EVM.	99
95%ile EVM	n=1 1st RMS 95th %ile EVM	9.99 %
Magnitude Error	n=1 7th Magnitude error	9.99 %
Phase Error	n=1 9th Phase error	9.99 °
Frequency Error	n=1 11th Frequency error	-999.99 Hz
I/Q Origin Offset	n=1 13th I/Q origin offset	-99.99 dB
Amplitude Droop	n=1 14th Amplitude droop error	-99.99 dB
T0 Offset	n=1 15th Trigger to T0	0.000 us 0.000 symbols
AMPM Offset	n=1 16th AMPM Offset	0.000 us 0.0000 symbols

NOTE

The value of 'T0 Offset' and 'AM PM Offset' is displayed by 'sec' and both 'Symbol' unit. (The figure above does not show this. See the Data Bits figure.)

Symbol Dots

Allows you to toggle the symbol dots between On and Off.

- On: turns on blue symbol dots on the trace in 'Mag Error', 'Phase Error' & 'EVM' window.
- Off: turns off blue symbol dots on the trace in 'Mag Error', 'Phase Error' & 'EVM' window.

Key Path	View/Display

Mode	GSM
Remote Command	:DISPlay:EEVM:SDOTs[:STATe] OFF ON 0 1 :DISPlay:EEVM:SDOTs[:STATe]?
Example	DISP:EEVM:SDOT ON DISP:EEVM:SDOT?
Notes	This parameter does not control the constellation view/hide state on I/Q Measured Polar Graph. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Backwards Compatibility SCPI	[:SENSe] :EEVM:SDOTs [:STATe]
Initial S/W Revision	Prior to A.02.00

Time Offset Unit

Toggles the unit of Time Offset result between Symbol and Second.

Key Path	View/Display, Display
Mode	GSM
Remote Command	:DISPlay:EEVM:TEXT:TFUNit SECond SYMBOL :DISPlay:EEVM:TEXT:TFUNit?
Example	DISP:EEVM:TEXT:TFUN SEC DISP:EEVM:TEXT:TFUN?
Notes	This command only affects the display result. Results returned by remote commands are always expressed in units of "SYMBOL".
Preset	SEC
State Saved	Saved in instrument state.
Range	sec symbols
Initial S/W Revision	Prior to A.02.00

Data Bits

For the Remote Command, see ["View Selection" on page 804](#) and ["View Selection by number \(Remote Command Only\)" on page 805](#).

This view has only one window: the ["Metric window" on page 817](#).

Below: Example Data Bits View for EDGE Normal 8PSK Burst

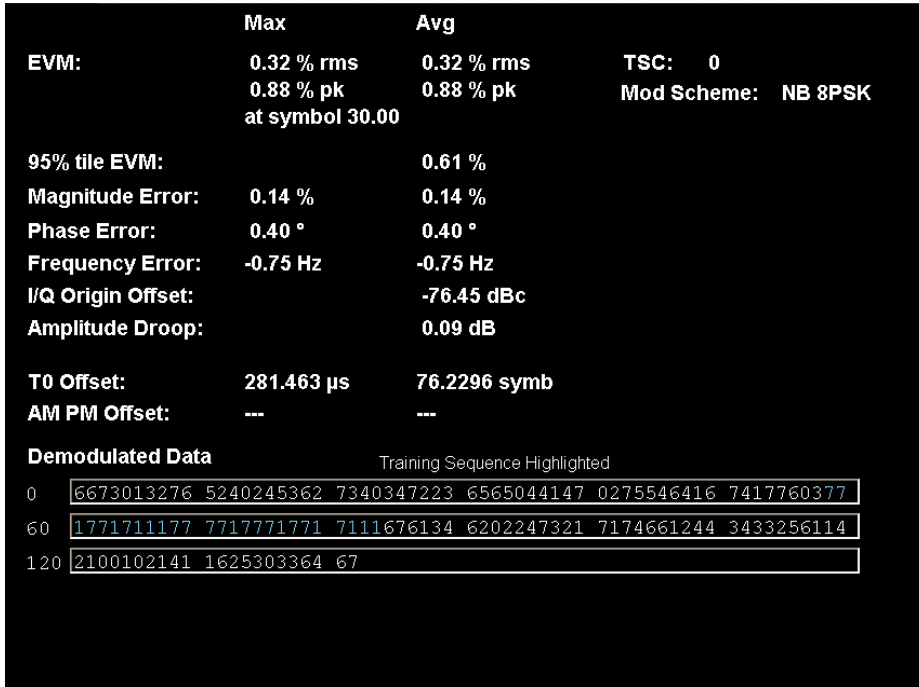


Figure 0-6 Data Bits view for EDGE Normal 8PSK Burst

Below: Example Data Bits View for EDGE Normal 16QAM Burst

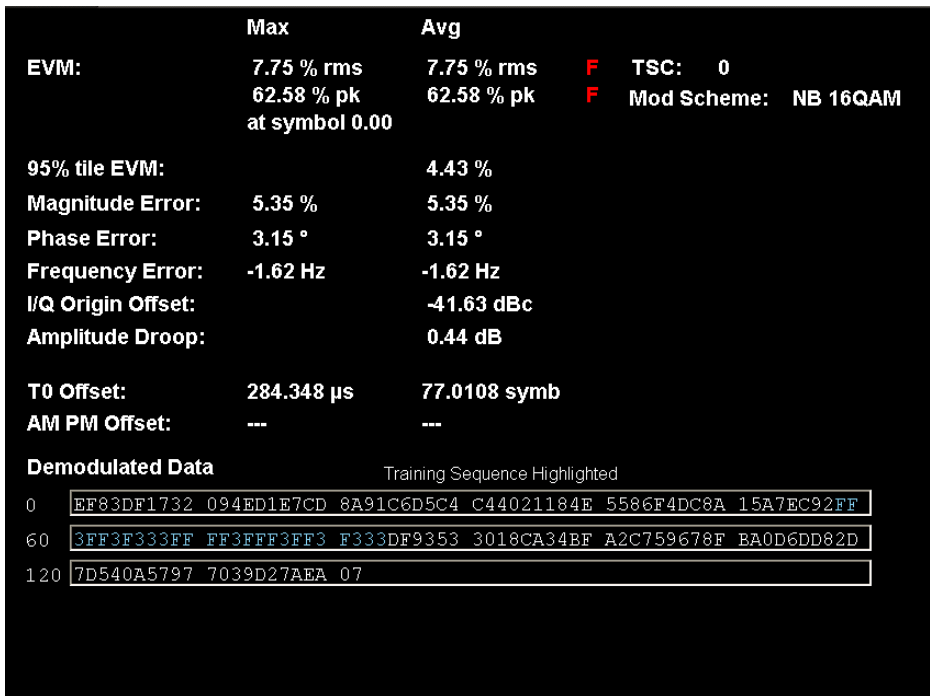


Figure 0-7 Data Bits view for EDGE Normal 16QAM Burst

Below: Example Data Bits View for EDGE Normal 32QAM Burst

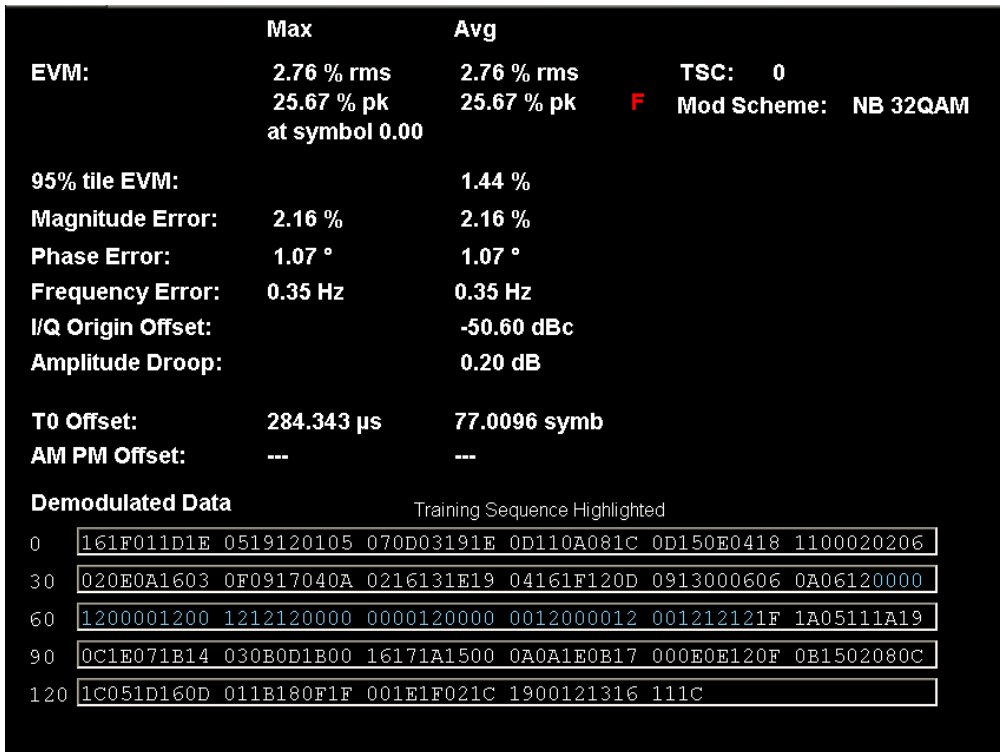


Figure 0-8 Data Bits view for EDGE Normal 32QAM Burst

Below: Example Data Bits View for EDGE HSR QPSK Burst

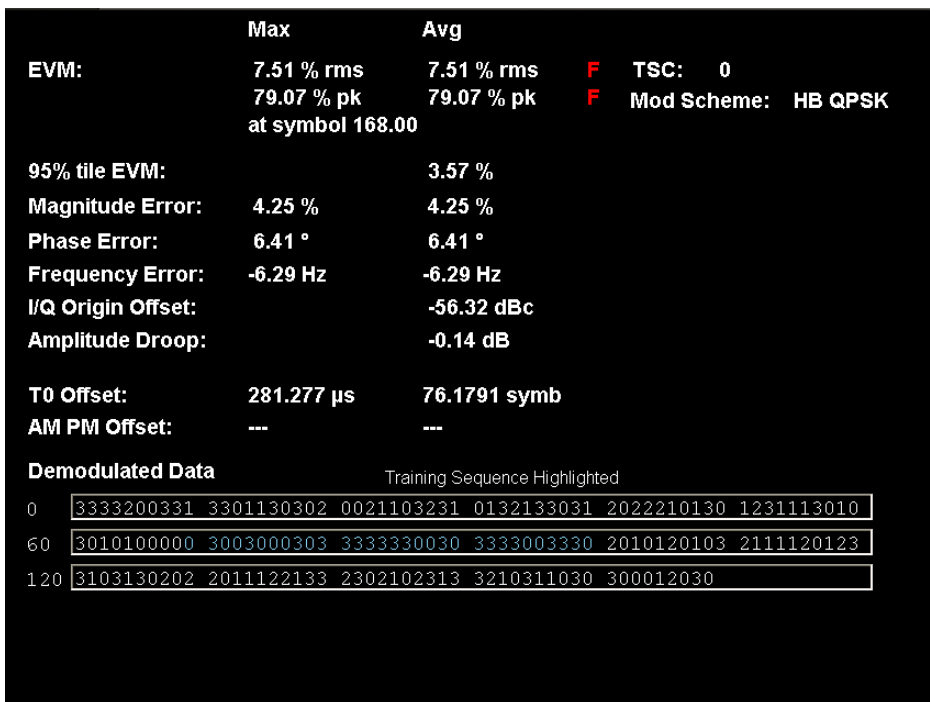


Figure 0-9 Data Bits view for EDGE HSR QPSK Burst

Below: Example Data Bits View for EDGE HSR 16QAM Burst

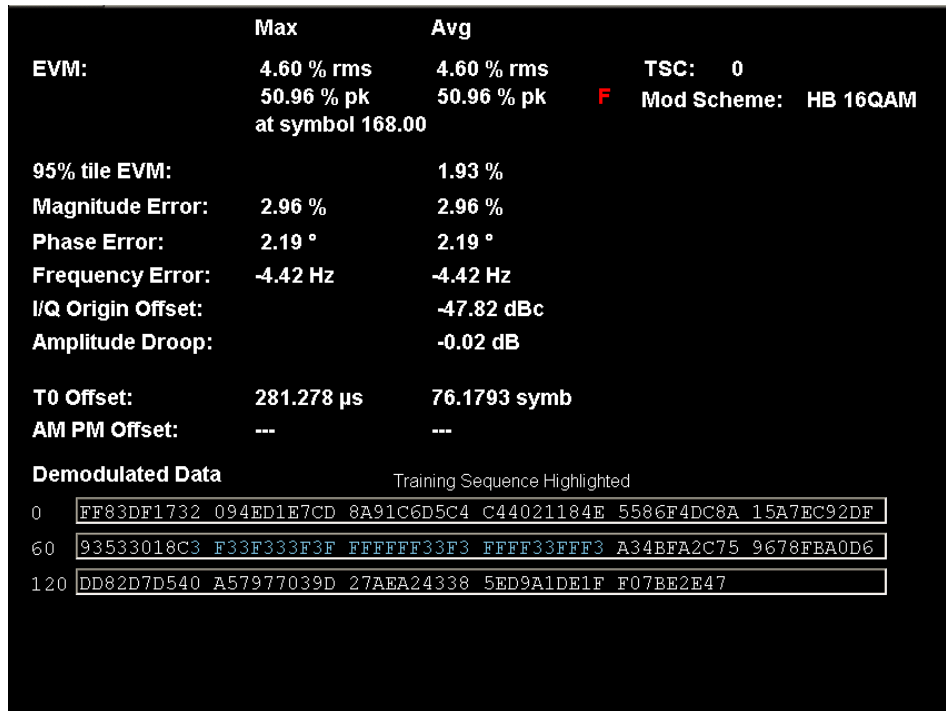


Figure 0-10 Data Bits view for EDGE HSR 16QAM Burst

Below: Example Data Bits View for EDGE HSR 32QAM Burst

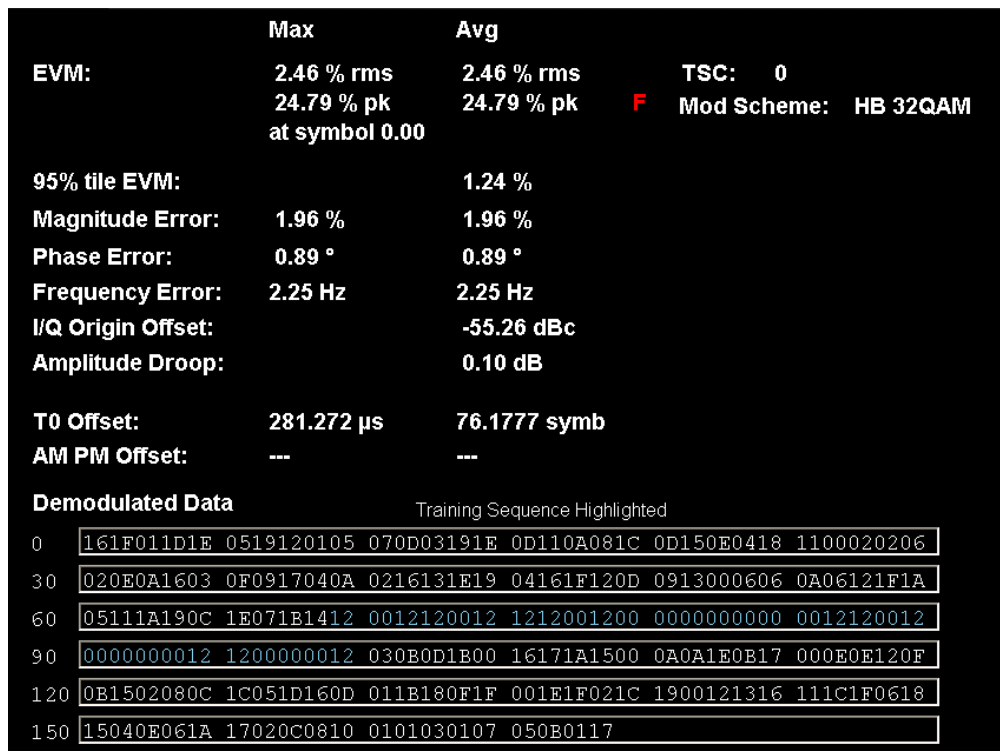


Figure 0-11 Data Bits view for EDGE HSR 32QAM Burst

Metric window

Name	Corresponding Results	Display Format
EVM rms (Max)	n=1 3rd Maximum RMS EVM	9.99 %rms
EVM rms (Avg)	n=1 2nd RMS EVM	9.99 %rms
EVM Pk (Max)	n=1 5th Maximum peak EVM	9.99 %pk
EVM Pk (Avg)	n=1 4th Peak EVM	9.99 %pk
Symbol position of the peak EVM	n=1 6th Symbol position of Peak EVM.	99
95%ile EVM	n=1 1st RMS 95th %ile EVM	9.99 %
Magnitude Error	n=1 7th Magnitude error	9.99 %
Phase Error	n=1 9th Phase error	9.99 °
Frequency Error	n=1 11th Frequency error	-999.99 Hz
I/Q Origin Offset	n=1 13th I/Q origin offset	-99.99 dB
Amplitude Droop	n=1 14th Amplitude droop error	-99.99 dB
T0 Offset	n=1 15th Trigger to T0	0.000 us 0.000 symbols
AMPM Offset	n=1 16th AMPM Offset	0.000 us 0.0000 symbols
Mod Scheme	n=8 18th Modulation Scheme	NB 8PSK

Key Path	View/Display
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.02.00

10 EDGE Output RF Spectrum Measurement

The Output RF Spectrum measurement is the GSM version of the adjacent channel power (ACP) measurement.

This topic contains the following sections:

["Measurement Commands for EDGE Output RF Spectrum" on page 820](#)

["Remote Command Results for EDGE Output RF Spectrum" on page 821](#)

Measurement Commands for EDGE Output RF Spectrum

The following commands and queries can be used to retrieve the measurement results:

`:CONFigure:EORFspectr`

`:CONFigure:EORFspectr:NDEFault`

`:INITiate:EORFspectr`

`:FETCh:EORFspectr [n] ?`

`:READ:EORFspectr [n] ?`

`:MEASure:EORFspectr [n] ?`

For more measurement related commands, see the section ["Remote Measurement Functions" on page 2301](#).

Remote Command Results for EDGE Output RF Spectrum

For the queries listed above, the results returned depend on the value of n, as follows.

Measurement Method	n	Results Returned
	0	Returns unprocessed I/Q trace data, as a series of comma-separated trace points, in volts. The I values are listed first in each pair, using the 0 through even-indexed values. The Q values are the odd-indexed values.
Single offset	not specified or n = 1	Returns 4 comma-separated results for the specified offset: <ol style="list-style-type: none"> 1. Modulation spectrum power, dB 2. Modulation spectrum power, dBm 3. Switching transient power, dB 4. Switching transient power, dBm
Multi-Offset	not specified or n = 1	<p>Returns a list of comma-separated values for the modulation spectrum at all the offsets (lower and upper). This is followed by the switching transient results at all the offsets (lower and upper). The carrier is considered offset zero (0) and is the first set of results sent. Four values are provided for each of the offsets (including the carrier), in this order:</p> <ol style="list-style-type: none"> 1. Lower offset(a) - power relative to carrier (dB) 2. Lower offset(a) - absolute average power (dBm) 3. Upper offset(a) - power relative to carrier (dB) 4. Upper offset(a) - absolute average power (dBm) <p>Values for all possible offsets are sent. Zeros are sent for offsets that have not been defined. The total number of values sent (120) = (4 results/offset) * (15 offsets) * (2 measurement types - modulation & switching)</p> <p>Carrier - modulation measurement values Offset 1 - modulation measurement values and so on ... Offset 14 - modulation measurement values Carrier - switching transients measurement values Offset 1 - switching transients measurement values ... Offset 14 - switching transients measurement values and so on</p> <p>This measurement defaults to modulation measurements and not switching measurements. If you want to return the switching measurement values, you must change that default condition and use FETCh or READ to return values, rather than MEASure.</p>
Swept	not specified or n = 1	Returns 5 comma-separated results of the closest point to the limit line: <ol style="list-style-type: none"> 1. Frequency 2. Offset frequency from carrier frequency

Measurement Method	n	Results Returned
		3. Power in dBm 4. delta from limit (dB) 5. delta from reference (dB)
Single offset	2	Returns floating point numbers (in dBm) of the captured trace data. It contains N data points of the “spectrum due to modulation” signal, where N is the specified number of samples.
Multi-Offset or Swept	2	Nothing returns.
Single offset	3	Returns floating point numbers (in dBm) of the captured trace data. It contains N data points of the “spectrum due to switching transients” signal, where N is the specified number of samples.
Multi-Offset or Swept	3	Nothing returns.
Swept	4	Returns floating point numbers (in dBm) of the sweep spectrum trace.
Multi-Offset or Single Offset	4	Nothing returns.
Swept	5	Returns floating point numbers (in dBm) of the swept limit trace.
Multi-Offset or Single Offset	5	Nothing returns.
Multi-Offset	6	<p>Relative level to the test limit, and test limit itself for both modulation and switching transient measurements.</p> <p>Returns a list of relative level to the test limit, the relative test limit and the absolute test limit for all the offset frequencies. The relative level to the test limit is returned for both lower and upper offsets. Four values are returned for each offset in the following order:</p> <ol style="list-style-type: none"> 1. Relative level to the test limit (dB) at the lower offset frequency 2. Relative level to the test limit (dB) at the upper offset frequency 3. Relative test limit used (dB) 4. Absolute test limit used (dBm) <p>For #3 and #4, the value of the upper offset frequencies are returned when carriers are set to more than 1.</p> <p>Values for all possible offsets are returned.</p> <p>The carrier frequency is considered offset zero (0.0 Hz) and is the first set of values returned.</p> <p>Zeros are returned for offsets that have not been defined.</p> <p>Zeros are returned for the measurement that was not performed. For example, if Meas Type is Modulation, all switching transient measurement results are 0.0.</p> <p>The total number of values returned is:</p> $120 = (4 \text{ results / offset}) * (15 \text{ offset frequencies}) * (2 \text{ measurement types})$

Measurement Method	n	Results Returned
		Carrier (Offset A) - modulation measurement results Offset 1 (Offset B) - modulation measurement results ... Offset 14 (Offset O) - modulation measurement results Carrier (Offset A) - switching transients measurement results Offset 1 (Offset B) - switching transient measurement results ... Offset 14 (Offset O) - switching transients measurement results
Single Offset or Swept	6	Returns NULL
All	7	Returns floating point number (in dBm) of Measured Carrier Power Level that determines the PCL.
Multi-Offset	8	Returns a list of relative level to the test limit, test limit itself, and the test limit actually applied for the test (Abs, Rel, or both Abs and Rel) for both modulation and switching transient measurements. Eight values are returned for each offset in the following order. <1 ~4: Lower Offset Freq.> 1. Relative level to the test limit (dB) 2. Relative test limit (dB) 3. Absolute test limit (dBm) 4. Test limit actually applied (1 for Abs, 2 for Rel, 3 for Abs and Rel) <5 ~8: Upper Offset Freq.> 1. Relative level to the test limit (dB) 1. Relative test limit (dB) 2. Absolute test limit (dBm) 3. Test limit actually applied (1 for Abs, 2 for Rel, 3 for Abs and Rel) The total number of values returned: $240 = (8 \text{ values/offset}) * (15 \text{ offset frequencies}) * (2 \text{ Meas Type})$ Values for all possible offsets are returned. The carrier frequency is considered offset zero (0.0 Hz) and is the first set of values returned. Zeros are returned for offsets that have not been defined. Zeros are returned for the measurement that was not performed. For example, if Meas Type is Modulation, all switching transient measurement results are 0.0. When Meas Type is Modulation: Carrier (Offset A) - All values are 0. Offset 1 (Offset B) - limit measurement values ...

Measurement Method	n	Results Returned
		<p>Offset 14 (Offset 0) - limit measurement values</p> <p>When Meas Type is Switching:</p> <p>Carrier (Offset A) - All values are 0.</p> <p>Offset 1 (Offset B) -limit measurement values</p> <p>...</p> <p>Offset 14 (Offset 0) - limit measurement values</p>
Single Offset or Swept	8	Returns NULL.
All	9	<p>Note that this query is duplicated. Use the query (n=11) instead.</p> <p>Returns a list of comma-separated values for the Carrier Header Information and the Carrier Power Measurement Results for Modulation and Switching.</p> <p>1. Carrier Header Information for Modulation</p> <p>Nine values are returned in the following order.</p> <p>(a) Number of Carriers</p> <p>(b) Reference Carrier</p> <p>(c) VBW/RBW Ratio</p> <p>(d) Modulation Carrier RBW 1</p> <p>(e) Modulation Carrier RBW 2</p> <p>(f) Modulation Carrier RBW 3</p> <p>(g) Power Reference Type (Reference Carrier = 0, Max Power = 1)</p> <p>(h) Actual Reference Carrier</p> <p>(i) Modulation Type for Actual Reference Carrier (GMSK = 0, EDGE = 1)</p> <p>All of the modulation carrier RBW 1, 2, and 3 are valid only when the following conditions are met.</p> <ul style="list-style-type: none"> + The number of carriers is more than 1. + The Meas Type is set to Modulation or Modulation&Switching. + The Carrier RBW is set to Auto. + The Ofst Freq List is set to Standard in the Multi Offset method or the Wideband Noise is set to ON in the Swept method. <p>All are invalid unless the Meas Type is set to Modulation or Modulation&Switching.</p> <p>2. Carrier Power Measurement Results for Modulation</p> <p>Six values are returned for each carrier in the following order.</p> <p>(a) Carrier Power</p> <p>(b) Reference Power Measured with Modulation Carrier RBW 1</p> <p>(c) Reference Power Measured with Modulation Carrier RBW 2</p> <p>(d) Reference Power Measured with Modulation Carrier RBW 3</p>

Measurement Method	n	Results Returned
		<p>(e) Carrier Center Frequency</p> <p>(f) Power Present (No = 0, Yes = 1)</p> <p>The maximum number of carriers is 8, and therefore a total of 48 values are returned.</p> <p>The Carrier Power and the Carrier Center Frequency are invalid when its corresponding Power Present is set to 0.</p> <p>The Reference Power is invalid when its corresponding Modulation Carrier RBW is invalid.</p> <p>All are invalid unless the Meas Type is set to Modulation or Modulation&Switching.</p> <p>3. Carrier Header Information for Switching</p> <p>Seven values are returned in the following order.</p> <p>(a) Number of Carriers</p> <p>(b) Reference Carrier</p> <p>(c) VBW/RBW Ratio</p> <p>(d) Switching Carrier RBW</p> <p>(e) Power Reference Type (Reference Carrier = 0. Max Power = 1)</p> <p>(f) Actual Reference Carrier</p> <p>(g) Modulation Type for Actual Reference Carrier (GMSK = 0, EDGE = 1)</p> <p>All are invalid unless the Meas Type is set to Switching or Modulation&Switching.</p> <p>4 Carrier Power Measurement Results for Switching</p> <p>Four values are returned for each carrier in the following order.</p> <p>(a) Carrier Power</p> <p>(b) Reference Power Measured with Switching Carrier RBW</p> <p>(c) Carrier Center Frequency</p> <p>(d) Power Present (No = 0, Yes = 1)</p> <p>The maximum number of carriers is 8, and therefore a total of 32 values are returned.</p> <p>The Carrier Power and the Carrier Center Frequency are invalid when its corresponding Power Present is set to 0.</p> <p>The Reference Power is invalid when the Switching Carrier RBW is invalid</p> <p>All are invalid unless the Meas Type is set to Switching or Modulation&Switching.</p>
Multi-Offset	10	<p>Returns a list of results for both modulation and switching transient measurements in the multi-offset method. Sixteen values are returned for each offset in the following order.</p> <p>1. Offset frequency (Hz)</p> <p>2. Offset RBW (Hz)</p>

Measurement Method	n	Results Returned
		<p><3~9: Lower Offset Freq.></p> <p>3. Carrier RBW (Hz)</p> <p>4. Power relative to carrier (dB)</p> <p>5. Relative level to the test limit (dB)</p> <p>6. Absolute average power (dBm)</p> <p>7. Relative test limit (dB)</p> <p>8. Absolute test limit (dBm)</p> <p>9. Test limit actually applied (0 for not applied, 1 for Abs, 2 for Rel, 3 for Abs and Rel)</p> <p><10~16: Upper Offset Freq.></p> <p>10. Carrier RBW (Hz)</p> <p>11. Power relative to carrier (dB)</p> <p>12. Relative level to the test limit (dB)</p> <p>13. Absolute average power (dBm)</p> <p>14. Relative test limit (dB)</p> <p>15. Absolute test limit (dBm)</p> <p>16. Test limit actually applied (0 for not applied, 1 for Abs, 2 for Rel, 3 for Abs and Rel)</p> <p>The total number of values returned: IF all the following conditions are met</p> <ul style="list-style-type: none"> • The number of carriers is greater than one. • (CHAN:CARR:COUN n, where n > 1) • The state of the test limit exception is set to On. (EORF:MCAR:LEXC ON) • The type of the multicarrier limit exception rule is set to Custom. (EORF:MCAR:LEXC:RULE CUST) • The type of a frequency list for multi offset is set to Limited Custom. (EORF:LIST:SEL LCUS) <p>THEN</p> <p>$1280 = (16 \text{ values/offset}) * (40 \text{ offset frequencies}) * (2 \text{ Meas Type})$ Values for all possible offsets are returned.</p> <p>Offset 1 – modulation measurement results ...</p> <p>Offset 40 – modulation measurement results</p> <p>Offset 1 – switching transient measurement results ...</p> <p>Offset 40 – switching transient measurement results</p> <p>ELSE</p> <p>$448 = (16 \text{ values/offset}) * (14 \text{ offset frequencies}) * (2 \text{ Meas Type})$ Values for all possible offsets are returned.</p> <p>Offset 1 – modulation measurement results ...</p> <p>Offset 14 – modulation measurement results</p>

Measurement Method	n	Results Returned
		Offset 1 – switching transient measurement results ... Offset 14 – switching transient measurement results
All	11	<p>Returns a list of comma-separated values for the Carrier Header Information and the Carrier Power Measurement Results for Modulation and Switching.</p> <p>1. Carrier Header Information for Modulation</p> <p>Nine values are returned in the following order.</p> <ul style="list-style-type: none"> (a) Number of Carriers (b) Reference Carrier (c) VBW/RBW Ratio (d) Modulation Carrier RBW 1 (e) Modulation Carrier RBW 2 (f) Modulation Carrier RBW 3 (g) Power Reference Type (Reference Carrier = 0, Max Power = 1) (h) Actual Reference Carrier (i) Modulation Type for Actual Reference Carrier (GMSK = 0, EDGE = 1) <p>All of the modulation carrier RBW 1, 2, and 3 are valid only when the following conditions are met.</p> <ul style="list-style-type: none"> + The number of carriers is more than 1. + The Meas Type is set to Modulation or Modulation&Switching. + The Carrier RBW is set to Auto. + The Ofst Freq List is set to Standard in the Multi Offset method or the Wideband Noise is set to ON in the Swept method. <p>All are invalid unless the Meas Type is set to Modulation or Modulation&Switching.</p> <p>2. Carrier Power Measurement Results for Modulation</p> <p>Six values are returned for each carrier in the following order.</p> <ul style="list-style-type: none"> (a) Carrier Power (b) Reference Power Measured with Modulation Carrier RBW 1 (c) Reference Power Measured with Modulation Carrier RBW 2 (d) Reference Power Measured with Modulation Carrier RBW 3 (e) Carrier Center Frequency (f) Power Present (No = 0, Yes = 1) <p>As a result, a total of 6 * N values are returned where N is the number of carriers.</p> <p>The Carrier Power and the Carrier Center Frequency are invalid when its corresponding Power Present is set to 0.</p> <p>The Reference Power is invalid when its corresponding Modulation</p>

Measurement Method	n	Results Returned
		<p>Carrier RBW is invalid.</p> <p>All are invalid unless the Meas Type is set to Modulation or Modulation&Switching.</p> <p>3. Carrier Header Information for Switching</p> <p>Seven values are returned in the following order.</p> <p>(a) Number of Carriers</p> <p>(b) Reference Carrier</p> <p>(c) VBW/RBW Ratio</p> <p>(d) Switching Carrier RBW</p> <p>(e) Power Reference Type (Reference Carrier = 0. Max Power = 1)</p> <p>(f) Actual Reference Carrier</p> <p>(g) Modulation Type for Actual Reference Carrier (GMSK = 0, EDGE = 1)</p> <p>All are invalid unless the Meas Type is set to Switching or Modulation&Switching.</p> <p>4. Carrier Power Measurement Results for Switching</p> <p>Four values are returned for each carrier in the following order.</p> <p>(a) Carrier Power</p> <p>(b) Reference Power Measured with Switching Carrier RBW</p> <p>(c) Carrier Center Frequency</p> <p>(d) Power Present (No = 0, Yes = 1)</p> <p>As a result, a total of $4 * N$ values are returned where N is the number of carriers.</p> <p>The Carrier Power and the Carrier Center Frequency are invalid when its corresponding Power Present is set to 0.</p> <p>The Reference Power is invalid when the Switching Carrier RBW is invalid</p> <p>All are invalid unless the Meas Type is set to Switching or Modulation&Switching.</p>
Swept	12	<p>Returns the number of failed frequency bands and a list of the following four pieces of information for each of the frequency bands.</p> <p>1. The offset frequency of the band center frequency, Hz</p> <p>17. The worst delta power in the band, dBm</p> <p>18. The absolute frequency of the band center frequency, Hz</p> <p>19. The absolute frequency with the worst delta power in the band, Hz</p> <p>As a result, a total of $(1 + 4 * N)$ values are returned where N is the number of failed frequency bands.</p>
Key Path	Meas	

Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.07.00, A.13.00, A.14.00

AMPTD Y Scale

Accesses a menu of functions that enable you to set the vertical scale parameters. These functions control how data on the vertical (Y) axis is displayed and control instrument settings that affect the vertical axis.

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Ref Value

Allows you to set the absolute power reference.

Key Path	AMPTD Y Scale
Mode	GSM
Remote Command	:DISPlay:EORFspectr:VIEW[1] 2:WINDow[1]:TRACe:Y[:SCALE]:RLEVel <real> :DISPlay:EORFspectr:VIEW[1] 2:WINDow[1]:TRACe:Y[:SCALE]:RLEVel?
Example	DISP:EORF:VIEW:WIND:TRAC:Y:RLEV -10 DISP:EORF:VIEW:WIND:TRAC:Y:RLEV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. SubOpCode: VIEW[1]:WINDow[1]: RF Envelope window VIEW2:WINDow[1]: Spectrum window
Dependencies	Blanked when Meas Method is Multi Offset.
Couplings	When the Auto Scaling is On, this value is automatically determined by the measurement result. When the user sets this value manually, Auto Scaling automatically changes to Off.
Preset	0.00 0.00
State Saved	Saved in instrument state.
Min	-250.0
Max	250.0
Initial S/W Revision	Prior to A.02.00

Attenuation

This menu controls the attenuator functions and interactions between the attenuation system components.

There are two attenuator configurations in the X-Series. One is a dual attenuator configuration consisting of a mechanical attenuator and an optional electronic attenuator. The other configuration uses a single attenuator with combined mechanical and electronic sections that controls all the attenuation functions. Different models in the X-Series come with different configurations.

See ["Dual Attenuator Configurations:" on page 831](#)

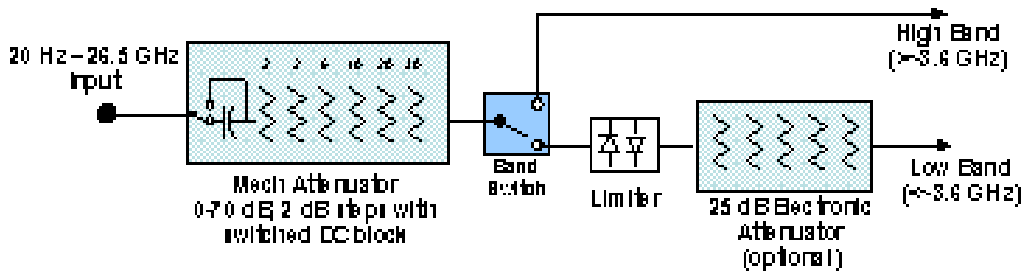
See "Single Attenuator Configuration:" on page 832

Most Attenuation settings are the same for all measurements – they do not change as you change measurements. Settings like these are called “Meas Global” and are unaffected by Meas Preset.

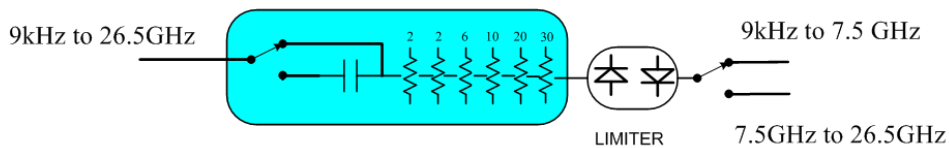
Key Path	AMPTD Y Scale
Scope	Meas Global
Dependencies	In measurements that support the I/Q inputs, this key is unavailable when I/Q is the selected input, and is replaced by the Range key in that case.
Readback Line	Contains a summary in [] brackets of the current total attenuation. See the descriptions of the , " (Mech) Atten " on page 2242, and " Enable Elec Atten " on page 2244 keys for more detail on the contributors to the total attenuation. Note that when "Pre-Adjust for Min Clip" is on, this value can change at the start of every measurement.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Dual Attenuator Configurations:

Configuration 1: Mechanical attenuator + optional electronic attenuator

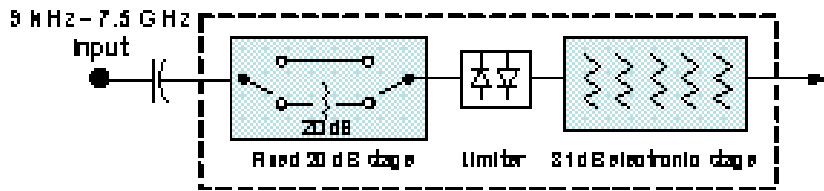


Configuration 2: Mechanical attenuator, no optional electronic attenuator

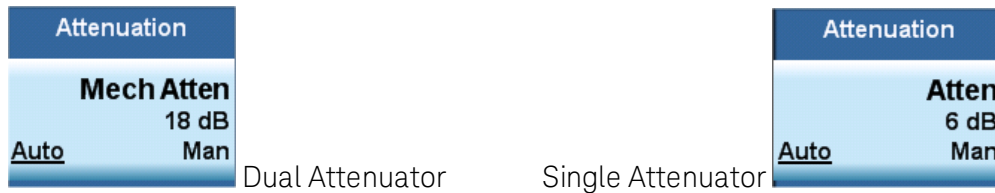


(note that Configuration 2 is not strictly speaking a dual-section attenuator, since there is no electronic section available. However, it behaves exactly like Configuration 1 without the Electronic Attenuator option EA3, therefore for the sake of this document it is grouped into the “Dual Attenuator” configuration)

Single Attenuator Configuration:



You can tell which attenuator configuration you have by pressing the Attenuation key, which (in most Modes) opens the Attenuation menu. If the first key in the Attenuation menu says Mech Atten you have the dual attenuator configuration. If the first key says Atten you have the single attenuator configuration.



In the single attenuator configuration, you control the attenuation with a single control, as the fixed stage has only two states. In the dual attenuator configuration, both stages have significant range so you are given separate control of the mechanical and electronic attenuator stages.

When you have the dual attenuator configuration, you may still have only a single attenuator, because unless option EA3 (the Electronic Attenuator option) is available, and you purchase it, you will have only the mechanical attenuator.

(Mech) Atten

This key is labeled Mech Atten in dual attenuator models and Atten in single attenuator models. In the dual attenuator configuration, this key only affects the mechanical attenuator.

This key lets you modify the attenuation applied to the RF input signal path. This value is normally auto coupled to the Ref Level, the Internal Preamp Gain, any External Gain that is entered, and the Max Mixer Level, as described in the table below.

See ["Attenuator Configurations and Auto/Man" on page 834](#)

Key Path	AMPTD Y Scale, Attenuation
Remote Command	<pre>[:SENSe]:POWer[:RF]:ATTenuation <rel_ampl> [:SENSe]:POWer[:RF]:ATTenuation? [:SENSe]:POWer[:RF]:ATTenuation:AUTO OFF ON 0 1 [:SENSe]:POWer[:RF]:ATTenuation:AUTO?</pre>
Example	<p>POW:ATT 20</p> <p>Dual attenuator configuration: sets the mechanical attenuator to 20 dB</p> <p>Single attenuator mode: sets the main attenuation to 20 dB (see below for definition of “main” attenuation).</p> <p>If the attenuator was in Auto, it sets it to Manual.</p>
Dependencies	Some measurements do not support the Auto setting of (Mech) Atten. In these measurements, the

Auto/Man selection is not available, and the Auto/Man line on the key disappears.

In dual attenuator configurations, when the electronic attenuator is enabled, the mechanical attenuator has no auto setting and the Auto/Man line on the key disappears. The state of Auto/Man is remembered and restored when the electronic attenuator is once again disabled. This is described in more detail in the ["Enable Elec Atten" on page 2244](#) key description.

See ["Attenuator Configurations and Auto/Man" on page 834](#) for more information on the Auto/Man functionality of Attenuation.

Couplings

When (Mech) Atten is in Auto, it uses the following algorithm to determine a value:
 If the USB Preamp is connected to USB, use 0 dB.
 Otherwise, $Atten = ReferenceLevel + PreAmpGain + ExternalGain - RefLevelOffset - MaxMixerLevel + IF\ Gain$.
 Limit this value to be between 6 dB and the Max value. No value below 6 dB can ever be chosen by Auto.
 The resulting value is rounded up to the largest value possible given the attenuation step setting. That is, 50.01 dB would change to 60 dB (for a 10 dB attenuation step).
 The "IF Gain" term in the equation above is either 0 dB or +10 dB, depending on the settings of FFT IF Gain, Swept IF Gain, max Ref Level and the Auto/Man setting of Mech Atten.
 In External Mixing and BBIQ, where the Attenuator is not in the signal path, the Attenuator setting changes as described above when (Mech) Atten is in Auto, but no changes are made to the actual attenuator hardware setting until the input is changed back to the RF Input.

Preset The preset for Mech Attenuation is "Auto."
 The Auto value of attenuation is:
 CXA, EXA, MXA and PXA: 10 dB

State Saved Saved in instrument state

Min 0 dB
 The attenuation set by this key cannot be decreased below 6 dB with the knob or step keys. To get to a value below 6 dB it has to be directly entered from the keypad or via SCPI. This protects from adjusting the attenuation to a dangerously small value which can put the instrument at risk of damage to input circuitry. However, if the current mechanical attenuation is below 6 dB it can be increased with the knob and step keys, but not decreased.

Max CXA N9000A-503/507: 50 dB
 CXA N9000A-513/526: 70dB
 EXA: 60 dB
 MXA and PXA: 70 dB
 In the single attenuator configuration, the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB.

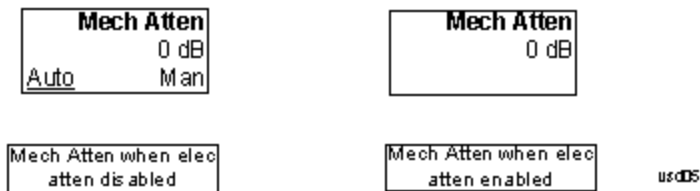
Initial S/W Revision Prior to A.02.00

Modified at S/W Revision A.03.00

Attenuator Configurations and Auto/Man

As described in the Attenuation key description, there are two distinct attenuator configurations available in the X-Series, the single attenuator and dual attenuator configurations. In dual attenuator configurations, we have the mechanical attenuation and the electronic attenuation, and the current total attenuation is the sum of the electronic + mechanical attenuation. In single attenuator configurations, we refer to the attenuation set using the (Mech) Atten key (or POW:ATT SCPI) as the “main” attenuation; and the attenuation that is set by the SCPI command POW:EATT as the “soft” attenuation (the POW:EATT command is honored even in the single attenuator configuration, for compatibility purposes). Then the current total attenuation is the sum of the main + soft attenuation. See the Elec Atten key description for more on “soft” attenuation.

In the dual attenuator configuration, when the electronic attenuator is enabled, there is no Auto/Man functionality for the mechanical attenuator, and the third line of the key label (the Auto/Man line) disappears:



Enable Elec Atten

Enables the Electronic Attenuator.

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear. These advantages primarily aid in remote operation and are negligible for front panel use. See ["Using the Electronic Attenuator: Pros and Cons" on page 836](#) for a detailed discussion of the pros and cons of using the electronic attenuator.

For the single attenuator configuration, for SCPI backwards compatibility, the “soft” attenuation feature replaces the dual attenuator configuration’s electronic attenuator. All the same couplings and limitations apply. See ["Attenuator Configurations and Auto/Man" on page 2244](#)

See ["More Information" on page 835](#)

Key Path	AMPTD Y Scale, Attenuation
Remote Command	[:SENSE] : POWer [:RF] : EATTenuation : STATE OFF ON 0 1 [:SENSe] : POWer [:RF] : EATTenuation : STATE ?
Example	POW:EATT:STAT ON
Dependencies	This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no “electronic attenuator” there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a “soft” attenuation as described in "Attenuator Configurations and Auto/Man" on page 2244 . The electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable above 3.6 GHz. Therefore, if the Stop Frequency of the analyzer is > 3.6 GHz then the Enable Elec Atten key will be OFF and grayed out.

	<p>If the Internal Preamp is on, meaning it is set to Low Band or Full, the electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable. In this case the Enable Elec Atten key will be OFF and grayed out.</p> <p>If either of the above is true, if the SCPI command is sent, an error indicating that the electronic attenuator is unavailable will be sent.</p> <p>If the electronic/soft Attenuator is enabled, then the Stop Freq of the analyzer is limited to 3.6 GHz and the Internal Preamp is unavailable.</p> <p>The SCPI-only “soft” electronic attenuation for the single-attenuator configuration is not available in all measurements; in particular, it is not available in the Swept SA measurement.</p>
Couplings	Enabling and disabling the Electronic Attenuator affects the setting of the Mechanical Attenuator (in dual attenuator configurations). This is described in more detail below this table.
Preset	OFF for Swept SA measurement; ON for all other measurements that support the electronic attenuator
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

More Information

Mechanical Attenuator Transition Rules

When the Electronic Attenuator is enabled, the Mechanical Attenuator transitions to a state that has no Auto function. Below are the rules for transitioning the Mechanical Attenuator. NOTE that the information below ONLY applies to the dual attenuator configurations, and ONLY when the Electronic Attenuator is installed:

When the Electronic Attenuation is enabled from a disabled state:

- The Mechanical Attenuator is initialized to 10 dB (this is its optimal performance setting). You can then set it as desired with SCPI, numeric keypad, step keys, or knob, and it behaves as it normally would in manual mode
- The Auto/Man state of (Mech) Atten is saved
- The Auto/Man line on the (Mech) Atten key disappears and the auto rules are disabled
- The Electronic Attenuator is set to 10 dB less than the previous value of the Mechanical Attenuator, within the limitation that it must stay within the range of 0 to 24 dB of attenuation.

Examples in the dual attenuator configuration:

- Mech Atten at 20 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 10 dB. New total attenuation equals the value before Elec Atten enabled.
- Mech Atten at 0 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 0 dB. New total attenuation does not equal the value before Elec Atten enabled.
- Mech Atten at 40 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 24 dB. New total attenuation does not equal the value before Elec Atten enabled.

When the Electronic Attenuation is disabled from an enabled state:

- The Elec Atten key is grayed out
- The Auto/Man state of (Mech) Atten is restored
- If now in Auto, (Mech) Atten recouples
- If now in Man, (Mech) Atten is set to the value of total attenuation that existed before the Elec Atten was disabled. The resulting value is rounded up to the smallest value possible given the (Mech) Atten Step setting - (That is, 57 dB changes to 58 dB when (Mech) Atten Step is 2 dB.)

Using the Electronic Attenuator: Pros and Cons

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear.

The “finer steps” advantage of the electronic attenuator is beneficial in optimizing the alignment of the analyzer dynamic range to the signal power in the front panel as well as remote use. Thus, you can achieve improved relative signal measurement accuracy. Compared to a mechanical attenuator with 2 dB steps, the 1 dB resolution of the electronic attenuator only gives better resolution when the odd-decibel steps are used. Those odd-decibel steps are less accurately calibrated than the even-decibel steps, so one tradeoff for this superior relative accuracy is reduced absolute amplitude accuracy.

Another disadvantage of the electronic attenuator is that the spectrum analyzer loses its “Auto” setting, making operation less convenient.

Also, the relationship between the dynamic range specifications (TOI, SHI, compression and noise) and instrument performance are less well-known with the electrical attenuator. With the mechanical attenuator, TOI, SHI and compression threshold levels increase dB-for-dB with increasing attenuation, and the noise floor does as well. With the electronic attenuator, there is an excess attenuation of about 1 to 3 dB between 0 and 3.6 GHz, making the effective TOI, SHI, and so forth, less well known. Excess attenuation is the actual attenuation relative to stated attenuation. Excess attenuation is accounted for in the analyzer calibration

Elec Atten

Controls the Electronic Attenuator in dual attenuator configurations. This key does not appear in single attenuator configurations, as the control of both the mechanical and electronic stages of the single attenuator is integrated into the single Atten key.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	[:SENSe] :POWer [:RF] :EATTenuation <rel_amp1> [:SENSe] :POWer [:RF] :EATTenuation?
Notes	Electronic Attenuation’s specification is defined only when Mechanical Attenuation is 6 dB.
Dependencies	This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no “electronic attenuator” there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a “soft” attenuation as described in "Attenuator Configurations and Auto/Man" on page 2244 . The “soft” attenuation is treated as an addition to the “main” attenuation value set by the Atten softkey or the

	POW:ATT SCPI command and affects the total attenuation displayed on the Attenuation key and the Meas Bar. When Enable Elec Atten is off or grayed out, the Elec Atten key is grayed out.
Preset	0 dB
State Saved	Saved in instrument state
Min	0 dB
Max	Dual attenuator configuration: 24 dB Single attenuator configuration: the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Adjust Atten for Min Clip

Sets the combination of mechanical and electronic attenuation and gain based on the current measured signal level so that clipping will be at a minimum.

This is an "immediate action" function, that is, it executes once, when the key is pressed.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	<code>[:SENSe] :POWer [:RF] :RANGe:OPTimize IMMEDIATE</code>
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Pre-Adjust for Min Clip

If this function is on, it does the adjustment described under "[Adjust Atten for Min Clip](#)" on page 2247 each time a measurement restarts. Therefore, in Continuous measurement mode, it only executes before the first measurement.

In dual attenuator models, you can set Elec+Mech Atten, in which case both attenuators participate in the autoranging, or Elec Atten Only, in which case the mechanical attenuator does not participate in the autoranging. This latter case results in less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	<code>[:SENSe] :POWer [:RF] :RANGe:OPTimize:ATTenuation OFF ELECTRical COMBined</code>

	<code>[:SENSe] :POWer [:RF] :RANGe:OPTimize:ATTenuation?</code>
Notes	The SCPI parameter ELECtrical sets this function to On in single attenuator models. The SCPI parameter COMBined is mapped to ELECtrical in single attenuator models; if you send COMBined, it sets the function to On and returns ELEC to a query.
Dependencies	This key only appears in Dual Attenuator models with an Electronic Attenuator installed. In instruments with Dual Attenuator model, when Enable Elec Atten is off or grayed out, the Pre-Adjust for Min Clip key is grayed out.
Preset	OFF for Swept SA measurement; ON for all other measurements that support Pre-Adjust for Min Clip
State Saved	Saved in instrument state
Range	Dual attenuator models: Off Elec Atten Only Mech + Elec Atten Single attenuator models: Off On
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Remote Command	<code>[:SENSe] :POWer [:RF] :RANGe:AUTO ON OFF 1 0</code> <code>[:SENSe] :POWer [:RF] :RANGe:AUTO?</code>
Notes	ON aliases to "Elec Atten Only" (:POW:RANG:OPT:ATT ELEC) OFF aliases to "Off" (:POW:RANG:OPT:ATT OFF) The query :POW:RANG:AUTO? returns true if :POW:RANG:OPT:ATT is not "Off"
Initial S/W Revision	Prior to A.02.00

Off

Turns Pre-Adjust for Min Clip off. This is the default setting.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip
Example	:POW:RANGe:OPT:ATT OFF
Initial S/W Revision	Prior to A.02.00

Elec Atten Only

Selects only the electric attenuator to participate in auto ranging. This offers less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip
Example	:POW:RANGe:OPT:ATT ELEC
Initial S/W Revision	Prior to A.02.00

Mech + Elec Atten

In dual attenuator models, this selects both attenuators participate in the autoranging.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip
Example	:POW:RANGe:OPT:ATT COMB
Initial S/W Revision	Prior to A.02.00

(Mech) Atten Step

This controls the step size used when making adjustments to the input attenuation.

This key is labeled Mech Atten Step in dual attenuator models and Atten Step in single attenuator models. In the dual attenuator configuration, this key only affects the step size of the mechanical attenuator.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	[[:SENSe]:POWer[:RF]:ATTenuation:STEP[:INCRement] 10 dB 2 dB [:SENSe]:POWer[:RF]:ATTenuation:STEP[:INCRement]?
Example	POW:ATT:STEP 2
Notes	Note this feature works like a 1-N choice from the front panel, but it takes a specific value (in dB) when used remotely. The only valid values are 2 and 10.
Dependencies	Blanked in CXA and EXA if option FSA (2 dB steps) is not present. If blanked, attempts to set it via SCPI will yield an error.
Couplings	When the attenuation step size changes, the current mechanical attenuation value is adjusted (if necessary) to be quantized to the new step size. That is, if step is set to 10 dB, mech atten is increased if necessary so it is a multiple of 10 dB
Preset	PXA and MXA: 2 dB EXA and CXA: 10 dB (2 dB with option FSA)
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Scale/Div

Allows you to enter a numeric value to change the vertical display sensitivity.

Key Path	AMPTD Y Scale
Mode	GSM
Remote Command	:DISPlay:EORFspectr:VIEW[1] 2:WINDow[1]:TRACe:Y[:SCALe]:PDIVision <rel_ ampl> :DISPlay:EORFspectr:VIEW[1] 2:WINDow[1]:TRACe:Y[:SCALe]:PDIVision?
Example	DISP:EORF:VIEW:WIND:TRAC:Y:PDIV 2 DISP:EORF:VIEW:WIND:TRAC:Y:PDIV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. SubOpCode: VIEW[1]:WINDow[1]: RF Envelope window VIEW2:WINDow[1]: Spectrum window
Dependencies	Blanked when Meas Method is Multi Offset.
Couplings	When the Auto Scaling is On, this value is automatically determined by the measurement result. When the user sets this value manually, Auto Scaling automatically changes to Off.
Preset	10.00 10.00
State Saved	Saved in instrument state.
Min	0.1
Max	20.0
Initial S/W Revision	Prior to A.02.00

Presel Center

When this key is pressed, the centering of the preselector filter is adjusted to optimize the amplitude accuracy at the frequency of the selected marker. If the selected marker is not on when Presel Center is pressed, the analyzer will turn on the selected marker, perform a peak search, and then perform centering on the marker's center frequency. If the selected marker is already on and between the start and stop frequencies of the analyzer, the analyzer performs the preselector calibration on that marker's frequency. If the selected marker is already on, but outside the frequency range between Start Freq and Stop Freq, the analyzer will first perform a peak search, and then perform centering on the marker's center frequency.

The value displayed on the Presel Adjust key will change to reflect the new preselector tuning (see Presel Adjust).

A number of considerations should be observed to ensure proper operation. See ["Proper Preselector Operation" on page 841](#).

Key Path	AMPTD Y Scale
Remote Command	[:SENSe]:POWer[:RF]:PCENter
Example	POW:PCEN

Notes	Note that the rules outlined above under the key description apply for the remote command as well as the key. The result of the command is dependent on marker position, and so forth. Any message shown by the key press is also shown in response to the remote command.
Dependencies	<ul style="list-style-type: none"> • Grayed out if the microwave preselector is off.) • If the selected marker's frequency is below Band 1, advisory message 0.5001 is generated and no action is taken. • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0. • Grayed out in the Spectrogram View.
Couplings	<p>The active marker position determines where the centering will be attempted.</p> <p>If the analyzer is in a measurement such as averaging when centering is initiated, the act of centering the preselector will restart averaging but the first average trace will not be taken until the centering is completed.</p>
Status Bits/OPC dependencies	<p>When centering the preselector, *OPC will not return true until the process is complete and a subsequent measurement has completed, nor will results be returned to a READ or MEASure command.</p> <p>The Measuring bit should remain set while this command is operating and should not go false until the subsequent sweep/measurement has completed.</p>
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Proper Preselector Operation

A number of considerations should be observed to ensure proper operation:

1. If the selected marker is off, the analyzer will turn on a marker, perform a peak search, and adjust the preselector using the selected marker's frequency. It uses the "highest peak" peak search method unqualified by threshold or excursion, so that there is no chance of a 'no peak found' error. It continues with that peak, even if it is the peak of just noise. Therefore, for this operation to work properly, there should be a signal on screen in a preselected range for the peak search to find.
2. If the selected marker is already on, the analyzer will attempt the centering at that marker's frequency. There is no preselector for signals below about 3.6 GHz, therefore if the marker is on a signal below 3.6 GHz, no centering will be attempted and an advisory message generated
3. In some models, the preselector can be bypassed. If it is bypassed, no centering will be attempted in that range and a message will be generated.

Preselector Adjust

Allows you to manually adjust the preselector filter frequency to optimize its response to the signal of interest. This function is only available when **"Presel Center"** on page 2250 is available.

For general purpose signal analysis, using Presel Center is recommended. Centering the filter minimizes the impact of long-term preselector drift. Presel Adjust can be used instead to manually optimize the preselector. One application of manual optimization would be to peak the preselector response, which both optimizes the signal-to-noise ratio and minimizes amplitude variations due to small (short-term) preselector drifting.

Key Path	AMPTD Y Scale
Scope	Meas Global
Remote Command	<code>[:SENSe] :POWer [:RF] :PADJust <freq></code> <code>[:SENSe] :POWer [:RF] :PADJust?</code>
Example	POW:PADJ 100KHz POW:PADJ?
Notes	The value on the key reads out to 0.1 MHz resolution.
Dependencies	<ul style="list-style-type: none"> • Grayed out if microwave preselector is off.) • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0. • Grayed out in the Spectrogram View.
Preset	0 MHz
State Saved	The Presel Adjust value set by Presel Center, or by manually adjusting Presel Adjust, is not saved in instrument state, and does not survive a Preset or power cycle.
Min	-500 MHz
Max	500 MHz
Default Unit	Hz
Backwards Compatibility SCPI	<code>[:SENSe] :POWer [:RF] :MW :PADJust</code> <code>[:SENSe] :POWer [:RF] :MMW :PADJust</code> PSA had multiple preselectors, but the X-Series has only one. These commands simply alias to <code>[:SENSe] :POWer [:RF] :PADJust</code>
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Remote Command	<code>[:SENSe] :POWer [:RF] :PADJust :PRESelector MWAVE MMWave EXTERNAL</code> <code>[:SENSe] :POWer [:RF] :PADJust :PRESelector?</code>
Notes	PSA had multiple preselectors, and you could select which preselector to adjust. Since the X-Series has only one mm/uW preselector, the preselector selection softkey is no longer available. However, to provide backward compatibility, we accept the legacy remote commands. The command form has no effect, the query always returns MWAVE
Initial S/W Revision	Prior to A.02.00

μW Path Control

The μW Path Control functions include the μW Preselector Bypass (Option MPB) and Low Noise Path (Option LNP) controls in the High Band path circuits.

When the μW Preselector is bypassed, the user has better flatness, but will be subject to spurs from out of band interfering signals. When the Low Noise Path is enabled, the analyzer automatically switches around certain circuitry in the high frequency bands which can contribute to noise, when it is appropriate based on other analyzer settings.

For most applications, the preset state is Standard Path, which gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear out in the hardware switches. For applications that utilize the wideband IF paths, the preset state is the μW Preselector Bypass path, if option MPB is present. This is because, when using a wideband IF such as the 140 MHz IF, the μW Preselector's bandwidth can be narrower than the available IF bandwidth, causing degraded amplitude flatness and phase linearity, so it is desirable to bypass the preselector in the default case.

Users may choose Low Noise Path Enable. It gives a lower noise floor, especially in the 21–26.5 GHz region, though without improving many measures of dynamic range, and without giving the best possible noise floor. The preamp, if purchased and used, gives better noise floor than does the Low Noise Path, however its compression threshold and third-order intercept are much poorer than that of the non-preamp Low Noise Path. There are some applications, typically for signals around –30 dBm, for which the third-order dynamic range of the standard path is good enough, but the noise floor is not low enough even with 0 dB input attenuation. When the third-order dynamic range of the preamp path is too little and the noise floor of the standard path is too high, the Low Noise Path can provide the best dynamic range.

Key Path	AMPTD Y Scale
Mode	SA, BASIC, PNOISE, VSA , LTE, LTETDD
Scope	Meas Global
Remote Command	[:SENSe] :POWer [:RF] :MW:PATH STD LNPath MPBypass FULL [:SENSe] :POWer [:RF] :MW:PATH?
Example	:POW:MW:PATH LNP Enables the Low Noise path
Notes	If a Presel Center is performed, the analyzer will momentarily switch to the Standard Path, regardless of the setting of μW Path Control The DC Block will always be switched in when the low noise path is switched in, to protect succeeding circuitry from DC. Note that this does not mean “when the low noise path is enabled” but when, based on the Low Noise Path rules, the path is actually switched in. This can happen when the selection is Low Noise Path Enable . In the case where the DC Block is switched in the analyzer is now AC coupled. However, if the user has selected DC coupling, the UI will still behave as though it were DC coupled, including all annunciation, warnings, status bits, and responses to SCPI queries. This is because, based on other settings, the analyzer could switch out the low noise path at any time and hence go back to being DC coupled. Alignment switching ignores the settings in this menu, and restores them when finished.
Dependencies	Unavailable in BBIQ and External Mixing
Preset	All modes other than IQ Analyzer mode and VXA: STD IQ Analyzer, VXA and WLAN mode:

	MPB option present and licensed: MPB MPB option not present and licensed: STD
State Saved	Save in instrument state
Readback	Value selected in the submenu
Initial S/W Revision	A.04.00
Modified at S/W Revision	A.10.00

Standard Path

This path gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear in the hardware switches, particularly in remote test scenarios where both low band and high band setups will follow in rapid succession.

In this path, the bypass of the low band/high band switch and microwave preamp is never activated, which can cause some noise degradation but preserves the life of the bypass switch.

Key Path	AMPTD Y Scale, μ W Path Control
Example	:POW:MW:PATH STD
Readback Text	Standard Path
Initial S/W Revision	A.04.00

μ W Preselector Bypass

This key toggles the preselector bypass switch for band 1 and higher. When the microwave preselect is on, the signal path is preselected. When the microwave preselector is off, the signal path is not preselected. The preselected path is the normal path for the analyzer.

The preselector is a tunable bandpass filter which prevents signals away from the frequency of interest from combining in the mixer to generate in-band spurious signals (images). The consequences of using a preselector filter are its limited bandwidth, the amplitude and phase ripple in its passband, and any amplitude and phase instability due to center frequency drift.

Option MPB or pre-selector bypass provides an unpreselected input mixer path for certain X-Series signal analyzers with frequency ranges above 3.6 GHz. This signal path allows a wider bandwidth and less amplitude variability, which is an advantage when doing modulation analysis and broadband signal analysis. The disadvantage is that, without the preselector, image signals will be displayed. Another disadvantage of bypassing the preselector is increased LO emission levels at the front panel input port.

Image responses are separated from the real signal by twice the 1st IF. For IF Paths of 10 MHz and 25 MHz, the 1st IF is 322.5 MHz, so the image response and the real signal will be separated by 645 MHz. The 1st IF will be different for other IF Path settings. When viewing a real signal and its corresponding image response in internal mixing, the image response will be to the left of the real signal.

Also, the image response and the real signal typically have the same amplitude and exhibit the same shape factor.

However, if Option FS1, Fast Sweep Capability, is enabled, the image response in the Swept SA measurement will appear lower in amplitude and have a much wider shape factor compared to the real signal.

Key Path	AMPTD Y Scale, μ W Path Control
Example	:POW:MW:PATH MPB
Dependencies	Key is blanked if current mode does not support it. Key is grayed out if mode supports it but current measurement does not support it. Key is blank unless Option MPB is present and licensed. If SCPI command sent when MPB not present, error -241, "Hardware missing; Option not installed" is generated.
Readback Text	μ W Preselector Bypass
Initial S/W Revision	A.04.00

Remote Command	[:SENSe] :POWer [:RF] :MW:PRESelector [:STATe] ON OFF 0 1 [:SENSe] :POWer [:RF] :MW:PRESelector [:STATe] ?
Example	:POW:MW:PRES OFF Bypasses the microwave preselector
Notes	The ON parameter sets the STD path (:POW:MW:PATH STD) The OFF parameter sets path MPB (:POW:MW:PATH MPB)
Preset	ON

Internal Preamp

Accesses a menu of keys that control the internal preamps. Turning on the preamp gives a better noise figure, but a poorer TOI to noise floor dynamic range. You can optimize this setting for your particular measurement.

The instrument takes the preamp gain into account as it sweeps. If you sweep outside of the range of the preamp the instrument will also account for that. The displayed result will always reflect the correct gain.

For some measurements, when the preamp is on and any part of the displayed frequency range is below the lowest frequency for which the preamp has specifications, a warning condition message appears in the status line. For example, for a preamp with a 9 kHz lowest specified frequency: "Preamp: Accy unspec'd below 9 kHz".

Key Path	AMPTD Y Scale
Scope	Meas Global
Remote Command	[:SENSe] :POWer [:RF] :GAIN [:STATe] OFF ON 0 1 [:SENSe] :POWer [:RF] :GAIN [:STATe] ?
Dependencies	Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the key is not shown. The preamp is not available when the electronic/soft attenuator is enabled.

Couplings	<p>The act of connecting the U7227A USB Preamplifier to one of the analyzer's USB ports will cause the Internal Preamp to be switched on. When this happens an informational message will be generated: "Internal Preamp turned on for optimal operation with USB Preamp." Note that if the Internal Preamp was already on, there will be no change to the setting, but if it was Off it will be switched On, to Full Range.</p> <p>Note that this same action occurs when the SA mode is selected while the USB Preamp is connected to one of the analyzer's USB ports, if it is the first time that the SA mode has run since powerup, or if the last time the SA mode was running the USB Preamp was NOT connected.</p> <p>Subsequently disconnecting the USB Preamp from USB does not change the Internal Preamp setting nor restore the previous setting.</p>
Preset	OFF
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.14.00

Key Path	AMPTD Y Scale, Internal Preamp
Scope	Meas Global
Remote Command	<pre>[:SENSe] :POWer [:RF] :GAIN :BAND LOW FULL</pre> <pre>[:SENSe] :POWer [:RF] :GAIN :BAND ?</pre>
Dependencies	<p>Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the key is not shown.</p> <p>If a POW:GAIN:BAND FULL command is sent when a low band preamp is available, the preamp band parameter is to LOW instead of FULL, and an "Option not installed" message is generated.</p>
Preset	LOW
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00

Off

Turns the internal preamp off

Key Path	AMPTD Y Scale, Internal Preamp
Example	:POW:GAIN OFF
Readback	Off
Initial S/W Revision	Prior to A.02.00

Low Band

Sets the internal preamp to use only the low band.

The frequency range of the installed (optional) low-band preamp is displayed in square brackets on the Low Band key label.

Key Path	AMPTD Y Scale, Internal Preamp
Example	:POW:GAIN ON :POW:GAIN:BAND LOW
Readback	Low Band
Initial S/W Revision	Prior to A.02.00

Full Range

Sets the internal preamp to use its full range. The low band (0–3.6 GHz or 0–3GHz, depending on the model) is supplied by the low band preamp and the frequencies above low band are supplied by the high band preamp.

The frequency range of the installed (optional) preamp is displayed in square brackets on the Full Range key label. If the high band option is not installed the Full Range key does not appear.

Key Path	AMPTD Y Scale, Internal Preamp
Example	:POW:GAIN ON :POW:GAIN:BAND FULL
Readback	Full Range
Initial S/W Revision	Prior to A.02.00

Ref Position

Allows you to set the display reference position to either 0(Top), 5(Center), or 10(Bottom).

Key Path	AMPTD Y Scale
Mode	GSM
Remote Command	:DISPlay:EORFspectr:VIEW[1] 2:WINDow[1]:TRACe:Y[:SCALE]:RPOSition TOP CENTer BOTTom :DISPlay:EORFspectr:VIEW[1] 2:WINDow[1]:TRACe:Y[:SCALE]:RPOSition?
Example	DISP:EORF:VIEW:WIND:TRAC:Y:RPOS TOP DISP:EORF:VIEW:WIND:TRAC:Y:RPOS?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. SubOpCode: VIEW[1]:WINDow[1]: RF Envelope window VIEW2:WINDow[1]: Spectrum window
Dependencies	Blanked when Meas Method is Multi Offset.
Preset	TOP TOP

State Saved	Saved in instrument state.
Range	Top Ctr Bot
Initial S/W Revision	Prior to A.02.00

Auto Scaling

Allows you to toggle the Auto Scaling function between On and Off.

Key Path	AMPTD Y Scale
Mode	GSM
Remote Command	:DISPlay:EORFspectr:VIEW[1] 2:WINDow[1]:TRACe:Y[:SCALe]:COUPle 0 1 OFF ON :DISPlay:EORFspectr:VIEW[1] 2:WINDow[1]:TRACe:Y[:SCALe]:COUPle?
Example	DISP:EORF:VIEW:WIND:TRAC:Y:COUP ON DISP:EORF:VIEW:WIND:TRAC:Y:COUP?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. SubOpCode: VIEW[1]:WINDow[1]: RF Envelope window VIEW2:WINDow[1]: Spectrum window
Dependencies	Blanked when Meas Method is Multi Offset.
Couplings	When Auto Scaling is On, upon pressing the Restart front-panel key, this function automatically determines the scale per division and reference values based on the measurement results. When user sets a value either Ref Value or Scale/Div manually, this parameter is set to 'Off' automatically.
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

Auto Couple

The Auto Couple feature provides a quick and convenient way to automatically couple multiple instrument settings. This helps ensure accurate measurements and optimum dynamic range. When the Auto Couple feature is activated, either from the front panel or remotely, all parameters of the current measurement that have an Auto/Manual mode are set to Auto mode and all measurement settings dependent on (or coupled to) the Auto/Man parameters are automatically adjusted for optimal performance.

However, the Auto Couple key actions are confined to the current measurement only. It does not affect other measurements in the mode, and it does not affect markers, marker functions, or trace or display attributes.

See "[More Information](#)" on page 849

Key Path	Front-panel key
Remote Command	:COUPle ALL NONE
Example	:COUP ALL
Notes	:COUPle ALL puts all Auto/Man parameters in Auto mode (equivalent to pressing the Auto Couple key). :COUPLE NONE puts all Auto/Man parameters in manual mode. It decouples all the coupled instrument parameters and is not recommended for making measurements.
Initial S/W Revision	Prior to A.02.00

More Information

There are two types of functions that have Auto/Manual modes.

Auto/Man Active Function keys

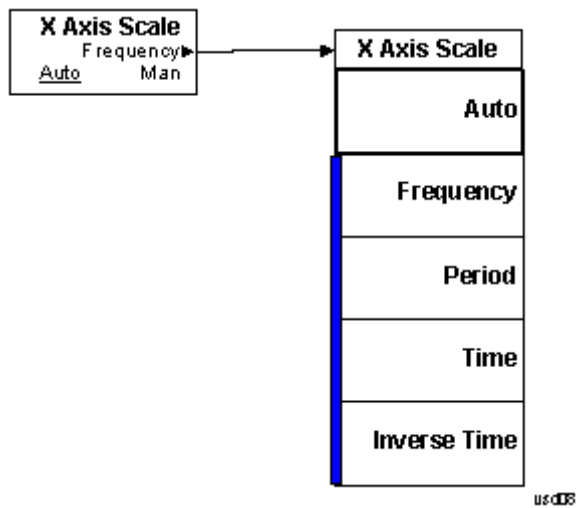
An Auto/Man toggle key controls the binary state associated with an instrument parameter by toggling between Auto (where the parameter is automatically coupled to the other parameters it is dependent upon) and Man (where the parameter is controlled independent of the other parameters), as well as making the parameter the active function. The current mode is indicated on the softkey with either Auto or Man underlined as illustrated below.



Auto/Man 1-of-N keys

An Auto/Man 1-of-N key allows you to manually pick from a list of parameter values, or place the function in Auto, in which case the value is automatically selected (and indicated) as shown below. If in Auto, Auto is underlined on the calling key. If in manual operation, manual is indicated on the calling key. But the calling key does not actually toggle the function, it simply opens the menu.

10 EDGE Output RF Spectrum Measurement
Auto Couple



BW

There is no 'BW' functionality supported in EDGE Output RF Spectrum, so this Front-panel key displays a blank menu when pressed.

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Cont (Continuous Measurement/Sweep)

Sets the analyzer for Continuous measurement operation. The single/continuous state is Meas Global so the setting will affect all measurements. If you are Paused, pressing Cont does a Resume.

Key Path	Front-panel key
Remote Command	:INITiate:CONTinuous OFF ON 0 1 :INITiate:CONTinuous?
Example	:INIT:CONT 0 puts analyzer in Single measurement operation. :INIT:CONT 1 puts analyzer in Continuous measurement operation
Preset	ON (Note that SYST:PRESet sets INIT:CONT to ON but *RST sets INIT:CONT to OFF)
State Saved	Saved in instrument state
Backwards Compatibility Notes	For Spectrum Analysis mode in ESA and PSA, there is no Cont hardkey, instead there is a Sweep Single/Cont key. In these analyzers, switching the Sweep Single/Cont key from Single to Cont restarts averages (displayed average count reset to 1), but does not restart Max Hold and Min Hold. The X-Series has Single and Cont keys in place of the SweepSingleCont key. In the X-Series, if in single measurement, the Cont key (and INIT:CONT ON) switches to continuous measurement, but never restarts a measurement and never resets a sweep.
Initial S/W Revision	Prior to A.02.00

In Swept SA Measurement (Spectrum Analysis Mode):

The analyzer takes repetitive sweeps, averages, measurements, etc., when in Continuous mode. When the average count reaches the Average/Hold Number the count stops incrementing, but the analyzer keeps sweeping. See the Trace/Detector section for the averaging formula used both before and after the Average/Hold Number is reached. The trigger condition must be met prior to each sweep. The type of trace processing for multiple sweeps, is set under the Trace/Detector key, with choices of Trace Average, Max Hold, or Min Hold.

In Other Measurements/Modes:

With Avg/Hold Num (in the Meas Setup menu) set to Off or set to On with a value of 1, a sweep is taken after the trigger condition is met; and the analyzer continues to take new sweeps after the current sweep has completed and the trigger condition is again met. However, with Avg/Hold Num set to On with a value >1, multiple sweeps (data acquisitions) are taken for the measurement. The trigger condition must be met prior to each sweep. The sweep is not stopped when the average count k equals the number N set for Avg/Hold Num is reached, but the number k stops incrementing. A measurement average usually applies to all traces, marker results, and numeric results. But sometimes it only applies to the numeric results.

If the analyzer is in Single measurement, pressing the Cont key does not change k and does not cause the sweep to be reset; the only action is to put the analyzer into Continuous measurement operation.

If it is already in continuous sweep:

the INIT:CONT 1 command has no effect

the INIT:CONT 0 command will place the analyzer in Single Sweep but will have no effect on the current sequence until $k = N$, at which point the current sequence will stop and the instrument will go to the idle state.

10 EDGE Output RF Spectrum Measurement
File

File

See "File" on page 320

FREQ/Channel

Accesses a menu of keys that allows you to control the Frequency parameters of the instrument.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

ARFCN

Sets the analyzer to a frequency that corresponds to the ARFCN (Absolute RF Channel Number). Used to enter the channel to be measured for the selected band. If the Center Freq value entered does not exactly correlate with an ARFCN, the softkey label changes to display the closest ARFCN to the selected frequency, along with a > or < symbol indicating whether the frequency is above or below that ARFCN.

Key Path	FREQ Channel
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel:ARFCn RFChannel <integer></code> <code>[:SENSe] :CHANnel:ARFCn RFChannel?</code>
Example	CHAN:ARFC 3 CHAN:ARFC?
Notes	This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not available (blank).
Couplings	Coupled with Center Frequency . Setting ARFCN sets Center Freq to the value corresponding to that ARFCN. BMT Freq choice changes this parameter.
Preset	1
State Saved	Saved in instrument state.
Range	Different for each BAND as follows: E-GSM: 0 to 124, and 975 to 1023 P-GSM: 1 to 124 R-GSM: 0 to 124(MS), and 955 to 1023(BTS) DCS1800: 512 to 885 PCS1900: 512 to 810 GSM450: 259 to 293 GSM480: 306 to 340 GSM700: 438 to 516 GSM850: 128 to 251 T-GSM 810: 350 to 425

Min	Different for each BAND as follows: E-GSM: 0(MS), and 975(BTS) P-GSM: 1 R-GSM: 0(MS), and 955(BTS) DCS1800: 512 PCS1900: 512 GSM450: 259 GSM480: 306 GSM700: 438 GSM850: 128 T-GSM 810: 350
Max	Different for each BAND as follows: E-GSM: 124(MS), and 1023(BTS) P-GSM: 124 R-GSM: 124(MS), and 1023(BTS) DCS1800: 885 PCS1900: 810 GSM450: 293 GSM480: 340 GSM700: 516 GSM850: 251 T-GSM 810: 425
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.07.00

Center Freq

Sets the center frequency to be measured for the selected band. It is coupled with ARFCN – setting Center Freq sets ARFCN to the channel corresponding to that frequency.

For more information, see the section ["Center Freq" on page 2269](#).

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

Time Slot

This functionality is the same as that of the corresponding key in the Demod menu. See ["Time Slot" on page 2288](#) for details.

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

Burst Type

This functionality is the same as that of the corresponding key in the Demod menu. See ["Burst Type" on page 2289](#) for details.

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

TSC (Std)

This functionality is the same as that of the corresponding key in the Demod menu. See ["TSC \(Std\)" on page 2291](#) for details.

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

Center Freq

Sets the frequency that corresponds to the horizontal center of the graticule (when frequency Scale Type is set to linear). While adjusting the Center Frequency the Span is held constant, which means that both Start Frequency and Stop Frequency will change.

Pressing Center Freq also sets the frequency entry mode to Center/Span. In Center/Span mode, the center frequency and span values are displayed below the graticule, and the default active function in the Frequency menu is Center Freq.

The center frequency setting is the same for all measurements within a mode, that is, it is Meas Global. Some modes are also able to share a Mode Global center frequency value. If this is the case, the Mode will have a Global Settings key in its Mode Setup menu.

The Center Freq function sets (and queries) the Center Frequency for the currently selected input. If your analyzer has multiple inputs, and you select another input, the Center Freq changes to the value for that input. SCPI commands are available to directly set the Center Freq for a specific input.

Center Freq is remembered as you go from input to input. Thus you can set a Center Freq of 10 GHz with the RF Input selected, change to BBIQ and set a Center Freq of 20 MHz, then switch to External Mixing and set a Center Freq of 60 GHz, and when you go back to the RF Input the Center Freq will go back to 10 GHz; back to BBIQ and it is 20 MHz; back to External Mixing and it is 60 GHz.

See ["RF Center Freq" on page 860](#)

See [Ext Mix Center Freq](#)

See ["I/Q Center Freq" on page 862](#)

See ["Center Frequency Presets" on page 859](#)

Key Path	FREQ Channel
Scope	Meas Global
Remote Command	[:SENSe] :FREQuency:CENTer <freq> [:SENSe] :FREQuency:CENTer?
Example	FREQ:CENT 50 MHz FREQ:CENT UP changes the center frequency to 150 MHz if you use FREQ:CENT:STEP 100 MHz to set the center frequency step size to 100 MHz FREQ:CENT?
Notes	This command sets either the RF or I/Q Center Frequency depending on the selected input. For RF input it is equivalent to FREQ:RF:CENT For I/Q input it is equivalent to FREQ:IQ:CENT Preset and Max values are dependent on Hardware Options (5xx) If no terminator (e.g. MHz) is sent the terminator Hz is used. If a terminator with unit other than Frequency is used, an invalid suffix error message is generated.
Dependencies	The Center Frequency can be limited by Start or Stop Freq limits, if the Span is so large that Start or Stop reach their limit.
Couplings	When operating in "swept span", any value of the Center Frequency or Span that is within the frequency range of the analyzer is allowed when the value is being set through the front panel numeric key pad or the SCPI command. The other parameter is forced to a different value if needed, to keep the Start and the Stop Frequencies within the analyzer's frequency range
Preset	Depends on instrument maximum frequency, mode, measurement, and selected input. See "Center Frequency Presets" on page 859 and "RF Center Freq" on page 860 and Ext Mix Center Freq and "I/Q Center Freq" on page 862.
State Saved	Saved in instrument state
Min	Depends on instrument maximum frequency, mode, measurement, and selected input.. See "Center Frequency Presets" on page 859 and "RF Center Freq" on page 860 and "I/Q Center Freq" on page 862.
Max	Depends on instrument maximum frequency, mode, measurement, and selected input.. See "Center Frequency Presets" on page 859 and "RF Center Freq" on page 860 and "I/Q Center Freq" on page 862.
Default Unit	Hz
Status Bits/OPC	Non-overlapped
Dependencies	
Initial S/W Revision	Prior to A.02.00

Center Frequency Presets

The following table provides the Center Frequency Presets for the Spectrum Analyzer mode, and the Max Freq, for the various frequency options:

Freq Option	CF after Mode Preset	Stop Freq after Mode Preset	Max Freq (can't tune above)
503 (all but N9000A)	1.805 GHz	3.6 GHz	3.7 GHz
503 (N9000A)	1.505 GHz	3.0 GHz	3.08 GHz
507 (all but N9000A)	3.505 GHz	7.0 GHz	7.1 GHz
507 (N9000A)	3.755 GHz	7.5 GHz	7.58 GHz
508 (all but N9038A)	1.805 GHz	3.6 GHz	8.5 GHz
508 (N9038A)	4.205 GHz	8.4 GHz	8.5 GHz
513	6.805 GHz	13.6 GHz	13.8 GHz
526 (all but N9000A and N9038A)	13.255 GHz	26.5 GHz	27.0 GHz
526 (N9000A)	13.255 GHz	26.5 GHz	26.55 GHz
526 (N9038A)	1.805 GHz	3.6 GHz	27.0 GHz
532	16.005 GHz	32.0 GHz	32.5 GHz
543	21.505 GHz	43.0 GHz	TBD
544	22.005 GHz	44.0 GHz	44.5 GHz
550	25.005 GHz	50.0 GHz	51 GHz

Input 2:

Model	CF after Mode Preset	Stop Freq after Mode Preset	Max Freq (can't tune above)
N9000A opt C75	0.7505GHz	1.5 GHz	1.58 GHz
N9038A	505 MHz	1 GHz	1.000025 GHz

Tracking Generator Frequency Limits (N9000A only):

Tracking Generator Option	Min Freq (clips to this freq when turn TG on and can't tune below while TG on)	If above this Freq, Stop Freq clipped to this Freq when TG turned on	Max Freq (can't tune above) while TG on
T03	9 kHz	3.0 GHz	3.08 GHz
T06	9 kHz	6.0 GHz	6.05 GHz

The following table shows the Center Frequency Presets for modes other than Spectrum Analyzer:

Mode	CF Preset for RF
WCDMA	1 GHz
WIMAXOFDMA,	1 GHz
BASIC	1 GHz
ADEMOD	1 GHz
VSA	1 GHz
TDSCDMA	1 GHz
PNOISE	1 GHz
LTE	1 GHz
LTETDD	1 GHz
MSR	1 GHz
GSM	935.2 MHz
NFIGURE	1.505 GHz

RF Center Freq

SCPI command for specifying the RF Center Frequency. This command will set the Center Frequency to be used when the RF input is selected, even if the RF input is not the input that is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

Scope	Meas Global
Remote Command	<code>[:SENSe] :FREQuency:RF:CENTer <freq></code> <code>[:SENSe] :FREQuency:RF:CENTer?</code>
Example	FREQ:RF:CENT 30 MHz
Notes	This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode.
Dependencies	If the electronic/soft attenuator is enabled, any attempt to set Center Frequency such that the Stop

	Frequency would be >3.6 GHz fails and results in an advisory message. If the equivalent SCPI command is sent, this same message is generated as part of a “-221, Settings conflict” warning. If Source Mode is set to Tracking, and the Max or Min Center Freq is therefore limited by the limits of the source, a warning message is generated, “Data out of range;clipped to source max/min” if these limits are exceeded. Note that for an external source, these limits can be affected by the settings of Source Numerator, Source Denominator and Power Sweep.
Preset	See table above
State Saved	Saved in instrument state.
Min	-79.999995 MHz, unless Source Mode is set to Tracking, in which case it is limited by the minimum frequency of the Source
Max	See table above. Basically instrument maximum frequency - 5 Hz. Note that, if the Source Mode is set to Tracking, the effective instrument maximum frequency may be limited by the source maximum frequency. If the knob or step keys are being used, also depends on the value of the other three interdependent parameters Span, Start Frequency and Stop Frequency
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Ext Mix Center Freq

SCPI command for specifying the External Mixer Center Frequency. This command will set the Center Frequency to be used when the External Mixer is selected, even if the External Mixer input is not the input which is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

Scope	Meas Global
Remote Command	<code>[:SENSe] :FREQuency:EMIXer:CENTer <freq></code> <code>[:SENSe] :FREQuency:EMIXer:CENTer?</code>
Example	<code>:FREQ:EMIX:CENT 60 GHz</code> <code>:FREQ:EMIX:CENT?</code>
Notes	This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode.
Couplings	When returning to External Mixing after having been switched to one of the other inputs (e.g., RF), you will come back into the settings that you had when you left External Mixing. So you will come back to the band you were in with the Center Frequency that you had. However, Span is not an input-dependent parameter, therefore you will bring the span over from the other input. Therefore, the analyzer comes back with the span from the previous input, limited as necessary by the current mixer setup.
Preset	When a Mode Preset is performed while in External Mixing, the Start frequency of the current Mode is set to the nominal Min Freq of the lowest harmonic range in the Harmonic Table for the current mixer setup. Similarly, the Stop frequency of the current Mode is set to the nominal Max Freq of the highest harmonic range in the Harmonic Table. The Center Freq thus presets to the point arithmetically equidistant from these two frequencies.

	<p>If the current measurement has a limited Span available to it, and cannot achieve the Span shown in the table (Span=Stop Freq – Start Freq), the analyzer uses the maximum Span the measurement allows, and still sets the Center Freq to the midpoint of the Start and Stop Freq values in the Harmonic Table.</p> <p>When Restore Input/Output Defaults is performed, the mixer presets to the 11970A, whose Start and Stop frequencies are 26.5 and 40 GHz respectively. The center of these two frequencies is 33.25 GHz.</p> <p>Therefore, after a Restore Input/Output Defaults, if you go into External Mixing and do a Mode Preset while in the Spectrum Analyzer Mode, the resulting Center Freq is 33.25 GHz.</p>
State Saved	Saved in instrument state.
Min	The minimum frequency in the currently selected mixer band + 5 Hz
Max	The maximum frequency in the currently selected mixer band – 5 Hz If the knob or step keys are being used, also depends on the value of the other three interdependent parameters Span, Start Frequency and Stop Frequency
Initial S/W Revision	A.08.01

I/Q Center Freq

SCPI command for specifying the I/Q Center Frequency. This command will set the Center Frequency to be used when the I/Q input is selected, even if the I/Q input is not the input which is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

Scope	Meas Global
Remote Command	[:SENSE] :FREQuency:IQ:CENTer <freq> [:SENSE] :FREQuency:IQ:CENTer?
Example	FREQ:IQ:CENT: 30 MHz
Notes	This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode.
Preset	0 Hz
State Saved	Saved in instrument state.
Min	-40.049995 MHz
Max	40.049995 MHz
Initial S/W Revision	Prior to A.02.00

BMT Freq

Enables quick selection from a subset of the available ARFCN numbers for the Top, Middle, or Bottom frequency in the selected band.

Key Path	FREQ Channel
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Mode	GSM
Scope	Meas Global
Notes	This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this.
Dependencies	When I/Q Input is selected, this key is not available (blank).
Couplings	BMT choice changes ARFCN and Center Freq. Chosen ARFCN will be displayed on each menu key.
Range	Top Middle Bottom
Initial S/W Revision	Prior to A.02.00

BMT Freq Top

Sets the analyzer to the frequency of the highest ARFCN (Absolute RF Channel Number) of the selected radio band.

Key Path	FREQ Channel, BMT Freq
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel:ARFCn RFCHannel:TOP
Example	CHAN:ARFC:TOP
Notes	1. This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. 2. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not displayed.
Couplings	Change [:SENSe]:CHANnel:ARFCn RFCHannel as follows: E-GSM: 124 P-GSM: 124 R-GSM: 124 DCS 1800: 885 PCS 1900: 810 GSM 450: 293 GSM 480: 340 GSM 700: 516 GSM 850: 251 T-GSM 810: 425 Change BMT ARFCN to BMT FreqTOP. Change [:SENSe]:FREQuency:CENter as follows: E-GSM: 959.800 MHz P-GSM: 959.800 MHz R-GSM: 959.800 MHz

	DCS 1800: 1879.80 MHz
	PCS 1900: 1989.80 MHz
	GSM 450: 467.400 MHz
	GSM 480: 495.800 MHz
	GSM 700: 792.800 MHz
	GSM 850: 893.800 MHz
	T-GSM810: 866.000 MHz

State Saved	No
Initial S/W Revision	Prior to A.02.00

BMT Freq Middle

Sets the analyzer to the frequency of the middle ARFCN (Absolute RF Channel Number) of the selected radio band.

Key Path	FREQ Channel, BMT Freq
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :ARFCn RFCHannel :MIDDLE</code>
Example	CHAN:ARFC:MIDD
Notes	<ol style="list-style-type: none"> 1. This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. 2. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not displayed.
Couplings	Change [:SENSe]:CHANnel:ARFCn RFCHannel as follows: E-GSM: 38 P-GSM: 63 R-GSM: 28 DSC 1800: 699 PCS 1900: 661 GSM 450: 276 GSM 480: 323 GSM 700: 477 GSM 850: 190 T-GSM 810: 388 Change BMT ARFCN to BMT FreqMIDDLE. Change [:SENSe]:FREQuency:CENTer as follows: E-GSM: 942.600 MHz P-GSM: 947.600 MHz R-GSM: 940.600 MHz

	DCS 1800: 1842.60 MHz
	PCS 1900: 1960.00 MHz
	GSM 450: 464.000 MHz
	GSM 480: 492.400 MHz
	GSM 700: 755.000 MHz
	GSM 850: 881.600 MHz
	T-GSM 810: 858.600 MHz

State Saved	No
Initial S/W Revision	Prior to A.02.00

BMT Freq Bottom

Sets the analyzer to the frequency of the lowest ARFCN (Absolute RF Channel Number) of the selected radio band.

Key Path	FREQ Channel, BMT Freq
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel:ARFCn RFCHannel:BOTTom
Example	CHAN:ARFC:BOT
Notes	<ol style="list-style-type: none"> 1. This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. 2. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not displayed.
Couplings	Change [:SENSe]:CHANnel:ARFCn RFCHannel as follows: E-GSM: 975 P-GSM: 1 R-GSM: 955 DCS 1800: 512 PCS 1900: 512 GSM 450: 259 GSM 480: 306 GSM 700: 438 GSM 850: 128 T-GSM 810: 350 Change BMT ARFCN to BMT FreqBOTTOM. Change [:SENSe]:FREQuency:CENTer as follows: E-GSM: 925.200 MHz P-GSM: 935.200 MHz R-GSM: 921.200 MHz

	DCS 1800: 1805.20 MHz PCS 1900: 1930.20 MHz GSM 450: 460.600 MHz GSM 480: 489.000 MHz GSM 700: 747.2 MHz GSM 850: 869.200 MHz T-GSM 810: 851.000 MHz
State Saved	No
Initial S/W Revision	Prior to A.02.00

Carrier Setup

Allows you to set carrier parameters.

Key Path	FREQ Channel
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Initial S/W Revision	A.06.00
Modified at S/W Revision	A.14.00

Carriers

Defines the number of carriers.

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :COUNT <integer></code> <code>[:SENSe] :CHANnel :CARRier :COUNT?</code>
Example	CHAN:CARR:COUN 3 CHAN:CARR:COUN?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Couplings	This can change when the SCPI command of the Carrier Power Present or the Carrier Interval is sent.
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	16

Initial S/W Revision	A.06.00
Modified at S/W Revision	A.13.00

Reference Carrier

Defines the reference active carrier. The Reference Carrier frequency point is always aligned with the Measurement Global Center Frequency. The minimum value 1 specifies the lowest frequency carrier among the active carriers. The maximum value specifies the highest frequency carrier among the active carriers.

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :RCARrier <integer></code> <code>[:SENSe] :CHANnel :CARRier :RCARrier ?</code>
Example	CHAN:CARR:RCAR 3 CHAN:CARR:RCAR ?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	The maximum value depends on the number of carriers. If you set it to more than the number of carriers, it's clipped to the number of carriers. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Couplings	When you decrease the number of carriers to a value which is less than this value, this is clipped to the value.
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	Number of carriers
Initial S/W Revision	A.06.00

Configure Carriers

Opens a menu of keys that allows you to configure carriers.

Key Path	FREQ Channel, Multi Carrier Setup
Dependencies	This key is grayed out when there is only one carrier. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Initial S/W Revision	A.06.00

Select Carrier

Selects a carrier to configure.

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	The maximum value depends on the number of carriers. This key is only shown when the N9071A–3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned. This parameter is unavailable when there is only one carrier.
Couplings	This value can change when you decrease the number of carriers.
Preset	1
State Saved	No
Min	1
Max	Number of carriers
Initial S/W Revision	A.06.00

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :CARRier :LIST :COUPle OFF ON 0 1, ... [:SENSe] :CHANnel :CARRier :LIST :COUPle ?
Example	CHAN:CARR:LIST:COUP OFF CHAN:CARR:LIST:COUP?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This key is only shown when the N9071A–3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	When Couple is selected, the carrier settings are coupled to carrier #1. Coupled parameters are Carrier Power Present, Carrier Interval. When a setting is changed, the couple is set to Man automatically. Carrier #1 is always set to couple and cannot be changed. Couple/Man selection on the Carrier key is not displayed when selected carrier number is #1.
Preset	ON
State Saved	No
Range	Couple Man
Initial S/W Revision	A.06.00

Carrier Power Present

Specifies whether each of carriers is active or not.

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :LIST :PPresent YES NO, ...</code> <code>[:SENSe] :CHANnel :CARRier :LIST :PPresent ?</code>
Example	CHAN:CARR:LIST:PPR YES CHAN:CARR:LIST:PPR?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode. Missing values are not permitted, therefore if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Dependencies	This parameter is unavailable when there is only one carrier. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	Coupled to the number of carriers. When the SCPI command is sent, the number of carriers will be set to the number of entries in the parameter list.
Preset	YES
State Saved	Saved in instrument state.
Range	Yes No
Initial S/W Revision	A.06.00

Carrier Interval

Specifies the frequency interval between the Carrier #n and #n+1 center frequencies.

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :LIST :INTerval <freq>, ...</code> <code>[:SENSe] :CHANnel :CARRier :LIST :INTerval ?</code>
Example	CHAN:CARR:LIST:INT 600k CHAN:CARR:LIST:INT?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode. The softkey for the last carrier (say, #N) is grayed out.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned. This parameter is unavailable when there is only one carrier.
Couplings	Coupled to the number of carriers. When the SCPI command is sent, the number of carriers will be

	set to the number of entries in the parameter list. Changing Carrier Interval might affect the Span.
Preset	600kHz
State Saved	Saved in instrument state.
Min	400 kHz
Max	100 MHz
Initial S/W Revision	A.06.00
Modified at S/W Revision	A.07.00, A.08.00

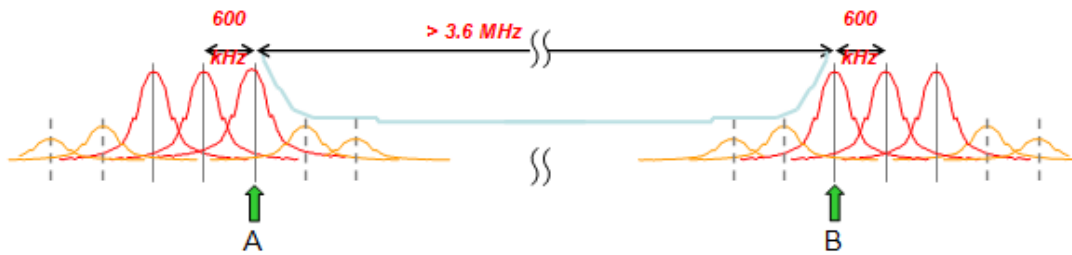
Carrier Frequency Allocation

Specifies the carrier frequency allocation. There are two types of allocation, contiguous and non-contiguous. Non-Contiguous frequency allocation is defined as an allocation where two groups of frequencies are separated with at least [3.6] MHz carrier separation between the innermost carriers. In case of the non-contiguous frequency allocation, tests will be measured between the uppermost carrier A of the lower frequency group and the lowermost carrier B of the upper frequency group.

See ["An example of non-contiguous frequency allocation" on page 871](#)

Key Path	FREQ Channel, Multi Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :FALLocation</code> CONTiguous NCONTiguous <code>[:SENSe] :CHANnel :CARRier :FALLocation?</code>
Example	CHAN:CARR:FALL NCON CHAN:CARR:FALL?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This menu key is available only when the number of carriers is more than one. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Preset	CONTiguous
State Saved	Saved in instrument state.
Range	Contiguous Non-Contiguous
Readback Text	CONTiguous NCONTiguous
Initial S/W Revision	A.07.00

An example of non-contiguous frequency allocation



Non-Contiguous

Opens a menu of keys that allows you to set non-contiguous frequency allocation parameters.

Key Path	FREQ Channel, Multi Carrier Setup, Carr Freq Alloc
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Initial S/W Revision	A.07.00

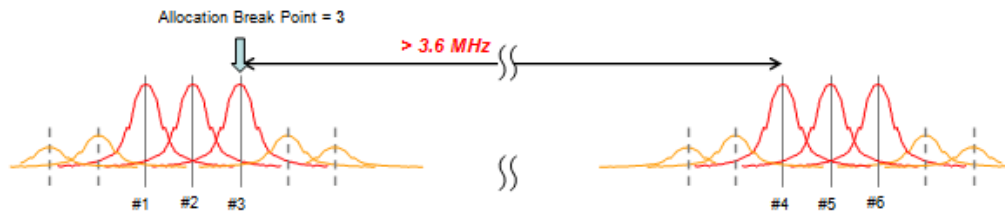
Allocation Break Pt

Specifies an allocation break point that is a sequence (or index) number of the uppermost carrier in the lower frequency group.

See ["An example of allocation break point" on page 873](#)

Key Path	FREQ Channel, Multi Carrier Setup, Carr Freq Alloc, Non-Contiguous
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :FALLocation :NCONtiguous :ABPoint <integer></code> <code>[:SENSe] :CHANnel :CARRier :FALLocation :NCONtiguous :ABPoint ?</code>
Example	<code>CHAN:CARR:FALL:NCON:ABP 3</code> <code>CHAN:CARR:FALL:NCON:ABP ?</code>
Notes	You must be in the GSM mode to use this command. Use <code>INSTRument:SElect</code> to set the mode.
Dependencies	The maximum value depends on the number of carriers. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	This value can change when you decrease the number of carriers.
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	Number of carriers - 1
Initial S/W Revision	A.07.00
Modified at S/W Revision	A.13.00

An example of allocation break point



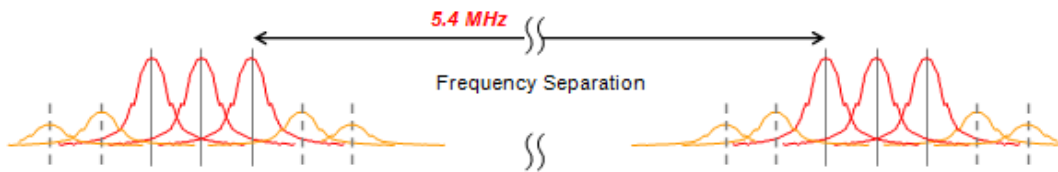
Freq Separation

Specifies frequency separation between the innermost of carriers.

See ["An example of frequency separation" on page 874](#)

Key Path	FREQ Channel, Multi Carrier Setup, Carr Freq Alloc, Non-Contiguous
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :FALLocation :NCONtiguous :FSEParation <freq></code> <code>[:SENSe] :CHANnel :CARRier :FALLocation :NCONtiguous :FSEParation?</code>
Example	<code>CHAN:CARR:FALL:NCON:FSEP 5.4M</code> <code>CHAN:CARR:FALL:NCON:FSEP?</code>
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	Changing Frequency Separation might affect the Span
Preset	5.4 MHz
State Saved	Saved in instrument state.
Min	3.6 MHz
Max	100 MHz
Initial S/W Revision	A.07.00

An example of frequency separation



Carrier BPF

Selects whether to use the carrier bandpass filter.

Key Path	FREQ Channel, Multi Carrier SetupMode Setup, Demod
Mode	GSM
Remote Command	[:SENSe]:RADio:CARRier:NUMBer:AUTO ON OFF 1 0 [:SENSe]:RADio:CARRier:NUMBer:AUTO?
Example	RAD:CARR:NUMB:AUTO 1 RAD:CARR:NUMB:AUTO?
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	ON automatically changes to OFF when Multiple or Single is selected as Carrier BPF Type.
Preset	ON
State Saved	Saved in instrument state.
Range	Auto Man
Initial S/W Revision	A.06.00

Carrier BPF Type

Opens a menu of keys that allows you to select the type of the bandpass filter. When carriers other than the signal of interest are present, especially if they are strong, they can interfere with the measurement, making it difficult to sync and producing artificially high EVM results. When this condition exists, toggle from Single to Multi. A band-limited filter will help reduce the measurement interference.

BPF Type	Description
MULTiple	Enable multi carrier tolerance filter.
SINGle	Disable multi carrier tolerance filter

This parameter applies only to the following measurements:

- GMSK Phase & Frequency Error measurement
- EDGE EVM measurement
- GMSK Power vs. Time

- EDGE Power vs. Time

Key Path	FREQ Channel, Multi Carrier Setup, Carrier BPFMode Setup, Demod, Carrier BPF
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :RADio :CARRier :NUMBer SINGLE MULTiple</code> <code>[:SENSe] :RADio :CARRier :NUMBer ?</code>
Example	<code>RAD:CARR:NUMB SING</code> <code>RAD:CARR:NUMB ?</code>
Notes	The Carrier Bandpass Filter key is in the Mode Setup menu, but only EDGE EVM and GSM PFER measurements support this feature. In other measurements, this setting is not applicable. You must be in the GSM mode to use this command. Use <code>INSTRument:SElect</code> to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Preset	SINGLE
State Saved	Saved in instrument state.
Range	Single Multi
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

BTS Class

Selects a BTS class.

BTS Class	Definition
MC	Multicarrier BTS is defined as a class of BTS, characterized by the ability to, in addition to single carrier operation, process two or more carriers in common active RF components simultaneously, either in multicarrier transmitter only or, in both multicarrier transmitter and multicarrier receiver.
SC	Single carrier BTS is defined as a class of BTS, characterized by the ability to process one carrier in single carrier BTSs, not belonging to a Multicarrier BTS class.

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Remote Command	<code>[:SENSe] :CHANnel :CARRier :BASE :CLASs :AUTO ON OFF 1 0</code> <code>[:SENSe] :CHANnel :CARRier :BASE :CLASs :AUTO ?</code>
Example	<code>CHAN:CARR:BASE:CLAS:AUTO 1</code> <code>CHAN:CARR:BASE:CLAS:AUTO ?</code>
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.

Couplings	ON automatically changes to OFF when Multicarrier Class (MC) or Single carrier Class (SC) is selected as BTS Class.
Preset	ON
State Saved	Saved in instrument state.
Range	Auto Man
Initial S/W Revision	A.14.00

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :CARRier :BASE :CLASs SC MC [:SENSe] :CHANnel :CARRier :BASE :CLASs ?
Example	CHAN:CARR:BASE:CLAS MC CHAN:CARR:BASE:CLAS?

Notes

You must be in the GSM mode to use this command.
 Use INSTRument:SElect to set the mode.
 Selection C1 and C2 are supported for backwards compatibility.
 When "C1" or "C2" is passed as SCPI command parameter, the BTS Class Auto is set to ON. As a result, it's converted to "SC" if the number of carriers is one, and otherwise "MC."

Dependencies	This parameter is available when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Preset	SC
State Saved	Saved in instrument state.
Range	Single Carrier Multi Carrier
Initial S/W Revision	A.06.00
Modified at S/W Revision	A.10.01, A14.00

Time Slot

Selects On or Off for slot searching. Generally, this feature is only valid in external and periodic timer trigger source modes that triggers every frame since another trigger source does not have the information that identifies the head of the frame. When Timeslot is set to On, the demodulation measurement is made on the nth timeslot specified by the trigger point + n timeslots, where n is the selected timeslot value 0 to 7.

This functionality is the same as Time Slot under the Freq/Channel menu.

Key Path	Mode Setup, Demod FREQ Channel
Mode	GSM

Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :SLOT <integer> [:SENSe] :CHANnel :SLOT? [:SENSe] :CHANnel :SLOT :AUTO OFF ON 0 1 [:SENSe] :CHANnel :SLOT :AUTO?
Example	CHAN:SLOT 0 CHAN:SLOT? CHAN:SLOT:AUTO OFF CHAN:SLOT:AUTO?
Notes	This functionality does not affect Combined GSM/EDGE measurement. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	0 OFF
State Saved	Saved in instrument state.
Min	0
Max	7
Initial S/W Revision	Prior to A.02.00

Burst Type

Sets the burst type that the analyzer will search for and to which it will synchronize.

This functionality is the same as Burst Type under the FREQ Channel menu.

Key	SCPI	Description
Sync (SCH)	SYNC	Burst length = 142 symbols Extended training sequences for CTS and COMPACT synchronization bursts are not supported.
Access (RACH)	ACCess	Burst length = 88 symbols Alternative training (synchronization) sequence "TS1" and "TS2" are supported only in GSMK Power vs. Time.
Normal - NB (TCH & CCH)	NORMAL	Burst length = 142 symbols Softkey label will be changed to 'Normal - NB' form 'Normal'
Higher Symbol Rate - HB (TCH & CCH)	HSRate	Burst length = 169 symbols This selection key is only shown when the N9071A-3FP license is installed.
Mixed (NB/HB for TSC sync)	MIXed	Enables auto detection between Normal (NB) and HSR (HB) TCH & CCH EDGE Burst. This selection key is only shown when the N9071A-3FP license is installed.

Measurement synchronization capability (Burst Sync = Training Seq)

	Sync	Access	Normal		HSR	Mixed
			GMSK	8PSK		
				16QAM		
				32QAM		
				AQPSK		
GMSK Phase & Freq Error measurement	Yes	Yes	Yes	No	N/A	
GMSK Power vs. Time measurement	Yes	Yes	Yes	No	(measures as Normal GMSK when selected)	
GMSK Output RF Spectrum measurement (when Trigger Source is Periodic Timer and Sync Source is Off)	No	No	Yes	No		
EDGE EVM measurement	No	No	No	Yes	Yes	Yes
EDGE Power vs. Time measurement	Yes	Yes	Yes	Yes	Yes	Yes
EDGE Output RF Spectrum measurement (when Trigger Source is Periodic Timer and Sync Source is Off.)	No	No	Yes	Yes	Yes	Yes

Key Path	Mode Setup, Demod FREQ Channel
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :BURSt NORMal SYNC ACCess HSRate MIXed [:SENSe] :CHANnel :BURSt?
Example	CHAN:BURS NORM CHAN:BURS?
Notes	This functionality does not affect the Combined GSM/EDGE measurement. Higher Symbol Rate and Mixed selections are only available when the N9071A-3FP license is installed. Otherwise these menu keys are blank. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Higher Symbol Rate and Mixed selection keys are not shown unless N9071A-3FP is installed. When unlicensed and SCPI is sent, an undefined header error is returned. When "Mixed" is selected, the Burst Sync menu key under the Meas Setup menu will be grayed out and Training Sequence (TSC) will be used for synchronization. The sync algorithm always runs in Training Sequence (TSC) synchronization because the Burst Type can be determined by looking at TSC in the signal. Original selection of Burst Sync will become effective again when the Burst Type selection is changed from "Mixed" to another one.
Preset	NORMal
State Saved	Saved in instrument state.
Range	Sync (SCH) Access (RACH) Normal - NB (TCH & CCH) Higher Symbol Rate - HB (TCH & CCH) Mixed (NB/HB for TSC sync)

Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

TSC (Std)

Allows you to select the Training Sequence Code that determines which burst is to be measured. Applicable only when Burst Sync is set to Training Sequence in the measurement. In the case of AQPSK, this parameter specifies TSC number of VAMOS sub-channel A. TSC of VAMOS sub-channel B is ignored.

This functionality is the same as TSC under the FREQ Channel menu.

This parameter applies only to the following measurements:

- GMSK/EDGE Power vs. Time measurement
- GMSK Phase & Frequency Error measurement
- EDGE EVM measurement

Selection	SCPI	Description
AutoDet	ON 1	The measurement is made on the first burst found to have any one of the valid TSCs in the range of 0 to 7. The measurement may be made on various timeslots if more than one timeslot has one of the 8 valid TSCs.
Man	OFF 0	The measurement is made on the first burst found to have the selected TSC. TSC numbers in the range of 0 to 7 can be selected. The measurement may be made on various timeslots if more than one timeslot has this same TSC.

Key Path	Mode Setup, Demod FREQ Channel
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe]:CHANnel:TSCode <integer> [:SENSe]:CHANnel:TSCode? [:SENSe]:CHANnel:TSCode:AUTO OFF ON 0 1 [:SENSe]:CHANnel:TSCode:AUTO?
Example	CHAN:TSC 3 CHAN:TSC? CHAN:TSC:AUTO 1 CHAN:TSC:AUTO?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. When Sync or Access is selected as Burst Type, this key is grayed out.
Preset	0 ON

10 EDGE Output RF Spectrum Measurement
FREQ/Channel

State Saved	Saved in instrument state.
Min	0
Max	7
Initial S/W Revision	Prior to A.02.00

Input/Output

See "Input/Output" on page 196

Marker

Accesses a menu that enables you to select, set up and control the markers for the current measurement.

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Select Marker

Displays 12 markers available for selection

Key Path	Marker
Initial S/W Revision	Prior to A.02.00

Marker Type

Sets the marker control mode to Normal, Delta or Off. All interactions and dependencies detailed under the key description are enforced when the remote command is sent.

Key Path	Marker
Mode	GSM
Remote Command	:CALCulate:EORFspectr:MARKer[1] 2 ...12:MODE POSition DELTA OFF :CALCulate:EORFspectr:MARKer[1] 2 ...12:MODE?
Example	CALC:EORF:MARK:MODE OFF CALC:EORF:MARK:MODE?
Notes	If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules. At the same time, Marker X Axis Value appears on the Active Function area. Default Active Function: the active function for the selected marker's current control mode. If the current control mode is Off, there is no active function and the active function is turned off. Active Function Display: the marker X axis value entered in the active function area displays the marker value to its full entered precision. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	OFF
State Saved	Saved in instrument state.
Range	Normal Delta Off
Initial S/W Revision	Prior to A.02.00

Marker X Axis Value (Remote Command Only)

Sets the marker X Axis value, using the current marker X Axis Scale unit. It has no effect if the control mode is Off, but is the SCPI equivalent of entering an X value if the control mode is Normal, Delta or Fixed.

Mode	GSM
Remote Command	:CALCulate:EORFspectr:MARKer[1] 2 ...12:X <real> :CALCulate:EORFspectr:MARKer[1] 2 ...12:X?
Example	CALC:EORF:MARK3:X 0 CALC:EORF:MARK3:X?
Notes	If no suffix is sent , uses the fundamental units for the current marker X Axis Scale. If a suffix is sent that does not match the current marker X Axis Scale unit, an error "Invalid suffix" is generated. The query returns the marker's absolute X Axis value if the control mode is Normal, or the offset from the marker's reference marker if the control mode is Delta. The query is returned in the fundamental units for the current marker X Axis scale: Hz for Frequency and Inverse Time, seconds for Period and Time. If the marker is Off the response is not a number. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	Max/Min value is changed by Sweep Time or Frequency Span.
Preset	After a preset, all markers are turned OFF, so Marker X Axis Value query returns a not a number (NAN).
State Saved	No
Min	-9.9E37.
Max	9.9E37
Initial S/W Revision	Prior to A.02.00

Marker X Axis Position (Remote Command Only)

Sets the marker X position in trace points. It has no effect if the control mode is Off, but is the SCPI equivalent of entering a value if the control mode is Normal or Delta except in trace points rather than X Axis Scale units. The entered value is immediately translated into the current X Axis Scale units for setting the value of the marker.

Mode	GSM
Remote Command	:CALCulate:EORFspectr:MARKer[1] 2 ...12:X:POSition <integer> :CALCulate:EORFspectr:MARKer[1] 2 ...12:X:POSition?
Example	CALC:EORFspectr:MARK10:X:POS 0 CALC:EORFspectr:MARK10:X:POS?
Notes	The query returns the marker's absolute X Axis value in trace points if the control mode is Normal, or the offset from the marker's reference marker in trace points if the control mode is Delta. If the marker is Off the response is not a number. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	Max/Min value is changed by Sweep Time or Frequency Span.
Preset	After a preset, all markers are turned OFF, so Marker X Axis Value query returns a not a number

	(NAN).
State Saved	No
Min	-9.9E37
Max	9.9E37
Initial S/W Revision	Prior to A.02.00

Marker Y Axis Value (Remote Command Only)

Returns the marker Y Axis value in the current marker Y Axis unit.

The “result” of a marker is the value which is displayed on the second line of the Marker Result block. To properly interpret the returned value, the remote programmer must also know what the analyzer’s Y-Axis Unit is set to as described below.

A marker can have up to two results, only one of which is displayed or returned on a query, as follows:

- **Absolute** result: every marker has an absolute result and it is simply:

For Normal and Delta markers, the Y-axis value of the trace point the marker is currently on.

The absolute result is displayed in the result block or returned on a query unless the marker control mode is Delta.

- **Relative** result: if a marker’s control mode is Delta, the relative result is displayed in the result block or returned on a query. This is the ratio of the Absolute Result of a delta marker.

Mode	GSM
Remote Command	:CALCulate:EORFspectr:MARKer[1] 2 ...12:Y?
Example	CALC:EORFspectr:MARK11:Y?
Notes	The query returns the marker Y-axis result. If the marker is Off the response is not a number. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	0
State Saved	No
Backwards Compatibility SCPI	:CALCulate:EORFspectr:MARKer[1] 2 ...4:FUNction:RESult?
Initial S/W Revision	Prior to A.02.00

Marker Type

Sets the marker control mode to Normal, Delta or Off. All interactions and dependencies detailed under the key description are enforced when the remote command is sent.

Key Path	Marker
Mode	GSM

Remote Command	:CALCulate:EORFspectr:MARKer[1] 2 ...12:MODE POSition DELTa OFF :CALCulate:EORFspectr:MARKer[1] 2 ...12:MODE?
Example	CALC:EORF:MARK:MODE OFF CALC:EORF:MARK:MODE?
Notes	If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules. At the same time, Marker X Axis Value appears on the Active Function area. Default Active Function: the active function for the selected marker's current control mode. If the current control mode is Off, there is no active function and the active function is turned off. Active Function Display: the marker X axis value entered in the active function area displays the marker value to its full entered precision. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	OFF
State Saved	Saved in instrument state.
Range	Normal Delta Off
Initial S/W Revision	Prior to A.02.00

Properties

Accesses a menu that allow you to set marker properties and to access the marker trace menu.

Key Path	Marker
Initial S/W Revision	Prior to A.02.00

Select Marker

Displays 12 markers available for selection

Key Path	Marker
Initial S/W Revision	Prior to A.02.00

Relative To

Selects the marker that the selected marker is relative to (its reference marker).

Key Path	Marker, Properties
Mode	GSM
Remote Command	:CALCulate:EORFspectr:MARKer[1] 2 ...12:REFerence <integer> :CALCulate:EORFspectr:MARKer[1] 2 ...12:REFerence?

Example	CALC:EORF:MARK:REF 10 CALC:EORF:MARK:REF?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode. When queried a single value is returned (the specified marker numbers relative marker). A marker cannot be relative to itself so that choice is grayed out, and if sent from SCPI generates error -221: "Settings conflict; marker cannot be relative to itself."
Dependencies	A marker cannot be relative to itself so that choice is grayed out, and if sent from SCPI generates error -221: "Settings conflict; marker cannot be relative to itself."
Preset	2 3 4 5 6 7 8 9 10 11 12 1
State Saved	Saved in instrument state.
Min	1
Max	12
Initial S/W Revision	Prior to A.02.00

Marker Trace

Assigns the specified marker to the designated trace.

Key Path	Marker, Properties
Mode	GSM
Remote Command	:CALCulate:EORFspectr:MARKer[1] 2 ...12:TRACe RFEMod RFESwitching SPEMod LIMMod :CALCulate:EORFspectr:MARKer[1] 2 ...12:TRACe?
Example	CALC:EORF:MARK:TRACE RFES CALC:EORF:MARK:TRACE?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Dependencies	RF Envelope Modulation and RF Envelop Switching are available only when Meas Method is Single. Swp Spectrum Modulation and Limit Modulation are available when the Meas Method is Swept. Otherwise they are unavailable.
Preset	RFEMod
State Saved	Saved in instrument state.
Range	RF Envelope Modulation RF Envelope Switching Swp Spectrum Modulation Limit Modulation
Initial S/W Revision	Prior to A.02.00

Select Marker

Displays 12 markers available for selection.

Key Path	Marker, Properties
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Couple Markers

When this function is true, moving any marker causes an equal X Axis movement of every other marker which is not Off. By “equal X Axis movement” we mean that we preserve the difference between each marker’s X Axis value (in the fundamental x-axis units of the trace that marker is on) and the X Axis value of the marker being moved (in the same fundamental x-axis units).

This may result in markers going off screen.

Key Path	Marker
Mode	GSM
Remote Command	:CALCulate:EORFspectr:MARKer:COUPle[:STATe] ON OFF 1 0 :CALCulate:EORFspectr:MARKer:COUPle[:STATe]?
Example	CALC:EORF:MARK:COUP ON CALC:EORF:MARK:COUP?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

All Markers Off

Turns off all markers.

Key Path	Marker
Mode	GSM
Remote Command	:CALCulate:EORFspectr:MARKer:AOff
Example	CALC:EORFspectr:MARK:AOff
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Initial S/W Revision	Prior to A.02.00

Marker State (Backwards Compatibility/Remote Command Only)

Sets or queries the state of a marker. Setting a marker which is OFF to state ON or 1 puts it in Normal mode and places it at the center of the screen.

Mode	EDGE GSM
Remote Command	:CALCulate:EORFspectr:MARKer[1] 2 ...12:STATe OFF ON 0 1 :CALCulate:EORFspectr:MARKer[1] 2 ...12:STATe?
Example	CALC:EORF:MARK3:STAT ON
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

Marker Function

There is no functionality for this Front-panel key in this measurement. Pressing this key displays a blank menu.

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Marker To

There is no functionality for this Front-panel key in this measurement. Pressing this key displays a blank menu.

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Meas

The information in this section is common to all measurements. For key and remote command information for a specific measurement, refer to the section that describes the measurement of interest.

Measurements available under the Meas key are specific to the current Mode.

When viewing Help for measurements, note the following:

NOTE

Operation for some keys differs between measurements. The information displayed in Help pertains to the current measurement. To see how a key operates in a different measurement, exit Help (press the Cancel Esc key), select the measurement, then reenter Help (press the Help key) and press that key.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Remote Measurement Functions

This section contains the following topics:

"Measurement Group of Commands" on page 2302

"Current Measurement Query (Remote Command Only)" on page 2304

"Limit Test Current Results (Remote Command Only)" on page 2304

"Data Query (Remote Command Only)" on page 2304

"Calculate/Compress Trace Data Query (Remote Command Only)" on page 2305

"Calculate Peaks of Trace Data (Remote Command Only)" on page 2310

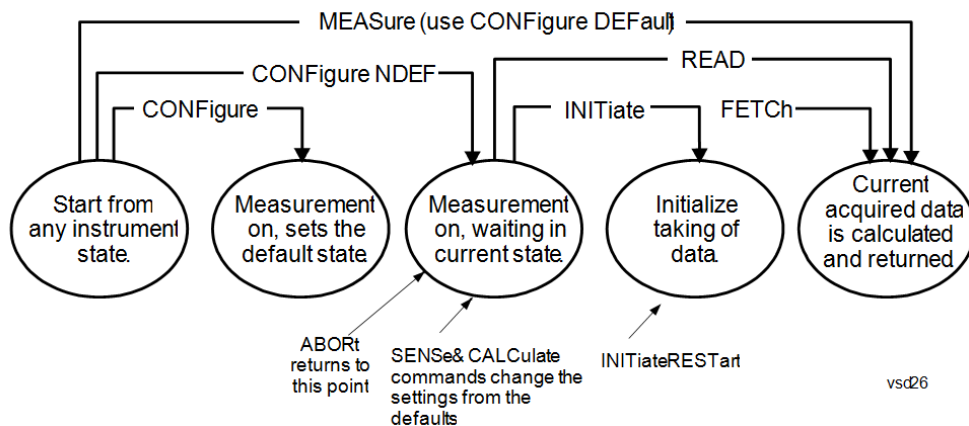
Hardware-Accelerated Fast Power Measurement (Remote Command Only)

"Format Data: Numeric Data (Remote Command Only)" on page 2311

"Format Data: Byte Order (Remote Command Only)" on page 2312

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Measurement Group of Commands



Measure Commands:

:MEASure:<measurement>[n]?

This is a fast single-command way to make a measurement using the factory default instrument settings. These are the settings and units that conform to the Mode Setup settings (e.g. radio standard) that you have currently selected.

- Stops the current measurement (if any) and sets up the instrument for the specified measurement using the factory defaults
- Initiates the data acquisition for the measurement
- Blocks other SCPI communication, waiting until the measurement is complete before returning results.
- If the function does averaging, it is turned on and the number of averages is set to 10.
- After the data is valid it returns the scalar results, or the trace data, for the specified measurement. The type of data returned may be defined by an [n] value that is sent with the command.
- The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available.
- ASCII is the default format for the data output. (Older versions of Spectrum Analysis and Phase Noise mode measurements only use ASCII.) The binary data formats should be used for handling large blocks of data since they are smaller and faster than the ASCII format. Refer to the FORMat:DATA command for more information.

If you need to change some of the measurement parameters from the factory default settings you can set up the measurement with the CONFIgure command. Use the commands in the SENSE:<measurement> and CALCulate:<measurement> subsystems to change the settings. Then you can use the READ? command to initiate the measurement and query the results.

If you need to repeatedly make a given measurement with settings other than the factory defaults, you can use the commands in the SENSE:<measurement> and CALCulate:<measurement> subsystems to set up the measurement. Then use the READ? command to initiate the measurement and query results.

Measurement settings persist if you initiate a different measurement and then return to a previous one. Use READ:<measurement>? if you want to use those persistent settings. If you want to go back to the default settings, use MEASure:<measurement>?.

Configure Commands:

:CONFIgure:<measurement>

This command stops the current measurement (if any) and sets up the instrument for the specified measurement using

the factory default instrument settings. It does not initiate the taking of measurement data unless INIT:CONTInuous is ON. If you change any measurement settings after using the CONFigure command, the READ command can be used to initiate a measurement without changing the settings back to their defaults.

In the Swept SA measurement in Spectrum Analyzer mode the CONFigure command also turns the averaging function on and sets the number of averages to 10 for all measurements.

:CONFigure: <measurement>: NDEFault stops the current measurement and changes to the specified measurement. It does not change the settings to the defaults. It does not initiate the taking of measurement data unless INIT:CONTInuous is ON.

The CONFigure? query returns the current measurement name.

The CONFigure:CATalog? query returns a quoted string of all licensed measurement names in the current mode. For example, "SAN, CHP, OBW, ACP, PST, TXP, SPUR, SEM, LIST".

Fetch Commands:

:FETCh:<measurement>[n]?

This command puts selected data from the most recent measurement into the output buffer. Use FETCh if you have already made a good measurement and you want to return several types of data (different [n] values, for example, both scalars and trace data) from a single measurement. FETCh saves you the time of re-making the measurement. You can only FETCh results from the measurement that is currently active, it will not change to a different measurement. An error message is reported if a measurement other than the current one is specified.

If you need to get new measurement data, use the READ command, which is equivalent to an INITiate followed by a FETCh.

The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used for handling large blocks of data since they are smaller and transfer faster than the ASCII format. (FORMat:DATA)

FETCh may be used to return results other than those specified with the original READ or MEASure command that you sent.

INITiate Commands:

:INITiate:<measurement>

This command is not available for measurements in all the instrument modes:

- Initiates a trigger cycle for the specified measurement, but does not output any data. You must then use the FETCh<meas> command to return data. If a measurement other than the current one is specified, the instrument will switch to that measurement and then initiate it.
- For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. If you send INIT:ACP? it will change from channel power to ACP and will initiate an ACP measurement.
- Does not change any of the measurement settings. For example, if you have previously started the ACP measurement and you send INIT:ACP? it will initiate a new ACP measurement using the same instrument settings as the last time ACP was run.
- If your selected measurement is currently active (in the idle state) it triggers the measurement, assuming the trigger conditions are met. Then it completes one trigger cycle. Depending upon the measurement and the number of averages, there may be multiple data acquisitions, with multiple trigger events, for one full trigger cycle. It also holds off additional commands on GPIB until the acquisition is complete.

READ Commands:

:READ:<measurement>[n]?

- Does not preset the measurement to the factory default settings. For example, if you have previously initiated the ACP
-

measurement and you send READ:ACP? it will initiate a new measurement using the same instrument settings.

- Initiates the measurement and puts valid data into the output buffer. If a measurement other than the current one is specified, the instrument will switch to that measurement before it initiates the measurement and returns results.
 - For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. Then you send READ:ACP? It will change from channel power back to ACP and, using the previous ACP settings, will initiate the measurement and return results.
 - Blocks other SCPI communication, waiting until the measurement is complete before returning the results
 - If the optional [n] value is not included, or is set to 1, the scalar measurement results will be returned. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used when handling large blocks of data since they are smaller and faster than the ASCII format. (FORMat:DATA)
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Current Measurement Query (Remote Command Only)

This command returns the name of the measurement that is currently running.

Remote Command	:CONFigure?
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Example	CONF?
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Limit Test Current Results (Remote Command Only)

Queries the status of the current measurement limit testing. It returns a 0 if the measured results pass when compared with the current limits. It returns a 1 if the measured results fail any limit tests.

Remote Command	:CALCulate:CLIMits:FAIL?
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Example	CALC:CLIM:FAIL? queries the current measurement to see if it fails the defined limits. Returns a 0 or 1: 0 it passes, 1 it fails.
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Data Query (Remote Command Only)

Returns the designated measurement data for the currently selected measurement and subopcode.

n = any valid subopcode for the current measurement. See the measurement command results table for your current measurement, for information about what data is returned for the subopcodes.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. (See the format command descriptions under Input/Output in the Analyzer Setup section.)

Remote Command	:CALCulate:DATA[n]?
Notes	The return trace depends on the measurement. In CALCulate:<meas>:DATA[n], n is any valid subopcode for the current measurement. It returns the same data as the FETCH:<measurement>? query where <measurement> is the current measurement.
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Calculate/Compress Trace Data Query (Remote Command Only)

Returns compressed data for the currently selected measurement and sub-opcode [n].

n = any valid sub-opcode for that measurement. See the MEASure:<measurement>? command description of your specific measurement for information on the data that can be returned.

The data is returned in the current Y Axis Unit of the analyzer. The command is used with a sub-opcode <n> (default=1) to specify the trace. With trace queries, it is best if the analyzer is not sweeping during the query. Therefore, it is generally advisable to be in Single Sweep, or Update=Off.

This command is used to compress or decimate a long trace to extract and return only the desired data. A typical example would be to acquire N frames of GSM data and return the mean power of the first burst in each frame. The command can also be used to identify the best curve fit for the data.

Remote Command	:CALCulate:DATA<n>:COMPRESS? BLOCK CFIT MAXimum MINimum MEAN DMEan RMS RMSCubed SAMPLE SDEVIation PPHase [,<soffset> [,<length>[,<roffset>[,<rlimit>]]]]
Example	To query the mean power of a set of GSM bursts: Supply a signal that is a set of GSM bursts. Select the IQ Waveform measurement (in IQ Analyzer Mode). Set the sweep time to acquire at least one burst. Set the triggers such that acquisition happens at a known position relative to a burst. Then query the mean burst levels using, CALC:DATA2:COMP? MEAN, 24e-6, 526e-6 (These parameter values correspond to GSM signals, where 526e-6 is the length of the burst in the slot and you just want 1 burst.)
Notes	The command supports 5 parameters. Note that the last 4 (<soffset>, <length>, <roffset>, <rlimit>) are optional. But these optional parameters must be entered in the specified order. For example, if you want to specify <length>, then you must also specify <soffset>. See details below for a definition of each of these parameters. This command uses the data in the format specified by FORMat:DATA, returning either binary or ASCII data.
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- BLOCK or block data - returns all the data points from the region of the trace data that you specify. For example, it could be used to return the data points of an input signal over several timeslots, excluding the portions of the trace data that you do not want. (This is x,y pairs for trace data and I,Q pairs for complex data.)

- CFIT or curve fit - applies curve fitting routines to the data. <soffset> and <length> are required to define the data that you want. <roffset> is an optional parameter for the desired order of the curve equation. The query will return the following values: the x-offset (in seconds) and the curve coefficients ((order + 1) values).

MIN, MAX, MEAN, DME, RMS, RMSC, SAMP, SDEV and PPH return one data value for each specified region (or <length>) of trace data, for as many regions as possible until you run out of trace data (using <roffset> to specify regions). Or they return the number of regions you specify (using <rlimit>) ignoring any data beyond that.

- MINimum - returns the minimum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the minimum magnitude of the I/Q pairs is returned.
- MAXimum - returns the maximum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the maximum magnitude of the I/Q pairs is returned.
- MEAN - returns a single value that is the arithmetic mean of the data point values (in dB/ dBm) for the specified region(s) of trace data. For I/Q trace data, the mean of the magnitudes of the I/Q pairs is returned. See the following equations.

NOTE If the original trace data is in dB, this function returns the arithmetic mean of those log values, not log of the mean power which is a more useful value. The mean of the log is the better measurement technique when measuring CW signals in the presence of noise. The mean of the power, expressed in dB, is useful in power measurements such as Channel Power. To achieve the mean of the power, use the RMS option.

Equation 1

Mean Value of Data Points for Specified Region(s)

$$MEAN = \frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 2

Mean Value of I/Q Data Pairs for Specified Region(s)

$$MEAN = \frac{1}{n} \sum_{X_i \in \text{region}(s)} |X_i|$$

where $|X_i|$ is the magnitude of an I/Q pair, and n is the number of I/Q pairs in the specified region(s).

- DMEan - returns a single value that is the mean power (in dB/ dBm) of the data point values for the specified region(s) of trace data. See the following equation:

Equation 3

DMEan Value of Data Points for Specified Region(s)

$$\text{DME} = 10 \times \log_{10} \left(\frac{1}{n} \sum_{X_i \in \text{region}(s)} 10^{\frac{X_i}{10}} \right)$$

- RMS - returns a single value that is the average power on a root-mean-squared voltage scale (arithmetic rms) of the data point values for the specified region(s) of trace data. See the following equation.

NOTE

For I/Q trace data, the rms of the magnitudes of the I/Q pairs is returned. See the following equation. This function is very useful for I/Q trace data. However, if the original trace data is in dB, this function returns the rms of the log values which is not usually needed.

Equation 4

RMS Value of Data Points for Specified Region(s)

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i^2}$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 5

RMS Value of I/Q Data Pairs for Specified Region(s)

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region(s).

Once you have the rms value for a region of trace data (linear or I/Q), you may want to calculate the mean power. You must convert this rms value (peak volts) to power in dBm:

$$10 \times \log[10 \times (\text{rms value})^2]$$

- SAMPLe - returns the first data value (x,y pair) for the specified region(s) of trace data. For I/Q trace data, the first I/Q pair is returned.
- SDEViation - returns a single value that is the arithmetic standard deviation for the data point values for the specified region(s) of trace data. See the following equation.
- For I/Q trace data, the standard deviation of the magnitudes of the I/Q pairs is returned. See the following equation.

Equation 6

Standard Deviation of Data Point Values for Specified Region(s)

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (X_i - \bar{X})^2}$$

where X_i is a data point value, \bar{X} is the arithmetic mean of the data point values for the specified region (s), and n is the number of data points in the specified region(s).

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (|X_i| - \bar{X})^2}$$

where $|X_i|$ is the magnitude of an I/Q pair, \bar{X} is the mean of the magnitudes for the specified region(s), and n is the number of data points in the specified region(s).

- PPHase - returns the x,y pairs of both rms power (dBm) and arithmetic mean phase (radian) for every specified region and frequency offset (Hz). The number of pairs is defined by the specified number of regions. This parameter can be used for I/Q vector ($n=0$) in Waveform (time domain) measurement and all parameters are specified by data point in PPHase.

The rms power of the specified region may be expressed as:

$$\text{Power} = 10 \times \log [10 \times (\text{RMS I/Q value})] + 10.$$

The RMS I/Q value (peak volts) is:

$$\sqrt{\frac{1}{n} \sum_{X_i \in \text{region}} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region.

The arithmetic mean phase of the specified region may be expressed as:

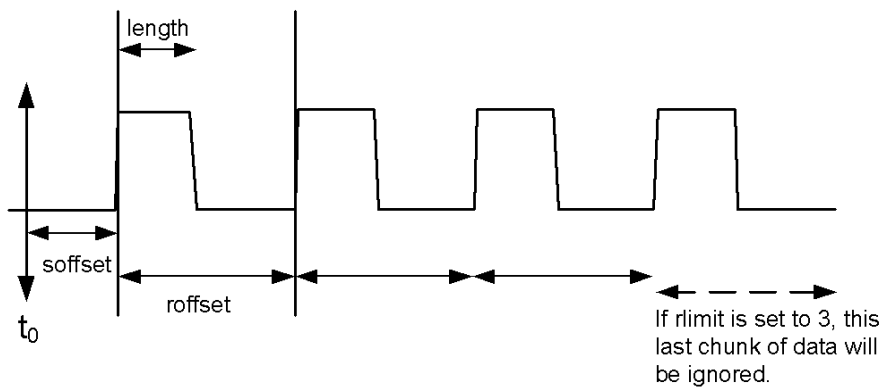
$$\frac{1}{n} \sum_{Y_i \in \text{region}} Y_i$$

where Y_i is the unwrapped phase of I/Q pair with applying frequency correction and n is the number of I/Q pairs in the specified region.

The frequency correction is made by the frequency offset calculated by the arithmetic mean of every specified region's frequency offset. Each frequency offset is calculated by the least square method against the unwrapped phase of I/Q pair.

Sample Trace Data - Constant Envelope

(See below for explanation of variables.)



Sample Trace Data - Not Constant Envelope

(See below for explanation of variables.)



<soffset> - start offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It specifies the amount of data at the beginning of the trace that will be ignored before the decimation process starts. It is the time or frequency change from the start of the trace to the point where you want to start using the data. The default value is zero.

<length> - is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines how much data will be compressed into one value. This parameter has a default value equal to the current trace length.

<roffset> - repeat offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines the beginning of the next field of trace elements to be compressed. This is relative to the beginning of the previous field. This parameter has a default value equal to the <length> variable. Note that this parameter is used for a completely different purpose when curve fitting (see CFIT above).

<rlimit> - repeat limit is an optional integer. It specifies the number of data items that you want returned. It will ignore any additional items beyond that number. You can use the Start offset and the Repeat limit to pick out exactly what part of the data you want to use. The default value is all the data.

Calculate Peaks of Trace Data (Remote Command Only)

Returns a list of all the peaks for the currently selected measurement and sub-opcode [n]. The peaks must meet the requirements of the peak threshold and excursion values.

n = any valid sub-opcode for the current measurement. See the MEASure:<measurement> command description of your specific measurement for information on the data that can be returned.

The command can only be used with specific sub-opcodes with measurement results that are trace data. Both real and complex traces can be searched, but complex traces are converted to magnitude in dBm. In many measurements the sub-opcode n=0, is the raw trace data which cannot be searched for peaks. And Sub-opcode n=1, is often calculated results values which also cannot be searched for peaks.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. If the format is set to INT,32, it returns REAL,32 data.

The command has four types of parameters:

- Threshold (in dBm)
- Excursion (in dB)
- Sorting order (amplitude, frequency, time)
- Optional in some measurements: Display line use (all, > display line, < display line)

Remote Command	<p>For Swept SA measurement:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME[,ALL GTDLine LTDLine]]</pre> <p>For most other measurements:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME]</pre>
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Example	<p>Example for Swept SA measurement in Spectrum Analyzer Mode:</p> <p>CALC:DATA4:PEAK? -40, 10, FREQ, GTDL This will identify the peaks of trace 4 that are above -40 dBm, with excursions of at least 10 dB. The peaks are returned in order of increasing frequency, starting with the lowest frequency. Only the peaks that are above the display line are returned.</p> <p>Query Results 1:</p> <p>With FORMat:DATA REAL, 32 selected, it returns a list of floating-point numbers. The first value in the list is the number of peak points that are in the following list. A peak point consists of two values: a peak amplitude followed by its corresponding frequency (or time).</p> <p>If no peaks are found the peak list will consist of only the number of peaks, (0).</p>
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Notes	<p><n> - is the trace that will be used</p> <p><threshold> - is the level below which trace data peaks are ignored. Note that the threshold value is required and is always used as a peak criterion. To effectively disable the threshold criterion for this command, provide a substantially low threshold value such as -200 dBm. Also note that the threshold value used in this command is independent of and has no effect on the threshold value stored under the Peak Criteria menu.</p> <p><excursion> - is the minimum amplitude variation (rise and fall) required for a signal to be identified as peak. Note that the excursion value is required and is always used as a peak criterion. To effectively disable the excursion criterion for this command, provide the minimum value of 0.0 dB. Also note that the excursion value used in this command is independent of and has no effect on the</p>
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excursion value stored under the Peak Criteria menu.

Values must be provided for threshold and excursion. The sorting and display line parameters are optional (defaults are AMPLitude and ALL).

Note that there is always a Y-axis value for the display line, regardless of whether the display line state is on or off. It is the current Y-axis value of the display line which is used by this command to determine whether a peak should be reported

Sorting order:

AMPLitude - lists the peaks in order of descending amplitude, with the highest peak first (default if optional parameter not sent)

FREQUency - lists the peaks in order of occurrence, left to right across the x-axis.

TIME - lists the peaks in order of occurrence, left to right across the x-axis.

Peaks vs. Display Line:

ALL - lists all of the peaks found (default if optional parameter not sent).

GTDLine (greater than display line) - lists all of the peaks found above the display line.

LTDLine (less than display line) - lists all of the peaks found below the display line.

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Format Data: Numeric Data (Remote Command Only)

This command specifies the format of the trace data input and output. It specifies the formats used for trace data during data transfer across any remote port. It affects only the data format for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]?, :CALCulate:DATA[n]? and FETCh:SANalyzer [n]? commands and queries.

Remote Command :FORMat[:TRACe][:DATA] ASCii|INTeger,32|REAL,32 |REAL,64
:FORMat[:TRACe][:DATA]?

Notes The query response is:
ASCii: ASC,8
REAL,32: REAL,32
REAL,64: REAL,64
INTeger,32: INT,32

When the numeric data format is REAL or ASCii, data is output in the current Y Axis unit. When the data format is INTeger, data is output in units of m dBm (.001 dBm).

The INT,32 format returns binary 32-bit integer values in internal units (m dBm), in a definite length block.

Dependencies Sending a data format spec with an invalid number (for example, INT,48) generates no error. The analyzer simply uses the default (8 for ASCii, 32 for INTeger, 32 for REAL).

Sending data to the analyzer which does not conform to the current FORMat specified, results in an error. Sending ASCII data when a definite block is expected generates message -161 "Invalid Block Data" and sending a definite block when ASCII data is expected generates message -121 "Invalid Character in Number".

Preset ASCii

Backwards Compatibility Notes Note that the INT,32 format is only applicable to the command, TRACe:DATA. This preserves backwards compatibility for the Swept SA measurement. For all other commands/queries which honor FORMat:DATA, if INT,32 is sent the analyzer will behave as though it were set to REAL,32.

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The specs for each output type follow:

AScii - Amplitude values are in ASCII, in the current Y Axis Unit, one ASCII character per digit, values separated by commas, each value in the form:

SX.YYYYYEsZZ

Where:

S = sign (+ or -)

X = one digit to left of decimal point

Y = 5 digits to right of decimal point

E = E, exponent header

s = sign of exponent (+ or -)

ZZ = two digit exponent

REAL,32 - Binary 32-bit real values in the current Y Axis Unit, in a definite length block.

REAL,64 - Binary 64-bit real values in the current Y Axis Unit, in a definite length block.

Format Data: Byte Order (Remote Command Only)

This command selects the binary data byte order for data transfer and other queries. It controls whether binary data is transferred in normal or swapped mode. This command affects only the byte order for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]? , :CALCulate:DATA[n]? and FETCh:SANalyzer[n]? commands and queries.

By definition any command that says it uses FORMat:DATA uses any format supported by FORMat:DATA.

The NORMal order is a byte sequence that begins with the most significant byte (MSB) first, and ends with the least significant byte (LSB) last in the sequence: 1|2|3|4. SWAPped order is when the byte sequence begins with the LSB first, and ends with the MSB last in the sequence: 4|3|2|1.

Remote Command	:FORMat:BORDER NORMal SWAPped :FORMat:BORDER?
Preset	NORMal
Initial S/W Revision	Prior to A.02.00

Meas Setup

Displays the measurement setup menu for the currently selected measurement.

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Avg/Hold Num

Specifies the number of data acquisitions that are averaged. After the specified number of average counts, the averaging mode (terminal control) setting determines the averaging action.

- On – Sets measurement averaging on.
- Off – Sets measurement averaging off.

Key Path	Meas Setup
Mode	GSM
Remote Command	[:SENSe]:EORFspectr:AVERage:COUNT <integer> [:SENSe]:EORFspectr:AVERage:COUNT? [:SENSe]:EORFspectr:AVERage[:STATe] OFF ON 0 1 [:SENSe]:EORFspectr:AVERage[:STATe]?
Example	EORF:AVER:COUN 3 EORF:AVER:COUN? EORF:AVER ON EORF:AVER?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Preset	20 ON
State Saved	Saved in instrument state.
Range	1 to 10000
Min	1
Max	10000
Initial S/W Revision	Prior to A.02.00

Meas Type

Selects the measurement type.

Key	SCPI	Type
Mod & Switch	MSWitching	Performs both Modulation and Switching measurements.
Modulation	MODulation	Measures the spectrum due to the 3/8pi shift 8PSK modulation and noise.
Switching	SWITching	Measures the spectrum due to switching transients (burst ramping).
Full Frame Modulation (FAST)	FFModulation	Improves measurement speed by acquiring a full frame of data prior to performing the FFT calculation. This feature can only be used when all slots in the transmitted frame are active.

Key Path	Meas Setup
Mode	GSM
Remote Command	[:SENSe]:EORFspectr:TYPE MODulation MSWitching SWITching FFModulation [:SENSe]:EORFspectr:TYPE?
Example	EORF:TYPE MOD EORF:TYPE?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. If a grayed out selection is chosen via SCPI command, it is ignored (no error)
Dependencies	When "Meas Method" on page 909 is set to SWEPT, the Mod & Switch and Full Frame Mod(FAST) selection keys are grayed out. When "Meas Method" on page 909 is set to Single Offset, the Full Frame Mod selection key is grayed out.
Preset	MODulation
State Saved	Saved in instrument state.
Range	Mod & Switch Modulation Switching Full Frame Mod (FAST)
Initial S/W Revision	Prior to A.02.00

Modulation

Opens a menu of keys that allows you to specify parameters for Modulation.

Key Path	Meas Setup, Meas Type
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

Fast Avg

Allows you to change the On/Off state of fast averaging.

Fast average method shortens the measurement speed of spectrum due to modulation when averaging is On. This method halves the actual number of average and measures 10 ~ 90 % of the useful part of the time slot excluding midamble. When this state is set to Off, 50 ~ 90 % of the useful part of the time slot excluding midamble will be measured and actual average number will be the same as the Avg/Hold Num.

Key Path	Meas Setup, Meas Type, Modulation
Mode	GSM
Remote Command	[:SENSe] :EORFspectr:AVErAge:FAST[:STATe] OFF ON 0 1 [:SENSe] :EORFspectr:AVErAge:FAST[:STATe] ?
Example	EORF:AVER:FAST ON EORF:AVER:FAST?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This parameter is available when: <ul style="list-style-type: none"> • Avg/Hold Num is set to more than 2 and the state is On • Meas Type is set to Modulation • Meas Method is set to Multi Offset or Single Offset.
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00, A.06.00

Switching

Opens a menu of keys that allows you to specify parameters for Switching.

Key Path	Meas Setup, Meas Type
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

Fast Peak Det

Allows you to change the On/Off state of fast peak detection.

Fast peak detection method shortens the measurement speed of spectrum due to switching when averaging is On. This method reduces the actual number of average and measures more than 2 slots at one measurement cycle.

Key Path	Meas Setup, Meas Type, Switching
Mode	GSM
Remote Command	[:SENSe] :EORFspectr:DETEctor:SWITChing:FAST[:STATe] ON OFF 1 0

	<code>[:SENSe] :EORFspectr:DETEctor:SWITching:FAST [:STATe] ?</code>
Example	EORF:DET:SWIT:FAST ON EORF:DET:SWIT:FAST?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This parameter is available when - Avg/Hold Num is set to more than 2 and the state is On. - Meas Type is set to Switching. - Meas Method is set to Multi Offset or Single Offset.
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00, A.06.00

Mod Average

Allows you to select the type of averaging method when measuring the spectrum due to modulation.

Pwr Avg (RMS) - True power averaging that is equivalent to taking the RMS value

Log-Pwr Avg (Video) - Simulates the traditional spectrum analyzer type of averaging by averaging the log of the power. (This is known as video averaging.)

This parameter determines how to average the results of spectrum due to modulation (Avg/Hold Num).

Key	SCPI	Operation
Log-Pwr Avg (Video)	LOG	The log of the power is averaged. (This is also known as video averaging.)
Pwr Avg (RMS)	RMS	The power is averaged, providing the rms of the voltage.

Key Path	Meas Setup
Mode	GSM
Remote Command	<code>[:SENSe] :EORFspectr:AVERage:MODulation:TYPE LOG RMS</code> <code>[:SENSe] :EORFspectr:AVERage:MODulation:TYPE ?</code>
Example	EORF:AVER:MOD:TYPE LOG EORF:AVER:MOD:TYPE?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This parameter is valid when the Meas Type is set to Modulation or Mod/Switch. Otherwise grayed out.
Preset	LOG
State Saved	Saved in instrument state.

Range	Pwr Avg (RMS) Log-Pwr Avg (Video)
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00, A.06.00

Power Ref Carrier

Opens a menu of keys that allows you to specify parameters for power reference carrier.

Key Path	Meas Setup
Initial S/W Revision	A.06.00

Power Ref Carrier Type

Allows you to select which carrier power should be used as reference when the Mod Ref Pwr Auto or the Switch Ref Pwr Auto is set to true.

Key	SCPI	Type
Ref Carrier	REF	Ref Carrier – Uses the power of the carrier indicated by Ref Carrier as reference.
Max Power Carrier	MAX	Max Power Carrier – Uses the power of the carrier with the highest power as reference.

Key Path	Meas Setup, Power Ref Carrier
Mode	GSM
Remote Command	<code>[:SENSe] :EORFspectr:CARRier:PREFerence:TYPE REF MAX</code> <code>[:SENSe] :EORFspectr:CARRier:PREFerence:TYPE?</code>
Example	EORF:CARR:PREF:TYPE REF EORF:CARR:PREF:TYPE?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	MAX
State Saved	Saved in instrument state.
Range	Ref Carrier Max Power Carrier
Initial S/W Revision	A.06.00

Mod Ref Power

Allows you to manually set the modulation reference power for each Meas Method

Key Path	Meas Setup, Power Ref Carrier
Mode	GSM
Remote Command	[:SENSe]:EORFspectr:MODulation:RPOWer <ampl> [:SENSe]:EORFspectr:MODulation:RPOWer? [:SENSe]:EORFspectr:MODulation:RPOWer:AUTO[:STATe] OFF ON 0 1 [:SENSe]:EORFspectr:MODulation:RPOWer:AUTO[:STATe]?
Example	EORF:MOD:RPOW -20 EORF:MOD:RPOW? EORF:MOD:RPOW:AUTO 0 EORF:MOD:RPOW:AUTO?
Preset	-250 ON
State Saved	Saved in instrument state.
Min	-250
Max	250
Initial S/W Revision	A.02.00
Modified at S/W Revision	A.06.00

Switching Ref Power

Allows you to manually set the switching reference power for each Meas Method.

Key Path	Meas Setup, Power Ref Carrier
Mode	GSM
Remote Command	[:SENSe]:EORFspectr:SWITching:RPOWer <ampl> [:SENSe]:EORFspectr:SWITching:RPOWer [:SENSe]:EORFspectr:SWITching:RPOWer:AUTO[:STATe] OFF ON 0 1 [:SENSe]:EORFspectr:SWITching:RPOWer:AUTO[:STATe]?
Example	EORF:SWIT:RPOW -20 EORF:SWIT:RPOW? EORF:SWIT:RPOW:AUTO 0 EORF:SWIT:RPOW:AUTO?
Preset	-250 ON
State Saved	Saved in instrument state.
Min	-250
Max	250
Initial S/W Revision	A.02.00
Modified at S/W Revision	A.06.00

Meas Method

Selects the measurement method.

Key	SCPI	Method
Multi-Offset	MULTiple	The measurement is done at all offsets in the offset frequency list.
Single Offset (Examine)	SINGLE	The measurement is done at only one offset as determined by the offset frequency setting. This allows detailed examination of the time-domain waveform at the specified offset frequency.
Swept	SWEPT	The measurement is done in the frequency domain. For output RF spectrum due to modulation it is done using time-gated spectrum analysis to sweep the analyzer with the gate turned on for the desired portion of the burst only.

Key Path	Meas Setup
Mode	GSM
Remote Command	[:SENSe] :EORFspectr:MEASure MULTiple SINGLE SWEPT [:SENSe] :EORFspectr:MEASure?
Example	EORF:MEAS SING EORF:MEAS?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. If a grayed out selection is chosen via SCPI command, it is ignored (no error). When “Select Modulation Method” is set to DISCcrete, this parameter is forced to MULTiple. When “Select Modulation Method” is set to SWEPT and Meas Type is set to Modulation or Switching, this parameter is forced to SWEPT
Preset	MULTiple
State Saved	Saved in instrument state.
Range	Multi Offset Single Offset (Examine) Swept
Readback Text	Multi Offset: [xxxx] where xxxx is the type of Multi-Offset Freq List: Standard Short Custom Single Offset: (Examine) [xxxx] where xxxx is the value of the Single Offset Freq Swept: [WB Noise: xxxx] where xxxx is the state ON/OFF of Wideband Noise
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

Offset Frequency List

Frequency list items for Single Carrier

Allows you to select the type of a frequency list used for Multi Offset for Single Carrier. You can select a Standard, Short, or Custom frequency list as shown in the table below.

List	Modulation Offsets (kHz)	Switching Transients Offsets (kHz)
Standard	100, 200, 250, 400, 600, 800, 1000, 1200, 1400, 1600, 1800, 3000, 6000	400, 600, 1200, 1800
Short	200, 250, 400, 600, 1200, 1800	400, 600, 1200, 1800
Custom	User-defined list that specifies: Offset Freq, RES BW, Limit Offsets, Meas Type, Initialized to be the same as the standard list Mod RBW, SW Trans RBW	400, 600, 1200, 1800

Select the list of settings that are used to make the EORFspectr measurement. This specifies standard or customized lists and short lists. The lists contain the offset frequencies (and bandwidths) that are used for the modulation spectrum and transient spectrum parts of the EORFspectr measurement.

- CUSTom – uses the four user-defined lists that specify:
 - Offset frequencies for modulation spectrum measurement
 - Corresponding resolution bandwidths for each of the modulation offset frequencies
 - Offset frequencies for switching transient spectrum measurement
 - Corresponding resolution bandwidths for each of the switching transient offset frequencies
- SHORt – a shortened list of the offset frequencies specified in the GSM Standards. It uses two internal offset frequency lists, one for modulation spectrum and the other for switching transient spectrum. These offset frequencies cannot be changed, but the resolution bandwidths can be changed by other commands in the SENSE:EORFspectr subsystem.
- STANdard – the complete list of the offset frequencies specified in the GSM Standards, except for those offsets greater than 6 MHz. It uses two internal offset frequency lists, one for modulation spectrum and the other for switching transient spectrum. These offset frequencies cannot be changed, but the resolution bandwidths can be changed by other commands in the SENSE:EORFspectr subsystem.

Frequency list items for Multi Carrier

Allows you to select the type of a frequency list used for Multi Offset for Multi Carrier. You can select a Standard, Short, Custom, or Limited Custom frequency list as shown in the table below.

List	Modulation Offsets (kHz)	Switching Transients Offsets (kHz)
Standard (Non	400, 600, 1200, 1800, 2000, 2200, 2400, 2600, and offsets that meet	400, 600, 1200,

Contiguous and Inner)	the following conditions. (1) The frequency point is between 2600 kHz (exclusive) above the uppermost carrier in lower group and 2600 kHz (exclusive) below the lowermost carrier in upper group. (2) The frequency point corresponds to the center frequency of one of IM products. (3) The number of offsets is less than 15.	1800
Standard (Except for the above)	400, 600, 1200, 1800, and offsets that meet the following conditions. (1) The frequency point is between 10 MHz below/above the lower/upper edge of operating band and 1.8 MHz (exclusive) below/above the lowermost/uppermost carrier (2) The frequency point corresponds to the center frequency of one of IM products. (3) The number of offsets is less than 15.	400, 600, 1200, 1800
Short	400, 600, 1200, 1800	400, 600, 1200, 1800
Custom	User-defined list that specifies: Offset Freq, RES BW, Limit Offsets, Meas Type, Initialized to be the same as the standard list Mod RBW, SW Trans RBW	400, 600, 1200, 1800
Limited Custom	User-defined list that specifies: Only Offset Freq The following SCPI command is used to specify a list of User-defined offset frequencies. “[:SENSe]:EORFspectr:MCARrier:LCUStom:LIST:COFRrequency”	400, 600, 1200, 1800

Select the list of settings that are used to make the EORFspectr measurement. This specifies standard or customized lists and short lists. The lists contain the offset frequencies (and bandwidths) that are used for the modulation spectrum and transient spectrum parts of the EORFspectr measurement.

- CUSTom – uses the four user-defined lists that specify:
 - Offset frequencies for modulation spectrum measurement
 - Corresponding resolution bandwidths for each of the modulation offset frequencies
 - Offset frequencies for switching transient spectrum measurement
 - Corresponding resolution bandwidths for each of the switching transient offset frequencies
- SHORt – a shortened list of the offset frequencies specified in the GSM Standards. It uses two internal offset frequency lists, one for modulation spectrum and the other for switching transient spectrum. These offset frequencies cannot be changed, but the resolution bandwidths can be changed by other commands in the SENSe:EORFspectr subsystem.
- STANdard – a list of the offset frequencies specified in the GSM Standard and the offset frequencies that correspond to IM products. It uses two internal offset frequency lists, one for modulation spectrum and

the other for switching transient spectrum. These offset frequencies cannot be changed, but the resolution bandwidths can be changed by other commands in the SENSE:EORFspectr subsystem.

- LCUSom – a list of user specified offset frequencies. The difference between CUSTom and LCUSom is the user can specify only the offset frequencies in LCUSom. In other words, the user cannot specify resolution bandwidth or limit level for each of the offset frequencies in LCUSom.

Key Path	Meas Setup, Meas Method, Multi Offset
Mode	GSM
Remote Command	[[:SENSe]:EORFspectr:LIST:SElect CUSTom SHORt STANdard LCUSom [:SENSe]:EORFspectr:LIST:SElect?
Example	EORF:LIST:SEL CUST EORF:LIST:SEL?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	SHORt
State Saved	Saved in instrument state.
Range	Standard Freq List Short Freq List Custom Freq List Limited Custom Freq List
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.14.00

Min Freq Using Direct Time

Allows you to select the transition frequency (the first offset frequency) where the Direct Time Domain method is used instead of the FFT method. The Direct Time Domain offers a high dynamic range and the measurement speed is faster at a few offset frequencies. The FFT method has a moderate dynamic range (generally sufficient when the RBW = 30 kHz) and the measurement speed is much faster at many offset frequencies. The FFT method uses 5-pole sync-tuned filters, as required by the standards, while the Direct Time method does not. The use of 5-pole sync-tuned filters is critical at close-in offsets, such as 250 kHz and lower, because the measurement standards as written usually test the analyzer filter shape instead of the device under test. At 600 kHz offsets and above, the shape of the filters is unimportant, only their noise bandwidth and impulse bandwidth matter. At 400 kHz offset, the shape matters somewhat; therefore, the best agreement between different pieces of measurement equipment requires that the 400 kHz offset be measured with the FFT method.

Key Path	Meas Setup, Meas Method, Multi Offset
Mode	GSM
Remote Command	[[:SENSe]:EORFspectr:BFrequency <freq> [:SENSe]:EORFspectr:BFrequency?
Example	EORF:BFR 600e3 EORF:BFR?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Grayed out unless "Meas Method" on page 909 is set to MULTiple and "Meas Type" on page 903 is

	set to MSWitching or MODulation.
Preset	600 kHz
State Saved	Saved in instrument state.
Min	0 kHz
Max	6.2MHz
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00, A.14.00

Single Offset

Opens a menu of keys that allows you to specify parameters for Multi Offset measurement method.

Key Path	Meas Setup, Meas Method
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

Single Offset Freq

Allows you to specify a frequency offset from the carrier at which a single offset Output RF Spectrum measurement is performed.

Key Path	Meas Setup, Meas Method, Single Offset
Mode	GSM
Remote Command	[:SENSe] :EORFspectr:OFRequency <freq> [:SENSe] :EORFspectr:OFRequency?
Example	EORF:OFR 250kHz EORF:OFR?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	250 kHz
State Saved	Saved in instrument state.
Min	-12.0 MHz
Max	+12.0 MHz
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

Ref Pwr Avg

Allows you to specify how many averages you want to execute when measuring the reference power. This parameter is valid when the Meas Method is set to Single. Set to ON to use the same number of averages

as specified in the number of bursts averaged command. Set to OFF to use the number specified in the reference power averages command.

Key Path	Meas Setup, Meas Method, Single Offset
Mode	GSM
Remote Command	[:SENSE]:EORFspectr:REFerence:AVERage:COUNT <integer> [:SENSE]:EORFspectr:REFerence:AVERage:COUNT? [:SENSE]:EORFspectr:REFerence:AVERage[:AUTO] ON OFF 1 0 [:SENSE]:EORFspectr:REFerence:AVERage[:AUTO]?
Example	EORF:REF:AVER:COUN 10 EORF:REF:AVER:COUN? EORF:REF:AVER OFF EORF:REF:AVER?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SELEct to set the mode.
Dependencies	This parameter is valid when the Meas Method is set to Single. Otherwise grayed out.
Preset	10 ON
State Saved	Saved in instrument state.
Min	1
Max	1000
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00, A.06.00

Swept

Opens a menu of keys that allows you to specify parameters for Swept measurement method.

Key Path	Meas Setup, Meas Method
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

Wideband Noise

Allows you to select whether to use the wideband noise function:

- OFF - the analyzer is tuned to the carrier and the sweep is performed as follows.
 - Single Carrier: -1800 kHz to +1800 kHz on either side of the center frequency is swept with the bandwidth of 30 kHz.
 - Multi Carrier:

- Non-Contiguous Inner Mode: –400 kHz to +400 kHz from the center frequency of the lowermost and the uppermost carrier is swept with the bandwidth of 30 kHz.
- Other: –1800 kHz to +1800 kHz from the center frequency of the lowermost and the uppermost carrier is swept with the resolution bandwidth of 30 kHz.

- ON – the span is extended until 2 MHz (10 MHz for Multi Carrier) outside the edge of the relevant Tx band. For single carrier, the power is measured with the resolution bandwidth of 100 kHz for frequency offsets 1800 kHz up to 2 MHz outside either side of the Tx band. The limit mask is changed accordingly to exclude between –1800 kHz (exclusive) to +1800 kHz (exclusive) on either side of the center frequency. For multi carrier, the power is measured as follows.

For frequency offsets from the center frequency of the uppermost and lowermost active carrier of more than 6 MHz,

- Within a 600 kHz band centered at the center frequencies of the intermodulation components, the power is measured with a measurement bandwidth of 300 kHz.
- For offsets outside the 600 kHz bands around the center frequencies of the intermodulation components, the power is measured with a measurement bandwidth of 100 kHz.

For frequency offsets from the center frequency of the uppermost and lowermost active carrier of 1.8 MHz up to and including 6 MHz, the power is measured with a measurement bandwidth of 100 kHz.

See ["Limit Test Region for the Swept Method" on page 917](#) for more details.

Key Path	Meas Setup, Meas Method
Mode	GSM
Remote Command	<code>[:SENSe] :EORFspectr:WBNoise ON OFF 1 0</code> <code>[:SENSe] :EORFspectr:WBNoise?</code>
Example	EORF:WBN ON EORF:WBN?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This function is effective only when "Meas Method" on page 909 is Swept and "Meas Type" on page 903 is Modulation. When Wideband Noise is ON, the sweep start/stop frequency is determined by the Radio Band parameter.
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00, A.08.00

Custom Offset Frequency List for Limited Custom

Allows you to specify a list of custom offset frequencies for the limited custom list.

Key Path	SCPI only
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Mode	GSM
Remote Command	[:SENSE] :EORFspectr:MCARrier:LCUStom:LIST:COFRequency <freq>, ... [:SENSE] :EORFspectr:MCARrier:LCUStom:LIST:COFRequency?
Example	EORF:MCAR:LCUS:LIST:COFR 600e3, 1200e3, 2400e3, 4800e3 EORF:MCAR:LCUS:LIST:COFR?
Notes	You can specify a maximum of 40 offset frequencies in the modulation measurement. This command is available when all the following conditions are met. <ul style="list-style-type: none"> • The number of carriers is greater than one. • (CHAN:CARR:COUN n, where n > 1) • The state of the test limit exception is set to On. (EORF:MCAR:LEXC ON). • The type of the multicarrier limit exception rule is set to Custom. (EORF:MCAR:LEXC:RULE CUST) • The type of a frequency list for multi offset is set to Limited Custom. (EORF:LIST:SEL LCUS)
Preset	400 kHz, 600 kHz, 1200 kHz, 1800 kHz
State Saved	Saved in instrument state.
Initial S/W Revision	A.14.00

Non-Contiguous Meas Region

Selects the region to measure for the non-contiguous frequency allocation from either inner or outer.

Key Path	Meas Setup
Mode	GSM
Remote Command	[:SENSE] :EORFspectr:NCONtiguous:REGion INNer OUTer [:SENSE] :EORFspectr:NCONtiguous:REGion?
Example	EORF:NCON:REG INN EORF:NCON:REG?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This function is effective only when the number of active carriers is more than one.
Preset	INNER
State Saved	Saved in instrument state.
Range	Inner Outer
Initial S/W Revision	A.07.00

Offset Frequency

The definition of offset frequency differs depending on the setting of the Non-Contiguous Meas Region. When it is set to Inner, the Lower/Upper offset frequency is defined as frequency offset from the uppermost/lowermost carrier of the lower/upper group, whose value is positive/negative. When it is set to Outer, meanwhile, the Lower/Upper offset frequency is defined as frequency offset from the lowermost/uppermost carrier, whose value is negative/positive.

The figure below shows Lower/Upper Offset Frequency Definition for Non-Contiguous Frequency Allocation.

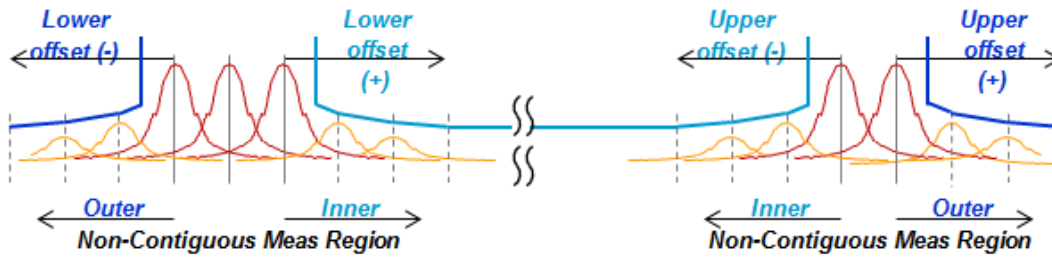


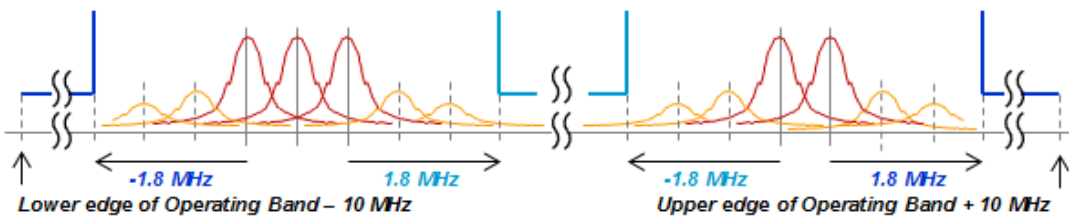
Figure 0-1 Lower/Upper Offset Frequency Definition for Non-Contiguous Frequency Allocation

Limit Test Region for the Swept Method

The limit test region for the Swept method differs depending on the settings of both the Non-Contiguous Meas Region and the Wideband Noise.

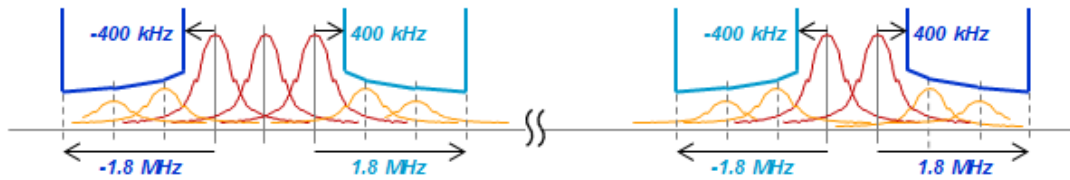
Wideband Noise	Non-Contiguous Meas Region	Limit Test to be Performed
ON (See "The Limit Test Region for the Wideband Noise ON" on page 917)	Inner	Frequency offsets between 1.8 MHz (inclusive) above the uppermost carrier in lower group and 1.8 MHz (inclusive) below the lowermost carrier in upper group.
	Outer	Frequency offsets between lower/upper edge of operating band ± 10 MHz and 1.8 MHz (inclusive) below/above the lowermost/uppermost carrier.
OFF (See "The Limit Test Region for the Wideband Noise OFF" on page 918)	Inner	Frequency offsets between 400 kHz and 1.8 MHz (exclusive) above/below the uppermost/lowermost carrier in lower/upper group.
	Outer	Frequency offsets between 400 kHz and 1.8 MHz (exclusive) below/above the lowermost/uppermost carrier.

The figure below shows the Limit Region for the Wideband Noise ON.



The Limit Test Region for the Wideband Noise ON

The figure below shows the Limit Region for the Wideband Noise OFF.



The Limit Test Region for the Wideband Noise OFF

Advanced

Opens a menu of keys that allows you to specify parameters for advanced features that are recommended for use only by advanced users.

Key Path	Meas Setup
Initial S/W Revision	Prior to A.02.00

Modulation Meas BWs

Opens a menu of keys that allows you to specify parameters for bandwidth for the modulation measurement. There are four sections as listed below.

- Carrier RBW (For Modulation Meas BWs)
- ≤ 1800 kHz Offset RBW (for Modulation Meas BWs)
- >1800 kHz Offset RBW (for Modulation Meas BWs)
- >6000 kHz Offset RBW (for Modulation Meas BWs)

This menu key is grayed out when:

- "Meas Type" on page 903 is Switching, or
- Multi-Offset Freq List is Custom, or
- "Meas Method" on page 909 is Swept.

When Carrier is set to 1, the bottom key (i.e. >6000 kHz Offset RBW) is grayed out.

Key Path	Meas Setup, Advanced
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

Carrier RBW (for Modulation Meas BWs)

Allows you to manually set the bandwidth for measuring the carrier when measuring spectrum due to modulation and wideband noise. When you select Auto, the following bandwidth is used.

Frequency Offset	Frequency Point	Bandwidth
<1.8 MHz	-	30 kHz
1.8 MHz ~ 6 MHz	Within 600 kHz band centered at the center frequency of the intermodulation components	100 kHz
	Outside 600 kHz bands around the center frequency of the intermodulation components	30 kHz
> 6 MHz	Within 600 kHz band centered at the center frequency of the intermodulation components	300 kHz
	Outside 600 kHz bands around the center frequency of the intermodulation components	30 kHz

Key Path	Meas Setup, Advanced, Modulation Meas BWs
Mode	GSM
Remote Command	[:SENSe]:EORFspectr:BANDwidth[:RESolution]:MODulation:CARRier <freq> [:SENSe]:EORFspectr:BANDwidth[:RESolution]:MODulation:CARRier? [:SENSe]:EORFspectr:BANDwidth[:RESolution]:MODulation:CARRier:AUTO OFF ON 0 1 [:SENSe]:EORFspectr:BANDwidth[:RESolution]:MODulation:CARRier:AUTO?
Example	EORF:BAND:MOD:CARR 30e3 EORF:BAND:MOD:CARR? EORF:BAND:MOD:CARR:AUTO 0 EORF:BAND:MOD:CARR:AUTO?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This parameter is only used with the "Offset Frequency List" on page 910 Standard or Short, and not with Custom.
Preset	30 kHz ON
State Saved	Saved in instrument state.
Min	1 kHz
Max	5 MHz
Backwards Compatibility SCPI	[:SENSe]:EORFspectr:BWIDth[:RESolution]:MODulation:CARRier
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

< 1800 kHz Offset RBW (for Modulation Meas BWs)

Sets the resolution bandwidth used for the spectrum due to modulation part of the ORFS measurement for offset frequencies less than 1800 kHz.

Key Path	Meas Setup, Advanced, Modulation Meas BWs
Mode	GSM
Remote Command	[:SENSe]:EORFspectr:BAWdth[:RESolution]:MODulation:OFFSet:CLOSe <freq> [:SENSe]:EORFspectr:BAWdth[:RESolution]:MODulation:OFFSet:CLOSe?
Example	EORF:BAND:MOD:OFFS:CLOS 30 kHz EORF:BAND:MOD:OFFS:CLOS?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This parameter is only used with the "Offset Frequency List" on page 910 Standard or Short, and not with Custom.
Preset	30 kHz
State Saved	Saved in instrument state.
Min	1 kHz
Max	5 MHz
Backwards Compatibility SCPI	[:SENSe]:EORFspectr:BWIDth[:RESolution]:MODulation:OFFSet:CLOSe
Initial S/W Revision	Prior to A.02.00

>= 1800 kHz Offset RBW (for Modulation Meas BWs)

Sets the resolution bandwidth used for the spectrum due to modulation part of the ORFS measurement for offset frequencies greater than or equal to 1800 kHz.

Key Path	Meas Setup, Advanced, Modulation Meas BWs
Mode	GSM
Remote Command	[:SENSe]:EORFspectr:BAWdth[:RESolution]:MODulation:OFFSet:FAR[1] <freq> [:SENSe]:EORFspectr:BAWdth[:RESolution]:MODulation:OFFSet:FAR[1]?
Example	EORF:BAND:RES:MOD:OFFS:FAR 30 kHz EORF:BAND:RES:MOD:OFFS:FAR?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This parameter is only used with the "Offset Frequency List" on page 910 Standard or Short, and not with Custom.
Preset	100 kHz
State Saved	Saved in instrument state.
Min	1 kHz
Max	5 MHz
Backwards Compatibility SCPI	[:SENSe]:EORFspectr:BWIDth[:RESolution]:MODulation:OFFSet:FAR
Initial S/W Revision	Prior to A.02.00

> 6000 kHz IM Offset RBW (for Modulation Meas BWs)

Allows you to specify the resolution bandwidth used for the spectrum due to modulation part of the ORFS measurement for offset frequencies greater than 6 MHz.

Key Path	Meas Setup, Advanced, Modulation Meas BWs
Mode	GSM
Remote Command	[:SENSe] :EORFspectr:BAWdwidth[:RESolution]:MODulation:OFFSet:IM:FAR2 <freq> [:SENSe] :EORFspectr:BAWdwidth[:RESolution]:MODulation:OFFSet:IM:FAR2?
Example	EORF:BAND:RES:MOD:OFFS:IM:FAR2 300 kHz EORF:BAND:RES:MOD:OFFS:IM:FAR2?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This parameter is only used with the "Offset Frequency List" on page 910 Standard or Short, and not with Custom. If there is only one carrier, this key will be grayed out.
Preset	300 kHz
State Saved	Saved in instrument state.
Min	1 kHz
Max	5 MHz
Initial S/W Revision	A.06.00

Switching Meas BWs

Accesses a menu with the following sections:

- Carrier RBW (For Modulation Meas BWs)
- < 1800 kHz Offset RBW (for Modulation Meas BWs)
- >=1800 kHz Offset RBW (for Modulation Meas BWs)
- VBW:3dB RBW (for Switching Meas BWs) – information only. Bandwidth ratio is fixed at 3.

This menu key is grayed out when "Meas Type" on page 903 is Modulation or Full Frame Mod, or when "Offset Frequency List" on page 910 is Custom.

Key Path	Meas Setup, Advanced
Initial S/W Revision	Prior to A.02.00

Carrier RBW (for Switching Meas BWs)

Sets the resolution bandwidth for the carrier when measuring spectrum due to switching transients.

Key Path	Meas Setup, Advanced, Switching Meas BWs
Mode	GSM
Remote Command	[:SENSe] :EORFspectr :BANDwidth [:RESolution] :SWITching :CARRier <freq> [:SENSe] :EORFspectr :BANDwidth [:RESolution] :SWITching :CARRier?
Example	EORF:BAND:SWIT:CARR 30e3 EORF:BAND:SWIT:CARR?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This parameter is only used with the "Offset Frequency List" on page 910 Standard or Short, and not with Custom.
Preset	300 kHz
State Saved	Saved in instrument state.
Min	1 kHz
Max	5 MHz
Backwards Compatibility SCPI	[:SENSe] :EORFspectr :BWIDth [:RESolution] :SWITching :CARRier
Initial S/W Revision	Prior to A.02.00

< 1800 kHz Offset RBW (for Switching Meas BWs)

Sets the resolution bandwidth used for the spectrum due to switching transients part of the EORFspectr measurement for offset frequencies less than 1800 kHz.

Key Path	Meas Setup, Advanced, Switching Meas BWs
Mode	GSM
Remote Command	[:SENSe] :EORFspectr :BANDwidth [:RESolution] :SWITching :OFFSet :CLOSe <freq> [:SENSe] :EORFspectr :BANDwidth [:RESolution] :SWITching :OFFSet :CLOSe?
Example	EORF:BAND:RES:SWIT:OFFS:CLOS 30 kHz EORF:BAND:RES:SWIT:OFFS:CLOS?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This parameter is only used with the "Offset Frequency List" on page 910 Standard or Short, and not with Custom.
Preset	30 kHz
State Saved	Saved in instrument state.
Min	1 kHz
Max	5 MHz
Backwards Compatibility SCPI	[:SENSe] :EORFspectr :BWIDth [:RESolution] :SWITching :OFFSet :CLOSe
Initial S/W Revision	Prior to A.02.00

>= 1800 kHz Offset RBW (for Switching Meas BWs)

Sets the resolution bandwidth used for the spectrum due to switching transients part of the EORFspectr measurement for offset frequencies greater than or equal to 1800 kHz.

Key Path	Meas Setup, Advanced, Switching Meas BWs
Mode	GSM
Remote Command	[:SENSe] :EORFspectr :BANDwidth [:RESolution] :SWITching :OFFSet :FAR <freq> [:SENSe] :EORFspectr :BANDwidth [:RESolution] :SWITching :OFFSet :FAR?
Example	EORF:BAND:RES:SWIT:OFFS:FAR 30e3 EORF:BAND:RES:SWIT:OFFS:FAR?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This parameter is only used with the "Offset Frequency List" on page 910 Standard or Short, and not with Custom.
Preset	30 kHz
State Saved	Saved in instrument state.
Min	1 kHz
Max	5 MHz
Backwards Compatibility SCPI	[:SENSe] :EORFspectr :BWIDth [:RESolution] :SWITching :OFFSet :FAR
Initial S/W Revision	Prior to A.02.00

Modulation Custom Offs & Lim

This menu key is available only when the parameters listed below are set to the specified values at the same time. Otherwise it is grayed out.

- Meas Type: Mod & Switch|Modulation|Full Frame Mod
- Meas Method: Multi Offset
- Multi-Offset Freq List: Custom

Key Path	Meas Setup, Advanced
Initial S/W Revision	Prior to A.02.00

Offset

Selects the offset pairs (upper and lower) that affect the menu keys and displays the memory selection menu from A to O. The memory selection menu allows you to store up to 5 sets of parameter values for the offset pairs, such as Offset Freq, Res BW, Rel Limit Level Offset, Abs Limit Level Offset and Apply Level Offset. Press Offset until the letter selection at a time is shown on this menu key label.

Key Path	Meas Setup, Advanced
Mode	GSM
Initial S/W Revision	Prior to A.02.00

Offset Freq

This parameter defines a custom set of states that defines whether or not the measurement is made on each defined offset frequency. Note that offset frequencies need to be arranged in ascending order from left to right. Otherwise, the analyzer cannot perform measurements properly.

Key	SCPI	Operation
On	ON 1	The measurement is made on the corresponding frequency in Custom Modulation Offset Freq list.
Off	OFF 0	The measurement is skipped for the corresponding frequency in Custom Modulation Offset Freq list.

Key Path	Meas Setup, Advanced, Modulation Custom Offset & Limits
Mode	GSM
Remote Command	<pre>[:SENSe]:EORFspectr:LIST:MODulation[:FREQuency] <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq> [:SENSe]:EORFspectr:LIST:MODulation[:FREQuency]? [:SENSe]:EORFspectr:LIST:MODulation:STATe OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1 [:SENSe]:EORFspectr:LIST:MODulation:STATe?</pre>

Example
EORF:LIST:MOD:FREQ 0.0, 1.0e5, 2.0e5
EORF:LIST:MOD:FREQ?
EORF:LIST:MOD:STAT ON, ON, ON
EORF:LIST:MOD:STAT?

Notes
Offset frequencies need to be arranged in ascending order from left to right. Otherwise, the analyzer cannot perform measurements properly.
You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.

Preset	0.0, 1.0e5, 2.0e5, 2.5e5, 4.0e5, 6.0e5, 8.0e5, 1.0e6, 1.2e6, 1.4e6, 1.6e6, 1.8e6, 3.0e6, 6.0e6, 0.0 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1
State Saved	Saved in instrument state.

Min	0.0 Hz
Max	12.0 MHz
Initial S/W Revision	Prior to A.02.00

Res BW

Defines the custom set of resolution bandwidths for the modulation spectrum part of the EORFspectr measurement. The first bandwidth specified is for the carrier. Each resolution bandwidth in this list corresponds to an offset frequency in the modulation offset frequency list. The number of items in each list must be the same.

Key Path	Meas Setup, Advanced, Modulation Custom Offset & Limits
Remote Command	<code>[:SENSe] :EORFspectr :LIST :MODulation :BANDwidth <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq></code> <code>[:SENSe] :EORFspectr :LIST :MODulation :BANDwidth?</code>
Example	<code>EORF:LIST:MOD:BAND 10e3, 20e3, 10e3</code> <code>EORF:LIST:MOD:BAND?</code>
Notes	You must be in the GSM, EDGE mode to use this command. Use <code>INSTRument:SElect</code> to set the mode.
Dependencies	This command is only valid when <code>SENS:EORFspectr:MEAS</code> is set to multiple and the custom list type is selected with <code>SENS:EORFspectr:LISE:SEL CUST</code> .
Preset	<code>3.000000000E+04, 3.000000000E+04, 3.000000000E+04, 3.000000000E+04, 3.000000000E+04, 3.000000000E+04, 3.000000000E+04, 3.000000000E+04, 3.000000000E+04, 1.000000000E+05, 1.000000000E+05, 1.000000000E+05, 1.000000000E+05</code>
State Saved	Saved in instrument state.
Min	1 kHz
Max	5 MHz
Backwards Compatibility SCPI	<code>[:SENSe] :EORFspectr :LIST :MODulation :BWIDth</code>
Initial S/W Revision	Prior to A.02.00

Rel Limit Level Offset

Defines the custom set of level offsets for the modulation spectrum part of the EORF measurement. This allows you to modify the standard limits by adding a delta amplitude value to them. The first level offset specified must be 0 dB for the carrier. Each level offset in this list corresponds to an offset frequency in the modulation offset frequency list. The number of items in each of these lists must be the same.

Key Path	Meas Setup, Advanced, Modulation Custom Offset & Limits
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Mode	GSM
Remote Command	[:SENSe]:EORFspectr:LIST:MODulation:LOFFset[:RCARrier] <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl> [:SENSe]:EORFspectr:LIST:MODulation:LOFFset[:RCARrier]?
Example	EORF:LIST:MOD:LOFF:RCAR 0.0, -2.0, -5.0 EORF:LIST:MOD:LOFF:RCAR?
Notes	The first element of the parameters must be zero. Otherwise, the Custom freq list is not used, but Standard freq list is used instead. This command is only valid if SENS:EORF:MEAS is set to multiple, and the custom list type is selected with SENS:EORF:LIST:SEL CUST. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	0
State Saved	Saved in instrument state.
Min	-200.0
Max	200.0
Initial S/W Revision	Prior to A.02.00

Abs Limit Level Offset

This parameter defines a custom set of absolute limit level offsets for the modulation spectrum part of the EORFspectr measurement. It allows you to modify the standard-defined test limits by adding/subtracting a delta amplitude value to/from them. The single set of the offsets applies to all the cases in terms of all the DUT types and power level classes. It takes an array of float64 numbers. Each element represents absolute level offsets at corresponding Custom Modulation Offset Freq.

Key Path	Meas Setup, Advanced, Modulation Custom Offset & Limits
Mode	GSM
Remote Command	[:SENSe]:EORFspectr:LIST:MODulation:LOFFset:ABSolute <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl> [:SENSe]:EORFspectr:LIST:MODulation:LOFFset:ABSolute?
Example	EORF:LIST:MOD:LOFF:ABS 0.0, -2.0, -5.0 EORF:LIST:MOD:LOFF:ABS?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	0
State Saved	Saved in instrument state.
Min	-200.0
Max	200.0
Initial S/W Revision	Prior to A.02.00

Apply Level Offset

Key	SCPI	Operation
Rel	RELative	<p>Only Custom Modulation Relative Limit Level Offsets are applied to standard-defined modulation relative test limit.</p> <p>Standard-defined modulation relative test limit does not change.</p> <p>More relaxed test limit between the resulting relative test limit and the resulting absolute test limit is then used for the pass/fail judgment.</p>
Both	BOTH	<p>Custom Modulation Relative Limit Level Offsets are applied to standard-defined modulation relative test limit.</p> <p>And, Custom Modulation Absolute Limit Level Offsets are applied to standard-defined modulation absolute test limit.</p> <p>More relaxed test limit between the resulting relative test limit and the resulting absolute test limit is then used for the pass/fail judgment.</p>
Abs	ABSolute	<p>Only Custom Modulation Absolute Limit Level Offsets are applied to standard-defined modulation absolute test limit.</p> <p>Standard-defined modulation absolute test limit does not change.</p> <p>More relaxed test limit between the resulting relative test limit and the resulting absolute test limit is then used for the pass/fail judgment.</p>

Key Path	Meas Setup, Advanced, Modulation Custom Offset & Limits
Mode	GSM
Remote Command	<pre>[:SENSe]:EORFspectr:LIST:MODulation:APPLy RELative BOTH ABSolute, RELative BOTH ABSolute, RELative BOTH ABSolute, RELative BOTH ABSolute, RELative BOTH ABSolute, RELative BOTH ABSolute, RELative BOTH ABSolute, RELative BOTH ABSolute, RELative BOTH ABSolute, RELative BOTH ABSolute, RELative BOTH ABSolute, RELative BOTH ABSolute, RELative BOTH ABSolute, RELative BOTH ABSolute, RELative BOTH ABSolute</pre> <pre>[:SENSe]:EORFspectr:LIST:MODulation:APPLy?</pre>
Example	<pre>EORF:LIST:MOD:APPL REL, REL, REL EORF:LIST:MOD:APPL?</pre>
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	BOTH, BOTH, BOTH, BOTH, BOTH, BOTH, BOTH, BOTH, BOTH, BOTH, BOTH, BOTH, BOTH, BOTH, BOTH
State Saved	Saved in instrument state.
Range	Rel Both Abs
Initial S/W Revision	Prior to A.02.00

Switching Custom Offs & Lim

This menu key is available only when parameters below are set to the following values at the same time. Otherwise it is grayed out.

- Meas Type: Mod & Switch | Switching
- Meas Method: Multi Offset
- Multi-Offset Freq List: Custom

Key Path	Meas Setup, Advanced
Initial S/W Revision	Prior to A.02.00

Offset

Selects the offset pairs (upper and lower) that affect the menu keys and displays the memory selection menu from A to O. The memory selection menu allows you to store up to 5 sets of parameter values for the offset pairs, such as Offset Freq, Res BW, Rel Limit Level Offset, Abs Limit Level Offset and Apply Level Offset. Press Offset until the letter selection at a time is shown on this menu key label.

Key Path	Meas Setup, Advanced
Mode	GSM
Initial S/W Revision	Prior to A.02.00

Offset Freq

Defines the custom set of offset frequencies at which the switching transient spectrum part of the EORFspectr measurement is made.

The first offset specified must be 0 Hz, for the carrier. For each offset frequency specified, the power is measured at both the lower and upper offsets. Up to 14 offset frequencies, plus the 0 Hz carrier frequency, may be defined.

For the BAF SCPI command:

Key	SCPI	Operation
On	ON 1	The measurement is made on the corresponding frequency in Custom Switching Offset Freq list.
Off	OFF 0	The measurement is skipped for the corresponding frequency in Custom Switching Offset Freq list.

Key Path	Meas Setup, Advanced, Switching Custom Offsets & Limits
Mode	GSM
Remote Command	[[:SENSE]:EORFspectr:LIST:SWITching[:FREQUENCY] <freq>, <freq>, <freq>,


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<freq>,<freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>,
<freq>, <freq>, <freq>

[:SENSe]:EORFspectr:LIST:SWITching[:FREQuency]?

[:SENSe]:EORFspectr:LIST:SWITching:STATe OFF | ON | 0 | 1, OFF | ON | 0
| 1, OFF | ON | 0 | 1, OFF | ON | 0 | 1, OFF | ON | 0 | 1, OFF | ON | 0
| 1, OFF | ON | 0 | 1, OFF | ON | 0 | 1, OFF | ON | 0 | 1, OFF | ON | 0
| 1, OFF | ON | 0 | 1, OFF | ON | 0 | 1, OFF | ON | 0 | 1, OFF | ON | 0
| 1, OFF | ON | 0 | 1

[:SENSe]:EORFspectr:LIST:SWITching:STATe?
```

Example	EORF:LIST:SWIT:FREQ 0.0, 1.0e5, 2.0e5 EORF:LIST:SWIT:FREQ? EORF:LIST:SWIT:STAT ON, ON, ON EORF:LIST:SWIT:STAT?
Notes	This command is only valid if SENS:EORF:MEAS is set to multiple, and the custom list type is selected with SENS:EORF:LIST:SEL CUST. You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Preset	0.0, 4.0e5, 6.0e5, 1.2e6, 1.8e6, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1
State Saved	Saved in instrument state.
Min	0.0 Hz
Max	12.0 MHz
Initial S/W Revision	Prior to A.02.00

Res BW

Defines the custom set of resolution bandwidths for the switching transient spectrum part of the EORFspectr measurement. The first bandwidth specified is for the carrier. Each resolution bandwidth in this list corresponds to an offset frequency in the switching offset frequency list. The number of items in each list must be the same.

Key Path	Meas Setup, Advanced, Switching Custom Offsets & Limits
Remote Command	[:SENSe]:EORFspectr:LIST:SWITching:BANDwidth <freq>, <freq>, <freq>, <freq>,<freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq> [:SENSe]:EORFspectr:LIST:SWITching:BANDwidth?
Example	EORF:LIST:SWIT:BAND 1e3, 1e3,1e3 EORF:LIST:SWIT:BAND?
Notes	This command is only valid if SENS:EORFspectr:MEAS is set to multiple and the custom list type is selected with SENS:EORFspectr:LISE:SEL CUST. You must be in the GSM, EDGE mode to use this command. Use INSTRUMENT:SElect to set the mode.

Preset	3.000000000E+05, 3.000000000E+04, 3.000000000E+04, 3.000000000E+04, 3.000000000E+04, 3.000000000E+04, 3.000000000E+04, 3.000000000E+04, 3.000000000E+04, 3.000000000E+04, 3.000000000E+04, 3.000000000E+04, 3.000000000E+04, 3.000000000E+04, 3.000000000E+04
State Saved	Saved in instrument state.
Min	1 kHz
Max	5 MHz
Backwards Compatibility SCPI	[:SENSe] :EORFspectr:LIST:SWITching:BWIDth
Initial S/W Revision	Prior to A.02.00

Rel Limit Level Offset

Defines the custom set of level offsets for the switching transient spectrum part of the EORF measurement. This allows you to modify the standard limits by adding a delta amplitude value to them. The first level offset specified must be 0 dB for the carrier. Each level offset in this list corresponds to an offset frequency in the modulation offset frequency list. The number of items in each of these lists must be the same.

Key Path	Meas Setup, Advanced, Switching Custom Offsets & Limits
Mode	GSM
Remote Command	[:SENSe] :EORFspectr:LIST:SWITching:LOFFset [:RCARrier] <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl> [:SENSe] :EORFspectr:LIST:SWITching:LOFFset [:RCARrier] ?
Example	EORF:LIST:SWIT:LOFF:RCAR 0.0, -2.0, -5.0 EORF:LIST:SWIT:LOFF:RCAR?
Notes	The first element of the parameters must be zero. Otherwise, the Custom freq list is not used, but Standard freq list is used instead. This command is only valid if SENS:EORF:MEAS is set to multiple, and the custom list type is selected with SENS:EORF:LIST:SEL CUST. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	0
State Saved	Saved in instrument state.
Min	-200.0
Max	200.0
Initial S/W Revision	Prior to A.02.00

Abs Limit Level Offset

This parameter defines a custom set of absolute limit level offsets for the Switching spectrum part of the EORFspectr measurement. It allows you to modify the standard-defined test limits by adding/subtracting a

delta amplitude value to/from them. The single set of the offsets applies all the cases in terms of all the DUT types and power level classes. It takes an array of float64 numbers. Each element represents absolute level offsets at corresponding Custom Switching Offset Freq.

Key Path	Meas Setup, Advanced, Switching Custom Offsets & Limits
Mode	GSM
Remote Command	[:SENSe]:EORFspectr:LIST:SWITching:LOFFset:ABSolute <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl> [:SENSe]:EORFspectr:LIST:SWITching:LOFFset:ABSolute?
Example	EORF:LIST:SWIT:LOFF:ABS 0.0, -2.0, -5.0 EORF:LIST:SWIT:LOFF:ABS?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	0
State Saved	Saved in instrument state.
Min	-200.0
Max	200.0
Initial S/W Revision	Prior to A.02.00

Apply Level Offset

Key	SCPI	Operation
Rel	RELative	Only Custom Switching Relative Limit Level Offsets are applied to standard-defined switching relative test limit. Standard-defined switching relative test limit does not change. More relaxed test limit between the resulting relative test limit and the resulting absolute test limit is then used for the pass/fail judgment.
Both	BOTH	Custom Switching Relative Limit Level Offsets are applied to standard-defined switching relative test limit. And, Custom Switching Absolute Limit Level Offsets are applied to standard-defined switching absolute test limit. More relaxed test limit between the resulting relative test limit and the resulting absolute test limit is then used for the pass/fail judgment.
Abs	ABSolute	Only Custom Switching Absolute Limit Level Offsets are applied to standard-defined switching absolute test limit. Standard-defined switching absolute test limit does not change. More relaxed test limit between the resulting relative test limit and the resulting absolute test limit is then used for the pass/fail judgment.

Key Path	Meas Setup, Advanced, Switching Custom Offsets & Limits
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Mode	GSM
Remote Command	[:SENSe] :EORFspectr:LIST:SWITChing:APPLy RELative BOTH ABSolute, RELative BOTH ABSolute, RELative BOTH ABSolute, RELative BOTH ABSolute, RELative BOTH ABSolute, RELative BOTH ABSolute, RELative BOTH ABSolute, RELative BOTH ABSolute, RELative BOTH ABSolute, RELative BOTH ABSolute, RELative BOTH ABSolute, RELative BOTH ABSolute, RELative BOTH ABSolute, RELative BOTH ABSolute, RELative BOTH ABSolute [:SENSe] :EORFspectr:LIST:SWITChing:APPLy?
Example	EORF:LIST:SWIT:APPL REL, REL, REL EORF:LIST:SWIT:APPL?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	BOTH, BOTH, BOTH, BOTH, BOTH, BOTH, BOTH, BOTH, BOTH, BOTH, BOTH, BOTH, BOTH, BOTH, BOTH
State Saved	Saved in instrument state.
Range	Rel Both Abs
Initial S/W Revision	Prior to A.02.00

Offset

Selects the offset pairs (upper and lower) that affect the menu keys and displays the memory selection menu from A to O. The memory selection menu allows you to store up to 5 sets of parameter values for the offset pairs, such as Offset Freq, Res BW, Rel Limit Level Offset, Abs Limit Level Offset and Apply Level Offset. Press Offset until the letter selection at a time is shown on this menu key label.

Key Path	Meas Setup, Advanced
Initial S/W Revision	Prior to A.02.00

IM Product Order

Sets the highest order of the intermodulation products to be considered in the measurement. It must be an integer between 3 and 5.

Key Path	Meas Setup, Advanced
Mode	GSM
Remote Command	[:SENSe] :EORFspectr:IMPorder <integer> [:SENSe] :EORFspectr:IMPorder?
Example	EORF:IMP 5 EORF:IMP?
Notes	When an even value (i.e. 4) is entered, it's replaced with the maximum odd value that doesn't exceed the even value. If you recall 7, the previously saved value, it will be clipped to 5.

Preset	5
State Saved	Saved in instrument state.
Min	3
Max	5
Initial S/W Revision	A.07.00
Modified at S/W Revision	A.13.00

Multi Carrier Limit Exception

Accesses the menu to set Limit Exception parameters.

Key Path	Meas Setup
Readback	[On, Currently selected Exception Rule] [Off, ---]
Initial S/W Revision	A.14.00

Multi Carrier Limit Exception State

Selects whether to apply the Multicarrier Limit Exception.

Key Path	Meas Setup, Advanced, Limit Exception
Mode	GSM
Remote Command	[:SENSe] :EORFspectr:MCARrier:LEXCeption[:STATe] OFF ON 0 1 [:SENSe] :EORFspectr:MCARrier:LEXCeption[:STATe] ?
Example	EORF:MCAR:LEXC ON EORF:MCAR:LEXC?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. If set to ON, the exception is applied.
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	A.10.00
Modified S/W Revision	A.14.00

Multi Carrier Limit Exception Rule

Selects the Multicarrier Limit Exception Rule. The Rules are listed below.

FIXed: The exception bands (200 kHz block) are automatically allocated.

CUSTOm: Allows you to allocate the exception bands (200 kHz block) manually.

Key Path	Meas Setup, Advanced, Limit Exception
Mode	GSM
Remote Command	[:SENSe] :EORFspectr:MCARrier:LEXCeption:RULE FIXed CUSTom [:SENSe] :EORFspectr:MCARrier:LEXCeption:RULE?
Example	EORF:MCAR:LEXC:RULE CUST EORF:MCAR:LEXC:RULE?
Preset	FIXed
State Saved	Saved in instrument state.
Range	Fixed Custom
Initial S/W Revision	A.14.00

Multi Carrier Limit Exception Frequency Band List

Specifies a list of center frequencies for the Multicarrier Limit Exception bands.

Key Path	SCPI only
Mode	GSM
Remote Command	[:SENSe] :EORFspectr:MCARrier:LEXCeption:LIST:FREQuency <freq>, ... [:SENSe] :EORFspectr:MCARrier:LEXCeption:LIST:FREQuency?
Example	EORF:MCAR:LEXC:LIST:FREQ -600e3, 600e3 EORF:MCAR:LEXC:LIST:FREQ?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. Each given frequency is determined as the center frequency of 200 kHz block of an exception band when EORF:MCAR:LEXC is set to "ON" and "EORF:MCAR:LEXC:RULE" is set to "CUSTom". In the following 3 cases, the warning message "Setting conflict" is issued in the error queue. •Case 1: where the number of the given list items exceeds the specified value (i.e. $18+3*(N-1)$ or up to 40), whichever the lowest, where N is the number of active multi carriers. •Case 2: where the given frequency coincides with the center frequency of 3rd order IM products of any combination of two or three active carriers and corresponding adjacent channels (+/-200 kHz). •Case 3: where the given frequency is beyond either edge of the specified operating band +/-10 MHz margin.
Preset	0
State Saved	Saved in instrument state.
Initial S/W Revision	A.14.00

Phase Noise Optimization

Selects the type of the LO (local oscillator) phase noise optimization.

Key Path	Meas Setup, Advanced
Mode	GSM
Remote Command	<code>[:SENSe] :EORFspectr:FREQuency:SYNTHeSis [:STATe] 2 3</code> <code>[:SENSe] :EORFspectr:FREQuency:SYNTHeSis [:STATe] ?</code>
Example	EORF:FREQ:SYNT 2 EORF:FREQ:SYNT?
Notes	Parameter: 2: optimizes phase noise for wide frequency offsets from the carrier. 3: optimizes LO for tuning speed
Preset	Models with option EP2: 3 Other: 2
State Saved	Saved in instrument state.
Range	Best Wide-Offset Φ Noise Fast Tuning
Min	2
Max	3
Initial S/W Revision	A.10.00
Modified at S/W Revision	A.13.00

Band Extension for Multicarrier

Sets the band extension for multicarrier. The band extension is symmetrically applied on both sides of the relevant transmit band.

Key Path	Meas Setup, Advanced
Mode	GSM
Remote Command	<code>[:SENSe] :EORFspectr:MCARrier:BEXTension <freq></code> <code>[:SENSe] :EORFspectr:MCARrier:BEXTension?</code>
Example	EORF:MCAR:BEXT 12e6 EORF:MCAR:BEXT?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	10 MHz
State Saved	Saved in instrument state.
Min	100 kHz
Max	50 MHz
Initial S/W Revision	A.10.00

Switching Ref Power Type

Selects the type of Switching Reference Power from either Average or Max Hold.

Key Path	Meas Setup, Advanced
Mode	GSM
Remote Command	<code>[:SENSe] :EORFspectr :SWITching :RPOWer :TYPE AVERage MAXHold</code> <code>[:SENSe] :EORFspectr :SWITching :RPOWer :TYPE ?</code>
Example	EORF:SWIT:RPOW:TYPE AVER EORF:SWIT:RPOW:TYPE?
Preset	AVERage
State Saved	Saved in instrument state.
Range	Average Max Hold
Initial S/W Revision	A.11.00

Meas Preset

Restores all the measurement parameters to their default values.

Key Path	Meas Setup
Mode	GSM
Remote Command	<code>:CONFIgure :EORFspectr</code>
Example	CONF:EORF
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Initial S/W Revision	Prior to A.02.00

Select Modulation Method (Backwards Compatibility/Remote Command Only)

Mode	GSM
Remote Command	<code>[:SENSe] :EORFspectr :TYPE :MODulation [:METHod] DISCrete SWEep</code> <code>[:SENSe] :EORFspectr :TYPE :MODulation [:METHod] ?</code>
Example	EORF:TYPE:MOD SWE EORF:TYPE:MOD?
Notes	The legacy parameter <code>[:SENSe] :EORFspectr :TYPE :MODulation [:METHod] DISCrete SWEep</code> is aliased to the new command <code>[:SENSe] :EORFspectr :MEASure MULTiple SWEpt</code> . When Meas Method is set to MULTiple, this parameter is forced to DISCrete. When Meas Method is set to SWEpt, this parameter is forced to SWEep. When this parameter is set to DISCrete, Meas Method is forced to MULTiple. When this parameter is set to SWEep and " Meas Type " on page 903 is set to MODulation or SWITching., Meas Method is forced to SWEpt.
Dependencies	This parameter is available only when " Meas Type " on page 903 is set to MODulation or SWITching.
Couplings	Coupled with " Meas Type " on page 903 and Meas Method. See Notes.

Preset	DISC
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

10 EDGE Output RF Spectrum Measurement
Mode

Mode

See "[Mode](#)" on page 274

Mode Preset

Returns the active mode to a known state.

Mode Preset does the following for the currently active mode:

- Aborts the currently running measurement.
- Brings up the default menu for the mode, with no active function.
- Sets measurement Global settings to their preset values for the active mode only.
- Activates the default measurement.
- Brings up the default menu for the mode.
- Clears the input and output buffers.
- Sets Status Byte to 0.

Mode Preset does not:

- Cause a mode switch
- Affect mode persistent settings
- Affect system settings

See "[How-To Preset](#)" on page 940 for more information.

Key Path	Front-panel key
Remote Command	:SYSTem:PRESet
Example	:SYST:PRES
Notes	*RST is preferred over :SYST:PRES for remote operation. *RST does a Mode Preset, as done by the :SYST:PRES command, and it sets the measurement mode to Single measurement rather than Continuous for optimal remote control throughput. Clears all pending OPC bits. The Status Byte is set to 0.
Couplings	A Mode Preset aborts the currently running measurement, activates the default measurement, and gets the mode to a consistent state with all of the default couplings set.
Backwards Compatibility Notes	In the X-Series, the legacy "Factory Preset" has been replaced with Mode Preset, which only presets the currently active mode, not the entire instrument. In the X-Series, the way to preset the entire instrument is by using System, Restore System Defaults All, which behaves essentially the same way as restore System Defaults does on ESA and PSA. There is also no "Preset Type" as there is on the PSA. There is a green Mode Preset front-panel key that does a Mode Preset and a white-with-green-letters User Preset front-panel key that does a User Preset. The old PRESet:TYPE command is ignored (without generating an error), and SYST:PRES without a parameter does a Mode Preset, which should cover most backward code compatibility issues. The settings and correction data under the Input/Output front-panel key (examples: Input Z Corr, Ext Amp Gain, etc.) are no longer part of any Mode, so they will not be preset by a Mode Preset. They are preset using Restore Input/Output Defaults, Restore System Defaults All. Note that because User Preset does a Recall State, and all of these settings are saved in State, they ARE recalled when using

	User Preset.
Initial S/W Revision	Prior to A.02.00

How-To Preset

The table below shows all possible presets, their corresponding SCPI commands and front-panel access (key paths). Instrument settings depend on the current measurement context. Some settings are local to the current measurement, some are global (common) across all the measurements in the current mode, and some are global to all the available modes. In a similar way, restoring the settings to their preset state can be done within the different contexts.

Auto Couple - is a measurement local key. It sets all Auto/Man parameter couplings in the measurement to Auto. Any Auto/Man selection that is local to other measurements in the mode will not be affected.

Meas Preset - is a measurement local key. Meas Preset resets all the variables local to the current measurement except the persistent ones.

Mode Preset - resets all the current mode's measurement local and measurement global variables except the persistent ones.

Restore Mode Defaults - resets ALL the Mode variables (and all the Meas global and Meas local variables), including the persistent ones.

Type Of Preset	SCPI Command	Front Panel Access
Auto Couple	:COUPle ALL	Auto Couple front-panel key
Meas Preset	:CONFigure:<Measurement>	Meas Setup Menu
Mode Preset	:SYSTem:PRESet	Mode Preset (green key)
Restore Mode Defaults	:INSTrument:DEFault	Mode Setup Menu
Restore All Mode Defaults	:SYSTem:DEFault MODes	System Menu; Restore System Default Menu
*RST	*RST	not possible (Mode Preset with Single)
Restore Input/Output Defaults	:SYSTem:DEFault INPUt	System Menu; Restore System Default Menu
Restore Power On Defaults	:SYSTem:DEFault PON	System Menu; Restore System Default Menu
Restore Alignment Defaults	:SYSTem:DEFault ALIGN	System Menu; Restore System Default Menu
Restore Miscellaneous Defaults	:SYSTem:DEFault MISC	System Menu; Restore System Default Menu
Restore All System Defaults	:SYSTem:DEFault [ALL] :SYSTem:PRESet:PERsistent	System Menu; Restore System Default Menu
User Preset	:SYSTem:PRESet:USER	User Preset Menu
User Preset All Modes	:SYSTem:PRESet:USER:ALL	User Preset Menu

Power On Mode Preset	:SYSTem:PON:TYPE MODE	System Menu
Power On User Preset	:SYSTem:PON:TYPE USER	System Menu
Power On Last State	:SYSTem:PON:TYPE LAST	System Menu

Mode Setup

See "[Mode Setup](#)" on page 294

Peak Search

Pressing Peak Search front-panel key performs a peak search and opens this Peak Search menu. Peak Search places the selected marker on the trace point with the maximum y-axis value for that marker's trace.

Key Path	Front-panel key
Mode	GSM
Remote Command	:CALCulate:EORFspectr:MARKer[1 2 ...12:MAXimum
Example	CALC:EORF:MARK2:MAX
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Initial S/W Revision	Prior to A.02.00

Min Peak Search (Backwards Compatibility/Remote Command Only)

Mode	GSM
Remote Command	:CALCulate:EORFspectr:MARKer[1 2 ...12:MINimum
Example	CALC:EORF:MARK:MIN
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Initial S/W Revision	Prior to A.02.00

10 EDGE Output RF Spectrum Measurement
Print

Print

See ["Print" on page 325](#)

Quick Save

The Quick Save front-panel key repeats the most recent save that was performed from the Save menu, with the following exceptions:

- Register saves are not remembered as Saves for the purpose of the Quick Save function
- If the current measurement does not support the last non-register save that was performed, an informational message is generated, “File type not supported for this measurement”

Quick Save repeats the last type of qualified save (that is, a save qualified by the above criteria) in the last save directory by creating a unique filename using the Auto File Naming algorithm described below.

If Quick Save is pressed after startup and before any qualified Save has been performed, the Quick Save function performs a Screen Image save using the current settings for Screen Image saves (current theme, current directory), which then becomes the “last save” for the purpose of subsequent Quick Saves.

The Auto File Naming feature automatically generates a file name for use when saving a file. The filename consists of a prefix and suffix separated by a dot, as is standard for the Windows® file system. A default prefix exists for each of the available file types:

Type	Default Prefix	Menu
State	State_	(Save/Recall)
Trace + State	State_	(Save/Recall)
Screen	Screen_	(Save/Recall)
Amplitude Corrections	Ampcor_	(Import/Export)
Traces	Trace_	(Import/Export)
Limit Lines	LLine_	(Import/Export)
Measurement Result	MeasR_	(Import/Export)
Capture Buffer	CapBuf_	(Import/Export)

A four digit number is appended to the prefix to create a unique file name. The numbering sequence starts at 0000 within each Mode for each file type and updates incrementally to 9999, then wraps to 0000 again. It remembers where it was through a Mode Preset and when leaving and returning to the Mode. It is reset by Restore Misc Defaults and Restore System Defaults and subsequent running of the instrument application. So, for example, the first auto file name generated for State files is State_0000.state. The next is State_0001, and so forth.

One of the key features of Auto File Name is that we guarantee that the Auto File Name will never conflict with an existing file. The algorithm looks for the next available number. If it gets to 9999, then it looks for holes. If it find no holes, that is no more numbers are available, it gives an error.

For example, if when we get to State_0010.state there is already a State_0010.state file in the current directory, it advances the counter to State_0011.state to ensure that no conflict will exist (and then it verifies that State_0011.state also does not exist in the current directory and advances again if it does, and so forth).

If you enter a file name for a given file type, then the prefix becomes the filename you entered instead of the default prefix, followed by an underscore. The last four letters (the suffix) are the 4-digit number.

For example, if you save a measurement results file as “fred.csv”, then the next auto file name chosen for a measurement results save will be fred_0000.csv.

NOTE

Although 0000 is used in the example above, the number that is used is actually the current number in the Meas Results sequence, that is, the number that would have been used if you had not entered your own file name.

NOTE

If the filename you entered ends with _dddd, where d=any number, making it look just like an auto file name, then the next auto file name picks up where you left off with the suffix being dddd + 1.

Key Path	Front-panel key
Notes	No remote command for this key specifically.
Initial S/W Revision	Prior to A.02.00

Recall

The Recall menu lets you choose what you want to recall, and where you want to recall it from. Among the types of files you can recall are **States and Traces**. In addition, an Import (Data) option lets you recall a number of data types stored in CSV files (as used by Excel and other spreadsheet programs).

The default paths for Recall are data type dependent and are the same as for the Save key.

Key Path	Front-panel key
Notes	<p>No remote command for this key specifically, but the :MMEM:LOAD command is available for specific file types. An example is :MMEM:LOAD:STATe <filename>.</p> <p>If you try to recall a State file for a mode that is not licensed or not available in the instrument, an error message will occur and the state will not change.</p>
Backwards Compatibility Notes	<p>In legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly (since User Preset is actually loading a state), it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, “state” always includes all of this data; so whenever state is loaded, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p>
Backwards Compatibility Notes	<p>Recall for the X-Series supports backward compatibility in the sense that you can recall a state file from any X-Series model number and any version of X-Series software. This is only possible if part of the recalling process goes through a limiting step after recalling the mode settings, at least for settings that may vary with version number, model number, option and license differences. If you try to recall a state file onto an instrument with less capability than what was available on the instrument during the save, the recall will ignore the state it doesn't support and it will limit the recalled setting to what it allows.</p> <p>Example: if the saved state includes preamp ON, but the recalling instrument does not have a preamp; the preamp is limited to OFF. Conversely, if you save a state without a preamp, the preamp is OFF in the state file. When this saved file is recalled on an instrument with a licensed preamp, the preamp is changed to OFF. Another example is if the saved state has center frequency set to 20 GHz, but the instrument recalling the saved state is a different model and only supports 13.5 GHz. In this case, the center frequency is limited along with any other frequency based settings. Since the center frequency can't be preserved in this case, the recall limiting tries to at least preserve span to keep the measurement setup as intact as possible.</p> <p>It may be appropriate to issue a warning if the state is limited on the recall; warnings do not go out to SCPI so this would only affect the manual user.</p> <p>Note that there is no state file compatibility outside of the X-Series. For example, you cannot recall a state file from ESA or PSA.</p>
Initial S/W Revision	Prior to A.02.00

State

The Recall State menu lets you choose a register or file from which to recall the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings that were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the

additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, GPIB address) are not affected by either a Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

Since each state file is only for one Mode, the settings for other Modes are unaffected when it is loaded. Recall State will cause a mode switch if the state being recalled is not from the current active mode.

After the recall completes, the message "File <filename> recalled" or "Recalled State Register <register number>" is displayed.

For rapid recalls, the State menu lists 16 registers that you can choose from to recall. Pressing a Register key initiates the recall. You can also select a file from which to recall.

The default path for all State Files is:

My Documents\<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

See ["More Information" on page 949](#).

Key Path	Recall
Mode	All
Remote Command	:MMEMory:LOAD:STATe <filename>
Example	:MMEM:LOAD:STAT "myState.state" This recalls the file myState.state on the default path
Example	MMEM:LOAD:STAT "MyStateFile.state" This loads the state file data (on the default file directory path) into the instrument state.
Notes	<p>When you pick a file to recall, the analyzer first verifies that the file is recallable in the current instrument by checking the software version and model number of the instrument. If everything matches, a full recall proceeds by aborting the currently running measurement, clearing any pending operations, and then loading the State from the saved state file. You can open state files from any mode, so recalling a State file switches to the mode that was active when the save occurred. After switching to the mode of the saved state file, mode settings and data (if any for the mode) are loaded with values from the saved file. The saved measurement of the mode becomes the newly active measurement and the data relevant to the measurement (if there is any) is recalled.</p> <p>If there is a mismatch between file version or model number or instrument version or model number, the recall function tries to recall as much as possible and returns a warning message. It may limit settings that differ based on model number, licensing or version number.</p> <p>After recalling the state, the Recall State function does the following:</p> <ul style="list-style-type: none"> • Makes the saved measurement for the mode the active measurement. • Clears the input and output buffers. • Status Byte is set to 0. • Executes a *CLS <p>If the file specified is empty an error is generated. If the specified file does not exist, another error is generated. If there is a mismatch between the file and the proper file type, an error is generated. If</p>

	there is a mismatch between file version or model number or instrument version or model number, a warning is displayed. Then it returns to the State menu and File Open dialog goes away. After the Recall, the analyzer exits the Recall menu and returns to the previous menu.
Backwards Compatibility SCPI	:MMEMory:LOAD:STATe 1,<filename> For backwards compatibility, the above syntax is supported. The "1" is simply ignored.
Initial S/W Revision	Prior to A.02.00

More Information

In measurements that support saving Traces, for example, Swept SA, the Trace data is saved along with the State in the State file. When recalling the State, the Trace data is recalled as well. Traces are recalled exactly as they were stored, including the writing mode and update and display modes. If a Trace was updating and visible when the State was saved, it will come back updating and visible, and its data will be rewritten right away. When you use State to save and recall traces, any trace whose data must be preserved should be placed in View or Blank mode before saving.

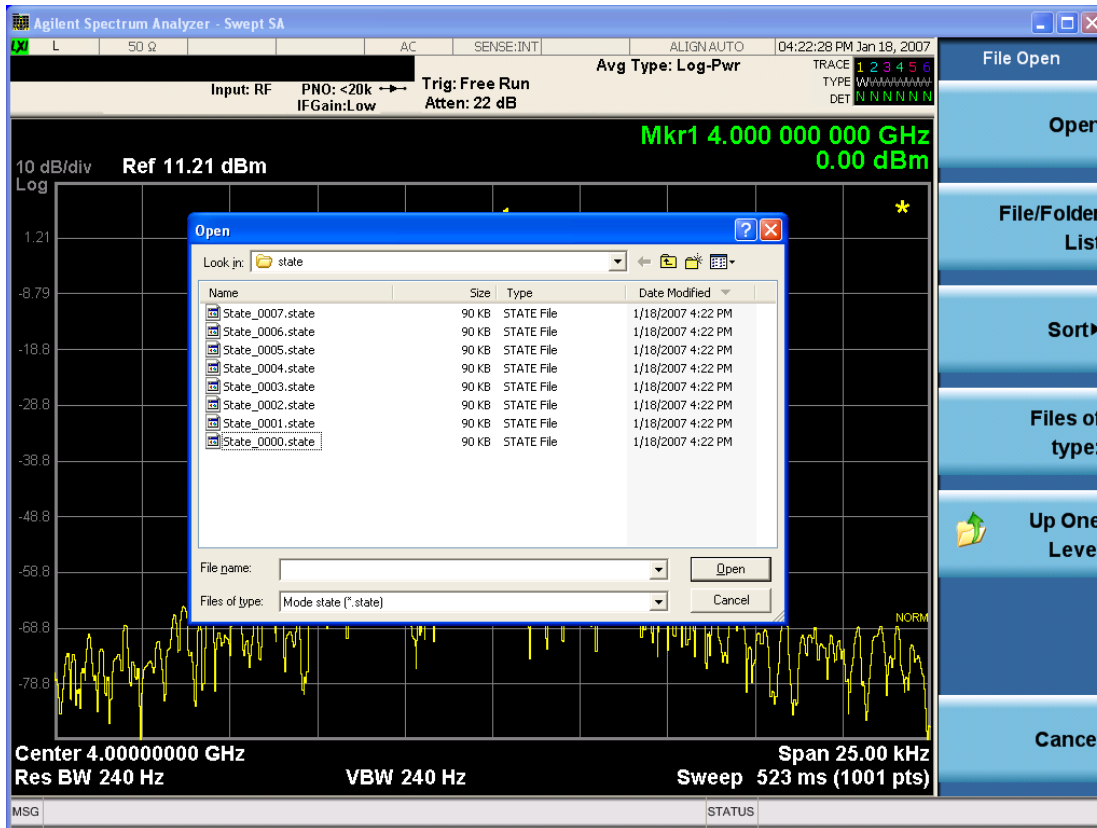
The following table describes the Trace Save and Recall possibilities:

You want to recall state and one trace's data, leaving other traces unaffected.	Save Trace+State from 1 trace. Make sure that no other traces are updating (they should all be in View or Blank mode) when the save is performed.	On Recall, specify the trace you want to load the one trace's data into. This trace will load in View. All other traces' data will be unaffected, although their trace mode will be as it was when the state save was performed.
You want to recall all traces	Save Trace+State from ALL traces.	On Recall, all traces will come back in View (or Blank if they were in Blank or Background when saved)
You want all traces to load exactly as they were when saved.	Save State	On recall, all traces' mode and data will be exactly as they were when saved. Any traces that were updating will have their data immediately overwritten.

From File...

When you press "From File", the analyzer brings up a Windows dialog and a menu entitled "File Open." This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

10 EDGE Output RF Spectrum Measurement Recall



Listed below are the functions of the various fields in the dialog, and the corresponding softkeys:

Open

Performs the recall of the specified file. While the recall is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Look In.

Look In

The Look In field shows the path from which the file will be recalled and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Look In field** first uses the last path from the Save As dialog **Save In:** path for that same file type. There is no softkey for directly navigating to the Look In field, but you can use the left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

Sort

Accesses a menu that enables you to sort the files within the File Open dialog. Only one sorting type can be selected at a time and the sorting happens immediately. The sorting types are By Date, By Name, By extension, and By Size.

Files of Type

This field shows the file suffix for the type of file you have selected to recall. For example, if you navigated here while recalling State, "Mode state (*.state)" is in the field. If you navigated here while recalling Trace, ""Mode state (*.trace)" is in the field. If you navigated here while importing a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown menu, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Open** request to be cancelled. The ESC key does the same thing.

Key Path	Recall, State
Notes	Brings up the Open dialog for recalling a State Save Type
Initial S/W Revision	Prior to A.02.00

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

For more information and the SCPI command, see Edit Register Names under the Save, State function.

Key Path	Recall, State
Mode	All
Dependencies	N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending the SCPI command generates an error, -221, "Settings conflict;Option not available"
Initial S/W Revision	A.11.00

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last

modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

Key Path	Recall, State
Example	*RCL 1
Range	1–16 from front panel, 1–128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State, Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	Prior to A.11.00

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

Key Path	Recall, State
Example	*RCL 1
Range	1-16 from front panel, 1-128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State,Edit Register Names key OR "(empty)" if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	Prior to A.11.00

Restart

The Restart function restarts the current sweep, or measurement, or set of averaged/held sweeps or measurements. If you are Paused, pressing Restart does a Resume.

The Restart function is accessed in several ways:

- Pressing the Restart key
- Sending the remote command INIT:IMMEDIATE
- Sending the remote command INIT:RESTART

See "[More Information](#)" on page 954

Key Path	Front-panel key
Remote Command	:INITiate[:IMMEDIATE] :INITiate:RESTART
Example	:INIT:IMM :INIT:REST
Notes	:INITiate:RESTART and :INITiate:IMMEDIATE perform exactly the same function.
Couplings	Resets average/hold count k. For the first sweep overwrites all active (update=on) traces with new current data. For application modes, it resets other parameters as required by the measurement.
Status Bits/OPC dependencies	This is an Overlapped command. The STATus:OPERation register bits 0 through 8 are cleared. The STATus:QUESTionable register bit 9 (INTegrity sum) is cleared. The SWEEPING bit is set. The MEASURING bit is set.
Backwards Compatibility Notes	For Spectrum Analysis mode in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart trace averages (displayed average count reset to 1) for a trace in Clear Write, but did not restart Max Hold and Min Hold. In the X-Series, the Restart hardkey and the INITiate:RESTART command restart not only Trace Average, but MaxHold and MinHold traces as well. For wireless comms modes in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart every measurement, which includes all traces and numeric results. There is no change to this operation.
Initial S/W Revision	Prior to A.02.00

More Information

The **Restart** function first aborts the current sweep/measurement as quickly as possible. It then resets the sweep and trigger systems, sets up the measurement and initiates a new data measurement sequence with a new data acquisition (sweep) taken once the trigger condition is met.

If the analyzer is in the process of aligning when **Restart** is executed, the alignment finishes before the restart function is performed.

Even when set for Single operation, multiple sweeps may be taken when Restart is pressed (for example, when averaging/holding is on). Thus when we say that **Restart** "restarts a measurement," we may mean:

- It restarts the current sweep
- It restarts the current measurement
- It restarts the current set of sweeps if any trace is in Trace Average, Max Hold or Min Hold
- It restarts the current set of measurements if Averaging, or Max Hold, or Min Hold is on for the measurement
- depending on the current settings.

With **Average/Hold Number** (in **Meas Setup** menu) set to 1, or Averaging off, or no trace in Trace Average or Hold, a single sweep is equivalent to a single measurement. A single sweep is taken after the trigger condition is met; and the analyzer stops sweeping once that sweep has completed. However, with **Average/Hold Number** >1 and at least one trace set to **Trace Average, Max Hold, or Min Hold (SA Measurement)** or **Averaging on (most other measurements)**, multiple sweeps/data acquisitions are taken for a single measurement. The trigger condition must be met prior to each sweep. The sweep is stopped when the average count k equals the number N set for **Average/Hold Number**. A measurement average usually applies to all traces, marker results, and numeric results; but sometimes it only applies to the numeric results.

Once the full set of sweeps has been taken, the analyzer will go to idle state. To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command `CALC:AVER:TCON UP`.

Save

The Save menu lets you choose what you want to save and where you want to save it. Among the types of files you can save are **States**, **Traces**, and **Screen Images**. In addition, an Export (Data) option lets you save a number of data types as CSV files for easy import into Excel and other spreadsheet programs.

Key Path	Front-panel key
Mode	All
Notes	No remote command for this key specifically, but the :MMEM:STOR:STATe <filename> command is available for specific file types. An example is :MMEM:STOR:STATe <filename>.
Initial S/W Revision	Prior to A.02.00

State

The Save State menu lets you choose a register or file for saving the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings which were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, Verbose SCPI) are not affected by either Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

After the save completes, the message "File <filename> saved" or "State Register <register number> saved" is displayed.

For rapid saving, the State menu lists 16 registers to save to. Pressing a Register key initiates the save. You can also select a file to save to.

The default path for all State Files is:

My Documents\<<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

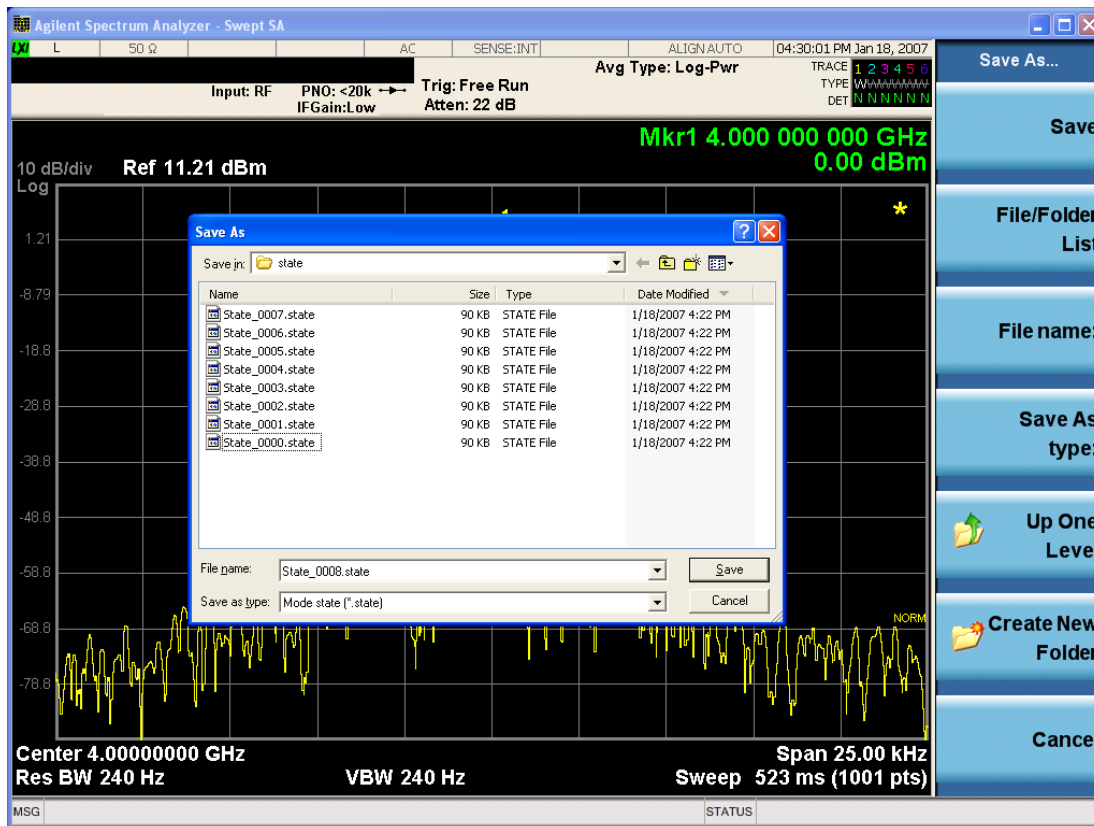
Key Path	Save
Mode	All
Remote Command	:MMEMory:STORe:STATe <filename>
Example	MMEM:STOR:STATe "MyStateFile.state" This stores the current instrument state data in the file MyStateFile.state in the default directory.
Notes	Both single and double quotes are supported for any filename parameter over remote. After saving to a register, that register's menu key is updated with the date the time, unless a custom label has been entered for that key. After saving to a register, you remain in the Save State menu, so that you can see the Register key

update. After saving to a file, the analyzer automatically returns to the previous menu and any Save As dialog goes away.

Backwards Compatibility SCPI	:MMEMoRY:STORe:STATe 1,<filename>
Initial S/W Revision	Prior to A.02.00

To File . . .

When you press “To File”, the analyzer brings up a Windows dialog and a menu entitled “**Save As.**” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



The Listed below

are the functions of the various fields in the dialog, and the corresponding softkeys:

Save

Performs the save to the specified file of the selected type. If the file already exists, a dialog will appear that allows you to replace the existing file by selecting OK, or you can Cancel the request. If you select OK, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade.

While the save is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Save In.

Save In

The Save In field shows the path to which the file will be saved and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Save In field** defaults to the default path for this type of file and remembers the last path you used to save this type of file. There is no softkey for directly navigating to the Save In field but you can use left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

File Name

The File Name field is initially loaded with an automatically generated filename specific to the appropriate Save Type. The automatically generated filename is guaranteed not to conflict with any filename currently in the directory. You may replace or modify this filename using the File Name key. See the ["Quick Save " on page 2328](#) documentation for more on the automatic file naming algorithm.

When you press the File Name key the analyzer displays the Alpha Editor. Use the knob to choose the letter to add and the front-panel Enter key to add the letter to the file name. The BK character moves you back and the FW character moves you forward in the filename. The Select key on the front panel generates a space character. When you are done entering the filename press the Done softkey. This returns back to the **File Open** dialog and menu, but does not cause the save to occur.

Save As Type

This field shows the file suffix for the type of file you have selected to save. For example, if you navigated here while saving State, "Mode state (*.state)" is in the field. If you navigated here from saving Trace, ""Mode state (*.trace)" is in the field. If you navigated here while exporting a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Create New Folder

This key corresponds to the icon of a folder with the "*" that is in the tool bar of the dialog. When pressed, a new folder is created in the current directory with the name **New Folder** and you can enter a new folder name using the Alpha Editor.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Save As** request to be cancelled. The ESC key does the same thing.

Key Path	Save, State
Mode	All
Notes	Brings up Save As dialog for saving a State Save Type
Initial S/W Revision	Prior to A.02.00

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

See ["More Information" on page 959](#)

Key Path	Save, State
Mode	All
Remote Command	:MMEMory:REGister:STATe:LABel <reg number>,"label" :MMEMory:REGister:STATe:LABel? <reg number>
Example	:MMEM:REG:STAT:LAB 1,"my label"
Notes	<reg number> is an integer from 1 to 16. If the SCPI specifies an invalid register number an error message is generated, -222,"Data out of range;Invalid register label number" "label" is a string from 0 to 30 characters in length. If a label exceeds 30 characters, an error message is generated, -150,"String data error;Label clipped to 30 characters" "label" of length 0 erases the custom label and restores the default (time and date) label. E.g.: :MMEM:REG:STAT:LAB 1,""
Dependencies	N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending this command generates an error, -221,"Settings conflict;Option not available"
Preset	The names are unaffected by Preset or power cycle but are set to the default label (time and date) on a "Restore System Defaults->Misc"
Initial S/W Revision	A.11.00

More Information

When you edit one of the register names, the time and date field will be replaced by the custom name.

If you delete all the characters in the custom name, it restores the default (time and date).

The register names are stored within the state files, but they are not part of the instrument state; that is, once you have edited a register name, loading a new state will not change that register name. Another consequence of this is that the names will be persistent through a power cycle. Also, if a named state file is transferred to another analyzer, it will bring its custom name along with it.

If you try to edit the name of an empty register, the analyzer will first save the state to have a file to put the name in. If you load a named state file into an analyzer with older firmware it will ignore the metadata.

The *SAV and *RCL commands will not be affected by the custom register names, nor will the MMEM commands.

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

Key Path	Save, State
Mode	All
Example	*SAV 1
Range	1–16 from front panel, 1–128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.11.00

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

Key Path	Save, State
Mode	All
Example	*SAV 1
Range	1–16 from front panel, 1–128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.11.00

Data (Export)

Exporting a data file stores data from the current measurement to mass storage files. The Export Menu only contains data types that are supported by the current measurement.

Since the commonly exported data files are in .csv format, the data can be edited by you prior to importing. This allows you to export a data file, manipulate the data in Excel (the most common PC Application for manipulating .csv files) and then import it.

Selecting an Export Data menu key will not actually cause the exporting to occur, since the analyzer still needs to know where you wish to save the data. Pressing the Save As key in this menu brings up the Save As dialog and Save As menu that allows you to specify the destination file and directory. Once a filename has been selected or entered in the Open menu, the export will occur as soon as the Save key is pressed.

Key Path	Save
Mode	All
Notes	The menu is built from whatever data types are available for the mode. So the key locations in the sub menu will vary. No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:STORe commands.
Dependencies	If a file type is not used by a certain measurement, that type is grayed out for that measurement. The key for a file type will not show at all if there are no measurements in the Mode that support it.
Preset	Is not affected by a Preset or shutdown, but is reset during Restore Mode Defaults
Readback	The data type that is currently selected
Initial S/W Revision	Prior to A.02.00

Measurement Results

Pressing this key selects Meas Results as the data type to be exported. Pressing the key a second time brings up the Meas Results menu, which allows you to select which **Meas Result** to save. In the Swept SA measurement, there are three types of Measurement Results files: Peak Table, Marker Table and Spectrogram.

See "[Meas Results File Contents](#)" on page 962.

See "[Marker Table](#)" on page 962.

See "[Peak Table](#)" on page 965.

See "[Spectrogram](#)" on page 968

Remote Command	:MMEMory:STORe:RESults:MTABle PTABle SPEctrogram <filename>
Example	:MMEM:STOR:RES:MTAB "myResults.csv" Saves the results from the current marker table to the file myResults.csv in the current path. :MMEM:STOR:RES:PTAB "myResults.csv" Saves the results from the current peak table to the file myResults.csv in the current path. :MMEM:STOR:RES:SPEC "myResults.csv" Saves the results from the current Spectrogram display to the file myResults.csv in the current path. The default path is My Documents\SA\data\SAN\results
Notes	If the save is initiated via SCPI, and the file already exists, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade. Both single and double quotes are supported for any filename parameter over SCPI.
Dependencies	If a save of Marker Table results is requested and the Marker Table is not on, no file is saved and a message is generated If a save of Peak Table results is requested and the Peak Table is not on, no file is saved and a message is generated If a save of Spectrogram results is requested and the Spectrogram is not on, no file is saved and a message is generated. The Spectrogram choice only appears if option EDP is licensed.
Preset	Not part of Preset, but is reset to Peak Table by Restore Mode Defaults. Survives a shutdown.
Initial S/W Revision	Prior to A.02.00

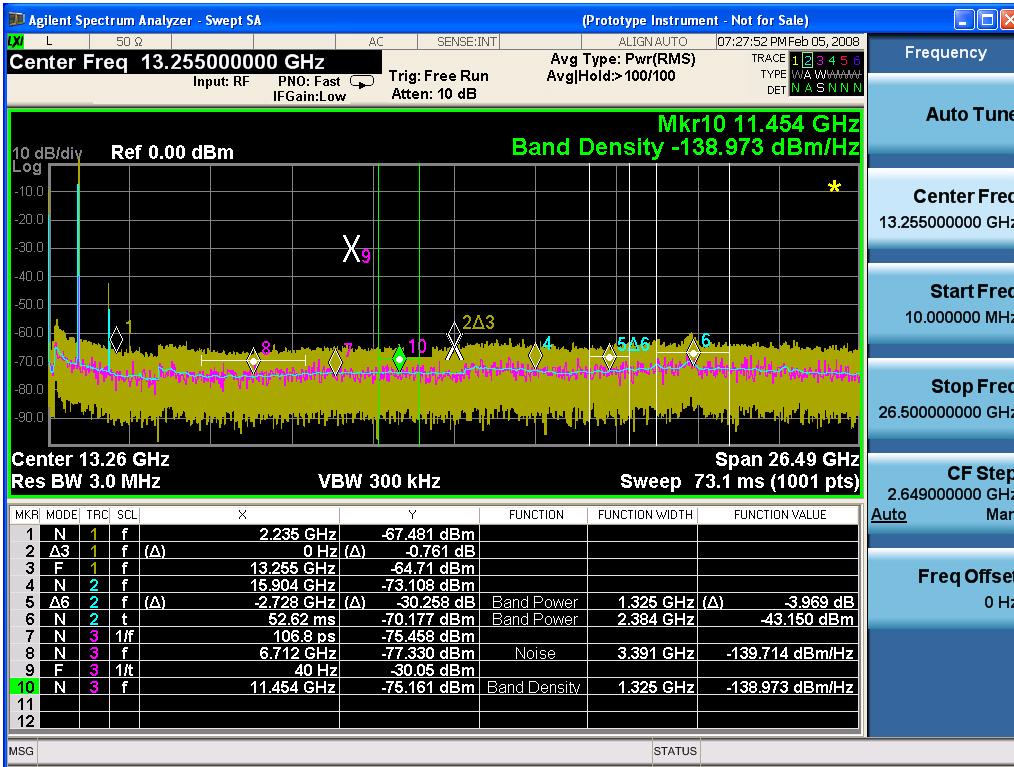
Meas Results File Contents

All files are .csv files. The following section details the data in each file type.

Marker Table

This section discusses the Marker Table Meas Results file format.

Imagine that, at the point where a Marker Table Meas Result is requested, the following screen is showing:



Then the Meas Results file, when opened, would show the following data:

MeasurementR	
result	
Swept SA	
A.01.40_R0017	N9020A
526 B25 PFR	1
P26 EA3	
Result Type	Marker Table
Ref Level	0
Number of Points	1001
Sweep Time	0.0662666 67
Start Frequency	10000000
Stop Frequency	26500000 000
Average Count	0
Average Type	LogPower (Video)
RBW	3000000

10 EDGE Output RF Spectrum Measurement
Save

RBW Filter	Gaussian
RBW Filter BW	3dB
VBW	3000000
Sweep Type	Swept
X Axis Scale	Lin
PreAmp State	Off
PreAmp Band	Low
Trigger Source	Free
Trigger Level	1.2
Trigger Slope	Positive
Trigger Delay	1.00E-06
Phase Noise Optimization	Fast
Swept If Gain	Low
FFT If Gain	Autorange
RF Coupling	AC
FFT Width	411900
Ext Ref	10000000
Input	RF
RF Calibrator	Off
Attenuation	10
Ref Level Offset	0
External Gain	0
X Axis Units	Hz
Y Axis Units	dBm

DATA									
MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	FUNCTION UNIT
1	Normal	1	Frequency	2.2350E+09	-67.481	Off	0.0000E+00	0	None
2	Delta3	1	Frequency	0.0000E+00	-0.761	Off	0.0000E+00	0	None
3	Fixed	1	Frequency	1.3255E+10	-64.71	Off	0.0000E+00	0	None
4	Normal	2	Frequency	1.5904E+10	-73.1	Off	0.0000E+00	0	None

08									
5	Delta7	2	Frequency	- 2.7280E+ 09	- 30.2 58	Band Power	1.3250E+ 06	-3.969	dB
6	Normal	2	Time	5.2620E- 02	- 70.1 77	Band Power	2.3840E+ 06	-43.15	dBm
7	Normal	3	Period	1.0680E- 10	- 75.4 58	Off	0.0000E+ 00	0	None
8	Normal	3	Frequency	6.7120E+ 09	- 77.3 3	Noise	3.3910E+ 06	- 139.71 4	dBm/Hz
9	Fixed	3	Inverse Time	4.0000E+ 01	- 30.0 5	Off	0.0000E+ 00	0	None
10	Normal	3	Frequency	1.1454E+ 10	- 75.1 61	Band Density	1.3250E+ 06	- 138.97 3	dBm/Hz
11	Off	1	Frequency	0.0000E+ 00	0	Off	0.0000E+ 00	0	None
12	Off	1	Frequency	0.0000E+ 00	0	Off	0.0000E+ 00	0	None

The numbers appear in the file exactly as they appear onscreen. If it says 11.454 GHz onscreen, then in the file it is 11.454E+09.

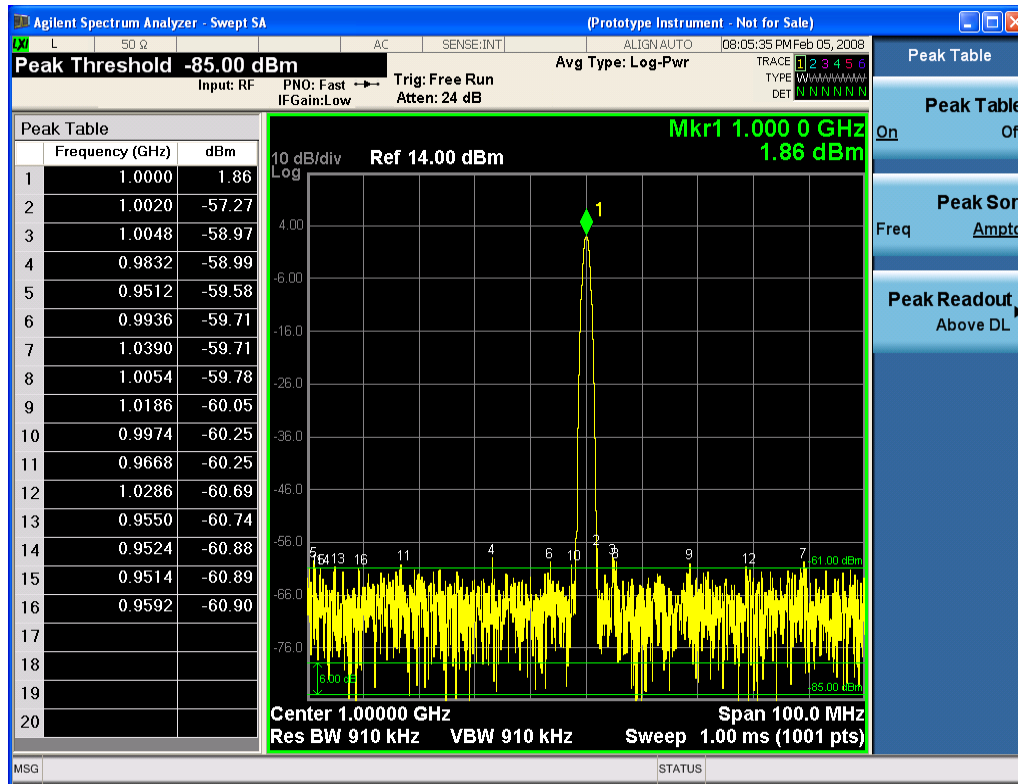
The metadata header is very similar to the metadata used in the trace data .csv files. See Trace File Contents. The only new information concerns the 1-of-N fields in the marker table itself.

Peak Table

This section discusses the Peak Table Meas Results file format.

Imagine that, at the point where a Marker Table Meas Result is requested, the following screen is showing:

10 EDGE Output RF Spectrum Measurement
Save



Then the Meas Results file, when opened, would show the header data (the same as for the Marker Table except that the Result Type is Peak Table) ending with a few fields of specific interest to Peak Table users:

- Peak Threshold
- Peak Threshold State (On|Off)
- Peak Excursion
- Peak Excursion State (On|Off)
- Display Line
- Peak Readout (All|AboveDL|BelowDL)
- Peak Sort (Freq|Amptd)

These fields are then followed by the data for the Peak Table itself.

Note that the label for the Frequency column changes to Time in 0 span.

Here is what the table for the above display looks like:

MeasurementResult	
Swept SA	
A.01.40_R0017	N9020A
526 B25 PFR P26 EA3	1

Result Type	Peak Table
Ref Level	0
Number of Points	1001
Sweep Time	0.066266667
Start Frequency	10000000
Stop Frequency	26500000000
Average Count	0
Average Type	LogPower(Video)
RBW	3000000
RBW Filter	Gaussian
RBW Filter BW	3dB
VBW	3000000
Sweep Type	Swept
X Axis Scale	Lin
PreAmp State	Off
PreAmp Band	Low
Trigger Source	Free
Trigger Level	1.2
Trigger Slope	Positive
Trigger Delay	1.00E-06
Phase Noise Optimization	Fast
Swept If Gain	Low
FFT If Gain	Autorange
RF Coupling	AC
FFT Width	411900
Ext Ref	10000000
Input	RF
RF Calibrator	Off
Attenuation	10
Ref Level Offset	0
External Gain	0
X Axis Units	Hz
Y Axis Units	dBm
Peak Threshold	-85
Peak Threshold State	On
Peak Excursion	6
Peak Excursion State	On

Display Line	-61	
Peak Readout	AboveDL	
Peak Sort	Amptd	
DATA		
Peak	Frequency	Amplitude
1	1.0000E+06	1.86
2	1.0020E+06	-57.27
3	1.0048E+06	-58.97
4	9.8320E+05	-58.99
5	9.5120E+05	-59.58
6	9.9360E+05	-59.71
7	1.0390E+06	-59.71
8	1.0054E+06	-59.78
9	1.1086E+06	-60.05
10	9.9740E+05	-60.25
11	9.6680E+05	-60.25
12	1.0286E+06	-60.69
13	9.5500E+05	-60.74
14	9.5240E+05	-60.88
15	9.5140E+05	-60.89
16	9.5920E+05	-60.90
17		
18		
19		
20		

Spectrogram

This section discusses the Spectrogram Results file format. The Spectrogram choice only appears if option EDP is licensed.

The Spectrogram results are the same as a Trace data export, except that instead of having just one trace's data, all 300 traces appear one after the other.

Each trace has its own data mark; the data for Spectrogram Trace 0 follows the row marked DATA, the data for Spectrogram Trace 1 follows the row marked DATA1, for Spectrogram Trace 2 follows the row marked DATA2, and so on.

Each DATA row has a timestamp in the second column (as of firmware revision A.11.01). So, for example, if Trace 0 had a relative start time of 1729.523 sec, then the first DATA row would look like this:

DATA,1729.523

And if Trace 13 had a relative start time of 100.45 sec, then the fourteenth data row would look like:

DATA13,100.453

To find the absolute time for the relative timestamps of each trace, the last row before the first DATA row gives the absolute start time of the Spectrogram, in the form YYYYMMDDHHMMSS

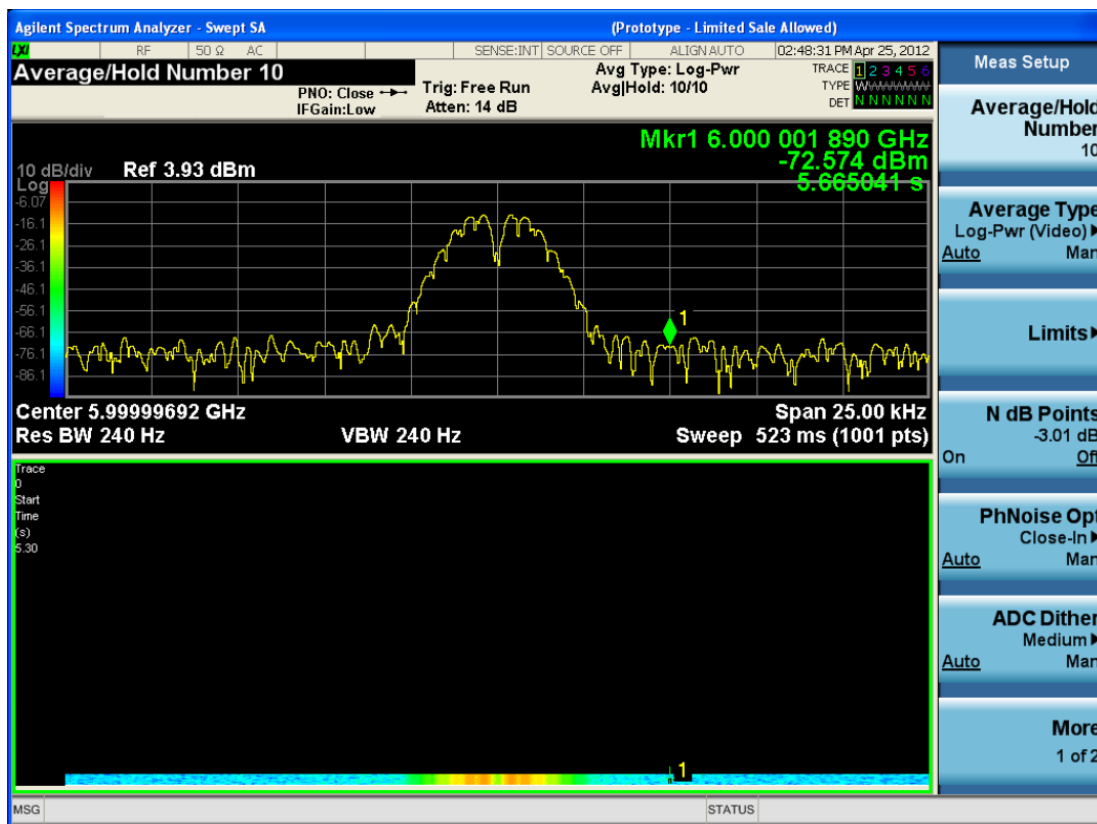
So, for example, if the absolute start time is 13:23:45:678 on January 30, 2012, this row would look like:

Start Time,20120130132345678

NOTE The resolution of the absolute time stored is 1 ms, which matches up with the fact that the fastest sweep time is also 1 ms. However, there is no specification for the absolute accuracy of the clock in the analyzer, nor is there any facility provided to allow the user to set this time to any particular degree of accuracy.

Traces that have not yet been filled in the Spectrogram display are empty; there is no DATA header for them. The file ends after the last non-empty trace.

Imagine that, at the point where a Spectrogram Meas Result is requested, the following screen is showing:



For the purpose of this example, we have set the Average/Hold Number to 10, thus we have only traces 0 thru 10. The Spectrogram was started at 02:28:08:700 pm on April 25, 2012 (that is, 700 ms after 2:28:08 pm), although the screen dump itself shows a different time, as it was taken ten minutes after the

Spectrogram data. Trace 0 is showing a start time of 5.30 seconds, meaning 5.3 seconds after the Spectrogram started (trace 10 has a start time of 0, as it was the first trace taken but has now rolled up into the tenth trace slot).

The Meas Results file, when opened, shows the header data and ten traces of trace data. Below is an extract from the result file for the above display. Note the start time of 20120425142808700 showing in the last row before the first DATA row, and the relative time of 5.299231048 showing in the first DATA row:

Result Type	Spectrogram
MeasResult	
Swept SA	
A.11.00.01	N9020A
503 508 513 526 ALL ALV B1C B1X B25 B2X B40 BAB BBA CR3 CRP DP2 DRD EA3 EDP EMC EP1 ERC ESC ESP EXM FSA HBA K03 LFE MPB P03 P08 P13 P26 PFR RTL RTS S40 SB1 SEC SM1 UK6 YAS YAV	1
Segment	0
Number of Points	1001
Sweep Time	0.523333333
Start Frequency	5999984415
Stop Frequency	6000009415
Average Count	0
Average Type	LogPower(Video)
RBW	240
RBW Filter	Gaussian
RBW Filter BW	3dB
VBW	240
Sweep Type	Swept
X Axis Scale	Lin
PreAmp State	Off
PreAmp Band	Low
Trigger Source	Free
Trigger Level	1.2
Trigger Slope	Positive
Trigger Delay	0
Phase Noise Optimization	Wide
Swept If Gain	Low
FFT If Gain	Autorange
RF Coupling	AC

Result Type	Spectrogram
FFT Width	411900
Ext Ref	10000000
Input	RF
RF Calibrator	Off
Attenuation	14
Ref Level Offset	0
External Gain	0
Trace Type	Clearwrite
Detector	Normal
Trace Math	Off
Trace Math Oper1	Trace5
Trace Math Oper2	Trace6
Trace Math Offset	0
Trace Name	Trace1
X Axis Units	Hz
Y Axis Units	dBm
Start Time	20120425142808700
DATA	5.299231048
5999984415	-76.34749519
5999984440	-77.28097006
5999984465	-75.32317869
5999984490	-73.64417681
5999984515	-72.67154604

- o
- o
- o

6000009315	-77.94423277
6000009340	-79.51829697
6000009365	-78.46108961
6000009390	-78.46108957
6000009415	-76.59570596
DATA2	4.708697055
5999984415	-80.98197882
5999984440	-80.98197879

5999984465	-75.83142132
5999984490	-74.02712079
5999984515	-73.57213005

o
o
o

6000009315	-75.9183103
6000009340	-79.53787488
6000009365	-78.82602191
6000009390	-78.82602188
6000009415	-76.37486709
DATA10	0
5999984415	-75.56751112
5999984440	-75.76485645
5999984465	-76.67718717
5999984490	-78.79238489
5999984515	-83.72680212

o
o
o

6000009315	-71.3942461
6000009340	-72.28308332
6000009365	-73.92684489
6000009390	-75.45548832
6000009415	-75.17904815

Save As . . .

When you press "Save As", the analyzer brings up a Windows dialog and a menu entitled "**Save As.**" This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[To File . . .](#)" on page 2340 in Save, State for a full description of this dialog and menu.

The default path for saving files is:

For all of the Trace Data Files:

My Documents\`<mode name>`\data\traces

For all of the Limit Data Files:

My Documents\`<mode name>`\data\limits

For all of the Measurement Results Data Files:

My Documents\`<mode name>`\data\`<measurement name>`\results

For all of the Capture Buffer Data Files:

My Documents\`<mode name>`\data\captureBuffer

Key Path	Save, Data
Mode	All
Notes	The key location is mode-dependent and will vary. Brings up the Save As dialog for saving a <code><mode specific></code> Save Type. The save is performed immediately and does not wait until the measurement is complete.
Initial S/W Revision	Prior to A.02.00

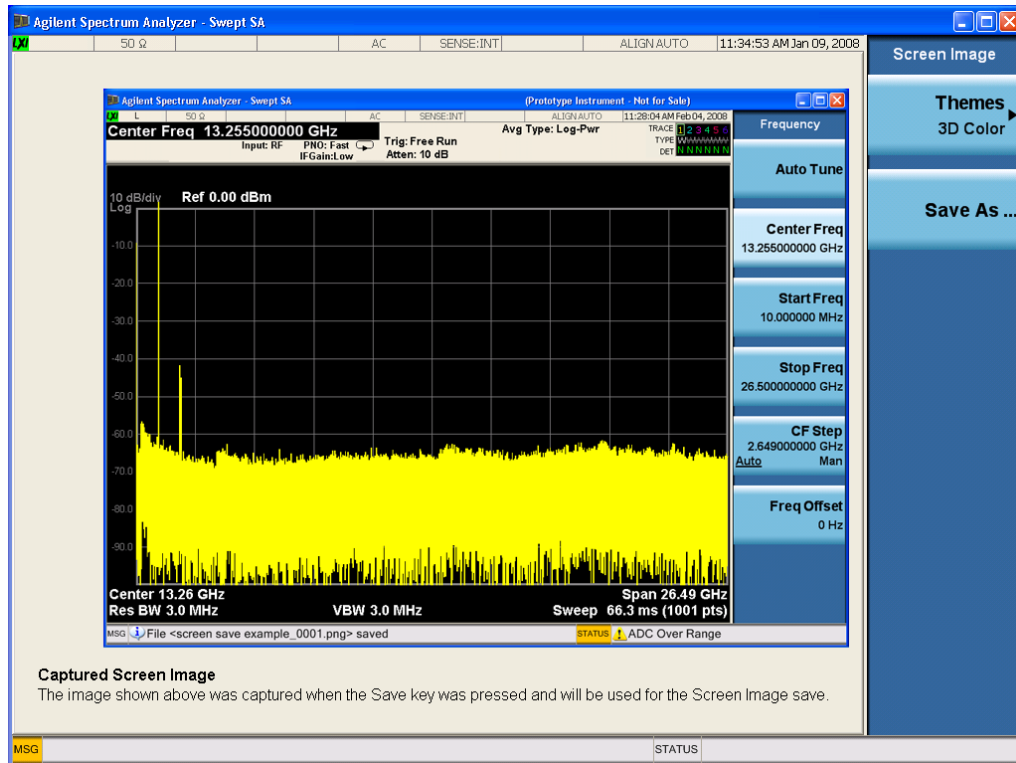
Screen Image

Pressing Screen Image accesses a menu of functions that enable you to specify a format and location for the saved screen image. It brings up a menu that allows you to specify the color scheme of the Screen Image (Themes) or navigate to the Save As dialog to perform the actual save.

Screen Image files contain an exact representation of the analyzer display. They cannot be loaded back onto the analyzer, but they can be loaded into your PC for use in many popular applications.

The image to be saved is actually captured when the Save front panel key is pressed, and kept in temporary storage to be used if you ask for a Screen Image save. When the Screen Image key is pressed, a "thumbnail" of the captured image is displayed, as shown below:

10 EDGE Output RF Spectrum Measurement Save



When you continue on into the Save As menu and complete the Screen Image save, the image depicted in the thumbnail is the one that gets saved, showing the menus that were on the screen before going into the Save menus. The save is performed immediately and does not wait until the measurement is complete.

After you have completed the save, the Quick Save front-panel key lets you quickly repeat the last save performed, using an auto-named file, with the current screen data.

NOTE

For versions previous to A.01.55, if you initiate a screen image save by navigating through the Save menus, the image that is saved will contain the Save menu softkeys, not the menus and the active function that were on the screen when you first pressed the Save front panel key.

Key Path	Save
Mode	All
Remote Command	:MMEMory:STORe:SCReen <filename>
Example	:MMEM:STOR:SCR "myScreen.png" This stores the current screen image in the file MyScreenFile.png in the default directory.
Initial S/W Revision	Prior to A.02.00

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

Key Path	Save, Screen Image
Remote Command	:MMEMory:STORe:SCReen:THEMe TDColor TDMonochrome FCOLOR FMONochrome :MMEMory:STORe:SCReen:THEMe?
Example	:MMEM:STOR:SCR:THEM TDM
Preset	3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes.
Readback	3D Color 3D Mono Flat Color Flat Mono
Backwards Compatibility Notes	In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical.
Initial S/W Revision	Prior to A.02.00

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDC
Readback	3D Color
Initial S/W Revision	Prior to A.02.00

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDM
Readback	3D Mono
Initial S/W Revision	Prior to A.02.00

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

Key Path	Save, Screen Image, Themes
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Example	MMEM:STOR:SCR:THEM FCOL
Readback	Flat Color
Initial S/W Revision	Prior to A.02.00

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FMON
Readback	Flat Mono
Initial S/W Revision	Prior to A.02.00

Save As...

When you press “Save As”, the analyzer brings up a Windows dialog and a menu entitled “**Save As.**” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[To File . . .](#)" on page 2340 in Save, State for a full description of this dialog and menu.

The default path for Screen Images is

My Documents\<<mode name>\screen.

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

Key Path	Save, Screen Image
Notes	Brings up Save As dialog for saving a Screen Image Save Type
Initial S/W Revision	Prior to A.02.00

Mass Storage Catalog (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:CATalog? [<directory_name>]
Notes	<p>The string must be a valid logical path.</p> <p>Queries disk usage information (drive capacity, free space available) and obtains a list of files and directories in a specified directory in the following format:</p> <p><numeric_value>,<numeric_value>,{<file_entry>}</p> <p>It returns two numeric parameters and as many strings as there are files and directories. The first parameter indicates the total amount of storage currently used in bytes. The second parameter</p>

indicates the total amount of storage available, also in bytes. The <file_entry> is a string. Each <file_entry> indicates the name, type, and size of one file in the directory list:

<file_name>,<file_type>,<file_size>

As the windows file system has an extension that indicates file type, <file_type> is always empty. <file_size> provides the size of the file in bytes. For directories, <file_entry> is surrounded by square brackets and both <file_type> and <file_size> are empty

Initial S/W Revision Prior to A.02.00

Mass Storage Change Directory (Remote Command Only)

Key path SCPI Only

Remote Command :MMEMory:CDIRectory [<directory_name>]
 :MMEMory:CDIRectory?

Notes The string must be a valid logical path.

 Changes the default directory for a mass memory file system. The <directory_name> parameter is a string. If no parameter is specified, the directory is set to the *RST value.

 At *RST, this value is set to the default user data storage area, that is defined as System.Environment.SpecialFolder.Personal.

 Query returns full path of the default directory.

Initial S/W Revision Prior to A.02.00

Mass Storage Copy (Remote Command Only)

Key path SCPI Only

Remote Command :MMEMory:COPY <string>,<string>[,<string>,<string>]

Notes The string must be a valid logical path.

 Copies an existing file to a new file or an existing directory to a new directory.

 Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.

 The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.

 This command will generate an "access denied" error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.

Mass Storage Device Copy (Remote Command Only)

This command transfers data to/from a file and a peripheral device.

Key path	SCPI Only
Remote Command	:MMEMory:COpy:DEvice <source_string>,<dest_string>
Notes	The strings must be a valid logical path or a valid device keyword. If the dest_string is a device keyword, the data is copied from the source file to the device. If the source_string is a device keyword, the data is copied to the source file from the device. Valid device keywords are: SNS (smart noise source) An error is generated if the file or device is not found.

Mass Storage Delete (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:DELeTe <file_name>[,<directory_name>]
Notes	The string must be a valid logical path. Removes a file from the specified directory. The <file_name> parameter specifies the file name to be removed. This command will generate an "access denied" error if the file is in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.
Initial S/W Revision	Prior to A.02.00

Mass Storage Data (Remote Command Only)

Creates a file containing the specified data OR queries the data from an existing file.

Key path	SCPI Only
Remote Command	:MMEMory:DATA <file_name>, <data> :MMEMory:DATA? <file_name>
Notes	The string must be a valid logical path. The command form is MMEMory:DATA <file_name>,<data>. It loads <data> into the file <file_name>. <data> is in 488.2 block format. <file_name> is string data. The query form is MMEMory:DATA? <file_name> with the response being the associated <data> in block format.
Initial S/W Revision	Prior to A.02.00

Mass Storage Make Directory (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:MDIRectory <directory_name>
Notes	The string must be a valid logical path. Creates a new directory. The <directory_name> parameter specifies the name to be created.

	This command will generate an “access denied” error if the new directory would be in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.
Initial S/W Revision	Prior to A.02.00

Mass Storage Move (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:MOVE <string>,<string>[,<string>,<string>]
Notes	<p>The string must be a valid logical path.</p> <p>Moves an existing file to a new file or an existing directory to a new directory.</p> <p>Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.</p> <p>The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.</p> <p>This command will generate an “access denied” error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.</p>
Initial S/W Revision	Prior to A.02.00

Mass Storage Remove Directory (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:RDIRECTory <directory_name>
Notes	<p>The string must be a valid logical path.</p> <p>Removes a directory. The <directory_name> parameter specifies the directory name to be removed. All files and directories under the specified directory shall also be removed.</p> <p>This command will generate an “access denied” error if the folder is a restricted folder (e.g., C:\Windows) or is in a restricted folder and the current user does not have Power User or Administrator privileges.</p>
Initial S/W Revision	Prior to A.02.00

Single (Single Measurement/Sweep)

Sets the analyzer for Single measurement operation. The single/continuous state is Meas Global, so the setting will affect all the measurements. If you are Paused, pressing Single does a Resume.

See "[More Information](#)" on page 980

Key Path	Front-panel key
Example	:INIT:CONT OFF
Notes	See Cont key description.
Backwards Compatibility Notes	<p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey and the INITiate:IMM switched from continuous measurement to single measurement and restarted sweeps and averages (displayed average count reset to 1), but did not restart Max Hold and Min Hold. In the X-Series, the Single hardkey and the INITiate:IMM command initiate a sweep/ measurement/ average sequence/hold sequence including MaxHold and MinHold.</p> <p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey restarted the sweep regardless of whether or not you were in an active sweep or sweep sequence. In the X-Series, Restart does this but Single only restarts the sweep or sweep sequence if you are in the idle state.</p> <p>INIT[:IMM] in ESA & PSA Spectrum Analysis Mode does an implied ABORT. In some other PSA Modes, INIT[:IMM] is ignored if not in the idle state. . The X-Series follows the ESA/PSA SA Mode model, which may cause some Modes to have compatibility problems.</p>
Initial S/W Revision	Prior to A.02.00

More Information

See "[Restart](#)" on page 2337 for details on the INIT:IMMEDIATE (Restart) function.

If you are already in single sweep, the INIT:CONT OFF command has no effect.

If you are already in Single Sweep, then pressing the Single key in the middle of a sweep does not restart the sweep or sequence. Similarly, pressing the Single key does not restart the sweep or sequence if the sweep is not in the idle state (for example, if you are taking a very slow sweep, or the analyzer is waiting for a trigger). Instead, it results in a message. "Already in Single, press Restart to initiate a new sweep or sequence". Even though pressing the Single key in the middle of a sweep does not restart the sweep, sending INIT:IMMEDIATE does reset it.

To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command CALC:AVER:TCON UP.

Source

There is no Source control functionality for this measurement. When this key is pressed, the screen either displays a blank menu, or the previously-selected menu remains unchanged.

Key Path	Front-panel key
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SPAN X Scale

Accesses a menu of functions that enable you to set the horizontal scale parameters

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Ref Value

Allows you to set the display X reference value.

Key Path	Span X Scale
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Ref Value (RF Envelope window)

Allows you to set the display X reference value in the RF Envelope window..

Key Path	SPAN X Scale
Mode	GSM
Remote Command	:DISPlay:EORFspectr:VIEW[1]:WINDow[1]:TRACe:X[:SCALE]:RLEVel <time> :DISPlay:EORFspectr:VIEW[1]:WINDow[1]:TRACe:X[:SCALE]:RLEVel?
Example	DISP:EORF:VIEW:WIND:TRAC:X:RLEV 1 DISP:EORF:VIEW:WIND:TRAC:X:RLEV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Blanked when Meas Method is Multi Offset.
Couplings	If the Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually Auto Scaling automatically changes to Off.
Preset	0.000
State Saved	Saved in instrument state.
Min	-1.00 s
Max	10.00 s
Initial S/W Revision	Prior to A.02.00

Ref Value (Spectrum window)

Allows you to set the display X reference value in the Spectrum window.

Key Path	SPAN X Scale
Mode	GSM
Remote Command	:DISPlay:EORFspectr:VIEW2:WINDow[1]:TRACe:X[:SCALE]:RLEVel <freq> :DISPlay:EORFspectr:VIEW2:WINDow[1]:TRACe:X[:SCALE]:RLEVel?
Example	DISP:EORF:VIEW2:WIND:TRAC:X:RLEV 0 DISP:EORF:VIEW2:WIND:TRAC:X:RLEV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Blanked when Meas Method is Multi Offset.
Couplings	If the Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, X Auto Scaling automatically changes to Off.
Preset	935.2 MHz
State Saved	Saved in instrument state.
Min	Depends on instrument minimum frequency.
Max	Depends on hardware options and instrument maximum frequency.
Initial S/W Revision	Prior to A.02.00

Scale/Div

Allows you to set the display X scale/division value.

Key Path	SPAN X Scale
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Scale/Div (RF Envelope window)

Allows you to set the display X scale/division value in the RF Envelope window.

Key Path	SPAN X Scale
Mode	GSM
Remote Command	:DISPlay:EORFspectr:VIEW[1]:WINDow[1]:TRACe:X[:SCALE]:PDIVision <time> :DISPlay:EORFspectr:VIEW[1]:WINDow[1]:TRACe:X[:SCALE]:PDIVision?
Example	DISP:EORF:VIEW:WIND:TRAC:X:PDIV 1ms DISP:EORF:VIEW:WIND:TRAC:X:PDIV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Blanked when Meas Method is Multi Offset.
Couplings	If the Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.

Preset	57.600 us
State Saved	Saved in instrument state.
Min	1.00 ns
Max	1.00 s
Initial S/W Revision	Prior to A.02.00

Scale/Div (Spectrum window)

Allows you to set the display X scale/division value in the Spectrum window.

Key Path	SPAN X Scale
Mode	GSM
Remote Command	:DISPlay:EORFspectr:VIEW2:WINDow[1]:TRACe:X[:SCALe]:PDIVision <freq> :DISPlay:EORFspectr:VIEW2:WINDow[1]:TRACe:X[:SCALe]:PDIVision?
Example	DISP:EORF:VIEW2:WIND:TRAC:X:PDIV 1 MHz DISP:EORF:VIEW2:WIND:TRAC:X:PDIV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Blanked when Meas Method is not Swept
Couplings	If the Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.
Preset	360.000 kHz
State Saved	Saved in instrument state.
Min	100.000 kHz
Max	10 MHz
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.04.00

Ref Position

Allows you to set the display reference position to Left, Center or Right.

Key Path	SPAN X Scale
Mode	GSM
Remote Command	:DISPlay:EORFspectr:VIEW[1] 2:WINDow[1]:TRACe:X[:SCALe]:RPOSition LEFT CENTer RIGHT :DISPlay:EORFspectr:VIEW[1] 2:WINDow[1]:TRACe:X[:SCALe]:RPOSition?
Example	DISP:EORF:VIEW:WIND:TRAC:X:RPOS CENT DISP:EORF:VIEW:WIND:TRAC:X:RPOS?

Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Blanked when Meas Method is Multi Offset.
Preset	LEFT CENTer
State Saved	No
Range	Left Ctr Right
Initial S/W Revision	Prior to A.02.00

Auto Scaling

Allows you to toggle the Auto Scaling function between On and Off.

Key Path	SPAN X Scale
Mode	GSM
Remote Command	:DISPlay:EORFspectr:VIEW[1] 2:WINDow[1]:TRACe:X[:SCALE]:COUPle 0 1 OFF ON :DISPlay:EORFspectr:VIEW[1] 2:WINDow[1]:TRACe:X[:SCALE]:COUPle?
Example	DISP:EORF:VIEW:WIND:TRAC:X:COUP 1 DISP:EORF:VIEW:WIND:TRAC:X:COUP?
Notes	Upon pressing the Restart front-panel key or Restart softkey under the Meas Control menu, the scale coupling function automatically determines the scale per division and reference values based on the measurement results if this parameter is set to On. When you set a value to either X_Ref_Value_ –RF Envelope or X_Scale/Div – RF Envelope manually, X Auto Scaling automatically changes to Off You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Blanked when Meas Method is Multi Offset.
Couplings	See Notes
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

Sweep/Control

Accesses a menu that enables you to configure the Sweep and Control functions of the analyzer, such as Sweep Time and Gating.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Pause/Resume

Pauses a measurement after the current data acquisition is complete.

When Paused, the label on the key changes to Resume. Pressing Resume un-pauses the measurement. When you are Paused, pressing Restart, Single or Cont does a Resume.

Key Path	Sweep/Control
Remote Command	:INITiate:PAUSE
Dependencies	Grayed out in Measurements that do not support Pausing. Blanked in Modes that do not support Pausing.
Initial S/W Revision	Prior to A.02.00

Key Path	Sweep/Control
Remote Command	:INITiate:RESume
Dependencies	Grayed out in Measurements that do not support Pausing. Blanked in Modes that do not support Pausing.
Initial S/W Revision	Prior to A.02.00

Abort (Remote Command Only)

This command is used to stop the current measurement. It aborts the current measurement as quickly as possible, resets the sweep and trigger systems, and puts the measurement into an "idle" state. If the analyzer is in the process of aligning when ABORT is sent, the alignment finishes before the abort function is performed. So ABORT does not abort an alignment.

If the analyzer is set for Continuous measurement, it sets up the measurement and initiates a new data measurement sequence with a new data acquisition (sweep) taken once the trigger condition is met.

If the analyzer is set for Single measurement, it remains in the "idle" state until an :INIT:IMM command is received.

Remote Command	:ABORT
Example	:ABOR

Notes	<p>If :INITiate:CONTinuous is ON, then a new continuous measurement will start immediately; with sweep (data acquisition) occurring once the trigger condition has been met.</p> <p>If :INITiate:CONTinuous is OFF, then :INITiate:IMMediate is used to start a single measurement; with sweep (data acquisition) occurring once the trigger condition has been met.</p>
Dependencies	<p>For continuous measurement, ABORt is equivalent to the Restart key.</p> <p>Not all measurements support the abort command.</p>
Status Bits/OPC dependencies	<p>The STATus:OPERation register bits 0 through 8 are cleared.</p> <p>The STATus:QUESTionable register bit 9 (INTEgrity sum) is cleared.</p> <p>Since all the bits that feed into OPC are cleared by the ABORt, the ABORt will cause the *OPC query to return true.</p>
Initial S/W Revision	<p>Prior to A.02.00</p>

System

See ["System" on page 326](#)

Trace/Detector

There is no 'Trace/Detector' functionality supported in EDGE Output RF Spectrum, so this Front-panel key displays a blank menu when pressed.

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Trigger

See ["Trigger" on page 408](#)

Free Run

See ["Free Run " on page 415](#)

Video

See ["Video \(IF Envelope\) " on page 416](#)

Trigger Level

See ["Trigger Level " on page 416](#)

Trig Slope

See ["Trig Slope " on page 417](#)

Trig Delay

See ["Trig Delay " on page 418](#)

Line

See ["Line " on page 1321](#)

Trig Slope

See ["Trig Slope " on page 1321](#)

Trig Delay

See ["Trig Delay " on page 420](#)

External 1

See ["External 1 " on page 1333](#)

Trigger Level

See ["Trigger Level " on page 1333](#)

Trig Slope

See ["Trig Slope " on page 1334](#)

Trig Delay

See ["Trig Delay " on page 423](#)

External 2

See ["External 2 " on page 1335](#)

Trigger Level

See ["Trigger Level "](#) on page 1335

Trig Slope

See ["Trig Slope "](#) on page 1336

Trig Delay

See ["Trig Delay "](#) on page 425

RF Burst

See ["RF Burst "](#) on page 1336

Absolute Trigger

See ["Absolute Trigger Level"](#) on page 1337

Relative Trigger

See ["Relative Trigger Level"](#) on page 1326

Trig Slope

See ["Trigger Slope "](#) on page 1338

Trig Delay

See ["Trig Delay "](#) on page 429

Periodic Timer

See ["Periodic Timer \(Frame Trigger\) "](#) on page 1328

Period

See ["Period "](#) on page 1329

Offset

See ["Offset "](#) on page 1330

Offset Adjust (Remote Command Only)

See ["Offset Adjust \(Remote Command Only\)"](#) on page 1331

Reset Offset Display

See ["Reset Offset Display "](#) on page 1332

Sync Source

See ["Sync Source "](#) on page 1332

Off

See ["Off "](#) on page 1333

External 1

See ["External 1 "](#) on page 1333

Trigger Level

See ["Trigger Level "](#) on page 1333

Trig Slope

See ["Trig Slope "](#) on page 1334

External 2

See ["External 2 "](#) on page 1335

Trigger Level

See ["Trigger Level "](#) on page 1335

Trig Slope

See ["Trig Slope "](#) on page 1336

RF Burst

See ["RF Burst "](#) on page 1336

Absolute Trigger

See ["Absolute Trigger Level"](#) on page 1337

Trig Slope

See ["Trigger Slope "](#) on page 1338

Trig Delay

See ["Trig Delay"](#) on page 440

Auto/Holdoff

See ["Auto/Holdoff "](#) on page 440

Auto Trig

See ["Auto Trig "](#) on page 441

Trig Holdoff

See ["Trig Holdoff "](#) on page 441

Holdoff Type

See ["Holdoff Type"](#) on page 442

User Preset

Accesses a menu that gives you the following three choices:

- User Preset – recalls a state previously saved using the Save User Preset function.
- User Preset All Modes – presets all of the modes in the analyzer
- Save User Preset– saves the current state for the current mode

Key Path	Front-panel key
Backwards Compatibility Notes	<p>User Preset is actually loading a state, and in legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, “state” always includes all of this data; so whenever state is loaded, or User Preset is executed, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p> <p>On ESA and PSA, User Preset affected the entire instrument’s state. In the X-Series, User Preset only recalls the state for the active mode. There is a User Preset file for each mode. User Preset can never cause a mode switch as it can in legacy analyzers. If you want to recall all modes to their user preset file state, you will need to do a User Preset after mode switching into each mode.</p> <p>User Preset recalls mode state which can now include data like traces; whereas on ESA and PSA, User Preset did not affect data.</p>
Initial S/W Revision	Prior to A.02.00

User Preset

User Preset sets the state of the currently active mode back to the state that was previously saved for this mode using the Save User Preset menu key or the SCPI command, SYST:PRES:USER:SAV. It not only recalls the Mode Preset settings, but it also recalls all of the mode persistent settings, and the Input/Output system setting that existed at the time Save User Preset was executed.

If a Save User Preset has not been done at any time, User Preset recalls the default user preset file for the currently active mode. The default user preset files are created if, at power-on, a mode detects there is no user preset file. There will never be a scenario when there is no user preset file to restore. For each mode, the default user preset state is the same state that would be saved if a Save User Preset is performed in each mode right after doing a Restore Mode Default and after a Restore Input/Output Defaults.

The User Preset function does the following:

- Aborts the currently running measurement.
- Sets the mode State to the values defined by Save User Preset.
- Makes the saved measurement for the currently running mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

Key Path	User Preset
Remote Command	:SYSTem:PRESet:USER
Example	:SYST:PRES:USER:SAVE:SYST:PRES:USER
Notes	:SYST:PRES:USER:SAVE is used to save the current state as the user preset state. Clears all pending OPC bits. The Status Byte is set to 0. Pressing the User Preset front-panel key while already in the User Preset menu will cause the User Preset to get executed
Couplings	A user preset will cause the currently running measurement to be aborted and cause the saved measurement to be active. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved.
Initial S/W Revision	Prior to A.02.00

User Preset All Modes

Recalls all of the User Preset files for each mode, switches to the power-on mode, and activates the saved measurement from the power-on mode User Preset file.

NOTE

When the instrument is secured, all of the user preset files are converted back to their default user preset files.

The User Preset function does the following:

- Aborts the currently running measurement.
- Switches the Mode to the power-on mode.
- Restores the User Preset files for each mode.
- Makes the saved measurement for the power-on mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

Key Path	User Preset
Remote Command	:SYSTem:PRESet:USER:ALL
Example	:SYST:PRES:USER:SAVE:SYST:PRES:USER:ALL
Notes	Clears all pending OPC bits. The Status Byte is set to 0. :SYST:PRES:USER:SAVE is used to save the current state as the user preset state.
Couplings	A user preset will cause the currently running measurement to be aborted, cause a mode switch to the power-on mode, and cause the saved measurement to be active in the power-on mode. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved.
Initial S/W Revision	Prior to A.02.00

Save User Preset

Saves the currently active mode and its State. You can recall this User Preset file by pressing the User Preset menu key or sending the SYST:PRES:USER remote command. This same state is also saved by the Save State function.

Key Path	User Preset
Remote Command	:SYSTem:PRESet:USER:SAVE
Example	:SYST:PRES:USER:SAVE
Notes	:SYST:PRES:SAVE creates the same file as if the user requested a *SAV or a MMEM:STOR:STAT, except User Preset Save does not allow the user to specify the filename or the location of the file.
Initial S/W Revision	Prior to A.02.00

View Selection

The View/Display key accesses a menu that allows you to select the desired view of the measurement from the following selections.

- ORFS Result Summary (SCPI: RSUMmary) – views the result summary.
- Carrier Info (SCPI: CINfo) – views the carrier information.

The measurement has several available view types. The displayed view depends on the settings of Meas Type (see "[Meas Type](#)" on page 1957) and Meas Method (see "[Meas Method](#)" on page 1963) in the Meas Setup menu.

For details of each view, click the link in the View column of the table below. For remote commands, see "[View Selection by Name](#)" on page 997 and "[View Selection by number \(Remote Command Only\)](#)" on page 997.

View	Meas Type Setting	Meas Method Setting
Modulation Power, Multi Offset (See " Modulation Power " on page 2061)	Modulation <i>or</i> Full Frame Mod (FAST)	Multi Offset
Switching Power, Multi Offset (See " Switching Power " on page 2067)	Switching	Multi Offset
Modulation and Switching, Multi Offset (See " Modulation & Switching " on page 2070)	Mod & Switch	Multi Offset
Modulation and Switching, Single Offset (See " Modulation & Switching " on page 2075)	Mod & Switch	Single Offset
Modulation, Single Offset (See " Modulation Power " on page 2061)	Modulation	Single Offset
Switching, Single Offset (See " Switching Power " on page 2080)	Switching	Single Offset
Swept Spectrum (See " Swept Spectrum Views " on page 2081)	Modulation <i>or</i> Switching	Swept

For any view, if a result fails, a red 'F' is displayed beside the result.

Meas Type	Meas Method	Selected View	Displayed View
Modulation*	Multi-Offset	ORFS Result Summary	"Modulation Power" on page 2061
Modulation*	Multi-Offset	Carrier Info	"Modulation Carrier Info" on page 2065
Switching	Multi-Offset	Any	"Switching Power" on page 2067
Mod & Switch	Multi-Offset	Any	"Modulation & Switching" on page 2070

Meas Type	Meas Method	Selected View	Displayed View
Mod & Switch	Single Offset	Any	"Modulation & Switching" on page 2075
Modulation*	Single Offset	ORFS Result Summary	"Modulation Power" on page 2076
Modulation*	Single Offset	Carrier Info	"Modulation Carrier Info" on page 2078
Switching	Single Offset	Any	"Switching Power" on page 2080
Modulation*	Swept	ORFS Result Summary	"Modulation Power" on page 2081
Modulation*	Swept	Carrier Info	"Modulation Carrier Info" on page 2083

Table note: *(or FFModulation)

View Selection by Name

Key Path	View/Display
Mode	GSM
Remote Command	:DISPlay:ORFSpectrum:VIEW[:SElect] RSUMmary CINFormation :DISPlay:ORFSpectrum:VIEW[:SElect]?
Example	DISP:ORFS:VIEW RSUM DISP:ORFS:VIEW?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	RSUMmary
State Saved	Saved in instrument state.
Range	ORFS Result Summary Carrier Info
Initial S/W Revision	A.06.00

View Selection by number (Remote Command Only)

Mode	GSM
Remote Command	:DISPlay:ORFSpectrum:VIEW:NSElect <integer> :DISPlay:ORFSpectrum:VIEW:NSElect?
Example	DISP:ORFS:VIEW:NSEL 5 DISP:ORFS:VIEW:NSEL?
Notes	5: ORFS Result Summary 6: Carrier Info You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.

Preset	5
State Saved	Saved in instrument state.
Min	5
Max	6
Initial S/W Revision	A.06.00

Display

The Display menu is common to most measurements, and is used for configuring items on the display. Some Display menu settings apply to all the measurements in a mode, and some only to the current measurement. Those under the System Display Settings key apply to all measurements in all modes.

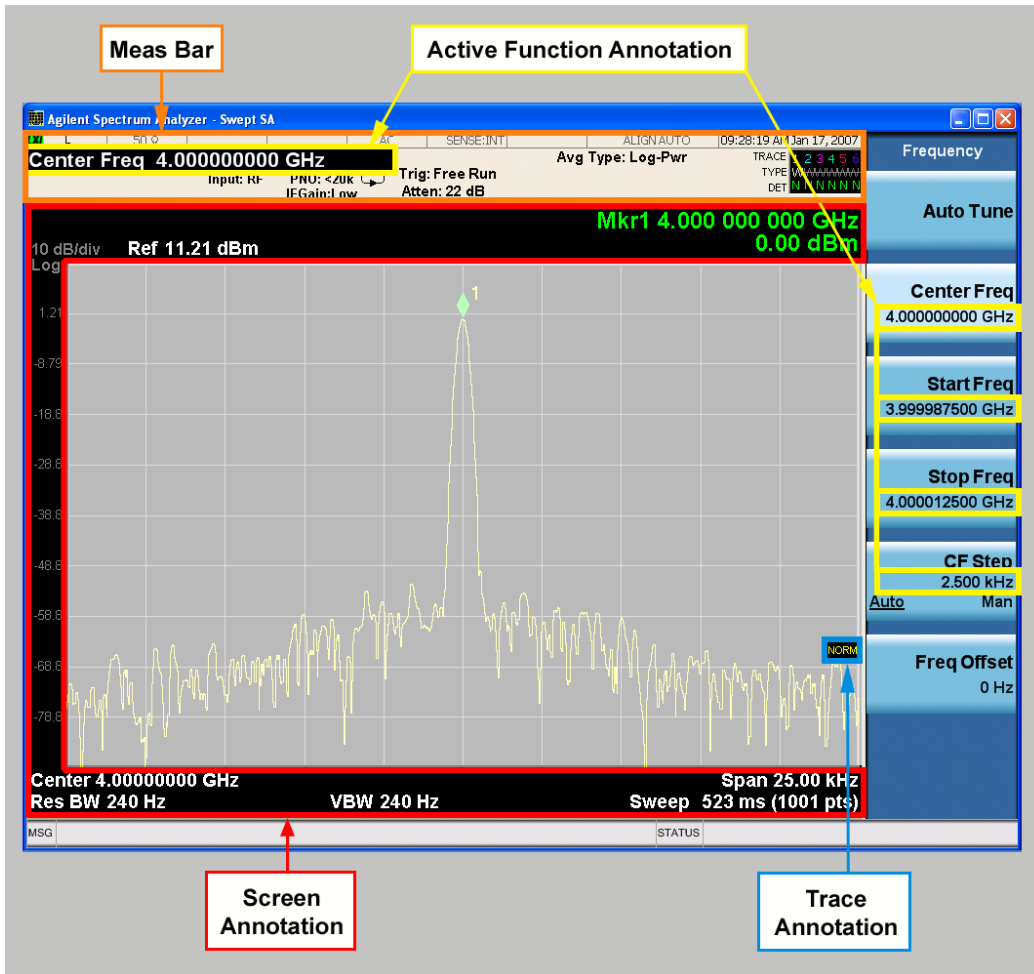
Key Path	Display
Key Path	View/Display
Initial S/W Revision	Prior to A.02.00

Annotation

Turns on and off various parts of the display annotation. The annotation is divided up into four categories:

1. Meas Bar: This is the measurement bar at the top of the screen. It does not include the settings panel or the Active Function. Turning off the Meas Bar turns off the settings panel and the Active Function. When the Meas Bar is off, the graticule area expands to fill the area formerly occupied by the Meas Bar.
2. Screen Annotation: this is the annotation and annunciation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) This does NOT include the marker number or the N dB result. When off, the graticule expands to fill the entire graticule area.
3. Trace annotation: these are the labels on the traces, showing their detector (or their math mode).
4. Active Function annotation: this is the active function display in the meas bar, and all of the active function values displayed on softkeys.

See the figure below. Each type of annotation can be turned on and off individually.



Key Path	View/Display, Display
Initial S/W Revision	Prior to A.02.00

Meas Bar On/Off

This function turns the Measurement Bar on and off, including the settings panel. When off, the graticule area expands to fill the area formerly occupied by the Measurement Bar.

Key Path	View/Display, Display, Annotation
Remote Command	:DISPlay:ANNotation:MBAR[:STATE] OFF ON 0 1 :DISPlay:ANNotation:MBAR[:STATE]?
Example	DISP:ANN:MBAR OFF
Dependencies	Grayed out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset	On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off.
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Screen

This controls the display of the annunciation and annotation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) and the y-axis annotation. This does NOT include marker annotation (or the N dB result). When off, the graticule expands to fill the entire graticule area, leaving only the 1.5% gap above the graticule as described in the Trace/Detector chapter.

Key Path	View/Display, Display, Annotation
Remote Command	:DISPlay:ANNotation:SCReen[:STATe] OFF ON 0 1 :DISPlay:ANNotation:SCReen[:STATe]?
Example	DISP:ANN:SCR OFF
Dependencies	Grayed-out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset	On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Active Function Values On/Off

Turns on and off the active function display in the Meas Bar, and all of the active function values displayed on the softkeys.

Note that all of the softkeys that have active functions have these numeric values blanked when this function is on. This is a security feature..



Key Path	View/Display, Display, Annotation
Remote Command	:DISPlay:ACTivefunc[:STATE] ON OFF 1 0 :DISPlay:ACTivefunc[:STATE]?
Example	DISP:ACT OFF
Dependencies	Grayed out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset	On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Title

Displays menu keys that enable you to change or clear a title on your display.

Key Path	View/Display, Display
Initial S/W Revision	Prior to A.02.00

Change Title

Writes a title into the "measurement name" field in the banner, for example, "Swept SA".

Press Change Title to enter a new title through the alpha editor. Press Enter or Return to complete the entry. Press ESC to cancel the entry and preserve your existing title.

The display title will replace the measurement name. It remains for this measurement until you press Change Title again, or you recall a state, or a Preset is performed. A title can also be cleared by pressing Title, Clear Title.

NOTE

Notice the inclusion of the <measurement> parameter in the command below. Because each measurement remembers the Display Title, the command must be qualified with the measurement name. For the Swept SA measurement this is not the case; no <measurement> parameter is used when changing the Display Title for the Swept SA measurement.

Key Path	View/Display, Display, Title
Mode	All
Remote Command	:DISPlay:<measurement>:ANNotation:TITLe:DATA <string> :DISPlay:<measurement>:ANNotation:TITLe:DATA?
Example	DISP:ANN:TITL:DATA "This Is My Title" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "This Is My Title" This example is for Measurements other than Swept SA. Both set the title to: This Is My Title
Notes	Pressing this key cancels any active function. When a title is edited the previous title remains intact (it is not cleared) and the cursor goes at the end so that characters can be added or BKSP can be used to go back over previous characters.
Preset	No title (measurement name instead)
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Clear Title

Clears a title from the front-panel display. Once cleared, the title cannot be retrieved. After the title is cleared, the current Measurement Name replaces it in the title bar.

Key Path	View/Display, Display, Title
Example	The following commands clear the title and restore the measurement's original title: DISP:ANN:TITL:DATA "" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "" This example is for ACP; in measurements other than Swept SA the measurement name is required.
Notes	Uses the :DISPlay:<measurement>:ANNotation:TITLe:DATA <string> command with an empty string (in the Swept SA, the <measurement> is omitted).
Preset	Performed on Preset.
Initial S/W Revision	Prior to A.02.00

Graticule

Pressing Graticule turns the display graticule On or Off. It also turns the graticule y-axis annotation on and off.

Key Path	View/Display, Display
Remote Command	:DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe] OFF ON 0 1 :DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe]?
Example	DISP:WIND:TRAC:GRAT:GRID OFF
Notes	The graticule is the set of horizontal and vertical lines that make up the grid/divisions for the x-axis and y-axis.
Preset	On
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00

System Display Settings

These settings are "Mode Global" – they affect all modes and measurements and are reset only by Restore Misc Defaults or Restore System Defaults under System.

Key Path	View/Display, Display
Initial S/W Revision	Prior to A.02.00

View Selection

The View/Display key accesses a menu that allows you to select the desired view of the measurement from the following selections.

- ORFS Result Summary (SCPI: RSUMmary) – views the result summary.
- Carrier Info (SCPI: CINFo) – views the carrier information.

The measurement has several available view types. The displayed view depends on the settings of Meas Type (see ["Meas Type" on page 903](#)) and Meas Method (see ["Meas Method" on page 909](#)), in the Meas Setup menu.

For details of each view, click the link in the View column of the table below. For remote commands, see ["View Selection by Name" on page 1004](#) and ["View Selection by Number \(Remote Command Only\)" on page 1004](#).

Meas Type Setting	Meas Method Setting	View
Modulation <i>or</i> Full Frame Mod (FAST)	Multi Offset	Modulation Power, Multi Offset (See "Modulation Power" on page 1005)

Meas Type Setting	Meas Method Setting	View
Switching	Multi Offset	Switching Power, Multi Offset (See "Switching Power" on page 1011)
Mod & Switch	Multi Offset	Modulation and Switching, Multi Offset (See "Modulation & Switching" on page 1015)
Mod & Switch	Single Offset	Modulation and Switching, Single Offset (See "Modulation & Switching" on page 1021)
Modulation	Single Offset	Modulation, Single Offset (See "Modulation Power" on page 1021)
Switching	Single Offset	Switching, Single Offset (See "Switching Power" on page 1025)
Modulation or Switching	Swept	Swept Spectrum (See "Swept Spectrum Views" on page 1027)

For any view, if a result fails, a red 'F' is displayed beside the result.

View Selection by Name

See also "View Selection by Number (Remote Command Only)" on page 1004.

Key Path	View/Display
Mode	GSM
Remote Command	:DISPlay:EORFspectr:VIEW[:SElect] RSUMmary CINformation :DISPlay:EORFspectr:VIEW[:SElect]?
Example	DISP:EORF:VIEW RSUM DISP:EORF:VIEW?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	RSUMmary
State Saved	Saved in instrument state.
Range	ORFS Result Summary Carrier Info
Initial S/W Revision	A.06.00

View Selection by Number (Remote Command Only)

Mode	GSM
Remote Command	:DISPlay:EORFspectr:VIEW:NSElect <integer> :DISPlay:EORFspectr:VIEW:NSElect?

Example	DISP:EORF:VIEW:NSEL 5 DISP:EORF:VIEW:NSEL?
Notes	5: ORFS Result Summary 6: Carrier Info You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Preset	5
State Saved	Saved in instrument state.
Min	5
Max	6
Initial S/W Revision	A.06.00

Multi Offset Views

The views in this group are displayed when Meas Method is set to Multi Offset. For details, see ["Meas Method" on page 909](#).

The group includes:

- ["Modulation Power" on page 1005](#)
- ["Modulation Carrier Info" on page 1010](#)
- ["Switching Power" on page 1011](#)
- ["Modulation & Switching" on page 1015](#)

Modulation Power

This view is displayed when:

- Meas Type: Modulation
- Meas Method: Multi-Offset
- View/Display: ORFS Result Summary

The view has only one window: the Metrics Window. Details of each element of this window can be found in ["Metrics Window" on page 1006](#) and ["Metrics Windows \(for single carrier only\)" on page 1008](#).

The following graphic shows an example of this view.

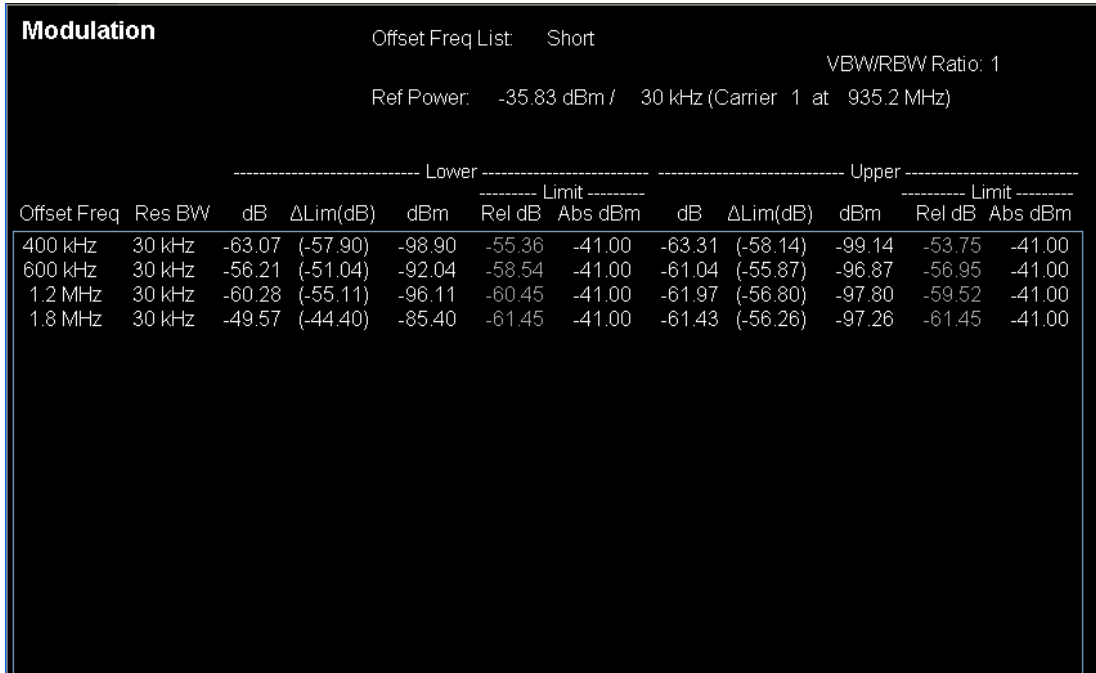


Figure 0-2 Multi-Offset View with Modulation Power

Metrics Window

Name	Corresponding Results	Display Format
PCL	None. Power Control Level determined by the Carrier Power and used to determine the limits. Since PCL is a Measurement Global parameter, [:SENSe]:RADio:PCL, refer to the section Mode Functionality. Auto disappears when [:SENSe]:RADio:PCL:STATe is set to 0 Off. This is shown for MS only.	
Offset Freq List	None Offset Frequency list parameter value (Standard Short Custom)	Short
Ref Power	n=1 2 Reference Power for all offsets [dBm] Resolution Bandwidth for reference power measurement [Hz] Index of the Power Reference Carrier Center Frequency of the Power Reference Carrier [Hz]	-99.99/99/1/99
VBW/RBW Ratio	None VBW/RBW Ratio (1 3) [1 = Modulation, 3 = Switching]	1
Offset Freq	None	-99.99

Name	Corresponding Results	Display Format
	Offset Frequency to be measured [Hz]	
Res BW	None Resolution Bandwidth for each offset [Hz]	-99.99
Lower dB	$n=1N*4+1$ Lower offset(N) – power relative to carrier [dB]	-99.99
Delta from Limit dB Lower	$n=8N*8+1$ Relative level to the test limit [dB] at the lower offset(N)	-99.99
Lower dBm	$n=1N*4+2$ Lower offset(N) – absolute average power [dBm]	-99.99
Limit Rel dB Lower	$n=8N*8+2$ Relative lower test limit used [dB]	-99.99
Limit Abs dBm Lower	$n=8N*8+3$ Absolute lower test limit used [dBm]	-99.99
Abs/Rel Lower Limit Applied	$n=8 N*8+4$ Which lower test limit is applied, Abs or Rel (0 1 2 3) “0” indicates neither test limit is applied. “1” indicates Absolute test limit is applied “2” indicates Relative test limit is applied. “3” indicates both test limits are applied. This means Absolute test limit is equal to Relative test limit.	1
Upper dB	$n=1N*4+3$ Upper offset(N) – power relative to carrier [dB]	-99.99
Delta from Limit dB Upper	$n=8N*8+5$ Relative level to the test limit [dB] at the upper offset(N)	-99.99
Upper dBm	$n=1N*4+4$ Upper offset(N) – absolute average power [dBm]	-99.99
Limit Rel dB Upper	$n=8N*8+6$ Relative upper test limit used [dB]	-99.99
Limit Abs dBm Upper	$n=8 N*8+7$ Absolute upper test limit used [dBm]	-99.99
Abs/Rel Upper Limit Applied	$n=8 N*8+8$ Which upper test limit is applied, Abs or Rel (0 1 2 3) “0” indicates neither test limit is applied. “1” indicates Absolute test limit is applied “2” indicates Relative test limit is applied. “3” indicates both test limits are applied. This means Absolute test limit is equal to Relative test limit.	1

The measurement results for an offset frequency are typically displayed in one row in a table. However, there is a possibility that the results are displayed in two rows in a multi-carrier system. The following graphic depicts an example of this. In the figure, the results for an offset frequency of 8.0 MHz are displayed in two rows enclosed by green lines. The results for the lower/upper offset are displayed in the lower/upper row respectively. This is a case where one of the lower and upper offset frequencies corresponds to IM Products and the other doesn't. In such case, the Res BWs are different between the two offset frequencies and therefore, the results are displayed in two separate rows. The results from the query READ/FETCH are retrieved in a format similar to the displayed table. For invalid data indicated by "--", if they are power related data, the results are returned as 9.91E+37 which means NaN (Not a Number). If they indicate the limit applied, Rel or Abs, the results are returned as 0 which means neither of the two is applied.

Modulation													
		Offset Freq List			Standard			VBW/RBW Ratio: 1					
Ref Power:		26.08 dBm / 30 kHz (Carrier 2 at 937.2 MHz)			30.05 dBm / 100 kHz (Carrier 2 at 937.2 MHz)			32.07 dBm / 300 kHz (Carrier 2 at 937.2 MHz)					
		Lower			Limit			Upper			Limit		
Offset Freq	Res BW	dB	ΔLim(dB)	dBm	Rel dB	Abs dBm	dB	ΔLim(dB)	dBm	Rel dB	Abs dBm		
400 kHz	30 kHz	-74.81	(-19.13)	-48.74	-55.69	-36.00	-76.40	(-20.71)	-50.32	-55.69	-36.00		
600 kHz	30 kHz	-77.83	(-17.97)	-51.75	-59.86	-36.00	-78.68	(-18.83)	-52.61	-59.86	-36.00		
1.2 MHz	30 kHz	-78.03	(-15.95)	-51.95	-62.14	-36.00	-79.27	(-17.20)	-53.20	-62.76	-36.00		
1.8 MHz	30 kHz	-77.96	(-15.89)	-51.89	-63.42	-36.00	-78.65	(-16.57)	-52.57	-64.27	-36.00		
2.0 MHz	100 kHz	-48.87	(12.08)	-18.82	-60.96	-36.00	-71.53	(-10.57)	-41.48	-60.96	-36.00		
3.0 MHz	100 kHz	-68.28	(-7.33)	-38.23	-60.96	-36.00	-77.70	(-16.74)	-47.64	-60.96	-36.00		
4.0 MHz	100 kHz	-65.47	(-4.51)	-35.42	-60.96	-36.00	-77.42	(-16.46)	-47.36	-60.96	-36.00		
5.0 MHz	100 kHz	-67.14	(-6.18)	-37.09	-60.96	-36.00	-76.92	(-15.97)	-46.87	-60.96	-36.00		
7.0 MHz	300 kHz	-52.84	(15.23)	-20.77	-70.00	-36.00	-75.05	(-6.99)	-42.99	-70.00	-36.00		
8.0 MHz	300 kHz	-75.08	(-7.01)	-43.01	-70.00	-36.00	---	---	---	---	---		
8.0 MHz	100 kHz	---	---	---	---	---	-74.00	(-11.92)	-47.92	-75.23	-36.00		
9.0 MHz	300 kHz	-69.65	(-1.59)	-37.59	-70.00	-36.00	-75.44	(-7.37)	-43.37	-70.00	-36.00		
10.0 MHz	300 kHz	-75.42	(-7.36)	-43.36	-70.00	-36.00	-75.65	(-7.58)	-43.58	-70.00	-36.00		

Figure 0-3 An example of a case where results are displayed in two rows

Metrics Windows (for single carrier only)

Name	Corresponding Results	Display Format
PCL	None. Power Control Level determined by the Transmit Power and used to determine the limits. Since PCL is a Measurement Global parameter, [:SENSe]:RADio:PCL, refer to the section Mode Functionality. Auto disappears when [:SENSe]:RADio:PCL:STATe is set to	PCL: ## AutoRange

Name	Corresponding Results	Display Format
	0 Off. This is shown for MS only.	
Offset Freq List	None Offset Frequency list parameter value (Standard Short Custom)	Short
Ref Power	n=1 2 Reference Power for all offsets [dBm] Resolution Bandwidth for reference power measurement [Hz]	-99.99/99
VBW/RBW Ratio	None VBW/RBW Ratio (1 3) [1 = Modulation, 3 = Switching]	1
Offset Freq	None Offset Frequency to be measured [Hz]	-99.99
Res BW	None Resolution Bandwidth for each offset [Hz]	-99.99
Lower dB	n=1N*4+1 Lower offset(N) - power relative to carrier [dB]	-99.99
Delta from Limit dB Lower	n=6N*4+1 Relative level to the test limit [dB] at the lower offset(N)	-99.99
Lower dBm	n=1N*4+2 Lower offset(N) - absolute average power [dBm]	-99.99
Limit Rel dB Lower	n=6N*4+3 Relative lower test limit used [dB]	-99.99
Limit Abs dBm Lower	n=6N*4+4 Absolute lower test limit used [dBm]	-99.99
Upper dB	n=1N*4+3 Upper offset(N) - power relative to carrier [dB]	-99.99
Delta from Limit dB Upper	n=6N*4+2 Relative level to the test limit [dB] at the upper offset(N)	-99.99
Upper dBm	n=1N*4+4 Upper offset(N) - absolute average power [dBm]	-99.99
Limit Rel dB Upper	n=6N*4+3 Relative upper test limit used [dB]	-99.99
Limit Abs dBm Upper	n=6N*4+4 Absolute upper test limit used [dBm]	-99.99

Modulation Carrier Info

This view is displayed when:

- Meas Type: Modulation
- Meas Method: Multi-Offset
- View/Display: Carrier Info

The view has only one window: the Metrics Window. Details of each element of this window can be found in ["Metrics Window" on page 1010](#).

The following graphic shows an example of this view.

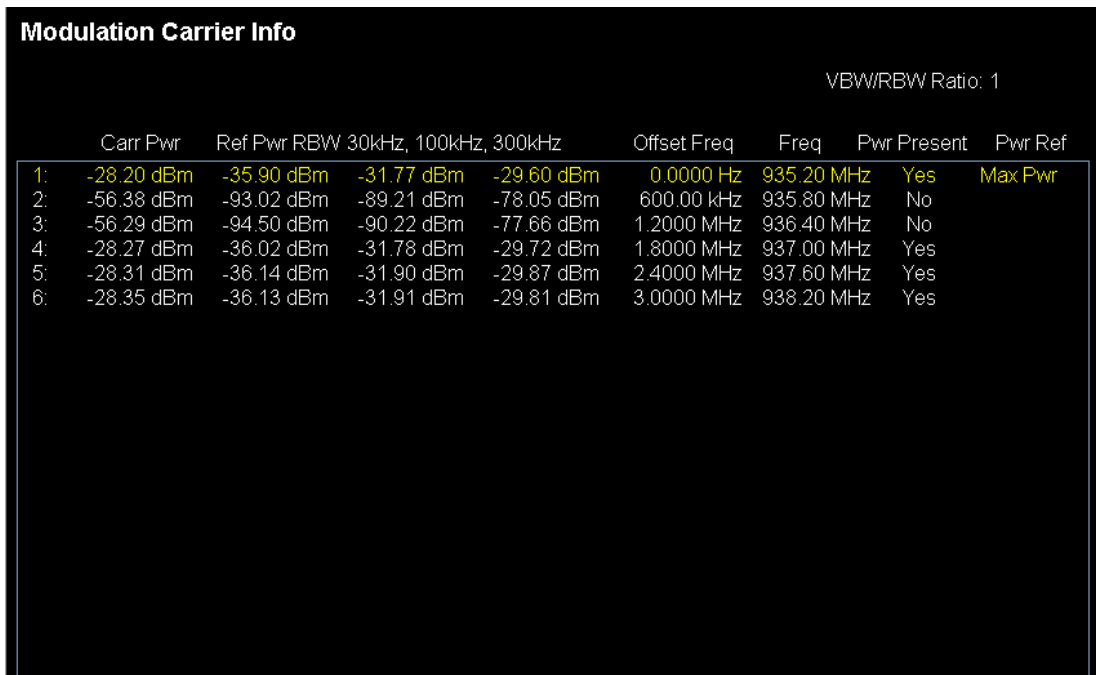


Figure 0-4 Multi-Offset View with Modulation Carrier Info

Metrics Window

Name	Corresponding Results	Display Format
VBW/RBW Ratio	None VBW/RBW Ratio (1 3) [1 = Modulation, 3 = Switching]	1
Carrier Index	None Index of Carrier to be measured	1
Carr Pwr	None Carrier Power for Power Level (Measured with 400kHz RBW)	-99.99
Ref Pwr	None	-99.99/99

Name	Corresponding Results	Display Format
	Carrier Power for Reference Power (Measured with the specified RBW. e.g. 30kHz, 100kHz, 300kHz)	
Offset Freq	None Offset Frequency from the Reference Carrier for each Carrier [Hz]	99
Freq	None Center Frequency of each Carrier [Hz]	99
Pwr Present	None Indicates whether the power is present for each carrier	Yes
Pwr Ref	None Indicates the type of the Power Reference if the carrier is the Power Reference Carrier (Ref Carr Max Pwr)	Ref Carr

Switching Power

This view is displayed when:

- Meas Type: Switching
- Meas Method: Multi-Offset

The view has only one window: the Metrics Window. Details of each element of this window can be found in ["Metrics Window" on page 1012](#) and ["Metrics Window \(for single carrier only\)" on page 1014](#).

The following graphic shows an example of this view.

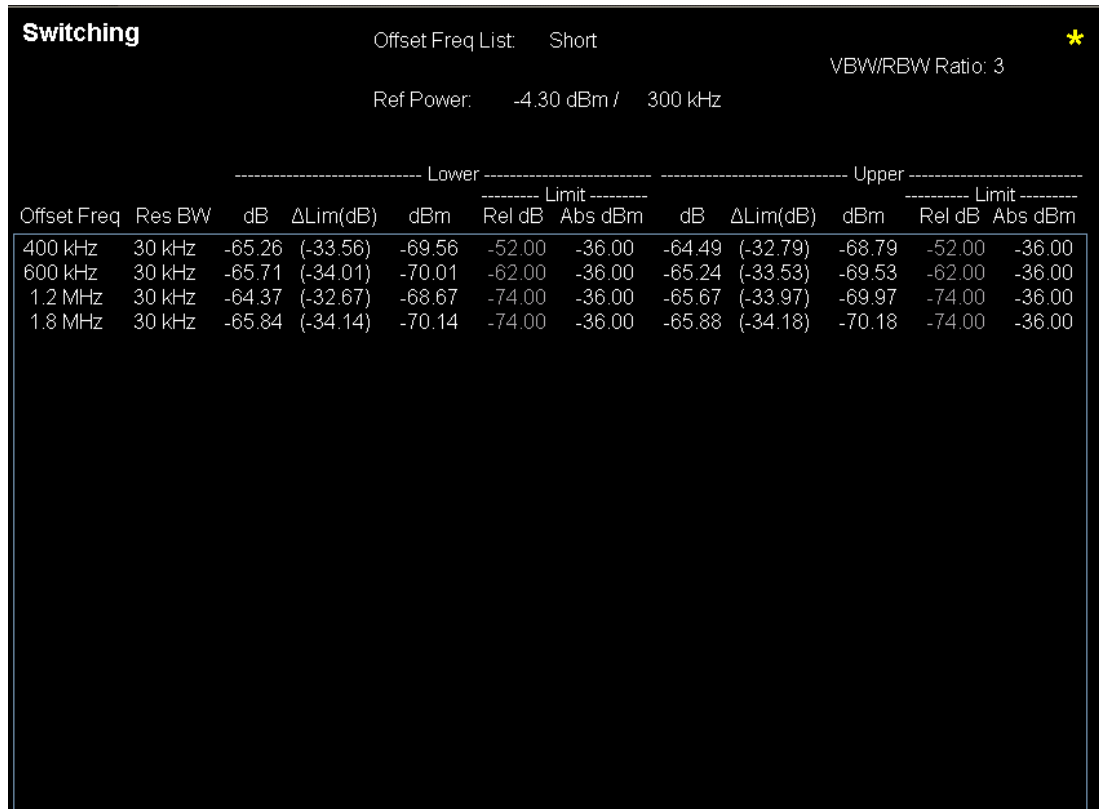


Figure 0-5 Switching Power view for EDGE Output RF Spectrum Measurement

Metrics Window

Name	Corresponding Results	Display Format
PCL	None. Power Control Level determined by the Transmit Power and used to determine the limits. Since PCL is a Measurement Global parameter, [:SENSE]:RADio:PCL, refer to the section Mode Functionality. Auto disappears when [:SENSE]:RADio:PCL:STATe is set to 0 Off. This is shown for MS only.	PCL: ## AutoRange
Offset Freq List	None Offset Frequency list parameter value (Standard Short Custom)	Short
Ref Power	n=1 62 Reference Power for all offsets [dBm] Resolution Bandwidth for reference power measurement [Hz]	-99.99
VBW/RBW Ratio	None VBW/RBW Ratio (1 3) [1 = Modulation, 3 = Switching]	1

Name	Corresponding Results	Display Format
Offset Freq	None Offset Frequency to be measured [Hz]	-99.99
Res BW	None Resolution Bandwidth for each offset [Hz]	-99.99
Lower dB	$n=1N*4+1$ Lower offset(N) - power relative to carrier [dB]	-99.99
Delta from Limit dB Lower	$n=8N*8+1$ Relative level to the test limit [dB] at the lower offset(N)	-99.99
Lower dBm	$n=1N*4+2$ Lower offset(N) - absolute average power [dBm]	-99.99
Limit Rel dB Lower	$n=8N*8+2$ Relative lower test limit used [dB]	-99.99
Limit Abs dBm Lower	$n=8N*8+3$ Absolute lower test limit used [dBm]	-99.99
Abs/Rel Lower Limit Applied	$n=8 N*8+4$ Which lower test limit is applied, Abs or Rel (0 1 2 3) "0" indicates neither test limit is applied. "1" indicates Absolute test limit is applied "2" indicates Relative test limit is applied. "3" indicates both test limits are applied. This means Absolute test limit is equal to Relative test limit.	1
Upper dB	$n=1N*4+3$ Upper offset(N) - power relative to carrier [dB]	-99.99
Delta from Limit dB Upper	$n=8N*8+5$ Relative level to the test limit [dB] at the upper offset(N)	-99.99
Upper dBm	$n=1N*4+4$ Upper offset(N) - absolute average power [dBm]	-99.99
Limit Rel dB Upper	$n=8N*8+6$ Relative test limit used [dB]	-99.99
Limit Abs dBm Upper	$n=8N*8+7$ Absolute test limit used [dBm]	-99.99
Abs/Rel Upper Limit Applied	$n=8 (N-1)*8+8$ Which upper test limit is applied, Abs or Rel (0 1 2 3) "0" indicates neither test limit is applied.	1

Name	Corresponding Results	Display Format
	<p>“1” indicates Absolute test limit is applied</p> <p>“2” indicates Relative test limit is applied.</p> <p>“3” indicates both test limits are applied. This means Absolute test limit is equal to Relative test limit.</p>	

Metrics Window (for single carrier only)

Name	Corresponding Results	Display Format
PCL	<p>None.</p> <p>Power Control Level determined by the Transmit Power and used to determine the limits. Since PCL is a Measurement Global parameter, [:SENSe]:RADio:PCL, refer to the section Mode Functionality. Auto disappears when [:SENSe]:RADio:PCL:STATe is set to 0[Off].</p> <p>This is shown for MS only.</p>	<p>PCL: ##</p> <p>AutoRange</p>
Offset Freq List	<p>None</p> <p>Offset Frequency list parameter value (Standard Short Custom)</p>	Short
Ref Power	<p>n=1 62</p> <p>Reference Power for all offsets [dBm]</p> <p>Resolution Bandwidth for reference power measurement [Hz]</p>	-99.99
VBW/RBW Ratio	<p>None</p> <p>VBW/RBW Ratio (1 3)</p> <p>[1 = Modulation, 3 = Switching]</p>	1
Offset Freq	<p>None</p> <p>Offset Frequency to be measured [Hz]</p>	-99.99
Res BW	<p>None</p> <p>Resolution Bandwidth for each offset [Hz]</p>	-99.99
Lower dB	<p>n=1 N*4+1</p> <p>Lower offset(N) - power relative to carrier [dB]</p>	-99.99
Delta from Limit dB Lower	<p>n=6 N*4+1</p> <p>Relative level to the test limit [dB] at the lower offset(N)</p>	-99.99
Lower dBm	<p>n=1 N*4+2</p> <p>Lower offset(N) - absolute average power [dBm]</p>	-99.99
Limit Rel dB Lower	<p>n=6 N*4+3</p> <p>Relative lower test limit used [dB]</p>	-99.99

Name	Corresponding Results	Display Format
Limit Abs dBm Lower	n=6N*4+4 Absolute lower test limit used [dBm]	-99.99
Upper dB	n=1N*4+3 Upper offset(N) - power relative to carrier [dB]	-99.99
Delta from Limit dB Upper	n=6N*4+2 Relative level to the test limit [dB] at the upper offset(N)	-99.99
Upper dBm	n=1N*4+4 Upper offset(N) - absolute average power [dBm]	-99.99
Limit Rel dB Upper	n=6N*4+3 Relative upper test limit used [dB]	-99.99
Limit Abs dBm Upper	n=6N*4+4 Absolute upper test limit used [dBm]	-99.99

Modulation & Switching

This view is displayed when:

- Meas Type: Mod & Switch
- Meas Method: Multi-Offset

The view has only one window: the Metrics Window. Details of each element of this window can be found in ["Metrics Window" on page 1016](#) and ["Metrics Window \(for single carrier only\)" on page 1019](#).

The following graphic shows an example of this view.

Modulation & Switching		Offset Freq List: Short									
Modulation		Ref Power: -11.22 dBm / 30 kHz	VBW/RBW Ratio: 1								
		----- Lower -----		----- Limit -----		----- Upper -----					
Offset Freq	Res BW	dB	ΔLim(dB)	dBm	Rel dB	Abs dBm	dB	ΔLim(dB)	dBm	Rel dB	Abs dBm
200 kHz	30 kHz	-39.84	(-9.84)	-51.06	-30.00	-65.00	-40.16	(-10.16)	-51.38	-30.00	-65.00
250 kHz	30 kHz	-42.37	(-9.37)	-53.58	-33.00	-65.00	-41.50	(-8.50)	-52.72	-33.00	-65.00
400 kHz	30 kHz	-67.12	(-13.34)	-78.34	-56.00	-65.00	-68.05	(-14.26)	-79.26	-56.00	-65.00
600 kHz	30 kHz	-70.30	(-16.52)	-81.52	-60.00	-65.00	-70.59	(-16.81)	-81.81	-60.00	-65.00
1.2 MHz	30 kHz	-70.66	(-16.87)	-81.87	-63.00	-65.00	-69.88	(-16.10)	-81.10	-63.00	-65.00
1.8 MHz	100 kHz	-65.47	(-11.68)	-76.68	-65.00	-65.00	-65.27	(-11.49)	-76.49	-65.00	-65.00

Switching		Ref Power: -4.28 dBm / 300 kHz	VBW/RBW Ratio: 3								
		----- Lower -----		----- Limit -----		----- Upper -----					
Offset Freq	Res BW	dB	ΔLim(dB)	dBm	Rel dB	Abs dBm	dB	ΔLim(dB)	dBm	Rel dB	Abs dBm
400 kHz	30 kHz	-65.41	(-33.69)	-69.69	-52.00	-36.00	-64.01	(-32.29)	-68.29	-52.00	-36.00
600 kHz	30 kHz	-65.06	(-33.33)	-69.33	-62.00	-36.00	-65.01	(-33.29)	-69.29	-62.00	-36.00
1.2 MHz	30 kHz	-65.64	(-33.92)	-69.92	-74.00	-36.00	-65.64	(-33.92)	-69.92	-74.00	-36.00
1.8 MHz	30 kHz	-65.20	(-33.47)	-69.47	-74.00	-36.00	-65.29	(-33.57)	-69.57	-74.00	-36.00

Figure 0-6 Modulation and Switching view for EDGE Output RF Spectrum Measurement

Metrics Window

Name	Corresponding Results	Display Format
PCL	None. Power Control Level determined by the Transmit Power and used to determine the limits. Since PCL is a Measurement Global parameter, [:SENSE]:RADio:PCL, refer to the section Mode Functionality. Auto disappears when [:SENSE]:RADio:PCL:STATE is set to 0 Off. This is shown for MS only.	PCL: ## AutoRange
Offset Freq List	Offset Frequency list parameter value (Standard Short Custom)	Short
Ref Power (Modulation)	n=1 2 Modulation Reference Power for all offsets [dBm] Resolution Bandwidth for reference power measurement [Hz]	-99.99/99
Ref Power (Switching)	n=1 62 Switching Reference Power for all offsets [dBm] Resolution Bandwidth for reference power measurement [Hz]	-99.99/99

Name	Corresponding Results	Display Format
VBW/RBW Ratio	None VBW/RBW Ratio (1 3) [1 = Modulation, 3 = Switching]	1
Offset Freq	Offset Frequency to be measured [Hz]	-99.99
Res BW	Resolution Bandwidth for each offset [Hz]	-99.99
Lower dB (Modulation)	$n=1N*4+1$ Lower offset(N) - power relative to carrier [dB]	-99.99
Delta from Limit dB Lower (Modulation)	$n=8N*8+1$ Relative level to the test limit [dB] at the lower offset(N)	-99.99
Lower dBm (Modulation)	$n=1N*4+2$ Lower offset(N) - absolute average power [dBm]	-99.99
Limit Rel dB Lower (Modulation)	$n=8N*8+2$ Relative lower test limit used [dB]	-99.99
Limit Abs dBm Lower (Modulation)	$n=8N*8+3$ Absolute lower test limit used [dBm]	-99.99
Abs/Rel Lower Limit Applied (Modulation)	$n=8N*8+4$ Which lower test limit is applied, Abs or Rel (0 1 2 3) "0" indicates neither test limit is applied. "1" indicates Absolute test limit is applied "2" indicates Relative test limit is applied. "3" indicates both test limits are applied. This means Absolute test limit is equal to Relative test limit.	1
Upper dB (Modulation)	$n=1N*4+3$ Upper offset(N) - power relative to carrier [dB]	-99.99
Delta from Limit dB Upper (Modulation)	$n=8N*8+5$ Relative level to the test limit [dB] at the upper offset(N)	-99.99
Limit Rel dB Upper (Modulation)	$n=8N*8+6$ Relative test limit used [dB]	-99.99
Limit Abs dBm Upper (Modulation)	$n=8N*8+7$ Absolute test limit used [dBm]	-99.99
Abs/Rel Upper Limit Applied (Modulation)	$n=8N*8+8$ Which upper test limit is applied, Abs or Rel (0 1 2 3) "0" indicates neither test limit is applied. "1" indicates Absolute test limit is applied	1

Name	Corresponding Results	Display Format
	<p>“2” indicates Relative test limit is applied.</p> <p>“3” indicates both test limits are applied. This means Absolute test limit is equal to Relative test limit.</p>	
Lower dB (Switching)	<p>$n=1 N*4+61$</p> <p>Lower offset(N) – power relative to carrier [dB]</p>	-99.99
Delta from Limit dB Lower (Switching)	<p>$n=8 N*8+121$</p> <p>Relative level to the test limit [dB] at the lower offset(N)</p>	-99.99
Lower dBm (Switching)	<p>$n=1 N*4+62$</p> <p>Lower offset(N) – absolute average power [dBm]</p>	-99.99
Limit Rel dB Lower (Switching)	<p>$n=8 N*8+122$</p> <p>Relative lower test limit used [dB]</p>	-99.99
Limit Abs dBm Lower (Switching)	<p>$n=8 N*8+123$</p> <p>Absolute lower test limit used [dBm]</p>	-99.99
Abs/Rel Lower Limit Applied (Switching)	<p>$n=8 N*8+124$</p> <p>Which lower test limit is applied, Abs or Rel (0 1 2 3)</p> <p>“0” indicates neither test limit is applied.</p> <p>“1” indicates Absolute test limit is applied</p> <p>“2” indicates Relative test limit is applied.</p> <p>“3” indicates both test limits are applied. This means Absolute test limit is equal to Relative test limit.</p>	1
Upper dB (Switching)	<p>$n=1 N*4+63$</p> <p>Upper offset(N) – power relative to carrier [dB]</p>	-99.99
Delta from Limit dB Upper (Switching)	<p>$n=8 N*8+125$</p> <p>Relative level to the test limit [dB] at the upper offset(N)</p>	-99.99
Limit Rel dB Upper (Switching)	<p>$n=8 N*8+126$</p> <p>Relative test limit used [dB]</p>	-99.99
Limit Abs dBm Upper (Switching)	<p>$n=8 N*8+127$</p> <p>Absolute test limit used [dBm]</p>	-99.99
Abs/Rel Upper Limit Applied (Switching)	<p>$n=8 N*8+128$</p> <p>Which upper test limit is applied, Abs or Rel (0 1 2 3)</p> <p>“0” indicates neither test limit is applied.</p> <p>“1” indicates Absolute test limit is applied</p> <p>“2” indicates Relative test limit is applied.</p> <p>“3” indicates both test limits are applied. This</p>	1

Name	Corresponding Results	Display Format
	means Absolute test limit is equal to Relative test limit.	

Metrics Window (for single carrier only)

Name	Corresponding Results	Display Format
PCL	None. Power Control Level determined by the Transmit Power and used to determine the limits. Since PCL is a Measurement Global parameter, [:SENSe]:RADIo:PCL, refer to the section Mode Functionality. Auto disappears when [:SENSe]:RADIo:PCL:STATe is set to 0 Off. This is shown for MS only.	PCL: ## AutoRange
Offset Freq List	Offset Frequency list parameter value (Standard Short Custom)	Short
Ref Power (Modulation)	n=1 2 Modulation Reference Power for all offsets [dBm] Resolution Bandwidth for reference power measurement [Hz]	-99.99/99
Ref Power (Switching)	n=1 62 Switching Reference Power for all offsets [dBm] Resolution Bandwidth for reference power measurement [Hz]	-99.99/99
VBW/RBW Ratio	None VBW/RBW Ratio (1 3) [1 = Modulation, 3 = Switching]	1
Offset Freq	Offset Frequency to be measured [Hz]	-99.99
Res BW	Resolution Bandwidth for each offset [Hz]	-99.99
Lower dB (Modulation)	n=1 N*4+1 Lower offset(N) - power relative to carrier [dB]	-99.99
Delta from Limit dB Lower (Modulation)	n=6N*4+1 Relative level to the test limit [dB] at the lower offset(N)	-99.99
Lower dBm (Modulation)	n=1 N*4+2 Lower offset(N) - absolute average power [dBm]	-99.99
Limit Rel dB Lower (Modulation)	n=6N*4+3 Relative lower test limit used [dB]	-99.99
Limit Abs dBm Lower (Modulation)	n=6N*4+4 Absolute lower test limit used [dBm]	-99.99

Name	Corresponding Results	Display Format
Upper dB (Modulation)	$n=1 N^4+3$ Upper offset(N) – power relative to carrier [dB]	-99.99
Delta from Limit dB Upper (Modulation)	$n=6 N^4+2$ Relative level to the test limit [dB] at the upper offset(N)	-99.99
Limit Rel dB Upper (Modulation)	$n=6 N^4+3$ Relative test limit used [dB]	-99.99
Limit Abs dBm Upper (Modulation)	$n=6 N^4+4$ Absolute test limit used [dBm]	-99.99
Lower dB (Switching)	$n=1 N^4+61$ Lower offset(N) – power relative to carrier [dB]	-99.99
Delta from Limit dB Lower (Switching)	$n=6 N^4+61$ Relative level to the test limit [dB] at the lower offset(N)	-99.99
Lower dBm (Switching)	$n=1 N^4+62$ Lower offset(N) – absolute average power [dBm]	-99.99
Limit Rel dB Lower (Switching)	$n=6 N^4+63$ Relative lower test limit used [dB]	-99.99
Limit Abs dBm Lower (Switching)	$n=6 N^4+64$ Absolute lower test limit used [dBm]	-99.99
Upper dB (Switching)	$n=1 N^4+63$ Upper offset(N) – power relative to carrier [dB]	-99.99
Delta from Limit dB Upper (Switching)	$n=6 N^4+62$ Relative level to the test limit [dB] at the upper offset(N)	-99.99
Limit Rel dB Upper (Switching)	$n=6 N^4+63$ Relative test limit used [dB]	-99.99
Limit Abs dBm Upper (Switching)	$n=6 N^4+64$ Absolute test limit used [dBm]	-99.99

Single Offset Views

The views in this group are displayed when Meas Method is set to Single Offset. For details, see ["Meas Method" on page 909](#).

The group includes:

- ["Modulation & Switching" on page 1021](#)
- ["Modulation Power" on page 1021](#)
- ["Modulation Carrier Info" on page 1023](#)

Modulation & Switching

This view is displayed when:

- Meas Type: Mod & Switch
- Meas Method: Single Offset

The following graphic shows an example of this view, in which:

- The blue trace is the Switching data
- The yellow trace is the Modulation data
- The measurement gates are shown as vertical white lines

"Fast Avg" on page 904 is not available for this measurement.

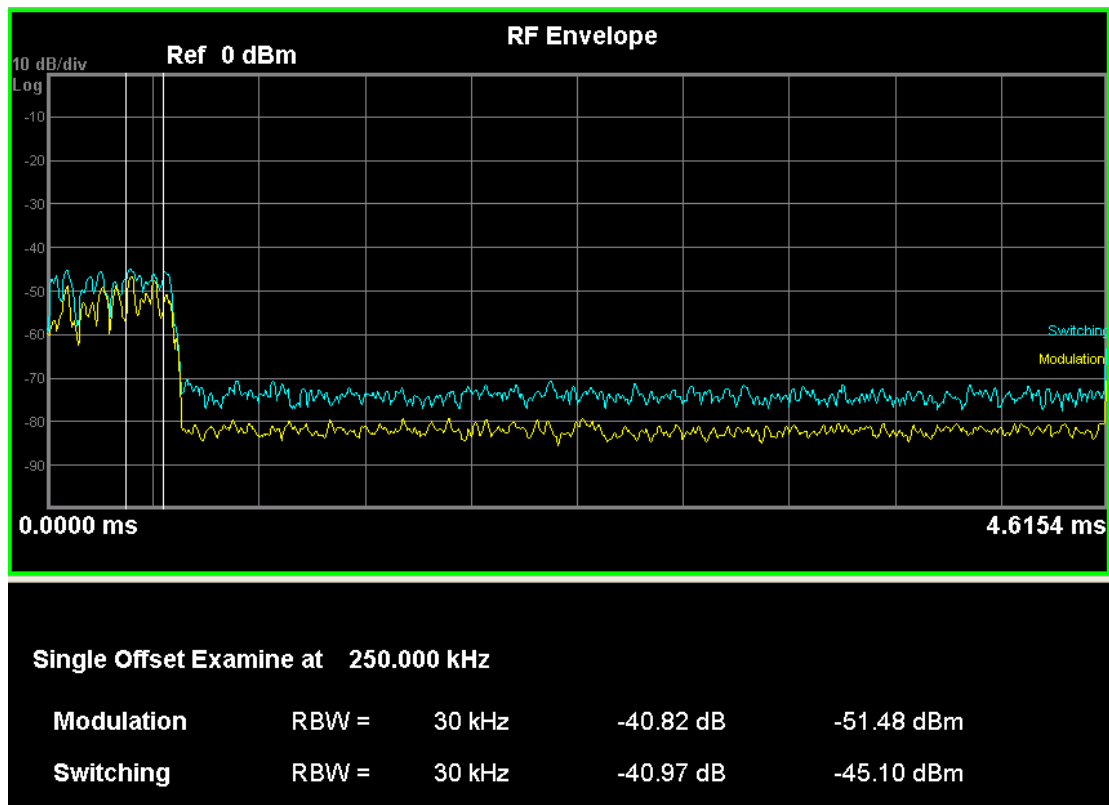


Figure 0-7 Single Offset view with Mod & Switching for EDGE Output RF Spectrum Measurement

Modulation Power

This view is displayed when:

- Meas Type: Modulation
- Meas Method: Single-Offset
- View/Display: ORFS Result Summary

The view has 2 windows:

- "Graph Window " on page 1022
- "Metrics Window " on page 1022

The following graphic shows an example of this view, in which:

- The white vertical lines represent the modulation section to be measured for modulation measurement.
- The red vertical lines represent the added section to be measured when "Fast Avg" on page 904 is set to 'On' (improve measurement speed).

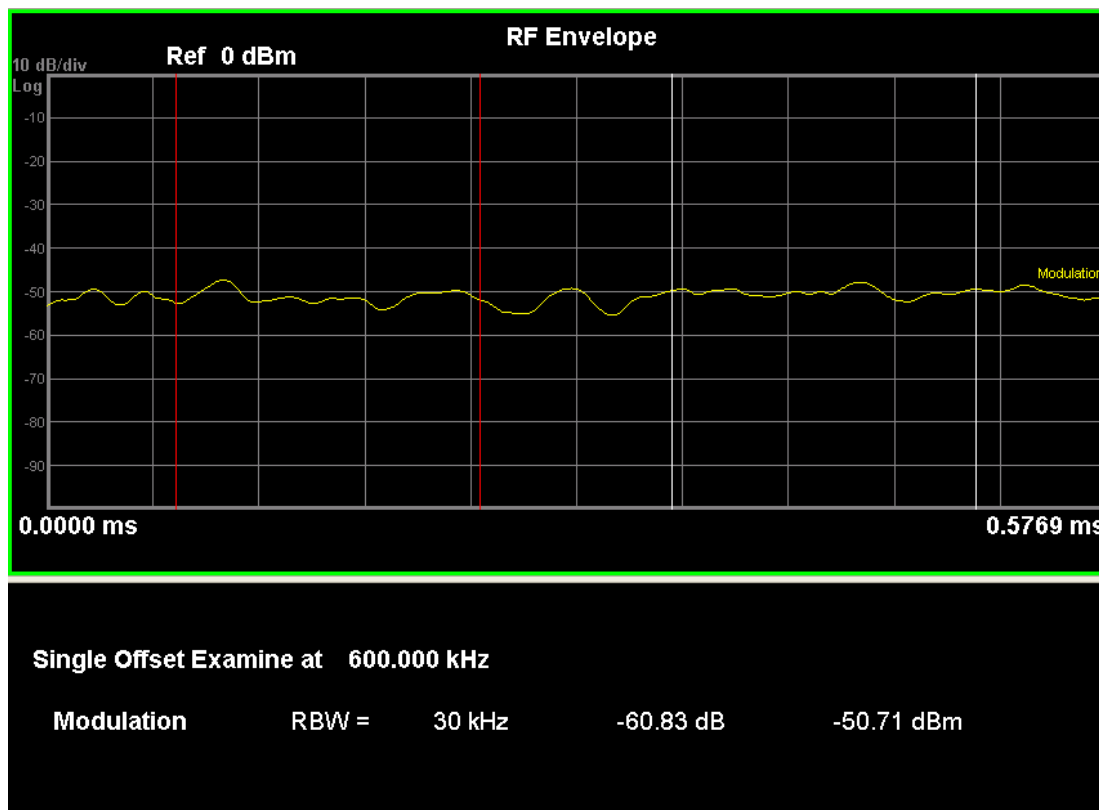


Figure 0-8 Single Offset View with Modulation Power

Graph Window

Marker Operation	Yes
Corresponding Trace	Yellow: Series of floating point numbers that represent the "spectrum due to modulation" signal. (n=2)

Metrics Window

Name	Corresponding Results	Display Format
Modulation [dB]	n=1 1st Modulation spectrum power	-99.99 dB

Name	Corresponding Results	Display Format
Modulation [dBm]	n=1 2nd Modulation spectrum power	-99.99 dBm
Transmit Power	n=7 Transmit Power	-99.99 dBm
PCL	None. Power Control Level determined by the Transmit Power and used to determine the limits. Since PCL is a Measurement Global parameter, [:SENSe]:RADio:PCL, refer to the section Mode Functionality. Auto disappears when [:SENSe]:RADio:PCL:STATe is set to 0 Off. This is shown for MS only.	PCL: ## Auto

Modulation Carrier Info

This view is displayed when:

- Meas Type: Modulation
- Meas Method: Single-Offset
- View/Display: Carrier Info

The view has 2 windows:

- ["Graph Window " on page 1024](#)
- ["Metrics Window " on page 1024](#)

The following graphic shows an example of this view, in which:

- The white vertical lines represent the modulation section to be measured for modulation measurement.
- The red vertical lines represent the added section to be measured when ["Fast Avg" on page 904](#) is set to 'On' (improve measurement speed).

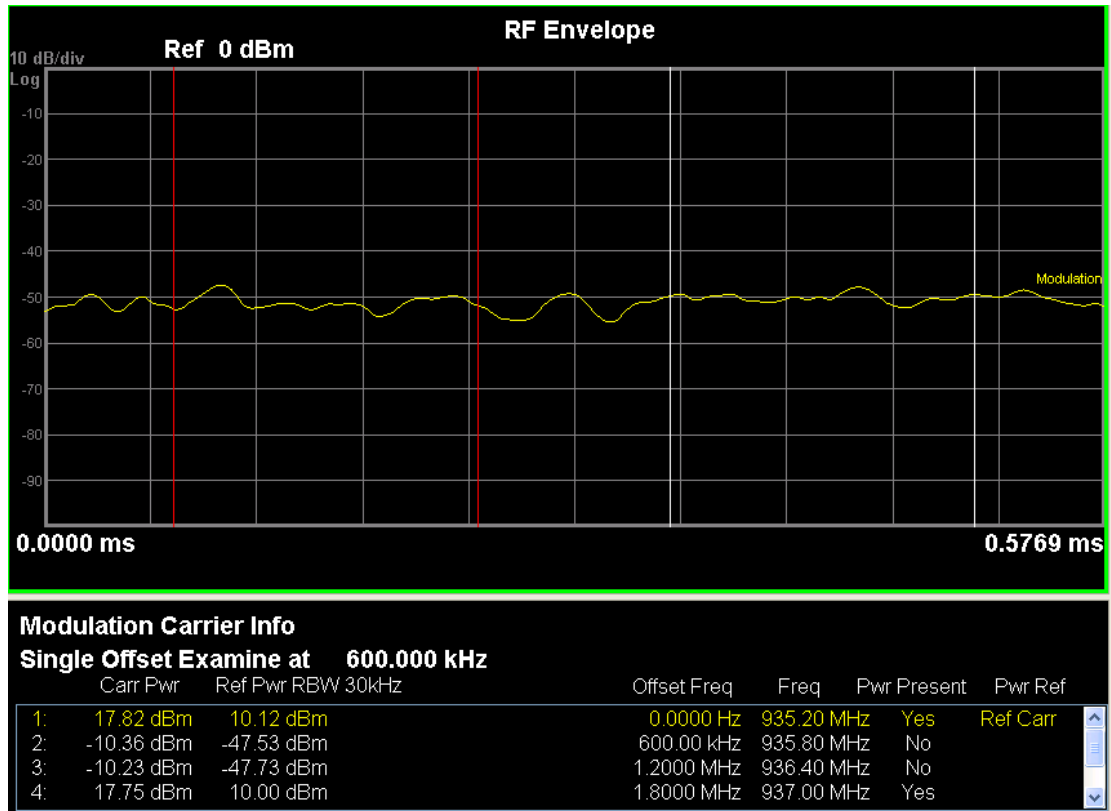


Figure 0-9 Single Offset View with Modulation Carrier Info

Graph Window

Marker Operation	Yes
Corresponding Trace	Yellow: Series of floating point numbers that represent the “spectrum due to modulation” signal. (n=2)

Metrics Window

Name	Corresponding Results	Display Format
Carrier Index	None Index of Carrier to be measured	1
Carr Pwr	None Carrier Power for Power level (Measured with 400kHz RBW)	-99.99
Ref Pwr	None Carrier Power for Reference Power (Measured with the specified RBW e.g. 30kHz)	-99.99/99
Offset Freq	None	99

Name	Corresponding Results	Display Format
	Offset Frequency from the Reference Carrier for each Carrier [Hz]	
Freq	None	99
	Center Frequency of each Carrier [Hz]	
Pwr Present	None	Yes
	Indicates whether the power is present for each carrier	
Pwr Ref	None	Ref Carr
	Indicates the type of the Power Reference if the carrier is the Power Reference Carrier (Ref Carr Max Pwr)	

Switching Power

This view is displayed when:

- Meas Type: Switching
- Meas Method: Single Offset

The view has two windows: the Graph Window and the Metrics Window. Details of each element of these windows can be found in "[Graph Window](#)" on page 1026 and "[Metrics Window](#)" on page 1026 respectively.

The following graphic shows an example of this view.

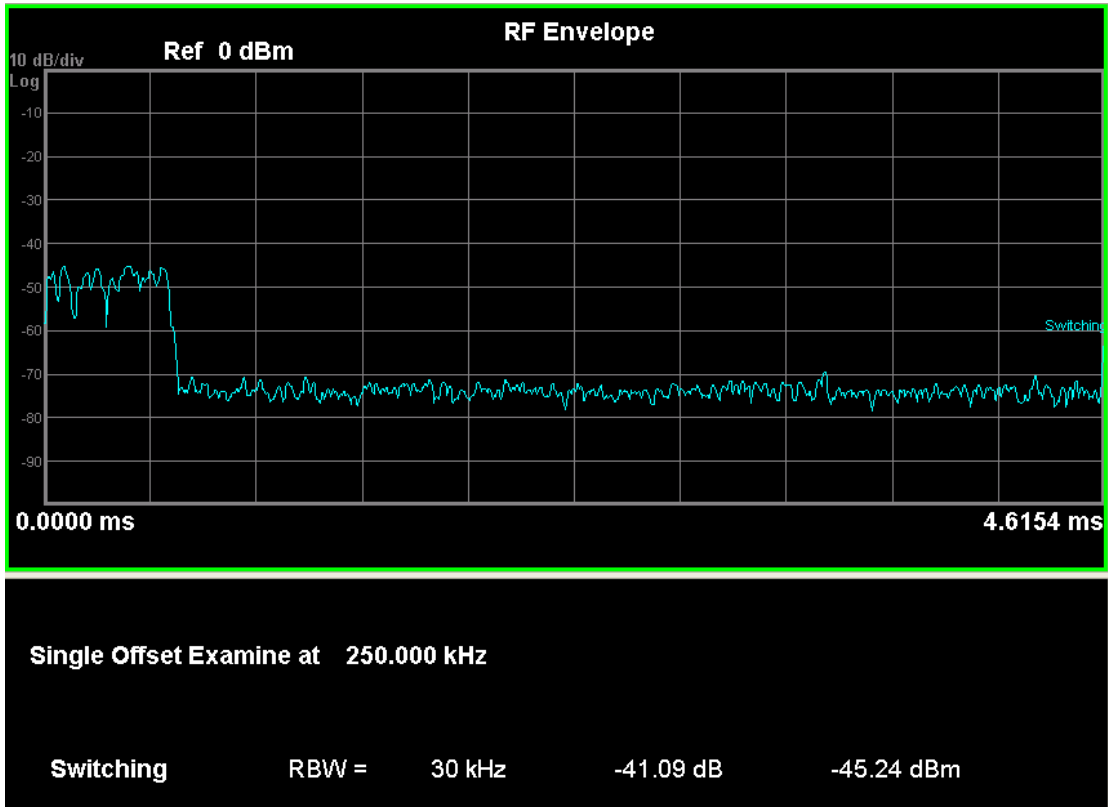


Figure 0-10 Single Offset view with Switching for EDGE Output RF Spectrum Measurement

Graph Window

Marker Operation	Yes
Corresponding Trace	Yellow: Series of floating point numbers that represent the “spectrum due to modulation” signal. (n=2) Blue: Series of floating point numbers that represent the “spectrum due to switching transients” signal. (n=3)

Metrics Window

Name	Corresponding Results	Display Format
Modulation [dB]	n=1 1st Modulation spectrum power	-99.99 dB
Modulation [dBm]	n=1 2nd Modulation spectrum power	-99.99 dBm
Switching [dB]	n=1 3rd Switching transient power	-99.99 dB
Switching [dBm]	n=1 4th Switching transient power	-99.99 dBm

Name	Corresponding Results	Display Format
Transmit Power	n=7 Transmit Power	-99.99 dBm
PCL	None. Power Control Level determined by the Transmit Power and used to determine the limits. Since PCL is a Measurement Global parameter, [:SENSe]:RADio:PCL, refer to the section Mode Functionality. Auto disappears when [:SENSe]:RADio:PCL:STATe is set to 0 Off. This is shown for MS only.	PCL: ## Auto

Swept Spectrum Views

The views in this group are displayed when Meas Method is set to Swept. For details, see ["Meas Method" on page 909](#).

The group includes:

- ["Modulation Power" on page 1027](#)
- ["Modulation Carrier Info" on page 1029](#)

Modulation Power

This view is displayed when:

- Meas Type: Modulation
- Meas Method: Swept
- View/Display: ORFS Result Summary

The view has two windows: the Graph Window and the Metrics Window. Details of each element of these windows can be found in ["Graph Window" on page 1028](#) and ["Metrics Window" on page 1028](#) respectively.

The following graphic shows an example of this view.

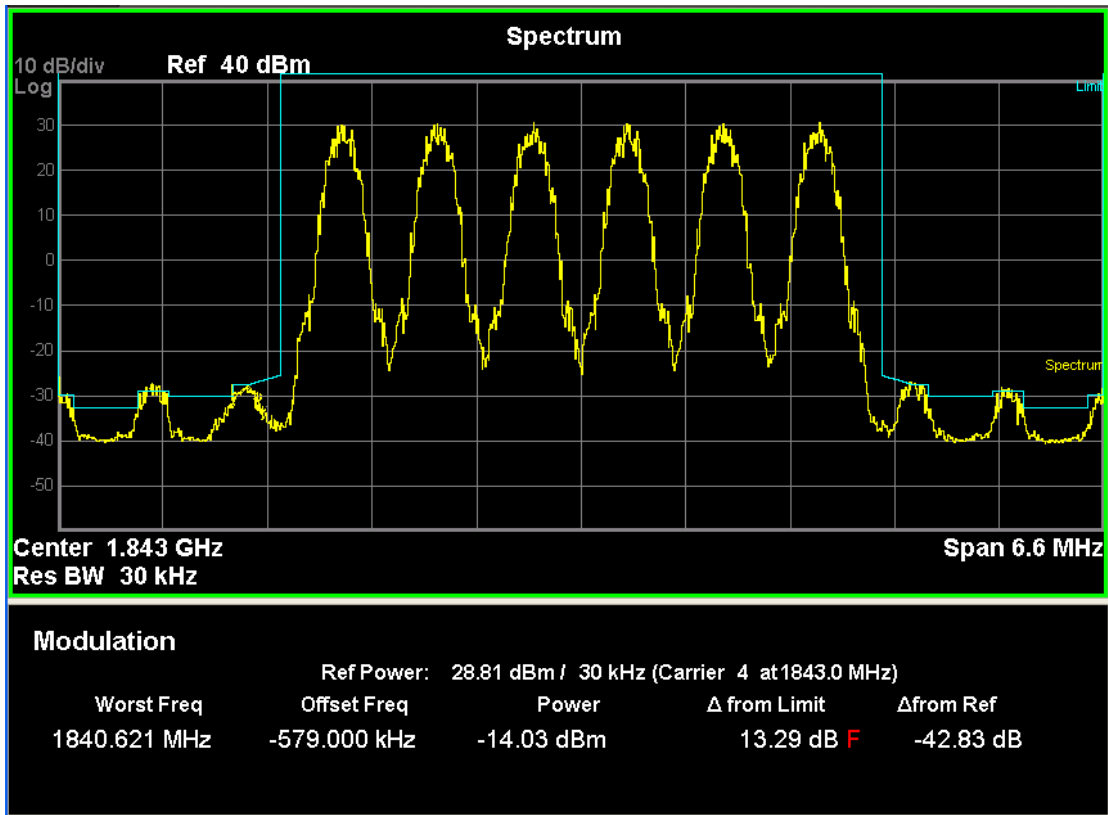


Figure 0-11 Swept Spectrum View with Modulation Power

Graph Window

Marker Operation	Yes
Corresponding Trace	Yellow: Series of floating point numbers that represent the “spectrum due to modulation” signal. (n=2)

Metrics Window

Name	Corresponding Results	Display Format
Worst Freq	n=1 1st Frequency	999.999 MHz
Offset Freq	n=1 2nd Offset frequency from carrier frequency	999.999 kHz
Power	n=1 3rd Power in dBm	-99.99 dBm
from Limit	n=1 4th delta from limit	-9.99 dB
from Ref	n=1 5th	-99.99 dB

Name	Corresponding Results	Display Format
PCL	<p>delta from reference</p> <p>None.</p> <p>Power Control Level determined by the Transmit Power and used to determine the limits. Since PCL is a Measurement Global parameter, [:SENSe]:RADio:PCL, refer to the section Mode Functionality. Auto disappears when [:SENSe]:RADio:PCL:STATe is set to 0 Off.</p> <p>This is shown for MS only.</p>	PCL: ## Auto

Modulation Carrier Info

This view is displayed when:

- Meas Type: Modulation
- Meas Method: Swept
- View/Display: Carrier Info

The view has two windows: the Graph Window and the Metrics Window. Details of each element of these windows can be found in ["Graph Window" on page 1030](#) and ["Metrics Window" on page 1030](#) respectively.

The following graphic shows an example of this view.

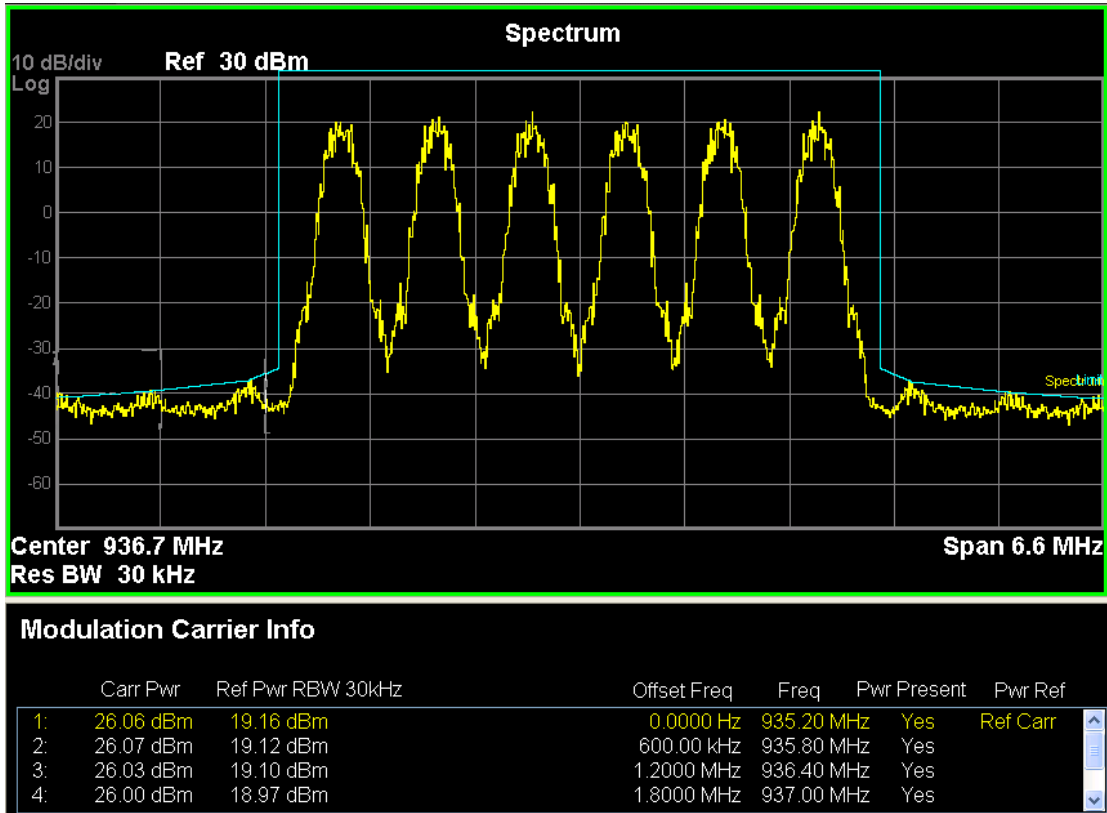


Figure 0-12 Swept Spectrum View with Modulation Carrier Info

Graph Window

Marker Operation	Yes
Corresponding Trace	Yellow: Series of floating point numbers that represent the “spectrum due to modulation” signal. (n=2)

Metrics Window

Name	Corresponding Results	Display Format
Carrier Index	None Index of Carrier to be measured	1
Carr Pwr	None Carrier Power for Power level (Measured with 400kHz RBW)	-99.99
Ref Pwr	None Carrier Power for Reference Power (Measured with the specified RBW. e.g. 30kHz)	-99.99/99
Offset Freq	None	99

Name	Corresponding Results	Display Format
Freq	Offset Frequency from the Reference Carrier for each Carrier [Hz] None Center Frequency of each Carrier [Hz]	99
Pwr Present	None Indicates whether the power is present for each carrier	Yes
Pwr Ref	None Indicates the type of the Power Reference if the carrier is the Power Reference Carrier (Ref Carr Max Pwr)	Ref Carr

11 EDGE Tx Band Spur Measurement

This measurement checks that the transmitter does not transmit undesirable energy into the transmit band. This energy may cause interference for other users of the GSM system. For more details, see ["EDGE Tx Band Spur Description"](#) on page 1037 below.

This topic contains the following sections:

["Measurement Commands for EDGE Tx Band Spur"](#) on page 1034

["Remote Command Results for EDGE Tx Band Spur"](#) on page 1035

Measurement Commands for EDGE Tx Band Spur

The following commands and queries are used to retrieve the measurement results:

```
:CONFigure:ETSPur  
:CONFigure:ETSPur:NDEFault  
:INITiate:ETSPur  
:FETCh:ETSPur[n]?  
:READ:ETSPur[n]?  
:MEASure:ETSPur[n]?
```

For more measurement related commands, see the section ["Remote Measurement Functions" on page 2301](#).

Remote Command Results for EDGE Tx Band Spur

For the queries listed above, the results returned depend on the value of n, as follows.

n	Results Returned
not specified or n = 1	Returns 3 comma-separated scalar results: <ol style="list-style-type: none"> 1. The worst spur's frequency difference from channel center frequency (in MHz) 2. The worst spur's amplitude difference from the limit (in dB) 3. The worst spur's amplitude difference from the mean transmit power (in dB)
2	Returns trace of the current segment spectrum.
3	Returns trace of the current segment Upper Limit.
4	Returns trace of Lowest segment Spectrum.
5	Returns trace of Lowest segment Upper Limit.
6	Returns trace of Lower Adj segment Spectrum.
7	Returns trace of Lower Adj segment Upper Limit.
8	Returns trace of Upper Adj segment Spectrum.
9	Returns trace of Upper Adj segment Upper Limit.
10	Returns trace of Highest segment Spectrum.
11	Returns trace of Highest segment Upper Limit.
12	Returns the following comma-separated scalar results: <ol style="list-style-type: none"> 1. The mean transmit power. 2. The spur's frequency offset from channel center frequency (in MHz) on Lowest region. 3. The spur's amplitude difference from the limit (in dB) on Lowest region. 4. The spur's amplitude difference from the mean transmit power (in dBc) on Lowest region. 5. The spur's frequency offset from channel center frequency (in MHz) on Lower region. 6. The spur's amplitude difference from the limit (in dB) on Lower region. 7. The spur's amplitude difference from the mean transmit power (in dBc) on Lower region. 8. The spur's frequency offset from channel center frequency (in MHz) on Upper region. 9. The spur's amplitude difference from the limit (in dB) on Upper region. 10. The spur's amplitude difference from the mean transmit power (in dBc) on Upper region. 11. The spur's frequency offset from channel center frequency (in MHz) on Highest region. 12. The spur's amplitude difference from the limit (in dB) on Highest region. 13. The spur's amplitude difference from the mean transmit power (in dBc) on Highest region. 14. Reserved 15. Reserved 16. Reserved 17. Reserved 18. Reserved <p>Note: -999.0 is returned if the region cannot be specified due to the band limit.</p>

EDGE Tx Band Spur Description

This measurement is only available for the base station. The transmitter should be set at its maximum output power on all time slots.

Key Path	Meas
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

AMPTD (Amplitude) Y Scale

Accesses a menu of functions that enable you to set the vertical scale parameters. These functions control how data on the vertical (Y) axis is displayed and control instrument settings that affect the vertical axis.

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Ref Value

Allows you to set the absolute power reference.

Key Path	AMPTD Y Scale
Mode	GSM
Remote Command	:DISPlay:TSPur:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:RLEVel <real> :DISPlay:TSPur:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:RLEVel?
Example	DISP:TSP:VIEW:WIND:TRAC:Y:RLEV -10 DISP:TSP:VIEW:WIND:TRAC:Y:RLEV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	When Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.
Preset	0
State Saved	Saved in instrument state.
Min	-250.0
Max	250.0
Initial S/W Revision	Prior to A.02.00

Attenuation

This menu controls the attenuator functions and interactions between the attenuation system components.

There are two attenuator configurations in the X-Series. One is a dual attenuator configuration consisting of a mechanical attenuator and an optional electronic attenuator. The other configuration uses a single attenuator with combined mechanical and electronic sections that controls all the attenuation functions. Different models in the X-Series come with different configurations.

See ["Dual Attenuator Configurations:" on page 1039](#)

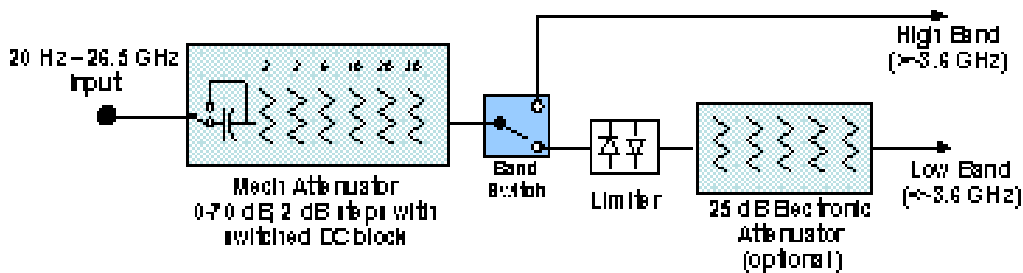
See ["Single Attenuator Configuration:" on page 1039](#)

Most Attenuation settings are the same for all measurements – they do not change as you change measurements. Settings like these are called “Meas Global” and are unaffected by Meas Preset.

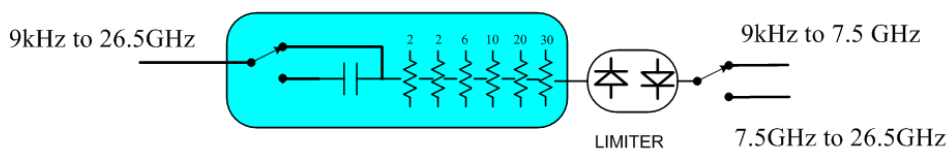
Key Path	AMPTD Y Scale
Scope	Meas Global
Dependencies	In measurements that support the I/Q inputs, this key is unavailable when I/Q is the selected input, and is replaced by the Range key in that case.
Readback Line	Contains a summary in [] brackets of the current total attenuation. See the descriptions of the , " (Mech) Atten " on page 2242, and " Enable Elec Atten " on page 2244 keys for more detail on the contributors to the total attenuation. Note that when "Pre-Adjust for Min Clip" is on, this value can change at the start of every measurement.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Dual Attenuator Configurations:

Configuration 1: Mechanical attenuator + optional electronic attenuator

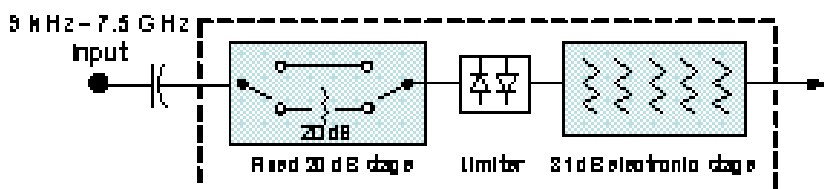


Configuration 2: Mechanical attenuator, no optional electronic attenuator

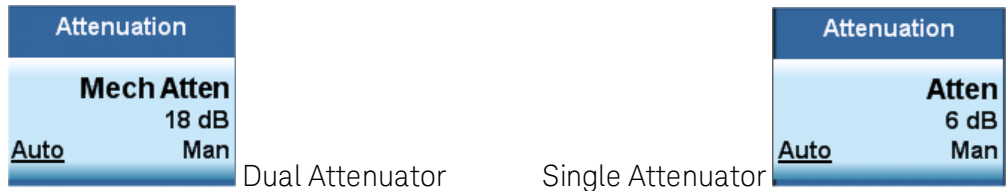


(note that Configuration 2 is not strictly speaking a dual-section attenuator, since there is no electronic section available. However, it behaves exactly like Configuration 1 without the Electronic Attenuator option EA3, therefore for the sake of this document it is grouped into the "Dual Attenuator" configuration)

Single Attenuator Configuration:



You can tell which attenuator configuration you have by pressing the Attenuation key, which (in most Modes) opens the Attenuation menu. If the first key in the Attenuation menu says Mech Atten you have the dual attenuator configuration. If the first key says Atten you have the single attenuator configuration.



In the single attenuator configuration, you control the attenuation with a single control, as the fixed stage has only two states. In the dual attenuator configuration, both stages have significant range so you are given separate control of the mechanical and electronic attenuator stages.

When you have the dual attenuator configuration, you may still have only a single attenuator, because unless option EA3 (the Electronic Attenuator option) is available, and you purchase it, you will have only the mechanical attenuator.

(Mech) Atten

This key is labeled Mech Atten in dual attenuator models and Atten in single attenuator models. In the dual attenuator configuration, this key only affects the mechanical attenuator.

This key lets you modify the attenuation applied to the RF input signal path. This value is normally auto coupled to the Ref Level, the Internal Preamp Gain, any External Gain that is entered, and the Max Mixer Level, as described in the table below.

See "[Attenuator Configurations and Auto/Man](#)" on page 1041

Key Path	AMPTD Y Scale, Attenuation
Remote Command	<pre>[:SENSe] : POWer [:RF] : ATTenuation <rel_ampl> [:SENSe] : POWer [:RF] : ATTenuation? [:SENSe] : POWer [:RF] : ATTenuation : AUTO OFF ON 0 1 [:SENSe] : POWer [:RF] : ATTenuation : AUTO ?</pre>
Example	<p>POW:ATT 20</p> <p>Dual attenuator configuration: sets the mechanical attenuator to 20 dB</p> <p>Single attenuator mode: sets the main attenuation to 20 dB (see below for definition of "main" attenuation).</p> <p>If the attenuator was in Auto, it sets it to Manual.</p>
Dependencies	<p>Some measurements do not support the Auto setting of (Mech) Atten. In these measurements, the Auto/Man selection is not available, and the Auto/Man line on the key disappears.</p> <p>In dual attenuator configurations, when the electronic attenuator is enabled, the mechanical attenuator has no auto setting and the Auto/Man line on the key disappears. The state of Auto/Man is remembered and restored when the electronic attenuator is once again disabled. This is described in more detail in the "Enable Elec Atten" on page 2244 key description.</p> <p>See "Attenuator Configurations and Auto/Man" on page 1041 for more information on the Auto/Man functionality of Attenuation.</p>

Couplings

	<p>When (Mech) Atten is in Auto, it uses the following algorithm to determine a value: If the USB Preamp is connected to USB, use 0 dB. Otherwise, $Atten = ReferenceLevel + PreAmpGain + ExternalGain - RefLevelOffset - MaxMixerLevel + IF\ Gain$. Limit this value to be between 6 dB and the Max value. No value below 6 dB can ever be chosen by Auto. The resulting value is rounded up to the largest value possible given the attenuation step setting. That is, 50.01 dB would change to 60 dB (for a 10 dB attenuation step). The "IF Gain" term in the equation above is either 0 dB or +10 dB, depending on the settings of FFT IF Gain, Swept IF Gain, max Ref Level and the Auto/Man setting of Mech Atten. In External Mixing and BBIQ, where the Attenuator is not in the signal path, the Attenuator setting changes as described above when (Mech) Atten is in Auto, but no changes are made to the actual attenuator hardware setting until the input is changed back to the RF Input.</p>
Preset	<p>The preset for Mech Attenuation is "Auto." The Auto value of attenuation is: CXA, EXA, MXA and PXA: 10 dB</p>
State Saved	Saved in instrument state
Min	<p>0 dB The attenuation set by this key cannot be decreased below 6 dB with the knob or step keys. To get to a value below 6 dB it has to be directly entered from the keypad or via SCPI. This protects from adjusting the attenuation to a dangerously small value which can put the instrument at risk of damage to input circuitry. However, if the current mechanical attenuation is below 6 dB it can be increased with the knob and step keys, but not decreased.</p>
Max	<p>CXA N9000A-503/507: 50 dB CXA N9000A-513/526: 70dB EXA: 60 dB MXA and PXA: 70 dB In the single attenuator configuration, the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB.</p>
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Attenuator Configurations and Auto/Man

As described in the Attenuation key description, there are two distinct attenuator configurations available in the X-Series, the single attenuator and dual attenuator configurations. In dual attenuator configurations, we have the mechanical attenuation and the electronic attenuation, and the current total attenuation is the sum of the electronic + mechanical attenuation. In single attenuator configurations, we refer to the attenuation set using the (Mech) Atten key (or POW:ATT SCPI) as the "main" attenuation; and the attenuation that is set by the SCPI command POW:EATT as the "soft" attenuation (the POW:EATT command is honored even in the single attenuator configuration, for compatibility purposes). Then the

current total attenuation is the sum of the main + soft attenuation. See the Elec Atten key description for more on “soft” attenuation.

In the dual attenuator configuration, when the electronic attenuator is enabled, there is no Auto/Man functionality for the mechanical attenuator, and the third line of the key label (the Auto/Man line) disappears:



Enable Elec Atten

Enables the Electronic Attenuator.

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear. These advantages primarily aid in remote operation and are negligible for front panel use. See ["Using the Electronic Attenuator: Pros and Cons" on page 1044](#) for a detailed discussion of the pros and cons of using the electronic attenuator.

For the single attenuator configuration, for SCPI backwards compatibility, the “soft” attenuation feature replaces the dual attenuator configuration’s electronic attenuator. All the same couplings and limitations apply. See ["Attenuator Configurations and Auto/Man" on page 2244](#)

See ["More Information" on page 1043](#)

Key Path	AMPTD Y Scale, Attenuation
Remote Command	[:SENSe] :POWeR [:RF] :EATTenuation:STATe OFF ON 0 1 [:SENSe] :POWeR [:RF] :EATTenuation:STATe?
Example	POW:EATT:STAT ON
Dependencies	<p>This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no “electronic attenuator” there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a “soft” attenuation as described in "Attenuator Configurations and Auto/Man" on page 2244.</p> <p>The electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable above 3.6 GHz. Therefore, if the Stop Frequency of the analyzer is > 3.6 GHz then the Enable Elec Atten key will be OFF and grayed out.</p> <p>If the Internal Preamp is on, meaning it is set to Low Band or Full, the electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable. In this case the Enable Elec Atten key will be OFF and grayed out.</p> <p>If either of the above is true, if the SCPI command is sent, an error indicating that the electronic attenuator is unavailable will be sent.</p> <p>If the electronic/soft Attenuator is enabled, then the Stop Freq of the analyzer is limited to 3.6 GHz and the Internal Preamp is unavailable.</p> <p>The SCPI-only “soft” electronic attenuation for the single-attenuator configuration is not available in</p>

	all measurements; in particular, it is not available in the Swept SA measurement.
Couplings	Enabling and disabling the Electronic Attenuator affects the setting of the Mechanical Attenuator (in dual attenuator configurations). This is described in more detail below this table.
Preset	OFF for Swept SA measurement; ON for all other measurements that support the electronic attenuator
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

More Information

Mechanical Attenuator Transition Rules

When the Electronic Attenuator is enabled, the Mechanical Attenuator transitions to a state that has no Auto function. Below are the rules for transitioning the Mechanical Attenuator. NOTE that the information below ONLY applies to the dual attenuator configurations, and ONLY when the Electronic Attenuator is installed:

When the Electronic Attenuation is enabled from a disabled state:

- The Mechanical Attenuator is initialized to 10 dB (this is its optimal performance setting). You can then set it as desired with SCPI, numeric keypad, step keys, or knob, and it behaves as it normally would in manual mode
- The Auto/Man state of (Mech) Atten is saved
- The Auto/Man line on the (Mech) Atten key disappears and the auto rules are disabled
- The Electronic Attenuator is set to 10 dB less than the previous value of the Mechanical Attenuator, within the limitation that it must stay within the range of 0 to 24 dB of attenuation.

Examples in the dual attenuator configuration:

- Mech Atten at 20 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 10 dB. New total attenuation equals the value before Elec Atten enabled.
- Mech Atten at 0 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 0 dB. New total attenuation does not equal the value before Elec Atten enabled.
- Mech Atten at 40 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 24 dB. New total attenuation does not equal the value before Elec Atten enabled.

When the Electronic Attenuation is disabled from an enabled state:

- The Elec Atten key is grayed out
- The Auto/Man state of (Mech) Atten is restored
- If now in Auto, (Mech) Atten recouples

- If now in Man, (Mech) Atten is set to the value of total attenuation that existed before the Elec Atten was disabled. The resulting value is rounded up to the smallest value possible given the (Mech) Atten Step setting - (That is, 57 dB changes to 58 dB when (Mech) Atten Step is 2 dB.)

Using the Electronic Attenuator: Pros and Cons

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear.

The “finer steps” advantage of the electronic attenuator is beneficial in optimizing the alignment of the analyzer dynamic range to the signal power in the front panel as well as remote use. Thus, you can achieve improved relative signal measurement accuracy. Compared to a mechanical attenuator with 2 dB steps, the 1 dB resolution of the electronic attenuator only gives better resolution when the odd-decibel steps are used. Those odd-decibel steps are less accurately calibrated than the even-decibel steps, so one tradeoff for this superior relative accuracy is reduced absolute amplitude accuracy.

Another disadvantage of the electronic attenuator is that the spectrum analyzer loses its “Auto” setting, making operation less convenient.

Also, the relationship between the dynamic range specifications (TOI, SHI, compression and noise) and instrument performance are less well-known with the electrical attenuator. With the mechanical attenuator, TOI, SHI and compression threshold levels increase dB-for-dB with increasing attenuation, and the noise floor does as well. With the electronic attenuator, there is an excess attenuation of about 1 to 3 dB between 0 and 3.6 GHz, making the effective TOI, SHI, and so forth, less well known. Excess attenuation is the actual attenuation relative to stated attenuation. Excess attenuation is accounted for in the analyzer calibration

Elec Atten

Controls the Electronic Attenuator in dual attenuator configurations. This key does not appear in single attenuator configurations, as the control of both the mechanical and electronic stages of the single attenuator is integrated into the single Atten key.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	<code>[:SENSe] :POWer [:RF] :EATTenuation <rel_amp></code> <code>[:SENSe] :POWer [:RF] :EATTenuation?</code>
Notes	Electronic Attenuation's specification is defined only when Mechanical Attenuation is 6 dB.
Dependencies	This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no “electronic attenuator” there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a “soft” attenuation as described in "Attenuator Configurations and Auto/Man" on page 2244 . The “soft” attenuation is treated as an addition to the “main” attenuation value set by the Atten softkey or the POW:ATT SCPI command and affects the total attenuation displayed on the Attenuation key and the Meas Bar. When Enable Elec Atten is off or grayed out, the Elec Atten key is grayed out.
Preset	0 dB
State Saved	Saved in instrument state

Min	0 dB
Max	Dual attenuator configuration: 24 dB Single attenuator configuration: the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Adjust Atten for Min Clip

Sets the combination of mechanical and electronic attenuation and gain based on the current measured signal level so that clipping will be at a minimum.

This is an "immediate action" function, that is, it executes once, when the key is pressed.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	<code>[:SENSe] :POWer [:RF] :RANGe:OPTimize IMMEDIATE</code>
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Pre-Adjust for Min Clip

If this function is on, it does the adjustment described under "[Adjust Atten for Min Clip](#)" on page 2247 each time a measurement restarts. Therefore, in Continuous measurement mode, it only executes before the first measurement.

In dual attenuator models, you can set Elec+Mech Atten, in which case both attenuators participate in the autoranging, or Elec Atten Only, in which case the mechanical attenuator does not participate in the autoranging. This latter case results in less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	<code>[:SENSe] :POWer [:RF] :RANGe:OPTimize:ATTenuation OFF ELECTrical COMBined</code> <code>[:SENSe] :POWer [:RF] :RANGe:OPTimize:ATTenuation?</code>
Notes	The SCPI parameter ELECTrical sets this function to On in single attenuator models. The SCPI parameter COMBined is mapped to ELECTrical in single attenuator models; if you send COMBined, it sets the function to On and returns ELEC to a query.
Dependencies	This key only appears in Dual Attenuator models with an Electronic Attenuator installed.

	In instruments with Dual Attenuator model, when Enable Elec Atten is off or grayed out, the Pre-Adjust for Min Clip key is grayed out.
Preset	OFF for Swept SA measurement; ON for all other measurements that support Pre-Adjust for Min Clip
State Saved	Saved in instrument state
Range	Dual attenuator models: Off Elec Atten Only Mech + Elec Atten Single attenuator models: Off On
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Remote Command	<code>[:SENSe] :POWer [:RF] :RANGe :AUTO ON OFF 1 0</code> <code>[:SENSe] :POWer [:RF] :RANGe :AUTO?</code>
Notes	ON aliases to "Elec Atten Only" (:POW:RANG:OPT:ATT ELEC) OFF aliases to "Off" (:POW:RANG:OPT:ATT OFF) The query :POW:RANG:AUTO? returns true if :POW:RANG:OPT:ATT is not "Off"
Initial S/W Revision	Prior to A.02.00

Off

Turns Pre-Adjust for Min Clip off. This is the default setting.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip
Example	:POW:RANG:OPT:ATT OFF
Initial S/W Revision	Prior to A.02.00

Elec Atten Only

Selects only the electric attenuator to participate in auto ranging. This offers less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip
Example	:POW:RANG:OPT:ATT ELEC
Initial S/W Revision	Prior to A.02.00

Mech + Elec Atten

In dual attenuator models, this selects both attenuators participate in the autoranging.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip
Example	:POW:RANGe:OPT:ATT COMB
Initial S/W Revision	Prior to A.02.00

(Mech) Atten Step

This controls the step size used when making adjustments to the input attenuation.

This key is labeled Mech Atten Step in dual attenuator models and Atten Step in single attenuator models. In the dual attenuator configuration, this key only affects the step size of the mechanical attenuator.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	[:SENSe] :POWer [:RF] :ATTenuation:STEP [:INCRement] 10 dB 2 dB [:SENSe] :POWer [:RF] :ATTenuation:STEP [:INCRement] ?
Example	POW:ATT:STEP 2
Notes	Note this feature works like a 1-N choice from the front panel, but it takes a specific value (in dB) when used remotely. The only valid values are 2 and 10.
Dependencies	Blanked in CXA and EXA if option FSA (2 dB steps) is not present. If blanked, attempts to set it via SCPI will yield an error.
Couplings	When the attenuation step size changes, the current mechanical attenuation value is adjusted (if necessary) to be quantized to the new step size. That is, if step is set to 10 dB, mech atten is increased if necessary so it is a multiple of 10 dB
Preset	PXA and MXA: 2 dB EXA and CXA: 10 dB (2 dB with option FSA)
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Scale/Div

Allows you to enter a numeric value to change the vertical display sensitivity.

Key Path	AMPTD Y Scale
----------	---------------

Mode	GSM
Remote Command	:DISPlay:TSPur:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision <rel_ampl> :DISPlay:TSPur:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision?
Example	DISP:TSP:VIEW:WIND:TRAC:Y:PDIV 10 DISP:TSP:VIEW:WIND:TRAC:Y:PDIV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	When Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.
Preset	10.00
State Saved	Saved in instrument state.
Min	0.1
Max	20.0
Initial S/W Revision	Prior to A.02.00

Presel Center

When this key is pressed, the centering of the preselector filter is adjusted to optimize the amplitude accuracy at the frequency of the selected marker. If the selected marker is not on when Presel Center is pressed, the analyzer will turn on the selected marker, perform a peak search, and then perform centering on the marker's center frequency. If the selected marker is already on and between the start and stop frequencies of the analyzer, the analyzer performs the preselector calibration on that marker's frequency. If the selected marker is already on, but outside the frequency range between Start Freq and Stop Freq, the analyzer will first perform a peak search, and then perform centering on the marker's center frequency.

The value displayed on the Presel Adjust key will change to reflect the new preselector tuning (see Presel Adjust).

A number of considerations should be observed to ensure proper operation. See "**Proper Preselector Operation**" on page 1049.

Key Path	AMPTD Y Scale
Remote Command	[:SENSe]:POWer[:RF]:PCENter
Example	POW:PCEN
Notes	Note that the rules outlined above under the key description apply for the remote command as well as the key. The result of the command is dependent on marker position, and so forth. Any message shown by the key press is also shown in response to the remote command.
Dependencies	<ul style="list-style-type: none"> • Grayed out if the microwave preselector is off.) • If the selected marker's frequency is below Band 1, advisory message 0.5001 is generated and no action is taken. • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0. • Grayed out in the Spectrogram View.

Couplings	The active marker position determines where the centering will be attempted. If the analyzer is in a measurement such as averaging when centering is initiated, the act of centering the preselector will restart averaging but the first average trace will not be taken until the centering is completed.
Status Bits/OPC dependencies	When centering the preselector, *OPC will not return true until the process is complete and a subsequent measurement has completed, nor will results be returned to a READ or MEASURE command. The Measuring bit should remain set while this command is operating and should not go false until the subsequent sweep/measurement has completed.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Proper Preselector Operation

A number of considerations should be observed to ensure proper operation:

1. If the selected marker is off, the analyzer will turn on a marker, perform a peak search, and adjust the preselector using the selected marker's frequency. It uses the "highest peak" peak search method unqualified by threshold or excursion, so that there is no chance of a 'no peak found' error. It continues with that peak, even if it is the peak of just noise. Therefore, for this operation to work properly, there should be a signal on screen in a preselected range for the peak search to find.
2. If the selected marker is already on, the analyzer will attempt the centering at that marker's frequency. There is no preselector for signals below about 3.6 GHz, therefore if the marker is on a signal below 3.6 GHz, no centering will be attempted and an advisory message generated
3. In some models, the preselector can be bypassed. If it is bypassed, no centering will be attempted in that range and a message will be generated.

Preselector Adjust

Allows you to manually adjust the preselector filter frequency to optimize its response to the signal of interest. This function is only available when "Presel Center" on page 2250 is available.

For general purpose signal analysis, using Presel Center is recommended. Centering the filter minimizes the impact of long-term preselector drift. Presel Adjust can be used instead to manually optimize the preselector. One application of manual optimization would be to peak the preselector response, which both optimizes the signal-to-noise ratio and minimizes amplitude variations due to small (short-term) preselector drifting.

Key Path	AMPTD Y Scale
Scope	Meas Global
Remote Command	[:SENSe] :POWer [:RF] :PADJust <freq> [:SENSe] :POWer [:RF] :PADJust?

Example	POW:PADJ 100KHz POW:PADJ?
Notes	The value on the key reads out to 0.1 MHz resolution.
Dependencies	<ul style="list-style-type: none"> • Grayed out if microwave preselector is off.) • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0. • Grayed out in the Spectrogram View.
Preset	0 MHz
State Saved	The Presel Adjust value set by Presel Center, or by manually adjusting Presel Adjust, is not saved in instrument state, and does not survive a Preset or power cycle.
Min	-500 MHz
Max	500 MHz
Default Unit	Hz
Backwards Compatibility SCPI	<pre>[:SENSe] : POWer [:RF] : MW : PADJust</pre> <pre>[:SENSe] : POWer [:RF] : MMW : PADJust</pre> <p>PSA had multiple preselectors, but the X-Series has only one. These commands simply alias to [:SENSe]:POWer[:RF]:PADJust</p>
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Remote Command	<pre>[:SENSe] : POWer [:RF] : PADJust : PRESelector MWAVE MMWave EXTernal</pre> <pre>[:SENSe] : POWer [:RF] : PADJust : PRESelector?</pre>
Notes	<p>PSA had multiple preselectors, and you could select which preselector to adjust. Since the X-Series has only one mm/uW preselector, the preselector selection softkey is no longer available. However, to provide backward compatibility, we accept the legacy remote commands.</p> <p>The command form has no effect, the query always returns MWAVE</p>
Initial S/W Revision	Prior to A.02.00

μW Path Control

The μW Path Control functions include the μW Preselector Bypass (Option MPB) and Low Noise Path (Option LNP) controls in the High Band path circuits.

When the μW Preselector is bypassed, the user has better flatness, but will be subject to spurs from out of band interfering signals. When the Low Noise Path is enabled, the analyzer automatically switches around

certain circuitry in the high frequency bands which can contribute to noise, when it is appropriate based on other analyzer settings.

For most applications, the preset state is Standard Path, which gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear out in the hardware switches. For applications that utilize the wideband IF paths, the preset state is the μ W Preselector Bypass path, if option MPB is present. This is because, when using a wideband IF such as the 140 MHz IF, the μ W Preselector's bandwidth can be narrower than the available IF bandwidth, causing degraded amplitude flatness and phase linearity, so it is desirable to bypass the preselector in the default case.

Users may choose Low Noise Path Enable. It gives a lower noise floor, especially in the 21–26.5 GHz region, though without improving many measures of dynamic range, and without giving the best possible noise floor. The preamp, if purchased and used, gives better noise floor than does the Low Noise Path, however its compression threshold and third-order intercept are much poorer than that of the non-preamp Low Noise Path. There are some applications, typically for signals around –30 dBm, for which the third-order dynamic range of the standard path is good enough, but the noise floor is not low enough even with 0 dB input attenuation. When the third-order dynamic range of the preamp path is too little and the noise floor of the standard path is too high, the Low Noise Path can provide the best dynamic range.

Key Path	AMPTD Y Scale
Mode	SA, BASIC, PNOISE, VSA , LTE, LTETDD
Scope	Meas Global
Remote Command	[:SENSe] :POWer [:RF] :MW:PATH STD LNPath MPBypass FULL [:SENSe] :POWer [:RF] :MW:PATH?
Example	:POW:MW:PATH LNP Enables the Low Noise path
Notes	If a Presel Center is performed, the analyzer will momentarily switch to the Standard Path, regardless of the setting of μ W Path Control The DC Block will always be switched in when the low noise path is switched in, to protect succeeding circuitry from DC. Note that this does not mean “when the low noise path is enabled” but when, based on the Low Noise Path rules, the path is actually switched in. This can happen when the selection is Low Noise Path Enable . In the case where the DC Block is switched in the analyzer is now AC coupled. However, if the user has selected DC coupling, the UI will still behave as though it were DC coupled, including all annunciation, warnings, status bits, and responses to SCPI queries. This is because, based on other settings, the analyzer could switch out the low noise path at any time and hence go back to being DC coupled. Alignment switching ignores the settings in this menu, and restores them when finished.
Dependencies	Unavailable in BBIQ and External Mixing
Preset	All modes other than IQ Analyzer mode and VXA: STD IQ Analyzer, VXA and WLAN mode: MPB option present and licensed: MPB MPB option not present and licensed: STD
State Saved	Save in instrument state
Readback	Value selected in the submenu
Initial S/W Revision	A.04.00
Modified at S/W Revision	A.10.00

Standard Path

This path gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear in the hardware switches, particularly in remote test scenarios where both low band and high band setups will follow in rapid succession.

In this path, the bypass of the low band/high band switch and microwave preamp is never activated, which can cause some noise degradation but preserves the life of the bypass switch.

Key Path	AMPTD Y Scale, μ W Path Control
Example	:POW:MW:PATH STD
Readback Text	Standard Path
Initial S/W Revision	A.04.00

μ W Preselector Bypass

This key toggles the preselector bypass switch for band 1 and higher. When the microwave preselect is on, the signal path is preselected. When the microwave preselector is off, the signal path is not preselected. The preselected path is the normal path for the analyzer.

The preselector is a tunable bandpass filter which prevents signals away from the frequency of interest from combining in the mixer to generate in-band spurious signals (images). The consequences of using a preselector filter are its limited bandwidth, the amplitude and phase ripple in its passband, and any amplitude and phase instability due to center frequency drift.

Option MPB or pre-selector bypass provides an unpreselected input mixer path for certain X-Series signal analyzers with frequency ranges above 3.6 GHz. This signal path allows a wider bandwidth and less amplitude variability, which is an advantage when doing modulation analysis and broadband signal analysis. The disadvantage is that, without the preselector, image signals will be displayed. Another disadvantage of bypassing the preselector is increased LO emission levels at the front panel input port.

Image responses are separated from the real signal by twice the 1st IF. For IF Paths of 10 MHz and 25 MHz, the 1st IF is 322.5 MHz, so the image response and the real signal will be separated by 645 MHz. The 1st IF will be different for other IF Path settings. When viewing a real signal and its corresponding image response in internal mixing, the image response will be to the left of the real signal.

Also, the image response and the real signal typically have the same amplitude and exhibit the same shape factor.

However, if Option FS1, Fast Sweep Capability, is enabled, the image response in the Swept SA measurement will appear lower in amplitude and have a much wider shape factor compared to the real signal.

Key Path	AMPTD Y Scale, μ W Path Control
Example	:POW:MW:PATH MPB
Dependencies	Key is blanked if current mode does not support it. Key is grayed out if mode supports it but current measurement does not support it. Key is blank unless Option MPB is present and licensed. If SCPI command sent when MPB not

	present, error -241, "Hardware missing; Option not installed" is generated.
Readback Text	μ W Preselector Bypass
Initial S/W Revision	A.04.00
Remote Command	[:SENSE]:POWER[:RF]:MW:PRESelector[:STATE] ON OFF 0 1 [:SENSE]:POWER[:RF]:MW:PRESelector[:STATE]?
Example	:POW:MW:PRES OFF Bypasses the microwave preselector
Notes	The ON parameter sets the STD path (:POW:MW:PATH STD) The OFF parameter sets path MPB (:POW:MW:PATH MPB)
Preset	ON

Internal Preamp

Accesses a menu of keys that control the internal preamps. Turning on the preamp gives a better noise figure, but a poorer TOI to noise floor dynamic range. You can optimize this setting for your particular measurement.

The instrument takes the preamp gain into account as it sweeps. If you sweep outside of the range of the preamp the instrument will also account for that. The displayed result will always reflect the correct gain.

For some measurements, when the preamp is on and any part of the displayed frequency range is below the lowest frequency for which the preamp has specifications, a warning condition message appears in the status line. For example, for a preamp with a 9 kHz lowest specified frequency: "Preamp: Accy unspc'd below 9 kHz".

Key Path	AMPTD Y Scale
Scope	Meas Global
Remote Command	[:SENSE]:POWER[:RF]:GAIN[:STATE] OFF ON 0 1 [:SENSE]:POWER[:RF]:GAIN[:STATE]?
Dependencies	Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the key is not shown. The preamp is not available when the electronic/soft attenuator is enabled.
Couplings	The act of connecting the U7227A USB Preamplifier to one of the analyzer's USB ports will cause the Internal Preamp to be switched on. When this happens an informational message will be generated: "Internal Preamp turned on for optimal operation with USB Preamp." Note that if the Internal Preamp was already on, there will be no change to the setting, but if it was Off it will be switched On, to Full Range. Note that this same action occurs when the SA mode is selected while the USB Preamp is connected to one of the analyzer's USB ports, if it is the first time that the SA mode has run since powerup, or if the last time the SA mode was running the USB Preamp was NOT connected.

	Subsequently disconnecting the USB Preamp from USB does not change the Internal Preamp setting nor restore the previous setting.
Preset	OFF
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.14.00

Key Path	AMPTD Y Scale, Internal Preamp
Scope	Meas Global
Remote Command	[:SENSe] :POWer [:RF] :GAIN:BAND LOW FULL [:SENSe] :POWer [:RF] :GAIN:BAND?
Dependencies	Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the key is not shown. If a POW:GAIN:BAND FULL command is sent when a low band preamp is available, the preamp band parameter is to LOW instead of FULL, and an "Option not installed" message is generated.
Preset	LOW
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00

Off

Turns the internal preamp off

Key Path	AMPTD Y Scale, Internal Preamp
Example	:POW:GAIN OFF
Readback	Off
Initial S/W Revision	Prior to A.02.00

Low Band

Sets the internal preamp to use only the low band.

The frequency range of the installed (optional) low-band preamp is displayed in square brackets on the Low Band key label.

Key Path	AMPTD Y Scale, Internal Preamp
Example	:POW:GAIN ON :POW:GAIN:BAND LOW
Readback	Low Band
Initial S/W Revision	Prior to A.02.00

Full Range

Sets the internal preamp to use its full range. The low band (0–3.6 GHz or 0–3GHz, depending on the model) is supplied by the low band preamp and the frequencies above low band are supplied by the high band preamp.

The frequency range of the installed (optional) preamp is displayed in square brackets on the Full Range key label. If the high band option is not installed the Full Range key does not appear.

Key Path	AMPTD Y Scale, Internal Preamp
Example	:POW:GAIN ON :POW:GAIN:BAND FULL
Readback	Full Range
Initial S/W Revision	Prior to A.02.00

Ref Position

Allows you to set the display reference position to Top, Center or Bottom.

Key Path	AMPTD Y Scale
Mode	GSM
Remote Command	:DISPlay:TSPur:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOSition TOP CENTer BOTTom :DISPlay:TSPur:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOSition?
Example	DISP:TSP:VIEW:WIND:TRAC:Y:RPOS CENT DISP:TSP:VIEW:WIND:TRAC:Y:RPOS?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	TOP
State Saved	Saved in instrument state.
Range	Top Ctr Bot
Initial S/W Revision	Prior to A.02.00

Auto Scaling

Allows you to toggle the scale coupling function between On and Off.

Key Path	AMPTD Y Scale
Mode	GSM
Remote Command	:DISPlay:TSPur:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPlE 0 1 OFF ON :DISPlay:TSPur:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPlE?

Example	DISP:TSP:VIEW:WIND:TRAC:Y:COUP 1 DISP:TSP:VIEW:WIND:TRAC:Y:COUP?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Couplings	When Auto Scaling is On, upon pressing the Restart front-panel key, this function automatically determines the scale per division and reference values based on the measurement results. When you set the value of either Ref_Value or Scale/Div manually, this parameter is set to 'Off' automatically.
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

Auto Couple

The Auto Couple feature provides a quick and convenient way to automatically couple multiple instrument settings. This helps ensure accurate measurements and optimum dynamic range. When the Auto Couple feature is activated, either from the front panel or remotely, all parameters of the current measurement that have an Auto/Manual mode are set to Auto mode and all measurement settings dependent on (or coupled to) the Auto/Man parameters are automatically adjusted for optimal performance.

However, the Auto Couple key actions are confined to the current measurement only. It does not affect other measurements in the mode, and it does not affect markers, marker functions, or trace or display attributes.

See "[More Information](#)" on page 1057

Key Path	Front-panel key
Remote Command	:COUPle ALL NONE
Example	:COUP ALL
Notes	:COUPle ALL puts all Auto/Man parameters in Auto mode (equivalent to pressing the Auto Couple key). :COUPLE NONE puts all Auto/Man parameters in manual mode. It decouples all the coupled instrument parameters and is not recommended for making measurements.
Initial S/W Revision	Prior to A.02.00

More Information

There are two types of functions that have Auto/Manual modes.

Auto/Man Active Function keys

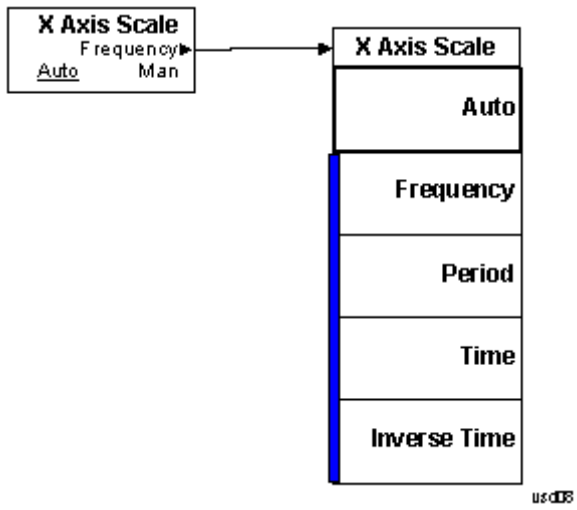
An Auto/Man toggle key controls the binary state associated with an instrument parameter by toggling between Auto (where the parameter is automatically coupled to the other parameters it is dependent upon) and Man (where the parameter is controlled independent of the other parameters), as well as making the parameter the active function. The current mode is indicated on the softkey with either Auto or Man underlined as illustrated below.



Auto/Man 1-of-N keys

An Auto/Man 1-of-N key allows you to manually pick from a list of parameter values, or place the function in Auto, in which case the value is automatically selected (and indicated) as shown below. If in Auto, Auto is underlined on the calling key. If in manual operation, manual is indicated on the calling key. But the calling key does not actually toggle the function, it simply opens the menu.

11 EDGE Tx Band Spur Measurement
Auto Couple



BW

There is no functionality for this function in this measurement. When pressed, this key displays a blank menu.

Key Path	Front-panel key
Mode	EDGE GSM

Cont (Continuous Measurement/Sweep)

Sets the analyzer for Continuous measurement operation. The single/continuous state is Meas Global so the setting will affect all measurements. If you are Paused, pressing Cont does a Resume.

Key Path	Front-panel key
Remote Command	:INITiate:CONTinuous OFF ON 0 1 :INITiate:CONTinuous?
Example	:INIT:CONT 0 puts analyzer in Single measurement operation. :INIT:CONT 1 puts analyzer in Continuous measurement operation
Preset	ON (Note that SYST:PRESet sets INIT:CONT to ON but *RST sets INIT:CONT to OFF)
State Saved	Saved in instrument state
Backwards Compatibility Notes	For Spectrum Analysis mode in ESA and PSA, there is no Cont hardkey, instead there is a Sweep Single/Cont key. In these analyzers, switching the Sweep Single/Cont key from Single to Cont restarts averages (displayed average count reset to 1), but does not restart Max Hold and Min Hold. The X-Series has Single and Cont keys in place of the SweepSingleCont key. In the X-Series, if in single measurement, the Cont key (and INIT:CONT ON) switches to continuous measurement, but never restarts a measurement and never resets a sweep.
Initial S/W Revision	Prior to A.02.00

In Swept SA Measurement (Spectrum Analysis Mode):

The analyzer takes repetitive sweeps, averages, measurements, etc., when in Continuous mode. When the average count reaches the Average/Hold Number the count stops incrementing, but the analyzer keeps sweeping. See the Trace/Detector section for the averaging formula used both before and after the Average/Hold Number is reached. The trigger condition must be met prior to each sweep. The type of trace processing for multiple sweeps, is set under the Trace/Detector key, with choices of Trace Average, Max Hold, or Min Hold.

In Other Measurements/Modes:

With Avg/Hold Num (in the Meas Setup menu) set to Off or set to On with a value of 1, a sweep is taken after the trigger condition is met; and the analyzer continues to take new sweeps after the current sweep has completed and the trigger condition is again met. However, with Avg/Hold Num set to On with a value >1, multiple sweeps (data acquisitions) are taken for the measurement. The trigger condition must be met prior to each sweep. The sweep is not stopped when the average count k equals the number N set for Avg/Hold Num is reached, but the number k stops incrementing. A measurement average usually applies to all traces, marker results, and numeric results. But sometimes it only applies to the numeric results.

If the analyzer is in Single measurement, pressing the Cont key does not change k and does not cause the sweep to be reset; the only action is to put the analyzer into Continuous measurement operation.

If it is already in continuous sweep:

the INIT:CONT 1 command has no effect

the INIT:CONT 0 command will place the analyzer in Single Sweep but will have no effect on the current sequence until $k = N$, at which point the current sequence will stop and the instrument will go to the idle state.

11 EDGE Tx Band Spur Measurement
File

File

See "File" on page 320

FREQ/Channel

Accesses a menu of keys that allows you to control the Frequency parameters of the instrument.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

ARFCN

Sets the analyzer to a frequency that corresponds to the ARFCN (Absolute RF Channel Number). Used to enter the channel to be measured for the selected band. If the Center Freq value entered does not exactly correlate with an ARFCN, the softkey label changes to display the closest ARFCN to the selected frequency, along with a > or < symbol indicating whether the frequency is above or below that ARFCN.

Key Path	FREQ Channel
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel:ARFCn RFCHannel <integer></code> <code>[:SENSe] :CHANnel:ARFCn RFCHannel?</code>
Example	CHAN:ARFC 3 CHAN:ARFC?
Notes	This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not available (blank).
Couplings	Coupled with Center Frequency . Setting ARFCN sets Center Freq to the value corresponding to that ARFCN. BMT Freq choice changes this parameter.
Preset	1
State Saved	Saved in instrument state.
Range	Different for each BAND as follows: E-GSM: 0 to 124, and 975 to 1023 P-GSM: 1 to 124 R-GSM: 0 to 124(MS), and 955 to 1023(BTS) DCS1800: 512 to 885 PCS1900: 512 to 810 GSM450: 259 to 293 GSM480: 306 to 340 GSM700: 438 to 516 GSM850: 128 to 251 T-GSM 810: 350 to 425

Min	Different for each BAND as follows: E-GSM: 0(MS), and 975(BTS) P-GSM: 1 R-GSM: 0(MS), and 955(BTS) DCS1800: 512 PCS1900: 512 GSM450: 259 GSM480: 306 GSM700: 438 GSM850: 128 T-GSM 810: 350
Max	Different for each BAND as follows: E-GSM: 124(MS), and 1023(BTS) P-GSM: 124 R-GSM: 124(MS), and 1023(BTS) DCS1800: 885 PCS1900: 810 GSM450: 293 GSM480: 340 GSM700: 516 GSM850: 251 T-GSM 810: 425
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.07.00

Center Freq

Sets the center frequency to be measured for the selected band. It is coupled with ARFCN – setting Center Freq sets ARFCN to the channel corresponding to that frequency.

For more information, see the section ["Center Freq" on page 2269](#).

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

Time Slot

This functionality is the same as that of the corresponding key in the Demod menu. See ["Time Slot" on page 2288](#) for details.

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

Burst Type

This functionality is the same as that of the corresponding key in the Demod menu. See ["Burst Type" on page 2289](#) for details.

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

TSC (Std)

This functionality is the same as that of the corresponding key in the Demod menu. See ["TSC \(Std\)" on page 2291](#) for details.

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

Center Freq

Sets the frequency that corresponds to the horizontal center of the graticule (when frequency Scale Type is set to linear). While adjusting the Center Frequency the Span is held constant, which means that both Start Frequency and Stop Frequency will change.

Pressing Center Freq also sets the frequency entry mode to Center/Span. In Center/Span mode, the center frequency and span values are displayed below the graticule, and the default active function in the Frequency menu is Center Freq.

The center frequency setting is the same for all measurements within a mode, that is, it is Meas Global. Some modes are also able to share a Mode Global center frequency value. If this is the case, the Mode will have a Global Settings key in its Mode Setup menu.

The Center Freq function sets (and queries) the Center Frequency for the currently selected input. If your analyzer has multiple inputs, and you select another input, the Center Freq changes to the value for that input. SCPI commands are available to directly set the Center Freq for a specific input.

Center Freq is remembered as you go from input to input. Thus you can set a Center Freq of 10 GHz with the RF Input selected, change to BBIQ and set a Center Freq of 20 MHz, then switch to External Mixing and set a Center Freq of 60 GHz, and when you go back to the RF Input the Center Freq will go back to 10 GHz; back to BBIQ and it is 20 MHz; back to External Mixing and it is 60 GHz.

See ["RF Center Freq" on page 1068](#)

See [Ext Mix Center Freq](#)

See ["I/Q Center Freq" on page 1070](#)

See ["Center Frequency Presets" on page 1067](#)

Key Path	FREQ Channel
Scope	Meas Global
Remote Command	<code>[:SENSe] :FREQuency:CENTer <freq></code> <code>[:SENSe] :FREQuency:CENTer?</code>
Example	FREQ:CENT 50 MHz FREQ:CENT UP changes the center frequency to 150 MHz if you use FREQ:CENT:STEP 100 MHz to set the center frequency step size to 100 MHz FREQ:CENT?
Notes	This command sets either the RF or I/Q Center Frequency depending on the selected input. For RF input it is equivalent to FREQ:RF:CENT For I/Q input it is equivalent to FREQ:IQ:CENT Preset and Max values are dependent on Hardware Options (5xx) If no terminator (e.g. MHz) is sent the terminator Hz is used. If a terminator with unit other than Frequency is used, an invalid suffix error message is generated.
Dependencies	The Center Frequency can be limited by Start or Stop Freq limits, if the Span is so large that Start or Stop reach their limit.
Couplings	When operating in "swept span", any value of the Center Frequency or Span that is within the frequency range of the analyzer is allowed when the value is being set through the front panel numeric key pad or the SCPI command. The other parameter is forced to a different value if needed, to keep the Start and the Stop Frequencies within the analyzer's frequency range
Preset	Depends on instrument maximum frequency, mode, measurement, and selected input. See " Center Frequency Presets " on page 1067 and " RF Center Freq " on page 1068 and Ext Mix Center Freq and " I/Q Center Freq " on page 1070.
State Saved	Saved in instrument state
Min	Depends on instrument maximum frequency, mode, measurement, and selected input.. See " Center Frequency Presets " on page 1067 and " RF Center Freq " on page 1068 and " I/Q Center Freq " on page 1070.
Max	Depends on instrument maximum frequency, mode, measurement, and selected input.. See " Center Frequency Presets " on page 1067 and " RF Center Freq " on page 1068 and " I/Q Center Freq " on page 1070.
Default Unit	Hz
Status Bits/OPC	Non-overlapped
Dependencies	
Initial S/W Revision	Prior to A.02.00

Center Frequency Presets

The following table provides the Center Frequency Presets for the Spectrum Analyzer mode, and the Max Freq, for the various frequency options:

Freq Option	CF after Mode Preset	Stop Freq after Mode Preset	Max Freq (can't tune above)
503 (all but N9000A)	1.805 GHz	3.6 GHz	3.7 GHz
503 (N9000A)	1.505 GHz	3.0 GHz	3.08 GHz
507 (all but N9000A)	3.505 GHz	7.0 GHz	7.1 GHz
507 (N9000A)	3.755 GHz	7.5 GHz	7.58 GHz
508 (all but N9038A)	1.805 GHz	3.6 GHz	8.5 GHz
508 (N9038A)	4.205 GHz	8.4 GHz	8.5 GHz
513	6.805 GHz	13.6 GHz	13.8 GHz
526 (all but N9000A and N9038A)	13.255 GHz	26.5 GHz	27.0 GHz
526 (N9000A)	13.255 GHz	26.5 GHz	26.55 GHz
526 (N9038A)	1.805 GHz	3.6 GHz	27.0 GHz
532	16.005 GHz	32.0 GHz	32.5 GHz
543	21.505 GHz	43.0 GHz	TBD
544	22.005 GHz	44.0 GHz	44.5 GHz
550	25.005 GHz	50.0 GHz	51 GHz

Input 2:

Model	CF after Mode Preset	Stop Freq after Mode Preset	Max Freq (can't tune above)
N9000A opt C75	0.7505GHz	1.5 GHz	1.58 GHz
N9038A	505 MHz	1 GHz	1.000025 GHz

Tracking Generator Frequency Limits (N9000A only):

Tracking Generator Option	Min Freq (clips to this freq when turn TG on and can't tune below while TG on)	If above this Freq, Stop Freq clipped to this Freq when TG turned on	Max Freq (can't tune above) while TG on
T03	9 kHz	3.0 GHz	3.08 GHz
T06	9 kHz	6.0 GHz	6.05 GHz

The following table shows the Center Frequency Presets for modes other than Spectrum Analyzer:

Mode	CF Preset for RF
WCDMA	1 GHz
WIMAXOFDMA, BASIC	1 GHz
ADEMOD	1 GHz
VSA	1 GHz
TDSCDMA	1 GHz
PNOISE	1 GHz
LTE	1 GHz
LTETDD	1 GHz
MSR	1 GHz
GSM	935.2 MHz
NFIGURE	1.505 GHz

RF Center Freq

SCPI command for specifying the RF Center Frequency. This command will set the Center Frequency to be used when the RF input is selected, even if the RF input is not the input that is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

Scope	Meas Global
Remote Command	<code>[:SENSe] :FREQuency:RF:CENTer <freq></code> <code>[:SENSe] :FREQuency:RF:CENTer?</code>
Example	FREQ:RF:CENT 30 MHz
Notes	This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode.
Dependencies	If the electronic/soft attenuator is enabled, any attempt to set Center Frequency such that the Stop

	Frequency would be >3.6 GHz fails and results in an advisory message. If the equivalent SCPI command is sent, this same message is generated as part of a “-221, Settings conflict” warning. If Source Mode is set to Tracking, and the Max or Min Center Freq is therefore limited by the limits of the source, a warning message is generated, “Data out of range;clipped to source max/min” if these limits are exceeded. Note that for an external source, these limits can be affected by the settings of Source Numerator, Source Denominator and Power Sweep.
Preset	See table above
State Saved	Saved in instrument state.
Min	-79.999995 MHz, unless Source Mode is set to Tracking, in which case it is limited by the minimum frequency of the Source
Max	See table above. Basically instrument maximum frequency - 5 Hz. Note that, if the Source Mode is set to Tracking, the effective instrument maximum frequency may be limited by the source maximum frequency. If the knob or step keys are being used, also depends on the value of the other three interdependent parameters Span, Start Frequency and Stop Frequency
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Ext Mix Center Freq

SCPI command for specifying the External Mixer Center Frequency. This command will set the Center Frequency to be used when the External Mixer is selected, even if the External Mixer input is not the input which is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

Scope	Meas Global
Remote Command	<code>[:SENSe] :FREQuency:EMIXer:CENTer <freq></code> <code>[:SENSe] :FREQuency:EMIXer:CENTer?</code>
Example	<code>:FREQ:EMIX:CENT 60 GHz</code> <code>:FREQ:EMIX:CENT?</code>
Notes	This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode.
Couplings	When returning to External Mixing after having been switched to one of the other inputs (e.g., RF), you will come back into the settings that you had when you left External Mixing. So you will come back to the band you were in with the Center Frequency that you had. However, Span is not an input-dependent parameter, therefore you will bring the span over from the other input. Therefore, the analyzer comes back with the span from the previous input, limited as necessary by the current mixer setup.
Preset	When a Mode Preset is performed while in External Mixing, the Start frequency of the current Mode is set to the nominal Min Freq of the lowest harmonic range in the Harmonic Table for the current mixer setup. Similarly, the Stop frequency of the current Mode is set to the nominal Max Freq of the highest harmonic range in the Harmonic Table. The Center Freq thus presets to the point arithmetically equidistant from these two frequencies.

	<p>If the current measurement has a limited Span available to it, and cannot achieve the Span shown in the table (Span=Stop Freq – Start Freq), the analyzer uses the maximum Span the measurement allows, and still sets the Center Freq to the midpoint of the Start and Stop Freq values in the Harmonic Table.</p> <p>When Restore Input/Output Defaults is performed, the mixer presets to the 11970A, whose Start and Stop frequencies are 26.5 and 40 GHz respectively. The center of these two frequencies is 33.25 GHz.</p> <p>Therefore, after a Restore Input/Output Defaults, if you go into External Mixing and do a Mode Preset while in the Spectrum Analyzer Mode, the resulting Center Freq is 33.25 GHz.</p>
State Saved	Saved in instrument state.
Min	The minimum frequency in the currently selected mixer band + 5 Hz
Max	The maximum frequency in the currently selected mixer band – 5 Hz If the knob or step keys are being used, also depends on the value of the other three interdependent parameters Span, Start Frequency and Stop Frequency
Initial S/W Revision	A.08.01

I/Q Center Freq

SCPI command for specifying the I/Q Center Frequency. This command will set the Center Frequency to be used when the I/Q input is selected, even if the I/Q input is not the input which is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

Scope	Meas Global
Remote Command	[:SENSe] :FREQuency:IQ:CENTer <freq> [:SENSe] :FREQuency:IQ:CENTer?
Example	FREQ:IQ:CENt: 30 MHz
Notes	This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode.
Preset	0 Hz
State Saved	Saved in instrument state.
Min	-40.049995 MHz
Max	40.049995 MHz
Initial S/W Revision	Prior to A.02.00

BMT Freq

Enables quick selection from a subset of the available ARFCN numbers for the Top, Middle, or Bottom frequency in the selected band.

Key Path	FREQ Channel
----------	--------------

Mode	GSM
Scope	Meas Global
Notes	This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this.
Dependencies	When I/Q Input is selected, this key is not available (blank).
Couplings	BMT choice changes ARFCN and Center Freq. Chosen ARFCN will be displayed on each menu key.
Range	Top Middle Bottom
Initial S/W Revision	Prior to A.02.00

BMT Freq Top

Sets the analyzer to the frequency of the highest ARFCN (Absolute RF Channel Number) of the selected radio band.

Key Path	FREQ Channel, BMT Freq
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel:ARFCn RFCHannel:TOP
Example	CHAN:ARFC:TOP
Notes	<ol style="list-style-type: none"> 1. This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. 2. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not displayed.
Couplings	Change [:SENSe]:CHANnel:ARFCn RFCHannel as follows: E-GSM: 124 P-GSM: 124 R-GSM: 124 DCS 1800: 885 PCS 1900: 810 GSM 450: 293 GSM 480: 340 GSM 700: 516 GSM 850: 251 T-GSM 810: 425 Change BMT ARFCN to BMT FreqTOP. Change [:SENSe]:FREQuency:CENter as follows: E-GSM: 959.800 MHz P-GSM: 959.800 MHz R-GSM: 959.800 MHz

	DCS 1800: 1879.80 MHz
	PCS 1900: 1989.80 MHz
	GSM 450: 467.400 MHz
	GSM 480: 495.800 MHz
	GSM 700: 792.800 MHz
	GSM 850: 893.800 MHz
	T-GSM810: 866.000 MHz

State Saved	No
Initial S/W Revision	Prior to A.02.00

BMT Freq Middle

Sets the analyzer to the frequency of the middle ARFCN (Absolute RF Channel Number) of the selected radio band.

Key Path	FREQ Channel, BMT Freq
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :ARFCn RFCHannel :MIDDLE</code>
Example	CHAN:ARFC:MIDD
Notes	<ol style="list-style-type: none"> 1. This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. 2. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not displayed.
Couplings	Change [:SENSe]:CHANnel:ARFCn RFCHannel as follows: E-GSM: 38 P-GSM: 63 R-GSM: 28 DSC 1800: 699 PCS 1900: 661 GSM 450: 276 GSM 480: 323 GSM 700: 477 GSM 850: 190 T-GSM 810: 388 Change BMT ARFCN to BMT FreqMIDDLE. Change [:SENSe]:FREQuency:CENTer as follows: E-GSM: 942.600 MHz P-GSM: 947.600 MHz R-GSM: 940.600 MHz

	DCS 1800: 1842.60 MHz
	PCS 1900: 1960.00 MHz
	GSM 450: 464.000 MHz
	GSM 480: 492.400 MHz
	GSM 700: 755.000 MHz
	GSM 850: 881.600 MHz
	T-GSM 810: 858.600 MHz
State Saved	No
Initial S/W Revision	Prior to A.02.00

BMT Freq Bottom

Sets the analyzer to the frequency of the lowest ARFCN (Absolute RF Channel Number) of the selected radio band.

Key Path	FREQ Channel, BMT Freq
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel:ARFCn RFChannel:BOTTom
Example	CHAN:ARFC:BOT
Notes	<ol style="list-style-type: none"> 1. This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. 2. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not displayed.
Couplings	Change [:SENSe]:CHANnel:ARFCn RFChannel as follows: E-GSM: 975 P-GSM: 1 R-GSM: 955 DCS 1800: 512 PCS 1900: 512 GSM 450: 259 GSM 480: 306 GSM 700: 438 GSM 850: 128 T-GSM 810: 350 Change BMT ARFCN to BMT FreqBOTTOM. Change [:SENSe]:FREQuency:CENTer as follows: E-GSM: 925.200 MHz P-GSM: 935.200 MHz R-GSM: 921.200 MHz

	DCS 1800: 1805.20 MHz PCS 1900: 1930.20 MHz GSM 450: 460.600 MHz GSM 480: 489.000 MHz GSM 700: 747.2 MHz GSM 850: 869.200 MHz T-GSM 810: 851.000 MHz
State Saved	No
Initial S/W Revision	Prior to A.02.00

Carrier Setup

Allows you to set carrier parameters.

Key Path	FREQ Channel
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Initial S/W Revision	A.06.00
Modified at S/W Revision	A.14.00

Carriers

Defines the number of carriers.

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :COUNT <integer></code> <code>[:SENSe] :CHANnel :CARRier :COUNT?</code>
Example	CHAN:CARR:COUN 3 CHAN:CARR:COUN?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Couplings	This can change when the SCPI command of the Carrier Power Present or the Carrier Interval is sent.
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	16

Initial S/W Revision	A.06.00
Modified at S/W Revision	A.13.00

Reference Carrier

Defines the reference active carrier. The Reference Carrier frequency point is always aligned with the Measurement Global Center Frequency. The minimum value 1 specifies the lowest frequency carrier among the active carriers. The maximum value specifies the highest frequency carrier among the active carriers.

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :RCARrier <integer></code> <code>[:SENSe] :CHANnel :CARRier :RCARrier?</code>
Example	CHAN:CARR:RCAR 3 CHAN:CARR:RCAR?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	The maximum value depends on the number of carriers. If you set it to more than the number of carriers, it's clipped to the number of carriers. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Couplings	When you decrease the number of carriers to a value which is less than this value, this is clipped to the value.
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	Number of carriers
Initial S/W Revision	A.06.00

Configure Carriers

Opens a menu of keys that allows you to configure carriers.

Key Path	FREQ Channel, Multi Carrier Setup
Dependencies	This key is grayed out when there is only one carrier. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Initial S/W Revision	A.06.00

Select Carrier

Selects a carrier to configure.

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	The maximum value depends on the number of carriers. This key is only shown when the N9071A–3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned. This parameter is unavailable when there is only one carrier.
Couplings	This value can change when you decrease the number of carriers.
Preset	1
State Saved	No
Min	1
Max	Number of carriers
Initial S/W Revision	A.06.00

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :CARRier :LIST :COUPle OFF ON 0 1, ... [:SENSe] :CHANnel :CARRier :LIST :COUPle ?
Example	CHAN:CARR:LIST:COUP OFF CHAN:CARR:LIST:COUP?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This key is only shown when the N9071A–3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	When Couple is selected, the carrier settings are coupled to carrier #1. Coupled parameters are Carrier Power Present, Carrier Interval. When a setting is changed, the couple is set to Man automatically. Carrier #1 is always set to couple and cannot be changed. Couple/Man selection on the Carrier key is not displayed when selected carrier number is #1.
Preset	ON
State Saved	No
Range	Couple Man
Initial S/W Revision	A.06.00

Carrier Power Present

Specifies whether each of carriers is active or not.

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :LIST :PPresent YES NO, ...</code> <code>[:SENSe] :CHANnel :CARRier :LIST :PPresent ?</code>
Example	CHAN:CARR:LIST:PPR YES CHAN:CARR:LIST:PPR?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode. Missing values are not permitted, therefore if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Dependencies	This parameter is unavailable when there is only one carrier. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	Coupled to the number of carriers. When the SCPI command is sent, the number of carriers will be set to the number of entries in the parameter list.
Preset	YES
State Saved	Saved in instrument state.
Range	Yes No
Initial S/W Revision	A.06.00

Carrier Interval

Specifies the frequency interval between the Carrier #n and #n+1 center frequencies.

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :LIST :INTerval <freq>, ...</code> <code>[:SENSe] :CHANnel :CARRier :LIST :INTerval ?</code>
Example	CHAN:CARR:LIST:INT 600k CHAN:CARR:LIST:INT?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode. The softkey for the last carrier (say, #N) is grayed out.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned. This parameter is unavailable when there is only one carrier.
Couplings	Coupled to the number of carriers. When the SCPI command is sent, the number of carriers will be

	set to the number of entries in the parameter list. Changing Carrier Interval might affect the Span.
Preset	600kHz
State Saved	Saved in instrument state.
Min	400 kHz
Max	100 MHz
Initial S/W Revision	A.06.00
Modified at S/W Revision	A.07.00, A.08.00

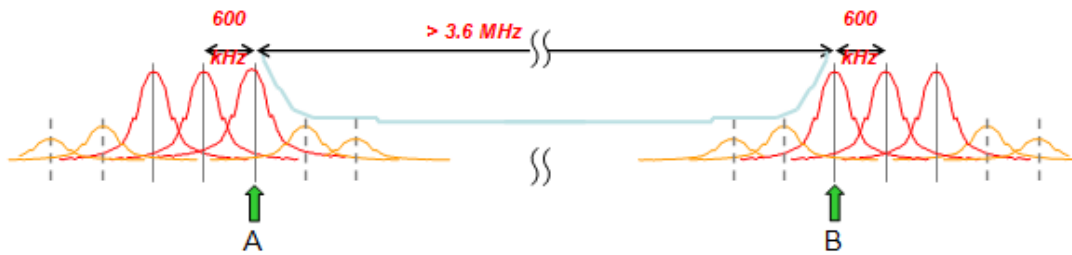
Carrier Frequency Allocation

Specifies the carrier frequency allocation. There are two types of allocation, contiguous and non-contiguous. Non-Contiguous frequency allocation is defined as an allocation where two groups of frequencies are separated with at least [3.6] MHz carrier separation between the innermost carriers. In case of the non-contiguous frequency allocation, tests will be measured between the uppermost carrier A of the lower frequency group and the lowermost carrier B of the upper frequency group.

See ["An example of non-contiguous frequency allocation" on page 1079](#)

Key Path	FREQ Channel, Multi Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :FALLocation</code> CONTiguous NCONTiguous <code>[:SENSe] :CHANnel :CARRier :FALLocation?</code>
Example	CHAN:CARR:FALL NCON CHAN:CARR:FALL?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This menu key is available only when the number of carriers is more than one. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Preset	CONTiguous
State Saved	Saved in instrument state.
Range	Contiguous Non-Contiguous
Readback Text	CONTiguous NCONTiguous
Initial S/W Revision	A.07.00

An example of non-contiguous frequency allocation



Non-Contiguous

Opens a menu of keys that allows you to set non-contiguous frequency allocation parameters.

Key Path	FREQ Channel, Multi Carrier Setup, Carr Freq Alloc
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Initial S/W Revision	A.07.00

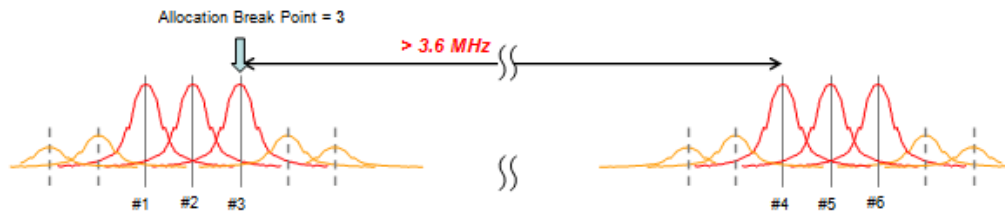
Allocation Break Pt

Specifies an allocation break point that is a sequence (or index) number of the uppermost carrier in the lower frequency group.

See ["An example of allocation break point" on page 1081](#)

Key Path	FREQ Channel, Multi Carrier Setup, Carr Freq Alloc, Non-Contiguous
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe]:CHANnel:CARRier:FALLocation:NCONtiguous:ABPoint <integer></code> <code>[:SENSe]:CHANnel:CARRier:FALLocation:NCONtiguous:ABPoint?</code>
Example	CHAN:CARR:FALL:NCON:ABP 3 CHAN:CARR:FALL:NCON:ABP?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	The maximum value depends on the number of carriers. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	This value can change when you decrease the number of carriers.
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	Number of carriers - 1
Initial S/W Revision	A.07.00
Modified at S/W Revision	A.13.00

An example of allocation break point



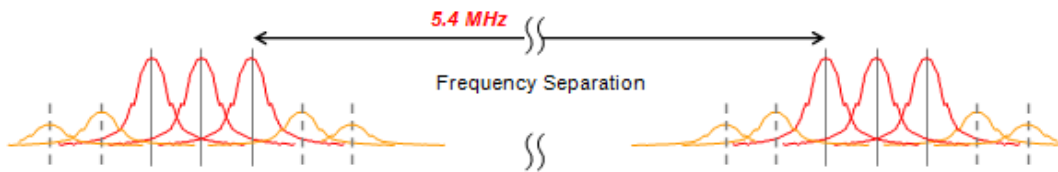
Freq Separation

Specifies frequency separation between the innermost of carriers.

See ["An example of frequency separation" on page 1082](#)

Key Path	FREQ Channel, Multi Carrier Setup, Carr Freq Alloc, Non-Contiguous
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :FALlocation :NCONtiguous :FSEParation <freq></code> <code>[:SENSe] :CHANnel :CARRier :FALlocation :NCONtiguous :FSEParation?</code>
Example	<code>CHAN:CARR:FALL:NCON:FSEP 5.4M</code> <code>CHAN:CARR:FALL:NCON:FSEP?</code>
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	Changing Frequency Separation might affect the Span
Preset	5.4 MHz
State Saved	Saved in instrument state.
Min	3.6 MHz
Max	100 MHz
Initial S/W Revision	A.07.00

An example of frequency separation



Carrier BPF

Selects whether to use the carrier bandpass filter.

Key Path	FREQ Channel, Multi Carrier SetupMode Setup, Demod
Mode	GSM
Remote Command	[:SENSe] :RADio :CARRier :NUMBer :AUTO ON OFF 1 0 [:SENSe] :RADio :CARRier :NUMBer :AUTO ?
Example	RAD:CARR:NUMB:AUTO 1 RAD:CARR:NUMB:AUTO ?
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	ON automatically changes to OFF when Multiple or Single is selected as Carrier BPF Type.
Preset	ON
State Saved	Saved in instrument state.
Range	Auto Man
Initial S/W Revision	A.06.00

Carrier BPF Type

Opens a menu of keys that allows you to select the type of the bandpass filter. When carriers other than the signal of interest are present, especially if they are strong, they can interfere with the measurement, making it difficult to sync and producing artificially high EVM results. When this condition exists, toggle from Single to Multi. A band-limited filter will help reduce the measurement interference.

BPF Type	Description
MULTiple	Enable multi carrier tolerance filter.
SINGle	Disable multi carrier tolerance filter

This parameter applies only to the following measurements:

- GMSK Phase & Frequency Error measurement
- EDGE EVM measurement
- GMSK Power vs. Time

- EDGE Power vs. Time

Key Path	FREQ Channel, Multi Carrier Setup, Carrier BPFMode Setup, Demod, Carrier BPF
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :RADio :CARRier :NUMBer SINGLE MULTiple</code> <code>[:SENSe] :RADio :CARRier :NUMBer ?</code>
Example	<code>RAD:CARR:NUMB SING</code> <code>RAD:CARR:NUMB ?</code>
Notes	The Carrier Bandpass Filter key is in the Mode Setup menu, but only EDGE EVM and GSM PFER measurements support this feature. In other measurements, this setting is not applicable. You must be in the GSM mode to use this command. Use <code>INSTRument:SElect</code> to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Preset	SINGLE
State Saved	Saved in instrument state.
Range	Single Multi
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

BTS Class

Selects a BTS class.

BTS Class	Definition
MC	Multicarrier BTS is defined as a class of BTS, characterized by the ability to, in addition to single carrier operation, process two or more carriers in common active RF components simultaneously, either in multicarrier transmitter only or, in both multicarrier transmitter and multicarrier receiver.
SC	Single carrier BTS is defined as a class of BTS, characterized by the ability to process one carrier in single carrier BTSs, not belonging to a Multicarrier BTS class.

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Remote Command	<code>[:SENSe] :CHANnel :CARRier :BASE :CLASs :AUTO ON OFF 1 0</code> <code>[:SENSe] :CHANnel :CARRier :BASE :CLASs :AUTO ?</code>
Example	<code>CHAN:CARR:BASE:CLAS:AUTO 1</code> <code>CHAN:CARR:BASE:CLAS:AUTO ?</code>
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.

Couplings	ON automatically changes to OFF when Multicarrier Class (MC) or Single carrier Class (SC) is selected as BTS Class.
Preset	ON
State Saved	Saved in instrument state.
Range	Auto Man
Initial S/W Revision	A.14.00

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :CARRier :BASE :CLASs SC MC [:SENSe] :CHANnel :CARRier :BASE :CLASs ?
Example	CHAN:CARR:BASE:CLAS MC CHAN:CARR:BASE:CLAS?

Notes

You must be in the GSM mode to use this command.
Use INSTRument:SElect to set the mode.
Selection C1 and C2 are supported for backwards compatibility.
When "C1" or "C2" is passed as SCPI command parameter, the BTS Class Auto is set to ON. As a result, it's converted to "SC" if the number of carriers is one, and otherwise "MC."

Dependencies	This parameter is available when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Preset	SC
State Saved	Saved in instrument state.
Range	Single Carrier Multi Carrier
Initial S/W Revision	A.06.00
Modified at S/W Revision	A.10.01, A14.00

Time Slot

Selects On or Off for slot searching. Generally, this feature is only valid in external and periodic timer trigger source modes that triggers every frame since another trigger source does not have the information that identifies the head of the frame. When Timeslot is set to On, the demodulation measurement is made on the nth timeslot specified by the trigger point + n timeslots, where n is the selected timeslot value 0 to 7.

This functionality is the same as Time Slot under the Freq/Channel menu.

Key Path	Mode Setup, Demod FREQ Channel
Mode	GSM

Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :SLOT <integer> [:SENSe] :CHANnel :SLOT? [:SENSe] :CHANnel :SLOT :AUTO OFF ON 0 1 [:SENSe] :CHANnel :SLOT :AUTO?
Example	CHAN:SLOT 0 CHAN:SLOT? CHAN:SLOT:AUTO OFF CHAN:SLOT:AUTO?
Notes	This functionality does not affect Combined GSM/EDGE measurement. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	0 OFF
State Saved	Saved in instrument state.
Min	0
Max	7
Initial S/W Revision	Prior to A.02.00

Burst Type

Sets the burst type that the analyzer will search for and to which it will synchronize.

This functionality is the same as Burst Type under the FREQ Channel menu.

Key	SCPI	Description
Sync (SCH)	SYNC	Burst length = 142 symbols Extended training sequences for CTS and COMPACT synchronization bursts are not supported.
Access (RACH)	ACCess	Burst length = 88 symbols Alternative training (synchronization) sequence "TS1" and "TS2" are supported only in GSMK Power vs. Time.
Normal - NB (TCH & CCH)	NORMal	Burst length = 142 symbols Softkey label will be changed to 'Normal - NB' form 'Normal'
Higher Symbol Rate - HB (TCH & CCH)	HSRate	Burst length = 169 symbols This selection key is only shown when the N9071A-3FP license is installed.
Mixed (NB/HB for TSC sync)	MIXed	Enables auto detection between Normal (NB) and HSR (HB) TCH & CCH EDGE Burst. This selection key is only shown when the N9071A-3FP license is installed.

Measurement synchronization capability (Burst Sync = Training Seq)

	Sync	Access	Normal		HSR	Mixed
			GMSK	8PSK		
				16QAM		
				32QAM		
				AQPSK		
GMSK Phase & Freq Error measurement	Yes	Yes	Yes	No	N/A	
GMSK Power vs. Time measurement	Yes	Yes	Yes	No	(measures as Normal GMSK when selected)	
GMSK Output RF Spectrum measurement (when Trigger Source is Periodic Timer and Sync Source is Off)	No	No	Yes	No		
EDGE EVM measurement	No	No	No	Yes	Yes	Yes
EDGE Power vs. Time measurement	Yes	Yes	Yes	Yes	Yes	Yes
EDGE Output RF Spectrum measurement (when Trigger Source is Periodic Timer and Sync Source is Off.)	No	No	Yes	Yes	Yes	Yes

Key Path	Mode Setup, Demod FREQ Channel
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :BURSt NORMal SYNC ACCess HSRate MIXed [:SENSe] :CHANnel :BURSt?
Example	CHAN:BURS NORM CHAN:BURS?
Notes	This functionality does not affect the Combined GSM/EDGE measurement. Higher Symbol Rate and Mixed selections are only available when the N9071A-3FP license is installed. Otherwise these menu keys are blank. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Higher Symbol Rate and Mixed selection keys are not shown unless N9071A-3FP is installed. When unlicensed and SCPI is sent, an undefined header error is returned. When "Mixed" is selected, the Burst Sync menu key under the Meas Setup menu will be grayed out and Training Sequence (TSC) will be used for synchronization. The sync algorithm always runs in Training Sequence (TSC) synchronization because the Burst Type can be determined by looking at TSC in the signal. Original selection of Burst Sync will become effective again when the Burst Type selection is changed from "Mixed" to another one.
Preset	NORMal
State Saved	Saved in instrument state.
Range	Sync (SCH) Access (RACH) Normal - NB (TCH & CCH) Higher Symbol Rate - HB (TCH & CCH) Mixed (NB/HB for TSC sync)

Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

TSC (Std)

Allows you to select the Training Sequence Code that determines which burst is to be measured. Applicable only when Burst Sync is set to Training Sequence in the measurement. In the case of AQPSK, this parameter specifies TSC number of VAMOS sub-channel A. TSC of VAMOS sub-channel B is ignored.

This functionality is the same as TSC under the FREQ Channel menu.

This parameter applies only to the following measurements:

- GMSK/EDGE Power vs. Time measurement
- GMSK Phase & Frequency Error measurement
- EDGE EVM measurement

Selection	SCPI	Description
AutoDet	ON 1	The measurement is made on the first burst found to have any one of the valid TSCs in the range of 0 to 7. The measurement may be made on various timeslots if more than one timeslot has one of the 8 valid TSCs.
Man	OFF 0	The measurement is made on the first burst found to have the selected TSC. TSC numbers in the range of 0 to 7 can be selected. The measurement may be made on various timeslots if more than one timeslot has this same TSC.

Key Path	Mode Setup, Demod FREQ Channel
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe]:CHANnel:TSCode <integer> [:SENSe]:CHANnel:TSCode? [:SENSe]:CHANnel:TSCode:AUTO OFF ON 0 1 [:SENSe]:CHANnel:TSCode:AUTO?
Example	CHAN:TSC 3 CHAN:TSC? CHAN:TSC:AUTO 1 CHAN:TSC:AUTO?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. When Sync or Access is selected as Burst Type, this key is grayed out.
Preset	0 ON

11 EDGE Tx Band Spur Measurement
FREQ/Channel

State Saved	Saved in instrument state.
Min	0
Max	7
Initial S/W Revision	Prior to A.02.00

Input/Output

See ["Input/Output" on page 196](#)

Marker

Accesses a menu that enables you to select, set up and control the markers for the current measurement.

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Select Marker

Displays 12 markers available for selection.

Key Path	Marker
Initial S/W Revision	Prior to A.02.00

Marker Type

Sets the marker control mode Normal, Delta and Off. All interactions and dependencies detailed under the key description are enforced when the remote command is sent.

Key Path	Marker
Mode	GSM
Remote Command	:CALCulate:ETSPur:MARKer[1] 2 ...12:MODE POSITION DELTA OFF :CALCulate:ETSPur:MARKer[1] 2 ...12:MODE?
Example	CALC:ETSP:MARK:MODE OFF CALC:ETSP:MARK:MODE?
Notes	If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules. At the same time, Marker X Axis Value appears on the Active Function area. Default Active Function: the active function for the selected marker's current control mode. If the current control mode is Off, there is no active function and the active function is turned off. Active Function Display: the marker X axis value entered in the active function area displays the marker value to its full entered precision. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	OFF
State Saved	Saved in instrument state.
Range	Normal Delta Off
Initial S/W Revision	Prior to A.02.00

Marker X Axis Value (Remote Command Only)

Sets the marker X Axis value in the current marker X Axis Scale unit. It has no effect if the control mode is Off, but is the SCPI equivalent of entering an X value if the control mode is Normal or Delta.

Mode	GSM
Remote Command	:CALCulate:ETSPur:MARKer[1] 2 ...12:X <real> :CALCulate:ETSPur:MARKer[1] 2 ...12:X?
Example	CALC:ETSP:MARK3:X 0 CALC:ETSP:MARK3:X?
Notes	If no suffix is sent, uses the fundamental units for the current marker X Axis Scale. If a suffix is sent that does not match the current marker X Axis Scale unit, an error "Invalid suffix" is generated. The query returns the marker's absolute X Axis value if the control mode is Normal, or the offset from the marker's reference marker if the control mode is Delta. The query is returned in the fundamental units for the current marker X Axis scale: Hz for Frequency and Inverse Time, seconds for Period and Time. If the marker is Off the response is Not A Number (NaN). You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	Max value is changed.
Preset	After a preset, all markers are turned OFF, so Marker X Axis Value query returns a not a number (NaN).
State Saved	No
Min	-9.9E37
Max	9.9E37
Initial S/W Revision	Prior to A.02.00

Marker X Axis Position (Remote Command Only)

Sets the marker X position in trace points. It has no effect if the control mode is Off, but is the SCPI equivalent of entering a value if the control mode is Normal or Delta except in trace points rather than X Axis Scale units. The entered value is immediately translated into the current X Axis Scale units for setting the value of the marker.

Mode	GSM
Remote Command	:CALCulate:ETSPur:MARKer[1] 2 ...12:X:POSition <integer> :CALCulate:ETSPur:MARKer[1] 2 ...12:X:POSition?
Example	CALC:ETSP:MARK10:X:POS 10 CALC:ETSP:MARK10:X:POS?
Notes	The query returns the marker's absolute X Axis value in trace points if the control mode is Normal, or the offset from the marker's reference marker in trace points if the control mode is Delta. If the marker is Off the response is not a number. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	Max value is changed.
Preset	After a preset, all markers are turned OFF, so Marker X Axis Value query returns a not a number

	(NAN).
State Saved	No
Min	-9.9E37
Max	9.9E37
Initial S/W Revision	Prior to A.02.00

Marker Y Axis Value (Remote Command Only)

Returns the marker Y Axis value in the current marker Y Axis unit.

The “result” of a marker is the value which is displayed on the second line of the Marker Result block. To properly interpret the returned value the remote programmer must also know what the analyzer’s Y-Axis Unit is set to as described below.

A marker can have up to two results, only one of which is displayed or returned on a query, as follows:

- **Absolute** result: every marker has an absolute result and it is simply:

For Normal and Delta markers, the Y-axis value of the trace point the marker is currently on.

The absolute result is displayed in the result block or returned on a query unless the marker control mode is Delta.

- **Relative** result: if a marker’s control mode is Delta, the relative result is displayed in the result block or returned on a query. This is the ratio of the Absolute Result of a delta marker to the Absolute Result of its reference marker.

Mode	GSM
Remote Command	:CALCulate:ETSPur:MARKer[1] 2 ...12:Y?
Example	CALC:ETSPur:MARK11:Y?
Notes	The query returns the marker Y-axis result. If the marker is Off the response is not a number. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	0
State Saved	No
Backwards Compatibility SCPI	:CALCulate:ETSPur:MARKer[1] 2 ...4:FUNCTION:RESult?
Initial S/W Revision	Prior to A.02.00

Properties

Accesses a menu that allows you to set marker properties and to access the marker trace menu.

Key Path	Marker
Initial S/W Revision	Prior to A.02.00

Select Marker

Displays 12 markers available for selection.

Key Path	Marker
Initial S/W Revision	Prior to A.02.00

Relative To

Selects the marker that the selected marker is relative to (its reference marker).

Key Path	Marker, Properties
Mode	GSM
Remote Command	:CALCulate:ETSPur:MARKer[1] 2 ...12:REfERENCE <integer> :CALCulate:ETSPur:MARKer[1] 2 ...12:REfERENCE?
Example	CALC:ETSP:MARK:REF 5 CALC:ETSP:MARK:REF?
Notes	A marker cannot be relative to itself so that choice is grayed out, and if sent from SCPI generates error -221: "Settings conflict; marker cannot be relative to itself." You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode. When queried a single value is returned (the specified marker numbers relative marker).
Preset	2 3 4 5 6 7 8 9 10 11 12 1
State Saved	Saved in instrument state.
Min	1
Max	12
Initial S/W Revision	Prior to A.02.00

Marker Trace

Assigns the specified marker to the designated trace.

Key Path	Marker, Properties
Mode	GSM
Remote Command	:CALCulate:ETSPur:MARKer[1] 2 ...12:TRACe SPECTrum ULIMit :CALCulate:ETSPur:MARKer[1] 2 ...12:TRACe?
Example	CALC:ETSP:MARK:TRACE ULIM CALC:ETSP:MARK:TRACE?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Preset	SPECTrum

State Saved	Saved in instrument state.
Range	Spectrum Upper Limit
Initial S/W Revision	Prior to A.02.00

Couple Markers

When toggled on, moving any marker causes an equal X Axis movement of every other marker which is not Off. By “equal X Axis movement” we mean that we preserve the difference between each marker’s X Axis value (in the fundamental x-axis units of the trace that marker is on) and the X Axis value of the marker being moved (in the same fundamental x-axis units).

This may result in markers going off screen.

Key Path	Marker
Mode	GSM
Remote Command	:CALCulate:ETSPur:MARKer:COUPle[:STATe] ON OFF 1 0 :CALCulate:ETSPur:MARKer:COUPle[:STATe]?
Example	CALC:ETSP:MARK:COUP ON CALC:ETSP:MARK:COUP?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

All Markers Off

Turns off all markers.

Key Path	Marker
Mode	GSM
Remote Command	:CALCulate:ETSPur:MARKer:AOff
Example	CALC:ETSPur:MARK:AOff
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Initial S/W Revision	Prior to A.02.00

Marker State (Backwards Compatibility/Remote Command Only)

Sets or queries the state of a marker. Setting a marker which is OFF to state ON or 1 puts it in Normal mode and places it at the center of the screen.

Mode	EDGE GSM
Remote Command	:CALCulate:ETSPur:MARKer[1] 2 ...12:STATe OFF ON 0 1 :CALCulate:ETSPur:MARKer[1] 2 ...12:STATe?
Example	CALC:ETSP:MARK3:STAT ON CALC:ETSP:MARK3:STAT?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

Marker Function

There is no functionality for this front-panel key in this measurement. When pressed, this key displays a blank menu.

Key Path	Front-panel key
Mode	EDGE GSM

Marker To

There is no functionality for this front-panel key in this measurement. When pressed, this key displays a blank menu.

Key Path	Front-panel key
Mode	EDGE GSM

Meas

The information in this section is common to all measurements. For key and remote command information for a specific measurement, refer to the section that describes the measurement of interest.

Measurements available under the Meas key are specific to the current Mode.

When viewing Help for measurements, note the following:

NOTE

Operation for some keys differs between measurements. The information displayed in Help pertains to the current measurement. To see how a key operates in a different measurement, exit Help (press the Cancel Esc key), select the measurement, then reenter Help (press the Help key) and press that key.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Remote Measurement Functions

This section contains the following topics:

["Measurement Group of Commands" on page 2302](#)

["Current Measurement Query \(Remote Command Only\)" on page 2304](#)

["Limit Test Current Results \(Remote Command Only\)" on page 2304](#)

["Data Query \(Remote Command Only\)" on page 2304](#)

["Calculate/Compress Trace Data Query \(Remote Command Only\)" on page 2305](#)

["Calculate Peaks of Trace Data \(Remote Command Only\)" on page 2310](#)

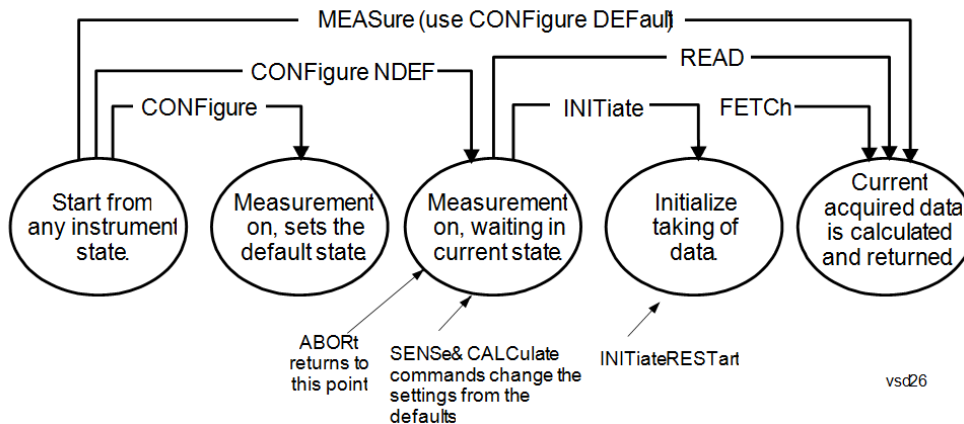
[Hardware-Accelerated Fast Power Measurement \(Remote Command Only\)](#)

["Format Data: Numeric Data \(Remote Command Only\)" on page 2311](#)

["Format Data: Byte Order \(Remote Command Only\)" on page 2312](#)

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Measurement Group of Commands



Measure Commands:

:MEASure:<measurement>[n]?

This is a fast single-command way to make a measurement using the factory default instrument settings. These are the settings and units that conform to the Mode Setup settings (e.g. radio standard) that you have currently selected.

- Stops the current measurement (if any) and sets up the instrument for the specified measurement using the factory defaults
- Initiates the data acquisition for the measurement
- Blocks other SCPI communication, waiting until the measurement is complete before returning results.
- If the function does averaging, it is turned on and the number of averages is set to 10.
- After the data is valid it returns the scalar results, or the trace data, for the specified measurement. The type of data returned may be defined by an [n] value that is sent with the command.
- The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available.
- ASCII is the default format for the data output. (Older versions of Spectrum Analysis and Phase Noise mode measurements only use ASCII.) The binary data formats should be used for handling large blocks of data since they are smaller and faster than the ASCII format. Refer to the FORMat:DATA command for more information.

If you need to change some of the measurement parameters from the factory default settings you can set up the measurement with the CONFigure command. Use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to change the settings. Then you can use the READ? command to initiate the measurement and query the results.

If you need to repeatedly make a given measurement with settings other than the factory defaults, you can use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to set up the measurement. Then use the READ? command to initiate the measurement and query results.

Measurement settings persist if you initiate a different measurement and then return to a previous one. Use READ:<measurement>? if you want to use those persistent settings. If you want to go back to the default settings, use MEASure:<measurement>?.

Configure Commands:

:CONFigure:<measurement>

This command stops the current measurement (if any) and sets up the instrument for the specified measurement using

the factory default instrument settings. It does not initiate the taking of measurement data unless INIT:CONTinuous is ON. If you change any measurement settings after using the CONFigure command, the READ command can be used to initiate a measurement without changing the settings back to their defaults.

In the Swept SA measurement in Spectrum Analyzer mode the CONFigure command also turns the averaging function on and sets the number of averages to 10 for all measurements.

:CONFigure: <measurement>: NDEFault stops the current measurement and changes to the specified measurement. It does not change the settings to the defaults. It does not initiate the taking of measurement data unless INIT:CONTinuous is ON.

The CONFigure? query returns the current measurement name.

The CONFigure:CATalog? query returns a quoted string of all licensed measurement names in the current mode. For example, "SAN, CHP, OBW, ACP, PST, TXP, SPUR, SEM, LIST".

Fetch Commands:

:FETCh:<measurement>[n]?

This command puts selected data from the most recent measurement into the output buffer. Use FETCh if you have already made a good measurement and you want to return several types of data (different [n] values, for example, both scalars and trace data) from a single measurement. FETCh saves you the time of re-making the measurement. You can only FETCh results from the measurement that is currently active, it will not change to a different measurement. An error message is reported if a measurement other than the current one is specified.

If you need to get new measurement data, use the READ command, which is equivalent to an INITiate followed by a FETCh.

The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used for handling large blocks of data since they are smaller and transfer faster than the ASCII format. (FORMat:DATA)

FETCh may be used to return results other than those specified with the original READ or MEASure command that you sent.

INITiate Commands:

:INITiate:<measurement>

This command is not available for measurements in all the instrument modes:

- Initiates a trigger cycle for the specified measurement, but does not output any data. You must then use the FETCh<meas> command to return data. If a measurement other than the current one is specified, the instrument will switch to that measurement and then initiate it.
 - For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. If you send INIT:ACP? it will change from channel power to ACP and will initiate an ACP measurement.
 - Does not change any of the measurement settings. For example, if you have previously started the ACP measurement and you send INIT:ACP? it will initiate a new ACP measurement using the same instrument settings as the last time ACP was run.
 - If your selected measurement is currently active (in the idle state) it triggers the measurement, assuming the trigger conditions are met. Then it completes one trigger cycle. Depending upon the measurement and the number of averages, there may be multiple data acquisitions, with multiple trigger events, for one full trigger cycle. It also holds off additional commands on GPIB until the acquisition is complete.
-

READ Commands:

:READ:<measurement>[n]?

- Does not preset the measurement to the factory default settings. For example, if you have previously initiated the ACP
-

measurement and you send READ:ACP? it will initiate a new measurement using the same instrument settings.

- Initiates the measurement and puts valid data into the output buffer. If a measurement other than the current one is specified, the instrument will switch to that measurement before it initiates the measurement and returns results.
 - For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. Then you send READ:ACP? It will change from channel power back to ACP and, using the previous ACP settings, will initiate the measurement and return results.
 - Blocks other SCPI communication, waiting until the measurement is complete before returning the results
 - If the optional [n] value is not included, or is set to 1, the scalar measurement results will be returned. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used when handling large blocks of data since they are smaller and faster than the ASCII format. (FORMat:DATA)
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Current Measurement Query (Remote Command Only)

This command returns the name of the measurement that is currently running.

Remote Command	:CONFigure?
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Example	CONF?
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Limit Test Current Results (Remote Command Only)

Queries the status of the current measurement limit testing. It returns a 0 if the measured results pass when compared with the current limits. It returns a 1 if the measured results fail any limit tests.

Remote Command	:CALCulate:CLIMits:FAIL?
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Example	CALC:CLIM:FAIL? queries the current measurement to see if it fails the defined limits. Returns a 0 or 1: 0 it passes, 1 it fails.
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Data Query (Remote Command Only)

Returns the designated measurement data for the currently selected measurement and subopcode.

n = any valid subopcode for the current measurement. See the measurement command results table for your current measurement, for information about what data is returned for the subopcodes.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. (See the format command descriptions under Input/Output in the Analyzer Setup section.)

Remote Command	:CALCulate:DATA[n]?
Notes	The return trace depends on the measurement. In CALCulate:<meas>:DATA[n], n is any valid subopcode for the current measurement. It returns the same data as the FETCH:<measurement>? query where <measurement> is the current measurement.
Initial S/W Revision	Prior to A.02.00

Calculate/Compress Trace Data Query (Remote Command Only)

Returns compressed data for the currently selected measurement and sub-opcode [n].

n = any valid sub-opcode for that measurement. See the MEASure:<measurement>? command description of your specific measurement for information on the data that can be returned.

The data is returned in the current Y Axis Unit of the analyzer. The command is used with a sub-opcode <n> (default=1) to specify the trace. With trace queries, it is best if the analyzer is not sweeping during the query. Therefore, it is generally advisable to be in Single Sweep, or Update=Off.

This command is used to compress or decimate a long trace to extract and return only the desired data. A typical example would be to acquire N frames of GSM data and return the mean power of the first burst in each frame. The command can also be used to identify the best curve fit for the data.

Remote Command	:CALCulate:DATA<n>:COMPRESS? BLOCK CFIT MAXimum MINimum MEAN DMEan RMS RMSCubed SAMPLE SDEVIation PPHase [,<soffset> [,<length>[,<roffset>[,<rlimit>]]]]
Example	To query the mean power of a set of GSM bursts: Supply a signal that is a set of GSM bursts. Select the IQ Waveform measurement (in IQ Analyzer Mode). Set the sweep time to acquire at least one burst. Set the triggers such that acquisition happens at a known position relative to a burst. Then query the mean burst levels using, CALC:DATA2:COMP? MEAN, 24e-6, 526e-6 (These parameter values correspond to GSM signals, where 526e-6 is the length of the burst in the slot and you just want 1 burst.)
Notes	The command supports 5 parameters. Note that the last 4 (<soffset>, <length>, <roffset>, <rlimit>) are optional. But these optional parameters must be entered in the specified order. For example, if you want to specify <length>, then you must also specify <soffset>. See details below for a definition of each of these parameters. This command uses the data in the format specified by FORMat:DATA, returning either binary or ASCII data.
Initial S/W Revision	Prior to A.02.00

- BLOCK or block data - returns all the data points from the region of the trace data that you specify. For example, it could be used to return the data points of an input signal over several timeslots, excluding the portions of the trace data that you do not want. (This is x,y pairs for trace data and I,Q pairs for complex data.)

- CFIT or curve fit - applies curve fitting routines to the data. <soffset> and <length> are required to define the data that you want. <roffset> is an optional parameter for the desired order of the curve equation. The query will return the following values: the x-offset (in seconds) and the curve coefficients ((order + 1) values).

MIN, MAX, MEAN, DME, RMS, RMSC, SAMP, SDEV and PPH return one data value for each specified region (or <length>) of trace data, for as many regions as possible until you run out of trace data (using <roffset> to specify regions). Or they return the number of regions you specify (using <rlimit>) ignoring any data beyond that.

- MINimum - returns the minimum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the minimum magnitude of the I/Q pairs is returned.
- MAXimum - returns the maximum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the maximum magnitude of the I/Q pairs is returned.
- MEAN - returns a single value that is the arithmetic mean of the data point values (in dB/ dBm) for the specified region(s) of trace data. For I/Q trace data, the mean of the magnitudes of the I/Q pairs is returned. See the following equations.

-

NOTE

If the original trace data is in dB, this function returns the arithmetic mean of those log values, not log of the mean power which is a more useful value. The mean of the log is the better measurement technique when measuring CW signals in the presence of noise. The mean of the power, expressed in dB, is useful in power measurements such as Channel Power. To achieve the mean of the power, use the RMS option.

Equation 1

Mean Value of Data Points for Specified Region(s)

$$\text{MEAN} = \frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 2

Mean Value of I/Q Data Pairs for Specified Region(s)

$$\text{MEAN} = \frac{1}{n} \sum_{X_i \in \text{region}(s)} |X_i|$$

where $|X_i|$ is the magnitude of an I/Q pair, and n is the number of I/Q pairs in the specified region(s).

- DMEan - returns a single value that is the mean power (in dB/ dBm) of the data point values for the specified region(s) of trace data. See the following equation:

Equation 3

DMEan Value of Data Points for Specified Region(s)

$$\text{DME} = 10 \times \log_{10} \left(\frac{1}{n} \sum_{X_i \in \text{region}(s)} 10^{\frac{X_i}{10}} \right)$$

- RMS - returns a single value that is the average power on a root-mean-squared voltage scale (arithmetic rms) of the data point values for the specified region(s) of trace data. See the following equation.

NOTE For I/Q trace data, the rms of the magnitudes of the I/Q pairs is returned. See the following equation. This function is very useful for I/Q trace data. However, if the original trace data is in dB, this function returns the rms of the log values which is not usually needed.

Equation 4

RMS Value of Data Points for Specified Region(s)

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i^2}$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 5

RMS Value of I/Q Data Pairs for Specified Region(s)

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region(s).

Once you have the rms value for a region of trace data (linear or I/Q), you may want to calculate the mean power. You must convert this rms value (peak volts) to power in dBm:

$$10 \times \log[10 \times (\text{rms value})^2]$$

- SAMPlE - returns the first data value (x,y pair) for the specified region(s) of trace data. For I/Q trace data, the first I/Q pair is returned.
- SDEViation - returns a single value that is the arithmetic standard deviation for the data point values for the specified region(s) of trace data. See the following equation.
- For I/Q trace data, the standard deviation of the magnitudes of the I/Q pairs is returned. See the following equation.

Equation 6

Standard Deviation of Data Point Values for Specified Region(s)

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (X_i - \bar{X})^2}$$

where X_i is a data point value, \bar{X} is the arithmetic mean of the data point values for the specified region (s), and n is the number of data points in the specified region(s).

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (|X_i| - \bar{X})^2}$$

where $|X_i|$ is the magnitude of an I/Q pair, \bar{X} is the mean of the magnitudes for the specified region(s), and n is the number of data points in the specified region(s).

- PPHase - returns the x,y pairs of both rms power (dBm) and arithmetic mean phase (radian) for every specified region and frequency offset (Hz). The number of pairs is defined by the specified number of regions. This parameter can be used for I/Q vector ($n=0$) in Waveform (time domain) measurement and all parameters are specified by data point in PPHase.

The rms power of the specified region may be expressed as:

$$\text{Power} = 10 \times \log [10 \times (\text{RMS I/Q value})] + 10.$$

The RMS I/Q value (peak volts) is:

$$\sqrt{\frac{1}{n} \sum_{X_i \in \text{region}} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region.

The arithmetic mean phase of the specified region may be expressed as:

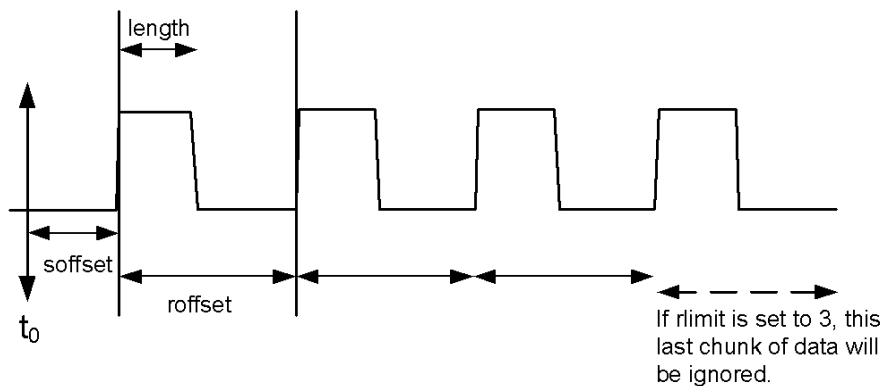
$$\frac{1}{n} \sum_{Y_i \in \text{region}} Y_i$$

where Y_i is the unwrapped phase of I/Q pair with applying frequency correction and n is the number of I/Q pairs in the specified region.

The frequency correction is made by the frequency offset calculated by the arithmetic mean of every specified region's frequency offset. Each frequency offset is calculated by the least square method against the unwrapped phase of I/Q pair.

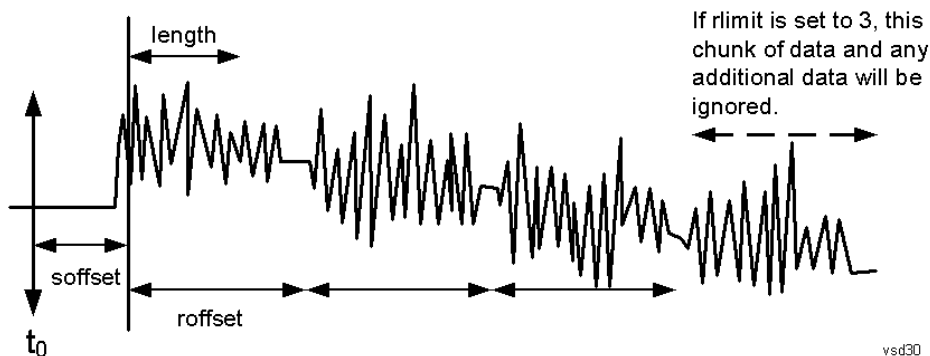
Sample Trace Data - Constant Envelope

(See below for explanation of variables.)



Sample Trace Data - Not Constant Envelope

(See below for explanation of variables.)



<soffset> - start offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It specifies the amount of data at the beginning of the trace that will be ignored before the decimation process starts. It is the time or frequency change from the start of the trace to the point where you want to start using the data. The default value is zero.

<length> - is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines how much data will be compressed into one value. This parameter has a default value equal to the current trace length.

<roffset> - repeat offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines the beginning of the next field of trace elements to be compressed. This is relative to the beginning of the previous field. This parameter has a default value equal to the <length> variable. Note that this parameter is used for a completely different purpose when curve fitting (see CFIT above).

<rlimit> - repeat limit is an optional integer. It specifies the number of data items that you want returned. It will ignore any additional items beyond that number. You can use the Start offset and the Repeat limit to pick out exactly what part of the data you want to use. The default value is all the data.

Calculate Peaks of Trace Data (Remote Command Only)

Returns a list of all the peaks for the currently selected measurement and sub-opcode [n]. The peaks must meet the requirements of the peak threshold and excursion values.

n = any valid sub-opcode for the current measurement. See the MEASure:<measurement> command description of your specific measurement for information on the data that can be returned.

The command can only be used with specific sub-opcodes with measurement results that are trace data. Both real and complex traces can be searched, but complex traces are converted to magnitude in dBm. In many measurements the sub-opcode n=0, is the raw trace data which cannot be searched for peaks. And Sub-opcode n=1, is often calculated results values which also cannot be searched for peaks.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. If the format is set to INT,32, it returns REAL,32 data.

The command has four types of parameters:

- Threshold (in dBm)
- Excursion (in dB)
- Sorting order (amplitude, frequency, time)
- Optional in some measurements: Display line use (all, > display line, < display line)

Remote Command	<p>For Swept SA measurement:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME[,ALL GTDLline LTDLine]]</pre> <p>For most other measurements:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME]</pre>
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Example	<p>Example for Swept SA measurement in Spectrum Analyzer Mode:</p> <p>CALC:DATA4:PEAK? -40, 10, FREQ, GTDL This will identify the peaks of trace 4 that are above -40 dBm, with excursions of at least 10 dB. The peaks are returned in order of increasing frequency, starting with the lowest frequency. Only the peaks that are above the display line are returned.</p> <p>Query Results 1:</p> <p>With FORMat:DATA REAL, 32 selected, it returns a list of floating-point numbers. The first value in the list is the number of peak points that are in the following list. A peak point consists of two values: a peak amplitude followed by its corresponding frequency (or time).</p> <p>If no peaks are found the peak list will consist of only the number of peaks, (0).</p>
----------------	---

Notes	<p><n> - is the trace that will be used</p> <p><threshold> - is the level below which trace data peaks are ignored. Note that the threshold value is required and is always used as a peak criterion. To effectively disable the threshold criterion for this command, provide a substantially low threshold value such as -200 dBm. Also note that the threshold value used in this command is independent of and has no effect on the threshold value stored under the Peak Criteria menu.</p> <p><excursion> - is the minimum amplitude variation (rise and fall) required for a signal to be identified as peak. Note that the excursion value is required and is always used as a peak criterion. To effectively disable the excursion criterion for this command, provide the minimum value of 0.0 dB. Also note that the excursion value used in this command is independent of and has no effect on the</p>
--------------	---

excursion value stored under the Peak Criteria menu.

Values must be provided for threshold and excursion. The sorting and display line parameters are optional (defaults are AMPLitude and ALL).

Note that there is always a Y-axis value for the display line, regardless of whether the display line state is on or off. It is the current Y-axis value of the display line which is used by this command to determine whether a peak should be reported

Sorting order:

AMPLitude - lists the peaks in order of descending amplitude, with the highest peak first (default if optional parameter not sent)

FREQuency - lists the peaks in order of occurrence, left to right across the x-axis.

TIME - lists the peaks in order of occurrence, left to right across the x-axis.

Peaks vs. Display Line:

ALL - lists all of the peaks found (default if optional parameter not sent).

GTDLine (greater than display line) - lists all of the peaks found above the display line.

LTDLine (less than display line) - lists all of the peaks found below the display line.

Initial S/W Revision Prior to A.02.00

Format Data: Numeric Data (Remote Command Only)

This command specifies the format of the trace data input and output. It specifies the formats used for trace data during data transfer across any remote port. It affects only the data format for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]?, :CALCulate:DATA[n]? and FETCh:SANalyzer [n]? commands and queries.

Remote Command :FORMat [:TRACe] [:DATA] ASCii|INTeger,32|REAL,32 |REAL,64
:FORMat [:TRACe] [:DATA] ?

Notes The query response is:
ASCii: ASC,8
REAL,32: REAL,32
REAL,64: REAL,64
INTeger,32: INT,32

When the numeric data format is REAL or ASCii, data is output in the current Y Axis unit. When the data format is INTeger, data is output in units of m dBm (.001 dBm).

The INT,32 format returns binary 32-bit integer values in internal units (m dBm), in a definite length block.

Dependencies Sending a data format spec with an invalid number (for example, INT,48) generates no error. The analyzer simply uses the default (8 for ASCii, 32 for INTeger, 32 for REAL).

Sending data to the analyzer which does not conform to the current FORMat specified, results in an error. Sending ASCII data when a definite block is expected generates message -161 "Invalid Block Data" and sending a definite block when ASCII data is expected generates message -121 "Invalid Character in Number".

Preset ASCii

Backwards Compatibility Notes Note that the INT,32 format is only applicable to the command, TRACe:DATA. This preserves backwards compatibility for the Swept SA measurement. For all other commands/queries which honor FORMat:DATA, if INT,32 is sent the analyzer will behave as though it were set to REAL,32.

Initial S/W Revision Prior to A.02.00

The specs for each output type follow:

ASCIi - Amplitude values are in ASCII, in the current Y Axis Unit, one ASCII character per digit, values separated by commas, each value in the form:

SX.YYYYYEsZZ

Where:

S = sign (+ or -)

X = one digit to left of decimal point

Y = 5 digits to right of decimal point

E = E, exponent header

s = sign of exponent (+ or -)

ZZ = two digit exponent

REAL,32 - Binary 32-bit real values in the current Y Axis Unit, in a definite length block.

REAL,64 - Binary 64-bit real values in the current Y Axis Unit, in a definite length block.

Format Data: Byte Order (Remote Command Only)

This command selects the binary data byte order for data transfer and other queries. It controls whether binary data is transferred in normal or swapped mode. This command affects only the byte order for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]? , :CALCulate:DATA[n]? and FETCh:SANalyzer[n]? commands and queries.

By definition any command that says it uses FORMat:DATA uses any format supported by FORMat:DATA.

The NORMal order is a byte sequence that begins with the most significant byte (MSB) first, and ends with the least significant byte (LSB) last in the sequence: 1|2|3|4. SWAPPed order is when the byte sequence begins with the LSB first, and ends with the MSB last in the sequence: 4|3|2|1.

Remote Command	:FORMat:BORDER NORMal SWAPPed :FORMat:BORDER?
Preset	NORMal
Initial S/W Revision	Prior to A.02.00

Meas Setup

Displays the measurement setup menu for the currently selected measurement.

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Avg/Hold Num

Used to specify the number of data acquisitions that are averaged. After the specified number of average counts, the averaging mode (terminal control) setting determines the averaging action.

- On: Sets measurement averaging on.
- Off: Sets measurement averaging off.

Key Path	Meas Setup
Mode	GSM
Remote Command	[:SENSe]:ETSPur:AVERage:COUNT <integer> [:SENSe]:ETSPur:AVERage:COUNT? [:SENSe]:ETSPur:AVERage[:STATe] OFF ON 0 1 [:SENSe]:ETSPur:AVERage[:STATe]?
Example	ETSP:AVER:COUN 3 ETSP:AVER:COUN? ETSP:AVER ON ETSP:AVER?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	30 ON
State Saved	Saved in instrument state.
Min	1
Max	10000
Initial S/W Revision	Prior to A.02.00

Avg Mode

Select the type of termination control used for the averaging function. This determines the averaging action after the specified number of data acquisitions (average count) is reached.

Key	SCPI	Mode
Exponential	EXPonential	Each successive data acquisition after the average count is reached, is

Key	SCPI	Mode
		exponentially weighted and combined with the existing average.
Repeat	REPeat	After reaching the average count, the averaging is reset and a new average is started.
<hr/>		
Key Path	Meas Setup	
Mode	GSM	
Remote Command	[:SENSe]:ETSPur:AVERage:TCONtrol EXPOnential REPeat [:SENSe]:ETSPur:AVERage:TCONtrol?	
Example	ETSP:AVER:TCON REP ETSP:AVER:TCON?	
Notes	Valid only when Avg/Hold Num is set to On. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.	
Preset	REPeat	
State Saved	Saved in instrument state.	
Range	Exp Repeat	
Initial S/W Revision	Prior to A.02.00	

Avg Type

Select the type of averaging.

- LOG – The log of the power is averaged. (This is also known as video averaging.)
- MAXimum – The maximum values are retained. Remove from MUI.
- RMS – The power is averaged, providing the rms of the voltage.

Key Path	Meas Setup	
Mode	GSM	
Remote Command	[:SENSe]:ETSPur:AVERage:TYPE LOG MAXimum RMS [:SENSe]:ETSPur:AVERage:TYPE?	
Example	ETSP:AVER:TYPE RMS ETSP:AVER:TYPE?	
Notes	MAXimum is SCPI only, no MUI. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.	
Couplings	Selecting 'MAXimum' via SCPI forces to change the state of Trace to 'MAXHold'. Selecting 'LOG' or 'RMS' via SCPI forces to change the state of Trace to 'AVERage'.	
Preset	MAXimum	

State Saved	Saved in instrument state.
Range	Pwr Avg (RMS) Log-Pwr Avg (Video)
Initial S/W Revision	Prior to A.02.00

Meas Type

Select the measurement type from the following selections:

Key	SCPI	Type
Full	FULL	In Continuous Measure, it repeatedly does full search of all segments.
Examine	EXAMine	In Continuous Measure, after doing one full search across all segments, it parks on the worst segment and continuously updates that segment.

Key Path	Meas Setup
Mode	GSM
Remote Command	[:SENSe] :ETSPur:TYPE EXAMine FULL [:SENSe] :ETSPur:TYPE?
Example	ETSP:TYPE FULL ETSP:TYPE?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	FULL
State Saved	Saved in instrument state.
Range	Examine Full
Initial S/W Revision	Prior to A.02.00

IF Gain

To take full advantage of the RF dynamic range of the analyzer, a switched IF amplifier with approximately 10 dB of gain is available. When it can be turned on without an overload, the dynamic range is always better with it on than off. The IF Gain key can be used to set the IF Gain function to Auto, or to On (the extra 10 dB) or Off. These settings affect sensitivity and IF overloads.

Key Path	Meas Setup, Advanced
Initial S/W Revision	Prior to A.02.00

IF Gain Auto

Activates the auto rules for IF Gain. Auto rules set IF Gain to Low Gain.

Key Path	Meas Setup
Mode	GSM
Remote Command	<code>[:SENSe] :ETSPur :IF :GAIN :AUTO [:STATe] ON OFF 1 0</code> <code>[:SENSe] :ETSPur :IF :GAIN :AUTO [:STATe] ?</code>
Example	ETSPur:IF:GAIN:AUTO ON ETSPur:IF:GAIN:AUTO?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	Couple to IF Gain State.
Preset	ON
State Saved	Saved in instrument state.
Range	Auto Man
Initial S/W Revision	Prior to A.02.00

IF Gain State

Selects the range of IF gain.

Key Path	Meas Setup
Mode	GSM
Remote Command	<code>[:SENSe] :ETSPur :IF :GAIN [:STATe] ON OFF 1 0</code> <code>[:SENSe] :ETSPur :IF :GAIN [:STATe] ?</code>
Example	ETSPur:IF:GAIN ON ETSPur:IF:GAIN?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. where ON = high gain OFF = low gain
Couplings	Coupled to IF Gain Auto , which may force it to Man.
Preset	OFF
State Saved	Saved in instrument state.
Range	Low Gain (Best for Large Signals) High Gain (Best Noise Level)
Initial S/W Revision	Prior to A.02.00

Limit

Set the value for the test limit. This command does not accept units. Use :CALCulate:ETSPur:LIMit:TEST to select the units dBm (absolute) or dB (relative).

- dBm – Absolute limit
- dBc – Relative to Mean Transmit Power.

Key Path	Meas Setup
Mode	GSM
Remote Command	:CALCulate:ETSPur:LIMit[:UPPer][:DATA] <real> :CALCulate:ETSPur:LIMit[:UPPer][:DATA]? :CALCulate:ETSPur:LIMit:TEST ABSolute RELative :CALCulate:ETSPur:LIMit:TEST?
Example	CALC:ETSP:LIM -10 CALC:ETSP:LIM? CALC:ETSP:LIM:TEST ABS CALC:ETSP:LIM:TEST?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	Selection of Front Panel Unit/Terminator Key changes this BAF parameter, absolute or relative. If you select dBm for terminator, BAF parameter should be changed to ABSolute(dBm).
Preset	-36.00 ABSolute
State Saved	Saved in instrument state.
Min	-200
Max	100
Initial S/W Revision	Prior to A.02.00

Meas Preset

Restores all the measurement parameters to their default values.

Key Path	Meas Setup
Mode	GSM
Remote Command	:CONFigure:ETSPur
Example	CONF:ETSP
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Initial S/W Revision	Prior to A.02.00

Tx Band Custom Setting (SCPI only)

Customizes the Tx Band frequency of the analyzer. You can send two frequency values; Tx Band Lower Edge and Tx Band Upper Edge. If you send only one value, then Tx Band Lower Edge is changed.

Key Path	SCPI only
Mode	GSM
Remote Command	[:SENSe]:ETSPur:TXBand:RANGe <freq>, <freq>

	<code>[:SENSe] :ETSPur :TXBand :RANGe?</code>
Example	ETSP:TXB:RANG 935 MHz, 960 MHz ETSP:TXB:RANG?
Preset	935 MHz, 960 MHz
State Saved	Saved in instrument state.
Min	-80 MHz
Max	Depends on instrument maximum frequency
Initial S/W Revision	A.14.00

Tx Band Customize (SCPI only)

Selects whether to customize the Tx Band frequency of the analyzer or use the predefined Tx Band. When CUSTom is selected, Tx Band Custom Setting is applied to the measurement band.

Key Path	SCPI only
Mode	GSM
Remote Command	<code>[:SENSe] :ETSPur :TXBand DEFault CUSTom</code> <code>[:SENSe] :ETSPur :TXBand?</code>
Example	ETSP:TXB CUST ETSP:TXB?
Preset	DEFault
State Saved	Saved in instrument state.
Range	DEFault CUSTom
Initial S/W Revision	A.14.00

11 EDGE Tx Band Spur Measurement
Mode

Mode

See "[Mode](#)" on page 274

Mode Preset

Returns the active mode to a known state.

Mode Preset does the following for the currently active mode:

- Aborts the currently running measurement.
- Brings up the default menu for the mode, with no active function.
- Sets measurement Global settings to their preset values for the active mode only.
- Activates the default measurement.
- Brings up the default menu for the mode.
- Clears the input and output buffers.
- Sets Status Byte to 0.

Mode Preset does not:

- Cause a mode switch
- Affect mode persistent settings
- Affect system settings

See "[How-To Preset](#)" on page 1118 for more information.

Key Path	Front-panel key
Remote Command	:SYSTem:PRESet
Example	:SYST:PRES
Notes	*RST is preferred over :SYST:PRES for remote operation. *RST does a Mode Preset, as done by the :SYST:PRES command, and it sets the measurement mode to Single measurement rather than Continuous for optimal remote control throughput. Clears all pending OPC bits. The Status Byte is set to 0.
Couplings	A Mode Preset aborts the currently running measurement, activates the default measurement, and gets the mode to a consistent state with all of the default couplings set.
Backwards Compatibility Notes	In the X-Series, the legacy "Factory Preset" has been replaced with Mode Preset, which only presets the currently active mode, not the entire instrument. In the X-Series, the way to preset the entire instrument is by using System, Restore System Defaults All, which behaves essentially the same way as restore System Defaults does on ESA and PSA. There is also no "Preset Type" as there is on the PSA. There is a green Mode Preset front-panel key that does a Mode Preset and a white-with-green-letters User Preset front-panel key that does a User Preset. The old PRESet:TYPE command is ignored (without generating an error), and SYST:PRES without a parameter does a Mode Preset, which should cover most backward code compatibility issues. The settings and correction data under the Input/Output front-panel key (examples: Input Z Corr, Ext Amp Gain, etc.) are no longer part of any Mode, so they will not be preset by a Mode Preset. They are preset using Restore Input/Output Defaults, Restore System Defaults All. Note that because User Preset does a Recall State, and all of these settings are saved in State, they ARE recalled when using

	User Preset.
Initial S/W Revision	Prior to A.02.00

How-To Preset

The table below shows all possible presets, their corresponding SCPI commands and front-panel access (key paths). Instrument settings depend on the current measurement context. Some settings are local to the current measurement, some are global (common) across all the measurements in the current mode, and some are global to all the available modes. In a similar way, restoring the settings to their preset state can be done within the different contexts.

Auto Couple - is a measurement local key. It sets all Auto/Man parameter couplings in the measurement to Auto. Any Auto/Man selection that is local to other measurements in the mode will not be affected.

Meas Preset - is a measurement local key. Meas Preset resets all the variables local to the current measurement except the persistent ones.

Mode Preset - resets all the current mode's measurement local and measurement global variables except the persistent ones.

Restore Mode Defaults - resets ALL the Mode variables (and all the Meas global and Meas local variables), including the persistent ones.

Type Of Preset	SCPI Command	Front Panel Access
Auto Couple	:COUPle ALL	Auto Couple front-panel key
Meas Preset	:CONFigure:<Measurement>	Meas Setup Menu
Mode Preset	:SYSTem:PRESet	Mode Preset (green key)
Restore Mode Defaults	:INSTrument:DEFault	Mode Setup Menu
Restore All Mode Defaults	:SYSTem:DEFault MODes	System Menu; Restore System Default Menu
*RST	*RST	not possible (Mode Preset with Single)
Restore Input/Output Defaults	:SYSTem:DEFault INPUt	System Menu; Restore System Default Menu
Restore Power On Defaults	:SYSTem:DEFault PON	System Menu; Restore System Default Menu
Restore Alignment Defaults	:SYSTem:DEFault ALIGN	System Menu; Restore System Default Menu
Restore Miscellaneous Defaults	:SYSTem:DEFault MISC	System Menu; Restore System Default Menu
Restore All System Defaults	:SYSTem:DEFault [ALL] :SYSTem:PRESet:PERsistent	System Menu; Restore System Default Menu
User Preset	:SYSTem:PRESet:USER	User Preset Menu
User Preset All Modes	:SYSTem:PRESet:USER:ALL	User Preset Menu

Power On Mode Preset	:SYSTem:PON:TYPE MODE	System Menu
Power On User Preset	:SYSTem:PON:TYPE USER	System Menu
Power On Last State	:SYSTem:PON:TYPE LAST	System Menu

Mode Setup

See "[Mode Setup](#)" on page 294

Peak Search

Places the selected marker on the trace point with the maximum y-axis value for that marker's trace.

Key Path	Front-panel key
Mode	GSM
Remote Command	:CALCulate:ETSPur:MARKer[1] 2 ...12:MAXimum
Example	CALC:ETSP:MARK2:MAX
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Initial S/W Revision	Prior to A.02.00

Min Peak Search (Backwards Compatibility/Remote Command Only)

Mode	GSM
Remote Command	:CALCulate:ETSPur:MARKer[1] 2 ...12:MINimum
Example	CALC:ETSP:MARK:MIN
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Initial S/W Revision	Prior to A.02.00

11 EDGE Tx Band Spur Measurement
Print

Print

See ["Print" on page 325](#)

Quick Save

The Quick Save front-panel key repeats the most recent save that was performed from the Save menu, with the following exceptions:

- Register saves are not remembered as Saves for the purpose of the Quick Save function
- If the current measurement does not support the last non-register save that was performed, an informational message is generated, “File type not supported for this measurement”

Quick Save repeats the last type of qualified save (that is, a save qualified by the above criteria) in the last save directory by creating a unique filename using the Auto File Naming algorithm described below.

If Quick Save is pressed after startup and before any qualified Save has been performed, the Quick Save function performs a Screen Image save using the current settings for Screen Image saves (current theme, current directory), which then becomes the “last save” for the purpose of subsequent Quick Saves.

The Auto File Naming feature automatically generates a file name for use when saving a file. The filename consists of a prefix and suffix separated by a dot, as is standard for the Windows® file system. A default prefix exists for each of the available file types:

Type	Default Prefix	Menu
State	State_	(Save/Recall)
Trace + State	State_	(Save/Recall)
Screen	Screen_	(Save/Recall)
Amplitude Corrections	Ampcor_	(Import/Export)
Traces	Trace_	(Import/Export)
Limit Lines	LLine_	(Import/Export)
Measurement Result	MeasR_	(Import/Export)
Capture Buffer	CapBuf_	(Import/Export)

A four digit number is appended to the prefix to create a unique file name. The numbering sequence starts at 0000 within each Mode for each file type and updates incrementally to 9999, then wraps to 0000 again. It remembers where it was through a Mode Preset and when leaving and returning to the Mode. It is reset by Restore Misc Defaults and Restore System Defaults and subsequent running of the instrument application. So, for example, the first auto file name generated for State files is State_0000.state. The next is State_0001, and so forth.

One of the key features of Auto File Name is that we guarantee that the Auto File Name will never conflict with an existing file. The algorithm looks for the next available number. If it gets to 9999, then it looks for holes. If it find no holes, that is no more numbers are available, it gives an error.

For example, if when we get to State_0010.state there is already a State_0010.state file in the current directory, it advances the counter to State_0011.state to ensure that no conflict will exist (and then it verifies that State_0011.state also does not exist in the current directory and advances again if it does, and so forth).

If you enter a file name for a given file type, then the prefix becomes the filename you entered instead of the default prefix, followed by an underscore. The last four letters (the suffix) are the 4-digit number.

For example, if you save a measurement results file as “fred.csv”, then the next auto file name chosen for a measurement results save will be fred_0000.csv.

NOTE

Although 0000 is used in the example above, the number that is used is actually the current number in the Meas Results sequence, that is, the number that would have been used if you had not entered your own file name.

NOTE

If the filename you entered ends with _dddd, where d=any number, making it look just like an auto file name, then the next auto file name picks up where you left off with the suffix being dddd + 1.

Key Path	Front-panel key
Notes	No remote command for this key specifically.
Initial S/W Revision	Prior to A.02.00

Recall

The Recall menu lets you choose what you want to recall, and where you want to recall it from. Among the types of files you can recall are **States and Traces**. In addition, an Import (Data) option lets you recall a number of data types stored in CSV files (as used by Excel and other spreadsheet programs).

The default paths for Recall are data type dependent and are the same as for the Save key.

Key Path	Front-panel key
Notes	<p>No remote command for this key specifically, but the :MMEM:LOAD command is available for specific file types. An example is :MMEM:LOAD:STATe <filename>.</p> <p>If you try to recall a State file for a mode that is not licensed or not available in the instrument, an error message will occur and the state will not change.</p>
Backwards Compatibility Notes	<p>In legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly (since User Preset is actually loading a state), it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, “state” always includes all of this data; so whenever state is loaded, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p>
Backwards Compatibility Notes	<p>Recall for the X-Series supports backward compatibility in the sense that you can recall a state file from any X-Series model number and any version of X-Series software. This is only possible if part of the recalling process goes through a limiting step after recalling the mode settings, at least for settings that may vary with version number, model number, option and license differences. If you try to recall a state file onto an instrument with less capability than what was available on the instrument during the save, the recall will ignore the state it doesn't support and it will limit the recalled setting to what it allows.</p> <p>Example: if the saved state includes preamp ON, but the recalling instrument does not have a preamp; the preamp is limited to OFF. Conversely, if you save a state without a preamp, the preamp is OFF in the state file. When this saved file is recalled on an instrument with a licensed preamp, the preamp is changed to OFF. Another example is if the saved state has center frequency set to 20 GHz, but the instrument recalling the saved state is a different model and only supports 13.5 GHz. In this case, the center frequency is limited along with any other frequency based settings. Since the center frequency can't be preserved in this case, the recall limiting tries to at least preserve span to keep the measurement setup as intact as possible.</p> <p>It may be appropriate to issue a warning if the state is limited on the recall; warnings do not go out to SCPI so this would only affect the manual user.</p> <p>Note that there is no state file compatibility outside of the X-Series. For example, you cannot recall a state file from ESA or PSA.</p>
Initial S/W Revision	Prior to A.02.00

State

The Recall State menu lets you choose a register or file from which to recall the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings that were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the

additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, GPIB address) are not affected by either a Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

Since each state file is only for one Mode, the settings for other Modes are unaffected when it is loaded. Recall State will cause a mode switch if the state being recalled is not from the current active mode.

After the recall completes, the message "File <filename> recalled" or "Recalled State Register <register number>" is displayed.

For rapid recalls, the State menu lists 16 registers that you can choose from to recall. Pressing a Register key initiates the recall. You can also select a file from which to recall.

The default path for all State Files is:

My Documents\<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

See ["More Information" on page 1127](#).

Key Path	Recall
Mode	All
Remote Command	:MMEMory:LOAD:STATe <filename>
Example	:MMEM:LOAD:STAT "myState.state" This recalls the file myState.state on the default path
Example	MMEM:LOAD:STAT "MyStateFile.state" This loads the state file data (on the default file directory path) into the instrument state.
Notes	<p>When you pick a file to recall, the analyzer first verifies that the file is recallable in the current instrument by checking the software version and model number of the instrument. If everything matches, a full recall proceeds by aborting the currently running measurement, clearing any pending operations, and then loading the State from the saved state file. You can open state files from any mode, so recalling a State file switches to the mode that was active when the save occurred. After switching to the mode of the saved state file, mode settings and data (if any for the mode) are loaded with values from the saved file. The saved measurement of the mode becomes the newly active measurement and the data relevant to the measurement (if there is any) is recalled.</p> <p>If there is a mismatch between file version or model number or instrument version or model number, the recall function tries to recall as much as possible and returns a warning message. It may limit settings that differ based on model number, licensing or version number.</p> <p>After recalling the state, the Recall State function does the following:</p> <ul style="list-style-type: none"> • Makes the saved measurement for the mode the active measurement. • Clears the input and output buffers. • Status Byte is set to 0. • Executes a *CLS <p>If the file specified is empty an error is generated. If the specified file does not exist, another error is generated. If there is a mismatch between the file and the proper file type, an error is generated. If</p>

	there is a mismatch between file version or model number or instrument version or model number, a warning is displayed. Then it returns to the State menu and File Open dialog goes away. After the Recall, the analyzer exits the Recall menu and returns to the previous menu.
Backwards Compatibility SCPI	:MMEMory:LOAD:STATe 1,<filename> For backwards compatibility, the above syntax is supported. The "1" is simply ignored.
Initial S/W Revision	Prior to A.02.00

More Information

In measurements that support saving Traces, for example, Swept SA, the Trace data is saved along with the State in the State file. When recalling the State, the Trace data is recalled as well. Traces are recalled exactly as they were stored, including the writing mode and update and display modes. If a Trace was updating and visible when the State was saved, it will come back updating and visible, and its data will be rewritten right away. When you use State to save and recall traces, any trace whose data must be preserved should be placed in View or Blank mode before saving.

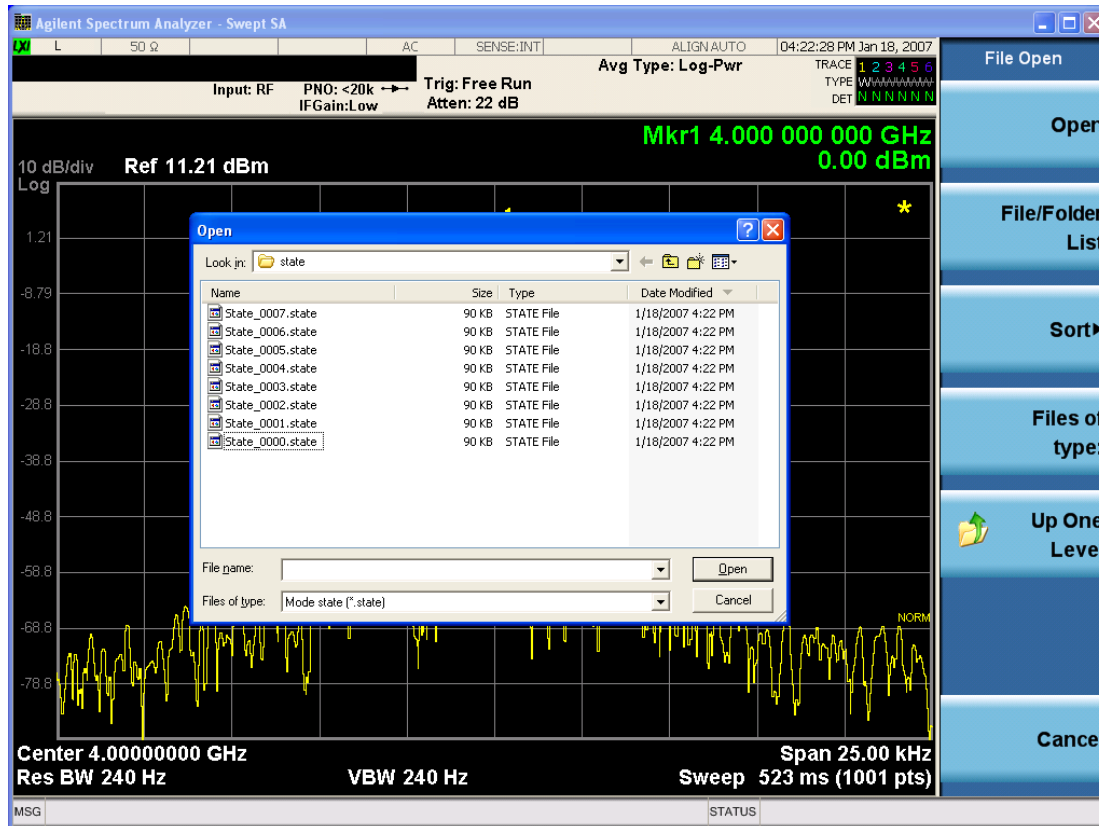
The following table describes the Trace Save and Recall possibilities:

You want to recall state and one trace's data, leaving other traces unaffected.	Save Trace+State from 1 trace. Make sure that no other traces are updating (they should all be in View or Blank mode) when the save is performed.	On Recall, specify the trace you want to load the one trace's data into. This trace will load in View. All other traces' data will be unaffected, although their trace mode will be as it was when the state save was performed.
You want to recall all traces	Save Trace+State from ALL traces.	On Recall, all traces will come back in View (or Blank if they were in Blank or Background when saved)
You want all traces to load exactly as they were when saved.	Save State	On recall, all traces' mode and data will be exactly as they were when saved. Any traces that were updating will have their data immediately overwritten.

From File...

When you press "From File", the analyzer brings up a Windows dialog and a menu entitled "File Open." This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

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Listed below are the functions of the various fields in the dialog, and the corresponding softkeys:

Open

Performs the recall of the specified file. While the recall is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Look In.

Look In

The Look In field shows the path from which the file will be recalled and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Look In field** first uses the last path from the Save As dialog **Save In:** path for that same file type. There is no softkey for directly navigating to the Look In field, but you can use the left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

Sort

Accesses a menu that enables you to sort the files within the File Open dialog. Only one sorting type can be selected at a time and the sorting happens immediately. The sorting types are By Date, By Name, By extension, and By Size.

Files of Type

This field shows the file suffix for the type of file you have selected to recall. For example, if you navigated here while recalling State, "Mode state (*.state)" is in the field. If you navigated here while recalling Trace, ""Mode state (*.trace)" is in the field. If you navigated here while importing a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown menu, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Open** request to be cancelled. The ESC key does the same thing.

Key Path	Recall, State
Notes	Brings up the Open dialog for recalling a State Save Type
Initial S/W Revision	Prior to A.02.00

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

For more information and the SCPI command, see Edit Register Names under the Save, State function.

Key Path	Recall, State
Mode	All
Dependencies	N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending the SCPI command generates an error, -221, "Settings conflict;Option not available"
Initial S/W Revision	A.11.00

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last

modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

Key Path	Recall, State
Example	*RCL 1
Range	1–16 from front panel, 1–128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State, Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	Prior to A.11.00

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

Key Path	Recall, State
Example	*RCL 1
Range	1-16 from front panel, 1-128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State,Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	Prior to A.11.00

Restart

The Restart function restarts the current sweep, or measurement, or set of averaged/held sweeps or measurements. If you are Paused, pressing Restart does a Resume.

The Restart function is accessed in several ways:

- Pressing the Restart key
- Sending the remote command INIT:IMMEDIATE
- Sending the remote command INIT:RESTART

See "[More Information](#)" on page 1132

Key Path	Front-panel key
Remote Command	:INITiate[:IMMEDIATE] :INITiate:RESTART
Example	:INIT:IMM :INIT:REST
Notes	:INITiate:RESTART and :INITiate:IMMEDIATE perform exactly the same function.
Couplings	Resets average/hold count k. For the first sweep overwrites all active (update=on) traces with new current data. For application modes, it resets other parameters as required by the measurement.
Status Bits/OPC dependencies	This is an Overlapped command. The STATus:OPERation register bits 0 through 8 are cleared. The STATus:QUESTionable register bit 9 (INTegrity sum) is cleared. The SWEEPING bit is set. The MEASURING bit is set.
Backwards Compatibility Notes	For Spectrum Analysis mode in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart trace averages (displayed average count reset to 1) for a trace in Clear Write, but did not restart Max Hold and Min Hold. In the X-Series, the Restart hardkey and the INITiate:RESTART command restart not only Trace Average, but MaxHold and MinHold traces as well. For wireless comms modes in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart every measurement, which includes all traces and numeric results. There is no change to this operation.
Initial S/W Revision	Prior to A.02.00

More Information

The **Restart** function first aborts the current sweep/measurement as quickly as possible. It then resets the sweep and trigger systems, sets up the measurement and initiates a new data measurement sequence with a new data acquisition (sweep) taken once the trigger condition is met.

If the analyzer is in the process of aligning when **Restart** is executed, the alignment finishes before the restart function is performed.

Even when set for Single operation, multiple sweeps may be taken when Restart is pressed (for example, when averaging/holding is on). Thus when we say that **Restart** "restarts a measurement," we may mean:

- It restarts the current sweep
- It restarts the current measurement
- It restarts the current set of sweeps if any trace is in Trace Average, Max Hold or Min Hold
- It restarts the current set of measurements if Averaging, or Max Hold, or Min Hold is on for the measurement
- depending on the current settings.

With **Average/Hold Number** (in **Meas Setup** menu) set to 1, or Averaging off, or no trace in Trace Average or Hold, a single sweep is equivalent to a single measurement. A single sweep is taken after the trigger condition is met; and the analyzer stops sweeping once that sweep has completed. However, with **Average/Hold Number** >1 and at least one trace set to **Trace Average, Max Hold, or Min Hold (SA Measurement)** or **Averaging on (most other measurements)**, multiple sweeps/data acquisitions are taken for a single measurement. The trigger condition must be met prior to each sweep. The sweep is stopped when the average count k equals the number N set for **Average/Hold Number**. A measurement average usually applies to all traces, marker results, and numeric results; but sometimes it only applies to the numeric results.

Once the full set of sweeps has been taken, the analyzer will go to idle state. To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command `CALC:AVER:TCON UP`.

Save

The Save menu lets you choose what you want to save and where you want to save it. Among the types of files you can save are **States**, **Traces**, and **Screen Images**. In addition, an Export (Data) option lets you save a number of data types as CSV files for easy import into Excel and other spreadsheet programs.

Key Path	Front-panel key
Mode	All
Notes	No remote command for this key specifically, but the :MMEM:STORe command is available for specific file types. An example is :MMEM:STOR:STATe <filename>.
Initial S/W Revision	Prior to A.02.00

State

The Save State menu lets you choose a register or file for saving the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings which were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, Verbose SCPI) are not affected by either Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

After the save completes, the message "File <filename> saved" or "State Register <register number> saved" is displayed.

For rapid saving, the State menu lists 16 registers to save to. Pressing a Register key initiates the save. You can also select a file to save to.

The default path for all State Files is:

My Documents\<<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

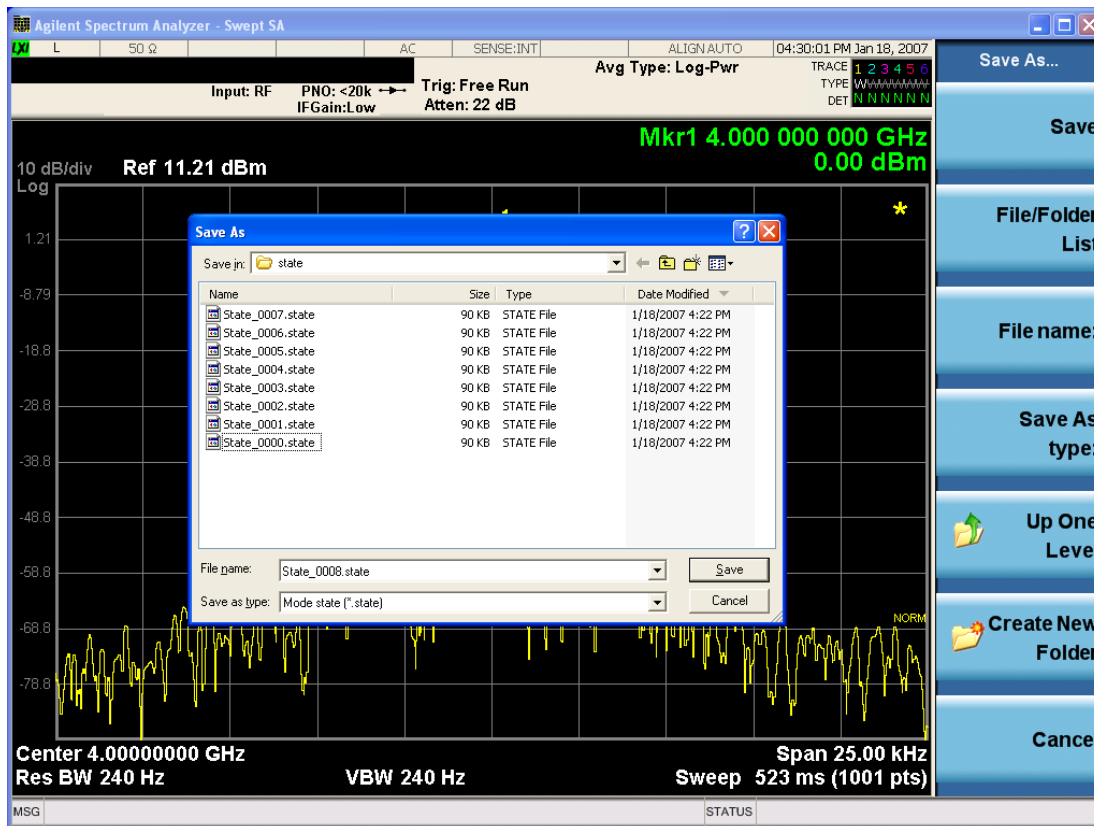
Key Path	Save
Mode	All
Remote Command	:MMEMory:STORe:STATe <filename>
Example	MMEM:STOR:STATe "MyStateFile.state" This stores the current instrument state data in the file MyStateFile.state in the default directory.
Notes	Both single and double quotes are supported for any filename parameter over remote. After saving to a register, that register's menu key is updated with the date the time, unless a custom label has been entered for that key. After saving to a register, you remain in the Save State menu, so that you can see the Register key

update. After saving to a file, the analyzer automatically returns to the previous menu and any Save As dialog goes away.

Backwards Compatibility SCPI	:MMEMoRY:STORe:STATe 1,<filename>
Initial S/W Revision	Prior to A.02.00

To File . . .

When you press “To File”, the analyzer brings up a Windows dialog and a menu entitled “**Save As.**” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



The Listed below

are the functions of the various fields in the dialog, and the corresponding softkeys:

Save

Performs the save to the specified file of the selected type. If the file already exists, a dialog will appear that allows you to replace the existing file by selecting OK, or you can Cancel the request. If you select OK, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade.

While the save is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Save In.

Save In

The Save In field shows the path to which the file will be saved and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Save In field** defaults to the default path for this type of file and remembers the last path you used to save this type of file. There is no softkey for directly navigating to the Save In field but you can use left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

File Name

The File Name field is initially loaded with an automatically generated filename specific to the appropriate Save Type. The automatically generated filename is guaranteed not to conflict with any filename currently in the directory. You may replace or modify this filename using the File Name key. See the ["Quick Save " on page 2328](#) documentation for more on the automatic file naming algorithm.

When you press the File Name key the analyzer displays the Alpha Editor. Use the knob to choose the letter to add and the front-panel Enter key to add the letter to the file name. The BK character moves you back and the FW character moves you forward in the filename. The Select key on the front panel generates a space character. When you are done entering the filename press the Done softkey. This returns back to the **File Open** dialog and menu, but does not cause the save to occur.

Save As Type

This field shows the file suffix for the type of file you have selected to save. For example, if you navigated here while saving State, "Mode state (*.state)" is in the field. If you navigated here from saving Trace, ""Mode state (*.trace)" is in the field. If you navigated here while exporting a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Create New Folder

This key corresponds to the icon of a folder with the "*" that is in the tool bar of the dialog. When pressed, a new folder is created in the current directory with the name **New Folder** and you can enter a new folder name using the Alpha Editor.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Save As** request to be cancelled. The ESC key does the same thing.

Key Path	Save, State
Mode	All
Notes	Brings up Save As dialog for saving a State Save Type
Initial S/W Revision	Prior to A.02.00

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

See ["More Information" on page 1137](#)

Key Path	Save, State
Mode	All
Remote Command	:MMEMory:REGister:STATe:LABel <reg number>,"label" :MMEMory:REGister:STATe:LABel? <reg number>
Example	:MMEM:REG:STAT:LAB 1,"my label"
Notes	<reg number> is an integer from 1 to 16. If the SCPI specifies an invalid register number an error message is generated, -222,"Data out of range;Invalid register label number" "label" is a string from 0 to 30 characters in length. If a label exceeds 30 characters, an error message is generated, -150,"String data error;Label clipped to 30 characters" "label" of length 0 erases the custom label and restores the default (time and date) label. E.g.: :MMEM:REG:STAT:LAB 1,""
Dependencies	N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending this command generates an error, -221,"Settings conflict;Option not available"
Preset	The names are unaffected by Preset or power cycle but are set to the default label (time and date) on a "Restore System Defaults->Misc"
Initial S/W Revision	A.11.00

More Information

When you edit one of the register names, the time and date field will be replaced by the custom name.

If you delete all the characters in the custom name, it restores the default (time and date).

The register names are stored within the state files, but they are not part of the instrument state; that is, once you have edited a register name, loading a new state will not change that register name. Another consequence of this is that the names will be persistent through a power cycle. Also, if a named state file is transferred to another analyzer, it will bring its custom name along with it.

If you try to edit the name of an empty register, the analyzer will first save the state to have a file to put the name in. If you load a named state file into an analyzer with older firmware it will ignore the metadata.

The *SAV and *RCL commands will not be affected by the custom register names, nor will the MMEM commands.

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

Key Path	Save, State
Mode	All
Example	*SAV 1
Range	1–16 from front panel, 1–128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.11.00

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

Key Path	Save, State
Mode	All
Example	*SAV 1
Range	1-16 from front panel, 1-128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.11.00

Data (Export)

Exporting a data file stores data from the current measurement to mass storage files. The Export Menu only contains data types that are supported by the current measurement.

Since the commonly exported data files are in .csv format, the data can be edited by you prior to importing. This allows you to export a data file, manipulate the data in Excel (the most common PC Application for manipulating .csv files) and then import it.

Selecting an Export Data menu key will not actually cause the exporting to occur, since the analyzer still needs to know where you wish to save the data. Pressing the Save As key in this menu brings up the Save As dialog and Save As menu that allows you to specify the destination file and directory. Once a filename has been selected or entered in the Open menu, the export will occur as soon as the Save key is pressed.

Key Path	Save
Mode	All
Notes	The menu is built from whatever data types are available for the mode. So the key locations in the sub menu will vary. No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:STORe commands.
Dependencies	If a file type is not used by a certain measurement, that type is grayed out for that measurement. The key for a file type will not show at all if there are no measurements in the Mode that support it.
Preset	Is not affected by a Preset or shutdown, but is reset during Restore Mode Defaults
Readback	The data type that is currently selected
Initial S/W Revision	Prior to A.02.00

Measurement Results

Pressing this key selects Meas Results as the data type to be exported. Pressing the key a second time brings up the Meas Results menu, which allows you to select which **Meas Result** to save. In the Swept SA measurement, there are three types of Measurement Results files: Peak Table, Marker Table and Spectrogram.

See "[Meas Results File Contents](#)" on page 1140.

See "[Marker Table](#)" on page 1140.

See "[Peak Table](#)" on page 1143.

See "[Spectrogram](#)" on page 1146

Remote Command	:MMEMory:STORe:RESults:MTABle PTABle SPEctrogram <filename>
Example	:MMEM:STOR:RES:MTAB "myResults.csv" Saves the results from the current marker table to the file myResults.csv in the current path. :MMEM:STOR:RES:PTAB "myResults.csv" Saves the results from the current peak table to the file myResults.csv in the current path. :MMEM:STOR:RES:SPEC "myResults.csv" Saves the results from the current Spectrogram display to the file myResults.csv in the current path. The default path is My Documents\SA\data\SAN\results
Notes	If the save is initiated via SCPI, and the file already exists, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade. Both single and double quotes are supported for any filename parameter over SCPI.
Dependencies	If a save of Marker Table results is requested and the Marker Table is not on, no file is saved and a message is generated If a save of Peak Table results is requested and the Peak Table is not on, no file is saved and a message is generated If a save of Spectrogram results is requested and the Spectrogram is not on, no file is saved and a message is generated. The Spectrogram choice only appears if option EDP is licensed.
Preset	Not part of Preset, but is reset to Peak Table by Restore Mode Defaults. Survives a shutdown.
Initial S/W Revision	Prior to A.02.00

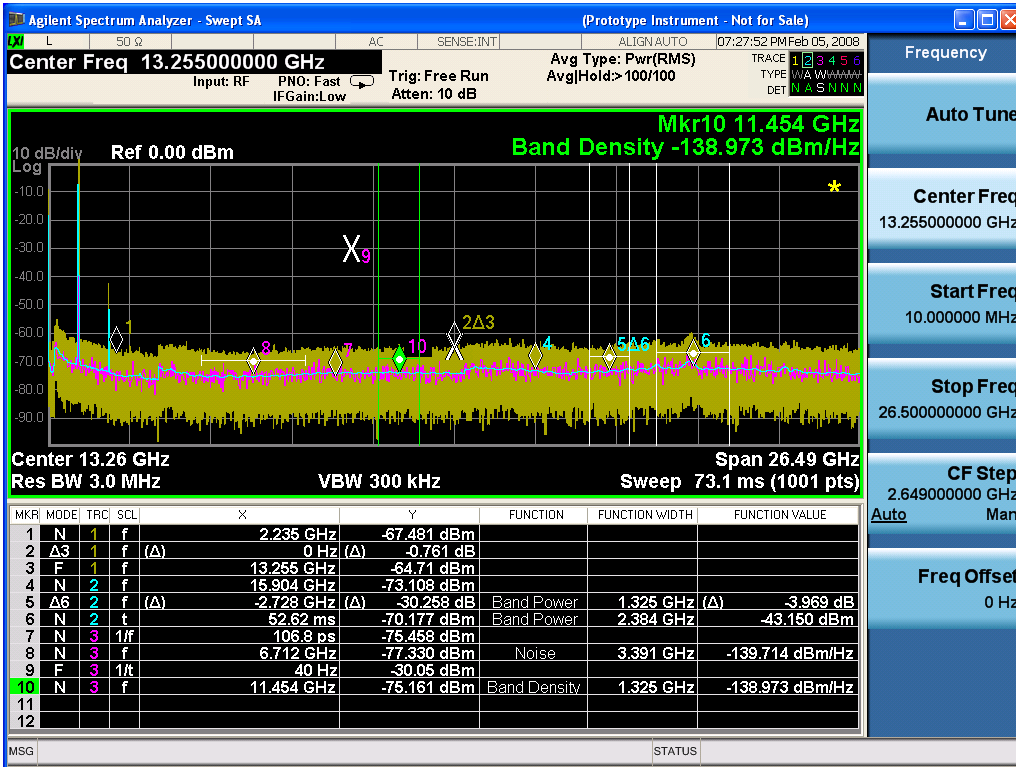
Meas Results File Contents

All files are .csv files. The following section details the data in each file type.

Marker Table

This section discusses the Marker Table Meas Results file format.

Imagine that, at the point where a Marker Table Meas Result is requested, the following screen is showing:



Then the Meas Results file, when opened, would show the following data:

MeasurementR	
result	
Swept SA	
A.01.40_R0017	N9020A
526 B25 PFR	1
P26 EA3	
Result Type	Marker Table
Ref Level	0
Number of Points	1001
Sweep Time	0.0662666 67
Start Frequency	10000000
Stop Frequency	26500000 000
Average Count	0
Average Type	LogPower (Video)
RBW	3000000

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RBW Filter	Gaussian
RBW Filter BW	3dB
VBW	3000000
Sweep Type	Swept
X Axis Scale	Lin
PreAmp State	Off
PreAmp Band	Low
Trigger Source	Free
Trigger Level	1.2
Trigger Slope	Positive
Trigger Delay	1.00E-06
Phase Noise Optimization	Fast
Swept If Gain	Low
FFT If Gain	Autorange
RF Coupling	AC
FFT Width	411900
Ext Ref	10000000
Input	RF
RF Calibrator	Off
Attenuation	10
Ref Level Offset	0
External Gain	0
X Axis Units	Hz
Y Axis Units	dBm

DATA									
MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	FUNCTION UNIT
1	Normal	1	Frequency	2.2350E+09	-67.481	Off	0.0000E+00	0	None
2	Delta3	1	Frequency	0.0000E+00	-0.761	Off	0.0000E+00	0	None
3	Fixed	1	Frequency	1.3255E+10	-64.71	Off	0.0000E+00	0	None
4	Normal	2	Frequency	1.5904E+10	-73.1	Off	0.0000E+00	0	None

08									
5	Delta7	2	Frequency	- 2.7280E+ 09	- 30.2 58	Band Power	1.3250E+ 06	-3.969	dB
6	Normal	2	Time	5.2620E- 02	- 70.1 77	Band Power	2.3840E+ 06	-43.15	dBm
7	Normal	3	Period	1.0680E- 10	- 75.4 58	Off	0.0000E+ 00	0	None
8	Normal	3	Frequency	6.7120E+ 09	- 77.3 3	Noise	3.3910E+ 06	- 139.71 4	dBm/Hz
9	Fixed	3	Inverse Time	4.0000E+ 01	- 30.0 5	Off	0.0000E+ 00	0	None
10	Normal	3	Frequency	1.1454E+ 10	- 75.1 61	Band Density	1.3250E+ 06	- 138.97 3	dBm/Hz
11	Off	1	Frequency	0.0000E+ 00	0	Off	0.0000E+ 00	0	None
12	Off	1	Frequency	0.0000E+ 00	0	Off	0.0000E+ 00	0	None

The numbers appear in the file exactly as they appear onscreen. If it says 11.454 GHz onscreen, then in the file it is 11.454E+09.

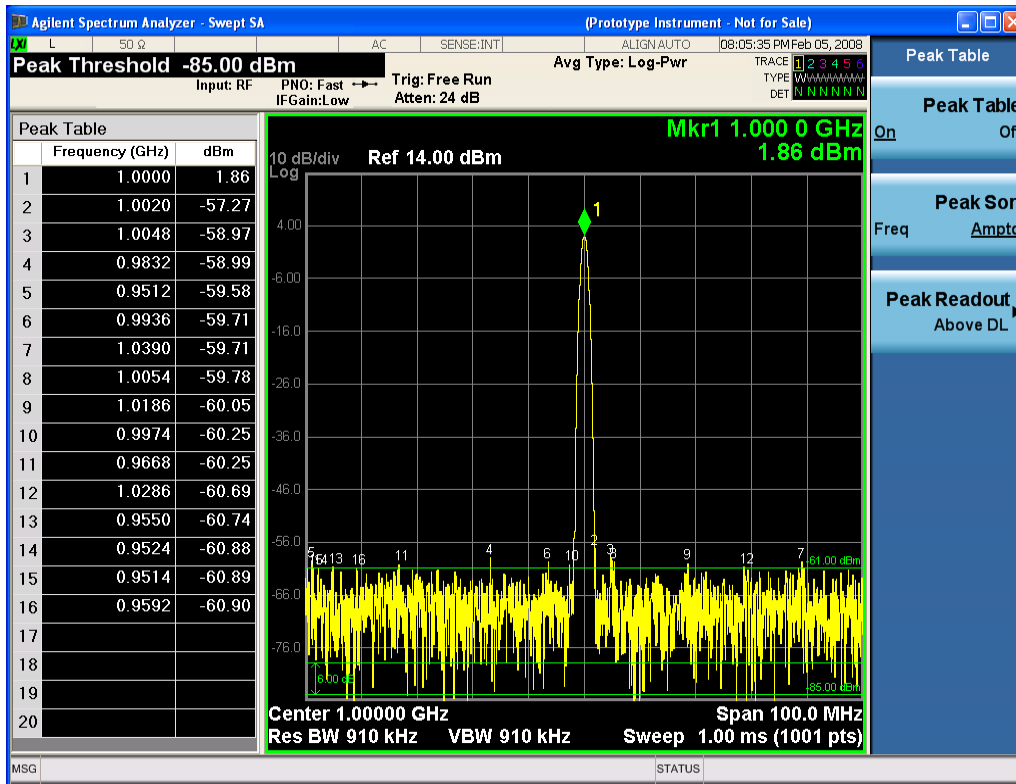
The metadata header is very similar to the metadata used in the trace data .csv files. See Trace File Contents. The only new information concerns the 1-of-N fields in the marker table itself.

Peak Table

This section discusses the Peak Table Meas Results file format.

Imagine that, at the point where a Marker Table Meas Result is requested, the following screen is showing:

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Then the Meas Results file, when opened, would show the header data (the same as for the Marker Table except that the Result Type is Peak Table) ending with a few fields of specific interest to Peak Table users:

- Peak Threshold
- Peak Threshold State (On|Off)
- Peak Excursion
- Peak Excursion State (On|Off)
- Display Line
- Peak Readout (All|AboveDL|BelowDL)
- Peak Sort (Freq|Amptd)

These fields are then followed by the data for the Peak Table itself.

Note that the label for the Frequency column changes to Time in 0 span.

Here is what the table for the above display looks like:

MeasurementResult	
Swept SA	
A.01.40_R0017	N9020A
526 B25 PFR P26 EA3	1

Result Type	Peak Table
Ref Level	0
Number of Points	1001
Sweep Time	0.066266667
Start Frequency	10000000
Stop Frequency	26500000000
Average Count	0
Average Type	LogPower(Video)
RBW	3000000
RBW Filter	Gaussian
RBW Filter BW	3dB
VBW	3000000
Sweep Type	Swept
X Axis Scale	Lin
PreAmp State	Off
PreAmp Band	Low
Trigger Source	Free
Trigger Level	1.2
Trigger Slope	Positive
Trigger Delay	1.00E-06
Phase Noise Optimization	Fast
Swept If Gain	Low
FFT If Gain	Autorange
RF Coupling	AC
FFT Width	411900
Ext Ref	10000000
Input	RF
RF Calibrator	Off
Attenuation	10
Ref Level Offset	0
External Gain	0
X Axis Units	Hz
Y Axis Units	dBm
Peak Threshold	-85
Peak Threshold State	On
Peak Excursion	6
Peak Excursion State	On

Display Line	-61	
Peak Readout	AboveDL	
Peak Sort	Amptd	
DATA		
Peak	Frequency	Amplitude
1	1.0000E+06	1.86
2	1.0020E+06	-57.27
3	1.0048E+06	-58.97
4	9.8320E+05	-58.99
5	9.5120E+05	-59.58
6	9.9360E+05	-59.71
7	1.0390E+06	-59.71
8	1.0054E+06	-59.78
9	1.1086E+06	-60.05
10	9.9740E+05	-60.25
11	9.6680E+05	-60.25
12	1.0286E+06	-60.69
13	9.5500E+05	-60.74
14	9.5240E+05	-60.88
15	9.5140E+05	-60.89
16	9.5920E+05	-60.90
17		
18		
19		
20		

Spectrogram

This section discusses the Spectrogram Results file format. The Spectrogram choice only appears if option EDP is licensed.

The Spectrogram results are the same as a Trace data export, except that instead of having just one trace's data, all 300 traces appear one after the other.

Each trace has its own data mark; the data for Spectrogram Trace 0 follows the row marked DATA, the data for Spectrogram Trace 1 follows the row marked DATA1, for Spectrogram Trace 2 follows the row marked DATA2, and so on.

Each DATA row has a timestamp in the second column (as of firmware revision A.11.01). So, for example, if Trace 0 had a relative start time of 1729.523 sec, then the first DATA row would look like this:

DATA,1729.523

And if Trace 13 had a relative start time of 100.45 sec, then the fourteenth data row would look like:

DATA13,100.453

To find the absolute time for the relative timestamps of each trace, the last row before the first DATA row gives the absolute start time of the Spectrogram, in the form YYYYMMDDHHMMSS

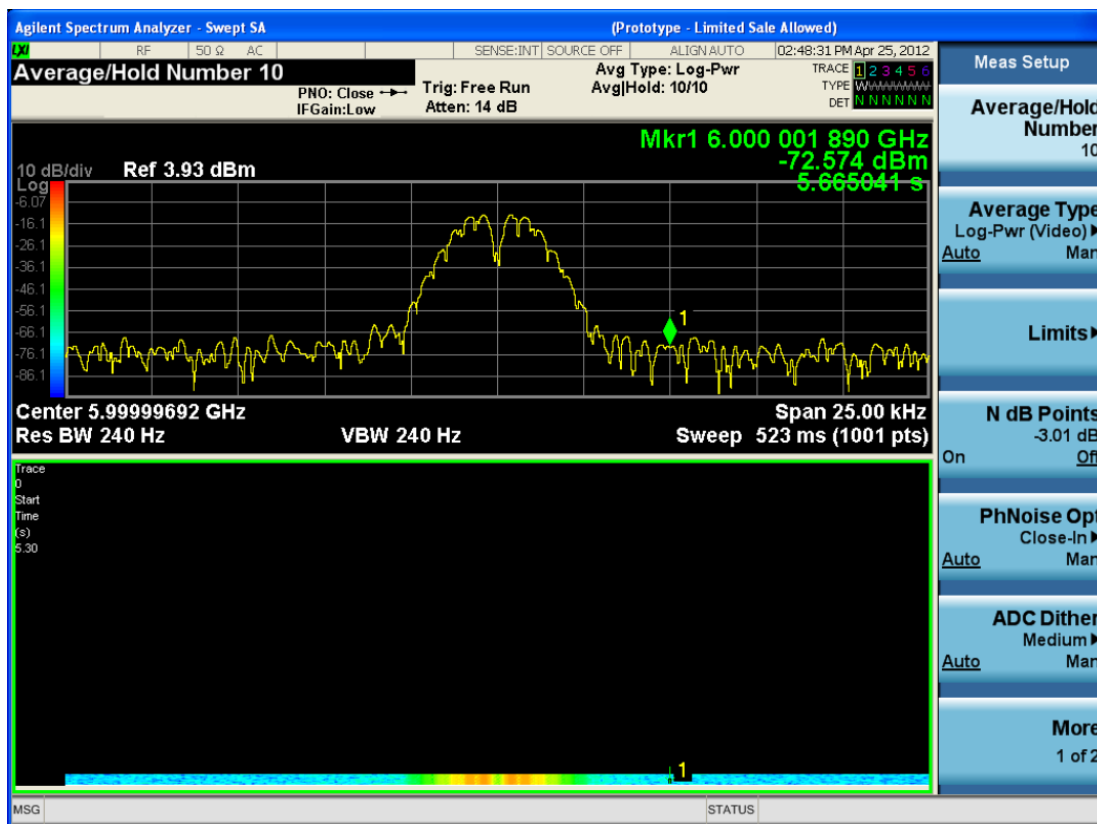
So, for example, if the absolute start time is 13:23:45:678 on January 30, 2012, this row would look like:

Start Time,20120130132345678

NOTE The resolution of the absolute time stored is 1 ms, which matches up with the fact that the fastest sweep time is also 1 ms. However, there is no specification for the absolute accuracy of the clock in the analyzer, nor is there any facility provided to allow the user to set this time to any particular degree of accuracy.

Traces that have not yet been filled in the Spectrogram display are empty; there is no DATA header for them. The file ends after the last non-empty trace.

Imagine that, at the point where a Spectrogram Meas Result is requested, the following screen is showing:



For the purpose of this example, we have set the Average/Hold Number to 10, thus we have only traces 0 thru 10. The Spectrogram was started at 02:28:08:700 pm on April 25, 2012 (that is, 700 ms after 2:28:08 pm), although the screen dump itself shows a different time, as it was taken ten minutes after the

Spectrogram data. Trace 0 is showing a start time of 5.30 seconds, meaning 5.3 seconds after the Spectrogram started (trace 10 has a start time of 0, as it was the first trace taken but has now rolled up into the tenth trace slot).

The Meas Results file, when opened, shows the header data and ten traces of trace data. Below is an extract from the result file for the above display. Note the start time of 20120425142808700 showing in the last row before the first DATA row, and the relative time of 5.299231048 showing in the first DATA row:

Result Type	Spectrogram
MeasResult	
Swept SA	
A.11.00.01	N9020A
503 508 513 526 ALL ALV B1C B1X B25 B2X B40 BAB BBA CR3 CRP DP2 DRD EA3 EDP EMC EP1 ERC ESC ESP EXM FSA HBA K03 LFE MPB P03 P08 P13 P26 PFR RTL RTS S40 SB1 SEC SM1 UK6 YAS YAV	1
Segment	0
Number of Points	1001
Sweep Time	0.523333333
Start Frequency	5999984415
Stop Frequency	6000009415
Average Count	0
Average Type	LogPower(Video)
RBW	240
RBW Filter	Gaussian
RBW Filter BW	3dB
VBW	240
Sweep Type	Swept
X Axis Scale	Lin
PreAmp State	Off
PreAmp Band	Low
Trigger Source	Free
Trigger Level	1.2
Trigger Slope	Positive
Trigger Delay	0
Phase Noise Optimization	Wide
Swept If Gain	Low
FFT If Gain	Autorange
RF Coupling	AC

Result Type	Spectrogram
FFT Width	411900
Ext Ref	10000000
Input	RF
RF Calibrator	Off
Attenuation	14
Ref Level Offset	0
External Gain	0
Trace Type	Clearwrite
Detector	Normal
Trace Math	Off
Trace Math Oper1	Trace5
Trace Math Oper2	Trace6
Trace Math Offset	0
Trace Name	Trace1
X Axis Units	Hz
Y Axis Units	dBm
Start Time	20120425142808700
DATA	5.299231048
5999984415	-76.34749519
5999984440	-77.28097006
5999984465	-75.32317869
5999984490	-73.64417681
5999984515	-72.67154604

- o
- o
- o

6000009315	-77.94423277
6000009340	-79.51829697
6000009365	-78.46108961
6000009390	-78.46108957
6000009415	-76.59570596
DATA2	4.708697055
5999984415	-80.98197882
5999984440	-80.98197879

Save

5999984465	-75.83142132
5999984490	-74.02712079
5999984515	-73.57213005

O

O

O

6000009315	-75.9183103
6000009340	-79.53787488
6000009365	-78.82602191
6000009390	-78.82602188
6000009415	-76.37486709
DATA10	0
5999984415	-75.56751112
5999984440	-75.76485645
5999984465	-76.67718717
5999984490	-78.79238489
5999984515	-83.72680212

O

O

O

6000009315	-71.3942461
6000009340	-72.28308332
6000009365	-73.92684489
6000009390	-75.45548832
6000009415	-75.17904815

Save As . . .

When you press "Save As", the analyzer brings up a Windows dialog and a menu entitled "**Save As.**" This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[To File . . .](#)" on page 2340 in Save, State for a full description of this dialog and menu.

The default path for saving files is:

For all of the Trace Data Files:

My Documents\`<mode name>`\data\traces

For all of the Limit Data Files:

My Documents\`<mode name>`\data\limits

For all of the Measurement Results Data Files:

My Documents\`<mode name>`\data\`<measurement name>`\results

For all of the Capture Buffer Data Files:

My Documents\`<mode name>`\data\captureBuffer

Key Path	Save, Data
Mode	All
Notes	The key location is mode-dependent and will vary. Brings up the Save As dialog for saving a <code><mode specific></code> Save Type. The save is performed immediately and does not wait until the measurement is complete.
Initial S/W Revision	Prior to A.02.00

Screen Image

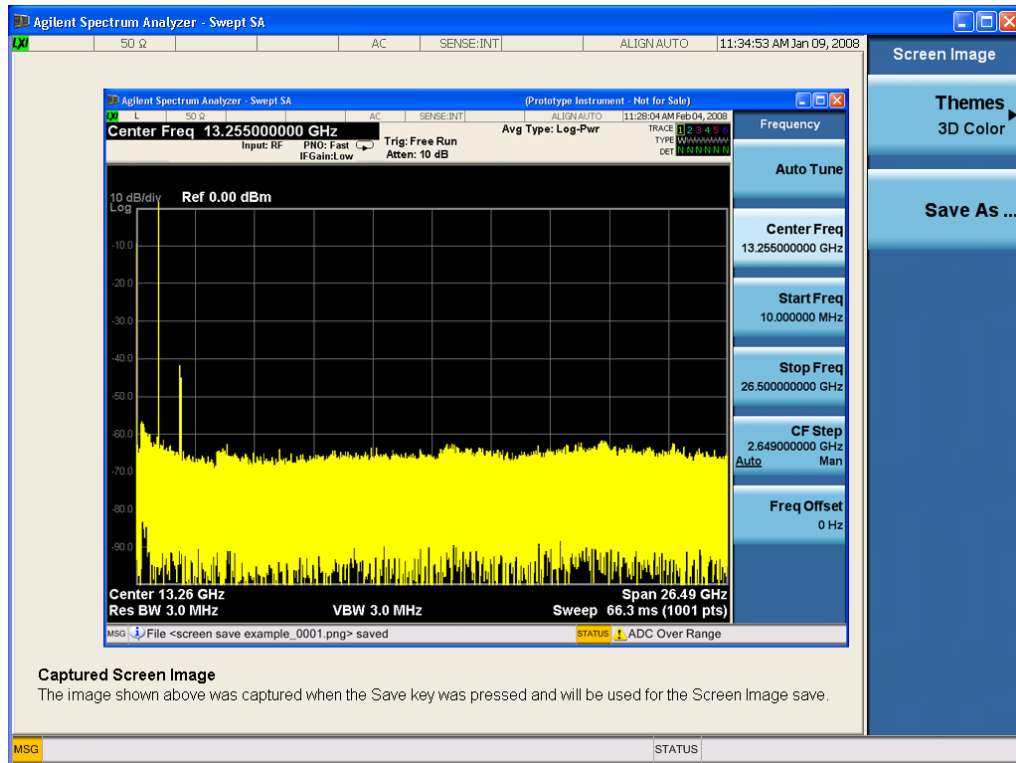
Pressing Screen Image accesses a menu of functions that enable you to specify a format and location for the saved screen image. It brings up a menu that allows you to specify the color scheme of the Screen Image (Themes) or navigate to the Save As dialog to perform the actual save.

Screen Image files contain an exact representation of the analyzer display. They cannot be loaded back onto the analyzer, but they can be loaded into your PC for use in many popular applications.

The image to be saved is actually captured when the Save front panel key is pressed, and kept in temporary storage to be used if you ask for a Screen Image save. When the Screen Image key is pressed, a "thumbnail" of the captured image is displayed, as shown below:

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Save



When you continue on into the Save As menu and complete the Screen Image save, the image depicted in the thumbnail is the one that gets saved, showing the menus that were on the screen before going into the Save menus. The save is performed immediately and does not wait until the measurement is complete.

After you have completed the save, the Quick Save front-panel key lets you quickly repeat the last save performed, using an auto-named file, with the current screen data.

NOTE

For versions previous to A.01.55, if you initiate a screen image save by navigating through the Save menus, the image that is saved will contain the Save menu softkeys, not the menus and the active function that were on the screen when you first pressed the Save front panel key.

Key Path	Save
Mode	All
Remote Command	:MMEMory:STORe:SCReem <filename>
Example	:MMEM:STOR:SCR "myScreen.png" This stores the current screen image in the file MyScreenFile.png in the default directory.
Initial S/W Revision	Prior to A.02.00

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

Key Path	Save, Screen Image
Remote Command	:MMEMory:STORe:SCReen:THEMe TDColor TDMonochrome FCOLOR FMONochrome :MMEMory:STORe:SCReen:THEMe?
Example	:MMEM:STOR:SCR:THEM TDM
Preset	3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes.
Readback	3D Color 3D Mono Flat Color Flat Mono
Backwards Compatibility Notes	In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical.
Initial S/W Revision	Prior to A.02.00

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDC
Readback	3D Color
Initial S/W Revision	Prior to A.02.00

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDM
Readback	3D Mono
Initial S/W Revision	Prior to A.02.00

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

Key Path	Save, Screen Image, Themes
----------	----------------------------

Example	MMEM:STOR:SCR:THEM FCOL
Readback	Flat Color
Initial S/W Revision	Prior to A.02.00

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FMON
Readback	Flat Mono
Initial S/W Revision	Prior to A.02.00

Save As...

When you press "Save As", the analyzer brings up a Windows dialog and a menu entitled "**Save As.**" This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[To File . . .](#)" on page 2340 in Save, State for a full description of this dialog and menu.

The default path for Screen Images is

My Documents\<<mode name>\screen.

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

Key Path	Save, Screen Image
Notes	Brings up Save As dialog for saving a Screen Image Save Type
Initial S/W Revision	Prior to A.02.00

Mass Storage Catalog (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:CATalog? [<directory_name>]
Notes	<p>The string must be a valid logical path.</p> <p>Queries disk usage information (drive capacity, free space available) and obtains a list of files and directories in a specified directory in the following format:</p> <p><numeric_value>,<numeric_value>,{<file_entry>}</p> <p>It returns two numeric parameters and as many strings as there are files and directories. The first parameter indicates the total amount of storage currently used in bytes. The second parameter</p>

indicates the total amount of storage available, also in bytes. The <file_entry> is a string. Each <file_entry> indicates the name, type, and size of one file in the directory list:

<file_name>,<file_type>,<file_size>

As the windows file system has an extension that indicates file type, <file_type> is always empty. <file_size> provides the size of the file in bytes. For directories, <file_entry> is surrounded by square brackets and both <file_type> and <file_size> are empty

Initial S/W Revision Prior to A.02.00

Mass Storage Change Directory (Remote Command Only)

Key path SCPI Only

Remote Command :MMEMory:CDIRectory [<directory_name>]
 :MMEMory:CDIRectory?

Notes The string must be a valid logical path.

Changes the default directory for a mass memory file system. The <directory_name> parameter is a string. If no parameter is specified, the directory is set to the *RST value.

At *RST, this value is set to the default user data storage area, that is defined as System.Environment.SpecialFolder.Personal.

Query returns full path of the default directory.

Initial S/W Revision Prior to A.02.00

Mass Storage Copy (Remote Command Only)

Key path SCPI Only

Remote Command :MMEMory:COPY <string>,<string>[,<string>,<string>]

Notes The string must be a valid logical path.

Copies an existing file to a new file or an existing directory to a new directory.

Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.

The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.

This command will generate an "access denied" error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.

Mass Storage Device Copy (Remote Command Only)

This command transfers data to/from a file and a peripheral device.

Key path	SCPI Only
Remote Command	:MMEMory:COpy:DEvice <source_string>,<dest_string>
Notes	The strings must be a valid logical path or a valid device keyword. If the dest_string is a device keyword, the data is copied from the source file to the device. If the source_string is a device keyword, the data is copied to the source file from the device. Valid device keywords are: SNS (smart noise source) An error is generated if the file or device is not found.

Mass Storage Delete (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:DELeTe <file_name>[,<directory_name>]
Notes	The string must be a valid logical path. Removes a file from the specified directory. The <file_name> parameter specifies the file name to be removed. This command will generate an "access denied" error if the file is in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.
Initial S/W Revision	Prior to A.02.00

Mass Storage Data (Remote Command Only)

Creates a file containing the specified data OR queries the data from an existing file.

Key path	SCPI Only
Remote Command	:MMEMory:DATA <file_name>, <data> :MMEMory:DATA? <file_name>
Notes	The string must be a valid logical path. The command form is MMEMory:DATA <file_name>,<data>. It loads <data> into the file <file_name>. <data> is in 488.2 block format. <file_name> is string data. The query form is MMEMory:DATA? <file_name> with the response being the associated <data> in block format.
Initial S/W Revision	Prior to A.02.00

Mass Storage Make Directory (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:MDIRectory <directory_name>
Notes	The string must be a valid logical path. Creates a new directory. The <directory_name> parameter specifies the name to be created.

	This command will generate an “access denied” error if the new directory would be in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.
Initial S/W Revision	Prior to A.02.00

Mass Storage Move (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:MOVE <string>,<string>[,<string>,<string>]
Notes	<p>The string must be a valid logical path.</p> <p>Moves an existing file to a new file or an existing directory to a new directory.</p> <p>Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.</p> <p>The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.</p> <p>This command will generate an “access denied” error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.</p>
Initial S/W Revision	Prior to A.02.00

Mass Storage Remove Directory (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:RDIRECTory <directory_name>
Notes	<p>The string must be a valid logical path.</p> <p>Removes a directory. The <directory_name> parameter specifies the directory name to be removed. All files and directories under the specified directory shall also be removed.</p> <p>This command will generate an “access denied” error if the folder is a restricted folder (e.g., C:\Windows) or is in a restricted folder and the current user does not have Power User or Administrator privileges.</p>
Initial S/W Revision	Prior to A.02.00

Single (Single Measurement/Sweep)

Sets the analyzer for Single measurement operation. The single/continuous state is Meas Global, so the setting will affect all the measurements. If you are Paused, pressing Single does a Resume.

See "[More Information](#)" on page 1158

Key Path	Front-panel key
Example	:INIT:CONT OFF
Notes	See Cont key description.
Backwards Compatibility Notes	<p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey and the INITiate:IMM switched from continuous measurement to single measurement and restarted sweeps and averages (displayed average count reset to 1), but did not restart Max Hold and Min Hold. In the X-Series, the Single hardkey and the INITiate:IMM command initiate a sweep/ measurement/ average sequence/hold sequence including MaxHold and MinHold.</p> <p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey restarted the sweep regardless of whether or not you were in an active sweep or sweep sequence. In the X-Series, Restart does this but Single only restarts the sweep or sweep sequence if you are in the idle state.</p> <p>INIT[:IMM] in ESA & PSA Spectrum Analysis Mode does an implied ABORT. In some other PSA Modes, INIT[:IMM] is ignored if not in the idle state. . The X-Series follows the ESA/PSA SA Mode model, which may cause some Modes to have compatibility problems.</p>
Initial S/W Revision	Prior to A.02.00

More Information

See "[Restart](#)" on page 2337 for details on the INIT:IMMEDIATE (Restart) function.

If you are already in single sweep, the INIT:CONT OFF command has no effect.

If you are already in Single Sweep, then pressing the Single key in the middle of a sweep does not restart the sweep or sequence. Similarly, pressing the Single key does not restart the sweep or sequence if the sweep is not in the idle state (for example, if you are taking a very slow sweep, or the analyzer is waiting for a trigger). Instead, it results in a message. "Already in Single, press Restart to initiate a new sweep or sequence". Even though pressing the Single key in the middle of a sweep does not restart the sweep, sending INIT:IMMEDIATE does reset it.

To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command CALC:AVER:TCON UP.

Source

There is no Source control functionality for this measurement. When this key is pressed, the screen either displays a blank menu, or the previously-selected menu remains unchanged.

Key Path	Front-panel key
----------	-----------------

SPAN X Scale

There is no functionality for this Front-panel key in this measurement. When pressed, this key displays a blank menu.

Key Path	Front-panel key
Mode	EDGE GSM

Sweep/Control

Accesses a menu that enables you to configure the Sweep and Control functions of the analyzer, such as Sweep Time and Gating.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Pause/Resume

Pauses a measurement after the current data acquisition is complete.

When Paused, the label on the key changes to Resume. Pressing Resume un-pauses the measurement. When you are Paused, pressing Restart, Single or Cont does a Resume.

Key Path	Sweep/Control
Remote Command	:INITiate:PAUSE
Dependencies	Grayed out in Measurements that do not support Pausing. Blanked in Modes that do not support Pausing.
Initial S/W Revision	Prior to A.02.00

Key Path	Sweep/Control
Remote Command	:INITiate:RESume
Dependencies	Grayed out in Measurements that do not support Pausing. Blanked in Modes that do not support Pausing.
Initial S/W Revision	Prior to A.02.00

Abort (Remote Command Only)

This command is used to stop the current measurement. It aborts the current measurement as quickly as possible, resets the sweep and trigger systems, and puts the measurement into an "idle" state. If the analyzer is in the process of aligning when ABORT is sent, the alignment finishes before the abort function is performed. So ABORT does not abort an alignment.

If the analyzer is set for Continuous measurement, it sets up the measurement and initiates a new data measurement sequence with a new data acquisition (sweep) taken once the trigger condition is met.

If the analyzer is set for Single measurement, it remains in the "idle" state until an :INIT:IMM command is received.

Remote Command	:ABORT
Example	:ABOR

Notes	If :INITiate:CONTInuous is ON, then a new continuous measurement will start immediately, with sweep (data acquisition) occurring once the trigger condition has been met. If :INITiate:CONTInuous is OFF, then :INITiate:IMMEDIATE is used to start a single measurement; with sweep (data acquisition) occurring once the trigger condition has been met.
Dependencies	For continuous measurement, ABORt is equivalent to the Restart key. Not all measurements support the abort command.
Status Bits/OPC dependencies	The STATus:OPERation register bits 0 through 8 are cleared. The STATus:QUEStionable register bit 9 (INTegrity sum) is cleared. Since all the bits that feed into OPC are cleared by the ABORt, the ABORt will cause the *OPC query to return true.
Initial S/W Revision	Prior to A.02.00

System

See "System" on page 326

Trace/Detector

Accesses a menu that allows you to control trace settings.

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Trace

Select the trace mode from the following selections:

Key	SCPI	Operation
Average	AVERage	Trace is averaged.
Max Hold	MAXHold	Trace holds maximum value.
Auto	AUTO	Average (Multi-Carrier) or Max Hold (Single-Carrier)

Key Path	Trace/Detector
Mode	GSM
Remote Command	[:SENSe] :ETSPur:TRACe AVERage MAXHold AUTO [:SENSe] :ETSPur:TRACe?
Example	ETSP:TRAC MAXH ETSP:TRAC?
Notes	This parameter is available when N/W9071A-BFP (Auto selection) is installed. Valid only when "Avg/Hold Num" on page 1110 is set to On. When Auto is selected, Average is applied if Carrier Setup is configured with Multi Carrier setting and Max Hold is applied if Carrier Setup is configured with Single Carrier setting. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	Coupled with "Avg Type" on page 1111.
Preset	AUTO
State Saved	Saved in instrument state.
Range	Average Max Hold Auto
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.14.00

Detector

Accesses a menu of functions that enables you to control the detector for the current measurement. The following choices are available.

- Auto - The detector is set to AVERage when in the Multi Carrier configuration and set to PEAK when in the Single Carrier configuration.
- Average - The detector determines the average of the signal within the sweep points. The averaging method is Power (RMS).
- Peak - The detector determines the maximum of the signal within the sweep points.

Key Path	Trace/Detector
Mode	EDGE GSM
Notes	This parameter is available when N/W9071A-BFP (Detector selection) is installed.
Initial S/W Revision	A.14.00

Auto

Sets the detector to auto.

Key Path	Trace/Detector, Detector
Mode	GSM
Remote Command	[:SENSe] :ETSPur:DETECTOR:AUTO ON OFF 1 0 [:SENSe] :ETSPur:DETECTOR:AUTO?
Example	ETSP:DET:AUTO 1 ETSP:DET:AUTO?
Couplings	When Auto is selected ([:SENSe] :ETSPur:DETECTOR:AUTO?), the detector depends on the Carrier Setup condition. When Multi-Carrier is selected, the detector works as Average and when Single-Carrier is selected, it works as Peak.
Preset	ON
State Saved	Saved in instrument state.
Range	ON OFF
Initial S/W Revision	A.14.00

Detector Selection

Selects a detector to be used by the analyzer for the current measurement.

Average - The detector determines the average of the signal within the sweep points. The averaging method is Power (RMS).

Peak - The detector determines the maximum of the signal within the sweep points.

Key Path	Trace/Detector, Detector
Mode	GSM
Remote Command	[:SENSe] :ETSPur:DETECTOR [:FUNCTION] AVERage POSitive [:SENSe] :ETSPur:DETECTOR [:FUNCTION] ?

Example	ETSP:DET AVER ETSP:DET?
Notes	When you manually select the detector (instead of selecting Auto), that detector is used regardless of other analyzer settings.
Preset	POSitive
State Saved	Saved in instrument state.
Range	Average Peak
Initial S/W Revision	A.14.00

Trigger

See [___](#) on page X

User Preset

Accesses a menu that gives you the following three choices:

- User Preset – recalls a state previously saved using the Save User Preset function.
- User Preset All Modes – presets all of the modes in the analyzer
- Save User Preset– saves the current state for the current mode

Key Path	Front-panel key
Backwards Compatibility Notes	<p>User Preset is actually loading a state, and in legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, “state” always includes all of this data; so whenever state is loaded, or User Preset is executed, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p> <p>On ESA and PSA, User Preset affected the entire instrument’s state. In the X-Series, User Preset only recalls the state for the active mode. There is a User Preset file for each mode. User Preset can never cause a mode switch as it can in legacy analyzers. If you want to recall all modes to their user preset file state, you will need to do a User Preset after mode switching into each mode.</p> <p>User Preset recalls mode state which can now include data like traces; whereas on ESA and PSA, User Preset did not affect data.</p>
Initial S/W Revision	Prior to A.02.00

User Preset

User Preset sets the state of the currently active mode back to the state that was previously saved for this mode using the Save User Preset menu key or the SCPI command, SYST:PRES:USER:SAV. It not only recalls the Mode Preset settings, but it also recalls all of the mode persistent settings, and the Input/Output system setting that existed at the time Save User Preset was executed.

If a Save User Preset has not been done at any time, User Preset recalls the default user preset file for the currently active mode. The default user preset files are created if, at power-on, a mode detects there is no user preset file. There will never be a scenario when there is no user preset file to restore. For each mode, the default user preset state is the same state that would be saved if a Save User Preset is performed in each mode right after doing a Restore Mode Default and after a Restore Input/Output Defaults.

The User Preset function does the following:

- Aborts the currently running measurement.
- Sets the mode State to the values defined by Save User Preset.
- Makes the saved measurement for the currently running mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

Key Path	User Preset
Remote Command	:SYSTem:PRESet:USER
Example	:SYST:PRES:USER:SAVE:SYST:PRES:USER
Notes	:SYST:PRES:USER:SAVE is used to save the current state as the user preset state. Clears all pending OPC bits. The Status Byte is set to 0. Pressing the User Preset front-panel key while already in the User Preset menu will cause the User Preset to get executed
Couplings	A user preset will cause the currently running measurement to be aborted and cause the saved measurement to be active. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved.
Initial S/W Revision	Prior to A.02.00

User Preset All Modes

Recalls all of the User Preset files for each mode, switches to the power-on mode, and activates the saved measurement from the power-on mode User Preset file.

NOTE

When the instrument is secured, all of the user preset files are converted back to their default user preset files.

The User Preset function does the following:

- Aborts the currently running measurement.
- Switches the Mode to the power-on mode.
- Restores the User Preset files for each mode.
- Makes the saved measurement for the power-on mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

Key Path	User Preset
Remote Command	:SYSTem:PRESet:USER:ALL
Example	:SYST:PRES:USER:SAVE:SYST:PRES:USER:ALL
Notes	Clears all pending OPC bits. The Status Byte is set to 0. :SYST:PRES:USER:SAVE is used to save the current state as the user preset state.
Couplings	A user preset will cause the currently running measurement to be aborted, cause a mode switch to the power-on mode, and cause the saved measurement to be active in the power-on mode. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved.
Initial S/W Revision	Prior to A.02.00

Save User Preset

Saves the currently active mode and its State. You can recall this User Preset file by pressing the User Preset menu key or sending the SYST:PRES:USER remote command. This same state is also saved by the Save State function.

Key Path	User Preset
Remote Command	:SYSTem:PRESet:USER:SAVE
Example	:SYST:PRES:USER:SAVE
Notes	:SYST:PRES:SAVE creates the same file as if the user requested a *SAV or a MMEM:STOR:STAT, except User Preset Save does not allow the user to specify the filename or the location of the file.
Initial S/W Revision	Prior to A.02.00

View/Display

The View/Display key opens the Display Menu (common to most measurements) and the View menu for the current measurement.

Some measurements have simple View menus, or even no View menu, others provide many different Views.

Views are different ways of looking at data, usually different ways of looking at the same data, often when the data represents a time record that is being digitally processed with an FFT and/or other digital signal processing algorithms.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Display

The Display menu is common to most measurements, and is used for configuring items on the display. Some Display menu settings apply to all the measurements in a mode, and some only to the current measurement. Those under the System Display Settings key apply to all measurements in all modes.

Key Path	Display
Key Path	View/Display
Initial S/W Revision	Prior to A.02.00

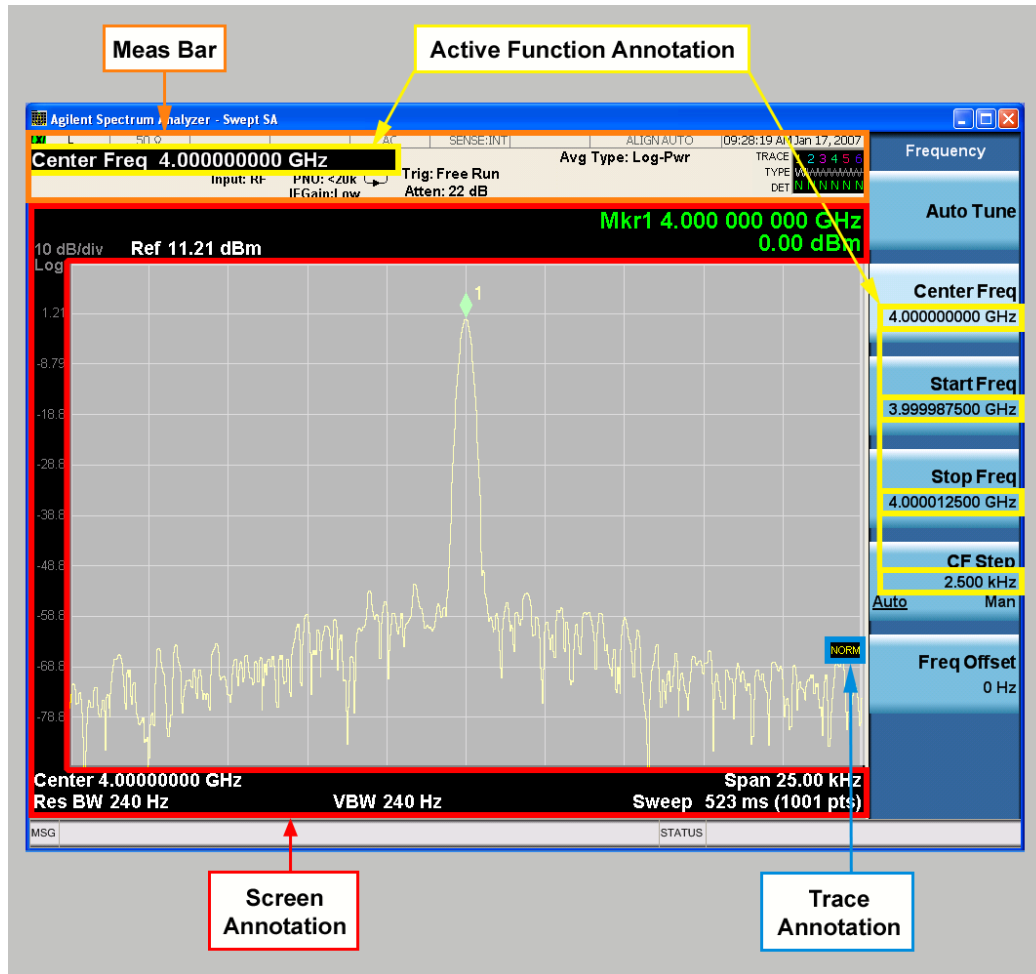
Annotation

Turns on and off various parts of the display annotation. The annotation is divided up into four categories:

1. Meas Bar: This is the measurement bar at the top of the screen. It does not include the settings panel or the Active Function. Turning off the Meas Bar turns off the settings panel and the Active Function. When the Meas Bar is off, the graticule area expands to fill the area formerly occupied by the Meas Bar.
2. Screen Annotation: this is the annotation and annunciation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) This does NOT include the marker number or the N dB result. When off, the graticule expands to fill the entire graticule area.
3. Trace annotation: these are the labels on the traces, showing their detector (or their math mode).
4. Active Function annotation: this is the active function display in the meas bar, and all of the active function values displayed on softkeys.

See the figure below. Each type of annotation can be turned on and off individually.

11 EDGE Tx Band Spur Measurement
View/Display



Key Path	View/Display, Display
Initial S/W Revision	Prior to A.02.00

Meas Bar On/Off

This function turns the Measurement Bar on and off, including the settings panel. When off, the graticule area expands to fill the area formerly occupied by the Measurement Bar.

Key Path	View/Display, Display, Annotation
Remote Command	:DISPlay:ANNOtation:MBAR[:STATe] OFF ON 0 1 :DISPlay:ANNOtation:MBAR[:STATe]?
Example	DISP:ANN:MBAR OFF
Dependencies	Grayed out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset	On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off.
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Screen

This controls the display of the annunciation and annotation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) and the y-axis annotation. This does NOT include marker annotation (or the N dB result). When off, the graticule expands to fill the entire graticule area, leaving only the 1.5% gap above the graticule as described in the Trace/Detector chapter.

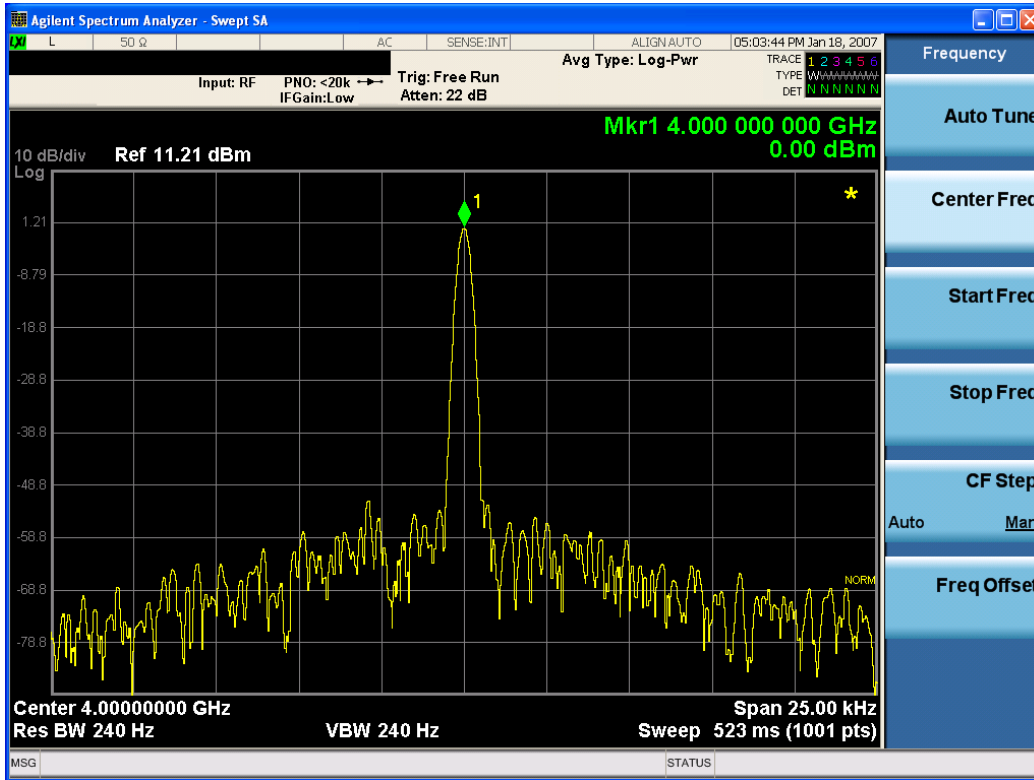
Key Path	View/Display, Display, Annotation
Remote Command	:DISPlay:ANNotation:SCReen[:STATe] OFF ON 0 1 :DISPlay:ANNotation:SCReen[:STATe]?
Example	DISP:ANN:SCR OFF
Dependencies	Grayed-out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset	On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Active Function Values On/Off

Turns on and off the active function display in the Meas Bar, and all of the active function values displayed on the softkeys.

Note that all of the softkeys that have active functions have these numeric values blanked when this function is on. This is a security feature..

11 EDGE Tx Band Spur Measurement
View/Display



Key Path	View/Display, Display, Annotation
Remote Command	:DISPlay:ACTivefunc[:STATE] ON OFF 1 0 :DISPlay:ACTivefunc[:STATE]?
Example	DISP:ACT OFF
Dependencies	Grayed out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset	On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Title

Displays menu keys that enable you to change or clear a title on your display.

Key Path	View/Display, Display
Initial S/W Revision	Prior to A.02.00

Change Title

Writes a title into the "measurement name" field in the banner, for example, "Swept SA".

Press Change Title to enter a new title through the alpha editor. Press Enter or Return to complete the entry. Press ESC to cancel the entry and preserve your existing title.

The display title will replace the measurement name. It remains for this measurement until you press Change Title again, or you recall a state, or a Preset is performed. A title can also be cleared by pressing Title, Clear Title.

NOTE

Notice the inclusion of the <measurement> parameter in the command below. Because each measurement remembers the Display Title, the command must be qualified with the measurement name. For the Swept SA measurement this is not the case; no <measurement> parameter is used when changing the Display Title for the Swept SA measurement.

Key Path	View/Display, Display, Title
Mode	All
Remote Command	:DISPlay:<measurement>:ANNotation:TITLe:DATA <string> :DISPlay:<measurement>:ANNotation:TITLe:DATA?
Example	DISP:ANN:TITL:DATA "This Is My Title" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "This Is My Title" This example is for Measurements other than Swept SA. Both set the title to: This Is My Title
Notes	Pressing this key cancels any active function. When a title is edited the previous title remains intact (it is not cleared) and the cursor goes at the end so that characters can be added or BKSP can be used to go back over previous characters.
Preset	No title (measurement name instead)
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Clear Title

Clears a title from the front-panel display. Once cleared, the title cannot be retrieved. After the title is cleared, the current Measurement Name replaces it in the title bar.

Key Path	View/Display, Display, Title
Example	The following commands clear the title and restore the measurement's original title: DISP:ANN:TITL:DATA "" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "" This example is for ACP; in measurements other than Swept SA the measurement name is required.
Notes	Uses the :DISPlay:<measurement>:ANNotation:TITLe:DATA <string> command with an empty string (in the Swept SA, the <measurement> is omitted).
Preset	Performed on Preset.
Initial S/W Revision	Prior to A.02.00

Graticule

Pressing Graticule turns the display graticule On or Off. It also turns the graticule y-axis annotation on and off.

Key Path	View/Display, Display
Remote Command	:DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe] OFF ON 0 1 :DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe]?
Example	DISP:WIND:TRAC:GRAT:GRID OFF
Notes	The graticule is the set of horizontal and vertical lines that make up the grid/divisions for the x-axis and y-axis.
Preset	On
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00

System Display Settings

These settings are "Mode Global" – they affect all modes and measurements and are reset only by Restore Misc Defaults or Restore System Defaults under System.

Key Path	View/Display, Display
Initial S/W Revision	Prior to A.02.00

Annotation Local Settings

This is a Mode Global override of the meas local annotation settings. When it is All Off, it forces ScreenAnnotation, Meas Bar, Trace, and Active Function Values settings to be OFF for all measurements in all modes. This provides the security based "annotation off" function of previous analyzers; hence it uses the legacy SCPI command.

When it is All Off, the Screen, Meas Bar, Trace, and Active Function Values keys under the Display, Annotation menu are grayed out and forced to Off. When Local Settings is selected, you are able to set the local annotation settings on a measurement by measurement basis.

Key Path	View/Display, Display, System Display Settings
Remote Command	:DISPlay:WINDow[1]:ANNotation[:ALL] OFF ON 0 1 :DISPlay:WINDow[1]:ANNotation[:ALL]?
Example	:DISP:WIND:ANN OFF
Preset	On (Set by Restore Misc Defaults)
State Saved	Not saved in instrument state.
Backwards Compatibility Notes	The WINDow parameter and optional subopcode is included for backwards compatibility but ignored – all windows are equally affected.
Initial S/W Revision	Prior to A.02.00

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

Key Path	Save, Screen Image
Remote Command	:MMEMory:STORe:SCReen:THEMe TDColor TDMonochrome FCOLOR FMONochrome :MMEMory:STORe:SCReen:THEMe?
Example	:MMEM:STOR:SCR:THEM TDM
Preset	3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes.
Readback	3D Color 3D Mono Flat Color Flat Mono
Backwards Compatibility Notes	In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical.
Initial S/W Revision	Prior to A.02.00

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDC
Readback	3D Color
Initial S/W Revision	Prior to A.02.00

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDM
Readback	3D Mono
Initial S/W Revision	Prior to A.02.00

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FCOL
Readback	Flat Color
Initial S/W Revision	Prior to A.02.00

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FMON
Readback	Flat Mono
Initial S/W Revision	Prior to A.02.00

Backlight

Accesses the display backlight on/off keys. This setting may interact with settings under the Windows "Power" menu.

When the backlight is off, pressing ESC, TAB, SPACE, ENTER, UP, DOWN, LEFT, RIGHT, DEL, BKSP, CTRL, or ALT turns the backlight on without affecting the application. Pressing any other key will turn backlight on and could potentially perform the action as well.

Key Path	View/Display, Display, System Display Settings
Remote Command	:DISPlay:BACKlight ON OFF :DISPlay:BACKlight?
Preset	ON (Set by Restore Misc Defaults)
Initial S/W Revision	Prior to A.02.00

Backlight Intensity

An active function used to set the backlight intensity. It goes from 0 to 100 where 100 is full on and 0 is off. This value is independent of the values set under the Backlight on/off key.

Key Path	View/Display, Display, System Display Settings
Remote Command	:DISPlay:BACKlight:INTensity <integer> :DISPlay:BACKlight:INTensity?
Example	DISP:BACK:INT 50

Preset	100 (Set by Restore Misc Defaults)
Min	0
Max	100
Initial S/W Revision	Prior to A.02.00

Lowest Segment

This view has two windows, as follows:

- Top window - "Spectrum Window" on page 1179: shows spectrum of each segment
- Bottom window - "Metrics Window" on page 1180: shows each metric result.

If a result failed, 'F' is displayed beside the result.

The following graphic shows an example of the two windows of this view.

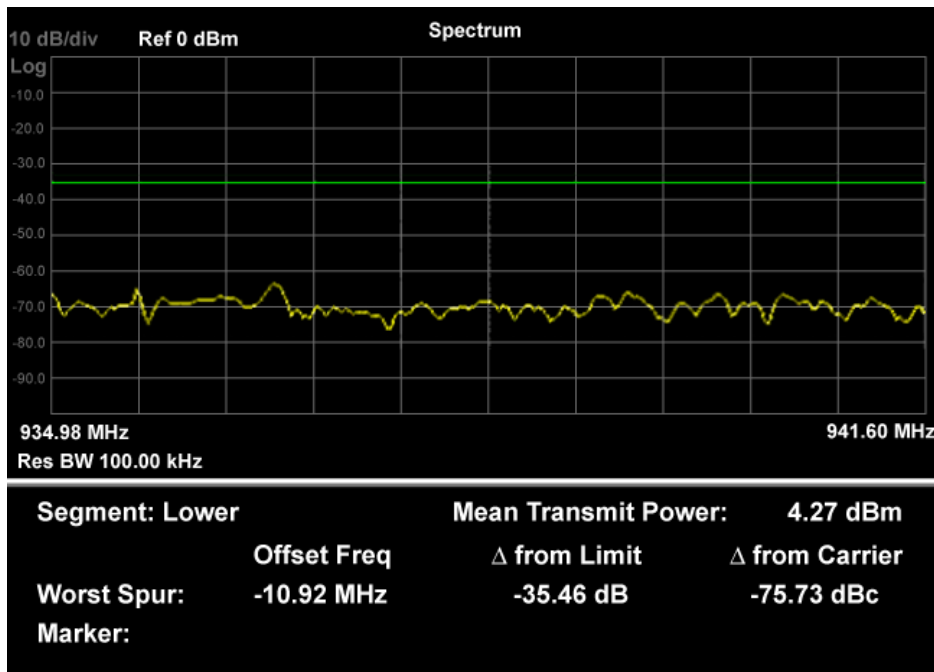


Figure 0-1 EDGE Tx Spur Measurement – Lowest Segment spectrum & Metrics

Spectrum Window

Marker Operation	Yes
Corresponding Trace	Corrected measured trace (n=2,4,6,8,10)

Metrics Window

Name	Corresponding Results	Display Format
Worst Spur: Offset	n=1 1st The worst spur's frequency difference from channel center frequency.	99.99 MHz
Worst Spur: Δ from Limit	n=1 2nd The worst spur's amplitude difference from the limit	99.99 dB
Worst Spur: Δ from Carrier	n=1 3rd The worst spur's amplitude difference from the mean transmit power	99.99 dBc
Marker: Δ from Limit	Marker frequency difference from channel center frequency.	99.99 dB
Marker: Δ from Carrier	Marker amplitude difference from the limit.	99.99 dBc

Key Path	View/Display
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Lower Adj Segment

This view has two windows:

- Top window - "[Spectrum Window](#)" on page 1179: shows spectrum of each segment
- Bottom window - "[Metrics Window](#)" on page 1180: shows each metric result.

For details of both windows, see the section "[Lowest Segment](#)" on page 1179.

The following graphic shows only the Metrics Window for this view.

Segment: Lower Adjacent	Mean Transmit Power: 4.27 dBm		
Offset Freq	Δ from Limit	Δ from Carrier	
Worst Spur: -10.92 MHz	-35.46 dB	-75.73 dBc	
Marker:			

Figure 0-2 EDGE Tx Spur Measurement – Lower Adjacent Segment & Metrics

Key Path	View/Display
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Upper Adj Segment

This view has two windows:

- Top window - "[Spectrum Window](#)" on page 1179: shows spectrum of each segment
- Bottom window - "[Metrics Window](#)" on page 1180: shows each metric result.

For details of both windows, see the section "[Lowest Segment](#)" on page 1179.

The following graphic shows only the Metrics Window for this view.

Segment: Upper Adjacent	Mean Transmit Power: 4.27 dBm		
	Offset Freq	Δ from Limit	Δ from Carrier
Worst Spur:	-10.92 MHz	-35.46 dB	-75.73 dBc
Marker:			

Figure 0-3 EDGE Tx Spur Measurement – Upper Adjacent Segment & Metrics

Key Path	View/Display
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Highest Segment

This view has two windows:

- Top window - "[Spectrum Window](#)" on page 1179: shows spectrum of each segment
- Bottom window - "[Metrics Window](#)" on page 1180: shows each metric result.

For details of both windows, see the section "[Lowest Segment](#)" on page 1179.

The following graphic shows only the Metrics Window for this view.

Segment: Upper	Mean Transmit Power: 4.27 dBm		
	Offset Freq	Δ from Limit	Δ from Carrier
Worst Spur:	-10.92 MHz	-35.46 dB	-75.73 dBc
Marker:			

Figure 0-4 EDGE Tx Spur Measurement – Highest Segment & Metrics

Key Path	View/Display
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

12 Monitor Spectrum Measurement

The monitor spectrum measurement is used as a quick, convenient means of looking at the entire spectrum. While the look and feel are similar to the Spectrum Analyzer mode, the functionality is greatly reduced for easy operation. The main purpose of the measurement is to show the spectrum. The default span should cover an appropriate frequency range of the application.

For measurement results and views, see View/Display.

This topic contains the following sections:

["Measurement Commands for Monitor Spectrum" on page 1184](#)

["Remote Command Results for Monitor Spectrum Measurement" on page 1185](#)

Measurement Commands for Monitor Spectrum

The following commands can be used to retrieve the measurement results:

`:CONFigure:MONitor`

`:CONFigure:MONitor:NDEFault`

`:INITiate:MONitor`

`:FETCh:MONitor[n]?`

`:READ:MONitor[n]?`

`:MEASure:MONitor[n]?`

For more measurement related commands, see the SENSE subsystem, and the section "[Remote Measurement Functions](#)" on page 2301.

Remote Command Results for Monitor Spectrum Measurement

The following table describes the results returned by the queries listed above, according to the index value n .

n	Results Returned
1 (or not specified)	Returns trace1 data with comma separated floating numbers
2	Returns trace2 data with comma separated floating numbers
3	Returns trace3 data with comma separated floating numbers

Key Path	Meas
Initial S/W Revision	Prior to A.02.00

AMPTD Y Scale

Accesses a menu of functions that enable you to set the vertical scale parameters. These functions control how data on the vertical (Y) axis is displayed and control instrument settings that affect the vertical axis.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Ref Value

Sets the absolute power reference value. However, since Auto Scaling defaults to On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.

Key Path	AMPTD Y Scale
Mode	All except SA and BASIC
Remote Command	:DISPlay:MONitor:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <real> :DISPlay:MONitor:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel?
Example	DISP:MON:VIEW:WIND:TRAC:Y:RLEV 2.0 DISP:MON:VIEW:WIND:TRAC:Y:RLEV?
Couplings	When the Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.
Preset	10.00 dBm
State Saved	Saved in instrument state.
Min	-250.00 dBm
Max	250.00 dBm
Initial S/W Revision	Prior to A.02.00

Attenuation

This menu controls the attenuator functions and interactions between the attenuation system components.

There are two attenuator configurations in the X-Series. One is a dual attenuator configuration consisting of a mechanical attenuator and an optional electronic attenuator. The other configuration uses a single attenuator with combined mechanical and electronic sections that controls all the attenuation functions. Different models in the X-Series come with different configurations.

See ["Dual Attenuator Configurations:" on page 1187](#)

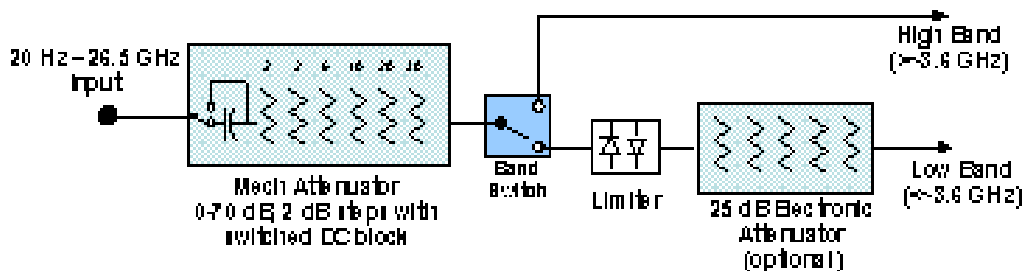
See ["Single Attenuator Configuration:" on page 1187](#)

Most Attenuation settings are the same for all measurements – they do not change as you change measurements. Settings like these are called “Meas Global” and are unaffected by Meas Preset.

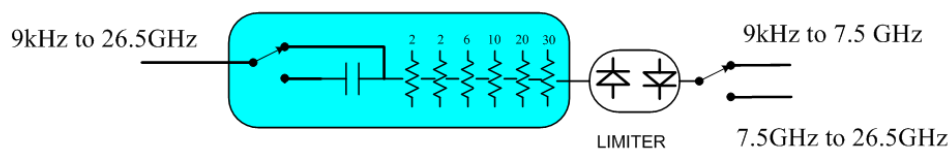
Key Path	AMPTD Y Scale
Scope	Meas Global
Dependencies	In measurements that support the I/Q inputs, this key is unavailable when I/Q is the selected input, and is replaced by the Range key in that case.
Readback Line	Contains a summary in [] brackets of the current total attenuation. See the descriptions of the , " (Mech) Atten " on page 2242, and " Enable Elec Atten " on page 2244 keys for more detail on the contributors to the total attenuation. Note that when "Pre-Adjust for Min Clip" is on, this value can change at the start of every measurement.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Dual Attenuator Configurations:

Configuration 1: Mechanical attenuator + optional electronic attenuator

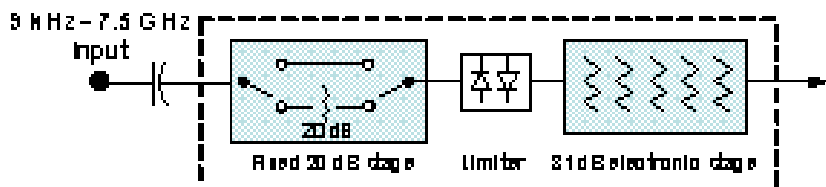


Configuration 2: Mechanical attenuator, no optional electronic attenuator

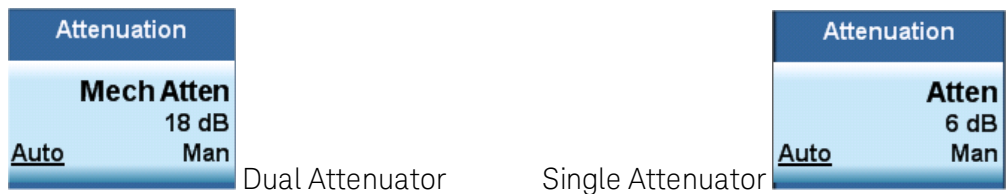


(note that Configuration 2 is not strictly speaking a dual-section attenuator, since there is no electronic section available. However, it behaves exactly like Configuration 1 without the Electronic Attenuator option EA3, therefore for the sake of this document it is grouped into the "Dual Attenuator" configuration)

Single Attenuator Configuration:



You can tell which attenuator configuration you have by pressing the Attenuation key, which (in most Modes) opens the Attenuation menu. If the first key in the Attenuation menu says Mech Atten you have the dual attenuator configuration. If the first key says Atten you have the single attenuator configuration.



In the single attenuator configuration, you control the attenuation with a single control, as the fixed stage has only two states. In the dual attenuator configuration, both stages have significant range so you are given separate control of the mechanical and electronic attenuator stages.

When you have the dual attenuator configuration, you may still have only a single attenuator, because unless option EA3 (the Electronic Attenuator option) is available, and you purchase it, you will have only the mechanical attenuator.

(Mech) Atten

This key is labeled Mech Atten in dual attenuator models and Atten in single attenuator models. In the dual attenuator configuration, this key only affects the mechanical attenuator.

This key lets you modify the attenuation applied to the RF input signal path. This value is normally auto coupled to the Ref Level, the Internal Preamp Gain, any External Gain that is entered, and the Max Mixer Level, as described in the table below.

See "[Attenuator Configurations and Auto/Man](#)" on page 1189

Key Path	AMPTD Y Scale, Attenuation
Remote Command	[:SENSe]:POWer[:RF]:ATTenuation <rel_ampl> [:SENSe]:POWer[:RF]:ATTenuation? [:SENSe]:POWer[:RF]:ATTenuation:AUTO OFF ON 0 1 [:SENSe]:POWer[:RF]:ATTenuation:AUTO?
Example	POW:ATT 20 Dual attenuator configuration: sets the mechanical attenuator to 20 dB Single attenuator mode: sets the main attenuation to 20 dB (see below for definition of "main" attenuation). If the attenuator was in Auto, it sets it to Manual.
Dependencies	Some measurements do not support the Auto setting of (Mech) Atten. In these measurements, the Auto/Man selection is not available, and the Auto/Man line on the key disappears. In dual attenuator configurations, when the electronic attenuator is enabled, the mechanical attenuator has no auto setting and the Auto/Man line on the key disappears. The state of Auto/Man is remembered and restored when the electronic attenuator is once again disabled. This is described in more detail in the " Enable Elec Atten " on page 2244 key description. See " Attenuator Configurations and Auto/Man " on page 1189 for more information on the Auto/Man functionality of Attenuation.

Couplings

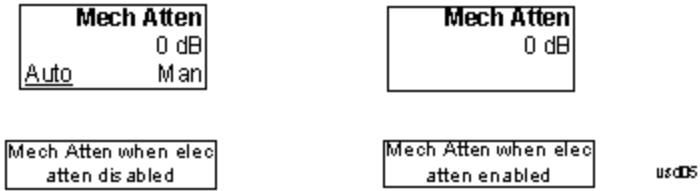
	<p>When (Mech) Atten is in Auto, it uses the following algorithm to determine a value: If the USB Preamp is connected to USB, use 0 dB. Otherwise, Atten = ReferenceLevel + PreAmpGain + ExternalGain – RefLevelOffset - MaxMixerLevel + IF Gain. Limit this value to be between 6 dB and the Max value. No value below 6 dB can ever be chosen by Auto. The resulting value is rounded up to the largest value possible given the attenuation step setting. That is, 50.01 dB would change to 60 dB (for a 10 dB attenuation step). The “IF Gain” term in the equation above is either 0 dB or +10 dB, depending on the settings of FFT IF Gain, Swept IF Gain, max Ref Level and the Auto/Man setting of Mech Atten. In External Mixing and BBIQ, where the Attenuator is not in the signal path, the Attenuator setting changes as described above when (Mech) Atten is in Auto, but no changes are made to the actual attenuator hardware setting until the input is changed back to the RF Input.</p>
Preset	<p>The preset for Mech Attenuation is “Auto.” The Auto value of attenuation is: CXA, EXA, MXA and PXA: 10 dB</p>
State Saved	<p>Saved in instrument state</p>
Min	<p>0 dB The attenuation set by this key cannot be decreased below 6 dB with the knob or step keys. To get to a value below 6 dB it has to be directly entered from the keypad or via SCPI. This protects from adjusting the attenuation to a dangerously small value which can put the instrument at risk of damage to input circuitry. However, if the current mechanical attenuation is below 6 dB it can be increased with the knob and step keys, but not decreased.</p>
Max	<p>CXA N9000A–503/507: 50 dB CXA N9000A–513/526: 70dB EXA: 60 dB MXA and PXA: 70 dB In the single attenuator configuration, the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB.</p>
Initial S/W Revision	<p>Prior to A.02.00</p>
Modified at S/W Revision	<p>A.03.00</p>

Attenuator Configurations and Auto/Man

As described in the Attenuation key description, there are two distinct attenuator configurations available in the X-Series, the single attenuator and dual attenuator configurations. In dual attenuator configurations, we have the mechanical attenuation and the electronic attenuation, and the current total attenuation is the sum of the electronic + mechanical attenuation. In single attenuator configurations, we refer to the attenuation set using the (Mech) Atten key (or POW:ATT SCPI) as the “main” attenuation; and the attenuation that is set by the SCPI command POW:EATT as the “soft” attenuation (the POW:EATT command is honored even in the single attenuator configuration, for compatibility purposes). Then the

current total attenuation is the sum of the main + soft attenuation. See the Elec Atten key description for more on “soft” attenuation.

In the dual attenuator configuration, when the electronic attenuator is enabled, there is no Auto/Man functionality for the mechanical attenuator, and the third line of the key label (the Auto/Man line) disappears:



Enable Elec Atten

Enables the Electronic Attenuator.

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear. These advantages primarily aid in remote operation and are negligible for front panel use. See ["Using the Electronic Attenuator: Pros and Cons" on page 1192](#) for a detailed discussion of the pros and cons of using the electronic attenuator.

For the single attenuator configuration, for SCPI backwards compatibility, the “soft” attenuation feature replaces the dual attenuator configuration’s electronic attenuator. All the same couplings and limitations apply. See ["Attenuator Configurations and Auto/Man" on page 2244](#)

See ["More Information" on page 1191](#)

Key Path	AMPTD Y Scale, Attenuation
Remote Command	[:SENSE] :POWER [:RF] :EATTenuation :STATe OFF ON 0 1 [:SENSE] :POWER [:RF] :EATTenuation :STATe ?
Example	POW:EATT:STAT ON
Dependencies	<p>This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no “electronic attenuator” there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a “soft” attenuation as described in "Attenuator Configurations and Auto/Man" on page 2244.</p> <p>The electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable above 3.6 GHz. Therefore, if the Stop Frequency of the analyzer is > 3.6 GHz then the Enable Elec Atten key will be OFF and grayed out.</p> <p>If the Internal Preamp is on, meaning it is set to Low Band or Full, the electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable. In this case the Enable Elec Atten key will be OFF and grayed out.</p> <p>If either of the above is true, if the SCPI command is sent, an error indicating that the electronic attenuator is unavailable will be sent.</p> <p>If the electronic/soft Attenuator is enabled, then the Stop Freq of the analyzer is limited to 3.6 GHz and the Internal Preamp is unavailable.</p> <p>The SCPI-only “soft” electronic attenuation for the single-attenuator configuration is not available in</p>

	all measurements; in particular, it is not available in the Swept SA measurement.
Couplings	Enabling and disabling the Electronic Attenuator affects the setting of the Mechanical Attenuator (in dual attenuator configurations). This is described in more detail below this table.
Preset	OFF for Swept SA measurement; ON for all other measurements that support the electronic attenuator
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

More Information

Mechanical Attenuator Transition Rules

When the Electronic Attenuator is enabled, the Mechanical Attenuator transitions to a state that has no Auto function. Below are the rules for transitioning the Mechanical Attenuator. NOTE that the information below ONLY applies to the dual attenuator configurations, and ONLY when the Electronic Attenuator is installed:

When the Electronic Attenuation is enabled from a disabled state:

- The Mechanical Attenuator is initialized to 10 dB (this is its optimal performance setting). You can then set it as desired with SCPI, numeric keypad, step keys, or knob, and it behaves as it normally would in manual mode
- The Auto/Man state of (Mech) Atten is saved
- The Auto/Man line on the (Mech) Atten key disappears and the auto rules are disabled
- The Electronic Attenuator is set to 10 dB less than the previous value of the Mechanical Attenuator, within the limitation that it must stay within the range of 0 to 24 dB of attenuation.

Examples in the dual attenuator configuration:

- Mech Atten at 20 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 10 dB. New total attenuation equals the value before Elec Atten enabled.
- Mech Atten at 0 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 0 dB. New total attenuation does not equal the value before Elec Atten enabled.
- Mech Atten at 40 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 24 dB. New total attenuation does not equal the value before Elec Atten enabled.

When the Electronic Attenuation is disabled from an enabled state:

- The Elec Atten key is grayed out
- The Auto/Man state of (Mech) Atten is restored
- If now in Auto, (Mech) Atten recouples

- If now in Man, (Mech) Atten is set to the value of total attenuation that existed before the Elec Atten was disabled. The resulting value is rounded up to the smallest value possible given the (Mech) Atten Step setting - (That is, 57 dB changes to 58 dB when (Mech) Atten Step is 2 dB.)

Using the Electronic Attenuator: Pros and Cons

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear.

The “finer steps” advantage of the electronic attenuator is beneficial in optimizing the alignment of the analyzer dynamic range to the signal power in the front panel as well as remote use. Thus, you can achieve improved relative signal measurement accuracy. Compared to a mechanical attenuator with 2 dB steps, the 1 dB resolution of the electronic attenuator only gives better resolution when the odd-decibel steps are used. Those odd-decibel steps are less accurately calibrated than the even-decibel steps, so one tradeoff for this superior relative accuracy is reduced absolute amplitude accuracy.

Another disadvantage of the electronic attenuator is that the spectrum analyzer loses its “Auto” setting, making operation less convenient.

Also, the relationship between the dynamic range specifications (TOI, SHI, compression and noise) and instrument performance are less well-known with the electrical attenuator. With the mechanical attenuator, TOI, SHI and compression threshold levels increase dB-for-dB with increasing attenuation, and the noise floor does as well. With the electronic attenuator, there is an excess attenuation of about 1 to 3 dB between 0 and 3.6 GHz, making the effective TOI, SHI, and so forth, less well known. Excess attenuation is the actual attenuation relative to stated attenuation. Excess attenuation is accounted for in the analyzer calibration

Elec Atten

Controls the Electronic Attenuator in dual attenuator configurations. This key does not appear in single attenuator configurations, as the control of both the mechanical and electronic stages of the single attenuator is integrated into the single Atten key.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	<code>[:SENSe] :POWer [:RF] :EATTenuation <rel_amp1></code> <code>[:SENSe] :POWer [:RF] :EATTenuation?</code>
Notes	Electronic Attenuation's specification is defined only when Mechanical Attenuation is 6 dB.
Dependencies	This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no “electronic attenuator” there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a “soft” attenuation as described in "Attenuator Configurations and Auto/Man" on page 2244 . The “soft” attenuation is treated as an addition to the “main” attenuation value set by the Atten softkey or the POW:ATT SCPI command and affects the total attenuation displayed on the Attenuation key and the Meas Bar. When Enable Elec Atten is off or grayed out, the Elec Atten key is grayed out.
Preset	0 dB
State Saved	Saved in instrument state

Min	0 dB
Max	Dual attenuator configuration: 24 dB Single attenuator configuration: the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Adjust Atten for Min Clip

Sets the combination of mechanical and electronic attenuation and gain based on the current measured signal level so that clipping will be at a minimum.

This is an "immediate action" function, that is, it executes once, when the key is pressed.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	<code>[:SENSe] :POWer [:RF] :RANGe:OPTimize IMMEDIATE</code>
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Pre-Adjust for Min Clip

If this function is on, it does the adjustment described under "[Adjust Atten for Min Clip](#)" on page 2247 each time a measurement restarts. Therefore, in Continuous measurement mode, it only executes before the first measurement.

In dual attenuator models, you can set Elec+Mech Atten, in which case both attenuators participate in the autoranging, or Elec Atten Only, in which case the mechanical attenuator does not participate in the autoranging. This latter case results in less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	<code>[:SENSe] :POWer [:RF] :RANGe:OPTimize:ATTenuation OFF ELECTrical COMBined</code> <code>[:SENSe] :POWer [:RF] :RANGe:OPTimize:ATTenuation?</code>
Notes	The SCPI parameter ELECTrical sets this function to On in single attenuator models. The SCPI parameter COMBined is mapped to ELECTrical in single attenuator models; if you send COMBined, it sets the function to On and returns ELEC to a query.
Dependencies	This key only appears in Dual Attenuator models with an Electronic Attenuator installed.

	In instruments with Dual Attenuator model, when Enable Elec Atten is off or grayed out, the Pre-Adjust for Min Clip key is grayed out.
Preset	OFF for Swept SA measurement; ON for all other measurements that support Pre-Adjust for Min Clip
State Saved	Saved in instrument state
Range	Dual attenuator models: Off Elec Atten Only Mech + Elec Atten Single attenuator models: Off On
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Remote Command	<code>[:SENSe] :POWer [:RF] :RANGe :AUTO ON OFF 1 0</code> <code>[:SENSe] :POWer [:RF] :RANGe :AUTO?</code>
Notes	ON aliases to "Elec Atten Only" (:POW:RANG:OPT:ATT ELEC) OFF aliases to "Off" (:POW:RANG:OPT:ATT OFF) The query :POW:RANG:AUTO? returns true if :POW:RANG:OPT:ATT is not "Off"
Initial S/W Revision	Prior to A.02.00

Off

Turns Pre-Adjust for Min Clip off. This is the default setting.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip
Example	:POW:RANGe:OPT:ATT OFF
Initial S/W Revision	Prior to A.02.00

Elec Atten Only

Selects only the electric attenuator to participate in auto ranging. This offers less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip
Example	:POW:RANGe:OPT:ATT ELEC
Initial S/W Revision	Prior to A.02.00

Mech + Elec Atten

In dual attenuator models, this selects both attenuators participate in the autoranging.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip
Example	:POW:RANGe:OPT:ATT COMB
Initial S/W Revision	Prior to A.02.00

(Mech) Atten Step

This controls the step size used when making adjustments to the input attenuation.

This key is labeled Mech Atten Step in dual attenuator models and Atten Step in single attenuator models. In the dual attenuator configuration, this key only affects the step size of the mechanical attenuator.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	<code>[:SENSe] :POWer [:RF] :ATTenuation :STEP [:INCRement] 10 dB 2 dB</code> <code>[:SENSe] :POWer [:RF] :ATTenuation :STEP [:INCRement] ?</code>
Example	POW:ATT:STEP 2
Notes	Note this feature works like a 1-N choice from the front panel, but it takes a specific value (in dB) when used remotely. The only valid values are 2 and 10.
Dependencies	Blanked in CXA and EXA if option FSA (2 dB steps) is not present. If blanked, attempts to set it via SCPI will yield an error.
Couplings	When the attenuation step size changes, the current mechanical attenuation value is adjusted (if necessary) to be quantized to the new step size. That is, if step is set to 10 dB, mech atten is increased if necessary so it is a multiple of 10 dB
Preset	PXA and MXA: 2 dB EXA and CXA: 10 dB (2 dB with option FSA)
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Scale/Div

Sets the logarithmic units per vertical graticule division on the display. However, since the Auto Scaling defaults to On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.

Key Path	AMPTD Y Scale
Mode	All except SA and BASIC
Remote Command	:DISPlay:MONitor:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision <rel_ampl> :DISPlay:MONitor:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision?
Example	DISP:MON:VIEW:WIND:TRAC:Y:PDIV 5.0 dB DISP:MON:VIEW:WIND:TRAC:Y:PDIV?
Couplings	When the Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.
Preset	10.00 dB
State Saved	Saved in instrument state.
Min	0.10 dB
Max	20.00 dB
Initial S/W Revision	Prior to A.02.00

Presel Center

When this key is pressed, the centering of the preselector filter is adjusted to optimize the amplitude accuracy at the frequency of the selected marker. If the selected marker is not on when Presel Center is pressed, the analyzer will turn on the selected marker, perform a peak search, and then perform centering on the marker's center frequency. If the selected marker is already on and between the start and stop frequencies of the analyzer, the analyzer performs the preselector calibration on that marker's frequency. If the selected marker is already on, but outside the frequency range between Start Freq and Stop Freq, the analyzer will first perform a peak search, and then perform centering on the marker's center frequency.

The value displayed on the Presel Adjust key will change to reflect the new preselector tuning (see Presel Adjust).

A number of considerations should be observed to ensure proper operation. See ["Proper Preselector Operation" on page 1197](#).

Key Path	AMPTD Y Scale
Remote Command	[:SENSe]:POWer[:RF]:PCENter
Example	POW:PCEN
Notes	Note that the rules outlined above under the key description apply for the remote command as well as the key. The result of the command is dependent on marker position, and so forth. Any message shown by the key press is also shown in response to the remote command.
Dependencies	<ul style="list-style-type: none"> • Grayed out if the microwave preselector is off.) • If the selected marker's frequency is below Band 1, advisory message 0.5001 is generated and no action is taken. • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0.

- Grayed out in the Spectrogram View.

Couplings	The active marker position determines where the centering will be attempted. If the analyzer is in a measurement such as averaging when centering is initiated, the act of centering the preselector will restart averaging but the first average trace will not be taken until the centering is completed.
Status Bits/OPC dependencies	When centering the preselector, *OPC will not return true until the process is complete and a subsequent measurement has completed, nor will results be returned to a READ or MEASURE command. The Measuring bit should remain set while this command is operating and should not go false until the subsequent sweep/measurement has completed.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Proper Preselector Operation

A number of considerations should be observed to ensure proper operation:

1. If the selected marker is off, the analyzer will turn on a marker, perform a peak search, and adjust the preselector using the selected marker's frequency. It uses the "highest peak" peak search method unqualified by threshold or excursion, so that there is no chance of a 'no peak found' error. It continues with that peak, even if it is the peak of just noise. Therefore, for this operation to work properly, there should be a signal on screen in a preselected range for the peak search to find.
2. If the selected marker is already on, the analyzer will attempt the centering at that marker's frequency. There is no preselector for signals below about 3.6 GHz, therefore if the marker is on a signal below 3.6 GHz, no centering will be attempted and an advisory message generated
3. In some models, the preselector can be bypassed. If it is bypassed, no centering will be attempted in that range and a message will be generated.

Preselector Adjust

Allows you to manually adjust the preselector filter frequency to optimize its response to the signal of interest. This function is only available when "Presel Center" on page 2250 is available.

For general purpose signal analysis, using Presel Center is recommended. Centering the filter minimizes the impact of long-term preselector drift. Presel Adjust can be used instead to manually optimize the preselector. One application of manual optimization would be to peak the preselector response, which both optimizes the signal-to-noise ratio and minimizes amplitude variations due to small (short-term) preselector drifting.

Key Path	AMPTD Y Scale
Scope	Meas Global
Remote Command	<code>[:SENSe] :POWer [:RF] :PADJust <freq></code>

	<code>[:SENSe] :POWer [:RF] :PADJust ?</code>
Example	POW:PADJ 100KHz POW:PADJ?
Notes	The value on the key reads out to 0.1 MHz resolution.
Dependencies	<ul style="list-style-type: none"> • Grayed out if microwave preselector is off.) • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0. • Grayed out in the Spectrogram View.
Preset	0 MHz
State Saved	The Presel Adjust value set by Presel Center, or by manually adjusting Presel Adjust, is not saved in instrument state, and does not survive a Preset or power cycle.
Min	-500 MHz
Max	500 MHz
Default Unit	Hz
Backwards Compatibility SCPI	<code>[:SENSe] :POWer [:RF] :MW :PADJust</code> <code>[:SENSe] :POWer [:RF] :MMW :PADJust</code> PSA had multiple preselectors, but the X-Series has only one. These commands simply alias to <code>[:SENSe] :POWer [:RF] :PADJust</code>
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Remote Command	<code>[:SENSe] :POWer [:RF] :PADJust :PRESelector MWAVE MMWave EXTernal</code> <code>[:SENSe] :POWer [:RF] :PADJust :PRESelector ?</code>
Notes	PSA had multiple preselectors, and you could select which preselector to adjust. Since the X-Series has only one mm/uW preselector, the preselector selection softkey is no longer available. However, to provide backward compatibility, we accept the legacy remote commands. The command form has no effect, the query always returns MWAVE
Initial S/W Revision	Prior to A.02.00

μW Path Control

The μW Path Control functions include the μW Preselector Bypass (Option MPB) and Low Noise Path (Option LNP) controls in the High Band path circuits.

When the μW Preselector is bypassed, the user has better flatness, but will be subject to spurs from out of band interfering signals. When the Low Noise Path is enabled, the analyzer automatically switches around

certain circuitry in the high frequency bands which can contribute to noise, when it is appropriate based on other analyzer settings.

For most applications, the preset state is Standard Path, which gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear out in the hardware switches. For applications that utilize the wideband IF paths, the preset state is the μ W Preselector Bypass path, if option MPB is present. This is because, when using a wideband IF such as the 140 MHz IF, the μ W Preselector's bandwidth can be narrower than the available IF bandwidth, causing degraded amplitude flatness and phase linearity, so it is desirable to bypass the preselector in the default case.

Users may choose Low Noise Path Enable. It gives a lower noise floor, especially in the 21–26.5 GHz region, though without improving many measures of dynamic range, and without giving the best possible noise floor. The preamp, if purchased and used, gives better noise floor than does the Low Noise Path, however its compression threshold and third-order intercept are much poorer than that of the non-preamp Low Noise Path. There are some applications, typically for signals around –30 dBm, for which the third-order dynamic range of the standard path is good enough, but the noise floor is not low enough even with 0 dB input attenuation. When the third-order dynamic range of the preamp path is too little and the noise floor of the standard path is too high, the Low Noise Path can provide the best dynamic range.

Key Path	AMPTD Y Scale
Mode	SA, BASIC, PNOISE, VSA , LTE, LTETDD
Scope	Meas Global
Remote Command	[:SENSe] :POWer [:RF] :MW:PATH STD LNPath MPBypass FULL [:SENSe] :POWer [:RF] :MW:PATH?
Example	:POW:MW:PATH LNP Enables the Low Noise path
Notes	If a Presel Center is performed, the analyzer will momentarily switch to the Standard Path, regardless of the setting of μ W Path Control The DC Block will always be switched in when the low noise path is switched in, to protect succeeding circuitry from DC. Note that this does not mean “when the low noise path is enabled” but when, based on the Low Noise Path rules, the path is actually switched in. This can happen when the selection is Low Noise Path Enable . In the case where the DC Block is switched in the analyzer is now AC coupled. However, if the user has selected DC coupling, the UI will still behave as though it were DC coupled, including all annunciation, warnings, status bits, and responses to SCPI queries. This is because, based on other settings, the analyzer could switch out the low noise path at any time and hence go back to being DC coupled. Alignment switching ignores the settings in this menu, and restores them when finished.
Dependencies	Unavailable in BBIQ and External Mixing
Preset	All modes other than IQ Analyzer mode and VXA: STD IQ Analyzer, VXA and WLAN mode: MPB option present and licensed: MPB MPB option not present and licensed: STD
State Saved	Save in instrument state
Readback	Value selected in the submenu
Initial S/W Revision	A.04.00
Modified at S/W Revision	A.10.00

Standard Path

This path gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear in the hardware switches, particularly in remote test scenarios where both low band and high band setups will follow in rapid succession.

In this path, the bypass of the low band/high band switch and microwave preamp is never activated, which can cause some noise degradation but preserves the life of the bypass switch.

Key Path	AMPTD Y Scale, μ W Path Control
Example	:POW:MW:PATH STD
Readback Text	Standard Path
Initial S/W Revision	A.04.00

μ W Preselector Bypass

This key toggles the preselector bypass switch for band 1 and higher. When the microwave preselect is on, the signal path is preselected. When the microwave preselector is off, the signal path is not preselected. The preselected path is the normal path for the analyzer.

The preselector is a tunable bandpass filter which prevents signals away from the frequency of interest from combining in the mixer to generate in-band spurious signals (images). The consequences of using a preselector filter are its limited bandwidth, the amplitude and phase ripple in its passband, and any amplitude and phase instability due to center frequency drift.

Option MPB or pre-selector bypass provides an unpreselected input mixer path for certain X-Series signal analyzers with frequency ranges above 3.6 GHz. This signal path allows a wider bandwidth and less amplitude variability, which is an advantage when doing modulation analysis and broadband signal analysis. The disadvantage is that, without the preselector, image signals will be displayed. Another disadvantage of bypassing the preselector is increased LO emission levels at the front panel input port.

Image responses are separated from the real signal by twice the 1st IF. For IF Paths of 10 MHz and 25 MHz, the 1st IF is 322.5 MHz, so the image response and the real signal will be separated by 645 MHz. The 1st IF will be different for other IF Path settings. When viewing a real signal and its corresponding image response in internal mixing, the image response will be to the left of the real signal.

Also, the image response and the real signal typically have the same amplitude and exhibit the same shape factor.

However, if Option FS1, Fast Sweep Capability, is enabled, the image response in the Swept SA measurement will appear lower in amplitude and have a much wider shape factor compared to the real signal.

Key Path	AMPTD Y Scale, μ W Path Control
Example	:POW:MW:PATH MPB
Dependencies	Key is blanked if current mode does not support it. Key is grayed out if mode supports it but current measurement does not support it. Key is blank unless Option MPB is present and licensed. If SCPI command sent when MPB not

	present, error -241, "Hardware missing; Option not installed" is generated.
Readback Text	μW Preselector Bypass
Initial S/W Revision	A.04.00
Remote Command	[:SENSE]:POWER[:RF]:MW:PRESelector[:STATE] ON OFF 0 1 [:SENSE]:POWER[:RF]:MW:PRESelector[:STATE]?
Example	:POW:MW:PRES OFF Bypasses the microwave preselector
Notes	The ON parameter sets the STD path (:POW:MW:PATH STD) The OFF parameter sets path MPB (:POW:MW:PATH MPB)
Preset	ON

Internal Preamp

Accesses a menu of keys that control the internal preamps. Turning on the preamp gives a better noise figure, but a poorer TOI to noise floor dynamic range. You can optimize this setting for your particular measurement.

The instrument takes the preamp gain into account as it sweeps. If you sweep outside of the range of the preamp the instrument will also account for that. The displayed result will always reflect the correct gain.

For some measurements, when the preamp is on and any part of the displayed frequency range is below the lowest frequency for which the preamp has specifications, a warning condition message appears in the status line. For example, for a preamp with a 9 kHz lowest specified frequency: "Preamp: Accy unspc'd below 9 kHz".

Key Path	AMPTD Y Scale
Scope	Meas Global
Remote Command	[:SENSE]:POWER[:RF]:GAIN[:STATE] OFF ON 0 1 [:SENSE]:POWER[:RF]:GAIN[:STATE]?
Dependencies	Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the key is not shown. The preamp is not available when the electronic/soft attenuator is enabled.
Couplings	The act of connecting the U7227A USB Preamplifier to one of the analyzer's USB ports will cause the Internal Preamp to be switched on. When this happens an informational message will be generated: "Internal Preamp turned on for optimal operation with USB Preamp." Note that if the Internal Preamp was already on, there will be no change to the setting, but if it was Off it will be switched On, to Full Range. Note that this same action occurs when the SA mode is selected while the USB Preamp is connected to one of the analyzer's USB ports, if it is the first time that the SA mode has run since powerup, or if the last time the SA mode was running the USB Preamp was NOT connected.

	Subsequently disconnecting the USB Preamp from USB does not change the Internal Preamp setting nor restore the previous setting.
Preset	OFF
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.14.00

Key Path	AMPTD Y Scale, Internal Preamp
Scope	Meas Global
Remote Command	[:SENSe] :POWer [:RF] :GAIN:BAND LOW FULL [:SENSe] :POWer [:RF] :GAIN:BAND?
Dependencies	Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the key is not shown. If a POW:GAIN:BAND FULL command is sent when a low band preamp is available, the preamp band parameter is to LOW instead of FULL, and an "Option not installed" message is generated.
Preset	LOW
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00

Off

Turns the internal preamp off

Key Path	AMPTD Y Scale, Internal Preamp
Example	:POW:GAIN OFF
Readback	Off
Initial S/W Revision	Prior to A.02.00

Low Band

Sets the internal preamp to use only the low band.

The frequency range of the installed (optional) low-band preamp is displayed in square brackets on the Low Band key label.

Key Path	AMPTD Y Scale, Internal Preamp
Example	:POW:GAIN ON :POW:GAIN:BAND LOW
Readback	Low Band
Initial S/W Revision	Prior to A.02.00

Full Range

Sets the internal preamp to use its full range. The low band (0–3.6 GHz or 0–3GHz, depending on the model) is supplied by the low band preamp and the frequencies above low band are supplied by the high band preamp.

The frequency range of the installed (optional) preamp is displayed in square brackets on the Full Range key label. If the high band option is not installed the Full Range key does not appear.

Key Path	AMPTD Y Scale, Internal Preamp
Example	:POW:GAIN ON :POW:GAIN:BAND FULL
Readback	Full Range
Initial S/W Revision	Prior to A.02.00

Ref Position

Positions the reference level at the top, center or bottom of the Y Scale display. Changing the reference position does not change the reference level value.

Key Path	AMPTD Y Scale
Mode	All except SA and BASIC
Remote Command	:DISPlay:MONitor:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOSition TOP CENTer BOTTom :DISPlay:MONitor:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOSition?
Example	DISP:MON:VIEW:WIND:TRAC:Y:RPOS CENT DISP:MON:VIEW:WIND:TRAC:Y:RPOS?
Preset	TOP
State Saved	Saved in instrument state.
Range	Top Ctr Bot
Initial S/W Revision	Prior to A.02.00

Auto Scaling

Toggles the Auto Scaling function between On and Off.

Key Path	AMPTD Y Scale
Mode	All except SA and BASIC
Remote Command	:DISPlay:MONitor:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPlE 0 1 OFF ON :DISPlay:MONitor:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPlE?

Example	DISP:MON:VIEW:WIND:TRAC:Y:COUP ON DISP:MON:VIEW:WIND:TRAC:Y:COUP?
Couplings	When Auto Scaling is On, and the Restart front-panel key is pressed, this function automatically determines the scale per division and reference values based on the measurement results. When you set a value to either Scale/Div or Ref Value manually, Auto Scaling automatically changes to Off.
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

Auto Couple

The Auto Couple feature provides a quick and convenient way to automatically couple multiple instrument settings. This helps ensure accurate measurements and optimum dynamic range. When the Auto Couple feature is activated, either from the front panel or remotely, all parameters of the current measurement that have an Auto/Manual mode are set to Auto mode and all measurement settings dependent on (or coupled to) the Auto/Man parameters are automatically adjusted for optimal performance.

However, the Auto Couple key actions are confined to the current measurement only. It does not affect other measurements in the mode, and it does not affect markers, marker functions, or trace or display attributes.

See ["More Information" on page 1205](#)

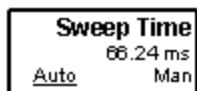
Key Path	Front-panel key
Remote Command	:COUPle ALL NONE
Example	:COUP ALL
Notes	:COUPle ALL puts all Auto/Man parameters in Auto mode (equivalent to pressing the Auto Couple key). :COUPLE NONE puts all Auto/Man parameters in manual mode. It decouples all the coupled instrument parameters and is not recommended for making measurements.
Initial S/W Revision	Prior to A.02.00

More Information

There are two types of functions that have Auto/Manual modes.

Auto/Man Active Function keys

An Auto/Man toggle key controls the binary state associated with an instrument parameter by toggling between Auto (where the parameter is automatically coupled to the other parameters it is dependent upon) and Man (where the parameter is controlled independent of the other parameters), as well as making the parameter the active function. The current mode is indicated on the softkey with either Auto or Man underlined as illustrated below.

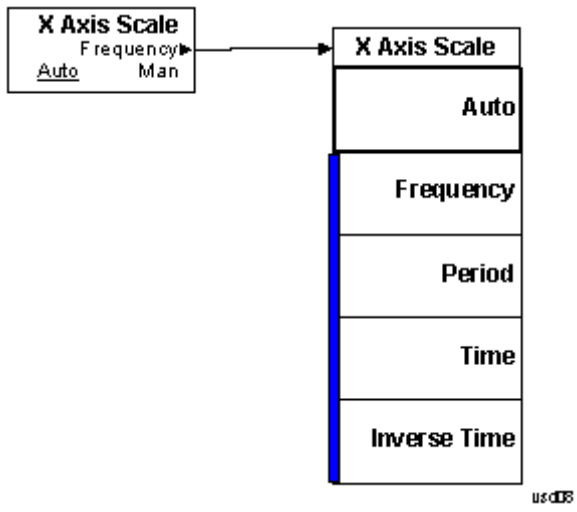


uscIT

Auto/Man 1-of-N keys

An Auto/Man 1-of-N key allows you to manually pick from a list of parameter values, or place the function in Auto, in which case the value is automatically selected (and indicated) as shown below. If in Auto, Auto is underlined on the calling key. If in manual operation, manual is indicated on the calling key. But the calling key does not actually toggle the function, it simply opens the menu.

12 Monitor Spectrum Measurement
Auto Couple



BW

Accesses a menu that enables you to specify the resolution bandwidth functions that control the bandwidth and filter selection.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Res BW

Sets the resolution bandwidth for the current measurement. If an unavailable bandwidth is entered with the numeric keypad, the closest available bandwidth is selected.

Key Path	BW
Mode	All except SA and BASIC
Remote Command	<pre>[:SENSe]:MONitor:BANDwidth[:RESolution] <freq> [:SENSe]:MONitor:BANDwidth[:RESolution]? [:SENSe]:MONitor:BANDwidth[:RESolution]:AUTO OFF ON 0 1 [:SENSe]:MONitor:BANDwidth[:RESolution]:AUTO?</pre>
Example	<pre>MON:BAND 2.4 MHz MON:BAND? MON:BAND:AUTO ON MON:BAND:AUTO?</pre>
Preset	<pre>WCDMA: Automatically calculated WIMAX OFDMA: 100kHz C2K: Automatically calculated BLUETOOTH: Automatically calculated PN: Automatically calculated GSM/EDGE: Automatically calculated TD-SCDMA: Automatically calculated 1xEVDO: 30kHz DVB-T/H: 3.9kHz DTMB (CTTB): 3.9kHz ISDB-T: 3.9kHz CMMB: 3.9kHz LTE: 100 kHz LTETDD: 100 kHz Digital Cable TV: 3.9kHz WLAN: 100 kHz MSR: Automatically calculated LTEAFDD, LTEATDD: 100kHz</pre>

	WCDMA: ON
	WIMAX: OFF
	C2K: ON
	BLUETOOTH: ON
	PN: ON
	GSM/EDGE: ON
	TD-SCDMA: ON
	1xEVDO: ON
	DVB-T/H: OFF
	DTMB (CTTB): OFF
	ISDB-T: OFF
	CMMB: OFF
	LTE:OFF
	LTETDD: OFF
	Digital Cable TV: OFF
	WLAN: OFF
	MSR: ON
	LTEAFDD, LTEATDD: OFF
State Saved	Saved in instrument state.
Min	1.0 Hz
Max	8.0 MHz
Backwards Compatibility SCPI	<code>[[:SENSe]:MONitor:BWIDth[:RESolution]</code>
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.02.00
Modified at S/W Revision	A.03.00

Video BW

Changes the analyzer post-detection filter.

Key Path	BW
Mode	All except SA and BASIC
Remote Command	<code>[[:SENSe]:MONitor:BANDwidth:VIDeo <bandwidth></code> <code>[[:SENSe]:MONitor:BANDwidth:VIDeo?</code> <code>[[:SENSe]:MONitor:BANDwidth:VIDeo:AUTO ON OFF 1 0</code> <code>[[:SENSe]:MONitor:BANDwidth:VIDeo:AUTO?</code>
Example	MON:BAND:VID 10 MHz MON:BAND:VID? MON:BAND:VID:AUTO OFF

	MON:BAND:VID:AUTO?
Preset	WCDMA: Automatically calculated WIMAX OFDMA: 1 MHz C2K: Automatically calculated BLUETOOTH: Automatically calculated PN: Automatically calculated GSM/EDGE: Automatically calculated TD-SCDMA: Automatically calculated 1xEVDO: 300kHz DVB-T/H: 39kHz DTMB (CTTB): 39kHz ISDB-T: 39kHz CMMB: 39kHz LTE: 1 MHz LTETDD: 1 MHz Digital Cable TV: 39kHz WLAN: 1 MHz MSR: Automatically calculated LTEAFDD, LTEATDD: 1 MHz WCDMA: ON WIMAX: OFF C2K: ON BLUETOOTH: ON PN: ON GSM/EDGE: ON TD-SCDMA: ON 1xEVDO: ON DVB-T/H: OFF DTMB (CTTB): OFF ISDB-T: OFF CMMB: OFF LTE: OFF LTETDD: OFF Digital Cable TV: OFF WLAN: OFF MSR: ON LTEAFDD, LTEATDD: OFF
State Saved	Saved in instrument state.
Min	1 Hz
Max	50 MHz

Backwards Compatibility SCPI	<code>[:SENSe] :MONitor :BWIDth :VIDeo</code>
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.02.00
Modified at S/W Revision	A.03.00

VBW:3dB RBW

Selects the ratio between the video bandwidth and the equivalent 3 dB resolution bandwidth to be used for setting the VBW when VBW is in Auto.

Key Path	BW
Mode	All except SA and BASIC
Remote Command	<code>[:SENSe] :MONitor :BANDwidth :VIDeo :RATio <real></code> <code>[:SENSe] :MONitor :BANDwidth :VIDeo :RATio?</code> <code>[:SENSe] :MONitor :BANDwidth :VIDeo :RATio :AUTO OFF ON 0 1</code> <code>[:SENSe] :MONitor :BANDwidth :VIDeo :RATio :AUTO?</code>
Example	MON:BAND:VID:RAT 2 MON:BAND:VID:RAT? MON:BAND:VID:RAT:AUTO 0 MON:BAND:VID:RAT:AUTO?
Preset	1 ON
State Saved	Saved in instrument state.
Min	0.00001
Max	3000000
Backwards Compatibility SCPI	<code>[:SENSe] :MONitor :BWIDth :VIDeo :RATio</code>
Initial S/W Revision	Prior to A.02.00

Span:3dB RBW

Selects the ratio between span and resolution bandwidth.

The default setting is Auto with a Span:3 dB RBW ratio of 106:1. You can manually change this ratio by pressing the key, entering a new value, and pressing Enter.

Key Path	BW
Mode	All except SA and BASIC
Remote Command	<code>[:SENSe] :MONitor :FREQuency :SPAN :BANDwidth [:RESolution] :RATio <integer></code>

```
[:SENSe]:MONitor:FREQuency:SPAN:BANDwidth[:RESolution]:RATio?
[:SENSe]:MONitor:FREQuency:SPAN:BANDwidth[:RESolution]:RATio:AUTO OFF |
ON | 0 | 1
[:SENSe]:MONitor:FREQuency:SPAN:BANDwidth[:RESolution]:RATio:AUTO?
```

Example

```
MON:FREQ:SPAN:BAND:RAT 200
MON:FREQ:SPAN:BAND:RAT?
MON:FREQ:SPAN:BAND:RAT:AUTO ON
MON:FREQ:SPAN:BAND:RAT:AUTO?
```

Preset

106
ON

State Saved

Saved in instrument state.

Min

2

Max

10000

Backwards

```
[:SENSe]:MONitor:FREQuency:SPAN:BWIDth[:RESolution]:RATio
```

Compatibility SCPI

Initial S/W Revision

Prior to A.02.00

Modified at S/W Revision

A.04.00

Cont (Continuous Measurement/Sweep)

Sets the analyzer for Continuous measurement operation. The single/continuous state is Meas Global so the setting will affect all measurements. If you are Paused, pressing Cont does a Resume.

Key Path	Front-panel key
Remote Command	:INITiate:CONTinuous OFF ON 0 1 :INITiate:CONTinuous?
Example	:INIT:CONT 0 puts analyzer in Single measurement operation. :INIT:CONT 1 puts analyzer in Continuous measurement operation
Preset	ON (Note that SYST:PRESet sets INIT:CONT to ON but *RST sets INIT:CONT to OFF)
State Saved	Saved in instrument state
Backwards Compatibility Notes	For Spectrum Analysis mode in ESA and PSA, there is no Cont hardkey, instead there is a Sweep Single/Cont key. In these analyzers, switching the Sweep Single/Cont key from Single to Cont restarts averages (displayed average count reset to 1), but does not restart Max Hold and Min Hold. The X-Series has Single and Cont keys in place of the SweepSingleCont key. In the X-Series, if in single measurement, the Cont key (and INIT:CONT ON) switches to continuous measurement, but never restarts a measurement and never resets a sweep.
Initial S/W Revision	Prior to A.02.00

In Swept SA Measurement (Spectrum Analysis Mode):

The analyzer takes repetitive sweeps, averages, measurements, etc., when in Continuous mode. When the average count reaches the Average/Hold Number the count stops incrementing, but the analyzer keeps sweeping. See the Trace/Detector section for the averaging formula used both before and after the Average/Hold Number is reached. The trigger condition must be met prior to each sweep. The type of trace processing for multiple sweeps, is set under the Trace/Detector key, with choices of Trace Average, Max Hold, or Min Hold.

In Other Measurements/Modes:

With Avg/Hold Num (in the Meas Setup menu) set to Off or set to On with a value of 1, a sweep is taken after the trigger condition is met; and the analyzer continues to take new sweeps after the current sweep has completed and the trigger condition is again met. However, with Avg/Hold Num set to On with a value >1, multiple sweeps (data acquisitions) are taken for the measurement. The trigger condition must be met prior to each sweep. The sweep is not stopped when the average count k equals the number N set for Avg/Hold Num is reached, but the number k stops incrementing. A measurement average usually applies to all traces, marker results, and numeric results. But sometimes it only applies to the numeric results.

If the analyzer is in Single measurement, pressing the Cont key does not change k and does not cause the sweep to be reset; the only action is to put the analyzer into Continuous measurement operation.

If it is already in continuous sweep:

the INIT:CONT 1 command has no effect

the INIT:CONT 0 command will place the analyzer in Single Sweep but will have no effect on the current sequence until $k = N$, at which point the current sequence will stop and the instrument will go to the idle state.

12 Monitor Spectrum Measurement
File

File

See "File" on page 320

FREQ/Channel

Accesses a menu of keys that allows you to control the Frequency parameters of the instrument.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

ARFCN

Sets the analyzer to a frequency that corresponds to the ARFCN (Absolute RF Channel Number). Used to enter the channel to be measured for the selected band. If the Center Freq value entered does not exactly correlate with an ARFCN, the softkey label changes to display the closest ARFCN to the selected frequency, along with a > or < symbol indicating whether the frequency is above or below that ARFCN.

Key Path	FREQ Channel
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel:ARFCn RFCHannel <integer></code> <code>[:SENSe] :CHANnel:ARFCn RFCHannel?</code>
Example	CHAN:ARFC 3 CHAN:ARFC?
Notes	This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not available (blank).
Couplings	Coupled with Center Frequency . Setting ARFCN sets Center Freq to the value corresponding to that ARFCN. BMT Freq choice changes this parameter.
Preset	1
State Saved	Saved in instrument state.
Range	Different for each BAND as follows: E-GSM: 0 to 124, and 975 to 1023 P-GSM: 1 to 124 R-GSM: 0 to 124(MS), and 955 to 1023(BTS) DCS1800: 512 to 885 PCS1900: 512 to 810 GSM450: 259 to 293 GSM480: 306 to 340 GSM700: 438 to 516 GSM850: 128 to 251 T-GSM 810: 350 to 425

Min	Different for each BAND as follows: E-GSM: 0(MS), and 975(BTS) P-GSM: 1 R-GSM: 0(MS), and 955(BTS) DCS1800: 512 PCS1900: 512 GSM450: 259 GSM480: 306 GSM700: 438 GSM850: 128 T-GSM 810: 350
Max	Different for each BAND as follows: E-GSM: 124(MS), and 1023(BTS) P-GSM: 124 R-GSM: 124(MS), and 1023(BTS) DCS1800: 885 PCS1900: 810 GSM450: 293 GSM480: 340 GSM700: 516 GSM850: 251 T-GSM 810: 425
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.07.00

Center Freq

Sets the center frequency to be measured for the selected band. It is coupled with ARFCN – setting Center Freq sets ARFCN to the channel corresponding to that frequency.

For more information, see the section ["Center Freq" on page 2269](#).

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

Time Slot

This functionality is the same as that of the corresponding key in the Demod menu. See ["Time Slot" on page 2288](#) for details.

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

Burst Type

This functionality is the same as that of the corresponding key in the Demod menu. See ["Burst Type" on page 2289](#) for details.

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

TSC (Std)

This functionality is the same as that of the corresponding key in the Demod menu. See ["TSC \(Std\)" on page 2291](#) for details.

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

Center Freq

Sets the frequency that corresponds to the horizontal center of the graticule (when frequency Scale Type is set to linear). While adjusting the Center Frequency the Span is held constant, which means that both Start Frequency and Stop Frequency will change.

Pressing Center Freq also sets the frequency entry mode to Center/Span. In Center/Span mode, the center frequency and span values are displayed below the graticule, and the default active function in the Frequency menu is Center Freq.

The center frequency setting is the same for all measurements within a mode, that is, it is Meas Global. Some modes are also able to share a Mode Global center frequency value. If this is the case, the Mode will have a Global Settings key in its Mode Setup menu.

The Center Freq function sets (and queries) the Center Frequency for the currently selected input. If your analyzer has multiple inputs, and you select another input, the Center Freq changes to the value for that input. SCPI commands are available to directly set the Center Freq for a specific input.

Center Freq is remembered as you go from input to input. Thus you can set a Center Freq of 10 GHz with the RF Input selected, change to BBIQ and set a Center Freq of 20 MHz, then switch to External Mixing and set a Center Freq of 60 GHz, and when you go back to the RF Input the Center Freq will go back to 10 GHz; back to BBIQ and it is 20 MHz; back to External Mixing and it is 60 GHz.

See ["RF Center Freq" on page 1220](#)

See [Ext Mix Center Freq](#)

See ["I/Q Center Freq" on page 1222](#)

See ["Center Frequency Presets" on page 1219](#)

Key Path	FREQ Channel
Scope	Meas Global
Remote Command	<code>[:SENSe] :FREQuency:CENTer <freq></code> <code>[:SENSe] :FREQuency:CENTer?</code>
Example	FREQ:CENT 50 MHz FREQ:CENT UP changes the center frequency to 150 MHz if you use FREQ:CENT:STEP 100 MHz to set the center frequency step size to 100 MHz FREQ:CENT?
Notes	This command sets either the RF or I/Q Center Frequency depending on the selected input. For RF input it is equivalent to FREQ:RF:CENT For I/Q input it is equivalent to FREQ:IQ:CENT Preset and Max values are dependent on Hardware Options (5xx) If no terminator (e.g. MHz) is sent the terminator Hz is used. If a terminator with unit other than Frequency is used, an invalid suffix error message is generated.
Dependencies	The Center Frequency can be limited by Start or Stop Freq limits, if the Span is so large that Start or Stop reach their limit.
Couplings	When operating in "swept span", any value of the Center Frequency or Span that is within the frequency range of the analyzer is allowed when the value is being set through the front panel numeric key pad or the SCPI command. The other parameter is forced to a different value if needed, to keep the Start and the Stop Frequencies within the analyzer's frequency range
Preset	Depends on instrument maximum frequency, mode, measurement, and selected input. See "Center Frequency Presets" on page 1219 and "RF Center Freq" on page 1220 and Ext Mix Center Freq and "I/Q Center Freq" on page 1222.
State Saved	Saved in instrument state
Min	Depends on instrument maximum frequency, mode, measurement, and selected input.. See "Center Frequency Presets" on page 1219 and "RF Center Freq" on page 1220 and "I/Q Center Freq" on page 1222.
Max	Depends on instrument maximum frequency, mode, measurement, and selected input.. See "Center Frequency Presets" on page 1219 and "RF Center Freq" on page 1220 and "I/Q Center Freq" on page 1222.
Default Unit	Hz
Status Bits/OPC	Non-overlapped
Dependencies	
Initial S/W Revision	Prior to A.02.00

Center Frequency Presets

The following table provides the Center Frequency Presets for the Spectrum Analyzer mode, and the Max Freq, for the various frequency options:

Freq Option	CF after Mode Preset	Stop Freq after Mode Preset	Max Freq (can't tune above)
503 (all but N9000A)	1.805 GHz	3.6 GHz	3.7 GHz
503 (N9000A)	1.505 GHz	3.0 GHz	3.08 GHz
507 (all but N9000A)	3.505 GHz	7.0 GHz	7.1 GHz
507 (N9000A)	3.755 GHz	7.5 GHz	7.58 GHz
508 (all but N9038A)	1.805 GHz	3.6 GHz	8.5 GHz
508 (N9038A)	4.205 GHz	8.4 GHz	8.5 GHz
513	6.805 GHz	13.6 GHz	13.8 GHz
526 (all but N9000A and N9038A)	13.255 GHz	26.5 GHz	27.0 GHz
526 (N9000A)	13.255 GHz	26.5 GHz	26.55 GHz
526 (N9038A)	1.805 GHz	3.6 GHz	27.0 GHz
532	16.005 GHz	32.0 GHz	32.5 GHz
543	21.505 GHz	43.0 GHz	TBD
544	22.005 GHz	44.0 GHz	44.5 GHz
550	25.005 GHz	50.0 GHz	51 GHz

Input 2:

Model	CF after Mode Preset	Stop Freq after Mode Preset	Max Freq (can't tune above)
N9000A opt C75	0.7505GHz	1.5 GHz	1.58 GHz
N9038A	505 MHz	1 GHz	1.000025 GHz

Tracking Generator Frequency Limits (N9000A only):

Tracking Generator Option	Min Freq (clips to this freq when turn TG on and can't tune below while TG on)	If above this Freq, Stop Freq clipped to this Freq when TG turned on	Max Freq (can't tune above) while TG on
T03	9 kHz	3.0 GHz	3.08 GHz
T06	9 kHz	6.0 GHz	6.05 GHz

The following table shows the Center Frequency Presets for modes other than Spectrum Analyzer:

Mode	CF Preset for RF
WCDMA	1 GHz
WIMAXOFDMA,	1 GHz
BASIC	1 GHz
ADEMOD	1 GHz
VSA	1 GHz
TDSCDMA	1 GHz
PNOISE	1 GHz
LTE	1 GHz
LTETDD	1 GHz
MSR	1 GHz
GSM	935.2 MHz
NFIGURE	1.505 GHz

RF Center Freq

SCPI command for specifying the RF Center Frequency. This command will set the Center Frequency to be used when the RF input is selected, even if the RF input is not the input that is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

Scope	Meas Global
Remote Command	[:SENSe] :FREQuency:RF:CENTer <freq> [:SENSe] :FREQuency:RF:CENTer?
Example	FREQ:RF:CENT 30 MHz
Notes	This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode.
Dependencies	If the electronic/soft attenuator is enabled, any attempt to set Center Frequency such that the Stop

	Frequency would be >3.6 GHz fails and results in an advisory message. If the equivalent SCPI command is sent, this same message is generated as part of a “-221, Settings conflict” warning. If Source Mode is set to Tracking, and the Max or Min Center Freq is therefore limited by the limits of the source, a warning message is generated, “Data out of range;clipped to source max/min” if these limits are exceeded. Note that for an external source, these limits can be affected by the settings of Source Numerator, Source Denominator and Power Sweep.
Preset	See table above
State Saved	Saved in instrument state.
Min	-79.999995 MHz, unless Source Mode is set to Tracking, in which case it is limited by the minimum frequency of the Source
Max	See table above. Basically instrument maximum frequency - 5 Hz. Note that, if the Source Mode is set to Tracking, the effective instrument maximum frequency may be limited by the source maximum frequency. If the knob or step keys are being used, also depends on the value of the other three interdependent parameters Span, Start Frequency and Stop Frequency
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Ext Mix Center Freq

SCPI command for specifying the External Mixer Center Frequency. This command will set the Center Frequency to be used when the External Mixer is selected, even if the External Mixer input is not the input which is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

Scope	Meas Global
Remote Command	<code>[:SENSe] :FREQuency:EMIXer:CENTer <freq></code> <code>[:SENSe] :FREQuency:EMIXer:CENTer?</code>
Example	<code>:FREQ:EMIX:CENT 60 GHz</code> <code>:FREQ:EMIX:CENT?</code>
Notes	This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode.
Couplings	When returning to External Mixing after having been switched to one of the other inputs (e.g., RF), you will come back into the settings that you had when you left External Mixing. So you will come back to the band you were in with the Center Frequency that you had. However, Span is not an input-dependent parameter, therefore you will bring the span over from the other input. Therefore, the analyzer comes back with the span from the previous input, limited as necessary by the current mixer setup.
Preset	When a Mode Preset is performed while in External Mixing, the Start frequency of the current Mode is set to the nominal Min Freq of the lowest harmonic range in the Harmonic Table for the current mixer setup. Similarly, the Stop frequency of the current Mode is set to the nominal Max Freq of the highest harmonic range in the Harmonic Table. The Center Freq thus presets to the point arithmetically equidistant from these two frequencies.

	<p>If the current measurement has a limited Span available to it, and cannot achieve the Span shown in the table (Span=Stop Freq – Start Freq), the analyzer uses the maximum Span the measurement allows, and still sets the Center Freq to the midpoint of the Start and Stop Freq values in the Harmonic Table.</p> <p>When Restore Input/Output Defaults is performed, the mixer presets to the 11970A, whose Start and Stop frequencies are 26.5 and 40 GHz respectively. The center of these two frequencies is 33.25 GHz.</p> <p>Therefore, after a Restore Input/Output Defaults, if you go into External Mixing and do a Mode Preset while in the Spectrum Analyzer Mode, the resulting Center Freq is 33.25 GHz.</p>
State Saved	Saved in instrument state.
Min	The minimum frequency in the currently selected mixer band + 5 Hz
Max	The maximum frequency in the currently selected mixer band – 5 Hz If the knob or step keys are being used, also depends on the value of the other three interdependent parameters Span, Start Frequency and Stop Frequency
Initial S/W Revision	A.08.01

I/Q Center Freq

SCPI command for specifying the I/Q Center Frequency. This command will set the Center Frequency to be used when the I/Q input is selected, even if the I/Q input is not the input which is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

Scope	Meas Global
Remote Command	[:SENSe] :FREQuency:IQ:CENTer <freq> [:SENSe] :FREQuency:IQ:CENTer?
Example	FREQ:IQ:CENt: 30 MHz
Notes	This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode.
Preset	0 Hz
State Saved	Saved in instrument state.
Min	-40.049995 MHz
Max	40.049995 MHz
Initial S/W Revision	Prior to A.02.00

BMT Freq

Enables quick selection from a subset of the available ARFCN numbers for the Top, Middle, or Bottom frequency in the selected band.

Key Path	FREQ Channel
----------	--------------

Mode	GSM
Scope	Meas Global
Notes	This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this.
Dependencies	When I/Q Input is selected, this key is not available (blank).
Couplings	BMT choice changes ARFCN and Center Freq. Chosen ARFCN will be displayed on each menu key.
Range	Top Middle Bottom
Initial S/W Revision	Prior to A.02.00

BMT Freq Top

Sets the analyzer to the frequency of the highest ARFCN (Absolute RF Channel Number) of the selected radio band.

Key Path	FREQ Channel, BMT Freq
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel:ARFCn RFCHannel:TOP
Example	CHAN:ARFC:TOP
Notes	1. This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. 2. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not displayed.
Couplings	Change [:SENSe]:CHANnel:ARFCn RFCHannel as follows: E-GSM: 124 P-GSM: 124 R-GSM: 124 DCS 1800: 885 PCS 1900: 810 GSM 450: 293 GSM 480: 340 GSM 700: 516 GSM 850: 251 T-GSM 810: 425 Change BMT ARFCN to BMT FreqTOP. Change [:SENSe]:FREQuency:CENter as follows: E-GSM: 959.800 MHz P-GSM: 959.800 MHz R-GSM: 959.800 MHz

	DCS 1800: 1879.80 MHz
	PCS 1900: 1989.80 MHz
	GSM 450: 467.400 MHz
	GSM 480: 495.800 MHz
	GSM 700: 792.800 MHz
	GSM 850: 893.800 MHz
	T-GSM810: 866.000 MHz

State Saved	No
Initial S/W Revision	Prior to A.02.00

BMT Freq Middle

Sets the analyzer to the frequency of the middle ARFCN (Absolute RF Channel Number) of the selected radio band.

Key Path	FREQ Channel, BMT Freq
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :ARFCn RFCHannel :MIDDLE</code>
Example	CHAN:ARFC:MIDD
Notes	<ol style="list-style-type: none"> 1. This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. 2. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not displayed.
Couplings	Change [:SENSe]:CHANnel:ARFCn RFCHannel as follows: E-GSM: 38 P-GSM: 63 R-GSM: 28 DSC 1800: 699 PCS 1900: 661 GSM 450: 276 GSM 480: 323 GSM 700: 477 GSM 850: 190 T-GSM 810: 388 Change BMT ARFCN to BMT FreqMIDDLE. Change [:SENSe]:FREQuency:CENTer as follows: E-GSM: 942.600 MHz P-GSM: 947.600 MHz R-GSM: 940.600 MHz

	DCS 1800: 1842.60 MHz
	PCS 1900: 1960.00 MHz
	GSM 450: 464.000 MHz
	GSM 480: 492.400 MHz
	GSM 700: 755.000 MHz
	GSM 850: 881.600 MHz
	T-GSM 810: 858.600 MHz
State Saved	No
Initial S/W Revision	Prior to A.02.00

BMT Freq Bottom

Sets the analyzer to the frequency of the lowest ARFCN (Absolute RF Channel Number) of the selected radio band.

Key Path	FREQ Channel, BMT Freq
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel:ARFCn RFChannel:BOTTom
Example	CHAN:ARFC:BOT
Notes	<ol style="list-style-type: none"> 1. This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. 2. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not displayed.
Couplings	<p>Change [:SENSe]:CHANnel:ARFCn RFChannel as follows:</p> <p>E-GSM: 975</p> <p>P-GSM: 1</p> <p>R-GSM: 955</p> <p>DCS 1800: 512</p> <p>PCS 1900: 512</p> <p>GSM 450: 259</p> <p>GSM 480: 306</p> <p>GSM 700: 438</p> <p>GSM 850: 128</p> <p>T-GSM 810: 350</p> <p>Change BMT ARFCN to BMT FreqBOTTOM.</p> <p>Change [:SENSe]:FREQuency:CENTer as follows:</p> <p>E-GSM: 925.200 MHz</p> <p>P-GSM: 935.200 MHz</p> <p>R-GSM: 921.200 MHz</p>

	DCS 1800: 1805.20 MHz PCS 1900: 1930.20 MHz GSM 450: 460.600 MHz GSM 480: 489.000 MHz GSM 700: 747.2 MHz GSM 850: 869.200 MHz T-GSM 810: 851.000 MHz
State Saved	No
Initial S/W Revision	Prior to A.02.00

Carrier Setup

Allows you to set carrier parameters.

Key Path	FREQ Channel
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Initial S/W Revision	A.06.00
Modified at S/W Revision	A.14.00

Carriers

Defines the number of carriers.

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :COUNT <integer></code> <code>[:SENSe] :CHANnel :CARRier :COUNT?</code>
Example	CHAN:CARR:COUN 3 CHAN:CARR:COUN?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Couplings	This can change when the SCPI command of the Carrier Power Present or the Carrier Interval is sent.
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	16

Initial S/W Revision	A.06.00
Modified at S/W Revision	A.13.00

Reference Carrier

Defines the reference active carrier. The Reference Carrier frequency point is always aligned with the Measurement Global Center Frequency. The minimum value 1 specifies the lowest frequency carrier among the active carriers. The maximum value specifies the highest frequency carrier among the active carriers.

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :RCARrier <integer></code> <code>[:SENSe] :CHANnel :CARRier :RCARrier?</code>
Example	CHAN:CARR:RCAR 3 CHAN:CARR:RCAR?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	The maximum value depends on the number of carriers. If you set it to more than the number of carriers, it's clipped to the number of carriers. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Couplings	When you decrease the number of carriers to a value which is less than this value, this is clipped to the value.
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	Number of carriers
Initial S/W Revision	A.06.00

Configure Carriers

Opens a menu of keys that allows you to configure carriers.

Key Path	FREQ Channel, Multi Carrier Setup
Dependencies	This key is grayed out when there is only one carrier. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Initial S/W Revision	A.06.00

Select Carrier

Selects a carrier to configure.

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	The maximum value depends on the number of carriers. This key is only shown when the N9071A–3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned. This parameter is unavailable when there is only one carrier.
Couplings	This value can change when you decrease the number of carriers.
Preset	1
State Saved	No
Min	1
Max	Number of carriers
Initial S/W Revision	A.06.00

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :CARRier :LIST :COUPle OFF ON 0 1, ... [:SENSe] :CHANnel :CARRier :LIST :COUPle ?
Example	CHAN:CARR:LIST:COUP OFF CHAN:CARR:LIST:COUP?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This key is only shown when the N9071A–3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	When Couple is selected, the carrier settings are coupled to carrier #1. Coupled parameters are Carrier Power Present, Carrier Interval. When a setting is changed, the couple is set to Man automatically. Carrier #1 is always set to couple and cannot be changed. Couple/Man selection on the Carrier key is not displayed when selected carrier number is #1.
Preset	ON
State Saved	No
Range	Couple Man
Initial S/W Revision	A.06.00

Carrier Power Present

Specifies whether each of carriers is active or not.

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :CARRier :LIST :PPResent YES NO, ... [:SENSe] :CHANnel :CARRier :LIST :PPResent ?
Example	CHAN:CARR:LIST:PPR YES CHAN:CARR:LIST:PPR?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode. Missing values are not permitted, therefore if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Dependencies	This parameter is unavailable when there is only one carrier. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	Coupled to the number of carriers. When the SCPI command is sent, the number of carriers will be set to the number of entries in the parameter list.
Preset	YES
State Saved	Saved in instrument state.
Range	Yes No
Initial S/W Revision	A.06.00

Carrier Interval

Specifies the frequency interval between the Carrier #n and #n+1 center frequencies.

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :CARRier :LIST :INTerval <freq>, ... [:SENSe] :CHANnel :CARRier :LIST :INTerval ?
Example	CHAN:CARR:LIST:INT 600k CHAN:CARR:LIST:INT?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode. The softkey for the last carrier (say, #N) is grayed out.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned. This parameter is unavailable when there is only one carrier.
Couplings	Coupled to the number of carriers. When the SCPI command is sent, the number of carriers will be

	set to the number of entries in the parameter list. Changing Carrier Interval might affect the Span.
Preset	600kHz
State Saved	Saved in instrument state.
Min	400 kHz
Max	100 MHz
Initial S/W Revision	A.06.00
Modified at S/W Revision	A.07.00, A.08.00

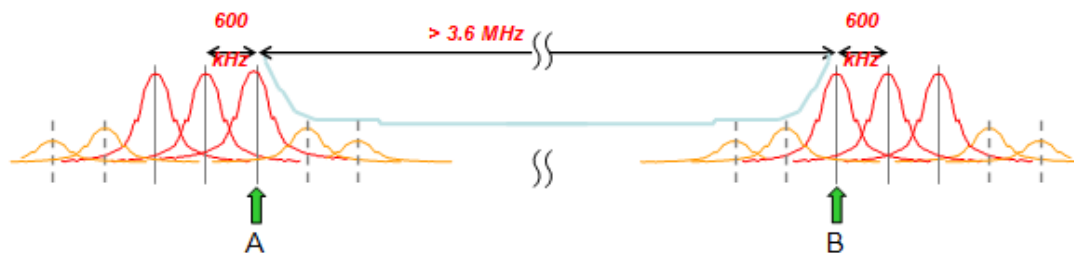
Carrier Frequency Allocation

Specifies the carrier frequency allocation. There are two types of allocation, contiguous and non-contiguous. Non-Contiguous frequency allocation is defined as an allocation where two groups of frequencies are separated with at least [3.6] MHz carrier separation between the innermost carriers. In case of the non-contiguous frequency allocation, tests will be measured between the uppermost carrier A of the lower frequency group and the lowermost carrier B of the upper frequency group.

See ["An example of non-contiguous frequency allocation" on page 1231](#)

Key Path	FREQ Channel, Multi Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :FALLocation</code> CONTiguous NCONTiguous <code>[:SENSe] :CHANnel :CARRier :FALLocation?</code>
Example	CHAN:CARR:FALL NCON CHAN:CARR:FALL?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This menu key is available only when the number of carriers is more than one. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Preset	CONTiguous
State Saved	Saved in instrument state.
Range	Contiguous Non-Contiguous
Readback Text	CONTiguous NCONTiguous
Initial S/W Revision	A.07.00

An example of non-contiguous frequency allocation



Non-Contiguous

Opens a menu of keys that allows you to set non-contiguous frequency allocation parameters.

Key Path	FREQ Channel, Multi Carrier Setup, Carr Freq Alloc
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Initial S/W Revision	A.07.00

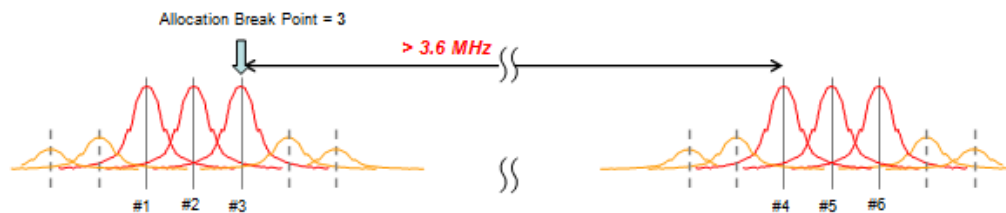
Allocation Break Pt

Specifies an allocation break point that is a sequence (or index) number of the uppermost carrier in the lower frequency group.

See ["An example of allocation break point" on page 1233](#)

Key Path	FREQ Channel, Multi Carrier Setup, Carr Freq Alloc, Non-Contiguous
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe]:CHANnel:CARRier:FALLocation:NCONtiguous:ABPoint <integer></code> <code>[:SENSe]:CHANnel:CARRier:FALLocation:NCONtiguous:ABPoint?</code>
Example	CHAN:CARR:FALL:NCON:ABP 3 CHAN:CARR:FALL:NCON:ABP?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Dependencies	The maximum value depends on the number of carriers. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	This value can change when you decrease the number of carriers.
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	Number of carriers - 1
Initial S/W Revision	A.07.00
Modified at S/W Revision	A.13.00

An example of allocation break point



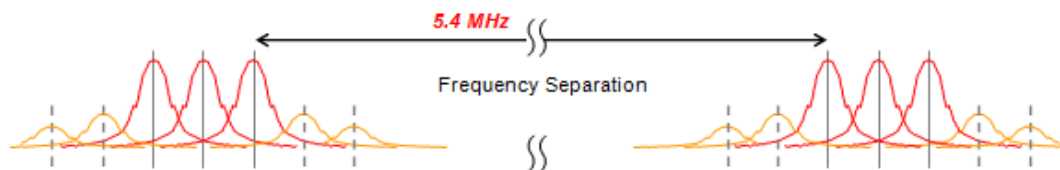
Freq Separation

Specifies frequency separation between the innermost of carriers.

See ["An example of frequency separation" on page 1234](#)

Key Path	FREQ Channel, Multi Carrier Setup, Carr Freq Alloc, Non-Contiguous
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :FALLocation :NCONtiguous :FSEParation <freq></code> <code>[:SENSe] :CHANnel :CARRier :FALLocation :NCONtiguous :FSEParation?</code>
Example	<code>CHAN:CARR:FALL:NCON:FSEP 5.4M</code> <code>CHAN:CARR:FALL:NCON:FSEP?</code>
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	Changing Frequency Separation might affect the Span
Preset	5.4 MHz
State Saved	Saved in instrument state.
Min	3.6 MHz
Max	100 MHz
Initial S/W Revision	A.07.00

An example of frequency separation



Carrier BPF

Selects whether to use the carrier bandpass filter.

Key Path	FREQ Channel, Multi Carrier SetupMode Setup, Demod
Mode	GSM
Remote Command	[:SENSe] :RADio:CARRier:NUMBer:AUTO ON OFF 1 0 [:SENSe] :RADio:CARRier:NUMBer:AUTO?
Example	RAD:CARR:NUMB:AUTO 1 RAD:CARR:NUMB:AUTO?
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	ON automatically changes to OFF when Multiple or Single is selected as Carrier BPF Type.
Preset	ON
State Saved	Saved in instrument state.
Range	Auto Man
Initial S/W Revision	A.06.00

Carrier BPF Type

Opens a menu of keys that allows you to select the type of the bandpass filter. When carriers other than the signal of interest are present, especially if they are strong, they can interfere with the measurement, making it difficult to sync and producing artificially high EVM results. When this condition exists, toggle from Single to Multi. A band-limited filter will help reduce the measurement interference.

BPF Type	Description
MULTiple	Enable multi carrier tolerance filter.
SINGle	Disable multi carrier tolerance filter

This parameter applies only to the following measurements:

- GMSK Phase & Frequency Error measurement
- EDGE EVM measurement
- GMSK Power vs. Time

- EDGE Power vs. Time

Key Path	FREQ Channel, Multi Carrier Setup, Carrier BPFMode Setup, Demod, Carrier BPF
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :RADio :CARRier :NUMBer SINGLE MULTiple</code> <code>[:SENSe] :RADio :CARRier :NUMBer ?</code>
Example	<code>RAD:CARR:NUMB SING</code> <code>RAD:CARR:NUMB ?</code>
Notes	The Carrier Bandpass Filter key is in the Mode Setup menu, but only EDGE EVM and GSM PFER measurements support this feature. In other measurements, this setting is not applicable. You must be in the GSM mode to use this command. Use <code>INSTRument:SElect</code> to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Preset	SINGLE
State Saved	Saved in instrument state.
Range	Single Multi
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

BTS Class

Selects a BTS class.

BTS Class	Definition
MC	Multicarrier BTS is defined as a class of BTS, characterized by the ability to, in addition to single carrier operation, process two or more carriers in common active RF components simultaneously, either in multicarrier transmitter only or, in both multicarrier transmitter and multicarrier receiver.
SC	Single carrier BTS is defined as a class of BTS, characterized by the ability to process one carrier in single carrier BTSs, not belonging to a Multicarrier BTS class.

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Remote Command	<code>[:SENSe] :CHANnel :CARRier :BASE :CLASs :AUTO ON OFF 1 0</code> <code>[:SENSe] :CHANnel :CARRier :BASE :CLASs :AUTO ?</code>
Example	<code>CHAN:CARR:BASE:CLAS:AUTO 1</code> <code>CHAN:CARR:BASE:CLAS:AUTO ?</code>
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.

Couplings	ON automatically changes to OFF when Multicarrier Class (MC) or Single carrier Class (SC) is selected as BTS Class.
Preset	ON
State Saved	Saved in instrument state.
Range	Auto Man
Initial S/W Revision	A.14.00

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :CARRier :BASE :CLASs SC MC [:SENSe] :CHANnel :CARRier :BASE :CLASs ?
Example	CHAN:CARR:BASE:CLAS MC CHAN:CARR:BASE:CLAS?

Notes
 You must be in the GSM mode to use this command.
 Use INSTRument:SElect to set the mode.
 Selection C1 and C2 are supported for backwards compatibility.
 When "C1" or "C2" is passed as SCPI command parameter, the BTS Class Auto is set to ON. As a result, it's converted to "SC" if the number of carriers is one, and otherwise "MC."

Dependencies	This parameter is available when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Preset	SC
State Saved	Saved in instrument state.
Range	Single Carrier Multi Carrier
Initial S/W Revision	A.06.00
Modified at S/W Revision	A.10.01, A14.00

Time Slot

Selects On or Off for slot searching. Generally, this feature is only valid in external and periodic timer trigger source modes that triggers every frame since another trigger source does not have the information that identifies the head of the frame. When Timeslot is set to On, the demodulation measurement is made on the nth timeslot specified by the trigger point + n timeslots, where n is the selected timeslot value 0 to 7.

This functionality is the same as Time Slot under the Freq/Channel menu.

Key Path	Mode Setup, Demod FREQ Channel
Mode	GSM

Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :SLOT <integer> [:SENSe] :CHANnel :SLOT? [:SENSe] :CHANnel :SLOT :AUTO OFF ON 0 1 [:SENSe] :CHANnel :SLOT :AUTO?
Example	CHAN:SLOT 0 CHAN:SLOT? CHAN:SLOT:AUTO OFF CHAN:SLOT:AUTO?
Notes	This functionality does not affect Combined GSM/EDGE measurement. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	0 OFF
State Saved	Saved in instrument state.
Min	0
Max	7
Initial S/W Revision	Prior to A.02.00

Burst Type

Sets the burst type that the analyzer will search for and to which it will synchronize.

This functionality is the same as Burst Type under the FREQ Channel menu.

Key	SCPI	Description
Sync (SCH)	SYNC	Burst length = 142 symbols Extended training sequences for CTS and COMPACT synchronization bursts are not supported.
Access (RACH)	ACCess	Burst length = 88 symbols Alternative training (synchronization) sequence "TS1" and "TS2" are supported only in GSMK Power vs. Time.
Normal - NB (TCH & CCH)	NORMal	Burst length = 142 symbols Softkey label will be changed to 'Normal - NB' form 'Normal'
Higher Symbol Rate - HB (TCH & CCH)	HSRate	Burst length = 169 symbols This selection key is only shown when the N9071A-3FP license is installed.
Mixed (NB/HB for TSC sync)	MIXed	Enables auto detection between Normal (NB) and HSR (HB) TCH & CCH EDGE Burst. This selection key is only shown when the N9071A-3FP license is installed.

Measurement synchronization capability (Burst Sync = Training Seq)

	Sync	Access	Normal		HSR	Mixed
			GMSK	8PSK		
				16QAM		
				32QAM		
				AQPSK		
GMSK Phase & Freq Error measurement	Yes	Yes	Yes	No	N/A	
GMSK Power vs. Time measurement	Yes	Yes	Yes	No	(measures as Normal GMSK when selected)	
GMSK Output RF Spectrum measurement (when Trigger Source is Periodic Timer and Sync Source is Off)	No	No	Yes	No		
EDGE EVM measurement	No	No	No	Yes	Yes	Yes
EDGE Power vs. Time measurement	Yes	Yes	Yes	Yes	Yes	Yes
EDGE Output RF Spectrum measurement (when Trigger Source is Periodic Timer and Sync Source is Off.)	No	No	Yes	Yes	Yes	Yes

Key Path	Mode Setup, Demod FREQ Channel
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :BURSt NORMal SYNC ACCess HSRate MIXed [:SENSe] :CHANnel :BURSt?
Example	CHAN:BURS NORM CHAN:BURS?
Notes	This functionality does not affect the Combined GSM/EDGE measurement. Higher Symbol Rate and Mixed selections are only available when the N9071A-3FP license is installed. Otherwise these menu keys are blank. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Higher Symbol Rate and Mixed selection keys are not shown unless N9071A-3FP is installed. When unlicensed and SCPI is sent, an undefined header error is returned. When "Mixed" is selected, the Burst Sync menu key under the Meas Setup menu will be grayed out and Training Sequence (TSC) will be used for synchronization. The sync algorithm always runs in Training Sequence (TSC) synchronization because the Burst Type can be determined by looking at TSC in the signal. Original selection of Burst Sync will become effective again when the Burst Type selection is changed from "Mixed" to another one.
Preset	NORMal
State Saved	Saved in instrument state.
Range	Sync (SCH) Access (RACH) Normal - NB (TCH & CCH) Higher Symbol Rate - HB (TCH & CCH) Mixed (NB/HB for TSC sync)

Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

TSC (Std)

Allows you to select the Training Sequence Code that determines which burst is to be measured. Applicable only when Burst Sync is set to Training Sequence in the measurement. In the case of AQPSK, this parameter specifies TSC number of VAMOS sub-channel A. TSC of VAMOS sub-channel B is ignored.

This functionality is the same as TSC under the FREQ Channel menu.

This parameter applies only to the following measurements:

- GMSK/EDGE Power vs. Time measurement
- GMSK Phase & Frequency Error measurement
- EDGE EVM measurement

Selection	SCPI	Description
AutoDet	ON 1	The measurement is made on the first burst found to have any one of the valid TSCs in the range of 0 to 7. The measurement may be made on various timeslots if more than one timeslot has one of the 8 valid TSCs.
Man	OFF 0	The measurement is made on the first burst found to have the selected TSC. TSC numbers in the range of 0 to 7 can be selected. The measurement may be made on various timeslots if more than one timeslot has this same TSC.

Key Path	Mode Setup, Demod FREQ Channel
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe]:CHANnel:TSCode <integer> [:SENSe]:CHANnel:TSCode? [:SENSe]:CHANnel:TSCode:AUTO OFF ON 0 1 [:SENSe]:CHANnel:TSCode:AUTO?
Example	CHAN:TSC 3 CHAN:TSC? CHAN:TSC:AUTO 1 CHAN:TSC:AUTO?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. When Sync or Access is selected as Burst Type, this key is grayed out.
Preset	0 ON

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State Saved	Saved in instrument state.
Min	0
Max	7
Initial S/W Revision	Prior to A.02.00

Input/Output

See ["Input/Output" on page 196](#)

Marker

Accesses a menu that enables you to select, set up and control the markers for the current measurement. For remote-only commands associated with Marker functionality, see:

- "Marker X Axis Value (Remote Command only)" on page 1243
- "Marker X Axis Position (Remote Command only)" on page 1243
- "Marker Y Axis Value (Remote Command only)" on page 1244

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Select Marker

Displays 12 markers available for selection.

Key Path	Marker
Initial S/W Revision	Prior to A.02.00

Marker Type

Sets the marker control mode to Normal, Delta or Off. If the selected marker is Off, pressing Marker sets it to Normal and places a single marker at the center of the display. At the same time, Marker X Axis Value appears on the Active Function area.

Key Path	Marker
Mode	All except SA and BASIC
Remote Command	:CALCulate:MONitor:MARKer[1] 2 ... 12:MODE POSITION DELTa OFF :CALCulate:MONitor:MARKer[1] 2 ... 12:MODE?
Example	CALC:MON:MARK:MODE POS CALC:MON:MARK:MODE?
Notes	If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules. At the same time, Marker X Axis Value appears on the Active Function area. Default Active Function: the active function for the selected marker's current control mode. If the current control mode is Off, there is no active function and the active function is turned off. Active Function Display: the marker X axis value entered in the active function area displays the marker value to its full entered precision.
Preset	OFF
State Saved	Saved in instrument state.
Range	Normal Delta Off
Initial S/W Revision	Prior to A.02.00

Marker X Axis Value (Remote Command only)

Sets the marker X Axis value in the current marker X Axis Scale unit. It has no effect if the control mode is Off, but is the SCPI equivalent of entering an X value if the control mode is Normal or Delta.

Mode	All except SA and BASIC
Remote Command	:CALCulate:MONitor:MARKer[1] 2 ... 12:X <freq> :CALCulate:MONitor:MARKer[1] 2 ... 12:X?
Example	CALC:MON:MARK3:X 0 CALC:MON:MARK3:X?
Notes	If no suffix is sent, uses the fundamental units for the current marker X Axis Scale. If a suffix is sent that does not match the current marker X Axis Scale unit, an error "Invalid suffix" is generated. The query returns the marker's absolute X Axis value if the control mode is Normal, or the offset from the marker's reference marker if the control mode is Delta. The query is returned in the fundamental units for the current marker X Axis scale: Hz for Frequency and Inverse Time, seconds for Period and Time. If the marker is Off the response is not a number.
Preset	After a preset, all markers are turned OFF, so Marker X Axis Value query returns a not a number (NAN).
State Saved	No
Min	-9.9E+37
Max	9.9E+37
Initial S/W Revision	Prior to A.02.00

Marker X Axis Position (Remote Command only)

Sets the marker X position in trace points. It has no effect if the control mode is Off, but is the SCPI equivalent of entering a value if the control mode is Normal or Delta – except in trace points rather than X Axis Scale units. The entered value is immediately translated into the current X Axis Scale units for setting the value of the marker.

Mode	All except SA and BASIC
Remote Command	:CALCulate:MONitor:MARKer[1] 2 ... 12:X:POSition <real> :CALCulate:MONitor:MARKer[1] 2 ... 12:X:POSition?
Example	CALC:MON:MARK:X:POS 0 CALC:MON:MARK:X:POS?
Notes	The query returns the marker's absolute X Axis value in trace points if the control mode is Normal, or the offset from the marker's reference marker in trace points if the control mode is Delta. The value is returned as a real number, not an integer, corresponding to the translation from X Axis Scale units to trace points. If the marker is Off the response is not a number.
Preset	After a preset, all markers are turned OFF, so Marker X Axis Value query returns a not a number (NAN).
State Saved	No

Min	-9.9E+37
Max	9.9E+37
Initial S/W Revision	Prior to A.02.00

Marker Y Axis Value (Remote Command only)

Returns the marker Y Axis value in the current marker.

Mode	All except SA and BASIC
Remote Command	:CALCulate:MONitor:MARKer[1] 2 ... 12:Y?
Example	CALC:MON:MARK11:Y?
Preset	Result dependent on markers setup and signal source
Backwards Compatibility SCPI	:CALCulate:MONitor:MARKer[1] 2 ... 12:FUNction:RESult?
Initial S/W Revision	Prior to A.02.00

Properties

Accesses a menu that enables you to select the active marker, the reference marker and the trace for the current measurement.

Key Path	Marker
Initial S/W Revision	Prior to A.02.00

Select Marker

Displays 12 markers available for selection.

Key Path	Marker
Initial S/W Revision	Prior to A.02.00

Relative To

Selects the desired marker. The selected marker is relative to its reference marker.

Key Path	Marker, Properties
Mode	All except SA and BASIC
Remote Command	:CALCulate:MONitor:MARKer[1] 2 ... 12:REFerence <integer> :CALCulate:MONitor:MARKer[1] 2 ... 12:REFerence?

Example	CALC:MON:MARK2:REF 1 CALC:MON:MARK2:REF?
Notes	A marker cannot be relative to itself so that choice is grayed out, and if sent from SCPI generates error -221: "Settings conflict; marker cannot be relative to itself." When queried a single value is returned (the specified marker number's relative marker).
Preset	2 3 4 5 6 7 8 9 10 11 12 1
State Saved	Saved in instrument state.
Min	1
Max	12
Initial S/W Revision	Prior to A.02.00

Marker Trace

Assigns the specified marker to the designated trace.

Key Path	Marker, Properties
Mode	All except SA and BASIC
Remote Command	:CALCulate:MONitor:MARKer[1] 2 ... 12:TRACe <integer> :CALCulate:MONitor:MARKer[1] 2 ... 12:TRACe?
Example	CALC:MON:MARK:TRAC 1 CALC:MON:MARK:TRAC?
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	3
Initial S/W Revision	Prior to A.02.00

Couple Markers

When this function is true, moving any marker causes an equal X Axis movement of every other marker that is not Off. By "equal X Axis movement" we mean that we preserve the difference between each marker's X Axis value (in the fundamental x-axis units of the trace that marker is on) and the X Axis value of the marker being moved (in the same fundamental x-axis units).

Key Path	Marker
Mode	All except SA and BASIC
Remote Command	:CALCulate:MONitor:MARKer:COUPle[:STATe] ON OFF 1 0 :CALCulate:MONitor:MARKer:COUPle[:STATe]?
Example	CALC:MON:MARK:COUP ON

	CALC:MON:MARK:COUP?
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

All Markers Off

Turns off all markers on the current measurement.

Key Path	Marker
Mode	All except SA and BASIC
Remote Command	:CALCulate:MONitor:MARKer:AOff
Example	CALC:MON:MARK:AOff
Initial S/W Revision	Prior to A.02.00

Marker Function

Accesses special marker functions such as marker noise, and power in a specified bandwidth or time interval.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Select Marker

Displays 12 markers available for selection.

Key Path	Marker
Initial S/W Revision	Prior to A.02.00

Marker Function Type

Sets the marker control function type to one of the following:

NOISe	Marker Noise
BPOWer	Band/Interval Power
BDENsity	Band Interval Density
OFF	Marker Function Off

Key Path	Marker Function
Mode	All except SA and BASIC
Remote Command	:CALCulate:MONitor:MARKer[1] 2 ... 12:FUNction NOISe BPOWer BDENsity OFF :CALCulate:MONitor:MARKer[1] 2 ... 12:FUNction?
Example	CALC:MON:MARK:FUNC NOISCALC:MON:MARK:FUNC?
Preset	OFF
State Saved	Saved in instrument state.
Range	Marker Noise Band/Interval Power Band Interval Density Marker Function Off
Initial S/W Revision	Prior to A.02.00

Band Adjust

Accesses a menu that enables you to set the frequency span width and the left and right edge, or time values, for the band or interval of the selected marker.

Key Path	Marker Function
Initial S/W Revision	Prior to A.02.00

Band/Interval Span for Frequency Domain

Sets the width of the frequency span for the selected marker.

Key Path	Marker Function
Mode	All except SA and BASIC
Remote Command	:CALCulate:MONitor:MARKer[1] 2 ... 12:FUNction:BAND:SPAN <freq> :CALCulate:MONitor:MARKer[1] 2 ... 12:FUNction:BAND:SPAN?
Example	CALC:MON:MARK12:FUNC:BAND:SPAN 20 MHz CALC:MON:MARK12:FUNC:BAND:SPAN?
Couplings	Changing the Band/Interval Span necessarily changes the Band/Interval Left and Band/Interval Right values.
Preset	Depends on X axis range of selected Trace.
State Saved	Saved in instrument state.
Min	-9.9E+37
Max	9.9E+37
Initial S/W Revision	Prior to A.02.00

Band/Interval Left for Frequency Domain

Sets the left edge frequency or time value for the band of the selected marker.

Key Path	Marker Function
Mode	All except SA and BASIC
Remote Command	:CALCulate:MONitor:MARKer[1] 2 ... 12:FUNction:BAND:LEFT <freq> :CALCulate:MONitor:MARKer[1] 2 ... 12:FUNction:BAND:LEFT?
Example	CALC:MON:MARK12:FUNC:BAND:LEFT 20 GHz CALC:MON:MARK12:FUNC:BAND:LEFT?
Couplings	Changing the Band/Interval Left necessarily changes the Band/Interval Span value.
Preset	Depends on X axis range of selected Trace.
State Saved	Saved in instrument state.
Min	-9.9E+37
Max	9.9E+37
Initial S/W Revision	Prior to A.02.00

Band/Interval Right for Frequency Domain

Sets the right edge frequency or time value for the band of the selected marker.

Key Path	Marker Function
Mode	All except SA and BASIC
Remote Command	:CALCulate:MONitor:MARKer[1] 2 ... 12:FUNCtion:BAND:RIGHT <freq> :CALCulate:MONitor:MARKer[1] 2 ... 12:FUNCtion:BAND:RIGHT?
Example	CALC:MON:MARK12:FUNC:BAND:RIGH 20 GHz CALC:MON:MARK12:FUNC:BAND:RIGH?
Couplings	Changing the Band/Interval Right necessarily changes the Band/Interval Span value.
Preset	Depends on X axis range of selected Trace.
State Saved	Saved in instrument state.
Min	-9.9E+37
Max	9.9E+37
Initial S/W Revision	Prior to A.02.00

Marker To

There is no 'Marker To' functionality supported in Monitor Spectrum. The front-panel key displays a blank menu when pressed.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Meas

The information in this section is common to all measurements. For key and remote command information for a specific measurement, refer to the section that describes the measurement of interest.

Measurements available under the Meas key are specific to the current Mode.

When viewing Help for measurements, note the following:

NOTE

Operation for some keys differs between measurements. The information displayed in Help pertains to the current measurement. To see how a key operates in a different measurement, exit Help (press the Cancel Esc key), select the measurement, then reenter Help (press the Help key) and press that key.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Remote Measurement Functions

This section contains the following topics:

"Measurement Group of Commands" on page 2302

"Current Measurement Query (Remote Command Only)" on page 2304

"Limit Test Current Results (Remote Command Only)" on page 2304

"Data Query (Remote Command Only)" on page 2304

"Calculate/Compress Trace Data Query (Remote Command Only)" on page 2305

"Calculate Peaks of Trace Data (Remote Command Only)" on page 2310

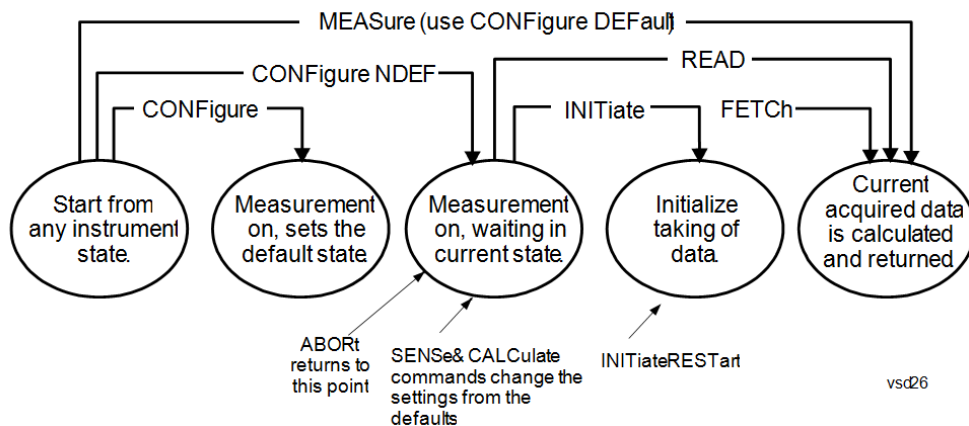
Hardware-Accelerated Fast Power Measurement (Remote Command Only)

"Format Data: Numeric Data (Remote Command Only)" on page 2311

"Format Data: Byte Order (Remote Command Only)" on page 2312

Initial S/W Revision	Prior to A.02.00
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Measurement Group of Commands



Measure Commands:

:MEASure:<measurement>[n]?

This is a fast single-command way to make a measurement using the factory default instrument settings. These are the settings and units that conform to the Mode Setup settings (e.g. radio standard) that you have currently selected.

- Stops the current measurement (if any) and sets up the instrument for the specified measurement using the factory defaults
- Initiates the data acquisition for the measurement
- Blocks other SCPI communication, waiting until the measurement is complete before returning results.
- If the function does averaging, it is turned on and the number of averages is set to 10.
- After the data is valid it returns the scalar results, or the trace data, for the specified measurement. The type of data returned may be defined by an [n] value that is sent with the command.
- The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available.
- ASCII is the default format for the data output. (Older versions of Spectrum Analysis and Phase Noise mode measurements only use ASCII.) The binary data formats should be used for handling large blocks of data since they are smaller and faster than the ASCII format. Refer to the FORMat:DATA command for more information.

If you need to change some of the measurement parameters from the factory default settings you can set up the measurement with the CONFIgure command. Use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to change the settings. Then you can use the READ? command to initiate the measurement and query the results.

If you need to repeatedly make a given measurement with settings other than the factory defaults, you can use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to set up the measurement. Then use the READ? command to initiate the measurement and query results.

Measurement settings persist if you initiate a different measurement and then return to a previous one. Use READ:<measurement>? if you want to use those persistent settings. If you want to go back to the default settings, use MEASure:<measurement>?.

Configure Commands:

:CONFIgure:<measurement>

This command stops the current measurement (if any) and sets up the instrument for the specified measurement using

the factory default instrument settings. It does not initiate the taking of measurement data unless INIT:CONTInuous is ON. If you change any measurement settings after using the CONFigure command, the READ command can be used to initiate a measurement without changing the settings back to their defaults.

In the Swept SA measurement in Spectrum Analyzer mode the CONFigure command also turns the averaging function on and sets the number of averages to 10 for all measurements.

:CONFigure: <measurement>: NDEFault stops the current measurement and changes to the specified measurement. It does not change the settings to the defaults. It does not initiate the taking of measurement data unless INIT:CONTInuous is ON.

The CONFigure? query returns the current measurement name.

The CONFigure:CATalog? query returns a quoted string of all licensed measurement names in the current mode. For example, "SAN, CHP, OBW, ACP, PST, TXP, SPUR, SEM, LIST".

Fetch Commands:

:FETCh:<measurement>[n]?

This command puts selected data from the most recent measurement into the output buffer. Use FETCh if you have already made a good measurement and you want to return several types of data (different [n] values, for example, both scalars and trace data) from a single measurement. FETCh saves you the time of re-making the measurement. You can only FETCh results from the measurement that is currently active, it will not change to a different measurement. An error message is reported if a measurement other than the current one is specified.

If you need to get new measurement data, use the READ command, which is equivalent to an INITiate followed by a FETCh.

The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used for handling large blocks of data since they are smaller and transfer faster than the ASCII format. (FORMat:DATA)

FETCh may be used to return results other than those specified with the original READ or MEASure command that you sent.

INITiate Commands:

:INITiate:<measurement>

This command is not available for measurements in all the instrument modes:

- Initiates a trigger cycle for the specified measurement, but does not output any data. You must then use the FETCh<meas> command to return data. If a measurement other than the current one is specified, the instrument will switch to that measurement and then initiate it.
 - For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. If you send INIT:ACP? it will change from channel power to ACP and will initiate an ACP measurement.
 - Does not change any of the measurement settings. For example, if you have previously started the ACP measurement and you send INIT:ACP? it will initiate a new ACP measurement using the same instrument settings as the last time ACP was run.
 - If your selected measurement is currently active (in the idle state) it triggers the measurement, assuming the trigger conditions are met. Then it completes one trigger cycle. Depending upon the measurement and the number of averages, there may be multiple data acquisitions, with multiple trigger events, for one full trigger cycle. It also holds off additional commands on GPIB until the acquisition is complete.
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READ Commands:

:READ:<measurement>[n]?

- Does not preset the measurement to the factory default settings. For example, if you have previously initiated the ACP
-

measurement and you send READ:ACP? it will initiate a new measurement using the same instrument settings.

- Initiates the measurement and puts valid data into the output buffer. If a measurement other than the current one is specified, the instrument will switch to that measurement before it initiates the measurement and returns results.
 - For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. Then you send READ:ACP? It will change from channel power back to ACP and, using the previous ACP settings, will initiate the measurement and return results.
 - Blocks other SCPI communication, waiting until the measurement is complete before returning the results
 - If the optional [n] value is not included, or is set to 1, the scalar measurement results will be returned. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used when handling large blocks of data since they are smaller and faster than the ASCII format. (FORMat:DATA)
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Initial S/W Revision	Prior to A.02.00
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Current Measurement Query (Remote Command Only)

This command returns the name of the measurement that is currently running.

Remote Command	:CONFigure?
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Example	CONF?
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Initial S/W Revision	Prior to A.02.00
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Limit Test Current Results (Remote Command Only)

Queries the status of the current measurement limit testing. It returns a 0 if the measured results pass when compared with the current limits. It returns a 1 if the measured results fail any limit tests.

Remote Command	:CALCulate:CLIMits:FAIL?
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Example	CALC:CLIM:FAIL? queries the current measurement to see if it fails the defined limits. Returns a 0 or 1: 0 it passes, 1 it fails.
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Initial S/W Revision	Prior to A.02.00
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Data Query (Remote Command Only)

Returns the designated measurement data for the currently selected measurement and subopcode.

n = any valid subopcode for the current measurement. See the measurement command results table for your current measurement, for information about what data is returned for the subopcodes.

This command uses the data setting specified by the FORMat:BOReR and FORMat:DATA commands and can return real or ASCII data. (See the format command descriptions under Input/Output in the Analyzer Setup section.)

Remote Command	:CALCulate:DATA[n]?
Notes	The return trace depends on the measurement. In CALCulate:<meas>:DATA[n], n is any valid subopcode for the current measurement. It returns the same data as the FETCH:<measurement>? query where <measurement> is the current measurement.
Initial S/W Revision	Prior to A.02.00

Calculate/Compress Trace Data Query (Remote Command Only)

Returns compressed data for the currently selected measurement and sub-opcode [n].

n = any valid sub-opcode for that measurement. See the MEASure:<measurement>? command description of your specific measurement for information on the data that can be returned.

The data is returned in the current Y Axis Unit of the analyzer. The command is used with a sub-opcode <n> (default=1) to specify the trace. With trace queries, it is best if the analyzer is not sweeping during the query. Therefore, it is generally advisable to be in Single Sweep, or Update=Off.

This command is used to compress or decimate a long trace to extract and return only the desired data. A typical example would be to acquire N frames of GSM data and return the mean power of the first burst in each frame. The command can also be used to identify the best curve fit for the data.

Remote Command	:CALCulate:DATA<n>:COMPRESS? BLOCK CFIT MAXimum MINimum MEAN DMEan RMS RMSCubed SAMPLE SDEVIation PPHase [,<soffset> [,<length>[,<roffset>[,<rlimit>]]]]
Example	To query the mean power of a set of GSM bursts: Supply a signal that is a set of GSM bursts. Select the IQ Waveform measurement (in IQ Analyzer Mode). Set the sweep time to acquire at least one burst. Set the triggers such that acquisition happens at a known position relative to a burst. Then query the mean burst levels using, CALC:DATA2:COMP? MEAN, 24e-6, 526e-6 (These parameter values correspond to GSM signals, where 526e-6 is the length of the burst in the slot and you just want 1 burst.)
Notes	The command supports 5 parameters. Note that the last 4 (<soffset>, <length>, <roffset>, <rlimit>) are optional. But these optional parameters must be entered in the specified order. For example, if you want to specify <length>, then you must also specify <soffset>. See details below for a definition of each of these parameters. This command uses the data in the format specified by FORMat:DATA, returning either binary or ASCII data.
Initial S/W Revision	Prior to A.02.00

- BLOCK or block data - returns all the data points from the region of the trace data that you specify. For example, it could be used to return the data points of an input signal over several timeslots, excluding the portions of the trace data that you do not want. (This is x,y pairs for trace data and I,Q pairs for complex data.)

- CFIT or curve fit - applies curve fitting routines to the data. <soffset> and <length> are required to define the data that you want. <roffset> is an optional parameter for the desired order of the curve equation. The query will return the following values: the x-offset (in seconds) and the curve coefficients ((order + 1) values).

MIN, MAX, MEAN, DME, RMS, RMSC, SAMP, SDEV and PPH return one data value for each specified region (or <length>) of trace data, for as many regions as possible until you run out of trace data (using <roffset> to specify regions). Or they return the number of regions you specify (using <rlimit>) ignoring any data beyond that.

- MINimum - returns the minimum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the minimum magnitude of the I/Q pairs is returned.
- MAXimum - returns the maximum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the maximum magnitude of the I/Q pairs is returned.
- MEAN - returns a single value that is the arithmetic mean of the data point values (in dB/ dBm) for the specified region(s) of trace data. For I/Q trace data, the mean of the magnitudes of the I/Q pairs is returned. See the following equations.

NOTE If the original trace data is in dB, this function returns the arithmetic mean of those log values, not log of the mean power which is a more useful value. The mean of the log is the better measurement technique when measuring CW signals in the presence of noise. The mean of the power, expressed in dB, is useful in power measurements such as Channel Power. To achieve the mean of the power, use the RMS option.

Equation 1

Mean Value of Data Points for Specified Region(s)

$$\text{MEAN} = \frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 2

Mean Value of I/Q Data Pairs for Specified Region(s)

$$\text{MEAN} = \frac{1}{n} \sum_{X_i \in \text{region}(s)} |X_i|$$

where $|X_i|$ is the magnitude of an I/Q pair, and n is the number of I/Q pairs in the specified region(s).

- DMEan - returns a single value that is the mean power (in dB/ dBm) of the data point values for the specified region(s) of trace data. See the following equation:

Equation 3

DMEan Value of Data Points for Specified Region(s)

$$\text{DME} = 10 \times \log_{10} \left(\frac{1}{n} \sum_{X_i \in \text{region}(s)} 10^{\frac{X_i}{10}} \right)$$

- RMS - returns a single value that is the average power on a root-mean-squared voltage scale (arithmetic rms) of the data point values for the specified region(s) of trace data. See the following equation.

NOTE

For I/Q trace data, the rms of the magnitudes of the I/Q pairs is returned. See the following equation. This function is very useful for I/Q trace data. However, if the original trace data is in dB, this function returns the rms of the log values which is not usually needed.

Equation 4

RMS Value of Data Points for Specified Region(s)

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i^2}$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 5

RMS Value of I/Q Data Pairs for Specified Region(s)

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region(s).

Once you have the rms value for a region of trace data (linear or I/Q), you may want to calculate the mean power. You must convert this rms value (peak volts) to power in dBm:

$$10 \times \log[10 \times (\text{rms value})^2]$$

- SAMPLe - returns the first data value (x,y pair) for the specified region(s) of trace data. For I/Q trace data, the first I/Q pair is returned.
- SDEViation - returns a single value that is the arithmetic standard deviation for the data point values for the specified region(s) of trace data. See the following equation.
- For I/Q trace data, the standard deviation of the magnitudes of the I/Q pairs is returned. See the following equation.

Equation 6

Standard Deviation of Data Point Values for Specified Region(s)

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (X_i - \bar{X})^2}$$

where X_i is a data point value, \bar{X} is the arithmetic mean of the data point values for the specified region (s), and n is the number of data points in the specified region(s).

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (|X_i| - \bar{X})^2}$$

where $|X_i|$ is the magnitude of an I/Q pair, \bar{X} is the mean of the magnitudes for the specified region(s), and n is the number of data points in the specified region(s).

- PPHase - returns the x,y pairs of both rms power (dBm) and arithmetic mean phase (radian) for every specified region and frequency offset (Hz). The number of pairs is defined by the specified number of regions. This parameter can be used for I/Q vector ($n=0$) in Waveform (time domain) measurement and all parameters are specified by data point in PPHase.

The rms power of the specified region may be expressed as:

$$\text{Power} = 10 \times \log [10 \times (\text{RMS I/Q value})] + 10.$$

The RMS I/Q value (peak volts) is:

$$\sqrt{\frac{1}{n} \sum_{X_i \in \text{region}} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region.

The arithmetic mean phase of the specified region may be expressed as:

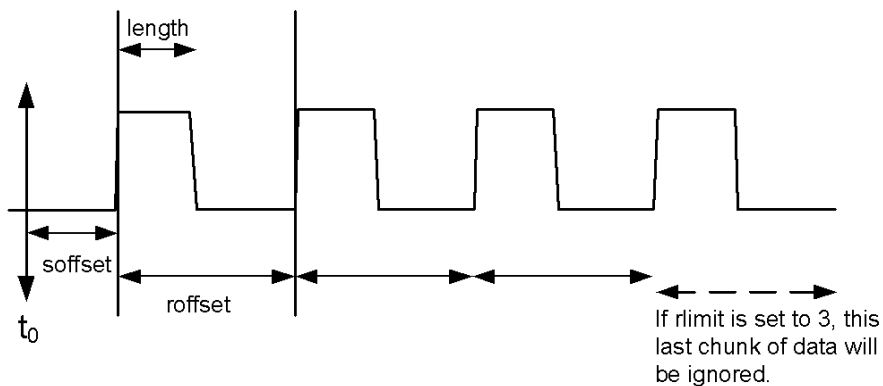
$$\frac{1}{n} \sum_{Y_i \in \text{region}} Y_i$$

where Y_i is the unwrapped phase of I/Q pair with applying frequency correction and n is the number of I/Q pairs in the specified region.

The frequency correction is made by the frequency offset calculated by the arithmetic mean of every specified region's frequency offset. Each frequency offset is calculated by the least square method against the unwrapped phase of I/Q pair.

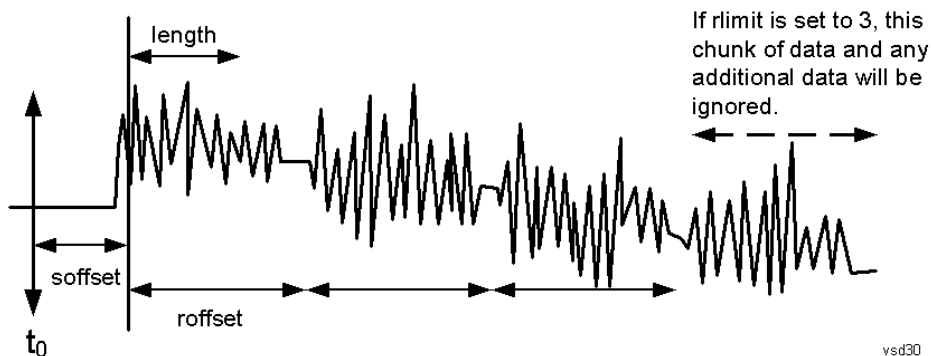
Sample Trace Data - Constant Envelope

(See below for explanation of variables.)



Sample Trace Data - Not Constant Envelope

(See below for explanation of variables.)



<soffset> - start offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It specifies the amount of data at the beginning of the trace that will be ignored before the decimation process starts. It is the time or frequency change from the start of the trace to the point where you want to start using the data. The default value is zero.

<length> - is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines how much data will be compressed into one value. This parameter has a default value equal to the current trace length.

<roffset> - repeat offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines the beginning of the next field of trace elements to be compressed. This is relative to the beginning of the previous field. This parameter has a default value equal to the <length> variable. Note that this parameter is used for a completely different purpose when curve fitting (see CFIT above).

<rlimit> - repeat limit is an optional integer. It specifies the number of data items that you want returned. It will ignore any additional items beyond that number. You can use the Start offset and the Repeat limit to pick out exactly what part of the data you want to use. The default value is all the data.

Calculate Peaks of Trace Data (Remote Command Only)

Returns a list of all the peaks for the currently selected measurement and sub-opcode [n]. The peaks must meet the requirements of the peak threshold and excursion values.

n = any valid sub-opcode for the current measurement. See the MEASure:<measurement> command description of your specific measurement for information on the data that can be returned.

The command can only be used with specific sub-opcodes with measurement results that are trace data. Both real and complex traces can be searched, but complex traces are converted to magnitude in dBm. In many measurements the sub-opcode n=0, is the raw trace data which cannot be searched for peaks. And Sub-opcode n=1, is often calculated results values which also cannot be searched for peaks.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. If the format is set to INT,32, it returns REAL,32 data.

The command has four types of parameters:

- Threshold (in dBm)
- Excursion (in dB)
- Sorting order (amplitude, frequency, time)
- Optional in some measurements: Display line use (all, > display line, < display line)

Remote Command	<p>For Swept SA measurement:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME[,ALL GTDLine LTDLine]]</pre> <p>For most other measurements:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME]</pre>
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Example	<p>Example for Swept SA measurement in Spectrum Analyzer Mode:</p> <p>CALC:DATA4:PEAK? -40, 10, FREQ, GTDL This will identify the peaks of trace 4 that are above -40 dBm, with excursions of at least 10 dB. The peaks are returned in order of increasing frequency, starting with the lowest frequency. Only the peaks that are above the display line are returned.</p> <p>Query Results 1:</p> <p>With FORMat:DATA REAL, 32 selected, it returns a list of floating-point numbers. The first value in the list is the number of peak points that are in the following list. A peak point consists of two values: a peak amplitude followed by its corresponding frequency (or time).</p> <p>If no peaks are found the peak list will consist of only the number of peaks, (0).</p>
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Notes	<p><n> - is the trace that will be used</p> <p><threshold> - is the level below which trace data peaks are ignored. Note that the threshold value is required and is always used as a peak criterion. To effectively disable the threshold criterion for this command, provide a substantially low threshold value such as -200 dBm. Also note that the threshold value used in this command is independent of and has no effect on the threshold value stored under the Peak Criteria menu.</p> <p><excursion> - is the minimum amplitude variation (rise and fall) required for a signal to be identified as peak. Note that the excursion value is required and is always used as a peak criterion. To effectively disable the excursion criterion for this command, provide the minimum value of 0.0 dB. Also note that the excursion value used in this command is independent of and has no effect on the</p>
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excursion value stored under the Peak Criteria menu.

Values must be provided for threshold and excursion. The sorting and display line parameters are optional (defaults are AMPLitude and ALL).

Note that there is always a Y-axis value for the display line, regardless of whether the display line state is on or off. It is the current Y-axis value of the display line which is used by this command to determine whether a peak should be reported

Sorting order:

AMPLitude - lists the peaks in order of descending amplitude, with the highest peak first (default if optional parameter not sent)

FREQUency - lists the peaks in order of occurrence, left to right across the x-axis.

TIME - lists the peaks in order of occurrence, left to right across the x-axis.

Peaks vs. Display Line:

ALL - lists all of the peaks found (default if optional parameter not sent).

GTDLine (greater than display line) - lists all of the peaks found above the display line.

LTDLine (less than display line) - lists all of the peaks found below the display line.

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Format Data: Numeric Data (Remote Command Only)

This command specifies the format of the trace data input and output. It specifies the formats used for trace data during data transfer across any remote port. It affects only the data format for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]?, :CALCulate:DATA[n]? and FETCh:SANalyzer [n]? commands and queries.

Remote Command :FORMat[:TRACe] [:DATA] ASCii|INTeger,32|REAL,32 |REAL,64
:FORMat[:TRACe] [:DATA] ?

Notes The query response is:
ASCii: ASC,8
REAL,32: REAL,32
REAL,64: REAL,64
INTeger,32: INT,32

When the numeric data format is REAL or ASCii, data is output in the current Y Axis unit. When the data format is INTeger, data is output in units of m dBm (.001 dBm).

The INT,32 format returns binary 32-bit integer values in internal units (m dBm), in a definite length block.

Dependencies Sending a data format spec with an invalid number (for example, INT,48) generates no error. The analyzer simply uses the default (8 for ASCii, 32 for INTeger, 32 for REAL).

Sending data to the analyzer which does not conform to the current FORMat specified, results in an error. Sending ASCII data when a definite block is expected generates message -161 "Invalid Block Data" and sending a definite block when ASCII data is expected generates message -121 "Invalid Character in Number".

Preset ASCii

Backwards Compatibility Notes Note that the INT,32 format is only applicable to the command, TRACe:DATA. This preserves backwards compatibility for the Swept SA measurement. For all other commands/queries which honor FORMat:DATA, if INT,32 is sent the analyzer will behave as though it were set to REAL,32.

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The specs for each output type follow:

AScii - Amplitude values are in ASCII, in the current Y Axis Unit, one ASCII character per digit, values separated by commas, each value in the form:

SX.YYYYYEsZZ

Where:

S = sign (+ or -)

X = one digit to left of decimal point

Y = 5 digits to right of decimal point

E = E, exponent header

s = sign of exponent (+ or -)

ZZ = two digit exponent

REAL,32 - Binary 32-bit real values in the current Y Axis Unit, in a definite length block.

REAL,64 - Binary 64-bit real values in the current Y Axis Unit, in a definite length block.

Format Data: Byte Order (Remote Command Only)

This command selects the binary data byte order for data transfer and other queries. It controls whether binary data is transferred in normal or swapped mode. This command affects only the byte order for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]? , :CALCulate:DATA[n]? and FETCh:SANalyzer[n]? commands and queries.

By definition any command that says it uses FORMat:DATA uses any format supported by FORMat:DATA.

The NORMal order is a byte sequence that begins with the most significant byte (MSB) first, and ends with the least significant byte (LSB) last in the sequence: 1|2|3|4. SWAPped order is when the byte sequence begins with the LSB first, and ends with the MSB last in the sequence: 4|3|2|1.

Remote Command	:FORMat:BORDER NORMal SWAPped :FORMat:BORDER?
Preset	NORMal
Initial S/W Revision	Prior to A.02.00

Meas Setup

Displays the setup menu for the current measurement. The measurement setup parameters include the number of measurement averages used to calculate the measurement result and the averaging mode. The setup menu also includes the option to reset the measurement settings to their factory defaults.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Avg/Hold Num

Specifies the number of measurement averages used when calculating the measurement result. The average is displayed at the end of each sweep.

After the specified number of average counts, the averaging mode (terminal control) setting determines the averaging action.

Key Path	Meas Setup
Mode	All except SA and BASIC
Remote Command	[:SENSe]:MONitor:AVERage:COUNT <integer> [:SENSe]:MONitor:AVERage:COUNT? [:SENSe]:MONitor:AVERage[:STATe] OFF ON 0 1 [:SENSe]:MONitor:AVERage[:STATe]?
Example	MON:AVER:COUN 25 MON:AVER:COUN? MON:AVER ON MON:AVER?
Preset	10 OFF
State Saved	Saved in instrument state.
Min	1
Max	1000
Initial S/W Revision	Prior to A.02.00

Avg Mode

Toggles the average mode between exponential (Exp) and Repeat.

- **Exp**– continues measurement averaging, using the specified number of averages to compute each averaged value. The average is displayed at the end of each sweep.
- **Repeat**– causes the measurement to reset the average counter each time the specified number of averages is reached.

Key Path	Meas Setup
Mode	All except SA and BASIC
Remote Command	[:SENSe] :MONitor :AVERage :TCONtrol EXPonential REPEAT [:SENSe] :MONitor :AVERage :TCONtrol ?
Example	MON:AVER:TCON EXP MON:AVER:TCON?
Preset	EXPonential
State Saved	Saved in instrument state.
Range	ExpRepeat
Initial S/W Revision	Prior to A.02.00

Meas Preset

Restores all the measurement parameters to their default values.

Key Path	Meas Setup
Mode	All except SA and BASIC
Remote Command	:CONFigure:MONitor
Example	CONF:MON
Initial S/W Revision	Prior to A.02.00

Mode

See "Mode" on page 274

Mode Preset

Returns the active mode to a known state.

Mode Preset does the following for the currently active mode:

- Aborts the currently running measurement.
- Brings up the default menu for the mode, with no active function.
- Sets measurement Global settings to their preset values for the active mode only.
- Activates the default measurement.
- Brings up the default menu for the mode.
- Clears the input and output buffers.
- Sets Status Byte to 0.

Mode Preset does not:

- Cause a mode switch
- Affect mode persistent settings
- Affect system settings

See "[How-To Preset](#)" on page 1267 for more information.

Key Path	Front-panel key
Remote Command	:SYSTem:PRESet
Example	:SYST:PRES
Notes	*RST is preferred over :SYST:PRES for remote operation. *RST does a Mode Preset, as done by the :SYST:PRES command, and it sets the measurement mode to Single measurement rather than Continuous for optimal remote control throughput. Clears all pending OPC bits. The Status Byte is set to 0.
Couplings	A Mode Preset aborts the currently running measurement, activates the default measurement, and gets the mode to a consistent state with all of the default couplings set.
Backwards Compatibility Notes	In the X-Series, the legacy "Factory Preset" has been replaced with Mode Preset, which only presets the currently active mode, not the entire instrument. In the X-Series, the way to preset the entire instrument is by using System, Restore System Defaults All, which behaves essentially the same way as restore System Defaults does on ESA and PSA. There is also no "Preset Type" as there is on the PSA. There is a green Mode Preset front-panel key that does a Mode Preset and a white-with-green-letters User Preset front-panel key that does a User Preset. The old PRESet:TYPE command is ignored (without generating an error), and SYST:PRES without a parameter does a Mode Preset, which should cover most backward code compatibility issues. The settings and correction data under the Input/Output front-panel key (examples: Input Z Corr, Ext Amp Gain, etc.) are no longer part of any Mode, so they will not be preset by a Mode Preset. They are preset using Restore Input/Output Defaults, Restore System Defaults All. Note that because User Preset does a Recall State, and all of these settings are saved in State, they ARE recalled when using

	User Preset.
Initial S/W Revision	Prior to A.02.00

How-To Preset

The table below shows all possible presets, their corresponding SCPI commands and front-panel access (key paths). Instrument settings depend on the current measurement context. Some settings are local to the current measurement, some are global (common) across all the measurements in the current mode, and some are global to all the available modes. In a similar way, restoring the settings to their preset state can be done within the different contexts.

Auto Couple - is a measurement local key. It sets all Auto/Man parameter couplings in the measurement to Auto. Any Auto/Man selection that is local to other measurements in the mode will not be affected.

Meas Preset - is a measurement local key. Meas Preset resets all the variables local to the current measurement except the persistent ones.

Mode Preset - resets all the current mode's measurement local and measurement global variables except the persistent ones.

Restore Mode Defaults - resets ALL the Mode variables (and all the Meas global and Meas local variables), including the persistent ones.

Type Of Preset	SCPI Command	Front Panel Access
Auto Couple	:COUPlE ALL	Auto Couple front-panel key
Meas Preset	:CONFIgure:<Measurement>	Meas Setup Menu
Mode Preset	:SYSTem:PRESet	Mode Preset (green key)
Restore Mode Defaults	:INSTrument:DEFault	Mode Setup Menu
Restore All Mode Defaults	:SYSTem:DEFault MODEs	System Menu; Restore System Default Menu
*RST	*RST	not possible (Mode Preset with Single)
Restore Input/Output Defaults	:SYSTem:DEFault INPut	System Menu; Restore System Default Menu
Restore Power On Defaults	:SYSTem:DEFault PON	System Menu; Restore System Default Menu
Restore Alignment Defaults	:SYSTem:DEFault ALIGn	System Menu; Restore System Default Menu
Restore Miscellaneous Defaults	:SYSTem:DEFault MISC	System Menu; Restore System Default Menu
Restore All System Defaults	:SYSTem:DEFault [ALL] :SYSTem:PRESet:PERSistent	System Menu; Restore System Default Menu
User Preset	:SYSTem:PRESet:USER	User Preset Menu
User Preset All Modes	:SYSTem:PRESet:USER:ALL	User Preset Menu

Power On Mode Preset	:SYSTem:PON:TYPE MODE	System Menu
Power On User Preset	:SYSTem:PON:TYPE USER	System Menu
Power On Last State	:SYSTem:PON:TYPE LAST	System Menu

Preset Type (Remote Command Only)

As stated in the Backward Compatibility section, to be compatible with ESA/PSA the PRESet:TYPE command will be implemented as a no-op.

Mode	All
Remote Command	:SYSTem:PRESet:TYPE FACTory MODE USER :SYSTem:PRESet:TYPE?
Example	:SYST:PRESet:TYPE FACT
Notes	This command is supported for backward compatibility only. It is a no-op which does not change the behavior of any preset operation.
Preset	This is unaffected by Preset but is set to Mode on a "Restore System Defaults->All"
State Saved	No
Initial S/W Revision	Prior to A.02.00

Mode Setup

See ["Mode Setup" on page 294](#)

Peak Search

Places the selected marker on the trace point with the maximum y-axis value for that marker's trace. Pressing Peak Search with the selected marker off causes the selected marker to be set to Normal, then a peak search is immediately performed.

Key Path	Front-panel key
Mode	All except SA and BASIC
Remote Command	:CALCulate:MONitor:MARKer[1] 2 ... 12:MAXimum
Example	CALC:MON:MARK2:MAX
Initial S/W Revision	Prior to A.02.00

Print

See "Print" on page 325

Quick Save

The Quick Save front-panel key repeats the most recent save that was performed from the Save menu, with the following exceptions:

- Register saves are not remembered as Saves for the purpose of the Quick Save function
- If the current measurement does not support the last non-register save that was performed, an informational message is generated, “File type not supported for this measurement”

Quick Save repeats the last type of qualified save (that is, a save qualified by the above criteria) in the last save directory by creating a unique filename using the Auto File Naming algorithm described below.

If Quick Save is pressed after startup and before any qualified Save has been performed, the Quick Save function performs a Screen Image save using the current settings for Screen Image saves (current theme, current directory), which then becomes the “last save” for the purpose of subsequent Quick Saves.

The Auto File Naming feature automatically generates a file name for use when saving a file. The filename consists of a prefix and suffix separated by a dot, as is standard for the Windows® file system. A default prefix exists for each of the available file types:

Type	Default Prefix	Menu
State	State_	(Save/Recall)
Trace + State	State_	(Save/Recall)
Screen	Screen_	(Save/Recall)
Amplitude Corrections	Ampcor_	(Import/Export)
Traces	Trace_	(Import/Export)
Limit Lines	LLine_	(Import/Export)
Measurement Result	MeasR_	(Import/Export)
Capture Buffer	CapBuf_	(Import/Export)

A four digit number is appended to the prefix to create a unique file name. The numbering sequence starts at 0000 within each Mode for each file type and updates incrementally to 9999, then wraps to 0000 again. It remembers where it was through a Mode Preset and when leaving and returning to the Mode. It is reset by Restore Misc Defaults and Restore System Defaults and subsequent running of the instrument application. So, for example, the first auto file name generated for State files is State_0000.state. The next is State_0001, and so forth.

One of the key features of Auto File Name is that we guarantee that the Auto File Name will never conflict with an existing file. The algorithm looks for the next available number. If it gets to 9999, then it looks for holes. If it find no holes, that is no more numbers are available, it gives an error.

For example, if when we get to State_0010.state there is already a State_0010.state file in the current directory, it advances the counter to State_0011.state to ensure that no conflict will exist (and then it verifies that State_0011.state also does not exist in the current directory and advances again if it does, and so forth).

If you enter a file name for a given file type, then the prefix becomes the filename you entered instead of the default prefix, followed by an underscore. The last four letters (the suffix) are the 4-digit number.

For example, if you save a measurement results file as “fred.csv”, then the next auto file name chosen for a measurement results save will be fred_0000.csv.

NOTE

Although 0000 is used in the example above, the number that is used is actually the current number in the Meas Results sequence, that is, the number that would have been used if you had not entered your own file name.

NOTE

If the filename you entered ends with _dddd, where d=any number, making it look just like an auto file name, then the next auto file name picks up where you left off with the suffix being dddd + 1.

Key Path	Front-panel key
Notes	No remote command for this key specifically.
Initial S/W Revision	Prior to A.02.00

Recall

The Recall menu lets you choose what you want to recall, and where you want to recall it from. Among the types of files you can recall are **States and Traces**. In addition, an Import (Data) option lets you recall a number of data types stored in CSV files (as used by Excel and other spreadsheet programs).

The default paths for Recall are data type dependent and are the same as for the Save key.

Key Path	Front-panel key
Notes	<p>No remote command for this key specifically, but the :MMEM:LOAD command is available for specific file types. An example is :MMEM:LOAD:STATE <filename>.</p> <p>If you try to recall a State file for a mode that is not licensed or not available in the instrument, an error message will occur and the state will not change.</p>
Backwards Compatibility Notes	<p>In legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly (since User Preset is actually loading a state), it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, “state” always includes all of this data; so whenever state is loaded, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p>
Backwards Compatibility Notes	<p>Recall for the X-Series supports backward compatibility in the sense that you can recall a state file from any X-Series model number and any version of X-Series software. This is only possible if part of the recalling process goes through a limiting step after recalling the mode settings, at least for settings that may vary with version number, model number, option and license differences. If you try to recall a state file onto an instrument with less capability than what was available on the instrument during the save, the recall will ignore the state it doesn't support and it will limit the recalled setting to what it allows.</p> <p>Example: if the saved state includes preamp ON, but the recalling instrument does not have a preamp; the preamp is limited to OFF. Conversely, if you save a state without a preamp, the preamp is OFF in the state file. When this saved file is recalled on an instrument with a licensed preamp, the preamp is changed to OFF. Another example is if the saved state has center frequency set to 20 GHz, but the instrument recalling the saved state is a different model and only supports 13.5 GHz. In this case, the center frequency is limited along with any other frequency based settings. Since the center frequency can't be preserved in this case, the recall limiting tries to at least preserve span to keep the measurement setup as intact as possible.</p> <p>It may be appropriate to issue a warning if the state is limited on the recall; warnings do not go out to SCPI so this would only affect the manual user.</p> <p>Note that there is no state file compatibility outside of the X-Series. For example, you cannot recall a state file from ESA or PSA.</p>
Initial S/W Revision	Prior to A.02.00

State

The Recall State menu lets you choose a register or file from which to recall the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings that were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the

additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, GPIB address) are not affected by either a Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

Since each state file is only for one Mode, the settings for other Modes are unaffected when it is loaded. Recall State will cause a mode switch if the state being recalled is not from the current active mode.

After the recall completes, the message "File <filename> recalled" or "Recalled State Register <register number>" is displayed.

For rapid recalls, the State menu lists 16 registers that you can choose from to recall. Pressing a Register key initiates the recall. You can also select a file from which to recall.

The default path for all State Files is:

My Documents\<<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

See "[More Information](#)" on page 1276.

Key Path	Recall
Mode	All
Remote Command	:MMEMory:LOAD:STATe <filename>
Example	:MMEM:LOAD:STAT "myState.state" This recalls the file myState.state on the default path
Example	MMEM:LOAD:STAT "MyStateFile.state" This loads the state file data (on the default file directory path) into the instrument state.
Notes	<p>When you pick a file to recall, the analyzer first verifies that the file is recallable in the current instrument by checking the software version and model number of the instrument. If everything matches, a full recall proceeds by aborting the currently running measurement, clearing any pending operations, and then loading the State from the saved state file. You can open state files from any mode, so recalling a State file switches to the mode that was active when the save occurred. After switching to the mode of the saved state file, mode settings and data (if any for the mode) are loaded with values from the saved file. The saved measurement of the mode becomes the newly active measurement and the data relevant to the measurement (if there is any) is recalled.</p> <p>If there is a mismatch between file version or model number or instrument version or model number, the recall function tries to recall as much as possible and returns a warning message. It may limit settings that differ based on model number, licensing or version number.</p> <p>After recalling the state, the Recall State function does the following:</p> <ul style="list-style-type: none"> • Makes the saved measurement for the mode the active measurement. • Clears the input and output buffers. • Status Byte is set to 0. • Executes a *CLS <p>If the file specified is empty an error is generated. If the specified file does not exist, another error is generated. If there is a mismatch between the file and the proper file type, an error is generated. If</p>

	there is a mismatch between file version or model number or instrument version or model number, a warning is displayed. Then it returns to the State menu and File Open dialog goes away. After the Recall, the analyzer exits the Recall menu and returns to the previous menu.
Backwards Compatibility SCPI	:MMEMory:LOAD:STATe 1,<filename> For backwards compatibility, the above syntax is supported. The "1" is simply ignored.
Initial S/W Revision	Prior to A.02.00

More Information

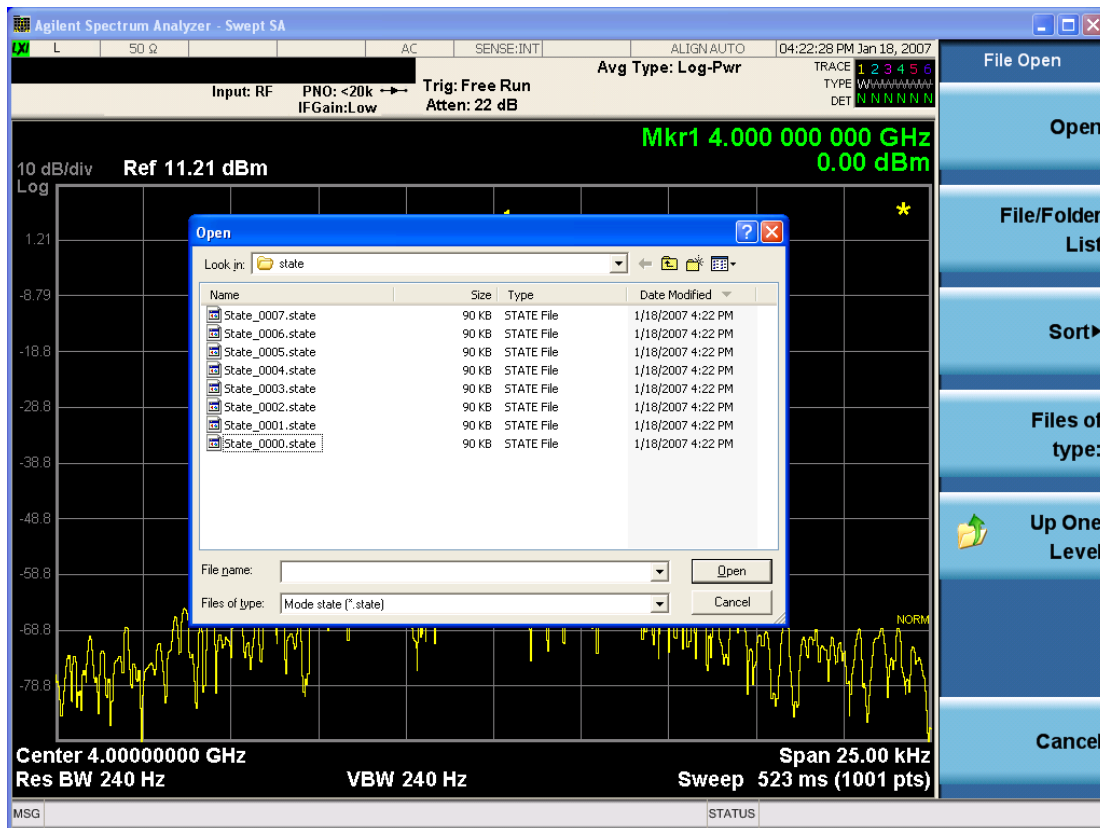
In measurements that support saving Traces, for example, Swept SA, the Trace data is saved along with the State in the State file. When recalling the State, the Trace data is recalled as well. Traces are recalled exactly as they were stored, including the writing mode and update and display modes. If a Trace was updating and visible when the State was saved, it will come back updating and visible, and its data will be rewritten right away. When you use State to save and recall traces, any trace whose data must be preserved should be placed in View or Blank mode before saving.

The following table describes the Trace Save and Recall possibilities:

You want to recall state and one trace's data, leaving other traces unaffected.	Save Trace+State from 1 trace. Make sure that no other traces are updating (they should all be in View or Blank mode) when the save is performed.	On Recall, specify the trace you want to load the one trace's data into. This trace will load in View. All other traces' data will be unaffected, although their trace mode will be as it was when the state save was performed.
You want to recall all traces	Save Trace+State from ALL traces.	On Recall, all traces will come back in View (or Blank if they were in Blank or Background when saved)
You want all traces to load exactly as they were when saved.	Save State	On recall, all traces' mode and data will be exactly as they were when saved. Any traces that were updating will have their data immediately overwritten.

From File...

When you press "From File", the analyzer brings up a Windows dialog and a menu entitled "File Open." This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



Listed below are the functions of the various fields in the dialog, and the corresponding softkeys:

Open

Performs the recall of the specified file. While the recall is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Look In.

Look In

The Look In field shows the path from which the file will be recalled and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Look In field** first uses the last path from the Save As dialog **Save In:** path for that same file type. There is no softkey for directly navigating to the Look In field, but you can use the left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

Sort

Accesses a menu that enables you to sort the files within the File Open dialog. Only one sorting type can be selected at a time and the sorting happens immediately. The sorting types are By Date, By Name, By extension, and By Size.

Files of Type

This field shows the file suffix for the type of file you have selected to recall. For example, if you navigated here while recalling State, "Mode state (*.state)" is in the field. If you navigated here while recalling Trace, ""Mode state (*.trace)" is in the field. If you navigated here while importing a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown menu, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Open** request to be cancelled. The ESC key does the same thing.

Key Path	Recall, State
Notes	Brings up the Open dialog for recalling a State Save Type
Initial S/W Revision	Prior to A.02.00

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

For more information and the SCPI command, see Edit Register Names under the Save, State function.

Key Path	Recall, State
Mode	All
Dependencies	N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending the SCPI command generates an error, -221, "Settings conflict;Option not available"
Initial S/W Revision	A.11.00

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last

modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

Key Path	Recall, State
Example	*RCL 1
Range	1–16 from front panel, 1–128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State, Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	Prior to A.11.00

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

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Recall

Key Path	Recall, State
Example	*RCL 1
Range	1-16 from front panel, 1-128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State,Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	Prior to A.11.00

Restart

The Restart function restarts the current sweep, or measurement, or set of averaged/held sweeps or measurements. If you are Paused, pressing Restart does a Resume.

The Restart function is accessed in several ways:

- Pressing the Restart key
- Sending the remote command INIT:IMMEDIATE
- Sending the remote command INIT:RESTART

See "[More Information](#)" on page 1281

Key Path	Front-panel key
Remote Command	:INITiate[:IMMEDIATE] :INITiate:RESTART
Example	:INIT:IMM :INIT:REST
Notes	:INITiate:RESTART and :INITiate:IMMEDIATE perform exactly the same function.
Couplings	Resets average/hold count k. For the first sweep overwrites all active (update=on) traces with new current data. For application modes, it resets other parameters as required by the measurement.
Status Bits/OPC dependencies	This is an Overlapped command. The STATUS:OPERation register bits 0 through 8 are cleared. The STATUS:QUESTIONable register bit 9 (INTEgrity sum) is cleared. The SWEEPING bit is set. The MEASURING bit is set.
Backwards Compatibility Notes	For Spectrum Analysis mode in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart trace averages (displayed average count reset to 1) for a trace in Clear Write, but did not restart Max Hold and Min Hold. In the X-Series, the Restart hardkey and the INITiate:RESTART command restart not only Trace Average, but MaxHold and MinHold traces as well. For wireless comms modes in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart every measurement, which includes all traces and numeric results. There is no change to this operation.
Initial S/W Revision	Prior to A.02.00

More Information

The **Restart** function first aborts the current sweep/measurement as quickly as possible. It then resets the sweep and trigger systems, sets up the measurement and initiates a new data measurement sequence with a new data acquisition (sweep) taken once the trigger condition is met.

If the analyzer is in the process of aligning when **Restart** is executed, the alignment finishes before the restart function is performed.

Even when set for Single operation, multiple sweeps may be taken when Restart is pressed (for example, when averaging/holding is on). Thus when we say that **Restart** "restarts a measurement," we may mean:

- It restarts the current sweep
- It restarts the current measurement
- It restarts the current set of sweeps if any trace is in Trace Average, Max Hold or Min Hold
- It restarts the current set of measurements if Averaging, or Max Hold, or Min Hold is on for the measurement
- depending on the current settings.

With **Average/Hold Number** (in **Meas Setup** menu) set to 1, or Averaging off, or no trace in Trace Average or Hold, a single sweep is equivalent to a single measurement. A single sweep is taken after the trigger condition is met; and the analyzer stops sweeping once that sweep has completed. However, with **Average/Hold Number** >1 and at least one trace set to **Trace Average, Max Hold, or Min Hold (SA Measurement)** or **Averaging on (most other measurements)**, multiple sweeps/data acquisitions are taken for a single measurement. The trigger condition must be met prior to each sweep. The sweep is stopped when the average count k equals the number N set for **Average/Hold Number**. A measurement average usually applies to all traces, marker results, and numeric results; but sometimes it only applies to the numeric results.

Once the full set of sweeps has been taken, the analyzer will go to idle state. To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command **CALC:AVER:TCON UP**.

Save

The Save menu lets you choose what you want to save and where you want to save it. Among the types of files you can save are **States**, **Traces**, and **Screen Images**. In addition, an Export (Data) option lets you save a number of data types as CSV files for easy import into Excel and other spreadsheet programs.

Key Path	Front-panel key
Mode	All
Notes	No remote command for this key specifically, but the :MMEM:STORe command is available for specific file types. An example is :MMEM:STOR:STATe <filename>.
Initial S/W Revision	Prior to A.02.00

State

The Save State menu lets you choose a register or file for saving the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings which were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, Verbose SCPI) are not affected by either Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

After the save completes, the message "File <filename> saved" or "State Register <register number> saved" is displayed.

For rapid saving, the State menu lists 16 registers to save to. Pressing a Register key initiates the save. You can also select a file to save to.

The default path for all State Files is:

My Documents\<>mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

Key Path	Save
Mode	All
Remote Command	:MMEMory:STORe:STATe <filename>
Example	MMEM:STOR:STATe "MyStateFile.state" This stores the current instrument state data in the file MyStateFile.state in the default directory.
Notes	Both single and double quotes are supported for any filename parameter over remote. After saving to a register, that register's menu key is updated with the date the time, unless a custom label has been entered for that key. After saving to a register, you remain in the Save State menu, so that you can see the Register key

update. After saving to a file, the analyzer automatically returns to the previous menu and any Save As dialog goes away.

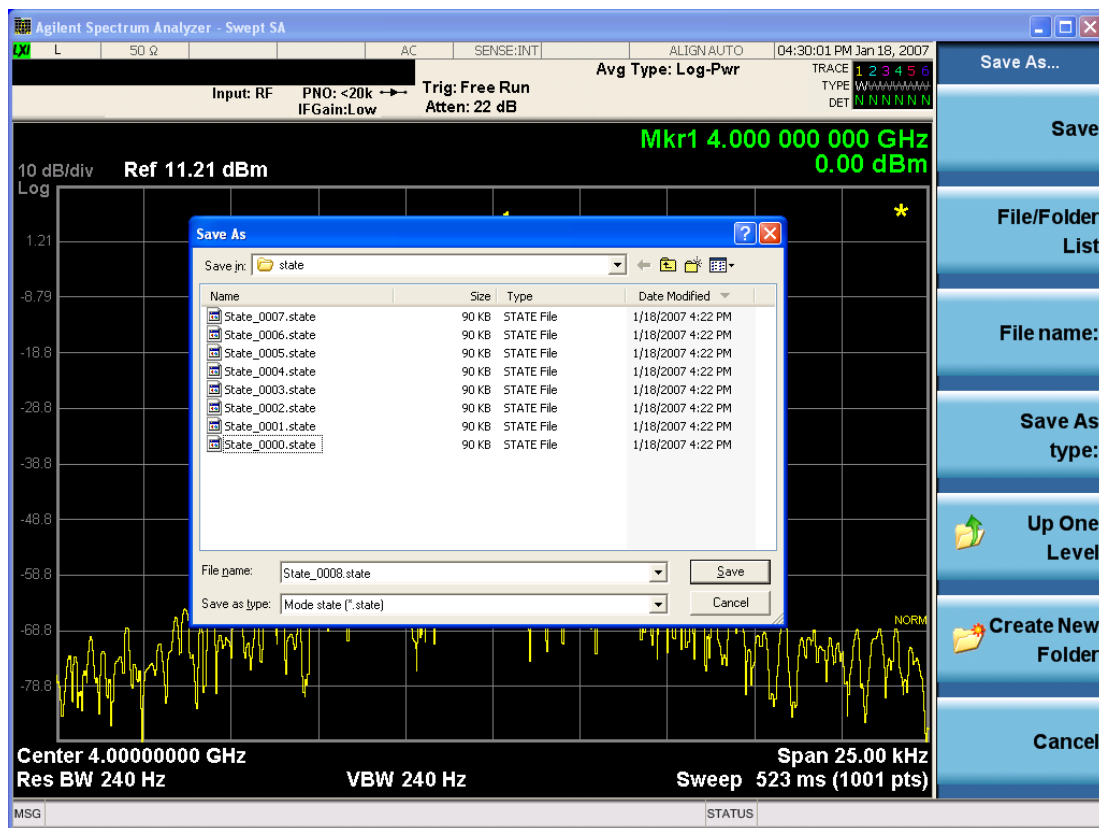
Backwards Compatibility SCPI :MMEMory:STORe:STATe 1,<filename>

For backwards compatibility, the above syntax is supported. The "1" is simply ignored. The command is sequential.

Initial S/W Revision Prior to A.02.00

To File . . .

When you press “To File”, the analyzer brings up a Windows dialog and a menu entitled “Save As.” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



The Listed below

are the functions of the various fields in the dialog, and the corresponding softkeys:

Save

Performs the save to the specified file of the selected type. If the file already exists, a dialog will appear that allows you to replace the existing file by selecting OK, or you can Cancel the request. If you select OK, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade.

While the save is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Save In.

Save In

The Save In field shows the path to which the file will be saved and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Save In field** defaults to the default path for this type of file and remembers the last path you used to save this type of file. There is no softkey for directly navigating to the Save In field but you can use left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

File Name

The File Name field is initially loaded with an automatically generated filename specific to the appropriate Save Type. The automatically generated filename is guaranteed not to conflict with any filename currently in the directory. You may replace or modify this filename using the File Name key. See the ["Quick Save " on page 2328](#) documentation for more on the automatic file naming algorithm.

When you press the File Name key the analyzer displays the Alpha Editor. Use the knob to choose the letter to add and the front-panel Enter key to add the letter to the file name. The BK character moves you back and the FW character moves you forward in the filename. The Select key on the front panel generates a space character. When you are done entering the filename press the Done softkey. This returns back to the **File Open** dialog and menu, but does not cause the save to occur.

Save As Type

This field shows the file suffix for the type of file you have selected to save. For example, if you navigated here while saving State, "Mode state (*.state)" is in the field. If you navigated here from saving Trace, ""Mode state (*.trace)" is in the field. If you navigated here while exporting a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Create New Folder

This key corresponds to the icon of a folder with the "*" that is in the tool bar of the dialog. When pressed, a new folder is created in the current directory with the name **New Folder** and you can enter a new folder name using the Alpha Editor.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Save As** request to be cancelled. The ESC key does the same thing.

Key Path	Save, State
Mode	All
Notes	Brings up Save As dialog for saving a State Save Type
Initial S/W Revision	Prior to A.02.00

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

See ["More Information" on page 1286](#)

Key Path	Save, State
Mode	All
Remote Command	:MMEMory:REGister:STATe:LABel <reg number>,"label" :MMEMory:REGister:STATe:LABel? <reg number>
Example	:MMEM:REG:STAT:LAB 1,"my label"
Notes	<reg number> is an integer from 1 to 16. If the SCPI specifies an invalid register number an error message is generated, -222,"Data out of range;Invalid register label number" "label" is a string from 0 to 30 characters in length. If a label exceeds 30 characters, an error message is generated, -150,"String data error;Label clipped to 30 characters" "label" of length 0 erases the custom label and restores the default (time and date) label. E.g.: :MMEM:REG:STAT:LAB 1,""
Dependencies	N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending this command generates an error, -221,"Settings conflict;Option not available"
Preset	The names are unaffected by Preset or power cycle but are set to the default label (time and date) on a "Restore System Defaults->Misc"
Initial S/W Revision	A.11.00

More Information

When you edit one of the register names, the time and date field will be replaced by the custom name.

If you delete all the characters in the custom name, it restores the default (time and date).

The register names are stored within the state files, but they are not part of the instrument state; that is, once you have edited a register name, loading a new state will not change that register name. Another consequence of this is that the names will be persistent through a power cycle. Also, if a named state file is transferred to another analyzer, it will bring its custom name along with it.

If you try to edit the name of an empty register, the analyzer will first save the state to have a file to put the name in. If you load a named state file into an analyzer with older firmware it will ignore the metadata.

The *SAV and *RCL commands will not be affected by the custom register names, nor will the MMEM commands.

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

Key Path	Save, State
Mode	All
Example	*SAV 1
Range	1–16 from front panel, 1–128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.11.00

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

Key Path	Save, State
Mode	All
Example	*SAV 1
Range	1-16 from front panel, 1-128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.11.00

Data (Export)

Exporting a data file stores data from the current measurement to mass storage files. The Export Menu only contains data types that are supported by the current measurement.

Since the commonly exported data files are in .csv format, the data can be edited by you prior to importing. This allows you to export a data file, manipulate the data in Excel (the most common PC Application for manipulating .csv files) and then import it.

Selecting an Export Data menu key will not actually cause the exporting to occur, since the analyzer still needs to know where you wish to save the data. Pressing the Save As key in this menu brings up the Save As dialog and Save As menu that allows you to specify the destination file and directory. Once a filename has been selected or entered in the Open menu, the export will occur as soon as the Save key is pressed.

Key Path	Save
Mode	All
Notes	The menu is built from whatever data types are available for the mode. So the key locations in the sub menu will vary. No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:STORe commands.
Dependencies	If a file type is not used by a certain measurement, that type is grayed out for that measurement. The key for a file type will not show at all if there are no measurements in the Mode that support it.
Preset	Is not affected by a Preset or shutdown, but is reset during Restore Mode Defaults
Readback	The data type that is currently selected
Initial S/W Revision	Prior to A.02.00

Measurement Results

Pressing this key selects Meas Results as the data type to be exported. Pressing the key a second time brings up the Meas Results menu, which allows you to select which **Meas Result** to save. In the Swept SA measurement, there are three types of Measurement Results files: Peak Table, Marker Table and Spectrogram.

See "Meas Results File Contents" on page 1289.

See "Marker Table" on page 1289.

See "Peak Table" on page 1292.

See "Spectrogram" on page 1295

Remote Command	:MMEMory:STORe:RESults:MTABle PTABle SPEctrogram <filename>
Example	:MMEM:STOR:RES:MTAB "myResults.csv" Saves the results from the current marker table to the file myResults.csv in the current path. :MMEM:STOR:RES:PTAB "myResults.csv" Saves the results from the current peak table to the file myResults.csv in the current path. :MMEM:STOR:RES:SPEC "myResults.csv" Saves the results from the current Spectrogram display to the file myResults.csv in the current path. The default path is My Documents\SA\data\SAN\results
Notes	If the save is initiated via SCPI, and the file already exists, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade. Both single and double quotes are supported for any filename parameter over SCPI.
Dependencies	If a save of Marker Table results is requested and the Marker Table is not on, no file is saved and a message is generated If a save of Peak Table results is requested and the Peak Table is not on, no file is saved and a message is generated If a save of Spectrogram results is requested and the Spectrogram is not on, no file is saved and a message is generated. The Spectrogram choice only appears if option EDP is licensed.
Preset	Not part of Preset, but is reset to Peak Table by Restore Mode Defaults. Survives a shutdown.
Initial S/W Revision	Prior to A.02.00

Meas Results File Contents

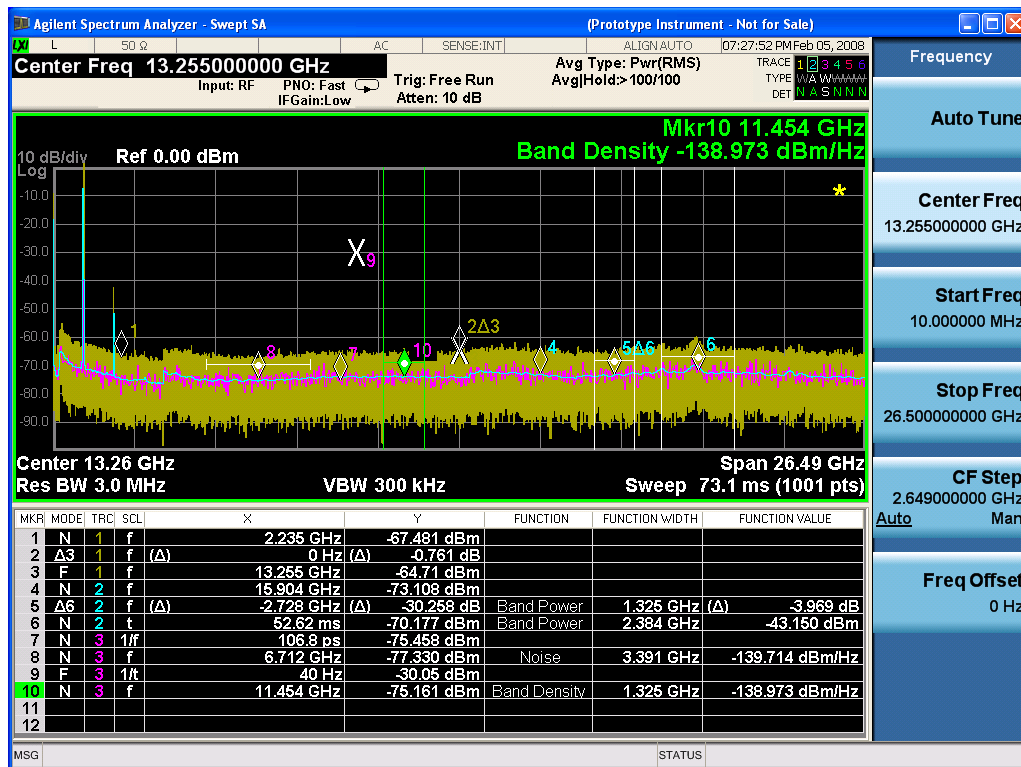
All files are .csv files. The following section details the data in each file type.

Marker Table

This section discusses the Marker Table Meas Results file format.

Imagine that, at the point where a Marker Table Meas Result is requested, the following screen is showing:

12 Monitor Spectrum Measurement
Save



Then the Meas Results file, when opened, would show the following data:

MeasurementResult	
Swept SA	
A.01.40_R0017	N9020A
526 B25 PFR	1
P26 EA3	
Result Type	Marker Table
Ref Level	0
Number of Points	1001
Sweep Time	0.0662666 67
Start Frequency	10000000
Stop Frequency	26500000 000
Average Count	0
Average Type	LogPower (Video)
RBW	3000000

RBW Filter	Gaussian
RBW Filter BW	3dB
VBW	3000000
Sweep Type	Swept
X Axis Scale	Lin
PreAmp State	Off
PreAmp Band	Low
Trigger Source	Free
Trigger Level	1.2
Trigger Slope	Positive
Trigger Delay	1.00E-06
Phase Noise Optimization	Fast
Swept If Gain	Low
FFT If Gain	Autorange
RF Coupling	AC
FFT Width	411900
Ext Ref	10000000
Input	RF
RF Calibrator	Off
Attenuation	10
Ref Level Offset	0
External Gain	0
X Axis Units	Hz
Y Axis Units	dBm

DATA									
MKR	MODE	TR C	SCL	X	Y	FUNCTI ON	FUNCTIO N WIDTH	FUNCTI ON VALUE	FUNCTI ON UNIT
1	Normal	1	Freque ncy	2.2350E+09	- 67.481	Off	0.0000E+00	0	None
2	Delta3	1	Freque ncy	0.0000E+00	- 0.761	Off	0.0000E+00	0	None
3	Fixed	1	Freque ncy	1.3255E+10	- 64.71	Off	0.0000E+00	0	None
4	Normal	2	Freque ncy	1.5904E+10	- 73.1	Off	0.0000E+00	0	None

08									
5	Delta7	2	Frequ ncy	- 2.7280E+ 09	- 30.2 58	Band Power	1.3250E+ 06	-3.969	dB
6	Normal	2	Time	5.2620E- 02	- 70.1 77	Band Power	2.3840E+ 06	-43.15	dBm
7	Normal	3	Period	1.0680E- 10	- 75.4 58	Off	0.0000E+ 00	0	None
8	Normal	3	Frequ ncy	6.7120E+ 09	- 77.3 3	Noise	3.3910E+ 06	- 139.71 4	dBm/Hz
9	Fixed	3	Inverse Time	4.0000E+ 01	- 30.0 5	Off	0.0000E+ 00	0	None
10	Normal	3	Frequ ncy	1.1454E+ 10	- 75.1 61	Band Density	1.3250E+ 06	- 138.97 3	dBm/Hz
11	Off	1	Frequ ncy	0.0000E+ 00	0	Off	0.0000E+ 00	0	None
12	Off	1	Frequ ncy	0.0000E+ 00	0	Off	0.0000E+ 00	0	None

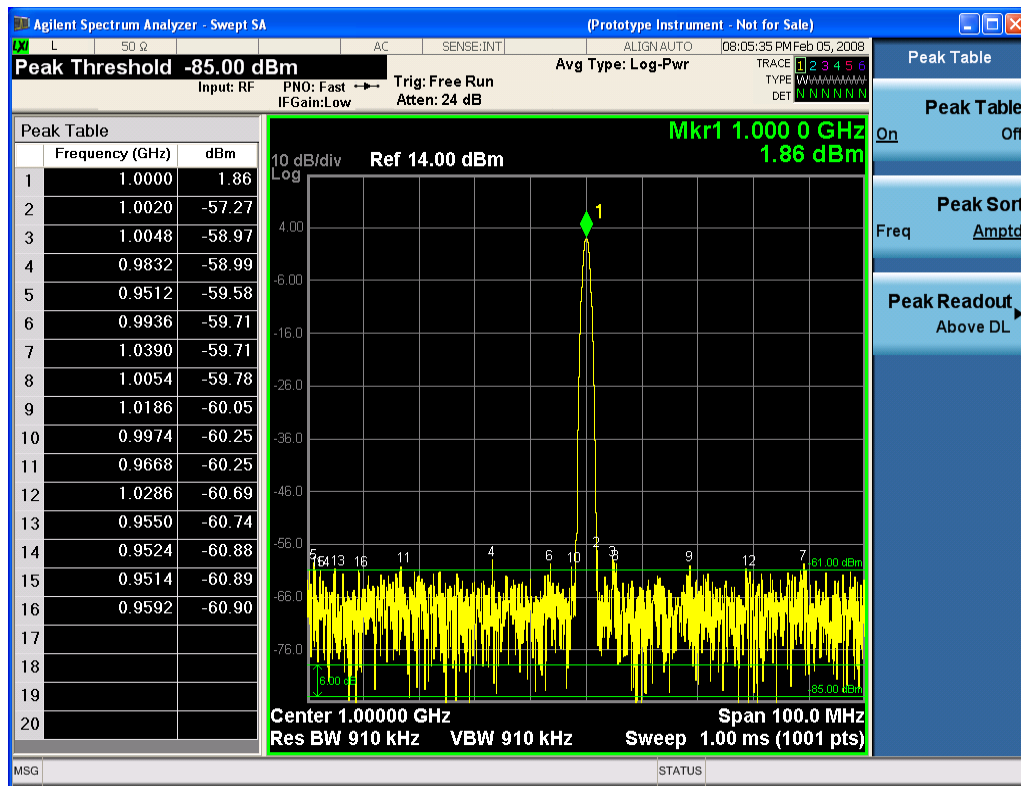
The numbers appear in the file exactly as they appear onscreen. If it says 11.454 GHz onscreen, then in the file it is 11.454E+09.

The metadata header is very similar to the metadata used in the trace data .csv files. See Trace File Contents. The only new information concerns the 1-of-N fields in the marker table itself.

Peak Table

This section discusses the Peak Table Meas Results file format.

Imagine that, at the point where a Marker Table Meas Result is requested, the following screen is showing:



Then the Meas Results file, when opened, would show the header data (the same as for the Marker Table except that the Result Type is Peak Table) ending with a few fields of specific interest to Peak Table users:

- Peak Threshold
- Peak Threshold State (On|Off)
- Peak Excursion
- Peak Excursion State (On|Off)
- Display Line
- Peak Readout (All|AboveDL|BelowDL)
- Peak Sort (Freq|Amptd)

These fields are then followed by the data for the Peak Table itself.

Note that the label for the Frequency column changes to Time in 0 span.

Here is what the table for the above display looks like:

MeasurementResult	
Swept SA	
A.01.40_R0017	N9020A
526 B25 PFR P26 EA3	1

12 Monitor Spectrum Measurement
Save

Result Type	Peak Table
Ref Level	0
Number of Points	1001
Sweep Time	0.066266667
Start Frequency	10000000
Stop Frequency	26500000000
Average Count	0
Average Type	LogPower(Video)
RBW	3000000
RBW Filter	Gaussian
RBW Filter BW	3dB
VBW	3000000
Sweep Type	Swept
X Axis Scale	Lin
PreAmp State	Off
PreAmp Band	Low
Trigger Source	Free
Trigger Level	1.2
Trigger Slope	Positive
Trigger Delay	1.00E-06
Phase Noise Optimization	Fast
Swept If Gain	Low
FFT If Gain	Autorange
RF Coupling	AC
FFT Width	411900
Ext Ref	10000000
Input	RF
RF Calibrator	Off
Attenuation	10
Ref Level Offset	0
External Gain	0
X Axis Units	Hz
Y Axis Units	dBm
Peak Threshold	-85
Peak Threshold State	On
Peak Excursion	6
Peak Excursion State	On

Display Line	-61	
Peak Readout	AboveDL	
Peak Sort	Amptd	
DATA		
Peak	Frequency	Amplitude
1	1.0000E+06	1.86
2	1.0020E+06	-57.27
3	1.0048E+06	-58.97
4	9.8320E+05	-58.99
5	9.5120E+05	-59.58
6	9.9360E+05	-59.71
7	1.0390E+06	-59.71
8	1.0054E+06	-59.78
9	1.1086E+06	-60.05
10	9.9740E+05	-60.25
11	9.6680E+05	-60.25
12	1.0286E+06	-60.69
13	9.5500E+05	-60.74
14	9.5240E+05	-60.88
15	9.5140E+05	-60.89
16	9.5920E+05	-60.90
17		
18		
19		
20		

Spectrogram

This section discusses the Spectrogram Results file format. The Spectrogram choice only appears if option EDP is licensed.

The Spectrogram results are the same as a Trace data export, except that instead of having just one trace's data, all 300 traces appear one after the other.

Each trace has its own data mark; the data for Spectrogram Trace 0 follows the row marked DATA, the data for Spectrogram Trace 1 follows the row marked DATA1, for Spectrogram Trace 2 follows the row marked DATA2, and so on.

Each DATA row has a timestamp in the second column (as of firmware revision A.11.01). So, for example, if Trace 0 had a relative start time of 1729.523 sec, then the first DATA row would look like this:

DATA,1729.523

And if Trace 13 had a relative start time of 100.45 sec, then the fourteenth data row would look like:

DATA13,100.453

To find the absolute time for the relative timestamps of each trace, the last row before the first DATA row gives the absolute start time of the Spectrogram, in the form YYYYMMDDHHMMSS

So, for example, if the absolute start time is 13:23:45:678 on January 30, 2012, this row would look like:

Start Time,20120130132345678

NOTE The resolution of the absolute time stored is 1 ms, which matches up with the fact that the fastest sweep time is also 1 ms. However, there is no specification for the absolute accuracy of the clock in the analyzer, nor is there any facility provided to allow the user to set this time to any particular degree of accuracy.

Traces that have not yet been filled in the Spectrogram display are empty; there is no DATA header for them. The file ends after the last non-empty trace.

Imagine that, at the point where a Spectrogram Meas Result is requested, the following screen is showing:



For the purpose of this example, we have set the Average/Hold Number to 10, thus we have only traces 0 thru 10. The Spectrogram was started at 02:28:08:700 pm on April 25, 2012 (that is, 700 ms after 2:28:08 pm), although the screen dump itself shows a different time, as it was taken ten minutes after the

Spectrogram data. Trace 0 is showing a start time of 5.30 seconds, meaning 5.3 seconds after the Spectrogram started (trace 10 has a start time of 0, as it was the first trace taken but has now rolled up into the tenth trace slot).

The Meas Results file, when opened, shows the header data and ten traces of trace data. Below is an extract from the result file for the above display. Note the start time of 20120425142808700 showing in the last row before the first DATA row, and the relative time of 5.299231048 showing in the first DATA row:

Result Type	Spectrogram
MeasResult	
Swept SA	
A.11.00.01	N9020A
503 508 513 526 ALL ALV B1C B1X B25 B2X B40 BAB BBA CR3 CRP DP2 DRD EA3 EDP EMC EP1 ERC ESC ESP EXM FSA HBA K03 LFE MPB P03 P08 P13 P26 PFR RTL RTS S40 SB1 SEC SM1 UK6 YAS YAV	1
Segment	0
Number of Points	1001
Sweep Time	0.523333333
Start Frequency	5999984415
Stop Frequency	6000009415
Average Count	0
Average Type	LogPower(Video)
RBW	240
RBW Filter	Gaussian
RBW Filter BW	3dB
VBW	240
Sweep Type	Swept
X Axis Scale	Lin
PreAmp State	Off
PreAmp Band	Low
Trigger Source	Free
Trigger Level	1.2
Trigger Slope	Positive
Trigger Delay	0
Phase Noise Optimization	Wide
Swept If Gain	Low
FFT If Gain	Autorange
RF Coupling	AC

Result Type	Spectrogram
FFT Width	411900
Ext Ref	10000000
Input	RF
RF Calibrator	Off
Attenuation	14
Ref Level Offset	0
External Gain	0
Trace Type	Clearwrite
Detector	Normal
Trace Math	Off
Trace Math Oper1	Trace5
Trace Math Oper2	Trace6
Trace Math Offset	0
Trace Name	Trace1
X Axis Units	Hz
Y Axis Units	dBm
Start Time	20120425142808700
DATA	5.299231048
5999984415	-76.34749519
5999984440	-77.28097006
5999984465	-75.32317869
5999984490	-73.64417681
5999984515	-72.67154604

o
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6000009315	-77.94423277
6000009340	-79.51829697
6000009365	-78.46108961
6000009390	-78.46108957
6000009415	-76.59570596
DATA2	4.708697055
5999984415	-80.98197882
5999984440	-80.98197879

5999984465	-75.83142132
5999984490	-74.02712079
5999984515	-73.57213005

0
0
0

6000009315	-75.9183103
6000009340	-79.53787488
6000009365	-78.82602191
6000009390	-78.82602188
6000009415	-76.37486709
DATA10	0
5999984415	-75.56751112
5999984440	-75.76485645
5999984465	-76.67718717
5999984490	-78.79238489
5999984515	-83.72680212

0
0
0

6000009315	-71.3942461
6000009340	-72.28308332
6000009365	-73.92684489
6000009390	-75.45548832
6000009415	-75.17904815

Save As . . .

When you press “Save As”, the analyzer brings up a Windows dialog and a menu entitled “**Save As.**” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[To File . . .](#)" on page 2340 in Save, State for a full description of this dialog and menu.

The default path for saving files is:

For all of the Trace Data Files:

My Documents\<<mode name>\data\traces

For all of the Limit Data Files:

My Documents\<<mode name>\data\limits

For all of the Measurement Results Data Files:

My Documents\<<mode name>\data\<<measurement name>\results

For all of the Capture Buffer Data Files:

My Documents\<<mode name>\data\captureBuffer

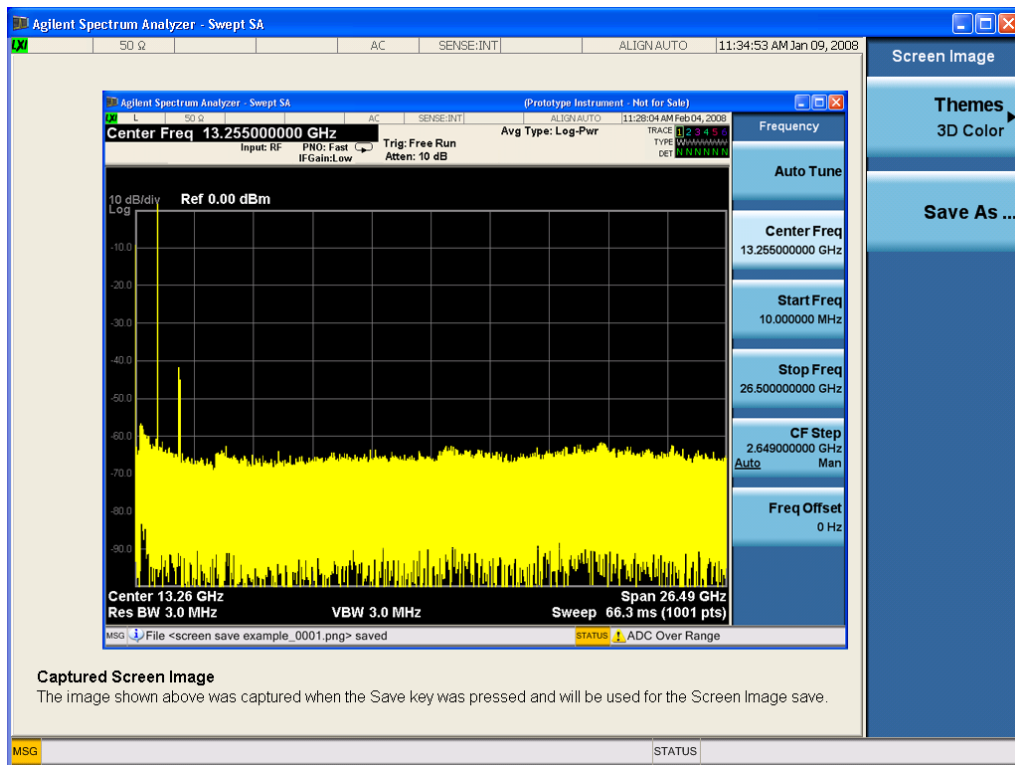
Key Path	Save, Data
Mode	All
Notes	The key location is mode-dependent and will vary. Brings up the Save As dialog for saving a <mode specific> Save Type. The save is performed immediately and does not wait until the measurement is complete.
Initial S/W Revision	Prior to A.02.00

Screen Image

Pressing Screen Image accesses a menu of functions that enable you to specify a format and location for the saved screen image. It brings up a menu that allows you to specify the color scheme of the Screen Image (Themes) or navigate to the Save As dialog to perform the actual save.

Screen Image files contain an exact representation of the analyzer display. They cannot be loaded back onto the analyzer, but they can be loaded into your PC for use in many popular applications.

The image to be saved is actually captured when the Save front panel key is pressed, and kept in temporary storage to be used if you ask for a Screen Image save. When the Screen Image key is pressed, a "thumbnail" of the captured image is displayed, as shown below:



When you continue on into the Save As menu and complete the Screen Image save, the image depicted in the thumbnail is the one that gets saved, showing the menus that were on the screen before going into the Save menus. The save is performed immediately and does not wait until the measurement is complete.

After you have completed the save, the Quick Save front-panel key lets you quickly repeat the last save performed, using an auto-named file, with the current screen data.

NOTE

For versions previous to A.01.55, if you initiate a screen image save by navigating through the Save menus, the image that is saved will contain the Save menu softkeys, not the menus and the active function that were on the screen when you first pressed the Save front panel key.

Key Path	Save
Mode	All
Remote Command	:MMEMory:STORe:SCReem <filename>
Example	:MMEM:STOR:SCR "myScreen.png" This stores the current screen image in the file MyScreenFile.png in the default directory.
Initial S/W Revision	Prior to A.02.00

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

Key Path	Save, Screen Image
Remote Command	:MMEMory:STORe:SCReen:THEMe TDColor TDMonochrome FCOLor FMONochrome :MMEMory:STORe:SCReen:THEMe?
Example	:MMEM:STOR:SCR:THEM TDM
Preset	3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes.
Readback	3D Color 3D Mono Flat Color Flat Mono
Backwards Compatibility Notes	In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical.
Initial S/W Revision	Prior to A.02.00

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDC
Readback	3D Color
Initial S/W Revision	Prior to A.02.00

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDM
Readback	3D Mono
Initial S/W Revision	Prior to A.02.00

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

Key Path	Save, Screen Image, Themes
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Example	MMEM:STOR:SCR:THEM FCOL
Readback	Flat Color
Initial S/W Revision	Prior to A.02.00

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FMON
Readback	Flat Mono
Initial S/W Revision	Prior to A.02.00

Save As...

When you press "Save As", the analyzer brings up a Windows dialog and a menu entitled "**Save As.**" This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[To File . . .](#)" on page 2340 in Save, State for a full description of this dialog and menu.

The default path for Screen Images is

My Documents\`<mode name>`\screen.

where `<mode name>` is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

Key Path	Save, Screen Image
Notes	Brings up Save As dialog for saving a Screen Image Save Type
Initial S/W Revision	Prior to A.02.00

Mass Storage Catalog (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:CATalog? [<code><directory_name></code>]
Notes	<p>The string must be a valid logical path.</p> <p>Queries disk usage information (drive capacity, free space available) and obtains a list of files and directories in a specified directory in the following format:</p> <p><code><numeric_value>,<numeric_value>,{<file_entry>}</code></p> <p>It returns two numeric parameters and as many strings as there are files and directories. The first parameter indicates the total amount of storage currently used in bytes. The second parameter</p>

indicates the total amount of storage available, also in bytes. The <file_entry> is a string. Each <file_entry> indicates the name, type, and size of one file in the directory list:

<file_name>, <file_type>, <file_size>

As the windows file system has an extension that indicates file type, <file_type> is always empty. <file_size> provides the size of the file in bytes. For directories, <file_entry> is surrounded by square brackets and both <file_type> and <file_size> are empty

Initial S/W Revision Prior to A.02.00

Mass Storage Change Directory (Remote Command Only)

Key path SCPI Only

Remote Command :MMEMory:CDIRectory [<directory_name>]
 :MMEMory:CDIRectory?

Notes The string must be a valid logical path.

Changes the default directory for a mass memory file system. The <directory_name> parameter is a string. If no parameter is specified, the directory is set to the *RST value.

At *RST, this value is set to the default user data storage area, that is defined as System.Environment.SpecialFolder.Personal.

Query returns full path of the default directory.

Initial S/W Revision Prior to A.02.00

Mass Storage Copy (Remote Command Only)

Key path SCPI Only

Remote Command :MMEMory:COPY <string>,<string>[,<string>,<string>]

Notes The string must be a valid logical path.

Copies an existing file to a new file or an existing directory to a new directory.

Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.

The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.

This command will generate an "access denied" error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.

Mass Storage Device Copy (Remote Command Only)

This command transfers data to/from a file and a peripheral device.

Key path	SCPI Only
Remote Command	:MMEMory:COpy:DEvIce <source_string>,<dest_string>
Notes	<p>The strings must be a valid logical path or a valid device keyword. If the dest_string is a device keyword, the data is copied from the source file to the device. If the source_string is a device keyword, the data is copied to the source file from the device.</p> <p>Valid device keywords are: SNS (smart noise source)</p> <p>An error is generated if the file or device is not found.</p>

Mass Storage Delete (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:DELeTe <file_name>[,<directory_name>]
Notes	<p>The string must be a valid logical path.</p> <p>Removes a file from the specified directory. The <file_name> parameter specifies the file name to be removed. This command will generate an “access denied” error if the file is in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.</p>
Initial S/W Revision	Prior to A.02.00

Mass Storage Data (Remote Command Only)

Creates a file containing the specified data OR queries the data from an existing file.

Key path	SCPI Only
Remote Command	:MMEMory:DATA <file_name>, <data> :MMEMory:DATA? <file_name>
Notes	<p>The string must be a valid logical path.</p> <p>The command form is MMEMory:DATA <file_name>,<data>. It loads <data> into the file <file_name>. <data> is in 488.2 block format. <file_name> is string data.</p> <p>The query form is MMEMory:DATA? <file_name> with the response being the associated <data> in block format.</p>
Initial S/W Revision	Prior to A.02.00

Mass Storage Make Directory (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:MDIRectory <directory_name>
Notes	<p>The string must be a valid logical path.</p> <p>Creates a new directory. The <directory_name> parameter specifies the name to be created.</p>

	This command will generate an “access denied” error if the new directory would be in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.
Initial S/W Revision	Prior to A.02.00

Mass Storage Move (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:MOVE <string>,<string>[,<string>,<string>]
Notes	<p>The string must be a valid logical path.</p> <p>Moves an existing file to a new file or an existing directory to a new directory.</p> <p>Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.</p> <p>The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.</p> <p>This command will generate an “access denied” error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.</p>
Initial S/W Revision	Prior to A.02.00

Mass Storage Remove Directory (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:RDIRECTory <directory_name>
Notes	<p>The string must be a valid logical path.</p> <p>Removes a directory. The <directory_name> parameter specifies the directory name to be removed. All files and directories under the specified directory shall also be removed.</p> <p>This command will generate an “access denied” error if the folder is a restricted folder (e.g., C:\Windows) or is in a restricted folder and the current user does not have Power User or Administrator privileges.</p>
Initial S/W Revision	Prior to A.02.00

Single (Single Measurement/Sweep)

Sets the analyzer for Single measurement operation. The single/continuous state is Meas Global, so the setting will affect all the measurements. If you are Paused, pressing Single does a Resume.

See "[More Information](#)" on page 1307

Key Path	Front-panel key
Example	:INIT:CONT OFF
Notes	See Cont key description.
Backwards Compatibility Notes	<p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey and the INITiate:IMM switched from continuous measurement to single measurement and restarted sweeps and averages (displayed average count reset to 1), but did not restart Max Hold and Min Hold. In the X-Series, the Single hardkey and the INITiate:IMM command initiate a sweep/ measurement/ average sequence/hold sequence including MaxHold and MinHold.</p> <p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey restarted the sweep regardless of whether or not you were in an active sweep or sweep sequence. In the X-Series, Restart does this but Single only restarts the sweep or sweep sequence if you are in the idle state.</p> <p>INIT[:IMM] in ESA & PSA Spectrum Analysis Mode does an implied ABORT. In some other PSA Modes, INIT[:IMM] is ignored if not in the idle state. . The X-Series follows the ESA/PSA SA Mode model, which may cause some Modes to have compatibility problems.</p>
Initial S/W Revision	Prior to A.02.00

More Information

See "[Restart](#)" on page 2337 for details on the INIT:IMMEDIATE (Restart) function.

If you are already in single sweep, the INIT:CONT OFF command has no effect.

If you are already in Single Sweep, then pressing the Single key in the middle of a sweep does not restart the sweep or sequence. Similarly, pressing the Single key does not restart the sweep or sequence if the sweep is not in the idle state (for example, if you are taking a very slow sweep, or the analyzer is waiting for a trigger). Instead, it results in a message. "Already in Single, press Restart to initiate a new sweep or sequence". Even though pressing the Single key in the middle of a sweep does not restart the sweep, sending INIT:IMMEDIATE does reset it.

To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command CALC:AVER:TCON UP.

Source

There is no Source control functionality for this measurement. When this key is pressed, the screen either displays a blank menu, or the previously-selected menu remains unchanged.

Key Path	Front-panel key
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Span X Scale

Accesses a menu of functions that enable you to set the horizontal scale parameters.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Span

Changes the frequency range symmetrically about the center frequency.

For details of WiDEN preset values, see ["IDEN Mode Span Preset for Monitor Spectrum" on page 1310](#).

Key Path	Span X Scale
Mode	All except SA, BASIC
Remote Command	[:SENSe] :MONitor:FREQuency:SPAN <freq> [:SENSe] :MONitor:FREQuency:SPAN?
Example	MON:FREQ:SPAN 1 MHz MON:FREQ:SPAN?
Couplings	Changing the span causes the resolution bandwidth to change automatically, and affects data acquisition time.
Preset	WCDMA: 10.0 MHz WIMAX OFDMA: 50.0 MHz C2K: 2.5MHz PN: 1.0 MHz GSM/EDGE: 1.0 MHz TD-SCDMA: 3.2 MHz 1xEVDO: 2.0MHz DVB-T/H: 10.0MHz DTMB (CTTB): 10.0MHz ISDB-T: 10.0MHz CMMB: 10.0MHz LTE: 50 MHz LTETDD: 50 MHz IDEN: See the table below Digital Cable TV: 10.0MHz WLAN: If Radio Std is 802.11a/b/g 802.11n(20MHz) 802.11ac(20MHz): 25 MHz If Radio Std is 802.11n(40MHz), 802.11ac (40MHz): 50 MHz If Radio Std is 802.11ac(80MHz): 100MHz If Radio Std is 802.11ac(160MHz): 200MHz

	MSR: 20.0 MHz LTEAFDD, LTEATDD: 20.0MHz
State Saved	Saved in instrument state.
Min	10 Hz
Max	Hardware Dependent: Option 503 = 3.7 GHz Option 507 = 7.1GHz Option 508 = 8.5 GHz Option 513 = 13.8 GHz Option 526 = 27.0 GHz
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.02.00
Modified at S/W Revision	A.03.00

IDEN Mode Span Preset for Monitor Spectrum

iDEN Slot Format	WiDEN Slot Format 25kHz	WiDEN Slot Format 50kHz	WiDEN Slot Format 75kHz	WiDEN Slot Format 100kHz	WiDEN Slot Format 50kHz Out
60kHz	60kHz	85kHz	110kHz	135kHz	135kHz

Full Span

Changes the Span to show the full frequency range of the analyzer.

Key Path	Span X Scale
Mode	All except SA and BASIC
Remote Command	[:SENSe] :MONitor:FREQuency:SPAN:FULL
Example	MON:FREQ:SPAN:FULL
Couplings	Sets the span to the full frequency range, and adjusts the center frequency accordingly.
Initial S/W Revision	Prior to A.02.00

Last Span

Changes the measurement span to the span setting of the previous measurement. If there is no existing previous span value, then the span remains unchanged.

Key Path	Span X Scale
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Mode	All except SA and BASIC
Remote Command	[:SENSe] :MONitor :FREQuency :SPAN :PREVious
Example	MON:FREQ:SPAN:PREV
Couplings	Selecting last span changes the measurement span value.
Initial S/W Revision	Prior to A.02.00

Sweep/Control

Access a menu of functions that enable you to set up and control the sweep time for the current measurement

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Sweep Time

Selects the length of time in which the spectrum analyzer sweeps the displayed frequency span. Additional overhead time is required by the analyzer. It impacts the sweep rate, but is not calculated as part of the sweep time. Reducing the sweep time increases the rate of sweeps.

Key Path	Sweep/Control
Mode	All except SA and BASIC
Remote Command	[:SENSe]:MONitor:SWEep:TIME <time> [:SENSe]:MONitor:SWEep:TIME? [:SENSe]:MONitor:SWEep:TIME:AUTO OFF ON 0 1 [:SENSe]:MONitor:SWEep:TIME:AUTO?
Example	MON:SWE:TIME 100 ms MON:SWE:TIME? MON:SWE:TIME:AUTO ON MON:SWE:TIME:AUTO?
Preset	Automatically Calculated
State Saved	Saved in instrument state.
Min	1 ms
Max	4000 s
Initial S/W Revision	Prior to A.02.00
MIN/MAX/DEF Support	Yes

Pause

Pauses a measurement after the current data acquisition is complete.

When Paused, the label on the key changes to Resume. Pressing Resume continues the measurement at the point where it had been paused.

See "[Pause/Resume](#)" on page 2358 under Sweep/Control for more information.

Key Path	Sweep/Control
Initial S/W Revision	Prior to A.02.00

Gate

Accesses a menu that enables you to control the gating function. The Gate functionality is used to view signals best viewed by qualifying them with other events.

Gate setup parameters are the same for all measurements – they do not change as you change measurements. Settings like these are called “Meas Global” and are unaffected by Meas Preset.

Note that Sweep Time autocoupling rules and annotation are changed by Gate being on.

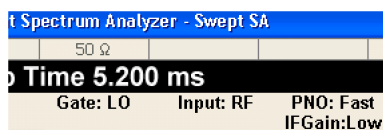
Key Path	Sweep/Control
Scope	Meas Global
Readback	The state and method of Gate, as [Off, LO] or [On, Video]. Note that for measurements that only support gated LO, the method is nonetheless read back, but always as LO.
Initial S/W Revision	Prior to A.02.00

Gate On/Off

Turns the gate function on and off.

When the Gate Function is on, the selected Gate Method is used along with the gate settings and the signal at the gate source to control the sweep and video system with the gate signal. Not all measurements allow every type of Gate Methods.

When Gate is on, the annunciation in the measurement bar reflects that it is on and what method is used, as seen in the following "Gate: LO" annunciator graphic.



Key Path	Sweep/Control, Gate
Remote Command	[:SENSe] :SWEep:EGATe [:STATe] OFF ON 0 1 [:SENSe] :SWEep:EGATe [:STATe] ?
Example	SWE:EGAT ON SWE:EGAT?
Dependencies	The function is unavailable (grayed out) and Off when:

- Gate Method is LO or Video and FFT Sweep Type is manually selected.
- Gate Method is FFT and Swept Sweep Type is manually selected.
- Marker Count is ON.

The following are unavailable whenever Gate is on:

- FFT under Sweep Type when Method=LO or Video or Swept under Sweep Type when Method=FFT
- Marker Count

While Gate is on, the Auto Rules for Sweep Type are modified so that the choice agrees with the Gate Method: i.e., FFT for Method = FFT and Swept for Method = LO or Video.

The Gate softkey and all SCPI under the [:SENSe]:SWEep:EGATe SCPI node are grayed out when Source Mode is Tracking with an external source. This is because the Gate circuitry is used to sync the external source. If the Tracking Source is turned on, the Gate is turned off.

When in the ACP measurement:

- When Meas Method is RBW or FAST, this function is unavailable and the key is grayed out.
- Whenever Gate is on, Meas Method, RBW or FAST is unavailable and keys for those are grayed out.
- When Gate is on, Offset Res BW and Offset Video BW are ignored (if you set these values) and the measurement works as if all Offset Res BW and all Offset Video BW are coupled with the Res BW and the Video BW under the BW menu. When Gate is on, the Offset BW key in the Offset/Limit menu is grayed out.

Preset	Off LTETDD: On
State Saved	Saved in instrument state
Range	On Off
Backwards Compatibility SCPI	[:SENSe]:SWEep:TIME:GATE[:STATe] ESA compatibility
Backwards Compatibility Notes	In ESA, Trig Delay (On) and Gate (On) could not be active at the same time.. This dependency does not exist in PSA or in the X-Series.
Initial S/W Revision	Prior to A.02.00

Gate View On/Off

Turning on Gate View in the Swept SA measurement provides a single-window gate view display..

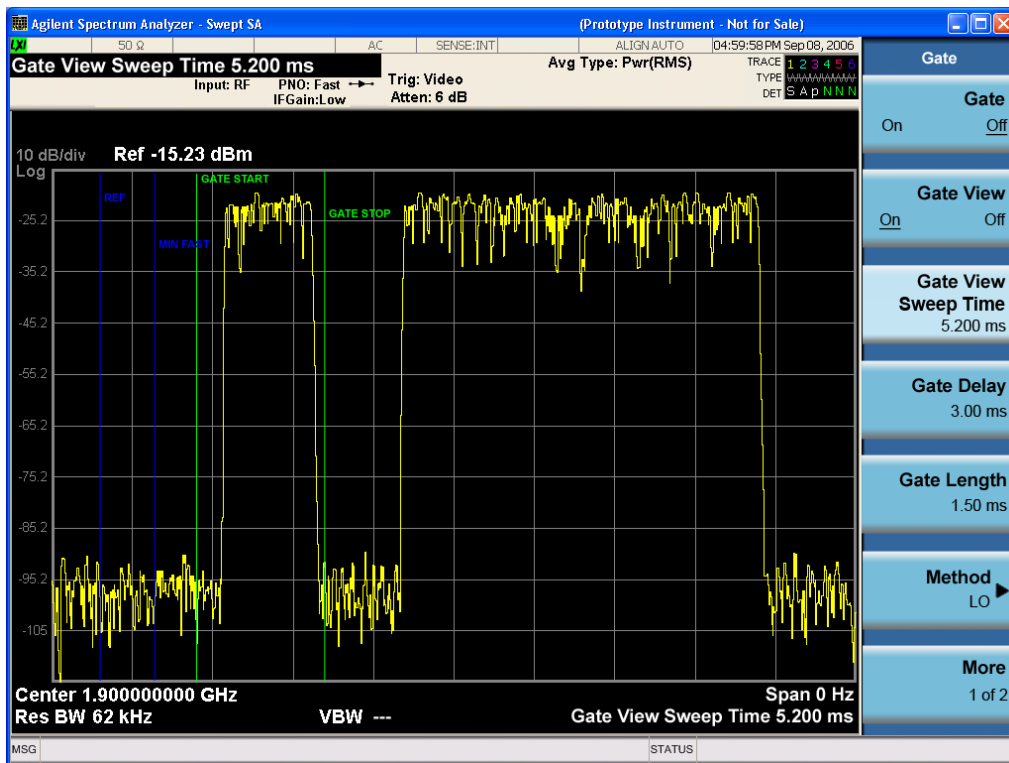
Turning on Gate View in other measurements shows the split-screen Gate View. In these measurements, when the Gate View is on, the regular view of the current measurement traces and results are reduced vertically to about 70% of the regular height. The Zero Span window, showing the positions of the Gate, is shown between the Measurement Bar and the reduced measurement window. By reducing the height of the measurement window, some of the annotation on the Data Display may not fit and is not shown.

Key Path	Sweep/Control, Gate
Remote Command	[:SENSe]:SWEep:EGATe:VIEW ON OFF 1 0 [:SENSe]:SWEep:EGATe:VIEW?

Example	SWE:EGAT:VIEW ON turns on the gate view.
Dependencies	<p>In the Swept SA measurement:</p> <p>In Gate View, the regular Sweep Time key is grayed out . When pressed, the grayed out key puts up the informational message "Use Gate View Sweep Time in the Gate menu."</p> <p>In the other measurements:</p> <p>When you turn Gate View on, the lower window takes on the current state of the instrument. Upon leaving Gate View, the instrument takes on the state of the lower window.</p> <p>When you turn Gate View on, the upper window Sweep Time is set to the gate view sweep time.</p>
Couplings	<p>These couplings apply to the Swept SA measurement:</p> <ul style="list-style-type: none"> • When Gate View is turned on, the instrument is set to Zero Span. • Gate View automatically turns off whenever a Span other than Zero is selected. • Gate View automatically turns off if you press the Last Span key while in Gate View, and the instrument returns to the Span it was in before entering Gate View (even if that is Zero Span). • When Gate View is turned on, the sweep time used is the gate view sweep time. This is set according to the rules in section "Gate View Setup" on page 1317 • When Gate View is turned off, Sweep Time is set to the normal Swept SA measurement sweep time. • If Gate View is on and Gate is off, then turning on Gate turns off Gate View.
Preset	OFF
State Saved	Saved in instrument state
Range	On Off
Initial S/W Revision	Prior to A.02.00

A sample of the Gate View screen in the Swept SA measurement is shown in the following graphic :

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A sample of the Gate View screen in other measurements is shown in the following graphic. This example is for the ACP measurement:



Turning Gate View off returns the analyzer to the Normal measurement view.

In the Swept SA, the normal measurement view is the single-window Swept SA view. When returning to this view, the Swept SA measurement returns to the Span it was in before entering **Gate View** (even if that is Zero Span).

The **Gate View** window is triggered from the Gate Source, with zero trigger delay. Also, when updating the **Gate View** window, the Gate itself must not operate. So it is internally shut off while the gate view window is being updated. For the Swept SA measurement, this means that the Gate is internally shut off whenever the gate view window is displayed. The measurement bar and softkeys continue to show the Trigger source for the main sweep window and give no indication that the Gate is shut off or that the Gate View window is triggered from the Gate Source.

When in **Gate View**, vertical lines are displayed in the Gate View window as follows:

- Green lines are displayed at the gate edges as follows: in Edge Gate, a line is shown for Delay and one for the end of the Gate period, defined by Length. In Level Gate a line is shown only for Delay. You can adjust the position of the green lines by adjusting the gate length and the gate delay. These lines update in the Gate View window as the active function changes, even if the window is not being updated. In Gated LO and Gated Video, these lines are positioned relative to the delay reference line (not relative to 0 time). In Gated FFT, their location is relative to the left edge of the screen.
- A blue line is displayed showing the delay reference, that is, the reference point for the Gate Delay within the Zero Span window. The blue line represents where (in time) the effective location of the gate start would be if the gate were programmed to zero delay.
-
- The second blue line is labeled "MIN FAST" as shown in the figure above because it represents the minimum Gate Delay for fast Gated LO operation. This line is only displayed in Gated LO. You cannot scroll (knob) or decrement (down key) the Gate Delay to less than that represented by the position of this line, it can only be set below this position manually, although once there it can be moved freely with the knob while below the line.
- A yellow line in the Gated Video case only, is displayed at Blength, where Blength is the display point (bucket) length for the swept trace, which is given by the sweep time for that trace divided by number of Points – 1. So it is referenced to 0 time, not to the delay reference. This line is labeled NEXT PT (it is not shown in the figure above because the figure above is for Gated LO).
- The yellow line represents the edge of a display point (bucket). Normally in Gated Video, the bucket length must be selected so that it exceeds the off time of the burst. There is another way to use the analyzer in Gated Video measurements, and that is to set the bucket width much shorter than the off time of the burst. Then use the Max Hold trace function to fill in "missing" buckets more slowly. This allows you to see some of the patterns of the Gated Video results earlier, though seeing a completely filled-in spectrum later.

Gate View Setup

Accesses a menu that enables you to setup parameters relevant to the Gate View

Key Path	Sweep/Control, Gate
Scope	Meas Global
Initial S/W Revision	A.10.00

Gate View Sweep Time

Controls the sweep time in the Gate View window. To provide an optimal view of the gate signal, the analyzer initializes Gate View Sweep Time based on the current settings of Gate Delay and Gate Length.

Key Path	Sweep/Control, Gate, Gate View Setup
Remote Command	[:SENSe] :SWEep:EGATe:TIME <time> [:SENSe] :SWEep:EGATe:TIME?
Example	SWE:EGAT:TIME 500 ms
Dependencies	Gate View Sweep Time is initialized: <ul style="list-style-type: none"> • On Preset (after initializing delay and length). • Every time the Gate Method is set/changed. <p>Additionally, in the Swept SA measurement, whenever you do a Preset, or leave Gate View, the analyzer remembers the Gate Delay and Gate Length settings. Then, when returning to Gate View, if the current Gate Delay and/or Gate Length do not match the remembered values Gate View Sweep Time is re-initialized.</p> <ol style="list-style-type: none"> 1. Compute the location of the "gate stop" line, which you know is at time $t = t_{min} + \text{GateDelay} + \text{GateLength}$.
Preset	519.3 μ s WiMAX OFDMA: 5 ms GSM/EDGE: 1 ms
State Saved	Saved in instrument state
Max	6000 s
Initial S/W Revision	Prior to A.02.00

Gate View Start Time

Controls the time at the left edge of the Gate View.

Key Path	Sweep/Control, Gate, Gate View Setup
Remote Command	[:SENSe] :SWEep:EGATe:VIEW:START <time> [:SENSe] :SWEep:EGATe:VIEW:START?
Example	SWE:EGAT:VIEW:STAR 10ms
Notes	Units of time are required or no units; otherwise an invalid suffix error message will be generated. See error -131.
Preset	0 ms
State Saved	Saved in instrument state
Min	0
Max	500 ms
Initial S/W Revision	A.10.00

Gate Delay

Controls the length of time from the time the gate condition goes True until the gate is turned on.

Key Path	Sweep/Control, Gate
Remote Command	[:SENSe] :SWEep:EGATe:DELay <time> [:SENSe] :SWEep:EGATe:DELay?
Example	SWE:EGAT:DELay 500ms SWE:EGAT:DELay?
Notes	Units of time are required or no units; otherwise an invalid suffix error message will be generated.
Preset	57.7 us WiMAX OFDMA: 71 us GSM/EDGE: 600 us WLAN: 500 us
State Saved	Saved in instrument state
Min	0.0 us
Max	100 s
Backwards Compatibility SCPI	[:SENSe] :SWEep:TIME:GATE:DELay ESA compatibility
Initial S/W Revision	Prior to A.02.00

Gate Length

Controls the length of time that the gate is on after it opens.

Key Path	Sweep/Control, Gate
Remote Command	[:SENSe] :SWEep:EGATe:LENGth <time> [:SENSe] :SWEep:EGATe:LENGth?
Example	SWE:EGAT:LENG 1 SWE:EGAT:LENG?
Notes	Units of time are required or no units; otherwise an invalid suffix error message will be generated.
Dependencies	<p>Grayed out when Gate Method is set to FFT in which case the label changes to that shown below.</p> <div style="border: 1px solid black; padding: 5px; display: inline-block;"> <p>Gate Length (=1.83/RBW) 2.8 ms</p> </div> <p style="margin-left: 20px;">vsd 39-1</p> <p>The key is also grayed out if Gate Control = Level.</p>
Preset	461.6 us

	WiMAX OFDMA: 50 us GSM/EDGE: 200 us WLAN: 1.54 ms
State Saved	Saved in instrument state
Min	100 ns
Max	5 s
Backwards Compatibility SCPI	[:SENSe] : SWEep : TIME : GATE : LENGth ESA compatibility
Initial S/W Revision	Prior to A.02.00

Gate Source

The menus under the Gate Source key are the same as those under the Trigger key, with the exception that neither Free Run nor Video are available as Gate Source selections. However, a different SCPI command is used to select the Gate Source (see table below) because you may independently set the Gate Source and the Trigger Source.

Any changes to the settings in the setup menus under each Gate Source selection key (for example: Trigger Level, Trigger Delay, etc.) also affect the corresponding settings under the Trigger menu keys. The SCPI commands used for these are the same for Trigger and Gate, since there is only one setting which affects both Gate and Trigger. Example: to set the Trigger Level for External 1 you use the command :TRIG:EXT1:LEV regardless of whether you are using External 1 as a Trigger Source or a Gate Source.

Key Path	Sweep/Control, Gate
Remote Command	<pre>[:SENSe] : SWEep : EGATe : SOURce EXTernal1 EXTernal2 LINE FRAME RFBurst [:SENSe] : SWEep : EGATe : SOURce?</pre>
Dependencies	In some models, there is no second External input. In these models, the External 2 key is blanked and the EXTernal2 parameter will generate a "Hardware missing; Not available for this model number" error.
Preset	EXTernal 1 GSM/EDGE, MSR: FRAME LTETDD: EXTernal 1When Direction is Downlink, FRAME when Direction is Uplink.
Backwards Compatibility Notes	In ESA, there is a single Gate input port. In PSA, the Gate Source may be taken from one of two specified input ports. In the X-Series, any Trigger Source can be a Gate Source.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00, A.14.00

Line

Pressing this key, when it is not selected, selects the line signal as the trigger. A new sweep/measurement will start synchronized with the next cycle of the line voltage. Pressing this key, when it is already selected, access the line trigger setup menu.

Key Path	Trigger
Example	TRIG:SOUR LINE Swept SA measurement TRIG:<meas>:SOUR LINE Measurements other than Swept SA
Dependencies	Line trigger is not available when operating from a "dc power source", for example, when the instrument is powered from batteries.
State Saved	Saved in instrument state
Status Bits/OPC dependencies	The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.
Initial S/W Revision	Prior to A.02.00

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

Key Path	Trigger, Line
Remote Command	:TRIGger[:SEQuence]:LINE:SLOPe POSitive NEGative :TRIGger[:SEQuence]:LINE:SLOPe?
Example	TRIG:LINE:SLOP NEG
Preset	POSitive
State Saved	Saved in instrument state
Backwards Compatibility Notes	The legacy :TRIGger[:SEQuence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers.
Initial S/W Revision	Prior to A.02.00

External 1

Pressing this key, when it is not selected, selects an external input signal as the trigger. A new sweep/measurement will start when the external trigger condition is met using the external 1 input connector on the rear panel.

Pressing this key, when it is already selected, accesses the external 1 trigger setup menu.

Key Path	Trigger
Example	TRIG:SOUR EXT1 Swept SA measurement TRIG:<meas>:SOUR EXT1 Measurements other than Swept SA
Dependencies	Grayed out if in use by Point Trigger in the Source Setup menu. Forced to Free Run if already selected and Point Trigger is set to External 1.
State Saved	Saved in instrument state
Status Bits/OPC dependencies	The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.
Initial S/W Revision	Prior to A.02.00

Trigger Level

Sets the value where the external 1 trigger input will trigger a new sweep/measurement.

Key Path	Trigger, External 1
Remote Command	:TRIGger[:SEquence]:EXTernal1:LEVel <level> :TRIGger[:SEquence]:EXTernal1:LEVel?
Example	TRIG:EXT1:LEV 0.4 V
Couplings	This same level is used for the Ext1 trigger source in the Trigger menu, for the Ext1 selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the Ext1 selection in the Gate Source menu.
Preset	1.2 V
State Saved	Saved in instrument state
Min	-5 V
Max	5 V
Default Unit	V
Backwards Compatibility SCPI	:TRIGger[:SEquence]:EXTernal:LEVel For backward compatibility, the parameter EXTernal is mapped to EXTernal1
Backwards Compatibility SCPI	:TRIGger[:SEquence]:FRAME:EXTernal1:LEVel
Initial S/W Revision	Prior to A.02.00

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

Key Path	Trigger, External 1
Remote Command	:TRIGger[:SEquence]:EXTernal1:SLOPe POSitive NEGative :TRIGger[:SEquence]:EXTernal1:SLOPe?
Example	TRIG:EXT1:SLOP NEG
Couplings	This same slope is used in the Ext1 selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu).
Preset	POSitive
State Saved	Saved in instrument state
Backwards Compatibility SCPI	:TRIGger[:SEquence]:EXTernal:SLOPe For backward compatibility, the parameter EXTernal is mapped to EXTernal1
Backwards Compatibility SCPI	:TRIGger[:SEquence]:FRAMe:EXTernal1:SLOPe
Backwards Compatibility Notes	The legacy :TRIGger[:SEquence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers.
Initial S/W Revision	Prior to A.02.00

External 2

Pressing this key, when it is not selected, selects an external input signal as the trigger. A new sweep/measurement will start when the external trigger condition is met using the external 2 input connector. The external trigger 2 input connector is on the rear panel.

Pressing this key, when it is already selected, accesses the external 2 trigger setup menu.

Key Path	Trigger
Example	TRIG:SOUR EXT2 Swept SA measurement TRIG:<meas>:SOUR EXT2 Measurements other than Swept SA
Dependencies	In some models, there is no second External input. In these models, the External 2 key is blanked and the EXTernal2 parameter will generate a "Hardware missing; Not available for this model number" message. Grayed out if in use by Point Trigger in the Source Setup menu. Forced to Free Run if already selected and Point Trigger is set to External 2.
State Saved	Saved in instrument state
Status Bits/OPC dependencies	The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Trigger Level

Sets the value where the external 2 trigger input will trigger a new sweep/measurement.

Key Path	Trigger, External 2
Remote Command	:TRIGger[:SEquence]:EXTernal2:LEVel :TRIGger[:SEquence]:EXTernal2:LEVel?
Example	TRIG:EXT2:LEV 1.1 V
Couplings	This same level is used for the Ext2 trigger source in the Trigger menu, for the Ext2 selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the Ext2 selection in the Gate Source menu.
Preset	1.2 V
State Saved	Saved in instrument state
Min	-5 V
Max	5 V
Default Unit	V
Backwards Compatibility SCPI	:TRIGger[:SEquence]:FRAMe:EXTernal2:LEVel
Initial S/W Revision	Prior to A.02.00

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

Key Path	Trigger, External 2
Remote Command	:TRIGger[:SEquence]:EXTernal2:SLOPe POSitive NEGative :TRIGger[:SEquence]:EXTernal2:SLOPe?
Example	TRIG:EXT2:SLOP NEG
Couplings	This same slope is used in the Ext2 selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu).
Preset	POSitive
State Saved	Saved in instrument state
Backwards Compatibility SCPI	:TRIGger[:SEquence]:FRAMe:EXTernal2:SLOPe
Backwards Compatibility Notes	The legacy :TRIGger[:SEquence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers.
Initial S/W Revision	Prior to A.02.00

RF Burst

Pressing this key, when it is not selected, selects the RF Burst as the trigger. A new sweep/measurement will start when an RF burst envelope signal is identified from the signal at the RF Input connector. Pressing this key, when it is already selected, accesses the RF Burst trigger setup menu.

In some models, a variety of burst trigger circuitry is available, resulting in various available burst trigger bandwidths. The analyzer automatically chooses the appropriate trigger path based on the hardware configuration and other settings of the analyzer.

Key Path	Trigger
Example	TRIG:SOUR RFB Swept SA measurement TRIG:<meas>:SOUR RFB Measurements other than Swept SA
State Saved	Saved in instrument state
Status Bits/OPC dependencies	The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.
Backwards Compatibility Notes	The legacy command: :TRIGger[:SEQuence]:RFBurst:FSElectivity[:STATe] OFF ON 0 1 is not supported in the X-Series, as the hardware to do Frequency Selective burst triggers does not exist in X-Series.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.04.00

Absolute Trigger Level

Sets the absolute trigger level for the RF burst envelope.

When using the External Mixing path, the Absolute Trigger Level is uncalibrated because the factory default was set to accommodate the expected IF levels for the RF path.

Key Path	Trigger, RF Burst
Scope	Meas Global
Remote Command	:TRIGger[:SEQuence]:RFBurst:LEVel:ABSolute <amp1> :TRIGger[:SEQuence]:RFBurst:LEVel:ABSolute?
Example	TRIG:RFB:LEV:ABS 10 dBm sets the trigger level of the RF burst envelope signal to the absolute level of 10 dBm
Notes	Sending this command does not switch the setting from relative to absolute; to switch it you need to send the :TRIGger[:SEQuence]:RFBurst:LEVel:TYPE command, below. Amplitude Corrections are not taken into account by the Absolute Trigger Level. For example, if you have given yourself effective gain with an amplitude correction factor, the Absolute Trigger will not fire until you have set the trigger level that far below the displayed signal level, rather than simply to

	the displayed signal level. This is only true for Amplitude Corrections, not External Gain or Ref Level Offset functions. If mode is Bluetooth, the default value is -50 dBm.
Couplings	This same level is used for the RF Burst trigger source in the Trigger menu, for the RF Burst selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the RF Burst selection in the Gate Source menu
Preset	-20 dBm
State Saved	Saved in instrument state
Min	-200 dBm
Max	100 dBm
Default Unit	depends on the current selected Y-Axis unit
Backwards Compatibility SCPI	:TRIGger[:SEquence]:FRAME:RFBurst:LEVel:ABSolute
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.04.00

Key Path	Trigger, RF Burst
Remote Command	:TRIGger[:SEquence]:RFBurst:LEVel:TYPE ABSolute RELative :TRIGger[:SEquence]:RFBurst:LEVel:TYPE?
Example	TRIG:RFB:LEV:TYPE REL sets the trigger level type of the RF burst trigger to Relative.
Preset	ABSolute
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.04.00

Relative Trigger Level

Sets the relative trigger level for the RF burst envelope.

In some models, the relative burst trigger function is implemented in hardware. In other models, without the advanced triggering hardware required, the relative burst trigger function is implemented in software in some measurements, and is unavailable in other measurements.

When implemented in software, the relative RF Burst trigger function is implemented as follows:

1. The measurement starts with the absolute RF Burst trigger setting. If it cannot get a trigger with that level, auto trigger fires and the acquisition starts anyway. After the acquisition, the measurement searches for the peak in the acquired waveform and saves it.

2. Now, in the next cycle of the measurement, the measurement determines a new absolute RF Burst level based on the peak value from the first measurement and the Relative RF Burst Trigger Level (always 0 or negative dB) set by the user. The following formula is used:
 3. absolute RF Burst level = peak level of the previous acquisition + relative RF Burst level
 4. If the new absolute RF Burst level differs from the previous by more than 0.5 dB, the new level is sent to the hardware; otherwise it is not updated (to avoid slowing down the acquisition)
- Steps 2 and 3 repeat for subsequent measurements.

Key Path	Trigger, RF Burst
Scope	Meas Global
Remote Command	:TRIGger[:SEquence]:RFBurst:LEVel:RELative <rel_ampl> :TRIGger[:SEquence]:RFBurst:LEVel:RELative?
Example	TRIG:RFB:LEV:REL -10 dB sets the trigger level of the RF burst envelope signal to the relative level of -10 dB
Notes	Sending this command does not switch the setting from absolute to relative; to switch it you need to send the :TRIGger[:SEquence]:RFBurst:LEVel:TYPE command, above. The relative trigger level is not available in some measurements. In those measurements the RELative parameter, and the :TRIGger[:SEquence]:RFBurst:LEVel:TYPE command (above), will generate an error if sent.
Dependencies	This key is grayed out and Absolute Trigger Level selected if the required hardware is not present in your analyzer and the current measurement does not support Relative triggering.
Preset	-6 dB GSM: -25 dB
State Saved	Saved in instrument state
Min	-45 dB
Max	0 dB
Default Unit	dB or dBc
Backwards Compatibility SCPI	:TRIGger[:SEquence]:RFBurst:LEVel This legacy command is aliased to :TRIGger[:SEquence]:RFBurst:LEVel:RELative because the PSA had ONLY relative burst triggering
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.04.00

Trigger Slope

It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

Key Path	Trigger, RF Burst
Remote Command	:TRIGger[:SEquence]:RFBurst:SLOPe Positive NEGative :TRIGger[:SEquence]:RFBurst:SLOPe?

Example	TRIG:RFB:SLOP NEG
Couplings	This same slope is used in the RF Burst selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu).
Preset	POSitive
State Saved	Saved in instrument state
Backwards Compatibility SCPI	:TRIGger[:SEQuence]:FRAMe:RFBurst:SLOPe
Backwards Compatibility Notes	The legacy :TRIGger[:SEQuence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers.
Initial S/W Revision	Prior to A.02.00

Periodic Timer (Frame Trigger)

Pressing this key, when it is not selected, selects the internal periodic timer signal as the trigger. Triggering occurrences are set by the **Period** parameter, which is modified by the **Sync Source** and **Offset**. Pressing this key, when it is already selected, accesses the periodic timer trigger setup functions.

If you do not have a sync source selected (it is Off), then the internal timer will not be synchronized with any external timing events.

Key Path	Trigger
Example	TRIG:SOUR FRAM Swept SA measurement TRIG:<meas>:SOUR FRAM Measurements other than Swept SA
State Saved	Saved in instrument state
Readback	[Sync: <value of Sync Source>], for example, [Sync: External 1]
Status Bits/OPC dependencies	The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.
Initial S/W Revision	Prior to A.02.00

Periodic Timer Triggering:

This feature selects the internal periodic timer signal as the trigger. Trigger occurrences are set by the **Periodic Timer** parameter, which is modified by the **Sync Source** and **Offset**.

The figure below shows the action of the periodic timer trigger. Before reviewing the figure, we'll explain some uses for the periodic trigger.

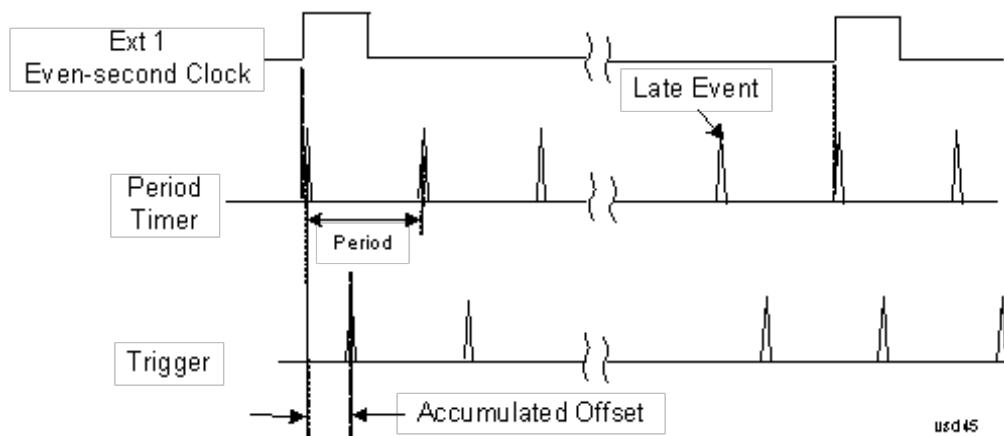
A common application is measuring periodic burst RF signals for which a trigger signal is not easily available. For example, we might be measuring a TDMA radio which bursts every 20 ms. Let's assume that the 20 ms period is very consistent. Let's also assume that we do not have an external trigger source

available that is synchronized with the period, and that the signal-to-noise ratio of the signal is not high enough to provide a clean RF burst trigger at all of the analysis frequencies. For example, we might want to measure spurious transmissions at an offset from the carrier that is larger than the bandwidth of the RF burst trigger. In this application, we can set the Periodic Timer to a 20.00 ms period and adjust the offset from that timer to position our trigger just where we want it. If we find that the 20.00 ms is not exactly right, we can adjust the period slightly to minimize the drift between the period timer and the signal to be measured.

A second way to use this feature would be to use **Sync Source** temporarily, instead of **Offset**. In this case, we might tune to the signal in a narrow span and use the RF Burst trigger to synchronize the periodic timer. Then we would turn the sync source off so that it would not miss-trigger. Miss-triggering can occur when we are tuned so far away from the RF burst trigger that it is no longer reliable.

A third example would be to synchronize to a signal that has a reference time element of much longer period than the period of interest. In some CDMA applications, it is useful to look at signals with a short periodicity, by synchronizing that periodicity to the "even-second clock" edge that happens every two seconds. Thus, we could connect the even-second clock trigger to Ext1 and use then Ext1 as the sync source for the periodic timer.

The figure below illustrates this third example. The top trace represents the even-second clock. It causes the periodic timer to synchronize with the leading edge shown. The analyzer trigger occurs at a time delayed by the accumulated offset from the period trigger event. The periodic timer continues to run, and triggers continue to occur, with a periodicity determined by the analyzer time base. The timer output (labeled "late event") will drift away from its ideal time due to imperfect matching between the time base of the signal being measured and the time base of the analyzer, and also because of imperfect setting of the period parameter. But the synchronization is restored on the next even-second clock event. ("Accumulated offset" is described in the in the **Offset** function section.)



Period

Sets the period of the internal periodic timer clock. For digital communications signals, this is usually set to the frame period of your current input signal. In the case that sync source is not set to OFF, and the external sync source rate is changed for some reason, the periodic timer is synchronized at the every external synchronization pulse by resetting the internal state of the timer circuit.

Key Path	Trigger, Periodic Timer
Remote Command	:TRIGger[:SEquence]:FRAMe:PERIOD <time>

	:TRIGger[:SEquence]:FRAMe:PERiod?
Example	TRIG:FRAM:PER 100 ms
Dependencies	The invalid data indicator turns on when the period is changed, until the next sweep/measurement completes.
Couplings	The same period is used in the Gate Source selection of the period timer.
Preset	20 ms GSM: 4.615383
State Saved	Saved in instrument state
Min	100.000 ns
Max	559.0000 ms
Default Unit	S
Initial S/W Revision	Prior to A.02.00

Offset

Adjusts the accumulated offset between the periodic timer events and the trigger event. Adjusting the accumulated offset is different than setting an offset, and requires explanation.

The periodic timer is usually not synchronized with any external events, so the timing of its output events has no absolute meaning. Since the timing relative to external events (RF signals) is important, you need to be able to adjust (offset) it. However, you have no direct way to see when the periodic timer events occur. All that you can see is the trigger timing. When you want to adjust the trigger timing, you will be changing the internal offset between the periodic timer events and the trigger event. Because the absolute value of that internal offset is unknown, we will just call that the accumulated offset. Whenever the Offset parameter is changed, you are changing that accumulated offset. You can reset the displayed offset using Reset Offset Display. Changing the display does not change the value of the accumulated offset, and you can still make additional changes to accumulated offset.

To avoid ambiguity, we define that an increase in the "offset" parameter, either from the knob or the SCPI adjust command, serves to delay the timing of the trigger event.

Key Path	Trigger, Periodic Timer
Remote Command	:TRIGger[:SEquence]:FRAMe:OFFSet <time> :TRIGger[:SEquence]:FRAMe:OFFSet?
Example	TRIG:FRAM:OFFS 1.2 ms
Notes	The front panel interface (for example, the knob), and this command, adjust the accumulated offset, which is shown on the active function display. However, the actual amount sent to the hardware each time the offset is updated is the delta value, that is, the current accumulated offset value minus the previous accumulated offset value. Note that the accumulated offset value is essentially arbitrary; it represents the accumulated offset from the last time the offset was zeroed (with the Reset Offset Display key). Note that this command does not change the period of the trigger waveform. Note also that Offset is used only when the sync source is set to OFF, otherwise delay is used, see section " Trig Delay " on page 440 .

	An increase in the "offset" parameter, either from the knob or the SCPI adjust command, serves to delay the timing of the trigger event.
Notes	When the SCPI command is sent the value shown on the key (and the Active Function, if this happens to be the active function) is updated with the new value. However, the actual amount sent to the hardware is the delta value, that is, the current accumulated offset value minus the previous accumulated offset value. The SCPI query simply returns the value currently showing on the key.
Dependencies	The invalid data indicator turns on when the offset is changed, until the next sweep/measurement completes.
Couplings	The same offset is used in the Gate Source selection of the period timer.
Preset	0 s
State Saved	Saved in instrument state
Min	-10.000 s
Max	10.000 s
Default Unit	S
Initial S/W Revision	Prior to A.02.00

Offset Adjust (Remote Command Only)

This remote command does not work at all like the related front panel keys. This command lets you advance the phase of the frame trigger by the amount you specify.

It does not change the period of the trigger waveform. If the command is sent multiple times, it advances the phase of the frame trigger an additional amount each time it is sent. Negative numbers are permitted.

Remote Command	:TRIGger[:SEquence]:FRAMe:ADJust <time>
Example	TRIG:FRAM:ADJ 1.2 ms
Notes	Note also that Offset is used only when the sync source is set to OFF, otherwise delay is used, see section " Trig Delay " on page 440 An increase in the "offset" parameter, either from the knob or the SCPI adjust command, serves to delay the timing of the trigger event.
Notes	The front panel interface (for example, the knob) and the :TRIG:FRAM:OFFS command adjust the accumulated offset, which is shown on the active function display. However, the actual amount sent to the hardware is the delta value, that is, the current offset value minus the previous offset value. When the SCPI command is sent the value shown on the key (and the Active Function, if this happens to be the active function) is updated by increasing it (or decreasing it if the value sent is negative) by the amount specified in the SCPI command. This is a "command only" SCPI command, with no query.
Dependencies	The invalid data indicator turns on when the offset is changed, until the next sweep/measurement completes.
Couplings	The same offset is used in the Gate Source selection of the period timer.
Preset	0 s

State Saved	Saved in instrument state
Min	-10.000 s
Max	10.000 s
Default Unit	S
Initial S/W Revision	Prior to A.02.00

Reset Offset Display

Resets the value of the periodic trigger offset display setting to 0.0 seconds. The current displayed trigger location may include an offset value defined with the Offset key. Pressing this key redefines the currently displayed trigger location as the new trigger point that is 0.0 s offset. The Offset key can then be used to add offset relative to this new timing.

Key Path	Trigger, Periodic Timer
Remote Command	:TRIGger[:SEquence]:FRAMe:OFFSet:DISPlay:RESet
Example	TRIG:FRAM:OFFS:DISP:RES
Initial S/W Revision	Prior to A.02.00

Sync Source

Selects a signal source for you to synchronize your periodic timer trigger to, otherwise you are triggering at some arbitrary location in the frame. Synchronization reduces the precision requirements on the setting of the period.

For convenience you may adjust the level and slope of the selected sync source in a conditional branch setup menu accessed from the Sync Source menu. Note that these settings match those in the **Trigger** and **Gate Source** menus; that is, each trigger source has only one value of level and slope, regardless of which menu it is accessed from.

Key Path	Trigger, Periodic Timer
Remote Command	:TRIGger[:SEquence]:FRAMe:SYNC EXTernal1 EXTernal2 RFBurst OFF :TRIGger[:SEquence]:FRAMe:SYNC?
Example	TRIG:FRAM:SYNC EXT2
Dependencies	In some models, there is no second External input. In these models, the External 2 key is blanked and the EXTernal2 parameter will generate a "Hardware missing; Not available for this model number" message.
Preset	Off GSM/EDGE, MSR,LTE,LTETDD: RFBurst
State Saved	Saved in instrument state
Readback	The current setting is read back to this key and it is also Readback to the previous Periodic Timer trigger key.

Backwards Compatibility SCPI	:TRIGger[:SEquence]:FRAMe:SYNC EXTernal
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00, A.14.00

Off

Turns off the sync source for your periodic trigger. With the sync source off, the timing will drift unless the signal source frequency is locked to the analyzer frequency reference.

Key Path	Trigger, Periodic Timer, Sync Source
Example	TRIG:FRAM:SYNC OFF
Readback	Off
Initial S/W Revision	Prior to A.02.00

External 1

Pressing this key, when it is not selected, selects an external input signal as the trigger. A new sweep/measurement will start when the external trigger condition is met using the external 1 input connector on the rear panel.

Pressing this key, when it is already selected, accesses the external 1 trigger setup menu.

Key Path	Trigger
Example	TRIG:SOUR EXT1 Swept SA measurement TRIG:<meas>:SOUR EXT1 Measurements other than Swept SA
Dependencies	Grayed out if in use by Point Trigger in the Source Setup menu. Forced to Free Run if already selected and Point Trigger is set to External 1.
State Saved	Saved in instrument state
Status Bits/OPC dependencies	The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.
Initial S/W Revision	Prior to A.02.00

Trigger Level

Sets the value where the external 1 trigger input will trigger a new sweep/measurement.

Key Path	Trigger, External 1
Remote Command	:TRIGger[:SEquence]:EXTErnal1:LEVel <level> :TRIGger[:SEquence]:EXTErnal1:LEVel?
Example	TRIG:EXT1:LEV 0.4 V
Couplings	This same level is used for the Ext1 trigger source in the Trigger menu, for the Ext1 selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the Ext1 selection in the Gate Source menu.
Preset	1.2 V
State Saved	Saved in instrument state
Min	-5 V
Max	5 V
Default Unit	V
Backwards Compatibility SCPI	:TRIGger[:SEquence]:EXTErnal:LEVel For backward compatibility, the parameter EXTErnal is mapped to EXTErnal1
Backwards Compatibility SCPI	:TRIGger[:SEquence]:FRAME:EXTErnal1:LEVel
Initial S/W Revision	Prior to A.02.00

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

Key Path	Trigger, External 1
Remote Command	:TRIGger[:SEquence]:EXTErnal1:SLOPe POSitive NEGative :TRIGger[:SEquence]:EXTErnal1:SLOPe?
Example	TRIG:EXT1:SLOP NEG
Couplings	This same slope is used in the Ext1 selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu).
Preset	POSitive
State Saved	Saved in instrument state
Backwards Compatibility SCPI	:TRIGger[:SEquence]:EXTErnal:SLOPe For backward compatibility, the parameter EXTErnal is mapped to EXTErnal1
Backwards Compatibility SCPI	:TRIGger[:SEquence]:FRAME:EXTErnal1:SLOPe
Backwards Compatibility Notes	The legacy :TRIGger[:SEquence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers.
Initial S/W Revision	Prior to A.02.00

External 2

Pressing this key, when it is not selected, selects an external input signal as the trigger. A new sweep/measurement will start when the external trigger condition is met using the external 2 input connector. The external trigger 2 input connector is on the rear panel.

Pressing this key, when it is already selected, accesses the external 2 trigger setup menu.

Key Path	Trigger
Example	TRIG:SOUR EXT2 Swept SA measurement TRIG:<meas>:SOUR EXT2 Measurements other than Swept SA
Dependencies	In some models, there is no second External input. In these models, the External 2 key is blanked and the EXTernal2 parameter will generate a "Hardware missing; Not available for this model number" message. Grayed out if in use by Point Trigger in the Source Setup menu. Forced to Free Run if already selected and Point Trigger is set to External 2.
State Saved	Saved in instrument state
Status Bits/OPC dependencies	The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Trigger Level

Sets the value where the external 2 trigger input will trigger a new sweep/measurement.

Key Path	Trigger, External 2
Remote Command	:TRIGger[:SEquence]:EXTernal2:LEVel :TRIGger[:SEquence]:EXTernal2:LEVel?
Example	TRIG:EXT2:LEV 1.1 V
Couplings	This same level is used for the Ext2 trigger source in the Trigger menu, for the Ext2 selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the Ext2 selection in the Gate Source menu.
Preset	1.2 V
State Saved	Saved in instrument state
Min	-5 V
Max	5 V
Default Unit	V
Backwards Compatibility SCPI	:TRIGger[:SEquence]:FRAMe:EXTernal2:LEVel
Initial S/W Revision	Prior to A.02.00

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

Key Path	Trigger, External 2
Remote Command	:TRIGger[:SEQuence]:EXTErnal2:SLOPe POSitive NEGative :TRIGger[:SEQuence]:EXTErnal2:SLOPe?
Example	TRIG:EXT2:SLOP NEG
Couplings	This same slope is used in the Ext2 selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu).
Preset	POSitive
State Saved	Saved in instrument state
Backwards Compatibility SCPI	:TRIGger[:SEQuence]:FRAMe:EXTErnal2:SLOPe
Backwards Compatibility Notes	The legacy :TRIGger[:SEQuence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers.
Initial S/W Revision	Prior to A.02.00

RF Burst

Pressing this key, when it is not selected, selects the RF Burst as the trigger. A new sweep/measurement will start when an RF burst envelope signal is identified from the signal at the RF Input connector. Pressing this key, when it is already selected, accesses the RF Burst trigger setup menu.

In some models, a variety of burst trigger circuitry is available, resulting in various available burst trigger bandwidths. The analyzer automatically chooses the appropriate trigger path based on the hardware configuration and other settings of the analyzer.

Key Path	Trigger
Example	TRIG:SOUR RFB Swept SA measurement TRIG:< meas>:SOUR RFB Measurements other than Swept SA
State Saved	Saved in instrument state
Status Bits/OPC dependencies	The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.
Backwards Compatibility Notes	The legacy command: :TRIGger[:SEQuence]:RFBurst:FSElectivity[:STATe] OFF ON 0 1 is not supported in the X-Series, as the hardware to do Frequency Selective burst triggers does not exist in X-Series.

Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.04.00

Absolute Trigger Level

Sets the absolute trigger level for the RF burst envelope.

When using the External Mixing path, the Absolute Trigger Level is uncalibrated because the factory default was set to accommodate the expected IF levels for the RF path.

Key Path	Trigger, RF Burst
Scope	Meas Global
Remote Command	:TRIGger[:SEquence]:RFBurst:LEVel:ABSolute <ampl> :TRIGger[:SEquence]:RFBurst:LEVel:ABSolute?
Example	TRIG:RFB:LEV:ABS 10 dBm sets the trigger level of the RF burst envelope signal to the absolute level of 10 dBm
Notes	Sending this command does not switch the setting from relative to absolute; to switch it you need to send the :TRIGger[:SEquence]:RFBurst:LEVel:TYPE command, below. Amplitude Corrections are not taken into account by the Absolute Trigger Level. For example, if you have given yourself effective gain with an amplitude correction factor, the Absolute Trigger will not fire until you have set the trigger level that far below the displayed signal level, rather than simply to the displayed signal level. This is only true for Amplitude Corrections, not External Gain or Ref Level Offset functions. If mode is Bluetooth, the default value is -50 dBm.
Couplings	This same level is used for the RF Burst trigger source in the Trigger menu, for the RF Burst selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the RF Burst selection in the Gate Source menu
Preset	-20 dBm
State Saved	Saved in instrument state
Min	-200 dBm
Max	100 dBm
Default Unit	depends on the current selected Y-Axis unit
Backwards Compatibility SCPI	:TRIGger[:SEquence]:FRAME:RFBurst:LEVel:ABSolute
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.04.00

Key Path	Trigger, RF Burst
Remote Command	:TRIGger[:SEquence]:RFBurst:LEVel:TYPE ABSolute RELative :TRIGger[:SEquence]:RFBurst:LEVel:TYPE?

Example	TRIG:RFB:LEV:TYPE REL sets the trigger level type of the RF burst trigger to Relative.
Preset	ABSolute
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.04.00

Trigger Slope

It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

Key Path	Trigger, RF Burst
Remote Command	:TRIGger[:SEquence]:RFBurst:SLOPe POSitive NEGative :TRIGger[:SEquence]:RFBurst:SLOPe?
Example	TRIG:RFB:SLOP NEG
Couplings	This same slope is used in the RF Burst selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu).
Preset	POSitive
State Saved	Saved in instrument state
Backwards Compatibility SCPI	:TRIGger[:SEquence]:FRAME:RFBurst:SLOPe
Backwards Compatibility Notes	The legacy :TRIGger[:SEquence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers.
Initial S/W Revision	Prior to A.02.00

Sync Holdoff

Sync Holdoff specifies the duration that the sync source signal must be kept false before the transition to true to be recognized as the sync timing. The periodic timer phase is aligned when the sync source signal becomes true, after the Holdoff time is satisfied.

A holdoff of 2 ms will work with most WiMAX signals, but there may be cases where the burst off duration is less than 1 ms and this value will need to be changed.

Key Path	Trigger, Periodic Timer
Remote Command	:TRIGger[:SEquence]:FRAME:SYNC:HOLDoff <time> :TRIGger[:SEquence]:FRAME:SYNC:HOLDoff? :TRIGger[:SEquence]:FRAME:SYNC:HOLDoff:STATe OFF ON 0 1 :TRIGger[:SEquence]:FRAME:SYNC:HOLDoff:STATe?
Preset	On, 1.000 ms

State Saved	Saved in instrument state
Min	0 ms
Max	+500 ms
Default Unit	s
Initial S/W Revision	Prior to A.02.00

Control Edge/Level

Sets the method of controlling the gating function from the gating signal.

Edge

In Edge triggering, the gate opens (after the Delay) on the selected edge (for example, positive) of the gate signal and closes on the alternate edge (for example, negative).

Level

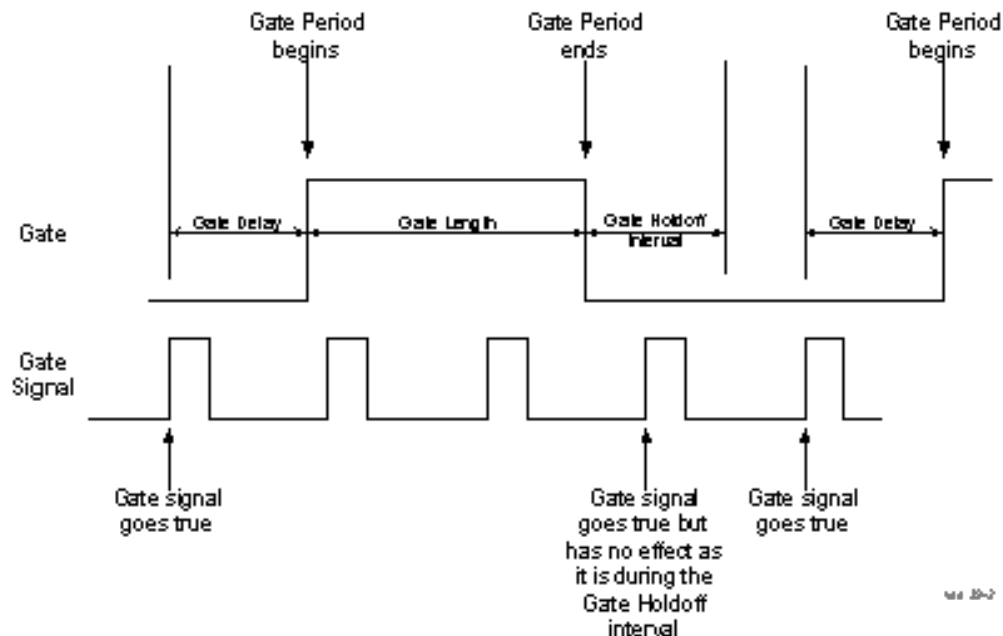
In Level triggering, the gate opens (after the Delay) when the gate signal has achieved a certain level and stays open as long as that level is maintained.

Key Path	Sweep/Control, Gate
Remote Command	[:SENSe] :SWEep:EGATe:CONTRol EDGE LEVe1 [:SENSe] :SWEep:EGATe:CONTRol?
Example	SWE:EGAT:CONT EDGE
Dependencies	If the Gate Method is FFT the Control key is grayed out and Edge is selected. If the Gate Source is TV, Frame or Line, the Control key is grayed out and Edge is selected.
Preset	EDGE
State Saved	Saved in instrument state
Backwards Compatibility SCPI	[:SENSe] :SWEep:TIME:GATE:TYPE ESA Compatibility
Initial S/W Revision	Prior to A.02.00

Gate Holdoff

Lets you increase or decrease the wait time after a gate event ends before the analyzer will respond to the next gate signal.

After any Gate event finishes, the analyzer must wait for the sweep system to settle before it can respond to another Gate signal. The analyzer calculates a "wait time," taking into account a number of factors, including RBW and Phase Noise Optimization settings. The goal is to achieve the same accuracy when gated as in ungated operation. The figure below illustrates this concept:



When Gate Holdoff is in Auto, the wait time calculated by the analyzer is used. When Gate Time is in Manual, the user may adjust the wait time, usually decreasing it in order to achieve greater speed, but at the risk of decreasing accuracy.

When the Method key is set to Video or FFT, the Gate Holdoff function has no effect.

In measurements that do not support Auto, the value shown when Auto is selected is “---” and the manually set holdoff is returned to a query.

Key Path	Sweep/Control, Gate
Remote Command	<pre>[:SENSe] :SWEep:EGATe:HOLDoff <time> [:SENSe] :SWEep:EGATe:HOLDoff? [:SENSe] :SWEep:EGATe:HOLDoff:AUTO OFF ON 0 1 [:SENSe] :SWEep:EGATe:HOLDoff:AUTO?</pre>
Example	<pre>SWE:EGAT:HOLD 0.0002 SWE:EGAT:HOLD? SWE:EGAT:HOLD:AUTO ON SWE:EGAT:HOLD:AUTO?</pre>
Couplings	<p>When Gate Holdoff is Auto, the Gate Holdoff key shows the value calculated by the analyzer for the wait time.</p> <p>Pressing the Gate Holdoff key while it is in Auto and not selected, causes the key to become selected and allows the user to adjust the value. If the value is adjusted, the setting changes to Man.</p> <p>Pressing the Gate Holdoff key, while it is in Auto and selected, does not change the value of Gate Holdoff, but causes the setting to change to Man. Now the user can adjust the value.</p> <p>Pressing the key while it is in Man and selected, cause the value to change back to Auto.</p> <p>Pressing the key while it is in Man and not selected, causes the key to become selected and allows the user to adjust the value.</p>

	When Method is set to Video or FFT, the Gate Holdoff function has no effect.
Preset	Auto Auto/On
State Saved	Saved in instrument state
Min	1 μ sec
Max	1 sec
Initial S/W Revision	Prior to A.02.00

Gate Delay Compensation

This function allows you to select an RBW-dependent value by which to adjust the gate delay, to compensate for changes in the delay caused by RBW effects.

You can select between uncompensated operation and two types of compensation, Delay Until RBW Settled and Compensate for RBW Group Delay.

See "[More Information](#)" on page 1342

Key Path	Sweep/Control, Gate
Scope	Meas Global
Remote Command	[:SENSe] :SWEep:EGATe:DELaY:COMPensation:TYPE OFF SETTled GDELaY [:SENSe] :SWEep:EGATe:DELaY:COMPensation:TYPE?
Example	SWE:EGAT:DEL:COMP:TYPE SETT SWE:EGAT:DEL:COMP:TYPE?
Notes	Although this function is Meas Global, there are some measurements that do not support this function. In those measurements the operation will be Uncompensated. Going into one of those measurements will not change the Meas Global selection; it will simply display the grayed-out menu key with "Uncompensated" showing as the selection. This is a non-forceful grayout, so the SCPI command is still accepted. If Gate Delay Compensation is not supported at all within a particular mode, the key is not displayed, and if the SCPI command is sent while in a measurement within that mode, an "Undefined Header" message is generated. Measurements that do not support this function include: Swept SA
Preset	TD-SCDMA mode: Compensate for RBW Group Delay All other modes: Delay Until RBW Settled
State Saved	Saved in instrument state
Range	Uncompensated Delay Until RBW Settled Compensate for RBW Group Delay
Readback text	Uncompensated Settled Group Delay
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.11.0

More Information

Selecting Uncompensated means that the actual gate delay is as you sets it.

Selecting Delay Until RBW Settled causes the gate delay to be increased above the user setting by an amount equal to $3.06/\text{RBW}$. This compensated delay causes the GATE START and GATE STOP lines on the display to move by the compensation amount, and the actual hardware gate delay to be increased by the same amount. All the other gate lines (for example, MIN FAST) are unaffected. If the RBW subsequently changes, the compensation is readjusted for the new RBW. The value shown on the Gate Delay key does NOT change.

Delay Until RBW Settled allows excellent measurements of gated signals, by allowing the IF to settle following any transient that affects the burst. Excellent measurements also require that the analysis region not extend into the region affected by the falling edge of the burst. Thus, excellent measurements can only be made over a width that declines with narrowing RBWs, which is achieved by decreasing the gate length below the user setting by an amount equal to $2.53/\text{RBW}$. Therefore, for general purpose compensation, you will still want to change the gate length with changes in RBW even if the gate delay is compensated. The compensated Gate Length is limited by the analyzer so that it will never go below 10% of the value shown on the Gate Length key, as otherwise the sweep times could get very long. Anytime the Gate Length and RBW values combine in such a way that this limiting takes place, a warning is displayed. For measurements which contain multiple sweeps with different RBW like SEM and SPUR, the smallest RBW is used for this limiting.

Selecting Compensate for RBW Group Delay causes the gate delay to be increased above the user setting by an amount equal to $1.81/\text{RBW}$. This compensated delay causes the GATE START, GATE STOP lines on the display to move by the compensation amount, and the actual hardware gate delay to be increased by the same amount. All the other gate lines (for example, MIN FAST) are unaffected. If the RBW subsequently changes, the compensation is readjusted for the new RBW. The value shown on the Gate Delay key does NOT change. Compensate for RBW Group Delay also includes gate length compensation; the gate length itself is adjusted as necessary to attempt to compensate for delay effects imposed by the RBW.

Compensate for RBW Group Delay is similar to Delay Until RBW Settled, but compensates for the group delay of the RBW filter, rather than the filter settling time. As the RBW gets narrow, this can allow the settling tail of the RBW to affect the beginning part of the gated measurement, and allow the beginning of the RBW settling transient to affect the end of the gated measurement. These two effects are symmetric because the RBW response is symmetric. Because the gate length is not automatically compensated, some users might find this compensation to be more intuitive than compensation for RBW settling.

Min Fast Position Query (Remote Command Only)

This command queries the position of the MIN FAST line, relative to the delay reference (REF) line. See section ["Gate View On/Off" on page 1314](#). If this query is sent while not in gate view, the MinFast calculation is performed based on the current values of the appropriate parameters and the result is returned. Knowing this value lets you set an optimal gate delay value for the current measurement setup.

Remote Command	<code>[:SENSe] :SWEep:EGATe:MINFast?</code>
Example	<code>SWE:EGAT:MIN?</code>
Initial S/W Revision	Prior to A.02.00

Gate Preset (Remote Command Only)

Presets the time-gated spectrum analysis capability.

This command sets gate parameter values to the ESA preset values, as follows:

Gate trigger type = edge

Gate polarity = positive

Gate delay = 1 us

Gate length = 1 us

Remote Command	<code>[[:SENSe]:SWEep:TIME:GATE:PRESet</code> ESA Compatibility
Initial S/W Revision	Prior to A.02.00

Gate Level (Remote Command Only)

Sets the gate input transition point level for the external TRIGGER inputs on the front and rear panel. This is a legacy command for PSA compatibility. It is simply an alias to the equivalent trigger level command.

Remote Command	<code>[[:SENSe]:SWEep:EGATE:EXTernal[1] 2:LEVel <voltage></code> <code>[[:SENSe]:SWEep:EGATE:EXTernal[1] 2:LEVel?</code>
Notes	This command is simply an alias to <code>:TRIGger[:SEQUence]:EXTernal[1] 2:LEVel</code> For details refer
Initial S/W Revision	Prior to A.02.00

Gate Polarity (Remote Command Only)

Sets the polarity for the gate signal. This setup is now done using the gate trigger's slope setting.

When Positive (Pos) is selected, a positive-going edge (Edge) or a high voltage (Level) will satisfy the gate condition, after the delay set with the Gate Delay key. When Negative (Neg) is selected, a negative-going edge (Edge) or a low voltage (Level) will satisfy the gate condition after the delay.

Remote Command	<code>[[:SENSe]:SWEep:EGATE:POLarity</code> NEGative POSitive <code>[[:SENSe]:SWEep:EGATE:POLarity?</code>
Example	<code>SWE:EGAT:POL NEG</code> <code>SWE:EGAT:POL?</code>
Preset	POSitive
State Saved	Saved in instrument state
Backwards Compatibility SCPI	<code>[[:SENSe]:SWEep:TIME:GATE:POLarity</code> ESA compatibility
Initial S/W Revision	Prior to A.02.00

Remote Command	<code>[:SENSe] :SWEep:TIME:GATE:LEVel HIGH LOW</code> <code>[:SENSe] :SWEep:TIME:GATE:LEVel?</code> ESA compatibility
Preset	HIGH
Initial S/W Revision	Prior to A.02.00

Points

Sets the number of points per sweep. The resolution of setting the sweep time depends on the number of points selected. If Preset is selected, the number of points per sweep defaults to 1001. The current value of points is displayed parenthetically, next to the sweep time in the lower right corner of the display.

Key Path	Sweep/Control
Mode	All except SA and BASIC
Remote Command	<code>[:SENSe] :MONitor:SWEep:POINts <integer></code> <code>[:SENSe] :MONitor:SWEep:POINts?</code>
Example	<code>:MON:SWE:POIN 1000</code> <code>:MON:SWE:POIN?</code>
Couplings	Whenever the number of sweep points changes, the sweep time is re-quantized.
Preset	1001
State Saved	Saved in instrument state.
Range	1 to 20001
Min	1
Max	20001
Initial S/W Revision	Prior to A.02.00

System

See "System" on page 326

Trace/Detector

Accesses a menu that enables you to control the display, storage, detection and manipulation of trace data. Each trace is comprised of a series of data points in which X and Y axis information is stored. The analyzer updates the information for the active trace with each sweep of the current measurement.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Select Trace

Allows you to select which trace you want to use for the current measurement. You can select one of three traces. Monitor Spectrum supports 3 traces, numbered 1 through 3.

Key Path	Trace/Detector
Mode	All except SA and BASIC
Preset	Trace 1
State Saved	The number of the selected trace is saved in Instrument State
Initial S/W Revision	Prior to A.02.00

Trace Type

Allows you to select the type of trace you want to use for the current measurement. You can assign a trace type to one of the three available traces.

The first page of this menu contains a 1-of-N selection of the trace type for the selected trace:

WRITe	Clear Write
AVERAge	Average
MAXHold	Max Hold
MINHold	Min Hold

Key Path	Trace/Detector
Mode	All except SA and BASIC
Remote Command	:TRACe[1] 2 3:MONitor:TYPE WRITe AVERAge MAXHold MINHold :TRACe[1] 2 3:MONitor:TYPE?
Example	TRAC:MON:TYPE WRIT TRAC:MON:TYPE?
Preset	WRITe
State Saved	Saved in instrument state.

Range	WRITE AVERage MAXHold MINHold for traces 1 through 3
Backwards Compatibility SCPI	:DISPlay:MONitor:VIEW:WINDow:TRACe [1] 2 3 :TYPE
Initial S/W Revision	Prior to A.02.00

Update

Toggles a trace state between Update and Off. The Off selection makes the trace inactive (or a *stored trace*). This does not affect whether the trace is visible or not. To change the trace visibility, see "[Display](#)" on page 1347.

Key Path	Trace/Detector
Mode	All except SA and BASIC
Remote Command	:TRACe [1] 2 3 :MONitor:UPDate [:STATe] ON OFF 0 1 :TRACe [1] 2 3 :MONitor:UPDate [:STATe] ?
Example	TRAC3:MON:UPD OFF TRAC3:MON:UPD?
Preset	ON
State Saved	Saved in instrument state.
Range	On Off(View)
Initial S/W Revision	Prior to A.02.00

Display

Controls the visibility of a trace. When set to Blank, traces do not display nor appear on printouts but are otherwise unaffected. They may be queried and markers may be placed on them.

Key Path	Trace/Detector
Mode	All except SA and BASIC
Remote Command	:TRACe [1] 2 3 :MONitor:DISPlay [:STATe] ON OFF 0 1 :TRACe [1] 2 3 :MONitor:DISPlay [:STATe] ?
Example	TRAC:MON:DISP ON TRAC:MON:DISP?
Preset	ON OFF OFF
State Saved	Saved in instrument state.
Range	Show Blank
Initial S/W Revision	Prior to A.02.00

Detector

Accesses a menu of functions that enable you to control the detectors for the current measurement. The following choices are available:

- **Auto** – the detector selected depends on marker functions, trace functions, average type, and the trace averaging function. See "[Auto](#)" on page 1349.
- **Normal** – the detector determines the peak of the CW-like signals, and it yields alternating maximums and minimums of noise-like signals. This is also referred to as Rosenfell detection.
- **Average** – the detector determines the average of the signal within the sweep points. The averaging method depends upon the Average Type selection (voltage, power or log scales).
- **Peak** – the detector determines the maximum of the signal within the sweep points.
- **Sample** – the detector indicates the instantaneous level of the signal at the center of the sweep points represented by each display point.
- **Negative Peak** – the detector determines the minimum of the signal within the sweep points.

In swept analysis, the time interval of the data collection for the display sweep points also represents a frequency interval. In FFT analysis, the sweep points represent just a frequency interval. The detector determines the relationship between the spectrum computed by the FFT and the single data point displayed for the sweep points.

Key Path	Trace/Detector
Mode	All except SA and BASIC
Remote Command	<code>[:SENSe] :MONitor:DETEctor:TRACe AVERage NEGative NORMal POSitive SAMPle [:SENSe] :MONitor:DETEctor:TRACe?</code>
Example	<code>MON:DET:TRAC NORM MON:DET:TRAC?</code>
Notes	The query returns a name that corresponds to the detector type as shown below. String Returned - Definition <ul style="list-style-type: none"> • NORM - Normal • AVER - Average • POS - Peak • SAMP - Sample • NEG - Negative Peak
Couplings	When the Detector choice is Auto, the detector selected depends on average type.
Preset	NORMal
State Saved	Saved in instrument state.
Range	Normal Average(RMS) Peak Sample Negative Peak
Backwards Compatibility SCPI	<code>[:SENSe] :MONitor:DETEctor [:FUNction]</code>
Initial S/W Revision	Prior to A.02.00

Auto

Sets the detector for the currently selected trace to Auto. When the detector choice is Auto, the analyzer selects the detector. The selected detector depends on marker functions, trace functions, and trace averaging functions for the current measurement.

Key Path	Trace/DetectorTrace/Detector, Detector
Mode	All except SA and BASIC
Remote Command	<code>[:SENSe] :MONitor :DETECTOR :AUTO ON OFF 1 0</code> <code>[:SENSe] :MONitor :DETECTOR :AUTO ?</code>
Example	<code>MON:DET:AUTO OFF</code> <code>MON:DET:AUTO ?</code>
Couplings	When the Detector choice is Auto, the detector selected depends on average state and trace type.
Preset	ON
State Saved	Saved in instrument state.
Range	Auto Man
Initial S/W Revision	Prior to A.02.00

Clear Trace

Clears the selected trace from the display.

Key Path	Trace/Detector
Mode	All except SA and BASIC
Remote Command	<code>:TRACe :MONitor :CLEAr [TRACE1] TRACE2 TRACE3</code>
Example	<code>TRAC:MON:CLE</code>
Initial S/W Revision	Prior to A.02.00

Mode	All except SA and BASIC
Remote Command	<code>:DISPlay :MONitor :VIEW :WINDow :TRACe [1] 2 3 :CLEAr</code>
Example	<code>DISP:MON:VIEW:WIND:TRAC:CLE</code>
Initial S/W Revision	Prior to A.02.00

Clear All Traces

Clears all traces from the display.

Key Path	Trace/Detector
Mode	All except SA and BASIC

Remote Command	:TRACe:MONitor:CLEar:ALL
Example	TRAC:MON:CLE:ALL
Backwards Compatibility SCPI	:DISPlay:MONitor:VIEW:WINDow:TRACe:CLEar:ALL
Initial S/W Revision	Prior to A.02.00

Trigger

See "Trigger" on page 408

Free Run

See "Free Run " on page 415

Video

See "Video (IF Envelope) " on page 416

Trigger Level

See "Trigger Level " on page 416

Trig Slope

See "Trig Slope " on page 417

Trig Delay

See "Trig Delay " on page 418

Line

See "Line " on page 1321

Trig Slope

See "Trig Slope " on page 1321

Trig Delay

See "Trig Delay " on page 420

External 1

See "External 1 " on page 1333

Trigger Level

See "Trigger Level " on page 1333

Trig Slope

See "Trig Slope " on page 1334

Trig Delay

See "Trig Delay " on page 423

External 2

See "External 2 " on page 1335

Trigger Level

See ["Trigger Level "](#) on page 1335

Trig Slope

See ["Trig Slope "](#) on page 1336

Trig Delay

See ["Trig Delay "](#) on page 425

RF Burst

See ["RF Burst "](#) on page 1336

Absolute Trigger

See ["Absolute Trigger Level"](#) on page 1337

Relative Trigger

See ["Relative Trigger Level"](#) on page 1326

Trig Slope

See ["Trigger Slope "](#) on page 1338

Trig Delay

See ["Trig Delay "](#) on page 429

Periodic Timer

See ["Periodic Timer \(Frame Trigger\) "](#) on page 1328

Period

See ["Period "](#) on page 1329

Offset

See ["Offset "](#) on page 1330

Reset Offset Display

See ["Reset Offset Display "](#) on page 1332

Sync Source

See ["Sync Source "](#) on page 1332

Off

See ["Off "](#) on page 1333

External 1

See "External 1 " on page 1333

Trigger Level

See "Trigger Level " on page 1333

Trig Slope

See "Trig Slope " on page 1334

External 2

See "External 2 " on page 1335

Trigger Level

See "Trigger Level " on page 1335

Trig Slope

See "Trig Slope " on page 1336

RF Burst

See "RF Burst " on page 1336

Absolute Trigger

See "Absolute Trigger Level" on page 1337

Trig Slope

See "Trigger Slope " on page 1338

Trig Delay

See "Trig Delay" on page 440

Auto/Holdoff

See "Auto/Holdoff " on page 440

Auto Trig

See "Auto Trig " on page 441

Trig Holdoff

See "Trig Holdoff " on page 441

Holdoff Type

See "Holdoff Type" on page 442

User Preset

Accesses a menu that gives you the following three choices:

- User Preset – recalls a state previously saved using the Save User Preset function.
- User Preset All Modes – presets all of the modes in the analyzer
- Save User Preset– saves the current state for the current mode

Key Path	Front-panel key
Backwards Compatibility Notes	<p>User Preset is actually loading a state, and in legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, “state” always includes all of this data; so whenever state is loaded, or User Preset is executed, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p> <p>On ESA and PSA, User Preset affected the entire instrument’s state. In the X-Series, User Preset only recalls the state for the active mode. There is a User Preset file for each mode. User Preset can never cause a mode switch as it can in legacy analyzers. If you want to recall all modes to their user preset file state, you will need to do a User Preset after mode switching into each mode.</p> <p>User Preset recalls mode state which can now include data like traces; whereas on ESA and PSA, User Preset did not affect data.</p>
Initial S/W Revision	Prior to A.02.00

User Preset

User Preset sets the state of the currently active mode back to the state that was previously saved for this mode using the Save User Preset menu key or the SCPI command, SYST:PRES:USER:SAV. It not only recalls the Mode Preset settings, but it also recalls all of the mode persistent settings, and the Input/Output system setting that existed at the time Save User Preset was executed.

If a Save User Preset has not been done at any time, User Preset recalls the default user preset file for the currently active mode. The default user preset files are created if, at power-on, a mode detects there is no user preset file. There will never be a scenario when there is no user preset file to restore. For each mode, the default user preset state is the same state that would be saved if a Save User Preset is performed in each mode right after doing a Restore Mode Default and after a Restore Input/Output Defaults.

The User Preset function does the following:

- Aborts the currently running measurement.
- Sets the mode State to the values defined by Save User Preset.
- Makes the saved measurement for the currently running mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

Key Path	User Preset
Remote Command	:SYSTem:PRESet:USER
Example	:SYST:PRES:USER:SAVE:SYST:PRES:USER
Notes	:SYST:PRES:USER:SAVE is used to save the current state as the user preset state. Clears all pending OPC bits. The Status Byte is set to 0. Pressing the User Preset front-panel key while already in the User Preset menu will cause the User Preset to get executed
Couplings	A user preset will cause the currently running measurement to be aborted and cause the saved measurement to be active. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved.
Initial S/W Revision	Prior to A.02.00

User Preset All Modes

Recalls all of the User Preset files for each mode, switches to the power-on mode, and activates the saved measurement from the power-on mode User Preset file.

NOTE

When the instrument is secured, all of the user preset files are converted back to their default user preset files.

The User Preset function does the following:

- Aborts the currently running measurement.
- Switches the Mode to the power-on mode.
- Restores the User Preset files for each mode.
- Makes the saved measurement for the power-on mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

Key Path	User Preset
Remote Command	:SYSTem:PRESet:USER:ALL
Example	:SYST:PRES:USER:SAVE:SYST:PRES:USER:ALL
Notes	Clears all pending OPC bits. The Status Byte is set to 0. :SYST:PRES:USER:SAVE is used to save the current state as the user preset state.
Couplings	A user preset will cause the currently running measurement to be aborted, cause a mode switch to the power-on mode, and cause the saved measurement to be active in the power-on mode. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved.
Initial S/W Revision	Prior to A.02.00

Save User Preset

Saves the currently active mode and its State. You can recall this User Preset file by pressing the User Preset menu key or sending the SYST:PRES:USER remote command. This same state is also saved by the Save State function.

Key Path	User Preset
Remote Command	:SYSTem:PRESet:USER:SAVE
Example	:SYST:PRES:USER:SAVE
Notes	:SYST:PRES:SAVE creates the same file as if the user requested a *SAV or a MMEM:STOR:STAT, except User Preset Save does not allow the user to specify the filename or the location of the file.
Initial S/W Revision	Prior to A.02.00

View/Display

The View/Display key opens the Display Menu (common to most measurements) and the View menu for the current measurement.

Some measurements have simple View menus, or even no View menu, others provide many different Views.

Views are different ways of looking at data, usually different ways of looking at the same data, often when the data represents a time record that is being digitally processed with an FFT and/or other digital signal processing algorithms.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Display

The Display menu is common to most measurements, and is used for configuring items on the display. Some Display menu settings apply to all the measurements in a mode, and some only to the current measurement. Those under the System Display Settings key apply to all measurements in all modes.

Key Path	Display
Key Path	View/Display
Initial S/W Revision	Prior to A.02.00

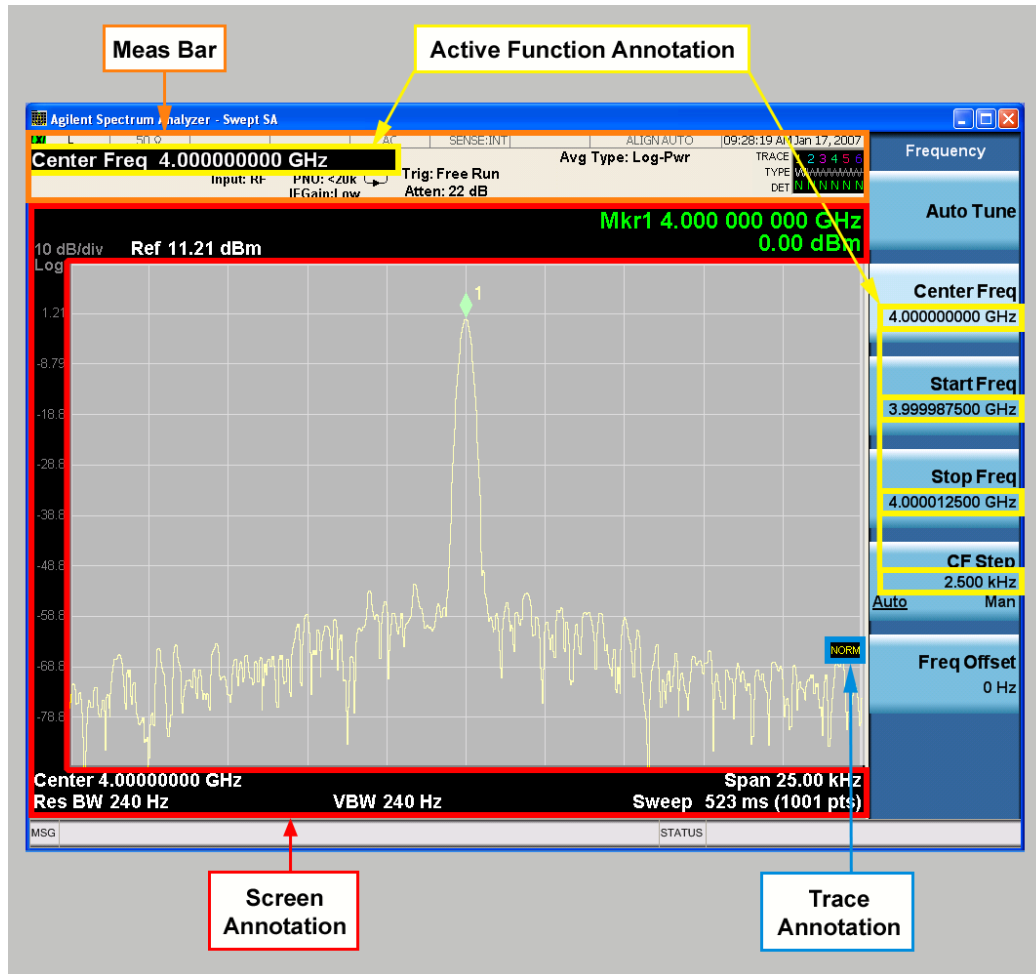
Annotation

Turns on and off various parts of the display annotation. The annotation is divided up into four categories:

1. Meas Bar: This is the measurement bar at the top of the screen. It does not include the settings panel or the Active Function. Turning off the Meas Bar turns off the settings panel and the Active Function. When the Meas Bar is off, the graticule area expands to fill the area formerly occupied by the Meas Bar.
2. Screen Annotation: this is the annotation and annunciation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) This does NOT include the marker number or the N dB result. When off, the graticule expands to fill the entire graticule area.
3. Trace annotation: these are the labels on the traces, showing their detector (or their math mode).
4. Active Function annotation: this is the active function display in the meas bar, and all of the active function values displayed on softkeys.

See the figure below. Each type of annotation can be turned on and off individually.

12 Monitor Spectrum Measurement
View/Display



Key Path	View/Display, Display
Initial S/W Revision	Prior to A.02.00

Meas Bar On/Off

This function turns the Measurement Bar on and off, including the settings panel. When off, the graticule area expands to fill the area formerly occupied by the Measurement Bar.

Key Path	View/Display, Display, Annotation
Remote Command	:DISPlay:ANNOtation:MBAR[:STATe] OFF ON 0 1 :DISPlay:ANNOtation:MBAR[:STATe]?
Example	DISP:ANN:MBAR OFF
Dependencies	Grayed out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset	On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off.
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Screen

This controls the display of the annunciation and annotation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) and the y-axis annotation. This does NOT include marker annotation (or the N dB result). When off, the graticule expands to fill the entire graticule area, leaving only the 1.5% gap above the graticule as described in the Trace/Detector chapter.

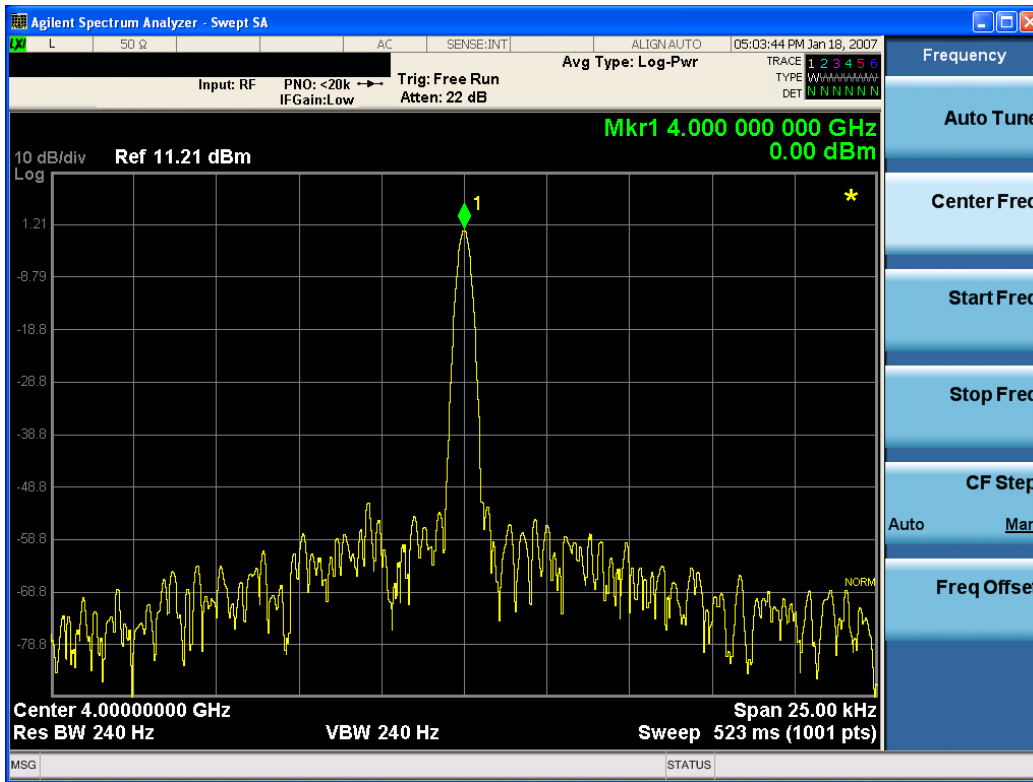
Key Path	View/Display, Display, Annotation
Remote Command	:DISPlay:ANNotation:SCReen[:STATe] OFF ON 0 1 :DISPlay:ANNotation:SCReen[:STATe]?
Example	DISP:ANN:SCR OFF
Dependencies	Grayed-out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset	On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Active Function Values On/Off

Turns on and off the active function display in the Meas Bar, and all of the active function values displayed on the softkeys.

Note that all of the softkeys that have active functions have these numeric values blanked when this function is on. This is a security feature..

12 Monitor Spectrum Measurement View/Display



Key Path	View/Display, Display, Annotation
Remote Command	:DISPlay:ACTivefunc[:STATE] ON OFF 1 0 :DISPlay:ACTivefunc[:STATE] ?
Example	DISP:ACT OFF
Dependencies	Grayed out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset	On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Title

Displays menu keys that enable you to change or clear a title on your display.

Key Path	View/Display, Display
Initial S/W Revision	Prior to A.02.00

Change Title

Writes a title into the "measurement name" field in the banner, for example, "Swept SA".

Press Change Title to enter a new title through the alpha editor. Press Enter or Return to complete the entry. Press ESC to cancel the entry and preserve your existing title.

The display title will replace the measurement name. It remains for this measurement until you press Change Title again, or you recall a state, or a Preset is performed. A title can also be cleared by pressing Title, Clear Title.

NOTE

Notice the inclusion of the <measurement> parameter in the command below. Because each measurement remembers the Display Title, the command must be qualified with the measurement name. For the Swept SA measurement this is not the case; no <measurement> parameter is used when changing the Display Title for the Swept SA measurement.

Key Path	View/Display, Display, Title
Mode	All
Remote Command	:DISPlay:<measurement>:ANNotation:TITLe:DATA <string> :DISPlay:<measurement>:ANNotation:TITLe:DATA?
Example	DISP:ANN:TITL:DATA "This Is My Title" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "This Is My Title" This example is for Measurements other than Swept SA. Both set the title to: This Is My Title
Notes	Pressing this key cancels any active function. When a title is edited the previous title remains intact (it is not cleared) and the cursor goes at the end so that characters can be added or BKSP can be used to go back over previous characters.
Preset	No title (measurement name instead)
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Clear Title

Clears a title from the front-panel display. Once cleared, the title cannot be retrieved. After the title is cleared, the current Measurement Name replaces it in the title bar.

Key Path	View/Display, Display, Title
Example	The following commands clear the title and restore the measurement's original title: DISP:ANN:TITL:DATA "" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "" This example is for ACP; in measurements other than Swept SA the measurement name is required.
Notes	Uses the :DISPlay:<measurement>:ANNotation:TITLe:DATA <string> command with an empty string (in the Swept SA, the <measurement> is omitted).
Preset	Performed on Preset.
Initial S/W Revision	Prior to A.02.00

Graticule

Pressing Graticule turns the display graticule On or Off. It also turns the graticule y-axis annotation on and off.

Key Path	View/Display, Display
Remote Command	:DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe] OFF ON 0 1 :DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe]?
Example	DISP:WIND:TRAC:GRAT:GRID OFF
Notes	The graticule is the set of horizontal and vertical lines that make up the grid/divisions for the x-axis and y-axis.
Preset	On
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00

System Display Settings

These settings are "Mode Global" – they affect all modes and measurements and are reset only by Restore Misc Defaults or Restore System Defaults under System.

Key Path	View/Display, Display
Initial S/W Revision	Prior to A.02.00

Annotation Local Settings

This is a Mode Global override of the meas local annotation settings. When it is All Off, it forces ScreenAnnotation, Meas Bar, Trace, and Active Function Values settings to be OFF for all measurements in all modes. This provides the security based "annotation off" function of previous analyzers; hence it uses the legacy SCPI command.

When it is All Off, the Screen, Meas Bar, Trace, and Active Function Values keys under the Display, Annotation menu are grayed out and forced to Off. When Local Settings is selected, you are able to set the local annotation settings on a measurement by measurement basis.

Key Path	View/Display, Display, System Display Settings
Remote Command	:DISPlay:WINDow[1]:ANNOtation[:ALL] OFF ON 0 1 :DISPlay:WINDow[1]:ANNOtation[:ALL]?
Example	:DISP:WIND:ANN OFF
Preset	On (Set by Restore Misc Defaults)
State Saved	Not saved in instrument state.
Backwards Compatibility Notes	The WINDow parameter and optional subopcode is included for backwards compatibility but ignored – all windows are equally affected.
Initial S/W Revision	Prior to A.02.00

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

Key Path	Save, Screen Image
Remote Command	:MMEMory:STORe:SCReen:THEMe TDColor TDMonochrome FCOLOR FMONochrome :MMEMory:STORe:SCReen:THEMe?
Example	:MMEM:STOR:SCR:THEM TDM
Preset	3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes.
Readback	3D Color 3D Mono Flat Color Flat Mono
Backwards Compatibility Notes	In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical.
Initial S/W Revision	Prior to A.02.00

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDC
Readback	3D Color
Initial S/W Revision	Prior to A.02.00

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDM
Readback	3D Mono
Initial S/W Revision	Prior to A.02.00

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FCOL
Readback	Flat Color
Initial S/W Revision	Prior to A.02.00

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FMON
Readback	Flat Mono
Initial S/W Revision	Prior to A.02.00

Backlight

Accesses the display backlight on/off keys. This setting may interact with settings under the Windows "Power" menu.

When the backlight is off, pressing ESC, TAB, SPACE, ENTER, UP, DOWN, LEFT, RIGHT, DEL, BKSP, CTRL, or ALT turns the backlight on without affecting the application. Pressing any other key will turn backlight on and could potentially perform the action as well.

Key Path	View/Display, Display, System Display Settings
Remote Command	:DISPlay:BACKlight ON OFF :DISPlay:BACKlight?
Preset	ON (Set by Restore Misc Defaults)
Initial S/W Revision	Prior to A.02.00

Backlight Intensity

An active function used to set the backlight intensity. It goes from 0 to 100 where 100 is full on and 0 is off. This value is independent of the values set under the Backlight on/off key.

Key Path	View/Display, Display, System Display Settings
Remote Command	:DISPlay:BACKlight:INTensity <integer> :DISPlay:BACKlight:INTensity?
Example	DISP:BACK:INT 50

Preset	100 (Set by Restore Misc Defaults)
Min	0
Max	100
Initial S/W Revision	Prior to A.02.00

13 Waveform Measurement

The waveform measurement is a generic measurement for viewing the input signal waveforms in the time domain. This measurement represents how the instrument performs the zero span functionality found in traditional spectrum analyzers. For more details, see ["Waveform Measurement Description" on page 1370](#) below.

This topic contains the following sections:

["Measurement Commands for Waveform" on page 1368](#)

["Remote Command Results for the Waveform Measurement" on page 1369](#)

Measurement Commands for Waveform

The general functionality of CONFigure, INITiate, FETCh, MEASure, and READ are described at this section.

:CONFigure:WAVeform

:CONFigure:WAVeform:NDEFault

:INITiate:WAVeform

:FETCh:WAVeform[n]?

:MEASure:WAVeform[n]?

:READ:WAVeform[n]?

For more measurement related commands, see the SENSE subsystem, and the section "[Remote Measurement Functions](#)" on page 2301.

Remote Command Results for the Waveform Measurement

The following table denotes the returned results from the FETCh|MEASure|READ commands:

n	Results Returned
0	Returns unprocessed I/Q trace data, as a series of trace point values, in volts. The I values are listed first in each pair, using the 0 through even-indexed values. The Q values are the odd-indexed values.
1	<p>Returns the following scalar results:</p> <ol style="list-style-type: none"> 1. Sample Time is a floating point number representing the time between samples when using the trace queries (n=0, 2, and so forth). 2. Mean Power is the mean power (in dBm). This is the power across the entire trace. If averaging is on, the power is for the latest acquisition. 3. Mean Power Averaged is the power (in dBm) for N averages, if averaging is on. This is the power across the entire trace. If averaging is on, the power is for the latest acquisition. If averaging is off, the value of the mean power averaged is the same as the value of the mean power. 4. Number of samples is the number of data points in the captured signal. This number is useful when performing a query on the signal (i.e. when n=0, 2, etc.). 5. Peak-to-mean ratio has units of dB. This is the ratio of the maximum signal level to the mean power. Valid values are only obtained with averaging turned off. If averaging is on, the peak-to-mean ratio is calculated using the highest peak value, rather than the displayed average peak value. 6. Maximum value is the maximum of the most recently acquired data (in dBm). 7. Minimum value is the minimum of the most recently acquired data (in dBm).
2	Returns trace point values of the entire captured signal envelope trace data. These data points are floating point numbers representing the power of the signal (in dBm). There are N data points, where N is the number of samples. The period between the samples is defined by the sample time.

Waveform Measurement Description

Also available under the basic Waveform measurement is an I/Q window, which shows the I and Q signal waveforms in parameters of voltage versus time to disclose the voltages that comprise the complex modulated waveform of a digital signal.

The waveform measurement can also be used to perform general purpose power measurements to a high degree of accuracy.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

AMPTD Y Scale

Accesses a menu of functions that enable you to set the vertical scale parameters.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Ref Value

Sets the absolute power reference value. However, since Auto Scaling is defaulted to On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.

This functionality depends on the selected view:

- ["Ref Value \(RF Envelope View\)" on page 1371](#)
- ["Ref Value \(I/Q Waveform View\)" on page 1372](#)

Ref Value (RF Envelope View)

Sets the Y Scale reference value (in dBm) when the RF Envelope View is active. By default, the measurement determines the reference value with Auto Scaling. Entering a reference value manually turns Auto Scaling off.

Key Path	AMPTD Y Scale
Mode	BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN,LTEATDD, LTEAFDD
Remote Command	:DISPlay:WAVeform:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <ampl> :DISPlay:WAVeform:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel?
Example	DISP:WAV:VIEW:WIND:TRAC:Y:RLEV -50 dBm DISP:WAV:VIEW:WIND:TRAC:Y:RLEV?
Notes	You must be in the mode that includes Waveform measurement to use this command. Use INSTRument:SElect to set the mode.
Couplings	When Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.
Preset	10.00 dBm
State Saved	Saved in instrument state.
Range	-250.00 dBm to 250.00 dBm
Min	-250.00 dBm
Max	250.00 dBm
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Ref Value (I/Q Waveform View)

Sets the Y Scale reference value (in volts) when the I/Q Waveform View is active. By default, the measurement determines the reference value with Auto Scaling. Entering a reference value manually turns Auto Scaling off.

Key Path	AMPTD Y Scale
Mode	BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDB-T, CMMB, LTE, LTETDD, DCATV, WLAN, LTEATDD, LTEAFDD
Remote Command	:DISPlay:WAVeform:VIEW2:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <voltage> :DISPlay:WAVeform:VIEW2:WINDow[1]:TRACe:Y[:SCALe]:RLEVel?
Example	DISP:WAV:VIEW2:WIND:TRAC:Y:RLEV 25 V DISP:WAV:VIEW2:WIND:TRAC:Y:RLEV?
Notes	You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode.
Couplings	When Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.
Preset	0 V
State Saved	Saved in instrument state.
Min	-250 V
Max	250 V
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Attenuation

This menu controls the attenuator functions and interactions between the attenuation system components.

There are two attenuator configurations in the X-Series. One is a dual attenuator configuration consisting of a mechanical attenuator and an optional electronic attenuator. The other configuration uses a single attenuator with combined mechanical and electronic sections that controls all the attenuation functions. Different models in the X-Series come with different configurations.

See ["Dual Attenuator Configurations:" on page 1373](#)

See ["Single Attenuator Configuration:" on page 1373](#)

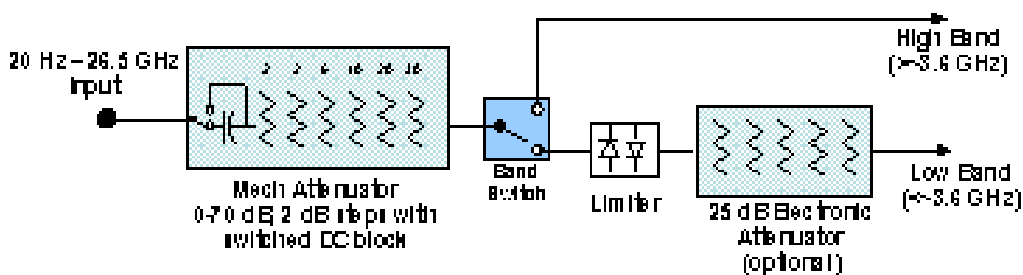
Most Attenuation settings are the same for all measurements – they do not change as you change measurements. Settings like these are called “Meas Global” and are unaffected by Meas Preset.

Key Path	AMPTD Y Scale
Scope	Meas Global
Dependencies	In measurements that support the I/Q inputs, this key is unavailable when I/Q is the selected input, and is replaced by the Range key in that case.

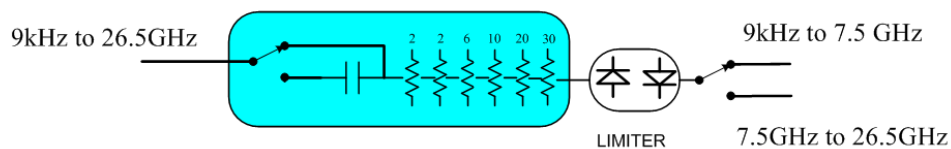
Readback Line	Contains a summary in [] brackets of the current total attenuation. See the descriptions of the , " (Mech) Atten " on page 2242, and "Enable Elec Atten" on page 2244 keys for more detail on the contributors to the total attenuation. Note that when "Pre-Adjust for Min Clip" is on, this value can change at the start of every measurement.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Dual Attenuator Configurations:

Configuration 1: Mechanical attenuator + optional electronic attenuator

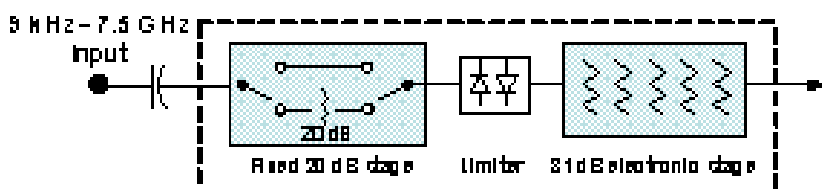


Configuration 2: Mechanical attenuator, no optional electronic attenuator

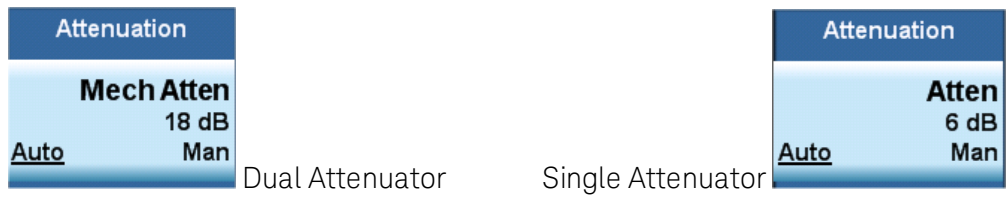


(note that Configuration 2 is not strictly speaking a dual-section attenuator, since there is no electronic section available. However, it behaves exactly like Configuration 1 without the Electronic Attenuator option EA3, therefore for the sake of this document it is grouped into the "Dual Attenuator" configuration)

Single Attenuator Configuration:



You can tell which attenuator configuration you have by pressing the Attenuation key, which (in most Modes) opens the Attenuation menu. If the first key in the Attenuation menu says Mech Atten you have the dual attenuator configuration. If the first key says Atten you have the single attenuator configuration.



In the single attenuator configuration, you control the attenuation with a single control, as the fixed stage has only two states. In the dual attenuator configuration, both stages have significant range so you are given separate control of the mechanical and electronic attenuator stages.

When you have the dual attenuator configuration, you may still have only a single attenuator, because unless option EA3 (the Electronic Attenuator option) is available, and you purchase it, you will have only the mechanical attenuator.

(Mech) Atten

This key is labeled Mech Atten in dual attenuator models and Atten in single attenuator models. In the dual attenuator configuration, this key only affects the mechanical attenuator.

This key lets you modify the attenuation applied to the RF input signal path. This value is normally auto coupled to the Ref Level, the Internal Preamp Gain, any External Gain that is entered, and the Max Mixer Level, as described in the table below.

See ["Attenuator Configurations and Auto/Man" on page 1375](#)

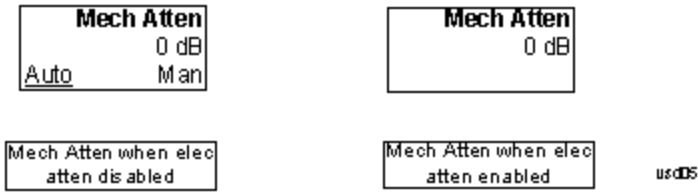
Key Path	AMPTD Y Scale, Attenuation
Remote Command	<pre>[:SENSe]:POWer[:RF]:ATTenuation <rel_ampl> [:SENSe]:POWer[:RF]:ATTenuation? [:SENSe]:POWer[:RF]:ATTenuation:AUTO OFF ON 0 1 [:SENSe]:POWer[:RF]:ATTenuation:AUTO?</pre>
Example	<p>POW:ATT 20</p> <p>Dual attenuator configuration: sets the mechanical attenuator to 20 dB</p> <p>Single attenuator mode: sets the main attenuation to 20 dB (see below for definition of “main” attenuation).</p> <p>If the attenuator was in Auto, it sets it to Manual.</p>
Dependencies	<p>Some measurements do not support the Auto setting of (Mech) Atten. In these measurements, the Auto/Man selection is not available, and the Auto/Man line on the key disappears.</p> <p>In dual attenuator configurations, when the electronic attenuator is enabled, the mechanical attenuator has no auto setting and the Auto/Man line on the key disappears. The state of Auto/Man is remembered and restored when the electronic attenuator is once again disabled. This is described in more detail in the "Enable Elec Atten" on page 2244 key description.</p> <p>See "Attenuator Configurations and Auto/Man" on page 1375 for more information on the Auto/Man functionality of Attenuation.</p>
Couplings	<p>When (Mech) Atten is in Auto, it uses the following algorithm to determine a value:</p> <p>If the USB Preamp is connected to USB, use 0 dB.</p> <p>Otherwise, Atten = ReferenceLevel + PreAmpGain + ExternalGain - RefLevelOffset - MaxMixerLevel</p>

	<p>+ IF Gain.</p> <p>Limit this value to be between 6 dB and the Max value. No value below 6 dB can ever be chosen by Auto.</p> <p>The resulting value is rounded up to the largest value possible given the attenuation step setting. That is, 50.01 dB would change to 60 dB (for a 10 dB attenuation step).</p> <p>The “IF Gain” term in the equation above is either 0 dB or +10 dB, depending on the settings of FFT IF Gain, Swept IF Gain, max Ref Level and the Auto/Man setting of Mech Atten.</p> <p>In External Mixing and BBIQ, where the Attenuator is not in the signal path, the Attenuator setting changes as described above when (Mech) Atten is in Auto, but no changes are made to the actual attenuator hardware setting until the input is changed back to the RF Input.</p>
Preset	<p>The preset for Mech Attenuation is “Auto.”</p> <p>The Auto value of attenuation is: CXA, EXA, MXA and PXA: 10 dB</p>
State Saved	Saved in instrument state
Min	<p>0 dB</p> <p>The attenuation set by this key cannot be decreased below 6 dB with the knob or step keys. To get to a value below 6 dB it has to be directly entered from the keypad or via SCPI. This protects from adjusting the attenuation to a dangerously small value which can put the instrument at risk of damage to input circuitry. However, if the current mechanical attenuation is below 6 dB it can be increased with the knob and step keys, but not decreased.</p>
Max	<p>CXA N9000A–503/507: 50 dB CXA N9000A–513/526: 70dB EXA: 60 dB MXA and PXA: 70 dB</p> <p>In the single attenuator configuration, the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB.</p>
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Attenuator Configurations and Auto/Man

As described in the Attenuation key description, there are two distinct attenuator configurations available in the X-Series, the single attenuator and dual attenuator configurations. In dual attenuator configurations, we have the mechanical attenuation and the electronic attenuation, and the current total attenuation is the sum of the electronic + mechanical attenuation. In single attenuator configurations, we refer to the attenuation set using the (Mech) Atten key (or POW:ATT SCPI) as the “main” attenuation; and the attenuation that is set by the SCPI command POW:EATT as the “soft” attenuation (the POW:EATT command is honored even in the single attenuator configuration, for compatibility purposes). Then the current total attenuation is the sum of the main + soft attenuation. See the Elec Atten key description for more on “soft” attenuation.

In the dual attenuator configuration, when the electronic attenuator is enabled, there is no Auto/Man functionality for the mechanical attenuator, and the third line of the key label (the Auto/Man line) disappears:



Enable Elec Atten

Enables the Electronic Attenuator.

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear. These advantages primarily aid in remote operation and are negligible for front panel use. See ["Using the Electronic Attenuator: Pros and Cons" on page 1378](#) for a detailed discussion of the pros and cons of using the electronic attenuator.

For the single attenuator configuration, for SCPI backwards compatibility, the “soft” attenuation feature replaces the dual attenuator configuration’s electronic attenuator. All the same couplings and limitations apply. See ["Attenuator Configurations and Auto/Man" on page 2244](#)

See ["More Information" on page 1377](#)

Key Path	AMPTD Y Scale, Attenuation
Remote Command	[:SENSE] :POWER [:RF] :EATTenuation :STATE OFF ON 0 1 [:SENSE] :POWER [:RF] :EATTenuation :STATE ?
Example	POW:EATT:STAT ON
Dependencies	<p>This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no “electronic attenuator” there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a “soft” attenuation as described in "Attenuator Configurations and Auto/Man" on page 2244.</p> <p>The electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable above 3.6 GHz. Therefore, if the Stop Frequency of the analyzer is > 3.6 GHz then the Enable Elec Atten key will be OFF and grayed out.</p> <p>If the Internal Preamp is on, meaning it is set to Low Band or Full, the electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable. In this case the Enable Elec Atten key will be OFF and grayed out.</p> <p>If either of the above is true, if the SCPI command is sent, an error indicating that the electronic attenuator is unavailable will be sent.</p> <p>If the electronic/soft Attenuator is enabled, then the Stop Freq of the analyzer is limited to 3.6 GHz and the Internal Preamp is unavailable.</p> <p>The SCPI-only “soft” electronic attenuation for the single-attenuator configuration is not available in all measurements; in particular, it is not available in the Swept SA measurement.</p>
Couplings	Enabling and disabling the Electronic Attenuator affects the setting of the Mechanical Attenuator (in

	dual attenuator configurations). This is described in more detail below this table.
Preset	OFF for Swept SA measurement; ON for all other measurements that support the electronic attenuator
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

More Information

Mechanical Attenuator Transition Rules

When the Electronic Attenuator is enabled, the Mechanical Attenuator transitions to a state that has no Auto function. Below are the rules for transitioning the Mechanical Attenuator. NOTE that the information below ONLY applies to the dual attenuator configurations, and ONLY when the Electronic Attenuator is installed:

When the Electronic Attenuation is enabled from a disabled state:

- The Mechanical Attenuator is initialized to 10 dB (this is its optimal performance setting). You can then set it as desired with SCPI, numeric keypad, step keys, or knob, and it behaves as it normally would in manual mode
- The Auto/Man state of (Mech) Atten is saved
- The Auto/Man line on the (Mech) Atten key disappears and the auto rules are disabled
- The Electronic Attenuator is set to 10 dB less than the previous value of the Mechanical Attenuator, within the limitation that it must stay within the range of 0 to 24 dB of attenuation.

Examples in the dual attenuator configuration:

- Mech Atten at 20 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 10 dB. New total attenuation equals the value before Elec Atten enabled.
- Mech Atten at 0 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 0 dB. New total attenuation does not equal the value before Elec Atten enabled.
- Mech Atten at 40 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 24 dB. New total attenuation does not equal the value before Elec Atten enabled.

When the Electronic Attenuation is disabled from an enabled state:

- The Elec Atten key is grayed out
- The Auto/Man state of (Mech) Atten is restored
- If now in Auto, (Mech) Atten recouples
- If now in Man, (Mech) Atten is set to the value of total attenuation that existed before the Elec Atten was disabled. The resulting value is rounded up to the smallest value possible given the (Mech) Atten Step setting - (That is, 57 dB changes to 58 dB when (Mech) Atten Step is 2 dB.)

Using the Electronic Attenuator: Pros and Cons

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear.

The “finer steps” advantage of the electronic attenuator is beneficial in optimizing the alignment of the analyzer dynamic range to the signal power in the front panel as well as remote use. Thus, you can achieve improved relative signal measurement accuracy. Compared to a mechanical attenuator with 2 dB steps, the 1 dB resolution of the electronic attenuator only gives better resolution when the odd-decibel steps are used. Those odd-decibel steps are less accurately calibrated than the even-decibel steps, so one tradeoff for this superior relative accuracy is reduced absolute amplitude accuracy.

Another disadvantage of the electronic attenuator is that the spectrum analyzer loses its “Auto” setting, making operation less convenient.

Also, the relationship between the dynamic range specifications (TOI, SHI, compression and noise) and instrument performance are less well-known with the electrical attenuator. With the mechanical attenuator, TOI, SHI and compression threshold levels increase dB-for-dB with increasing attenuation, and the noise floor does as well. With the electronic attenuator, there is an excess attenuation of about 1 to 3 dB between 0 and 3.6 GHz, making the effective TOI, SHI, and so forth, less well known. Excess attenuation is the actual attenuation relative to stated attenuation. Excess attenuation is accounted for in the analyzer calibration

Elec Atten

Controls the Electronic Attenuator in dual attenuator configurations. This key does not appear in single attenuator configurations, as the control of both the mechanical and electronic stages of the single attenuator is integrated into the single Atten key.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	[:SENSe] :POWer [:RF] :EATTenuation <rel_amp1> [:SENSe] :POWer [:RF] :EATTenuation?
Notes	Electronic Attenuation’s specification is defined only when Mechanical Attenuation is 6 dB.
Dependencies	This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no “electronic attenuator” there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a “soft” attenuation as described in "Attenuator Configurations and Auto/Man" on page 2244 . The “soft” attenuation is treated as an addition to the “main” attenuation value set by the Atten softkey or the POW:ATT SCPI command and affects the total attenuation displayed on the Attenuation key and the Meas Bar. When Enable Elec Atten is off or grayed out, the Elec Atten key is grayed out.
Preset	0 dB
State Saved	Saved in instrument state
Min	0 dB
Max	Dual attenuator configuration: 24 dB Single attenuator configuration: the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if

	the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Adjust Atten for Min Clip

Sets the combination of mechanical and electronic attenuation and gain based on the current measured signal level so that clipping will be at a minimum.

This is an "immediate action" function, that is, it executes once, when the key is pressed.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	<code>[:SENSe] :POWer [:RF] :RANGe :OPTimize IMMEDIATE</code>
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Pre-Adjust for Min Clip

If this function is on, it does the adjustment described under "[Adjust Atten for Min Clip](#)" on page 2247 each time a measurement restarts. Therefore, in Continuous measurement mode, it only executes before the first measurement.

In dual attenuator models, you can set Elec+Mech Atten, in which case both attenuators participate in the autoranging, or Elec Atten Only, in which case the mechanical attenuator does not participate in the autoranging. This latter case results in less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	<code>[:SENSe] :POWer [:RF] :RANGe :OPTimize :ATTenuation OFF ELECTRical COMBined</code> <code>[:SENSe] :POWer [:RF] :RANGe :OPTimize :ATTenuation?</code>
Notes	The SCPI parameter ELECTRical sets this function to On in single attenuator models. The SCPI parameter COMBined is mapped to ELECTRical in single attenuator models; if you send COMBined, it sets the function to On and returns ELEC to a query.
Dependencies	This key only appears in Dual Attenuator models with an Electronic Attenuator installed. In instruments with Dual Attenuator model, when Enable Elec Atten is off or grayed out, the Pre-Adjust for Min Clip key is grayed out.
Preset	OFF for Swept SA measurement; ON for all other measurements that support Pre-Adjust for Min Clip

State Saved	Saved in instrument state
Range	Dual attenuator models: Off Elec Atten Only Mech + Elec Atten Single attenuator models: Off On
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Remote Command	<code>[:SENSe] :POWer [:RF] :RANGe :AUTO ON OFF 1 0</code> <code>[:SENSe] :POWer [:RF] :RANGe :AUTO?</code>
Notes	ON aliases to "Elec Atten Only" (:POW:RANG:OPT:ATT ELEC) OFF aliases to "Off" (:POW:RANG:OPT:ATT OFF) The query :POW:RANG:AUTO? returns true if :POW:RANG:OPT:ATT is not "Off"
Initial S/W Revision	Prior to A.02.00

Off

Turns Pre-Adjust for Min Clip off. This is the default setting.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip
Example	:POW:RANG:OPT:ATT OFF
Initial S/W Revision	Prior to A.02.00

Elec Atten Only

Selects only the electric attenuator to participate in auto ranging. This offers less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip
Example	:POW:RANG:OPT:ATT ELEC
Initial S/W Revision	Prior to A.02.00

Mech + Elec Atten

In dual attenuator models, this selects both attenuators participate in the autoranging.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip
Example	:POW:RANGe:OPT:ATT COMB
Initial S/W Revision	Prior to A.02.00

(Mech) Atten Step

This controls the step size used when making adjustments to the input attenuation.

This key is labeled Mech Atten Step in dual attenuator models and Atten Step in single attenuator models. In the dual attenuator configuration, this key only affects the step size of the mechanical attenuator.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	[:SENSe] :POWer [:RF] :ATTenuation :STEP [:INCRement] 10 dB 2 dB [:SENSe] :POWer [:RF] :ATTenuation :STEP [:INCRement] ?
Example	POW:ATT:STEP 2
Notes	Note this feature works like a 1-N choice from the front panel, but it takes a specific value (in dB) when used remotely. The only valid values are 2 and 10.
Dependencies	Blanked in CXA and EXA if option FSA (2 dB steps) is not present. If blanked, attempts to set it via SCPI will yield an error.
Couplings	When the attenuation step size changes, the current mechanical attenuation value is adjusted (if necessary) to be quantized to the new step size. That is, if step is set to 10 dB, mech atten is increased if necessary so it is a multiple of 10 dB
Preset	PXA and MXA: 2 dB EXA and CXA: 10 dB (2 dB with option FSA)
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Scale/Div

Sets the units per division of vertical scale in the logarithmic display. However, since Auto Scaling is defaulted to On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.

This functionality depends on the selected view:

- ["Scale/Div \(RF Envelope View\)" on page 1382](#)
- ["Scale/Div \(I/Q Waveform View\)" on page 1382](#)

Scale/Div (RF Envelope View)

Sets the scale per division for the RF Envelope result waveform (time domain) measurements in the graph window.

Key Path	AMPTD Y Scale
Mode	BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CM MB, LTE, LTETDD, DCATV, WLAN,LTEATDD, LTEAFDD
Remote Command	:DISPlay:WAVeform:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision <rel_ ampl> :DISPlay:WAVeform:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision?
Example	DISP:WAV:VIEW:WIND:TRAC:Y:PDIV 5 DISP:WAV:VIEW:WIND:TRAC:Y:PDIV?
Notes	You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode.
Couplings	When Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.
Preset	10.00 dB
State Saved	Saved in instrument state.
Range	0.10 dB to 20.00 dB
Min	0.10 dB
Max	20.00 dB
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Scale/Div (I/Q Waveform View)

Sets the scale per division for the I/Q signal waveform graph.

Key Path	AMPTD Y Scale
Mode	BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CM MB, LTE, LTETDD, DCATV, WLAN,LTEATDD, LTEAFDD
Remote Command	:DISPlay:WAVeform:VIEW2:WINDow[1]:TRACe:Y[:SCALe]:PDIVision <voltage> :DISPlay:WAVeform:VIEW2:WINDow[1]:TRACe:Y[:SCALe]:PDIVision?
Example	DISP:WAV:VIEW2:WIND:TRAC:Y:PDIV 25mV DISP:WAV:VIEW2:WIND:TRAC:Y:PDIV?
Notes	You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode.
Couplings	When Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.
Preset	100.0 mV

State Saved	Saved in instrument state.
Min	1.0 nV
Max	20 V
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Presel Center

When this key is pressed, the centering of the preselector filter is adjusted to optimize the amplitude accuracy at the frequency of the selected marker. If the selected marker is not on when Presel Center is pressed, the analyzer will turn on the selected marker, perform a peak search, and then perform centering on the marker's center frequency. If the selected marker is already on and between the start and stop frequencies of the analyzer, the analyzer performs the preselector calibration on that marker's frequency. If the selected marker is already on, but outside the frequency range between Start Freq and Stop Freq, the analyzer will first perform a peak search, and then perform centering on the marker's center frequency.

The value displayed on the Presel Adjust key will change to reflect the new preselector tuning (see Presel Adjust).

A number of considerations should be observed to ensure proper operation. See ["Proper Preselector Operation" on page 1384](#).

Key Path	AMPTD Y Scale
Remote Command	[:SENSe] :POWer [:RF] :PCENter
Example	POW:PCEN
Notes	Note that the rules outlined above under the key description apply for the remote command as well as the key. The result of the command is dependent on marker position, and so forth. Any message shown by the key press is also shown in response to the remote command.
Dependencies	<ul style="list-style-type: none"> • Grayed out if the microwave preselector is off.) • If the selected marker's frequency is below Band 1, advisory message 0.5001 is generated and no action is taken. • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0. • Grayed out in the Spectrogram View.
Couplings	The active marker position determines where the centering will be attempted. If the analyzer is in a measurement such as averaging when centering is initiated, the act of centering the preselector will restart averaging but the first average trace will not be taken until the centering is completed.
Status Bits/OPC dependencies	When centering the preselector, *OPC will not return true until the process is complete and a subsequent measurement has completed, nor will results be returned to a READ or MEASure command. The Measuring bit should remain set while this command is operating and should not go false until

the subsequent sweep/measurement has completed.

Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Proper Preselector Operation

A number of considerations should be observed to ensure proper operation:

1. If the selected marker is off, the analyzer will turn on a marker, perform a peak search, and adjust the preselector using the selected marker's frequency. It uses the "highest peak" peak search method unqualified by threshold or excursion, so that there is no chance of a 'no peak found' error. It continues with that peak, even if it is the peak of just noise. Therefore, for this operation to work properly, there should be a signal on screen in a preselected range for the peak search to find.
2. If the selected marker is already on, the analyzer will attempt the centering at that marker's frequency. There is no preselector for signals below about 3.6 GHz, therefore if the marker is on a signal below 3.6 GHz, no centering will be attempted and an advisory message generated
3. In some models, the preselector can be bypassed. If it is bypassed, no centering will be attempted in that range and a message will be generated.

Preselector Adjust

Allows you to manually adjust the preselector filter frequency to optimize its response to the signal of interest. This function is only available when "Presel Center" on page 2250 is available.

For general purpose signal analysis, using Presel Center is recommended. Centering the filter minimizes the impact of long-term preselector drift. Presel Adjust can be used instead to manually optimize the preselector. One application of manual optimization would be to peak the preselector response, which both optimizes the signal-to-noise ratio and minimizes amplitude variations due to small (short-term) preselector drifting.

Key Path	AMPTD Y Scale
Scope	Meas Global
Remote Command	[:SENSe] :POWer [:RF] :PADJust <freq> [:SENSe] :POWer [:RF] :PADJust?
Example	POW:PADJ 100KHz POW:PADJ?
Notes	The value on the key reads out to 0.1 MHz resolution.
Dependencies	<ul style="list-style-type: none"> • Grayed out if microwave preselector is off.) • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0.

- Grayed out in the Spectrogram View.

Preset	0 MHz
State Saved	The Presel Adjust value set by Presel Center, or by manually adjusting Presel Adjust, is not saved in instrument state, and does not survive a Preset or power cycle.
Min	-500 MHz
Max	500 MHz
Default Unit	Hz
Backwards Compatibility SCPI	[:SENSe]:POWer[:RF]:MW:PADJust [:SENSe]:POWer[:RF]:MMW:PADJust PSA had multiple preselectors, but the X-Series has only one. These commands simply alias to [:SENSe]:POWer[:RF]:PADJust
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Remote Command	[:SENSe]:POWer[:RF]:PADJust:PRESelector MWAVE MMWave EXTERNAL [:SENSe]:POWer[:RF]:PADJust:PRESelector?
Notes	PSA had multiple preselectors, and you could select which preselector to adjust. Since the X-Series has only one mm/uW preselector, the preselector selection softkey is no longer available. However, to provide backward compatibility, we accept the legacy remote commands. The command form has no effect, the query always returns MWAVE
Initial S/W Revision	Prior to A.02.00

μW Path Control

The μW Path Control functions include the μW Preselector Bypass (Option MPB) and Low Noise Path (Option LNP) controls in the High Band path circuits.

When the μW Preselector is bypassed, the user has better flatness, but will be subject to spurs from out of band interfering signals. When the Low Noise Path is enabled, the analyzer automatically switches around certain circuitry in the high frequency bands which can contribute to noise, when it is appropriate based on other analyzer settings.

For most applications, the preset state is Standard Path, which gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear out in the hardware switches. For applications that utilize the wideband IF paths, the preset state is the μW Preselector Bypass path, if option MPB is present. This is because, when using a wideband IF such as the 140 MHz IF, the μW Preselector's bandwidth can be narrower than the available IF bandwidth, causing degraded amplitude flatness and phase linearity, so it is desirable to bypass the preselector in the default case.

Users may choose Low Noise Path Enable. It gives a lower noise floor, especially in the 21–26.5 GHz region, though without improving many measures of dynamic range, and without giving the best possible noise floor. The preamp, if purchased and used, gives better noise floor than does the Low Noise Path, however its compression threshold and third-order intercept are much poorer than that of the non-preamp Low Noise Path. There are some applications, typically for signals around –30 dBm, for which the third-order dynamic range of the standard path is good enough, but the noise floor is not low enough even with 0 dB input attenuation. When the third-order dynamic range of the preamp path is too little and the noise floor of the standard path is too high, the Low Noise Path can provide the best dynamic range.

Key Path	AMPTD Y Scale
Mode	SA, BASIC, PNOISE, VSA , LTE, LTETDD
Scope	Meas Global
Remote Command	[:SENSe] : POWer [:RF] : MW : PATH STD LNPath MPBypass FULL [:SENSe] : POWer [:RF] : MW : PATH ?
Example	:POW:MW:PATH LNP Enables the Low Noise path
Notes	If a Presel Center is performed, the analyzer will momentarily switch to the Standard Path, regardless of the setting of μ W Path Control The DC Block will always be switched in when the low noise path is switched in, to protect succeeding circuitry from DC. Note that this does not mean “when the low noise path is enabled” but when, based on the Low Noise Path rules, the path is actually switched in. This can happen when the selection is Low Noise Path Enable . In the case where the DC Block is switched in the analyzer is now AC coupled. However, if the user has selected DC coupling, the UI will still behave as though it were DC coupled, including all annunciation, warnings, status bits, and responses to SCPI queries. This is because, based on other settings, the analyzer could switch out the low noise path at any time and hence go back to being DC coupled. Alignment switching ignores the settings in this menu, and restores them when finished.
Dependencies	Unavailable in BBIQ and External Mixing
Preset	All modes other than IQ Analyzer mode and VXA: STD IQ Analyzer, VXA and WLAN mode: MPB option present and licensed: MPB MPB option not present and licensed: STD
State Saved	Save in instrument state
Readback	Value selected in the submenu
Initial S/W Revision	A.04.00
Modified at S/W Revision	A.10.00

Standard Path

This path gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear in the hardware switches, particularly in remote test scenarios where both low band and high band setups will follow in rapid succession.

In this path, the bypass of the low band/high band switch and microwave preamp is never activated, which can cause some noise degradation but preserves the life of the bypass switch.

Key Path	AMPTD Y Scale, μ W Path Control
Example	:POW:MW:PATH STD
Readback Text	Standard Path
Initial S/W Revision	A.04.00

μ W Preselector Bypass

This key toggles the preselector bypass switch for band 1 and higher. When the microwave preselect is on, the signal path is preselected. When the microwave preselector is off, the signal path is not preselected. The preselected path is the normal path for the analyzer.

The preselector is a tunable bandpass filter which prevents signals away from the frequency of interest from combining in the mixer to generate in-band spurious signals (images). The consequences of using a preselector filter are its limited bandwidth, the amplitude and phase ripple in its passband, and any amplitude and phase instability due to center frequency drift.

Option MPB or pre-selector bypass provides an unpreselected input mixer path for certain X-Series signal analyzers with frequency ranges above 3.6 GHz. This signal path allows a wider bandwidth and less amplitude variability, which is an advantage when doing modulation analysis and broadband signal analysis. The disadvantage is that, without the preselector, image signals will be displayed. Another disadvantage of bypassing the preselector is increased LO emission levels at the front panel input port.

Image responses are separated from the real signal by twice the 1st IF. For IF Paths of 10 MHz and 25 MHz, the 1st IF is 322.5 MHz, so the image response and the real signal will be separated by 645 MHz. The 1st IF will be different for other IF Path settings. When viewing a real signal and its corresponding image response in internal mixing, the image response will be to the left of the real signal.

Also, the image response and the real signal typically have the same amplitude and exhibit the same shape factor.

However, if Option FS1, Fast Sweep Capability, is enabled, the image response in the Swept SA measurement will appear lower in amplitude and have a much wider shape factor compared to the real signal.

Key Path	AMPTD Y Scale, μ W Path Control
Example	:POW:MW:PATH MPB
Dependencies	Key is blanked if current mode does not support it. Key is grayed out if mode supports it but current measurement does not support it. Key is blank unless Option MPB is present and licensed. If SCPI command sent when MPB not present, error -241, "Hardware missing; Option not installed" is generated.
Readback Text	μ W Preselector Bypass
Initial S/W Revision	A.04.00

Remote Command	[:SENSe] :POWer [:RF] :MW:PRESelector [:STATE] ON OFF 0 1
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	<code>[:SENSe] :POWer [:RF] :MW:PRESelector [:STATe] ?</code>
Example	<code>:POW:MW:PRES OFF</code> Bypasses the microwave preselector
Notes	The ON parameter sets the STD path (<code>:POW:MW:PATH STD</code>) The OFF parameter sets path MPB (<code>:POW:MW:PATH MPB</code>)
Preset	ON

Internal Preamp

Accesses a menu of keys that control the internal preamps. Turning on the preamp gives a better noise figure, but a poorer TOI to noise floor dynamic range. You can optimize this setting for your particular measurement.

The instrument takes the preamp gain into account as it sweeps. If you sweep outside of the range of the preamp the instrument will also account for that. The displayed result will always reflect the correct gain.

For some measurements, when the preamp is on and any part of the displayed frequency range is below the lowest frequency for which the preamp has specifications, a warning condition message appears in the status line. For example, for a preamp with a 9 kHz lowest specified frequency: "Preamp: Accy unspec'd below 9 kHz".

Key Path	AMPTD Y Scale
Scope	Meas Global
Remote Command	<code>[:SENSe] :POWer [:RF] :GAIN [:STATe] OFF ON 0 1</code> <code>[:SENSe] :POWer [:RF] :GAIN [:STATe] ?</code>
Dependencies	Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the key is not shown. The preamp is not available when the electronic/soft attenuator is enabled.
Couplings	The act of connecting the U7227A USB Preamplifier to one of the analyzer's USB ports will cause the Internal Preamp to be switched on. When this happens an informational message will be generated: "Internal Preamp turned on for optimal operation with USB Preamp." Note that if the Internal Preamp was already on, there will be no change to the setting, but if it was Off it will be switched On, to Full Range. Note that this same action occurs when the SA mode is selected while the USB Preamp is connected to one of the analyzer's USB ports, if it is the first time that the SA mode has run since powerup, or if the last time the SA mode was running the USB Preamp was NOT connected. Subsequently disconnecting the USB Preamp from USB does not change the Internal Preamp setting nor restore the previous setting.
Preset	OFF
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.14.00

Key Path	AMPTD Y Scale, Internal Preamp
Scope	Meas Global
Remote Command	<code>[:SENSe] :POWer [:RF] :GAIN:BAND LOW FULL</code> <code>[:SENSe] :POWer [:RF] :GAIN:BAND?</code>
Dependencies	Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the key is not shown. If a POW:GAIN:BAND FULL command is sent when a low band preamp is available, the preamp band parameter is to LOW instead of FULL, and an "Option not installed" message is generated.
Preset	LOW
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00

Off

Turns the internal preamp off

Key Path	AMPTD Y Scale, Internal Preamp
Example	<code>:POW:GAIN OFF</code>
Readback	Off
Initial S/W Revision	Prior to A.02.00

Low Band

Sets the internal preamp to use only the low band.

The frequency range of the installed (optional) low-band preamp is displayed in square brackets on the Low Band key label.

Key Path	AMPTD Y Scale, Internal Preamp
Example	<code>:POW:GAIN ON</code> <code>:POW:GAIN:BAND LOW</code>
Readback	Low Band
Initial S/W Revision	Prior to A.02.00

Full Range

Sets the internal preamp to use its full range. The low band (0–3.6 GHz or 0–3GHz, depending on the model) is supplied by the low band preamp and the frequencies above low band are supplied by the high band preamp.

The frequency range of the installed (optional) preamp is displayed in square brackets on the Full Range key label. If the high band option is not installed the Full Range key does not appear.

Key Path	AMPTD Y Scale, Internal Preamp
Example	:POW:GAIN ON :POW:GAIN:BAND FULL
Readback	Full Range
Initial S/W Revision	Prior to A.02.00

Ref Position

Positions the reference level at the top, center or bottom of the Y Scale display. Changing the reference position does not change the reference level value.

This functionality depends on the selected view:

- ["Ref Position \(RF Envelope View\)" on page 1390](#)
- ["Ref Position \(I/Q Waveform View\)" on page 1391](#)

Ref Position (RF Envelope View)

Positions the reference level at the top, center or bottom of the Y Scale display. Changing the reference position does not change the reference level value.

Key Path	AMPTD Y Scale
Mode	BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN,LTEATDD, LTEAFDD
Remote Command	:DISPlay:WAVEform:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOSition TOP CENTER BOTTom :DISPlay:WAVEform:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOSition?
Example	DISP:WAV:VIEW:WIND:TRAC:Y:RPOS CENT DISP:WAV:VIEW:WIND:TRAC:Y:RPOS?
Notes	You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode.
Preset	TOP
State Saved	Saved in instrument state.
Range	Top Ctr Bot
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Ref Position (I/Q Waveform View)

Positions the reference level at the top, center or bottom of the Y Scale display. Changing the reference position does not change the reference level value.

Key Path	AMPTD Y Scale
Mode	BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN,LTEATDD, LTEAFDD
Remote Command	:DISPlay:WAVeform:VIEW2:WINDow[1]:TRACe:Y[:SCALe]:RPOSition TOP CENTER BOTTom :DISPlay:WAVeform:VIEW2:WINDow[1]:TRACe:Y[:SCALe]:RPOSition?
Example	DISP:WAV:VIEW2:WIND:TRAC:Y:RPOS CENT DISP:WAV:VIEW2:WIND:TRAC:Y:RPOS?
Notes	You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode.
Preset	CENT
State Saved	Saved in instrument state.
Range	Top Ctr Bot
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Auto Scaling

Toggles the Auto Scaling function between On and Off. When the Restart front-panel key is pressed, this function automatically determines the scale per division and reference values based on the measurement results.

Key Path	AMPTD Y Scale
Mode	BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN,LTEATDD, LTEAFDD
Remote Command	:DISPlay:WAVeform:VIEW[1] 2:WINDow[1]:TRACe:Y[:SCALe]:COUPlE 0 1 OFF ON :DISPlay:WAVeform:VIEW[1] 2:WINDow[1]:TRACe:Y[:SCALe]:COUPlE?
Example	DISP:WAV:VIEW:WIND:TRAC:Y:COUP OFF DISP:WAV:VIEW:WIND:TRAC:Y:COUP?
Notes	You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode.
Couplings	When Auto Scaling is On, upon pressing the Restart front-panel key, this function automatically switches the scale per division and reference values into the defaults. When you set a value to either Scale/Div or Ref Value manually, Auto Scaling automatically changes to Off.
Preset	OFF

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AMPTD Y Scale

State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Auto Couple

The Auto Couple feature provides a quick and convenient way to automatically couple multiple instrument settings. This helps ensure accurate measurements and optimum dynamic range. When the Auto Couple feature is activated, either from the front panel or remotely, all parameters of the current measurement that have an Auto/Manual mode are set to Auto mode and all measurement settings dependent on (or coupled to) the Auto/Man parameters are automatically adjusted for optimal performance.

However, the Auto Couple key actions are confined to the current measurement only. It does not affect other measurements in the mode, and it does not affect markers, marker functions, or trace or display attributes.

See "[More Information](#)" on page 1393

Key Path	Front-panel key
Remote Command	:COUPle ALL NONE
Example	:COUP ALL
Notes	:COUPle ALL puts all Auto/Man parameters in Auto mode (equivalent to pressing the Auto Couple key). :COUPLE NONE puts all Auto/Man parameters in manual mode. It decouples all the coupled instrument parameters and is not recommended for making measurements.
Initial S/W Revision	Prior to A.02.00

More Information

There are two types of functions that have Auto/Manual modes.

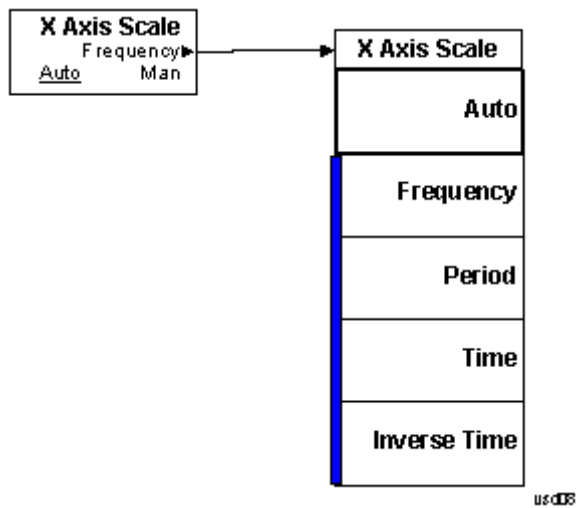
Auto/Man Active Function keys

An Auto/Man toggle key controls the binary state associated with an instrument parameter by toggling between Auto (where the parameter is automatically coupled to the other parameters it is dependent upon) and Man (where the parameter is controlled independent of the other parameters), as well as making the parameter the active function. The current mode is indicated on the softkey with either Auto or Man underlined as illustrated below.



Auto/Man 1-of-N keys

An Auto/Man 1-of-N key allows you to manually pick from a list of parameter values, or place the function in Auto, in which case the value is automatically selected (and indicated) as shown below. If in Auto, Auto is underlined on the calling key. If in manual operation, manual is indicated on the calling key. But the calling key does not actually toggle the function, it simply opens the menu.



BW

Accesses a menu that enables you to control the information bandwidth functions of the instrument. You can also select the filter type for the measurement.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Digital IF BW

Enables you to set the Digital IF (formerly Info BW) bandwidth of the instrument.

Key Path	BW
Mode	BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TD-SCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN, MSR,LTEATDD, LTEAFDD
Remote Command	<code>[:SENSe] :WAVeform:DIF:BA NDwidth <freq></code> <code>[:SENSe] :WAVeform:DIF:BA NDwidth?</code>
Example	WAV:DIF:BA ND 1kHz WAV:DIF:BA ND?
Notes	Max value depends on the IF Path Selection
Remote Command Notes	You must be in a mode that includes the Waveform measurements to use this command. Use INSTRument:SElect to set the mode.
Dependencies	For applications that have the IF Path Selection menu such as the BASIC mode, if IF Path Auto is OFF, the maximum value depends on which IF Path is currently selected. If 10 MHz, 25 MHz, 40 MHz, 85 MHz, 125 MHz, 140 MHz or 160 MHz paths are selected, the maximum value of this parameter will be 10, 25, 40, 85, 125, 140 or 160 MHz, respectively. If IF Path Auto is ON, the maximum value will be the maximum Digital IF BW available in the instrument regardless of the current IF Path Selection. For example, if the instrument has the options B25, B40, and B1X installed, the maximum available Digital IF BW of the instrument is 140 MHz. Thus, if IF Path Auto is ON and IF Path Selection is 25 MHz, the maximum Digital IF BW is not limited to 25 MHz but is 140 MHz.
Preset	All except the following list: 100 kHz GSM/EDGE: 510 kHz TDSCDMA: 1.3 MHz 1xEVD0: 1.3 MHz DVB-T/H: 8.0 MHz DTMB (CTTB): 8.0 MHz ISDB-T: 6.0 MHz CMMB: 8.0 MHz Digital Cable TV: 8 MHz LTEAFDD, LTEATDD: 6 MHz LTETDD: 6 MHz

	WLAN: Hardware Dependent No option = 10 MHz Option B25 = 25 MHz Option B40: if Radio Std is 802.11a/b/g/n(20MHz) = 25 MHz if Radio Std is 802.11n(40MHz) = 40 MHz if Radio Std is 802.11ac(20MHz) = 25 MHz if Radio Std is 802.11ac(40MHz) = 40 MHz Option B1X: if Radio Std is 802.11ac(80MHz) = 80 MHz Option B1Y: if Radio Std is 802.11ac(160MHz) = 160 MHz
State Saved	Saved in instrument state.
Min	10 Hz
Max	Hardware Dependent: RF Input: No Option = 10 MHz Option B25 = 25 MHz Option B40 = 40 MHz Option B85 = 85.0 MHz Option B1A = 125.0 MHz Option B1X = 140 MHz Option B1Y = 160 MHz I/Q Input: No Option = 10 MHz per channel (20 MHz for I+jQ) Option B25 = 25 MHz per channel (50 MHz for I+jQ) Option S40 = 40 MHz per channel (80 MHz for I+jQ)
Backwards Compatibility SCPI	[:SENSe]:WAVEform:BANDwidth[:RESolution]
	[:SENSe]:WAVEform:BWIDth[:RESolution]
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00, A.13.00

Filter Type

Selects the type of bandwidth filter that is used.

Besides the Gaussian filter shape, a variety of other filter types are available with variable alpha settings for maximum control over the filter shape..

Key Path	BW
Mode	BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT,

	CMMB, LTE, LTE40, DCATV, WLAN, MSR,,LTE40, LTEAFDD
Remote Command	[:SENSe]:WAVeform:DIF:FILTer:TYPE GAUSSian FLATtop [:SENSe]:WAVeform:DIF:FILTer:TYPE? (With DIF40 and/or WBDIF) [:SENSe]:WAVeform:DIF:FILTer:TYPE GAUSSian FLATtop SNYQuist RSNYquist RCOSine RRCosine [:SENSe]:WAVeform:DIF:FILTer:TYPE?
Example	WAV:DIF:FILT:TYPE GAUS WAV:DIF:FILT:TYPE?
Remote Command Notes	You must be in a mode that includes the Waveform measurements to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Gaussian and FlatTop are available in all DIF configurations. For the other filter types, the filters are only available when Option DP2, B40, or wider IF Bandwidth option is installed.
Preset	BASIC with DP2, B40, or wider IF Bandwidth option: FLATtop All other apps: GAUSSian
State Saved	Saved in instrument state.
Range	Gaussian FlatTop When Option DP2, B40, or wider IF Bandwidth option is installed, the range is as follows. Gaussian FlatTop Short nyquist Root Short Nquist Raised Cosine Root RaisedCosine
Backwards Compatibility SCPI	[:SENSe]:WAVeform:BANDwidth:SHApe [:SENSe]:WAVeform:BWIDth:SHApe [:SENSe]:WAVeform:BANDwidth BWIDth[:RESolution]:TYPE
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00, A.13.00

Filter Type Bwcc

This parameter is strictly for Bwcc purposes.

Remote Command	[:SENSe]:WAVeform:WBIF:FILTer[:TYPE] GAUSSian NONE NYQuist RNYQuist RCOSine RRCosine [:SENSe]:WAVeform:WBIF:FILTer[:TYPE]?
Preset	BASIC with Option DP2, B40, or wider IF Bandwidth option: FLATtop All other apps: GAUSSian

Gaussian

When Option DP2, B40, or wider IF Bandwidth option is installed, the capability for arbitrary Digital IF bandwidths is available. However, for instruments without DP2, B40, or wider IF Bandwidth option, the

selectable Gaussian filter bandwidths are predetermined as shown in the following list. There are 160 Info BWs (RBWs) arranged in a 24-per-decade sequence from 1 Hz through 3 MHz, plus the 4, 5, 6 and 8 MHz settings.

The following table list all 160 Gaussian filter types

Gaussian filters

Normal (-3 dB)	-6 dB	Noise	Impulse
1.0 Hz	1.41 Hz	1.06 Hz	1.49 Hz
1.1 Hz	1.55 Hz	1.16 Hz	1.63 Hz
1.2 Hz	1.69 Hz	1.27 Hz	1.77 Hz
1.3 Hz	1.83 Hz	1.37 Hz	1.92 Hz
1.5 Hz	2.11 Hz	1.59 Hz	2.22 Hz
1.6 Hz	2.25 Hz	1.69 Hz	2.37 Hz
1.8 Hz	2.53 Hz	1.90 Hz	2.66 Hz
2.0 Hz	2.81 Hz	2.12 Hz	2.96 Hz
2.2 Hz	3.09 Hz	2.33 Hz	3.25 Hz
2.4 Hz	3.38 Hz	2.54 Hz	3.55 Hz
2.7 Hz	3.80 Hz	2.86 Hz	3.99 Hz
3.0 Hz	4.22 Hz	3.17 Hz	4.44 Hz
3.3 Hz	4.64 Hz	3.49 Hz	4.88 Hz
3.6 Hz	5.06 Hz	3.81 Hz	5.32 Hz
3.9 Hz	5.49 Hz	4.12 Hz	5.77 Hz
4.3 Hz	6.05 Hz	4.55 Hz	6.36 Hz
4.7 Hz	6.61 Hz	4.97 Hz	6.95 Hz
5.1 Hz	7.17 Hz	5.39 Hz	7.54 Hz
5.6 Hz	7.87 Hz	5.92 Hz	8.27 Hz
6.2 Hz	8.72 Hz	6.56 Hz	9.17 Hz
6.8 Hz	9.55 Hz	7.18 Hz	10.0 Hz
7.5 Hz	10.5 Hz	7.93 Hz	11.1 Hz
8.2 Hz	11.5 Hz	8.66 Hz	12.1 Hz
9.1 Hz	12.8 Hz	9.64 Hz	13.5 Hz
10 Hz	14.0 Hz	10.6 Hz	14.8 Hz
11 Hz	15.4 Hz	11.6 Hz	16.2 Hz
12 Hz	16.9 Hz	12.7 Hz	17.7 Hz
13 Hz	18.3 Hz	13.7 Hz	19.2 Hz
15 Hz	21.1 Hz	15.9 Hz	22.2 Hz
16 Hz	22.5 Hz	16.9 Hz	23.7 Hz

18 Hz	25.3 Hz	19.1 Hz	26.6 Hz
20 Hz	28.1 Hz	21.1 Hz	29.5 Hz
22 Hz	30.9 Hz	23.2 Hz	32.5 Hz
24 Hz	33.8 Hz	25.4 Hz	35.5 Hz
27 Hz	38.0 Hz	28.6 Hz	40.0 Hz
30 Hz	42.3 Hz	31.8 Hz	44.5 Hz
33 Hz	46.3 Hz	34.8 Hz	48.7 Hz
36 Hz	50.7 Hz	38.1 Hz	53.3 Hz
39 Hz	54.9 Hz	41.3 Hz	57.7 Hz
43 Hz	60.5 Hz	45.5 Hz	63.6 Hz
47 Hz	66.1 Hz	49.7 Hz	69.5 Hz
51 Hz	71.7 Hz	53.9 Hz	75.3 Hz
56 Hz	78.9 Hz	59.3 Hz	83.0 Hz
62 Hz	87.3 Hz	65.6 Hz	91.7 Hz
68 Hz	95.5 Hz	71.8 Hz	100 Hz
75 Hz	106 Hz	79.4 Hz	111 Hz
82 Hz	115 Hz	86.8 Hz	121 Hz
91 Hz	128 Hz	96.4 Hz	135 Hz
100 Hz	141 Hz	106 Hz	148 Hz
110 Hz	154 Hz	116 Hz	162 Hz
120 Hz	169 Hz	127 Hz	178 Hz
130 Hz	183 Hz	137 Hz	192 Hz
150 Hz	211 Hz	159 Hz	222 Hz
160 Hz	225 Hz	169 Hz	237 Hz
180 Hz	253 Hz	190 Hz	266 Hz
200 Hz	281 Hz	211 Hz	295 Hz
220 Hz	309 Hz	232 Hz	325 Hz
240 Hz	337 Hz	254 Hz	355 Hz
270 Hz	380 Hz	286 Hz	400 Hz
300 Hz	422 Hz	317 Hz	444 Hz
330 Hz	463 Hz	348 Hz	487 Hz
360 Hz	507 Hz	381 Hz	533 Hz
390 Hz	550 Hz	413 Hz	578 Hz
430 Hz	605 Hz	455 Hz	636 Hz
470 Hz	662 Hz	498 Hz	696 Hz
510 Hz	718 Hz	540 Hz	755 Hz
560 Hz	789 Hz	593 Hz	829 Hz

620 Hz	872 Hz	655 Hz	916 Hz
680 Hz	958 Hz	720 Hz	1.01 kHz
750 Hz	1.06 kHz	794 Hz	1.11 kHz
820 Hz	1.15 kHz	866 Hz	1.21 kHz
910 Hz	1.28 kHz	964 Hz	1.35 kHz
1.0 kHz	1.41 kHz	1.06 kHz	1.48 kHz
1.1 kHz	1.55 kHz	1.17 kHz	1.63 kHz
1.2 kHz	1.69 kHz	1.27 kHz	1.78 kHz
1.3 kHz	1.83 kHz	1.38 kHz	1.93 kHz
1.5 kHz	2.11 kHz	1.59 kHz	2.22 kHz
1.6 kHz	2.26 kHz	1.70 kHz	2.37 kHz
1.8 kHz	2.54 kHz	1.91 kHz	2.67 kHz
2.0 kHz	2.82 kHz	2.12 kHz	2.96 kHz
2.2 kHz	3.10 kHz	2.33 kHz	3.26 kHz
2.4 kHz	3.38 kHz	2.54 kHz	3.56 kHz
2.7 kHz	3.80 kHz	2.86 kHz	4.00 kHz
3.0 kHz	4.23 kHz	3.18 kHz	4.44 kHz
3.3 kHz	4.65 kHz	3.49 kHz	4.89 kHz
3.6 kHz	5.06 kHz	3.81 kHz	5.32 kHz
3.9 kHz	5.48 kHz	4.12 kHz	5.76 kHz
4.3 kHz	6.07 kHz	4.56 kHz	6.38 kHz
4.7 kHz	6.62 kHz	4.98 kHz	6.96 kHz
5.1 kHz	7.16 kHz	5.38 kHz	7.53 kHz
5.6 kHz	7.87 kHz	5.92 kHz	8.27 kHz
6.2 kHz	8.74 kHz	6.57 kHz	9.18 kHz
6.8 kHz	9.58 kHz	7.20 kHz	10.1 kHz
7.5 kHz	10.5 kHz	7.92 kHz	11.1 kHz
8.2 kHz	11.5 kHz	8.66 kHz	12.1 kHz
9.1 kHz	12.8 kHz	9.64 kHz	13.5 kHz
10 kHz	14.1 kHz	10.6 kHz	14.8 kHz
11 kHz	15.4 kHz	11.6 kHz	16.2 kHz
12 kHz	16.9 kHz	12.7 kHz	17.8 kHz
13 kHz	18.3 kHz	13.7 kHz	19.2 kHz
15 kHz	21.2 kHz	15.9 kHz	22.3 kHz
16 kHz	22.4 kHz	16.8 kHz	23.5 kHz
18 kHz	25.2 kHz	19.0 kHz	26.5 kHz
20 kHz	28.4 kHz	21.3 kHz	29.8 kHz

22 kHz	31.2 kHz	23.4 kHz	32.8 kHz
24 kHz	33.8 kHz	25.4 kHz	35.6 kHz
27 kHz	38.1 kHz	28.7 kHz	40.1 kHz
30 kHz	42.1 kHz	31.7 kHz	44.3 kHz
33 kHz	46.8 kHz	35.2 kHz	49.2 kHz
36 kHz	50.1 kHz	37.7 kHz	52.7 kHz
39 kHz	54.8 kHz	41.2 kHz	57.6 kHz
43 kHz	61.1 kHz	46.0 kHz	64.3 kHz
47 kHz	66.2 kHz	49.8 kHz	69.6 kHz
51 kHz	72.3 kHz	54.3 kHz	76.0 kHz
56 kHz	79.5 kHz	59.8 kHz	83.6 kHz
62 kHz	86.3 kHz	64.9 kHz	90.8 kHz
68 kHz	96.5 kHz	72.6 kHz	101 kHz
75 kHz	106 kHz	79.7 kHz	111 kHz
82 kHz	114 kHz	86.0 kHz	120 kHz
91 kHz	129 kHz	97.3 kHz	136 kHz
100 kHz	140 kHz	105 kHz	147 kHz
110 kHz	154 kHz	116 kHz	162 kHz
120 kHz	169 kHz	127 kHz	178 kHz
130 kHz	182 kHz	137 kHz	192 kHz
150 kHz	210 kHz	158 kHz	221 kHz
160 kHz	223 kHz	168 kHz	235 kHz
180 kHz	253 kHz	190 kHz	266 kHz
200 kHz	280 kHz	211 kHz	295 kHz
220 kHz	308 kHz	232 kHz	324 kHz
240 kHz	336 kHz	253 kHz	353 kHz
270 kHz	380 kHz	286 kHz	400 kHz
300 kHz	420 kHz	316 kHz	441 kHz
330 kHz	467 kHz	352 kHz	491 kHz
360 kHz	506 kHz	380 kHz	532 kHz
390 kHz	550 kHz	414 kHz	578 kHz
430 kHz	599 kHz	451 kHz	629 kHz
470 kHz	660 kHz	497 kHz	693 kHz
510 kHz	715 kHz	538 kHz	750 kHz
560 kHz	786 kHz	592 kHz	826 kHz
620 kHz	867 kHz	653 kHz	912 kHz
680 kHz	952 kHz	717 kHz	1.00 MHz

750 kHz	1.05 MHz	791 kHz	1.10 MHz
820 kHz	1.14 MHz	859 kHz	1.19 MHz
910 kHz	1.27 MHz	960 kHz	1.34 MHz
1.0 MHz	1.40 MHz	1.06 MHz	1.47 MHz
1.1 MHz	1.53 MHz	1.15 MHz	1.61 MHz
1.2 MHz	1.66 MHz	1.26 MHz	1.75 MHz
1.3 MHz	1.80 MHz	1.36 MHz	1.89 MHz
1.5 MHz	2.06 MHz	1.56 MHz	2.17 MHz
1.6 MHz	2.19 MHz	1.66 MHz	2.29 MHz
1.8 MHz	2.51 MHz	1.91 MHz	2.63 MHz
2.0 MHz	2.75 MHz	2.10 MHz	2.88 MHz
2.2 MHz	3.00 MHz	2.30 MHz	3.14 MHz
2.4 MHz	3.30 MHz	2.54 MHz	3.45 MHz
2.7 MHz	3.63 MHz	2.81 MHz	3.78 MHz
3.0 MHz	4.09 MHz	3.18 MHz	4.22 MHz
4 MHz	5.30 MHz	4.23 MHz	5.30 MHz
5 MHz	5.78 MHz	4.81 MHz	5.41 MHz
6 MHz	6.31 MHz	5.50 MHz	5.82 MHz
8 MHz	8.07 MHz	7.21 MHz	6.90 MHz

Flattop

When Option DP2, B40, or wider IF Bandwidth option is installed, the capability for arbitrary Digital IF bandwidths is available. However, for instruments without Option DP2, B40 or wider IF Bandwidth option, the selectable Flattop filter bandwidths are predefined as shown in the following table. There are 134 Digital IF BWs (RBWs).

The table in the section ["Flattop Filters" on page 1402](#) lists all 134 Flattop filter types.

Flattop Filters

3.0 Hz	3.3 Hz	3.6 Hz	3.9 Hz
4.3 Hz	4.7 Hz	5.1 Hz	5.6 Hz
6.2 Hz	6.8 Hz	7.5 Hz	8.2 Hz
9.1 Hz	10 Hz	11 Hz	12 Hz
13 Hz	15 Hz	16 Hz	18 Hz
20 Hz	22 Hz	24 Hz	27 Hz
30 Hz	33 Hz	36 Hz	39 Hz
43 Hz	47 Hz	51 Hz	56 Hz

62 Hz	68 Hz	75 Hz	82 Hz
91 Hz	100 Hz	110 Hz	120 Hz
130 Hz	150 Hz	160 Hz	180 Hz
200 Hz	220 Hz	240 Hz	270 Hz
300 Hz	330 Hz	360 Hz	390 Hz
430 Hz	470 Hz	510 Hz	560 Hz
620 Hz	680 Hz	750 Hz	820 Hz
910 Hz	1.0 kHz	1.1 kHz	1.2 kHz
1.3 kHz	1.5 kHz	1.6 kHz	1.8 kHz
2.0 kHz	2.2 kHz	2.4 kHz	2.7 kHz
3.0 kHz	3.3 kHz	3.6 kHz	3.9 kHz
4.3 kHz	4.7 kHz	5.1 kHz	5.6 kHz
6.2 kHz	6.8 kHz	7.5 kHz	8.2 kHz
9.1 kHz	10 kHz	11 kHz	12 kHz
13 kHz	15 kHz	16 kHz	18 kHz
20 kHz	22 kHz	24 kHz	27 kHz
30 kHz	33 kHz	36 kHz	39 kHz
43 kHz	47 kHz	51 kHz	56 kHz
62 kHz	68 kHz	75 kHz	82 kHz
91 kHz	100 kHz	110 kHz	120 kHz
130 kHz	150 kHz	160 kHz	180 kHz
200 kHz	220 kHz	240 kHz	270 kHz
300 kHz	330 kHz	390 kHz	430 kHz
510 kHz	620 kHz	750 kHz	1.0 MHz
1.5 MHz	3.0 MHz	4 MHz	5 MHz
6 MHz	8 MHz		

Filter BW

This feature is only available when Option DP2, B40, or wider IF Bandwidth option is installed.

Key Path	BW
Mode	BASIC
Remote Command	[:SENSe]:WAVeform:DIF:FILTer:BANDwidth <freq> [:SENSe]:WAVeform:DIF:FILTer:BANDwidth? [:SENSe]:WAVeform:DIF:FILTer:BANDwidth:AUTO ON OFF 1 0 [:SENSe]:WAVeform:DIF:FILTer:BANDwidth:AUTO?
Example	WAV:DIF:FILT:BAND 1MHz

	WAV:DIF:FILT:BAND? WAV:DIF:FILT:BAND:AUTO 0 WAV:DIF:FILT:BAND:AUTO?
Notes	You must be in the IQ Analyzer (Basic) mode to use this command. Use INSTRUMENT:SElect to set the mode.
Dependencies	This feature is only available when Option DP2, B40, or wider IF Bandwidth option is installed.
Couplings	Sets the same value as the current Digital IF BW value upon a preset or when Channel Filter Bandwidth Auto is ON.
Preset	Same value as Digital IF BW ON
State Saved	Saved in instrument state.
Min	10 Hz
Max	Clipped to the current Digital IF BW value.
Initial S/W Revision	A.04.00, A.13.00

Channel Filter Bandwidth Bwcc (Remote Command Only)

This is the backward compatibility command for Channel Filter Bandwidth.

Mode	BASIC
Remote Command	<pre>[:SENSe] :WAVeform:WBIF:FILTer:BANDwidth <real> [:SENSe] :WAVeform:WBIF:FILTer:BANDwidth?</pre>
Example	WAV:WBIF:FILT:BAND 0.3 WAV:WBIF:FILT:BAND?
Notes	You must be in the IQ Analyzer (Basic) mode to use this command. Use INSTRUMENT:SElect to set the mode.
Dependencies	This feature is only available when Option DP2, B40, or wider IF Bandwidth option is installed.
Couplings	The value is determined by the following equation. $\text{ChannelFilterBwBwcc} = (\text{ChannelFilterBw} / (\text{DigitalIFBw} * \text{OverSampleRatio}))$
Preset	0.8
State Saved	Saved in instrument state.
Min	0.01
Max	1.0
Initial S/W Revision	A.04.00
Modified at S/W Revision	A.13.00

Filter Alpha

Sets the filter alpha for the DIF filter. This feature is only available when Option DP2, B40, or wider IF Bandwidth option is installed.

Key Path	BW
Mode	BASIC
Remote Command	[:SENSe] :WAVeform:DIF:FILTer:ALPHa <real> [:SENSe] :WAVeform:DIF:FILTer:ALPHa?
Example	WAV:DIF:FILT:ALPH 0.5 WAV:DIF:FILT:ALPH?
Notes	You must be in the IQ Analyzer (Basic) mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This feature is only available when Option DP2, B40, or wider IF Bandwidth option is installed.
Preset	0.2
State Saved	Saved in instrument state.
Min	0.01
Max	1.00
Backwards Compatibility SCPI	[:SENSe] :WAVeform:WBIF:FILTer:ALPHa
Modified at S/W Revision	A.13.00

Cont (Continuous Measurement/Sweep)

Sets the analyzer for Continuous measurement operation. The single/continuous state is Meas Global so the setting will affect all measurements. If you are Paused, pressing Cont does a Resume.

Key Path	Front-panel key
Remote Command	:INITiate:CONTinuous OFF ON 0 1 :INITiate:CONTinuous?
Example	:INIT:CONT 0 puts analyzer in Single measurement operation. :INIT:CONT 1 puts analyzer in Continuous measurement operation
Preset	ON (Note that SYST:PRESet sets INIT:CONT to ON but *RST sets INIT:CONT to OFF)
State Saved	Saved in instrument state
Backwards Compatibility Notes	For Spectrum Analysis mode in ESA and PSA, there is no Cont hardkey, instead there is a Sweep Single/Cont key. In these analyzers, switching the Sweep Single/Cont key from Single to Cont restarts averages (displayed average count reset to 1), but does not restart Max Hold and Min Hold. The X-Series has Single and Cont keys in place of the SweepSingleCont key. In the X-Series, if in single measurement, the Cont key (and INIT:CONT ON) switches to continuous measurement, but never restarts a measurement and never resets a sweep.
Initial S/W Revision	Prior to A.02.00

In Swept SA Measurement (Spectrum Analysis Mode):

The analyzer takes repetitive sweeps, averages, measurements, etc., when in Continuous mode. When the average count reaches the Average/Hold Number the count stops incrementing, but the analyzer keeps sweeping. See the Trace/Detector section for the averaging formula used both before and after the Average/Hold Number is reached. The trigger condition must be met prior to each sweep. The type of trace processing for multiple sweeps, is set under the Trace/Detector key, with choices of Trace Average, Max Hold, or Min Hold.

In Other Measurements/Modes:

With Avg/Hold Num (in the Meas Setup menu) set to Off or set to On with a value of 1, a sweep is taken after the trigger condition is met; and the analyzer continues to take new sweeps after the current sweep has completed and the trigger condition is again met. However, with Avg/Hold Num set to On with a value >1, multiple sweeps (data acquisitions) are taken for the measurement. The trigger condition must be met prior to each sweep. The sweep is not stopped when the average count k equals the number N set for Avg/Hold Num is reached, but the number k stops incrementing. A measurement average usually applies to all traces, marker results, and numeric results. But sometimes it only applies to the numeric results.

If the analyzer is in Single measurement, pressing the Cont key does not change k and does not cause the sweep to be reset; the only action is to put the analyzer into Continuous measurement operation.

If it is already in continuous sweep:

the INIT:CONT 1 command has no effect

the INIT:CONT 0 command will place the analyzer in Single Sweep but will have no effect on the current sequence until $k = N$, at which point the current sequence will stop and the instrument will go to the idle state.

13 Waveform Measurement
File

File

See "File" on page 320

FREQ/Channel

Accesses a menu of keys that allows you to control the Frequency parameters of the instrument.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

ARFCN

Sets the analyzer to a frequency that corresponds to the ARFCN (Absolute RF Channel Number). Used to enter the channel to be measured for the selected band. If the Center Freq value entered does not exactly correlate with an ARFCN, the softkey label changes to display the closest ARFCN to the selected frequency, along with a > or < symbol indicating whether the frequency is above or below that ARFCN.

Key Path	FREQ Channel
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel:ARFCn RFCHannel <integer></code> <code>[:SENSe] :CHANnel:ARFCn RFCHannel?</code>
Example	CHAN:ARFC 3 CHAN:ARFC?
Notes	This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not available (blank).
Couplings	Coupled with Center Frequency . Setting ARFCN sets Center Freq to the value corresponding to that ARFCN. BMT Freq choice changes this parameter.
Preset	1
State Saved	Saved in instrument state.
Range	Different for each BAND as follows: E-GSM: 0 to 124, and 975 to 1023 P-GSM: 1 to 124 R-GSM: 0 to 124(MS), and 955 to 1023(BTS) DCS1800: 512 to 885 PCS1900: 512 to 810 GSM450: 259 to 293 GSM480: 306 to 340 GSM700: 438 to 516 GSM850: 128 to 251 T-GSM 810: 350 to 425

Min	Different for each BAND as follows: E-GSM: 0(MS), and 975(BTS) P-GSM: 1 R-GSM: 0(MS), and 955(BTS) DCS1800: 512 PCS1900: 512 GSM450: 259 GSM480: 306 GSM700: 438 GSM850: 128 T-GSM 810: 350
Max	Different for each BAND as follows: E-GSM: 124(MS), and 1023(BTS) P-GSM: 124 R-GSM: 124(MS), and 1023(BTS) DCS1800: 885 PCS1900: 810 GSM450: 293 GSM480: 340 GSM700: 516 GSM850: 251 T-GSM 810: 425
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.07.00

Center Freq

Sets the center frequency to be measured for the selected band. It is coupled with ARFCN – setting Center Freq sets ARFCN to the channel corresponding to that frequency.

For more information, see the section ["Center Freq" on page 2269](#).

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

Time Slot

This functionality is the same as that of the corresponding key in the Demod menu. See ["Time Slot" on page 2288](#) for details.

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

Burst Type

This functionality is the same as that of the corresponding key in the Demod menu. See ["Burst Type" on page 2289](#) for details.

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

TSC (Std)

This functionality is the same as that of the corresponding key in the Demod menu. See ["TSC \(Std\)" on page 2291](#) for details.

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

Center Freq

Sets the frequency that corresponds to the horizontal center of the graticule (when frequency Scale Type is set to linear). While adjusting the Center Frequency the Span is held constant, which means that both Start Frequency and Stop Frequency will change.

Pressing Center Freq also sets the frequency entry mode to Center/Span. In Center/Span mode, the center frequency and span values are displayed below the graticule, and the default active function in the Frequency menu is Center Freq.

The center frequency setting is the same for all measurements within a mode, that is, it is Meas Global. Some modes are also able to share a Mode Global center frequency value. If this is the case, the Mode will have a Global Settings key in its Mode Setup menu.

The Center Freq function sets (and queries) the Center Frequency for the currently selected input. If your analyzer has multiple inputs, and you select another input, the Center Freq changes to the value for that input. SCPI commands are available to directly set the Center Freq for a specific input.

Center Freq is remembered as you go from input to input. Thus you can set a Center Freq of 10 GHz with the RF Input selected, change to BBIQ and set a Center Freq of 20 MHz, then switch to External Mixing and set a Center Freq of 60 GHz, and when you go back to the RF Input the Center Freq will go back to 10 GHz; back to BBIQ and it is 20 MHz; back to External Mixing and it is 60 GHz.

See ["RF Center Freq" on page 1414](#)

See [Ext Mix Center Freq](#)

See ["I/Q Center Freq" on page 1416](#)

See ["Center Frequency Presets" on page 1413](#)

Key Path	FREQ Channel
Scope	Meas Global
Remote Command	[:SENSe] :FREQuency:CENTer <freq> [:SENSe] :FREQuency:CENTer?
Example	FREQ:CENT 50 MHz FREQ:CENT UP changes the center frequency to 150 MHz if you use FREQ:CENT:STEP 100 MHz to set the center frequency step size to 100 MHz FREQ:CENT?
Notes	This command sets either the RF or I/Q Center Frequency depending on the selected input. For RF input it is equivalent to FREQ:RF:CENT For I/Q input it is equivalent to FREQ:IQ:CENT Preset and Max values are dependent on Hardware Options (5xx) If no terminator (e.g. MHz) is sent the terminator Hz is used. If a terminator with unit other than Frequency is used, an invalid suffix error message is generated.
Dependencies	The Center Frequency can be limited by Start or Stop Freq limits, if the Span is so large that Start or Stop reach their limit.
Couplings	When operating in "swept span", any value of the Center Frequency or Span that is within the frequency range of the analyzer is allowed when the value is being set through the front panel numeric key pad or the SCPI command. The other parameter is forced to a different value if needed, to keep the Start and the Stop Frequencies within the analyzer's frequency range
Preset	Depends on instrument maximum frequency, mode, measurement, and selected input. See "Center Frequency Presets" on page 1413 and "RF Center Freq" on page 1414 and Ext Mix Center Freq and "I/Q Center Freq" on page 1416.
State Saved	Saved in instrument state
Min	Depends on instrument maximum frequency, mode, measurement, and selected input.. See "Center Frequency Presets" on page 1413 and "RF Center Freq" on page 1414 and "I/Q Center Freq" on page 1416.
Max	Depends on instrument maximum frequency, mode, measurement, and selected input.. See "Center Frequency Presets" on page 1413 and "RF Center Freq" on page 1414 and "I/Q Center Freq" on page 1416.
Default Unit	Hz
Status Bits/OPC Dependencies	Non-overlapped
Initial S/W Revision	Prior to A.02.00

Center Frequency Presets

The following table provides the Center Frequency Presets for the Spectrum Analyzer mode, and the Max Freq, for the various frequency options:

Freq Option	CF after Mode Preset	Stop Freq after Mode Preset	Max Freq (can't tune above)
503 (all but N9000A)	1.805 GHz	3.6 GHz	3.7 GHz
503 (N9000A)	1.505 GHz	3.0 GHz	3.08 GHz
507 (all but N9000A)	3.505 GHz	7.0 GHz	7.1 GHz
507 (N9000A)	3.755 GHz	7.5 GHz	7.58 GHz
508 (all but N9038A)	1.805 GHz	3.6 GHz	8.5 GHz
508 (N9038A)	4.205 GHz	8.4 GHz	8.5 GHz
513	6.805 GHz	13.6 GHz	13.8 GHz
526 (all but N9000A and N9038A)	13.255 GHz	26.5 GHz	27.0 GHz
526 (N9000A)	13.255 GHz	26.5 GHz	26.55 GHz
526 (N9038A)	1.805 GHz	3.6 GHz	27.0 GHz
532	16.005 GHz	32.0 GHz	32.5 GHz
543	21.505 GHz	43.0 GHz	TBD
544	22.005 GHz	44.0 GHz	44.5 GHz
550	25.005 GHz	50.0 GHz	51 GHz

Input 2:

Model	CF after Mode Preset	Stop Freq after Mode Preset	Max Freq (can't tune above)
N9000A opt C75	0.7505GHz	1.5 GHz	1.58 GHz
N9038A	505 MHz	1 GHz	1.000025 GHz

Tracking Generator Frequency Limits (N9000A only):

Tracking Generator Option	Min Freq (clips to this freq when turn TG on and can't tune below while TG on)	If above this Freq, Stop Freq clipped to this Freq when TG turned on	Max Freq (can't tune above) while TG on
T03	9 kHz	3.0 GHz	3.08 GHz
T06	9 kHz	6.0 GHz	6.05 GHz

The following table shows the Center Frequency Presets for modes other than Spectrum Analyzer:

Mode	CF Preset for RF
WCDMA	1 GHz
WIMAXOFDMA,	1 GHz
BASIC	1 GHz
ADEMOD	1 GHz
VSA	1 GHz
TDSCDMA	1 GHz
PNOISE	1 GHz
LTE	1 GHz
LTETDD	1 GHz
MSR	1 GHz
GSM	935.2 MHz
NFIGURE	1.505 GHz

RF Center Freq

SCPI command for specifying the RF Center Frequency. This command will set the Center Frequency to be used when the RF input is selected, even if the RF input is not the input that is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

Scope	Meas Global
Remote Command	<code>[:SENSe] :FREQuency:RF:CENTer <freq></code> <code>[:SENSe] :FREQuency:RF:CENTer?</code>
Example	<code>FREQ:RF:CENT 30 MHz</code>
Notes	This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode.
Dependencies	If the electronic/soft attenuator is enabled, any attempt to set Center Frequency such that the Stop

	Frequency would be >3.6 GHz fails and results in an advisory message. If the equivalent SCPI command is sent, this same message is generated as part of a “-221, Settings conflict” warning. If Source Mode is set to Tracking, and the Max or Min Center Freq is therefore limited by the limits of the source, a warning message is generated, “Data out of range;clipped to source max/min” if these limits are exceeded. Note that for an external source, these limits can be affected by the settings of Source Numerator, Source Denominator and Power Sweep.
Preset	See table above
State Saved	Saved in instrument state.
Min	-79.999995 MHz, unless Source Mode is set to Tracking, in which case it is limited by the minimum frequency of the Source
Max	See table above. Basically instrument maximum frequency - 5 Hz. Note that, if the Source Mode is set to Tracking, the effective instrument maximum frequency may be limited by the source maximum frequency. If the knob or step keys are being used, also depends on the value of the other three interdependent parameters Span, Start Frequency and Stop Frequency
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Ext Mix Center Freq

SCPI command for specifying the External Mixer Center Frequency. This command will set the Center Frequency to be used when the External Mixer is selected, even if the External Mixer input is not the input which is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

Scope	Meas Global
Remote Command	<code>[:SENSe] :FREQuency:EMIXer:CENTer <freq></code> <code>[:SENSe] :FREQuency:EMIXer:CENTer?</code>
Example	<code>:FREQ:EMIX:CENT 60 GHz</code> <code>:FREQ:EMIX:CENT?</code>
Notes	This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode.
Couplings	When returning to External Mixing after having been switched to one of the other inputs (e.g., RF), you will come back into the settings that you had when you left External Mixing. So you will come back to the band you were in with the Center Frequency that you had. However, Span is not an input-dependent parameter, therefore you will bring the span over from the other input. Therefore, the analyzer comes back with the span from the previous input, limited as necessary by the current mixer setup.
Preset	When a Mode Preset is performed while in External Mixing, the Start frequency of the current Mode is set to the nominal Min Freq of the lowest harmonic range in the Harmonic Table for the current mixer setup. Similarly, the Stop frequency of the current Mode is set to the nominal Max Freq of the highest harmonic range in the Harmonic Table. The Center Freq thus presets to the point arithmetically equidistant from these two frequencies.

	<p>If the current measurement has a limited Span available to it, and cannot achieve the Span shown in the table (Span=Stop Freq – Start Freq), the analyzer uses the maximum Span the measurement allows, and still sets the Center Freq to the midpoint of the Start and Stop Freq values in the Harmonic Table.</p> <p>When Restore Input/Output Defaults is performed, the mixer presets to the 11970A, whose Start and Stop frequencies are 26.5 and 40 GHz respectively. The center of these two frequencies is 33.25 GHz.</p> <p>Therefore, after a Restore Input/Output Defaults, if you go into External Mixing and do a Mode Preset while in the Spectrum Analyzer Mode, the resulting Center Freq is 33.25 GHz.</p>
State Saved	Saved in instrument state.
Min	The minimum frequency in the currently selected mixer band + 5 Hz
Max	The maximum frequency in the currently selected mixer band – 5 Hz If the knob or step keys are being used, also depends on the value of the other three interdependent parameters Span, Start Frequency and Stop Frequency
Initial S/W Revision	A.08.01

I/Q Center Freq

SCPI command for specifying the I/Q Center Frequency. This command will set the Center Frequency to be used when the I/Q input is selected, even if the I/Q input is not the input which is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

Scope	Meas Global
Remote Command	[:SENSe] :FREQuency:IQ:CENTer <freq> [:SENSe] :FREQuency:IQ:CENTer?
Example	FREQ:IQ:CENt: 30 MHz
Notes	This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode.
Preset	0 Hz
State Saved	Saved in instrument state.
Min	-40.049995 MHz
Max	40.049995 MHz
Initial S/W Revision	Prior to A.02.00

BMT Freq

Enables quick selection from a subset of the available ARFCN numbers for the Top, Middle, or Bottom frequency in the selected band.

Key Path	FREQ Channel
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Mode	GSM
Scope	Meas Global
Notes	This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this.
Dependencies	When I/Q Input is selected, this key is not available (blank).
Couplings	BMT choice changes ARFCN and Center Freq. Chosen ARFCN will be displayed on each menu key.
Range	Top Middle Bottom
Initial S/W Revision	Prior to A.02.00

BMT Freq Top

Sets the analyzer to the frequency of the highest ARFCN (Absolute RF Channel Number) of the selected radio band.

Key Path	FREQ Channel, BMT Freq
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel:ARFCn RFChannel:TOP
Example	CHAN:ARFC:TOP
Notes	1. This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. 2. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not displayed.
Couplings	Change [:SENSe]:CHANnel:ARFCn RFChannel as follows: E-GSM: 124 P-GSM: 124 R-GSM: 124 DCS 1800: 885 PCS 1900: 810 GSM 450: 293 GSM 480: 340 GSM 700: 516 GSM 850: 251 T-GSM 810: 425 Change BMT ARFCN to BMT FreqTOP. Change [:SENSe]:FREQuency:CENter as follows: E-GSM: 959.800 MHz P-GSM: 959.800 MHz R-GSM: 959.800 MHz

	DCS 1800: 1879.80 MHz
	PCS 1900: 1989.80 MHz
	GSM 450: 467.400 MHz
	GSM 480: 495.800 MHz
	GSM 700: 792.800 MHz
	GSM 850: 893.800 MHz
	T-GSM810: 866.000 MHz

State Saved	No
Initial S/W Revision	Prior to A.02.00

BMT Freq Middle

Sets the analyzer to the frequency of the middle ARFCN (Absolute RF Channel Number) of the selected radio band.

Key Path	FREQ Channel, BMT Freq
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :ARFCn RFCHannel :MIDDLE</code>
Example	CHAN:ARFC:MIDD
Notes	<ol style="list-style-type: none"> 1. This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. 2. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not displayed.
Couplings	Change [:SENSe]:CHANnel:ARFCn RFCHannel as follows: E-GSM: 38 P-GSM: 63 R-GSM: 28 DSC 1800: 699 PCS 1900: 661 GSM 450: 276 GSM 480: 323 GSM 700: 477 GSM 850: 190 T-GSM 810: 388 Change BMT ARFCN to BMT FreqMIDDLE. Change [:SENSe]:FREQuency:CENTer as follows: E-GSM: 942.600 MHz P-GSM: 947.600 MHz R-GSM: 940.600 MHz

	DCS 1800: 1842.60 MHz
	PCS 1900: 1960.00 MHz
	GSM 450: 464.000 MHz
	GSM 480: 492.400 MHz
	GSM 700: 755.000 MHz
	GSM 850: 881.600 MHz
	T-GSM 810: 858.600 MHz
State Saved	No
Initial S/W Revision	Prior to A.02.00

BMT Freq Bottom

Sets the analyzer to the frequency of the lowest ARFCN (Absolute RF Channel Number) of the selected radio band.

Key Path	FREQ Channel, BMT Freq
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel:ARFCn RFCHannel:BOTTom
Example	CHAN:ARFC:BOTT
Notes	<ol style="list-style-type: none"> 1. This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. 2. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not displayed.
Couplings	Change [:SENSe]:CHANnel:ARFCn RFCHannel as follows: E-GSM: 975 P-GSM: 1 R-GSM: 955 DCS 1800: 512 PCS 1900: 512 GSM 450: 259 GSM 480: 306 GSM 700: 438 GSM 850: 128 T-GSM 810: 350 Change BMT ARFCN to BMT FreqBOTTOM. Change [:SENSe]:FREQuency:CENTer as follows: E-GSM: 925.200 MHz P-GSM: 935.200 MHz R-GSM: 921.200 MHz

	DCS 1800: 1805.20 MHz
	PCS 1900: 1930.20 MHz
	GSM 450: 460.600 MHz
	GSM 480: 489.000 MHz
	GSM 700: 747.2 MHz
	GSM 850: 869.200 MHz
	T-GSM 810: 851.000 MHz
State Saved	No
Initial S/W Revision	Prior to A.02.00

Carrier Setup

Allows you to set carrier parameters.

Key Path	FREQ Channel
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Initial S/W Revision	A.06.00
Modified at S/W Revision	A.14.00

Carriers

Defines the number of carriers.

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :COUNT <integer></code> <code>[:SENSe] :CHANnel :CARRier :COUNT?</code>
Example	CHAN:CARR:COUN 3 CHAN:CARR:COUN?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Couplings	This can change when the SCPI command of the Carrier Power Present or the Carrier Interval is sent.
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	16

Initial S/W Revision	A.06.00
Modified at S/W Revision	A.13.00

Reference Carrier

Defines the reference active carrier. The Reference Carrier frequency point is always aligned with the Measurement Global Center Frequency. The minimum value 1 specifies the lowest frequency carrier among the active carriers. The maximum value specifies the highest frequency carrier among the active carriers.

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :RCARrier <integer></code> <code>[:SENSe] :CHANnel :CARRier :RCARrier ?</code>
Example	CHAN:CARR:RCAR 3 CHAN:CARR:RCAR ?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	The maximum value depends on the number of carriers. If you set it to more than the number of carriers, it's clipped to the number of carriers. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Couplings	When you decrease the number of carriers to a value which is less than this value, this is clipped to the value.
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	Number of carriers
Initial S/W Revision	A.06.00

Configure Carriers

Opens a menu of keys that allows you to configure carriers.

Key Path	FREQ Channel, Multi Carrier Setup
Dependencies	This key is grayed out when there is only one carrier. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Initial S/W Revision	A.06.00

Select Carrier

Selects a carrier to configure.

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	The maximum value depends on the number of carriers. This key is only shown when the N9071A–3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned. This parameter is unavailable when there is only one carrier.
Couplings	This value can change when you decrease the number of carriers.
Preset	1
State Saved	No
Min	1
Max	Number of carriers
Initial S/W Revision	A.06.00

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :CARRier :LIST :COUPle OFF ON 0 1, ... [:SENSe] :CHANnel :CARRier :LIST :COUPle ?
Example	CHAN:CARR:LIST:COUP OFF CHAN:CARR:LIST:COUP?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This key is only shown when the N9071A–3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	When Couple is selected, the carrier settings are coupled to carrier #1. Coupled parameters are Carrier Power Present, Carrier Interval. When a setting is changed, the couple is set to Man automatically. Carrier #1 is always set to couple and cannot be changed. Couple/Man selection on the Carrier key is not displayed when selected carrier number is #1.
Preset	ON
State Saved	No
Range	Couple Man
Initial S/W Revision	A.06.00

Carrier Power Present

Specifies whether each of carriers is active or not.

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :LIST :PPResent YES NO, ...</code> <code>[:SENSe] :CHANnel :CARRier :LIST :PPResent ?</code>
Example	CHAN:CARR:LIST:PPR YES CHAN:CARR:LIST:PPR?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode. Missing values are not permitted, therefore if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Dependencies	This parameter is unavailable when there is only one carrier. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	Coupled to the number of carriers. When the SCPI command is sent, the number of carriers will be set to the number of entries in the parameter list.
Preset	YES
State Saved	Saved in instrument state.
Range	Yes No
Initial S/W Revision	A.06.00

Carrier Interval

Specifies the frequency interval between the Carrier #n and #n+1 center frequencies.

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :LIST :INTerval <freq>, ...</code> <code>[:SENSe] :CHANnel :CARRier :LIST :INTerval ?</code>
Example	CHAN:CARR:LIST:INT 600k CHAN:CARR:LIST:INT?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode. The softkey for the last carrier (say, #N) is grayed out.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned. This parameter is unavailable when there is only one carrier.
Couplings	Coupled to the number of carriers. When the SCPI command is sent, the number of carriers will be

	set to the number of entries in the parameter list. Changing Carrier Interval might affect the Span.
Preset	600kHz
State Saved	Saved in instrument state.
Min	400 kHz
Max	100 MHz
Initial S/W Revision	A.06.00
Modified at S/W Revision	A.07.00, A.08.00

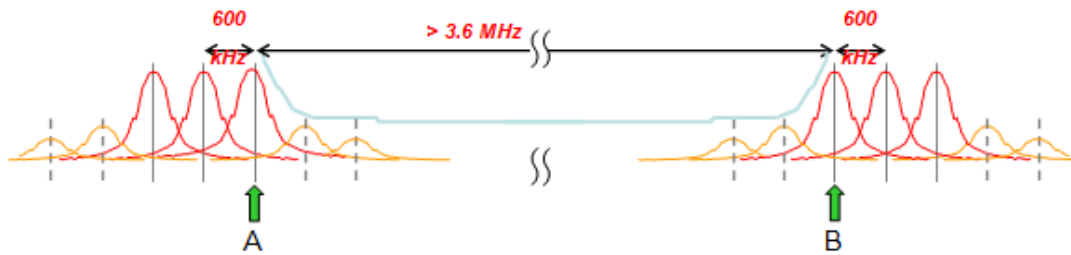
Carrier Frequency Allocation

Specifies the carrier frequency allocation. There are two types of allocation, contiguous and non-contiguous. Non-Contiguous frequency allocation is defined as an allocation where two groups of frequencies are separated with at least [3.6] MHz carrier separation between the innermost carriers. In case of the non-contiguous frequency allocation, tests will be measured between the uppermost carrier A of the lower frequency group and the lowermost carrier B of the upper frequency group.

See ["An example of non-contiguous frequency allocation" on page 1425](#)

Key Path	FREQ Channel, Multi Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :CARRier :FALLocation CONTiguous NCONTiguous [:SENSe] :CHANnel :CARRier :FALLocation?
Example	CHAN:CARR:FALL NCON CHAN:CARR:FALL?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This menu key is available only when the number of carriers is more than one. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Preset	CONTiguous
State Saved	Saved in instrument state.
Range	Contiguous Non-Contiguous
Readback Text	CONTiguous NCONTiguous
Initial S/W Revision	A.07.00

An example of non-contiguous frequency allocation



Non-Contiguous

Opens a menu of keys that allows you to set non-contiguous frequency allocation parameters.

Key Path	FREQ Channel, Multi Carrier Setup, Carr Freq Alloc
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Initial S/W Revision	A.07.00

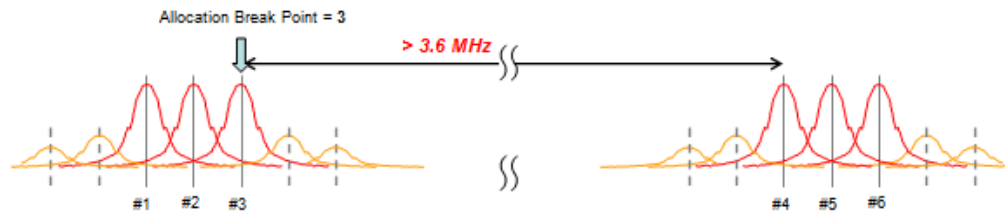
Allocation Break Pt

Specifies an allocation break point that is a sequence (or index) number of the uppermost carrier in the lower frequency group.

See ["An example of allocation break point" on page 1427](#)

Key Path	FREQ Channel, Multi Carrier Setup, Carr Freq Alloc, Non-Contiguous
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :FALLocation :NCONtiguous :ABPoint <integer></code> <code>[:SENSe] :CHANnel :CARRier :FALLocation :NCONtiguous :ABPoint ?</code>
Example	<code>CHAN:CARR:FALL:NCON:ABP 3</code> <code>CHAN:CARR:FALL:NCON:ABP ?</code>
Notes	You must be in the GSM mode to use this command. Use <code>INSTRument:SElect</code> to set the mode.
Dependencies	The maximum value depends on the number of carriers. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	This value can change when you decrease the number of carriers.
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	Number of carriers - 1
Initial S/W Revision	A.07.00
Modified at S/W Revision	A.13.00

An example of allocation break point



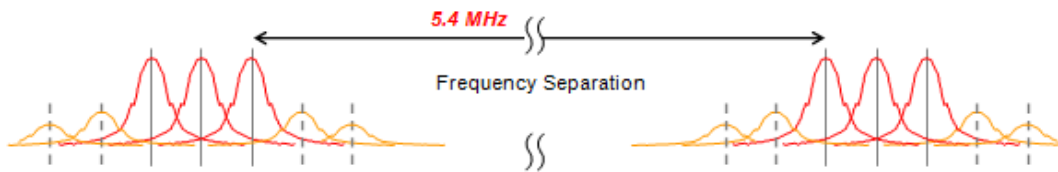
Freq Separation

Specifies frequency separation between the innermost of carriers.

See ["An example of frequency separation" on page 1428](#)

Key Path	FREQ Channel, Multi Carrier Setup, Carr Freq Alloc, Non-Contiguous
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :FALLocation :NCONtiguous :FSEParation <freq></code> <code>[:SENSe] :CHANnel :CARRier :FALLocation :NCONtiguous :FSEParation?</code>
Example	<code>CHAN:CARR:FALL:NCON:FSEP 5.4M</code> <code>CHAN:CARR:FALL:NCON:FSEP?</code>
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	Changing Frequency Separation might affect the Span
Preset	5.4 MHz
State Saved	Saved in instrument state.
Min	3.6 MHz
Max	100 MHz
Initial S/W Revision	A.07.00

An example of frequency separation



Carrier BPF

Selects whether to use the carrier bandpass filter.

Key Path	FREQ Channel, Multi Carrier SetupMode Setup, Demod
Mode	GSM
Remote Command	[:SENSe] :RADio:CARRier:NUMBer:AUTO ON OFF 1 0 [:SENSe] :RADio:CARRier:NUMBer:AUTO?
Example	RAD:CARR:NUMB:AUTO 1 RAD:CARR:NUMB:AUTO?
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	ON automatically changes to OFF when Multiple or Single is selected as Carrier BPF Type.
Preset	ON
State Saved	Saved in instrument state.
Range	Auto Man
Initial S/W Revision	A.06.00

Carrier BPF Type

Opens a menu of keys that allows you to select the type of the bandpass filter. When carriers other than the signal of interest are present, especially if they are strong, they can interfere with the measurement, making it difficult to sync and producing artificially high EVM results. When this condition exists, toggle from Single to Multi. A band-limited filter will help reduce the measurement interference.

BPF Type	Description
MULTiple	Enable multi carrier tolerance filter.
SINGle	Disable multi carrier tolerance filter

This parameter applies only to the following measurements:

- GMSK Phase & Frequency Error measurement
- EDGE EVM measurement
- GMSK Power vs. Time

- EDGE Power vs. Time

Key Path	FREQ Channel, Multi Carrier Setup, Carrier BPFMode Setup, Demod, Carrier BPF
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :RADio :CARRier :NUMBer SINGLE MULTiple</code> <code>[:SENSe] :RADio :CARRier :NUMBer ?</code>
Example	<code>RAD:CARR:NUMB SING</code> <code>RAD:CARR:NUMB ?</code>
Notes	The Carrier Bandpass Filter key is in the Mode Setup menu, but only EDGE EVM and GSM PFER measurements support this feature. In other measurements, this setting is not applicable. You must be in the GSM mode to use this command. Use <code>INSTRument:SElect</code> to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Preset	SINGLE
State Saved	Saved in instrument state.
Range	Single Multi
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

BTS Class

Selects a BTS class.

BTS Class	Definition
MC	Multicarrier BTS is defined as a class of BTS, characterized by the ability to, in addition to single carrier operation, process two or more carriers in common active RF components simultaneously, either in multicarrier transmitter only or, in both multicarrier transmitter and multicarrier receiver.
SC	Single carrier BTS is defined as a class of BTS, characterized by the ability to process one carrier in single carrier BTSs, not belonging to a Multicarrier BTS class.

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Remote Command	<code>[:SENSe] :CHANnel :CARRier :BASE :CLASs :AUTO ON OFF 1 0</code> <code>[:SENSe] :CHANnel :CARRier :BASE :CLASs :AUTO ?</code>
Example	<code>CHAN:CARR:BASE:CLAS:AUTO 1</code> <code>CHAN:CARR:BASE:CLAS:AUTO ?</code>
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.

Couplings	ON automatically changes to OFF when Multicarrier Class (MC) or Single carrier Class (SC) is selected as BTS Class.
Preset	ON
State Saved	Saved in instrument state.
Range	Auto Man
Initial S/W Revision	A.14.00

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :CARRier :BASE :CLASs SC MC [:SENSe] :CHANnel :CARRier :BASE :CLASs ?
Example	CHAN:CARR:BASE:CLAS MC CHAN:CARR:BASE:CLAS?

Notes
 You must be in the GSM mode to use this command.
 Use INSTRument:SElect to set the mode.
 Selection C1 and C2 are supported for backwards compatibility.
 When "C1" or "C2" is passed as SCPI command parameter, the BTS Class Auto is set to ON. As a result, it's converted to "SC" if the number of carriers is one, and otherwise "MC."

Dependencies	This parameter is available when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Preset	SC
State Saved	Saved in instrument state.
Range	Single Carrier Multi Carrier
Initial S/W Revision	A.06.00
Modified at S/W Revision	A.10.01, A14.00

Time Slot

Selects On or Off for slot searching. Generally, this feature is only valid in external and periodic timer trigger source modes that triggers every frame since another trigger source does not have the information that identifies the head of the frame. When Timeslot is set to On, the demodulation measurement is made on the nth timeslot specified by the trigger point + n timeslots, where n is the selected timeslot value 0 to 7.

This functionality is the same as Time Slot under the Freq/Channel menu.

Key Path	Mode Setup, Demod FREQ Channel
Mode	GSM

Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :SLOT <integer> [:SENSe] :CHANnel :SLOT? [:SENSe] :CHANnel :SLOT :AUTO OFF ON 0 1 [:SENSe] :CHANnel :SLOT :AUTO?
Example	CHAN:SLOT 0 CHAN:SLOT? CHAN:SLOT:AUTO OFF CHAN:SLOT:AUTO?
Notes	This functionality does not affect Combined GSM/EDGE measurement. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	0 OFF
State Saved	Saved in instrument state.
Min	0
Max	7
Initial S/W Revision	Prior to A.02.00

Burst Type

Sets the burst type that the analyzer will search for and to which it will synchronize.

This functionality is the same as Burst Type under the FREQ Channel menu.

Key	SCPI	Description
Sync (SCH)	SYNC	Burst length = 142 symbols Extended training sequences for CTS and COMPACT synchronization bursts are not supported.
Access (RACH)	ACCess	Burst length = 88 symbols Alternative training (synchronization) sequence "TS1" and "TS2" are supported only in GSMK Power vs. Time.
Normal - NB (TCH & CCH)	NORMAL	Burst length = 142 symbols Softkey label will be changed to 'Normal - NB' form 'Normal'
Higher Symbol Rate - HB (TCH & CCH)	HSRate	Burst length = 169 symbols This selection key is only shown when the N9071A-3FP license is installed.
Mixed (NB/HB for TSC sync)	MIXed	Enables auto detection between Normal (NB) and HSR (HB) TCH & CCH EDGE Burst. This selection key is only shown when the N9071A-3FP license is installed.

Measurement synchronization capability (Burst Sync = Training Seq)

	Sync	Access	Normal		HSR	Mixed
			GMSK	8PSK		
				16QAM		
				32QAM		
				AQPSK		
GMSK Phase & Freq Error measurement	Yes	Yes	Yes	No	N/A	
GMSK Power vs. Time measurement	Yes	Yes	Yes	No	(measures as Normal GMSK when selected)	
GMSK Output RF Spectrum measurement (when Trigger Source is Periodic Timer and Sync Source is Off)	No	No	Yes	No		
EDGE EVM measurement	No	No	No	Yes	Yes	Yes
EDGE Power vs. Time measurement	Yes	Yes	Yes	Yes	Yes	Yes
EDGE Output RF Spectrum measurement (when Trigger Source is Periodic Timer and Sync Source is Off.)	No	No	Yes	Yes	Yes	Yes

Key Path	Mode Setup, Demod FREQ Channel
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :BURSt NORMal SYNC ACCess HSRate MIXed [:SENSe] :CHANnel :BURSt?
Example	CHAN:BURS NORM CHAN:BURS?
Notes	This functionality does not affect the Combined GSM/EDGE measurement. Higher Symbol Rate and Mixed selections are only available when the N9071A-3FP license is installed. Otherwise these menu keys are blank. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Higher Symbol Rate and Mixed selection keys are not shown unless N9071A-3FP is installed. When unlicensed and SCPI is sent, an undefined header error is returned. When "Mixed" is selected, the Burst Sync menu key under the Meas Setup menu will be grayed out and Training Sequence (TSC) will be used for synchronization. The sync algorithm always runs in Training Sequence (TSC) synchronization because the Burst Type can be determined by looking at TSC in the signal. Original selection of Burst Sync will become effective again when the Burst Type selection is changed from "Mixed" to another one.
Preset	NORMal
State Saved	Saved in instrument state.
Range	Sync (SCH) Access (RACH) Normal - NB (TCH & CCH) Higher Symbol Rate - HB (TCH & CCH) Mixed (NB/HB for TSC sync)

Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

TSC (Std)

Allows you to select the Training Sequence Code that determines which burst is to be measured. Applicable only when Burst Sync is set to Training Sequence in the measurement. In the case of AQPSK, this parameter specifies TSC number of VAMOS sub-channel A. TSC of VAMOS sub-channel B is ignored.

This functionality is the same as TSC under the FREQ Channel menu.

This parameter applies only to the following measurements:

- GSMK/EDGE Power vs. Time measurement
- GSMK Phase & Frequency Error measurement
- EDGE EVM measurement

Selection	SCPI	Description
AutoDet	ON 1	The measurement is made on the first burst found to have any one of the valid TSCs in the range of 0 to 7. The measurement may be made on various timeslots if more than one timeslot has one of the 8 valid TSCs.
Man	OFF 0	The measurement is made on the first burst found to have the selected TSC. TSC numbers in the range of 0 to 7 can be selected. The measurement may be made on various timeslots if more than one timeslot has this same TSC.

Key Path	Mode Setup, Demod FREQ Channel
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe]:CHANnel:TSCode <integer> [:SENSe]:CHANnel:TSCode? [:SENSe]:CHANnel:TSCode:AUTO OFF ON 0 1 [:SENSe]:CHANnel:TSCode:AUTO?
Example	CHAN:TSC 3 CHAN:TSC? CHAN:TSC:AUTO 1 CHAN:TSC:AUTO?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. When Sync or Access is selected as Burst Type, this key is grayed out.
Preset	0 ON

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State Saved	Saved in instrument state.
Min	0
Max	7
Initial S/W Revision	Prior to A.02.00

Input/Output

See ["Input/Output" on page 196](#)

Marker

Accesses a menu that enables you to select, set up and control the markers for the current measurement.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Select Marker

Displays 12 markers available for selection.

Key Path	Marker
Initial S/W Revision	Prior to A.02.00

Marker Type

Sets the marker control mode to Normal, Delta, Fixed or Off. All interactions and dependencies detailed under the key description are enforced when the remote command is sent. If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules. At the same time, the Marker X Axis Value appears on the Active Function area.

The default active function is the active function for the currently selected marker control mode. If the current control mode is Off, there is no active function and the active function is turned off.

Key Path	Marker
Mode	BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN,,LTEATDD, LTEAFDD
Remote Command	:CALCulate:WAVeform:MARKer[1] 2 ... 12:MODE POSition DELTa OFF :CALCulate:WAVeform:MARKer[1] 2 ... 12:MODE?
Example	CALC:WAV:MARK:MODE OFF CALC:WAV:MARK:MODE?
Notes	If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules. At the same time, Marker X Axis Value appears on the Active Function area. Default Active Function: the active function for the selected marker's current control mode. If the current control mode is Off, there is no active function and the active function is turned off. Active Function Display: the marker X axis value entered in the active function area displays the marker value to its full entered precision. You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode.
Preset	OFF
State Saved	Saved in instrument state.

Range	Normal Delta Off
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Marker X Axis Value (Remote Command Only)

Sets the marker X Axis value in the current marker X Axis Scale unit. It has no effect if the control mode is Off, but is the SCPI equivalent of entering an X value if the control mode is Normal or Delta.

Mode	BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN,,LTEATDD, LTEAFDD
Remote Command	:CALCulate:WAVEform:MARKer[1] 2 ... 12:X <time> :CALCulate:WAVEform:MARKer[1] 2 ... 12:X?
Example	CALC:WAV:MARK:X 50 ms CALC:WAV:MARK:X?
Notes	If no suffix is sent, uses the fundamental units for the current marker X Axis Scale. If a suffix is sent that does not match the current marker X Axis Scale unit, an error "Invalid suffix" is generated. If the specified marker is Fixed and a Marker Function is on, error -221 "Settings conflict; cannot adjust Fixed marker while Marker Function is on" is generated. The query returns the marker's absolute X Axis value if the control mode is Normal, or the offset from the marker's reference marker if the control mode is Delta. The query is returned in the fundamental units for the current marker X Axis scale: Hz for Frequency and Inverse Time, seconds for Period and Time. If the marker is Off the response is not a number. You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode.
Preset	0
Preset	After a preset, all markers are turned OFF, so Marker X Axis Value query returns a not a number (NAN).
State Saved	No
Min	(9.9E+37
Max	9.9E+37
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Marker X Axis Position (Remote Command Only)

Sets the marker X position in trace points. It has no effect if the control mode is Off, but is the SCPI equivalent of entering a value if the control mode is Normal or Delta. The entered value is immediately translated into the current X Axis Scale units for setting the value of the marker.

Mode	BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN,,LTEATDD, LTEAFDD
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Remote Command	:CALCulate:WAVeform:MARKer[1] 2 ... 12:X:POSition <real> :CALCulate:WAVeform:MARKer[1] 2 ... 12:X:POSition?
Example	CALC:WAV:MARK:X:POS 500 CALC:WAV:MARK:X:POS?
Notes	The query returns the marker's absolute X Axis value in trace points if the control mode is Normal or the offset from the marker's reference marker in trace points if the control mode is Delta. The value is returned as a real number, not an integer, corresponding to the translation from X Axis Scale units to trace points. You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode.
Preset	0
Preset	After a preset, all markers are turned OFF, so Marker X Axis Value query returns a not a number (NAN).
State Saved	No
Min	(9.9E+37
Max	9.9E+37
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Marker Y Axis Value (Remote Command Only)

Queries the marker Y Axis value in the current marker Y Axis unit.

Mode	BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN,,LTEATDD, LTEAFDD
Remote Command	:CALCulate:WAVeform:MARKer[1] 2 ... 12:Y?
Example	CALC:WAV:MARK11:Y?
Notes	When the marker is on, IQ waveform returns I and Q values. Case #1 - Trace RF, I or Q: returns a single double value. >:CALC:WAV:MARK1:Y? -2.402406506109E+001 Case #2 - Trace IQ: returns a double array of two values, the first is I, and the second is Q. >:CALC:WAV:MARK1:Y? -3.006944493834E-003,+9.9870666467354E-004 The IQ selection is for backward compatibility purposes. It is recommended that the users use the I and/or Q selection instead. You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode.
Preset	Result dependent on the marker setup and signal source.
State Saved	No
Backwards	:CALCulate:WAVeform:MARKer[1] 2 ... 12:FUNCTion:RESult?

Compatibility SCPI

Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Properties

Accesses the marker properties menu.

Key Path	Marker
Initial S/W Revision	Prior to A.02.00

Select Marker

Displays 12 markers available for selection.

Key Path	Marker
Initial S/W Revision	Prior to A.02.00

Relative To

Selects the marker that the selected marker is relative to (*its reference marker*).

Key Path	Marker, Properties
Mode	BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN,,LTEATDD, LTEAFDD
Remote Command	:CALCulate:WAVEform:MARKer[1] 2 ... 12:REFerence <integer> :CALCulate:WAVEform:MARKer[1] 2 ... 12:REFerence?
Example	CALC:WAV:MARK:REF 8 CALC:WAV:MARK:REF?
Notes	A marker cannot be relative to itself so that choice is grayed out, and if sent from SCPI generates error -221: "Settings conflict; marker cannot be relative to itself." When queried a single value is returned (the specified marker numbers relative marker). You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode.
Preset	2 3 4 5 6 7 8 9 10 11 12 1
State Saved	Saved in instrument state.
Min	1
Max	12
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Marker Trace

Assigns the specified marker to the designated trace.

Key Path	Marker
Mode	BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN,,LTEATDD, LTEAFDD
Remote Command	:CALCulate:WAVeform:MARKer[1] 2 ... 12:TRACe RFENvelope I Q IQ :CALCulate:WAVeform:MARKer[1] 2 ... 12:TRACe?
Example	CALC:WAV:MARK:TRAC RFEN CALC:WAV:MARK:TRAC?
Notes	Assigns the specified marker to the designated trace. The IQ selection is for backward compatibility purposes. It is recommended that the users use the I and/or Q selection instead. You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode.
Preset	RFEN
State Saved	Saved in instrument state.
Range	RF Envelope I Q IQ
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Couple Markers

Toggles the state of the markers to be coupled On or Off. When this function is true (On), moving any marker causes an equal X-axis movement of every other marker which is not Off. "Equal X-axis movement" refers to the difference between each marker's X-Axis value (in the fundamental x-axis units of the trace that marker is on) and the X-Axis value of the marker being moved (in the same fundamental x-axis units) are preserved.

Key Path	Marker
Mode	BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN,,LTEATDD, LTEAFDD
Remote Command	:CALCulate:WAVeform:MARKer:COUPle[:STATe] ON OFF 1 0 :CALCulate:WAVeform:MARKer:COUPle[:STATe]?
Example	CALC:WAV:MARK:COUP ON CALC:WAV:MARK:COUP ON
Notes	You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode.
Preset	OFF

State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

All Markers Off

Turns off all markers.

Key Path	Marker
Mode	BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN, LTEATDD, LTEAFDD
Remote Command	:CALCulate:WAVeform:MARKer:AOff
Example	CALC:WAV:MARK:AOff
Notes	You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Backward Compatibility SCPI Commands

Sets or queries the state of a marker. Setting a marker that is OFF to state ON or 1 puts it in Normal mode and places it at the center of the screen.

Mode	BASIC, PNOISE, WCDMA, CDMA2K, EDGE GSM, WIMAXOFDMA, TDSCDMA, CDMA1XEV, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN
Remote Command	:CALCulate:WAVeform:MARKer[1] 2 ... 12:STATe OFF ON 0 1 :CALCulate:WAVeform:MARKer[1] 2 ... 12:STATe?
Example	CALC:WAV:MARK:STAT ON CALC:WAV:MARK:STAT?
Notes	You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode.
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Marker ->

There is no 'Marker ->' functionality supported in Waveform measurements. The front-panel key displays a blank menu when pressed.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Marker Function

Accesses a menu of marker functions that perform post-processing operations on markers based on the measurement specifications. Marker functions are distinct from measurement functions, which automatically perform complex sequences of setup, data acquisition, and display operations in order to measure specified signal characteristics. Marker Functions are specified for each individual marker and may be turned on individually for each marker.

The Marker Function menu controls which marker functions are turned on and allows you to adjust the setup parameters for each function. These parameters include the following, but only one parameter can be assigned to a given marker:

- Marker Noise
- BandInterval Power
- Band/Interval Density
- Marker Function Off

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Select Marker

Displays 12 markers available for selection.

Key Path	Marker
Initial S/W Revision	Prior to A.02.00

Marker Function Type

Sets the marker control function type to, Marker Noise, Band/Interval Power, Band Interval Density, or Marker Function Off

Key Path	Marker Function
Mode	BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN,,LTEATDD, LTEAFDD
Remote Command	:CALCulate:WAVEform:MARKer[1] 2 ... 12:FUNCTION BPOwer BDENsity OFF :CALCulate:WAVEform:MARKer[1] 2 ... 12:FUNCTION?
Example	CALC:WAV:MARK:FUNC BPOW CALC:WAV:MARK:FUNC?
Notes	You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode.
Preset	OFF

State Saved	Saved in instrument state.
Range	Band/Interval Power Band Interval Density Marker Function Off
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Band Adjust

Accesses a menu that enables you to set the frequency span width and the left and right edge, or time values, for the band or interval of the selected marker.

Key Path	Marker Function
Initial S/W Revision	Prior to A.02.00

Band/Interval Span for Time Domain

Sets the width of the frequency span for the selected marker.

Key Path	Marker Function
Mode	BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN,LTEATDD, LTEAFDD
Remote Command	:CALCulate:WAVEform:MARKer[1] 2 ... 12:FUNCtion:BAND:SPAN <time> :CALCulate:WAVEform:MARKer[1] 2 ... 12:FUNCtion:BAND:SPAN?
Example	CALC:WAV:MARK:FUNC:BAND:SPAN 20 ms CALC:WAV:MARK:FUNC:BAND:SPAN?
Notes	You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode.
Couplings	Changing the Band/Interval Span necessarily changes the Band/Interval Left and Band/Interval Right values
Preset	0
Preset	10% of Meas Time
State Saved	Saved in instrument state.
Min	0
Max	100 s
Backwards Compatibility SCPI	:CALCulate:WAVEform:MARKer[1] 2 ... 4:X:SPAN
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Band/Interval Left for Time Domain

Sets the left edge frequency or time value for the band of the selected marker.

Key Path	Marker Function
Mode	BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN,,LTEATDD, LTEAFDD
Remote Command	:CALCulate:WAVeform:MARKer[1] 2 ... 12:FUNction:BAND:LEFT <time> :CALCulate:WAVeform:MARKer[1] 2 ... 12:FUNction:BAND:LEFT?
Example	CALC:WAV:MARK12:FUNC:BAND:LEFT 1 s CALC:WAV:MARK12:FUNC:BAND:LEFT?
Notes	You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode.
Couplings	Changing the Band/Interval Left necessarily changes the Band/Interval Span and Band/Interval Right values
Preset	0
Preset	5% of Meas Time
State Saved	Saved in instrument state.
Min	0
Max	100 s
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Band/Interval Right for Time Domain

Sets the right edge frequency or time value for the band of the selected marker.

Key Path	Marker Function
Mode	BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN,,LTEATDD, LTEAFDD
Remote Command	:CALCulate:WAVeform:MARKer[1] 2 ... 12:FUNction:BAND:RIGHT <time> :CALCulate:WAVeform:MARKer[1] 2 ... 12:FUNction:BAND:RIGHT?
Example	CALC:WAV:MARK12:FUNC:BAND:RIGH 1 s CALC:WAV:MARK12:FUNC:BAND:RIGH?
Notes	You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode.
Couplings	Changing the Band/Interval Left necessarily changes the Band/Interval Span and Band/Interval Right values
Preset	0
Preset	5% of Meas Time
State Saved	Saved in instrument state.

13 Waveform Measurement
Marker Function

Min	0
Max	100 s
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Meas

The information in this section is common to all measurements. For key and remote command information for a specific measurement, refer to the section that describes the measurement of interest.

Measurements available under the Meas key are specific to the current Mode.

When viewing Help for measurements, note the following:

NOTE

Operation for some keys differs between measurements. The information displayed in Help pertains to the current measurement. To see how a key operates in a different measurement, exit Help (press the Cancel Esc key), select the measurement, then reenter Help (press the Help key) and press that key.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Remote Measurement Functions

This section contains the following topics:

"Measurement Group of Commands" on page 2302

"Current Measurement Query (Remote Command Only)" on page 2304

"Limit Test Current Results (Remote Command Only)" on page 2304

"Data Query (Remote Command Only)" on page 2304

"Calculate/Compress Trace Data Query (Remote Command Only)" on page 2305

"Calculate Peaks of Trace Data (Remote Command Only)" on page 2310

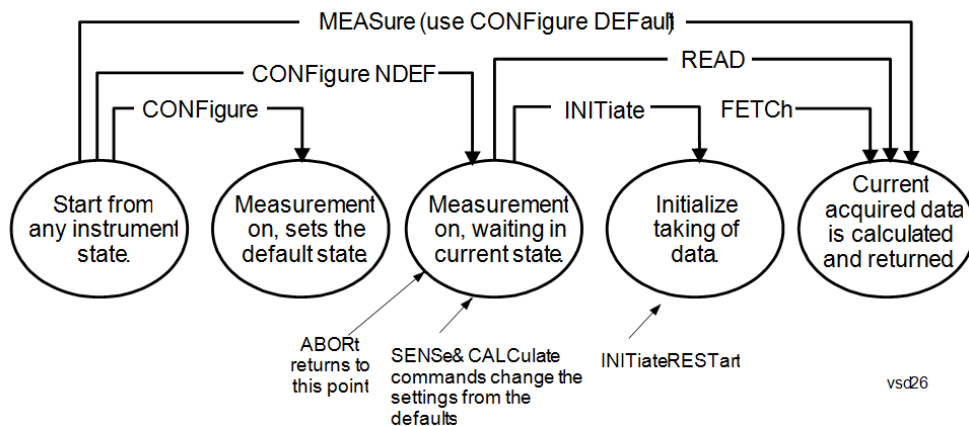
Hardware-Accelerated Fast Power Measurement (Remote Command Only)

"Format Data: Numeric Data (Remote Command Only)" on page 2311

"Format Data: Byte Order (Remote Command Only)" on page 2312

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Measurement Group of Commands



Measure Commands:

:MEASure:<measurement>[n]?

This is a fast single-command way to make a measurement using the factory default instrument settings. These are the settings and units that conform to the Mode Setup settings (e.g. radio standard) that you have currently selected.

- Stops the current measurement (if any) and sets up the instrument for the specified measurement using the factory defaults
- Initiates the data acquisition for the measurement
- Blocks other SCPI communication, waiting until the measurement is complete before returning results.
- If the function does averaging, it is turned on and the number of averages is set to 10.
- After the data is valid it returns the scalar results, or the trace data, for the specified measurement. The type of data returned may be defined by an [n] value that is sent with the command.
- The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available.
- ASCII is the default format for the data output. (Older versions of Spectrum Analysis and Phase Noise mode measurements only use ASCII.) The binary data formats should be used for handling large blocks of data since they are smaller and faster than the ASCII format. Refer to the FORMat:DATA command for more information.

If you need to change some of the measurement parameters from the factory default settings you can set up the measurement with the CONFIgure command. Use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to change the settings. Then you can use the READ? command to initiate the measurement and query the results.

If you need to repeatedly make a given measurement with settings other than the factory defaults, you can use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to set up the measurement. Then use the READ? command to initiate the measurement and query results.

Measurement settings persist if you initiate a different measurement and then return to a previous one. Use READ:<measurement>? if you want to use those persistent settings. If you want to go back to the default settings, use MEASure:<measurement>?.

Configure Commands:

:CONFIgure:<measurement>

This command stops the current measurement (if any) and sets up the instrument for the specified measurement using

the factory default instrument settings. It does not initiate the taking of measurement data unless INIT:CONTInuous is ON. If you change any measurement settings after using the CONFigure command, the READ command can be used to initiate a measurement without changing the settings back to their defaults.

In the Swept SA measurement in Spectrum Analyzer mode the CONFigure command also turns the averaging function on and sets the number of averages to 10 for all measurements.

:CONFigure: <measurement>: NDEFault stops the current measurement and changes to the specified measurement. It does not change the settings to the defaults. It does not initiate the taking of measurement data unless INIT:CONTInuous is ON.

The CONFigure? query returns the current measurement name.

The CONFigure:CATalog? query returns a quoted string of all licensed measurement names in the current mode. For example, "SAN, CHP, OBW, ACP, PST, TXP, SPUR, SEM, LIST".

Fetch Commands:

:FETCh:<measurement>[n]?

This command puts selected data from the most recent measurement into the output buffer. Use FETCh if you have already made a good measurement and you want to return several types of data (different [n] values, for example, both scalars and trace data) from a single measurement. FETCh saves you the time of re-making the measurement. You can only FETCh results from the measurement that is currently active, it will not change to a different measurement. An error message is reported if a measurement other than the current one is specified.

If you need to get new measurement data, use the READ command, which is equivalent to an INITiate followed by a FETCh.

The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used for handling large blocks of data since they are smaller and transfer faster than the ASCII format. (FORMat:DATA)

FETCh may be used to return results other than those specified with the original READ or MEASure command that you sent.

INITiate Commands:

:INITiate:<measurement>

This command is not available for measurements in all the instrument modes:

- Initiates a trigger cycle for the specified measurement, but does not output any data. You must then use the FETCh<meas> command to return data. If a measurement other than the current one is specified, the instrument will switch to that measurement and then initiate it.
 - For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. If you send INIT:ACP? it will change from channel power to ACP and will initiate an ACP measurement.
 - Does not change any of the measurement settings. For example, if you have previously started the ACP measurement and you send INIT:ACP? it will initiate a new ACP measurement using the same instrument settings as the last time ACP was run.
 - If your selected measurement is currently active (in the idle state) it triggers the measurement, assuming the trigger conditions are met. Then it completes one trigger cycle. Depending upon the measurement and the number of averages, there may be multiple data acquisitions, with multiple trigger events, for one full trigger cycle. It also holds off additional commands on GPIB until the acquisition is complete.
-

READ Commands:

:READ:<measurement>[n]?

- Does not preset the measurement to the factory default settings. For example, if you have previously initiated the ACP
-

measurement and you send READ:ACP? it will initiate a new measurement using the same instrument settings.

- Initiates the measurement and puts valid data into the output buffer. If a measurement other than the current one is specified, the instrument will switch to that measurement before it initiates the measurement and returns results.
 - For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. Then you send READ:ACP? It will change from channel power back to ACP and, using the previous ACP settings, will initiate the measurement and return results.
 - Blocks other SCPI communication, waiting until the measurement is complete before returning the results
 - If the optional [n] value is not included, or is set to 1, the scalar measurement results will be returned. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used when handling large blocks of data since they are smaller and faster than the ASCII format. (FORMat:DATA)
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Initial S/W Revision	Prior to A.02.00
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Current Measurement Query (Remote Command Only)

This command returns the name of the measurement that is currently running.

Remote Command	:CONFigure?
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Example	CONF?
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Initial S/W Revision	Prior to A.02.00
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Limit Test Current Results (Remote Command Only)

Queries the status of the current measurement limit testing. It returns a 0 if the measured results pass when compared with the current limits. It returns a 1 if the measured results fail any limit tests.

Remote Command	:CALCulate:CLIMits:FAIL?
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Example	CALC:CLIM:FAIL? queries the current measurement to see if it fails the defined limits. Returns a 0 or 1: 0 it passes, 1 it fails.
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Initial S/W Revision	Prior to A.02.00
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Data Query (Remote Command Only)

Returns the designated measurement data for the currently selected measurement and subopcode.

n = any valid subopcode for the current measurement. See the measurement command results table for your current measurement, for information about what data is returned for the subopcodes.

This command uses the data setting specified by the FORMat:BOReDer and FORMat:DATA commands and can return real or ASCII data. (See the format command descriptions under Input/Output in the Analyzer Setup section.)

Remote Command	:CALCulate:DATA[n]?
Notes	The return trace depends on the measurement. In CALCulate:<meas>:DATA[n], n is any valid subopcode for the current measurement. It returns the same data as the FETCH:<measurement>? query where <measurement> is the current measurement.
Initial S/W Revision	Prior to A.02.00

Calculate/Compress Trace Data Query (Remote Command Only)

Returns compressed data for the currently selected measurement and sub-opcode [n].

n = any valid sub-opcode for that measurement. See the MEASure:<measurement>? command description of your specific measurement for information on the data that can be returned.

The data is returned in the current Y Axis Unit of the analyzer. The command is used with a sub-opcode <n> (default=1) to specify the trace. With trace queries, it is best if the analyzer is not sweeping during the query. Therefore, it is generally advisable to be in Single Sweep, or Update=Off.

This command is used to compress or decimate a long trace to extract and return only the desired data. A typical example would be to acquire N frames of GSM data and return the mean power of the first burst in each frame. The command can also be used to identify the best curve fit for the data.

Remote Command	:CALCulate:DATA<n>:COMPRESS? BLOCK CFIT MAXimum MINimum MEAN DMEan RMS RMSCubed SAMPLE SDEVIation PPHase [,<soffset> [,<length>[,<roffset>[,<rlimit>]]]]
Example	To query the mean power of a set of GSM bursts: Supply a signal that is a set of GSM bursts. Select the IQ Waveform measurement (in IQ Analyzer Mode). Set the sweep time to acquire at least one burst. Set the triggers such that acquisition happens at a known position relative to a burst. Then query the mean burst levels using, CALC:DATA2:COMP? MEAN, 24e-6, 526e-6 (These parameter values correspond to GSM signals, where 526e-6 is the length of the burst in the slot and you just want 1 burst.)
Notes	The command supports 5 parameters. Note that the last 4 (<soffset>, <length>, <roffset>, <rlimit>) are optional. But these optional parameters must be entered in the specified order. For example, if you want to specify <length>, then you must also specify <soffset>. See details below for a definition of each of these parameters. This command uses the data in the format specified by FORMat:DATA, returning either binary or ASCII data.
Initial S/W Revision	Prior to A.02.00

- BLOCK or block data - returns all the data points from the region of the trace data that you specify. For example, it could be used to return the data points of an input signal over several timeslots, excluding the portions of the trace data that you do not want. (This is x,y pairs for trace data and I,Q pairs for complex data.)

- CFIT or curve fit - applies curve fitting routines to the data. <soffset> and <length> are required to define the data that you want. <roffset> is an optional parameter for the desired order of the curve equation. The query will return the following values: the x-offset (in seconds) and the curve coefficients ((order + 1) values).

MIN, MAX, MEAN, DME, RMS, RMSC, SAMP, SDEV and PPH return one data value for each specified region (or <length>) of trace data, for as many regions as possible until you run out of trace data (using <roffset> to specify regions). Or they return the number of regions you specify (using <rlimit>) ignoring any data beyond that.

- MINimum - returns the minimum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the minimum magnitude of the I/Q pairs is returned.
- MAXimum - returns the maximum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the maximum magnitude of the I/Q pairs is returned.
- MEAN - returns a single value that is the arithmetic mean of the data point values (in dB/ dBm) for the specified region(s) of trace data. For I/Q trace data, the mean of the magnitudes of the I/Q pairs is returned. See the following equations.

•

NOTE

If the original trace data is in dB, this function returns the arithmetic mean of those log values, not log of the mean power which is a more useful value. The mean of the log is the better measurement technique when measuring CW signals in the presence of noise. The mean of the power, expressed in dB, is useful in power measurements such as Channel Power. To achieve the mean of the power, use the RMS option.

Equation 1

Mean Value of Data Points for Specified Region(s)

$$MEAN = \frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 2

Mean Value of I/Q Data Pairs for Specified Region(s)

$$MEAN = \frac{1}{n} \sum_{X_i \in \text{region}(s)} |X_i|$$

where $|X_i|$ is the magnitude of an I/Q pair, and n is the number of I/Q pairs in the specified region(s).

- DMEan - returns a single value that is the mean power (in dB/ dBm) of the data point values for the specified region(s) of trace data. See the following equation:

Equation 3

DMEan Value of Data Points for Specified Region(s)

$$\text{DME} = 10 \times \log_{10} \left(\frac{1}{n} \sum_{X_i \in \text{region}(s)} 10^{\frac{X_i}{10}} \right)$$

- RMS - returns a single value that is the average power on a root-mean-squared voltage scale (arithmetic rms) of the data point values for the specified region(s) of trace data. See the following equation.

NOTE

For I/Q trace data, the rms of the magnitudes of the I/Q pairs is returned. See the following equation. This function is very useful for I/Q trace data. However, if the original trace data is in dB, this function returns the rms of the log values which is not usually needed.

Equation 4

RMS Value of Data Points for Specified Region(s)

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i^2}$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 5

RMS Value of I/Q Data Pairs for Specified Region(s)

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region(s).

Once you have the rms value for a region of trace data (linear or I/Q), you may want to calculate the mean power. You must convert this rms value (peak volts) to power in dBm:

$$10 \times \log[10 \times (\text{rms value})^2]$$

- SAMPLe - returns the first data value (x,y pair) for the specified region(s) of trace data. For I/Q trace data, the first I/Q pair is returned.
- SDEViation - returns a single value that is the arithmetic standard deviation for the data point values for the specified region(s) of trace data. See the following equation.
- For I/Q trace data, the standard deviation of the magnitudes of the I/Q pairs is returned. See the following equation.

Equation 6

Standard Deviation of Data Point Values for Specified Region(s)

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (X_i - \bar{X})^2}$$

where X_i is a data point value, \bar{X} is the arithmetic mean of the data point values for the specified region (s), and n is the number of data points in the specified region(s).

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (|X_i| - \bar{X})^2}$$

where $|X_i|$ is the magnitude of an I/Q pair, \bar{X} is the mean of the magnitudes for the specified region(s), and n is the number of data points in the specified region(s).

- PPHase - returns the x,y pairs of both rms power (dBm) and arithmetic mean phase (radian) for every specified region and frequency offset (Hz). The number of pairs is defined by the specified number of regions. This parameter can be used for I/Q vector ($n=0$) in Waveform (time domain) measurement and all parameters are specified by data point in PPHase.

The rms power of the specified region may be expressed as:

$$\text{Power} = 10 \times \log [10 \times (\text{RMS I/Q value})] + 10.$$

The RMS I/Q value (peak volts) is:

$$\sqrt{\frac{1}{n} \sum_{X_i \in \text{region}} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region.

The arithmetic mean phase of the specified region may be expressed as:

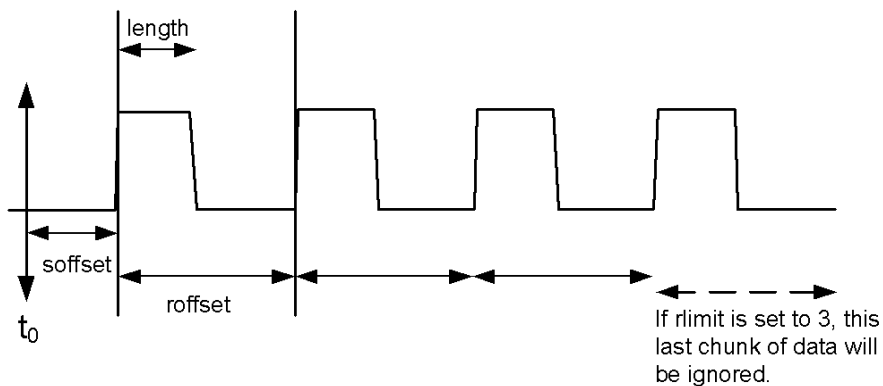
$$\frac{1}{n} \sum_{Y_i \in \text{region}} Y_i$$

where Y_i is the unwrapped phase of I/Q pair with applying frequency correction and n is the number of I/Q pairs in the specified region.

The frequency correction is made by the frequency offset calculated by the arithmetic mean of every specified region's frequency offset. Each frequency offset is calculated by the least square method against the unwrapped phase of I/Q pair.

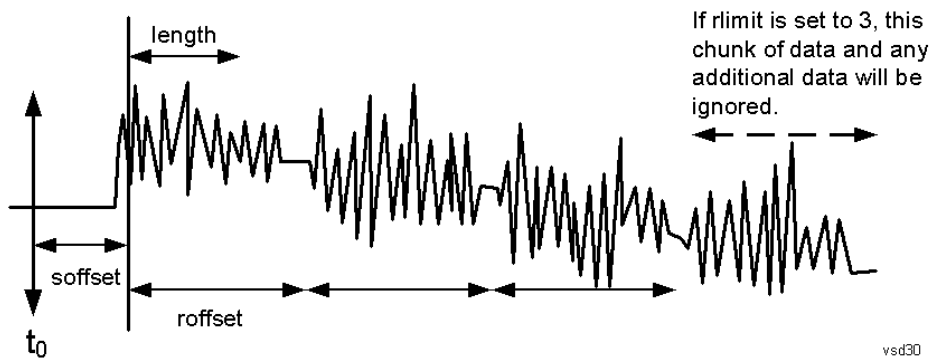
Sample Trace Data - Constant Envelope

(See below for explanation of variables.)



Sample Trace Data - Not Constant Envelope

(See below for explanation of variables.)



<soffset> - start offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It specifies the amount of data at the beginning of the trace that will be ignored before the decimation process starts. It is the time or frequency change from the start of the trace to the point where you want to start using the data. The default value is zero.

<length> - is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines how much data will be compressed into one value. This parameter has a default value equal to the current trace length.

<roffset> - repeat offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines the beginning of the next field of trace elements to be compressed. This is relative to the beginning of the previous field. This parameter has a default value equal to the <length> variable. Note that this parameter is used for a completely different purpose when curve fitting (see CFIT above).

<rlimit> - repeat limit is an optional integer. It specifies the number of data items that you want returned. It will ignore any additional items beyond that number. You can use the Start offset and the Repeat limit to pick out exactly what part of the data you want to use. The default value is all the data.

Calculate Peaks of Trace Data (Remote Command Only)

Returns a list of all the peaks for the currently selected measurement and sub-opcode [n]. The peaks must meet the requirements of the peak threshold and excursion values.

n = any valid sub-opcode for the current measurement. See the MEASure:<measurement> command description of your specific measurement for information on the data that can be returned.

The command can only be used with specific sub-opcodes with measurement results that are trace data. Both real and complex traces can be searched, but complex traces are converted to magnitude in dBm. In many measurements the sub-opcode n=0, is the raw trace data which cannot be searched for peaks. And Sub-opcode n=1, is often calculated results values which also cannot be searched for peaks.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. If the format is set to INT,32, it returns REAL,32 data.

The command has four types of parameters:

- Threshold (in dBm)
- Excursion (in dB)
- Sorting order (amplitude, frequency, time)
- Optional in some measurements: Display line use (all, > display line, < display line)

Remote Command	<p>For Swept SA measurement:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME[,ALL GTDLine LTDLine]]</pre> <p>For most other measurements:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME]</pre>
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Example	<p>Example for Swept SA measurement in Spectrum Analyzer Mode:</p> <p>CALC:DATA4:PEAK? -40, 10, FREQ, GTDL This will identify the peaks of trace 4 that are above -40 dBm, with excursions of at least 10 dB. The peaks are returned in order of increasing frequency, starting with the lowest frequency. Only the peaks that are above the display line are returned.</p> <p>Query Results 1:</p> <p>With FORMat:DATA REAL, 32 selected, it returns a list of floating-point numbers. The first value in the list is the number of peak points that are in the following list. A peak point consists of two values: a peak amplitude followed by its corresponding frequency (or time).</p> <p>If no peaks are found the peak list will consist of only the number of peaks, (0).</p>
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Notes	<p><n> - is the trace that will be used</p> <p><threshold> - is the level below which trace data peaks are ignored. Note that the threshold value is required and is always used as a peak criterion. To effectively disable the threshold criterion for this command, provide a substantially low threshold value such as -200 dBm. Also note that the threshold value used in this command is independent of and has no effect on the threshold value stored under the Peak Criteria menu.</p> <p><excursion> - is the minimum amplitude variation (rise and fall) required for a signal to be identified as peak. Note that the excursion value is required and is always used as a peak criterion. To effectively disable the excursion criterion for this command, provide the minimum value of 0.0 dB. Also note that the excursion value used in this command is independent of and has no effect on the</p>
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excursion value stored under the Peak Criteria menu.

Values must be provided for threshold and excursion. The sorting and display line parameters are optional (defaults are AMPLitude and ALL).

Note that there is always a Y-axis value for the display line, regardless of whether the display line state is on or off. It is the current Y-axis value of the display line which is used by this command to determine whether a peak should be reported. Sorting order:

AMPLitude - lists the peaks in order of descending amplitude, with the highest peak first (default if optional parameter not sent)

FREQUency - lists the peaks in order of occurrence, left to right across the x-axis.

TIME - lists the peaks in order of occurrence, left to right across the x-axis.

Peaks vs. Display Line:

ALL - lists all of the peaks found (default if optional parameter not sent).

GTDLine (greater than display line) - lists all of the peaks found above the display line.

LTDLine (less than display line) - lists all of the peaks found below the display line.

Initial S/W Revision Prior to A.02.00

Format Data: Numeric Data (Remote Command Only)

This command specifies the format of the trace data input and output. It specifies the formats used for trace data during data transfer across any remote port. It affects only the data format for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]?, :CALCulate:DATA[n]? and FETCh:SANalyzer[n]? commands and queries.

Remote Command :FORMat[:TRACe][:DATA] ASCii|INTeger,32|REAL,32 |REAL,64
:FORMat[:TRACe][:DATA]?

Notes The query response is:
ASCii: ASC,8
REAL,32: REAL,32
REAL,64: REAL,64
INTeger,32: INT,32

When the numeric data format is REAL or ASCii, data is output in the current Y Axis unit. When the data format is INTeger, data is output in units of m dBm (.001 dBm).

The INT,32 format returns binary 32-bit integer values in internal units (m dBm), in a definite length block.

Dependencies Sending a data format spec with an invalid number (for example, INT,48) generates no error. The analyzer simply uses the default (8 for ASCii, 32 for INTeger, 32 for REAL).

Sending data to the analyzer which does not conform to the current FORMat specified, results in an error. Sending ASCII data when a definite block is expected generates message -161 "Invalid Block Data" and sending a definite block when ASCII data is expected generates message -121 "Invalid Character in Number".

Preset ASCii

Backwards Compatibility Notes Note that the INT,32 format is only applicable to the command, TRACe:DATA. This preserves backwards compatibility for the Swept SA measurement. For all other commands/queries which honor FORMat:DATA, if INT,32 is sent the analyzer will behave as though it were set to REAL,32.

Initial S/W Revision Prior to A.02.00

The specs for each output type follow:

AScii - Amplitude values are in ASCII, in the current Y Axis Unit, one ASCII character per digit, values separated by commas, each value in the form:

SX.YYYYYEsZZ

Where:

S = sign (+ or -)

X = one digit to left of decimal point

Y = 5 digits to right of decimal point

E = E, exponent header

s = sign of exponent (+ or -)

ZZ = two digit exponent

REAL,32 - Binary 32-bit real values in the current Y Axis Unit, in a definite length block.

REAL,64 - Binary 64-bit real values in the current Y Axis Unit, in a definite length block.

Format Data: Byte Order (Remote Command Only)

This command selects the binary data byte order for data transfer and other queries. It controls whether binary data is transferred in normal or swapped mode. This command affects only the byte order for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]? , :CALCulate:DATA[n]? and FETCh:SANalyzer[n]? commands and queries.

By definition any command that says it uses FORMat:DATA uses any format supported by FORMat:DATA.

The NORMal order is a byte sequence that begins with the most significant byte (MSB) first, and ends with the least significant byte (LSB) last in the sequence: 1|2|3|4. SWAPped order is when the byte sequence begins with the LSB first, and ends with the MSB last in the sequence: 4|3|2|1.

Remote Command	:FORMat:BORDER NORMal SWAPped :FORMat:BORDER?
Preset	NORMal
Initial S/W Revision	Prior to A.02.00

Meas Setup

Displays the setup menu keys that enable you to control the parameters for the current measurement.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Average/Hold Num

Sets the number of sweeps (average counts) that are averaged. After the specified number of sweeps, the averaging mode (terminal control) setting determines the averaging action.

Key Path	Meas Setup
Mode	BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN, MSR, LTEATDD, LTEAFDD
Remote Command	[:SENSe]:WAVeform:AVERAge:COUNT <integer> [:SENSe]:WAVeform:AVERAge:COUNT? [:SENSe]:WAVeform:AVERAge[:STATe] OFF ON 0 1 [:SENSe]:WAVeform:AVERAge[:STATe]?
Example	WAV:AVER:COUN 1001 WAV:AVER:COUN? WAV:AVER ON WAV:AVER?
Notes	You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode.
Preset	10 OFF
State Saved	Saved in instrument state.
Min	1
Max	20001
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Avg Mode

Enables you to set the averaging mode.

- When set to Exponential (Exp) the measurement averaging continues using the specified number of averages to compute each averaged value. The average is displayed at the end of each sweep.
- When set to Repeat, the measurement resets the average counter each time the specified number of averages is reached.

Key Path	Meas Setup
Mode	BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN, MSR,LTEATDD, LTEAFDD
Remote Command	<code>[:SENSe] :WAVeform:AVERage:TCONtrol EXPonential REPEAT</code> <code>[:SENSe] :WAVeform:AVERage:TCONtrol?</code>
Example	WAV:AVER:TCON REP WAV:AVER:TCON?
Notes	You must be in a mode that includes the Waveform measurement to use this command. Use INSTRUMENT:SElect to set the mode.
Preset	EXPonential
State Saved	Saved in instrument state.
Range	Exp Repeat
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Avg Type

Selects the type of averaging.

Key Path	Meas Setup
Mode	BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN, MSR,LTEATDD, LTEAFDD
Remote Command	<code>[:SENSe] :WAVeform:AVERage:TYPE LOG MAXimum MINimum RMS SCALar</code> <code>[:SENSe] :WAVeform:AVERage:TYPE?</code>
Example	WAV:AVER:TYPE RMS WAV:AVER:TYPE?
Notes	The SCPI selection of MAX and MIN are kept for BWCC, but they are removed from the front panel access because they are not an Average function. You must be in a mode that includes the Waveform measurement to use this command. Use INSTRUMENT:SElect to set the mode.
Preset	RMS
State Saved	Saved in instrument state.
Range	Pwr Avg(RMS) Log-Pwr Avg(Video) Voltage Avg
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Avg Type Auto

When Auto is selected, the analyzer chooses the type of averaging. When one of the average types is selected manually, the analyzer uses that type regardless of other analyzer settings, and shows Man on the Average Type softkey.

Key Path	Meas Setup, Avg Type
Remote Command	[:SENSe] :WAVeform:AVERage:TYPE:AUTO [:STATe] ON OFF 1 0 [:SENSe] :WAVeform:AVERage:TYPE:AUTO [:STATe] ?
Example	WAV:AVER:TYPE:AUTO 0 WAV:AVER:TYPE:AUTO?
Couplings	Auto selects Power (RMS) averaging if a Marker Function (Marker Noise, Band/Intvl Power) is on.
Preset	ON
State Saved	Saved in instrument state.
Range	Auto Man
Modified at S/W Revision	A.14.00

Time Avg Num

Sets the number of HW averages to be executed per each data acquisition.

Key Path	Meas Setup
Mode	BASIC
Remote Command	[:SENSe] :WAVeform:AVERage:TACount <integer> [:SENSe] :WAVeform:AVERage:TACount?
Example	WAV:AVER:TAC 10WAV:AVER:TAC?
Notes	This feature is only available when Option DP2, B40, or wider IF Bandwidth option is installed.
Preset	1
State Saved	Saved in instrument state
Min	1
Max	65535
Default Unit	Enter

Meas Time

Sets how long the measurement is performed. X Scale only changes the representation of the display.

Key Path	Meas Setup
Mode	BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN, MSR,LTEATDD, LTEAFDD

Remote Command	<code>[:SENSe] :WAVeform:SWEep:TIME <time></code> <code>[:SENSe] :WAVeform:SWEep:TIME?</code>
Example	WAV:SWE:TIME 50 ms WAV:SWE:TIME?
Notes	Specifies and returns how long the measurement is performed. It is the time record length of the measurement waveform. The Max time may be reduced when the sample frequency is high due to the memory limitation. You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode.
Preset	All except the following list: 2.000000 ms LTEAFDD, LTEATDD: 10 ms LTETDD: 10 ms
State Saved	Saved in instrument state.
Range	1.000 (s to 100.00 s)
Min	1.000 us
Max	3200 s
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00, A.14.00

Sample Rate

Enables you to set an arbitrary sample rate for the acquired data to be processed.

Key Path	Meas Setup
Mode	BASIC
Remote Command	<code>[:SENSe] :WAVeform:SRATe <freq></code> <code>[:SENSe] :WAVeform:SRATe?</code>
Example	WAV:SRAT 1.3636 MHz
Notes	Command and query available when Option DP2, B40, or wider IF Bandwidth option is installed. For other configuration, only query is available.
Couplings	The coupling between Sample Rate and IF BW depends on Physics implementation.
Preset	125.0 kHz
Min	12.5 Hz
Max	<ul style="list-style-type: none"> • (For Option DP2, B40 or wider IF Bandwidth option) • Digital IF 10 MHz path: 12.5 MHz • Digital IF 25 MHz path: 31.25 MHz • Digital IF 40 MHz path: 50 MHz • Option B85 85 MHz path: 106.25 MHz • Option B1A 125 MHz path: 156.25 MHz

- Option B1X 140 MHz path: 175 MHz
- Option B1Y 160 MHz path: 200 MHz
- (For all other configuration)
- 10 MHz path: 15 MHz
- Option B25 25 MHz path: 45 MHz

Modified at S/W Revision 13.00

PhNoise Opt

Selects the LO (local oscillator) phase noise behavior for various desired operating conditions.

Key Path	Meas Setup
Remote Command	[:SENSe] :WAVeform:FREQuency:SYNThesis [:STATe] 1 2 3 [:SENSe] :WAVeform:FREQuency:SYNThesis [:STATe] ?
Example	WAV:FREQ:SYNT 2 Selects optimization for best wide offset phase noise
Notes	Parameter: 1 optimizes phase noise for small frequency offsets from the carrier. 2 optimizes phase noise for wide frequency offsets from the carrier. 3 optimizes LO for tuning speed (In PXA, the local oscillator hardware provides for extra-low phase noise at the expense of some speed.)
Dependencies	Does not appear in all models. The key is blank in those models, but the SCPI command is accepted for compatibility (although no action is taken).
Preset	Because this function is in Auto after preset, and because Digital IF BW after preset < 150 kHz for MXA/EXA and > 400 kHz for PXA the state of this function after Preset will be 1 for MXA/EXA and 2 for PXA.
State Saved	Saved in instrument state.
Min	1
Min	1
Max	3
Initial S/W Revision	Prior to A.07.00
Modified at S/W Revision	A.07.00

Auto

Selects the LO (local oscillator) phase noise behavior to optimize dynamic range and speed for various instrument operating conditions.

The X-Series has two grades of LO; a high performance LO that gives the best phase noise performance; and a medium-performance LO that gives excellent performance.

In models with the high performance LO, Auto will choose:

	Best Close in Phase Noise	Best Wide-offset Phase Noise
Filter BW	≤ 400 kHz	> 400 kHz

In models with the medium-performance LO, Auto will choose:

	Best Close in Phase Noise	Best Wide-offset Phase Noise
Filter BW	≤ 150 kHz	>150 kHz

Note that Fast Tuning will not be selected when in Auto.

Key Path	Meas Setup, PhNoise Opt
Remote Command	[:SENSe] :WAVeform:FREQuency:SYNThesis:AUTO[:STATe] OFF ON 0 1 [:SENSe] :WAVeform:FREQuency:SYNThesis:AUTO[:STATe] ?
Example	WAV:FREQ:SYNT:AUTO ON
Preset	ON
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.07.00

Best Close-in P Noise

The LO phase noise is optimized for smaller offsets from the carrier, at the expense of phase noise farther out.

Key Path	Meas Setup, PhNoise Opt
Example	WAV:FREQ:SYNT 1
Couplings	The frequency below which the phase noise is optimized is model dependent: <ul style="list-style-type: none"> • CXA: n/a • EXA: [offset ≤150 kHz] • MXA: [offset ≤150 kHz] • PXA: [offset ≤400 kHz]
Readback	Close-in. If manually selected, “Man” will be underlined. The actual frequency offset within which noise is optimized is shown with in square brackets, as this can vary depending on the hardware set in use. For example, in some analyzers this annotation appears as [offset <150 kHz]
Initial S/W Revision	Prior to A.07.00

Best Wide-offset P Noise

The LO phase noise is optimized for wider offsets from the carrier. Closer offsets are compromised and the throughput of measurements (especially remote measurements where the center frequency is changing rapidly), is reduced.

Key Path	Meas Setup, PhNoise Opt
Example	WAV:FREQ:SYNT 2
Couplings	<p>The frequency below which the phase noise is optimized is model dependent:</p> <p>CXA: n/a</p> <p>EXA: [offset >150 kHz]</p> <p>MXA: [offset >150 kHz]</p> <p>PXA: [offset >400 kHz]</p>
Readback	<p>Wide-offset.</p> <p>If manually selected, “Man” will be underlined. The actual frequency offset beyond which noise is optimized is shown with in square brackets, as this can vary depending on the hardware set in use. For example, in some analyzers this annotation appears as [offset >150 kHz]</p>
Initial S/W Revision	Prior to A.07.00

Advanced

Accesses a menu of advanced functions that are used for specific applications. These settings should not be changed for most measurements.

Key Path	Meas Setup
Initial S/W Revision	Prior to A.02.00

ADC Dither

Accesses the ADC Dither control menu.

Key Path	Meas Setup, Advanced
Initial S/W Revision	Prior to A.02.00

ADC Dither Auto

Sets ADC dithering to automatically select whether dithering is needed.

Key Path	Meas Setup, Advanced, ADC Dither
Mode	BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN, MSR,LTEATDD, LTEAFDD
Remote Command	[:SENSe] :WAVeform:ADC:DITHer:AUTO [:STATe] OFF ON 0 1 [:SENSe] :WAVeform:ADC:DITHer:AUTO [:STATe] ?
Example	WAV:ADC:DITH:AUTO ON WAV:ADC:DITH:AUTO?
Notes	The dither function improves linearity for low level signals, at the expense of a higher noise floor. You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode.
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

ADC Dither

Toggles the dither function On and Off. The dither function improves linearity for low level signals, at the expense of a higher noise floor.

The reduced clipping-to-noise ratio results in higher noise, because the clipping level of the ADC relative to the front terminals remains unchanged with the introduction of dither. The enhanced linearity is mostly improved scale fidelity.

With dither on, the third-order distortions are usually invisible for mixer levels below -35 dBm. With dither off, these distortions can be visible, with typical power levels of -110 dBm referred to the mixer. Detection nonlinearity can reach 1 dB for dither off at mixer levels around -70 dBm and lower, while the specified nonlinearity is many times smaller with dither on.

Key Path	Meas Setup, Advanced, ADC Dither
Mode	BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN, MSR,LTEATDD, LTEAFDD
Remote Command	[:SENSe] :WAVeform:ADC:DITHer [:STATe] OFF ON 0 1 [:SENSe] :WAVeform:ADC:DITHer [:STATe] ?
Example	WAV:ADC:DITH ON WAV:ADC:DITH?
Notes	The dither function improves linearity for low level signals, at the expense of a higher noise floor. . You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode.

Preset	OFF
State Saved	Saved in instrument state.
Range	Auto Man
Backwards Compatibility SCPI	[:SENSe] :WAVeform:WBIF:ADC:DITHer [:SENSe] :WAVeform:PDITHer
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

IF Gain

Accesses the keys to select the IF Gain settings.

When in Autorange mode, the IF checks its range once for data acquisition, to provide the best signal to noise ratio. You can specify the range for the best speed, and optimize for noise or for large signals.

When the IF Gain is set to Autorange, the IF Gain is set to High initially for each chunk of data. The data is then acquired. If the IF overloads, then the IF Gain is set to Low and the data is re-acquired. Because of this operation, the Autorange setting uses more measurement time as the instrument checks/resets its range. You can get faster measurement speed by forcing the range to either the high or low gain setting. But you must know that your measurement conditions will not overload the IF (in the high gain range) and that your signals are well above the noise floor (for the low gain range), and that the signals are not changing.

When Digital Bus Out (under the Input/Output menu) is ON, the IF Gain State Autorange selection is not allowed. Thus, in this case, IF Gain State will be set to Low.

This only applies to the RF input. It does not apply to baseband I/Q input.

Key Path	Meas Setup, Advanced
Initial S/W Revision	Prior to A.02.00

IF Gain Auto

Activates the auto rules for IF Gain

Key Path	Meas Setup, Advanced, IF Gain
Mode	BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN, MSR, LTEATDD, LTEAFDD
Remote Command	[:SENSe] :WAVeform:IF:GAIN:AUTO [:STATE] ON OFF 1 0 [:SENSe] :WAVeform:IF:GAIN:AUTO [:STATE] ?
Example	WAV:IF:GAIN:AUTO ON WAV:IF:GAIN:AUTO?
Notes	This only applies to the RF input. It does not apply to baseband I/Q input. You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode.

Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

IF Gain State

Selects the range of IF gain.

Key Path	Meas Setup, Advanced, IF Gain
Mode	BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN, MSR,LTEATDD, LTEAFDD
Remote Command	[:SENSe] :WAVeform:IF:GAIN[:STATe] AUTOrange LOW HIGH [:SENSe] :WAVeform:IF:GAIN[:STATe] ?
Example	WAV:IF:GAIN HIGH WAV:IF:GAIN?
Notes	This only applies to the RF input and does not apply to baseband I/Q input. You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode. If the user tries to select Autorange while Digital Bus Out is ON, an error message -221 "Settings conflict; "IF Gain Autorange not allowed when Digital Bus Out is ON" is displayed.
Couplings	If the user tries to select Autorange via SCPI while Digital Bus Out is ON, an error message - 224, "Illegal parameter value; "IF Gain Autorange not allowed when Digital Bus Out is on" is displayed. If the user tries to select Autorange via front panel while Digital Bus Out is ON, an advisory message "IF Gain Autorange not allowed when Digital Bus Out is on" is displayed.
Preset	LOW
State Saved	Saved in instrument state.
Range	Autorange (Slower Follows Signals) Low (Best for Large Signals) High (Best Noise Level)
Readback Text	Autorange Low High
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

IF Gain Offset

Sets the IF Gain offset in 2 dB step from -6 dB to +6 dB. Increasing the gain can increase the amplitude of small signals as long as you do not overdrive the hardware. Wideband gain should usually be adjusted after setting the input attenuation.

Internally, the IF Gain value will change based on the current configuration of the hardware. If you choose to offset this value, you may do so with this parameter. The value specified is not an absolute value but relative to the current internal IF Gain setting.

For example:

IF Gain Low + IF Gain Offset +4 dB = Total IF Gain of +4 dB (0 + 4 = 4)

IF Gain High + IF Gain Offset +4 dB = Total IF Gain of +14 dB (10 + 4 = 14)

IF Gain Low + IF Gain Offset -6 dB = Total IF Gain of -6 dB (0 - 6 = -6)

IF Gain High + IF Gain Offset -6 dB = Total IF Gain of +6 dB (10 - 6 = 4)

The total IF Gain range when IF Gain Offset is available is a minimum of 0 - 6 = -6 dB and a maximum of 10 + 6 = 16 dB. The available IF Gain depends on the IF Path and center frequency. The maximum IF Gain may not be achievable at all times depending on the configuration.

Key Path	Meas Setup, Advanced
Remote Command	[:SENSe] :WAVeform:IF:GAIN:OFFSet <rel_ampl > [:SENSe] :WAVeform:IF:GAIN:OFFSet?
Example	WAV:IF:GAIN:OFFS 2 Sets the IF Gain offset to 2
Preset	0
State Saved	Saved in instrument state.
Min	-6
Max	+6
Default Unit	dB

Meas Preset

Restores all the measurement parameters to their default values.

Key Path	Meas Setup
Mode	BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN, MSR,LTEATDD, LTEAFDD
Remote Command	:CONFigure:WAVeform
Example	CONF:WAV
Notes	Restore default values of all parameters. You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

HW Averaging

Changes the number of time averages is to be made using hardware. This averaging is much faster than the standard averaging done in software. The hardware averaging is done on the complex voltage time trace data before any measurement application averaging is done. Both types of averaging (HW and SW) can be done on the same measurement data.

When time averaging is being done in HW, each trace update represents N fresh data acquisitions averaged together, where N is the number of averages. You cannot access the individual time data. Note that in the spectrum measurement this averaging is done prior to the standard averaging done within the application. Thus the yellow trace in this measurement shows the result of the time averaging. Subsequent averaging is orthogonal to this hardware based time averaging and its result is seen as the blue trace in this and other applications.

So it is possible to turn off the averaging within the application but still have the HW averaging set to a certain number. In other words, turning averaging off within the measurement will not affect HW averaging. If HW averaging needs to be turned off, simply set the HW Averaging parameter to 1.

Since it is time averaging, a trigger source something other than Free Run should be used to avoid cancelling out the signal to be measured. It is most useful for a periodic signal with known periods.

Mode

See "Mode" on page 274

Mode Preset

Returns the active mode to a known state.

Mode Preset does the following for the currently active mode:

- Aborts the currently running measurement.
- Brings up the default menu for the mode, with no active function.
- Sets measurement Global settings to their preset values for the active mode only.
- Activates the default measurement.
- Brings up the default menu for the mode.
- Clears the input and output buffers.
- Sets Status Byte to 0.

Mode Preset does not:

- Cause a mode switch
- Affect mode persistent settings
- Affect system settings

See "[How-To Preset](#)" on page 1473 for more information.

Key Path	Front-panel key
Remote Command	:SYSTem:PRESet
Example	:SYST:PRES
Notes	*RST is preferred over :SYST:PRES for remote operation. *RST does a Mode Preset, as done by the :SYST:PRES command, and it sets the measurement mode to Single measurement rather than Continuous for optimal remote control throughput. Clears all pending OPC bits. The Status Byte is set to 0.
Couplings	A Mode Preset aborts the currently running measurement, activates the default measurement, and gets the mode to a consistent state with all of the default couplings set.
Backwards Compatibility Notes	In the X-Series, the legacy "Factory Preset" has been replaced with Mode Preset, which only presets the currently active mode, not the entire instrument. In the X-Series, the way to preset the entire instrument is by using System, Restore System Defaults All, which behaves essentially the same way as restore System Defaults does on ESA and PSA. There is also no "Preset Type" as there is on the PSA. There is a green Mode Preset front-panel key that does a Mode Preset and a white-with-green-letters User Preset front-panel key that does a User Preset. The old PRESet:TYPE command is ignored (without generating an error), and SYST:PRES without a parameter does a Mode Preset, which should cover most backward code compatibility issues. The settings and correction data under the Input/Output front-panel key (examples: Input Z Corr, Ext Amp Gain, etc.) are no longer part of any Mode, so they will not be preset by a Mode Preset. They are preset using Restore Input/Output Defaults, Restore System Defaults All. Note that because User Preset does a Recall State, and all of these settings are saved in State, they ARE recalled when using

	User Preset.
Initial S/W Revision	Prior to A.02.00

How-To Preset

The table below shows all possible presets, their corresponding SCPI commands and front-panel access (key paths). Instrument settings depend on the current measurement context. Some settings are local to the current measurement, some are global (common) across all the measurements in the current mode, and some are global to all the available modes. In a similar way, restoring the settings to their preset state can be done within the different contexts.

Auto Couple - is a measurement local key. It sets all Auto/Man parameter couplings in the measurement to Auto. Any Auto/Man selection that is local to other measurements in the mode will not be affected.

Meas Preset - is a measurement local key. Meas Preset resets all the variables local to the current measurement except the persistent ones.

Mode Preset - resets all the current mode's measurement local and measurement global variables except the persistent ones.

Restore Mode Defaults - resets ALL the Mode variables (and all the Meas global and Meas local variables), including the persistent ones.

Type Of Preset	SCPI Command	Front Panel Access
Auto Couple	:COUPlE ALL	Auto Couple front-panel key
Meas Preset	:CONFIgure:<Measurement>	Meas Setup Menu
Mode Preset	:SYSTem:PRESet	Mode Preset (green key)
Restore Mode Defaults	:INSTRument:DEFault	Mode Setup Menu
Restore All Mode Defaults	:SYSTem:DEFault MODEs	System Menu; Restore System Default Menu
*RST	*RST	not possible (Mode Preset with Single)
Restore Input/Output Defaults	:SYSTem:DEFault INPut	System Menu; Restore System Default Menu
Restore Power On Defaults	:SYSTem:DEFault PON	System Menu; Restore System Default Menu
Restore Alignment Defaults	:SYSTem:DEFault ALIGn	System Menu; Restore System Default Menu
Restore Miscellaneous Defaults	:SYSTem:DEFault MISC	System Menu; Restore System Default Menu
Restore All System Defaults	:SYSTem:DEFault [ALL] :SYSTem:PRESet:PERSistent	System Menu; Restore System Default Menu
User Preset	:SYSTem:PRESet:USER	User Preset Menu
User Preset All Modes	:SYSTem:PRESet:USER:ALL	User Preset Menu

13 Waveform Measurement
Mode Preset

Power On Mode Preset	:SYSTem:PON:TYPE MODE	System Menu
Power On User Preset	:SYSTem:PON:TYPE USER	System Menu
Power On Last State	:SYSTem:PON:TYPE LAST	System Menu

Mode Setup

See ["Mode Setup" on page 294](#)

Peak Search

Places the selected marker on the trace point with the maximum y-axis value for that marker's trace and accesses a menu that enables you to select to do a next peak or minimum peak search.

Key Path	Front-panel key
Mode	BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN, MSR,LTEATDD, LTEAFDD
Remote Command	:CALCulate:WAVEform:MARKer[1] 2 ... 12:MAXimum
Example	CALC:WAV:MARK2:MAX
Notes	You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Next Peak

Moves the selected marker to the next highest local maximum with a value less than that of the current marker.

Key Path	Peak Search
Mode	BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN, MSR,LTEATDD, LTEAFDD
Remote Command	:CALCulate:WAVEform:MARKer[1] 2 ... 12:MAXimum:NEXT
Example	CALC:WAV:MARK:MAX:NEXT
Notes	You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Min Search

Moves the selected marker to the minimum y-axis value on the current trace.

Key Path	Peak Search
Mode	BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN, MSR,LTEATDD, LTEAFDD
Remote Command	:CALCulate:WAVEform:MARKer[1] 2 ... 12:MINimum
Example	CALC:WAV:MARK:MIN
Notes	You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode.

Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

13 Waveform Measurement
Print

Print

See ["Print" on page 325](#)

Quick Save

The Quick Save front-panel key repeats the most recent save that was performed from the Save menu, with the following exceptions:

- Register saves are not remembered as Saves for the purpose of the Quick Save function
- If the current measurement does not support the last non-register save that was performed, an informational message is generated, “File type not supported for this measurement”

Quick Save repeats the last type of qualified save (that is, a save qualified by the above criteria) in the last save directory by creating a unique filename using the Auto File Naming algorithm described below.

If Quick Save is pressed after startup and before any qualified Save has been performed, the Quick Save function performs a Screen Image save using the current settings for Screen Image saves (current theme, current directory), which then becomes the “last save” for the purpose of subsequent Quick Saves.

The Auto File Naming feature automatically generates a file name for use when saving a file. The filename consists of a prefix and suffix separated by a dot, as is standard for the Windows® file system. A default prefix exists for each of the available file types:

Type	Default Prefix	Menu
State	State_	(Save/Recall)
Trace + State	State_	(Save/Recall)
Screen	Screen_	(Save/Recall)
Amplitude Corrections	Ampcor_	(Import/Export)
Traces	Trace_	(Import/Export)
Limit Lines	LLine_	(Import/Export)
Measurement Result	MeasR_	(Import/Export)
Capture Buffer	CapBuf_	(Import/Export)

A four digit number is appended to the prefix to create a unique file name. The numbering sequence starts at 0000 within each Mode for each file type and updates incrementally to 9999, then wraps to 0000 again. It remembers where it was through a Mode Preset and when leaving and returning to the Mode. It is reset by Restore Misc Defaults and Restore System Defaults and subsequent running of the instrument application. So, for example, the first auto file name generated for State files is State_0000.state. The next is State_0001, and so forth.

One of the key features of Auto File Name is that we guarantee that the Auto File Name will never conflict with an existing file. The algorithm looks for the next available number. If it gets to 9999, then it looks for holes. If it find no holes, that is no more numbers are available, it gives an error.

For example, if when we get to State_0010.state there is already a State_0010.state file in the current directory, it advances the counter to State_0011.state to ensure that no conflict will exist (and then it verifies that State_0011.state also does not exist in the current directory and advances again if it does, and so forth).

If you enter a file name for a given file type, then the prefix becomes the filename you entered instead of the default prefix, followed by an underscore. The last four letters (the suffix) are the 4-digit number.

For example, if you save a measurement results file as “fred.csv”, then the next auto file name chosen for a measurement results save will be fred_0000.csv.

NOTE

Although 0000 is used in the example above, the number that is used is actually the current number in the Meas Results sequence, that is, the number that would have been used if you had not entered your own file name.

NOTE

If the filename you entered ends with _dddd, where d=any number, making it look just like an auto file name, then the next auto file name picks up where you left off with the suffix being dddd + 1.

Key Path	Front-panel key
Notes	No remote command for this key specifically.
Initial S/W Revision	Prior to A.02.00

Recall

The Recall menu lets you choose what you want to recall, and where you want to recall it from. Among the types of files you can recall are **States and Traces**. In addition, an Import (Data) option lets you recall a number of data types stored in CSV files (as used by Excel and other spreadsheet programs).

The default paths for Recall are data type dependent and are the same as for the Save key.

Key Path	Front-panel key
Notes	<p>No remote command for this key specifically, but the :MMEM:LOAD command is available for specific file types. An example is :MMEM:LOAD:STATe <filename>.</p> <p>If you try to recall a State file for a mode that is not licensed or not available in the instrument, an error message will occur and the state will not change.</p>
Backwards Compatibility Notes	<p>In legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly (since User Preset is actually loading a state), it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, “state” always includes all of this data; so whenever state is loaded, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p>
Backwards Compatibility Notes	<p>Recall for the X-Series supports backward compatibility in the sense that you can recall a state file from any X-Series model number and any version of X-Series software. This is only possible if part of the recalling process goes through a limiting step after recalling the mode settings, at least for settings that may vary with version number, model number, option and license differences. If you try to recall a state file onto an instrument with less capability than what was available on the instrument during the save, the recall will ignore the state it doesn't support and it will limit the recalled setting to what it allows.</p> <p>Example: if the saved state includes preamp ON, but the recalling instrument does not have a preamp; the preamp is limited to OFF. Conversely, if you save a state without a preamp, the preamp is OFF in the state file. When this saved file is recalled on an instrument with a licensed preamp, the preamp is changed to OFF. Another example is if the saved state has center frequency set to 20 GHz, but the instrument recalling the saved state is a different model and only supports 13.5 GHz. In this case, the center frequency is limited along with any other frequency based settings. Since the center frequency can't be preserved in this case, the recall limiting tries to at least preserve span to keep the measurement setup as intact as possible.</p> <p>It may be appropriate to issue a warning if the state is limited on the recall; warnings do not go out to SCPI so this would only affect the manual user.</p> <p>Note that there is no state file compatibility outside of the X-Series. For example, you cannot recall a state file from ESA or PSA.</p>
Initial S/W Revision	Prior to A.02.00

State

The Recall State menu lets you choose a register or file from which to recall the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings that were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the

additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, GPIB address) are not affected by either a Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

Since each state file is only for one Mode, the settings for other Modes are unaffected when it is loaded. Recall State will cause a mode switch if the state being recalled is not from the current active mode.

After the recall completes, the message "File <filename> recalled" or "Recalled State Register <register number>" is displayed.

For rapid recalls, the State menu lists 16 registers that you can choose from to recall. Pressing a Register key initiates the recall. You can also select a file from which to recall.

The default path for all State Files is:

My Documents\<<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

See ["More Information" on page 1483](#).

Key Path	Recall
Mode	All
Remote Command	:MMEMory:LOAD:STATe <filename>
Example	:MMEM:LOAD:STAT "myState.state" This recalls the file myState.state on the default path
Example	MMEM:LOAD:STAT "MyStateFile.state" This loads the state file data (on the default file directory path) into the instrument state.
Notes	<p>When you pick a file to recall, the analyzer first verifies that the file is recallable in the current instrument by checking the software version and model number of the instrument. If everything matches, a full recall proceeds by aborting the currently running measurement, clearing any pending operations, and then loading the State from the saved state file. You can open state files from any mode, so recalling a State file switches to the mode that was active when the save occurred. After switching to the mode of the saved state file, mode settings and data (if any for the mode) are loaded with values from the saved file. The saved measurement of the mode becomes the newly active measurement and the data relevant to the measurement (if there is any) is recalled.</p> <p>If there is a mismatch between file version or model number or instrument version or model number, the recall function tries to recall as much as possible and returns a warning message. It may limit settings that differ based on model number, licensing or version number.</p> <p>After recalling the state, the Recall State function does the following:</p> <ul style="list-style-type: none"> • Makes the saved measurement for the mode the active measurement. • Clears the input and output buffers. • Status Byte is set to 0. • Executes a *CLS <p>If the file specified is empty an error is generated. If the specified file does not exist, another error is generated. If there is a mismatch between the file and the proper file type, an error is generated. If</p>

	there is a mismatch between file version or model number or instrument version or model number, a warning is displayed. Then it returns to the State menu and File Open dialog goes away. After the Recall, the analyzer exits the Recall menu and returns to the previous menu.
Backwards Compatibility SCPI	:MMEMory:LOAD:STATe 1,<filename> For backwards compatibility, the above syntax is supported. The "1" is simply ignored.
Initial S/W Revision	Prior to A.02.00

More Information

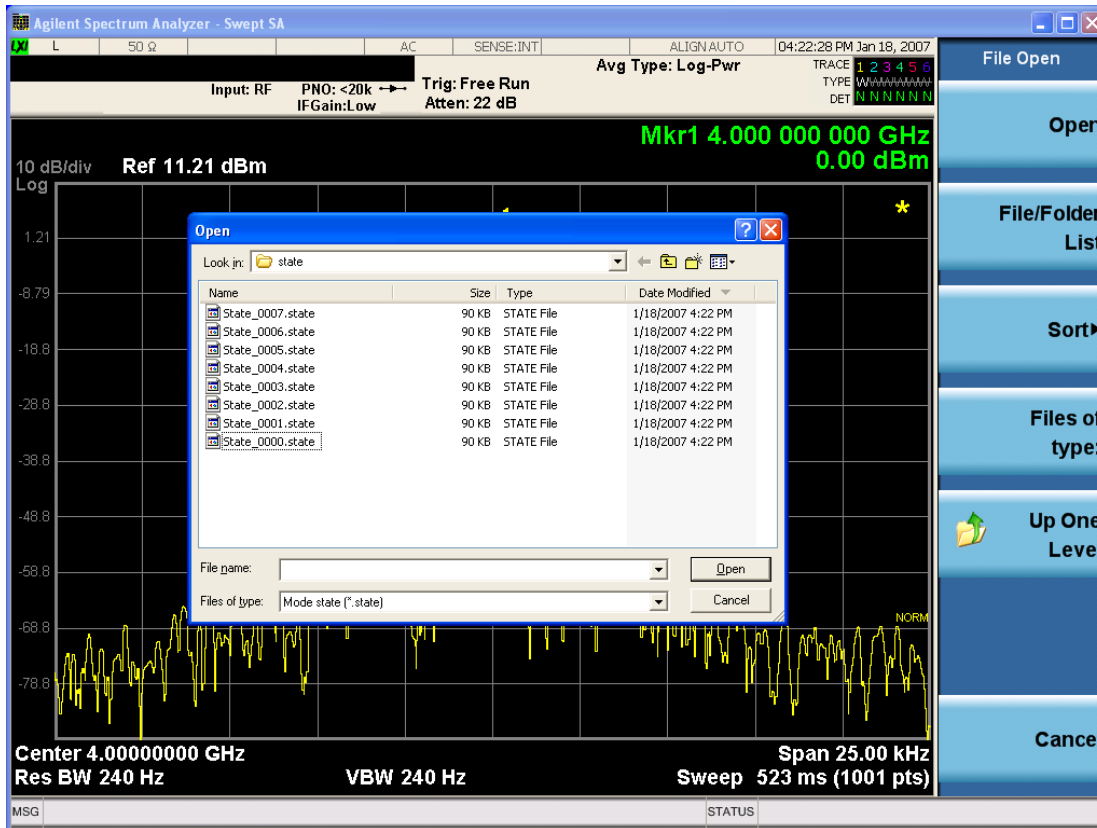
In measurements that support saving Traces, for example, Swept SA, the Trace data is saved along with the State in the State file. When recalling the State, the Trace data is recalled as well. Traces are recalled exactly as they were stored, including the writing mode and update and display modes. If a Trace was updating and visible when the State was saved, it will come back updating and visible, and its data will be rewritten right away. When you use State to save and recall traces, any trace whose data must be preserved should be placed in View or Blank mode before saving.

The following table describes the Trace Save and Recall possibilities:

You want to recall state and one trace's data, leaving other traces unaffected.	Save Trace+State from 1 trace. Make sure that no other traces are updating (they should all be in View or Blank mode) when the save is performed.	On Recall, specify the trace you want to load the one trace's data into. This trace will load in View. All other traces' data will be unaffected, although their trace mode will be as it was when the state save was performed.
You want to recall all traces	Save Trace+State from ALL traces.	On Recall, all traces will come back in View (or Blank if they were in Blank or Background when saved)
You want all traces to load exactly as they were when saved.	Save State	On recall, all traces' mode and data will be exactly as they were when saved. Any traces that were updating will have their data immediately overwritten.

From File...

When you press "From File", the analyzer brings up a Windows dialog and a menu entitled "File Open." This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



Listed below are the functions of the various fields in the dialog, and the corresponding softkeys:

Open

Performs the recall of the specified file. While the recall is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Look In.

Look In

The Look In field shows the path from which the file will be recalled and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Look In field** first uses the last path from the Save As dialog **Save In:** path for that same file type. There is no softkey for directly navigating to the Look In field, but you can use the left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

Sort

Accesses a menu that enables you to sort the files within the File Open dialog. Only one sorting type can be selected at a time and the sorting happens immediately. The sorting types are By Date, By Name, By extension, and By Size.

Files of Type

This field shows the file suffix for the type of file you have selected to recall. For example, if you navigated here while recalling State, "Mode state (*.state)" is in the field. If you navigated here while recalling Trace, ""Mode state (*.trace)" is in the field. If you navigated here while importing a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown menu, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Open** request to be cancelled. The ESC key does the same thing.

Key Path	Recall, State
Notes	Brings up the Open dialog for recalling a State Save Type
Initial S/W Revision	Prior to A.02.00

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

For more information and the SCPI command, see Edit Register Names under the Save, State function.

Key Path	Recall, State
Mode	All
Dependencies	N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending the SCPI command generates an error, -221, "Settings conflict;Option not available"
Initial S/W Revision	A.11.00

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last

modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

Key Path	Recall, State
Example	*RCL 1
Range	1–16 from front panel, 1–128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State, Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	Prior to A.11.00

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

Key Path	Recall, State
Example	*RCL 1
Range	1-16 from front panel, 1-128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State,Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	Prior to A.11.00

Restart

The Restart function restarts the current sweep, or measurement, or set of averaged/held sweeps or measurements. If you are Paused, pressing Restart does a Resume.

The Restart function is accessed in several ways:

- Pressing the Restart key
- Sending the remote command INIT:IMMEDIATE
- Sending the remote command INIT:RESTART

See "[More Information](#)" on page 1488

Key Path	Front-panel key
Remote Command	:INITiate[:IMMEDIATE] :INITiate:RESTART
Example	:INIT:IMM :INIT:REST
Notes	:INITiate:RESTART and :INITiate:IMMEDIATE perform exactly the same function.
Couplings	Resets average/hold count k. For the first sweep overwrites all active (update=on) traces with new current data. For application modes, it resets other parameters as required by the measurement.
Status Bits/OPC dependencies	This is an Overlapped command. The STATUS:OPERATION register bits 0 through 8 are cleared. The STATUS:QUESTIONABLE register bit 9 (INTEGRITY sum) is cleared. The SWEEPING bit is set. The MEASURING bit is set.
Backwards Compatibility Notes	For Spectrum Analysis mode in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart trace averages (displayed average count reset to 1) for a trace in Clear Write, but did not restart Max Hold and Min Hold. In the X-Series, the Restart hardkey and the INITiate:RESTART command restart not only Trace Average, but MaxHold and MinHold traces as well. For wireless comms modes in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart every measurement, which includes all traces and numeric results. There is no change to this operation.
Initial S/W Revision	Prior to A.02.00

More Information

The **Restart** function first aborts the current sweep/measurement as quickly as possible. It then resets the sweep and trigger systems, sets up the measurement and initiates a new data measurement sequence with a new data acquisition (sweep) taken once the trigger condition is met.

If the analyzer is in the process of aligning when **Restart** is executed, the alignment finishes before the restart function is performed.

Even when set for Single operation, multiple sweeps may be taken when Restart is pressed (for example, when averaging/holding is on). Thus when we say that **Restart** "restarts a measurement," we may mean:

- It restarts the current sweep
- It restarts the current measurement
- It restarts the current set of sweeps if any trace is in Trace Average, Max Hold or Min Hold
- It restarts the current set of measurements if Averaging, or Max Hold, or Min Hold is on for the measurement
- depending on the current settings.

With **Average/Hold Number** (in **Meas Setup** menu) set to 1, or Averaging off, or no trace in Trace Average or Hold, a single sweep is equivalent to a single measurement. A single sweep is taken after the trigger condition is met; and the analyzer stops sweeping once that sweep has completed. However, with **Average/Hold Number** >1 and at least one trace set to **Trace Average, Max Hold, or Min Hold (SA Measurement)** or **Averaging on (most other measurements)**, multiple sweeps/data acquisitions are taken for a single measurement. The trigger condition must be met prior to each sweep. The sweep is stopped when the average count k equals the number N set for **Average/Hold Number**. A measurement average usually applies to all traces, marker results, and numeric results; but sometimes it only applies to the numeric results.

Once the full set of sweeps has been taken, the analyzer will go to idle state. To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command `CALC:AVER:TCON UP`.

Save

The Save menu lets you choose what you want to save and where you want to save it. Among the types of files you can save are **States**, **Traces**, and **Screen Images**. In addition, an Export (Data) option lets you save a number of data types as CSV files for easy import into Excel and other spreadsheet programs.

Key Path	Front-panel key
Mode	All
Notes	No remote command for this key specifically, but the :MMEM:STOR:STATe <filename> command is available for specific file types. An example is :MMEM:STOR:STATe <filename>.
Initial S/W Revision	Prior to A.02.00

State

The Save State menu lets you choose a register or file for saving the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings which were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, Verbose SCPI) are not affected by either Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

After the save completes, the message "File <filename> saved" or "State Register <register number> saved" is displayed.

For rapid saving, the State menu lists 16 registers to save to. Pressing a Register key initiates the save. You can also select a file to save to.

The default path for all State Files is:

My Documents\<<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

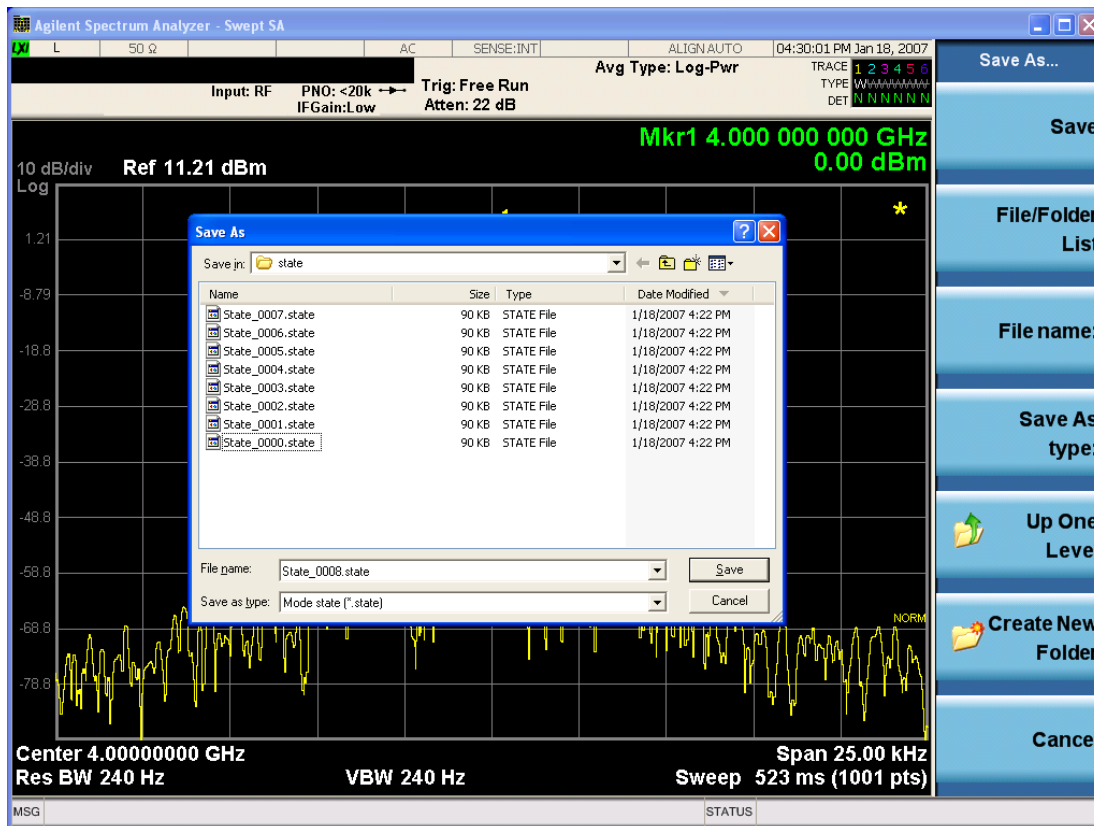
Key Path	Save
Mode	All
Remote Command	:MMEMory:STORe:STATe <filename>
Example	MMEM:STOR:STATe "MyStateFile.state" This stores the current instrument state data in the file MyStateFile.state in the default directory.
Notes	Both single and double quotes are supported for any filename parameter over remote. After saving to a register, that register's menu key is updated with the date the time, unless a custom label has been entered for that key. After saving to a register, you remain in the Save State menu, so that you can see the Register key

update. After saving to a file, the analyzer automatically returns to the previous menu and any Save As dialog goes away.

Backwards Compatibility SCPI	:MMEMoRY:STORe:STATe 1,<filename>
Initial S/W Revision	Prior to A.02.00

To File . . .

When you press “To File”, the analyzer brings up a Windows dialog and a menu entitled “**Save As.**” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



The Listed below

are the functions of the various fields in the dialog, and the corresponding softkeys:

Save

Performs the save to the specified file of the selected type. If the file already exists, a dialog will appear that allows you to replace the existing file by selecting OK, or you can Cancel the request. If you select OK, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade.

While the save is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Save In.

Save In

The Save In field shows the path to which the file will be saved and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Save In field** defaults to the default path for this type of file and remembers the last path you used to save this type of file. There is no softkey for directly navigating to the Save In field but you can use left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

File Name

The File Name field is initially loaded with an automatically generated filename specific to the appropriate Save Type. The automatically generated filename is guaranteed not to conflict with any filename currently in the directory. You may replace or modify this filename using the File Name key. See the ["Quick Save " on page 2328](#) documentation for more on the automatic file naming algorithm.

When you press the File Name key the analyzer displays the Alpha Editor. Use the knob to choose the letter to add and the front-panel Enter key to add the letter to the file name. The BK character moves you back and the FW character moves you forward in the filename. The Select key on the front panel generates a space character. When you are done entering the filename press the Done softkey. This returns back to the **File Open** dialog and menu, but does not cause the save to occur.

Save As Type

This field shows the file suffix for the type of file you have selected to save. For example, if you navigated here while saving State, "Mode state (*.state)" is in the field. If you navigated here from saving Trace, ""Mode state (*.trace)" is in the field. If you navigated here while exporting a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Create New Folder

This key corresponds to the icon of a folder with the "*" that is in the tool bar of the dialog. When pressed, a new folder is created in the current directory with the name **New Folder** and you can enter a new folder name using the Alpha Editor.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Save As** request to be cancelled. The ESC key does the same thing.

Key Path	Save, State
Mode	All
Notes	Brings up Save As dialog for saving a State Save Type
Initial S/W Revision	Prior to A.02.00

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

See ["More Information" on page 1493](#)

Key Path	Save, State
Mode	All
Remote Command	:MMEMory:REGister:STATe:LABel <reg number>,"label" :MMEMory:REGister:STATe:LABel? <reg number>
Example	:MMEM:REG:STAT:LAB 1,"my label"
Notes	<reg number> is an integer from 1 to 16. If the SCPI specifies an invalid register number an error message is generated, -222,"Data out of range;Invalid register label number" "label" is a string from 0 to 30 characters in length. If a label exceeds 30 characters, an error message is generated, -150,"String data error;Label clipped to 30 characters" "label" of length 0 erases the custom label and restores the default (time and date) label. E.g.: :MMEM:REG:STAT:LAB 1,""
Dependencies	N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending this command generates an error, -221,"Settings conflict;Option not available"
Preset	The names are unaffected by Preset or power cycle but are set to the default label (time and date) on a "Restore System Defaults->Misc"
Initial S/W Revision	A.11.00

More Information

When you edit one of the register names, the time and date field will be replaced by the custom name.

If you delete all the characters in the custom name, it restores the default (time and date).

The register names are stored within the state files, but they are not part of the instrument state; that is, once you have edited a register name, loading a new state will not change that register name. Another consequence of this is that the names will be persistent through a power cycle. Also, if a named state file is transferred to another analyzer, it will bring its custom name along with it.

If you try to edit the name of an empty register, the analyzer will first save the state to have a file to put the name in. If you load a named state file into an analyzer with older firmware it will ignore the metadata.

The *SAV and *RCL commands will not be affected by the custom register names, nor will the MMEM commands.

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

Key Path	Save, State
Mode	All
Example	*SAV 1
Range	1–16 from front panel, 1–128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.11.00

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

Key Path	Save, State
Mode	All
Example	*SAV 1
Range	1–16 from front panel, 1–128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.11.00

Data (Export)

Exporting a data file stores data from the current measurement to mass storage files. The Export Menu only contains data types that are supported by the current measurement.

Since the commonly exported data files are in .csv format, the data can be edited by you prior to importing. This allows you to export a data file, manipulate the data in Excel (the most common PC Application for manipulating .csv files) and then import it.

Selecting an Export Data menu key will not actually cause the exporting to occur, since the analyzer still needs to know where you wish to save the data. Pressing the Save As key in this menu brings up the Save As dialog and Save As menu that allows you to specify the destination file and directory. Once a filename has been selected or entered in the Open menu, the export will occur as soon as the Save key is pressed.

Key Path	Save
Mode	All
Notes	The menu is built from whatever data types are available for the mode. So the key locations in the sub menu will vary. No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:STORe commands.
Dependencies	If a file type is not used by a certain measurement, that type is grayed out for that measurement. The key for a file type will not show at all if there are no measurements in the Mode that support it.
Preset	Is not affected by a Preset or shutdown, but is reset during Restore Mode Defaults
Readback	The data type that is currently selected
Initial S/W Revision	Prior to A.02.00

Measurement Results

Pressing this key selects Meas Results as the data type to be exported. Pressing the key a second time brings up the Meas Results menu, which allows you to select which **Meas Result** to save. In the Swept SA measurement, there are three types of Measurement Results files: Peak Table, Marker Table and Spectrogram.

See "[Meas Results File Contents](#)" on page 1496.

See "[Marker Table](#)" on page 1496.

See "[Peak Table](#)" on page 1499.

See "[Spectrogram](#)" on page 1502

Remote Command	:MMEMory:STORe:RESults:MTABle PTABle SPEctrogram <filename>
Example	:MMEM:STOR:RES:MTAB "myResults.csv" Saves the results from the current marker table to the file myResults.csv in the current path. :MMEM:STOR:RES:PTAB "myResults.csv" Saves the results from the current peak table to the file myResults.csv in the current path. :MMEM:STOR:RES:SPEC "myResults.csv" Saves the results from the current Spectrogram display to the file myResults.csv in the current path. The default path is My Documents\SA\data\SAN\results
Notes	If the save is initiated via SCPI, and the file already exists, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade. Both single and double quotes are supported for any filename parameter over SCPI.
Dependencies	If a save of Marker Table results is requested and the Marker Table is not on, no file is saved and a message is generated If a save of Peak Table results is requested and the Peak Table is not on, no file is saved and a message is generated If a save of Spectrogram results is requested and the Spectrogram is not on, no file is saved and a message is generated. The Spectrogram choice only appears if option EDP is licensed.
Preset	Not part of Preset, but is reset to Peak Table by Restore Mode Defaults. Survives a shutdown.
Initial S/W Revision	Prior to A.02.00

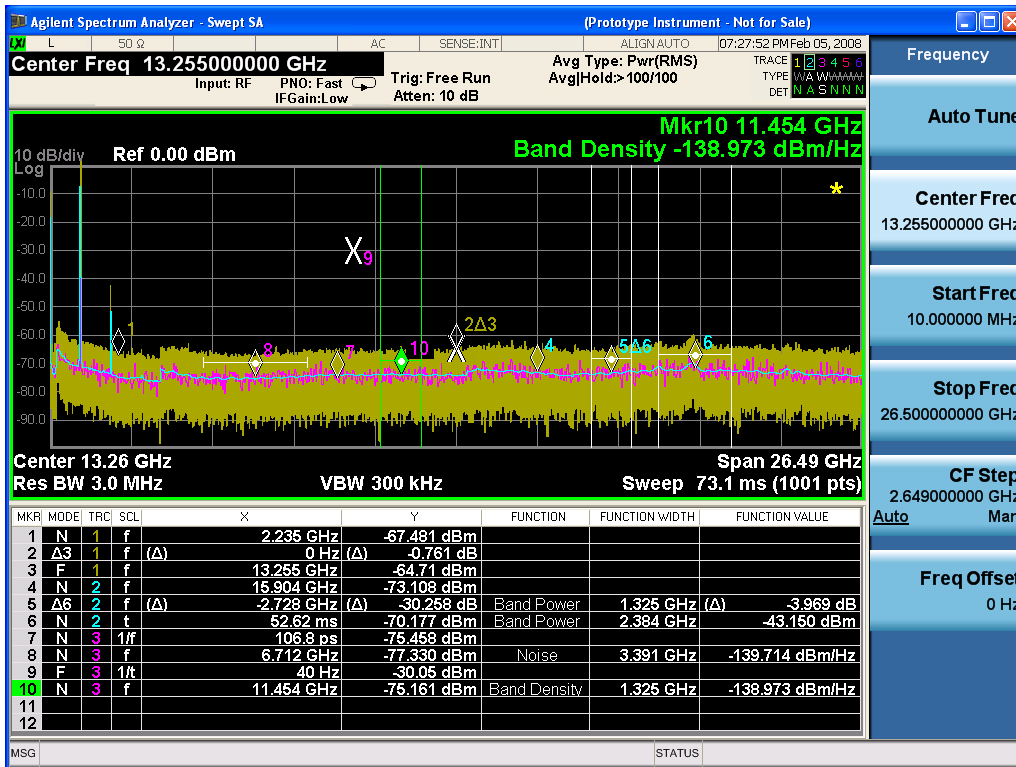
Meas Results File Contents

All files are .csv files. The following section details the data in each file type.

Marker Table

This section discusses the Marker Table Meas Results file format.

Imagine that, at the point where a Marker Table Meas Result is requested, the following screen is showing:



Then the Meas Results file, when opened, would show the following data:

MeasurementR	
result	
Swept SA	
A.01.40_R0017	N9020A
526 B25 PFR	1
P26 EA3	
Result Type	Marker Table
Ref Level	0
Number of Points	1001
Sweep Time	0.0662666 67
Start Frequency	10000000
Stop Frequency	26500000 000
Average Count	0
Average Type	LogPower (Video)
RBW	3000000

RBW Filter	Gaussian
RBW Filter BW	3dB
VBW	3000000
Sweep Type	Swept
X Axis Scale	Lin
PreAmp State	Off
PreAmp Band	Low
Trigger Source	Free
Trigger Level	1.2
Trigger Slope	Positive
Trigger Delay	1.00E-06
Phase Noise Optimization	Fast
Swept If Gain	Low
FFT If Gain	Autorange
RF Coupling	AC
FFT Width	411900
Ext Ref	10000000
Input	RF
RF Calibrator	Off
Attenuation	10
Ref Level Offset	0
External Gain	0
X Axis Units	Hz
Y Axis Units	dBm

DATA									
MKR	MODE	TR C	SCL	X	Y	FUNCTI ON	FUNCTIO N WIDTH	FUNCTI ON VALUE	FUNCTI ON UNIT
1	Normal	1	Freque ncy	2.2350E+09	- 67.481	Off	0.0000E+00	0	None
2	Delta3	1	Freque ncy	0.0000E+00	- 0.761	Off	0.0000E+00	0	None
3	Fixed	1	Freque ncy	1.3255E+10	- 64.71	Off	0.0000E+00	0	None
4	Normal	2	Freque ncy	1.5904E+10	- 73.1	Off	0.0000E+00	0	None

08									
5	Delta7	2	Frequency	- 2.7280E+ 09	- 30.2 58	Band Power	1.3250E+ 06	-3.969	dB
6	Normal	2	Time	5.2620E- 02	- 70.1 77	Band Power	2.3840E+ 06	-43.15	dBm
7	Normal	3	Period	1.0680E- 10	- 75.4 58	Off	0.0000E+ 00	0	None
8	Normal	3	Frequency	6.7120E+ 09	- 77.3 3	Noise	3.3910E+ 06	- 139.71 4	dBm/Hz
9	Fixed	3	Inverse Time	4.0000E+ 01	- 30.0 5	Off	0.0000E+ 00	0	None
10	Normal	3	Frequency	1.1454E+ 10	- 75.1 61	Band Density	1.3250E+ 06	- 138.97 3	dBm/Hz
11	Off	1	Frequency	0.0000E+ 00	0	Off	0.0000E+ 00	0	None
12	Off	1	Frequency	0.0000E+ 00	0	Off	0.0000E+ 00	0	None

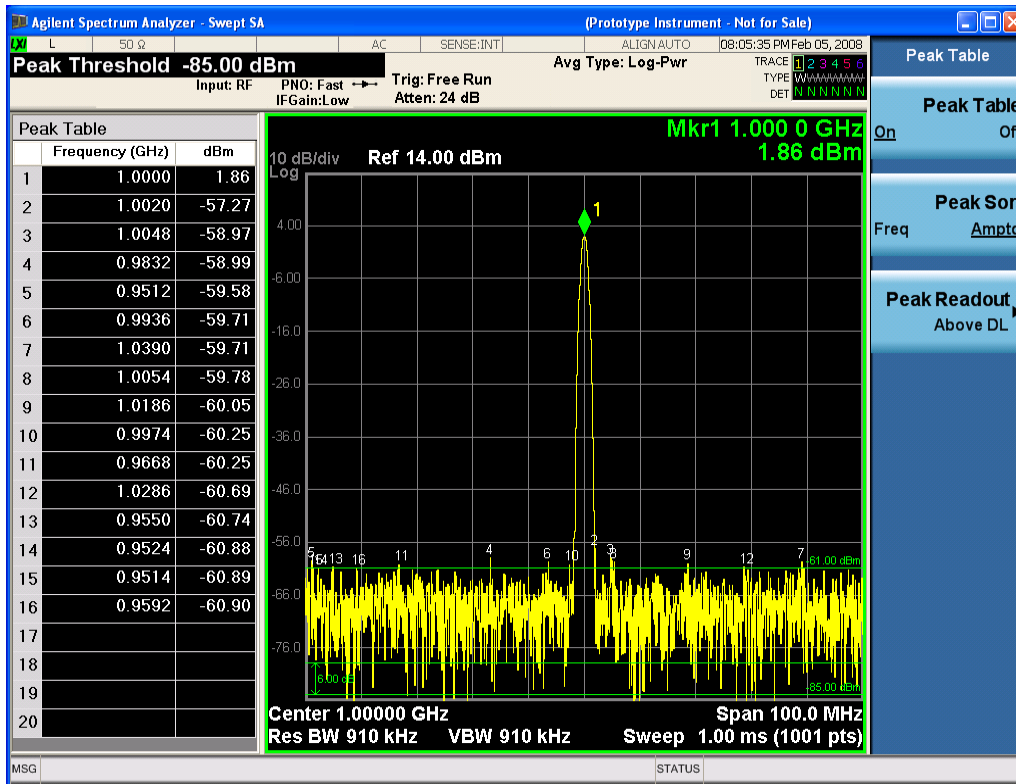
The numbers appear in the file exactly as they appear onscreen. If it says 11.454 GHz onscreen, then in the file it is 11.454E+09.

The metadata header is very similar to the metadata used in the trace data .csv files. See Trace File Contents. The only new information concerns the 1-of-N fields in the marker table itself.

Peak Table

This section discusses the Peak Table Meas Results file format.

Imagine that, at the point where a Marker Table Meas Result is requested, the following screen is showing:



Then the Meas Results file, when opened, would show the header data (the same as for the Marker Table except that the Result Type is Peak Table) ending with a few fields of specific interest to Peak Table users:

- Peak Threshold
- Peak Threshold State (On|Off)
- Peak Excursion
- Peak Excursion State (On|Off)
- Display Line
- Peak Readout (All|AboveDL|BelowDL)
- Peak Sort (Freq|Amptd)

These fields are then followed by the data for the Peak Table itself.

Note that the label for the Frequency column changes to Time in 0 span.

Here is what the table for the above display looks like:

MeasurementResult	
Swept SA	
A.01.40_R0017	N9020A
526 B25 PFR P26 EA3	1

Result Type	Peak Table
Ref Level	0
Number of Points	1001
Sweep Time	0.066266667
Start Frequency	10000000
Stop Frequency	26500000000
Average Count	0
Average Type	LogPower(Video)
RBW	3000000
RBW Filter	Gaussian
RBW Filter BW	3dB
VBW	3000000
Sweep Type	Swept
X Axis Scale	Lin
PreAmp State	Off
PreAmp Band	Low
Trigger Source	Free
Trigger Level	1.2
Trigger Slope	Positive
Trigger Delay	1.00E-06
Phase Noise Optimization	Fast
Swept If Gain	Low
FFT If Gain	Autorange
RF Coupling	AC
FFT Width	411900
Ext Ref	10000000
Input	RF
RF Calibrator	Off
Attenuation	10
Ref Level Offset	0
External Gain	0
X Axis Units	Hz
Y Axis Units	dBm
Peak Threshold	-85
Peak Threshold State	On
Peak Excursion	6
Peak Excursion State	On

Display Line	-61	
Peak Readout	AboveDL	
Peak Sort	Amptd	
DATA		
Peak	Frequency	Amplitude
1	1.0000E+06	1.86
2	1.0020E+06	-57.27
3	1.0048E+06	-58.97
4	9.8320E+05	-58.99
5	9.5120E+05	-59.58
6	9.9360E+05	-59.71
7	1.0390E+06	-59.71
8	1.0054E+06	-59.78
9	1.1086E+06	-60.05
10	9.9740E+05	-60.25
11	9.6680E+05	-60.25
12	1.0286E+06	-60.69
13	9.5500E+05	-60.74
14	9.5240E+05	-60.88
15	9.5140E+05	-60.89
16	9.5920E+05	-60.90
17		
18		
19		
20		

Spectrogram

This section discusses the Spectrogram Results file format. The Spectrogram choice only appears if option EDP is licensed.

The Spectrogram results are the same as a Trace data export, except that instead of having just one trace's data, all 300 traces appear one after the other.

Each trace has its own data mark; the data for Spectrogram Trace 0 follows the row marked DATA, the data for Spectrogram Trace 1 follows the row marked DATA1, for Spectrogram Trace 2 follows the row marked DATA2, and so on.

Each DATA row has a timestamp in the second column (as of firmware revision A.11.01). So, for example, if Trace 0 had a relative start time of 1729.523 sec, then the first DATA row would look like this:

DATA,1729.523

And if Trace 13 had a relative start time of 100.45 sec, then the fourteenth data row would look like:

DATA13,100.453

To find the absolute time for the relative timestamps of each trace, the last row before the first DATA row gives the absolute start time of the Spectrogram, in the form YYYYMMDDHHMMSS

So, for example, if the absolute start time is 13:23:45:678 on January 30, 2012, this row would look like:

Start Time,20120130132345678

NOTE The resolution of the absolute time stored is 1 ms, which matches up with the fact that the fastest sweep time is also 1 ms. However, there is no specification for the absolute accuracy of the clock in the analyzer, nor is there any facility provided to allow the user to set this time to any particular degree of accuracy.

Traces that have not yet been filled in the Spectrogram display are empty; there is no DATA header for them. The file ends after the last non-empty trace.

Imagine that, at the point where a Spectrogram Meas Result is requested, the following screen is showing:



For the purpose of this example, we have set the Average/Hold Number to 10, thus we have only traces 0 thru 10. The Spectrogram was started at 02:28:08:700 pm on April 25, 2012 (that is, 700 ms after 2:28:08 pm), although the screen dump itself shows a different time, as it was taken ten minutes after the

Spectrogram data. Trace 0 is showing a start time of 5.30 seconds, meaning 5.3 seconds after the Spectrogram started (trace 10 has a start time of 0, as it was the first trace taken but has now rolled up into the tenth trace slot).

The Meas Results file, when opened, shows the header data and ten traces of trace data. Below is an extract from the result file for the above display. Note the start time of 20120425142808700 showing in the last row before the first DATA row, and the relative time of 5.299231048 showing in the first DATA row:

Result Type	Spectrogram
MeasResult	
Swept SA	
A.11.00.01	N9020A
503 508 513 526 ALL ALV B1C B1X B25 B2X B40 BAB BBA CR3 CRP DP2 DRD EA3 EDP EMC EP1 ERC ESC ESP EXM FSA HBA K03 LFE MPB P03 P08 P13 P26 PFR RTL RTS S40 SB1 SEC SM1 UK6 YAS YAV	1
Segment	0
Number of Points	1001
Sweep Time	0.523333333
Start Frequency	5999984415
Stop Frequency	6000009415
Average Count	0
Average Type	LogPower(Video)
RBW	240
RBW Filter	Gaussian
RBW Filter BW	3dB
VBW	240
Sweep Type	Swept
X Axis Scale	Lin
PreAmp State	Off
PreAmp Band	Low
Trigger Source	Free
Trigger Level	1.2
Trigger Slope	Positive
Trigger Delay	0
Phase Noise Optimization	Wide
Swept If Gain	Low
FFT If Gain	Autorange
RF Coupling	AC

Result Type	Spectrogram
FFT Width	411900
Ext Ref	10000000
Input	RF
RF Calibrator	Off
Attenuation	14
Ref Level Offset	0
External Gain	0
Trace Type	Clearwrite
Detector	Normal
Trace Math	Off
Trace Math Oper1	Trace5
Trace Math Oper2	Trace6
Trace Math Offset	0
Trace Name	Trace1
X Axis Units	Hz
Y Axis Units	dBm
Start Time	20120425142808700
DATA	5.299231048
5999984415	-76.34749519
5999984440	-77.28097006
5999984465	-75.32317869
5999984490	-73.64417681
5999984515	-72.67154604

- o
- o
- o

6000009315	-77.94423277
6000009340	-79.51829697
6000009365	-78.46108961
6000009390	-78.46108957
6000009415	-76.59570596
DATA2	4.708697055
5999984415	-80.98197882
5999984440	-80.98197879

5999984465	-75.83142132
5999984490	-74.02712079
5999984515	-73.57213005

o
o
o

6000009315	-75.9183103
6000009340	-79.53787488
6000009365	-78.82602191
6000009390	-78.82602188
6000009415	-76.37486709
DATA10	0
5999984415	-75.56751112
5999984440	-75.76485645
5999984465	-76.67718717
5999984490	-78.79238489
5999984515	-83.72680212

o
o
o

6000009315	-71.3942461
6000009340	-72.28308332
6000009365	-73.92684489
6000009390	-75.45548832
6000009415	-75.17904815

Save As . . .

When you press "Save As", the analyzer brings up a Windows dialog and a menu entitled "**Save As.**" This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[To File . . .](#)" on page 2340 in Save, State for a full description of this dialog and menu.

The default path for saving files is:

For all of the Trace Data Files:

My Documents\`<mode name>`\data\traces

For all of the Limit Data Files:

My Documents\`<mode name>`\data\limits

For all of the Measurement Results Data Files:

My Documents\`<mode name>`\data\`<measurement name>`\results

For all of the Capture Buffer Data Files:

My Documents\`<mode name>`\data\captureBuffer

Key Path	Save, Data
Mode	All
Notes	The key location is mode-dependent and will vary. Brings up the Save As dialog for saving a <code><mode specific></code> Save Type. The save is performed immediately and does not wait until the measurement is complete.
Initial S/W Revision	Prior to A.02.00

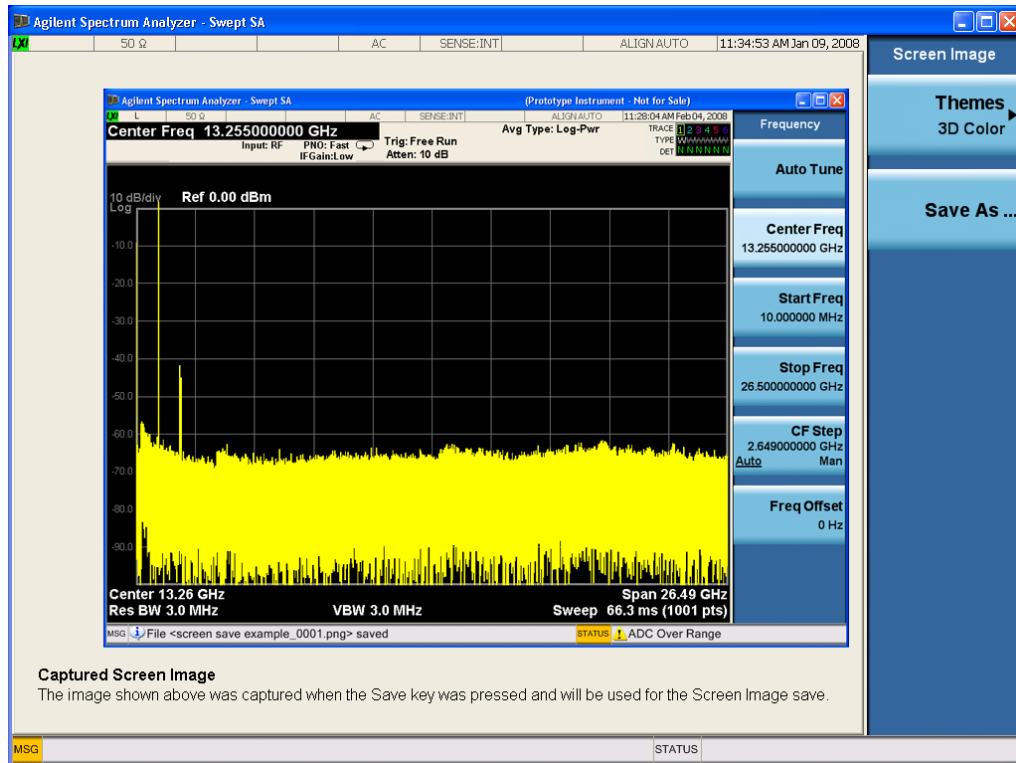
Screen Image

Pressing Screen Image accesses a menu of functions that enable you to specify a format and location for the saved screen image. It brings up a menu that allows you to specify the color scheme of the Screen Image (Themes) or navigate to the Save As dialog to perform the actual save.

Screen Image files contain an exact representation of the analyzer display. They cannot be loaded back onto the analyzer, but they can be loaded into your PC for use in many popular applications.

The image to be saved is actually captured when the Save front panel key is pressed, and kept in temporary storage to be used if you ask for a Screen Image save. When the Screen Image key is pressed, a "thumbnail" of the captured image is displayed, as shown below:

13 Waveform Measurement Save



When you continue on into the Save As menu and complete the Screen Image save, the image depicted in the thumbnail is the one that gets saved, showing the menus that were on the screen before going into the Save menus. The save is performed immediately and does not wait until the measurement is complete.

After you have completed the save, the Quick Save front-panel key lets you quickly repeat the last save performed, using an auto-named file, with the current screen data.

NOTE

For versions previous to A.01.55, if you initiate a screen image save by navigating through the Save menus, the image that is saved will contain the Save menu softkeys, not the menus and the active function that were on the screen when you first pressed the Save front panel key.

Key Path	Save
Mode	All
Remote Command	:MMEMory:STORe:SCReen <filename>
Example	:MMEM:STOR:SCR "myScreen.png" This stores the current screen image in the file MyScreenFile.png in the default directory.
Initial S/W Revision	Prior to A.02.00

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

Key Path	Save, Screen Image
Remote Command	:MMEMory:STORe:SCReen:THEMe TDColor TDMonochrome FCOLOR FMONochrome :MMEMory:STORe:SCReen:THEMe?
Example	:MMEM:STOR:SCR:THEM TDM
Preset	3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes.
Readback	3D Color 3D Mono Flat Color Flat Mono
Backwards Compatibility Notes	In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical.
Initial S/W Revision	Prior to A.02.00

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDC
Readback	3D Color
Initial S/W Revision	Prior to A.02.00

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDM
Readback	3D Mono
Initial S/W Revision	Prior to A.02.00

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

Key Path	Save, Screen Image, Themes
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Example	MMEM:STOR:SCR:THEM FCOL
Readback	Flat Color
Initial S/W Revision	Prior to A.02.00

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FMON
Readback	Flat Mono
Initial S/W Revision	Prior to A.02.00

Save As...

When you press “Save As”, the analyzer brings up a Windows dialog and a menu entitled “**Save As.**” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[To File . . .](#)" on page 2340 in Save, State for a full description of this dialog and menu.

The default path for Screen Images is

My Documents\<<mode name>\screen.

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

Key Path	Save, Screen Image
Notes	Brings up Save As dialog for saving a Screen Image Save Type
Initial S/W Revision	Prior to A.02.00

Mass Storage Catalog (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:CATalog? [<directory_name>]
Notes	<p>The string must be a valid logical path.</p> <p>Queries disk usage information (drive capacity, free space available) and obtains a list of files and directories in a specified directory in the following format:</p> <p><numeric_value>,<numeric_value>,{<file_entry>}</p> <p>It returns two numeric parameters and as many strings as there are files and directories. The first parameter indicates the total amount of storage currently used in bytes. The second parameter</p>

indicates the total amount of storage available, also in bytes. The <file_entry> is a string. Each <file_entry> indicates the name, type, and size of one file in the directory list:

<file_name>,<file_type>,<file_size>

As the windows file system has an extension that indicates file type, <file_type> is always empty. <file_size> provides the size of the file in bytes. For directories, <file_entry> is surrounded by square brackets and both <file_type> and <file_size> are empty

Initial S/W Revision Prior to A.02.00

Mass Storage Change Directory (Remote Command Only)

Key path SCPI Only

Remote Command :MMEMory:CDIRectory [<directory_name>]
 :MMEMory:CDIRectory?

Notes The string must be a valid logical path.

Changes the default directory for a mass memory file system. The <directory_name> parameter is a string. If no parameter is specified, the directory is set to the *RST value.

At *RST, this value is set to the default user data storage area, that is defined as System.Environment.SpecialFolder.Personal.

Query returns full path of the default directory.

Initial S/W Revision Prior to A.02.00

Mass Storage Copy (Remote Command Only)

Key path SCPI Only

Remote Command :MMEMory:COPY <string>,<string>[,<string>,<string>]

Notes The string must be a valid logical path.

Copies an existing file to a new file or an existing directory to a new directory.

Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.

The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.

This command will generate an "access denied" error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.

Mass Storage Device Copy (Remote Command Only)

This command transfers data to/from a file and a peripheral device.

Key path	SCPI Only
Remote Command	:MMEMory:COpy:DEvice <source_string>,<dest_string>
Notes	The strings must be a valid logical path or a valid device keyword. If the dest_string is a device keyword, the data is copied from the source file to the device. If the source_string is a device keyword, the data is copied to the source file from the device. Valid device keywords are: SNS (smart noise source) An error is generated if the file or device is not found.

Mass Storage Delete (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:DELeTe <file_name>[,<directory_name>]
Notes	The string must be a valid logical path. Removes a file from the specified directory. The <file_name> parameter specifies the file name to be removed. This command will generate an "access denied" error if the file is in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.
Initial S/W Revision	Prior to A.02.00

Mass Storage Data (Remote Command Only)

Creates a file containing the specified data OR queries the data from an existing file.

Key path	SCPI Only
Remote Command	:MMEMory:DATA <file_name>, <data> :MMEMory:DATA? <file_name>
Notes	The string must be a valid logical path. The command form is MMEMory:DATA <file_name>,<data>. It loads <data> into the file <file_name>. <data> is in 488.2 block format. <file_name> is string data. The query form is MMEMory:DATA? <file_name> with the response being the associated <data> in block format.
Initial S/W Revision	Prior to A.02.00

Mass Storage Make Directory (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:MDIRectory <directory_name>
Notes	The string must be a valid logical path. Creates a new directory. The <directory_name> parameter specifies the name to be created.

This command will generate an “access denied” error if the new directory would be in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.

Initial S/W Revision Prior to A.02.00

Mass Storage Move (Remote Command Only)

Key path SCPI Only

Remote Command :MMEMory:MOVE <string>,<string>[,<string>,<string>]

Notes

The string must be a valid logical path.

Moves an existing file to a new file or an existing directory to a new directory.

Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.

The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.

This command will generate an “access denied” error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.

Initial S/W Revision Prior to A.02.00

Mass Storage Remove Directory (Remote Command Only)

Key path SCPI Only

Remote Command :MMEMory:RDIRECTory <directory_name>

Notes

The string must be a valid logical path.

Removes a directory. The <directory_name> parameter specifies the directory name to be removed. All files and directories under the specified directory shall also be removed.

This command will generate an “access denied” error if the folder is a restricted folder (e.g., C:\Windows) or is in a restricted folder and the current user does not have Power User or Administrator privileges.

Initial S/W Revision Prior to A.02.00

Single (Single Measurement/Sweep)

Sets the analyzer for Single measurement operation. The single/continuous state is Meas Global, so the setting will affect all the measurements. If you are Paused, pressing Single does a Resume.

See ["More Information" on page 1514](#)

Key Path	Front-panel key
Example	:INIT:CONT OFF
Notes	See Cont key description.
Backwards Compatibility Notes	<p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey and the INITiate:IMM switched from continuous measurement to single measurement and restarted sweeps and averages (displayed average count reset to 1), but did not restart Max Hold and Min Hold. In the X-Series, the Single hardkey and the INITiate:IMM command initiate a sweep/ measurement/ average sequence/hold sequence including MaxHold and MinHold.</p> <p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey restarted the sweep regardless of whether or not you were in an active sweep or sweep sequence. In the X-Series, Restart does this but Single only restarts the sweep or sweep sequence if you are in the idle state.</p> <p>INIT[:IMM] in ESA & PSA Spectrum Analysis Mode does an implied ABORT. In some other PSA Modes, INIT[:IMM] is ignored if not in the idle state. . The X-Series follows the ESA/PSA SA Mode model, which may cause some Modes to have compatibility problems.</p>
Initial S/W Revision	Prior to A.02.00

More Information

See ["Restart" on page 2337](#) for details on the INIT:IMMEDIATE (Restart) function.

If you are already in single sweep, the INIT:CONT OFF command has no effect.

If you are already in Single Sweep, then pressing the Single key in the middle of a sweep does not restart the sweep or sequence. Similarly, pressing the Single key does not restart the sweep or sequence if the sweep is not in the idle state (for example, if you are taking a very slow sweep, or the analyzer is waiting for a trigger). Instead, it results in a message. "Already in Single, press Restart to initiate a new sweep or sequence". Even though pressing the Single key in the middle of a sweep does not restart the sweep, sending INIT:IMMEDIATE does reset it.

To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command CALC:AVER:TCON UP.

Source

There is no Source control functionality for this measurement. When this key is pressed, the screen either displays a blank menu, or the previously-selected menu remains unchanged.

Key Path	Front-panel key
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Span X Scale

Accesses a menu of functions that enable you to set the horizontal scale parameters.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Ref Value

Sets the reference value for time on the horizontal axis. When Auto Scaling is set to On, the displayed plots use a Scale/Div value determined by the analyzer, based on the measurement result.

Key Path	SPAN X Scale
Mode	BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CM MB, LTE, LTETDD, DCATV, WLAN, MSR,LTEATDD, LTEAFDD
Remote Command	:DISPlay:WAVeform:VIEW[1] 2:WINDow[1]:TRACe:X[:SCALE]:RLEVel <time> :DISPlay:WAVeform:VIEW[1] 2:WINDow[1]:TRACe:X[:SCALE]:RLEVel?
Example	DISP:WAV:VIEW:WIND:TRAC:X:RLEV 10 ms DISP:WAV:VIEW:WIND:TRAC:X:RLEV?
Notes	You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode.
Couplings	If Auto Scaling is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scaling automatically changes to Off.
Preset	0.00 s
State Saved	Saved in instrument state.
Min	-1.000 s
Max	10.00 s
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Scale/Div

Sets the horizontal scale by changing a time value per division.

Key Path	SPAN X Scale
Mode	BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CM MB, LTE, LTETDD, DCATV, WLAN, MSR,LTEATDD, LTEAFDD
Remote Command	:DISPlay:WAVeform:VIEW[1] 2:WINDow[1]:TRACe:X[:SCALE]:PDIVision <time> :DISPlay:WAVeform:VIEW[1] 2:WINDow[1]:TRACe:X[:SCALE]:PDIVision?
Example	DISP:WAV:VIEW:WIND:TRAC:X:PDIV 500 us DISP:WAV:VIEW:WIND:TRAC:X:PDIV?

Notes	You must be in a mode that includes the Waveform measurement to use this command. Use INSTRUMENT:SElect to set the mode.
Couplings	If Auto Scaling is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scaling automatically changes to Off.
Preset	All except the following list: 200.0 us LTEAFDD, LTEATDD: 1.000 ms LTETDD: 1.000 ms
State Saved	Saved in instrument state.
Min	1.000 ns
Max	320 s
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00, A.14.00

Ref Position

Sets the reference position for the X axis to Left, Center or Right.

Key Path	SPAN X Scale
Mode	BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN, MSR,LTEATDD, LTEAFDD
Remote Command	:DISPlay:WAVeform:VIEW[1] 2:WINDow[1]:TRACe:X[:SCALe]:RPOSition LEFT CENTER RIGHT :DISPlay:WAVeform:VIEW[1] 2:WINDow[1]:TRACe:X[:SCALe]:RPOSition?
Example	DISP:WAV:VIEW:WIND:TRAC:X:RPOS LEFT DISP:WAV:VIEW:WIND:TRAC:X:RPOS?
Notes	Allows you to set the reference position to Left, Ctr (center) or Right. You must be in a mode that includes the Waveform measurement to use this command. Use INSTRUMENT:SElect to set the mode.
Preset	LEFT
State Saved	Saved in instrument state.
Range	Left Ctr Right
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Auto Scaling

Toggles the scale coupling function between On and Off.

Key Path	SPAN X Scale
Mode	BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CM MB, LTE, LTETDD, DCATV, WLAN, MSR,LTEATDD, LTEAFDD
Remote Command	:DISPlay:WAVeform:VIEW[1] 2:WINDow[1]:TRACe:X[:SCALE]:COUPle 0 1 OFF ON :DISPlay:WAVeform:VIEW[1] 2:WINDow[1]:TRACe:X[:SCALE]:COUPle?
Example	DISP:WAV:VIEW:WIND:TRAC:X:COUP ON DISP:WAV:VIEW:WIND:TRAC:X:COUP?
Notes	You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode.
Couplings	When Auto Scaling is On and the Restart front-panel key is pressed, this function automatically determines the scale per division and reference values based on the measurement results. When you set a value to either Scale/Div or Ref Value manually, Auto Scaling automatically changes to Off.
Preset	1
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Sweep/Control

Accesses a menu that enables you to configure the Sweep and Control functions of the analyzer, such as Sweep Time and Gating.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Pause/Resume

Pauses a measurement after the current data acquisition is complete.

When Paused, the label on the key changes to Resume. Pressing Resume un-pauses the measurement. When you are Paused, pressing Restart, Single or Cont does a Resume.

Key Path	Sweep/Control
Remote Command	:INITiate:PAUSE
Dependencies	Grayed out in Measurements that do not support Pausing. Blanked in Modes that do not support Pausing.
Initial S/W Revision	Prior to A.02.00

Key Path	Sweep/Control
Remote Command	:INITiate:RESume
Dependencies	Grayed out in Measurements that do not support Pausing. Blanked in Modes that do not support Pausing.
Initial S/W Revision	Prior to A.02.00

Abort (Remote Command Only)

This command is used to stop the current measurement. It aborts the current measurement as quickly as possible, resets the sweep and trigger systems, and puts the measurement into an "idle" state. If the analyzer is in the process of aligning when ABORT is sent, the alignment finishes before the abort function is performed. So ABORT does not abort an alignment.

If the analyzer is set for Continuous measurement, it sets up the measurement and initiates a new data measurement sequence with a new data acquisition (sweep) taken once the trigger condition is met.

If the analyzer is set for Single measurement, it remains in the "idle" state until an :INIT:IMM command is received.

Remote Command	:ABORT
Example	:ABOR

Notes	<p>If :INITiate:CONTInuous is ON, then a new continuous measurement will start immediately, with sweep (data acquisition) occurring once the trigger condition has been met.</p> <p>If :INITiate:CONTInuous is OFF, then :INITiate:IMMEDIATE is used to start a single measurement; with sweep (data acquisition) occurring once the trigger condition has been met.</p>
Dependencies	<p>For continuous measurement, ABORt is equivalent to the Restart key.</p> <p>Not all measurements support the abort command.</p>
Status Bits/OPC dependencies	<p>The STATus:OPERation register bits 0 through 8 are cleared.</p> <p>The STATus:QUEStionable register bit 9 (INTegrity sum) is cleared.</p> <p>Since all the bits that feed into OPC are cleared by the ABORt, the ABORt will cause the *OPC query to return true.</p>
Initial S/W Revision	Prior to A.02.00

System

See "System" on page 326

Trace/Detector

There is no Trace/Detector functionality supported in the Waveform measurement. The front-panel key displays a blank menu when pressed.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Trigger

See ["Trigger" on page 408](#)

Free Run

See ["Free Run " on page 415](#)

Video

See ["Video \(IF Envelope\) " on page 416](#)

Trigger Level

See ["Trigger Level " on page 416](#)

Trig Slope

See ["Trig Slope " on page 417](#)

Trig Delay

See ["Trig Delay " on page 418](#)

Line

See ["Line " on page 1321](#)

Trig Slope

See ["Trig Slope " on page 1321](#)

Trig Delay

See ["Trig Delay " on page 420](#)

External 1

See ["External 1 " on page 1333](#)

Trigger Level

See ["Trigger Level " on page 1333](#)

Trig Slope

See ["Trig Slope " on page 1334](#)

Trig Delay

See ["Trig Delay " on page 423](#)

External 2

See ["External 2 " on page 1335](#)

Trigger Level

See ["Trigger Level "](#) on page 1335

Trig Slope

See ["Trig Slope "](#) on page 1336

Trig Delay

See ["Trig Delay "](#) on page 425

RF Burst

See ["RF Burst "](#) on page 1336

Absolute Trigger

See ["Absolute Trigger Level"](#) on page 1337

Relative Trigger

See ["Relative Trigger Level"](#) on page 1326

Trig Slope

See ["Trigger Slope "](#) on page 1338

Trig Delay

See ["Trig Delay "](#) on page 429

Periodic Timer

See ["Periodic Timer \(Frame Trigger\) "](#) on page 1328

Period

See ["Period "](#) on page 1329

Offset

See ["Offset "](#) on page 1330

Offset Adjust (Remote Command Only)

See ["Offset Adjust \(Remote Command Only\)"](#) on page 1331

Reset Offset Display

See ["Reset Offset Display "](#) on page 1332

Sync Source

See ["Sync Source "](#) on page 1332

Off

See ["Off "](#) on page 1333

External 1

See ["External 1 "](#) on page 1333

Trigger Level

See ["Trigger Level "](#) on page 1333

Trig Slope

See ["Trig Slope "](#) on page 1334

External 2

See ["External 2 "](#) on page 1335

Trigger Level

See ["Trigger Level "](#) on page 1335

Trig Slope

See ["Trig Slope "](#) on page 1336

RF Burst

See ["RF Burst "](#) on page 1336

Absolute Trigger

See ["Absolute Trigger Level"](#) on page 1337

Trig Slope

See ["Trigger Slope "](#) on page 1338

Trig Delay

See ["Trig Delay"](#) on page 440

Auto/Holdoff

See ["Auto/Holdoff "](#) on page 440

Auto Trig

See ["Auto Trig "](#) on page 441

Trig Holdoff

See ["Trig Holdoff "](#) on page 441

Holdoff Type

See ["Holdoff Type"](#) on page 442

User Preset

Accesses a menu that gives you the following three choices:

- User Preset – recalls a state previously saved using the Save User Preset function.
- User Preset All Modes – presets all of the modes in the analyzer
- Save User Preset– saves the current state for the current mode

Key Path	Front-panel key
Backwards Compatibility Notes	<p>User Preset is actually loading a state, and in legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, “state” always includes all of this data; so whenever state is loaded, or User Preset is executed, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p> <p>On ESA and PSA, User Preset affected the entire instrument’s state. In the X-Series, User Preset only recalls the state for the active mode. There is a User Preset file for each mode. User Preset can never cause a mode switch as it can in legacy analyzers. If you want to recall all modes to their user preset file state, you will need to do a User Preset after mode switching into each mode.</p> <p>User Preset recalls mode state which can now include data like traces; whereas on ESA and PSA, User Preset did not affect data.</p>
Initial S/W Revision	Prior to A.02.00

User Preset

User Preset sets the state of the currently active mode back to the state that was previously saved for this mode using the Save User Preset menu key or the SCPI command, SYST:PRES:USER:SAV. It not only recalls the Mode Preset settings, but it also recalls all of the mode persistent settings, and the Input/Output system setting that existed at the time Save User Preset was executed.

If a Save User Preset has not been done at any time, User Preset recalls the default user preset file for the currently active mode. The default user preset files are created if, at power-on, a mode detects there is no user preset file. There will never be a scenario when there is no user preset file to restore. For each mode, the default user preset state is the same state that would be saved if a Save User Preset is performed in each mode right after doing a Restore Mode Default and after a Restore Input/Output Defaults.

The User Preset function does the following:

- Aborts the currently running measurement.
- Sets the mode State to the values defined by Save User Preset.
- Makes the saved measurement for the currently running mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

Key Path	User Preset
Remote Command	:SYSTem:PRESet:USER
Example	:SYST:PRES:USER:SAVE:SYST:PRES:USER
Notes	:SYST:PRES:USER:SAVE is used to save the current state as the user preset state. Clears all pending OPC bits. The Status Byte is set to 0. Pressing the User Preset front-panel key while already in the User Preset menu will cause the User Preset to get executed
Couplings	A user preset will cause the currently running measurement to be aborted and cause the saved measurement to be active. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved.
Initial S/W Revision	Prior to A.02.00

User Preset All Modes

Recalls all of the User Preset files for each mode, switches to the power-on mode, and activates the saved measurement from the power-on mode User Preset file.

NOTE

When the instrument is secured, all of the user preset files are converted back to their default user preset files.

The User Preset function does the following:

- Aborts the currently running measurement.
- Switches the Mode to the power-on mode.
- Restores the User Preset files for each mode.
- Makes the saved measurement for the power-on mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

Key Path	User Preset
Remote Command	:SYSTem:PRESet:USER:ALL
Example	:SYST:PRES:USER:SAVE:SYST:PRES:USER:ALL
Notes	Clears all pending OPC bits. The Status Byte is set to 0. :SYST:PRES:USER:SAVE is used to save the current state as the user preset state.
Couplings	A user preset will cause the currently running measurement to be aborted, cause a mode switch to the power-on mode, and cause the saved measurement to be active in the power-on mode. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved.
Initial S/W Revision	Prior to A.02.00

Save User Preset

Saves the currently active mode and its State. You can recall this User Preset file by pressing the User Preset menu key or sending the SYST:PRES:USER remote command. This same state is also saved by the Save State function.

Key Path	User Preset
Remote Command	:SYSTem:PRESet:USER:SAVE
Example	:SYST:PRES:USER:SAVE
Notes	:SYST:PRES:SAVE creates the same file as if the user requested a *SAV or a MMEM:STOR:STAT, except User Preset Save does not allow the user to specify the filename or the location of the file.
Initial S/W Revision	Prior to A.02.00

View/Display

Accesses a menu of functions that enable you to set up and control the display parameters for the current measurement.

This topic contains the following sections:

["View Selection by name \(Remote Command Only\)" on page 1529](#)

["View Selection by number \(Remote Command Only\)" on page 1529](#)

View Selection by name (Remote Command Only)

Selects the results view.

Key Path	View/Display
Mode	BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN, MSR,LTEATDD, LTEAFDD
Remote Command	:DISPlay:WAVeform:VIEW[:SElect] RFENvelope IQ :DISPlay:WAVeform:VIEW[:SElect]?
Example	DISP:WAV:VIEW RFEN DISP:WAV:VIEW?
Notes	You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode.
Preset	RFENveloper
State Saved	Saved in instrument state.
Range	RF Envelope IQ Waveform
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

View Selection by number (Remote Command Only)

Displays the numeric values of the measurement results.

Mode	BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN, MSR,LTEATDD, LTEAFDD
Remote Command	:DISPlay:WAVeform:VIEW:NSElect <integer> :DISPlay:WAVeform:VIEW:NSElect?
Example	DISP:WAV:VIEW:NSEL 1 DISP:WAV:VIEW:NSEL?
Notes	You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode.
Preset	1
State Saved	Saved in instrument state.

Min	1
Max	2
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Display

The Display menu is common to most measurements, and is used for configuring items on the display. Some Display menu settings apply to all the measurements in a mode, and some only to the current measurement. Those under the System Display Settings key apply to all measurements in all modes.

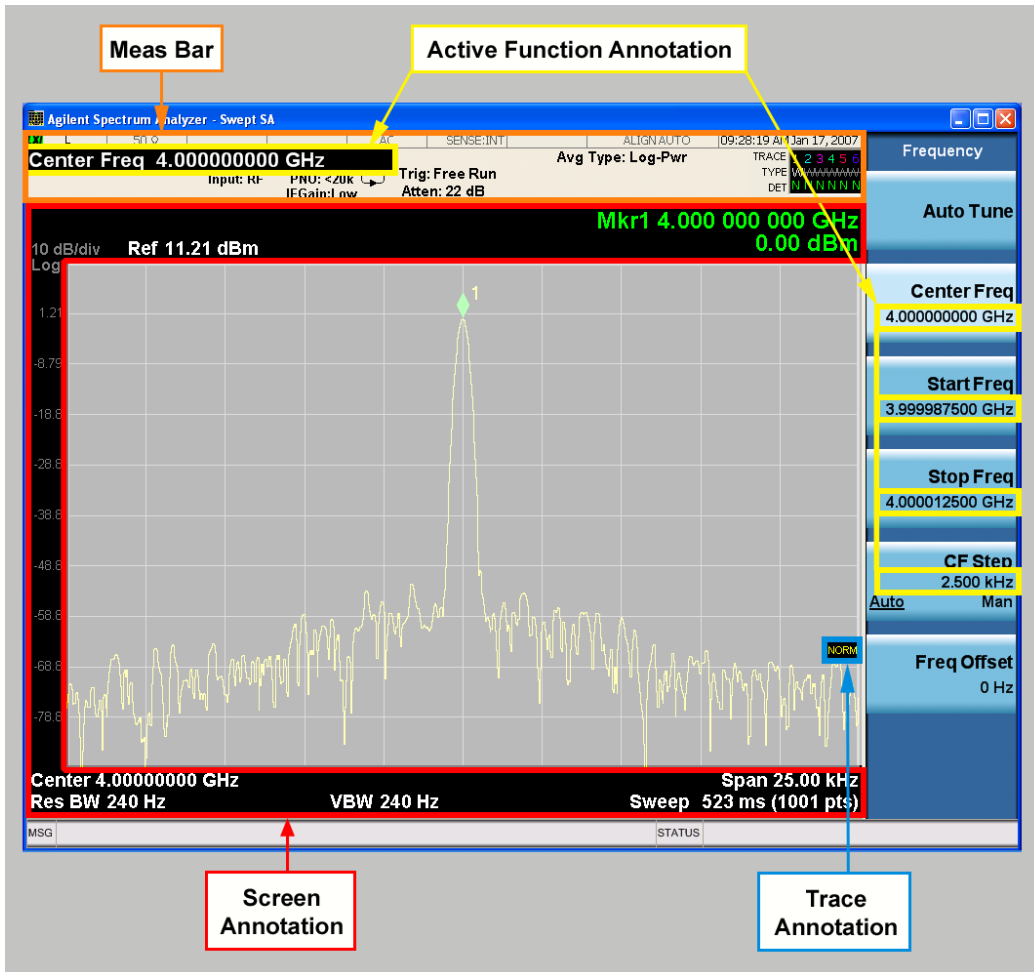
Key Path	Display
Key Path	View/Display
Initial S/W Revision	Prior to A.02.00

Annotation

Turns on and off various parts of the display annotation. The annotation is divided up into four categories:

1. Meas Bar: This is the measurement bar at the top of the screen. It does not include the settings panel or the Active Function. Turning off the Meas Bar turns off the settings panel and the Active Function. When the Meas Bar is off, the graticule area expands to fill the area formerly occupied by the Meas Bar.
2. Screen Annotation: this is the annotation and annunciation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) This does NOT include the marker number or the N dB result. When off, the graticule expands to fill the entire graticule area.
3. Trace annotation: these are the labels on the traces, showing their detector (or their math mode).
4. Active Function annotation: this is the active function display in the meas bar, and all of the active function values displayed on softkeys.

See the figure below. Each type of annotation can be turned on and off individually.



Key Path	View/Display, Display
Initial S/W Revision	Prior to A.02.00

Meas Bar On/Off

This function turns the Measurement Bar on and off, including the settings panel. When off, the graticule area expands to fill the area formerly occupied by the Measurement Bar.

Key Path	View/Display, Display, Annotation
Remote Command	:DISPlay:ANNotation:MBAR[:STATE] OFF ON 0 1 :DISPlay:ANNotation:MBAR[:STATE]?
Example	DISP:ANN:MBAR OFF
Dependencies	Grayed out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset	On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off.
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Screen

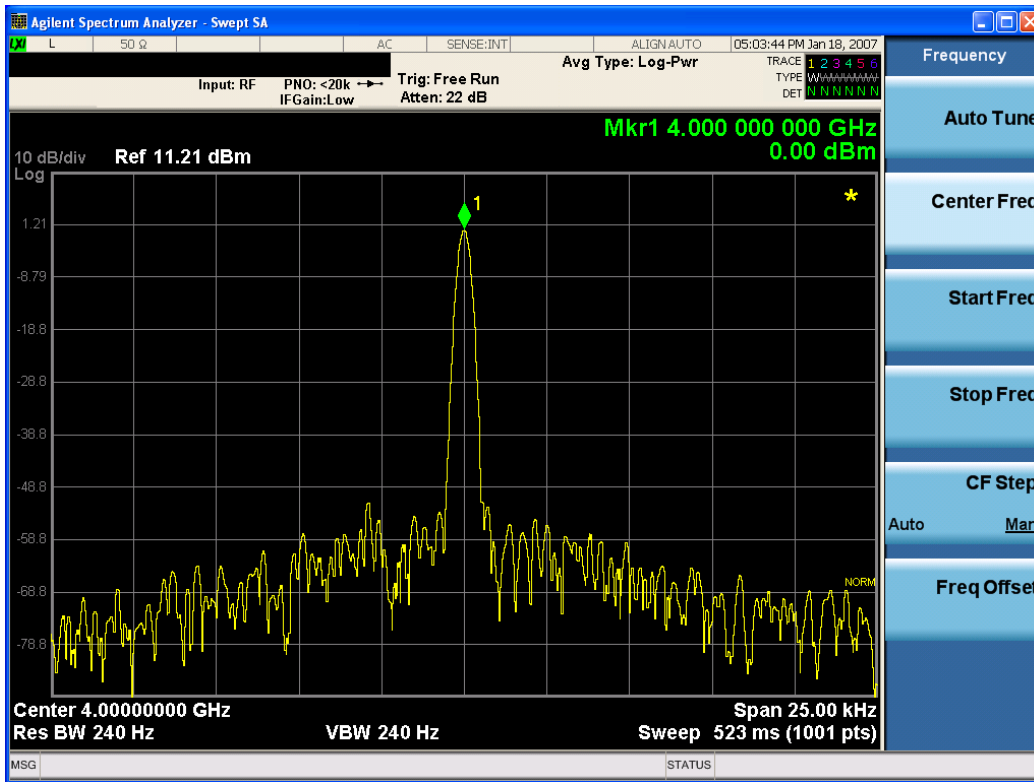
This controls the display of the annunciation and annotation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) and the y-axis annotation. This does NOT include marker annotation (or the N dB result). When off, the graticule expands to fill the entire graticule area, leaving only the 1.5% gap above the graticule as described in the Trace/Detector chapter.

Key Path	View/Display, Display, Annotation
Remote Command	:DISPlay:ANNotation:SCReen[:STATe] OFF ON 0 1 :DISPlay:ANNotation:SCReen[:STATe]?
Example	DISP:ANN:SCR OFF
Dependencies	Grayed-out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset	On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Active Function Values On/Off

Turns on and off the active function display in the Meas Bar, and all of the active function values displayed on the softkeys.

Note that all of the softkeys that have active functions have these numeric values blanked when this function is on. This is a security feature..



Key Path	View/Display, Display, Annotation
Remote Command	:DISPlay:ACTivefunc[:STATE] ON OFF 1 0 :DISPlay:ACTivefunc[:STATE]?
Example	DISP:ACT OFF
Dependencies	Grayed out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset	On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Title

Displays menu keys that enable you to change or clear a title on your display.

Key Path	View/Display, Display
Initial S/W Revision	Prior to A.02.00

Change Title

Writes a title into the "measurement name" field in the banner, for example, "Swept SA".

Press Change Title to enter a new title through the alpha editor. Press Enter or Return to complete the entry. Press ESC to cancel the entry and preserve your existing title.

The display title will replace the measurement name. It remains for this measurement until you press Change Title again, or you recall a state, or a Preset is performed. A title can also be cleared by pressing Title, Clear Title.

NOTE

Notice the inclusion of the <measurement> parameter in the command below. Because each measurement remembers the Display Title, the command must be qualified with the measurement name. For the Swept SA measurement this is not the case; no <measurement> parameter is used when changing the Display Title for the Swept SA measurement.

Key Path	View/Display, Display, Title
Mode	All
Remote Command	:DISPlay:<measurement>:ANNotation:TITLe:DATA <string> :DISPlay:<measurement>:ANNotation:TITLe:DATA?
Example	DISP:ANN:TITL:DATA "This Is My Title" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "This Is My Title" This example is for Measurements other than Swept SA. Both set the title to: This Is My Title
Notes	Pressing this key cancels any active function. When a title is edited the previous title remains intact (it is not cleared) and the cursor goes at the end so that characters can be added or BKSP can be used to go back over previous characters.
Preset	No title (measurement name instead)
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Clear Title

Clears a title from the front-panel display. Once cleared, the title cannot be retrieved. After the title is cleared, the current Measurement Name replaces it in the title bar.

Key Path	View/Display, Display, Title
Example	The following commands clear the title and restore the measurement's original title: DISP:ANN:TITL:DATA "" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "" This example is for ACP; in measurements other than Swept SA the measurement name is required.
Notes	Uses the :DISPlay:<measurement>:ANNotation:TITLe:DATA <string> command with an empty string (in the Swept SA, the <measurement> is omitted).
Preset	Performed on Preset.
Initial S/W Revision	Prior to A.02.00

Graticule

Pressing Graticule turns the display graticule On or Off. It also turns the graticule y-axis annotation on and off.

Key Path	View/Display, Display
Remote Command	:DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe] OFF ON 0 1 :DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe]?
Example	DISP:WIND:TRAC:GRAT:GRID OFF
Notes	The graticule is the set of horizontal and vertical lines that make up the grid/divisions for the x-axis and y-axis.
Preset	On
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00

System Display Settings

These settings are "Mode Global" – they affect all modes and measurements and are reset only by Restore Misc Defaults or Restore System Defaults under System.

Key Path	View/Display, Display
Initial S/W Revision	Prior to A.02.00

Annotation Local Settings

This is a Mode Global override of the meas local annotation settings. When it is All Off, it forces ScreenAnnotation, Meas Bar, Trace, and Active Function Values settings to be OFF for all measurements in all modes. This provides the security based "annotation off" function of previous analyzers; hence it uses the legacy SCPI command.

When it is All Off, the Screen, Meas Bar, Trace, and Active Function Values keys under the Display, Annotation menu are grayed out and forced to Off. When Local Settings is selected, you are able to set the local annotation settings on a measurement by measurement basis.

Key Path	View/Display, Display, System Display Settings
Remote Command	:DISPlay:WINDow[1]:ANNotation[:ALL] OFF ON 0 1 :DISPlay:WINDow[1]:ANNotation[:ALL]?
Example	:DISP:WIND:ANN OFF
Preset	On (Set by Restore Misc Defaults)
State Saved	Not saved in instrument state.
Backwards Compatibility Notes	The WINDow parameter and optional subopcode is included for backwards compatibility but ignored – all windows are equally affected.
Initial S/W Revision	Prior to A.02.00

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

Key Path	Save, Screen Image
Remote Command	:MMEMory:STORe:SCReen:THEMe TDColor TDMonochrome FCOLor FMONochrome :MMEMory:STORe:SCReen:THEMe?
Example	:MMEM:STOR:SCR:THEM TDM
Preset	3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes.
Readback	3D Color 3D Mono Flat Color Flat Mono
Backwards Compatibility Notes	In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical.
Initial S/W Revision	Prior to A.02.00

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDC
Readback	3D Color
Initial S/W Revision	Prior to A.02.00

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDM
Readback	3D Mono
Initial S/W Revision	Prior to A.02.00

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FCOL
Readback	Flat Color
Initial S/W Revision	Prior to A.02.00

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FMON
Readback	Flat Mono
Initial S/W Revision	Prior to A.02.00

Backlight

Accesses the display backlight on/off keys. This setting may interact with settings under the Windows "Power" menu.

When the backlight is off, pressing ESC, TAB, SPACE, ENTER, UP, DOWN, LEFT, RIGHT, DEL, BKSP, CTRL, or ALT turns the backlight on without affecting the application. Pressing any other key will turn backlight on and could potentially perform the action as well.

Key Path	View/Display, Display, System Display Settings
Remote Command	:DISPlay:BACKlight ON OFF :DISPlay:BACKlight?
Preset	ON (Set by Restore Misc Defaults)
Initial S/W Revision	Prior to A.02.00

Backlight Intensity

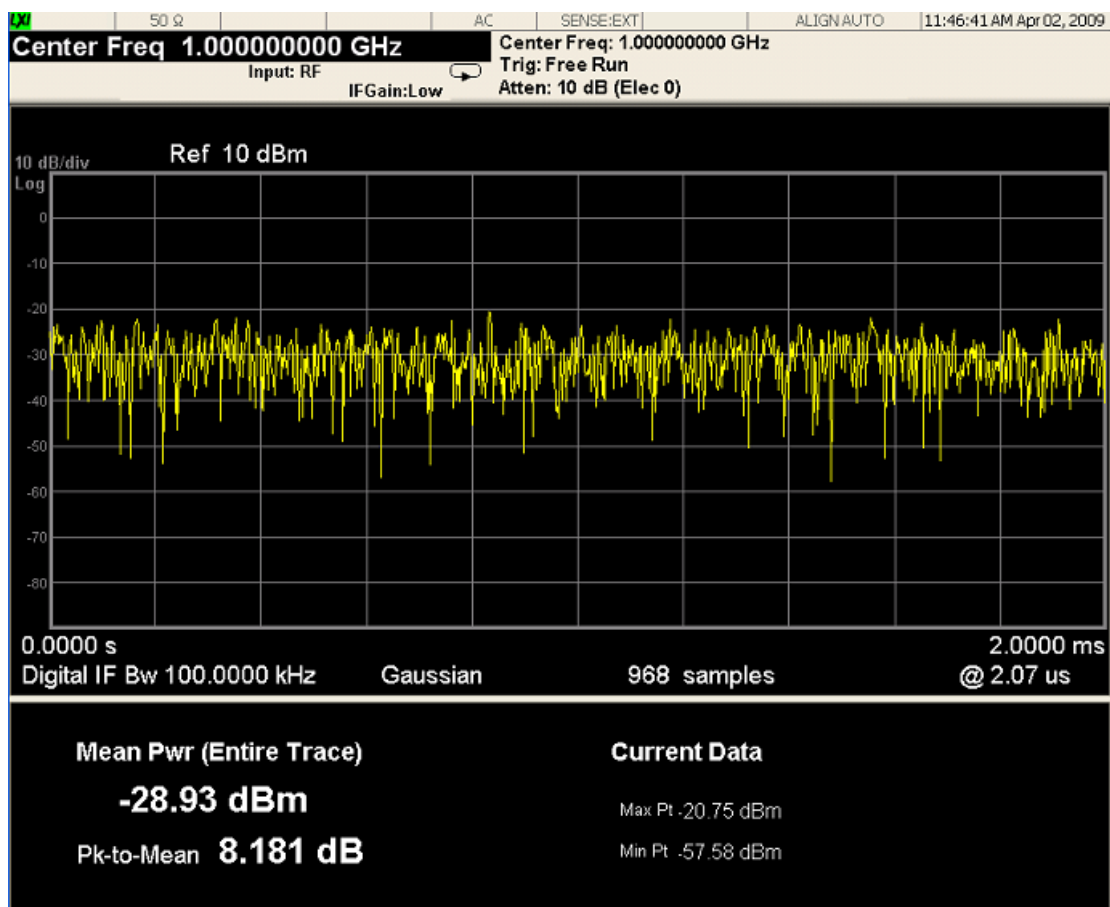
An active function used to set the backlight intensity. It goes from 0 to 100 where 100 is full on and 0 is off. This value is independent of the values set under the Backlight on/off key.

Key Path	View/Display, Display, System Display Settings
Remote Command	:DISPlay:BACKlight:INTensity <integer> :DISPlay:BACKlight:INTensity?
Example	DISP:BACK:INT 50

Preset	100 (Set by Restore Misc Defaults)
Min	0
Max	100
Initial S/W Revision	Prior to A.02.00

RF Envelope

This view shows an example of the RF Envelope result for the waveform (time domain) measurements in the graph window. The measured values for the mean power and peak-to-mean power are shown in the text window.



Numeric Results

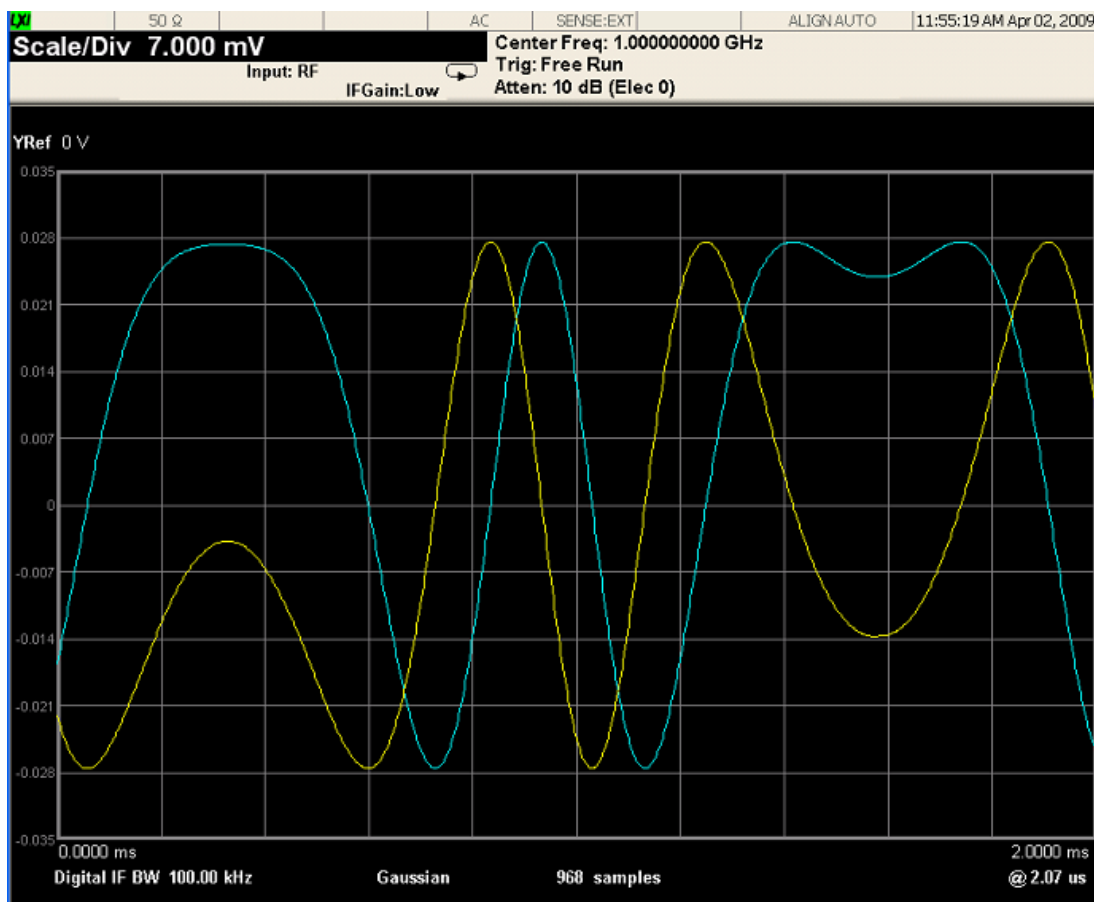
Name	Type	Description	Unit	Format
Mean Pwr	Float64	The mean power (dBm). This is either the power across the entire trace, or the power between markers if the markers are enabled.	dBm	XX.XX dBm

Name	Type	Description	Unit	Format
Pk-to-Mean	Float64	This is the ratio of the maximum signal level to the mean power.	dB	XX.XX dB
Max Pt	Float64	The maximum of the most recently acquired data.	dBm	XX.XX dBm
Min Pt	Float64	The minimum of the most recently acquired data.	dBm	XX.XX dBm

Key Path	View/Display
Initial S/W Revision	Prior to A.02.00

I/Q Waveform

This view shows the I and Q signal waveforms in parameters of voltage versus time.



Key Path	View/Display
Initial S/W Revision	Prior to A.02.00

14 GSMK Power vs. Time Measurement

Power vs. Time measures the mean transmit power during the “useful part” of GSM bursts and verifies that the power ramp fits within the defined mask. Power vs. Time also lets you view the rise, fall, and “useful part” of the GSM bursts. Using the “Multi-Slot” function, up to eight slots in a frame can be viewed at one time.

This topic contains the following sections:

["Measurement Commands for GSMK Power vs Time" on page 1542](#)

["Remote Command Results for GSMK Power vs Time" on page 1543](#)

Measurement Commands for GSMK Power vs Time

The following commands and queries are used to retrieve the measurement results:

```
:CONFigure:PVTime  
:CONFigure:PVTime:NDEFault  
:INITiate:PVTime  
:FETCh:PVTime[n]?  
:READ:PVTime[n]?  
:MEASure:PVTime[n]?
```

For more measurement related commands, see the section ["Remote Measurement Functions" on page 2301](#).

See Also: ["Custom Limit Mask Remote Only Commands " on page 1629](#)

Remote Command Results for GMSK Power vs Time

For the queries listed above, the results returned depend on the value of n, as follows.

n	Results Returned
0	Returns unprocessed I/Q trace data, as a series of comma-separated trace points, in volts. The I values are listed first in each pair, using the 0 through even-indexed values. The Q values are the odd-indexed values.
not specified or n = 1	Returns the following comma-separated scalar results: <ol style="list-style-type: none"> Sample time is a floating point number that represents the time between samples when using the trace queries (n=0,2,etc.). Power of single burst is the mean power (in dBm) across the useful part of the selected burst in the most recently acquired data, or in the last data acquired at the end of a set of averages. If averaging is on, the power is for the last burst. Power averaged is the power (in dBm) of N averaged bursts, if averaging is on. The power is averaged across the useful part of the burst. Average m is a single burst from the acquired trace. If there are multiple bursts in the acquired trace, only one burst is used for average m. This means that N traces are acquired to make the complete average. If averaging is off, the value of power averaged is the same as the power single burst value. Number of samples is the number of data points in the captured signal. This number is useful when performing a query on the signal (i.e. when n=0,2,etc.). Start point of the useful part of the burst is the index of the data point at the start of the useful part of the burst Stop point of the useful part of the burst is the index of the data point at the end of the useful part of the burst Index of the data point where T0 occurred. Burst width of the useful part of the burst is the width of the burst measured at .3dB below the mean power in the useful part of the burst. Maximum value is the maximum value of the most recently acquired data (in dBm). Minimum value is the minimum value of the most recently acquired data (in dBm). Burst search threshold is the value (in dBm) of the threshold where a valid burst is identified, after the data has been acquired. IQ point delta is the number of data points offset that are internally applied to the useful data in traces n=2,3,4. You must apply this correction value to find the actual location of the Start, Stop, or T0 values.
2	Returns comma-separated trace points of the entire captured I/Q trace data. These data points are floating point numbers representing the power of the signal (in dBm). There are N data points, where N is the number of samples. The period between the samples is defined by the sample time.
3	Returns comma-separated points representing the upper mask (in dBm).
4	Returns comma-separated points representing the lower mask (in dBm).
7	Returns power level values for the 8 slots in the current frame (in dBm).
8	Returns comma-separated trace points of the Max Hold Trace data. These data points are floating point numbers representing the power of the signal (in dBm). There are N data points, where N is the number of samples. The period between the samples is defined by the sample time.
9	Returns comma-separated trace points of the Min Hold Trace data. These data points are floating point numbers representing the power of the signal (in dBm). There are N data points, where N is the number of samples. The period between the samples is defined by the sample time.
10	Returns the following comma-separated scalar results: <ol style="list-style-type: none"> Sample time is a floating point number that represents the time between samples when using the trace queries

n	Results Returned
	<p>(n=0,2,etc.).</p> <p>2. Power of single burst is the mean power (in dBm) across the useful part of the selected burst in the most recently acquired data, or in the last data acquired at the end of a set of averages. If averaging is on, the power is for the last burst.</p> <p>3. Power averaged is the power (in dBm) of N averaged bursts, if averaging is on. The power is averaged across the useful part of the burst. Average m is a single burst from the acquired trace. If there are multiple bursts in the acquired trace, only one burst is used for average m. This means that N traces are acquired to make the complete average. If averaging is off, the value of power averaged is the same as the power single burst value.</p> <p>4. Number of samples is the number of data points in the captured signal. This number is useful when performing a query on the signal (i.e. when n=0,2,etc.).</p> <p>5. Start point of the useful part of the burst is the index of the data point at the start of the useful part of the burst</p> <p>6. Stop point of the useful part of the burst is the index of the data point at the end of the useful part of the burst</p> <p>7. Index of the data point where T0 occurred.</p> <p>8. Burst width of the useful part of the burst is the width of the burst measured at -3dB below the mean power in the useful part of the burst.</p> <p>9. Maximum value is the maximum value of the most recently acquired data (in dBm).</p> <p>10. Minimum value is the minimum value of the most recently acquired data (in dBm).</p> <p>11. Burst search threshold is the value (in dBm) of the threshold where a valid burst is identified, after the data has been acquired.</p> <p>12. IQ point delta is the number of data points offset that are internally applied to the useful data in traces n=2,3,4. You must apply this correction value to find the actual location of the Start, Stop, or T0 values.</p> <p>13. 1st Error point is the time (in seconds) that indicates the point on the X Scale where the first failure of a signal was detected. Use a marker to locate this point in order to examine the nature of the failure. If the limit passes, returned data has no meaning.</p> <p>14. Detected TSC is the most recently detected TSC. The returned value is 0~7 (Burst Type : Normal) if TSC detected. If TSC not detected, the returned value is -999.0. If Amptd or NONE (Power vs Time only) is specified in Sync Type, the returned value is -999.0. In multi slot condition, the returned value is the detected TSC of the specified slot (Time Slot ON) or the first evaluated slot (Time Slot OFF).</p>
	<p>NOTE The returned value in Sync (Synchronization Burst):</p> <p>10 if (BN42, BN43..BN105) = (1,0,1,1,1,0,0,1,0,1,1,0,0,0,1,0,0,0,0,0,0,1,0,0,0,0,0,1, 1,1,1,0,0,1,0,1,1,0,1,0,1,0,0,0,1,0,1,0,1,1,1,0,1,1,0,0,0,1,1,0,1,1)</p> <p>11 if (BN42, BN43..BN105) = (1,1,1,0,1,1,1,0,0,1,1,0,1,0,1,1,0,0,1,0,1,0,0,0,0,0,1,1,1,1,1,0,1, 1,1,1,0,1,0,0,0,1,1,1,1,1,0,1,1,0,0,1,0,1,1,0,0,0,1,0,1,0,1)</p> <p>12 if (BN42, BN43..BN105) = (1,1,1,0,1,1,0,0,0,0,1,1,0,1,1,1,0,1,0,1,0,0,0,1,0,1,0,1,1,0, 1,0,0,1,1,1,1,0,0,0,0,0,0,1,0,0,0,0,0,1,0,0,0,1,1,0,1,0,0,1,1,1,0)</p> <p>The returned value in Access (Access Burst) is</p> <p>20 if (BN8, BN9..BN48) = (0,1,0,0,1,0,1,1,0,1,1,1,1,1,1,1,0,0,1,1,0,0,1,1,0,1,0,1,0,1,0,0,0,1,1,1,1,0,0,0)</p> <p>21 if (BN8, BN9..BN48) = (0,1,0,1,0,1,0,0,1,1,1,1,1,0,0,0,1,0,0,0,0,1,1,0,0,0,1,0,1,1,1,0,0,1,0,0,1,1,0,1)</p> <p>22 if (BN8, BN9..BN48) = (1,1,1,0,1,1,1,1,0,0,1,0,0,1,1,1,0,1,0,1,0,1,1,0,0,0,0,0,1,1,0,1,1,0,1,1,1,0,1,1,1)</p>

n	Results Returned
	15. Reserved for future use - the value returned is -999.0 (floating point).
	16. Reserved for future use - the value returned is -999.0 (floating point).
	17. Reserved for future use - the value returned is -999.0 (floating point).
	18. Reserved for future use - the value returned is -999.0 (floating point).
	19. Reserved for future use - the value returned is -999.0 (floating point).

Key Path	Meas
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

AMPTD Y Scale

Accesses a menu of functions that enable you to set the vertical scale parameters. These functions control how data on the vertical (Y) axis is displayed and control instrument settings that affect the vertical axis.

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Ref Value

Sets the absolute power reference by Burst, Multi-slot and Rise & Fall views.

See ["Ref Value \(Burst view and Multi-slot view\)" on page 1546](#) and ["Ref Value \(Rise & Fall view\)" on page 1547](#).

Key Path	AMPTD Y Scale
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Ref Value (Burst view and Multi-slot view)

Sets the absolute power reference.

Key Path	AMPTD Y Scale
Mode	GSM
Remote Command	:DISPlay:PVTime:VIEW[1] 3:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <real> :DISPlay:PVTime:VIEW[1] 3:WINDow[1]:TRACe:Y[:SCALe]:RLEVel?
Example	DISP:PVT:VIEW:WIND:TRAC:Y:SCAL:RLEV 5 DISP:PVT:VIEW:WIND:TRAC:Y:SCAL:RLEV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. Subopcode: VIEW[1]:WINDow[1]: Burst view RF Envelope window VIEW3:WINDow[1]: Multi-slot view RF Envelope window
Couplings	When Y Auto Scaling is On, this value is automatically determined by the measurement result. When the user sets this value manually, Y Auto Scaling automatically changes to Off.
Preset	10 dBm 0.00 dBm
State Saved	Saved in instrument state.
Min	-250.0
Max	250.0
Initial S/W Revision	Prior to A.02.00

Ref Value (Rise & Fall view)

Sets the absolute power reference.

Key Path	AMPTD Y Scale
Mode	GSM
Remote Command	:DISPlay:PVTime:VIEW2:WINDow[1] 2:TRACe:Y[:SCALe]:RLEVel <real> :DISPlay:PVTime:VIEW2:WINDow[1] 2:TRACe:Y[:SCALe]:RLEVel?
Example	DISP:PVT:VIEW:WIND:TRAC:Y:SCAL:RLEV 5 DISP:PVT:VIEW:WIND:TRAC:Y:SCAL:RLEV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. Subopcode: VIEW2:WINDow[1]: Rising RF Envelope window VIEW2:WINDow2: Falling RF Envelope window
Couplings	When Y Auto Scaling is On, this value is automatically determined by the measurement result. When the user sets this value manually, Y Auto Scaling automatically changes to Off.
Preset	0.00 dBm
State Saved	Saved in instrument state.
Min	-250.0
Max	250.0
Initial S/W Revision	Prior to A.02.00

Attenuation

This menu controls the attenuator functions and interactions between the attenuation system components.

There are two attenuator configurations in the X-Series. One is a dual attenuator configuration consisting of a mechanical attenuator and an optional electronic attenuator. The other configuration uses a single attenuator with combined mechanical and electronic sections that controls all the attenuation functions. Different models in the X-Series come with different configurations.

See ["Dual Attenuator Configurations:" on page 1548](#)

See ["Single Attenuator Configuration:" on page 1548](#)

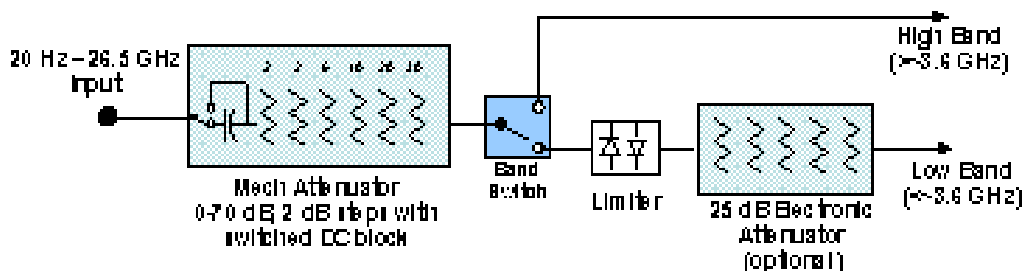
Most Attenuation settings are the same for all measurements – they do not change as you change measurements. Settings like these are called “Meas Global” and are unaffected by Meas Preset.

Key Path	AMPTD Y Scale
Scope	Meas Global
Dependencies	In measurements that support the I/Q inputs, this key is unavailable when I/Q is the selected input, and is replaced by the Range key in that case.

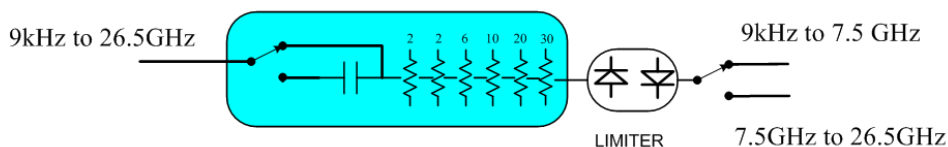
Readback Line	Contains a summary in [] brackets of the current total attenuation. See the descriptions of the , " (Mech) Atten " on page 2242, and "Enable Elec Atten" on page 2244 keys for more detail on the contributors to the total attenuation. Note that when "Pre-Adjust for Min Clip" is on, this value can change at the start of every measurement.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Dual Attenuator Configurations:

Configuration 1: Mechanical attenuator + optional electronic attenuator

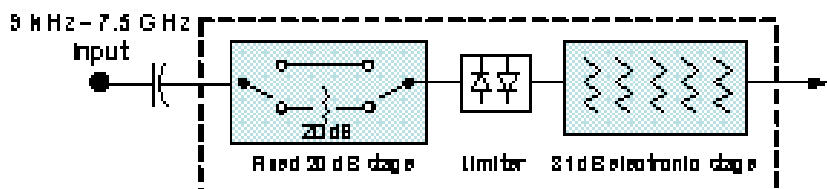


Configuration 2: Mechanical attenuator, no optional electronic attenuator

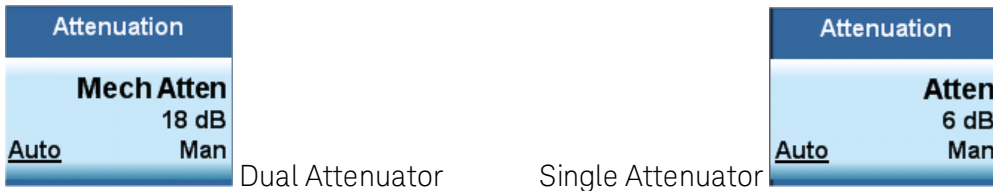


(note that Configuration 2 is not strictly speaking a dual-section attenuator, since there is no electronic section available. However, it behaves exactly like Configuration 1 without the Electronic Attenuator option EA3, therefore for the sake of this document it is grouped into the "Dual Attenuator" configuration)

Single Attenuator Configuration:



You can tell which attenuator configuration you have by pressing the Attenuation key, which (in most Modes) opens the Attenuation menu. If the first key in the Attenuation menu says Mech Atten you have the dual attenuator configuration. If the first key says Atten you have the single attenuator configuration.



In the single attenuator configuration, you control the attenuation with a single control, as the fixed stage has only two states. In the dual attenuator configuration, both stages have significant range so you are given separate control of the mechanical and electronic attenuator stages.

When you have the dual attenuator configuration, you may still have only a single attenuator, because unless option EA3 (the Electronic Attenuator option) is available, and you purchase it, you will have only the mechanical attenuator.

(Mech) Atten

This key is labeled Mech Atten in dual attenuator models and Atten in single attenuator models. In the dual attenuator configuration, this key only affects the mechanical attenuator.

This key lets you modify the attenuation applied to the RF input signal path. This value is normally auto coupled to the Ref Level, the Internal Preamp Gain, any External Gain that is entered, and the Max Mixer Level, as described in the table below.

See "[Attenuator Configurations and Auto/Man](#)" on page 1550

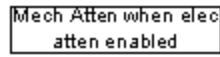
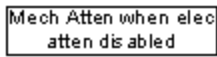
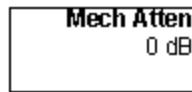
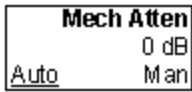
Key Path	AMPTD Y Scale, Attenuation
Remote Command	<pre>[:SENSe]:POWer[:RF]:ATTenuation <rel_amp1> [:SENSe]:POWer[:RF]:ATTenuation? [:SENSe]:POWer[:RF]:ATTenuation:AUTO OFF ON 0 1 [:SENSe]:POWer[:RF]:ATTenuation:AUTO?</pre>
Example	<p>POW:ATT 20</p> <p>Dual attenuator configuration: sets the mechanical attenuator to 20 dB</p> <p>Single attenuator mode: sets the main attenuation to 20 dB (see below for definition of "main" attenuation).</p> <p>If the attenuator was in Auto, it sets it to Manual.</p>
Dependencies	<p>Some measurements do not support the Auto setting of (Mech) Atten. In these measurements, the Auto/Man selection is not available, and the Auto/Man line on the key disappears.</p> <p>In dual attenuator configurations, when the electronic attenuator is enabled, the mechanical attenuator has no auto setting and the Auto/Man line on the key disappears. The state of Auto/Man is remembered and restored when the electronic attenuator is once again disabled. This is described in more detail in the "Enable Elec Atten" on page 2244 key description.</p> <p>See "Attenuator Configurations and Auto/Man" on page 1550 for more information on the Auto/Man functionality of Attenuation.</p>
Couplings	<p>When (Mech) Atten is in Auto, it uses the following algorithm to determine a value:</p> <p>If the USB Preamp is connected to USB, use 0 dB.</p> <p>Otherwise, Atten = ReferenceLevel + PreAmpGain + ExternalGain - RefLevelOffset - MaxMixerLevel</p>

	<p>+ IF Gain.</p> <p>Limit this value to be between 6 dB and the Max value. No value below 6 dB can ever be chosen by Auto.</p> <p>The resulting value is rounded up to the largest value possible given the attenuation step setting. That is, 50.01 dB would change to 60 dB (for a 10 dB attenuation step).</p> <p>The “IF Gain” term in the equation above is either 0 dB or +10 dB, depending on the settings of FFT IF Gain, Swept IF Gain, max Ref Level and the Auto/Man setting of Mech Atten.</p> <p>In External Mixing and BBIQ, where the Attenuator is not in the signal path, the Attenuator setting changes as described above when (Mech) Atten is in Auto, but no changes are made to the actual attenuator hardware setting until the input is changed back to the RF Input.</p>
Preset	<p>The preset for Mech Attenuation is “Auto.”</p> <p>The Auto value of attenuation is: CXA, EXA, MXA and PXA: 10 dB</p>
State Saved	Saved in instrument state
Min	<p>0 dB</p> <p>The attenuation set by this key cannot be decreased below 6 dB with the knob or step keys. To get to a value below 6 dB it has to be directly entered from the keypad or via SCPI. This protects from adjusting the attenuation to a dangerously small value which can put the instrument at risk of damage to input circuitry. However, if the current mechanical attenuation is below 6 dB it can be increased with the knob and step keys, but not decreased.</p>
Max	<p>CXA N9000A-503/507: 50 dB CXA N9000A-513/526: 70dB EXA: 60 dB MXA and PXA: 70 dB</p> <p>In the single attenuator configuration, the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB.</p>
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Attenuator Configurations and Auto/Man

As described in the Attenuation key description, there are two distinct attenuator configurations available in the X-Series, the single attenuator and dual attenuator configurations. In dual attenuator configurations, we have the mechanical attenuation and the electronic attenuation, and the current total attenuation is the sum of the electronic + mechanical attenuation. In single attenuator configurations, we refer to the attenuation set using the (Mech) Atten key (or POW:ATT SCPI) as the “main” attenuation; and the attenuation that is set by the SCPI command POW:EATT as the “soft” attenuation (the POW:EATT command is honored even in the single attenuator configuration, for compatibility purposes). Then the current total attenuation is the sum of the main + soft attenuation. See the Elec Atten key description for more on “soft” attenuation.

In the dual attenuator configuration, when the electronic attenuator is enabled, there is no Auto/Man functionality for the mechanical attenuator, and the third line of the key label (the Auto/Man line) disappears:



usdB

Enable Elec Atten

Enables the Electronic Attenuator.

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear. These advantages primarily aid in remote operation and are negligible for front panel use. See ["Using the Electronic Attenuator: Pros and Cons" on page 1553](#) for a detailed discussion of the pros and cons of using the electronic attenuator.

For the single attenuator configuration, for SCPI backwards compatibility, the “soft” attenuation feature replaces the dual attenuator configuration’s electronic attenuator. All the same couplings and limitations apply. See ["Attenuator Configurations and Auto/Man" on page 2244](#)

See ["More Information" on page 1552](#)

Key Path	AMPTD Y Scale, Attenuation
Remote Command	[:SENSe]:POWer[:RF]:EATTenuation:STATe OFF ON 0 1 [:SENSe]:POWer[:RF]:EATTenuation:STATe?
Example	POW:EATT:STAT ON
Dependencies	<p>This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no “electronic attenuator” there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a “soft” attenuation as described in "Attenuator Configurations and Auto/Man" on page 2244.</p> <p>The electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable above 3.6 GHz. Therefore, if the Stop Frequency of the analyzer is > 3.6 GHz then the Enable Elec Atten key will be OFF and grayed out.</p> <p>If the Internal Preamp is on, meaning it is set to Low Band or Full, the electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable. In this case the Enable Elec Atten key will be OFF and grayed out.</p> <p>If either of the above is true, if the SCPI command is sent, an error indicating that the electronic attenuator is unavailable will be sent.</p> <p>If the electronic/soft Attenuator is enabled, then the Stop Freq of the analyzer is limited to 3.6 GHz and the Internal Preamp is unavailable.</p> <p>The SCPI-only “soft” electronic attenuation for the single-attenuator configuration is not available in all measurements; in particular, it is not available in the Swept SA measurement.</p>
Couplings	Enabling and disabling the Electronic Attenuator affects the setting of the Mechanical Attenuator (in

	dual attenuator configurations). This is described in more detail below this table.
Preset	OFF for Swept SA measurement; ON for all other measurements that support the electronic attenuator
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

More Information

Mechanical Attenuator Transition Rules

When the Electronic Attenuator is enabled, the Mechanical Attenuator transitions to a state that has no Auto function. Below are the rules for transitioning the Mechanical Attenuator. NOTE that the information below ONLY applies to the dual attenuator configurations, and ONLY when the Electronic Attenuator is installed:

When the Electronic Attenuation is enabled from a disabled state:

- The Mechanical Attenuator is initialized to 10 dB (this is its optimal performance setting). You can then set it as desired with SCPI, numeric keypad, step keys, or knob, and it behaves as it normally would in manual mode
- The Auto/Man state of (Mech) Atten is saved
- The Auto/Man line on the (Mech) Atten key disappears and the auto rules are disabled
- The Electronic Attenuator is set to 10 dB less than the previous value of the Mechanical Attenuator, within the limitation that it must stay within the range of 0 to 24 dB of attenuation.

Examples in the dual attenuator configuration:

- Mech Atten at 20 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 10 dB. New total attenuation equals the value before Elec Atten enabled.
- Mech Atten at 0 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 0 dB. New total attenuation does not equal the value before Elec Atten enabled.
- Mech Atten at 40 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 24 dB. New total attenuation does not equal the value before Elec Atten enabled.

When the Electronic Attenuation is disabled from an enabled state:

- The Elec Atten key is grayed out
- The Auto/Man state of (Mech) Atten is restored
- If now in Auto, (Mech) Atten recouples
- If now in Man, (Mech) Atten is set to the value of total attenuation that existed before the Elec Atten was disabled. The resulting value is rounded up to the smallest value possible given the (Mech) Atten Step setting - (That is, 57 dB changes to 58 dB when (Mech) Atten Step is 2 dB.)

Using the Electronic Attenuator: Pros and Cons

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear.

The “finer steps” advantage of the electronic attenuator is beneficial in optimizing the alignment of the analyzer dynamic range to the signal power in the front panel as well as remote use. Thus, you can achieve improved relative signal measurement accuracy. Compared to a mechanical attenuator with 2 dB steps, the 1 dB resolution of the electronic attenuator only gives better resolution when the odd-decibel steps are used. Those odd-decibel steps are less accurately calibrated than the even-decibel steps, so one tradeoff for this superior relative accuracy is reduced absolute amplitude accuracy.

Another disadvantage of the electronic attenuator is that the spectrum analyzer loses its “Auto” setting, making operation less convenient.

Also, the relationship between the dynamic range specifications (TOI, SHI, compression and noise) and instrument performance are less well-known with the electrical attenuator. With the mechanical attenuator, TOI, SHI and compression threshold levels increase dB-for-dB with increasing attenuation, and the noise floor does as well. With the electronic attenuator, there is an excess attenuation of about 1 to 3 dB between 0 and 3.6 GHz, making the effective TOI, SHI, and so forth, less well known. Excess attenuation is the actual attenuation relative to stated attenuation. Excess attenuation is accounted for in the analyzer calibration

Elec Atten

Controls the Electronic Attenuator in dual attenuator configurations. This key does not appear in single attenuator configurations, as the control of both the mechanical and electronic stages of the single attenuator is integrated into the single Atten key.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	<code>[:SENSe] :POWer [:RF] :EATTenuation <rel_ampl></code> <code>[:SENSe] :POWer [:RF] :EATTenuation?</code>
Notes	Electronic Attenuation’s specification is defined only when Mechanical Attenuation is 6 dB.
Dependencies	This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no “electronic attenuator” there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a “soft” attenuation as described in "Attenuator Configurations and Auto/Man" on page 2244 . The “soft” attenuation is treated as an addition to the “main” attenuation value set by the Atten softkey or the POW:ATT SCPI command and affects the total attenuation displayed on the Attenuation key and the Meas Bar. When Enable Elec Atten is off or grayed out, the Elec Atten key is grayed out.
Preset	0 dB
State Saved	Saved in instrument state
Min	0 dB
Max	Dual attenuator configuration: 24 dB Single attenuator configuration: the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if

	the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Adjust Atten for Min Clip

Sets the combination of mechanical and electronic attenuation and gain based on the current measured signal level so that clipping will be at a minimum.

This is an "immediate action" function, that is, it executes once, when the key is pressed.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	<code>[:SENSe] :POWer [:RF] :RANGe :OPTimize IMMEDIATE</code>
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Pre-Adjust for Min Clip

If this function is on, it does the adjustment described under ["Adjust Atten for Min Clip" on page 2247](#) each time a measurement restarts. Therefore, in Continuous measurement mode, it only executes before the first measurement.

In dual attenuator models, you can set Elec+Mech Atten, in which case both attenuators participate in the autoranging, or Elec Atten Only, in which case the mechanical attenuator does not participate in the autoranging. This latter case results in less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	<code>[:SENSe] :POWer [:RF] :RANGe :OPTimize :ATTenuation OFF ELECTrical COMBined</code> <code>[:SENSe] :POWer [:RF] :RANGe :OPTimize :ATTenuation?</code>
Notes	The SCPI parameter ELECTrical sets this function to On in single attenuator models. The SCPI parameter COMBined is mapped to ELECTrical in single attenuator models; if you send COMBined, it sets the function to On and returns ELEC to a query.
Dependencies	This key only appears in Dual Attenuator models with an Electronic Attenuator installed. In instruments with Dual Attenuator model, when Enable Elec Atten is off or grayed out, the Pre-Adjust for Min Clip key is grayed out.
Preset	OFF for Swept SA measurement; ON for all other measurements that support Pre-Adjust for Min Clip

State Saved	Saved in instrument state
Range	Dual attenuator models: Off Elec Atten Only Mech + Elec Atten Single attenuator models: Off On
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Remote Command	[:SENSe] :POWer [:RF] :RANGe :AUTO ON OFF 1 0 [:SENSe] :POWer [:RF] :RANGe :AUTO?
Notes	ON aliases to "Elec Atten Only" (:POW:RANG:OPT:ATT ELEC) OFF aliases to "Off" (:POW:RANG:OPT:ATT OFF) The query :POW:RANG:AUTO? returns true if :POW:RANG:OPT:ATT is not "Off"
Initial S/W Revision	Prior to A.02.00

Off

Turns Pre-Adjust for Min Clip off. This is the default setting.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip
Example	:POW:RANG:OPT:ATT OFF
Initial S/W Revision	Prior to A.02.00

Elec Atten Only

Selects only the electric attenuator to participate in auto ranging. This offers less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip
Example	:POW:RANG:OPT:ATT ELEC
Initial S/W Revision	Prior to A.02.00

Mech + Elec Atten

In dual attenuator models, this selects both attenuators participate in the autoranging.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip
Example	:POW:RANGe:OPT:ATT COMB
Initial S/W Revision	Prior to A.02.00

(Mech) Atten Step

This controls the step size used when making adjustments to the input attenuation.

This key is labeled Mech Atten Step in dual attenuator models and Atten Step in single attenuator models. In the dual attenuator configuration, this key only affects the step size of the mechanical attenuator.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	<code>[:SENSe] :POWeR [:RF] :ATTenuation :STEP [:INCRement] 10 dB 2 dB</code> <code>[:SENSe] :POWeR [:RF] :ATTenuation :STEP [:INCRement] ?</code>
Example	POW:ATT:STEP 2
Notes	Note this feature works like a 1-N choice from the front panel, but it takes a specific value (in dB) when used remotely. The only valid values are 2 and 10.
Dependencies	Blanked in CXA and EXA if option FSA (2 dB steps) is not present. If blanked, attempts to set it via SCPI will yield an error.
Couplings	When the attenuation step size changes, the current mechanical attenuation value is adjusted (if necessary) to be quantized to the new step size. That is, if step is set to 10 dB, mech atten is increased if necessary so it is a multiple of 10 dB
Preset	PXA and MXA: 2 dB EXA and CXA: 10 dB (2 dB with option FSA)
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Scale/Div

Allows you to enter a numeric value to change the vertical display sensitivity by Burst, Multi-slot and Rise & Fall views.

See "[Scale/Div \(Burst view and Multi-slot view\)](#)" on page 1557 and "[Scale/Div \(Rise & Fall view\)](#)" on page 1557.

Key Path	AMPTD Y Scale
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Scale/Div (Burst view and Multi-slot view)

Allows you to enter a numeric value to change the vertical display sensitivity.

Key Path	AMPTD Y Scale
Mode	GSM
Remote Command	:DISPlay:PVTime:VIEW[1] 3:WINDow[1]:TRACe:Y[:SCALe]:PDIVision <rel_ ampl> :DISPlay:PVTime:VIEW[1] 3:WINDow[1]:TRACe:Y[:SCALe]:PDIVision?
Example	DISP:PVT:VIEW:WIND:TRAC:Y:PDIV 10 DISP:PVT:VIEW:WIND:TRAC:Y:PDIV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. Subopcode: VIEW[1]:WINDow[1]: Burst view RF Envelope window VIEW3:WINDow[1]: Multi-slot view RF Envelope window
Couplings	When Y Auto Scaling is On, this value is automatically determined by the measurement result. When the user sets this value manually, Y Auto Scaling automatically changes to Off.
Preset	10.00
State Saved	Saved in instrument state.
Min	0.1
Max	20.0
Initial S/W Revision	Prior to A.02.00

Scale/Div (Rise & Fall view)

Allows you to enter a numeric value to change the vertical display sensitivity.

Key Path	AMPTD Y Scale
Mode	GSM
Remote Command	:DISPlay:PVTime:VIEW2:WINDow[1] 2:TRACe:Y[:SCALe]:PDIVision <rel_ ampl> :DISPlay:PVTime:VIEW2:WINDow[1] 2:TRACe:Y[:SCALe]:PDIVision?
Example	DISP:PVT:VIEW:WIND:TRAC:Y:PDIV 10 DISP:PVT:VIEW:WIND:TRAC:Y:PDIV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. Subopcode: VIEW2:WINDow[1]: Rising RF Envelope window VIEW2:WINDow2: Falling RF Envelope window
Couplings	When Y Auto Scaling is On, this value is automatically determined by the measurement result. When the user sets this value manually, Y Auto Scaling automatically changes to Off.

Preset	10.00
State Saved	Saved in instrument state.
Min	0.1
Max	20.0
Initial S/W Revision	Prior to A.02.00

Presel Center

When this key is pressed, the centering of the preselector filter is adjusted to optimize the amplitude accuracy at the frequency of the selected marker. If the selected marker is not on when Presel Center is pressed, the analyzer will turn on the selected marker, perform a peak search, and then perform centering on the marker's center frequency. If the selected marker is already on and between the start and stop frequencies of the analyzer, the analyzer performs the preselector calibration on that marker's frequency. If the selected marker is already on, but outside the frequency range between Start Freq and Stop Freq, the analyzer will first perform a peak search, and then perform centering on the marker's center frequency.

The value displayed on the Presel Adjust key will change to reflect the new preselector tuning (see Presel Adjust).

A number of considerations should be observed to ensure proper operation. See ["Proper Preselector Operation" on page 1559](#).

Key Path	AMPTD Y Scale
Remote Command	[:SENSe] :POWer [:RF] :PCENter
Example	POW:PCEN
Notes	Note that the rules outlined above under the key description apply for the remote command as well as the key. The result of the command is dependent on marker position, and so forth. Any message shown by the key press is also shown in response to the remote command.
Dependencies	<ul style="list-style-type: none"> • Grayed out if the microwave preselector is off.) • If the selected marker's frequency is below Band 1, advisory message 0.5001 is generated and no action is taken. • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0. • Grayed out in the Spectrogram View.
Couplings	<p>The active marker position determines where the centering will be attempted.</p> <p>If the analyzer is in a measurement such as averaging when centering is initiated, the act of centering the preselector will restart averaging but the first average trace will not be taken until the centering is completed.</p>
Status Bits/OPC dependencies	<p>When centering the preselector, *OPC will not return true until the process is complete and a subsequent measurement has completed, nor will results be returned to a READ or MEASure command.</p> <p>The Measuring bit should remain set while this command is operating and should not go false until</p>

the subsequent sweep/measurement has completed.

Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Proper Preselector Operation

A number of considerations should be observed to ensure proper operation:

1. If the selected marker is off, the analyzer will turn on a marker, perform a peak search, and adjust the preselector using the selected marker's frequency. It uses the "highest peak" peak search method unqualified by threshold or excursion, so that there is no chance of a 'no peak found' error. It continues with that peak, even if it is the peak of just noise. Therefore, for this operation to work properly, there should be a signal on screen in a preselected range for the peak search to find.
2. If the selected marker is already on, the analyzer will attempt the centering at that marker's frequency. There is no preselector for signals below about 3.6 GHz, therefore if the marker is on a signal below 3.6 GHz, no centering will be attempted and an advisory message generated
3. In some models, the preselector can be bypassed. If it is bypassed, no centering will be attempted in that range and a message will be generated.

Preselector Adjust

Allows you to manually adjust the preselector filter frequency to optimize its response to the signal of interest. This function is only available when "Presel Center" on page 2250 is available.

For general purpose signal analysis, using Presel Center is recommended. Centering the filter minimizes the impact of long-term preselector drift. Presel Adjust can be used instead to manually optimize the preselector. One application of manual optimization would be to peak the preselector response, which both optimizes the signal-to-noise ratio and minimizes amplitude variations due to small (short-term) preselector drifting.

Key Path	AMPTD Y Scale
Scope	Meas Global
Remote Command	<code>[:SENSe] :POWer [:RF] :PADJust <freq></code> <code>[:SENSe] :POWer [:RF] :PADJust?</code>
Example	<code>POW:PADJ 100KHz</code> <code>POW:PADJ?</code>
Notes	The value on the key reads out to 0.1 MHz resolution.
Dependencies	<ul style="list-style-type: none"> • Grayed out if microwave preselector is off.) • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0.

• Grayed out in the Spectrogram View.

Preset	0 MHz
State Saved	The Presel Adjust value set by Presel Center, or by manually adjusting Presel Adjust, is not saved in instrument state, and does not survive a Preset or power cycle.
Min	-500 MHz
Max	500 MHz
Default Unit	Hz
Backwards Compatibility SCPI	[:SENSe]:POWer[:RF]:MW:PADJust [:SENSe]:POWer[:RF]:MMW:PADJust PSA had multiple preselectors, but the X-Series has only one. These commands simply alias to [:SENSe]:POWer[:RF]:PADJust
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Remote Command	[:SENSe]:POWer[:RF]:PADJust:PRESelector MWAVE MMWave EXTERNAL [:SENSe]:POWer[:RF]:PADJust:PRESelector?
Notes	PSA had multiple preselectors, and you could select which preselector to adjust. Since the X-Series has only one mm/uW preselector, the preselector selection softkey is no longer available. However, to provide backward compatibility, we accept the legacy remote commands. The command form has no effect, the query always returns MWAVE
Initial S/W Revision	Prior to A.02.00

μW Path Control

The μW Path Control functions include the μW Preselector Bypass (Option MPB) and Low Noise Path (Option LNP) controls in the High Band path circuits.

When the μW Preselector is bypassed, the user has better flatness, but will be subject to spurs from out of band interfering signals. When the Low Noise Path is enabled, the analyzer automatically switches around certain circuitry in the high frequency bands which can contribute to noise, when it is appropriate based on other analyzer settings.

For most applications, the preset state is Standard Path, which gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear out in the hardware switches. For applications that utilize the wideband IF paths, the preset state is the μW Preselector Bypass path, if option MPB is present. This is because, when using a wideband IF such as the 140 MHz IF, the μW Preselector's bandwidth can be narrower than the available IF bandwidth, causing degraded amplitude flatness and phase linearity, so it is desirable to bypass the preselector in the default case.

Users may choose Low Noise Path Enable. It gives a lower noise floor, especially in the 21–26.5 GHz region, though without improving many measures of dynamic range, and without giving the best possible noise floor. The preamp, if purchased and used, gives better noise floor than does the Low Noise Path, however its compression threshold and third-order intercept are much poorer than that of the non-preamp Low Noise Path. There are some applications, typically for signals around –30 dBm, for which the third-order dynamic range of the standard path is good enough, but the noise floor is not low enough even with 0 dB input attenuation. When the third-order dynamic range of the preamp path is too little and the noise floor of the standard path is too high, the Low Noise Path can provide the best dynamic range.

Key Path	AMPTD Y Scale
Mode	SA, BASIC, PNOISE, VSA , LTE, LTETDD
Scope	Meas Global
Remote Command	<code>[:SENSe] :POWer [:RF] :MW:PATH STD LNPath MPBypass FULL</code> <code>[:SENSe] :POWer [:RF] :MW:PATH?</code>
Example	<code>:POW:MW:PATH LNP</code> Enables the Low Noise path
Notes	If a Presel Center is performed, the analyzer will momentarily switch to the Standard Path, regardless of the setting of μ W Path Control The DC Block will always be switched in when the low noise path is switched in, to protect succeeding circuitry from DC. Note that this does not mean “when the low noise path is enabled” but when, based on the Low Noise Path rules, the path is actually switched in. This can happen when the selection is Low Noise Path Enable . In the case where the DC Block is switched in the analyzer is now AC coupled. However, if the user has selected DC coupling, the UI will still behave as though it were DC coupled, including all annunciation, warnings, status bits, and responses to SCPI queries. This is because, based on other settings, the analyzer could switch out the low noise path at any time and hence go back to being DC coupled. Alignment switching ignores the settings in this menu, and restores them when finished.
Dependencies	Unavailable in BBIQ and External Mixing
Preset	All modes other than IQ Analyzer mode and VXA: STD IQ Analyzer, VXA and WLAN mode: MPB option present and licensed: MPB MPB option not present and licensed: STD
State Saved	Save in instrument state
Readback	Value selected in the submenu
Initial S/W Revision	A.04.00
Modified at S/W Revision	A.10.00

Standard Path

This path gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear in the hardware switches, particularly in remote test scenarios where both low band and high band setups will follow in rapid succession.

In this path, the bypass of the low band/high band switch and microwave preamp is never activated, which can cause some noise degradation but preserves the life of the bypass switch.

Key Path	AMPTD Y Scale, μ W Path Control
Example	:POW:MW:PATH STD
Readback Text	Standard Path
Initial S/W Revision	A.04.00

μ W Preselector Bypass

This key toggles the preselector bypass switch for band 1 and higher. When the microwave presel is on, the signal path is preselected. When the microwave preselector is off, the signal path is not preselected. The preselected path is the normal path for the analyzer.

The preselector is a tunable bandpass filter which prevents signals away from the frequency of interest from combining in the mixer to generate in-band spurious signals (images). The consequences of using a preselector filter are its limited bandwidth, the amplitude and phase ripple in its passband, and any amplitude and phase instability due to center frequency drift.

Option MPB or pre-selector bypass provides an unpreselected input mixer path for certain X-Series signal analyzers with frequency ranges above 3.6 GHz. This signal path allows a wider bandwidth and less amplitude variability, which is an advantage when doing modulation analysis and broadband signal analysis. The disadvantage is that, without the preselector, image signals will be displayed. Another disadvantage of bypassing the preselector is increased LO emission levels at the front panel input port.

Image responses are separated from the real signal by twice the 1st IF. For IF Paths of 10 MHz and 25 MHz, the 1st IF is 322.5 MHz, so the image response and the real signal will be separated by 645 MHz. The 1st IF will be different for other IF Path settings. When viewing a real signal and its corresponding image response in internal mixing, the image response will be to the left of the real signal.

Also, the image response and the real signal typically have the same amplitude and exhibit the same shape factor.

However, if Option FS1, Fast Sweep Capability, is enabled, the image response in the Swept SA measurement will appear lower in amplitude and have a much wider shape factor compared to the real signal.

Key Path	AMPTD Y Scale, μ W Path Control
Example	:POW:MW:PATH MPB
Dependencies	Key is blanked if current mode does not support it. Key is grayed out if mode supports it but current measurement does not support it. Key is blank unless Option MPB is present and licensed. If SCPI command sent when MPB not present, error -241, "Hardware missing; Option not installed" is generated.
Readback Text	μ W Preselector Bypass
Initial S/W Revision	A.04.00

Remote Command	[:SENSe] :POWER [:RF] :MW:PRESelector [:STATe] ON OFF 0 1
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	<code>[:SENSe] :POWer [:RF] :MW:PRESelector [:STATe] ?</code>
Example	<code>:POW:MW:PRES OFF</code> Bypasses the microwave preselector
Notes	The ON parameter sets the STD path (<code>:POW:MW:PATH STD</code>) The OFF parameter sets path MPB (<code>:POW:MW:PATH MPB</code>)
Preset	ON

Internal Preamp

Accesses a menu of keys that control the internal preamps. Turning on the preamp gives a better noise figure, but a poorer TOI to noise floor dynamic range. You can optimize this setting for your particular measurement.

The instrument takes the preamp gain into account as it sweeps. If you sweep outside of the range of the preamp the instrument will also account for that. The displayed result will always reflect the correct gain.

For some measurements, when the preamp is on and any part of the displayed frequency range is below the lowest frequency for which the preamp has specifications, a warning condition message appears in the status line. For example, for a preamp with a 9 kHz lowest specified frequency: "Preamp: Accy unspc'd below 9 kHz".

Key Path	AMPTD Y Scale
Scope	Meas Global
Remote Command	<code>[:SENSe] :POWer [:RF] :GAIN [:STATe] OFF ON 0 1</code> <code>[:SENSe] :POWer [:RF] :GAIN [:STATe] ?</code>
Dependencies	Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the key is not shown. The preamp is not available when the electronic/soft attenuator is enabled.
Couplings	The act of connecting the U7227A USB Preamplifier to one of the analyzer's USB ports will cause the Internal Preamp to be switched on. When this happens an informational message will be generated: "Internal Preamp turned on for optimal operation with USB Preamp." Note that if the Internal Preamp was already on, there will be no change to the setting, but if it was Off it will be switched On, to Full Range. Note that this same action occurs when the SA mode is selected while the USB Preamp is connected to one of the analyzer's USB ports, if it is the first time that the SA mode has run since powerup, or if the last time the SA mode was running the USB Preamp was NOT connected. Subsequently disconnecting the USB Preamp from USB does not change the Internal Preamp setting nor restore the previous setting.
Preset	OFF
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.14.00

Key Path	AMPTD Y Scale, Internal Preamp
Scope	Meas Global
Remote Command	[:SENSe] :POWer [:RF] :GAIN:BAND LOW FULL [:SENSe] :POWer [:RF] :GAIN:BAND?
Dependencies	Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the key is not shown. If a POW:GAIN:BAND FULL command is sent when a low band preamp is available, the preamp band parameter is to LOW instead of FULL, and an "Option not installed" message is generated.
Preset	LOW
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00

Off

Turns the internal preamp off

Key Path	AMPTD Y Scale, Internal Preamp
Example	:POW:GAIN OFF
Readback	Off
Initial S/W Revision	Prior to A.02.00

Low Band

Sets the internal preamp to use only the low band.

The frequency range of the installed (optional) low-band preamp is displayed in square brackets on the Low Band key label.

Key Path	AMPTD Y Scale, Internal Preamp
Example	:POW:GAIN ON :POW:GAIN:BAND LOW
Readback	Low Band
Initial S/W Revision	Prior to A.02.00

Full Range

Sets the internal preamp to use its full range. The low band (0–3.6 GHz or 0–3GHz, depending on the model) is supplied by the low band preamp and the frequencies above low band are supplied by the high band preamp.

The frequency range of the installed (optional) preamp is displayed in square brackets on the Full Range key label. If the high band option is not installed the Full Range key does not appear.

Key Path	AMPTD Y Scale, Internal Preamp
Example	:POW:GAIN ON :POW:GAIN:BAND FULL
Readback	Full Range
Initial S/W Revision	Prior to A.02.00

Ref Position

Sets the display reference position to Top, Center, or Bottom, by Burst, Multi-slot and Rise & Fall views.

See "[Ref Position \(Burst view and Multi-slot view\)](#)" on page 1565 and "[Ref Position \(Rise & Fall view\)](#)" on page 1566.

Key Path	AMPTD Y Scale
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Ref Position (Burst view and Multi-slot view)

Sets the display reference position to Top, Center, or Bottom.

Key Path	AMPTD Y Scale
Mode	GSM
Remote Command	:DISPlay:PVTime:VIEW[1] 3:WINDow[1]:TRACe:Y[:SCALE]:RPOSition TOP CENTer BOTTom :DISPlay:PVTime:VIEW[1] 3:WINDow[1]:TRACe:Y[:SCALE]:RPOSition?
Example	DISP:PVT:VIEW:WIND:TRAC:Y:RPOS CENT DISP:PVT:VIEW:WIND:TRAC:Y:RPOS?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. Subopcode: VIEW[1]:WINDow[1]: Burst view RF Envelope window VIEW3:WINDow[1]: Multi-slot view RF Envelope window
Preset	TOP
State Saved	Saved in instrument state.
Range	Top Ctr Bot
Initial S/W Revision	Prior to A.02.00

Ref Position (Rise & Fall view)

Sets the display reference position to Top, Center, or Bottom.

Key Path	AMPTD Y Scale
Mode	GSM
Remote Command	:DISPlay:PVTime:VIEW2:WINDow[1] 2:TRACe:Y[:SCALe]:RPOSition TOP CENTer BOTTom :DISPlay:PVTime:VIEW2:WINDow[1] 2:TRACe:Y[:SCALe]:RPOSition?
Example	DISP:PVT:VIEW:WIND:TRAC:Y:RPOS CENT DISP:PVT:VIEW:WIND:TRAC:Y:RPOS?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. Subopcode: VIEW2:WINDow[1]: Rising RF Envelope window VIEW2:WINDow2: Falling RF Envelope window
Preset	TOP
State Saved	Saved in instrument state.
Range	Top Ctr Bot
Initial S/W Revision	Prior to A.02.00

Auto Scaling

Allows you to toggle the Y-axis auto scaling function between On and Off by Burst, Multi-slot and Rise & Fall views.

See "[Auto Scaling \(Burst view and Multi-slot view\)](#)" on page 1566 and "[Auto Scaling \(Rise & Fall view\)](#)" on page 1567.

Key Path	AMPTD Y Scale
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Auto Scaling (Burst view and Multi-slot view)

Allows you to toggle the Y-axis auto scaling function between On and Off.

Key Path	AMPTD Y Scale
Mode	GSM
Remote Command	:DISPlay:PVTime:VIEW[1] 3:WINDow[1]:TRACe:Y[:SCALe]:COUPlE 0 1 OFF ON :DISPlay:PVTime:VIEW[1] 3:WINDow[1]:TRACe:Y[:SCALe]:COUPlE?
Example	DISP:PVT:VIEW:WIND:TRAC:Y:COUP 0

	DISP:PVT:VIEW:WIND:TRAC:Y:COUP?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode. Subopcode: VIEW[1]:WINDow[1]: Burst view RF Envelope window VIEW3:WINDow[1]: Multi-slot view RF Envelope window
Couplings	When Auto Scaling is On, upon pressing the Restart front-panel key, this function automatically determines the scale per division and reference values based on the measurement results. When user sets a value either "Ref Value" on page 1546 or "Ref Position" on page 1565 manually, this parameter is set to 'Off' automatically.
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

Auto Scaling (Rise & Fall view)

Allows you to toggle the Y-axis auto scaling function between On and Off.

Key Path	AMPTD Y Scale
Mode	GSM
Remote Command	:DISPlay:PVTTime:VIEW2:WINDow[1] 2:TRACe:Y[:SCALe]:COUPle 0 1 OFF ON :DISPlay:PVTTime:VIEW2:WINDow[1] 2:TRACe:Y[:SCALe]:COUPle?
Example	DISP:PVT:VIEW:WIND:TRAC:Y:COUP 0 DISP:PVT:VIEW:WIND:TRAC:Y:COUP?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode. Subopcode: VIEW2:WINDow[1]: Rising RF Envelope window VIEW2:WINDow2: Falling RF Envelope window
Couplings	When Auto Scaling is On, upon pressing the Restart front-panel key, this function automatically determines the scale per division and reference values based on the measurement results. When user sets a value either "Ref Value" on page 1546 or "Ref Position" on page 1565 manually, this parameter is set to 'Off' automatically.
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

Auto Couple

The Auto Couple feature provides a quick and convenient way to automatically couple multiple instrument settings. This helps ensure accurate measurements and optimum dynamic range. When the Auto Couple feature is activated, either from the front panel or remotely, all parameters of the current measurement that have an Auto/Manual mode are set to Auto mode and all measurement settings dependent on (or coupled to) the Auto/Man parameters are automatically adjusted for optimal performance.

However, the Auto Couple key actions are confined to the current measurement only. It does not affect other measurements in the mode, and it does not affect markers, marker functions, or trace or display attributes.

See "[More Information](#)" on page 1568

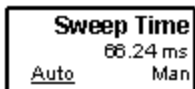
Key Path	Front-panel key
Remote Command	:COUPle ALL NONE
Example	:COUP ALL
Notes	:COUPle ALL puts all Auto/Man parameters in Auto mode (equivalent to pressing the Auto Couple key). :COUPLE NONE puts all Auto/Man parameters in manual mode. It decouples all the coupled instrument parameters and is not recommended for making measurements.
Initial S/W Revision	Prior to A.02.00

More Information

There are two types of functions that have Auto/Manual modes.

Auto/Man Active Function keys

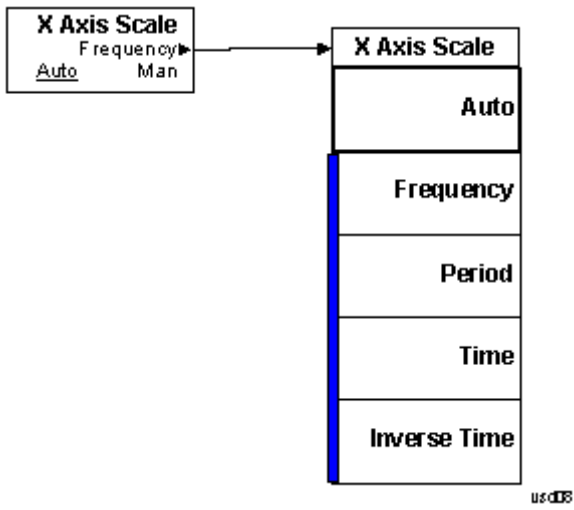
An Auto/Man toggle key controls the binary state associated with an instrument parameter by toggling between Auto (where the parameter is automatically coupled to the other parameters it is dependent upon) and Man (where the parameter is controlled independent of the other parameters), as well as making the parameter the active function. The current mode is indicated on the softkey with either Auto or Man underlined as illustrated below.



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Auto/Man 1-of-N keys

An Auto/Man 1-of-N key allows you to manually pick from a list of parameter values, or place the function in Auto, in which case the value is automatically selected (and indicated) as shown below. If in Auto, Auto is underlined on the calling key. If in manual operation, manual is indicated on the calling key. But the calling key does not actually toggle the function, it simply opens the menu.



BW

Accesses a menu that enables you to control the information bandwidth functions of the instrument. You can also select the filter type for the measurement.

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Info BW

Sets the information bandwidth. This is the bandwidth used for the power measurement. The bandwidth is ideally wide enough to pass all the power of the burst signal, while not being so wide that it passes noise, which reduces dynamic range and the accuracy of low level measurements.

This is an advanced control that normally does not need to be changed. Setting this to a value other than the factory default may cause invalid measurement results.

Key Path	BW
Mode	GSM
Remote Command	<code>[:SENSe] :PVTime :BANDwidth [:RESolution] <bandwidth></code> <code>[:SENSe] :PVTime :BANDwidth [:RESolution] ?</code>
Example	PVT:BAND 1000 PVT:BAND?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Preset	510 kHz
State Saved	Saved in instrument state.
Min	1 kHz
Max	Hardware Dependent: No Option = 10 MHz WB (25 MHz or wider) = 25MHz
Backwards Compatibility SCPI	<code>[:SENSe] :PVTime :BWIDth [:RESolution]</code>
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

Filter Type

Allows you to select the type of resolution bandwidth filter. Besides the familiar Gaussian filter shape, Flat Top, desirable under certain conditions, is available.

This is an advanced control that normally does not need to be changed. Setting this to a value other than the factory default may cause invalid measurement results.

Key Path	BW
Mode	GSM
Remote Command	<code>[:SENSe] :PVTime :BANDwidth [:RESolution] :TYPE FLATtop GAUSSian</code> <code>[:SENSe] :PVTime :BANDwidth [:RESolution] :TYPE ?</code>
Example	PVT:BAND:TYPE GAUS PVT:BAND:TYPE ?
Notes	<p>Selects the type of filter: either Gaussian or Flat (Flattop). Gaussian is the best choice when looking at the overall burst or the rising and falling edges, as it has excellent pulse response. Even though they have a 5.5% wider noise bandwidth for the same -3 dB bandwidth as a flat top filter, that is only 0.23 dB more noise, and their step response is much cleaner and free of overshooting and ringing. If you want to precisely examine just the useful part of the burst, choose Flat.</p> <p>FLATtop – a filter with a flat amplitude response, which provides the best amplitude accuracy.</p> <p>GAUSSian – a filter with Gaussian characteristics, which provides the best pulse response.</p> <p>This is an advanced control that normally does not need to be changed. Setting this to a value other than the factory default, may cause invalid measurement results.</p>
Preset	GAUSSian
State Saved	Saved in instrument state.
Range	Gaussian Flat
Backwards Compatibility SCPI	<code>[:SENSe] :PVTime :BWIDth [:RESolution] :TYPE</code>
Initial S/W Revision	Prior to A.02.00

Cont (Continuous Measurement/Sweep)

Sets the analyzer for Continuous measurement operation. The single/continuous state is Meas Global so the setting will affect all measurements. If you are Paused, pressing Cont does a Resume.

Key Path	Front-panel key
Remote Command	:INITiate:CONTinuous OFF ON 0 1 :INITiate:CONTinuous?
Example	:INIT:CONT 0 puts analyzer in Single measurement operation. :INIT:CONT 1 puts analyzer in Continuous measurement operation
Preset	ON (Note that SYST:PRESet sets INIT:CONT to ON but *RST sets INIT:CONT to OFF)
State Saved	Saved in instrument state
Backwards Compatibility Notes	For Spectrum Analysis mode in ESA and PSA, there is no Cont hardkey, instead there is a Sweep Single/Cont key. In these analyzers, switching the Sweep Single/Cont key from Single to Cont restarts averages (displayed average count reset to 1), but does not restart Max Hold and Min Hold. The X-Series has Single and Cont keys in place of the SweepSingleCont key. In the X-Series, if in single measurement, the Cont key (and INIT:CONT ON) switches to continuous measurement, but never restarts a measurement and never resets a sweep.
Initial S/W Revision	Prior to A.02.00

In Swept SA Measurement (Spectrum Analysis Mode):

The analyzer takes repetitive sweeps, averages, measurements, etc., when in Continuous mode. When the average count reaches the Average/Hold Number the count stops incrementing, but the analyzer keeps sweeping. See the Trace/Detector section for the averaging formula used both before and after the Average/Hold Number is reached. The trigger condition must be met prior to each sweep. The type of trace processing for multiple sweeps, is set under the Trace/Detector key, with choices of Trace Average, Max Hold, or Min Hold.

In Other Measurements/Modes:

With Avg/Hold Num (in the Meas Setup menu) set to Off or set to On with a value of 1, a sweep is taken after the trigger condition is met; and the analyzer continues to take new sweeps after the current sweep has completed and the trigger condition is again met. However, with Avg/Hold Num set to On with a value >1, multiple sweeps (data acquisitions) are taken for the measurement. The trigger condition must be met prior to each sweep. The sweep is not stopped when the average count k equals the number N set for Avg/Hold Num is reached, but the number k stops incrementing. A measurement average usually applies to all traces, marker results, and numeric results. But sometimes it only applies to the numeric results.

If the analyzer is in Single measurement, pressing the Cont key does not change k and does not cause the sweep to be reset; the only action is to put the analyzer into Continuous measurement operation.

If it is already in continuous sweep:

the INIT:CONT 1 command has no effect

the INIT:CONT 0 command will place the analyzer in Single Sweep but will have no effect on the current sequence until $k = N$, at which point the current sequence will stop and the instrument will go to the idle state.

14 GMSK Power vs. Time Measurement
File

File

See "File" on page 320

FREQ/Channel

Accesses a menu of keys that allows you to control the Frequency parameters of the instrument.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

ARFCN

Sets the analyzer to a frequency that corresponds to the ARFCN (Absolute RF Channel Number). Used to enter the channel to be measured for the selected band. If the Center Freq value entered does not exactly correlate with an ARFCN, the softkey label changes to display the closest ARFCN to the selected frequency, along with a > or < symbol indicating whether the frequency is above or below that ARFCN.

Key Path	FREQ Channel
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel:ARFCn RFCHannel <integer></code> <code>[:SENSe] :CHANnel:ARFCn RFCHannel?</code>
Example	CHAN:ARFC 3 CHAN:ARFC?
Notes	This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not available (blank).
Couplings	Coupled with Center Frequency . Setting ARFCN sets Center Freq to the value corresponding to that ARFCN. BMT Freq choice changes this parameter.
Preset	1
State Saved	Saved in instrument state.
Range	Different for each BAND as follows: E-GSM: 0 to 124, and 975 to 1023 P-GSM: 1 to 124 R-GSM: 0 to 124(MS), and 955 to 1023(BTS) DCS1800: 512 to 885 PCS1900: 512 to 810 GSM450: 259 to 293 GSM480: 306 to 340 GSM700: 438 to 516 GSM850: 128 to 251 T-GSM 810: 350 to 425

Min	Different for each BAND as follows: E-GSM: 0(MS), and 975(BTS) P-GSM: 1 R-GSM: 0(MS), and 955(BTS) DCS1800: 512 PCS1900: 512 GSM450: 259 GSM480: 306 GSM700: 438 GSM850: 128 T-GSM 810: 350
Max	Different for each BAND as follows: E-GSM: 124(MS), and 1023(BTS) P-GSM: 124 R-GSM: 124(MS), and 1023(BTS) DCS1800: 885 PCS1900: 810 GSM450: 293 GSM480: 340 GSM700: 516 GSM850: 251 T-GSM 810: 425
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.07.00

Center Freq

Sets the center frequency to be measured for the selected band. It is coupled with ARFCN – setting Center Freq sets ARFCN to the channel corresponding to that frequency.

For more information, see the section ["Center Freq" on page 2269](#).

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

Time Slot

This functionality is the same as that of the corresponding key in the Demod menu. See ["Time Slot" on page 2288](#) for details.

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

Burst Type

This functionality is the same as that of the corresponding key in the Demod menu. See ["Burst Type" on page 2289](#) for details.

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

TSC (Std)

This functionality is the same as that of the corresponding key in the Demod menu. See ["TSC \(Std\)" on page 2291](#) for details.

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

Center Freq

Sets the frequency that corresponds to the horizontal center of the graticule (when frequency Scale Type is set to linear). While adjusting the Center Frequency the Span is held constant, which means that both Start Frequency and Stop Frequency will change.

Pressing Center Freq also sets the frequency entry mode to Center/Span. In Center/Span mode, the center frequency and span values are displayed below the graticule, and the default active function in the Frequency menu is Center Freq.

The center frequency setting is the same for all measurements within a mode, that is, it is Meas Global. Some modes are also able to share a Mode Global center frequency value. If this is the case, the Mode will have a Global Settings key in its Mode Setup menu.

The Center Freq function sets (and queries) the Center Frequency for the currently selected input. If your analyzer has multiple inputs, and you select another input, the Center Freq changes to the value for that input. SCPI commands are available to directly set the Center Freq for a specific input.

Center Freq is remembered as you go from input to input. Thus you can set a Center Freq of 10 GHz with the RF Input selected, change to BBIQ and set a Center Freq of 20 MHz, then switch to External Mixing and set a Center Freq of 60 GHz, and when you go back to the RF Input the Center Freq will go back to 10 GHz; back to BBIQ and it is 20 MHz; back to External Mixing and it is 60 GHz.

See ["RF Center Freq" on page 1580](#)

See [Ext Mix Center Freq](#)

See ["I/Q Center Freq" on page 1582](#)

See ["Center Frequency Presets" on page 1579](#)

Key Path	FREQ Channel
Scope	Meas Global
Remote Command	<code>[:SENSe] :FREQuency:CENTer <freq></code> <code>[:SENSe] :FREQuency:CENTer?</code>
Example	FREQ:CENT 50 MHz FREQ:CENT UP changes the center frequency to 150 MHz if you use FREQ:CENT:STEP 100 MHz to set the center frequency step size to 100 MHz FREQ:CENT?
Notes	This command sets either the RF or I/Q Center Frequency depending on the selected input. For RF input it is equivalent to FREQ:RF:CENT For I/Q input it is equivalent to FREQ:IQ:CENT Preset and Max values are dependent on Hardware Options (5xx) If no terminator (e.g. MHz) is sent the terminator Hz is used. If a terminator with unit other than Frequency is used, an invalid suffix error message is generated.
Dependencies	The Center Frequency can be limited by Start or Stop Freq limits, if the Span is so large that Start or Stop reach their limit.
Couplings	When operating in "swept span", any value of the Center Frequency or Span that is within the frequency range of the analyzer is allowed when the value is being set through the front panel numeric key pad or the SCPI command. The other parameter is forced to a different value if needed, to keep the Start and the Stop Frequencies within the analyzer's frequency range
Preset	Depends on instrument maximum frequency, mode, measurement, and selected input. See "Center Frequency Presets" on page 1579 and "RF Center Freq" on page 1580 and Ext Mix Center Freq and "I/Q Center Freq" on page 1582 .
State Saved	Saved in instrument state
Min	Depends on instrument maximum frequency, mode, measurement, and selected input.. See "Center Frequency Presets" on page 1579 and "RF Center Freq" on page 1580 and "I/Q Center Freq" on page 1582 .
Max	Depends on instrument maximum frequency, mode, measurement, and selected input.. See "Center Frequency Presets" on page 1579 and "RF Center Freq" on page 1580 and "I/Q Center Freq" on page 1582 .
Default Unit	Hz
Status Bits/OPC	Non-overlapped
Dependencies	
Initial S/W Revision	Prior to A.02.00

Center Frequency Presets

The following table provides the Center Frequency Presets for the Spectrum Analyzer mode, and the Max Freq, for the various frequency options:

Freq Option	CF after Mode Preset	Stop Freq after Mode Preset	Max Freq (can't tune above)
503 (all but N9000A)	1.805 GHz	3.6 GHz	3.7 GHz
503 (N9000A)	1.505 GHz	3.0 GHz	3.08 GHz
507 (all but N9000A)	3.505 GHz	7.0 GHz	7.1 GHz
507 (N9000A)	3.755 GHz	7.5 GHz	7.58 GHz
508 (all but N9038A)	1.805 GHz	3.6 GHz	8.5 GHz
508 (N9038A)	4.205 GHz	8.4 GHz	8.5 GHz
513	6.805 GHz	13.6 GHz	13.8 GHz
526 (all but N9000A and N9038A)	13.255 GHz	26.5 GHz	27.0 GHz
526 (N9000A)	13.255 GHz	26.5 GHz	26.55 GHz
526 (N9038A)	1.805 GHz	3.6 GHz	27.0 GHz
532	16.005 GHz	32.0 GHz	32.5 GHz
543	21.505 GHz	43.0 GHz	TBD
544	22.005 GHz	44.0 GHz	44.5 GHz
550	25.005 GHz	50.0 GHz	51 GHz

Input 2:

Model	CF after Mode Preset	Stop Freq after Mode Preset	Max Freq (can't tune above)
N9000A opt C75	0.7505GHz	1.5 GHz	1.58 GHz
N9038A	505 MHz	1 GHz	1.000025 GHz

Tracking Generator Frequency Limits (N9000A only):

Tracking Generator Option	Min Freq (clips to this freq when turn TG on and can't tune below while TG on)	If above this Freq, Stop Freq clipped to this Freq when TG turned on	Max Freq (can't tune above) while TG on
T03	9 kHz	3.0 GHz	3.08 GHz
T06	9 kHz	6.0 GHz	6.05 GHz

The following table shows the Center Frequency Presets for modes other than Spectrum Analyzer:

Mode	CF Preset for RF
WCDMA	1 GHz
WIMAXOFDMA,	1 GHz
BASIC	1 GHz
ADEMOD	1 GHz
VSA	1 GHz
TDSCDMA	1 GHz
PNOISE	1 GHz
LTE	1 GHz
LTETDD	1 GHz
MSR	1 GHz
GSM	935.2 MHz
NFIGURE	1.505 GHz

RF Center Freq

SCPI command for specifying the RF Center Frequency. This command will set the Center Frequency to be used when the RF input is selected, even if the RF input is not the input that is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

Scope	Meas Global
Remote Command	<code>[:SENSe] :FREQuency:RF:CENTer <freq></code> <code>[:SENSe] :FREQuency:RF:CENTer?</code>
Example	FREQ:RF:CENT 30 MHz
Notes	This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode.
Dependencies	If the electronic/soft attenuator is enabled, any attempt to set Center Frequency such that the Stop

	Frequency would be >3.6 GHz fails and results in an advisory message. If the equivalent SCPI command is sent, this same message is generated as part of a “-221, Settings conflict” warning. If Source Mode is set to Tracking, and the Max or Min Center Freq is therefore limited by the limits of the source, a warning message is generated, “Data out of range;clipped to source max/min” if these limits are exceeded. Note that for an external source, these limits can be affected by the settings of Source Numerator, Source Denominator and Power Sweep.
Preset	See table above
State Saved	Saved in instrument state.
Min	-79.999995 MHz, unless Source Mode is set to Tracking, in which case it is limited by the minimum frequency of the Source
Max	See table above. Basically instrument maximum frequency - 5 Hz. Note that, if the Source Mode is set to Tracking, the effective instrument maximum frequency may be limited by the source maximum frequency. If the knob or step keys are being used, also depends on the value of the other three interdependent parameters Span, Start Frequency and Stop Frequency
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Ext Mix Center Freq

SCPI command for specifying the External Mixer Center Frequency. This command will set the Center Frequency to be used when the External Mixer is selected, even if the External Mixer input is not the input which is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

Scope	Meas Global
Remote Command	<code>[:SENSe] :FREQuency:EMIXer:CENTer <freq></code> <code>[:SENSe] :FREQuency:EMIXer:CENTer?</code>
Example	<code>:FREQ:EMIX:CENT 60 GHz</code> <code>:FREQ:EMIX:CENT?</code>
Notes	This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode.
Couplings	When returning to External Mixing after having been switched to one of the other inputs (e.g., RF), you will come back into the settings that you had when you left External Mixing. So you will come back to the band you were in with the Center Frequency that you had. However, Span is not an input-dependent parameter, therefore you will bring the span over from the other input. Therefore, the analyzer comes back with the span from the previous input, limited as necessary by the current mixer setup.
Preset	When a Mode Preset is performed while in External Mixing, the Start frequency of the current Mode is set to the nominal Min Freq of the lowest harmonic range in the Harmonic Table for the current mixer setup. Similarly, the Stop frequency of the current Mode is set to the nominal Max Freq of the highest harmonic range in the Harmonic Table. The Center Freq thus presets to the point arithmetically equidistant from these two frequencies.

	<p>If the current measurement has a limited Span available to it, and cannot achieve the Span shown in the table (Span=Stop Freq – Start Freq), the analyzer uses the maximum Span the measurement allows, and still sets the Center Freq to the midpoint of the Start and Stop Freq values in the Harmonic Table.</p> <p>When Restore Input/Output Defaults is performed, the mixer presets to the 11970A, whose Start and Stop frequencies are 26.5 and 40 GHz respectively. The center of these two frequencies is 33.25 GHz.</p> <p>Therefore, after a Restore Input/Output Defaults, if you go into External Mixing and do a Mode Preset while in the Spectrum Analyzer Mode, the resulting Center Freq is 33.25 GHz.</p>
State Saved	Saved in instrument state.
Min	The minimum frequency in the currently selected mixer band + 5 Hz
Max	The maximum frequency in the currently selected mixer band – 5 Hz If the knob or step keys are being used, also depends on the value of the other three interdependent parameters Span, Start Frequency and Stop Frequency
Initial S/W Revision	A.08.01

I/Q Center Freq

SCPI command for specifying the I/Q Center Frequency. This command will set the Center Frequency to be used when the I/Q input is selected, even if the I/Q input is not the input which is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

Scope	Meas Global
Remote Command	[:SENSe] :FREQuency:IQ:CENTer <freq> [:SENSe] :FREQuency:IQ:CENTer?
Example	FREQ:IQ:CENt: 30 MHz
Notes	This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode.
Preset	0 Hz
State Saved	Saved in instrument state.
Min	-40.049995 MHz
Max	40.049995 MHz
Initial S/W Revision	Prior to A.02.00

BMT Freq

Enables quick selection from a subset of the available ARFCN numbers for the Top, Middle, or Bottom frequency in the selected band.

Key Path	FREQ Channel
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Mode	GSM
Scope	Meas Global
Notes	This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this.
Dependencies	When I/Q Input is selected, this key is not available (blank).
Couplings	BMT choice changes ARFCN and Center Freq. Chosen ARFCN will be displayed on each menu key.
Range	Top Middle Bottom
Initial S/W Revision	Prior to A.02.00

BMT Freq Top

Sets the analyzer to the frequency of the highest ARFCN (Absolute RF Channel Number) of the selected radio band.

Key Path	FREQ Channel, BMT Freq
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel:ARFCn RFCHannel:TOP
Example	CHAN:ARFC:TOP
Notes	1. This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. 2. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not displayed.
Couplings	Change [:SENSe]:CHANnel:ARFCn RFCHannel as follows: E-GSM: 124 P-GSM: 124 R-GSM: 124 DCS 1800: 885 PCS 1900: 810 GSM 450: 293 GSM 480: 340 GSM 700: 516 GSM 850: 251 T-GSM 810: 425 Change BMT ARFCN to BMT FreqTOP. Change [:SENSe]:FREQuency:CENTer as follows: E-GSM: 959.800 MHz P-GSM: 959.800 MHz R-GSM: 959.800 MHz

	DCS 1800: 1879.80 MHz
	PCS 1900: 1989.80 MHz
	GSM 450: 467.400 MHz
	GSM 480: 495.800 MHz
	GSM 700: 792.800 MHz
	GSM 850: 893.800 MHz
	T-GSM810: 866.000 MHz

State Saved	No
Initial S/W Revision	Prior to A.02.00

BMT Freq Middle

Sets the analyzer to the frequency of the middle ARFCN (Absolute RF Channel Number) of the selected radio band.

Key Path	FREQ Channel, BMT Freq
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :ARFCn RFCHannel :MIDDLE</code>
Example	CHAN:ARFC:MIDD
Notes	<ol style="list-style-type: none"> 1. This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. 2. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not displayed.
Couplings	Change [:SENSe]:CHANnel:ARFCn RFCHannel as follows: E-GSM: 38 P-GSM: 63 R-GSM: 28 DSC 1800: 699 PCS 1900: 661 GSM 450: 276 GSM 480: 323 GSM 700: 477 GSM 850: 190 T-GSM 810: 388 Change BMT ARFCN to BMT FreqMIDDLE. Change [:SENSe]:FREQuency:CENTer as follows: E-GSM: 942.600 MHz P-GSM: 947.600 MHz R-GSM: 940.600 MHz

	DCS 1800: 1842.60 MHz
	PCS 1900: 1960.00 MHz
	GSM 450: 464.000 MHz
	GSM 480: 492.400 MHz
	GSM 700: 755.000 MHz
	GSM 850: 881.600 MHz
	T-GSM 810: 858.600 MHz

State Saved	No
Initial S/W Revision	Prior to A.02.00

BMT Freq Bottom

Sets the analyzer to the frequency of the lowest ARFCN (Absolute RF Channel Number) of the selected radio band.

Key Path	FREQ Channel, BMT Freq
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel:ARFCn RFChannel:BOTTom
Example	CHAN:ARFC:BOTT
Notes	<ol style="list-style-type: none"> 1. This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. 2. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not displayed.
Couplings	Change [:SENSe]:CHANnel:ARFCn RFChannel as follows: E-GSM: 975 P-GSM: 1 R-GSM: 955 DCS 1800: 512 PCS 1900: 512 GSM 450: 259 GSM 480: 306 GSM 700: 438 GSM 850: 128 T-GSM 810: 350 Change BMT ARFCN to BMT FreqBOTTOM. Change [:SENSe]:FREQuency:CENTer as follows: E-GSM: 925.200 MHz P-GSM: 935.200 MHz R-GSM: 921.200 MHz

	DCS 1800: 1805.20 MHz
	PCS 1900: 1930.20 MHz
	GSM 450: 460.600 MHz
	GSM 480: 489.000 MHz
	GSM 700: 747.2 MHz
	GSM 850: 869.200 MHz
	T-GSM 810: 851.000 MHz
State Saved	No
Initial S/W Revision	Prior to A.02.00

Carrier Setup

Allows you to set carrier parameters.

Key Path	FREQ Channel
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Initial S/W Revision	A.06.00
Modified at S/W Revision	A.14.00

Carriers

Defines the number of carriers.

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :COUNT <integer></code> <code>[:SENSe] :CHANnel :CARRier :COUNT?</code>
Example	CHAN:CARR:COUN 3 CHAN:CARR:COUN?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Couplings	This can change when the SCPI command of the Carrier Power Present or the Carrier Interval is sent.
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	16

Initial S/W Revision	A.06.00
Modified at S/W Revision	A.13.00

Reference Carrier

Defines the reference active carrier. The Reference Carrier frequency point is always aligned with the Measurement Global Center Frequency. The minimum value 1 specifies the lowest frequency carrier among the active carriers. The maximum value specifies the highest frequency carrier among the active carriers.

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :RCARrier <integer></code> <code>[:SENSe] :CHANnel :CARRier :RCARrier ?</code>
Example	CHAN:CARR:RCAR 3 CHAN:CARR:RCAR ?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	The maximum value depends on the number of carriers. If you set it to more than the number of carriers, it's clipped to the number of carriers. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Couplings	When you decrease the number of carriers to a value which is less than this value, this is clipped to the value.
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	Number of carriers
Initial S/W Revision	A.06.00

Configure Carriers

Opens a menu of keys that allows you to configure carriers.

Key Path	FREQ Channel, Multi Carrier Setup
Dependencies	This key is grayed out when there is only one carrier. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Initial S/W Revision	A.06.00

Select Carrier

Selects a carrier to configure.

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	The maximum value depends on the number of carriers. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned. This parameter is unavailable when there is only one carrier.
Couplings	This value can change when you decrease the number of carriers.
Preset	1
State Saved	No
Min	1
Max	Number of carriers
Initial S/W Revision	A.06.00

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :CARRier :LIST :COUPle OFF ON 0 1, ... [:SENSe] :CHANnel :CARRier :LIST :COUPle ?
Example	CHAN:CARR:LIST:COUP OFF CHAN:CARR:LIST:COUP?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	When Couple is selected, the carrier settings are coupled to carrier #1. Coupled parameters are Carrier Power Present, Carrier Interval. When a setting is changed, the couple is set to Man automatically. Carrier #1 is always set to couple and cannot be changed. Couple/Man selection on the Carrier key is not displayed when selected carrier number is #1.
Preset	ON
State Saved	No
Range	Couple Man
Initial S/W Revision	A.06.00

Carrier Power Present

Specifies whether each of carriers is active or not.

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :LIST :PPresent YES NO, ...</code> <code>[:SENSe] :CHANnel :CARRier :LIST :PPresent ?</code>
Example	CHAN:CARR:LIST:PPR YES CHAN:CARR:LIST:PPR?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode. Missing values are not permitted, therefore if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Dependencies	This parameter is unavailable when there is only one carrier. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	Coupled to the number of carriers. When the SCPI command is sent, the number of carriers will be set to the number of entries in the parameter list.
Preset	YES
State Saved	Saved in instrument state.
Range	Yes No
Initial S/W Revision	A.06.00

Carrier Interval

Specifies the frequency interval between the Carrier #n and #n+1 center frequencies.

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :LIST :INTerval <freq>, ...</code> <code>[:SENSe] :CHANnel :CARRier :LIST :INTerval ?</code>
Example	CHAN:CARR:LIST:INT 600k CHAN:CARR:LIST:INT?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode. The softkey for the last carrier (say, #N) is grayed out.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned. This parameter is unavailable when there is only one carrier.
Couplings	Coupled to the number of carriers. When the SCPI command is sent, the number of carriers will be

	set to the number of entries in the parameter list. Changing Carrier Interval might affect the Span.
Preset	600kHz
State Saved	Saved in instrument state.
Min	400 kHz
Max	100 MHz
Initial S/W Revision	A.06.00
Modified at S/W Revision	A.07.00, A.08.00

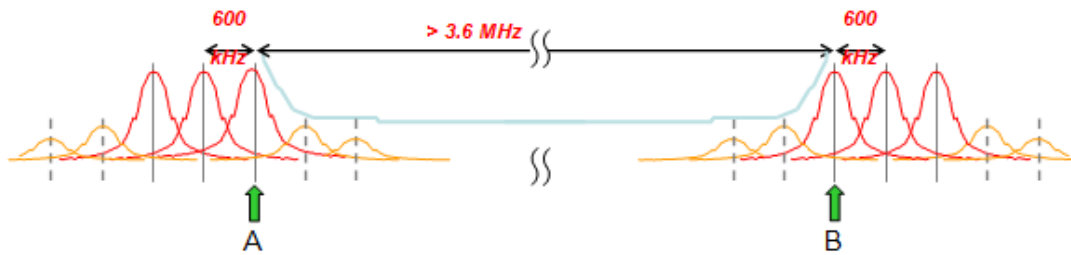
Carrier Frequency Allocation

Specifies the carrier frequency allocation. There are two types of allocation, contiguous and non-contiguous. Non-Contiguous frequency allocation is defined as an allocation where two groups of frequencies are separated with at least [3.6] MHz carrier separation between the innermost carriers. In case of the non-contiguous frequency allocation, tests will be measured between the uppermost carrier A of the lower frequency group and the lowermost carrier B of the upper frequency group.

See ["An example of non-contiguous frequency allocation" on page 1591](#)

Key Path	FREQ Channel, Multi Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :CARRier :FALLocation CONTiguous NCONTiguous [:SENSe] :CHANnel :CARRier :FALLocation?
Example	CHAN:CARR:FALL NCON CHAN:CARR:FALL?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This menu key is available only when the number of carriers is more than one. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Preset	CONTiguous
State Saved	Saved in instrument state.
Range	Contiguous Non-Contiguous
Readback Text	CONTiguous NCONTiguous
Initial S/W Revision	A.07.00

An example of non-contiguous frequency allocation



Non-Contiguous

Opens a menu of keys that allows you to set non-contiguous frequency allocation parameters.

Key Path	FREQ Channel, Multi Carrier Setup, Carr Freq Alloc
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Initial S/W Revision	A.07.00

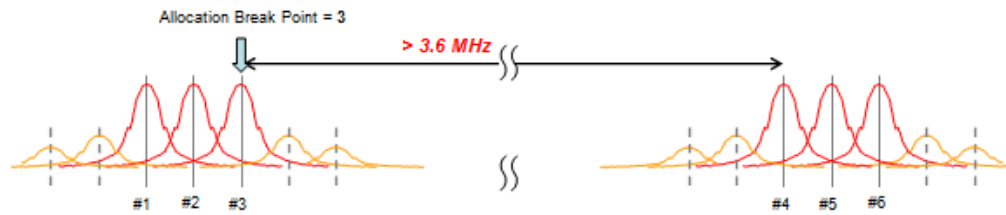
Allocation Break Pt

Specifies an allocation break point that is a sequence (or index) number of the uppermost carrier in the lower frequency group.

See ["An example of allocation break point" on page 1593](#)

Key Path	FREQ Channel, Multi Carrier Setup, Carr Freq Alloc, Non-Contiguous
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe]:CHANnel:CARRier:FALLocation:NCONtiguous:ABPoint <integer></code> <code>[:SENSe]:CHANnel:CARRier:FALLocation:NCONtiguous:ABPoint?</code>
Example	<code>CHAN:CARR:FALL:NCON:ABP 3</code> <code>CHAN:CARR:FALL:NCON:ABP?</code>
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	The maximum value depends on the number of carriers. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	This value can change when you decrease the number of carriers.
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	Number of carriers - 1
Initial S/W Revision	A.07.00
Modified at S/W Revision	A.13.00

An example of allocation break point



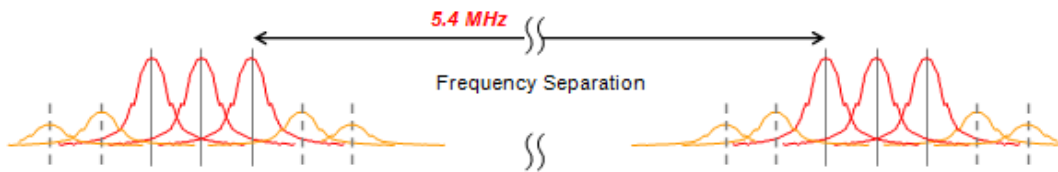
Freq Separation

Specifies frequency separation between the innermost of carriers.

See ["An example of frequency separation" on page 1594](#)

Key Path	FREQ Channel, Multi Carrier Setup, Carr Freq Alloc, Non-Contiguous
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :FALLocation :NCONtiguous :FSEParation <freq></code> <code>[:SENSe] :CHANnel :CARRier :FALLocation :NCONtiguous :FSEParation?</code>
Example	<code>CHAN:CARR:FALL:NCON:FSEP 5.4M</code> <code>CHAN:CARR:FALL:NCON:FSEP?</code>
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	Changing Frequency Separation might affect the Span
Preset	5.4 MHz
State Saved	Saved in instrument state.
Min	3.6 MHz
Max	100 MHz
Initial S/W Revision	A.07.00

An example of frequency separation



Carrier BPF

Selects whether to use the carrier bandpass filter.

Key Path	FREQ Channel, Multi Carrier SetupMode Setup, Demod
Mode	GSM
Remote Command	[:SENSe]:RADio:CARRier:NUMBer:AUTO ON OFF 1 0 [:SENSe]:RADio:CARRier:NUMBer:AUTO?
Example	RAD:CARR:NUMB:AUTO 1 RAD:CARR:NUMB:AUTO?
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	ON automatically changes to OFF when Multiple or Single is selected as Carrier BPF Type.
Preset	ON
State Saved	Saved in instrument state.
Range	Auto Man
Initial S/W Revision	A.06.00

Carrier BPF Type

Opens a menu of keys that allows you to select the type of the bandpass filter. When carriers other than the signal of interest are present, especially if they are strong, they can interfere with the measurement, making it difficult to sync and producing artificially high EVM results. When this condition exists, toggle from Single to Multi. A band-limited filter will help reduce the measurement interference.

BPF Type	Description
MULTiple	Enable multi carrier tolerance filter.
SINGle	Disable multi carrier tolerance filter

This parameter applies only to the following measurements:

- GSMK Phase & Frequency Error measurement
- EDGE EVM measurement
- GSMK Power vs. Time

- EDGE Power vs. Time

Key Path	FREQ Channel, Multi Carrier Setup, Carrier BPFMode Setup, Demod, Carrier BPF
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :RADio :CARRier :NUMBer SINGLE MULTiple</code> <code>[:SENSe] :RADio :CARRier :NUMBer ?</code>
Example	<code>RAD:CARR:NUMB SING</code> <code>RAD:CARR:NUMB ?</code>
Notes	The Carrier Bandpass Filter key is in the Mode Setup menu, but only EDGE EVM and GSM PFER measurements support this feature. In other measurements, this setting is not applicable. You must be in the GSM mode to use this command. Use <code>INSTRument:SElect</code> to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Preset	SINGLE
State Saved	Saved in instrument state.
Range	Single Multi
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

BTS Class

Selects a BTS class.

BTS Class	Definition
MC	Multicarrier BTS is defined as a class of BTS, characterized by the ability to, in addition to single carrier operation, process two or more carriers in common active RF components simultaneously, either in multicarrier transmitter only or, in both multicarrier transmitter and multicarrier receiver.
SC	Single carrier BTS is defined as a class of BTS, characterized by the ability to process one carrier in single carrier BTSs, not belonging to a Multicarrier BTS class.

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Remote Command	<code>[:SENSe] :CHANnel :CARRier :BASE :CLASs :AUTO ON OFF 1 0</code> <code>[:SENSe] :CHANnel :CARRier :BASE :CLASs :AUTO ?</code>
Example	<code>CHAN:CARR:BASE:CLAS:AUTO 1</code> <code>CHAN:CARR:BASE:CLAS:AUTO ?</code>
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.

Couplings	ON automatically changes to OFF when Multicarrier Class (MC) or Single carrier Class (SC) is selected as BTS Class.
Preset	ON
State Saved	Saved in instrument state.
Range	Auto Man
Initial S/W Revision	A.14.00

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :CARRier :BASE :CLASs SC MC [:SENSe] :CHANnel :CARRier :BASE :CLASs ?
Example	CHAN:CARR:BASE:CLAS MC CHAN:CARR:BASE:CLAS?

Notes

You must be in the GSM mode to use this command.
 Use INSTRument:SElect to set the mode.
 Selection C1 and C2 are supported for backwards compatibility.
 When "C1" or "C2" is passed as SCPI command parameter, the BTS Class Auto is set to ON. As a result, it's converted to "SC" if the number of carriers is one, and otherwise "MC."

Dependencies	This parameter is available when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Preset	SC
State Saved	Saved in instrument state.
Range	Single Carrier Multi Carrier
Initial S/W Revision	A.06.00
Modified at S/W Revision	A.10.01, A14.00

Time Slot

Selects On or Off for slot searching. Generally, this feature is only valid in external and periodic timer trigger source modes that triggers every frame since another trigger source does not have the information that identifies the head of the frame. When Timeslot is set to On, the demodulation measurement is made on the nth timeslot specified by the trigger point + n timeslots, where n is the selected timeslot value 0 to 7.

This functionality is the same as Time Slot under the Freq/Channel menu.

Key Path	Mode Setup, Demod FREQ Channel
Mode	GSM

Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :SLOT <integer> [:SENSe] :CHANnel :SLOT? [:SENSe] :CHANnel :SLOT :AUTO OFF ON 0 1 [:SENSe] :CHANnel :SLOT :AUTO?
Example	CHAN:SLOT 0 CHAN:SLOT? CHAN:SLOT:AUTO OFF CHAN:SLOT:AUTO?
Notes	This functionality does not affect Combined GSM/EDGE measurement. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	0 OFF
State Saved	Saved in instrument state.
Min	0
Max	7
Initial S/W Revision	Prior to A.02.00

Burst Type

Sets the burst type that the analyzer will search for and to which it will synchronize.

This functionality is the same as Burst Type under the FREQ Channel menu.

Key	SCPI	Description
Sync (SCH)	SYNC	Burst length = 142 symbols Extended training sequences for CTS and COMPACT synchronization bursts are not supported.
Access (RACH)	ACCess	Burst length = 88 symbols Alternative training (synchronization) sequence "TS1" and "TS2" are supported only in GSMK Power vs. Time.
Normal - NB (TCH & CCH)	NORMal	Burst length = 142 symbols Softkey label will be changed to 'Normal - NB' form 'Normal'
Higher Symbol Rate - HB (TCH & CCH)	HSRate	Burst length = 169 symbols This selection key is only shown when the N9071A-3FP license is installed.
Mixed (NB/HB for TSC sync)	MIXed	Enables auto detection between Normal (NB) and HSR (HB) TCH & CCH EDGE Burst. This selection key is only shown when the N9071A-3FP license is installed.

Measurement synchronization capability (Burst Sync = Training Seq)

	Sync	Access	Normal		HSR	Mixed
			GMSK	8PSK		
				16QAM		
				32QAM		
				AQPSK		
GMSK Phase & Freq Error measurement	Yes	Yes	Yes	No	N/A	
GMSK Power vs. Time measurement	Yes	Yes	Yes	No	(measures as Normal GMSK when selected)	
GMSK Output RF Spectrum measurement (when Trigger Source is Periodic Timer and Sync Source is Off)	No	No	Yes	No		
EDGE EVM measurement	No	No	No	Yes	Yes	Yes
EDGE Power vs. Time measurement	Yes	Yes	Yes	Yes	Yes	Yes
EDGE Output RF Spectrum measurement (when Trigger Source is Periodic Timer and Sync Source is Off.)	No	No	Yes	Yes	Yes	Yes

Key Path	Mode Setup, Demod FREQ Channel
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :BURSt NORMal SYNC ACCess HSRate MIXed [:SENSe] :CHANnel :BURSt?
Example	CHAN:BURS NORM CHAN:BURS?
Notes	This functionality does not affect the Combined GSM/EDGE measurement. Higher Symbol Rate and Mixed selections are only available when the N9071A-3FP license is installed. Otherwise these menu keys are blank. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Higher Symbol Rate and Mixed selection keys are not shown unless N9071A-3FP is installed. When unlicensed and SCPI is sent, an undefined header error is returned. When "Mixed" is selected, the Burst Sync menu key under the Meas Setup menu will be grayed out and Training Sequence (TSC) will be used for synchronization. The sync algorithm always runs in Training Sequence (TSC) synchronization because the Burst Type can be determined by looking at TSC in the signal. Original selection of Burst Sync will become effective again when the Burst Type selection is changed from "Mixed" to another one.
Preset	NORMal
State Saved	Saved in instrument state.
Range	Sync (SCH) Access (RACH) Normal - NB (TCH & CCH) Higher Symbol Rate - HB (TCH & CCH) Mixed (NB/HB for TSC sync)

Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

TSC (Std)

Allows you to select the Training Sequence Code that determines which burst is to be measured. Applicable only when Burst Sync is set to Training Sequence in the measurement. In the case of AQPSK, this parameter specifies TSC number of VAMOS sub-channel A. TSC of VAMOS sub-channel B is ignored.

This functionality is the same as TSC under the FREQ Channel menu.

This parameter applies only to the following measurements:

- GSMK/EDGE Power vs. Time measurement
- GSMK Phase & Frequency Error measurement
- EDGE EVM measurement

Selection	SCPI	Description
AutoDet	ON 1	The measurement is made on the first burst found to have any one of the valid TSCs in the range of 0 to 7. The measurement may be made on various timeslots if more than one timeslot has one of the 8 valid TSCs.
Man	OFF 0	The measurement is made on the first burst found to have the selected TSC. TSC numbers in the range of 0 to 7 can be selected. The measurement may be made on various timeslots if more than one timeslot has this same TSC.

Key Path	Mode Setup, Demod FREQ Channel
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe]:CHANnel:TSCode <integer> [:SENSe]:CHANnel:TSCode? [:SENSe]:CHANnel:TSCode:AUTO OFF ON 0 1 [:SENSe]:CHANnel:TSCode:AUTO?
Example	CHAN:TSC 3 CHAN:TSC? CHAN:TSC:AUTO 1 CHAN:TSC:AUTO?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. When Sync or Access is selected as Burst Type, this key is grayed out.
Preset	0 ON

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FREQ/Channel

State Saved	Saved in instrument state.
Min	0
Max	7
Initial S/W Revision	Prior to A.02.00

Input/Output

See ["Input/Output" on page 196](#)

Marker

Accesses a menu that enables you to select, set up and control the markers for the current measurement.

Key Path	Front-panel key
Mode	EDGE/GSM
Initial S/W Revision	Prior to A.02.00

Select Marker

Displays 12 markers available for selection.

Key Path	Marker
Initial S/W Revision	Prior to A.02.00

Marker Type

Sets the marker control mode to Normal, Delta or Off. All interactions and dependencies detailed under the key description are enforced when the remote command is sent.

Key Path	Marker
Mode	GSM
Remote Command	:CALCulate:PVTTime:MARKer[1] 2 ...12:MODE POSITION DELTA OFF :CALCulate:PVTTime:MARKer[1] 2 ...12:MODE?
Example	CALC:PVT:MARK:MODE OFF CALC:PVT:MARK:MODE?
Notes	If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules. At the same time, Marker X Axis Value appears on the Active Function area. Default Active Function: the active function for the selected marker's current control mode. If the current control mode is Off, there is no active function and the active function is turned off. Active Function Display: the marker X axis value entered in the active function area displays the marker value to its full entered precision. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	OFF
State Saved	Saved in instrument state.
Range	Normal Delta Off
Initial S/W Revision	Prior to A.02.00

Marker X Axis Value (Remote Command Only)

Sets the marker X Axis value in the current marker X Axis Scale unit. It has no effect if the control mode is Off, however, it is the SCPI equivalent of entering an X value if the control mode is Normal or Delta.

Mode	GSM
Remote Command	:CALCulate:PVTime:MARKer[1] 2 ...12:X <real> :CALCulate:PVTime:MARKer[1] 2 ...12:X?
Example	CALC:PVT:MARK3:X 0 CALC:PVT:MARK3:X?
Notes	If no suffix is sent, uses the fundamental units for the current marker X Axis Scale. If a suffix is sent that does not match the current marker X Axis Scale unit, an error "Invalid suffix" is generated. The query returns the marker's absolute X Axis value if the control mode is Normal, or the offset from the marker's reference marker if the control mode is Delta. The query is returned in the fundamental units for the current marker X Axis scale: seconds for Period and Time. If the marker is Off the response is not a number. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	Max value will be changed by Meas Time parameter value.
Preset	After a preset, all markers are turned OFF, so Marker X-Axis Value query returns a not a number (NAN).
State Saved	No
Min	-9.9E37
Max	9.9E37
Initial S/W Revision	Prior to A.02.00

Marker X Axis Position (Remote Command Only)

Sets the marker X position in trace points. It has no effect if the control mode is Off, however, it is the SCPI equivalent of entering a value if the control mode is Normal or Delta except in trace points rather than X Axis Scale units. The entered value is immediately translated into the current X Axis Scale units for setting the value of the marker.

Mode	GSM
Remote Command	:CALCulate:PVTime:MARKer[1] 2 ...12:X:POSition <integer> :CALCulate:PVTime:MARKer[1] 2 ...12:X:POSition?
Example	CALC:PVT:MARK10:X:POS 0 CALC:PVT:MARK10:X:POS?
Notes	The query returns the marker's absolute X-Axis value in trace points if the control mode is Normal, or the offset from the marker's reference marker in trace points if the control mode is Delta. If the marker is Off the response is not a number. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	Max value will be changed by Sweep/Meas Time parameter value.
Preset	After a preset, all markers are turned OFF, so Marker X Axis Value query returns a not a number

	(NAN).
State Saved	No
Min	-9.9E37
Max	9.9E37
Initial S/W Revision	Prior to A.02.00

Marker Y Axis Value (Remote Command Only)

Returns the marker Y Axis value in the current marker Y Axis unit.

The “result” of a marker is the value which is displayed on the second line of the Marker Result block. To properly interpret the returned value, the remote programmer must also know to which the analyzer’s Y Axis Unit is set as described below.

A marker can have up to two results, only one of which is displayed or returned on a query, as follows:

- Absolute result: every marker has an absolute result and it is simply:

For Normal and Delta markers, the Y-axis value of the trace point the marker is currently on.

The absolute result is displayed in the result block or returned on a query unless the marker control mode is Delta.

- Relative result: if a marker’s control mode is Delta, the relative result is displayed in the result block or returned on a query. This is the ratio of the Absolute Result of a delta marker to the Absolute Result of its reference marker. The ratio is expressed in dB.

Mode	GSM
Remote Command	:CALCulate:PVTTime:MARKer[1] 2 ...12:Y?
Example	CALC:PVT:MARK11:Y?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. Query only command
Preset	0
State Saved	No
Backwards Compatibility SCPI	:CALCulate:PVTTime:MARKer[1] 2 ...4:FUNCTION:RESult?
Initial S/W Revision	Prior to A.02.00

Properties

Accesses a menu that allows you to set marker properties and to access the marker trace menu.

Key Path	Marker
Initial S/W Revision	Prior to A.02.00

Select Marker

Displays 12 markers available for selection.

Key Path	Marker
Initial S/W Revision	Prior to A.02.00

Relative To

Selects the marker that the selected marker is relative to (its reference marker).

Key Path	Marker, Properties
Mode	GSM
Remote Command	:CALCulate:PVTime:MARKer[1] 2 ...12:REfERENCE <integer> :CALCulate:PVTime:MARKer[1] 2 ...12:REfERENCE?
Example	CALC:PVT:MARK:REF 3 CALC:PVT:MARK:REF?
Notes	A marker cannot be relative to itself, so that choice is unavailable, and if sent from SCPI generates error -221: "Settings conflict; marker cannot be relative to itself." You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode. When queried, a single value is returned (the specified marker numbers relative marker).
Preset	2 3 4 5 6 7 8 9 10 11 12 1
State Saved	Saved in instrument state.
Min	1
Max	12
Initial S/W Revision	Prior to A.02.00

Marker Trace

Assigns the specified marker to the designated trace.

Key Path	Marker, Properties
Mode	GSM
Remote Command	:CALCulate:PVTime:MARKer[1] 2 ...12:TRACe RFENvelope UMASK LMASK MAXRfenvelop MINRfenvelop :CALCulate:PVTime:MARKer[1] 2 ...12:TRACe?
Example	CALC:PVT:MARK:TRAC LMAS CALC:PVT:MARK:TRAC?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.

Dependencies	Upper Mask and Lower Mask are available when "Limit Mask" on page 1709 under View/Display is On. Max Hold RF Envelope is only available when Max Trace is set to On. Min Hold RF Envelope is only available when Min Hold Trace is set to On. Otherwise, the menu keys and commands are unavailable.
Preset	RFENvelope
State Saved	Saved in instrument state.
Range	RF Envelope Upper Mask Lower Mask Max Hold RF Envelope Min Hold RF Envelope
Initial S/W Revision	Prior to A.02.00

Couple Markers

When this function is true, moving any marker causes an equal X Axis movement of every other marker which is not Off. By "equal X Axis movement" we mean that we preserve the difference between each marker's X Axis value (in the fundamental x-axis units of the trace that marker is on) and the X Axis value of the marker being moved (in the same fundamental x-axis units).

This may result in markers going off screen.

Key Path	Marker
Mode	GSM
Remote Command	:CALCulate:PVTtime:MARKer:COUPle[:STATe] ON OFF 1 0 :CALCulate:PVTtime:MARKer:COUPle[:STATe]?
Example	CALC:PVT:MARK:COUP ON CALC:PVT:MARK:COUP?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

All Markers Off

Turns off all markers.

Key Path	Marker
Mode	GSM
Remote Command	:CALCulate:PVTtime:MARKer:AOff
Example	CALC:PVT:MARK:AOff
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Initial S/W Revision	Prior to A.02.00

Marker State (Backwards Compatibility/Remote Command Only)

Sets or queries the state of a marker. Setting a marker which is OFF to state ON or 1 puts it in Normal mode and places it at the center of the screen.

Mode	EDGE GSM
Remote Command	:CALCulate:PVTime:MARKer[1] 2 ...12:STATE OFF ON 0 1 :CALCulate:PVTime:MARKer[1] 2 ...12:STATE?
Example	CALC:PVT:MARK3:STAT 0 CALC:PVT:MARK3:STAT?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

Marker Function

There is no functionality for this Front-panel key in this measurement. When pressed, this key displays a blank menu.

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Marker To

There is no functionality for this Front-panel key in this measurement. When pressed, this key displays a blank menu.

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Meas

The information in this section is common to all measurements. For key and remote command information for a specific measurement, refer to the section that describes the measurement of interest.

Measurements available under the Meas key are specific to the current Mode.

When viewing Help for measurements, note the following:

NOTE

Operation for some keys differs between measurements. The information displayed in Help pertains to the current measurement. To see how a key operates in a different measurement, exit Help (press the Cancel Esc key), select the measurement, then reenter Help (press the Help key) and press that key.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Remote Measurement Functions

This section contains the following topics:

["Measurement Group of Commands" on page 2302](#)

["Current Measurement Query \(Remote Command Only\)" on page 2304](#)

["Limit Test Current Results \(Remote Command Only\)" on page 2304](#)

["Data Query \(Remote Command Only\)" on page 2304](#)

["Calculate/Compress Trace Data Query \(Remote Command Only\)" on page 2305](#)

["Calculate Peaks of Trace Data \(Remote Command Only\)" on page 2310](#)

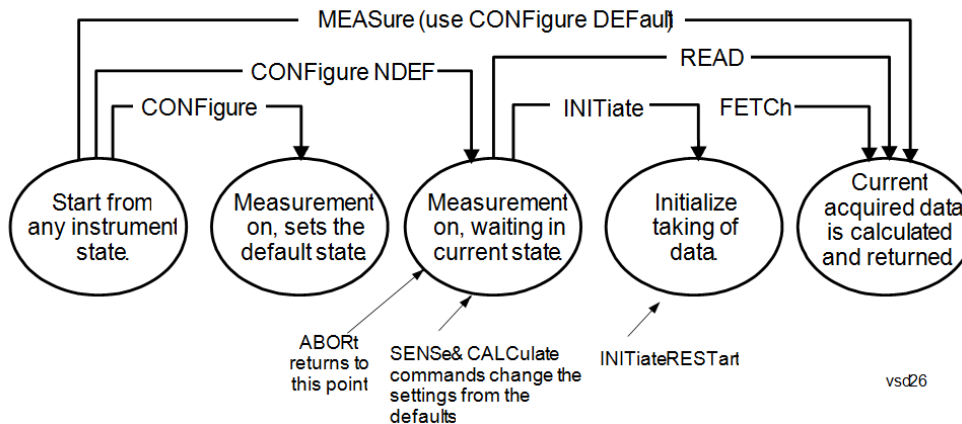
[Hardware-Accelerated Fast Power Measurement \(Remote Command Only\)](#)

["Format Data: Numeric Data \(Remote Command Only\)" on page 2311](#)

["Format Data: Byte Order \(Remote Command Only\)" on page 2312](#)

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Measurement Group of Commands



Measure Commands:

:MEASure:<measurement>[n]?

This is a fast single-command way to make a measurement using the factory default instrument settings. These are the settings and units that conform to the Mode Setup settings (e.g. radio standard) that you have currently selected.

- Stops the current measurement (if any) and sets up the instrument for the specified measurement using the factory defaults
- Initiates the data acquisition for the measurement
- Blocks other SCPI communication, waiting until the measurement is complete before returning results.
- If the function does averaging, it is turned on and the number of averages is set to 10.
- After the data is valid it returns the scalar results, or the trace data, for the specified measurement. The type of data returned may be defined by an [n] value that is sent with the command.
- The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available.
- ASCII is the default format for the data output. (Older versions of Spectrum Analysis and Phase Noise mode measurements only use ASCII.) The binary data formats should be used for handling large blocks of data since they are smaller and faster than the ASCII format. Refer to the FORMat:DATA command for more information.

If you need to change some of the measurement parameters from the factory default settings you can set up the measurement with the CONFigure command. Use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to change the settings. Then you can use the READ? command to initiate the measurement and query the results.

If you need to repeatedly make a given measurement with settings other than the factory defaults, you can use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to set up the measurement. Then use the READ? command to initiate the measurement and query results.

Measurement settings persist if you initiate a different measurement and then return to a previous one. Use READ:<measurement>? if you want to use those persistent settings. If you want to go back to the default settings, use MEASure:<measurement>?.

Configure Commands:

:CONFigure:<measurement>

This command stops the current measurement (if any) and sets up the instrument for the specified measurement using

the factory default instrument settings. It does not initiate the taking of measurement data unless INIT:CONTinuous is ON. If you change any measurement settings after using the CONFigure command, the READ command can be used to initiate a measurement without changing the settings back to their defaults.

In the Swept SA measurement in Spectrum Analyzer mode the CONFigure command also turns the averaging function on and sets the number of averages to 10 for all measurements.

:CONFigure: <measurement>: NDEFault stops the current measurement and changes to the specified measurement. It does not change the settings to the defaults. It does not initiate the taking of measurement data unless INIT:CONTinuous is ON.

The CONFigure? query returns the current measurement name.

The CONFigure:CATalog? query returns a quoted string of all licensed measurement names in the current mode. For example, "SAN, CHP, OBW, ACP, PST, TXP, SPUR, SEM, LIST".

Fetch Commands:

:FETCh:<measurement>[n]?

This command puts selected data from the most recent measurement into the output buffer. Use FETCh if you have already made a good measurement and you want to return several types of data (different [n] values, for example, both scalars and trace data) from a single measurement. FETCh saves you the time of re-making the measurement. You can only FETCh results from the measurement that is currently active, it will not change to a different measurement. An error message is reported if a measurement other than the current one is specified.

If you need to get new measurement data, use the READ command, which is equivalent to an INITiate followed by a FETCh.

The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used for handling large blocks of data since they are smaller and transfer faster than the ASCII format. (FORMat:DATA)

FETCh may be used to return results other than those specified with the original READ or MEASure command that you sent.

INITiate Commands:

:INITiate:<measurement>

This command is not available for measurements in all the instrument modes:

- Initiates a trigger cycle for the specified measurement, but does not output any data. You must then use the FETCh<meas> command to return data. If a measurement other than the current one is specified, the instrument will switch to that measurement and then initiate it.
 - For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. If you send INIT:ACP? it will change from channel power to ACP and will initiate an ACP measurement.
 - Does not change any of the measurement settings. For example, if you have previously started the ACP measurement and you send INIT:ACP? it will initiate a new ACP measurement using the same instrument settings as the last time ACP was run.
 - If your selected measurement is currently active (in the idle state) it triggers the measurement, assuming the trigger conditions are met. Then it completes one trigger cycle. Depending upon the measurement and the number of averages, there may be multiple data acquisitions, with multiple trigger events, for one full trigger cycle. It also holds off additional commands on GPIB until the acquisition is complete.
-

READ Commands:

:READ:<measurement>[n]?

- Does not preset the measurement to the factory default settings. For example, if you have previously initiated the ACP
-

measurement and you send READ:ACP? it will initiate a new measurement using the same instrument settings.

- Initiates the measurement and puts valid data into the output buffer. If a measurement other than the current one is specified, the instrument will switch to that measurement before it initiates the measurement and returns results.
 - For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. Then you send READ:ACP? It will change from channel power back to ACP and, using the previous ACP settings, will initiate the measurement and return results.
 - Blocks other SCPI communication, waiting until the measurement is complete before returning the results
 - If the optional [n] value is not included, or is set to 1, the scalar measurement results will be returned. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used when handling large blocks of data since they are smaller and faster than the ASCII format. (FORMat:DATA)
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Current Measurement Query (Remote Command Only)

This command returns the name of the measurement that is currently running.

Remote Command	:CONFigure?
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Example	CONF?
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Limit Test Current Results (Remote Command Only)

Queries the status of the current measurement limit testing. It returns a 0 if the measured results pass when compared with the current limits. It returns a 1 if the measured results fail any limit tests.

Remote Command	:CALCulate:CLIMits:FAIL?
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Example	CALC:CLIM:FAIL? queries the current measurement to see if it fails the defined limits. Returns a 0 or 1: 0 it passes, 1 it fails.
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Data Query (Remote Command Only)

Returns the designated measurement data for the currently selected measurement and subopcode.

n = any valid subopcode for the current measurement. See the measurement command results table for your current measurement, for information about what data is returned for the subopcodes.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. (See the format command descriptions under Input/Output in the Analyzer Setup section.)

Remote Command	:CALCulate:DATA[n]?
Notes	The return trace depends on the measurement. In CALCulate:<meas>:DATA[n], n is any valid subopcode for the current measurement. It returns the same data as the FETCH:<measurement>? query where <measurement> is the current measurement.
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Calculate/Compress Trace Data Query (Remote Command Only)

Returns compressed data for the currently selected measurement and sub-opcode [n].

n = any valid sub-opcode for that measurement. See the MEASure:<measurement>? command description of your specific measurement for information on the data that can be returned.

The data is returned in the current Y Axis Unit of the analyzer. The command is used with a sub-opcode <n> (default=1) to specify the trace. With trace queries, it is best if the analyzer is not sweeping during the query. Therefore, it is generally advisable to be in Single Sweep, or Update=Off.

This command is used to compress or decimate a long trace to extract and return only the desired data. A typical example would be to acquire N frames of GSM data and return the mean power of the first burst in each frame. The command can also be used to identify the best curve fit for the data.

Remote Command	:CALCulate:DATA<n>:COMPRESS? BLOCK CFIT MAXimum MINimum MEAN DMEan RMS RMSCubed SAMPLE SDEVIation PPHase [,<soffset> [,<length>[,<roffset>[,<rlimit>]]]]
Example	To query the mean power of a set of GSM bursts: Supply a signal that is a set of GSM bursts. Select the IQ Waveform measurement (in IQ Analyzer Mode). Set the sweep time to acquire at least one burst. Set the triggers such that acquisition happens at a known position relative to a burst. Then query the mean burst levels using, CALC:DATA2:COMP? MEAN, 24e-6, 526e-6 (These parameter values correspond to GSM signals, where 526e-6 is the length of the burst in the slot and you just want 1 burst.)
Notes	The command supports 5 parameters. Note that the last 4 (<soffset>, <length>, <roffset>, <rlimit>) are optional. But these optional parameters must be entered in the specified order. For example, if you want to specify <length>, then you must also specify <soffset>. See details below for a definition of each of these parameters. This command uses the data in the format specified by FORMat:DATA, returning either binary or ASCII data.
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- BLOCK or block data - returns all the data points from the region of the trace data that you specify. For example, it could be used to return the data points of an input signal over several timeslots, excluding the portions of the trace data that you do not want. (This is x,y pairs for trace data and I,Q pairs for complex data.)

- CFIT or curve fit - applies curve fitting routines to the data. <soffset> and <length> are required to define the data that you want. <roffset> is an optional parameter for the desired order of the curve equation. The query will return the following values: the x-offset (in seconds) and the curve coefficients ((order + 1) values).

MIN, MAX, MEAN, DME, RMS, RMSC, SAMP, SDEV and PPH return one data value for each specified region (or <length>) of trace data, for as many regions as possible until you run out of trace data (using <roffset> to specify regions). Or they return the number of regions you specify (using <rlimit>) ignoring any data beyond that.

- MINimum - returns the minimum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the minimum magnitude of the I/Q pairs is returned.
- MAXimum - returns the maximum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the maximum magnitude of the I/Q pairs is returned.
- MEAN - returns a single value that is the arithmetic mean of the data point values (in dB/ dBm) for the specified region(s) of trace data. For I/Q trace data, the mean of the magnitudes of the I/Q pairs is returned. See the following equations.

-

NOTE

If the original trace data is in dB, this function returns the arithmetic mean of those log values, not log of the mean power which is a more useful value. The mean of the log is the better measurement technique when measuring CW signals in the presence of noise. The mean of the power, expressed in dB, is useful in power measurements such as Channel Power. To achieve the mean of the power, use the RMS option.

Equation 1

Mean Value of Data Points for Specified Region(s)

$$\text{MEAN} = \frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 2

Mean Value of I/Q Data Pairs for Specified Region(s)

$$\text{MEAN} = \frac{1}{n} \sum_{X_i \in \text{region}(s)} |X_i|$$

where $|X_i|$ is the magnitude of an I/Q pair, and n is the number of I/Q pairs in the specified region(s).

- DMEan - returns a single value that is the mean power (in dB/ dBm) of the data point values for the specified region(s) of trace data. See the following equation:

Equation 3

DMEan Value of Data Points for Specified Region(s)

$$DME = 10 \times \log_{10} \left(\frac{1}{n} \sum_{X_i \in \text{region}(s)} 10^{\frac{X_i}{10}} \right)$$

- RMS - returns a single value that is the average power on a root-mean-squared voltage scale (arithmetic rms) of the data point values for the specified region(s) of trace data. See the following equation.

NOTE

For I/Q trace data, the rms of the magnitudes of the I/Q pairs is returned. See the following equation. This function is very useful for I/Q trace data. However, if the original trace data is in dB, this function returns the rms of the log values which is not usually needed.

Equation 4

RMS Value of Data Points for Specified Region(s)

$$RMS = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i^2}$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 5

RMS Value of I/Q Data Pairs for Specified Region(s)

$$RMS = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region(s).

Once you have the rms value for a region of trace data (linear or I/Q), you may want to calculate the mean power. You must convert this rms value (peak volts) to power in dBm:

$$10 \times \log[10 \times (\text{rms value})^2]$$

- SAMPlE - returns the first data value (x,y pair) for the specified region(s) of trace data. For I/Q trace data, the first I/Q pair is returned.
- SDEVIation - returns a single value that is the arithmetic standard deviation for the data point values for the specified region(s) of trace data. See the following equation.
- For I/Q trace data, the standard deviation of the magnitudes of the I/Q pairs is returned. See the following equation.

Equation 6

Standard Deviation of Data Point Values for Specified Region(s)

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (X_i - \bar{X})^2}$$

where X_i is a data point value, \bar{X} is the arithmetic mean of the data point values for the specified region (s), and n is the number of data points in the specified region(s).

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (|X_i| - \bar{X})^2}$$

where $|X_i|$ is the magnitude of an I/Q pair, \bar{X} is the mean of the magnitudes for the specified region(s), and n is the number of data points in the specified region(s).

- PPHase - returns the x,y pairs of both rms power (dBm) and arithmetic mean phase (radian) for every specified region and frequency offset (Hz). The number of pairs is defined by the specified number of regions. This parameter can be used for I/Q vector ($n=0$) in Waveform (time domain) measurement and all parameters are specified by data point in PPHase.

The rms power of the specified region may be expressed as:

$$\text{Power} = 10 \times \log [10 \times (\text{RMS I/Q value})] + 10.$$

The RMS I/Q value (peak volts) is:

$$\sqrt{\frac{1}{n} \sum_{X_i \in \text{region}} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region.

The arithmetic mean phase of the specified region may be expressed as:

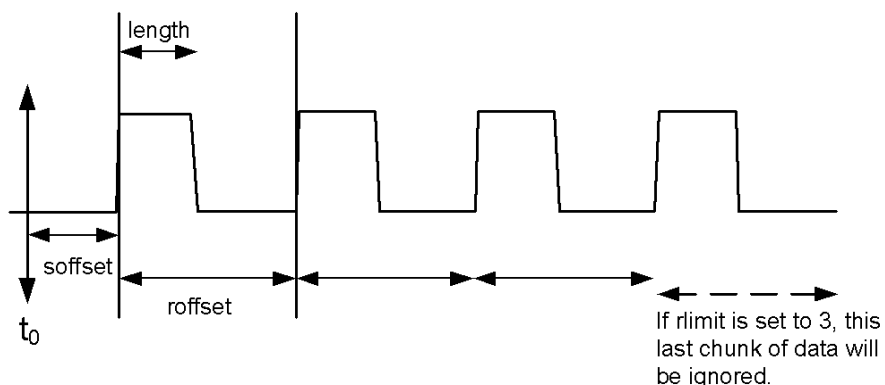
$$\frac{1}{n} \sum_{Y_i \in \text{region}} Y_i$$

where Y_i is the unwrapped phase of I/Q pair with applying frequency correction and n is the number of I/Q pairs in the specified region.

The frequency correction is made by the frequency offset calculated by the arithmetic mean of every specified region's frequency offset. Each frequency offset is calculated by the least square method against the unwrapped phase of I/Q pair.

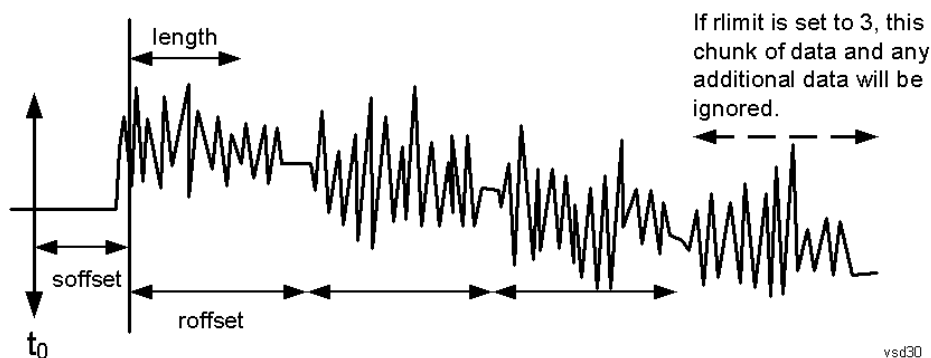
Sample Trace Data - Constant Envelope

(See below for explanation of variables.)



Sample Trace Data - Not Constant Envelope

(See below for explanation of variables.)



<soffset> - start offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It specifies the amount of data at the beginning of the trace that will be ignored before the decimation process starts. It is the time or frequency change from the start of the trace to the point where you want to start using the data. The default value is zero.

<length> - is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines how much data will be compressed into one value. This parameter has a default value equal to the current trace length.

<roffset> - repeat offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines the beginning of the next field of trace elements to be compressed. This is relative to the beginning of the previous field. This parameter has a default value equal to the <length> variable. Note that this parameter is used for a completely different purpose when curve fitting (see CFIT above).

<rlimit> - repeat limit is an optional integer. It specifies the number of data items that you want returned. It will ignore any additional items beyond that number. You can use the Start offset and the Repeat limit to pick out exactly what part of the data you want to use. The default value is all the data.

Calculate Peaks of Trace Data (Remote Command Only)

Returns a list of all the peaks for the currently selected measurement and sub-opcode [n]. The peaks must meet the requirements of the peak threshold and excursion values.

n = any valid sub-opcode for the current measurement. See the MEASure:<measurement> command description of your specific measurement for information on the data that can be returned.

The command can only be used with specific sub-opcodes with measurement results that are trace data. Both real and complex traces can be searched, but complex traces are converted to magnitude in dBm. In many measurements the sub-opcode n=0, is the raw trace data which cannot be searched for peaks. And Sub-opcode n=1, is often calculated results values which also cannot be searched for peaks.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. If the format is set to INT,32, it returns REAL,32 data.

The command has four types of parameters:

- Threshold (in dBm)
- Excursion (in dB)
- Sorting order (amplitude, frequency, time)
- Optional in some measurements: Display line use (all, > display line, < display line)

Remote Command	<p>For Swept SA measurement:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME[,ALL GTDLline LTDLine]]</pre> <p>For most other measurements:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME]</pre>
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Example	<p>Example for Swept SA measurement in Spectrum Analyzer Mode:</p> <p>CALC:DATA4:PEAK? -40, 10, FREQ, GTDL This will identify the peaks of trace 4 that are above -40 dBm, with excursions of at least 10 dB. The peaks are returned in order of increasing frequency, starting with the lowest frequency. Only the peaks that are above the display line are returned.</p> <p>Query Results 1:</p> <p>With FORMat:DATA REAL, 32 selected, it returns a list of floating-point numbers. The first value in the list is the number of peak points that are in the following list. A peak point consists of two values: a peak amplitude followed by its corresponding frequency (or time).</p> <p>If no peaks are found the peak list will consist of only the number of peaks, (0).</p>
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Notes	<p><n> - is the trace that will be used</p> <p><threshold> - is the level below which trace data peaks are ignored. Note that the threshold value is required and is always used as a peak criterion. To effectively disable the threshold criterion for this command, provide a substantially low threshold value such as -200 dBm. Also note that the threshold value used in this command is independent of and has no effect on the threshold value stored under the Peak Criteria menu.</p> <p><excursion> - is the minimum amplitude variation (rise and fall) required for a signal to be identified as peak. Note that the excursion value is required and is always used as a peak criterion. To effectively disable the excursion criterion for this command, provide the minimum value of 0.0 dB. Also note that the excursion value used in this command is independent of and has no effect on the</p>
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excursion value stored under the Peak Criteria menu.

Values must be provided for threshold and excursion. The sorting and display line parameters are optional (defaults are AMPLitude and ALL).

Note that there is always a Y-axis value for the display line, regardless of whether the display line state is on or off. It is the current Y-axis value of the display line which is used by this command to determine whether a peak should be reported

Sorting order:

AMPLitude - lists the peaks in order of descending amplitude, with the highest peak first (default if optional parameter not sent)

FREQuency - lists the peaks in order of occurrence, left to right across the x-axis.

TIME - lists the peaks in order of occurrence, left to right across the x-axis.

Peaks vs. Display Line:

ALL - lists all of the peaks found (default if optional parameter not sent).

GTDLine (greater than display line) - lists all of the peaks found above the display line.

LTDLine (less than display line) - lists all of the peaks found below the display line.

Initial S/W Revision Prior to A.02.00

Format Data: Numeric Data (Remote Command Only)

This command specifies the format of the trace data input and output. It specifies the formats used for trace data during data transfer across any remote port. It affects only the data format for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]?, :CALCulate:DATA[n]? and FETCh:SANalyzer [n]? commands and queries.

Remote Command :FORMat [:TRACe] [:DATA] ASCii|INTEger, 32|REAL, 32 |REAL, 64
:FORMat [:TRACe] [:DATA] ?

Notes The query response is:
ASCii: ASC,8
REAL,32: REAL,32
REAL,64: REAL,64
INTEger,32: INT,32

When the numeric data format is REAL or ASCii, data is output in the current Y Axis unit. When the data format is INTEger, data is output in units of m dBm (.001 dBm).

The INT,32 format returns binary 32-bit integer values in internal units (m dBm), in a definite length block.

Dependencies Sending a data format spec with an invalid number (for example, INT,48) generates no error. The analyzer simply uses the default (8 for ASCii, 32 for INTEger, 32 for REAL).

Sending data to the analyzer which does not conform to the current FORMat specified, results in an error. Sending ASCII data when a definite block is expected generates message -161 "Invalid Block Data" and sending a definite block when ASCII data is expected generates message -121 "Invalid Character in Number".

Preset ASCii

Backwards Compatibility Notes Note that the INT,32 format is only applicable to the command, TRACe:DATA. This preserves backwards compatibility for the Swept SA measurement. For all other commands/queries which honor FORMat:DATA, if INT,32 is sent the analyzer will behave as though it were set to REAL,32.

Initial S/W Revision Prior to A.02.00

The specs for each output type follow:

ASCIi - Amplitude values are in ASCII, in the current Y Axis Unit, one ASCII character per digit, values separated by commas, each value in the form:

SX.YYYYYEsZZ

Where:

S = sign (+ or -)

X = one digit to left of decimal point

Y = 5 digits to right of decimal point

E = E, exponent header

s = sign of exponent (+ or -)

ZZ = two digit exponent

REAL,32 - Binary 32-bit real values in the current Y Axis Unit, in a definite length block.

REAL,64 - Binary 64-bit real values in the current Y Axis Unit, in a definite length block.

Format Data: Byte Order (Remote Command Only)

This command selects the binary data byte order for data transfer and other queries. It controls whether binary data is transferred in normal or swapped mode. This command affects only the byte order for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]? , :CALCulate:DATA[n]? and FETCh:SANalyzer[n]? commands and queries.

By definition any command that says it uses FORMat:DATA uses any format supported by FORMat:DATA.

The NORMal order is a byte sequence that begins with the most significant byte (MSB) first, and ends with the least significant byte (LSB) last in the sequence: 1|2|3|4. SWAPPed order is when the byte sequence begins with the LSB first, and ends with the MSB last in the sequence: 4|3|2|1.

Remote Command	:FORMat:BORDER NORMal SWAPPed :FORMat:BORDER?
Preset	NORMal
Initial S/W Revision	Prior to A.02.00

Meas Setup

Displays the measurement setup menu for the currently selected measurement.

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Avg/Hold Num

Sets the number of bursts that are averaged. After the specified number of bursts (average counts), the averaging mode (termination control) setting determines the averaging action.

Key Path	Meas Setup
Mode	GSM
Remote Command	[:SENSe]:PVTtime:AVERage:COUNT <integer> [:SENSe]:PVTtime:AVERage:COUNT? [:SENSe]:PVTtime:AVERage[:STATe] OFF ON 0 1 [:SENSe]:PVTtime:AVERage[:STATe]?
Example	PVT:AVER:COUN 3 PVT:AVER:COUN? PVT:AVER 1 PVT:AVER?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	10 OFF
State Saved	Saved in instrument state.
Min	1
Max	10000
Initial S/W Revision	Prior to A.02.00

Avg Mode

Selects the type of termination control used for the averaging function. This selection only affects the averaging after the number of N averages is reached (set using the Averages, Avg Bursts, or Avg Number key).

Key	SCPI	Mode
Exponential averaging	EXPOnential	When Measure is set at Cont, data acquisitions continue indefinitely. After N averages, exponential averaging is used with a weighting factor of N (the displayed average count stops at N). Exponential averaging weights new

Key	SCPI	Mode
		data more than old data, which allows tracking of slow-changing signals. The weighting factor N is set using the Averages, Avg Bursts key.
Repeat averaging	REPeat	When Measure is set at Cont, data acquisitions continue indefinitely. After N averages is reached, all previous result data is cleared and the average count is set back to 1. This is equivalent to being in Measure Single and pressing the Restart key when the Single measurement finishes.

Key Path	Meas Setup
Mode	GSM
Remote Command	[:SENSe] :PVTime:AVERage:TCONtrol EXPonential REPeat [:SENSe] :PVTime:AVERage:TCONtrol?
Example	PVT:AVER:TCON REP PVT:AVER:TCON?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	EXPonential
State Saved	Saved in instrument state.
Range	Exp Repeat
Initial S/W Revision	Prior to A.02.00

Avg Type

Selects the averaging type from the following:

Key	SCPI	Type
Pwr Avg (RMS)	RMS	True power averaging that is equivalent to taking the RMS value of the voltage. It is the most accurate type of averaging.
Log-Pwr Avg (Video)	LOG	Simulates the traditional spectrum analyzer type of averaging by averaging the log of the power.
None	MAXimum	Keeps track of the maximum values.
None	MINimum	Keeps track of the minimum values.
None	MXMinimum	Keeps track of the maximum and minimum values.

Key Path	Meas Setup
Mode	GSM
Remote Command	[:SENSe] :PVTime:AVERage:TYPE LOG RMS MAXimum MINimum MXMinimum [:SENSe] :PVTime:AVERage:TYPE?
Example	PVT:AVER:TYPE RMS

	PVT:AVER:TYPE?
Notes	Maximum Minimum Max&Min can be selected only via SCPI. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	Selecting MAXimum MINimum MXMinimum forces to visible "Max Hold Trace" on page 1687 or and "Min Hold Trace" on page 1687. Measure Trace stays in RMS or Video average state.
Preset	Video
State Saved	Saved in instrument state.
Range	Pwr Avg(RMS) Log-Pwr Avg(Video)
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

Meas Time

Allows you to measure more than one timeslot. Enter a value in integer increments of "slots" with a range of 1 to 8. The actual measure time in μ s is set somewhat longer than the specified number of slots, in order to view the complete burst.

Key Path	Meas Setup
Mode	GSM
Remote Command	[:SENSe] :PVTime :SWEep :TIME <integer> [:SENSe] :PVTime :SWEep :TIME?
Example	PVT:SWE:TIME 4 PVT:SWE:TIME?
Notes	The actual sweep time may be slightly larger than required SweepTime due to limited trace point resolution, this is a hardware dependency. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	Scale/Div of X scale of Multi Slot View varies according to this value. Scale/Div should be adjusted to show set meas time.
Preset	1 Slot
State Saved	Saved in instrument state.
Min	1
Max	8
Backwards Compatibility SCPI	[:SENSe] :PVTime :MTime
Initial S/W Revision	Prior to A.02.00

Burst Sync

Pressing the Burst Sync key allows you to choose the source used to synchronize the measurement to the "T0" point of the GSM burst. The "T0" point is defined as the time point of the transition from bit 13 to bit 14

of the midamble training sequence for a given time slot. The Burst Search Threshold setting (in the Mode Setup keys under the Demod menu) applies to both Training Seq and RF Amptd. Pressing the Burst Sync key brings up a menu with some or all of the following choices:

- **Training Seq** (SCPI: TSEquence)
- **RF Amptd** (SCPI: RFBurst)
- **None** (SCPI: NONE)

Key Path	Meas Setup
Mode	GSM
Remote Command	[:SENSe] :PVTime:BSYNc:SOURce TSEquence RFBurst NONE [:SENSe] :PVTime:BSYNc:SOURce?
Example	PVT:BSYN:SOUR NONE PVT:BSYN:SOUR?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	If the selected Burst Sync is "NONE", the key " Timeslot Length " on page 1628 becomes active. Otherwise the key gray-out.
Preset	TSEquence
State Saved	Saved in instrument state.
Range	Training Seq RF Amptd None
Initial S/W Revision	Prior to A.02.00

IF Gain

To take full advantage of the RF dynamic range of the analyzer, a switched IF amplifier with approximately 10 dB of gain is available. When it can be turned on without an overload, the dynamic range is always better with it on than off. The IF Gain key can be used to set the IF Gain function to Auto, or to On (the extra 10 dB) or Off. These settings affect sensitivity and IF overloads.

Key Path	Meas Setup, Advanced,
Initial S/W Revision	Prior to A.02.00

IF Gain Auto

Activates the auto rules for IF Gain

Key Path	Meas Setup, IF Gain
Mode	GSM
Remote Command	[:SENSe] :PVTime:IF:GAIN:AUTO [:STATe] ON OFF 1 0 [:SENSe] :PVTime:IF:GAIN:AUTO [:STATe] ?

Example	PVT:IF:GAIN:AUTO ON PVT:IF:GAIN:AUTO?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	When either the auto attenuation works (for example, with electrical attenuator), or the optimize mechanical attenuator range is requested, the IF Gain setting is changed as following rule. 'auto' sets IF Gain High under any of the following conditions: the input attenuator is set to 0 dB, the preamp is turned on, or the Max Mixer Level is -20 dBm or lower. For other settings, auto sets IF Gain to Low.
Preset	OFF
State Saved	Saved in instrument state.
Range	Auto Man
Initial S/W Revision	Prior to A.02.00

IF Gain State

Selects the range of IF gain.

Key Path	Meas Setup, IF Gain
Mode	GSM
Remote Command	[:SENSe] :PVTime :IF:GAIN [:STATe] ON OFF 1 0 [:SENSe] :PVTime :IF:GAIN [:STATe] ?
Example	PVT:IF:GAIN ON PVT:IF:GAIN?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. where ON = high gain OFF = low gain
Couplings	Couple to "IF Gain Auto" on page 1625 force it to Man.
Preset	OFF
State Saved	Saved in instrument state.
Range	Low Gain (Best for Large Signals) High Gain (Best Noise Level)
Initial S/W Revision	Prior to A.02.00

Limit Test

Turns on or off limit pass/fail testing that does not affect the limit line display.

Key Path	Meas Setup
----------	------------

Mode	GSM
Remote Command	:CALCulate:PVTime:LIMit:TEST[:STATe] OFF ON 0 1 :CALCulate:PVTime:LIMit:TEST[:STATe]?
Example	CALC:PVT:LIM:TEST ON CALC:PVT:LIM:TEST?
Notes	This is not the same as the "Limit Mask" on page 1709 – the measurement results are checked against the PVT Limit parameter to see if they meet the limit requirements if set to On. If set to Off, PASS/FAIL indicator on the Meas Bar goes blank. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Backwards Compatibility SCPI	:PVT:LIM:TEST 0 :PVT:LIM:TEST?
Initial S/W Revision	Prior to A.02.00

Limit Mask

Allows you to set the Limit Mask type to Standard or Custom.

For custom, see also:

- ["Lower Mask Absolute Amplitude Levels"](#) on page 1629
- ["Lower Mask Relative Amplitude Levels"](#) on page 1630
- ["Lower Mask Time Points"](#) on page 1631
- ["Upper Mask Absolute Amplitude Levels"](#) on page 1631
- ["Upper Mask Points"](#) on page 1632
- ["Upper Mask Relative Amplitude Levels"](#) on page 1632
- ["Upper Mask Time Points"](#) on page 1632

Key	SCPI	Operation
Standard	STANdard	The measurement algorithm uses standard-defined limit mask.
Custom	CUSTom	The measurement algorithm uses user-defined custom limit mask.

Key Path	Meas Setup
Mode	GSM
Remote Command	[:SENSe]:PVTime:MASK:SElect STANdard CUSTom [:SENSe]:PVTime:MASK:SElect?

Example	PVT:MASK:SEL STAN PVT:MASK:SEL?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	STANdard
State Saved	Saved in instrument state.
Range	Std Custm
Initial S/W Revision	Prior to A.02.00

Timeslot Length

Allows you to change how the limit mask applies for each slot when in a multi-slot measurement.

Key	SCPI	Operation
All 156.25 symb	EVEN	The measurement algorithm generates limit mask with the same slot length. All slots have 156.25 symbol
157/156 symb	INTEger	The measurement algorithm generates limit mask for slot 0 and 4 with slot length 157 symbol. And, the algorithm generates limit mask for slot 1, 2, 3, 5, 6, 7 with slot length 156 symbol. Slot 0 here is simply the first slot in the captured data, not the absolute slot determined by training sequence number.

Key Path	Meas Setup
Mode	GSM
Remote Command	[:SENSe] :PVTime:BSYNc:SLENgth EVEN INTEger [:SENSe] :PVTime:BSYNc:SLENgth?
Example	PVT:BSYN:SLEN INT PVT:BSYN:SLEN?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This parameter is available only when Burst Sync is None. Otherwise grayed out.
Preset	INTEger
State Saved	Saved in instrument state.
Range	Even Not Even
Initial S/W Revision	Prior to A.02.00

Meas Preset

Restores all the measurement parameters to their default values.

Key Path	Meas Setup
Mode	GSM
Remote Command	:CONFigure:PVTime
Example	CONF:PVT
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Initial S/W Revision	Prior to A.02.00

Custom Limit Mask Remote Only Commands

The following Remote Only commands define the custom limit mask:

- "Lower Mask Absolute Amplitude Levels" on page 1629
- "Lower Mask Points" on page 1630
- "Lower Mask Relative Amplitude Levels" on page 1630
- "Lower Mask Time Points" on page 1631
- "Upper Mask Absolute Amplitude Levels" on page 1631
- "Upper Mask Points" on page 1632
- "Upper Mask Relative Amplitude Levels" on page 1632
- "Upper Mask Time Points" on page 1632
- "Current Data (Backward Compatibility)" on page 1633

Lower Mask Absolute Amplitude Levels

Allows you to enter a power level for any mask line segment that requires an absolute minimum power limit in addition to its relative limit. Each time a measurement is made, the Ref Level is determined. As the power of the Ref Level changes, all of the relative mask power levels change by the same amount.

Each relative limit is then compared to the Ref Level and an equivalent absolute power level is calculated. This power level is compared to the specified absolute limit for each line segment. If this calculated relative limit is lower than the specified absolute limit, then the value of the absolute limit is used for this segment. Therefore, if the absolute reference limit is set to a very low value, the calculated value of the reference limit will never be lower, and the specified relative limit is always used for the segment.

Every time point you define with PVT:MASK:LOW:TIME must have a power value defined in the same order.

Remote Command	[:SENSe] :PVTime:MASK:LIST:LOWer:ABSolute <real>, ... [:SENSe] :PVTime:MASK:LIST:LOWer:ABSolute?
Example	PVT:MASK:LIST:LOW:ABS 0,-10,-60 PVT:MASK:LIST:LOW:ABS?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.

Couplings	Relative Amplitude Levels are also changed when this value has been set.
Preset	-200,-200
State Saved	Saved in instrument state.
Min	-200 dBm
Max	100 dBm
Initial S/W Revision	Prior to A.02.00

Lower Mask Points

Queries the number of elements in the lower mask. This value is determined by the number of time points entered by :PVT:MASK:LIST:LOW:TIME.

Remote Command	[:SENSe] :PVTime:MASK:LIST:LOWer:POINTs?
Example	PVT:MASK:LIST:LOW:POIN?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. Query only.
Initial S/W Revision	Prior to A.02.00

Lower Mask Relative Amplitude Levels

Allows you to enter the relative power level for each horizontal line segment in the lower limit mask. There should be a power level for each time point entered using [:SENSe]:PVTime:MASK:LIST:LOWer:TIME, and they must be entered in the same order. These power levels are all relative to the defined Reference Power Level (the average power in the useful part of the data). When an upper and lower limit mask have been defined, the Reference Power Level is the mid-point between these two limits at time T0.

Any portion of the signal that has no limit line segment defined for it defaults to a very low limit (-100dB relative to the reference power). This prevents the measurement from indicating a failure for that portion of the data.

Remote Command	[:SENSe] :PVTime:MASK:LIST:LOWer:RELative <rel_ampl>, ... [:SENSe] :PVTime:MASK:LIST:LOWer:RELative?
Example	PVT:MASK:LIST:LOW:REL -200,-200 PVT:MASK:LIST:LOW:REL?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	Absolute Amplitude Levels are also changed when this value has been set.
Preset	-200,-200
State Saved	Saved in instrument state.
Min	-200
Max	200
Initial S/W Revision	Prior to A.02.00

Lower Mask Time Points

Allows you to enter the time points that define the horizontal line segments for the lower limit. A reference point designated “t0” is at the center of the useful data (usually the center of the burst). Each line segment to the right of the t0 reference point is designated as a positive time value, and each segment to the left of t0 reference point is a negative time value.

First enter positive values in sequence starting from t0, then negative values in sequence starting from t0.

Remote Command	<code>[:SENSe] :PVTime:MASK:LIST:LOWer:TIME <seconds>, ...</code> <code>[:SENSe] :PVTime:MASK:LIST:LOWer:TIME?</code>
Example	<code>PVT:MASK:LIST:LOW:TIME 1, 1</code> <code>PVT:MASK:LIST:LOW:TIME?</code>
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Preset	1,-1
State Saved	Saved in instrument state.
Min	-1 s
Max	1 s
Initial S/W Revision	Prior to A.02.00

Upper Mask Absolute Amplitude Levels

Allows you to enter a power level for any mask line segment that requires an absolute minimum power limit in addition to its relative limit. Each time a measurement is made, the Ref Level is determined (This is the power level of the useful part of the burst, or midway between the upper/lower masks). Remember, as the power of the Ref Level changes, all of the relative mask power levels change by the same amount.

Each relative limit is then compared to the Ref Level and an equivalent absolute power level is calculated. This power level is compared to the specified absolute limit for each line segment. If this calculated relative limit is higher than the specified absolute limit, then the value of the absolute limit is used for this segment. Therefore, if the absolute reference limit is set to a very low value (-200 dBm), the calculated value of the reference limit will never be lower, and the specified relative limit is always used for the segment.

Every time point you define with PVT:MASK:UPP:TIME must have a power value defined in the same order.

Remote Command	<code>[:SENSe] :PVTime:MASK:LIST:UPPer:ABSolute <real>, ...</code> <code>[:SENSe] :PVTime:MASK:LIST:UPPer:ABSolute?</code>
Example	<code>PVT:MASK:LIST:UPP:ABS -200, -200, -58, -200, -200, -200, -200, -58, -200</code> <code>PVT:MASK:LIST:UPP:ABS?</code>
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Couplings	Relative Amplitude Levels are also changed when this value has been set.
Preset	-200,-200
State Saved	Saved in instrument state.

Min	-200 dBm
Max	100 dBm
Initial S/W Revision	Prior to A.02.00

Upper Mask Points

Queries the number of elements in the upper mask. This value is determined by the number of time points entered by :PVT:MASK:LIST:UPP:TIME.

Remote Command	[:SENSe] :PVTime:MASK:LIST:UPPer:POINTs?
Example	PVT:MASK:LIST:UPP:POIN?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. Query only.
Initial S/W Revision	Prior to A.02.00

Upper Mask Relative Amplitude Levels

Allows you to enter the relative power level for each horizontal line segment in the upper limit mask. There should be a power level for each time point entered using [:SENSe]:PVTime:MASK:LIST:UPPer:TIME, and they must be entered in the same order. These power levels are all relative to the defined Reference Power Level (the average power in the useful part of the data). When an upper and lower limit mask have been defined, the Reference Power Level is the mid-point between these two limits.

Remote Command	[:SENSe] :PVTime:MASK:LIST:UPPer:RELative <rel_ampl>, ... [:SENSe] :PVTime:MASK:LIST:UPPer:RELative?
Example	PVT:MASK:LIST:UPP:REL 4, -32, -48, 100, 4, 7, -25, -43, 100 PVT:MASK:LIST:UPP:REL?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	Absolute Amplitude Levels are also changed when this value has been set.
Preset	100,100
State Saved	Saved in instrument state.
Min	-200 dB
Max	200 dB
Initial S/W Revision	Prior to A.02.00

Upper Mask Time Points

Allows you to enter the time points that define the horizontal line segments for the upper limit. A reference point designated "t0" is at the center of the useful data (usually the center of the burst). Each line segment

to the right of the t0 reference point is designated as a positive time value and each segment to the left of t0 is a negative time value.

First enter positive values in sequence starting from t0, then the negative values in sequence starting from t0.

We recommend that you select a large time value for your first and last mask points (e.g. -1 and +1 second). This guarantees that you've defined a limit for all the measured data.

Remote Command	<code>[:SENSe] :PVTime:MASK:LIST:UPPer:TIME <seconds>, ...</code> <code>[:SENSe] :PVTime:MASK:LIST:UPPer:TIME?</code>
Example	<code>PVT:MASK:LIST:UPP:TIME 1,-1</code> <code>PVT:MASK:LIST:UPP:TIME?</code>
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	1,-1
State Saved	Saved in instrument state.
Min	-1 s
Max	1 s
Initial S/W Revision	Prior to A.02.00

Current Data (Backward Compatibility)

This setting is used to toggle the current data calculation and display between on and off.

Mode	GSM
Remote Command	<code>[:SENSe] :PVTime:CDATa ON OFF 1 0</code> <code>[:SENSe] :PVTime:CDATa?</code>
Example	<code>PVT:CDAT OFF</code> <code>PVT:CDAT?</code>
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

14 GMSK Power vs. Time Measurement
Mode

Mode

See "[Mode](#)" on page 274

Mode Preset

Returns the active mode to a known state.

Mode Preset does the following for the currently active mode:

- Aborts the currently running measurement.
- Brings up the default menu for the mode, with no active function.
- Sets measurement Global settings to their preset values for the active mode only.
- Activates the default measurement.
- Brings up the default menu for the mode.
- Clears the input and output buffers.
- Sets Status Byte to 0.

Mode Preset does not:

- Cause a mode switch
- Affect mode persistent settings
- Affect system settings

See "[How-To Preset](#)" on page 1636 for more information.

Key Path	Front-panel key
Remote Command	:SYSTem:PRESet
Example	:SYST:PRES
Notes	*RST is preferred over :SYST:PRES for remote operation. *RST does a Mode Preset, as done by the :SYST:PRES command, and it sets the measurement mode to Single measurement rather than Continuous for optimal remote control throughput. Clears all pending OPC bits. The Status Byte is set to 0.
Couplings	A Mode Preset aborts the currently running measurement, activates the default measurement, and gets the mode to a consistent state with all of the default couplings set.
Backwards Compatibility Notes	In the X-Series, the legacy "Factory Preset" has been replaced with Mode Preset, which only presets the currently active mode, not the entire instrument. In the X-Series, the way to preset the entire instrument is by using System, Restore System Defaults All, which behaves essentially the same way as restore System Defaults does on ESA and PSA. There is also no "Preset Type" as there is on the PSA. There is a green Mode Preset front-panel key that does a Mode Preset and a white-with-green-letters User Preset front-panel key that does a User Preset. The old PRESet:TYPE command is ignored (without generating an error), and SYST:PRES without a parameter does a Mode Preset, which should cover most backward code compatibility issues. The settings and correction data under the Input/Output front-panel key (examples: Input Z Corr, Ext Amp Gain, etc.) are no longer part of any Mode, so they will not be preset by a Mode Preset. They are preset using Restore Input/Output Defaults, Restore System Defaults All. Note that because User Preset does a Recall State, and all of these settings are saved in State, they ARE recalled when using

	User Preset.
Initial S/W Revision	Prior to A.02.00

How-To Preset

The table below shows all possible presets, their corresponding SCPI commands and front-panel access (key paths). Instrument settings depend on the current measurement context. Some settings are local to the current measurement, some are global (common) across all the measurements in the current mode, and some are global to all the available modes. In a similar way, restoring the settings to their preset state can be done within the different contexts.

Auto Couple - is a measurement local key. It sets all Auto/Man parameter couplings in the measurement to Auto. Any Auto/Man selection that is local to other measurements in the mode will not be affected.

Meas Preset - is a measurement local key. Meas Preset resets all the variables local to the current measurement except the persistent ones.

Mode Preset - resets all the current mode's measurement local and measurement global variables except the persistent ones.

Restore Mode Defaults - resets ALL the Mode variables (and all the Meas global and Meas local variables), including the persistent ones.

Type Of Preset	SCPI Command	Front Panel Access
Auto Couple	:COUPle ALL	Auto Couple front-panel key
Meas Preset	:CONFigure:<Measurement>	Meas Setup Menu
Mode Preset	:SYSTem:PRESet	Mode Preset (green key)
Restore Mode Defaults	:INSTrument:DEFault	Mode Setup Menu
Restore All Mode Defaults	:SYSTem:DEFault MODes	System Menu; Restore System Default Menu
*RST	*RST	not possible (Mode Preset with Single)
Restore Input/Output Defaults	:SYSTem:DEFault INPUt	System Menu; Restore System Default Menu
Restore Power On Defaults	:SYSTem:DEFault PON	System Menu; Restore System Default Menu
Restore Alignment Defaults	:SYSTem:DEFault ALIGN	System Menu; Restore System Default Menu
Restore Miscellaneous Defaults	:SYSTem:DEFault MISC	System Menu; Restore System Default Menu
Restore All System Defaults	:SYSTem:DEFault [ALL] :SYSTem:PRESet:PERsistent	System Menu; Restore System Default Menu
User Preset	:SYSTem:PRESet:USER	User Preset Menu
User Preset All Modes	:SYSTem:PRESet:USER:ALL	User Preset Menu

Power On Mode Preset	:SYSTEM:PON:TYPE MODE	System Menu
Power On User Preset	:SYSTEM:PON:TYPE USER	System Menu
Power On Last State	:SYSTEM:PON:TYPE LAST	System Menu

Mode Setup

See "[Mode Setup](#)" on page 294

Peak Search

Places the selected marker on the trace point with the maximum y-axis value for that marker's trace. Pressing Peak Search with the selected marker off causes the selected marker to be set to Normal, then a peak search is immediately performed.

Key Path	Front-panel key
Mode	GSM
Remote Command	:CALCulate:PVTime:MARKer[1] 2 ...12:MAXimum
Example	CALC:TXP:MARK2:MAX
Initial S/W Revision	Prior to A.02.00

Min Peak Search (Backwards Compatibility/Remote Command Only)

Mode	GSM
Remote Command	:CALCulate:PVTime:MARKer[1] 2 ...12:MINimum
Example	CALC:PVT:MARK:MIN
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Initial S/W Revision	Prior to A.02.00

14 GMSK Power vs. Time Measurement
Print

Print

See ["Print" on page 325](#)

Quick Save

The Quick Save front-panel key repeats the most recent save that was performed from the Save menu, with the following exceptions:

- Register saves are not remembered as Saves for the purpose of the Quick Save function
- If the current measurement does not support the last non-register save that was performed, an informational message is generated, “File type not supported for this measurement”

Quick Save repeats the last type of qualified save (that is, a save qualified by the above criteria) in the last save directory by creating a unique filename using the Auto File Naming algorithm described below.

If Quick Save is pressed after startup and before any qualified Save has been performed, the Quick Save function performs a Screen Image save using the current settings for Screen Image saves (current theme, current directory), which then becomes the “last save” for the purpose of subsequent Quick Saves.

The Auto File Naming feature automatically generates a file name for use when saving a file. The filename consists of a prefix and suffix separated by a dot, as is standard for the Windows® file system. A default prefix exists for each of the available file types:

Type	Default Prefix	Menu
State	State_	(Save/Recall)
Trace + State	State_	(Save/Recall)
Screen	Screen_	(Save/Recall)
Amplitude Corrections	Ampcor_	(Import/Export)
Traces	Trace_	(Import/Export)
Limit Lines	LLine_	(Import/Export)
Measurement Result	MeasR_	(Import/Export)
Capture Buffer	CapBuf_	(Import/Export)

A four digit number is appended to the prefix to create a unique file name. The numbering sequence starts at 0000 within each Mode for each file type and updates incrementally to 9999, then wraps to 0000 again. It remembers where it was through a Mode Preset and when leaving and returning to the Mode. It is reset by Restore Misc Defaults and Restore System Defaults and subsequent running of the instrument application. So, for example, the first auto file name generated for State files is State_0000.state. The next is State_0001, and so forth.

One of the key features of Auto File Name is that we guarantee that the Auto File Name will never conflict with an existing file. The algorithm looks for the next available number. If it gets to 9999, then it looks for holes. If it find no holes, that is no more numbers are available, it gives an error.

For example, if when we get to State_0010.state there is already a State_0010.state file in the current directory, it advances the counter to State_0011.state to ensure that no conflict will exist (and then it verifies that State_0011.state also does not exist in the current directory and advances again if it does, and so forth).

If you enter a file name for a given file type, then the prefix becomes the filename you entered instead of the default prefix, followed by an underscore. The last four letters (the suffix) are the 4-digit number.

For example, if you save a measurement results file as “fred.csv”, then the next auto file name chosen for a measurement results save will be fred_0000.csv.

NOTE

Although 0000 is used in the example above, the number that is used is actually the current number in the Meas Results sequence, that is, the number that would have been used if you had not entered your own file name.

NOTE

If the filename you entered ends with _dddd, where d=any number, making it look just like an auto file name, then the next auto file name picks up where you left off with the suffix being dddd + 1.

Key Path	Front-panel key
Notes	No remote command for this key specifically.
Initial S/W Revision	Prior to A.02.00

Recall

The Recall menu lets you choose what you want to recall, and where you want to recall it from. Among the types of files you can recall are **States and Traces**. In addition, an Import (Data) option lets you recall a number of data types stored in CSV files (as used by Excel and other spreadsheet programs).

The default paths for Recall are data type dependent and are the same as for the Save key.

Key Path	Front-panel key
Notes	<p>No remote command for this key specifically, but the :MMEM:LOAD command is available for specific file types. An example is :MMEM:LOAD:STATe <filename>.</p> <p>If you try to recall a State file for a mode that is not licensed or not available in the instrument, an error message will occur and the state will not change.</p>
Backwards Compatibility Notes	<p>In legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly (since User Preset is actually loading a state), it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, “state” always includes all of this data; so whenever state is loaded, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p>
Backwards Compatibility Notes	<p>Recall for the X-Series supports backward compatibility in the sense that you can recall a state file from any X-Series model number and any version of X-Series software. This is only possible if part of the recalling process goes through a limiting step after recalling the mode settings, at least for settings that may vary with version number, model number, option and license differences. If you try to recall a state file onto an instrument with less capability than what was available on the instrument during the save, the recall will ignore the state it doesn't support and it will limit the recalled setting to what it allows.</p> <p>Example: if the saved state includes preamp ON, but the recalling instrument does not have a preamp; the preamp is limited to OFF. Conversely, if you save a state without a preamp, the preamp is OFF in the state file. When this saved file is recalled on an instrument with a licensed preamp, the preamp is changed to OFF. Another example is if the saved state has center frequency set to 20 GHz, but the instrument recalling the saved state is a different model and only supports 13.5 GHz. In this case, the center frequency is limited along with any other frequency based settings. Since the center frequency can't be preserved in this case, the recall limiting tries to at least preserve span to keep the measurement setup as intact as possible.</p> <p>It may be appropriate to issue a warning if the state is limited on the recall; warnings do not go out to SCPI so this would only affect the manual user.</p> <p>Note that there is no state file compatibility outside of the X-Series. For example, you cannot recall a state file from ESA or PSA.</p>
Initial S/W Revision	Prior to A.02.00

State

The Recall State menu lets you choose a register or file from which to recall the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings that were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the

additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, GPIB address) are not affected by either a Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

Since each state file is only for one Mode, the settings for other Modes are unaffected when it is loaded. Recall State will cause a mode switch if the state being recalled is not from the current active mode.

After the recall completes, the message "File <filename> recalled" or "Recalled State Register <register number>" is displayed.

For rapid recalls, the State menu lists 16 registers that you can choose from to recall. Pressing a Register key initiates the recall. You can also select a file from which to recall.

The default path for all State Files is:

My Documents\<<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

See ["More Information" on page 1645](#).

Key Path	Recall
Mode	All
Remote Command	:MMEMory:LOAD:STATe <filename>
Example	:MMEM:LOAD:STAT "myState.state" This recalls the file myState.state on the default path
Example	MMEM:LOAD:STAT "MyStateFile.state" This loads the state file data (on the default file directory path) into the instrument state.
Notes	<p>When you pick a file to recall, the analyzer first verifies that the file is recallable in the current instrument by checking the software version and model number of the instrument. If everything matches, a full recall proceeds by aborting the currently running measurement, clearing any pending operations, and then loading the State from the saved state file. You can open state files from any mode, so recalling a State file switches to the mode that was active when the save occurred. After switching to the mode of the saved state file, mode settings and data (if any for the mode) are loaded with values from the saved file. The saved measurement of the mode becomes the newly active measurement and the data relevant to the measurement (if there is any) is recalled.</p> <p>If there is a mismatch between file version or model number or instrument version or model number, the recall function tries to recall as much as possible and returns a warning message. It may limit settings that differ based on model number, licensing or version number.</p> <p>After recalling the state, the Recall State function does the following:</p> <ul style="list-style-type: none"> • Makes the saved measurement for the mode the active measurement. • Clears the input and output buffers. • Status Byte is set to 0. • Executes a *CLS <p>If the file specified is empty an error is generated. If the specified file does not exist, another error is generated. If there is a mismatch between the file and the proper file type, an error is generated. If</p>

	there is a mismatch between file version or model number or instrument version or model number, a warning is displayed. Then it returns to the State menu and File Open dialog goes away. After the Recall, the analyzer exits the Recall menu and returns to the previous menu.
Backwards Compatibility SCPI	:MMEMory:LOAD:STATe 1,<filename> For backwards compatibility, the above syntax is supported. The "1" is simply ignored.
Initial S/W Revision	Prior to A.02.00

More Information

In measurements that support saving Traces, for example, Swept SA, the Trace data is saved along with the State in the State file. When recalling the State, the Trace data is recalled as well. Traces are recalled exactly as they were stored, including the writing mode and update and display modes. If a Trace was updating and visible when the State was saved, it will come back updating and visible, and its data will be rewritten right away. When you use State to save and recall traces, any trace whose data must be preserved should be placed in View or Blank mode before saving.

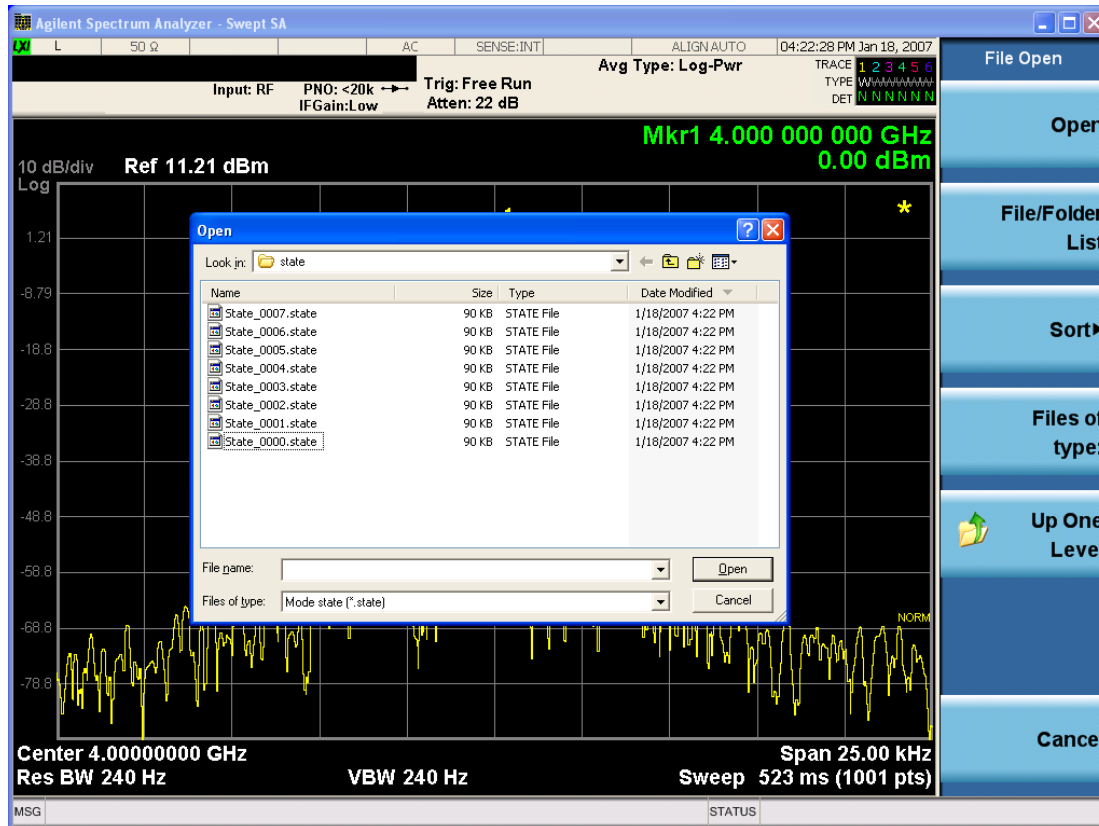
The following table describes the Trace Save and Recall possibilities:

You want to recall state and one trace's data, leaving other traces unaffected.	Save Trace+State from 1 trace. Make sure that no other traces are updating (they should all be in View or Blank mode) when the save is performed.	On Recall, specify the trace you want to load the one trace's data into. This trace will load in View. All other traces' data will be unaffected, although their trace mode will be as it was when the state save was performed.
You want to recall all traces	Save Trace+State from ALL traces.	On Recall, all traces will come back in View (or Blank if they were in Blank or Background when saved)
You want all traces to load exactly as they were when saved.	Save State	On recall, all traces' mode and data will be exactly as they were when saved. Any traces that were updating will have their data immediately overwritten.

From File...

When you press "From File", the analyzer brings up a Windows dialog and a menu entitled "File Open." This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

14 GSM Power vs. Time Measurement Recall



Listed below are the functions of the various fields in the dialog, and the corresponding softkeys:

Open

Performs the recall of the specified file. While the recall is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Look In.

Look In

The Look In field shows the path from which the file will be recalled and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Look In field** first uses the last path from the Save As dialog **Save In:** path for that same file type. There is no softkey for directly navigating to the Look In field, but you can use the left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

Sort

Accesses a menu that enables you to sort the files within the File Open dialog. Only one sorting type can be selected at a time and the sorting happens immediately. The sorting types are By Date, By Name, By extension, and By Size.

Files of Type

This field shows the file suffix for the type of file you have selected to recall. For example, if you navigated here while recalling State, "Mode state (*.state)" is in the field. If you navigated here while recalling Trace, ""Mode state (*.trace)" is in the field. If you navigated here while importing a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown menu, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Open** request to be cancelled. The ESC key does the same thing.

Key Path	Recall, State
Notes	Brings up the Open dialog for recalling a State Save Type
Initial S/W Revision	Prior to A.02.00

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

For more information and the SCPI command, see Edit Register Names under the Save, State function.

Key Path	Recall, State
Mode	All
Dependencies	N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending the SCPI command generates an error, -221, "Settings conflict;Option not available"
Initial S/W Revision	A.11.00

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last

modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

Key Path	Recall, State
Example	*RCL 1
Range	1–16 from front panel, 1–128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State, Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	Prior to A.11.00

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

Key Path	Recall, State
Example	*RCL 1
Range	1-16 from front panel, 1-128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State,Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	Prior to A.11.00

Restart

The Restart function restarts the current sweep, or measurement, or set of averaged/held sweeps or measurements. If you are Paused, pressing Restart does a Resume.

The Restart function is accessed in several ways:

- Pressing the Restart key
- Sending the remote command INIT:IMMEDIATE
- Sending the remote command INIT:RESTART

See "[More Information](#)" on page 1650

Key Path	Front-panel key
Remote Command	:INITiate[:IMMEDIATE] :INITiate:RESTART
Example	:INIT:IMM :INIT:REST
Notes	:INITiate:RESTART and :INITiate:IMMEDIATE perform exactly the same function.
Couplings	Resets average/hold count k. For the first sweep overwrites all active (update=on) traces with new current data. For application modes, it resets other parameters as required by the measurement.
Status Bits/OPC dependencies	This is an Overlapped command. The STATUS:OPERATION register bits 0 through 8 are cleared. The STATUS:QUESTIONABLE register bit 9 (INTEGRITY sum) is cleared. The SWEEPING bit is set. The MEASURING bit is set.
Backwards Compatibility Notes	For Spectrum Analysis mode in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart trace averages (displayed average count reset to 1) for a trace in Clear Write, but did not restart Max Hold and Min Hold. In the X-Series, the Restart hardkey and the INITiate:RESTART command restart not only Trace Average, but MaxHold and MinHold traces as well. For wireless comms modes in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart every measurement, which includes all traces and numeric results. There is no change to this operation.
Initial S/W Revision	Prior to A.02.00

More Information

The **Restart** function first aborts the current sweep/measurement as quickly as possible. It then resets the sweep and trigger systems, sets up the measurement and initiates a new data measurement sequence with a new data acquisition (sweep) taken once the trigger condition is met.

If the analyzer is in the process of aligning when **Restart** is executed, the alignment finishes before the restart function is performed.

Even when set for Single operation, multiple sweeps may be taken when Restart is pressed (for example, when averaging/holding is on). Thus when we say that **Restart** "restarts a measurement," we may mean:

- It restarts the current sweep
- It restarts the current measurement
- It restarts the current set of sweeps if any trace is in Trace Average, Max Hold or Min Hold
- It restarts the current set of measurements if Averaging, or Max Hold, or Min Hold is on for the measurement
- depending on the current settings.

With **Average/Hold Number** (in **Meas Setup** menu) set to 1, or Averaging off, or no trace in Trace Average or Hold, a single sweep is equivalent to a single measurement. A single sweep is taken after the trigger condition is met; and the analyzer stops sweeping once that sweep has completed. However, with **Average/Hold Number** >1 and at least one trace set to **Trace Average, Max Hold, or Min Hold (SA Measurement)** or **Averaging on (most other measurements)**, multiple sweeps/data acquisitions are taken for a single measurement. The trigger condition must be met prior to each sweep. The sweep is stopped when the average count k equals the number N set for **Average/Hold Number**. A measurement average usually applies to all traces, marker results, and numeric results; but sometimes it only applies to the numeric results.

Once the full set of sweeps has been taken, the analyzer will go to idle state. To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command `CALC:AVER:TCON UP`.

Save

The Save menu lets you choose what you want to save and where you want to save it. Among the types of files you can save are **States**, **Traces**, and **Screen Images**. In addition, an Export (Data) option lets you save a number of data types as CSV files for easy import into Excel and other spreadsheet programs.

Key Path	Front-panel key
Mode	All
Notes	No remote command for this key specifically, but the :MMEM:STORe command is available for specific file types. An example is :MMEM:STOR:STATe <filename>.
Initial S/W Revision	Prior to A.02.00

State

The Save State menu lets you choose a register or file for saving the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings which were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, Verbose SCPI) are not affected by either Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

After the save completes, the message "File <filename> saved" or "State Register <register number> saved" is displayed.

For rapid saving, the State menu lists 16 registers to save to. Pressing a Register key initiates the save. You can also select a file to save to.

The default path for all State Files is:

My Documents\<<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

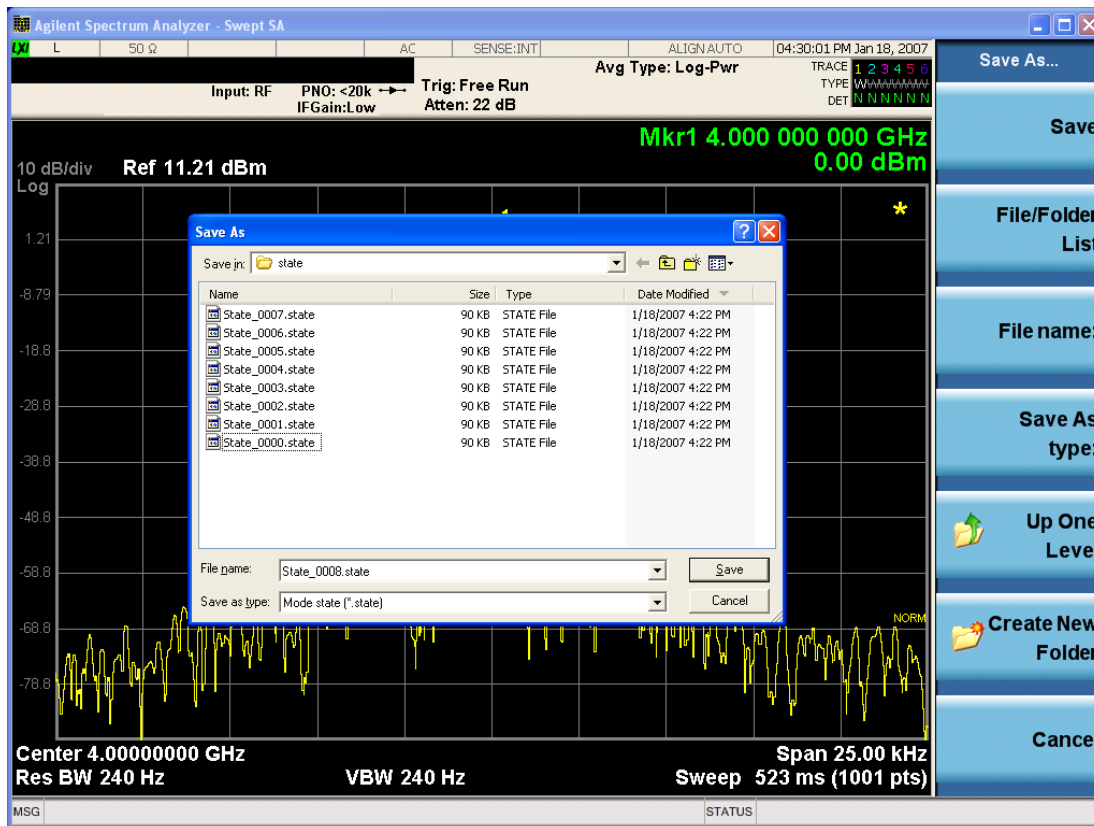
Key Path	Save
Mode	All
Remote Command	:MMEMory:STORe:STATe <filename>
Example	MMEM:STOR:STATe "MyStateFile.state" This stores the current instrument state data in the file MyStateFile.state in the default directory.
Notes	Both single and double quotes are supported for any filename parameter over remote. After saving to a register, that register's menu key is updated with the date the time, unless a custom label has been entered for that key. After saving to a register, you remain in the Save State menu, so that you can see the Register key

update. After saving to a file, the analyzer automatically returns to the previous menu and any Save As dialog goes away.

Backwards Compatibility SCPI	:MMEMoRY:STORe:STATe 1,<filename>
Initial S/W Revision	Prior to A.02.00

To File . . .

When you press “To File”, the analyzer brings up a Windows dialog and a menu entitled “**Save As.**” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



The Listed below

are the functions of the various fields in the dialog, and the corresponding softkeys:

Save

Performs the save to the specified file of the selected type. If the file already exists, a dialog will appear that allows you to replace the existing file by selecting OK, or you can Cancel the request. If you select OK, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade.

While the save is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Save In.

Save In

The Save In field shows the path to which the file will be saved and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Save In field** defaults to the default path for this type of file and remembers the last path you used to save this type of file. There is no softkey for directly navigating to the Save In field but you can use left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

File Name

The File Name field is initially loaded with an automatically generated filename specific to the appropriate Save Type. The automatically generated filename is guaranteed not to conflict with any filename currently in the directory. You may replace or modify this filename using the File Name key. See the ["Quick Save " on page 2328](#) documentation for more on the automatic file naming algorithm.

When you press the File Name key the analyzer displays the Alpha Editor. Use the knob to choose the letter to add and the front-panel Enter key to add the letter to the file name. The BK character moves you back and the FW character moves you forward in the filename. The Select key on the front panel generates a space character. When you are done entering the filename press the Done softkey. This returns back to the **File Open** dialog and menu, but does not cause the save to occur.

Save As Type

This field shows the file suffix for the type of file you have selected to save. For example, if you navigated here while saving State, "Mode state (*.state)" is in the field. If you navigated here from saving Trace, ""Mode state (*.trace)" is in the field. If you navigated here while exporting a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Create New Folder

This key corresponds to the icon of a folder with the "*" that is in the tool bar of the dialog. When pressed, a new folder is created in the current directory with the name **New Folder** and you can enter a new folder name using the Alpha Editor.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Save As** request to be cancelled. The ESC key does the same thing.

Key Path	Save, State
Mode	All
Notes	Brings up Save As dialog for saving a State Save Type
Initial S/W Revision	Prior to A.02.00

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

See ["More Information" on page 1655](#)

Key Path	Save, State
Mode	All
Remote Command	:MMEMory:REGister:STATe:LABel <reg number>,"label" :MMEMory:REGister:STATe:LABel? <reg number>
Example	:MMEM:REG:STAT:LAB 1,"my label"
Notes	<reg number> is an integer from 1 to 16. If the SCPI specifies an invalid register number an error message is generated, -222,"Data out of range;Invalid register label number" "label" is a string from 0 to 30 characters in length. If a label exceeds 30 characters, an error message is generated, -150,"String data error;Label clipped to 30 characters" "label" of length 0 erases the custom label and restores the default (time and date) label. E.g.: :MMEM:REG:STAT:LAB 1,""
Dependencies	N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending this command generates an error, -221,"Settings conflict;Option not available"
Preset	The names are unaffected by Preset or power cycle but are set to the default label (time and date) on a "Restore System Defaults->Misc"
Initial S/W Revision	A.11.00

More Information

When you edit one of the register names, the time and date field will be replaced by the custom name.

If you delete all the characters in the custom name, it restores the default (time and date).

The register names are stored within the state files, but they are not part of the instrument state; that is, once you have edited a register name, loading a new state will not change that register name. Another consequence of this is that the names will be persistent through a power cycle. Also, if a named state file is transferred to another analyzer, it will bring its custom name along with it.

If you try to edit the name of an empty register, the analyzer will first save the state to have a file to put the name in. If you load a named state file into an analyzer with older firmware it will ignore the metadata.

The *SAV and *RCL commands will not be affected by the custom register names, nor will the MMEM commands.

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

Key Path	Save, State
Mode	All
Example	*SAV 1
Range	1–16 from front panel, 1–128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.11.00

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

Key Path	Save, State
Mode	All
Example	*SAV 1
Range	1-16 from front panel, 1-128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR "(empty)" if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.11.00

Data (Export)

Exporting a data file stores data from the current measurement to mass storage files. The Export Menu only contains data types that are supported by the current measurement.

Since the commonly exported data files are in .csv format, the data can be edited by you prior to importing. This allows you to export a data file, manipulate the data in Excel (the most common PC Application for manipulating .csv files) and then import it.

Selecting an Export Data menu key will not actually cause the exporting to occur, since the analyzer still needs to know where you wish to save the data. Pressing the Save As key in this menu brings up the Save As dialog and Save As menu that allows you to specify the destination file and directory. Once a filename has been selected or entered in the Open menu, the export will occur as soon as the Save key is pressed.

Key Path	Save
Mode	All
Notes	The menu is built from whatever data types are available for the mode. So the key locations in the sub menu will vary. No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:STORe commands.
Dependencies	If a file type is not used by a certain measurement, that type is grayed out for that measurement. The key for a file type will not show at all if there are no measurements in the Mode that support it.
Preset	Is not affected by a Preset or shutdown, but is reset during Restore Mode Defaults
Readback	The data type that is currently selected
Initial S/W Revision	Prior to A.02.00

Measurement Results

Pressing this key selects Meas Results as the data type to be exported. Pressing the key a second time brings up the Meas Results menu, which allows you to select which **Meas Result** to save. In the Swept SA measurement, there are three types of Measurement Results files: Peak Table, Marker Table and Spectrogram.

See "[Meas Results File Contents](#)" on page 1658.

See "[Marker Table](#)" on page 1658.

See "[Peak Table](#)" on page 1661.

See "[Spectrogram](#)" on page 1664

Remote Command	:MMEMory:STORe:RESults:MTABle PTABle SPEctrogram <filename>
Example	:MMEM:STOR:RES:MTAB "myResults.csv" Saves the results from the current marker table to the file myResults.csv in the current path. :MMEM:STOR:RES:PTAB "myResults.csv" Saves the results from the current peak table to the file myResults.csv in the current path. :MMEM:STOR:RES:SPEC "myResults.csv" Saves the results from the current Spectrogram display to the file myResults.csv in the current path. The default path is My Documents\SA\data\SAN\results
Notes	If the save is initiated via SCPI, and the file already exists, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade. Both single and double quotes are supported for any filename parameter over SCPI.
Dependencies	If a save of Marker Table results is requested and the Marker Table is not on, no file is saved and a message is generated If a save of Peak Table results is requested and the Peak Table is not on, no file is saved and a message is generated If a save of Spectrogram results is requested and the Spectrogram is not on, no file is saved and a message is generated. The Spectrogram choice only appears if option EDP is licensed.
Preset	Not part of Preset, but is reset to Peak Table by Restore Mode Defaults. Survives a shutdown.
Initial S/W Revision	Prior to A.02.00

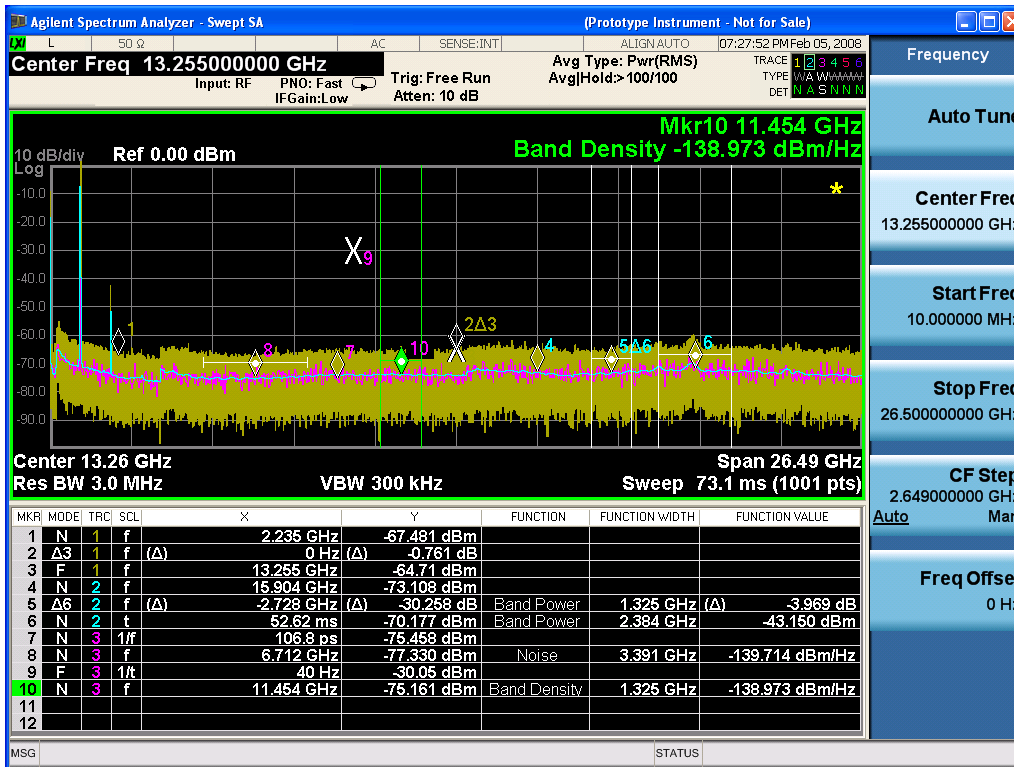
Meas Results File Contents

All files are .csv files. The following section details the data in each file type.

Marker Table

This section discusses the Marker Table Meas Results file format.

Imagine that, at the point where a Marker Table Meas Result is requested, the following screen is showing:



Then the Meas Results file, when opened, would show the following data:

MeasurementR	
result	
Swept SA	
A.01.40_R0017	N9020A
526 B25 PFR	1
P26 EA3	
Result Type	Marker Table
Ref Level	0
Number of Points	1001
Sweep Time	0.0662666 67
Start Frequency	10000000
Stop Frequency	26500000 000
Average Count	0
Average Type	LogPower (Video)
RBW	3000000

Save

RBW Filter	Gaussian
RBW Filter BW	3dB
VBW	3000000
Sweep Type	Swept
X Axis Scale	Lin
PreAmp State	Off
PreAmp Band	Low
Trigger Source	Free
Trigger Level	1.2
Trigger Slope	Positive
Trigger Delay	1.00E-06
Phase Noise Optimization	Fast
Swept If Gain	Low
FFT If Gain	Autorange
RF Coupling	AC
FFT Width	411900
Ext Ref	10000000
Input	RF
RF Calibrator	Off
Attenuation	10
Ref Level Offset	0
External Gain	0
X Axis Units	Hz
Y Axis Units	dBm

DATA

MKR	MODE	TR C	SCL	X	Y	FUNCTI ON	FUNCTIO N WIDTH	FUNCTI ON VALUE	FUNCTI ON UNIT
1	Normal	1	Freque ncy	2.2350E+ 09	- 67.4 81	Off	0.0000E+ 00	0	None
2	Delta3	1	Freque ncy	0.0000E+ 00	- 0.76 1	Off	0.0000E+ 00	0	None
3	Fixed	1	Freque ncy	1.3255E+ 10	- 64.7 1	Off	0.0000E+ 00	0	None
4	Normal	2	Freque ncy	1.5904E+ 10	- 73.1	Off	0.0000E+ 00	0	None

08									
5	Delta7	2	Frequency	- 2.7280E+ 09	- 30.2 58	Band Power	1.3250E+ 06	-3.969	dB
6	Normal	2	Time	5.2620E- 02	- 70.1 77	Band Power	2.3840E+ 06	-43.15	dBm
7	Normal	3	Period	1.0680E- 10	- 75.4 58	Off	0.0000E+ 00	0	None
8	Normal	3	Frequency	6.7120E+ 09	- 77.3 3	Noise	3.3910E+ 06	- 139.71 4	dBm/Hz
9	Fixed	3	Inverse Time	4.0000E+ 01	- 30.0 5	Off	0.0000E+ 00	0	None
10	Normal	3	Frequency	1.1454E+ 10	- 75.1 61	Band Density	1.3250E+ 06	- 138.97 3	dBm/Hz
11	Off	1	Frequency	0.0000E+ 00	0	Off	0.0000E+ 00	0	None
12	Off	1	Frequency	0.0000E+ 00	0	Off	0.0000E+ 00	0	None

The numbers appear in the file exactly as they appear onscreen. If it says 11.454 GHz onscreen, then in the file it is 11.454E+09.

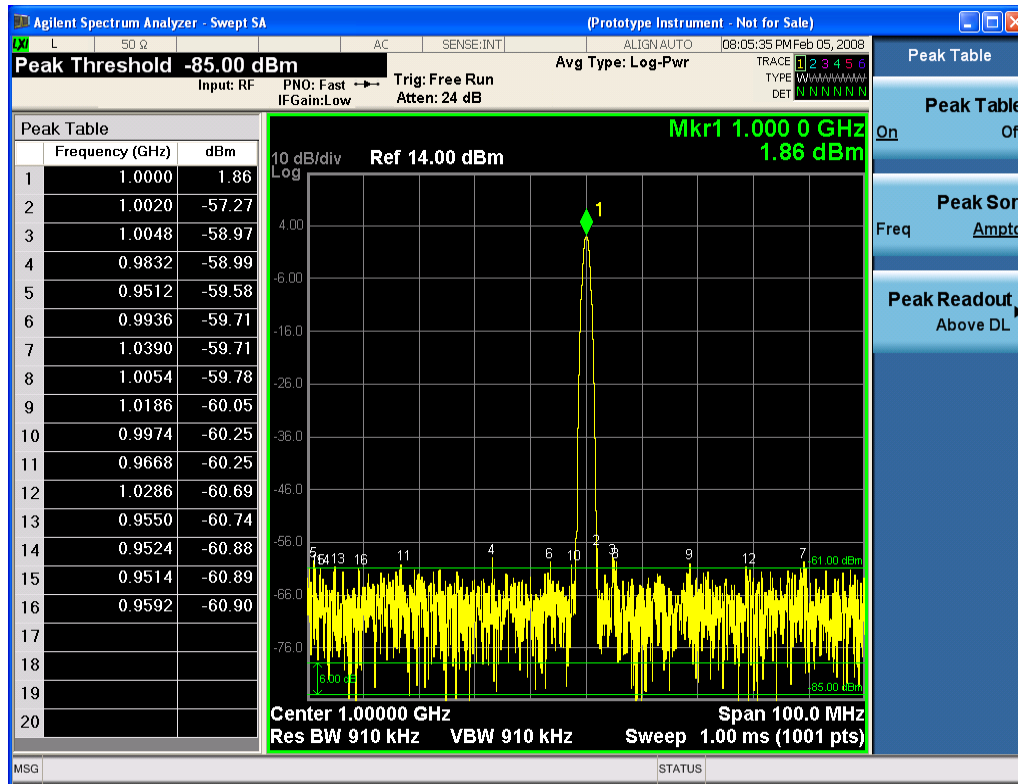
The metadata header is very similar to the metadata used in the trace data .csv files. See Trace File Contents. The only new information concerns the 1-of-N fields in the marker table itself.

Peak Table

This section discusses the Peak Table Meas Results file format.

Imagine that, at the point where a Marker Table Meas Result is requested, the following screen is showing:

14 GSM Power vs. Time Measurement
Save



Then the Meas Results file, when opened, would show the header data (the same as for the Marker Table except that the Result Type is Peak Table) ending with a few fields of specific interest to Peak Table users:

- Peak Threshold
- Peak Threshold State (On|Off)
- Peak Excursion
- Peak Excursion State (On|Off)
- Display Line
- Peak Readout (All|AboveDL|BelowDL)
- Peak Sort (Freq|Amptd)

These fields are then followed by the data for the Peak Table itself.

Note that the label for the Frequency column changes to Time in 0 span.

Here is what the table for the above display looks like:

MeasurementResult	
Swept SA	
A.01.40_R0017	N9020A
526 B25 PFR P26 EA3	1

Result Type	Peak Table
Ref Level	0
Number of Points	1001
Sweep Time	0.066266667
Start Frequency	10000000
Stop Frequency	26500000000
Average Count	0
Average Type	LogPower(Video)
RBW	3000000
RBW Filter	Gaussian
RBW Filter BW	3dB
VBW	3000000
Sweep Type	Swept
X Axis Scale	Lin
PreAmp State	Off
PreAmp Band	Low
Trigger Source	Free
Trigger Level	1.2
Trigger Slope	Positive
Trigger Delay	1.00E-06
Phase Noise Optimization	Fast
Swept If Gain	Low
FFT If Gain	Autorange
RF Coupling	AC
FFT Width	411900
Ext Ref	10000000
Input	RF
RF Calibrator	Off
Attenuation	10
Ref Level Offset	0
External Gain	0
X Axis Units	Hz
Y Axis Units	dBm
Peak Threshold	-85
Peak Threshold State	On
Peak Excursion	6
Peak Excursion State	On

Display Line	-61	
Peak Readout	AboveDL	
Peak Sort	Amptd	
DATA		
Peak	Frequency	Amplitude
1	1.0000E+06	1.86
2	1.0020E+06	-57.27
3	1.0048E+06	-58.97
4	9.8320E+05	-58.99
5	9.5120E+05	-59.58
6	9.9360E+05	-59.71
7	1.0390E+06	-59.71
8	1.0054E+06	-59.78
9	1.1086E+06	-60.05
10	9.9740E+05	-60.25
11	9.6680E+05	-60.25
12	1.0286E+06	-60.69
13	9.5500E+05	-60.74
14	9.5240E+05	-60.88
15	9.5140E+05	-60.89
16	9.5920E+05	-60.90
17		
18		
19		
20		

Spectrogram

This section discusses the Spectrogram Results file format. The Spectrogram choice only appears if option EDP is licensed.

The Spectrogram results are the same as a Trace data export, except that instead of having just one trace's data, all 300 traces appear one after the other.

Each trace has its own data mark; the data for Spectrogram Trace 0 follows the row marked DATA, the data for Spectrogram Trace 1 follows the row marked DATA1, for Spectrogram Trace 2 follows the row marked DATA2, and so on.

Each DATA row has a timestamp in the second column (as of firmware revision A.11.01). So, for example, if Trace 0 had a relative start time of 1729.523 sec, then the first DATA row would look like this:

DATA,1729.523

And if Trace 13 had a relative start time of 100.45 sec, then the fourteenth data row would look like:

DATA13,100.453

To find the absolute time for the relative timestamps of each trace, the last row before the first DATA row gives the absolute start time of the Spectrogram, in the form YYYYMMDDHHMMSS

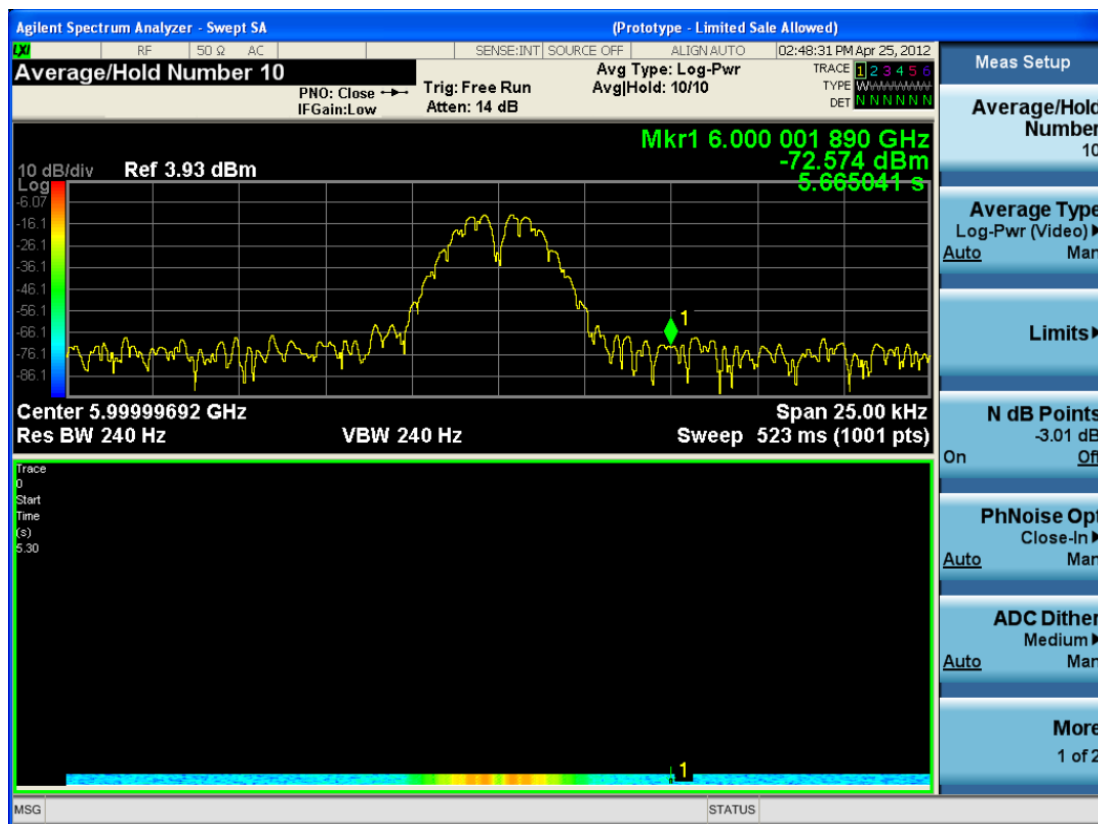
So, for example, if the absolute start time is 13:23:45:678 on January 30, 2012, this row would look like:

Start Time,20120130132345678

NOTE The resolution of the absolute time stored is 1 ms, which matches up with the fact that the fastest sweep time is also 1 ms. However, there is no specification for the absolute accuracy of the clock in the analyzer, nor is there any facility provided to allow the user to set this time to any particular degree of accuracy.

Traces that have not yet been filled in the Spectrogram display are empty; there is no DATA header for them. The file ends after the last non-empty trace.

Imagine that, at the point where a Spectrogram Meas Result is requested, the following screen is showing:



For the purpose of this example, we have set the Average/Hold Number to 10, thus we have only traces 0 thru 10. The Spectrogram was started at 02:28:08:700 pm on April 25, 2012 (that is, 700 ms after 2:28:08 pm), although the screen dump itself shows a different time, as it was taken ten minutes after the

Save

Spectrogram data. Trace 0 is showing a start time of 5.30 seconds, meaning 5.3 seconds after the Spectrogram started (trace 10 has a start time of 0, as it was the first trace taken but has now rolled up into the tenth trace slot).

The Meas Results file, when opened, shows the header data and ten traces of trace data. Below is an extract from the result file for the above display. Note the start time of 20120425142808700 showing in the last row before the first DATA row, and the relative time of 5.299231048 showing in the first DATA row:

Result Type	Spectrogram
MeasResult	
Swept SA	
A.11.00.01	N9020A
503 508 513 526 ALL ALV B1C B1X B25 B2X B40 BAB BBA CR3 CRP DP2 DRD EA3 EDP EMC EP1 ERC ESC ESP EXM FSA HBA K03 LFE MPB P03 P08 P13 P26 PFR RTL RTS S40 SB1 SEC SM1 UK6 YAS YAV	1
Segment	0
Number of Points	1001
Sweep Time	0.523333333
Start Frequency	5999984415
Stop Frequency	6000009415
Average Count	0
Average Type	LogPower(Video)
RBW	240
RBW Filter	Gaussian
RBW Filter BW	3dB
VBW	240
Sweep Type	Swept
X Axis Scale	Lin
PreAmp State	Off
PreAmp Band	Low
Trigger Source	Free
Trigger Level	1.2
Trigger Slope	Positive
Trigger Delay	0
Phase Noise Optimization	Wide
Swept If Gain	Low
FFT If Gain	Autorange
RF Coupling	AC

Result Type	Spectrogram
FFT Width	411900
Ext Ref	10000000
Input	RF
RF Calibrator	Off
Attenuation	14
Ref Level Offset	0
External Gain	0
Trace Type	Clearwrite
Detector	Normal
Trace Math	Off
Trace Math Oper1	Trace5
Trace Math Oper2	Trace6
Trace Math Offset	0
Trace Name	Trace1
X Axis Units	Hz
Y Axis Units	dBm
Start Time	20120425142808700
DATA	5.299231048
5999984415	-76.34749519
5999984440	-77.28097006
5999984465	-75.32317869
5999984490	-73.64417681
5999984515	-72.67154604

- o
- o
- o

6000009315	-77.94423277
6000009340	-79.51829697
6000009365	-78.46108961
6000009390	-78.46108957
6000009415	-76.59570596
DATA2	4.708697055
5999984415	-80.98197882
5999984440	-80.98197879

Save

5999984465	-75.83142132
5999984490	-74.02712079
5999984515	-73.57213005

O

O

O

6000009315	-75.9183103
6000009340	-79.53787488
6000009365	-78.82602191
6000009390	-78.82602188
6000009415	-76.37486709
DATA10	0
5999984415	-75.56751112
5999984440	-75.76485645
5999984465	-76.67718717
5999984490	-78.79238489
5999984515	-83.72680212

O

O

O

6000009315	-71.3942461
6000009340	-72.28308332
6000009365	-73.92684489
6000009390	-75.45548832
6000009415	-75.17904815

Save As . . .

When you press "Save As", the analyzer brings up a Windows dialog and a menu entitled "**Save As.**" This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[To File . . .](#)" on page 2340 in Save, State for a full description of this dialog and menu.

The default path for saving files is:

For all of the Trace Data Files:

My Documents\`<mode name>`\data\traces

For all of the Limit Data Files:

My Documents\`<mode name>`\data\limits

For all of the Measurement Results Data Files:

My Documents\`<mode name>`\data\`<measurement name>`\results

For all of the Capture Buffer Data Files:

My Documents\`<mode name>`\data\captureBuffer

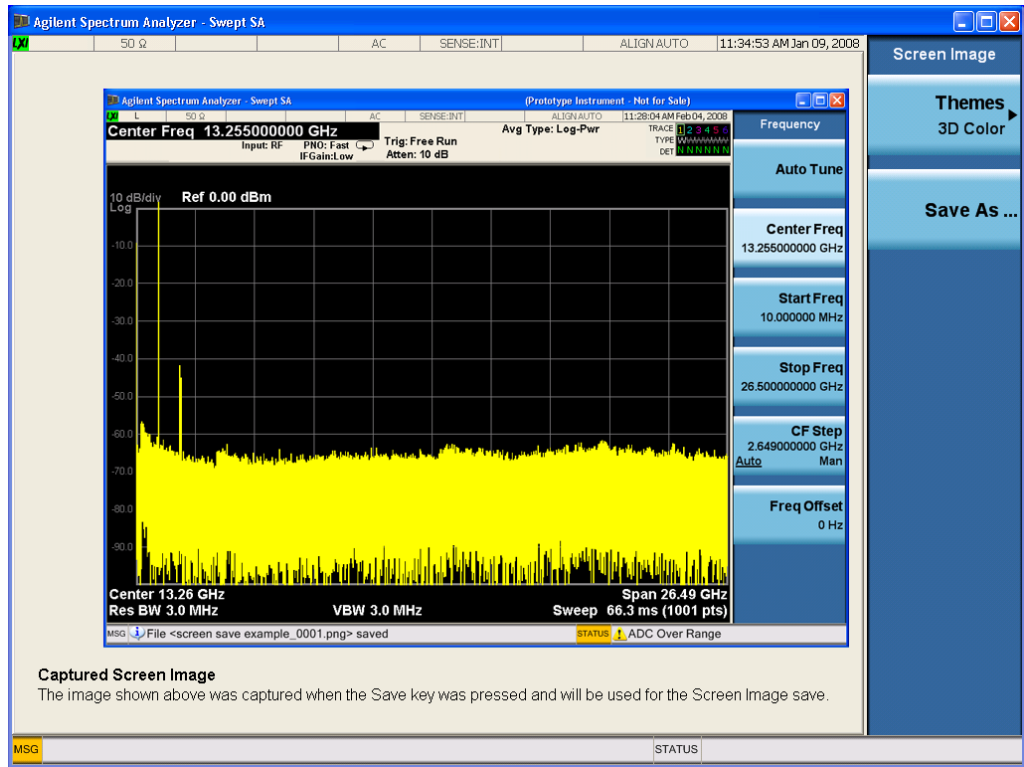
Key Path	Save, Data
Mode	All
Notes	The key location is mode-dependent and will vary. Brings up the Save As dialog for saving a <code><mode specific></code> Save Type. The save is performed immediately and does not wait until the measurement is complete.
Initial S/W Revision	Prior to A.02.00

Screen Image

Pressing Screen Image accesses a menu of functions that enable you to specify a format and location for the saved screen image. It brings up a menu that allows you to specify the color scheme of the Screen Image (Themes) or navigate to the Save As dialog to perform the actual save.

Screen Image files contain an exact representation of the analyzer display. They cannot be loaded back onto the analyzer, but they can be loaded into your PC for use in many popular applications.

The image to be saved is actually captured when the Save front panel key is pressed, and kept in temporary storage to be used if you ask for a Screen Image save. When the Screen Image key is pressed, a "thumbnail" of the captured image is displayed, as shown below:



When you continue on into the Save As menu and complete the Screen Image save, the image depicted in the thumbnail is the one that gets saved, showing the menus that were on the screen before going into the Save menus. The save is performed immediately and does not wait until the measurement is complete.

After you have completed the save, the Quick Save front-panel key lets you quickly repeat the last save performed, using an auto-named file, with the current screen data.

NOTE For versions previous to A.01.55, if you initiate a screen image save by navigating through the Save menus, the image that is saved will contain the Save menu softkeys, not the menus and the active function that were on the screen when you first pressed the Save front panel key.

Key Path	Save
Mode	All
Remote Command	:MMEMory:STORe:SCReen <filename>
Example	:MMEM:STOR:SCR "myScreen.png" This stores the current screen image in the file MyScreenFile.png in the default directory.
Initial S/W Revision	Prior to A.02.00

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

Key Path	Save, Screen Image
Remote Command	:MMEMory:STORe:SCReen:THEMe TDColor TDMonochrome FCOLOR FMONochrome :MMEMory:STORe:SCReen:THEMe?
Example	:MMEM:STOR:SCR:THEM TDM
Preset	3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes.
Readback	3D Color 3D Mono Flat Color Flat Mono
Backwards Compatibility Notes	In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical.
Initial S/W Revision	Prior to A.02.00

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDC
Readback	3D Color
Initial S/W Revision	Prior to A.02.00

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDM
Readback	3D Mono
Initial S/W Revision	Prior to A.02.00

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

Key Path	Save, Screen Image, Themes
----------	----------------------------

Example	MMEM:STOR:SCR:THEM FCOL
Readback	Flat Color
Initial S/W Revision	Prior to A.02.00

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FMON
Readback	Flat Mono
Initial S/W Revision	Prior to A.02.00

Save As...

When you press “Save As”, the analyzer brings up a Windows dialog and a menu entitled “**Save As.**” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[To File . . .](#)" on page 2340 in Save, State for a full description of this dialog and menu.

The default path for Screen Images is

My Documents\<mode name>\screen.

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

Key Path	Save, Screen Image
Notes	Brings up Save As dialog for saving a Screen Image Save Type
Initial S/W Revision	Prior to A.02.00

Mass Storage Change Directory (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:CDIRectory [<directory_name>] :MMEMory:CDIRectory?
Notes	The string must be a valid logical path. Changes the default directory for a mass memory file system. The <directory_name> parameter is a string. If no parameter is specified, the directory is set to the *RST value. At *RST, this value is set to the default user data storage area, that is defined as System.Environment.SpecialFolder.Personal.

	Query returns full path of the default directory.
Initial S/W Revision	Prior to A.02.00

Mass Storage Copy (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:COpy <string>,<string>[,<string>,<string>]
Notes	<p>The string must be a valid logical path.</p> <p>Copies an existing file to a new file or an existing directory to a new directory.</p> <p>Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.</p> <p>The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.</p> <p>This command will generate an "access denied" error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.</p>

Mass Storage Device Copy (Remote Command Only)

This command transfers data to/from a file and a peripheral device.

Key path	SCPI Only
Remote Command	:MMEMory:COpy:DEvice <source_string>,<dest_string>
Notes	<p>The strings must be a valid logical path or a valid device keyword. If the dest_string is a device keyword, the data is copied from the source file to the device. If the source_string is a device keyword, the data is copied to the source file from the device.</p> <p>Valid device keywords are:</p> <p>SNS (smart noise source)</p> <p>An error is generated if the file or device is not found.</p>

Mass Storage Delete (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:DElete <file_name>[,<directory_name>]
Notes	<p>The string must be a valid logical path.</p> <p>Removes a file from the specified directory. The <file_name> parameter specifies the file name to be removed. This command will generate an "access denied" error if the file is in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.</p>
Initial S/W Revision	Prior to A.02.00

Mass Storage Data (Remote Command Only)

Creates a file containing the specified data OR queries the data from an existing file.

Key path	SCPI Only
Remote Command	:MMEMory:DATA <file_name>, <data> :MMEMory:DATA? <file_name>
Notes	The string must be a valid logical path. The command form is MMEMory:DATA <file_name>,<data>. It loads <data> into the file <file_name>. <data> is in 488.2 block format. <file_name> is string data. The query form is MMEMory:DATA? <file_name> with the response being the associated <data> in block format.
Initial S/W Revision	Prior to A.02.00

Mass Storage Catalog (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:CATalog? [<directory_name>]
Notes	The string must be a valid logical path. Queries disk usage information (drive capacity, free space available) and obtains a list of files and directories in a specified directory in the following format: <numeric_value>,<numeric_value>,{<file_entry>} It returns two numeric parameters and as many strings as there are files and directories. The first parameter indicates the total amount of storage currently used in bytes. The second parameter indicates the total amount of storage available, also in bytes. The <file_entry> is a string. Each <file_entry> indicates the name, type, and size of one file in the directory list: <file_name>,<file_type>,<file_size> As the windows file system has an extension that indicates file type, <file_type> is always empty. <file_size> provides the size of the file in bytes. For directories, <file_entry> is surrounded by square brackets and both <file_type> and <file_size> are empty
Initial S/W Revision	Prior to A.02.00

Mass Storage Make Directory (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:MDIRectory <directory_name>
Notes	The string must be a valid logical path. Creates a new directory. The <directory_name> parameter specifies the name to be created. This command will generate an "access denied" error if the new directory would be in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.
Initial S/W Revision	Prior to A.02.00

Mass Storage Move (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:MOVE <string>,<string>[,<string>,<string>]
Notes	<p>The string must be a valid logical path.</p> <p>Moves an existing file to a new file or an existing directory to a new directory.</p> <p>Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.</p> <p>The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.</p> <p>This command will generate an "access denied" error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.</p>
Initial S/W Revision	Prior to A.02.00

Mass Storage Remove Directory (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:RDIRECTory <directory_name>
Notes	<p>The string must be a valid logical path.</p> <p>Removes a directory. The <directory_name> parameter specifies the directory name to be removed. All files and directories under the specified directory shall also be removed.</p> <p>This command will generate an "access denied" error if the folder is a restricted folder (e.g., C:\Windows) or is in a restricted folder and the current user does not have Power User or Administrator privileges.</p>
Initial S/W Revision	Prior to A.02.00

Single (Single Measurement/Sweep)

Sets the analyzer for Single measurement operation. The single/continuous state is Meas Global, so the setting will affect all the measurements. If you are Paused, pressing Single does a Resume.

See "[More Information](#)" on page 1676

Key Path	Front-panel key
Example	:INIT:CONT OFF
Notes	See Cont key description.
Backwards Compatibility Notes	<p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey and the INITiate:IMM switched from continuous measurement to single measurement and restarted sweeps and averages (displayed average count reset to 1), but did not restart Max Hold and Min Hold. In the X-Series, the Single hardkey and the INITiate:IMM command initiate a sweep/ measurement/ average sequence/hold sequence including MaxHold and MinHold.</p> <p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey restarted the sweep regardless of whether or not you were in an active sweep or sweep sequence. In the X-Series, Restart does this but Single only restarts the sweep or sweep sequence if you are in the idle state.</p> <p>INIT[:IMM] in ESA & PSA Spectrum Analysis Mode does an implied ABORT. In some other PSA Modes, INIT[:IMM] is ignored if not in the idle state. . The X-Series follows the ESA/PSA SA Mode model, which may cause some Modes to have compatibility problems.</p>
Initial S/W Revision	Prior to A.02.00

More Information

See "[Restart](#)" on page 2337 for details on the INIT:IMMEDIATE (Restart) function.

If you are already in single sweep, the INIT:CONT OFF command has no effect.

If you are already in Single Sweep, then pressing the Single key in the middle of a sweep does not restart the sweep or sequence. Similarly, pressing the Single key does not restart the sweep or sequence if the sweep is not in the idle state (for example, if you are taking a very slow sweep, or the analyzer is waiting for a trigger). Instead, it results in a message. "Already in Single, press Restart to initiate a new sweep or sequence". Even though pressing the Single key in the middle of a sweep does not restart the sweep, sending INIT:IMMEDIATE does reset it.

To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command CALC:AVER:TCON UP.

Source

There is no Source control functionality for this measurement. When this key is pressed, the screen either displays a blank menu, or the previously-selected menu remains unchanged.

Key Path	Front-panel key
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SPAN X Scale

Accesses a menu of functions that enable you to set the horizontal scale parameters

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Ref Value

Sets the display X reference value in the Burst, Multi-slot, and Rise & Fall views.

See ["Ref Value \(Burst view and Multi-slot view\)" on page 1678](#) and ["Ref Value \(Rise & Fall view\)" on page 1679](#).

Key Path	SPAN X Scale
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Ref Value (Burst view and Multi-slot view)

Sets the display X reference value.

Key Path	SPAN X Scale
Mode	GSM
Remote Command	:DISPlay:PVTime:VIEW[1] 3:WINDow[1]:TRACe:X[:SCALE]:RLEVel <time> :DISPlay:PVTime:VIEW[1] 3:WINDow[1]:TRACe:X[:SCALE]:RLEVel?
Example	DISP:PVT:VIEW:WIND:TRAC:X:RLEV 1 DISP:PVT:VIEW:WIND:TRAC:X:RLEV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	If the "Auto Scaling" on page 1681 is On, this value is automatically determined by the measurement result. When you set a value manually, "Auto Scaling" on page 1681 automatically changes to Off.
Preset	-65 us -67 us
State Saved	Saved in instrument state.
Min	-1.00 s
Max	1.00 s
Initial S/W Revision	Prior to A.02.00

Ref Value (Rise & Fall view)

Sets the display X reference value.

Key Path	SPAN X Scale
Mode	GSM
Remote Command	:DISPlay:PVTime:VIEW2:WINDow[1] 2:TRACe:X[:SCALe]:RLEVel <time> :DISPlay:PVTime:VIEW2:WINDow[1] 2:TRACe:X[:SCALe]:RLEVel?
Example	DISP:PVT:VIEW2:WIND2:TRAC:X:RLEV 1 DISP:PVT:VIEW2:WIND2:TRAC:X:RLEV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	If the "Auto Scaling" on page 1681 is On, this value is automatically determined by the measurement result. When you set a value manually, "Auto Scaling" on page 1681 automatically changes to Off.
Preset	0 s 542.8 us
State Saved	Saved in instrument state.
Min	-1.00 s
Max	1.00 s
Initial S/W Revision	Prior to A.02.00

Scale/Div

Sets the display X scale/division value in the Burst, Multi-slot, and Rise & Fall views.

See **"Scale/Div (Burst view and Multi-slot view)" on page 1679** and **"Scale/Div (Rise & Fall view)" on page 1680**

Key Path	SPAN X Scale
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Scale/Div (Burst view and Multi-slot view)

Sets the display X scale/division value.

Key Path	Span X Scale
Mode	GSM
Remote Command	:DISPlay:PVTime:VIEW[1] 3:WINDow[1]:TRACe:X[:SCALe]:PDIVision <time> :DISPlay:PVTime:VIEW[1] 3:WINDow[1]:TRACe:X[:SCALe]:PDIVision?
Example	DISP:PVT:VIEW:WIND:TRAC:X:PDIV 1ms DISP:PVT:VIEW:WIND:TRAC:X:PDIV?

Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	If the "Auto Scaling" on page 1681 is On, this value is automatically determined by the measurement result. When you set a value manually, "Auto Scaling" on page 1681 automatically changes to Off.
Preset	70.00us 84.00us
State Saved	Saved in instrument state.
Min	1.00 ns
Max	1.00 s
Initial S/W Revision	Prior to A.02.00

Scale/Div (Rise & Fall view)

Sets the display X scale/division value.

Key Path	Span X Scale
Mode	GSM
Remote Command	:DISPlay:PVTime:VIEW2:WINDow[1] 2:TRACe:X[:SCALE]:PDIVision <time> :DISPlay:PVTime:VIEW2:WINDow[1] 2:TRACe:X[:SCALE]:PDIVision?
Example	DISP:PVT:VIEW2:WIND2:TRAC:X:PDIV 1ms DISP:PVT:VIEW2:WIND2:TRAC:X:PDIV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	If the "Auto Scaling" on page 1681 is On, this value is automatically determined by the measurement result. When you set a value manually, "Auto Scaling" on page 1681 automatically changes to Off.
Preset	10.00us 10.00 us
State Saved	Saved in instrument state.
Min	1.00 ns
Max	1.00 s
Initial S/W Revision	Prior to A.02.00

Ref Position

Allows you to set the display reference position to Left, Center or Right for Burst, Multi-slot, and Rise & Fall views.

Key Path	SPAN X Scale
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Ref Position (Burst view and Multi-slot view)

Sets the display reference position to Left, Center or Right.

Key Path	SPAN X Scale
Mode	GSM
Remote Command	:DISPlay:PVTime:VIEW[1] 3:WINDow[1]:TRACe:X[:SCALe]:RPOSition LEFT CENTer RIGHT :DISPlay:PVTime:VIEW[1] 3:WINDow[1]:TRACe:X[:SCALe]:RPOSition?
Example	DISP:PVT:VIEW:WIND:TRAC:X:RPOS LEFT DISP:PVT:VIEW:WIND:TRAC:X:RPOS?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	LEFT LEFT
State Saved	Saved in instrument state.
Range	Left Ctr Right
Initial S/W Revision	Prior to A.02.00

Ref Position (Rise & Fall view)

Sets the display reference position to Left, Center or Right.

Key Path	SPAN X Scale
Mode	GSM
Remote Command	:DISPlay:PVTime:VIEW2:WINDow[1] 2:TRACe:X[:SCALe]:RPOSition LEFT CENTer RIGHT :DISPlay:PVTime:VIEW2:WINDow[1] 2:TRACe:X[:SCALe]:RPOSition?
Example	DISP:PVT:VIEW2:WIND2:TRAC:X:RPOS LEFT DISP:PVT:VIEW2:WIND2:TRAC:X:RPOS?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	CENTER CENTER
State Saved	Saved in instrument state.
Range	Left Ctr Right
Initial S/W Revision	Prior to A.02.00

Auto Scaling

Allows you to toggle the scale coupling function between On and Off in Burst, Multi-slot and Rise & Fall views.

Key Path	SPAN X Scale
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Auto Scaling (Burst view and Multi-slot view)

Allows you to toggle the scale coupling function between On and Off.

Key Path	Span X Scale
Mode	GSM
Remote Command	:DISPlay:PVTime:VIEW[1] 3:WINDow[1]:TRACe:X[:SCALe]:COUPlE 0 1 OFF ON :DISPlay:PVTime:VIEW[1] 3:WINDow[1]:TRACe:X[:SCALe]:COUPlE?
Example	DISP:PVT:VIEW:WIND:TRAC:X:COUP OFF DISP:PVT:VIEW:WIND:TRAC:X:COUP?
Notes	Upon pressing the Restart front-panel key the scale coupling function automatically determines the scale per division and reference values based on the measurement results if this parameter is set to On. When you set a value to either " Ref Value " on page 1678 or " Scale/Div " on page 1679 manually, X Auto Scaling automatically changes to Off. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

Auto Scaling (Rise & Fall view)

Allows you to toggle the scale coupling function between On and Off.

Key Path	Span X Scale
Mode	GSM
Remote Command	:DISPlay:PVTime:VIEW2:WINDow[1] 2:TRACe:X[:SCALe]:COUPlE 0 1 OFF ON :DISPlay:PVTime:VIEW2:WINDow[1] 2:TRACe:X[:SCALe]:COUPlE?
Example	DISP:PVT:VIEW2:WIND2:TRAC:X:COUP OFF DISP:PVT:VIEW2:WIND2:TRAC:X:COUP?
Notes	Upon pressing the Restart front-panel key, the scale coupling function automatically determines the scale per division and reference values based on the measurement results if this parameter is set to On. When you set a value to either " Ref Value " on page 1678 or " Scale/Div " on page 1679 manually, X Auto Scaling automatically changes to Off. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

Sweep/Control

Accesses a menu that enables you to configure the Sweep and Control functions of the analyzer, such as Sweep Time and Gating.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Pause/Resume

Pauses a measurement after the current data acquisition is complete.

When Paused, the label on the key changes to Resume. Pressing Resume un-pauses the measurement. When you are Paused, pressing Restart, Single or Cont does a Resume.

Key Path	Sweep/Control
Remote Command	:INITiate:PAUSE
Dependencies	Grayed out in Measurements that do not support Pausing. Blanked in Modes that do not support Pausing.
Initial S/W Revision	Prior to A.02.00

Key Path	Sweep/Control
Remote Command	:INITiate:RESume
Dependencies	Grayed out in Measurements that do not support Pausing. Blanked in Modes that do not support Pausing.
Initial S/W Revision	Prior to A.02.00

Abort (Remote Command Only)

This command is used to stop the current measurement. It aborts the current measurement as quickly as possible, resets the sweep and trigger systems, and puts the measurement into an "idle" state. If the analyzer is in the process of aligning when ABORT is sent, the alignment finishes before the abort function is performed. So ABORT does not abort an alignment.

If the analyzer is set for Continuous measurement, it sets up the measurement and initiates a new data measurement sequence with a new data acquisition (sweep) taken once the trigger condition is met.

If the analyzer is set for Single measurement, it remains in the "idle" state until an :INIT:IMM command is received.

Remote Command	:ABORT
Example	:ABOR

Notes	<p>If :INITiate:CONTinuous is ON, then a new continuous measurement will start immediately; with sweep (data acquisition) occurring once the trigger condition has been met.</p> <p>If :INITiate:CONTinuous is OFF, then :INITiate:IMMediate is used to start a single measurement; with sweep (data acquisition) occurring once the trigger condition has been met.</p>
Dependencies	<p>For continuous measurement, ABORt is equivalent to the Restart key.</p> <p>Not all measurements support the abort command.</p>
Status Bits/OPC dependencies	<p>The STATus:OPERation register bits 0 through 8 are cleared.</p> <p>The STATus:QUESTionable register bit 9 (INTEgrity sum) is cleared.</p> <p>Since all the bits that feed into OPC are cleared by the ABORt, the ABORt will cause the *OPC query to return true.</p>
Initial S/W Revision	<p>Prior to A.02.00</p>

System

See "[System](#)" on page 326

Trace/Detector

Accesses a menu that enables you to hide or show Max Hold Trace and Min Hold Trace.

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Max Hold Trace

This key allows you to hide or show Max Hold Trace.

Key Path	Trace/Detector
Mode	GSM
Remote Command	:DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:MAXHold[:STATe] ON OFF 1 0 :DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:MAXHold[:STATe]?
Example	DISP:PVT:VIEW:WIND:TRAC:MAXH ON DISP:PVT:VIEW:WIND:TRAC:MAXH?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	Selecting [:SENSe]:PVTime:AVERAge:TYPE MAXimum MXMinimum forces this parameter to ON.
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

Min Hold Trace

This key allows you to hide or show Min Hold Trace.

Key Path	Trace/Detector
Mode	GSM
Remote Command	:DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:MINHold[:STATe] ON OFF 1 0 :DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:MINHold[:STATe]?
Example	DISP:PVT:VIEW:WIND:TRAC:MINH ON DISP:PVT:VIEW:WIND:TRAC:MINH?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.

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Trace/Detector

Couplings	Selecting [:SENSE]:PVTime:AVERage:TYPE MINimum MXMinimum forces this parameter to ON.
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

Trigger

See ["Trigger" on page 408](#)

Free Run

See ["Free Run " on page 415](#)

Video

See ["Video \(IF Envelope\) " on page 416](#)

Trigger Level

See ["Trigger Level " on page 416](#)

Trig Slope

See ["Trig Slope " on page 417](#)

Trig Delay

See ["Trig Delay " on page 418](#)

Line

See ["Line " on page 1321](#)

Trig Slope

See ["Trig Slope " on page 1321](#)

Trig Delay

See ["Trig Delay " on page 420](#)

External 1

See ["External 1 " on page 1333](#)

Trigger Level

See ["Trigger Level " on page 1333](#)

Trig Slope

See ["Trig Slope " on page 1334](#)

Trig Delay

See ["Trig Delay " on page 423](#)

External 2

See ["External 2 " on page 1335](#)

Trigger Level

See ["Trigger Level "](#) on page 1335

Trig Slope

See ["Trig Slope "](#) on page 1336

Trig Delay

See ["Trig Delay "](#) on page 425

RF Burst

See ["RF Burst "](#) on page 1336

Absolute Trigger

See ["Absolute Trigger Level"](#) on page 1337

Relative Trigger

See ["Relative Trigger Level"](#) on page 1326

Trig Slope

See ["Trigger Slope "](#) on page 1338

Trig Delay

See ["Trig Delay "](#) on page 429

Periodic Timer

See ["Periodic Timer \(Frame Trigger\) "](#) on page 1328

Period

See ["Period "](#) on page 1329

Offset

See ["Offset "](#) on page 1330

Offset Adjust (Remote Command Only)

See ["Offset Adjust \(Remote Command Only\)"](#) on page 1331

Reset Offset Display

See ["Reset Offset Display "](#) on page 1332

Sync Source

See ["Sync Source "](#) on page 1332

Off

See ["Off "](#) on page 1333

External 1

See ["External 1 "](#) on page 1333

Trigger Level

See ["Trigger Level "](#) on page 1333

Trig Slope

See ["Trig Slope "](#) on page 1334

External 2

See ["External 2 "](#) on page 1335

Trigger Level

See ["Trigger Level "](#) on page 1335

Trig Slope

See ["Trig Slope "](#) on page 1336

RF Burst

See ["RF Burst "](#) on page 1336

Absolute Trigger

See ["Absolute Trigger Level"](#) on page 1337

Trig Slope

See ["Trigger Slope "](#) on page 1338

Trig Delay

See ["Trig Delay"](#) on page 440

Auto/Holdoff

See ["Auto/Holdoff "](#) on page 440

Auto Trig

See ["Auto Trig "](#) on page 441

Trig Holdoff

See ["Trig Holdoff "](#) on page 441

Holdoff Type

See ["Holdoff Type"](#) on page 442

User Preset

Accesses a menu that gives you the following three choices:

- User Preset – recalls a state previously saved using the Save User Preset function.
- User Preset All Modes – presets all of the modes in the analyzer
- Save User Preset– saves the current state for the current mode

Key Path	Front-panel key
Backwards Compatibility Notes	<p>User Preset is actually loading a state, and in legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, “state” always includes all of this data; so whenever state is loaded, or User Preset is executed, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p> <p>On ESA and PSA, User Preset affected the entire instrument’s state. In the X-Series, User Preset only recalls the state for the active mode. There is a User Preset file for each mode. User Preset can never cause a mode switch as it can in legacy analyzers. If you want to recall all modes to their user preset file state, you will need to do a User Preset after mode switching into each mode.</p> <p>User Preset recalls mode state which can now include data like traces; whereas on ESA and PSA, User Preset did not affect data.</p>
Initial S/W Revision	Prior to A.02.00

User Preset

User Preset sets the state of the currently active mode back to the state that was previously saved for this mode using the Save User Preset menu key or the SCPI command, SYST:PRES:USER:SAV. It not only recalls the Mode Preset settings, but it also recalls all of the mode persistent settings, and the Input/Output system setting that existed at the time Save User Preset was executed.

If a Save User Preset has not been done at any time, User Preset recalls the default user preset file for the currently active mode. The default user preset files are created if, at power-on, a mode detects there is no user preset file. There will never be a scenario when there is no user preset file to restore. For each mode, the default user preset state is the same state that would be saved if a Save User Preset is performed in each mode right after doing a Restore Mode Default and after a Restore Input/Output Defaults.

The User Preset function does the following:

- Aborts the currently running measurement.
- Sets the mode State to the values defined by Save User Preset.
- Makes the saved measurement for the currently running mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

Key Path	User Preset
Remote Command	:SYSTem:PRESet:USER
Example	:SYST:PRES:USER:SAVE:SYST:PRES:USER
Notes	:SYST:PRES:USER:SAVE is used to save the current state as the user preset state. Clears all pending OPC bits. The Status Byte is set to 0. Pressing the User Preset front-panel key while already in the User Preset menu will cause the User Preset to get executed
Couplings	A user preset will cause the currently running measurement to be aborted and cause the saved measurement to be active. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved.
Initial S/W Revision	Prior to A.02.00

User Preset All Modes

Recalls all of the User Preset files for each mode, switches to the power-on mode, and activates the saved measurement from the power-on mode User Preset file.

NOTE

When the instrument is secured, all of the user preset files are converted back to their default user preset files.

The User Preset function does the following:

- Aborts the currently running measurement.
- Switches the Mode to the power-on mode.
- Restores the User Preset files for each mode.
- Makes the saved measurement for the power-on mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

Key Path	User Preset
Remote Command	:SYSTem:PRESet:USER:ALL
Example	:SYST:PRES:USER:SAVE:SYST:PRES:USER:ALL
Notes	Clears all pending OPC bits. The Status Byte is set to 0. :SYST:PRES:USER:SAVE is used to save the current state as the user preset state.
Couplings	A user preset will cause the currently running measurement to be aborted, cause a mode switch to the power-on mode, and cause the saved measurement to be active in the power-on mode. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved.
Initial S/W Revision	Prior to A.02.00

Save User Preset

Saves the currently active mode and its State. You can recall this User Preset file by pressing the User Preset menu key or sending the SYST:PRES:USER remote command. This same state is also saved by the Save State function.

Key Path	User Preset
Remote Command	:SYSTem:PRESet:USER:SAVE
Example	:SYST:PRES:USER:SAVE
Notes	:SYST:PRES:SAVE creates the same file as if the user requested a *SAV or a MMEM:STOR:STAT, except User Preset Save does not allow the user to specify the filename or the location of the file.
Initial S/W Revision	Prior to A.02.00

View/Display

Accesses a menu of functions that enable you to:

- Set the display parameters for the current measurement
- Select the View
- Set the Limit Mask On or Off

View Selections

For details of Remote Commands associated with the measurement's views, see the following sections:

["View Selection by Name \(Remote Command Only\)" on page 1695](#)

["View Selection by Number \(Remote Command Only\)" on page 1696](#)

The View/Display menu includes three View Selection keys, as listed below, which allow you to select the desired view of the measurement.

View	Name	Description
1	Burst (SCPI: ALL)	Views the entire burst of interest as determined by the current trigger source, burst sync, training sequence, and timeslot settings. To view a different burst of interest you must set these parameters for the selected timeslot. To view multiple slots, use the Multi-Slot view described below. For full details, see the section "Burst View" on page 1704 .
2	Rise & Fall (SCPI: BOTH)	Zooms in on the rising and falling portions of the burst being tested. For full details, see the section "Rise & Fall View" on page 1706 .
3	Multi-Slot (SCPI: MSLot)	Views the entire sweep as specified by the current Meas Time setting. Power levels for each active slot are listed in a table below the timeslot display. Also shown in the table, under 1st Error Pt, is the point in time at which the signal level first exceeds the limit; to help identify the slot where a failure first occurs. For full details, see the section "Multi-Slot View" on page 1707 .

View Selection by Name (Remote Command Only)

Key Path	View/Display
Mode	GSM
Remote Command	:DISPlay:PVTime:VIEW[:SElect] ALL BOTH MSLot :DISPlay:PVTime:VIEW[:SElect]?
Example	DISP:PVT:VIEW:SEL ALL DISP:PVT:VIEW:SEL?
Preset	ALL
State Saved	Saved in instrument state.
Range	Burst Rise & Fall Multi-Slot
Initial S/W Revision	Prior to A.02.00

View Selection by Number (Remote Command Only)

Mode	GSM
Remote Command	:DISPlay:PVTime:VIEW:NSElect <integer> :DISPlay:PVTime:VIEW:NSElect?
Example	DISP:PVT:VIEW:NSEL 3 DISP:PVT:VIEW:NSEL?
Notes	1: Burst 2: Rise & Fall 3: Multi-Slot You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	3
Initial S/W Revision	Prior to A.02.00

Display

The Display menu is common to most measurements, and is used for configuring items on the display. Some Display menu settings apply to all the measurements in a mode, and some only to the current measurement. Those under the System Display Settings key apply to all measurements in all modes.

Key Path	Display
Key Path	View/Display
Initial S/W Revision	Prior to A.02.00

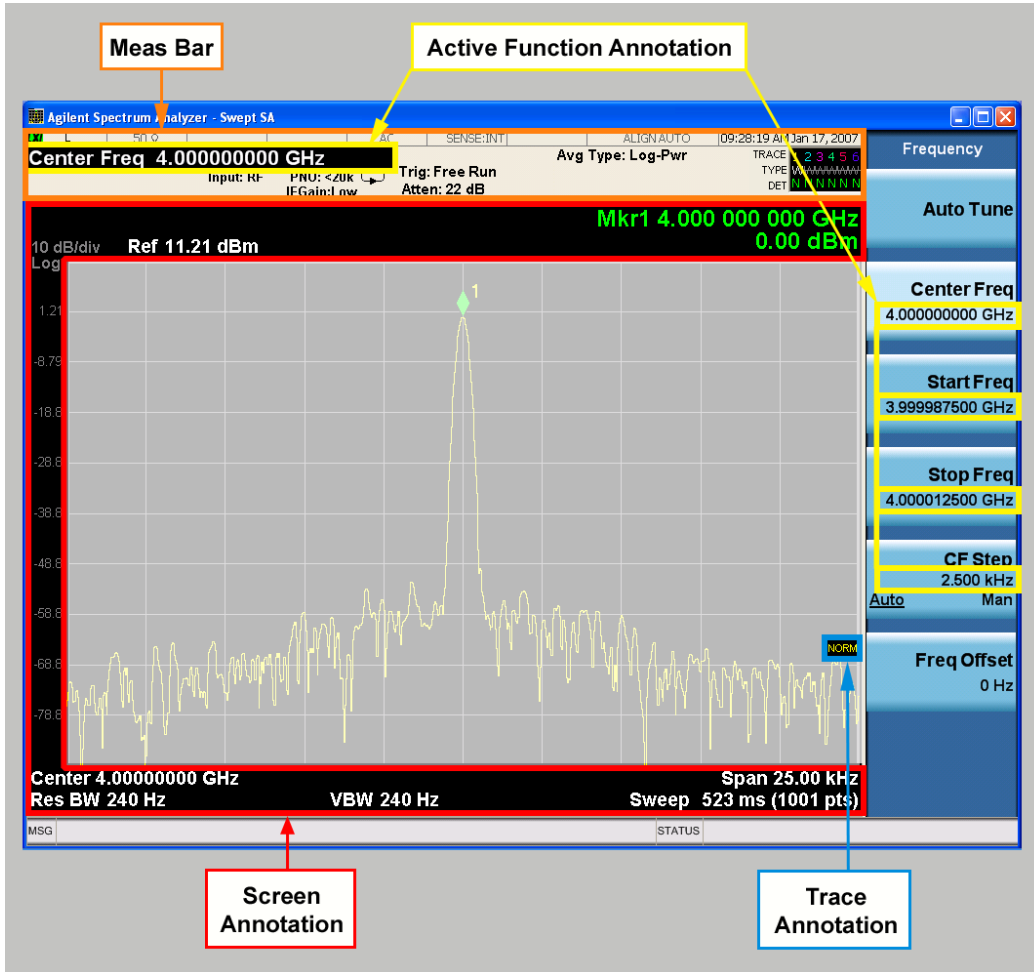
Annotation

Turns on and off various parts of the display annotation. The annotation is divided up into four categories:

1. Meas Bar: This is the measurement bar at the top of the screen. It does not include the settings panel or the Active Function. Turning off the Meas Bar turns off the settings panel and the Active Function. When the Meas Bar is off, the graticule area expands to fill the area formerly occupied by the Meas Bar.
2. Screen Annotation: this is the annotation and annunciation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) This does NOT include the marker number or the N dB result. When off, the graticule expands to fill the entire graticule area.
3. Trace annotation: these are the labels on the traces, showing their detector (or their math mode).

4. Active Function annotation: this is the active function display in the meas bar, and all of the active function values displayed on softkeys.

See the figure below. Each type of annotation can be turned on and off individually.



Key Path	View/Display, Display
Initial S/W Revision	Prior to A.02.00

Meas Bar On/Off

This function turns the Measurement Bar on and off, including the settings panel. When off, the graticule area expands to fill the area formerly occupied by the Measurement Bar.

Key Path	View/Display, Display, Annotation
Remote Command	:DISPlay:ANNotation:MBAR[:STATe] OFF ON 0 1 :DISPlay:ANNotation:MBAR[:STATe]?
Example	DISP:ANN:MBAR OFF

Dependencies	Grayed out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset	On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off.
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Screen

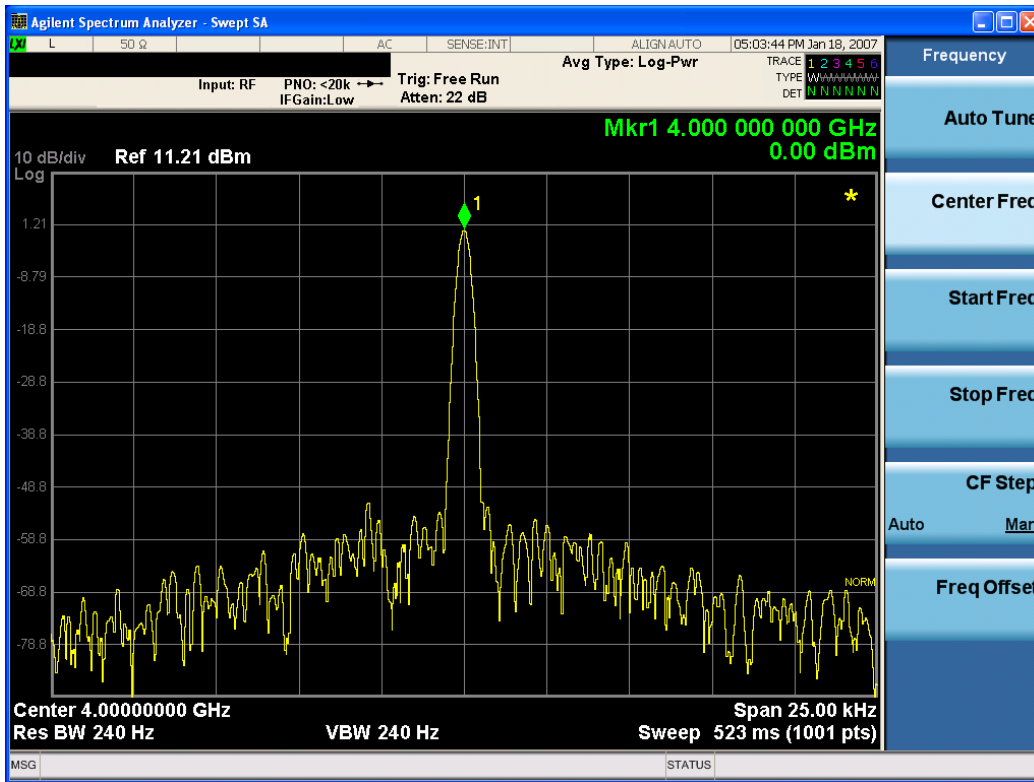
This controls the display of the annunciation and annotation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) and the y-axis annotation. This does NOT include marker annotation (or the N dB result). When off, the graticule expands to fill the entire graticule area, leaving only the 1.5% gap above the graticule as described in the Trace/Detector chapter.

Key Path	View/Display, Display, Annotation
Remote Command	:DISPlay:ANNotation:SCReen[:STATe] OFF ON 0 1 :DISPlay:ANNotation:SCReen[:STATe]?
Example	DISP:ANN:SCR OFF
Dependencies	Grayed-out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset	On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Active Function Values On/Off

Turns on and off the active function display in the Meas Bar, and all of the active function values displayed on the softkeys.

Note that all of the softkeys that have active functions have these numeric values blanked when this function is on. This is a security feature..



Key Path	View/Display, Display, Annotation
Remote Command	:DISPlay:ACTivefunc[:STATE] ON OFF 1 0 :DISPlay:ACTivefunc[:STATE]?
Example	DISP:ACT OFF
Dependencies	Grayed out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset	On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Title

Displays menu keys that enable you to change or clear a title on your display.

Key Path	View/Display, Display
Initial S/W Revision	Prior to A.02.00

Change Title

Writes a title into the "measurement name" field in the banner, for example, "Swept SA".

Press Change Title to enter a new title through the alpha editor. Press Enter or Return to complete the entry. Press ESC to cancel the entry and preserve your existing title.

The display title will replace the measurement name. It remains for this measurement until you press Change Title again, or you recall a state, or a Preset is performed. A title can also be cleared by pressing Title, Clear Title.

NOTE

Notice the inclusion of the <measurement> parameter in the command below. Because each measurement remembers the Display Title, the command must be qualified with the measurement name. For the Swept SA measurement this is not the case; no <measurement> parameter is used when changing the Display Title for the Swept SA measurement.

Key Path	View/Display, Display, Title
Mode	All
Remote Command	:DISPlay:<measurement>:ANNotation:TITLe:DATA <string> :DISPlay:<measurement>:ANNotation:TITLe:DATA?
Example	DISP:ANN:TITL:DATA "This Is My Title" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "This Is My Title" This example is for Measurements other than Swept SA. Both set the title to: This Is My Title
Notes	Pressing this key cancels any active function. When a title is edited the previous title remains intact (it is not cleared) and the cursor goes at the end so that characters can be added or BKSP can be used to go back over previous characters.
Preset	No title (measurement name instead)
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Clear Title

Clears a title from the front-panel display. Once cleared, the title cannot be retrieved. After the title is cleared, the current Measurement Name replaces it in the title bar.

Key Path	View/Display, Display, Title
Example	The following commands clear the title and restore the measurement's original title: DISP:ANN:TITL:DATA "" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "" This example is for ACP; in measurements other than Swept SA the measurement name is required.
Notes	Uses the :DISPlay:<measurement>:ANNotation:TITLe:DATA <string> command with an empty string (in the Swept SA, the <measurement> is omitted).
Preset	Performed on Preset.
Initial S/W Revision	Prior to A.02.00

Graticule

Pressing Graticule turns the display graticule On or Off. It also turns the graticule y-axis annotation on and off.

Key Path	View/Display, Display
Remote Command	:DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe] OFF ON 0 1 :DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe]?
Example	DISP:WIND:TRAC:GRAT:GRID OFF
Notes	The graticule is the set of horizontal and vertical lines that make up the grid/divisions for the x-axis and y-axis.
Preset	On
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00

System Display Settings

These settings are "Mode Global" – they affect all modes and measurements and are reset only by Restore Misc Defaults or Restore System Defaults under System.

Key Path	View/Display, Display
Initial S/W Revision	Prior to A.02.00

Annotation Local Settings

This is a Mode Global override of the meas local annotation settings. When it is All Off, it forces ScreenAnnotation, Meas Bar, Trace, and Active Function Values settings to be OFF for all measurements in all modes. This provides the security based "annotation off" function of previous analyzers; hence it uses the legacy SCPI command.

When it is All Off, the Screen, Meas Bar, Trace, and Active Function Values keys under the Display, Annotation menu are grayed out and forced to Off. When Local Settings is selected, you are able to set the local annotation settings on a measurement by measurement basis.

Key Path	View/Display, Display, System Display Settings
Remote Command	:DISPlay:WINDow[1]:ANNOtation[:ALL] OFF ON 0 1 :DISPlay:WINDow[1]:ANNOtation[:ALL]?
Example	:DISP:WIND:ANN OFF
Preset	On (Set by Restore Misc Defaults)
State Saved	Not saved in instrument state.
Backwards Compatibility Notes	The WINDow parameter and optional subopcode is included for backwards compatibility but ignored – all windows are equally affected.
Initial S/W Revision	Prior to A.02.00

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

Key Path	Save, Screen Image
Remote Command	:MMEMory:STORe:SCReen:THEMe TDColor TDMonochrome FCOLor FMONochrome :MMEMory:STORe:SCReen:THEMe?
Example	:MMEM:STOR:SCR:THEM TDM
Preset	3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes.
Readback	3D Color 3D Mono Flat Color Flat Mono
Backwards Compatibility Notes	In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical.
Initial S/W Revision	Prior to A.02.00

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDC
Readback	3D Color
Initial S/W Revision	Prior to A.02.00

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDM
Readback	3D Mono
Initial S/W Revision	Prior to A.02.00

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FCOL
Readback	Flat Color
Initial S/W Revision	Prior to A.02.00

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FMON
Readback	Flat Mono
Initial S/W Revision	Prior to A.02.00

Backlight

Accesses the display backlight on/off keys. This setting may interact with settings under the Windows "Power" menu.

When the backlight is off, pressing ESC, TAB, SPACE, ENTER, UP, DOWN, LEFT, RIGHT, DEL, BKSP, CTRL, or ALT turns the backlight on without affecting the application. Pressing any other key will turn backlight on and could potentially perform the action as well.

Key Path	View/Display, Display, System Display Settings
Remote Command	:DISPlay:BACKlight ON OFF :DISPlay:BACKlight?
Preset	ON (Set by Restore Misc Defaults)
Initial S/W Revision	Prior to A.02.00

Backlight Intensity

An active function used to set the backlight intensity. It goes from 0 to 100 where 100 is full on and 0 is off. This value is independent of the values set under the Backlight on/off key.

Key Path	View/Display, Display, System Display Settings
Remote Command	:DISPlay:BACKlight:INTensity <integer> :DISPlay:BACKlight:INTensity?
Example	DISP:BACK:INT 50

Preset	100 (Set by Restore Misc Defaults)
Min	0
Max	100
Initial S/W Revision	Prior to A.02.00

Burst View

This view shows power vs. time and mask result for a GSMK-modulated burst. The view has two windows:

- "RF Envelope Window" on page 1704
- "Numeric Results Window" on page 1705

For the associated Remote Commands, see the subtopics under "View/Display" on page 1695.

The figure below shows an example of the Burst View.

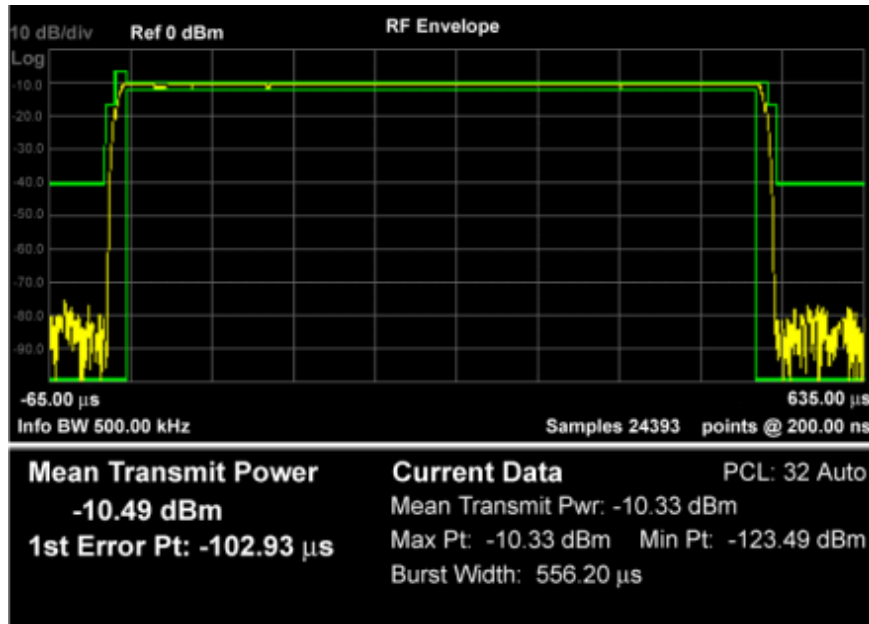


Figure 0-1 Burst View for GSMK Power vs. Time Measurement

RF Envelope Window

Shows the trace and mask lines.

The following tables provide details of the traces and masks.

Measured Trace

Marker Trace	Yes
Corresponding Trace	n=7
Color	Yellow

Max Hold Trace

Marker Trace	Yes
Corresponding Trace	n=8
Color	Water Blue

Min Hold Trace

Marker Trace	Yes
Corresponding Trace	n=9
Color	Magenta

Upper Mask

Marker Trace	Yes
Corresponding Trace	n=3
Color	Green

Lower Mask

Marker Trace	Yes
Corresponding Trace	n=4
Color	Green

Numeric Results Window

Name	Corresponding Trace	Description	Display Format
Mean Transmit Power	n=1, 3rd	The power of N averaged bursts, if averaging is on. The power is averaged across the useful part of the burst. If there are multiple bursts in the acquired trace, only one burst is used for average. This means that N traces are acquired to make the complete average. If " Avg/Hold Num " on page 1622 is off or the number is 1, this number is the power averaged across the useful part of the most recently acquired data.	##.## dBm
Mean Transmit Power (Current	n=1, 2nd	The power averaged across the useful part of the most recently acquired data.	##.## dBm

Data)		If "Avg/Hold Num" on page 1622 is off or the number is 1, disappear from the window since the number is identical to the Mean Transmit Power above.	
Max Pt (Current Data)	n=1, 9th	The maximum value of the most recently acquired data.	##.## dBm
Min Pt (Current Data)	n=1, 10th	The minimum value of the most recently acquired data.	##.## dBm
Burst Width	n=1, 8th	The width of the burst measured at -3dB below the mean power in the useful part of the burst.	###.## μs
1st Error Pt	n=1, 13th	The time which indicates the point on the X Scale where the first failure of a signal was detected. Use a marker to locate this point in order to examine the nature of the failure. If the limit passes, disappear from the window.	##.## μs
PCL	None	Power Control Level determined by the Mean Transmit Power and used to determine the limit mask. Auto disappears when [:SENSe]:RADio:PCL:STATe is set to 0 Off.	PCL: ## Auto

Key Path	View/Display
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Rise & Fall View

This view has three windows:

Rising RF Envelope Window.	The parameters of this window are identical to those of the "RF Envelope Window" on page 1704 in the "Burst View" on page 1704.
Falling RF Envelope Window.	The parameters of this window are identical to those of the "RF Envelope Window" on page 1704 in the "Burst View" on page 1704.
Numeric Results Window.	The parameters of this window are identical to those of the "Numeric Results Window" on page 1705 in the "Burst View" on page 1704.

For the associated Remote Commands, see the subtopics under "View/Display" on page 1695.

The figure below shows an example of the Rise & Fall View.

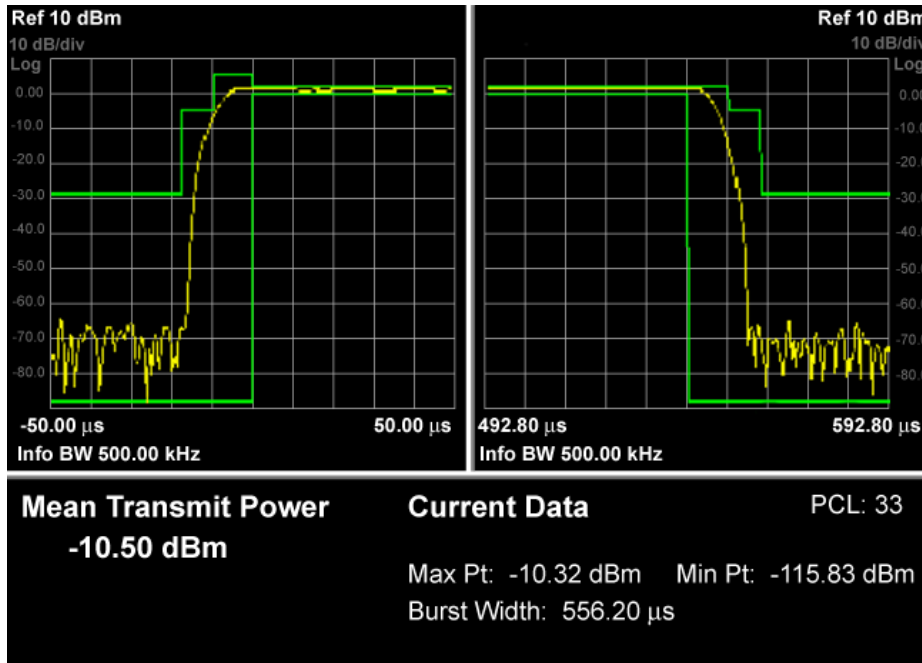


Figure 0-2 Rise & Fall View for GSMK Power vs. Time Measurement

Key Path	View/Display
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Multi-Slot View

This view has two windows:

- "RF Envelope Window" on page 1708
- "Numeric Results Window" on page 1708

For the associated Remote Commands, see the subtopics under "View/Display" on page 1695.

The figure below shows an example of the Multi-Slot View.

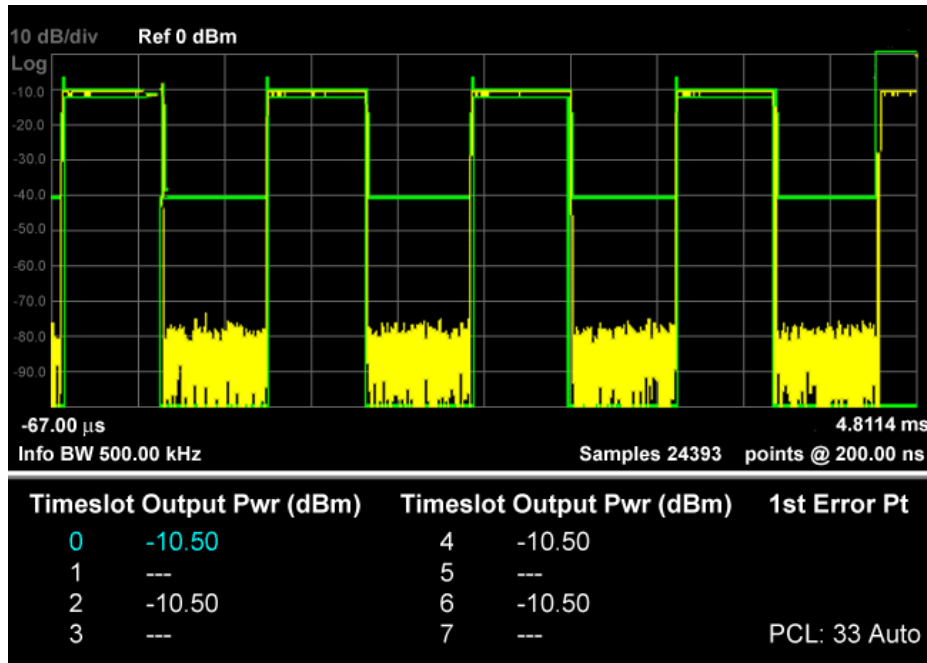


Figure 0-3 Multi Slot View for GSMK Power vs. Time Measurement

RF Envelope Window

The parameters of this window are identical to those of the "RF Envelope Window" on page 1704 in the "Burst View" on page 1704.

Numeric Results Window

The output power of multi slots whose number is defined by Meas Time.

Name	Corresponding Trace	Description	Display Format
1st Error Pt	None	The time which indicates the point on the X Scale where the first failure of a signal was detected. Use a marker to locate this point in order to examine the nature of the failure. If the limit passes, disappear from the window.	###.## μs
Timeslot Output Pwr	n=7	Power level values for each slot in the current frame	##.## dBm
PCL	None	Power Control Level that determined by the Mean Transmit Power and used to determine the limit mask. Auto disappears when [:SENSE]:RADio:PCL:STATe is set to 0 Off.	PCL: ## Auto

Key Path	View/Display
Mode	EDGE/GSM
Initial S/W Revision	Prior to A.02.00

Limit Mask

This setting is used to show (On) or hide (Off) the limit mask that is displayed on the graticule.

NOTE This does not affect any calculation taking place.

Key Path	View/Display
Mode	GSM
Remote Command	:DISPlay:PVTime:LIMit:MASK OFF ON 0 1 :DISPlay:PVTime:LIMit:MASK?
Example	DISP:PVT:LIM:MASK 1 DISP:PVT:LIM:MASK?
Notes	This parameter only hides or shows the limit mask line on the display. PASS/FAIL limit check will be done if " Limit Test " on page 1626 is set to On whether Limit Mask state is set to On or Off. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

15 GSMK Phase and Frequency Measurement

Phase and frequency error are the measures of modulation quality for GSM systems. Since GSM systems use relative phase to transmit information, the phase and frequency accuracy of the transmitter are critical to the systems' performance and ultimately affect range.

This topic contains the following sections:

"Measurement Commands for GSMK Phase & Frequency" on page 1712

"Remote Command Results for GSMK Phase & Frequency" on page 1713

Measurement Commands for GMSK Phase & Frequency

The following commands and queries are used to retrieve the measurement results:

`:CONFigure:PFERror`

`:CONFigure:PFERror:NDEFault`

`:INITiate:PFERror`

`:FETCh:PFERror[n]?`

`:READ:PFERror[n]?`

`:MEASure:PFERror[n]?`

For more measurement related commands, see the section ["Remote Measurement Functions" on page 2301](#).

Remote Command Results for GMSK Phase & Frequency

For the queries listed above, the results returned depend on the value of n, as follows.

n	Results Returned
0	Returns unprocessed I/Q trace data, as a series of comma-separated trace points, in volts. The I values are listed first in each pair, using the 0 through even-indexed values. The Q values are the odd-indexed values.
not specified or n = 1	<p>Returns the 10 following scalar results:</p> <p>The result depends on the Average Type setting (Maximum or Mean) if the average state is ON. The average type is a remote command only parameter.</p> <p>Average type is:</p> <ul style="list-style-type: none"> • Maximum (default setting) : Detected Maximum value in average cycle • Mean : Averaged value in average cycle <ol style="list-style-type: none"> 1. RMS Phase Error is a floating point number (in degrees) of the rms phase error between the measured phase and the ideal phase. The calculation is based on symbol decision points and points halfway between symbol decision points (i.e. 2 points/symbol). 2. Peak Phase Error is a floating point number (in degrees) of the peak phase error of all the individual symbol decision points (prior to the rms averaging process). 3. Peak Phase Error Symbol Position is a floating point number (in symbols) representing the symbol number at which the peak phase error occurred. 4. Frequency Error is a floating point number (in Hz) of the frequency error in the measured signal. This is the difference between the measured phase trajectory and the reference phase trajectory. 5. I/Q Origin Offset is a floating point number (in dB) of the I and Q error (magnitude squared) offset from the origin. 6. Trace Phase Sample is a floating point number (in units of bits) representing the time between samples. It is used in querying phase error vector traces. 7. Trace bit 0 Decision Offset is an integer number in units of sample pairs for the sample points in an I/Q vector trace that represents the bit 0 (zero) decision point. The sample pairs in the trace are numbered 0 to N. 8. Trace Sync Start is an integer number in units of bits for the bit number, within the data bits trace, that represents the start of the sync word. 9. Trace Time Sample is a floating point number (in second) of the time between samples. It is used in querying time domain traces. For the n=0 trace, of acquired I/Q pairs, this is the time between pairs. 10. T0 Offset is a floating-point number of the time interval between the trigger point to T0. T0 means the transition time from symbol 13 to symbol 14 of the midamble training sequence for each time slot. Unit is sec.
2	Returns a series of floating point numbers (in degrees) that represent each sample in the phase error trace. The first number is the symbol 0 decision point and there are 10 points per symbol. Therefore, decision points are at 0, 10, 20, etc.
3	Returns a series of floating point numbers (in degrees) that represent each sample in the phase error with frequency trace. Phase error with frequency is the error vector between the measured phase (that has not had frequency compensation) and the ideal

n	Results Returned
	reference phase. The calculation is based on symbol decision points and points halfway between symbol decision points (i.e. 2 points/symbol). The first number is the symbol 0 decision point and there are 10 points per symbol. Therefore, decision points are at 0, 10, 20, etc.
4	Returns a series of floating point numbers that represent each sample in the log magnitude trace of the original time record. Each number represents a value (in dBm) of the time record.
5	Returns a series of floating point numbers that alternately represent I and Q pairs of the corrected measured trace. The magnitude of each I and Q pair are normalized to 1.0. The first number is the in-phase (I) sample of symbol 0 decision point and the second is the quadrature-phase (Q) sample of symbol 0 decision point. As in the rms phase error, there are ten points per symbol, so that: 1st number = I of the symbol 0 decision point 2nd number = Q of the symbol 0 decision point ... 10th number = Q of the symbol 0 decision point 11th number = I of the symbol 1 decision point 12th number = Q of the symbol 1 decision point ... Nth number = Q of the symbol N decision point
6	Returns a series of logical values (0 or 1) that represent the demodulated bit value of the measured waveform. The first number is the symbol 0 decision point and there are 1 point per symbol. Therefore, decision points are at 0, 1, 2, etc.
7	Returns comma-separated scalar values of pass/fail (0.0 = passed, 1.0 = failed) results determined by testing Phase and Frequency Error. The tested results are changed between Maximum and Average. It depends on the Average Type (:PFER:AVER:TYPE) setting. 1. Test results of RMS Phase Error 2. Test results of Peak Phase Error 3. Test results of Frequency Error
8	Returns the following 22 scalar results: 1. Average RMS Phase Error is a floating point number (in degrees) of the rms phase error between the measured phase and the ideal phase. The calculation is based on symbol decision points and points halfway between symbol decision points (i.e. 2 points/symbol). If averaging is ON, this is the average of the individual rms phase error. 2. Maximum RMS Phase Error is a floating point number (in degrees) of the rms phase error between the measured phase and the ideal phase. The calculation is based on symbol decision points and points halfway between symbol decision points (i.e. 2 points/symbol). If averaging is ON, this is the max hold number of the individual rms phase error. 3. Average Peak Phase Error is a floating point number (in degrees) of the peak phase error of all the individual symbol decision points (prior to the rms averaging process). If averaging is ON, this is the average of the individual peak phase error.

n	Results Returned
	<p>4. Maximum Peak Phase Error is a floating point number (in degrees) of the peak phase error of all the individual symbol decision points (prior to the rms averaging process). If averaging is ON, this is the max hold number of the individual peak phase error.</p> <p>5. Average Peak Phase Error Symbol Position is a floating point number (in symbols) representing the symbol number at which the peak phase error occurred. If averaging is ON, keeps the position that has the worst phase error.</p> <p>6. Maximum Peak Phase Error Symbol Position is a floating point number (in symbols) representing the symbol number at which the peak phase error occurred. If averaging is ON, keeps the position that has the worst maximum peak phase error.</p> <p>7. Average Frequency Error is a floating point number (in Hz) of the frequency error in the measured signal. This is the difference between the measured phase trajectory and the reference phase trajectory. If averaging is ON, this is the average of the individual frequency error.</p> <p>8. Maximum Frequency Error is a floating point number (in Hz) of the frequency error in the measured signal. This is the difference between the measured phase trajectory and the reference phase trajectory. If averaging is ON, this is the max hold number of the individual frequency error.</p> <p>9. Average I/Q Origin Offset is a floating point number (in dB) of the I and Q error (magnitude squared) offset from the origin. If averaging is ON, this is the average of the individual IQ Offset.</p> <p>10. Maximum I/Q Origin Offset is a floating point number (in dB) of the I and Q error (magnitude squared) offset from the origin. If averaging is ON, this is the max hold number of the individual IQ Offset</p> <p>11. Average T0 Offset is a floating-point number of the time interval between the trigger point to T0. T0 means the transition time from symbol 13 to symbol 14 of the midamble training sequence for each time slot. Unit is sec. If averaging is ON, this is the average of the T0 offset.</p> <p>12. Maximum T0 Offset is a floating-point number of the time interval between the trigger point to T0. T0 means the transition time from symbol 13 to symbol 14 of the midamble training sequence for each time slot. Unit is sec. If averaging is ON, this is the max hold number of the T0 offset.</p> <p>13. Trace Phase Sample is a floating point number (in units of bits) representing the time between samples. It is used in querying phase error vector traces.</p> <p>14. Trace bit 0 Decision Offset is an integer number in units of sample pairs for the sample points in an I/Q vector trace that represents the bit 0 (zero) decision point. The sample pairs in the trace are numbered 0 to N.</p> <p>15. Trace Sync Start is an integer number in units of bits for the bit number, within the data bits trace, that represents the start of the sync word.</p> <p>16. Trace Time Sample is a floating point number (in second) of the time between samples. It is used in querying time domain traces. For the n=0 trace, of acquired I/Q pairs, this is the time between pairs.</p> <p>17. Detected TSC is the most recently detected TSC. The returned value is 0~7 (Burst Type : Normal), 10 (Burst Type : Sync), 20 (Burst Type : Access) if TSC detected. If TSC(Normal), Extended Training Sequence Bits(Sync) or Synch. Sequence Bits (Access) not detected, the returned value is -999.0. If Amptd or NONE(Power vs Time only) specified in Sync Type, the returned value is -999.0. In multi slot</p>

n	Results Returned
	<p>condition, the returned value is the detected TSC of the specified slot(Time Slot ON) or the first evaluated slot(Time Slot OFF).</p> <p>18. Reserved for future use - the value returned is -999.0 (floating point).</p> <p>19. Reserved for future use - the value returned is -999.0 (floating point).</p> <p>20. Reserved for future use - the value returned is -999.0 (floating point).</p> <p>21. Reserved for future use - the value returned is -999.0 (floating point).</p> <p>22. Reserved for future use - the value returned is -999.0 (floating point).</p>

Key Path	Meas
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

AMPTD Y Scale

The Amplitude front-panel key activates the Amplitude menu and selects Reference Level or Reference Value (depending on the measurement) as the active function.

Some features in the Amplitude menu apply to multiple measurements; others apply only to specific measurements. Keys that only apply to some measurements are blanked or grayed out in measurements that are not supported.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Ref Value

Allows you to set the reference value, using absolute degree (Phase Error and Phase Error w/Freq) or absolute power (RF Envelope).

See also:

- ["Ref Value \(Phase Error and Phase Error w/Freq window\)" on page 1717](#)
- ["Ref Value \(RF Envelope window\)" on page 1718](#)

Key Path	AMPTD Y Scale
Mode	GSM
Initial S/W Revision	Prior to A.02.00

Ref Value (Phase Error and Phase Error w/Freq window)

Allows you to set the absolute degree reference.

Key Path	AMPTD Y Scale
Mode	GSM
Remote Command	:DISPlay:PFERror:VIEW[1]:WINDow[1] 2:TRACe:Y[:SCALe]:RLEVel <real> :DISPlay:PFERror:VIEW[1]:WINDow[1] 2:TRACe:Y[:SCALe]:RLEVel?
Example	DISP:PFER:VIEW:WIND:TRAC:Y:RLEV 5 DISP:PFER:VIEW:WIND:TRAC:Y:RLEV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	When "Auto Scaling" on page 1736 is On, this value is automatically determined by the measurement result. When the user sets this value manually, "Auto Scaling" on page 1736 automatically changes to Off.
Preset	0.00
State Saved	Saved in instrument state.

Min	-36000.0
Max	36000.0
Initial S/W Revision	Prior to A.02.00

Ref Value (RF Envelope window)

Allows you to set the absolute power reference.

Key Path	AMPTD Y Scale
Mode	GSM
Remote Command	:DISPlay:PFERror:VIEW[1]:WINDow3:TRACe:Y[:SCALE]:RLEVel <real> :DISPlay:PFERror:VIEW[1]:WINDow3:TRACe:Y[:SCALE]:RLEVel?
Example	DISP:PFER:VIEW:WIND3:TRAC:Y:RLEV 4 DISP:PFER:VIEW:WIND3:TRAC:Y:RLEV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	When " Auto Scaling " on page 1736 is On, this value is automatically determined by the measurement result. When the user sets this value manually, " Auto Scaling " on page 1736 automatically changes to Off.
Preset	0.00
State Saved	Saved in instrument state.
Min	-250.0
Max	250.0
Initial S/W Revision	Prior to A.02.00

Attenuation

This menu controls the attenuator functions and interactions between the attenuation system components.

There are two attenuator configurations in the X-Series. One is a dual attenuator configuration consisting of a mechanical attenuator and an optional electronic attenuator. The other configuration uses a single attenuator with combined mechanical and electronic sections that controls all the attenuation functions. Different models in the X-Series come with different configurations.

See "**Dual Attenuator Configurations:**" on page 1719

See "**Single Attenuator Configuration:**" on page 1719

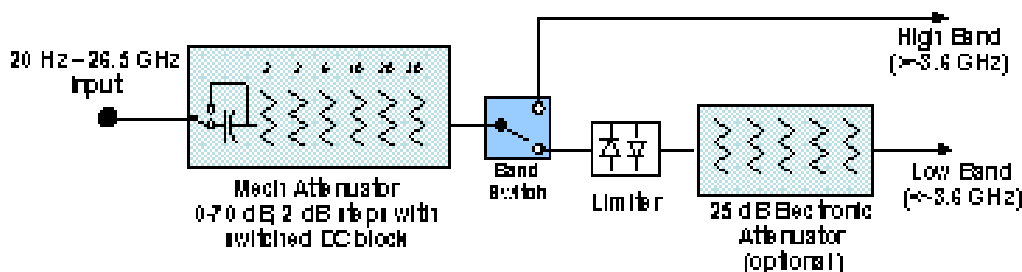
Most Attenuation settings are the same for all measurements – they do not change as you change measurements. Settings like these are called “Meas Global” and are unaffected by Meas Preset.

Key Path	AMPTD Y Scale
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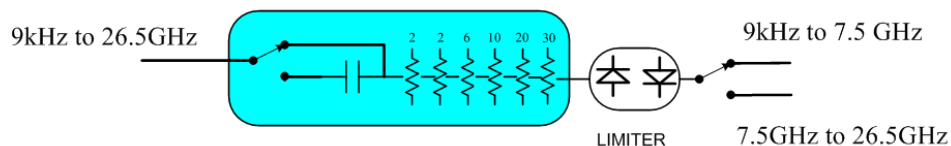
Scope	Meas Global
Dependencies	In measurements that support the I/Q inputs, this key is unavailable when I/Q is the selected input, and is replaced by the Range key in that case.
Readback Line	Contains a summary in [] brackets of the current total attenuation. See the descriptions of the , " (Mech) Atten " on page 2242, and " Enable Elec Atten " on page 2244 keys for more detail on the contributors to the total attenuation. Note that when "Pre-Adjust for Min Clip" is on, this value can change at the start of every measurement.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Dual Attenuator Configurations:

Configuration 1: Mechanical attenuator + optional electronic attenuator

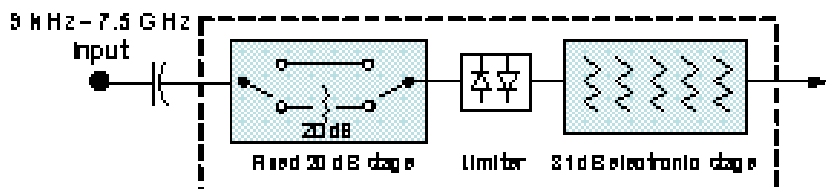


Configuration 2: Mechanical attenuator, no optional electronic attenuator

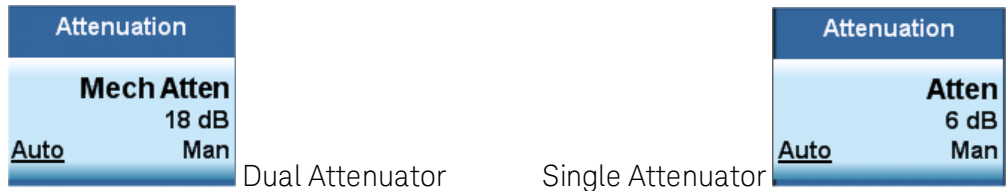


(note that Configuration 2 is not strictly speaking a dual-section attenuator, since there is no electronic section available. However, it behaves exactly like Configuration 1 without the Electronic Attenuator option EA3, therefore for the sake of this document it is grouped into the "Dual Attenuator" configuration)

Single Attenuator Configuration:



You can tell which attenuator configuration you have by pressing the Attenuation key, which (in most Modes) opens the Attenuation menu. If the first key in the Attenuation menu says Mech Atten you have the dual attenuator configuration. If the first key says Atten you have the single attenuator configuration.



In the single attenuator configuration, you control the attenuation with a single control, as the fixed stage has only two states. In the dual attenuator configuration, both stages have significant range so you are given separate control of the mechanical and electronic attenuator stages.

When you have the dual attenuator configuration, you may still have only a single attenuator, because unless option EA3 (the Electronic Attenuator option) is available, and you purchase it, you will have only the mechanical attenuator.

(Mech) Atten

This key is labeled Mech Atten in dual attenuator models and Atten in single attenuator models. In the dual attenuator configuration, this key only affects the mechanical attenuator.

This key lets you modify the attenuation applied to the RF input signal path. This value is normally auto coupled to the Ref Level, the Internal Preamp Gain, any External Gain that is entered, and the Max Mixer Level, as described in the table below.

See "[Attenuator Configurations and Auto/Man](#)" on page 1721

Key Path	AMPTD Y Scale, Attenuation
Remote Command	[:SENSe]:POWer[:RF]:ATTenuation <rel_ampl> [:SENSe]:POWer[:RF]:ATTenuation? [:SENSe]:POWer[:RF]:ATTenuation:AUTO OFF ON 0 1 [:SENSe]:POWer[:RF]:ATTenuation:AUTO?
Example	POW:ATT 20 Dual attenuator configuration: sets the mechanical attenuator to 20 dB Single attenuator mode: sets the main attenuation to 20 dB (see below for definition of "main" attenuation). If the attenuator was in Auto, it sets it to Manual.
Dependencies	Some measurements do not support the Auto setting of (Mech) Atten. In these measurements, the Auto/Man selection is not available, and the Auto/Man line on the key disappears. In dual attenuator configurations, when the electronic attenuator is enabled, the mechanical attenuator has no auto setting and the Auto/Man line on the key disappears. The state of Auto/Man is remembered and restored when the electronic attenuator is once again disabled. This is described in more detail in the " Enable Elec Atten " on page 2244 key description. See " Attenuator Configurations and Auto/Man " on page 1721 for more information on the Auto/Man functionality of Attenuation.

Couplings

	<p>When (Mech) Atten is in Auto, it uses the following algorithm to determine a value: If the USB Preamp is connected to USB, use 0 dB. Otherwise, $Atten = ReferenceLevel + PreAmpGain + ExternalGain - RefLevelOffset - MaxMixerLevel + IF\ Gain$. Limit this value to be between 6 dB and the Max value. No value below 6 dB can ever be chosen by Auto. The resulting value is rounded up to the largest value possible given the attenuation step setting. That is, 50.01 dB would change to 60 dB (for a 10 dB attenuation step). The "IF Gain" term in the equation above is either 0 dB or +10 dB, depending on the settings of FFT IF Gain, Swept IF Gain, max Ref Level and the Auto/Man setting of Mech Atten. In External Mixing and BBIQ, where the Attenuator is not in the signal path, the Attenuator setting changes as described above when (Mech) Atten is in Auto, but no changes are made to the actual attenuator hardware setting until the input is changed back to the RF Input.</p>
Preset	<p>The preset for Mech Attenuation is "Auto." The Auto value of attenuation is: CXA, EXA, MXA and PXA: 10 dB</p>
State Saved	Saved in instrument state
Min	<p>0 dB The attenuation set by this key cannot be decreased below 6 dB with the knob or step keys. To get to a value below 6 dB it has to be directly entered from the keypad or via SCPI. This protects from adjusting the attenuation to a dangerously small value which can put the instrument at risk of damage to input circuitry. However, if the current mechanical attenuation is below 6 dB it can be increased with the knob and step keys, but not decreased.</p>
Max	<p>CXA N9000A-503/507: 50 dB CXA N9000A-513/526: 70dB EXA: 60 dB MXA and PXA: 70 dB In the single attenuator configuration, the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB.</p>
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Attenuator Configurations and Auto/Man

As described in the Attenuation key description, there are two distinct attenuator configurations available in the X-Series, the single attenuator and dual attenuator configurations. In dual attenuator configurations, we have the mechanical attenuation and the electronic attenuation, and the current total attenuation is the sum of the electronic + mechanical attenuation. In single attenuator configurations, we refer to the attenuation set using the (Mech) Atten key (or POW:ATT SCPI) as the "main" attenuation; and the attenuation that is set by the SCPI command POW:EATT as the "soft" attenuation (the POW:EATT command is honored even in the single attenuator configuration, for compatibility purposes). Then the

current total attenuation is the sum of the main + soft attenuation. See the Elec Atten key description for more on “soft” attenuation.

In the dual attenuator configuration, when the electronic attenuator is enabled, there is no Auto/Man functionality for the mechanical attenuator, and the third line of the key label (the Auto/Man line) disappears:



Enable Elec Atten

Enables the Electronic Attenuator.

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear. These advantages primarily aid in remote operation and are negligible for front panel use. See ["Using the Electronic Attenuator: Pros and Cons" on page 1724](#) for a detailed discussion of the pros and cons of using the electronic attenuator.

For the single attenuator configuration, for SCPI backwards compatibility, the “soft” attenuation feature replaces the dual attenuator configuration’s electronic attenuator. All the same couplings and limitations apply. See ["Attenuator Configurations and Auto/Man" on page 2244](#)

See ["More Information" on page 1723](#)

Key Path	AMPTD Y Scale, Attenuation
Remote Command	[:SENSe] :POWeR [:RF] :EATTenuation :STATe OFF ON 0 1 [:SENSe] :POWeR [:RF] :EATTenuation :STATe ?
Example	POW:EATT:STAT ON
Dependencies	<p>This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no “electronic attenuator” there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a “soft” attenuation as described in "Attenuator Configurations and Auto/Man" on page 2244.</p> <p>The electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable above 3.6 GHz. Therefore, if the Stop Frequency of the analyzer is > 3.6 GHz then the Enable Elec Atten key will be OFF and grayed out.</p> <p>If the Internal Preamp is on, meaning it is set to Low Band or Full, the electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable. In this case the Enable Elec Atten key will be OFF and grayed out.</p> <p>If either of the above is true, if the SCPI command is sent, an error indicating that the electronic attenuator is unavailable will be sent.</p> <p>If the electronic/soft Attenuator is enabled, then the Stop Freq of the analyzer is limited to 3.6 GHz and the Internal Preamp is unavailable.</p> <p>The SCPI-only “soft” electronic attenuation for the single-attenuator configuration is not available in</p>

	all measurements; in particular, it is not available in the Swept SA measurement.
Couplings	Enabling and disabling the Electronic Attenuator affects the setting of the Mechanical Attenuator (in dual attenuator configurations). This is described in more detail below this table.
Preset	OFF for Swept SA measurement; ON for all other measurements that support the electronic attenuator
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

More Information

Mechanical Attenuator Transition Rules

When the Electronic Attenuator is enabled, the Mechanical Attenuator transitions to a state that has no Auto function. Below are the rules for transitioning the Mechanical Attenuator. NOTE that the information below ONLY applies to the dual attenuator configurations, and ONLY when the Electronic Attenuator is installed:

When the Electronic Attenuation is enabled from a disabled state:

- The Mechanical Attenuator is initialized to 10 dB (this is its optimal performance setting). You can then set it as desired with SCPI, numeric keypad, step keys, or knob, and it behaves as it normally would in manual mode
- The Auto/Man state of (Mech) Atten is saved
- The Auto/Man line on the (Mech) Atten key disappears and the auto rules are disabled
- The Electronic Attenuator is set to 10 dB less than the previous value of the Mechanical Attenuator, within the limitation that it must stay within the range of 0 to 24 dB of attenuation.

Examples in the dual attenuator configuration:

- Mech Atten at 20 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 10 dB. New total attenuation equals the value before Elec Atten enabled.
- Mech Atten at 0 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 0 dB. New total attenuation does not equal the value before Elec Atten enabled.
- Mech Atten at 40 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 24 dB. New total attenuation does not equal the value before Elec Atten enabled.

When the Electronic Attenuation is disabled from an enabled state:

- The Elec Atten key is grayed out
- The Auto/Man state of (Mech) Atten is restored
- If now in Auto, (Mech) Atten recouples

- If now in Man, (Mech) Atten is set to the value of total attenuation that existed before the Elec Atten was disabled. The resulting value is rounded up to the smallest value possible given the (Mech) Atten Step setting - (That is, 57 dB changes to 58 dB when (Mech) Atten Step is 2 dB.)

Using the Electronic Attenuator: Pros and Cons

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear.

The “finer steps” advantage of the electronic attenuator is beneficial in optimizing the alignment of the analyzer dynamic range to the signal power in the front panel as well as remote use. Thus, you can achieve improved relative signal measurement accuracy. Compared to a mechanical attenuator with 2 dB steps, the 1 dB resolution of the electronic attenuator only gives better resolution when the odd-decibel steps are used. Those odd-decibel steps are less accurately calibrated than the even-decibel steps, so one tradeoff for this superior relative accuracy is reduced absolute amplitude accuracy.

Another disadvantage of the electronic attenuator is that the spectrum analyzer loses its “Auto” setting, making operation less convenient.

Also, the relationship between the dynamic range specifications (TOI, SHI, compression and noise) and instrument performance are less well-known with the electrical attenuator. With the mechanical attenuator, TOI, SHI and compression threshold levels increase dB-for-dB with increasing attenuation, and the noise floor does as well. With the electronic attenuator, there is an excess attenuation of about 1 to 3 dB between 0 and 3.6 GHz, making the effective TOI, SHI, and so forth, less well known. Excess attenuation is the actual attenuation relative to stated attenuation. Excess attenuation is accounted for in the analyzer calibration

Elec Atten

Controls the Electronic Attenuator in dual attenuator configurations. This key does not appear in single attenuator configurations, as the control of both the mechanical and electronic stages of the single attenuator is integrated into the single Atten key.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	<code>[:SENSe] :POWer [:RF] :EATTenuation <rel_amp1></code> <code>[:SENSe] :POWer [:RF] :EATTenuation?</code>
Notes	Electronic Attenuation's specification is defined only when Mechanical Attenuation is 6 dB.
Dependencies	This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no “electronic attenuator” there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a “soft” attenuation as described in "Attenuator Configurations and Auto/Man" on page 2244 . The “soft” attenuation is treated as an addition to the “main” attenuation value set by the Atten softkey or the POW:ATT SCPI command and affects the total attenuation displayed on the Attenuation key and the Meas Bar. When Enable Elec Atten is off or grayed out, the Elec Atten key is grayed out.
Preset	0 dB
State Saved	Saved in instrument state

Min	0 dB
Max	Dual attenuator configuration: 24 dB Single attenuator configuration: the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Adjust Atten for Min Clip

Sets the combination of mechanical and electronic attenuation and gain based on the current measured signal level so that clipping will be at a minimum.

This is an "immediate action" function, that is, it executes once, when the key is pressed.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	<code>[:SENSe] :POWer [:RF] :RANGe:OPTimize IMMEDIATE</code>
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Pre-Adjust for Min Clip

If this function is on, it does the adjustment described under "[Adjust Atten for Min Clip](#)" on page 2247 each time a measurement restarts. Therefore, in Continuous measurement mode, it only executes before the first measurement.

In dual attenuator models, you can set Elec+Mech Atten, in which case both attenuators participate in the autoranging, or Elec Atten Only, in which case the mechanical attenuator does not participate in the autoranging. This latter case results in less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	<code>[:SENSe] :POWer [:RF] :RANGe:OPTimize:ATTenuation OFF ELECTrical COMBined</code> <code>[:SENSe] :POWer [:RF] :RANGe:OPTimize:ATTenuation?</code>
Notes	The SCPI parameter ELECTrical sets this function to On in single attenuator models. The SCPI parameter COMBined is mapped to ELECTrical in single attenuator models; if you send COMBined, it sets the function to On and returns ELEC to a query.
Dependencies	This key only appears in Dual Attenuator models with an Electronic Attenuator installed.

	In instruments with Dual Attenuator model, when Enable Elec Atten is off or grayed out, the Pre-Adjust for Min Clip key is grayed out.
Preset	OFF for Swept SA measurement; ON for all other measurements that support Pre-Adjust for Min Clip
State Saved	Saved in instrument state
Range	Dual attenuator models: Off Elec Atten Only Mech + Elec Atten Single attenuator models: Off On
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Remote Command	<code>[:SENSe] :POWer [:RF] :RANGe :AUTO ON OFF 1 0</code> <code>[:SENSe] :POWer [:RF] :RANGe :AUTO ?</code>
Notes	ON aliases to "Elec Atten Only" (:POW:RANG:OPT:ATT ELEC) OFF aliases to "Off" (:POW:RANG:OPT:ATT OFF) The query :POW:RANG:AUTO? returns true if :POW:RANG:OPT:ATT is not "Off"
Initial S/W Revision	Prior to A.02.00

Off

Turns Pre-Adjust for Min Clip off. This is the default setting.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip
Example	:POW:RANG:OPT:ATT OFF
Initial S/W Revision	Prior to A.02.00

Elec Atten Only

Selects only the electric attenuator to participate in auto ranging. This offers less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip
Example	:POW:RANG:OPT:ATT ELEC
Initial S/W Revision	Prior to A.02.00

Mech + Elec Atten

In dual attenuator models, this selects both attenuators participate in the autoranging.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip
Example	:POW:RANGe:OPT:ATT COMB
Initial S/W Revision	Prior to A.02.00

(Mech) Atten Step

This controls the step size used when making adjustments to the input attenuation.

This key is labeled Mech Atten Step in dual attenuator models and Atten Step in single attenuator models. In the dual attenuator configuration, this key only affects the step size of the mechanical attenuator.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	<code>[:SENSe] :POWer [:RF] :ATTenuation :STEP [:INCRement] 10 dB 2 dB</code> <code>[:SENSe] :POWer [:RF] :ATTenuation :STEP [:INCRement] ?</code>
Example	POW:ATT:STEP 2
Notes	Note this feature works like a 1-N choice from the front panel, but it takes a specific value (in dB) when used remotely. The only valid values are 2 and 10.
Dependencies	Blanked in CXA and EXA if option FSA (2 dB steps) is not present. If blanked, attempts to set it via SCPI will yield an error.
Couplings	When the attenuation step size changes, the current mechanical attenuation value is adjusted (if necessary) to be quantized to the new step size. That is, if step is set to 10 dB, mech atten is increased if necessary so it is a multiple of 10 dB
Preset	PXA and MXA: 2 dB EXA and CXA: 10 dB (2 dB with option FSA)
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Scale/Div

Sets the Y scale per division on the display, using absolute degree (Phase Error and Phase Error w/Freq) or absolute power (RF Envelope).

See also:

- ["Ref Value \(Phase Error and Phase Error w/Freq window\)" on page 1717](#)

- "Scale/Division (RF Envelope window)" on page 1728

Key Path	AMPTD Y Scale
Mode	GSM
Initial S/W Revision	Prior to A.02.00

Scale/Div (Phase Error and Phase Error w/Freq window)

Allows you to enter a numeric value to change the vertical display sensitivity.

Key Path	AMPTD Y Scale
Mode	GSM
Remote Command	:DISPlay:PFERror:VIEW[1]:WINDow[1] 2:TRACe:Y[:SCALe]:PDIVision <real> :DISPlay:PFERror:VIEW[1]:WINDow[1] 2:TRACe:Y[:SCALe]:PDIVision?
Example	DISP:PFER:VIEW:WIND:TRAC:Y:PDIV 10 DISP:PFER:VIEW:WIND:TRAC:Y:PDIV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	When Y Auto Scaling is On, this value is automatically determined by the measurement result. When the user sets this value manually, Y Auto Scaling automatically changes to Off.
Preset	5.00
State Saved	Saved in instrument state.
Min	0.01
Max	360
Initial S/W Revision	Prior to A.02.00

Scale/Division (RF Envelope window)

Allows you to enter a numeric value to change the vertical display sensitivity.

Key Path	AMPTD Y Scale
Mode	GSM
Remote Command	:DISPlay:PFERror:VIEW[1]:WINDow3:TRACe:Y[:SCALe]:PDIVision <rel_amp1> :DISPlay:PFERror:VIEW[1]:WINDow3:TRACe:Y[:SCALe]:PDIVision?
Example	DISP:PFER:VIEW:WIND3:TRAC:Y:SCAL:PDIV 10 DISP:PFER:VIEW:WIND3:TRAC:Y:SCAL:PDIV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	When Y Auto Scaling is On, this value is automatically determined by the measurement result. When the user sets this value manually, Y Auto Scaling automatically changes to Off.
Preset	10.00

State Saved	Saved in instrument state.
Min	0.1
Max	20.0
Initial S/W Revision	Prior to A.02.00

Presel Center

When this key is pressed, the centering of the preselector filter is adjusted to optimize the amplitude accuracy at the frequency of the selected marker. If the selected marker is not on when Presel Center is pressed, the analyzer will turn on the selected marker, perform a peak search, and then perform centering on the marker's center frequency. If the selected marker is already on and between the start and stop frequencies of the analyzer, the analyzer performs the preselector calibration on that marker's frequency. If the selected marker is already on, but outside the frequency range between Start Freq and Stop Freq, the analyzer will first perform a peak search, and then perform centering on the marker's center frequency.

The value displayed on the Presel Adjust key will change to reflect the new preselector tuning (see Presel Adjust).

A number of considerations should be observed to ensure proper operation. See ["Proper Preselector Operation" on page 1730](#).

Key Path	AMPTD Y Scale
Remote Command	[:SENSe] :POWer [:RF] :PCENter
Example	POW:PCEN
Notes	Note that the rules outlined above under the key description apply for the remote command as well as the key. The result of the command is dependent on marker position, and so forth. Any message shown by the key press is also shown in response to the remote command.
Dependencies	<ul style="list-style-type: none"> • Grayed out if the microwave preselector is off.) • If the selected marker's frequency is below Band 1, advisory message 0.5001 is generated and no action is taken. • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0. • Grayed out in the Spectrogram View.
Couplings	<p>The active marker position determines where the centering will be attempted.</p> <p>If the analyzer is in a measurement such as averaging when centering is initiated, the act of centering the preselector will restart averaging but the first average trace will not be taken until the centering is completed.</p>
Status Bits/OPC dependencies	<p>When centering the preselector, *OPC will not return true until the process is complete and a subsequent measurement has completed, nor will results be returned to a READ or MEASure command.</p> <p>The Measuring bit should remain set while this command is operating and should not go false until the subsequent sweep/measurement has completed.</p>

Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Proper Preselector Operation

A number of considerations should be observed to ensure proper operation:

1. If the selected marker is off, the analyzer will turn on a marker, perform a peak search, and adjust the preselector using the selected marker's frequency. It uses the "highest peak" peak search method unqualified by threshold or excursion, so that there is no chance of a 'no peak found' error. It continues with that peak, even if it is the peak of just noise. Therefore, for this operation to work properly, there should be a signal on screen in a preselected range for the peak search to find.
2. If the selected marker is already on, the analyzer will attempt the centering at that marker's frequency. There is no preselector for signals below about 3.6 GHz, therefore if the marker is on a signal below 3.6 GHz, no centering will be attempted and an advisory message generated
3. In some models, the preselector can be bypassed. If it is bypassed, no centering will be attempted in that range and a message will be generated.

Preselector Adjust

Allows you to manually adjust the preselector filter frequency to optimize its response to the signal of interest. This function is only available when **"Presel Center"** on page 2250 is available.

For general purpose signal analysis, using Presel Center is recommended. Centering the filter minimizes the impact of long-term preselector drift. Presel Adjust can be used instead to manually optimize the preselector. One application of manual optimization would be to peak the preselector response, which both optimizes the signal-to-noise ratio and minimizes amplitude variations due to small (short-term) preselector drifting.

Key Path	AMPTD Y Scale
Scope	Meas Global
Remote Command	<code>[:SENSe] :POWeR [:RF] :PADJust <freq></code> <code>[:SENSe] :POWeR [:RF] :PADJust?</code>
Example	POW:PADJ 100KHz POW:PADJ?
Notes	The value on the key reads out to 0.1 MHz resolution.
Dependencies	<ul style="list-style-type: none"> • Grayed out if microwave preselector is off.) • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0. • Grayed out in the Spectrogram View.

Preset	0 MHz
State Saved	The Presel Adjust value set by Presel Center, or by manually adjusting Presel Adjust, is not saved in instrument state, and does not survive a Preset or power cycle.
Min	-500 MHz
Max	500 MHz
Default Unit	Hz
Backwards Compatibility SCPI	[:SENSe]:POWer[:RF]:MW:PADJust [:SENSe]:POWer[:RF]:MMW:PADJust PSA had multiple preselectors, but the X-Series has only one. These commands simply alias to [:SENSe]:POWer[:RF]:PADJust
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Remote Command	[:SENSe]:POWer[:RF]:PADJust:PRESelector MWAVE MMWave EXTERNAL [:SENSe]:POWer[:RF]:PADJust:PRESelector?
Notes	PSA had multiple preselectors, and you could select which preselector to adjust. Since the X-Series has only one mm/uW preselector, the preselector selection softkey is no longer available. However, to provide backward compatibility, we accept the legacy remote commands. The command form has no effect, the query always returns MWAVE
Initial S/W Revision	Prior to A.02.00

μW Path Control

The μW Path Control functions include the μW Preselector Bypass (Option MPB) and Low Noise Path (Option LNP) controls in the High Band path circuits.

When the μW Preselector is bypassed, the user has better flatness, but will be subject to spurs from out of band interfering signals. When the Low Noise Path is enabled, the analyzer automatically switches around certain circuitry in the high frequency bands which can contribute to noise, when it is appropriate based on other analyzer settings.

For most applications, the preset state is Standard Path, which gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear out in the hardware switches. For applications that utilize the wideband IF paths, the preset state is the μW Preselector Bypass path, if option MPB is present. This is because, when using a wideband IF such as the 140 MHz IF, the μW Preselector's bandwidth can be narrower than the available IF bandwidth, causing degraded amplitude flatness and phase linearity, so it is desirable to bypass the preselector in the default case.

Users may choose Low Noise Path Enable. It gives a lower noise floor, especially in the 21–26.5 GHz region, though without improving many measures of dynamic range, and without giving the best possible noise floor. The preamp, if purchased and used, gives better noise floor than does the Low Noise Path,

however its compression threshold and third-order intercept are much poorer than that of the non-preamp Low Noise Path. There are some applications, typically for signals around -30 dBm, for which the third-order dynamic range of the standard path is good enough, but the noise floor is not low enough even with 0 dB input attenuation. When the third-order dynamic range of the preamp path is too little and the noise floor of the standard path is too high, the Low Noise Path can provide the best dynamic range.

Key Path	AMPTD Y Scale
Mode	SA, BASIC, PNOISE, VSA , LTE, LTETDD
Scope	Meas Global
Remote Command	[:SENSe] :POWer [:RF] :MW:PATH STD LNPath MPBypass FULL [:SENSe] :POWer [:RF] :MW:PATH?
Example	:POW:MW:PATH LNP Enables the Low Noise path
Notes	If a Presel Center is performed, the analyzer will momentarily switch to the Standard Path, regardless of the setting of μ W Path Control The DC Block will always be switched in when the low noise path is switched in, to protect succeeding circuitry from DC. Note that this does not mean “when the low noise path is enabled” but when, based on the Low Noise Path rules, the path is actually switched in. This can happen when the selection is Low Noise Path Enable . In the case where the DC Block is switched in the analyzer is now AC coupled. However, if the user has selected DC coupling, the UI will still behave as though it were DC coupled, including all annunciation, warnings, status bits, and responses to SCPI queries. This is because, based on other settings, the analyzer could switch out the low noise path at any time and hence go back to being DC coupled. Alignment switching ignores the settings in this menu, and restores them when finished.
Dependencies	Unavailable in BBIQ and External Mixing
Preset	All modes other than IQ Analyzer mode and VXA: STD IQ Analyzer, VXA and WLAN mode: MPB option present and licensed: MPB MPB option not present and licensed: STD
State Saved	Save in instrument state
Readback	Value selected in the submenu
Initial S/W Revision	A.04.00
Modified at S/W Revision	A.10.00

Standard Path

This path gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear in the hardware switches, particularly in remote test scenarios where both low band and high band setups will follow in rapid succession.

In this path, the bypass of the low band/high band switch and microwave preamp is never activated, which can cause some noise degradation but preserves the life of the bypass switch.

Key Path	AMPTD Y Scale, μ W Path Control
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Example	:POW:MW:PATH STD
Readback Text	Standard Path
Initial S/W Revision	A.04.00

μW Preselector Bypass

This key toggles the preselector bypass switch for band 1 and higher. When the microwave preselect is on, the signal path is preselected. When the microwave preselector is off, the signal path is not preselected. The preselected path is the normal path for the analyzer.

The preselector is a tunable bandpass filter which prevents signals away from the frequency of interest from combining in the mixer to generate in-band spurious signals (images). The consequences of using a preselector filter are its limited bandwidth, the amplitude and phase ripple in its passband, and any amplitude and phase instability due to center frequency drift.

Option MPB or pre-selector bypass provides an unpreselected input mixer path for certain X-Series signal analyzers with frequency ranges above 3.6 GHz. This signal path allows a wider bandwidth and less amplitude variability, which is an advantage when doing modulation analysis and broadband signal analysis. The disadvantage is that, without the preselector, image signals will be displayed. Another disadvantage of bypassing the preselector is increased LO emission levels at the front panel input port.

Image responses are separated from the real signal by twice the 1st IF. For IF Paths of 10 MHz and 25 MHz, the 1st IF is 322.5 MHz, so the image response and the real signal will be separated by 645 MHz. The 1st IF will be different for other IF Path settings. When viewing a real signal and its corresponding image response in internal mixing, the image response will be to the left of the real signal.

Also, the image response and the real signal typically have the same amplitude and exhibit the same shape factor.

However, if Option FS1, Fast Sweep Capability, is enabled, the image response in the Swept SA measurement will appear lower in amplitude and have a much wider shape factor compared to the real signal.

Key Path	AMPTD Y Scale, μW Path Control
Example	:POW:MW:PATH MPB
Dependencies	Key is blanked if current mode does not support it. Key is grayed out if mode supports it but current measurement does not support it. Key is blank unless Option MPB is present and licensed. If SCPI command sent when MPB not present, error -241, "Hardware missing; Option not installed" is generated.
Readback Text	μW Preselector Bypass
Initial S/W Revision	A.04.00

Remote Command	[:SENSe] :POWer [:RF] :MW:PRESelector [:STATe] ON OFF 0 1 [:SENSe] :POWer [:RF] :MW:PRESelector [:STATe] ?
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Example	:POW:MW:PRES OFF Bypasses the microwave preselector
Notes	The ON parameter sets the STD path (:POW:MW:PATH STD) The OFF parameter sets path MPB (:POW:MW:PATH MPB)
Preset	ON

Internal Preamp

Accesses a menu of keys that control the internal preamps. Turning on the preamp gives a better noise figure, but a poorer TOI to noise floor dynamic range. You can optimize this setting for your particular measurement.

The instrument takes the preamp gain into account as it sweeps. If you sweep outside of the range of the preamp the instrument will also account for that. The displayed result will always reflect the correct gain.

For some measurements, when the preamp is on and any part of the displayed frequency range is below the lowest frequency for which the preamp has specifications, a warning condition message appears in the status line. For example, for a preamp with a 9 kHz lowest specified frequency: "Preamp: Accy unspec'd below 9 kHz".

Key Path	AMPTD Y Scale
Scope	Meas Global
Remote Command	[:SENSe] :POWer [:RF] :GAIN [:STATe] OFF ON 0 1 [:SENSe] :POWer [:RF] :GAIN [:STATe] ?
Dependencies	Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the key is not shown. The preamp is not available when the electronic/soft attenuator is enabled.
Couplings	The act of connecting the U7227A USB Preamplifier to one of the analyzer's USB ports will cause the Internal Preamp to be switched on. When this happens an informational message will be generated: "Internal Preamp turned on for optimal operation with USB Preamp." Note that if the Internal Preamp was already on, there will be no change to the setting, but if it was Off it will be switched On, to Full Range. Note that this same action occurs when the SA mode is selected while the USB Preamp is connected to one of the analyzer's USB ports, if it is the first time that the SA mode has run since powerup, or if the last time the SA mode was running the USB Preamp was NOT connected. Subsequently disconnecting the USB Preamp from USB does not change the Internal Preamp setting nor restore the previous setting.
Preset	OFF
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.14.00

Key Path	AMPTD Y Scale, Internal Preamp
Scope	Meas Global
Remote Command	[:SENSe] :POWer [:RF] :GAIN:BAND LOW FULL [:SENSe] :POWer [:RF] :GAIN:BAND?
Dependencies	Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the key is not shown. If a POW:GAIN:BAND FULL command is sent when a low band preamp is available, the preamp band parameter is to LOW instead of FULL, and an "Option not installed" message is generated.
Preset	LOW
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00

Off

Turns the internal preamp off

Key Path	AMPTD Y Scale, Internal Preamp
Example	:POW:GAIN OFF
Readback	Off
Initial S/W Revision	Prior to A.02.00

Low Band

Sets the internal preamp to use only the low band.

The frequency range of the installed (optional) low-band preamp is displayed in square brackets on the Low Band key label.

Key Path	AMPTD Y Scale, Internal Preamp
Example	:POW:GAIN ON :POW:GAIN:BAND LOW
Readback	Low Band
Initial S/W Revision	Prior to A.02.00

Full Range

Sets the internal preamp to use its full range. The low band (0–3.6 GHz or 0–3GHz, depending on the model) is supplied by the low band preamp and the frequencies above low band are supplied by the high band preamp.

The frequency range of the installed (optional) preamp is displayed in square brackets on the Full Range key label. If the high band option is not installed the Full Range key does not appear.

Key Path	AMPTD Y Scale, Internal Preamp
Example	:POW:GAIN ON :POW:GAIN:BAND FULL
Readback	Full Range
Initial S/W Revision	Prior to A.02.00

Ref Position

Allows you to set the reference position.

Key Path	AMPTD Y Scale
Mode	GSM
Remote Command	:DISPlay:PFERror:VIEW[1]:WINDow[1] 2 3:TRACe:Y[:SCALE]:RPOsition TOP CENTer BOTTom :DISPlay:PFERror:VIEW[1]:WINDow[1] 2:TRACe:Y[:SCALE]:RPOsition?
Example	DISP:PFER:VIEW:WIND:TRAC:Y:RPOS TOP DISP:PFER:VIEW:WIND:TRAC:Y:RPOS?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	CENT CENT TOP
State Saved	Saved in instrument state.
Range	Top Ctr Bot
Initial S/W Revision	Prior to A.02.00

Auto Scaling

Allows you to toggle the auto scaling function between On and Off.

Key Path	AMPTD Y Scale
Mode	GSM
Remote Command	:DISPlay:PFERror:VIEW[1]:WINDow[1]2 3:TRACe:Y[:SCALE]:COUPle ON OFF 1 0 :DISPlay:PFERror:VIEW[1]:WINDow[1]2 3:TRACe:Y[:SCALE]:COUPle?
Example	DISP:PFER:VIEW:WIND:TRAC:Y:COUP ON DISP:PFER:VIEW:WIND:TRAC:Y:COUP?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	When Auto Scaling is On, upon pressing the Restart front-panel key, this function automatically determines the scale per division and reference values based on the measurement results. When you set either "Ref Value" on page 1717 or "Presel Center" on page 2250 manually, this

	parameter is set to 'Off' automatically.
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

Auto Couple

The Auto Couple feature provides a quick and convenient way to automatically couple multiple instrument settings. This helps ensure accurate measurements and optimum dynamic range. When the Auto Couple feature is activated, either from the front panel or remotely, all parameters of the current measurement that have an Auto/Manual mode are set to Auto mode and all measurement settings dependent on (or coupled to) the Auto/Man parameters are automatically adjusted for optimal performance.

However, the Auto Couple key actions are confined to the current measurement only. It does not affect other measurements in the mode, and it does not affect markers, marker functions, or trace or display attributes.

See "[More Information](#)" on page 1738

Key Path	Front-panel key
Remote Command	:COUPle ALL NONE
Example	:COUP ALL
Notes	:COUPle ALL puts all Auto/Man parameters in Auto mode (equivalent to pressing the Auto Couple key). :COUPLE NONE puts all Auto/Man parameters in manual mode. It decouples all the coupled instrument parameters and is not recommended for making measurements.
Initial S/W Revision	Prior to A.02.00

More Information

There are two types of functions that have Auto/Manual modes.

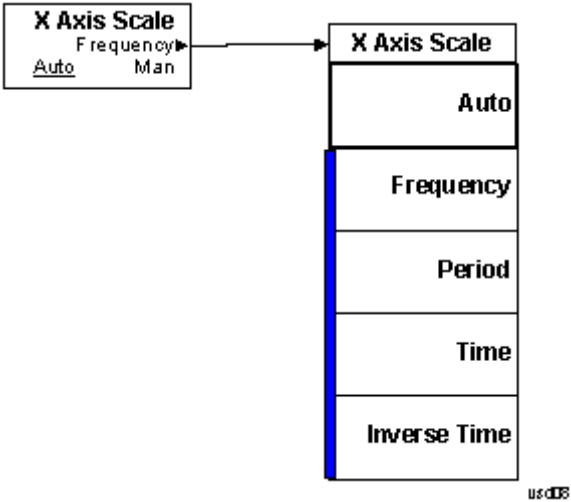
Auto/Man Active Function keys

An Auto/Man toggle key controls the binary state associated with an instrument parameter by toggling between Auto (where the parameter is automatically coupled to the other parameters it is dependent upon) and Man (where the parameter is controlled independent of the other parameters), as well as making the parameter the active function. The current mode is indicated on the softkey with either Auto or Man underlined as illustrated below.



Auto/Man 1-of-N keys

An Auto/Man 1-of-N key allows you to manually pick from a list of parameter values, or place the function in Auto, in which case the value is automatically selected (and indicated) as shown below. If in Auto, Auto is underlined on the calling key. If in manual operation, manual is indicated on the calling key. But the calling key does not actually toggle the function, it simply opens the menu.



BW

There is no functionality for this front-panel key in this measurement. When pressed, this key displays a blank menu.

Key Path	Front-panel key
Mode	EDGE GSM

Cont (Continuous Measurement/Sweep)

Sets the analyzer for Continuous measurement operation. The single/continuous state is Meas Global so the setting will affect all measurements. If you are Paused, pressing Cont does a Resume.

Key Path	Front-panel key
Remote Command	:INITiate:CONTinuous OFF ON 0 1 :INITiate:CONTinuous?
Example	:INIT:CONT 0 puts analyzer in Single measurement operation. :INIT:CONT 1 puts analyzer in Continuous measurement operation
Preset	ON (Note that SYST:PRESet sets INIT:CONT to ON but *RST sets INIT:CONT to OFF)
State Saved	Saved in instrument state
Backwards Compatibility Notes	For Spectrum Analysis mode in ESA and PSA, there is no Cont hardkey, instead there is a Sweep Single/Cont key. In these analyzers, switching the Sweep Single/Cont key from Single to Cont restarts averages (displayed average count reset to 1), but does not restart Max Hold and Min Hold. The X-Series has Single and Cont keys in place of the SweepSingleCont key. In the X-Series, if in single measurement, the Cont key (and INIT:CONT ON) switches to continuous measurement, but never restarts a measurement and never resets a sweep.
Initial S/W Revision	Prior to A.02.00

In Swept SA Measurement (Spectrum Analysis Mode):

The analyzer takes repetitive sweeps, averages, measurements, etc., when in Continuous mode. When the average count reaches the Average/Hold Number the count stops incrementing, but the analyzer keeps sweeping. See the Trace/Detector section for the averaging formula used both before and after the Average/Hold Number is reached. The trigger condition must be met prior to each sweep. The type of trace processing for multiple sweeps, is set under the Trace/Detector key, with choices of Trace Average, Max Hold, or Min Hold.

In Other Measurements/Modes:

With Avg/Hold Num (in the Meas Setup menu) set to Off or set to On with a value of 1, a sweep is taken after the trigger condition is met; and the analyzer continues to take new sweeps after the current sweep has completed and the trigger condition is again met. However, with Avg/Hold Num set to On with a value >1, multiple sweeps (data acquisitions) are taken for the measurement. The trigger condition must be met prior to each sweep. The sweep is not stopped when the average count k equals the number N set for Avg/Hold Num is reached, but the number k stops incrementing. A measurement average usually applies to all traces, marker results, and numeric results. But sometimes it only applies to the numeric results.

If the analyzer is in Single measurement, pressing the Cont key does not change k and does not cause the sweep to be reset; the only action is to put the analyzer into Continuous measurement operation.

If it is already in continuous sweep:

the INIT:CONT 1 command has no effect

the INIT:CONT 0 command will place the analyzer in Single Sweep but will have no effect on the current sequence until $k = N$, at which point the current sequence will stop and the instrument will go to the idle state.

File

See "File" on page 320

FREQ/Channel

Accesses a menu of keys that allows you to control the Frequency parameters of the instrument.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

ARFCN

Sets the analyzer to a frequency that corresponds to the ARFCN (Absolute RF Channel Number). Used to enter the channel to be measured for the selected band. If the Center Freq value entered does not exactly correlate with an ARFCN, the softkey label changes to display the closest ARFCN to the selected frequency, along with a > or < symbol indicating whether the frequency is above or below that ARFCN.

Key Path	FREQ Channel
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :ARFCn RFCHannel <integer></code> <code>[:SENSe] :CHANnel :ARFCn RFCHannel ?</code>
Example	CHAN:ARFC 3 CHAN:ARFC?
Notes	This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not available (blank).
Couplings	Coupled with Center Frequency . Setting ARFCN sets Center Freq to the value corresponding to that ARFCN. BMT Freq choice changes this parameter.
Preset	1
State Saved	Saved in instrument state.
Range	Different for each BAND as follows: E-GSM: 0 to 124, and 975 to 1023 P-GSM: 1 to 124 R-GSM: 0 to 124(MS), and 955 to 1023(BTS) DCS1800: 512 to 885 PCS1900: 512 to 810 GSM450: 259 to 293 GSM480: 306 to 340 GSM700: 438 to 516 GSM850: 128 to 251 T-GSM 810: 350 to 425

Min	Different for each BAND as follows: E-GSM: 0(MS), and 975(BTS) P-GSM: 1 R-GSM: 0(MS), and 955(BTS) DCS1800: 512 PCS1900: 512 GSM450: 259 GSM480: 306 GSM700: 438 GSM850: 128 T-GSM 810: 350
Max	Different for each BAND as follows: E-GSM: 124(MS), and 1023(BTS) P-GSM: 124 R-GSM: 124(MS), and 1023(BTS) DCS1800: 885 PCS1900: 810 GSM450: 293 GSM480: 340 GSM700: 516 GSM850: 251 T-GSM 810: 425
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.07.00

Center Freq

Sets the center frequency to be measured for the selected band. It is coupled with ARFCN – setting Center Freq sets ARFCN to the channel corresponding to that frequency.

For more information, see the section ["Center Freq" on page 2269](#).

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

Time Slot

This functionality is the same as that of the corresponding key in the Demod menu. See ["Time Slot" on page 2288](#) for details.

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

Burst Type

This functionality is the same as that of the corresponding key in the Demod menu. See ["Burst Type" on page 2289](#) for details.

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

TSC (Std)

This functionality is the same as that of the corresponding key in the Demod menu. See ["TSC \(Std\)" on page 2291](#) for details.

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

Center Freq

Sets the frequency that corresponds to the horizontal center of the graticule (when frequency Scale Type is set to linear). While adjusting the Center Frequency the Span is held constant, which means that both Start Frequency and Stop Frequency will change.

Pressing Center Freq also sets the frequency entry mode to Center/Span. In Center/Span mode, the center frequency and span values are displayed below the graticule, and the default active function in the Frequency menu is Center Freq.

The center frequency setting is the same for all measurements within a mode, that is, it is Meas Global. Some modes are also able to share a Mode Global center frequency value. If this is the case, the Mode will have a Global Settings key in its Mode Setup menu.

The Center Freq function sets (and queries) the Center Frequency for the currently selected input. If your analyzer has multiple inputs, and you select another input, the Center Freq changes to the value for that input. SCPI commands are available to directly set the Center Freq for a specific input.

Center Freq is remembered as you go from input to input. Thus you can set a Center Freq of 10 GHz with the RF Input selected, change to BBIQ and set a Center Freq of 20 MHz, then switch to External Mixing and set a Center Freq of 60 GHz, and when you go back to the RF Input the Center Freq will go back to 10 GHz; back to BBIQ and it is 20 MHz; back to External Mixing and it is 60 GHz.

See ["RF Center Freq" on page 1749](#)

See [Ext Mix Center Freq](#)

See ["I/Q Center Freq" on page 1751](#)

See ["Center Frequency Presets" on page 1748](#)

Key Path	FREQ Channel
Scope	Meas Global
Remote Command	[:SENSe] :FREQuency:CENTer <freq> [:SENSe] :FREQuency:CENTer?
Example	FREQ:CENT 50 MHz FREQ:CENT UP changes the center frequency to 150 MHz if you use FREQ:CENT:STEP 100 MHz to set the center frequency step size to 100 MHz FREQ:CENT?
Notes	This command sets either the RF or I/Q Center Frequency depending on the selected input. For RF input it is equivalent to FREQ:RF:CENT For I/Q input it is equivalent to FREQ:IQ:CENT Preset and Max values are dependent on Hardware Options (5xx) If no terminator (e.g. MHz) is sent the terminator Hz is used. If a terminator with unit other than Frequency is used, an invalid suffix error message is generated.
Dependencies	The Center Frequency can be limited by Start or Stop Freq limits, if the Span is so large that Start or Stop reach their limit.
Couplings	When operating in "swept span", any value of the Center Frequency or Span that is within the frequency range of the analyzer is allowed when the value is being set through the front panel numeric key pad or the SCPI command. The other parameter is forced to a different value if needed, to keep the Start and the Stop Frequencies within the analyzer's frequency range
Preset	Depends on instrument maximum frequency, mode, measurement, and selected input. See " Center Frequency Presets " on page 1748 and " RF Center Freq " on page 1749 and Ext Mix Center Freq and " I/Q Center Freq " on page 1751.
State Saved	Saved in instrument state
Min	Depends on instrument maximum frequency, mode, measurement, and selected input.. See " Center Frequency Presets " on page 1748 and " RF Center Freq " on page 1749 and " I/Q Center Freq " on page 1751.
Max	Depends on instrument maximum frequency, mode, measurement, and selected input.. See " Center Frequency Presets " on page 1748 and " RF Center Freq " on page 1749 and " I/Q Center Freq " on page 1751.
Default Unit	Hz
Status Bits/OPC Dependencies	Non-overlapped
Initial S/W Revision	Prior to A.02.00

Center Frequency Presets

The following table provides the Center Frequency Presets for the Spectrum Analyzer mode, and the Max Freq, for the various frequency options:

Freq Option	CF after Mode Preset	Stop Freq after Mode Preset	Max Freq (can't tune above)
503 (all but N9000A)	1.805 GHz	3.6 GHz	3.7 GHz
503 (N9000A)	1.505 GHz	3.0 GHz	3.08 GHz
507 (all but N9000A)	3.505 GHz	7.0 GHz	7.1 GHz
507 (N9000A)	3.755 GHz	7.5 GHz	7.58 GHz
508 (all but N9038A)	1.805 GHz	3.6 GHz	8.5 GHz
508 (N9038A)	4.205 GHz	8.4 GHz	8.5 GHz
513	6.805 GHz	13.6 GHz	13.8 GHz
526 (all but N9000A and N9038A)	13.255 GHz	26.5 GHz	27.0 GHz
526 (N9000A)	13.255 GHz	26.5 GHz	26.55 GHz
526 (N9038A)	1.805 GHz	3.6 GHz	27.0 GHz
532	16.005 GHz	32.0 GHz	32.5 GHz
543	21.505 GHz	43.0 GHz	TBD
544	22.005 GHz	44.0 GHz	44.5 GHz
550	25.005 GHz	50.0 GHz	51 GHz

Input 2:

Model	CF after Mode Preset	Stop Freq after Mode Preset	Max Freq (can't tune above)
N9000A opt C75	0.7505GHz	1.5 GHz	1.58 GHz
N9038A	505 MHz	1 GHz	1.000025 GHz

Tracking Generator Frequency Limits (N9000A only):

Tracking Generator Option	Min Freq (clips to this freq when turn TG on and can't tune below while TG on)	If above this Freq, Stop Freq clipped to this Freq when TG turned on	Max Freq (can't tune above) while TG on
T03	9 kHz	3.0 GHz	3.08 GHz
T06	9 kHz	6.0 GHz	6.05 GHz

The following table shows the Center Frequency Presets for modes other than Spectrum Analyzer:

Mode	CF Preset for RF
WCDMA	1 GHz
WIMAXOFDMA,	1 GHz
BASIC	1 GHz
ADEMOD	1 GHz
VSA	1 GHz
TDSCDMA	1 GHz
PNOISE	1 GHz
LTE	1 GHz
LTETDD	1 GHz
MSR	1 GHz
GSM	935.2 MHz
NFIGURE	1.505 GHz

RF Center Freq

SCPI command for specifying the RF Center Frequency. This command will set the Center Frequency to be used when the RF input is selected, even if the RF input is not the input that is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

Scope	Meas Global
Remote Command	<code>[:SENSe] :FREQuency:RF:CENTer <freq></code> <code>[:SENSe] :FREQuency:RF:CENTer?</code>
Example	FREQ:RF:CENT 30 MHz
Notes	This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode.
Dependencies	If the electronic/soft attenuator is enabled, any attempt to set Center Frequency such that the Stop

	Frequency would be >3.6 GHz fails and results in an advisory message. If the equivalent SCPI command is sent, this same message is generated as part of a “-221, Settings conflict” warning. If Source Mode is set to Tracking, and the Max or Min Center Freq is therefore limited by the limits of the source, a warning message is generated, “Data out of range;clipped to source max/min” if these limits are exceeded. Note that for an external source, these limits can be affected by the settings of Source Numerator, Source Denominator and Power Sweep.
Preset	See table above
State Saved	Saved in instrument state.
Min	-79.999995 MHz, unless Source Mode is set to Tracking, in which case it is limited by the minimum frequency of the Source
Max	See table above. Basically instrument maximum frequency – 5 Hz. Note that, if the Source Mode is set to Tracking, the effective instrument maximum frequency may be limited by the source maximum frequency. If the knob or step keys are being used, also depends on the value of the other three interdependent parameters Span, Start Frequency and Stop Frequency
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Ext Mix Center Freq

SCPI command for specifying the External Mixer Center Frequency. This command will set the Center Frequency to be used when the External Mixer is selected, even if the External Mixer input is not the input which is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

Scope	Meas Global
Remote Command	<code>[:SENSe] :FREQuency:EMIXer:CENTer <freq></code> <code>[:SENSe] :FREQuency:EMIXer:CENTer?</code>
Example	<code>:FREQ:EMIX:CENT 60 GHz</code> <code>:FREQ:EMIX:CENT?</code>
Notes	This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode.
Couplings	When returning to External Mixing after having been switched to one of the other inputs (e.g., RF), you will come back into the settings that you had when you left External Mixing. So you will come back to the band you were in with the Center Frequency that you had. However, Span is not an input-dependent parameter, therefore you will bring the span over from the other input. Therefore, the analyzer comes back with the span from the previous input, limited as necessary by the current mixer setup.
Preset	When a Mode Preset is performed while in External Mixing, the Start frequency of the current Mode is set to the nominal Min Freq of the lowest harmonic range in the Harmonic Table for the current mixer setup. Similarly, the Stop frequency of the current Mode is set to the nominal Max Freq of the highest harmonic range in the Harmonic Table. The Center Freq thus presets to the point arithmetically equidistant from these two frequencies.

	<p>If the current measurement has a limited Span available to it, and cannot achieve the Span shown in the table (Span=Stop Freq - Start Freq), the analyzer uses the maximum Span the measurement allows, and still sets the Center Freq to the midpoint of the Start and Stop Freq values in the Harmonic Table.</p> <p>When Restore Input/Output Defaults is performed, the mixer presets to the 11970A, whose Start and Stop frequencies are 26.5 and 40 GHz respectively. The center of these two frequencies is 33.25 GHz.</p> <p>Therefore, after a Restore Input/Output Defaults, if you go into External Mixing and do a Mode Preset while in the Spectrum Analyzer Mode, the resulting Center Freq is 33.25 GHz.</p>
State Saved	Saved in instrument state.
Min	The minimum frequency in the currently selected mixer band + 5 Hz
Max	The maximum frequency in the currently selected mixer band - 5 Hz If the knob or step keys are being used, also depends on the value of the other three interdependent parameters Span, Start Frequency and Stop Frequency
Initial S/W Revision	A.08.01

I/Q Center Freq

SCPI command for specifying the I/Q Center Frequency. This command will set the Center Frequency to be used when the I/Q input is selected, even if the I/Q input is not the input which is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

Scope	Meas Global
Remote Command	[:SENSe] :FREQuency:IQ:CENTer <freq> [:SENSe] :FREQuency:IQ:CENTer?
Example	FREQ:IQ:CEN: 30 MHz
Notes	This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode.
Preset	0 Hz
State Saved	Saved in instrument state.
Min	-40.049995 MHz
Max	40.049995 MHz
Initial S/W Revision	Prior to A.02.00

BMT Freq

Enables quick selection from a subset of the available ARFCN numbers for the Top, Middle, or Bottom frequency in the selected band.

Key Path	FREQ Channel
----------	--------------

Mode	GSM
Scope	Meas Global
Notes	This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this.
Dependencies	When I/Q Input is selected, this key is not available (blank).
Couplings	BMT choice changes ARFCN and Center Freq. Chosen ARFCN will be displayed on each menu key.
Range	Top Middle Bottom
Initial S/W Revision	Prior to A.02.00

BMT Freq Top

Sets the analyzer to the frequency of the highest ARFCN (Absolute RF Channel Number) of the selected radio band.

Key Path	FREQ Channel, BMT Freq
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :ARFCn RFCHannel :TOP
Example	CHAN:ARFC:TOP
Notes	<ol style="list-style-type: none"> This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not displayed.
Couplings	Change [:SENSe]:CHANnel:ARFCn RFCHannel as follows: E-GSM: 124 P-GSM: 124 R-GSM: 124 DCS 1800: 885 PCS 1900: 810 GSM 450: 293 GSM 480: 340 GSM 700: 516 GSM 850: 251 T-GSM 810: 425 Change BMT ARFCN to BMT FreqTOP. Change [:SENSe]:FREQuency:CENTer as follows: E-GSM: 959.800 MHz P-GSM: 959.800 MHz R-GSM: 959.800 MHz

	DCS 1800: 1879.80 MHz
	PCS 1900: 1989.80 MHz
	GSM 450: 467.400 MHz
	GSM 480: 495.800 MHz
	GSM 700: 792.800 MHz
	GSM 850: 893.800 MHz
	T-GSM810: 866.000 MHz

State Saved	No
Initial S/W Revision	Prior to A.02.00

BMT Freq Middle

Sets the analyzer to the frequency of the middle ARFCN (Absolute RF Channel Number) of the selected radio band.

Key Path	FREQ Channel, BMT Freq
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel:ARFCn RFChannel:MIDDLE</code>
Example	CHAN:ARFC:MIDD
Notes	<ol style="list-style-type: none"> 1. This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. 2. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not displayed.
Couplings	Change [:SENSe]:CHANnel:ARFCn RFChannel as follows: E-GSM: 38 P-GSM: 63 R-GSM: 28 DSC 1800: 699 PCS 1900: 661 GSM 450: 276 GSM 480: 323 GSM 700: 477 GSM 850: 190 T-GSM 810: 388 Change BMT ARFCN to BMT FreqMIDDLE. Change [:SENSe]:FREQuency:CENTer as follows: E-GSM: 942.600 MHz P-GSM: 947.600 MHz R-GSM: 940.600 MHz

	DCS 1800: 1842.60 MHz
	PCS 1900: 1960.00 MHz
	GSM 450: 464.000 MHz
	GSM 480: 492.400 MHz
	GSM 700: 755.000 MHz
	GSM 850: 881.600 MHz
	T-GSM 810: 858.600 MHz

State Saved	No
Initial S/W Revision	Prior to A.02.00

BMT Freq Bottom

Sets the analyzer to the frequency of the lowest ARFCN (Absolute RF Channel Number) of the selected radio band.

Key Path	FREQ Channel, BMT Freq
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :ARFCn RFCHannel :BOTTom</code>
Example	<code>CHAN:ARFC:BOTT</code>
Notes	<ol style="list-style-type: none"> 1. This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. 2. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not displayed.
Couplings	Change <code>[:SENSe] :CHANnel :ARFCn RFCHannel</code> as follows: E-GSM: 975 P-GSM: 1 R-GSM: 955 DCS 1800: 512 PCS 1900: 512 GSM 450: 259 GSM 480: 306 GSM 700: 438 GSM 850: 128 T-GSM 810: 350 Change BMT ARFCN to BMT FreqBOTTOM. Change <code>[:SENSe] :FREQuency :CENTer</code> as follows: E-GSM: 925.200 MHz P-GSM: 935.200 MHz R-GSM: 921.200 MHz

	DCS 1800: 1805.20 MHz
	PCS 1900: 1930.20 MHz
	GSM 450: 460.600 MHz
	GSM 480: 489.000 MHz
	GSM 700: 747.2 MHz
	GSM 850: 869.200 MHz
	T-GSM 810: 851.000 MHz
State Saved	No
Initial S/W Revision	Prior to A.02.00

Carrier Setup

Allows you to set carrier parameters.

Key Path	FREQ Channel
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Initial S/W Revision	A.06.00
Modified at S/W Revision	A.14.00

Carriers

Defines the number of carriers.

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :COUNT <integer></code> <code>[:SENSe] :CHANnel :CARRier :COUNT?</code>
Example	CHAN:CARR:COUN 3 CHAN:CARR:COUN?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Couplings	This can change when the SCPI command of the Carrier Power Present or the Carrier Interval is sent.
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	16

Initial S/W Revision	A.06.00
Modified at S/W Revision	A.13.00

Reference Carrier

Defines the reference active carrier. The Reference Carrier frequency point is always aligned with the Measurement Global Center Frequency. The minimum value 1 specifies the lowest frequency carrier among the active carriers. The maximum value specifies the highest frequency carrier among the active carriers.

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :RCARrier <integer></code> <code>[:SENSe] :CHANnel :CARRier :RCARrier?</code>
Example	CHAN:CARR:RCAR 3 CHAN:CARR:RCAR?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	The maximum value depends on the number of carriers. If you set it to more than the number of carriers, it's clipped to the number of carriers. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Couplings	When you decrease the number of carriers to a value which is less than this value, this is clipped to the value.
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	Number of carriers
Initial S/W Revision	A.06.00

Configure Carriers

Opens a menu of keys that allows you to configure carriers.

Key Path	FREQ Channel, Multi Carrier Setup
Dependencies	This key is grayed out when there is only one carrier. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Initial S/W Revision	A.06.00

Select Carrier

Selects a carrier to configure.

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	The maximum value depends on the number of carriers. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned. This parameter is unavailable when there is only one carrier.
Couplings	This value can change when you decrease the number of carriers.
Preset	1
State Saved	No
Min	1
Max	Number of carriers
Initial S/W Revision	A.06.00

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe]:CHANnel:CARRier:LIST:COUPle OFF ON 0 1, ... [:SENSe]:CHANnel:CARRier:LIST:COUPle?
Example	CHAN:CARR:LIST:COUP OFF CHAN:CARR:LIST:COUP?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	When Couple is selected, the carrier settings are coupled to carrier #1. Coupled parameters are Carrier Power Present, Carrier Interval. When a setting is changed, the couple is set to Man automatically. Carrier #1 is always set to couple and cannot be changed. Couple/Man selection on the Carrier key is not displayed when selected carrier number is #1.
Preset	ON
State Saved	No
Range	Couple Man
Initial S/W Revision	A.06.00

Carrier Power Present

Specifies whether each of carriers is active or not.

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :CARRier :LIST :PPResent YES NO, ... [:SENSe] :CHANnel :CARRier :LIST :PPResent?
Example	CHAN:CARR:LIST:PPR YES CHAN:CARR:LIST:PPR?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. Missing values are not permitted, therefore if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Dependencies	This parameter is unavailable when there is only one carrier. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	Coupled to the number of carriers. When the SCPI command is sent, the number of carriers will be set to the number of entries in the parameter list.
Preset	YES
State Saved	Saved in instrument state.
Range	Yes No
Initial S/W Revision	A.06.00

Carrier Interval

Specifies the frequency interval between the Carrier #n and #n+1 center frequencies.

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :CARRier :LIST :INTerval <freq>, ... [:SENSe] :CHANnel :CARRier :LIST :INTerval?
Example	CHAN:CARR:LIST:INT 600k CHAN:CARR:LIST:INT?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. The softkey for the last carrier (say, #N) is grayed out.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned. This parameter is unavailable when there is only one carrier.
Couplings	Coupled to the number of carriers. When the SCPI command is sent, the number of carriers will be

	set to the number of entries in the parameter list. Changing Carrier Interval might affect the Span.
Preset	600kHz
State Saved	Saved in instrument state.
Min	400 kHz
Max	100 MHz
Initial S/W Revision	A.06.00
Modified at S/W Revision	A.07.00, A.08.00

Carrier Frequency Allocation

Specifies the carrier frequency allocation. There are two types of allocation, contiguous and non-contiguous. Non-Contiguous frequency allocation is defined as an allocation where two groups of frequencies are separated with at least [3.6] MHz carrier separation between the innermost carriers. In case of the non-contiguous frequency allocation, tests will be measured between the uppermost carrier A of the lower frequency group and the lowermost carrier B of the upper frequency group.

See ["An example of non-contiguous frequency allocation" on page 1760](#)

Key Path	FREQ Channel, Multi Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe]:CHANnel:CARRier:FALLocation</code> <code>CONTiguous NCONTiguous</code> <code>[:SENSe]:CHANnel:CARRier:FALLocation?</code>
Example	<code>CHAN:CARR:FALL NCON</code> <code>CHAN:CARR:FALL?</code>
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This menu key is available only when the number of carriers is more than one. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Preset	CONTiguous
State Saved	Saved in instrument state.
Range	Contiguous Non-Contiguous
Readback Text	CONTiguous NCONTiguous
Initial S/W Revision	A.07.00

An example of non-contiguous frequency allocation



Non-Contiguous

Opens a menu of keys that allows you to set non-contiguous frequency allocation parameters.

Key Path	FREQ Channel, Multi Carrier Setup, Carr Freq Alloc
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Initial S/W Revision	A.07.00

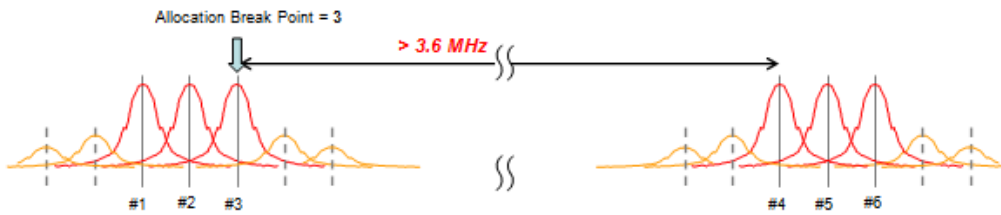
Allocation Break Pt

Specifies an allocation break point that is a sequence (or index) number of the uppermost carrier in the lower frequency group.

See ["An example of allocation break point" on page 1762](#)

Key Path	FREQ Channel, Multi Carrier Setup, Carr Freq Alloc, Non-Contiguous
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :FALlocation :NCONtiguous :ABPoint <integer></code> <code>[:SENSe] :CHANnel :CARRier :FALlocation :NCONtiguous :ABPoint ?</code>
Example	<code>CHAN:CARR:FALL:NCON:ABP 3</code> <code>CHAN:CARR:FALL:NCON:ABP ?</code>
Notes	You must be in the GSM mode to use this command. Use <code>INSTRument:SElect</code> to set the mode.
Dependencies	The maximum value depends on the number of carriers. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	This value can change when you decrease the number of carriers.
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	Number of carriers - 1
Initial S/W Revision	A.07.00
Modified at S/W Revision	A.13.00

An example of allocation break point



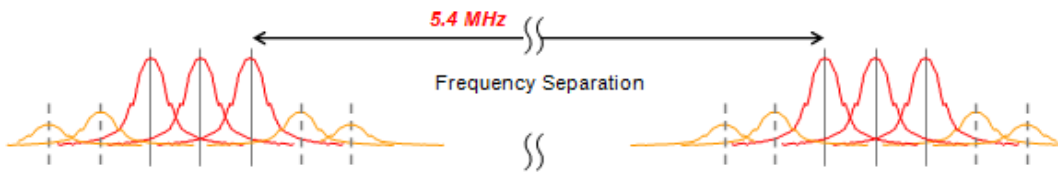
Freq Separation

Specifies frequency separation between the innermost of carriers.

See ["An example of frequency separation" on page 1763](#)

Key Path	FREQ Channel, Multi Carrier Setup, Carr Freq Alloc, Non-Contiguous
Mode	GSM
Scope	Meas Global
Remote Command	<code>[[:SENSe]:CHANnel:CARRier:FALLocation:NCONtiguous:FSEParation <freq></code> <code>[[:SENSe]:CHANnel:CARRier:FALLocation:NCONtiguous:FSEParation?</code>
Example	<code>CHAN:CARR:FALL:NCON:FSEP 5.4M</code> <code>CHAN:CARR:FALL:NCON:FSEP?</code>
Notes	You must be in the GSM mode to use this command. Use <code>INSTRument:SElect</code> to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	Changing Frequency Separation might affect the Span
Preset	5.4 MHz
State Saved	Saved in instrument state.
Min	3.6 MHz
Max	100 MHz
Initial S/W Revision	A.07.00

An example of frequency separation



Carrier BPF

Selects whether to use the carrier bandpass filter.

Key Path	FREQ Channel, Multi Carrier SetupMode Setup, Demod
Mode	GSM
Remote Command	<code>[:SENSe]:RADio:CARRier:NUMBer:AUTO ON OFF 1 0</code> <code>[:SENSe]:RADio:CARRier:NUMBer:AUTO?</code>
Example	<code>RAD:CARR:NUMB:AUTO 1</code> <code>RAD:CARR:NUMB:AUTO?</code>
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	ON automatically changes to OFF when Multiple or Single is selected as Carrier BPF Type.
Preset	ON
State Saved	Saved in instrument state.
Range	Auto Man
Initial S/W Revision	A.06.00

Carrier BPF Type

Opens a menu of keys that allows you to select the type of the bandpass filter. When carriers other than the signal of interest are present, especially if they are strong, they can interfere with the measurement, making it difficult to sync and producing artificially high EVM results. When this condition exists, toggle from Single to Multi. A band-limited filter will help reduce the measurement interference.

BPF Type	Description
MULTiple	Enable multi carrier tolerance filter.
SINGle	Disable multi carrier tolerance filter

This parameter applies only to the following measurements:

- GSMK Phase & Frequency Error measurement
- EDGE EVM measurement
- GSMK Power vs. Time

- EDGE Power vs. Time

Key Path	FREQ Channel, Multi Carrier Setup, Carrier BPFMode Setup, Demod, Carrier BPF
Mode	GSM
Scope	Meas Global
Remote Command	[[:SENSe]:RADio:CARRier:NUMBer SINGLE MULTiple [:SENSe]:RADio:CARRier:NUMBer?
Example	RAD:CARR:NUMB SING RAD:CARR:NUMB?
Notes	The Carrier Bandpass Filter key is in the Mode Setup menu, but only EDGE EVM and GSM PFER measurements support this feature. In other measurements, this setting is not applicable. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Preset	SINGLE
State Saved	Saved in instrument state.
Range	Single Multi
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

BTS Class

Selects a BTS class.

BTS Class	Definition
MC	Multicarrier BTS is defined as a class of BTS, characterized by the ability to, in addition to single carrier operation, process two or more carriers in common active RF components simultaneously, either in multicarrier transmitter only or, in both multicarrier transmitter and multicarrier receiver.
SC	Single carrier BTS is defined as a class of BTS, characterized by the ability to process one carrier in single carrier BTSs, not belonging to a Multicarrier BTS class.

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Remote Command	[[:SENSe]:CHANnel:CARRier:BASE:CLASs:AUTO ON OFF 1 0 [:SENSe]:CHANnel:CARRier:BASE:CLASs:AUTO?
Example	CHAN:CARR:BASE:CLAS:AUTO 1 CHAN:CARR:BASE:CLAS:AUTO?
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.

Couplings	ON automatically changes to OFF when Multicarrier Class (MC) or Single carrier Class (SC) is selected as BTS Class.
Preset	ON
State Saved	Saved in instrument state.
Range	Auto Man
Initial S/W Revision	A.14.00

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :CARRier :BASE :CLASs SC MC [:SENSe] :CHANnel :CARRier :BASE :CLASs?
Example	CHAN:CARR:BASE:CLAS MC CHAN:CARR:BASE:CLAS?

Notes

You must be in the GSM mode to use this command.
 Use INSTRument:SElect to set the mode.
 Selection C1 and C2 are supported for backwards compatibility.
 When "C1" or "C2" is passed as SCPI command parameter, the BTS Class Auto is set to ON. As a result, it's converted to "SC" if the number of carriers is one, and otherwise "MC."

Dependencies	This parameter is available when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Preset	SC
State Saved	Saved in instrument state.
Range	Single Carrier Multi Carrier
Initial S/W Revision	A.06.00
Modified at S/W Revision	A.10.01, A14.00

Time Slot

Selects On or Off for slot searching. Generally, this feature is only valid in external and periodic timer trigger source modes that triggers every frame since another trigger source does not have the information that identifies the head of the frame. When Timeslot is set to On, the demodulation measurement is made on the nth timeslot specified by the trigger point + n timeslots, where n is the selected timeslot value 0 to 7.

This functionality is the same as Time Slot under the Freq/Channel menu.

Key Path	Mode Setup, Demod FREQ Channel
Mode	GSM

Scope	Meas Global
Remote Command	[:SENSe]:CHANnel:SLOT <integer> [:SENSe]:CHANnel:SLOT? [:SENSe]:CHANnel:SLOT:AUTO OFF ON 0 1 [:SENSe]:CHANnel:SLOT:AUTO?
Example	CHAN:SLOT 0 CHAN:SLOT? CHAN:SLOT:AUTO OFF CHAN:SLOT:AUTO?
Notes	This functionality does not affect Combined GSM/EDGE measurement. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	0 OFF
State Saved	Saved in instrument state.
Min	0
Max	7
Initial S/W Revision	Prior to A.02.00

Burst Type

Sets the burst type that the analyzer will search for and to which it will synchronize.

This functionality is the same as Burst Type under the FREQ Channel menu.

Key	SCPI	Description
Sync (SCH)	SYNC	Burst length = 142 symbols Extended training sequences for CTS and COMPACT synchronization bursts are not supported.
Access (RACH)	ACcEss	Burst length = 88 symbols Alternative training (synchronization) sequence "TS1" and "TS2" are supported only in GSMK Power vs. Time.
Normal - NB (TCH & CCH)	NORMAl	Burst length = 142 symbols Softkey label will be changed to 'Normal - NB' form 'Normal'
Higher Symbol Rate - HB (TCH & CCH)	HSRate	Burst length = 169 symbols This selection key is only shown when theN9071A-3FP license is installed.
Mixed (NB/HB for TSC sync)	MIXed	Enables auto detection between Normal (NB) and HSR (HB) TCH & CCH EDGE Burst. This selection key is only shown when theN9071A-3FP license is installed.

Measurement synchronization capability (Burst Sync = Training Seq)

	Sync	Access	Normal		HSR	Mixed
			GMSK	8PSK		
				16QAM		
				32QAM		
				AQPSK		
GMSK Phase & Freq Error measurement	Yes	Yes	Yes	No	N/A	
GMSK Power vs. Time measurement	Yes	Yes	Yes	No	(measures as Normal GMSK when selected)	
GMSK Output RF Spectrum measurement (when Trigger Source is Periodic Timer and Sync Source is Off)	No	No	Yes	No		
EDGE EVM measurement	No	No	No	Yes	Yes	Yes
EDGE Power vs. Time measurement	Yes	Yes	Yes	Yes	Yes	Yes
EDGE Output RF Spectrum measurement (when Trigger Source is Periodic Timer and Sync Source is Off.)	No	No	Yes	Yes	Yes	Yes

Key Path	Mode Setup, Demod FREQ Channel
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :BURSt NORMal SYNC ACCess HSRate MIXed [:SENSe] :CHANnel :BURSt ?
Example	CHAN:BURS NORM CHAN:BURS?
Notes	This functionality does not affect the Combined GSM/EDGE measurement. Higher Symbol Rate and Mixed selections are only available when the N9071A-3FP license is installed. Otherwise these menu keys are blank. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Higher Symbol Rate and Mixed selection keys are not shown unless N9071A-3FP is installed. When unlicensed and SCPI is sent, an undefined header error is returned. When "Mixed" is selected, the Burst Sync menu key under the Meas Setup menu will be grayed out and Training Sequence (TSC) will be used for synchronization. The sync algorithm always runs in Training Sequence (TSC) synchronization because the Burst Type can be determined by looking at TSC in the signal. Original selection of Burst Sync will become effective again when the Burst Type selection is changed from "Mixed" to another one.
Preset	NORMal
State Saved	Saved in instrument state.
Range	Sync (SCH) Access (RACH) Normal - NB (TCH & CCH) Higher Symbol Rate - HB (TCH & CCH) Mixed (NB/HB for TSC sync)

Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

TSC (Std)

Allows you to select the Training Sequence Code that determines which burst is to be measured. Applicable only when Burst Sync is set to Training Sequence in the measurement. In the case of AQPSK, this parameter specifies TSC number of VAMOS sub-channel A. TSC of VAMOS sub-channel B is ignored.

This functionality is the same as TSC under the FREQ Channel menu.

This parameter applies only to the following measurements:

- GSMK/EDGE Power vs. Time measurement
- GSMK Phase & Frequency Error measurement
- EDGE EVM measurement

Selection	SCPI	Description
AutoDet	ON 1	The measurement is made on the first burst found to have any one of the valid TSCs in the range of 0 to 7. The measurement may be made on various timeslots if more than one timeslot has one of the 8 valid TSCs.
Man	OFF 0	The measurement is made on the first burst found to have the selected TSC. TSC numbers in the range of 0 to 7 can be selected. The measurement may be made on various timeslots if more than one timeslot has this same TSC.

Key Path	Mode Setup, Demod FREQ Channel
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe]:CHANnel:TSCode <integer> [:SENSe]:CHANnel:TSCode? [:SENSe]:CHANnel:TSCode:AUTO OFF ON 0 1 [:SENSe]:CHANnel:TSCode:AUTO?
Example	CHAN:TSC 3 CHAN:TSC? CHAN:TSC:AUTO 1 CHAN:TSC:AUTO?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. When Sync or Access is selected as Burst Type, this key is grayed out.
Preset	0 ON

State Saved	Saved in instrument state.
Min	0
Max	7
Initial S/W Revision	Prior to A.02.00

Input/Output

See ["Input/Output" on page 196](#)

Marker

Accesses a menu that enables you to select, set up and control the markers for the current measurement.

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Select Marker

Displays 12 markers available for selection.

Key Path	Marker
Initial S/W Revision	Prior to A.02.00

Marker Type

Sets the marker control mode Normal, Delta and Off. All interactions and dependencies detailed under the key description are enforced when the remote command is sent.

See also:

- ["Marker X Axis Value \(Remote Command Only\)" on page 1772](#)
- ["Marker X Axis Position \(Remote Command Only\)" on page 1772](#)
- ["Marker Y Axis Value \(Remote Command Only\)" on page 1773](#)

Key Path	Marker
Mode	GSM
Remote Command	:CALCulate:PFERror:MARKer[1] 2 ...12:MODE POSition DELTA OFF :CALCulate:PFERror:MARKer[1] 2 ...12:MODE?
Example	CALC:PFER:MARK:MODE OFF CALC:PFER:MARK:MODE?
Notes	If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules. At the same time, Marker X Axis Value appears on the Active Function area. Default Active Function: the active function for the selected marker's current control mode. If the current control mode is Off, there is no active function and the active function is turned off. Active Function Display: the marker X-axis value entered in the active function area displays the marker value to its full entered precision. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	OFF

State Saved	Saved in instrument state.
Range	Normal Delta Off
Initial S/W Revision	Prior to A.02.00

Marker X Axis Value (Remote Command Only)

Sets the marker X Axis value in the current marker X Axis Scale unit. It has no effect if the control mode is Off, but is the SCPI equivalent of entering an X-value if the control mode is Normal or Delta.

Mode	EDGE GSM
Remote Command	:CALCulate:PFERror:MARKer[1] 2 ...12:X <real> :CALCulate:PFERror:MARKer[1] 2 ...12:X?
Example	CALC:PFER:MARK3:X 0 CALC:PFER:MARK3:X?
Notes	If no suffix is sent, uses the fundamental units for the current marker X Axis Scale. If a suffix is sent that does not match the current marker X Axis Scale unit, an error "Invalid suffix" is generated. The query returns the marker's absolute X Axis value if the control mode is Normal, or the offset from the marker's reference marker if the control mode is Delta. The query is returned in the fundamental units for the current marker X Axis scale: Hz for Frequency and Inverse Time, seconds for Period and Time. If the marker is Off, the response is not a number. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	Max value would be changed.
Preset	After a preset, all markers are turned OFF, so the Marker X Axis Value query returns a not a number (NAN).
State Saved	No
Min	-9.9E37
Max	9.9E37
Initial S/W Revision	Prior to A.02.00

Marker X Axis Position (Remote Command Only)

Sets the marker X position in trace points. It has no effect if the control mode is Off, but is the SCPI equivalent of entering a value if the control mode is Normal or Delta or Fixed - except in trace points rather than X Axis Scale units. The entered value is immediately translated into the current X Axis Scale units for setting the value of the marker.

Mode	EDGE GSM
Remote Command	:CALCulate:PFERror:MARKer[1] 2 ...12:X:POSition <integer> :CALCulate:PFERror:MARKer[1] 2 ...12:X:POSition?
Example	CALC:PFER:MARK10:X:POS 0 CALC:PFER:MARK10:X:POS?

Notes	The query returns the marker's absolute X Axis value in trace points if the control mode is Normal, or the offset from the marker's reference marker in trace points if the control mode is Delta. If the marker is Off the response is not a number. You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Preset	After a preset, all markers are turned OFF, so the Marker X Axis Value query returns a not a number (NAN).
State Saved	No
Min	-9.9E37
Max	9.9E37
Initial S/W Revision	Prior to A.02.00

Marker Y Axis Value (Remote Command Only)

Returns the marker Y Axis value in the current marker Y Axis unit.

The “result” of a marker is the value which is displayed on the second line of the Marker Result block. To properly interpret the returned value, the remote programmer must also know what the analyzer's Y Axis Unit is set to as described below.

A marker can have up to two results, only one of which is displayed or returned on a query, as follows:

- Absolute result: every marker has an absolute result:

For Normal and Delta markers, the Y-axis value of the trace point the marker is currently on.

The absolute result is displayed in the result block or returned on a query unless the marker control mode is Delta.

- Relative result: if a marker's control mode is Delta, the relative result is displayed in the result block or returned on a query. This is the ratio of the Absolute Result of a delta marker to the Absolute Result of its reference marker.

Mode	EDGE GSM
Remote Command	:CALCulate:PFERror:MARKer [1] 2 . . . 12 : Y ?
Example	CALC:PFERror:MARK11:Y?
Notes	The query returns the marker Y-axis result. If the marker is Off the response is not a number. If 'Polar' is selected for the Marker Trace, it returns the values of 'I' and 'Q' at the same time. You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Preset	0
State Saved	No
Backwards Compatibility SCPI	:CALCulate:PFERror:MARKer [1] 2 . . . 4 : FUNCTION:RESult?
Initial S/W Revision	Prior to A.02.00

Properties

Accesses a menu that allows you to set marker properties and to access the marker trace menu.

Key Path	Marker
Initial S/W Revision	Prior to A.02.00

Select Marker

Displays 12 markers available for selection.

Key Path	Marker
Initial S/W Revision	Prior to A.02.00

Relative To

Selects the marker that the selected marker is relative to (its reference marker).

Key Path	Marker, Properties
Mode	GSM
Remote Command	:CALCulate:PFERror:MARKer[1] 2 ...12:REFerence <integer> :CALCulate:PFERror:MARKer[1] 2 ...12:REFerence?
Example	CALC:PFER:MARK:REF 10 CALC:PFER:MARK:REF?
Notes	A marker cannot be relative to itself so that choice is grayed out, and if sent from SCPI generates error -221: "Settings conflict; marker cannot be relative to itself." You must be in the GSM mode to use this command. Use INSTRument:SELEct to set the mode. When queried, a single value is returned (the specified marker number's relative marker).
Preset	2 3 4 5 6 7 8 9 10 11 12 1
State Saved	Saved in instrument state.
Min	1
Max	12
Initial S/W Revision	Prior to A.02.00

Marker Trace

Assigns the specified marker to the designated trace.

Key Path	Marker, Properties
Mode	GSM
Remote Command	:CALCulate:PFERror:MARKer[1] 2 ...12:TRACe PERRor PFERror

	RFENvelope POLar :CALCulate:PFERror:MARKer [1] 2 . . . 12:TRACe?
Example	CALC:PFER:MARK:TRAC POL CALC:PFER:MARK:TRAC?
Couplings	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	PERRor
State Saved	Saved in instrument state.
Range	IQ Polar Phase Error Phase Error w/Freq RF Envelope
Initial S/W Revision	Prior to A.02.00

Select Marker

Displays 12 markers available for selection.

Key Path	Marker
Initial S/W Revision	Prior to A.02.00

Couple Markers

When this function is true, moving any marker causes an equal X Axis movement of every other marker which is not Off. By “equal X Axis movement” we mean that we preserve the difference between each marker’s X Axis value (in the fundamental x-axis units of the trace that marker is on) and the X Axis value of the marker being moved (in the same fundamental x-axis units).

This may result in markers going off screen.

Key Path	Marker
Mode	GSM
Remote Command	:CALCulate:PFERror:MARKer:COUPle[:STATe] ON OFF 1 0 :CALCulate:PFERror:MARKer:COUPle[:STATe]?
Example	CALC:PFER:MARK:COUP ON CALC:PFER:MARK:COUP?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

All Markers Off

Turns off all markers.

Key Path	Marker
Mode	GSM
Remote Command	:CALCulate:PFERror:MARKer:AOff
Example	CALC:PFER:MARK:AOff
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Initial S/W Revision	Prior to A.02.00

Marker Function

There is no functionality for this front-panel key in this measurement. When pressed, this key displays a blank menu.

Key Path	Front-panel key
Mode	EDGE GSM

Marker To

There is no functionality for this front-panel key in this measurement. When pressed, this key displays a blank menu.

Key Path	Front-panel key
Mode	EDGE GSM

Meas

The information in this section is common to all measurements. For key and remote command information for a specific measurement, refer to the section that describes the measurement of interest.

Measurements available under the Meas key are specific to the current Mode.

When viewing Help for measurements, note the following:

NOTE

Operation for some keys differs between measurements. The information displayed in Help pertains to the current measurement. To see how a key operates in a different measurement, exit Help (press the Cancel Esc key), select the measurement, then reenter Help (press the Help key) and press that key.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Remote Measurement Functions

This section contains the following topics:

"Measurement Group of Commands" on page 2302

"Current Measurement Query (Remote Command Only)" on page 2304

"Limit Test Current Results (Remote Command Only)" on page 2304

"Data Query (Remote Command Only)" on page 2304

"Calculate/Compress Trace Data Query (Remote Command Only)" on page 2305

"Calculate Peaks of Trace Data (Remote Command Only)" on page 2310

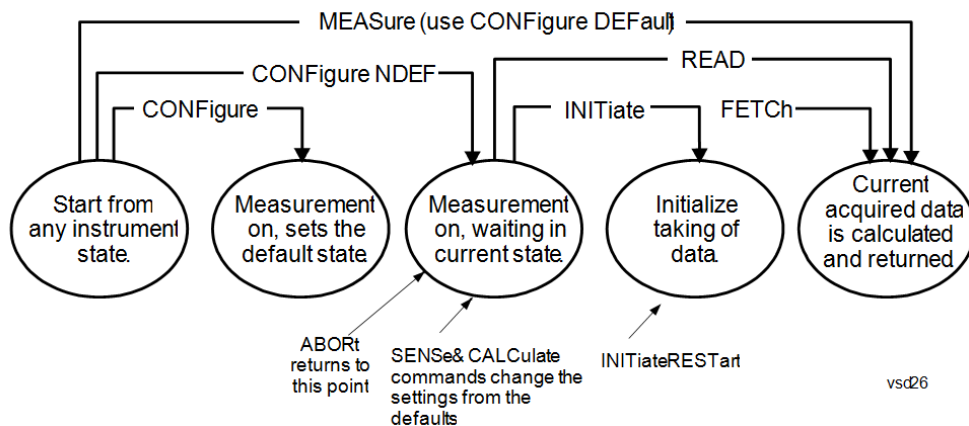
Hardware-Accelerated Fast Power Measurement (Remote Command Only)

"Format Data: Numeric Data (Remote Command Only)" on page 2311

"Format Data: Byte Order (Remote Command Only)" on page 2312

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Measurement Group of Commands



Measure Commands:

:MEASure:<measurement>[n]?

This is a fast single-command way to make a measurement using the factory default instrument settings. These are the settings and units that conform to the Mode Setup settings (e.g. radio standard) that you have currently selected.

- Stops the current measurement (if any) and sets up the instrument for the specified measurement using the factory defaults
- Initiates the data acquisition for the measurement
- Blocks other SCPI communication, waiting until the measurement is complete before returning results.
- If the function does averaging, it is turned on and the number of averages is set to 10.
- After the data is valid it returns the scalar results, or the trace data, for the specified measurement. The type of data returned may be defined by an [n] value that is sent with the command.
- The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available.
- ASCII is the default format for the data output. (Older versions of Spectrum Analysis and Phase Noise mode measurements only use ASCII.) The binary data formats should be used for handling large blocks of data since they are smaller and faster than the ASCII format. Refer to the FORMat:DATA command for more information.

If you need to change some of the measurement parameters from the factory default settings you can set up the measurement with the CONFIgure command. Use the commands in the SENSE:<measurement> and CALCulate:<measurement> subsystems to change the settings. Then you can use the READ? command to initiate the measurement and query the results.

If you need to repeatedly make a given measurement with settings other than the factory defaults, you can use the commands in the SENSE:<measurement> and CALCulate:<measurement> subsystems to set up the measurement. Then use the READ? command to initiate the measurement and query results.

Measurement settings persist if you initiate a different measurement and then return to a previous one. Use READ:<measurement>? if you want to use those persistent settings. If you want to go back to the default settings, use MEASure:<measurement>?.

Configure Commands:

:CONFIgure:<measurement>

This command stops the current measurement (if any) and sets up the instrument for the specified measurement using

the factory default instrument settings. It does not initiate the taking of measurement data unless INIT:CONTinuous is ON. If you change any measurement settings after using the CONFigure command, the READ command can be used to initiate a measurement without changing the settings back to their defaults.

In the Swept SA measurement in Spectrum Analyzer mode the CONFigure command also turns the averaging function on and sets the number of averages to 10 for all measurements.

:CONFigure: <measurement>: NDEFault stops the current measurement and changes to the specified measurement. It does not change the settings to the defaults. It does not initiate the taking of measurement data unless INIT:CONTinuous is ON.

The CONFigure? query returns the current measurement name.

The CONFigure:CATalog? query returns a quoted string of all licensed measurement names in the current mode. For example, "SAN, CHP, OBW, ACP, PST, TXP, SPUR, SEM, LIST".

Fetch Commands:

:FETCh:<measurement>[n]?

This command puts selected data from the most recent measurement into the output buffer. Use FETCh if you have already made a good measurement and you want to return several types of data (different [n] values, for example, both scalars and trace data) from a single measurement. FETCh saves you the time of re-making the measurement. You can only FETCh results from the measurement that is currently active, it will not change to a different measurement. An error message is reported if a measurement other than the current one is specified.

If you need to get new measurement data, use the READ command, which is equivalent to an INITiate followed by a FETCh.

The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used for handling large blocks of data since they are smaller and transfer faster than the ASCII format. (FORMat:DATA)

FETCh may be used to return results other than those specified with the original READ or MEASure command that you sent.

INITiate Commands:

:INITiate:<measurement>

This command is not available for measurements in all the instrument modes:

- Initiates a trigger cycle for the specified measurement, but does not output any data. You must then use the FETCh<meas> command to return data. If a measurement other than the current one is specified, the instrument will switch to that measurement and then initiate it.
 - For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. If you send INIT:ACP? it will change from channel power to ACP and will initiate an ACP measurement.
 - Does not change any of the measurement settings. For example, if you have previously started the ACP measurement and you send INIT:ACP? it will initiate a new ACP measurement using the same instrument settings as the last time ACP was run.
 - If your selected measurement is currently active (in the idle state) it triggers the measurement, assuming the trigger conditions are met. Then it completes one trigger cycle. Depending upon the measurement and the number of averages, there may be multiple data acquisitions, with multiple trigger events, for one full trigger cycle. It also holds off additional commands on GPIB until the acquisition is complete.
-

READ Commands:

:READ:<measurement>[n]?

- Does not preset the measurement to the factory default settings. For example, if you have previously initiated the ACP
-

measurement and you send READ:ACP? it will initiate a new measurement using the same instrument settings.

- Initiates the measurement and puts valid data into the output buffer. If a measurement other than the current one is specified, the instrument will switch to that measurement before it initiates the measurement and returns results.
 - For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. Then you send READ:ACP? It will change from channel power back to ACP and, using the previous ACP settings, will initiate the measurement and return results.
 - Blocks other SCPI communication, waiting until the measurement is complete before returning the results
 - If the optional [n] value is not included, or is set to 1, the scalar measurement results will be returned. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used when handling large blocks of data since they are smaller and faster than the ASCII format. (FORMat:DATA)
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Initial S/W Revision	Prior to A.02.00
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Current Measurement Query (Remote Command Only)

This command returns the name of the measurement that is currently running.

Remote Command	:CONFigure?
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Example	CONF?
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Limit Test Current Results (Remote Command Only)

Queries the status of the current measurement limit testing. It returns a 0 if the measured results pass when compared with the current limits. It returns a 1 if the measured results fail any limit tests.

Remote Command	:CALCulate:CLIMits:FAIL?
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Example	CALC:CLIM:FAIL? queries the current measurement to see if it fails the defined limits. Returns a 0 or 1: 0 it passes, 1 it fails.
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Initial S/W Revision	Prior to A.02.00
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Data Query (Remote Command Only)

Returns the designated measurement data for the currently selected measurement and subopcode.

n = any valid subopcode for the current measurement. See the measurement command results table for your current measurement, for information about what data is returned for the subopcodes.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. (See the format command descriptions under Input/Output in the Analyzer Setup section.)

Remote Command	:CALCulate:DATA[n]?
Notes	The return trace depends on the measurement. In CALCulate:<meas>:DATA[n], n is any valid subopcode for the current measurement. It returns the same data as the FETCH:<measurement>? query where <measurement> is the current measurement.
Initial S/W Revision	Prior to A.02.00

Calculate/Compress Trace Data Query (Remote Command Only)

Returns compressed data for the currently selected measurement and sub-opcode [n].

n = any valid sub-opcode for that measurement. See the MEASure:<measurement>? command description of your specific measurement for information on the data that can be returned.

The data is returned in the current Y Axis Unit of the analyzer. The command is used with a sub-opcode <n> (default=1) to specify the trace. With trace queries, it is best if the analyzer is not sweeping during the query. Therefore, it is generally advisable to be in Single Sweep, or Update=Off.

This command is used to compress or decimate a long trace to extract and return only the desired data. A typical example would be to acquire N frames of GSM data and return the mean power of the first burst in each frame. The command can also be used to identify the best curve fit for the data.

Remote Command	:CALCulate:DATA<n>:COMPRESS? BLOCK CFIT MAXimum MINimum MEAN DMEan RMS RMSCubed SAMPLE SDEVIation PPHase [,<soffset> [,<length>[,<roffset>[,<rlimit>]]]]
Example	To query the mean power of a set of GSM bursts: Supply a signal that is a set of GSM bursts. Select the IQ Waveform measurement (in IQ Analyzer Mode). Set the sweep time to acquire at least one burst. Set the triggers such that acquisition happens at a known position relative to a burst. Then query the mean burst levels using, CALC:DATA2:COMP? MEAN, 24e-6, 526e-6 (These parameter values correspond to GSM signals, where 526e-6 is the length of the burst in the slot and you just want 1 burst.)
Notes	The command supports 5 parameters. Note that the last 4 (<soffset>, <length>, <roffset>, <rlimit>) are optional. But these optional parameters must be entered in the specified order. For example, if you want to specify <length>, then you must also specify <soffset>. See details below for a definition of each of these parameters. This command uses the data in the format specified by FORMat:DATA, returning either binary or ASCII data.
Initial S/W Revision	Prior to A.02.00

- BLOCK or block data - returns all the data points from the region of the trace data that you specify. For example, it could be used to return the data points of an input signal over several timeslots, excluding the portions of the trace data that you do not want. (This is x,y pairs for trace data and I,Q pairs for complex data.)

- CFIT or curve fit - applies curve fitting routines to the data. <soffset> and <length> are required to define the data that you want. <roffset> is an optional parameter for the desired order of the curve equation. The query will return the following values: the x-offset (in seconds) and the curve coefficients ((order + 1) values).

MIN, MAX, MEAN, DME, RMS, RMSC, SAMP, SDEV and PPH return one data value for each specified region (or <length>) of trace data, for as many regions as possible until you run out of trace data (using <roffset> to specify regions). Or they return the number of regions you specify (using <rlimit>) ignoring any data beyond that.

- MINimum - returns the minimum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the minimum magnitude of the I/Q pairs is returned.
- MAXimum - returns the maximum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the maximum magnitude of the I/Q pairs is returned.
- MEAN - returns a single value that is the arithmetic mean of the data point values (in dB/ dBm) for the specified region(s) of trace data. For I/Q trace data, the mean of the magnitudes of the I/Q pairs is returned. See the following equations.

NOTE If the original trace data is in dB, this function returns the arithmetic mean of those log values, not log of the mean power which is a more useful value. The mean of the log is the better measurement technique when measuring CW signals in the presence of noise. The mean of the power, expressed in dB, is useful in power measurements such as Channel Power. To achieve the mean of the power, use the RMS option.

Equation 1

Mean Value of Data Points for Specified Region(s)

$$MEAN = \frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 2

Mean Value of I/Q Data Pairs for Specified Region(s)

$$MEAN = \frac{1}{n} \sum_{X_i \in \text{region}(s)} |X_i|$$

where $|X_i|$ is the magnitude of an I/Q pair, and n is the number of I/Q pairs in the specified region(s).

- DMEan - returns a single value that is the mean power (in dB/ dBm) of the data point values for the specified region(s) of trace data. See the following equation:

Equation 3

DMEan Value of Data Points for Specified Region(s)

$$\text{DME} = 10 \times \log_{10} \left(\frac{1}{n} \sum_{X_i \in \text{region}(s)} 10^{\frac{X_i}{10}} \right)$$

- RMS - returns a single value that is the average power on a root-mean-squared voltage scale (arithmetic rms) of the data point values for the specified region(s) of trace data. See the following equation.

NOTE

For I/Q trace data, the rms of the magnitudes of the I/Q pairs is returned. See the following equation. This function is very useful for I/Q trace data. However, if the original trace data is in dB, this function returns the rms of the log values which is not usually needed.

Equation 4

RMS Value of Data Points for Specified Region(s)

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i^2}$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 5

RMS Value of I/Q Data Pairs for Specified Region(s)

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region(s).

Once you have the rms value for a region of trace data (linear or I/Q), you may want to calculate the mean power. You must convert this rms value (peak volts) to power in dBm:

$$10 \times \log[10 \times (\text{rms value})^2]$$

- SAMPLe - returns the first data value (x,y pair) for the specified region(s) of trace data. For I/Q trace data, the first I/Q pair is returned.
- SDEViation - returns a single value that is the arithmetic standard deviation for the data point values for the specified region(s) of trace data. See the following equation.
- For I/Q trace data, the standard deviation of the magnitudes of the I/Q pairs is returned. See the following equation.

Equation 6

Standard Deviation of Data Point Values for Specified Region(s)

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (X_i - \bar{X})^2}$$

where X_i is a data point value, \bar{X} is the arithmetic mean of the data point values for the specified region (s), and n is the number of data points in the specified region(s).

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (|X_i| - \bar{X})^2}$$

where $|X_i|$ is the magnitude of an I/Q pair, \bar{X} is the mean of the magnitudes for the specified region(s), and n is the number of data points in the specified region(s).

- PPHase - returns the x,y pairs of both rms power (dBm) and arithmetic mean phase (radian) for every specified region and frequency offset (Hz). The number of pairs is defined by the specified number of regions. This parameter can be used for I/Q vector ($n=0$) in Waveform (time domain) measurement and all parameters are specified by data point in PPHase.

The rms power of the specified region may be expressed as:

$$\text{Power} = 10 \times \log [10 \times (\text{RMS I/Q value})] + 10.$$

The RMS I/Q value (peak volts) is:

$$\sqrt{\frac{1}{n} \sum_{X_i \in \text{region}} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region.

The arithmetic mean phase of the specified region may be expressed as:

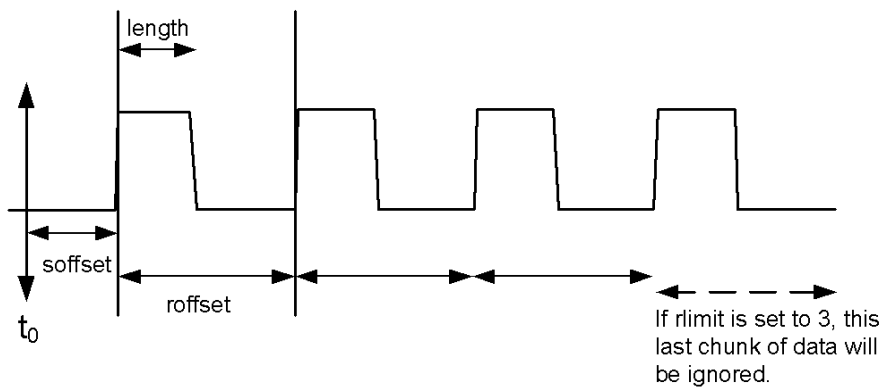
$$\frac{1}{n} \sum_{Y_i \in \text{region}} Y_i$$

where Y_i is the unwrapped phase of I/Q pair with applying frequency correction and n is the number of I/Q pairs in the specified region.

The frequency correction is made by the frequency offset calculated by the arithmetic mean of every specified region's frequency offset. Each frequency offset is calculated by the least square method against the unwrapped phase of I/Q pair.

Sample Trace Data - Constant Envelope

(See below for explanation of variables.)



Sample Trace Data - Not Constant Envelope

(See below for explanation of variables.)



<soffset> - start offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It specifies the amount of data at the beginning of the trace that will be ignored before the decimation process starts. It is the time or frequency change from the start of the trace to the point where you want to start using the data. The default value is zero.

<length> - is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines how much data will be compressed into one value. This parameter has a default value equal to the current trace length.

<roffset> - repeat offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines the beginning of the next field of trace elements to be compressed. This is relative to the beginning of the previous field. This parameter has a default value equal to the <length> variable. Note that this parameter is used for a completely different purpose when curve fitting (see CFIT above).

<rlimit> - repeat limit is an optional integer. It specifies the number of data items that you want returned. It will ignore any additional items beyond that number. You can use the Start offset and the Repeat limit to pick out exactly what part of the data you want to use. The default value is all the data.

Calculate Peaks of Trace Data (Remote Command Only)

Returns a list of all the peaks for the currently selected measurement and sub-opcode [n]. The peaks must meet the requirements of the peak threshold and excursion values.

n = any valid sub-opcode for the current measurement. See the MEASure:<measurement> command description of your specific measurement for information on the data that can be returned.

The command can only be used with specific sub-opcodes with measurement results that are trace data. Both real and complex traces can be searched, but complex traces are converted to magnitude in dBm. In many measurements the sub-opcode n=0, is the raw trace data which cannot be searched for peaks. And Sub-opcode n=1, is often calculated results values which also cannot be searched for peaks.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. If the format is set to INT,32, it returns REAL,32 data.

The command has four types of parameters:

- Threshold (in dBm)
- Excursion (in dB)
- Sorting order (amplitude, frequency, time)
- Optional in some measurements: Display line use (all, > display line, < display line)

Remote Command	<p>For Swept SA measurement:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME[,ALL GTDLine LTDLine]]</pre> <p>For most other measurements:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME]</pre>
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Example	<p>Example for Swept SA measurement in Spectrum Analyzer Mode:</p> <p>CALC:DATA4:PEAK? -40, 10, FREQ, GTDL This will identify the peaks of trace 4 that are above -40 dBm, with excursions of at least 10 dB. The peaks are returned in order of increasing frequency, starting with the lowest frequency. Only the peaks that are above the display line are returned.</p> <p>Query Results 1:</p> <p>With FORMat:DATA REAL, 32 selected, it returns a list of floating-point numbers. The first value in the list is the number of peak points that are in the following list. A peak point consists of two values: a peak amplitude followed by its corresponding frequency (or time).</p> <p>If no peaks are found the peak list will consist of only the number of peaks, (0).</p>
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Notes	<p><n> - is the trace that will be used</p> <p><threshold> - is the level below which trace data peaks are ignored. Note that the threshold value is required and is always used as a peak criterion. To effectively disable the threshold criterion for this command, provide a substantially low threshold value such as -200 dBm. Also note that the threshold value used in this command is independent of and has no effect on the threshold value stored under the Peak Criteria menu.</p> <p><excursion> - is the minimum amplitude variation (rise and fall) required for a signal to be identified as peak. Note that the excursion value is required and is always used as a peak criterion. To effectively disable the excursion criterion for this command, provide the minimum value of 0.0 dB. Also note that the excursion value used in this command is independent of and has no effect on the</p>
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excursion value stored under the Peak Criteria menu.

Values must be provided for threshold and excursion. The sorting and display line parameters are optional (defaults are AMPLitude and ALL).

Note that there is always a Y-axis value for the display line, regardless of whether the display line state is on or off. It is the current Y-axis value of the display line which is used by this command to determine whether a peak should be reported

Sorting order:

AMPLitude - lists the peaks in order of descending amplitude, with the highest peak first (default if optional parameter not sent)

FREQUency - lists the peaks in order of occurrence, left to right across the x-axis.

TIME - lists the peaks in order of occurrence, left to right across the x-axis.

Peaks vs. Display Line:

ALL - lists all of the peaks found (default if optional parameter not sent).

GTDLine (greater than display line) - lists all of the peaks found above the display line.

LTDLine (less than display line) - lists all of the peaks found below the display line.

Initial S/W Revision Prior to A.02.00

Format Data: Numeric Data (Remote Command Only)

This command specifies the format of the trace data input and output. It specifies the formats used for trace data during data transfer across any remote port. It affects only the data format for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]?, :CALCulate:DATA[n]? and FETCh:SANalyzer [n]? commands and queries.

Remote Command :FORMat[:TRACe][:DATA] ASCii|INTeger,32|REAL,32 |REAL,64
:FORMat[:TRACe][:DATA]?

Notes The query response is:
ASCii: ASC,8
REAL,32: REAL,32
REAL,64: REAL,64
INTeger,32: INT,32

When the numeric data format is REAL or ASCii, data is output in the current Y Axis unit. When the data format is INTeger, data is output in units of m dBm (.001 dBm).

The INT,32 format returns binary 32-bit integer values in internal units (m dBm), in a definite length block.

Dependencies Sending a data format spec with an invalid number (for example, INT,48) generates no error. The analyzer simply uses the default (8 for ASCii, 32 for INTeger, 32 for REAL).

Sending data to the analyzer which does not conform to the current FORMat specified, results in an error. Sending ASCII data when a definite block is expected generates message -161 "Invalid Block Data" and sending a definite block when ASCII data is expected generates message -121 "Invalid Character in Number".

Preset ASCii

Backwards Compatibility Notes Note that the INT,32 format is only applicable to the command, TRACe:DATA. This preserves backwards compatibility for the Swept SA measurement. For all other commands/queries which honor FORMat:DATA, if INT,32 is sent the analyzer will behave as though it were set to REAL,32.

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The specs for each output type follow:

AScii - Amplitude values are in ASCII, in the current Y Axis Unit, one ASCII character per digit, values separated by commas, each value in the form:

SX.YYYYYEsZZ

Where:

S = sign (+ or -)

X = one digit to left of decimal point

Y = 5 digits to right of decimal point

E = E, exponent header

s = sign of exponent (+ or -)

ZZ = two digit exponent

REAL,32 - Binary 32-bit real values in the current Y Axis Unit, in a definite length block.

REAL,64 - Binary 64-bit real values in the current Y Axis Unit, in a definite length block.

Format Data: Byte Order (Remote Command Only)

This command selects the binary data byte order for data transfer and other queries. It controls whether binary data is transferred in normal or swapped mode. This command affects only the byte order for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]? , :CALCulate:DATA[n]? and FETCh:SANalyzer[n]? commands and queries.

By definition any command that says it uses FORMat:DATA uses any format supported by FORMat:DATA.

The NORMal order is a byte sequence that begins with the most significant byte (MSB) first, and ends with the least significant byte (LSB) last in the sequence: 1|2|3|4. SWAPped order is when the byte sequence begins with the LSB first, and ends with the MSB last in the sequence: 4|3|2|1.

Remote Command	:FORMat:BORDER NORMal SWAPped :FORMat:BORDER?
Preset	NORMal
Initial S/W Revision	Prior to A.02.00

Meas Setup

Displays the measurement setup menu for the currently selected measurement.

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Avg/Hold Num

Used to specify the number of data acquisitions that are averaged. After the specified number of average counts, the averaging mode (terminal control) setting determines the averaging action.

- On – Sets measurement averaging on.
- Off – Sets measurement averaging off.

Key Path	Meas Setup
Mode	GSM
Remote Command	[:SENSe]:PFERror:AVERage:COUNT <integer> [:SENSe]:PFERror:AVERage:COUNT? [:SENSe]:PFERror:AVERage[:STATe] OFF ON 0 1 [:SENSe]:PFERror:AVERage[:STATe]?
Example	PFER:AVER:COUN 4 PFER:AVER:COUN? PFER:AVER OFF PFER:AVER?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Couplings	When this value is changed, Avg State is set to On.
Preset	10 OFF
State Saved	Saved in instrument state.
Min	1
Max	10000
Initial S/W Revision	Prior to A.02.00

Avg Mode

Allows you to choose either exponential or repeat averaging. This selection only effects the averaging after the number of N averages is reached (set using the Averages, Avg Bursts, or Avg Number key).

- Exponential averaging – When Measure is set at Cont, data acquisitions continue indefinitely. After N averages, exponential averaging is used with a weighting factor of N (the displayed average count stops at N). Exponential averaging weights new data more than old data, which allows tracking of slow-changing signals. The weighting factor N is set using the Averages, Avg Bursts key.
- Repeat averaging – When Measure is set at Cont, data acquisitions continue indefinitely. After N averages is reached, all previous result data is cleared and the average count is set back to 1. This is equivalent to being in Measure Single and pressing the Restart key when the Single measurement finishes.

Key Path	Meas Setup
Mode	GSM
Remote Command	[:SENSe] :PFERror:AVERage:TCONtrol EXPonential REPeat [:SENSe] :PFERror:AVERage:TCONtrol?
Example	PFER:AVER:TCON REP PFER:AVER:TCON?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	REPeat
State Saved	Saved in instrument state.
Range	Exp Repeat
Initial S/W Revision	Prior to A.02.00

Average Type (Backward Compatibility/Remote Command Only)

Allows you to select the averaging type from the following selections:

- Maximum – The maximum values are restored (the maximum of all values is retained).
- Mean – The mean values are restored (the average of all values is retained).

Mode	EDGE GSM
Remote Command	[:SENSe] :PFERror:AVERage:TYPE MEAN MAXimum [:SENSe] :PFERror:AVERage:TYPE?
Example	PFER:AVER:TYPE MEAN PFER:AVER:TYPE?
Notes	SCPI only. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	MAXimum
State Saved	Saved in instrument state.
Range	Mean Maximum
Initial S/W Revision	Prior to A.02.00

Burst Sync

Allows you to select the method of synchronizing the measurement to the bursts.

- RFBurst – The burst synchronization approximates the start and stop of the useful part of the burst without demodulation of the burst.
- Training Sequence (TSEquence) – The burst synchronization performs a demodulation of the burst and determines the start and stop of the useful part of the burst based on the midamble training sync sequence.

Key Path	Meas Setup
Mode	GSM
Remote Command	[:SENSe] :PFERror:BSYNc:SOURce RFBurst TSEquence [:SENSe] :PFERror:BSYNc:SOURce?
Example	PFER:BSYN:SOUR RFB PFER:BSYN:SOUR?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	TSEquence
State Saved	Saved in instrument state.
Range	Training Seq RF Amptd
Initial S/W Revision	Prior to A.02.00

IF Gain

Accesses a menu that controls the setting of the IF Gain function.

This function is an IF amplifier with approximately 10 dB of gain and enables you to take full advantage of the RF dynamic range of the analyzer. When it is turned on without an overload, the dynamic range is always better than when this function is off. The IF Gain key can be used to set the IF Gain function to Auto, On (the extra 10 dB), or Off. These settings affect sensitivity and IF overloads.

This only applies to the RF input. It does not apply to baseband I/Q input.

Key Path	Meas Setup, Advanced,
Initial S/W Revision	Prior to A.02.00

IF Gain Auto

Activates the auto rules for IF Gain

Key Path	Meas Setup
Mode	GSM
Remote Command	[:SENSe] :PFERror:IF:GAIN:AUTO[:STATe] ON OFF 1 0

	<code>[:SENSe] :PFERror:IF:GAIN:AUTO [:STATe] ?</code>
Example	PFERror:IF:GAIN:AUTO ON PFERror:IF:GAIN:AUTO?
Notes	IF Gain only applies to the RF input. It does not apply to baseband I/Q input. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	When either the auto attenuation works (for example, with electrical attenuator), or the Optimize Mechanical Attenuator range is requested, the IF Gain setting is changed. 'auto' sets IF Gain High under any of the following conditions: the input attenuator is set to 0 dB, the preamp is turned on, or the Max Mixer Level is -20 dBm or lower. For other settings, auto sets IF Gain to Low.
Preset	OFF
State Saved	Saved in instrument state.
Range	Auto Man
Initial S/W Revision	Prior to A.02.00

IF Gain State

Selects the range of IF gain.

Key Path	Meas Setup, IF Gain
Mode	GSM
Remote Command	<code>[:SENSe] :PFERror:IF:GAIN [:STATe] ON OFF 1 0</code> <code>[:SENSe] :PFERror:IF:GAIN [:STATe] ?</code>
Example	PFER:IF:GAIN ON PFER:IF:GAIN?
Notes	IF Gain only applies to the RF input. It does not apply to baseband I/Q input. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. where ON = high gain OFF = low gain
Couplings	Coupled to "IF Gain Auto" on page 1793. Setting IF Gain Auto forces IF Gain State to Man.
Preset	OFF
State Saved	Saved in instrument state.
Range	Low Gain (Best for Large Signals) High Gain (Best Noise Level)
Initial S/W Revision	Prior to A.02.00

Limits

Accesses a menu that enables you to set the Limit Test.

Key Path	Meas Setup, Mode, Limits
Mode	GSM
Initial S/W Revision	Prior to A.02.00

Limit Test

Turns on or off limit pass/fail testing.

Key Path	Meas Setup, Limits
Mode	GSM
Remote Command	:CALCulate:PFERror:LIMit:TEST[:STATe] OFF ON 0 1 :CALCulate:PFERror:LIMit:TEST[:STATe]?
Example	CALC:PFER:LIM:TEST ON CALC:PFER:LIM:TEST?
Notes	If set to Off, PASS/FAIL indicator on the Meas Bar goes blank. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

RMS Phase Error

Sets the limit value for RMS Phase limit in degree for MS and BTS.

See also:

- ["RMS Phase Error Limit for BTS" on page 1795](#)
- ["RMS Phase Error Limit for MS" on page 1796](#)

Key Path	Meas Setup, Limits
Mode	GSM
Initial S/W Revision	Prior to A.02.00

RMS Phase Error Limit for BTS

Key Path	Meas Setup, Limits
Mode	GSM
Remote Command	:CALCulate:PFERror:LIMit:BTS:RPHase <real>

	:CALCulate:PFERror:LIMit:BTS:RPHase?
Example	CALC:PFER:LIM:BTS:RPH 10 CALC:PFER:LIM:BTS:RPH?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	5
State Saved	Saved in instrument state.
Min	0.0
Max	180.0
Initial S/W Revision	Prior to A.02.00

RMS Phase Error Limit for MS

Key Path	Meas Setup, Limits
Mode	GSM
Remote Command	:CALCulate:PFERror:LIMit:MS:RPHase <real> :CALCulate:PFERror:LIMit:MS:RPHase?
Example	CALC:PFER:LIM:MS:RPH 10 CALC:PFER:LIM:MS:RPH?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	5
State Saved	Saved in instrument state.
Min	0.0
Max	180.0
Initial S/W Revision	Prior to A.02.00

Peak Phase Error

Sets the limit value for Peak Phase limit in degree for MS and BTS.

See also:

- ["Peak Phase Error Limit for BTS" on page 1797](#)
- ["Peak Phase Error Limit for MS" on page 1797](#)

Key Path	Meas Setup, Limits
Mode	GSM
Initial S/W Revision	Prior to A.02.00

Peak Phase Error Limit for BTS

Key Path	Meas Setup, Limits
Mode	GSM
Remote Command	:CALCulate:PFERror:LIMit:BTS:PPHase <real> :CALCulate:PFERror:LIMit:BTS:PPHase?
Example	CALC:PFER:LIM:BTS:PPH 10 CALC:PFER:LIM:BTS:PPH?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. Unit is Degree(s).
Preset	20
State Saved	Saved in instrument state.
Min	0.0
Max	180.0
Initial S/W Revision	Prior to A.02.00

Peak Phase Error Limit for MS

Key Path	Meas Setup, Limits
Mode	GSM
Remote Command	:CALCulate:PFERror:LIMit:MS:PPHase <real> :CALCulate:PFERror:LIMit:MS:PPHase?
Example	CALC:PFER:LIM:MS:PPH 10 CALC:PFER:LIM:MS:PPH?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	20
State Saved	Saved in instrument state.
Min	0.0
Max	180.0
Initial S/W Revision	Prior to A.02.00

Frequency Error

Sets the limit value for frequency limit in ppm for MS and BTS.

See also:

- ["Freq Error Limit for BTS \(BTS Type is Normal\)" on page 1798](#)
- ["Freq Error Limit for mBTS \(BTS Type is one of Micro BTS types\)" on page 1798](#)
- ["Freq Error Limit for pBTS \(BTS Type is Pico1\)" on page 1799](#)

- "Freq Error Limit for MS" on page 1799

Key Path	Meas Setup, Limits
Mode	GSM
Initial S/W Revision	Prior to A.02.00

Freq Error Limit for BTS (BTS Type is Normal)

Key Path	Meas Setup, Limits
Mode	GSM
Remote Command	:CALCulate:PFERror:LIMit:BTS:FERRor <real> :CALCulate:PFERror:LIMit:BTS:FERRor?
Example	CALC:PFER:LIM:BTS:FERR 10 CALC:PFER:LIM:BTS:FERR?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	0.05
State Saved	Saved in instrument state.
Min	0
Max	100
Initial S/W Revision	Prior to A.02.00

Freq Error Limit for mBTS (BTS Type is one of Micro BTS types)

Key Path	Meas Setup, Limits
Mode	GSM
Remote Command	:CALCulate:PFERror:LIMit:MBTS:FERRor <real> :CALCulate:PFERror:LIMit:MBTS:FERRor?
Example	CALC:PFER:LIM:MBTS:FERR 10 CALC:PFER:LIM:MBTS:FERR?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	0.05
State Saved	Saved in instrument state.
Min	0
Max	100
Initial S/W Revision	Prior to A.02.00

Freq Error Limit for pBTS (BTS Type is Pico1)

Key Path	Meas Setup, Limits
Mode	GSM
Remote Command	:CALCulate:PFERror:LIMit:PBTS:FERRor <real> :CALCulate:PFERror:LIMit:PBTS:FERRor?
Example	CALC:PFER:LIM:PBTS:FERR 10 CALC:PFER:LIM:PBTS:FERR?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. Unit is ppm.
Preset	0.1
State Saved	Saved in instrument state.
Min	0
Max	100
Initial S/W Revision	Prior to A.02.00

Freq Error Limit for MS

Key Path	Meas Setup, Limits
Mode	GSM
Remote Command	:CALCulate:PFERror:LIMit:MS:FERRor <real> :CALCulate:PFERror:LIMit:MS:FERRor?
Example	CALC:PFER:LIM:MS:FERR 10 CALC:PFER:LIM:MS:FERR?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	0.1
State Saved	Saved in instrument state.
Min	0
Max	100
Initial S/W Revision	Prior to A.02.00

Meas Preset

Restores all the measurement parameters to their default values.

Key Path	Meas Setup
Mode	GSM
Remote Command	:CONFigure:PFERror

Example	CONF:PFER
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Initial S/W Revision	Prior to A.02.00

Mode

See "Mode" on page 274

Mode Preset

Returns the active mode to a known state.

Mode Preset does the following for the currently active mode:

- Aborts the currently running measurement.
- Brings up the default menu for the mode, with no active function.
- Sets measurement Global settings to their preset values for the active mode only.
- Activates the default measurement.
- Brings up the default menu for the mode.
- Clears the input and output buffers.
- Sets Status Byte to 0.

Mode Preset does not:

- Cause a mode switch
- Affect mode persistent settings
- Affect system settings

See "[How-To Preset](#)" on page 1803 for more information.

Key Path	Front-panel key
Remote Command	:SYSTem:PRESet
Example	:SYST:PRES
Notes	*RST is preferred over :SYST:PRES for remote operation. *RST does a Mode Preset, as done by the :SYST:PRES command, and it sets the measurement mode to Single measurement rather than Continuous for optimal remote control throughput. Clears all pending OPC bits. The Status Byte is set to 0.
Couplings	A Mode Preset aborts the currently running measurement, activates the default measurement, and gets the mode to a consistent state with all of the default couplings set.
Backwards Compatibility Notes	In the X-Series, the legacy "Factory Preset" has been replaced with Mode Preset, which only presets the currently active mode, not the entire instrument. In the X-Series, the way to preset the entire instrument is by using System, Restore System Defaults All, which behaves essentially the same way as restore System Defaults does on ESA and PSA. There is also no "Preset Type" as there is on the PSA. There is a green Mode Preset front-panel key that does a Mode Preset and a white-with-green-letters User Preset front-panel key that does a User Preset. The old PRESet:TYPE command is ignored (without generating an error), and SYST:PRES without a parameter does a Mode Preset, which should cover most backward code compatibility issues. The settings and correction data under the Input/Output front-panel key (examples: Input Z Corr, Ext Amp Gain, etc.) are no longer part of any Mode, so they will not be preset by a Mode Preset. They are preset using Restore Input/Output Defaults, Restore System Defaults All. Note that because User Preset does a Recall State, and all of these settings are saved in State, they ARE recalled when using

	User Preset.
Initial S/W Revision	Prior to A.02.00

How-To Preset

The table below shows all possible presets, their corresponding SCPI commands and front-panel access (key paths). Instrument settings depend on the current measurement context. Some settings are local to the current measurement, some are global (common) across all the measurements in the current mode, and some are global to all the available modes. In a similar way, restoring the settings to their preset state can be done within the different contexts.

Auto Couple - is a measurement local key. It sets all Auto/Man parameter couplings in the measurement to Auto. Any Auto/Man selection that is local to other measurements in the mode will not be affected.

Meas Preset - is a measurement local key. Meas Preset resets all the variables local to the current measurement except the persistent ones.

Mode Preset - resets all the current mode's measurement local and measurement global variables except the persistent ones.

Restore Mode Defaults - resets ALL the Mode variables (and all the Meas global and Meas local variables), including the persistent ones.

Type Of Preset	SCPI Command	Front Panel Access
Auto Couple	:COUPlE ALL	Auto Couple front-panel key
Meas Preset	:CONFIgure:<Measurement>	Meas Setup Menu
Mode Preset	:SYSTem:PRESet	Mode Preset (green key)
Restore Mode Defaults	:INSTrument:DEFault	Mode Setup Menu
Restore All Mode Defaults	:SYSTem:DEFault MODEs	System Menu; Restore System Default Menu
*RST	*RST	not possible (Mode Preset with Single)
Restore Input/Output Defaults	:SYSTem:DEFault INPut	System Menu; Restore System Default Menu
Restore Power On Defaults	:SYSTem:DEFault PON	System Menu; Restore System Default Menu
Restore Alignment Defaults	:SYSTem:DEFault ALIGn	System Menu; Restore System Default Menu
Restore Miscellaneous Defaults	:SYSTem:DEFault MISC	System Menu; Restore System Default Menu
Restore All System Defaults	:SYSTem:DEFault [ALL] :SYSTem:PRESet:PERSistent	System Menu; Restore System Default Menu
User Preset	:SYSTem:PRESet:USER	User Preset Menu
User Preset All Modes	:SYSTem:PRESet:USER:ALL	User Preset Menu

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Mode Preset

Power On Mode Preset	:SYSTem:PON:TYPE MODE	System Menu
Power On User Preset	:SYSTem:PON:TYPE USER	System Menu
Power On Last State	:SYSTem:PON:TYPE LAST	System Menu

Mode Setup

See ["Mode Setup" on page 294](#)

Peak Search

Places the selected marker on the trace point with the maximum y-axis value for that marker's trace. Pressing Peak Search with the selected marker off causes the selected marker to be set to Normal, then a peak search is immediately performed.

When Marker Trace of the selected marker is POL, peak search will not be performed.

Key Path	Peak Search
Mode	GSM
Remote Command	:CALCulate:PFERror:MARKer[1] 2 ...12:MAXimum
Example	CALC:PFER:MARK2:MAX
Initial S/W Revision	Prior to A.02.00

Print

See "Print" on page 325

Quick Save

The Quick Save front-panel key repeats the most recent save that was performed from the Save menu, with the following exceptions:

- Register saves are not remembered as Saves for the purpose of the Quick Save function
- If the current measurement does not support the last non-register save that was performed, an informational message is generated, “File type not supported for this measurement”

Quick Save repeats the last type of qualified save (that is, a save qualified by the above criteria) in the last save directory by creating a unique filename using the Auto File Naming algorithm described below.

If Quick Save is pressed after startup and before any qualified Save has been performed, the Quick Save function performs a Screen Image save using the current settings for Screen Image saves (current theme, current directory), which then becomes the “last save” for the purpose of subsequent Quick Saves.

The Auto File Naming feature automatically generates a file name for use when saving a file. The filename consists of a prefix and suffix separated by a dot, as is standard for the Windows® file system. A default prefix exists for each of the available file types:

Type	Default Prefix	Menu
State	State_	(Save/Recall)
Trace + State	State_	(Save/Recall)
Screen	Screen_	(Save/Recall)
Amplitude Corrections	Ampcor_	(Import/Export)
Traces	Trace_	(Import/Export)
Limit Lines	LLine_	(Import/Export)
Measurement Result	MeasR_	(Import/Export)
Capture Buffer	CapBuf_	(Import/Export)

A four digit number is appended to the prefix to create a unique file name. The numbering sequence starts at 0000 within each Mode for each file type and updates incrementally to 9999, then wraps to 0000 again. It remembers where it was through a Mode Preset and when leaving and returning to the Mode. It is reset by Restore Misc Defaults and Restore System Defaults and subsequent running of the instrument application. So, for example, the first auto file name generated for State files is State_0000.state. The next is State_0001, and so forth.

One of the key features of Auto File Name is that we guarantee that the Auto File Name will never conflict with an existing file. The algorithm looks for the next available number. If it gets to 9999, then it looks for holes. If it find no holes, that is no more numbers are available, it gives an error.

For example, if when we get to State_0010.state there is already a State_0010.state file in the current directory, it advances the counter to State_0011.state to ensure that no conflict will exist (and then it verifies that State_0011.state also does not exist in the current directory and advances again if it does, and so forth).

If you enter a file name for a given file type, then the prefix becomes the filename you entered instead of the default prefix, followed by an underscore. The last four letters (the suffix) are the 4-digit number.

For example, if you save a measurement results file as “fred.csv”, then the next auto file name chosen for a measurement results save will be fred_0000.csv.

NOTE Although 0000 is used in the example above, the number that is used is actually the current number in the Meas Results sequence, that is, the number that would have been used if you had not entered your own file name.

NOTE If the filename you entered ends with _dddd, where d=any number, making it look just like an auto file name, then the next auto file name picks up where you left off with the suffix being dddd + 1.

Key Path	Front-panel key
Notes	No remote command for this key specifically.
Initial S/W Revision	Prior to A.02.00

Recall

The Recall menu lets you choose what you want to recall, and where you want to recall it from. Among the types of files you can recall are **States andTraces**. In addition, an Import (Data) option lets you recall a number of data types stored in CSV files (as used by Excel and other spreadsheet programs).

The default paths for Recall are data type dependent and are the same as for the Save key.

Key Path	Front-panel key
Notes	<p>No remote command for this key specifically, but the :MMEM:LOAD command is available for specific file types. An example is :MMEM:LOAD:STATe <filename>.</p> <p>If you try to recall a State file for a mode that is not licensed or not available in the instrument, an error message will occur and the state will not change.</p>
Backwards Compatibility Notes	<p>In legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly (since User Preset is actually loading a state), it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, “state” always includes all of this data; so whenever state is loaded, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p>
Backwards Compatibility Notes	<p>Recall for the X-Series supports backward compatibility in the sense that you can recall a state file from any X-Series model number and any version of X-Series software. This is only possible if part of the recalling process goes through a limiting step after recalling the mode settings, at least for settings that may vary with version number, model number, option and license differences. If you try to recall a state file onto an instrument with less capability than what was available on the instrument during the save, the recall will ignore the state it doesn't support and it will limit the recalled setting to what it allows.</p> <p>Example: if the saved state includes preamp ON, but the recalling instrument does not have a preamp; the preamp is limited to OFF. Conversely, if you save a state without a preamp, the preamp is OFF in the state file. When this saved file is recalled on an instrument with a licensed preamp, the preamp is changed to OFF. Another example is if the saved state has center frequency set to 20 GHz, but the instrument recalling the saved state is a different model and only supports 13.5 GHz. In this case, the center frequency is limited along with any other frequency based settings. Since the center frequency can't be preserved in this case, the recall limiting tries to at least preserve span to keep the measurement setup as intact as possible.</p> <p>It may be appropriate to issue a warning if the state is limited on the recall; warnings do not go out to SCPI so this would only affect the manual user.</p> <p>Note that there is no state file compatibility outside of the X-Series. For example, you cannot recall a state file from ESA or PSA.</p>
Initial S/W Revision	Prior to A.02.00

State

The Recall State menu lets you choose a register or file from which to recall the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings that were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the

additional settings affected by Restore Mode Defaults; all of the Mode’s settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode’s state, because they are needed to restore the complete setup. Persistent System settings (for example, GPIB address) are not affected by either a Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

Since each state file is only for one Mode, the settings for other Modes are unaffected when it is loaded. Recall State will cause a mode switch if the state being recalled is not from the current active mode.

After the recall completes, the message "File <filename> recalled" or “Recalled State Register <register number>” is displayed.

For rapid recalls, the State menu lists 16 registers that you can choose from to recall. Pressing a Register key initiates the recall. You can also select a file from which to recall.

The default path for all State Files is:

My Documents\<<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

See "[More Information](#)" on page 1812.

Key Path	Recall
Mode	All
Remote Command	:MMEMory:LOAD:STATe <filename>
Example	:MMEM:LOAD:STAT "myState.state" This recalls the file myState.state on the default path
Example	MMEM:LOAD:STAT "MyStateFile.state" This loads the state file data (on the default file directory path) into the instrument state.
Notes	<p>When you pick a file to recall, the analyzer first verifies that the file is recallable in the current instrument by checking the software version and model number of the instrument. If everything matches, a full recall proceeds by aborting the currently running measurement, clearing any pending operations, and then loading the State from the saved state file. You can open state files from any mode, so recalling a State file switches to the mode that was active when the save occurred. After switching to the mode of the saved state file, mode settings and data (if any for the mode) are loaded with values from the saved file. The saved measurement of the mode becomes the newly active measurement and the data relevant to the measurement (if there is any) is recalled.</p> <p>If there is a mismatch between file version or model number or instrument version or model number, the recall function tries to recall as much as possible and returns a warning message. It may limit settings that differ based on model number, licensing or version number.</p> <p>After recalling the state, the Recall State function does the following:</p> <ul style="list-style-type: none"> • Makes the saved measurement for the mode the active measurement. • Clears the input and output buffers. • Status Byte is set to 0. • Executes a *CLS <p>If the file specified is empty an error is generated. If the specified file does not exist, another error is generated. If there is a mismatch between the file and the proper file type, an error is generated. If</p>

	there is a mismatch between file version or model number or instrument version or model number, a warning is displayed. Then it returns to the State menu and File Open dialog goes away. After the Recall, the analyzer exits the Recall menu and returns to the previous menu.
Backwards Compatibility SCPI	:MMEMory:LOAD:STATe 1,<filename> For backwards compatibility, the above syntax is supported. The "1" is simply ignored.
Initial S/W Revision	Prior to A.02.00

More Information

In measurements that support saving Traces, for example, Swept SA, the Trace data is saved along with the State in the State file. When recalling the State, the Trace data is recalled as well. Traces are recalled exactly as they were stored, including the writing mode and update and display modes. If a Trace was updating and visible when the State was saved, it will come back updating and visible, and its data will be rewritten right away. When you use State to save and recall traces, any trace whose data must be preserved should be placed in View or Blank mode before saving.

The following table describes the Trace Save and Recall possibilities:

You want to recall state and one trace's data, leaving other traces unaffected.	Save Trace+State from 1 trace. Make sure that no other traces are updating (they should all be in View or Blank mode) when the save is performed.	On Recall, specify the trace you want to load the one trace's data into. This trace will load in View. All other traces' data will be unaffected, although their trace mode will be as it was when the state save was performed.
You want to recall all traces	Save Trace+State from ALL traces.	On Recall, all traces will come back in View (or Blank if they were in Blank or Background when saved)
You want all traces to load exactly as they were when saved.	Save State	On recall, all traces' mode and data will be exactly as they were when saved. Any traces that were updating will have their data immediately overwritten.

From File...

When you press "From File", the analyzer brings up a Windows dialog and a menu entitled "File Open." This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



Listed below are the functions of the various fields in the dialog, and the corresponding softkeys:

Open

Performs the recall of the specified file. While the recall is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Look In.

Look In

The Look In field shows the path from which the file will be recalled and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Look In field** first uses the last path from the Save As dialog **Save In:** path for that same file type. There is no softkey for directly navigating to the Look In field, but you can use the left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

Sort

Accesses a menu that enables you to sort the files within the File Open dialog. Only one sorting type can be selected at a time and the sorting happens immediately. The sorting types are By Date, By Name, By extension, and By Size.

Files of Type

This field shows the file suffix for the type of file you have selected to recall. For example, if you navigated here while recalling State, "Mode state (*.state)" is in the field. If you navigated here while recalling Trace, ""Mode state (*.trace)" is in the field. If you navigated here while importing a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown menu, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Open** request to be cancelled. The ESC key does the same thing.

Key Path	Recall, State
Notes	Brings up the Open dialog for recalling a State Save Type
Initial S/W Revision	Prior to A.02.00

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

For more information and the SCPI command, see Edit Register Names under the Save, State function.

Key Path	Recall, State
Mode	All
Dependencies	N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending the SCPI command generates an error, -221, "Settings conflict;Option not available"
Initial S/W Revision	A.11.00

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last

modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

Key Path	Recall, State
Example	*RCL 1
Range	1–16 from front panel, 1–128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State, Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	Prior to A.11.00

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

Key Path	Recall, State
Example	*RCL 1
Range	1-16 from front panel, 1-128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State,Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	Prior to A.11.00

Restart

The Restart function restarts the current sweep, or measurement, or set of averaged/held sweeps or measurements. If you are Paused, pressing Restart does a Resume.

The Restart function is accessed in several ways:

- Pressing the Restart key
- Sending the remote command INIT:IMMEDIATE
- Sending the remote command INIT:RESTART

See "[More Information](#)" on page 1817

Key Path	Front-panel key
Remote Command	:INITiate[:IMMEDIATE] :INITiate:RESTART
Example	:INIT:IMM :INIT:REST
Notes	:INITiate:RESTART and :INITiate:IMMEDIATE perform exactly the same function.
Couplings	Resets average/hold count k. For the first sweep overwrites all active (update=on) traces with new current data. For application modes, it resets other parameters as required by the measurement.
Status Bits/OPC dependencies	This is an Overlapped command. The STATUS:OPERation register bits 0 through 8 are cleared. The STATUS:QUESTIONable register bit 9 (INTEgrity sum) is cleared. The SWEEPING bit is set. The MEASURING bit is set.
Backwards Compatibility Notes	For Spectrum Analysis mode in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart trace averages (displayed average count reset to 1) for a trace in Clear Write, but did not restart Max Hold and Min Hold. In the X-Series, the Restart hardkey and the INITiate:RESTART command restart not only Trace Average, but MaxHold and MinHold traces as well. For wireless comms modes in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart every measurement, which includes all traces and numeric results. There is no change to this operation.
Initial S/W Revision	Prior to A.02.00

More Information

The **Restart** function first aborts the current sweep/measurement as quickly as possible. It then resets the sweep and trigger systems, sets up the measurement and initiates a new data measurement sequence with a new data acquisition (sweep) taken once the trigger condition is met.

If the analyzer is in the process of aligning when **Restart** is executed, the alignment finishes before the restart function is performed.

Even when set for Single operation, multiple sweeps may be taken when Restart is pressed (for example, when averaging/holding is on). Thus when we say that **Restart** "restarts a measurement," we may mean:

- It restarts the current sweep
- It restarts the current measurement
- It restarts the current set of sweeps if any trace is in Trace Average, Max Hold or Min Hold
- It restarts the current set of measurements if Averaging, or Max Hold, or Min Hold is on for the measurement
- depending on the current settings.

With **Average/Hold Number** (in **Meas Setup** menu) set to 1, or Averaging off, or no trace in Trace Average or Hold, a single sweep is equivalent to a single measurement. A single sweep is taken after the trigger condition is met; and the analyzer stops sweeping once that sweep has completed. However, with **Average/Hold Number** >1 and at least one trace set to **Trace Average, Max Hold, or Min Hold (SA Measurement)** or **Averaging on (most other measurements)**, multiple sweeps/data acquisitions are taken for a single measurement. The trigger condition must be met prior to each sweep. The sweep is stopped when the average count k equals the number N set for **Average/Hold Number**. A measurement average usually applies to all traces, marker results, and numeric results; but sometimes it only applies to the numeric results.

Once the full set of sweeps has been taken, the analyzer will go to idle state. To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command CALC:AVER:TCON UP.

Save

The Save menu lets you choose what you want to save and where you want to save it. Among the types of files you can save are **States**, **Traces**, and **Screen Images**. In addition, an Export (Data) option lets you save a number of data types as CSV files for easy import into Excel and other spreadsheet programs.

Key Path	Front-panel key
Mode	All
Notes	No remote command for this key specifically, but the :MMEM:STORe command is available for specific file types. An example is :MMEM:STOR:STATe <filename>.
Initial S/W Revision	Prior to A.02.00

State

The Save State menu lets you choose a register or file for saving the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings which were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, Verbose SCPI) are not affected by either Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

After the save completes, the message "File <filename> saved" or "State Register <register number> saved" is displayed.

For rapid saving, the State menu lists 16 registers to save to. Pressing a Register key initiates the save. You can also select a file to save to.

The default path for all State Files is:

My Documents\<<mode name>\state

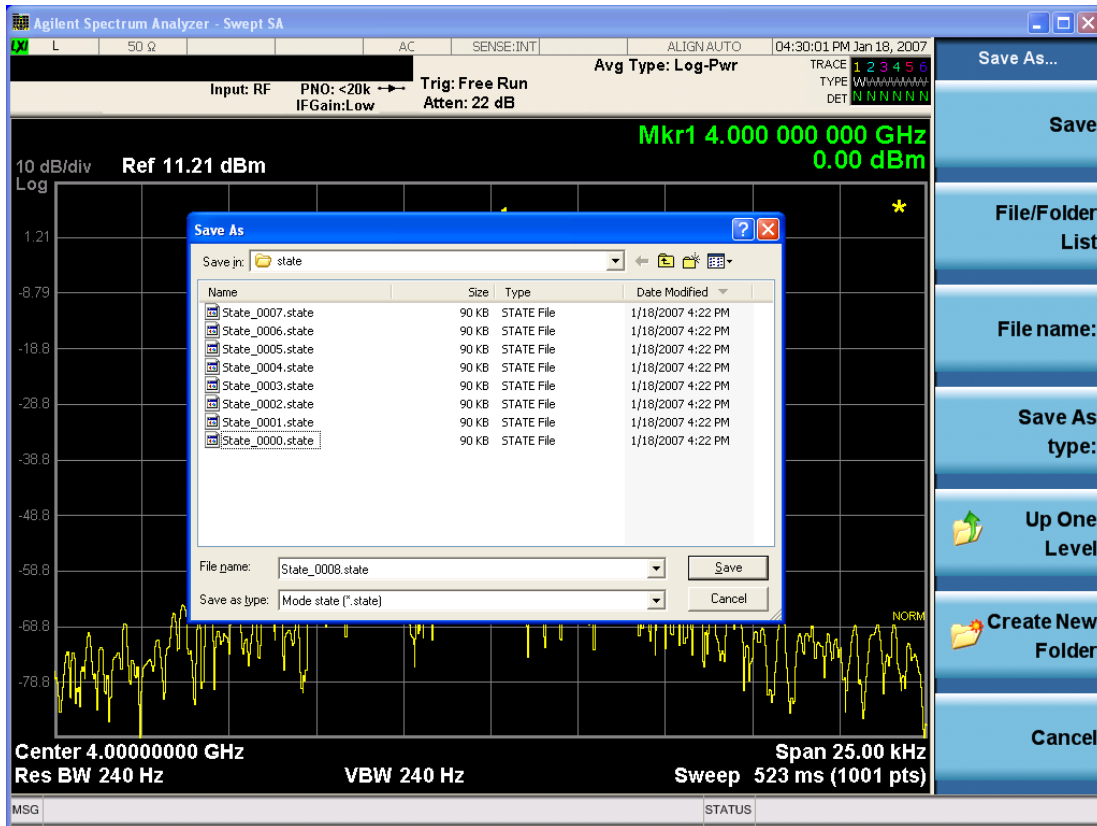
where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

Key Path	Save
Mode	All
Remote Command	:MMEMory:STORe:STATe <filename>
Example	MMEM:STOR:STATe "MyStateFile.state" This stores the current instrument state data in the file MyStateFile.state in the default directory.
Notes	Both single and double quotes are supported for any filename parameter over remote. After saving to a register, that register's menu key is updated with the date the time, unless a custom label has been entered for that key. After saving to a register, you remain in the Save State menu, so that you can see the Register key

	update. After saving to a file, the analyzer automatically returns to the previous menu and any Save As dialog goes away.
Backwards Compatibility SCPI	:MMEMory:STORe:STATe 1,<filename>
Initial S/W Revision	Prior to A.02.00

To File . . .

When you press “To File”, the analyzer brings up a Windows dialog and a menu entitled “Save As.” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



The Listed below are the functions of the various fields in the dialog, and the corresponding softkeys:

Save

Performs the save to the specified file of the selected type. If the file already exists, a dialog will appear that allows you to replace the existing file by selecting OK, or you can Cancel the request. If you select OK, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade.

While the save is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Save In.

Save In

The Save In field shows the path to which the file will be saved and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Save In field** defaults to the default path for this type of file and remembers the last path you used to save this type of file. There is no softkey for directly navigating to the Save In field but you can use left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

File Name

The File Name field is initially loaded with an automatically generated filename specific to the appropriate Save Type. The automatically generated filename is guaranteed not to conflict with any filename currently in the directory. You may replace or modify this filename using the File Name key. See the ["Quick Save " on page 2328](#) documentation for more on the automatic file naming algorithm.

When you press the File Name key the analyzer displays the Alpha Editor. Use the knob to choose the letter to add and the front-panel Enter key to add the letter to the file name. The BK character moves you back and the FW character moves you forward in the filename. The Select key on the front panel generates a space character. When you are done entering the filename press the Done softkey. This returns back to the **File Open** dialog and menu, but does not cause the save to occur.

Save As Type

This field shows the file suffix for the type of file you have selected to save. For example, if you navigated here while saving State, "Mode state (*.state)" is in the field. If you navigated here from saving Trace, ""Mode state (*.trace)" is in the field. If you navigated here while exporting a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Create New Folder

This key corresponds to the icon of a folder with the "*" that is in the tool bar of the dialog. When pressed, a new folder is created in the current directory with the name **New Folder** and you can enter a new folder name using the Alpha Editor.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Save As** request to be cancelled. The ESC key does the same thing.

Key Path	Save, State
Mode	All
Notes	Brings up Save As dialog for saving a State Save Type
Initial S/W Revision	Prior to A.02.00

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

See ["More Information" on page 1822](#)

Key Path	Save, State
Mode	All
Remote Command	:MMEMory:REGister:STATe:LABel <reg number>,"label" :MMEMory:REGister:STATe:LABel? <reg number>
Example	:MMEM:REG:STAT:LAB 1,"my label"
Notes	<reg number> is an integer from 1 to 16. If the SCPI specifies an invalid register number an error message is generated, -222,"Data out of range;Invalid register label number" "label" is a string from 0 to 30 characters in length. If a label exceeds 30 characters, an error message is generated, -150,"String data error;Label clipped to 30 characters" "label" of length 0 erases the custom label and restores the default (time and date) label. E.g.: :MMEM:REG:STAT:LAB 1,""
Dependencies	N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending this command generates an error, -221,"Settings conflict;Option not available"
Preset	The names are unaffected by Preset or power cycle but are set to the default label (time and date) on a "Restore System Defaults->Misc"
Initial S/W Revision	A.11.00

More Information

When you edit one of the register names, the time and date field will be replaced by the custom name.

If you delete all the characters in the custom name, it restores the default (time and date).

The register names are stored within the state files, but they are not part of the instrument state; that is, once you have edited a register name, loading a new state will not change that register name. Another consequence of this is that the names will be persistent through a power cycle. Also, if a named state file is transferred to another analyzer, it will bring its custom name along with it.

If you try to edit the name of an empty register, the analyzer will first save the state to have a file to put the name in. If you load a named state file into an analyzer with older firmware it will ignore the metadata.

The *SAV and *RCL commands will not be affected by the custom register names, nor will the MMEM commands.

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

Key Path	Save, State
Mode	All
Example	*SAV 1
Range	1–16 from front panel, 1–128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.11.00

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

Key Path	Save, State
Mode	All
Example	*SAV 1
Range	1-16 from front panel, 1-128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR "(empty)" if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.11.00

Data (Export)

Exporting a data file stores data from the current measurement to mass storage files. The Export Menu only contains data types that are supported by the current measurement.

Since the commonly exported data files are in .csv format, the data can be edited by you prior to importing. This allows you to export a data file, manipulate the data in Excel (the most common PC Application for manipulating .csv files) and then import it.

Selecting an Export Data menu key will not actually cause the exporting to occur, since the analyzer still needs to know where you wish to save the data. Pressing the Save As key in this menu brings up the Save As dialog and Save As menu that allows you to specify the destination file and directory. Once a filename has been selected or entered in the Open menu, the export will occur as soon as the Save key is pressed.

Key Path	Save
Mode	All
Notes	The menu is built from whatever data types are available for the mode. So the key locations in the sub menu will vary. No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:STORe commands.
Dependencies	If a file type is not used by a certain measurement, that type is grayed out for that measurement. The key for a file type will not show at all if there are no measurements in the Mode that support it.
Preset	Is not affected by a Preset or shutdown, but is reset during Restore Mode Defaults
Readback	The data type that is currently selected
Initial S/W Revision	Prior to A.02.00

Measurement Results

Pressing this key selects Meas Results as the data type to be exported. Pressing the key a second time brings up the Meas Results menu, which allows you to select which **Meas Result** to save. In the Swept SA measurement, there are three types of Measurement Results files: Peak Table, Marker Table and Spectrogram.

See "Meas Results File Contents" on page 1825.

See "Marker Table" on page 1825.

See "Peak Table" on page 1828.

See "Spectrogram" on page 1831

Remote Command	:MMEMory:STORe:RESults:MTABle PTABle SPEctrogram <filename>
Example	:MMEM:STOR:RES:MTAB "myResults.csv" Saves the results from the current marker table to the file myResults.csv in the current path. :MMEM:STOR:RES:PTAB "myResults.csv" Saves the results from the current peak table to the file myResults.csv in the current path. :MMEM:STOR:RES:SPEC "myResults.csv" Saves the results from the current Spectrogram display to the file myResults.csv in the current path. The default path is My Documents\SA\data\SAN\results
Notes	If the save is initiated via SCPI, and the file already exists, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade. Both single and double quotes are supported for any filename parameter over SCPI.
Dependencies	If a save of Marker Table results is requested and the Marker Table is not on, no file is saved and a message is generated If a save of Peak Table results is requested and the Peak Table is not on, no file is saved and a message is generated If a save of Spectrogram results is requested and the Spectrogram is not on, no file is saved and a message is generated. The Spectrogram choice only appears if option EDP is licensed.
Preset	Not part of Preset, but is reset to Peak Table by Restore Mode Defaults. Survives a shutdown.
Initial S/W Revision	Prior to A.02.00

Meas Results File Contents

All files are .csv files. The following section details the data in each file type.

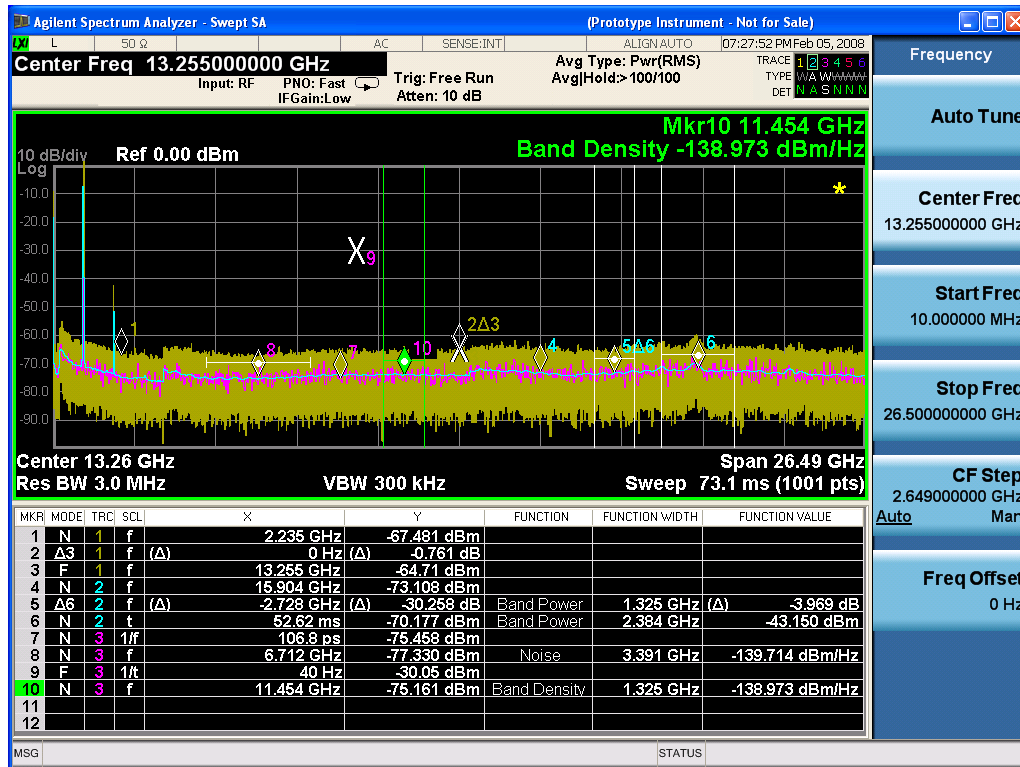
Marker Table

This section discusses the Marker Table Meas Results file format.

Imagine that, at the point where a Marker Table Meas Result is requested, the following screen is showing:

15 GMSK Phase and Frequency Measurement

Save



Then the Meas Results file, when opened, would show the following data:

MeasurementResult	
Swept SA	
A.01.40_R0017	N9020A
526 B25 PFR	1
P26 EA3	
Result Type	Marker Table
Ref Level	0
Number of Points	1001
Sweep Time	0.0662666 67
Start Frequency	10000000
Stop Frequency	26500000 000
Average Count	0
Average Type	LogPower (Video)
RBW	3000000

RBW Filter	Gaussian
RBW Filter BW	3dB
VBW	3000000
Sweep Type	Swept
X Axis Scale	Lin
PreAmp State	Off
PreAmp Band	Low
Trigger Source	Free
Trigger Level	1.2
Trigger Slope	Positive
Trigger Delay	1.00E-06
Phase Noise Optimization	Fast
Swept If Gain	Low
FFT If Gain	Autorange
RF Coupling	AC
FFT Width	411900
Ext Ref	10000000
Input	RF
RF Calibrator	Off
Attenuation	10
Ref Level Offset	0
External Gain	0
X Axis Units	Hz
Y Axis Units	dBm

DATA									
MKR	MODE	TR C	SCL	X	Y	FUNCTI ON	FUNCTIO N WIDTH	FUNCTI ON VALUE	FUNCTI ON UNIT
1	Normal	1	Freque ncy	2.2350E+09	- 67.481	Off	0.0000E+00	0	None
2	Delta3	1	Freque ncy	0.0000E+00	- 0.761	Off	0.0000E+00	0	None
3	Fixed	1	Freque ncy	1.3255E+10	- 64.71	Off	0.0000E+00	0	None
4	Normal	2	Freque ncy	1.5904E+10	- 73.1	Off	0.0000E+00	0	None

08									
5	Delta7	2	Frequency	-2.7280E+09	-30.258	Band Power	1.3250E+06	-3.969	dB
6	Normal	2	Time	5.2620E-02	-70.177	Band Power	2.3840E+06	-43.15	dBm
7	Normal	3	Period	1.0680E-10	-75.458	Off	0.0000E+00	0	None
8	Normal	3	Frequency	6.7120E+09	-77.33	Noise	3.3910E+06	-139.714	dBm/Hz
9	Fixed	3	Inverse Time	4.0000E+01	-30.05	Off	0.0000E+00	0	None
10	Normal	3	Frequency	1.1454E+10	-75.161	Band Density	1.3250E+06	-138.973	dBm/Hz
11	Off	1	Frequency	0.0000E+00	0	Off	0.0000E+00	0	None
12	Off	1	Frequency	0.0000E+00	0	Off	0.0000E+00	0	None

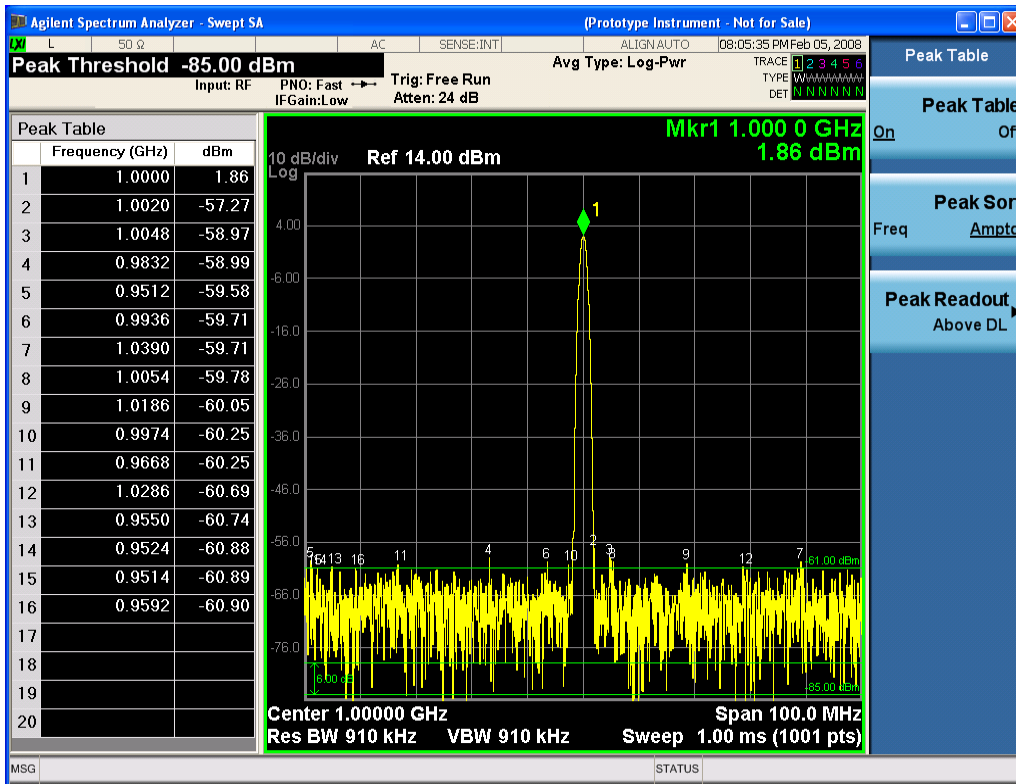
The numbers appear in the file exactly as they appear onscreen. If it says 11.454 GHz onscreen, then in the file it is 11.454E+09.

The metadata header is very similar to the metadata used in the trace data .csv files. See Trace File Contents. The only new information concerns the 1-of-N fields in the marker table itself.

Peak Table

This section discusses the Peak Table Meas Results file format.

Imagine that, at the point where a Marker Table Meas Result is requested, the following screen is showing:



Then the Meas Results file, when opened, would show the header data (the same as for the Marker Table except that the Result Type is Peak Table) ending with a few fields of specific interest to Peak Table users:

- Peak Threshold
- Peak Threshold State (On|Off)
- Peak Excursion
- Peak Excursion State (On|Off)
- Display Line
- Peak Readout (All|AboveDL|BelowDL)
- Peak Sort (Freq|Amptd)

These fields are then followed by the data for the Peak Table itself.

Note that the label for the Frequency column changes to Time in 0 span.

Here is what the table for the above display looks like:

MeasurementResult	
Swept SA	
A.01.40_R0017	N9020A
526 B25 PFR P26 EA3	1

Result Type	Peak Table
Ref Level	0
Number of Points	1001
Sweep Time	0.066266667
Start Frequency	10000000
Stop Frequency	26500000000
Average Count	0
Average Type	LogPower(Video)
RBW	3000000
RBW Filter	Gaussian
RBW Filter BW	3dB
VBW	3000000
Sweep Type	Swept
X Axis Scale	Lin
PreAmp State	Off
PreAmp Band	Low
Trigger Source	Free
Trigger Level	1.2
Trigger Slope	Positive
Trigger Delay	1.00E-06
Phase Noise Optimization	Fast
Swept If Gain	Low
FFT If Gain	Autorange
RF Coupling	AC
FFT Width	411900
Ext Ref	10000000
Input	RF
RF Calibrator	Off
Attenuation	10
Ref Level Offset	0
External Gain	0
X Axis Units	Hz
Y Axis Units	dBm
Peak Threshold	-85
Peak Threshold State	On
Peak Excursion	6
Peak Excursion State	On

Display Line	-61	
Peak Readout	AboveDL	
Peak Sort	Amptd	
DATA		
Peak	Frequency	Amplitude
1	1.0000E+06	1.86
2	1.0020E+06	-57.27
3	1.0048E+06	-58.97
4	9.8320E+05	-58.99
5	9.5120E+05	-59.58
6	9.9360E+05	-59.71
7	1.0390E+06	-59.71
8	1.0054E+06	-59.78
9	1.1086E+06	-60.05
10	9.9740E+05	-60.25
11	9.6680E+05	-60.25
12	1.0286E+06	-60.69
13	9.5500E+05	-60.74
14	9.5240E+05	-60.88
15	9.5140E+05	-60.89
16	9.5920E+05	-60.90
17		
18		
19		
20		

Spectrogram

This section discusses the Spectrogram Results file format. The Spectrogram choice only appears if option EDP is licensed.

The Spectrogram results are the same as a Trace data export, except that instead of having just one trace's data, all 300 traces appear one after the other.

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Each trace has its own data mark; the data for Spectrogram Trace 0 follows the row marked DATA, the data for Spectrogram Trace 1 follows the row marked DATA1, for Spectrogram Trace 2 follows the row marked DATA2, and so on.

Each DATA row has a timestamp in the second column (as of firmware revision A.11.01). So, for example, if Trace 0 had a relative start time of 1729.523 sec, then the first DATA row would look like this:

DATA,1729.523

And if Trace 13 had a relative start time of 100.45 sec, then the fourteenth data row would look like:

DATA13,100.453

To find the absolute time for the relative timestamps of each trace, the last row before the first DATA row gives the absolute start time of the Spectrogram, in the form YYYYMMDDHHMMSS

So, for example, if the absolute start time is 13:23:45:678 on January 30, 2012, this row would look like:

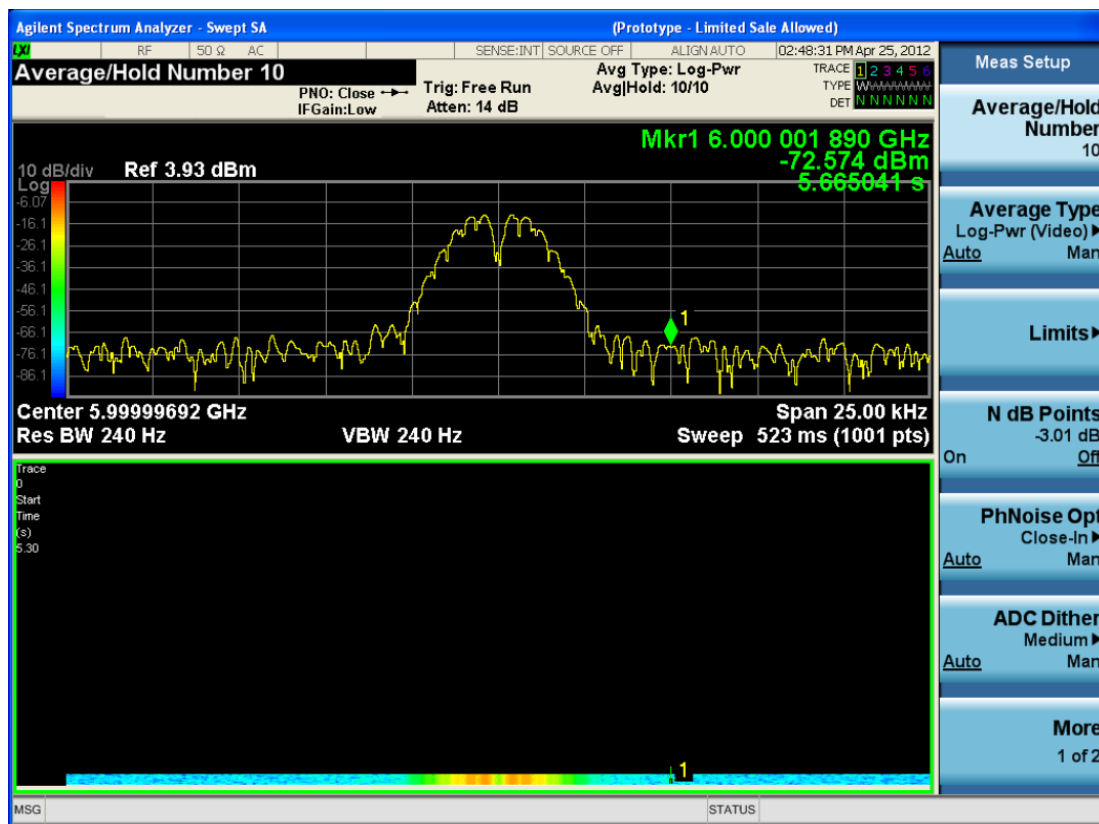
Start Time,20120130132345678

NOTE

The resolution of the absolute time stored is 1 ms, which matches up with the fact that the fastest sweep time is also 1 ms. However, there is no specification for the absolute accuracy of the clock in the analyzer, nor is there any facility provided to allow the user to set this time to any particular degree of accuracy.

Traces that have not yet been filled in the Spectrogram display are empty; there is no DATA header for them. The file ends after the last non-empty trace.

Imagine that, at the point where a Spectrogram Meas Result is requested, the following screen is showing:



For the purpose of this example, we have set the Average/Hold Number to 10, thus we have only traces 0 thru 10. The Spectrogram was started at 02:28:08:700 pm on April 25, 2012 (that is, 700 ms after 2:28:08 pm), although the screen dump itself shows a different time, as it was taken ten minutes after the

Spectrogram data. Trace 0 is showing a start time of 5.30 seconds, meaning 5.3 seconds after the Spectrogram started (trace 10 has a start time of 0, as it was the first trace taken but has now rolled up into the tenth trace slot).

The Meas Results file, when opened, shows the header data and ten traces of trace data. Below is an extract from the result file for the above display. Note the start time of 20120425142808700 showing in the last row before the first DATA row, and the relative time of 5.299231048 showing in the first DATA row:

Result Type	Spectrogram
MeasResult	
Swept SA	
A.11.00.01	N9020A
503 508 513 526 ALL ALV B1C B1X B25 B2X B40 BAB BBA CR3 CRP DP2 DRD EA3 EDP EMC EP1 ERC ESC ESP EXM FSA HBA K03 LFE MPB P03 P08 P13 P26 PFR RTL RTS S40 SB1 SEC SM1 UK6 YAS YAV	1
Segment	0
Number of Points	1001
Sweep Time	0.523333333
Start Frequency	5999984415
Stop Frequency	6000009415
Average Count	0
Average Type	LogPower(Video)
RBW	240
RBW Filter	Gaussian
RBW Filter BW	3dB
VBW	240
Sweep Type	Swept
X Axis Scale	Lin
PreAmp State	Off
PreAmp Band	Low
Trigger Source	Free
Trigger Level	1.2
Trigger Slope	Positive
Trigger Delay	0
Phase Noise Optimization	Wide
Swept If Gain	Low
FFT If Gain	Autorange
RF Coupling	AC

Save

Result Type	Spectrogram
FFT Width	411900
Ext Ref	10000000
Input	RF
RF Calibrator	Off
Attenuation	14
Ref Level Offset	0
External Gain	0
Trace Type	Clearwrite
Detector	Normal
Trace Math	Off
Trace Math Oper1	Trace5
Trace Math Oper2	Trace6
Trace Math Offset	0
Trace Name	Trace1
X Axis Units	Hz
Y Axis Units	dBm
Start Time	20120425142808700
DATA	5.299231048
5999984415	-76.34749519
5999984440	-77.28097006
5999984465	-75.32317869
5999984490	-73.64417681
5999984515	-72.67154604

o

o

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6000009315	-77.94423277
6000009340	-79.51829697
6000009365	-78.46108961
6000009390	-78.46108957
6000009415	-76.59570596
DATA2	4.708697055
5999984415	-80.98197882
5999984440	-80.98197879

5999984465	-75.83142132
5999984490	-74.02712079
5999984515	-73.57213005

0
0
0

6000009315	-75.9183103
6000009340	-79.53787488
6000009365	-78.82602191
6000009390	-78.82602188
6000009415	-76.37486709
DATA10	0
5999984415	-75.56751112
5999984440	-75.76485645
5999984465	-76.67718717
5999984490	-78.79238489
5999984515	-83.72680212

0
0
0

6000009315	-71.3942461
6000009340	-72.28308332
6000009365	-73.92684489
6000009390	-75.45548832
6000009415	-75.17904815

Save As . . .

When you press “Save As”, the analyzer brings up a Windows dialog and a menu entitled “**Save As.**” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[To File . . .](#)" on page 2340 in Save, State for a full description of this dialog and menu.

The default path for saving files is:

For all of the Trace Data Files:

My Documents\<<mode name>\data\traces

For all of the Limit Data Files:

My Documents\<<mode name>\data\limits

For all of the Measurement Results Data Files:

My Documents\<<mode name>\data\<<measurement name>\results

For all of the Capture Buffer Data Files:

My Documents\<<mode name>\data\captureBuffer

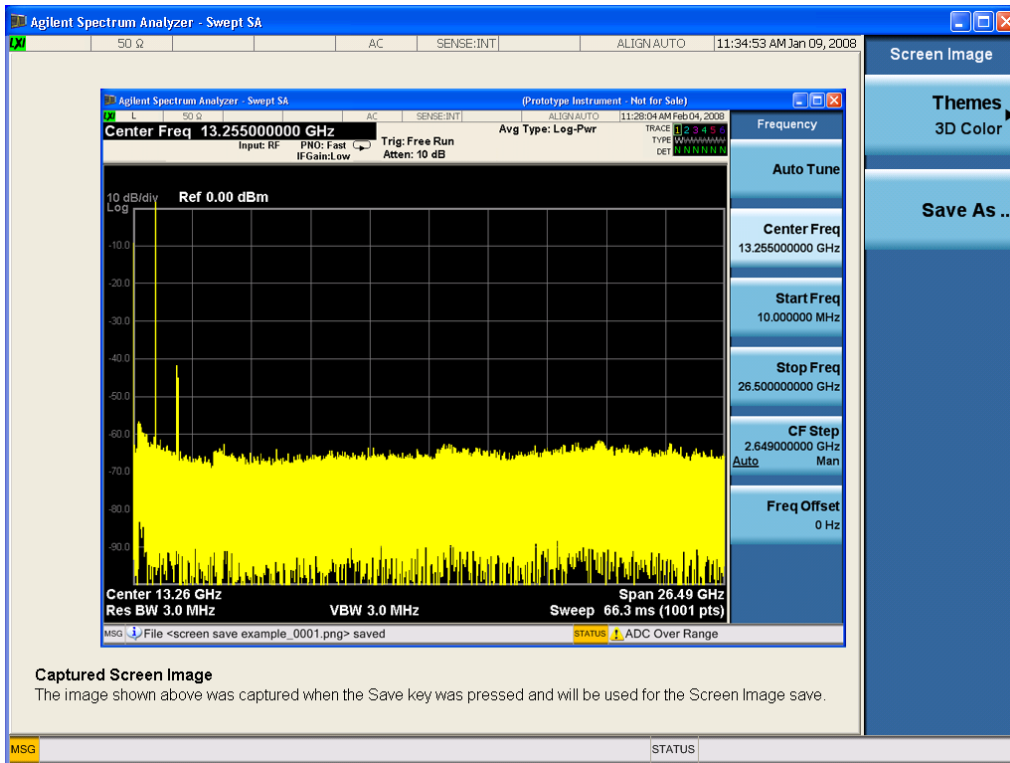
Key Path	Save, Data
Mode	All
Notes	The key location is mode-dependent and will vary. Brings up the Save As dialog for saving a <mode specific> Save Type. The save is performed immediately and does not wait until the measurement is complete.
Initial S/W Revision	Prior to A.02.00

Screen Image

Pressing Screen Image accesses a menu of functions that enable you to specify a format and location for the saved screen image. It brings up a menu that allows you to specify the color scheme of the Screen Image (Themes) or navigate to the Save As dialog to perform the actual save.

Screen Image files contain an exact representation of the analyzer display. They cannot be loaded back onto the analyzer, but they can be loaded into your PC for use in many popular applications.

The image to be saved is actually captured when the Save front panel key is pressed, and kept in temporary storage to be used if you ask for a Screen Image save. When the Screen Image key is pressed, a "thumbnail" of the captured image is displayed, as shown below:



When you continue on into the Save As menu and complete the Screen Image save, the image depicted in the thumbnail is the one that gets saved, showing the menus that were on the screen before going into the Save menus. The save is performed immediately and does not wait until the measurement is complete.

After you have completed the save, the Quick Save front-panel key lets you quickly repeat the last save performed, using an auto-named file, with the current screen data.

NOTE For versions previous to A.01.55, if you initiate a screen image save by navigating through the Save menus, the image that is saved will contain the Save menu softkeys, not the menus and the active function that were on the screen when you first pressed the Save front panel key.

Key Path	Save
Mode	All
Remote Command	:MMEMory:STORe:SCReem <filename>
Example	:MMEM:STOR:SCR "myScreen.png" This stores the current screen image in the file MyScreenFile.png in the default directory.
Initial S/W Revision	Prior to A.02.00

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

Key Path	Save, Screen Image
Remote Command	:MMEMory:STORe:SCReem:THEMe TDColor TDMonochrome FCOLor FMONochrome :MMEMory:STORe:SCReem:THEMe?
Example	:MMEM:STOR:SCR:THEM TDM
Preset	3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes.
Readback	3D Color 3D Mono Flat Color Flat Mono
Backwards Compatibility Notes	In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical.
Initial S/W Revision	Prior to A.02.00

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDC
Readback	3D Color
Initial S/W Revision	Prior to A.02.00

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDM
Readback	3D Mono
Initial S/W Revision	Prior to A.02.00

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

Key Path	Save, Screen Image, Themes
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Example	MMEM:STOR:SCR:THEM FCOL
Readback	Flat Color
Initial S/W Revision	Prior to A.02.00

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FMON
Readback	Flat Mono
Initial S/W Revision	Prior to A.02.00

Save As...

When you press "Save As", the analyzer brings up a Windows dialog and a menu entitled "**Save As.**" This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[To File . . .](#)" on page 2340 in Save, State for a full description of this dialog and menu.

The default path for Screen Images is

My Documents\`<mode name>`\screen.

where `<mode name>` is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

Key Path	Save, Screen Image
Notes	Brings up Save As dialog for saving a Screen Image Save Type
Initial S/W Revision	Prior to A.02.00

Mass Storage Catalog (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:CATalog? [<code><directory_name></code>]
Notes	<p>The string must be a valid logical path.</p> <p>Queries disk usage information (drive capacity, free space available) and obtains a list of files and directories in a specified directory in the following format:</p> <p><code><numeric_value>,<numeric_value>,{<file_entry>}</code></p> <p>It returns two numeric parameters and as many strings as there are files and directories. The first parameter indicates the total amount of storage currently used in bytes. The second parameter</p>

	<p>indicates the total amount of storage available, also in bytes. The <file_entry> is a string. Each <file_entry> indicates the name, type, and size of one file in the directory list: <file_name>,<file_type>,<file_size></p> <p>As the windows file system has an extension that indicates file type, <file_type> is always empty. <file_size> provides the size of the file in bytes. For directories, <file_entry> is surrounded by square brackets and both <file_type> and <file_size> are empty</p>
Initial S/W Revision	Prior to A.02.00

Mass Storage Change Directory (Remote Command Only)

Key path	SCPI Only
Remote Command	<pre>:MMEMory:CDIRectory [<directory_name>] :MMEMory:CDIRectory?</pre>
Notes	<p>The string must be a valid logical path.</p> <p>Changes the default directory for a mass memory file system. The <directory_name> parameter is a string. If no parameter is specified, the directory is set to the *RST value.</p> <p>At *RST, this value is set to the default user data storage area, that is defined as System.Environment.SpecialFolder.Personal.</p> <p>Query returns full path of the default directory.</p>
Initial S/W Revision	Prior to A.02.00

Mass Storage Copy (Remote Command Only)

Key path	SCPI Only
Remote Command	<pre>:MMEMory:COPY <string>,<string>[,<string>,<string>]</pre>
Notes	<p>The string must be a valid logical path.</p> <p>Copies an existing file to a new file or an existing directory to a new directory.</p> <p>Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.</p> <p>The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.</p> <p>This command will generate an "access denied" error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.</p>

Mass Storage Device Copy (Remote Command Only)

This command transfers data to/from a file and a peripheral device.

Key path	SCPI Only
Remote Command	:MMEMory:COpy:DEvice <source_string>,<dest_string>
Notes	The strings must be a valid logical path or a valid device keyword. If the dest_string is a device keyword, the data is copied from the source file to the device. If the source_string is a device keyword, the data is copied to the source file from the device. Valid device keywords are: SNS (smart noise source) An error is generated if the file or device is not found.

Mass Storage Delete (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:DElete <file_name>[,<directory_name>]
Notes	The string must be a valid logical path. Removes a file from the specified directory. The <file_name> parameter specifies the file name to be removed. This command will generate an “access denied” error if the file is in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.
Initial S/W Revision	Prior to A.02.00

Mass Storage Data (Remote Command Only)

Creates a file containing the specified data OR queries the data from an existing file.

Key path	SCPI Only
Remote Command	:MMEMory:DATA <file_name>, <data> :MMEMory:DATA? <file_name>
Notes	The string must be a valid logical path. The command form is MMEMory:DATA <file_name>,<data>. It loads <data> into the file <file_name>. <data> is in 488.2 block format. <file_name> is string data. The query form is MMEMory:DATA? <file_name> with the response being the associated <data> in block format.
Initial S/W Revision	Prior to A.02.00

Mass Storage Make Directory (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:MDIRectory <directory_name>
Notes	The string must be a valid logical path. Creates a new directory. The <directory_name> parameter specifies the name to be created.

	This command will generate an “access denied” error if the new directory would be in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.
Initial S/W Revision	Prior to A.02.00

Mass Storage Move (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:MOVE <string>,<string>[,<string>,<string>]
Notes	<p>The string must be a valid logical path.</p> <p>Moves an existing file to a new file or an existing directory to a new directory.</p> <p>Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.</p> <p>The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.</p> <p>This command will generate an “access denied” error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.</p>
Initial S/W Revision	Prior to A.02.00

Mass Storage Remove Directory (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:RDIRECTory <directory_name>
Notes	<p>The string must be a valid logical path.</p> <p>Removes a directory. The <directory_name> parameter specifies the directory name to be removed. All files and directories under the specified directory shall also be removed.</p> <p>This command will generate an “access denied” error if the folder is a restricted folder (e.g., C:\Windows) or is in a restricted folder and the current user does not have Power User or Administrator privileges.</p>
Initial S/W Revision	Prior to A.02.00

Single (Single Measurement/Sweep)

Sets the analyzer for Single measurement operation. The single/continuous state is Meas Global, so the setting will affect all the measurements. If you are Paused, pressing Single does a Resume.

See ["More Information" on page 1843](#)

Key Path	Front-panel key
Example	:INIT:CONT OFF
Notes	See Cont key description.
Backwards Compatibility Notes	<p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey and the INITiate:IMM switched from continuous measurement to single measurement and restarted sweeps and averages (displayed average count reset to 1), but did not restart Max Hold and Min Hold. In the X-Series, the Single hardkey and the INITiate:IMM command initiate a sweep/ measurement/ average sequence/hold sequence including MaxHold and MinHold.</p> <p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey restarted the sweep regardless of whether or not you were in an active sweep or sweep sequence. In the X-Series, Restart does this but Single only restarts the sweep or sweep sequence if you are in the idle state.</p> <p>INIT[:IMM] in ESA & PSA Spectrum Analysis Mode does an implied ABORT. In some other PSA Modes, INIT[:IMM] is ignored if not in the idle state. . The X-Series follows the ESA/PSA SA Mode model, which may cause some Modes to have compatibility problems.</p>
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More Information

See ["Restart" on page 2337](#) for details on the INIT:IMMEDIATE (Restart) function.

If you are already in single sweep, the INIT:CONT OFF command has no effect.

If you are already in Single Sweep, then pressing the Single key in the middle of a sweep does not restart the sweep or sequence. Similarly, pressing the Single key does not restart the sweep or sequence if the sweep is not in the idle state (for example, if you are taking a very slow sweep, or the analyzer is waiting for a trigger). Instead, it results in a message. "Already in Single, press Restart to initiate a new sweep or sequence". Even though pressing the Single key in the middle of a sweep does not restart the sweep, sending INIT:IMMEDIATE does reset it.

To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command CALC:AVER:TCON UP.

Source

There is no Source control functionality for this measurement. When this key is pressed, the screen either displays a blank menu, or the previously-selected menu remains unchanged.

Key Path	Front-panel key
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SPAN X Scale

Accesses a menu of functions that enable you set the horizontal scale parameters

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Ref Value

Allows you to set reference value by Phase Error and Phase Error w/Freq, and RF Envelope.

See also:

- ["Ref Value \(Phase Error and Phase Error w/Freq window\)" on page 1845](#)
- ["Ref Value \(RF Envelope window\)" on page 1846](#)

Key Path	SPAN X Scale
Mode	GSM
Initial S/W Revision	Prior to A.02.00

Ref Value (Phase Error and Phase Error w/Freq window)

Allows you to set the display X reference value for time axis 'bit'.

Key Path	SPAN / X Scale
Mode	GSM
Remote Command	:DISPlay:PFERror:VIEW[1]:WINDow[1] 2:TRACe:X[:SCALe]:RLEVel <real> :DISPlay:PFERror:VIEW[1]:WINDow[1] 2:TRACe:X[:SCALe]:RLEVel?
Example	DISP:PFER:VIEW:WIND:TRAC:X:RLEV 1.5 DISP:PFER:VIEW:WIND:TRAC:X:RLEV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	If the "Auto Scaling" on page 1848 is On, this value is automatically determined by the measurement result. When you set a value manually, "Auto Scaling" on page 1848 automatically changes to Off.
Preset	0.5
State Saved	Saved in instrument state.
Min	0.000
Max	5000000.000
Initial S/W Revision	Prior to A.02.00

Ref Value (RF Envelope window)

Allow you to set the display X reference value for time axis 'sec'.

Key Path	SPAN / X Scale
Mode	GSM
Remote Command	:DISPlay:PFERror:VIEW[1]:WINDow3:TRACe:X[:SCALe]:RLEVel <time> :DISPlay:PFERror:VIEW[1]:WINDow3:TRACe:X[:SCALe]:RLEVel?
Example	DISP:PFER:VIEW:WIND3:TRAC:X:RLEV 1.5 DISP:PFER:VIEW:WIND3:TRAC:X:RLEV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	If the "Auto Scaling" on page 1848 is On, this value is automatically determined by the measurement result. When you set a value manually, "Auto Scaling" on page 1848 automatically changes to Off.
Preset	-64.4 us
State Saved	Saved in instrument state.
Min	-1.0 s
Max	10.0 s
Initial S/W Revision	Prior to A.02.00

Scale/Div

Allows you to set the display X scale/division value using bits (Phase Error and Phase Error w/Freq) or time (RF Envelope)

See also:

["Scale/Div \(Phase Error and Phase Error w/Freq window\)" on page 1846](#)

["Scale/Div \(RF Envelope window\)" on page 1847](#)

Key Path	SPAN X Scale
Mode	GSM
Initial S/W Revision	Prior to A.02.00

Scale/Div (Phase Error and Phase Error w/Freq window)

Allows you to set the display X scale/division value.

Key Path	SPAN / X Scale
Mode	GSM
Remote Command	:DISPlay:PFERror:VIEW[1]:WINDow[1] 2:TRACe:X[:SCALe]:PDIVision <real> :DISPlay:PFERror:VIEW[1]:WINDow[1] 2:TRACe:X[:SCALe]:PDIVision?

Example	DISP:PFER:VIEW:WINDOW:TRAC:X:PDIV 15 DISP:PFER:VIEW:WINDOW:TRAC:X:PDIV?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Couplings	If the "Auto Scaling" on page 1848 is On, this value is automatically determined by the measurement result. When you set a value manually, "Auto Scaling" on page 1848 automatically changes to Off.
Preset	14.7
State Saved	Saved in instrument state.
Min	1.000
Max	500000.0
Initial S/W Revision	Prior to A.02.00

Scale/Div (RF Envelope window)

Allows you to set the display X scale/division value.

Key Path	SPAN / X Scale
Mode	GSM
Remote Command	:DISPlay:PFERror:VIEW[1]:WINDow3:TRACe:X[:SCALE]:PDIVision <time> :DISPlay:PFERror:VIEW[1]:WINDow3:TRACe:X[:SCALE]:PDIVision?
Example	DISP:PFER:VIEW:WINDOW3:TRAC:X:PDIV 1 DISP:PFER:VIEW:WINDOW3:TRAC:X:PDIV?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Couplings	If the "Auto Scaling" on page 1848 is On, this value is automatically determined by the measurement result. When you set a value manually, "Auto Scaling" on page 1848 automatically changes to Off.
Preset	532.0 us
State Saved	Saved in instrument state.
Min	1.00 ns
Max	1.00 s
Initial S/W Revision	Prior to A.02.00

Ref Position

Allows you to set the display reference position to Left, Center or Right.

Key Path	SPAN / X Scale
Mode	GSM
Remote Command	:DISPlay:PFERror:VIEW[1]:WINDow[1] 2 3:TRACe:X[:SCALE]:RPOSition LEFT CENTER RIGHT

	:DISPlay:PFERror:VIEW[1]:WINDow[1] 2 3:TRACe:X[:SCALe]:RPOSition?
Example	DISP:PFER:VIEW:WIND2:TRAC:X:RPOS LEFT DISP:PFER:VIEW:WIND2:TRAC:X:RPOS?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	LEFT
State Saved	Saved in instrument state.
Range	Left Ctr Right
Initial S/W Revision	Prior to A.02.00

Auto Scaling

Allows you to toggle the scale coupling function between On and Off.

Key Path	SPAN / X Scale
Mode	GSM
Remote Command	:DISPlay:PFERror:VIEW[1]:WINDow[1] 2 3:TRACe:X[:SCALe]:COUPle ON OFF 1 0 :DISPlay:PFERror:VIEW[1]:WINDow[1] 2 3:TRACe:X[:SCALe]:COUPle?
Example	DISP:PFER:VIEW:WIND:TRAC:X:COUP ON DISP:PFER:VIEW:WIND:TRAC:X:COUP?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	Upon pressing the Restart front-panel key, the scale coupling function automatically determines the scale per division and reference values based on the measurement results if this parameter is set to On. When you set a value to either "Ref Value" on page 1845 or "Scale/Div" on page 1846 manually, Auto Scaling automatically changes to Off.
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

Sweep/Control

Accesses a menu that enables you to configure the Sweep and Control functions of the analyzer, such as Sweep Time and Gating.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Pause/Resume

Pauses a measurement after the current data acquisition is complete.

When Paused, the label on the key changes to Resume. Pressing Resume un-pauses the measurement. When you are Paused, pressing Restart, Single or Cont does a Resume.

Key Path	Sweep/Control
Remote Command	:INITiate:PAUSE
Dependencies	Grayed out in Measurements that do not support Pausing. Blanked in Modes that do not support Pausing.
Initial S/W Revision	Prior to A.02.00

Key Path	Sweep/Control
Remote Command	:INITiate:RESume
Dependencies	Grayed out in Measurements that do not support Pausing. Blanked in Modes that do not support Pausing.
Initial S/W Revision	Prior to A.02.00

Abort (Remote Command Only)

This command is used to stop the current measurement. It aborts the current measurement as quickly as possible, resets the sweep and trigger systems, and puts the measurement into an "idle" state. If the analyzer is in the process of aligning when ABORT is sent, the alignment finishes before the abort function is performed. So ABORT does not abort an alignment.

If the analyzer is set for Continuous measurement, it sets up the measurement and initiates a new data measurement sequence with a new data acquisition (sweep) taken once the trigger condition is met.

If the analyzer is set for Single measurement, it remains in the "idle" state until an :INIT:IMM command is received.

Remote Command	:ABORT
Example	:ABOR

Notes	If :INITiate:CONTInuous is ON, then a new continuous measurement will start immediately, with sweep (data acquisition) occurring once the trigger condition has been met. If :INITiate:CONTInuous is OFF, then :INITiate:IMMEDIATE is used to start a single measurement; with sweep (data acquisition) occurring once the trigger condition has been met.
Dependencies	For continuous measurement, ABORt is equivalent to the Restart key. Not all measurements support the abort command.
Status Bits/OPC dependencies	The STATus:OPERation register bits 0 through 8 are cleared. The STATus:QUEStionable register bit 9 (INTegrity sum) is cleared. Since all the bits that feed into OPC are cleared by the ABORt, the ABORt will cause the *OPC query to return true.
Initial S/W Revision	Prior to A.02.00

System

See "System" on page 326

Trace/Detector

There is no functionality for this Front-panel key in this measurement. When pressed, this key displays a blank menu.

Key Path	Front-panel key
Mode	EDGE GSM

Trigger

See ["Trigger" on page 408](#)

Free Run

See ["Free Run " on page 415](#)

Video

See ["Video \(IF Envelope\) " on page 416](#)

Trigger Level

See ["Trigger Level " on page 416](#)

Trig Slope

See ["Trig Slope " on page 417](#)

Trig Delay

See ["Trig Delay " on page 418](#)

Line

See ["Line " on page 1321](#)

Trig Slope

See ["Trig Slope " on page 1321](#)

Trig Delay

See ["Trig Delay " on page 420](#)

External 1

See ["External 1 " on page 1333](#)

Trigger Level

See ["Trigger Level " on page 1333](#)

Trig Slope

See ["Trig Slope " on page 1334](#)

Trig Delay

See ["Trig Delay " on page 423](#)

External 2

See ["External 2 " on page 1335](#)

Trigger Level

See ["Trigger Level "](#) on page 1335

Trig Slope

See ["Trig Slope "](#) on page 1336

Trig Delay

See ["Trig Delay "](#) on page 425

RF Burst

See ["RF Burst "](#) on page 1336

Absolute Trigger

See ["Absolute Trigger Level"](#) on page 1337

Relative Trigger

See ["Relative Trigger Level"](#) on page 1326

Trig Slope

See ["Trigger Slope "](#) on page 1338

Trig Delay

See ["Trig Delay "](#) on page 429

Periodic Timer

See ["Periodic Timer \(Frame Trigger\) "](#) on page 1328

Period

See ["Period "](#) on page 1329

Offset

See ["Offset "](#) on page 1330

Offset Adjust (Remote Command Only)

See ["Offset Adjust \(Remote Command Only\)"](#) on page 1331

Reset Offset Display

See ["Reset Offset Display "](#) on page 1332

Sync Source

See ["Sync Source "](#) on page 1332

Off

See ["Off "](#) on page 1333

External 1

See ["External 1 "](#) on page 1333

Trigger Level

See ["Trigger Level "](#) on page 1333

Trig Slope

See ["Trig Slope "](#) on page 1334

External 2

See ["External 2 "](#) on page 1335

Trigger Level

See ["Trigger Level "](#) on page 1335

Trig Slope

See ["Trig Slope "](#) on page 1336

RF Burst

See ["RF Burst "](#) on page 1336

Absolute Trigger

See ["Absolute Trigger Level"](#) on page 1337

Trig Slope

See ["Trigger Slope "](#) on page 1338

Trig Delay

See ["Trig Delay"](#) on page 440

Auto/Holdoff

See ["Auto/Holdoff "](#) on page 440

Auto Trig

See ["Auto Trig "](#) on page 441

Trig Holdoff

See ["Trig Holdoff "](#) on page 441

Holdoff Type

See ["Holdoff Type"](#) on page 442

User Preset

Accesses a menu that gives you the following three choices:

- User Preset – recalls a state previously saved using the Save User Preset function.
- User Preset All Modes – presets all of the modes in the analyzer
- Save User Preset– saves the current state for the current mode

Key Path	Front-panel key
Backwards Compatibility Notes	<p>User Preset is actually loading a state, and in legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, “state” always includes all of this data; so whenever state is loaded, or User Preset is executed, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p> <p>On ESA and PSA, User Preset affected the entire instrument’s state. In the X-Series, User Preset only recalls the state for the active mode. There is a User Preset file for each mode. User Preset can never cause a mode switch as it can in legacy analyzers. If you want to recall all modes to their user preset file state, you will need to do a User Preset after mode switching into each mode.</p> <p>User Preset recalls mode state which can now include data like traces; whereas on ESA and PSA, User Preset did not affect data.</p>
Initial S/W Revision	Prior to A.02.00

User Preset

User Preset sets the state of the currently active mode back to the state that was previously saved for this mode using the Save User Preset menu key or the SCPI command, SYST:PRES:USER:SAV. It not only recalls the Mode Preset settings, but it also recalls all of the mode persistent settings, and the Input/Output system setting that existed at the time Save User Preset was executed.

If a Save User Preset has not been done at any time, User Preset recalls the default user preset file for the currently active mode. The default user preset files are created if, at power-on, a mode detects there is no user preset file. There will never be a scenario when there is no user preset file to restore. For each mode, the default user preset state is the same state that would be saved if a Save User Preset is performed in each mode right after doing a Restore Mode Default and after a Restore Input/Output Defaults.

The User Preset function does the following:

- Aborts the currently running measurement.
- Sets the mode State to the values defined by Save User Preset.
- Makes the saved measurement for the currently running mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

Key Path	User Preset
Remote Command	:SYSTem:PRESet:USER
Example	:SYST:PRES:USER:SAVE:SYST:PRES:USER
Notes	:SYST:PRES:USER:SAVE is used to save the current state as the user preset state. Clears all pending OPC bits. The Status Byte is set to 0. Pressing the User Preset front-panel key while already in the User Preset menu will cause the User Preset to get executed
Couplings	A user preset will cause the currently running measurement to be aborted and cause the saved measurement to be active. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved.
Initial S/W Revision	Prior to A.02.00

User Preset All Modes

Recalls all of the User Preset files for each mode, switches to the power-on mode, and activates the saved measurement from the power-on mode User Preset file.

NOTE

When the instrument is secured, all of the user preset files are converted back to their default user preset files.

The User Preset function does the following:

- Aborts the currently running measurement.
- Switches the Mode to the power-on mode.
- Restores the User Preset files for each mode.
- Makes the saved measurement for the power-on mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

Key Path	User Preset
Remote Command	:SYSTem:PRESet:USER:ALL
Example	:SYST:PRES:USER:SAVE:SYST:PRES:USER:ALL
Notes	Clears all pending OPC bits. The Status Byte is set to 0. :SYST:PRES:USER:SAVE is used to save the current state as the user preset state.
Couplings	A user preset will cause the currently running measurement to be aborted, cause a mode switch to the power-on mode, and cause the saved measurement to be active in the power-on mode. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved.
Initial S/W Revision	Prior to A.02.00

Save User Preset

Saves the currently active mode and its State. You can recall this User Preset file by pressing the User Preset menu key or sending the SYST:PRES:USER remote command. This same state is also saved by the Save State function.

Key Path	User Preset
Remote Command	:SYSTem:PRESet:USER:SAVE
Example	:SYST:PRES:USER:SAVE
Notes	:SYST:PRES:SAVE creates the same file as if the user requested a *SAV or a MMEM:STOR:STAT, except User Preset Save does not allow the user to specify the filename or the location of the file.
Initial S/W Revision	Prior to A.02.00

View/Display

Accesses a menu of functions that enable you to set the display parameters for the current measurement and select the View.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Display

The Display menu is common to most measurements, and is used for configuring items on the display. Some Display menu settings apply to all the measurements in a mode, and some only to the current measurement. Those under the System Display Settings key apply to all measurements in all modes.

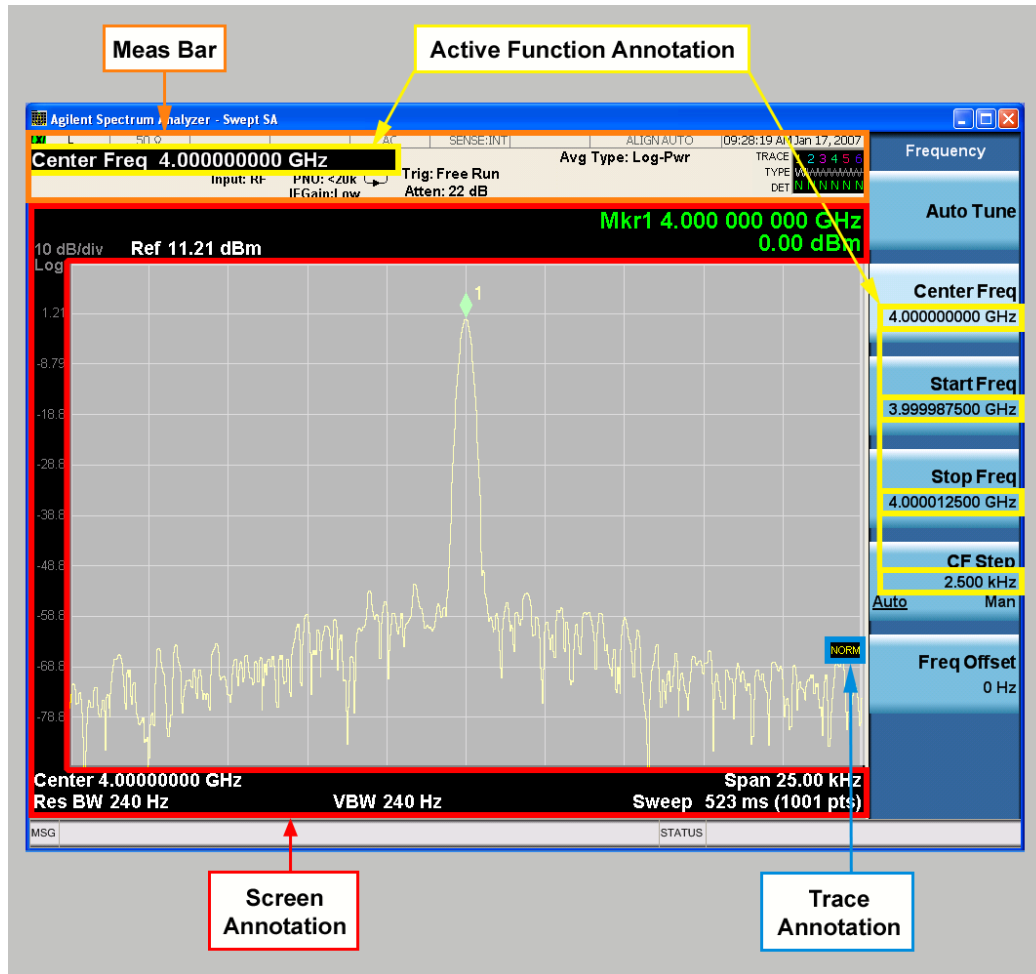
Key Path	Display
Key Path	View/Display
Initial S/W Revision	Prior to A.02.00

Annotation

Turns on and off various parts of the display annotation. The annotation is divided up into four categories:

1. Meas Bar: This is the measurement bar at the top of the screen. It does not include the settings panel or the Active Function. Turning off the Meas Bar turns off the settings panel and the Active Function. When the Meas Bar is off, the graticule area expands to fill the area formerly occupied by the Meas Bar.
2. Screen Annotation: this is the annotation and annunciation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) This does NOT include the marker number or the N dB result. When off, the graticule expands to fill the entire graticule area.
3. Trace annotation: these are the labels on the traces, showing their detector (or their math mode).
4. Active Function annotation: this is the active function display in the meas bar, and all of the active function values displayed on softkeys.

See the figure below. Each type of annotation can be turned on and off individually.



Key Path	View/Display, Display
Initial S/W Revision	Prior to A.02.00

Meas Bar On/Off

This function turns the Measurement Bar on and off, including the settings panel. When off, the graticule area expands to fill the area formerly occupied by the Measurement Bar.

Key Path	View/Display, Display, Annotation
Remote Command	:DISPlay:ANNOtation:MBAR[:STATe] OFF ON 0 1 :DISPlay:ANNOtation:MBAR[:STATe]?
Example	DISP:ANN:MBAR OFF
Dependencies	Grayed out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset	On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off.
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Screen

This controls the display of the annunciation and annotation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) and the y-axis annotation. This does NOT include marker annotation (or the N dB result). When off, the graticule expands to fill the entire graticule area, leaving only the 1.5% gap above the graticule as described in the Trace/Detector chapter.

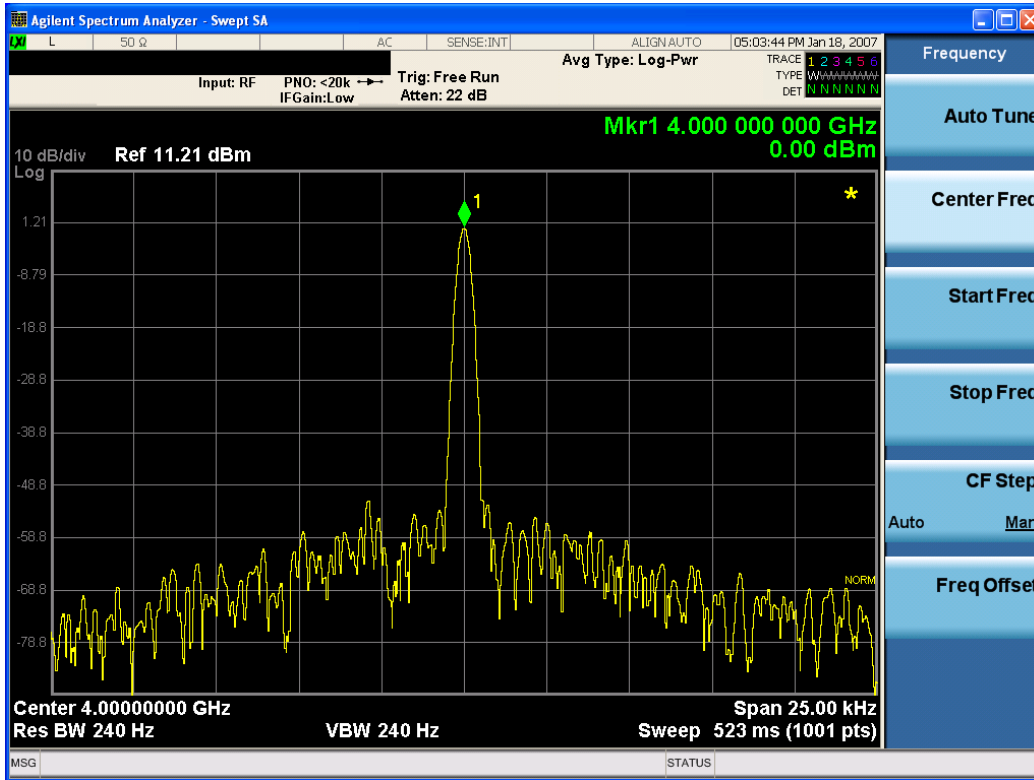
Key Path	View/Display, Display, Annotation
Remote Command	:DISPlay:ANNotation:SCReen[:STATe] OFF ON 0 1 :DISPlay:ANNotation:SCReen[:STATe]?
Example	DISP:ANN:SCR OFF
Dependencies	Grayed-out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset	On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Active Function Values On/Off

Turns on and off the active function display in the Meas Bar, and all of the active function values displayed on the softkeys.

Note that all of the softkeys that have active functions have these numeric values blanked when this function is on. This is a security feature..

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View/Display



Key Path	View/Display, Display, Annotation
Remote Command	:DISPlay:ACTivefunc[:STATE] ON OFF 1 0 :DISPlay:ACTivefunc[:STATE] ?
Example	DISP:ACT OFF
Dependencies	Grayed out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset	On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Title

Displays menu keys that enable you to change or clear a title on your display.

Key Path	View/Display, Display
Initial S/W Revision	Prior to A.02.00

Change Title

Writes a title into the "measurement name" field in the banner, for example, "Swept SA".

Press Change Title to enter a new title through the alpha editor. Press Enter or Return to complete the entry. Press ESC to cancel the entry and preserve your existing title.

The display title will replace the measurement name. It remains for this measurement until you press Change Title again, or you recall a state, or a Preset is performed. A title can also be cleared by pressing Title, Clear Title.

NOTE

Notice the inclusion of the <measurement> parameter in the command below. Because each measurement remembers the Display Title, the command must be qualified with the measurement name. For the Swept SA measurement this is not the case; no <measurement> parameter is used when changing the Display Title for the Swept SA measurement.

Key Path	View/Display, Display, Title
Mode	All
Remote Command	:DISPlay:<measurement>:ANNotation:TITLe:DATA <string> :DISPlay:<measurement>:ANNotation:TITLe:DATA?
Example	DISP:ANN:TITL:DATA "This Is My Title" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "This Is My Title" This example is for Measurements other than Swept SA. Both set the title to: This Is My Title
Notes	Pressing this key cancels any active function. When a title is edited the previous title remains intact (it is not cleared) and the cursor goes at the end so that characters can be added or BKSP can be used to go back over previous characters.
Preset	No title (measurement name instead)
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Clear Title

Clears a title from the front-panel display. Once cleared, the title cannot be retrieved. After the title is cleared, the current Measurement Name replaces it in the title bar.

Key Path	View/Display, Display, Title
Example	The following commands clear the title and restore the measurement's original title: DISP:ANN:TITL:DATA "" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "" This example is for ACP; in measurements other than Swept SA the measurement name is required.
Notes	Uses the :DISPlay:<measurement>:ANNotation:TITLe:DATA <string> command with an empty string (in the Swept SA, the <measurement> is omitted).
Preset	Performed on Preset.
Initial S/W Revision	Prior to A.02.00

Graticule

Pressing Graticule turns the display graticule On or Off. It also turns the graticule y-axis annotation on and off.

Key Path	View/Display, Display
Remote Command	:DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe] OFF ON 0 1 :DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe]?
Example	DISP:WIND:TRAC:GRAT:GRID OFF
Notes	The graticule is the set of horizontal and vertical lines that make up the grid/divisions for the x-axis and y-axis.
Preset	On
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00

System Display Settings

These settings are "Mode Global" – they affect all modes and measurements and are reset only by Restore Misc Defaults or Restore System Defaults under System.

Key Path	View/Display, Display
Initial S/W Revision	Prior to A.02.00

Annotation Local Settings

This is a Mode Global override of the meas local annotation settings. When it is All Off, it forces ScreenAnnotation, Meas Bar, Trace, and Active Function Values settings to be OFF for all measurements in all modes. This provides the security based "annotation off" function of previous analyzers; hence it uses the legacy SCPI command.

When it is All Off, the Screen, Meas Bar, Trace, and Active Function Values keys under the Display, Annotation menu are grayed out and forced to Off. When Local Settings is selected, you are able to set the local annotation settings on a measurement by measurement basis.

Key Path	View/Display, Display, System Display Settings
Remote Command	:DISPlay:WINDow[1]:ANNotation[:ALL] OFF ON 0 1 :DISPlay:WINDow[1]:ANNotation[:ALL]?
Example	:DISP:WIND:ANN OFF
Preset	On (Set by Restore Misc Defaults)
State Saved	Not saved in instrument state.
Backwards Compatibility Notes	The WINDow parameter and optional subopcode is included for backwards compatibility but ignored – all windows are equally affected.
Initial S/W Revision	Prior to A.02.00

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

Key Path	Save, Screen Image
Remote Command	:MMEMory:STORe:SCReem:THEMe TDColor TDMonochrome FCOLOR FMONochrome :MMEMory:STORe:SCReem:THEMe?
Example	:MMEM:STOR:SCR:THEM TDM
Preset	3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes.
Readback	3D Color 3D Mono Flat Color Flat Mono
Backwards Compatibility Notes	In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical.
Initial S/W Revision	Prior to A.02.00

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDC
Readback	3D Color
Initial S/W Revision	Prior to A.02.00

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDM
Readback	3D Mono
Initial S/W Revision	Prior to A.02.00

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FCOL
Readback	Flat Color
Initial S/W Revision	Prior to A.02.00

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FMON
Readback	Flat Mono
Initial S/W Revision	Prior to A.02.00

Backlight

Accesses the display backlight on/off keys. This setting may interact with settings under the Windows "Power" menu.

When the backlight is off, pressing ESC, TAB, SPACE, ENTER, UP, DOWN, LEFT, RIGHT, DEL, BKSP, CTRL, or ALT turns the backlight on without affecting the application. Pressing any other key will turn backlight on and could potentially perform the action as well.

Key Path	View/Display, Display, System Display Settings
Remote Command	:DISPlay:BACKlight ON OFF :DISPlay:BACKlight?
Preset	ON (Set by Restore Misc Defaults)
Initial S/W Revision	Prior to A.02.00

Backlight Intensity

An active function used to set the backlight intensity. It goes from 0 to 100 where 100 is full on and 0 is off. This value is independent of the values set under the Backlight on/off key.

Key Path	View/Display, Display, System Display Settings
Remote Command	:DISPlay:BACKlight:INTensity <integer> :DISPlay:BACKlight:INTensity?
Example	DISP:BACK:INT 50

Preset	100 (Set by Restore Misc Defaults)
Min	0
Max	100
Initial S/W Revision	Prior to A.02.00

I/Q Measured Polar Graph View

This view has 2 windows, as detailed in the sections below:

"Graph Window" on page 1867

"Metrics Window" on page 1868

The figure below shows an example of this view.

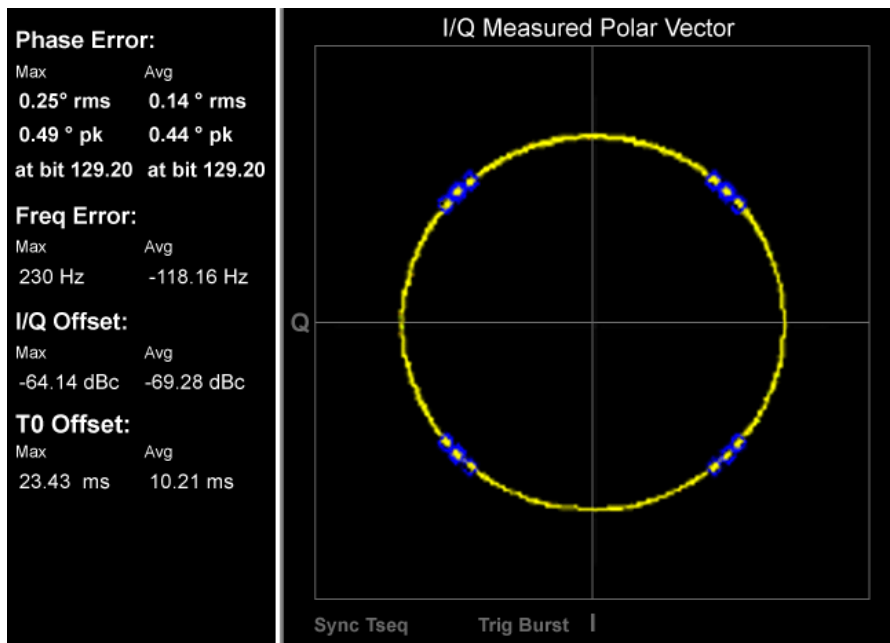


Figure 0-1 I/Q Measured Polar Graph View for GSM Phase & Frequency Error Measurement

For any multi-window view, you can select each window using the Next Window key, and make the selected window full size using the Zoom key.

Graph Window

Marker Operation	No
Corresponding Trace	Series of floating point numbers that alternately represent I and Q pairs of the corrected measured trace. (n=5)

Metrics Window

The Metrics Window is identical to that of the I/Q Error view. Refer to the section "[I/Q Error](#)" on page 1868.

Key Path	View/Display
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

I/Q Polar Vect/Constln

I/Q Polar Vector/Constellation allows you to change the format of the polar vector graph. The following display options are available:

- Vector and Constellation (SCPI: VC)
- Vector Only (SCPI: VECTor)
- Constellation Only (SCPI: CONSTln)

Key Path	View/Display
Mode	GSM
Remote Command	:DISPlay:PFERror:VIEW[1]:WINDow2:TRACe:POLar VC VECTor CONSTln :DISPlay:PFERror:VIEW[1]:WINDow2:TRACe:POLar?
Example	DISP:PFER:VIEW:WIND2:TRAC:POL VC DISP:PFER:VIEW:WIND2:TRAC:POL?
Notes	VC : Vect & Constln VECTor: Vector CONSTln : Constellation You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	VC
State Saved	Saved in instrument state.
Range	Vect & Constln Vector Constellation
Initial S/W Revision	Prior to A.02.00

I/Q Error

This view has 4 windows, as detailed in the sections below:

["Phase Err Window"](#) on page 1869

["Phase Err w/Freq Window"](#) on page 1869

["RF Envelope Window"](#) on page 1869

["Metrics Window"](#) on page 1870

The figure below shows an example of this view.

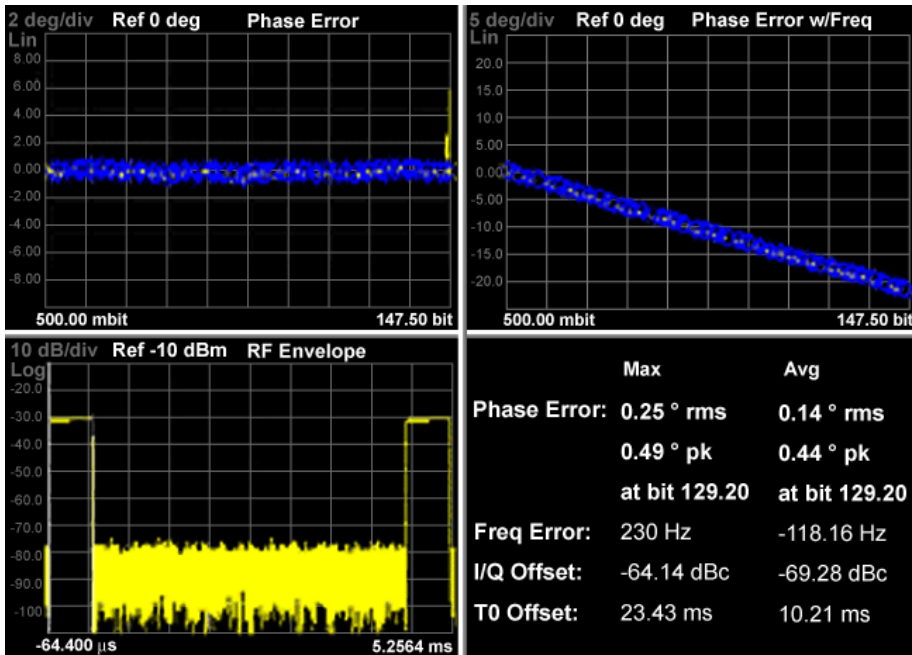


Figure 0-2 I/Q Error View for GSM Phase & Frequency Error Measurement

For any multi-window view, you can select each window using the Next Window key, and make the selected window full size using the Zoom key.

Phase Err Window

Marker Operation	Yes
Corresponding Trace	Series of floating point numbers (in degrees) that represent each sample in the phase error trace. (n=2)

Phase Err w/Freq Window

Marker Operation	Yes
Corresponding Trace	Series of floating point numbers (in degrees) that represent each sample in the phase error with frequency trace. (n=3)

RF Envelope Window

Marker Operation	Yes
Corresponding Trace	Series of floating point numbers that represent each sample in the log magnitude trace of the original time record. (n=4)

Metrics Window

Name	Corresponding Results	Display Format
Phase Error [rms] (Avg)	n=8 1st Average RMS Phase Error	9.99 ° rms
Phase Error [rms] (Max Hold)	n=8 2nd Maximum RMS Phase Error	9.99 ° rms
Phase Error [pk] (Avg)	n=8 3rd Average Peak Phase Error	9.99 °pk
Phase Error [pk] (Max Hold)	n=8 4th Maximum Peak Phase Error	9.99 °pk
Phase Error at bit (Avg)	n=8 5th Average Peak Phase Error Symbol Position	at bit 99.99
Phase Error at bit (Max Hold)	n=8 6th Maximum Peak Phase Error Symbol Position	at bit 99.99
Freq Error (Avg)	n=8 7th Average Frequency Error	-999.99 Hz
Freq Error (Max Hold)	n=8 8th Maximum Frequency Error	-999.99 Hz
I/Q Offset (Avg)	n=8 9th Average I/Q Origin Offset	-99.99 dBc
I/Q Offset (Max Hold)	n=8 10th Maximum I/Q Origin Offset	-99.99 dBc
T0 Offset (Avg)	n=8 11th Average T0 Offset	999.999 µs
T0 Offset (Max Hold)	n=8 12th Maximum T0 Offset	999.999 µs

Key Path	View/Display
Mode	EDGE/GSM
Initial S/W Revision	Prior to A.02.00

Bit Dots

Allows you to toggle the bit dots between On and Off.

- On: turns on blue bit dots on the trace in 'Phase Error' & 'Phase Error with Freq' window.
- Off: turns off blue bit dots on the trace in 'Phase Error' & 'Phase Error with Freq' window.

Key Path	View/Display
Mode	GSM
Remote Command	:DISPlay:PFERror:BDOTs[:STATe] ON OFF 1 0 :DISPlay:PFERror:BDOTs[:STATe]?
Example	DISP:PFER:BDOT ON DISP:PFER:BDOT?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. This SCPI command is included for completeness. But only affects the traces displayed on the screen.
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

Data Bits

This view has only one window, as detailed in the section "[Metrics Window](#)" on page 1872 below.

The figure below shows an example of this view.

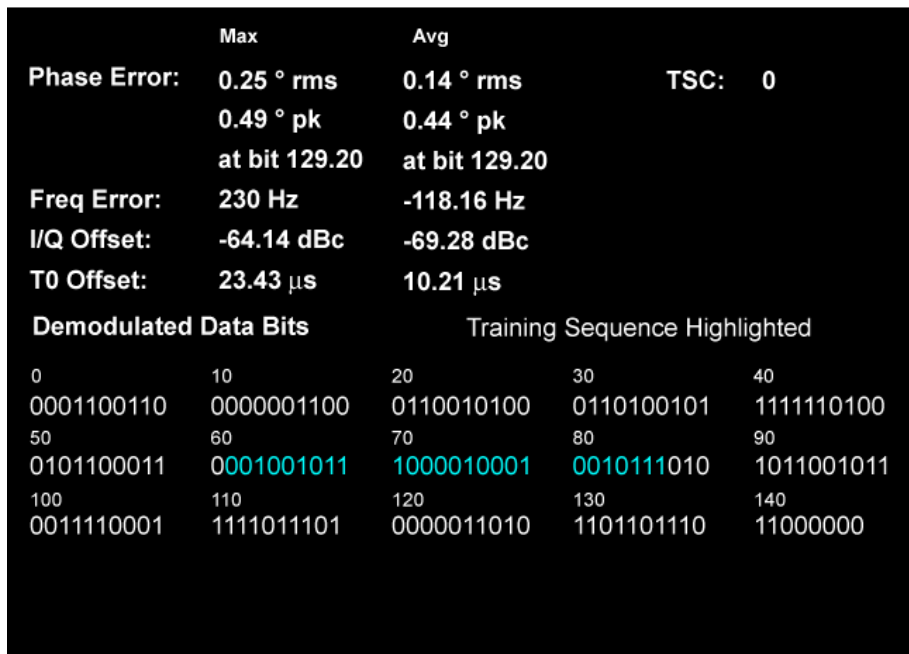


Figure 0-3 Data Bits View for GMSK Phase & Frequency Error Measurement

Metrics Window

Name	Corresponding Results	Display Format
Phase Error [rms] (Avg)	n=8 1st Average RMS Phase Error	9.99 ° rms
Phase Error [rms] (Max Hold)	n=8 2nd Maximum RMS Phase Error	9.99 ° rms
Phase Error [pk] (Avg)	n=8 3rd Average Peak Phase Error	9.99 °pk
Phase Error [pk] (Max Hold)	n=8 4th Maximum Peak Phase Error	9.99 °pk
Phase Error at bit (Avg)	n=8 5th Average Peak Phase Error Symbol Position	at bit 99.99
Phase Error at bit (Max Hold)	n=8 6th Maximum Peak Phase Error Symbol Position	at bit 99.99
Freq Error (Avg)	n=8 7th Average Frequency Error	-999.99 Hz
Freq Error (Max Hold)	n=8 8th Maximum Frequency Error	-999.99 Hz
I/Q Offset (Avg)	n=8 9th Average I/Q Origin Offset	-99.99 dBc
I/Q Offset (Max Hold)	n=8 10th Maximum I/Q Origin Offset	-99.99 dBc
T0 Offset (Avg)	n=8 11th Average T0 Offset	999.999 µs
T0 Offset (Max Hold)	n=8 12th Maximum T0 Offset	999.999 µs
Demodulated Data Bits	n=6	

Key Path	View/Display
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

View Selection by name (SCPI only)

Key Path	View/Display
Mode	GSM
Remote Command	<code>:DISPlay:PFERror:VIEW[:SElect] POLar ERRor DBITs</code>

	:DISPlay:PFERror:VIEW[:SElect]?
Example	DISP:PFER:VIEW ERR DISP:PFER:VIEW?
Notes	- POLar : I/Q Measured Polar Graph - ERRor : I/Q Error - DBITs : Data Bits You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	View Selection by number must be coupled with this parameter value.
Preset	ERRor
State Saved	Saved in instrument state.
Range	I/Q Error I/Q Measured Polar Graph Data Bits
Initial S/W Revision	Prior to A.02.00

View Selection by number (SCPI only)

Mode	GSM
Remote Command	:DISPlay:PFERror:VIEW:NSElect <integer> :DISPlay:PFERror:VIEW:NSElect?
Example	DISP:PFER:VIEW:NSEL 3
Notes	1: I/Q Measured Polar Graph 2: IQ Error 3: Data Bits You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	View Selection must be coupled with this parameter value.
Preset	2
State Saved	Saved in instrument state.
Min	1
Max	3
Initial S/W Revision	Prior to A.02.00

16 GSMK Output RF Spectrum Measurement

The Output RF Spectrum measurement is the GSM version of the adjacent channel power (ACP) measurement. For more details, see ["GSMK Output RF Spectrum Description" on page 1885](#) below.

This topic contains the following sections:

["Measurement Commands for GSMK Output RF Spectrum" on page 1876](#)

["Remote Command Results for GSMK Output RF Spectrum" on page 1877](#)

Measurement Commands for GMSK Output RF Spectrum

The following commands and queries are used to retrieve the measurement results:

```
:CONFigure:ORFSpectrum  
:CONFigure:ORFSpectrum:NDEFault  
:FETCh:ORFSpectrum[n]?  
:INITiate:ORFSpectrum  
:MEASure:ORFSpectrum[n]?  
:READ:ORFSpectrum[n]?
```

Remote Command Results for GSMK Output RF Spectrum

For the queries listed above, the results returned depend on the value of n, as follows.

Measurement Method	n	Results Returned
	0	Returns unprocessed I/Q trace data, as a series of comma-separated trace points, in volts. The I values are listed first in each pair, using the 0 through even-indexed values. The Q values are the odd-indexed values.
Single offset	not specified or n = 1	Returns 4 comma-separated results for the specified offset: <ol style="list-style-type: none"> 1. Modulation spectrum power, dB 2. Modulation spectrum power, dBm 3. Switching transient power, dB 4. Switching transient power, dBm
Multi-Offset	not specified or n = 1	<p>Returns a list of comma-separated values for the modulation spectrum at all the offsets (lower and upper). This is followed by the switching transient results at all the offsets (lower and upper). The carrier is considered offset zero (0) and is the first set of results sent. Four values are provided for each of the offsets (including the carrier), in this order:</p> <ol style="list-style-type: none"> 1. Lower offset(a) - power relative to carrier (dB) 2. Lower offset(a) - absolute average power (dBm) 3. Upper offset(a) - power relative to carrier (dB) 4. Upper offset(a) - absolute average power (dBm) <p>Values for all possible offsets are sent. Zeros are sent for offsets that have not been defined. The total number of values sent (120) = (4 results/offset) * (15 offsets) * (2 measurement types - modulation & switching)</p> <p>Carrier - modulation measurement values Offset 1 - modulation measurement values and so on ... Offset 14 - modulation measurement values Carrier - switching transients measurement values Offset 1 - switching transients measurement values ... Offset 14 - switching transients measurement values and so on</p> <p>This measurement defaults to modulation measurements and not switching measurements. If you want to return the switching measurement values, you must change that default condition and use FETCh or READ to return values, rather than MEASure.</p>
Swept	not specified or n = 1	Returns 5 comma-separated results of the closest point to the limit line: <ol style="list-style-type: none"> 1. Frequency 2. Offset frequency from carrier frequency 3. Power in dBm 4. delta from limit (dB)

Measurement Method	n	Results Returned
		5. delta from reference (dB)
Single offset	2	Returns floating point numbers (in dBm) of the captured trace data. It contains N data points of the “spectrum due to modulation” signal, where N is the specified number of samples.
Multi-Offset or Swept	2	Nothing returns.
Single offset	3	Returns floating point numbers (in dBm) of the captured trace data. It contains N data points of the “spectrum due to switching transients” signal, where N is the specified number of samples.
Multi-Offset or Swept	3	Nothing returns.
Swept	4	Returns floating point numbers (in dBm) of the sweep spectrum trace.
Multi-Offset or Single Offset	4	Nothing returns.
Swept	5	Returns floating point numbers (in dBm) of the swept limit trace.
Multi-Offset or Single Offset	5	Nothing returns.
Multi-Offset	6	<p>Relative level to the test limit, and test limit itself for both modulation and switching transient measurements.</p> <p>Returns a list of relative level to the test limit, the relative test limit and the absolute test limit for all the offset frequencies. The relative level to the test limit is returned for both lower and upper offsets. Four values are returned for each offset in the following order:</p> <ol style="list-style-type: none"> 1. Relative level to the test limit (dB) at the lower offset frequency 2. Relative level to the test limit (dB) at the upper offset frequency 3. Relative test limit used (dB) 4. Absolute test limit used (dBm) <p>For #3 and #4, the value of the upper offset frequencies are returned when carriers are set to more than 1.</p> <p>Values for all possible offsets are returned.</p> <p>The carrier frequency is considered offset zero (0.0 Hz) and is the first set of values returned.</p> <p>Zeros are returned for offsets that have not been defined.</p> <p>Zeros are returned for the measurement that was not performed. For example, if Meas Type is Modulation, all switching transient measurement results are 0.0.</p> <p>The total number of values returned is:</p> $120 = (4 \text{ results / offset}) * (15 \text{ offset frequencies}) * (2 \text{ measurement types})$ <p>Carrier (Offset A) – modulation measurement results Offset 1 (Offset B) – modulation measurement results</p>

Measurement Method	n	Results Returned
		<p>...</p> <p>Offset 14 (Offset 0) - modulation measurement results</p> <p>Carrier (Offset A) - switching transients measurement results</p> <p>Offset 1 (Offset B) - switching transient measurement results</p> <p>...</p> <p>Offset 14 (Offset 0) - switching transients measurement results</p>
Single Offset or Swept	6	Returns NULL
All	7	Returns floating point number (in dBm) of Measured Carrier Power Level that determines the PCL.
Multi-Offset	8	<p>Returns a list of relative level to the test limit, test limit itself, and the test limit actually applied for the test (Abs, Rel, or both Abs and Rel) for both modulation and switching transient measurements.</p> <p>Eight values are returned for each offset in the following order.</p> <p><1 ~4: Lower Offset Freq.></p> <ol style="list-style-type: none"> 1. Relative level to the test limit (dB) 2. Relative test limit (dB) 3. Absolute test limit (dBm) 4. Test limit actually applied (1 for Abs, 2 for Rel, 3 for Abs and Rel) <p><5 ~8: Upper Offset Freq.></p> <ol style="list-style-type: none"> 5: Relative level to the test limit (dB) 6: Relative test limit (dB) 7: Absolute test limit (dBm) 8: Test limit actually applied (1 for Abs, 2 for Rel, 3 for Abs and Rel) <p>The total number of values returned:</p> $240 = (8 \text{ values/offset}) * (15 \text{ offset frequencies}) * (2 \text{ Meas Type})$ <p>Values for all possible offsets are returned.</p> <p>The carrier frequency is considered offset zero (0.0 Hz) and is the first set of values returned.</p> <p>Zeros are returned for offsets that have not been defined.</p> <p>Zeros are returned for the measurement that was not performed. For example, if Meas Type is Modulation, all switching transient measurement results are 0.0.</p> <p>When Meas Type is Modulation:</p> <p>Carrier (Offset A) - All values are 0.</p> <p>Offset 1 (Offset B) - limit measurement values</p> <p>...</p> <p>Offset 14 (Offset 0) - limit measurement values</p> <p>When Meas Type is Switching:</p>

Measurement Method	n	Results Returned
		Carrier (Offset A) – All values are 0. Offset 1 (Offset B) – limit measurement values ... Offset 14 (Offset O) – limit measurement values
Single Offset or Swept	8	Returns NULL.
All	9	<p>Note that this query is duplicated. Use the query (n=11) instead.</p> <p>Returns a list of comma-separated values for the Carrier Header Information and the Carrier Power Measurement Results for Modulation and Switching.</p> <p>1. Carrier Header Information for Modulation</p> <p>Nine values are returned in the following order.</p> <ol style="list-style-type: none"> Number of Carriers Reference Carrier VBW/RBW Ratio Modulation Carrier RBW 1 Modulation Carrier RBW 2 Modulation Carrier RBW 3 Power Reference Type (Reference Carrier = 0, Max Power = 1) Actual Reference Carrier Modulation Type for Actual Reference Carrier (GMSK = 0) <p>All of the modulation carrier RBW 1, 2, and 3 are valid only when the following conditions are met.</p> <ul style="list-style-type: none"> + The number of carriers is more than 1. + The Meas Type is set to Modulation or Modulation&Switching. + The Carrier RBW is set to Auto. + The Ofst Freq List is set to Standard in the Multi Offset method or the Wideband Noise is set to ON in the Swept method. <p>All are invalid unless the Meas Type is set to Modulation or Modulation&Switching.</p> <p>2. Carrier Power Measurement Results for Modulation</p> <p>Six values are returned for each carrier in the following order.</p> <ol style="list-style-type: none"> Carrier Power Reference Power Measured with Modulation Carrier RBW 1 Reference Power Measured with Modulation Carrier RBW 2 Reference Power Measured with Modulation Carrier RBW 3 Carrier Center Frequency Power Present (No = 0, Yes = 1) <p>The maximum number of carriers is 8, and therefore a total of 48 values</p>

Measurement Method	n	Results Returned
		<p>are returned.</p> <p>The Carrier Power and the Carrier Center Frequency are invalid when its corresponding Power Present is set to 0.</p> <p>The Reference Power is invalid when its corresponding Modulation Carrier RBW is invalid.</p> <p>All are invalid unless the Meas Type is set to Modulation or Modulation&Switching.</p> <p>3. Carrier Header Information for Switching</p> <p>Seven values are returned in the following order.</p> <ul style="list-style-type: none"> (a) Number of Carriers (b) Reference Carrier (c) VBW/RBW Ratio (d) Switching Carrier RBW (e) Power Reference Type (Reference Carrier = 0. Max Power = 1) (f) Actual Reference Carrier (g) Modulation Type for Actual Reference Carrier (GMSK = 0) <p>All are invalid unless the Meas Type is set to Switching or Modulation&Switching.</p> <p>4 Carrier Power Measurement Results for Switching</p> <p>Four values are returned for each carrier in the following order.</p> <ul style="list-style-type: none"> (a) Carrier Power (b) Reference Power Measured with Switching Carrier RBW (c) Carrier Center Frequency (d) Power Present (No = 0, Yes = 1) <p>The maximum number of carriers is 8, and therefore a total of 32 values are returned.</p> <p>The Carrier Power and the Carrier Center Frequency are invalid when its corresponding Power Present is set to 0.</p> <p>The Reference Power is invalid when the Switching Carrier RBW is invalid</p> <p>All are invalid unless the Meas Type is set to Switching or Modulation&Switching.</p>
Multi-Offset	10	<p>Returns a list of results for both modulation and switching transient measurements in the multi-offset method. Sixteen values are returned for each offset in the following order.</p> <ul style="list-style-type: none"> 1. Offset frequency (Hz) 2. Offset RBW (Hz) <3~9: Lower Offset Freq.> 3. Carrier RBW (Hz) 4. Power relative to carrier (dB) 5. Relative level to the test limit (dB)

Measurement Method	n	Results Returned
		<p>6. Absolute average power (dBm)</p> <p>7. Relative test limit (dB)</p> <p>8. Absolute test limit (dBm)</p> <p>9. Test limit actually applied (0 for not applied, 1 for Abs, 2 for Rel, 3 for Abs and Rel)</p> <p><10~16: Upper Offset Freq.></p> <p>10. Carrier RBW (Hz)</p> <p>11. Power relative to carrier (dB)</p> <p>12. Relative level to the test limit (dB)</p> <p>13. Absolute average power (dBm)</p> <p>14. Relative test limit (dB)</p> <p>15. Absolute test limit (dBm)</p> <p>16. Test limit actually applied (0 for not applied, 1 for Abs, 2 for Rel, 3 for Abs and Rel)</p> <p>The total number of values returned:</p> <p>IF all the following conditions are met</p> <ul style="list-style-type: none"> • The number of carriers is greater than one. • (CHAN:CARR:COUN n, where n > 1) • The state of the test limit exception is set to On. (ORFS:MCAR:LEXC ON) • The type of the multicarrier limit exception rule is set to Custom. (ORFS:MCAR:LEXC:RULE CUST) • The type of a frequency list for multi offset is set to Limited Custom. (ORFS:LIST:SEL LCUS) <p>THEN</p> <p>$1280 = (16 \text{ values/offset}) * (40 \text{ offset frequencies}) * (2 \text{ Meas Type})$</p> <p>Values for all possible offsets are returned.</p> <p>Offset 1 – modulation measurement results ...</p> <p>Offset 40 – modulation measurement results</p> <p>Offset 1 – switching transient measurement results ...</p> <p>Offset 40 – switching transient measurement results</p> <p>ELSE</p> <p>$448 = (16 \text{ values/offset}) * (14 \text{ offset frequencies}) * (2 \text{ Meas Type})$ Values for all possible offsets are returned.</p> <p>Offset 1 – modulation measurement results ...</p> <p>Offset 14 – modulation measurement results</p> <p>Offset 1 – switching transient measurement results ...</p> <p>Offset 14 – switching transient measurement results</p>
All	11	Returns a list of comma-separated values for the Carrier Header Information and the Carrier Power Measurement Results for Modulation

Measurement Method	n	Results Returned
		<p>and Switching.</p> <p>1. Carrier Header Information for Modulation</p> <p>Nine values are returned in the following order.</p> <p>(a) Number of Carriers</p> <p>(b) Reference Carrier</p> <p>(c) VBW/RBW Ratio</p> <p>(d) Modulation Carrier RBW 1</p> <p>(e) Modulation Carrier RBW 2</p> <p>(f) Modulation Carrier RBW 3</p> <p>(g) Power Reference Type (Reference Carrier = 0, Max Power = 1)</p> <p>(h) Actual Reference Carrier</p> <p>(i) Modulation Type for Actual Reference Carrier (GMSK = 0, EDGE = 1)</p> <p>All of the modulation carrier RBW 1, 2, and 3 are valid only when the following conditions are met.</p> <ul style="list-style-type: none"> + The number of carriers is more than 1. + The Meas Type is set to Modulation or Modulation&Switching. + The Carrier RBW is set to Auto. + The Ofst Freq List is set to Standard in the Multi Offset method or the Wideband Noise is set to ON in the Swept method. <p>All are invalid unless the Meas Type is set to Modulation or Modulation&Switching.</p> <p>2. Carrier Power Measurement Results for Modulation</p> <p>Six values are returned for each carrier in the following order.</p> <p>(a) Carrier Power</p> <p>(b) Reference Power Measured with Modulation Carrier RBW 1</p> <p>(c) Reference Power Measured with Modulation Carrier RBW 2</p> <p>(d) Reference Power Measured with Modulation Carrier RBW 3</p> <p>(e) Carrier Center Frequency</p> <p>(f) Power Present (No = 0, Yes = 1)</p> <p>As a result, a total of $6 * N$ values are returned where N is the number of carriers.</p> <p>The Carrier Power and the Carrier Center Frequency are invalid when its corresponding Power Present is set to 0.</p> <p>The Reference Power is invalid when its corresponding Modulation Carrier RBW is invalid.</p> <p>All are invalid unless the Meas Type is set to Modulation or Modulation&Switching.</p> <p>3. Carrier Header Information for Switching</p> <p>Seven values are returned in the following order.</p>

Measurement Method	n	Results Returned
		<p>(a) Number of Carriers (b) Reference Carrier (c) VBW/RBW Ratio (d) Switching Carrier RBW (e) Power Reference Type (Reference Carrier = 0. Max Power = 1) (f) Actual Reference Carrier (g) Modulation Type for Actual Reference Carrier (GMSK = 0, EDGE = 1)</p> <p>All are invalid unless the Meas Type is set to Switching or Modulation&Switching.</p> <p>4 Carrier Power Measurement Results for Switching</p> <p>Four values are returned for each carrier in the following order.</p> <p>(a) Carrier Power (b) Reference Power Measured with Switching Carrier RBW (c) Carrier Center Frequency (d) Power Present (No = 0, Yes = 1)</p> <p>As a result, a total of $4 * N$ values are returned where N is the number of carriers.</p> <p>The Carrier Power and the Carrier Center Frequency are invalid when its corresponding Power Present is set to 0.</p> <p>The Reference Power is invalid when the Switching Carrier RBW is invalid</p> <p>All are invalid unless the Meas Type is set to Switching or Modulation&Switching.</p>
Swept	12	<p>Returns the number of failed frequency bands and a list of the following four pieces of information for each of the frequency bands.</p> <ol style="list-style-type: none"> 1. The offset frequency of the band center frequency, Hz 2. The worst delta power in the band, dBm 3. The absolute frequency of the band center frequency, Hz 4. The absolute frequency with the worst delta power in the band, Hz <p>As a result, a total of $(1 + 4 * N)$ values are returned where N is the number of failed frequency bands.</p>

GMSK Output RF Spectrum Description

Since GSM is a TDMA format, RF power is switched on and off depending on whether the actual burst is being transmitted. The switching of power causes spectral splatter at frequencies other than that being transmitted by the carrier. Fast transitions in the time domain cause switching transients that have high frequency content associated with them. Excessive amount of energy spilling into an adjacent frequency channel could interfere with signals being transmitted to other MS or BTS.

Key Path	Meas
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.13.00, A.14.00

AMPTD Y Scale

Accesses a menu of functions that enable you to set the vertical scale parameters. These functions control how data on the vertical (Y) axis is displayed and control instrument settings that affect the vertical axis.

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Ref Value

Allows you to set the absolute power reference.

Key Path	AMPTD Y Scale
Mode	GSM
Remote Command	:DISPlay:ORFSpectrum:VIEW[1] 2:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <real> :DISPlay:ORFSpectrum:VIEW[1] 2:WINDow[1]:TRACe:Y[:SCALe]:RLEVel?
Example	DISP:ORFS:VIEW:WIND:TRAC:Y:RLEV -10 DISP:ORFS:VIEW:WIND:TRAC:Y:RLEV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. SubOpCode: VIEW[1]:WINDow[1]: RF Envelope window VIEW2:WINDow[1]: Spectrum window
Dependencies	Blanked when Meas Method is Multi Offset.
Couplings	When "Auto Scaling" on page 1904 is On, this value is automatically determined by the measurement result. When this value is set manually, "Auto Scaling" on page 1904 automatically changes to Off.
Preset	0.00 0.00
State Saved	Saved in instrument state.
Min	-250.0
Max	250.0
Initial S/W Revision	Prior to A.02.00

Attenuation

This menu controls the attenuator functions and interactions between the attenuation system components.

There are two attenuator configurations in the X-Series. One is a dual attenuator configuration consisting of a mechanical attenuator and an optional electronic attenuator. The other configuration uses a single attenuator with combined mechanical and electronic sections that controls all the attenuation functions. Different models in the X-Series come with different configurations.

See "Dual Attenuator Configurations:" on page 1887

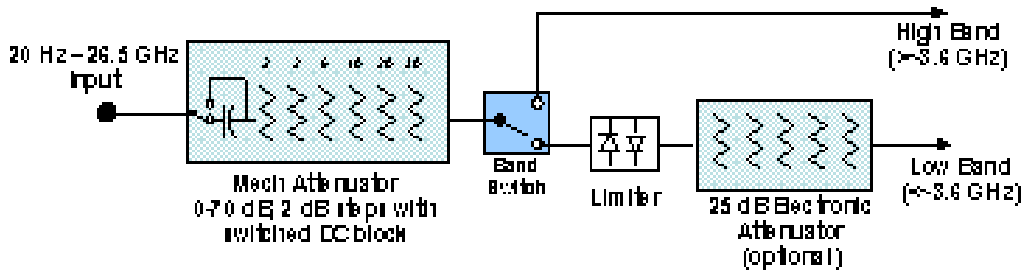
See "Single Attenuator Configuration:" on page 1888

Most Attenuation settings are the same for all measurements – they do not change as you change measurements. Settings like these are called “Meas Global” and are unaffected by Meas Preset.

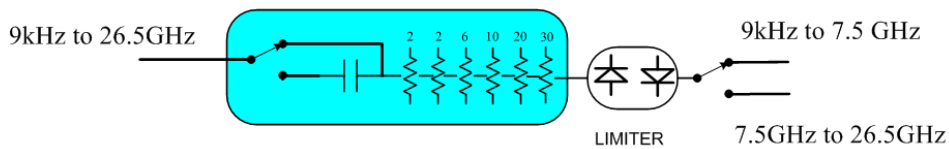
Key Path	AMPTD Y Scale
Scope	Meas Global
Dependencies	In measurements that support the I/Q inputs, this key is unavailable when I/Q is the selected input, and is replaced by the Range key in that case.
Readback Line	Contains a summary in [] brackets of the current total attenuation. See the descriptions of the , " (Mech) Atten " on page 2242, and "Enable Elec Atten" on page 2244 keys for more detail on the contributors to the total attenuation. Note that when "Pre-Adjust for Min Clip" is on, this value can change at the start of every measurement.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Dual Attenuator Configurations:

Configuration 1: Mechanical attenuator + optional electronic attenuator

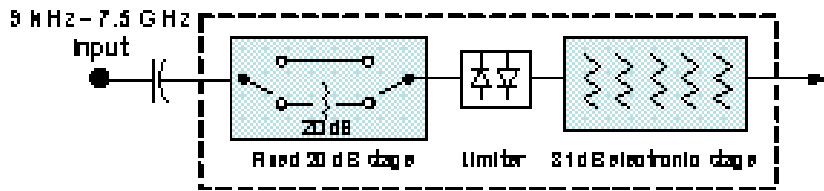


Configuration 2: Mechanical attenuator, no optional electronic attenuator

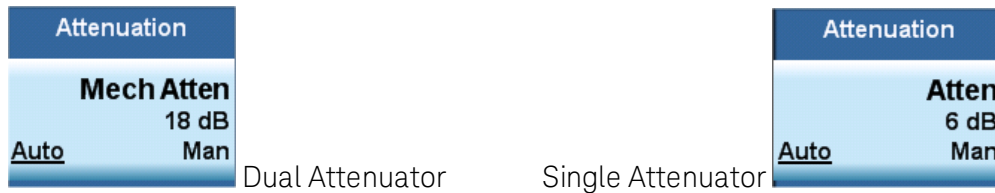


(note that Configuration 2 is not strictly speaking a dual-section attenuator, since there is no electronic section available. However, it behaves exactly like Configuration 1 without the Electronic Attenuator option EA3, therefore for the sake of this document it is grouped into the “Dual Attenuator” configuration)

Single Attenuator Configuration:



You can tell which attenuator configuration you have by pressing the Attenuation key, which (in most Modes) opens the Attenuation menu. If the first key in the Attenuation menu says Mech Atten you have the dual attenuator configuration. If the first key says Atten you have the single attenuator configuration.



In the single attenuator configuration, you control the attenuation with a single control, as the fixed stage has only two states. In the dual attenuator configuration, both stages have significant range so you are given separate control of the mechanical and electronic attenuator stages.

When you have the dual attenuator configuration, you may still have only a single attenuator, because unless option EA3 (the Electronic Attenuator option) is available, and you purchase it, you will have only the mechanical attenuator.

(Mech) Atten

This key is labeled Mech Atten in dual attenuator models and Atten in single attenuator models. In the dual attenuator configuration, this key only affects the mechanical attenuator.

This key lets you modify the attenuation applied to the RF input signal path. This value is normally auto coupled to the Ref Level, the Internal Preamp Gain, any External Gain that is entered, and the Max Mixer Level, as described in the table below.

See "[Attenuator Configurations and Auto/Man](#)" on page 1890

Key Path	AMPTD Y Scale, Attenuation
Remote Command	<pre>[:SENSe]:POWeR[:RF]:ATTenuation <rel_ampl> [:SENSe]:POWeR[:RF]:ATTenuation? [:SENSe]:POWeR[:RF]:ATTenuation:AUTO OFF ON 0 1 [:SENSe]:POWeR[:RF]:ATTenuation:AUTO?</pre>
Example	<p>POW:ATT 20</p> <p>Dual attenuator configuration: sets the mechanical attenuator to 20 dB</p> <p>Single attenuator mode: sets the main attenuation to 20 dB (see below for definition of “main” attenuation).</p> <p>If the attenuator was in Auto, it sets it to Manual.</p>
Dependencies	Some measurements do not support the Auto setting of (Mech) Atten. In these measurements, the

Auto/Man selection is not available, and the Auto/Man line on the key disappears.

In dual attenuator configurations, when the electronic attenuator is enabled, the mechanical attenuator has no auto setting and the Auto/Man line on the key disappears. The state of Auto/Man is remembered and restored when the electronic attenuator is once again disabled. This is described in more detail in the ["Enable Elec Atten" on page 2244](#) key description.

See ["Attenuator Configurations and Auto/Man" on page 1890](#) for more information on the Auto/Man functionality of Attenuation.

Couplings

When (Mech) Atten is in Auto, it uses the following algorithm to determine a value:
 If the USB Preamp is connected to USB, use 0 dB.
 Otherwise, $Atten = ReferenceLevel + PreAmpGain + ExternalGain - RefLevelOffset - MaxMixerLevel + IF\ Gain$.
 Limit this value to be between 6 dB and the Max value. No value below 6 dB can ever be chosen by Auto.
 The resulting value is rounded up to the largest value possible given the attenuation step setting. That is, 50.01 dB would change to 60 dB (for a 10 dB attenuation step).
 The "IF Gain" term in the equation above is either 0 dB or +10 dB, depending on the settings of FFT IF Gain, Swept IF Gain, max Ref Level and the Auto/Man setting of Mech Atten.
 In External Mixing and BBIQ, where the Attenuator is not in the signal path, the Attenuator setting changes as described above when (Mech) Atten is in Auto, but no changes are made to the actual attenuator hardware setting until the input is changed back to the RF Input.

Preset The preset for Mech Attenuation is "Auto."
 The Auto value of attenuation is:
 CXA, EXA, MXA and PXA: 10 dB

State Saved Saved in instrument state

Min 0 dB
 The attenuation set by this key cannot be decreased below 6 dB with the knob or step keys. To get to a value below 6 dB it has to be directly entered from the keypad or via SCPI. This protects from adjusting the attenuation to a dangerously small value which can put the instrument at risk of damage to input circuitry. However, if the current mechanical attenuation is below 6 dB it can be increased with the knob and step keys, but not decreased.

Max CXA N9000A-503/507: 50 dB
 CXA N9000A-513/526: 70dB
 EXA: 60 dB
 MXA and PXA: 70 dB
 In the single attenuator configuration, the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB.

Initial S/W Revision Prior to A.02.00

Modified at S/W Revision A.03.00

Attenuator Configurations and Auto/Man

As described in the Attenuation key description, there are two distinct attenuator configurations available in the X-Series, the single attenuator and dual attenuator configurations. In dual attenuator configurations, we have the mechanical attenuation and the electronic attenuation, and the current total attenuation is the sum of the electronic + mechanical attenuation. In single attenuator configurations, we refer to the attenuation set using the (Mech) Atten key (or POW:ATT SCPI) as the “main” attenuation; and the attenuation that is set by the SCPI command POW:EATT as the “soft” attenuation (the POW:EATT command is honored even in the single attenuator configuration, for compatibility purposes). Then the current total attenuation is the sum of the main + soft attenuation. See the Elec Atten key description for more on “soft” attenuation.

In the dual attenuator configuration, when the electronic attenuator is enabled, there is no Auto/Man functionality for the mechanical attenuator, and the third line of the key label (the Auto/Man line) disappears:



Enable Elec Atten

Enables the Electronic Attenuator.

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear. These advantages primarily aid in remote operation and are negligible for front panel use. See ["Using the Electronic Attenuator: Pros and Cons" on page 1892](#) for a detailed discussion of the pros and cons of using the electronic attenuator.

For the single attenuator configuration, for SCPI backwards compatibility, the “soft” attenuation feature replaces the dual attenuator configuration’s electronic attenuator. All the same couplings and limitations apply. See ["Attenuator Configurations and Auto/Man" on page 2244](#)

See ["More Information" on page 1891](#)

Key Path	AMPTD Y Scale, Attenuation
Remote Command	[:SENSe] :POWer [:RF] :EATTenuation :STATe OFF ON 0 1 [:SENSe] :POWer [:RF] :EATTenuation :STATe ?
Example	POW:EATT:STAT ON
Dependencies	This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no “electronic attenuator” there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a “soft” attenuation as described in "Attenuator Configurations and Auto/Man" on page 2244 . The electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable above 3.6 GHz. Therefore, if the Stop Frequency of the analyzer is > 3.6 GHz then the Enable Elec Atten key will be OFF and grayed out.

	<p>If the Internal Preamp is on, meaning it is set to Low Band or Full, the electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable. In this case the Enable Elec Atten key will be OFF and grayed out.</p> <p>If either of the above is true, if the SCPI command is sent, an error indicating that the electronic attenuator is unavailable will be sent.</p> <p>If the electronic/soft Attenuator is enabled, then the Stop Freq of the analyzer is limited to 3.6 GHz and the Internal Preamp is unavailable.</p> <p>The SCPI-only “soft” electronic attenuation for the single-attenuator configuration is not available in all measurements; in particular, it is not available in the Swept SA measurement.</p>
Couplings	Enabling and disabling the Electronic Attenuator affects the setting of the Mechanical Attenuator (in dual attenuator configurations). This is described in more detail below this table.
Preset	OFF for Swept SA measurement; ON for all other measurements that support the electronic attenuator
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

More Information

Mechanical Attenuator Transition Rules

When the Electronic Attenuator is enabled, the Mechanical Attenuator transitions to a state that has no Auto function. Below are the rules for transitioning the Mechanical Attenuator. NOTE that the information below ONLY applies to the dual attenuator configurations, and ONLY when the Electronic Attenuator is installed:

When the Electronic Attenuation is enabled from a disabled state:

- The Mechanical Attenuator is initialized to 10 dB (this is its optimal performance setting). You can then set it as desired with SCPI, numeric keypad, step keys, or knob, and it behaves as it normally would in manual mode
- The Auto/Man state of (Mech) Atten is saved
- The Auto/Man line on the (Mech) Atten key disappears and the auto rules are disabled
- The Electronic Attenuator is set to 10 dB less than the previous value of the Mechanical Attenuator, within the limitation that it must stay within the range of 0 to 24 dB of attenuation.

Examples in the dual attenuator configuration:

- Mech Atten at 20 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 10 dB. New total attenuation equals the value before Elec Atten enabled.
- Mech Atten at 0 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 0 dB. New total attenuation does not equal the value before Elec Atten enabled.
- Mech Atten at 40 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 24 dB. New total attenuation does not equal the value before Elec Atten enabled.

When the Electronic Attenuation is disabled from an enabled state:

- The Elec Atten key is grayed out
- The Auto/Man state of (Mech) Atten is restored
- If now in Auto, (Mech) Atten recouples
- If now in Man, (Mech) Atten is set to the value of total attenuation that existed before the Elec Atten was disabled. The resulting value is rounded up to the smallest value possible given the (Mech) Atten Step setting - (That is, 57 dB changes to 58 dB when (Mech) Atten Step is 2 dB.)

Using the Electronic Attenuator: Pros and Cons

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear.

The “finer steps” advantage of the electronic attenuator is beneficial in optimizing the alignment of the analyzer dynamic range to the signal power in the front panel as well as remote use. Thus, you can achieve improved relative signal measurement accuracy. Compared to a mechanical attenuator with 2 dB steps, the 1 dB resolution of the electronic attenuator only gives better resolution when the odd-decibel steps are used. Those odd-decibel steps are less accurately calibrated than the even-decibel steps, so one tradeoff for this superior relative accuracy is reduced absolute amplitude accuracy.

Another disadvantage of the electronic attenuator is that the spectrum analyzer loses its “Auto” setting, making operation less convenient.

Also, the relationship between the dynamic range specifications (TOI, SHI, compression and noise) and instrument performance are less well-known with the electrical attenuator. With the mechanical attenuator, TOI, SHI and compression threshold levels increase dB-for-dB with increasing attenuation, and the noise floor does as well. With the electronic attenuator, there is an excess attenuation of about 1 to 3 dB between 0 and 3.6 GHz, making the effective TOI, SHI, and so forth, less well known. Excess attenuation is the actual attenuation relative to stated attenuation. Excess attenuation is accounted for in the analyzer calibration

Elec Atten

Controls the Electronic Attenuator in dual attenuator configurations. This key does not appear in single attenuator configurations, as the control of both the mechanical and electronic stages of the single attenuator is integrated into the single Atten key.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	[:SENSe] :POWer [:RF] :EATTenuation <rel_amp1> [:SENSe] :POWer [:RF] :EATTenuation?
Notes	Electronic Attenuation’s specification is defined only when Mechanical Attenuation is 6 dB.
Dependencies	This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no “electronic attenuator” there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a “soft” attenuation as described in "Attenuator Configurations and Auto/Man" on page 2244 . The “soft” attenuation is treated as an addition to the “main” attenuation value set by the Atten softkey or the

	POW:ATT SCPI command and affects the total attenuation displayed on the Attenuation key and the Meas Bar. When Enable Elec Atten is off or grayed out, the Elec Atten key is grayed out.
Preset	0 dB
State Saved	Saved in instrument state
Min	0 dB
Max	Dual attenuator configuration: 24 dB Single attenuator configuration: the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Adjust Atten for Min Clip

Sets the combination of mechanical and electronic attenuation and gain based on the current measured signal level so that clipping will be at a minimum.

This is an "immediate action" function, that is, it executes once, when the key is pressed.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	<code>[:SENSe] :POWer [:RF] :RANGe:OPTimize IMMEDIATE</code>
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Pre-Adjust for Min Clip

If this function is on, it does the adjustment described under "[Adjust Atten for Min Clip](#)" on page 2247 each time a measurement restarts. Therefore, in Continuous measurement mode, it only executes before the first measurement.

In dual attenuator models, you can set Elec+Mech Atten, in which case both attenuators participate in the autoranging, or Elec Atten Only, in which case the mechanical attenuator does not participate in the autoranging. This latter case results in less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	<code>[:SENSe] :POWer [:RF] :RANGe:OPTimize:ATTenuation OFF ELECTRical COMBined</code>

	<code>[:SENSe] :POWer [:RF] :RANGe:OPTimize:ATTenuation?</code>
Notes	The SCPI parameter ELECtrical sets this function to On in single attenuator models. The SCPI parameter COMBined is mapped to ELECtrical in single attenuator models; if you send COMBined, it sets the function to On and returns ELEC to a query.
Dependencies	This key only appears in Dual Attenuator models with an Electronic Attenuator installed. In instruments with Dual Attenuator model, when Enable Elec Atten is off or grayed out, the Pre-Adjust for Min Clip key is grayed out.
Preset	OFF for Swept SA measurement; ON for all other measurements that support Pre-Adjust for Min Clip
State Saved	Saved in instrument state
Range	Dual attenuator models: Off Elec Atten Only Mech + Elec Atten Single attenuator models: Off On
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Remote Command	<code>[:SENSe] :POWer [:RF] :RANGe:AUTO ON OFF 1 0</code> <code>[:SENSe] :POWer [:RF] :RANGe:AUTO?</code>
Notes	ON aliases to "Elec Atten Only" (:POW:RANG:OPT:ATT ELEC) OFF aliases to "Off" (:POW:RANG:OPT:ATT OFF) The query :POW:RANG:AUTO? returns true if :POW:RANG:OPT:ATT is not "Off"
Initial S/W Revision	Prior to A.02.00

Off

Turns Pre-Adjust for Min Clip off. This is the default setting.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip
Example	:POW:RANGe:OPT:ATT OFF
Initial S/W Revision	Prior to A.02.00

Elec Atten Only

Selects only the electric attenuator to participate in auto ranging. This offers less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip
Example	:POW:RANGe:OPT:ATT ELEC
Initial S/W Revision	Prior to A.02.00

Mech + Elec Atten

In dual attenuator models, this selects both attenuators participate in the autoranging.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip
Example	:POW:RANGe:OPT:ATT COMB
Initial S/W Revision	Prior to A.02.00

(Mech) Atten Step

This controls the step size used when making adjustments to the input attenuation.

This key is labeled Mech Atten Step in dual attenuator models and Atten Step in single attenuator models. In the dual attenuator configuration, this key only affects the step size of the mechanical attenuator.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	[[:SENSe]:POWer[:RF]:ATTenuation:STEP[:INCRement] 10 dB 2 dB [:SENSe]:POWer[:RF]:ATTenuation:STEP[:INCRement]?
Example	POW:ATT:STEP 2
Notes	Note this feature works like a 1-N choice from the front panel, but it takes a specific value (in dB) when used remotely. The only valid values are 2 and 10.
Dependencies	Blanked in CXA and EXA if option FSA (2 dB steps) is not present. If blanked, attempts to set it via SCPI will yield an error.
Couplings	When the attenuation step size changes, the current mechanical attenuation value is adjusted (if necessary) to be quantized to the new step size. That is, if step is set to 10 dB, mech atten is increased if necessary so it is a multiple of 10 dB
Preset	PXA and MXA: 2 dB EXA and CXA: 10 dB (2 dB with option FSA)
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Scale/Div

Allows you to enter a numeric value to change the vertical display sensitivity.

Key Path	AMPTD Y Scale
Mode	GSM
Remote Command	:DISPlay:ORFSpectrum:VIEW[1] 2:WINDow[1]:TRACe:Y[:SCALe]:PDIVision <rel_ampl> :DISPlay:ORFSpectrum:VIEW[1] 2:WINDow[1]:TRACe:Y[:SCALe]:PDIVision?
Example	DISP:ORFS:VIEW:WIND:TRAC:Y:PDIV 2db DISP:ORFS:VIEW:WIND:TRAC:Y:PDIV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. SubOpCode: VIEW[1]:WINDow[1]: RF Envelope window VIEW2:WINDow[1]: Spectrum window
Dependencies	Blanked when Meas Method is Multi Offset.
Couplings	When "Auto Scaling" on page 1904 is On, this value is automatically determined by the measurement result. Whenthis value is set manually, "Auto Scaling" on page 1904 automatically changes to Off.
Preset	10.00 10.00
State Saved	Saved in instrument state.
Min	0.1
Max	20.0
Initial S/W Revision	Prior to A.02.00

Presel Center

When this key is pressed, the centering of the preselector filter is adjusted to optimize the amplitude accuracy at the frequency of the selected marker. If the selected marker is not on when Presel Center is pressed, the analyzer will turn on the selected marker, perform a peak search, and then perform centering on the marker's center frequency. If the selected marker is already on and between the start and stop frequencies of the analyzer, the analyzer performs the preselector calibration on that marker's frequency. If the selected marker is already on, but outside the frequency range between Start Freq and Stop Freq, the analyzer will first perform a peak search, and then perform centering on the marker's center frequency.

The value displayed on the Presel Adjust key will change to reflect the new preselector tuning (see Presel Adjust).

A number of considerations should be observed to ensure proper operation. See "Proper Preselector Operation" on page 1897.

Key Path	AMPTD Y Scale
Remote Command	[:SENSE] : POWer [:RF] : PCENter

Example	POW:PCEN
Notes	Note that the rules outlined above under the key description apply for the remote command as well as the key. The result of the command is dependent on marker position, and so forth. Any message shown by the key press is also shown in response to the remote command.
Dependencies	<ul style="list-style-type: none"> • Grayed out if the microwave preselector is off.) • If the selected marker's frequency is below Band 1, advisory message 0.5001 is generated and no action is taken. • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0. • Grayed out in the Spectrogram View.
Couplings	<p>The active marker position determines where the centering will be attempted.</p> <p>If the analyzer is in a measurement such as averaging when centering is initiated, the act of centering the preselector will restart averaging but the first average trace will not be taken until the centering is completed.</p>
Status Bits/OPC dependencies	<p>When centering the preselector, *OPC will not return true until the process is complete and a subsequent measurement has completed, nor will results be returned to a READ or MEASURE command.</p> <p>The Measuring bit should remain set while this command is operating and should not go false until the subsequent sweep/measurement has completed.</p>
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Proper Preselector Operation

A number of considerations should be observed to ensure proper operation:

1. If the selected marker is off, the analyzer will turn on a marker, perform a peak search, and adjust the preselector using the selected marker's frequency. It uses the "highest peak" peak search method unqualified by threshold or excursion, so that there is no chance of a 'no peak found' error. It continues with that peak, even if it is the peak of just noise. Therefore, for this operation to work properly, there should be a signal on screen in a preselected range for the peak search to find.
2. If the selected marker is already on, the analyzer will attempt the centering at that marker's frequency. There is no preselector for signals below about 3.6 GHz, therefore if the marker is on a signal below 3.6 GHz, no centering will be attempted and an advisory message generated
3. In some models, the preselector can be bypassed. If it is bypassed, no centering will be attempted in that range and a message will be generated.

Preselector Adjust

Allows you to manually adjust the preselector filter frequency to optimize its response to the signal of interest. This function is only available when "[Presel Center](#)" on page 2250 is available.

For general purpose signal analysis, using Presel Center is recommended. Centering the filter minimizes the impact of long-term preselector drift. Presel Adjust can be used instead to manually optimize the preselector. One application of manual optimization would be to peak the preselector response, which both optimizes the signal-to-noise ratio and minimizes amplitude variations due to small (short-term) preselector drifting.

Key Path	AMPTD Y Scale
Scope	Meas Global
Remote Command	<code>[:SENSe] :POWer [:RF] :PADJust <freq></code> <code>[:SENSe] :POWer [:RF] :PADJust?</code>
Example	POW:PADJ 100KHz POW:PADJ?
Notes	The value on the key reads out to 0.1 MHz resolution.
Dependencies	<ul style="list-style-type: none"> • Grayed out if microwave preselector is off.) • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0. • Grayed out in the Spectrogram View.
Preset	0 MHz
State Saved	The Presel Adjust value set by Presel Center, or by manually adjusting Presel Adjust, is not saved in instrument state, and does not survive a Preset or power cycle.
Min	-500 MHz
Max	500 MHz
Default Unit	Hz
Backwards Compatibility SCPI	<code>[:SENSe] :POWer [:RF] :MW :PADJust</code> <code>[:SENSe] :POWer [:RF] :MMW :PADJust</code> PSA had multiple preselectors, but the X-Series has only one. These commands simply alias to <code>[:SENSe] :POWer [:RF] :PADJust</code>
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Remote Command	<code>[:SENSe] :POWer [:RF] :PADJust :PRESelector MWAVE MMWave EXTERNAL</code> <code>[:SENSe] :POWer [:RF] :PADJust :PRESelector?</code>
Notes	PSA had multiple preselectors, and you could select which preselector to adjust. Since the X-Series has only one mm/uW preselector, the preselector selection softkey is no longer available. However, to provide backward compatibility, we accept the legacy remote commands. The command form has no effect, the query always returns MWAVE
Initial S/W Revision	Prior to A.02.00

μW Path Control

The μW Path Control functions include the μW Preselector Bypass (Option MPB) and Low Noise Path (Option LNP) controls in the High Band path circuits.

When the μW Preselector is bypassed, the user has better flatness, but will be subject to spurs from out of band interfering signals. When the Low Noise Path is enabled, the analyzer automatically switches around certain circuitry in the high frequency bands which can contribute to noise, when it is appropriate based on other analyzer settings.

For most applications, the preset state is Standard Path, which gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear out in the hardware switches. For applications that utilize the wideband IF paths, the preset state is the μW Preselector Bypass path, if option MPB is present. This is because, when using a wideband IF such as the 140 MHz IF, the μW Preselector's bandwidth can be narrower than the available IF bandwidth, causing degraded amplitude flatness and phase linearity, so it is desirable to bypass the preselector in the default case.

Users may choose Low Noise Path Enable. It gives a lower noise floor, especially in the 21–26.5 GHz region, though without improving many measures of dynamic range, and without giving the best possible noise floor. The preamp, if purchased and used, gives better noise floor than does the Low Noise Path, however its compression threshold and third-order intercept are much poorer than that of the non-preamp Low Noise Path. There are some applications, typically for signals around –30 dBm, for which the third-order dynamic range of the standard path is good enough, but the noise floor is not low enough even with 0 dB input attenuation. When the third-order dynamic range of the preamp path is too little and the noise floor of the standard path is too high, the Low Noise Path can provide the best dynamic range.

Key Path	AMPTD Y Scale
Mode	SA, BASIC, PNOISE, VSA , LTE, LTETDD
Scope	Meas Global
Remote Command	[:SENSe] :POWer [:RF] :MW:PATH STD LNPath MPBypass FULL [:SENSe] :POWer [:RF] :MW:PATH?
Example	:POW:MW:PATH LNP Enables the Low Noise path
Notes	If a Presel Center is performed, the analyzer will momentarily switch to the Standard Path, regardless of the setting of μW Path Control The DC Block will always be switched in when the low noise path is switched in, to protect succeeding circuitry from DC. Note that this does not mean “when the low noise path is enabled” but when, based on the Low Noise Path rules, the path is actually switched in. This can happen when the selection is Low Noise Path Enable . In the case where the DC Block is switched in the analyzer is now AC coupled. However, if the user has selected DC coupling, the UI will still behave as though it were DC coupled, including all annunciation, warnings, status bits, and responses to SCPI queries. This is because, based on other settings, the analyzer could switch out the low noise path at any time and hence go back to being DC coupled. Alignment switching ignores the settings in this menu, and restores them when finished.
Dependencies	Unavailable in BBIQ and External Mixing
Preset	All modes other than IQ Analyzer mode and VXA: STD IQ Analyzer, VXA and WLAN mode:

	MPB option present and licensed: MPB MPB option not present and licensed: STD
State Saved	Save in instrument state
Readback	Value selected in the submenu
Initial S/W Revision	A.04.00
Modified at S/W Revision	A.10.00

Standard Path

This path gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear in the hardware switches, particularly in remote test scenarios where both low band and high band setups will follow in rapid succession.

In this path, the bypass of the low band/high band switch and microwave preamp is never activated, which can cause some noise degradation but preserves the life of the bypass switch.

Key Path	AMPTD Y Scale, μ W Path Control
Example	:POW:MW:PATH STD
Readback Text	Standard Path
Initial S/W Revision	A.04.00

μ W Preselector Bypass

This key toggles the preselector bypass switch for band 1 and higher. When the microwave preselect is on, the signal path is preselected. When the microwave preselector is off, the signal path is not preselected. The preselected path is the normal path for the analyzer.

The preselector is a tunable bandpass filter which prevents signals away from the frequency of interest from combining in the mixer to generate in-band spurious signals (images). The consequences of using a preselector filter are its limited bandwidth, the amplitude and phase ripple in its passband, and any amplitude and phase instability due to center frequency drift.

Option MPB or pre-selector bypass provides an unpreselected input mixer path for certain X-Series signal analyzers with frequency ranges above 3.6 GHz. This signal path allows a wider bandwidth and less amplitude variability, which is an advantage when doing modulation analysis and broadband signal analysis. The disadvantage is that, without the preselector, image signals will be displayed. Another disadvantage of bypassing the preselector is increased LO emission levels at the front panel input port.

Image responses are separated from the real signal by twice the 1st IF. For IF Paths of 10 MHz and 25 MHz, the 1st IF is 322.5 MHz, so the image response and the real signal will be separated by 645 MHz. The 1st IF will be different for other IF Path settings. When viewing a real signal and its corresponding image response in internal mixing, the image response will be to the left of the real signal.

Also, the image response and the real signal typically have the same amplitude and exhibit the same shape factor.

However, if Option FS1, Fast Sweep Capability, is enabled, the image response in the Swept SA measurement will appear lower in amplitude and have a much wider shape factor compared to the real signal.

Key Path	AMPTD Y Scale, μ W Path Control
Example	:POW:MW:PATH MPB
Dependencies	Key is blanked if current mode does not support it. Key is grayed out if mode supports it but current measurement does not support it. Key is blank unless Option MPB is present and licensed. If SCPI command sent when MPB not present, error -241, "Hardware missing; Option not installed" is generated.
Readback Text	μ W Preselector Bypass
Initial S/W Revision	A.04.00

Remote Command	[:SENSe] :POWer [:RF] :MW:PRESelector [:STATe] ON OFF 0 1 [:SENSe] :POWer [:RF] :MW:PRESelector [:STATe] ?
Example	:POW:MW:PRES OFF Bypasses the microwave preselector
Notes	The ON parameter sets the STD path (:POW:MW:PATH STD) The OFF parameter sets path MPB (:POW:MW:PATH MPB)
Preset	ON

Internal Preamp

Accesses a menu of keys that control the internal preamps. Turning on the preamp gives a better noise figure, but a poorer TOI to noise floor dynamic range. You can optimize this setting for your particular measurement.

The instrument takes the preamp gain into account as it sweeps. If you sweep outside of the range of the preamp the instrument will also account for that. The displayed result will always reflect the correct gain.

For some measurements, when the preamp is on and any part of the displayed frequency range is below the lowest frequency for which the preamp has specifications, a warning condition message appears in the status line. For example, for a preamp with a 9 kHz lowest specified frequency: "Preamp: Accy unspc'd below 9 kHz".

Key Path	AMPTD Y Scale
Scope	Meas Global
Remote Command	[:SENSe] :POWer [:RF] :GAIN [:STATe] OFF ON 0 1 [:SENSe] :POWer [:RF] :GAIN [:STATe] ?
Dependencies	Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the key is not shown. The preamp is not available when the electronic/soft attenuator is enabled.

Couplings	<p>The act of connecting the U7227A USB Preamplifier to one of the analyzer's USB ports will cause the Internal Preamp to be switched on. When this happens an informational message will be generated: "Internal Preamp turned on for optimal operation with USB Preamp." Note that if the Internal Preamp was already on, there will be no change to the setting, but if it was Off it will be switched On, to Full Range.</p> <p>Note that this same action occurs when the SA mode is selected while the USB Preamp is connected to one of the analyzer's USB ports, if it is the first time that the SA mode has run since powerup, or if the last time the SA mode was running the USB Preamp was NOT connected.</p> <p>Subsequently disconnecting the USB Preamp from USB does not change the Internal Preamp setting nor restore the previous setting.</p>
Preset	OFF
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.14.00

Key Path	AMPTD Y Scale, Internal Preamp
Scope	Meas Global
Remote Command	<pre>[:SENSe] :POWer [:RF] :GAIN :BAND LOW FULL</pre> <pre>[:SENSe] :POWer [:RF] :GAIN :BAND ?</pre>
Dependencies	<p>Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the key is not shown.</p> <p>If a POW:GAIN:BAND FULL command is sent when a low band preamp is available, the preamp band parameter is to LOW instead of FULL, and an "Option not installed" message is generated.</p>
Preset	LOW
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00

Off

Turns the internal preamp off

Key Path	AMPTD Y Scale, Internal Preamp
Example	:POW:GAIN OFF
Readback	Off
Initial S/W Revision	Prior to A.02.00

Low Band

Sets the internal preamp to use only the low band.

The frequency range of the installed (optional) low-band preamp is displayed in square brackets on the Low Band key label.

Key Path	AMPTD Y Scale, Internal Preamp
Example	:POW:GAIN ON :POW:GAIN:BAND LOW
Readback	Low Band
Initial S/W Revision	Prior to A.02.00

Full Range

Sets the internal preamp to use its full range. The low band (0–3.6 GHz or 0–3GHz, depending on the model) is supplied by the low band preamp and the frequencies above low band are supplied by the high band preamp.

The frequency range of the installed (optional) preamp is displayed in square brackets on the Full Range key label. If the high band option is not installed the Full Range key does not appear.

Key Path	AMPTD Y Scale, Internal Preamp
Example	:POW:GAIN ON :POW:GAIN:BAND FULL
Readback	Full Range
Initial S/W Revision	Prior to A.02.00

Ref Position

Allows you to set the display reference position to 0(Top), 5(Center), or 10(Bottom).

Key Path	AMPTD Y Scale
Mode	GSM
Remote Command	:DISPlay:ORFSpectrum:VIEW[1] 2:WINDow[1]:TRACe:Y[:SCALE]:RPOSition TOP CENTer BOTTom :DISPlay:ORFSpectrum:VIEW[1] 2:WINDow[1]:TRACe:Y[:SCALE]:RPOSition?
Example	DISP:ORFS:VIEW:WIND:TRAC:Y:RPOS TOP DISP:ORFS:VIEW:WIND:TRAC:Y:RPOS?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. SubOpCode: VIEW[1]:WINDow[1]:RF Envelope window VIEW2:WINDow[1]:Spectrum window
Dependencies	Blanked when Meas Method is Multi Offset.
Preset	TOP TOP

State Saved	Saved in instrument state.
Range	Top Ctr Bot
Initial S/W Revision	Prior to A.02.00

Auto Scaling

Allows you to toggle the Auto Scaling function between On and Off.

Key Path	AMPTD Y Scale
Mode	GSM
Remote Command	:DISPlay:ORFSpectrum:VIEW[1] 2:WINDow[1]:TRACe:Y[:SCALe]:COUPLe 0 1 OFF ON :DISPlay:ORFSpectrum:VIEW[1] 2:WINDow[1]:TRACe:Y[:SCALe]:COUPLe?
Example	DISP:ORFS:VIEW:WIND:TRAC:Y:COUP ON DISP:ORFS:VIEW:WIND:TRAC:Y:COUP?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. SubOpCode: VIEW[1]:WINDow[1]: RF Envelope window VIEW2:WINDow[1]: Spectrum window
Dependencies	Blanked when Meas Method is Multi Offset.
Couplings	When Auto Scaling is On, upon pressing the Restart front-panel key, this function automatically determines the scale per division and reference values based on the measurement results. When either "Ref Value" on page 1886 or "Scale/Div" on page 1896 is set manually, this parameter is set to 'Off' automatically.
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

Auto Couple

The Auto Couple feature provides a quick and convenient way to automatically couple multiple instrument settings. This helps ensure accurate measurements and optimum dynamic range. When the Auto Couple feature is activated, either from the front panel or remotely, all parameters of the current measurement that have an Auto/Manual mode are set to Auto mode and all measurement settings dependent on (or coupled to) the Auto/Man parameters are automatically adjusted for optimal performance.

However, the Auto Couple key actions are confined to the current measurement only. It does not affect other measurements in the mode, and it does not affect markers, marker functions, or trace or display attributes.

See "[More Information](#)" on page 1905

Key Path	Front-panel key
Remote Command	:COUPle ALL NONE
Example	:COUP ALL
Notes	:COUPle ALL puts all Auto/Man parameters in Auto mode (equivalent to pressing the Auto Couple key). :COUPLE NONE puts all Auto/Man parameters in manual mode. It decouples all the coupled instrument parameters and is not recommended for making measurements.
Initial S/W Revision	Prior to A.02.00

More Information

There are two types of functions that have Auto/Manual modes.

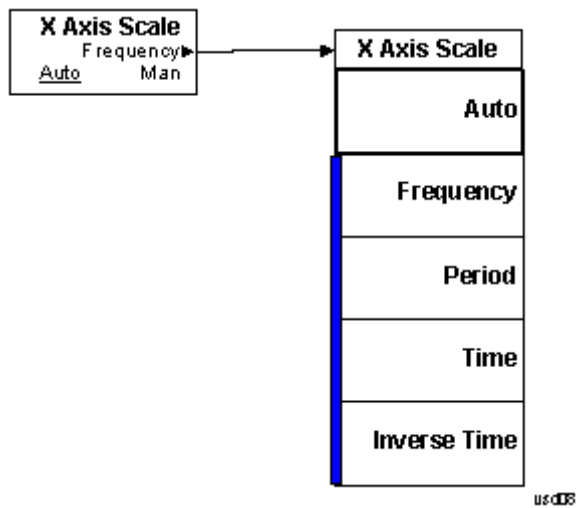
Auto/Man Active Function keys

An Auto/Man toggle key controls the binary state associated with an instrument parameter by toggling between Auto (where the parameter is automatically coupled to the other parameters it is dependent upon) and Man (where the parameter is controlled independent of the other parameters), as well as making the parameter the active function. The current mode is indicated on the softkey with either Auto or Man underlined as illustrated below.



Auto/Man 1-of-N keys

An Auto/Man 1-of-N key allows you to manually pick from a list of parameter values, or place the function in Auto, in which case the value is automatically selected (and indicated) as shown below. If in Auto, Auto is underlined on the calling key. If in manual operation, manual is indicated on the calling key. But the calling key does not actually toggle the function, it simply opens the menu.



BW

There is no 'BW' functionality supported in GSMK Output RF Spectrum so this front-panel key displays a blank menu when pressed.

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Cont (Continuous Measurement/Sweep)

Sets the analyzer for Continuous measurement operation. The single/continuous state is Meas Global so the setting will affect all measurements. If you are Paused, pressing Cont does a Resume.

Key Path	Front-panel key
Remote Command	:INITiate:CONTinuous OFF ON 0 1 :INITiate:CONTinuous?
Example	:INIT:CONT 0 puts analyzer in Single measurement operation. :INIT:CONT 1 puts analyzer in Continuous measurement operation
Preset	ON (Note that SYST:PRESet sets INIT:CONT to ON but *RST sets INIT:CONT to OFF)
State Saved	Saved in instrument state
Backwards Compatibility Notes	For Spectrum Analysis mode in ESA and PSA, there is no Cont hardkey, instead there is a Sweep Single/Cont key. In these analyzers, switching the Sweep Single/Cont key from Single to Cont restarts averages (displayed average count reset to 1), but does not restart Max Hold and Min Hold. The X-Series has Single and Cont keys in place of the SweepSingleCont key. In the X-Series, if in single measurement, the Cont key (and INIT:CONT ON) switches to continuous measurement, but never restarts a measurement and never resets a sweep.
Initial S/W Revision	Prior to A.02.00

In Swept SA Measurement (Spectrum Analysis Mode):

The analyzer takes repetitive sweeps, averages, measurements, etc., when in Continuous mode. When the average count reaches the Average/Hold Number the count stops incrementing, but the analyzer keeps sweeping. See the Trace/Detector section for the averaging formula used both before and after the Average/Hold Number is reached. The trigger condition must be met prior to each sweep. The type of trace processing for multiple sweeps, is set under the Trace/Detector key, with choices of Trace Average, Max Hold, or Min Hold.

In Other Measurements/Modes:

With Avg/Hold Num (in the Meas Setup menu) set to Off or set to On with a value of 1, a sweep is taken after the trigger condition is met; and the analyzer continues to take new sweeps after the current sweep has completed and the trigger condition is again met. However, with Avg/Hold Num set to On with a value >1, multiple sweeps (data acquisitions) are taken for the measurement. The trigger condition must be met prior to each sweep. The sweep is not stopped when the average count k equals the number N set for Avg/Hold Num is reached, but the number k stops incrementing. A measurement average usually applies to all traces, marker results, and numeric results. But sometimes it only applies to the numeric results.

If the analyzer is in Single measurement, pressing the Cont key does not change k and does not cause the sweep to be reset; the only action is to put the analyzer into Continuous measurement operation.

If it is already in continuous sweep:

the INIT:CONT 1 command has no effect

the INIT:CONT 0 command will place the analyzer in Single Sweep but will have no effect on the current sequence until $k = N$, at which point the current sequence will stop and the instrument will go to the idle state.

16 GMSK Output RF Spectrum Measurement
File

File

See "File" on page 320

FREQ/Channel

Accesses a menu of keys that allows you to control the Frequency parameters of the instrument.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

ARFCN

Sets the analyzer to a frequency that corresponds to the ARFCN (Absolute RF Channel Number). Used to enter the channel to be measured for the selected band. If the Center Freq value entered does not exactly correlate with an ARFCN, the softkey label changes to display the closest ARFCN to the selected frequency, along with a > or < symbol indicating whether the frequency is above or below that ARFCN.

Key Path	FREQ Channel
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel:ARFCn RFCHannel <integer></code> <code>[:SENSe] :CHANnel:ARFCn RFCHannel?</code>
Example	CHAN:ARFC 3 CHAN:ARFC?
Notes	This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not available (blank).
Couplings	Coupled with Center Frequency . Setting ARFCN sets Center Freq to the value corresponding to that ARFCN. BMT Freq choice changes this parameter.
Preset	1
State Saved	Saved in instrument state.
Range	Different for each BAND as follows: E-GSM: 0 to 124, and 975 to 1023 P-GSM: 1 to 124 R-GSM: 0 to 124(MS), and 955 to 1023(BTS) DCS1800: 512 to 885 PCS1900: 512 to 810 GSM450: 259 to 293 GSM480: 306 to 340 GSM700: 438 to 516 GSM850: 128 to 251 T-GSM 810: 350 to 425

Min	Different for each BAND as follows: E-GSM: 0(MS), and 975(BTS) P-GSM: 1 R-GSM: 0(MS), and 955(BTS) DCS1800: 512 PCS1900: 512 GSM450: 259 GSM480: 306 GSM700: 438 GSM850: 128 T-GSM 810: 350
Max	Different for each BAND as follows: E-GSM: 124(MS), and 1023(BTS) P-GSM: 124 R-GSM: 124(MS), and 1023(BTS) DCS1800: 885 PCS1900: 810 GSM450: 293 GSM480: 340 GSM700: 516 GSM850: 251 T-GSM 810: 425
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.07.00

Center Freq

Sets the center frequency to be measured for the selected band. It is coupled with ARFCN – setting Center Freq sets ARFCN to the channel corresponding to that frequency.

For more information, see the section ["Center Freq" on page 2269](#).

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

Time Slot

This functionality is the same as that of the corresponding key in the Demod menu. See ["Time Slot" on page 2288](#) for details.

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

Burst Type

This functionality is the same as that of the corresponding key in the Demod menu. See ["Burst Type" on page 2289](#) for details.

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

TSC (Std)

This functionality is the same as that of the corresponding key in the Demod menu. See ["TSC \(Std\)" on page 2291](#) for details.

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

Center Freq

Sets the frequency that corresponds to the horizontal center of the graticule (when frequency Scale Type is set to linear). While adjusting the Center Frequency the Span is held constant, which means that both Start Frequency and Stop Frequency will change.

Pressing Center Freq also sets the frequency entry mode to Center/Span. In Center/Span mode, the center frequency and span values are displayed below the graticule, and the default active function in the Frequency menu is Center Freq.

The center frequency setting is the same for all measurements within a mode, that is, it is Meas Global. Some modes are also able to share a Mode Global center frequency value. If this is the case, the Mode will have a Global Settings key in its Mode Setup menu.

The Center Freq function sets (and queries) the Center Frequency for the currently selected input. If your analyzer has multiple inputs, and you select another input, the Center Freq changes to the value for that input. SCPI commands are available to directly set the Center Freq for a specific input.

Center Freq is remembered as you go from input to input. Thus you can set a Center Freq of 10 GHz with the RF Input selected, change to BBIQ and set a Center Freq of 20 MHz, then switch to External Mixing and set a Center Freq of 60 GHz, and when you go back to the RF Input the Center Freq will go back to 10 GHz; back to BBIQ and it is 20 MHz; back to External Mixing and it is 60 GHz.

See ["RF Center Freq" on page 1916](#)

See [Ext Mix Center Freq](#)

See ["I/Q Center Freq" on page 1918](#)

See ["Center Frequency Presets" on page 1915](#)

Key Path	FREQ Channel
Scope	Meas Global
Remote Command	<code>[:SENSe] :FREQuency:CENTer <freq></code> <code>[:SENSe] :FREQuency:CENTer?</code>
Example	FREQ:CENT 50 MHz FREQ:CENT UP changes the center frequency to 150 MHz if you use FREQ:CENT:STEP 100 MHz to set the center frequency step size to 100 MHz FREQ:CENT?
Notes	This command sets either the RF or I/Q Center Frequency depending on the selected input. For RF input it is equivalent to FREQ:RF:CENT For I/Q input it is equivalent to FREQ:IQ:CENT Preset and Max values are dependent on Hardware Options (5xx) If no terminator (e.g. MHz) is sent the terminator Hz is used. If a terminator with unit other than Frequency is used, an invalid suffix error message is generated.
Dependencies	The Center Frequency can be limited by Start or Stop Freq limits, if the Span is so large that Start or Stop reach their limit.
Couplings	When operating in "swept span", any value of the Center Frequency or Span that is within the frequency range of the analyzer is allowed when the value is being set through the front panel numeric key pad or the SCPI command. The other parameter is forced to a different value if needed, to keep the Start and the Stop Frequencies within the analyzer's frequency range
Preset	Depends on instrument maximum frequency, mode, measurement, and selected input. See "Center Frequency Presets" on page 1915 and "RF Center Freq" on page 1916 and Ext Mix Center Freq and "I/Q Center Freq" on page 1918.
State Saved	Saved in instrument state
Min	Depends on instrument maximum frequency, mode, measurement, and selected input.. See "Center Frequency Presets" on page 1915 and "RF Center Freq" on page 1916 and "I/Q Center Freq" on page 1918.
Max	Depends on instrument maximum frequency, mode, measurement, and selected input.. See "Center Frequency Presets" on page 1915 and "RF Center Freq" on page 1916 and "I/Q Center Freq" on page 1918.
Default Unit	Hz
Status Bits/OPC	Non-overlapped
Dependencies	
Initial S/W Revision	Prior to A.02.00

Center Frequency Presets

The following table provides the Center Frequency Presets for the Spectrum Analyzer mode, and the Max Freq, for the various frequency options:

Freq Option	CF after Mode Preset	Stop Freq after Mode Preset	Max Freq (can't tune above)
503 (all but N9000A)	1.805 GHz	3.6 GHz	3.7 GHz
503 (N9000A)	1.505 GHz	3.0 GHz	3.08 GHz
507 (all but N9000A)	3.505 GHz	7.0 GHz	7.1 GHz
507 (N9000A)	3.755 GHz	7.5 GHz	7.58 GHz
508 (all but N9038A)	1.805 GHz	3.6 GHz	8.5 GHz
508 (N9038A)	4.205 GHz	8.4 GHz	8.5 GHz
513	6.805 GHz	13.6 GHz	13.8 GHz
526 (all but N9000A and N9038A)	13.255 GHz	26.5 GHz	27.0 GHz
526 (N9000A)	13.255 GHz	26.5 GHz	26.55 GHz
526 (N9038A)	1.805 GHz	3.6 GHz	27.0 GHz
532	16.005 GHz	32.0 GHz	32.5 GHz
543	21.505 GHz	43.0 GHz	TBD
544	22.005 GHz	44.0 GHz	44.5 GHz
550	25.005 GHz	50.0 GHz	51 GHz

Input 2:

Model	CF after Mode Preset	Stop Freq after Mode Preset	Max Freq (can't tune above)
N9000A opt C75	0.7505GHz	1.5 GHz	1.58 GHz
N9038A	505 MHz	1 GHz	1.000025 GHz

Tracking Generator Frequency Limits (N9000A only):

Tracking Generator Option	Min Freq (clips to this freq when turn TG on and can't tune below while TG on)	If above this Freq, Stop Freq clipped to this Freq when TG turned on	Max Freq (can't tune above) while TG on
T03	9 kHz	3.0 GHz	3.08 GHz
T06	9 kHz	6.0 GHz	6.05 GHz

The following table shows the Center Frequency Presets for modes other than Spectrum Analyzer:

Mode	CF Preset for RF
WCDMA	1 GHz
WIMAXOFDMA,	1 GHz
BASIC	1 GHz
ADEMOD	1 GHz
VSA	1 GHz
TDSCDMA	1 GHz
PNOISE	1 GHz
LTE	1 GHz
LTETDD	1 GHz
MSR	1 GHz
GSM	935.2 MHz
NFIGURE	1.505 GHz

RF Center Freq

SCPI command for specifying the RF Center Frequency. This command will set the Center Frequency to be used when the RF input is selected, even if the RF input is not the input that is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

Scope	Meas Global
Remote Command	<code>[:SENSe] :FREQuency:RF:CENTer <freq></code> <code>[:SENSe] :FREQuency:RF:CENTer?</code>
Example	FREQ:RF:CENT 30 MHz
Notes	This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode.
Dependencies	If the electronic/soft attenuator is enabled, any attempt to set Center Frequency such that the Stop

	Frequency would be >3.6 GHz fails and results in an advisory message. If the equivalent SCPI command is sent, this same message is generated as part of a “-221, Settings conflict” warning. If Source Mode is set to Tracking, and the Max or Min Center Freq is therefore limited by the limits of the source, a warning message is generated, “Data out of range;clipped to source max/min” if these limits are exceeded. Note that for an external source, these limits can be affected by the settings of Source Numerator, Source Denominator and Power Sweep.
Preset	See table above
State Saved	Saved in instrument state.
Min	-79.999995 MHz, unless Source Mode is set to Tracking, in which case it is limited by the minimum frequency of the Source
Max	See table above. Basically instrument maximum frequency - 5 Hz. Note that, if the Source Mode is set to Tracking, the effective instrument maximum frequency may be limited by the source maximum frequency. If the knob or step keys are being used, also depends on the value of the other three interdependent parameters Span, Start Frequency and Stop Frequency
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Ext Mix Center Freq

SCPI command for specifying the External Mixer Center Frequency. This command will set the Center Frequency to be used when the External Mixer is selected, even if the External Mixer input is not the input which is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

Scope	Meas Global
Remote Command	<code>[:SENSe] :FREQuency:EMIXer:CENTer <freq></code> <code>[:SENSe] :FREQuency:EMIXer:CENTer?</code>
Example	<code>:FREQ:EMIX:CENT 60 GHz</code> <code>:FREQ:EMIX:CENT?</code>
Notes	This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode.
Couplings	When returning to External Mixing after having been switched to one of the other inputs (e.g., RF), you will come back into the settings that you had when you left External Mixing. So you will come back to the band you were in with the Center Frequency that you had. However, Span is not an input-dependent parameter, therefore you will bring the span over from the other input. Therefore, the analyzer comes back with the span from the previous input, limited as necessary by the current mixer setup.
Preset	When a Mode Preset is performed while in External Mixing, the Start frequency of the current Mode is set to the nominal Min Freq of the lowest harmonic range in the Harmonic Table for the current mixer setup. Similarly, the Stop frequency of the current Mode is set to the nominal Max Freq of the highest harmonic range in the Harmonic Table. The Center Freq thus presets to the point arithmetically equidistant from these two frequencies.

	<p>If the current measurement has a limited Span available to it, and cannot achieve the Span shown in the table (Span=Stop Freq – Start Freq), the analyzer uses the maximum Span the measurement allows, and still sets the Center Freq to the midpoint of the Start and Stop Freq values in the Harmonic Table.</p> <p>When Restore Input/Output Defaults is performed, the mixer presets to the 11970A, whose Start and Stop frequencies are 26.5 and 40 GHz respectively. The center of these two frequencies is 33.25 GHz.</p> <p>Therefore, after a Restore Input/Output Defaults, if you go into External Mixing and do a Mode Preset while in the Spectrum Analyzer Mode, the resulting Center Freq is 33.25 GHz.</p>
State Saved	Saved in instrument state.
Min	The minimum frequency in the currently selected mixer band + 5 Hz
Max	The maximum frequency in the currently selected mixer band – 5 Hz If the knob or step keys are being used, also depends on the value of the other three interdependent parameters Span, Start Frequency and Stop Frequency
Initial S/W Revision	A.08.01

I/Q Center Freq

SCPI command for specifying the I/Q Center Frequency. This command will set the Center Frequency to be used when the I/Q input is selected, even if the I/Q input is not the input which is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

Scope	Meas Global
Remote Command	[:SENSe] :FREQuency:IQ:CENTer <freq> [:SENSe] :FREQuency:IQ:CENTer?
Example	FREQ:IQ:CEN: 30 MHz
Notes	This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode.
Preset	0 Hz
State Saved	Saved in instrument state.
Min	-40.049995 MHz
Max	40.049995 MHz
Initial S/W Revision	Prior to A.02.00

BMT Freq

Enables quick selection from a subset of the available ARFCN numbers for the Top, Middle, or Bottom frequency in the selected band.

Key Path	FREQ Channel
----------	--------------

Mode	GSM
Scope	Meas Global
Notes	This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this.
Dependencies	When I/Q Input is selected, this key is not available (blank).
Couplings	BMT choice changes ARFCN and Center Freq. Chosen ARFCN will be displayed on each menu key.
Range	Top Middle Bottom
Initial S/W Revision	Prior to A.02.00

BMT Freq Top

Sets the analyzer to the frequency of the highest ARFCN (Absolute RF Channel Number) of the selected radio band.

Key Path	FREQ Channel, BMT Freq
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :ARFCn RFChannel :TOP
Example	CHAN:ARFC:TOP
Notes	<ol style="list-style-type: none"> 1. This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. 2. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not displayed.
Couplings	Change [:SENSe]:CHANnel:ARFCn RFChannel as follows: E-GSM: 124 P-GSM: 124 R-GSM: 124 DCS 1800: 885 PCS 1900: 810 GSM 450: 293 GSM 480: 340 GSM 700: 516 GSM 850: 251 T-GSM 810: 425 Change BMT ARFCN to BMT FreqTOP. Change [:SENSe]:FREQuency:CENter as follows: E-GSM: 959.800 MHz P-GSM: 959.800 MHz R-GSM: 959.800 MHz

	DCS 1800: 1879.80 MHz
	PCS 1900: 1989.80 MHz
	GSM 450: 467.400 MHz
	GSM 480: 495.800 MHz
	GSM 700: 792.800 MHz
	GSM 850: 893.800 MHz
	T-GSM810: 866.000 MHz

State Saved	No
Initial S/W Revision	Prior to A.02.00

BMT Freq Middle

Sets the analyzer to the frequency of the middle ARFCN (Absolute RF Channel Number) of the selected radio band.

Key Path	FREQ Channel, BMT Freq
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :ARFCn RFCHannel :MIDDLE</code>
Example	CHAN:ARFC:MIDD
Notes	<ol style="list-style-type: none"> 1. This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. 2. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not displayed.
Couplings	Change [:SENSe]:CHANnel:ARFCn RFCHannel as follows: E-GSM: 38 P-GSM: 63 R-GSM: 28 DSC 1800: 699 PCS 1900: 661 GSM 450: 276 GSM 480: 323 GSM 700: 477 GSM 850: 190 T-GSM 810: 388 Change BMT ARFCN to BMT FreqMIDDLE. Change [:SENSe]:FREQuency:CENTer as follows: E-GSM: 942.600 MHz P-GSM: 947.600 MHz R-GSM: 940.600 MHz

	DCS 1800: 1842.60 MHz
	PCS 1900: 1960.00 MHz
	GSM 450: 464.000 MHz
	GSM 480: 492.400 MHz
	GSM 700: 755.000 MHz
	GSM 850: 881.600 MHz
	T-GSM 810: 858.600 MHz

State Saved	No
Initial S/W Revision	Prior to A.02.00

BMT Freq Bottom

Sets the analyzer to the frequency of the lowest ARFCN (Absolute RF Channel Number) of the selected radio band.

Key Path	FREQ Channel, BMT Freq
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel:ARFCn RFChannel:BOTTom
Example	CHAN:ARFC:BOT
Notes	<ol style="list-style-type: none"> 1. This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. 2. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not displayed.
Couplings	Change [:SENSe]:CHANnel:ARFCn RFChannel as follows: E-GSM: 975 P-GSM: 1 R-GSM: 955 DCS 1800: 512 PCS 1900: 512 GSM 450: 259 GSM 480: 306 GSM 700: 438 GSM 850: 128 T-GSM 810: 350 Change BMT ARFCN to BMT FreqBOTTOM. Change [:SENSe]:FREQuency:CENTer as follows: E-GSM: 925.200 MHz P-GSM: 935.200 MHz R-GSM: 921.200 MHz

	DCS 1800: 1805.20 MHz
	PCS 1900: 1930.20 MHz
	GSM 450: 460.600 MHz
	GSM 480: 489.000 MHz
	GSM 700: 747.2 MHz
	GSM 850: 869.200 MHz
	T-GSM 810: 851.000 MHz
State Saved	No
Initial S/W Revision	Prior to A.02.00

Carrier Setup

Allows you to set carrier parameters.

Key Path	FREQ Channel
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Initial S/W Revision	A.06.00
Modified at S/W Revision	A.14.00

Carriers

Defines the number of carriers.

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :COUNT <integer></code> <code>[:SENSe] :CHANnel :CARRier :COUNT?</code>
Example	CHAN:CARR:COUN 3 CHAN:CARR:COUN?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Couplings	This can change when the SCPI command of the Carrier Power Present or the Carrier Interval is sent.
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	16

Initial S/W Revision	A.06.00
Modified at S/W Revision	A.13.00

Reference Carrier

Defines the reference active carrier. The Reference Carrier frequency point is always aligned with the Measurement Global Center Frequency. The minimum value 1 specifies the lowest frequency carrier among the active carriers. The maximum value specifies the highest frequency carrier among the active carriers.

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :RCARrier <integer></code> <code>[:SENSe] :CHANnel :CARRier :RCARrier ?</code>
Example	CHAN:CARR:RCAR 3 CHAN:CARR:RCAR ?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	The maximum value depends on the number of carriers. If you set it to more than the number of carriers, it's clipped to the number of carriers. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Couplings	When you decrease the number of carriers to a value which is less than this value, this is clipped to the value.
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	Number of carriers
Initial S/W Revision	A.06.00

Configure Carriers

Opens a menu of keys that allows you to configure carriers.

Key Path	FREQ Channel, Multi Carrier Setup
Dependencies	This key is grayed out when there is only one carrier. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Initial S/W Revision	A.06.00

Select Carrier

Selects a carrier to configure.

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	The maximum value depends on the number of carriers. This key is only shown when the N9071A–3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned. This parameter is unavailable when there is only one carrier.
Couplings	This value can change when you decrease the number of carriers.
Preset	1
State Saved	No
Min	1
Max	Number of carriers
Initial S/W Revision	A.06.00

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :CARRier :LIST :COUPle OFF ON 0 1, ... [:SENSe] :CHANnel :CARRier :LIST :COUPle ?
Example	CHAN:CARR:LIST:COUP OFF CHAN:CARR:LIST:COUP?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This key is only shown when the N9071A–3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	When Couple is selected, the carrier settings are coupled to carrier #1. Coupled parameters are Carrier Power Present, Carrier Interval. When a setting is changed, the couple is set to Man automatically. Carrier #1 is always set to couple and cannot be changed. Couple/Man selection on the Carrier key is not displayed when selected carrier number is #1.
Preset	ON
State Saved	No
Range	Couple Man
Initial S/W Revision	A.06.00

Carrier Power Present

Specifies whether each of carriers is active or not.

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :LIST :PPResent YES NO, ...</code> <code>[:SENSe] :CHANnel :CARRier :LIST :PPResent ?</code>
Example	CHAN:CARR:LIST:PPR YES CHAN:CARR:LIST:PPR?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode. Missing values are not permitted, therefore if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Dependencies	This parameter is unavailable when there is only one carrier. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	Coupled to the number of carriers. When the SCPI command is sent, the number of carriers will be set to the number of entries in the parameter list.
Preset	YES
State Saved	Saved in instrument state.
Range	Yes No
Initial S/W Revision	A.06.00

Carrier Interval

Specifies the frequency interval between the Carrier #n and #n+1 center frequencies.

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :LIST :INTerval <freq>, ...</code> <code>[:SENSe] :CHANnel :CARRier :LIST :INTerval ?</code>
Example	CHAN:CARR:LIST:INT 600k CHAN:CARR:LIST:INT?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode. The softkey for the last carrier (say, #N) is grayed out.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned. This parameter is unavailable when there is only one carrier.
Couplings	Coupled to the number of carriers. When the SCPI command is sent, the number of carriers will be

	set to the number of entries in the parameter list. Changing Carrier Interval might affect the Span.
Preset	600kHz
State Saved	Saved in instrument state.
Min	400 kHz
Max	100 MHz
Initial S/W Revision	A.06.00
Modified at S/W Revision	A.07.00, A.08.00

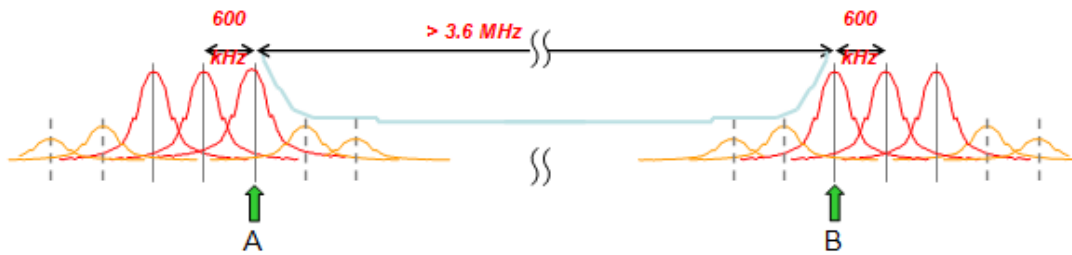
Carrier Frequency Allocation

Specifies the carrier frequency allocation. There are two types of allocation, contiguous and non-contiguous. Non-Contiguous frequency allocation is defined as an allocation where two groups of frequencies are separated with at least [3.6] MHz carrier separation between the innermost carriers. In case of the non-contiguous frequency allocation, tests will be measured between the uppermost carrier A of the lower frequency group and the lowermost carrier B of the upper frequency group.

See ["An example of non-contiguous frequency allocation" on page 1927](#)

Key Path	FREQ Channel, Multi Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :FALLocation</code> CONTiguous NCONTiguous <code>[:SENSe] :CHANnel :CARRier :FALLocation?</code>
Example	CHAN:CARR:FALL NCON CHAN:CARR:FALL?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This menu key is available only when the number of carriers is more than one. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Preset	CONTiguous
State Saved	Saved in instrument state.
Range	Contiguous Non-Contiguous
Readback Text	CONTiguous NCONTiguous
Initial S/W Revision	A.07.00

An example of non-contiguous frequency allocation



Non-Contiguous

Opens a menu of keys that allows you to set non-contiguous frequency allocation parameters.

Key Path	FREQ Channel, Multi Carrier Setup, Carr Freq Alloc
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Initial S/W Revision	A.07.00

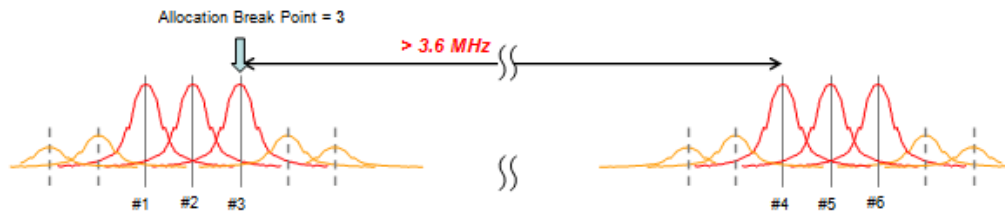
Allocation Break Pt

Specifies an allocation break point that is a sequence (or index) number of the uppermost carrier in the lower frequency group.

See ["An example of allocation break point" on page 1929](#)

Key Path	FREQ Channel, Multi Carrier Setup, Carr Freq Alloc, Non-Contiguous
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe]:CHANnel:CARRier:FALLocation:NCONtiguous:ABPoint <integer></code> <code>[:SENSe]:CHANnel:CARRier:FALLocation:NCONtiguous:ABPoint?</code>
Example	<code>CHAN:CARR:FALL:NCON:ABP 3</code> <code>CHAN:CARR:FALL:NCON:ABP?</code>
Notes	You must be in the GSM mode to use this command. Use <code>INSTRument:SElect</code> to set the mode.
Dependencies	The maximum value depends on the number of carriers. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	This value can change when you decrease the number of carriers.
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	Number of carriers - 1
Initial S/W Revision	A.07.00
Modified at S/W Revision	A.13.00

An example of allocation break point



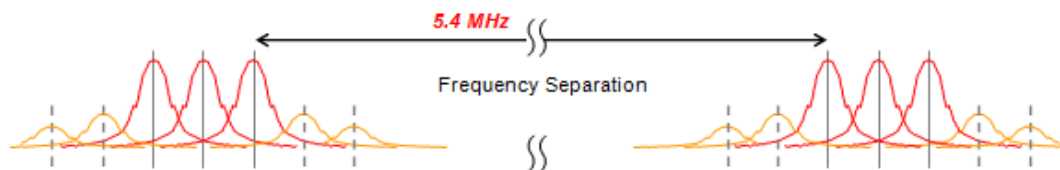
Freq Separation

Specifies frequency separation between the innermost of carriers.

See ["An example of frequency separation" on page 1930](#)

Key Path	FREQ Channel, Multi Carrier Setup, Carr Freq Alloc, Non-Contiguous
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :FALLocation :NCONtiguous :FSEParation <freq></code> <code>[:SENSe] :CHANnel :CARRier :FALLocation :NCONtiguous :FSEParation?</code>
Example	<code>CHAN:CARR:FALL:NCON:FSEP 5.4M</code> <code>CHAN:CARR:FALL:NCON:FSEP?</code>
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	Changing Frequency Separation might affect the Span
Preset	5.4 MHz
State Saved	Saved in instrument state.
Min	3.6 MHz
Max	100 MHz
Initial S/W Revision	A.07.00

An example of frequency separation



Carrier BPF

Selects whether to use the carrier bandpass filter.

Key Path	FREQ Channel, Multi Carrier SetupMode Setup, Demod
Mode	GSM
Remote Command	[:SENSe] :RADio:CARRier:NUMBer:AUTO ON OFF 1 0 [:SENSe] :RADio:CARRier:NUMBer:AUTO?
Example	RAD:CARR:NUMB:AUTO 1 RAD:CARR:NUMB:AUTO?
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	ON automatically changes to OFF when Multiple or Single is selected as Carrier BPF Type.
Preset	ON
State Saved	Saved in instrument state.
Range	Auto Man
Initial S/W Revision	A.06.00

Carrier BPF Type

Opens a menu of keys that allows you to select the type of the bandpass filter. When carriers other than the signal of interest are present, especially if they are strong, they can interfere with the measurement, making it difficult to sync and producing artificially high EVM results. When this condition exists, toggle from Single to Multi. A band-limited filter will help reduce the measurement interference.

BPF Type	Description
MULTiple	Enable multi carrier tolerance filter.
SINGle	Disable multi carrier tolerance filter

This parameter applies only to the following measurements:

- GSMK Phase & Frequency Error measurement
- EDGE EVM measurement
- GSMK Power vs. Time

- EDGE Power vs. Time

Key Path	FREQ Channel, Multi Carrier Setup, Carrier BPFMode Setup, Demod, Carrier BPF
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :RADio :CARRier :NUMBer SINGLE MULTiple</code> <code>[:SENSe] :RADio :CARRier :NUMBer ?</code>
Example	<code>RAD:CARR:NUMB SING</code> <code>RAD:CARR:NUMB ?</code>
Notes	The Carrier Bandpass Filter key is in the Mode Setup menu, but only EDGE EVM and GSM PFER measurements support this feature. In other measurements, this setting is not applicable. You must be in the GSM mode to use this command. Use <code>INSTrument:SElect</code> to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Preset	SINGLE
State Saved	Saved in instrument state.
Range	Single Multi
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

BTS Class

Selects a BTS class.

BTS Class	Definition
MC	Multicarrier BTS is defined as a class of BTS, characterized by the ability to, in addition to single carrier operation, process two or more carriers in common active RF components simultaneously, either in multicarrier transmitter only or, in both multicarrier transmitter and multicarrier receiver.
SC	Single carrier BTS is defined as a class of BTS, characterized by the ability to process one carrier in single carrier BTSs, not belonging to a Multicarrier BTS class.

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Remote Command	<code>[:SENSe] :CHANnel :CARRier :BASE :CLASs :AUTO ON OFF 1 0</code> <code>[:SENSe] :CHANnel :CARRier :BASE :CLASs :AUTO ?</code>
Example	<code>CHAN:CARR:BASE:CLAS:AUTO 1</code> <code>CHAN:CARR:BASE:CLAS:AUTO ?</code>
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.

Couplings	ON automatically changes to OFF when Multicarrier Class (MC) or Single carrier Class (SC) is selected as BTS Class.
Preset	ON
State Saved	Saved in instrument state.
Range	Auto Man
Initial S/W Revision	A.14.00

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :CARRier :BASE :CLASs SC MC [:SENSe] :CHANnel :CARRier :BASE :CLASs ?
Example	CHAN:CARR:BASE:CLAS MC CHAN:CARR:BASE:CLAS?

Notes
 You must be in the GSM mode to use this command.
 Use INSTRument:SElect to set the mode.
 Selection C1 and C2 are supported for backwards compatibility.
 When "C1" or "C2" is passed as SCPI command parameter, the BTS Class Auto is set to ON. As a result, it's converted to "SC" if the number of carriers is one, and otherwise "MC."

Dependencies	This parameter is available when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Preset	SC
State Saved	Saved in instrument state.
Range	Single Carrier Multi Carrier
Initial S/W Revision	A.06.00
Modified at S/W Revision	A.10.01, A14.00

Time Slot

Selects On or Off for slot searching. Generally, this feature is only valid in external and periodic timer trigger source modes that triggers every frame since another trigger source does not have the information that identifies the head of the frame. When Timeslot is set to On, the demodulation measurement is made on the nth timeslot specified by the trigger point + n timeslots, where n is the selected timeslot value 0 to 7.

This functionality is the same as Time Slot under the Freq/Channel menu.

Key Path	Mode Setup, Demod FREQ Channel
Mode	GSM

Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :SLOT <integer> [:SENSe] :CHANnel :SLOT? [:SENSe] :CHANnel :SLOT :AUTO OFF ON 0 1 [:SENSe] :CHANnel :SLOT :AUTO?
Example	CHAN:SLOT 0 CHAN:SLOT? CHAN:SLOT:AUTO OFF CHAN:SLOT:AUTO?
Notes	This functionality does not affect Combined GSM/EDGE measurement. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	0 OFF
State Saved	Saved in instrument state.
Min	0
Max	7
Initial S/W Revision	Prior to A.02.00

Burst Type

Sets the burst type that the analyzer will search for and to which it will synchronize.

This functionality is the same as Burst Type under the FREQ Channel menu.

Key	SCPI	Description
Sync (SCH)	SYNC	Burst length = 142 symbols Extended training sequences for CTS and COMPACT synchronization bursts are not supported.
Access (RACH)	ACCess	Burst length = 88 symbols Alternative training (synchronization) sequence "TS1" and "TS2" are supported only in GSMK Power vs. Time.
Normal - NB (TCH & CCH)	NORMal	Burst length = 142 symbols Softkey label will be changed to 'Normal - NB' form 'Normal'
Higher Symbol Rate - HB (TCH & CCH)	HSRate	Burst length = 169 symbols This selection key is only shown when theN9071A-3FP license is installed.
Mixed (NB/HB for TSC sync)	MIXed	Enables auto detection between Normal (NB) and HSR (HB) TCH & CCH EDGE Burst. This selection key is only shown when theN9071A-3FP license is installed.

Measurement synchronization capability (Burst Sync = Training Seq)

	Sync	Access	Normal		HSR	Mixed
			GMSK	8PSK		
				16QAM		
				32QAM		
				AQPSK		
GMSK Phase & Freq Error measurement	Yes	Yes	Yes	No	N/A	
GMSK Power vs. Time measurement	Yes	Yes	Yes	No	(measures as Normal GMSK when selected)	
GMSK Output RF Spectrum measurement (when Trigger Source is Periodic Timer and Sync Source is Off)	No	No	Yes	No		
EDGE EVM measurement	No	No	No	Yes	Yes	Yes
EDGE Power vs. Time measurement	Yes	Yes	Yes	Yes	Yes	Yes
EDGE Output RF Spectrum measurement (when Trigger Source is Periodic Timer and Sync Source is Off.)	No	No	Yes	Yes	Yes	Yes

Key Path	Mode Setup, Demod FREQ Channel
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :BURSt NORMal SYNC ACCess HSRate MIXed [:SENSe] :CHANnel :BURSt?
Example	CHAN:BURS NORM CHAN:BURS?
Notes	This functionality does not affect the Combined GSM/EDGE measurement. Higher Symbol Rate and Mixed selections are only available when the N9071A-3FP license is installed. Otherwise these menu keys are blank. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Higher Symbol Rate and Mixed selection keys are not shown unless N9071A-3FP is installed. When unlicensed and SCPI is sent, an undefined header error is returned. When "Mixed" is selected, the Burst Sync menu key under the Meas Setup menu will be grayed out and Training Sequence (TSC) will be used for synchronization. The sync algorithm always runs in Training Sequence (TSC) synchronization because the Burst Type can be determined by looking at TSC in the signal. Original selection of Burst Sync will become effective again when the Burst Type selection is changed from "Mixed" to another one.
Preset	NORMal
State Saved	Saved in instrument state.
Range	Sync (SCH) Access (RACH) Normal - NB (TCH & CCH) Higher Symbol Rate - HB (TCH & CCH) Mixed (NB/HB for TSC sync)

Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

TSC (Std)

Allows you to select the Training Sequence Code that determines which burst is to be measured. Applicable only when Burst Sync is set to Training Sequence in the measurement. In the case of AQPSK, this parameter specifies TSC number of VAMOS sub-channel A. TSC of VAMOS sub-channel B is ignored.

This functionality is the same as TSC under the FREQ Channel menu.

This parameter applies only to the following measurements:

- GMSK/EDGE Power vs. Time measurement
- GMSK Phase & Frequency Error measurement
- EDGE EVM measurement

Selection	SCPI	Description
AutoDet	ON 1	The measurement is made on the first burst found to have any one of the valid TSCs in the range of 0 to 7. The measurement may be made on various timeslots if more than one timeslot has one of the 8 valid TSCs.
Man	OFF 0	The measurement is made on the first burst found to have the selected TSC. TSC numbers in the range of 0 to 7 can be selected. The measurement may be made on various timeslots if more than one timeslot has this same TSC.

Key Path	Mode Setup, Demod FREQ Channel
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe]:CHANnel:TSCode <integer> [:SENSe]:CHANnel:TSCode? [:SENSe]:CHANnel:TSCode:AUTO OFF ON 0 1 [:SENSe]:CHANnel:TSCode:AUTO?
Example	CHAN:TSC 3 CHAN:TSC? CHAN:TSC:AUTO 1 CHAN:TSC:AUTO?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. When Sync or Access is selected as Burst Type, this key is grayed out.
Preset	0 ON

16 GMSK Output RF Spectrum Measurement
FREQ/Channel

State Saved	Saved in instrument state.
Min	0
Max	7
Initial S/W Revision	Prior to A.02.00

Input/Output

See ["Input/Output" on page 196](#)

Marker

Accesses a menu that enables you to select, set up and control the markers for the current measurement.

Key Path	Front-panel key
Mode	EDGE/GSM
Initial S/W Revision	Prior to A.02.00

Select Marker

Displays 12 markers available for selection.

Key Path	Marker
Initial S/W Revision	Prior to A.02.00

Marker Type

Sets the marker control mode Normal, Delta, and Off. All interactions and dependencies detailed under the key description are enforced when the remote command is sent.

Key Path	Marker
Mode	GSM
Remote Command	:CALCulate:ORFSpectrum:MARKer[1] 2 ... 12:MODE POSition DELTa OFF :CALCulate:ORFSpectrum:MARKer[1] 2 ... 12:MODE?
Example	CALC:ORFS:MARK:MODE OFF CALC:ORFS:MARK:MODE?
Notes	If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules. At the same time, Marker X Axis Value appears on the Active Function area. Default Active Function: The active function for the selected marker's current control mode. If the current control mode is Off, there is no active function and the active function is turned off. Active Function Display: the marker X axis value entered in the active function area displays the marker value to its full entered precision. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode
Preset	OFF
State Saved	Saved in instrument state.
Range	Normal Delta Off
Initial S/W Revision	Prior to A.02.00

Marker X Axis Value (Remote Command Only)

Sets the marker X Axis value in the current marker X Axis Scale unit. It has no effect if the control mode is Off, but it is the SCPI equivalent of entering an X value if the control mode is Normal, Delta or Fixed.

Mode	GSM
Remote Command	:CALCulate:ORFSpectrum:MARKer[1] 2 ... 12:X <real> :CALCulate:ORFSpectrum:MARKer[1] 2 ... 12:X?
Example	CALC:ORFS:MARK3:X 0 CALC:ORFS:MARK3:X?
Notes	If no suffix is sent it, uses the fundamental units for the current marker X Axis Scale. If a suffix is sent that does not match the current marker X Axis Scale unit, an error "Invalid suffix" is generated. The query returns the marker's absolute X Axis value if the control mode is Normal, or the offset from the marker's reference marker if the control mode is Delta. The query is returned in the fundamental units for the current marker X Axis scale: Hz for Frequency and Inverse Time, seconds for Period and Time. If the marker is Off the response is not a number. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	Max/Min value may be changed by Sweep Time or Frequency Span.
Preset	After a preset, all markers are turned OFF, so Marker X Axis Value query returns a not a number (NAN).
State Saved	No
Min	-9.9E37.
Max	9.9E37
Initial S/W Revision	Prior to A.02.00

Marker X Axis Position (Remote Command Only)

Sets the marker X position in trace points. It has no effect if the control mode is Off, but it is the SCPI equivalent of entering a value if the control mode is Normal or Delta except in trace points rather than X Axis Scale units. The entered value is immediately translated into the current X Axis Scale units for setting the value of the marker.

Mode	GSM
Remote Command	:CALCulate:ORFSpectrum:MARKer[1] 2 ... 12:X:POSition <integer> :CALCulate:ORFSpectrum:MARKer[1] 2 ... 12:X:POSition?
Example	CALC:ORFS:MARK10:X:POS 0 CALC:ORFS:MARK10:X:POS?
Notes	The query returns the marker's absolute X Axis value in trace points if the control mode is Normal, or the offset from the marker's reference marker in trace points if the control mode is Delta. If the marker is Off the response is not a number. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	Max/Min value may be changed by Sweep Time or Frequency Span.
Preset	After a preset, all markers are turned OFF, so Marker X Axis Value query returns a not a number

	(NAN).
State Saved	No
Min	-9.9E37
Max	9.9E37
Initial S/W Revision	Prior to A.02.00

Marker Y Axis Value (Remote Command Only)

Returns the marker Y Axis value in the current marker Y Axis unit.

The “result” of a marker is the value which is displayed on the second line of the Marker Result block. To properly interpret the returned value the remote programmer must also know what the analyzer’s Y-Axis Unit is set to as described below.

A marker can have up to two results, only one of which is displayed or returned on a query, as follows:

- Absolute result: every marker has an absolute result, which, for Normal and Delta markers, is the Y-axis value of the trace point the marker is currently on.

The absolute result is displayed in the result block or returned on a query unless the marker control mode is Delta.

- Relative result: if a marker’s control mode is Delta, the relative result is displayed in the result block or returned on a query. This is the ratio of the Absolute Result of a delta marker to the Absolute Result of its reference marker.

Mode	GSM
Remote Command	:CALCulate:ORFSpectrum:MARKer[1] 2 ... 12:Y?
Example	CALC:ORFS:MARK11:Y?
Notes	The query returns the marker Y-axis result. If the marker is Off, the response is not a Number. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	0
State Saved	No
Backwards Compatibility SCPI	:CALCulate:ORFSpectrum:MARKer[1] 2 ... 4:FUNction:RESult?
Initial S/W Revision	Prior to A.02.00

Properties

Accesses a menu that allows you to set marker properties and to access the marker trace menu.

Key Path	Marker
Initial S/W Revision	Prior to A.02.00

Select Marker

Displays 12 markers available for selection.

Key Path	Marker
Initial S/W Revision	Prior to A.02.00

Relative To

Selects the marker that the selected marker is relative to (its reference marker).

Key Path	Marker, Properties
Mode	GSM
Remote Command	:CALCulate:ORFSpectrum:MARKer [1] 2 ... 12:REFerence <integer> :CALCulate:ORFSpectrum:MARKer [1] 2 ... 12:REFerence?
Example	CALC:ORFS:MARK:REF 5 CALC:ORFS:MARK:REF?
Notes	A marker cannot be relative to itself so that choice is grayed out. If the equivalent SCPI command is sent, an error message is generated as part of a “-221, Settings conflict” . You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode. When queried, a single value is returned (the specified marker number's relative marker).
Preset	2 3 4 5 6 7 8 9 10 11 12 1
State Saved	Saved in instrument state.
Min	1
Max	12
Initial S/W Revision	Prior to A.02.00

Marker Trace

Assigns the specified marker to the designated trace.

Key Path	Marker, Properties
Mode	GSM
Remote Command	:CALCulate:ORFSpectrum:MARKer [1] 2 ... 12:TRACe RFEMod RFESwitching SPEMod LIMMod :CALCulate:ORFSpectrum:MARKer [1] 2 ... 12:TRACe?
Example	CALC:ORFS:MARK:TRACE RFES CALC:ORFS:MARK:TRACE?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Dependencies	RF Envelope Modulation and RF Envelope Switching are available only when Meas Method is Single. Swp Spectrum Modulation and Limit Modulation are available when the Meas Method is Swept.

	Otherwise they are grayed out.
Preset	RFEMod
State Saved	Saved in instrument state.
Range	RF Envelope Modulation RF Envelope Switching Swp Spectrum Modulation Limit Modulation
Initial S/W Revision	Prior to A.02.00

Couple Markers

When this function is true, moving any marker causes an equal X Axis movement of every other marker which is not Off. By “equal X Axis movement” we mean that we preserve the difference between each marker’s X Axis value (in the fundamental x-axis units of the trace that marker is on) and the X Axis value of the marker being moved (in the same fundamental x-axis units).

This may result in markers going off screen.

Key Path	Marker
Mode	GSM
Remote Command	:CALCulate:ORFSpectrum:MARKer:COUPle[:STATE] ON OFF 1 0 :CALCulate:ORFSpectrum:MARKer:COUPle[:STATE]?
Example	CALC:ORFS:MARK:COUP ON CALC:ORFS:MARK:COUP?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

All Markers Off

Turns off all markers.

Key Path	Marker
Mode	GSM
Remote Command	:CALCulate:ORFSpectrum:MARKer:AOFF
Example	CALC:ORFS:MARK:AOFF
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Initial S/W Revision	Prior to A.02.00

Marker Function

There is no functionality for this front-panel key in this measurement. When pressed, this key displays a blank menu.

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Marker To

There is no functionality for this front-panel key in this measurement. When pressed, this key displays a blank menu.

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Meas

The information in this section is common to all measurements. For key and remote command information for a specific measurement, refer to the section that describes the measurement of interest.

Measurements available under the Meas key are specific to the current Mode.

When viewing Help for measurements, note the following:

NOTE

Operation for some keys differs between measurements. The information displayed in Help pertains to the current measurement. To see how a key operates in a different measurement, exit Help (press the Cancel Esc key), select the measurement, then reenter Help (press the Help key) and press that key.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Remote Measurement Functions

This section contains the following topics:

"Measurement Group of Commands" on page 2302

"Current Measurement Query (Remote Command Only)" on page 2304

"Limit Test Current Results (Remote Command Only)" on page 2304

"Data Query (Remote Command Only)" on page 2304

"Calculate/Compress Trace Data Query (Remote Command Only)" on page 2305

"Calculate Peaks of Trace Data (Remote Command Only)" on page 2310

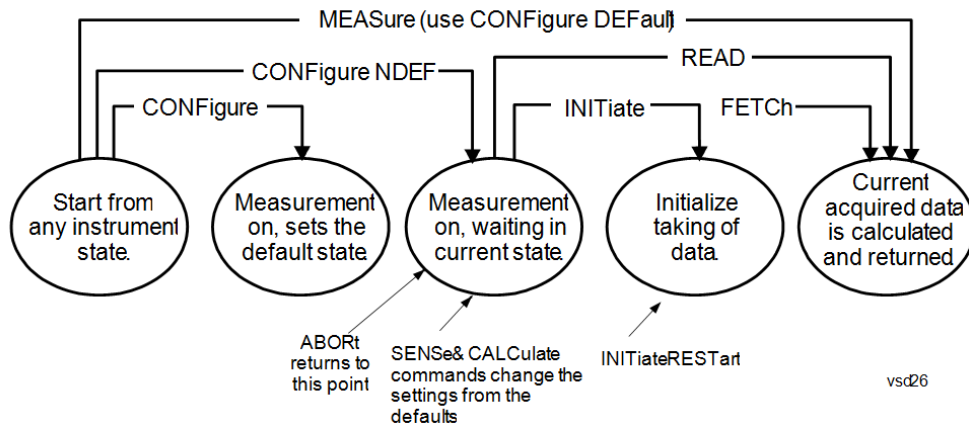
Hardware-Accelerated Fast Power Measurement (Remote Command Only)

"Format Data: Numeric Data (Remote Command Only)" on page 2311

"Format Data: Byte Order (Remote Command Only)" on page 2312

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Measurement Group of Commands



Measure Commands:

:MEASure:<measurement>[n]?

This is a fast single-command way to make a measurement using the factory default instrument settings. These are the settings and units that conform to the Mode Setup settings (e.g. radio standard) that you have currently selected.

- Stops the current measurement (if any) and sets up the instrument for the specified measurement using the factory defaults
- Initiates the data acquisition for the measurement
- Blocks other SCPI communication, waiting until the measurement is complete before returning results.
- If the function does averaging, it is turned on and the number of averages is set to 10.
- After the data is valid it returns the scalar results, or the trace data, for the specified measurement. The type of data returned may be defined by an [n] value that is sent with the command.
- The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available.
- ASCII is the default format for the data output. (Older versions of Spectrum Analysis and Phase Noise mode measurements only use ASCII.) The binary data formats should be used for handling large blocks of data since they are smaller and faster than the ASCII format. Refer to the FORMat:DATA command for more information.

If you need to change some of the measurement parameters from the factory default settings you can set up the measurement with the CONFIgure command. Use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to change the settings. Then you can use the READ? command to initiate the measurement and query the results.

If you need to repeatedly make a given measurement with settings other than the factory defaults, you can use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to set up the measurement. Then use the READ? command to initiate the measurement and query results.

Measurement settings persist if you initiate a different measurement and then return to a previous one. Use READ:<measurement>? if you want to use those persistent settings. If you want to go back to the default settings, use MEASure:<measurement>?.

Configure Commands:

:CONFIgure:<measurement>

This command stops the current measurement (if any) and sets up the instrument for the specified measurement using

the factory default instrument settings. It does not initiate the taking of measurement data unless INIT:CONTinuous is ON. If you change any measurement settings after using the CONFigure command, the READ command can be used to initiate a measurement without changing the settings back to their defaults.

In the Swept SA measurement in Spectrum Analyzer mode the CONFigure command also turns the averaging function on and sets the number of averages to 10 for all measurements.

:CONFigure: <measurement>: NDEFault stops the current measurement and changes to the specified measurement. It does not change the settings to the defaults. It does not initiate the taking of measurement data unless INIT:CONTinuous is ON.

The CONFigure? query returns the current measurement name.

The CONFigure:CATalog? query returns a quoted string of all licensed measurement names in the current mode. For example, "SAN, CHP, OBW, ACP, PST, TXP, SPUR, SEM, LIST".

Fetch Commands:

:FETCh:<measurement>[n]?

This command puts selected data from the most recent measurement into the output buffer. Use FETCh if you have already made a good measurement and you want to return several types of data (different [n] values, for example, both scalars and trace data) from a single measurement. FETCh saves you the time of re-making the measurement. You can only FETCh results from the measurement that is currently active, it will not change to a different measurement. An error message is reported if a measurement other than the current one is specified.

If you need to get new measurement data, use the READ command, which is equivalent to an INITiate followed by a FETCh.

The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used for handling large blocks of data since they are smaller and transfer faster than the ASCII format. (FORMat:DATA)

FETCh may be used to return results other than those specified with the original READ or MEASure command that you sent.

INITiate Commands:

:INITiate:<measurement>

This command is not available for measurements in all the instrument modes:

- Initiates a trigger cycle for the specified measurement, but does not output any data. You must then use the FETCh<meas> command to return data. If a measurement other than the current one is specified, the instrument will switch to that measurement and then initiate it.
 - For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. If you send INIT:ACP? it will change from channel power to ACP and will initiate an ACP measurement.
 - Does not change any of the measurement settings. For example, if you have previously started the ACP measurement and you send INIT:ACP? it will initiate a new ACP measurement using the same instrument settings as the last time ACP was run.
 - If your selected measurement is currently active (in the idle state) it triggers the measurement, assuming the trigger conditions are met. Then it completes one trigger cycle. Depending upon the measurement and the number of averages, there may be multiple data acquisitions, with multiple trigger events, for one full trigger cycle. It also holds off additional commands on GPIB until the acquisition is complete.
-

READ Commands:

:READ:<measurement>[n]?

- Does not preset the measurement to the factory default settings. For example, if you have previously initiated the ACP
-

measurement and you send READ:ACP? it will initiate a new measurement using the same instrument settings.

- Initiates the measurement and puts valid data into the output buffer. If a measurement other than the current one is specified, the instrument will switch to that measurement before it initiates the measurement and returns results.
 - For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. Then you send READ:ACP? It will change from channel power back to ACP and, using the previous ACP settings, will initiate the measurement and return results.
 - Blocks other SCPI communication, waiting until the measurement is complete before returning the results
 - If the optional [n] value is not included, or is set to 1, the scalar measurement results will be returned. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used when handling large blocks of data since they are smaller and faster than the ASCII format. (FORMat:DATA)
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Initial S/W Revision	Prior to A.02.00
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Current Measurement Query (Remote Command Only)

This command returns the name of the measurement that is currently running.

Remote Command	:CONFigure?
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Example	CONF?
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Limit Test Current Results (Remote Command Only)

Queries the status of the current measurement limit testing. It returns a 0 if the measured results pass when compared with the current limits. It returns a 1 if the measured results fail any limit tests.

Remote Command	:CALCulate:CLIMits:FAIL?
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Example	CALC:CLIM:FAIL? queries the current measurement to see if it fails the defined limits. Returns a 0 or 1: 0 it passes, 1 it fails.
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Initial S/W Revision	Prior to A.02.00
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Data Query (Remote Command Only)

Returns the designated measurement data for the currently selected measurement and subopcode.

n = any valid subopcode for the current measurement. See the measurement command results table for your current measurement, for information about what data is returned for the subopcodes.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. (See the format command descriptions under Input/Output in the Analyzer Setup section.)

Remote Command	:CALCulate:DATA[n]?
Notes	The return trace depends on the measurement. In CALCulate:<meas>:DATA[n], n is any valid subopcode for the current measurement. It returns the same data as the FETCH:<measurement>? query where <measurement> is the current measurement.
Initial S/W Revision	Prior to A.02.00

Calculate/Compress Trace Data Query (Remote Command Only)

Returns compressed data for the currently selected measurement and sub-opcode [n].

n = any valid sub-opcode for that measurement. See the MEASure:<measurement>? command description of your specific measurement for information on the data that can be returned.

The data is returned in the current Y Axis Unit of the analyzer. The command is used with a sub-opcode <n> (default=1) to specify the trace. With trace queries, it is best if the analyzer is not sweeping during the query. Therefore, it is generally advisable to be in Single Sweep, or Update=Off.

This command is used to compress or decimate a long trace to extract and return only the desired data. A typical example would be to acquire N frames of GSM data and return the mean power of the first burst in each frame. The command can also be used to identify the best curve fit for the data.

Remote Command	:CALCulate:DATA<n>:COMPRESS? BLOCK CFIT MAXimum MINimum MEAN DMEan RMS RMSCubed SAMPLE SDEVIation PPHase [,<soffset> [,<length>[,<roffset>[,<rlimit>]]]]
Example	To query the mean power of a set of GSM bursts: Supply a signal that is a set of GSM bursts. Select the IQ Waveform measurement (in IQ Analyzer Mode). Set the sweep time to acquire at least one burst. Set the triggers such that acquisition happens at a known position relative to a burst. Then query the mean burst levels using, CALC:DATA2:COMP? MEAN, 24e-6, 526e-6 (These parameter values correspond to GSM signals, where 526e-6 is the length of the burst in the slot and you just want 1 burst.)
Notes	The command supports 5 parameters. Note that the last 4 (<soffset>, <length>, <roffset>, <rlimit>) are optional. But these optional parameters must be entered in the specified order. For example, if you want to specify <length>, then you must also specify <soffset>. See details below for a definition of each of these parameters. This command uses the data in the format specified by FORMat:DATA, returning either binary or ASCII data.
Initial S/W Revision	Prior to A.02.00

- BLOCK or block data - returns all the data points from the region of the trace data that you specify. For example, it could be used to return the data points of an input signal over several timeslots, excluding the portions of the trace data that you do not want. (This is x,y pairs for trace data and I,Q pairs for complex data.)

- CFIT or curve fit - applies curve fitting routines to the data. <soffset> and <length> are required to define the data that you want. <roffset> is an optional parameter for the desired order of the curve equation. The query will return the following values: the x-offset (in seconds) and the curve coefficients ((order + 1) values).

MIN, MAX, MEAN, DME, RMS, RMSC, SAMP, SDEV and PPH return one data value for each specified region (or <length>) of trace data, for as many regions as possible until you run out of trace data (using <roffset> to specify regions). Or they return the number of regions you specify (using <rlimit>) ignoring any data beyond that.

- MINimum - returns the minimum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the minimum magnitude of the I/Q pairs is returned.
- MAXimum - returns the maximum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the maximum magnitude of the I/Q pairs is returned.
- MEAN - returns a single value that is the arithmetic mean of the data point values (in dB/ dBm) for the specified region(s) of trace data. For I/Q trace data, the mean of the magnitudes of the I/Q pairs is returned. See the following equations.

-

NOTE

If the original trace data is in dB, this function returns the arithmetic mean of those log values, not log of the mean power which is a more useful value. The mean of the log is the better measurement technique when measuring CW signals in the presence of noise. The mean of the power, expressed in dB, is useful in power measurements such as Channel Power. To achieve the mean of the power, use the RMS option.

Equation 1

Mean Value of Data Points for Specified Region(s)

$$MEAN = \frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 2

Mean Value of I/Q Data Pairs for Specified Region(s)

$$MEAN = \frac{1}{n} \sum_{X_i \in \text{region}(s)} |X_i|$$

where $|X_i|$ is the magnitude of an I/Q pair, and n is the number of I/Q pairs in the specified region(s).

- DMEan - returns a single value that is the mean power (in dB/ dBm) of the data point values for the specified region(s) of trace data. See the following equation:

Equation 3

DMEan Value of Data Points for Specified Region(s)

$$\text{DME} = 10 \times \log_{10} \left(\frac{1}{n} \sum_{X_i \in \text{region}(s)} 10^{\frac{X_i}{10}} \right)$$

- RMS - returns a single value that is the average power on a root-mean-squared voltage scale (arithmetic rms) of the data point values for the specified region(s) of trace data. See the following equation.

NOTE For I/Q trace data, the rms of the magnitudes of the I/Q pairs is returned. See the following equation. This function is very useful for I/Q trace data. However, if the original trace data is in dB, this function returns the rms of the log values which is not usually needed.

Equation 4

RMS Value of Data Points for Specified Region(s)

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i^2}$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 5

RMS Value of I/Q Data Pairs for Specified Region(s)

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region(s).

Once you have the rms value for a region of trace data (linear or I/Q), you may want to calculate the mean power. You must convert this rms value (peak volts) to power in dBm:

$$10 \times \log[10 \times (\text{rms value})^2]$$

- SAMPLe - returns the first data value (x,y pair) for the specified region(s) of trace data. For I/Q trace data, the first I/Q pair is returned.
- SDEViation - returns a single value that is the arithmetic standard deviation for the data point values for the specified region(s) of trace data. See the following equation.
- For I/Q trace data, the standard deviation of the magnitudes of the I/Q pairs is returned. See the following equation.

Equation 6

Standard Deviation of Data Point Values for Specified Region(s)

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (X_i - \bar{X})^2}$$

where X_i is a data point value, \bar{X} is the arithmetic mean of the data point values for the specified region (s), and n is the number of data points in the specified region(s).

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (|X_i| - \bar{X})^2}$$

where $|X_i|$ is the magnitude of an I/Q pair, \bar{X} is the mean of the magnitudes for the specified region(s), and n is the number of data points in the specified region(s).

- PPHase - returns the x,y pairs of both rms power (dBm) and arithmetic mean phase (radian) for every specified region and frequency offset (Hz). The number of pairs is defined by the specified number of regions. This parameter can be used for I/Q vector ($n=0$) in Waveform (time domain) measurement and all parameters are specified by data point in PPHase.

The rms power of the specified region may be expressed as:

$$\text{Power} = 10 \times \log [10 \times (\text{RMS I/Q value})] + 10.$$

The RMS I/Q value (peak volts) is:

$$\sqrt{\frac{1}{n} \sum_{X_i \in \text{region}} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region.

The arithmetic mean phase of the specified region may be expressed as:

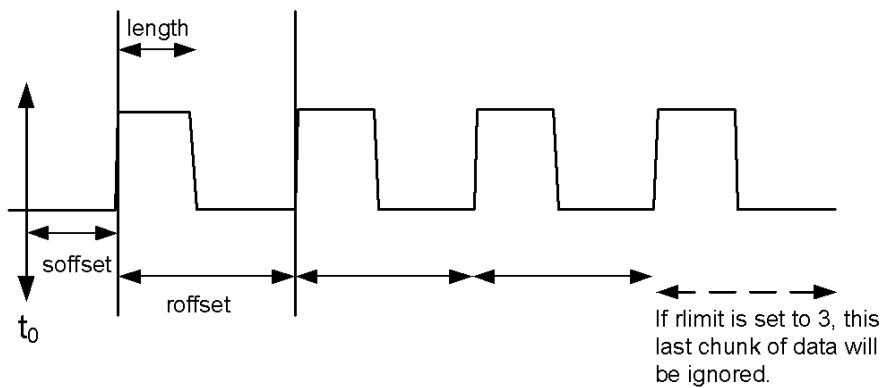
$$\frac{1}{n} \sum_{Y_i \in \text{region}} Y_i$$

where Y_i is the unwrapped phase of I/Q pair with applying frequency correction and n is the number of I/Q pairs in the specified region.

The frequency correction is made by the frequency offset calculated by the arithmetic mean of every specified region's frequency offset. Each frequency offset is calculated by the least square method against the unwrapped phase of I/Q pair.

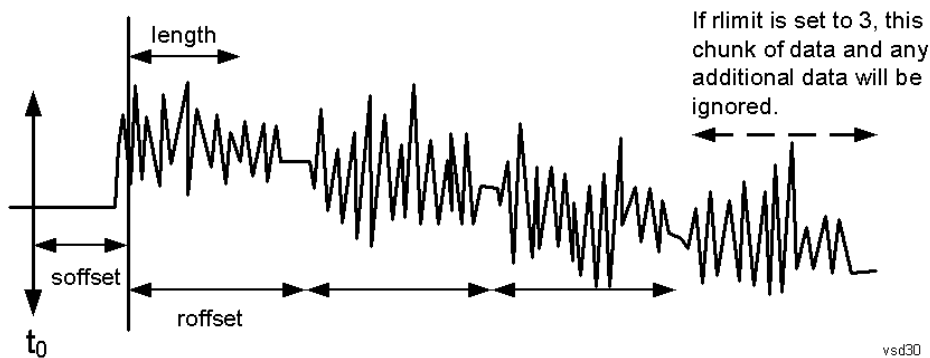
Sample Trace Data - Constant Envelope

(See below for explanation of variables.)



Sample Trace Data - Not Constant Envelope

(See below for explanation of variables.)



<soffset> - start offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It specifies the amount of data at the beginning of the trace that will be ignored before the decimation process starts. It is the time or frequency change from the start of the trace to the point where you want to start using the data. The default value is zero.

<length> - is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines how much data will be compressed into one value. This parameter has a default value equal to the current trace length.

<roffset> - repeat offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines the beginning of the next field of trace elements to be compressed. This is relative to the beginning of the previous field. This parameter has a default value equal to the <length> variable. Note that this parameter is used for a completely different purpose when curve fitting (see CFIT above).

<rlimit> - repeat limit is an optional integer. It specifies the number of data items that you want returned. It will ignore any additional items beyond that number. You can use the Start offset and the Repeat limit to pick out exactly what part of the data you want to use. The default value is all the data.

Calculate Peaks of Trace Data (Remote Command Only)

Returns a list of all the peaks for the currently selected measurement and sub-opcode [n]. The peaks must meet the requirements of the peak threshold and excursion values.

n = any valid sub-opcode for the current measurement. See the MEASure:<measurement> command description of your specific measurement for information on the data that can be returned.

The command can only be used with specific sub-opcodes with measurement results that are trace data. Both real and complex traces can be searched, but complex traces are converted to magnitude in dBm. In many measurements the sub-opcode n=0, is the raw trace data which cannot be searched for peaks. And Sub-opcode n=1, is often calculated results values which also cannot be searched for peaks.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. If the format is set to INT,32, it returns REAL,32 data.

The command has four types of parameters:

- Threshold (in dBm)
- Excursion (in dB)
- Sorting order (amplitude, frequency, time)
- Optional in some measurements: Display line use (all, > display line, < display line)

Remote Command	<p>For Swept SA measurement:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME[,ALL GTDLine LTDLine]]</pre> <p>For most other measurements:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME]</pre>
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Example	<p>Example for Swept SA measurement in Spectrum Analyzer Mode:</p> <p>CALC:DATA4:PEAK? -40, 10, FREQ, GTDL This will identify the peaks of trace 4 that are above -40 dBm, with excursions of at least 10 dB. The peaks are returned in order of increasing frequency, starting with the lowest frequency. Only the peaks that are above the display line are returned.</p> <p>Query Results 1:</p> <p>With FORMat:DATA REAL, 32 selected, it returns a list of floating-point numbers. The first value in the list is the number of peak points that are in the following list. A peak point consists of two values: a peak amplitude followed by its corresponding frequency (or time).</p> <p>If no peaks are found the peak list will consist of only the number of peaks, (0).</p>
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Notes	<p><n> - is the trace that will be used</p> <p><threshold> - is the level below which trace data peaks are ignored. Note that the threshold value is required and is always used as a peak criterion. To effectively disable the threshold criterion for this command, provide a substantially low threshold value such as -200 dBm. Also note that the threshold value used in this command is independent of and has no effect on the threshold value stored under the Peak Criteria menu.</p> <p><excursion> - is the minimum amplitude variation (rise and fall) required for a signal to be identified as peak. Note that the excursion value is required and is always used as a peak criterion. To effectively disable the excursion criterion for this command, provide the minimum value of 0.0 dB. Also note that the excursion value used in this command is independent of and has no effect on the</p>
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excursion value stored under the Peak Criteria menu.

Values must be provided for threshold and excursion. The sorting and display line parameters are optional (defaults are AMPLitude and ALL).

Note that there is always a Y-axis value for the display line, regardless of whether the display line state is on or off. It is the current Y-axis value of the display line which is used by this command to determine whether a peak should be reported

Sorting order:

AMPLitude - lists the peaks in order of descending amplitude, with the highest peak first (default if optional parameter not sent)

FREQUency - lists the peaks in order of occurrence, left to right across the x-axis.

TIME - lists the peaks in order of occurrence, left to right across the x-axis.

Peaks vs. Display Line:

ALL - lists all of the peaks found (default if optional parameter not sent).

GTDLine (greater than display line) - lists all of the peaks found above the display line.

LTDLine (less than display line) - lists all of the peaks found below the display line.

Initial S/W Revision Prior to A.02.00

Format Data: Numeric Data (Remote Command Only)

This command specifies the format of the trace data input and output. It specifies the formats used for trace data during data transfer across any remote port. It affects only the data format for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]?, :CALCulate:DATA[n]? and FETCh:SANalyzer [n]? commands and queries.

Remote Command :FORMat[:TRACe] [:DATA] ASCii|INTeger, 32|REAL, 32 |REAL, 64
:FORMat[:TRACe] [:DATA] ?

Notes The query response is:
ASCii: ASC,8
REAL,32: REAL,32
REAL,64: REAL,64
INTeger,32: INT,32

When the numeric data format is REAL or ASCii, data is output in the current Y Axis unit. When the data format is INTeger, data is output in units of m dBm (.001 dBm).

The INT,32 format returns binary 32-bit integer values in internal units (m dBm), in a definite length block.

Dependencies Sending a data format spec with an invalid number (for example, INT,48) generates no error. The analyzer simply uses the default (8 for ASCii, 32 for INTeger, 32 for REAL).

Sending data to the analyzer which does not conform to the current FORMat specified, results in an error. Sending ASCII data when a definite block is expected generates message -161 "Invalid Block Data" and sending a definite block when ASCII data is expected generates message -121 "Invalid Character in Number".

Preset ASCii

Backwards Compatibility Notes Note that the INT,32 format is only applicable to the command, TRACe:DATA. This preserves backwards compatibility for the Swept SA measurement. For all other commands/queries which honor FORMat:DATA, if INT,32 is sent the analyzer will behave as though it were set to REAL,32.

Initial S/W Revision Prior to A.02.00

The specs for each output type follow:

AScii - Amplitude values are in ASCII, in the current Y Axis Unit, one ASCII character per digit, values separated by commas, each value in the form:

SX.YYYYYEsZZ

Where:

S = sign (+ or -)

X = one digit to left of decimal point

Y = 5 digits to right of decimal point

E = E, exponent header

s = sign of exponent (+ or -)

ZZ = two digit exponent

REAL,32 - Binary 32-bit real values in the current Y Axis Unit, in a definite length block.

REAL,64 - Binary 64-bit real values in the current Y Axis Unit, in a definite length block.

Format Data: Byte Order (Remote Command Only)

This command selects the binary data byte order for data transfer and other queries. It controls whether binary data is transferred in normal or swapped mode. This command affects only the byte order for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]? , :CALCulate:DATA[n]? and FETCh:SANalyzer[n]? commands and queries.

By definition any command that says it uses FORMat:DATA uses any format supported by FORMat:DATA.

The NORMal order is a byte sequence that begins with the most significant byte (MSB) first, and ends with the least significant byte (LSB) last in the sequence: 1|2|3|4. SWAPped order is when the byte sequence begins with the LSB first, and ends with the MSB last in the sequence: 4|3|2|1.

Remote Command	:FORMat:BORDER NORMal SWAPped :FORMat:BORDER?
Preset	NORMal
Initial S/W Revision	Prior to A.02.00

Meas Setup

Displays the measurement setup menu for the currently selected measurement.

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Avg/Hold Num

Specifies the number of data acquisitions that are averaged. After the specified number of average counts, the averaging mode (terminal control) setting determines the averaging action.

- On – Sets measurement averaging on.
- Off – Sets measurement averaging off.

Key Path	Meas Setup
Mode	GSM
Remote Command	[:SENSe]:ORFSpectrum:AVERage:COUNT <integer> [:SENSe]:ORFSpectrum:AVERage:COUNT? [:SENSe]:ORFSpectrum:AVERage[:STATe] OFF ON 0 1 [:SENSe]:ORFSpectrum:AVERage[:STATe]?
Example	ORFS:AVER:COUN 3 ORFS:AVER:COUN? ORFS:AVER ON ORFS:AVER?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Preset	20 ON
State Saved	Saved in instrument state.
Min	1
Max	10000
Initial S/W Revision	Prior to A.02.00

Meas Type

Selects the measurement type.

The Meas Type selection affects the displayed view. For details, see ["View Selection" on page 2059](#).

Key	SCPI	Type
Mod & Switch	MSWitching	Performs both Modulation and Switching measurements.
Modulation	MODulation	Measures the spectrum due to the 0.3 GMSK modulation and noise.
Switching	SWITching	Measures the spectrum due to switching transients (burst ramping).
Full Frame Modulation (FAST)	FFModulation	Improves measurement speed by acquiring a full frame of data prior to performing the FFT calculation. This feature can only be used when all slots in the transmitted frame are active.

Key Path	Meas Setup
Mode	GSM
Remote Command	<code>[:SENSe]:ORFSpectrum:TYPE MODulation MSWitching SWITching FFModulation</code> <code>[:SENSe]:ORFSpectrum:TYPE?</code>
Example	ORFS:TYPE MOD ORFS:TYPE?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. If a grayed out selection is chosen via SCPI command, it is ignored (no error).
Dependencies	When "Meas Method" on page 1963 is set to SWEpt, the "Mod & Switch" and "Full Frame Mod (FAST)" selection keys are grayed out. When "Meas Method" on page 1963 is set to Single Offset, the Full Frame Mod selection key is grayed out.
Preset	MODulation
State Saved	Saved in instrument state.
Range	Mod & Switch Modulation Switching Full FrameMod (FAST)
Initial S/W Revision	Prior to A.02.00

Modulation

Opens a menu of keys that allows you to specify parameters for Modulation.

Key Path	Meas Setup, Meas Type
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

Fast Avg

Allows you to change the On/Off state of fast averaging.

Fast average method shortens the measurement speed of spectrum due to modulation when averaging is On. This method halves the actual number of average and measures 10 ~ 90 % of the useful part of the time slot excluding midamble. When this state is set to Off, 50 ~ 90 % of the useful part of the time slot excluding midamble will be measured and actual average number will be the same as the Avg/Hold Num.

Key Path	Meas Setup, Meas Type, Modulation
Mode	GSM
Remote Command	[:SENSe] :ORFSpectrum:AVERage:FAST [:STATe] OFF ON 0 1 [:SENSe] :ORFSpectrum:AVERage:FAST [:STATe] ?
Example	ORFS:AVER:FAST ON ORFS:AVER:FAST?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This parameter is valid when - Avg/Hold Num is set to more than 2 and the state is On - Meas Type is set to Modulation - Meas Method is set to Multi Offset or Single Offset.
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00, A.06.00

Switching

Opens a menu of keys that allows you to specify parameters for Switching.

Key Path	Meas Setup, Meas Type
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

Fast Peak Det

Allows you to change the On/Off state of fast peak detection.

Fast peak detection method shortens the measurement speed of spectrum due to switching when averaging is On. This method reduces the actual number of average and measures more than 2 slots at one measurement cycle.

Key Path	Meas Setup, Meas Type, Switching
Mode	GSM
Remote Command	[:SENSe] :ORFSpectrum:DETEctor:SWITching:FAST [:STATe] ON OFF 1 0 [:SENSe] :ORFSpectrum:DETEctor:SWITching:FAST [:STATe] ?

Example	ORFS:DET:SWIT:FAST ON ORFS:DET:SWIT:FAST?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This parameter is valid when - Avg/Hold Num is set to more than 2 and the state is On - Meas Type is set to Switching - Meas Method is set to Multi Offset.
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00, A.06.00

Mod Average

Allows you to select the type of averaging method when measuring the spectrum due to modulation.

- Pwr Avg (RMS) - True power averaging that is equivalent to taking the RMS value
- Log-Pwr Avg (Video) - Simulates the traditional spectrum analyzer type of averaging by averaging the log of the power. (This is known as video averaging.)

This parameter determines how to average the results of spectrum due to modulation (Avg/Hold Num).

Key	SCPI	Averaging Operation
Log-Pwr Avg (Video)	LOG	The log of the power is averaged. (This is also known as video averaging.)
Pwr Avg (RMS)	RMS	The power is averaged, providing the rms of the voltage.

Key Path	Meas Setup
Mode	GSM
Remote Command	[:SENSe] :ORFSpectrum:AVERage:MODulation:TYPE LOG RMS [:SENSe] :ORFSpectrum:AVERage:MODulation:TYPE?
Example	ORFS:AVER:MOD:TYPE LOG ORFS:AVER:MOD:TYPE?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This parameter is valid when the Meas Type is set to Modulation or Mod/Switch.
Preset	LOG
State Saved	Saved in instrument state.
Range	Pwr Avg (RMS) Log-Pwr Avg (Video)

Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00, A.06.00

Power Ref Carrier

Opens a menu of keys that allows you to specify parameters for power reference carrier.

Key Path	Meas Setup
Initial S/W Revision	A.06.00

Power Ref Carrier Type

Allows you to select which carrier power should be used as reference when the Mod Ref Pwr Auto or the Switch Ref Pwr Auto is set to true.

Key	SCPI	Type
Ref Carrier	REF	Ref Carrier – Uses the power of the carrier indicated by Ref Carrier as reference.
Max Power Carrier	MAX	Max Power Carrier – Uses the power of the carrier with the highest power as reference.

Key Path	Meas Setup, Power Ref Carrier
Mode	GSM
Remote Command	<code>[:SENSe] :ORFSpectrum:CARRier:PREFereNce:TYPE REF MAX</code> <code>[:SENSe] :ORFSpectrum:CARRier:PREFereNce:TYPE?</code>
Example	<code>ORFS:CARR:PREF:TYPE REF</code> <code>ORFS:CARR:PREF:TYPE?</code>
Notes	You must be in the GSM mode to use this command. Use <code>INSTRument:SElect</code> to set the mode.
Preset	MAX
State Saved	Saved in instrument state.
Range	Ref Carrier Max Power Carrier
Initial S/W Revision	A.06.00

Modulation Reference Power

Allows you to manually set the modulation reference power for each Meas Method.

Key Path	Meas Setup, Power Ref Carrier
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Mode	GSM
Remote Command	[:SENSe]:ORFSpectrum:MODulation:RPOWer <ampl> [:SENSe]:ORFSpectrum:MODulation:RPOWer? [:SENSe]:ORFSpectrum:MODulation:RPOWer:AUTO[:STATe] OFF ON 0 1 [:SENSe]:ORFSpectrum:MODulation:RPOWer:AUTO[:STATe]?
Example	ORFS:MOD:RPOW -20 ORFS:MOD:RPOW? ORFS:MOD:RPOW:AUTO 0 ORFS:MOD:RPOW:AUTO?
Preset	-250 ON
State Saved	Saved in instrument state.
Min	-250
Max	250
Initial S/W Revision	A.02.00
Modified at S/W Revision	A.06.00

Switching Reference Power

Allows you to manually set the switching reference power for each Meas Method.

Key Path	Meas Setup, Power Ref Carrier
Mode	GSM
Remote Command	[:SENSe]:ORFSpectrum:SWITching:RPOWer <ampl> [:SENSe]:ORFSpectrum:SWITching:RPOWer? [:SENSe]:ORFSpectrum:SWITching:RPOWer:AUTO[:STATe] OFF ON 0 1 [:SENSe]:ORFSpectrum:SWITching:RPOWer:AUTO[:STATe]?
Example	ORFS:SWIT:RPOW -20 ORFS:SWIT:RPOW? ORFS:SWIT:RPOW:AUTO 0 ORFS:SWIT:RPOW:AUTO?
Preset	-250 ON
State Saved	Saved in instrument state.
Min	-250
Max	250
Initial S/W Revision	A.02.00
Modified at S/W Revision	A.06.00

Meas Method

Selects the measurement method.

The Meas Method selection affects the displayed view. For details, see ["View Selection" on page 2059](#).

Key	SCPI	Method
Multi-Offset	MULTiple	The measurement is done at all offsets in the offset frequency list.
Single Offset (Examine)	SINGLE	The measurement is done at only one offset as determined by the offset frequency setting. This allows detailed examination of the time-domain waveform at the specified offset frequency.
Swept	SWEPT	The measurement is done in the frequency domain. For output RF spectrum due to modulation it is done using time-gated spectrum analysis to sweep the analyzer with the gate turned on for the desired portion of the burst only.

Key Path	Meas Setup
Mode	GSM
Remote Command	[:SENSe] :ORFSpectrum:MEASure MULTiple SINGLE SWEPT [:SENSe] :ORFSpectrum:MEASure?
Example	ORFS:MEAS SING ORFS:MEAS?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. If a grayed out selection is chosen via a SCPI command, it is ignored (no error). When "Select Modulation Method" is set to DISCcrete, this parameter is forced to MULTiple. When "Select Modulation Method" is set to SWEep and Meas Type is set to Modulation or Switching, this parameter is forced to SWEPT.
Preset	MULTiple
State Saved	Saved in instrument state.
Range	Multi Offset Single Offset (Examine) Swept
Readback Text	Multi Offset: [xxxx] where xxxx is the type of Multi-Offset Freq List: Standard Short Custom. Single Offset: (Examine) [xxxx] where xxxx is the value of the Single Offset Freq. Swept: [WB Noise: xxxx] where xxxx is the state ON/OFF of Wideband Noise.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

Offset Frequency List

Frequency list items for Single Carrier

Accesses a menu to choose the offset frequency list. You can select a Standard, Short, or Custom frequency list as shown in the table below.

List	Modulation Offsets (kHz)	Switching Transients Offsets (kHz)
Standard	100, 200, 250, 400, 600, 800, 1000, 1200, 1400, 1600, 1800, 3000, 6000	400, 600, 1200, 1800
Short	200, 250, 400, 600, 1200, 1800	400, 600, 1200, 1800
Custom	User-defined list that specifies: Offset Freq, RES BW, Limit Offsets, Meas Type, Initialized to be the same as the standard list Mod RBW, SW Trans RBW	400, 600, 1200, 1800

Selects the list of settings that are used to make the ORFS measurement. This specifies standard or customized lists and short lists. The lists contain the offset frequencies (and bandwidths) that are used for the modulation spectrum and transient spectrum parts of the ORFS measurement.

- CUSTom – uses the four user-defined lists that specify:
 - Offset frequencies for modulation spectrum measurement
 - Corresponding resolution bandwidths for each of the modulation offset frequencies
 - Offset frequencies for switching transient spectrum measurement
 - Corresponding resolution bandwidths for each of the switching transient offset frequencies
- SHORt - a shortened list of the offset frequencies specified in the GSM Standards. It uses two internal offset frequency lists, one for modulation spectrum and the other for switching transient spectrum. These offset frequencies cannot be changed, but the resolution bandwidths can be changed by other commands in the :SENSE:ORFSpectrum subsystem.
- STANdard - the complete list of the offset frequencies specified in the GSM Standards, except for those offsets greater than 6 MHz. It uses two internal offset frequency lists, one for modulation spectrum and the other for switching transient spectrum. These offset frequencies cannot be changed, but the resolution bandwidths can be changed by other commands in the :SENSE:ORFSpectrum subsystem.

Frequency list items for Multi Carrier

Allows you to select the type of a frequency list used for Multi Offset for Multi Carrier. You can select a Standard, Short, Custom, or Limited Custom frequency list as shown in the table below.

List	Modulation Offsets (kHz)	Switching Transients Offsets (kHz)
Standard (Non Contiguous and Inner)	400, 600, 1200, 1800, 2000, 2200, 2400, 2600, and offsets that meet the following conditions. (1) The frequency point is between 2600 kHz (exclusive) above the uppermost carrier in lower group and 2600 kHz (exclusive) below the lowermost carrier in upper group. (2) The frequency point corresponds to the center frequency of one of IM products. (3) The number of offsets is less than 15.	400, 600, 1200, 1800
Standard (Except for the above)	400, 600, 1200, 1800, and offsets that meet the following conditions. (1) The frequency point is between 10 MHz below/above the lower/upper edge of operating band and 1.8 MHz (exclusive) below/above the lowermost/uppermost carrier (2) The frequency point corresponds to the center frequency of one of IM products. (3) The number of offsets is less than 15.	400, 600, 1200, 1800
Short	400, 600, 1200, 1800	400, 600, 1200, 1800
Custom	User-defined list that specifies: Offset Freq, RES BW, Limit Offsets, Meas Type, Initialized to be the same as the standard list Mod RBW, SW Trans RBW	400, 600, 1200, 1800
Limited Custom	User-defined list that specifies: Only Offset Freq The following SCPI command is used to specify a list of User-defined offset frequencies. “[:SENSe]:ORFSpectrum:MCARrier:LCUStom:LIST:COFRequency”	400, 600, 1200, 1800

Selects the list of settings that are used to make the ORFSpectrum measurement. This specifies standard or customized lists and short lists. The lists contain the offset frequencies (and bandwidths) that are used for the modulation spectrum and transient spectrum parts of the ORFSpectrum measurement.

- CUSTom – uses the four user-defined lists that specify:
 - Offset frequencies for modulation spectrum measurement
 - Corresponding resolution bandwidths for each of the modulation offset frequencies
 - Offset frequencies for switching transient spectrum measurement
 - Corresponding resolution bandwidths for each of the switching transient offset frequencies
- SHORt - a shortened list of the offset frequencies specified in the GSM Standards. It uses two internal offset frequency lists, one for modulation spectrum and the other for switching transient spectrum.

These offset frequencies cannot be changed, but the resolution bandwidths can be changed by other commands in the SENSE:ORFSpectrum:subsystem.

- STANdard – a list of the offset frequencies specified in the GSM Standard and the offset frequencies that correspond to IM products. It uses two internal offset frequency lists, one for modulation spectrum and the other for switching transient spectrum. These offset frequencies cannot be changed, but the resolution bandwidths can be changed by other commands in the SENSE:ORFSpectrum subsystem.
- LCUSom – a list of user specified offset frequencies. The difference between CUSTom and LCUSom is the user can specify only the offset frequencies in LCUSom. In other words, the user cannot specify resolution bandwidth or limit level for each of the offset frequencies in LCUSom.

Key Path	Meas Setup
Mode	GSM
Remote Command	[:SENSe] :ORFSpectrum:LIST:SElect CUSTom SHORt STANdard LCUSom [:SENSe] :ORFSpectrum:LIST:SElect?
Example	ORFS:LIST:SEL CUST ORFS:LIST:SEL?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	SHORt
State Saved	Saved in instrument state.
Range	Standard Freq List Short Freq List Custom Freq List Limited Custom Freq List
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.14.00

Min Freq Using Direct Time

Selects the transition frequency (the first offset frequency) where the Direct Time Domain method is used instead of the FFT method. The Direct Time Domain offers a high dynamic range and the measurement speed is faster at a few offset frequencies. The FFT method has a moderate dynamic range (generally sufficient when the RBW = 30 kHz) and the measurement speed is much faster at many offset frequencies. The FFT method uses 5-pole sync-tuned filters, as required by the standards, while the Direct Time method does not. The use of 5-pole sync-tuned filters is critical at close-in offsets, such as 250 kHz and lower, because the measurement standards as written usually test the analyzer filter shape instead of the device under test. At 600 kHz offsets and above, the shape of the filters is unimportant, only their noise bandwidth and impulse bandwidth matter. At 400 kHz offset, the shape matters somewhat; therefore, the best agreement between different pieces of measurement equipment requires that the 400 kHz offset be measured with the FFT method.

Key Path	Meas Setup, Meas Method, Multi Offset
Mode	GSM
Remote Command	[:SENSe] :ORFSpectrum:BFRequency <freq> [:SENSe] :ORFSpectrum:BFRequency?
Example	ORFS:BFR 600e3

	ORFS:BFR?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Grayed out unless Meas Method is set to MULTiple and Meas Type is set to MSWitching or MODulation.
Preset	600 kHz
State Saved	Saved in instrument state.
Min	0 kHz
Max	6.2MHz
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00, A.14.00

Single Offset

Opens a menu of keys that allows you to specify parameters for Multi Offset measurement method.

Key Path	Meas Setup, Meas Method
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

Single Offset Freq

Selects a frequency offset from the carrier, at which a single offset Output RF Spectrum measurement is performed.

Key Path	Meas Setup, Meas Method, Single Offset
Mode	GSM
Remote Command	[:SENSe] :ORFSpectrum:OFrequency <freq> [:SENSe] :ORFSpectrum:OFrequency?
Example	ORFS:OFR 250kHz ORFS:OFR?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	250 kHz
State Saved	Saved in instrument state.
Min	-12.0 MHz
Max	+12.0 MHz
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

Ref Pwr Avg

Allows you to specify how many averages you want to execute when measuring the reference power. This parameter is valid when the Meas Method is set to Single. Set to ON to use the same number of averages as specified in the number of bursts averaged command. Set to OFF to use the number specified in the reference power averages command.

Key Path	Meas Setup, Meas Method, Single Offset
Mode	GSM
Remote Command	[:SENSe]:ORFSpectrum:REFerence:AVERage:COUNT <integer> [:SENSe]:ORFSpectrum:REFerence:AVERage:COUNT? [:SENSe]:ORFSpectrum:REFerence:AVERage[:AUTO] ON OFF 1 0 [:SENSe]:ORFSpectrum:REFerence:AVERage[:AUTO]?
Example	ORFS:REF:AVER:COUN 10 ORFS:REF:AVER:COUN? ORFS:REF:AVER OFF ORFS:REF:AVER?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This key is only available when the "Meas Method" on page 1963 is set to Single Offset. Otherwise grayed out.
Preset	10 ON
State Saved	Saved in instrument state.
Range	1 to 1000
Min	1
Max	1000
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00, A.06.00

Swept

Opens a menu of keys that allows you to specify parameters for Swept measurement method.

Key Path	Meas Setup, Meas Method
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

Wideband Noise

Allows you to select whether to use the wideband noise function:

- OFF - the analyzer is tuned to the carrier and the sweep is performed as follows.

- Single Carrier: –1800 kHz to +1800 kHz on either side of the center frequency is swept with the bandwidth of 30 kHz.
- Multi Carrier:
 - Non-Contiguous Inner Mode: –400 kHz to +400 kHz from the center frequency of the lowermost and the uppermost carrier is swept with the bandwidth of 30 kHz.
 - Other: –1800 kHz to +1800 kHz from the center frequency of the lowermost and the uppermost carrier is swept with the resolution bandwidth of 30 kHz.
- ON – the span is extended until 2 MHz (10 MHz for Multi Carrier) outside the edge of the relevant Tx band. For single carrier, the power is measured with the resolution bandwidth of 100 kHz for frequency offsets 1800 kHz up to 2 MHz outside either side of the Tx band. The limit mask is changed accordingly to exclude between –1800 kHz (exclusive) to +1800 kHz (exclusive) on either side of the center frequency. For multi carrier, the power is measured as follows.

For frequency offsets from the center frequency of the uppermost and lowermost active carrier of more than 6 MHz,

- Within a 600 kHz band centered at the center frequencies of the intermodulation components, the power is measured with a measurement bandwidth of 300 kHz.
- For offsets outside the 600 kHz bands around the center frequencies of the intermodulation components, the power is measured with a measurement bandwidth of 100 kHz.

For frequency offsets from the center frequency of the uppermost and lowermost active carrier of 1.8 MHz up to and including 6 MHz, the power is measured with a measurement bandwidth of 100 kHz.

See "[Limit Test Region for the Swept Method](#)" on page 1971 for more details.

Key Path	Meas Setup, Meas Method, Swept
Mode	GSM
Remote Command	<code>[:SENSe] :ORFSpectrum:WBNoise ON OFF 1 0</code> <code>[:SENSe] :ORFSpectrum:WBNoise?</code>
Example	ORFS:WBN ON ORFS:WBN?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00, A.08.00

Custom Offset Frequency List for Limited Custom

Allows you to specify a list of custom offset frequencies for the limited custom list.

Key Path	SCPI only
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Mode	GSM
Remote Command	[:SENSe] :ORFSpectrum:MCARrier:LCUStom:LIST:COFRequency <freq>, ... [:SENSe] :ORFSpectrum:MCARrier:LCUStom:LIST:COFRequency?
Example	ORFS:MCAR:LCUS:LIST:COFR 600e3, 1200e3, 2400e3, 4800e3 ORFS:MCAR:LCUS:LIST:COFR?
Notes	You can specify a maximum of 40 offset frequencies in the modulation measurement. This command is available when all the following conditions are met. <ul style="list-style-type: none"> • The number of carriers is greater than one. • (CHAN:CARR:COUN n, where n > 1) • The state of the test limit exception is set to On. (ORFS:MCAR:LEXC ON). • The type of the multicarrier limit exception rule is set to Custom. (ORFS:MCAR:LEXC:RULE CUST) • The type of a frequency list for multi offset is set to Limited Custom. (ORFS:LIST:SEL LCUS)
Preset	400 kHz, 600 kHz, 1200 kHz, 1800 kHz
State Saved	Saved in instrument state.
Initial S/W Revision	A.14.00

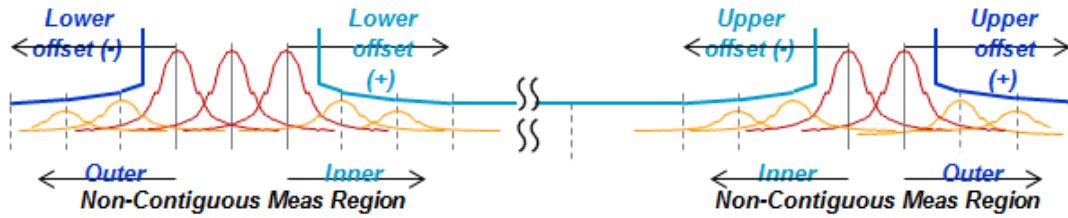
Non-Contiguous Meas Region

Selects the region to measure for the non-contiguous frequency allocation from either inner or outer.

Key Path	Meas Setup
Mode	GSM
Remote Command	[:SENSe] :ORFSpectrum:NCONtiguous:REGion INNer OUTer [:SENSe] :ORFSpectrum:NCONtiguous:REGion?
Example	ORFS:NCON:REG INN ORFS:NCON:REG?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This function is effective only when the number of active carriers is more than one.
Preset	INNer
State Saved	Saved in instrument state.
Range	Inner Outer
Initial S/W Revision	A.07.00

Offset Frequency

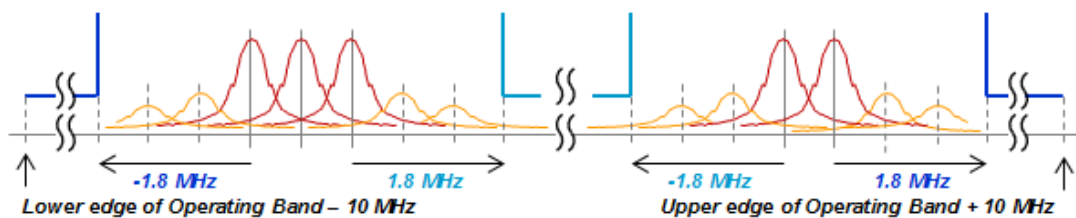
The definition of offset frequency differs depending on the setting of the Non-Contiguous Meas Region. When it is set to Inner, the Lower/Upper offset frequency is defined as frequency offset from the uppermost/lowermost carrier of the lower/upper group, whose value is positive/negative. When it is set to Outer, meanwhile, the Lower/Upper offset frequency is defined as frequency offset from the lowermost/uppermost carrier, whose value is negative/positive. Refer to the following graphic.



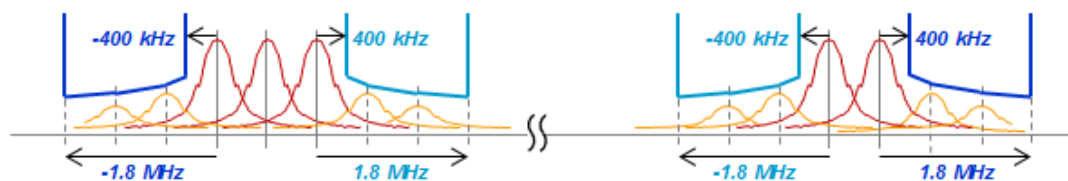
Limit Test Region for the Swept Method

The limit test region for the Swept method differs depending on the settings of both the Non-Contiguous Meas Region and the Wideband Noise.

Wideband Noise	Non-Contiguous Meas Region	Limit Test to be Performed
ON (See "The Limit Test Region for the Wideband Noise ON" on page 1971)	Inner	Frequency offsets between 1.8 MHz (inclusive) above the uppermost carrier in lower group and 1.8 MHz (inclusive) below the lowermost carrier in upper group.
	Outer	Frequency offsets between lower/upper edge of operating band \pm 10 MHz and 1.8 MHz (inclusive) below/above the lowermost/uppermost carrier.
OFF (See "The Limit Test Region for the Wideband Noise OFF" on page 1972)	Inner	Frequency offsets between 400 kHz and 1.8 MHz (exclusive) above/below the uppermost/lowermost carrier in lower/upper group.
	Outer	Frequency offsets between 400 kHz and 1.8 MHz (exclusive) below/above the lowermost/uppermost carrier.



The Limit Test Region for the Wideband Noise ON



The Limit Test Region for the Wideband Noise OFF

Advanced

Accesses advanced features. These features are recommended for use only by advanced users.

Key Path	Meas Setup
Initial S/W Revision	Prior to A.02.00

Modulation Meas BWs

Accesses a menu with the following sections:

- Carrier RBW (for Modulation Meas BWs)
- <1800 kHz Offset RBW (for Modulation Meas BWs)
- >= 1800 kHz Offset RBW (for Modulation Meas BWs)
- >6000 kHz Offset RBW (for Modulation Meas BWs)

This menu key is grayed out when:

"Meas Type" on page 1957 is Switching, or

"Offset Frequency List" on page 1964 is Custom, or

"Meas Method" on page 1963 is Swept.

When Carrier is set to 1, the bottom key (i.e. >6000 kHz Offset RBW) is grayed out.

Key Path	Meas Setup, Advanced
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

Carrier RBW (for Modulation Meas BWs)

Allows you to manually set the bandwidth for measuring the carrier when measuring spectrum due to modulation and wideband noise. When you select Auto, the following bandwidth is used.

Frequency Offset	Frequency Point	Bandwidth
<1.8 MHz	-	30 kHz
1.8 MHz ~ 6 MHz	Within 600 kHz band centered at the center frequency of the intermodulation components	100 kHz
	Outside 600 kHz bands around the center frequency of the intermodulation components	30 kHz
> 6 MHz	Within 600 kHz band centered at the center frequency of the intermodulation components	300 kHz
	Outside 600 kHz bands around the center frequency of the intermodulation components	30 kHz

Key Path	Meas Setup, Advanced, Modulation Meas BWs
Mode	GSM
Remote Command	[:SENSe]:ORFSpectrum:BANDwidth[:RESolution]:MODulation:CARRier <freq> [:SENSe]:ORFSpectrum:BANDwidth[:RESolution]:MODulation:CARRier? [:SENSe]:ORFSpectrum:BANDwidth[:RESolution]:MODulation:CARRier:AUTO OFF ON 0 1 [:SENSe]:ORFSpectrum:BANDwidth[:RESolution]:MODulation:CARRier:AUTO?
Example	ORFS:BAND:MOD:CARR 30e3 ORFS:BAND:MOD:CARR? ORFS:BAND:MOD:CARR:AUTO 0 ORFS:BAND:MOD:CARR:AUTO?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This parameter is only used with the "Offset Frequency List" on page 1964 Standard or Short lists, and not with the Custom list.
Preset	30 kHz ON
State Saved	Saved in instrument state.
Min	1 kHz
Max	5 MHz
Backwards Compatibility SCPI	[:SENSe]:ORFSpectrum:BWIDth[:RESolution]:MODulation:CARRier
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

< 1800 kHz Offset RBW (for Modulation Meas BWs)

Sets the resolution bandwidth used for the spectrum due to modulation part of the ORFS measurement for offset frequencies less than 1800 kHz.

Key Path	Meas Setup, Advanced, Modulation Meas BWs
Mode	GSM
Remote Command	[:SENSe]:ORFSpectrum:BANDwidth[:RESolution]:MODulation:OFFSet:CLOSe <freq> [:SENSe]:ORFSpectrum:BANDwidth[:RESolution]:MODulation:OFFSet:CLOSe?
Example	ORFS:BAND:MOD:OFFS:CLOS 30kHz ORFS:BAND:MOD:OFFS:CLOS?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This parameter is only used with the "Offset Frequency List" on page 1964 Standard or Short lists, and not with the Custom list.

Preset	30 kHz
State Saved	Saved in instrument state.
Min	1 kHz
Max	5 MHz
Backwards Compatibility SCPI	<code>[:SENSe] :ORFSpectrum :BWIDth [:RESolution] :MODulation :OFFSet :CLOSe</code>
Initial S/W Revision	Prior to A.02.00

≥ 1800 kHz Offset RBW (for Modulation Meas BWs)

Sets the resolution bandwidth used for the spectrum due to modulation part of the ORFS measurement for offset frequencies greater than or equal to 1800 kHz.

Key Path	Meas Setup, Advanced, Modulation Meas BWs
Mode	GSM
Remote Command	<code>[:SENSe] :ORFSpectrum :BANDwidth [:RESolution] :MODulation :OFFSet :FAR <freq></code> <code>[:SENSe] :ORFSpectrum :BANDwidth [:RESolution] :MODulation :OFFSet :FAR?</code>
Example	ORFS:BAND:RES:MOD:OFFS:FAR 30kHz ORFS:BAND:RES:MOD:OFFS:FAR?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This parameter is only used with the "Offset Frequency List" on page 1964 Standard or Short lists, and not with the Custom list.
Preset	100 kHz
State Saved	Saved in instrument state.
Min	1 kHz
Max	5 MHz
Backwards Compatibility SCPI	<code>[:SENSe] :ORFSpectrum :BWIDth [:RESolution] :MODulation :OFFSet :FAR</code>
Initial S/W Revision	Prior to A.02.00

> 6000 kHz IM Offset RBW (for Modulation Meas BWs)

Allows you to specify the resolution bandwidth used for the spectrum due to modulation part of the ORFS measurement for IM offset frequencies greater than 6 MHz.

Key Path	Meas Setup, Advanced, Modulation Meas BWs
Mode	GSM
Remote Command	<code>[:SENSe] :ORFSpectrum :BANDwidth [:RESolution] :MODulation :OFFSet :IM :FAR2 <freq></code>

	<code>[:SENSe] :ORFSpectrum :BANDwidth [:RESolution] :MODulation :OFFSet :IM :FAR2 ?</code>
Example	ORFS:BAND:RES:MOD:OFFS:IM:FAR2 300 kHz ORFS:BAND:RES:MOD:OFFS:IM:FAR2?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Dependencies	This parameter is only used with the "Offset Frequency List" on page 1964 Standard or Short lists, and not with the Custom list. If there is only one carrier, this key will be grayed out.
Preset	300 kHz
State Saved	Saved in instrument state.
Min	1 kHz
Max	5 MHz
Initial S/W Revision	A.06.00

Switching Meas BWs

Accesses a menu with the following sections:

- Carrier RBW (for Modulation Meas BWs)
- < 1800 kHz Offset RBW (for Modulation Meas BWs)
- ≥ 1800 kHz Offset RBW (for Modulation Meas BWs)
- VBW:3dB RBW (for Switching Meas BWs) – information only. Bandwidth ratio is fixed at 3.

This menu key is grayed out when "Meas Type" on page 1957 is Modulation or Full Frame Mod, or when "Offset Frequency List" on page 1964 is Custom.

Key Path	Meas Setup, Advanced
Initial S/W Revision	Prior to A.02.00

Carrier RBW (for Switching Meas BWs)

Sets the resolution bandwidth for the carrier when measuring spectrum due to switching transients.

Key Path	Meas Setup, Advanced, Switching Meas BWs
Mode	GSM
Remote Command	<code>[:SENSe] :ORFSpectrum :BANDwidth [:RESolution] :SWITching :CARRier <freq></code> <code>[:SENSe] :ORFSpectrum :BANDwidth [:RESolution] :SWITching :CARRier ?</code>
Example	ORFS:BAND:SWIT:CARR 30e3 ORFS:BAND:SWIT:CARR?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Dependencies	This parameter is only used with the "Offset Frequency List" on page 1964 Standard or Short lists, and not with the Custom list.

Preset	300 kHz
State Saved	Saved in instrument state.
Min	1 kHz
Max	5 MHz
Backwards Compatibility SCPI	<code>[:SENSe] :ORFSpectrum :BWIDth [:RESolution] :SWITching :CARRier</code>
Initial S/W Revision	Prior to A.02.00

< 1800 kHz Offset RBW (for Switching Meas BWs)

Sets the resolution bandwidth used for the spectrum due to switching transients part of the ORFS measurement for offset frequencies less than 1800 kHz.

Key Path	Meas Setup, Advanced, Switching Meas BWs
Mode	GSM
Remote Command	<code>[:SENSe] :ORFSpectrum :BANDwidth [:RESolution] :SWITching :OFFSet :CLOSe <freq></code> <code>[:SENSe] :ORFSpectrum :BANDwidth [:RESolution] :SWITching :OFFSet :CLOSe?</code>
Example	<code>ORFS:BAND:RES:SWIT:OFFS:CLOS 30kHz</code> <code>ORFS:BAND:RES:SWIT:OFFS:CLOS?</code>
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This parameter is only used with the "Offset Frequency List" on page 1964 Standard or Short lists, and not with the Custom list.
Preset	30 kHz
State Saved	Saved in instrument state.
Min	1 kHz
Max	5 MHz
Backwards Compatibility SCPI	<code>[:SENSe] :ORFSpectrum :BWIDth [:RESolution] :SWITching :OFFSet :CLOSe</code>
Initial S/W Revision	Prior to A.02.00

≥1800 kHz Offset RBW (for Switching Meas BWs)

Sets the resolution bandwidth used for the spectrum due to switching transient part of the ORFS measurement for offset frequencies greater than or equal to 1800 kHz.

Key Path	Meas Setup, Advanced, Switching Meas BWs
Mode	GSM
Remote Command	<code>[:SENSe] :ORFSpectrum :BANDwidth [:RESolution] :SWITching :OFFSet :FAR <freq></code> <code>[:SENSe] :ORFSpectrum :BANDwidth [:RESolution] :SWITching :OFFSet :FAR?</code>

Example	ORFS:BAND:RES:SWIT:OFFS:FAR 30e3 ORFS:BAND:RES:SWIT:OFFS:FAR?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This parameter is only used with the "Offset Frequency List" on page 1964 Standard or Short lists, and not with the Custom list.
Preset	30 kHz
State Saved	Saved in instrument state.
Min	1 kHz
Max	5 MHz
Backwards Compatibility SCPI	[:SENSe] :ORFSpectrum:BWIDth [:RESolution] :SWITching:OFFSet:FAR
Initial S/W Revision	Prior to A.02.00

Modulation Custom Offs & Lim

This menu key is available only when the parameters below are set to the following values at the same time. Otherwise it is grayed out.

- Meas Type: Mod & Switch|Modulation|Full Frame Mod
- Meas Method: Multi Offset
- Multi-Offset Freq List: Custom

Key Path	Meas Setup, Advanced
Initial S/W Revision	Prior to A.02.00

Offset

Selects the offset pairs (upper and lower) that affect the menu keys and displays the memory selection menu from A to O. The memory selection menu allows you to store up to 5 sets of parameter values for the offset pairs, such as Offset Freq, Res BW, Rel Limit Level Offset, Abs Limit Level Offset and Apply Level Offset. Press Offset until the letter selection at a time is shown on this menu key label.

Key Path	Meas Setup, Advanced
Initial S/W Revision	Prior to A.02.00

Offset Freq

This parameter defines a custom set of states that defines whether or not the measurement is made on each defined offset frequency. Note that offset frequencies need to be arranged in ascending order from left to right. Otherwise, the analyzer cannot perform measurements properly.

Key	SCPI	Description
On	ON 1	The measurement is made on the corresponding frequency in Custom Modulation Offset Freq list.
Off	OFF 0	The measurement is skipped for the corresponding frequency in Custom Modulation Offset Freq list.

Key Path	Meas Setup, Advanced, Modulation Custom Offset & Limits
Mode	GSM
Remote Command	<pre>[:SENSe]:ORFSpectrum:LIST:MODulation[:FREQuency] <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq> [:SENSe]:ORFSpectrum:LIST:MODulation[:FREQuency]? [:SENSe]:ORFSpectrum:LIST:MODulation:STATe OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1 [:SENSe]:ORFSpectrum:LIST:MODulation:STATe?</pre>
Example	<pre>ORFS:LIST:MOD:FREQ 0.0, 1.0e5, 2.0e5 ORFS:LIST:MOD:FREQ? ORFS:LIST:MOD:STAT ON, ON, ON ORFS:LIST:MOD:STAT?</pre>
Notes	<p>Offset frequencies need to be arranged in ascending order from left to right. Otherwise, the analyzer cannot perform measurements properly.</p> <p>You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.</p>
Preset	<pre>0.0, 1.0e5, 2.0e5, 2.5e5, 4.0e5, 6.0e5, 8.0e5, 1.0e6, 1.2e6, 1.4e6, 1.6e6, 1.8e6, 3.0e6, 6.0e6, 0.0 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1</pre>
State Saved	Saved in instrument state.
Min	0.0 Hz
Max	12.0 MHz
Initial S/W Revision	Prior to A.02.00

Res BW

Defines the custom set of resolution bandwidths for the modulation spectrum part of the ORFS measurement. The first bandwidth specified is for the carrier. Each resolution bandwidth in this list corresponds to an offset frequency in the modulation offset frequency list. The number of items in each of these lists must be the same.

Key Path	Meas Setup, Advanced, Modulation Custom Offset & Limits
Remote Command	[:SENSe]:ORFSpectrum:LIST:MODulation:BANDwidth <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq> [:SENSe]:ORFSpectrum:LIST:MODulation:BANDwidth?
Example	ORFS:LIST:MOD:BAND 10e3,10e3,10e3 ORFS:LIST:MOD:BAND?
Notes	You must be in the GSM, EDGE mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This command is only valid when SENS:ORFS:MEAS is set to multiple and the custom list type is selected with :SENS:ORFS:LISE:SEL CUST.
Preset	3.000000000E+04, 3.000000000E+04, 3.000000000E+04, 3.000000000E+04, 3.000000000E+04, 3.000000000E+04, 3.000000000E+04, 3.000000000E+04, 3.000000000E+04, 3.000000000E+04, 3.000000000E+04, 1.000000000E+05, 1.000000000E+05, 1.000000000E+05, 1.000000000E+05
State Saved	Saved in instrument state.
Min	1 kHz
Max	5 MHz
Backwards Compatibility SCPI	[:SENSe]:ORFSpectrum:LIST:MODulation:BWIDth
Initial S/W Revision	Prior to A.02.00

Rel Limit Level Offset

Defines the custom set of level offsets for the modulation spectrum part of the ORFS measurement. This allows you to modify the standard limits by adding a delta amplitude value to them. The first level offset specified must be 0 dB for the carrier. Each level offset in this list corresponds to an offset frequency in the modulation offset frequency list. The number of items in each of these lists must be the same.

Key Path	Meas Setup, Advanced, Modulation Custom Offset & Limits
Mode	GSM
Remote Command	[:SENSe]:ORFSpectrum:LIST:MODulation:LOFFset[:RCARrier] <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl> [:SENSe]:ORFSpectrum:LIST:MODulation:LOFFset[:RCARrier]?
Example	ORFS:LIST:MOD:LOFF:RCAR 0.0, -2.0, -5.0 ORFS:LIST:MOD:LOFF:RCAR?
Notes	The first element of the parameters must be zero. Otherwise, the Custom freq list is not used, but Standard freq list is used instead. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	0

State Saved	Saved in instrument state.
Min	-200.0
Max	200.0
Initial S/W Revision	Prior to A.02.00

Abs Limit Level Offset

This parameter defines a custom set of absolute limit level offsets for the modulation spectrum part of the ORFS measurement. It allows you to modify the standard-defined test limits by adding/subtracting a delta amplitude value to/from them. The single set of the offsets applies all the cases in terms of all the DUT types and power level classes. It takes an array of float64 numbers. Each element represents absolute level offsets at corresponding Custom Modulation Offset Freq.

Key Path	Meas Setup, Advanced, Modulation Custom Offset & Limits
Mode	GSM
Remote Command	[:SENSe]:ORFSpectrum:LIST:MODulation:LOFFset:ABSolute <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl> [:SENSe]:ORFSpectrum:LIST:MODulation:LOFFset:ABSolute?
Example	ORFS:LIST:MOD:LOFF:ABS 0.0, -2.0, -5.0 ORFS:LIST:MOD:LOFF:ABS?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	0
State Saved	Saved in instrument state.
Min	-200.0
Max	200.0
Initial S/W Revision	Prior to A.02.00

Apply Level Offset

Key	SCPI	Option
Rel	RELative	Only Custom Modulation Relative Limit Level Offsets are applied to standard-defined modulation relative test limit. Standard-defined modulation relative test limit does not change. More relaxed test limit between the resulting relative test limit and the resulting absolute test limit is then used for the pass/fail judgment.
Both	BOTH	Custom Modulation Relative Limit Level Offsets are applied to standard-defined modulation relative test limit. And, Custom Modulation Absolute Limit Level Offsets are applied to standard-defined modulation absolute test limit.

Offset

Selects the offset pairs (upper and lower) that affect the menu keys and displays the memory selection menu from A to O. The memory selection menu allows you to store up to 5 sets of parameter values for the offset pairs, such as Offset Freq, Res BW, Rel Limit Level Offset, Abs Limit Level Offset and Apply Level Offset. Press Offset until the letter selection at a time is shown on this menu key label.

Key Path	Meas Setup, Advanced
Initial S/W Revision	Prior to A.02.00

Offset Freq

Defines the custom set of offset frequencies at which the switching transient spectrum part of the ORFS measurement is made.

The first offset specified must be 0 Hz, for the carrier. For each offset frequency specified, the power is measured at both the lower and upper offsets. Up to 14 offset frequencies, plus the 0 Hz carrier frequency, may be defined.

For the BAF SCPI command:

Key	SCPI	Description
On	ON 1	The measurement is made on the corresponding frequency in Custom Switching Offset Freq list.
Off	OFF 0	The measurement is skipped for the corresponding frequency in Custom Switching Offset Freq list.

Key Path	Meas Setup, Advanced, Switching Custom Offsets & Limits
Mode	GSM
Remote Command	<pre>[:SENSe]:ORFSpectrum:LIST:SWITching[:FREQuency] <freq>, <freq>, <freq>, <freq>,<freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq> [:SENSe]:ORFSpectrum:LIST:SWITching[:FREQuency]? [:SENSe]:ORFSpectrum:LIST:SWITching:STATe OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1 [:SENSe]:ORFSpectrum:LIST:SWITching:STATe?</pre>
Example	<pre>ORFS:LIST:SWIT:FREQ 0.0, 1.0e5, 2.0e5 ORFS:LIST:SWIT:FREQ? ORFS:LIST:SWIT:STAT ON, ON, ON ORFS:LIST:SWIT:STAT?</pre>
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	0.0, 4.0e5, 6.0e5, 1.2e6, 1.8e6, 0, 0, 0, 0, 0, 0, 0, 0, 0

	1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1
State Saved	Saved in instrument state.
Min	0.0 Hz
Max	12.0 MHz
Initial S/W Revision	Prior to A.02.00

Res BW

Defines the custom set of resolution bandwidths for the switching transient spectrum part of the ORFS measurement. The first bandwidth specified is for the carrier. Each resolution bandwidth in this list corresponds to an offset frequency in the switching offset frequency list. The number of items in each of these lists must be the same.

Key Path	Meas Setup, Advanced, Switching Custom Offsets & Limits
Remote Command	[:SENSe]:ORFSpectrum:LIST:SWITching:BANDwidth <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq> [:SENSe]:ORFSpectrum:LIST:SWITching:BANDwidth?
Example	ORFS:LIST:SWIT:BAND 1e3,1e3,1e3,1e3 ORFS:LIST:SWIT:BAND?
Notes	You must be in the GSM, EDGE mode to use this command. Use INSTRument:SElect to set the mode. This command is only valid if :SENS:ORFS:MEAS is set to multiple and the custom list type is selected with :SENS:ORFS:LISE:SEL CUST.
Preset	3.000000000E+05, 3.000000000E+04, 3.000000000E+04, 3.000000000E+04, 3.000000000E+04, 3.000000000E+04, 3.000000000E+04, 3.000000000E+04, 3.000000000E+04, 3.000000000E+04, 3.000000000E+04, 3.000000000E+04, 3.000000000E+04, 3.000000000E+04, 3.000000000E+04
State Saved	Saved in instrument state.
Min	1 kHz
Max	5 MHz
Backwards Compatibility SCPI	[:SENSe]:ORFSpectrum:LIST:SWITching:BWIDth
Initial S/W Revision	Prior to A.02.00

Rel Limit Level Offset

Defines the custom set of level offsets for the switching transient spectrum part of the ORFS measurement. This allows you to modify the standard limits by adding a delta amplitude value to them. The first level offset specified must be 0 dB for the carrier. Each level offset in this list corresponds to an offset frequency in the modulation offset frequency list. The number of items in each of these lists must be the same.

Key Path	Meas Setup, Advanced, Switching Custom Offsets & Limits
Mode	GSM
Remote Command	<code>[:SENSe] :ORFSpectrum:LIST:SWITching:LOFFset[:RCARrier] <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl></code> <code>[:SENSe] :ORFSpectrum:LIST:SWITching:LOFFset[:RCARrier] ?</code>
Example	<code>ORFS:LIST:SWIT:LOFF:RCAR 0.0, -2.0, -5.0</code> <code>ORFS:LIST:SWIT:LOFF:RCAR?</code>
Notes	The first element of the parameters must be zero. Otherwise, the Custom freq list is not used, but Standard freq list is used instead. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	0
State Saved	Saved in instrument state.
Min	-200.0
Max	200.0
Initial S/W Revision	Prior to A.02.00

Abs Limit Level Offset

This parameter defines a custom set of absolute limit level offsets for the Switching spectrum part of the ORFS measurement. It allows you to modify the standard-defined test limits by adding/subtracting a delta amplitude value to/from them. The single set of the offsets applies all the cases in terms of all the DUT types and power level classes. It takes an array of float64 numbers. Each element represents absolute level offsets at corresponding Custom Switching Offset Freq.

Key Path	Meas Setup, Advanced, Switching Custom Offsets & Limits
Mode	GSM
Remote Command	<code>[:SENSe] :ORFSpectrum:LIST:SWITching:LOFFset:ABSolute <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl></code> <code>[:SENSe] :ORFSpectrum:LIST:SWITching:LOFFset:ABSolute?</code>
Example	<code>ORFS:LIST:SWIT:LOFF:ABS 0.0, -2.0, -5.0</code> <code>ORFS:LIST:SWIT:LOFF:ABS?</code>
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	0
State Saved	Saved in instrument state.
Min	-200.0
Max	200.0
Initial S/W Revision	Prior to A.02.00

Apply Level Offset

Key	SCPI	Description
Rel	RELative	<p>Only Custom Switching Relative Limit Level Offsets are applied to standard-defined switching relative test limit.</p> <p>Standard-defined switching relative test limit does not change.</p> <p>More relaxed test limit between the resulting relative test limit and the resulting absolute test limit is then used for the pass/fail judgment.</p>
Both	BOTH	<p>Custom Switching Relative Limit Level Offsets are applied to standard-defined switching relative test limit.</p> <p>And, Custom Switching Absolute Limit Level Offsets are applied to standard-defined switching absolute test limit.</p> <p>More relaxed test limit between the resulting relative test limit and the resulting absolute test limit is then used for the pass/fail judgment.</p>
Abs	ABSolute	<p>Only Custom Switching Absolute Limit Level Offsets are applied to standard-defined switching absolute test limit.</p> <p>Standard-defined switching absolute test limit does not change.</p> <p>More relaxed test limit between the resulting relative test limit and the resulting absolute test limit is then used for the pass/fail judgment.</p>

Key Path	Meas Setup, Advanced, Switching Custom Offsets & Limits
Mode	GSM
Remote Command	<pre>[:SENSe]:ORFSpectrum:LIST:SWITching:APPLy RELative BOTH ABSolute, RELative BOTH ABSolute, RELative BOTH ABSolute, RELative BOTH ABSolute, RELative BOTH ABSolute, RELative BOTH ABSolute, RELative BOTH ABSolute, RELative BOTH ABSolute, RELative BOTH ABSolute, RELative BOTH ABSolute, RELative BOTH ABSolute, RELative BOTH ABSolute, RELative BOTH ABSolute, RELative BOTH ABSolute, RELative BOTH ABSolute</pre> <pre>[:SENSe]:ORFSpectrum:LIST:SWITching:APPLy?</pre>
Example	<pre>ORFS:LIST:SWIT:APPL REL, REL, REL ORFS:LIST:SWIT:APPL?</pre>
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SELEct to set the mode.
Preset	BOTH, BOTH, BOTH, BOTH, BOTH, BOTH, BOTH, BOTH, BOTH, BOTH, BOTH, BOTH, BOTH, BOTH, BOTH
State Saved	Saved in instrument state.
Range	Rel Both Abs
Initial S/W Revision	Prior to A.02.00

Offset

Selects the offset pairs (upper and lower) that affect the menu keys and displays the memory selection menu from A to O. The memory selection menu allows you to store up to 5 sets of parameter values for the

offset pairs, such as Offset Freq, Res BW, Rel Limit Level Offset, Abs Limit Level Offset and Apply Level Offset. Press Offset until the letter selection at a time is shown on this menu key label.

Key Path	Meas Setup, Advanced
Initial S/W Revision	Prior to A.02.00

IM Product Order

Sets the highest order of the intermodulation products to be considered in the measurement. It must be an integer between 3 and 7.

Key Path	Meas Setup, Advanced
Mode	GSM
Remote Command	[:SENSe] :ORFSpectrum:IMPorder <integer> [:SENSe] :ORFSpectrum:IMPorder?
Example	ORFS:IMP 5 ORFS:IMP?
Notes	When an even value (i.e. 4) is entered, it's replaced with the maximum odd value that doesn't exceed the even value. If you recall 7, the previously saved value, it will be clipped to 5.
Preset	5
State Saved	Saved in instrument state.
Min	3
Max	5
Initial S/W Revision	A.07.00
Modified at S/W Revision	A.13.00

Multi Carrier Limit Exception

Accesses the menu to set Limit Exception parameters.

Key Path	Meas Setup
Readback	[On, Currently selected Exception Rule] [Off, ---]
Initial S/W Revision	A.14.00

Multi Carrier Limit Exception State

Selects whether to apply the Multi Carrier Limit Exception.

Key Path	Meas Setup, Advanced, Limit Exception
Mode	GSM

Remote Command	<code>[:SENSe] :ORFSpectrum:MCARrier:LEXception[:STATe] OFF ON 0 1</code> <code>[:SENSe] :ORFSpectrum:MCARrier:LEXception[:STATe] ?</code>
Example	ORFS:MCAR:LEXC ON ORFS:MCAR:LEXC?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. If set to ON, the exception is applied.
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	A.10.01
Modified at S/W Revision	A.14.00

Multi Carrier Limit Exception Rule

Selects the Multicarrier Limit Exception Rule. The Rules are listed below.

FIXed: The exception bands (200 kHz block) are automatically allocated.

CUSTom: Allows you to allocate the exception bands (200 kHz block) manually.

Key Path	Meas Setup, Advanced, Limit Exception
Mode	GSM
Remote Command	<code>[:SENSe] :ORFSpectrum:MCARrier:LEXception:RULE FIXed CUSTom</code> <code>[:SENSe] :ORFSpectrum:MCARrier:LEXception:RULE ?</code>
Example	ORFS:MCAR:LEXC:RULE CUST ORFS:MCAR:LEXC:RULE?
Preset	FIXed
State Saved	Saved in instrument state.
Range	Fixed Custom
Initial S/W Revision	A.14.00

Multi Carrier Limit Exception Frequency Band List

Specifies a list of center frequencies for the Multicarrier Limit Exception bands.

Key Path	SCPI only
Mode	GSM
Remote Command	<code>[:SENSe] :ORFSpectrum:MCARrier:LEXception:LIST:FREQuency <freq>, ...</code> <code>[:SENSe] :ORFSpectrum:MCARrier:LEXception:LIST:FREQuency ?</code>
Example	ORFS:MCAR:LEXC:LIST:FREQ -600e3, 600e3

ORFS:MCAR:LEXC:LIST:FREQ?	
Notes	<p>You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.</p> <p>Each given frequency is determined as the center frequency of 200kHz block of an exception band when ORFS:MCAR:LEXC is set to "ON" and "ORFS:MCAR:LEXC:RULE" is set to "CUSTom".</p> <p>In the following 3 cases, the warning message "Setting conflict" is issued in the error queue.</p> <ul style="list-style-type: none"> -Case 1: where the number of the given list items exceeds the specified value (i.e. $18+3*(N-1)$ or up to 40), whichever the lowest, where N is the number of active multi carriers. -Case 2: where the given frequency coincides with the center frequency of 3rd order IM products of any combination of two or three active carriers and corresponding adjacent channels (+/-200 kHz). -Case 3: where the given frequency is beyond either edge of the specified operating band +/-10MHz margin.
Preset	0
State Saved	Saved in instrument state
Initial S/W Revision	A.14.00

Phase Noise Optimization

Selects the type of the LO (local oscillator) phase noise optimization.

Key Path	Meas Setup, Advanced
Mode	GSM
Remote Command	[:SENSe]:ORFSpectrum:FREQuency:SYNTHeSis[:STATe] 2 3 [:SENSe]:ORFSpectrum:FREQuency:SYNTHeSis[:STATe]?
Example	ORFS:FREQ:SYNT 2 ORFS:FREQ:SYNT?
Notes	<p>Parameter:</p> <ul style="list-style-type: none"> 2: optimizes phase noise for wide frequency offsets from the carrier. 3: optimizes LO for tuning speed
Preset	Models with option EP2: 3 Other: 2
State Saved	Saved in instrument state.
Range	Best Wide-Offset Φ Noise Fast Tuning
Min	2
Max	3
Initial S/W Revision	A.10.01
Modified at S/W Revision	A.13.00

Band Extension for Multicarrier

Sets the band extension for multicarrier. The band extension is symmetrically applied on both sides of the relevant transmit band.

Key Path	Meas Setup, Advanced
Mode	GSM
Remote Command	<code>[:SENSe] :ORFSpectrum:MCARrier:BEXTension <freq></code> <code>[:SENSe] :ORFSpectrum:MCARrier:BEXTension?</code>
Example	ORFS:MCAR:BEXT 12e6 ORFS:MCAR:BEXT?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Preset	10 MHz
State Saved	Saved in instrument state.
Min	100 kHz
Max	50 MHz
Initial S/W Revision	A.10.00

Meas Preset

Restores all the measurement parameters to their default values.

Key Path	Meas Setup
Mode	GSM
Remote Command	<code>:CONFigure:ORFSpectrum</code>
Example	CONF:ORFS
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Initial S/W Revision	Prior to A.02.00

Select Modulation Method (Backwards Compatibility/Remote Command Only)

Mode	GSM
Remote Command	<code>[:SENSe] :ORFSpectrum:TYPE:MODulation[:METHod] DIScrete SWEep</code> <code>[:SENSe] :ORFSpectrum:TYPE:MODulation[:METHod]?</code>
Example	ORFS:TYPE:MOD SWE ORFS:TYPE:MOD?
Notes	The legacy parameter <code>[:SENSe] :ORFSpectrum:TYPE:MODulation[:METHod] DIScrete SWEep</code> is aliased to the new command <code>[:SENSe] :ORFSpectrum:MEASure MULTiple SWEPT</code> . When Meas Method is set to MULTiple, this parameter is forced to DIScrete. When Meas Method is set to SWEPT, this parameter is forced to SWEep.

	When this parameter is set to DISCcrete, Meas Method is forced to MULTiple. When this parameter is set to SWEep and Meas Type is set to MODulation or SWITching., Meas Method is forced to SWEPT
Dependencies	This parameter is available only when Meas Type is set to MODulation or SWITching.
Couplings	Coupled with Meas Type and Meas Method. See Notes.
Preset	DISC
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Mode

See "Mode" on page 274

Mode Preset

Returns the active mode to a known state.

Mode Preset does the following for the currently active mode:

- Aborts the currently running measurement.
- Brings up the default menu for the mode, with no active function.
- Sets measurement Global settings to their preset values for the active mode only.
- Activates the default measurement.
- Brings up the default menu for the mode.
- Clears the input and output buffers.
- Sets Status Byte to 0.

Mode Preset does not:

- Cause a mode switch
- Affect mode persistent settings
- Affect system settings

See "[How-To Preset](#)" on page 1993 for more information.

Key Path	Front-panel key
Remote Command	:SYSTem:PRESet
Example	:SYST:PRES
Notes	*RST is preferred over :SYST:PRES for remote operation. *RST does a Mode Preset, as done by the :SYST:PRES command, and it sets the measurement mode to Single measurement rather than Continuous for optimal remote control throughput. Clears all pending OPC bits. The Status Byte is set to 0.
Couplings	A Mode Preset aborts the currently running measurement, activates the default measurement, and gets the mode to a consistent state with all of the default couplings set.
Backwards Compatibility Notes	In the X-Series, the legacy "Factory Preset" has been replaced with Mode Preset, which only presets the currently active mode, not the entire instrument. In the X-Series, the way to preset the entire instrument is by using System, Restore System Defaults All, which behaves essentially the same way as restore System Defaults does on ESA and PSA. There is also no "Preset Type" as there is on the PSA. There is a green Mode Preset front-panel key that does a Mode Preset and a white-with-green-letters User Preset front-panel key that does a User Preset. The old PRESet:TYPE command is ignored (without generating an error), and SYST:PRES without a parameter does a Mode Preset, which should cover most backward code compatibility issues. The settings and correction data under the Input/Output front-panel key (examples: Input Z Corr, Ext Amp Gain, etc.) are no longer part of any Mode, so they will not be preset by a Mode Preset. They are preset using Restore Input/Output Defaults, Restore System Defaults All. Note that because User Preset does a Recall State, and all of these settings are saved in State, they ARE recalled when using

	User Preset.
Initial S/W Revision	Prior to A.02.00

How-To Preset

The table below shows all possible presets, their corresponding SCPI commands and front-panel access (key paths). Instrument settings depend on the current measurement context. Some settings are local to the current measurement, some are global (common) across all the measurements in the current mode, and some are global to all the available modes. In a similar way, restoring the settings to their preset state can be done within the different contexts.

Auto Couple - is a measurement local key. It sets all Auto/Man parameter couplings in the measurement to Auto. Any Auto/Man selection that is local to other measurements in the mode will not be affected.

Meas Preset - is a measurement local key. Meas Preset resets all the variables local to the current measurement except the persistent ones.

Mode Preset - resets all the current mode's measurement local and measurement global variables except the persistent ones.

Restore Mode Defaults - resets ALL the Mode variables (and all the Meas global and Meas local variables), including the persistent ones.

Type Of Preset	SCPI Command	Front Panel Access
Auto Couple	:COUPlE ALL	Auto Couple front-panel key
Meas Preset	:CONFIgure:<Measurement>	Meas Setup Menu
Mode Preset	:SYSTem:PRESet	Mode Preset (green key)
Restore Mode Defaults	:INSTrument:DEFault	Mode Setup Menu
Restore All Mode Defaults	:SYSTem:DEFault MODEs	System Menu; Restore System Default Menu
*RST	*RST	not possible (Mode Preset with Single)
Restore Input/Output Defaults	:SYSTem:DEFault INPut	System Menu; Restore System Default Menu
Restore Power On Defaults	:SYSTem:DEFault PON	System Menu; Restore System Default Menu
Restore Alignment Defaults	:SYSTem:DEFault ALIGn	System Menu; Restore System Default Menu
Restore Miscellaneous Defaults	:SYSTem:DEFault MISC	System Menu; Restore System Default Menu
Restore All System Defaults	:SYSTem:DEFault [ALL] :SYSTem:PRESet:PERSistent	System Menu; Restore System Default Menu
User Preset	:SYSTem:PRESet:USER	User Preset Menu
User Preset All Modes	:SYSTem:PRESet:USER:ALL	User Preset Menu

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Mode Preset

Power On Mode Preset	:SYSTem:PON:TYPE MODE	System Menu
Power On User Preset	:SYSTem:PON:TYPE USER	System Menu
Power On Last State	:SYSTem:PON:TYPE LAST	System Menu

Mode Setup

See ["Mode Setup" on page 294](#)

Peak Search

Pressing Peak Search front-panel key performs a peak search and opens this Peak Search menu. Peak Search places the selected marker on the trace point with the maximum y-axis value for that marker's trace

Key Path	Front-panel key
Mode	GSM
Remote Command	:CALCulate:ORFSpectrum:MARKer[1] 2 ... 12:MAXimum
Example	CALC:ORFS:MARK2:MAX
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Initial S/W Revision	Prior to A.02.00

Min Peak Search (Backwards Compatibility/Remote Command Only)

Mode	GSM
Remote Command	:CALCulate:ORFSpectrum:MARKer[1] 2 ... 12:MINimum
Example	CALC:ORFS:MARK:MIN
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Initial S/W Revision	Prior to A.02.00

Print

See "Print" on page 325

Quick Save

The Quick Save front-panel key repeats the most recent save that was performed from the Save menu, with the following exceptions:

- Register saves are not remembered as Saves for the purpose of the Quick Save function
- If the current measurement does not support the last non-register save that was performed, an informational message is generated, “File type not supported for this measurement”

Quick Save repeats the last type of qualified save (that is, a save qualified by the above criteria) in the last save directory by creating a unique filename using the Auto File Naming algorithm described below.

If Quick Save is pressed after startup and before any qualified Save has been performed, the Quick Save function performs a Screen Image save using the current settings for Screen Image saves (current theme, current directory), which then becomes the “last save” for the purpose of subsequent Quick Saves.

The Auto File Naming feature automatically generates a file name for use when saving a file. The filename consists of a prefix and suffix separated by a dot, as is standard for the Windows® file system. A default prefix exists for each of the available file types:

Type	Default Prefix	Menu
State	State_	(Save/Recall)
Trace + State	State_	(Save/Recall)
Screen	Screen_	(Save/Recall)
Amplitude Corrections	Ampcor_	(Import/Export)
Traces	Trace_	(Import/Export)
Limit Lines	LLine_	(Import/Export)
Measurement Result	MeasR_	(Import/Export)
Capture Buffer	CapBuf_	(Import/Export)

A four digit number is appended to the prefix to create a unique file name. The numbering sequence starts at 0000 within each Mode for each file type and updates incrementally to 9999, then wraps to 0000 again. It remembers where it was through a Mode Preset and when leaving and returning to the Mode. It is reset by Restore Misc Defaults and Restore System Defaults and subsequent running of the instrument application. So, for example, the first auto file name generated for State files is State_0000.state. The next is State_0001, and so forth.

One of the key features of Auto File Name is that we guarantee that the Auto File Name will never conflict with an existing file. The algorithm looks for the next available number. If it gets to 9999, then it looks for holes. If it find no holes, that is no more numbers are available, it gives an error.

For example, if when we get to State_0010.state there is already a State_0010.state file in the current directory, it advances the counter to State_0011.state to ensure that no conflict will exist (and then it verifies that State_0011.state also does not exist in the current directory and advances again if it does, and so forth).

If you enter a file name for a given file type, then the prefix becomes the filename you entered instead of the default prefix, followed by an underscore. The last four letters (the suffix) are the 4-digit number.

For example, if you save a measurement results file as “fred.csv”, then the next auto file name chosen for a measurement results save will be fred_0000.csv.

NOTE Although 0000 is used in the example above, the number that is used is actually the current number in the Meas Results sequence, that is, the number that would have been used if you had not entered your own file name.

NOTE If the filename you entered ends with _dddd, where d=any number, making it look just like an auto file name, then the next auto file name picks up where you left off with the suffix being dddd + 1.

Key Path	Front-panel key
Notes	No remote command for this key specifically.
Initial S/W Revision	Prior to A.02.00

Recall

The Recall menu lets you choose what you want to recall, and where you want to recall it from. Among the types of files you can recall are **States and Traces**. In addition, an Import (Data) option lets you recall a number of data types stored in CSV files (as used by Excel and other spreadsheet programs).

The default paths for Recall are data type dependent and are the same as for the Save key.

Key Path	Front-panel key
Notes	<p>No remote command for this key specifically, but the :MMEM:LOAD command is available for specific file types. An example is :MMEM:LOAD:STATE <filename>.</p> <p>If you try to recall a State file for a mode that is not licensed or not available in the instrument, an error message will occur and the state will not change.</p>
Backwards Compatibility Notes	<p>In legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly (since User Preset is actually loading a state), it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, "state" always includes all of this data; so whenever state is loaded, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p>
Backwards Compatibility Notes	<p>Recall for the X-Series supports backward compatibility in the sense that you can recall a state file from any X-Series model number and any version of X-Series software. This is only possible if part of the recalling process goes through a limiting step after recalling the mode settings, at least for settings that may vary with version number, model number, option and license differences. If you try to recall a state file onto an instrument with less capability than what was available on the instrument during the save, the recall will ignore the state it doesn't support and it will limit the recalled setting to what it allows.</p> <p>Example: if the saved state includes preamp ON, but the recalling instrument does not have a preamp; the preamp is limited to OFF. Conversely, if you save a state without a preamp, the preamp is OFF in the state file. When this saved file is recalled on an instrument with a licensed preamp, the preamp is changed to OFF. Another example is if the saved state has center frequency set to 20 GHz, but the instrument recalling the saved state is a different model and only supports 13.5 GHz. In this case, the center frequency is limited along with any other frequency based settings. Since the center frequency can't be preserved in this case, the recall limiting tries to at least preserve span to keep the measurement setup as intact as possible.</p> <p>It may be appropriate to issue a warning if the state is limited on the recall; warnings do not go out to SCPI so this would only affect the manual user.</p> <p>Note that there is no state file compatibility outside of the X-Series. For example, you cannot recall a state file from ESA or PSA.</p>
Initial S/W Revision	Prior to A.02.00

State

The Recall State menu lets you choose a register or file from which to recall the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings that were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the

additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, GPIB address) are not affected by either a Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

Since each state file is only for one Mode, the settings for other Modes are unaffected when it is loaded. Recall State will cause a mode switch if the state being recalled is not from the current active mode.

After the recall completes, the message "File <filename> recalled" or "Recalled State Register <register number>" is displayed.

For rapid recalls, the State menu lists 16 registers that you can choose from to recall. Pressing a Register key initiates the recall. You can also select a file from which to recall.

The default path for all State Files is:

My Documents\<<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

See "[More Information](#)" on page 2002.

Key Path	Recall
Mode	All
Remote Command	:MMEMory:LOAD:STATe <filename>
Example	:MMEM:LOAD:STAT "myState.state" This recalls the file myState.state on the default path
Example	MMEM:LOAD:STAT "MyStateFile.state" This loads the state file data (on the default file directory path) into the instrument state.
Notes	<p>When you pick a file to recall, the analyzer first verifies that the file is recallable in the current instrument by checking the software version and model number of the instrument. If everything matches, a full recall proceeds by aborting the currently running measurement, clearing any pending operations, and then loading the State from the saved state file. You can open state files from any mode, so recalling a State file switches to the mode that was active when the save occurred. After switching to the mode of the saved state file, mode settings and data (if any for the mode) are loaded with values from the saved file. The saved measurement of the mode becomes the newly active measurement and the data relevant to the measurement (if there is any) is recalled.</p> <p>If there is a mismatch between file version or model number or instrument version or model number, the recall function tries to recall as much as possible and returns a warning message. It may limit settings that differ based on model number, licensing or version number.</p> <p>After recalling the state, the Recall State function does the following:</p> <ul style="list-style-type: none"> • Makes the saved measurement for the mode the active measurement. • Clears the input and output buffers. • Status Byte is set to 0. • Executes a *CLS <p>If the file specified is empty an error is generated. If the specified file does not exist, another error is generated. If there is a mismatch between the file and the proper file type, an error is generated. If</p>

	there is a mismatch between file version or model number or instrument version or model number, a warning is displayed. Then it returns to the State menu and File Open dialog goes away. After the Recall, the analyzer exits the Recall menu and returns to the previous menu.
Backwards Compatibility SCPI	:MMEMory:LOAD:STATe 1,<filename> For backwards compatibility, the above syntax is supported. The "1" is simply ignored.
Initial S/W Revision	Prior to A.02.00

More Information

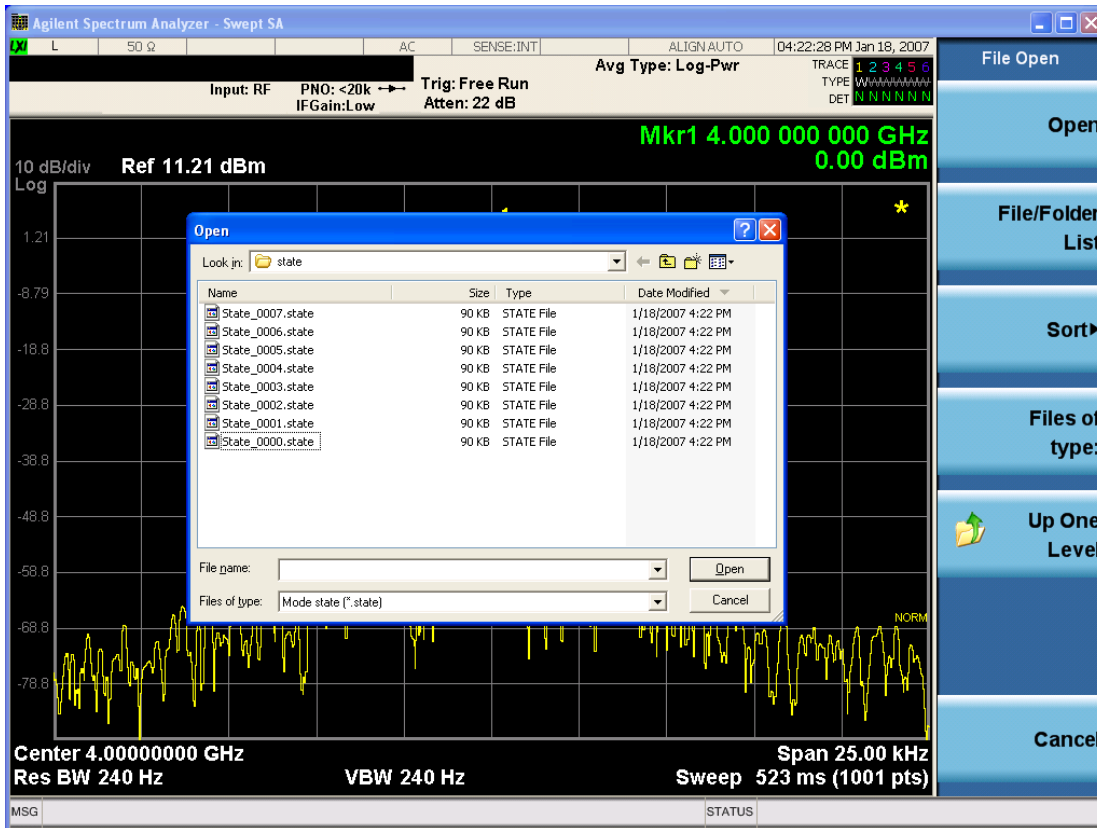
In measurements that support saving Traces, for example, Swept SA, the Trace data is saved along with the State in the State file. When recalling the State, the Trace data is recalled as well. Traces are recalled exactly as they were stored, including the writing mode and update and display modes. If a Trace was updating and visible when the State was saved, it will come back updating and visible, and its data will be rewritten right away. When you use State to save and recall traces, any trace whose data must be preserved should be placed in View or Blank mode before saving.

The following table describes the Trace Save and Recall possibilities:

You want to recall state and one trace's data, leaving other traces unaffected.	Save Trace+State from 1 trace. Make sure that no other traces are updating (they should all be in View or Blank mode) when the save is performed.	On Recall, specify the trace you want to load the one trace's data into. This trace will load in View. All other traces' data will be unaffected, although their trace mode will be as it was when the state save was performed.
You want to recall all traces	Save Trace+State from ALL traces.	On Recall, all traces will come back in View (or Blank if they were in Blank or Background when saved)
You want all traces to load exactly as they were when saved.	Save State	On recall, all traces' mode and data will be exactly as they were when saved. Any traces that were updating will have their data immediately overwritten.

From File...

When you press "From File", the analyzer brings up a Windows dialog and a menu entitled "File Open." This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



Listed below are the functions of the various fields in the dialog, and the corresponding softkeys:

Open

Performs the recall of the specified file. While the recall is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Look In.

Look In

The Look In field shows the path from which the file will be recalled and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Look In field** first uses the last path from the Save As dialog **Save In**; path for that same file type. There is no softkey for directly navigating to the Look In field, but you can use the left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

Sort

Accesses a menu that enables you to sort the files within the File Open dialog. Only one sorting type can be selected at a time and the sorting happens immediately. The sorting types are By Date, By Name, By extension, and By Size.

Files of Type

This field shows the file suffix for the type of file you have selected to recall. For example, if you navigated here while recalling State, "Mode state (*.state)" is in the field. If you navigated here while recalling Trace, ""Mode state (*.trace)" is in the field. If you navigated here while importing a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown menu, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Open** request to be cancelled. The ESC key does the same thing.

Key Path	Recall, State
Notes	Brings up the Open dialog for recalling a State Save Type
Initial S/W Revision	Prior to A.02.00

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

For more information and the SCPI command, see Edit Register Names under the Save, State function.

Key Path	Recall, State
Mode	All
Dependencies	N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending the SCPI command generates an error, -221, "Settings conflict;Option not available"
Initial S/W Revision	A.11.00

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last

modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

Key Path	Recall, State
Example	*RCL 1
Range	1–16 from front panel, 1–128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State, Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	Prior to A.11.00

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

Key Path	Recall, State
Example	*RCL 1
Range	1-16 from front panel, 1-128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State,Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	Prior to A.11.00

Restart

The Restart function restarts the current sweep, or measurement, or set of averaged/held sweeps or measurements. If you are Paused, pressing Restart does a Resume.

The Restart function is accessed in several ways:

- Pressing the Restart key
- Sending the remote command INIT:IMMEDIATE
- Sending the remote command INIT:RESTART

See "[More Information](#)" on page 2007

Key Path	Front-panel key
Remote Command	:INITiate[:IMMEDIATE] :INITiate:RESTART
Example	:INIT:IMM :INIT:REST
Notes	:INITiate:RESTART and :INITiate:IMMEDIATE perform exactly the same function.
Couplings	Resets average/hold count k. For the first sweep overwrites all active (update=on) traces with new current data. For application modes, it resets other parameters as required by the measurement.
Status Bits/OPC dependencies	This is an Overlapped command. The STATUS:OPERation register bits 0 through 8 are cleared. The STATUS:QUESTIONable register bit 9 (INTEgrity sum) is cleared. The SWEEPING bit is set. The MEASURING bit is set.
Backwards Compatibility Notes	For Spectrum Analysis mode in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart trace averages (displayed average count reset to 1) for a trace in Clear Write, but did not restart Max Hold and Min Hold. In the X-Series, the Restart hardkey and the INITiate:RESTART command restart not only Trace Average, but MaxHold and MinHold traces as well. For wireless comms modes in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart every measurement, which includes all traces and numeric results. There is no change to this operation.
Initial S/W Revision	Prior to A.02.00

More Information

The **Restart** function first aborts the current sweep/measurement as quickly as possible. It then resets the sweep and trigger systems, sets up the measurement and initiates a new data measurement sequence with a new data acquisition (sweep) taken once the trigger condition is met.

If the analyzer is in the process of aligning when **Restart** is executed, the alignment finishes before the restart function is performed.

Even when set for Single operation, multiple sweeps may be taken when Restart is pressed (for example, when averaging/holding is on). Thus when we say that **Restart** "restarts a measurement," we may mean:

- It restarts the current sweep
- It restarts the current measurement
- It restarts the current set of sweeps if any trace is in Trace Average, Max Hold or Min Hold
- It restarts the current set of measurements if Averaging, or Max Hold, or Min Hold is on for the measurement
- depending on the current settings.

With **Average/Hold Number** (in **Meas Setup** menu) set to 1, or Averaging off, or no trace in Trace Average or Hold, a single sweep is equivalent to a single measurement. A single sweep is taken after the trigger condition is met; and the analyzer stops sweeping once that sweep has completed. However, with **Average/Hold Number** >1 and at least one trace set to **Trace Average, Max Hold, or Min Hold (SA Measurement)** or **Averaging on (most other measurements)**, multiple sweeps/data acquisitions are taken for a single measurement. The trigger condition must be met prior to each sweep. The sweep is stopped when the average count k equals the number N set for **Average/Hold Number**. A measurement average usually applies to all traces, marker results, and numeric results; but sometimes it only applies to the numeric results.

Once the full set of sweeps has been taken, the analyzer will go to idle state. To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command `CALC:AVER:TCON UP`.

Save

The Save menu lets you choose what you want to save and where you want to save it. Among the types of files you can save are **States**, **Traces**, and **Screen Images**. In addition, an Export (Data) option lets you save a number of data types as CSV files for easy import into Excel and other spreadsheet programs.

Key Path	Front-panel key
Mode	All
Notes	No remote command for this key specifically, but the :MMEM:STORe command is available for specific file types. An example is :MMEM:STOR:STATe <filename>.
Initial S/W Revision	Prior to A.02.00

State

The Save State menu lets you choose a register or file for saving the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings which were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, Verbose SCPI) are not affected by either Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

After the save completes, the message "File <filename> saved" or "State Register <register number> saved" is displayed.

For rapid saving, the State menu lists 16 registers to save to. Pressing a Register key initiates the save. You can also select a file to save to.

The default path for all State Files is:

My Documents\<<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

Key Path	Save
Mode	All
Remote Command	:MMEMory:STORe:STATe <filename>
Example	MMEM:STOR:STATe "MyStateFile.state" This stores the current instrument state data in the file MyStateFile.state in the default directory.
Notes	Both single and double quotes are supported for any filename parameter over remote. After saving to a register, that register's menu key is updated with the date the time, unless a custom label has been entered for that key. After saving to a register, you remain in the Save State menu, so that you can see the Register key

update. After saving to a file, the analyzer automatically returns to the previous menu and any Save As dialog goes away.

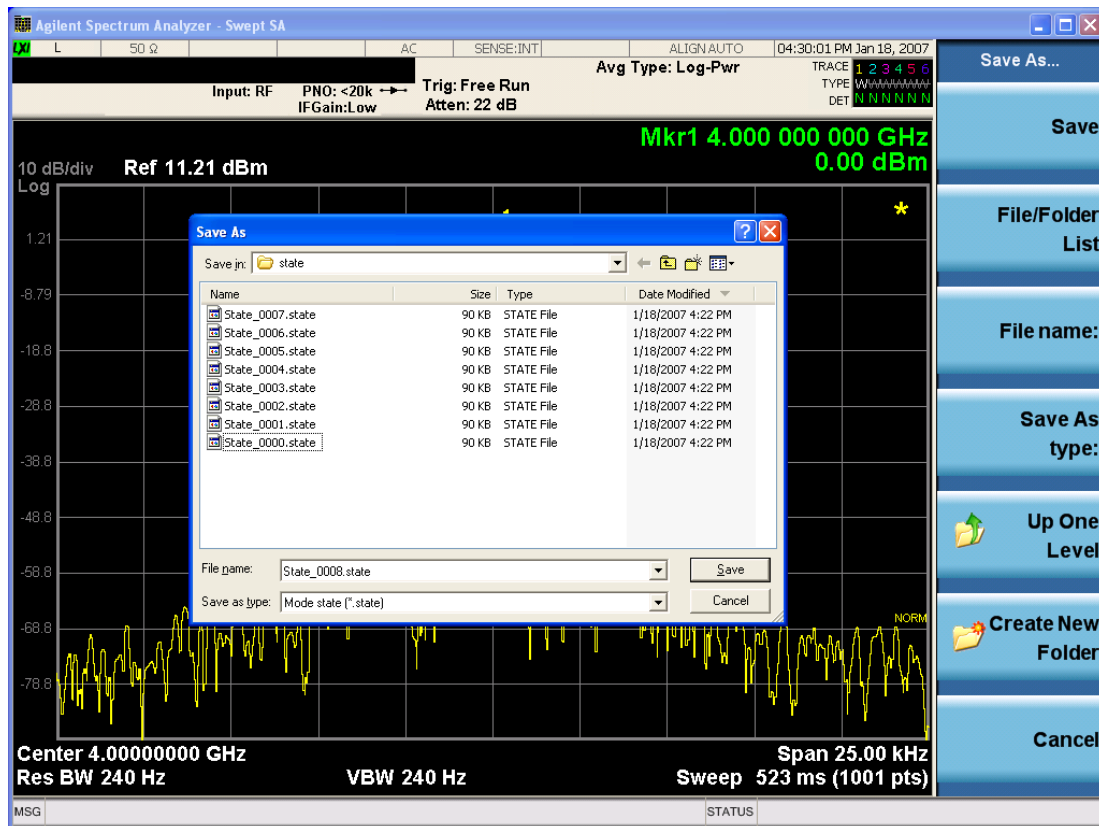
Backwards Compatibility SCPI :MMEMory:STORe:STATe 1,<filename>

For backwards compatibility, the above syntax is supported. The "1" is simply ignored. The command is sequential.

Initial S/W Revision Prior to A.02.00

To File . . .

When you press “To File”, the analyzer brings up a Windows dialog and a menu entitled “Save As.” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



The Listed below

are the functions of the various fields in the dialog, and the corresponding softkeys:

Save

Performs the save to the specified file of the selected type. If the file already exists, a dialog will appear that allows you to replace the existing file by selecting OK, or you can Cancel the request. If you select OK, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade.

While the save is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Save In.

Save In

The Save In field shows the path to which the file will be saved and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Save In field** defaults to the default path for this type of file and remembers the last path you used to save this type of file. There is no softkey for directly navigating to the Save In field but you can use left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

File Name

The File Name field is initially loaded with an automatically generated filename specific to the appropriate Save Type. The automatically generated filename is guaranteed not to conflict with any filename currently in the directory. You may replace or modify this filename using the File Name key. See the ["Quick Save " on page 2328](#) documentation for more on the automatic file naming algorithm.

When you press the File Name key the analyzer displays the Alpha Editor. Use the knob to choose the letter to add and the front-panel Enter key to add the letter to the file name. The BK character moves you back and the FW character moves you forward in the filename. The Select key on the front panel generates a space character. When you are done entering the filename press the Done softkey. This returns back to the **File Open** dialog and menu, but does not cause the save to occur.

Save As Type

This field shows the file suffix for the type of file you have selected to save. For example, if you navigated here while saving State, "Mode state (*.state)" is in the field. If you navigated here from saving Trace, ""Mode state (*.trace)" is in the field. If you navigated here while exporting a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Create New Folder

This key corresponds to the icon of a folder with the "*" that is in the tool bar of the dialog. When pressed, a new folder is created in the current directory with the name **New Folder** and you can enter a new folder name using the Alpha Editor.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Save As** request to be cancelled. The ESC key does the same thing.

Key Path	Save, State
Mode	All
Notes	Brings up Save As dialog for saving a State Save Type
Initial S/W Revision	Prior to A.02.00

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

See ["More Information" on page 2012](#)

Key Path	Save, State
Mode	All
Remote Command	:MMEMory:REGister:STATe:LABel <reg number>,"label" :MMEMory:REGister:STATe:LABel? <reg number>
Example	:MMEM:REG:STAT:LAB 1,"my label"
Notes	<reg number> is an integer from 1 to 16. If the SCPI specifies an invalid register number an error message is generated, -222,"Data out of range;Invalid register label number" "label" is a string from 0 to 30 characters in length. If a label exceeds 30 characters, an error message is generated, -150,"String data error;Label clipped to 30 characters" "label" of length 0 erases the custom label and restores the default (time and date) label. E.g.: :MMEM:REG:STAT:LAB 1,""
Dependencies	N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending this command generates an error, -221,"Settings conflict;Option not available"
Preset	The names are unaffected by Preset or power cycle but are set to the default label (time and date) on a "Restore System Defaults->Misc"
Initial S/W Revision	A.11.00

More Information

When you edit one of the register names, the time and date field will be replaced by the custom name.

If you delete all the characters in the custom name, it restores the default (time and date).

The register names are stored within the state files, but they are not part of the instrument state; that is, once you have edited a register name, loading a new state will not change that register name. Another consequence of this is that the names will be persistent through a power cycle. Also, if a named state file is transferred to another analyzer, it will bring its custom name along with it.

If you try to edit the name of an empty register, the analyzer will first save the state to have a file to put the name in. If you load a named state file into an analyzer with older firmware it will ignore the metadata.

The *SAV and *RCL commands will not be affected by the custom register names, nor will the MMEM commands.

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

Key Path	Save, State
Mode	All
Example	*SAV 1
Range	1–16 from front panel, 1–128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.11.00

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

Key Path	Save, State
Mode	All
Example	*SAV 1
Range	1-16 from front panel, 1-128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.11.00

Data (Export)

Exporting a data file stores data from the current measurement to mass storage files. The Export Menu only contains data types that are supported by the current measurement.

Since the commonly exported data files are in .csv format, the data can be edited by you prior to importing. This allows you to export a data file, manipulate the data in Excel (the most common PC Application for manipulating .csv files) and then import it.

Selecting an Export Data menu key will not actually cause the exporting to occur, since the analyzer still needs to know where you wish to save the data. Pressing the Save As key in this menu brings up the Save As dialog and Save As menu that allows you to specify the destination file and directory. Once a filename has been selected or entered in the Open menu, the export will occur as soon as the Save key is pressed.

Key Path	Save
Mode	All
Notes	The menu is built from whatever data types are available for the mode. So the key locations in the sub menu will vary. No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:STORe commands.
Dependencies	If a file type is not used by a certain measurement, that type is grayed out for that measurement. The key for a file type will not show at all if there are no measurements in the Mode that support it.
Preset	Is not affected by a Preset or shutdown, but is reset during Restore Mode Defaults
Readback	The data type that is currently selected
Initial S/W Revision	Prior to A.02.00

Measurement Results

Pressing this key selects Meas Results as the data type to be exported. Pressing the key a second time brings up the Meas Results menu, which allows you to select which **Meas Result** to save. In the Swept SA measurement, there are three types of Measurement Results files: Peak Table, Marker Table and Spectrogram.

See "Meas Results File Contents" on page 2015.

See "Marker Table" on page 2015.

See "Peak Table" on page 2018.

See "Spectrogram" on page 2021

Remote Command	:MMEMory:STORe:RESults:MTABle PTABle SPEctrogram <filename>
Example	:MMEM:STOR:RES:MTAB "myResults.csv" Saves the results from the current marker table to the file myResults.csv in the current path. :MMEM:STOR:RES:PTAB "myResults.csv" Saves the results from the current peak table to the file myResults.csv in the current path. :MMEM:STOR:RES:SPEC "myResults.csv" Saves the results from the current Spectrogram display to the file myResults.csv in the current path. The default path is My Documents\SA\data\SAN\results
Notes	If the save is initiated via SCPI, and the file already exists, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade. Both single and double quotes are supported for any filename parameter over SCPI.
Dependencies	If a save of Marker Table results is requested and the Marker Table is not on, no file is saved and a message is generated If a save of Peak Table results is requested and the Peak Table is not on, no file is saved and a message is generated If a save of Spectrogram results is requested and the Spectrogram is not on, no file is saved and a message is generated. The Spectrogram choice only appears if option EDP is licensed.
Preset	Not part of Preset, but is reset to Peak Table by Restore Mode Defaults. Survives a shutdown.
Initial S/W Revision	Prior to A.02.00

Meas Results File Contents

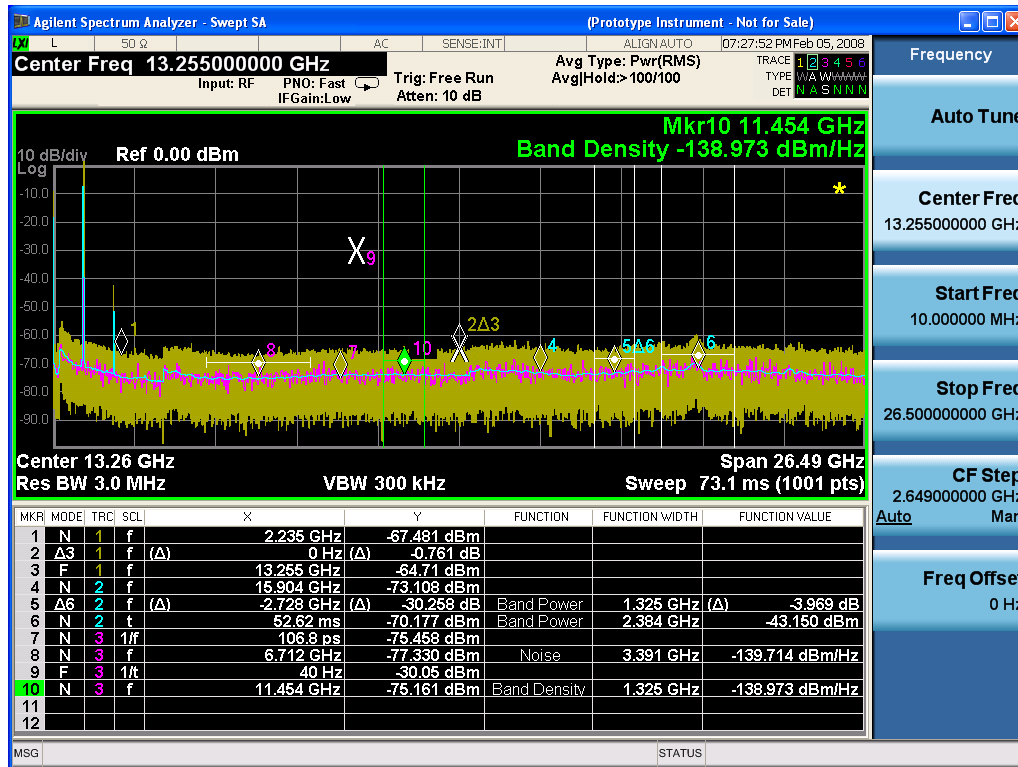
All files are .csv files. The following section details the data in each file type.

Marker Table

This section discusses the Marker Table Meas Results file format.

Imagine that, at the point where a Marker Table Meas Result is requested, the following screen is showing:

16 GMSK Output RF Spectrum Measurement
Save



Then the Meas Results file, when opened, would show the following data:

MeasurementResult	
Swept SA	
A.01.40_R0017	N9020A
526 B25 PFR	1
P26 EA3	
Result Type	Marker Table
Ref Level	0
Number of Points	1001
Sweep Time	0.0662666 67
Start Frequency	10000000
Stop Frequency	26500000 000
Average Count	0
Average Type	LogPower (Video)
RBW	3000000

RBW Filter	Gaussian
RBW Filter BW	3dB
VBW	3000000
Sweep Type	Swept
X Axis Scale	Lin
PreAmp State	Off
PreAmp Band	Low
Trigger Source	Free
Trigger Level	1.2
Trigger Slope	Positive
Trigger Delay	1.00E-06
Phase Noise Optimization	Fast
Swept If Gain	Low
FFT If Gain	Autorange
RF Coupling	AC
FFT Width	411900
Ext Ref	10000000
Input	RF
RF Calibrator	Off
Attenuation	10
Ref Level Offset	0
External Gain	0
X Axis Units	Hz
Y Axis Units	dBm

DATA									
MKR	MODE	TR C	SCL	X	Y	FUNCTI ON	FUNCTIO N WIDTH	FUNCTI ON VALUE	FUNCTI ON UNIT
1	Normal	1	Freque ncy	2.2350E+09	- 67.481	Off	0.0000E+00	0	None
2	Delta3	1	Freque ncy	0.0000E+00	- 0.761	Off	0.0000E+00	0	None
3	Fixed	1	Freque ncy	1.3255E+10	- 64.71	Off	0.0000E+00	0	None
4	Normal	2	Freque ncy	1.5904E+10	- 73.1	Off	0.0000E+00	0	None

08									
5	Delta7	2	Frequ ncy	- 2.7280E+ 09	- 30.2 58	Band Power	1.3250E+ 06	-3.969	dB
6	Normal	2	Time	5.2620E- 02	- 70.1 77	Band Power	2.3840E+ 06	-43.15	dBm
7	Normal	3	Period	1.0680E- 10	- 75.4 58	Off	0.0000E+ 00	0	None
8	Normal	3	Frequ ncy	6.7120E+ 09	- 77.3 3	Noise	3.3910E+ 06	- 139.71 4	dBm/Hz
9	Fixed	3	Inverse Time	4.0000E+ 01	- 30.0 5	Off	0.0000E+ 00	0	None
10	Normal	3	Frequ ncy	1.1454E+ 10	- 75.1 61	Band Density	1.3250E+ 06	- 138.97 3	dBm/Hz
11	Off	1	Frequ ncy	0.0000E+ 00	0	Off	0.0000E+ 00	0	None
12	Off	1	Frequ ncy	0.0000E+ 00	0	Off	0.0000E+ 00	0	None

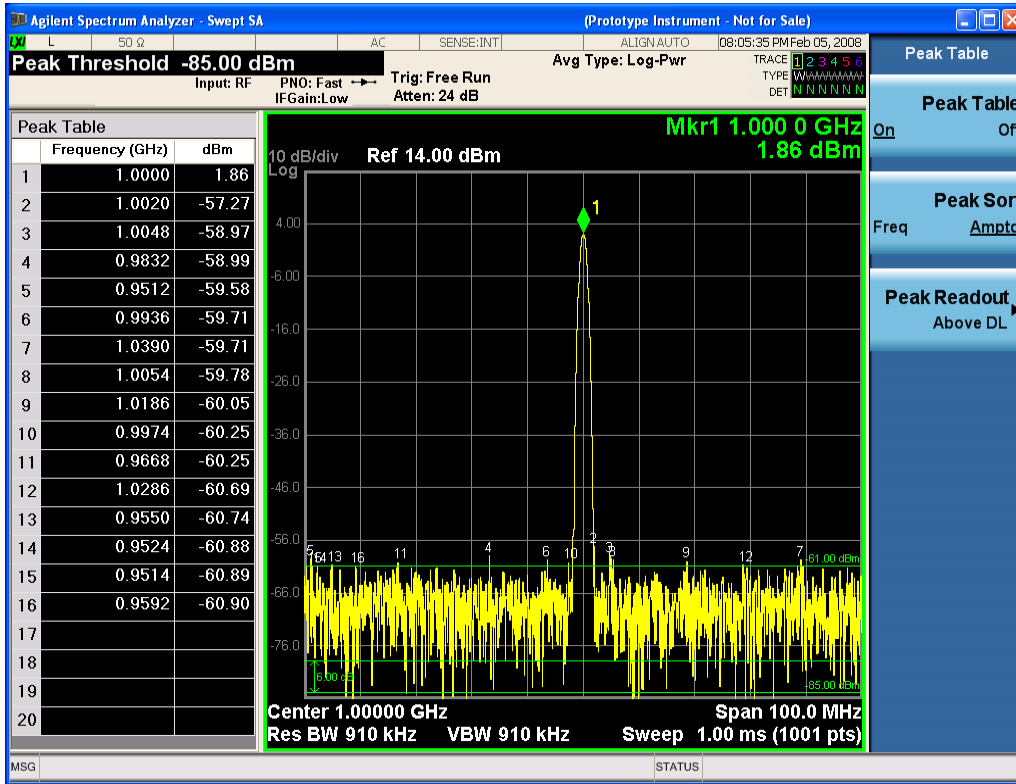
The numbers appear in the file exactly as they appear onscreen. If it says 11.454 GHz onscreen, then in the file it is 11.454E+09.

The metadata header is very similar to the metadata used in the trace data .csv files. See Trace File Contents. The only new information concerns the 1-of-N fields in the marker table itself.

Peak Table

This section discusses the Peak Table Meas Results file format.

Imagine that, at the point where a Marker Table Meas Result is requested, the following screen is showing:



Then the Meas Results file, when opened, would show the header data (the same as for the Marker Table except that the Result Type is Peak Table) ending with a few fields of specific interest to Peak Table users:

- Peak Threshold
- Peak Threshold State (On|Off)
- Peak Excursion
- Peak Excursion State (On|Off)
- Display Line
- Peak Readout (All|AboveDL|BelowDL)
- Peak Sort (Freq|Amptd)

These fields are then followed by the data for the Peak Table itself.

Note that the label for the Frequency column changes to Time in 0 span.

Here is what the table for the above display looks like:

MeasurementResult	
Swept SA	
A.01.40_R0017	N9020A
526 B25 PFR P26 EA3	1

Result Type	Peak Table
Ref Level	0
Number of Points	1001
Sweep Time	0.066266667
Start Frequency	10000000
Stop Frequency	26500000000
Average Count	0
Average Type	LogPower(Video)
RBW	3000000
RBW Filter	Gaussian
RBW Filter BW	3dB
VBW	3000000
Sweep Type	Swept
X Axis Scale	Lin
PreAmp State	Off
PreAmp Band	Low
Trigger Source	Free
Trigger Level	1.2
Trigger Slope	Positive
Trigger Delay	1.00E-06
Phase Noise Optimization	Fast
Swept If Gain	Low
FFT If Gain	Autorange
RF Coupling	AC
FFT Width	411900
Ext Ref	10000000
Input	RF
RF Calibrator	Off
Attenuation	10
Ref Level Offset	0
External Gain	0
X Axis Units	Hz
Y Axis Units	dBm
Peak Threshold	-85
Peak Threshold State	On
Peak Excursion	6
Peak Excursion State	On

Display Line	-61	
Peak Readout	AboveDL	
Peak Sort	Amptd	
DATA		
Peak	Frequency	Amplitude
1	1.0000E+06	1.86
2	1.0020E+06	-57.27
3	1.0048E+06	-58.97
4	9.8320E+05	-58.99
5	9.5120E+05	-59.58
6	9.9360E+05	-59.71
7	1.0390E+06	-59.71
8	1.0054E+06	-59.78
9	1.1086E+06	-60.05
10	9.9740E+05	-60.25
11	9.6680E+05	-60.25
12	1.0286E+06	-60.69
13	9.5500E+05	-60.74
14	9.5240E+05	-60.88
15	9.5140E+05	-60.89
16	9.5920E+05	-60.90
17		
18		
19		
20		

Spectrogram

This section discusses the Spectrogram Results file format. The Spectrogram choice only appears if option EDP is licensed.

The Spectrogram results are the same as a Trace data export, except that instead of having just one trace's data, all 300 traces appear one after the other.

Each trace has its own data mark; the data for Spectrogram Trace 0 follows the row marked DATA, the data for Spectrogram Trace 1 follows the row marked DATA1, for Spectrogram Trace 2 follows the row marked DATA2, and so on.

Each DATA row has a timestamp in the second column (as of firmware revision A.11.01). So, for example, if Trace 0 had a relative start time of 1729.523 sec, then the first DATA row would look like this:

DATA,1729.523

And if Trace 13 had a relative start time of 100.45 sec, then the fourteenth data row would look like:

DATA13,100.453

To find the absolute time for the relative timestamps of each trace, the last row before the first DATA row gives the absolute start time of the Spectrogram, in the form YYYYMMDDHHMMSS

So, for example, if the absolute start time is 13:23:45:678 on January 30, 2012, this row would look like:

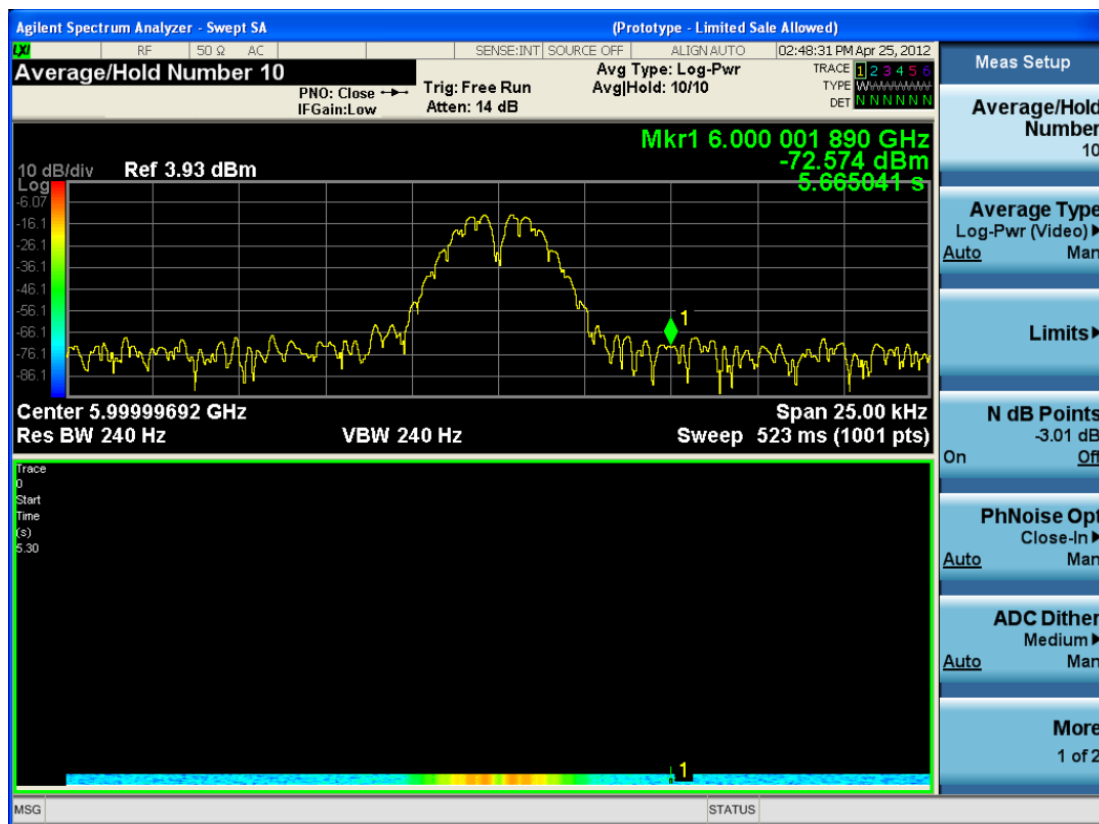
Start Time,20120130132345678

NOTE

The resolution of the absolute time stored is 1 ms, which matches up with the fact that the fastest sweep time is also 1 ms. However, there is no specification for the absolute accuracy of the clock in the analyzer, nor is there any facility provided to allow the user to set this time to any particular degree of accuracy.

Traces that have not yet been filled in the Spectrogram display are empty; there is no DATA header for them. The file ends after the last non-empty trace.

Imagine that, at the point where a Spectrogram Meas Result is requested, the following screen is showing:



For the purpose of this example, we have set the Average/Hold Number to 10, thus we have only traces 0 thru 10. The Spectrogram was started at 02:28:08:700 pm on April 25, 2012 (that is, 700 ms after 2:28:08 pm), although the screen dump itself shows a different time, as it was taken ten minutes after the

Spectrogram data. Trace 0 is showing a start time of 5.30 seconds, meaning 5.3 seconds after the Spectrogram started (trace 10 has a start time of 0, as it was the first trace taken but has now rolled up into the tenth trace slot).

The Meas Results file, when opened, shows the header data and ten traces of trace data. Below is an extract from the result file for the above display. Note the start time of 20120425142808700 showing in the last row before the first DATA row, and the relative time of 5.299231048 showing in the first DATA row:

Result Type	Spectrogram
MeasResult	
Swept SA	
A.11.00.01	N9020A
503 508 513 526 ALL ALV B1C B1X B25 B2X B40 BAB BBA CR3 CRP DP2 DRD EA3 EDP EMC EP1 ERC ESC ESP EXM FSA HBA K03 LFE MPB P03 P08 P13 P26 PFR RTL RTS S40 SB1 SEC SM1 UK6 YAS YAV	1
Segment	0
Number of Points	1001
Sweep Time	0.523333333
Start Frequency	5999984415
Stop Frequency	6000009415
Average Count	0
Average Type	LogPower(Video)
RBW	240
RBW Filter	Gaussian
RBW Filter BW	3dB
VBW	240
Sweep Type	Swept
X Axis Scale	Lin
PreAmp State	Off
PreAmp Band	Low
Trigger Source	Free
Trigger Level	1.2
Trigger Slope	Positive
Trigger Delay	0
Phase Noise Optimization	Wide
Swept If Gain	Low
FFT If Gain	Autorange
RF Coupling	AC

Result Type	Spectrogram
FFT Width	411900
Ext Ref	10000000
Input	RF
RF Calibrator	Off
Attenuation	14
Ref Level Offset	0
External Gain	0
Trace Type	Clearwrite
Detector	Normal
Trace Math	Off
Trace Math Oper1	Trace5
Trace Math Oper2	Trace6
Trace Math Offset	0
Trace Name	Trace1
X Axis Units	Hz
Y Axis Units	dBm
Start Time	20120425142808700
DATA	5.299231048
5999984415	-76.34749519
5999984440	-77.28097006
5999984465	-75.32317869
5999984490	-73.64417681
5999984515	-72.67154604

o
 o
 o

6000009315	-77.94423277
6000009340	-79.51829697
6000009365	-78.46108961
6000009390	-78.46108957
6000009415	-76.59570596
DATA2	4.708697055
5999984415	-80.98197882
5999984440	-80.98197879

5999984465	-75.83142132
5999984490	-74.02712079
5999984515	-73.57213005

o
o
o

6000009315	-75.9183103
6000009340	-79.53787488
6000009365	-78.82602191
6000009390	-78.82602188
6000009415	-76.37486709
DATA10	0
5999984415	-75.56751112
5999984440	-75.76485645
5999984465	-76.67718717
5999984490	-78.79238489
5999984515	-83.72680212

o
o
o

6000009315	-71.3942461
6000009340	-72.28308332
6000009365	-73.92684489
6000009390	-75.45548832
6000009415	-75.17904815

Save As . . .

When you press “Save As”, the analyzer brings up a Windows dialog and a menu entitled “**Save As.**” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[To File . . .](#)" on page 2340 in Save, State for a full description of this dialog and menu.

The default path for saving files is:

For all of the Trace Data Files:

My Documents\<<mode name>\data\traces

For all of the Limit Data Files:

My Documents\<<mode name>\data\limits

For all of the Measurement Results Data Files:

My Documents\<<mode name>\data\<<measurement name>\results

For all of the Capture Buffer Data Files:

My Documents\<<mode name>\data\captureBuffer

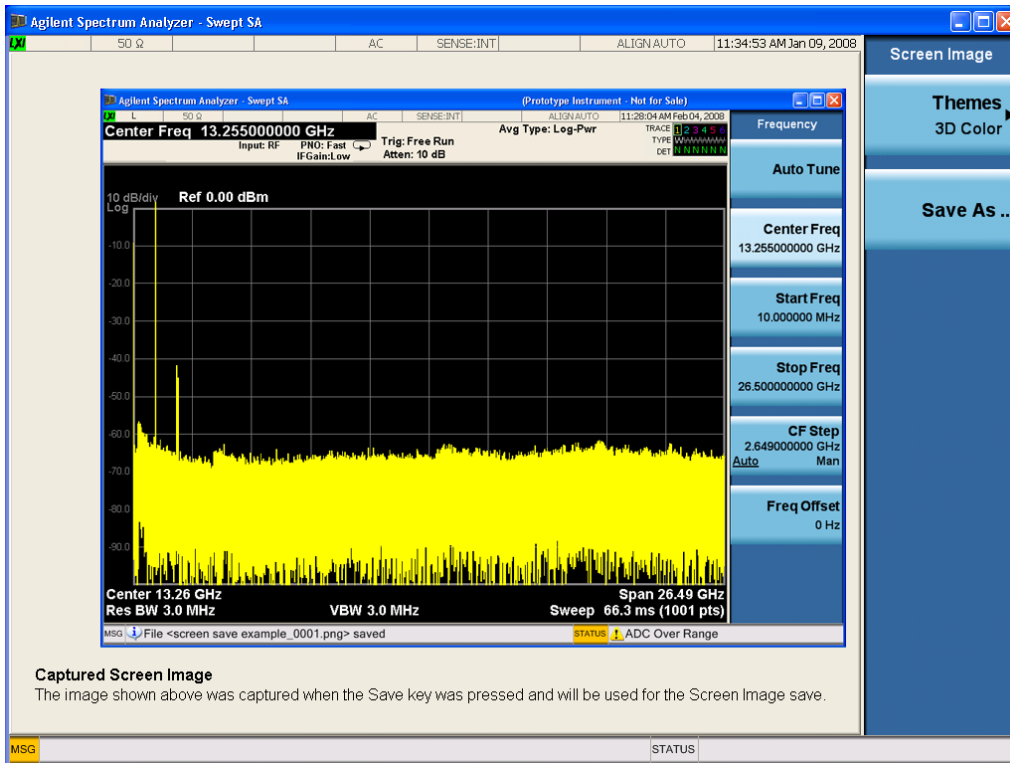
Key Path	Save, Data
Mode	All
Notes	The key location is mode-dependent and will vary. Brings up the Save As dialog for saving a <mode specific> Save Type. The save is performed immediately and does not wait until the measurement is complete.
Initial S/W Revision	Prior to A.02.00

Screen Image

Pressing Screen Image accesses a menu of functions that enable you to specify a format and location for the saved screen image. It brings up a menu that allows you to specify the color scheme of the Screen Image (Themes) or navigate to the Save As dialog to perform the actual save.

Screen Image files contain an exact representation of the analyzer display. They cannot be loaded back onto the analyzer, but they can be loaded into your PC for use in many popular applications.

The image to be saved is actually captured when the Save front panel key is pressed, and kept in temporary storage to be used if you ask for a Screen Image save. When the Screen Image key is pressed, a "thumbnail" of the captured image is displayed, as shown below:



When you continue on into the Save As menu and complete the Screen Image save, the image depicted in the thumbnail is the one that gets saved, showing the menus that were on the screen before going into the Save menus. The save is performed immediately and does not wait until the measurement is complete.

After you have completed the save, the Quick Save front-panel key lets you quickly repeat the last save performed, using an auto-named file, with the current screen data.

NOTE

For versions previous to A.01.55, if you initiate a screen image save by navigating through the Save menus, the image that is saved will contain the Save menu softkeys, not the menus and the active function that were on the screen when you first pressed the Save front panel key.

Key Path	Save
Mode	All
Remote Command	:MMEMory:STORe:SCREen <filename>
Example	:MMEM:STOR:SCR "myScreen.png" This stores the current screen image in the file MyScreenFile.png in the default directory.
Initial S/W Revision	Prior to A.02.00

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

Key Path	Save, Screen Image
Remote Command	:MMEMory:STORe:SCReem:THEMe TDColor TDMonochrome FCOLor FMONochrome :MMEMory:STORe:SCReem:THEMe?
Example	:MMEM:STOR:SCR:THEM TDM
Preset	3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes.
Readback	3D Color 3D Mono Flat Color Flat Mono
Backwards Compatibility Notes	In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical.
Initial S/W Revision	Prior to A.02.00

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDC
Readback	3D Color
Initial S/W Revision	Prior to A.02.00

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDM
Readback	3D Mono
Initial S/W Revision	Prior to A.02.00

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

Key Path	Save, Screen Image, Themes
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Example	MMEM:STOR:SCR:THEM FCOL
Readback	Flat Color
Initial S/W Revision	Prior to A.02.00

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FMON
Readback	Flat Mono
Initial S/W Revision	Prior to A.02.00

Save As...

When you press “Save As”, the analyzer brings up a Windows dialog and a menu entitled “**Save As.**” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[To File . . .](#)" on page 2340 in Save, State for a full description of this dialog and menu.

The default path for Screen Images is

My Documents\`<mode name>`\screen.

where `<mode name>` is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

Key Path	Save, Screen Image
Notes	Brings up Save As dialog for saving a Screen Image Save Type
Initial S/W Revision	Prior to A.02.00

Mass Storage Catalog (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:CATalog? [<code><directory_name></code>]
Notes	<p>The string must be a valid logical path.</p> <p>Queries disk usage information (drive capacity, free space available) and obtains a list of files and directories in a specified directory in the following format:</p> <p><code><numeric_value>,<numeric_value>,{<file_entry>}</code></p> <p>It returns two numeric parameters and as many strings as there are files and directories. The first parameter indicates the total amount of storage currently used in bytes. The second parameter</p>

indicates the total amount of storage available, also in bytes. The <file_entry> is a string. Each <file_entry> indicates the name, type, and size of one file in the directory list:

<file_name>,<file_type>,<file_size>

As the windows file system has an extension that indicates file type, <file_type> is always empty. <file_size> provides the size of the file in bytes. For directories, <file_entry> is surrounded by square brackets and both <file_type> and <file_size> are empty

Initial S/W Revision Prior to A.02.00

Mass Storage Change Directory (Remote Command Only)

Key path SCPI Only

Remote Command :MMEMory:CDIRectory [<directory_name>]
 :MMEMory:CDIRectory?

Notes The string must be a valid logical path.
 Changes the default directory for a mass memory file system. The <directory_name> parameter is a string. If no parameter is specified, the directory is set to the *RST value.
 At *RST, this value is set to the default user data storage area, that is defined as System.Environment.SpecialFolder.Personal.
 Query returns full path of the default directory.

Initial S/W Revision Prior to A.02.00

Mass Storage Copy (Remote Command Only)

Key path SCPI Only

Remote Command :MMEMory:COPY <string>,<string>[,<string>,<string>]

Notes The string must be a valid logical path.
 Copies an existing file to a new file or an existing directory to a new directory.
 Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.
 The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.
 This command will generate an "access denied" error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.

Mass Storage Device Copy (Remote Command Only)

This command transfers data to/from a file and a peripheral device.

Key path	SCPI Only
Remote Command	:MMEMory:COpy:DEvIce <source_string>,<dest_string>
Notes	The strings must be a valid logical path or a valid device keyword. If the dest_string is a device keyword, the data is copied from the source file to the device. If the source_string is a device keyword, the data is copied to the source file from the device. Valid device keywords are: SNS (smart noise source) An error is generated if the file or device is not found.

Mass Storage Delete (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:DElete <file_name>[,<directory_name>]
Notes	The string must be a valid logical path. Removes a file from the specified directory. The <file_name> parameter specifies the file name to be removed. This command will generate an “access denied” error if the file is in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.
Initial S/W Revision	Prior to A.02.00

Mass Storage Data (Remote Command Only)

Creates a file containing the specified data OR queries the data from an existing file.

Key path	SCPI Only
Remote Command	:MMEMory:DATA <file_name>, <data> :MMEMory:DATA? <file_name>
Notes	The string must be a valid logical path. The command form is MMEMory:DATA <file_name>,<data>. It loads <data> into the file <file_name>. <data> is in 488.2 block format. <file_name> is string data. The query form is MMEMory:DATA? <file_name> with the response being the associated <data> in block format.
Initial S/W Revision	Prior to A.02.00

Mass Storage Make Directory (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:MDIRectory <directory_name>
Notes	The string must be a valid logical path. Creates a new directory. The <directory_name> parameter specifies the name to be created.

	This command will generate an “access denied” error if the new directory would be in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.
Initial S/W Revision	Prior to A.02.00

Mass Storage Move (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:MOVE <string>,<string>[,<string>,<string>]
Notes	<p>The string must be a valid logical path.</p> <p>Moves an existing file to a new file or an existing directory to a new directory.</p> <p>Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.</p> <p>The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.</p> <p>This command will generate an “access denied” error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.</p>
Initial S/W Revision	Prior to A.02.00

Mass Storage Remove Directory (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:RDIRECTory <directory_name>
Notes	<p>The string must be a valid logical path.</p> <p>Removes a directory. The <directory_name> parameter specifies the directory name to be removed. All files and directories under the specified directory shall also be removed.</p> <p>This command will generate an “access denied” error if the folder is a restricted folder (e.g., C:\Windows) or is in a restricted folder and the current user does not have Power User or Administrator privileges.</p>
Initial S/W Revision	Prior to A.02.00

Single (Single Measurement/Sweep)

Sets the analyzer for Single measurement operation. The single/continuous state is Meas Global, so the setting will affect all the measurements. If you are Paused, pressing Single does a Resume.

See "[More Information](#)" on page 2033

Key Path	Front-panel key
Example	:INIT:CONT OFF
Notes	See Cont key description.
Backwards Compatibility Notes	<p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey and the INITiate:IMM switched from continuous measurement to single measurement and restarted sweeps and averages (displayed average count reset to 1), but did not restart Max Hold and Min Hold. In the X-Series, the Single hardkey and the INITiate:IMM command initiate a sweep/ measurement/ average sequence/hold sequence including MaxHold and MinHold.</p> <p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey restarted the sweep regardless of whether or not you were in an active sweep or sweep sequence. In the X-Series, Restart does this but Single only restarts the sweep or sweep sequence if you are in the idle state.</p> <p>INIT[:IMM] in ESA & PSA Spectrum Analysis Mode does an implied ABORT. In some other PSA Modes, INIT[:IMM] is ignored if not in the idle state. . The X-Series follows the ESA/PSA SA Mode model, which may cause some Modes to have compatibility problems.</p>
Initial S/W Revision	Prior to A.02.00

More Information

See "[Restart](#)" on page 2337 for details on the INIT:IMMEDIATE (Restart) function.

If you are already in single sweep, the INIT:CONT OFF command has no effect.

If you are already in Single Sweep, then pressing the Single key in the middle of a sweep does not restart the sweep or sequence. Similarly, pressing the Single key does not restart the sweep or sequence if the sweep is not in the idle state (for example, if you are taking a very slow sweep, or the analyzer is waiting for a trigger). Instead, it results in a message. "Already in Single, press Restart to initiate a new sweep or sequence". Even though pressing the Single key in the middle of a sweep does not restart the sweep, sending INIT:IMMEDIATE does reset it.

To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command CALC:AVER:TCON UP.

Source

There is no Source control functionality for this measurement. When this key is pressed, the screen either displays a blank menu, or the previously-selected menu remains unchanged.

Key Path	Front-panel key
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SPAN X Scale

Accesses a menu of functions that enable you to set the horizontal scale parameters.

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Ref Value

Allows you to set the display X reference value.

Key Path	Span X Scale
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Ref Value (RF Envelope window)

Allows you to set the display X reference value in the RF Envelope window.

Key Path	Span X Scale
Mode	GSM
Remote Command	:DISPlay:ORFSpectrum:VIEW[1]:WINDow[1]:TRACe:X[:SCALE]:RLEVel <time> :DISPlay:ORFSpectrum:VIEW[1]:WINDow[1]:TRACe:X[:SCALE]:RLEVel?
Example	DISP:ORFS:VIEW:WIND:TRAC:X:RLEV 1 DISP:ORFS:VIEW:WIND:TRAC:X:RLEV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Blanked when Meas Method is Multi Offset.
Couplings	If the "Auto Scaling" on page 2038 is On, this value is automatically determined by the measurement result. When you set a value manually, "Auto Scaling" on page 2038 automatically changes to Off.
Preset	0.000
State Saved	Saved in instrument state.
Min	-1.00 s
Max	10.00 s
Initial S/W Revision	Prior to A.02.00

Ref Value (Spectrum window)

Allows you to set the display X reference value.

Key Path	Span X Scale
Mode	GSM
Remote Command	:DISPlay:ORFSpectrum:VIEW2:WINDow[1]:TRACe:X[:SCALe]:RLEVel <freq> :DISPlay:ORFSpectrum:VIEW2:WINDow[1]:TRACe:X[:SCALe]:RLEVel?
Example	DISP:ORFS:VIEW2:WIND:TRAC:X:RLEV 0 DISP:ORFS:VIEW2:WIND:TRAC:X:RLEV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Blanked when Meas Method is Multi Offset.
Couplings	If the "Auto Scaling" on page 2038 is On, this value is automatically determined by the measurement result. When you set a value manually, "Auto Scaling" on page 2038 automatically changes to Off.
Preset	935.2 MHz
State Saved	Saved in instrument state.
Min	Depends on instrument minimum frequency.
Max	Depends on hardware options and instrument maximum frequency
Initial S/W Revision	Prior to A.02.00

Scale/Div

Allows you to set the display X scale/division value.

Key Path	Span X Scale
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Scale/Div (RF Envelope window)

Allows you to set the display X scale/division value in the RF Envelope window.

Key Path	Span X Scale
Mode	GSM
Remote Command	:DISPlay:ORFSpectrum:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:PDIVision <time> :DISPlay:ORFSpectrum:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:PDIVision?
Example	DISP:ORFS:VIEW:WIND:TRAC:X:PDIV 1ms DISP:ORFS:VIEW:WIND:TRAC:X:PDIV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Blanked when Meas Method is Multi Offset.
Couplings	If the "Auto Scaling" on page 2038 is On, this value is automatically determined by the measurement result. When you set a value manually, "Auto Scaling" on page 2038 automatically

	changes to Off.
Preset	57.600 us
State Saved	Saved in instrument state.
Min	1.00 ns
Max	1.00 s
Initial S/W Revision	Prior to A.02.00

Scale/Div (Spectrum window)

Allows you to set the display X scale/division value in the Spectrum window.

Key Path	Span X Scale
Mode	GSM
Remote Command	:DISPlay:ORFSpectrum:VIEW2:WINDow[1]:TRACe:X[:SCALe]:PDIVision <freq> :DISPlay:ORFSpectrum:VIEW2:WINDow[1]:TRACe:X[:SCALe]:PDIVision?
Example	DISP:ORFS:VIEW2:WIND:TRAC:X:PDIV 1MHz DISP:ORFS:VIEW2:WIND:TRAC:X:PDIV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Blanked when Meas Method is Multi Offset.
Couplings	If the "Auto Scaling" on page 2038 is On, this value is automatically determined by the measurement result. When you set a value manually, "Auto Scaling" on page 2038 automatically changes to Off.
Preset	360.000 kHz
State Saved	Saved in instrument state.
Min	100.000 kHz
Max	10 MHz
Initial S/W Revision	Prior to A.02.00

Ref Position

Allows you to set the display reference position to Left, Center or Right.

Key Path	Span X Scale
Mode	GSM
Remote Command	:DISPlay:ORFSpectrum:VIEW[1] 2:WINDow[1]:TRACe:X[:SCALe]:RPOSition LEFT CENTer RIGHT :DISPlay:ORFSpectrum:VIEW[1] 2:WINDow[1]:TRACe:X[:SCALe]:RPOSition?
Example	DISP:ORFS:VIEW:WIND:TRAC:X:RPOS CENT DISP:ORFS:VIEW:WIND:TRAC:X:RPOS?

Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Blanked when Meas Method is Multi Offset.
Preset	LEFT CENTer
State Saved	Saved in instrument state.
Range	Left Ctr Right
Initial S/W Revision	Prior to A.02.00

Auto Scaling

Allows you to toggle the Auto Scaling function between On and Off.

Key Path	Span X Scale
Mode	GSM
Remote Command	:DISPlay:ORFSpectrum:VIEW[1] 2:WINDow[1]:TRACe:X[:SCALE]:COUPle 0 1 OFF ON :DISPlay:ORFSpectrum:VIEW[1] 2:WINDow[1]:TRACe:X[:SCALE]:COUPle?
Example	DISP:ORFS:VIEW:WIND:TRAC:X:COUP 1 DISP:ORFS:VIEW:WIND:TRAC:X:COUP?
Notes	Upon pressing the Restart front-panel key or Restart softkey under the Meas Control menu, the scale coupling function automatically determines the scale per division and reference values based on the measurement results if this parameter is set to On. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. Automatically changes to Off
Dependencies	Blanked when Meas Method is Multi Offset.
Couplings	See Notes
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

Sweep/Control

Accesses a menu that enables you to configure the Sweep and Control functions of the analyzer, such as Sweep Time and Gating.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Pause/Resume

Pauses a measurement after the current data acquisition is complete.

When Paused, the label on the key changes to Resume. Pressing Resume un-pauses the measurement. When you are Paused, pressing Restart, Single or Cont does a Resume.

Key Path	Sweep/Control
Remote Command	:INITiate:PAUSE
Dependencies	Grayed out in Measurements that do not support Pausing. Blanked in Modes that do not support Pausing.
Initial S/W Revision	Prior to A.02.00

Key Path	Sweep/Control
Remote Command	:INITiate:RESume
Dependencies	Grayed out in Measurements that do not support Pausing. Blanked in Modes that do not support Pausing.
Initial S/W Revision	Prior to A.02.00

Abort (Remote Command Only)

This command is used to stop the current measurement. It aborts the current measurement as quickly as possible, resets the sweep and trigger systems, and puts the measurement into an "idle" state. If the analyzer is in the process of aligning when ABORT is sent, the alignment finishes before the abort function is performed. So ABORT does not abort an alignment.

If the analyzer is set for Continuous measurement, it sets up the measurement and initiates a new data measurement sequence with a new data acquisition (sweep) taken once the trigger condition is met.

If the analyzer is set for Single measurement, it remains in the "idle" state until an :INIT:IMM command is received.

Remote Command	:ABORT
Example	:ABOR

Notes	<p>If :INITiate:CONTInuous is ON, then a new continuous measurement will start immediately, with sweep (data acquisition) occurring once the trigger condition has been met.</p> <p>If :INITiate:CONTInuous is OFF, then :INITiate:IMMediate is used to start a single measurement; with sweep (data acquisition) occurring once the trigger condition has been met.</p>
Dependencies	<p>For continuous measurement, ABORt is equivalent to the Restart key.</p> <p>Not all measurements support the abort command.</p>
Status Bits/OPC dependencies	<p>The STATus:OPERation register bits 0 through 8 are cleared.</p> <p>The STATus:QUEStionable register bit 9 (INTegrity sum) is cleared.</p> <p>Since all the bits that feed into OPC are cleared by the ABORt, the ABORt will cause the *OPC query to return true.</p>
Initial S/W Revision	Prior to A.02.00

System

See "System" on page 326

Trace/Detector

There is no 'Trace/Detector' functionality supported in GMSK Output RF Spectrum so this Front-panel key displays a blank menu when the key is pressed.

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Trigger

See ["Trigger" on page 408](#)

Free Run

See ["Free Run " on page 415](#)

Video

See ["Video \(IF Envelope\) " on page 416](#)

Trigger Level

See ["Trigger Level " on page 416](#)

Trig Slope

See ["Trig Slope " on page 417](#)

Trig Delay

See ["Trig Delay " on page 418](#)

Line

See ["Line " on page 1321](#)

Trig Slope

See ["Trig Slope " on page 1321](#)

Trig Delay

See ["Trig Delay " on page 420](#)

External 1

See ["External 1 " on page 1333](#)

Trigger Level

See ["Trigger Level " on page 1333](#)

Trig Slope

See ["Trig Slope " on page 1334](#)

Trig Delay

See ["Trig Delay " on page 423](#)

External 2

See ["External 2 " on page 1335](#)

Trigger Level

See ["Trigger Level "](#) on page 1335

Trig Slope

See ["Trig Slope "](#) on page 1336

Trig Delay

See ["Trig Delay "](#) on page 425

RF Burst

See ["RF Burst "](#) on page 1336

Absolute Trigger

See ["Absolute Trigger Level"](#) on page 1337

Relative Trigger

See ["Relative Trigger Level"](#) on page 1326

Trig Slope

See ["Trigger Slope "](#) on page 1338

Trig Delay

See ["Trig Delay "](#) on page 429

Periodic Timer

See ["Periodic Timer \(Frame Trigger\) "](#) on page 1328

Period

See ["Period "](#) on page 1329

Offset

See ["Offset "](#) on page 1330

Offset Adjust (Remote Command Only)

See ["Offset Adjust \(Remote Command Only\)"](#) on page 1331

Reset Offset Display

See ["Reset Offset Display "](#) on page 1332

Sync Source

See ["Sync Source "](#) on page 1332

Off

See ["Off "](#) on page 1333

External 1

See ["External 1 "](#) on page 1333

Trigger Level

See ["Trigger Level "](#) on page 1333

Trig Slope

See ["Trig Slope "](#) on page 1334

External 2

See ["External 2 "](#) on page 1335

Trigger Level

See ["Trigger Level "](#) on page 1335

Trig Slope

See ["Trig Slope "](#) on page 1336

RF Burst

See ["RF Burst "](#) on page 1336

Absolute Trigger

See ["Absolute Trigger Level"](#) on page 1337

Trig Slope

See ["Trigger Slope "](#) on page 1338

Trig Delay

See ["Trig Delay"](#) on page 440

Auto/Holdoff

See ["Auto/Holdoff "](#) on page 440

Auto Trig

See ["Auto Trig "](#) on page 441

Trig Holdoff

See ["Trig Holdoff "](#) on page 441

Holdoff Type

See ["Holdoff Type"](#) on page 442

User Preset

Accesses a menu that gives you the following three choices:

- User Preset – recalls a state previously saved using the Save User Preset function.
- User Preset All Modes – presets all of the modes in the analyzer
- Save User Preset– saves the current state for the current mode

Key Path	Front-panel key
Backwards Compatibility Notes	<p>User Preset is actually loading a state, and in legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, “state” always includes all of this data; so whenever state is loaded, or User Preset is executed, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p> <p>On ESA and PSA, User Preset affected the entire instrument’s state. In the X-Series, User Preset only recalls the state for the active mode. There is a User Preset file for each mode. User Preset can never cause a mode switch as it can in legacy analyzers. If you want to recall all modes to their user preset file state, you will need to do a User Preset after mode switching into each mode.</p> <p>User Preset recalls mode state which can now include data like traces; whereas on ESA and PSA, User Preset did not affect data.</p>
Initial S/W Revision	Prior to A.02.00

User Preset

User Preset sets the state of the currently active mode back to the state that was previously saved for this mode using the Save User Preset menu key or the SCPI command, SYST:PRES:USER:SAV. It not only recalls the Mode Preset settings, but it also recalls all of the mode persistent settings, and the Input/Output system setting that existed at the time Save User Preset was executed.

If a Save User Preset has not been done at any time, User Preset recalls the default user preset file for the currently active mode. The default user preset files are created if, at power-on, a mode detects there is no user preset file. There will never be a scenario when there is no user preset file to restore. For each mode, the default user preset state is the same state that would be saved if a Save User Preset is performed in each mode right after doing a Restore Mode Default and after a Restore Input/Output Defaults.

The User Preset function does the following:

- Aborts the currently running measurement.
- Sets the mode State to the values defined by Save User Preset.
- Makes the saved measurement for the currently running mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

Key Path	User Preset
Remote Command	:SYSTem:PRESet:USER
Example	:SYST:PRES:USER:SAVE:SYST:PRES:USER
Notes	:SYST:PRES:USER:SAVE is used to save the current state as the user preset state. Clears all pending OPC bits. The Status Byte is set to 0. Pressing the User Preset front-panel key while already in the User Preset menu will cause the User Preset to get executed
Couplings	A user preset will cause the currently running measurement to be aborted and cause the saved measurement to be active. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved.
Initial S/W Revision	Prior to A.02.00

User Preset All Modes

Recalls all of the User Preset files for each mode, switches to the power-on mode, and activates the saved measurement from the power-on mode User Preset file.

NOTE

When the instrument is secured, all of the user preset files are converted back to their default user preset files.

The User Preset function does the following:

- Aborts the currently running measurement.
- Switches the Mode to the power-on mode.
- Restores the User Preset files for each mode.
- Makes the saved measurement for the power-on mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

Key Path	User Preset
Remote Command	:SYSTem:PRESet:USER:ALL
Example	:SYST:PRES:USER:SAVE:SYST:PRES:USER:ALL
Notes	Clears all pending OPC bits. The Status Byte is set to 0. :SYST:PRES:USER:SAVE is used to save the current state as the user preset state.
Couplings	A user preset will cause the currently running measurement to be aborted, cause a mode switch to the power-on mode, and cause the saved measurement to be active in the power-on mode. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved.
Initial S/W Revision	Prior to A.02.00

Save User Preset

Saves the currently active mode and its State. You can recall this User Preset file by pressing the User Preset menu key or sending the SYST:PRES:USER remote command. This same state is also saved by the Save State function.

Key Path	User Preset
Remote Command	:SYSTem:PRESet:USER:SAVE
Example	:SYST:PRES:USER:SAVE
Notes	:SYST:PRES:SAVE creates the same file as if the user requested a *SAV or a MMEM:STOR:STAT, except User Preset Save does not allow the user to specify the filename or the location of the file.
Initial S/W Revision	Prior to A.02.00

View Selection

The View/Display key accesses a menu that allows you to select the desired view of the measurement from the following selections.

- ORFS Result Summary (SCPI: RSUMmary) – views the result summary.
- Carrier Info (SCPI: CINFo) – views the carrier information.

The measurement has several available view types. The displayed view depends on the settings of Meas Type (see "[Meas Type](#)" on page 1957) and Meas Method (see "[Meas Method](#)" on page 1963) in the Meas Setup menu.

For details of each view, click the link in the View column of the table below. For remote commands, see "[View Selection by Name](#)" on page 2050 and "[View Selection by number \(Remote Command Only\)](#)" on page 2050.

View	Meas Type Setting	Meas Method Setting
Modulation Power, Multi Offset (See " Modulation Power " on page 2061)	Modulation <i>or</i> Full Frame Mod (FAST)	Multi Offset
Switching Power, Multi Offset (See " Switching Power " on page 2067)	Switching	Multi Offset
Modulation and Switching, Multi Offset (See " Modulation & Switching " on page 2070)	Mod & Switch	Multi Offset
Modulation and Switching, Single Offset (See " Modulation & Switching " on page 2075)	Mod & Switch	Single Offset
Modulation, Single Offset (See " Modulation Power " on page 2061)	Modulation	Single Offset
Switching, Single Offset (See " Switching Power " on page 2080)	Switching	Single Offset
Swept Spectrum (See " Swept Spectrum Views " on page 2081)	Modulation <i>or</i> Switching	Swept

For any view, if a result fails, a red 'F' is displayed beside the result.

Meas Type	Meas Method	Selected View	Displayed View
Modulation*	Multi-Offset	ORFS Result Summary	"Modulation Power" on page 2061
Modulation*	Multi-Offset	Carrier Info	"Modulation Carrier Info" on page 2065
Switching	Multi-Offset	Any	"Switching Power" on page 2067
Mod & Switch	Multi-Offset	Any	"Modulation & Switching" on page 2070

Meas Type	Meas Method	Selected View	Displayed View
Mod & Switch	Single Offset	Any	"Modulation & Switching" on page 2075
Modulation*	Single Offset	ORFS Result Summary	"Modulation Power" on page 2076
Modulation*	Single Offset	Carrier Info	"Modulation Carrier Info" on page 2078
Switching	Single Offset	Any	"Switching Power" on page 2080
Modulation*	Swept	ORFS Result Summary	"Modulation Power" on page 2081
Modulation*	Swept	Carrier Info	"Modulation Carrier Info" on page 2083

Table note: * (or FFModulation)

View Selection by Name

Key Path	View/Display
Mode	GSM
Remote Command	:DISPlay:ORFSpectrum:VIEW[:SElect] RSUMmary CINformation :DISPlay:ORFSpectrum:VIEW[:SElect]?
Example	DISP:ORFS:VIEW RSUM DISP:ORFS:VIEW?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	RSUMmary
State Saved	Saved in instrument state.
Range	ORFS Result Summary Carrier Info
Initial S/W Revision	A.06.00

View Selection by number (Remote Command Only)

Mode	GSM
Remote Command	:DISPlay:ORFSpectrum:VIEW:NSElect <integer> :DISPlay:ORFSpectrum:VIEW:NSElect?
Example	DISP:ORFS:VIEW:NSEL 5 DISP:ORFS:VIEW:NSEL?
Notes	5: ORFS Result Summary 6: Carrier Info You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.

Preset	5
State Saved	Saved in instrument state.
Min	5
Max	6
Initial S/W Revision	A.06.00

Display

The Display menu is common to most measurements, and is used for configuring items on the display. Some Display menu settings apply to all the measurements in a mode, and some only to the current measurement. Those under the System Display Settings key apply to all measurements in all modes.

Key Path	Display
Key Path	View/Display
Initial S/W Revision	Prior to A.02.00

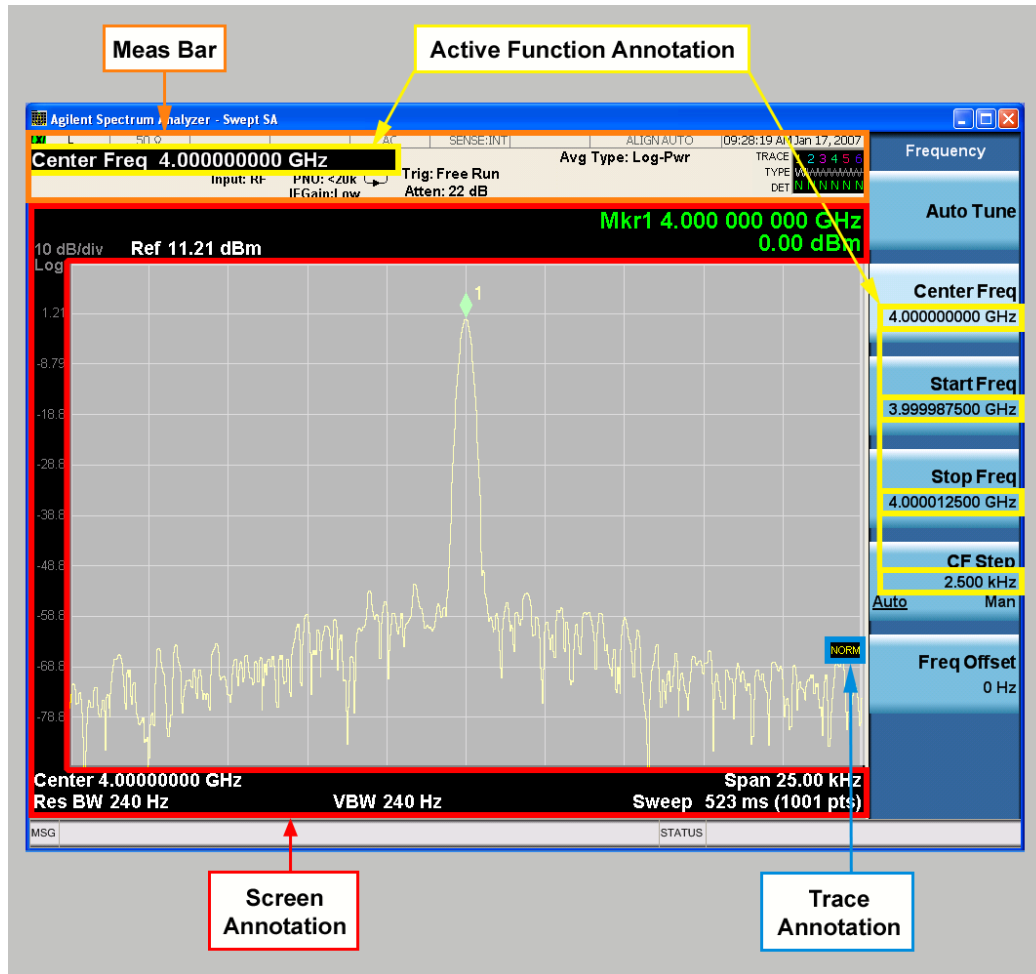
Annotation

Turns on and off various parts of the display annotation. The annotation is divided up into four categories:

1. Meas Bar: This is the measurement bar at the top of the screen. It does not include the settings panel or the Active Function. Turning off the Meas Bar turns off the settings panel and the Active Function. When the Meas Bar is off, the graticule area expands to fill the area formerly occupied by the Meas Bar.
2. Screen Annotation: this is the annotation and annunciation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) This does NOT include the marker number or the N dB result. When off, the graticule expands to fill the entire graticule area.
3. Trace annotation: these are the labels on the traces, showing their detector (or their math mode).
4. Active Function annotation: this is the active function display in the meas bar, and all of the active function values displayed on softkeys.

See the figure below. Each type of annotation can be turned on and off individually.

16 GSM Output RF Spectrum Measurement
View Selection



Key Path	View/Display, Display
Initial S/W Revision	Prior to A.02.00

Meas Bar On/Off

This function turns the Measurement Bar on and off, including the settings panel. When off, the graticule area expands to fill the area formerly occupied by the Measurement Bar.

Key Path	View/Display, Display, Annotation
Remote Command	:DISPlay:ANNOtation:MBAR[:STATe] OFF ON 0 1 :DISPlay:ANNOtation:MBAR[:STATe]?
Example	DISP:ANN:MBAR OFF
Dependencies	Grayed out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset	On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off.
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Screen

This controls the display of the annunciation and annotation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) and the y-axis annotation. This does NOT include marker annotation (or the N dB result). When off, the graticule expands to fill the entire graticule area, leaving only the 1.5% gap above the graticule as described in the Trace/Detector chapter.

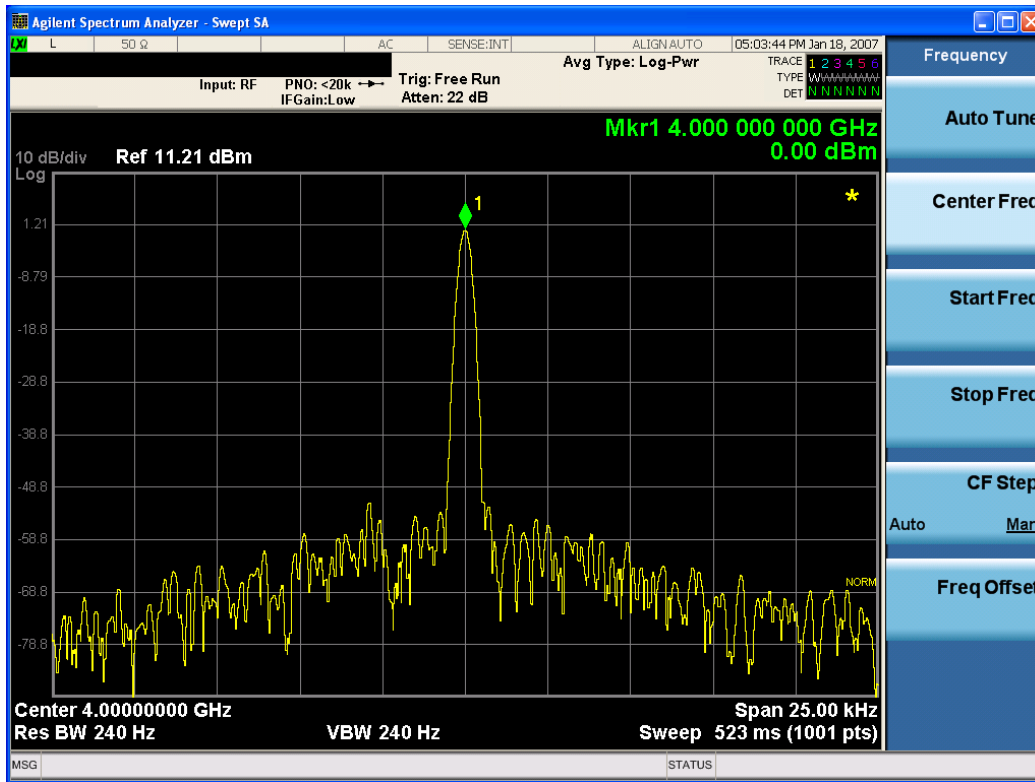
Key Path	View/Display, Display, Annotation
Remote Command	:DISPlay:ANNotation:SCReen[:STATe] OFF ON 0 1 :DISPlay:ANNotation:SCReen[:STATe]?
Example	DISP:ANN:SCR OFF
Dependencies	Grayed-out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset	On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Active Function Values On/Off

Turns on and off the active function display in the Meas Bar, and all of the active function values displayed on the softkeys.

Note that all of the softkeys that have active functions have these numeric values blanked when this function is on. This is a security feature..

16 GSM Output RF Spectrum Measurement
View Selection



Key Path	View/Display, Display, Annotation
Remote Command	:DISPlay:ACTivefunc[:STATE] ON OFF 1 0 :DISPlay:ACTivefunc[:STATE] ?
Example	DISP:ACT OFF
Dependencies	Grayed out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset	On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Title

Displays menu keys that enable you to change or clear a title on your display.

Key Path	View/Display, Display
Initial S/W Revision	Prior to A.02.00

Change Title

Writes a title into the "measurement name" field in the banner, for example, "Swept SA".

Press Change Title to enter a new title through the alpha editor. Press Enter or Return to complete the entry. Press ESC to cancel the entry and preserve your existing title.

The display title will replace the measurement name. It remains for this measurement until you press Change Title again, or you recall a state, or a Preset is performed. A title can also be cleared by pressing Title, Clear Title.

NOTE

Notice the inclusion of the <measurement> parameter in the command below. Because each measurement remembers the Display Title, the command must be qualified with the measurement name. For the Swept SA measurement this is not the case; no <measurement> parameter is used when changing the Display Title for the Swept SA measurement.

Key Path	View/Display, Display, Title
Mode	All
Remote Command	:DISPlay:<measurement>:ANNotation:TITLe:DATA <string> :DISPlay:<measurement>:ANNotation:TITLe:DATA?
Example	DISP:ANN:TITL:DATA "This Is My Title" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "This Is My Title" This example is for Measurements other than Swept SA. Both set the title to: This Is My Title
Notes	Pressing this key cancels any active function. When a title is edited the previous title remains intact (it is not cleared) and the cursor goes at the end so that characters can be added or BKSP can be used to go back over previous characters.
Preset	No title (measurement name instead)
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Clear Title

Clears a title from the front-panel display. Once cleared, the title cannot be retrieved. After the title is cleared, the current Measurement Name replaces it in the title bar.

Key Path	View/Display, Display, Title
Example	The following commands clear the title and restore the measurement's original title: DISP:ANN:TITL:DATA "" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "" This example is for ACP; in measurements other than Swept SA the measurement name is required.
Notes	Uses the :DISPlay:<measurement>:ANNotation:TITLe:DATA <string> command with an empty string (in the Swept SA, the <measurement> is omitted).
Preset	Performed on Preset.
Initial S/W Revision	Prior to A.02.00

Graticule

Pressing Graticule turns the display graticule On or Off. It also turns the graticule y-axis annotation on and off.

Key Path	View/Display, Display
Remote Command	:DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe] OFF ON 0 1 :DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe]?
Example	DISP:WIND:TRAC:GRAT:GRID OFF
Notes	The graticule is the set of horizontal and vertical lines that make up the grid/divisions for the x-axis and y-axis.
Preset	On
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00

System Display Settings

These settings are "Mode Global" – they affect all modes and measurements and are reset only by Restore Misc Defaults or Restore System Defaults under System.

Key Path	View/Display, Display
Initial S/W Revision	Prior to A.02.00

Annotation Local Settings

This is a Mode Global override of the meas local annotation settings. When it is All Off, it forces ScreenAnnotation, Meas Bar, Trace, and Active Function Values settings to be OFF for all measurements in all modes. This provides the security based "annotation off" function of previous analyzers; hence it uses the legacy SCPI command.

When it is All Off, the Screen, Meas Bar, Trace, and Active Function Values keys under the Display, Annotation menu are grayed out and forced to Off. When Local Settings is selected, you are able to set the local annotation settings on a measurement by measurement basis.

Key Path	View/Display, Display, System Display Settings
Remote Command	:DISPlay:WINDow[1]:ANNotation[:ALL] OFF ON 0 1 :DISPlay:WINDow[1]:ANNotation[:ALL]?
Example	:DISP:WIND:ANN OFF
Preset	On (Set by Restore Misc Defaults)
State Saved	Not saved in instrument state.
Backwards Compatibility Notes	The WINDow parameter and optional subopcode is included for backwards compatibility but ignored – all windows are equally affected.
Initial S/W Revision	Prior to A.02.00

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

Key Path	Save, Screen Image
Remote Command	:MMEMory:STORe:SCReem:THEMe TDColor TDMonochrome FCOLor FMONochrome :MMEMory:STORe:SCReem:THEMe?
Example	:MMEM:STOR:SCR:THEM TDM
Preset	3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes.
Readback	3D Color 3D Mono Flat Color Flat Mono
Backwards Compatibility Notes	In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical.
Initial S/W Revision	Prior to A.02.00

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDC
Readback	3D Color
Initial S/W Revision	Prior to A.02.00

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDM
Readback	3D Mono
Initial S/W Revision	Prior to A.02.00

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FCOL
Readback	Flat Color
Initial S/W Revision	Prior to A.02.00

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FMON
Readback	Flat Mono
Initial S/W Revision	Prior to A.02.00

Backlight

Accesses the display backlight on/off keys. This setting may interact with settings under the Windows "Power" menu.

When the backlight is off, pressing ESC, TAB, SPACE, ENTER, UP, DOWN, LEFT, RIGHT, DEL, BKSP, CTRL, or ALT turns the backlight on without affecting the application. Pressing any other key will turn backlight on and could potentially perform the action as well.

Key Path	View/Display, Display, System Display Settings
Remote Command	:DISPlay:BACKlight ON OFF :DISPlay:BACKlight?
Preset	ON (Set by Restore Misc Defaults)
Initial S/W Revision	Prior to A.02.00

Backlight Intensity

An active function used to set the backlight intensity. It goes from 0 to 100 where 100 is full on and 0 is off. This value is independent of the values set under the Backlight on/off key.

Key Path	View/Display, Display, System Display Settings
Remote Command	:DISPlay:BACKlight:INTensity <integer> :DISPlay:BACKlight:INTensity?
Example	DISP:BACK:INT 50

Preset	100 (Set by Restore Misc Defaults)
Min	0
Max	100
Initial S/W Revision	Prior to A.02.00

View Selection

The View/Display key accesses a menu that allows you to select the desired view of the measurement from the following selections.

- ORFS Result Summary (SCPI: RSUMmary) – views the result summary.
- Carrier Info (SCPI: CINFo) – views the carrier information.

The measurement has several available view types. The displayed view depends on the settings of Meas Type (see "[Meas Type](#)" on page 1957) and Meas Method (see "[Meas Method](#)" on page 1963) in the Meas Setup menu.

For details of each view, click the link in the View column of the table below. For remote commands, see "[View Selection by Name](#)" on page 2060 and "[View Selection by number \(Remote Command Only\)](#)" on page 2060.

View	Meas Type Setting	Meas Method Setting
Modulation Power, Multi Offset (See " Modulation Power " on page 2061)	Modulation <i>or</i> Full Frame Mod (FAST)	Multi Offset
Switching Power, Multi Offset (See " Switching Power " on page 2067)	Switching	Multi Offset
Modulation and Switching, Multi Offset (See " Modulation & Switching " on page 2070)	Mod & Switch	Multi Offset
Modulation and Switching, Single Offset (See " Modulation & Switching " on page 2075)	Mod & Switch	Single Offset
Modulation, Single Offset (See " Modulation Power " on page 2061)	Modulation	Single Offset
Switching, Single Offset (See " Switching Power " on page 2080)	Switching	Single Offset
Swept Spectrum (See " Swept Spectrum Views " on page 2081)	Modulation <i>or</i> Switching	Swept

For any view, if a result fails, a red 'F' is displayed beside the result.

Meas Type	Meas Method	Selected View	Displayed View
Modulation*	Multi-Offset	ORFS Result Summary	"Modulation Power" on page 2061
Modulation*	Multi-Offset	Carrier Info	"Modulation Carrier Info" on page 2065
Switching	Multi-Offset	Any	"Switching Power" on page 2067
Mod & Switch	Multi-Offset	Any	"Modulation & Switching" on page 2070
Mod & Switch	Single Offset	Any	"Modulation & Switching" on page 2075
Modulation*	Single Offset	ORFS Result Summary	"Modulation Power" on page 2076
Modulation*	Single Offset	Carrier Info	"Modulation Carrier Info" on page 2078
Switching	Single Offset	Any	"Switching Power" on page 2080
Modulation*	Swept	ORFS Result Summary	"Modulation Power" on page 2081
Modulation*	Swept	Carrier Info	"Modulation Carrier Info" on page 2083

Table note: *(or FFModulation)

View Selection by Name

Key Path	View/Display
Mode	GSM
Remote Command	:DISPlay:ORFSpectrum:VIEW[:SElect] RSUMmary CINformation :DISPlay:ORFSpectrum:VIEW[:SElect]?
Example	DISP:ORFS:VIEW RSUM DISP:ORFS:VIEW?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	RSUMmary
State Saved	Saved in instrument state.
Range	ORFS Result Summary Carrier Info
Initial S/W Revision	A.06.00

View Selection by number (Remote Command Only)

Mode	GSM
Remote Command	:DISPlay:ORFSpectrum:VIEW:NSElect <integer> :DISPlay:ORFSpectrum:VIEW:NSElect?

Example	DISP:ORFS:VIEW:NSEL 5 DISP:ORFS:VIEW:NSEL?
Notes	5: ORFS Result Summary 6: Carrier Info You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Preset	5
State Saved	Saved in instrument state.
Min	5
Max	6
Initial S/W Revision	A.06.00

Multi-Offset views

These views are displayed when Meas Method is set to Multi Offset. For details, see ["Meas Method" on page 1963](#).

Modulation Power

This view is displayed when:

- Meas Type: Modulation
- Meas Method: Multi-Offset
- View/Display: ORFS Result Summary

The view has only one window: the Metrics Window. Details of each element of this window can be found in ["Metrics Window" on page 2062](#) and ["Metrics Window \(for single carrier only\)" on page 2064](#).

The following graphic shows an example of this view.

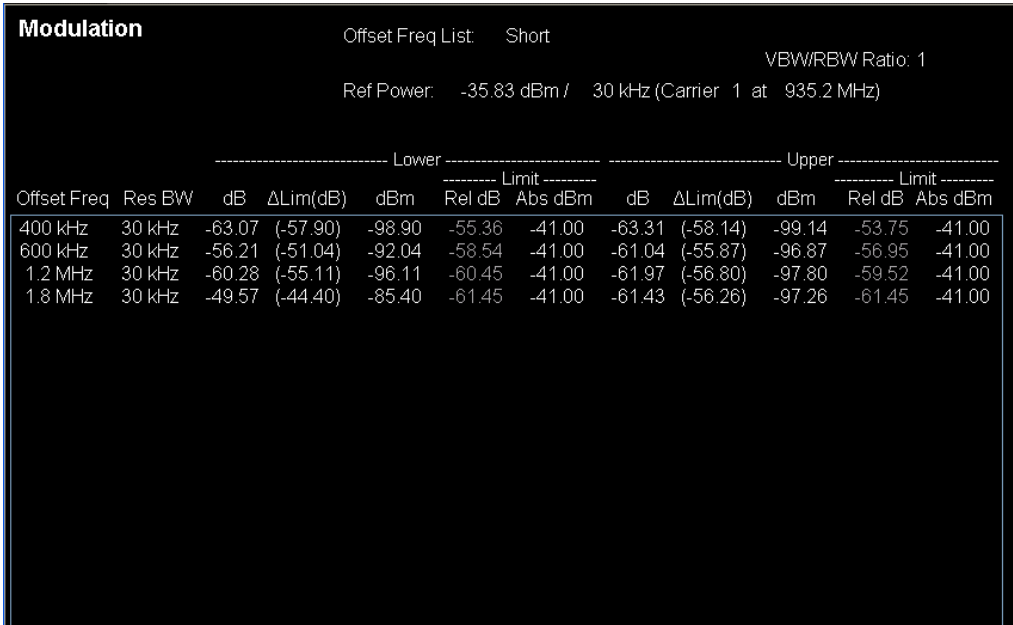


Figure 0-1 Multi-Offset View with Modulation Power

Metrics Window

Name	Corresponding Results	Display Format
PCL	None. Power Control Level determined by the Carrier Power and used to determine the limits. Since PCL is a Measurement Global parameter, [:SENSe]:RADio:PCL, refer to the section Mode Functionality. Auto disappears when [:SENSe]:RADio:PCL:STATe is set to 0 Off. This is shown for MS only.	
Offset Freq List	None Offset Frequency list parameter value (Standard Short Custom)	Short
Ref Power	n=1 2 Reference Power for all offsets [dBm] Resolution Bandwidth for reference power measurement [Hz] Index of the Power Reference Carrier Center Frequency of the Power Reference Carrier [Hz]	-99.99/99/1/99
VBW/RBW Ratio	None VBW/RBW Ratio (1 3) [1 = Modulation, 3 = Switching]	1
Offset Freq	None Offset Frequency to be measured [Hz]	-99.99
Res BW	None	-99.99

Name	Corresponding Results	Display Format
	Resolution Bandwidth for each offset [Hz]	
Lower dB	n=1 N*4+1 Lower offset(N) – power relative to carrier [dB]	-99.99
Delta from Limit dB Lower	n=8N*8+1 Relative level to the test limit [dB] at the lower offset(N)	-99.99
Lower dBm	n=1 N*4+2 Lower offset(N) – absolute average power [dBm]	-99.99
Limit Rel dB Lower	n=8N*8+2 Relative lower test limit used [dB]	-99.99
Limit Abs dBm Lower	n=8N*8+3 Absolute lower test limit used [dBm]	-99.99
Abs/Rel Lower Limit Applied	n=8 N*8+4 Which lower test limit is applied, Abs or Rel (0 1 2 3) “0” indicates neither test limit is applied. “1” indicates Absolute test limit is applied “2” indicates Relative test limit is applied. “3” indicates both test limits are applied. This means Absolute test limit is equal to Relative test limit.	1
Upper dB	n=1 N*4+3 Upper offset(N) – power relative to carrier [dB]	-99.99
Delta from Limit dB Upper	n=8N*8+5 Relative level to the test limit [dB] at the upper offset(N)	-99.99
Upper dBm	n=1 N*4+4 Upper offset(N) – absolute average power [dBm]	-99.99
Limit Rel dB Upper	n=8N*8+6 Relative upper test limit used [dB]	-99.99
Limit Abs dBm Upper	n=8 N*8+7 Absolute upper test limit used [dBm]	-99.99
Abs/Rel Upper Limit Applied	n=8 N*8+8 Which upper test limit is applied, Abs or Rel (0 1 2 3) “0” indicates neither test limit is applied. “1” indicates Absolute test limit is applied “2” indicates Relative test limit is applied. “3” indicates both test limits are applied. This means Absolute test limit is equal to Relative test limit.	1

The measurement results for an offset frequency are typically displayed in one row in a table. However, there is a possibility that the results are displayed in two rows in a multi-carrier system. The following graphic depicts an example of this. In the figure, the results for an offset frequency of 8.0 MHz are displayed in two rows enclosed by green lines. The results for the lower/upper offset are displayed in the lower/upper row respectively. This is a case where one of the lower and upper offset frequencies corresponds to IM Products and the other doesn't. In such case, the Res BWs are different between the two offset frequencies and therefore, the results are displayed in two separate rows. The results from the query READ/FETCH are retrieved in a format similar to the displayed table. For invalid data indicated by "--", if they are power related data, the results are returned as 9.91E+37 which means NaN (Not a Number). If they indicate the limit applied, Rel or Abs, the results are returned as 0 which means neither of the two is applied.

Modulation												
		Offset Freq List						Standard				
		VBW/RBW Ratio: 1										
		Ref Power: 26.08 dBm / 30 kHz (Carrier 2 at 937.2 MHz)										
		30.05 dBm / 100 kHz (Carrier 2 at 937.2 MHz)										
		32.07 dBm / 300 kHz (Carrier 2 at 937.2 MHz)										
		----- Lower -----						----- Upper -----				
Offset Freq	Res BW	dB	ΔLim(dB)	dBm	Rel dB	Abs dBm	dB	ΔLim(dB)	dBm	Rel dB	Abs dBm	Limit
400 kHz	30 kHz	-74.81	(-19.13)	-48.74	-55.69	-36.00	-76.40	(-20.71)	-50.32	-55.69	-36.00	
600 kHz	30 kHz	-77.83	(-17.97)	-51.75	-59.86	-36.00	-78.68	(-18.83)	-52.61	-59.86	-36.00	
1.2 MHz	30 kHz	-78.03	(-15.95)	-51.95	-62.14	-36.00	-79.27	(-17.20)	-53.20	-62.76	-36.00	
1.8 MHz	30 kHz	-77.96	(-15.89)	-51.89	-63.42	-36.00	-78.65	(-16.57)	-52.57	-64.27	-36.00	
2.0 MHz	100 kHz	-48.87	(12.08)	-18.82	-60.96	-36.00	-71.53	(-10.57)	-41.48	-60.96	-36.00	
3.0 MHz	100 kHz	-68.28	(-7.33)	-38.23	-60.96	-36.00	-77.70	(-16.74)	-47.64	-60.96	-36.00	
4.0 MHz	100 kHz	-65.47	(-4.51)	-35.42	-60.96	-36.00	-77.42	(-16.46)	-47.36	-60.96	-36.00	
5.0 MHz	100 kHz	-67.14	(-6.18)	-37.09	-60.96	-36.00	-76.92	(-15.97)	-46.87	-60.96	-36.00	
7.0 MHz	300 kHz	-52.84	(15.23)	-20.77	-70.00	-36.00	-75.05	(-6.99)	-42.99	-70.00	-36.00	
8.0 MHz	300 kHz	-75.08	(-7.01)	-43.01	-70.00	-36.00	---	---	---	---	---	
8.0 MHz	100 kHz	---	---	---	---	---	-74.00	(-11.92)	-47.92	-75.23	-36.00	
9.0 MHz	300 kHz	-69.65	(-1.59)	-37.59	-70.00	-36.00	-75.44	(-7.37)	-43.37	-70.00	-36.00	
10.0 MHz	300 kHz	-75.42	(-7.36)	-43.36	-70.00	-36.00	-75.65	(-7.58)	-43.58	-70.00	-36.00	

Metrics Window (for single carrier only)

Name	Corresponding Results	Display Format
PCL	None. Power Control Level determined by the Transmit Power and used to determine the limits. Since PCL is a Measurement Global parameter, [:SENSe]:RADio:PCL, refer to the section Mode Functionality. Auto disappears when [:SENSe]:RADio:PCL:STATe is set to 0 Off. This is shown for MS only.	PCL: ## AutoRange
Offset Freq List	None Offset Frequency list parameter value (Standard Short Custom)	Short

Name	Corresponding Results	Display Format
Ref Power	n=1 2 Reference Power for all offsets [dBm] Resolution Bandwidth for reference power measurement [Hz]	-99.99/99
VBW/RBW Ratio	None VBW/RBW Ratio (1 3) [1 = Modulation, 3 = Switching]	1
Offset Freq	None Offset Frequency to be measured [Hz]	-99.99
Res BW	None Resolution Bandwidth for each offset [Hz]	-99.99
Lower dB	n=1 (N-1)*4+1 Negative offset(N) – power relative to carrier [dB]	-99.99
Delta from Limit dB Lower	n=6 (N-1)*4+1 Relative level to the test limit [dB] at the negative offset (N)	-99.99
Lower dBm	n=1 (N-1)*4+2 Negative offset(N) – absolute average power [dBm]	-99.99
Limit Rel dB Lower	n=6 (N-1)*4+3 Relative lower test limit used [dB]	-99.99
Limit Abs dBm Lower	n=6 (N-1)*4+4 Absolute lower test limit used [dBm]	-99.99
Upper dB	n=1 (N-1)*4+3 Positive offset(N) – power relative to carrier [dB]	-99.99
Delta from Limit dB Upper	n=6 (N-1)*4+2 Relative level to the test limit [dB] at the positive offset (N)	-99.99
Upper dBm	n=1 (N-1)*4+4 Positive offset(N) – absolute average power [dBm]	-99.99
Limit Rel dB Upper	n=6 (N-1)*4+3 Relative upper test limit used [dB]	-99.99
Limit Abs dBm Upper	n=6 (N-1)*4+4 Absolute upper test limit used [dBm]	-99.99

Modulation Carrier Info

This view is displayed when:

- Meas Type: Modulation
- Meas Method: Multi-Offset

- View/Display: Carrier Info

The view has only one window: the Metrics Window. For details of the elements of this window, see ["Metrics Window" on page 2066](#).

The following graphic shows an example of this view.

Modulation Carrier Info								
VBW/RBW Ratio: 1								
	Carr Pwr	Ref Pwr	RBW 30kHz, 100kHz, 300kHz	Offset Freq	Freq	Pwr Present	Pwr Ref	
1:	-28.20 dBm	-35.90 dBm	-31.77 dBm -29.60 dBm	0.0000 Hz	935.20 MHz	Yes	Max Pwr	
2:	-56.38 dBm	-93.02 dBm	-89.21 dBm -78.05 dBm	600.00 kHz	935.80 MHz	No		
3:	-56.29 dBm	-94.50 dBm	-90.22 dBm -77.66 dBm	1.2000 MHz	936.40 MHz	No		
4:	-28.27 dBm	-36.02 dBm	-31.78 dBm -29.72 dBm	1.8000 MHz	937.00 MHz	Yes		
5:	-28.31 dBm	-36.14 dBm	-31.90 dBm -29.87 dBm	2.4000 MHz	937.60 MHz	Yes		
6:	-28.35 dBm	-36.13 dBm	-31.91 dBm -29.81 dBm	3.0000 MHz	938.20 MHz	Yes		

Figure 0-2 Multi-Offset View with Modulation Carrier Info

Metrics Window

Name	Corresponding Results	Display Format
VBW/RBW Ratio	None VBW/RBW Ratio (1 3) [1 = Modulation, 3 = Switching]	1
Carrier Index	None Index of Carrier to be measured	1
Carr Pwr	None Carrier Power for Power Level (Measured with 400kHz RBW)	-99.99
Ref Pwr	None Carrier Power for Reference Power (Measured with the specified RBW. e.g. 30kHz, 100kHz, 300kHz)	-99.99/99
Offset Freq	None Offset Frequency from the Reference Carrier for each Carrier [Hz]	99
Freq	None Center Frequency of each Carrier [Hz]	99

Name	Corresponding Results	Display Format
Pwr Present	None Indicates whether the power is present for each carrier	Yes
Pwr Ref	None Indicates the type of the Power Reference if the carrier is the Power Reference Carrier (Ref Carr Max Pwr)	Ref Carr

Switching Power

This view is displayed when:

- Meas Type: Switching
- Meas Method: Multi-Offset

The view has only one window: the Metrics Window. For details of the elements of this window, see ["Metrics Window" on page 2068](#) and ["Metrics Window \(for single carrier only\)" on page 2069](#)

The following graphic shows an example of this view.

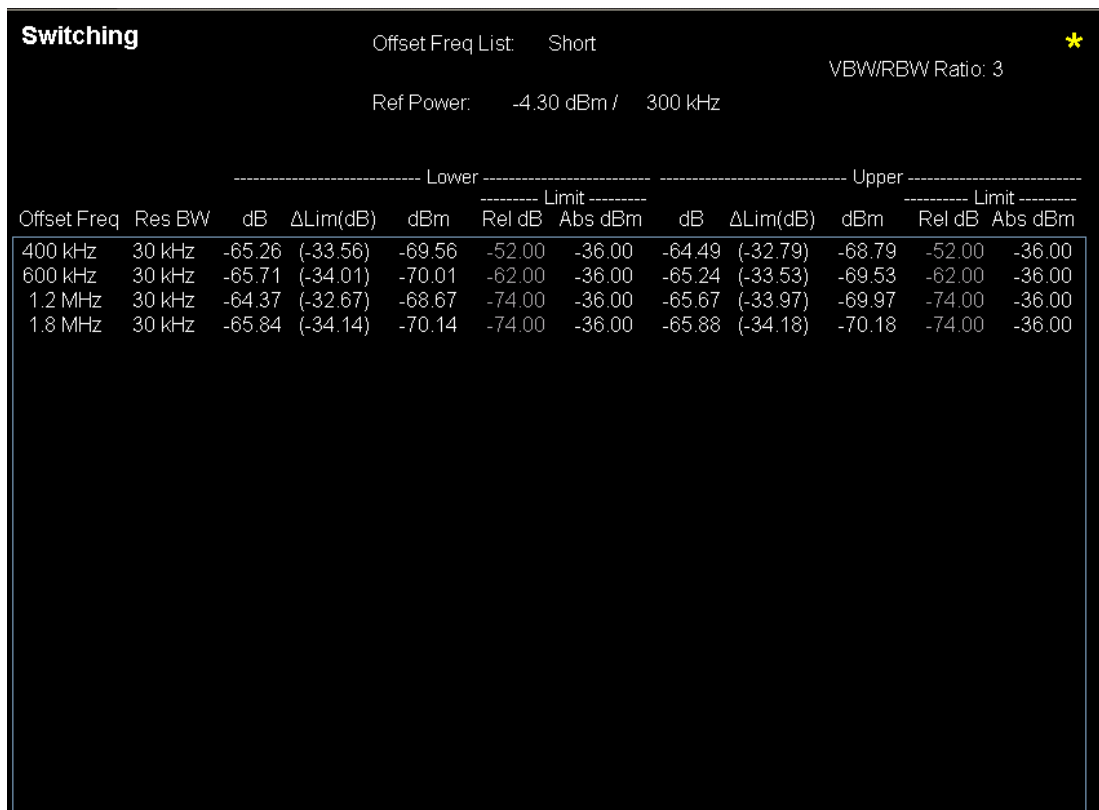


Figure 0-3 Switching Power view for GMSK Output RF Spectrum Measurement

Metrics Window

Name	Corresponding Results	Display Format
PCL	None. Power Control Level determined by the Transmit Power and used to determine the limits. Since PCL is a Measurement Global parameter, [:SENSe]:RADio:PCL, refer to the section Mode Functionality. Auto disappears when [:SENSe]:RADio:PCL:STATe is set to 0 Off. This is shown for MS only.	PCL: ## AutoRange
Offset Freq List	None Offset Frequency list parameter value (Standard Short Custom)	Short
Ref Power	n=1 62 Reference Power for all offsets [dBm] Resolution Bandwidth for reference power measurement [Hz]	-99.99
VBW/RBW Ratio	None VBW/RBW Ratio (1 3) [1 = Modulation, 3 = Switching]	1
Offset Freq	None Offset Frequency to be measured [Hz]	-99.99
Res BW	None Resolution Bandwidth for each offset [Hz]	-99.99
Lower dB	n=1 N*4+1 Lower offset(N) – power relative to carrier [dB]	-99.99
Delta from Limit dB Lower	n=8 N*8+1 Relative level to the test limit [dB] at the lower offset (N)	-99.99
Lower dBm	n=1 N*4+2 Lower offset(N) – absolute average power [dBm]	-99.99
Limit Rel dB Lower	n=8 N*8+2 Relative lower test limit used [dB]	-99.99
Limit Abs dBm Lower	n=8 N*8+3 Absolute lower test limit used [dBm]	-99.99
Abs/Rel Lower Limit Applied	n=8 N*8+4 Which lower test limit is applied, Abs or Rel (0 1 2 3) “0” indicates neither test limit is applied. “1” indicates Absolute test limit is applied “2” indicates Relative test limit is applied.	1

Name	Corresponding Results	Display Format
	“3” indicates both test limits are applied. This means Absolute test limit is equal to Relative test limit.	
Upper dB	n=1 N*4+3 Upper offset(N) – power relative to carrier [dB]	-99.99
Delta from Limit dB Upper	n=8N*8+5 Relative level to the test limit [dB] at the upper offset (N)	-99.99
Upper dBm	n=1 N*4+4 Upper offset(N) – absolute average power [dBm]	-99.99
Limit Rel dB Upper	n=8N*8+6 Relative test limit used [dB]	-99.99
Limit Abs dBm Upper	n=8N*8+7 Absolute test limit used [dBm]	-99.99
Abs/Rel Upper Limit Applied	n=8 (N-1)*8+8 Which upper test limit is applied, Abs or Rel (0 1 2 3) “0” indicates neither test limit is applied. “1” indicates Absolute test limit is applied “2” indicates Relative test limit is applied. “3” indicates both test limits are applied. This means Absolute test limit is equal to Relative test limit.	1

Metrics Window (for single carrier only)

Name	Corresponding Results	Display Format
PCL	None. Power Control Level determined by the Transmit Power and used to determine the limits. Since PCL is a Measurement Global parameter, [:SENSe]:RADio:PCL, refer to the section Mode Functionality. Auto disappears when [:SENSe]:RADio:PCL:STATe is set to 0 Off. This is shown for MS only.	PCL: ## AutoRange
Offset Freq List	None Offset Frequency list parameter value (Standard Short Custom)	Short
Ref Power	n=1 62 Reference Power for all offsets [dBm] Resolution Bandwidth for reference power measurement [Hz]	-99.99

Name	Corresponding Results	Display Format
VBW/RBW Ratio	None VBW/RBW Ratio (1 3) [1 = Modulation, 3 = Switching]	1
Offset Freq	None Offset Frequency to be measured [Hz]	-99.99
Res BW	None Resolution Bandwidth for each offset [Hz]	-99.99
Lower dB	$n=1N*4+1$ Lower offset(N) - power relative to carrier [dB]	-99.99
Delta from Limit dB Lower	$n=6N*4+1$ Relative level to the test limit [dB] at the lower offset (N)	-99.99
Lower dBm	$n=1N*4+2$ Lower offset(N) - absolute average power [dBm]	-99.99
Limit Rel dB Lower	$n=6N*4+3$ Relative lower test limit used [dB]	-99.99
Limit Abs dBm Lower	$n=6N*4+4$ Absolute lower test limit used [dBm]	-99.99
Upper dB	$n=1N*4+3$ Upper offset(N) - power relative to carrier [dB]	-99.99
Delta from Limit dB Upper	$n=6N*4+2$ Relative level to the test limit [dB] at the upper offset (N)	-99.99
Upper dBm	$n=1N*4+4$ Upper offset(N) - absolute average power [dBm]	-99.99
Limit Rel dB Upper	$n=6N*4+3$ Relative upper test limit used [dB]	-99.99
Limit Abs dBm Upper	$n=6N*4+4$ Absolute upper test limit used [dBm]	-99.99

Modulation & Switching

This view is displayed when:

- Meas Type: Mod & Switch
- Meas Method: Multi-Offset

The view has only one window: the Metrics Window. Details of each element of this window can be found in ["Metrics Window" on page 2071](#) and ["Metrics Window \(for single carrier only\)" on page 2074](#).

The following graphic shows an example of this view.

Modulation & Switching												
Modulation		Offset Freq List						Short				
Modulation		Ref Power: -11.22 dBm / 30 kHz						VBW/RBW Ratio: 1				
		----- Lower -----						----- Upper -----				
Offset Freq	Res BW	dB	ΔLim(dB)	dBm	Rel dB	Abs dBm	dB	ΔLim(dB)	dBm	Rel dB	Abs dBm	
200 kHz	30 kHz	-39.84	(-9.84)	-51.06	-30.00	-65.00	-40.16	(-10.16)	-51.38	-30.00	-65.00	
250 kHz	30 kHz	-42.37	(-9.37)	-53.58	-33.00	-65.00	-41.50	(-8.50)	-52.72	-33.00	-65.00	
400 kHz	30 kHz	-67.12	(-13.34)	-78.34	-56.00	-65.00	-68.05	(-14.26)	-79.26	-56.00	-65.00	
600 kHz	30 kHz	-70.30	(-16.52)	-81.52	-60.00	-65.00	-70.59	(-16.81)	-81.81	-60.00	-65.00	
1.2 MHz	30 kHz	-70.66	(-16.87)	-81.87	-63.00	-65.00	-69.88	(-16.10)	-81.10	-63.00	-65.00	
1.8 MHz	100 kHz	-65.47	(-11.68)	-76.68	-65.00	-65.00	-65.27	(-11.49)	-76.49	-65.00	-65.00	

Switching												
Switching		Ref Power: -4.28 dBm / 300 kHz						VBW/RBW Ratio: 3				
		----- Lower -----						----- Upper -----				
Offset Freq	Res BW	dB	ΔLim(dB)	dBm	Rel dB	Abs dBm	dB	ΔLim(dB)	dBm	Rel dB	Abs dBm	
400 kHz	30 kHz	-65.41	(-33.69)	-69.69	-52.00	-36.00	-64.01	(-32.29)	-68.29	-52.00	-36.00	
600 kHz	30 kHz	-65.06	(-33.33)	-69.33	-62.00	-36.00	-65.01	(-33.29)	-69.29	-62.00	-36.00	
1.2 MHz	30 kHz	-65.64	(-33.92)	-69.92	-74.00	-36.00	-65.64	(-33.92)	-69.92	-74.00	-36.00	
1.8 MHz	30 kHz	-65.20	(-33.47)	-69.47	-74.00	-36.00	-65.29	(-33.57)	-69.57	-74.00	-36.00	

Figure 0-4 Modulation and Switching view for EDGE Output RF Spectrum Measurement

Metrics Window

Name	Corresponding Results	Display Format
PCL	None. Power Control Level determined by the Transmit Power and used to determine the limits. Since PCL is a Measurement Global parameter, [:SENSE]:RADio:PCL, refer to the section Mode Functionality. Auto disappears when [:SENSE]:RADio:PCL:STATE is set to 0 Off. This is shown for MS only.	PCL: ## AutoRange
Offset Freq List	Offset Frequency list parameter value (Standard Short Custom)	Short
Ref Power (Modulation)	n=1 2 Modulation Reference Power for all offsets [dBm] Resolution Bandwidth for reference power measurement [Hz]	-99.99/99
Ref Power (Switching)	n=1 62 Switching Reference Power for all offsets [dBm] Resolution Bandwidth for reference power measurement [Hz]	-99.99/99

Name	Corresponding Results	Display Format
VBW/RBW Ratio	None VBW/RBW Ratio (1 3) [1 = Modulation, 3 = Switching]	1
Offset Freq	Offset Frequency to be measured [Hz]	-99.99
Res BW	Resolution Bandwidth for each offset [Hz]	-99.99
Lower dB (Modulation)	$n=1N*4+1$ Lower offset(N) - power relative to carrier [dB]	-99.99
Delta from Limit dB Lower (Modulation)	$n=8N*8+1$ Relative level to the test limit [dB] at the lower offset(N)	-99.99
Lower dBm (Modulation)	$n=1N*4+2$ Lower offset(N) - absolute average power [dBm]	-99.99
Limit Rel dB Lower (Modulation)	$n=8N*8+2$ Relative lower test limit used [dB]	-99.99
Limit Abs dBm Lower (Modulation)	$n=8N*8+3$ Absolute lower test limit used [dBm]	-99.99
Abs/Rel Lower Limit Applied (Modulation)	$n=8 N*8+4$ Which lower test limit is applied, Abs or Rel (0 1 2 3) "0" indicates neither test limit is applied. "1" indicates Absolute test limit is applied "2" indicates Relative test limit is applied. "3" indicates both test limits are applied. This means Absolute test limit is equal to Relative test limit.	1
Upper dB (Modulation)	$n=1N*4+3$ Upper offset(N) - power relative to carrier [dB]	-99.99
Delta from Limit dB Upper (Modulation)	$n=8N*8+5$ Relative level to the test limit [dB] at the upper offset(N)	-99.99
Limit Rel dB Upper (Modulation)	$n=8N*8+6$ Relative test limit used [dB]	-99.99
Limit Abs dBm Upper (Modulation)	$n=8N*8+7$ Absolute test limit used [dBm]	-99.99
Abs/Rel Upper Limit Applied (Modulation)	$n=8 N*8+8$ Which upper test limit is applied, Abs or Rel (0 1 2 3) "0" indicates neither test limit is applied. "1" indicates Absolute test limit is applied	1

Name	Corresponding Results	Display Format
	<p>"2" indicates Relative test limit is applied.</p> <p>"3" indicates both test limits are applied. This means Absolute test limit is equal to Relative test limit.</p>	
Lower dB (Switching)	<p>$n=1 \ N*4+61$</p> <p>Lower offset(N) – power relative to carrier [dB]</p>	-99.99
Delta from Limit dB Lower (Switching)	<p>$n=8 \ N*8+121$</p> <p>Relative level to the test limit [dB] at the lower offset(N)</p>	-99.99
Lower dBm (Switching)	<p>$n=1 \ N*4+62$</p> <p>Lower offset(N) – absolute average power [dBm]</p>	-99.99
Limit Rel dB Lower (Switching)	<p>$n=8 \ N*8+122$</p> <p>Relative lower test limit used [dB]</p>	-99.99
Limit Abs dBm Lower (Switching)	<p>$n=8 \ N*8+123$</p> <p>Absolute lower test limit used [dBm]</p>	-99.99
Abs/Rel Lower Limit Applied (Switching)	<p>$n=8 \ N*8+124$</p> <p>Which lower test limit is applied, Abs or Rel (0 1 2 3)</p> <p>"0" indicates neither test limit is applied.</p> <p>"1" indicates Absolute test limit is applied</p> <p>"2" indicates Relative test limit is applied.</p> <p>"3" indicates both test limits are applied. This means Absolute test limit is equal to Relative test limit.</p>	1
Upper dB (Switching)	<p>$n=1 \ N*4+63$</p> <p>Upper offset(N) – power relative to carrier [dB]</p>	-99.99
Delta from Limit dB Upper (Switching)	<p>$n=8 \ N*8+125$</p> <p>Relative level to the test limit [dB] at the upper offset(N)</p>	-99.99
Limit Rel dB Upper (Switching)	<p>$n=8 \ N*8+126$</p> <p>Relative test limit used [dB]</p>	-99.99
Limit Abs dBm Upper (Switching)	<p>$n=8 \ N*8+127$</p> <p>Absolute test limit used [dBm]</p>	-99.99
Abs/Rel Upper Limit Applied (Switching)	<p>$n=8 \ N*8+128$</p> <p>Which upper test limit is applied, Abs or Rel (0 1 2 3)</p> <p>"0" indicates neither test limit is applied.</p> <p>"1" indicates Absolute test limit is applied</p> <p>"2" indicates Relative test limit is applied.</p> <p>"3" indicates both test limits are applied. This</p>	1

Name	Corresponding Results	Display Format
	means Absolute test limit is equal to Relative test limit.	

Metrics Window (for single carrier only)

Name	Corresponding Results	Display Format
PCL	None. Power Control Level determined by the Transmit Power and used to determine the limits. Since PCL is a Measurement Global parameter, [:SENSe]:RADio:PCL, refer to the section Mode Functionality. Auto disappears when [:SENSe]:RADio:PCL:STATe is set to 0 Off. This is shown for MS only.	PCL: ## AutoRange
Offset Freq List	Offset Frequency list parameter value (Standard Short Custom)	Short
Ref Power (Modulation)	n=1 2 Modulation Reference Power for all offsets [dBm] Resolution Bandwidth for reference power measurement [Hz]	-99.99/99
Ref Power (Switching)	n=1 62 Switching Reference Power for all offsets [dBm] Resolution Bandwidth for reference power measurement [Hz]	-99.99/99
VBW/RBW Ratio	None VBW/RBW Ratio (1 3) [1 = Modulation, 3 = Switching]	1
Offset Freq	Offset Frequency to be measured [Hz]	-99.99
Res BW	Resolution Bandwidth for each offset [Hz]	-99.99
Lower dB (Modulation)	n=1 N*4+1 Lower offset(N) - power relative to carrier [dB]	-99.99
Delta from Limit dB Lower (Modulation)	n=6N*4+1 Relative level to the test limit [dB] at the lower offset(N)	-99.99
Lower dBm (Modulation)	n=1 N*4+2 Lower offset(N) - absolute average power [dBm]	-99.99
Limit Rel dB Lower (Modulation)	n=6N*4+3 Relative lower test limit used [dB]	-99.99
Limit Abs dBm Lower (Modulation)	n=6N*4+4 Absolute lower test limit used [dBm]	-99.99

Name	Corresponding Results	Display Format
Upper dB (Modulation)	$n=1N*4+3$ Upper offset(N) – power relative to carrier [dB]	-99.99
Delta from Limit dB Upper (Modulation)	$n=6N*4+2$ Relative level to the test limit [dB] at the upper offset(N)	-99.99
Limit Rel dB Upper (Modulation)	$n=6N*4+3$ Relative test limit used [dB]	-99.99
Limit Abs dBm Upper (Modulation)	$n=6N*4+4$ Absolute test limit used [dBm]	-99.99
Lower dB (Switching)	$n=1 N*4+61$ Lower offset(N) – power relative to carrier [dB]	-99.99
Delta from Limit dB Lower (Switching)	$n=6 N*4+61$ Relative level to the test limit [dB] at the lower offset(N)	-99.99
Lower dBm (Switching)	$n=1 N*4+62$ Lower offset(N) – absolute average power [dBm]	-99.99
Limit Rel dB Lower (Switching)	$n=6 N*4+63$ Relative lower test limit used [dB]	-99.99
Limit Abs dBm Lower (Switching)	$n=6 N*4+64$ Absolute lower test limit used [dBm]	-99.99
Upper dB (Switching)	$n=1 N*4+63$ Upper offset(N) – power relative to carrier [dB]	-99.99
Delta from Limit dB Upper (Switching)	$n=6 N*4+62$ Relative level to the test limit [dB] at the upper offset(N)	-99.99
Limit Rel dB Upper (Switching)	$n=6 N*4+63$ Relative test limit used [dB]	-99.99
Limit Abs dBm Upper (Switching)	$n=6 N*4+64$ Absolute test limit used [dBm]	-99.99

Single Offset Views

These views are displayed when Meas Method is set to Single Offset. For details, see ["Meas Method" on page 1963](#).

Modulation & Switching

This view is displayed when:

- Meas Type: Mod & Switch
- Meas Method: Single Offset

The following graphic shows an example of this view, in which:

- The blue trace is the Switching data
- The yellow trace is the Modulation data
- The measurement gates are shown as vertical white lines

"Fast Avg" on page 1958 is not available for this measurement.

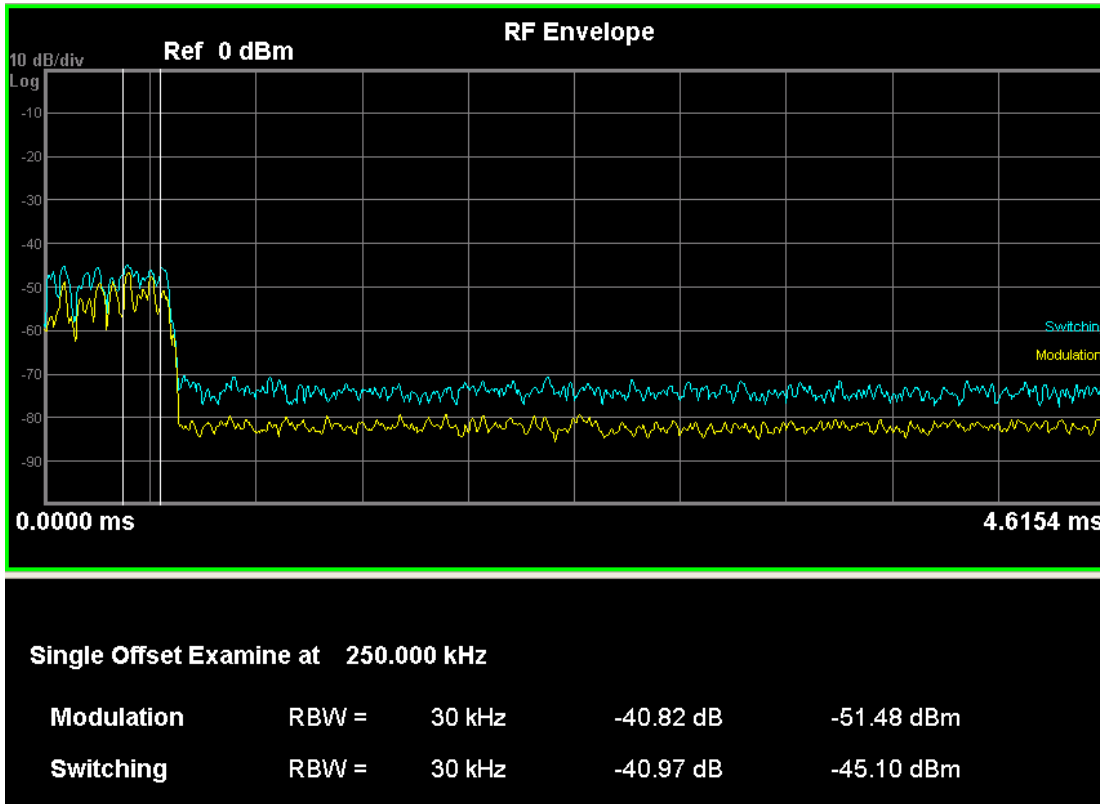


Figure 0-5 Single Offset view with Mod & Switching for GSM Output RF Spectrum Measurement

Modulation Power

This view is displayed when:

- Meas Type: Modulation
- Meas Method: Single-Offset
- View/Display: Result Summary

The view has 2 windows:

- "Graph Window " on page 2077
- "Metrics Window " on page 2077

The following graphic shows an example of this view, in which:

- The white vertical lines represent the modulation section to be measured for modulation measurement.

- The red vertical lines represent the added section to be measured when "Fast Avg" on page 1958 is set to 'On' (improve measurement speed).

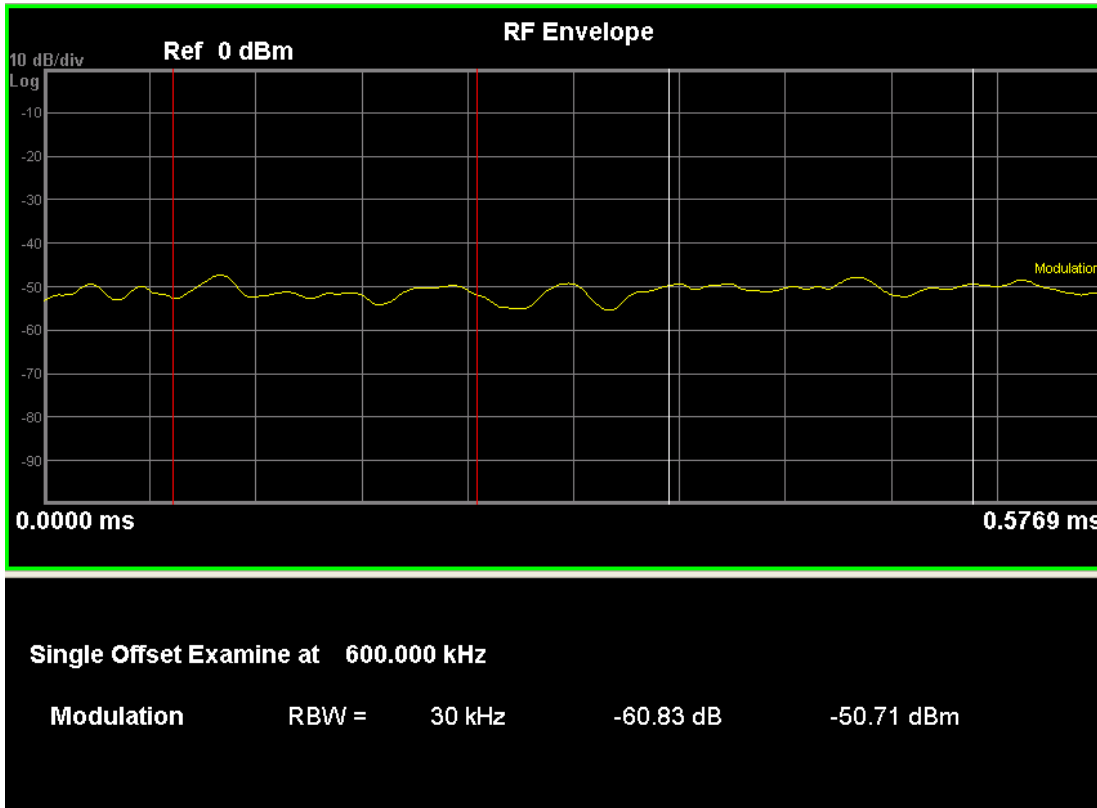


Figure 0-6 Single Offset View with Modulation Power

Graph Window

Marker Operation	Yes
Corresponding Trace	Yellow: Series of floating point numbers that represent the "spectrum due to modulation" signal. (n=2)

Metrics Window

Name	Corresponding Results	Display Format
Modulation [dB]	n=1 1st Modulation spectrum power	-99.99 dB
Modulation [dBm]	n=1 2nd Modulation spectrum power	-99.99 dBm
Transmit Power	n=7 Transmit Power	-99.99 dBm
PCL	None.	PCL: ## Auto

Name	Corresponding Results	Display Format
	Power Control Level determined by the Transmit Power and used to determine the limits. Since PCL is a Measurement Global parameter, [:SENSe]:RADio:PCL, refer to the section Mode Functionality. Auto disappears when [:SENSe]:RADio:PCL:STATe is set to 0 Off. This is shown for MS only.	

Modulation Carrier Info

This view is displayed when:

- Meas Type: Modulation
- Meas Method: Single-Offset
- View/Display: Carrier Info

The view has 2 windows:

- ["Graph Window " on page 2079](#)
- ["Metrics Window " on page 2079](#)

The following graphic shows an example of this view, in which:

- The white vertical lines represent the modulation section to be measured for modulation measurement.
- The red vertical lines represent the added section to be measured when ["Fast Avg" on page 1958](#) is set to 'On' (improve measurement speed).

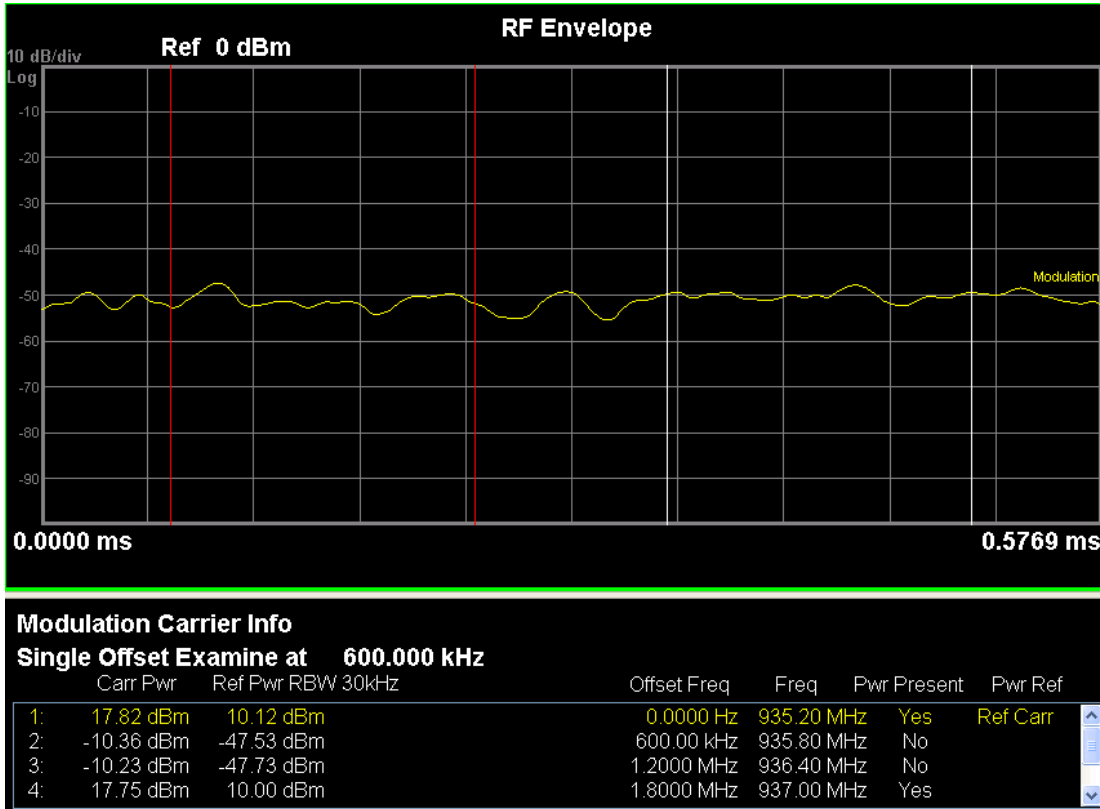


Figure 0-7 Single Offset View with Modulation Carrier Info

Graph Window

Marker Operation	Yes
Corresponding Trace	Yellow: Series of floating point numbers that represent the “spectrum due to modulation” signal. (n=2)

Metrics Window

Name	Corresponding Results	Display Format
Carrier Index	None Index of Carrier to be measured	1
Carr Pwr	None Carrier Power for Power level (Measured with 400kHz RBW)	-99.99
Ref Power	None Carrier Power for Reference Power (Measured with the specified RBW. e.g. 30kHz)	-99.99/99
Offset Freq	None Offset Frequency from the Reference Carrier for each	99

Name	Corresponding Results	Display Format
	Carrier [Hz]	
Freq	None Center Frequency of each Carrier [Hz]	99
Pwr Present	None Indicates whether the power is present for each carrier	Yes
Pwr Ref	None Indicates the type of the Power Reference if the carrier is the Power Reference Carrier (Ref Carr Max Pwr)	Ref Carr

Switching Power

This view is displayed when:

- Meas Type: Switching
- Meas Method: Single Offset

The view has two windows: Graph Window and the Metrics Window. Details of each element of these windows can be found in ["Graph Window" on page 2081](#) and ["Metrics Window" on page 2081](#) respectively.

The following graphic shows an example of this view.

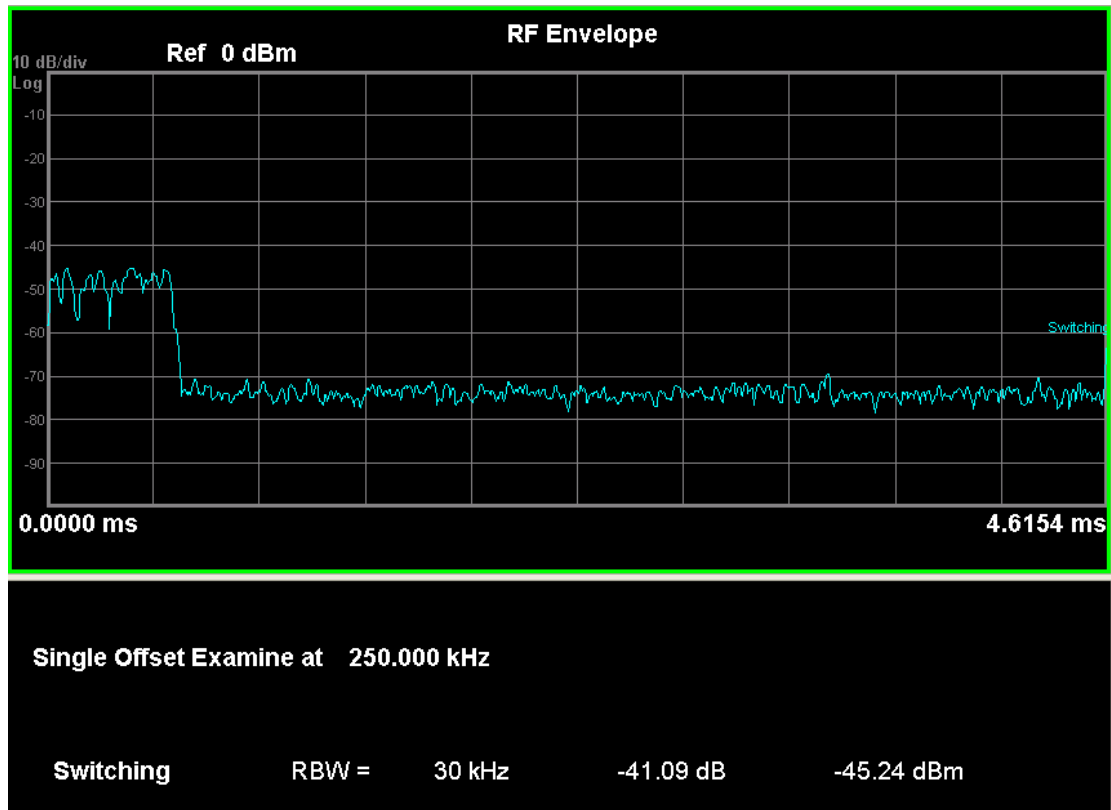


Figure 0-8 Single Offset view with Switching for GMSK Output RF Spectrum Measurement

Graph Window

Marker Operation	Yes
Corresponding Trace	Yellow: Series of floating point numbers that represent the “spectrum due to modulation” signal. (n=2) Blue: Series of floating point numbers that represent the “spectrum due to switching transients” signal. (n=3)

Metrics Window

Name	Corresponding Results	Display Format
Modulation [dB]	n=1 1st Modulation spectrum power	-99.99 dB
Modulation [dBm]	n=1 2nd Modulation spectrum power	-99.99 dBm
Switching [dB]	n=1 3rd Switching transient power	-99.99 dB
Switching [dBm]	n=1 4th Switching transient power	-99.99 dBm
Transmit Power	n=7 Transmit Power	-99.99 dBm
PCL	None. Power Control Level determined by the Transmit Power and used to determine the limits. Since PCL is a Measurement Global parameter, [:SENSe]:RADio:PCL, refer to the section Mode Functionality. Auto disappears when [:SENSe]:RADio:PCL:STATe is set to 0 Off. This is shown for MS only.	PCL: ## Auto

Swept Spectrum Views

These views are displayed when Meas Method is set to Swept. For details, see ["Meas Method" on page 1963](#).

Modulation Power

This view is displayed when:

- Meas Type: Modulation
- Meas Method: Swept
- View/Display: Result Summary

The view has two windows: the Graph Window and the Metrics Window. For details of the elements of these windows, see "Graph Window" on page 2082 and "Metrics Window" on page 2082 respectively.

The following graphic shows an example of this view.

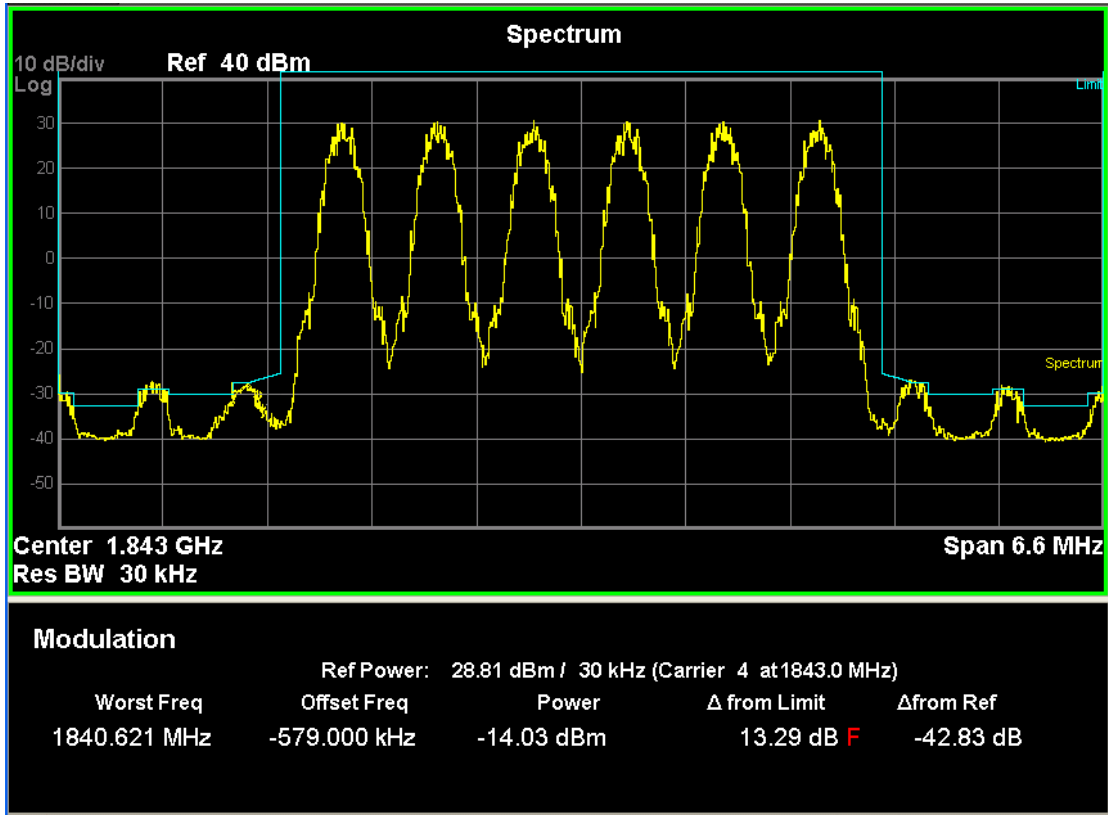


Figure 0-9 Swept Spectrum View with Modulation Power

Graph Window

Marker Operation	Yes
Corresponding Trace	Yellow: Series of floating point numbers that represent the "spectrum due to modulation" signal. (n=2)

Metrics Window

Name	Corresponding Results	Display Format
Worst Freq	n=1 1st Frequency	999.999 MHz
Offset Freq	n=1 2nd Offset frequency from carrier frequency	999.999 kHz
Power	n=1 3rd Power in dBm	-99.99 dBm

Name	Corresponding Results	Display Format
from Limit	n=1 4th delta from limit	-9.99 dB
from Ref	n=1 5th delta from reference	-99.99 dB
PCL	None. Power Control Level determined by the Transmit Power and used to determine the limits. Since PCL is a Measurement Global parameter, [:SENSe]:RADio:PCL, refer to the section Mode Functionality. Auto disappears when [:SENSe]:RADio:PCL:STATe is set to 0 Off. This is shown for MS only.	PCL: ## Auto

Modulation Carrier Info

This view is displayed when:

- Meas Type: Modulation
- Meas Method: Swept
- View/Display: Carrier Info

The view has two windows: the Graph Window and the Metrics Window. For details of the elements of these windows, see "[Graph Window](#)" on page 2084 and "[Metrics Window](#)" on page 2084 respectively.

The following graphic shows an example of this view.

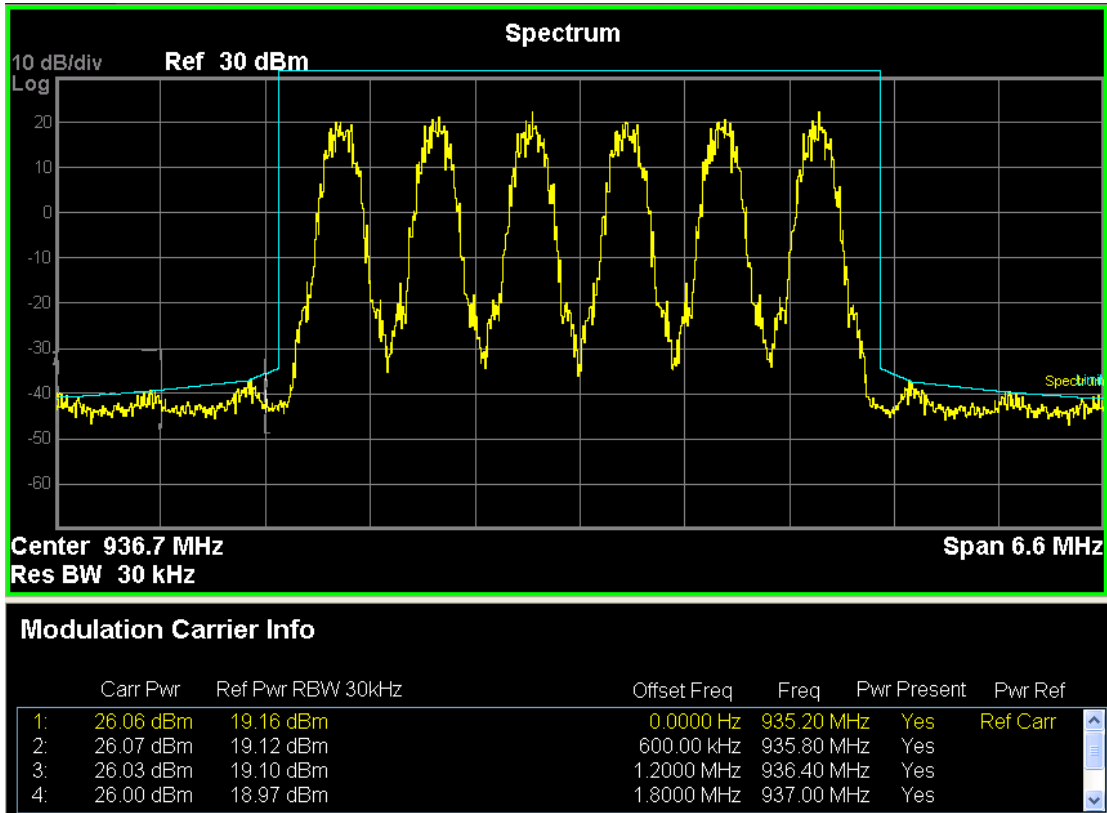


Figure 0-10 Swept Spectrum View with Modulation Carrier Info

Graph Window

Marker Operation	Yes
Corresponding Trace	Yellow: Series of floating point numbers that represent the “spectrum due to modulation” signal. (n=2)

Metrics Window

Name	Corresponding Results	Display Format
Carrier Index	None Index of Carrier to be measured	1
Carr Pwr	None Carrier Power for Power level (Measured with 400kHz RBW)	-99.99
Ref Pwr	None Carrier Power for Reference Power (Measured with the specified RBW. e.g. 30kHz)	-99.99/99
Offset Freq	None Offset Frequency from the Reference Carrier for each	99

Name	Corresponding Results	Display Format
Freq	Carrier [Hz] None Center Frequency of each Carrier [Hz]	99
Pwr Present	None Indicates whether the power is present for each carrier	Yes
Pwr Ref	None Indicates the type of the Power Reference if the carrier is the Power Reference Carrier (Ref Carr Max Pwr)	Ref Carr

17 GSM TX Band Spur Measurement

This measurement checks that the transmitter does not transmit undesirable energy into the transmit band. This energy may cause interference for other users of the GSM system. For more details, see the section "[GSM TX Band Spur Measurement Description](#)" on [page 2090](#) below.

This topic contains the following sections:

["Measurement Commands for GSM TX Band Spur"](#) on [page 2088](#)

["Remote Command Results for GSM TX Band Spur"](#) on [page 2089](#)

Measurement Commands for GSM TX Band Spur

The following commands and queries are used to retrieve the measurement results:

`:CONFigure:TSPur`

`:CONFigure:TSPur:NDEFault`

`:INITiate:TSPur`

`:FETCh:TSPur[n]?`

`:READ:TSPur[n]?`

`:MEASure:TSPur[n]?`

For more measurement related commands, see the section ["Remote Measurement Functions" on page 2301](#).

Remote Command Results for GMSK TX Band Spur

For the queries listed above, the results returned depend on the value of n, as follows.

n	Results Returned
not specified or n = 1	Returns 3 comma-separated scalar results: <ol style="list-style-type: none"> 1. The worst spur's frequency difference from channel center frequency (in MHz) 2. The worst spur's amplitude difference from the limit (in dB) 3. The worst spur's amplitude difference from the mean transmit power (in dB)
2	Returns trace of the current segment spectrum.
3	Returns trace of the current segment Upper Limit.
4	Returns trace of Lowest segment Spectrum.
5	Returns trace of Lowest segment Upper Limit.
6	Returns trace of Lower Adj segment Spectrum.
7	Returns trace of Lower Adj segment Upper Limit.
8	Returns trace of Upper Adj segment Spectrum.
9	Returns trace of Upper Adj segment Upper Limit.
10	Returns trace of Highest segment Spectrum.
11	Returns trace of Highest segment Upper Limit.
12	Returns 18 comma-separated scalar results: <ol style="list-style-type: none"> 1. The mean transmit power 2. The spur's frequency offset from channel center frequency (in MHz) on Lowest region. 3. The spur's amplitude difference from the limit (in dB) on Lowest region. 4. The spur's amplitude difference from the mean transmit power (in dBc) on Lowest region. 5. The spur's frequency offset from channel center frequency (in MHz) on Lower region. 6. The spur's amplitude difference from the limit (in dB) on Lower region. 7. The spur's amplitude difference from the mean transmit power (in dBc) on Lower region. 8. The spur's frequency offset from channel center frequency (in MHz) on Upper region. 9. The spur's amplitude difference from the limit (in dB) on Upper region. 10. The spur's amplitude difference from the mean transmit power (in dBc) on Upper region. 11. The spur's frequency offset from channel center frequency (in MHz) on Highest region. 12. The spur's amplitude difference from the limit (in dB) on Highest region. 13. The spur's amplitude difference from the mean transmit power (in dBc) on Highest region. 14. Reserved 15. Reserved 16. Reserved 17. Reserved 18. Reserved
	<div style="background-color: #cccccc; padding: 2px;">NOTE</div> -999.0 is returned if the region cannot be specified due to the band limit.

GMSK TX Band Spur Measurement Description

This measurement is only available for the base station. The transmitter should be set at its maximum output power on all time slots.

Key Path	Meas
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

AMPTD (Amplitude) Y Scale

Accesses a menu of functions that enable you to set the vertical scale parameters. These functions control how data on the vertical (Y) axis is displayed and control instrument settings that affect the vertical axis.

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Ref Value

Allows you to set the absolute power reference.

Key Path	AMPTD Y Scale
Mode	GSM
Remote Command	:DISPlay:TSPur:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <real> :DISPlay:TSPur:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel?
Example	DISP:TSP:VIEW:WIND:TRAC:Y:RLEV -10 DISP:TSP:VIEW:WIND:TRAC:Y:RLEV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	When Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.
Preset	0
State Saved	Saved in instrument state.
Min	-250.0
Max	250.0
Initial S/W Revision	Prior to A.02.00

Attenuation

This menu controls the attenuator functions and interactions between the attenuation system components.

There are two attenuator configurations in the X-Series. One is a dual attenuator configuration consisting of a mechanical attenuator and an optional electronic attenuator. The other configuration uses a single attenuator with combined mechanical and electronic sections that controls all the attenuation functions. Different models in the X-Series come with different configurations.

See ["Dual Attenuator Configurations:" on page 2092](#)

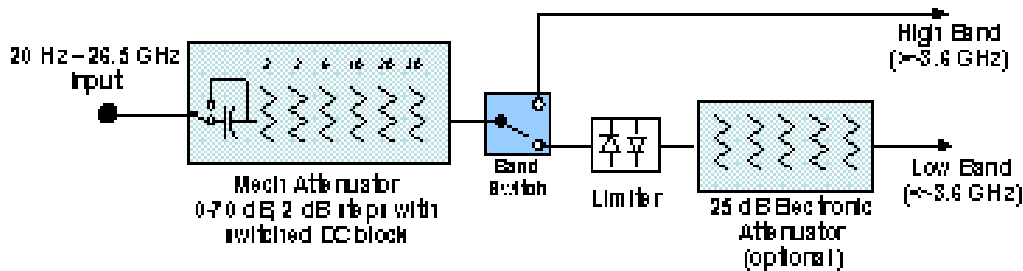
See ["Single Attenuator Configuration:" on page 2092](#)

Most Attenuation settings are the same for all measurements – they do not change as you change measurements. Settings like these are called “Meas Global” and are unaffected by Meas Preset.

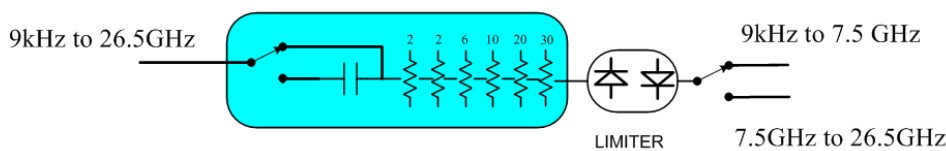
Key Path	AMPTD Y Scale
Scope	Meas Global
Dependencies	In measurements that support the I/Q inputs, this key is unavailable when I/Q is the selected input, and is replaced by the Range key in that case.
Readback Line	Contains a summary in [] brackets of the current total attenuation. See the descriptions of the , " (Mech) Atten " on page 2242, and " Enable Elec Atten " on page 2244 keys for more detail on the contributors to the total attenuation. Note that when "Pre-Adjust for Min Clip" is on, this value can change at the start of every measurement.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Dual Attenuator Configurations:

Configuration 1: Mechanical attenuator + optional electronic attenuator

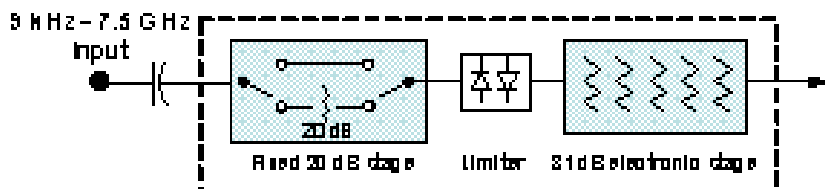


Configuration 2: Mechanical attenuator, no optional electronic attenuator

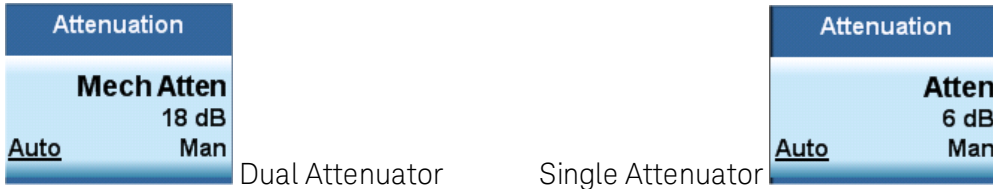


(note that Configuration 2 is not strictly speaking a dual-section attenuator, since there is no electronic section available. However, it behaves exactly like Configuration 1 without the Electronic Attenuator option EA3, therefore for the sake of this document it is grouped into the "Dual Attenuator" configuration)

Single Attenuator Configuration:



You can tell which attenuator configuration you have by pressing the Attenuation key, which (in most Modes) opens the Attenuation menu. If the first key in the Attenuation menu says Mech Atten you have the dual attenuator configuration. If the first key says Atten you have the single attenuator configuration.



In the single attenuator configuration, you control the attenuation with a single control, as the fixed stage has only two states. In the dual attenuator configuration, both stages have significant range so you are given separate control of the mechanical and electronic attenuator stages.

When you have the dual attenuator configuration, you may still have only a single attenuator, because unless option EA3 (the Electronic Attenuator option) is available, and you purchase it, you will have only the mechanical attenuator.

(Mech) Atten

This key is labeled Mech Atten in dual attenuator models and Atten in single attenuator models. In the dual attenuator configuration, this key only affects the mechanical attenuator.

This key lets you modify the attenuation applied to the RF input signal path. This value is normally auto coupled to the Ref Level, the Internal Preamp Gain, any External Gain that is entered, and the Max Mixer Level, as described in the table below.

See "[Attenuator Configurations and Auto/Man](#)" on page 2094

Key Path	AMPTD Y Scale, Attenuation
Remote Command	<pre>[:SENSe]:POWer[:RF]:ATTenuation <rel_ampl> [:SENSe]:POWer[:RF]:ATTenuation? [:SENSe]:POWer[:RF]:ATTenuation:AUTO OFF ON 0 1 [:SENSe]:POWer[:RF]:ATTenuation:AUTO?</pre>
Example	<p>POW:ATT 20</p> <p>Dual attenuator configuration: sets the mechanical attenuator to 20 dB</p> <p>Single attenuator mode: sets the main attenuation to 20 dB (see below for definition of "main" attenuation).</p> <p>If the attenuator was in Auto, it sets it to Manual.</p>
Dependencies	<p>Some measurements do not support the Auto setting of (Mech) Atten. In these measurements, the Auto/Man selection is not available, and the Auto/Man line on the key disappears.</p> <p>In dual attenuator configurations, when the electronic attenuator is enabled, the mechanical attenuator has no auto setting and the Auto/Man line on the key disappears. The state of Auto/Man is remembered and restored when the electronic attenuator is once again disabled. This is described in more detail in the "Enable Elec Atten" on page 2244 key description.</p> <p>See "Attenuator Configurations and Auto/Man" on page 2094 for more information on the Auto/Man functionality of Attenuation.</p>

Couplings

	<p>When (Mech) Atten is in Auto, it uses the following algorithm to determine a value: If the USB Preamp is connected to USB, use 0 dB. Otherwise, Atten = ReferenceLevel + PreAmpGain + ExternalGain – RefLevelOffset - MaxMixerLevel + IF Gain. Limit this value to be between 6 dB and the Max value. No value below 6 dB can ever be chosen by Auto. The resulting value is rounded up to the largest value possible given the attenuation step setting. That is, 50.01 dB would change to 60 dB (for a 10 dB attenuation step). The “IF Gain” term in the equation above is either 0 dB or +10 dB, depending on the settings of FFT IF Gain, Swept IF Gain, max Ref Level and the Auto/Man setting of Mech Atten. In External Mixing and BBIQ, where the Attenuator is not in the signal path, the Attenuator setting changes as described above when (Mech) Atten is in Auto, but no changes are made to the actual attenuator hardware setting until the input is changed back to the RF Input.</p>
Preset	<p>The preset for Mech Attenuation is “Auto.” The Auto value of attenuation is: CXA, EXA, MXA and PXA: 10 dB</p>
State Saved	<p>Saved in instrument state</p>
Min	<p>0 dB The attenuation set by this key cannot be decreased below 6 dB with the knob or step keys. To get to a value below 6 dB it has to be directly entered from the keypad or via SCPI. This protects from adjusting the attenuation to a dangerously small value which can put the instrument at risk of damage to input circuitry. However, if the current mechanical attenuation is below 6 dB it can be increased with the knob and step keys, but not decreased.</p>
Max	<p>CXA N9000A-503/507: 50 dB CXA N9000A-513/526: 70dB EXA: 60 dB MXA and PXA: 70 dB In the single attenuator configuration, the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB.</p>
Initial S/W Revision	<p>Prior to A.02.00</p>
Modified at S/W Revision	<p>A.03.00</p>

Attenuator Configurations and Auto/Man

As described in the Attenuation key description, there are two distinct attenuator configurations available in the X-Series, the single attenuator and dual attenuator configurations. In dual attenuator configurations, we have the mechanical attenuation and the electronic attenuation, and the current total attenuation is the sum of the electronic + mechanical attenuation. In single attenuator configurations, we refer to the attenuation set using the (Mech) Atten key (or POW:ATT SCPI) as the “main” attenuation; and the attenuation that is set by the SCPI command POW:EATT as the “soft” attenuation (the POW:EATT command is honored even in the single attenuator configuration, for compatibility purposes). Then the

current total attenuation is the sum of the main + soft attenuation. See the Elec Atten key description for more on “soft” attenuation.

In the dual attenuator configuration, when the electronic attenuator is enabled, there is no Auto/Man functionality for the mechanical attenuator, and the third line of the key label (the Auto/Man line) disappears:



Enable Elec Atten

Enables the Electronic Attenuator.

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear. These advantages primarily aid in remote operation and are negligible for front panel use. See ["Using the Electronic Attenuator: Pros and Cons" on page 2097](#) for a detailed discussion of the pros and cons of using the electronic attenuator.

For the single attenuator configuration, for SCPI backwards compatibility, the “soft” attenuation feature replaces the dual attenuator configuration’s electronic attenuator. All the same couplings and limitations apply. See ["Attenuator Configurations and Auto/Man" on page 2244](#)

See ["More Information" on page 2096](#)

Key Path	AMPTD Y Scale, Attenuation
Remote Command	[:SENSe]:POWer[:RF]:EATTenuation:STATe OFF ON 0 1 [:SENSe]:POWer[:RF]:EATTenuation:STATe?
Example	POW:EATT:STAT ON
Dependencies	<p>This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no “electronic attenuator” there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a “soft” attenuation as described in "Attenuator Configurations and Auto/Man" on page 2244.</p> <p>The electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable above 3.6 GHz. Therefore, if the Stop Frequency of the analyzer is > 3.6 GHz then the Enable Elec Atten key will be OFF and grayed out.</p> <p>If the Internal Preamp is on, meaning it is set to Low Band or Full, the electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable. In this case the Enable Elec Atten key will be OFF and grayed out.</p> <p>If either of the above is true, if the SCPI command is sent, an error indicating that the electronic attenuator is unavailable will be sent.</p> <p>If the electronic/soft Attenuator is enabled, then the Stop Freq of the analyzer is limited to 3.6 GHz and the Internal Preamp is unavailable.</p> <p>The SCPI-only “soft” electronic attenuation for the single-attenuator configuration is not available in</p>

	all measurements; in particular, it is not available in the Swept SA measurement.
Couplings	Enabling and disabling the Electronic Attenuator affects the setting of the Mechanical Attenuator (in dual attenuator configurations). This is described in more detail below this table.
Preset	OFF for Swept SA measurement; ON for all other measurements that support the electronic attenuator
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

More Information

Mechanical Attenuator Transition Rules

When the Electronic Attenuator is enabled, the Mechanical Attenuator transitions to a state that has no Auto function. Below are the rules for transitioning the Mechanical Attenuator. NOTE that the information below ONLY applies to the dual attenuator configurations, and ONLY when the Electronic Attenuator is installed:

When the Electronic Attenuation is enabled from a disabled state:

- The Mechanical Attenuator is initialized to 10 dB (this is its optimal performance setting). You can then set it as desired with SCPI, numeric keypad, step keys, or knob, and it behaves as it normally would in manual mode
- The Auto/Man state of (Mech) Atten is saved
- The Auto/Man line on the (Mech) Atten key disappears and the auto rules are disabled
- The Electronic Attenuator is set to 10 dB less than the previous value of the Mechanical Attenuator, within the limitation that it must stay within the range of 0 to 24 dB of attenuation.

Examples in the dual attenuator configuration:

- Mech Atten at 20 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 10 dB. New total attenuation equals the value before Elec Atten enabled.
- Mech Atten at 0 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 0 dB. New total attenuation does not equal the value before Elec Atten enabled.
- Mech Atten at 40 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 24 dB. New total attenuation does not equal the value before Elec Atten enabled.

When the Electronic Attenuation is disabled from an enabled state:

- The Elec Atten key is grayed out
- The Auto/Man state of (Mech) Atten is restored
- If now in Auto, (Mech) Atten recouples

- If now in Man, (Mech) Atten is set to the value of total attenuation that existed before the Elec Atten was disabled. The resulting value is rounded up to the smallest value possible given the (Mech) Atten Step setting - (That is, 57 dB changes to 58 dB when (Mech) Atten Step is 2 dB.)

Using the Electronic Attenuator: Pros and Cons

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear.

The “finer steps” advantage of the electronic attenuator is beneficial in optimizing the alignment of the analyzer dynamic range to the signal power in the front panel as well as remote use. Thus, you can achieve improved relative signal measurement accuracy. Compared to a mechanical attenuator with 2 dB steps, the 1 dB resolution of the electronic attenuator only gives better resolution when the odd-decibel steps are used. Those odd-decibel steps are less accurately calibrated than the even-decibel steps, so one tradeoff for this superior relative accuracy is reduced absolute amplitude accuracy.

Another disadvantage of the electronic attenuator is that the spectrum analyzer loses its “Auto” setting, making operation less convenient.

Also, the relationship between the dynamic range specifications (TOI, SHI, compression and noise) and instrument performance are less well-known with the electrical attenuator. With the mechanical attenuator, TOI, SHI and compression threshold levels increase dB-for-dB with increasing attenuation, and the noise floor does as well. With the electronic attenuator, there is an excess attenuation of about 1 to 3 dB between 0 and 3.6 GHz, making the effective TOI, SHI, and so forth, less well known. Excess attenuation is the actual attenuation relative to stated attenuation. Excess attenuation is accounted for in the analyzer calibration

Elec Atten

Controls the Electronic Attenuator in dual attenuator configurations. This key does not appear in single attenuator configurations, as the control of both the mechanical and electronic stages of the single attenuator is integrated into the single Atten key.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	<code>[:SENSe] :POWer [:RF] :EATTenuation <rel_ampl></code> <code>[:SENSe] :POWer [:RF] :EATTenuation?</code>
Notes	Electronic Attenuation's specification is defined only when Mechanical Attenuation is 6 dB.
Dependencies	This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no “electronic attenuator” there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a “soft” attenuation as described in "Attenuator Configurations and Auto/Man" on page 2244 . The “soft” attenuation is treated as an addition to the “main” attenuation value set by the Atten softkey or the POW:ATT SCPI command and affects the total attenuation displayed on the Attenuation key and the Meas Bar. When Enable Elec Atten is off or grayed out, the Elec Atten key is grayed out.
Preset	0 dB
State Saved	Saved in instrument state

Min	0 dB
Max	Dual attenuator configuration: 24 dB Single attenuator configuration: the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Adjust Atten for Min Clip

Sets the combination of mechanical and electronic attenuation and gain based on the current measured signal level so that clipping will be at a minimum.

This is an "immediate action" function, that is, it executes once, when the key is pressed.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	<code>[:SENSe]:POWeR[:RF]:RANGe:OPTimize IMMEDIATE</code>
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Pre-Adjust for Min Clip

If this function is on, it does the adjustment described under "[Adjust Atten for Min Clip](#)" on page 2247 each time a measurement restarts. Therefore, in Continuous measurement mode, it only executes before the first measurement.

In dual attenuator models, you can set Elec+Mech Atten, in which case both attenuators participate in the autoranging, or Elec Atten Only, in which case the mechanical attenuator does not participate in the autoranging. This latter case results in less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	<code>[:SENSe]:POWeR[:RF]:RANGe:OPTimize:ATTenuation OFF ELEctrical COMBined</code> <code>[:SENSe]:POWeR[:RF]:RANGe:OPTimize:ATTenuation?</code>
Notes	The SCPI parameter ELEctrical sets this function to On in single attenuator models. The SCPI parameter COMBined is mapped to ELEctrical in single attenuator models; if you send COMBined, it sets the function to On and returns ELEC to a query.
Dependencies	This key only appears in Dual Attenuator models with an Electronic Attenuator installed.

	In instruments with Dual Attenuator model, when Enable Elec Atten is off or grayed out, the Pre-Adjust for Min Clip key is grayed out.
Preset	OFF for Swept SA measurement; ON for all other measurements that support Pre-Adjust for Min Clip
State Saved	Saved in instrument state
Range	Dual attenuator models: Off Elec Atten Only Mech + Elec Atten Single attenuator models: Off On
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Remote Command	<code>[:SENSe] :POWer [:RF] :RANGe :AUTO ON OFF 1 0</code> <code>[:SENSe] :POWer [:RF] :RANGe :AUTO ?</code>
Notes	ON aliases to "Elec Atten Only" (:POW:RANG:OPT:ATT ELEC) OFF aliases to "Off" (:POW:RANG:OPT:ATT OFF) The query :POW:RANG:AUTO? returns true if :POW:RANG:OPT:ATT is not "Off"
Initial S/W Revision	Prior to A.02.00

Off

Turns Pre-Adjust for Min Clip off. This is the default setting.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip
Example	:POW:RANG:OPT:ATT OFF
Initial S/W Revision	Prior to A.02.00

Elec Atten Only

Selects only the electric attenuator to participate in auto ranging. This offers less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip
Example	:POW:RANG:OPT:ATT ELEC
Initial S/W Revision	Prior to A.02.00

Mech + Elec Atten

In dual attenuator models, this selects both attenuators participate in the autoranging.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip
Example	:POW:RANGe:OPT:ATT COMB
Initial S/W Revision	Prior to A.02.00

(Mech) Atten Step

This controls the step size used when making adjustments to the input attenuation.

This key is labeled Mech Atten Step in dual attenuator models and Atten Step in single attenuator models. In the dual attenuator configuration, this key only affects the step size of the mechanical attenuator.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	[:SENSe] :POWer [:RF] :ATTenuation :STEP [:INCRement] 10 dB 2 dB [:SENSe] :POWer [:RF] :ATTenuation :STEP [:INCRement] ?
Example	POW:ATT:STEP 2
Notes	Note this feature works like a 1-N choice from the front panel, but it takes a specific value (in dB) when used remotely. The only valid values are 2 and 10.
Dependencies	Blanked in CXA and EXA if option FSA (2 dB steps) is not present. If blanked, attempts to set it via SCPI will yield an error.
Couplings	When the attenuation step size changes, the current mechanical attenuation value is adjusted (if necessary) to be quantized to the new step size. That is, if step is set to 10 dB, mech atten is increased if necessary so it is a multiple of 10 dB
Preset	PXA and MXA: 2 dB EXA and CXA: 10 dB (2 dB with option FSA)
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Scale/Div

Allows you to enter a numeric value to change the vertical display sensitivity.

Key Path	AMPTD Y Scale
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Mode	GSM
Remote Command	:DISPlay:TSPur:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision <rel_ampl> :DISPlay:TSPur:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision?
Example	DISP:TSP:VIEW:WIND:TRAC:Y:PDIV 10 DISP:TSP:VIEW:WIND:TRAC:Y:PDIV?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	When Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.
Preset	10.00
State Saved	Saved in instrument state.
Min	0.1
Max	20.0
Initial S/W Revision	Prior to A.02.00

Presel Center

When this key is pressed, the centering of the preselector filter is adjusted to optimize the amplitude accuracy at the frequency of the selected marker. If the selected marker is not on when Presel Center is pressed, the analyzer will turn on the selected marker, perform a peak search, and then perform centering on the marker's center frequency. If the selected marker is already on and between the start and stop frequencies of the analyzer, the analyzer performs the preselector calibration on that marker's frequency. If the selected marker is already on, but outside the frequency range between Start Freq and Stop Freq, the analyzer will first perform a peak search, and then perform centering on the marker's center frequency.

The value displayed on the Presel Adjust key will change to reflect the new preselector tuning (see Presel Adjust).

A number of considerations should be observed to ensure proper operation. See "[Proper Preselector Operation](#)" on page 2102.

Key Path	AMPTD Y Scale
Remote Command	[:SENSe]:POWer[:RF]:PCENter
Example	POW:PCEN
Notes	Note that the rules outlined above under the key description apply for the remote command as well as the key. The result of the command is dependent on marker position, and so forth. Any message shown by the key press is also shown in response to the remote command.
Dependencies	<ul style="list-style-type: none"> • Grayed out if the microwave preselector is off.) • If the selected marker's frequency is below Band 1, advisory message 0.5001 is generated and no action is taken. • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0. • Grayed out in the Spectrogram View.

Couplings	The active marker position determines where the centering will be attempted. If the analyzer is in a measurement such as averaging when centering is initiated, the act of centering the preselector will restart averaging but the first average trace will not be taken until the centering is completed.
Status Bits/OPC dependencies	When centering the preselector, *OPC will not return true until the process is complete and a subsequent measurement has completed, nor will results be returned to a READ or MEASure command. The Measuring bit should remain set while this command is operating and should not go false until the subsequent sweep/measurement has completed.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Proper Preselector Operation

A number of considerations should be observed to ensure proper operation:

1. If the selected marker is off, the analyzer will turn on a marker, perform a peak search, and adjust the preselector using the selected marker's frequency. It uses the "highest peak" peak search method unqualified by threshold or excursion, so that there is no chance of a 'no peak found' error. It continues with that peak, even if it is the peak of just noise. Therefore, for this operation to work properly, there should be a signal on screen in a preselected range for the peak search to find.
2. If the selected marker is already on, the analyzer will attempt the centering at that marker's frequency. There is no preselector for signals below about 3.6 GHz, therefore if the marker is on a signal below 3.6 GHz, no centering will be attempted and an advisory message generated
3. In some models, the preselector can be bypassed. If it is bypassed, no centering will be attempted in that range and a message will be generated.

Preselector Adjust

Allows you to manually adjust the preselector filter frequency to optimize its response to the signal of interest. This function is only available when "Presel Center" on page 2250 is available.

For general purpose signal analysis, using Presel Center is recommended. Centering the filter minimizes the impact of long-term preselector drift. Presel Adjust can be used instead to manually optimize the preselector. One application of manual optimization would be to peak the preselector response, which both optimizes the signal-to-noise ratio and minimizes amplitude variations due to small (short-term) preselector drifting.

Key Path	AMPTD Y Scale
Scope	Meas Global
Remote Command	<code>[:SENSe] :POWer [:RF] :PADJust <freq></code> <code>[:SENSe] :POWer [:RF] :PADJust?</code>

Example	POW:PADJ 100KHz POW:PADJ?
Notes	The value on the key reads out to 0.1 MHz resolution.
Dependencies	<ul style="list-style-type: none"> • Grayed out if microwave preselector is off.) • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0. • Grayed out in the Spectrogram View.
Preset	0 MHz
State Saved	The Presel Adjust value set by Presel Center, or by manually adjusting Presel Adjust, is not saved in instrument state, and does not survive a Preset or power cycle.
Min	-500 MHz
Max	500 MHz
Default Unit	Hz
Backwards Compatibility SCPI	<pre>[:SENSe] :POWer [:RF] :MW :PADJust</pre> <pre>[:SENSe] :POWer [:RF] :MMW :PADJust</pre> <p>PSA had multiple preselectors, but the X-Series has only one. These commands simply alias to [:SENSe]:POWer[:RF]:PADJust</p>
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Remote Command	<pre>[:SENSe] :POWer [:RF] :PADJust :PRESelector MWAVE MMWave EXTernal</pre> <pre>[:SENSe] :POWer [:RF] :PADJust :PRESelector?</pre>
Notes	<p>PSA had multiple preselectors, and you could select which preselector to adjust. Since the X-Series has only one mm/uW preselector, the preselector selection softkey is no longer available. However, to provide backward compatibility, we accept the legacy remote commands.</p> <p>The command form has no effect, the query always returns MWAVE</p>
Initial S/W Revision	Prior to A.02.00

μW Path Control

The μW Path Control functions include the μW Preselector Bypass (Option MPB) and Low Noise Path (Option LNP) controls in the High Band path circuits.

When the μW Preselector is bypassed, the user has better flatness, but will be subject to spurs from out of band interfering signals. When the Low Noise Path is enabled, the analyzer automatically switches around

certain circuitry in the high frequency bands which can contribute to noise, when it is appropriate based on other analyzer settings.

For most applications, the preset state is Standard Path, which gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear out in the hardware switches. For applications that utilize the wideband IF paths, the preset state is the μ W Preselector Bypass path, if option MPB is present. This is because, when using a wideband IF such as the 140 MHz IF, the μ W Preselector's bandwidth can be narrower than the available IF bandwidth, causing degraded amplitude flatness and phase linearity, so it is desirable to bypass the preselector in the default case.

Users may choose Low Noise Path Enable. It gives a lower noise floor, especially in the 21–26.5 GHz region, though without improving many measures of dynamic range, and without giving the best possible noise floor. The preamp, if purchased and used, gives better noise floor than does the Low Noise Path, however its compression threshold and third-order intercept are much poorer than that of the non-preamp Low Noise Path. There are some applications, typically for signals around –30 dBm, for which the third-order dynamic range of the standard path is good enough, but the noise floor is not low enough even with 0 dB input attenuation. When the third-order dynamic range of the preamp path is too little and the noise floor of the standard path is too high, the Low Noise Path can provide the best dynamic range.

Key Path	AMPTD Y Scale
Mode	SA, BASIC, PNOISE, VSA , LTE, LTETDD
Scope	Meas Global
Remote Command	[:SENSe] :POWer [:RF] :MW:PATH STD LNPath MPBypass FULL [:SENSe] :POWer [:RF] :MW:PATH?
Example	:POW:MW:PATH LNP Enables the Low Noise path
Notes	If a Presel Center is performed, the analyzer will momentarily switch to the Standard Path, regardless of the setting of μ W Path Control The DC Block will always be switched in when the low noise path is switched in, to protect succeeding circuitry from DC. Note that this does not mean “when the low noise path is enabled” but when, based on the Low Noise Path rules, the path is actually switched in. This can happen when the selection is Low Noise Path Enable . In the case where the DC Block is switched in the analyzer is now AC coupled. However, if the user has selected DC coupling, the UI will still behave as though it were DC coupled, including all annunciation, warnings, status bits, and responses to SCPI queries. This is because, based on other settings, the analyzer could switch out the low noise path at any time and hence go back to being DC coupled. Alignment switching ignores the settings in this menu, and restores them when finished.
Dependencies	Unavailable in BBIQ and External Mixing
Preset	All modes other than IQ Analyzer mode and VXA: STD IQ Analyzer, VXA and WLAN mode: MPB option present and licensed: MPB MPB option not present and licensed: STD
State Saved	Save in instrument state
Readback	Value selected in the submenu
Initial S/W Revision	A.04.00
Modified at S/W Revision	A.10.00

Standard Path

This path gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear in the hardware switches, particularly in remote test scenarios where both low band and high band setups will follow in rapid succession.

In this path, the bypass of the low band/high band switch and microwave preamp is never activated, which can cause some noise degradation but preserves the life of the bypass switch.

Key Path	AMPTD Y Scale, μ W Path Control
Example	:POW:MW:PATH STD
Readback Text	Standard Path
Initial S/W Revision	A.04.00

μ W Preselector Bypass

This key toggles the preselector bypass switch for band 1 and higher. When the microwave preselect is on, the signal path is preselected. When the microwave preselector is off, the signal path is not preselected. The preselected path is the normal path for the analyzer.

The preselector is a tunable bandpass filter which prevents signals away from the frequency of interest from combining in the mixer to generate in-band spurious signals (images). The consequences of using a preselector filter are its limited bandwidth, the amplitude and phase ripple in its passband, and any amplitude and phase instability due to center frequency drift.

Option MPB or pre-selector bypass provides an unpreselected input mixer path for certain X-Series signal analyzers with frequency ranges above 3.6 GHz. This signal path allows a wider bandwidth and less amplitude variability, which is an advantage when doing modulation analysis and broadband signal analysis. The disadvantage is that, without the preselector, image signals will be displayed. Another disadvantage of bypassing the preselector is increased LO emission levels at the front panel input port.

Image responses are separated from the real signal by twice the 1st IF. For IF Paths of 10 MHz and 25 MHz, the 1st IF is 322.5 MHz, so the image response and the real signal will be separated by 645 MHz. The 1st IF will be different for other IF Path settings. When viewing a real signal and its corresponding image response in internal mixing, the image response will be to the left of the real signal.

Also, the image response and the real signal typically have the same amplitude and exhibit the same shape factor.

However, if Option FS1, Fast Sweep Capability, is enabled, the image response in the Swept SA measurement will appear lower in amplitude and have a much wider shape factor compared to the real signal.

Key Path	AMPTD Y Scale, μ W Path Control
Example	:POW:MW:PATH MPB
Dependencies	Key is blanked if current mode does not support it. Key is grayed out if mode supports it but current measurement does not support it. Key is blank unless Option MPB is present and licensed. If SCPI command sent when MPB not

	present, error -241, "Hardware missing; Option not installed" is generated.
Readback Text	μ W Preselector Bypass
Initial S/W Revision	A.04.00
Remote Command	<code>[:SENSe] :POWer [:RF] :MW:PRESelector [:STATe] ON OFF 0 1</code> <code>[:SENSe] :POWer [:RF] :MW:PRESelector [:STATe] ?</code>
Example	<code>:POW:MW:PRES OFF</code> Bypasses the microwave preselector
Notes	The ON parameter sets the STD path (:POW:MW:PATH STD) The OFF parameter sets path MPB (:POW:MW:PATH MPB)
Preset	ON

Internal Preamp

Accesses a menu of keys that control the internal preamps. Turning on the preamp gives a better noise figure, but a poorer TOI to noise floor dynamic range. You can optimize this setting for your particular measurement.

The instrument takes the preamp gain into account as it sweeps. If you sweep outside of the range of the preamp the instrument will also account for that. The displayed result will always reflect the correct gain.

For some measurements, when the preamp is on and any part of the displayed frequency range is below the lowest frequency for which the preamp has specifications, a warning condition message appears in the status line. For example, for a preamp with a 9 kHz lowest specified frequency: "Preamp: Accy unspec'd below 9 kHz".

Key Path	AMPTD Y Scale
Scope	Meas Global
Remote Command	<code>[:SENSe] :POWer [:RF] :GAIN [:STATe] OFF ON 0 1</code> <code>[:SENSe] :POWer [:RF] :GAIN [:STATe] ?</code>
Dependencies	Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the key is not shown. The preamp is not available when the electronic/soft attenuator is enabled.
Couplings	The act of connecting the U7227A USB Preamplifier to one of the analyzer's USB ports will cause the Internal Preamp to be switched on. When this happens an informational message will be generated: "Internal Preamp turned on for optimal operation with USB Preamp." Note that if the Internal Preamp was already on, there will be no change to the setting, but if it was Off it will be switched On, to Full Range. Note that this same action occurs when the SA mode is selected while the USB Preamp is connected to one of the analyzer's USB ports, if it is the first time that the SA mode has run since powerup, or if the last time the SA mode was running the USB Preamp was NOT connected.

	Subsequently disconnecting the USB Preamp from USB does not change the Internal Preamp setting nor restore the previous setting.
Preset	OFF
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.14.00

Key Path	AMPTD Y Scale, Internal Preamp
Scope	Meas Global
Remote Command	[:SENSe] :POWer [:RF] :GAIN :BAND LOW FULL [:SENSe] :POWer [:RF] :GAIN :BAND ?
Dependencies	Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the key is not shown. If a POW:GAIN:BAND FULL command is sent when a low band preamp is available, the preamp band parameter is to LOW instead of FULL, and an "Option not installed" message is generated.
Preset	LOW
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00

Off

Turns the internal preamp off

Key Path	AMPTD Y Scale, Internal Preamp
Example	:POW:GAIN OFF
Readback	Off
Initial S/W Revision	Prior to A.02.00

Low Band

Sets the internal preamp to use only the low band.

The frequency range of the installed (optional) low-band preamp is displayed in square brackets on the Low Band key label.

Key Path	AMPTD Y Scale, Internal Preamp
Example	:POW:GAIN ON :POW:GAIN:BAND LOW
Readback	Low Band
Initial S/W Revision	Prior to A.02.00

Full Range

Sets the internal preamp to use its full range. The low band (0–3.6 GHz or 0–3GHz, depending on the model) is supplied by the low band preamp and the frequencies above low band are supplied by the high band preamp.

The frequency range of the installed (optional) preamp is displayed in square brackets on the Full Range key label. If the high band option is not installed the Full Range key does not appear.

Key Path	AMPTD Y Scale, Internal Preamp
Example	:POW:GAIN ON :POW:GAIN:BAND FULL
Readback	Full Range
Initial S/W Revision	Prior to A.02.00

Ref Position

Allows you to set the display reference position to Top, Center or Bottom.

Key Path	AMPTD Y Scale
Mode	GSM
Remote Command	:DISPlay:TSPur:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOSition TOP CENTer BOTTom :DISPlay:TSPur:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOSition?
Example	DISP:TSP:VIEW:WIND:TRAC:Y:RPOS CENT DISP:TSP:VIEW:WIND:TRAC:Y:RPOS?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	TOP
State Saved	Saved in instrument state.
Range	Top Ctr Bot
Initial S/W Revision	Prior to A.02.00

Auto Scaling

Allows you to toggle the scale coupling function between On and Off.

Key Path	AMPTD Y Scale
Mode	GSM
Remote Command	:DISPlay:TSPur:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPlE 0 1 OFF ON :DISPlay:TSPur:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPlE?

Example	DISP:TSP:VIEW:WIND:TRAC:Y:COUP 1 DISP:TSP:VIEW:WIND:TRAC:Y:COUP?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Couplings	When Auto Scaling is On, upon pressing the Restart front-panel key, this function automatically determines the scale per division and reference values based on the measurement results. When you set the value of either Ref_Value or Scale/Div manually, this parameter is set to 'Off' automatically.
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

Auto Couple

The Auto Couple feature provides a quick and convenient way to automatically couple multiple instrument settings. This helps ensure accurate measurements and optimum dynamic range. When the Auto Couple feature is activated, either from the front panel or remotely, all parameters of the current measurement that have an Auto/Manual mode are set to Auto mode and all measurement settings dependent on (or coupled to) the Auto/Man parameters are automatically adjusted for optimal performance.

However, the Auto Couple key actions are confined to the current measurement only. It does not affect other measurements in the mode, and it does not affect markers, marker functions, or trace or display attributes.

See ["More Information" on page 2110](#)

Key Path	Front-panel key
Remote Command	:COUPle ALL NONE
Example	:COUP ALL
Notes	:COUPle ALL puts all Auto/Man parameters in Auto mode (equivalent to pressing the Auto Couple key). :COUPLE NONE puts all Auto/Man parameters in manual mode. It decouples all the coupled instrument parameters and is not recommended for making measurements.
Initial S/W Revision	Prior to A.02.00

More Information

There are two types of functions that have Auto/Manual modes.

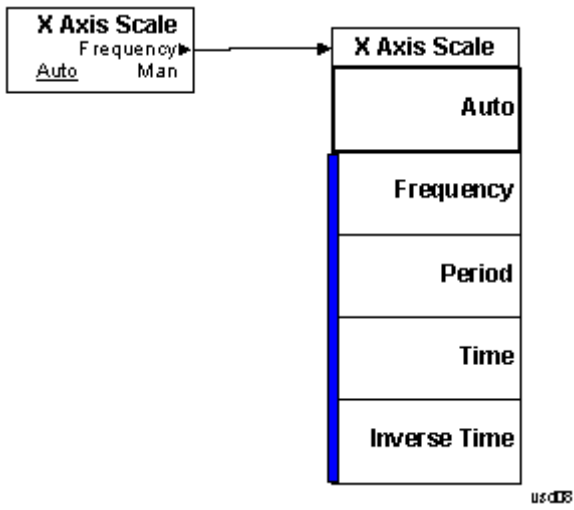
Auto/Man Active Function keys

An Auto/Man toggle key controls the binary state associated with an instrument parameter by toggling between Auto (where the parameter is automatically coupled to the other parameters it is dependent upon) and Man (where the parameter is controlled independent of the other parameters), as well as making the parameter the active function. The current mode is indicated on the softkey with either Auto or Man underlined as illustrated below.



Auto/Man 1-of-N keys

An Auto/Man 1-of-N key allows you to manually pick from a list of parameter values, or place the function in Auto, in which case the value is automatically selected (and indicated) as shown below. If in Auto, Auto is underlined on the calling key. If in manual operation, manual is indicated on the calling key. But the calling key does not actually toggle the function, it simply opens the menu.



BW

There is no functionality for this Front-panel key in this measurement. When pressed, this key displays a blank menu.

Key Path	Front-panel key
Mode	EDGE GSM

Cont (Continuous Measurement/Sweep)

Sets the analyzer for Continuous measurement operation. The single/continuous state is Meas Global so the setting will affect all measurements. If you are Paused, pressing Cont does a Resume.

Key Path	Front-panel key
Remote Command	:INITiate:CONTinuous OFF ON 0 1 :INITiate:CONTinuous?
Example	:INIT:CONT 0 puts analyzer in Single measurement operation. :INIT:CONT 1 puts analyzer in Continuous measurement operation
Preset	ON (Note that SYST:PRESet sets INIT:CONT to ON but *RST sets INIT:CONT to OFF)
State Saved	Saved in instrument state
Backwards Compatibility Notes	For Spectrum Analysis mode in ESA and PSA, there is no Cont hardkey, instead there is a Sweep Single/Cont key. In these analyzers, switching the Sweep Single/Cont key from Single to Cont restarts averages (displayed average count reset to 1), but does not restart Max Hold and Min Hold. The X-Series has Single and Cont keys in place of the SweepSingleCont key. In the X-Series, if in single measurement, the Cont key (and INIT:CONT ON) switches to continuous measurement, but never restarts a measurement and never resets a sweep.
Initial S/W Revision	Prior to A.02.00

In Swept SA Measurement (Spectrum Analysis Mode):

The analyzer takes repetitive sweeps, averages, measurements, etc., when in Continuous mode. When the average count reaches the Average/Hold Number the count stops incrementing, but the analyzer keeps sweeping. See the Trace/Detector section for the averaging formula used both before and after the Average/Hold Number is reached. The trigger condition must be met prior to each sweep. The type of trace processing for multiple sweeps, is set under the Trace/Detector key, with choices of Trace Average, Max Hold, or Min Hold.

In Other Measurements/Modes:

With Avg/Hold Num (in the Meas Setup menu) set to Off or set to On with a value of 1, a sweep is taken after the trigger condition is met; and the analyzer continues to take new sweeps after the current sweep has completed and the trigger condition is again met. However, with Avg/Hold Num set to On with a value >1, multiple sweeps (data acquisitions) are taken for the measurement. The trigger condition must be met prior to each sweep. The sweep is not stopped when the average count k equals the number N set for Avg/Hold Num is reached, but the number k stops incrementing. A measurement average usually applies to all traces, marker results, and numeric results. But sometimes it only applies to the numeric results.

If the analyzer is in Single measurement, pressing the Cont key does not change k and does not cause the sweep to be reset; the only action is to put the analyzer into Continuous measurement operation.

If it is already in continuous sweep:

the INIT:CONT 1 command has no effect

17 GSM TX Band Spur Measurement
Cont (Continuous Measurement/Sweep)

the INIT:CONT 0 command will place the analyzer in Single Sweep but will have no effect on the current sequence until $k = N$, at which point the current sequence will stop and the instrument will go to the idle state.

File

See "File" on page 320

FREQ/Channel

Accesses a menu of keys that allows you to control the Frequency parameters of the instrument.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

ARFCN

Sets the analyzer to a frequency that corresponds to the ARFCN (Absolute RF Channel Number). Used to enter the channel to be measured for the selected band. If the Center Freq value entered does not exactly correlate with an ARFCN, the softkey label changes to display the closest ARFCN to the selected frequency, along with a > or < symbol indicating whether the frequency is above or below that ARFCN.

Key Path	FREQ Channel
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :ARFCn RFCHannel <integer></code> <code>[:SENSe] :CHANnel :ARFCn RFCHannel ?</code>
Example	CHAN:ARFC 3 CHAN:ARFC?
Notes	This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not available (blank).
Couplings	Coupled with Center Frequency . Setting ARFCN sets Center Freq to the value corresponding to that ARFCN. BMT Freq choice changes this parameter.
Preset	1
State Saved	Saved in instrument state.
Range	Different for each BAND as follows: E-GSM: 0 to 124, and 975 to 1023 P-GSM: 1 to 124 R-GSM: 0 to 124(MS), and 955 to 1023(BTS) DCS1800: 512 to 885 PCS1900: 512 to 810 GSM450: 259 to 293 GSM480: 306 to 340 GSM700: 438 to 516 GSM850: 128 to 251 T-GSM 810: 350 to 425

Min	Different for each BAND as follows: E-GSM: 0(MS), and 975(BTS) P-GSM: 1 R-GSM: 0(MS), and 955(BTS) DCS1800: 512 PCS1900: 512 GSM450: 259 GSM480: 306 GSM700: 438 GSM850: 128 T-GSM 810: 350
Max	Different for each BAND as follows: E-GSM: 124(MS), and 1023(BTS) P-GSM: 124 R-GSM: 124(MS), and 1023(BTS) DCS1800: 885 PCS1900: 810 GSM450: 293 GSM480: 340 GSM700: 516 GSM850: 251 T-GSM 810: 425
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.07.00

Center Freq

Sets the center frequency to be measured for the selected band. It is coupled with ARFCN – setting Center Freq sets ARFCN to the channel corresponding to that frequency.

For more information, see the section "[Center Freq](#)" on page 2269.

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

Time Slot

This functionality is the same as that of the corresponding key in the Demod menu. See "[Time Slot](#)" on page 2288 for details.

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

Burst Type

This functionality is the same as that of the corresponding key in the Demod menu. See ["Burst Type" on page 2289](#) for details.

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

TSC (Std)

This functionality is the same as that of the corresponding key in the Demod menu. See ["TSC \(Std\)" on page 2291](#) for details.

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

Center Freq

Sets the frequency that corresponds to the horizontal center of the graticule (when frequency Scale Type is set to linear). While adjusting the Center Frequency the Span is held constant, which means that both Start Frequency and Stop Frequency will change.

Pressing Center Freq also sets the frequency entry mode to Center/Span. In Center/Span mode, the center frequency and span values are displayed below the graticule, and the default active function in the Frequency menu is Center Freq.

The center frequency setting is the same for all measurements within a mode, that is, it is Meas Global. Some modes are also able to share a Mode Global center frequency value. If this is the case, the Mode will have a Global Settings key in its Mode Setup menu.

The Center Freq function sets (and queries) the Center Frequency for the currently selected input. If your analyzer has multiple inputs, and you select another input, the Center Freq changes to the value for that input. SCPI commands are available to directly set the Center Freq for a specific input.

Center Freq is remembered as you go from input to input. Thus you can set a Center Freq of 10 GHz with the RF Input selected, change to BBIQ and set a Center Freq of 20 MHz, then switch to External Mixing and set a Center Freq of 60 GHz, and when you go back to the RF Input the Center Freq will go back to 10 GHz; back to BBIQ and it is 20 MHz; back to External Mixing and it is 60 GHz.

See ["RF Center Freq" on page 2121](#)

See [Ext Mix Center Freq](#)

See ["I/Q Center Freq" on page 2123](#)

See ["Center Frequency Presets" on page 2120](#)

Key Path	FREQ Channel
Scope	Meas Global
Remote Command	[:SENSe] :FREQuency:CENTer <freq> [:SENSe] :FREQuency:CENTer?
Example	FREQ:CENT 50 MHz FREQ:CENT UP changes the center frequency to 150 MHz if you use FREQ:CENT:STEP 100 MHz to set the center frequency step size to 100 MHz FREQ:CENT?
Notes	This command sets either the RF or I/Q Center Frequency depending on the selected input. For RF input it is equivalent to FREQ:RF:CENT For I/Q input it is equivalent to FREQ:IQ:CENT Preset and Max values are dependent on Hardware Options (5xx) If no terminator (e.g. MHz) is sent the terminator Hz is used. If a terminator with unit other than Frequency is used, an invalid suffix error message is generated.
Dependencies	The Center Frequency can be limited by Start or Stop Freq limits, if the Span is so large that Start or Stop reach their limit.
Couplings	When operating in "swept span", any value of the Center Frequency or Span that is within the frequency range of the analyzer is allowed when the value is being set through the front panel numeric key pad or the SCPI command. The other parameter is forced to a different value if needed, to keep the Start and the Stop Frequencies within the analyzer's frequency range
Preset	Depends on instrument maximum frequency, mode, measurement, and selected input. See " Center Frequency Presets " on page 2120 and " RF Center Freq " on page 2121 and Ext Mix Center Freq and " I/Q Center Freq " on page 2123.
State Saved	Saved in instrument state
Min	Depends on instrument maximum frequency, mode, measurement, and selected input.. See " Center Frequency Presets " on page 2120 and " RF Center Freq " on page 2121 and " I/Q Center Freq " on page 2123.
Max	Depends on instrument maximum frequency, mode, measurement, and selected input.. See " Center Frequency Presets " on page 2120 and " RF Center Freq " on page 2121 and " I/Q Center Freq " on page 2123.
Default Unit	Hz
Status Bits/OPC Dependencies	Non-overlapped
Initial S/W Revision	Prior to A.02.00

Center Frequency Presets

The following table provides the Center Frequency Presets for the Spectrum Analyzer mode, and the Max Freq, for the various frequency options:

Freq Option	CF after Mode Preset	Stop Freq after Mode Preset	Max Freq (can't tune above)
503 (all but N9000A)	1.805 GHz	3.6 GHz	3.7 GHz
503 (N9000A)	1.505 GHz	3.0 GHz	3.08 GHz
507 (all but N9000A)	3.505 GHz	7.0 GHz	7.1 GHz
507 (N9000A)	3.755 GHz	7.5 GHz	7.58 GHz
508 (all but N9038A)	1.805 GHz	3.6 GHz	8.5 GHz
508 (N9038A)	4.205 GHz	8.4 GHz	8.5 GHz
513	6.805 GHz	13.6 GHz	13.8 GHz
526 (all but N9000A and N9038A)	13.255 GHz	26.5 GHz	27.0 GHz
526 (N9000A)	13.255 GHz	26.5 GHz	26.55 GHz
526 (N9038A)	1.805 GHz	3.6 GHz	27.0 GHz
532	16.005 GHz	32.0 GHz	32.5 GHz
543	21.505 GHz	43.0 GHz	TBD
544	22.005 GHz	44.0 GHz	44.5 GHz
550	25.005 GHz	50.0 GHz	51 GHz

Input 2:

Model	CF after Mode Preset	Stop Freq after Mode Preset	Max Freq (can't tune above)
N9000A opt C75	0.7505GHz	1.5 GHz	1.58 GHz
N9038A	505 MHz	1 GHz	1.000025 GHz

Tracking Generator Frequency Limits (N9000A only):

Tracking Generator Option	Min Freq (clips to this freq when turn TG on and can't tune below while TG on)	If above this Freq, Stop Freq clipped to this Freq when TG turned on	Max Freq (can't tune above) while TG on
T03	9 kHz	3.0 GHz	3.08 GHz
T06	9 kHz	6.0 GHz	6.05 GHz

The following table shows the Center Frequency Presets for modes other than Spectrum Analyzer:

Mode	CF Preset for RF
WCDMA	1 GHz
WIMAXOFDMA,	1 GHz
BASIC	1 GHz
ADEMOD	1 GHz
VSA	1 GHz
TDSCDMA	1 GHz
PNOISE	1 GHz
LTE	1 GHz
LTETDD	1 GHz
MSR	1 GHz
GSM	935.2 MHz
NFIGURE	1.505 GHz

RF Center Freq

SCPI command for specifying the RF Center Frequency. This command will set the Center Frequency to be used when the RF input is selected, even if the RF input is not the input that is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

Scope	Meas Global
Remote Command	<code>[:SENSe] :FREQuency:RF:CENTer <freq></code> <code>[:SENSe] :FREQuency:RF:CENTer?</code>
Example	FREQ:RF:CENT 30 MHz
Notes	This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode.
Dependencies	If the electronic/soft attenuator is enabled, any attempt to set Center Frequency such that the Stop

	Frequency would be >3.6 GHz fails and results in an advisory message. If the equivalent SCPI command is sent, this same message is generated as part of a “-221, Settings conflict” warning. If Source Mode is set to Tracking, and the Max or Min Center Freq is therefore limited by the limits of the source, a warning message is generated, “Data out of range;clipped to source max/min” if these limits are exceeded. Note that for an external source, these limits can be affected by the settings of Source Numerator, Source Denominator and Power Sweep.
Preset	See table above
State Saved	Saved in instrument state.
Min	-79.999995 MHz, unless Source Mode is set to Tracking, in which case it is limited by the minimum frequency of the Source
Max	See table above. Basically instrument maximum frequency – 5 Hz. Note that, if the Source Mode is set to Tracking, the effective instrument maximum frequency may be limited by the source maximum frequency. If the knob or step keys are being used, also depends on the value of the other three interdependent parameters Span, Start Frequency and Stop Frequency
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Ext Mix Center Freq

SCPI command for specifying the External Mixer Center Frequency. This command will set the Center Frequency to be used when the External Mixer is selected, even if the External Mixer input is not the input which is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

Scope	Meas Global
Remote Command	<code>[:SENSe] :FREQuency:EMIXer:CENTer <freq></code> <code>[:SENSe] :FREQuency:EMIXer:CENTer?</code>
Example	<code>:FREQ:EMIX:CENT 60 GHz</code> <code>:FREQ:EMIX:CENT?</code>
Notes	This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode.
Couplings	When returning to External Mixing after having been switched to one of the other inputs (e.g., RF), you will come back into the settings that you had when you left External Mixing. So you will come back to the band you were in with the Center Frequency that you had. However, Span is not an input-dependent parameter, therefore you will bring the span over from the other input. Therefore, the analyzer comes back with the span from the previous input, limited as necessary by the current mixer setup.
Preset	When a Mode Preset is performed while in External Mixing, the Start frequency of the current Mode is set to the nominal Min Freq of the lowest harmonic range in the Harmonic Table for the current mixer setup. Similarly, the Stop frequency of the current Mode is set to the nominal Max Freq of the highest harmonic range in the Harmonic Table. The Center Freq thus presets to the point arithmetically equidistant from these two frequencies.

	<p>If the current measurement has a limited Span available to it, and cannot achieve the Span shown in the table (Span=Stop Freq - Start Freq), the analyzer uses the maximum Span the measurement allows, and still sets the Center Freq to the midpoint of the Start and Stop Freq values in the Harmonic Table.</p> <p>When Restore Input/Output Defaults is performed, the mixer presets to the 11970A, whose Start and Stop frequencies are 26.5 and 40 GHz respectively. The center of these two frequencies is 33.25 GHz.</p> <p>Therefore, after a Restore Input/Output Defaults, if you go into External Mixing and do a Mode Preset while in the Spectrum Analyzer Mode, the resulting Center Freq is 33.25 GHz.</p>
State Saved	Saved in instrument state.
Min	The minimum frequency in the currently selected mixer band + 5 Hz
Max	The maximum frequency in the currently selected mixer band - 5 Hz If the knob or step keys are being used, also depends on the value of the other three interdependent parameters Span, Start Frequency and Stop Frequency
Initial S/W Revision	A.08.01

I/Q Center Freq

SCPI command for specifying the I/Q Center Frequency. This command will set the Center Frequency to be used when the I/Q input is selected, even if the I/Q input is not the input which is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

Scope	Meas Global
Remote Command	[:SENSe] :FREQuency:IQ:CENTer <freq> [:SENSe] :FREQuency:IQ:CENTer?
Example	FREQ:IQ:CEN: 30 MHz
Notes	This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode.
Preset	0 Hz
State Saved	Saved in instrument state.
Min	-40.049995 MHz
Max	40.049995 MHz
Initial S/W Revision	Prior to A.02.00

BMT Freq

Enables quick selection from a subset of the available ARFCN numbers for the Top, Middle, or Bottom frequency in the selected band.

Key Path	FREQ Channel
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Mode	GSM
Scope	Meas Global
Notes	This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this.
Dependencies	When I/Q Input is selected, this key is not available (blank).
Couplings	BMT choice changes ARFCN and Center Freq. Chosen ARFCN will be displayed on each menu key.
Range	Top Middle Bottom
Initial S/W Revision	Prior to A.02.00

BMT Freq Top

Sets the analyzer to the frequency of the highest ARFCN (Absolute RF Channel Number) of the selected radio band.

Key Path	FREQ Channel, BMT Freq
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :ARFCn RFCHannel :TOP
Example	CHAN:ARFC:TOP
Notes	<ol style="list-style-type: none"> 1. This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. 2. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not displayed.
Couplings	Change [:SENSe]:CHANnel:ARFCn RFCHannel as follows: E-GSM: 124 P-GSM: 124 R-GSM: 124 DCS 1800: 885 PCS 1900: 810 GSM 450: 293 GSM 480: 340 GSM 700: 516 GSM 850: 251 T-GSM 810: 425 Change BMT ARFCN to BMT FreqTOP. Change [:SENSe]:FREQuency:CENTer as follows: E-GSM: 959.800 MHz P-GSM: 959.800 MHz R-GSM: 959.800 MHz

	DCS 1800: 1879.80 MHz
	PCS 1900: 1989.80 MHz
	GSM 450: 467.400 MHz
	GSM 480: 495.800 MHz
	GSM 700: 792.800 MHz
	GSM 850: 893.800 MHz
	T-GSM810: 866.000 MHz
State Saved	No
Initial S/W Revision	Prior to A.02.00

BMT Freq Middle

Sets the analyzer to the frequency of the middle ARFCN (Absolute RF Channel Number) of the selected radio band.

Key Path	FREQ Channel, BMT Freq
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel:ARFCn RFChannel:MIDDLE</code>
Example	CHAN:ARFC:MIDD
Notes	<ol style="list-style-type: none"> 1. This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. 2. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not displayed.
Couplings	Change <code>[:SENSe] :CHANnel:ARFCn RFChannel</code> as follows: E-GSM: 38 P-GSM: 63 R-GSM: 28 DSC 1800: 699 PCS 1900: 661 GSM 450: 276 GSM 480: 323 GSM 700: 477 GSM 850: 190 T-GSM 810: 388 Change BMT ARFCN to BMT FreqMIDDLE. Change <code>[:SENSe] :FREQuency:CENTer</code> as follows: E-GSM: 942.600 MHz P-GSM: 947.600 MHz R-GSM: 940.600 MHz

	DCS 1800: 1842.60 MHz
	PCS 1900: 1960.00 MHz
	GSM 450: 464.000 MHz
	GSM 480: 492.400 MHz
	GSM 700: 755.000 MHz
	GSM 850: 881.600 MHz
	T-GSM 810: 858.600 MHz

State Saved	No
Initial S/W Revision	Prior to A.02.00

BMT Freq Bottom

Sets the analyzer to the frequency of the lowest ARFCN (Absolute RF Channel Number) of the selected radio band.

Key Path	FREQ Channel, BMT Freq
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :ARFCn RFCHannel :BOTTom
Example	CHAN:ARFC:BOTT
Notes	<ol style="list-style-type: none"> 1. This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. 2. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not displayed.
Couplings	Change [:SENSe]:CHANnel:ARFCn RFCHannel as follows: E-GSM: 975 P-GSM: 1 R-GSM: 955 DCS 1800: 512 PCS 1900: 512 GSM 450: 259 GSM 480: 306 GSM 700: 438 GSM 850: 128 T-GSM 810: 350 Change BMT ARFCN to BMT FreqBOTTOM. Change [:SENSe]:FREQuency:CENTer as follows: E-GSM: 925.200 MHz P-GSM: 935.200 MHz R-GSM: 921.200 MHz

	DCS 1800: 1805.20 MHz
	PCS 1900: 1930.20 MHz
	GSM 450: 460.600 MHz
	GSM 480: 489.000 MHz
	GSM 700: 747.2 MHz
	GSM 850: 869.200 MHz
	T-GSM 810: 851.000 MHz
State Saved	No
Initial S/W Revision	Prior to A.02.00

Carrier Setup

Allows you to set carrier parameters.

Key Path	FREQ Channel
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Initial S/W Revision	A.06.00
Modified at S/W Revision	A.14.00

Carriers

Defines the number of carriers.

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :COUNT <integer></code> <code>[:SENSe] :CHANnel :CARRier :COUNT?</code>
Example	CHAN:CARR:COUN 3 CHAN:CARR:COUN?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Couplings	This can change when the SCPI command of the Carrier Power Present or the Carrier Interval is sent.
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	16

Initial S/W Revision	A.06.00
Modified at S/W Revision	A.13.00

Reference Carrier

Defines the reference active carrier. The Reference Carrier frequency point is always aligned with the Measurement Global Center Frequency. The minimum value 1 specifies the lowest frequency carrier among the active carriers. The maximum value specifies the highest frequency carrier among the active carriers.

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :RCARrier <integer></code> <code>[:SENSe] :CHANnel :CARRier :RCARrier?</code>
Example	CHAN:CARR:RCAR 3 CHAN:CARR:RCAR?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	The maximum value depends on the number of carriers. If you set it to more than the number of carriers, it's clipped to the number of carriers. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Couplings	When you decrease the number of carriers to a value which is less than this value, this is clipped to the value.
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	Number of carriers
Initial S/W Revision	A.06.00

Configure Carriers

Opens a menu of keys that allows you to configure carriers.

Key Path	FREQ Channel, Multi Carrier Setup
Dependencies	This key is grayed out when there is only one carrier. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Initial S/W Revision	A.06.00

Select Carrier

Selects a carrier to configure.

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	The maximum value depends on the number of carriers. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned. This parameter is unavailable when there is only one carrier.
Couplings	This value can change when you decrease the number of carriers.
Preset	1
State Saved	No
Min	1
Max	Number of carriers
Initial S/W Revision	A.06.00

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe]:CHANnel:CARRier:LIST:COUPle OFF ON 0 1, ... [:SENSe]:CHANnel:CARRier:LIST:COUPle?
Example	CHAN:CARR:LIST:COUP OFF CHAN:CARR:LIST:COUP?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	When Couple is selected, the carrier settings are coupled to carrier #1. Coupled parameters are Carrier Power Present, Carrier Interval. When a setting is changed, the couple is set to Man automatically. Carrier #1 is always set to couple and cannot be changed. Couple/Man selection on the Carrier key is not displayed when selected carrier number is #1.
Preset	ON
State Saved	No
Range	Couple Man
Initial S/W Revision	A.06.00

Carrier Power Present

Specifies whether each of carriers is active or not.

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :CARRier :LIST :PPResent YES NO, ... [:SENSe] :CHANnel :CARRier :LIST :PPResent?
Example	CHAN:CARR:LIST:PPR YES CHAN:CARR:LIST:PPR?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. Missing values are not permitted, therefore if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Dependencies	This parameter is unavailable when there is only one carrier. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	Coupled to the number of carriers. When the SCPI command is sent, the number of carriers will be set to the number of entries in the parameter list.
Preset	YES
State Saved	Saved in instrument state.
Range	Yes No
Initial S/W Revision	A.06.00

Carrier Interval

Specifies the frequency interval between the Carrier #n and #n+1 center frequencies.

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :CARRier :LIST :INTerval <freq>, ... [:SENSe] :CHANnel :CARRier :LIST :INTerval?
Example	CHAN:CARR:LIST:INT 600k CHAN:CARR:LIST:INT?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. The softkey for the last carrier (say, #N) is grayed out.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned. This parameter is unavailable when there is only one carrier.
Couplings	Coupled to the number of carriers. When the SCPI command is sent, the number of carriers will be

	set to the number of entries in the parameter list. Changing Carrier Interval might affect the Span.
Preset	600kHz
State Saved	Saved in instrument state.
Min	400 kHz
Max	100 MHz
Initial S/W Revision	A.06.00
Modified at S/W Revision	A.07.00, A.08.00

Carrier Frequency Allocation

Specifies the carrier frequency allocation. There are two types of allocation, contiguous and non-contiguous. Non-Contiguous frequency allocation is defined as an allocation where two groups of frequencies are separated with at least [3.6] MHz carrier separation between the innermost carriers. In case of the non-contiguous frequency allocation, tests will be measured between the uppermost carrier A of the lower frequency group and the lowermost carrier B of the upper frequency group.

See ["An example of non-contiguous frequency allocation" on page 2132](#)

Key Path	FREQ Channel, Multi Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe]:CHANnel:CARRier:FALLocation</code> <code>CONTiguous NCONTiguous</code> <code>[:SENSe]:CHANnel:CARRier:FALLocation?</code>
Example	<code>CHAN:CARR:FALL NCON</code> <code>CHAN:CARR:FALL?</code>
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This menu key is available only when the number of carriers is more than one. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Preset	CONTiguous
State Saved	Saved in instrument state.
Range	Contiguous Non-Contiguous
Readback Text	CONTiguous NCONTiguous
Initial S/W Revision	A.07.00

An example of non-contiguous frequency allocation



Non-Contiguous

Opens a menu of keys that allows you to set non-contiguous frequency allocation parameters.

Key Path	FREQ Channel, Multi Carrier Setup, Carr Freq Alloc
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Initial S/W Revision	A.07.00

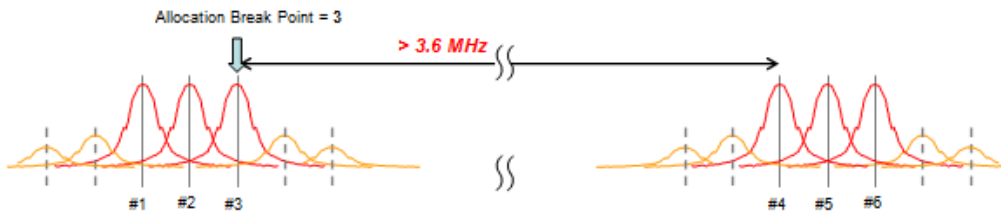
Allocation Break Pt

Specifies an allocation break point that is a sequence (or index) number of the uppermost carrier in the lower frequency group.

See ["An example of allocation break point" on page 2134](#)

Key Path	FREQ Channel, Multi Carrier Setup, Carr Freq Alloc, Non-Contiguous
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :CARRier :FALLocation :NCONtiguous :ABPoint <integer> [:SENSe] :CHANnel :CARRier :FALLocation :NCONtiguous :ABPoint ?
Example	CHAN:CARR:FALL:NCON:ABP 3 CHAN:CARR:FALL:NCON:ABP ?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	The maximum value depends on the number of carriers. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	This value can change when you decrease the number of carriers.
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	Number of carriers - 1
Initial S/W Revision	A.07.00
Modified at S/W Revision	A.13.00

An example of allocation break point



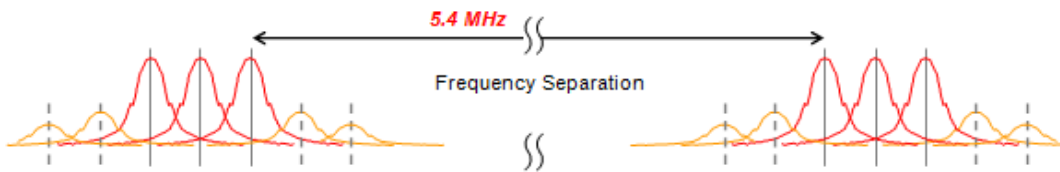
Freq Separation

Specifies frequency separation between the innermost of carriers.

See ["An example of frequency separation" on page 2135](#)

Key Path	FREQ Channel, Multi Carrier Setup, Carr Freq Alloc, Non-Contiguous
Mode	GSM
Scope	Meas Global
Remote Command	<code>[[:SENSe]:CHANnel:CARRier:FALLocation:NCONtiguous:FSEParation <freq></code> <code>[[:SENSe]:CHANnel:CARRier:FALLocation:NCONtiguous:FSEParation?</code>
Example	<code>CHAN:CARR:FALL:NCON:FSEP 5.4M</code> <code>CHAN:CARR:FALL:NCON:FSEP?</code>
Notes	You must be in the GSM mode to use this command. Use <code>INSTrument:SElect</code> to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	Changing Frequency Separation might affect the Span
Preset	5.4 MHz
State Saved	Saved in instrument state.
Min	3.6 MHz
Max	100 MHz
Initial S/W Revision	A.07.00

An example of frequency separation



Carrier BPF

Selects whether to use the carrier bandpass filter.

Key Path	FREQ Channel, Multi Carrier SetupMode Setup, Demod
Mode	GSM
Remote Command	<code>[:SENSe] :RADio :CARRier :NUMBer :AUTO ON OFF 1 0</code> <code>[:SENSe] :RADio :CARRier :NUMBer :AUTO ?</code>
Example	<code>RAD:CARR:NUMB:AUTO 1</code> <code>RAD:CARR:NUMB:AUTO ?</code>
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	ON automatically changes to OFF when Multiple or Single is selected as Carrier BPF Type.
Preset	ON
State Saved	Saved in instrument state.
Range	Auto Man
Initial S/W Revision	A.06.00

Carrier BPF Type

Opens a menu of keys that allows you to select the type of the bandpass filter. When carriers other than the signal of interest are present, especially if they are strong, they can interfere with the measurement, making it difficult to sync and producing artificially high EVM results. When this condition exists, toggle from Single to Multi. A band-limited filter will help reduce the measurement interference.

BPF Type	Description
MULTiple	Enable multi carrier tolerance filter.
SINGle	Disable multi carrier tolerance filter

This parameter applies only to the following measurements:

- GMSK Phase & Frequency Error measurement
- EDGE EVM measurement
- GMSK Power vs. Time

- EDGE Power vs. Time

Key Path	FREQ Channel, Multi Carrier Setup, Carrier BPFMode Setup, Demod, Carrier BPF
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe]:RADio:CARRier:NUMBer SINGLE MULTiple [:SENSe]:RADio:CARRier:NUMBer?
Example	RAD:CARR:NUMB SING RAD:CARR:NUMB?
Notes	The Carrier Bandpass Filter key is in the Mode Setup menu, but only EDGE EVM and GSM PFER measurements support this feature. In other measurements, this setting is not applicable. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Preset	SINGLE
State Saved	Saved in instrument state.
Range	Single Multi
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

BTS Class

Selects a BTS class.

BTS Class	Definition
MC	Multicarrier BTS is defined as a class of BTS, characterized by the ability to, in addition to single carrier operation, process two or more carriers in common active RF components simultaneously, either in multicarrier transmitter only or, in both multicarrier transmitter and multicarrier receiver.
SC	Single carrier BTS is defined as a class of BTS, characterized by the ability to process one carrier in single carrier BTSs, not belonging to a Multicarrier BTS class.

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Remote Command	[:SENSe]:CHANnel:CARRier:BASE:CLASs:AUTO ON OFF 1 0 [:SENSe]:CHANnel:CARRier:BASE:CLASs:AUTO?
Example	CHAN:CARR:BASE:CLAS:AUTO 1 CHAN:CARR:BASE:CLAS:AUTO?
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.

Couplings	ON automatically changes to OFF when Multicarrier Class (MC) or Single carrier Class (SC) is selected as BTS Class.
Preset	ON
State Saved	Saved in instrument state.
Range	Auto Man
Initial S/W Revision	A.14.00

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :CARRier :BASE :CLASs SC MC [:SENSe] :CHANnel :CARRier :BASE :CLASs?
Example	CHAN:CARR:BASE:CLAS MC CHAN:CARR:BASE:CLAS?

Notes

You must be in the GSM mode to use this command.
 Use INSTRument:SElect to set the mode.
 Selection C1 and C2 are supported for backwards compatibility.
 When "C1" or "C2" is passed as SCPI command parameter, the BTS Class Auto is set to ON. As a result, it's converted to "SC" if the number of carriers is one, and otherwise "MC."

Dependencies	This parameter is available when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Preset	SC
State Saved	Saved in instrument state.
Range	Single Carrier Multi Carrier
Initial S/W Revision	A.06.00
Modified at S/W Revision	A.10.01, A14.00

Time Slot

Selects On or Off for slot searching. Generally, this feature is only valid in external and periodic timer trigger source modes that triggers every frame since another trigger source does not have the information that identifies the head of the frame. When Timeslot is set to On, the demodulation measurement is made on the nth timeslot specified by the trigger point + n timeslots, where n is the selected timeslot value 0 to 7.

This functionality is the same as Time Slot under the Freq/Channel menu.

Key Path	Mode Setup, Demod FREQ Channel
Mode	GSM

Scope	Meas Global
Remote Command	[:SENSe]:CHANnel:SLOT <integer> [:SENSe]:CHANnel:SLOT? [:SENSe]:CHANnel:SLOT:AUTO OFF ON 0 1 [:SENSe]:CHANnel:SLOT:AUTO?
Example	CHAN:SLOT 0 CHAN:SLOT? CHAN:SLOT:AUTO OFF CHAN:SLOT:AUTO?
Notes	This functionality does not affect Combined GSM/EDGE measurement. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	0 OFF
State Saved	Saved in instrument state.
Min	0
Max	7
Initial S/W Revision	Prior to A.02.00

Burst Type

Sets the burst type that the analyzer will search for and to which it will synchronize.

This functionality is the same as Burst Type under the FREQ Channel menu.

Key	SCPI	Description
Sync (SCH)	SYNC	Burst length = 142 symbols Extended training sequences for CTS and COMPACT synchronization bursts are not supported.
Access (RACH)	ACcEss	Burst length = 88 symbols Alternative training (synchronization) sequence "TS1" and "TS2" are supported only in GSMK Power vs. Time.
Normal - NB (TCH & CCH)	NORMAl	Burst length = 142 symbols Softkey label will be changed to 'Normal - NB' from 'Normal'
Higher Symbol Rate - HB (TCH & CCH)	HSRate	Burst length = 169 symbols This selection key is only shown when theN9071A-3FP license is installed.
Mixed (NB/HB for TSC sync)	MIXed	Enables auto detection between Normal (NB) and HSR (HB) TCH & CCH EDGE Burst. This selection key is only shown when theN9071A-3FP license is installed.

Measurement synchronization capability (Burst Sync = Training Seq)

	Sync	Access	Normal		HSR	Mixed
			GMSK	8PSK		
				16QAM		
				32QAM		
				AQPSK		
GMSK Phase & Freq Error measurement	Yes	Yes	Yes	No	N/A	
GMSK Power vs. Time measurement	Yes	Yes	Yes	No	(measures as Normal GMSK when selected)	
GMSK Output RF Spectrum measurement (when Trigger Source is Periodic Timer and Sync Source is Off)	No	No	Yes	No		
EDGE EVM measurement	No	No	No	Yes	Yes	Yes
EDGE Power vs. Time measurement	Yes	Yes	Yes	Yes	Yes	Yes
EDGE Output RF Spectrum measurement (when Trigger Source is Periodic Timer and Sync Source is Off.)	No	No	Yes	Yes	Yes	Yes

Key Path	Mode Setup, Demod FREQ Channel
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :BURSt NORMal SYNC ACCess HSRate MIXed [:SENSe] :CHANnel :BURSt ?
Example	CHAN:BURS NORM CHAN:BURS?
Notes	This functionality does not affect the Combined GSM/EDGE measurement. Higher Symbol Rate and Mixed selections are only available when the N9071A-3FP license is installed. Otherwise these menu keys are blank. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Higher Symbol Rate and Mixed selection keys are not shown unless N9071A-3FP is installed. When unlicensed and SCPI is sent, an undefined header error is returned. When "Mixed" is selected, the Burst Sync menu key under the Meas Setup menu will be grayed out and Training Sequence (TSC) will be used for synchronization. The sync algorithm always runs in Training Sequence (TSC) synchronization because the Burst Type can be determined by looking at TSC in the signal. Original selection of Burst Sync will become effective again when the Burst Type selection is changed from "Mixed" to another one.
Preset	NORMal
State Saved	Saved in instrument state.
Range	Sync (SCH) Access (RACH) Normal - NB (TCH & CCH) Higher Symbol Rate - HB (TCH & CCH) Mixed (NB/HB for TSC sync)

Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

TSC (Std)

Allows you to select the Training Sequence Code that determines which burst is to be measured. Applicable only when Burst Sync is set to Training Sequence in the measurement. In the case of AQPSK, this parameter specifies TSC number of VAMOS sub-channel A. TSC of VAMOS sub-channel B is ignored.

This functionality is the same as TSC under the FREQ Channel menu.

This parameter applies only to the following measurements:

- GSMK/EDGE Power vs. Time measurement
- GSMK Phase & Frequency Error measurement
- EDGE EVM measurement

Selection	SCPI	Description
AutoDet	ON 1	The measurement is made on the first burst found to have any one of the valid TSCs in the range of 0 to 7. The measurement may be made on various timeslots if more than one timeslot has one of the 8 valid TSCs.
Man	OFF 0	The measurement is made on the first burst found to have the selected TSC. TSC numbers in the range of 0 to 7 can be selected. The measurement may be made on various timeslots if more than one timeslot has this same TSC.

Key Path	Mode Setup, Demod FREQ Channel
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe]:CHANnel:TSCode <integer> [:SENSe]:CHANnel:TSCode? [:SENSe]:CHANnel:TSCode:AUTO OFF ON 0 1 [:SENSe]:CHANnel:TSCode:AUTO?
Example	CHAN:TSC 3 CHAN:TSC? CHAN:TSC:AUTO 1 CHAN:TSC:AUTO?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. When Sync or Access is selected as Burst Type, this key is grayed out.
Preset	0 ON

State Saved	Saved in instrument state.
Min	0
Max	7
Initial S/W Revision	Prior to A.02.00

17 GSM TX Band Spur Measurement
Input/Output

Input/Output

See "[Input/Output](#)" on page 196

Marker

Accesses a menu that enables you to select, set up and control the markers for the current measurement.

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Select Marker

Displays 12 markers available for selection.

Key Path	Marker
Initial S/W Revision	Prior to A.02.00

Marker Type

Sets the marker control mode Normal, Delta and Off. All interactions and dependencies detailed under the key description are enforced when the remote command is sent.

Key Path	Marker
Mode	GSM
Remote Command	:CALCulate:TSPur:MARKer[1] 2 ...12:MODE POSition DELTA OFF :CALCulate:TSPur:MARKer[1] 2 ...12:MODE?
Example	CALC:TSP:MARK:MODE OFF CALC:TSP:MARK:MODE?
Notes	If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules. At the same time, Marker X Axis Value appears on the Active Function area. Default Active Function: the active function for the selected marker's current control mode. If the current control mode is Off, there is no active function and the active function is turned off. Active Function Display: the marker X axis value entered in the active function area displays the marker value to its full entered precision. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	OFF
State Saved	Saved in instrument state.
Range	Normal Delta Off
Initial S/W Revision	Prior to A.02.00

Marker X Axis Value (Remote Command Only)

Sets the marker X Axis value in the current marker X Axis Scale unit. It has no effect if the control mode is Off, but is the SCPI equivalent of entering an X value if the control mode is Normal or Delta.

Mode	GSM
Remote Command	:CALCulate:TSPur:MARKer[1] 2 ...12:X <real> :CALCulate:TSPur:MARKer[1] 2 ...12:X?
Example	CALC:TSP:MARK3:X 0 CALC:TSP:MARK3:X?
Notes	If no suffix is sent, uses the fundamental units for the current marker X Axis Scale. If a suffix is sent that does not match the current marker X Axis Scale unit, an error "Invalid suffix" is generated. The query returns the marker's absolute X Axis value if the control mode is Normal, or the offset from the marker's reference marker if the control mode is Delta. The query is returned in the fundamental units for the current marker X Axis scale: Hz for Frequency and Inverse Time, seconds for Period and Time. If the marker is Off the response is not a number. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	Max value will be changed.
Preset	After a preset, all markers are turned OFF, so Marker X Axis Value query returns a not a number (NAN).
State Saved	No
Min	-9.9E37
Max	9.9E37
Initial S/W Revision	Prior to A.02.00

Marker X Axis Position (Remote Command Only)

Sets the marker X position in trace points. It has no effect if the control mode is Off, but is the SCPI equivalent of entering a value if the control mode is Normal or Delta except in trace points rather than X Axis Scale units. The entered value is immediately translated into the current X Axis Scale units for setting the value of the marker.

Mode	GSM
Remote Command	:CALCulate:TSPur:MARKer[1] 2 ...12:X:POSition <integer> :CALCulate:TSPur:MARKer[1] 2 ...12:X:POSition?
Example	CALC:TSP:MARK10:X:POS 0 CALC:TSP:MARK10:X:POS?
Notes	The query returns the marker's absolute X Axis value in trace points if the control mode is Normal, or the offset from the marker's reference marker in trace points if the control mode is Delta. If the marker is Off the response is not a number. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	Max value will be changed.
Preset	After a preset, all markers are turned OFF, so Marker X Axis Value query returns a not a number

	(NAN).
State Saved	No
Min	-9.9E37
Max	9.9E37
Initial S/W Revision	Prior to A.02.00

Marker Y Axis Value (Remote Command Only)

Returns the marker Y Axis value in the current marker Y Axis unit.

The “result” of a marker is the value which is displayed on the second line of the Marker Result block. To properly interpret the returned value the remote programmer must also know what the analyzer’s Y-Axis Unit is set to as described below.

A marker can have up to two results, only one of which is displayed or returned on a query, as follows:

- **Absolute** result: every marker has an absolute result and it is simply:

For Normal and Delta markers, the Y-axis value of the trace point the marker is currently on.

The absolute result is displayed in the result block or returned on a query unless the marker control mode is Delta.

- **Relative** result: if a marker’s control mode is Delta, the relative result is displayed in the result block or returned on a query. This is the ratio of the Absolute Result of a delta marker to the Absolute Result of its reference marker.

Mode	GSM
Remote Command	:CALCulate:TSPur:MARKer[1] 2 ...12:Y?
Example	CALC:TSP:MARK11:Y?
Notes	The query returns the marker Y-axis result. If the marker is Off the response is not a number. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. Query only command
Preset	0
State Saved	No
Backwards Compatibility SCPI	:CALCulate:TSPur:MARKer[1] 2 ...4:FUNCTION:RESult?
Initial S/W Revision	Prior to A.02.00

Properties

Accesses a menu that allows you to set marker properties and to access the marker trace menu.

Key Path	Marker
Initial S/W Revision	Prior to A.02.00

Select Marker

Displays 12 markers available for selection.

Key Path	Marker
Initial S/W Revision	Prior to A.02.00

Relative To

Selects the marker that the selected marker is relative to (its reference marker).

Key Path	Marker, Properties
Mode	GSM
Remote Command	:CALCulate:TSPur:MARKer[1] 2 ...12:REFeRence <integer> :CALCulate:TSPur:MARKer[1] 2 ...12:REFeRence?
Example	CALC:TSP:MARK:REF 5 CALC:TSP:MARK:REF?
Notes	A marker cannot be relative to itself so that choice is grayed out, and if sent from SCPI generates error -221: "Settings conflict; marker cannot be relative to itself." When queried, a single value is returned (the specified marker numbers relative marker). You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	2 3 4 5 6 7 8 9 10 11 12 1
State Saved	Saved in instrument state.
Min	1
Max	12
Initial S/W Revision	Prior to A.02.00

Marker Trace

Assigns the specified marker to the designated trace.

Key Path	Marker, Properties
Mode	GSM
Remote Command	:CALCulate:TSPur:MARKer[1] 2 ...12:TRACe SPECTrum ULIMit :CALCulate:TSPur:MARKer[1] 2 ...12:TRACe?
Example	CALC:TSP:MARK:TRAC SPEC CALC:TSP:MARK:TRAC?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	SPECTrum

State Saved	Saved in instrument state.
Range	Spectrum Upper Limit
Initial S/W Revision	Prior to A.02.00

Couple Markers

When this function is true, moving any marker causes an equal X Axis movement of every other marker which is not Off. By “equal X Axis movement” we mean that we preserve the difference between each marker’s X Axis value (in the fundamental x-axis units of the trace that marker is on) and the X Axis value of the marker being moved (in the same fundamental x-axis units).

This may result in markers going off screen.

Key Path	Marker
Mode	GSM
Remote Command	:CALCulate:TSPur:MARKer:COUPle[:STATe] ON OFF 1 0 :CALCulate:TSPur:MARKer:COUPle[:STATe]?
Example	CALC:TSP:MARK:COUP ON CALC:TSP:MARK:COUP?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

All Markers Off

Turns off all markers.

Key Path	Marker
Mode	GSM
Remote Command	:CALCulate:TSPur:MARKer:AOff
Example	CALC:TSP:MARK:AOff
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Initial S/W Revision	Prior to A.02.00

Marker State (Backwards Compatibility/Remote Command Only)

Sets or queries the state of a marker. Setting a marker which is OFF to state ON or 1 puts it in Normal mode and places it at the center of the screen.

Mode	EDGE GSM
Remote Command	:CALCulate:TSPur:MARKer[1] 2 ...12:STATe OFF ON 0 1 :CALCulate:TSPur:MARKer[1] 2 ...12:STATe?
Example	CALC:TSP:MARK3:STAT ON CALC:TSP:MARK3:STAT?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

Marker > (Marker To)

There is no functionality for this Front-panel key in this measurement. When pressed, this key displays a blank menu.

Key Path	Front-panel key
Mode	EDGE GSM

Marker Function

There is no functionality for this Front-panel key in this measurement. When pressed, this key displays a blank menu.

Key Path	Front-panel key
Mode	EDGE GSM

Meas

The information in this section is common to all measurements. For key and remote command information for a specific measurement, refer to the section that describes the measurement of interest.

Measurements available under the Meas key are specific to the current Mode.

When viewing Help for measurements, note the following:

NOTE

Operation for some keys differs between measurements. The information displayed in Help pertains to the current measurement. To see how a key operates in a different measurement, exit Help (press the Cancel Esc key), select the measurement, then reenter Help (press the Help key) and press that key.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Remote Measurement Functions

This section contains the following topics:

"Measurement Group of Commands" on page 2302

"Current Measurement Query (Remote Command Only)" on page 2304

"Limit Test Current Results (Remote Command Only)" on page 2304

"Data Query (Remote Command Only)" on page 2304

"Calculate/Compress Trace Data Query (Remote Command Only)" on page 2305

"Calculate Peaks of Trace Data (Remote Command Only)" on page 2310

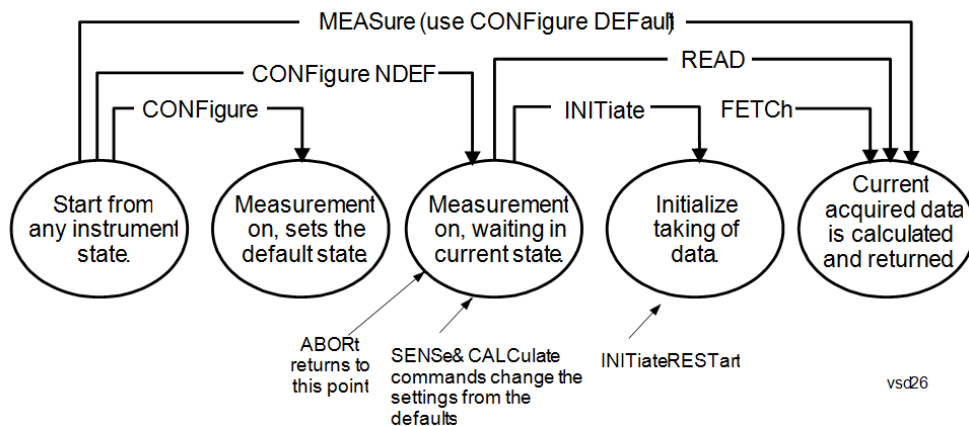
Hardware-Accelerated Fast Power Measurement (Remote Command Only)

"Format Data: Numeric Data (Remote Command Only)" on page 2311

"Format Data: Byte Order (Remote Command Only)" on page 2312

Initial S/W Revision	Prior to A.02.00
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Measurement Group of Commands



Measure Commands:

:MEASure:<measurement>[n]?

This is a fast single-command way to make a measurement using the factory default instrument settings. These are the settings and units that conform to the Mode Setup settings (e.g. radio standard) that you have currently selected.

- Stops the current measurement (if any) and sets up the instrument for the specified measurement using the factory defaults
- Initiates the data acquisition for the measurement
- Blocks other SCPI communication, waiting until the measurement is complete before returning results.
- If the function does averaging, it is turned on and the number of averages is set to 10.
- After the data is valid it returns the scalar results, or the trace data, for the specified measurement. The type of data returned may be defined by an [n] value that is sent with the command.
- The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available.
- ASCII is the default format for the data output. (Older versions of Spectrum Analysis and Phase Noise mode measurements only use ASCII.) The binary data formats should be used for handling large blocks of data since they are smaller and faster than the ASCII format. Refer to the FORMat:DATA command for more information.

If you need to change some of the measurement parameters from the factory default settings you can set up the measurement with the CONFIgure command. Use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to change the settings. Then you can use the READ? command to initiate the measurement and query the results.

If you need to repeatedly make a given measurement with settings other than the factory defaults, you can use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to set up the measurement. Then use the READ? command to initiate the measurement and query results.

Measurement settings persist if you initiate a different measurement and then return to a previous one. Use READ:<measurement>? if you want to use those persistent settings. If you want to go back to the default settings, use MEASure:<measurement>?.

Configure Commands:

:CONFIgure:<measurement>

This command stops the current measurement (if any) and sets up the instrument for the specified measurement using

the factory default instrument settings. It does not initiate the taking of measurement data unless INIT:CONTInuous is ON. If you change any measurement settings after using the CONFigure command, the READ command can be used to initiate a measurement without changing the settings back to their defaults.

In the Swept SA measurement in Spectrum Analyzer mode the CONFigure command also turns the averaging function on and sets the number of averages to 10 for all measurements.

:CONFigure: <measurement>: NDEFault stops the current measurement and changes to the specified measurement. It does not change the settings to the defaults. It does not initiate the taking of measurement data unless INIT:CONTInuous is ON.

The CONFigure? query returns the current measurement name.

The CONFigure:CATalog? query returns a quoted string of all licensed measurement names in the current mode. For example, "SAN, CHP, OBW, ACP, PST, TXP, SPUR, SEM, LIST".

Fetch Commands:

:FETCh:<measurement>[n]?

This command puts selected data from the most recent measurement into the output buffer. Use FETCh if you have already made a good measurement and you want to return several types of data (different [n] values, for example, both scalars and trace data) from a single measurement. FETCh saves you the time of re-making the measurement. You can only FETCh results from the measurement that is currently active, it will not change to a different measurement. An error message is reported if a measurement other than the current one is specified.

If you need to get new measurement data, use the READ command, which is equivalent to an INITiate followed by a FETCh.

The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used for handling large blocks of data since they are smaller and transfer faster than the ASCII format. (FORMat:DATA)

FETCh may be used to return results other than those specified with the original READ or MEASure command that you sent.

INITiate Commands:

:INITiate:<measurement>

This command is not available for measurements in all the instrument modes:

- Initiates a trigger cycle for the specified measurement, but does not output any data. You must then use the FETCh<meas> command to return data. If a measurement other than the current one is specified, the instrument will switch to that measurement and then initiate it.
- For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. If you send INIT:ACP? it will change from channel power to ACP and will initiate an ACP measurement.
- Does not change any of the measurement settings. For example, if you have previously started the ACP measurement and you send INIT:ACP? it will initiate a new ACP measurement using the same instrument settings as the last time ACP was run.
- If your selected measurement is currently active (in the idle state) it triggers the measurement, assuming the trigger conditions are met. Then it completes one trigger cycle. Depending upon the measurement and the number of averages, there may be multiple data acquisitions, with multiple trigger events, for one full trigger cycle. It also holds off additional commands on GPIB until the acquisition is complete.

READ Commands:

:READ:<measurement>[n]?

- Does not preset the measurement to the factory default settings. For example, if you have previously initiated the ACP
-

measurement and you send READ:ACP? it will initiate a new measurement using the same instrument settings.

- Initiates the measurement and puts valid data into the output buffer. If a measurement other than the current one is specified, the instrument will switch to that measurement before it initiates the measurement and returns results.
 - For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. Then you send READ:ACP? It will change from channel power back to ACP and, using the previous ACP settings, will initiate the measurement and return results.
 - Blocks other SCPI communication, waiting until the measurement is complete before returning the results
 - If the optional [n] value is not included, or is set to 1, the scalar measurement results will be returned. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used when handling large blocks of data since they are smaller and faster than the ASCII format. (FORMat:DATA)
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Current Measurement Query (Remote Command Only)

This command returns the name of the measurement that is currently running.

Remote Command	:CONFigure?
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Example	CONF?
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Limit Test Current Results (Remote Command Only)

Queries the status of the current measurement limit testing. It returns a 0 if the measured results pass when compared with the current limits. It returns a 1 if the measured results fail any limit tests.

Remote Command	:CALCulate:CLIMits:FAIL?
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Example	CALC:CLIM:FAIL? queries the current measurement to see if it fails the defined limits. Returns a 0 or 1: 0 it passes, 1 it fails.
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Data Query (Remote Command Only)

Returns the designated measurement data for the currently selected measurement and subopcode.

n = any valid subopcode for the current measurement. See the measurement command results table for your current measurement, for information about what data is returned for the subopcodes.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. (See the format command descriptions under Input/Output in the Analyzer Setup section.)

Remote Command	:CALCulate:DATA[n]?
Notes	The return trace depends on the measurement. In CALCulate:<meas>:DATA[n], n is any valid subopcode for the current measurement. It returns the same data as the FETCH:<measurement>? query where <measurement> is the current measurement.
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Calculate/Compress Trace Data Query (Remote Command Only)

Returns compressed data for the currently selected measurement and sub-opcode [n].

n = any valid sub-opcode for that measurement. See the MEASure:<measurement>? command description of your specific measurement for information on the data that can be returned.

The data is returned in the current Y Axis Unit of the analyzer. The command is used with a sub-opcode <n> (default=1) to specify the trace. With trace queries, it is best if the analyzer is not sweeping during the query. Therefore, it is generally advisable to be in Single Sweep, or Update=Off.

This command is used to compress or decimate a long trace to extract and return only the desired data. A typical example would be to acquire N frames of GSM data and return the mean power of the first burst in each frame. The command can also be used to identify the best curve fit for the data.

Remote Command	:CALCulate:DATA<n>:COMPRESS? BLOCK CFIT MAXimum MINimum MEAN DMEan RMS RMSCubed SAMPLE SDEVIation PPHase [,<soffset> [,<length>[,<roffset>[,<rlimit>]]]]
Example	To query the mean power of a set of GSM bursts: Supply a signal that is a set of GSM bursts. Select the IQ Waveform measurement (in IQ Analyzer Mode). Set the sweep time to acquire at least one burst. Set the triggers such that acquisition happens at a known position relative to a burst. Then query the mean burst levels using, CALC:DATA2:COMP? MEAN, 24e-6, 526e-6 (These parameter values correspond to GSM signals, where 526e-6 is the length of the burst in the slot and you just want 1 burst.)
Notes	The command supports 5 parameters. Note that the last 4 (<soffset>, <length>, <roffset>, <rlimit>) are optional. But these optional parameters must be entered in the specified order. For example, if you want to specify <length>, then you must also specify <soffset>. See details below for a definition of each of these parameters. This command uses the data in the format specified by FORMat:DATA, returning either binary or ASCII data.
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- BLOCK or block data - returns all the data points from the region of the trace data that you specify. For example, it could be used to return the data points of an input signal over several timeslots, excluding the portions of the trace data that you do not want. (This is x,y pairs for trace data and I,Q pairs for complex data.)

- CFIT or curve fit - applies curve fitting routines to the data. <soffset> and <length> are required to define the data that you want. <roffset> is an optional parameter for the desired order of the curve equation. The query will return the following values: the x-offset (in seconds) and the curve coefficients ((order + 1) values).

MIN, MAX, MEAN, DME, RMS, RMSC, SAMP, SDEV and PPH return one data value for each specified region (or <length>) of trace data, for as many regions as possible until you run out of trace data (using <roffset> to specify regions). Or they return the number of regions you specify (using <rlimit>) ignoring any data beyond that.

- MINimum - returns the minimum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the minimum magnitude of the I/Q pairs is returned.
- MAXimum - returns the maximum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the maximum magnitude of the I/Q pairs is returned.
- MEAN - returns a single value that is the arithmetic mean of the data point values (in dB/ dBm) for the specified region(s) of trace data. For I/Q trace data, the mean of the magnitudes of the I/Q pairs is returned. See the following equations.

NOTE If the original trace data is in dB, this function returns the arithmetic mean of those log values, not log of the mean power which is a more useful value. The mean of the log is the better measurement technique when measuring CW signals in the presence of noise. The mean of the power, expressed in dB, is useful in power measurements such as Channel Power. To achieve the mean of the power, use the RMS option.

Equation 1

Mean Value of Data Points for Specified Region(s)

$$MEAN = \frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 2

Mean Value of I/Q Data Pairs for Specified Region(s)

$$MEAN = \frac{1}{n} \sum_{X_i \in \text{region}(s)} |X_i|$$

where $|X_i|$ is the magnitude of an I/Q pair, and n is the number of I/Q pairs in the specified region(s).

- DMEan - returns a single value that is the mean power (in dB/ dBm) of the data point values for the specified region(s) of trace data. See the following equation:

Equation 3

DMEan Value of Data Points for Specified Region(s)

$$\text{DME} = 10 \times \log_{10} \left(\frac{1}{n} \sum_{X_i \in \text{region}(s)} 10^{\frac{X_i}{10}} \right)$$

- RMS - returns a single value that is the average power on a root-mean-squared voltage scale (arithmetic rms) of the data point values for the specified region(s) of trace data. See the following equation.

NOTE

For I/Q trace data, the rms of the magnitudes of the I/Q pairs is returned. See the following equation. This function is very useful for I/Q trace data. However, if the original trace data is in dB, this function returns the rms of the log values which is not usually needed.

Equation 4

RMS Value of Data Points for Specified Region(s)

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i^2}$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 5

RMS Value of I/Q Data Pairs for Specified Region(s)

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region(s).

Once you have the rms value for a region of trace data (linear or I/Q), you may want to calculate the mean power. You must convert this rms value (peak volts) to power in dBm:

$$10 \times \log[10 \times (\text{rms value})^2]$$

- SAMPLe - returns the first data value (x,y pair) for the specified region(s) of trace data. For I/Q trace data, the first I/Q pair is returned.
- SDEViation - returns a single value that is the arithmetic standard deviation for the data point values for the specified region(s) of trace data. See the following equation.
- For I/Q trace data, the standard deviation of the magnitudes of the I/Q pairs is returned. See the following equation.

Equation 6

Standard Deviation of Data Point Values for Specified Region(s)

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (X_i - \bar{X})^2}$$

where X_i is a data point value, \bar{X} is the arithmetic mean of the data point values for the specified region (s), and n is the number of data points in the specified region(s).

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (|X_i| - \bar{X})^2}$$

where $|X_i|$ is the magnitude of an I/Q pair, \bar{X} is the mean of the magnitudes for the specified region(s), and n is the number of data points in the specified region(s).

- PPHase - returns the x,y pairs of both rms power (dBm) and arithmetic mean phase (radian) for every specified region and frequency offset (Hz). The number of pairs is defined by the specified number of regions. This parameter can be used for I/Q vector ($n=0$) in Waveform (time domain) measurement and all parameters are specified by data point in PPHase.

The rms power of the specified region may be expressed as:

$$\text{Power} = 10 \times \log [10 \times (\text{RMS I/Q value})] + 10.$$

The RMS I/Q value (peak volts) is:

$$\sqrt{\frac{1}{n} \sum_{X_i \in \text{region}} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region.

The arithmetic mean phase of the specified region may be expressed as:

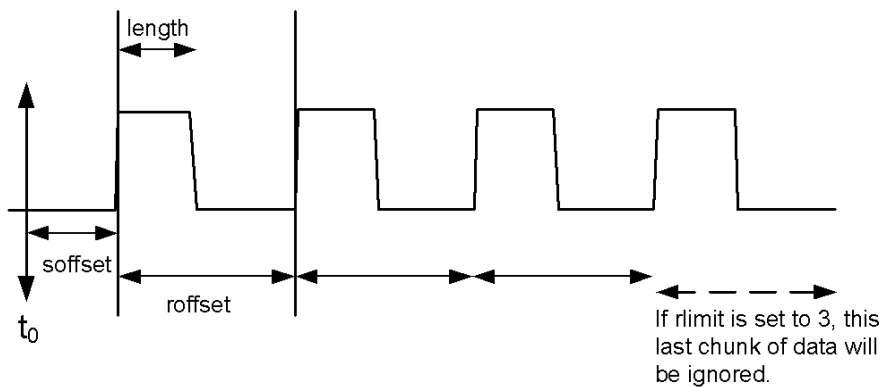
$$\frac{1}{n} \sum_{Y_i \in \text{region}} Y_i$$

where Y_i is the unwrapped phase of I/Q pair with applying frequency correction and n is the number of I/Q pairs in the specified region.

The frequency correction is made by the frequency offset calculated by the arithmetic mean of every specified region's frequency offset. Each frequency offset is calculated by the least square method against the unwrapped phase of I/Q pair.

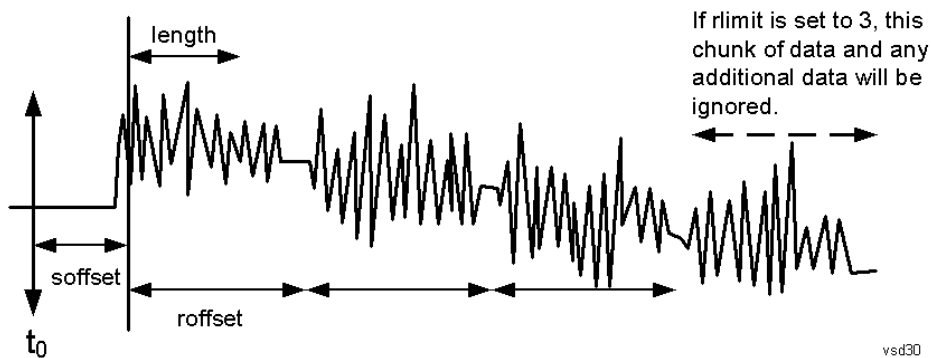
Sample Trace Data - Constant Envelope

(See below for explanation of variables.)



Sample Trace Data - Not Constant Envelope

(See below for explanation of variables.)



<soffset> - start offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It specifies the amount of data at the beginning of the trace that will be ignored before the decimation process starts. It is the time or frequency change from the start of the trace to the point where you want to start using the data. The default value is zero.

<length> - is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines how much data will be compressed into one value. This parameter has a default value equal to the current trace length.

<roffset> - repeat offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines the beginning of the next field of trace elements to be compressed. This is relative to the beginning of the previous field. This parameter has a default value equal to the <length> variable. Note that this parameter is used for a completely different purpose when curve fitting (see CFIT above).

<rlimit> - repeat limit is an optional integer. It specifies the number of data items that you want returned. It will ignore any additional items beyond that number. You can use the Start offset and the Repeat limit to pick out exactly what part of the data you want to use. The default value is all the data.

Calculate Peaks of Trace Data (Remote Command Only)

Returns a list of all the peaks for the currently selected measurement and sub-opcode [n]. The peaks must meet the requirements of the peak threshold and excursion values.

n = any valid sub-opcode for the current measurement. See the MEASure:<measurement> command description of your specific measurement for information on the data that can be returned.

The command can only be used with specific sub-opcodes with measurement results that are trace data. Both real and complex traces can be searched, but complex traces are converted to magnitude in dBm. In many measurements the sub-opcode n=0, is the raw trace data which cannot be searched for peaks. And Sub-opcode n=1, is often calculated results values which also cannot be searched for peaks.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. If the format is set to INT,32, it returns REAL,32 data.

The command has four types of parameters:

- Threshold (in dBm)
- Excursion (in dB)
- Sorting order (amplitude, frequency, time)
- Optional in some measurements: Display line use (all, > display line, < display line)

Remote Command	<p>For Swept SA measurement:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME[,ALL GTDLine LTDLine]]</pre> <p>For most other measurements:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME]</pre>
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Example	<p>Example for Swept SA measurement in Spectrum Analyzer Mode:</p> <p>CALC:DATA4:PEAK? -40, 10, FREQ, GTDL This will identify the peaks of trace 4 that are above -40 dBm, with excursions of at least 10 dB. The peaks are returned in order of increasing frequency, starting with the lowest frequency. Only the peaks that are above the display line are returned.</p> <p>Query Results 1:</p> <p>With FORMat:DATA REAL, 32 selected, it returns a list of floating-point numbers. The first value in the list is the number of peak points that are in the following list. A peak point consists of two values: a peak amplitude followed by its corresponding frequency (or time).</p> <p>If no peaks are found the peak list will consist of only the number of peaks, (0).</p>
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Notes	<p><n> - is the trace that will be used</p> <p><threshold> - is the level below which trace data peaks are ignored. Note that the threshold value is required and is always used as a peak criterion. To effectively disable the threshold criterion for this command, provide a substantially low threshold value such as -200 dBm. Also note that the threshold value used in this command is independent of and has no effect on the threshold value stored under the Peak Criteria menu.</p> <p><excursion> - is the minimum amplitude variation (rise and fall) required for a signal to be identified as peak. Note that the excursion value is required and is always used as a peak criterion. To effectively disable the excursion criterion for this command, provide the minimum value of 0.0 dB. Also note that the excursion value used in this command is independent of and has no effect on the</p>
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excursion value stored under the Peak Criteria menu.

Values must be provided for threshold and excursion. The sorting and display line parameters are optional (defaults are AMPLitude and ALL).

Note that there is always a Y-axis value for the display line, regardless of whether the display line state is on or off. It is the current Y-axis value of the display line which is used by this command to determine whether a peak should be reported

Sorting order:

AMPLitude - lists the peaks in order of descending amplitude, with the highest peak first (default if optional parameter not sent)

FREQUency - lists the peaks in order of occurrence, left to right across the x-axis.

TIME - lists the peaks in order of occurrence, left to right across the x-axis.

Peaks vs. Display Line:

ALL - lists all of the peaks found (default if optional parameter not sent).

GTDLine (greater than display line) - lists all of the peaks found above the display line.

LTDLine (less than display line) - lists all of the peaks found below the display line.

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Format Data: Numeric Data (Remote Command Only)

This command specifies the format of the trace data input and output. It specifies the formats used for trace data during data transfer across any remote port. It affects only the data format for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]?, :CALCulate:DATA[n]? and FETCh:SANalyzer [n]? commands and queries.

Remote Command :FORMat[:TRACe] [:DATA] ASCii|INTeger,32|REAL,32 |REAL,64
:FORMat[:TRACe] [:DATA] ?

Notes The query response is:
ASCii: ASC,8
REAL,32: REAL,32
REAL,64: REAL,64
INTeger,32: INT,32

When the numeric data format is REAL or ASCii, data is output in the current Y Axis unit. When the data format is INTeger, data is output in units of m dBm (.001 dBm).

The INT,32 format returns binary 32-bit integer values in internal units (m dBm), in a definite length block.

Dependencies Sending a data format spec with an invalid number (for example, INT,48) generates no error. The analyzer simply uses the default (8 for ASCii, 32 for INTeger, 32 for REAL).

Sending data to the analyzer which does not conform to the current FORMat specified, results in an error. Sending ASCII data when a definite block is expected generates message -161 "Invalid Block Data" and sending a definite block when ASCII data is expected generates message -121 "Invalid Character in Number".

Preset ASCii

Backwards Compatibility Notes Note that the INT,32 format is only applicable to the command, TRACe:DATA. This preserves backwards compatibility for the Swept SA measurement. For all other commands/queries which honor FORMat:DATA, if INT,32 is sent the analyzer will behave as though it were set to REAL,32.

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The specs for each output type follow:

AScii - Amplitude values are in ASCII, in the current Y Axis Unit, one ASCII character per digit, values separated by commas, each value in the form:

SX.YYYYYEsZZ

Where:

S = sign (+ or -)

X = one digit to left of decimal point

Y = 5 digits to right of decimal point

E = E, exponent header

s = sign of exponent (+ or -)

ZZ = two digit exponent

REAL,32 - Binary 32-bit real values in the current Y Axis Unit, in a definite length block.

REAL,64 - Binary 64-bit real values in the current Y Axis Unit, in a definite length block.

Format Data: Byte Order (Remote Command Only)

This command selects the binary data byte order for data transfer and other queries. It controls whether binary data is transferred in normal or swapped mode. This command affects only the byte order for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]? , :CALCulate:DATA[n]? and FETCh:SANalyzer[n]? commands and queries.

By definition any command that says it uses FORMat:DATA uses any format supported by FORMat:DATA.

The NORMal order is a byte sequence that begins with the most significant byte (MSB) first, and ends with the least significant byte (LSB) last in the sequence: 1|2|3|4. SWAPped order is when the byte sequence begins with the LSB first, and ends with the MSB last in the sequence: 4|3|2|1.

Remote Command	:FORMat:BORDER NORMal SWAPped :FORMat:BORDER?
Preset	NORMal
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Meas Setup

Displays the measurement setup menu for the currently selected measurement.

Key Path	Front-panel key
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Avg/Hold Num

Used to specify the number of data acquisitions that are averaged. After the specified number of average counts, the averaging mode (terminal control) setting determines the averaging action.

- On: Sets measurement averaging on.
- Off: Sets measurement averaging off.

Key Path	Meas Setup
Mode	GSM
Remote Command	[:SENSe]:TSPur:AVERage:COUNT <integer> [:SENSe]:TSPur:AVERage:COUNT? [:SENSe]:TSPur:AVERage[:STATe] OFF ON 0 1 [:SENSe]:TSPur:AVERage[:STATe]?
Example	TSP:AVER:COUN 100 TSP:AVER:COUN? TSP:AVER 0 TSP:AVER?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Preset	30 ON
State Saved	Saved in instrument state.
Min	1
Max	10000
Initial S/W Revision	Prior to A.02.00

Avg Mode

Selects the type of termination control used for the averaging function. This determines the averaging action after the specified number of data acquisitions (average count) is reached.

Key	SCPI	Mode
Exponential	EXponential	Each successive data acquisition after the average count is reached, is

Key	SCPI	Mode
		exponentially weighted and combined with the existing average.
Repeat	REPeat	After reaching the average count, the averaging is reset and a new average is started.
<hr/>		
Key Path	Meas Setup	
Mode	GSM	
Remote Command	[:SENSe]:TSPur:AVERage:TCONtrol EXPonential REPeat [:SENSe]:TSPur:AVERage:TCONtrol?	
Example	TSP:AVER:TCON EXP TSP:AVER:TCON?	
Notes	Valid only when Avg/Hold_Num is set to On. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.	
Preset	REPeat	
State Saved	Saved in instrument state.	
Range	Exp Repeat	
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Avg Type

Selects the type of averaging.

- LOG – The log of the power is averaged. (This is also known as video averaging.)
- MAXimum – The maximum values are retained. Remove from MUI.
- RMS – The power is averaged, providing the rms of the voltage.

Key Path	Meas Setup	
Mode	GSM	
Remote Command	[:SENSe]:TSPur:AVERage:TYPE LOG MAXimum RMS [:SENSe]:TSPur:AVERage:TYPE?	
Example	TSP:AVER:TYPE LOG TSP:AVER:TYPE?	
Notes	MAXimum is SCPI only, no MUI. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.	
Couplings	Selecting 'MAXimum' via SCPI forces to change the state of Trace to 'MAXHold'. Selecting 'LOG' or 'RMS' via SCPI forces to change the state of Trace to 'AVERage'.	
Preset	MAXimum	

State Saved	Saved in instrument state.
Range	Pwr Avg (RMS) Log-Pwr Avg (Video)
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Meas Type

Selects the measurement type from the following selections:

Key	SCPI	Type
Full	FULL	In Continuous Measure, it repeatedly does full search of all segments.
Examine	EXAMine	In Continuous Measure, after doing one full search across all segments, it parks on the worst segment and continuously updates that segment.

Key Path	Meas Setup
Mode	GSM
Remote Command	[:SENSe] :TSPur:TYPE EXAMine FULL [:SENSe] :TSPur:TYPE?
Example	TSP:TYPE EXAM TSP:TYPE?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	FULL
State Saved	Saved in instrument state.
Range	Examine Full
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IF Gain

To take full advantage of the RF dynamic range of the analyzer, a switched IF amplifier with approximately 10 dB of gain is available. When it can be turned on without an overload, the dynamic range is always better with it on than off. The IF Gain key can be used to set the IF Gain function to Auto, or to On (the extra 10 dB) or Off. These settings affect sensitivity and IF overloads.

Key Path	Meas Setup, Advanced
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IF Gain Auto

Activates the auto rules for IF Gain. Auto rules will be set IF Gain to Low Gain.

Key Path	Meas Setup
Mode	GSM
Remote Command	<code>[:SENSe] :TSPur :IF :GAIN :AUTO [:STATe] ON OFF 1 0</code> <code>[:SENSe] :TSPur :IF :GAIN :AUTO [:STATe] ?</code>
Example	TSP:IF:GAIN:AUTO ON TSP:IF:GAIN:AUTO?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Couplings	Couple to IF Gain State.
Preset	ON
State Saved	Saved in instrument state.
Range	Auto Man
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IF Gain State

Selects the range of IF gain.

Key Path	Meas Setup
Mode	GSM
Remote Command	<code>[:SENSe] :TSPur :IF :GAIN [:STATe] ON OFF 1 0</code> <code>[:SENSe] :TSPur :IF :GAIN [:STATe] ?</code>
Example	TSP:IF:GAIN ON TSP:IF:GAIN?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode. where ON = high gain OFF = low gain
Couplings	Coupled to IF Gain Auto , which may force it to Man.
Preset	OFF
State Saved	Saved in instrument state.
Range	Low Gain (Best for Large Signals) High Gain (Best Noise Level)
Initial S/W Revision	Prior to A.02.00

Limit

Sets the value for the test limit. This command does not accept units. Use :CALCulate:TSPur:LIMit:TEST to select the units dBm (absolute) or dB (relative).

- dBm – Absolute limit
- dBc – Relative to Mean Transmit Power.

Key Path	Meas Setup
Mode	GSM
Remote Command	:CALCulate:TSPur:LIMit[:UPPer][:DATA] <real> :CALCulate:TSPur:LIMit[:UPPer][:DATA]? :CALCulate:TSPur:LIMit:TEST ABSolute RELative :CALCulate:TSPur:LIMit:TEST?
Example	CALC:TSP:LIM 100 CALC:TSP:LIM? CALC:TSP:LIM:TEST ABS CALC:TSP:LIM:TEST?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	Selection of Front-panel key Unit/Terminator Key will change this BAF parameter, absolute or relative. If you select dBm for terminator, BAF parameter should be changed to ABSolute(dBm).
Preset	-36.00 ABSolute
State Saved	Saved in instrument state.
Min	-200
Max	100
Initial S/W Revision	Prior to A.02.00

Meas Preset

Restores all the measurement parameters to their default values.

Key Path	Meas Setup
Mode	GSM
Remote Command	:CONFigure:TSPur
Example	CONF:TSP
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Initial S/W Revision	Prior to A.02.00

Tx Band Customize (SCPI only)

Selects whether to customize the Tx Band frequency of the analyzer or use the predefined Tx Band. When CUSTom is selected, Tx Band Custom Setting is applied to the measurement band.

Key Path	SCPI only
Mode	GSM
Remote Command	[:SENSe]:TSPur:TXBand DEFault CUSTom

	<code>[:SENSe] :TSPur :TXBand?</code>
Example	ETSP:TXB CUST ETSP:TXB?
Preset	DEFAult
State Saved	Saved in instrument state.
Range	DEFAult CUSTom
Initial S/W Revision	A.14.00

Tx Band Custom Setting (SCPI only)

Customizes the Tx Band frequency of the analyzer. You can send two frequency values; Tx Band Lower Edge and Tx Band Upper Edge. If you send only one value, then Tx Band Lower Edge is changed.

Key Path	SCPI only
Mode	GSM
Remote Command	<code>[:SENSe] :TSPur :TXBand :RANGe <freq>, <freq></code> <code>[:SENSe] :TSPur :TXBand :RANGe?</code>
Example	TSP:TXB:RANG 935 MHz, 960 MHz TSP:TXB:RANG?
Preset	935 MHz, 960 MHz
State Saved	Saved in instrument state.
Min	-80 MHz
Max	Depends on instrument maximum frequency
Initial S/W Revision	A.14.00

Mode

See "Mode" on page 274

Mode Preset

Returns the active mode to a known state.

Mode Preset does the following for the currently active mode:

- Aborts the currently running measurement.
- Brings up the default menu for the mode, with no active function.
- Sets measurement Global settings to their preset values for the active mode only.
- Activates the default measurement.
- Brings up the default menu for the mode.
- Clears the input and output buffers.
- Sets Status Byte to 0.

Mode Preset does not:

- Cause a mode switch
- Affect mode persistent settings
- Affect system settings

See "[How-To Preset](#)" on page 2171 for more information.

Key Path	Front-panel key
Remote Command	:SYSTem:PRESet
Example	:SYST:PRES
Notes	*RST is preferred over :SYST:PRES for remote operation. *RST does a Mode Preset, as done by the :SYST:PRES command, and it sets the measurement mode to Single measurement rather than Continuous for optimal remote control throughput. Clears all pending OPC bits. The Status Byte is set to 0.
Couplings	A Mode Preset aborts the currently running measurement, activates the default measurement, and gets the mode to a consistent state with all of the default couplings set.
Backwards Compatibility Notes	In the X-Series, the legacy "Factory Preset" has been replaced with Mode Preset, which only presets the currently active mode, not the entire instrument. In the X-Series, the way to preset the entire instrument is by using System, Restore System Defaults All, which behaves essentially the same way as restore System Defaults does on ESA and PSA. There is also no "Preset Type" as there is on the PSA. There is a green Mode Preset front-panel key that does a Mode Preset and a white-with-green-letters User Preset front-panel key that does a User Preset. The old PRESet:TYPE command is ignored (without generating an error), and SYST:PRES without a parameter does a Mode Preset, which should cover most backward code compatibility issues. The settings and correction data under the Input/Output front-panel key (examples: Input Z Corr, Ext Amp Gain, etc.) are no longer part of any Mode, so they will not be preset by a Mode Preset. They are preset using Restore Input/Output Defaults, Restore System Defaults All. Note that because User Preset does a Recall State, and all of these settings are saved in State, they ARE recalled when using

	User Preset.
Initial S/W Revision	Prior to A.02.00

How-To Preset

The table below shows all possible presets, their corresponding SCPI commands and front-panel access (key paths). Instrument settings depend on the current measurement context. Some settings are local to the current measurement, some are global (common) across all the measurements in the current mode, and some are global to all the available modes. In a similar way, restoring the settings to their preset state can be done within the different contexts.

Auto Couple - is a measurement local key. It sets all Auto/Man parameter couplings in the measurement to Auto. Any Auto/Man selection that is local to other measurements in the mode will not be affected.

Meas Preset - is a measurement local key. Meas Preset resets all the variables local to the current measurement except the persistent ones.

Mode Preset - resets all the current mode's measurement local and measurement global variables except the persistent ones.

Restore Mode Defaults - resets ALL the Mode variables (and all the Meas global and Meas local variables), including the persistent ones.

Type Of Preset	SCPI Command	Front Panel Access
Auto Couple	:COUPlE ALL	Auto Couple front-panel key
Meas Preset	:CONFIgure:<Measurement>	Meas Setup Menu
Mode Preset	:SYSTem:PRESet	Mode Preset (green key)
Restore Mode Defaults	:INSTrument:DEFault	Mode Setup Menu
Restore All Mode Defaults	:SYSTem:DEFault MODEs	System Menu; Restore System Default Menu
*RST	*RST	not possible (Mode Preset with Single)
Restore Input/Output Defaults	:SYSTem:DEFault INPut	System Menu; Restore System Default Menu
Restore Power On Defaults	:SYSTem:DEFault PON	System Menu; Restore System Default Menu
Restore Alignment Defaults	:SYSTem:DEFault ALIGn	System Menu; Restore System Default Menu
Restore Miscellaneous Defaults	:SYSTem:DEFault MISC	System Menu; Restore System Default Menu
Restore All System Defaults	:SYSTem:DEFault [ALL] :SYSTem:PRESet:PERSistent	System Menu; Restore System Default Menu
User Preset	:SYSTem:PRESet:USER	User Preset Menu
User Preset All Modes	:SYSTem:PRESet:USER:ALL	User Preset Menu

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Power On Mode Preset	:SYSTem:PON:TYPE MODE	System Menu
Power On User Preset	:SYSTem:PON:TYPE USER	System Menu
Power On Last State	:SYSTem:PON:TYPE LAST	System Menu

Mode Setup

See ["Mode Setup" on page 294](#)

Peak Search

Pressing Peak Search Front-panel key performs a peak search and opens this Peak Search menu. Places the selected marker on the trace point with the maximum y-axis value for that marker's trace.

Key Path	Front-panel key
Mode	GSM
Remote Command	:CALCulate:TSPur:MARKer[1] 2 ...12:MAXimum
Example	:CALC:TSP:MARK2:MAX
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Initial S/W Revision	Prior to A.02.00

Print

See "Print" on page 325

Quick Save

The Quick Save front-panel key repeats the most recent save that was performed from the Save menu, with the following exceptions:

- Register saves are not remembered as Saves for the purpose of the Quick Save function
- If the current measurement does not support the last non-register save that was performed, an informational message is generated, “File type not supported for this measurement”

Quick Save repeats the last type of qualified save (that is, a save qualified by the above criteria) in the last save directory by creating a unique filename using the Auto File Naming algorithm described below.

If Quick Save is pressed after startup and before any qualified Save has been performed, the Quick Save function performs a Screen Image save using the current settings for Screen Image saves (current theme, current directory), which then becomes the “last save” for the purpose of subsequent Quick Saves.

The Auto File Naming feature automatically generates a file name for use when saving a file. The filename consists of a prefix and suffix separated by a dot, as is standard for the Windows® file system. A default prefix exists for each of the available file types:

Type	Default Prefix	Menu
State	State_	(Save/Recall)
Trace + State	State_	(Save/Recall)
Screen	Screen_	(Save/Recall)
Amplitude Corrections	Ampcor_	(Import/Export)
Traces	Trace_	(Import/Export)
Limit Lines	LLine_	(Import/Export)
Measurement Result	MeasR_	(Import/Export)
Capture Buffer	CapBuf_	(Import/Export)

A four digit number is appended to the prefix to create a unique file name. The numbering sequence starts at 0000 within each Mode for each file type and updates incrementally to 9999, then wraps to 0000 again. It remembers where it was through a Mode Preset and when leaving and returning to the Mode. It is reset by Restore Misc Defaults and Restore System Defaults and subsequent running of the instrument application. So, for example, the first auto file name generated for State files is State_0000.state. The next is State_0001, and so forth.

One of the key features of Auto File Name is that we guarantee that the Auto File Name will never conflict with an existing file. The algorithm looks for the next available number. If it gets to 9999, then it looks for holes. If it find no holes, that is no more numbers are available, it gives an error.

For example, if when we get to State_0010.state there is already a State_0010.state file in the current directory, it advances the counter to State_0011.state to ensure that no conflict will exist (and then it verifies that State_0011.state also does not exist in the current directory and advances again if it does, and so forth).

If you enter a file name for a given file type, then the prefix becomes the filename you entered instead of the default prefix, followed by an underscore. The last four letters (the suffix) are the 4-digit number.

For example, if you save a measurement results file as “fred.csv”, then the next auto file name chosen for a measurement results save will be fred_0000.csv.

NOTE Although 0000 is used in the example above, the number that is used is actually the current number in the Meas Results sequence, that is, the number that would have been used if you had not entered your own file name.

NOTE If the filename you entered ends with _dddd, where d=any number, making it look just like an auto file name, then the next auto file name picks up where you left off with the suffix being dddd + 1.

Key Path	Front-panel key
Notes	No remote command for this key specifically.
Initial S/W Revision	Prior to A.02.00

Recall

The Recall menu lets you choose what you want to recall, and where you want to recall it from. Among the types of files you can recall are **States and Traces**. In addition, an Import (Data) option lets you recall a number of data types stored in CSV files (as used by Excel and other spreadsheet programs).

The default paths for Recall are data type dependent and are the same as for the Save key.

Key Path	Front-panel key
Notes	<p>No remote command for this key specifically, but the :MMEM:LOAD command is available for specific file types. An example is :MMEM:LOAD:STATe <filename>.</p> <p>If you try to recall a State file for a mode that is not licensed or not available in the instrument, an error message will occur and the state will not change.</p>
Backwards Compatibility Notes	<p>In legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly (since User Preset is actually loading a state), it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, “state” always includes all of this data; so whenever state is loaded, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p>
Backwards Compatibility Notes	<p>Recall for the X-Series supports backward compatibility in the sense that you can recall a state file from any X-Series model number and any version of X-Series software. This is only possible if part of the recalling process goes through a limiting step after recalling the mode settings, at least for settings that may vary with version number, model number, option and license differences. If you try to recall a state file onto an instrument with less capability than what was available on the instrument during the save, the recall will ignore the state it doesn't support and it will limit the recalled setting to what it allows.</p> <p>Example: if the saved state includes preamp ON, but the recalling instrument does not have a preamp; the preamp is limited to OFF. Conversely, if you save a state without a preamp, the preamp is OFF in the state file. When this saved file is recalled on an instrument with a licensed preamp, the preamp is changed to OFF. Another example is if the saved state has center frequency set to 20 GHz, but the instrument recalling the saved state is a different model and only supports 13.5 GHz. In this case, the center frequency is limited along with any other frequency based settings. Since the center frequency can't be preserved in this case, the recall limiting tries to at least preserve span to keep the measurement setup as intact as possible.</p> <p>It may be appropriate to issue a warning if the state is limited on the recall; warnings do not go out to SCPI so this would only affect the manual user.</p> <p>Note that there is no state file compatibility outside of the X-Series. For example, you cannot recall a state file from ESA or PSA.</p>
Initial S/W Revision	Prior to A.02.00

State

The Recall State menu lets you choose a register or file from which to recall the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings that were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the

additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, GPIB address) are not affected by either a Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

Since each state file is only for one Mode, the settings for other Modes are unaffected when it is loaded. Recall State will cause a mode switch if the state being recalled is not from the current active mode.

After the recall completes, the message "File <filename> recalled" or "Recalled State Register <register number>" is displayed.

For rapid recalls, the State menu lists 16 registers that you can choose from to recall. Pressing a Register key initiates the recall. You can also select a file from which to recall.

The default path for all State Files is:

My Documents\<<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

See "[More Information](#)" on page 2180.

Key Path	Recall
Mode	All
Remote Command	:MMEMory:LOAD:STATe <filename>
Example	:MMEM:LOAD:STAT "myState.state" This recalls the file myState.state on the default path
Example	MMEM:LOAD:STAT "MyStateFile.state" This loads the state file data (on the default file directory path) into the instrument state.
Notes	<p>When you pick a file to recall, the analyzer first verifies that the file is recallable in the current instrument by checking the software version and model number of the instrument. If everything matches, a full recall proceeds by aborting the currently running measurement, clearing any pending operations, and then loading the State from the saved state file. You can open state files from any mode, so recalling a State file switches to the mode that was active when the save occurred. After switching to the mode of the saved state file, mode settings and data (if any for the mode) are loaded with values from the saved file. The saved measurement of the mode becomes the newly active measurement and the data relevant to the measurement (if there is any) is recalled.</p> <p>If there is a mismatch between file version or model number or instrument version or model number, the recall function tries to recall as much as possible and returns a warning message. It may limit settings that differ based on model number, licensing or version number.</p> <p>After recalling the state, the Recall State function does the following:</p> <ul style="list-style-type: none"> • Makes the saved measurement for the mode the active measurement. • Clears the input and output buffers. • Status Byte is set to 0. • Executes a *CLS <p>If the file specified is empty an error is generated. If the specified file does not exist, another error is generated. If there is a mismatch between the file and the proper file type, an error is generated. If</p>

	there is a mismatch between file version or model number or instrument version or model number, a warning is displayed. Then it returns to the State menu and File Open dialog goes away. After the Recall, the analyzer exits the Recall menu and returns to the previous menu.
Backwards Compatibility SCPI	:MMEMory:LOAD:STATe 1,<filename> For backwards compatibility, the above syntax is supported. The "1" is simply ignored.
Initial S/W Revision	Prior to A.02.00

More Information

In measurements that support saving Traces, for example, Swept SA, the Trace data is saved along with the State in the State file. When recalling the State, the Trace data is recalled as well. Traces are recalled exactly as they were stored, including the writing mode and update and display modes. If a Trace was updating and visible when the State was saved, it will come back updating and visible, and its data will be rewritten right away. When you use State to save and recall traces, any trace whose data must be preserved should be placed in View or Blank mode before saving.

The following table describes the Trace Save and Recall possibilities:

You want to recall state and one trace's data, leaving other traces unaffected.	Save Trace+State from 1 trace. Make sure that no other traces are updating (they should all be in View or Blank mode) when the save is performed.	On Recall, specify the trace you want to load the one trace's data into. This trace will load in View. All other traces' data will be unaffected, although their trace mode will be as it was when the state save was performed.
You want to recall all traces	Save Trace+State from ALL traces.	On Recall, all traces will come back in View (or Blank if they were in Blank or Background when saved)
You want all traces to load exactly as they were when saved.	Save State	On recall, all traces' mode and data will be exactly as they were when saved. Any traces that were updating will have their data immediately overwritten.

From File...

When you press "From File", the analyzer brings up a Windows dialog and a menu entitled "File Open." This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



Listed below are the functions of the various fields in the dialog, and the corresponding softkeys:

Open

Performs the recall of the specified file. While the recall is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Look In.

Look In

The Look In field shows the path from which the file will be recalled and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Look In field** first uses the last path from the Save As dialog **Save In:** path for that same file type. There is no softkey for directly navigating to the Look In field, but you can use the left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

Sort

Accesses a menu that enables you to sort the files within the File Open dialog. Only one sorting type can be selected at a time and the sorting happens immediately. The sorting types are By Date, By Name, By extension, and By Size.

Files of Type

This field shows the file suffix for the type of file you have selected to recall. For example, if you navigated here while recalling State, "Mode state (*.state)" is in the field. If you navigated here while recalling Trace, ""Mode state (*.trace)" is in the field. If you navigated here while importing a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown menu, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Open** request to be cancelled. The ESC key does the same thing.

Key Path	Recall, State
Notes	Brings up the Open dialog for recalling a State Save Type
Initial S/W Revision	Prior to A.02.00

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

For more information and the SCPI command, see Edit Register Names under the Save, State function.

Key Path	Recall, State
Mode	All
Dependencies	N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending the SCPI command generates an error, -221, "Settings conflict;Option not available"
Initial S/W Revision	A.11.00

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last

modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

Key Path	Recall, State
Example	*RCL 1
Range	1–16 from front panel, 1–128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State, Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	Prior to A.11.00

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

Key Path	Recall, State
Example	*RCL 1
Range	1-16 from front panel, 1-128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State,Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	Prior to A.11.00

Restart

The Restart function restarts the current sweep, or measurement, or set of averaged/held sweeps or measurements. If you are Paused, pressing Restart does a Resume.

The Restart function is accessed in several ways:

- Pressing the Restart key
- Sending the remote command INIT:IMMEDIATE
- Sending the remote command INIT:RESTART

See "[More Information](#)" on page 2185

Key Path	Front-panel key
Remote Command	:INITiate[:IMMEDIATE] :INITiate:RESTART
Example	:INIT:IMM :INIT:REST
Notes	:INITiate:RESTART and :INITiate:IMMEDIATE perform exactly the same function.
Couplings	Resets average/hold count k. For the first sweep overwrites all active (update=on) traces with new current data. For application modes, it resets other parameters as required by the measurement.
Status Bits/OPC dependencies	This is an Overlapped command. The STATUS:OPERation register bits 0 through 8 are cleared. The STATUS:QUESTIONable register bit 9 (INTEgrity sum) is cleared. The SWEEPING bit is set. The MEASURING bit is set.
Backwards Compatibility Notes	For Spectrum Analysis mode in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart trace averages (displayed average count reset to 1) for a trace in Clear Write, but did not restart Max Hold and Min Hold. In the X-Series, the Restart hardkey and the INITiate:RESTART command restart not only Trace Average, but MaxHold and MinHold traces as well. For wireless comms modes in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart every measurement, which includes all traces and numeric results. There is no change to this operation.
Initial S/W Revision	Prior to A.02.00

More Information

The **Restart** function first aborts the current sweep/measurement as quickly as possible. It then resets the sweep and trigger systems, sets up the measurement and initiates a new data measurement sequence with a new data acquisition (sweep) taken once the trigger condition is met.

If the analyzer is in the process of aligning when **Restart** is executed, the alignment finishes before the restart function is performed.

Even when set for Single operation, multiple sweeps may be taken when Restart is pressed (for example, when averaging/holding is on). Thus when we say that **Restart** "restarts a measurement," we may mean:

- It restarts the current sweep
- It restarts the current measurement
- It restarts the current set of sweeps if any trace is in Trace Average, Max Hold or Min Hold
- It restarts the current set of measurements if Averaging, or Max Hold, or Min Hold is on for the measurement
- depending on the current settings.

With **Average/Hold Number** (in **Meas Setup** menu) set to 1, or Averaging off, or no trace in Trace Average or Hold, a single sweep is equivalent to a single measurement. A single sweep is taken after the trigger condition is met; and the analyzer stops sweeping once that sweep has completed. However, with **Average/Hold Number** >1 and at least one trace set to **Trace Average, Max Hold, or Min Hold (SA Measurement)** or **Averaging on (most other measurements)**, multiple sweeps/data acquisitions are taken for a single measurement. The trigger condition must be met prior to each sweep. The sweep is stopped when the average count k equals the number N set for **Average/Hold Number**. A measurement average usually applies to all traces, marker results, and numeric results; but sometimes it only applies to the numeric results.

Once the full set of sweeps has been taken, the analyzer will go to idle state. To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command `CALC:AVER:TCON UP`.

Save

The Save menu lets you choose what you want to save and where you want to save it. Among the types of files you can save are **States**, **Traces**, and **Screen Images**. In addition, an Export (Data) option lets you save a number of data types as CSV files for easy import into Excel and other spreadsheet programs.

Key Path	Front-panel key
Mode	All
Notes	No remote command for this key specifically, but the :MMEM:STORe command is available for specific file types. An example is :MMEM:STOR:STATe <filename>.
Initial S/W Revision	Prior to A.02.00

State

The Save State menu lets you choose a register or file for saving the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings which were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, Verbose SCPI) are not affected by either Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

After the save completes, the message "File <filename> saved" or "State Register <register number> saved" is displayed.

For rapid saving, the State menu lists 16 registers to save to. Pressing a Register key initiates the save. You can also select a file to save to.

The default path for all State Files is:

My Documents\<>mode name>\state

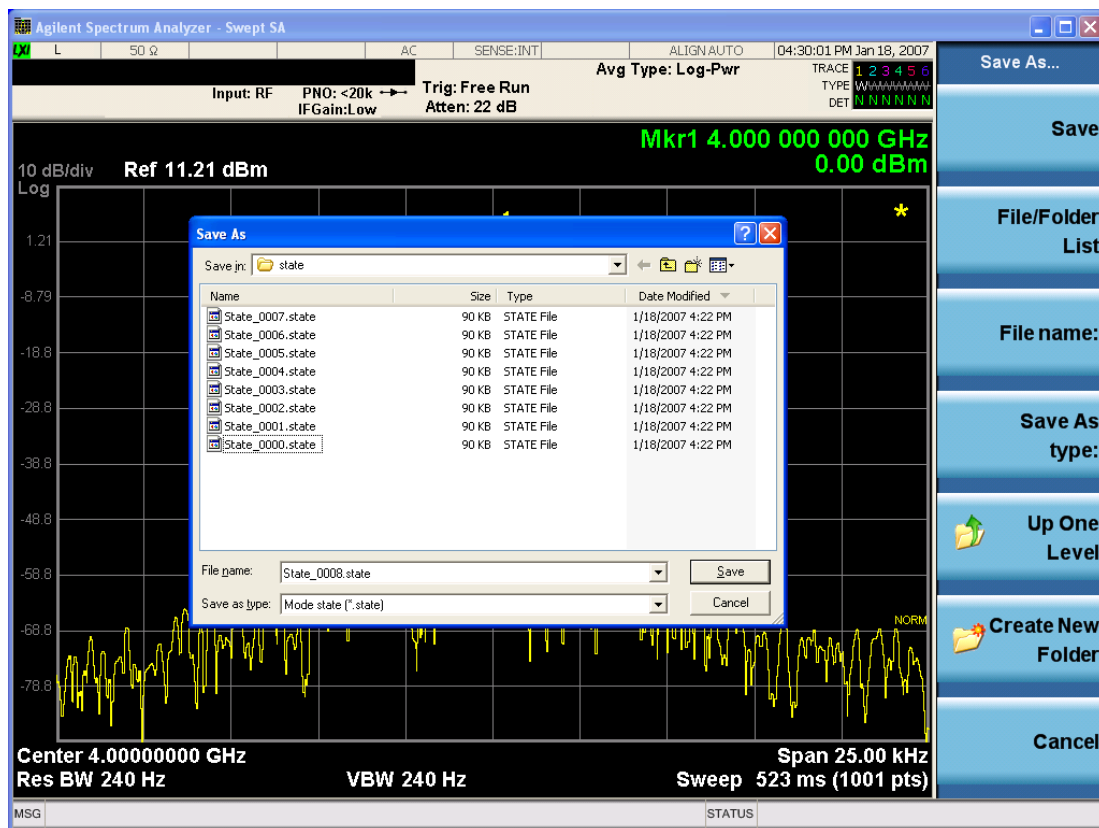
where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

Key Path	Save
Mode	All
Remote Command	:MMEMory:STORe:STATe <filename>
Example	MMEM:STOR:STATe "MyStateFile.state" This stores the current instrument state data in the file MyStateFile.state in the default directory.
Notes	Both single and double quotes are supported for any filename parameter over remote. After saving to a register, that register's menu key is updated with the date the time, unless a custom label has been entered for that key. After saving to a register, you remain in the Save State menu, so that you can see the Register key

	update. After saving to a file, the analyzer automatically returns to the previous menu and any Save As dialog goes away.
Backwards Compatibility SCPI	:MMEMory:STORe:STATe 1,<filename>
Initial S/W Revision	Prior to A.02.00

To File . . .

When you press “To File”, the analyzer brings up a Windows dialog and a menu entitled “Save As.” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



The Listed below

are the functions of the various fields in the dialog, and the corresponding softkeys:

Save

Performs the save to the specified file of the selected type. If the file already exists, a dialog will appear that allows you to replace the existing file by selecting OK, or you can Cancel the request. If you select OK, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade.

While the save is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Save In.

Save In

The Save In field shows the path to which the file will be saved and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Save In field** defaults to the default path for this type of file and remembers the last path you used to save this type of file. There is no softkey for directly navigating to the Save In field but you can use left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

File Name

The File Name field is initially loaded with an automatically generated filename specific to the appropriate Save Type. The automatically generated filename is guaranteed not to conflict with any filename currently in the directory. You may replace or modify this filename using the File Name key. See the ["Quick Save " on page 2328](#) documentation for more on the automatic file naming algorithm.

When you press the File Name key the analyzer displays the Alpha Editor. Use the knob to choose the letter to add and the front-panel Enter key to add the letter to the file name. The BK character moves you back and the FW character moves you forward in the filename. The Select key on the front panel generates a space character. When you are done entering the filename press the Done softkey. This returns back to the **File Open** dialog and menu, but does not cause the save to occur.

Save As Type

This field shows the file suffix for the type of file you have selected to save. For example, if you navigated here while saving State, "Mode state (*.state)" is in the field. If you navigated here from saving Trace, ""Mode state (*.trace)" is in the field. If you navigated here while exporting a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Create New Folder

This key corresponds to the icon of a folder with the "*" that is in the tool bar of the dialog. When pressed, a new folder is created in the current directory with the name **New Folder** and you can enter a new folder name using the Alpha Editor.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Save As** request to be cancelled. The ESC key does the same thing.

Key Path	Save, State
Mode	All
Notes	Brings up Save As dialog for saving a State Save Type
Initial S/W Revision	Prior to A.02.00

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

See ["More Information" on page 2190](#)

Key Path	Save, State
Mode	All
Remote Command	:MMEMory:REGister:STATe:LABel <reg number>,"label" :MMEMory:REGister:STATe:LABel? <reg number>
Example	:MMEM:REG:STAT:LAB 1,"my label"
Notes	<reg number> is an integer from 1 to 16. If the SCPI specifies an invalid register number an error message is generated, -222,"Data out of range;Invalid register label number" "label" is a string from 0 to 30 characters in length. If a label exceeds 30 characters, an error message is generated, -150,"String data error;Label clipped to 30 characters" "label" of length 0 erases the custom label and restores the default (time and date) label. E.g.: :MMEM:REG:STAT:LAB 1,""
Dependencies	N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending this command generates an error, -221,"Settings conflict;Option not available"
Preset	The names are unaffected by Preset or power cycle but are set to the default label (time and date) on a "Restore System Defaults->Misc"
Initial S/W Revision	A.11.00

More Information

When you edit one of the register names, the time and date field will be replaced by the custom name.

If you delete all the characters in the custom name, it restores the default (time and date).

The register names are stored within the state files, but they are not part of the instrument state; that is, once you have edited a register name, loading a new state will not change that register name. Another consequence of this is that the names will be persistent through a power cycle. Also, if a named state file is transferred to another analyzer, it will bring its custom name along with it.

If you try to edit the name of an empty register, the analyzer will first save the state to have a file to put the name in. If you load a named state file into an analyzer with older firmware it will ignore the metadata.

The *SAV and *RCL commands will not be affected by the custom register names, nor will the MMEM commands.

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

Key Path	Save, State
Mode	All
Example	*SAV 1
Range	1–16 from front panel, 1–128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.11.00

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

Key Path	Save, State
Mode	All
Example	*SAV 1
Range	1-16 from front panel, 1-128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR "(empty)" if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.11.00

Data (Export)

Exporting a data file stores data from the current measurement to mass storage files. The Export Menu only contains data types that are supported by the current measurement.

Since the commonly exported data files are in .csv format, the data can be edited by you prior to importing. This allows you to export a data file, manipulate the data in Excel (the most common PC Application for manipulating .csv files) and then import it.

Selecting an Export Data menu key will not actually cause the exporting to occur, since the analyzer still needs to know where you wish to save the data. Pressing the Save As key in this menu brings up the Save As dialog and Save As menu that allows you to specify the destination file and directory. Once a filename has been selected or entered in the Open menu, the export will occur as soon as the Save key is pressed.

Key Path	Save
Mode	All
Notes	The menu is built from whatever data types are available for the mode. So the key locations in the sub menu will vary. No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:STORe commands.
Dependencies	If a file type is not used by a certain measurement, that type is grayed out for that measurement. The key for a file type will not show at all if there are no measurements in the Mode that support it.
Preset	Is not affected by a Preset or shutdown, but is reset during Restore Mode Defaults
Readback	The data type that is currently selected
Initial S/W Revision	Prior to A.02.00

Measurement Results

Pressing this key selects Meas Results as the data type to be exported. Pressing the key a second time brings up the Meas Results menu, which allows you to select which **Meas Result** to save. In the Swept SA measurement, there are three types of Measurement Results files: Peak Table, Marker Table and Spectrogram.

See "Meas Results File Contents" on page 2193.

See "Marker Table" on page 2193.

See "Peak Table" on page 2196.

See "Spectrogram" on page 2199

Remote Command	:MMEMory:STORe:RESults:MTABle PTABle SPEctrogram <filename>
Example	:MMEM:STOR:RES:MTAB "myResults.csv" Saves the results from the current marker table to the file myResults.csv in the current path. :MMEM:STOR:RES:PTAB "myResults.csv" Saves the results from the current peak table to the file myResults.csv in the current path. :MMEM:STOR:RES:SPEC "myResults.csv" Saves the results from the current Spectrogram display to the file myResults.csv in the current path. The default path is My Documents\SA\data\SAN\results
Notes	If the save is initiated via SCPI, and the file already exists, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade. Both single and double quotes are supported for any filename parameter over SCPI.
Dependencies	If a save of Marker Table results is requested and the Marker Table is not on, no file is saved and a message is generated If a save of Peak Table results is requested and the Peak Table is not on, no file is saved and a message is generated If a save of Spectrogram results is requested and the Spectrogram is not on, no file is saved and a message is generated. The Spectrogram choice only appears if option EDP is licensed.
Preset	Not part of Preset, but is reset to Peak Table by Restore Mode Defaults. Survives a shutdown.
Initial S/W Revision	Prior to A.02.00

Meas Results File Contents

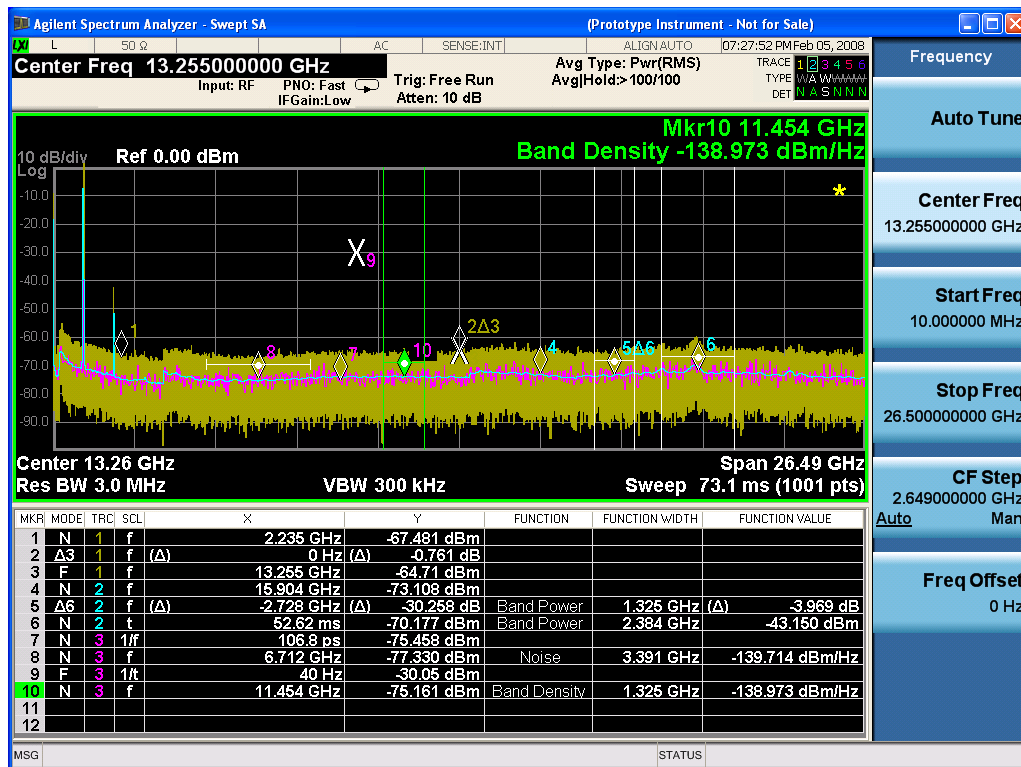
All files are .csv files. The following section details the data in each file type.

Marker Table

This section discusses the Marker Table Meas Results file format.

Imagine that, at the point where a Marker Table Meas Result is requested, the following screen is showing:

17 GMSK TX Band Spur Measurement
Save



Then the Meas Results file, when opened, would show the following data:

MeasurementResult	
Swept SA	
A.01.40_R0017	N9020A
526 B25 PFR	1
P26 EA3	
Result Type	Marker Table
Ref Level	0
Number of Points	1001
Sweep Time	0.0662666 67
Start Frequency	10000000
Stop Frequency	26500000 000
Average Count	0
Average Type	LogPower (Video)
RBW	3000000

RBW Filter	Gaussian
RBW Filter BW	3dB
VBW	3000000
Sweep Type	Swept
X Axis Scale	Lin
PreAmp State	Off
PreAmp Band	Low
Trigger Source	Free
Trigger Level	1.2
Trigger Slope	Positive
Trigger Delay	1.00E-06
Phase Noise Optimization	Fast
Swept If Gain	Low
FFT If Gain	Autorange
RF Coupling	AC
FFT Width	411900
Ext Ref	10000000
Input	RF
RF Calibrator	Off
Attenuation	10
Ref Level Offset	0
External Gain	0
X Axis Units	Hz
Y Axis Units	dBm

DATA									
MKR	MODE	TR C	SCL	X	Y	FUNCTI ON	FUNCTIO N WIDTH	FUNCTI ON VALUE	FUNCTI ON UNIT
1	Normal	1	Freque ncy	2.2350E+09	- 67.481	Off	0.0000E+00	0	None
2	Delta3	1	Freque ncy	0.0000E+00	- 0.761	Off	0.0000E+00	0	None
3	Fixed	1	Freque ncy	1.3255E+10	- 64.71	Off	0.0000E+00	0	None
4	Normal	2	Freque ncy	1.5904E+10	- 73.1	Off	0.0000E+00	0	None

08									
5	Delta7	2	Frequency	-2.7280E+09	-30.258	Band Power	1.3250E+06	-3.969	dB
6	Normal	2	Time	5.2620E-02	-70.177	Band Power	2.3840E+06	-43.15	dBm
7	Normal	3	Period	1.0680E-10	-75.458	Off	0.0000E+00	0	None
8	Normal	3	Frequency	6.7120E+09	-77.33	Noise	3.3910E+06	-139.714	dBm/Hz
9	Fixed	3	Inverse Time	4.0000E+01	-30.05	Off	0.0000E+00	0	None
10	Normal	3	Frequency	1.1454E+10	-75.161	Band Density	1.3250E+06	-138.973	dBm/Hz
11	Off	1	Frequency	0.0000E+00	0	Off	0.0000E+00	0	None
12	Off	1	Frequency	0.0000E+00	0	Off	0.0000E+00	0	None

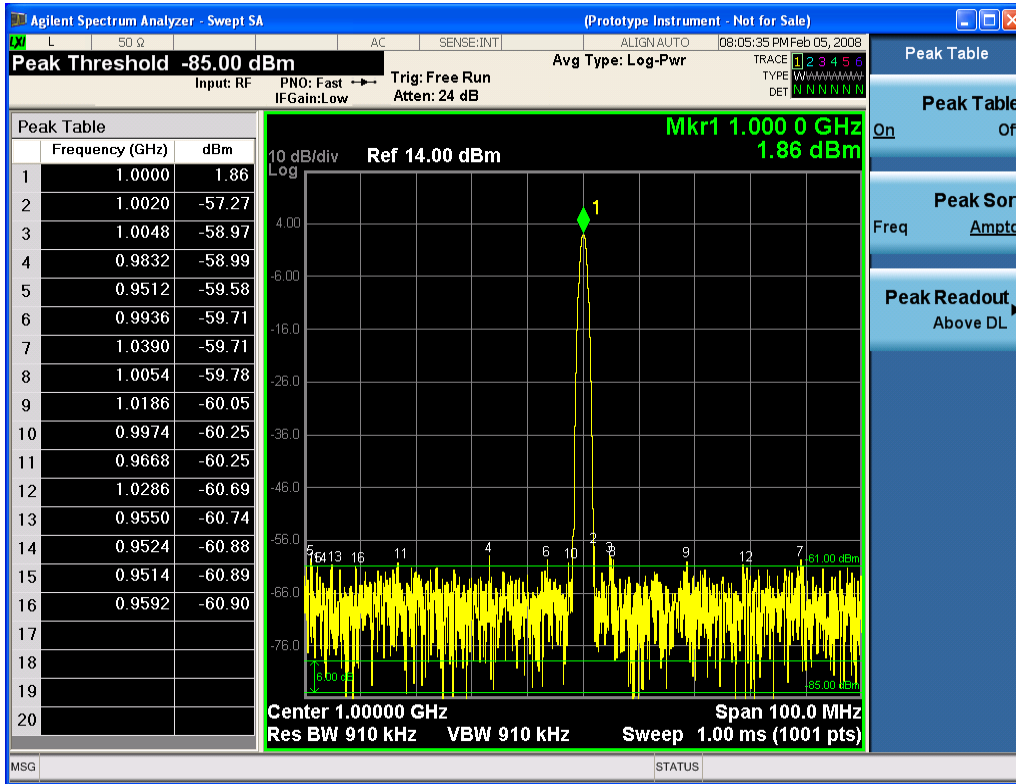
The numbers appear in the file exactly as they appear onscreen. If it says 11.454 GHz onscreen, then in the file it is 11.454E+09.

The metadata header is very similar to the metadata used in the trace data .csv files. See Trace File Contents. The only new information concerns the 1-of-N fields in the marker table itself.

Peak Table

This section discusses the Peak Table Meas Results file format.

Imagine that, at the point where a Marker Table Meas Result is requested, the following screen is showing:



Then the Meas Results file, when opened, would show the header data (the same as for the Marker Table except that the Result Type is Peak Table) ending with a few fields of specific interest to Peak Table users:

- Peak Threshold
- Peak Threshold State (On|Off)
- Peak Excursion
- Peak Excursion State (On|Off)
- Display Line
- Peak Readout (All|AboveDL|BelowDL)
- Peak Sort (Freq|Amptd)

These fields are then followed by the data for the Peak Table itself.

Note that the label for the Frequency column changes to Time in 0 span.

Here is what the table for the above display looks like:

MeasurementResult	
Swept SA	
A.01.40_R0017	N9020A
526 B25 PFR P26 EA3	1

Result Type	Peak Table
Ref Level	0
Number of Points	1001
Sweep Time	0.066266667
Start Frequency	10000000
Stop Frequency	26500000000
Average Count	0
Average Type	LogPower(Video)
RBW	3000000
RBW Filter	Gaussian
RBW Filter BW	3dB
VBW	3000000
Sweep Type	Swept
X Axis Scale	Lin
PreAmp State	Off
PreAmp Band	Low
Trigger Source	Free
Trigger Level	1.2
Trigger Slope	Positive
Trigger Delay	1.00E-06
Phase Noise Optimization	Fast
Swept If Gain	Low
FFT If Gain	Autorange
RF Coupling	AC
FFT Width	411900
Ext Ref	10000000
Input	RF
RF Calibrator	Off
Attenuation	10
Ref Level Offset	0
External Gain	0
X Axis Units	Hz
Y Axis Units	dBm
Peak Threshold	-85
Peak Threshold State	On
Peak Excursion	6
Peak Excursion State	On

Display Line	-61	
Peak Readout	AboveDL	
Peak Sort	Amptd	
DATA		
Peak	Frequency	Amplitude
1	1.0000E+06	1.86
2	1.0020E+06	-57.27
3	1.0048E+06	-58.97
4	9.8320E+05	-58.99
5	9.5120E+05	-59.58
6	9.9360E+05	-59.71
7	1.0390E+06	-59.71
8	1.0054E+06	-59.78
9	1.1086E+06	-60.05
10	9.9740E+05	-60.25
11	9.6680E+05	-60.25
12	1.0286E+06	-60.69
13	9.5500E+05	-60.74
14	9.5240E+05	-60.88
15	9.5140E+05	-60.89
16	9.5920E+05	-60.90
17		
18		
19		
20		

Spectrogram

This section discusses the Spectrogram Results file format. The Spectrogram choice only appears if option EDP is licensed.

The Spectrogram results are the same as a Trace data export, except that instead of having just one trace's data, all 300 traces appear one after the other.

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Each trace has its own data mark; the data for Spectrogram Trace 0 follows the row marked DATA, the data for Spectrogram Trace 1 follows the row marked DATA1, for Spectrogram Trace 2 follows the row marked DATA2, and so on.

Each DATA row has a timestamp in the second column (as of firmware revision A.11.01). So, for example, if Trace 0 had a relative start time of 1729.523 sec, then the first DATA row would look like this:

DATA,1729.523

And if Trace 13 had a relative start time of 100.45 sec, then the fourteenth data row would look like:

DATA13,100.453

To find the absolute time for the relative timestamps of each trace, the last row before the first DATA row gives the absolute start time of the Spectrogram, in the form YYYYMMDDHHMMSS

So, for example, if the absolute start time is 13:23:45:678 on January 30, 2012, this row would look like:

Start Time,20120130132345678

NOTE The resolution of the absolute time stored is 1 ms, which matches up with the fact that the fastest sweep time is also 1 ms. However, there is no specification for the absolute accuracy of the clock in the analyzer, nor is there any facility provided to allow the user to set this time to any particular degree of accuracy.

Traces that have not yet been filled in the Spectrogram display are empty; there is no DATA header for them. The file ends after the last non-empty trace.

Imagine that, at the point where a Spectrogram Meas Result is requested, the following screen is showing:



For the purpose of this example, we have set the Average/Hold Number to 10, thus we have only traces 0 thru 10. The Spectrogram was started at 02:28:08:700 pm on April 25, 2012 (that is, 700 ms after 2:28:08 pm), although the screen dump itself shows a different time, as it was taken ten minutes after the

Spectrogram data. Trace 0 is showing a start time of 5.30 seconds, meaning 5.3 seconds after the Spectrogram started (trace 10 has a start time of 0, as it was the first trace taken but has now rolled up into the tenth trace slot).

The Meas Results file, when opened, shows the header data and ten traces of trace data. Below is an extract from the result file for the above display. Note the start time of 20120425142808700 showing in the last row before the first DATA row, and the relative time of 5.299231048 showing in the first DATA row:

Result Type	Spectrogram
MeasResult	
Swept SA	
A.11.00.01	N9020A
503 508 513 526 ALL ALV B1C B1X B25 B2X B40 BAB BBA CR3 CRP DP2 DRD EA3 EDP EMC EP1 ERC ESC ESP EXM FSA HBA K03 LFE MPB P03 P08 P13 P26 PFR RTL RTS S40 SB1 SEC SM1 UK6 YAS YAV	1
Segment	0
Number of Points	1001
Sweep Time	0.523333333
Start Frequency	5999984415
Stop Frequency	6000009415
Average Count	0
Average Type	LogPower(Video)
RBW	240
RBW Filter	Gaussian
RBW Filter BW	3dB
VBW	240
Sweep Type	Swept
X Axis Scale	Lin
PreAmp State	Off
PreAmp Band	Low
Trigger Source	Free
Trigger Level	1.2
Trigger Slope	Positive
Trigger Delay	0
Phase Noise Optimization	Wide
Swept If Gain	Low
FFT If Gain	Autorange
RF Coupling	AC

Result Type	Spectrogram
FFT Width	411900
Ext Ref	10000000
Input	RF
RF Calibrator	Off
Attenuation	14
Ref Level Offset	0
External Gain	0
Trace Type	Clearwrite
Detector	Normal
Trace Math	Off
Trace Math Oper1	Trace5
Trace Math Oper2	Trace6
Trace Math Offset	0
Trace Name	Trace1
X Axis Units	Hz
Y Axis Units	dBm
Start Time	20120425142808700
DATA	5.299231048
5999984415	-76.34749519
5999984440	-77.28097006
5999984465	-75.32317869
5999984490	-73.64417681
5999984515	-72.67154604

o
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6000009315	-77.94423277
6000009340	-79.51829697
6000009365	-78.46108961
6000009390	-78.46108957
6000009415	-76.59570596
DATA2	4.708697055
5999984415	-80.98197882
5999984440	-80.98197879

5999984465	-75.83142132
5999984490	-74.02712079
5999984515	-73.57213005

0
0
0

6000009315	-75.9183103
6000009340	-79.53787488
6000009365	-78.82602191
6000009390	-78.82602188
6000009415	-76.37486709
DATA10	0
5999984415	-75.56751112
5999984440	-75.76485645
5999984465	-76.67718717
5999984490	-78.79238489
5999984515	-83.72680212

0
0
0

6000009315	-71.3942461
6000009340	-72.28308332
6000009365	-73.92684489
6000009390	-75.45548832
6000009415	-75.17904815

Save As . . .

When you press “Save As”, the analyzer brings up a Windows dialog and a menu entitled “**Save As.**” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[To File . . .](#)" on page 2340 in Save, State for a full description of this dialog and menu.

The default path for saving files is:

For all of the Trace Data Files:

My Documents\<<mode name>\data\traces

For all of the Limit Data Files:

My Documents\<<mode name>\data\limits

For all of the Measurement Results Data Files:

My Documents\<<mode name>\data\<<measurement name>\results

For all of the Capture Buffer Data Files:

My Documents\<<mode name>\data\captureBuffer

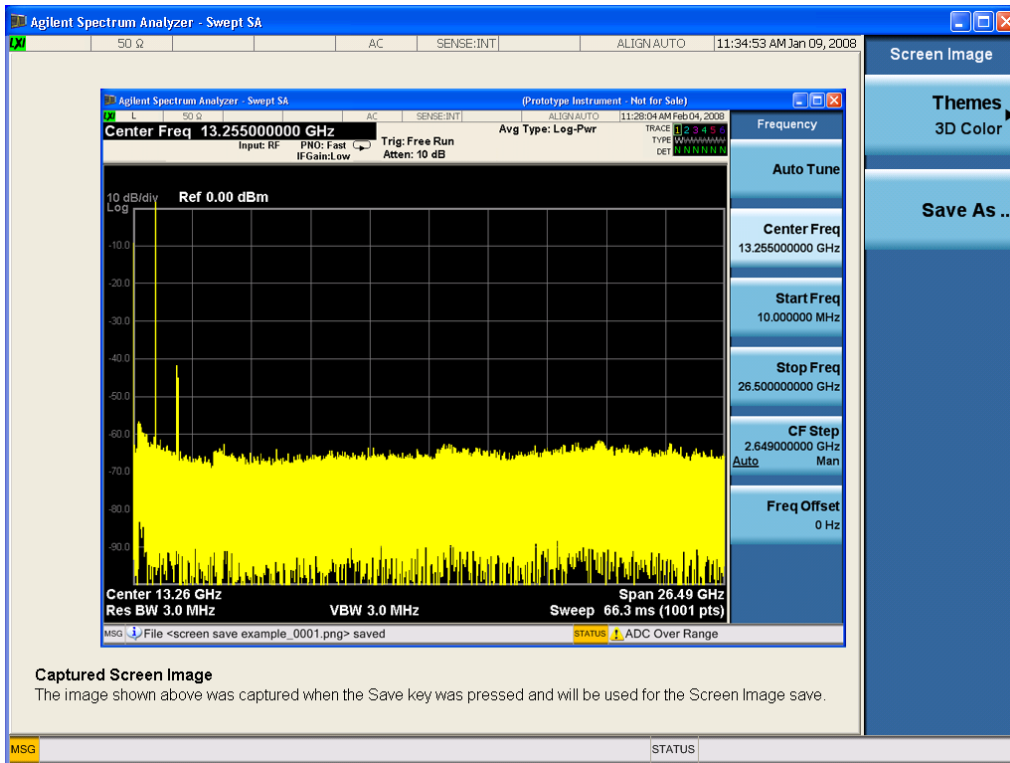
Key Path	Save, Data
Mode	All
Notes	The key location is mode-dependent and will vary. Brings up the Save As dialog for saving a <mode specific> Save Type. The save is performed immediately and does not wait until the measurement is complete.
Initial S/W Revision	Prior to A.02.00

Screen Image

Pressing Screen Image accesses a menu of functions that enable you to specify a format and location for the saved screen image. It brings up a menu that allows you to specify the color scheme of the Screen Image (Themes) or navigate to the Save As dialog to perform the actual save.

Screen Image files contain an exact representation of the analyzer display. They cannot be loaded back onto the analyzer, but they can be loaded into your PC for use in many popular applications.

The image to be saved is actually captured when the Save front panel key is pressed, and kept in temporary storage to be used if you ask for a Screen Image save. When the Screen Image key is pressed, a "thumbnail" of the captured image is displayed, as shown below:



When you continue on into the Save As menu and complete the Screen Image save, the image depicted in the thumbnail is the one that gets saved, showing the menus that were on the screen before going into the Save menus. The save is performed immediately and does not wait until the measurement is complete.

After you have completed the save, the Quick Save front-panel key lets you quickly repeat the last save performed, using an auto-named file, with the current screen data.

NOTE

For versions previous to A.01.55, if you initiate a screen image save by navigating through the Save menus, the image that is saved will contain the Save menu softkeys, not the menus and the active function that were on the screen when you first pressed the Save front panel key.

Key Path	Save
Mode	All
Remote Command	:MMEMory:STORe:SCReem <filename>
Example	:MMEM:STOR:SCR "myScreen.png" This stores the current screen image in the file MyScreenFile.png in the default directory.
Initial S/W Revision	Prior to A.02.00

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

Key Path	Save, Screen Image
Remote Command	:MMEMory:STORe:SCReem:THEMe TDColor TDMonochrome FCOLor FMONochrome :MMEMory:STORe:SCReem:THEMe?
Example	:MMEM:STOR:SCR:THEM TDM
Preset	3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes.
Readback	3D Color 3D Mono Flat Color Flat Mono
Backwards Compatibility Notes	In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical.
Initial S/W Revision	Prior to A.02.00

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDC
Readback	3D Color
Initial S/W Revision	Prior to A.02.00

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDM
Readback	3D Mono
Initial S/W Revision	Prior to A.02.00

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

Key Path	Save, Screen Image, Themes
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Example	MMEM:STOR:SCR:THEM FCOL
Readback	Flat Color
Initial S/W Revision	Prior to A.02.00

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FMON
Readback	Flat Mono
Initial S/W Revision	Prior to A.02.00

Save As...

When you press "Save As", the analyzer brings up a Windows dialog and a menu entitled "**Save As.**" This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[To File . . .](#)" on page 2340 in Save, State for a full description of this dialog and menu.

The default path for Screen Images is

My Documents\`<mode name>`\screen.

where `<mode name>` is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

Key Path	Save, Screen Image
Notes	Brings up Save As dialog for saving a Screen Image Save Type
Initial S/W Revision	Prior to A.02.00

Mass Storage Catalog (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:CATalog? [<code><directory_name></code>]
Notes	<p>The string must be a valid logical path.</p> <p>Queries disk usage information (drive capacity, free space available) and obtains a list of files and directories in a specified directory in the following format:</p> <p><code><numeric_value>,<numeric_value>,{<file_entry>}</code></p> <p>It returns two numeric parameters and as many strings as there are files and directories. The first parameter indicates the total amount of storage currently used in bytes. The second parameter</p>

indicates the total amount of storage available, also in bytes. The <file_entry> is a string. Each <file_entry> indicates the name, type, and size of one file in the directory list:

<file_name>,<file_type>,<file_size>

As the windows file system has an extension that indicates file type, <file_type> is always empty. <file_size> provides the size of the file in bytes. For directories, <file_entry> is surrounded by square brackets and both <file_type> and <file_size> are empty

Initial S/W Revision Prior to A.02.00

Mass Storage Change Directory (Remote Command Only)

Key path SCPI Only

Remote Command :MMEMory:CDIRectory [<directory_name>]
 :MMEMory:CDIRectory?

Notes The string must be a valid logical path.

Changes the default directory for a mass memory file system. The <directory_name> parameter is a string. If no parameter is specified, the directory is set to the *RST value.

At *RST, this value is set to the default user data storage area, that is defined as System.Environment.SpecialFolder.Personal.

Query returns full path of the default directory.

Initial S/W Revision Prior to A.02.00

Mass Storage Copy (Remote Command Only)

Key path SCPI Only

Remote Command :MMEMory:COPY <string>,<string>[,<string>,<string>]

Notes The string must be a valid logical path.

Copies an existing file to a new file or an existing directory to a new directory.

Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.

The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.

This command will generate an "access denied" error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.

Mass Storage Device Copy (Remote Command Only)

This command transfers data to/from a file and a peripheral device.

Key path	SCPI Only
Remote Command	:MMEMory:COpy:DEvice <source_string>,<dest_string>
Notes	The strings must be a valid logical path or a valid device keyword. If the dest_string is a device keyword, the data is copied from the source file to the device. If the source_string is a device keyword, the data is copied to the source file from the device. Valid device keywords are: SNS (smart noise source) An error is generated if the file or device is not found.

Mass Storage Delete (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:DElete <file_name>[,<directory_name>]
Notes	The string must be a valid logical path. Removes a file from the specified directory. The <file_name> parameter specifies the file name to be removed. This command will generate an “access denied” error if the file is in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.
Initial S/W Revision	Prior to A.02.00

Mass Storage Data (Remote Command Only)

Creates a file containing the specified data OR queries the data from an existing file.

Key path	SCPI Only
Remote Command	:MMEMory:DATA <file_name>, <data> :MMEMory:DATA? <file_name>
Notes	The string must be a valid logical path. The command form is MMEMory:DATA <file_name>,<data>. It loads <data> into the file <file_name>. <data> is in 488.2 block format. <file_name> is string data. The query form is MMEMory:DATA? <file_name> with the response being the associated <data> in block format.
Initial S/W Revision	Prior to A.02.00

Mass Storage Make Directory (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:MDIRectory <directory_name>
Notes	The string must be a valid logical path. Creates a new directory. The <directory_name> parameter specifies the name to be created.

	This command will generate an “access denied” error if the new directory would be in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.
Initial S/W Revision	Prior to A.02.00

Mass Storage Move (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:MOVE <string>,<string>[,<string>,<string>]
Notes	<p>The string must be a valid logical path.</p> <p>Moves an existing file to a new file or an existing directory to a new directory.</p> <p>Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.</p> <p>The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.</p> <p>This command will generate an “access denied” error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.</p>
Initial S/W Revision	Prior to A.02.00

Mass Storage Remove Directory (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:RDIRECTory <directory_name>
Notes	<p>The string must be a valid logical path.</p> <p>Removes a directory. The <directory_name> parameter specifies the directory name to be removed. All files and directories under the specified directory shall also be removed.</p> <p>This command will generate an “access denied” error if the folder is a restricted folder (e.g., C:\Windows) or is in a restricted folder and the current user does not have Power User or Administrator privileges.</p>
Initial S/W Revision	Prior to A.02.00

Single (Single Measurement/Sweep)

Sets the analyzer for Single measurement operation. The single/continuous state is Meas Global, so the setting will affect all the measurements. If you are Paused, pressing Single does a Resume.

See ["More Information" on page 2211](#)

Key Path	Front-panel key
Example	:INIT:CONT OFF
Notes	See Cont key description.
Backwards Compatibility Notes	<p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey and the INITiate:IMM switched from continuous measurement to single measurement and restarted sweeps and averages (displayed average count reset to 1), but did not restart Max Hold and Min Hold. In the X-Series, the Single hardkey and the INITiate:IMM command initiate a sweep/ measurement/ average sequence/hold sequence including MaxHold and MinHold.</p> <p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey restarted the sweep regardless of whether or not you were in an active sweep or sweep sequence. In the X-Series, Restart does this but Single only restarts the sweep or sweep sequence if you are in the idle state.</p> <p>INIT[:IMM] in ESA & PSA Spectrum Analysis Mode does an implied ABORT. In some other PSA Modes, INIT[:IMM] is ignored if not in the idle state. . The X-Series follows the ESA/PSA SA Mode model, which may cause some Modes to have compatibility problems.</p>
Initial S/W Revision	Prior to A.02.00

More Information

See ["Restart" on page 2337](#) for details on the INIT:IMMediate (Restart) function.

If you are already in single sweep, the INIT:CONT OFF command has no effect.

If you are already in Single Sweep, then pressing the Single key in the middle of a sweep does not restart the sweep or sequence. Similarly, pressing the Single key does not restart the sweep or sequence if the sweep is not in the idle state (for example, if you are taking a very slow sweep, or the analyzer is waiting for a trigger). Instead, it results in a message. "Already in Single, press Restart to initiate a new sweep or sequence". Even though pressing the Single key in the middle of a sweep does not restart the sweep, sending INIT:IMMediate does reset it.

To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command CALC:AVER:TCON UP.

Source

There is no Source control functionality for this measurement. When this key is pressed, the screen either displays a blank menu, or the previously-selected menu remains unchanged.

Key Path	Front-panel key
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SPAN X Scale

There is no functionality for this Front-panel key in this measurement. When pressed, this key displays a blank menu.

Key Path	Front-panel key
Mode	EDGE GSM

Sweep/Control

Accesses a menu that enables you to configure the Sweep and Control functions of the analyzer, such as Sweep Time and Gating.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Pause/Resume

Pauses a measurement after the current data acquisition is complete.

When Paused, the label on the key changes to Resume. Pressing Resume un-pauses the measurement. When you are Paused, pressing Restart, Single or Cont does a Resume.

Key Path	Sweep/Control
Remote Command	:INITiate:PAUSE
Dependencies	Grayed out in Measurements that do not support Pausing. Blanked in Modes that do not support Pausing.
Initial S/W Revision	Prior to A.02.00

Key Path	Sweep/Control
Remote Command	:INITiate:RESume
Dependencies	Grayed out in Measurements that do not support Pausing. Blanked in Modes that do not support Pausing.
Initial S/W Revision	Prior to A.02.00

Abort (Remote Command Only)

This command is used to stop the current measurement. It aborts the current measurement as quickly as possible, resets the sweep and trigger systems, and puts the measurement into an "idle" state. If the analyzer is in the process of aligning when ABORT is sent, the alignment finishes before the abort function is performed. So ABORT does not abort an alignment.

If the analyzer is set for Continuous measurement, it sets up the measurement and initiates a new data measurement sequence with a new data acquisition (sweep) taken once the trigger condition is met.

If the analyzer is set for Single measurement, it remains in the "idle" state until an :INIT:IMM command is received.

Remote Command	:ABORT
Example	:ABOR

Notes	<p>If :INITiate:CONTinuous is ON, then a new continuous measurement will start immediately; with sweep (data acquisition) occurring once the trigger condition has been met.</p> <p>If :INITiate:CONTinuous is OFF, then :INITiate:IMMediate is used to start a single measurement; with sweep (data acquisition) occurring once the trigger condition has been met.</p>
Dependencies	<p>For continuous measurement, ABORt is equivalent to the Restart key.</p> <p>Not all measurements support the abort command.</p>
Status Bits/OPC dependencies	<p>The STATus:OPERation register bits 0 through 8 are cleared.</p> <p>The STATus:QUESTionable register bit 9 (INTEgrity sum) is cleared.</p> <p>Since all the bits that feed into OPC are cleared by the ABORt, the ABORt will cause the *OPC query to return true.</p>
Initial S/W Revision	<p>Prior to A.02.00</p>

System

See ["System" on page 326](#)

Trace/Detector

Accesses a menu that allows you to control trace settings.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Trace

Selects the trace mode from the following selections:

Key	SCPI	Operation
Avg	AVERage	Trace will be averaged.
Max Hold	MAXHold	Trace will hold maximum value.
Auto	AUTO	Average (Multi-Carrier) or Max Hold (Single-Carrier)

Key Path	Trace/Detector
Mode	GSM
Remote Command	[:SENSe] :TSPur:TRACe AVERage MAXHold AUTO [:SENSe] :TSPur:TRACe?
Example	TSP:TRAC AVER TSP:TRAC?
Notes	This parameter is available when N/W9071A-BFP (Auto selection) is installed. Valid only when Avg/Hold_Num is set to On. When Auto is selected, Average is applied if Carrier Setup is configured with Multi Carrier setting, and Max Hold is applied if Carrier Setup is configured with Single Carrier setting. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	Coupled with Average_Type .
Preset	AUTO
State Saved	Saved in instrument state.
Range	Average Max Hold Auto
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.14.00

Detector

Accesses a menu of functions that enables you to control the detector for the current measurement. The following choices are available.

- Auto - The detector is set to AVERage when in the Multi Carrier configuration and set to PEAK when in the Single Carrier configuration.
- Average - The detector determines the average of the signal within the sweep points. The averaging method is Power (RMS).
- Peak - The detector determines the maximum of the signal within the sweep points.

Key Path	Trace/Detector
Mode	EDGE GSM
Notes	This parameter is available when N/W9071A-BFP (Detector selection) is installed.
Initial S/W Revision	A.14.00

Auto

Sets the detector to auto.

Key Path	Trace/Detector, Detector
Mode	GSM
Remote Command	[:SENSe] :TSPur:DETECTOR:AUTO ON OFF 1 0 [:SENSe] :TSPur:DETECTOR:AUTO?
Example	TSP:DET:AUTO 1 TSP:DET:AUTO?
Couplings	When Auto is selected ([:SENSe] :TSPur:DETECTOR:AUTO?), the detector depends on the Carrier Setup condition. When Multi-Carrier is selected, the detector works as Average and when Single-Carrier is selected, it works as Peak.
Preset	ON
State Saved	Saved in instrument state.
Range	ON OFF
Initial S/W Revision	A.14.00

Detector Selection

Selects a detector to be used by the analyzer for the current measurement.

Average - The detector determines the average of the signal within the sweep points. The averaging method is Power (RMS).

Peak - The detector determines the maximum of the signal within the sweep points.

Key Path	Trace/Detector, Detector
Mode	GSM
Remote Command	[:SENSe] :TSPur:DETECTOR [:FUNCTION] AVERage POSitive [:SENSe] :TSPur:DETECTOR [:FUNCTION] ?

Example	TSP:DET AVER TSP:DET?
Notes	When you manually select the detector (instead of selecting Auto), that detector is used regardless of other analyzer settings.
Preset	POSitive
State Saved	Saved in instrument state.
Range	Average Peak
Initial S/W Revision	A.14.00

Trigger

See ___ on page X

User Preset

Accesses a menu that gives you the following three choices:

- User Preset – recalls a state previously saved using the Save User Preset function.
- User Preset All Modes – presets all of the modes in the analyzer
- Save User Preset– saves the current state for the current mode

Key Path	Front-panel key
Backwards Compatibility Notes	<p>User Preset is actually loading a state, and in legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, “state” always includes all of this data; so whenever state is loaded, or User Preset is executed, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p> <p>On ESA and PSA, User Preset affected the entire instrument’s state. In the X-Series, User Preset only recalls the state for the active mode. There is a User Preset file for each mode. User Preset can never cause a mode switch as it can in legacy analyzers. If you want to recall all modes to their user preset file state, you will need to do a User Preset after mode switching into each mode.</p> <p>User Preset recalls mode state which can now include data like traces; whereas on ESA and PSA, User Preset did not affect data.</p>
Initial S/W Revision	Prior to A.02.00

User Preset

User Preset sets the state of the currently active mode back to the state that was previously saved for this mode using the Save User Preset menu key or the SCPI command, SYST:PRES:USER:SAV. It not only recalls the Mode Preset settings, but it also recalls all of the mode persistent settings, and the Input/Output system setting that existed at the time Save User Preset was executed.

If a Save User Preset has not been done at any time, User Preset recalls the default user preset file for the currently active mode. The default user preset files are created if, at power-on, a mode detects there is no user preset file. There will never be a scenario when there is no user preset file to restore. For each mode, the default user preset state is the same state that would be saved if a Save User Preset is performed in each mode right after doing a Restore Mode Default and after a Restore Input/Output Defaults.

The User Preset function does the following:

- Aborts the currently running measurement.
- Sets the mode State to the values defined by Save User Preset.
- Makes the saved measurement for the currently running mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

Key Path	User Preset
Remote Command	:SYSTem:PRESet:USER
Example	:SYST:PRES:USER:SAVE:SYST:PRES:USER
Notes	:SYST:PRES:USER:SAVE is used to save the current state as the user preset state. Clears all pending OPC bits. The Status Byte is set to 0. Pressing the User Preset front-panel key while already in the User Preset menu will cause the User Preset to get executed
Couplings	A user preset will cause the currently running measurement to be aborted and cause the saved measurement to be active. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved.
Initial S/W Revision	Prior to A.02.00

User Preset All Modes

Recalls all of the User Preset files for each mode, switches to the power-on mode, and activates the saved measurement from the power-on mode User Preset file.

NOTE

When the instrument is secured, all of the user preset files are converted back to their default user preset files.

The User Preset function does the following:

- Aborts the currently running measurement.
- Switches the Mode to the power-on mode.
- Restores the User Preset files for each mode.
- Makes the saved measurement for the power-on mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

Key Path	User Preset
Remote Command	:SYSTem:PRESet:USER:ALL
Example	:SYST:PRES:USER:SAVE:SYST:PRES:USER:ALL
Notes	Clears all pending OPC bits. The Status Byte is set to 0. :SYST:PRES:USER:SAVE is used to save the current state as the user preset state.
Couplings	A user preset will cause the currently running measurement to be aborted, cause a mode switch to the power-on mode, and cause the saved measurement to be active in the power-on mode. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved.
Initial S/W Revision	Prior to A.02.00

Save User Preset

Saves the currently active mode and its State. You can recall this User Preset file by pressing the User Preset menu key or sending the SYST:PRES:USER remote command. This same state is also saved by the Save State function.

Key Path	User Preset
Remote Command	:SYSTem:PRESet:USER:SAVE
Example	:SYST:PRES:USER:SAVE
Notes	:SYST:PRES:SAVE creates the same file as if the user requested a *SAV or a MMEM:STOR:STAT, except User Preset Save does not allow the user to specify the filename or the location of the file.
Initial S/W Revision	Prior to A.02.00

View/Display

The View/Display key opens the Display Menu (common to most measurements) and the View menu for the current measurement.

Some measurements have simple View menus, or even no View menu, others provide many different Views.

Views are different ways of looking at data, usually different ways of looking at the same data, often when the data represents a time record that is being digitally processed with an FFT and/or other digital signal processing algorithms.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Display

The Display menu is common to most measurements, and is used for configuring items on the display. Some Display menu settings apply to all the measurements in a mode, and some only to the current measurement. Those under the System Display Settings key apply to all measurements in all modes.

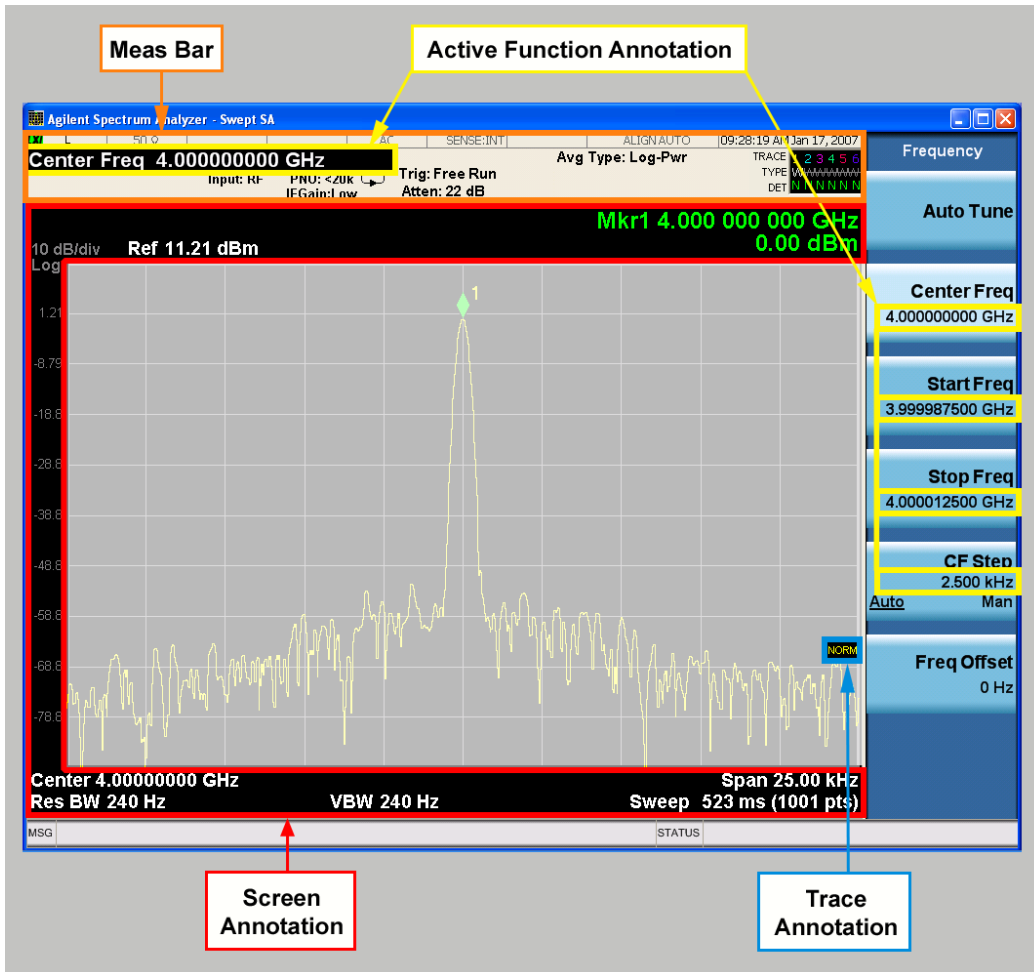
Key Path	Display
Key Path	View/Display
Initial S/W Revision	Prior to A.02.00

Annotation

Turns on and off various parts of the display annotation. The annotation is divided up into four categories:

1. Meas Bar: This is the measurement bar at the top of the screen. It does not include the settings panel or the Active Function. Turning off the Meas Bar turns off the settings panel and the Active Function. When the Meas Bar is off, the graticule area expands to fill the area formerly occupied by the Meas Bar.
2. Screen Annotation: this is the annotation and annunciation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) This does NOT include the marker number or the N dB result. When off, the graticule expands to fill the entire graticule area.
3. Trace annotation: these are the labels on the traces, showing their detector (or their math mode).
4. Active Function annotation: this is the active function display in the meas bar, and all of the active function values displayed on softkeys.

See the figure below. Each type of annotation can be turned on and off individually.



Key Path	View/Display, Display
Initial S/W Revision	Prior to A.02.00

Meas Bar On/Off

This function turns the Measurement Bar on and off, including the settings panel. When off, the graticule area expands to fill the area formerly occupied by the Measurement Bar.

Key Path	View/Display, Display, Annotation
Remote Command	:DISPlay:ANNotation:MBAR[:STATE] OFF ON 0 1 :DISPlay:ANNotation:MBAR[:STATE]?
Example	DISP:ANN:MBAR OFF
Dependencies	Grayed out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset	On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off.
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Screen

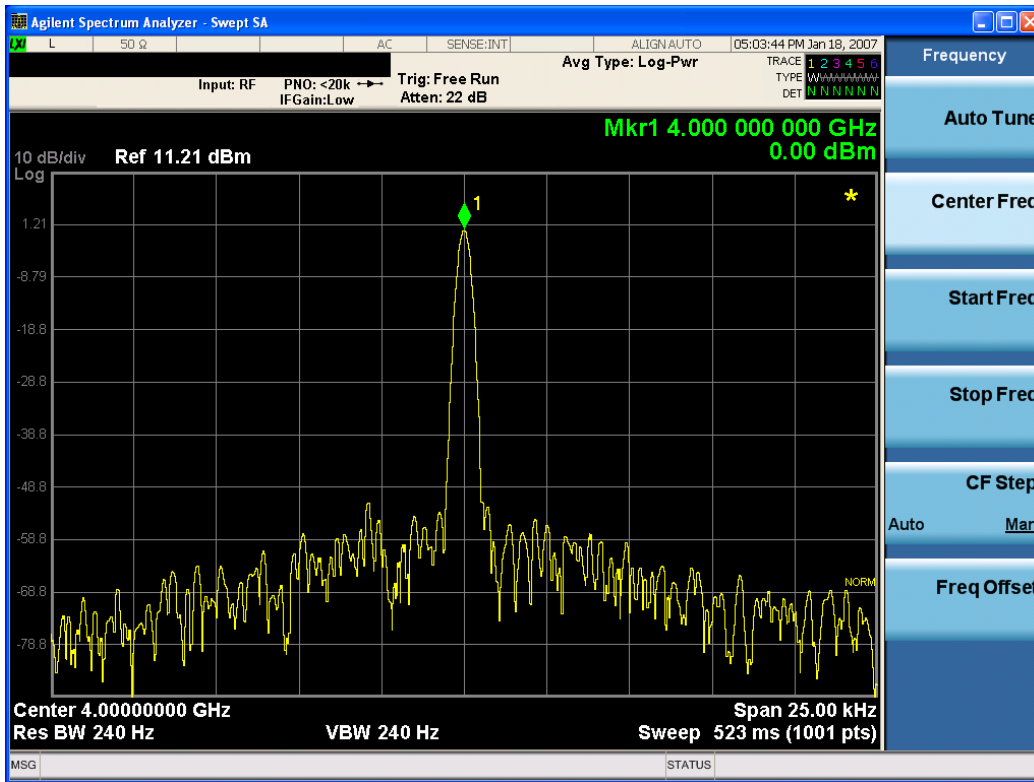
This controls the display of the annunciation and annotation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) and the y-axis annotation. This does NOT include marker annotation (or the N dB result). When off, the graticule expands to fill the entire graticule area, leaving only the 1.5% gap above the graticule as described in the Trace/Detector chapter.

Key Path	View/Display, Display, Annotation
Remote Command	:DISPlay:ANNotation:SCReen[:STATe] OFF ON 0 1 :DISPlay:ANNotation:SCReen[:STATe]?
Example	DISP:ANN:SCR OFF
Dependencies	Grayed-out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset	On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Active Function Values On/Off

Turns on and off the active function display in the Meas Bar, and all of the active function values displayed on the softkeys.

Note that all of the softkeys that have active functions have these numeric values blanked when this function is on. This is a security feature..



Key Path	View/Display, Display, Annotation
Remote Command	:DISPlay:ACTivefunc[:STATE] ON OFF 1 0 :DISPlay:ACTivefunc[:STATE]?
Example	DISP:ACT OFF
Dependencies	Grayed out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset	On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Title

Displays menu keys that enable you to change or clear a title on your display.

Key Path	View/Display, Display
Initial S/W Revision	Prior to A.02.00

Change Title

Writes a title into the "measurement name" field in the banner, for example, "Swept SA".

Press Change Title to enter a new title through the alpha editor. Press Enter or Return to complete the entry. Press ESC to cancel the entry and preserve your existing title.

The display title will replace the measurement name. It remains for this measurement until you press Change Title again, or you recall a state, or a Preset is performed. A title can also be cleared by pressing Title, Clear Title.

NOTE

Notice the inclusion of the <measurement> parameter in the command below. Because each measurement remembers the Display Title, the command must be qualified with the measurement name. For the Swept SA measurement this is not the case; no <measurement> parameter is used when changing the Display Title for the Swept SA measurement.

Key Path	View/Display, Display, Title
Mode	All
Remote Command	:DISPlay:<measurement>:ANNotation:TITLe:DATA <string> :DISPlay:<measurement>:ANNotation:TITLe:DATA?
Example	DISP:ANN:TITL:DATA "This Is My Title" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "This Is My Title" This example is for Measurements other than Swept SA. Both set the title to: This Is My Title
Notes	Pressing this key cancels any active function. When a title is edited the previous title remains intact (it is not cleared) and the cursor goes at the end so that characters can be added or BKSP can be used to go back over previous characters.
Preset	No title (measurement name instead)
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Clear Title

Clears a title from the front-panel display. Once cleared, the title cannot be retrieved. After the title is cleared, the current Measurement Name replaces it in the title bar.

Key Path	View/Display, Display, Title
Example	The following commands clear the title and restore the measurement's original title: DISP:ANN:TITL:DATA "" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "" This example is for ACP; in measurements other than Swept SA the measurement name is required.
Notes	Uses the :DISPlay:<measurement>:ANNotation:TITLe:DATA <string> command with an empty string (in the Swept SA, the <measurement> is omitted).
Preset	Performed on Preset.
Initial S/W Revision	Prior to A.02.00

Graticule

Pressing Graticule turns the display graticule On or Off. It also turns the graticule y-axis annotation on and off.

Key Path	View/Display, Display
Remote Command	:DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe] OFF ON 0 1 :DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe]?
Example	DISP:WIND:TRAC:GRAT:GRID OFF
Notes	The graticule is the set of horizontal and vertical lines that make up the grid/divisions for the x-axis and y-axis.
Preset	On
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00

System Display Settings

These settings are "Mode Global" – they affect all modes and measurements and are reset only by Restore Misc Defaults or Restore System Defaults under System.

Key Path	View/Display, Display
Initial S/W Revision	Prior to A.02.00

Annotation Local Settings

This is a Mode Global override of the meas local annotation settings. When it is All Off, it forces ScreenAnnotation, Meas Bar, Trace, and Active Function Values settings to be OFF for all measurements in all modes. This provides the security based "annotation off" function of previous analyzers; hence it uses the legacy SCPI command.

When it is All Off, the Screen, Meas Bar, Trace, and Active Function Values keys under the Display, Annotation menu are grayed out and forced to Off. When Local Settings is selected, you are able to set the local annotation settings on a measurement by measurement basis.

Key Path	View/Display, Display, System Display Settings
Remote Command	:DISPlay:WINDow[1]:ANNOtation[:ALL] OFF ON 0 1 :DISPlay:WINDow[1]:ANNOtation[:ALL]?
Example	:DISP:WIND:ANN OFF
Preset	On (Set by Restore Misc Defaults)
State Saved	Not saved in instrument state.
Backwards Compatibility Notes	The WINDow parameter and optional subopcode is included for backwards compatibility but ignored – all windows are equally affected.
Initial S/W Revision	Prior to A.02.00

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

Key Path	Save, Screen Image
Remote Command	:MMEMory:STORe:SCReen:THEMe TDColor TDMonochrome FCOLor FMONochrome :MMEMory:STORe:SCReen:THEMe?
Example	:MMEM:STOR:SCR:THEM TDM
Preset	3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes.
Readback	3D Color 3D Mono Flat Color Flat Mono
Backwards Compatibility Notes	In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical.
Initial S/W Revision	Prior to A.02.00

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDC
Readback	3D Color
Initial S/W Revision	Prior to A.02.00

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDM
Readback	3D Mono
Initial S/W Revision	Prior to A.02.00

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FCOL
Readback	Flat Color
Initial S/W Revision	Prior to A.02.00

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FMON
Readback	Flat Mono
Initial S/W Revision	Prior to A.02.00

Backlight

Accesses the display backlight on/off keys. This setting may interact with settings under the Windows "Power" menu.

When the backlight is off, pressing ESC, TAB, SPACE, ENTER, UP, DOWN, LEFT, RIGHT, DEL, BKSP, CTRL, or ALT turns the backlight on without affecting the application. Pressing any other key will turn backlight on and could potentially perform the action as well.

Key Path	View/Display, Display, System Display Settings
Remote Command	:DISPlay:BACKlight ON OFF :DISPlay:BACKlight?
Preset	ON (Set by Restore Misc Defaults)
Initial S/W Revision	Prior to A.02.00

Backlight Intensity

An active function used to set the backlight intensity. It goes from 0 to 100 where 100 is full on and 0 is off. This value is independent of the values set under the Backlight on/off key.

Key Path	View/Display, Display, System Display Settings
Remote Command	:DISPlay:BACKlight:INTensity <integer> :DISPlay:BACKlight:INTensity?
Example	DISP:BACK:INT 50

Preset	100 (Set by Restore Misc Defaults)
Min	0
Max	100
Initial S/W Revision	Prior to A.02.00

Lowest Segment

This view has 2 windows:

- Top window - Spectrum Window: shows spectrum of each segment. For details, see ["Spectrum window" on page 2232](#) below.
- Bottom window - Results Metrics Window: shows each metric result. For details, see ["Metrics window" on page 2233](#) below.

If a result fails, 'F' is displayed beside the result.

The figure below shows an example of the two windows of this view.

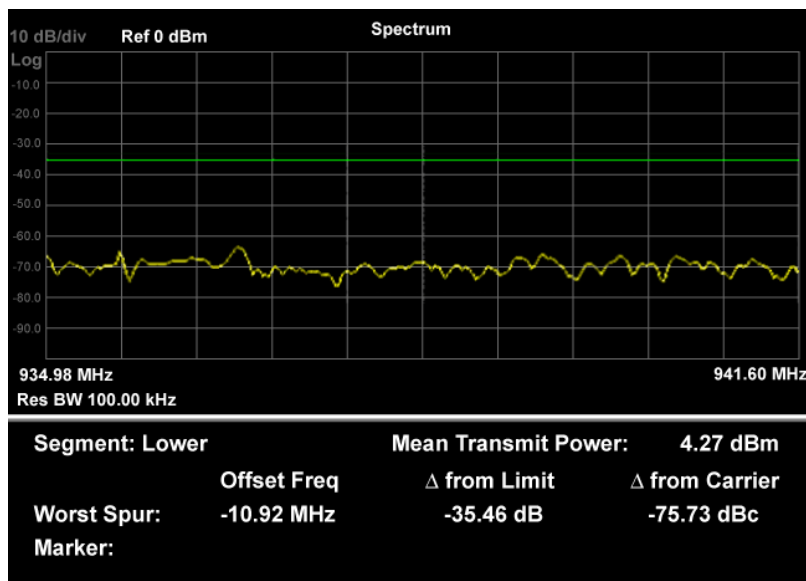


Figure 0-1 GSM Tx Spur Measurement – Lowest Segment spectrum & Metrics

Spectrum window

Marker Operation	Yes
Corresponding Trace	Corrected measured trace (n=2,4,6,8,10)

Metrics window

Name	Corresponding Results	Display Format
Worst Spur: Offset	n=1 1st The worst spur's frequency difference from channel center frequency.	99.99 MHz
Worst Spur: Δ from Limit	n=1 2nd The worst spur's amplitude difference from the limit	99.99 dB
Worst Spur: Δ from Carrier	n=1 3rd The worst spur's amplitude difference from the mean transmit power	99.99 dBc
Marker: Δ from Limit	Marker frequency difference from channel center frequency.	99.99 dB
Marker: Δ from Carrier	Marker amplitude difference from the limit.	99.99 dBc

Key Path	View/Display
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Lower Adj Segment

This view has 2 windows:

- Top window - Spectrum Window: shows spectrum of each segment. For details, see the Spectrum Window topic in the description of the view "[Lowest Segment](#)" on page 2232.
- Bottom window - Results Metrics Window: shows each metric result. This window is as shown in the example below.

Segment: Lower Adjacent	Mean Transmit Power: 4.27 dBm		
	Offset Freq	Δ from Limit	Δ from Carrier
Worst Spur:	-10.92 MHz	-35.46 dB	-75.73 dBc
Marker:			

Figure 0-2 GMSK Tx Spur Measurement – Lower Adjacent Segment & Metrics

Key Path	View/Display
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Upper Adj Segment

This view has 2 windows:

- Top window - Spectrum Window: shows spectrum of each segment. For details, see the Spectrum Window topic in the description of the view "[Lowest Segment](#)" on page 2232.
- Bottom window - Results Metrics Window: shows each metric result. This window is as shown in the example below.

Segment: Upper Adjacent	Mean Transmit Power: 4.27 dBm		
	Offset Freq	Δ from Limit	Δ from Carrier
Worst Spur:	-10.92 MHz	-35.46 dB	-75.73 dBc
Marker:			

Figure 0-3 GSM Tx Spur Measurement – Upper Adjacent Segment & Metrics

Key Path	View/Display
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

Highest Segment

This view has 2 windows:

- Top window - Spectrum Window: shows spectrum of each segment. For details, see the Spectrum Window topic in the description of the view "[Lowest Segment](#)" on page 2232.
- Bottom window - Results Metrics Window: shows each metric result. This window is as shown in the example below.

Segment: Upper	Mean Transmit Power: 4.27 dBm		
	Offset Freq	Δ from Limit	Δ from Carrier
Worst Spur:	-10.92 MHz	-35.46 dB	-75.73 dBc
Marker:			

Figure 0-4 GSM Tx Spur Measurement – Highest Segment & Metrics

Key Path	View/Display
Mode	EDGE GSM
Initial S/W Revision	Prior to A.02.00

18 Burst Power (Transmit Power)

The Burst Power (Transmit Power) measurement (at the base transceiver station) is used to determine the power delivered to the antenna system on the radio-frequency channel under test. The Burst Power measurement verifies the accuracy of the mean transmitted RF carrier power. This can be done across the frequency range and at each power step. For more information, see ["Transmit Power \(Burst Power\) Measurement Description" on page 2239](#). For measurement results and views, see ["View/Display" on page 2371](#).

This topic contains the following sections.

["Measurement Commands for Burst Power \(Transmit Power\)" on page 2236](#)

["Remote Command Results for Burst Power \(Transmit Power\)" on page 2237](#)

Measurement Commands for Burst Power (Transmit Power)

The general functionality of CONFigure, FETCh, MEASure, and READ are described at the beginning of this section. See the SENSE:TXPower|BPOWer commands for more measurement related commands.

NOTE

The BPOWer form of the commands is included for backward compatibility only. They are not recommended for use in new designs. Use the TXPower keyword.

The following commands and queries are used to retrieve the measurement results:

```
:CONFigure:TXPower|BPOWer  
:CONFigure:TXPower|BPOWer:NDEFault  
:INITiate:TXPower|BPOWer  
:FETCh:TXPower|BPOWer[n]?  
:READ:TXPower|BPOWer[n]?  
:MEASure:TXPower|BPOWer[n]?
```

For more remote command information, see SENSE:TXPower|BPOWer commands and the section, ["Remote Measurement Functions" on page 2301](#).

Remote Command Results for Burst Power (Transmit Power)

For the queries listed above, the results returned depend on the value of n, as follows.

n	Results Returned
0	Returns unprocessed I/Q trace data, as a series of comma-separated trace points, in volts. The I values are listed first in each pair, using the 0 through even-indexed values. The Q values are the odd-indexed values.
not specified or n = 1	<p>Returns the following comma-separated scalar results:</p> <ol style="list-style-type: none"> 1. Sample time is a floating point number representing the time between samples when using the trace queries (n=0, 2, etc). 2. Power is the mean power (in dBm) of the power value that calculated by specified method: above the threshold or measured burst width. If averaging is on, the power is for the latest acquisition. 3. Power averaged is the power (in dBm) for N averages, if averaging is on. An average consists of N acquisitions of data which represents the current trace. If averaging is off, the value of Power averaged is the same as the Power value. 4. Number of samples is the number of data points in the captured signal. This number is useful when performing a query on the signal (i.e. when n=0, 2, etc.). 5. Threshold value is the absolute threshold level (in dBm) above which the power is calculated when Meas Method is set to Above Threshold. 6. Threshold points is the number of points that were above the threshold and were used to calculate Mean Transmit Power when Meas Method is set to Above Threshold. If Meas Method is set to Measured Burst Width, Measured Pts is returned. 7. Maximum value is the maximum peak level of the most recently acquired trace data (in dBm). 8. Minimum value is the minimum peak level of the most recently acquired trace data (in dBm). <p>Full Burst width is the burst width of this signal regardless of the parameter value set for the current Measured width. The Burst width is determined by the Threshold Lvl when Meas Method is set to Measured Burst Width. If Meas Method is set to Above Threshold Lvl, this value is 0.</p> <ol style="list-style-type: none"> 9. Full Burst width is the burst width of this signal regardless of the parameter value set for the current Measured width. The Burst width is determined by the Threshold Lvl when Meas Method is set to Measured Burst Width. If Meas Method is set to Above Threshold Lvl, this value is zero. 10. Measured width is the time length that is used to calculate Mean Transmit Power when Meas Method is set to Measured Burst Width. If Meas Method is set to Above Threshold, this value is zero. 11. Measured points is the number of points used to calculate Mean Transmit Power when Meas Method is set to Measured Burst Width. If Meas Method is set to Above Threshold, this value is 0.
2	<p>Returns comma-separated trace points of the Measure Trace data.</p> <p>These data points are floating point numbers representing the power of the signal (in dBm). There are N data points, where N is the number of samples. The period between the samples is defined by the sample time.</p>
3	<p>Returns comma-separated trace points of the Max Hold Trace data.</p> <p>These data points are floating point numbers representing the power of the signal (in dBm). There are N data points, where N is the number of samples. The period between the samples is defined by the sample time.</p>

n	Results Returned
	* This is not available in TD-SCDMA.
4	<p>Returns comma-separated trace points of the Min Hold Trace data.</p> <p>These data points are floating point numbers representing the power of the signal (in dBm). There are N data points, where N is the number of samples. The period between the samples is defined by the sample time.</p> <p>* This is not available in TD-SCDMA.</p>

Transmit Power (Burst Power) Measurement Description

Mobile stations and base transceiver stations must transmit enough power, with sufficient modulation accuracy, to maintain a call of acceptable quality without leaking power into frequency channels or timeslots allocated for others. The Burst Power measurement determines the average power for an RF signal burst at or above a specified threshold value or during the detected burst width. The threshold value may be absolute, or relative to the peak value of the signal. Burst width can be set automatically or manually.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

AMPTD Y Scale

Accesses a menu of functions that enable you to set the vertical scale parameters. Many of the parameter values are measurement dependent. Attenuation values, and the Internal Preamp selection are measurement global, so they are common across all measurements. Functions with operation unique to this measurement are described below. See ["AMPTD Y Scale" on page 1717](#) for more information.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Y Ref Value

Sets the absolute power reference.

Key Path	AMPTD Y Scale
Mode	SA, GSM, TD-SCDMA
Remote Command	:DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <real> :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel?
Example	DISP:TXP:VIEW:WIND:TRAC:Y:RLEV 5dbm DISP:TXP:VIEW:WIND:TRAC:Y:RLEV?
Notes	You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	When Y Auto Scaling is On, this value is automatically determined by the measurement result. When the user sets this value manually, Y Auto Scaling automatically changes to Off.
Preset	10.00
State Saved	Saved in instrument state.
Min	-250.0
Max	250.0
Initial S/W Revision	Prior to A.02.00

Attenuation

This menu controls the attenuator functions and interactions between the attenuation system components.

There are two attenuator configurations in the X-Series. One is a dual attenuator configuration consisting of a mechanical attenuator and an optional electronic attenuator. The other configuration uses a single attenuator with combined mechanical and electronic sections that controls all the attenuation functions. Different models in the X-Series come with different configurations.

See ["Dual Attenuator Configurations:" on page 2241](#)

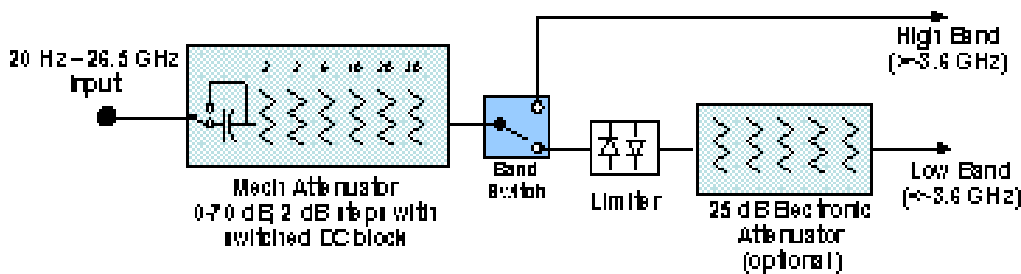
See ["Single Attenuator Configuration:" on page 2242](#)

Most Attenuation settings are the same for all measurements – they do not change as you change measurements. Settings like these are called “Meas Global” and are unaffected by Meas Preset.

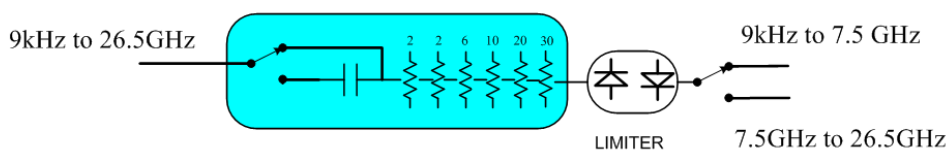
Key Path	AMPTD Y Scale
Scope	Meas Global
Dependencies	In measurements that support the I/Q inputs, this key is unavailable when I/Q is the selected input, and is replaced by the Range key in that case.
Readback Line	Contains a summary in [] brackets of the current total attenuation. See the descriptions of the , " (Mech) Atten " on page 2242, and "Enable Elec Atten" on page 2244 keys for more detail on the contributors to the total attenuation. Note that when "Pre-Adjust for Min Clip" is on, this value can change at the start of every measurement.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Dual Attenuator Configurations:

Configuration 1: Mechanical attenuator + optional electronic attenuator

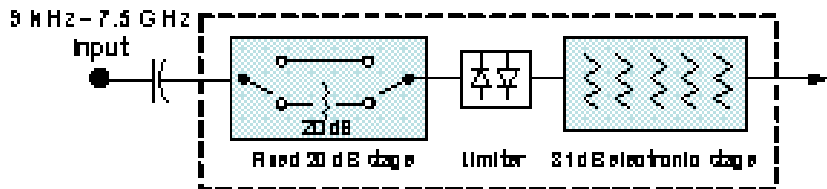


Configuration 2: Mechanical attenuator, no optional electronic attenuator

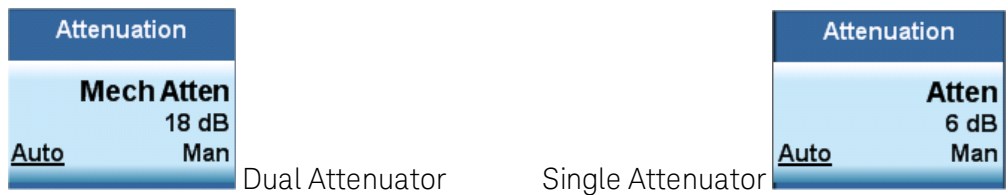


(note that Configuration 2 is not strictly speaking a dual-section attenuator, since there is no electronic section available. However, it behaves exactly like Configuration 1 without the Electronic Attenuator option EA3, therefore for the sake of this document it is grouped into the “Dual Attenuator” configuration)

Single Attenuator Configuration:



You can tell which attenuator configuration you have by pressing the Attenuation key, which (in most Modes) opens the Attenuation menu. If the first key in the Attenuation menu says Mech Atten you have the dual attenuator configuration. If the first key says Atten you have the single attenuator configuration.



In the single attenuator configuration, you control the attenuation with a single control, as the fixed stage has only two states. In the dual attenuator configuration, both stages have significant range so you are given separate control of the mechanical and electronic attenuator stages.

When you have the dual attenuator configuration, you may still have only a single attenuator, because unless option EA3 (the Electronic Attenuator option) is available, and you purchase it, you will have only the mechanical attenuator.

(Mech) Atten

This key is labeled Mech Atten in dual attenuator models and Atten in single attenuator models. In the dual attenuator configuration, this key only affects the mechanical attenuator.

This key lets you modify the attenuation applied to the RF input signal path. This value is normally auto coupled to the Ref Level, the Internal Preamp Gain, any External Gain that is entered, and the Max Mixer Level, as described in the table below.

See ["Attenuator Configurations and Auto/Man" on page 2244](#)

Key Path	AMPTD Y Scale, Attenuation
Remote Command	<pre>[:SENSe]:POWer[:RF]:ATTenuation <rel_ampl> [:SENSe]:POWer[:RF]:ATTenuation? [:SENSe]:POWer[:RF]:ATTenuation:AUTO OFF ON 0 1 [:SENSe]:POWer[:RF]:ATTenuation:AUTO?</pre>
Example	<p>POW:ATT 20</p> <p>Dual attenuator configuration: sets the mechanical attenuator to 20 dB</p> <p>Single attenuator mode: sets the main attenuation to 20 dB (see below for definition of “main” attenuation).</p> <p>If the attenuator was in Auto, it sets it to Manual.</p>
Dependencies	Some measurements do not support the Auto setting of (Mech) Atten. In these measurements, the

Auto/Man selection is not available, and the Auto/Man line on the key disappears.

In dual attenuator configurations, when the electronic attenuator is enabled, the mechanical attenuator has no auto setting and the Auto/Man line on the key disappears. The state of Auto/Man is remembered and restored when the electronic attenuator is once again disabled. This is described in more detail in the "[Enable Elec Atten](#)" on page 2244 key description.

See "[Attenuator Configurations and Auto/Man](#)" on page 2244 for more information on the Auto/Man functionality of Attenuation.

Couplings

When (Mech) Atten is in Auto, it uses the following algorithm to determine a value:

If the USB Preamp is connected to USB, use 0 dB.

Otherwise, $Atten = ReferenceLevel + PreAmpGain + ExternalGain - RefLevelOffset - MaxMixerLevel + IF\ Gain$.

Limit this value to be between 6 dB and the Max value. No value below 6 dB can ever be chosen by Auto.

The resulting value is rounded up to the largest value possible given the attenuation step setting. That is, 50.01 dB would change to 60 dB (for a 10 dB attenuation step).

The "IF Gain" term in the equation above is either 0 dB or +10 dB, depending on the settings of FFT IF Gain, Swept IF Gain, max Ref Level and the Auto/Man setting of Mech Atten.

In External Mixing and BBIQ, where the Attenuator is not in the signal path, the Attenuator setting changes as described above when (Mech) Atten is in Auto, but no changes are made to the actual attenuator hardware setting until the input is changed back to the RF Input.

Preset

The preset for Mech Attenuation is "Auto."

The Auto value of attenuation is:

CXA, EXA, MXA and PXA: 10 dB

State Saved

Saved in instrument state

Min

0 dB

The attenuation set by this key cannot be decreased below 6 dB with the knob or step keys. To get to a value below 6 dB it has to be directly entered from the keypad or via SCPI. This protects from adjusting the attenuation to a dangerously small value which can put the instrument at risk of damage to input circuitry. However, if the current mechanical attenuation is below 6 dB it can be increased with the knob and step keys, but not decreased.

Max

CXA N9000A-503/507: 50 dB

CXA N9000A-513/526: 70dB

EXA: 60 dB

MXA and PXA: 70 dB

In the single attenuator configuration, the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB.

Initial S/W Revision

Prior to A.02.00

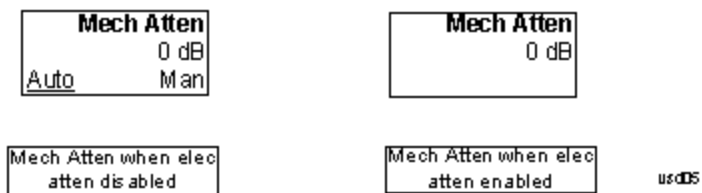
Modified at S/W Revision

A.03.00

Attenuator Configurations and Auto/Man

As described in the Attenuation key description, there are two distinct attenuator configurations available in the X-Series, the single attenuator and dual attenuator configurations. In dual attenuator configurations, we have the mechanical attenuation and the electronic attenuation, and the current total attenuation is the sum of the electronic + mechanical attenuation. In single attenuator configurations, we refer to the attenuation set using the (Mech) Atten key (or POW:ATT SCPI) as the “main” attenuation; and the attenuation that is set by the SCPI command POW:EATT as the “soft” attenuation (the POW:EATT command is honored even in the single attenuator configuration, for compatibility purposes). Then the current total attenuation is the sum of the main + soft attenuation. See the Elec Atten key description for more on “soft” attenuation.

In the dual attenuator configuration, when the electronic attenuator is enabled, there is no Auto/Man functionality for the mechanical attenuator, and the third line of the key label (the Auto/Man line) disappears:



Enable Elec Atten

Enables the Electronic Attenuator.

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear. These advantages primarily aid in remote operation and are negligible for front panel use. See ["Using the Electronic Attenuator: Pros and Cons" on page 2246](#) for a detailed discussion of the pros and cons of using the electronic attenuator.

For the single attenuator configuration, for SCPI backwards compatibility, the “soft” attenuation feature replaces the dual attenuator configuration’s electronic attenuator. All the same couplings and limitations apply. See ["Attenuator Configurations and Auto/Man" on page 2244](#)

See ["More Information" on page 2245](#)

Key Path	AMPTD Y Scale, Attenuation
Remote Command	[:SENSe] : POWer [:RF] : EATTenuation : STATE OFF ON 0 1 [:SENSe] : POWer [:RF] : EATTenuation : STATE ?
Example	POW:EATT:STAT ON
Dependencies	This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no “electronic attenuator” there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a “soft” attenuation as described in "Attenuator Configurations and Auto/Man" on page 2244 . The electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable above 3.6 GHz. Therefore, if the Stop Frequency of the analyzer is > 3.6 GHz then the Enable Elec Atten key will be OFF and grayed out.

	<p>If the Internal Preamp is on, meaning it is set to Low Band or Full, the electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable. In this case the Enable Elec Atten key will be OFF and grayed out.</p> <p>If either of the above is true, if the SCPI command is sent, an error indicating that the electronic attenuator is unavailable will be sent.</p> <p>If the electronic/soft Attenuator is enabled, then the Stop Freq of the analyzer is limited to 3.6 GHz and the Internal Preamp is unavailable.</p> <p>The SCPI-only “soft” electronic attenuation for the single-attenuator configuration is not available in all measurements; in particular, it is not available in the Swept SA measurement.</p>
Couplings	Enabling and disabling the Electronic Attenuator affects the setting of the Mechanical Attenuator (in dual attenuator configurations). This is described in more detail below this table.
Preset	OFF for Swept SA measurement; ON for all other measurements that support the electronic attenuator
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

More Information

Mechanical Attenuator Transition Rules

When the Electronic Attenuator is enabled, the Mechanical Attenuator transitions to a state that has no Auto function. Below are the rules for transitioning the Mechanical Attenuator. NOTE that the information below ONLY applies to the dual attenuator configurations, and ONLY when the Electronic Attenuator is installed:

When the Electronic Attenuation is enabled from a disabled state:

- The Mechanical Attenuator is initialized to 10 dB (this is its optimal performance setting). You can then set it as desired with SCPI, numeric keypad, step keys, or knob, and it behaves as it normally would in manual mode
- The Auto/Man state of (Mech) Atten is saved
- The Auto/Man line on the (Mech) Atten key disappears and the auto rules are disabled
- The Electronic Attenuator is set to 10 dB less than the previous value of the Mechanical Attenuator, within the limitation that it must stay within the range of 0 to 24 dB of attenuation.

Examples in the dual attenuator configuration:

- Mech Atten at 20 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 10 dB. New total attenuation equals the value before Elec Atten enabled.
- Mech Atten at 0 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 0 dB. New total attenuation does not equal the value before Elec Atten enabled.
- Mech Atten at 40 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 24 dB. New total attenuation does not equal the value before Elec Atten enabled.

When the Electronic Attenuation is disabled from an enabled state:

- The Elec Atten key is grayed out
- The Auto/Man state of (Mech) Atten is restored
- If now in Auto, (Mech) Atten recouples
- If now in Man, (Mech) Atten is set to the value of total attenuation that existed before the Elec Atten was disabled. The resulting value is rounded up to the smallest value possible given the (Mech) Atten Step setting - (That is, 57 dB changes to 58 dB when (Mech) Atten Step is 2 dB.)

Using the Electronic Attenuator: Pros and Cons

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear.

The “finer steps” advantage of the electronic attenuator is beneficial in optimizing the alignment of the analyzer dynamic range to the signal power in the front panel as well as remote use. Thus, you can achieve improved relative signal measurement accuracy. Compared to a mechanical attenuator with 2 dB steps, the 1 dB resolution of the electronic attenuator only gives better resolution when the odd-decibel steps are used. Those odd-decibel steps are less accurately calibrated than the even-decibel steps, so one tradeoff for this superior relative accuracy is reduced absolute amplitude accuracy.

Another disadvantage of the electronic attenuator is that the spectrum analyzer loses its “Auto” setting, making operation less convenient.

Also, the relationship between the dynamic range specifications (TOI, SHI, compression and noise) and instrument performance are less well-known with the electrical attenuator. With the mechanical attenuator, TOI, SHI and compression threshold levels increase dB-for-dB with increasing attenuation, and the noise floor does as well. With the electronic attenuator, there is an excess attenuation of about 1 to 3 dB between 0 and 3.6 GHz, making the effective TOI, SHI, and so forth, less well known. Excess attenuation is the actual attenuation relative to stated attenuation. Excess attenuation is accounted for in the analyzer calibration

Elec Atten

Controls the Electronic Attenuator in dual attenuator configurations. This key does not appear in single attenuator configurations, as the control of both the mechanical and electronic stages of the single attenuator is integrated into the single Atten key.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	[:SENSe] :POWeR [:RF] :EATTenuation <rel_amp1> [:SENSe] :POWeR [:RF] :EATTenuation?
Notes	Electronic Attenuation’s specification is defined only when Mechanical Attenuation is 6 dB.
Dependencies	This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no “electronic attenuator” there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a “soft” attenuation as described in "Attenuator Configurations and Auto/Man" on page 2244 . The “soft” attenuation is treated as an addition to the “main” attenuation value set by the Atten softkey or the

	POW:ATT SCPI command and affects the total attenuation displayed on the Attenuation key and the Meas Bar. When Enable Elec Atten is off or grayed out, the Elec Atten key is grayed out.
Preset	0 dB
State Saved	Saved in instrument state
Min	0 dB
Max	Dual attenuator configuration: 24 dB Single attenuator configuration: the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Adjust Atten for Min Clip

Sets the combination of mechanical and electronic attenuation and gain based on the current measured signal level so that clipping will be at a minimum.

This is an "immediate action" function, that is, it executes once, when the key is pressed.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	<code>[:SENSe] :POWer [:RF] :RANGe:OPTimize IMMEDIATE</code>
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Pre-Adjust for Min Clip

If this function is on, it does the adjustment described under "[Adjust Atten for Min Clip](#)" on page 2247 each time a measurement restarts. Therefore, in Continuous measurement mode, it only executes before the first measurement.

In dual attenuator models, you can set Elec+Mech Atten, in which case both attenuators participate in the autoranging, or Elec Atten Only, in which case the mechanical attenuator does not participate in the autoranging. This latter case results in less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	<code>[:SENSe] :POWer [:RF] :RANGe:OPTimize:ATTenuation OFF ELECTRical COMBined</code>

	<code>[:SENSe] :POWer [:RF] :RANGe:OPTimize:ATTenuation?</code>
Notes	The SCPI parameter ELECtrical sets this function to On in single attenuator models. The SCPI parameter COMBined is mapped to ELECtrical in single attenuator models; if you send COMBined, it sets the function to On and returns ELEC to a query.
Dependencies	This key only appears in Dual Attenuator models with an Electronic Attenuator installed. In instruments with Dual Attenuator model, when Enable Elec Atten is off or grayed out, the Pre-Adjust for Min Clip key is grayed out.
Preset	OFF for Swept SA measurement; ON for all other measurements that support Pre-Adjust for Min Clip
State Saved	Saved in instrument state
Range	Dual attenuator models: Off Elec Atten Only Mech + Elec Atten Single attenuator models: Off On
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Remote Command	<code>[:SENSe] :POWer [:RF] :RANGe:AUTO ON OFF 1 0</code> <code>[:SENSe] :POWer [:RF] :RANGe:AUTO?</code>
Notes	ON aliases to "Elec Atten Only" (:POW:RANG:OPT:ATT ELEC) OFF aliases to "Off" (:POW:RANG:OPT:ATT OFF) The query :POW:RANG:AUTO? returns true if :POW:RANG:OPT:ATT is not "Off"
Initial S/W Revision	Prior to A.02.00

Off

Turns Pre-Adjust for Min Clip off. This is the default setting.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip
Example	:POW:RANGe:OPT:ATT OFF
Initial S/W Revision	Prior to A.02.00

Elec Atten Only

Selects only the electric attenuator to participate in auto ranging. This offers less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip
Example	:POW:RANGe:OPT:ATT ELEC
Initial S/W Revision	Prior to A.02.00

Mech + Elec Atten

In dual attenuator models, this selects both attenuators participate in the autoranging.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip
Example	:POW:RANGe:OPT:ATT COMB
Initial S/W Revision	Prior to A.02.00

(Mech) Atten Step

This controls the step size used when making adjustments to the input attenuation.

This key is labeled Mech Atten Step in dual attenuator models and Atten Step in single attenuator models. In the dual attenuator configuration, this key only affects the step size of the mechanical attenuator.

Key Path	AMPTD Y Scale, Attenuation
Remote Command	[[:SENSe]:POWer[:RF]:ATTenuation:STEP[:INCRement] 10 dB 2 dB [:SENSe]:POWer[:RF]:ATTenuation:STEP[:INCRement]?
Example	POW:ATT:STEP 2
Notes	Note this feature works like a 1-N choice from the front panel, but it takes a specific value (in dB) when used remotely. The only valid values are 2 and 10.
Dependencies	Blanked in CXA and EXA if option FSA (2 dB steps) is not present. If blanked, attempts to set it via SCPI will yield an error.
Couplings	When the attenuation step size changes, the current mechanical attenuation value is adjusted (if necessary) to be quantized to the new step size. That is, if step is set to 10 dB, mech atten is increased if necessary so it is a multiple of 10 dB
Preset	PXA and MXA: 2 dB EXA and CXA: 10 dB (2 dB with option FSA)
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Scale/Division

Enables you to enter a numeric value to change the vertical display sensitivity.

Key Path	AMPTD Y Scale
Mode	SA, GSM, TD-SCDMA
Remote Command	:DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision <rel_ampl> :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision?
Example	DISP:TXP:VIEW:WIND:TRAC:Y:PDIV 10dB DISP:TXP:VIEW:WIND:TRAC:Y:PDIV?
Notes	You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	When the Y Auto Scaling is On, this value is automatically determined by the measurement result. When the user sets a value manually, Y Auton Scaling automatically changes to Off.
Preset	10.00 dB
State Saved	Saved in instrument state.
Min	0.1 dB
Max	20.00 dB
Initial S/W Revision	Prior to A.02.00

Presel Center

When this key is pressed, the centering of the preselector filter is adjusted to optimize the amplitude accuracy at the frequency of the selected marker. If the selected marker is not on when Presel Center is pressed, the analyzer will turn on the selected marker, perform a peak search, and then perform centering on the marker's center frequency. If the selected marker is already on and between the start and stop frequencies of the analyzer, the analyzer performs the preselector calibration on that marker's frequency. If the selected marker is already on, but outside the frequency range between Start Freq and Stop Freq, the analyzer will first perform a peak search, and then perform centering on the marker's center frequency.

The value displayed on the Presel Adjust key will change to reflect the new preselector tuning (see Presel Adjust).

A number of considerations should be observed to ensure proper operation. See ["Proper Preselector Operation" on page 2251](#).

Key Path	AMPTD Y Scale
Remote Command	[:SENSe]:POWer[:RF]:PCENter
Example	POW:PCEN
Notes	Note that the rules outlined above under the key description apply for the remote command as well as the key. The result of the command is dependent on marker position, and so forth. Any message shown by the key press is also shown in response to the remote command.
Dependencies	<ul style="list-style-type: none"> • Grayed out if the microwave preselector is off.) • If the selected marker's frequency is below Band 1, advisory message 0.5001 is generated and no

	<p>action is taken.</p> <ul style="list-style-type: none"> • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0. • Grayed out in the Spectrogram View.
Couplings	<p>The active marker position determines where the centering will be attempted.</p> <p>If the analyzer is in a measurement such as averaging when centering is initiated, the act of centering the preselector will restart averaging but the first average trace will not be taken until the centering is completed.</p>
Status Bits/OPC dependencies	<p>When centering the preselector, *OPC will not return true until the process is complete and a subsequent measurement has completed, nor will results be returned to a READ or MEASURE command.</p> <p>The Measuring bit should remain set while this command is operating and should not go false until the subsequent sweep/measurement has completed.</p>
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Proper Preselector Operation

A number of considerations should be observed to ensure proper operation:

1. If the selected marker is off, the analyzer will turn on a marker, perform a peak search, and adjust the preselector using the selected marker's frequency. It uses the "highest peak" peak search method unqualified by threshold or excursion, so that there is no chance of a 'no peak found' error. It continues with that peak, even if it is the peak of just noise. Therefore, for this operation to work properly, there should be a signal on screen in a preselected range for the peak search to find.
2. If the selected marker is already on, the analyzer will attempt the centering at that marker's frequency. There is no preselector for signals below about 3.6 GHz, therefore if the marker is on a signal below 3.6 GHz, no centering will be attempted and an advisory message generated
3. In some models, the preselector can be bypassed. If it is bypassed, no centering will be attempted in that range and a message will be generated.

Preselector Adjust

Allows you to manually adjust the preselector filter frequency to optimize its response to the signal of interest. This function is only available when **"Presel Center"** on page 2250 is available.

For general purpose signal analysis, using Presel Center is recommended. Centering the filter minimizes the impact of long-term preselector drift. Presel Adjust can be used instead to manually optimize the preselector. One application of manual optimization would be to peak the preselector response, which both optimizes the signal-to-noise ratio and minimizes amplitude variations due to small (short-term) preselector drifting.

Key Path	AMPTD Y Scale
Scope	Meas Global
Remote Command	<code>[:SENSe] :POWer [:RF] :PADJust <freq></code> <code>[:SENSe] :POWer [:RF] :PADJust?</code>
Example	POW:PADJ 100KHz POW:PADJ?
Notes	The value on the key reads out to 0.1 MHz resolution.
Dependencies	<ul style="list-style-type: none"> • Grayed out if microwave preselector is off.) • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0. • Grayed out in the Spectrogram View.
Preset	0 MHz
State Saved	The Presel Adjust value set by Presel Center, or by manually adjusting Presel Adjust, is not saved in instrument state, and does not survive a Preset or power cycle.
Min	-500 MHz
Max	500 MHz
Default Unit	Hz
Backwards Compatibility SCPI	<code>[:SENSe] :POWer [:RF] :MW :PADJust</code> <code>[:SENSe] :POWer [:RF] :MMW :PADJust</code> PSA had multiple preselectors, but the X-Series has only one. These commands simply alias to <code>[:SENSe] :POWer [:RF] :PADJust</code>
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00
Remote Command	<code>[:SENSe] :POWer [:RF] :PADJust :PRESelector MWAVE MMWave EXTERNAL</code> <code>[:SENSe] :POWer [:RF] :PADJust :PRESelector?</code>
Notes	PSA had multiple preselectors, and you could select which preselector to adjust. Since the X-Series has only one mm/uW preselector, the preselector selection softkey is no longer available. However, to provide backward compatibility, we accept the legacy remote commands. The command form has no effect, the query always returns MWAVE
Initial S/W Revision	Prior to A.02.00

μW Path Control

The μW Path Control functions include the μW Preselector Bypass (Option MPB) and Low Noise Path (Option LNP) controls in the High Band path circuits.

When the μW Preselector is bypassed, the user has better flatness, but will be subject to spurs from out of band interfering signals. When the Low Noise Path is enabled, the analyzer automatically switches around certain circuitry in the high frequency bands which can contribute to noise, when it is appropriate based on other analyzer settings.

For most applications, the preset state is Standard Path, which gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear out in the hardware switches. For applications that utilize the wideband IF paths, the preset state is the μW Preselector Bypass path, if option MPB is present. This is because, when using a wideband IF such as the 140 MHz IF, the μW Preselector's bandwidth can be narrower than the available IF bandwidth, causing degraded amplitude flatness and phase linearity, so it is desirable to bypass the preselector in the default case.

Users may choose Low Noise Path Enable. It gives a lower noise floor, especially in the 21–26.5 GHz region, though without improving many measures of dynamic range, and without giving the best possible noise floor. The preamp, if purchased and used, gives better noise floor than does the Low Noise Path, however its compression threshold and third-order intercept are much poorer than that of the non-preamp Low Noise Path. There are some applications, typically for signals around –30 dBm, for which the third-order dynamic range of the standard path is good enough, but the noise floor is not low enough even with 0 dB input attenuation. When the third-order dynamic range of the preamp path is too little and the noise floor of the standard path is too high, the Low Noise Path can provide the best dynamic range.

Key Path	AMPTD Y Scale
Mode	SA, BASIC, PNOISE, VSA , LTE, LTETDD
Scope	Meas Global
Remote Command	[:SENSe] :POWer [:RF] :MW:PATH STD LNPath MPBypass FULL [:SENSe] :POWer [:RF] :MW:PATH?
Example	:POW:MW:PATH LNP Enables the Low Noise path
Notes	If a Presel Center is performed, the analyzer will momentarily switch to the Standard Path, regardless of the setting of μW Path Control The DC Block will always be switched in when the low noise path is switched in, to protect succeeding circuitry from DC. Note that this does not mean “when the low noise path is enabled” but when, based on the Low Noise Path rules, the path is actually switched in. This can happen when the selection is Low Noise Path Enable . In the case where the DC Block is switched in the analyzer is now AC coupled. However, if the user has selected DC coupling, the UI will still behave as though it were DC coupled, including all annunciation, warnings, status bits, and responses to SCPI queries. This is because, based on other settings, the analyzer could switch out the low noise path at any time and hence go back to being DC coupled. Alignment switching ignores the settings in this menu, and restores them when finished.
Dependencies	Unavailable in BBIQ and External Mixing
Preset	All modes other than IQ Analyzer mode and VXA: STD IQ Analyzer, VXA and WLAN mode: MPB option present and licensed: MPB

	MPB option not present and licensed: STD
State Saved	Save in instrument state
Readback	Value selected in the submenu
Initial S/W Revision	A.04.00
Modified at S/W Revision	A.10.00

Standard Path

This path gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear in the hardware switches, particularly in remote test scenarios where both low band and high band setups will follow in rapid succession.

In this path, the bypass of the low band/high band switch and microwave preamp is never activated, which can cause some noise degradation but preserves the life of the bypass switch.

Key Path	AMPTD Y Scale, μ W Path Control
Example	:POW:MW:PATH STD
Readback Text	Standard Path
Initial S/W Revision	A.04.00

μ W Preselector Bypass

This key toggles the preselector bypass switch for band 1 and higher. When the microwave preselect is on, the signal path is preselected. When the microwave preselector is off, the signal path is not preselected. The preselected path is the normal path for the analyzer.

The preselector is a tunable bandpass filter which prevents signals away from the frequency of interest from combining in the mixer to generate in-band spurious signals (images). The consequences of using a preselector filter are its limited bandwidth, the amplitude and phase ripple in its passband, and any amplitude and phase instability due to center frequency drift.

Option MPB or pre-selector bypass provides an unpreselected input mixer path for certain X-Series signal analyzers with frequency ranges above 3.6 GHz. This signal path allows a wider bandwidth and less amplitude variability, which is an advantage when doing modulation analysis and broadband signal analysis. The disadvantage is that, without the preselector, image signals will be displayed. Another disadvantage of bypassing the preselector is increased LO emission levels at the front panel input port.

Image responses are separated from the real signal by twice the 1st IF. For IF Paths of 10 MHz and 25 MHz, the 1st IF is 322.5 MHz, so the image response and the real signal will be separated by 645 MHz. The 1st IF will be different for other IF Path settings. When viewing a real signal and its corresponding image response in internal mixing, the image response will be to the left of the real signal.

Also, the image response and the real signal typically have the same amplitude and exhibit the same shape factor.

However, if Option FS1, Fast Sweep Capability, is enabled, the image response in the Swept SA measurement will appear lower in amplitude and have a much wider shape factor compared to the real signal.

Key Path	AMPTD Y Scale, μ W Path Control
Example	:POW:MW:PATH MPB
Dependencies	Key is blanked if current mode does not support it. Key is grayed out if mode supports it but current measurement does not support it. Key is blank unless Option MPB is present and licensed. If SCPI command sent when MPB not present, error -241, "Hardware missing; Option not installed" is generated.
Readback Text	μ W Preselector Bypass
Initial S/W Revision	A.04.00

Remote Command	[:SENSe] :POWer [:RF] :MW:PRESelector [:STATe] ON OFF 0 1 [:SENSe] :POWer [:RF] :MW:PRESelector [:STATe] ?
Example	:POW:MW:PRES OFF Bypasses the microwave preselector
Notes	The ON parameter sets the STD path (:POW:MW:PATH STD) The OFF parameter sets path MPB (:POW:MW:PATH MPB)
Preset	ON

Internal Preamp

Accesses a menu of keys that control the internal preamps. Turning on the preamp gives a better noise figure, but a poorer TOI to noise floor dynamic range. You can optimize this setting for your particular measurement.

The instrument takes the preamp gain into account as it sweeps. If you sweep outside of the range of the preamp the instrument will also account for that. The displayed result will always reflect the correct gain.

For some measurements, when the preamp is on and any part of the displayed frequency range is below the lowest frequency for which the preamp has specifications, a warning condition message appears in the status line. For example, for a preamp with a 9 kHz lowest specified frequency: "Preamp: Accy unspc'd below 9 kHz".

Key Path	AMPTD Y Scale
Scope	Meas Global
Remote Command	[:SENSe] :POWer [:RF] :GAIN [:STATe] OFF ON 0 1 [:SENSe] :POWer [:RF] :GAIN [:STATe] ?
Dependencies	Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the key is not shown. The preamp is not available when the electronic/soft attenuator is enabled.

Couplings	<p>The act of connecting the U7227A USB Preamp to one of the analyzer's USB ports will cause the Internal Preamp to be switched on. When this happens an informational message will be generated: "Internal Preamp turned on for optimal operation with USB Preamp." Note that if the Internal Preamp was already on, there will be no change to the setting, but if it was Off it will be switched On, to Full Range.</p> <p>Note that this same action occurs when the SA mode is selected while the USB Preamp is connected to one of the analyzer's USB ports, if it is the first time that the SA mode has run since powerup, or if the last time the SA mode was running the USB Preamp was NOT connected.</p> <p>Subsequently disconnecting the USB Preamp from USB does not change the Internal Preamp setting nor restore the previous setting.</p>
Preset	OFF
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.14.00

Key Path	AMPTD Y Scale, Internal Preamp
Scope	Meas Global
Remote Command	<pre>[:SENSe] :POWer [:RF] :GAIN :BAND LOW FULL</pre> <pre>[:SENSe] :POWer [:RF] :GAIN :BAND ?</pre>
Dependencies	<p>Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the key is not shown.</p> <p>If a POW:GAIN:BAND FULL command is sent when a low band preamp is available, the preamp band parameter is to LOW instead of FULL, and an "Option not installed" message is generated.</p>
Preset	LOW
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00

Off

Turns the internal preamp off

Key Path	AMPTD Y Scale, Internal Preamp
Example	:POW:GAIN OFF
Readback	Off
Initial S/W Revision	Prior to A.02.00

Low Band

Sets the internal preamp to use only the low band.

The frequency range of the installed (optional) low-band preamp is displayed in square brackets on the Low Band key label.

Key Path	AMPTD Y Scale, Internal Preamp
Example	:POW:GAIN ON :POW:GAIN:BAND LOW
Readback	Low Band
Initial S/W Revision	Prior to A.02.00

Full Range

Sets the internal preamp to use its full range. The low band (0–3.6 GHz or 0–3GHz, depending on the model) is supplied by the low band preamp and the frequencies above low band are supplied by the high band preamp.

The frequency range of the installed (optional) preamp is displayed in square brackets on the Full Range key label. If the high band option is not installed the Full Range key does not appear.

Key Path	AMPTD Y Scale, Internal Preamp
Example	:POW:GAIN ON :POW:GAIN:BAND FULL
Readback	Full Range
Initial S/W Revision	Prior to A.02.00

Ref Position

Enables you to set the display reference position to either, Top, Center or Bottom.

Key Path	AMPTD Y Scale
Mode	SA, GSM, TD-SCDMA
Remote Command	:DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:RPOSition TOP CENTer BOTTom :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:RPOSition?
Example	DISP:TXP:VIEW:WIND:TRAC:Y:RPOS CENT DISP:TXP:VIEW:WIND:TRAC:Y:RPOS?
Notes	You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	TOP
State Saved	Saved in instrument state.
Range	Top Ctr Bot
Initial S/W Revision	Prior to A.02.00

Auto Scaling

Allows you to toggle the Y axis auto scaling function between On and Off.

Key Path	AMPTD Y Scale
Mode	SA, GSM, TD-SCDMA
Remote Command	:DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPle 0 1 OFF ON :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPle?
Example	DISP:TXP:VIEW:WIND:TRAC:Y:COUP 0 DISP:TXP:VIEW:WIND:TRAC:Y:COUP?
Notes	You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	When Auto Scaling is On, upon pressing the Restart front-panel key, this function automatically determines the scale per division and reference values based on the measurement results. When the user sets a value either Y Rel Value or Y Scale/Div manually, this parameter automatically is set to 'Off'.
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

Auto Couple

The Auto Couple feature provides a quick and convenient way to automatically couple multiple instrument settings. This helps ensure accurate measurements and optimum dynamic range. When the Auto Couple feature is activated, either from the front panel or remotely, all parameters of the current measurement that have an Auto/Manual mode are set to Auto mode and all measurement settings dependent on (or coupled to) the Auto/Man parameters are automatically adjusted for optimal performance.

However, the Auto Couple key actions are confined to the current measurement only. It does not affect other measurements in the mode, and it does not affect markers, marker functions, or trace or display attributes.

See "[More Information](#)" on page 2259

Key Path	Front-panel key
Remote Command	:COUPle ALL NONE
Example	:COUP ALL
Notes	:COUPle ALL puts all Auto/Man parameters in Auto mode (equivalent to pressing the Auto Couple key). :COUPLE NONE puts all Auto/Man parameters in manual mode. It decouples all the coupled instrument parameters and is not recommended for making measurements.
Initial S/W Revision	Prior to A.02.00

More Information

There are two types of functions that have Auto/Manual modes.

Auto/Man Active Function keys

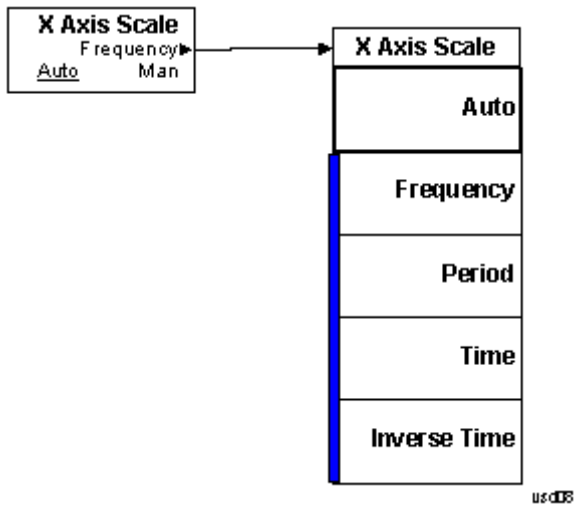
An Auto/Man toggle key controls the binary state associated with an instrument parameter by toggling between Auto (where the parameter is automatically coupled to the other parameters it is dependent upon) and Man (where the parameter is controlled independent of the other parameters), as well as making the parameter the active function. The current mode is indicated on the softkey with either Auto or Man underlined as illustrated below.



Auto/Man 1-of-N keys

An Auto/Man 1-of-N key allows you to manually pick from a list of parameter values, or place the function in Auto, in which case the value is automatically selected (and indicated) as shown below. If in Auto, Auto is underlined on the calling key. If in manual operation, manual is indicated on the calling key. But the calling key does not actually toggle the function, it simply opens the menu.

18 Burst Power (Transmit Power)
Auto Couple



BW

Accesses a menu of functions that enable you to specify and control the video and resolution bandwidths. You can also select the type of filter for the measurement and set the filter bandwidth.

NOTE If the selected mode is TD-SCDMA, this function is **not** available.

Key Path	Front-panel key
Mode	SA, EDGE/GSM
Initial S/W Revision	Prior to A.02.00

Res BW

Sets the resolution bandwidth. This is the bandwidth used for the power measurement. The bandwidth is ideally wide enough to pass all the power of the burst signal, while not being so wide that it passes noise that reduces dynamic range and the accuracy of low level measurements.

Key Path	BW
Mode	SA, GSM
Remote Command	[:SENSe] :TXPower :BANDwidth [:RESolution] <bandwidth> [:SENSe] :TXPower :BANDwidth [:RESolution] ?
Example	TXP:BAND 1000 TXP:BAND?
Notes	You must be in the Spectrum Analyzer mode or GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Preset	GSM: 510 kHz SA: 3 MHz
State Saved	Saved in instrument state.
Min	1 kHz
Max	Hardware Dependent: No Option = 10 MHz WB (25 MHz or wider) = Hardware Option Limit
Backwards Compatibility SCPI	[:SENSe] :TXPower :BWIDth [:RESolution]
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

Filter Type

Besides the familiar Gaussian filter shape, there are certain special filter types, such as Flat Top, that are desirable under certain conditions.

Key Path	BW
Mode	SA, GSM
Remote Command	[:SENSe] :TXPower:BAWdwidth:TYPE GAUSSian FLATtop [:SENSe] :TXPower:BAWdwidth:TYPE?
Example	TXP:BAWd:TYPE GAUS TXP:BAWd:TYPE?
Notes	Selects the type of filter: either Gaussian or Flat (Flattop). Gaussian is the best choice when looking at the overall burst or the rising and falling edges, as it has excellent pulse response. This measurement does not trade off time domain accuracy vs. noise, just total power accuracy vs. noise level. If you want to precisely examine just the useful part of the burst, choose Flat. This is an advanced control that normally does not need to be changed. Setting this to a value other than the factory default may cause invalid measurement results. FLATtop – a filter with a flat amplitude response, which provides the best amplitude accuracy. GAUSSian – a filter with Gaussian characteristics, which provides the best pulse response. You must be in the Spectrum Analyzer mode or GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	GAUSSian
State Saved	Saved in instrument state.
Range	Gaussian (Normal) Flattop
Backwards Compatibility SCPI	[:SENSe] :TXPower:BWIDth:TYPE
Initial S/W Revision	Prior to A.02.00

RBW Control

Accesses a menu that enables you to select the filter bandwidth and type.

Key Path	BW
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Filter Type

Besides the familiar Gaussian filter shape, there are certain special filter types, such as Flat Top, that are desirable under certain conditions.

Key Path	BW
Mode	SA, GSM
Remote Command	[:SENSe] :TXPower:BAWdwidth:TYPE GAUSSian FLATtop [:SENSe] :TXPower:BAWdwidth:TYPE?
Example	TXP:BAWd:TYPE GAUS TXP:BAWd:TYPE?

Notes	<p>Selects the type of filter: either Gaussian or Flat (Flattop). Gaussian is the best choice when looking at the overall burst or the rising and falling edges, as it has excellent pulse response. This measurement does not trade off time domain accuracy vs. noise, just total power accuracy vs. noise level. If you want to precisely examine just the useful part of the burst, choose Flat. This is an advanced control that normally does not need to be changed. Setting this to a value other than the factory default may cause invalid measurement results.</p> <p>FLATtop – a filter with a flat amplitude response, which provides the best amplitude accuracy.</p> <p>GAUSSian – a filter with Gaussian characteristics, which provides the best pulse response.</p> <p>You must be in the Spectrum Analyzer mode or GSM mode to use this command. Use INSTRument:SElect to set the mode.</p>
Preset	GAUSSian
State Saved	Saved in instrument state.
Range	Gaussian (Normal) Flattop
Backwards Compatibility SCPI	[:SENSe] :TXPower :BWidth :TYPE
Initial S/W Revision	Prior to A.02.00

Cont (Continuous Measurement/Sweep)

Sets the analyzer for Continuous measurement operation. The single/continuous state is Meas Global so the setting will affect all measurements. If you are Paused, pressing Cont does a Resume.

Key Path	Front-panel key
Remote Command	:INITiate:CONTinuous OFF ON 0 1 :INITiate:CONTinuous?
Example	:INIT:CONT 0 puts analyzer in Single measurement operation. :INIT:CONT 1 puts analyzer in Continuous measurement operation
Preset	ON (Note that SYST:PRESet sets INIT:CONT to ON but *RST sets INIT:CONT to OFF)
State Saved	Saved in instrument state
Backwards Compatibility Notes	For Spectrum Analysis mode in ESA and PSA, there is no Cont hardkey, instead there is a Sweep Single/Cont key. In these analyzers, switching the Sweep Single/Cont key from Single to Cont restarts averages (displayed average count reset to 1), but does not restart Max Hold and Min Hold. The X-Series has Single and Cont keys in place of the SweepSingleCont key. In the X-Series, if in single measurement, the Cont key (and INIT:CONT ON) switches to continuous measurement, but never restarts a measurement and never resets a sweep.
Initial S/W Revision	Prior to A.02.00

In Swept SA Measurement (Spectrum Analysis Mode):

The analyzer takes repetitive sweeps, averages, measurements, etc., when in Continuous mode. When the average count reaches the Average/Hold Number the count stops incrementing, but the analyzer keeps sweeping. See the Trace/Detector section for the averaging formula used both before and after the Average/Hold Number is reached. The trigger condition must be met prior to each sweep. The type of trace processing for multiple sweeps, is set under the Trace/Detector key, with choices of Trace Average, Max Hold, or Min Hold.

In Other Measurements/Modes:

With Avg/Hold Num (in the Meas Setup menu) set to Off or set to On with a value of 1, a sweep is taken after the trigger condition is met; and the analyzer continues to take new sweeps after the current sweep has completed and the trigger condition is again met. However, with Avg/Hold Num set to On with a value >1, multiple sweeps (data acquisitions) are taken for the measurement. The trigger condition must be met prior to each sweep. The sweep is not stopped when the average count k equals the number N set for Avg/Hold Num is reached, but the number k stops incrementing. A measurement average usually applies to all traces, marker results, and numeric results. But sometimes it only applies to the numeric results.

If the analyzer is in Single measurement, pressing the Cont key does not change k and does not cause the sweep to be reset; the only action is to put the analyzer into Continuous measurement operation.

If it is already in continuous sweep:

the INIT:CONT 1 command has no effect

the INIT:CONT 0 command will place the analyzer in Single Sweep but will have no effect on the current sequence until $k = N$, at which point the current sequence will stop and the instrument will go to the idle state.

18 Burst Power (Transmit Power)
File

File

See "File" on page 320

FREQ/Channel

Accesses a menu of keys that allows you to control the Frequency parameters of the instrument.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

ARFCN

Sets the analyzer to a frequency that corresponds to the ARFCN (Absolute RF Channel Number). Used to enter the channel to be measured for the selected band. If the Center Freq value entered does not exactly correlate with an ARFCN, the softkey label changes to display the closest ARFCN to the selected frequency, along with a > or < symbol indicating whether the frequency is above or below that ARFCN.

Key Path	FREQ Channel
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel:ARFCn RFChannel <integer></code> <code>[:SENSe] :CHANnel:ARFCn RFChannel?</code>
Example	CHAN:ARFC 3 CHAN:ARFC?
Notes	This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not available (blank).
Couplings	Coupled with Center Frequency . Setting ARFCN sets Center Freq to the value corresponding to that ARFCN. BMT Freq choice changes this parameter.
Preset	1
State Saved	Saved in instrument state.
Range	Different for each BAND as follows: E-GSM: 0 to 124, and 975 to 1023 P-GSM: 1 to 124 R-GSM: 0 to 124(MS), and 955 to 1023(BTS) DCS1800: 512 to 885 PCS1900: 512 to 810 GSM450: 259 to 293 GSM480: 306 to 340 GSM700: 438 to 516 GSM850: 128 to 251 T-GSM 810: 350 to 425

Min	Different for each BAND as follows: E-GSM: 0(MS), and 975(BTS) P-GSM: 1 R-GSM: 0(MS), and 955(BTS) DCS1800: 512 PCS1900: 512 GSM450: 259 GSM480: 306 GSM700: 438 GSM850: 128 T-GSM 810: 350
Max	Different for each BAND as follows: E-GSM: 124(MS), and 1023(BTS) P-GSM: 124 R-GSM: 124(MS), and 1023(BTS) DCS1800: 885 PCS1900: 810 GSM450: 293 GSM480: 340 GSM700: 516 GSM850: 251 T-GSM 810: 425
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.07.00

Center Freq

Sets the center frequency to be measured for the selected band. It is coupled with ARFCN – setting Center Freq sets ARFCN to the channel corresponding to that frequency.

For more information, see the section ["Center Freq" on page 2269](#).

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

Time Slot

This functionality is the same as that of the corresponding key in the Demod menu. See ["Time Slot" on page 2288](#) for details.

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

Burst Type

This functionality is the same as that of the corresponding key in the Demod menu. See ["Burst Type" on page 2289](#) for details.

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

TSC (Std)

This functionality is the same as that of the corresponding key in the Demod menu. See ["TSC \(Std\)" on page 2291](#) for details.

Key Path	FREQ Channel
Initial S/W Revision	Prior to A.02.00

Center Freq

Sets the frequency that corresponds to the horizontal center of the graticule (when frequency Scale Type is set to linear). While adjusting the Center Frequency the Span is held constant, which means that both Start Frequency and Stop Frequency will change.

Pressing Center Freq also sets the frequency entry mode to Center/Span. In Center/Span mode, the center frequency and span values are displayed below the graticule, and the default active function in the Frequency menu is Center Freq.

The center frequency setting is the same for all measurements within a mode, that is, it is Meas Global. Some modes are also able to share a Mode Global center frequency value. If this is the case, the Mode will have a Global Settings key in its Mode Setup menu.

The Center Freq function sets (and queries) the Center Frequency for the currently selected input. If your analyzer has multiple inputs, and you select another input, the Center Freq changes to the value for that input. SCPI commands are available to directly set the Center Freq for a specific input.

Center Freq is remembered as you go from input to input. Thus you can set a Center Freq of 10 GHz with the RF Input selected, change to BBIQ and set a Center Freq of 20 MHz, then switch to External Mixing and set a Center Freq of 60 GHz, and when you go back to the RF Input the Center Freq will go back to 10 GHz; back to BBIQ and it is 20 MHz; back to External Mixing and it is 60 GHz.

See ["RF Center Freq" on page 2272](#)

See [Ext Mix Center Freq](#)

See ["I/Q Center Freq" on page 2274](#)

See ["Center Frequency Presets" on page 2271](#)

Key Path	FREQ Channel
Scope	Meas Global
Remote Command	<code>[:SENSe] :FREQuency:CENTer <freq></code> <code>[:SENSe] :FREQuency:CENTer?</code>
Example	FREQ:CENT 50 MHz FREQ:CENT UP changes the center frequency to 150 MHz if you use FREQ:CENT:STEP 100 MHz to set the center frequency step size to 100 MHz FREQ:CENT?
Notes	This command sets either the RF or I/Q Center Frequency depending on the selected input. For RF input it is equivalent to FREQ:RF:CENT For I/Q input it is equivalent to FREQ:IQ:CENT Preset and Max values are dependent on Hardware Options (5xx) If no terminator (e.g. MHz) is sent the terminator Hz is used. If a terminator with unit other than Frequency is used, an invalid suffix error message is generated.
Dependencies	The Center Frequency can be limited by Start or Stop Freq limits, if the Span is so large that Start or Stop reach their limit.
Couplings	When operating in "swept span", any value of the Center Frequency or Span that is within the frequency range of the analyzer is allowed when the value is being set through the front panel numeric key pad or the SCPI command. The other parameter is forced to a different value if needed, to keep the Start and the Stop Frequencies within the analyzer's frequency range
Preset	Depends on instrument maximum frequency, mode, measurement, and selected input. See "Center Frequency Presets" on page 2271 and "RF Center Freq" on page 2272 and Ext Mix Center Freq and "I/Q Center Freq" on page 2274 .
State Saved	Saved in instrument state
Min	Depends on instrument maximum frequency, mode, measurement, and selected input.. See "Center Frequency Presets" on page 2271 and "RF Center Freq" on page 2272 and "I/Q Center Freq" on page 2274 .
Max	Depends on instrument maximum frequency, mode, measurement, and selected input.. See "Center Frequency Presets" on page 2271 and "RF Center Freq" on page 2272 and "I/Q Center Freq" on page 2274 .
Default Unit	Hz
Status Bits/OPC	Non-overlapped
Dependencies	
Initial S/W Revision	Prior to A.02.00

Center Frequency Presets

The following table provides the Center Frequency Presets for the Spectrum Analyzer mode, and the Max Freq, for the various frequency options:

Freq Option	CF after Mode Preset	Stop Freq after Mode Preset	Max Freq (can't tune above)
503 (all but N9000A)	1.805 GHz	3.6 GHz	3.7 GHz
503 (N9000A)	1.505 GHz	3.0 GHz	3.08 GHz
507 (all but N9000A)	3.505 GHz	7.0 GHz	7.1 GHz
507 (N9000A)	3.755 GHz	7.5 GHz	7.58 GHz
508 (all but N9038A)	1.805 GHz	3.6 GHz	8.5 GHz
508 (N9038A)	4.205 GHz	8.4 GHz	8.5 GHz
513	6.805 GHz	13.6 GHz	13.8 GHz
526 (all but N9000A and N9038A)	13.255 GHz	26.5 GHz	27.0 GHz
526 (N9000A)	13.255 GHz	26.5 GHz	26.55 GHz
526 (N9038A)	1.805 GHz	3.6 GHz	27.0 GHz
532	16.005 GHz	32.0 GHz	32.5 GHz
543	21.505 GHz	43.0 GHz	TBD
544	22.005 GHz	44.0 GHz	44.5 GHz
550	25.005 GHz	50.0 GHz	51 GHz

Input 2:

Model	CF after Mode Preset	Stop Freq after Mode Preset	Max Freq (can't tune above)
N9000A opt C75	0.7505GHz	1.5 GHz	1.58 GHz
N9038A	505 MHz	1 GHz	1.000025 GHz

Tracking Generator Frequency Limits (N9000A only):

Tracking Generator Option	Min Freq (clips to this freq when turn TG on and can't tune below while TG on)	If above this Freq, Stop Freq clipped to this Freq when TG turned on	Max Freq (can't tune above) while TG on
T03	9 kHz	3.0 GHz	3.08 GHz
T06	9 kHz	6.0 GHz	6.05 GHz

The following table shows the Center Frequency Presets for modes other than Spectrum Analyzer:

Mode	CF Preset for RF
WCDMA	1 GHz
WIMAXOFDMA,	1 GHz
BASIC	1 GHz
ADEMOD	1 GHz
VSA	1 GHz
TDSCDMA	1 GHz
PNOISE	1 GHz
LTE	1 GHz
LTETDD	1 GHz
MSR	1 GHz
GSM	935.2 MHz
NFIGURE	1.505 GHz

RF Center Freq

SCPI command for specifying the RF Center Frequency. This command will set the Center Frequency to be used when the RF input is selected, even if the RF input is not the input that is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

Scope	Meas Global
Remote Command	<code>[:SENSe] :FREQuency:RF:CENTer <freq></code> <code>[:SENSe] :FREQuency:RF:CENTer?</code>
Example	<code>FREQ:RF:CENT 30 MHz</code>
Notes	This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode.
Dependencies	If the electronic/soft attenuator is enabled, any attempt to set Center Frequency such that the Stop

	Frequency would be >3.6 GHz fails and results in an advisory message. If the equivalent SCPI command is sent, this same message is generated as part of a “-221, Settings conflict” warning. If Source Mode is set to Tracking, and the Max or Min Center Freq is therefore limited by the limits of the source, a warning message is generated, “Data out of range;clipped to source max/min” if these limits are exceeded. Note that for an external source, these limits can be affected by the settings of Source Numerator, Source Denominator and Power Sweep.
Preset	See table above
State Saved	Saved in instrument state.
Min	-79.999995 MHz, unless Source Mode is set to Tracking, in which case it is limited by the minimum frequency of the Source
Max	See table above. Basically instrument maximum frequency - 5 Hz. Note that, if the Source Mode is set to Tracking, the effective instrument maximum frequency may be limited by the source maximum frequency. If the knob or step keys are being used, also depends on the value of the other three interdependent parameters Span, Start Frequency and Stop Frequency
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Ext Mix Center Freq

SCPI command for specifying the External Mixer Center Frequency. This command will set the Center Frequency to be used when the External Mixer is selected, even if the External Mixer input is not the input which is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

Scope	Meas Global
Remote Command	<code>[:SENSe] :FREQuency:EMIXer:CENTer <freq></code> <code>[:SENSe] :FREQuency:EMIXer:CENTer?</code>
Example	<code>:FREQ:EMIX:CENT 60 GHz</code> <code>:FREQ:EMIX:CENT?</code>
Notes	This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode.
Couplings	When returning to External Mixing after having been switched to one of the other inputs (e.g., RF), you will come back into the settings that you had when you left External Mixing. So you will come back to the band you were in with the Center Frequency that you had. However, Span is not an input-dependent parameter, therefore you will bring the span over from the other input. Therefore, the analyzer comes back with the span from the previous input, limited as necessary by the current mixer setup.
Preset	When a Mode Preset is performed while in External Mixing, the Start frequency of the current Mode is set to the nominal Min Freq of the lowest harmonic range in the Harmonic Table for the current mixer setup. Similarly, the Stop frequency of the current Mode is set to the nominal Max Freq of the highest harmonic range in the Harmonic Table. The Center Freq thus presets to the point arithmetically equidistant from these two frequencies.

	<p>If the current measurement has a limited Span available to it, and cannot achieve the Span shown in the table (Span=Stop Freq – Start Freq), the analyzer uses the maximum Span the measurement allows, and still sets the Center Freq to the midpoint of the Start and Stop Freq values in the Harmonic Table.</p> <p>When Restore Input/Output Defaults is performed, the mixer presets to the 11970A, whose Start and Stop frequencies are 26.5 and 40 GHz respectively. The center of these two frequencies is 33.25 GHz.</p> <p>Therefore, after a Restore Input/Output Defaults, if you go into External Mixing and do a Mode Preset while in the Spectrum Analyzer Mode, the resulting Center Freq is 33.25 GHz.</p>
State Saved	Saved in instrument state.
Min	The minimum frequency in the currently selected mixer band + 5 Hz
Max	The maximum frequency in the currently selected mixer band – 5 Hz If the knob or step keys are being used, also depends on the value of the other three interdependent parameters Span, Start Frequency and Stop Frequency
Initial S/W Revision	A.08.01

I/Q Center Freq

SCPI command for specifying the I/Q Center Frequency. This command will set the Center Frequency to be used when the I/Q input is selected, even if the I/Q input is not the input which is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

Scope	Meas Global
Remote Command	[:SENSe] :FREQuency:IQ:CENTer <freq> [:SENSe] :FREQuency:IQ:CENTer?
Example	FREQ:IQ:CENt: 30 MHz
Notes	This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode.
Preset	0 Hz
State Saved	Saved in instrument state.
Min	-40.049995 MHz
Max	40.049995 MHz
Initial S/W Revision	Prior to A.02.00

BMT Freq

Enables quick selection from a subset of the available ARFCN numbers for the Top, Middle, or Bottom frequency in the selected band.

Key Path	FREQ Channel
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Mode	GSM
Scope	Meas Global
Notes	This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this.
Dependencies	When I/Q Input is selected, this key is not available (blank).
Couplings	BMT choice changes ARFCN and Center Freq. Chosen ARFCN will be displayed on each menu key.
Range	Top Middle Bottom
Initial S/W Revision	Prior to A.02.00

BMT Freq Top

Sets the analyzer to the frequency of the highest ARFCN (Absolute RF Channel Number) of the selected radio band.

Key Path	FREQ Channel, BMT Freq
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel:ARFCn RFChannel:TOP
Example	CHAN:ARFC:TOP
Notes	1. This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. 2. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not displayed.
Couplings	Change [:SENSe]:CHANnel:ARFCn RFChannel as follows: E-GSM: 124 P-GSM: 124 R-GSM: 124 DCS 1800: 885 PCS 1900: 810 GSM 450: 293 GSM 480: 340 GSM 700: 516 GSM 850: 251 T-GSM 810: 425 Change BMT ARFCN to BMT FreqTOP. Change [:SENSe]:FREQuency:CENter as follows: E-GSM: 959.800 MHz P-GSM: 959.800 MHz R-GSM: 959.800 MHz

	DCS 1800: 1879.80 MHz
	PCS 1900: 1989.80 MHz
	GSM 450: 467.400 MHz
	GSM 480: 495.800 MHz
	GSM 700: 792.800 MHz
	GSM 850: 893.800 MHz
	T-GSM810: 866.000 MHz

State Saved	No
Initial S/W Revision	Prior to A.02.00

BMT Freq Middle

Sets the analyzer to the frequency of the middle ARFCN (Absolute RF Channel Number) of the selected radio band.

Key Path	FREQ Channel, BMT Freq
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :ARFCn RFCHannel :MIDDLE</code>
Example	CHAN:ARFC:MIDD
Notes	<ol style="list-style-type: none"> 1. This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. 2. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not displayed.
Couplings	Change [:SENSe]:CHANnel:ARFCn RFCHannel as follows: E-GSM: 38 P-GSM: 63 R-GSM: 28 DSC 1800: 699 PCS 1900: 661 GSM 450: 276 GSM 480: 323 GSM 700: 477 GSM 850: 190 T-GSM 810: 388 Change BMT ARFCN to BMT FreqMIDDLE. Change [:SENSe]:FREQuency:CENTer as follows: E-GSM: 942.600 MHz P-GSM: 947.600 MHz R-GSM: 940.600 MHz

	DCS 1800: 1842.60 MHz
	PCS 1900: 1960.00 MHz
	GSM 450: 464.000 MHz
	GSM 480: 492.400 MHz
	GSM 700: 755.000 MHz
	GSM 850: 881.600 MHz
	T-GSM 810: 858.600 MHz

State Saved	No
Initial S/W Revision	Prior to A.02.00

BMT Freq Bottom

Sets the analyzer to the frequency of the lowest ARFCN (Absolute RF Channel Number) of the selected radio band.

Key Path	FREQ Channel, BMT Freq
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel:ARFCn RFChannel:BOTTom
Example	CHAN:ARFC:BOT
Notes	<ol style="list-style-type: none"> 1. This functionality does not affect the Combined GSM/EDGE measurement. You can set frequency settings using Frequency List (CGSM:LIST:FREQ) instead of this. 2. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	When I/Q Input is selected, this key is not displayed.
Couplings	Change [:SENSe]:CHANnel:ARFCn RFChannel as follows: E-GSM: 975 P-GSM: 1 R-GSM: 955 DCS 1800: 512 PCS 1900: 512 GSM 450: 259 GSM 480: 306 GSM 700: 438 GSM 850: 128 T-GSM 810: 350 Change BMT ARFCN to BMT FreqBOTTOM. Change [:SENSe]:FREQuency:CENTer as follows: E-GSM: 925.200 MHz P-GSM: 935.200 MHz R-GSM: 921.200 MHz

	DCS 1800: 1805.20 MHz PCS 1900: 1930.20 MHz GSM 450: 460.600 MHz GSM 480: 489.000 MHz GSM 700: 747.2 MHz GSM 850: 869.200 MHz T-GSM 810: 851.000 MHz
State Saved	No
Initial S/W Revision	Prior to A.02.00

Carrier Setup

Allows you to set carrier parameters.

Key Path	FREQ Channel
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Initial S/W Revision	A.06.00
Modified at S/W Revision	A.14.00

Carriers

Defines the number of carriers.

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :COUNT <integer></code> <code>[:SENSe] :CHANnel :CARRier :COUNT?</code>
Example	CHAN:CARR:COUN 3 CHAN:CARR:COUN?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Couplings	This can change when the SCPI command of the Carrier Power Present or the Carrier Interval is sent.
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	16

Initial S/W Revision	A.06.00
Modified at S/W Revision	A.13.00

Reference Carrier

Defines the reference active carrier. The Reference Carrier frequency point is always aligned with the Measurement Global Center Frequency. The minimum value 1 specifies the lowest frequency carrier among the active carriers. The maximum value specifies the highest frequency carrier among the active carriers.

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :RCARrier <integer></code> <code>[:SENSe] :CHANnel :CARRier :RCARrier ?</code>
Example	CHAN:CARR:RCAR 3 CHAN:CARR:RCAR?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	The maximum value depends on the number of carriers. If you set it to more than the number of carriers, it's clipped to the number of carriers. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Couplings	When you decrease the number of carriers to a value which is less than this value, this is clipped to the value.
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	Number of carriers
Initial S/W Revision	A.06.00

Configure Carriers

Opens a menu of keys that allows you to configure carriers.

Key Path	FREQ Channel, Multi Carrier Setup
Dependencies	This key is grayed out when there is only one carrier. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Initial S/W Revision	A.06.00

Select Carrier

Selects a carrier to configure.

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	The maximum value depends on the number of carriers. This key is only shown when the N9071A–3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned. This parameter is unavailable when there is only one carrier.
Couplings	This value can change when you decrease the number of carriers.
Preset	1
State Saved	No
Min	1
Max	Number of carriers
Initial S/W Revision	A.06.00

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :CARRier :LIST :COUPle OFF ON 0 1, ... [:SENSe] :CHANnel :CARRier :LIST :COUPle ?
Example	CHAN:CARR:LIST:COUP OFF CHAN:CARR:LIST:COUP?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This key is only shown when the N9071A–3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	When Couple is selected, the carrier settings are coupled to carrier #1. Coupled parameters are Carrier Power Present, Carrier Interval. When a setting is changed, the couple is set to Man automatically. Carrier #1 is always set to couple and cannot be changed. Couple/Man selection on the Carrier key is not displayed when selected carrier number is #1.
Preset	ON
State Saved	No
Range	Couple Man
Initial S/W Revision	A.06.00

Carrier Power Present

Specifies whether each of carriers is active or not.

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :LIST :PPresent YES NO, ...</code> <code>[:SENSe] :CHANnel :CARRier :LIST :PPresent ?</code>
Example	<code>CHAN:CARR:LIST:PPR YES</code> <code>CHAN:CARR:LIST:PPR?</code>
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode. Missing values are not permitted, therefore if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Dependencies	This parameter is unavailable when there is only one carrier. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	Coupled to the number of carriers. When the SCPI command is sent, the number of carriers will be set to the number of entries in the parameter list.
Preset	YES
State Saved	Saved in instrument state.
Range	Yes No
Initial S/W Revision	A.06.00

Carrier Interval

Specifies the frequency interval between the Carrier #n and #n+1 center frequencies.

Key Path	FREQ Channel, Multi Carrier Setup, Configure Carriers
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :LIST :INTerval <freq>, ...</code> <code>[:SENSe] :CHANnel :CARRier :LIST :INTerval ?</code>
Example	<code>CHAN:CARR:LIST:INT 600k</code> <code>CHAN:CARR:LIST:INT?</code>
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode. The softkey for the last carrier (say, #N) is grayed out.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned. This parameter is unavailable when there is only one carrier.
Couplings	Coupled to the number of carriers. When the SCPI command is sent, the number of carriers will be

	set to the number of entries in the parameter list. Changing Carrier Interval might affect the Span.
Preset	600kHz
State Saved	Saved in instrument state.
Min	400 kHz
Max	100 MHz
Initial S/W Revision	A.06.00
Modified at S/W Revision	A.07.00, A.08.00

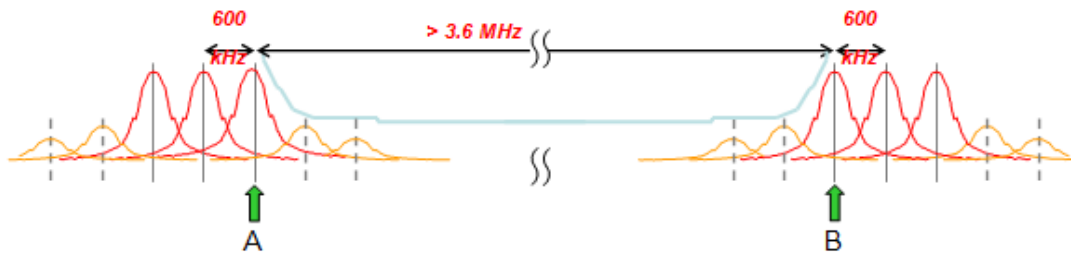
Carrier Frequency Allocation

Specifies the carrier frequency allocation. There are two types of allocation, contiguous and non-contiguous. Non-Contiguous frequency allocation is defined as an allocation where two groups of frequencies are separated with at least [3.6] MHz carrier separation between the innermost carriers. In case of the non-contiguous frequency allocation, tests will be measured between the uppermost carrier A of the lower frequency group and the lowermost carrier B of the upper frequency group.

See ["An example of non-contiguous frequency allocation" on page 2283](#)

Key Path	FREQ Channel, Multi Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :FALLocation</code> CONTiguous NCONTiguous <code>[:SENSe] :CHANnel :CARRier :FALLocation?</code>
Example	CHAN:CARR:FALL NCON CHAN:CARR:FALL?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	This menu key is available only when the number of carriers is more than one. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Preset	CONTiguous
State Saved	Saved in instrument state.
Range	Contiguous Non-Contiguous
Readback Text	CONTiguous NCONTiguous
Initial S/W Revision	A.07.00

An example of non-contiguous frequency allocation



Non-Contiguous

Opens a menu of keys that allows you to set non-contiguous frequency allocation parameters.

Key Path	FREQ Channel, Multi Carrier Setup, Carr Freq Alloc
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Initial S/W Revision	A.07.00

Allocation Break Pt

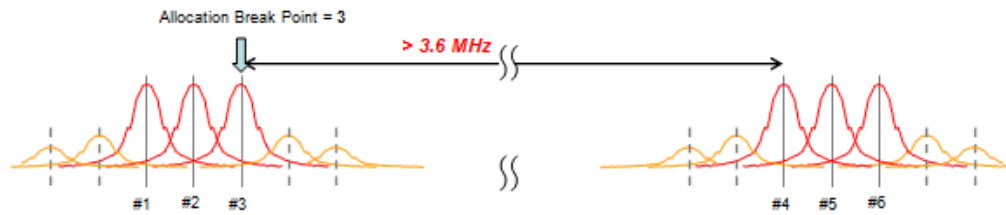
Specifies an allocation break point that is a sequence (or index) number of the uppermost carrier in the lower frequency group.

See ["An example of allocation break point" on page 2285](#)

Key Path	FREQ Channel, Multi Carrier Setup, Carr Freq Alloc, Non-Contiguous
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe]:CHANnel:CARRier:FALLocation:NCONtiguous:ABPoint <integer></code> <code>[:SENSe]:CHANnel:CARRier:FALLocation:NCONtiguous:ABPoint?</code>
Example	<code>CHAN:CARR:FALL:NCON:ABP 3</code> <code>CHAN:CARR:FALL:NCON:ABP?</code>
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Dependencies	The maximum value depends on the number of carriers. This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	This value can change when you decrease the number of carriers.
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	Number of carriers - 1
Initial S/W Revision	A.07.00
Modified at S/W Revision	A.13.00

18 Burst Power (Transmit Power)
FREQ/Channel

An example of allocation break point



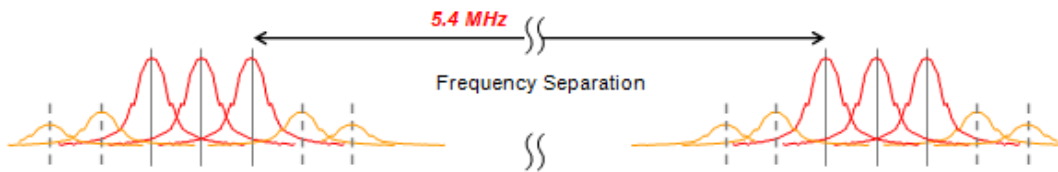
Freq Separation

Specifies frequency separation between the innermost of carriers.

See ["An example of frequency separation" on page 2286](#)

Key Path	FREQ Channel, Multi Carrier Setup, Carr Freq Alloc, Non-Contiguous
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :CHANnel :CARRier :FALLocation :NCONtiguous :FSEParation <freq></code> <code>[:SENSe] :CHANnel :CARRier :FALLocation :NCONtiguous :FSEParation?</code>
Example	<code>CHAN:CARR:FALL:NCON:FSEP 5.4M</code> <code>CHAN:CARR:FALL:NCON:FSEP?</code>
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	Changing Frequency Separation might affect the Span
Preset	5.4 MHz
State Saved	Saved in instrument state.
Min	3.6 MHz
Max	100 MHz
Initial S/W Revision	A.07.00

An example of frequency separation



Carrier BPF

Selects whether to use the carrier bandpass filter.

Key Path	FREQ Channel, Multi Carrier SetupMode Setup, Demod
Mode	GSM
Remote Command	[:SENSe] :RADio:CARRier:NUMBer:AUTO ON OFF 1 0 [:SENSe] :RADio:CARRier:NUMBer:AUTO?
Example	RAD:CARR:NUMB:AUTO 1 RAD:CARR:NUMB:AUTO?
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Couplings	ON automatically changes to OFF when Multiple or Single is selected as Carrier BPF Type.
Preset	ON
State Saved	Saved in instrument state.
Range	Auto Man
Initial S/W Revision	A.06.00

Carrier BPF Type

Opens a menu of keys that allows you to select the type of the bandpass filter. When carriers other than the signal of interest are present, especially if they are strong, they can interfere with the measurement, making it difficult to sync and producing artificially high EVM results. When this condition exists, toggle from Single to Multi. A band-limited filter will help reduce the measurement interference.

BPF Type	Description
MULTiple	Enable multi carrier tolerance filter.
SINGle	Disable multi carrier tolerance filter

This parameter applies only to the following measurements:

- GMSK Phase & Frequency Error measurement
- EDGE EVM measurement
- GMSK Power vs. Time

- EDGE Power vs. Time

Key Path	FREQ Channel, Multi Carrier Setup, Carrier BPFMode Setup, Demod, Carrier BPF
Mode	GSM
Scope	Meas Global
Remote Command	<code>[:SENSe] :RADio :CARRier :NUMBer SINGLE MULTiple</code> <code>[:SENSe] :RADio :CARRier :NUMBer ?</code>
Example	<code>RAD:CARR:NUMB SING</code> <code>RAD:CARR:NUMB ?</code>
Notes	The Carrier Bandpass Filter key is in the Mode Setup menu, but only EDGE EVM and GSM PFER measurements support this feature. In other measurements, this setting is not applicable. You must be in the GSM mode to use this command. Use <code>INSTRument:SElect</code> to set the mode.
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned
Preset	SINGLE
State Saved	Saved in instrument state.
Range	Single Multi
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

BTS Class

Selects a BTS class.

BTS Class	Definition
MC	Multicarrier BTS is defined as a class of BTS, characterized by the ability to, in addition to single carrier operation, process two or more carriers in common active RF components simultaneously, either in multicarrier transmitter only or, in both multicarrier transmitter and multicarrier receiver.
SC	Single carrier BTS is defined as a class of BTS, characterized by the ability to process one carrier in single carrier BTSs, not belonging to a Multicarrier BTS class.

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Remote Command	<code>[:SENSe] :CHANnel :CARRier :BASE :CLASs :AUTO ON OFF 1 0</code> <code>[:SENSe] :CHANnel :CARRier :BASE :CLASs :AUTO ?</code>
Example	<code>CHAN:CARR:BASE:CLAS:AUTO 1</code> <code>CHAN:CARR:BASE:CLAS:AUTO ?</code>
Dependencies	This key is only shown when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.

Couplings	ON automatically changes to OFF when Multicarrier Class (MC) or Single carrier Class (SC) is selected as BTS Class.
Preset	ON
State Saved	Saved in instrument state.
Range	Auto Man
Initial S/W Revision	A.14.00

Key Path	FREQ Channel, Carrier Setup
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :CARRier :BASE :CLASs SC MC [:SENSe] :CHANnel :CARRier :BASE :CLASs ?
Example	CHAN:CARR:BASE:CLAS MC CHAN:CARR:BASE:CLAS?

Notes

You must be in the GSM mode to use this command.
Use INSTRument:SElect to set the mode.
Selection C1 and C2 are supported for backwards compatibility.
When "C1" or "C2" is passed as SCPI command parameter, the BTS Class Auto is set to ON. As a result, it's converted to "SC" if the number of carriers is one, and otherwise "MC."

Dependencies	This parameter is available when the N9071A-3FP license is installed. When it is unlicensed and SCPI is sent, an undefined header error or illegal parameter error is returned.
Preset	SC
State Saved	Saved in instrument state.
Range	Single Carrier Multi Carrier
Initial S/W Revision	A.06.00
Modified at S/W Revision	A.10.01, A14.00

Time Slot

Selects On or Off for slot searching. Generally, this feature is only valid in external and periodic timer trigger source modes that triggers every frame since another trigger source does not have the information that identifies the head of the frame. When Timeslot is set to On, the demodulation measurement is made on the nth timeslot specified by the trigger point + n timeslots, where n is the selected timeslot value 0 to 7.

This functionality is the same as Time Slot under the Freq/Channel menu.

Key Path	Mode Setup, Demod FREQ Channel
Mode	GSM

Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :SLOT <integer> [:SENSe] :CHANnel :SLOT? [:SENSe] :CHANnel :SLOT :AUTO OFF ON 0 1 [:SENSe] :CHANnel :SLOT :AUTO?
Example	CHAN:SLOT 0 CHAN:SLOT? CHAN:SLOT:AUTO OFF CHAN:SLOT:AUTO?
Notes	This functionality does not affect Combined GSM/EDGE measurement. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	0 OFF
State Saved	Saved in instrument state.
Min	0
Max	7
Initial S/W Revision	Prior to A.02.00

Burst Type

Sets the burst type that the analyzer will search for and to which it will synchronize.

This functionality is the same as Burst Type under the FREQ Channel menu.

Key	SCPI	Description
Sync (SCH)	SYNC	Burst length = 142 symbols Extended training sequences for CTS and COMPACT synchronization bursts are not supported.
Access (RACH)	ACCess	Burst length = 88 symbols Alternative training (synchronization) sequence "TS1" and "TS2" are supported only in GSMK Power vs. Time.
Normal - NB (TCH & CCH)	NORMal	Burst length = 142 symbols Softkey label will be changed to 'Normal - NB' form 'Normal'
Higher Symbol Rate - HB (TCH & CCH)	HSRate	Burst length = 169 symbols This selection key is only shown when theN9071A-3FP license is installed.
Mixed (NB/HB for TSC sync)	MIXed	Enables auto detection between Normal (NB) and HSR (HB) TCH & CCH EDGE Burst. This selection key is only shown when theN9071A-3FP license is installed.

Measurement synchronization capability (Burst Sync = Training Seq)

	Sync	Access	Normal		HSR	Mixed
			GMSK	8PSK		
				16QAM		
				32QAM		
				AQPSK		
GMSK Phase & Freq Error measurement	Yes	Yes	Yes	No	N/A	
GMSK Power vs. Time measurement	Yes	Yes	Yes	No	(measures as Normal GMSK when selected)	
GMSK Output RF Spectrum measurement (when Trigger Source is Periodic Timer and Sync Source is Off)	No	No	Yes	No		
EDGE EVM measurement	No	No	No	Yes	Yes	Yes
EDGE Power vs. Time measurement	Yes	Yes	Yes	Yes	Yes	Yes
EDGE Output RF Spectrum measurement (when Trigger Source is Periodic Timer and Sync Source is Off.)	No	No	Yes	Yes	Yes	Yes

Key Path	Mode Setup, Demod FREQ Channel
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe] :CHANnel :BURSt NORMal SYNC ACCess HSRate MIXed [:SENSe] :CHANnel :BURSt?
Example	CHAN:BURS NORM CHAN:BURS?
Notes	This functionality does not affect the Combined GSM/EDGE measurement. Higher Symbol Rate and Mixed selections are only available when the N9071A-3FP license is installed. Otherwise these menu keys are blank. You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Higher Symbol Rate and Mixed selection keys are not shown unless N9071A-3FP is installed. When unlicensed and SCPI is sent, an undefined header error is returned. When "Mixed" is selected, the Burst Sync menu key under the Meas Setup menu will be grayed out and Training Sequence (TSC) will be used for synchronization. The sync algorithm always runs in Training Sequence (TSC) synchronization because the Burst Type can be determined by looking at TSC in the signal. Original selection of Burst Sync will become effective again when the Burst Type selection is changed from "Mixed" to another one.
Preset	NORMal
State Saved	Saved in instrument state.
Range	Sync (SCH) Access (RACH) Normal - NB (TCH & CCH) Higher Symbol Rate - HB (TCH & CCH) Mixed (NB/HB for TSC sync)

Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.06.00

TSC (Std)

Allows you to select the Training Sequence Code that determines which burst is to be measured. Applicable only when Burst Sync is set to Training Sequence in the measurement. In the case of AQPSK, this parameter specifies TSC number of VAMOS sub-channel A. TSC of VAMOS sub-channel B is ignored.

This functionality is the same as TSC under the FREQ Channel menu.

This parameter applies only to the following measurements:

- GMSK/EDGE Power vs. Time measurement
- GMSK Phase & Frequency Error measurement
- EDGE EVM measurement

Selection	SCPI	Description
AutoDet	ON 1	The measurement is made on the first burst found to have any one of the valid TSCs in the range of 0 to 7. The measurement may be made on various timeslots if more than one timeslot has one of the 8 valid TSCs.
Man	OFF 0	The measurement is made on the first burst found to have the selected TSC. TSC numbers in the range of 0 to 7 can be selected. The measurement may be made on various timeslots if more than one timeslot has this same TSC.

Key Path	Mode Setup, Demod FREQ Channel
Mode	GSM
Scope	Meas Global
Remote Command	[:SENSe]:CHANnel:TSCode <integer> [:SENSe]:CHANnel:TSCode? [:SENSe]:CHANnel:TSCode:AUTO OFF ON 0 1 [:SENSe]:CHANnel:TSCode:AUTO?
Example	CHAN:TSC 3 CHAN:TSC? CHAN:TSC:AUTO 1 CHAN:TSC:AUTO?
Notes	You must be in the GSM mode to use this command. Use INSTRument:SElect to set the mode. When Sync or Access is selected as Burst Type, this key is grayed out.
Preset	0 ON

18 Burst Power (Transmit Power)
FREQ/Channel

State Saved	Saved in instrument state.
Min	0
Max	7
Initial S/W Revision	Prior to A.02.00

Input/Output

See ["Input/Output" on page 196](#)

Marker

Accesses a menu that enables you to select, set up and control the markers for the current measurement.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Select Marker

Displays 12 markers available for selection.

Key Path	Marker
Initial S/W Revision	Prior to A.02.00

Marker Type

Sets the marker control mode as described under Normal, Delta, Fixed and Off, below. All interactions and dependencies detailed under the key description are enforced when the remote command is sent.

Key Path	Marker
Mode	GSM, SA, TD-SCDMA
Remote Command	:CALCulate:TXPower:MARKer[1] 2 ... 12:MODE POSition DELTa OFF :CALCulate:TXPower:MARKer[1] 2 ... 12:MODE?
Example	CALC:TXP:MARK:MODE OFF CALC:TXP:MARK:MODE?
Notes	<p>If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules. At the same time, Marker X Axis Value appears on the Active Function area.</p> <p>Default Active Function: the active function for the selected marker's current control mode. If the current control mode is Off, there is no active function and the active function is turned off.</p> <p>Active Function Display: the marker X axis value entered in the active function area will display the marker value to its full entered precision.</p> <p>You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode.</p>
Preset	OFF
State Saved	Saved in instrument state.
Range	Normal Delta Off
Backwards Compatibility SCPI	:CALCulate:BPOWer:MARKer[1] 2 ... 12:MODE
Initial S/W Revision	Prior to A.02.00

Marker X Axis Position (Remote Command Only)

Sets the marker X position in trace points. It has no effect if the control mode is Off, but is the SCPI equivalent of entering a value if the control mode is Normal or Delta except in trace points rather than X Axis Scale units. The entered value is immediately translated into the current X Axis Scale units for setting the value of the marker.

Mode	GSM, SA, TD-SCDMA
Remote Command	:CALCulate:TXPower:MARKer[1] 2 ... 12:X:POSition <real> :CALCulate:TXPower:MARKer[1] 2 ... 12:X:POSition?
Example	CALC:TXP:MARK10:X:POS 500 CALC:TXP:MARK10:X:POS?
Notes	The query returns the marker's absolute X Axis value in trace points if the control mode is Normal, or the offset from the marker's reference marker in trace points if the control mode is Delta. If the marker is Off the response is not a number. You must be in the Spectrum Analyzer mode, TDSCMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	Max value would be changed by Sweep/Meas Time parameter value.
Preset	Markers are turned OFF, so Marker X Axis Value query will return a not a number (NAN).
State Saved	No
Min	-9.9E+37
Max	9.9E+37
Backwards Compatibility SCPI	:CALCulate:BPOwer:MARKer[1] 2 ... 12:X:POSition
Initial S/W Revision	Prior to A.02.00

Marker Y Axis Value (Remote Command Only)

Returns the marker Y Axis value in the current marker Y Axis unit.

The "result" of a marker is the value which is displayed on the second line of the Marker Result block. To properly interpret the returned value the remote programmer must also know what the analyzer's Y-Axis Unit is set to as described below.

A marker can have up to two results, only one of which is displayed or returned on a query, as follows:

- Absolute result: every marker has an absolute result and it is simply:

For Normal and Delta markers, the Y Axis value of the trace point the marker is currently on.

The absolute result is displayed in the result block or returned on a query unless the marker control mode is Delta.

- Relative result: if a marker's control mode is Delta, the relative result is displayed in the result block or returned on a query. This is the ratio of the Absolute Result of a delta marker to the Absolute Result of its reference marker. The ratio is expressed in dB.

Mode	GSM, SA, TD-SCDMA
Remote Command	:CALCulate:TXPower:MARKer[1] 2 ... 12:Y?
Example	CALC:TXP:MARK11:Y?
Notes	The query returns the marker Y Axis result. If the marker is Off the response is not a number. You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	0
State Saved	No
Backwards Compatibility SCPI	:CALCulate:TXPower:MARKer[1] 2 ... 12:FUNction:RESult? :CALCulate:BPOwer:MARKer[1] 2 ... 12:FUNction:RESult? :CALCulate:BPOwer:MARKer[1] 2 ... 12:Y?
Initial S/W Revision	Prior to A.02.00

Properties

Accesses a menu that enables you to set marker properties and to access the marker trace menu.

Key Path	Marker
Initial S/W Revision	Prior to A.02.00

Select Marker

Displays 12 markers available for selection.

Key Path	Marker
Initial S/W Revision	Prior to A.02.00

Relative To

Selects the marker that the selected marker will be relative to (its reference marker).

Key Path	Marker, Properties
Mode	GSM, SA, TD-SCDMA
Remote Command	:CALCulate:TXPower:MARKer[1] 2 ... 12:REFerence <integer> :CALCulate:TXPower:MARKer[1] 2 ... 12:REFerence?
Example	CALC:TXP:MARK:REF 10 CALC:TXP:MARK:REF?
Notes	A marker cannot be relative to itself, so that choice is grayed out, and if sent from SCPI generates

	<p>error -221: "Settings conflict; marker cannot be relative to itself." You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode. When queried a single value will be returned (the specified marker numbers relative marker).</p>
Preset	2 3 4 5 6 7 8 9 10 11 12 1
State Saved	Saved in instrument state.
Min	1
Max	12
Initial S/W Revision	Prior to A.02.00

Marker Trace

Assigns the specified marker to the designated trace.

Key Path	Marker, Properties
Mode	GSM, SA, TD-SCDMA
Remote Command	:CALCulate:TXPower:MARKer[1] 2 ... 12:TRACe RFENvelope MAXHold MINHold :CALCulate:TXPower:MARKer[1] 2 ... 12:TRACe?
Example	CALC:TXP:MARK:TRAC MAXH CALC:TXP:MARK:TRAC?
Notes	You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	If Detector/Max Hold Trace is Off, Max Hold is grayed out and MAXHold parameter is not available. If Detector/Min Hold Trace is Off, Min Hold is grayed out and MINHold parameter is not available.
Preset	RFENvelope
State Saved	Saved in instrument state.
Range	RF Envelope Max Hold RF Envelope Min Hold RF Envelope
Backwards Compatibility SCPI	:CALCulate:BPOWer:MARKer[1] 2 ... 12:TRACe
Initial S/W Revision	Prior to A.02.00

Couple Markers

When this function is true, moving any marker causes an equal X Axis movement of every other marker which is not Off. By "equal X Axis movement" we mean that we preserve the difference between each marker's X Axis value (in the fundamental x-axis units of the trace that marker is on) and the X Axis value of the marker being moved (in the same fundamental x-axis units).

This may result in markers going off screen.

18 Burst Power (Transmit Power)
Marker

Key Path	Marker
Mode	GSM, SA, TD-SCDMA
Remote Command	:CALCulate:TXPower:MARKer:COUPle[:STATe] ON OFF 1 0 :CALCulate:TXPower:MARKer:COUPle[:STATe]?
Example	CALC:TXP:MARK:COUP ON CALC:TXP:MARK:COUP?
Notes	You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

All Markers Off

Turns off all markers.

Key Path	Marker
Mode	GSM, SA, TD-SCDMA
Remote Command	:CALCulate:TXPower:MARKer:AOff
Example	CALC:TXP:MARK:AOff
Notes	You must be in the Spectrum Analyzer mode, TDSDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode.
Backwards Compatibility SCPI	:CALCulate:BPOWer:MARKer:AOff
Initial S/W Revision	Prior to A.02.00

Marker Function

There is no 'Marker Function' supported in Burst (Tx) Power, so this front-panel key displays a blank menu key when pressed.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

18 Burst Power (Transmit Power)
Marker To

Marker To

There is no 'Marker To' functionality supported in Burst (Tx) Power, so this front-panel key displays a blank menu key when pressed.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Meas

The information in this section is common to all measurements. For key and remote command information for a specific measurement, refer to the section that describes the measurement of interest.

Measurements available under the Meas key are specific to the current Mode.

When viewing Help for measurements, note the following:

NOTE

Operation for some keys differs between measurements. The information displayed in Help pertains to the current measurement. To see how a key operates in a different measurement, exit Help (press the Cancel Esc key), select the measurement, then reenter Help (press the Help key) and press that key.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Remote Measurement Functions

This section contains the following topics:

"Measurement Group of Commands" on page 2302

"Current Measurement Query (Remote Command Only)" on page 2304

"Limit Test Current Results (Remote Command Only)" on page 2304

"Data Query (Remote Command Only)" on page 2304

"Calculate/Compress Trace Data Query (Remote Command Only)" on page 2305

"Calculate Peaks of Trace Data (Remote Command Only)" on page 2310

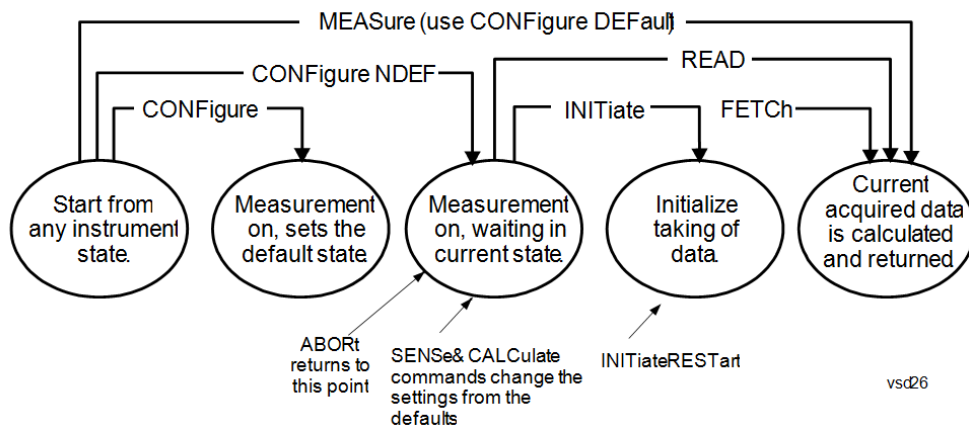
Hardware-Accelerated Fast Power Measurement (Remote Command Only)

"Format Data: Numeric Data (Remote Command Only)" on page 2311

"Format Data: Byte Order (Remote Command Only)" on page 2312

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Measurement Group of Commands



Measure Commands:

:MEASure:<measurement>[n]?

This is a fast single-command way to make a measurement using the factory default instrument settings. These are the settings and units that conform to the Mode Setup settings (e.g. radio standard) that you have currently selected.

- Stops the current measurement (if any) and sets up the instrument for the specified measurement using the factory defaults
- Initiates the data acquisition for the measurement
- Blocks other SCPI communication, waiting until the measurement is complete before returning results.
- If the function does averaging, it is turned on and the number of averages is set to 10.
- After the data is valid it returns the scalar results, or the trace data, for the specified measurement. The type of data returned may be defined by an [n] value that is sent with the command.
- The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available.
- ASCII is the default format for the data output. (Older versions of Spectrum Analysis and Phase Noise mode measurements only use ASCII.) The binary data formats should be used for handling large blocks of data since they are smaller and faster than the ASCII format. Refer to the FORMat:DATA command for more information.

If you need to change some of the measurement parameters from the factory default settings you can set up the measurement with the CONFigure command. Use the commands in the SENSE:<measurement> and CALCulate:<measurement> subsystems to change the settings. Then you can use the READ? command to initiate the measurement and query the results.

If you need to repeatedly make a given measurement with settings other than the factory defaults, you can use the commands in the SENSE:<measurement> and CALCulate:<measurement> subsystems to set up the measurement. Then use the READ? command to initiate the measurement and query results.

Measurement settings persist if you initiate a different measurement and then return to a previous one. Use READ:<measurement>? if you want to use those persistent settings. If you want to go back to the default settings, use MEASure:<measurement>?.

Configure Commands:

:CONFigure:<measurement>

This command stops the current measurement (if any) and sets up the instrument for the specified measurement using

the factory default instrument settings. It does not initiate the taking of measurement data unless INIT:CONTInuous is ON. If you change any measurement settings after using the CONFigure command, the READ command can be used to initiate a measurement without changing the settings back to their defaults.

In the Swept SA measurement in Spectrum Analyzer mode the CONFigure command also turns the averaging function on and sets the number of averages to 10 for all measurements.

:CONFigure: <measurement>: NDEFault stops the current measurement and changes to the specified measurement. It does not change the settings to the defaults. It does not initiate the taking of measurement data unless INIT:CONTInuous is ON.

The CONFigure? query returns the current measurement name.

The CONFigure:CATalog? query returns a quoted string of all licensed measurement names in the current mode. For example, "SAN, CHP, OBW, ACP, PST, TXP, SPUR, SEM, LIST".

Fetch Commands:

:FETCh:<measurement>[n]?

This command puts selected data from the most recent measurement into the output buffer. Use FETCh if you have already made a good measurement and you want to return several types of data (different [n] values, for example, both scalars and trace data) from a single measurement. FETCh saves you the time of re-making the measurement. You can only FETCh results from the measurement that is currently active, it will not change to a different measurement. An error message is reported if a measurement other than the current one is specified.

If you need to get new measurement data, use the READ command, which is equivalent to an INITiate followed by a FETCh.

The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used for handling large blocks of data since they are smaller and transfer faster than the ASCII format. (FORMat:DATA)

FETCh may be used to return results other than those specified with the original READ or MEASure command that you sent.

INITiate Commands:

:INITiate:<measurement>

This command is not available for measurements in all the instrument modes:

- Initiates a trigger cycle for the specified measurement, but does not output any data. You must then use the FETCh<meas> command to return data. If a measurement other than the current one is specified, the instrument will switch to that measurement and then initiate it.
 - For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. If you send INIT:ACP? it will change from channel power to ACP and will initiate an ACP measurement.
 - Does not change any of the measurement settings. For example, if you have previously started the ACP measurement and you send INIT:ACP? it will initiate a new ACP measurement using the same instrument settings as the last time ACP was run.
 - If your selected measurement is currently active (in the idle state) it triggers the measurement, assuming the trigger conditions are met. Then it completes one trigger cycle. Depending upon the measurement and the number of averages, there may be multiple data acquisitions, with multiple trigger events, for one full trigger cycle. It also holds off additional commands on GPIB until the acquisition is complete.
-

READ Commands:

:READ:<measurement>[n]?

- Does not preset the measurement to the factory default settings. For example, if you have previously initiated the ACP
-

measurement and you send READ:ACP? it will initiate a new measurement using the same instrument settings.

- Initiates the measurement and puts valid data into the output buffer. If a measurement other than the current one is specified, the instrument will switch to that measurement before it initiates the measurement and returns results.
 - For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. Then you send READ:ACP? It will change from channel power back to ACP and, using the previous ACP settings, will initiate the measurement and return results.
 - Blocks other SCPI communication, waiting until the measurement is complete before returning the results
 - If the optional [n] value is not included, or is set to 1, the scalar measurement results will be returned. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used when handling large blocks of data since they are smaller and faster than the ASCII format. (FORMat:DATA)
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Initial S/W Revision	Prior to A.02.00
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Current Measurement Query (Remote Command Only)

This command returns the name of the measurement that is currently running.

Remote Command	:CONFigure?
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Example	CONF?
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Limit Test Current Results (Remote Command Only)

Queries the status of the current measurement limit testing. It returns a 0 if the measured results pass when compared with the current limits. It returns a 1 if the measured results fail any limit tests.

Remote Command	:CALCulate:CLIMits:FAIL?
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Example	CALC:CLIM:FAIL? queries the current measurement to see if it fails the defined limits. Returns a 0 or 1: 0 it passes, 1 it fails.
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Data Query (Remote Command Only)

Returns the designated measurement data for the currently selected measurement and subopcode.

n = any valid subopcode for the current measurement. See the measurement command results table for your current measurement, for information about what data is returned for the subopcodes.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. (See the format command descriptions under Input/Output in the Analyzer Setup section.)

Remote Command	:CALCulate:DATA[n]?
Notes	The return trace depends on the measurement. In CALCulate:<meas>:DATA[n], n is any valid subopcode for the current measurement. It returns the same data as the FETCH:<measurement>? query where <measurement> is the current measurement.
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Calculate/Compress Trace Data Query (Remote Command Only)

Returns compressed data for the currently selected measurement and sub-opcode [n].

n = any valid sub-opcode for that measurement. See the MEASure:<measurement>? command description of your specific measurement for information on the data that can be returned.

The data is returned in the current Y Axis Unit of the analyzer. The command is used with a sub-opcode <n> (default=1) to specify the trace. With trace queries, it is best if the analyzer is not sweeping during the query. Therefore, it is generally advisable to be in Single Sweep, or Update=Off.

This command is used to compress or decimate a long trace to extract and return only the desired data. A typical example would be to acquire N frames of GSM data and return the mean power of the first burst in each frame. The command can also be used to identify the best curve fit for the data.

Remote Command	:CALCulate:DATA<n>:COMPRESS? BLOCK CFIT MAXimum MINimum MEAN DMEan RMS RMSCubed SAMPLE SDEVIation PPHase [,<soffset> [,<length>[,<roffset>[,<rlimit>]]]]
Example	To query the mean power of a set of GSM bursts: Supply a signal that is a set of GSM bursts. Select the IQ Waveform measurement (in IQ Analyzer Mode). Set the sweep time to acquire at least one burst. Set the triggers such that acquisition happens at a known position relative to a burst. Then query the mean burst levels using, CALC:DATA2:COMP? MEAN, 24e-6, 526e-6 (These parameter values correspond to GSM signals, where 526e-6 is the length of the burst in the slot and you just want 1 burst.)
Notes	The command supports 5 parameters. Note that the last 4 (<soffset>, <length>, <roffset>, <rlimit>) are optional. But these optional parameters must be entered in the specified order. For example, if you want to specify <length>, then you must also specify <soffset>. See details below for a definition of each of these parameters. This command uses the data in the format specified by FORMat:DATA, returning either binary or ASCII data.
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- BLOCK or block data - returns all the data points from the region of the trace data that you specify. For example, it could be used to return the data points of an input signal over several timeslots, excluding the portions of the trace data that you do not want. (This is x,y pairs for trace data and I,Q pairs for complex data.)

- CFIT or curve fit - applies curve fitting routines to the data. <soffset> and <length> are required to define the data that you want. <roffset> is an optional parameter for the desired order of the curve equation. The query will return the following values: the x-offset (in seconds) and the curve coefficients ((order + 1) values).

MIN, MAX, MEAN, DME, RMS, RMSC, SAMP, SDEV and PPH return one data value for each specified region (or <length>) of trace data, for as many regions as possible until you run out of trace data (using <roffset> to specify regions). Or they return the number of regions you specify (using <rlimit>) ignoring any data beyond that.

- MINimum - returns the minimum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the minimum magnitude of the I/Q pairs is returned.
- MAXimum - returns the maximum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the maximum magnitude of the I/Q pairs is returned.
- MEAN - returns a single value that is the arithmetic mean of the data point values (in dB/ dBm) for the specified region(s) of trace data. For I/Q trace data, the mean of the magnitudes of the I/Q pairs is returned. See the following equations.

-

NOTE

If the original trace data is in dB, this function returns the arithmetic mean of those log values, not log of the mean power which is a more useful value. The mean of the log is the better measurement technique when measuring CW signals in the presence of noise. The mean of the power, expressed in dB, is useful in power measurements such as Channel Power. To achieve the mean of the power, use the RMS option.

Equation 1

Mean Value of Data Points for Specified Region(s)

$$\text{MEAN} = \frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 2

Mean Value of I/Q Data Pairs for Specified Region(s)

$$\text{MEAN} = \frac{1}{n} \sum_{X_i \in \text{region}(s)} |X_i|$$

where $|X_i|$ is the magnitude of an I/Q pair, and n is the number of I/Q pairs in the specified region(s).

- DMEan - returns a single value that is the mean power (in dB/ dBm) of the data point values for the specified region(s) of trace data. See the following equation:

Equation 3

DMEan Value of Data Points for Specified Region(s)

$$\text{DME} = 10 \times \log_{10} \left(\frac{1}{n} \sum_{X_i \in \text{region}(s)} 10^{\frac{X_i}{10}} \right)$$

- RMS - returns a single value that is the average power on a root-mean-squared voltage scale (arithmetic rms) of the data point values for the specified region(s) of trace data. See the following equation.

NOTE

For I/Q trace data, the rms of the magnitudes of the I/Q pairs is returned. See the following equation. This function is very useful for I/Q trace data. However, if the original trace data is in dB, this function returns the rms of the log values which is not usually needed.

Equation 4

RMS Value of Data Points for Specified Region(s)

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i^2}$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 5

RMS Value of I/Q Data Pairs for Specified Region(s)

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region(s).

Once you have the rms value for a region of trace data (linear or I/Q), you may want to calculate the mean power. You must convert this rms value (peak volts) to power in dBm:

$$10 \times \log[10 \times (\text{rms value})^2]$$

- SAMPLe - returns the first data value (x,y pair) for the specified region(s) of trace data. For I/Q trace data, the first I/Q pair is returned.
- SDEViation - returns a single value that is the arithmetic standard deviation for the data point values for the specified region(s) of trace data. See the following equation.
- For I/Q trace data, the standard deviation of the magnitudes of the I/Q pairs is returned. See the following equation.

Equation 6

Standard Deviation of Data Point Values for Specified Region(s)

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (X_i - \bar{X})^2}$$

where X_i is a data point value, \bar{X} is the arithmetic mean of the data point values for the specified region (s), and n is the number of data points in the specified region(s).

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (|X_i| - \bar{X})^2}$$

where $|X_i|$ is the magnitude of an I/Q pair, \bar{X} is the mean of the magnitudes for the specified region(s), and n is the number of data points in the specified region(s).

- PPHase - returns the x,y pairs of both rms power (dBm) and arithmetic mean phase (radian) for every specified region and frequency offset (Hz). The number of pairs is defined by the specified number of regions. This parameter can be used for I/Q vector ($n=0$) in Waveform (time domain) measurement and all parameters are specified by data point in PPHase.

The rms power of the specified region may be expressed as:

$$\text{Power} = 10 \times \log [10 \times (\text{RMS I/Q value})] + 10.$$

The RMS I/Q value (peak volts) is:

$$\sqrt{\frac{1}{n} \sum_{X_i \in \text{region}} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region.

The arithmetic mean phase of the specified region may be expressed as:

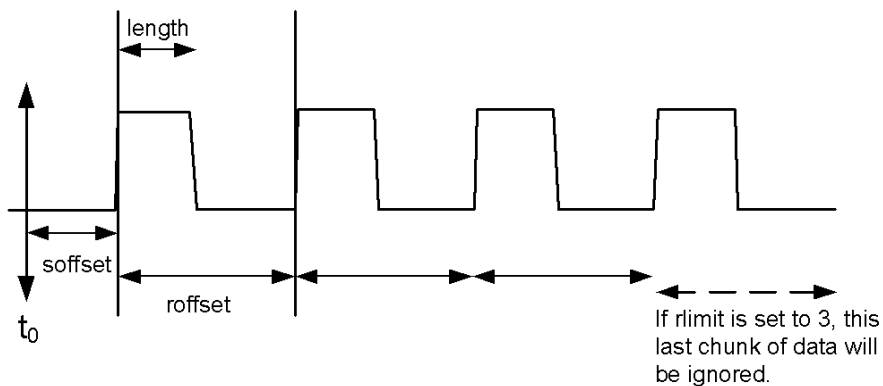
$$\frac{1}{n} \sum_{Y_i \in \text{region}} Y_i$$

where Y_i is the unwrapped phase of I/Q pair with applying frequency correction and n is the number of I/Q pairs in the specified region.

The frequency correction is made by the frequency offset calculated by the arithmetic mean of every specified region's frequency offset. Each frequency offset is calculated by the least square method against the unwrapped phase of I/Q pair.

Sample Trace Data - Constant Envelope

(See below for explanation of variables.)



Sample Trace Data - Not Constant Envelope

(See below for explanation of variables.)



<soffset> - start offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It specifies the amount of data at the beginning of the trace that will be ignored before the decimation process starts. It is the time or frequency change from the start of the trace to the point where you want to start using the data. The default value is zero.

<length> - is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines how much data will be compressed into one value. This parameter has a default value equal to the current trace length.

<roffset> - repeat offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines the beginning of the next field of trace elements to be compressed. This is relative to the beginning of the previous field. This parameter has a default value equal to the <length> variable. Note that this parameter is used for a completely different purpose when curve fitting (see CFIT above).

<rlimit> - repeat limit is an optional integer. It specifies the number of data items that you want returned. It will ignore any additional items beyond that number. You can use the Start offset and the Repeat limit to pick out exactly what part of the data you want to use. The default value is all the data.

Calculate Peaks of Trace Data (Remote Command Only)

Returns a list of all the peaks for the currently selected measurement and sub-opcode [n]. The peaks must meet the requirements of the peak threshold and excursion values.

n = any valid sub-opcode for the current measurement. See the MEASure:<measurement> command description of your specific measurement for information on the data that can be returned.

The command can only be used with specific sub-opcodes with measurement results that are trace data. Both real and complex traces can be searched, but complex traces are converted to magnitude in dBm. In many measurements the sub-opcode n=0, is the raw trace data which cannot be searched for peaks. And Sub-opcode n=1, is often calculated results values which also cannot be searched for peaks.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. If the format is set to INT,32, it returns REAL,32 data.

The command has four types of parameters:

- Threshold (in dBm)
- Excursion (in dB)
- Sorting order (amplitude, frequency, time)
- Optional in some measurements: Display line use (all, > display line, < display line)

Remote Command	<p>For Swept SA measurement:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME[,ALL GTDLine LTDLine]]</pre> <p>For most other measurements:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME]</pre>
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Example	<p>Example for Swept SA measurement in Spectrum Analyzer Mode:</p> <p>CALC:DATA4:PEAK? -40, 10, FREQ, GTDL This will identify the peaks of trace 4 that are above -40 dBm, with excursions of at least 10 dB. The peaks are returned in order of increasing frequency, starting with the lowest frequency. Only the peaks that are above the display line are returned.</p> <p>Query Results 1:</p> <p>With FORMat:DATA REAL, 32 selected, it returns a list of floating-point numbers. The first value in the list is the number of peak points that are in the following list. A peak point consists of two values: a peak amplitude followed by its corresponding frequency (or time).</p> <p>If no peaks are found the peak list will consist of only the number of peaks, (0).</p>
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Notes	<p><n> - is the trace that will be used</p> <p><threshold> - is the level below which trace data peaks are ignored. Note that the threshold value is required and is always used as a peak criterion. To effectively disable the threshold criterion for this command, provide a substantially low threshold value such as -200 dBm. Also note that the threshold value used in this command is independent of and has no effect on the threshold value stored under the Peak Criteria menu.</p> <p><excursion> - is the minimum amplitude variation (rise and fall) required for a signal to be identified as peak. Note that the excursion value is required and is always used as a peak criterion. To effectively disable the excursion criterion for this command, provide the minimum value of 0.0 dB. Also note that the excursion value used in this command is independent of and has no effect on the</p>
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excursion value stored under the Peak Criteria menu.

Values must be provided for threshold and excursion. The sorting and display line parameters are optional (defaults are AMPLitude and ALL).

Note that there is always a Y-axis value for the display line, regardless of whether the display line state is on or off. It is the current Y-axis value of the display line which is used by this command to determine whether a peak should be reported

Sorting order:

AMPLitude - lists the peaks in order of descending amplitude, with the highest peak first (default if optional parameter not sent)

FREQUency - lists the peaks in order of occurrence, left to right across the x-axis.

TIME - lists the peaks in order of occurrence, left to right across the x-axis.

Peaks vs. Display Line:

ALL - lists all of the peaks found (default if optional parameter not sent).

GTDLine (greater than display line) - lists all of the peaks found above the display line.

LTDLine (less than display line) - lists all of the peaks found below the display line.

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Format Data: Numeric Data (Remote Command Only)

This command specifies the format of the trace data input and output. It specifies the formats used for trace data during data transfer across any remote port. It affects only the data format for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]?, :CALCulate:DATA[n]? and FETCh:SANalyzer [n]? commands and queries.

Remote Command :FORMat[:TRACe][:DATA] ASCii|INTeger,32|REAL,32 |REAL,64
:FORMat[:TRACe][:DATA]?

Notes The query response is:
ASCii: ASC,8
REAL,32: REAL,32
REAL,64: REAL,64
INTeger,32: INT,32

When the numeric data format is REAL or ASCii, data is output in the current Y Axis unit. When the data format is INTeger, data is output in units of m dBm (.001 dBm).

The INT,32 format returns binary 32-bit integer values in internal units (m dBm), in a definite length block.

Dependencies Sending a data format spec with an invalid number (for example, INT,48) generates no error. The analyzer simply uses the default (8 for ASCii, 32 for INTeger, 32 for REAL).

Sending data to the analyzer which does not conform to the current FORMat specified, results in an error. Sending ASCII data when a definite block is expected generates message -161 "Invalid Block Data" and sending a definite block when ASCII data is expected generates message -121 "Invalid Character in Number".

Preset ASCii

Backwards Compatibility Notes Note that the INT,32 format is only applicable to the command, TRACe:DATA. This preserves backwards compatibility for the Swept SA measurement. For all other commands/queries which honor FORMat:DATA, if INT,32 is sent the analyzer will behave as though it were set to REAL,32.

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The specs for each output type follow:

ASCIi - Amplitude values are in ASCII, in the current Y Axis Unit, one ASCII character per digit, values separated by commas, each value in the form:

SX.YYYYYEsZZ

Where:

S = sign (+ or -)

X = one digit to left of decimal point

Y = 5 digits to right of decimal point

E = E, exponent header

s = sign of exponent (+ or -)

ZZ = two digit exponent

REAL,32 - Binary 32-bit real values in the current Y Axis Unit, in a definite length block.

REAL,64 - Binary 64-bit real values in the current Y Axis Unit, in a definite length block.

Format Data: Byte Order (Remote Command Only)

This command selects the binary data byte order for data transfer and other queries. It controls whether binary data is transferred in normal or swapped mode. This command affects only the byte order for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]? , :CALCulate:DATA[n]? and FETCh:SANalyzer[n]? commands and queries.

By definition any command that says it uses FORMat:DATA uses any format supported by FORMat:DATA.

The NORMal order is a byte sequence that begins with the most significant byte (MSB) first, and ends with the least significant byte (LSB) last in the sequence: 1|2|3|4. SWAPped order is when the byte sequence begins with the LSB first, and ends with the MSB last in the sequence: 4|3|2|1.

Remote Command	:FORMat:BORDER NORMal SWAPped :FORMat:BORDER?
Preset	NORMal
Initial S/W Revision	Prior to A.02.00

Meas Setup

Displays the setup menu for the currently selected measurement. Many of the lower-level menu keys operate the same in all measurements. Unique functions are described below.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Avg/Hold Num

Specifies the number of data acquisition that will be averaged. After the specified number of average counts, the averaging mode (terminal control) setting determines the averaging action.

- On - Sets measurement averaging on.
- Off - Sets measurement averaging off.

Key Path	Meas Setup
Mode	SA, GSM, TD-SCDMA
Remote Command	[:SENSe]:TXPower:AVERage:COUNT <integer> [:SENSe]:TXPower:AVERage:COUNT? [:SENSe]:TXPower:AVERage[:STATe] OFF ON 0 1 [:SENSe]:TXPower:AVERage[:STATe]?
Example	TXP:AVER:COUN 100 TXP:AVER:COUN? TXP:AVER:0 TXP:AVER?
Notes	You must be in the Spectrum Analyzer mode or GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Preset	50 ON
State Saved	Saved in instrument state.
Min	1
Max	10000
Backwards Compatibility SCPI	[:SENSe]:BPOWer:AVERage:COUNT
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Avg Mode

Selects the type of termination control used for the averaging function. This determines the averaging action after the specified number of data acquisitions (average count) is reached.

Key	SCPI	Mode
Exponential	EXponential	After the average count is reached, each successive data acquisition is exponentially weighted and combined with the existing average.
Repeat	REPeat	After reaching the average count, the averaging is reset and a new average is started.

Key Path	Meas Setup
Mode	SA, GSM, TD-SCDMA
Remote Command	[:SENSe] :TXPower:AVERage:TCONtrol EXPonential REPeat [:SENSe] :TXPower:AVERage:TCONtrol?
Example	TXP:AVER:TCON REP TXP:AVER:TCON?
Notes	You must be in the Spectrum Analyzer mode or GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	EXponential
State Saved	Saved in instrument state.
Range	Exp Repeat
Backwards Compatibility SCPI	[:SENSe] :BPOWer:AVERage:TCONtrol
Initial S/W Revision	Prior to A.02.00

Avg Type

Specifies the type of trace and result averaging to use.

Key	SCPI	Type
Pwr Avg (RMS)	RMS	True power averaging that is equivalent to taking the RMS value of the voltage. It is the most accurate type of averaging.
Log-Pwr Avg (Video)	LOG	Simulates the traditional spectrum analyzer type of averaging by averaging the log of the power.
None	MAXimum	The maximum values are retained during the averaging cycle.
None	MINimum	The minimum values are retained during the averaging cycle.

SA, GSM Mode

Key Path	Meas Setup
Mode	SA, GSM
Remote Command	[:SENSe] :TXPower :AVERage :TYPE LOG MAXimum MINimum RMS [:SENSe] :TXPower :AVERage :TYPE?
Example	TXP:AVER:TYPE LOG TXP:AVER:TYPE?
Notes	Maximum Minimum are selected only via SCPI. You must be in the Spectrum Analyzer or GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	Selecting MAXimum MINimum force to visible Max Hold Trace or and Min Hold Trace . Measure Trace stays in RMS or Video average state.
Preset	RMS
State Saved	Saved in instrument state.
Range	Pwr Avg (RMS) Log-Pwr Avg(Video) Maximum Minimum
Backwards Compatibility SCPI	[:SENSe] :BPOwer :AVERage :TYPE
Initial S/W Revision	Prior to A.02.00

Key Path	Meas Setup
Mode	TD-SCDMA
Remote Command	[:SENSe] :TXPower :AVERage :TYPE LOG RMS [:SENSe] :TXPower :AVERage :TYPE?
Example	TXP:AVER:TYPE LOG TXP:AVER:TYPE?
Notes	You must be in the TD-SCDMA mode. Use INSTRument:SElect to set the mode.
Preset	RMS
State Saved	Saved in instrument state.
Range	Pwr Avg (RMS) Log-Pwr Avg(Video)
Initial S/W Revision	Prior to A.02.00

Threshold Lvl

When Meas Method is set to Above Threshold Lvl, the mean carrier power is calculated based on the trace above the threshold level. The threshold level is displayed in dB (relative to the measured carrier) or dBm (absolute).

A green line in the grid is displayed at the y-position associated with the current threshold level value. Its state is controlled by the On/Off state of the 'Display Line' under the View/Display menu.

Key Path	Meas Setup
Mode	SA, GSM, TD-SCDMA
Remote Command	[:SENSe]:TXPower:THReshold <real> [:SENSe]:TXPower:THReshold? [:SENSe]:TXPower:THReshold:TYPE ABSolute RELative [:SENSe]:TXPower:THReshold:TYPE?
Example	TXP:THR 0 TXP:THR?
Example	TXP:THR:TYPE ABS TXP:THR:TYPE?
Notes	You must be in the TD-SCDMA mode, Spectrum Analyzer mode or GSM mode to use this command. Use INSTRument:SElect to set the mode. BAF SCPI Command determines whether this command is setting an absolute or a relative power level. Suffix dB and dBm are allowed, but it does not change the state of Threshold Type. Suffix may not be send. If Threshold Type is set to Relative, the positive value of Threshold level was allowed to +100dB and it treated as a negative value. Now max value of Threshold level is changed to 0dB. To keep the backward compatibility, the input from SCPI command allows to +100dB.
Preset	GSM: -20.0 SA: -30.0 TD-SCDMA : -60.0 RELative
State Saved	Saved in instrument state.
Min	-100
Max	GSM, SA: Relative : 0dB Absolute : 100dBm TD-SCDMA: Relative : 0dB Absolute : 60dBm
Backwards Compatibility SCPI	[:SENSe]:BPOWer:THReshold
Initial S/W Revision	Prior to A.02.00

Meas Method

When the selected mode is SA or GSM, there are two options for this parameter: .

- **Above Threshold Level** measurement algorithm is used to capture a time record, and average only those points in the time record that exceed the user-specified threshold level. No attempt is made to

position the burst, or to calculate/display burst widths. This can be used to measure continuous signals, or bursted signals where the Measured Burst Width algorithm is too restrictive.

- **Measured Burst Width** measurement algorithm uses the threshold level to calculate the burst center, and average those points that lie within a user-specified burst width that is centered upon the burst. The burst width parameter is described in more detail below.

When the selected mode is TD-SCDMA, there is a third option:

- **Single Time Slot** measurement algorithm is to capture a single time slot record, and calculate the start and stop position of the time slot in terms of the trigger position theoretically. No attempt is made to position the burst, or to calculate/display burst widths. The burst width drawn in the screen is considered to be the theoretical width of the slot. This method is recommended to measure the mean transmit power in a single slot when trigger source is External Front/Rear while the Measured Burst Width algorithm is too restrictive.

SA, GSM mode

Key Path	Meas Setup
Mode	SA, GSM
Remote Command	[:SENSe] :TXPower:METhod THReshold BWIDth [:SENSe] :TXPower:METhod?
Example	TXP:METH BWID TXP:METH?
Preset	THReshold
State Saved	Saved in instrument state.
Range	Above Threshold Lvl Measured Burst Width
Backwards Compatibility SCPI	[:SENSe] :BPOWer:METhod
Initial S/W Revision	Prior to A.02.00

Key Path	Meas Setup
Mode	TD-SCDMA
Remote Command	[:SENSe] :TXPower:METhod THReshold BWIDth SINGle [:SENSe] :TXPower:METhod?
Example	TXP:METH BWID TXP:METH?
Preset	SINGle
State Saved	Saved in instrument state.
Range	Threshold Lvl Measured Burst Width Single TimeSlot
Initial S/W Revision	Prior to A.02.00

Burst Width

When Burst Width Mode is set to manual, the user may enter a fixed-time value in seconds, or alternatively specify the burst width as a percentage of the last measured burst width (result in bottom-left corner of second window).

Key Path	Meas Setup
Mode	SA, GSM, TD-SCDMA
Remote Command	<pre>[:SENSe]:TXPower:BURSt:WIDTh <time> [:SENSe]:TXPower:BURSt:WIDTh? [:SENSe]:TXPower:BURSt:AUTO ON OFF 1 0 [:SENSe]:TXPower:BURSt:AUTO?</pre>
Example	<pre>TXP:BURS:WIDT 10 TXP:BURS:WIDT? TXP:BURS:AUTO 1 TXP:BURS:AUTO?</pre>
Example	<pre>TXP:BURS:AUTO 0 TXP:BURS:AUTO? TXP:BURS:AUTO 1 TXP:BURS:AUTO?</pre>
Notes	You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies	Burst Width will be grayed out if " Meas Method " on page 2316 is set to 'Above Threshold Lvl'.
Couplings	<p>SA, GSM</p> <p>Max value depends on Sweep Time, Res BW and RBW filter type.</p> <p>TD-SCDMA:</p> <p>If the measure method is not "Measured Burst Width", this key will be grayed out.</p> <p>The default value is depending on the Burst type:</p> <p>If Burst Type = Traffic, Burst Width = 662.5us</p> <p>If Burst Type = Downlink Pilot, Burst Width = 50us</p> <p>If Burst Type = Uplink Pilot, Burst Width = 100us</p>
Preset	<p>SA, GSM: 255.6 us</p> <p>TD-SCDMA: 662.5us</p> <p>ON</p>
State Saved	Saved in instrument state.
Min	100.0 ns
Max	50 s
Initial S/W Revision	Prior to A.02.00

IF Gain

The IF Gain key can be used to set the IF Gain function to Auto, or to On (the extra 10 dB) or Off. These settings affect sensitivity and IF overloads.

If the selected mode is TD-SCDMA, this function is not available and the front-panel key displays a blank menu key when pressed.

Key Path	Meas Setup
Mode	SA
Dependencies	The IF Gain keys (FFT IF Gain and Swept IF Gain) have no effect when the U7227A USB Preamplifier is connected. This is not annotated or reflected on any softkey; there are no keys grayed out nor any SCPI locked out. The analyzer simply behaves as though both FFT IF Gain and Swept IF Gain are set to Low regardless of the setting on the keys.
Initial S/W Revision	Prior to A.02.00

IF Gain Auto

Activates the auto rules for IF Gain.

Key Path	Meas Setup, IF Gain
Mode	SA, GSM
Remote Command	[:SENSe] :TXPower :IF:GAIN:AUTO [:STATe] OFF ON 0 1 [:SENSe] :TXPower :IF:GAIN:AUTO [:STATe] ?
Example	TXP:IF:GAIN:AUTO ON TXP:IF:GAIN:AUTO?
Notes	You must be in the Spectrum Analyzer mode, GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Dependencies	IF Gain is not available when IQ Input is selected (the menu key is blank).
Couplings	When either the auto attenuation works (for example, with electrical attenuator), or the optimize mechanical attenuator range is requested, the IF Gain setting is changed according to the following rule. 'auto' sets IF Gain High under any of the following conditions: the input attenuator is set to 0 dB, the preamp is turned on, or the Max Mixer Level is -20 dBm or lower. For other settings, auto sets IF Gain to Low.
Preset	ON
State Saved	Saved in instrument state.
Range	Auto Man
Initial S/W Revision	Prior to A.02.00

IF Gain State

Selects the range of the IF Gain.

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Key Path	Meas Setup, IF Gain
Mode	SA, GSM
Remote Command	<code>[:SENSe] :TXPower:IF:GAIN [:STATe] ON OFF 1 0</code> <code>[:SENSe] :TXPower:IF:GAIN [:STATe] ?</code>
Example	TXP:IF:GAIN ON TXP:IF:GAIN?
Notes	You must be in the Spectrum Analyzer mode, GSM mode to use this command. Use INSTRUMENT:SElect to set the mode. where ON = high gain OFF = low gain
Dependencies	IF Gain is not available when IQ Input is selected (the menu key is blank)
Couplings	Sending this command forces IF Gain Auto to OFF (Man).
Preset	OFF
State Saved	Saved in instrument state.
Range	Low Gain (Best for Large Signals) High Gain (Best Noise Level)
Initial S/W Revision	Prior to A.02.00

Meas Preset

Returns parameters for this measurement to those set by the factory.

Key Path	Meas Setup
Mode	SA, GSM, TD-SCDMA
Remote Command	<code>:CONFigure:TXPower</code>
Example	CONF:TXP
Notes	You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Initial S/W Revision	Prior to A.02.00

Mode

See "Mode" on page 274

Mode Preset

Returns the active mode to a known state.

Mode Preset does the following for the currently active mode:

- Aborts the currently running measurement.
- Brings up the default menu for the mode, with no active function.
- Sets measurement Global settings to their preset values for the active mode only.
- Activates the default measurement.
- Brings up the default menu for the mode.
- Clears the input and output buffers.
- Sets Status Byte to 0.

Mode Preset does not:

- Cause a mode switch
- Affect mode persistent settings
- Affect system settings

See "[How-To Preset](#)" on page 2323 for more information.

Key Path	Front-panel key
Remote Command	:SYSTem:PRESet
Example	:SYST:PRES
Notes	<p>*RST is preferred over :SYST:PRES for remote operation. *RST does a Mode Preset, as done by the :SYST:PRES command, and it sets the measurement mode to Single measurement rather than Continuous for optimal remote control throughput.</p> <p>Clears all pending OPC bits. The Status Byte is set to 0.</p>
Couplings	A Mode Preset aborts the currently running measurement, activates the default measurement, and gets the mode to a consistent state with all of the default couplings set.
Backwards Compatibility Notes	<p>In the X-Series, the legacy "Factory Preset" has been replaced with Mode Preset, which only presets the currently active mode, not the entire instrument. In the X-Series, the way to preset the entire instrument is by using System, Restore System Defaults All, which behaves essentially the same way as restore System Defaults does on ESA and PSA.</p> <p>There is also no "Preset Type" as there is on the PSA. There is a green Mode Preset front-panel key that does a Mode Preset and a white-with-green-letters User Preset front-panel key that does a User Preset. The old PRESet:TYPE command is ignored (without generating an error), and SYST:PRES without a parameter does a Mode Preset, which should cover most backward code compatibility issues.</p> <p>The settings and correction data under the Input/Output front-panel key (examples: Input Z Corr, Ext Amp Gain, etc.) are no longer part of any Mode, so they will not be preset by a Mode Preset. They are preset using Restore Input/Output Defaults, Restore System Defaults All. Note that because User Preset does a Recall State, and all of these settings are saved in State, they ARE recalled when using</p>

	User Preset.
Initial S/W Revision	Prior to A.02.00

How-To Preset

The table below shows all possible presets, their corresponding SCPI commands and front-panel access (key paths). Instrument settings depend on the current measurement context. Some settings are local to the current measurement, some are global (common) across all the measurements in the current mode, and some are global to all the available modes. In a similar way, restoring the settings to their preset state can be done within the different contexts.

Auto Couple - is a measurement local key. It sets all Auto/Man parameter couplings in the measurement to Auto. Any Auto/Man selection that is local to other measurements in the mode will not be affected.

Meas Preset - is a measurement local key. Meas Preset resets all the variables local to the current measurement except the persistent ones.

Mode Preset - resets all the current mode's measurement local and measurement global variables except the persistent ones.

Restore Mode Defaults - resets ALL the Mode variables (and all the Meas global and Meas local variables), including the persistent ones.

Type Of Preset	SCPI Command	Front Panel Access
Auto Couple	:COUPlE ALL	Auto Couple front-panel key
Meas Preset	:CONFIgure:<Measurement>	Meas Setup Menu
Mode Preset	:SYSTem:PRESet	Mode Preset (green key)
Restore Mode Defaults	:INSTrument:DEFault	Mode Setup Menu
Restore All Mode Defaults	:SYSTem:DEFault MODEs	System Menu; Restore System Default Menu
*RST	*RST	not possible (Mode Preset with Single)
Restore Input/Output Defaults	:SYSTem:DEFault INPut	System Menu; Restore System Default Menu
Restore Power On Defaults	:SYSTem:DEFault PON	System Menu; Restore System Default Menu
Restore Alignment Defaults	:SYSTem:DEFault ALIGn	System Menu; Restore System Default Menu
Restore Miscellaneous Defaults	:SYSTem:DEFault MISC	System Menu; Restore System Default Menu
Restore All System Defaults	:SYSTem:DEFault [ALL] :SYSTem:PRESet:PERSistent	System Menu; Restore System Default Menu
User Preset	:SYSTem:PRESet:USER	User Preset Menu
User Preset All Modes	:SYSTem:PRESet:USER:ALL	User Preset Menu

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Mode Preset

Power On Mode Preset	:SYSTem:PON:TYPE MODE	System Menu
Power On User Preset	:SYSTem:PON:TYPE USER	System Menu
Power On Last State	:SYSTem:PON:TYPE LAST	System Menu

Mode Setup

See ["Mode Setup" on page 294](#)

Peak Search

Places the selected marker on the trace point with the maximum y-axis value for that marker's trace. Pressing Peak Search with the selected marker off causes the selected marker to be set to Normal, then a peak search is immediately performed.

Key Path	Front-panel key
Mode	GSM, SA, TD-SCDMA
Remote Command	:CALCulate:TXPower:MARKer[1] 2 ... 12:MAXimum
Example	CALC:TXP:MARK2:MAX
Initial S/W Revision	Prior to A.02.00

Print

See "Print" on page 325

Quick Save

The Quick Save front-panel key repeats the most recent save that was performed from the Save menu, with the following exceptions:

- Register saves are not remembered as Saves for the purpose of the Quick Save function
- If the current measurement does not support the last non-register save that was performed, an informational message is generated, “File type not supported for this measurement”

Quick Save repeats the last type of qualified save (that is, a save qualified by the above criteria) in the last save directory by creating a unique filename using the Auto File Naming algorithm described below.

If Quick Save is pressed after startup and before any qualified Save has been performed, the Quick Save function performs a Screen Image save using the current settings for Screen Image saves (current theme, current directory), which then becomes the “last save” for the purpose of subsequent Quick Saves.

The Auto File Naming feature automatically generates a file name for use when saving a file. The filename consists of a prefix and suffix separated by a dot, as is standard for the Windows® file system. A default prefix exists for each of the available file types:

Type	Default Prefix	Menu
State	State_	(Save/Recall)
Trace + State	State_	(Save/Recall)
Screen	Screen_	(Save/Recall)
Amplitude Corrections	Ampcor_	(Import/Export)
Traces	Trace_	(Import/Export)
Limit Lines	LLine_	(Import/Export)
Measurement Result	MeasR_	(Import/Export)
Capture Buffer	CapBuf_	(Import/Export)

A four digit number is appended to the prefix to create a unique file name. The numbering sequence starts at 0000 within each Mode for each file type and updates incrementally to 9999, then wraps to 0000 again. It remembers where it was through a Mode Preset and when leaving and returning to the Mode. It is reset by Restore Misc Defaults and Restore System Defaults and subsequent running of the instrument application. So, for example, the first auto file name generated for State files is State_0000.state. The next is State_0001, and so forth.

One of the key features of Auto File Name is that we guarantee that the Auto File Name will never conflict with an existing file. The algorithm looks for the next available number. If it gets to 9999, then it looks for holes. If it find no holes, that is no more numbers are available, it gives an error.

For example, if when we get to State_0010.state there is already a State_0010.state file in the current directory, it advances the counter to State_0011.state to ensure that no conflict will exist (and then it verifies that State_0011.state also does not exist in the current directory and advances again if it does, and so forth).

If you enter a file name for a given file type, then the prefix becomes the filename you entered instead of the default prefix, followed by an underscore. The last four letters (the suffix) are the 4-digit number.

For example, if you save a measurement results file as “fred.csv”, then the next auto file name chosen for a measurement results save will be fred_0000.csv.

NOTE Although 0000 is used in the example above, the number that is used is actually the current number in the Meas Results sequence, that is, the number that would have been used if you had not entered your own file name.

NOTE If the filename you entered ends with _dddd, where d=any number, making it look just like an auto file name, then the next auto file name picks up where you left off with the suffix being dddd + 1.

Key Path	Front-panel key
Notes	No remote command for this key specifically.
Initial S/W Revision	Prior to A.02.00

Recall

The Recall menu lets you choose what you want to recall, and where you want to recall it from. Among the types of files you can recall are **States and Traces**. In addition, an Import (Data) option lets you recall a number of data types stored in CSV files (as used by Excel and other spreadsheet programs).

The default paths for Recall are data type dependent and are the same as for the Save key.

Key Path	Front-panel key
Notes	<p>No remote command for this key specifically, but the :MMEM:LOAD command is available for specific file types. An example is :MMEM:LOAD:STATE <filename>.</p> <p>If you try to recall a State file for a mode that is not licensed or not available in the instrument, an error message will occur and the state will not change.</p>
Backwards Compatibility Notes	<p>In legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly (since User Preset is actually loading a state), it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, “state” always includes all of this data; so whenever state is loaded, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p>
Backwards Compatibility Notes	<p>Recall for the X-Series supports backward compatibility in the sense that you can recall a state file from any X-Series model number and any version of X-Series software. This is only possible if part of the recalling process goes through a limiting step after recalling the mode settings, at least for settings that may vary with version number, model number, option and license differences. If you try to recall a state file onto an instrument with less capability than what was available on the instrument during the save, the recall will ignore the state it doesn't support and it will limit the recalled setting to what it allows.</p> <p>Example: if the saved state includes preamp ON, but the recalling instrument does not have a preamp; the preamp is limited to OFF. Conversely, if you save a state without a preamp, the preamp is OFF in the state file. When this saved file is recalled on an instrument with a licensed preamp, the preamp is changed to OFF. Another example is if the saved state has center frequency set to 20 GHz, but the instrument recalling the saved state is a different model and only supports 13.5 GHz. In this case, the center frequency is limited along with any other frequency based settings. Since the center frequency can't be preserved in this case, the recall limiting tries to at least preserve span to keep the measurement setup as intact as possible.</p> <p>It may be appropriate to issue a warning if the state is limited on the recall; warnings do not go out to SCPI so this would only affect the manual user.</p> <p>Note that there is no state file compatibility outside of the X-Series. For example, you cannot recall a state file from ESA or PSA.</p>
Initial S/W Revision	Prior to A.02.00

State

The Recall State menu lets you choose a register or file from which to recall the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings that were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the

additional settings affected by Restore Mode Defaults; all of the Mode’s settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode’s state, because they are needed to restore the complete setup. Persistent System settings (for example, GPIB address) are not affected by either a Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

Since each state file is only for one Mode, the settings for other Modes are unaffected when it is loaded. Recall State will cause a mode switch if the state being recalled is not from the current active mode.

After the recall completes, the message "File <filename> recalled" or “Recalled State Register <register number>” is displayed.

For rapid recalls, the State menu lists 16 registers that you can choose from to recall. Pressing a Register key initiates the recall. You can also select a file from which to recall.

The default path for all State Files is:

My Documents\<<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

See "[More Information](#)" on page 2332.

Key Path	Recall
Mode	All
Remote Command	:MMEMory:LOAD:STATe <filename>
Example	:MMEM:LOAD:STAT "myState.state" This recalls the file myState.state on the default path
Example	MMEM:LOAD:STAT "MyStateFile.state" This loads the state file data (on the default file directory path) into the instrument state.
Notes	<p>When you pick a file to recall, the analyzer first verifies that the file is recallable in the current instrument by checking the software version and model number of the instrument. If everything matches, a full recall proceeds by aborting the currently running measurement, clearing any pending operations, and then loading the State from the saved state file. You can open state files from any mode, so recalling a State file switches to the mode that was active when the save occurred. After switching to the mode of the saved state file, mode settings and data (if any for the mode) are loaded with values from the saved file. The saved measurement of the mode becomes the newly active measurement and the data relevant to the measurement (if there is any) is recalled.</p> <p>If there is a mismatch between file version or model number or instrument version or model number, the recall function tries to recall as much as possible and returns a warning message. It may limit settings that differ based on model number, licensing or version number.</p> <p>After recalling the state, the Recall State function does the following:</p> <ul style="list-style-type: none"> • Makes the saved measurement for the mode the active measurement. • Clears the input and output buffers. • Status Byte is set to 0. • Executes a *CLS <p>If the file specified is empty an error is generated. If the specified file does not exist, another error is generated. If there is a mismatch between the file and the proper file type, an error is generated. If</p>

	there is a mismatch between file version or model number or instrument version or model number, a warning is displayed. Then it returns to the State menu and File Open dialog goes away. After the Recall, the analyzer exits the Recall menu and returns to the previous menu.
Backwards Compatibility SCPI	:MMEMory:LOAD:STATe 1,<filename> For backwards compatibility, the above syntax is supported. The "1" is simply ignored.
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More Information

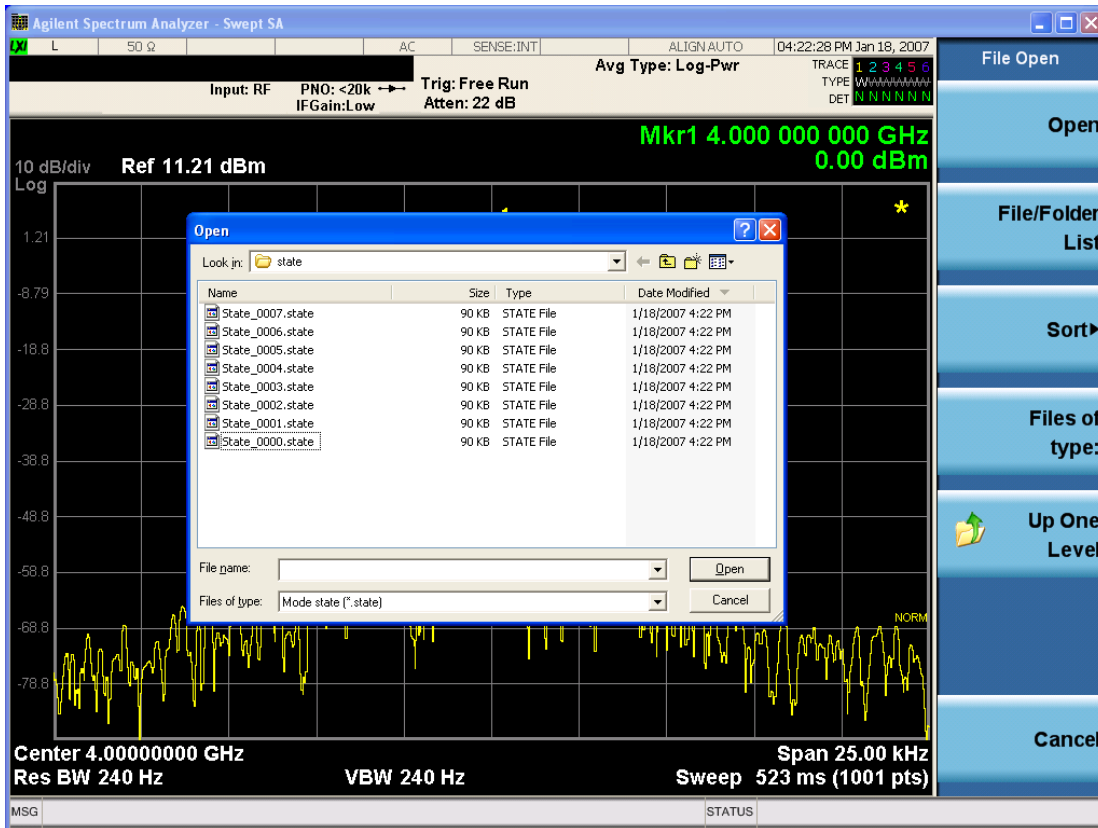
In measurements that support saving Traces, for example, Swept SA, the Trace data is saved along with the State in the State file. When recalling the State, the Trace data is recalled as well. Traces are recalled exactly as they were stored, including the writing mode and update and display modes. If a Trace was updating and visible when the State was saved, it will come back updating and visible, and its data will be rewritten right away. When you use State to save and recall traces, any trace whose data must be preserved should be placed in View or Blank mode before saving.

The following table describes the Trace Save and Recall possibilities:

You want to recall state and one trace's data, leaving other traces unaffected.	Save Trace+State from 1 trace. Make sure that no other traces are updating (they should all be in View or Blank mode) when the save is performed.	On Recall, specify the trace you want to load the one trace's data into. This trace will load in View. All other traces' data will be unaffected, although their trace mode will be as it was when the state save was performed.
You want to recall all traces	Save Trace+State from ALL traces.	On Recall, all traces will come back in View (or Blank if they were in Blank or Background when saved)
You want all traces to load exactly as they were when saved.	Save State	On recall, all traces' mode and data will be exactly as they were when saved. Any traces that were updating will have their data immediately overwritten.

From File...

When you press "From File", the analyzer brings up a Windows dialog and a menu entitled "File Open." This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



Listed below are the functions of the various fields in the dialog, and the corresponding softkeys:

Open

Performs the recall of the specified file. While the recall is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Look In.

Look In

The Look In field shows the path from which the file will be recalled and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Look In field** first uses the last path from the Save As dialog **Save In:** path for that same file type. There is no softkey for directly navigating to the Look In field, but you can use the left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

Sort

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Accesses a menu that enables you to sort the files within the File Open dialog. Only one sorting type can be selected at a time and the sorting happens immediately. The sorting types are By Date, By Name, By extension, and By Size.

Files of Type

This field shows the file suffix for the type of file you have selected to recall. For example, if you navigated here while recalling State, "Mode state (*.state)" is in the field. If you navigated here while recalling Trace, ""Mode state (*.trace)" is in the field. If you navigated here while importing a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown menu, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Open** request to be cancelled. The ESC key does the same thing.

Key Path	Recall, State
Notes	Brings up the Open dialog for recalling a State Save Type
Initial S/W Revision	Prior to A.02.00

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

For more information and the SCPI command, see Edit Register Names under the Save, State function.

Key Path	Recall, State
Mode	All
Dependencies	N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending the SCPI command generates an error, -221, "Settings conflict;Option not available"
Initial S/W Revision	A.11.00

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last

modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

Key Path	Recall, State
Example	*RCL 1
Range	1–16 from front panel, 1–128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State, Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	Prior to A.11.00

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

18 Burst Power (Transmit Power)
Recall

Key Path	Recall, State
Example	*RCL 1
Range	1-16 from front panel, 1-128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State,Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	Prior to A.11.00

Restart

The Restart function restarts the current sweep, or measurement, or set of averaged/held sweeps or measurements. If you are Paused, pressing Restart does a Resume.

The Restart function is accessed in several ways:

- Pressing the Restart key
- Sending the remote command INIT:IMMEDIATE
- Sending the remote command INIT:RESTART

See "[More Information](#)" on page 2337

Key Path	Front-panel key
Remote Command	:INITiate[:IMMEDIATE] :INITiate:RESTART
Example	:INIT:IMM :INIT:REST
Notes	:INITiate:RESTART and :INITiate:IMMEDIATE perform exactly the same function.
Couplings	Resets average/hold count k. For the first sweep overwrites all active (update=on) traces with new current data. For application modes, it resets other parameters as required by the measurement.
Status Bits/OPC dependencies	This is an Overlapped command. The STATUS:OPERation register bits 0 through 8 are cleared. The STATUS:QUESTIONable register bit 9 (INTEgrity sum) is cleared. The SWEEPING bit is set. The MEASURING bit is set.
Backwards Compatibility Notes	For Spectrum Analysis mode in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart trace averages (displayed average count reset to 1) for a trace in Clear Write, but did not restart Max Hold and Min Hold. In the X-Series, the Restart hardkey and the INITiate:RESTART command restart not only Trace Average, but MaxHold and MinHold traces as well. For wireless comms modes in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart every measurement, which includes all traces and numeric results. There is no change to this operation.
Initial S/W Revision	Prior to A.02.00

More Information

The **Restart** function first aborts the current sweep/measurement as quickly as possible. It then resets the sweep and trigger systems, sets up the measurement and initiates a new data measurement sequence with a new data acquisition (sweep) taken once the trigger condition is met.

If the analyzer is in the process of aligning when **Restart** is executed, the alignment finishes before the restart function is performed.

Even when set for Single operation, multiple sweeps may be taken when Restart is pressed (for example, when averaging/holding is on). Thus when we say that **Restart** "restarts a measurement," we may mean:

- It restarts the current sweep
- It restarts the current measurement
- It restarts the current set of sweeps if any trace is in Trace Average, Max Hold or Min Hold
- It restarts the current set of measurements if Averaging, or Max Hold, or Min Hold is on for the measurement
- depending on the current settings.

With **Average/Hold Number** (in **Meas Setup** menu) set to 1, or Averaging off, or no trace in Trace Average or Hold, a single sweep is equivalent to a single measurement. A single sweep is taken after the trigger condition is met; and the analyzer stops sweeping once that sweep has completed. However, with **Average/Hold Number** >1 and at least one trace set to **Trace Average, Max Hold, or Min Hold (SA Measurement)** or **Averaging on (most other measurements)**, multiple sweeps/data acquisitions are taken for a single measurement. The trigger condition must be met prior to each sweep. The sweep is stopped when the average count k equals the number N set for **Average/Hold Number**. A measurement average usually applies to all traces, marker results, and numeric results; but sometimes it only applies to the numeric results.

Once the full set of sweeps has been taken, the analyzer will go to idle state. To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command CALC:AVER:TCON UP.

Save

The Save menu lets you choose what you want to save and where you want to save it. Among the types of files you can save are **States**, **Traces**, and **Screen Images**. In addition, an Export (Data) option lets you save a number of data types as CSV files for easy import into Excel and other spreadsheet programs.

Key Path	Front-panel key
Mode	All
Notes	No remote command for this key specifically, but the :MMEM:STORe command is available for specific file types. An example is :MMEM:STOR:STATe <filename>.
Initial S/W Revision	Prior to A.02.00

State

The Save State menu lets you choose a register or file for saving the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings which were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, Verbose SCPI) are not affected by either Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

After the save completes, the message "File <filename> saved" or "State Register <register number> saved" is displayed.

For rapid saving, the State menu lists 16 registers to save to. Pressing a Register key initiates the save. You can also select a file to save to.

The default path for all State Files is:

My Documents\<<mode name>\state

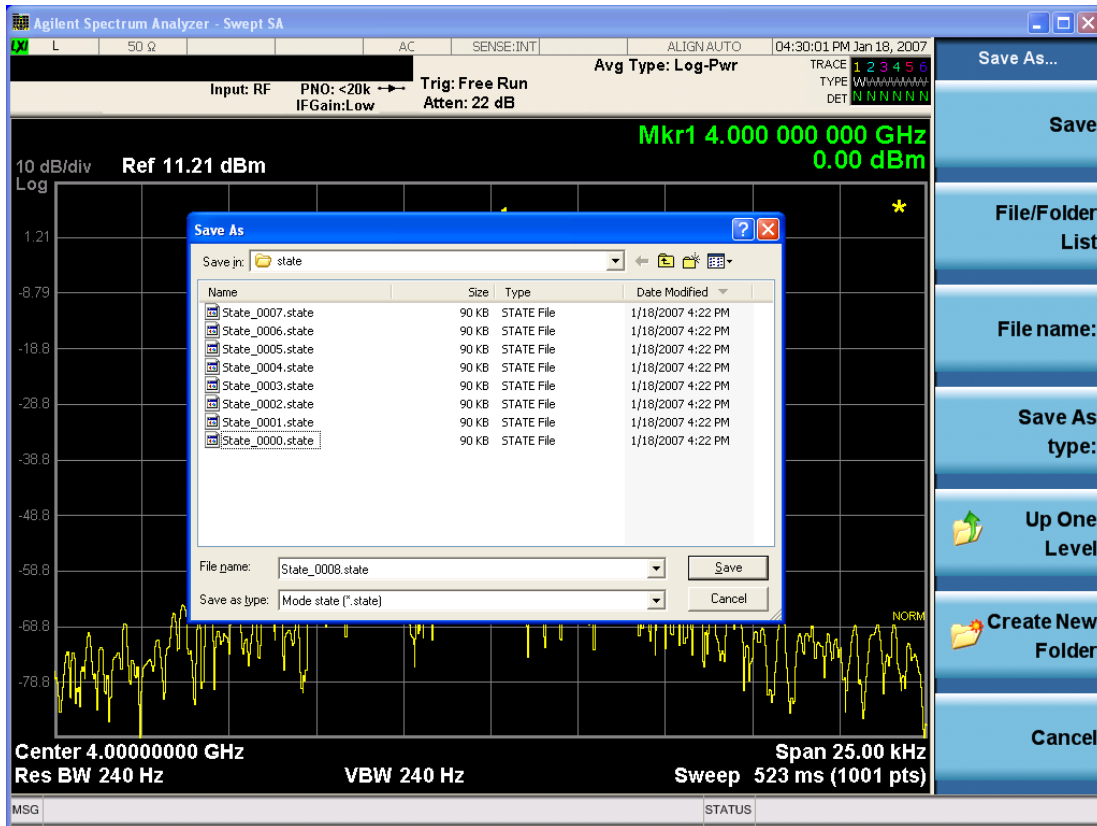
where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

Key Path	Save
Mode	All
Remote Command	:MMEMory:STORe:STATe <filename>
Example	MMEM:STOR:STATe "MyStateFile.state" This stores the current instrument state data in the file MyStateFile.state in the default directory.
Notes	Both single and double quotes are supported for any filename parameter over remote. After saving to a register, that register's menu key is updated with the date the time, unless a custom label has been entered for that key. After saving to a register, you remain in the Save State menu, so that you can see the Register key

	update. After saving to a file, the analyzer automatically returns to the previous menu and any Save As dialog goes away.
Backwards Compatibility SCPI	:MMEMory:STORe:STATe 1,<filename>
Initial S/W Revision	Prior to A.02.00

To File . . .

When you press “To File”, the analyzer brings up a Windows dialog and a menu entitled “Save As.” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



The Listed below are the functions of the various fields in the dialog, and the corresponding softkeys:

Save

Performs the save to the specified file of the selected type. If the file already exists, a dialog will appear that allows you to replace the existing file by selecting OK, or you can Cancel the request. If you select OK, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade.

While the save is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Save In.

Save In

The Save In field shows the path to which the file will be saved and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Save In field** defaults to the default path for this type of file and remembers the last path you used to save this type of file. There is no softkey for directly navigating to the Save In field but you can use left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

File Name

The File Name field is initially loaded with an automatically generated filename specific to the appropriate Save Type. The automatically generated filename is guaranteed not to conflict with any filename currently in the directory. You may replace or modify this filename using the File Name key. See the ["Quick Save " on page 2328](#) documentation for more on the automatic file naming algorithm.

When you press the File Name key the analyzer displays the Alpha Editor. Use the knob to choose the letter to add and the front-panel Enter key to add the letter to the file name. The BK character moves you back and the FW character moves you forward in the filename. The Select key on the front panel generates a space character. When you are done entering the filename press the Done softkey. This returns back to the **File Open** dialog and menu, but does not cause the save to occur.

Save As Type

This field shows the file suffix for the type of file you have selected to save. For example, if you navigated here while saving State, "Mode state (*.state)" is in the field. If you navigated here from saving Trace, ""Mode state (*.trace)" is in the field. If you navigated here while exporting a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Create New Folder

This key corresponds to the icon of a folder with the "*" that is in the tool bar of the dialog. When pressed, a new folder is created in the current directory with the name **New Folder** and you can enter a new folder name using the Alpha Editor.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Save As** request to be cancelled. The ESC key does the same thing.

Key Path	Save, State
Mode	All
Notes	Brings up Save As dialog for saving a State Save Type
Initial S/W Revision	Prior to A.02.00

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

See ["More Information" on page 2342](#)

Key Path	Save, State
Mode	All
Remote Command	:MMEMory:REGister:STATe:LABel <reg number>,"label" :MMEMory:REGister:STATe:LABel? <reg number>
Example	:MMEM:REG:STAT:LAB 1,"my label"
Notes	<reg number> is an integer from 1 to 16. If the SCPI specifies an invalid register number an error message is generated, -222,"Data out of range;Invalid register label number" "label" is a string from 0 to 30 characters in length. If a label exceeds 30 characters, an error message is generated, -150,"String data error;Label clipped to 30 characters" "label" of length 0 erases the custom label and restores the default (time and date) label. E.g.: :MMEM:REG:STAT:LAB 1,""
Dependencies	N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending this command generates an error, -221,"Settings conflict;Option not available"
Preset	The names are unaffected by Preset or power cycle but are set to the default label (time and date) on a "Restore System Defaults->Misc"
Initial S/W Revision	A.11.00

More Information

When you edit one of the register names, the time and date field will be replaced by the custom name.

If you delete all the characters in the custom name, it restores the default (time and date).

The register names are stored within the state files, but they are not part of the instrument state; that is, once you have edited a register name, loading a new state will not change that register name. Another consequence of this is that the names will be persistent through a power cycle. Also, if a named state file is transferred to another analyzer, it will bring its custom name along with it.

If you try to edit the name of an empty register, the analyzer will first save the state to have a file to put the name in. If you load a named state file into an analyzer with older firmware it will ignore the metadata.

The *SAV and *RCL commands will not be affected by the custom register names, nor will the MMEM commands.

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

Key Path	Save, State
Mode	All
Example	*SAV 1
Range	1–16 from front panel, 1–128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.11.00

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

Key Path	Save, State
Mode	All
Example	*SAV 1
Range	1–16 from front panel, 1–128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.11.00

Data (Export)

Exporting a data file stores data from the current measurement to mass storage files. The Export Menu only contains data types that are supported by the current measurement.

Since the commonly exported data files are in .csv format, the data can be edited by you prior to importing. This allows you to export a data file, manipulate the data in Excel (the most common PC Application for manipulating .csv files) and then import it.

Selecting an Export Data menu key will not actually cause the exporting to occur, since the analyzer still needs to know where you wish to save the data. Pressing the Save As key in this menu brings up the Save As dialog and Save As menu that allows you to specify the destination file and directory. Once a filename has been selected or entered in the Open menu, the export will occur as soon as the Save key is pressed.

Key Path	Save
Mode	All
Notes	The menu is built from whatever data types are available for the mode. So the key locations in the sub menu will vary. No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:STORe commands.
Dependencies	If a file type is not used by a certain measurement, that type is grayed out for that measurement. The key for a file type will not show at all if there are no measurements in the Mode that support it.
Preset	Is not affected by a Preset or shutdown, but is reset during Restore Mode Defaults
Readback	The data type that is currently selected
Initial S/W Revision	Prior to A.02.00

Measurement Results

Pressing this key selects Meas Results as the data type to be exported.

The Meas Results file contains information which describes the current state of the analyzer. It is detailed in ["Meas Results File Contents" on page 2345](#) below.

Key Path	Save, Data
Remote Command	:MMEMory:STORe:RESults <string>
Example	:MMEM:STOR:RES "MeasR_0000.csv"
Notes	<p>If the save is initiated via SCPI and the file already exists, the file will be overwritten.</p> <p>The SCPI command exports Burst Power (Transmit Power) measurement results to the file specified as the parameter in the current path. The default path is My Documents\<current mode>\data\txp\results.<="" p=""> <p>Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade.</p> <p>The SCPI parameter is a quoted string that specifies the filename. Both single and double quotes are supported for any filename parameter over SCPI.</p> </current></p>
Dependencies	The current active measurement must be the Burst Power (Transmit Power) measurement to use this command.
Status Bits/OPC dependencies	Sequential – waits for the previous measurement to complete
Initial S/W Revision	Prior to A.02.00

Meas Results File Contents

A Meas Results File contains measurement results with the following information.

- File ID string, which is "MeasResult"
- Measurement ID following Mode ID, which is "SA:TXP" for example.
- Firmware rev and model number
- Option string
- Center Frequency
- TXP_InfoBw
- TXP_Used_CaptureTime

The file contains these data followed by MeasResult1 to MeasResult4 that flag the start of the measurement results. Each line of Measurement Results consists of four comma separated values from MeasResult1 value to MeasResult4 value. MeasResult1 contains the same results as MEAS/READ/FETCH:TXPower|BPOWER1; MeasResult2, MEAS/READ/FETCH:TXPower|BPOWER2;... (continues in the same manner)

Exported file is .csv file. The Meas Results file, when imported into Excel, will show the following data:

MeasResult			
SA:TXP			
A.10.53	N9030A		
526 ALV ATP B1X B1Y B25	1		
B40 BBA CR3 CRP DCF DDA			
DP2 DRD EA3 EDP EMC EP1			
ERC ESC ESP EXM FSA LFE			
LNP MAT MPB NFE NUL P26			
PFR PNC RTL RTS S40 SB1			
SEC SM1 TVT YAS YAV			
Center Frequency	1.33E+10		
TXP_InfoBw	3000000		
TXP_Used_CaptureTime	0.00064		
MeasResult1	MeasResult2	MeasResult3	MeasResult4
0			
-999			

Save As . . .

When you press “Save As”, the analyzer brings up a Windows dialog and a menu entitled “**Save As.**” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[To File . . .](#)" on page 2340 in Save, State for a full description of this dialog and menu.

The default path for saving files is:

For all of the Trace Data Files:

My Documents\`<mode name>`\data\traces

For all of the Limit Data Files:

My Documents\`<mode name>`\data\limits

For all of the Measurement Results Data Files:

My Documents\`<mode name>`\data\`<measurement name>`\results

For all of the Capture Buffer Data Files:

My Documents\`<mode name>`\data\captureBuffer

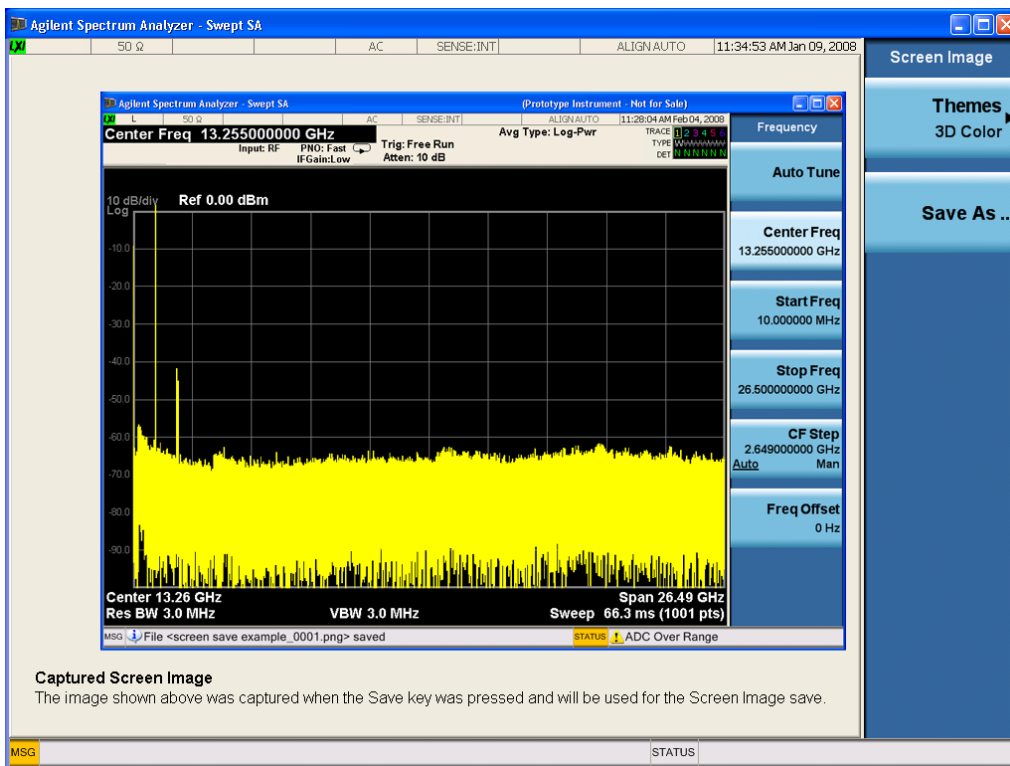
Key Path	Save, Data
Mode	All
Notes	The key location is mode-dependent and will vary. Brings up the Save As dialog for saving a <code><mode specific></code> Save Type. The save is performed immediately and does not wait until the measurement is complete.
Initial S/W Revision	Prior to A.02.00

Screen Image

Pressing Screen Image accesses a menu of functions that enable you to specify a format and location for the saved screen image. It brings up a menu that allows you to specify the color scheme of the Screen Image (Themes) or navigate to the Save As dialog to perform the actual save.

Screen Image files contain an exact representation of the analyzer display. They cannot be loaded back onto the analyzer, but they can be loaded into your PC for use in many popular applications.

The image to be saved is actually captured when the Save front panel key is pressed, and kept in temporary storage to be used if you ask for a Screen Image save. When the Screen Image key is pressed, a "thumbnail" of the captured image is displayed, as shown below:



When you continue on into the Save As menu and complete the Screen Image save, the image depicted in the thumbnail is the one that gets saved, showing the menus that were on the screen before going into the Save menus. The save is performed immediately and does not wait until the measurement is complete.

After you have completed the save, the Quick Save front-panel key lets you quickly repeat the last save performed, using an auto-named file, with the current screen data.

NOTE

For versions previous to A.01.55, if you initiate a screen image save by navigating through the Save menus, the image that is saved will contain the Save menu softkeys, not the menus and the active function that were on the screen when you first pressed the Save front panel key.

Key Path	Save
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Mode	All
Remote Command	:MMEMory:STORe:SCReen <filename>
Example	:MMEM:STOR:SCR "myScreen.png" This stores the current screen image in the file MyScreenFile.png in the default directory.
Initial S/W Revision	Prior to A.02.00

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

Key Path	Save, Screen Image
Remote Command	:MMEMory:STORe:SCReen:THEMe TDColor TDMonochrome FCOLOR FMONochrome :MMEMory:STORe:SCReen:THEMe?
Example	:MMEM:STOR:SCR:THEM TDM
Preset	3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes.
Readback	3D Color 3D Mono Flat Color Flat Mono
Backwards Compatibility Notes	In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical.
Initial S/W Revision	Prior to A.02.00

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDC
Readback	3D Color
Initial S/W Revision	Prior to A.02.00

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDM
Readback	3D Mono
Initial S/W Revision	Prior to A.02.00

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FCOL
Readback	Flat Color
Initial S/W Revision	Prior to A.02.00

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FMON
Readback	Flat Mono
Initial S/W Revision	Prior to A.02.00

Save As...

When you press "Save As", the analyzer brings up a Windows dialog and a menu entitled "**Save As.**" This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[To File . . .](#)" on page 2340 in Save, State for a full description of this dialog and menu.

The default path for Screen Images is

My Documents\`<mode name>`\screen.

where `<mode name>` is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

Key Path	Save, Screen Image
Notes	Brings up Save As dialog for saving a Screen Image Save Type
Initial S/W Revision	Prior to A.02.00

Mass Storage Catalog (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:CATalog? [<directory_name>]
Notes	<p>The string must be a valid logical path.</p> <p>Queries disk usage information (drive capacity, free space available) and obtains a list of files and directories in a specified directory in the following format: <numeric_value>,<numeric_value>,{<file_entry>}</p> <p>It returns two numeric parameters and as many strings as there are files and directories. The first parameter indicates the total amount of storage currently used in bytes. The second parameter indicates the total amount of storage available, also in bytes. The <file_entry> is a string. Each <file_entry> indicates the name, type, and size of one file in the directory list: <file_name>,<file_type>,<file_size></p> <p>As the windows file system has an extension that indicates file type, <file_type> is always empty. <file_size> provides the size of the file in bytes. For directories, <file_entry> is surrounded by square brackets and both <file_type> and <file_size> are empty</p>
Initial S/W Revision	Prior to A.02.00

Mass Storage Change Directory (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:CDIRectory [<directory_name>] :MMEMory:CDIRectory?
Notes	<p>The string must be a valid logical path.</p> <p>Changes the default directory for a mass memory file system. The <directory_name> parameter is a string. If no parameter is specified, the directory is set to the *RST value.</p> <p>At *RST, this value is set to the default user data storage area, that is defined as System.Environment.SpecialFolder.Personal.</p> <p>Query returns full path of the default directory.</p>
Initial S/W Revision	Prior to A.02.00

Mass Storage Copy (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:COPY <string>,<string>[,<string>,<string>]
Notes	<p>The string must be a valid logical path.</p> <p>Copies an existing file to a new file or an existing directory to a new directory.</p> <p>Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.</p> <p>The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the</p>

source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.

This command will generate an "access denied" error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.

Mass Storage Device Copy (Remote Command Only)

This command transfers data to/from a file and a peripheral device.

Key path	SCPI Only
Remote Command	:MMEMory:COpy:DEvice <source_string>,<dest_string>
Notes	<p>The strings must be a valid logical path or a valid device keyword. If the dest_string is a device keyword, the data is copied from the source file to the device. If the source_string is a device keyword, the data is copied to the source file from the device.</p> <p>Valid device keywords are:</p> <p>SNS (smart noise source)</p> <p>An error is generated if the file or device is not found.</p>

Mass Storage Delete (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:DElete <file_name>[,<directory_name>]
Notes	<p>The string must be a valid logical path.</p> <p>Removes a file from the specified directory. The <file_name> parameter specifies the file name to be removed. This command will generate an "access denied" error if the file is in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.</p>
Initial S/W Revision	Prior to A.02.00

Mass Storage Data (Remote Command Only)

Creates a file containing the specified data OR queries the data from an existing file.

Key path	SCPI Only
Remote Command	<p>:MMEMory:DATA <file_name>,<data></p> <p>:MMEMory:DATA? <file_name></p>
Notes	<p>The string must be a valid logical path.</p> <p>The command form is MMEMory:DATA <file_name>,<data>. It loads <data> into the file <file_name>. <data> is in 488.2 block format. <file_name> is string data.</p> <p>The query form is MMEMory:DATA? <file_name> with the response being the associated <data> in block format.</p>
Initial S/W Revision	Prior to A.02.00

Mass Storage Make Directory (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:MDIRectory <directory_name>
Notes	<p>The string must be a valid logical path.</p> <p>Creates a new directory. The <directory_name> parameter specifies the name to be created.</p> <p>This command will generate an “access denied” error if the new directory would be in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.</p>
Initial S/W Revision	Prior to A.02.00

Mass Storage Move (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:MOVE <string>,<string>[,<string>,<string>]
Notes	<p>The string must be a valid logical path.</p> <p>Moves an existing file to a new file or an existing directory to a new directory.</p> <p>Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.</p> <p>The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.</p> <p>This command will generate an “access denied” error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.</p>
Initial S/W Revision	Prior to A.02.00

Mass Storage Remove Directory (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:RDIRectory <directory_name>
Notes	<p>The string must be a valid logical path.</p> <p>Removes a directory. The <directory_name> parameter specifies the directory name to be removed. All files and directories under the specified directory shall also be removed.</p> <p>This command will generate an “access denied” error if the folder is a restricted folder (e.g., C:\Windows) or is in a restricted folder and the current user does not have Power User or Administrator privileges.</p>
Initial S/W Revision	Prior to A.02.00

Single (Single Measurement/Sweep)

Sets the analyzer for Single measurement operation. The single/continuous state is Meas Global, so the setting will affect all the measurements. If you are Paused, pressing Single does a Resume.

See ["More Information" on page 2353](#)

Key Path	Front-panel key
Example	:INIT:CONT OFF
Notes	See Cont key description.
Backwards Compatibility Notes	<p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey and the INITiate:IMM switched from continuous measurement to single measurement and restarted sweeps and averages (displayed average count reset to 1), but did not restart Max Hold and Min Hold. In the X-Series, the Single hardkey and the INITiate:IMM command initiate a sweep/ measurement/ average sequence/hold sequence including MaxHold and MinHold.</p> <p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey restarted the sweep regardless of whether or not you were in an active sweep or sweep sequence. In the X-Series, Restart does this but Single only restarts the sweep or sweep sequence if you are in the idle state.</p> <p>INIT[:IMM] in ESA & PSA Spectrum Analysis Mode does an implied ABORt. In some other PSA Modes, INIT[:IMM] is ignored if not in the idle state. . The X-Series follows the ESA/PSA SA Mode model, which may cause some Modes to have compatibility problems.</p>
Initial S/W Revision	Prior to A.02.00

More Information

See ["Restart" on page 2337](#) for details on the INIT:IMMediate (Restart) function.

If you are already in single sweep, the INIT:CONT OFF command has no effect.

If you are already in Single Sweep, then pressing the Single key in the middle of a sweep does not restart the sweep or sequence. Similarly, pressing the Single key does not restart the sweep or sequence if the sweep is not in the idle state (for example, if you are taking a very slow sweep, or the analyzer is waiting for a trigger). Instead, it results in a message. "Already in Single, press Restart to initiate a new sweep or sequence". Even though pressing the Single key in the middle of a sweep does not restart the sweep, sending INIT:IMMediate does reset it.

To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command CALC:AVER:TCON UP.

Source

There is no Source control functionality for this measurement. When this key is pressed, the screen either displays a blank menu, or the previously-selected menu remains unchanged.

Key Path	Front-panel key
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SPAN X Scale

Accesses a menu of functions that enable you set the horizontal scale parameters.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Ref Value

Enables you to set the display X reference value.

Key Path	SPAN X Scale
Mode	SA, GSM, TD-SCDMA
Remote Command	:DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RLEVel <time> :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RLEVel?
Example	DISP:TXP:VIEW:WIND:TRAC:X:RLEV 1s DISP:TXP:VIEW:WIND:TRAC:X:RLEV?
Notes	You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	If the X Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, X Auto Scaling automatically changes to Off.
Preset	0 s
State Saved	Saved in instrument state.
Min	-10.0 s
Max	10.00 s
Initial S/W Revision	Prior to A.02.00

Scale/Div

Enables you to set the display X scale/division value.

Key Path	SPAN X Scale
Mode	SA, GSM, TD-SCDMA
Remote Command	:DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:PDIVision <time> :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:PDIVision?
Example	DISP:TXP:VIEW:WIND:TRAC:X:PDIV 1ms DISP:TXP:VIEW:WIND:TRAC:X:PDIV?
Notes	You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	If the X Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, X Auto Scaling automatically changes to Off.

Preset	64.0 us
State Saved	Saved in instrument state.
Min	1.00 ns
Max	1.00 s
Initial S/W Revision	Prior to A.02.00

Ref Position

Enables you to set the display X reference position to Left, Center or Right.

Key Path	SPAN X Scale
Mode	SA, GSM, TD-SCDMA
Remote Command	:DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RPOSition LEFT CENTER RIGHT :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RPOSition?
Example	DISP:TXP:VIEW:WIND:TRAC:X:RPOS LEFT DISP:TXP:VIEW:WIND:TRAC:X:RPOS?
Notes	You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	LEFT
State Saved	Saved in instrument state.
Range	Left Ctr Right
Initial S/W Revision	Prior to A.02.00

Auto Scaling

Enables you to toggle the X auto scaling function between On and Off.

Key Path	SPAN X Scale
Mode	SA, GSM, TD-SCDMA
Remote Command	:DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:COUPle 0 1 OFF ON :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:COUPle?
Example	DISP:TXP:VIEW:WIND:TRAC:X:COUP OFF DISP:TXP:VIEW:WIND:TRAC:X:COUP?
Notes	You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	Upon pressing the Restart front-panel key, the scale coupling function automatically determines the scale per division and reference values based on the measurement results if this parameter is set to On. When you set a value to either X Rel Value or X Scale/Div manually, X Auto Scaling

	automatically changes to Off.
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

Sweep/Control

Accesses a menu of functions that enable you to set up and control the sweep for the current measurement. For details about this key, see "[Sweep/Control](#)" on page 2214.

Key Path	Front-panel key
Mode	SA, EDGE GSM, TDSCDMA
Initial S/W Revision	Prior to A.02.00

Sweep Time (for GSM mode)

Sets the number of slots which are used in each data acquisition. Each slot is approximately to 600 s.

Key Path	Sweep/Control
Mode	GSM
Remote Command	<code>[:SENSe] :TXPower :SWEep :TIME <integer></code> <code>[:SENSe] :TXPower :SWEep :TIME?</code>
Example	<code>TXP:SWE:TIME 4</code> <code>TXP:SWE:TIME?</code>
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	50
Initial S/W Revision	Prior to A.02.00

Pause/Resume

Pauses a measurement after the current data acquisition is complete.

When Paused, the label on the key changes to Resume. Pressing Resume un-pauses the measurement. When you are Paused, pressing Restart, Single or Cont does a Resume.

Key Path	Sweep/Control
Remote Command	<code>:INITiate:PAUSE</code>
Dependencies	Grayed out in Measurements that do not support Pausing. Blanked in Modes that do not support Pausing.
Initial S/W Revision	Prior to A.02.00

Key Path	Sweep/Control
Remote Command	:INITiate:RESume
Dependencies	Grayed out in Measurements that do not support Pausing. Blanked in Modes that do not support Pausing.
Initial S/W Revision	Prior to A.02.00

Abort (Remote Command Only)

This command is used to stop the current measurement. It aborts the current measurement as quickly as possible, resets the sweep and trigger systems, and puts the measurement into an "idle" state. If the analyzer is in the process of aligning when ABORT is sent, the alignment finishes before the abort function is performed. So ABORT does not abort an alignment.

If the analyzer is set for Continuous measurement, it sets up the measurement and initiates a new data measurement sequence with a new data acquisition (sweep) taken once the trigger condition is met.

If the analyzer is set for Single measurement, it remains in the "idle" state until an :INIT:IMM command is received.

Remote Command	:ABORt
Example	:ABOR
Notes	If :INITiate:CONTinuous is ON, then a new continuous measurement will start immediately; with sweep (data acquisition) occurring once the trigger condition has been met. If :INITiate:CONTinuous is OFF, then :INITiate:IMMEDIATE is used to start a single measurement; with sweep (data acquisition) occurring once the trigger condition has been met.
Dependencies	For continuous measurement, ABORt is equivalent to the Restart key. Not all measurements support the abort command.
Status Bits/OPC dependencies	The STATus:OPERation register bits 0 through 8 are cleared. The STATus:QUESTionable register bit 9 (INTegrity sum) is cleared. Since all the bits that feed into OPC are cleared by the ABORt, the ABORt will cause the *OPC query to return true.
Initial S/W Revision	Prior to A.02.00

18 Burst Power (Transmit Power)
System

System

See "[System](#)" on page 326

Trace/Detector

Accesses a menu of functions that enable you to control the detectors for the current measurement.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Max Hold Trace

This key enables you to select visible/invisible Max Hold Trace.

Key Path	Trace/Detector
Mode	SA, GSM, TD-SCDMA
Remote Command	:DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:MAXHold[:STATe] ON OFF 1 0 :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:MAXHold[:STATe]?
Example	:DISP:TXP:VIEW:WIND:TRAC:MAXH ON :DISP:TXP:VIEW:WIND:TRAC:MAXH?
Notes	You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	Selecting [:SENSe]:TXPower:AVERage:TYPE MAXimum forces this parameter to ON.
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

Min Hold Trace

This key enables you to select visible/invisible Min Hold Trace.

Key Path	Trace/Detector
Mode	SA, GSM, TD-SCDMA
Remote Command	:DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:MINHold[:STATe] ON OFF 1 0 :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:MINHold[:STATe]?
Example	:DISP:TXP:VIEW:WIND:TRAC:MINH ON :DISP:TXP:VIEW:WIND:TRAC:MINH?
Notes	You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode.
Couplings	Selecting [:SENSe]:TXPower:AVERage:TYPE MINimum forces this parameter to ON.

18 Burst Power (Transmit Power)
Trace/Detector

Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00

Trigger

See ["Trigger" on page 408](#)

Free Run

See ["Free Run " on page 415](#)

Video

See ["Video \(IF Envelope\) " on page 416](#)

Trigger Level

See ["Trigger Level " on page 416](#)

Trig Slope

See ["Trig Slope " on page 417](#)

Trig Delay

See ["Trig Delay " on page 418](#)

Line

See ["Line " on page 1321](#)

Trig Slope

See ["Trig Slope " on page 1321](#)

Trig Delay

See ["Trig Delay " on page 420](#)

External 1

See ["External 1 " on page 1333](#)

Trigger Level

See ["Trigger Level " on page 1333](#)

Trig Slope

See ["Trig Slope " on page 1334](#)

Trig Delay

See ["Trig Delay " on page 423](#)

External 2

See ["External 2 " on page 1335](#)

18 Burst Power (Transmit Power)
Trigger

Trigger Level

See ["Trigger Level "](#) on page 1335

Trig Slope

See ["Trig Slope "](#) on page 1336

Trig Delay

See ["Trig Delay "](#) on page 425

RF Burst

See ["RF Burst "](#) on page 1336

Absolute Trigger

See ["Absolute Trigger Level"](#) on page 1337

Relative Trigger

See ["Relative Trigger Level"](#) on page 1326

Trig Slope

See ["Trigger Slope "](#) on page 1338

Trig Delay

See ["Trig Delay "](#) on page 429

Periodic Timer

See ["Periodic Timer \(Frame Trigger\) "](#) on page 1328

Period

See ["Period "](#) on page 1329

Offset

See ["Offset "](#) on page 1330

Offset Adjust (Remote Command Only)

See ["Offset Adjust \(Remote Command Only\)"](#) on page 1331

Reset Offset Display

See ["Reset Offset Display "](#) on page 1332

Sync Source

See ["Sync Source "](#) on page 1332

Off

See ["Off "](#) on page 1333

External 1

See ["External 1 "](#) on page 1333

Trigger Level

See ["Trigger Level "](#) on page 1333

Trig Slope

See ["Trig Slope "](#) on page 1334

External 2

See ["External 2 "](#) on page 1335

Trigger Level

See ["Trigger Level "](#) on page 1335

Trig Slope

See ["Trig Slope "](#) on page 1336

RF Burst

See ["RF Burst "](#) on page 1336

Absolute Trigger

See ["Absolute Trigger Level"](#) on page 1337

Trig Slope

See ["Trigger Slope "](#) on page 1338

Trig Delay

See ["Trig Delay"](#) on page 440

Baseband I/Q

See [___](#) on page X

I/Q Mag

See [___](#) on page X

Trigger Level

See [___](#) on page X

Trig Slope

See [___](#) on page X

18 Burst Power (Transmit Power)
Trigger

Trig Delay

See ___ on page X

I (Demodulated)

See ___ on page X

Trigger Level

See ___ on page X

Trig Slope

See ___ on page X

Trig Delay

See ___ on page X

Q (Demodulated)

See ___ on page X

Trigger Level

See ___ on page X

Trig Slope

See ___ on page X

Trig Delay

See ___ on page X

Input I

See ___ on page X

Trigger Level

See ___ on page X

Trig Slope

See ___ on page X

Trig Delay

See ___ on page X

Input Q

See ___ on page X

Trigger Level

See ___ on page X

Trig Slope

See ___ on page X

Trig Delay

See ___ on page X

Auxiliary Channel I/Q Mag

See ___ on page X

Trigger Level

See ___ on page X

Trig Slope

See ___ on page X

Trig Delay

See ___ on page X

Trigger Center Frequency

See ___ on page X

Trigger Bandwidth

See ___ on page X

Auto/Holdoff

See "Auto/Holdoff " on page 440

Auto Trig

See "Auto Trig " on page 441

Trig Holdoff

See "Trig Holdoff " on page 441

Holdoff Type

See "Holdoff Type" on page 442

User Preset

Accesses a menu that gives you the following three choices:

- User Preset – recalls a state previously saved using the Save User Preset function.
- User Preset All Modes – presets all of the modes in the analyzer
- Save User Preset– saves the current state for the current mode

Key Path	Front-panel key
Backwards Compatibility Notes	<p>User Preset is actually loading a state, and in legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, “state” always includes all of this data; so whenever state is loaded, or User Preset is executed, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p> <p>On ESA and PSA, User Preset affected the entire instrument’s state. In the X-Series, User Preset only recalls the state for the active mode. There is a User Preset file for each mode. User Preset can never cause a mode switch as it can in legacy analyzers. If you want to recall all modes to their user preset file state, you will need to do a User Preset after mode switching into each mode.</p> <p>User Preset recalls mode state which can now include data like traces; whereas on ESA and PSA, User Preset did not affect data.</p>
Initial S/W Revision	Prior to A.02.00

User Preset

User Preset sets the state of the currently active mode back to the state that was previously saved for this mode using the Save User Preset menu key or the SCPI command, SYST:PRES:USER:SAV. It not only recalls the Mode Preset settings, but it also recalls all of the mode persistent settings, and the Input/Output system setting that existed at the time Save User Preset was executed.

If a Save User Preset has not been done at any time, User Preset recalls the default user preset file for the currently active mode. The default user preset files are created if, at power-on, a mode detects there is no user preset file. There will never be a scenario when there is no user preset file to restore. For each mode, the default user preset state is the same state that would be saved if a Save User Preset is performed in each mode right after doing a Restore Mode Default and after a Restore Input/Output Defaults.

The User Preset function does the following:

- Aborts the currently running measurement.
- Sets the mode State to the values defined by Save User Preset.
- Makes the saved measurement for the currently running mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

Key Path	User Preset
Remote Command	:SYSTem:PRESet:USER
Example	:SYST:PRES:USER:SAVE:SYST:PRES:USER
Notes	:SYST:PRES:USER:SAVE is used to save the current state as the user preset state. Clears all pending OPC bits. The Status Byte is set to 0. Pressing the User Preset front-panel key while already in the User Preset menu will cause the User Preset to get executed
Couplings	A user preset will cause the currently running measurement to be aborted and cause the saved measurement to be active. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved.
Initial S/W Revision	Prior to A.02.00

User Preset All Modes

Recalls all of the User Preset files for each mode, switches to the power-on mode, and activates the saved measurement from the power-on mode User Preset file.

NOTE

When the instrument is secured, all of the user preset files are converted back to their default user preset files.

The User Preset function does the following:

- Aborts the currently running measurement.
- Switches the Mode to the power-on mode.
- Restores the User Preset files for each mode.
- Makes the saved measurement for the power-on mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

Key Path	User Preset
Remote Command	:SYSTem:PRESet:USER:ALL
Example	:SYST:PRES:USER:SAVE:SYST:PRES:USER:ALL
Notes	Clears all pending OPC bits. The Status Byte is set to 0. :SYST:PRES:USER:SAVE is used to save the current state as the user preset state.
Couplings	A user preset will cause the currently running measurement to be aborted, cause a mode switch to the power-on mode, and cause the saved measurement to be active in the power-on mode. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved.
Initial S/W Revision	Prior to A.02.00

Save User Preset

Saves the currently active mode and its State. You can recall this User Preset file by pressing the User Preset menu key or sending the SYST:PRES:USER remote command. This same state is also saved by the Save State function.

Key Path	User Preset
Remote Command	:SYSTem:PRESet:USER:SAVE
Example	:SYST:PRES:USER:SAVE
Notes	:SYST:PRES:SAVE creates the same file as if the user requested a *SAV or a MMEM:STOR:STAT, except User Preset Save does not allow the user to specify the filename or the location of the file.
Initial S/W Revision	Prior to A.02.00

View/Display

The View/Display key opens up the View menu for the current measurement. The views that are available are specific to the current measurement selected under the Meas key. Many of the lower-level menu keys are also the same across all measurements. Unique functions are described below.

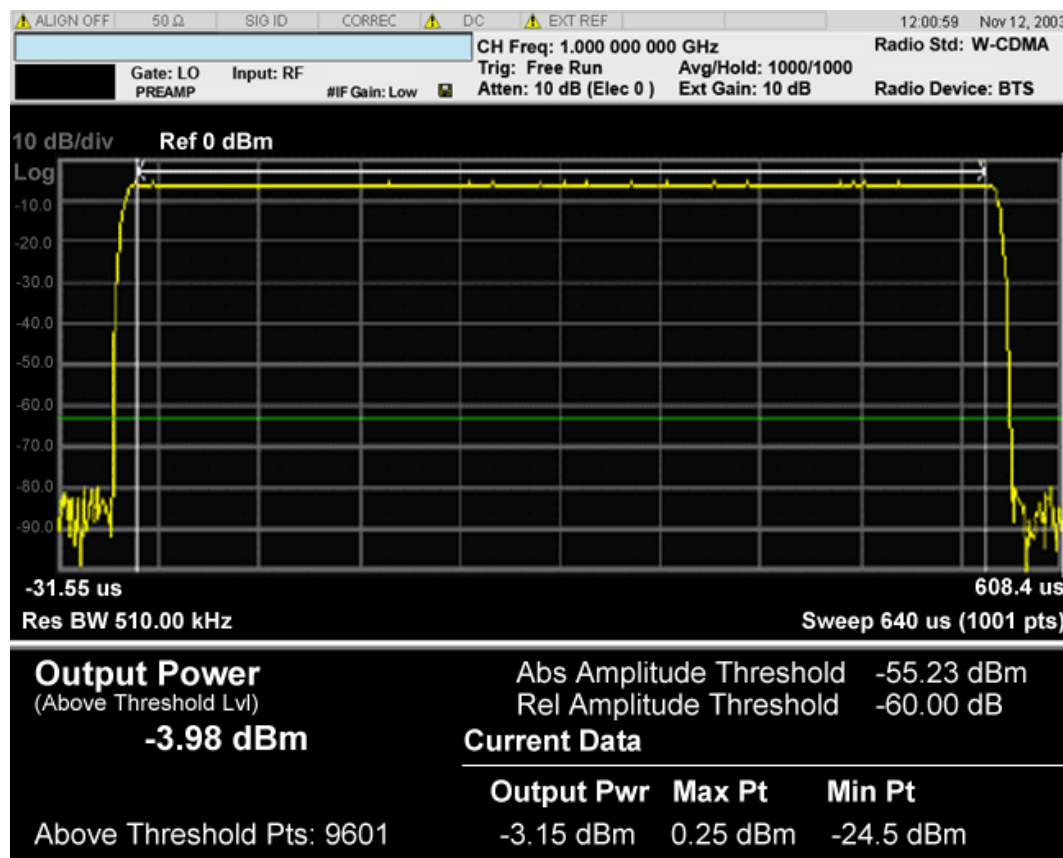
This measurement has one view, which consists of two windows.

"RF Envelope view for TX Power Measurement(Above Threshold)" on page 2371

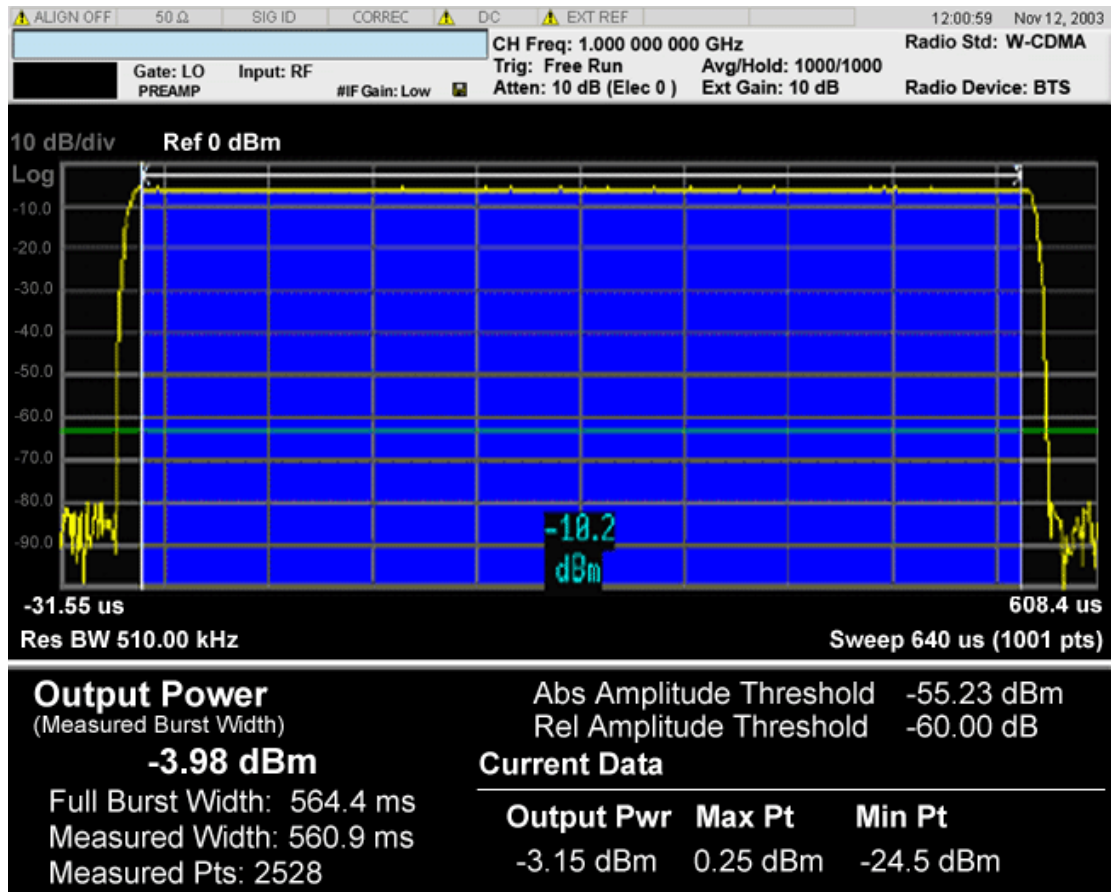
"RF Envelope view with Bar Graph for TX Power Measurement (Measured Burst Width)" on page 2372

"RF Envelope view with Bar Graph for TX Power Measurement (Single TimeSlot)" on page 2373

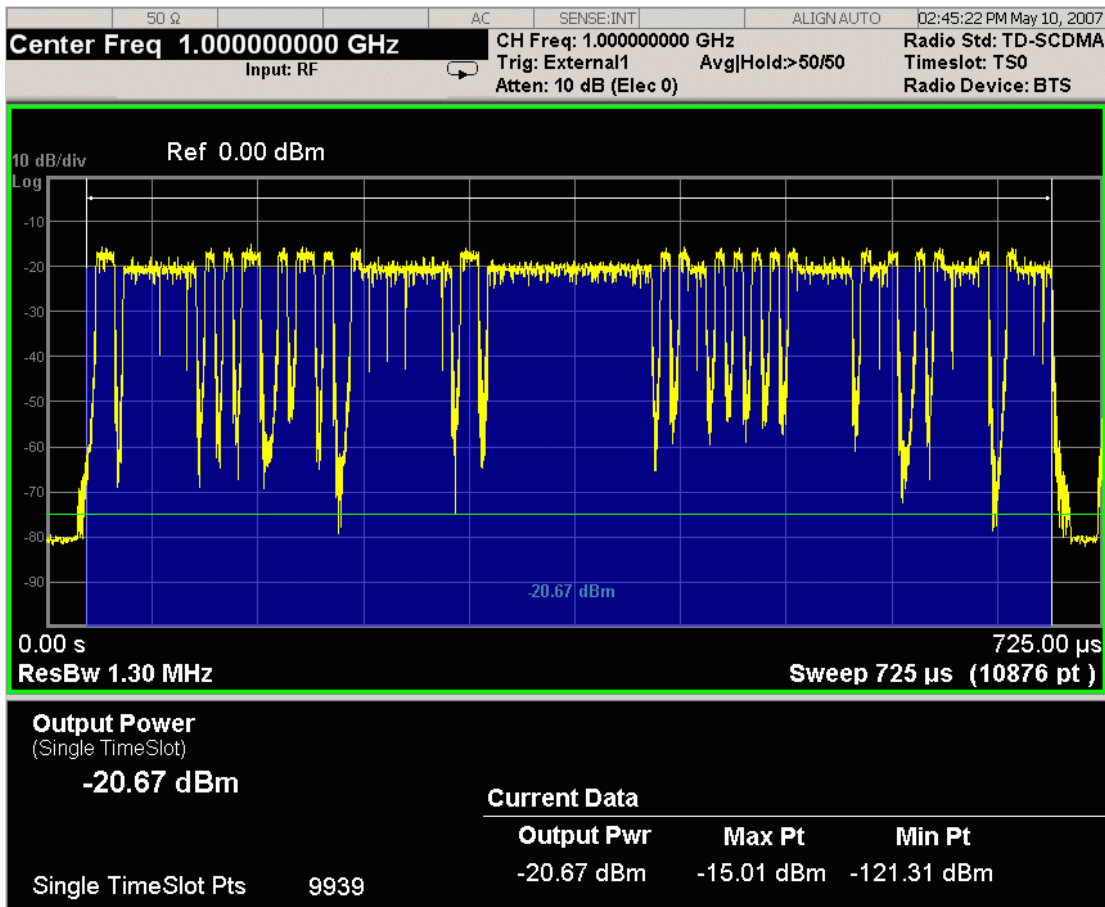
RF Envelope view for TX Power Measurement(Above Threshold)



RF Envelope view with Bar Graph for TX Power Measurement (Measured Burst Width)



RF Envelope view with Bar Graph for TX Power Measurement (Single TimeSlot)



The bar graph represents the measured portion of the trace. It is the blue bar in the second figure. Its state (On/Off) is controlled by the **Bar Graph** key under the View/Display key.

RF Envelope window

Marker Operation	Yes
Corresponding Trace	Corrected measured trace (n=2,3,4)

Metrics window

Name	Corresponding Results	Display Format
Mean Transmit Power	n=1 3rd	99.99 dBm
Above Threshold or Measured Burst Width	Power Value above the threshold or measured burst width for N averages, if averaging is on. An average consists of N acquisitions of data which represents the current trace. If averaging is off, the value of power averaged is the same as the Mean Transmit Power of Current Data.	
Full Burst Width	n=1 9th	999.9 us

Name	Corresponding Results	Display Format
	Burst width that is determined by the Threshold Lvl.	
Measured Width	n=1 10th Time length that is used to calculate Mean Transmit Power when Meas Method is Measured Burst Width. If Meas Method is set to Above Threshold, disappear from the window.	999.9 us
Above Thresh Pts	n=1 6th Number of points that were above the threshold level and were used for the power calculation when Meas Method is Above Threshold Level.	9999
Thresh Pts	N=1 6th Number of points that were used for the power calculation when Meas Method is Measured Burst Width.	9999
Abs Amplitude Threshold	n=1 5th Threshold value is the threshold (in dBm) above which the power is calculated.	99.99 dBm
Rel Amplitude Threshold	Threshold (in dB) relative to the peak carrier level above which the power is calculated	99.99 dB
Mean Transmit power (Current data)	n=1 2nd Power value above the threshold or measured burst width. If averaging is on, the power is for the latest acquisition.	99.99 dBm
Max Pt	n=1 7th Maximum peak level of the most recently acquired trace data.	99.99 dBm
Min Pt	n=1 8th Minimum peak level of the most recently acquired trace data.	99.99 dBm
Key Path	Front-panel key	
Mode	SA, EDGE/GSM, TDSCDMA	
Initial S/W Revision	Prior to A.02.00	

Display

The Display menu is common to most measurements, and is used for configuring items on the display. Some Display menu settings apply to all the measurements in a mode, and some only to the current measurement. Those under the System Display Settings key apply to all measurements in all modes.

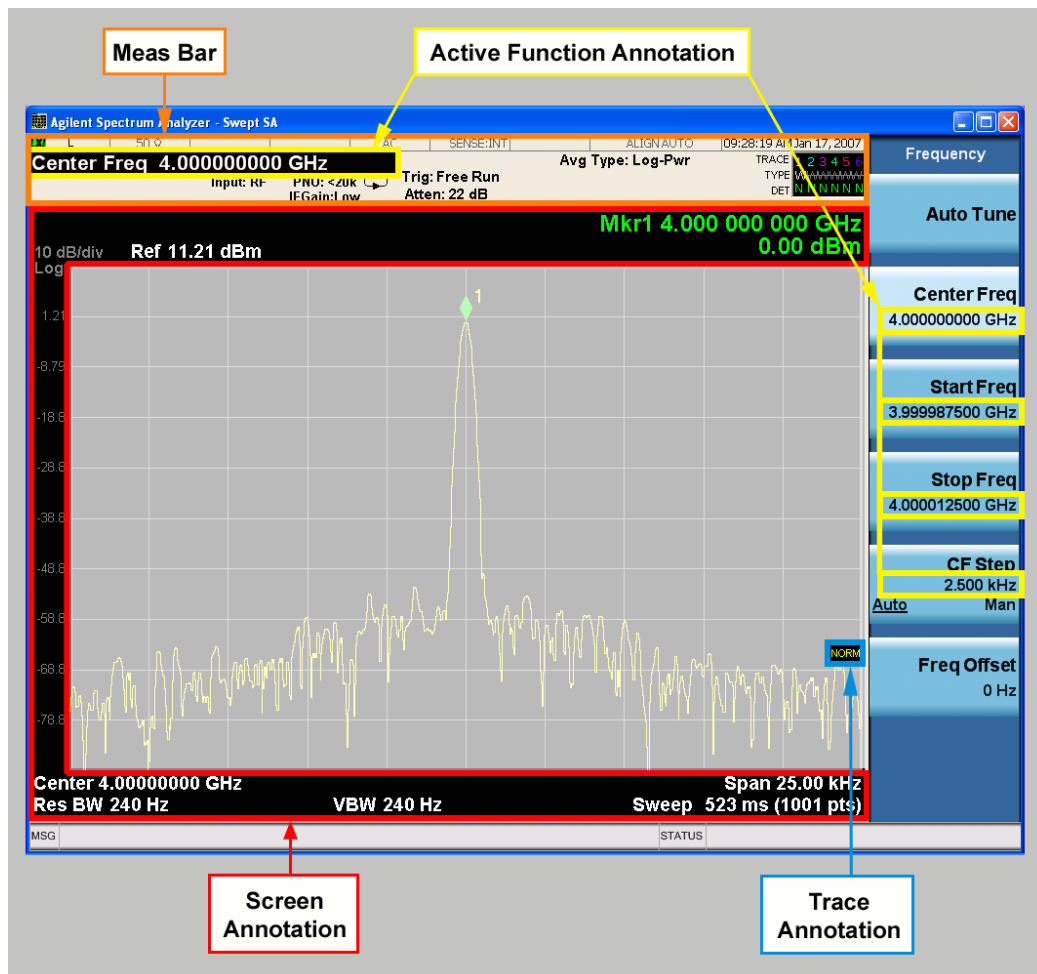
Key Path	Display
Key Path	View/Display
Initial S/W Revision	Prior to A.02.00

Annotation

Turns on and off various parts of the display annotation. The annotation is divided up into four categories:

1. Meas Bar: This is the measurement bar at the top of the screen. It does not include the settings panel or the Active Function. Turning off the Meas Bar turns off the settings panel and the Active Function. When the Meas Bar is off, the graticule area expands to fill the area formerly occupied by the Meas Bar.
2. Screen Annotation: this is the annotation and annunciation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) This does NOT include the marker number or the N dB result. When off, the graticule expands to fill the entire graticule area.
3. Trace annotation: these are the labels on the traces, showing their detector (or their math mode).
4. Active Function annotation: this is the active function display in the meas bar, and all of the active function values displayed on softkeys.

See the figure below. Each type of annotation can be turned on and off individually.



Key Path View/Display, Display

Initial S/W Revision Prior to A.02.00

Meas Bar On/Off

This function turns the Measurement Bar on and off, including the settings panel. When off, the graticule area expands to fill the area formerly occupied by the Measurement Bar.

Key Path	View/Display, Display, Annotation
Remote Command	:DISPlay:ANNOtation:MBAR[:STATe] OFF ON 0 1 :DISPlay:ANNOtation:MBAR[:STATe]?
Example	DISP:ANN:MBAR OFF
Dependencies	Grayed out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset	On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off.
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Screen

This controls the display of the annunciation and annotation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) and the y-axis annotation. This does NOT include marker annotation (or the N dB result). When off, the graticule expands to fill the entire graticule area, leaving only the 1.5% gap above the graticule as described in the Trace/Detector chapter.

Key Path	View/Display, Display, Annotation
Remote Command	:DISPlay:ANNOtation:SCREen[:STATe] OFF ON 0 1 :DISPlay:ANNOtation:SCREen[:STATe]?
Example	DISP:ANN:SCR OFF
Dependencies	Grayed-out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset	On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Active Function Values On/Off

Turns on and off the active function display in the Meas Bar, and all of the active function values displayed on the softkeys.

Note that all of the softkeys that have active functions have these numeric values blanked when this function is on. This is a security feature..



Key Path	View/Display, Display, Annotation
Remote Command	:DISPlay:ACTivefunc[:STATE] ON OFF 1 0 :DISPlay:ACTivefunc[:STATE]?
Example	DISP:ACT OFF
Dependencies	Grayed out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset	On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Title

Displays menu keys that enable you to change or clear a title on your display.

Key Path	View/Display, Display
Initial S/W Revision	Prior to A.02.00

Change Title

Writes a title into the "measurement name" field in the banner, for example, "Swept SA".

Press Change Title to enter a new title through the alpha editor. Press Enter or Return to complete the entry. Press ESC to cancel the entry and preserve your existing title.

The display title will replace the measurement name. It remains for this measurement until you press Change Title again, or you recall a state, or a Preset is performed. A title can also be cleared by pressing Title, Clear Title.

NOTE

Notice the inclusion of the <measurement> parameter in the command below. Because each measurement remembers the Display Title, the command must be qualified with the measurement name. For the Swept SA measurement this is not the case; no <measurement> parameter is used when changing the Display Title for the Swept SA measurement.

Key Path	View/Display, Display, Title
Mode	All
Remote Command	:DISPlay:<measurement>:ANNotation:TITLe:DATA <string> :DISPlay:<measurement>:ANNotation:TITLe:DATA?
Example	DISP:ANN:TITL:DATA "This Is My Title" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "This Is My Title" This example is for Measurements other than Swept SA. Both set the title to: This Is My Title
Notes	Pressing this key cancels any active function. When a title is edited the previous title remains intact (it is not cleared) and the cursor goes at the end so that characters can be added or BKSP can be used to go back over previous characters.
Preset	No title (measurement name instead)
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Clear Title

Clears a title from the front-panel display. Once cleared, the title cannot be retrieved. After the title is cleared, the current Measurement Name replaces it in the title bar.

Key Path	View/Display, Display, Title
Example	The following commands clear the title and restore the measurement's original title: DISP:ANN:TITL:DATA "" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "" This example is for ACP; in measurements other than Swept SA the measurement name is required.
Notes	Uses the :DISPlay:<measurement>:ANNotation:TITLe:DATA <string> command with an empty string (in the Swept SA, the <measurement> is omitted).
Preset	Performed on Preset.
Initial S/W Revision	Prior to A.02.00

Graticule

Pressing Graticule turns the display graticule On or Off. It also turns the graticule y-axis annotation on and off.

Key Path	View/Display, Display
Remote Command	:DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe] OFF ON 0 1 :DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe]?
Example	DISP:WIND:TRAC:GRAT:GRID OFF
Notes	The graticule is the set of horizontal and vertical lines that make up the grid/divisions for the x-axis and y-axis.
Preset	On
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00

System Display Settings

These settings are "Mode Global" – they affect all modes and measurements and are reset only by Restore Misc Defaults or Restore System Defaults under System.

Key Path	View/Display, Display
Initial S/W Revision	Prior to A.02.00

Annotation Local Settings

This is a Mode Global override of the meas local annotation settings. When it is All Off, it forces ScreenAnnotation, Meas Bar, Trace, and Active Function Values settings to be OFF for all measurements in all modes. This provides the security based "annotation off" function of previous analyzers; hence it uses the legacy SCPI command.

When it is All Off, the Screen, Meas Bar, Trace, and Active Function Values keys under the Display, Annotation menu are grayed out and forced to Off. When Local Settings is selected, you are able to set the local annotation settings on a measurement by measurement basis.

Key Path	View/Display, Display, System Display Settings
Remote Command	:DISPlay:WINDow[1]:ANNOtation[:ALL] OFF ON 0 1 :DISPlay:WINDow[1]:ANNOtation[:ALL]?
Example	:DISP:WIND:ANN OFF
Preset	On (Set by Restore Misc Defaults)
State Saved	Not saved in instrument state.
Backwards Compatibility Notes	The WINDow parameter and optional subopcode is included for backwards compatibility but ignored – all windows are equally affected.
Initial S/W Revision	Prior to A.02.00

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

Key Path	Save, Screen Image
Remote Command	:MMEMory:STORe:SCReen:THEMe TDColor TDMonochrome FCOLor FMONochrome :MMEMory:STORe:SCReen:THEMe?
Example	:MMEM:STOR:SCR:THEM TDM
Preset	3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes.
Readback	3D Color 3D Mono Flat Color Flat Mono
Backwards Compatibility Notes	In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical.
Initial S/W Revision	Prior to A.02.00

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDC
Readback	3D Color
Initial S/W Revision	Prior to A.02.00

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDM
Readback	3D Mono
Initial S/W Revision	Prior to A.02.00

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FCOL
Readback	Flat Color
Initial S/W Revision	Prior to A.02.00

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FMON
Readback	Flat Mono
Initial S/W Revision	Prior to A.02.00

Backlight

Accesses the display backlight on/off keys. This setting may interact with settings under the Windows "Power" menu.

When the backlight is off, pressing ESC, TAB, SPACE, ENTER, UP, DOWN, LEFT, RIGHT, DEL, BKSP, CTRL, or ALT turns the backlight on without affecting the application. Pressing any other key will turn backlight on and could potentially perform the action as well.

Key Path	View/Display, Display, System Display Settings
Remote Command	:DISPlay:BACKlight ON OFF :DISPlay:BACKlight?
Preset	ON (Set by Restore Misc Defaults)
Initial S/W Revision	Prior to A.02.00

Backlight Intensity

An active function used to set the backlight intensity. It goes from 0 to 100 where 100 is full on and 0 is off. This value is independent of the values set under the Backlight on/off key.

Key Path	View/Display, Display, System Display Settings
Remote Command	:DISPlay:BACKlight:INTensity <integer> :DISPlay:BACKlight:INTensity?
Example	DISP:BACK:INT 50

Preset	100 (Set by Restore Misc Defaults)
Min	0
Max	100
Initial S/W Revision	Prior to A.02.00

Bar Graph

Enables you to select visible/invisible Bar Graph.

Key Path	View/Display
Mode	SA, GSM, TD-SCDMA
Remote Command	:DISPlay:TXPower:BARGraph[:STATe] ON OFF 1 0 :DISPlay:TXPower:BARGraph[:STATe]?
Example	DISP:TXP:BARG ON DISP:TXP:BARG?
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	Prior to A.02.00