Keysight Signal Generators

This manual provides documentation for the following instruments:

MXG Signal Generator (Series B)

EXG Signal Generator

Notice: This document contains references to Agilent. Please note that Agilent's Test and Measurement business has become Keysight Technologies. For more information, go to www.keysight.com.

Security Features and Document of Volatility

KEYSIGHT TECHNOLOGIES

Notices

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Safety Notices

CAUTION

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a CAUTION notice until the indicated conditions are fully understood and met.

WARNING

A **WARNING** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

Warranty

This Keysight technologies instrument product is warranted against defects in material and workmanship for a period of three years from the date of shipment. During the warranty period, Keysight Technologies will, at its option, either repair or replace products that prove to be defective.

For warranty service or repair, this product must be returned to a service facility designated by Keysight Technologies. Buyer shall prepay shipping charges to Keysight Technologies, and Keysight Technologies shall pay shipping charges to return the product to Buyer. For products returned to Keysight Technologies from another country, Buyer shall pay all shipping charges, duties, and taxes.

Where to Find the Latest Information

Documentation is updated periodically. For the latest information about these products, including instrument software upgrades, application information, and product information, see the following URLs:

http://www.keysight.com/find/mxg

http://www.keysight.com/find/exg

To receive the latest updates by email, subscribe to Keysight Email Updates:

http://www.keysight.com/find/emailupdates

Information on preventing instrument damage can be found at:

http://www.keysight.com/find/PreventingInstrumentRepair

Is your product software up-to-date?

Periodically, Keysight releases software updates to fix known defects and incorporate product enhancements. To search for software updates for your product, go to the Keysight Technical Support website at:

http://www.keysight.com/find/techsupport

Table of Contents

1 Contacting Keysight Sales and Service Offices

Assistance with test and measurement needs, and information to help you find a local Keysight office, is available via the internet at, http://www.keysight.com/find/assist. If you do not have internet access, please contact your designated Keysight representative.

NOTE	In any correspondence or telephone conversation, refer to the instrument by its model number and full serial number. With this information, the Keysight representative can determine whether your unit is still within its warranty period.

2 Products Covered by this Document

Product Family Name	Product Name	Model Number	Firmware Revision
X-Series Signal Generators	MXG Microwave Analog Signal Generator	N5183B	All
	MXG RF Vector Signal Generator	N5182B	All
	MXG RF Analog Signal Generator	N5181B	All
	EXG Microwave Analog Signal Generator	N5173B	All
	EXG RF Vector Signal Generator	N5172B	All
	EXG RF Analog Signal Generator	N5171B	All

Document Purpose

This document describes instrument memory types and security features. It provides a statement regarding the volatility of all memory types, and specifies the steps required to declassify an instrument through memory clearing, sanitization, or removal.

For additional information, go to:

http://www.keysight.com/find/security

IMPORTANT

Be sure that all information stored by the user in the instrument that needs to be saved is properly backed up before attempting to clear any of the instrument memory. Keysight Technologies cannot be held responsible for any lost files or data resulting from the clearing of memory.

Be sure to read this document entirely before proceeding with any file deletion or memory clearing.

Signal Generator Products covered in Other Documents

Prior to August 2014, security details for these products were described in the document E4400-90621. Coverage has now been split across several documents. Table 2-1 below provides details of the documents covering other Signal Generator models..

Table 2-1 Other Security Features Documents

Product Names	Model Numbers	Security Features Document
MXG Signal Generator (Series A)	N5183A N5182A N5181A N5162A N5161A	Security Features and Document of Volatility (MXG Series A, ESG Signal Generators)
ESG Signal Generator	E4438C E4428C	
PSG Signal Generator	E8663D E8663B E8267D E8267C E8257N E8257D E8257C E8247C	Security Features and Document of Volatility (PSG Signal Generator)

3 Security Terms and Definitions

Term	Definition
Clearing	As defined in Section 8-301a of DoD 5220.22-M, "National Industrial Security Program Operating Manual (NISPOM)", clearing is the process of eradicating the data on media before reusing the media in an environment that provides an acceptable level of protection for the data that was on the media before clearing. Hence, clearing is typically used when the instrument is to remain in an environment with an acceptable level of protection.
Instrument Declassification	A term that refers to procedures that must be undertaken before an instrument can be removed from a secure environment, such as is the case when the instrument is returned for calibration. Declassification procedures include memory sanitization or memory removal, or both. Keysight declassification procedures are designed to meet the requirements specified in DoD 5220.22-M, "National Industrial Security Program Operating Manual (NISPOM)", Chapter 8.
Sanitization	As defined in Section 8-301b of DoD 5220.22-M, "National Industrial Security Program Operating Manual (NISPOM)", sanitization is the process of removing the data from media before reusing the media in an environment that does **not** provide an acceptable level of protection for the data that was in the media before sanitizing. Hence, instrument sanitization is typically required when an instrument is moved from a secure to a non-secure environment, such as when it is returned to the factory for calibration. Keysight memory sanitization procedures are designed for customers who need to meet the requirements specified by the US Defense Security Service (DSS). These requirements are specified in the "Clearing and Sanitization Matrix" in Section 5.2.5.5.5 of the ISFO Process Manual for the Certification and Accreditation of Classified Systems under the NISPOM.
Secure Erase	Secure Erase is a term that is used to refer to either the clearing or sanitization features of Keysight instruments.

4 Instrument Memory & Volatility

This chapter contains information on the memory components in your instrument.

The tables provide details of the size of each memory component, its type, how it is used, its location, volatility, and the sanitization procedure.

Table 4-1 Base Instrument (All models and options)

Memory Component, Type and Size	Writable During Normal Operation?	Data Retained When Powered Off?	Purpose/Contents	Data Input Method	Location in Instrument and Remarks	Sanitization Procedure
1. Main Memory (DRAM) 512 MByte	Yes	No	Firmware operating memory.	Operating system	CPU board, not battery backed. Volatile memory.	Turn off instrument power.
2. Main Memory (Flash) 512 MByte, partitioned as follows: 200 MByte: Boot (Main firmware image, Operating system) 50 MByte: System (Calibration/ Configuration) 1 MByte: Secure Storage 180 MByte: User	Yes	Yes	Factory calibration and configuration data User file system[a], which includes flatness calibration, instrument states, and sweep lists	Firmware upgrades and user-saved data[a]	CPU board	Boot Area: no user data User and Secure Storage Areas: see "Erase and Sanitize All" on page 17.
3. Front Panel Memory (Flash) 24 KByte	No	Yes	Front panel keyboard controller firmware	Operating system	Front Panel board	None required (no user data)
4. Front Panel Memory (SRAM) 2 KByte	Yes	No	Front panel operating memory	Front panel firmware	Front Panel board Volatile memory.	Turn off instrument power.

Table 4-1 Base Instrument (All models and options)

Memory Component, Type and Size	Writable During Normal Operation?	Data Retained When Powered Off?	Purpose/Contents	Data Input Method	Location in Instrument and Remarks	Sanitization Procedure
5. Front Panel Memory (EEPROM) 256 Byte	No	Yes	Unused	None	Front Panel board	None required
6. SD Card (Option 006) (Flash) 8 GByte	Yes	Yes	Optional storage of User data	User-saved data	Removable card may be retained in Secure Area	None required

a. Analog instruments only

Table 4-2 Vector Models with Baseband Generator

Memory Component, Type and Size	Writable During Normal Operation?	Data Retained When Powered Off?	Purpose/Contents	Data Input Method	Location in Instrument and Remarks	Sanitization Procedure
1. Waveform Memory (DRAM) 1 GByte	Yes	No	Waveforms (including header and marker data)	Normal user operation	Volatile memory. Not battery backed.	Turn off instrument power.
2. Extended Persistent Memory (Flash SSD) 40 GByte, partitioned as follows: 4 GByte: Apps 4 GByte: Base User Remainder: Optional Extended User	Yes	Yes	All user data	Normal user operation		See "Erase and Sanitize All" on page 17.
Calibration Data Memory (Flash) 128 KByte	No	Yes		Factory or service only		None required (no user data)

5 Memory Clearing, Sanitization and Removal Procedures

This chapter describes several security functions you can use to remove sensitive data stored in the instrument before moving it from a secure development environment. The functions described are:

CAUTION These functions do **not** erase or sanitize external media connected to the instrument's USB port.

Erase All

This function removes all user files, user flatness calibrations, user I/Q calibrations, and resets all table editors with original factory values, ensuring that user data and configurations are not accessible or viewable. The instrument appears as if it is in its original factory state, however, the memory is not sanitized. This action is relatively quick, typically taking less than one minute (the exact time depends on the number of files).

Key Sequence: **File** > **More** > **Security** > **Erase All** > **Confirm Erase**

Note that there is a similar but distinct function, as described below, that deletes all user files but does **not** reset the table editors:

Key Sequence: **File** > **Delete All Files**

Erase and Sanitize All

This function performs the same actions as **Erase All**, plus it clears and overwrites the various memory types, as described below.

Memory Type	Models	Description
CPU Flash (Main Memory)	MXG Series B EXG	User and "Secure Storage" partitions on CPU flash are erased by flash vendor firmware. For algorithm details, see the Application Note Greenliant NANDrive Security Erase Feature, Purge Command Specification.
Flash Drive	MXG N5182B EXG N5172B	Erased by drive vendor's firmware, which erases user data area, SSD reserve area, and retired blocks. The firmware accepts and implements the ATA commands `SECURITY ERASE UNIT` and `ENHANCED ERASE MODE`. For details of these commands, see AT Attachment 8 - ATA/ATAPI Command Set (ATA8-ACS).

NOTE The Erase and Sanitize All operation resets the instrument's LAN settings to their factory defaults. For more details, see "LAN Setup" on page 18.

Force Internal to SD Card

The options for this setting are **Off** or **On**:

- **On**: Forces all internal settings and files to be stored only on the external SD memory card, including instrument states, user data files, sweep list files, and other user created files. If it becomes necessary to sanitize the instrument, these settings may then be securely retained by removing the SD card and retaining it in the secure area.
- **Off**: All internal settings are stored in the instrument's Main Memory (see "Instrument Memory & Volatility" on page 13). This memory may be sanitized using the Erase and Sanitize All function.

Model	Key Sequence
MXG (Series B) EXG	**File** > **More** > **Security** > **Force Internal to SD Card**

Clear Persistent State Information

Persistent State

The persistent state settings contain instrument setup information that can be toggled within predefined limits such as display intensity, contrast and the GPIB address. In vector models, the user IQ Cal is also saved in this area.

The following key sequences or SCPI commands can be used to clear the IQ Cal file and to set the operating states that are not affected by an instrument power-on, preset, or ***RST** command to their factory default:

Instrument Setup

Key Sequence	MXG (Series B) EXG	**Utility** › **Power On/Preset** › **Restore System Settings to Default Values** › **Confirm Restore Sys Settings to Default Values**
SCPI Command	All Models	`:SYSTem:PRESet:PERSistent`

LAN Setup

The LAN setup (hostname, IP address, subnet mask, and default gateway) information is not modified by an instrument power-on or ***RST** command. This information can be changed or cleared by entering new data, or can be reset to the factory default settings by performing an Erase and Sanitize All operation.

User IQ Cal File (Vector Models Only)

When a user-defined IQ Calibration has been performed, the cal file data is removed by setting the cal file to default, as follows:

Key Sequence	All Models	**I/Q** › **I/Q Calibration** › **Revert to Default Cal Settings**
SCPI Command	MXG (Series B) EXG	`:CAL:IQ:DEF`

6 Using Secure Display

This function prevents unauthorized personnel from reading the instrument display or tampering with the current configuration via the front panel. When Secure Display is active, the display is blank, except for an advisory message, as shown in Figure 6-1 below. All front panel keys are disabled.

To set Secure Display, press: **Utility** > **Display** > **More** > **Activate Secure Display** > **Confirm Secure Display**

Once Secure Display has been activated, the power must be cycled to re-enable the display and front panel keys.

Figure 6-1 Signal Generator Screen with Secure Display Activated

7 Procedure for Declassifying a Faulty Instrument

If the instrument is not functional, and you are unable to use the security functions, you may physically remove the Processor board and Hard Disk or Solid State Drive (if installed).

For removal and replacement procedures, refer to the Service Guide for your instrument.

Once the Processor and Hard Disk assemblies have been removed, proceed as in Table 7-1 below:

Table 7-1 Assembly Disposal Procedures

Assembly	Procedure
Processor (CPU) Board	**Either** Discard the processor board and send the instrument to a repair facility. A new Processor Board will be installed, then the instrument will be repaired and calibrated. If the instrument is still under warranty, you will not be charged for the new Processor Board. **or** If you have another working instrument, install the Processor Board into that instrument and erase the memory. Then reinstall the Processor Board back into the non-working instrument and send it to a repair facility for repair and calibration. If you discover that the Processor Board does not function in the working instrument, discard the Processor Board and note that it caused the instrument failure on the repair order. If the instrument is still under warranty, you will not be charged for the new Processor Board.
A4 Memory Assembly (MXG Vector Instruments Only)	**Either** Discard the board and send the instrument to a repair facility. A new board will be installed, then the instrument will be repaired and calibrated. If the instrument is still under warranty, you will not be charged for the new board. **or** If you have another working instrument, install the board into that instrument and erase the memory. Then reinstall the board back into the non-working instrument and send it to a repair facility for repair and calibration. If you discover that the board does not function in the working instrument, discard the board and note that it caused the instrument failure on the repair order. If the instrument is still under warranty, you will not be charged for the new board.

A: References

1. **DoD 5220.22-M, "National Industrial Security Program Operating Manual (NISPOM)"**
United States Department of Defense. Revised February 28, 2006.
Security Features and Document of Volatility
http://www.dss.mil/isp/fac_clear/download_nispom.html

2. **ISFO Process Manual for the Certification and Accreditation of Classified Systems under the NISPOM**
Defense Security Service.
DSS-cleared industries may request a copy of this document via email, by following the instructions at:
http://www.dss.mil/isp/odaa/request.html

3. **Greenliant NANDrive Security Erase Feature, Purge Command Specification**
This Application Note may be obtained in PDF format from Greenliant Systems Ltd., by contacting the company via their web site:
http://www.greenliant.com/contact_us

4. **AT Attachment 8 - ATA/ATAPI Command Set (ATA8-ACS)**
INCITS Technical Committee T13/1699-D Revision 6a, September 6th, 2008
This standard may be downloaded in Acrobat (PDF) format from the INCITS T13 web site:
http://www.t13.org/documents/UploadedDocuments/docs2008/D1699r6a-ATA8-ACS.pdf

5. **Installation Guide**
Keysight Technologies Inc.
http://literature.cdn.keysight.com/litweb/pdf/N5180-90054.pdf

6. **Programming Guide**
Keysight Technologies Inc.
http://literature.cdn.keysight.com/litweb/pdf/E8251-90355.pdf

7. **SCPI Programmers Reference**
Keysight Technologies Inc.
http://literature.cdn.keysight.com/litweb/pdf/N5180-90057.pdf

8. **Service Guide**
Keysight Technologies Inc.
http://literature.cdn.keysight.com/litweb/pdf/N5180-90059.pdf

9. **Security Features and Document of Volatility (PSG Signal Generator)**
Keysight Technologies Inc.
http://literature.cdn.keysight.com/litweb/pdf/E8251-90379.pdf

10. **Security Features and Document of Volatility (MXG Series A, ESG Signal Generators)**
Keysight Technologies Inc.
http://literature.cdn.keysight.com/litweb/pdf/E4400-90621.pdf