RIGOL

Performance Verification Guide

DSA800 Series Spectrum Analyzer

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RIGOL Technologies, Inc.

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Contact Us

If you have any problem or requirement when using our products or this manual, please contact **RIGOL**.

E-mail: service@rigol.com
Websites: www.rigol.com

General Safety Summary

Please review the following safety precautions carefully before putting the instrument into operation so as to avoid any personal injuries or damages to the instrument and any product connected to it. To prevent potential hazards, please use the instrument only specified by this manual.

Use Proper Power Cord.

Only the power cord designed for the instrument and authorized by local country could be used.

Ground The Instrument.

The instrument is grounded through the Protective Earth lead of the power cord. To avoid electric shock, it is essential to connect the earth terminal of power cord to the Protective Earth terminal before any inputs or outputs.

Connect the Probe Correctly.

If a probe is used, do not connect the ground lead to high voltage since it has the isobaric electric potential as ground.

Observe All Terminal Ratings.

To avoid fire or shock hazard, observe all ratings and markers on the instrument and check your manual for more information about ratings before connecting.

Use Proper Overvoltage Protection.

Make sure that no overvoltage (such as that caused by a thunderstorm) can reach the product, or else the operator might expose to danger of electrical shock.

Do Not Operate Without Covers.

Do not operate the instrument with covers or panels removed.

Do Not Insert Anything into the Holes of Fan.

Do not insert anything into the holes of the fan to avoid damaging the instrument.

Use Proper Fuse.

Please use the specified fuses.

Avoid Circuit or Wire Exposure.

Do not touch exposed junctions and components when the unit is powered.

Do Not Operate With Suspected Failures.

If you suspect damage occurs to the instrument, have it inspected by qualified service personnel before further operations. Any maintenance, adjustment or replacement especially to circuits or accessories must be performed by **RIGOL** authorized personnel.

Keep Well Ventilation.

Inadequate ventilation may cause increasing of temperature or damages to the device. So please keep well ventilated and inspect the intake and fan regularly.

Do Not Operate in Wet Conditions.

In order to avoid short circuiting to the interior of the device or electric shock, please do not operate in a humid environment.

Do Not Operate in an Explosive Atmosphere.

In order to avoid damages to the device or personal injuries, it is important to operate the device away from an explosive atmosphere.

Keep Product Surfaces Clean and Dry.

To avoid the influence of dust and/or moisture in air, please keep the surface of device clean and dry.

Electrostatic Prevention.

Operate in an electrostatic discharge protective area environment to avoid damages induced by static discharges. Always ground both the internal and external conductors of the cable to release static before connecting.

Protect the RF Input Terminals of Instrument.

Do not bend or hit the devices (such as filter and attenuator) connected to the input terminals; otherwise, the weight exerted onto the instrument terminals might increase and the instrument might be damaged. Besides, the 50Ω and 75Ω connectors and cables cannot be used interchangeably.

Do Not Overload the Input.

To avoid damaging the instrument, the DC voltage component of the signal input into the RF input terminal cannot exceed 50V DC and the maximum continuous power of the AC (RF) signal component (the frequency range is from 10 MHz to 1.5 GHz) cannot exceed 20 dBm (100 mW) when the input attenuation to 30 dB.

Appropriate Use of Power Meter.

If you are not sure about the characteristics of the signal under test, follow these recommendations below to ensure safe operations of the spectrum analyzer. If RF power meter is available, use it to measure the signal level. If RF power meter is not available, add a rated external attenuator between the signal cable and input terminal of the spectrum analyzer; select maximum RF attenuation, maximum span and maximum possible reference level for the spectrum analyzer to display the signals within the screen.

Know About the Specification Conditions of the Instrument.

To ensure the performance specifications of the instrument, use the analyzer under specified conditions.

Proper Use of Battery.

If a battery is supplied, it must not be exposed to high temperature or in contact with fire. Keep it out of the reach of children. Improper change of battery (note: lithium battery) may cause explosion. Use **RIGOL** specified battery only.

Handling Safety

Please handle with care during transportation to avoid damages to buttons, knob interfaces and other parts on the panels.

Safety Terms and Symbols

Terms Used in this Manual. These terms may appear in this manual:

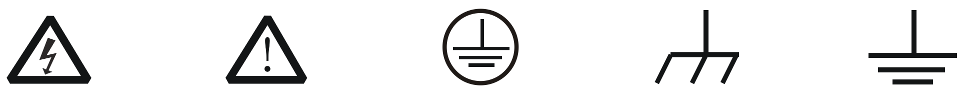
WARNING
Warning statements indicate the conditions or practices that could result in injury or loss of life.

CAUTION
Caution statements indicate the conditions or practices that could result in damage to this product or other property.

Terms Used on the Product. These terms may appear on the Product:

DANGER indicates an injury or hazard may immediately happen.
WARNING indicates an injury or hazard may be accessible potentially.
CAUTION indicates a potential damage to the instrument or other property might occur.

Symbols Used on the Product. These symbols may appear on the product:



Hazardous Voltage	Safety Warning	Protective Earth Terminal	Chassis Ground	Test Ground

Allgemeine Sicherheits Informationen

Überprüfen Sie diefolgenden Sicherheitshinweise sorgfältigumPersonenschädenoderSchäden am Gerätundan damit verbundenen weiteren Gerätenzu vermeiden. Zur Vermeidung vonGefahren, nutzen Sie bitte das Gerät nur so, wiein diesem Handbuchangegeben.

Um Feuer oder Verletzungen zu vermeiden, verwenden Sie ein ordnungsgemäßes Netzkabel.
Verwenden Sie für dieses Gerät nur das für ihr Land zugelassene und genehmigte Netzkabel.

Erden des Gerätes.
Das Gerät ist durch den Schutzleiter im Netzkabel geerdet. Um Gefahren durch elektrischen Schlag zu vermeiden, ist es unerlässlich, die Erdung durchzuführen. Erst dann dürfen weitere Ein- oder Ausgänge verbunden werden.

Anschluss einesTastkopfes.
Die Erdungsklemmen der Sonden sindauf dem gleichen Spannungspegel des Instruments geerdet. SchließenSie die Erdungsklemmen an keine hohe Spannung an.

Beachten Sie alle Anschlüsse.
Zur Vermeidung von Feuer oder Stromschlag, beachten Sie alle Bemerkungen und Markierungen auf dem Instrument. Befolgen Sie die Bedienungsanleitung für weitere Informationen, bevor Sie weitere Anschlüsse an das Instrument legen.

Verwenden Sie einen geeigneten Überspannungsschutz.
Stellen Sie sicher, daß keinerlei Überspannung (wie z.B. durch Gewitter verursacht) das Gerät erreichen kann. Andernfallsbestehtfür den Anwender die GefahreinesStromschlages.

Nicht ohne Abdeckung einschalten.
Betreiben Sie das Gerät nicht mit entfernten Gehäuse-Abdeckungen.

Betreiben Sie das Gerät nicht geöffnet.
Der Betrieb mit offenen oder entfernten Gehäuseteilen ist nicht zulässig. Nichts in entsprechende Öffnungen stecken (Lüfter z.B.)

Passende Sicherung verwenden.
Setzen Sie nur die spezifikationsgemäßen Sicherungen ein.

Vermeiden Sie ungeschützte Verbindungen.
Berühren Sie keine unisolierten Verbindungen oder Baugruppen, während das Gerät in Betrieb ist.

Betreiben Sie das Gerät nicht im Fehlerfall.
Wenn Sie am Gerät einen Defekt vermuten, sorgen Sie dafür, bevor Sie das Gerät wieder betreiben, dass eine Untersuchung durch qualifiziertes Kundendienstpersonal durchgeführt wird.Jedwede Wartung, Einstellarbeiten oder Austausch von Teilen am Gerät, sowie am Zubehör dürfen nur von **RIGOL** autorisiertem Personal durchgeführt werden.

Belüftung sicherstellen.
Unzureichende Belüftung kann zu Temperaturanstiegen und somit zu thermischen Schäden am Gerät führen. Stellen Sie deswegen die Belüftung sicher und kontrollieren regelmäßig Lüfter und Belüftungsöffnungen.

Nicht in feuchter Umgebung betreiben.
Zur Vermeidung von Kurzschluß im Geräteinneren und Stromschlag betreiben Sie das Gerät bitte niemals in feuchter Umgebung.

Nicht in explosiver Atmosphäre betreiben.
Zur Vermeidung von Personen- und Sachschäden ist es unumgänglich, das Gerät ausschließlich fernab jedweder explosiven Atmosphäre zu betreiben.

Geräteoberflächen sauber und trocken halten.
Um den Einfluß von Staub und Feuchtigkeit aus der Luft auszuschließen, halten Sie bitte die Geräteoberflächen sauber und trocken.

Schutz gegen elektrostatische Entladung (ESD).
Sorgen Sie für eine elektrostatisch geschützte Umgebung, um somit Schäden und Funktionsstörungen durch ESD zu vermeiden. Erden Sie vor dem Anschluß immer Innen- und Außenleiter der Verbindungsleitung, um statische Aufladung zu entladen.

Die richtige Verwendung desAkku.
Wenneine Batterieverwendet wird, vermeiden Sie hohe Temperaturen bzw. Feuer ausgesetzt werden.Bewahren Sie es außerhalbder Reichweitevon Kindern auf.UnsachgemäßeÄnderung derBatterie(Anmerkung:Lithium-Batterie)kann zu einer Explosion führen. VerwendenSie nur von RIGOLangegebenenAkkus.

Sicherer Transport.
Transportieren Sie das Gerät sorgfältig (Verpackung!), um Schäden an Bedienelementen, Anschlüssen und anderen Teilen zu vermeiden.

Sicherheits Begriffe und Symbole

Begriffe in diesem Guide. Diese Begriffe können in diesem Handbuch auftauchen:

WARNING
Die Kennzeichnung WARNING beschreibt Gefahrenquellen die leibliche Schäden oder den Tod von Personen zur Folge haben können.

CAUTION
Die Kennzeichnung Caution (Vorsicht) beschreibt Gefahrenquellen die Schäden am Gerät hervorrufen können.

Begriffe auf dem Produkt. Diese Bedingungen können auf dem Produkt erscheinen:

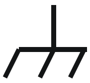
DANGER weist auf eine Verletzung oder Gefährdung hin, die sofort geschehen kann.
WARNING weist auf eine Verletzung oder Gefährdung hin, die möglicherweise nicht sofort geschehen.
CAUTION bedeutet, dass eine mögliche Beschädigung des Instruments oder anderer Gegenstände auftreten kann.

Symbole auf dem Produkt. Diese Symbole können auf dem Produkt erscheinen:

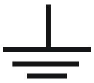
GefährlicheS pannung

Sicherheits-Hinweis

Schutz-erde



Gehäusemasse



Erde

Document Overview

This manual guides users to correctly test the performance specifications of **RIGOL** DSA800 series spectrum analyzer. For the operation method of the instrument, please refer to the corresponding User's Guide.

Main topics in this manual:

Chapter 1 Overview
This chapter introduces the preparations and precautions of the performance verification test.

Chapter 2 Performance Verification Test
This chapter introduces the limit, test devices, test method and procedures of each performance specification.

Appendix Test Record Form
In the appendix, a test record form is provided for recording the test results so as to determine whether each performance specification fulfills the requirement.

Format Conventions in this Manual:

Front Panel Key: denoted by "Text Box + Button Name (Bold)", for example, **System**.
Menu Softkey: denoted by "Character Shading + Menu Word (Bold)", for example, **Information**.
Operation Step: denoted by an arrow "→", for example, **System** →**Information**.

Content

Chapter 1 Overview

Test Preparations

Before performing the test, make the following preparations.

1) Warm the spectrum analyzer up for at least 30 minutes.
2) Make sure that the instrument is within the calibration period (1 year) and perform self-calibration on the spectrum analyzer (press **System** → **Calibrate** → **Cal Now** and the spectrum analyzer performs self-calibration immediately using the internal calibration source).
3) The test devices required are as shown in the table below.

Table 1-1 Test Devices Required

Device	Specification	Qty.	Recommended
Signal Generator	Amplitude accuracy: ±0.6dB Single-sideband phase noise: < -126 dBc/Hz	2	Agilent N5181A
Frequency Counter	Frequency Range: 10 MHz ± 100 Hz Support single trigger and external reference input Gate Time: ≥ 10 s Frequency Resolution: 10 digits/s	1	Agilent 53181A
Power Meter	Compatible with Agilent E9304A power sensor dB relative mode Resolution: 0.001 dB Reference Accuracy: ±1.2%	1	Agilent N1913A
Power Sensor	Frequency Range: 9 kHz to 18 GHz Max SWR: 1.13 (9 kHz to 2 GHz) 1.19 (2 GHz to 14 GHz) 1.22 (14 GHz to 16 GHz) 1.26 (16 GHz to 18 GHz) Amplitude Range: 1 nW to 100 mW (-60 dBm to +20 dBm)	1	Agilent E9304A
Power Divider	Frequency Range: 9 kHz to 13.2 GHz Insert Loss: 6 dB, rated Output Track: < 0.25 dB Equivalent Output SWR: < 1.22:1	1	Agilent 11667A
Low-pass Filter[1]	Cut-off Frequency: 50 MHz	1	--
Low-pass Filter [1]	Cut-off Frequency: 300 MHz	1	--
Low-pass Filter [1]	Cut-off Frequency: 1 GHz	1	--
Attenuator/Switch Driver	Compatible with Agilent 8494H and 8496H programmable step attenuator	1	Agilent 11713B

Test Devices Required (continue)

Device	Specification	Qty.	Recommended
Step Attenuator	Step: 1 dB Attenuation Range: 0 dB to 11 dB Frequency Range: 50 MHz ± 1 MHz Connector: N-type (female) Attenuation Repeatability: ±0.03 dB	1	Agilent 8494H
Step Attenuator	Step: 10 dB Attenuation Range: 0 dB to 110 dB Frequency Range: 50 MHz ± 1 MHz Connector: N-type (female) Attenuation Repeatability: ±0.03 dB	1	Agilent 8496H
Attenuator Interconnect Kit	Connect Agilent 8494H and Agilent 8496H	1	Agilent 11716A
50 Ω Matched Load	Impedance: 50 Ω, rated Connector: N-type (male)	1	--
Power Meter Connecting Cable	Compatible with Agilent N1913A power meter and Agilent E9304A power sensor	1	--
Dual-N Cable	N-type (male) to N-type (male) cable	3	--
Dual-BNC Cable	BNC (male)-BNC (male) cable	1	--
N-SMA Cable	N-type (male) to SMA (male) cable	2	--

Note[1]: The connecting terminals of the low-pass filter used in this manual are two SMA female terminals. In the actual test, the type of the connecting terminals of the low-pass filter may differ; please select proper connecting cable and adaptor according to the actual type of the connecting terminals.

Test Result Record

Record and keep the test result of each test. In the Appendix of this manual, a test result record form which lists all the test items and their corresponding performance limits as well as spaces for users to record the test results, is provided.

Tip:
It is recommended that users photocopy the test record form before each test and record the test results in the copy so that the form can be used repeatedly.

Specifications

The specification of each test item is provided in chapter 2. For other specifications, refer to DSA800 User's Guide or DSA800 Data Sheet (can be downloaded from www.rigol.com).

Tip:

All the specifications are only valid when the instrument has been warmed up for more than 30 minutes.

Chapter 2 Performance Verification Test

This chapter introduces the performance verification test method and procedures of DSA800 series spectrum analyzer.

Note:

1) Make sure that the spectrum analyzer has passed the self-calibration before executing the performance verification test.
2) Make sure that the instrument has been warmed up for at least 30 minutes before executing any of the following tests.
3) Press **Preset** to reset the instrument to the factory setting before or after executing any of the following tests.
4) For amplitude-related tests, perform self-calibration on the instrument (press **System** → **Calibrate** → **Cal Now**) before the test.
5) Definitions of “Typical Value” and “Nominal Value” for this product.
   - Typical Value: the performance specification of this product under specified conditions.
   - Nominal Value: the approximate quantity of the product during application.

Displayed Average Noise Level (DANL) Test

Specification

DANL		
0 dB Attenuation, RBW = VBW = 100 Hz, RMS Average Detector, Trace Average ≥ 50, Input Impedance = 50 Ω, Tracking Generator Off		
DANL (Preamplifier off)	100 kHz to 1 MHz	< -90 dBm Typical: -110 dBm
	1 MHz to 1.5 GHz	< -110 dBm + 6(f/1 GHz) dB Typical: -115 dBm
DANL (Preamplifier on)	100 kHz to 1 MHz	< -110 dBm Typical: -130 dBm
	1 MHz to 1.5 GHz	< -130 dBm + 6(f/1 GHz) dB Typical: -135 dBm

Test Device

1. 50 Ω Matched Load × 1

Test Connection Diagram

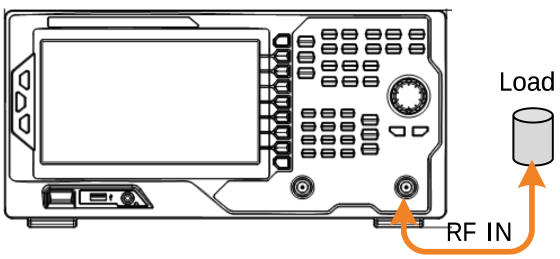


Figure 2-1 DANL Test Connection Diagram

Test Procedures

1. Connect the 50 Ω matched load to the RF input terminal of DSA800, as shown in Figure 2-1.

2. Configure the spectrum analyzer:
   a) Set the preamplifier to off.
   b) Set the span to 100 Hz.
   c) Set the trace type to power average (the number of averages ≥ 50).
   d) Set the input attenuation to 0 dB.
   e) Set the resolution bandwidth and video bandwidth to 100 Hz.
   f) Set the reference level to -40 dBm.

g) Set the sweep time to auto and the auto sweep time to accuracy.

3. Modify the center frequency of the spectrum analyzer according to the frequency parameters listed in Table 2-1. Press **Sweep/Trig** → **Single**, wait for the instrument to finish a sweep, perform maximum peak search and minimum peak search after the sweep is finished and record the results in the test record form each time the center frequency is modified.

Table 2-1 Center Frequency Setting of DANL Test

Center Frequency			
103 kHz	1.04 MHz	50.04 MHz	504 MHz

4. Take the average of the maximum peak and minimum peak (add the two values and calculate the average) as the measurement result and compare it with the specification.

5. Keep other settings unchanged and enable the preamplifier of the spectrum analyzer; repeat step 3 and step 4 and record the test results.

Test Record Form

Center Frequency	**Maximum Peak**	**Minimum Peak**	**Average [1]**	**Limit**	**Pass/Fail**
Preamplifier off					
103 kHz				**100 kHz to 1 MHz:** < -90 dBm Typical: -110 dBm **1 MHz to 1.5 GHz:** < -110 dBm + 6(f/1 GHz) dB Typical: -115 dBm	
1.04 MHz					
50.04 MHz					
504 MHz					
Preamplifier on					
103 kHz				**100 kHz to 1 MHz:** < -110 dBm Typical: -130 dBm **1 MHz to 1.5 GHz:** < -130 dBm + 6(f/1 GHz) dB Typical: -135 dBm	
1.04 MHz					
50.04 MHz					
504 MHz					

Note[1]: Average = (Maximum Peak + Minimum Peak)/2 (dimensionless calculation)

Single-sideband Phase Noise Test

Specification

Single-sideband Phase Noise		
Carrier Offset	10 kHz offset	< -80 dBc/Hz

Test Devices

1. Signal Generator × 1
2. Dual-N Cable × 1
3. Dual-BNC Cable × 1

Test Connection Diagram

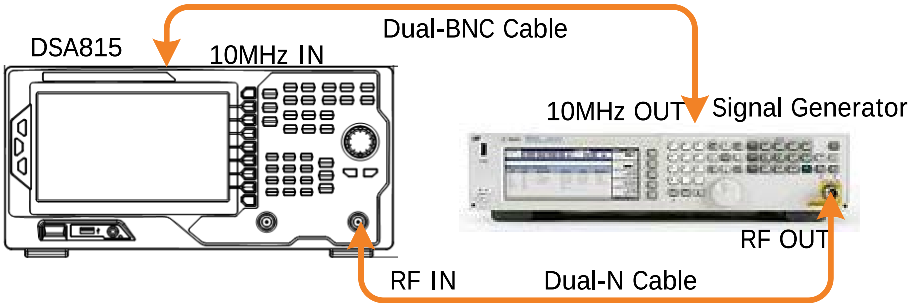


Figure 2-2 Single-sideband Phase Noise Test Connection Diagram

Test Procedures

1. Synchronize the spectrum analyzer and signal generator.

2. Connect the output terminal of the signal generator with the RF input terminal of the spectrum analyzer, as shown in Figure 2-2.

3. Set the signal generator to output a sine waveform with 500 MHz frequency and 0 dBm amplitude.

4. Configure the spectrum analyzer (take 10 kHz offset as an example):
   a) Set the center frequency to 500 MHz.
   b) Set the span to 50 kHz.
   c) Set the input attenuation to 10 dB and the reference level to 0 dBm.
   d) Set the resolution bandwidth to 1 kHz and the video bandwidth to 10 Hz.
   e) Set the trace type to clear write.

f) Set the detector type to positive peak.
g) Set the sweep time to auto and the auto sweep time to accuracy.

5. Press **Sweep/Trig** → **Single**, wait for the instrument to finish a sweep and press **Peak** to find the maximum peak.

6. Set the cursor type to Delta, the detector type to sample detector and the number of sweeps to 4.

7. Press **Marker** → **Delta** → input 10 kHz. Press **Sweep/Trig** → **Single** and wait for the instrument to finish the sweeps. Press **Marker Fctn**→ **Noise Mkr**; read and record the current measurement result.

8. Compare the measurement result with the specification.

Test Record Form

Signal Generator Output Frequency	Offset	Measurement Result	Limit	Pass/Fail
500 MHz	Offset 10 KHz		< -80 dBc/Hz	

Absolute Amplitude Accuracy Test

Specification

Absolute Amplitude Accuracy	
fc = 50 MHz, peak detector, preamplifier off, 10 dB attenuation, input signal = -10 dBm, 20℃ to 30℃	
Uncertainty	±0.4 dB

Test Devices

1. Signal Generator × 1
2. Power Meter × 1
3. Power Sensor × 1
4. Power Meter Connecting Cable × 1
5. Dual-N Cable × 1
6. Dual-BNC Cable × 1

Test Connection Diagram

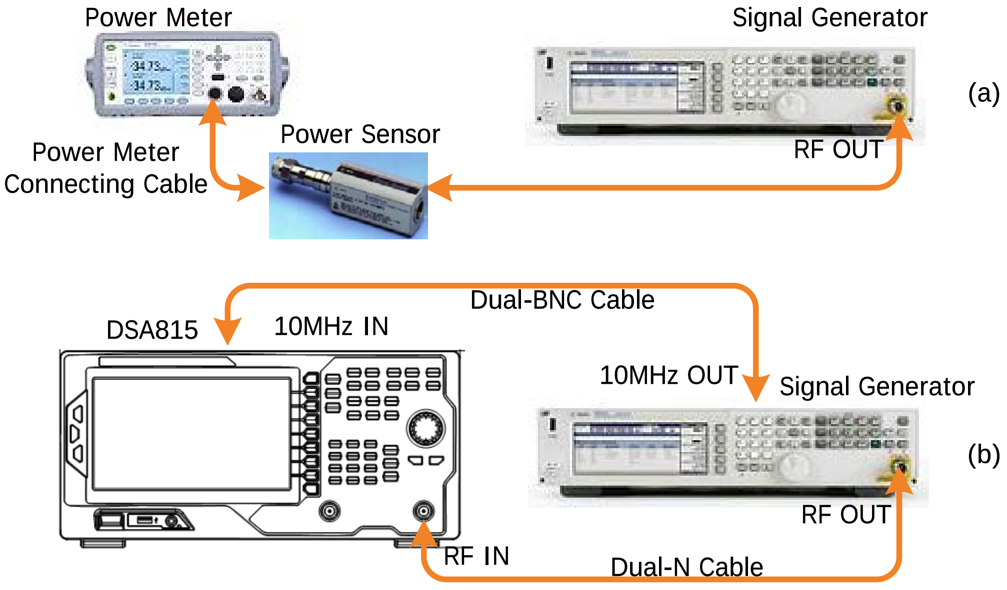


Figure 2-3 Absolute Amplitude Accuracy Test Connection Diagram

Test Procedures

1. Calibrate the power meter:
   a) Connect the power sensor with the **[REF]** terminal and channel A of the power meter. Press **Channel** and set the frequency of channel A to 50 MHz.
   b) Press **Cal** and enable **Power Ref** in the **Zero/Cal** menu. Press **Zero+Cal** and wait for the calibration to finish; then, observe whether the measurement value of the power meter is a 0 dBm, 50 MHz signal.
   c) Disable **Power Ref**.

2. Connect the output terminal of the signal generator with the power sensor, as shown in Figure 2-3 (a).

3. Set the signal generator to output a sine waveform with 50 MHz frequency and -10 dBm amplitude.

4. Measure the output amplitude of the signal generator using the power meter; read and record the measurement value **A1** of the power meter.

5. Disconnect the signal generator and the power meter. Connect the **[10MHz OUT]** terminal of the signal generator with the **[10MHz IN]** terminal at the rear panel of the spectrum analyzer using dual-BNC cable to synchronize the two instruments.

6. Connect the output terminal of the signal generator with the input terminal of the spectrum analyzer using dual-N cable as shown in Figure 2-3 (b).

7. Configure the spectrum analyzer:
   a) Set the center frequency to 50 MHz.
   b) Set the span to 1 MHz.
   c) Set the reference level to 0 dBm.
   d) Set the input attenuation to 10 dB.
   e) Set the resolution bandwidth to 10 kHz.
   f) Set the sweep time to auto and the auto sweep time to accuracy.
   g) Press **Sweep/Trig** → **Single** and wait for the instrument to finish a sweep; press **Peak** to find the maximum peak and record the result **A2**.

8. Absolute Amplitude Accuracy = **A1 - A2** and compare the calculation result with the specification.

Test Record Form

Power Meter Measurement Value A1	Spectrum Analyzer Measurement Value A2	Calculation Result (A1 - A2)	Limit	Pass/Fail
			±0.4 dB	

Frequency Response Test

Specification

Frequency Response		
10 dB attenuation, relative to 50 MHz, 20 ℃ to 30 ℃		
Frequency Response (preamplifier off)	100 kHz to 1.5 GHz	< 0.7 dB
Frequency Response (preamplifier on)	1 MHz to 1.5 GHz	< 1.0 dB

Test Devices

1. Signal Generator × 1
2. Power Meter × 1
3. Power Sensor × 1
4. Power Meter Connecting Cable × 1
5. Dual-N Cable × 1
6. Dual-BNC Cable × 1

Test Connection Diagram

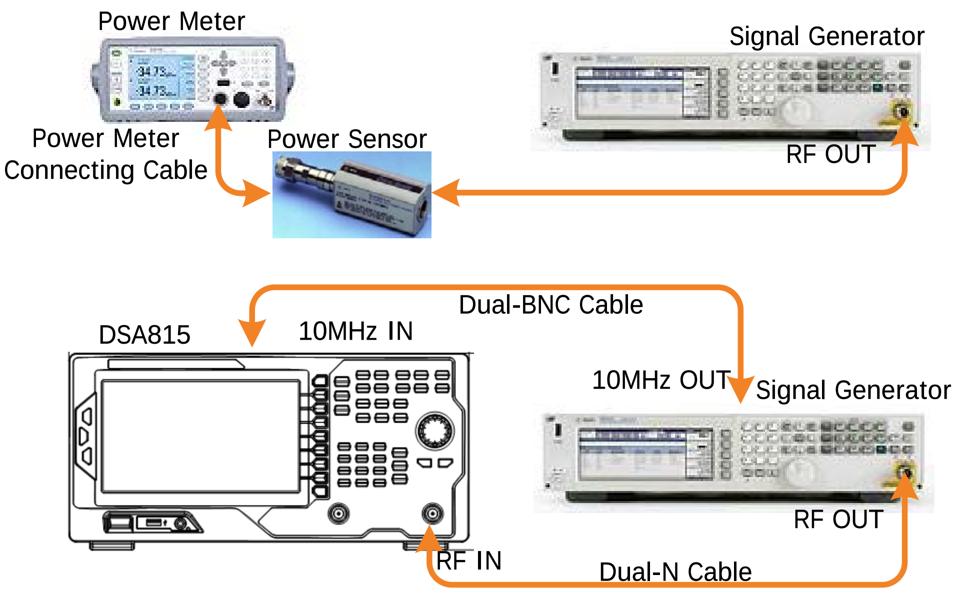


Figure 2-4 Frequency Response Test Connection Diagram

Test Procedures

1. Calibrate the power meter:
   a) Connect the power sensor with the **[REF]** terminal and channel A of the power meter. Press **Channel** and set the frequency of channel A to 50 MHz.

b) Press **Cal** and enable **Power Ref** in the **Zero/Cal** menu. Press **Zero+Cal** and wait for the calibration to finish; then, observe whether the measurement value of the power meter is a 0 dBm, 50 MHz signal.

c) Disable **Power Ref**.

2. Connect the output terminal of the signal generator with the power sensor, as shown in Figure 2-4 (a).

3. Set the output frequency of the signal generator to 50 MHz and the amplitude to -10 dBm.

4. Measure the output amplitude of the signal generator using the power meter and record the measurement result as **reference value 1**.

5. Modify the output frequency of the signal generator according to Table 2-2.

Table 2-2 Output frequency of the Signal Generator

Frequency	Amplitude	Frequency	Amplitude	Frequency	Amplitude
100 kHz		10 MHz		500 MHz	
500 kHz		50 MHz		1 GHz	
1 MHz		100 MHz		1.499995 GHz	

6. Modify the frequency of the power meter accordingly, measure the amplitude **A1** and record the measurement result each time the output frequency of the signal generator is modified; subtract **reference value 1** from **A1** to calculate the **system error**.

7. Disconnect the signal generator and power sensor and synchronize the signal generator and spectrum analyzer.

8. Connect the output terminal of the signal generator with the RF input terminal of the spectrum analyzer using dual-N cable, as shown in Figure 2-4 (b).

9. Set the output frequency of the signal generator to 50 MHz and the amplitude to -10 dBm.

10. Configure the spectrum analyzer:
    a) Set the center frequency to 50 MHz.
    b) Set the span to 10 kHz.
    c) Set the reference level to 0 dBm.
    d) Set the input attenuation to 10 dB.
    e) Set the resolution bandwidth to 1 kHz.
    f) Set the sweep time to auto and the auto sweep time to accuracy.
    g) Press **Sweep/Trig** → **Single** and wait for the instrument to finish a sweep; press **Peak** to find the maximum peak, record the measurement result and take it as **reference value 2**.

11. Set the output frequency of the signal generator and the center frequency of the spectrum

analyzer according to Table 2-2 (the center frequency of the spectrum analyzer corresponds to output frequency of the signal generator).

12. Each time the center frequency is changed, press **Sweep/Trig** → **Single** and wait for the instrument to finish a sweep; then, press **Peak** to find the maximum peak and record the measurement result **A2**; subtract **reference value 2** from **A2** to calculate the **global error** and record the result.

13. **Frequency Response = |Global Error - System Error|** and compare the calculation result with the specification.

14. Press **Preset** to restore the spectrum analyzer to its factory setting. Enable the preamplifier of the spectrum analyzer; set the output amplitude of the signal generator to -30 dBm, repeat steps 4 to 13 (at this point, as the preamplifier is enabled, after executing d) in step 10, the reference level will change to -20 dBm automatically) and record the calculation result.

Test Record Form

Preamplifier off:

Reference Value 1				**Reference Value 2**			
Output Frequency of Signal Generator	**Power Meter Measure-ment Value A1**	**Spectrum Analyzer Measurement Value A2**	**System Error[1]**	**Global Error[2]**	**Frequency Response[3]**	**Limit**	**Pass/ Fail**
100 kHz						**100 kHz to 1.5 GHz**: < 0.7 dB	
500 kHz							
1 MHz							
10 MHz							
50 MHz							
100 MHz							
500 MHz							
1 GHz							
1.499995 GHz							

Preamplifier on:

Reference Value 1				Reference Value 2			
Output Frequency of Signal Generator	**Power Meter Measure-ment Value A1**	**Spectrum Analyzer Measurement Value A2**	**System Error[1]**	**Global Error[2]**	**Frequency Response[3]**	**Limit**	**Pass/ Fail**
100 kHz						**1 MHz to 1.5 GHz**: < 1.0 dB	
500 kHz							
1 MHz							
10 MHz							
50 MHz							
100 MHz							
500 MHz							
1 GHz							
1.499995 GHz							

Note[1]: System Error = Power Meter Measurement Value A1 - Reference Value 1

Note[2]: Global Error = Spectrum Analyzer Measurement Value A2 - Reference Value 2

Note[3]: Frequency Response = |Global Error - System Error|

Second Harmonic Distortion Test

Specification

Second Harmonic Distortion	
Specification	40 dBm

Test Devices

1. Signal Generator × 1
2. 50 MHz Low-pass Filter × 1
3. 300 MHz Low-pass Filter × 1
4. Dual-BNC Cable × 1
5. N-SMA Cable × 2

Test Connection Diagram

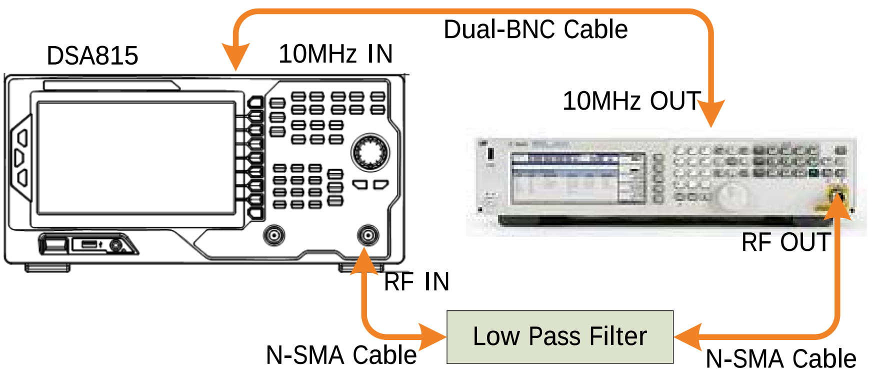


Figure 2-5 Second Harmonic Distortion Test Connection Diagram

Test Procedures

1. Synchronize the signal generator and spectrum analyzer. Connect the output terminal of the signal generator with the 50 MHz low-pass filter and connect the filter with the RF input terminal of the spectrum analyzer.

2. Set the output frequency of the signal generator to 50 MHz and the amplitude to -10 dBm.

3. Configure the spectrum analyzer:
   a) Set the center frequency to 50 MHz.
   b) Set the span to 10 kHz.
   c) Set the maximum mixing level to -20 dBm.
   d) Set the reference level to -10 dBm.
   e) Set the input attenuation to 10 dB.

f) Set the resolution bandwidth to 300 Hz.
g) Set the video bandwidth to 10 Hz.
h) Set the sweep time to auto and the auto sweep time to accuracy.

4. Press **Sweep/Trig** → **Single** and wait for the instrument to finish a sweep; press **Peak** to find the maximum peak. Then, set the cursor type to Delta. Set the center frequency to 100 MHz, press **Sweep/Trig** → **Single** and wait for the instrument to finish a sweep; press **Peak** and record the delta result.

5. **Second Harmonic Distortion = -20 dBm - Delta** (-20 dBm is the level input into the mixer) and compare the calculation result with the specification.

6. Press **Preset** to restore the spectrum analyzer to its factory setting. Change the filter connected with the signal generator to a 300 MHz low-pass filter. Set the output frequency of the signal generator to 300 MHz.

7. Configure the spectrum analyzer: set the center frequency to 300 MHz and the other parameter settings are the same with that of step 3.

8. Press **Sweep/Trig** → **Single** and wait for the instrument to finish a sweep; press **Peak** to find the maximum peak. Then, set the cursor type to Delta. Set the center frequency to 600 MHz, Press **Sweep/Trig** → **Single** and wait for the instrument to finish a sweep; press **Peak** and record the delta result.

9. **Second Harmonic Distortion = -20 dBm - Delta** (-20 dBm is the level input into the mixer) and compare the calculation result with the specification.

Test Record Form

Output Frequency of Signal Generator	Delta	Calculation Result[1]	Limit	Pass/Fail	
50 MHz			> 40 dBm		
300 MHz					

Note[1]: Calculation Result = -20 dBm - Delta (-20 dBm is the level input into the mixer).

TOI Distortion Test

Specification

TOI Distortion	
Specification (fc > 30 MHz)	10 dBm

Test Devices

1. Signal Generator × 2
2. Power Meter × 1
3. Power Sensor × 1
4. Power Meter Connecting Cable × 1
5. Power Divider × 1
6. 300 MHz Low-pass Filter × 1
7. 1 GHz Low-pass Filter × 1
8. Dual-N Cable × 2
9. N-SMA Cable × 2
10. Dual-BNC Cable × 1

Test Connection Diagram

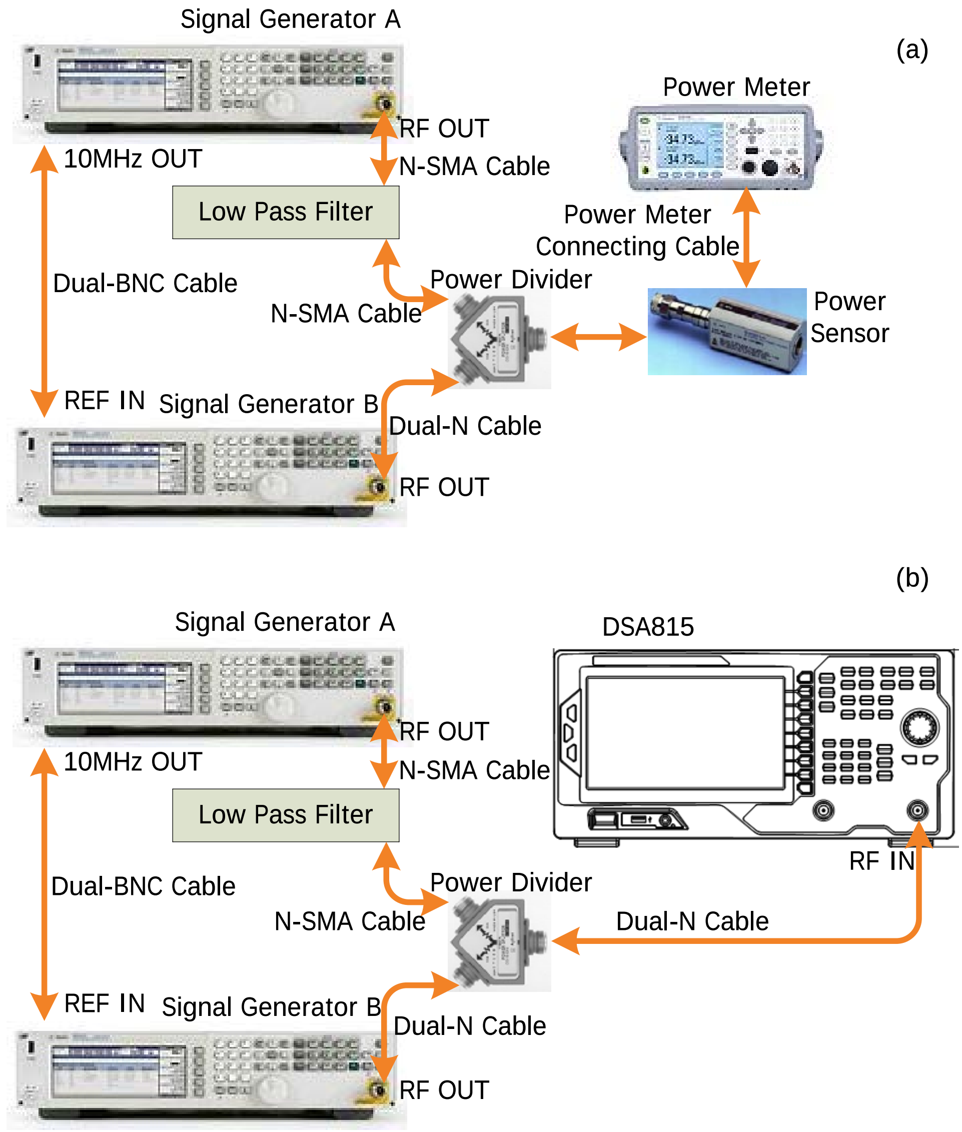


Figure 2-6 TOI Distortion Test Connection Diagram

Test Procedures

1. Calibrate the power meter:
   a) Connect the power sensor with the **[REF]** terminal and channel A of the power meter. Press **Channel** and set the frequency of channel A to 50 MHz.
   b) Press **Cal** and enable **Power Ref** in the **Zero/Cal** menu. Press **Zero+Cal** and wait for the calibration to finish; then, observe whether the measurement value of the power meter is a 0 dBm, 50 MHz signal.
   c) Disable **Power Ref**.

2. Synchronize the two signal generators.
   Set the output frequency of signal generator A to 300 MHz and the amplitude to -10 dBm.

Set the output frequency of signal generator B to 300.2 MHz and the amplitude to -10 dBm.

3. Connect the output terminal of signal generator A to the power divider via a 300 MHz low-pass filter.

4. Connect the output terminal of signal generator B with the power divider and connect the power divider with the power sensor, as shown in Figure 2-6 (a).

5. Press **Channel** on the power meter and set the frequency of channel A to 300 MHz. Enable the output of signal generator A and disable the output of signal generator B. Observe the measurement value of the power meter. Adjust the output amplitude of signal generator A until the measurement value of the power meter becomes -10 dBm.

6. Press **Channel** on the power meter and set the frequency of channel A to 300.2 MHz. Disable the output of signal generator A and enable the output of signal generator B. Observe the measurement value of the power meter. Adjust the output amplitude of signal generator B until the measurement value of the power meter becomes -10 dBm.

7. Enable the outputs of the two signal generators. Disconnect the power divider and power sensor and connect the power divider with spectrum analyzer, as shown in Figure 2-6 (b).

8. Configure the spectrum analyzer:
   a) Set the center frequency to 300 MHz.
   b) Set the span to 20 kHz.
   c) Set the CF step to 200 kHz.
   d) Set the maximum mixing level to -20 dBm.
   e) Set the reference level to 0 dBm and the input attenuation to 20 dB.
   f) Set the resolution bandwidth to 300 Hz and the video bandwidth to 300 Hz.
   g) Set the peak excursion to 3 dB.
   h) Set the sweep time to auto and the auto sweep time to accuracy.

9. Press **Sweep/Trig** → **Single** and wait for the instrument to finish a sweep; press **Peak** to find the maximum peak. Set the cursor type to Delta, reduce the center frequency by 200 kHz, press **Peak** and record the delta result.

10. **TOI Distortion = -20 dBm - Delta/2** and compare the calculation result with the specification.

11. Exchange the output frequencies of the two signal generators and set the center frequency of the spectrum analyzer to 300.4 MHz. Press **Sweep/Trig** → **Single** and wait for the instrument to finish a sweep; then, press **Peak** and record the current delta result.

12. **TOI Distortion = -20 dBm - Delta/2** and compare the calculation result with the specification.

13. Set the output frequency of signal generator A to 1 GHz and amplitude to -10 dBm; set the output frequency of signal generator B to 1.0002 GHz and amplitude to -10 dBm.

14. Change the 300 MHz low-pass filter connected with signal generator A to a 1 GHz low-pass filter. Repeat steps 4 to 7 (in step 5 and step 6, set the frequency of the power meter to 1 GHz and 1.0002 GHz respectively).

15. Keep other settings unchanged and set the center frequency and span of the spectrum analyzer to 1 GHz and 100 kHz respectively. Repeat steps 8 to 10.

16. Exchange the output settings of the two signal generators; set the center frequency of the spectrum analyzer to 1.0004 GHz. Press **Sweep/Trig** → **Single** and wait for the instrument to finish a sweep; press **Peak**, record the current delta result and repeat step 10.

Test Record Form

Center Frequency	Delta	Calculation Result[1]	Limit	Pass/Fail	
299.8 MHz			> 10 dBm		
300.4 MHz					
999.8 MHz					
1.0004 GHz					

Note[1]: Calculation Result = -20 dBm - Delta/2 (-20 dBm is the level input into the mixer).

1 dB Gain Compression Test

Specification

1 dB Gain Compression	
Specification (fc ≥ 50 MHz, preamplifier off)	> 0 dBm

Test Devices

1. Signal Generator × 2
2. Power Meter × 1
3. Power Sensor × 1
4. Power Meter Connecting Cable × 1
5. Power Divider × 1
6. Dual-N Cable × 3
7. Dual-BNC Cable × 1

Test Connection Diagram

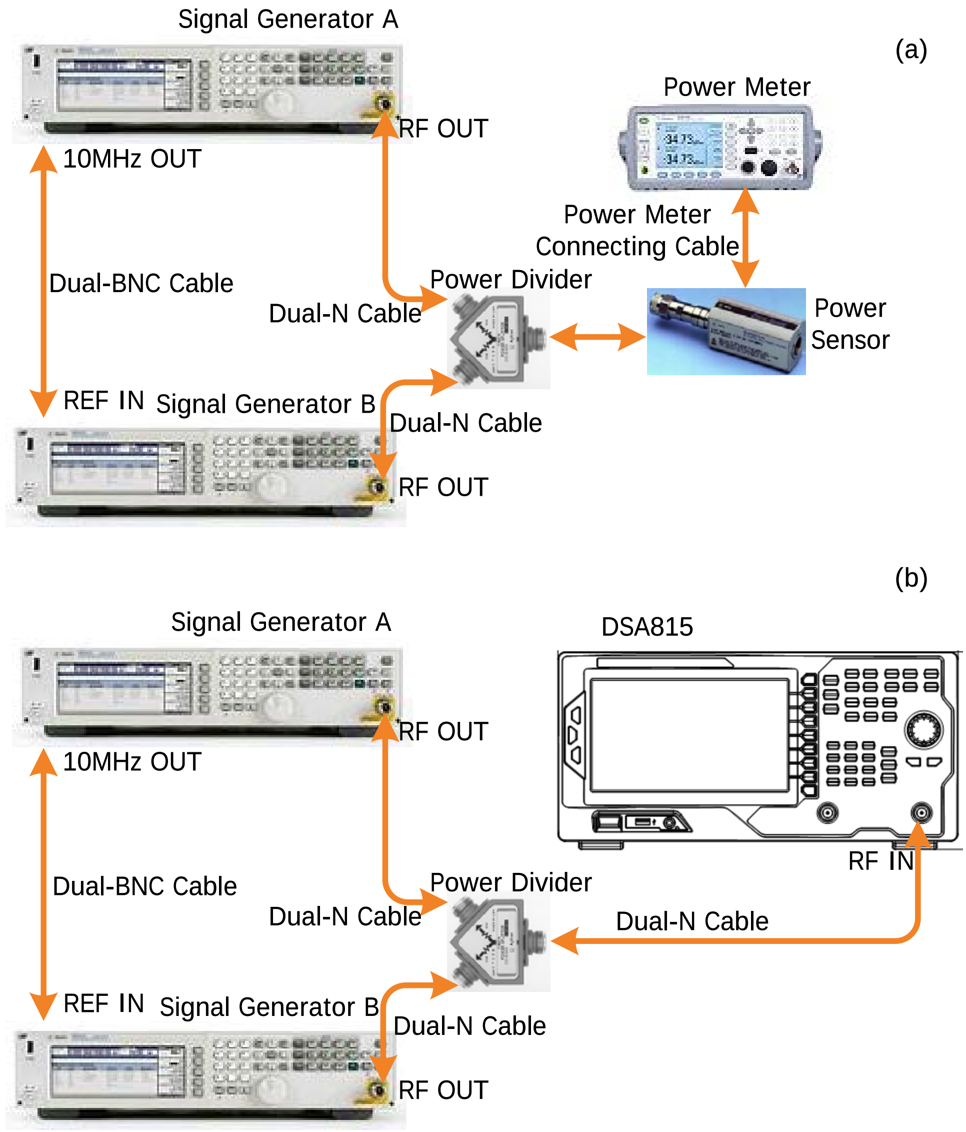


Figure 2-7 1 dB Gain Compression Test Connection Diagram

Test Procedures

1. Calibrate the power meter:
   a) Connect the power sensor with the **[REF]** terminal and channel A of the power meter. Press **Channel** and set the frequency of channel A to 50 MHz.
   b) Press **Cal** and enable **Power Ref** in the **Zero/Cal** menu. Press **Zero+Cal** and wait for the calibration to finish; then, observe whether the measurement value of the power meter is a 0 dBm, 50 MHz signal.
   c) Disable **Power Ref**.

2. Synchronize the two signal generators. Connect the outputs of the two signal generators using the power divider and connect the power divider with the power sensor, as shown in Figure 2-7

(a).

3. Set the signal generators:
   Set the output frequency of signal generator A to 50 MHz and the amplitude to -20 dBm.
   Set the output frequency of signal generator B to 53 MHz and the amplitude to 0 dBm.

4. Enable the output of signal generator A and disable the output of signal generator B. Observe the measurement value of the power meter. Adjust the output amplitude of signal generator A until the reading of the power meter becomes -20 dBm.

5. Press **Channel** on the power meter and set the frequency of channel A to 53 MHz.
   Disable the output of signal generator A and enable the output of signal generator B. Observe the measurement value of the power meter. Adjust the output amplitude of signal generator B until the reading of the power meter becomes 0 dBm.

6. Disconnect the power divider and power sensor and connect the power divider with spectrum analyzer, as shown in Figure 2-7 (b).

7. Enable the output of signal generator A and disable the output of signal generator B.

8. Configure the spectrum analyzer:
   a) Set the center frequency to 50 MHz.
   b) Set the span to 100 kHz.
   c) Set the reference level to -20 dBm.
   d) Set the input attenuation to 0 dB.
   e) Set the resolution bandwidth to 1 kHz.
   f) Set the sweep time to auto and the auto sweep time to accuracy.

9. Press **Sweep/Trig** → **Single** and wait for the instrument to finish a sweep. Press **Peak** to measure the current peak and record the measurement result as **A1**.

10. Enable the outputs of the two signal generators. Press **Sweep/Trig** → **Single** and wait for the instrument to finish a sweep. Press **Peak** to measure the peak at 50 MHz (**A2**).

11. **Delta = A1 - A2** and record the delta result.

Test Record Form

Output Amplitude of Signal Generator B	Measurement Result A1	Measurement Result A2	Calculation Result[1]	Limit	Pass/Fail
0 dBm				< 1 dBm	

Note[1]: Calculation Result = A1 - A2.

Input Attenuation Error Test

Specification

Input Attenuation Error	
fc = 50 MHz, relative to 10 dB, 20℃ to 30℃	
Switch Uncertainty	< 0.5 dB

Test Devices

1. Signal Generator × 1
2. Power Meter × 1
3. Power Sensor × 1
4. Power Meter Connecting Cable × 1
5. Program-controlled Attenuator:
   Attenuator/Switch Driver × 1
   Step Attenuator (Step: 1 dB) × 1
   Step Attenuator (Step: 10 dB) × 1
   Attenuator Interconnect Kit × 1
6. Dual-N Cable × 2

Test Connection Diagram

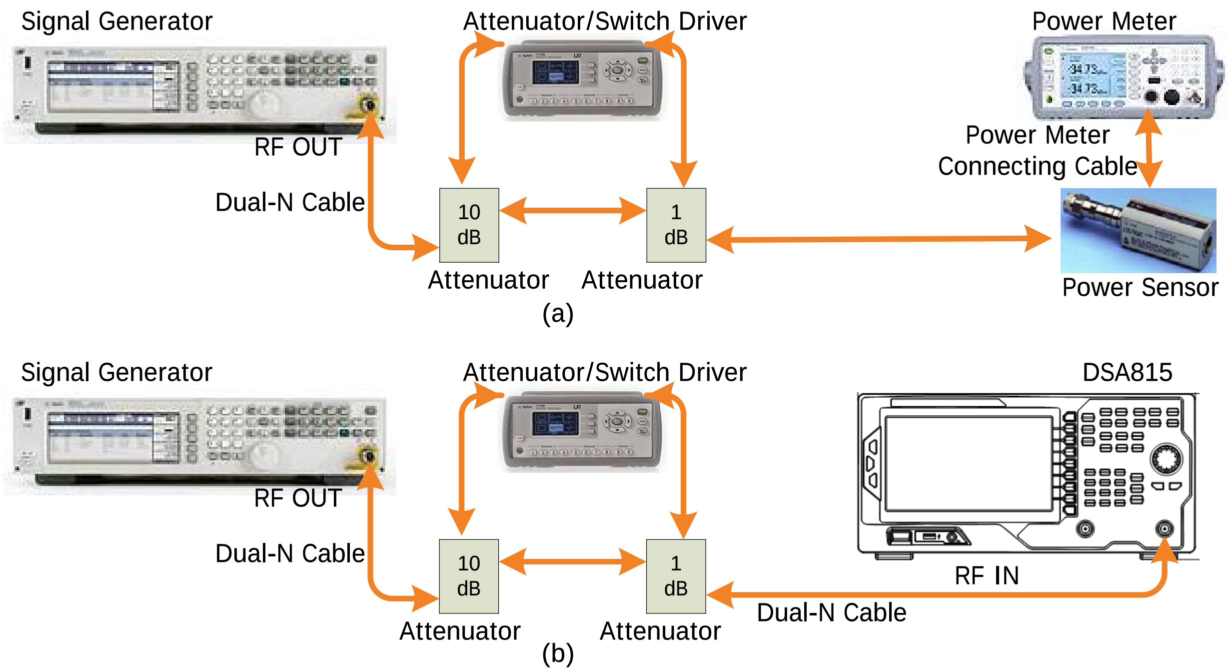


Figure 2-8 Input Attenuation Error Test Connection Diagram

Test Procedures

1. Calibrate the power meter:
   a) Connect the power sensor with the **[REF]** terminal and channel A of the power meter. Press **Channel** and set the frequency of channel A to 50 MHz.
   b) Press **Cal** and enable **Power Ref** in the **Zero/Cal** menu. Press **Zero+Cal** and wait for the calibration to finish; then, observe whether the measurement value of power meter is a 0 dBm, 50 MHz signal.
   c) Disable **Power Ref**.

2. Connect the output terminal of the signal generator with the program-controlled attenuator; then, connect the program-controlled attenuator with the power sensor, as shown in Figure 2-8 (a).

3. Set the output frequency of the signal generator to 50 MHz and the amplitude to +10 dBm.

4. Set the attenuation of the program-controlled attenuator to 20 dB and measure the amplitude using the power meter. **System Error Reference Value = Power Meter Measurement Value - (+10 dBm - 20 dB)** and record the calculation result in the test record form.

5. Modify the attenuation of the program-controlled attenuator according to the **Test Record Form** (keep other parameters unchanged). Each time the attenuation is modified, measure the amplitude using the power meter; **System Error = Power Meter Measurement Value -**

(+10 dBm - Attenuation of the Program-controlled Attenuator) - System Error Reference Value and record the calculation result in the test record form.

6. Disconnect the program-controlled attenuator and the power sensor and connect the output of the program-controlled attenuator to the RF input terminal of the spectrum analyzer, as shown in Figure 2-8 (b).

7. Set the attenuation of the program-controlled attenuator to 20 dB.

8. Configure the spectrum analyzer:
   a) Set the center frequency to 50 MHz.
   b) Set the span to 10 kHz.
   c) Set the reference level to 0 dBm.
   d) Set the input attenuation to 10 dB.
   e) Set the resolution bandwidth to 1 kHz and the video bandwidth to 10 Hz.
   f) Set the sweep time to auto and the auto sweep time to accuracy.

9. Press **Sweep/Trig** → **Single** and wait for the instrument to finish a sweep; press **Peak** to find the maximum peak. **Global Error Reference Value = Maximum Peak of the Spectrum Analyzer - (+10 dBm - 20 dB)** and record the calculation result in the test record form.

10. Set the attenuation of the program-controlled attenuator, the reference level of the spectrum analyzer and the attenuation of the internal attenuator according to the **Test Record Form**. For each group of settings, press **Sweep/Trig** → **Single**, wait for the instrument to finish a sweep and press **Peak** to find the maximum peak; **Global Error = Maximum Peak of the Spectrum Analyzer** - **(+10 dBm** - **Attenuation of the Program-controlled Attenuator)** - **Global Error Reference Value** and record the calculation result in the test record form.

11. **Uncertainty = |Global Error - System Error|** and compare the measurement results with the specification.

Test Record Form

System Error Reference Value							
Global Error Reference Value							
Reference Level	**Internal Attenuator**	**Program-controlled Attenuator**	**System Error[1]**	**Global Error[2]**	**Uncertainty[3]**	**Limit**	**Pass/Fail**
-10 dBm	0 dB	30 dB				< 0.5 dB	
-9 dBm	1 dB	29 dB					
-8 dBm	2 dB	28 dB					
-7 dBm	3 dB	27 dB					
-6 dBm	4 dB	26 dB					
-5 dBm	5 dB	25 dB					

Test Record Form (continue)

System Error Reference Value							
Global Error Reference Value							
Reference Level	**Internal Attenuator**	**Program-controlled Attenuator**	**System Error[1]**	**Global Error[2]**	**Uncertainty[3]**	**Limit**	**Pass/Fail**
-4 dBm	6 dB	24 dB					
-3 dBm	7 dB	23 dB					
-2 dBm	8 dB	22 dB					
-1 dBm	9 dB	21 dB					
0 dBm	10 dB	20 dB					
1 dBm	11 dB	19 dB					
2 dBm	12 dB	18 dB					
3 dBm	13 dB	17 dB					
4 dBm	14 dB	16 dB					
5 dBm	15 dB	15 dB					
6 dBm	16 dB	14 dB					
7 dBm	17 dB	13 dB					
8 dBm	18 dB	12 dB					
9 dBm	19 dB	11 dB					
10 dBm	20 dB	10 dB					
11 dBm	21 dB	9 dB					
12 dBm	22 dB	8 dB					
13 dBm	23 dB	7 dB					
14 dBm	24 dB	6 dB					
15 dBm	25 dB	5 dB					
16 dBm	26 dB	4 dB					
17 dBm	27 dB	3 dB					
18 dBm	28 dB	2 dB					
19 dBm	29 dB	1 dB					
20 dBm	30 dB	0 dB					

Note[1]: System Error = Measurement Value of the Power Meter - (+10 dBm - Attenuation of the Program-controlled Attenuator) - System Error Reference Value

Note[2]: Global Error = Maximum Peak of the Spectrum Analyzer - (+10 dBm - Attenuation of the Program-controlled Attenuator) - Global Error Reference Value

Note[3]: Uncertainty = |Global Error - System Error|

10 MHz Reference Output Accuracy Test

Specification

10 MHz Reference Output Accuracy	
Specification	Aging rate[1] × time from last calibration till now[2] + temperature drift[3]

Note[1]: Aging rate: < 2 ppm/year

Note[2]: The instrument was calibrated before leaving factory.

Note[3]: Temperature drift: < 2 ppm

Test Devices

1. Frequency Counter × 1
2. Dual-BNC Cable × 1

Test Connection Diagram

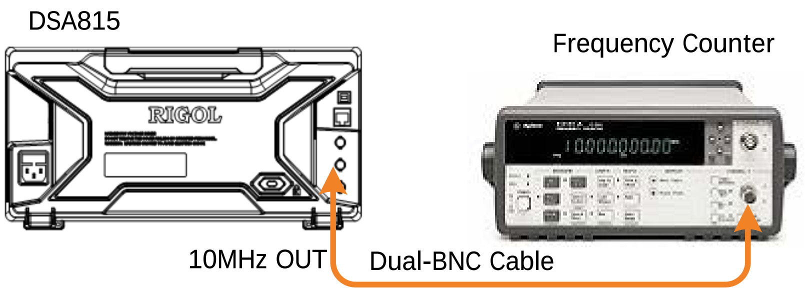


Figure 2-9 10 MHz Reference Output Accuracy Test Connection Diagram

Test Procedures

1. Connect the **[10 MHz OUT]** terminal at the rear panel of the spectrum analyzer with the frequency counter, as shown in Figure 2-9.

2. Record the measurement result of the frequency counter and compare it with the specification.

Test Record Form

Frequency Counter Measurement Result	Output Accuracy[1]	Limit	Pass/Fail
		< 10 MHz*(2ppm × time from the last calibration till now + 2ppm)	

Note[1]: Output Accuracy = |Frequency Counter Measurement Result - 10 MHz|

Appendix Test Record Form

RIGOL DSA800 Series Spectrum Analyzer
Performance Verification Test Record Form

Model:_______________ Tested By:_______________ Test Date:______________

Displayed Average Noise Level (DANL) Test:

Center Frequency	Maximum Peak	Minimum Peak	Average [1]	Limit	Pass/Fail
Preamplifier off					
103 kHz				**100 kHz to 1 MHz:** < -90 dBm Typical: -110 dBm **1 MHz to 1.5 GHz:** < -110 dBm + 6(f/1 GHz) dB Typical: -115 dBm	
1.04 MHz					
50.04 MHz					
504 MHz					
Preamplifier on					
103 kHz				**100 kHz to 1 MHz:** < -110 dBm Typical: -130 dBm **1 MHz to 1.5 GHz:** < -130 dBm + 6(f/1 GHz) dB Typical: -135 dBm	
1.04 MHz					
50.04 MHz					
504 MHz					

Note[1]: Average = (Maximum Peak + Minimum Peak)/2 (dimensionless calculation)

Single-sideband Phase Noise Test:

Signal Generator Output Frequency	Offset	Measurement Result	Limit	Pass/Fail
500 MHz	Offset 10 KHz		< -80 dBc/Hz	

Absolute Amplitude Accuracy Test:

Power Meter Measurement Value A1	Spectrum Analyzer Measurement Value A2	Calculation Result (A1 - A2)	Limit	Pass/Fail
			±0.4 dB	

Frequency Response Test (preamplifier off):

Reference Value 1				**Reference Value 2**			
Output Frequency of Signal Generator	**Power Meter Measure-ment Value A1**	**Spectrum Analyzer Measurement Value A2**	**System Error[1]**	**Global Error[2]**	**Frequency Response[3]**	**Limit**	**Pass/ Fail**
100 kHz						**100 kHz to 1.5 GHz**: < 0.7 dB	
500 kHz							
1 MHz							
10 MHz							
50 MHz							
100 MHz							
500 MHz							
1 GHz							
1.499995 GHz							

Frequency Response Test (preamplifier on):

Reference Value 1				**Reference Value 2**			
Output Frequency of Signal Generator	**Power Meter Measure-ment Value A1**	**Spectrum Analyzer Measurement Value A2**	**System Error[1]**	**Global Error[2]**	**Frequency Response[3]**	**Limit**	**Pass/ Fail**
100 kHz						**1 MHz to 1.5 GHz**: < 1.0 dB	
500 kHz							
1 MHz							
10 MHz							
50 MHz							
100 MHz							
500 MHz							
1 GHz							
1.499995 GHz							

Note[1]: System Error = Power Meter Measurement Value A1 - Reference Value 1

Note[2]: Global Error = Spectrum Analyzer Measurement Value A2 - Reference Value 2

Note[3]: Frequency Response = |Global Error - System Error|

Second Harmonic Distortion Test:

Output Frequency of Signal Generator	Delta	Calculation Result[1]	Limit	Pass/Fail	
50 MHz			> 40 dBm		
300 MHz					

Note[1]: Calculation Result = -20 dBm - Delta (-20 dBm is the level input into the mixer).

TOI Distortion Test:

Center Frequency	Delta	Calculation Result[1]	Limit	Pass/Fail	
299.8 MHz			> 10 dBm		
300.4 MHz					
999.8 MHz					
1.0004 GHz					

Note[1]: Calculation Result = -20 dBm - Delta/2 (-20 dBm is the level input into the mixer).

1 dB Gain Compression Test:

Output Amplitude of Signal Generator B	Measurement Result A1	Measurement Result A2	Calculation Result[1]	Limit	Pass/Fail
0 dBm				< 1 dBm	

Note[1]: Calculation Result = A1 - A2.

Input Attenuation Error Test:

System Error Reference Value							
Global Error Reference Value							
Reference Level	**Internal Attenuator**	**Program-controlled Attenuator**	**System Error[1]**	**Global Error[2]**	**Uncertainty[3]**	**Limit**	**Pass/Fail**
-10 dBm	0 dB	30 dB				< 0.5 dB	
-9 dBm	1 dB	29 dB					
-8 dBm	2 dB	28 dB					
-7 dBm	3 dB	27 dB					
-6 dBm	4 dB	26 dB					
-5 dBm	5 dB	25 dB					
-4 dBm	6 dB	24 dB					
-3 dBm	7 dB	23 dB					
-2 dBm	8 dB	22 dB					
-1 dBm	9 dB	21 dB					
0 dBm	10 dB	20 dB					
1 dBm	11 dB	19 dB					
2 dBm	12 dB	18 dB					
3 dBm	13 dB	17 dB					
4 dBm	14 dB	16 dB					
5 dBm	15 dB	15 dB					
6 dBm	16 dB	14 dB					
7 dBm	17 dB	13 dB					
8 dBm	18 dB	12 dB					
9 dBm	19 dB	11 dB					
10 dBm	20 dB	10 dB					
11 dBm	21 dB	9 dB					
12 dBm	22 dB	8 dB					
13 dBm	23 dB	7 dB					
14 dBm	24 dB	6 dB					
15 dBm	25 dB	5 dB					
16 dBm	26 dB	4 dB					
17 dBm	27 dB	3 dB					
18 dBm	28 dB	2 dB					
19 dBm	29 dB	1 dB					
20 dBm	30 dB	0 dB					

Note[1]: System Error = Measurement Value of the Power Meter - (+10 dBm - Attenuation of the Program-controlled Attenuator) - System Error Reference Value

Note[2]: Global Error = Maximum Peak of the Spectrum Analyzer - (+10 dBm - Attenuation of the Program-controlled Attenuator) - Global Error Reference Value

Note[3]: Uncertainty = |Global Error - System Error|

10 MHz Reference Output Accuracy Test:

Frequency Counter Measurement Result	Output Accuracy[1]	Limit	Pass/Fail
		< 10 MHz*(2ppm × time from the last calibration till now + 2ppm)	

Note[1]: Output Accuracy = \|Frequency Counter Measurement Result - 10 MHz\|