RIGOL

RSA6000 Series

Real-Time Spectrum Analyzer

Performance Verification Guide

Jul. 2025

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1 Safety Requirement

1.1 General Safety Summary

Please review the following safety precautions carefully before putting the instrument into operation so as to avoid any personal injury or damage to the instrument and any product connected to it. To prevent potential hazards, please follow the instructions specified in this manual to use the instrument properly.

- **Use Proper Power Cord.**

  Only the exclusive power cord designed for the instrument and authorized for use within the 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 the power cord to the Protective Earth terminal before connecting any inputs or outputs.

- **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 the instrument.

- **Use Proper Overvoltage Protection.**

  Ensure that no overvoltage (such as that caused by a bolt of lightning) can reach the product. Otherwise, the operator might be exposed to the danger of an electric shock.

- **Do Not Operate Without Covers.**

  Do not operate the instrument with covers or panels removed.

- **Do Not Insert Objects Into the Air Outlet.**

  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 on.

- **Do Not Operate With Suspected Failures.**

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

- **Provide Adequate Ventilation.**

  Inadequate ventilation may cause an increase of temperature in the instrument, which would cause damage to the instrument. So please keep the instrument well ventilated and inspect the air outlet and the fan regularly.

- **Do Not Operate in Wet Conditions.**

  To avoid short circuit inside the instrument or electric shock, never operate the instrument in a humid environment.

- **Do Not Operate in an Explosive Atmosphere.**

  To avoid personal injuries or damage to the instrument, never operate the instrument in an explosive atmosphere.

- **Keep Instrument Surfaces Clean and Dry.**

  To avoid dust or moisture from affecting the performance of the instrument, keep the surfaces of the instrument clean and dry.

- **Prevent Electrostatic Impact.**

  Operate the instrument in an electrostatic discharge protective environment to avoid damage induced by static discharges. Always ground both the internal and external conductors of cables to release static before making connections.

- **Use the Battery Properly.**

  Do not expose the battery (if available) to high temperature or fire. Keep it out of the reach of children. Improper change of a battery (lithium battery) may cause an explosion. Use the RIGOL specified battery only.

- **Handle with Caution.**

  Please handle with care during transportation to avoid damage to keys, knobs, interfaces, and other parts on the panels.

WARNING

Equipment meeting Class A requirements may not offer adequate protection to broadcast services within residential environment.

1.2 Safety Notices and Symbols

Safety Notices in this Manual:

WARNING

Indicates a potentially hazardous situation or practice which, if not avoided, will result in serious injury or death.

CAUTION

Indicates a potentially hazardous situation or practice which, if not avoided, could result in damage to the product or loss of important data.

Safety Notices on the Product:

- **DANGER**

  It calls attention to an operation, if not correctly performed, could result in injury or hazard immediately.

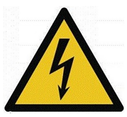
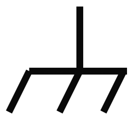
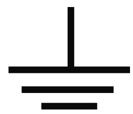
- **WARNING**

  It calls attention to an operation, if not correctly performed, could result in potential injury or hazard.

- **CAUTION**

  It calls attention to an operation, if not correctly performed, could result in damage to the product or other devices connected to the product.

Safety Symbols on the Product:

				
Hazardous Voltage	**Safety Warning**	**Protective Earth Terminal**	**Chassis Ground**	**Test Ground**

2 Document Overview

This manual is designed to guide you to properly test the performance specifications in the GPSA mode of RIGOL RSA6000 series real-time spectrum analyzer. For the operation methods mentioned in the test procedures, refer to User Guide of this product.

TIP

For the latest version of this manual, download it from the official website of RIGOL (*http://www.rigol.com*).

Publication Number

PVD27100-1110

Software Version

Software upgrade might change or add product features. Please acquire the latest version of the manual from RIGOL website or contact RIGOL to upgrade the software.

Format Conventions in this Manual

1. Key

The front panel key is denoted by the menu key icon. For example, 

indicates the "System" key.

2. Menu

The menu item is denoted by the format of "Menu Name (Bold) + Character Shading" in the manual. For example, **Setup** indicates clicking or tapping the "Setup" sub-menu under the "System" menu to view the basic system settings.

3. Operation Procedures

The next step of the operation is denoted by ">" in the manual. For example,  > **Save** indicates that first clicking or tapping the icon , then clicking or tapping **Save**.

4. Connector

The connectors on the front or rear panel are usually denoted by the format of "Connector Name (Bold) + Square Brackets (Bold)". For example **[TRIG IN]**.

Content Conventions in this Manual

The RSA6000 series spectrum analyzer includes the following models. Unless otherwise specified, this manual takes RSA6265 as an example to illustrate the functions and operation methods of the RSA6000 series.

Model	Frequency Range
RSA6265	5 kHz to 26.5 GHz
RSA6140	5 kHz to 14 GHz
RSA6085	5 kHz to 8.5 GHz

3 Overview

3.1 Test Preparations

Before performing the test, make the following preparations:

1. Warm up the RSA6000 spectrum analyzer for at least 30 minutes.
2. Make sure that the instrument is within the calibration period (18 months) and perform self-calibration on the spectrum analyzer. Click or tap **System** > **Calibration** > **Calibrate Now**, and the spectrum analyzer performs self-calibration immediately using internal calibration source.
3. The test devices required should fulfill the requirements of the "Specification" section as shown in *Test Devices Required*. You can also use the recommended models in the following table to make measurements.

Test Devices Required

Device	Specification	Qty.	Recommended Model
Signal Generator	Frequency range: 5 kHz to 26.5 GHz Amplitude accuracy: ±0.6 dB 1 GHz single-sideband phase noise: < -126 dBc/Hz@10 kHz offset	2	Keysight N5183B
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	Keysight 53181A
USB Power Sensor	Resolution: 0.01 dB Frequency range: 10 MHz to 26.5 GHz Max SWR: 1.13 (10 kHz to 2 GHz) 1.19 (2 GHz to 14 GHz) 1.22 (14 GHz to 16 GHz)	1	U2065XA

Device	Specification	Qty.	Recommended Model
	1.26 (16 GHz to 26.5 GHz) Amplitude range: 1 nW to 100 mW (-60 dBm to +20 dBm)		
Power Divider	Frequency range: 5 kHz to 26.5 GHz Insertion loss: 7 dB, nominal Output track: < 0.25 dB Equivalent output SWR: < 1.22:1	1	Keysight 11667B
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 Keysight 8494H and 8496H programmable step attenuator	1	Keysight 11713B
Step Attenuator	Step: 1 dB Attenuation range: 0 dB to 11 dB Frequency range: 50 MHz ± 1 MHz Connector: N (F) Attenuator repeatability: ±0.03 dB	1	Keysight 8494H
	Step: 10 dB Attenuation range: 0 dB to 110 dB Frequency range: 50 MHz ± 1 MHz Connector: N (F) Attenuator repeatability: ±0.03 dB		
Attenuator Interconnect Kit	Connect Keysight 8494H and Keysight 8496H	1	Keysight 11716A
50 Ω Matched Load	Impedance: 50 Ω, nominal Connector: 3.5 mm (F)	1	-
2.4 mm to 3.5 mm Cable	2.4 mm (F) to 3.5 mm (M) Cable	2	-
	2.4 mm (F) to 3.5 mm (F) Cable	1	

Device	Specification	Qty.	Recommended Model
2.4 mm to 2.4 mm Cable	2.4 mm (F) to 2.4 mm (F) Cable	1	-
3.5 mm to 3.5 mm Cable	3.5 mm (M) to 3.5 mm (M) Cable	1	-
2.4 mm to N-type Cable	2.4 mm (F) to N (M) Cable	2	-
Adapter	2.4 mm (F) to 3.5 mm (M)	1	-
Adapter	3.5 mm (M) to 3.5 mm (M)	1	-
Adapter	3.5 mm (F) to 3.5 mm (F)	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 adapter according to the actual type of the connecting terminals.

3.2 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.

3.3 Specifications

The specification of each test item is provided in Chapter 4. For other technical parameters, refer to *RSA6000 DataSheet* (available to download them from RIGOL website: *http://www.rigol.com*)

TIP

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

4 Performance Verification Test

This chapter introduces the performance verification test methods and test process of RSA6000 series real-time spectrum analyzer in GPSA mode.

NOTE

1. Before executing the performance verification test, ensure that the spectrum analyzer has undergone the self-calibration.
2. Before performing each test, ensure that the spectrum analyzer has been warmed up for at least 30 minutes.
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 (click or tap **System** > **Calibration**> **Calibrate Now**) before the test.
5. Definitions of "Typical", "Nominal", and "Measured" values for this product are as follows.
   - Typical (typ.): typical performance, which 80 percent of the measurement results will meet at room temperature (approximately 25℃). The data are not warranted and do not include the measurement uncertainty.
   - Nominal (nom.): the expected mean or average performance or a designed attribute (such as the 50Ω connector). The data are not warranted and are measured at room temperature (approximately 25℃).
   - Measured (meas.): an attribute measured during the design phase and can be compared with the expected performance, e.g. the amplitude drift varies with time. The data are not warranted and are measured at room temperature (approximately 25℃).

4.1 DANL Test

4.1.1 Specification

Displayed Average Noise Level (DANL)				
		RSA6085	RSA6140	RSA6265
		attenuation = 0 dB, sample detector, trace averages ≥ 50, tracking generator off, normalized to 1 Hz, 20℃ to 30℃, input impedance = 50 Ω.		
PA off	5 kHz to 100 kHz	<-120 dBm (typ.)		
	100 kHz to 20 MHz	<-135 dBm, <-138 dBm (typ.)		
	20 MHz to 1.5 GHz	<-140 dBm, <-143 dBm (typ.)		

Displayed Average Noise Level (DANL)		
	1.5 GHz to 3.2 GHz	<-138 dBm, <-141 dBm (typ.)
	3.2 GHz to 8.5 GHz	<-136 dBm, <-140 dBm (typ.)
	8.5 GHz to 14 GHz	<-133 dBm, <-136 dBm (typ.)
	14 GHz to 18 GHz	<-130 dBm, <-133 dBm (typ.)
	18 GHz to 23 GHz	<-127 dBm, <-131 dBm (typ.)
	23 GHz to 26.5 GHz	<-122 dBm, <-125 dBm (typ.)
PA on	100 kHz to 500 kHz	<-149 dBm, <-152 dBm (typ.)
	500 kHz to 20 MHz	<-152 dBm, <-155 dBm (typ.)
	20 MHz to 1.5 GHz	<-160 dBm, <-163 dBm (typ.)
	1.5 GHz to 3.2 GHz	<-157 dBm, <-160 dBm (typ.)
	3.2 GHz to 8.5 GHz	<-154 dBm, <-157 dBm (typ.)
	8.5 GHz to 14 GHz	<-151 dBm, <-154 dBm (typ.)
	14 GHz to 18 GHz	<-148 dBm, <-151 dBm (typ.)
	18 GHz to 23 GHz	<-145 dBm, <-148 dBm (typ.)
	23 GHz to 26.5 GHz	<-140 dBm, <-143 dBm (typ.)

4.1.2 Test Device

50 Ω Matched Load × 1

4.1.3 Test Connection Diagram

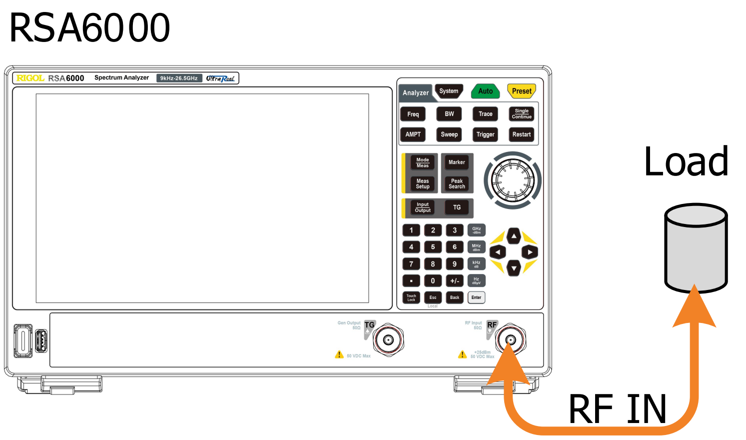


Figure 4.1 DANL Test Connection Diagram

4.1.4 Test Procedures

1. Connect the 50 Ω matched load to the RF input terminal of RSA6000, as shown in *Figure 4.1* .
2. Configure the spectrum analyzer:
   1. Set the preamplifier to Off.
   2. Set the span to 10 kHz.
   3. Set the detector type to Sample.
   4. Set the input attenuation to 0 dB.
   5. Set the resolution bandwidth to 1 kHz, and set the video bandwidth to 1 kHz.
   6. Set the reference level to -50 dBm.
   7. Set the trace type to Average, and set the average count to 50.
3. Modify the center frequency of the spectrum analyzer according to the frequency parameters listed in *Table 4.2 Center Frequency Setting of DANL Test* . Each time the center frequency is modified, press **Single** and wait for the instrument to perform a single sweep. After the sweep is finished, perform maximum peak search and minimum peak search, then record the results in the test record form.

Table 4.2 Center Frequency Setting of DANL Test

Center Frequency				
50 kHz	1.04 MHz	504 MHz	2.004 GHz	3.004 GHz
6.204 GHz	8.204 GHz	10.204 GHz	13.204 GHz	17.204 GHz

Center Frequency				
21.204 GHz	24.204 GHz	26.204 GHz		

4. Take the average of the maximum peak and minimum peak (add the two values and calculate the average), then normalize it to 1 Hz as the measurement result. That is, use the formula: **Measurement Result = Average Value - 10 x lg(RBW)**. Wherein, RBW is set to 1 kHz in *Configure the spectrum analyzer*. Compare the measurement result with the specification.

5. Keep other settings unchanged and enable the preamplifier of the spectrum analyzer. Repeat Step 3 (ignore the measurement for 50 kHz center frequency) and Step 4, then record the test results.

4.1.5 Test Record Form

Center Frequency	Maximum Peak	Minimum Peak	Average[1]	Test Result[2]	Limit	Pass/Fail
PA off						
50 kHz					5 kHz to 100 kHz <-120 dBm (typ.) 100 kHz to 20 MHz <-135 dBm, <-138 dBm (typ.) 20 MHz to 1.5 GHz <-140 dBm, <-143 dBm (typ.) 1.5 GHz to 3.2 GHz <-138 dBm, <-141 dBm (typ.) 3.2 GHz to 8.5 GHz <-136 dBm, <-140 dBm (typ.) 8.5 GHz to 14 GHz <-133 dBm, <-136 dBm (typ.) 14 GHz to 18 GHz <-130 dBm, <-133 dBm (typ.) 18 GHz to 23 GHz <-127 dBm, <-131 dBm (typ.) 23 GHz to 26.5 GHz <-122 dBm, <-125 dBm (typ.)	
1.04 MHz						
504 MHz						
2.004 GHz						
3.004 GHz						
6.204 GHz						
8.204 GHz						
10.204 GHz						
13.204 GHz						
17.204 GHz						
21.204 GHz						
24.204 GHz						
26.204 GHz						

Center Frequency	**Maximum Peak**	**Minimum Peak**	**Average**[1]	**Test Result**[2]	**Limit**	**Pass /Fail**
PA on						
1.04 MHz					100 kHz to 500 kHz <-149 dBm, <-152 dBm (typ.) 500 kHz to 20 MHz <-152 dBm, <-155 dBm (typ.) 20 MHz to 1.5 GHz <-160 dBm, <-163 dBm (typ.) 1.5 GHz to 3.2 GHz <-157 dBm, <-160 dBm (typ.) 3.2 GHz to 8.5 GHz <-154 dBm, <-157 dBm (typ.) 8.5 GHz to 14 GHz <-151 dBm, <-154 dBm (typ.) 14 GHz to 18 GHz <-148 dBm, <-151 dBm (typ.) 18 GHz to 23 GHz <-145 dBm, <-148 dBm (typ.) 23 GHz to 26.5 GHz <-140 dBm, <-143 dBm (typ.)	
504 MHz						
2.004 GHz						
3.004 GHz						
6.204 GHz						
8.204 GHz						
10.204 GHz						
13.204 GHz						
17.204 GHz						
21.204 GHz						
24.204 GHz						
26.204 GHz						

NOTE

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

[2]: Test Result = Average - 10 x lg1000 = Average - 30 dB

4.2 SSB Phase Noise Test

4.2.1 Specification

SSB Phase Noise		
20℃ to 30℃, f_c = 1 GHz, sample detector		
Carrier Offset	10 kHz offset	<-105 dBc/Hz

4.2.2 Test Device

1. Signal Generator × 1
2. 2.4 mm to 3.5 mm Cable × 1
3. Dual-BNC Cable × 1

4.2.3 Test Connection Diagram

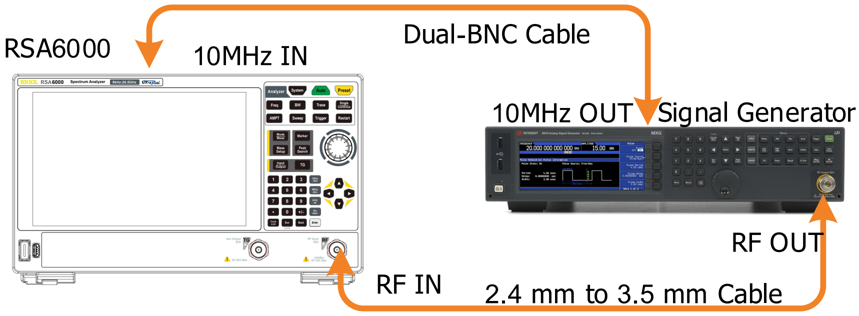


Figure 4.2 SSB Phase Noise Test Connection Diagram

4.2.4 Test Procedures

1. Synchronize the clock of the spectrum analyzer and that of the signal generator.
2. Connect the output terminal of the signal generator with the RF input terminal of the spectrum analyzer, as shown in *Figure 4.2* .
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 set the reference level to 0 dBm.

   d. Set the resolution bandwidth to 1 kHz, and set the video bandwidth to 30 Hz.

   e. Set the trace type to Clear Write.

   f. Set the detector type to Pos Peak.

   g. Set the sweep time to 10 s.

5. Press **Single** and wait for the instrument to finish a sweep. Then press **Peak Search** to find the maximum peak.
6. Set the marker mode to Delta; set the detector type to RMS Average; set the trace type to average; set the average times to 5.
7. Press **Marker** on the front panel, then click or tap **Marker Freq**. Then the virtual keypad is displayed. Input 10 kHz. Press **Single** and wait for the instrument to finish a sweep. Press **Marker** on the front panel, then click or tap **Function** under **Marker**. Click or tap the sub-menu item **Band Function** to select **Noise**. Read the current measurement results, and record the results.
8. Compare the measurement result with the specification.

4.2.5 Test Record Form

Output Frequency of Signal Generator	Offset	Measurement Result	Limit	Pass/Fail
1 GHz	10 kHz offset		<-105 dBc/Hz	

4.3 Absolute Amplitude Accuracy Test

4.3.1 Specification

Absolute Amplitude Accuracy	
fc = 50 MHz, peak detector, PA off, attenuation = 10 dB, input signal level = -10 dBm, 20℃ to 30℃	
Uncertainty	<0.3 dB

4.3.2 Test Device

1. Signal Generator × 1
2. USB Power Sensor × 1
3. 2.4 mm to 3.5 mm Cable × 1
4. 2.4 mm to 3.5 mm Adapter × 1
5. Dual-BNC Cable × 1

4.3.3 Test Connection Diagram

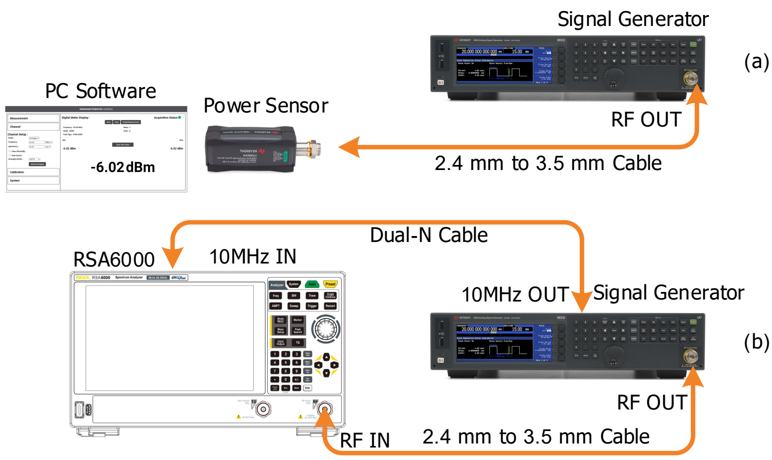


Figure 4.3 Absolute Amplitude Accuracy Test Connection Diagram

4.3.4 Test Procedures

1. Calibrate the power sensor: In the USB-connected operation control interface, click **Calibration**, then perform zeroing and calibration for the power sensor.
2. Connect the output terminal of the signal generator with the power sensor, as shown in *Figure 4.3* (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 sensor. Read the measurement value **A1** of the power sensor and record it.
5. Disconnect the signal generator and the power sensor. Connect the **[10MHz REF OUT]** terminal of the signal generator with the [10MHz REF IN] terminal on the rear panel of the spectrum analyzer by using a dual-BNC cable to synchronize the clock of the two instruments.
6. Connect the output terminal of the signal generator with the the input terminal of the spectrum analyzer, as shown in *Figure 4.3* (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 100 ms.

g. Press **Single** and wait for the instrument to finish a sweep. Then press **Peak Search** to find the maximum peak. Record the result **A2**.

8. Absolute Amplitude Accuracy = **A1** - **A2**. Compare the measurement result with the specification.

4.3.5 Test Record Form

Power Sensor Measurement Value A1	Spectrum Analyzer Measurement Value A2	Calculation Result (A1 - A2)	Limit	Pass/Fail
			<0.3 dB	

4.4 Frequency Response Test

4.4.1 Specification

Frequency Response				
		RSA6085	RSA6140	RSA6265
attenuation = 10 dB, relative to 50 MHz, 20℃ to 30℃				
PA Off	5 kHz to 100 kHz	<0.3 dB (typ.)		
	100 kHz to 3.2 GHz	<0.5 dB, <0.3 dB (typ.)		
	3.2 GHz to 8.5 GHz	<0.7 dB, <0.5 dB (typ.)		
	8.5 GHz to 14 GHz	<1.5 dB, <1.3 dB (typ.)		
	14 GHz to 20 GHz	<1.7 dB, <1.5 dB (typ.)		
	20 GHz to 26.5 GHz	<2 dB, <1.8 dB (typ.)		
attenuation = 0 dB, relative to 50 MHz, 20℃ to 30℃				
PA On	100 kHz to 3.2 GHz	<0.8 dB, <0.6 dB (typ.)		
	3.2 GHz to 8.5 GHz	<1 dB, <0.8 dB (typ.)		
	8.5 GHz to 14 GHz	<2.5 dB, <2.3 dB (typ.)		

Frequency Response		
	14 GHz to 20 GHz	<2.7 dB, <2.5 dB (typ.)
	20 GHz to 26.5 GHz	<3 dB, <2.8 dB (typ.)

4.4.2 Test Device

1. Signal Generator × 1
2. USB Power Sensor × 1
3. 2.4 mm to 3.5 mm Cable × 1
4. 2.4 mm to 3.5 mm Adapter × 1
5. Dual-BNC Cable × 1

4.4.3 Test Connection Diagram

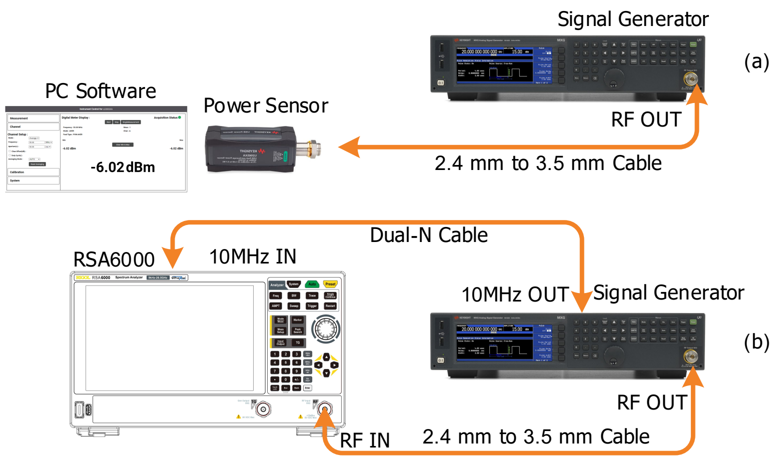


Figure 4.4 Frequency Response Test Connection Diagram

4.4.4 Test Procedures

1. Calibrate the power sensor: In the USB-connected operation control interface, click **Calibration**, then perform zeroing and calibration for the power sensor.
2. Connect the output terminal of the signal generator with the power sensor, as shown in *Figure 4.4* (a).
3. Set the output frequency of the signal generator to 50 MHz; set the amplitude to -10 dBm.

4. Measure the output amplitude of the signal generator by using the power sensor and record the measurement result as **Reference Value 1**.
5. Modify the output frequency of the signal generator according to *Table 4.9 Output Frequency of the Signal Generator* .

Table 4.9 Output Frequency of the Signal Generator

Freq				
10 MHz	54 MHz	504 MHz	2.004 GHz	3.004 GHz
6.204 GHz	8.204 GHz	10.204 GHz	13.204 GHz	17.204 GHz
21.204 GHz	24.204 GHz	26.204 GHz		

6. Each time the output frequency of the signal generator is modified, the frequency of the power sensor is modified accordingly. Measure the amplitude **A1** and record the measurement result. Subtract **Reference Value 1** from **A1** to calculate the **System Error**.
7. Disconnect the signal generator from the power sensor. Synchronize the clock of the signal generator and that of the spectrum analyzer.
8. Connect the output terminal of the signal generator with the RF input terminal of the spectrum analyzer, as shown in *Figure 4.4* (b).
9. Set the output frequency of the signal generator to 50 MHz; set 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 mode to Auto; set the sweep type to Accurate.
    g. Press **Single** and wait for the instrument to finish a sweep. Press **Peak Search** 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 4.9 Output Frequency of the Signal*

Generator (the center frequency of the spectrum analyzer corresponds to output frequency of the signal generator).

12. Each time the center frequency is modified, press **Single** and wait for the instrument to finish a sweep. Press **Peak Search** to find the maximum peak, record the measurement result **A2**; subtract **Reference Value 2** from **A2** to calculate the **Global Error** and record the result.

13. Use the formula **Frequency Response** = **|Global Error** - **System Error|** to calculate the frequency response. Compare the calculation result with the specification.

14. Press **Preset** to restore the spectrum analyzer to its factory setting. Enable the PA of the spectrum analyzer. Repeat Step 3-Step 13 (set the output amplitude of the signal generator in Step 3 and Step 9 to -40 dBm) and record the calculation result. At this point, as the PA is enabled, after executing d) in Step 10, the reference level will change to -30 dBm automatically.

4.4.5 Test Record Form

PA off

<table>
<tr><th colspan="4">Reference Value 1</th><th colspan="4">Reference Value 2</th></tr>
<tr><td>Output Frequency of Signal Generator</td><td>Power Sensor Measurement Value A1</td><td>Spectrum Analyzer Measurement Result A2</td><td>System Error[1]</td><td>Global Error[2]</td><td>Frequency Response[3]</td><td>Limit</td><td>Pass /Fail</td></tr>
<tr><td>10 MHz</td><td></td><td></td><td></td><td></td><td></td><td rowspan="9">5 kHz to 100 kHz
<0.3 dB (typ.)
100 kHz to 3.2 GHz
<0.5 dB, <0.3 dB (typ.)
3.2 GHz to 8.5 GHz
<0.7 dB, <0.5 dB (typ.)
8.5 GHz to 14 GHz
<1.5 dB, <1.3 dB (typ.)
14 GHz to 20 GHz</td><td></td></tr>
<tr><td>54 MHz</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>504 MHz</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>2.004 GHz</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>3.004 GHz</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>6.204 GHz</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>8.204 GHz</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>10.204 GHz</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>13.204 GHz</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

Reference Value 1				Reference Value 2			
17.204 GHz						<1.7 dB, <1.5 dB (typ.) 20 GHz to 26.5 GHz <2 dB, <1.8 dB (typ.)	
21.204 GHz							
24.204 GHz							
26.204 GHz							

PA on

Reference Value 1				Reference Value 2			
Output Frequency of Signal Generator	Power Sensor Measurement Value A1	Spectrum Analyzer Measurement Result A2	System Error[1]	Global Error[2]	Frequency Response[3]	Limit	Pass /Fail
54 MHz						100 kHz to 3.2 GHz <0.8 dB, <0.6 dB (typ.) 3.2 GHz to 8.5 GHz <1 dB, <0.8 dB (typ.) 8.5 GHz to 14 GHz <2.5 dB, <2.3 dB (typ.) 14 GHz to 20 GHz <2.7 dB, <2.5 dB (typ.) 20 GHz to 26.5 GHz <3 dB, <2.8 dB (typ.)	
504 MHz							
2.004 GHz							
3.004 GHz							
6.204 GHz							
8.204 GHz							
10.204 GHz							
13.204 GHz							
17.204 GHz							
21.204 GHz							

Reference Value 1				Reference Value 2			
24.204 GHz							
26.204 GHz							

NOTE

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

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

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

4.5 Second Harmonic Distortion Test

4.5.1 Specification

Second Harmonic Distortion	
fc≥ 50 MHz, input signal level = -20 dBm, attenuation = 0 dB, PA off.	
Specification	+45 dBm

4.5.2 Test Device

1. Signal Generator × 1
2. 300 MHz Low-pass Filter × 1
3. 1 GHz Low-pass Filter × 1
4. 2.4 mm to 3.5 mm Cable × 1
5. 3.5 mm to 3.5 mm Cable × 1
6. Dual-BNC Cable × 1

4.5.3 Test Connection Diagram

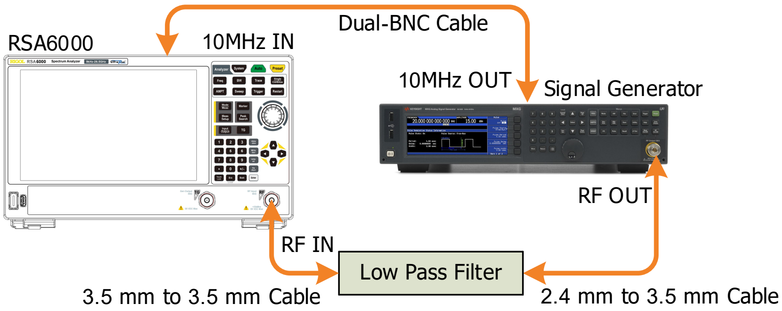


Figure 4.5 Second Harmonic Distortion Test Connection Diagram

4.5.4 Test Procedures

1. Synchronize the clock of the signal generator and that of spectrum analyzer. Connect the output terminal of the signal generator with the 300 MHz low-pass filter. Then connect the filter with the RF input terminal of the spectrum analyzer.
2. Set the output frequency of the signal generator to 300 MHz; set the amplitude to -20 dBm.
3. Configure the spectrum analyzer:
   a. Set the center frequency to 300 MHz.
   b. Set the span to 10 kHz.
   c. Set the reference level to -10 dBm.
   d. Set the input attenuation to 0 dB.
   e. Set the resolution bandwidth to 100 Hz.
   f. Set the video bandwidth to 100 Hz.
4. Press **Single** and wait for the instrument to finish a sweep. Then press **Peak Search** to find the maximum peak. Set the marker mode to Delta. Set the center frequency to 600 MHz. Press **Single** and wait for the instrument to finish a sweep. Then press **Peak Search** and record the delta result.
5. Use the formula below to calculate the second harmonic distortion.

   Second Harmonic Distortion = -20 dBm - Delta (-20 dBm is the level input into the mixer).

   Compare the calculation result with the specification.

6. Press **Preset** to restore the spectrum analyzer to its factory setting. Replace the filter connected with the signal generator with a 1 GHz low-pass filter. Set the output frequency of the signal generator to 1 GHz.
7. Configure the spectrum analyzer: set the center frequency to 1 GHz and the other parameter settings are the same as those specified in Step 3.
8. Press **Single** and wait for the instrument to finish a sweep. Then press **Peak Search** to find the maximum peak. Set the marker mode to Delta. Set the center frequency to 2 GHz. Press **Single** and wait for the instrument to finish a sweep. Then press **Peak Search** and record the delta result.
9. Use the formula below to calculate the second harmonic distortion.

   Second Harmonic Distortion = -20 dBm - Delta (-20 dBm is the level input into the mixer).

   Compare the calculation result with the specification.

4.5.5 Test Record Form

Output Frequency of Signal Generator	Delta	Calculation Result[1]	Limit	Pass/Fail
300 MHz			>45 dBm	
1 GHz				

NOTE

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

4.6 TOI Distortion Test

4.6.1 Specification

TOI Distortion		
f_c ≥ 50 MHz, two -20 dBm tones at input mixer spaced by 200 kHz, attenuation = 0 dB, preamp off.		
TOI	10 MHz to 8.5 GHz	+11 dBm, +15 dBm (typ.)
	8.5 GHz to 26.5 GHz	+10 dBm, +14 dBm (typ.)

4.6.2 Test Device

1. Signal Generator × 2
2. USB Power Sensor × 1
3. Power Divider × 1
4. 2.4 mm to 3.5 mm Cable × 2
5. 3.5 mm to 3.5 mm Cable × 2
6. 2.4 mm to 3.5 mm Adapter × 1
7. 300 MHz Low-pass Filter × 1
8. 1 GHz Low-pass Filter × 1
9. Dual-BNC Cable × 1

4.6.3 Test Connection Diagram

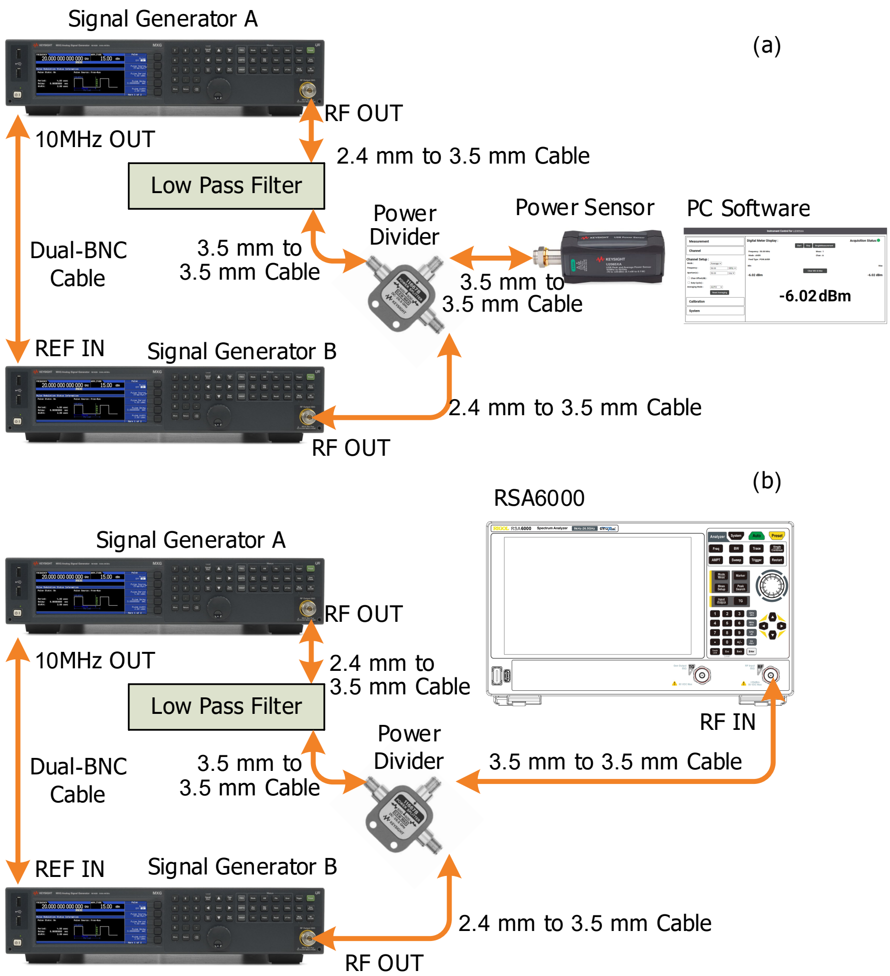


Figure 4.6 TOI Distortion Test Connection Diagram

4.6.4 Test Procedures

1. Calibrate the power sensor: In the USB-connected operation control interface, click **Calibration**, then perform zeroing and calibration for the power sensor.
2. Synchronize the clock of the two signal generators.

   Set the output frequency of Signal Generator A to 300 MHz; set the amplitude to -10 dBm.

   Set the output frequency of Signal Generator B to 300.2 MHz; set 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. Connect the power divider with the power sensor, as shown in *Figure 4.6* (a).
5. Set the frequency of the power sensor 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 sensor. Adjust the output amplitude of Signal Generator A until the measurement value of the power sensor becomes -20 dBm.
6. Set the frequency of the power sensor 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 sensor. Adjust the output amplitude of Signal Generator B until the measurement value of the power sensor becomes -20 dBm.
7. Enable the outputs of the two signal generators. Disconnect the power divider from the power sensor; connect the power divider with the spectrum analyzer, as shown in *Figure 4.6* (b).
8. Configure the spectrum analyzer:
   a. Set the center frequency to 300 MHz.
   b. Set the span to 1 kHz.
   c. Set the CF step to 200 kHz.
   d. Set the input attenuation to 0 dB; and set the reference level to -8 dBm.
   e. Set the resolution bandwidth to 30 Hz, and set the video bandwidth to 3 Hz.
   f. Set the peak excursion to 3 dB.
9. Press **Single** and wait for the instrument to finish a sweep. Then press **Peak Search** to find the maximum peak. Set the marker mode to Delta and reduce the center frequency by 200 kHz. Press **Single** and wait for the instrument to finish a sweep. Then press **Peak Search** and record the delta result.
10. Use the formula below to calculate the TOI distortion.

    TOI Distortion = -20 dBm - Delta/2

    Compare the calculation result with the specification.

11. Exchange the output frequencies of the two signal generators. Set the center frequency of the spectrum analyzer to 300.4 MHz. Press **Single** and wait for the instrument to finish a sweep. Then press **Peak Search** and record the delta result.

12. Use the formula below to calculate the TOI distortion. **TOI Distortion = -20 dBm - Delta/2**. Compare the calculation result with the specification.

13. Set the output frequency of Signal Generator A to 1 GHz; set the amplitude to -10 dBm. Set the output frequency of Signal Generator B to 1.0002 GHz; set the amplitude to -10 dBm.

14. Replace the 300 MHz low-pass filter connected with Signal Generator A with a 1 GHz low-pass filter. Repeat Step 4-7 (In Step 5 and Step 6, the frequency of the power sensor is set to 1 GHz and 1.0002 GHz respectively).

15. Keep other settings unchanged. Set the center frequency of the spectrum analyzer to 1 GHz; set the span to 1 kHz. Repeat Step 8-10.

16. Exchange the output settings of the two signal generators. Set the center frequency of the spectrum analyzer to 1.0004 GHz. Press **Single** and wait for the instrument to finish a sweep. Then press **Peak Search** and record the delta result. Repeat Step 10.

4.6.5 Test Record Form

Center Frequency	Delta	Calculation Result[1]	Limit	Pass/Fail
299.8 MHz			10 MHz to 8.5 GHz +11 dBm, +15 dBm (typ.) 8.5 GHz to 26.5 GHz +10 dBm, +14 dBm (typ.)	
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).

4.7 1 dB Gain Compression Test

4.7.1 Specification

1 dB Gain Compression[1]	
$f_c \geq$ 50 MHz, attenuation = 0 dB, PA off	
Specification	0 dBm (nom.)

NOTE

Note: [1] The frequency interval of the two-tone signals should be greater than 10 MHz.

4.7.2 Test Device

1. Signal Generator × 2
2. USB Power Sensor × 1
3. Power Divider × 1
4. 2.4 mm to 3.5 mm Cable × 2
5. 3.5 mm to 3.5 mm Cable × 1
6. 2.4 mm to 3.5 mm Adapter × 1
7. Dual-BNC Cable × 1

4.7.3 Test Connection Diagram

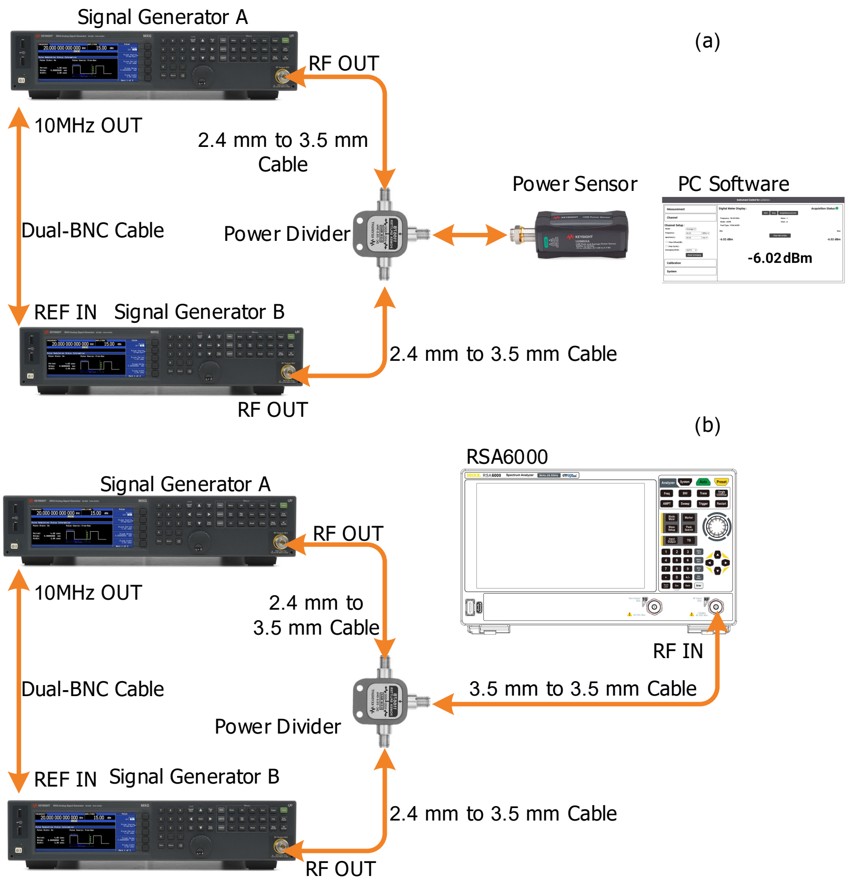


Figure 4.7 1 dB Gain Compression Test Connection Diagram

4.7.4 Test Procedures

1. Calibrate the power sensor: In the USB-connected operation control interface, click **Calibration**, then perform zeroing and calibration for the power sensor.
2. Synchronize the clock of the two signal generators. Connect the outputs of the two signal generators with the power divider. Then connect the power divider with the power sensor, as shown in *Figure 4.7* (a).
3. Set the signal generator:

   Set the output frequency of Signal Generator A to 50 MHz; set the amplitude to -20 dBm.

   Set the output frequency of Signal Generator B to 65 MHz; set the amplitude to 0 dBm.

4. Set the frequency of the power sensor to 50 MHz.

   Enable the output of Signal Generator A and disable the output of Signal Generator B. Observe the measurement value of the power sensor. Adjust the output amplitude of Signal Generator A until the readout value of the power sensor becomes -20 dBm.

5. Set the frequency of the power sensor to 65 MHz.

   Disable the output of Signal Generator A and enable the output of Signal Generator B. Observe the measurement value of the power sensor. Adjust the output amplitude of Signal Generator B until the readout value of the power sensor becomes 0 dBm.

6. Disconnect the power divider from the power sensor; connect the power divider with the spectrum analyzer, as shown in *Figure 4.7* (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 0 dBm.
   d. Set the input attenuation to 0 dB.
   e. Set the resolution bandwidth to 1 kHz.
   f. Set the sweep mode to Auto; set the sweep type to Accurate.
9. Press **Single** and wait for the instrument to finish a sweep. Press **Peak Search** to measure the current peak. Record the measurement result as **A1**.
10. Enable the output of the two signal generators. Press **Single** and wait for the instrument to finish a sweep. Press **Peak Search** to measure the peak at 50 MHz. Record the measurement result as **A2**.
11. **Delta = A1 - A2**. Record the delta result.

4.7.5 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.

4.8 Input Attenuation Switching Uncertainty Test

4.8.1 Specification

Input Attenuation Switching Uncertainty	
fc = 50 MHz, relative to 10 dB, PA off, 20℃ to 30℃	
Switching Uncertainty	<0.3 dB

4.8.2 Test Device

1. Signal Generator × 1
2. USB Power Sensor × 1
3. Program-controlled Attenuator:

   Attenuator/Switch Driver × 1

   Step Attenuator (Step: 1 dB) × 1

   Step Attenuator (Step: 10 dB) × 1

   Attenuator Interconnect Kit × 1
4. N to 2.4 mm Cable × 2
5. 2.4 mm to 3.5 mm Adapter × 1

4.8.3 Test Connection Diagram

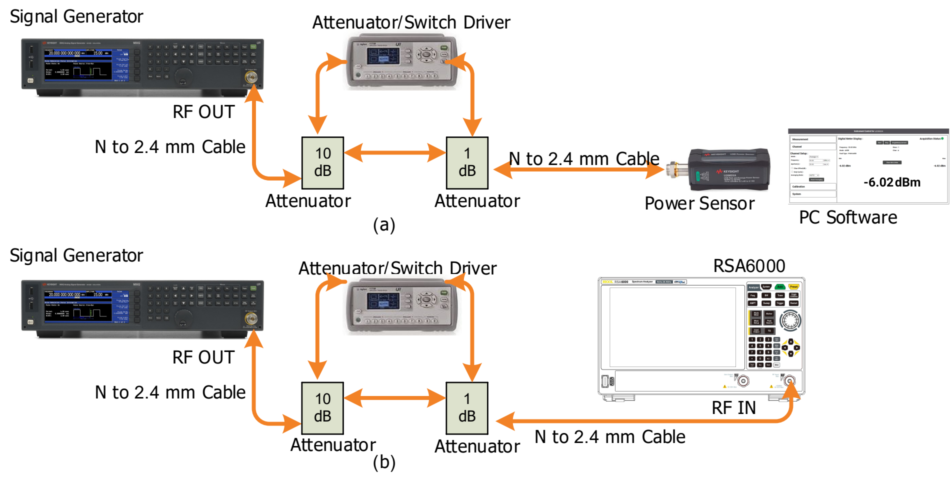


Figure 4.8 Input Attenuation Switching Uncertainty Test Connection Diagram

4.8.4 Test Procedures

1. Calibrate the power sensor: In the USB-connected operation control interface, click **Calibration**, then perform zeroing and calibration for the power sensor.
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 4.8* (a).
3. Set the output frequency of the signal generator to 50 MHz; set the amplitude to +10 dBm.
4. Set the attenuation of the program-controlled attenuator to 20 dB and measure sensor amplitude with the power sensor. Use the formula below to calculate the system error reference value. **System Error Reference Value = Power sensor Measurement Value - (+10 dBm - 20 dB)**. 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 sensor amplitude with the power sensor. Use the formula

below to calculate the system error. **System Error = Power Sensor Measurement Value - (+10 dBm - Attenuation of the Program-controlled Attenuator) - System Error Reference Value**. Record the calculation result in the test record form.

6. Disconnect the program-controlled attenuator and the power sensor. Connect the output of the program-controlled attenuator to the RF input terminal of the spectrum analyzer, as shown in *Figure 4.8* (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 set the video bandwidth to 10 Hz.
   - **f.** Set the sweep mode to Auto; set the sweep type to Accurate.
9. Press **Single** and wait for the instrument to finish a sweep. Press **Peak Search** to find the maximum peak. Use the formula below to calculate the global error reference value. **Global Error Reference Value = Maximum Peak of the Spectrum Analyzer - (+10 dBm - 20 dB)**. 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 **Single** and wait for the instrument to finish a sweep. Press **Peak Search** to find the maximum peak. Use the formula below to calculate the global error. **Global Error = Maximum Peak of the Spectrum Analyzer - (+10 dBm - Attenuation of the Program-controlled Attenuator) - Global Error Reference Value**. Record the calculation result in the test record form.

11. Use the formula **Uncertainty = |Global Error - System Error|** to calculate the uncertainty. Compare the calculation result with the specification.

4.8.5 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	40 dB				<0.3 dB	
-8 dBm	2 dB	38 dB					
-6 dBm	4 dB	36 dB					
-4 dBm	6 dB	34 dB					
-2 dBm	8 dB	32 dB					
0 dBm	10 dB	30 dB					
2 dBm	12 dB	28 dB					
4 dBm	14 dB	26 dB					
6 dBm	16 dB	24 dB					
8 dBm	18 dB	22 dB					
10 dBm	20 dB	20 dB					
12 dBm	22 dB	18 dB					
14 dBm	24 dB	16 dB					
16 dBm	26 dB	14 dB					
18 dBm	28 dB	12 dB					
20 dBm	30 dB	10 dB					
22 dBm	32 dB	8 dB					
24 dBm	34 dB	6 dB					
25 dBm	36 dB	4 dB					

Reference Level	Internal Attenuator	Program-controlled Attenuator	System Error[1]	Global Error[2]	Uncertainty[3]	Limit	Pass /Fail
25 dBm	38 dB	2 dB					
25 dBm	40 dB	0 dB					

NOTE

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

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

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

4.9 10 MHz Reference Output Accuracy Test

4.9.1 Specification

10 MHz Reference Output Accuracy	
Specification	Aging rate[1] × time since last calibration[2] + temperature stability[3] + calibration accuracy[4]

NOTE

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

[2]: The instrument will be calibrated before leaving factory.

[3]: Temperature stability: <0.5 ppm

[4]: Initial calibration accuracy: <1 ppm

4.9.2 Test Device

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

4.9.3 Test Connection Diagram

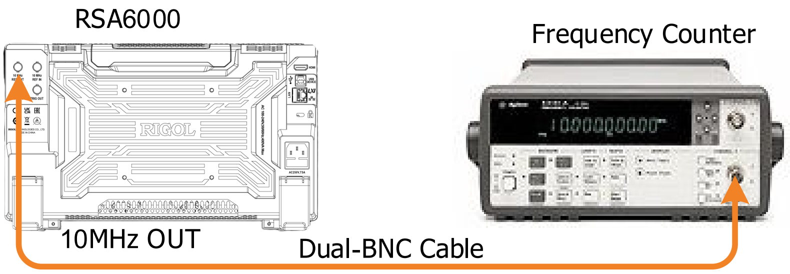


Figure 4.9 10 MHz Reference Output Accuracy Test Connection Diagram

4.9.4 Test Procedures

1. Connect the **[10 MHz REF OUT]** terminal on the rear panel of the spectrum analyzer with the frequency counter, as shown in *Figure 4.9* .
2. Record the measurement result of the frequency counter. Then compare the measurement result with the specification.

4.9.5 Test Record Form

Frequency Counter Measurement Result	Output Accuracy[1]	Limit	Pass/Fail
		<10 MHz × (1 ppm × time since last calibration + 0.5 ppm + 1 ppm)	

NOTE

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

5 Appendix Test Record Form

RIGOL RSA6000 Series Real-Time 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]	Test Result[2]	Limit	Pass /Fail
PA off						
50 kHz					5 kHz to 100 kHz <-120 dBm (typ.) 100 kHz to 20 MHz <-135 dBm, <-138 dBm (typ.) 20 MHz to 1.5 GHz <-140 dBm, <-143 dBm (typ.) 1.5 GHz to 3.2 GHz <-138 dBm, <-141 dBm (typ.) 3.2 GHz to 8.5 GHz <-136 dBm, <-140 dBm (typ.) 8.5 GHz to 14 GHz <-133 dBm, <-136 dBm (typ.) 14 GHz to 18 GHz <-130 dBm, <-133 dBm (typ.) 18 GHz to 23 GHz <-127 dBm, <-131 dBm (typ.) 23 GHz to 26.5 GHz <-122 dBm, <-125 dBm (typ.)	
1.04 MHz						
504 MHz						
2.004 GHz						
3.004 GHz						
6.204 GHz						
8.204 GHz						
10.204 GHz						
13.204 GHz						
17.204 GHz						
21.204 GHz						
24.204 GHz						
26.204 GHz						
PA on						
1.04 MHz					100 kHz to 500 kHz	

<table>
<tr><th>Center Frequency</th><th>Maximum Peak</th><th>Minimum Peak</th><th>Average [1]</th><th>Test Result[2]</th><th>Limit</th><th>Pass /Fail</th></tr>
<tr><td>504 MHz</td><td></td><td></td><td></td><td></td><td rowspan="11"><-149 dBm, <-152 dBm (typ.)
500 kHz to 20 MHz
<-152 dBm, <-155 dBm (typ.)
20 MHz to 1.5 GHz
<-160 dBm, <-163 dBm (typ.)
1.5 GHz to 3.2 GHz
<-157 dBm, <-160 dBm (typ.)
3.2 GHz to 8.5 GHz
<-154 dBm, <-157 dBm (typ.)
8.5 GHz to 14 GHz
<-151 dBm, <-154 dBm (typ.)
14 GHz to 18 GHz
<-148 dBm, <-151 dBm (typ.)
18 GHz to 23 GHz
<-145 dBm, <-148 dBm (typ.)
23 GHz to 26.5 GHz
<-140 dBm, <-143 dBm (typ.)</td><td></td></tr>
<tr><td>2.004 GHz</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>3.004 GHz</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>6.204 GHz</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>8.204 GHz</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>10.204 GHz</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>13.204 GHz</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>17.204 GHz</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>21.204 GHz</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>24.204 GHz</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>26.204 GHz</td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

NOTE

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

[2]: Test Result = Average - 10 x lg1000 = Average - 30 dB

SSB Phase Noise Test

Output Frequency of Signal Generator	Offset	Measurement Result	Limit	Pass/Fail
1 GHz	10 kHz offset		<-105 dBc/Hz	

Absolute Amplitude Accuracy Test

Power Sensor Measurement Value A1	Spectrum Analyzer Measurement Value A2	Calculation Result (A1 - A2)	Limit	Pass/Fail
			<0.3 dB	

Frequency Response Test (PA Off)

<table>
<tr><th colspan="4">Reference Value 1</th><th colspan="4">Reference Value 2</th></tr>
<tr><td>Output Frequency of Signal Generator</td><td>Power Sensor Measurement Value A1</td><td>Spectrum Analyzer Measurement Result A2</td><td>System Error[1]</td><td>Global Error[2]</td><td>Frequency Response[3]</td><td>Limit</td><td>Pass /Fail</td></tr>
<tr><td>10 MHz</td><td></td><td></td><td></td><td></td><td></td><td rowspan="13">5 kHz to 100 kHz
<0.3 dB (typ.)
100 kHz to 3.2 GHz
<0.5 dB, <0.3 dB (typ.)
3.2 GHz to 8.5 GHz
<0.7 dB, <0.5 dB (typ.)
8.5 GHz to 14 GHz
<1.5 dB, <1.3 dB (typ.)
14 GHz to 20 GHz
<1.7 dB, <1.5 dB (typ.)
20 GHz to 26.5 GHz
<2 dB, <1.8 dB (typ.)</td><td></td></tr>
<tr><td>54 MHz</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>504 MHz</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>2.004 GHz</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>3.004 GHz</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>6.204 GHz</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>8.204 GHz</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>10.204 GHz</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>13.204 GHz</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>17.204 GHz</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>21.204 GHz</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>24.204 GHz</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>26.204 GHz</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

Frequency Response Test (PA On)

Reference Value 1				Reference Value 2			
Output Frequency of Signal Generator	Power Sensor Measurement Value A1	Spectrum Analyzer Measurement Result A2	System Error[1]	Global Error[2]	Frequency Response[3]	Limit	Pass /Fail
54 MHz						100 kHz to 3.2 GHz <0.8 dB, <0.6 dB (typ.) 3.2 GHz to 8.5 GHz <1 dB, <0.8 dB (typ.) 8.5 GHz to 14 GHz <2.5 dB, <2.3 dB (typ.) 14 GHz to 20 GHz <2.7 dB, <2.5 dB (typ.) 20 GHz to 26.5 GHz <3 dB, <2.8 dB (typ.)	
504 MHz							
2.004 GHz							
3.004 GHz							
6.204 GHz							
8.204 GHz							
10.204 GHz							
13.204 GHz							
17.204 GHz							
21.204 GHz							
24.204 GHz							
26.204 GHz							

NOTE

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

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

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

Second Harmonic Distortion Test

Output Frequency of Signal Generator	Delta	Calculation Result[1]	Limit	Pass/Fail
300 MHz			>45 dBm	
1 GHz				

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 MHz to 8.5 GHz +11 dBm, +15 dBm (typ.) 8.5 GHz to 26.5 GHz +10 dBm, +14 dBm (typ.)	
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 Switching Uncertainty 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	40 dB				<0.3 dB	
-8 dBm	2 dB	38 dB					
-6 dBm	4 dB	36 dB					
-4 dBm	6 dB	34 dB					
-2 dBm	8 dB	32 dB					
0 dBm	10 dB	30 dB					
2 dBm	12 dB	28 dB					
4 dBm	14 dB	26 dB					
6 dBm	16 dB	24 dB					
8 dBm	18 dB	22 dB					
10 dBm	20 dB	20 dB					
12 dBm	22 dB	18 dB					
14 dBm	24 dB	16 dB					
16 dBm	26 dB	14 dB					
18 dBm	28 dB	12 dB					
20 dBm	30 dB	10 dB					
22 dBm	32 dB	8 dB					
24 dBm	34 dB	6 dB					
25 dBm	36 dB	4 dB					
25 dBm	38 dB	2 dB					
25 dBm	40 dB	0 dB					

NOTE

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

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

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

10 MHz Reference Output Accuracy Test

Frequency Counter Measurement Result	Output Accuracy[1]	Limit	Pass/Fail
		<10 MHz × (1 ppm × time since last calibration + 0.5 ppm + 1 ppm)	

NOTE

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

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