SSG5000A

Signal Generator

Service Manual

SM0805A-E01A

SIGLENT TECHNOLOGIES CO.,LTD

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Product Certification

SIGLENT guarantees this product conforms to the national and industrial standards in China as well as the ISO9001: 2008 standard and the ISO14001: 2004 standard. Other international standard conformance certification is in progress.

General Safety Summary

Carefully read the following safety precautions to avoid any personal injury or damage to the instrument and any products connected to it. To avoid potential hazards, please use the instrument as specified.

Use Proper AC Power Line

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

Ground the Instrument

The instrument is grounded through the protective earth conductor of the power line. To avoid electric shock, please make sure the instrument is grounded correctly before connecting its input or output terminals.

Connect the Probe Correctly.

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

Look Over All Terminals' Ratings

To avoid fire or electric shock, please observe all ratings and label notices on this instrument. Before connecting the instrument, please read the manual carefully to gain more information about the ratings.

Use Proper Overvoltage Protection

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

Electrostatic Prevention

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

Maintain Proper Ventilation

Inadequate ventilation may cause increasing of the instrument's temperature, which will eventually damage the instrument. So keep well ventilated and inspect the intake and fan regularly.

Avoid Exposed Circuit or Components

Do not touch exposed contacts or components when the power is on.

Do Not Operate Without Covers

Do not operate the instrument with covers or panels removed.

Use Only the Specified Fuse.

Keep Product Surfaces Clean and Dry.

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

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 the instrument in a humid environment.

Do Not Operate in an Explosive Atmosphere.

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

Safety Terms and Symbols

Terms on the product. These terms may appear on the product:

DANGER: Indicates an injury or hazard that may immediately happen.

WARNING: Indicates an injury or hazard that may not immediately happen.

CAUTION: Indicates that a potential damage to the instrument or other property might occur.

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

Hazardous Voltage

Protective Ground

Warning

Earth Chassis Ground

Contents

Preparation Information

Before initiating performance verification or any adjustments, it is recommended to follow these procedures. The following topics are discussed in this chapter.

- How to perform power-on inspection.
- How to perform interface test.

For more detailed information about the signal generator operation, please refer to the SSG5000A User Manual.

Power-on Inspection

The normal operating voltage for SSG5000A series signal generator is in the range of 100-240 VRMS, 50/60Hz or 100-120 VRMS, 400Hz.

Please use the power cord provided in the accessories to connect the instrument to the power source as shown in the figure below.

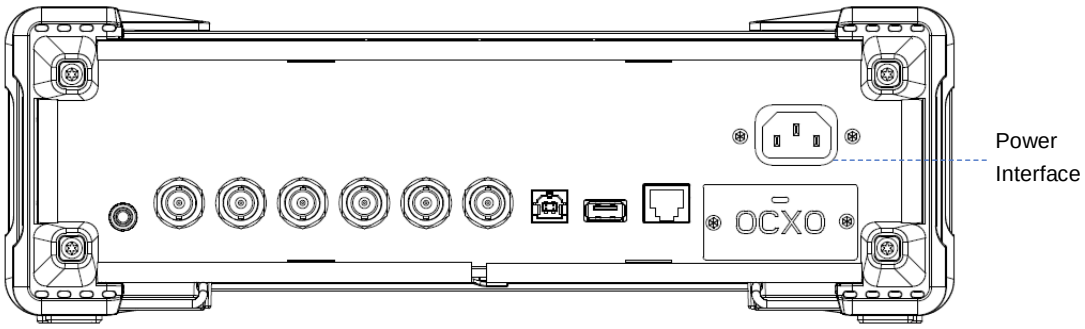


Figure 1 Connect power cord

Note: To avoid electric shock, make sure that the instrument is correctly grounded to the earth before connecting AC power.

Press the power-on button located at the lower left corner of the front panel and several keys will illuminate for about 6 seconds. Then, the boot screen will appear on the display.

The front and rear panels are shown in the figures below.

Figure 2 Front Panel

Figure 3 Rear Panel

Interface Test

The SSG5000A series signal generator is designed with three standard interfaces: USB Host, USB Device and LAN. Being connected to other instruments via these interfaces enables the signal generator to achieve additional capabilities. To ensure the signal generator is working properly, it is recommended to test the interfaces first.

USB Host Test

To test if the USB Host interface is working normally.

Tools:

- USB memory device (U disk)

Steps:

1. Insert a U disk into the USB Host interface on the front panel of the signal generator.
2. An icon shaped like a U disk appears on the upper right corner of the screen, as shown in figure below. The appearance of the icon indicates the U disk has been successfully recognized.

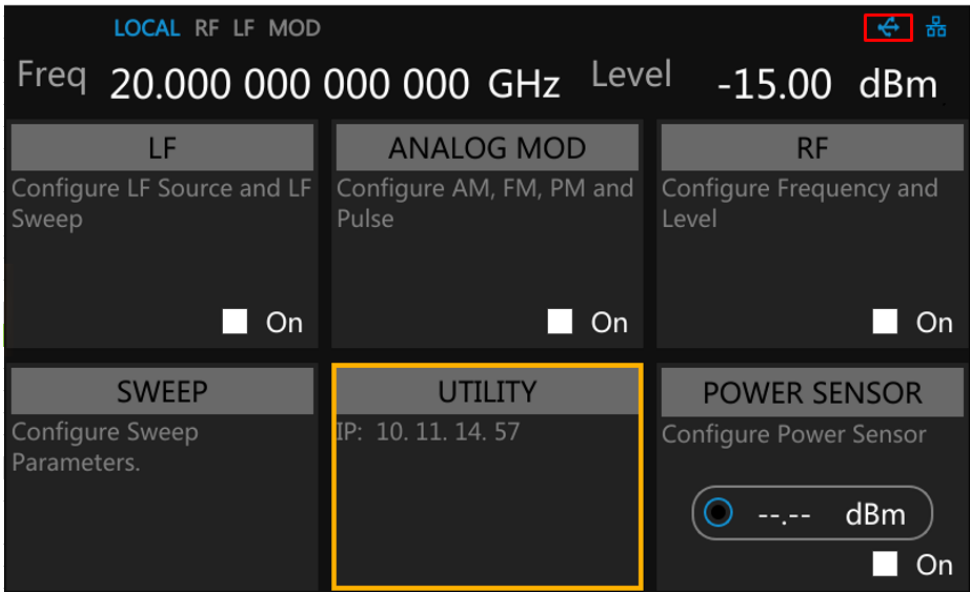


Figure 4 USB drive has been properly recognized

USB Device Test

To test if the USB Device interface is working normally.

Tools:

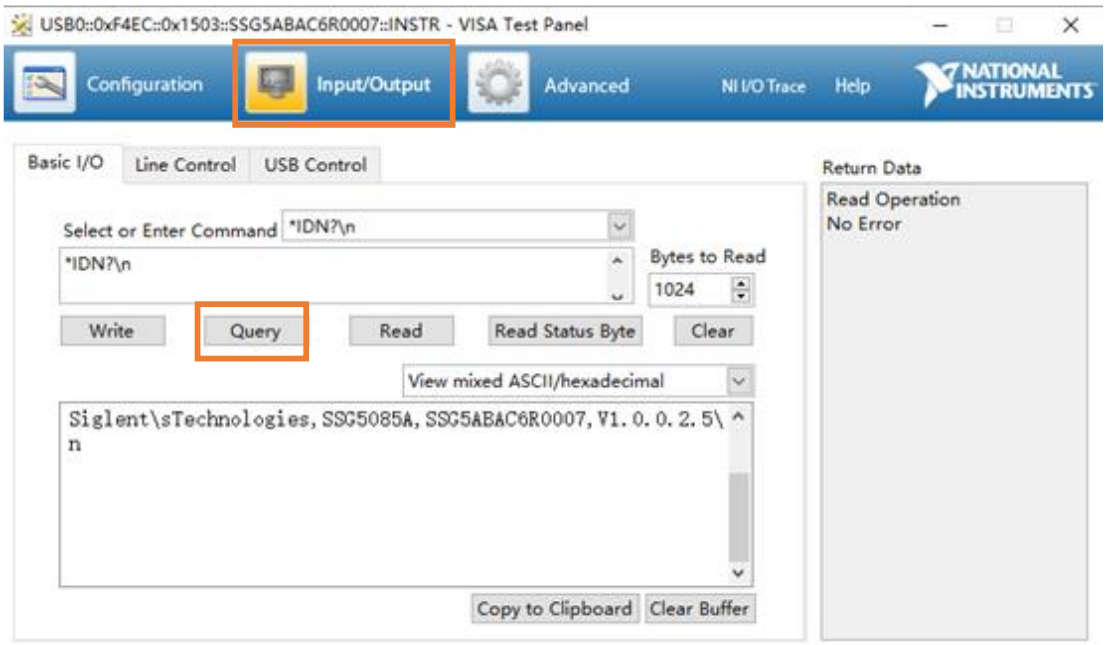
- A computer with USB interface that is compatible with running National Instruments NI-MAX software
- A standard USB cable (Type A-B)
- NI-MAX software

Steps:

1. Download and install National Instruments NI MAX software by following the installation instructions provided by National Instruments.
2. Connect the signal generator USB Device port and the computer with an USB cable.
3. Run NI MAX software. Click “Device and interface” at the upper left corner of the NI software

interface and it immediately displays the “USBTMC” device symbol.

4. Click “Open VISA Test Panel”, and then the VISA Test Panel as shown in the following picture will appear. Then click the “Input/Output” option button on the VISA Test Panel and click the “Query” option button to view the Read operation information.



LAN Port Test

To test if the LAN interface is working normally.

Tools:

- A computer with functional LAN interface
- A standard LAN cable

Steps:

1. Connect the signal generator and the computer with a LAN cable via LAN interface.
2. Press **UTILITY** -> Interface , and set DHCP State ON, as shown in the following figure. The signal generator will set IP Address, Subnet Mask and Gateway automatically in this network.
3. Write down the displayed IP address. It will be used in later steps.

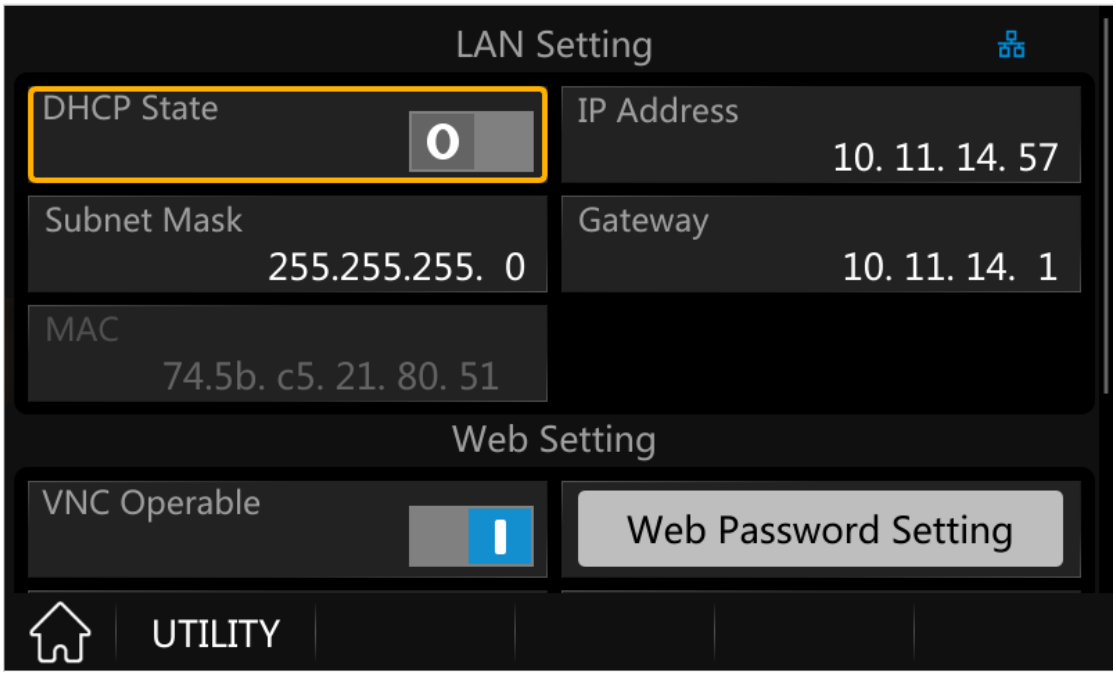
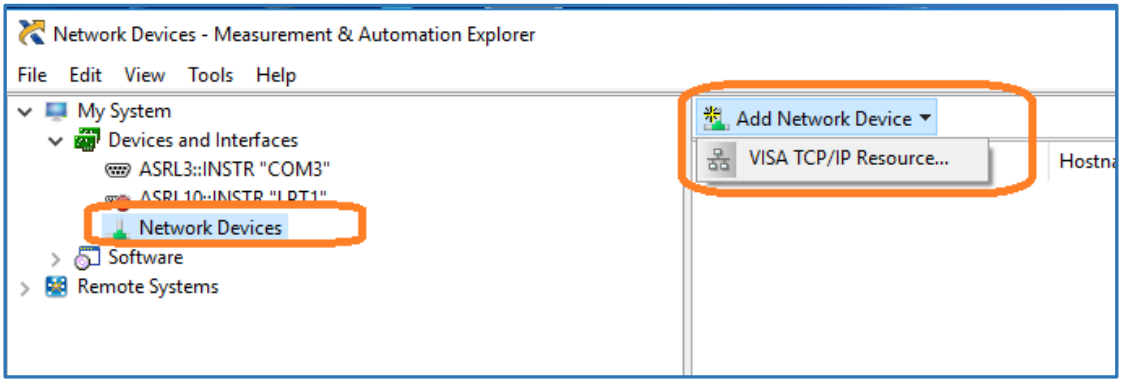


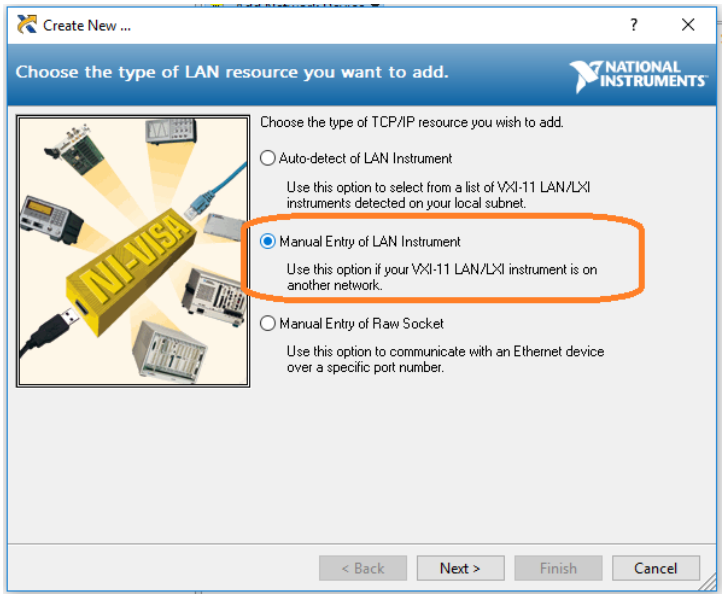
Figure 5 IP configuration interface

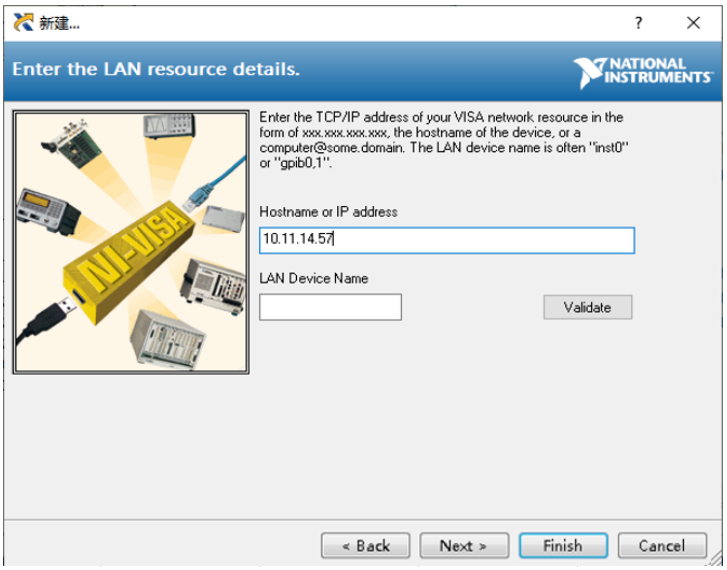
4. Run NI Max software. Click “Device and interfaces” in the upper left corner of the NI software interface, select “Network Devices”, “Add Network Device”, and select “VISA TCP/IP Resource” as shown:



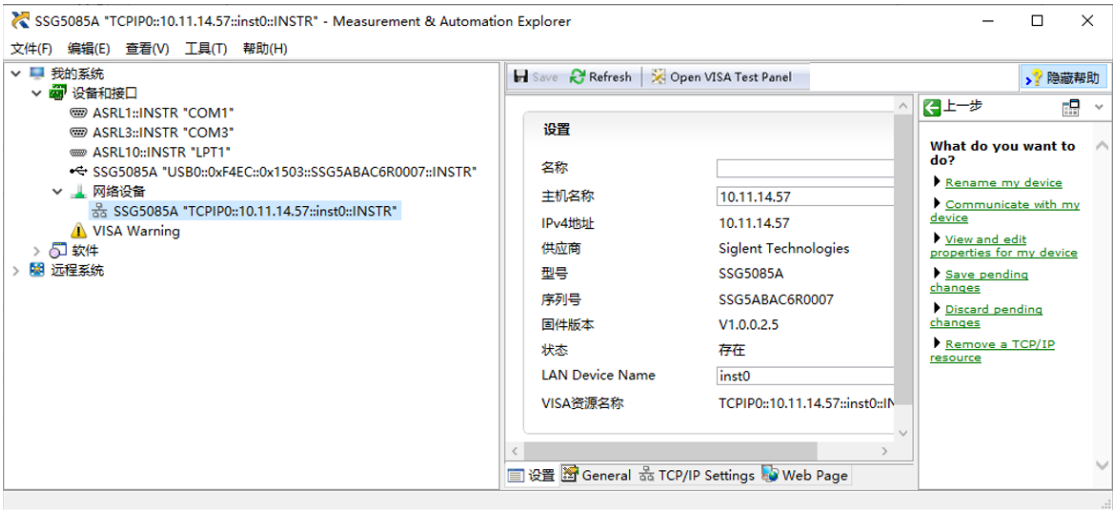
5. Select Manual Entry of LAN instrument, click “Next”, and enter the IP address as shown in the following figures. Click Finish to establish the connection.

Note: Leave the LAN Device Name **BLANK** or the connection may fail.





6. After a brief scan, the connection will be shown under Network Devices:



7. Right-click on the product and select Open VISA Test Panel.
8. Click the “Input/Output” option button on the VISA Test Panel and click the “Query” option button to view the Read operation information.

Note: The *IDN? Command (known as the Identification Query) should return the instrument manufacturer, instrument model, serial number, and other identification information.

Performance Verification Test

This chapter explains testing the signal generator in order to verify performance specifications. For accurate test results, please let the test equipment and the signal generator warm up 30 minutes before testing.

Below is the required equipment:

Table 1 Test equipment

Equipment	Specification	Qty.	Recommended
Signal Analyzer	20Hz ~ 26.5 GHz	1	Keysight N9020
Power Meter	40GHz	1	R&S NRP40T
Frequency Counter	10 MHz	1	53220A
N-2.92mm Cable	20GHz	1	
BNC Cable	2 GHz	1	

10 MHz output accuracy test

Specification

Reference frequency	10.000000 MHz
Initial calibration accuracy	< 100 ppb

Test Connection Diagram

Test Procedures

1. Connect **[10MHz OUT]** port of the signal generator to the channel A of the 53220A.
2. Set the 53220A to frequency counter mode, and set frequency ref to 10.000000 MHz
3. Check if the frequency deviation ≤ 100ppb

Test Record Form

Frequency	Frequency Deviation	Pass/Fail
10.000000 MHz		

Absolute amplitude accuracy test

Specification

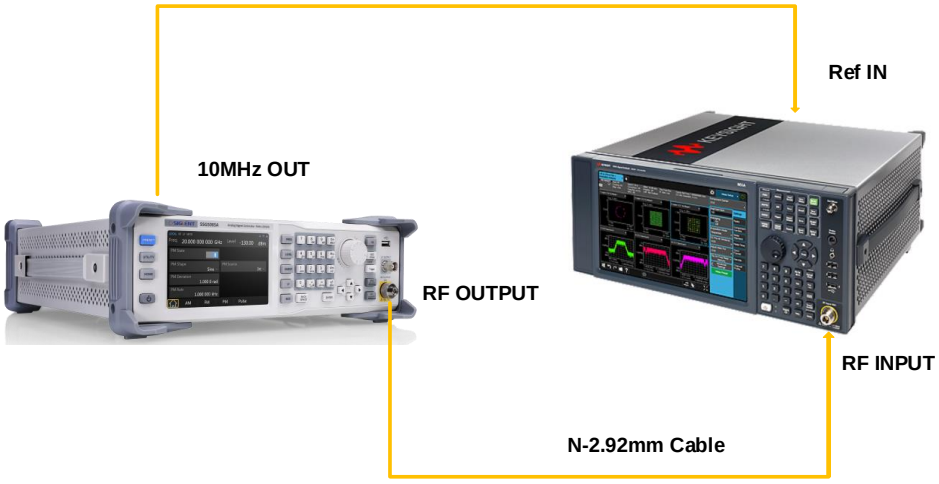
Level error (ALC on, temperature is 20 ℃ ~30 ℃)					
Frequency (f)	Max performance power to 13 dBm	13 dBm ~ -20 dBm	-20 dBm ~ -90dBm	-90 dBm ~ -110 dBm	-110 dBm ~ -120 dBm
9 kHz ≤ f <100 kHz			≤ 0.7 dB	≤ 1.1 dB	
100kHz ≤ f <1MHz		≤ 0.7 dB	≤ 0.7 dB	≤ 1.1 dB	
1MHz ≤ f ≤ 4 GHz	≤ 1dB	≤ 0.7 dB	≤ 0.7 dB	≤ 1.1 dB	≤ 2 dB
4 GHz < f ≤ 6 GHz	≤ 1dB	≤ 0.7 dB	≤ 0.7 dB	≤ 1.1 dB	≤ 2 dB
6 GHz < f ≤ 13.6 GHz	≤ 1dB	≤ 0.7 dB	≤ 0.7 dB	≤ 1.1 dB	≤ 2 dB
13.6 GHz < f ≤ 20 GHz	≤ 1dB	≤ 0.7 dB	≤ 0.9 dB	≤ 1.1 dB	≤ 2 dB

Test Devices

1. Power Meter × 1
2. SMA-2.92mm Adaptor × 1
3. Dual-BNC Cable × 1
4. Signal generator × 1

Test Connection Diagram

(a)



(b)

Figure 6 Absolute amplitude accuracy connections

Test Procedures

1. Connect the RF output terminal of the SSG5000A with the power meter, as shown in Figure 6 (a).
2. Set the SSG5000A to output a sine waveform with -10 dBm amplitude. Then modify the output frequency of the SSG5000A according to Table 2 and enable the RF output.
3. Modify the frequency of the power meter accordingly each time the output frequency of the SSG5000A is modified. Read the amplitude measurement value **A1** and record it to the test record form.
4. Disconnect the SSG5000A and the power meter. Connect the **[10 MHz OUT]** terminal of the signal analyzer with the **[EXT REF IN]** terminal at the rear panel of the signal generator using a dual-BNC cable to synchronize the two instruments.

5. Connect the **[RF OUTPUT]** terminal of the SSG5000A with the input terminal of the signal analyzer using a dual-N cable as shown in Figure 6 (b).
6. Configure the signal analyzer:
   1) Set the self-calibration to normal and perform all of the calibration items
   2) Select the external frequency reference input.
   3) Set the span to 100 Hz.
   4) Set the reference level to -20 dBm.
   5) Set the input attenuation to 10 dB.
   6) Set the resolution bandwidth to 1 Hz.
7. Set the output frequency of the SSG5000A and the center frequency of the signal analyzer according to Table 2 (the center frequency of the signal analyzer corresponds to the output frequency of the SSG5000A).
8. Each time the center frequency is changed, wait for the signal analyzer to finish a sweep and then press **Peak Search** to find the maximum peak. Read the peak value **A2** and record it to the test record form.
9. **System Error** (the input attenuation of the signal analyzer is 10 dB) **= A2 - A1** and record the measurement result.
10. Keep the connection shown in Figure 6 (b) unchanged. Press **Mode Preset** to restore the signal analyzer to its factory setting and set the output amplitude of the SSG5000A according to Table 3.
11. Each time the output amplitude is changed, set the output frequency of the SSG5000A and the center frequency of the signal analyzer according to Table 2 (the center frequency of the signal analyzer corresponds to output frequency of the SSG5000A).
12. Each time the center frequency is changed, wait for the signal analyzer to finish a sweep and then press **Peak Search** to find the maximum peak. Read the peak value **A3** and record it to the test record form.

    Note: when the output amplitude of the SSG5000A is -10 dBm, the measurement result **A3**, namely, is the measurement value **A2** of the signal analyzer in step 8.
13. Calculate the **Global Error = A3 - Reference Value** and record the result.
14. Calculate the amplitude accuracy using the formula **Amplitude Accuracy = |Global Error - System Error|** and compare the calculation result with the specification.

Table 2 Output Frequency of the SSG5000A

Output Frequency									
103 kHz	1.33 MHz	51.33 MHz	533 MHz	1.933 GHz	2.433 GHz	2.933 GHz	3.933 GHz	4.933 GHz	5.933 GHz
7.933 GHz	9.433 GHz	11.933 GHz	13.933 GHz	15.933 GHz	17.933 GHz	19.933 GHz			

Note: When the frequency of the signal measured is less than 10 MHz, make certain the signal analyzer is in the DC coupling mode to ensure the measurement accuracy.

Table 3 Output Amplitude of the SSG5000A

Output amplitude			
-10 dBm	-50 dBm	-90 dBm	-120 dBm

Test Record Form

SSG5000A Output Frequency	Power Meter Measurement Value A1	Signal Analyzer Measurement Value A2	System Error
103 kHz			
1.33 MHz			
51.33 MHz			
533 MHz			
1.933 GHz			
2.433 GHz			
2.933 GHz			
3.933 GHz			
4.933 GHz			
5.933 GHz			
7.933 GHz			
9.933 GHz			
11.933 GHz			
13.933 GHz			
15.933 GHz			
17.933 GHz			
19.933 GHz			

Reference Value	-10 dBm				
SSG5000A Output Frequency	**Signal Analyzer Measurement Value A3**	**Global Error**	**Amplitude Accuracy**	**Limit**	**Pass/Fail**
103 kHz				< 0.7	
1.33 MHz					
51.33 MHz					
533 MHz					
1.933 GHz					
2.433 GHz					
2.933 GHz					
3.933 GHz					
4.933 GHz					
5.933 GHz					
7.933 GHz					
9.933 GHz					
11.933 GHz					
13.933 GHz					
15.933 GHz					
17.933 GHz					
19.933 GHz					

Reference Value	-50 dBm				
SSG5000A Output Frequency	**Signal Analyzer Measurement Value A3**	**Global Error**	**Amplitude Accuracy**	**Limit**	**Pass/Fail**
103 kHz				< 0.7	
1.33 MHz					
51.33 MHz					
533 MHz					
1.933 GHz					
2.433 GHz					
2.933 GHz					
3.933 GHz					
4.933 GHz					
5.933 GHz					
7.933 GHz					
9.933 GHz					
11.933 GHz					
13.933 GHz					
15.933 GHz					
17.933 GHz					
19.933 GHz					

Reference Value	-90 dBm				
SSG5000A Output Frequency	**Signal Analyzer Measurement Value A3**	**Global Error**	**Amplitude Accuracy**	**Limit**	**Pass/Fail**
103 kHz				< 0.7	
1.33 MHz					
51.33 MHz					
533 MHz					
1.933 GHz					
2.433 GHz					
2.933 GHz					
3.933 GHz					
4.933 GHz					
5.933 GHz					
7.933 GHz					
9.933 GHz					
11.933 GHz					
13.933 GHz					
15.933 GHz					
17.933 GHz					
19.933 GHz					

Reference Value	-120 dBm				
SSG5000A Output Frequency	**Signal Analyzer Measurement Value A3**	**Global Error**	**Amplitude Accuracy**	**Limit**	**Pass/Fail**
103 kHz				< 0.7	
1.33 MHz					
51.33 MHz					
533 MHz					
1.933 GHz					
2.433 GHz					
2.933 GHz					
3.933 GHz					
4.933 GHz					
5.933 GHz					
7.933 GHz					
9.933 GHz					
11.933 GHz					
13.933 GHz					
15.933 GHz					
17.933 GHz					
19.933 GHz					

Second Harmonics

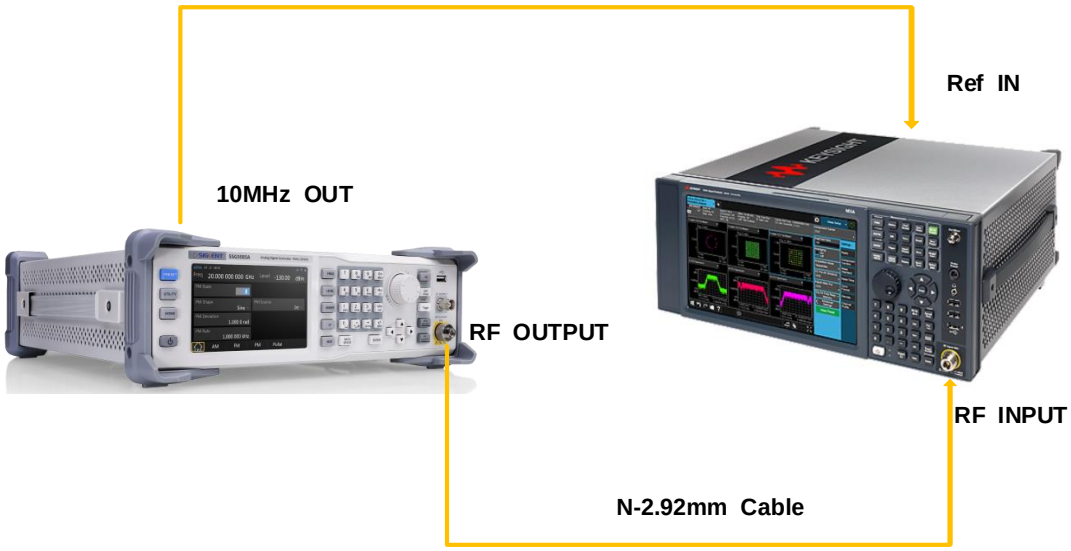
Specification

Spectral purity		
Harmonics	CW mod, 1 MHz < f < 20 GHz, Level ≤ +10 dBm	< -30 dBc

Test Devices

1. Signal Analyzer × 1
2. BNC-BNC Cable × 1
3. N-2.92mm Cable × 1

Test Connection Diagram



Test Procedures

1. Synchronize the SSG5000A and signal analyzer. Connect the RF output terminal of the SSG5000A with the RF input terminal of the signal analyzer.
2. Configure the SSG5000A:
   1) Set the output frequency according to the test record form as shown below
   2) Set the output level of the SSG5000A to 10dBm
3. Configure the signal analyzer:

1) Preset.
2) Set the input attenuation to auto.
3) Set the reference level to the SSG5000A power plus 2dBm.
4) Switch the preamp to off.
5) Set the center frequency to the SSG5000A frequency.
6) Set the span to 5 kHz.
7) Set the resolution bandwidth to 100 Hz.
8) Press **Peak** and get the power result as P0.
9) Set the center frequency to the SSG5000A frequency×2.
10) Press **Peak** and get the power result as P1.
11) Record the P0-P1.

4. The P0-P1 is the **Second Harmonic Distortion**. And compare the measurement result with the specification.

Test Record Form

Freq(Hz)	Signal Power P0 (dBm)	2th Harmonic Power P1 (dBm)	Diff (dB)	Pass Range (dB)	Pass/Fail
1 MHz				> 30.0	
52 MHz				> 30.0	
112 MHz				> 30.0	
312 MHz				> 30.0	
512 MHz				> 30.0	
912 MHz				> 30.0	
1212 MHz				> 30.0	
1512 MHz				> 30.0	
1912 MHz				> 30.0	
2512 MHz				> 30.0	
2912 MHz				> 30.0	
3912 MHz				> 30.0	
4912 MHz				> 30.0	
5912 MHz				> 30.0	

7912 MHz				> 30.0	
9912 MHz				> 30.0	
11912 MHz				> 30.0	
13912 MHz				> 30.0	
15912 MHz				> 30.0	
17912 MHz				> 30.0	
19912 MHz				> 30.0	

Internal AM modulation test

Specification

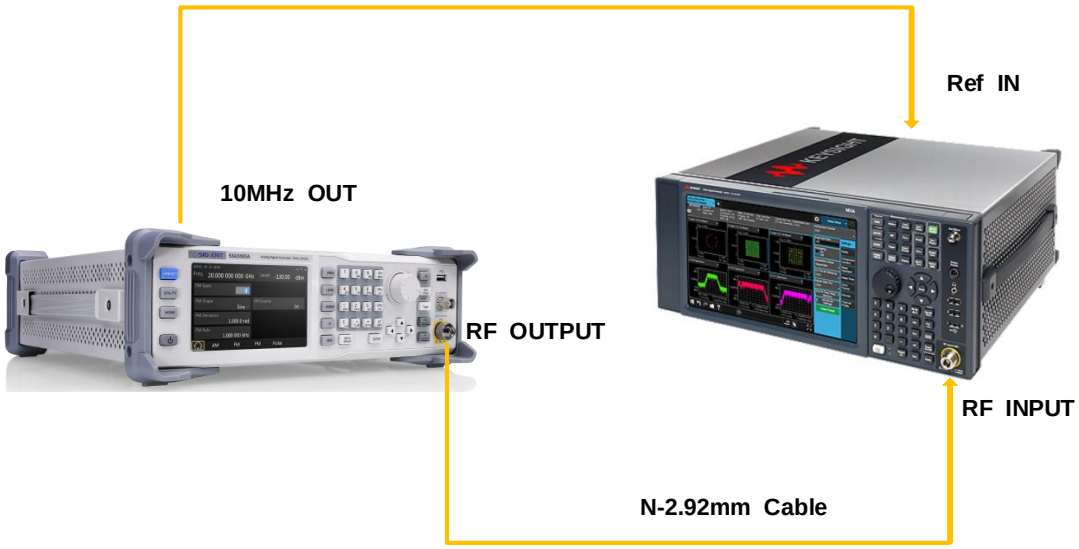
Amplitude Modulation		
Modulation source	internal, external, internal + external	
AM depth setting range	0.1 %~100 %	
Resolution of m[1] setting	0.01 %	
AM Accuracy	f_{mod}=1 kHz	< 4 % of m setting+1 %
AM Distortion	f_{mod} =1 kHz, m≤30 %, level=0 dBm	<3 % (typ.)

Note: [1] m represents the AM depth.

Test Devices

1. Signal Analyzer × 1
2. Dual-BNC Cable × 1
3. N-2.92mm Cable × 1

Test Connection Diagram



Test Procedures

1. Synchronize the SSG5000A and signal analyzer. Connect the RF output terminal of the SSG5000A with the RF input terminal of the signal analyzer as shown in above figure.
2. Configure the SSG5000A:
   1) Set the frequency to 1 GHz.
   2) Set the amplitude to 0 dBm.
   3) Enable the AM switch.
   4) Set the modulation source to internal.
   5) Set the modulation depth to 30%.
   6) Set the modulation rate to 1 kHz.
   7) Set the modulation waveform to “Sine”.
   8) Enable the modulation output switch **MOD ON/OFF** .
   9) Enable the RF output switch **RF ON/OFF** .
3. Configure the Signal Analyzer:
   1) Select the **Analog Demod** mode.
   2) Select the **AM** analog demodulation.

3) Set the span to 200 kHz.

4. Press **Meas Setup** -> **Auto BW & Scale** and then read the results of the demodulated signal in the AM analog demodulation test interface of the signal analyzer. Record the measurement results **(Pk - Pk)/2** and **Distortion**.

   Note: the value **(Pk - Pk)/2** represents the peak of the low frequency signal after AM demodulated.

5. Calculate the modulation accuracy and the distortion using the formulas:

   AM Accuracy = |(Pk - Pk)/2 - 30%|,

   AM Distortion = Distortion.

   Then, compare the calculation results with the specifications.

Test Record Form

SSG5000A Output Frequency	Test Item	Measurement	Calculated Result	Limit	Pass/ Fail
1 GHz	AM Accuracy			< 4% of setting+1 %	
	AM Distortion			< 3 % (typ.)	

Internal FM modulation test

Specification

Frequency Modulation		
Modulation source	internal, external, internal + external	
Maximum FM deviation	N[1]*1 MHz (typ.)	
Resolution of m[2] setting	0.1% of m setting or 1 Hz, whichever is larger	
FM Deviation Accuracy	f_{mod} =1 kHz, internal	< 2% of m setting+20 Hz
FM Distortion	f_{mod} =1 kHz, m=N*1 MHz	< 0.5 % (nom.)

Note:

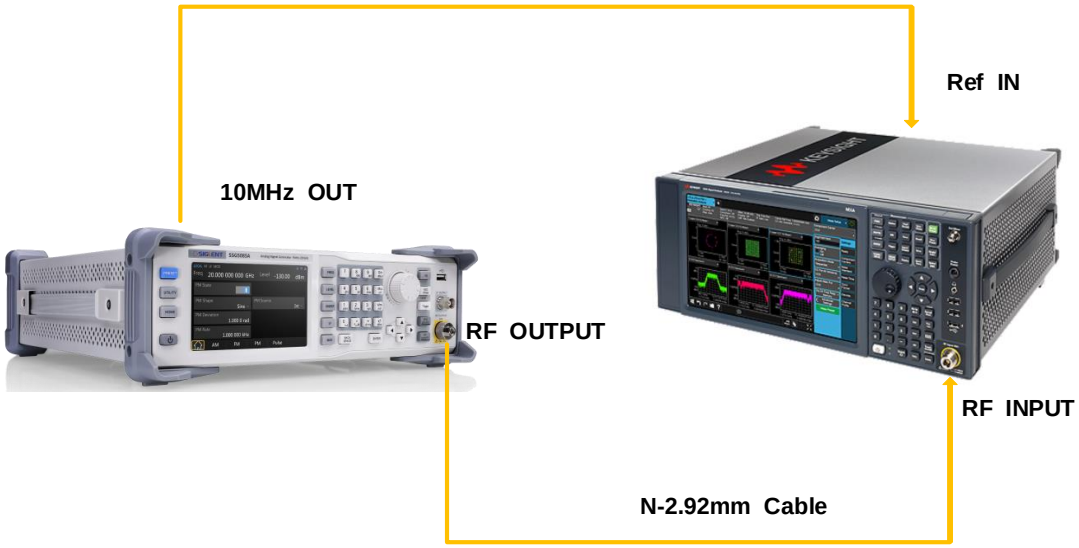
[1] Please refer to the value of N in the “Frequency Bands” section of the SSG5000A Data Sheet.

[2] m represents the FM deviation.

Test Devices

1. Signal Analyzer × 1
2. Dual-BNC Cable × 1
3. N-2.92mmCable × 1

Test Connection Diagram



Test Procedures

1. Synchronize the SSG5000A and signal analyzer. Connect the RF output terminal of the SSG5000A with the RF input terminal of the signal analyzer as shown in above figure.
2. Configure the SSG5000A:
   1) Set the frequency to 1 GHz.
   2) Set the amplitude to -10 dBm.
   3) Enable the FM switch.
   4) Set the modulation source to internal.
   5) Set the modulation deviation to 500 kHz.
   6) Set the modulation rate to 1 kHz.
   7) Set the modulation waveform to “Sine”.
   8) Enable the modulation output switch **MOD**.

9) Enable the RF output switch **RF**.

3. Configure the Signal Analyzer:

1) Select the **Analog Demod** mode.

2) Select the **FM** analog demodulation.

3) Press **Meas Setup** -> **Auto BW & Scale**.

4) Set the span to 2 MHz.

5) Set the Channel BW to 1.5 MHz.

6) Set the RF Res BW to 300 Hz.

4. Read the results of the demodulated signal in the FM analog demodulation test interface of the signal analyzer. Record the measurement results **(Pk - Pk)/2** and **Distortion**.

Note: the value **(Pk - Pk)/2** represents the peak of the low frequency signal after FM demodulated.

5. Calculate the modulation accuracy and the distortion using the formulas:

FM Accuracy = |(Pk - Pk)/2 – 500 kHz|,

FM Distortion = Distortion.

Next, compare the calculation results with the specifications.

Test Record Form

SSG5000A Output Frequency	Test Item	Measurement	Calculated Result	Limit	Pass/ Fail
1 GHz	FM Accuracy			< 2% of setting+20 Hz	
	FM Distortion			< 0.5 % (nom.)	

Internal ΦM modulation test

Specification

Phase Modulation	
Modulation source	internal, external, internal + external
Maximum ΦM deviation	N[1]*5 rad
Resolution of m[2] setting	0.1 % of m setting or 0.01 rad, whichever is larger

ΦM Deviation Accuracy	f_{mod} =1 kHz, internal, deviation ≤ N*5 rad	< 2 % of m setting + 0.05 rad
ΦM Distortion	f_{mod} =1 kHz, deviation ≤ N*5 rad	< 0.5 % (nom.)

Note:

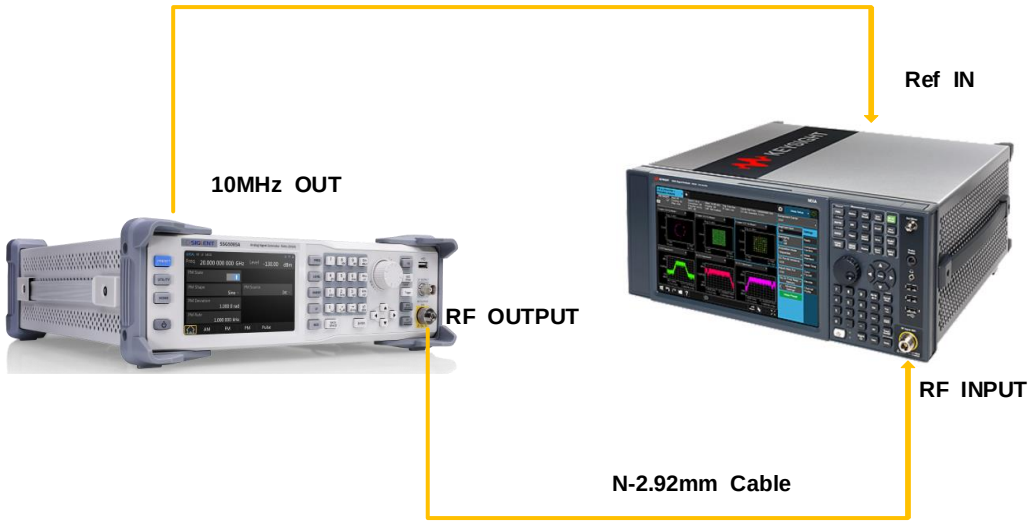
[1] Please refer to the value of N in the “Frequency Bands” section of the SSG5000A Data Sheet.

[2] m represents the ΦM deviation.

Test Devices

1. Signal Analyzer × 1
2. Dual-BNC Cable × 1
3. N-2.92mmCable × 1

Test Connection Diagram



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1. Synchronize the SSG5000A and signal analyzer. Connect the RF output terminal of the SSG5000A with the RF input terminal of the signal analyzer as shown in above figure.
2. Configure the SSG5000A:
   1) Set the frequency to 1 GHz.
   2) Set the amplitude to -10 dBm.

3) Enable the ΦM switch.

4) Set the modulation source to internal.

5) Set the modulation deviation to 2.5 rad.

6) Set the modulation rate to 1 kHz.

7) Set the modulation waveform to “Sine”.

8) Enable the modulation output switch **MOD ON/OFF**.

9) Enable the RF output switch **RF ON/OFF**.

3. Configure the Signal Analyzer:

1) Select the **Analog Demod** mode.

2) Select the **ΦM** analog demodulation.

4. Press **Meas Setup** -> **Auto BW & Scale** and then read the results of the demodulated signal in the ΦM analog demodulation test interface of the signal analyzer. Record the measurement results **(Pk - Pk)/2** and **Distortion**.

Note: the value **(Pk - Pk)/2** represents the peak of the low frequency signal after ΦM demodulated.

5. Calculate the modulation accuracy and the distortion using the formulas:

ΦM Accuracy = |(Pk - Pk)/2 – 2.5 rad|,

ΦM Distortion = Distortion.

Then, compare the calculation results with the specifications.

Test Record Form

SSG5000A Output Frequency	Test Item	Measurement	Calculated Result	Limit	Pass/ Fail
1 GHz	ΦM Accuracy			< 2% of setting + 0.05 rad	
	ΦM Distortion			< 0.5 % (nom.)	

Pulse modulation test

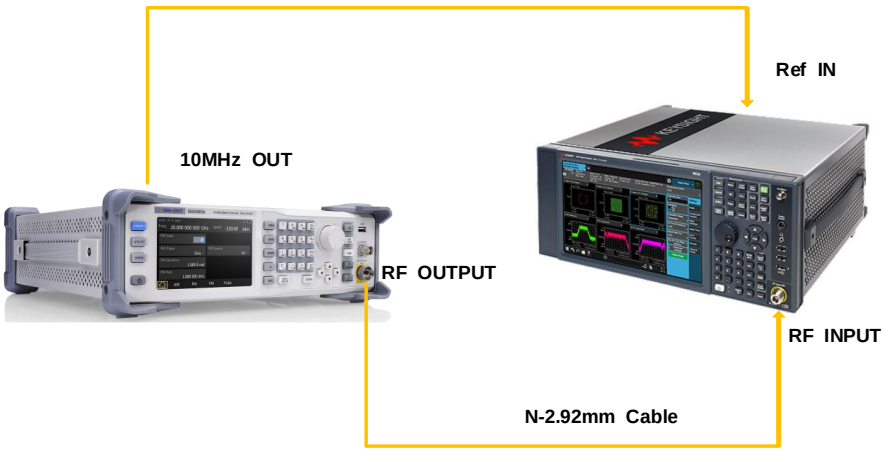
Specification

Pulse modulation		
Modulation source	internal, external	
On/off ration	1 MHz < f ≤ 6 GHz	> 70 dBc (typ.)
	6GHz < f ≤ 13.6 GHz	> 80 dBc (typ.)
	13.6GHz < f ≤ 20 GHz	> 75 dBc (typ.)
Raise/fall time (10 %/90 %)	10 % to 90 % of RF amplitude	< 15 ns (typ.)
Pulse repetition time	Setting range	40 ns~300 s

Test Devices

1. Signal Analyzer × 1
2. Dual-BNC Cable × 1
3. N-2.92mmCable × 1

Test Connection Diagram



Test Procedures

1. Synchronize the SSG5000A and signal analyzer. Connect the RF output terminal of the SSG5000A with the RF input terminal of the signal analyzer as shown in above figure.
2. Configure the SSG5000A:
   1) Set the frequency to 1 GHz.

2) Set the level to -10 dBm.

3) Enable the pulse state.

4) Set the pulse source to internal.

5) Set the pulse mode to single.

6) Set the pulse period to 1s.

7) Set the pulse width to 0.5s.

8) Set the pulse trigger to Key.

9) Enable the modulation output switch **MOD ON/OFF**.

10) Enable the RF output switch **RF ON/OFF**.

3. Configure the Signal Analyzer:

1) Set the center frequency to 1GHz.

2) Set the span to 0 Hz.

3) Set the reference level to 0 dBm.

4) Set the input attenuation to 10 dB.

5) Set the resolution bandwidth to 100 Hz.

6) Set the video bandwidth to 100 kHz.

7) Set the sweep time to 1s.

8) Set the trigger mode to video trigger.

4. Press **Click to trigger** on the display of the SSG5000A to start a pulse sweep and wait for the analyzer to finish a sweep. And then press **Peak Search** to locate the peak.

5. Press **Marker** -> **Delta** -> input 0.5s , then press **Click to trigger** on the display of the SSG5000A again. Record the **Delta** value which equals to the **- On/Off Ratio**.

Test Record Form

SSG5000A Output Frequency	Test Item	Measurement	Calculated Result[1]	Limit	Pass/ Fail
1 GHz	On/Off Ratio			> 70 dBc	
12GHz	On/Off Ratio			> 80 dBc	
15GHz	On/Off Ratio			> 75 dBc	

Note:

[1] Calculation Result = -Delta.

LF AC test

Specification

Internal modulation generator (LF)	
Frequency response	Sine wave < 0.3 dB

Test Devices

1. Power Sensor × 1
2. SMA-BNC Cable × 1
3. USB Cable × 1

Test Connection Diagram

Test Procedures

1. Connect the LF output terminal of the SSG5000A with the input terminal of the power sensor. Connect the **[USB** ⇐ **]** connector of the SSG5000A with the USB interface of the power sensor as shown in figure above.
2. Enable LF output switch. Select Sine waveform of the generator and set the amplitude to 0 dBm and then step through the frequencies listed below in sequence. Then, set the amplitude to -20 dBm and repeat the frequency steps.

Output Voltage	0 dBm		- 20 dBm	
Frequency	Power Meter Measurement Value	Spec Range (dBm)	Power Meter Measurement Value	Spec Range (dBm)
100 kHz		- 0.3 ~ 0.3		- 20.3 ~ - 19.7
200 kHz				
300 kHz				

400 kHz				
500 kHz				
600 kHz				
700 kHz				
800 kHz				
900 kHz				
1 MHz				

3. Compare the value measured from Power Sensor shown on the SSG5000A interface with the spec range shown in the above table.

LF DC test

Specification

DC Offset error	±(1%+3 mV)

Test Devices

1. Digital Multimeter × 1
2. Banana-to-single-BNC Cable × 1

Test Connection Diagram

Banana to single BNC Cable

Test Procedures

1. Connect the LF output terminal of the SSG5000A with the Voltage input terminal of the Digital Multimeter as shown in figure above.

2. Enable LF output switch. Select DC waveform of the generator and set the instrument to each output value described in the table below. And then measure the output voltage with the DMM.

DC Offset	DMM Measurement Value	Spec Range ± (1%+3 mV)
-2 V		-2.017 V ~ -1.983 V
-1 V		-1.007 V ~ -0.993 V
-100 mV		-102 mV ~ -98 mV
-10 mV		-12.9 mV ~ -7.1 mV
0 V		-3 mV ~ 3 mV
10 mV		6.9 mV ~ 13.1 mV
100 mV		96 mV ~ 104 mV
1 V		0.987 V ~ 1.013 V
2 V		1.977 V ~ 2.023 V

Note: The output impedance of generator is 50Ω and the input impedance of DMM is high-z, so the measured value should divide by 2 to get an accurate value.

3. Compare the measured voltage with the spec range shown in the table above.

Assembly Procedures

This chapter describes how to remove the major modules from the SSG5000A signal generator. To install the removed modules or replace new modules, please follow the corresponding operating steps in reverse order.

This chapter includes the following topics:

- **Safety Considerations** which describes security information needed to consider while operating.
- **List of Modules** in which the modules to remove are listed.
- **Required Tools** which describes the tools needed to perform the procedures.
- **Disassembly Procedures** which describes in detail how to remove and install the modules.

Safety Considerations

Only qualified personnel should perform the disassembly procedures. Whenever possible, disconnect the power before you begin to remove or replace the modules. Otherwise, possible personal injuries or damages to the components may occur.

Avoid Electrical Shock Hazardous voltages exist on the LCD module and power supply module. To avoid electrical shock, first disconnect the power cord from the analyzers and then wait at least three minutes for the capacitors in the generators to discharge before you begin disassembly.

Preventing ESD Electrostatic discharge (ESD) can damage electronic components. When doing any of the procedures in this chapter, use proper ESD precautions. As a minimum, place the generators on a properly grounded ESD mat and wear a properly grounded ESD strap.

List of Modules

The following removable modules are listed in the order of performing disassembly procedures.

Table 4 List of modules

Number of Module	Module
1	Outer cover
2	Front-Panel
3	Power module
4	Main board
5	Control board
6	Channel plate module
7	Frequency multiplication plate module
8	Mechanical attenuator module
9	RF connector
10	LCD, Keyboard

Required Tools

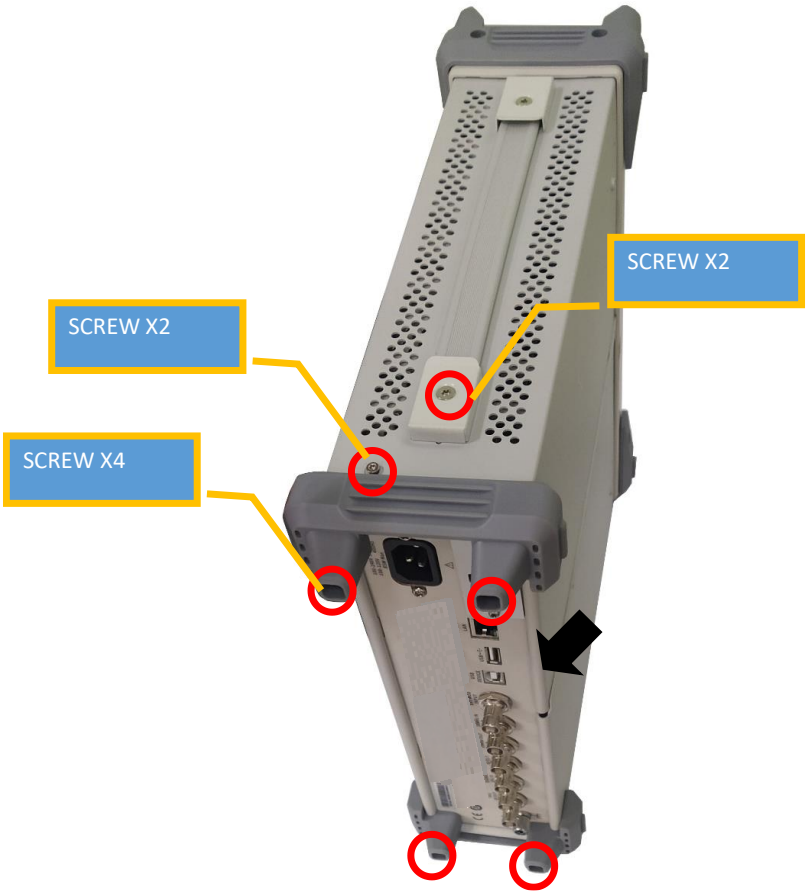
Use these tools to remove or replace the modules in the signal generators:

- Multifunctional screwdriver
- Antistatic gloves
- Custom screw hexagonal nut tool or long nose pliers

Disassembly Procedures

This section describes how to remove and install the modules listed above in the signal generator in detail. Complete disassembly will be best achieved using the following operating steps.

Remove the Outer Cover

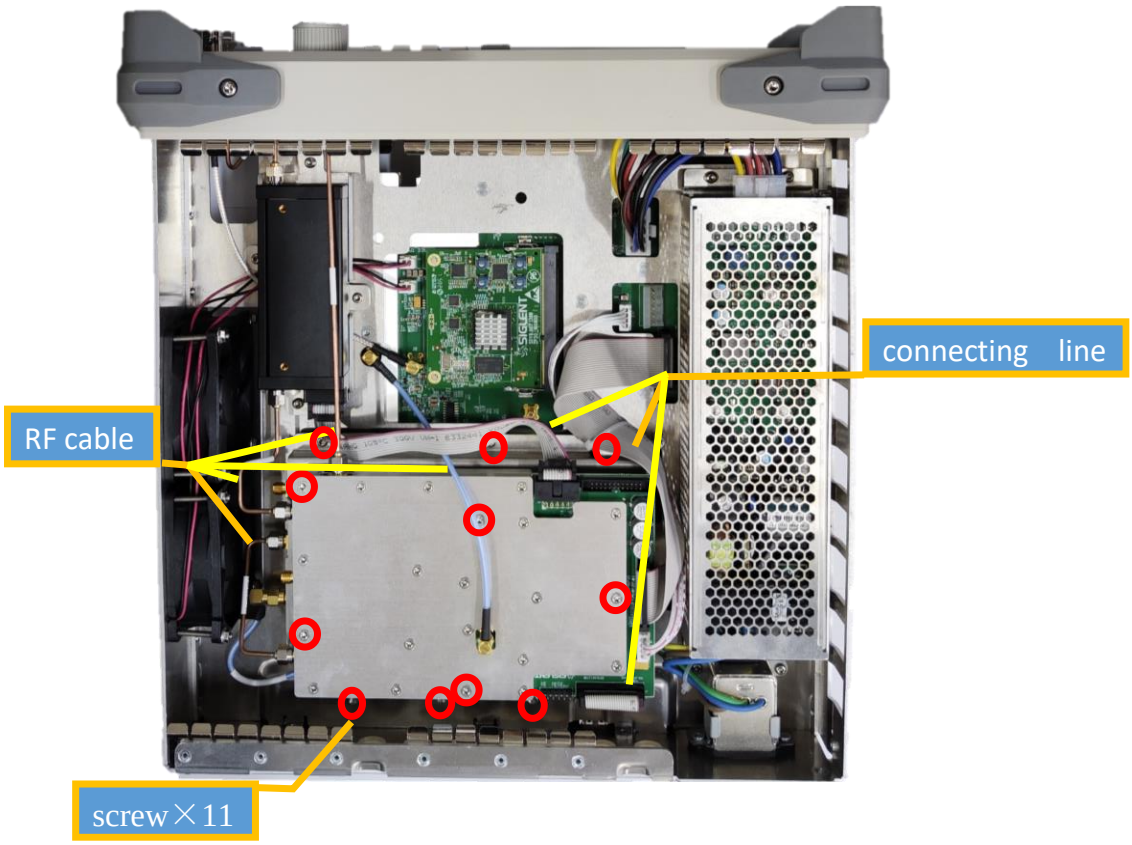


Removal steps:

1. Remove the screws as shown in figures above.
2. Press the place of the outer cover as the arrow point in the figure and remove the outer cover from the machine.

To install the outer cover, please perform the steps in reverse order.

Remove the Channel plate Module

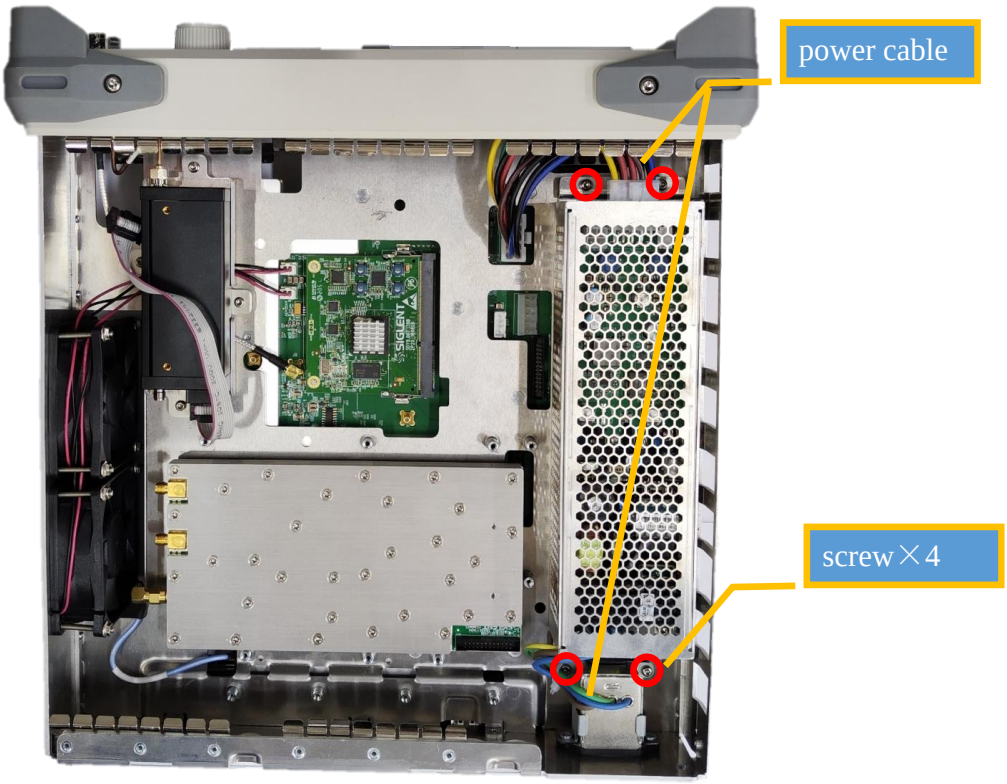


Removal steps:

1. Disconnect the connecting line and the RF cable
2. Remove the eleven screws located on the channel plate module.
3. Next, remove the channel plate module.

To install the channel plate module, please follow the steps in reverse order.

Remove the Power Module

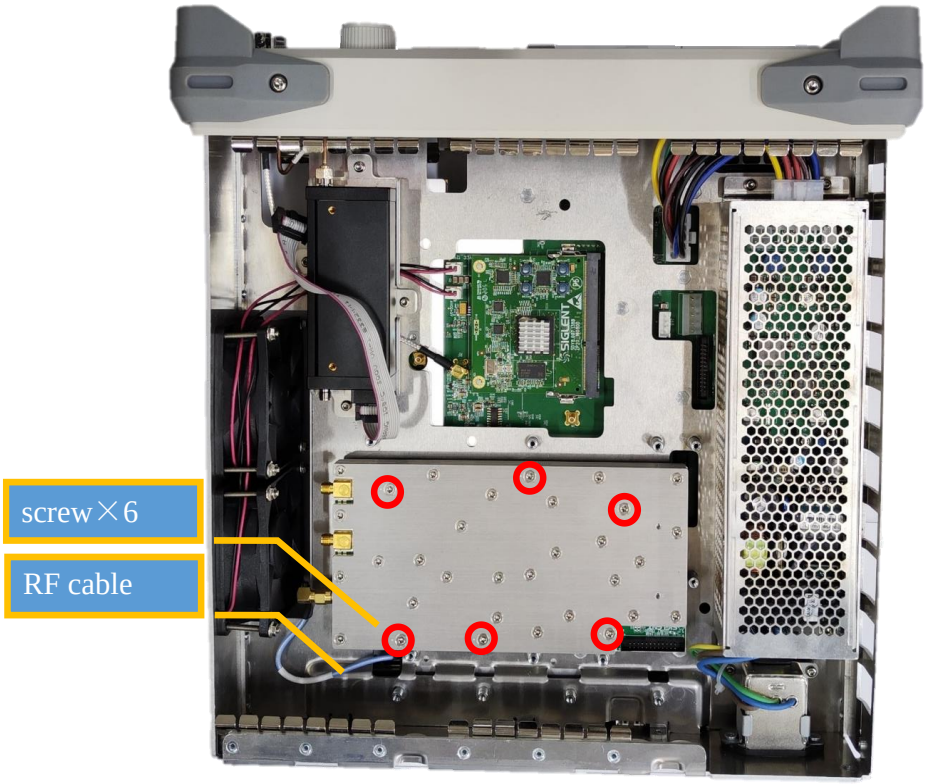


Removal steps:

1. Disconnect the power cable
2. Remove the four screws located on the metal shell
3. Next, remove the Power Module

To install the Power Module, please follow the steps in reverse order.

Remove the frequency multiplication plate module

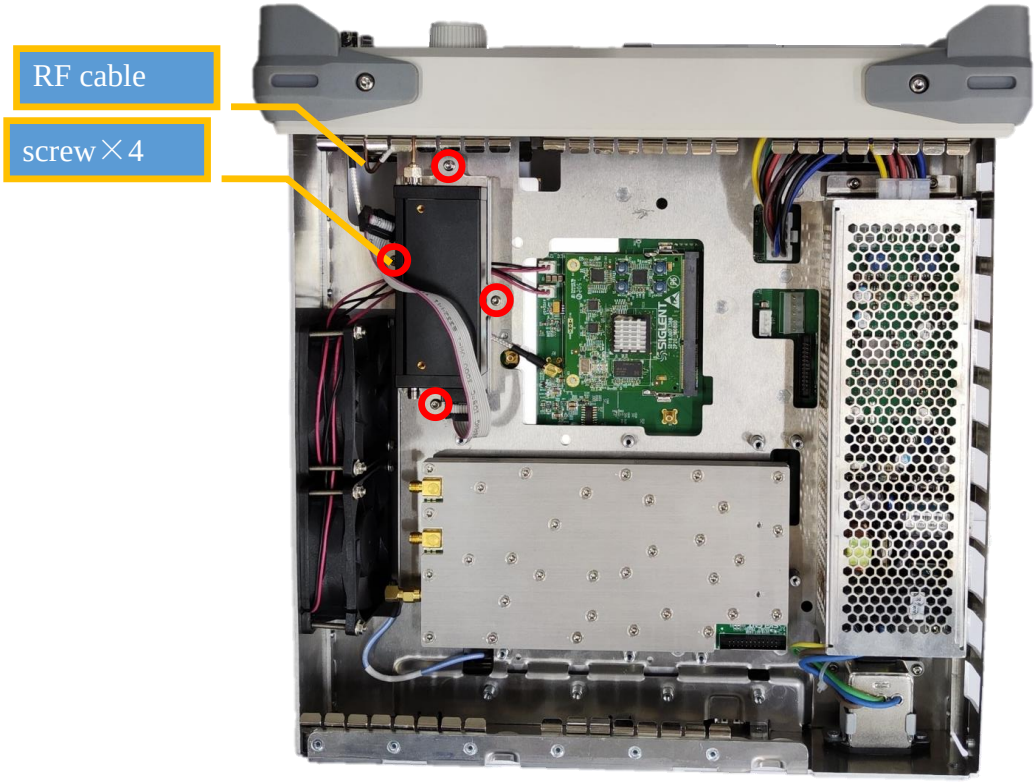


Removal steps:

1. Disconnect the RF cable
2. Remove the six screws located on the metal shell
3. Next, remove the frequency multiplication plate Module

To install the frequency multiplication plate Module, please follow the steps in reverse order.

Remove the Mechanical attenuator module

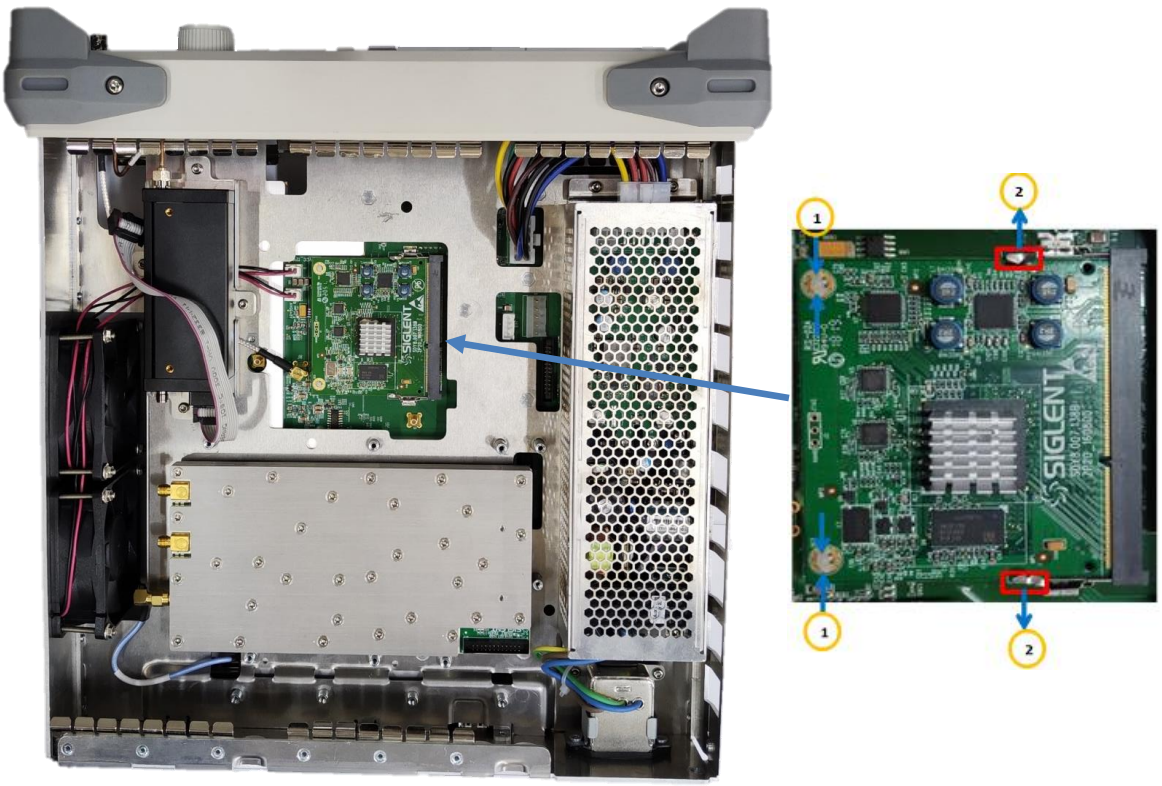


Removal steps:

1. Disconnect the RF cable
2. Remove the four screws located on the metal shell
3. Next, remove the mechanical attenuator module

To install the mechanical attenuator module, please follow the steps in reverse order.

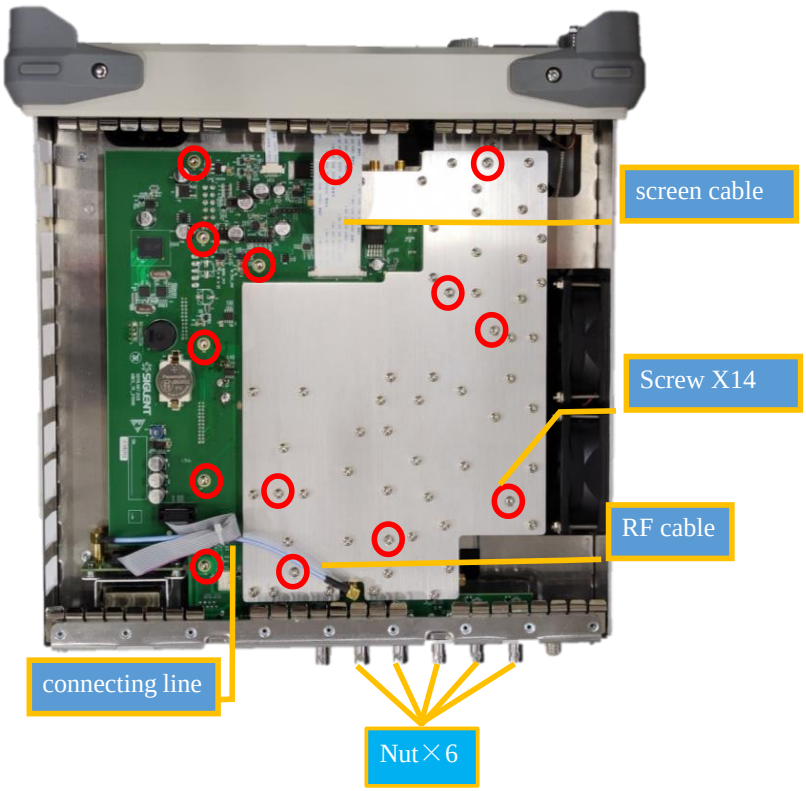
Remove the Control Board



Removal steps:

1. Unlock the hook as show in the above figure
2. Remove the control board

Remove the Main Board

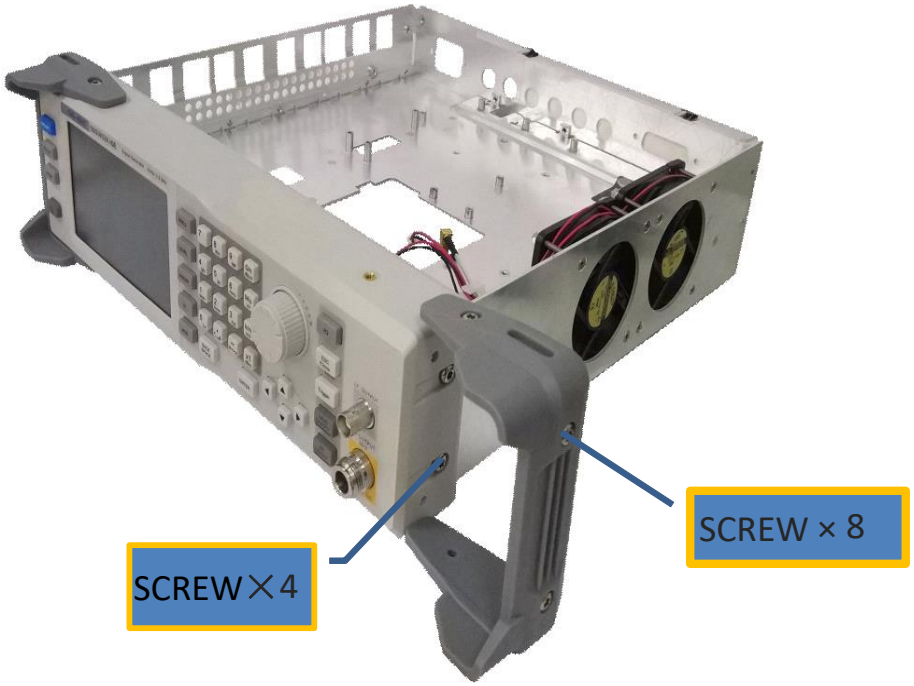


Removal steps:

1. Place the signal generator bottom up.
2. Disconnect the screen cable connected to the main board module from the front module and RF cable.
3. Remove the screws located on the main board.
4. Remove the six nuts from the back BNC terminal.

To install Main Board, please perform the steps in reverse order.

Remove the front panel

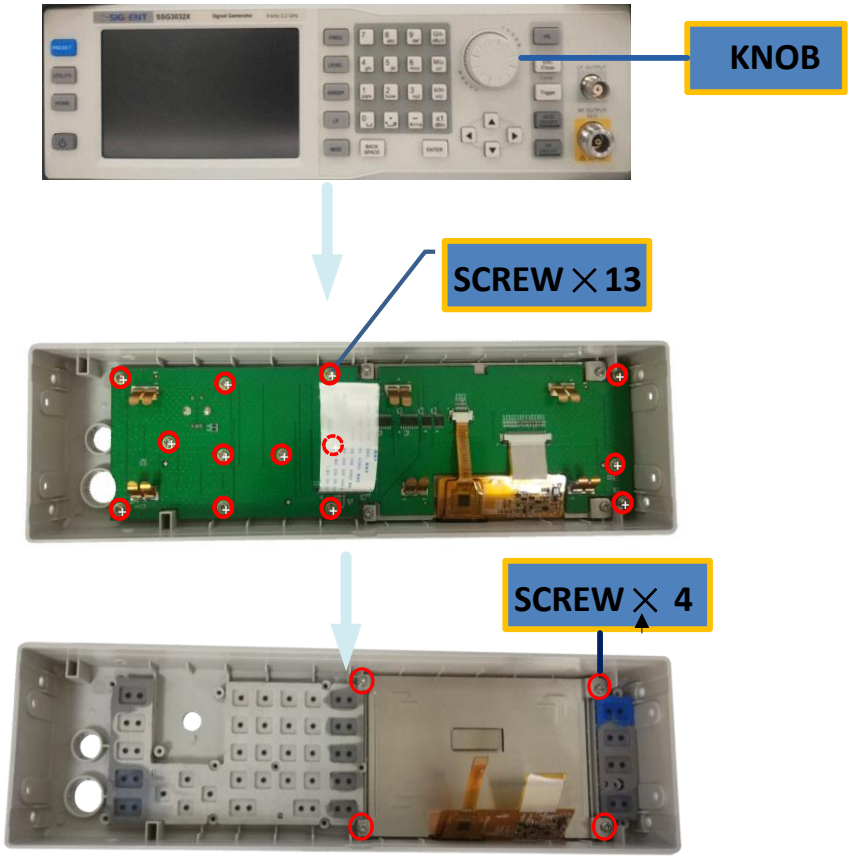


Removal steps:

1. Remove the eight screws on the rubber feet
2. Remove the four screws located on the front panel.

To install the front panel, please perform these steps in reverse order.

Remove the LCD and Keyboard



Removal steps:

1. Remove the thirteen screws on the keyboard.
2. Remove the four screws located on the edge of the display module.
3. Disconnect the cable that connects the keyboard and the channel board.
4. Separate the modules carefully.

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About SIGLENT

SIGLENT is an international high-tech company, concentrating on R&D, sales, production and services of electronic test & measurement instruments.

SIGLENT first began developing digital oscilloscopes independently in 2002. After more than a decade of continuous development, SIGLENT has extended its product line to include digital oscilloscopes, isolated handheld oscilloscopes, function/arbitrary waveform generators, RF/MW signal generators, spectrum analyzers, vector network analyzers, digital multimeters, DC power supplies, electronic loads and other general purpose test instrumentation. Since its first oscilloscope was launched in 2005, SIGLENT has become the fastest growing manufacturer of digital oscilloscopes. We firmly believe that today SIGLENT is the best value in electronic test & measurement.

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