XSG5000 Series RF Signal Generator User Manual

- XSG5015A
- XSG5025A
- XSG5045A
- XSG5065A

For product support, visit:www.owon.com.hk/download

※:The illustrations, interface, icons and characters in the user manual may be slightly different from the actual product. Please refer to the actual product.

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General Warranty

We warrant that the product will be free from defects in materials and workmanship for a period of 2 years (1 year for accessories) from the date of purchase of the product by the original purchaser from our company. This warranty only applies to the original purchaser and is not transferable to a third party.

If the product proves defective during the warranty period, we will either repair the defective product without charge for parts and labour, or will provide a replacement in exchange for the defective product. Parts, modules and replacement products used by our company for warranty work may be new or reconditioned like new. All replaced parts, modules and products become the property of our company.

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This warranty shall not apply to any defect, failure or damage caused by improper use or improper or inadequate maintenance and care. We shall not be obligated to furnish service under this warranty a) to repair damage resulting from attempts by personnel other than our company representatives to install, repair or service the product; b) to repair damage resulting from improper use or connection to incompatible equipment; c) to repair any damage or malfunction caused by the use of not our supplies; or d) to service a product that has been modified or integrated with other products when the effect of such modification or integration increases the time or difficulty of servicing the product.

Please contact the nearest Sales and Service Offices for services.

Excepting the after-sales services provided in this summary or the applicable warranty statements, we will not offer any guarantee for maintenance definitely declared or hinted, including but not limited to the implied guarantee for marketability and special-purpose acceptability. We should not take any responsibilities for any indirect, special or consequent damages.

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1.General Safety Requirements

Before use, please read the following safety precautions to avoid any possible bodily injury and to prevent this product or any other connected products from damage. To avoid any contingent danger, ensure this product is only used within the ranges specified.

- **Use Proper Power Cord.** Use only the power cord supplied with the product and certified to use in your country.
- **Product Grounded.** This instrument is grounded through the power cord grounding conductor. To avoid electric shock, the grounding conductor must be grounded. The product must be grounded properly before any connection with its input or output terminals.
- **Check all Terminal Ratings.** To avoid fire or shock hazard, check all ratings and markings on this product. Refer to the user manual for more information about ratings before connecting to the instrument.
- **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.
- **Avoid exposed circuit**. Be careful when working on exposed circuitry to avoid risk of electric shock or other injury.
- **Do not operate if any damage.** If you suspect damage to the instrument, have it inspected by qualified service personnel before further use. Any maintenance, adjustment or replacement especially to circuits or accessories must be performed by qualified service personnel.
- **Use your instrument in a well-ventilated area.** Make sure the instrument installed with proper ventilation.
- **Do not operate in damp 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 or moisture in air, please keep the surface of device clean and dry.
- **Electrostatic Prevention.** 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.
- **Protect the Input Terminals of Instrument.** Do not bend or hit the input terminals and the connected devices, (such as filter, attenuator, etc.) as such stress may cause damages to devices and the instrument. Do not mix

the use of 50Ω and 75Ω connectors and/or cables.

- **Do Not Overload the Input.** To avoid damaging the instrument, the signals at input terminal must be less than 50V DC voltage components and 30 dBm (1 W) AC (RF) components.
- **Appropriate Use of Power Meter.** If you are not sure of the characteristics of signal under measure, follow these recommendations to ensure safe operations: if a RF power meter is available, use it to measure the power level of this signal first; or add a rated external attenuator between signal cable and input terminal of the instrument. Maximum attenuation, reference level and maximum span frequency should be selected, so as to make the signals displayed within the screen.
- **Know About the Specification Conditions of the Instrument.** For maximum performance of the instrument, use the instrument under specified conditions.
- **Handling Safety.** Please handle with care during transportation to avoid damages to buttons, knob, interfaces and other parts on the panels.

2.Safety Terms and Symbols

Safety Terms

Terms in this manual (The following terms may appear in this manual):



WARNING: Warning indicates conditions or practices that could result in injury or loss of life.



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

Terms on the product (The following terms may appear on this product):

DANGER: Indicates an immediate hazard or injury possibility.

WARNING: Indicates a possible hazard or injury.

CAUTION: Indicates potential damage to the instrument or other property.

Safety Symbols

Symbols on the product (The following symbols may appear on the product):

	Hazardous Voltage		Refer to Manual
	Chassis Ground		

General Inspection

When you receive your new instrument, it is recommended that you check the instrument following these steps:

1. **Check for transportation damage.**

   If it is found that the packaging carton or the foamed plastic protection cushion has suffered serious damage, do not throw it away until the complete device and its accessories have been electrically and mechanically checked.

2. **Check the Accessories.**

   The supplied accessories are described in "Appendix A: Accessories" of this Manual. Please ensure that all the listed accessories are present and undamaged, if any problems are found please contact your distributor or

our local office.

3. Check the Complete Instrument.

If there is any physical damage, operational fault, or performance issue please contact your distributor or our local office. If there is any damage to the instrument please ensure you keep the original packaging. Ideally you should always keep the original packaging if the instrument must be returned for repair.

Safety Precaution before Operation

Check Power Supply

The instrument is equipped with a three-wire power cord in accordance with international safety standards. The product must be grounded properly before being powered on, as floating or improper ground may cause damage to the instrument or personal injury.

Make sure the grounding conductor of the instrument is grounded before turning on the instrument. After which the AC power cord can be connected. Do not use a non-ground power cord.

Allowed Variation Range of Power Supply Parameters

The instrument is compatible with 100V~240V, 50Hz-60Hz AC power, table lists the power requirement to run the instrument.

Power Supply Parameter	Compatible Range
Voltage	100 - 240 VAC
Frequency	50 - 60 Hz
Max. Power	28 W

To prevent or lower the risk of damage to the instrument from power interference between instruments, especially from peak pulses produced by large power consumption instruments, a 220V/110V AC regulated power supply is recommended.

Power Cord Selection

The instrument is equipped with a three-wire power cord in accordance with international safety standards. This cable grounds the instrument cabinet when connected to an appropriate power line outlet. The cable must be rated greater than 250Vac and 2A.

Warning: Improper grounding may cause damage to the instrument, or result in personal injury. Make sure the grounding conductor of the instrument is grounded before turning on the instrument. Always use a well-grounded power source. Do not use an external power cable, power cord or an auto transformer without grounded protection. If this product is to be powered via an external auto transformer for voltage reduction, ensure that its common terminal is connected to a neutral (earthed pole) of the power supply.

Warning: Make sure the supply power is stable before turning on the instrument to protect it from damage. Refer to "First Time to Power on".

Electro-static Discharge (ESD) Protection

ESD is an issue often ignored by users. Damage from ESD on the instrument is unlikely to occur immediately but will significantly reduce the reliability of it. Therefore, ESD precautions should be implemented in the work environment, and applied daily.

Generally, there are two steps to manage ESD protection:

(1) Conductive table mats to connect hands via wrist bands.
(2) Conductive ground mat to connect feet via ankle straps.

Implement both protection methods will provide a good level of anti-static protection. If used alone, the protection will not be as reliable. To ensure user's safety, anti-static components should offer at least 1MΩ isolation resistance.

Warning: The above ESD protections measures cannot be used when working with over 500V!

Make good use of anti-static technology to protect components from damage:

(1) Quickly ground the internal and external conductor of the coaxial cable before it is connected with the instrument.
(2) Staff must wear anti-static gloves before touching the connector cord or doing any assemble work.

First Time to Power on

Connect the three-pin AC power cord into the instrument. Insert the plug into a power socket provided with a protective ground.

Warning: Check the power source before turning on the instrument, to protect the device from damage.

(1) Press the power switch  on the bottom left of the front panel.

(2) Allow the instrument to warm up for 30 minutes.

3.Primary User Guide

This chapter elaborates the following topics:

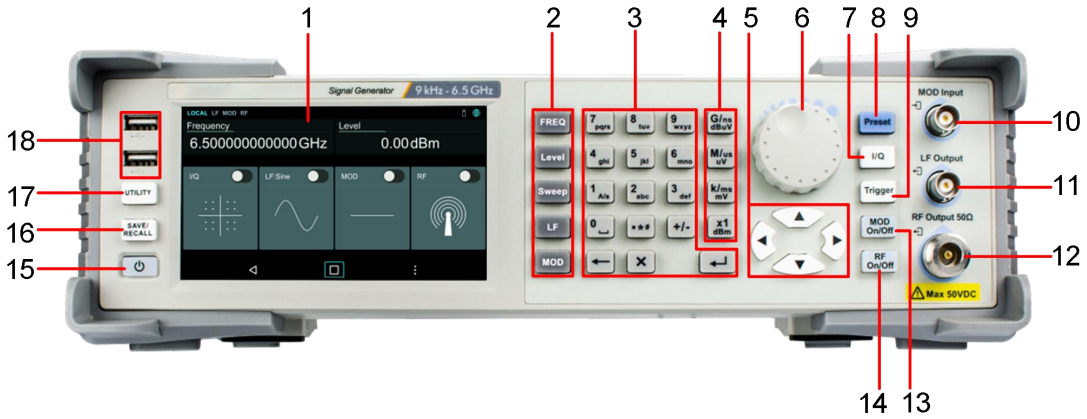
- **A General Knowledge Of The Instrument**
- **User Interface**
- **Touch Screen and External Mouse Control**
- **External Keyboard Control**
- **Basic Measurement**

A General Knowledge Of The Instrument

This chapter gives a brief description and introduction to the operations and functions of the front panel of the instrument, so as to facilitate your operations of the instrument in the shortest time.

Front Panel

On the instrument panel, knobs and function buttons are used to enter different function menus or directly use specific function application.



NO.	Description	NO.	Description
1	LCD	10	Mode input interface
2	Function keys	11	LF output interface
3	Numeric keypad	12	RF output 50Ω interface
4	Unit keys	13	Mode on/off key
5	Arrow keys	14	RF on/off key
6	Knob	15	Power key (Push to turn on, long push to turn off)
7	I/Q mode switch key	16	Save/recall key
8	Preset key	17	System setting key
9	Trigger key	18	USB Host port

Front Panel Function Key



Keys	Description
FREQ	Set frequency related parameters, including frequency, frequency offset, phase offset, etc.
Level	Set amplitude related parameters, including amplitude, amplitude offset, ALC status, flatness, etc.
Sweep	Set sweep related parameters, including sweep status, step sweep, list sweep, sweep direction, etc.
LF	Enter the LF interface to select the LF source or LF sweep mode.
MOD	Enter the modulation interface to select amplitude modulation, frequency modulation, phase modulation or pulse modulation.
Preset	Restore the instrument measurement configuration to factory default settings or user-defined measurement states. Users can select default state and user state via the [UTILITY] front panel key → [Setup] → [Reset Type] submenu.
I/Q	Enter the I/Q mode and configure relevant parameters.
Trigger	Trigger key: Press to trigger according to the current mode.
MOD On/Off	Modulation mode output master switch key: The key lamp illuminates to indicate output enabled.
RF On/Off	RF signal output key: The key lamp illuminates to indicate output enabled.
UTILITY	Enter the system setup interface to configure relevant parameters.
SAVE/ RECALL	Enter the file manager interface for file saving, loading and other operations.

Parameter Input

Specific parameter values are able to be entered using the numeric keypad, knob, and directional keys.

- **Numeric Keypad**



1. Numeric button
   - Press this button under English mode to input corresponding letters;
   - Press this button under number mode to input the numbers 0-9.
2. 1 A/a button
   Press this button under English mode to switch capital and small letter of English letters of input type; input the number “1” under numeric mode.
3. ▪*# button

Press this button under English mode to input special symbols; input decimal point “.” under number mode.

4. +/- button
   Press this button under English mode to switch small letter of English letters; press this button under number mode to enter negative number input state, which will display the parameter symbol “-”. Press this button again to return to return positive number input state.
5. Unit buttons
   Unit buttons include: G/ns/dBuV, M/us/uV, k/ms/mV and x1/dBm. Press the required unit button after inputting numbers. The meaning of unit button is subject to the type of current input parameter, i.e., “Frequency”, “Amplitude” or “Time”.
6. × Cancel button
   - Press this button while inputting panel button parameters to clear the input in active function area and exit parameter input state.
   - In the process of parameter input or file name editing on the small panel of touch screen, click to clear the characters in SIDE the input box, and double click to exit the current window.
7. ← Backspace button

   Press this button while inputting parameter to delete a character at the left side of cursor in the input box, or delete the last character from left to right

if there is no cursor.

8. ↵ button

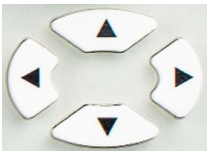
Press this button while inputting parameters to end inputting parameters and add unit value of the last input to the parameter.

- **Knob**



Knob function:
Press the knob to toggle between parameter edit state and function control state.
In the parameter edit state, the parameter is highlighted in white. Rotate the knob to increase (clockwise) or decrease (counterclockwise) the parameter by the specified step size.
In the function control state, rotate the knob to select the desired function. Press keys according to the selected function to pop up the numeric keypad or toggle switch status, etc.

- **Arrow keys**

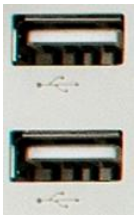


The directional keys have following functions:

- When entering parameters, press the left/right arrow keys to move the cursor, and press the up/down arrow keys to increment or decrement the parameter value by a fixed step.
- In the **SAVE/RECALL** file function, press the left/right arrow keys to select functions, and press the up/down arrow keys to move the cursor in the root directory.
- In other functions, press the arrow keys to switch setting parameters.

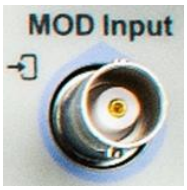
Front Panel Connector

1. USB Host



The instrument may serve as a "host" device to connect to external USB devices. This interface can be used for accessing a USB flash drive or more devices after expansion via USB HUB, such as external keyboard or mouse.

2. MOD Input



The modulation input port accepts an external modulation signal when the modulation source is set to External.

3. LF Output



Note: To prevent instrument damage, the reverse DC voltage on the RF output connector must not exceed 50 V. For frequencies above 1 MHz, the maximum continuous reverse input power shall not exceed +30 dBm.

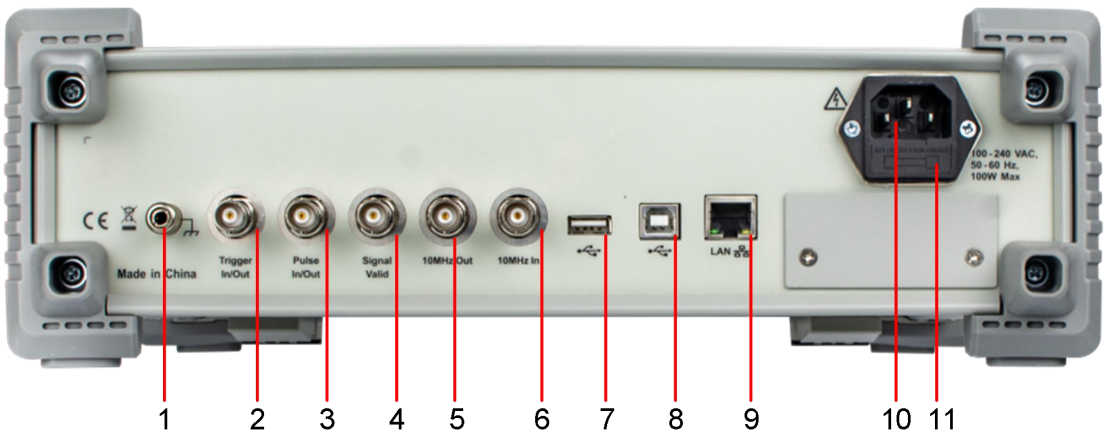
4. RF Output 50Ω



The RF input may be connected to a device via a N type connector

Note: The maximum output power of the RF output port is +20 dBm.

Rear Panel

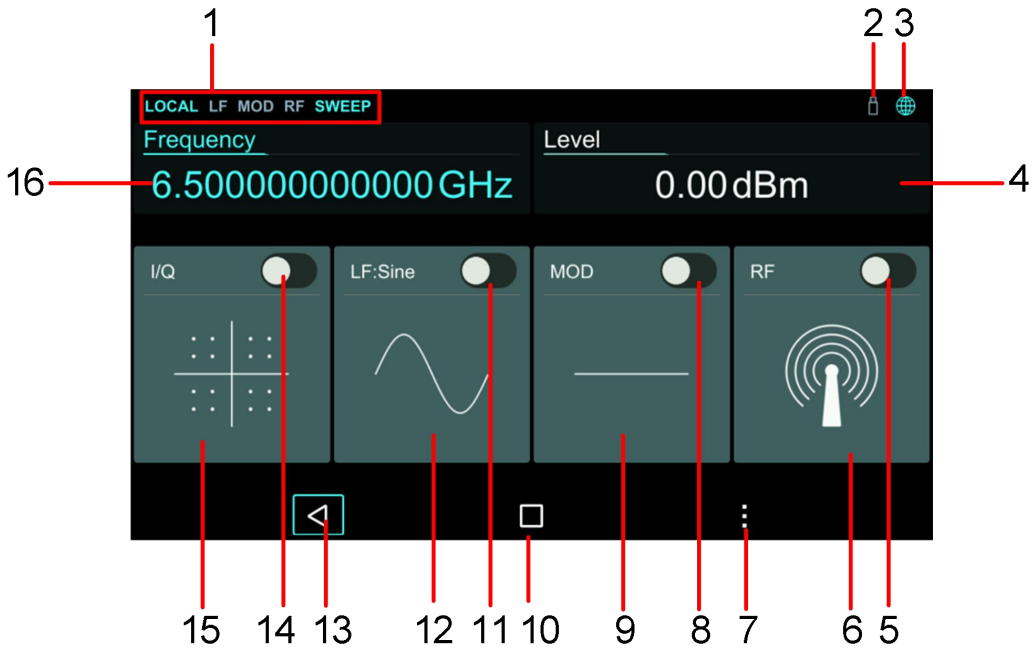


NO.	Name	Description

1	Lock hole	A security lock (purchased separately by the user) may be used with this lock hole to secure the instrument in place.
2	TRIGGER In/Out	When the trigger mode of Pulse modulation is set to Auto, this connector outputs a trigger signal. When the trigger mode of RF Sweep, Pulse modulation or LF Sweep is set to External, this connector accepts an external trigger signal.
3	PULSE In/Out	PULSE IN: Used to input an external pulse signal when the pulse source of Pulse is set to External. PULSE OUT: Used to output the pulse signal generated by the internal generator when the Pulse modulation source is Internal and the pulse output switch is enabled. The output signal depends on the selection of Pulse Type, which can be set to Single Pulse, Dual Pulse or Pulse Train.
4	SIGNAL VALID	When the RF output frequency or amplitude is modified, after a certain response and processing delay of the internal circuit, the front-panel RF output connector delivers the RF signal at the specified frequency and amplitude. During this period, the [SIGNAL VALID] port outputs a pulse synchronization signal to indicate the validity of the RF output: High level (3.3 V): RF signal is switching; Low level (0 V): RF signal is stable (valid).
5	10MHz Out	When the external reference is lost, out of range or disconnected, the instrument automatically switches to the internal reference, and "EXT REF" will no longer appear on the status bar. If the instrument uses the internal reference source, this port can output the internally generated 10 MHz clock signal for synchronizing other devices.
6	10MHz In	This port serves as the reference clock input / output. If the instrument detects an incoming 10 MHz clock signal, the signal will be used as the external reference source, and "EXT REF" will be displayed on the status bar of the user interface.
7	USB Host port	When the signal source acts as the host connected to an external USB device, a USB flash drive can be used to upgrade the signal source firmware, save the signal source configuration files to the flash drive, or connect an external mouse and keyboard.
8	USB Device interface	When the instrument acts as a device connected to an external USB host, data is transmitted through

		this port. For example, this port is used for connection to a PC or printer.
9	LAN interface	The instrument can be connected to a local area network via this port for remote control.
10	AC power connector	AC: 50–60 Hz, single-phase AC 220 V±15% or 110 V±15%.
11	Fuse	

User Interface



NO.	Name	Description
1	Status icon	Local / Remote: When Remote is shown in red, the on-screen keypad is locked. Press Preset to unlock. LF: Enable/disable status of the low-frequency signal generator. Modulation: Enable/disable status of the modulation mode. RF: Enable/disable status of the RF output.
2	U disk icon	Blue (Enabled), Gray (Disabled).
3	Network icon	Blue (Enabled), Gray (Disabled).
4	Amplitude parameter	Set amplitude parameter.
5	RF Switch	Enables or disables RF output.
6	RF Module	Tap to enter the RF output interface for relevant parameter configuration.

7	Menu key	Open the menu function window (corresponding to the function keys on the physical key area).
8	Modulation switch	Enables or disables modulation output.
9	Modulation Module	Tap to enter the modulation output interface for relevant parameter configuration.
10	Home key	Switch to main interface.
11	LF: Sine Wave Switch	Enables or disables LF sine wave output.
12	LF: Sine Wave Module	Tap to enter the LF sine wave output interface for relevant parameter configuration.
13	Return key	Return to the previous screen.
14	I/Q switch	Enables or disables I/Q output.
15	I/Q modulation	Tap to enter the I/Q output interface for relevant parameter configuration.
16	Frequency parameter	Set frequency parameter.

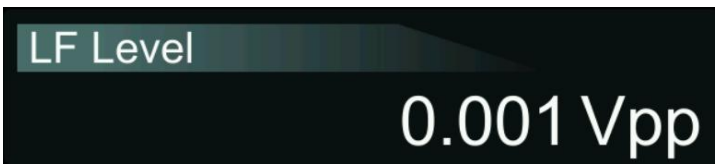
Touch Screen and External Mouse Control

The display is touchscreen-enabled. Gesture control is supported directly on the interface, and on-screen menus can be tapped for parameter editing. When a scroll bar appears on the right, swipe up or down to view more menus. Access mouse via USB port. If arrow appears on the screen, operate with the mouse.
The instrument can be operated by controlling the focus via keys and knob together with Enter.

- When the focus is on a switch component, pressing Enter toggles the switch state.



- When the focus is on a numeric input component, pressing Enter brings up the numeric keypad.



- When the focus is on a drop-down menu component, pressing Enter pops up the menu.



- When the focus is on a single digit, use the up/down arrow keys or the knob to increase or decrease the value, and use the left/right arrow keys to move the cursor and select the digit to adjust.



External Keyboard Control

Insert the keyboard into the USB port on the front panel. Control and input can be realized by keyboard. Buttons are corresponding to the following:

Button	Description	Button	Description	Button	Description
F	Frequency	L	Level	S	Sweep
K	LF	O	MOD	P	Preset
I	I/Q	T	Trigger	M	MOD On/Off
R	RF On/Off	A	Save/Recall	U	Utility
W	Power/Off	F9	GHz/ns/dBuV	F10	MHz/us/uV
F11	kHz/ms/mV	F12	X1 dBm	0~9	0~9
Backspace	←	Esc	X	Enter	Enter

Basic Measurement

Follow these five simple steps to configure the output signal:

1. Enter the frequency screen and set the frequency.
2. Enter the amplitude screen and set the amplitude.
3. Turn on the RF switch.
4. Turn on the MOD switch, enter the modulation screen, enable FM modulation, and set the modulation frequency and frequency deviation.
5. Connect the RF port of the signal source to the measuring device (e.g., another instrument), then observe the signal on the measuring device.

4.Menu Interpretation

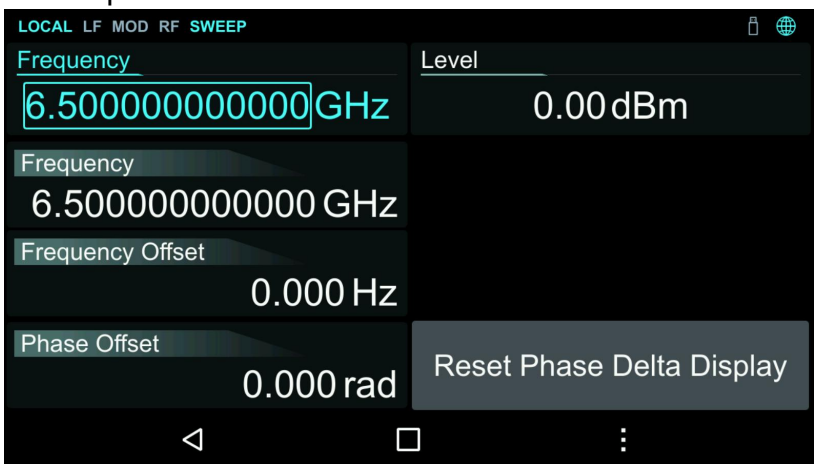
This chapter provides detailed descriptions of the menu keys on the instrument front panel.

This chapter elaborates the following topics:

- [FREQ]Frequency
- Level Amplitude
- [Sweep]Sweep
- LF
- MOD
- UTILITY
- SAVE/RECALL

[FREQ]Frequency

Press the **FREQ** key to enter the frequency setting screen and configure frequency related parameters.



Display Frequency

Displayed Frequency = Output Frequency + Frequency Offset
Note:

- Modifying the displayed frequency changes the actual output frequency value, which is limited by the output frequency range.
- Values and units can be set using the focus cursor.
- Values and units (GHz, MHz, kHz, Hz) can be set via the numeric keypad. Press Enter to use the current unit by default.
- Double-tap to enter the frequency setting screen.

Output Frequency

Set RF output frequency.
Note:

- Values and units (GHz, MHz, kHz, Hz) can be set via the numeric keypad. Press Enter to use the current unit by default.
- Modifying the output frequency will change the displayed frequency.

Frequency Offset

Set the frequency offset relative to the RF output frequency.
It is mainly used when an external mixer is connected. Configure the frequency offset so that the displayed frequency shows the final output frequency.
Note:

- Values and units (GHz, MHz, kHz, Hz) can be set via the numeric keypad. Press Enter to use the current unit by default.
- Modifying the frequency offset will change the displayed frequency.

Phase Offset

Set the phase offset relative to the current RF signal.
This parameter is mainly adjusted when multiple signal sources work together to align their output phases or set a fixed phase offset.
Note:

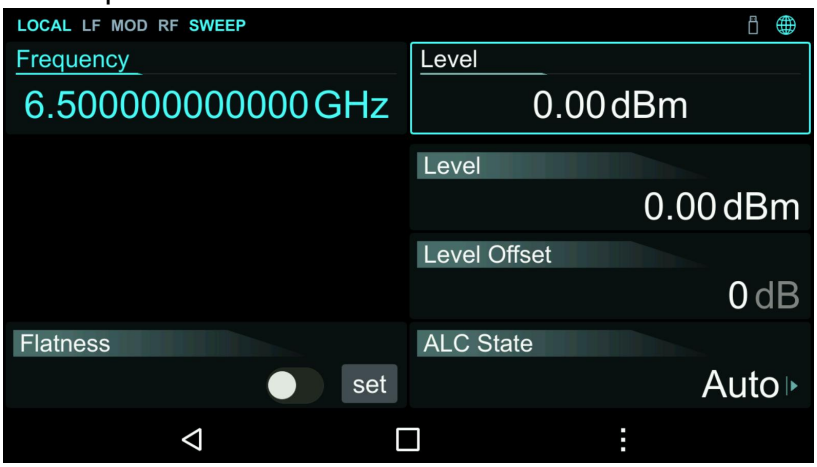
- Values and units (deg, rad) can be set via the numeric keypad. Press Enter to use the current unit by default.

Reset Phase Delta Display

Resets the currently displayed phase offset to 0 deg without changing the actual phase offset value, facilitating incremental adjustment of the offset.

[Level]Amplitude

Press the **Level** key to enter the amplitude setting screen and configure amplitude related parameters.



Display Level

Displayed Amplitude = Output Amplitude + Amplitude Offset
Note:

- Modifying the displayed amplitude changes the actual output amplitude value, which is limited by the output amplitude range.
- Values and units can be set using the focus cursor.
- Values and units (mW, uW, dBmV, dBuV, V, mV, uV, dBm) can be set via

the numeric keypad. Press Enter to use the current unit by default.
- Double-tap to enter the amplitude setting screen.

Output Level

Set the amplitude relative to the RF output.
Note:
- Values and units (mW, uW, dBmV, dBuV, V, mV, uV, dBm) can be set via the numeric keypad. Press Enter to use the current unit by default.
- Modifying the output amplitude will change the displayed amplitude.

Level Offset

Set the amplitude offset (dB) relative to the RF output amplitude.
It is mainly used when an external attenuator or amplifier is connected. Configure the amplitude offset so that the displayed amplitude indicates the final output amplitude.
Note:
- Values can be set via the numeric keypad.
- Modifying the amplitude offset will change the displayed amplitude.
- If the amplitude offset is non-zero, an offset indicator appears on the top status bar.

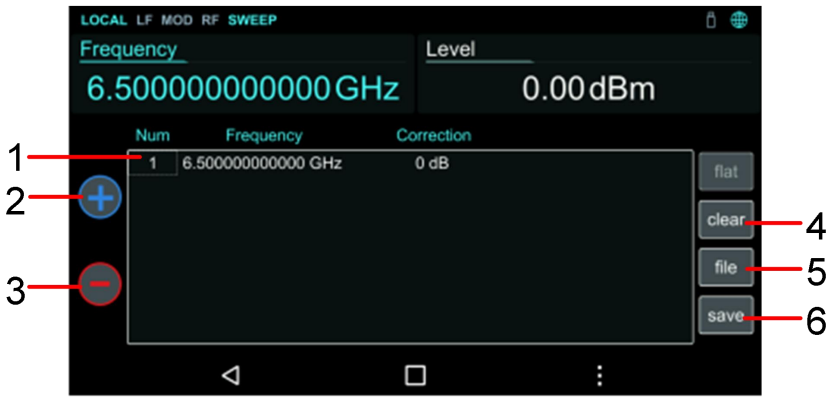
ALC State

Set the Automatic Level Control (ALC) mode (Off, On, Auto). The default operating state is Auto.
Note:
- Off: Disables the ALC function.
- On: Enables the ALC function.
- Auto: Automatically enables or disables ALC according to the current instrument status.

Flatness

The flatness correction function adjusts the RF output amplitude corresponding to each frequency point within the instrument frequency range to compensate for cable loss or external loss introduced by other devices. When flatness correction is enabled, the correction value at the RF output frequency in the flatness list is added to the RF output amplitude. If no matching frequency point exists, the correction value is calculated linearly from the two nearest points.

When flatness is enabled, a flatness indicator appears on the top status bar. Tap **Settings** to enter the flatness list editing screen.

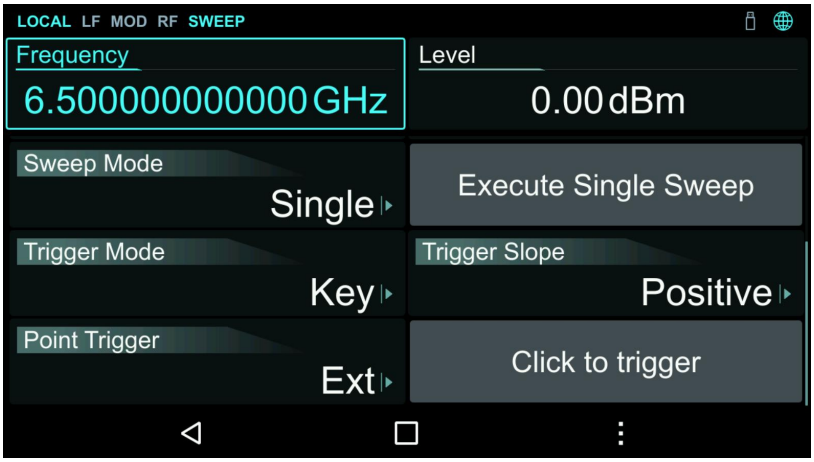


NO.	Description
1	Index: Index number of this compensation point. Frequency: Frequency corresponding to this compensation point. Amplitude: Amplitude correction value of this compensation point.
2	Tap the + key to insert a new data row below the currently selected row.
3	Tap the - key to delete the currently selected row.
4	Tap the Clear button to remove all rows and keep one default row.
5	Tap the File button to enter the Save/Recall screen and select the flatness correction file with the **.flatness** extension.
6	Tap the Save button to enter the Save/Recall screen. Enter the file name and tap Confirm to save the correction file.

[Sweep]Sweep

Press the **Sweep** key to enter the sweep setting screen and configure signal source sweep parameters.





Sweep State

Set the sweep state (Off, Frequency, Amplitude, Frequency & Amplitude). The setting takes effect only after the RF switch is turned on.
Note:

- A sweep indicator will be shown on the top status bar when sweep is enabled.
- **Off:** Disable the sweep function.
- **Freq:** Enable frequency sweep. The displayed frequency refreshes synchronously with the current swept frequency point, and a progress bar is displayed.
- **Level:** Enable amplitude sweep. The displayed amplitude refreshes synchronously with the current swept amplitude, and a progress bar is displayed.
- **Freq_Level:** Enable both frequency and amplitude sweep. The displayed frequency and amplitude refresh synchronously with the current swept values, and a progress bar is displayed.

Sweep Direction

Set sweep direction (Up, Down). The default is Up.

- **Up:** The signal source sweeps from the start parameter to the stop parameter, and the progress bar advances from left to right.
- **Down:** The signal source sweeps from the stop parameter to the start parameter, and the progress bar advances from right to left.

Sweep Mode

Set sweep mode (Continuous, Single). The default is Continuous. The priority order from high to low for condition judgment is: Sweep Mode → Trigger Mode

→ Point Trigger Mode.

- **Continuous:** When the trigger condition is met, the signal source performs continuous sweep with current parameter settings.
- **Single:** Each time the Single Sweep key is pressed, the signal source executes one sweep with current parameter settings and then stops.

Trigger Mode

Set trigger mode (Auto, Key, Bus, External). The default is Auto.

- **Auto:** For Continuous sweep mode, continuous sweep runs once sweep is enabled. For Single sweep mode, press the Single Sweep key to run one sweep with current settings and then stop.
- **Key:** For Continuous sweep mode, the signal source runs one sweep and stops each time the front-panel **Trigger** key or on-screen trigger button is pressed. For Single sweep mode, press the Single Sweep key first, then press the **Trigger** key or on-screen trigger button; the signal source runs one sweep and stops.
- **Bus:** For Continuous sweep mode, sending the SCPI command *TRG to the signal source triggers one sweep and then stops. For Single sweep mode, press the Single Sweep key first, then send *TRG; the signal source runs one sweep and stops.
- **Ext:** The signal source reads trigger signals from the rear-panel TRIGGER In/Out port.
  - For Continuous sweep mode, one sweep is executed and stops upon receiving each TTL pulse of the specified polarity.
  - For Single sweep mode, the Single Sweep key must be pressed first; one sweep is executed and stops only after a TTL pulse of the specified polarity is received.
  - Due to output switching control during sweep transitions, the input external trigger frequency must be less than 100 Hz.

Point Trigger

Set point trigger mode (Auto, Key, Bus, External). The default is Auto.

- **Auto:** In Continuous sweep mode, the instrument sweeps through all points continuously after sweep is enabled. In Single sweep mode, press the Single Sweep key to complete one full sweep with current settings and then stop.
- **Key:** In Continuous sweep mode, the signal source sweeps one point each time the front-panel **Trigger** key or on-screen trigger button is pressed. In Single sweep mode, press the Single Sweep key first, then press the **Trigger** key or trigger button; the signal source sweeps one point and stops after reaching the last point.

- **Bus:** In Continuous sweep mode, sending the SCPI command *TRG makes the signal source sweep one point. In Single sweep mode, press the Single Sweep key first, then send *TRG; the signal source sweeps one point and stops after reaching the last point.
- **Ext:** The signal source acquires trigger signals via the rear-panel TRIGGER In/Out port.
  - In Continuous sweep mode, the signal source sweeps one point upon receiving each TTL pulse of the specified polarity.
  - In Single sweep mode, press the Single Sweep key first; the signal source sweeps one point upon receiving a TTL pulse of the specified polarity and stops after reaching the last point.

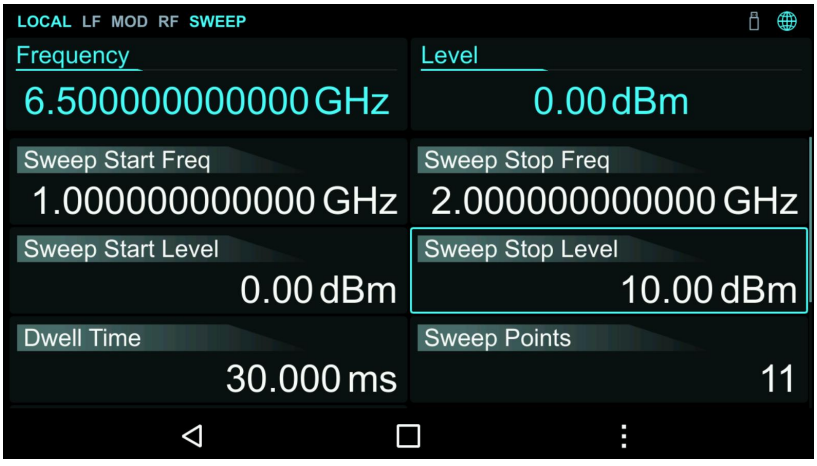
Edge

Set trigger edge (Rising Edge, Falling Edge). The default is Rising Edge. Trigger edge selection is available only when the trigger mode or point trigger mode is set to External.

- Rising Edge: Trigger one sweep on the rising edge of the external trigger signal.
- Falling Edge: Trigger one sweep on the falling edge of the external trigger signal.

Step Sweep

Step sweep is enabled by default. When step sweep is on, list sweep is off, and vice versa; the two modes are mutually exclusive. Tap the **set** button to enter the step sweep parameter setting screen.



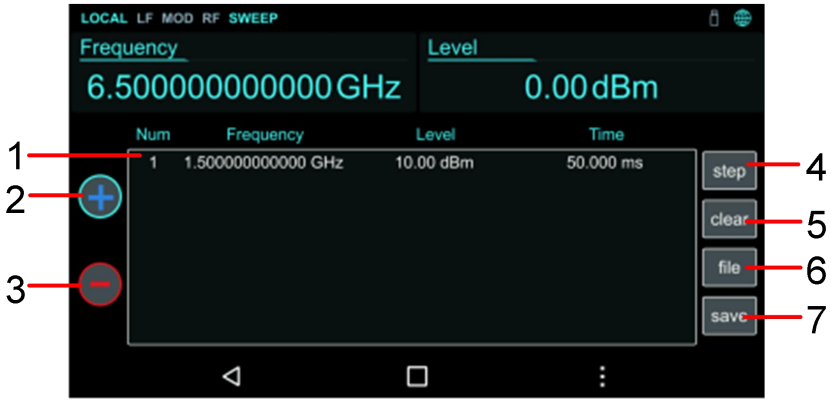
- **Sweep Start Freq:** Sets the start frequency of the sweep (GHz, MHz, kHz, Hz).
- **Sweep Stop Freq:** Sets the stop frequency of the sweep (GHz, MHz, kHz, Hz).
- **Sweep Start Level:** Sets the start amplitude of the sweep (mW, μW,

dBmV, dBuV, V, mV, μV, dBm).

- **Sweep Stop Level:** Sets the stop amplitude of the sweep (mW, μW, dBmV, dBuV, V, mV, μV, dBm).
- **Dwell Time:** Sets the time interval between successive points (s, ms, μs, ns).
- **Sweep Points:** Sets the quantity of sweep points. Parameters of each point are calculated linearly or logarithmically from the start and stop values.
- **Sweep Shape:** Sets the sweep cycle type. Sawtooth means the sweep runs from start to stop; the sequence resembles a sawtooth waveform. Triangle means the sweep runs from start to stop and then back to start; the sequence resembles a triangular waveform.
- **Sweep Space:** Sets the variation rule between adjacent points, Linear or Logarithmic.
- Frequency Linear / Logarithmic Step: Sets the linear or logarithmic step value for frequency.

List Sweep

List sweep is enabled while step sweep is disabled. Tap the **set** button to enter the list sweep parameter setting screen.

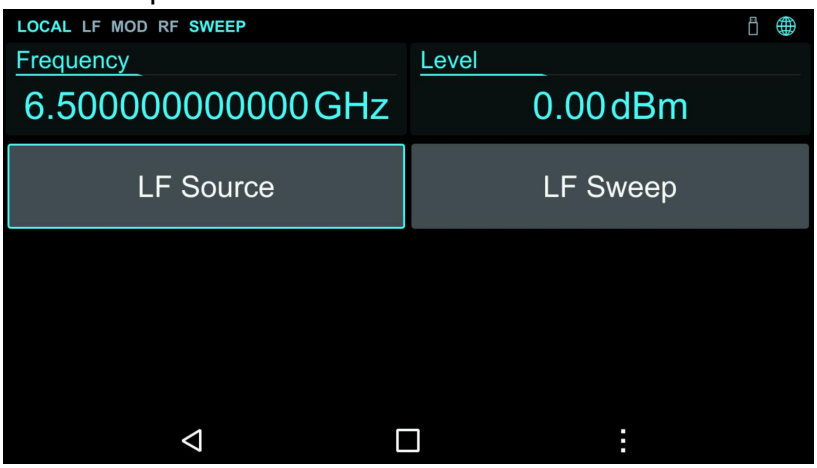


NO.	Description
1	Index: Index number of this sweep point. Frequency: Frequency corresponding to this sweep point. Amplitude: Amplitude corresponding to this sweep point. Time: Dwell time of this sweep point.
2	Tap the + key to insert a new data row below the currently selected row.
3	Tap the - key to delete the currently selected row.
4	Tap the **Step** button to generate a new list using the parameters configured for step sweep.
5	Tap the Clear button to remove all rows and keep one default row.

6	Tap the **File** button to enter the Save/Recall screen and select the list sweep file with the .listsweep extension.
7	Tap the Save button to enter the Save/Recall screen. Enter the file name and tap Confirm to save the sweep list file.

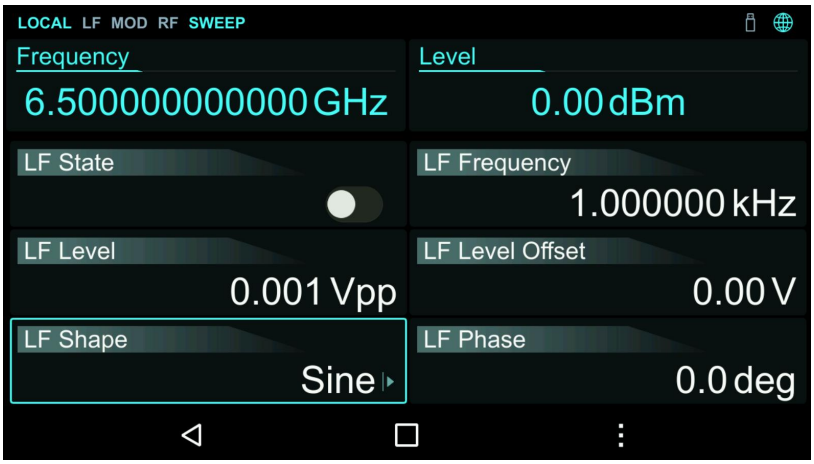
[LF]Low Frequency

Press the **LF** key to enter the low frequency setting screen, which includes LF Source and LF Sweep.



LF Source

The signal source has a built-in low-frequency generator, which can be used for low-frequency output or as the internal source for analog modulation. Tap the **LF Source** button to enter the setting screen.



LF State

Enable or disable the LF output.

LF Level

Set the output amplitude of the LF signal (dBm, μVpp, mVpp, Vpp, nW, μW,

mW, W).

The setting range is 1 mV ~ 3 V. If the unit is power, the calculated power value varies with waveform.

LF Shape

Set the output waveform of the LF signal (Sine, Square, Sawtooth, Triangle, DC).
The default is Sine. When Square, Sawtooth or Triangle is selected, the maximum output frequency is 20 kHz. When Sine is selected, the maximum output frequency is 1 MHz.

LF Frequency

Set the output frequency of the LF signal (GHz, MHz, kHz, Hz). The setting range is 0.01 Hz ~ 1 MHz.

LF Level Offset

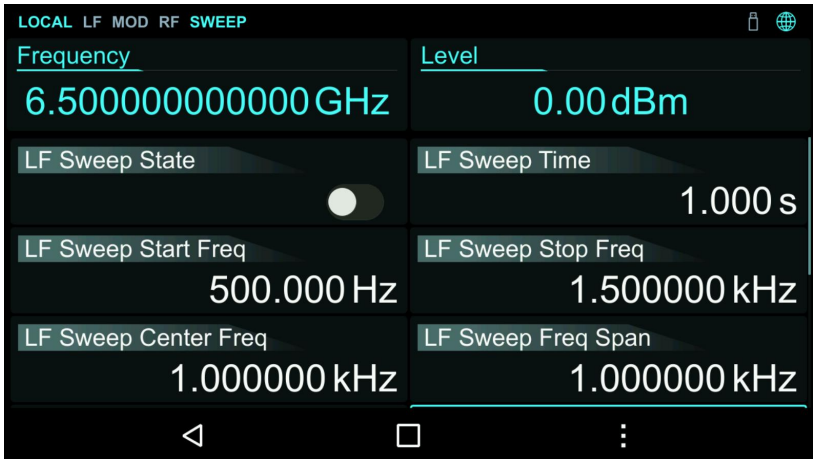
Set the amplitude offset of the LF signal (dBm, μV, mV, V, nW, μW, mW, W). Setting range: |offset| ≤ min(2.5 − 0.5 * LEVEL, 2).

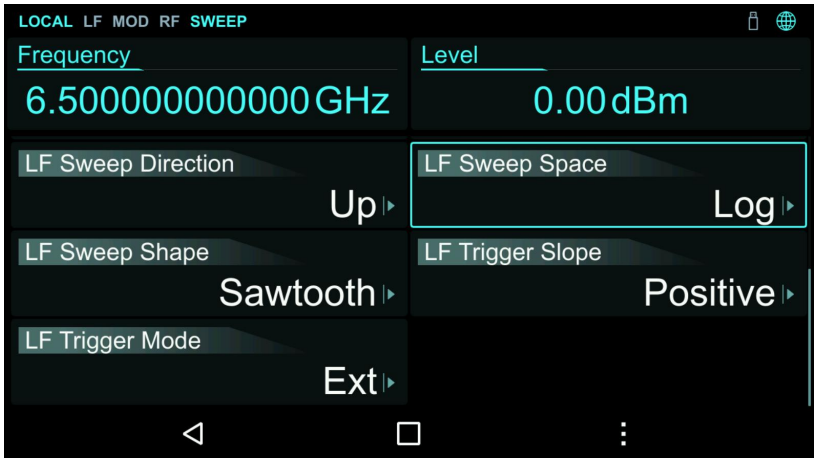
LF Phase

Set the output phase of the LF signal (deg, rad). The setting range is -360 deg ~ 360 deg.

LF Sweep

LF signal output supports frequency sweep. Tap the **LF Sweep** button to enter the setting screen.





LF Sweep State

Enable or disable LF Sweep state.

LF Scan Sweep Freq

Set the sweep start frequency (GHz, MHz, kHz, Hz). The setting range is 0.01 Hz ~ 1 MHz.

LF Sweep Center Freq

Set the sweep center frequency (GHz, MHz, kHz, Hz). Modification will change the start frequency, stop frequency and frequency span.

LF Sweep Time

Set the sweep time of the LF signal (s, ms, μs, ns). The setting range is 1 ms ~ 500 s.

LF Sweep Stop Freq

Set the sweep stop frequency (GHz, MHz, kHz, Hz). The setting range is 0.01 Hz ~ 1 MHz.

LF Sweep Freq Span

Set the sweep frequency bandwidth (GHz, MHz, kHz, Hz). Modification will change the start frequency and stop frequency.

LF Sweep Direction

Set sweep direction (Up, Down). The default is Up.

- Up: Sweep from start frequency to stop frequency.

- Down: Sweep from stop frequency to start frequency.

LF Sweep Shape

Set sweep shape (Sawtooth, Triangle). The default is Sawtooth.

- **Sawtooth:** Within one sweep cycle, the signal sweeps from start frequency to stop frequency.
- **Triangle:** Within one sweep cycle, the signal sweeps from start frequency to stop frequency, then back to start frequency.

LF Trigger Mode

Set trigger mode (Auto, Key, Bus, External). The default is Auto.

- Auto: The signal source outputs continuous LF sweep waveform.
- Key: Each time the front-panel **Trigger** key or on-screen trigger button is pressed, the signal source starts one LF sweep.
- Bus: The signal source starts one LF sweep each time the SCPI command *TRG is sent.
- External: The signal source reads trigger signals from the rear-panel TRIGGER In/Out port. One LF sweep starts upon receiving each TTL pulse of the specified polarity. The trigger edge can be configured on the screen under this mode.

LF Sweep Space

Set sweep type (Linear, Logarithmic). The default is Linear.

- **Linear:** The sweep varies linearly from start to stop.
- **Log:** The sweep varies logarithmically from start to stop.

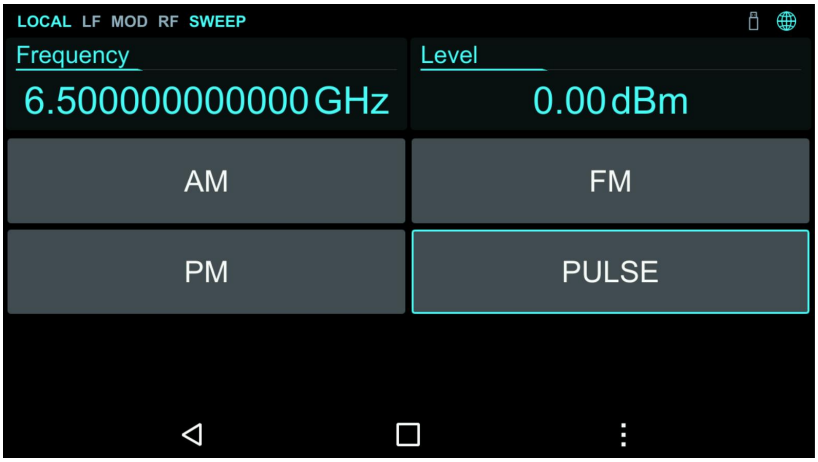
LF Trigger Slope

The setting is available only when the trigger mode is External. Set trigger edge (Positive, Negative). The default is Positive.

- **Positive:** Trigger one pulse modulation on the rising edge of the external trigger signal.
- **Negative:** Trigger one pulse modulation on the falling edge of the external trigger signal.

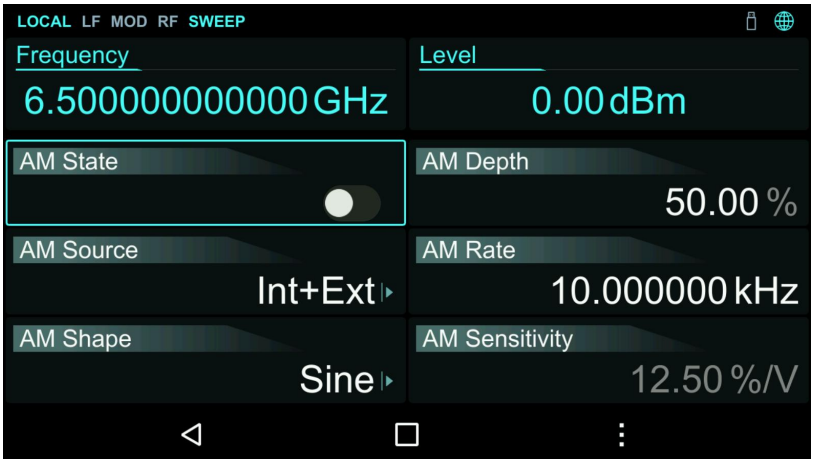
[MOD]Modulation

Press the **MOD** key to enter the modulation setting screen, which includes Amplitude Modulation, Frequency Modulation, Phase Modulation and Pulse Modulation.



AM

Amplitude modulation (AM) is a process in which the amplitude of the RF carrier varies linearly with the amplitude of the modulating signal. Tap the **AM** button to enter the setting screen.



AM State

Enable or disable AM modulation.

AM Source

Set the modulation source (Internal, External, Internal+External). Internal is the default.

- **Int:** The modulating signal comes from the internal modulation source. The AM waveform, frequency and modulation depth can be configured.
- **Ext:** The modulation signal is taken from MOD Input on the front panel and can be an arbitrary waveform.
- **Int+Ext:** The modulation signal is a dual-tone or more complex modulation generated by simultaneous modulation from internal and external sources.

AM Shape

Set modulation waveform (Sine, Square). The default is Sine. The waveform can only be selected when the modulation source is Internal or Internal + External.

AM Depth

Modulation depth describes the variation magnitude of carrier amplitude, expressed as a percentage.

- When Internal source is selected, the modulation depth range is 0.01% ~ 100%. The relation between modulation depth m and sideband amplitude difference ΔP is $\Delta P = 6.02 - 20 * \lg m$.
- When External source is selected, the actual modulation depth depends on the modulating signal amplitude received from the front-panel MOD Input. Modulation Depth = Input Signal Amplitude × External Modulation Sensitivity. Example: Set modulation depth to 50%, and the external modulation sensitivity is 25%/V. The actual modulation depth is 25% for a 1 Vpp (0 V offset) input signal, and 50% for a 2 Vpp (0 V offset) input signal.
- When Internal + External source is selected, the total modulation depth is the sum of internal and external contributions, each weighted equally: Modulation Depth = Set Value * 0.5 + External Signal Amplitude * External Modulation Sensitivity. Example: Set modulation depth = 50%, external modulation sensitivity = 12.5%/V. For an external input of 2 Vpp (0 V offset), total modulation depth = 50% * 0.5 + 2 Vpp * 12.5%/V = 50%.

AM Rate

AM frequency (GHz, MHz, kHz, Hz) can be configured only when the modulation source is Internal or Internal + External.

- For Sine waveform, the modulation frequency range is 0.01 Hz ~ 100 kHz.
- For Square waveform, the modulation frequency range is 0.01 Hz ~ 20 kHz.

AM Sensitivity

It displays the percentage value sampled from the amplitude of the external modulating signal. The value reaches its maximum when External modulation source is selected and the external modulation input is at full scale. When Internal + External modulation source is selected, the internal and external components each account for 50% of the total percentage. Therefore, the external input at full scale contributes only 50% of the maximum percentage.

FM

Frequency modulation (FM) is a process where the frequency of the RF carrier varies with the modulating signal. Tap the **FM** button to enter the setting

screen.



FM State

Enable or disable FM modulation.

FM Source

Set the modulation source (Internal, External, Internal+External). Internal is the default.

- **Int:** The modulation signal comes from the internal modulation source. The FM waveform, frequency and maximum frequency deviation can be configured.
- **Ext:** The modulation signal is acquired from the [MOD Input] port on the front panel and can be an arbitrary waveform.
- **Int+Ext:** The modulation signal is a dual-tone or more complex modulation generated by simultaneous modulation from internal and external sources.

FM Shape

Set waveform (Sine, Square). Sine is the default. The waveform selection is available only when the modulation source is Internal or Internal+External.

FM Deviation

The configurable frequency deviation range varies with carrier frequency: 0.01 Hz ~ N * 1 MHz. Refer to the datasheet for the definition of coefficient N.

- When Internal modulation source is selected, the set value is the frequency deviation of the RF carrier.
- When External modulation source is selected, the actual frequency deviation depends on the amplitude of the modulating signal at the front-panel MOD Input. Frequency Deviation = Input Signal Amplitude * External Modulation Sensitivity, calculated similarly to AM modulation depth.
- When Internal + External modulation source is selected, total frequency deviation is the sum of internal deviation and external deviation, with each contributing 50%.

FM Rate

Modulation frequency (GHz, MHz, kHz, Hz) can be configured only when the modulation source is Internal or Internal + External.

- For Sine waveform, the modulation frequency range is 0.01 Hz ~ 100 kHz.
- For Square waveform, the modulation frequency range is 0.01 Hz ~ 20 kHz.

FM Sensitivity

It displays the percentage value sampled from the amplitude of the external modulating signal. The value reaches its maximum when External modulation source is selected and the external modulation input is at full scale. When Internal + External modulation source is selected, the internal and external components each account for 50% of the total percentage. Therefore, the external input at full scale contributes only 50% of the maximum percentage.

PM

Phase modulation (PM) is a process in which the phase of the RF carrier varies with the modulating signal. Tap the **PM** button to enter the setting screen.



PM State

Enable or disable PM modulation.

PM Source

Set the modulation source (Internal, External, Internal+External). Internal is the default.

- **Int:** The modulation signal comes from the internal modulation source. The PM waveform, frequency and maximum phase deviation can be configured.
- **Ext:** The modulation signal is taken from MOD Input on the front panel and can be an arbitrary waveform.

- **Int+Ext:** The modulation signal is a dual-tone or more complex modulation generated by simultaneous modulation from internal and external sources.

PM Shape

Set waveform (Sine, Square). Sine is the default. The waveform selection is available only when the modulation source is Internal or Internal+External.

PM Deviation

Set phase deviation (deg, rad). Range: 0 rad ~ N * 5 rad.

- When Internal modulation source is selected, the set value is the phase deviation of the RF carrier.
- When External modulation source is selected, the actual phase deviation depends on the modulating signal amplitude at the front-panel MOD Input. Phase Deviation = Input Signal Amplitude × External Modulation Sensitivity.
- When Internal + External modulation source is selected, total phase deviation is the sum of internal phase deviation and external phase deviation, with each contributing 50%.

PM Rate

Modulation frequency (GHz, MHz, kHz, Hz) can be configured only when the modulation source is Internal or Internal + External.

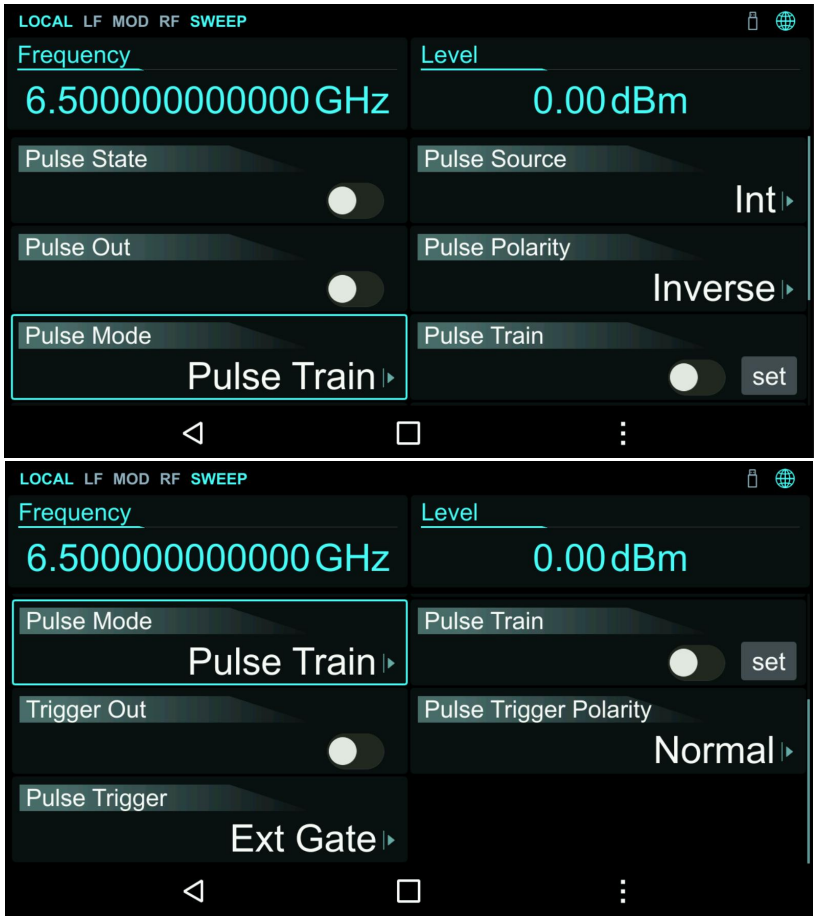
- For Sine waveform, the modulation frequency range is 0.01 Hz ~ 100 kHz.
- For Square waveform, the modulation frequency range is 0.01 Hz ~ 20 kHz.

PM Sensitivity

It shows the sampled phase deviation from the external modulating signal. When External source is selected and the external modulation input is at full scale, the value reaches the maximum phase deviation. When Internal + External modulation source is selected, the internal and external components each account for 50% of the total phase deviation. Therefore, the external input at full scale contributes only 50% of the maximum phase deviation.

Pulse

Pulse modulation is the process of modulating the RF carrier with a pulse signal. Tap the **Pulse** button to enter the setting screen.



Pulse State

Enable or disable Pulse modulation.

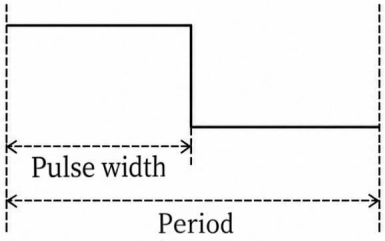
Pulse Out

Enable or disable the pulse output function. When enabled, the signal source outputs the pulse signal generated by the internal pulse generator via the rear-panel PULSE In/Out connector.

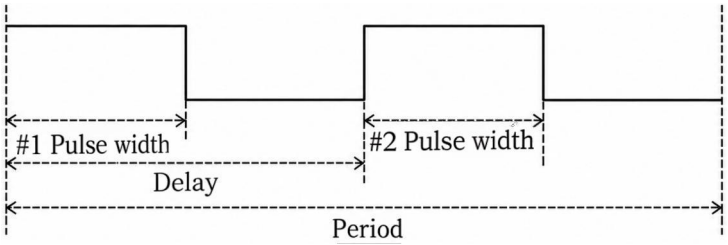
Pulse Mode

Set the pulse mode (Single Pulse, Double Pulse, Pulse Train). The default is Single Pulse.

- Single Pulse: One pulse is generated per cycle. In this mode, dual-pulse delay, pulse #2 width and pulse train parameters are unavailable.



- Double Pulse: Two pulses are generated per cycle. Pulse train parameters are unavailable in this mode.



- Pulse Train: Multiple pulses are generated per cycle. Parameters for single pulse and dual pulse are unavailable in this mode.

Pulse Source

Set the pulse source (Internal, External). The default is Internal.

- Internal: The modulating signal is supplied by the internal pulse generator of the signal source. Parameters such as pulse type, period and width can be configured.
- External: The modulating signal is the external pulse signal input via the rear-panel PULSE In/Out port. Parameters including pulse type, period and width are not configurable under this mode.

Pulse Polarity

Set pulse polarity (Normal, Inverse). The default is Normal.

- Normal: The RF carrier is output when the pulse modulation signal is high.
- Inverse: The RF carrier is output when the pulse modulation signal is low.

Pulse Train

Enable or disable the pulse train. Tap **set** to enter the list boundary screen for pulse train.



NO.	Description
1	Index: Index corresponding to the pulse. Positive Pulse Width: Positive pulse width of the pulse. Negative Pulse Width: Negative pulse width of the pulse. Count: Repetition count of the pulse.
2	Tap the + key to insert a new data row below the currently selected row.
3	Tap the - key to delete the currently selected row.

4	Tap the Pulse button to open the pulse train diagram screen for waveform review.
5	Tap the Clear button to remove all rows and keep one default row.
6	Tap the **File** button to open the Save/Recall screen and select pulse files with the .pulse extension.
7	Tap the **Save** button to open the Save/Recall screen. Enter the file name and confirm to save the pulse train file.

The pulse train diagram is shown below:



Plot Area: Pulse waveform generated from the current pulse train table. Drag the waveform left or right to adjust the time span.
Control Area: Tap **Return** to go back to the pulse train list edit screen. Tap **Full Screen** to restore the waveform to its original view. Tap **Zoom In** to zoom in the waveform. Tap **Zoom Out** to zoom out the waveform. Setting the zoom position changes the center of the waveform view.

Pulse Period

Set the interval time between two adjacent periodic pulses (s, ms, μs, ns).

Pulse Width

Set the duration of the high level of the pulse signal (s, ms, μs, ns).

#2 Width

Set the width of the second pulse for dual pulse modulation signal (s, ms, μs, ns).

Double Pulse Delay

Set the delay time from the first pulse to the second pulse of the dual-pulse modulation signal (s, ms, μs, ns).

Trigger Out

Enable or disable trigger output. When enabled, the signal source outputs the trigger signal generated by the internal pulse generator through the rear-panel TRIGGER In/Out port.

Pulse Trigger

Set trigger mode (Auto, Key, Bus, External, External Gate). The default is Auto.

- **Auto:** The signal source triggers automatically with no trigger condition. It continuously outputs pulse modulation signals according to the configured parameters.
- **Key:** The signal source starts one pulse modulation each time the front-panel **Trigger** key or the on-screen trigger button is pressed.
- **Ext:** The signal source receives trigger signals from the rear-panel PULSE In/Out port. One pulse modulation starts upon receiving each TTL pulse of the specified polarity. The trigger edge and trigger delay can be configured on the screen under this mode.
- **Ext Gate:** The signal source receives gate signals from the rear-panel PULSE In/Out port. When a TTL pulse of the specified polarity is detected, pulse modulation runs during the valid level period. The trigger polarity can be configured on the screen under this mode.

Pulse Trigger Delay

Set the delay from receiving the external trigger signal to the start of the first pulse of the pulse modulation signal (s, ms, μs, ns). This setting is available only when the trigger mode is External.

Pulse Trigger Slope

Set trigger edge (Positive, Negative). The default is Positive. This setting is available only when the trigger mode is External.

- Positive: Trigger one pulse modulation on the rising edge of the external trigger signal.
- Negative: Trigger one pulse modulation on the falling edge of the external trigger signal.

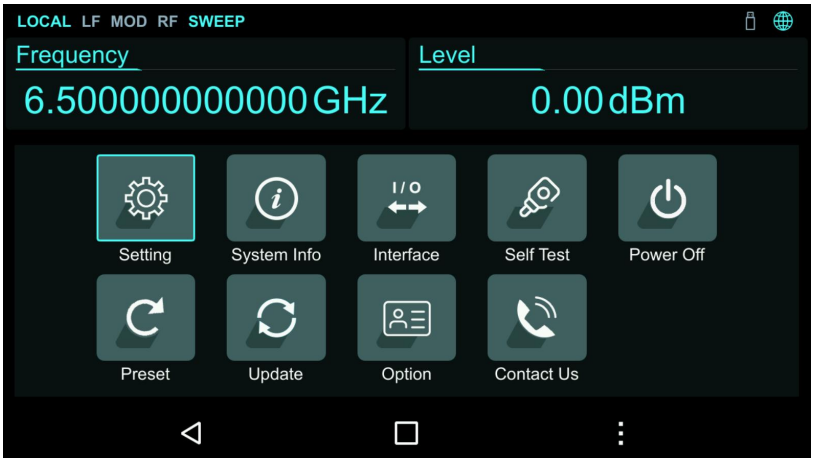
Pulse Trigger Polarity

Set trigger polarity (Normal, Inverse). The default is Normal. This setting is available only when the trigger mode is External Gate.

- Normal: Pulse modulation is triggered while the external gate signal is at the valid high level.
- Inverse: Pulse modulation is triggered while the external gate signal is at the valid low level.

[UTILITY] Utility Setting

Press the **UTILITY** key to enter system related settings.



Setting

Tap the **Setting** button to enter setting interface.

Language

Set the system language.

Screen Saver

Set screen saver timeout (Off, 10 s, 1 min, 5 min, 15 min, 30 min, 1 h, 2 h). The default is Off. After the timeout is set, the timer starts when there is no touch or key operation. The screen turns off once the countdown expires, and the screen can be woken up by pressing any physical key.

Power On

Set power-on state (Default, Last). The default is Default.

- Default: Load factory settings upon power-up.
- Last: Load the configuration saved before the last power-off.

Preset Type

Set preset type (Default, User). The default is Default.

- Default: Pressing the **Preset** key restores the signal parameters of the signal source to factory default values.
- User: Pressing the **Preset** key restores the signal parameters to the user-defined configuration (the user profile shall be loaded via Save/Recall). When User is selected, the screen switches to the Save/Recall interface and shows the currently loaded user configuration file.

Factory Reset

Restore the signal source configuration to factory settings.

Reset/Recall

Restore the signal source configuration to factory settings and delete all user-saved configuration files.

Beeper

Enable or disable the buzzer of the signal source. When the buzzer is enabled, it beeps when a key on the keypad is pressed or when the set value is out of the parameter range.

Power On Line

Enable or disable the power-on auto-start function of the signal source. When enabled, the signal source powers up immediately once power is applied. When disabled, you need to press the power button until it turns green to power on the instrument after power supply is connected.

Thousands Separator Format

Enable or disable the thousands separator format. When enabled, values are displayed with thousands separators.

Range Tips

Enable or disable the range prompt function. When enabled, the instrument will alarm if the setting exceeds the specified range.

Time Setting

Set the date and time of the signal source.

System Info

Tap the **System Info** button to view information such as model, serial number and firmware version of the device. Press the **X** button to close the system information screen.

Interface

Tap the **Interface** button to enter interface setting.

DHCP State

Enable or disable DHCP. When enabled, the signal source obtains an IP address automatically in the local area network. The IP address, subnet mask and gateway are not configurable under this mode.

IP

Set network IP address.

Mask

Set the subnet mask.

Gate

Set the gateway.

MAC

MAC address of the signal source, non-configurable.

Web Password State

Enable or disable web page password. When enabled, a password is required when accessing the signal source via its IP address in a browser.

Web Password

Set the password.

Reset to default

Reset Web Password.

Self Test

Tap the **Self Test** button to enter the self-test function. It is the built-in self-diagnostic tool of the signal source. Press the **X** button or tap **Cancel Test** to close the self-test screen.

LCD Test

The screen displays five color test patterns: red, green, blue, black and white, to check for dead pixels. Tap the LCD Test button to enter the test screen. Tap the screen to switch colors. Tap the upper-right corner or press key 8 to exit the test.

Key Test

Tap the Key Test button to enter the test screen. Press the front-panel keys one by one and check whether the corresponding key icon turns blue on the screen. If it does not turn blue, the key is faulty. Tap the screen to exit the test.

LED Test

Tap the LED Test button to enter the test screen. Press the MOD On/Off and RF On/Off keys on the front panel, and check whether their indicator lamps turn on or off. If the backlights do not light up, the backlights of these two keys are defective.

Board Test

Tap the Board Test button to enter the test screen, to verify read/write access of FPGA and CPLD.

Touch Screen Test

Tap the Touch Screen Test button to enter the test screen. Touch or drag the screen, and white touch points will be displayed on the interface. If no touch point appears, the touch screen is abnormal. Tap the upper-right button to exit the test.

Power Off

Tap the **Power Off** button to open the power-off screen. Slide the white slider to the right to power off the signal source. The user configuration will be saved before power-off. If the power-on state is set to Last, the signal source will start with this saved configuration next time it is powered on. Press the **X** button to close the power-off screen.

Preset

Reset the signal source parameters according to the preset type, same function as the **Preset** key on the front panel.

Update

Tap the **Update** button. The signal source will check for the Sig.Update upgrade package in the /signalgenerator directory under the root of Udisk0. The upgrade starts once verification passes, and the upgrade progress is displayed at the top of the screen.

Option

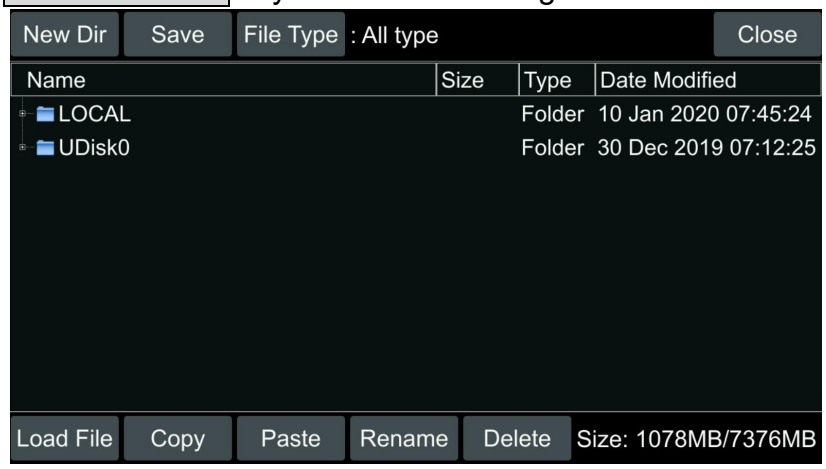
Select the option to be installed and enter the activation code for activation. Press the **X** button to close the option screen.

Contact Us

Display the company official website for further support. Press the **X** button to close the option screen.

SAVE/RECALL

Press the **SAVE/RECALL** key to enter the setting interface.



New Dir

Tap the New Folder button to create a directory named New Folder under /LOCAL.

Save

Tap the Save button, enter the file name in the pop-up window, and tap Confirm to save a user data file (.usr) containing the current signal source parameters under /LOCAL.

File Type

Set file type (All, usr, pulse, flatness, listsweep). The default is All. The interface filters out files other than the selected type.

- .usr: User data file for saving signal source parameter settings.
- .pulse: File for saving pulse sequence list parameters.
- .flatness: File for saving flatness list parameters.
- .listsweep: File for saving list sweep parameters.

Close

Close the file management interface.

Load File

Tap the Load File button to load the selected file.

Copy

Tap the Copy button to copy the currently selected file or directory.

Paste

Tap the Paste button to paste the copied file or directory into the currently selected directory.

Rename

Tap the Rename button, enter the name in the pop-up window, and tap Confirm to rename the selected file or directory.

Delete

Tap the Delete button, a confirmation dialog pops up. Tap Confirm to delete the selected file or directory.

5.Remote control

The RF signal source supports communication with a computer via USB and LAN interfaces. With these interfaces, together with appropriate programming languages or NI-VISA, users can remotely program and control the instrument using the SCPI command set. The RF signal source supports VXI-11, Socket and Telnet protocols. The host computer can be a personal computer (PC), minicomputer or certain smart instruments.

USB Interface Control

Procedure is as follows:

1. Install NI-VISA software on the PC to load the USB-TMC driver.
2. Use a USB A- B cable. Connect the B connector to the USB Device port on the rear panel of the signal source, and the A connector to the USB HOST port of the PC.
3. Power on the signal source. The signal source will be detected as a new USB device by NI-VISA. Send SCPI commands via NI-VISA to control the signal source.

LAN Interface Control

Procedure is as follows:

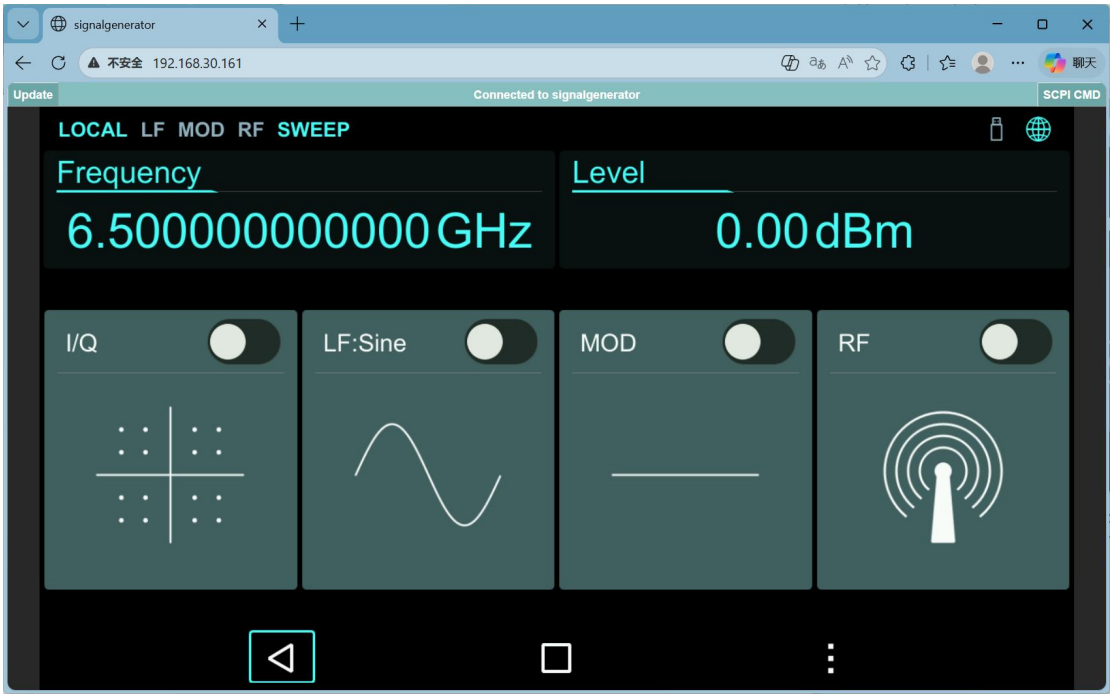
1. Install NI-VISA software on the PC to load the driver supporting the VXI-11 protocol.
2. Use an Ethernet cable. Connect one end to the LAN port of the signal source and the other end to the local area network where the PC resides.
3. Power on the signal source and enter the interface setting screen. Select DHCP or static IP and configure the relevant network parameters.
4. The signal source will be detected as a new network device by NI-VISA. Send SCPI commands via NI-VISA to control the signal source.

Web Control

Procedure is as follows:

1. Use an Ethernet cable. Connect one end to the LAN port of the signal source and the other end to the local area network where the PC resides.
2. Power on the signal source and enter the interface setting screen. Select DHCP or static IP, and configure the relevant network and web parameters.
3. Open the browser on the PC, enter the IP address of the signal source in the address bar, and enter the password to access the control interface of

the signal source. If no password is set, the interface can be accessed directly.



4. The firmware upgrade package can be selected at the upper left of the webpage and sent to the signal source for firmware update. The SCPI control module can be opened at the upper right to send SCPI commands for instrument control.

6.Technical Specifications

These specifications apply when the instrument is within its calibration interval, stored at room temperature for at least two hours, and warmed up for 40 minutes. Unless otherwise stated, all values in this manual are specifications including measurement uncertainty.

Specifications: Guaranteed performance parameters of the product, valid within the ambient temperature range for normal operating temperature unless otherwise specified.

Typical Values: Typical performance achieved by 80% of test results at room temperature (approx. 25 ℃) with a 95% confidence level. These values are non-guaranteed and exclude measurement uncertainty.

Nominal Values: Expected average or designed performance characteristics (e.g., 50 Ω connector). These values are non-guaranteed, measured at room temperature (approx. 25 ℃), and exclude measurement uncertainty.

Frequency Characteristic

Frequency Characteristic			
Frequency			
Frequency range	XSG5015A	CW MODE	9 kHz – 1.5 GHz
	XSG5025A	CW MODE	9 kHz – 2.5 GHz
	XSG5045A	CW MODE	9 kHz – 4.5 GHz
	XSG5065A	CW MODE	9 kHz – 6.5 GHz
Frequency Setting Resolution	0.001 Hz		
Set time	＜5 ms(typ. value) ALC ON ＜10 ms(typ. value) ALC OFF（S&H）		
Phase Offset Setting Resolution	0.1°		
Frequency Band[1]			
Band	Frequency range		N
1	9 kHz≤f ＜ 250 MHz		0.25
2	250 MHz ≤f ＜ 500 MHz		0.125
3	500 MHz ≤f ＜ 1000 MHz		0.25
4	1000 MHz ≤f ＜ 2000 MHz		0.5

5	2000 MHz ≤ f ＜ 4000 MHz	1
6	4000 MHz ≤f ≤6500 MHz	2
Note: [1] N in this document denotes the relevant factor used to determine the specification.		
Internal Reference Source		
	Standard	Optional 10M_OCXO
Reference Frequency	10.000000 MHz	
Initial Accuracy	＜1 ppm	±30 ppb
Temperature Stability	＜0.5 ppm，0℃~50℃	±1 ppb，0℃~50℃
Frequency Aging Rate	＜1 ppm/1 year	30 ppb/1year
Frequency Sweep		
Sweep Mode	Step sweep (frequency steps with linear or logarithmic spacing) List sweep (list with arbitrary frequency steps)	
Sweep range	Within the instrument frequency range	
Sweep shape	Triangle wave, Sawtooth wave	
Sweep mode	Single, Continuous	
Step change	Linear, Log	
Sweep Points	Step sweep	2-4096
	List sweep	1-500
Dwell Time	10 ms-100 s	
Dwell time Setting resolution	0.1 ms	
Trigger Mode	Auto; Trigger modes: Key trigger, External trigger, Bus trigger (USB, LAN)	
Edge	Rising edge trigger, Falling edge trigger; configurable only when the trigger source is External.	

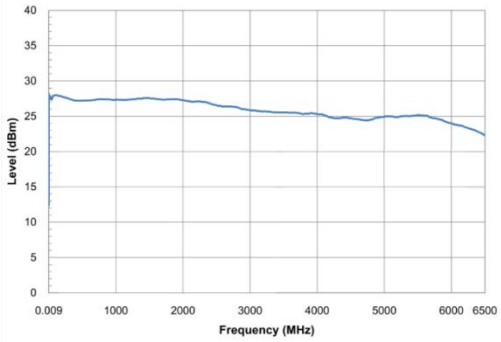
Level Characteristic

Level Characteristic		
Level setting range		
Level setting range	9 kHz ≤ f < 100 kHz	-110 dBm~9 dBm
	100 kHz ≤ f < 1 MHz	-110 dBm~18 dBm
	1 MHz ≤ f ≤ 4 GHz	-140 dBm~24 dBm
	4 GHz < f ≤ 6 GHz	-130 dBm~22 dBm
	6 GHz < f ≤ 6.5 GHz	-130 dBm~18 dBm

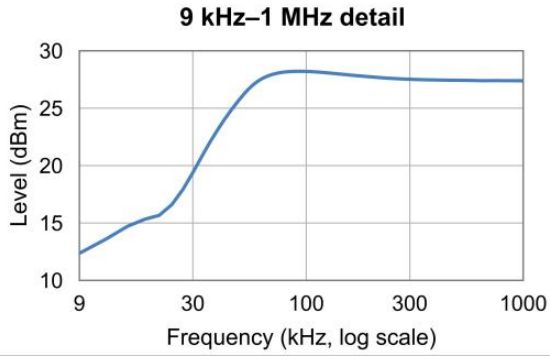
Setting resolution	0.01 dB			
Specification Level Range				
Specification Level Range	9 kHz ≤ f < 100 kHz	-110 dBm~7 dBm		
	100 kHz ≤ f < 1 MHz	-110 dBm~15 dBm		
	1 MHz ≤ f ≤ 4 GHz	-130 dBm~22 dBm		
	4 GHz < f ≤ 6 GHz	-120 dBm~20 dBm		
	6 GHz < f ≤ 6.5 GHz	-120 dBm~15 dBm		
Level error (ALC ON, temperature range: 20℃~30℃)				
	Specification Level ~-40 dBm	-40 dBm~-90 dBm	-90dBm~-110 dBm	-110dBm~-120dBm
9 kHz ≤ f <100 kHz	≤0.7 dB	≤0.9 dB	≤1.1 dB	
100 kHz ≤ f <1 MHz	≤0.7 dB	≤0.7 dB	≤1.1 dB	
1 MHz ≤ f ≤ 4 GHz	≤0.7 dB	≤0.7 dB	≤1.1 dB ≤0.7 dB(typ. value)	≤1.6 dB
4 GHz <f ≤ 6.5GHz	≤0.7 dB	≤0.7 dB	≤1.1 dB ≤0.7 dB(typ. value)	≤2 dB
Additional Error	ALC State	＜0.2 dB		
VSWR				
level ≤0 dBm，ALC State ON				
VSWR	1 MHz ≤ f ≤ 6.5 GHz			≤1.8(Nominal)
Level Setting				
Set time	ALC ON, fixed frequency, temperature range: 20°C -30°C			＜5 ms
	ALC OFF(S&H), fixed frequency, temperature range: 20°C -30°C			＜10 ms
Maximum Reverse Power				
Maximum DC Voltage	50 V			
Reverse Input Power	1 MHz ≤ f ≤ 6.5 GHz			30 dBm
Level sweep				
Sweep Mode	Step sweep (frequency steps with linear or logarithmic spacing) List sweep (list with arbitrary frequency steps)			
Sweep range	Within the instrument frequency range			
Sweep shape	Triangle wave, Sawtooth wave			
Trigger Mode	Single, Continuous			
Step change	LIN			

Sweep Points	Step sweep	2-4096
	List Sweep	1-500
Dwell Time	10 ms-100 s	
Dwell time setting resolution	0.1 ms	
Trigger Mode	Auto; Trigger modes: Key trigger, External trigger, Bus trigger (USB, LAN)	
Edge	Rising edge trigger, Falling edge trigger; configurable only when the trigger source is External.	

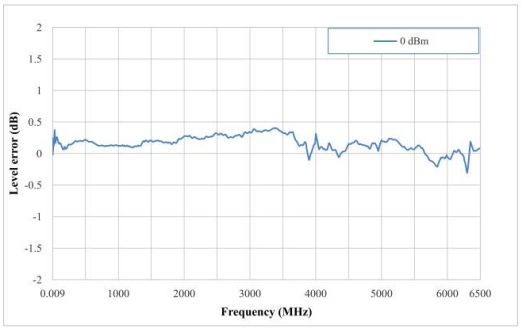
Max. output power VS Frequency, f ≧ 1 MHz



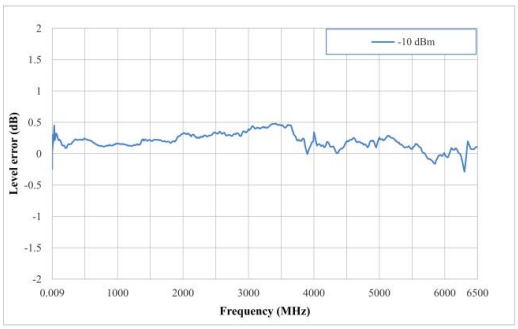
Max. output power VS Frequency, f ＜ 1 MHz



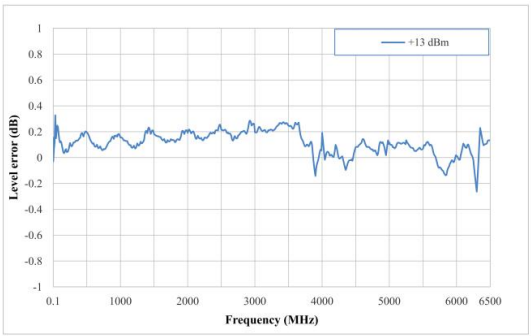
Level error VS Frequency, Output level= 0 dBm



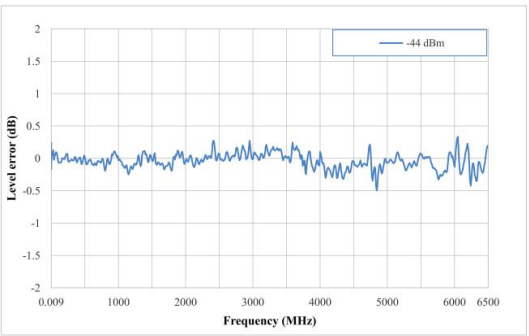
Level error VS Frequency, Output level= -10 dBm



Level error VS Frequency, Output level= 13 dBm

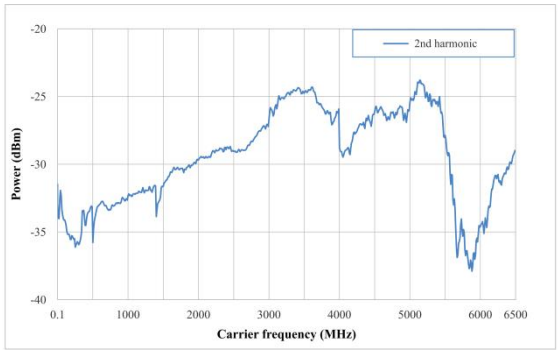


Level error VS Frequency, Output level= -44 dBm

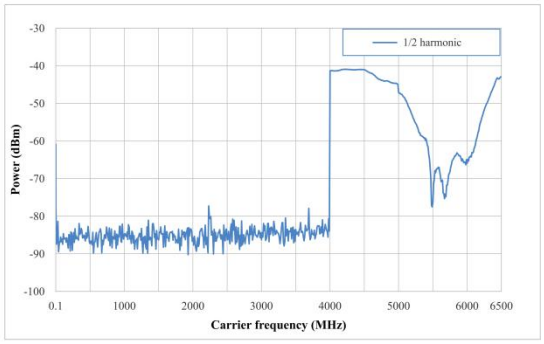


Spectral Purity		
Harmonics	CW mode, 1 MHz＜f ≤6 GHz, Output level ≤13 dBm	＜-30 dBc
Subharmonics	CW mode, 1 MHz＜f ≤6 GHz, Output level ≤13 dBm	＜-50 dBc
Non-harmonic Spurious	CW mode, Carrier Offset＞10 kHz，1 MHz＜f ≤ 4 GHz	＜-65 dBc
	CW mode, Carrier Offset＞10 kHz，4 GHz＜ f ≤6 GHz	＜-60 dBc
SSB Phase Noise	CW mode, Carrier Offset= 20 kHz，1 Hz measurement bandwidth	
	f=100 MHz	＜-122 dBc/Hz(typ. value)
	f=1 GHz	＜-120 dBc/Hz(typ. value)
	f=4 GHz	＜-106 dBc/Hz(typ. value)
	f=6 GHz	＜-105 dBc/Hz(typ. value)

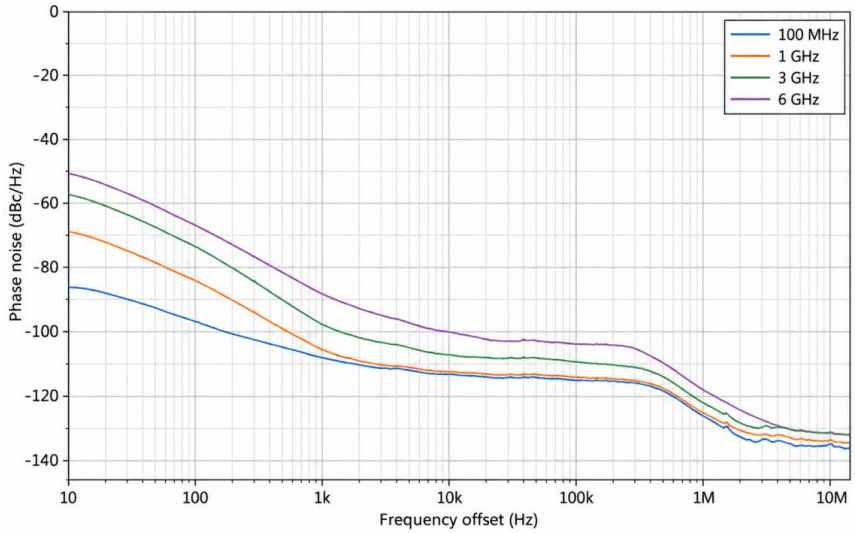
Second Harmonic vs Carrier Offset, Level=10dBm



1/2 Harmonic vs Carrier Offset, Level=10dBm



Phase Noise Specification



Internal Modulation Source (LF)		
Waveform	Sine wave, Square wave, Triangle wave, Sawtooth wave, DC	
Frequency range	Sine	0.01 Hz-1 MHz[2]
	Square wave, Triangle wave, Sawtooth	0.01 Hz-20 kHz

	wave	
Frequency resolution	0.01 Hz	
Frequency error	Same as RF Reference	
Frequency response	≤0.3 dB	
Level Offset	Setting range	Min(2.5V-$\frac{1}{2}$ LEVEL,2V)
	Offset resolution setting	0.01 V
AC Output voltage[3]	Setting range	1 mVpp-3 Vpp
	Voltage resolution	1 mVpp
DC voltage error	1%*Setting value ± 3 mV	
Output impendance	50Ω (Nominal)	

Note:

[2] Amplitude modulation and LF output cannot be enabled simultaneously; only one of them can be activated at a time.

[3] Measured with a 50 Ω load.

LF Frequency Sweep	
Sweep mode	LIN
	LOG
Sweep wave	Triangle wave, Sawtooth wave
Sweep direction	Up, Down
Sweep Time	1 ms-500 s
Sweep frequency range	0.01 Hz-1 MHz
Trigger Mode	Auto, Key, Ext, Bus

Modulation Characteristic

Modulation Characteristic				
Simultaneous Modulation				
	AM	FM	PM	Pulse
AM		●	●	(●)
FM	●		×	●
PM	●	×		●
Pulse	(●)	●	●	
●Compatible; ×: Incompatible; (●): Conditionally compatible. Enabling pulse modulation degrades the performance of amplitude modulation.				

AM		
Modulation Source	Internal, External, Internal+External	
Modulation Depth[4]	0 %-100 %	
Resolution	0.1 %	
Modulation Depth Error	fmod=1 kHz, Level=0 dBm	＜Setting value*4 %+1 %
AM Distortion	fmod=1 kHz，m＜30 %, Level=0 dBm	＜3 %
Modulation Frequency response	m＜80 %，10 Hz-100 kHz，	＜3 dB(Nominal）
Note: [4] When AM modulation is enabled, the peak power is lower than the maximum specified output level.		
FM		
Modulation Source	Internal, External, Internal+External	
Max. Offset	N*1 MHz	
Resolution	＜0.1 % of offset or 1 Hz, whichever is larger	
Modulation offset error	fmod=1 kHz, internal modulation	＜ Setting value*2 %+20 Hz (Nominal）
FM Distortion	fmod=1 kHz, offset ≤N*1MHz，	＜0.5 %(Nominal）
Modulation Frequency response	10 Hz-100 kHz	＜3 dB(Nominal）
PM		
Modulation Source	Internal, External, Internal+External	
Max. Offset	N*5 rad	
Resolution	＜0.1 % of offset or 0.01rad, whichever is larger	
Modulation offset error	fmod=1 kHz, internal modulation, offset ≤N*5 rad	＜Setting value*2 %(Nominal）
∅M Distortion	fmod=1 kHz, offset≤N*5rad	＜0.5 %(Nominal）
Modulation Frequency response	10 Hz-100 kHz	＜3 dB(Nominal）
Pulse		
Modulation Source	Internal, External	
Modulation Carrier Frequency	1 MHz ＜f ≤ 6.5 GHz	
On-Off Ratio	1 MHz ＜f ≤6.5 GHz	＞70 dBc (Typ. value)
Rising/falling time (10 %/90 %)	＜15 ns(typ. value)	
Pulse setting period	40 ns-300 s	
Pulse Generator		

Modulation Source	Internal, External	
Pulse Shape	Single pulse, Double pulse	
Pulse period	Setting range	40 ns-300 s
	Resolution	10 ns
Pulse width	Setting range	20 ns-300 s
	Resolution	10 ns
Double Pulse Interval	Setting range	20 ns-300 s
	Resolution	10 ns
2# Pulse	Setting range	20 ns-300s
	Resolution	10 ns
Trigger Mode	Auto, External Trigger, External Gating, Key Trigger, Bus Trigger (USB, LAN)	
Edge	Rising, Falling	
Trigger polarity	Positive, Negative	
Trigger delay setting range	External trigger	140 ns-300 s
Trigger delay setting resolution	External trigger	10 ns
Pulse Burst Generator		
Pulse Burst Generator	Pulse count	1-512
	On-Off time range	20 ns-300 s
	Pulse repeat count	1-512

Inputs and Outputs

Front Panel Connector		
RF Output	Impedance	50 Ω
	Connector	N type Female
Internal Modulator (LF) Output	Impedance	50 Ω
	Connector	BNC Female
Rear Panel Connector		
External trigger input	Impedance	100 kΩ
	Connector	BNC Female
	Trigger Voltage	5 VTTL
External Modulation Output	Impedance	High Z
	Connector	BNC Female
Pulse Input or Output	Impedance	Input:High Z; Output: 50 Ω
	Connector	BNC Female

	Input/Output voltage	CMOS 3.3 V
10 MHz Reference Input	Impedance	50 Ω
	Connector	BNC Female
	Input level range	-5 dBm~10 dBm
10 MHz Reference Output	Impedance	50 Ω
	Connector	BNC Female
	Output level range	>0 dBm
Valid Signal Output	Impedance	50 Ω
	Connector	BNC Female
	Output level	CMOS 3.3 V
Communication Port		
USB-HOST	USB-A 2.0	
USB-DEVICE	USB-B 2.0	
LAN	10/100Base，RJ-45	

General Technical

Power Supply		
Input voltage range, AC	100 V-240 V，50/60 Hz	
Consumption	All Options Enabled	100 W
Display		
Type	TFT LCD, 1280*760, 5-inch Capacitive Touch Screen	
Structure		
Dimensions	W×H×D=338×113×369 mm	
Net weight	Approx. 5.3 kg	
Mass Storage		
Mass Storage	FLASH non- volatile memory (local storage), U disk	
Data Storage Space	FLASH non- volatile memory (local storage)	8G Bytes
Working Environment		
Humidity	0~30℃, <95 % relative humidity 30℃ to 50℃, <75 % relative humidity	
Temperature range	Work temperature range:0℃~50 ℃ Storage temperature range: -20℃ ~70℃	
EMC & Safety		
EN 61326-1: 2013 / EN 61000-3-2: 2014	Class A	
EN 61000-3-3: 2013	Plt : 0.65; Pst : 1.00; dmax : 4.00 %; dc : 3.00 %; dtLim: 3.30 %; dt>Lim: 500 ms	

IEC 61000-4-2: 2008	AD ±8.0 kV，CD ±4.0 kV
IEC 61000-4-3: 2006 + A1: 2007 + A2: 2010	80 MHz to 1000 MHz: 10 V/m; 1.4 GHz to 2.0 GHz:3 V/m; 2.0 GHz to 2.7 GHz: 1 V/m
IEC 61000-4-4: 2004 + A1: 2010	AC Line: +/- 1.00 kV
IEC 61000-4-5: 2005	Line to Line: 1.0 kV，Line to Earth: 2.0 kV
IEC 61000-4-6: 2008	0.15-80 MHz:3V 1 kHz 80 % AM
IEC 61000-4-8: 2009	30 A/m，50/60 Hz
IEC 61000-4-11: 2004	Voltage Dips:0%/0.5P; 40%/10P; 70%/25P; Short Interruptions Test Level%UT:0%/250P
Safety	
IEC 61010-1:2010/EN 61010-1:2010	
Canada: CAN/CSA-C22.2 No.61010-1:2012	
RoHS	
2011/65/EU	

Interval Period of Adjustment:

One year is recommended for the calibration interval period.

7.Warranty

Troubleshooting

Typical issues that may occur when using your instrument:

- Power on malfunction
- No signal display
- Wrong measurement results or poor frequency or amplitude precision.

1. Power on malfunction

Power on malfunction can include a situation where the screen is still dark (no display) after switch on.

If the screen is still dark after power on, please check:

1) If the power supply has been connected correctly and it the power supply voltage range is within the specification.
2) If the power switch has been turned on.
3) If the fan is running, please contact us for service.

If the power indicator is not lit and the fan is not spinning, there might be a problem with the power supply of the instrument. If the system cannot be accessed, it could be a CPU failure in the instrument. If all the above checks are normal, then it's possible that the components related to graphic display are faulty.

2. USB Device Not Recognized

If the signal source fails to detect the connected USB device, follow the steps below for troubleshooting:

1) Verify that the USB flash drive works properly when connected to another instrument or PC.
2) Confirm that a flash-type USB drive is used. Hard-disk-type USB drives are not supported.
3) Restart the instrument and reinsert the USB drive for verification.
4) If the USB drive still cannot work properly, contact our company.

3. Unresponsive Keys or Ghosting

If the signal source keypad malfunctions, follow the steps below for troubleshooting:

1) After power-on, check whether all keys are unresponsive.
2) Go to UTILITY -> Self-Test -> Key Test to check for unresponsive keys or key ghosting.
3) If the above symptoms exist, the keypad cable may be loose or the keypad damaged. Do not disassemble the instrument by yourself. Please contact our company promptly.

4. No Signal Output

If no signal is output on all bands, perform the checks below: Set the signal source RF frequency to 30 MHz and power to -20 dBm, then feed the signal into the RF input port of the instrument. Tighten the signal cable. If no signal is observed, a hardware circuit fault may exist in the RF signal source. Contact the manufacturer for troubleshooting.

5. Poor signal frequency precision

If the signal jitters horizontally on the signal source screen or the frequency reading exceeds the error range when signal output is enabled, first check whether the signal frequency displayed on the instrument is stable. If the input signal frequency is stable, verify the reference frequency of the RF signal source. Select Internal Reference or External Reference according to test conditions. If the frequency reading is still inaccurate, the internal local oscillator of the RF signal source may lose lock, and the instrument needs to be returned to the manufacturer for repair.

6. Poor readout amplitude precision

If the amplitude output is inaccurate, check whether the RF signal source is within its calibration interval (1 year). If the interval has expired, calibrate the instrument. If the amplitude output remains incorrect after calibration, an internal circuit fault may be present. Contact the manufacturer for repair.

Repair

When it is difficult to solve your instrument problem, you can contact us by phone or fax. When it’s confirmed that the instrument is damaged and need return to repair, you need to wrap the instrument with the original packaging material and the packing box, follow the steps below to package:

1) Write a detailed description of the malfunction of the instrument, put it in the box together with the instrument.
2) Put the instrument in a dustproof / antistatic plastic bag to reduce possible damage.
3) Place pads in four corners of mother packaging carton, then put the instrument into the mother carton.
4) Seal the carton with tape and tighten it with nylon tape.
5) Mark the carton with words of "Fragile! Do not touch! Carefully".
6) Ship by type of precise instruments.
7) Keep all the copies of shipping sheets.

Caution: The use of other materials to package the spectrum analyzer may damage the instrument. Do not use polystyrene pellets as packaging materials, they can not adequately fit the instrument, and can be sucked into fan by the generated electrostatic, causing the instrument damage.

8.Appendix

Appendix A: Accessories

Standard Accessories

- Power Cord
- Quick Guide
- USB Cable
- N-BNC joint

Optional Accessories

- N-N Cable
- N-SMA Cable
- SMA-SMA Cable
- SMA-KK
- N-SMA Adaptor

Appendix B: General Care and Cleaning

General Care

Please do not place the instrument in areas exposed to direct sunlight for prolonged periods.

Caution

To avoid any damage to the instrument or probes, do not exposed it to any sprays, liquids, or solvents.

Cleaning

Inspect the instrument and probes as often as operating conditions require. To clean the instrument exterior, perform the following steps:
Wipe the dust from the instrument surface with a soft cloth. Take care not to scratch the transparent LCD protection screen when cleaning.

Warning: Before re-applying power, ensure that the instrument is completely dry, avoiding any electric shock or electrical short circuit resulting from moisture.

Appendix C: USB Disk Requirements

USB disk requirements:
Max capacity 4G, NTFS file system is not supported. If the USB disk doesn't work properly, format your USB disk and then try again.