SIGLENT®

# SSG5000X

## Signal Generator

# Quick Guide



# Guaranty and Declaration

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**Trademark Information**

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**Declaration**

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- **SIGLENT** will not be responsible for losses caused by either incidental or consequential in connection with the furnishing, use or performance of this manual as well as any information contained.

**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 power cord**

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

**Ground the instrument**

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

**Connect the signal wire correctly**

The potential of the signal wire ground is equal to the earth, so do not connect the signal wire to a high voltage.

**Look over all terminals' ratings**

To avoid fire or electric shock, please look over all ratings and sign instruction of the 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 reach the product, or else the operator might expose to danger of electrical shock.

**Electrostatic prevention**

Operate 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 temperature, which may eventually damage the instrument. So keep well ventilation and inspect the intake and fan regularly.

**Avoid circuit or components exposed**

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 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 direct injuries or hazards that may happen.

**WARNING** Indicates potential injuries or hazards that may happen.

**CAUTION** Indicates potential damages to the instrument or other property that may happen.

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



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# General Inspection

**Inspect the shipping container**

Keep the shipping container or cushioning material until the contents of the shipment have been completely checked and the instrument has passed both electrical and mechanical tests.

The consigner or carrier will be responsible for damages to the instrument resulting from shipment. **SIGLENT** will not provide free maintenance or replacement.

**Inspect the instrument**

If the instrument is found to be damaged, defective or fails in electrical or mechanical tests, please contact SIGLENT.

**Check the accessories**

Please check the accessories according to the packing list. If the accessories are incomplete or damaged, please contact your SIGLENT sales representative.

# Preparing for Use

**Adjust the supporting legs**

For benchtop operation, you may want to use the supporting legs. Adjust the supporting feet appropriately to tilt the RF signal source upwards.

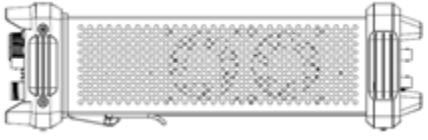


Figure 1- 1 Before adjusting

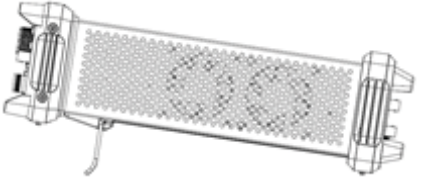


Figure 1- 2 After adjusting

**Connect to AC power supply**

The RF signal source accepts 100-240V, 50/60/440Hz AC power supply. Please use the power cord provided in the accessory to connect the instrument to the power source as shown in the figure below.

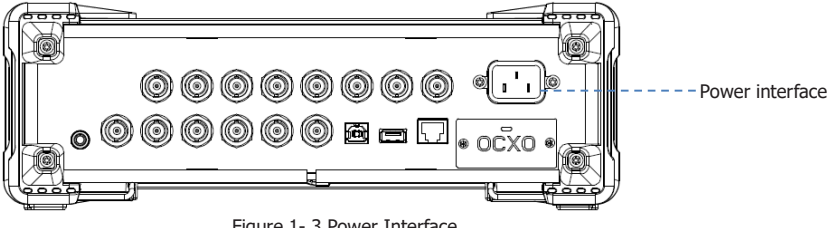



Figure 1- 3 Power Interface

# The Front Panel

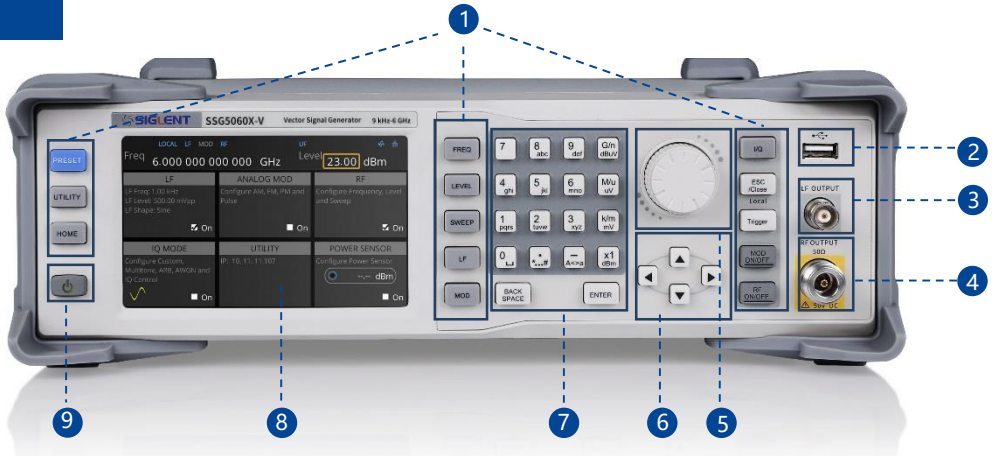



Figure 1- 4 the Front Panel

Table 1 1 Front Panel Description

| NO. | Description | NO. | Description |
|---|---|---|---|
| 1 | Function key | 2 | USB Host |
| 3 | LF output | 4 | RF output |
| 5 | Knob | 6 | Direction key |
| 7 | Digital keyboard | 8 | Touch screen display area |
| 9 | Power button | | |

**Front panel function button**

Table 1 2 Function keys description

| Control Keys | Description |
|---|---|
| FREQ | Set frequency, frequency offset, phase offset and other related parameters |
| LEVEL | Set level, level offset, ALC state, flatness and other parameters, power sensor display and control functions |
| SWEEP | Set sweep state, step sweep, list sweep, direction and other related parameters |
| LF | Set LF state, LF level, LF frequency and other related parameters |
| MOD | Set various modulation parameters (AM, FM, PM and PULSE) |
| I/Q | Set IQ related parameters |
| ESC/Close | During the parameter or editing process, pressing this key will clear the input of the active function area and exit the parameter input state.<br>Press this button to return to local control if previously controlling the instrument remotely |
| Trigger | When the trigger type is set to Key, press this button to perform one operation |
| MOD ON/OFF | The main switch of various modulation modes |
| RF ON/OFF | RF signal output switch |
| PRESET | Press this button to revert to the default parameters. The default parameters refer to the default parameter table |
| UTILITY | System and file related operations |
| HOME | You can get back to the main interface quickly |

**Digital keyboard**

The front panel of the RF signal source provides a numeric keypad (as shown below). The keyboard supports English uppercase and lowercase characters, numbers, and common symbols (including decimal points, spaces, and !, @, #,$, %, ^, &, *), mainly for editing the name of files or folders and setting parameters (refer to the "parameter setting" section).




Figure 1- 5 Digital Keyboard

| Control Keys | Description |
|---|---|
| 0 ␣ | Digit 0 and space bar switch |
| *...# | In the English state, enter the special symbol !, @, #,$, %, ^, &, *. In the digital state, enter the decimal point |
| A<>a | In the digital state, enter the "-" number. In the English state input for case switching |
| G/n dBuV | When setting the amplitude, press this key to set units as dBuV. When setting the frequency, press this key to set units as GHz. If the input is a time-related parameter, press this key to set units as ns |
| M/u uV | When setting the amplitude press this key to set units as uV. When setting the frequency, press this key to set the units as MHz. If the input is time-related , press this key to set the units as us |
| k/m mV | When setting the amplitude, press this key to select MV as the unit. When setting the frequency, press this key to select kHz. If the input is a time-related parameter press this key to select Ms |
| x1 dBm | When setting the amplitude, press this key to select dBm. When setting frequency, the units selected will be Hz. If the input is time, the units will be set to s |
| BACK SPACE | During the parameter or editing process, pressing this key will clear the input of the active function area and exit the parameter input state |
| ENTER | In the parameter input process, pressing this key will end the parameter input and add the currently set units for the parameter |

**Direction knob and keys operation**

**1. Direction knob**

In the non-parametric input state, turn the knob to move the focus frame in sequence.

Press the knob in the function area to enter the next level menu bar.

Press the knob in the parameter input area, the cursor will focus to a certain position, and then turn the knob to change the value.

**2. Direction keys**

In the non-parametric input state, press the up, down, left and right direction keys to move the focus frame in sequence.

Press the knob in the parameter input area, the cursor will focus to a certain position, then press the left and right direction keys to change the position of the cursor, and use the up, down, left and right keys to fine tune the value of the cursor position.

**Front panel key backlight**

**1. Power switch** 

Orange light constantly on indicates the unit is in stand-by state.

Green light constantly on indicates the instrument is in the normal operated state.

**2. MOD ON/OFF**

When the MOD ON/OFF is set to turn on the modulation, the backlight will illuminate. If modulation is off, the backlight will remain dark.

**3. RF ON/OFF**

When the RF signal is turned on, the backlight is on. If the RF signal output is turned off, the backlight will remain dark.




Figure 1- 6 Front panel connectors

**Front panel connectors**

**1. LF output**

Output for the LF (low frequency) signal. This is a BNC connection. The output can also be configured to source the modulation waveform for FM and PM modulation types.

**2. Radio frequency output terminal**

RF signal output N-type connector with an impedance of 50 ohms.

**CAUTION**

To avoid damage to the instrument, the RF input signal must meet the following: The DC voltage component and the maximum continuous power of the AC (RF) signal component cannot exceed 50 V and +30 dBm respectively.

# Rear Panel

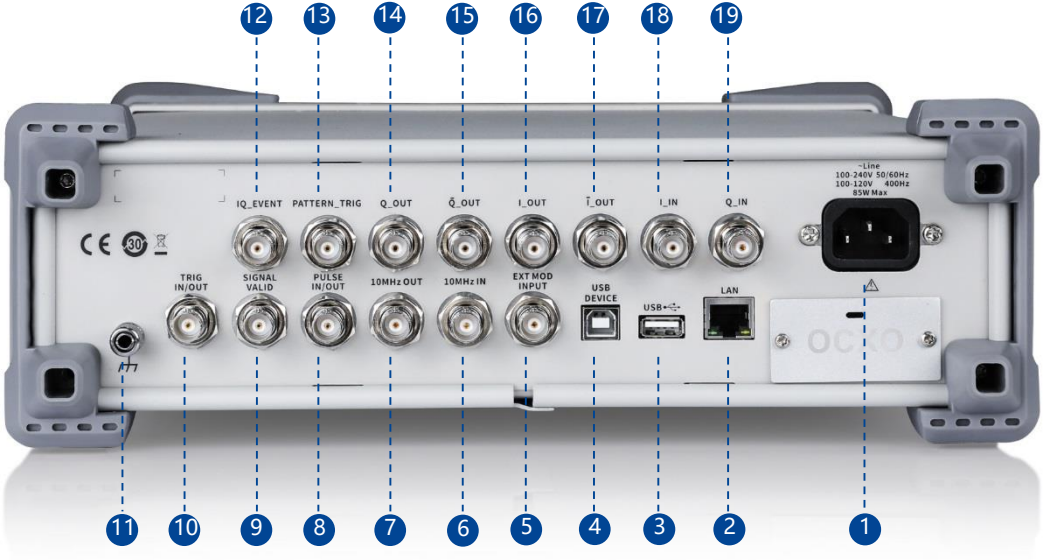



Figure 1- 7 Rear Panel

**1. AC power input terminal**

The RF signal source can operate with AC power from 100 V - 240 V, at 45 Hz - 440 Hz. Please connect the RF signal source to the AC power supply with the supplied power cord.

**2. LAN interface**

The RF signal source can be connected to a network through the interface and remotely controlled.

**3. USB host**

The RF signal source can be used as the "main device" to connect to an external USB device, like a USB RF power meter. The interface reads the trace or state file in the U disk, or stores the current instrument state or trace in the U disk, and can also save the content displayed on the current screen in the .Bmp format to the U disk.

**4. USB device interface**

The interface can be connected to a compatible computer and controlled by software on the host computer.

**5. EXT MOD INPUT**

Input BNC connection for external modulation.

**6. 10 MHz IN**

■ The [10MHz IN] and [10MHz OUT] connectors are commonly used to establish synchronization between multiple instruments.

■ The RF source can use an internal reference source or an external reference source.

If the instrument detects that there is a valid 10MHz signal at the 10 MHz in connector, it will use it as an external reference source. At this point the user interface status bar shows "Ext Ref". When an external reference is lost, exceeded, or disconnected, the instrument automatically switches to to the internal reference, and the screen status bar will no longer display "Ext Ref".

**7. 10 MHz OUT**

■ The [10MHz OUT] and [10MHz IN] connectors are commonly used to establish the same between multiple instruments.

■ The RF source can use an internal or external reference source.

If the instrument uses an internal reference source, the [10 MHz OUT] connector can output a 10 MHz clock signal generated by the instrument and can be used to synchronize other devices.

**8. PULSE IN/OUT**

The function of the connector is determined by the current mode of pulse modulation.

1) PULSE IN: When the pulse source is "Ext", it is used to input external pulse signals.

2) PULSE OUT: When the Pulse modulation source is "Int" and the pulse output switch is turned on, it is used to output the pulse signal generated by the internal generator. The output signal is related to "Pulse Mode", and can be set to "Single", "Double" or "Train".

**9. SIGNAL VALID**

When the RF output frequency or amplitude is modified, the RF output connector of the front panel outputs the RF signal at the specified frequency and amplitude after a certain response and processing time in the internal circuit of the instrument. In this process, the [SIGNAL VALID] connector outputs an impulse synchronization signal to indicate the validity of the RF output signal:

- High level (3.3 V): Indicates that the RF signal is being configured.
- Low level (0 V): Indicates that the RF signal is stable (effective).

**10. TRIG IN/OUT**

When PULSE trigger mode is "Int ", the connector can be used to output the trigger signal.

When the RF Sweep, LF Sweep, or PULSE trigger mode is "Ext", the connector is used to input the external trigger signal.

**11. Ground**

The system ground terminal.

**12. IQ_EVENT**

Output on this connector occurs whenever Marker is on in an Arb–based waveform.

Marker level ≈ 3.3 V (positive polarity selected),

Marker level = 0 V (negative polarity selected).

**13. PATTERN_TRIG**

When the IQ Arb trigger source is "Ext", the connector is used to input the external trigger signal.

**14. Q_OUT**

Output the analog, in–phase component of I/Q modulation from the internal baseband generator when the internal IQ modulation mode is on.

**15. $\overline{\text{Q}}$_OUT**

Used in conjunction with the Q_OUT connector to provide a balanced baseband stimulus.

**16. I_OUT**

Output the analog, quadrature–phase component of I/Q modulation from the internal baseband generator when the internal IQ modulation mode is on.

**17. $\overline{\text{I}}$_OUT**

Used in conjunction with the I_OUT connector to provide a balanced baseband stimulus.

**18. I INPUT**

Used to input an external modulated I baseband signal when the external IQ modulation mode is on.

**19. Q INPUT**

Used to input an external modulated Q baseband signal when the external IQ modulation mode is on.

# User Interface

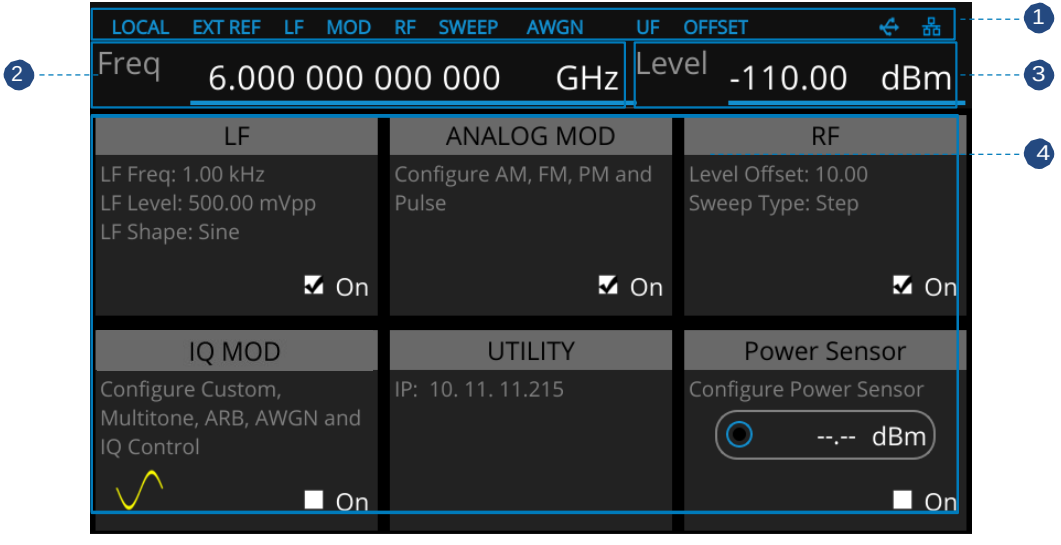



Figure 1- 8 User Interface

**1. Prompt status bar**

- Display LOCAL (local), REMOTE (remote). When REMOTE is displayed, the instrument is being controlled by a remote computer and the front panel inputs will be locked. To unlock (LOCAL mode), press Esc/Close.
- EXT REF: EXT REF shows that the SSG is using an external 10 MHz reference.
- LF: Low frequency signal generator state.
- MOD: The modulation state.
- RF: The RF output state.
- SWEEP: The status of the sweep state.
- AWGN: The status of the Additive White Gaussian Noise (AWGN) to a carrier when IQ Modulation.
- UF: Amplitude flatness function enabled.
- OFFSET: Amplitude offset enabled.
-  The identification is displayed when a USB disk is inserted.
- LAN: LAN state.  indicates that LAN is successfully connected.  indicates that there is no network connection or network connection failed.

**2. RF frequency**

RF output frequency setting. When the scan type is "frequency" or "frequency & amplitude", the frequency scanning progress bar is displayed.

**3. RF level**

RF output level setting. When the scan type is "amplitude" or "frequency & amplitude", level scanning progress bar is displayed.

**4. Touch screen display area: Display the settings under each menu**

- LF: LF output state and LF waveform displayed. Sine, Square, Sawtooth, Triangle and DC can be set up.
- ANALOG MOD: Modulation state. Amplitude modulation, frequency modulation, phase modulation, or pulse can be set.
- RF: RF output state. Frequency, level or RF Sweep can be set.
- IQ MOD: I/Q output state. IQ modulation can be set.
- UTILITY: System and file related parameters can be set.
- Power Sensor: Power sensor state. Power sensor related parameters can be set.

# Firmware Operation

**Check System Information**

Pres Utility -> System Info to view the instrument's system information, including:

- Startup Times
- Model
- Software Version
- Hardware Version
- Host ID
- Serial Number

**Load Option**

1. Press Utility -> Option , to enter option interface. Click the drop-down box under the "Install" to choose the license type need to be installed. Enter a license in the input box and click Install to finish the license installing.

2. If the installations succeed, the prompt message "license was successfully installed" will be pop-up. If not, the prompt message "license was entered incorrectly" will be pop-up.

Note: The SSG comes with trial options that have a finite number of uses. This is to allow users to evaluate the available options without purchasing them. You can find the remaining number of trials at top of the option interface. When the remaining time of a certain function is zero, the function will be disabled. When a license is successfully installed for a certain function, the remaining times will be shown as "--" and the type of the license is permanent, which means users have unrestricted access to the function.

**Firmware Upgrade**

Follow this procedure to update the instrument firmware:

1. Download the firmware package from an official SIGLENT website.
   www.siglentamerica.com
   http://www.siglent.com/ens
   https://www.siglenteu.com
2. Extract and copy the .ADS file into the root directory of a USB stick.
3. Press Utility -> Update , and select the update file.
4. Click Recall to update the system software.

The progress bar will appear on the screen while updating. The instrument will restart automatically if updates succeed or display a pop-up prompt box if updates fail.

# Touch Operation

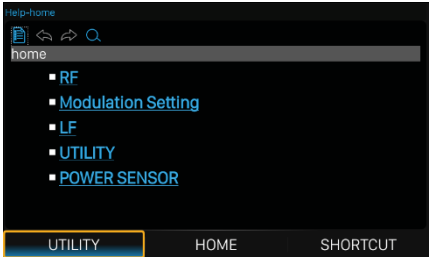
The RF signal source provides a 5-inch capacitive touch screen to support various gesture operations, including:

- Click on the screen parameters or menu to edit the parameters.
- Left or right slide switches menus.
- Up and down slides the display menu.

# Help Information

The built-in help system provides help information for each function and menu option on the front panel.

- Press UTILITY button and select help. The center of the screen will pop up to help.
- Click to enter the corresponding directory.



# Remote Control

The generator supports communication with compatible computers via USB, LAN, and GPIB-USB interfaces. By using these interfaces, in combination with programming languages and/or NI-VISA software, users can remotely control the signal generator. More information can be found in the SSG5000X Programming Guide available on the SIGLENT website.

# For More Product Information

You can obtain the instrument information and installation status of all options through **[UTILITY] System Info**.

For more information of this product, please refer to the following manuals (you can also download them from the **SIGLENT** Web site):

**SSG5000X User's Guide:** Provides detailed introductions of the functions of this product;

**SSG5000X Programming Guide:** Provides detailed introductions of the SCPI commands and programming of this product;

**SSG5000X Datasheet:** Provides the main characteristics and specifications of this product.

# Contact SIGLENT

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