SIGLENT®

SDG6000X Series
Pulse/Arbitrary
Waveform Generator

Quick Start

Copyright

General Safety Summary

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

Only the qualified technician can service the instrument.

Avoid fire or personal Injure.

Use proper power line —— Use only the special power line which approved by local state.

Ground the Instrument —— The instrument is grounded through the protective terra conductor of the power line. To avoid electric shock, the ground conductor must be connected to the earth. 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. Do not touch the exposed contacts or components.

Observe all terminal ratings —— To avoid fire or electric shock, please observe all ratings and sign instruction on the instrument. Before connecting the instrument, please read the manual carefully to gain more information about the ratings.

Do not operate with suspected failures —— If you suspect that the product is damaged, please let a qualified service personnel check it.

Avoid circuit or wire exposure —— Do not touch exposed contacts or components when the power is on.

Do not operate in wet/damp conditions.

Do not operate in an explosive atmosphere.

Keep the surface of the instrument clean and dry.

Safety Terms and Symbols

Terms used on the instrument. Terms may appear on the instrument:

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

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

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

Symbols used on the instrument. Symbols may appear on the instrument:

⚡	⚠	⏚		⏻
Hazardous Voltage	Warning	Protective Earth Ground	Chassis Ground	Power Switch

Content
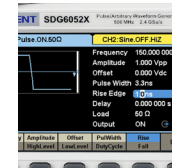
Adjust the Handle

When using the instrument, users can adjust the handle to a needed position which makes it easier to operate and observe.
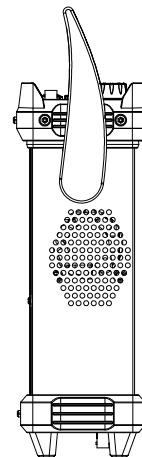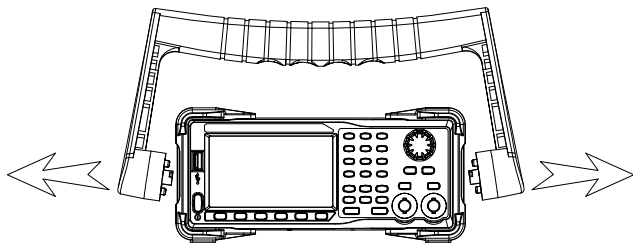
Carrying Position
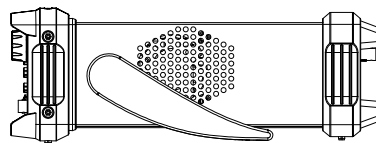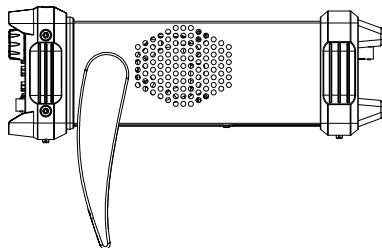
Horizontal Position

Figure 1 Adjust the Handle

The Front Panel

Figure 2 SDG6000X Front Panel

1. Power Key
2. USB Host
3. Touch Screen Display
4. Numeric Keyboard
5. Knob
6. Arrow Keys
7. CH1/CH2 Control/ Output Port
8. Channel Select Key
9. Function Keys
10. Waveform Option
11. Menu Keys

1.Power Key

This key is used to turn on/off the AWG. When the power key is off, the AWG is in the power off state.

2.USB Host

SDG6000X supports USB memory devices (U-Disks) using the FAT format. An external USB memory device can be used to store and recall waveforms or state files for use with the instrument. Users can also update the firmware using U-Disks.

3.Touch Screen Display

SDG6000X has a 4.3 inch TFT-LCD touch screen, which displays current function menu, parameter settings, system state, prompts, etc. For detailed information, please refer to "Touch Screen Display".

4.Numeric Keyboard

Consists of numbers from 0 to 9, radix points "." and symbol keys "+/-", which are used to input parameters.

Note：To enter a negative number, you need to enter a symbol "-" at first.

5.Knob

It is used to increase (clockwise) or decrease (counterclockwise) the current numerical value when setting parameters.

It is also used to switch characters in the soft keyboard when inputting a file name.

When saving or reading files, rotate the knob to choose a position to save a file or choose a file to be read; press the knob to open a selected folder or file.

When choosing **Waveforms** → **Page 1/2** → **Arb** → **Arb Type** rotate the knob to select a desired built-in or stored waveform.

6.Arrow Keys

When using the knob to set parameters, the arrow keys can be used to select the digit to be modified.

When using the numeric keyboard to set parameters, the left arrow key is used as a Backspace function.

When inputting a file name, they are used to move the position of the cursor.

7.Channel Control Area

CH1 Control/Output Key

The **Output** key on the left is used to turn on/off the CH1 output.

The nominal output impedance of the BNC connector is 50Ω.

When pressing **Output** (the key backlight turns on), the connector outputs the waveform according to the current configuration of CH1.

CH2 Control/Output Key

The **Output** key on the right is used to turn on/off the CH2 output.

The nominal output impedance of the BNC connector is 50Ω.

When pressing **Output** (the key backlight turns on), the connector outputs the waveform according to the current configuration of CH2.

A long press of the output key (>2 s) switches the output load setting between 50Ω and HiZ.

> ⚠️ **CAUTION:**
>
> Overvolltage protection of CH1 and CH2 will take effect once any of the following conditions is met. When overvoltage protection occurs, a message will be displayed and the output is disabled.
>
> • The absolute value of input voltage is higher than 11V±0.5V when the amplitude of the generator is higher than or equal to 3.2Vpp or the DC offset is higher than or equal to |2VDC|.
>
> • The absolute value of input voltage is higher than 4V±0.5V when the amplitude of the generator is lower than 3.2Vpp and the DC offset is lower than |2VDC|.
>
> If an overvoltage protection occurs, a message will be displayed and the output will be disabled.
>
> Choose **Utility** → **Page 1/2** → **OverVoltage Protection** to turn on/off the function.

8.Channel Select Key

This key is used to switch the current selected channel between CH1 and CH2.

9.Function Keys

Mod ----**Modulation**

This key is used to enable the modulation screen and allow for several types of modulation. It generates AM, DSB-AM, FM, PM, ASK, FSK and PWM modulated signals.

• It supports "Internal" and "External" modulation sources.

• The corresponding key backlight will turn on when this function is selected.

Sweep ----**Sweep**

This key is used to generate sweeping frequency signals of Sine, Square, Ramp and Arbitrary.

• It supports "Linear" and "Log" sweep profiles.

• It supports "Internal", "External" and "Manual" trigger sources.

• The corresponding key backlight will turn on when this function is selected.

Burst ----**Burst**

This key is used to generate burst signals of Sine, Square, Ramp, Noise and Arbitrary.

• It supports "NCycle", "Gated" and "Infinite" burst modes.

• Noise can only be used to generate gated burst.

• It supports "Internal", "External" and "Manual" trigger sources.

• The corresponding key backlight will turn on when this function is selected.

Parameter ----**Parameter Setting**

Users can switch directly to the parameter setting interface by pressing the key.

• The corresponding key backlight will turn on when this function is selected.

Utility ----Utility Functions and System Settings

This key is used to set system parameters and check version information.

• Press this key and then press the help softkey to obtain built-in help information about the product.

• The corresponding key backlight will turn on when this function is selected.

Store/Recall ----Store and Recall

Through this key, users can store/recall the instrument's state or arbitrary waveform data edited by users.

• Perform general file operations, such as Save, Save As, Delete, and others.

• In addition to the built-in nonvolatile memory (C disk), an external USB memory device can also be used.

• The corresponding key backlight will turn on when this function is selected.

10.Waveform Option

Waveforms ---- Sine

Provide sine waveform output with a frequency ranging from 1 μHz to 500 MHz.

Enabling the "harmonic" function permits adding sinewave harmonics up to the 16th order to the basic frequency.

• The backlight of **Waveforms** will turn on when this function is selected.

• "Frequency/Period", "Amplitude/High level", "Offset/Low level" and "Phase" of the sine waveform can be adjusted.

Waveforms ---- Square

Provide square waveform output with a frequency ranging from 1 μHz to 120 MHz.

The backlight of **Waveforms** will turn on when this function is selected.

• "Frequency/Period", "Amplitude/High level", "Offset/Low level", "Phase" and "Duty" of the square waveform can be adjusted.

Waveforms ---- **Ramp**

Provide ramp waveform output which ranges from 1 µHz to 5 MHz.

• The backlight of **Waveforms** will turn on when this function is selected.

• "Frequency/Period", "Amplitude/High level", "Offset/Low level", "Phase" and "Symmetry" of the ramp waveform can be adjusted.

Waveforms ---- **Pulse**

Provide pulse waveform output with frequencies that range from 1 µHz to 150 MHz.

• The backlight of **Waveforms** will turn on when this function is selected.

• "Frequency/Period", "Amplitude/High level", "Offset/Low level", "Pulse width/Duty", "Rise/Fall" and "Delay" of the pulse waveform can be adjusted.

Waveforms ---- **Noise**

Provide White Gauss Noise output with a bandwidth of 500 MHz.

• Enabling the "BandSet" function permits setting the bandwidth between 80 MHz ~ 500 MHz .

• The backlight of **Waveforms** will turn on when this function is selected.

• "Stdev" and ""Mean" of the noise signal can be adjusted.

Waveforms ---- **Arb**

Provide arbitrary waveform output with frequencies that range from 1 µHz to 50 MHz.

• The backlight of Waveforms will turn on when this function is selected.

• Support two output modes: "DDS" and "TrueArb". In "TrueArb" mode the interpolation can be set as "Zero-order hold" or "Linear".

• Built-in **waveforms** include Cardiac, Gauspuls, ExpRise and ExpFall, etc. In addition, the output waveform stored on the U-Disk can be sourced.

• Users can edit arbitrary waveforms through EasyWaveX and download them to the instrument.

• "Frequency/Period", "Amplitude/High level", "Offset/Low level" and "Phase" of the arbitrary waveform can be adjusted.

Waveforms ---- **IQ**

Provide IQ waveform output with center frequencies ranging from 0 Hz to 500 MHz.

• Support modulation types including 2ASK, 4ASK, 8ASK, BPSK, QPSK, 8PSK, DBPSK, DQPSK, D8PSK, 8QAM, 16QAM, 32QAM, 64QAM, 128QAM, 256QAM, 2FSK, 4FSK, 8FSK, 16FSK, MSK, Multi-tone

• Support data patterns including PN7, PN9, PN15, PN23, User file and Custom

• Built-in waveforms can be recalled by pressing I/Q Data.

• Users can edit IQ waveforms through EasyIQ and download them to the instrument.

• "Fsymb/Fs", "Amplitude" and "Center Frequency" of the IQ waveform can be adjusted.

Waveforms ---- **PRBS**

Provide PRBS output which ranges from 1μbps to 300Mbps.

• Support patterns from PRBS3 to PRBS32

• Supports setting the logic level quickly to TTL/CMOS, LVTTL/LVCMOS, ECL, LVPECL, LVDS

• Supports setting the two channels to differential mode quickly.

• "Bit Rate/Period", "Amplitude/High level", "Offset/Low level" and "Length" of the PRBS waveform can be adjusted.

11.Menu Keys

These keys correspond to the menu displayed above them on the display. Press any key to activate the corresponding menu.

Figure 3 SDG6000X Rear Panel

1.Counter

BNC connector. The input impedance is 1MΩ. This connector is the input connection to the frequency counter.

2.Aux In/Out

BNC connector. The function of this connector is determined by the current operating mode of the instrument.

• Sweep/Burst trigger signal input port of external trigger.

• Sweep/Burst trigger signal output port of internal/manual trigger.

• Burst gating trigger input port.

• ASK/FSK external modulation signal input port.

• Synchronization output port. When synchronization is on, the port can output a CMOS signal with the same frequency as basic waveforms (except Noise and DC), arbitrary waveforms, and modulated waveforms (except external modulation).

• AM, DSB-AM, FM, PM and PWM external modulation signal input port.

3.10 MHz Clock Input Port

BNC connector. If the instrument uses external clock source, the connector accepts an external 10MHz clock source.

4.10 MHz Clock Output Port

BNC connector. If the instrument uses internal clock source, the connector outputs the 10 MHz clock signal generated by the crystal oscillator inside the generator. If an external clock is being used as a clock input, the instrument will pass-through the external clock.

5.Earth Terminal

Used to ground the instrument.

6.AC Power Supply Input

SDG6000X can accept two different types of AC input power.

AC power: 100-240V, 50/60Hz or 100-120V, 400Hz

Fuse: 1.25A, 250V

7.USB Device

Used when connecting the instrument to an external computer to allow waveform editing (such as EasyWaveX and EasyIQ) and remote control.

8.LAN Interface

Through this interface, the generator can be connected to your computer or network for remote control. An integrated testing system may be built, as the generator conforms to the VXI-11 class standard of LAN-based instrument control, and supports remote control commands using open sockets or Telnet.

Touch Screen Display

SDG6000X can only display the parameters and waveform type of one channel at a time. The picture below shows the interface when CH1 has been configured to source an AM modulation of a sine waveform. The information displayed may vary depending on the function selected.

The entire screen of the SDG6000X is a touch screen. You can use your figure or touch pen to control the instrument. Most functions and selections can be chosen using the touch screen in a similar manner to the front panel keys and knob.
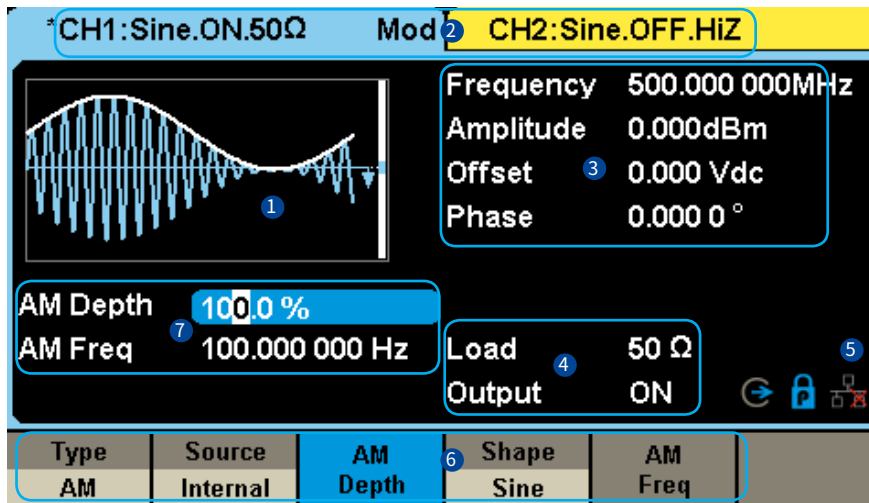

Figure 4 Touch Screen Display

1.Waveform Display Area

Shows the currently selected waveform of each channel. The key backlight will turn on when this area of the touch screen is pressed.

2. Channel Status Bar

Indicates the selected status and output configuration of the channels. Touch this area of the screen to switch to the corresponding channel. If you touch again, the shortcut menus of function keys will be recalled: Mod、Sweep、Burst、Parameter、Utility and Store/Recall.

3. Basic Waveform Parameters Area

Shows the current waveform parameters of each channel. Touch this area of the screen to highlight the parameter you want to configure and use number keys or knob to change the parameter value.

4. Channel Parameters Area

Displays the currently selected channel's load and output settings.

Load -----Value of the output load, as selected by the user.

After choosing the parameter to highlight it, use the softkeys, number keys or knob to change the parameter value.

High Impedance: displays HiZ.

Load: displays the set impedance value (the default is 50Ω and the range is 50Ω to 100kΩ).

Note: This setting does not actually change the instrument's output load impedance of 50Ω but rather is used to maintain amplitude accuracy into different load values.

Output ----Channel output state.

After touching this area of the screen or pressing corresponding channel output control port, you can turn on/off the current channel.

5.Status Icon

LAN Status Icon

The SDG6000X will show different prompt messages based on the current network status.

Indicates LAN connection is successful.

Indicates there is no LAN connection or LAN connection is unsuccessful.

Phase Mode Icon

Indicates "Phase Locked" mode, in which both DDS reset when changing frequency. Phase deviation between CH1 and CH2 is maintained.

Indicates "Independent" mode, in which no DDS resets when changing frequency. Phase deviation between CH1 and CH2 is random.

The independent mode is recommended when the smoothest manual frequency transitions are required.

Choose **Utility** → **Page 2/3** → **Phase Mode** to choose the mode.

Clock Source Icon

Indicates the clock source is internal

Indicates the clock source is external

Indicates the clock source is external, but not available

6. Menu

Touch here for the menu corresponding to the displayed function. For example, the picture above shows the parameters of "AM modulation". After touching the menu on the touch screen to choose the corresponding parameter, use number keys or knob to change the parameter value.

7. Modulation Parameters Area

Shows the parameters of the current modulation function. After touching this area of the screen or pressing corresponding menu, use number keys or knob to change the parameter value.

Use Built-In Help System

To obtain built-in help information of the product, please press **Utility** key first, then press **Page 1/2** and **Help**, use the knob to choose the help item you want, finally press **Select** to obtain help information.

Introduction of EasyWaveX

The SDG6000X series includes arbitrary waveform editing software called EasyWaveX. This software is a platform for easily creating, editing, and transferring waveforms to the generator. It provides 11 standard waveforms such as Sine, Square, Ramp, Pulse, Noise and DC, which meets most engineers' basic needs. In addition, it provides several ways of manual drawing, point-to-point line drawing and arbitrary point drawing. EasyWaveX allows for fast and easy creation of complex waveforms.

The main interface of EasyWaveX is shown in the following figure

Figure 5 EasyWaveX Interface

Introduction of EasyIQ

The IQ waveform editing software EasyIQ supports generating IQ data with 2ASK, 4ASK, 8ASK, BPSK, QPSK, 8PSK, DBPSK, DQPSK, D8PSK, 8QAM, 16QAM, 32QAM, 64QAM, 128QAM, 256QAM, 2FSK, 4FSK, 8FSK, 16FSK, MSK, Multi-tone modulation, and custom data to the instrument.
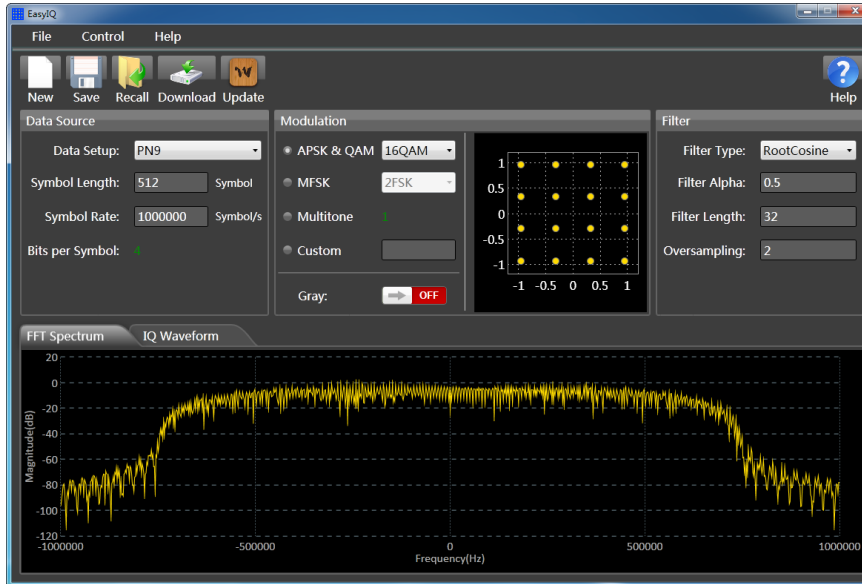

Figure 6 EasyIQ Interface

Contact SIGLENT

Headquarters:

SIGLENT Technologies Co., Ltd

Add: Bldg No.4 & No.5, Antongda Industrial Zone, 3rd Liuxian Road, Bao'an District, Shenzhen, 518101, China

Tel: + 86 755 3688 7876

Fax: + 86 755 3359 1582

Email: sales@siglent.com

Website: int.siglent.com

USA:

SIGLENT Technologies America, Inc

6557 Cochran Rd Solon, Ohio 44139

Tel: 440-398-5800

Toll Free: 877-515-5551

Fax: 440-399-1211

Email: info@siglent.com

Website: www.siglentna.com

Europe:

SIGLENT Technologies Germany GmbH

Add: Liebigstrasse 2-20, Gebaeude 14, 22113 Hamburg Germany

Tel: +49(0)-819-95946

Fax: +49(0)-819-95947

Email: info-eu@siglent.com

Website: www.siglenteu.com

SIGLENT®