

SDG7000A Arbitrary Waveform Generator

 **SIGLENT®**

 **TELONIC**
TEST INSTRUMENTS & POWER SUPPLIES



01189 786911 TELONIC.CO.UK

Quick Start

EN01C



SIGLENT TECHNOLOGIES CO.,LTD

Copyright and Declaration

Copyright

SIGLENT TECHNOLOGIES CO., LTD. All Rights Reserved.

Trademark Information

SIGLENT is the registered trademark of SIGLENT TECHNOLOGIES CO., LTD.

Declaration

SIGLENT products are protected by patent law in and outside of P.R.C.

SIGLENT reserves the right to modify or change parts of or all the specifications or pricing policies at company's sole decision.

Information in this publication replaces all previously corresponding material.

Any way of copying, extracting or translating the contents of this manual is not allowed without the permission of **SIGLENT**.

Product Certification

SIGLENT guarantees this product conforms to the national and industrial stands in China and other international stands conformance certification is in progress.

Content

Copyright and Declaration	I
General Safety Summary	1
Safety Terms and Symbols	3
Allgemeine Sicherheitsübersicht.....	4
Sicherheitsbegriffe und -symbole.....	7
Maintenance and Cleaning	8
First steps	9
Preparation before Use.....	10
The Front Panel	12
The Rear Panel.....	13
Touch Screen Display	14
Front Panel Operation	17
Basic Operations	19

General Safety Summary

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

To Avoid Fire or Personal Injury.

Use The Proper Power Line.

Use only the special power line approved by the state and local authorities.

Ground the Instrument.

The instrument grounds 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 is equal to the earth, so do not connect the signal wire to a high voltage. Do not touch the exposed contacts or components.

Look over All Terminals Ratings.

To avoid fire or electric shock, please look over all ratings and signed instructions of the instrument. Before connecting the instrument, please read the manual carefully to gain more information about the ratings.

Equipment Maintenance and Service.

In the event of an equipment failure, please do not dismantle the machine for maintenance. The equipment contains capacitors, power supply, transformers and other energy storage devices which may cause high voltage damage. The internal devices of the equipment are sensitive to static electricity and direct contact can easily cause irreparable damage to the equipment. It is necessary to return to the factory or to the company's designated maintenance organization for maintenance. Be sure to pull out the power cord before repairing the equipment. Live line operation is strictly prohibited. The equipment can only be powered on when the maintenance is completed and the maintenance is confirmed to be successful.

Identification of Normal State of Equipment.

After the equipment is started, there will be no alarm information and error information at the interface under normal conditions. The curve of the interface will scan from left to right freely; if there is a button in the scanning process or there is alarm or error prompt, the device may be in an abnormal state. You need to view the specific prompt information. You can try to restart the setting. If the fault information is still in place, do not use it for testing. Contact the manufacturer or the maintenance department designated by the manufacturer to carry out maintenance to avoid the wrong test data caused by the use of the fault or endanger the personal safety.

Do Not Operate with Suspected Failures.

If you suspect that there is damage to the instrument, please let only qualified service personnel check it.

Avoid Exposed Circuits, Wire, or Components.

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.

Only lithium batteries with the same specification could be used to replace the battery on the main board.

The responsible body or operator should refer to the instruction manual to preserve the protection afforded by the equipment. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Any parts of the device and its accessories are not allowed to be changed or replaced, other than authorized by the manufacturer or agent.

Safety Terms and Symbols

Terms used 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 potential damage to the instrument or other property might occur

Symbols used on the instrument.



Hazardous
Voltage



Protective
Earth Ground



Warning



Measurement
Ground



Power
Switch

Allgemeine Sicherheitsübersicht

Lesen Sie die folgenden Sicherheitshinweise sorgfältig durch, um Verletzungen oder Schäden am Gerät und an den daran angeschlossenen Produkten zu vermeiden. Um mögliche Gefahren zu vermeiden, verwenden Sie das Gerät bitte wie angegeben.

Verwenden Sie ein geeignetes Netzkabel

Verwenden Sie nur das für das Gerät vorgesehene und im jeweiligen Land zugelassene Netzkabel.

Erden Sie das Gerät

Das Gerät ist über den Schutzleiter der Netzleitung geerdet. Um einen elektrischen Schlag zu vermeiden, vergewissern Sie sich bitte, dass das Gerät korrekt geerdet ist, bevor Sie die Eingangs- oder Ausgangsklemmen des Geräts anschließen.

Schließen Sie das Messkabel richtig an

Die Kabelschirmung (Masse) des Messkabels ist gleich dem Potential der Erde, schließen Sie das Messkabel also nicht an eine hohe Spannung an.

Überprüfen Sie die Nennwerte aller Klemmen

Um Feuer oder einen elektrischen Schlag zu vermeiden, beachten Sie bitte alle Angaben und Hinweise auf dem Gerät. Bevor Sie das Gerät anschließen, lesen Sie bitte das Handbuch sorgfältig durch, um weitere Informationen über die Nennwerte zu erhalten.

Verwenden Sie einen ordnungsgemäßen Überspannungsschutz

Stellen Sie sicher, dass keine Überspannung (z. B. durch ein Gewitter) an das Gerät gelangen kann, da sonst die Gefahr eines elektrischen Schlages besteht.

Schutz vor Elektrostatik

Betreiben Sie das Gerät in einer Umgebung, die vor elektrostatischer Entladung geschützt ist, um Schäden durch statische Entladung zu vermeiden. Erden Sie vor dem Anschließen immer sowohl den Innen- als auch den Außenleiter des Kabels, um statische Aufladung abzubauen.

Für gute Belüftung sorgen

Eine unzureichende Belüftung kann zu einem Temperaturanstieg führen, der schließlich das Gerät beschädigt. Sorgen Sie daher für eine gute Belüftung und überprüfen Sie regelmäßig die Ansaugung und den Lüfter.

Vermeiden Sie freiliegende Schaltkreise oder Komponenten

Berühren Sie keine freiliegenden Kontakte oder Bauteile, wenn das Gerät eingeschaltet ist.

Richtige Sicherung verwenden

Verwenden Sie nur die angegebene Sicherung.

Betreiben Sie das Gerät nicht ohne Abdeckungen

Betreiben Sie das Gerät nicht, wenn Abdeckungen oder Verkleidungen entfernt sind.

Betreiben Sie das Gerät nicht bei vermuteten Defekten

Wenn Sie vermuten, dass das Gerät beschädigt ist, lassen Sie es vor dem weiteren Betrieb von qualifiziertem Servicepersonal überprüfen. Jegliche Wartung, Einstellung oder Austausch, insbesondere von Schaltkreisen oder Zubehör, muss von SIGLENT autorisiertem Personal durchgeführt werden.

Nicht in feuchter Umgebung betreiben

Um einen Kurzschluss im Geräteinneren oder einen elektrischen Schlag zu vermeiden, betreiben Sie das Gerät nicht in feuchter Umgebung.

Betreiben Sie das Gerät nicht in explosionsgefährdeten Umgebungen

Um Schäden am Gerät oder Personenschäden zu vermeiden, ist es wichtig, das Gerät nicht in explosionsgefährdeter Umgebung zu betreiben.

Halten Sie die Produktoberflächen sauber und trocken

Um den Einfluss von Staub und/oder Feuchtigkeit in der Luft zu vermeiden, halten Sie die Oberfläche des Geräts bitte sauber und trocken.

Sicherheit bei der Handhabung

Bitte behandeln Sie das Gerät während des Transports vorsichtig, um Schäden an Tasten, Drehknopfschnittstellen und anderen Teilen auf den Bedienfeldern zu vermeiden.

Es dürfen nur Tastköpfe verwendet werden, die den Spezifikationen des Herstellers entsprechen

Bei Verwendung von 2X/.../10000X-Sondenbaugruppen müssen die Sondenbaugruppen durch eine doppelte oder verstärkte Isolierung von den gemessenen Stromkreisen isoliert sein.

Alle Sondenbaugruppen sollten die Anforderungen von UL 61010-031 und CAN/CSA-C22.2 Nr. 61010-031-07 erfüllen.

Das Gerät darf nicht so positioniert werden, dass es schwierig ist, die Trennvorrichtung (abnehmbarer Stecker) zu bedienen.

Wenn das Gerät auf eine Weise verwendet wird, die nicht vom Hersteller angegeben ist, kann der Schutz, den das Gerät bietet, beeinträchtigt werden.

Sicherheitsbegriffe und Symbole

Begriffe in diesem Handbuch. Diese Begriffe können in diesem Handbuch vorkommen:



WARNUNG

Warnhinweise weisen auf Bedingungen oder Praktiken hin, die zu Verletzungen oder zum Verlust des Lebens führen können.



VORSICHT

Vorsichtshinweise weisen auf Bedingungen oder Praktiken hin, die zu Schäden an diesem Produkt oder anderen Gegenständen führen können.

Begriffe auf dem Produkt. Diese Begriffe können auf dem Produkt erscheinen:

GEFAHR

Weist auf direkte Verletzungen oder Gefahren hin, die auftreten können.

WARNUNG

Weist auf mögliche Verletzungen oder Gefährdungen hin, die auftreten können.

VORSICHT

Weist auf mögliche Schäden am Gerät oder an anderen Gegenständen hin, die eintreten können.

Symbole auf dem Produkt. Diese Symbole können auf dem Produkt erscheinen:



Hazardous
Voltage



Protective
Earth Ground



Warning



Terminal
Ground



Power
Switch

Wenn Sie solche Symbole auf dem Produkt finden, ziehen Sie das Handbuch zu Rate, um die Art der potenziellen Gefahr und die zu ergreifenden Maßnahmen zu erfahren

Maintenance and Cleaning

Maintenance: When storing or placing the instrument, do not expose the LCD to direct sunlight for a long time.

Cleaning: Please clean the instrument frequently according to the use. The method is as follows:

1. Use a soft cloth to wipe the floating dust outside the instrument and connector. When cleaning the LCD, be careful not to scratch the transparent protective film.
2. Use a soft cloth soaked with water to clean the instrument. Please disconnect the power supply. For more thorough cleaning, use an aqueous solvent of 75% isopropanol.

Note: To avoid damaging the instrument, do not use any corrosive reagent or cleaning reagent, and do not put it in fog, liquid or solvent. Before re-energizing, please make sure that the instrument is dry to avoid electrical short circuit or personal injury caused by moisture.

First steps

Delivery Checklist

First, verify that all items listed on the packing list have been delivered. If you note any omissions or damage, please contact your nearest SIGLENT customer service center or distributor as soon as possible. If you fail to contact us immediately in case of omission or damage, we will not be responsible for replacement.

Quality Assurance

The instrument has a 3-year warranty (1-year warranty for probe attachments) from the date of shipment, during normal use and operation. SIGLENT can repair or replace any product that is returned to the authorized service center during the warranty period. We must first examine the product to make sure that the defect is caused by the process or material, not by abuse, negligence, accident, abnormal conditions or operation.

SIGLENT shall not be responsible for any defect, damage, or failure caused by any of the following:

- a) Attempted repairs or installations by personnel other than **SIGLENT**.
- b) Connection to incompatible devices/incorrect connection.
- c) For any damage or malfunction caused by the use of non-**SIGLENT** supplies. Furthermore, **SIGLENT** shall not be obligated to service a product that has been modified. Spare, replacement parts, and repairs have a 90-day warranty.

The instrument's firmware has been thoroughly tested and is presumed to be functional. Nevertheless, it is supplied without warranty of any kind covering detailed performance. Products not made by **SIGLENT** are covered solely by the warranty of the original equipment manufacturer.

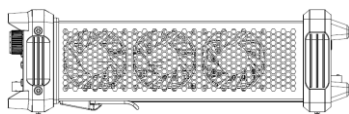
Maintenance Agreement

We provide various services on the basis of maintenance agreements. We offer extended warranties as well as installation, training, enhancement and on-site maintenance and other services through specialized supplementary support agreements. For details, please consult your local SIGLENT customer service center or distributor.

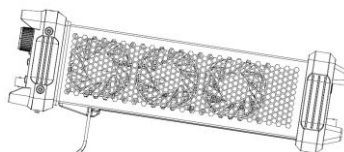
Preparation before Use

Adjust the Supporting Legs

Adjust the supporting legs properly to use them as stands to tilt the instrument upwards for stable placement as well as easier operation and observation of the instrument.



Before adjustment



After adjustment

Connecting to Power Supply

The standard power supply for the instrument is 100~240 V, 50/60 Hz. Please use the power cord provided with the instrument to connect it to AC power.

Power on

First turn on the power switch under the AC socket on the rear panel, and then press the power button on the front panel to start the equipment. If it is set to "Auto Power-on", the device will automatically boot when the power is connected.

Steps for enabling the "Auto Power-on " function:

Utility > **Setting** > **Auto Power-on** .

Power off

Press and hold the power button on the front panel for two seconds to turn off the device, or turn it off through the following steps:

Utility > **Shut Down** .



The Power button does not disconnect the instrument from the AC power supply. The way to fully power down the instrument is to disconnect the AC power input by turning off the power switch under the AC socket on the rear panel or unplugging the AC power cord from the outlet.

Choosing the Language

Utility > **Setting** > **Language** .

System Information

Utility > **System Info** .

The Front Panel



- A Touch Screen Display** The control and display center of the instrument. See “**Touch Screen Display**” for details.
- B Front Panel Keyboard** Includes knobs and keys, which are used to quickly call or set some common functions. See “**Front Panel Operation**” for details.
- C CH1 Output** When the output is differential, right is “+” and left is “-”; When the output is single-ended, it is output by the “+” port. When outputting baseband I / Q signal, CH1 is as “I” signal; When outputting IF signal, CH1 is as the IF.
- D CH2 Output** Same as CH1 except that when outputting baseband I / Q signal, CH2 is as “Q” signal.
- E USB 2.0 Hosts**
- F Power Button**

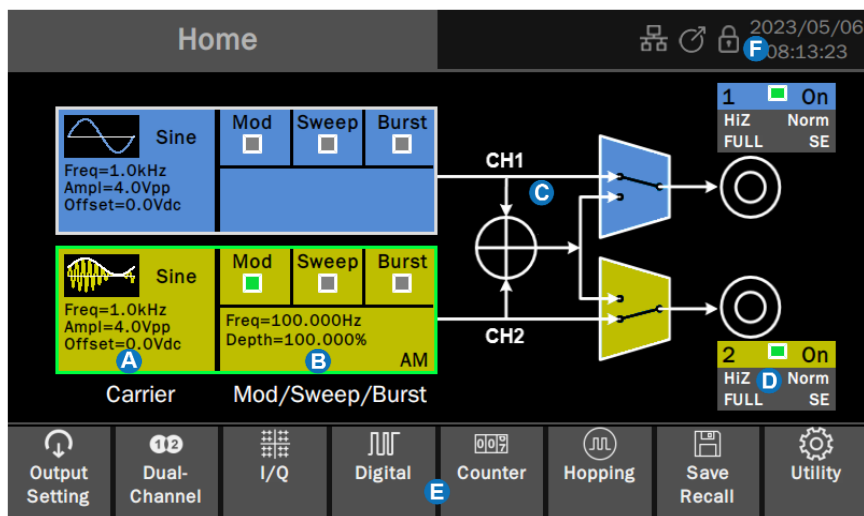
The Rear Panel



- | | |
|---|---|
| <p>A 10 MHz Reference Clock Output and Input</p> <p>B Trigger In/Trigger Out /Sync Out</p> <p>When internal trigger or manual trigger is used for frequency sweep, burst and other functions, trigger signal can be output from this port; When an external trigger is used, a trigger signal is input from the port; It can also be output as a synchronization signal with the same signal frequency and input as external modulation signal for ASK / FSK / PSK.</p> | <p>C External Modulation Signal / Counter Input</p> <p>D Markers</p> <p>E 16-bit Digital Bus Output</p> <p>F USB 2.0 Host</p> <p>G USB 2.0 Device</p> <p>H 10M/100M LAN</p> <p>I AC Power Input</p> <p>J Power Switch</p> <p>K Earth Terminal</p> <p>L OCXO (factory installed)</p> |
|---|---|

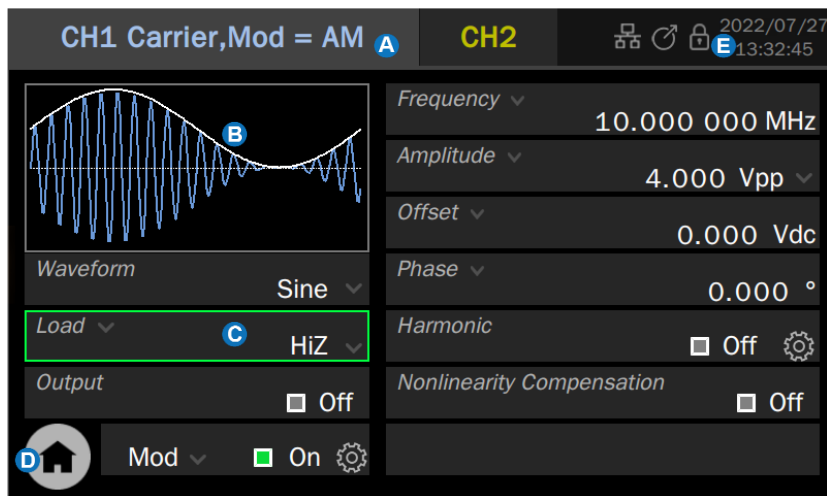
Touch Screen Display

Home Page



- A Carrier Setting Boxes** set and display parameters of the carrier. Click to enter the carrier setting page.
- B Modulation/ Sweep/ Burst Setting Boxes** set and display parameters of modulation/ sweep/ burst. Click to enter the modulation/ sweep/ burst setting page.
- C Waveform Combine Setting** provides schematic diagram and setting of two channel combine. Click the switches in the area to switch between channel output alone and channel output after combination.
- D Channel Output Setting Boxes** set and display output parameters. Click to switch between On/Off.
- E Toolbar** provides shortcuts to common functions.
- F Status Bar** Displays information such as network connection status, clock status, phase mode and time/date.

Parameter Setting Page



A Channel Tab Click the tab corresponding to the channel to switch to the parameter setting page of the channel.

B Waveform Preview Displays the preview of waveform

C Parameter Setting Box The parameter name is on the left. If the parameter name is followed by an icon , it indicates that the parameter has alternative parameters, such as "Frequency" can be switched to "Period". Click here to switch the parameter.

The parameter value is on the right. If the value has a unit, the unit will be displayed. Click the parameter value area to set the value through the virtual keyboard or front panel keyboard.

If the parameter value or unit is followed by an icon , it means that there are multiple options (for example, the unit of sine wave amplitude can be set to "Vpp", "Vrms" or "dBm"), click the icon to select.

If the parameter value area is a switch icon , it means that the parameter has only "ON" and "OFF" states. Click the icon to switch.

If the parameter value is followed by an icon , it indicates that there are more detailed parameter settings. Click the icon to enter the corresponding next level page.

D Go to the Homepage

E Status Bar Displays information such as network connection status, clock status, phase mode and time/date.

Description of Icons in the Status Bar



The network is connected. Click this icon to quickly set the LAN.



No network connection. Click this icon to quickly set the LAN.



USB storage device detected.



The clock source is internal. Click this icon to quickly set the clock source.



The clock source is external. Click this icon to quickly set the clock source.



The clock source is external, but no valid external clock was detected. Click this icon to quickly set the clock source.



The phase mode is "Locked". Click this icon to quickly set the phase mode.



The phase mode is "Independent". Click this icon to quickly set the phase mode.



Time/date. Click this area to quickly set the time/date.

Gesture and Mouse Control

The instrument is mainly operated by touching / clicking the screen. If it is connected with a mouse, you can also use the mouse to operate. Due to the small screen, it is recommended to use the mouse for operation.

Front Panel Operation

Shortcut Buttons



Press the **Burst** / **Mod** / **Sweep** button to quickly turn on/off the burst/modulation/sweep function and jump to the corresponding parameter setting page. When the function is turned on, the corresponding button light is on;

Press the **AWG** / **I/Q** button to quickly switch the waveform to arbitrarily waveform/vector signal and jump to the corresponding parameter setting page. When the waveform is selected, the corresponding button light is on;

Press the **Digital** button to quickly turn on / off the digital bus output and jump to the corresponding parameter setting page. When the digital bus is turned on, the corresponding button light is on;

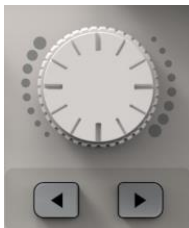
Press the **Waveform** button to quickly recall the waveform selection menu;

Press the **Utility** button to quickly recall the system setup menu.

Numeric Keypad and Knob



Use the numeric keypad to directly enter the value and order of magnitude of the selected parameter. For example, to set the frequency to 1 GHz, press the keys **1** and **G/n** in turn. If the order of magnitude is 1 (100), you can press **Enter** directly.



In addition to directly typing parameter values with the numeric keypad, you can also use the knob to realize continuous adjustment of parameters. Press the knob on the selected parameter box and press the button **◀** and **▶** below the knob to select the digit to be adjusted, and then rotate the knob clockwise to increase the value or counterclockwise to decrease the value.

Channel Setting Buttons



Press this button to quickly switch between CH1 and CH2 parameter setting pages



Press this button to switch the channel output on/off. When the channel is ON, the indicator light above the corresponding BNC connector lights up. Press this button for 2 seconds to switch the channel output load between 50 Ω and high impedance.

Other Buttons



Press this button to go to the home page



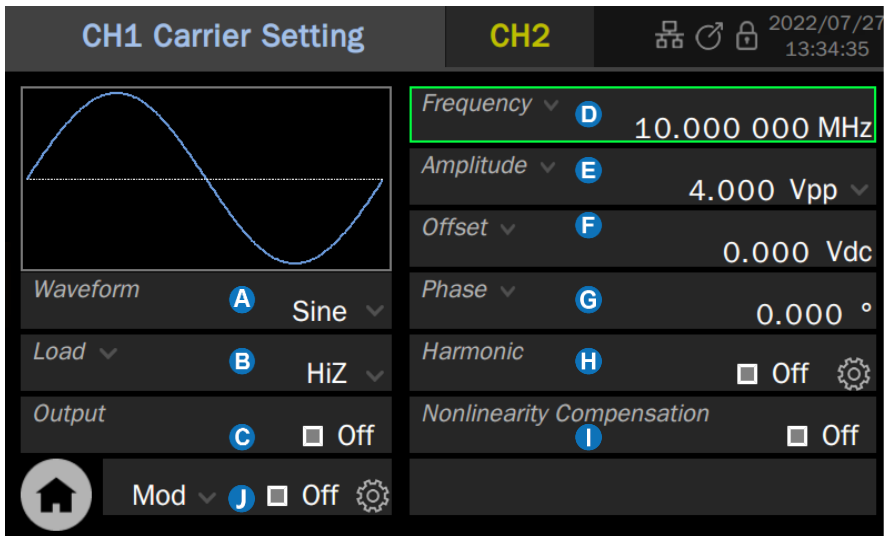
Press this button to turn the touch screen on/off. When the touch screen is enabled, the corresponding light is on

Basic Operations

This manual provides instructions for the basic operations of the instrument. For more advanced operations, please refer to the User Manual of the product.

Basic Waveform Setting

Taking setting sine wave as an example, some basic parameters of standard waveform are explained.



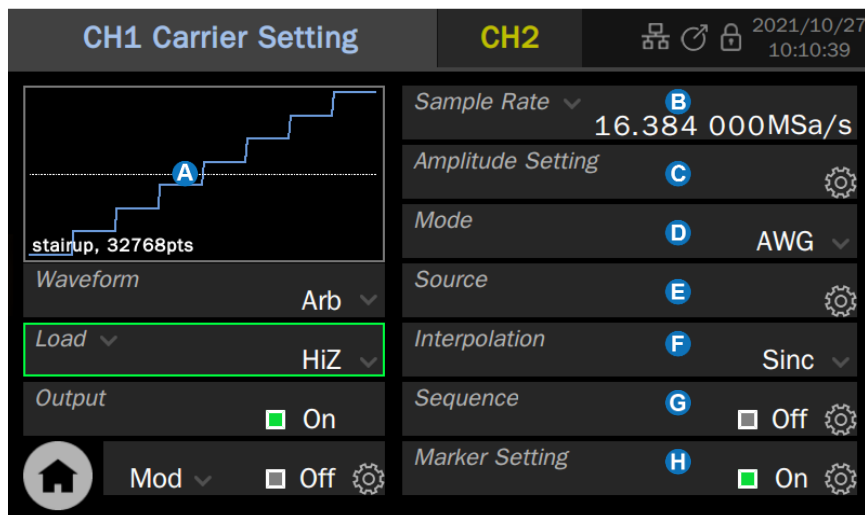
- A Waveform selection:** Where you can select the waveform type.
- B The load setting:** It is used to inform the instrument of the accurate external load value.
- C Output switch**
- D Frequency/Period setting**
- E Amplitude/High level setting**
- F Offset/Low level setting**
- G Phase/Delay setting**
- H Harmonic setting (sine wave only)**
- I Nonlinearity Compensation**
- J Modulation/Sweep/Burst setting**

Table 1 Description of basic waveform parameters

Sine/Square/Pulse/Ramp/PRBS	
Frequency/ Period	Frequency/Period of the signal. The unit of frequency is Hz and the unit of period is second. The relationship between the two is: $\text{Frequency} = 1/\text{Period}$
Amplitude/ Highlevel Offset/ Lowlevel	The amplitude/offset of the signal is linked with the high level/low level. Amplitude value refers to the difference between the highest point (high level, unit V) and the lowest point (low level, unit V) of the signal. The supported units include Vpp, Vrms and dBm (available when the load $\neq$ HiZ); Offset refers to the DC component superimposed on the signal waveform, in V; The relationship of several parameters is: $\text{Amplitude value (Vpp)} = \text{Highlevel} - \text{Lowlevel}$ $\text{Offset} = (\text{Highlevel} + \text{Lowlevel})/2$
Common Mode	The common mode value of the signal when the signal output is set to differential.
Phase/Delay	The phase/delay of the signal is meaningful only when the dual channel phase mode is "Locked", which is used to set the phase relationship between the two channels. The unit of phase is Degree, the unit of delay is second, and the relationship between them is: $\text{Delay} = - (\text{Period} \times \text{Phase}/360^\circ)$
Square	
DutyCycle	The ratio of the positive width to period of square wave.
Pulse	
Width/ DutyCycle	Width refers to the positive pulse width of the pulse, the unit is second; Dutycycle refers to the ratio of the positive pulse width to period. The relationship between the two is: $\text{Pulse width} = \text{Period} \times \text{DutyCycle}$
Rise Edge/ Fall Edge	The rising edge refers to the rising time of 10% ~ 90%, and the falling edge refers to the falling time of 90% ~ 10%, both in second. The rising edge and falling edge are independent of each other and can be set separately.
Ramp	
Symmetry	The ratio of the time during which the triangular wave is rising to the period, in %.

DC	
DC Offset	The "Offset" parameter of the same sine wave, i.e. DC level.
Noise	
Stdev	Standard deviation of noise.
Mean	Average value of noise.
BandSet	-3dB bandwidth of noise, adjustable.
PRBS	
Bit Rate/ Period	Bit rate/Symbol period of PRBS sequence. The unit of bit rate is bps and the unit of symbol period (UI) is second. The relationship between the two is: Bit Rate = 1/Symbol period.
Logic Level	Used to quickly set the amplitude to some standard levels.
Length	PRBS3 ~ PRBS32 can be set, corresponding length $(2^3-1) \sim (2^{32}-1)$.
Rise/Fall	It refers to the rise time of 10% ~ 90% and the fall time of 90% ~ 10%, with the unit of second. Both rising and falling edges are set at the same time.

Arbitrary Waveform Setting

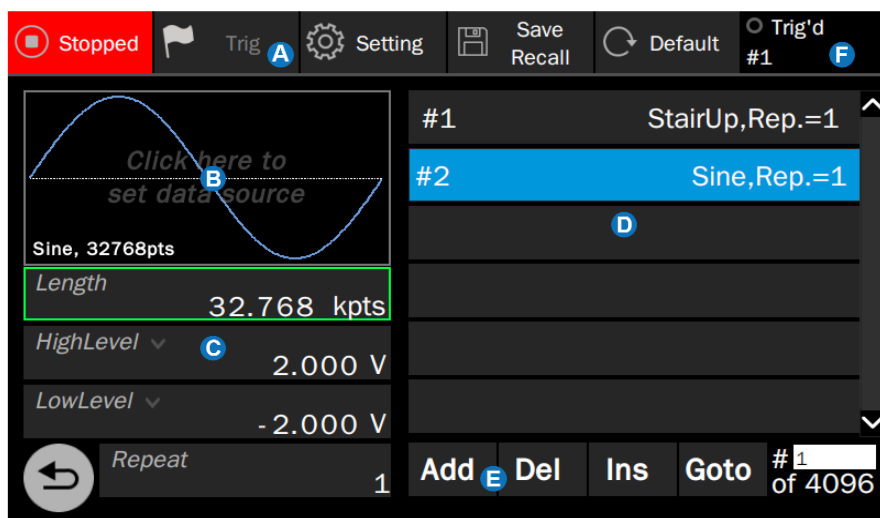


- A** Waveform Preview
- B** Sample Rate/ Frequency setting
- C** Amplitude Setting
- D** Working Mode setting
- E** Waveform data source selection
- F** Interpolation Mode setting
- G** Sequence setting
- H** Marker output position setting

Table 2 Description of arbitrary wave parameters

Sample Rate/Frequency	Sampling rate/frequency of the signal. The unit of sampling rate is Sa/S, which refers to the rate of outputting waveform points; The unit of frequency is Hz. The relationship between the two is Sampling rate = Frequency x number of waveform points.
Amplitude Setting	The setting of parameters such as amplitude/high level, offset/low level and common mode offset is the same as the basic waveform.
Mode	Select AFG or AWG mode. In AFG mode, the signal generator outputs the specified arbitrary waveform in the way of traditional DDS. At this time, the basic waveform parameter setting is the same as that of sine wave; In AWG mode, the signal generator adopts TrueArb technology to output the specified waveform sequence point by point according to the specified sampling rate.
Source	Waveform data sources include built-in waveform, stored waveform and EasyWaveX.
Interpolation	Waveform interpolation methods, including 0-order hold, linear interpolation and Sinx/x interpolation with several different bandwidth. Using Sinx/x interpolation, the smooth waveform can be obtained. The waveform with steep variation can be obtained by using 0-order hold interpolation.
Sequence	The setting of parameters of the sequence such as waveform of segment, waveform length, amplitude, and the sequence run mode.
Marker Setting	Marker switch, and set the marker output corresponding waveform point position.

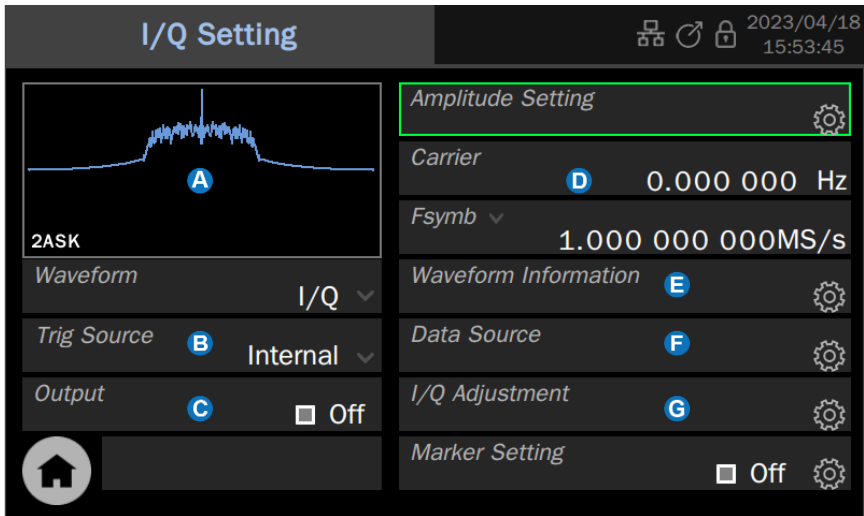
AWG mode supports multi-segment waveform output in sequence. Sequence refers to the combination of multiple arbitrary waveforms into a sequence in the form of "segment". The generation of sequence is realized through the embedded Sequence Editor. The sequence editor can combine up to 4096 segments into a waveform sequence output. The waveform of each segment can be individually specified as an arbitrary waveform, and its source can come from built-in waveform, saved waveform or EasyWaveX; the number of repetitions of each segment can be set. In addition, the sequence editor also provides some advanced functions of triggering and jump between segments.



- A** Menu Bar
- B** Waveform preview and waveform data source selection to display the waveform preview of the current active section. Click this area to select the waveform.
- C** The waveform parameter setting area is used to set the basic parameters of the current active segment
- D** List of segments The current active segment is highlighted.
- E** Segment operation area
- F** Trigger information display area

I/Q vector signal setting

The SDG7000A can be used as a vector signal generator to provide I/Q vector signals in ASK, PSK, QAM, FSK, MSK, multitone and other modulation modes. I/Q signal source data can be generated by the software EasyIQ on the host computer, which is connected with the instrument through USB or LAN. In I/Q mode, CH1 is used as I-channel output and CH2 is used as Q-channel output. The two outputs share a set of parameter settings, as shown in the following figure:



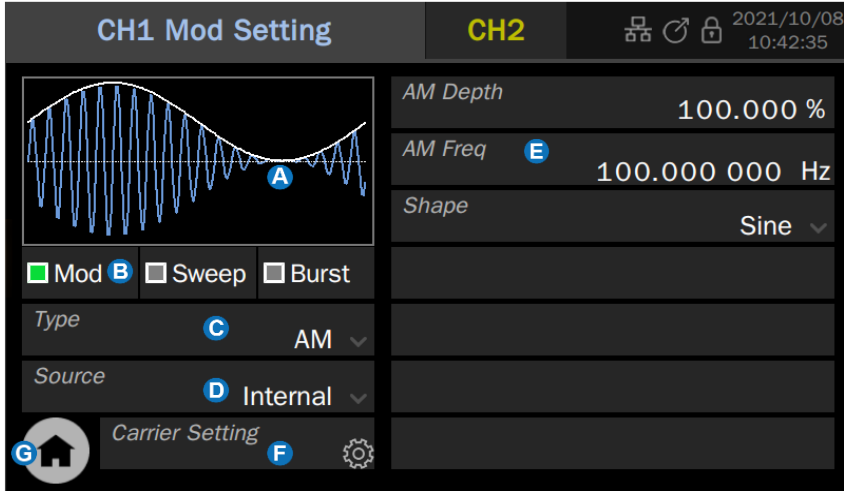
- A** Spectrum preview of waveform
- B** Trigger source selection
- C** Output switch
- D** Waveform parameter setting area
- E** Waveform information
- F** Waveform data source selection
- G** I/Q compensation setting

Table 3 I/Q waveform parameter description

Carrier	The frequency of the carrier. When the center frequency = 0, the output is baseband I / Q signal; When the center frequency $\neq$ 0, the output is the quadrature modulated IF signal.
Amplitude	When the center frequency = 0, the amplitude value is the modulus of the I / Q signal; When the center frequency $\neq$ 0, the signal is only output from channel I, and the amplitude value is the root mean square value of channel I output.
Fsymb/Fs	The symbol rate (Fsymb) and sample rate (Fs) are converted according to the parameter oversampling point (Pts/Symbol), and the conversion relationship $F_s = F_{symb} * (Pts/Symbol)$. Waveform oversampling point information can be obtained in "waveform information".
Waveform Information	The waveform information contains the modulation parameters of the waveform, including modulation type, symbol length, oversampling rate, filter type and roll off coefficient of the filter. It is read-only.
Trigger Source	Internal, External and Manual trigger sources.
Data Source	You can choose to load the built-in waveform or the saved waveform.
I/Q Adjustment	In baseband I/Q mode, SDG7000A provides the option of I/Q compensation to minimize the image caused by the imbalance of the two channels. I/Q compensation options include gain balance, I-channel offset, Q-channel offset and Q-angle adjustment.

Modulation

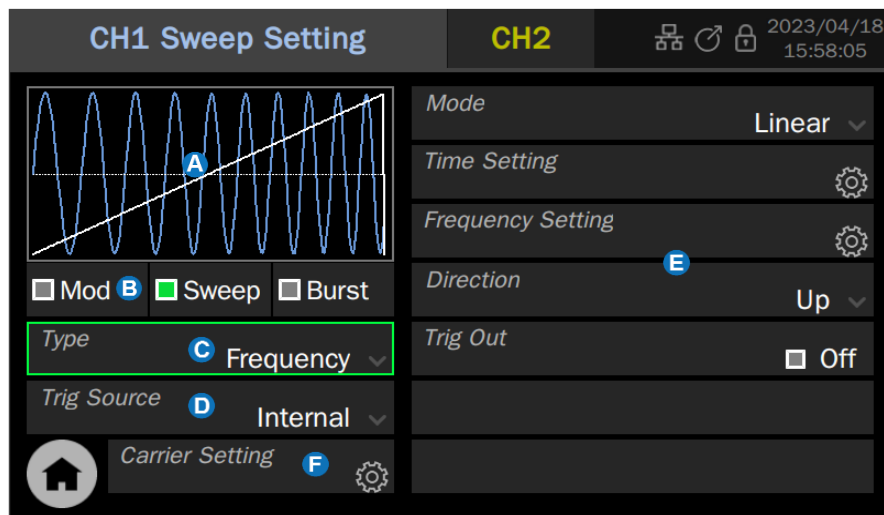
The SDG7000A supports common analog modulation (AM/ DSB-SC/ FM/ PM/ PWM, etc.) and digital keying modulation (ASK/ FSK/ PSK, etc.). The modulated source can be set as internal, external and channel.



- A Waveform Preview**
- B Mod/ Sweep/ Burst quick setting:** Click any one of the three to quickly switch to the corresponding function and open its parameter setting page.
- C Modulation type selection:** Click the modulation type parameter area on the right to select the modulation type.
- D Modulation source selection:** Select the modulation source, including internal, external and another channel
- E Modulation parameter setting area:** The parameters of each modulation are different. The page will automatically switch to the corresponding parameter setting according to the selected modulation type.
- F Quickly switch to carrier parameter setting page.**
- G Return to the Home Page**

Sweep

Sweep is a special type of frequency modulation (FM) or amplitude modulation (AM). When the sweep is on, the carrier output frequency or amplitude can be varied according to a set rhythm (linear/ logarithmic/ step) and can be controlled by a trigger signal.



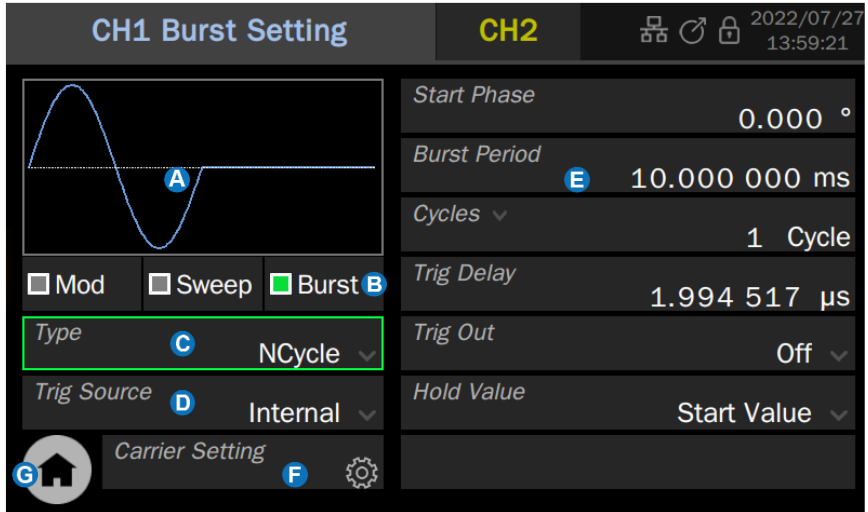
- | | |
|--|---|
| A Waveform Preview | E Sweep parameter setting area |
| B Mod/ Sweep/ Burst quick setting | F Quickly switch to carrier parameter setting page |
| C Sweep type setting | G Return to the Home Page |
| D Trigger source selection | |

Table 4 Sweep type

Sweep type	Description
Frequency	A special frequency modulation (FM)
Amplitude	A special amplitude modulation (AM)
Freq & Ampl	Frequency modulation and amplitude modulation

Burst

Burst is a signal train with limited cycles. The output of a certain number of carrier cycles is triggered by a certain control signal.



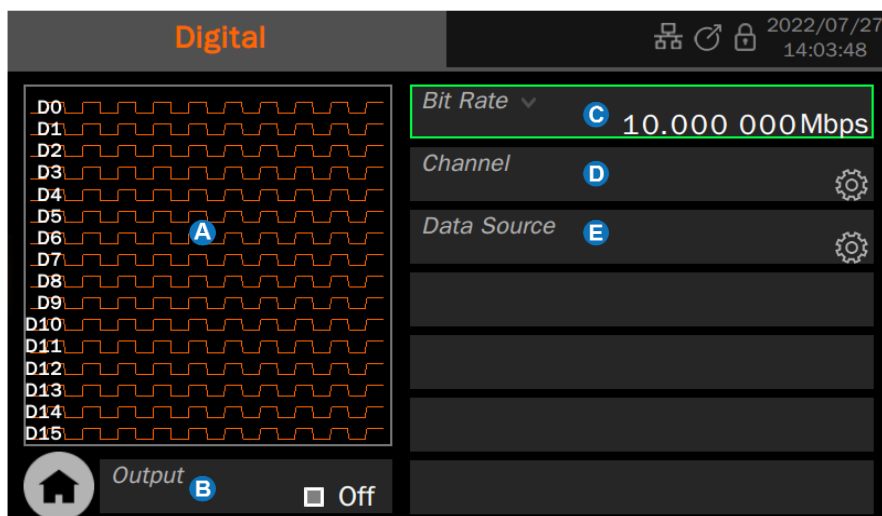
- A** Waveform Preview
- B** Mod/ Sweep/ Burst quick setting
- C** Burst type setting
- D** Trigger source selection
- E** Burst parameter setting area
- F** Quickly switch to carrier parameter setting page
- G** Return to the Home Page

Table 5 Burst type

Burst type	Description
NCycle	At each trigger, a specified number (N) of carrier cycles are output.
Gated	When the gating signal is valid, the carrier is output, otherwise it is not output. The gating signal can be active high or active low.

Digital Channel

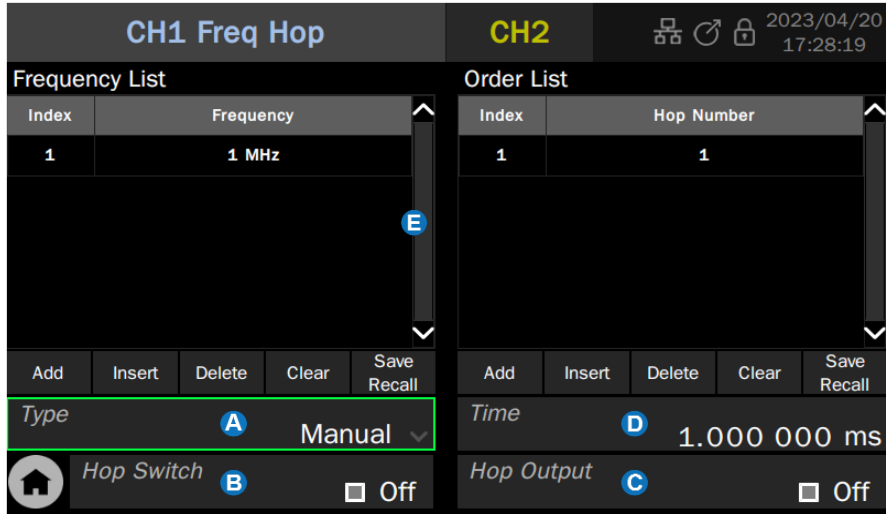
The SDG7000A provides 16-bit of digital bus output. The digital output function can be obtained by purchasing the optional digital output kits. There are two digital levels: LVTTTL and LVDS. The kit providing LVTTTL output converts the LVDS signal to LVTTTL signal. Since the level translation requires a special chip, the kit needs external USB power supply. The kit providing LVDS output directly leads out the LVDS signals without external power supply required. Click digital channel in the toolbar in the Home Page to enter the setting of digital bus.



- A** Waveform Preview
- B** **Output control:** Click the switch on the right side of the setting box to switch On/Off the output of the specified channel in **D**.
- C** **Bit Rate setting**
- D** **Channel setting:** Select the channels to be output.
- E** **Waveform data source selection**

Hopping

SDG7000A supports sine or AM frequency hopping output function; Frequency hopping has three output modes: list mode, random mode, and random list mode; Click Hopping in the toolbar in the Home Page to enter the setting of hopping bus.

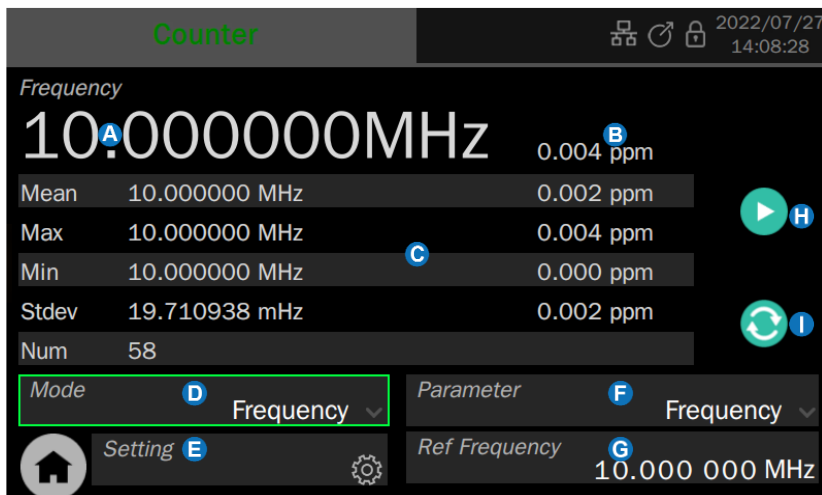


CH1 Freq Hop		CH2	
Frequency List		Order List	
Index	Frequency	Index	Hop Number
1	1 MHz	1	1
E		D	
Add Insert Delete Clear Save Recall		Add Insert Delete Clear Save Recall	
Type A Manual		Time D 1.000 000 ms	
Hop Switch B ☐ Off		Hop Output C ☐ Off	

- A Frequency hopping mode switching
- B Frequency hopping switch
- C Frequency hopping output switch
- D Frequency hopping time setting
- E Frequency hopping parameter setting area

Counter

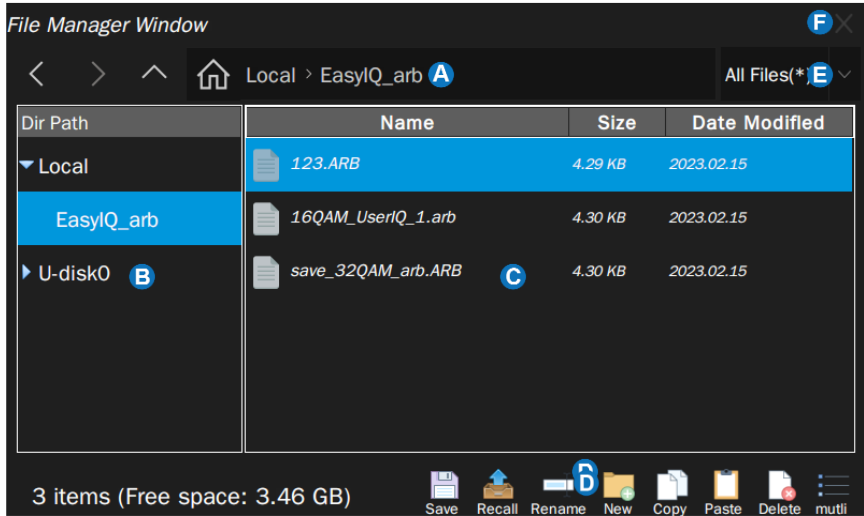
The counter is used to measure the frequency and period of the current signal, or to count the currently specified trigger events. Click counter in the toolbar in the Home Page to enter corresponding settings. The counter has two working modes: Frequency meter and Totalizer.



- A** When the mode is "Frequency", the parameters measured by the frequency meter (Frequency, Period or Duty Cycle) are displayed here. When the mode is "Totalizer", the Totalizer is displayed.
- B** **Current parameter measurement.** The small font on the right shows the deviation between the measured value and the reference value entered at **G**, expressed in parts per million (ppm).
- C** **Parameter measurement statistics display area**
- D** **Working mode selection**
- E** **Counter settings**
- F** **Display parameter setting:** Parameters that can be displayed include Frequency, Period or Duty Cycle.
- G** **Reference frequency setting:** Input the desired input frequency here, and the frequency meter will automatically calculate the deviation between the measured value and the reference frequency.
- H** **Pause measurement**
- I** **Clear statistics**

Save & Recall

The SDG7000A supports storing and recalling setting files, waveform files and firmware upgrade files. Storage and recalling locations include internal memory (local), external USB storage devices (such as USB flash disk) or network paths. The storage and recalling operations are realized through the file manager, as shown in the following figure:



A Address bar: Displays the path where the current file list is located. This includes some shortcuts to the path.

B Navigation panel

C File list

D Toolbar: Provides various specific operations on files. Hover the mouse over the icon to pop up a prompt.

E File type filter

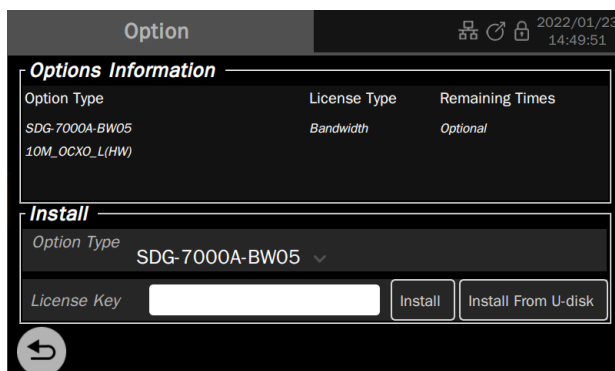
F Close the file manager

Icon	Operation	Icon	Operation	Icon	Operation
	Save		New Directory		Paste
	Recall		Copy		Delete
	Mutil				

Install Options

After you purchase an option according to the option code (see the data sheet for details), you will get the option key. Follow the instructions below to install the options.

1. **Utility** > **Options** .
2. Select the corresponding option name from the option list.
3. Enter the option key in the text box below and click **Install** .



4. Reboot the instrument.

About SIGLENT

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

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

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

North America:

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@siglentna.com
Website: www.siglentna.com

Europe:

SIGLENT Technologies Germany GmbH
Add: Staetzlinger Str. 70
86165 Augsburg, Germany
Tel: +49(0)-821-666 0 111 0
Fax: +49(0)-821-666 0 111 22
Email: info-eu@siglent.com
Website: www.siglenteu.com

Follow us on
Facebook: SiglentTech



2 7 7 4 0 1 0 6 2 9