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Quick Guide

UTG9000T Series Function/ Arbitrary Waveform Generator

V 1.0

2024.07.17

Perface

Thank you for purchasing this brand new product. In order to use this product safely and correctly, please read this manual thoroughly, especially the safety notes.

After reading this manual, it is recommended to keep the manual at an easily accessible place, preferably close to the device, for future reference.

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The warranty is inapplicable to any defects, failures or damages caused by accident, normal wear of components, use beyond specified scope or improper use of product, or improper or insufficient maintenance. UNI-T is not obliged to provide the services below as prescribed by the warranty:
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b) Repair damage caused by improper use or connection to incompatible equipment;
c) Repair any damages or failures caused by using power source not provided by UNI-T;
d) Repair products that have been changed or integrated with other products (if such change or integration increases time or difficulty of repair).

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Chapter 1 User's Guide

This manual includes safety requirements, installment and the operation of UTG100X series function/arbitrary generator.

1.1 Inspecting Packaging and List

When you receive the instrument, please make sure to check the packaging and list by the following steps.

- Check packing box and padding material whether is extruded or teased caused by external forces, and further checking the appearance of the instrument. If you have any questions about the product or need consulting services, please contact the distributor or local office.
- Carefully to take out the article and check it with the packing list.

1.2 Safety Requirements

This section contains information and warnings that must be followed to keep the instrument operating under safety conditions. In addition, user should also follow the common safety procedures.

Safety Precautions

Warning	**Please follow the following guidelines to avoid possible electric shock and risk to personal safety.**
	Users must follow the following conventional safety precautions in operation, service and maintenance of this device. UNI-T will not be liable for any personal safety and property loss caused by the user's failure to follow the following safety precautions. This device is designed for professional users and responsible organizations for measurement purposes.
	Do not use this device in any way not specified by the manufacturer. This device is only for indoor use unless otherwise specified in the product manual.

Safety Statements

Warning	"Warning" indicates the presence of a hazard. It reminds users to pay attention to a certain operation process, operation method or similar. Personal injury or death may occur if the rules in the "Warning" statement are not properly executed or observed. Do not proceed to the next step until you fully understand and meet the conditions stated in the "Warning" statement.
Caution	"Caution" indicates the presence of a hazard. It reminds users to pay attention to a certain operation process, operation method or similar. Product damage or loss of important data may occur if the rules in the "Caution" statement are not properly executed or observed. Do not proceed to the next step until you fully understand and meet the conditions stated in the "Caution" statement.
Note	"Note" indicates important information. It reminds users to pay attention to procedures, methods and conditions, etc. The contents of the "Note" should be highlighted if necessary.

Safety Sign

	Danger	It indicates possible danger of electric shock, which may cause personal injury or death.
	Warning	It indicates that you should be careful to avoid personal injury or product damage.
	Caution	It indicates possible danger, which may cause damage to this device or other equipment if you fail to follow a certain procedure or condition. If the "Caution" sign is present, all conditions must be met before you proceed to operation.
	Note	It indicates potential problems, which may cause failure of this device if you fail to follow a certain procedure or condition. If the "Note" sign is present, all conditions must be met before this device will function properly.
	AC	Alternating current of device. Please check the region's voltage range.
	DC	Direct current device. Please check the region's voltage range.
	Grounding	Frame and chassis grounding terminal.
	Grounding	Protective grounding terminal.
	Grounding	Measurement grounding terminal.
	OFF	Main power off.
	ON	Main power on.
	Power Supply	Standby power supply: when the power switch is turned off, this device is not completely disconnected from the AC power supply.
CAT I		Secondary electrical circuit connected to wall sockets through transformers or similar equipment, such as electronic instruments and electronic equipment; electronic equipment with protective measures, and any high-voltage and low-voltage circuits, such as the copier in the office.
CAT II		CATII: Primary electrical circuit of the electrical equipment connected to the indoor socket via the power cord, such as mobile tools, home appliances, etc. Household appliances, portable tools (e.g. electric drill), household sockets, sockets more than 10 meters away from CAT III circuit or sockets more than 20 meters away from CAT IV circuit.
CAT III		Primary circuit of large equipment directly connected to the distribution board and circuit between the distribution board and the socket (three-phase distributor circuit includes a single commercial lighting circuit). Fixed equipment, such as multi-phase motor and multi-phase fuse box; lighting equipment and lines inside large buildings; machine tools and power distribution boards at industrial sites (workshops).
CAT IV		Three-phase public power unit and outdoor power supply line equipment. Equipment designed to "initial connection", such as power distribution system of power station, power instrument, front-end overload protection, and any outdoor transmission line.
	Certification	CE indicates a registered trademark of EU.
	Certification	UKCA indicates a registered trademark of UK.
	Certification	ETL indicates a registered trademark of Intertek. It conform to UL STD 61010-1 and 61010-2-030, CSA STD C22.2 No.61010-1 and 61010-2-030.
	Waste	Do not place equipment and its accessories in the trash. Items must be properly disposed of in accordance with local regulations.

	EFUP	This environment-friendly use period (EFUP) mark indicates that dangerous or toxic substances will not leak or cause damage within this indicated time period. The environment-friendly use period of this product is 40 years, during which it can be used safely. Upon expiration of this period, it should enter the recycling system.

Safety Requirements

Warning	
Preparation before use	Please connect this device to AC power supply with the power cable provided; The AC input voltage of the line reaches the rated value of this device. See the product manual for specific rated value. The line voltage switch of this device matches the line voltage; The line voltage of the line fuse of this device is correct; It not used for measuring the main circuit.
Check all terminal rated values	Please check all rated values and marking instructions on the product to avoid fire and impact of excessive current. Please consult the product manual for detailed rated values before connection.
Use the power cord properly	You can only use the special power cord for the instrument approved by the local and state standards. Please check whether the insulation layer of the cord is damaged or the cord is exposed, and test whether the cord is conductive. If the cord is damaged, please replace it before using the instrument.
Instrument Grounding	To avoid electric shock, the grounding conductor must be connected to the ground. This product is grounded through the grounding conductor of the power supply. Please be sure to ground this product before it is powered on.
AC power supply	Please use the AC power supply specified for this device. Please use the power cord approved by your country and confirm that the insulation layer is not damaged.
Electrostatic prevention	This device may be damaged by static electricity, so it should be tested in the anti-static area if possible. Before the power cable is connected to this device, the internal and external conductors should be grounded briefly to release static electricity. The protection grade of this device is 4 kV for contact discharge and 8 kV for air discharge.
Measurement accessories	Measurement accessories are of lower class, which are definitely not applicable to main power supply measurement, CAT II, CAT III or CAT IV circuit measurement. Probe subassemblies and accessories within the range of IEC 61010-031 and current sensor within the range of IEC 61010-2-032 can meet its requirements.
Use the input / output port of this device properly	Please use the input / output ports provided by this device in a properly manner. Do not load any input signal at the output port of this device. Do not load any signal that does not reach the rated value at the input port of this device. The probe or other connection accessories should be effectively grounded to avoid product damage or abnormal function. Please refer to the product manual for the rated value of the input / output port of this device.
Power fuse	Please use power fuse of specified specification. If the fuse needs to be replaced, it must be replaced with another one that meets the specified specifications by the maintenance personnel authorized by UNI-T.
Disassembly and cleaning	There are no components available to operators inside. Do not remove the protective cover. Maintenance must be carried out by qualified personnel.
Service environment	This device should be used indoors in a clean and dry environment with ambient temperature from 10 ℃ to +40 ℃。 Do not use this device in

	explosive, dusty or humid air.
Do not operate in humid environment	Do not use this device in a humid environment to avoid the risk of internal short circuit or electric shock.
Do not operate in flammable and explosive environment	Do not use this device in a flammable and explosive environment to avoid product damage or personal injury.
Caution	
Abnormality	If this device may be faulty, please contact the authorized maintenance personnel of UNI-T for testing. Any maintenance, adjustment or parts replacement must be done by the relevant personnel of UNI-T.
Cooling	Do not block the ventilation holes at the side and back of this device; Do not allow any external objects to enter this device via ventilation holes; Please ensure adequate ventilation, and leave a gap of at least 15 cm on both sides, front and back of this device.
Safe transportation	Please transport this device safely to prevent it from sliding, which may damage the buttons, knobs or interfaces on the instrument panel.
Proper ventilation	Poor ventilation will cause the device temperature to rise, thus causing damage to this device. Please keep proper ventilation during use, and regularly check the vents and fans.
Keep clean and dry	Please take actions to avoid dust or moisture in the air affecting the performance of this device. Please keep the product surface clean and dry.
Note	
Calibration	The recommended calibration period is one year. Calibration should only be carried out by qualified personnel.

1.3 Environmental Requirements

This instrument is suitable for the following environment:

- Indoor use
- Pollution degree 2
- In operating: altitude lower than 2000 meters；in non-operating: altitude lower than 15000 meters;
- Unless otherwise specified, operating temperature is 10 to 40 ℃; storage temperature is -20 to 60 ℃
- In operating, humidity temperature below to + 35 ℃, ≤ 90 % relative humidity;
  In non-operating, humidity temperature + 35 ℃ to + 40 ℃, ≤ 60% relative humidity

There are ventilation opening on the rear panel and side panel of the instrument. So please keep the air flowing through the vents of the instrument housing. To prevent excessive dust from blocking the vents, please clean the instrument housing regularly. The housing is not waterproof, please disconnect the power supply first and then wipe the housing with a dry cloth or a slightly moistened soft cloth.

1.4 Connecting Power Supply

The specification of input AC power.

Voltage Range	Frequency
100-240 VAC（fluctuant ± 10 %）	50/60 Hz
100-120 VAC（fluctuant ± 10%）	400 Hz

Please use the attached power lead to connect to the power port.

Connecting to service cable

This instrument is a Class I safety product. The supplied power lead has good performance in terms of case ground. This instrument is equipped with a three-prong power cable that meets international safety standards. It provides good case grounding performance for the specification of your country or region.

Please install AC power cable as follow,

- Ensure the power cable is in a good condition.
- Leave enough space for connecting the power cord.
- Plug the attached three-prong power cable into a well-grounded power socket.

1.5 Electrostatic Protection

Electrostatic discharge may cause damage to component. Components can be damaged invisibly by electrostatic discharge during transportation, storage and use.

The following measure can reduce the damage of electrostatic discharge.

- Testing in anti-static area as far as possible
- Before connecting the power cable to the instrument, inner and outer conductors of the instrument should be
- briefly grounded to discharge static electricity;
- Ensure all the instruments are properly grounded to prevent the accumulation of static.

1.6 Preparation Work

1. Connecting the power supply wire, plug the power socket into the protective grounding socket; According to your view to adjust the alignment jig.
2. Toggle on the power switch on the back panel to operate the instrument. Press the switch  on the front panel, the instrument is boot-up.

1.7 Remote Control

UTG9000T series function/arbitrary waveform generator supports communication with the computer via USB interface. User can use SCPI via USB interface and combined with programming language or NI-VISA to remote control the instrument and operating other programmable instrument which is also supports SCPI.

The detailed information about the installation, remote control mode and the programming, please refer to UTG9000T Series Programming Manual at the official website http:// www.uni-trend.com

1.8 Help Information

UTG9000Tseries function/arbitrary waveform generator has built-in help system for each function key and menu control key.

Symbol for the help menu, tap this symbol  to open the help menu.

Chapter 2 Qick Guide

2.1. General Inspection

Please inspect the instrument as the following steps.

2.1.1. Inspect the Damage of Transportation

If the packing boxes or foamed plastic protection pad is serious damaged, please contact with distributor or the local office.
Due to the damage of transportation, please keep the packaging and notice the revenant transportation department and the distributor, they will replace or maintain the product.

2.1.2. Inspect the Accessories

UTG9000T accessories: power line (apply for the local country/region), one USB, four BNC cable (1 meter)
If the accessories are lost or damaged, please contact with the distributor or the local office.

2.1.3. Inspect the Instrument

If the instrument appearance is damaged. It can not operate properly or performance test failure. Please contact with the distributor or the local office.

2.2. Introduction of Panels and Keys

2.2.1. Front Panel

UTG9000T series function/arbitrary waveform generator front panel is sample, visual and easy to use. See Figure 2-1

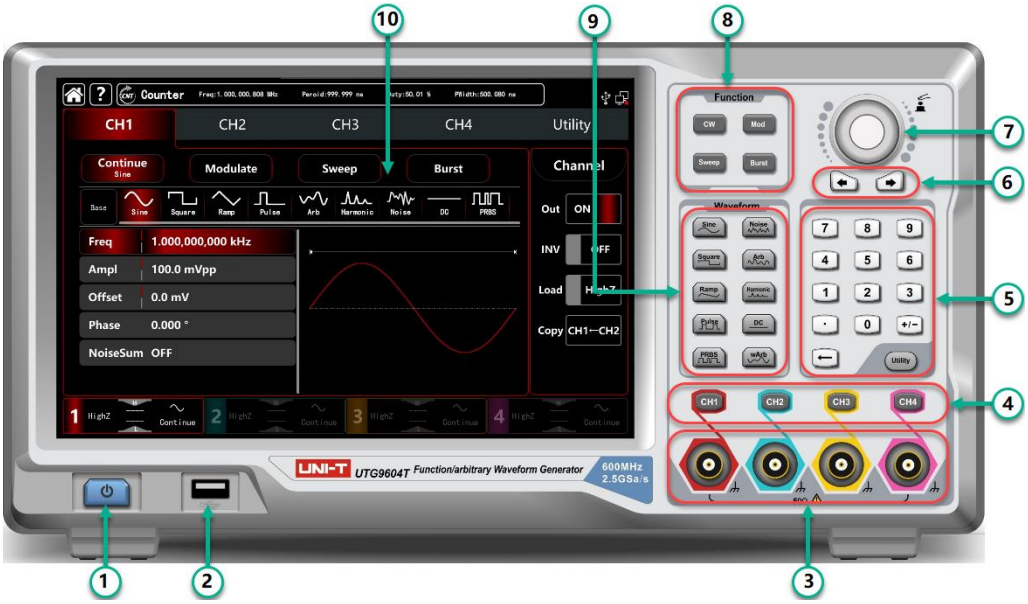


Figure 2-1 Front Panel Structure

① ON/OFF
Supply voltage of power source is 100 - 240 VAC (fluctuant ± 10 %), 50/60 Hz; 100 - 120 VAC (fluctuant ± 10 %). Connect the instrument to the power source with power line in accessories or other lines up to standard. Toggle on the power switch on the back panel to operate the instrument. Turn ON/OFF: backlight is on (red) when power supply in normal. Press the key, the backlight is on (green). Afterwards,

the screen enters function interface after displaying start-up interface. In order to prevent accidentally touching ON/OFF to turn off the instrument, this switch key needs to press about 1s to turn off the instrument. The backlight of the key and screen are simultaneously off after turning off the instrument.

② USB Interface

The instrument supports U disks of FAT32 with maximum capacity of 32 G. USB interface can be used to save and read the current status file. USB interface can also used to upgraded the system program, to ensure that the current program of function/ arbitrary generator is the latest version released by the company.

③ Channel Output

Terminal Output the signal of the wave.

④ Channel Control Terminal

Channel control terminal, which is channel output switch. There are three ways to operating:

1) Quick switch the current channel (CH bar is highlight, which means it is the current channel, parameter tab shows CH1 information for the wave parameter settings.) The CH1 can turn on/off the output function of the current channel quickly.
2) Tap UTILITY → Channel, turn on the output function.
3) Touch the channel setting on the left side of the screen.

Starting output function, the backlight of the CH1 will be light on, the channel tab displays output mode of the current channel (shows "continue", "modulate" words, etc.), and the channel output terminal export the signal at the same time. Turn off the output function, the backlight of the CH1 will be also light off, the channel tab becomes grey and the channel output terminal closed.

⑤ Numeric Key and Utility

The numeric key is used to enter numbers 0 to 9, decimal point ".", symbol key "+/-" and delete key. Utility key is used to set multipurpose settings.

⑥ Direction Key

The direction key is used to switch number digits or move cursor position (left or right) when using multifunction knob or direction key to set parameter.

⑦ Multifunction Knob/Key

The multifunction knob is used to change numbers (clockwise to increase number) or used as a menu key to select or confirm the parameter settings.

⑧ Select Output Mode

CW, MOD, SWEEP, BURST tab to control the output of continues, modulate, sweep, burst

⑨ Quick Select Wave Types

Quickly select the output wave types to produce the common wave that you need.

⑩ Display Screen

10.1 inch TFT. Different colors to distinguish the status of output, select menu and other important information of CH1, CH2, CH3 and CH4. A friendly-use system is helpful to promote work efficiency.

⑪ Over-voltage Protection

Caution The output terminal has over-voltage protection function, the following situation will activate the function,

amplitude **> 4 Vpp**, input voltage **> ± 12.5 V**, frequency **< 10 kHz**

amplitude **< 4 Vpp**, input voltage **> ± 5.0 V**, frequency **< 10 kHz**

Display screen will pop-out "Over-voltage protection, the output is closed."

2.2.2. Back Panel

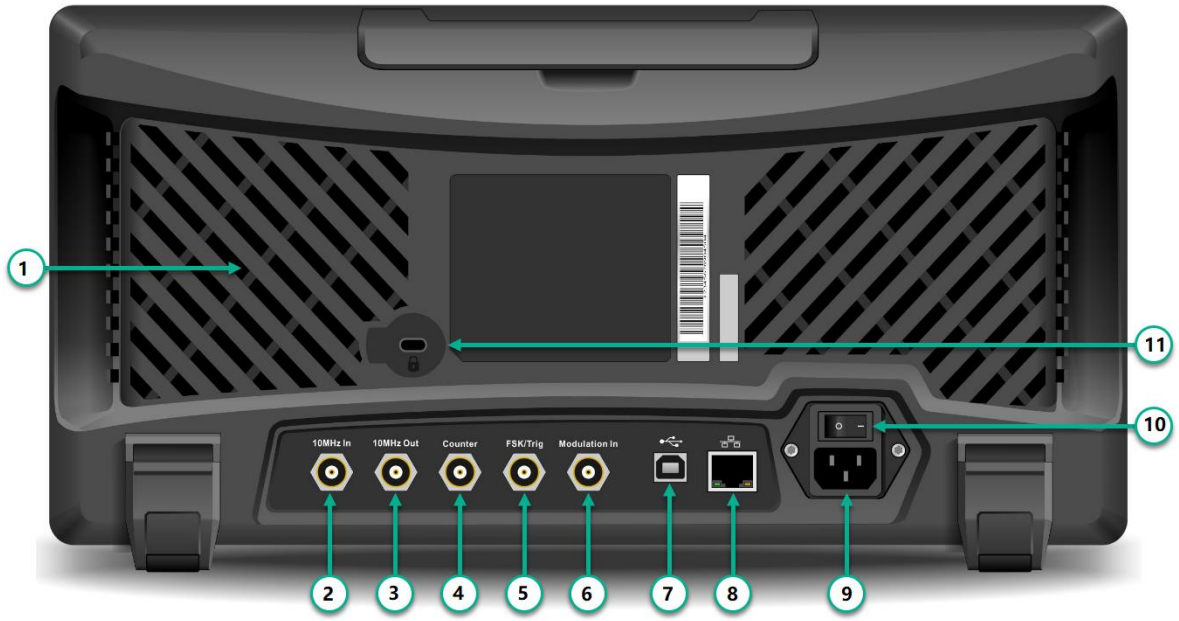


Figure 2-2 Back Front Structure

① Heat Emission Hole
To make sure that the instrument in good heat emission status, don't block off these holes.

② External 10 MHz input terminal
Establish synchronization of multiple function/arbitrary waveform generators or synchronization with external 10 MHz clock signal. When clock source of the instrument is external, external 10 MHz input terminal receives an external 10 MHz clock signal.

③ Internal 10 MHz output terminal
Establish synchronous or external clock signal with reference frequency of 10 MHz for multiple function/arbitrary waveform generators. When clock source of the instrument is internal, internal 10MHz output terminal outputs an internal 10 MHz clock signal.

④ Frequency Counter Interface
Input signal through the interface when using frequency counter.

⑤ External Digital Modulation Interface
In case of modulation of ASK, FSK, PSK or OSK signal, if modulation source is external, input modulation signal through external digital modulation interface (TTL level). The corresponding output amplitude, frequency and phase are determined by signal level of external digital modulation interface. If trigger source of frequency sweep is external, receive a TTL pulse with designated polarity through external digital modulation interface. This pulse can start scanning. If burst mode is gated. Trigger source of N period and wireless trigger source are external, input gated signal through the external modulation interface. This pulse string can output a designated cycle number of pulse string.

⑥ External Analog Modulation Output Terminal
In case of AM, FM, PM, DSB-AM, SUM or PWM signal, if modulation is external, input signal through external analog modulation. The corresponding modulation of depth, frequency deviation, phase deviation or duty ratio deviation is controlled by ±5V signal level of the external analog modulation input terminal.

⑦ USB Interface
Connect with the upper computer software through USB interface to achieve the control of the instrument by computer.

⑧ LAN Port
The instrument can connect with LAN by LAN port, to achieve remote control.

⑨ AC Power Input Terminal: 100-240 VAC (fluctuant ±10%), 50/60Hz; 100-120 VAC (fluctuant ± 10 %).

⑩ Main Power Switch：Power on in "I" position; Power off in "O" position (The front panel ON/OFF button is unable to use.)

⑪ Case Locker

Open the case locker to activate the function of anti-theft.

2.2.3. Touch Screen Display Interface

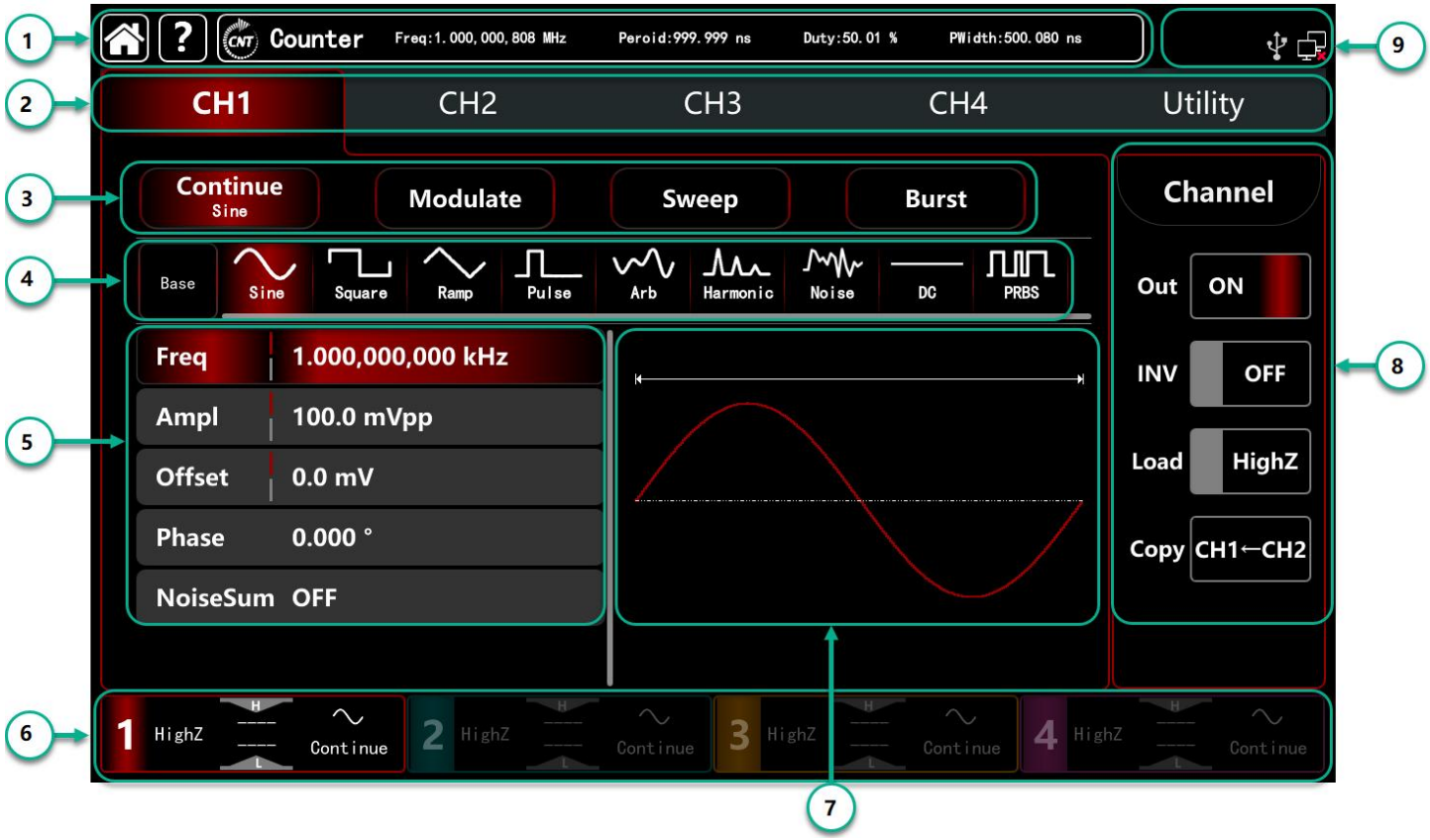


Figure 2-3 Touch Screen Display Interface

UTG9000T is designed with capacitive touch screen, display window multi-panel layout. Menu category position is fixed, reduce the level of interface jumps.

Description:

① Home key, Help key, Frequency counter: this area does not change with other interface jumps.

1)  : Home symbol, tap this symbol to return to the home page in any other interface.

2)  : Help symbol, tap this symbol to open the help menu.

3)  : Frequency symbol, tap this symbol to open frequency counter, it presents the test result .

② Menu tab: tap CH1, CH2, CH3, CH4 and Utility to make parameter and secondary function settings. Highlight display: Select tab will be highlight with CH color or cyan of the secondary function, words with white color.

③ Output Mode: continue, modulate, sweep, burst

④ Carrier wave Settings： Nine carrier wave - sine wave, square wave, ramp wave, pulse wave, harmonic wave, noise, PRBS (pseudo random binary sequence), DC, arbitrary wave.

⑤ Parameter List: Display the parameter of the current wave in list format, tap parameter list area to enable editing, virtual numeric keyboard pop-out ,see Figure 2-4

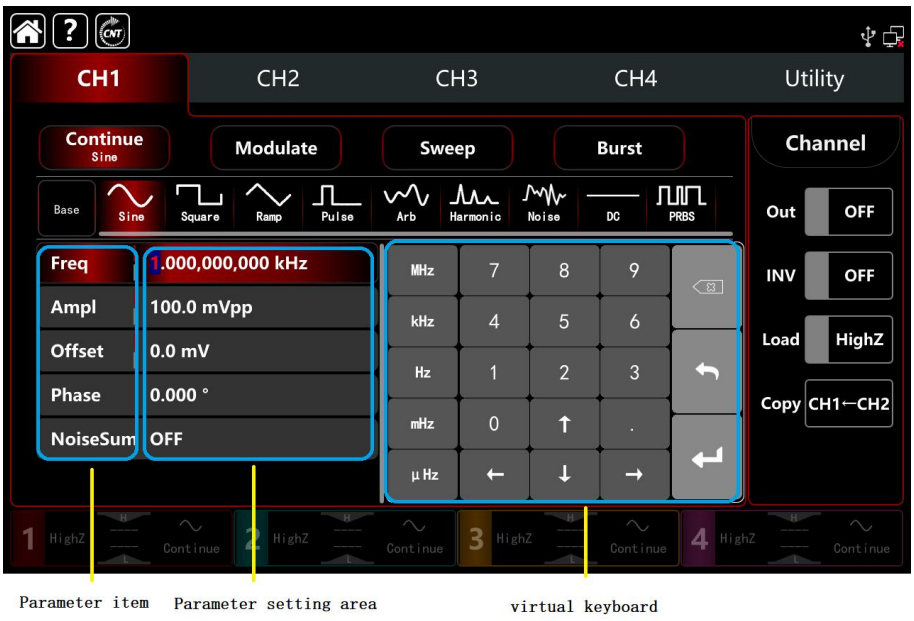


Figure 2-4 Parameter Editing

⑥ CH tab: the current channel which chosen will be highlight.
1) "High Z" presents load with high resistance, it can set to be 50 Ω.
2) presents the output wave is sine wave.
3) 3 "Continue" presents the output wave is continue wave, which is output carrier wave only.(Other different mode may presents "carrier wave", "AM", "linear" or "N period")

⑦ Wave Display Area: display the current waveform (it can distinguish by color or highlight of the CH tab, parameter list display the current waveform parameters on the left side.)
Note: There is no waveform display area in Utility page.

⑧ CH Status Settings: quick switch the general settings of the current channel. Tap channel tab to switch output on/off to enable the channel output; inverse on/off to enable output the inverse waveform; load on/off to enable HighZ or 50 Ω to match the resistance of the output terminal; CH1←CH2 can copy the CH2 settings to CH1

⑨ System Settings: display USB connecting status, LAN symbol, external clock, etc.

2.3. Output the Carrier wave

UTG9000T series function/arbitrary waveform generator can output the carrier wave by single channel or four channel, including sine wave, square wave, ramp wave, pulse wave, harmonic wave, noise, PRBS (pseudo random binary sequence), DC, arbitrary wave. The instrument output a sine wave frequency 1 kHz, amplitude 100 mVpp (default setting) when activating.

This section is to introduce how to set the output of the carrier wave, the contents as following:

- Frequency output settings
- Amplitude output settings
- DC offset voltage settings
- Square wave settings
- Pulse wave settings
- DC voltage settings
- Ramp wave settings
- Noise wave settings
- Harmonic wave settings
- PRBS settings
- Noise superposition settings

2.3.1. Frequency Output Settings

The instrument output of a sine wave is frequency 1 kHz, amplitude 100 mVpp (default setting) when activating the instrument.

The step to set the frequency to 2.5 MHz:

1) Tap the parameter list area of Frequency tab, pop-out the virtual numeric keyboard to enter 2.5 MHz (or rotate the knob and direction key to make the settings.)
2) Tap word Frequency to step through Frequency/Period

   Note: multifunction knob/direction key is also can used to make parameter settings.

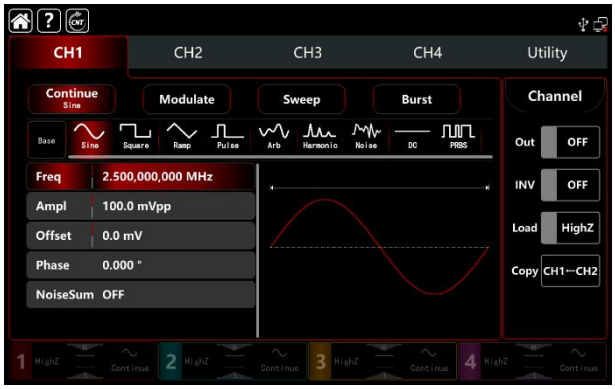


Figure 2-4 Frequency Settings

2.3.2. Output Amplitude Settings

The instrument output of a sine wave amplitude is 100mV peak value (default setting) when activating the instrument.

The step to set the amplitude to 300 mVpp:

1) Tap Amplitude tab, pop-out the virtual numeric keyboard to enter 300 mVpp
2) Tap word Amplitude to step through unit of Vpp, Vrms, dBm

   Note: dBm setting only enable when Load is no HighZ mode

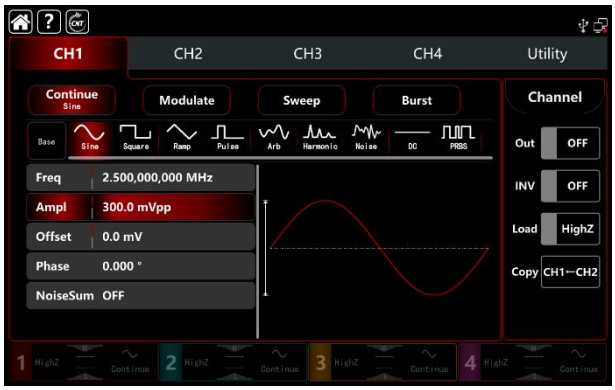


Figure 2-5 Amplitude Settings

2.3.3. DC Offset Voltage Settings

The instrument output DC offset voltage of a sine wave amplitude is 0V (default setting) when activating the instrument.

The step to set the DC offset voltage to -150 mV:

1) Tap Continue tab to select Sine
2) Tap Offset tab, pop-out the virtual numeric keyboard to enter -150 mV
3) Tap word Offset, Amplitude and Offset tab becomes High (maximum)/Low (minimum) level. This method is convenient to set the signal limits of digital applications

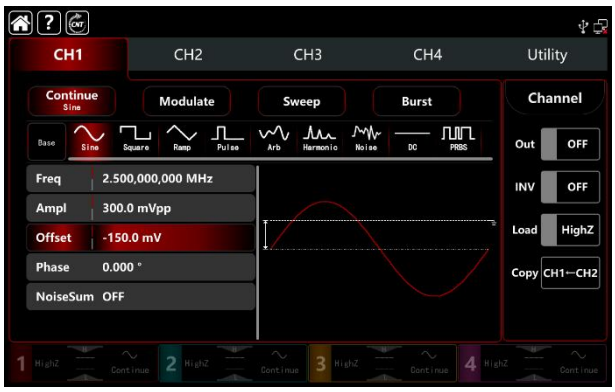


Figure 2-6 DC Offset Voltage Settings

2.3.4. Square Wave Settings

The duty ratio of square wave presents the time quantum of the square wave at a high level of each cycling (assuming that the waveform is not inverse.) The duty ratio default value is 50 % of the square wave.

The step to set frequency to 1 kHz, amplitude 1.5 Vpp, DC offset voltage 0V, duty ratio 70 %:

1) Tap Continue tab to select Square wave mode, tap Amplitude tab to pop-out virtual numeric keyboard to enter 1.5 Vpp.
2) Tap Duty tab, pop-out virtual numeric keyboard to enter 70 %.
3) Tap word Duty again to step through Duty/PWidth.

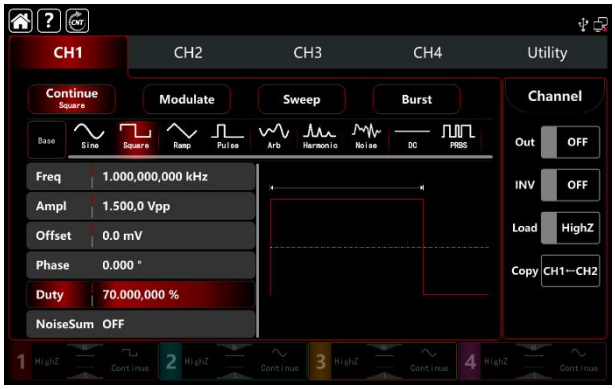


Figure 2-7 Square Settings

2.3.5. Pulse Wave Settings

The duty ratio of pulse wave presents the time quantum between with threshold value of rising edge 50 % decrease to the next falling edge 50 % (assuming that the waveform is not inverse.)

Users can make parameter settings to this instrument, then it can output the adjustable pulse wave with pulse width and edge time. The duty cycle default value is 50 % of the pulse wave, rising/falling edge time 1us.

The step to set period 2 ms, amplitude 1.5 Vpp, DC offset voltage 0 V, duty ratio 25 %(limited by the lower pulse wave width 2.4 ns), rising/falling edge time 200 us:

1) Tap Continue tab to select Pulse wave mode, pop-out numeric keyboard to enter 1.5 Vpp.
2) Tap Duty tab, pop-out the virtual numeric keyboard to enter 25 %.
3) Tap REdge tab, pop-out the virtual numeric keyboard to enter 200 us, the same way to set the FEdge.

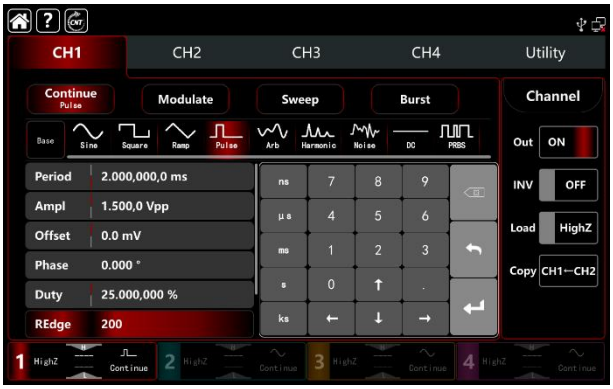


Figure 2-8 Pulse Wave Settings

2.3.6. DC Voltage Settings

The default value is 0 V of the DC voltage.

The step to set DC offset voltage to 3 V:

1) Tap Continue tab to select DC wave mode.
2) Tap Offset tab, pop-out the virtual numeric keyboard to enter 3 V.

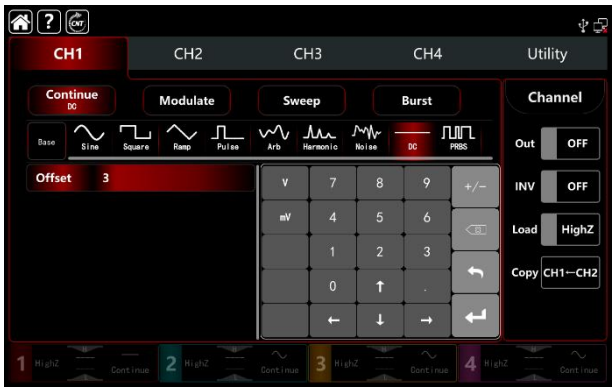


Figure 2-9 DC Settings

2.3.7. Ramp Wave Settings

The symmetry presents the ramp slope is the positive of time quantum in each cycling (assuming that the waveform is not inverse.) The default value of the symmetry of ramp wave is 50 %.

The step to set frequency 10 kHz, amplitude 2 Vpp, DC offset 0V, symmetry 60 %:

1）Tap Continue tab to select Ramp, pop-out the virtual numeric keyboard to enter 10 kHz.

2）Tap Amplitude tab, pop-out the virtual numeric keyboard to enter 2 Vpp.

3）Tap Symmetry tab, pop-out numeric keyboard to enter 60 %.

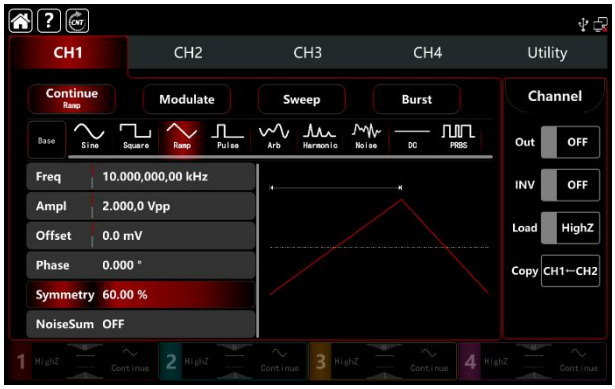


Figure 2-10 Ramp Wave Settings

2.3.8. Noise Wave Settings

The default value of amplitude is 100 mVpp, DC offset is 0mV (standard gaussian noise). If other wave's amplitude and DC offset function has changed, the default value of noise wave will also be change. So it can only set the amplitude and DC offset in noise wave mode.

The step to set frequency 100 MHz, amplitude 300 mVpp:

1) Tap Continue tab to select Noise wave mode.
2) Tap Frequency tab, pop-out the virtual numeric keyboard to enter 100 MHz.
3) Tap Amplitude tab, pop-out the virtual numeric keyboard to enter 300 mVpp.

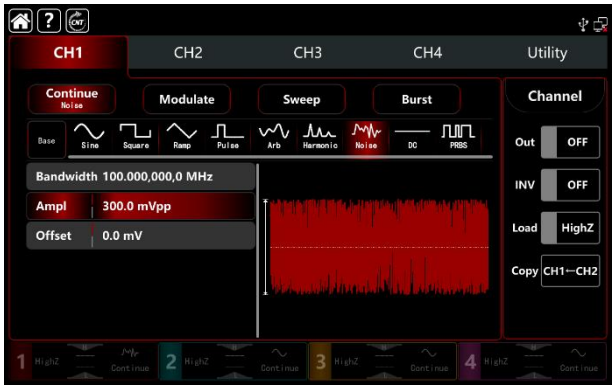


Figure 2-11 Noise Wave Settings

2.3.9. Harmonic Wave Settings

UTG9000T function/arbitrary waveform generator can output the designated count, amplitude and phase. According to the Fourier Transform theory, the time domain waveform of period function is the superposition of a series sine wave, it presents:

$$f(t) = A_1 \sin(2\pi f_1 t + \varphi_1) + A_2 \sin(2\pi f_2 t + \varphi_2) + A_3 \sin(2\pi f_3 t + \varphi_3) + \cdots\cdots$$

Usually, the component with frequency f_1 is called the carrier wave, f_1 serve as the carrier frequency, A_1 serve as the carrier wave amplitude, Φ_1 serve as the carrier wave phase. And beyond that, the frequency of other component are integer multiples of the carrier frequency are called harmonic wave. Harmonic whose rated frequency is an odd multiple of the carrier wave frequency is called odd harmonic; harmonic whose rated frequency is an even multiple of the carrier frequency are called even harmonic.

The default frequency is 1 kHz, amplitude 100 mVpp, DC offset 0mv, phase 0°, harmonic wave type as odd harmonic, the total number of harmonic wave 2 times, the amplitude of harmonic wave 100m, the phase of harmonic wave 0°. The step to set frequency 1 MHz, amplitude 5 Vpp, DC offset 0 mV, phase 0°, harmonic wave types as All, harmonic wave 2 times, the amplitude of harmonic 4 Vpp, the phase of harmonic 0°:

1) Tap Continue tab to select Harmonic.
2) Tap Frequency tab, pop-out the virtual numeric keyboard to enter 1 MHz.
3) Tap Amplitude tab, pop-out the virtual numeric keyboard to enter 5 Vpp.
4) Tap Total number tab, pop-out the virtual numeric keyboard to enter 2.
5) Tap Type tab to select All.
6) Tap Amplitude of harmonic wave tab, pop-out the virtual numeric keyboard to enter 4 Vpp.

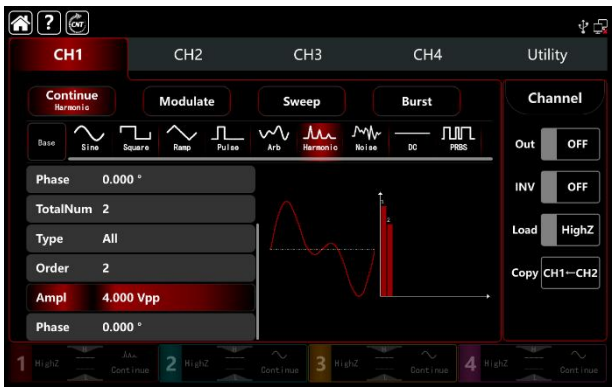


Figure 2-12 Ramp Wave Settings

2.3.10. PRBS Wave Settings

The step to set the PRBS wave to bit rate 50 kbps, amplitude 4 Vpp, code element PN7, and edge time 20 ns:

1) Tap Continue tab to select PRBS.
2) Tap Bitrate tab, pop-out the virtual numeric keyboard to enter 50 kbps.
3) Tap Amplitude tab, pop-out the virtual numeric keyboard to enter 4 Vpp.
4) Tap PN code tab, pop-out the virtual numeric keyboard to enter PN7.
   The default edge time is 20 ns.

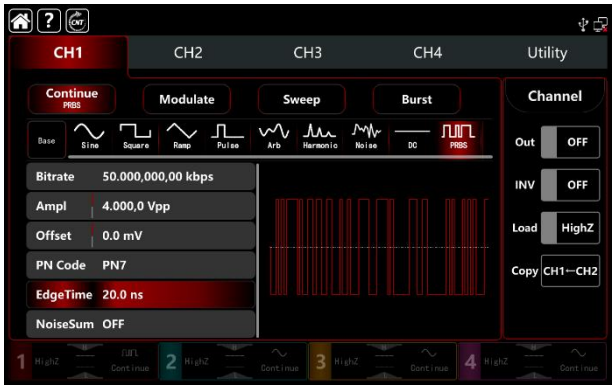


Figure 2-13 PRBS Wave Settings

2.3.11. Noise Superposition Settings

UTG9000T function/arbitrary waveform generator can add noise. The SNR is adjustable. The step to set the sine wave of frequency 10 kHz, amplitude 2 Vpp, DC offset 0 V, signal noise ratio 0 dB:

1) Tap Continue tab to select Sine.
2) Tap Frequency tab, pop-out the virtual numeric keyboard to enter 10 kHz.
3) Tap Amplitude tab, pop-out the virtual numeric keyboard to enter 2 Vpp.
4) Tap Noise to turn on.

Note: 1、Different frequency and amplitude will effect the range of SNR. The default noise superposition is 10 dB.
2、When the noise superposition is turned on, the amplitude coupling function is not available.

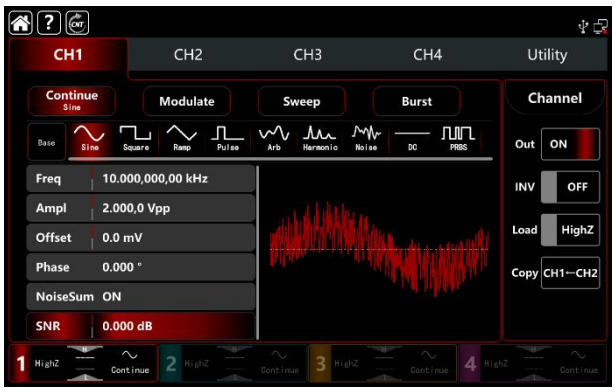


Figure 2-14 Noise Superposition Settings

Chapter 3 Troubleshooting

Possible faults in use of UTG9000T and troubleshooting methods are listed below.Please handle fault as the corresponding steps. If it can not be handled, contact with the dealer or local office and provide the model information (tap Utility → System).

3.1. No Display on Screen （Blank Screen）

If the waveform generator still does not display after push the power switch on the front panel.

1) Inspect whether power source is connected well.
2) Inspect whether power switch on the back panel is connected well and on "I "position.
3) Inspect whether power button is connected well.
4) Restart the instrument,
5) If the instrument still can't work, please contact with the dealer or local office for product maintenance service.

3.2. No Waveform Output

In correct setting but the instrument has no waveform output display.

1) Inspect whether BNC cable and the output terminal is connected well.
2) Inspect button whether CH1、CH2、CH3 or CH4 is turned on.
3) Keep the current settings into USB, and then push Factory Setting to restart the instrument.
4) If the instrument still can't work, please contact with the dealer or local office for product maintenance service.

3.3. Fail to Recognize USB

1) Inspect whether USB works normally.
2) Make sure that USB is Flash type, the instrument does not apply to hard USB.
3) Restart the instrument and insert USB again to see if it can work normally.
4) If USB still fail to recognize, please contact with the dealer or local office for product maintenance service.

Chapter 4 Service and Support

4.1. Upgrade Product Program

User can get the program update pack from UNI-T marketing department or official website. The waveform generator upgrade by built-in program upgrade system, to make sure that the current function/arbitrary waveform generator program is the latest release version.

1. Have a UTG9000T function /arbitrary waveform generator of UNI-T. Tap Utility → System to get the information of model, hardware and software version.

2. Upgrade the instrument according to steps of the update file.

4.2. Contact US

You can directly contact with Uni-Trend Technology (China) Limited (UNI-T， Inc.) in mainland China if you have any inconvenience in use of the product:

Beijing time 8:00 -17:30, Monday-Friday or e-mail us.

Our e-mail address: **infosh@uni-trend.com.cn**

Please contact with local dealer or sales center of UNI-T for products outside the mainland China.

Service support, many products of UNI-T are equipped with plans for extending warranty period and calibration period. Please contact with local dealer or sales center of UNI-T.

Please visit our website to get list of addresses of service centers in various regions.

Website： http://www.uni-trend.com