

# SDG800 Series

# Function/Arbitrary Waveform Generator

## Service Manual

E01A

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

### Product Certification

**SIGLENT** guarantees this product conforms to the national and industrial standards in china as well as the ISO9001: 2008 standard and the ISO14001: 2004 standard. Other international standard conformance certification is in progress.

## **General Safety Summary**

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

### **Only qualified technician should perform service procedures**

#### **Use Proper Power Line**

Use only the special power line of the instrument that approved by local state.

#### **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 connect 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 sign instruction of the instrument. Before connecting the instrument, please read the manual carefully to gain more information about the ratings.

#### **Not Operate with Suspected Failures**

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

#### **Avoid Circuit or Components Exposed**

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

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



**Hazardous  
Voltage**



**Protective  
Earth Ground**



**Warning**



**Earth Ground**



**Power  
Switch**

## Overview for the Document

The document is for SDG800 series arbitrary waveform generator, which will be mostly written as generator for short in the following text. The main contents described in this manual are:

### **SDG800 Series Generator at a glance**

This part introduces the main technology characteristics for SDG800 generator.

### **The Front Panel at a glance**

This part introduces briefly all the buttons and the knob on the front panel.

### **The Rear Panel at a glance**

This part introduces all the ports for easy communication on the rear panel.

### **Specification**

Chapter 1 lists the generator's specifications.

### **Quick Start**

Chapter 2 prepares the generator for use and helps you get familiar with a few of its front-panel features.

### **Calibration**

Chapter 3 provides calibration, verification and adjustment procedures for the generator.

### **Assembly Procedures**

Chapter 4 provides disassembly procedures for you to get an understanding of the structure of the generator, thus to install or replace some needed modules, or troubleshoot faults you encounter while operating it.

### **Troubleshooting**

Chapter 5 provides troubleshooting procedures for the internal main board and power supply board, as well as the quick guide for general troubles. Before any operation, you should read the ESD Precautions to avoid personal injuries or damages to the generator

### **Maintenance**

Chapter 6 provides information on maintenance, daily care and unpacking inspection of the instrument. The contact information is attached in the end in case of some unsolvable troubles you encounter.

## Convention for the whole Contents

All the description for function and performance in this document are according to SDG830 series generator, and apply to generator of the other types. The SDG800 series contains the following types:

Type	Analog Bandwidth
SDG805	5 MHz
SDG810	10 MHz
SDG830	30 MHz

## SDG800 Series at a Glance

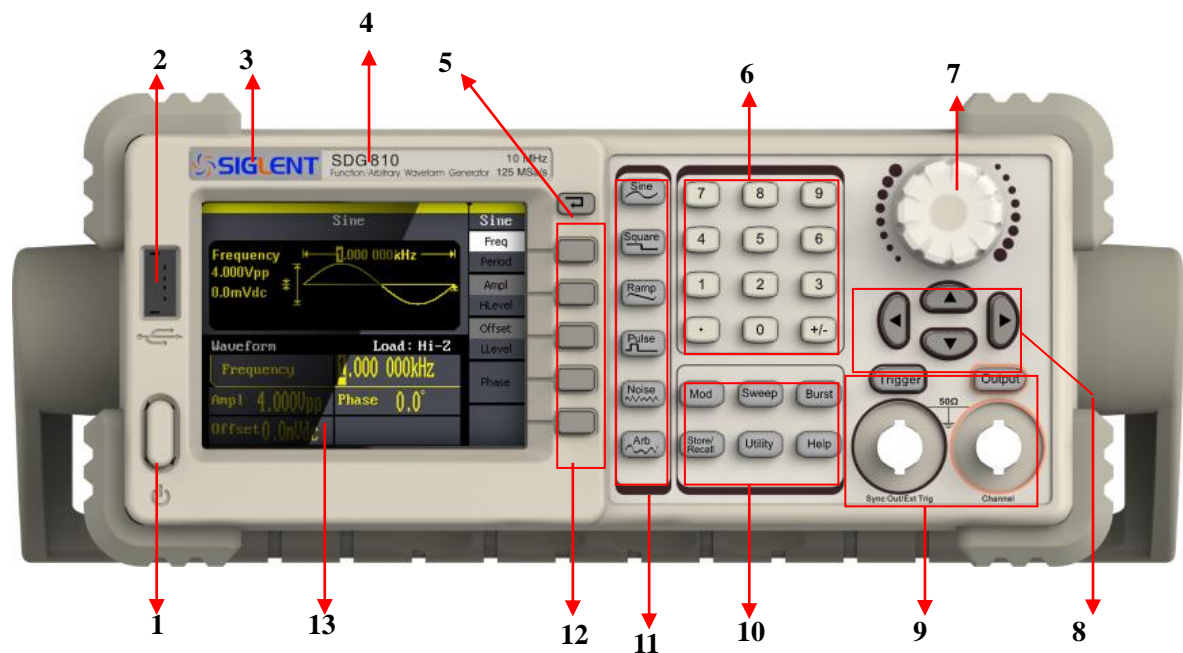
The SDG800 series is a direct digital synthesized waveform generator with built-in arbitrary waveform and pulse capabilities. Its combination of excellent system features, easiness in usage and versatile functions makes this generator a perfect solution for your testing now and in the future.

### Characteristics

- DDS technology provides precise, stable and low distortional output signal.
- Innovative Easy Pulse technology, capable of generating lower jitter Square or Pulse waveforms, brings a wide range and extremely high precision in pulse width and rise/fall times adjustment.
- 3.5" TFT color LCD display.
- 125MSa/s sampling rate, 14-bit resolution.
- Frequency characteristics:
  - Sine: 1 $\mu$ Hz to 30 MHz
  - Square: 1 $\mu$ Hz to 10 MHz
  - Ramp: 1 $\mu$ Hz to 300 kHz
  - Pulse: 500 $\mu$ Hz to 5MHz
  - White Noise: >30MHz bandwidth (-3dB)
  - Arbitrary: 1 $\mu$ Hz to 5MHz
- 5 standard waveforms: Sine, Square, Ramp, Pulse, Noise
- Self-defined arbitrary waveform
- Multiple modulation function, various modulated waveform: AM, DSB-AM, FM, PM, ASK, FSK, Sweep and Burst.
- Dedicated interface for trigger in/out and synchronous signal output.
- Support USB storage device. Software updating could also be performed using USB devices.
- Up to 16k sample points of internal waveform depth, which can rebuild or simulate any complex waveform.
- Remote control is realized using the USB cable.
- Multiple interfaces: USB host & device.
- Support the seamless connection with SIGLENT Series Digital Oscilloscopes; Be able to directly read and rebuild the stored waveform in the oscilloscopes.
- 2 languages (English and Chinese) user interface and built-in help system.

**Note:** All the specifications described in this manual are according to SDG830.

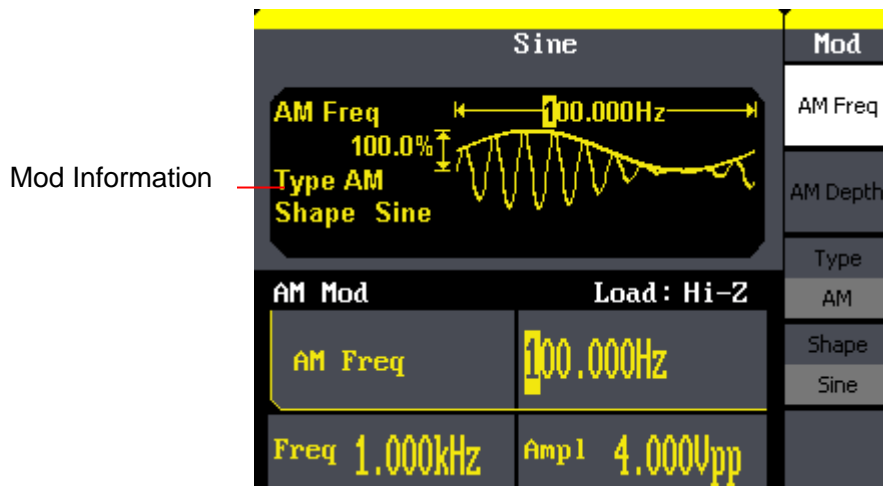
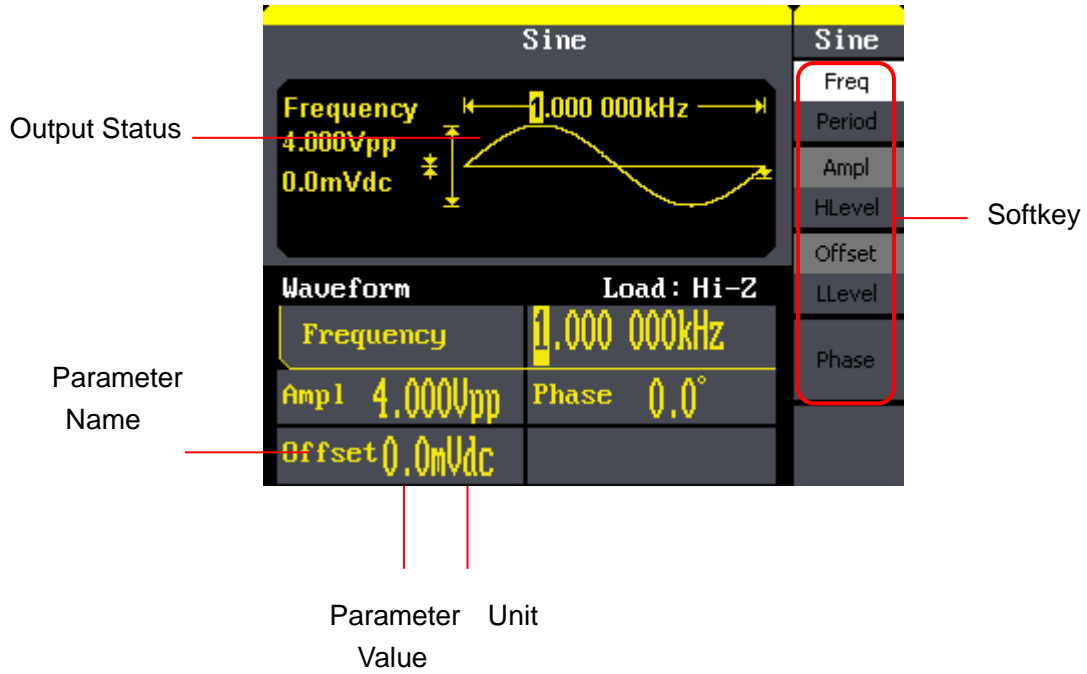
## The Front Panel at a Glance



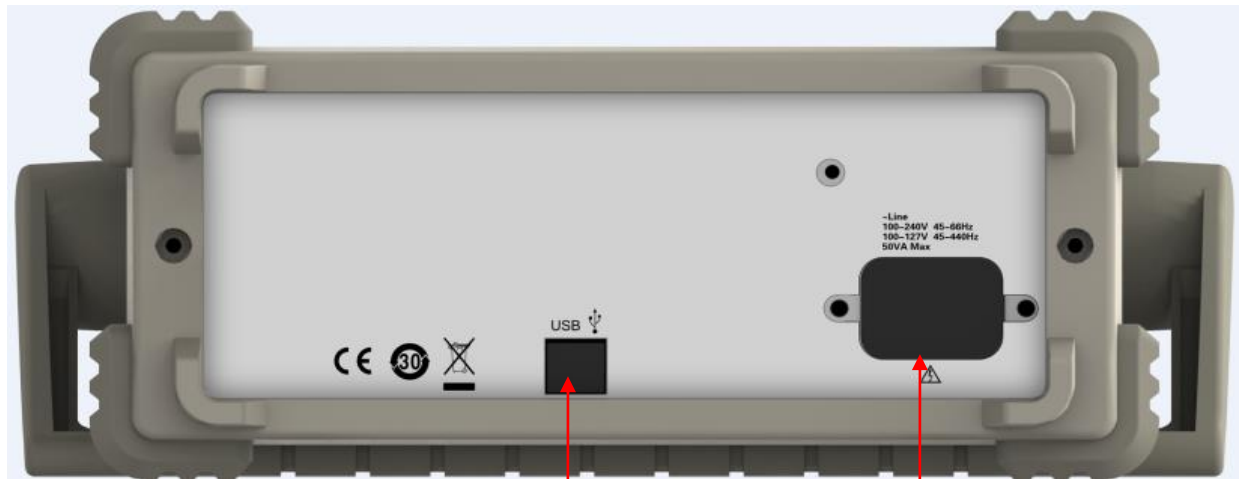
No.	Description	No.	Description
1	ON/OFF Switch	8	Direction Keys
2	USB Host	9	Output Control and Trigger Keys
3	LOGO	10	Function Keys
4	Model	11	Waveform Selection Keys
5	Return Key	12	Menu Operation Keys
6	Digital Keypad	13	LCD Display
7	Universal Knob		



# The Front Panel Display at a Glance



## The Rear Panel at a Glance



**USB Device**

**Power Socket**

## Contents

<b>Guaranty and Declaration</b> .....	II
<b>General Safety Summary</b> .....	III
<b>Safety Terms and Symbols</b> .....	IV
Overview for the Document .....	V
SDG800 Series at a Glance .....	VII
The Front Panel at a Glance.....	VIII
The Rear Panel at a Glance .....	X
Specification .....	1
<b>Specifications</b> .....	1
<b>General Specification</b> .....	5
Quick Start.....	6
<b>Prepare the Generator for Use</b> .....	7
<b>Adjust the carrying handle</b> .....	8
<b>Set the Output Frequency</b> .....	9
<b>Set the Output Amplitude</b> .....	10
<b>Set the DC offset</b> .....	11
<b>Set the Duty Cycle of a Square Wave</b> .....	12
<b>Set the Symmetry of a Ramp Wave</b> .....	13
<b>Generate a Pulse Waveform</b> .....	14
<b>Configure a Noise Waveform</b> .....	15
Set the DC Voltage.....	16
Output a Built-In Arbitrary Waveform.....	17
Use the Built-In Help System.....	19
Performance verification.....	20
<b>Recommended Test Equipment</b> .....	20
<b>Performance Verification Test</b> .....	21
<b>DC Output Verification</b> .....	22
<b>Frequency Response Verification</b> .....	23
<b>AC Amplitude Verification</b> .....	24
Assembly Procedures.....	25
<b>Security Consideration</b> .....	25
<b>List of Modules</b> .....	26
<b>Required Tools</b> .....	26
<b>Disassembly Procedures</b> .....	26
<b>A view of the whole Instrument</b> .....	27
<b>Removing the Handle</b> .....	28
<b>Removing the Metal Shell and Rear Cabinet</b> .....	29
<b>Removing the Front Cabinet</b> .....	31
<b>Removing the Display Module</b> .....	33
<b>Removing the Main Body</b> .....	35

---

Troubleshooting.....	37
<b>ESD Precautions</b> .....	37
<b>Required Equipments</b> .....	37
<b>Main Board Drawing</b> .....	38
<b>Check the Power Supply</b> .....	39
<b>Check the Main Board</b> .....	40
<b>Quick Guide for General Failures</b> .....	42
Maintenance.....	43
<b>Maintain Summary</b> .....	43
<b>Repackaging for Shipment</b> .....	44
<b>Contact SIGLENT</b> .....	45

# Specification

These specifications apply to SDG800 series Arbitrary Waveform Generator. To verify that an generator meets specifications, it must first meet the following conditions:

- The generator must have been operating continuously for fifteen minutes within the specified operating temperature.
- The generator must be within the factory calibration interval of one year.

## Specifications

Model	SDG805	SDG810	SDG830
Max.output frequency	5MHz	10MHz	30MHz
Output channels	1		
Sample rate	125 MSa/s		
Arbitrary waveform length	16 kpts		
Frequency resolution	1 $\mu$ Hz		
vertical resolution	14 bits		
Waveform	Sine, Square, Ramp, Pulse, Gaussian Noise, 46 types of built-in arbitrary waveform		
Sine	1 $\mu$ Hz ~ 5MHz	1 $\mu$ Hz ~ 10MHz	1 $\mu$ Hz ~30MHz
Square	1 $\mu$ Hz ~ 5MHz	1 $\mu$ Hz ~ 10MHz	1 $\mu$ Hz ~10MHz
Pulse	500 $\mu$ Hz~5MHz		
Ramp/Triangular	1 $\mu$ Hz ~ 300KHz		
Gaussian white noise	5MHz (-3dB)	10MHz (-3dB)	30MHz (-3dB)
Arbitrary waveform	1 $\mu$ Hz ~ 5MHz		
Modulation	AM, DSB-AM, FM, PM, FSK, ASK, PWM, Sweep, Burst		
Standard interface	USB Host & Device		
Dimension	W x H x D=229mm x 105mm x 281mm		

<b>Frequency Specification</b>			
Model	SDG805	SDG810	SDG830
Waveform	Sine, Square, Ramp, Pulse, Noise, Arbitrary		
Sine	1 $\mu$ Hz ~ 5MHz	1 $\mu$ Hz ~ 10MHz	1 $\mu$ Hz ~ 30MHz
Square	1 $\mu$ Hz ~ 5MHz	1 $\mu$ Hz ~ 10MHz	1 $\mu$ Hz ~ 10MHz
Pulse	500 $\mu$ Hz ~ 5MHz		
Ramp/Triangular	1 $\mu$ Hz ~ 300kHz		
Gaussian white noise	>5MHz (-3dB)	>10MHz (-3dB)	>30MHz (-3dB)
Arbitrary	1 $\mu$ Hz ~ 5MHz		
Resolution	1 $\mu$ Hz		
Accuracy	Within 90days $\pm$ 50ppm within 1 year $\pm$ 100ppm		
Temperature coefficient	<5ppm/ $^{\circ}$ C		

### Sine Wave

Harmonic Distortion	DC~1MHz	<-60dBc
	1MHz~10MHz	<-55dBc
	10MHz~30MHz	<-50dBc
Total harmonic waveform distortion	DC~20kHz, 1Vpp<0.2%	
Spurious signal(non-harmonic)	DC~1MHz	<-70dBc
	1MHz~10MHz	<-60dBc
	10MHz~30MHz	<-55dBc
Phase noise	10kHz Offset, -125dBc/Hz(typical value)	

### Square Wave

Rise/fall time	<24ns(10% ~ 90%)
Overshoot	<5%(typical, 1kHz, 1Vpp)
Duty Cycle	20%~80%
Asymmetric(50% Duty Cycle)	1% of period+20ns(typical, 1kHz, 1Vpp)
Jitter	500ps + 0.001% of period

### Ramp/Triangle Wave

Linearity	<0.1% of Vpp(typical, 1kHz, 1Vpp, 100% symmetric)
Symmetry	0%~100%

### Pulse Wave

Pulse width	16ns, Min. 1ns resolution
Rise/Fall time (10% ~ 90%, typical)	20ns~1.6ks
Duty Cycle	0.1% Resolution
Overshoot	<5%
Jitter(pk-pk)	500ps + 0.001% of period

<b>Arbitrary Wave</b>	
Waveform length	16k points
Vertical resolution	14bits
Sample rate	125MSa/s
Min. Rise/Fall time	8ns(typical)
Jitter(pk-pk)	8ns(typical)
Storage in non-volatile RAM memory (10 in total)	10 waveforms

<b>Output Specification</b>	
Amplitude	2mVpp~10Vpp(50Ω, ≤10MHz)
	2mVpp~5Vpp(50Ω, >10MHz)
	4mVpp ~ 20Vpp (High impedance, <10MHz)
	4mVpp ~ 10Vpp (High impedance, >10MHz)
Vertical accuracy (100 kHz sine)	±(1mVpp +0.3dB of setting value)
Amplitude flatness (compared to 100 kHz sine,5Vpp)	±0.3 dB
Impedance	50Ω
Protection	short-circuit protection

<b>DC Offset</b>	
Range(DC)	±5V(50Ω)
	±10V(High-Z)
Offset accuracy	±( setting offset value *1%+3mV)

<b>AM Modulation</b>	
Carrier	Sine, Square, Ramp, Arbitrary(except DC)
Modulation waveform	Sine, Square, Ramp, Noise, Arbitrary (2mHz ~ 20kHz)
Modulation depth	0% ~ 120%

<b>DSB-AM Modulation</b>	
Carrier	Sine, Square, Ramp, Arbitrary(except DC)
Modulation waveform	Sine, Square, Ramp, Noise, Arbitrary (2mHz ~ 20kHz)
Modulation depth	0% ~ 120%

<b>FM Modulation</b>	
Carrier	Sine, Square, Ramp, Arbitrary(except DC)
Modulation waveform	Sine, Square, Ramp, Noise, Arbitrary(2mHz~20kHz)
Frequency deviation	0 ~0.5*bandwidth 1mHz resolution

<b>PM Modulation</b>	
----------------------	--

Carrier	Sine, Square, Ramp, Arbitrary(except DC)
Modulation waveform	Sine, Square, Ramp, Noise, Arbitrary (2mHz~20kHz)
Phase Deviation	0~360° ,0.1°Resolution
<b>FSK Modulation</b>	
Carrier	Sine, Square, Ramp, Arbitrary(except DC)
Modulation waveform	50% duty-cycle square waveform(2mHz~50kHz)
<b>ASK Modulation</b>	
Carrier	Sine, Square, Ramp, Arbitrary(except DC)
Modulation waveform	50%duty-cycle square waveform(2mHz~50kHz)
<b>PWM Modulation</b>	
Frequency	500μHz~20kHz
Modulation waveform	Sine, Square, Ramp, Arbitrary(except DC)
<b>Sweep</b>	
Carrier	Sine, Square, Ramp, Arbitrary(except DC)
Type	linear/logarithmic
Direct	Up/down
Sweep time	1ms~500s
Trigger source	Manual, external, internal
<b>Burst</b>	
Waveform	Sine, Square, Ramp, Pulse, Arbitrary(except DC)
Type	Count(1~50,000 periods), infinite, Gated
Start/Stop phrase	0°~360°
Internal period	1μs~500s
Gated source	External trigger
Trigger source	Manual, External or Internal

<b>Trigger Input</b>	
Input Level	TTL compatible
Slope	Up or down
Pulse width	>100ns
Input impedance	>5kΩ,DC coupling

<b>SYNC Output</b>	
Voltage level	TTL compatible
Pulse width	>50ns
Output impedance	50Ω(typical)
Max. frequency	2MHz



## General Specification

### Display

Display type	3.5 inch TFT-LCD
Resolution	320×RGB×240
Color depth	24bit
Contrast Ratio	350:1 (typical)
Luminance	300cd/m <sup>2</sup> (typical)

### Power

Voltage	100~240 VAC <sub>RMS</sub> , 50/60Hz
	100~120 VAC <sub>RMS</sub> , 440Hz
Consumption	<30W
Fuse	1.25A, 250V

### Environment

Temperature	Operation:0°C~40°C
	Storage:-20°C~60°C
Humidity range	Below +35°C:≤90% relative humidity
	+35°C~+40°C:≤60% relative humidity
Altitude	Operation: below 3,000 meters
	Storage: below 15,000 meters
Electromagnetic Compatibility	2004/108/EC Directive
	Applicable standards EN 61326-1:2006
	EN 61000-3-2:2006 + A2:2009 EN 61000-3-3:2008
Safety	2006/95/EC Low Voltage Directive
	EN 61010-1:2010

### Others

Dimension	Width:229mm
	Height:105mm
	Depth:281mm
Weight	N.W: 2.6Kg
	G.W: 3.4Kg

### IP protection

IP2X

### Calibration Cycle

1 year

## Quick Start

One of the first things you will want to do with your generator is to become acquainted with the front panel. We have written the exercises in this chapter to prepare the instrument for use and help you get familiar with some of its front-panel operations. This chapter is divided into the following sections:

- To Prepare the Generator for Use
- To Adjust the Carrying Handle
- To Set the Output Frequency
- To Set the Output Amplitude
- To Set a DC Offset Voltage
- To Set the Duty Cycle of a Square Wave
- To Set the Symmetry of a Ramp Wave
- To Configure a Pulse Waveform
- To Configure a Noise Waveform
- To Select “DC Volts”
- To Output a Built-In Arbitrary Waveform
- To Use the Built-In Help System

## Prepare the Generator for Use

### 1. Check the list of accessories

Accessories supplied with the instrument are listed below. If anything is missing or damaged, please contact your nearest **SIGLENT** Sales Office.

- A Quick Start
- A Certification
- A Guaranty Card
- A CD(EasyWave software, DataSheet and Manual)
- A power cord that fits the standard of destination country
- A USB cable

### 2. Connect the power cord and turn on the generator

The instrument runs a short power-on self test, which takes a few seconds.

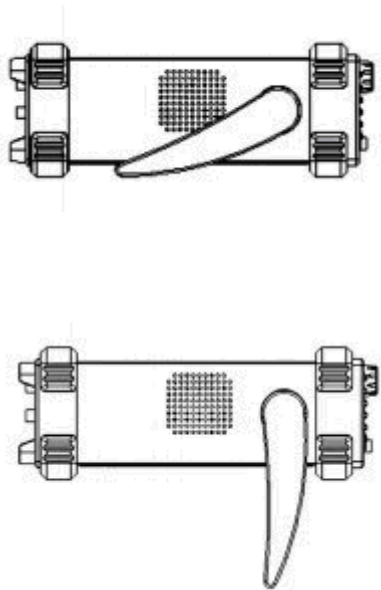
The generator powers up in the *sine wave* function at 1 kHz with an amplitude of 4V<sub>peak-to-peak</sub>. At power-on, the Output connector is disabled. To enable the Output connector, press the **Output** key.

If the generator does not turn on, verify that the power cord is firmly connected to the power socket on the rear panel (the power-line voltage is automatically sensed at power-on). You should also make sure that the generator is connected to a power source that is energized.

Then, verify that the generator is turned on.

## Adjust the carrying handle

To adjust the position, grasp the handle by the sides and pull outward. Then, rotate the handle to the desired position.



Pull the handle down



Pull the handle ahead for easy carrying

## Set the Output Frequency

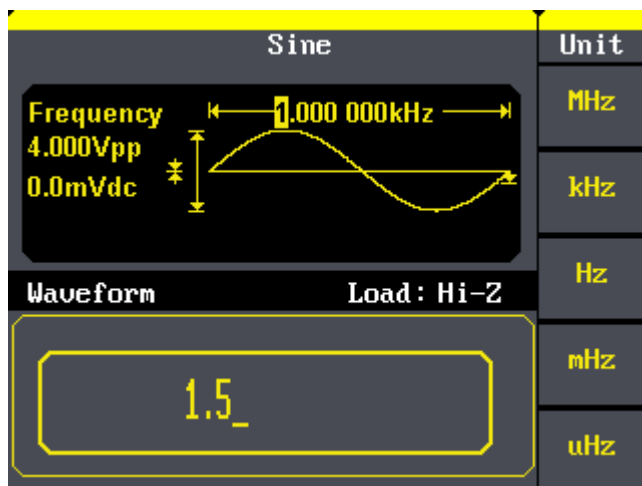
The following steps show you how to change the frequency to 1.5 MHz.

### 1. Press the **Freq/Period** softkey

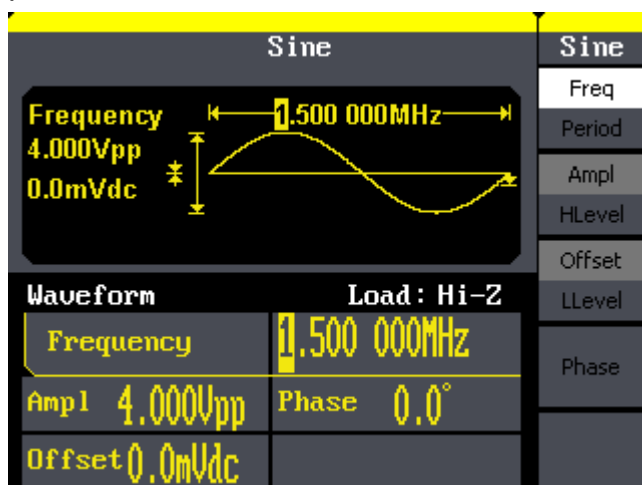
The displayed frequency is either the power-on value or the frequency previously selected. When you change the function, the same frequency is used if the current value is valid for the new waveform. If you want to set the period for the waveform, press the softkey again, to switch the period parameter (The current operation is displayed in inverse color).

### 2. Input the desired frequency

Use the digital keypad to input the value directly, enter the value “1.5”.



Then press the corresponding softkey to select the desired unit. For example, press **MHz**.



**Note:** You can also enter the desired value using the knob and direction keys.

## Set the Output Amplitude

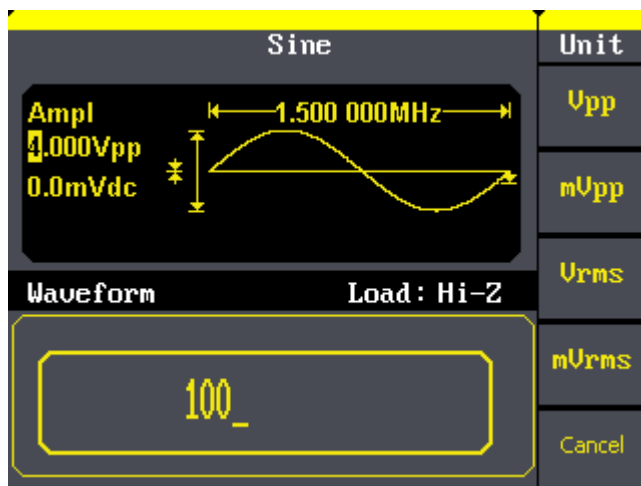
The following steps show you how to change the amplitude to 100mVrms.

### 1. Press the **Ampl/HLevel** softkey

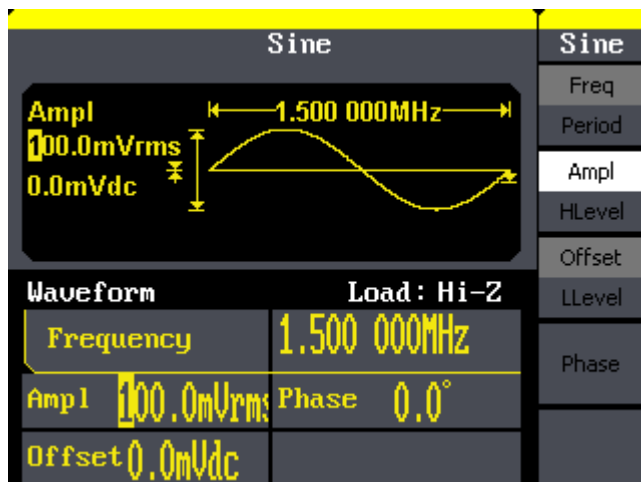
The displayed amplitude is either the power-on value or the amplitude previously selected. When you change the function, the same amplitude is used if the current value is valid for the new waveform. If you want to set the HLevel for the waveform, press the softkey again, to switch the HLevel parameter(The current operation is displayed in inverse color)

### 2. Input the desired amplitude

Use the digital keypad to input the value directly, enter the value “100”.



Then press the corresponding softkey to select the desired unit. For example, press **mVrms**.



**Note:** You can also enter the desired value using the knob and direction keys.

## Set the DC offset

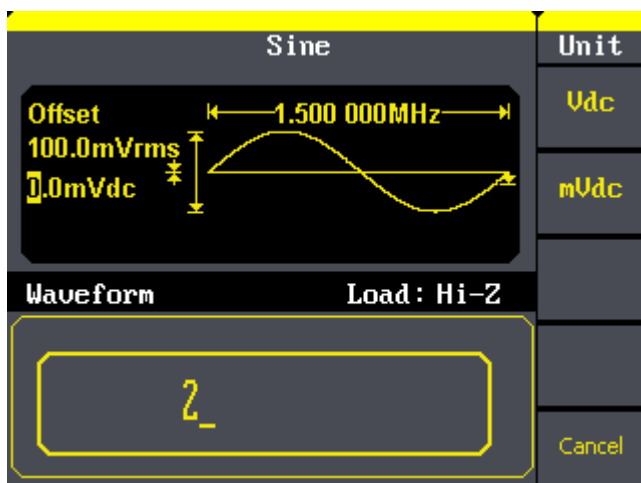
The following steps show you how to change offset to -2mVdc.

### 1. Press the **Offset/LLevel** softkey

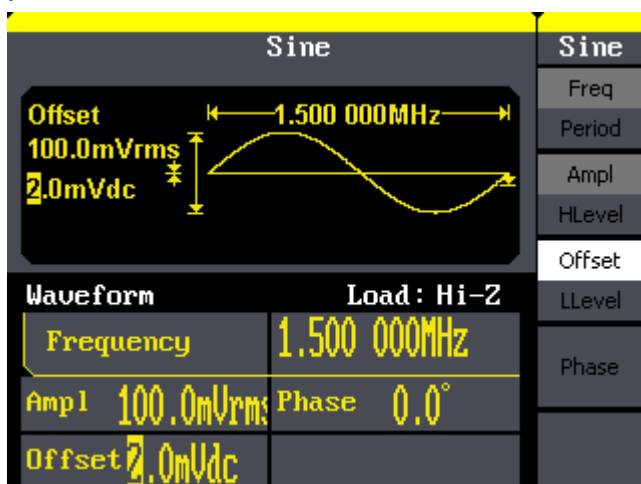
The displayed offset is either the power-on value or the offset previously selected. When you change the function, the same offset is used if the current value is valid for the new waveform. If you want to set the LLevel for the waveform, press the softkey again, to switch the LLevel parameter (The current operation is displayed in inverse color)

### 2. Input the desired offset

Use the digital keypad to input the value directly, enter the value “-2”.



Then press the corresponding softkey to select the desired unit. For example, press **mVdc**.



**Note:** You can also enter the desired value using the knob and direction keys.

## Set the Duty Cycle of a Square Wave

At power-on, the duty cycle for square wave is 50%. You can adjust the duty cycle from 20% to 80% for output frequencies up to 10 MHz. The following steps show you how to change the duty cycle to 30%.

### 1. Select the square wave function

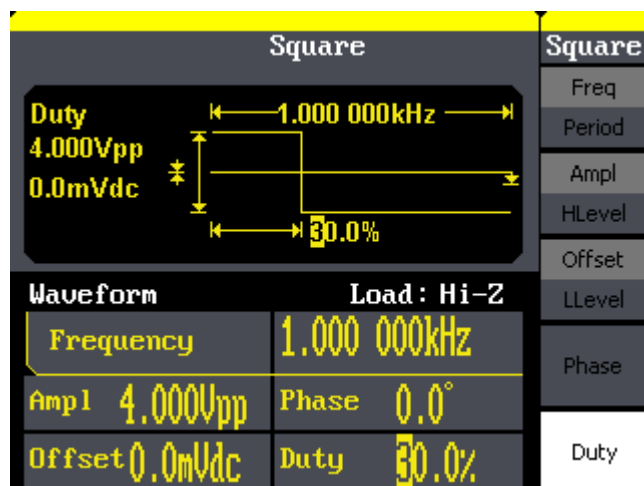
Press **Square** button and then select the desired output frequency to any value up to 10 MHz.

### 2. Press the **Duty** softkey

The displayed duty is either the power-on value or the percentage previously selected. The duty cycle represents the amount of time per cycle that the square wave is at a high level (note the icon on the up side of the display).

### 3. Input the desired duty

Use digital keypad to input the value directly, enter the value “30”, then press the corresponding softkey to select the desired unit “%”.





## Set the Symmetry of a Ramp Wave

At power-on, the Symmetry for Ramp wave is 50%. You can adjust the symmetry from 0% to 100%. The following steps show you how to change the symmetry to 60%.

### 1. Select the Ramp wave function

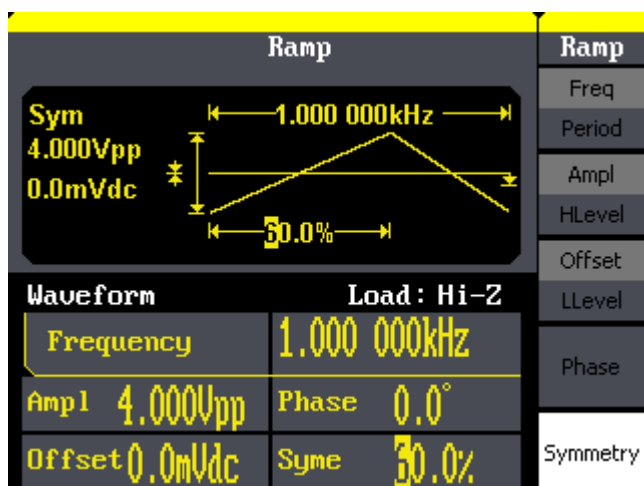
Press Ramp button and then select the desired output frequency to any value.

### 2. Press the Symmetry softkey

The displayed symmetry is either the power-on value or the percentage previously selected. The duty cycle represents the amount of time per cycle that the Ramp wave is at a Rise time( note the icon on the up side of the display).

### 3. Input the desired symmetry

Use digital keypad to input the value directly, enter the value “60”, then press the corresponding softkey to select the desired unit “%”.



## Generate a Pulse Waveform

You can set the generator to output a pulse waveform with variable width and delay time. The following steps show you how to generate a 500  $\mu\text{s}$  pulse waveform with a pulse width of 100  $\mu\text{s}$  and rise time of 10  $\mu\text{s}$ .

### 1. Select the pulse function

Press the **Pulse** button to select the pulse function and output a pulse waveform with the default parameters.

### 2. Set the Pulse period

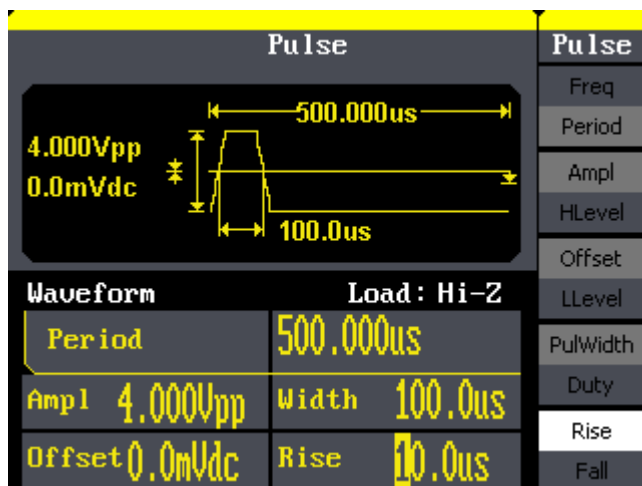
Press the Period softkey and then set the pulse period to 500  $\mu\text{s}$ .

### 3. Set the Pulse Width

Press the **PuWidth/Duty** softkey and then set the pulse width to 100  $\mu\text{s}$ . The pulse width represents the time from the 50% threshold of the rising edge to the 50% threshold of the next falling edge.

### 4. Set the Pulse Rise time

Press the **Rise/Fall** softkey and then set the pulse rise time to 10  $\mu\text{s}$ .



## Configure a Noise Waveform

You can set the generator to output a noise waveform with variance and mean. The following steps show you how to generate a noise waveform with 200mV variance and 10mV mean.

### 1. Select the Noise function

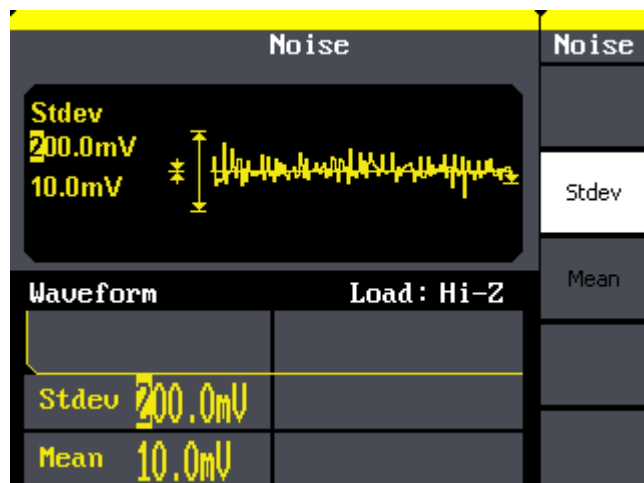
Press the **Noise** button to select the noise function and output a noise waveform with the default parameters.

### 2. Set the variance

Press the **Variance** softkey and then set the variance to 200mV.

### 3. Set the mean

Press the Mean softkey and then set the mean to 10mV.



## Set the DC Voltage

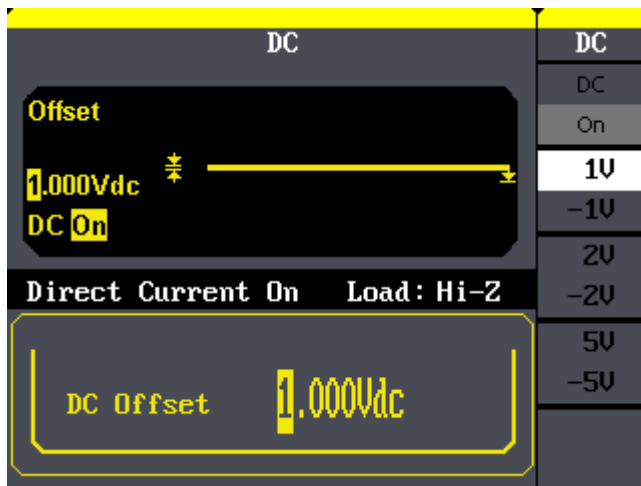
You can set the DC Voltage feature from the Utility Menu, and then set a dc voltage as an “Offset” value. The following steps show you how to set a dc voltage with +1Vdc.

### 1. Select the Utility function

Press the **Utility** button to select the Utility function.

### 2. Set the DC Voltage

Press the **DC ON** softkey and then enter the DC value 1Vdc.



You can enter any dc voltage from -10Vdc to +10Vdc.

## Output a Built-In Arbitrary Waveform

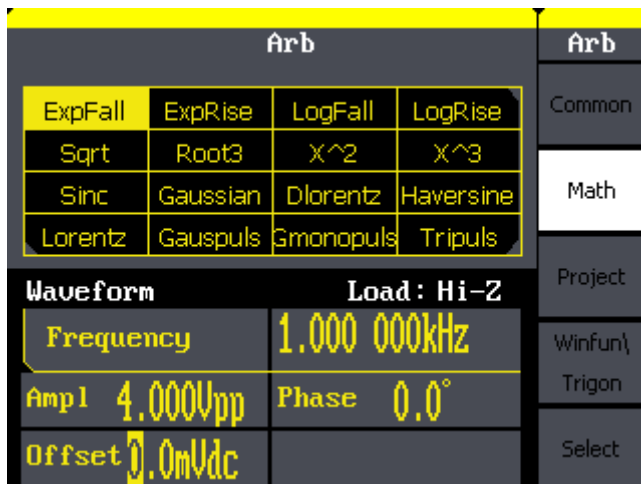
There are 48 built-in arbitrary waveforms stored in non-volatile memory. The following steps show you how to output the built-in “exponential fall” waveform from the front panel.

### 1. Select the arbitrary waveform function

Press the **Arb** button to select the arbitrary waveform function. Then press the **1/2 ↓** softkey, and press the **Load Wform** softkey.

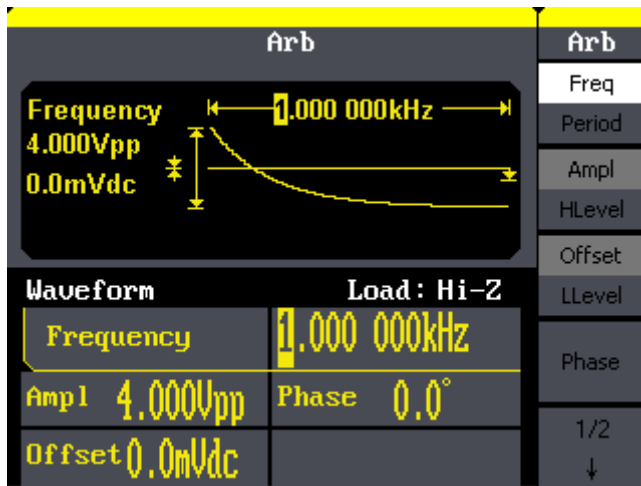
### 2. Select the built-in waveform

Press the **Built-In** softkey and press the **math** softkey to enter the arbitrary waveform interface. You will see the mathematic waveform as below.



### 3. Output the exponential fall waveform

Use the knob to select the ExpFall waveform and press the **Select** softkey. The waveform is output using the present settings for frequency, amplitude and offset unless you change them.

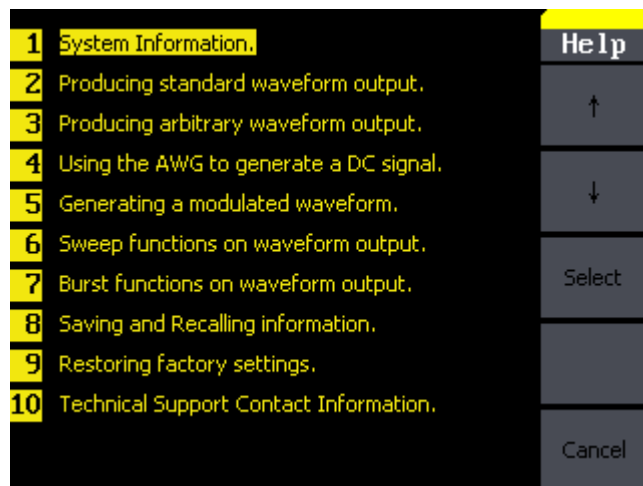


## Use the Built-In Help System

The built-in help system is designed to provide context-sensitive assistance of some functions. A list of help topics is also available to assist you with several operations.

### 1. View the help information for SDG800

Press **Help** button, you will see the list of help topics. Use the knob and directional keys to select the help title. Then press the **Select** softkey to view the help information.



2. Press **Help** button or any function button to exit help system.

# Performance verification

## Recommended Test Equipment

The test equipment recommended for the performance verification and adjustment procedures is listed below. If the exact instrument is not available, substitute calibration standards of equivalent accuracy.

Instrument	Requirements	Recommended Model
Digital Multimeter(DMM)	dc volts accuracy: 100ppm resolution: 100 $\mu$ V	SIGLENT SDM3055
Power Meter	Frequency: 10KHz to 30MHz	Keysight U2004



## Performance Verification Test

The performance verification tests are recommended as acceptance tests when you first receive the instrument. The acceptance test results should be compared against the specifications given in chapter 1. After acceptance, you should repeat the performance verification tests at every calibration interval.

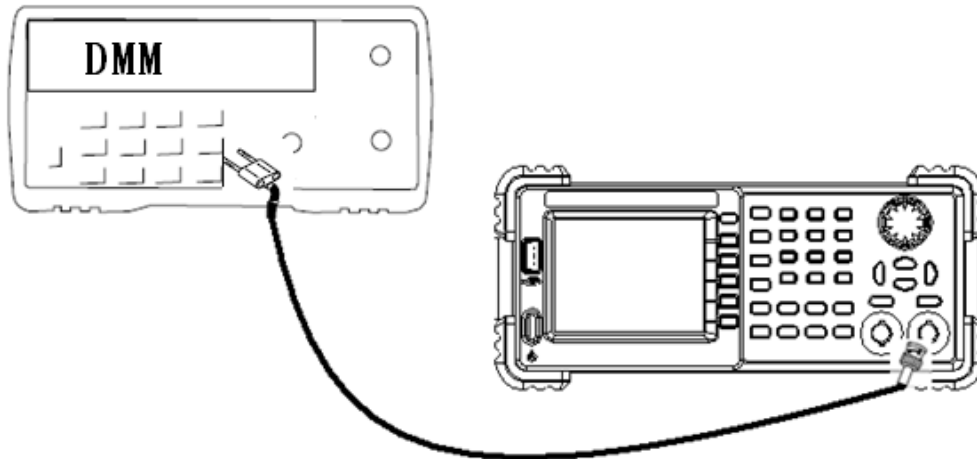
If the instrument fails performance verification, adjustment or repair is required.

Adjustment is recommended at every calibration interval. If adjustment is not made, you must guard band, using no more than 80% of the specifications listed in chapter 1, as the verification limits.

## DC Output Verification

This test checks if the DC offset listed in the table below are within the spec range using a DMM.

1. Set the DMM to measure DC voltage. Connect the DMM to the output of the generator as shown below.



2. Turn on output and select DC system under the Utility menu.
3. Set the instrument to each output value described in the table below and measure the output voltage with the DMM. Be sure the generator output impedance is set to High-Z and the output is enabled.

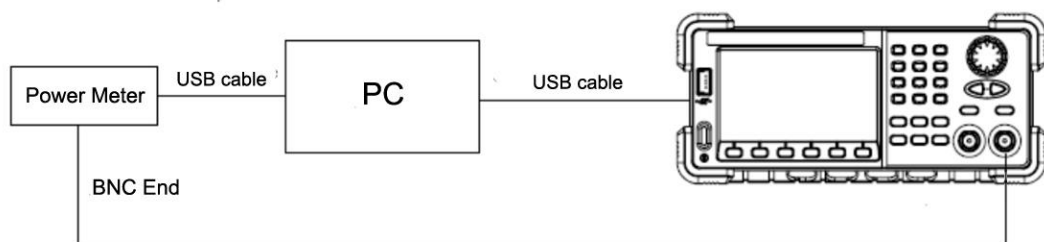
DC Offset	Spec Range $\pm (1\%+3\text{mv})$
0mv	-3mv ~ 3mv
10mv	6.9mv ~ 13.1mv
100mv	96mv ~ 104mv
1v	0.987v ~ 1.013v
3v	2.967v ~ 3.033v
10v	9.897v ~ 10.103v
-10mv	-13.1mv ~ 6.9mv
-100mv	-104mv ~ 96mv
-1v	-1.013v ~ 0.987v
-3v	-3.033v ~ 2.967v
-10v	-10.103v ~ 9.897 v

4. Compare the measured voltage to the spec range shown in the table above.

## Frequency Response Verification

This test checks if the value in dB format translated from output amplitude is within the spec range response to different frequency using a Power Meter.

1. Turn on the generator and set the load to 50Ω in OUTPUT SETUP system under the Utility menu.
2. Connect the Power Meter, PC and generator as shown below.



3. Select Sine waveform of the generator and set the amplitude to 1V and 2.5V, frequency to the values listed below in sequence.

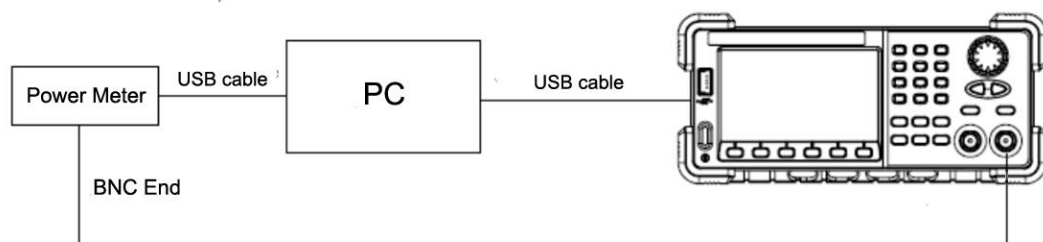
Output Voltage	1V	2.5V
Frequency	the Spec Range (dBm)	the Spec Range (dBm)
10KHz	3.8794 ~ 4.0794	11.84 ~12.04
100KHz	3.8294 ~ 4.1294	11.79 ~12.09
1MHz	3.8294 ~ 4.1294	11.79 ~12.09
5MHz	3.6794 ~ 4.2794	11.64 ~12.24
10MHz	3.6794 ~ 4.2794	11.64 ~12.24
15MHz	3.6794 ~ 4.2794	11.64 ~12.24
20MHz	3.6794 ~ 4.2794	11.64 ~12.24
25MHz	3.6794 ~ 4.2794	11.64 ~12.24
50MHz	3.6794 ~ 4.2794	11.64 ~12.24

4. Compare the value measured from Power Meter to the spec range shown in the table above.

## AC Amplitude Verification

This test checks the ac amplitude output accuracy at the frequency of 100 kHz using a Power Meter.

1. Turn on the generator and set the load to 50Ω in OUTPUT SETUP system under the Utility menu.
2. Connect the Power Meter, PC and generator as shown below.



3. Select Sine waveform of the generator and set the amplitude to the values listed below in sequence.

Amplitude	the Spec Range (dBm)
40mv	-24.50 ~ -23.46
200mv	-10.34 ~ -9.65
500mv	-2.35 ~ -1.72
2v	9.69 ~ 10.3
5v	17.65 ~ 18.26

4. Compare the value measured from Power Meter to the spec range shown in the table above.

# Assembly Procedures

This chapter describes how to remove the major modules from the SDG800 series Generator. To install the removed modules or replace new modules, please follow corresponding operating steps in reverse order.

The following contents are what mainly included in this chapter:

- **Security Consideration** which describes security information needed to considerate while operating
- **List of Module** in which the modules to remove are listed
- **Required Tools** which describes the tools needed to perform the procedures
- **Disassembly Procedures** which describes in detail how to remove and install the modules

## Security Consideration

Only qualified personnel should perform the disassembly procedures. Whenever possible, disconnect the power before you begin to remove or replace the modules. Otherwise, any personal injuries or damages to the components may occur.

**Avoid Electric Shock** Hazardous voltages exist on the LCD module and power supply module. To avoid electrical shock, you should firstly disconnect the power cord from the oscilloscope, and then wait at least three minutes for the capacitors in the oscilloscope to discharge before you begin disassembly.

**Preventing ESD** Almost all electrical components can be damaged by electrostatic discharge (ESD) during handling. Component damages can occur at electrostatic discharge voltages as low as 50 volts. The following guidelines will help preventing ESD damage when servicing the instrument or any electronic device.

- ◆ Disassemble instruments only in a static-free work area.
- ◆ Use a conductive work area to reduce static charges.
- ◆ Use a conductive wrist strap to reduce static charge accumulation.
- ◆ Minimize handling.

- ◆ Keep replacement parts in original static-free packaging.
- ◆ Remove all plastic, foam, vinyl, paper and other static-generating materials from the immediate work area.
- ◆ Use only anti-static solder suckers.

## List of Modules

The following removable modules are listed in the order of performing disassembly procedures.

Number of Module	Module
1	Handle
2	The main Metal Shell and Rear Cabinet
3	Front Shell
4	Display Module
5	Rear Metal Cover

## Required Tools

Use these tools to remove or replace the modules in the generator:

- PH2 philips head screw drivers

## Disassembly Procedures

This section describes how to remove and install the modules listed above in the generator in detail. Complete disassembly will be best achieved through the following operating steps.

## A view of the whole Instrument

The disassembly drawing are shown as below for you to disassemble the generator in right steps. Before disassembling, please cut the power to avoid any personal injuries or damages to inside components. Since some modules of the instrument are sharp, you should also take care while operating to prevent being scratched.

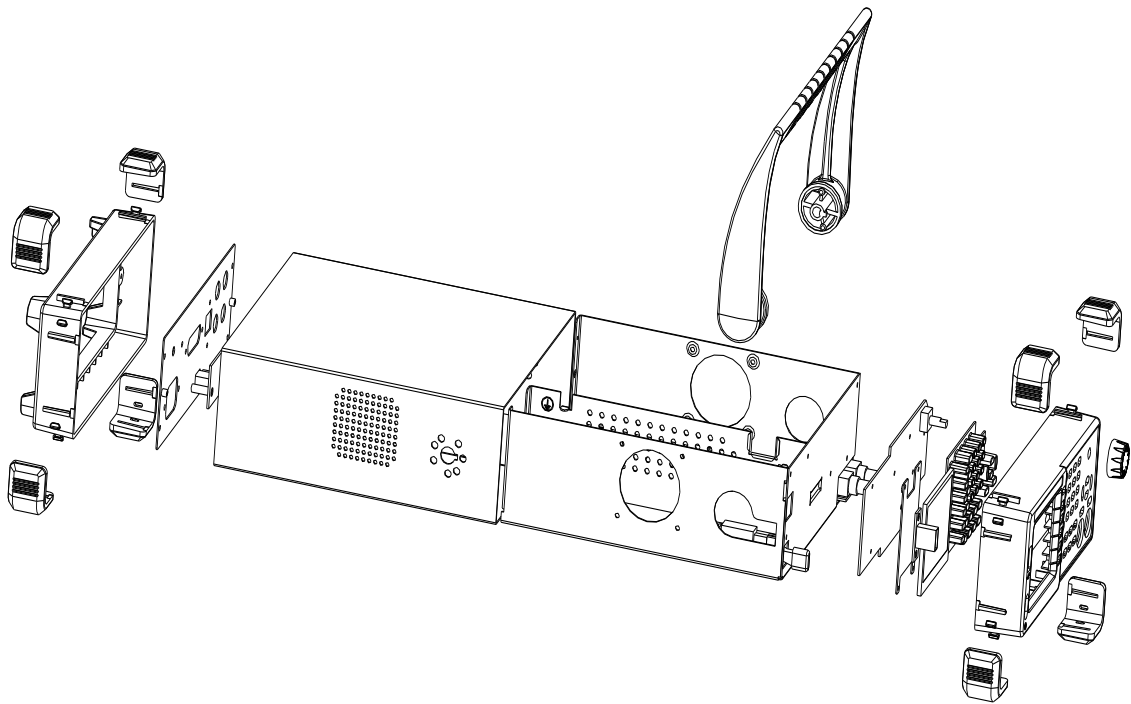


Table 4-1 A view of the whole instrument

## Removing the Handle

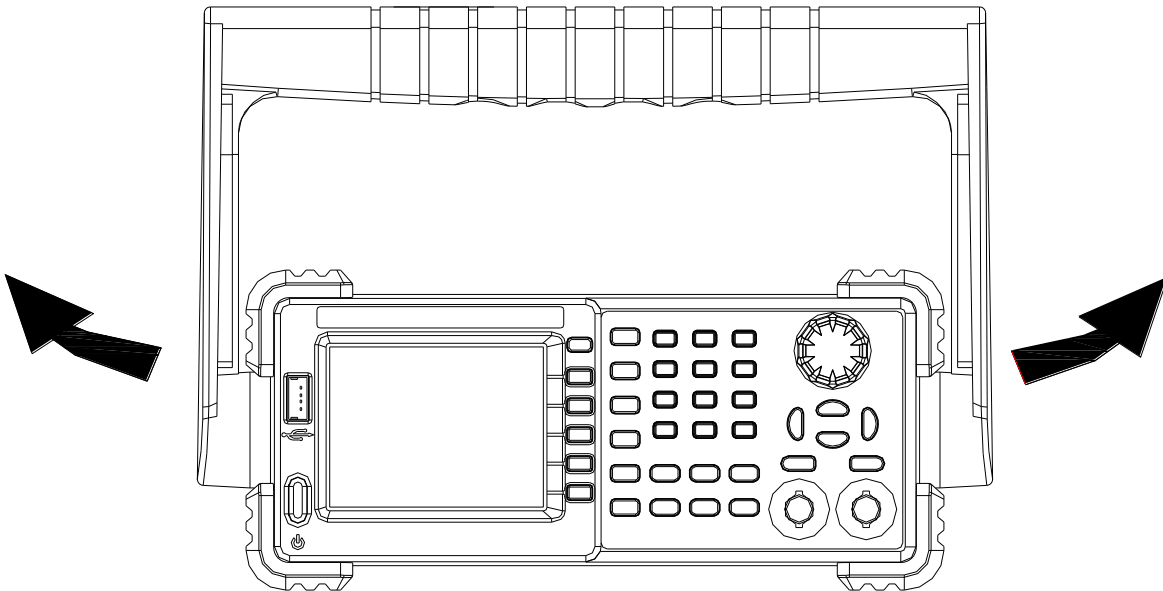


Table 4-2 Removing the handle

Removing steps:

Pull down the handle hard from the two sides of the generator.

To install the handle, please operate as the reverse steps.



## Removing the Metal Shell and Rear Cabinet

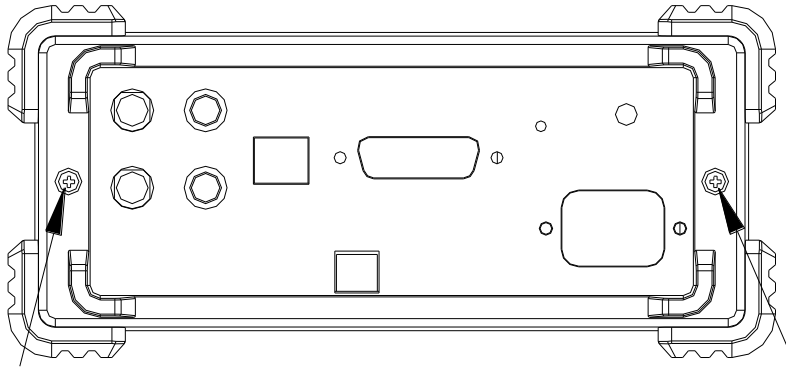


Table 4-3 Removing the rear cabinet screws

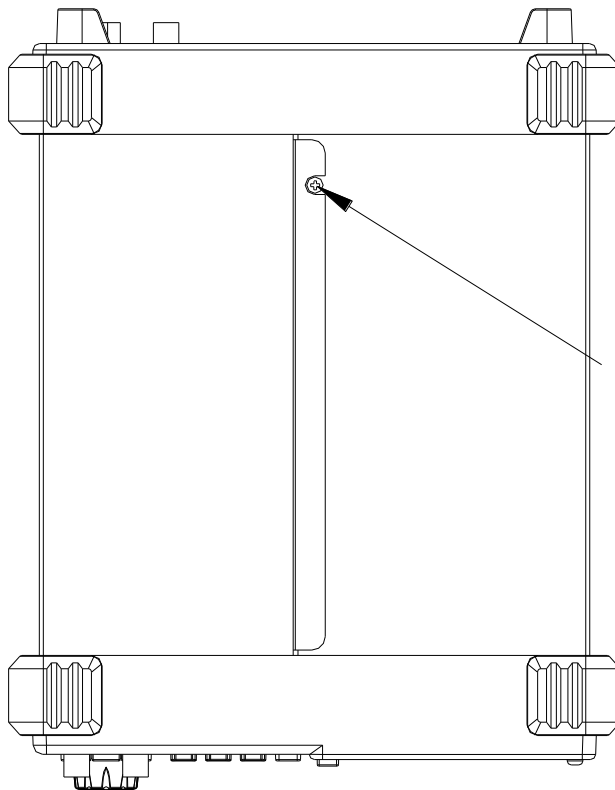


Table 4-4 Removing the metal shell screw

Removing steps:

1. Remove the two screws from the rear cabinet of the generator using a PH2 philips screw driver.
2. Remove the screw from the bottom of the generator using the screw driver.
3. Remove the rear cabinet and metal shell from the main body.

To install the metal shell and rear cabinet, please operate as the reverse steps.

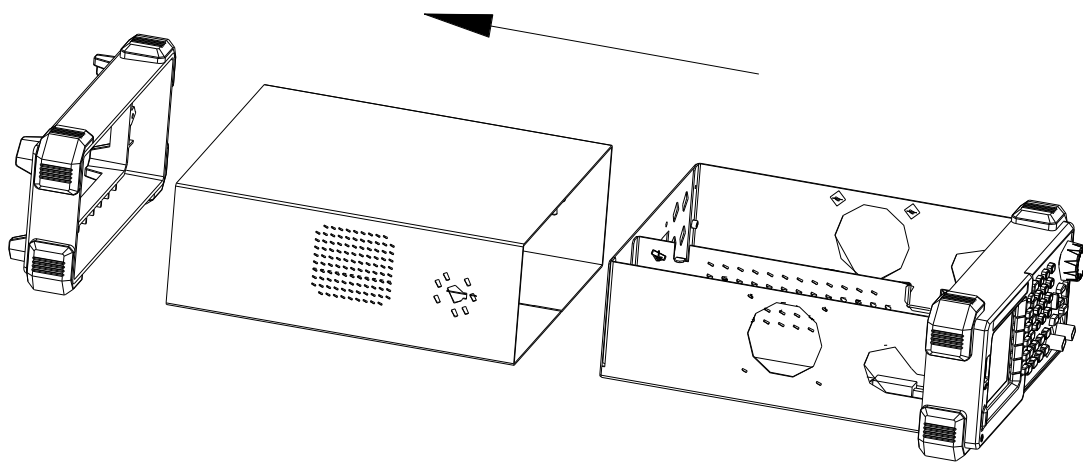


Table 4-5 Disassembled into three parts

## Removing the Front Cabinet

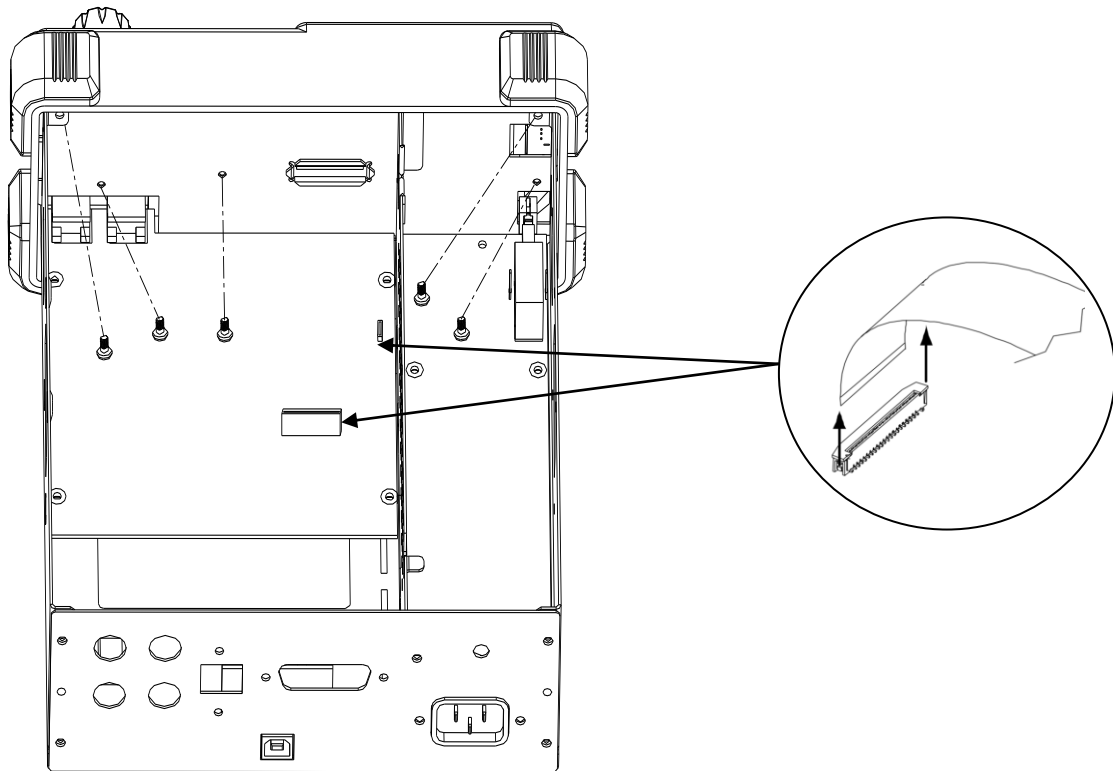


Table 4-6 Removing the front cabinet

Removing steps:

1. Remove the front module cable connected to the main board.
2. Remove the screws from the front cabinet using a PH2 philips screw driver.
3. Separate the front cabinet from the main body of the generator.

To install the front cabinet, please operate as the reverse steps.

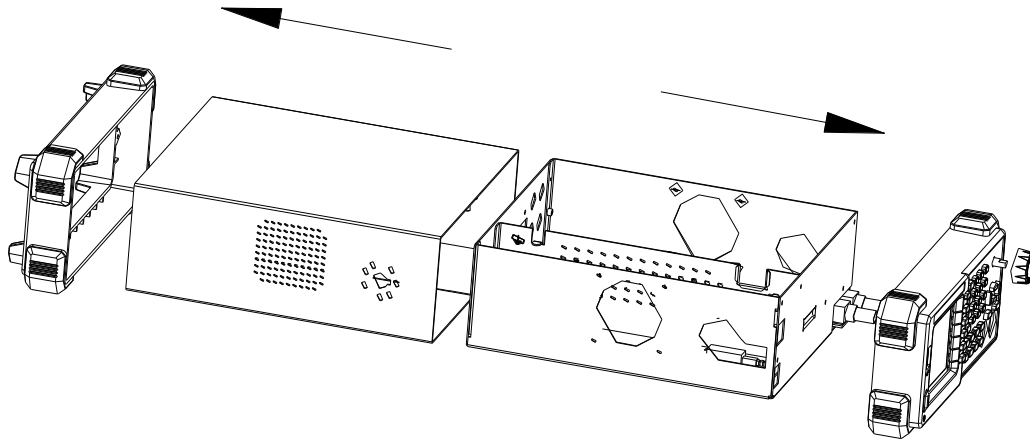


Table 4-7 Disassembled into three parts

## Removing the Display Module

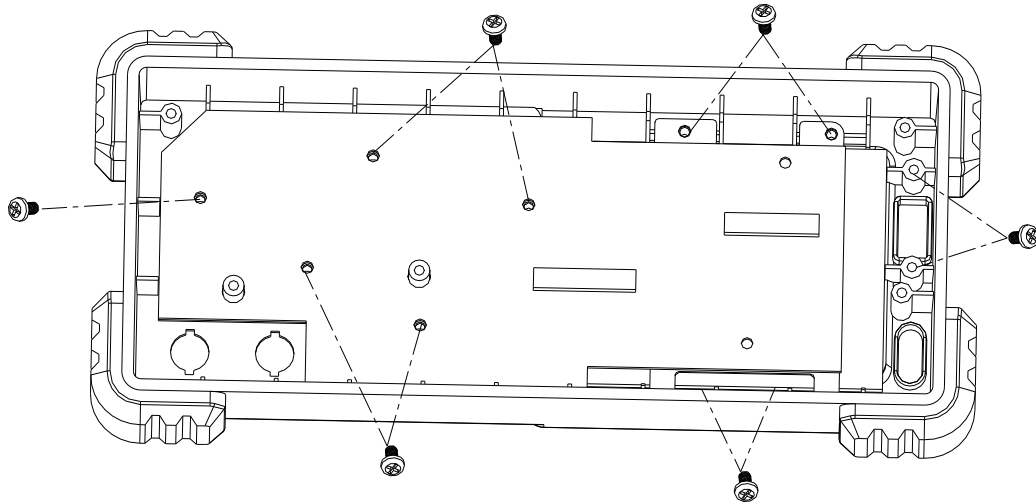


Table 4-8 Removing the display module screws

Removing steps:

1. Remove the screws from the keypad circuit board using a PH2 philips screw driver.
2. Remove the keypad circuit board, soft keypad and LCD screen from the front cabinet in sequence.
3. Remove the front cabinet universal knob by firmly pull it out.

To install the display module, please operate as the reverse steps.

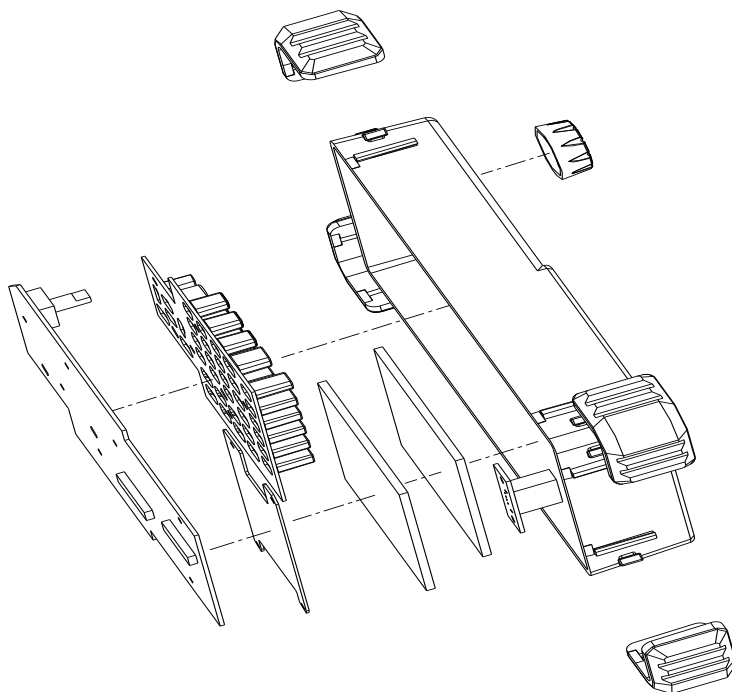


Table 4-9 Removing the front cabinet module

## Removing the Main Body

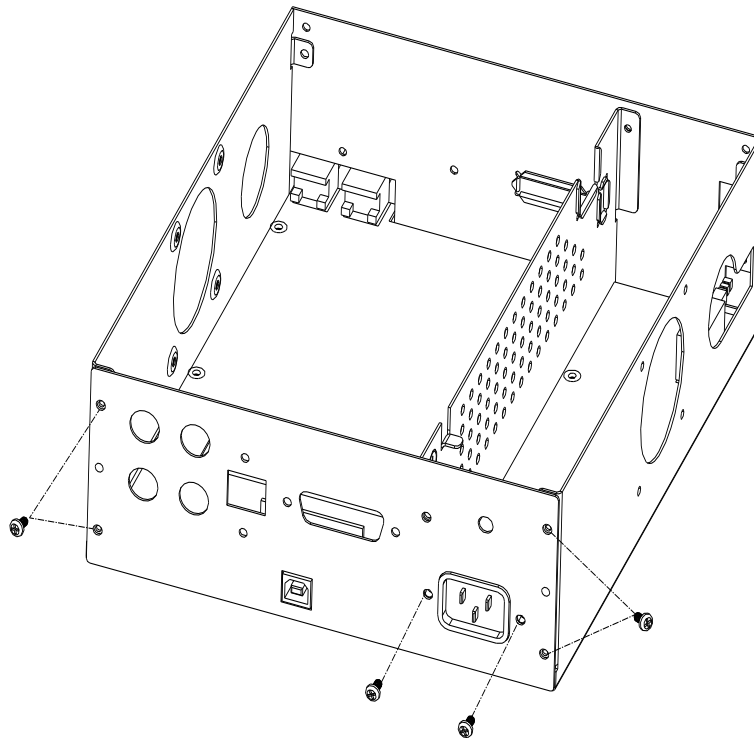


Table 4-10 Removing the main body

Removing steps:

1. Remove the screws from the rear metal cover using the screw driver.
2. Remove the rear metal cover from the main body of the generator.
3. Remove the screws from the main board and power supply board and using the screw driver.
4. Separate the rear metal cover, main board and power supply in sequence board from the main body of the generator.

To install the main body, please operate as the reverse steps.

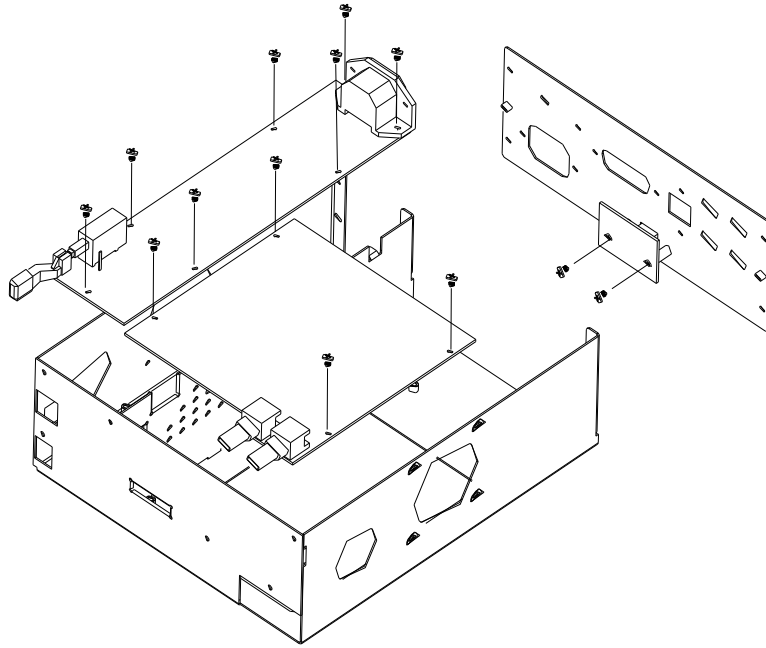


Table 4-11 Assembly drawing of the main body



# Troubleshooting

The internal structure of the generator consists of main board, power supply board, keypad circuit board and a USB device board. They are linked through cables or connectors. This chapter explains the main checking procedures for main board and power supply by measuring the pointed test points on them to help you decide the reason for the failure you encounter while operating SDG800 series arbitrary waveform generator.

## ESD Precautions

While performing any internal testing of the generator, please refer to the following precautions to avoid damages to internal modules or components result from ESD.

- Touch circuit boards by the edges as possible as you can.
- Reduce handling of static-sensitive modules when necessary.
- Wear a grounded antistatic wrist strap to insulate the static voltage from your body while touching these modules.
- Operate static-sensitive modules only at static-free areas. Avoid handling modules in areas that allow anything capable of generating or holding a static charge.

## Required Equipments

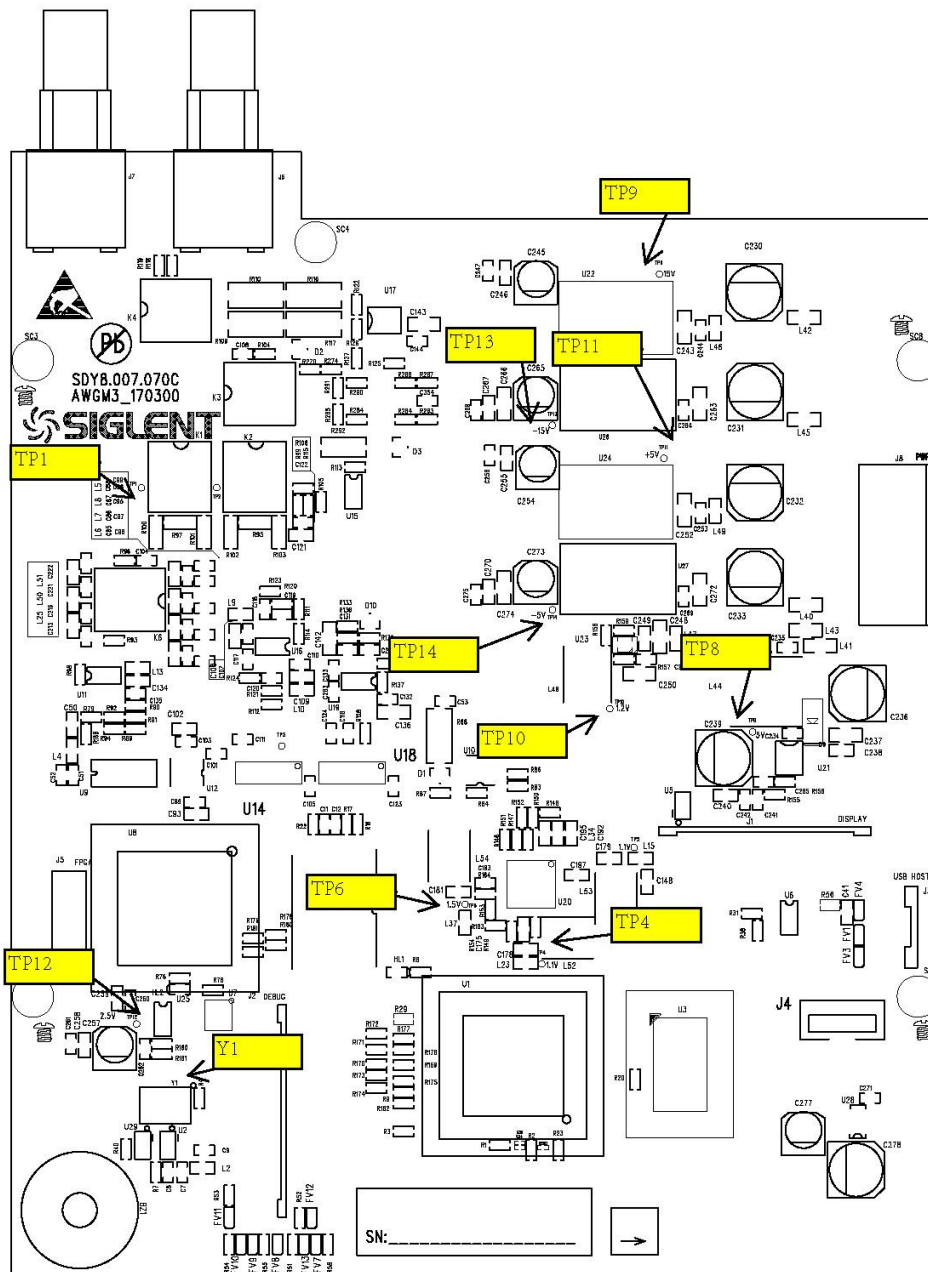
The equipments listed in the table are required to troubleshoot the generator.

Table 5-1 Required equipments

Equipment	Critical Specifications	Example
Digital Multimeter	Accuracy $\pm 0.05\%$ 1 mV resolution	SIGLENT SDM3055
Oscilloscope	100MHz Bandwidth	SIGLENT SDS1102X-E

## Main Board Drawing

Please refer to the following drawing to quickly locate the test points on the main board for easy resolution of the failures you encounter.



## Check the Power Supply

Before performing the power supply testing procedure, please make sure that the generator is grounded correctly through the protective lead of the power cord. Take care not to touch or even disassemble the power supply module without any safety precautions, or you may probably suffer from electric shock or burn. Here are procedures for testing the power supply:

1. Disconnect the power cord of the generator and then check whether the fuse has been burnt out.
2. Remove metal shell of the generator using a driver, and then disconnect the power connector connected to the main board.
3. Focus on the Power Connector which contains 6 pins from Pin1 to Pin6. Since two of the six pins are ground wire, you can respectively test the other four pins marked with blue, yellow, red and white to check whether the voltage value is within the corresponding specified range using a digital multimeter. The voltage parameters to be tested are listed in table below:

Table 5-2 Voltage parameters of the power connector

Voltage value	Pins	Error limit
20V	VH+(red)	20%
-20V	VH-(white)	20%
7.5V	VL+(yellow)	10%
-7.5V	VL-(blue)	10%

If each tested voltage value is within the corresponding spec range referring to the table above, then the power supply works normally. Otherwise, it proves to be faulted, please return it to the factory to have it repaired or contact SIGLENT.

**Note:** The main power supply provides an input fuse to protect against the danger of fire in the event of a failure of the power supply circuitry. However, this fuse will not fail ("open" or "blow") in normal power supply operation except that a significant overload occurs. Replace the entire main power supply assembly if the input fuse fails.

## Check the Main Board

If you want to remove the main board from the metal shelf inside the generator, you'd better place it on a clean, insulated mat. In addition, to avoid some chips or components on the main board being damaged for overheating, it is essential to cool the main board whenever possible using a fan. Here are procedures for testing the main board:

1. Several kinds of connectors including Power Connector and Keypad Connector are located on the main board. Check if all these connectors are connected properly.
2. Make sure that the connectors on the main board are properly connected, then connect the generator to AC power and turn it on. Check if the voltage values at all test points are within the spec range using a digital multimeter. The voltage parameters to be tested are listed in table below:

Table 5-3 Voltage parameters of the main board

Test point	Voltage value	Error limit
TP9	15V	±5%
TP13	-15V	±5%
TP11	5V	±5%
TP14	-5V	±5%
TP8	5V	±5%
TP10	1.2V	±5%
TP12	2.5V	±5%
TP4	1.1V	±5%
TP6	1.5V	±5%

If each tested voltage value is within the corresponding spec range referring to the table above, then the main board works normally. Otherwise, the failure may also come from power supply board except the main board, please return the generator to the factory to have it repaired or contact SIGLENT.

In addition to power supply test points listed in the table above, the following two signal test points are recommended for you to decide the main board failure. Since the signals from these points is AC signal, you should measure them using a digital oscilloscope.

Table 5-4 Signal test points for the main board

Test point	Description	Error limit
TP1	AC waveform	
Pin3 of Y1	25MHz	±50ppm

**TP1** is tested for output waveform in analog channel . The amplitude of waveform on TP1 changes when different amplitude was set.

**Y1** is the mainboard clock source. Please test its frequency using an oscilloscope. If the tested frequency is not 25MHz, the mainboard clock proves to be faulted.

## Quick Guide for General Failures

The general hardware failures are described as below. Reading the following information can help you quickly handle some easy hardware failures with more convenience.

### **1. No start-up after pressing the Power button:**

- (1) Check if the power cord is correctly connected.
- (2) Check if the power button is usable.
- (3) Check whether the fuse has been burnt out. If the fuse needs to be changed, please contact SIGLENT as soon as possible and return the instrument to the factory to have it repaired by qualified personnel.
- (4) Check if the power connector is properly connected to the main board.
- (5) If the instrument still does not work normally, please contact SIGLENT.

### **2. The instrument starts up with a dark screen:**

- (1) Check if the connector (J1) is properly connected to the main board.
- (2) Test if the voltages on the test points marked “TP8” and “TP13” are within the spec range.
- (3) If the instrument still does not work normally, please contact SIGLENT.

### **3. No response after pressing any button or abnormal display of the screen:**

- (1) Check if the two end of the connector between the keypad circuit board and the main board is properly connected.
- (2) If the instrument still does not work normally, please contact SIGLENT.

# Maintenance

## Maintain Summary

**SIGLENT** warrants that the products it manufactures and sells are free from defects in materials and workmanship for a period of three years from the date of shipment from an authorized **SIGLENT** distributor. If a product or CRT proves defective within the respective period, **SIGLENT** will provide repair or replacement as described in the complete warranty statement.

To arrange for service or obtain a copy of the complete warranty statement, please contact your nearest **SIGLENT** sales and service office.

Except that as provided in this summary or the applicable warranty Statement, **SIGLENT** makes no warranty of any kind, express or implied, including without limitation the implied warranties of merchantability and fitness for a particular purpose. In no case shall **SIGLENT** be liable for indirect, special or consequential damages.

## Repackaging for Shipment

If the unit needs to be shipped to **SIGLENT** for service or repair, be sure to:

1. Attach a tag to the unit identifying the owner and indicating the required service or repair.
2. Place the unit in its original container with appropriate packaging material for shipping.
3. Secure the container with strong tape or metal bands.

If the original shipping container is not available, place your unit in a container which will ensure at least 4 inches of compressible packaging material around all sides for the instrument. Use static-free packaging materials to avoid additional damage to your unit.



## Contact SIGLENT

### Headquarters

#### **SIGLENT TECHNOLOGIES CO., LTD.**

Blog 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

[sales@siglent.com](mailto:sales@siglent.com)

[www.int.siglent.com/](http://www.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

[info@siglent.com](mailto:info@siglent.com)

[www.siglentamerica.com](http://www.siglentamerica.com)

### Europe

#### **Siglent Technologies Germany GmbH**

Staetzlinger Str. 70, 86165 Augsburg, Germany

Tel: +49(0)-821-666 0 111 0

Fax: +49(0)-821-666 0 111 22

E-mail: [info-eu@siglent.com](mailto:info-eu@siglent.com)

Web: <https://www.siglenteu.com>