RIGOL
Innovation or nothing

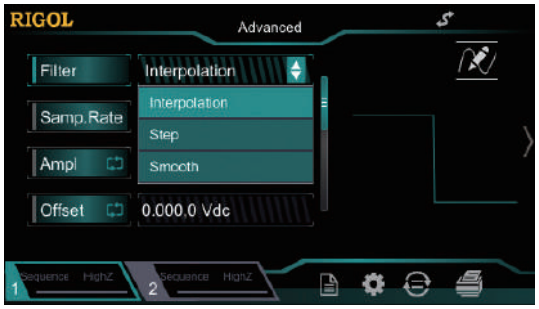
DG800 Series
Function/Arbitrary Waveform Generator

- Unique SiFi II (Signal Fidelity II) technology: generate the arbitrary waveforms point by point; recover the signal without distortion; sample rate accurate and adjustable; jitter of all the output waveforms (including Sine, Pulse, etc.) as low as 200 ps
- 2 Mpts memory depth (standard); 8 Mpts memory depth (optional) per channel for arbitrary waveforms
- Optional dual-channel with the same performance, equivalent to two independent signal sources
- High frequency stability: ±1 ppm; low phase noise: -105 dBc/Hz
- Built-in high-order harmonic generator (at most 8-order harmonics)
- Built-in 7 digits/s, 240 MHz bandwidth full featured frequency counter
- Up to 160 built-in arbitrary waveforms, covering the common signals in engineering application, medical electronics, auto electronics, math processing, and other various fields
- Sample rate up to 125 MSa/s, vertical resolution 16 bits
- Arbitrary waveform sequence editing function available; arbitrary waveforms also can be generated through the PC software
- Various analog and digital modulation functions: AM, FM, PM, ASK, FSK, PSK, and PWM.
- Standard waveform combine function, capable of outputting specified waveforms combined with the basic waveforms
- Standard channel tracking function, when enabled, all the parameters of both channels are updated based on users' configurations
- USB Host&Device interface (standard); USB-GPIB function supported
- 4.3" TFT color touch screen
- RS232, PRBS, and Dual-tone outputs supported

Design Features

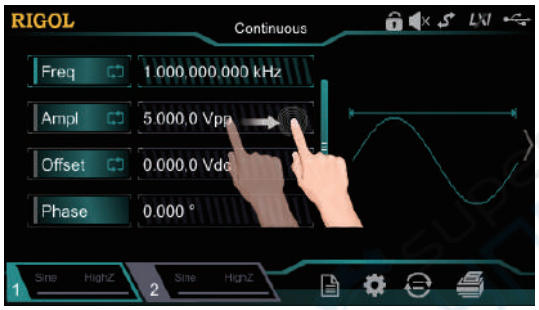
Unique SiFi II Technology

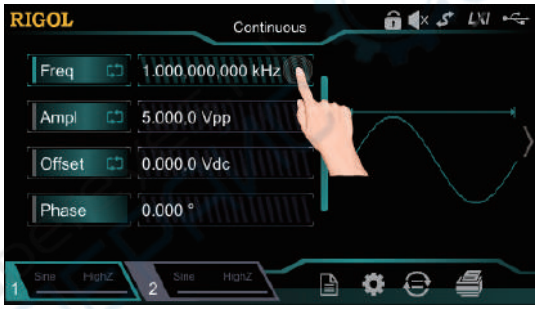
Generate the arbitrary waveforms points by points without distorting the signals. In comparison with the last generation of the SiFi technology, SiFi II has added multiple filters, supporting the dynamic adjustment of the edge time.

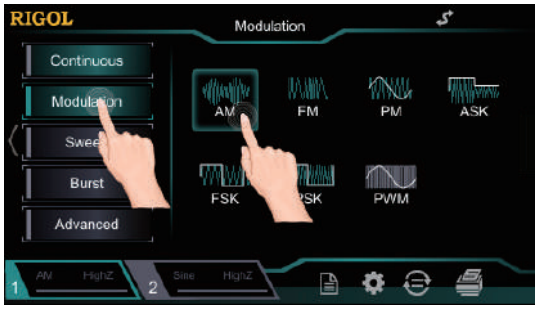


Touch–enabled UI Design

Provide brand new UI operation experience, supporting the tap and drag operation gestures. You can also use the onscreen keypad to complete the parameter settings.



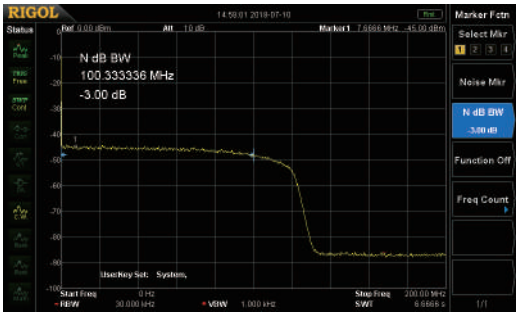




Advanced Function Output

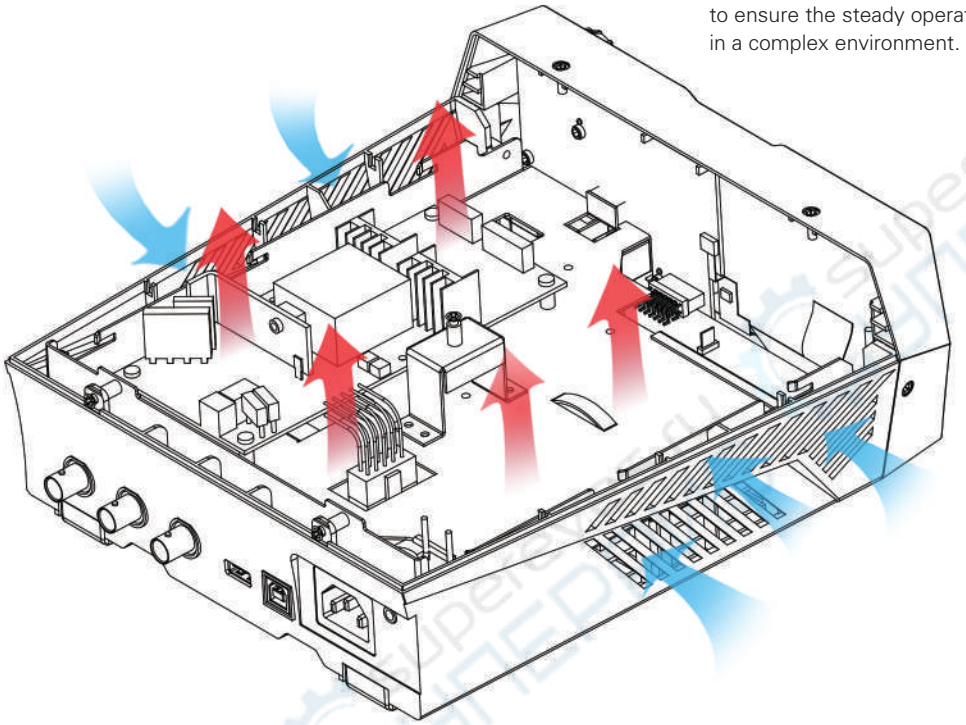
Support PRBS and RS232 pattern output and local Sequence editing.

100MHz Bandwidth White Gaussian Noise



Fan-free Mute Design
0 dB Operating Noise

The brand new heat dissipation structure design has undergone the strict thermal simulation test to ensure the steady operation of the instrument in a complex environment.

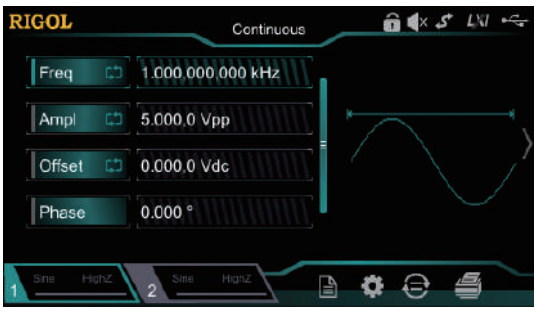


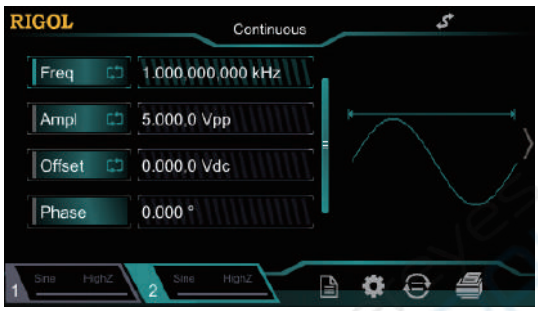
DG800 Series Function/Arbitrary Waveform Generator

Dimensions: W×H×D = 237.4 mm × 97 mm × 268 mm Weight: 1.75 kg (Package Excluded)

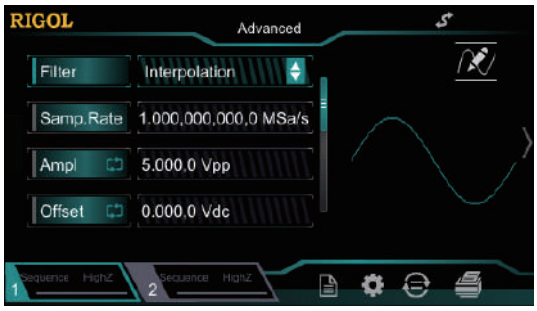
Function Interface

Dual-channel with the same performance
(Required to install the DG800-DCH option for the single-channel model)



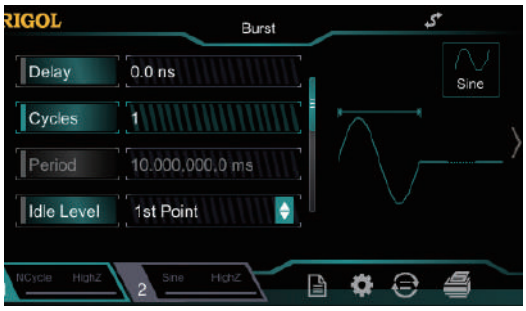


SiFi II — Arbitrary waveform function with the unique SiFi II technology

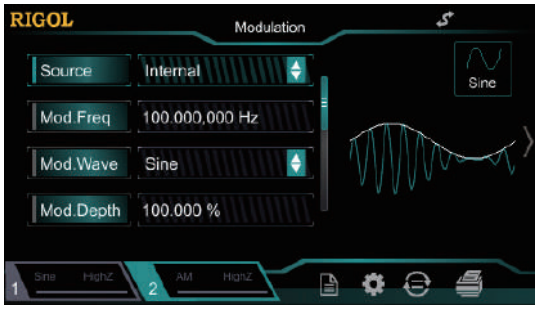


160 built-in arbitrary waveforms

Burst function

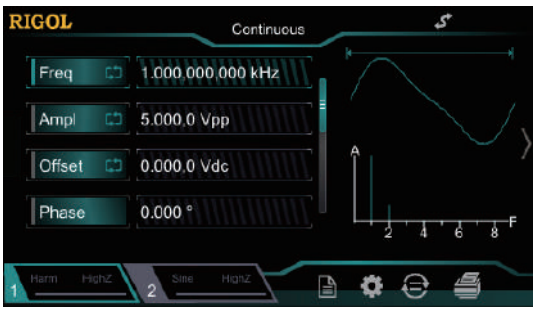


Various analog and digital modulation functions

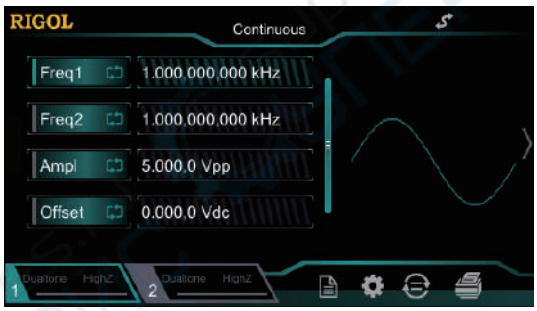


Sweep function

Standard harmonic generator function



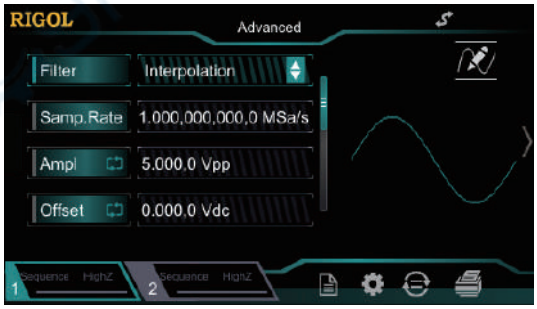
Dual-tone function



PRBS function

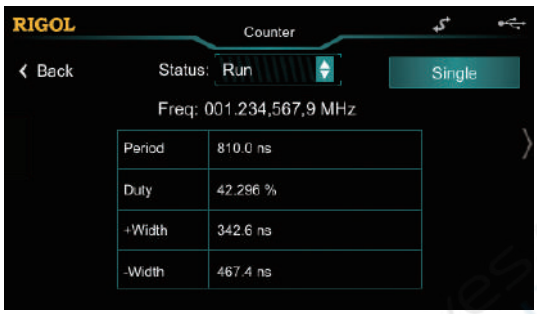
RS232 function

Sequence function



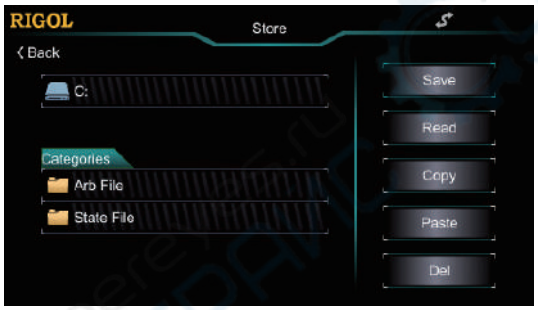
Waveform combine function

Standard 7 digits/s, 240 MHz bandwidth frequency counter



Channel and system setting

File management function



Specifications

Unless otherwise specified, all the specifications can be guaranteed when the following two conditions are met.

- The signal generator is within the calibration period.
- The signal generator has been running ceaselessly for over 30 minutes under the specified operating temperature (23℃ ± 5℃).

All the specifications are guaranteed except the parameters marked with "Typical".

DG800 series specifications

Model	DG812	DG811	DG822	DG821	DG832	DG831
Channel	2	1	2	1	2	1
Max. Frequency	10 MHz		25 MHz		35 MHz	
Sample Rate	125 MSa/s					

Waveform	
Basic Waveforms	Sine, Square, Ramp, Pulse, Noise, DC, Dual-tone
Advanced Waveforms	PRBS, RS232, Sequence
Built-in Arbitrary Waveforms	160 types of waveforms, including Sinc, Exponential Rise, Exponential Fall, ECG, Gauss, HaverSine, Lorentz, etc.

Frequency Characteristics			
Sine	1 μHz to 10 MHz	1 μHz to 25 MHz	1 μHz to 35 MHz
Square	1 μHz to 5 MHz	1 μHz to 10 MHz	1 μHz to 10 MHz
Ramp	1 μHz to 200 kHz	1 μHz to 500 kHz	1 μHz to 1 MHz
Pulse	1 μHz to 5 MHz	1 μHz to 10 MHz	1 μHz to 10 MHz
Harmonic	1 μHz to 5 MHz	1 μHz to 10 MHz	1 μHz to 15 MHz
PRBS	2 kbps to 10 Mbps	2 kbps to 20 Mbps	2 kbps to 30 Mbps
Dual-tone	1 μHz to 10 MHz	1 μHz to 20 MHz	1 μHz to 20 MHz
RS232	baud rate range: 9600, 14400, 19200, 38400, 57600, 115200, 128000, 230400		
Sequence	2 k to 30 MSa/s		
Noise (-3 dB)	100 MHz bandwidth		
Arbitrary Waveform	1 μHz to 5 MHz	1 μHz to 10 MHz	1 μHz to 10 MHz
Resolution	1 μHz		
Accuracy	±(1 ppm of the setting value + 10 pHz), 18℃ to 28℃		

Sine Wave Spectrum Purity	
Harmonic Distortion	Typical (0 dBm)[1] DC to 10 MHz (included): <-55 dBc 10 MHz to 20 MHz (included): <-50 dBc 20 MHz to 35 MHz (included): <-40 dBc
Total Harmonic Distortion[1]	<0.075% (10 Hz to 20 kHz)
Spurious (non-harmonic)	Typical[1] ≤10 MHz: <-60 dBc >10 MHz: <-60 dBc + 6 dB/octave
Phase Noise	Typical (0 dBm, 10 kHz offset) 10 MHz: <-105 dBc/Hz

Signal Characteristics	
Square	
Rise/Fall Time	Typical (1 Vpp, 1 kHz) ≤9 ns
Overshoot	Typical (100 kHz, 1 Vpp) ≤5%
Duty	0.01% to 99.99% (limited by the current frequency setting)
Non-symmetry	1% of the period + 4 ns
Jitter (rms)	Typical (1 Vpp) ≤5 MHz: 2 ppm of the period + 200 ps >5 MHz: 200 ps
Ramp	
Linearity	≤1% of peak output (typical, 1 kHz, 1 VPP, 100% symmetry)
Symmetry	0% to 100%
Pulse	

Pulse	16 ns to 1000 ks (limited by the current frequency setting)
Duty	0.001% to 99.999% (limited by the current frequency setting)
Rising/Falling Edge	≥8 ns (limited by the current frequency setting and pulse width setting)
Overshoot	Typical (1 Vpp, 1 kHz) ≤5%
Jitter (rms)	Typical (1 Vpp) ≤5 MHz: 2 ppm of the period + 200 ps >5 MHz: 200 ps
Arbitrary Waveform Sequence	
Waveform Length	2 Mpts (optional 8 Mpts)
Vertical Resolution	16 bits
Sample Rate	Interpolation filter: 10 Sa/s to 30 MSa/s Step filter: 2k Sa/s to 30 MSa/s Smooth filter: 2k Sa/s to 30 MSa/s
Min Rise/Fall Time	Interpolation filter: ≥8 ns Step filter: 3.0/sample rate Smooth filter: 1.0/sample rate
Jitter (rms)	Typical (1 Vpp) Interpolation filter: 200 ps Step filter: <5 ps Smooth filter: <5 ps
Overshoot	Typical (1 Vpp) ≤5%
Harmonic Output	
Harmonic Order	≤8
Harmonic Type	Even Harmonic, Odd Harmonic, Order Harmonic, User
Harmonic Amplitude	The amplitude of each order of the harmonic can be set.
Harmonic Phase	The phase of each order of harmonic can be set.

Output Characteristics	
Amplitude (into 50 Ω)	
Range	≤10 MHz: 1.0 mVpp to 10 Vpp ≤30 MHz: 1.0 mVpp to 5.0 Vpp ≤35 MHz: 1.0 mVpp to 2.5 Vpp
Accuracy	Typical (1 kHz sine, 0 V offset, >10 mVpp, auto) ±(1% of the setting value) ± 5 mV
Flatness	Typical (Sine, 1 Vpp) ≤5 MHz: ±0.1 dB ≤15 MHz: ±0.2 dB ≤25 MHz: ±0.3 dB ≤35 MHz: ±0.5 dB
Unit	Vpp, Vrms, dBm
Resolution	0.1 mVpp or 4 digits
Offset (into 50 Ω)	
Range(Peak ac+dc)	±5 Vpk ac+dc
Accuracy	±(1% of the setting value + 5 mV + 1% of the amplitude)
Waveform Output	
Output Impedance	50 Ω (typical)
Protection	Short-circuit protection, automatically disable the waveform output when overload occurs

Modulation Characteristics	
Modulation Type	AM, FM, PM, ASK, FSK, PSK, PWM
AM	
Carrier Waveform	Sine, Square, Ramp, Arb
Source	Internal/External
Modulating Waveform	Sine, Square, Ramp, Noise, Arb
Modulation Depth	0% to 120%
Modulation Frequency	2 mHz to 1 MHz
FM	
Carrier Waveform	Sine, Square, Ramp, Arb
Source	Internal/External

Modulating Waveform	Sine, Square, Ramp, Noise, Arb		
Modulation Frequency	2 mHz to 1 MHz		
PM			
Carrier Waveform	Sine, Square, Ramp, Arb		
Source	Internal/External		
Modulating Waveform	Sine, Square, Ramp, Noise, Arb		
Phase Deviation	0° to 360°		
Modulation Frequency	2 mHz to 1 MHz		
ASK			
Carrier Waveform	Sine, Square, Ramp, Arb		
Source	Internal/External		
Modulating Waveform	Square with 50% duty cycle		
Key Frequency	2 mHz to 1 MHz		
FSK			
Carrier Waveform	Sine, Square, Ramp, Arb		
Source	Internal/External		
Modulating Waveform	Square with 50% duty cycle		
Key Frequency	2 mHz to 1 MHz		
PSK			
Carrier Waveform	Sine, Square, Ramp, Arb		
Source	Internal/External		
Modulating Waveform	Square with 50% duty cycle		
Key Frequency	2 mHz to 1 MHz		
PWM			
Carrier Waveform	Pulse		
Source	Internal/External		
Modulating Waveform	Sine, Square, Ramp, Noise, Arb		
Width Deviation	0% to 100% of the pulse width		
Modulation Frequency	2 mHz to 1 MHz		
External Modulation Input			
Input Range	AM, PM, FM: 75 mVRMS to ±5 (Vac+dc) ASK, PSK, FSK: standard 5 V TTL		
Input Bandwidth	50 kHz		
Input Impedance	10 kΩ		

Burst Characteristics			
Carrier Waveform	Sine, Square, Ramp, Pulse, Noise, Arb, PRBS, RS232, Sequence (except DC, dual-tone, and Harmonic)		
Carrier Frequency	2 mHz to 10 MHz	2 mHz to 25 MHz	2 mHz to 35 MHz
Burst Count	1 to 1,000,000 or Infinite		
Internal Period	1 µs to 500 s		
Gated Source	External Trigger		
Source	Internal, External, Manual		
Trigger Delay	0 ns to 100 s		

Sweep Characteristics		
Carrier Waveform	Sine, Square, Ramp, Arb	
Type	Linear, Log, and Step	
Orientation	Up/Down	
Start/Stop Frequency	Same as the upper/lower limit of the corresponding carrier frequency	
Sweep Time	1 ms to 500 s	
Hold/Return Time	0 ms to 500 s	
Source	Internal, External, Manual	
Marker	Falling edge of the sync signal (programmable)	

Frequency Counter		
Measurement Function	Frequency, Period, Positive/Negative Pulse Width, Duty Cycle	
Frequency Resolution	7 digits/s (Gate Time = 1 s)	
Frequency Range	1 µHz to 240 MHz	
Period Measurement	Measurement Range	4 ns to 1,000 ks
Voltage Range and Sensitivity (non-modulating signal)		

DC Coupling	DC Offset Range	±1.5 Vdc	
	1 μHz to 100 MHz	50 mVRMS to ±2.5 (Vac+dc)	
	100 MHz to 240 MHz	100 mVRMS to ±2.5 (Vac+dc)	
AC Coupling	1 μHz to 100 MHz	50 mVRMS to ±2.5 Vpp	
	100 MHz to 240 MHz	100 mVRMS to ±2.5 Vpp	
Pulse Width and Duty Cycle Measurement			
Frequency and Amplitude Ranges	1 μHz to 25 MHz	50 mVRMS to ±2.5 (Vac+dc)	DC Coupling
Pulse Width	Min. Pulse Width	≥20 ns	
	Pulse Width Resolution	5 ns	
Duty	Measurement Range (display)	0% to 100%	
Input Characteristics			
Input Signal Range	Disruptive Discharge Voltage	±7 (Vac+dc)	Input Impedance = 1 MΩ
Input Adjustment	Coupling Mode	AC	DC
	High Frequency Rejection	On: Input Bandwidth = 150 kHz; Off: Input Bandwidth = 240 MHz	
Input Trigger	Trigger Level Range	-2.5 V to +2.5 V	
	Trigger Sensitivity Range	High, Low	
GateTime	1 ms	1.048 ms	
	10 ms	8.389 ms	
	100 ms	134.218 ms	
	1 s	1.074 s	
	10 s	8.590 s	
	>10 s	>8.590 s	

Trigger Characteristics	
Trig Input	
Level	TTL-compatible
Slope	Rising or falling (selectable)
Pulse Width	>100 ns
Latency	Sweep: <100 ns (typical) Burst: <350 ns (typical)

Trigger Output	
Level	TTL-compatible
Pulse Width	>60 ns (typical)
Max. Frequency	1 MHz

Two-channel Characteristics - Phase Offset	
Range	0° to 360°
Waveform Phase Resolution	0.03°

Reference Clock	
External Reference Input	
Lock Range	10 MHz ± 50 Hz
Level	250 mVpp to 5 Vpp
Lock Time	<2 s
Input Impedance(Typical)	1 kΩ, AC coupling
Internal Reference Output	
Frequency	10 MHz ± 50 Hz
Level	3.3 Vpp
Output Impedance(Typical)	50 Ω, AC coupling

Synchronous Output	
Level	TTL-compatible
Impedance	50 Ω, nominal value

Overvoltage Protection
Occurred when: The instrument amplitude setting is greater than 3.2 Vpp or the output AC+DC is greater than $\|1.6V_{DC}\|$ and the input voltage is greater than ±12 × (1 ± 5%)V (<10 kHz).Disruptive discharge voltage: ±5(Vac + dc). The instrument amplitude setting is smaller than or equal to 3.2 Vpp or the output AC+DC is smaller than $\|1.6V_{DC}\|$ and the input voltage is greater than ±2.6 × (1 ± 5%)V (<10 kHz).Disruptive discharge voltage: ±18(Vac + dc).

Overcurrent Protection
Occurred when: the current is greater than ±240 mA.

Programming Time	
Configuration Changes	USB
Function Change	10 ms
Amplitude Change	5 ms
Frequency Change	5 ms

General Specifications		
Power Supply		
Power Voltage	100 V to 127 V (45 Hz to 440 Hz) 100 V to 240 V (45 Hz to 65Hz)	
Power Consumption	Lower than 30 W	
Display		
Type	4.3-inch TFT LCD touch screen	
Resolution	480 horizontal × RGB × 272 vertical resolution	
Color	16 M	
Environment		
Temperature Range	Operating: 0℃ to 45℃ Non-operating: -40℃ to 60℃	
Cooling Method	Natural air cooling	
Humidity Range	Below 30℃: ≤95%RH 30℃ to 40℃: ≤75%RH 40℃ to 50℃: ≤45%RH	
Altitude	Operating: below 3,000 meters Non-operating: below 15,000 meters	
Mechanical Characteristics		
Dimensions (W×H×D)	237.4 mm × 97 mm × 268 mm	
Weight	Package excluded: 1.75 kg Package included: 2.85 kg	
Interface	USB Host, USB Device, and USB-GPIB	
IP Protection	IP2X	
Calibration Interval	1 year (recommended)	
Certification Information		
EMC	Compliant with EN61326-1:2006	
	IEC 61000-3-2:2000	±4.0 kV (Contact Discharge) ±4.0 kV (Air Discharge)
	IEC 61000-4-3:2002	3 V/m (80 MHz to 1 GHz); 3 V/m (1.4 GHz to 2 GHz); 1 V/m (2.0 GHz to 2.7 GHz)
	IEC 61000-4-4:2004	1kV power line
	IEC 61000-4-5:2001	0.5 kV (phase-to-neutral voltage); 0.5 kV (phase-to-earth voltage); 1 kV (neutral-to-earth voltage)
	IEC 61000-4-6:2003	3 V, 0.15 MHz to 80 MHz
	IEC 61000-4-11:2004	Voltage dip: 0% UT during half cycle 0% UT during 1 cycle 70% UT during 25 cycles Short interruption: 0% UT during 1 cycle
Electrical Safety	complies with USA: UL 61010-1:2012, Canada: CAN/CSA-C22.2 No. 61010-1-2012 EN 61010-1:2010,	

Note[1]: 0 dBm output, DC offset 0, impedance 50 Ω.

Options and Accessories

	Description	Order No
Model	DG812 (10 MHz, Dual-channel)	DG812
	DG822 (25 MHz, Dual-channel)	DG822
	DG832 (35 MHz, Dual-channel)	DG832
	DG811 (10 MHz, Single-channel)	DG811
	DG821 (20 MHz, Single-channel)	DG821
	DG831 (30 MHz, Single-channel)	DG831
Standard Accessories	1 Power Cord conforming to the standard of the destination country	-
	1 BNC Cable (only provided by DG832/DG831/DG822/DG821)	CB-BNC-BNC-MM-100
	1 Quick Guide	-
	1 Product Warranty Card	-
Option	Single-dual CH Upgrade Option (only for DG831/DG821/DG811)	DG800-DCH
	Memory Depth Upgrade Option	DG800-ARB8M
Optional Accessories	40 dB Attenuator	RA5040K
	USB-GPIB Interface Converter	USB-GPIB-L

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