

RIGOL



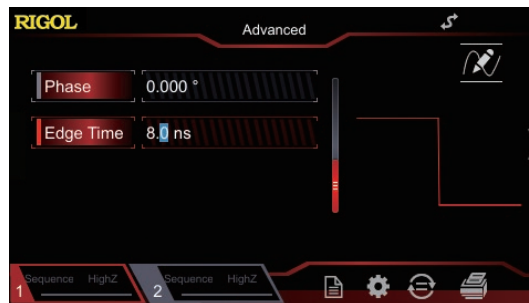
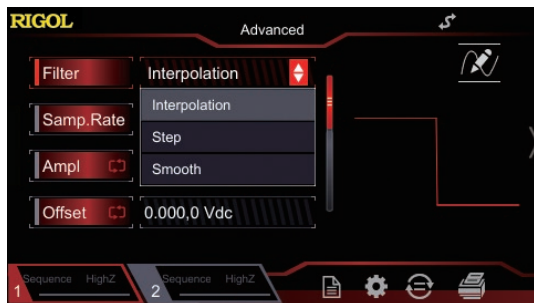
DG2000 Series Function/Arbitrary Waveform Generator

- 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
- 16 Mpts memory depth per channel for arbitrary waveforms
- Standard 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 250 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
- Standard interface: USB Host&Device and LAN (LXI Core 2011 Device); USB-GPIB function supported
- 4.3" TFT color touch screen
- RS232, PRBS, and Dual-tone outputs supported

► Design Features

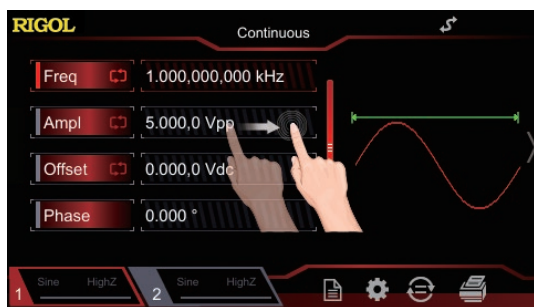
Unique SiFi II Technology

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.

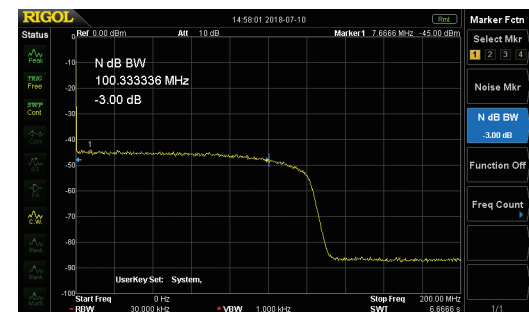


Advanced Function Output

Support PRBS and RS232 pattern output and local Sequence editing.



100MHz Bandwidth White Gaussian Noise



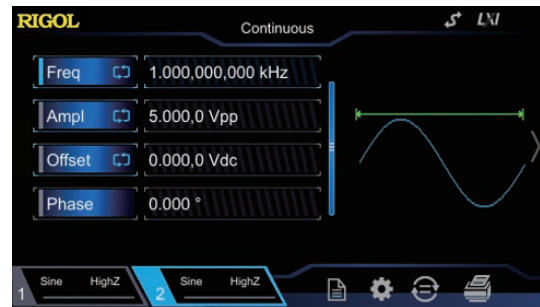
DG2000 Series Function/Arbitrary Waveform Generator



Dimensions: W×H×D = 261.5 mm × 112 mm × 318.4 mm Weight: 3.2 kg (Package Excluded)

► Function Interface

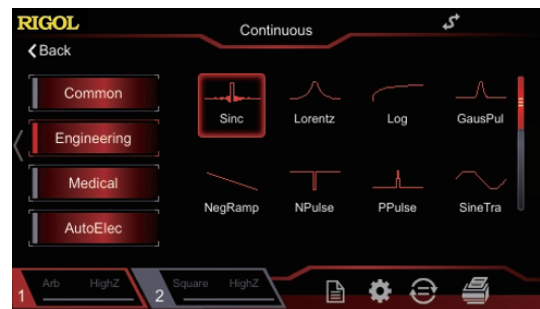
Dual-channel with the same performance



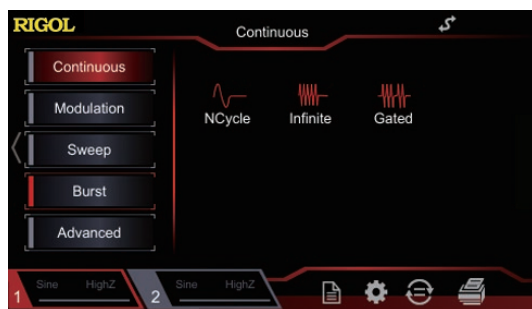
SiFi II Arbitrary waveform function with the unique SiFi II technology



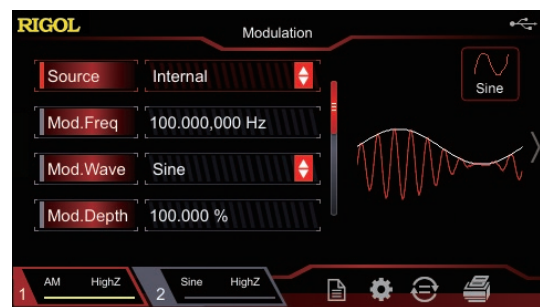
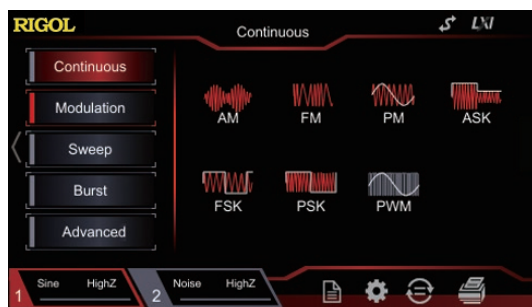
160 built-in arbitrary waveforms



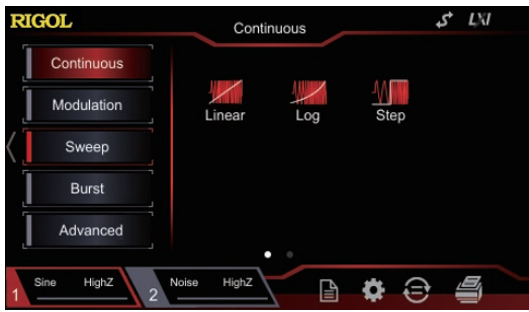
Burst function



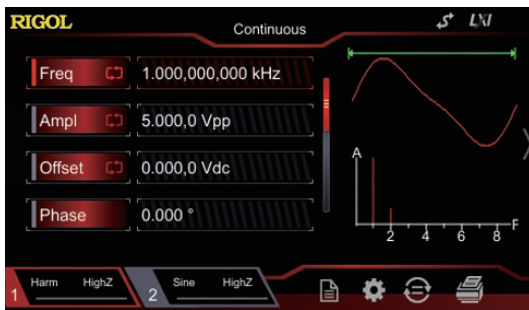
Various analog and digital modulation functions



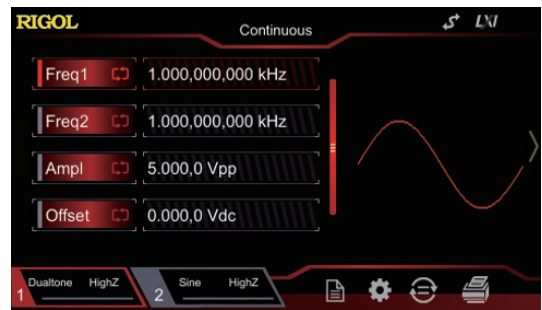
Sweep function



Standard harmonic generator function



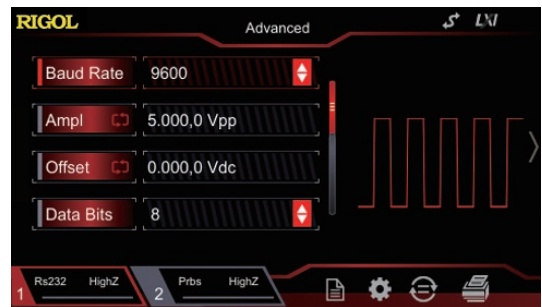
Dual-tone function



PRBS function



RS232 function



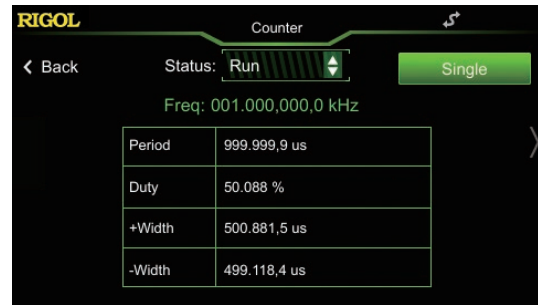
Sequence function



Waveform combine function



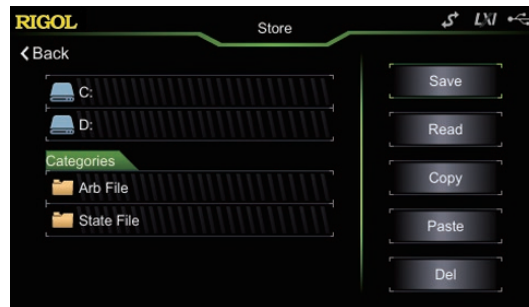
Standard 7 digits/s, 240 MHz bandwidth frequency counter



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°C ± 5°C).

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

DG2000 series specifications

| Model | DG2052 | DG2072 | DG2102 |
|----------------|-----------|--------|---------|
| Channel | 2 | 2 | 2 |
| Max. Frequency | 50 MHz | 70 MHz | 100 MHz |
| Sample Rate | 250 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 50 MHz | 1 µHz to 70 MHz | 1 µHz to 100 MHz |
| Square | 1 µHz to 15 MHz | 1 µHz to 20 MHz | 1 µHz to 25 MHz |
| Ramp | 1 µHz to 1.5 MHz | 1 µHz to 1.5 MHz | 1 µHz to 2 MHz |
| Pulse | 1 µHz to 15 MHz | 1 µHz to 20 MHz | 1 µHz to 25 MHz |
| Harmonic | 1 µHz to 20 MHz | 1 µHz to 20 MHz | 1 µHz to 25 MHz |
| PRBS | 2 kbps to 40 Mbps | 2 kbps to 50 Mbps | 2 kbps to 60 Mbps |
| Dual-tone | 1 µHz to 20 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 60 MSa/s | | |
| Noise (-3 dB) | 100 MHz bandwidth | | |
| Arbitrary Waveform | 1 µHz to 15 MHz | 1 µHz to 20 MHz | 1 µHz to 20 MHz |
| Resolution | 1 µHz | | |
| Accuracy | ±(1 ppm of the setting value + 10 pHz), 18°C to 28°C | | |

| Sine Wave Spectrum Purity | |
|--|--|
| Harmonic Distortion | Typical ^[1] DC to 10 MHz (included): <-55 dBc 10 MHz to 20 MHz (included): <-50 dBc 20 MHz to 40 MHz (included): <-40 dBc >40 MHz: <-35 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 | 16 Mpts |
| Vertical Resolution | 16 bits |
| Sample Rate | Interpolation filter: 10 Sa/s to 60 MSa/s Step filter: 2k Sa/s to 50 MSa/s Smooth filter: 2k Sa/s to 50 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 ≤60 MHz: 1.0 mVpp to 2.5 Vpp >60 MHz: 1.0 mVpp to 1 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 ≤40 MHz: ±0.5 dB >40 MHz: ±1 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 k Ω |

| | | | |
|-----------------------|---|-----------------|------------------|
| Burst Characteristics | | | |
| Carrier Waveform | Sine, Square, Ramp, Pulse, Noise, Arb, PRBS, RS232, Sequence (except DC, dual-tone, and Harmonic) | | |
| Carrier Frequency | 2 mHz to 50 MHz | 2 mHz to 70 MHz | 2 mHz to 100 MHz |
| Burst Count | 1 to 1,000,000 or Infinite | | |
| Internal Period | 1 μ s 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 μ Hz 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 μ Hz 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 μ Hz 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 μ Hz 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 M Ω |
| 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 |
| GateTime | Trigger Sensitivity Range | High, Low | |
| | 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 \pm 50 Hz |
| Level | 250 mVpp to 5 Vpp |
| Lock Time | <2 s |
| Input Impedance(Typical) | 1 k Ω , AC coupling |
| Internal Reference Output | |
| Frequency | 10 MHz \pm 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 $\pm 12 \times (1 \pm 5\%)V$ (<10 kHz). Disruptive discharge voltage: $\pm 18(V_{AC} + dc)$.

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 $\pm 2.6 \times (1 \pm 5\%)V$ (<10 kHz). Disruptive discharge voltage: $\pm 5(V_{AC} + dc)$.

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 65 Hz) | |
| 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°C to 45°C Non-operating: -40°C to 60°C | |
| Cooling Method | Natural air cooling | |
| Humidity Range | Below 30°C: ≤95%RH 30°C to 40°C: ≤75%RH 40°C to 50°C: ≤45%RH | |
| Altitude | Operating: below 3,000 meters Non-operating: below 15,000 meters | |
| Mechanical Characteristics | | |
| Dimensions (W×H×D) | 261.5 mm × 112 mm × 318.4 mm | |
| Weight | Package excluded: 3.2 kg Package included: 4.5 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 | DG2052 (50 MHz, Dual-channel) | DG2052 |
| | DG2072 (70 MHz, Dual-channel) | DG2072 |
| | DG2102 (100 MHz, Dual-channel) | DG2102 |
| Standard Accessories | 1 Power Cord conforming to the standard of the destination country | - |
| | 1 USB Cable | CB-USBA-USBB-FF-150 |
| | 1 BNC Cable | CB-BNC-BNC-MM-100 |
| | 1 Quick Guide | - |
| | 1 Product Warranty Card | - |
| Optional Accessories | 40 dB Attenuator | RA5040K |
| | USB-GPIB Interface Converter | USB-GPIB-L |

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