RIGOL
Beyond Measure

2010

DG5000 series Waveform Generators

DG5000 is a multifunctional generator that combines many functions in one, including Function Generator, Arbitrary Waveform Generator, IQ Baseband Source/IQ IF Source, Frequency Hopping Source (optional) and Pattern Generator (optional). It provides single and dual-channel models. The dual-channel model, with two channels having complete equivalent functions and precisely adjustable phase deviation between the two channels, is a real dual-channel signal generator.

DG5000, adopting the Direct Digital Synthesizer (DDS) technology, can provide stable, precise, pure and low distortion signal. The user-friendly interface design and panel layout bring users exceptional experience. Besides, the remote control of the generator can be easily done through different standard configuration interfaces, which provides more solutions for users.

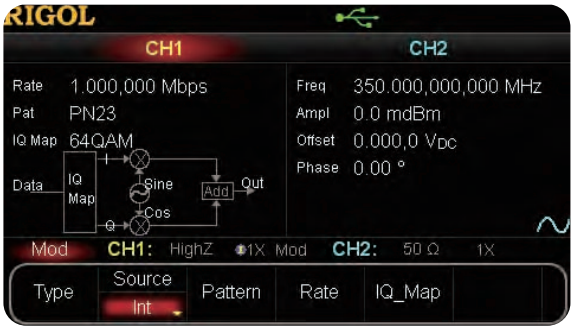
RIGOL TECHNOLOGIES, INC.

DG5000 series Waveform Generators

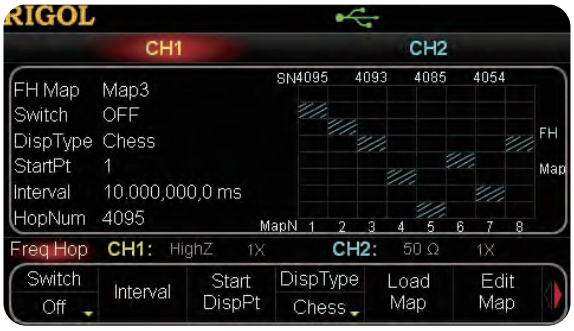
Features and Benefits

- 4.3 inches, 16M true color TFT LCD.
- 350 MHz, 250 MHz or 100 MHz maximum sine output frequency, 1 GSa/s sample rate, 14 bits resolution.
- Single/dual-channel models. The dual-channel model supports frequency and phase coupling.
- The 16+2 channels digital output module (optional) together with the analog channel can rebuild the more mixed signals in daily practice.
- Support an external power amplifier (optional) that can be configured online.
- Support frequency hopping (optional) with hopping interval up to 80 ns and arbitrary editing frequency hopping patterns.
- 14 standard waveform functions: Sine, Square, Ramp, Pulse, Noise, Sinc, Exponential Rise, Exponential Fall, ECG, Gauss, Haversine, Lorentz, Dual Tones and DC.
- Enable to edit arbitrary waveform up to 512 kpts and output arbitrary waveforms up to 128 Mpts.
- Support AM, FM, PM, ASK, FSK, PSK and PWM modulations.
- Support user-defined IQ vector signal modulation and IQ baseband/IF source output.
- Support Frequency Sweep and Burst output.
- Abundant I/O: waveform output, synchronous signal output, modulation input, 10 MHz clock input/output, trigger input/output.
- Enable to store and recall waveform data and instrument state, and support versatile file types. Standard configuration with 1 GBytes flash memory.
- Plenty of standard interfaces: double USB Hosts, USB Device, LAN, and GPIB (IEEE-488.2).
- Seamlessly interconnected with RIGOL USB-TMC digital oscilloscopes for loading and reappearing waveforms.
- Support USB flash device storage for FAT files.
- Support PictBridge printer.
- Provide security lock hole.
- Support remote control through 10/100M Ethernet web.
- Conform to LXI-C instrument standards (Version 1.2).
- Provide Chinese and English built-in help and input methods.
- Provide powerful waveform editing PC software.

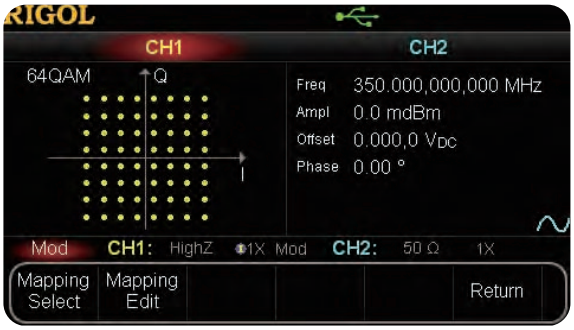
Advanced functions



IQ Modulation

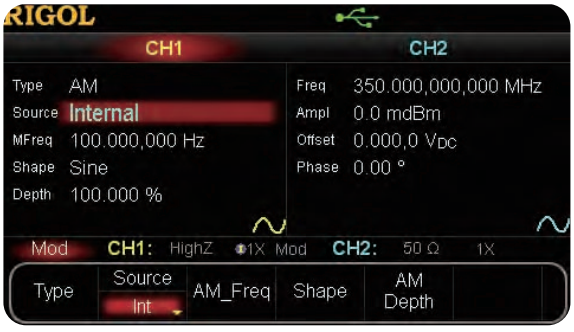


Frequency Hopping

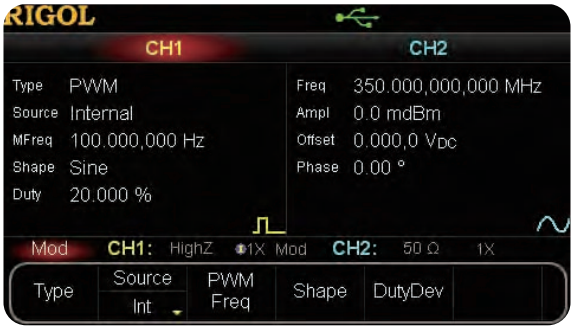


IQ Mapping Selection

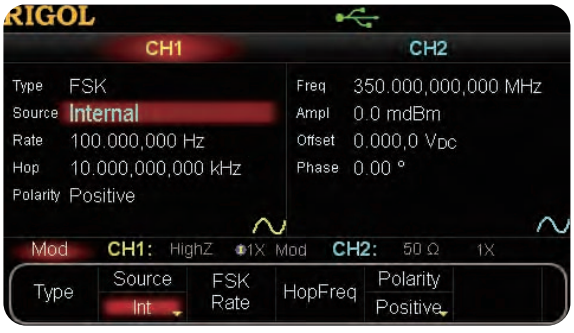
IQ Mapping Edit



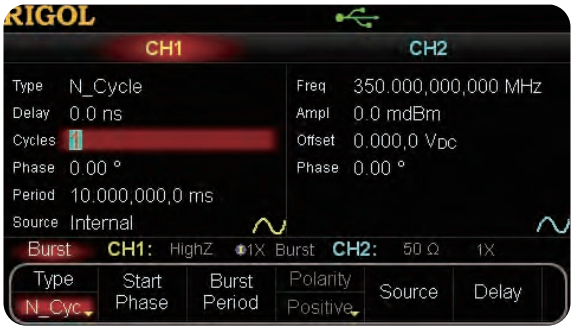
AM



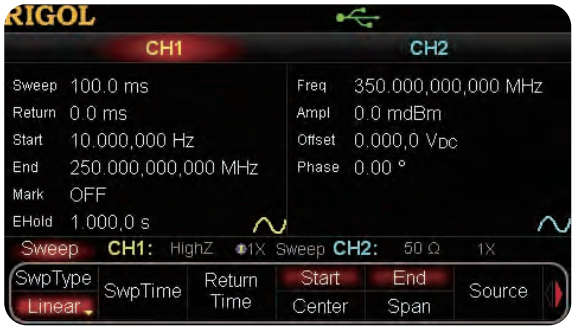
PWM



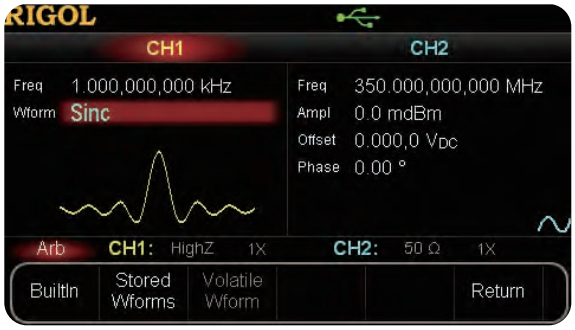
FSK



Burst



Sweep



ARB

Specification

All the specifications can be guaranteed if the following two conditions are met unless where noted.

· The generator is within the calibration and has performed self-calibration.

· The generator has been working continuously for 30 minutes at specified temperature (18°C ~ 28°C).

All the specifications are guaranteed unless those marked with "typical".

Model	DG5352	DG5351	DG5252	DG5251	DG5102	DG5101
Channel	2	1	2	1	2	1
Maximum Frequency	350 MHz		250 MHz		100 MHz	
Sample Rate	1 GSa/s					
Waveforms						
Standard Waveforms	Sine, Square, Ramp, Pulse, Noise					
Arbitrary Waveforms	Sinc, Exponential Rise, Exponential Fall, ECG, Gauss, HaverSine, Lorentz, Dual-Tone, DC					

Frequency Characteristics			
Sine	1 μHz to 350 MHz	1 μHz to 250 MHz	1 μHz to 100 MHz
Square	1 μHz to 120 MHz	1 μHz to 120 MHz	1 μHz to 100 MHz
Ramp	1 μHz to 5 MHz	1 μHz to 5 MHz	1 μHz to 3 MHz
Pulse	1 μHz to 50 MHz	1 μHz to 50 MHz	1 μHz to 50 MHz
Noise	250 MHz Bandwidth	250 MHz Bandwidth	100 MHz Bandwidth
Arb	1 μHz to 50 MHz	1 μHz to 50 MHz	1 μHz to 50 MHz
Resolution	1 μHz		
Accuracy	±1 ppm, 18 °C to 28 °C		

Sine Wave Spectrum Purity			
Harmonic Distortion	Typical (0 dBm)	Typical (0 dBm)	Typical (0 dBm)
	≤100MHz: <-45dBc	≤100MHz: <-45dBc	≤100MHz: <-45dBc
	>100MHz: <-35dBc	>100MHz: <-35dBc	
Total Harmonic Distortion	<0.5% (10 Hz to 20 kHz, 0 dBm)		
Spurious (non-harmonic)	Typical (0 dBm)	Typical (0 dBm)	Typical (0 dBm)
	≤100MHz: <-50dBc	≤100MHz: <-50dBc	≤100MHz: <-50dBc
	>100MHz: -50dBc+6dBc/octave	>100MHz: -50dBc+6dBc/octave	
Phase Noise	Typical (0 dBm, 10 kHz deviation)		
	10 MHz: <-110 dBc		

Signal Characteristics			
Square			
Rise/Fall Time	Typical Value (1Vpp)	Typical Value (1Vpp)	Typical Value (1Vpp)
	< 2.5 ns	< 2.5 ns	< 3 ns
Overshoot	Typical Value (1Vpp)		
	< 5%		
Duty Cycle	≤ 10 MHz: 20.0% to 80.0%		
	10 MHz to 40 MHz: 40.0% to 60.0%		
	> 40 MHz: 50.0% (fixed)		
Non-symmetry	1% of period + 5 ns		
Jitter (rms)	Typical Value (1Vpp)		
	≤ 30 MHz: 10ppm+500 ps		
	> 30 MHz: 500 ps		

Ramp	
Linearity	≤ 0.5% of peak output
Symmetry	0% to 100%
Pulse	
Period	20 ns to 1000000 s
Pulse Width	4 ns to 1000000 s
Variable Edge Time	2.5 ns to 1 ms
Overshoot	<5%
Jitter (rms)	Typical Value (1Vpp)
	10 ppm+500 ps

Arb	
Waveform Length	2 to 128M points
Vertical Resolution	14 bits
Sample Rate	Waveform Length is from 2 to 16k points: 1G Sa/s (fixed)
	Waveform Length is from 16k to 128M points: ≤1G Sa/s (variable)
Minimum Rise/Fall Time	Typical Value (1Vpp)
	≤3 ns
Jitter (rms)	3 ns
Mode	Internal, Play
Interpolation Method	Close, Linear, Spline
Edit Method	Edit Point, Edit Block
Non-Volatile Memory	1G Bytes

Output Characteristics			
Amplitude (into 50 Ω)			
Range	≤ 100 MHz: 5 mVpp to 10 Vpp	≤100MHz: 5mVpp to 10Vpp	5mVpp to 10Vpp
	≤ 300 MHz: 5 mVpp to 5 Vpp	≤250MHz: 5mVpp to 5Vpp	
	≤ 350 MHz: 5 mVpp to 2 Vpp		
Accuracy	Typical (1 kHz Sine, 0 V Deviation, >10 mVpp, Auto)		
	± 1% of setting ± 1 mVpp		
Flatness	Typical (Sine, 1.25 Vpp, 50 Ω)	Typical (Sine, 1.25 Vpp, 50 Ω)	Typical (Sine, 1.25 Vpp, 50 Ω)
	< 10 MHz: ± 0. 1dB	< 10 MHz: ±0.1dB	< 10 MHz: ± 0.1 dB
	10 MHz to 60 MHz: ±0.2 dB	10 MHz to 6 0MHz: ±0.2 dB	10 MHz to 60 MHz: ± 0.2 dB
	60 MHz to 100 MHz: ±0.4 dB	60 MHz to 100 MHz: ±0.4 dB	60 MHz to 100 MHz: ± 0.4 dB
	100 MHz to 250 MHz: ±1.0 dB	100 MHz to 250 MHz: ±1.0 dB	
	>250 MHz: ±1.5 dB		
Units	Vpp, Vrms, dBm, High Level, Low Level		
Resolution	0.1 mV or 4 digits		

Offset (into 50 Ω)	
Range	±5 Vpk ac + dc
Accuracy	1% of setting + 5mV + 0.5% of amplitude
Waveform Output	
Impedance	50 Ω (typical)
Isolation	42 Vpk max. to Earth
Protection	Over-temperature protected, Short-circuit protected, Overload relay automatically disables main output

FH Characteristic	
FH Bandwidth	100 kHz to 250 MHz
FH Rate	1 Hop/s to 12.5M Hop/s
Frequency Point Numbers	4096
Sequence Length	4096

Modulation Characteristics	
Modulation Types	AM、FM、PM、ASK、FSK、PSK、PWM、IQ

AM	
Carrier Waveforms	Sine, Square, Ramp, Arb (except DC)
Source	Internal/External
Modulating Waveforms	Sine, Square, Ramp, Noise, Arb (2 mHz to 50 kHz)
Depth	0% to 120%

FM	
Carrier Waveforms	Sine, Square, Ramp, Arb (except DC)
Source	Internal/External
Modulating Waveforms	Sine, Square, Ramp, Noise, Arb (2 mHz to 50 kHz)

PM	
Carrier Waveforms	Sine, Square, Ramp, Arb (except DC)
Source	Internal/External
Modulating Waveforms	Sine, Square, Ramp, Noise, Arb (2 mHz to 50 kHz)
Phase Deviation	0° to 360°

ASK	
Carrier Waveforms	Sine, Square, Ramp, Arb (except DC)
Source	Internal/External
Modulating Waveforms	Square with 50% duty cycle (2 mHz to 1 MHz)

FSK	
Carrier Waveforms	Sine, Square, Ramp, Arb (except DC)
Source	Internal/External
Modulating Waveforms	Square with 50% duty cycle (2 mHz to 1 MHz)

PSK	
Carrier Waveforms	Sine, Square, Ramp, Arb (except DC)
Source	Internal/External
Modulating Waveforms	Square with 50% duty cycle (2 mHz to 1 MHz)

PWM	
Carrier Waveform	Pulse
Source	Internal/External
Modulating Waveforms	Sine, Square, Ramp, Noise, Arb (2 mHz to 50 kHz)
Width Deviation	0% to 100% of Pulse Width

IQ			
Carrier Waveform	Sine (max. 200 MHz)	Sine (max. 200 MHz)	Sine (max. 100 MHz)
Source	Internal/External		
Code Pattern	PN Sequence, 4 bits code pattern, User		
IQ Mapping	4QAM, 8QAM, 16QAM, 32QAM, 64QAM, BPSK, QPSK, OQPSK, 8PSK, 16PSK, User		
Code Rate	1 bps to 1 M bps		

Burst Characteristics	
Carrier Waveforms	Sine, Square, Ramp, Pulse, Noise, Arb (except DC)
Burst Count	1 to 1 000 000 or Infinite
Start/Stop Phase	0° to 360°
Internal Period	2 µs to 500 s
Gated Source	External Trigger
Trigger Source	Internal, External or Manual
Trigger Delay	0 ns to 85 s

Sweep Characteristics			
Carrier Waveforms	Sine, Square, Ramp, Arb (except DC)		
Type	Linear, Log or Step		
Direction	Up or Down		
Start/Stop Frequency	1 μHz to 250 MHz	1 μHz to 250 MHz	1 μHz to 100 MHz
Sweep Time	1 ms to 300 s		
Hold/Return Time	0 ms to 300 s		
Trigger Source	Internal, External or Manual		
Marker	Falling edge of Sync signal (programmable)		
Trigger Characteristics			
Trigger Input			
Level	TTL-compatible		
Slope	Rising or falling (selectable)		
Pulse Width	> 50 ns		
Latency	Sweep: <100 ns (typical)		
	Burst: <300 ns (typical)		
Trigger Output			
Level	TTL-compatible		
Pulse Width	> 60 ns (typical)		
Maximum Rate	1MHz		
Clock Reference			
Phase Offset			
Range	0° to 360°		
Resolution	0.001°		
External Reference Input			
Lock Range	10 MHz ± 50 Hz		
Level	80 mVpp to 10 Vpp		
Lock Time	< 2 s		
Internal Reference Output			
Frequency	10 MHz		
Level	632 mVpp (0 dBm), nominal value		
Sync Output			
Level	TTL-compatible		
Impedance	50 Ω, nominal value		

General Specifications

Power	
Power Voltage	100-127 V, 45-440Hz
	100-240 V, 45-65Hz
Power Consumption	Less than 125 W
Fuse	250V, T3A
Display	
Type	4.3-inch TFT LCD
Resolution	480 Horizontal × RGB × 272 Vertical Resolution
Color	16 M color
Environment	
Temperature Range	Operating: 10℃ to 40℃
	Non-Operating: -20℃ to 60℃
Cooling Method	Cooling by fans compulsively
Humidity Range	Less than 35℃: ≤90% Relative Humidity (RH)
	35℃ to 40℃: ≤60% Relative Humidity (RH)
Altitude	Operating: Less than 3000 meters
	Non-Operating: Less than 15000 meters
Mechanical	
Dimensions (W×H×D)	230 mm ×106 mm×501 mm
Weight	with no package: 4.3 kg
	with package: 5.84 kg
Interfaces	USB Host (2), USB Device, GPIB, LAN
IP Protection	IP2X
Calibration Interval	Recommend 1 year for standard interval

Ordering Information

	Description	Order Number
Model	DG5352 (350 MHz, dual-channel)	DG5352
	DG5351 (350 MHz, single channel)	DG5351
	DG5252 (250 MHz, dual-channel)	DG5252
	DG5251 (250 MHz, single channel)	DG5251
	DG5102 (100 MHz, dual-channel)	DG5102
	DG5101 (100 MHz, single channel)	DG5101
Standard Accessories	Power Cord	
	USB Cable	CB-USB
	BNC Cable (1 meter)	CB-BNC-BNC-1
	BNC to Alligator Cable (1 meter)	CB-BNC-A-1
	Quick Guide (Hard Copy)	
	Resource CD (including User's Guide and Application Software)	
	Calibration Certificate	
Options	Hop Frequency Module	DG5-FH
	Logic Signal Output Module	DG-POD-A
	Power Amplifier	PA1011
Optional Accessories	SMB(M) to SMB(M) Cable (1 meter)	CB-SMB(M)-SMB(M)-1
	SMB(M) to BNC(M) Cable (1 meter)	CB-SMB(M)-BNC(M)-1
	SMB(M) to BNC(F) Cable (1 meter)	CB-SMB(M)-BNC(F)-1
	40 dB Attenuator	ATT-40dB
	Rack Mount Kit	RMK-DG-5

RIGOL

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