

RIGOL



DG5000 series Function/Arbitrary Waveform Generator

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

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.

DG5000 Series Function/Arbitrary Waveform Generator



► Features and Benefits

- 4.3 inches, 16M true color TFT LCD.
- 350 MHz, 250 MHz, or 100 MHz or 70 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 channels of the dual-channel model are isolated from each other.
- 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, Pules, Noise, Sinc, Exponential Rise, Exponential Fall, ECG, Gauss, Haversune, Lorentz, Dual Tones and DC.
- Rise/Fall Time of the Pulse could be adjusted separately.
- 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

Rate 1,000,000 Mbps
Pat PN23
IQ Map 64QAM

Mod CH1: HighZ 1X Mod CH2: 50 Ω 1X

Type Source Int Pattern Rate IQ_Map

IQ Modulation

FH Map Map3
Switch OFF
DispType Chess
StartPt 1
Interval 10,000,000,0 ms
HopNum 4095

Mod CH1: HighZ 1X Mod CH2: 50 Ω 1X

Switch Off Interval Start DispType Load Edit
Off Interval Start DispType Chess Map Map

Frequency Hopping

64QAM

Freq 350,000,000,000 MHz
Ampl 0.0 mdBm
Offset 0,000,0 Vdc
Phase 0,00 °

Mod CH1: HighZ 1X Mod CH2: 50 Ω 1X

Mapping Select Mapping Edit Return

IQ Mapping Selection

64QAM	I	Q
000000	0.1429	0.1429
000001	0.4286	0.1429
000010	0.1429	0.4286
000011	0.4286	0.4286

Freq 350,000,000,000 MHz
Ampl 0.0 mdBm
Offset 0,000,0 Vdc
Phase 0,00 °

MapEdit CH1: HighZ 1X Mod CH2: 50 Ω 1X

Default OK

IQ Mapping Edit

Type AM
Source Internal
MFreq 100,000,000 Hz
Shape Sine
Depth 100,000 %

Freq 350,000,000,000 MHz
Ampl 0.0 mdBm
Offset 0,000,0 Vdc
Phase 0,00 °

Mod CH1: HighZ 1X Mod CH2: 50 Ω 1X

Type Source Int AM_Freq Shape AM Depth

AM

Type PWM
Source Internal
MFreq 100,000,000 Hz
Shape Sine
Duty 20,000 %

Freq 350,000,000,000 MHz
Ampl 0.0 mdBm
Offset 0,000,0 Vdc
Phase 0,00 °

Mod CH1: HighZ 1X Mod CH2: 50 Ω 1X

Type Source Int PWM Freq Shape DutyDev

PWM

Type FSK
Source Internal
Rate 100,000,000 Hz
Hop 10,000,000,000 kHz
Polarity Positive

Freq 350,000,000,000 MHz
Ampl 0.0 mdBm
Offset 0,000,0 Vdc
Phase 0,00 °

Mod CH1: HighZ 1X Mod CH2: 50 Ω 1X

Type Source Int FSK Rate HopFreq Polarity Positive

FSK

Type N_Cycle
Delay 0.0 ns
Cycles
Phase 0,00 °
Period 10,000,000,0 ms
Source Internal

Freq 350,000,000,000 MHz
Ampl 0.0 mdBm
Offset 0,000,0 Vdc
Phase 0,00 °

Burst CH1: HighZ 1X Burst CH2: 50 Ω 1X

Type Start Burst Polarity Source Delay
N_Cyc Phase Period Positive

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	DG5252	DG5102	DG5072
	DG5351	DG5251	DG5101	DG5071
Channel	2/1	2/1	2/1	2/1
Maximum Frequency	350 MHz	250 MHz	100 MHz	70 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 μ Hz to 350 MHz	1 μ Hz to 250 MHz	1 μ Hz to 100 MHz	1 μ Hz to 70 MHz
Square	1 μ Hz to 120 MHz	1 μ Hz to 120 MHz	1 μ Hz to 100 MHz	1 μ Hz to 70 MHz
Ramp	1 μ Hz to 5 MHz	1 μ Hz to 5 MHz	1 μ Hz to 3 MHz	1 μ Hz to 3 MHz
Pulse	1 μ Hz to 50 MHz	1 μ Hz to 50 MHz	1 μ Hz to 50 MHz	1 μ Hz to 50 MHz
Noise	250 MHz Bandwidth			
Arb	1 μ Hz to 50 MHz	1 μ Hz to 50 MHz	1 μ Hz to 50 MHz	1 μ Hz to 50 MHz
Resolution	1 μ Hz			
Accuracy	± 1 ppm, 18 °C to 28 °C			

Sine Wave Spectrum Purity				
Harmonic Distortion	Typical (0 dBm)	Typical (0 dBm)	Typical (0 dBm)	Typical (0 dBm) \leq
	≤ 100 MHz: < -45 dBc	≤ 100 MHz: < -45 dBc	≤ 100 MHz: < -45 dBc	70MHz: < -45 dBc
	> 100 MHz: < -35 dBc	> 100 MHz: < -35 dBc		
Total Harmonic Distortion	$< 0.5\%$ (10 Hz to 20 kHz, 0 dBm)			
Spurious (non-harmonic)	Typical (0 dBm)	Typical (0 dBm)	Typical (0 dBm) \leq	ypical (0 dBm) \leq
	≤ 100 MHz: < -50 dBc	≤ 100 MHz: < -50 dBc	100MHz: < -50 dBc	70MHz: < -50 dBc
	> 100 MHz: < -50 dBc+6dBc/octave	> 100 MHz: < -50 dBc+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)	Typical Value (1Vpp)
	< 2.5 ns	< 2.5 ns	< 3 ns	< 4 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			
Leading/Trailing Edge Time	2.5 ns to 1 ms	2.5 ns to 1 ms	3 ns to 1 ms	4 ns to 1 ms
Overshoot	<5%			
Jitter (rms)	Typical Value (1Vpp)			
	10 ppm+500 ps			

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

Output Characteristics				
Amplitude (into 50 Ω)				
Range	≤ 100MHz: 5mVpp to 10Vpp	≤100MHz: 5mVpp to 10Vpp	5mVpp to 10Vpp	5mVpp to 10Vpp
	≤ 300MHz: 5mVpp to 5Vpp	≤250MHz: 5mVpp to 5Vpp		
	≤ 350MHz: 5mVpp to 2Vpp			
Accuracy	Typical (1kHz Sine, 0V Deviation, >10mVpp, Auto)			
	± 1% of setting ± 1mVpp			
Amplitude	<10MHz: ±0.1dB	<10MHz: ±0.1dB	<10MHz: ±0.1dB	<10MHz: ±0.1dB
Flatness	10MHz to 60MHz: ±0.2dB	10MHz to 60MHz: ±0.2dB	10MHz to 60MHz: ±0.2dB	10MHz to 60MHz: ±0.2dB
(relative to 100	60MHz to 100MHz: ±0.4dB	60MHz to 100MHz: ±0.4dB	60MHz to 100MHz: ±0.4dB	60MHz to 70MHz: ±0.4dB
kHz, 1.25Vpp Sine	100MHz to 250MHz: ±1.0dB	100MHz to 250MHz: ±1.0dB		
wave,	>250MHz: ±1.5dB			
50Ω)				
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 Characteristics				
FH Bandwidth	1.5 MHz to 250 MHz	1.5 MHz to 250 MHz	1.5 MHz to 100 MHz	1.5 MHz to 70 MHz
FH Rate	1 Hop/s to 12.5M Hop/s			
Frequency Point Count	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)	Sine (max. 70 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			

External Modulation Input	
Input Range	±5 Vac
Input Bandwidth	50 kHz
Input Impedance	10 kΩ

Burst Characteristics				
Carrier Waveforms	Sine, Square, Ramp, Pulse, Noise, Arb (except DC)			
Carrier Frequency	1 μ Hz to 120 MHz	1 μ Hz to 120	1 μ Hz to 100 MHz	1 μ Hz to 70 MHz
Burst Count	1 to 1 000 000 or Infinite			
Start/Stop Phase	0° to 360°			
Internal Period	1 μ s 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 μ Hz to 250 MHz	1 μ Hz to 250 MHz	1 μ Hz to 100 MHz	1 μ Hz to 70 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)			

Programming Time				
Configuration Time (typical)				
	USB2.0	LAN	GPIB	
Function Change	500ms	510ms	510ms	
Frequency Change	50ms	50ms	50ms	
Amplitude Change	300ms	310ms	310ms	
Select User Arb	500ms	510ms	510ms	
Arb Download Time (binary transfer)				
1 Mpts/s				
Note: Download time do not include setup or output time.				

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°(arb waveform), 0.03° (other waveforms)

External Reference Input	
Lock Range	10 MHz \pm 50 Hz
Level	80 mVpp to 10 Vpp
Lock Time	< 2 s

Internal Reference Output	
Frequency	10 MHz \pm 50 Hz
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 °C to 40 °C Non-Operating: -20 °C to 60 °C
Cooling Method	Cooling by fans compulsively
Humidity Range	Less than 35 °C : ≤90% Relative Humidity (RH) 35 °C to 40 °C : ≤60% Relative Humidity (RH)
Altitude	Operating: Less than 3,000 m eters Non-Operating: Less than 15,0 00 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

► Order 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
	DG5072 (70MHz, dual-channel)	DG5072
	DG5071 (70MHz, single-channel)	DG5071
	Standard	Power Cord
Accessories	USB Cable	CB-USB
	BNC Cable (1 meter)	CB-BNC-BNC-1
	Quick Guide (hard copy)	-
Options	SMB(F) to BNC(M) Cable (1 meter)	CB-SMB(F)-BNC(M)-1
	Frequency Hopping Module	DG5-FH
Optional	Power Amplifier	PA1011
	SMB(F) to SMB(F) Cable (1 meter)	CB-SMB(F)-SMB(F)-1
Accessories	SMB(F) to BNC(F) Cable (1 meter)	CB-SMB(F)-BNC(F)-1
	40 dB Attenuator	ATT-40dB
	Rack Mount Kit	RMK-DG-5

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