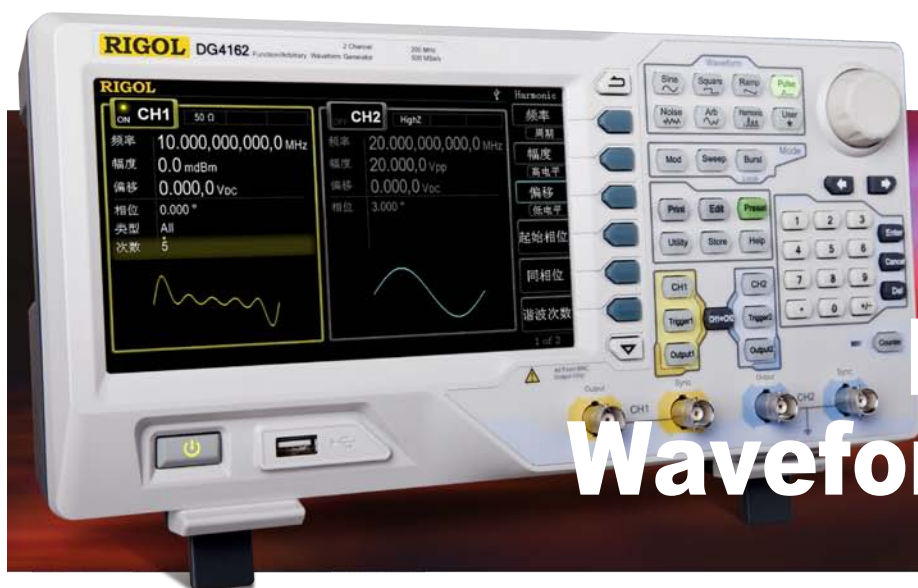


RIGOL
Beyond Measure

No.1



DG4000 series Waveform Generators

DG4000 series is a multifunctional generator that combines many functions in one, including Function Generator, Arbitrary Waveform Generator, Pulse Generator, Harmonic Generator, Analog/Digital Modulator and Counter. All of the 3 models have two channels with complete equivalent functions and precisely phase adjustable, they are the real dual-channel signal generator.

DG4000, 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.

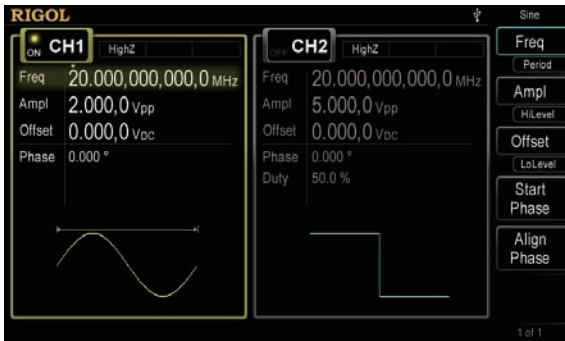
DG4000 Series Waveform Generators



► Features and Benefits

- Standard 2 full functional channels
- 500 MSa/s sample rate, 14 bits vertical resolution
- 2ppm high frequency stability, -115dBc/Hz low phase noise
- Arbitrary waveform function with up to 150 built-in waveforms
- Versatile analog and digital modulation functions (AM, FM, PM, ASK, FSK, PSK, BPSK, QPSK, 3FSK, 4FSK, OSK, PWM)
- Build-in high precision 200MHz frequency counter
- 7 inch color LCD (800X480 pixels)

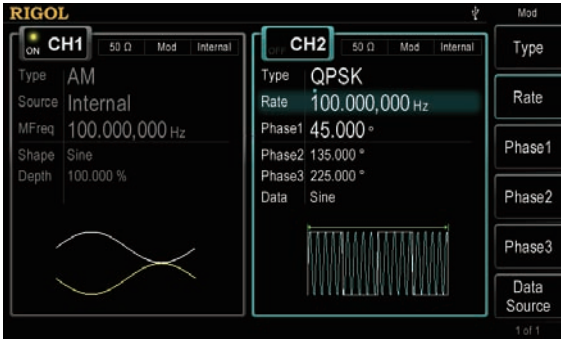
Advanced functions



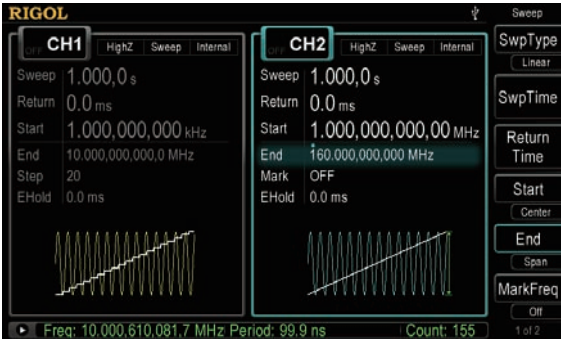
Standard identical 2 channels with frequency and phase coupling



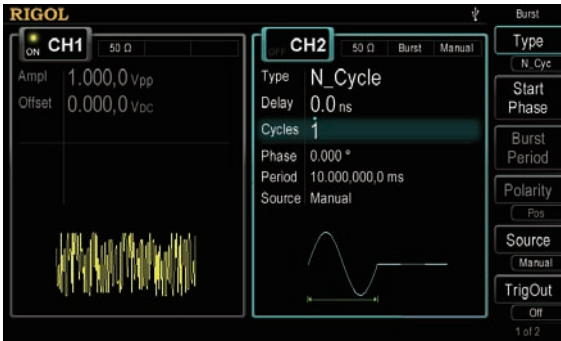
Arbitrary waveform function and built-in 150 waveforms



Abundant analog and digital modulation functions



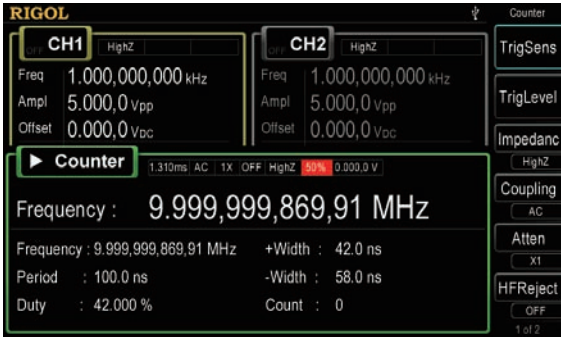
Various Sweep modes



Noise and Burst modes



Up to 16 orders customized Harmonic generation function



Standard high resolution counter function



The statistic analysis function of counter

► 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	DG4162	DG4102	DG4072
Channel	2	2	2
Maximum Frequency	160MHz	100 MHz	70 MHz
Sample Rate	500 MSa/s		

Waveforms	
Standard waveforms	Sine, Square, Ramp, Pulse, Noise, Harmonics
Arbitrary Waveforms	150 kinds, including Sinc, Exponential Rise, Exponential Fall, ECG, Gauss, HaverSine, Lorentz, Dual-Tone, DC, etc.

Frequency Characteristics			
Sine	1 μHz to 160 MHz	1 μHz to 100 MHz	1 μHz to 70 MHz
Square	1 μHz to 50 MHz	1 μHz to 40 MHz	1 μHz to 30 MHz
Ramp	1 μHz to 4MHz	1 μHz to 3 MHz	1 μHz to 2 MHz
Pulse	1 μHz to 40 MHz	1 μHz to 25 MHz	1 μHz to 20 MHz
Noise (-3dB)	120 MHz Bandwidth	80 MHz Bandwidth	60 MHz Bandwidth
Arb	1 μHz to 40 MHz	1 μHz to 25 MHz	1 μHz to 20 MHz
Resolution	1 μHz		
Accuracy	±2ppm, 18 °C至28 °C		

Sine Wave Spectrum Purity	
Harmonic Distortion	Typical (0dBm) DC-1MHz: <-60dBc 1MHz-10MHz: <-55dBc 10MHz-100MHz: <-50dBc 100MHz-160MHz: <-40dBc
Total Harmonic Distortion	<0.1%(10Hz-20kHz,0dBm)
Spurious (non-harmonic)	Typical(0dBm) ≤10MHz <-65dBc >10MHz <-65dBc+6dB/octave
Phase Noise	Typical (0 dBm, 10 kHz deviation) 10 MHz: ≤-115 dBc/Hz

Signal Characteristics			
Square			
Rise/Fall Time	Typical (1Vpp) <8 ns	Typical (1Vpp) <10 ns	Typical (1Vpp) <12 ns
Overshoot	Typical (1Vpp) <7.5%		
Duty Cycle	≤10 MHz: 20.0% to 80.0% 10 MHz-40 MHz: 40.0% to 60.0% >40 MHz: 50.0% (fixed)		
Non-symmetry	1% of period +5ns		
Jitter (rms)	Typical (1Vpp) ≤5MHz 2ppm+500 ps > 5MHz 500ps		
Ramp			
Linearity	≤1% of peak output (Typical, 1kHz, 1 VPP, 100% Symmetry)		
Symmetry	0% to 100%		
Pulse			
Period	25 ns to 1000000 s	40 ns to 1000000 s	50 ns to 1000000 s
Pulse Width	≥ 10ns	≥ 12ns	≥ 15ns
Leading/Trailing Edge Time	≥ 5ns	≥ 7ns	≥ 9ns
Overshoot	Typical (1Vpp) <5%		
Jitter (rms)	Typical (1Vpp) ≤5MHZ 2ppm+500 ps > 5MHZ 500ps		

Arb	
Waveform Length	16k points
Vertical Resolution	14 bits
Sample Rate	500M Sa/s
Minimum Rise/Fall Time	Typical (1Vpp) <5 ns
Jitter (rms)	Typical (1Vpp) ≤5MHZ 2ppm+500 ps > 5MHZ 500ps
Interpolation Method	Close, Linear
Edit Method	Edit Point, Edit Block



Output Characteristics			
Amplitude (into 50 Ω)			
Range	≤20MHz: 1mVpp to 10Vpp	≤20MHz: 1mVpp to 10Vpp	≤20MHz: 1mVpp to 10Vpp
	≤70MHz: 1mVpp to 5Vpp	≤70MHz: 1mVpp to 5Vpp	≤70MHz: 1mVpp to 5Vpp
	≤120MHz: 1mVpp to 2.5Vpp	≤100MHz: 1mVpp to 2.5Vpp	
	≤160MHz: 1mVpp to 1Vpp		
Accuracy	Typical (1kHz Sine, 0V Offset, >10mVpp, Auto)		
	± 1% of setting ± 2mVpp		
Amplitude Flatness	Typica (Sine, 2.5Vpp, 1kHz)	Typica (Sine, 2.5Vpp, 1kHz)	Typica (Sine, 2.5Vpp, 1kHz)
	≤10MHz: ±0.1dB	≤10MHz: ±0.1dB	≤10MHz: ±0.1dB
	≤60MHz: ±0.2dB	≤60MHz: ±0.2dB	≤60MHz: ±0.2dB
	≤100MHz: ±0.4dB	≤100MHz: ±0.4dB	≤70MHz: ±0.4dB
	≤160MHz: ±0.8dB		
Units	Vpp、Vrms、dBm		
Resolution	1 mV or 3 bit		
Offset (into 50 Ω)			
Range	±5 Vpk ac + dc		
Accuracy	1% of setting + 5mV + 0.5% of amplitude		
Waveform Output			
Impedance	50 Ω (Typical)		
Protection	Short-circuit protection, automatically disables main output when overload relay		

Modulation Characteristics	
Modulation Types	AM, FM, PM, ASK, FSK, PSK, BPSK, QPSK, 3FSK, 4FSK, OSK, PWM
AM	
Carrier Waveforms	Sine, Square, Ramp, Noise, Arb
Source	Internal/External
Modulating Waveforms	Sine, Square, Ramp, Noise, Arb
Depth	0% to 120%
Modulating Frequency	2mHz ~50kHz
FM	
Carrier Waveforms	Sine, Square, Ramp, Arb (except DC)
Source	Internal/External
Modulating Waveforms	Sine, Square, Ramp, Noise, Arb
Modulating Frequency	2mHz ~50kHz
PM	
Carrier Waveforms	Sine, Square, Ramp, Arb (except DC)
Source	Internal/External
Modulating Waveforms	Sine, Square, Ramp, Noise, Arb
Phase Deviation	0° to 360°
Modulating Frequency	2mHz ~50kHz
ASK	
Carrier Waveforms	Sine, Square, Ramp, Arb (except DC)
Source	Internal/External
Modulating Waveforms	Square with 50% duty cycle
Key Frequency	2 mHz ~1 MHz
FSK	
Carrier Waveforms	Sine, Square, Ramp, Arb (except DC)
Source	Internal/External
Modulating Waveforms	Square with 50% duty cycle
Key Frequency	2 mHz ~1 MHz
3FSK	
Carrier Waveforms	Sine, Square, Ramp, Arb (except DC)
Source	Internal
Modulating Waveforms	Square with 50% duty cycle
Key Frequency	2 mHz ~1 MHz
4FSK	
Carrier Waveforms	Sine, Square, Ramp, Arb (except DC)
Source	Internal





Modulating Waveforms	Square with 50% duty cycle		
Key Frequency	2 mHz ~ 1 MHz		
PSK			
Carrier Waveforms	Sine, Square, Ramp, Arb (except DC)		
Source	Internal/External		
Modulating Waveforms	Square with 50% duty cycle		
Key Frequency	2 mHz ~ 1 MHz		
BPSK			
Carrier Waveforms	Sine, Square, Ramp, Arb (except DC)		
Source	Internal		
Modulating Waveforms	Square with 50% duty cycle		
Key Frequency	2 mHz ~ 1 MHz		
QPSK			
Carrier Waveforms	Sine, Square, Ramp, Arb (except DC)		
Source	Internal		
Modulating Waveforms	Square with 50% duty cycle		
Key Frequency	2 mHz ~ 1 MHz		
OSK			
Carrier Waveform	Sine		
Source	Internal/External		
Oscillation Time	8ns ~ 200s		
Key Frequency	2 mHz ~ 1 MHz		
PWM			
Carrier Waveform	Pulse		
Source	Internal/External		
Modulating Waveforms	Sine, Square, Ramp, Noise, Arb		
Width Deviation	0% to 100% of Pulse Width		
Modulating Frequency	2mHz ~ 50kHz		
ExtTrig Input			
Input Range	75mVRMS ~ ±2.5Vac+dc		
Input Bandwidth	5MHz		
Input Impedance	100Ω		
Burst Characteristics			
Carrier Waveforms	Sine, Square, Ramp, Pulse, Noise, Arb (except DC)		
Carrier Frequency	2mHz to 100 MHz	2mHz to 100 MHz	2mHz to 70 MHz
Burst Count	1 to 1 000 000 or Infinite		
Start/Stop Phase	0° to 360°		
Internal Period	2μs 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 160 MHz	1 μHz to 100 MHz	1 μHz 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)		
Counter Specifications			
Function	Frequency, Period, Positive/Negative Pulse Width, Duty Cycle		
Frecuqy Resolution	7 digits/second (Gate Time =1s)		
Frecuqy Range	1uHz to 200MHz		
Period Range	5ns to 16 days		
Voltage Range and Sensitivity (Not modulation signal)			
DC Coupling	DC Offset Range	±1.5VDC	Input Attenuation: “closed”
	1uHz ~ 100MHz	50mVRMS ~ ±2.5Vac+dc	





AC Coupling		100MHz ~ 200MHz	100mVRMS ~ ±2.5Vac+dc	
		1uHZ ~ 100MHz	50mVRMS ~ ±2.5Vpp	
		100MHz ~ 200MHz	100mVRMS ~ ±2.5Vpp	
Pulse Width and Duty Cycle Measure				
Frequcy/Amplitude		1uHZ ~ 25MHz	50mVRMS ~ ±2.5Vac+dc	DC Coupling
Range	Pulse Width	Minimum	≥20ns	Input Attenuation:
		Resolution	2ns	“closed”
		Range (Display)	0% ~ 100%	
Duty Cycle	Input Characteristics			
Input Range	Brakdown Voltage		±7Vac+dc (Attenuation: closed)	Impedance=1MΩ
			±70Vac+dc(Attenuation: open)	
			5Vrms	Impedance=50Ω
Input Adjustment	Attenuation		Open: “×10”; Closed: “×1”	
	Impedance		50Ω	1MΩ
	Coupling		AC	DC
	HF Reject		ON: input bandwidth=250KHz; OFF: input bandwidth=225MHz	
Input Trigger	Trigger Level Range		-2.5V to +2.5V	
	Trigger Sensitivity Range		0% (140mV hysteresis voltage) to 100% (2mV hysteresis voltage)	
	GateTime1		1.310ms	
Gate Time	GateTime2		10.48ms	
	GateTime3		166.7ms	
	GateTime4		1.342s	
	GateTime5		10.73s	
	GataTime6		>10s	

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	0.03°
External Reference Input	
Lock Range	10 MHz ± 50 Hz
Level	250 mVpp to 5 Vpp
Lock Time	< 2 s
Impedance (Typical)	1kΩ, AC coupling

Internal Reference Output

Frequency	10 MHz ± 50 Hz
Level	3.3Vpp
Impedance (Typical)	50kΩ, AC coupling

Sync Output

Level	TTL-compatible
Impedance	50 Ω, nominal value

General Specifications

Power	
Power Voltage	100V~240V (45Hz~440Hz)
Power Consumption	Less than 50 W
Fuse	250V, T2A
Display	
Type	7-inch TFT LCD
Resolution	800 Horizontal × RGB × 480 Vertical Resolution
Color	16M 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)	313 mm ×160.7 mm×116.74mm
Weight	with no package: 3.2 kg with package: 4.5 kg
Interfaces	
USB Host (2), USB Device, LAN	
IP Protection	
IP2X	
Calibration Interval	
Recommend 1 year for standard interval	

► Ordering Information

	Description	Order Number
Model	DG4162 (160 MHz, dual-channel)	DG4162
	DG4102 (100 MHz, dual- channel)	DG4102
	DG4072 (70 MHz, dual-channel)	DG4072
Standard	Power Cord	-
Accessories	USB Cable	CB-USB
	BNC Cable (1 meter)	CB-BNC-BNC-1
	Quick Guide (Hard Copy)	-
Optional Accessories	Resource CD (including User's Guide and Application Software)	-
	40 dB Attenuator	ATT-40dB
	Rack Mount Kit	RMK-DG-4

RIGOL

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www.rigol.com

For further information,please contact Rigol
local Distributors