RIGOL

Data Sheet

DG2000 Series Function/Arbitrary Waveform Generator

DG2041A

Product Overview

DG2000 Series Function/Arbitrary Waveform Generators adopt DDS technology, which enables to generate stable, high-precision, pure and low distortion signals.

Applications

- Analog Sensor
- Practical Environment Signals
- Circuit Function Test
- IC chip Test

Easy to Use Design

- Clear graphical interface
- Support for Chinese and English menu and input
- Push-help makes information getting more convenient
- File management (support for U disc and local storage)

Main Features

- Adopt advanced DDS technology; 14 bits vertical accuracy; 100 MSa/s maximum sampling rate; 512 kpts waveform length
- Output 10 standard waveforms, DC and user-designed arbitrary waveforms
- Abundant modulation functions: AM, FM, PM, PWM, FSK, linear/logarithm sweep and burst
- Abundant output and input: waveform output; synchronous signal output; attached modulation source, external clock reference 10 MHz input, external trigger input and internal 10MHz clock output
- Standard configuration interfaces: USB Device, USB Host, LAN, RS-232, GPIB, support U-disc storage and Web remote control
- Seamlessly interconnect with DS1000 series digital oscilloscope
- Powerful arbitrary waveform edit software "UltraWave"
- Support remote control via a command line

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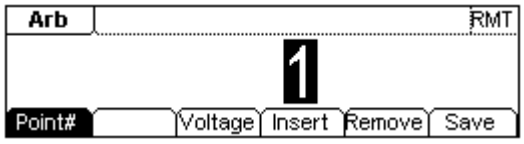
➢ 10 Standard Waves, DC and Editable Arb Waves

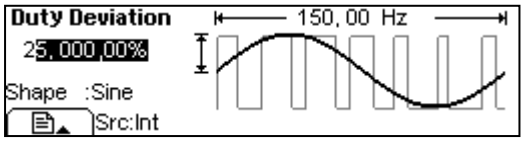


10 Standard Waves and DC Output: Enable to output Sine, Square, Ramp, Pulse, ExpRise, ExpFall, Sinc, Noise and DC waves.

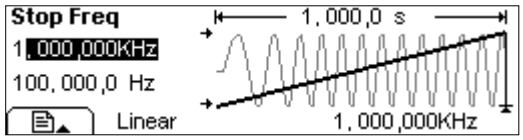
Editable Arb Waves: Enable to edit and output arbitrary wave up to 14bits and 4kpts. In addition, the instrument provides 4 nonvolatile memories for saving custom arbitrary waves. According to Ultrawave, more waves could be edited and saved, or perform analysis for the waves that has already been uploaded to it.

➢ Abundant Modulation Functions, Sweep, Burst

Abundant Modulation Functions: Support AM, FM, PM, PWM and FSK, the modulated waveforms are intuitively shown on the screen.

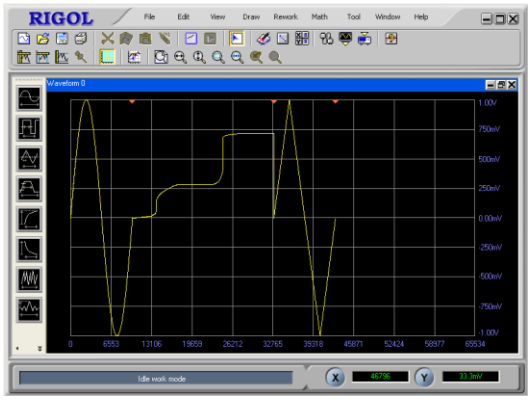


Sweep: It can output in the form of linearity or logarithm from the start frequency to the stop frequency during the sweep time (1 ms ~ 500 s) you specified. Sweeping can be generated by Sine, Square, Ramp or Arbitrary waveforms.



Burst: It can generate versatile waveforms in burst, which can last specific times of waveform cycle (N-Cycle Burst) or output gating pluse if applied external gating signal.

➢ Powerful Waveform Editing Software "UltraWave"



- Windows operation: enable to perform math operations such as"＋"、"－"、"×" for the waves in two windows.
- Absolute operation: enable to perform absolute operation for the selected waves.
- Filter: enable to perform low pass filtering or smoothing for the whole wave.

In order to meet the most basic needs of users, UltraWave provides 9 standard waveforms. In addition, hand drawing, line (point by point) drawing and arbitrary points drawing are also offered to make it easier to create complex waveforms and to edit multiple waves simultaneously through the multi-file management interface.

Either, UltraWave has following utilitarian functions:

- Save the arbitrary wave that has been created as the format of .txt (text file), .csv (CSV file) and .rdf (arbitrary waveform file).
- Read the wave files stored as the format of .Wfm from DS series Digital Oscilloscope.
- Print wavefroms.
- Download the waves have heen created to the internal storage of DG10X2.

Specifications

All the specifications below apply to DG2000 Series Function/ Arbitrary Waveform Generator unless where noted. To come up to these specifications, two conditions must be met firstly:

- The instrument must have been operated continuously for 30 minutes under the specified operating temperature.
- Do perform Self-Calibration through the Utility menu if the range of operating temperature variations up to or more than 5°C.

Note: All specifications are guaranteed unless where marked "typical".

Specifications

Frequency			
Waveforms	Sine, Square, Ramp, Triangle, Pulse, Noise, DC, Arb		
Sine	1 μHz ~ 40 MHz		
Square	1 μHz ~ 40 MHz		
Pulse	500 μHz ~ 16 MHz		
Ramp	1 μHz ~ 400 kHz		
White Noise	20 MHz bandwidth (-3 dB) (typical)		
Resolution	1 μHz		
Accuracy	±50 ppm in 90 days ±100 ppm in 1 year 18°C ~ 28°C		
Temperature Coefficient	< 2 ppm/°C		
Sine Wave Spectrum Purity			
Harmonic Distortion		**< 1 Vpp**	**> 1 Vpp**
	DC ~20 kHz	-70 dBc	-70 dBc
	20 kHz ~ 100 kHz	-65 dBc	-60 dBc
	100 kHz ~ 1 MHz	-50 dBc	-45 dBc
	1 MHz ~ 10 MHz	-40 dBc	-35 dBc
Total Harmonic Distortion	DC ~ 20 kHz，1 Vpp	<0.2%	
Spurious Signal (non-harmonic)	DC ~ 1 MHz	< -70 dBc	
	1 MHz ~ 10 MHz	< -70 dBc + 6 dB/octave	
Phase Noise (10 kHz offset)	-115 dBc / Hz (typical)		
Square Wave			
Rise/Fall Time	< 13 ns (10% ~ 90%) (typical: 1 kHz, 1 Vpp)		
Overshoot	< 2% (typical)		
Duty Cycle	20% ~ 80% (to 8 MHz) 40% ~ 60% (to 16 MHz) 50% (>16 MHz)		
Asymmetry (below 50% Duty Cycle)	1% of period + 5 ns		
Jitter	1 ns + 100 ppm of period		
Ramp Wave			
Linearity	< 0.1% of peak output (typical, 1 kHz, 1 Vpp, 100% Symmetry)		
Symmetry	0.0% ~ 100.0%		
Pulse Wave			

Pulse Width	2000 s max period; 12 ns min period; 1 ns resolution
Variable Edge Time	5 ns ~ 1 ms
Overshoot	< 2%
Jitter	1 ns + 100 ppm of period
Arb Wave	
Frequency Range	1 μHz ~ 12 MHz
Waveform Length	2 ~ 512 k points
Vertical Resolution	14 bits (including sign)
Sampling Rate	100 MSa/s
Minimum Rising /Falling Time	35 ns (Typical)
Jitter (RMS)	6 ns + 30 ppm
Nonvolatile Storage	4 waveforms
Output Characteristics	
Amplitude [1]	20 mVpp ~ 10 Vpp (50 Ω) 40 mVpp ~ 20 Vpp (High Z)
Vertical Accuracy (100 kHz Sine)	± (1% of setting +1 mVpp)
Amplitude Flatness (Sine wave relative to 100 kHz, 5 Vpp)	< 100 kHz 0.1 dB 100 kHz ~ 5 MHz 0.15 dB 5 MHz ~ 40 MHz 0.3 dB
DC Offset	
Range (peak value AC＋DC)	±5 V (50 Ω) ±10 V (High Z)
Offset Accuracy	± (2%of the |Offset Setting| + 0.5% of the amplitude+ 2 mV)
Waveform Output	
Impedance	50 Ω (typical)
Isolation	42 Vpk max. to Earth
Protection	Short-circuit protected; Overload relay automatically disables main output.
AM	
Carrier Waveforms	Sine, Square, Ramp, Arb
Source	Internal/ External
Waveforms	Sine, Square, Ramp, Noise, Arb (2 mHz to 20 kHz)
Modulation Depth	0% ~ 120%
FM	
Carrier Waveforms	Sine, Square, Ramp, Arb
Source	Internal/ External
Modulation waveforms	Sine, Square, Ramp, Noise, Arb (2 mHz to 20 kHz)
Phase Deviation	DC ~ 20 MHz
PM	
Carrier Waveforms	Sine, Square, Ramp, Arb
Source	Internal/ External
Modulation waveforms	Sine, Square, Ramp, Noise, Arb (2 mHz to 20 kHz)
Phase Deviation	0 ~ 360°
FSK	
Carrier Waveforms	Sine, Square, Ramp, Arb (except DC)
Source	Internal/ External
Modulation Waveforms	50% duty cycle square (2 mHz to 100 kHz)

PWM	
Carrier Waveforms	Pulse
Source	Internal/ External
Modulation Waveforms	Sine, Square, Ramp, Noise, Arb (2 mHz to 20 kHz)
Width Deviation	0% ~100% of the pulse width
Sweep	
Carrier Waveforms	Sine, Square, Ramp, Arb
Type	Linear or Logarithmic
Sweep Time	1 ms to 500 s ± 0.1%
Trigger Source	Manual/Internal/External
Burst	
Waveforms	Sine, Square, Ramp, Pulse, Noise, Arb
Types	Count (1 to 50,000 periods), infinite, gated
Start Phase	-360° ~ +360°
Internal Period	1 µs – 500 s ± 1%
Gate Source	External Trigger
Trigger Source	Manual/Internal/External
Rear Panel Connector	
External AM Modulation	± 5 Vpk = 100% modulation 5 kΩ input impedance
Input/Output Frequency Range	10 MHz ± 500 Hz
Input/Output Level Range	80 mVpp ~ 10 Vpp/0 dBm (typical)
Input/Output Impedance	2 kΩ/50 Ω (typical, AC coupled)
Time	< 1 s
External Trigger	TTL compatible
Trigger Input	
Input Level	TTL compatible
Slope	Rising or falling (selectable)
Pulse Width	> 100 ns
Input Impedance	> 10 kΩ, DC coupled
Linear Sweep	< 500 µs (typical)
Latency Sweep	< 500 ns (typical)
Trigger Output	
Electrical Level	TTL compatible, input >1 kΩ
Pulse Width	> 400 ns (typical)
Output Impedance	50 Ω (typical)
Maximum Rate	1 MHz

Remark[1] :

- Amplitude range (50 Ω):
  If output frequency >10 MHz, the range is 20 mVpp ~ 5 Vpp。
- Amplitude range (High Z):
  If output frequency >10 MHz, the range is 40 mVpp ~ 10 Vpp。

General Specifications

Display		
Display Type	Black and White LCD Screen	
Display Resolution	256 Horizontal x 64 Vertical	
Grey Degree	4 Level Grey	
Display Contrast (typical)	150:1	
Backlight Brightness (typical)	300 nit	
Supply Voltage		
Power Consumption	100-240 VACrms, 45-440 Hz, CAT II	
Fuse	Less than 50 W	
Supply Voltage	2 A, T level, 250 V	
Environment		
Ambient Temperature	Operation: 10℃ ~ +40℃	
	Non-operation: -20℃ ~ +60℃	
Cooling Method	Natural cooling	
Humidity Range	Below +35℃: ≤90％ relative humidity	
	+35℃~+40℃: ≤60％relative humidity	
Height above sea level	Operation : below 3,000m	
	Non-operation: below 15,000m	
Mechanism		
Dimension	Width	232 mm
	Height	108 mm
	Depth	288 mm
Weight	Net weight	2.7 kg
	Gross weight	4 kg
IP Protection		
IP2X		
Calibration Interval		
One year suggested		

Ordering Information

Name of Product

RIGOL DG2000 Series Function/Arbitrary Waveform Generator

Model	Frequency
DG2041A	40 MHz

Standard Accessories

- A Power Cord that fits the standard of destination country
- A USB Cable
- A Quick Guide
- A resource CD(including User's Guide)

Optional Accessories

- BNC Cable
- RS-232 Cable

Warranty

Thank you for choosing **RIGOL** products!

RIGOL Technologies, Inc. warrants that this product will be free from defects in materials and workmanship from the date of shipment. If a product proved defective within the respective period, **RIGOL** will provide repair or replacement as described in the complete warranty statement.

For the copy of complete warranty statement or maintenance, please contact with your nearest **RIGOL** sales and service office.

RIGOL do not provide any other warranty items except the one being provided by this summary and the warranty statement. The warranty items include but not being subjected to the hint guarantee items related to tradable characteristic and any particular purpose. **RIGOL** will not take any responsibility in cases regarding to indirect, particular and ensuing damage.

Contact Us

If you have any problem or requirement during using our products, please contact **RIGOL** Technologies, Inc. or the local distributors.

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Or mail to:
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Overseas: Contact the local **RIGOL** distributors or sales office.
For the latest product information and service, visit our website: http://www.rigol.com/