

Chapter 5 Specifications

All the specifications apply to the DG2000 Series Function/ Arbitrary Waveform Generator unless specified statement. To meet these specifications, two conditions must be satisfied first:

- The instrument must be operated continuously for more than 30 minutes within the specified operating temperature.
- **You must perform the "Self-Cal" operation through the Utility menu if the operating temperature changes by more than 5 °C.**

All specifications are guaranteed unless marked "typical"

Specifications

Frequency Characteristic (DG2041A)	
Waveforms	Sine, Square, Ramp, Triangle, Pulse, Noise, DC, Arb
Sine	1 μ Hz to 40MHz
Square	1 μ Hz to 40MHz
Pulse	500 μ Hz to 16MHz
Ramp	1 μ Hz to 400kHz
White Noise	20MHz bandwidth (-3dB) (typical)
Resolution	1 μ Hz
Accuracy	Within 90 days: \pm 50 ppm Within 1 year: \pm 100 ppm 18°C ~ 28°C
Temperature index	< 2 ppm/°C

Frequency Characteristic (DG2021A)	
Waveforms	Sine, Square, Ramp, Triangle, Pulse, Noise, DC, Arb
Sine	1 μ Hz to 25 MHz
Square	1 μ Hz to 25 MHz
Pulse	500 μ Hz to 10MHz
Ramp	1 μ Hz to 250kHz
White Noise	20MHz bandwidth (-3dB) (typical)
Resolution	1 μ Hz
Accuracy	Within 90 days: \pm 50 ppm Within 1 year: \pm 100 ppm 18°C ~ 28°C
Temperature index	< 2 ppm/°C

Sine Wave Spectral Purity			
Harmonic Distortion		< 1 V _{pp}	> 1 V _{pp}
		DC to 20 kHz	-70 dBc
20 kHz to 100 kHz	-65 dBc	-60 dBc	
100 kHz to 1 MHz	-50 dBc	-45 dBc	
1 MHz to 10 MHz	-40 dBc	-35 dBc	
Total Harmonic Distortion	DC to 20 kHz, 1V _{pp}	<0.2%	

Spurious (non-harmonic)	DC to 1 MHz < -70 dBc 1 MHz to 10 MHz < -70 dBc + 6 dB/octave
Phase Noise (10kHz offset)	-115 dBc/Hz (typical)

Square Wave Characteristic	
Rise/Fall Time	< 13 ns (10% to 90%) (typical, 1kHz, 1V _{pp})
Overshoot	< 2% (typical)
Duty Cycle	20% to 80% (to 8 MHz) 40% to 60% (to 16 MHz) 50% (>16 MHz)
Symmetry (below 50% Duty Cycle)	1% of period + 5ns
Jitter	1ns + 100ppm % of period

Ramp Wave Characteristics	
Linearity	< 0.1% of peak output (typical, 1kHz, 1V _{pp} , symmetry 100%)
Symmetry	0% to 100%

Pulse Wave Characteristics	
Pulse Width	2000s max period; 12ns min period; 1ns resolution
Variable Edge Time	5ns to 1ms
Overshoot	< 2%
Jitter	1ns + 100ppm % of period

Arb Wave Characteristics	
Frequency Range	1μHz to 12MHz (DG2041A) 1μHz to 8MHz (DG2021A)
Waveform Length	2 to 512 K points
Amplitude Accuracy	14 bits (including sign)
Sample Rate	100MSa/s
Minimum Edge Time	35ns (typical)
Jitter (RMS)	6 ns + 30ppm
Non-Volatile Storage	4 waveforms

Output Characteristics	
Amplitude ^[1]	20 mV _{pp} ~ 10 V _{pp} (50 Ω) 40 mV _{pp} ~ 20 V _{pp} (High Z)
Amplitude Accuracy (100 kHz sine wave)	± (1% of setting + 1 mV _{pp})
Amplitude Flatness (sine wave relative to 100 kHz, 5 V _{pp})	< 100kHz 0.1 dB
	100kHz to 5 MHz 0.15 dB
	5 MHz to 40 MHz 0.3 dB

DC Offset	
Range (peak AC+DC)	±5V (50Ω) ±10 V (High Z)
Offset Accuracy	± (2% of the Offset Setting + 0.5% of the Amplitude + 2mV)

Waveform Output	
Impedance	50 Ω (typical)
Isolation	42 Vpk max. to Earth
Protection	Short-circuit protected; Overload disables the waveform output automatically

AM Modulation	
Carrier Waveforms	Sine, Square, Ramp, Arb
Source	Internal/ External
Modulating Waveforms	Sine, Square, Ramp , Noise, Arb (2mHz to 20kHz)
Depth	0% ~ 120%

FM Modulation	
Carrier Waveforms	Sine, Square, Ramp, Arb
Source	Internal/ External
Modulating Waveforms	Sine, Square, Ramp, Noise, Arb (2mHz to 20kHz)
Frequency Deviation	DC to 20MHz (DG2041A); 12.5MHz (DG2021A)

PM Modulation	
Carrier Waveforms	Sine, Square, Ramp, Arb
Source	Internal/ External
Modulating Waveforms	Sine, Square, Ramp, Noise, Arb (2mHz to 20kHz)
Phase Deviation	0 to 360°

FSK Modulation	
Carrier Waveforms	Sine, Square, Ramp, Arb

Source	Internal/ External
Modulating Waveforms	50% duty cycle square (2mHz to 100kHz)
PWM Modulation	
Carrier Waveforms	Pulse
Source	Internal/ External
Modulating Waveforms	Sine, Square, Ramp, Noise, Arb (2mHz to 20kHz)
Deviation	pulse width: 0% to 100%
Sweep	
Carrier Waveforms	Sine, Square, Ramp, Arb
Type	Linear or Logarithmic
Sweep Time	1 ms to 500 s \pm 0.1%
Source	Internal/External/Manual
Burst	
Waveforms	Sine, Square, Ramp, Pulse, Noise, Arb
Types	Count (1 to 1,000,000 periods), infinite, gated
Start Phase	-360° to +360°
Internal Period	1 μ s – 500 s \pm 1%
Gate Source	External Trigger
Trigger Source	Internal/External/Manual

Rear Panel Connector	
External AM Modulation	\pm 5 V _{pk} = 100% modulation 5k Ω input impedance
Input/Output Frequency Range	10MHz \pm 500Hz
Input/Output Voltage Range	80mV _{pp} ~10V _{pp} /0dBm (typical)
Input/Output Impedance	2k Ω /50 Ω (typical), AC coupled
Time	<1s
External Trigger	TTL-compatible

Trigger Input	
Input Level	TTL-compatible
Slope	Rising or falling (selectable)
Pulse Width	> 100 ns
Input Impedance	> 10 k Ω , DC coupled
Linear Sweep	< 500 μ s (typical)

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Latency Sweep	< 500 ns (typical)
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Trigger Output	
Level	TTL-compatible into $>1k\Omega$
Pulse Width	$> 400ns$ (typical)
Output Impedance	50Ω (typical)
Maximum Rate	1 MHz

Notes^[1]:

- The amplitude range (50Ω):
The output frequency $>10MHz$, the amplitude range: $20mV_{pp} \sim 5V_{pp}$;
- The amplitude range (High Z):
The output frequency $>10MHz$, the amplitude range: $40mV_{pp} \sim 10V_{pp}$.

General Specifications

Display	
Type	Black and White LCD Screen
Resolution	256 Horizontal x 64 Vertical
Grey Degree	4 Degree Grey Level
Contrast (typical)	150 : 1
Light (typical)	300 nit

Power	
Supply	100-240 VAC _{RMS} , 45-440Hz, CAT II
Consumption	Less than 50W
Fuse	2A, T Level , 250V

Environment	
Temperature Range	Operation: 10°C ~ +40°C
	Non-operation: -20°C ~ +60°C
Cooling	Natural cooling
Humidity Range	Below +35°C: ≤90% relative humidity
	+35°C ~ +40°C: ≤60%relative humidity
Height Range	Operation : below 3,000m
	Non-operation: below 15,000m

Instrument Specifications		
Dimension	Width	232mm
	Height	108mm
	Depth	288mm
Weight	Package excluded	2.7Kg
	Package Included	4Kg

IP Protection
IP2X

Calibration Interval
One year suggested