Specifications DG1022 & DG1022A

All the specifications apply to the DG1022/A Series Function/ Arbitrary Waveform Generator unless specified statement. To meet these specifications, two conditions must be satisfied first:

- The instrument must have operated continuously for more than 30 minutes within the specified operating temperature.
- You must perform the "Test/Cal" operation through the Utility menu if the operating temperature changes by more than $5\,^{\circ}C$.
- All specifications are guaranteed unless marked "typical"

Characteristics

Frequency		
Waveforms	Sine, Square, Ramp, Triangle, Pulse, Noise, Arb	
	DG1022	**DG1022A**
Sine	1µHz ~ 20MHz	1µHz ~ 25MHz
Square	1µHz ~ 5MHz	1µHz ~ 5MHz
Ramp, Triangle	1µHz ~ 150kHz	1µHz ~ 500kHz
Pulse	500µHz ~ 3MHz	500µHz ~ 5MHz
Noise	5MHz (-3dB)	5MHz (-3dB)
Arb	1µHz ~ 5MHz	1µHz ~ 5MHz
Resolution	1 µHz	
Accuracy	±50 ppm in 90 days ±100 ppm in 1year 18°C ~ 28°C	
Temperature index	< 5 ppm/°C	

Sine Wave Spectral Purity				
Harmonic Distortion	**CH1**		**CH2**	
	≤1VPP	>1VPP	≤1VPP	>1VPP
DC-1MHz	-45dBc	-45dBc	-45dBc	-45dBc
1MHz-5MHz	-45dBc	-40dBc	-45dBc	-40dBc
5MHz-20MHz	-45dBc	-35dBc	-45dBc	-35dBc
Total Harmonic Distortion	DC to 20 kHz,1Vpp <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, -108 dBc / Hz (Typical)			

Square Wave		
Rise/Fall Time	< 20 ns (10% to 90%), (Typical, 1kHz, 1 VPP)	
Overshoot	< 5% (Typical, 1kHz 1Vpp)	
Duty Cycle	1µHz to 3MHz	20% to 80%

	3MHz(not contain) to 4MHz	40% to 60%
	4MHz (not contain) to 5MHz	50%
Asymmetry (below 50% Duty Cycle)	1% of period+ 20ns (Typical, 1kHz, 1 V$_{PP}$)	
Jitter	6ns + 0.1% of period (Typical, 1kHz, 1 V$_{PP}$)	

Ramp Wave	
Linearity	< 0.1% of peak output (Typical, 1kHz, 1 V$_{PP}$, 100% Symmetry)
Symmetry	0% to 100%

Pulse Wave	
Pulse Width	2000s max period; 20ns min period; 1ns resolution
Overshoot	< 5%
Jitter	6ns + 100ppm of period

Arb Wave	**CH1**	**CH2**
Waveform Length	4k points	1k points
Amplitude Accuracy	14 bits (including sign)	10 bits (including sign)
Sample Rate	100MSa/s	100MSa/s
Minimum Rising /Falling Time (Typical)	35ns	35ns
Jitter (RMS) (Typical)	6 ns + 30ppm	6 ns + 30ppm
Non-Volatile Storage (Total:10 Waveforms)	10 waveforms	10 waveforms

Output	**DG1022**		**DG1022A**	
Amplitude (50 Ω)	CH1	CH2	CH1	CH2
	2 mV$_{PP}$ ~ 10 V$_{PP}$	2 mV$_{PP}$ ~ 3 V$_{PP}$	≤20MHz: 2 mV$_{PP}$～10 V$_{PP}$; >20MHz: 2 mV$_{PP}$～5 V$_{PP}$;	2 mV$_{PP}$ ~ 3 V$_{PP}$

Amplitude Accuracy (1kHz Sine) [1]	±(2% of setting + 2mV_PP)		± (2% of setting+2 mV_PP)	
Amplitude Flatness (Sine wave relative to 1kHz, 5V_PP) [1]	<100kHz	0.1 dB	<100kHz	0.1 dB
	100kHz ~ 5MHz	0.15 dB	100kHz ~ 5MHz	0.15 dB
	5MHz ~ 20MHz	0.3 dB	5MHz ~ 25MHz	0.3 dB

DC Offset	CH1	CH2
Range (DC)	5V (50Ω) 10 V (High Z)	1.5V (50Ω) 3 V (High Z)
Accuracy	± (2% of the |Offset Setting|+ 2mV)	± (2% of the |Offset Setting|+ 2mV)

Waveform Output	CH1	CH2
Impedance	50 Ω (Typical)	50 Ω (Typical)
Protection[2]	Short-circuit protected, overload relay automatically disables main output	Short-circuit protected

AM (CH1)	
Carrier Waveforms	Sine, Square, Ramp, Arb (Except DC)
Source	Internal/ External
Modulating Waveforms	Sine, Square, UpRamp, DnRamp,Triangle, Noise, Arb (2mHz to 20kHz)
Depth	0% ~ 120%
FM (CH1)	
Carrier Waveforms	Sine, Square, Ramp, Arb (Except DC)
Source	Internal/ External
Modulating Waveforms	Sine, Square, UpRamp, DnRamp,Triangle, Noise, Arb (2mHz to 20kHz)
Frequency Deviation	DC~ 10 MHz
PM (CH1)	
Carrier Waveforms	Sine, Square, Ramp, Arb (Except DC)
Source	Internal/ External
Modulating Waveforms	Sine, Square, UpRamp, DnRamp,Triangle, Noise, Arb

	(2mHz to 20kHz)
Phase Deviation	0 to 360°

FSK (CH1)	
Carrier Waveforms	Sine, Square, Ramp, Arb (Except DC)
Source	Internal/ External
Modulating Waveforms	50% duty cycle square (2mHz to 50kHz)

Sweep (CH1)	
Carrier Waveforms	Sine, Square, Ramp, Arb (Except DC)
Type	Linear or Logarithmic
Direction	Up or Down
Sweep Time	1 ms to 500 s ± 0.1%
Source	Internal/External/Manual

Burst (CH1)	
Waveforms	Sine, Square, Ramp, Pulse, Noise, Arb (Except DC)
Types	Count (1 to 50,000 periods), infinite, gated
Start Phase	-180° to +180°
Internal Period	1 µs – 500s ± 1%
Gate Source	External Trigger
Trigger Source	Internal/External/Manual

Rear Panel Connector[3]	
External Modulation	± 5 V_{PK} = 100% modulation
	5kΩ input impedance
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
Latency	Sweep: < 500 µs (Typical)

	Burst: < 500 ns (Typical)

Trigger Output	
Level	TTL-compatible into >1kΩ
Pulse Width	> 400ns (Typical)
Output Impedance	50Ω (Typical)
Maximum Rate	1 MHz

Sync Output (CH1)	
Level	TTL-compatible into >1kΩ
Pulse Width	> 50ns (Typical)
Output Impedance	50Ω (Typical)
Maximum Frequency	2 MHz

Counter Specification			
Function	Frequency, period, positive/negative Pulse width, Duty cycle		
Frequency range	Single channel: 100mHz ~ 200MHz		
Frequency resolution	6 digits/second		
Voltage range and sensitivity (not modulated signal)			
Auto mode	1Hz to 200MHz	200 mV$_{PP}$ to 5 V$_{PP}$	
Manual mode	DC	DC offset range	±1.5 VDC
		100mHz~100MHz	20m V$_{RMS}$ to ±5 Vac+dc
		100MHz~200MHz	40m V$_{RMS}$ to ±5 Vac+dc
	AC	1Hz~100MHz	50m V$_{PP}$ to ±5 V$_{PP}$
		100MHz~200MHz	100m V$_{PP}$ to ±5 V$_{PP}$
Pulse width and Duty cycle measure	1Hz to 10MHz (100mV$_{PP}$ ~ 10V$_{PP}$)		
Input adjust	Input impedance		1MΩ
	Coupling mode		AC, DC
	High frequency restrain		High frequency noise restrain (HFR) on or off
	sensitivity		Low, Medium, High

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Trigger mode	The trigger level can adjust manually/ automatically
	Trigger level range: ±3 V (0.1% to 100﹪)
	Resolution: 6 mV

NOTE:

[1] In atypical condition, the specification may have minor differences.

[2] In normal temperature, short circuit in less than half hour will be tolerable.

- CH1 is provided with **Overvoltage** function. When the output terminal is connected to an external circuit, the relationships between the output voltage "Vout" of generator and the voltage "Vin" possibly generated by external circuit are:

    If Vout≤1V$_{DC}$, the protective range of Vin is ±6.5V

    If Vout>1V$_{DC}$, the protective range of Vin is ±12.5V

    Thereinto, Vout=Amplitude/2+|Offset|, the Amplitude and Offset are the parameters of the signal outputted from generator.

    The generator will cut off the output automatically when Vin exceeds the specified range.

- The voltage inputted to the output connector of CH2 should be within ±3V.

[3] External input voltage should be within ±5V, or else the generator may be damaged.

General Specifications

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

Power	
Supply	100-240 VAC$_{RMS}$, 45~440Hz, CAT II
Consumption	Less than 40W
Fuse	2A, T Level , 250V

Environment	
Temperature Range	Operation: 10℃~+40℃
	Non-operation: -20℃~+60℃
Cooling	Natural cooling
Humidity Range	Below +35℃: ≤90％ relative humidity
	+35℃~+40℃: ≤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	2.65kg
	Package Included	4kg

IP Protection
IP2X

Calibration Interval
One year suggested

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