

G51 Series

Function/Arbitrary Generator

DENVER
metrología electrónica, S.L.

Interface:

STD. USB & (LAN: LXI for G5100A)

OPT. GPIB / RS-232

(Conform to USBTMC&IEEE-488.2)



G5100A 50 MHz Function/Arbitrary Waveform Generator

- **Features:** Sine (50 MHz), Square (25 MHz), Arbitrary (10 MHz)
- **Freq. Resolution:** 1 μ Hz
- **Arbitrary:** 14-Bit, 125 MSa/s, 256 K-Point
- **Capability:** Sine, Square, Ramp, Triangle, Pulse, Noise, DC, Exponential Rise and Fall, Negative Ramp, Sin(x)/x, Cardiac
- **Modulation:**
 - AM/FM/PM/PWM: 2 mHz ~ 20 KHz
 - FSK: 2 mHz ~ 100 KHz
 - External Modulation Input: ± 5 V full scale, 8.7 K Ω Typical, DC to 20 KHz
 - Sweep: Linear/Logarithmic/Arb. Time (1 ms ~ 500 Sec.) Marker (Falling Edge of Sync Signal - Freq.: Programmable)
 - Burst: Counted (1 ~ 50 K Cycles), Infinite, Gated. Phase (-360° to +360°). Internal Period (1 μ s ~ 500 Sec.)
 - Trigger Input: TTL Compatible, Rising or Falling, Pulse Width (> 100ns), Impedance (>10 K Ω , DC Coupled), Latency (<500 ns)
 - Trigger Output: TTL Compatible into ≥ 1 K Ω . Output Impedance (50 Ω Typical). Max. Rate (1 MHz).
- **Amplitude Range:** 20 mVpp to 20 Vpp into Open Circuit
- **Display:** Graphic Mode (Visual Verification of Signal Settings)
- **Pattern Out:** 16-Bit Data Output + Clock
- **Time Base:** 10 MHz Input/Output
- **Free Software:** WavePatt
- **Dimension & Weight:** (for Rack) 214.6(W) x 88.6(H) x 346.9(D) mm, 3100 g
- **Optional Accessories:**
 - M3500-opt04: GPIB Card
 - M3500-opt06: RS-232 Card

G5110A 15 MHz Function/Arbitrary Waveform Generator

- **Features:** Sine (15 MHz), Square (15 MHz), Arbitrary (3 MHz)
- **Freq. Resolution:** 1 mHz
- **Arbitrary:** 14-Bit, 50 MSa/s, 8 K-Point
- **Capability:** Sine, Square, Ramp, Triangle, Pulse, DC, Exponential Rise and Fall, Negative Ramp, Sin(x)/x, Cardiac
- **Modulation:**
 - AM/FM/PM/PWM: 2 mHz ~ 20 KHz
 - FSK: 2 mHz ~ 100 KHz
 - Sweep: Linear or Logarithmic. Time (1 ms ~ 500 Sec.) Marker (Falling Edge of Sync Signal - Freq.: Programmable)
 - Burst: Counted (1 ~ 50 K Cycles), Infinite. Phase (-360° to +360°). Internal Period (1 μ s ~ 500 Sec.)
- **Amplitude Range:** 20 mVpp to 20 Vpp into Open Circuit
- **Display:** Text Mode LCD
- **Free Software:** WavePatt
- **Dimension & Weight:** (for Rack) 214.6(W) x 88.6(H) x 280.7(D) mm, 2120 g
- **Optional Accessories:**
 - G5110-opt01: External Time Base Card
 - M3500-opt04: GPIB Card
 - M3500-opt06: RS-232 Card



Display & Capability

Display:	(G5100A) Graphic Mode for Visual Verification of Signal Settings (G5110) Text Mode LCD
Standard Waveforms:	Sine, Square, Ramp, Triangle, Pulse, Noise, DC Sine, Square, Ramp, Triangle, Pulse, DC
Built-In Arbitrary Waveforms:	Exponential Rise & Fall, Negative Ramp, Sin(x)/x, Cardiac

Waveform Characteristics

Frequency: 1 μ Hz ~ 50 MHz / 1 mHz ~ 15 MHz	
Amplitude Flatness: ^{1,2}	0.1 dB (< 100 KHz), 0.15 dB (< 5 MHz), 0.3 dB (Relative to 1 KHz) (< 20 MHz), 0.5 dB (< 50 MHz)
Harmonic Distortion: ^{2,3}	DC ~ 20 KHz, -70 (< 1 Vpp) -70 (\geq 1 Vpp) -65 (< 1 Vpp) -65 (\geq 1 Vpp) 20 KHz ~ 100 KHz, -65 (< 1 Vpp) -60 (\geq 1 Vpp) 100 KHz ~ 1 MHz, -50 (< 1 Vpp) -45 (\geq 1 Vpp) 1 MHz ~ 20 MHz, -40 (< 1 Vpp) -35 (\geq 1 Vpp) 20 MHz ~ 50 MHz, -35 (< 1 Vpp) -30 (\geq 1 Vpp)
Total Harmonic Distortion:	DC ~ 20 KHz, Out put \geq 0.5 Vpp (THD + N \leq 0.06 %)
Spurious: ^{2,4}	DC ~ 1 MHz, -70 dBc 1 MHz ~ 50 MHz, -70 dBc + 6 dB/octave DC ~ 1 MHz, -60 dBc 1 MHz ~ 15 MHz, -60 dBc + 6 dB/octave
Phase Noise:	-115 dBc/Hz (Typical), when f \geq 1 MHz, V \geq 0.1 Vpp (10 KHz Offset) -100 dBc/Hz (Typical), when f \geq 1 MHz, V \geq 0.1 Vpp
Frequency:	1 μ Hz ~ 25 MHz / 1 mHz ~ 15 MHz
Rise/Fall Time:	< 10 ns / < 15 ns
Overshoot:	< 2 %
Square:	Variable : 20 % ~ 80 % (to 10 MHz) 20 % ~ 80 % (to 5 MHz) Duty Cycle : 40 % ~ 60 % (to 25 MHz) 40 % ~ 60 % (to 15 MHz)
Asymmetry:	1 % of Period + 5 ns (@ 50 % Duty)
Jitter (RMS):	200 ps, when f \geq 1 MHz, V \geq 0.1 Vpp 1 ns + 100 ppm of Period
Ramp, Triangle:	Frequency: 1 μ Hz ~ 200 KHz / 1 mHz ~ 200 KHz Linearity: < 0.1 % of Peak Output / < 0.2 % of Peak Output Symmetry: 0.0 % ~ 100.0 % / 5.0 % ~ 95.0 %
Pulse:	Frequency: 500 μ Hz ~ 10 MHz / 1 mHz ~ 5 MHz Width: 20 ns Minimum / 40 ns Minimum Variable : < 10 ns ~ 100 ns / < 15 ns Edge Time : Overshoot: < 2 % Jitter (Rms): 200 ps, when f \geq 50 kHz, V \geq 0.1 Vpp 300 ps + 0.1 ppm of Period
Noise:	Bandwidth: 20 MHz (Typical) / Not Support Frequency: 1 μ Hz ~ 10 MHz / 1 mHz ~ 3 MHz Length: 2 ~ 256 K / 2 ~ 8 K Resolution: 14 Bits (Including Sign) Sample Rate: 125 MSa/s / 50 MSa/s
Arb.:	Rise/Fall Time (Min) : 30 ns (Typical) / 50 ns (Typical) Linearity: < 0.1 % of Peak Output / < 0.5 % of Peak Output Setting Time: < 250 ns ~ 0.5 % of Final Value < 250 ns ~ 2 % of Final Value Jitter (RMS): 6 ns + 30 ppm / 12 ns + 60 ppm Non-Volatile : 4 Waveforms x 265 K Points Memory : 8 Waveforms x 8 K Points

Modulation

Type	Carrier	Source/Trig	Internal Modulation Shape/Type	Freq/Time
AM	Sine, Square ⁹	Source: Internal/External	Sine, Square, Ramp, Triangle, Noise, Arb	2 mHz 20 KHz
FM, PM	Sine, Square, Ramp, Arb		50 % Duty Square	2 mHz 100 KHz
PWM	Pulse	Trig: Internal/External/ Manual	Linear/Log, Arb	1 ms ~ 500 s
FSK	Sine, Square, Ramp, Arb		Counted Infinite	1 μ s ~ 500 s 1 ~ 50 K (Cycles)
Sweep	Sine, Square, Ramp, Noise, Arb		Gated	

Common Characteristics

Freq.:	Resolution: 1 μ Hz / 1 mHz
Range:	10 mVpp ~ 10 Vpp in 50 Ω 20 mVpp ~ 20 Vpp in Hi-Z
Ampl.:	Accuracy: ^{1,2} \pm 1 % of Setting \pm 1 mVpp / \pm 2 % of Setting \pm 2 mVpp (at 1 KHz) Units: Vpp, Vrms, dBm Resolution: 4 Digits / 3 Digits
DC Offset:	Peak Range : \pm 5 V in 50 Ω \pm 10 V in Hi-Z Accuracy: ^{1,2} \pm 2 % of Offset Setting \pm 0.5 % of Amplitude Setting \pm 2 mV \pm 2 % of Offset Setting \pm 1 % of Amplitude Setting \pm 3 mV Resolution: 4 Digits / 3 Digits
Main Output:	Impedance: 50 Ω (Typical) Isolation: 42 Vpk Maximum Protection: Short-Circuit Protected; Overload Automatically Disables Main Output
Internal Frequency:	\pm 10 ppm in 90 Days
Reference Accuracy:	\pm 20 ppm in 1 Year
Ext. Freq. Reference:	Standard / Optional
Ext. Freq. Input:	Lock Range: 10 MHz \pm 500 Hz Level: 100 mVpp ~ 5 Vpp Impedance: 1 K Ω (Typical), AC Coupled Lock Time: < 2 Sec
Ext. Freq. Output:	Lock Range: 10 MHz Level: 632 mVpp (0 dBm), Typical Impedance: 50 Ω (Typical), AC Coupled
Phase Offset:	Range: -360 $^\circ$ ~ +360 $^\circ$ Resolution: 0.001 Accuracy: 8 ns / 20 ns
External Modulation Input:	Voltage Range: \pm 5V Full Scale / NS Input Resistance: 8K Ω Typical / NS Bandwidth: DC ~ 20 KHz / NS
Trigger Input:	Level: TTL Compatible / NS Slope: Rising or Falling (Selectable) / NS Pulse Width: > 100 ns / NS Impedance: > 100 K Ω , DC Coupled / NS Latency: < 500 ns / NS
Trigger Output:	Level: TTL Compatible into \geq 1 K Ω / NS Pulse Width: > 400 ns / NS Output Impedance: 50 Ω Typical / NS Maximum Rate: 1 MHz / NS Fan-Out: \leq 4 Picotest G5100As / NS

Pattern Mode Characteristics

Clock:	Maximum Rate: 50 MHz / NS
Output:	Level: TTL Compatible into \geq 2 K Ω / NS Impedance: 110 Ω Typical / NS
Pattern:	Length: 2 ~ 256 / NS

General Specifications

Item	Description	Item	Description
Power Supply	CAT II 110 ~ 240 V AC \pm 10 %	Warm-Up Time	1 Hour
Power Cord Freq.	50 Hz ~ 60 Hz \pm 10 %	Language	SCPI-1993, IEEE-488.2
Power Consumption	80 VA Max. 35 VA Max.	Dimension	214.6(W) x 88.6(H) x 346.9(D) mm 214.6(W) x 88.6(H) x 280.7(D) mm
Operating Environment	0 ~ 55 $^\circ$ C	Weight	3100 g / 2120g
Storage Environment	-30 $^\circ$ C ~ 70 $^\circ$ C	Safety	IEC61010-1 EN61010-1
Operating Altitude	Up to 2000 m	EMC	EN61326
Operating Humidity	Max. Rel. Humidity 80 % for Temp. up to 31 $^\circ$ C Decreasing Linearly to 50 % Rel. Humidity at 40 $^\circ$ C	Interface	STD. USB & LAN OPT. GPIB or RS-232 STD. USB / OPT. GPIB or RS-232
		Warranty	1 Year
		Recycle Level	

- Add 1/10th of output amplitude and offset spec per $^\circ$ C to operation outside the range of 18 $^\circ$ C ~ 28 $^\circ$ C.
- The autorange is enabled.
- DC offset is set to 0 V.
- The spurious output at low amplitude is typical -75 / (-70) dBm.
- Add 1 ppm / $^\circ$ C average to operation outside the range of 18 $^\circ$ C ~ 28 $^\circ$ C.
- The sine and square waveforms above 10 MHz / (3 MHz) are allowed only with an "infinite" burst count.
- The FSK uses trigger input (1 MHz Max.).
- The words in gray are for the model G5110A. No gray description represents "the same as G5100A."
- The words in red and "NS" in gray stand for the functions which are "Not Supported" by G5110A.