

G51 Series

Function/Arbitrary Generator

Interface:

STD. USB & (LAN: LXI for G5100A)
OPT. GPIB / RS-232
(Conform to USBTMC&IEEE-488.2)

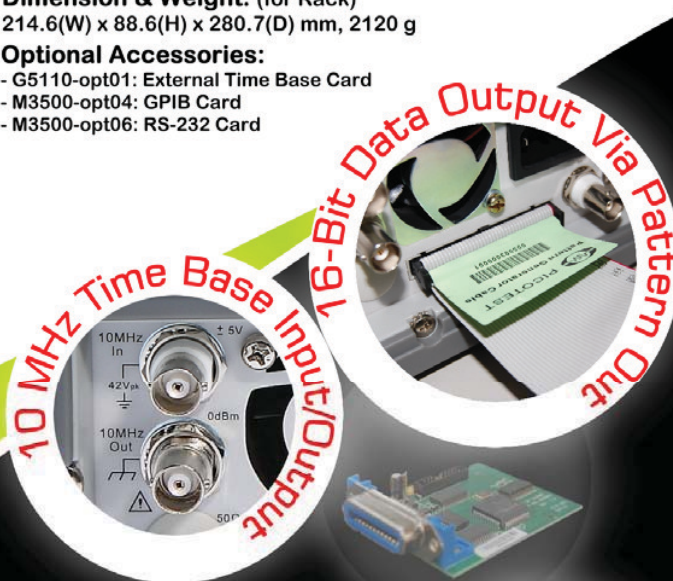


G5100A 50 MHz Function/Arbitrary Waveform Generator

- **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

Frequency: 1 μ HZ ~ 50 MHz

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)

Sine: DC ~ 20 KHz, -70 (< 1 Vpp) -70 ($\geq$ 1 Vpp)
-65 (< 1 Vpp) -65 ($\geq$ 1 Vpp)
Harmonic Distortion^{2,3}: 20 KHz ~ 100 KHz, -65 (< 1 Vpp) -60 ($\geq$ 1 Vpp)
100 KHz ~ 1 MHz, -50 (< 1 Vpp) -45 ($\geq$ 1 Vpp)
(Unit: dBc) 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
(Non-Harmonic): 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 %

Frequency: 500 μ HZ ~ 10 MHz / 1 mHz ~ 5 MHz

Width: 20 ns Minimum / 40 ns Minimum

Pulse: Variable: < 10 ns ~ 100 ns / < 15 ns

Edge Time: < 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 Memory: 4 Waveforms x 265 K Points
8 Waveforms x 8 K Points

Modulation

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

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} (at 1 KHz):	± 1 % of Setting ± 1 mVpp / ± 2 % of Setting ± 2 mVpp
	Units:	Vpp, Vrms, dBm
	Resolution:	4 Digits / 3 Digits
	Peak Range (AC + DC):	± 5 V in 50 Ω ± 10 V in Hi-Z
DC Offset:	Accuracy ^{1,2} :	± 2 % of Offset Setting ± 0.5 % of Amplitude Setting ± 2 mV ± 2 % of Offset Setting ± 1 % of Amplitude Setting ± 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 ⁸ :	± 10 ppm in 90 Days
	Reference Accuracy:	± 20 ppm in 1 Year
	Ext. Freq. Reference:	Standard / Optional
Ext. Freq.:	Lock Range:	10 MHz $\pm$ 500 Hz
Input:	Level:	100 mVpp ~ 5 Vpp
	Impedance:	1 K Ω (Typical), AC Coupled
	Lock Time:	< 2 Sec
Ext. Freq.:	Lock Range:	10 MHz
Output:	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 ⁷ :	Voltage Range:	± 5 V Full Scale / NS
Modulation:	Input Resistance:	8K Ω Typical / NS
Input:	Bandwidth:	DC ~ 20 KHz / NS
	Level:	TTL Compatible / NS
Trigger:	Slope:	Rising or Falling (Selectable) / NS
Input:	Pulse Width:	> 100 ns / NS
	Impedance:	> 100 K Ω , DC Coupled / NS
	Latency:	< 500 ns / NS
	Level:	TTL Compatible into $\geq$ 1 K Ω / NS
Trigger:	Pulse Width:	> 400 ns / NS
Output:	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 ± 10 %	Warm-Up Time	1 Hour
Power Cord Freq.	50 Hz ~ 60 Hz ± 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	

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

For more information, please refer to the user's manuals.

The specifications are subject to change without notice due to design improvements.