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GX1200 SERIES

ARBITRARY FUNCTION GENERATOR PXI CARD

- 50 MS/s (GX1200) and 100 MS/s (GX1201) sample rates
- Programmable 10 digit sample clock with resolution of 1 uHz
- 14-bit vertical resolution
- 2 M samples memory depth
- FM modes: FSK, ramped FSK, sweep, FM, and arbitrary FM



DESCRIPTION

The GX1200 and GX1201 are high performance, single-channel PXI arbitrary waveform generators that combine a function generator, arbitrary waveform synthesizer, programmable sequencer, pulse generator, and modulation generator in one instrument. The GX1200 Series delivers all this at a lower cost than comparable benchtop or VXI-based instruments.

FEATURES

With high sample rates of 50 MS/s (GX1200) and 100 MS/s (GX1201), the GX1200 Series is an ideal modulation source for troubleshooting encoding schemes. Both models also provide high speed waveforms to stimulate signal distortion, power line cycle dropouts, video signals, components failures and power supply transients.

The GX1200 Series comes standard with 2 M samples of waveform memory, accessible via a high speed interface. Waveform memory is segmentable. This allows for storage and access of up to 4,096 different waveforms rapidly without having to download waveforms multiple times, which in turn enhances test throughput.

ArbConnection Software

The GX1200 Series includes ArbConnection software to control instrument functions, modes, and features. Freehand sketch allows the user to draw custom waveforms - allowing for easy creation of custom analog signals. The built-in equation editor allows for the creation of exotic functions, adding or subtracting components of a Fourier series for the characterization of digital or analog filters, or to inject random noise into a signal to test immunity to auxiliary noise.

Sequencing

The GX1200 Series offers powerful sequencing capabilities which allows linkage of up to 4,096 waveform segments and/or bursts (repeated segments) into strings. A segment can be repeated up to 128 K times in burst mode. Sequenced functions can either run continuously or be initiated via a trigger. It is also possible to mix continuous and triggered segments within one sequence. These sequencing features permit the creation of complex waveforms or pulse patterns using a minimal amount of memory. Sequences are created by writing a sequence table. Sequence table downloads are extremely fast as ArbConnection writes directly to the register and does not require the overhead of an embedded controller.

Triggering

Combining PXI trigger lines with the GX1200 Series' sync capability transforms the GX1200 into an Arbitrary Trigger Generator. In addition to continuous output, the instrument can also wait for a trigger to initiate a single waveform, a burst of waveforms or a sequence of waveforms. Triggers can also be used to advance a sequence of waveforms one segment at a time. The GX1200 Series accepts the triggers from multiple sources: eight backplane trigger lines plus the PXI STAR trigger, the front panel trigger input, and manual commands such as *TRG.

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Sample Clock

The GX1200 Series offers outstanding low phase noise characteristics and carrier stability. Such characteristics are essential in telecommunication and channel separation applications. Also, the output of the GX1200 Series can be made extremely agile for applications needing sweep, FSK, and FM. The sample clock of the instrument is derived from a Direct Digital Synthesis (DDS) circuit so controlling instantaneous frequency is a matter of changing its input bits.
Functions such as wide-band FM, wander, linear, and logarithmic sweep are easily created and executed by the generator. A unique and extremely useful feature of ArbConnection is the FM Composer. The FM composer screen is similar to the Wave Composer screen, except the Y-axis is provided in units of frequency, so waveforms created using the FM composer generate frequency change over time.

Arbitrary Waveforms

The GX1200 Series can also function as an Arbitrary Waveform Generator. Combined with the power of ArbConnection, there is virtually no limit to what can be created and generated. Waveform coordinates can be imported from a variety of sources such as MathLab, ASCII files, etc. Anything displayed on one of the composer screens can be downloaded quickly and generated by the main output. Two or more GX1200 or GX1201s can be placed in a chassis to harness the power of multi-instrument synchronization and create multiple, phase-controlled output channels, then vary module-to-module phase offsets to create a multi-phase signal source.

PROGRAMMING AND SOFTWARE

The board is supplied with a 32-bit DLL driver. Various interface files provide access to the DLL from programming tools and languages such as ATEasy, LabVIEW, C/C++, Microsoft Visual Basic®, Delphi, and more. The available virtual panel can be used to interactively adjust and control the instrument from a window that displays the instrument's current settings and status.
An On-Line help file and PDF User's Guide provides documentation that includes instructions for installing, using and programming the board.

APPLICATIONS

- Video
- Navigation
- Radar
- Sonar
- Electronic Warfare Simulation
- Converter Testing
- Filter Design
- Computer Peripherals
- Data Storage

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SPECIFICATIONS

STANDARD WAVEFORMS	
Sine, triangle, square, pulse, ramp, sinc (sine(x)/x), Guassian pulse, exponential fall, rising pulse, noise, DC	
Frequency Range	Waveform dependent
Source	Internal synthesizer
SINE	
Frequency Range	100 μHz to 25 MHz (GX1200) 100 μHz to 50 MHz (GX1201)
Band Flatness	5% to 10 MHz; 20% to 50 MHz (GX1200) 5% to 10 MHz; 20% to 25 MHz (GX1201)
Programmable Parameters	Start phase, 0 °C to +360 °C
Harmonics and Non-Related Spurious	at 5 V_{PP}< -55 dBc for carrier frequencies 1 MHz <-45 dBc for carrier frequencies 5 MHz <-35 dBc for carrier frequencies 10 MHz <-28 dBc for carrier frequencies 25 MHz (GX1200) <-22 dBc for carrier frequencies 50 MHz (GX1201)
THD	0.05% to 100 kHz
TRIANGLE	
Frequency Range	100 μHz to 12.5 MHz
Start Phase	0 °C to +360 °C
SQUARE	
Frequency Range	100 μHz to 25 MHz (GX1200) 100 μHz to 50 MHz (GX1201)
Duty Cycle	1% to 99%
Rise / Fall Time	<10 ns
Aberration	<5% ± 10 mV
PULSE	
Frequency Range	100 μHz to 6.25 MHz
Adjustable Parameters	Delay, Rise Time, High Time, and Fall Time: 0% to 99% of period
Rise / Fall Time	<10 ns
Aberration	<5% ± 10 mV
RAMP	
Frequency Range	100 μHz to 12.5 MHz
Adjustable Parameters	Delay, Rise Time, and Fall Time: 0% to 99% of period
SINC (SINE(X) / X)	
Frequency Range	100 μHz to 3.125 MHz
"0" Crossing	4 to 100 cycles

GAUSSIAN PULSE	
Frequency Range	100 μHz to 3.125 MHz
Time Constant	10 to 200
EXPONENTIAL RISE / FALL	
Frequency Range	100 μHz to 6.25 MHz
Time Constant	10 to 200
Noise Bandwidth	25 MHz
DC	
Range	-100% to 100% of amplitude
ARBITRARY WAVEFORMS	
Range	100 mS/s to 50 MS/s
Vertical Resolution	14 bits (16,384)
Waveform Memory	2 Meg points per second
Download Rate	5 Meg points per second
MEMORY SEGMENTATION	
Number of Segments	1 to 4,096
Minimum Segment Size	16 points
Memory Interleave	4 (Trace lengths must be multiples 4)
SEQUENCED ARBITRARY WAVEFORMS	
Permits division of the memory bank into smaller segements. Segments may be linked and repeated in user-selectable fashion to generate extremely long waveforms.	
Automatic Sequence Advance	No triggers required to step from one segment to the next. Sequence is repeated continuously through a preprogrammed sequence list (table)
Stepped Sequence Advance	Current segment is sampled continuously, external trigger advances to next programmed segment. Control input is TRIG IN connector.
Single Sequence Advance	Current segment is sampled to the end of the segment including repeats and idles there. Next trigger advances to next segment. Control input is TRIG IN connector.
Mixed Sequence Advance	Each step of a sequence can be programmed to advance a) automatically (automatic Sequence Advance), or b) with a trigger (Stepped Sequence advance)
Advance Source	External, internal, or soft trigger
Sequencer Steps	From 1 to 4,096
Segment Loops	From 1 to 128 K

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COMMON CHARACTERISTICS	
MAIN OUTPUT	
Connector	Front panel BNC
Stand-By	Output off or normal
Impedance	50 ohm, ±1%
Protection	Protected against shorts to case ground
FREQUENCY	
Resolution	10 digits limited by 1 S/s
Accuracy	1 ppm
Stability	1 ppm
Reference	
Standard	0.0001% (1 ppm TCXO) initial tolerance over a 19 °C to 29 °C temperature range; 1 ppm / below 19 °C and above 29 °C; 1 ppm / year aging rate
External	10 MHz TTL, 50% ± 2% duty cycle
Amplitude	
Range	80 mV to 8 V_{PP} into 50 ohm; double into open circuit
Resolution	4 digits
Accuracy	800 mV to 8 V_{PP} ± (1% + 10 mV) 80 mV to 799.9 mV_{PP} ± (1% + 1 mV)
OFFSET	
Range	0 to ±3.6 V, amplitude dependent
Resolution	2.2 mV
Accuracy **4 V Window** **400 MV Window**	 ±(1% of reading + 1% of amplitude + 2 mV) ±(1% of reading + 1% of amplitude + 200V)
Filters	50 MHz Elliptic 25 MHz Elliptic

SYNC / MARKER OUTPUT	
Provides dual functionality. Sync, which is sychronous with the output waveform, and Marker in FM and sweep modes.	
Outputs	Front panel SYNC output BNC PXI backplane TTLTrig 0 through 7 programmable
Validators	BIT, LCOM
Level	> 2 V into 50 ohm, 4 V nominal into 10 K ohm
Protection	Temporary short case to ground
Position	Point 0 to n, programmable with four-point resoltion
Width **Range** **Resolution**	 4 to 100,000 waveform points Programmable with four points resolution
Source	Main output
SINEWAVE OUTPUT	
An output that is directly derived from the sample clock generator and has an output frequency equal to the programmed sample clock frequency, including modulated waveform such as FM, sweep, and FSK.	
Connector	Front panel SMB
Impedance	5 ohm, ±1%
Level	1 V into 50 ohm
Protection	Temporary short case to ground
Source	Sample clock frequency
Frequency Range And Resolution	Same as Sample clock
Flatness	-3 dB at 100 MHz
THD	0.3% to 100 kHz
Harmonics and Non-Related Spurious	-55 dBc to 1 MHz -45 dBc to 10 MHz -35 dBc < 50 MHz (GX1200); -35 dBc < 1000 MHz (GX1201)

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INPUTS	
Trig Input	
Connectors	Front panel BNC
Impedance	10 K ohm, ±5%
Threshold Level	TTL
Damage Level	± 10 V
Minimum Pulse Width	20 ns
Slope	Positive or negative going edge
10 MHz Reference Input	
Connector	Front panel SMB
Impedance	10 K ohm, ±5%
Threshold Level	TTL
Damage Level	± 10 V
Duty Cycle	50%, ±5%

MODULATION	
Waveform Modulation	Sine, triangle, square, pulse, ramp, sinc (sine(x)/x), Gaussian pulse, exponential fall, rising pulse, noise, DC, arb
Source	Internal
Resolution	10 digits
Accuracy	0.1%
Modulating Frequency Distortion	<0.1%
Deviation Range	100 mS/s to 50 MS/s (GX1200) 100 mS/s to 100 MS/s (GX1201)
Advanced Mode	Automatic, triggered, gated, or software command
Marker Output And Level Position	Same as SYNC output Fixed at carrier frequency

START / STOP CONTROL (BREAKPOINT)	
Range	0 to 1,999,999 waveform points (2 Meg)
Source	External (rear panel trigger input BNC) or software command
Resolution	4 points
Breakpoint Error	±4 points

SYSTEM DELAY	
Trigger to Waveform Output	One Sample Clock + 120 ns
Gated Mode	External signal enables generator. First output cycle synchronous with the activeslope of the triggering signal. Last cycle of output waveform always completed.

BURST	
Waveforms	Sine, triangle, square, pulse, ramp, sinc (sine(x)/x), Gaussian pulse, exponential fall, rising pulse, noise, DC, and arb
Number of Cycles per Burst	1 to 128 K
Trigger Source	Manual, external, or interna

MULTIPLE INSTRUMENT SYNCHRONIZATION

Multiple instruments can be connected together and synchronized to provide multichannel synchronization.

SAMPLE CLOCK	
Source	From master card to slave boards through the local bus
Range And Resolution	Same as Sample Clock (GX1200) Same as Sample Clock, but limited to 80 MS/s (GX1201)
Initial Skew	<20 ns to the first master; 20 ns cumulative to additional slaves
Phase Offset Between Instruments	Programmable from 0 to n points

GENERAL	
Power Requirements	10 W (max)
Current Consumption	+5 V @ 30 mA +12 V @ 200 mA -12 V @ 200 mA +3.3 V @ 1.4 A
Weight	Approx. 0.5 kg
Size	3U
Operating Temperature	0 °C to +40 °C
Storage Temperature	-20 °C to +70 °C
Humidity (Non-Condensing)	11 °C to 30 °C: 85% 31 °C to 40 °C: 75%
Workmanship Standards	Conform to IPC-A-610D
Reliability	MTBF per MIL-HDBK-217E, 25 °C, ground benign
Safety	Designed to meet IEC 1010-1, UL 3111-1, and CSA 22.2#1010
CE Labeled	Yes
Supplied Accessories	CD containing Manual ArbConnection. ArbDetector, and devloper libraries

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GPIB INTERFACE	
Compatibility	Conforms to IEEE488.2 and is compatible with SCPI (Standard Commands for Programmable Instruments).
Subsets	SH1, AH1, T6, L4, SR1, RL1 PPO, DC1, DT1, CO, E2.

Note: Specifications are subject to change without notice

ORDERING INFORMATION

GX1200	Single Channel AWG, 50 MS/s, 14-bit, w/Waveform Sequencer
GX1201	Single Channel AWG, 100 MS/s, 14-bit, w/Waveform Sequencer
CALIBRATION	
GX1200-CAL	GX1200 Calibration/Verification Service. Includes pre-verification data (post calibration data provided if applicable)
GX1200-CAL-3	GX1200 Calibration/Verification Service - 3 Years. Includes pre-verification data (post calibration data provided if applicable)
GX1200-CAL-5	GX1200 Calibration/Verification Service - 5 Years. Includes pre-verification data (post calibration data provided if applicable)
GX1201-CAL	GX1201 Calibration/Verification Service. Includes pre-verification data (post calibration data provided if applicable)
GX1201-CAL-3	GX1201 Calibration/Verification Service - 3 Years. Includes pre-verification data (post calibration data provided if applicable)
GX1201-CAL-5	GX1201 Calibration/Verification Service - 5 Years. Includes pre-verification data (post calibration data provided if applicable)

Note: The GX1200 Series is supplied by a 3rd party and resold by Marvin Test Solutions.

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