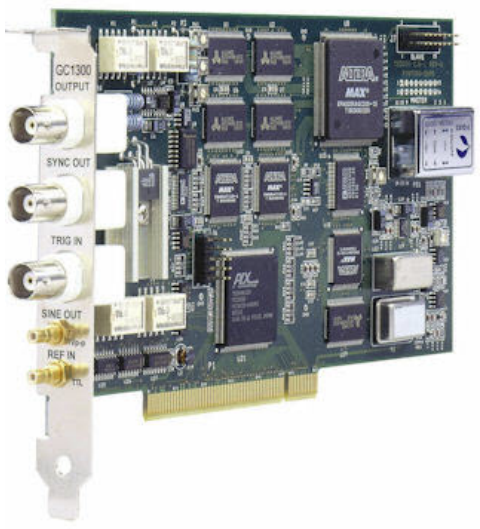
GC1300

MARVIN TEST SOLUTIONS

ARBITRARY WAVEFORM GENERATOR PCI CARD

- 125 MS/s
- 10 digits sample clock frequency setting, limited by 1 μS/s
- 1 ppm clock accuracy and stability
- Occupies only a single slot
- Multiple instrument synchronization
- 14-bit vertical resolution
- 2 MBit memory depth
- Ultra fast waveform downloads using DMA
- 1 ppm clock stability
- Extremely low phase noise carrier
- Frequency agility: FSK, Ramped FSK, Sweep, FM, Arbitrary FM
- Sequence generator controls 4096 segments, 4096 links, and 128 K loops



DESCRIPTION

The GC1300 is a single-channel PCI-based Arbitrary Waveform Generator. It is a high performance waveform generator that combines many powerful functions in one small package. Supplied free with the instrument is Arbconnection software, which is used for controlling the GC1300 and for generating, editing and downloading waveforms from a remote computer.

FEATURES

PCI: A Cost Effective Format

The GC1300 is sensible alternative to a GPIB based waveform generator when developing a PCI–based test system. The GC1300 provides a synergistic combination of a function generator, arbitrary waveform synthesizer, programmable sequencer, pulse generator, and modulation generator in one instrument. The GC1300 delivers all this at a lower cost than comparable bench-type, or VXI- based instruments. This versatility ensures that the GC1300 will adapt to future testing needs as well as current ones.

High Speed Sample Rates

New technology requirements are driving communications systems to use increasingly narrow channel width. A high sample rate of 125 MS/s makes the GC1300 an ideal modulation source for troubleshooting new encoding schemes. The GC1300 also provides high-speed waveforms to stimulate signal distortion, power line cycle dropouts, video signals, component failures and power supply transients.

2Meg Waveform Memory

The GC1300 provides 2Meg of waveform memory as standard, far more than competitive models. This waveform memory is accessible via a high-speed interface. Also, waveform memory is segmentable, allowing the storage of up to 4,096 different waveforms of variable size. This allows test software to switch between many different waveforms rapidly and without having to download multiple times, enhancing test throughput in a way that cannot be duplicated by other competing products.

Sequences of Up to 4096 Waveforms

Powerful sequencing capability allows linkage of up to 4096 waveform segments and/or bursts (repeated segments) into strings. A segment can be repeated up to 128 K times in burst mode. Sequenced functions run continuously or are initiated by a trigger. It is also possible to mix continuous and triggered segments within one sequence. These sequencing features permit the creation of complex waveform or pulse patterns using minimal amounts of memory. Sequences are created by writing a sequence table. Sequence table download is extremely fast because ArbConnection writes to registers and does not require the overhead of an embedded controller.

Flexible Triggering Capability

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 GC1300 accepts the triggers from a front panel trigger input, and from manual commands such as *TRG.

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ArbConnection Software: Unlimited Source of Arbitrary Waveforms

With the GC1300's ArbConnection software you can control instruments functions, modes and features. You can also create virtually and unlimited variety of test waveforms. Freehand sketch allows you to draw your own custom waveform for quick analysis of analog signals. You can use the built-in equation editor to create your own exotic functions. Add or subtract components of a Fourier series to characterize digital or analog filters or, inject random noise into a signal to test immunity to auxiliary noise.

Sample Clock Agility

The GC1300 has outstanding low phase noise characteristics and carrier stability. Such characteristics are very much needed for telecommunication and channel separation applications. On the other hand, the output of the GC1300 can be made extremely agile for applications needing sweep, FSK and FM. The sample clock of the instrument is derived from a DDS (Direct Digital Synthesis) circuit so controlling instantaneous frequency is a matter of changing its input bits. You, as a user, should not really care how it is done but the end result is magnificent: functions like wide-band FM, wander, linear and logarithmic sweep are easily created and executed by the generator. A unique an extremely useful feature of ArbConnection is the FM composer. The FM composer screen looks very much like the Wave composer screen except the "Y" axis is given in units of frequency, so waveforms you create using the FM composer generate frequency change over time. You can create any arbitrary waveform shape or even use the equation editor to generate exotic shapes which eventually you can use to frequency modulate your main output.

Arbritrary Waveforms

The last but not least is flexibility of the GC1300 as an Arbitrary Waveform Generator. Combined with the power of ArbConnection, there is no limit to what you can create and generate. Waveform coordinates can be imported from a variety of sources such as MathLab, ASCII files etc. Anything you can show on one of the composer screens is downloaded in a split of a second and generated by the main output. Place 2 or more GC1300's in a chassis and harness the power of multi-instrument synchronization to create multiple, phase-controlled output channels. Then vary module-to-module phase offsets to create multi-phase signal source.

PROGRAMMING AND SOFTWARE

The board is supplied 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 current instrument settings and measurements.

On-Line help file and PDF User's Guide provides documentation that includes instructions for installing, using and programming the board.

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GC1300

SPECIFICATIONS

MULTIPLE INSTRUMENT SYNCHRONIZATION	
Multiple instruments can be connected together and synchronized to provide multi-channel synchronization.	
Output Channels	1
Sample Clock	
Range and Resolution	100 mS/s to 125 MS/s
Resolution	10 digits limited by 1 µHz
Accuracy	Same as Reference
Stability	Same as Reference
Reference	
Internal	0.0001% (1 ppm) initial tolerance over a 19 °C to 29 °C temperature range; 1 ppm / °C below 19 °C and above 29 °C; 1 ppm / year aging rate
External	10 MHz TTL, 50% ±2% duty cycle

SAMPLE CLOCK MODULATION	
FM – Built-in Standard Waveforms	
Sample clock can be frequency modulated by internal waveforms that are resident in internal memory (fixed waveforms)	
Modulation Source	Internal sine square, triangle and ramp
Modulation Frequency Range	DC to 62.5 MHz (Sine / Pulse)
Resolution	10 Digits
Accuracy	0.1%
Peak Frequency Deviation	DC to 62.5 MHz
Advance	Automatic, triggered, gated or software command
Marker Output and Level	Same as SYNC output
Position	Fixed at carrier frequency
FM – Downloaded Arbitrary Waveforms	
Sample clock can be frequency modulate arbitrary waveforms that are downloaded by the user	
Modulation Source	User waveform, any shape, 10 to 20,000 waveform points
Modulation Sample Clock Range	1 mS/s to 2 MS/s
Resolution	7 Digits
Accuracy	0.1%
Peak Sample Clock Deviation	DC to 125 MHz
Advance	Automatic, triggered, gated or software command
Output and Level	Same as SYNC output
Position	Programmable for selected sample clock frequency
Waveform Download Rate	5 Meg points per second

FSK	
Current segment is sampled continuously. TTL low level programs carrier sample clock, TTL high level programs shifted sample clock frequency. Sample clock changes coherently between frequencies. FSK operates on arbitrary waveforms only.	
Carrier Sample Clock Range	100 mS/s to 125 MS/s
FSK Stimuli	External - front panel; trigger input BNC. Low level = carrier sample clock; High level = hop frequency. Frequency range: From 10 MHz to DC. Internal - same as internal trigger range
FSK Delay	Minimum 1 waveform cycle + 50 ns

RAMPED FSK	
Same as FSK except carrier sample clock ramps to shifted frequency at a rate defined by the ramp time parameter. TTL low level programs carrier sample clock, TTL high level programs shifted frequency.	
Ramp Time Range	10 µs to 1 s, 3 digits, ±0.01%

SWEEP	
Sample Clock sweeps continuously from start to stop, at a rate defined by the sweep time. More complex sweep modes and types can be generated using the FM mode in conjunction with the FM composer program.	
Type	Linear or Logarithmic
Direction	Up or down, depending on the start and stop setting
Range	100 mS/s to 125 MS/s
Time	1 ms to 1000 s, 7 digits, ±.01%
Advance	Automatic, triggered, gated or software command
Marker and Level	Same as SYNC output
Position	Programmable for selected frequency

OPERATING MODES	
Normal	Continuous waveform is generated
Triggered	Each input cycle generates a single output cycle

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Gated	External signal enables generator. First output cycle synchronous with the active slope of the triggering signal. Last cycle of output waveforms always completed External Burst Preset number of up to 128 K cycles stimulated by an internal or external trigger. This mode is not available in Sequence mode.

TRIGGER SOURCES

External	
Input	From panel BNC
Level	TTL
Slope Sensitivity	Positive or Negative, programmable
Frequency	5 MHz to DC
Internal	
Range	100 mHz to 2 MHz
Resolution	7 digits
Accuracy	0.1%
Software	SCPI command

SYSTEM DELAY

Trigger to Waveform Output	1 Sample Clock + 120 ns

STANDARD WAVEFORMS LIBRARY

Waveforms	Sine, Triangle, Square, Pulse, Ramp, Sinc, Gaussian Pulse, Exponential decay / Rise Pulse, Noise, DC waveforms. Advance Modes
Frequency Range	Waveform dependent

ARBITRARY WAVEFORMS

Waveform Memory	2 Meg points

MEMORY SEGMENTATION

Number of Segments	1 to 4,096
Minimum Segment Size	16 points
Memory Interleave	4 (Trace lengths divisible by 4)
Vertical Resolution	14 bits (16,384 points)
Waveform Download Rate	Meg points / s

SINE WAVE PERFORMANCE

THD	0.05% to 100 kHz
Non-Related Spurious	-55 dBc below 1 MHz; -40 dBc below 5 MHz; -35 dBc below 10 MHz

SEQUENCED ARBITRARY WAVEFORMS

Permits division of the memory bank into smaller segments. Segments may be linked, and repeated in user-selectable fashion to generate extremely long waveforms.

Advance Modes

- 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 either a) automatically (Automatic Sequence Advance), or b) with a trigger (Stepped Sequence Advance).

OUTPUTS

Waveform Output	
Connector	Front panel BNC
Stand-by	Output off or normal
Impedance	50 , ±1%
Protection	Protected against shorts to case ground
Amplitude	
Range	100 mV to 10 V_{p-p}, into 50 ; Double into open circuit
Resolution	3.5 digits
Accuracy	±(1% + 10 mV)

OFFSET

Offset	Offset is attenuated with amplitude
Range	0 to ±4.5 V, amplitude dependent
Resolution	2.2 mV within 5 V window; 220 mV within 500 mV window
Accuracy	±(1% of reading + 1% of amplitude + 2 mV)
Filters	25 MHz and 50 MHz, 7-pole elliptic
Square Wave, Pulse	
Rise / Fall Time	<10 ns, 10% to 90% of amplitude
Aberration	<5%, ±10 mV

SYNC / MARKER OUTPUT

Provides dual functionality. Sync, which is synchronous with the output waveform and market In FM and sweep modes.

Outputs	Front panel, Backplane TTL triggers, STAR
Validator	BIT, LCOM

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Connectors	Front panel BNC, P2
Impedance	50 , ±1%
Level	> 2 V into 50 , 4 V nominal into 10 k
Protection	Temporary short to case ground
Position	Point 0 to n, Programmable with 4-point resolution
Width	Programmable with 4 points resolution

SINE 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	50 , ±1%
Level	1 V into 50
Protection	Temporary short to case ground
Source	Sample clock frequency
Frequency Range and Resolution	Same as Sample Clock
Flatness	-3 dB at 125 MHz
THD	0.3% to 100 KHz; -55 dBc to 1 MHz
Non-Related Spurious	-45 dBc < 10 MHz; -35 dBc < 100 MHz

INPUTS

TRIG Input

Inputs	Front panel; Backplane TTL triggers,STAR
Connectors	Front panel BNC; P2
Impedance	10 k, ±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, ±5%
Threshold Level	TTL
Damage Level	±10 V
Duty Cycle	50%, ±5%

GENERAL

Power Requirements	10 W (max)
Current Consumption	+5 V @ 30 mA; +12 V@ 500 mA; +3.3 V @ 1.4 A
EMC Certification	CE marked
Dimensions	3U, single slot
Operating Temperature	0 °C to +50 °C
Reliability	MTBF per MIL-HDBK-217E, 25 °C, Ground Benign
Safety	Designed to meet IEC 1010-1, UL 3111-1, CSA 22.2 #1010
Workmanship Standards	Conform to IPC-A-610D
Supplied Accessories	CD containing Manual ArbConnection, ArbDetector and developer libraries

Note: Specifications are subject to change without notice

ORDERING INFORMATION

GC1300	Single Channel AWG, 125 MS/Sec, Waveform Sequencer (PCI)
ACCESSORY	
GX92012	Cable, BNC Male to BNC Male, 50 Ohm, 2'
GX92015	Cable, BNC Male to BNC Male, 50 Ohm, 5 Feet

Note: The GC1300 is supplied by a 3rd party and resold by Marvin Test Solutions.

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