The CG4800 is an exceptionally high-speed, 14-bit, four channel arbitrary waveform generator for the PCI Express bus. Each DAC can output data at a maximum rate of 1.2 GS/s, which allows up to 600 MHz of bandwidth for each output signal. Output waveforms may be "single shot" or "continuously looped" from the on-board 1 GigaSample memory.

CompuGen 4800

High-speed arbitrary waveform generator card

Arbitrary waveform generator and function generator PCIe card capable of providing high-speed aperiodic analog waveforms.

APPLICATIONS

Stimulus-response test systems

RF signal generation

Wireless communications

Manufacturing test

Radar signal simulation

Optical and magnetic storage media testing

Advanced ultrasonic signal generation

Video signal generation

Network analysis

FEATURES

- 1 Gigasamples on-board memory
- 600 MHz of bandwidth for each output signal
- 14 bit resolution
- 1.2 Gigasamples per second
- Free software for importing and generating waveforms
- Software Development Kits for C/C++, LabVIEW and MATLAB

CompuGen 4800 Simplified Block Diagram
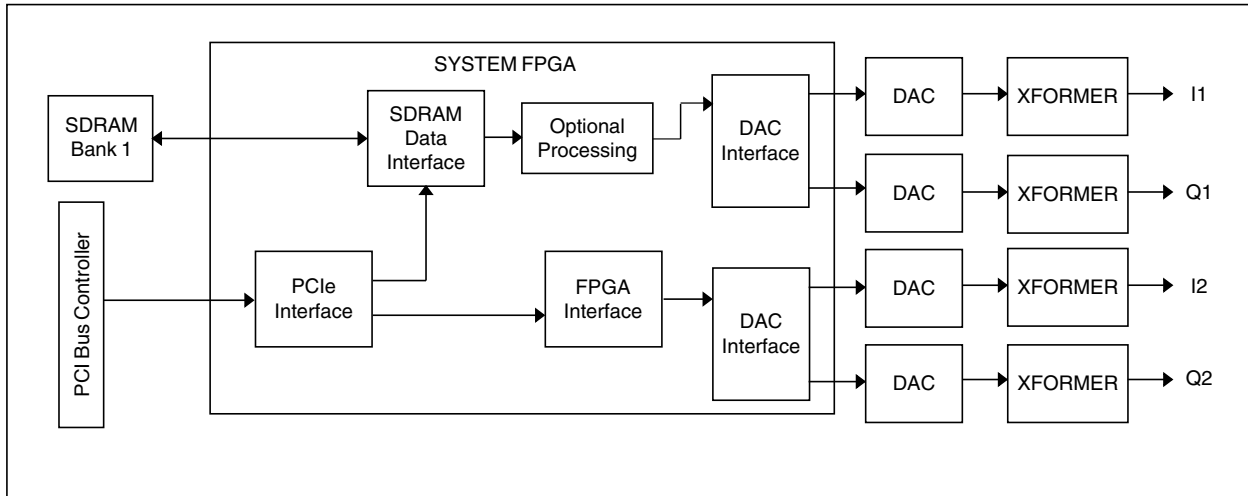
DATA FLOW

The block diagram above shows the primary data flow for the CG4800. There are two Virtex-5 FPGA devices onboard where the first device handles channel 1 and 2 data flows plus the system PCIe interface and the second device handles channels 3 and 4. Each FPGA has a 1 GB memory bank used for storing digital data for conversion to an analog signal. Data from channels 1 and 2 can only use RAM bank 1 and data from channels 3 and 4 can only use RAM bank 2.

The System FPGA incorporates the PCI Express Interface and the digital output interfaces for the four DAC channels. Data Flow to the DACs is supplied via the onboard RAM which has been previously loaded with waveform data through the PCIe bus.

SINGLE SHOT OPERATION

When Single Shot operation is selected, a single trigger, from either the external trigger input or via software, causes a waveform to be generated starting at RAM address 0 and continuing until the programmed ending address is reached. At that point the address is reset to 0 and another trigger can be issued to repeat the process. The board can also be placed into a free run mode whereby the ending address is ignored and the DAC will continue to output a waveform until a software stop command is issued.

WAVEFORM LOOPING

When the waveform data source is the on-board RAM, repeating waveforms can be generated by activating the "continuous looping" feature. In this mode the start of the waveform will be at address 0 and the "looping address" is the ending address.

EXTERNAL TRIGGER

An external trigger input is provided. The proper signal edge will activate the output from the DAC. This allows the output waveform to be synchronized with an external event.

CLOCK GENERATION

The DAC clock can be derived from on-board 1200 MHz or 900 MHz VCO oscillators or from an externally supplied clock. If either of the internal oscillators is selected, their outputs will be synchronized to the internal

or external 10 MHz reference clock via a phase lock loop. In this case the DAC clocking frequency will have the same accuracy as the reference clock. The internal reference accuracy is better than 5ppm. If used, an external reference clock must have frequency accuracy as stated in the specification section of this data sheet in order to guarantee that the onboard phase lock loop will attain lock.

SOFTWARE

CompuGen Windows drivers for Windows XP and Windows 7 are included with the CompuGen 4800.

The CompuGen 4800 also comes with CGTest, a simple waveform generation utility for Windows.

For custom software applications, Software Development Kits (SDKs) are available for C/C++, LabVIEW and MATLAB. Please contact the factory for other programming languages.

MULTI-CARD SYSTEMS

A Multi-Card CompuGen system, consisting of up to 4 independent CompuGen 4800 cards, can be ordered if more than four output channels are required.

INTEGRATION WITH COMPUSCOPE CARDS

The CompuGen 4800 can be operated within the same system as a CompuScope digitizer card. For instance, a CompuGen/CompuScope system can be configured into a stimulus/response instrument. Here, a stimulus signal generated by the CompuGen 4800 is connected through an electrical circuit and the output response signal is captured by a CompuScope digitizer card. Alternatively, a signal captured by a CompuScope digitizer card can be uploaded directly to a CompuGen 4800, which can then play back the signal.

Typical Test using a CompuGen and a CompuScope
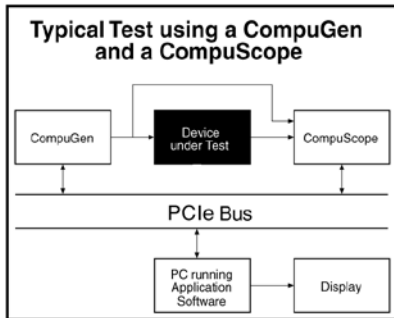
SYSTEM REQUIREMENTS
PCIe-bus-compatible PC with at least one free 8 or 16 lane (x8 or x16) PCIe slot; 1 GB RAM, 50 MB hard disk and SVGA video.

SIZE
Single-slot mid-sized PCIe card

POWER REQUIREMENTS
+3.3 V	10 Watts
+12 V	12 Watts

DIGITAL TO ANALOG CONVERSION
Outputs:	4 per card
Output Range:	750m Vp-p
Output Coupling:	AC
Output Impedance:	50 Ω
Resolution:	14 bits
Analog Output Bandwidth:	600 MHz max.
Connector:	SMA (7 total)
Generation Modes:	Free Run Mode (continuous looping) Triggered Mode (single-shot)
Memory Buffer Depth:	1 GigaSample total

CRYSTAL OSCILLATOR STABILITY
Long Term:	±5 ppm

TRIGGER
Source:	External
External Trigger Level:	TTL, 3.5V max.
Coupling:	DC
Trigger Slope:	Rising/falling
Connector:	SMA
Conversion Rates:	50 MHz to 1200 MHz simultaneous on all output channels

TRIGGER MODES
Single Shot:	Single start trigger runs memory data once
Continuous:	Single start trigger runs looped memory

EXTERNAL CLOCK
Clock Frequency:	Maximum 1200 MHz Minimum 50 MHz
Signal Type:	sine or square wave
Impedance:	50 Ω to ground
Amplitude:	500 mV p-p to 2.0 V p-p

Coupling:	AC
Connector:	SMA

MULTI-CARD SYSTEMS
Maximum No. of Cards:	4
Operating Mode:	Multiple/Independent

PCI BUS INTERFACE
Plug-&-Play:	Fully supported
Bus Width:	8 lanes
Bus Speed:	20 Gb (Gen1)
Compatibility:	PCI Express 2.0 compliant (Also 1.1 at 20 Gb)

AC PERFORMANCE
SNR (BW = 600 MHZ)
fsig = 50 MHz	: 74dB
fsig = 100 MHz	: 73dB
fsig = 200 MHz	: 70dB
fsig = 400 MHz	: 67dB

SFDR
fsig = 50 MHz	: 72dB
fsig = 100 MHz	: 65dB
fsig = 200 MHz	: 63dB
fsig = 400 MHz	: 58dB

ABSOLUTE MAXIMUM RATINGS
Trigger Input	-0.3 to +3.5 volts
Digital I/O (as Input)	-0.3 to +3.5 volts
Clock Input	5 volts peak to peak
Operating Temperature	+32°F to +122°F 0°C to 50°C
Storage Temperature	-4°F to +158°F -20°C to +70°C
Operating Relative Humidity	10% to 90%, non-condensing
Operating Vibration	0.25 G, 5 Hz to 500 Hz
Operating Shock	2.5 G, 11 ms, ½ sine
Board Dimensions	7.5" L x 4.3" H x 0.75" W 19.0cm L x 10.9cm H x 1.9cm W

APPLICATION SOFTWARE
CGTest Software

SOFTWARE DEVELOPMENT KITS
CompuGen PCI SDK for C/C++ for Windows
CompuGen PCI SDK for LabVIEW for Windows
CompuGen PCI SDK for MATLAB for Windows

MATERIALS SUPPLIED
One CompuGen 4800 card
One CompuGen PCIe CD containing:
    Windows XP and Windows 7 Drivers
    CompuGen PCIe Software Development Kits for
    C/C++, LabVIEW and MATLAB
    CGTest Software
One Hardware Manual

GaGe

www.gage-applied.com

WARRANTY

One year parts and labor

All specifications subject to change without notice.

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To find your local sales representative or distributor or to learn more about GaGe's products visit:

www.gage-applied.com

ORDERING INFORMATION

Hardware & Upgrades
CompuGen 4800   800-480-000

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