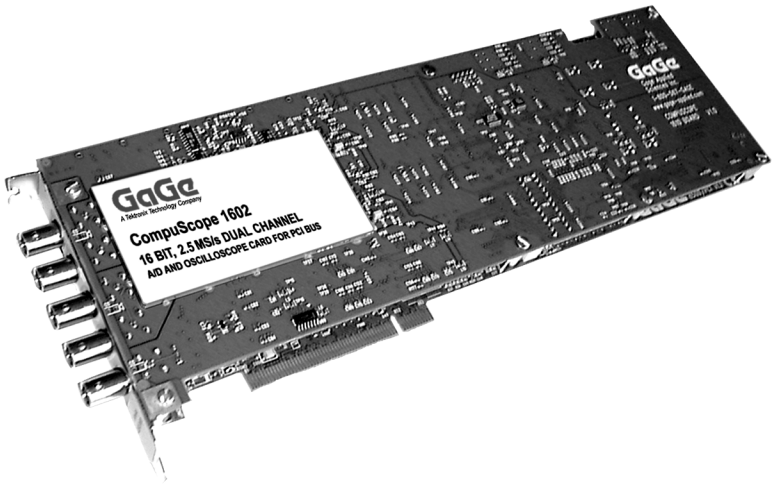
CompuScope 1602

Ultra-fast waveform digitizer card for PCI bus



Lower cost alternative for high precision measurements.

FEATURES

- 16 bit, 2.5 MS/s A/D sampling on two simultaneous channels
- Differential or single-ended inputs
- Up to 1 GigaSamples of on-board acquisition memory
- 75 dB signal to noise ratio
- Multi-card systems of up to 16 simultaneous channels at 2.5 MS/s
- Fast data transfer rate to system RAM
- GageScope compatible
- SDKs for C/C++, MATLAB, LabVIEW

APPLICATIONS

Non-destructive testing
Military & Aerospace
Communications & wireless
Electro-optic
Radar
Laser
High energy physics
Embedded digitizer

GaGe
www.gage-applied.com

COMPUSCOPE 1602

A CompuScope 1602 card for PCI bus can simultaneously sample two analog signals at speeds up to 2.5 MS/s with 16 bit resolution and store the data in the on-board memory.

16 BIT 2.5 MS/S SAMPLING

CompuScope 1602 uses state-of-the-art data conversion technology to provide dual-channel simultaneous sampling rate of 2.5 MS/s with 16 bit resolution. Each channel has its own ADC chip, eliminating the need for multiplexing the inputs.

DIFFERENTIAL INPUTS

Differential inputs allow the user to fully exploit the 16-bit A/D of the CompuScope 1602. Differential input circuitry automatically eliminates noise picked up by the signal and its reference. With over 80 dB CMRR (Common Mode Rejection Ratio) for low frequency inputs, differential inputs eliminate any ground loop problems.

Single-ended inputs are also available through a simple software command. This command simply connects the negative input of the differential pair to zero volts, allowing single-ended operation.

HIGH IMMUNITY TO DIGITAL NOISE

In order to isolate the high-frequency analog circuitry from PCI bus–related digital electronics, a two-board piggyback configuration is used. This allows maximum separation of analog and digital grounds, thereby providing high immunity to digital noise.

MEMORY DEPTH

CompuScope 1602 is available with memory depths of 1M, 4M, 8M, 64M, 256M, 512M and 1G (16-bit samples). This memory can be used as a circular buffer for storage of pre- and post-trigger data.

Memory is divided equally between the two input channels, i.e. a 1 Meg board provides 512 Ksamples of memory per channel.

The data stored in the CompuScope 1602 memory can be transferred to the system RAM for post-processing, display or storage to hard disk without any interface bus (no GPIB bus required).

FLEXIBLE TRIGGERING

CompuScope 1602 features flexible, oscilloscope-like analog triggering.

An analog comparator provides triggering from any one of the two input channels, from an external signal or from software.

In addition to the trigger source, trigger level and slope are also selectable by software, making the trigger system similar to traditional oscilloscopes.

BUILT-IN DECIMATION FILTER

CompuScope 1602 uses a unique architecture to provide 16 bit resolution. The input signal is over-sampled by a factor of 8 and the resulting data stream is fed into an on-chip decimation filter and error-correction circuitry which enhances the effective resolution and dynamic range by eliminating high frequency noise and by providing the lower order bits of the digital output.

EXTERNAL CLOCK UPGRADE

An external clock upgrade can be ordered if A/D sampling must be coherent with a system clock. The external clock must be 8 times faster than the required sample rate, i.e. if 1 MS/s sampling is required, external clock must be 8 MHz.

The External Clock must be a TTL signal with a maximum frequency of 20 MHz and minimum frequency of 8 kHz.

The rise and fall times of the clock signal must be better than 8 ns for proper operation at the peak sample rates. A minimum pulse width of 22.5 ns must be respected.

MULTIPLE RECORD

Even though the PCI bus allows very fast data throughput to system RAM, there may still be applications in which data bursts cannot be off-loaded either due to very fast trigger repeat frequency or due to software limitations.

Multiple Recording allows CS1602 to capture data on successive triggers and stack it in the on-board memory. Up to 4,194,304 triggers can be captured in multiple record mode.

Once the CompuScope 1602 finishes capturing a Multiple Record segment, the trigger circuitry is automatically re-armed within 5 sample clock cycles to start looking for the next trigger - with no software intervention.

MULTI-CARD SYSTEMS

A Multi-Card system, comprised of one Master and up to 7 Slave CS1602 boards, can be ordered from the factory if the user wants to capture more than two channels with a common clock and trigger. A board-to-board interconnect is supplied with the system. This interconnect carries all the signals needed for proper synchronization. Refer to the detailed spec for available configurations for different memory models.

GageScope can then display all channels from these boards on the same screen.

ORDERING INFORMATION

Hardware & Upgrades

CompuScope 1602-1M	162-001-001
CompuScope 1602-4M	162-001-002
CompuScope 1602-8M	162-001-003
CompuScope 1602-64M	162-001-004
CompuScope 1602-256M	162-001-005
CompuScope 1602-512M	162-001-006
CompuScope 1602-1G	162-001-007
CS1602 Memory Upgrade Charge	162-181-200
External Clock Upgrade	162-181-004
Master Multi-Card Upgrade	162-181-006
Slave Multi-Card Upgrade	162-181-007

GageScope Software

GageScope: Lite Edition	included
GageScope: Standard Edition *(with Purchase of CompuScope Hardware)*	300-100-351
GageScope: Professional Edition *(with Purchase of CompuScope Hardware)*	300-100-354

Software Development Kits (SDKs)

Gage SDK Pack on CD	200-113-000
CompuScope SDK for C/C++	200-200-101
CompuScope SDK for MATLAB	200-200-102
CompuScope SDK for LabVIEW	200-200-103

All Upgrades performed at the factory.

COMPUSCOPE 1602 SPECIFICATIONS

SYSTEM REQUIREMENT

PCI-based computer with at least one free full length PCI slot, 128 MB RAM, 50 MB hard disk and SVGA video.

SIZE

Plugs into 1 full length PCI Slot, 13" x 4.1"

Memory Depth:	Board Width occupies:
1M	1 full length slot
4M and 8 M	2 full length slots
64M, 256M	3 full length slots
512M, 1G	3 full length slots

POWER (IN WATTS)

Memory	+5 V	
	Worst	Typical
1 M	25.0	17.5
4 M	28.0	20.5
8 M	28.0	20.5
64 M	30.0	21.5
256 M	32.5	23.5
512 M	32.5	23.5
1 G	32.5	23.5
- 5V		
	Worst	Typical
All Models	0.0	0.0
+12 V		
	Worst	Typical
All Models	0.0	0.0
-12 V		
	Worst	Typical
All Models	0.0	0.0

CHANNELS A & B

Inputs per card: 2 differential inputs

Impedance: 1 MΩ, 35 pF or 50 Ω, software selectable

Coupling: AC or DC

Resolution: 16 bits

A/D Type: Monolithic, 16 bit oversampling with decimation filter

Analog Bandwidth: DC to 4 MHz (DC)
10 Hz to 4 MHz (AC)
DSP FIR filter limits the signal bandwidth to Nyquist Frequency

Full Scale Single-Ended Input Range:
±500mV, ±1V, ±2V, ±5V, ±10V

Common Mode Input Voltage: ±7.5V (DC+peak AC)max

Common Mode Rejection Ratio: 80 dB at 60 Hz

Absolute Max. Amplitude:
1 MΩ Impedance:
±15 Volts (continuous)
50 Ω Impedance:
±5 Volts (continuous)
±15 Volts (for 1 ms duration)

DC Accuracy relative to Full Scale Input: ±0.5% of full scale input

Sampling Rate: MS/s: 2.5, 1
kS/s: 500, 200, 100, 50, 20,10, 5, 2, 1

Protection: 1 MΩ: Diode Clamped
50 Ω: No protection

Connector: 2 BNCs per input

DYNAMIC PARAMETERS

Measured using 98 KHz sine wave input at 2.5 MS/s with amplitude of 95% of full scale on the ±1V range. Typical values listed below:

SNR: 75 dB
SFDR: 77 dB
SINAD: 74 dB
THD: -76 dB
ENOB: 12.15 bits

ACQUISITION MEMORY

Data Storage: In on-board memory

Memory Depth: 1M, 4M, 8M, 64M, 256M, 512M, 1G

Max. Depth: Up to half on-board memory per channel

TRIGGERING

of Trigger Inputs: 2 per card

Trigger Source: CH A, CH B, Ext or Software

Input combination: Wired-OR

Type: Analog triggering

Sensitivity: ±20% of full scale

Level Accuracy: ±10% of full scale

Slope: Positive or Negative, software selectable

Post Trigger Data: 64 points minimum in single record acquisition. 128 points minimum in multiple record acquisition. Can be defined with 64 point resolution.

EXTERNAL TRIGGER

Impedance: 1 MΩ, 30 pF

Input Type: Single-ended analog

Amplitude: Absolute Max ±15V

Voltage Range: ±1V and ±5V

Bandwidth: 10 MHz

Connector: BNC

EXTERNAL CLOCK (OPTIONAL)

Max. Freq.: 20 MHz, max. using 8x decimation filter.

Min. Freq.: 8 kHz

Signal Level: TTL

Required Duty Cycle: 50% ±5% at 20 MHz

MULTIPLE RECORD

Pre-trigger Data: 20 points

Record Length: 128 points minimum. Can be defined with a 64 point resolution

Max # of Triggers: 4,194,304

MULTI-CARD SYSTEMS

Operating Mode: Master/Slave or Multiple Independent

Number of Cards in:
- Master/Slave Mode:
  1M models: 2, 4, 6 or 8 cards
  4M & 8M models: 2, 3 or 4 cards
  64M and higher models: 2 or 3 cards
- Multiple Ind.: Limited by backplane

OPERATING SYSTEMS

Windows 95/98/ME/NT*/2000/XP
*version 4, SP3 or higher

ELECTROMAGNETIC COMPATIBILITY

CE Compliant

EC Council Directive 89/336/EEC
EN 61326 Class A
IEC 61000-4-2 Electrostatic Discharge (Perf.Crit.B)
IEC 61000-4-3 RF Electromagnetic Field (Perf.Crit.A)
IEC 61000-4-4 Electrical Fast Transient/Burst (Perf.Crit.B)
IEC 61000-4-5 Power Surge (Perf.Crit.B)
IEC 61000-4-6 Conducted RF (Perf.Crit.A)
IEC 61000-4-11 Voltage Dips & Interruptions (Perf.Crit B)
EN 61000-3-2 AC Power Line Harmonics Emissions
AS/NZS 2064
Australian emissions standard for Industrial, Scientific & Medical Equipment

Compliance demonstrated on a single card configuration

WARRANTY

One year parts and labor

All specifications subject to change without notice
Specification Last Updated: February 2003