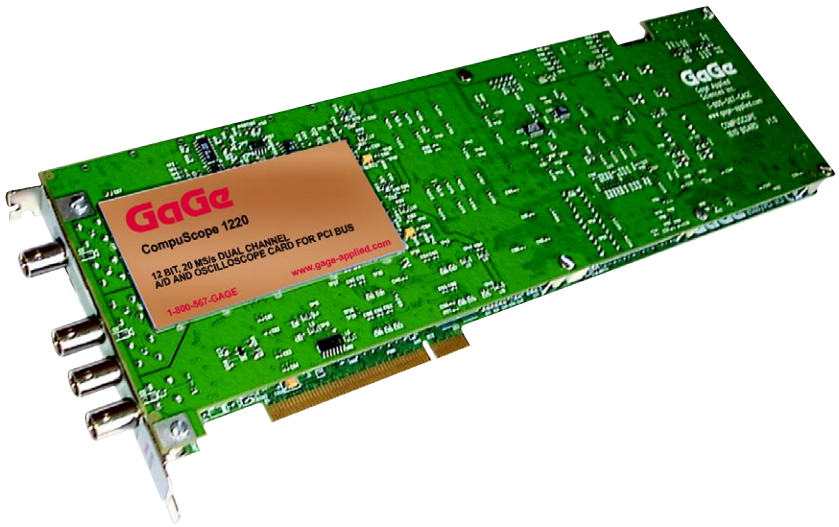
CompuScope 1220

Versatile waveform digitizer card for PCI bus



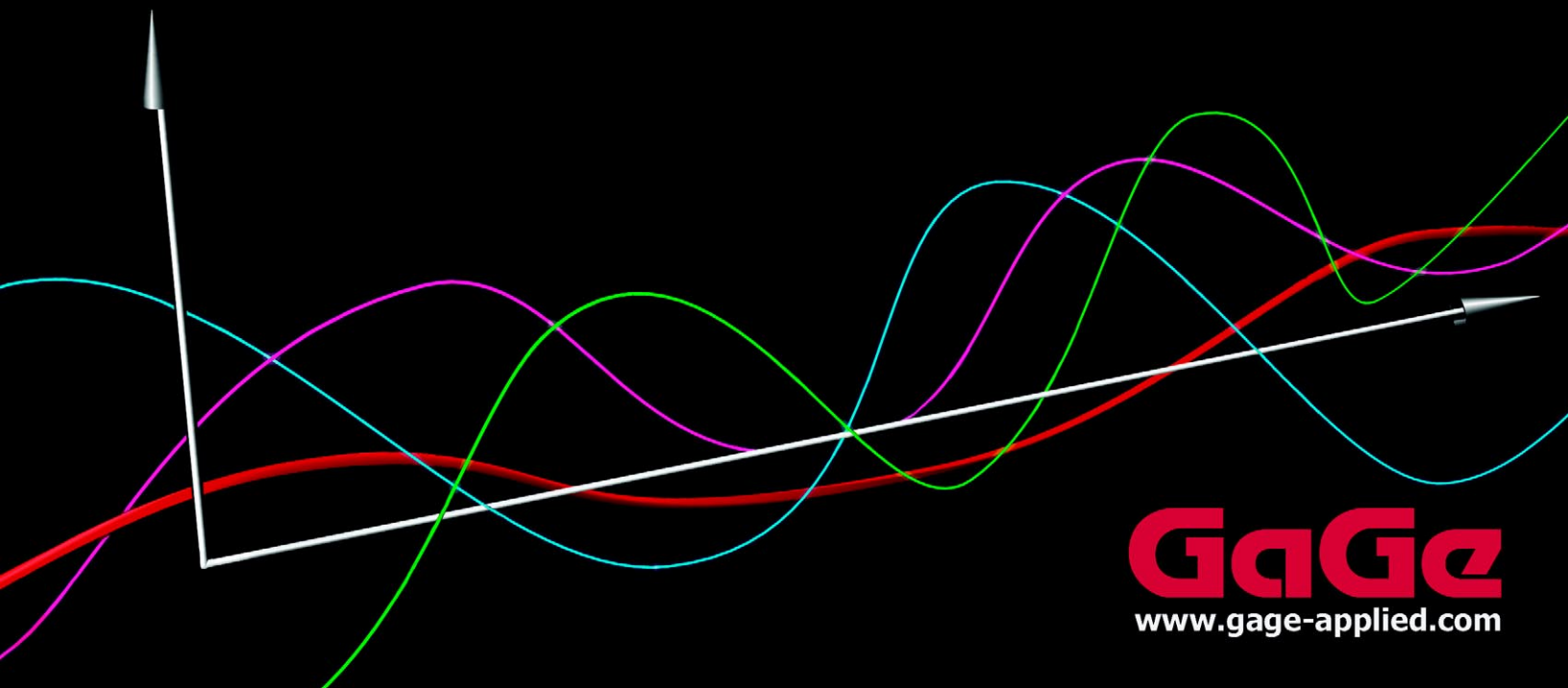
Ideal digitizer for synthetic instrumentation, manufacturing test, and imaging applications.

FEATURES

- 12 bit, 20 MS/s A/D sampling on two simultaneous channels
- Single-ended inputs
- Up to 1 GigaSample of on-board acquisition memory
- Enhanced external clocking capability for better system synchronization at low sampling rates
- Fast data transfer rate to PC memory
- Programming-free operation with GageScope software
- SDKs for C/C++, MATLAB, LabVIEW under Win 95/98/ME and Win NT/2000/XP

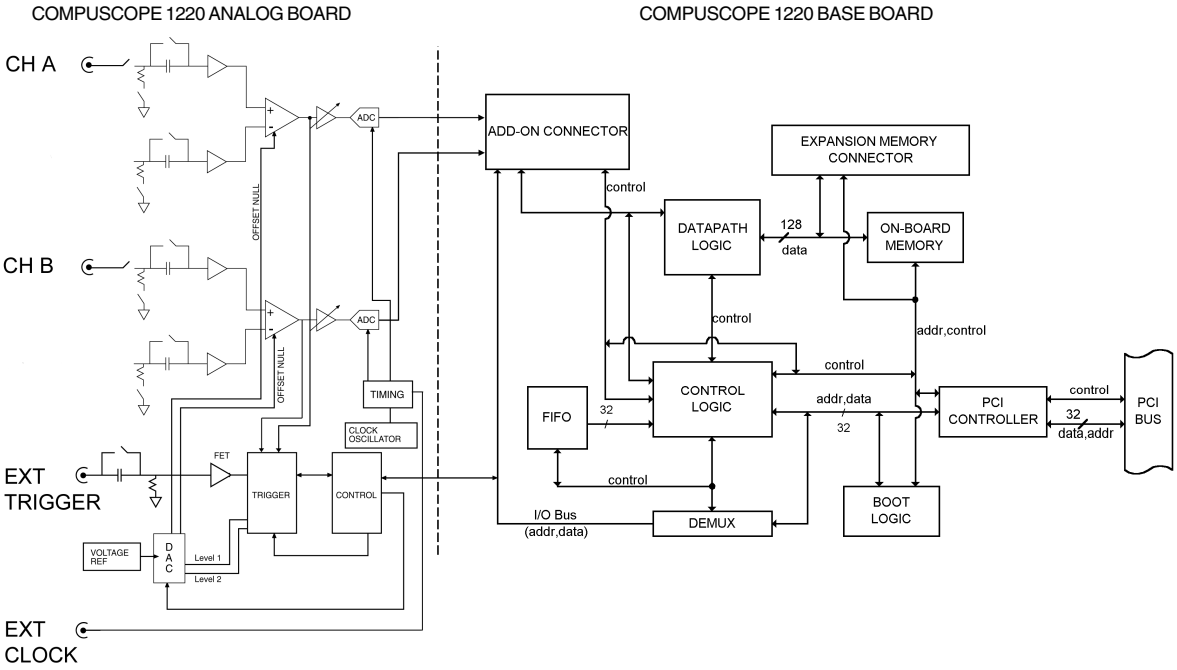
APPLICATIONS

Non-destructive testing
Ultrasonic testing
Imaging
Lidar
Radar
Manufacturing test
ATE
Embedded digitizer



GaGe
www.gage-applied.com

CompuScope 1220 Simplified Block Diagram



COMPUSCOPE 1220

A CompuScope 1220 card for PCI bus can simultaneously sample two analog signals at speeds up to 20 MS/s with 12 bit resolution and store the data in the on-board memory.

12 BIT 20 MS/S SAMPLING

CompuScope 1220 uses state-of-the-art data conversion technology to provide dual-channel simultaneous sampling rate of 20 MS/s with 12 bit resolution. Each channel has its own ADC chip, eliminating the need for multiplexing the inputs which invariably results in increased noise and lower performance.

EXTERNAL CLOCKING ENHANCEMENTS

The CompuScope 1220 was designed to solve a wide range of applications requiring both the synchronization of the digitizer to the test or data acquisition system as well as the best possible performance at lower sampling rates (below 1 MS/s).

The CompuScope 1220 can thus be externally clocked between 20 MS/s and 1 kS/s.

With full programming control over the signal conditioning front-end, a top performance A/D stage and a standard External Clock feature, the CompuScope 1220 is ready for such critical applications as NDT, imaging, and ATE.

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 scheme allows maximum separation of analog and digital grounds, thereby providing high immunity to digital noise.

MEMORY DEPTH

CompuScope 1220 is available with memory depths of 1M, 4M, 8M, 64M, 256M, 512M and 1G (12-bit samples mapped into 16-bit words). This memory can be used as a circular buffer for storage of pre- and post-trigger data.

The memory is divided equally between the two input channels, i.e. a 1 M board provides 512 K of memory per channel.

The data stored in the CompuScope 1220 memory can be transferred to the system RAM for post-processing, display or storage to hard disk over the PCI bus.

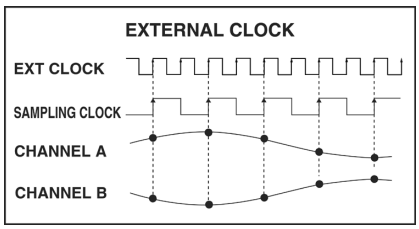
FAST BUS THROUGHPUT

The high-speed, 32 bit, bus-mastering interface to the PCI bus allows the data from the on-board memory of the CompuScope 1220 to be transferred to the system RAM, or any other PCI destination, at sustained rates of up to 50 MB/s under single-tasking operating systems. Under Windows, this rate depends on the architecture of the user application. Under controlled conditions, it is still possible to achieve 50 MB/s recording speed to the system RAM.

BUS MASTERING

CompuScope 1220 is fully capable of becoming a PCI bus master in order to transfer data at the maximum rate of 50 MB/s.

A PCI bus Master is a card which can take control of the bus and transfer data to any PCI target device such as system RAM without any involvement from the CPU.



FLEXIBLE TRIGGERING

CompuScope 1220 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.

MULTI-CHANNEL TRIGGERING

A very unique feature of CompuScope 1220 trigger system is the ability to trigger a multi-card Master/Slave system from any one of the input channels.

For example, in a 16 channel system, consisting of 8 Master/Slave CompuScope 1220 cards, the user can set the trigger conditions to be such that the system trigger from any channel.

Trigger level and slope can be defined independently for each channel.

This capability is very powerful for applications in which the trigger signal can come from any one of the sensors being used. Examples are explosion test, material stress analysis, high energy particle detection etc.

EXTERNAL CLOCK

External clock is a standard feature on the CompuScope 1220. This feature is useful when A/D sampling must be done coherently with the rest of the system.

The External Clock must be a TTL signal with a maximum frequency of 20 MHz and minimum frequency of 1 kHz.

It is very important to maintain the duty cycle of the external clock of 50% ± 5%. Failure to supply a clock with duty cycle in this range can result in invalid data.

The external clock is provided through a BNC connector.

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 because of very fast trigger repeat frequency or because of software limitations.

Multiple Recording allows CompuScope 1220 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.

GageScope Software can display the stacked data as individual acquisitions. Software drivers also provide support for accessing Multiple Record data.

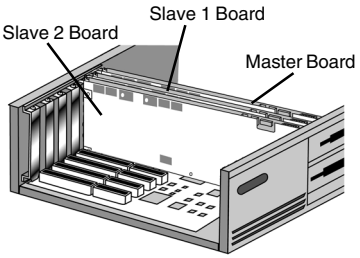
Once the CompuScope 1220 has finished capturing a Multiple Record segment, the trigger circuitry is automatically re-armed within 5 sample clock cycles to start looking for the next trigger. No software intervention is required.

Multiple Recording is useful for applications in which a series of bursts of data have to be captured in quick succession and there is not enough time to off-load the data to the PC memory.

Another situation in which Multiple Recording may be used is when data storage has to be optimized. These are cases in which only certain portions of the incoming signal are of interest and data capture during the dead-time between successive portions is not useful.

Examples of these situations are radar pulses, ultrasound data, lightning pulses, imaging signals and explosion testing.

MULTI-CARD SYSTEMS



One of the unique features of Gage's CompuScope cards is the multi-card system that can be configured.

A multi-card system, comprised of one Master and up to 7 Slave CS1220 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.

The following Master/Slave systems can be configured.

- For 1M memory models: 2, 4, 6 or 8 cards can be configured
- For 4M and 8M memory models: 2, 3 or 4 cards can be configured
- For 64M and higher memory models: 2 or 3 cards can be configured

GageScope can then display all channels from these boards on the same screen. Software drivers also support such Master/Slave systems.

ORDERING INFORMATION

Hardware & Upgrades

CompuScope 1220-1M	122-001-002
CompuScope 1220-4M	122-001-003
CompuScope 1220-8M	122-001-004
CompuScope 1220-64M	122-001-005
CompuScope 1220-256M	122-001-006
CompuScope 1220-512M	122-001-007
CompuScope 1220-1G	122-001-008
CS1220 Memory Upgrade Charge	122-181-200
Master Multi-Card Upgrade	122-181-002
Slave Multi-Card Upgrade	122-181-003

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 1220 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 one full length PCI Slot, 13 inch x 4.1 inch.

Memory Depth	Slots per Card
1 M	1 slot
4 M	2 slots
8 M	2 slots
64 M	3 slots
256 M	3 slots
512 M	3 slots
1 G	3 slots

POWER (IN WATTS)

Note 1: Power connector on 128M, 512M and 1 G models must be connected using a Y-cable

+5 V		
Memory	Worst	Typical
1 M	25.0	17.5
4 M	28.0	20.5
8 M	28.0	20.5
64 M	32.5	23.5
256 M	32.5	23.5
512 M	32.5	23.5
1 G	32.5	23.5

CHANNELS A & B

Inputs per card: 2 single-ended inputs

Connector: 1 BNC per channel

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

Coupling: AC or DC

Resolution: 12 bits

A/D Type: Monolithic, 16 bit oversampling with decimation filter; operating in 12 bit mode

Full Scale Input Range:
±50 mV, ±100 mV, ±200 mV, ±500 mV, ±1 V, ±2 V, ±5 V, ±10 V

Analog Bandwidth:

Input Range	-3 dB Point
± 10 V	5 MHz
± 5 V	5 MHz
± 2 V	10 MHz
± 1 V	10 MHz
± 500 mV	10 MHz
± 200 mV	10 MHz
± 100 mV	10 MHz
± 50 mV	10 MHz

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

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

DC Accuracy relative to full scale input:

Input Range	Accuracy
± 10 V	± 0.5%
± 5 V	± 0.5%
± 2 V	± 0.5%
± 1 V	± 0.5%
± 500 mV	± 0.5%
± 200 mV	± 0.5%
± 100 mV	± 1%
± 50 mV	± 2%

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

DYNAMIC PARAMETERS

Measured using 5 MHz sine wave input at 20 MS/s with amplitude of 95% of full scale on the ±1V range. Typical values listed.

SNR: 55 dB

SFDR: 57 dB

ENOB: 8.9 bits

ACQUISITION MEMORY

Data Storage: In on-board memory

Memory Sizes: 1M, 4M, 8M, 64M, 256M, 512M, 1G (16 bit samples)

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 a 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

INTERNAL CLOCK

Source: 20 MHz Clock Oscillator

Accuracy: ±50 ppm (0 to 70 deg C)

EXTERNAL CLOCK

Max. Frequency: 20 MHz

Min. Frequency: 1 kHz

Signal Level: TTL

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

MULTIPLE RECORD

Pre-Trigger Data: None

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

Max. # of Triggers: 4,194,304

MULTI-CARD SYSTEMS

Operating Modes: Master/Slave or Multiple Independent

Number of Cards in:

- Master/Slave Mode:
  - 1M models: 2, 4, 6 or 8 cards
  - 8M models: 2, 3 or 4 cards
  - 128M, 512M & 1G models: 2 or 3 cards
- Multiple Ind.: Limited by backplane

Max. # Channels: 16 at 20 MS/s (1M models)

MASTER/SLAVE SYSTEM TRIGGERING

of Trigger Inputs: 2 per card

Trigger Source: Ch A, Ch B, EXT or Software

Input Combination: Wired OR

Sensitivity: ± 20% of full scale

Level Accuracy: ± 10% of full scale

Slope: Positive or Negative Software selectable

OPERATING SYSTEMS

Windows 95/98/ME/NT*/2000/XP

*version 4, SP3 or higher

MATERIALS SUPPLIED

One CompuScope 1220 card
One Hardware Manual
One set of Gage Driver on floppies
One GageScope Lite Edition Software

WARRANTY

One year parts and labor

All specifications subject to change without notice; specifications are not guaranteed under all possible combinations of modes of operation.
Specification Last Updated: December 10 2003