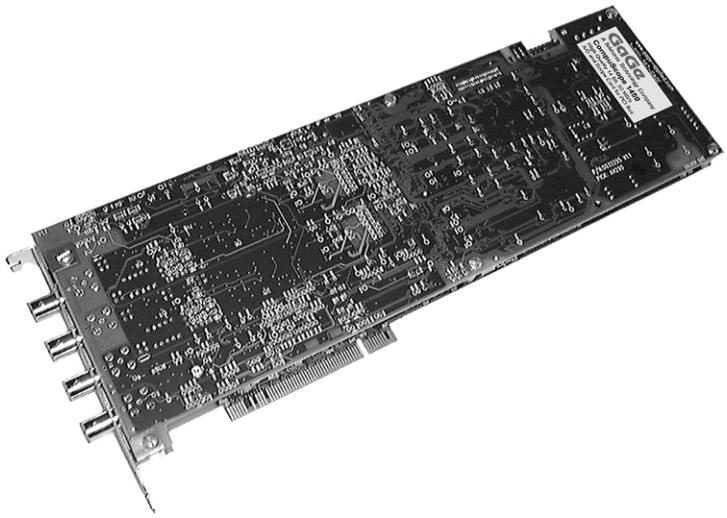
CompuScope 1450

Ultra-fast waveform digitizer card for PCI bus



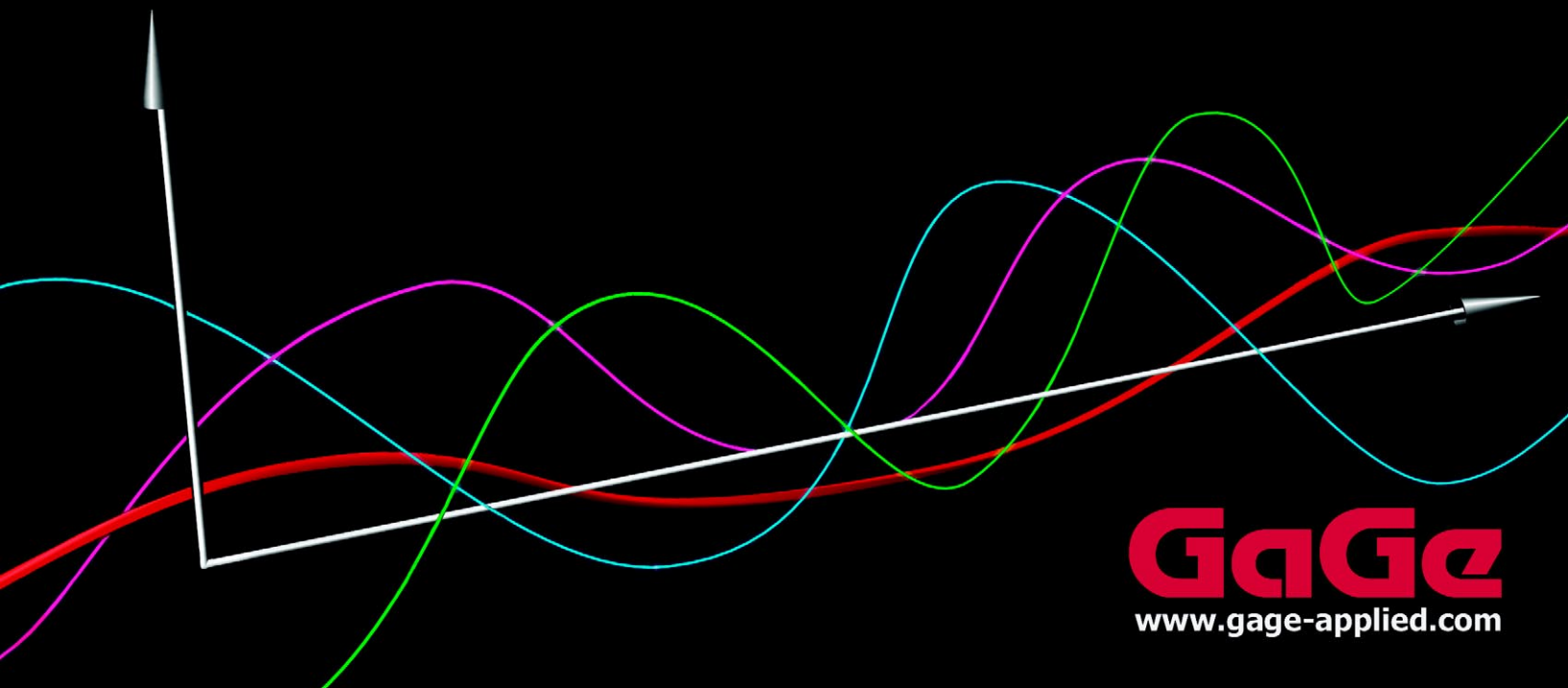
Lower cost alternative for high-accuracy synthetic instrumentation, automated test systems, and scientific research.

FEATURES

- 14 bit, 50 MS/s A/D
- Up to 1 GigaSample of on-board acquisition memory
- 63 dB signal to noise ratio
- Multi-card systems of up to 8 channels at 50 MS/s (16 channels at 25 MS/s)
- Fast data transfer rate to system RAM
- Compatible with GageScope software
- SDKs for C/C++, MATLAB, LabVIEW under Win 95/98/ME and Win NT/2000/XP

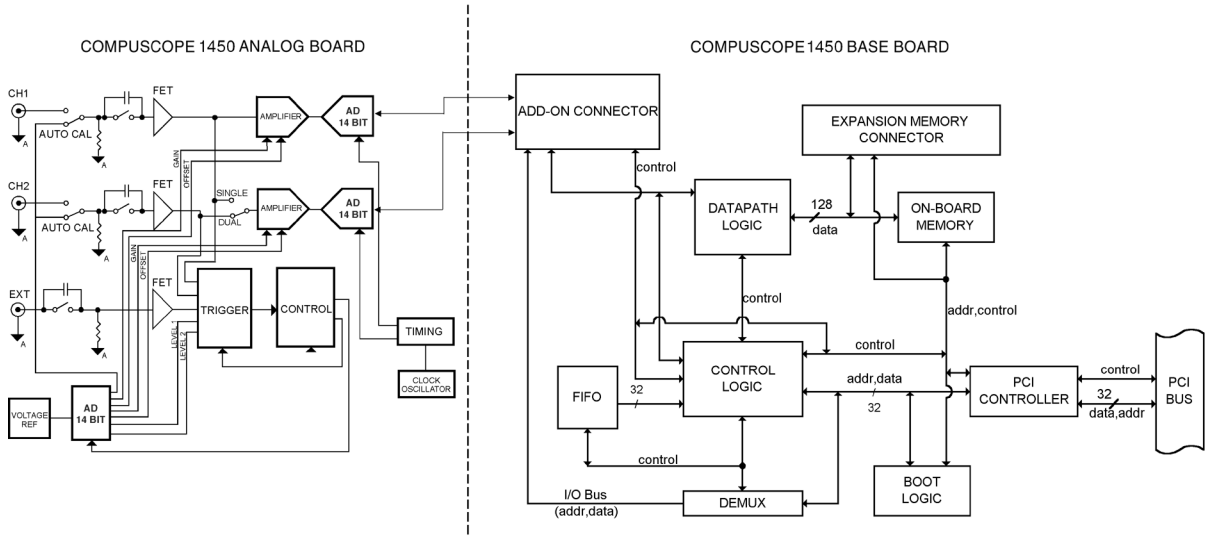
APPLICATIONS

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



GaGe
www.gage-applied.com

CompuScope 1450 Simplified Block Diagram



COMPUSCOPE 1450

CompuScope 1450 can sample analog signals at speeds up to 50 MS/s with 14 bit resolution and store the data in the on-board memory.

50 MS/S SAMPLING

CompuScope 1450 uses two monolithic sub-ranging A/D converters, each running at 25 MS/s, to provide a dual-channel simultaneous real-time sampling rate of 25 MS/s.

In the single-channel mode the two ADCs are clocked in a "ping-pong" mode to achieve up to 50 MS/s sampling. An on-board crystal-controlled timing circuit ensures timebase accuracy and long-term thermal stability.

The on-board auto-calibration circuitry allows the two channels to be matched in order to reduce the image signal.

HIGH IMMUNITY TO DIGITAL NOISE

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

MEMORY DEPTH

CompuScope 1450 is available with memory depths of 1M, 8M, 128M, 512M and 1G (14-bit samples). This memory can be used as a circular buffer for storage of pre- and post-trigger data.

In the single-channel mode, the maximum number of sample points is equal to the memory depth of the CompuScope 1450 model being used, whereas in the dual-channel mode the maximum number of sample points is half the memory depth.

The data stored in the CompuScope 1450 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).

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 1450 to be transferred to the system RAM, or any other PCI destination, at sustained rates of up to 80 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 80 MB/s recording speed to the system RAM.

BUS MASTERING

CompuScope 1450 is fully capable of becoming a PCI bus master in order to transfer data at the maximum rate of 80 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 1450 features state-of-the-art analog triggering.

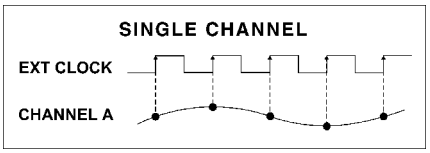
An analog comparator provides triggering from either one of the input channels, or from an external signal or from software.

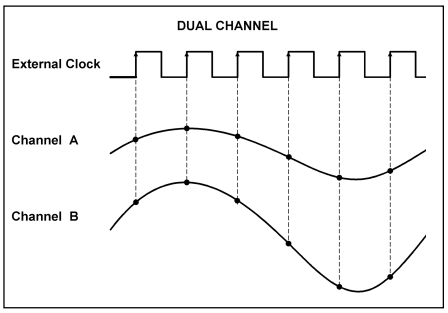
In addition to the trigger source, trigger level and slope are also selectable by software, making the trigger system similar to traditional oscilloscopes.

EXTERNAL CLOCK

An external clock input is included as standard on the CS1450 as a BNC input for situations where a special sampling frequency is required.

In both single-channel and dual-channel mode, input signals are sampled at every rising edge of the External Clock.





This External Clocking scheme is a marked improvement over the options available for previous CompuScope models.

The External Clock must be a sine wave with a minimum amplitude of 1 Volt RMS and a maximum amplitude of 2 Volts RMS.

The allowed external clock range is 40 to 50 MHz for single channel mode or 20 to 25 MHz for dual channel mode.

The duty cycle of the External Clock signal must be 50% ± 30% for single channel mode and 50% ± 5% for dual channel mode.

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 1450 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.

It should be noted that only post-trigger data 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 CS1450 has finished capturing a Multiple Record segment, the trigger circuitry is automatically re-armed within 5 (10) sample clock cycles in single (dual) channel mode, 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.

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.

IDEAL BUILDING BLOCK FOR OEM CUSTOMERS

CompuScope 1450 is an ideal module for embedded data acquisition for OEM applications.

The low cost, high performance and very high quality and reliability of this product brings together the essential ingredients many of the OEM customers in wireless communication, disk drive testing, ultrasound and explosion testing are looking for.

INTERNAL SAMPLE RATE FROM 50 MS/s DOWN TO 1 kS/s

A number of applications in mid-range data acquisition require the waveform digitizer to be able to capture data at very different sample rates.

CompuScope 1450 can capture signals with sample rates as fast as 50 MS/s, but also as low as 1 kS/s, allowing the use of the same instrument for very different applications.

SYSTEM REQUIREMENT

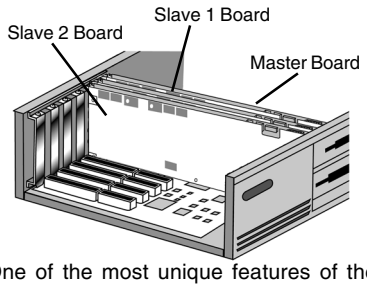
PCI-based computer with at least one free full-length PCI slot, 128 MB RAM, 50 MB hard disk and SVGA video.

SIZE

Plugs into one full-length PCI Slot, 13 inch x 4.1 inch

Memory Depth:	The board occupies:
1M	1 full length slot
8M	2 full length slots
128M	3 full length slots
512M	3 full length slots
1G	3 full length slots

MULTI-CARD SYSTEMS



One of the most unique features of the CompuScope cards is the Multi-Card system that can be configured.

A Multi-Card system, comprised of one Master and up to 7 Slave CS1450 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 8M Memory Models:
  2, 3 or 4 cards can be configured
- For 128M and higher Memory Models:
  2 or 3 cards can be configured

GageScope software 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 1450-1M	145-001-002
CompuScope 1450-8M	145-001-003
CompuScope 1450-128M	145-001-004
CompuScope 1450-512M	145-001-005
CompuScope 1450-1G	145-001-006
CS1450 memory Upgrade Charge	145-181-200
Master Multi-Card Upgrade	145-181-003
Slave Multi-Card Upgrade	145-181-004

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 1450 SPECIFICATIONS

POWER (IN WATTS)

+5V		
Memory	Worst	Typical
1 M	24.8	22.5
8 M	30.3	27.5
128 M	33.6	30.5
512 M	33.6	30.5
1 G	33.6	30.5
-5V		
	Worst	Typical
All Models	0.0	0.0
+12V		
	Worst	Typical
All Models	1.7	1.5
-12V		
	Worst	Typical
All Models	0.6	0.5

Note 1: Auxiliary Power Cable must be connected if more than one CS1450 cards are installed.

Note 2: Power connector on models of 128M, 512M and 1G models must also be connected using a Y-cable.

CHANNELS A & B

Inputs per card: 2

Impedance: 1 MΩ, 40 pF or 50 Ω, software selectable

Coupling: AC or DC

Resolution: 14 bits

Bandwidth: DC to 25 MHz (DC)
10 Hz to 25 MHz (AC)

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

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

DC Accuracy relative to full scale input:

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

Sampling Rate
Single-channel (Channel A only):
MS/s: 50, 25, 10, 5, 2, 1
kS/s: 500, 200,100, 50, 20, 10, 5, 2, 1
Dual-Channel Mode
(Channels A and B simultaneously):
MS/s: 25, 10, 5, 2, 1
kS/s: 500, 200,100, 50, 20, 10, 5, 2, 1

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

Connector: BNC

DYNAMIC PARAMETERS

Measured using 1 MHz sine wave input at 25 MS/s with amplitude of 95% of full scale on the ±1V range. Typical values listed below.

SNR: 63 dB
SFDR: 70 dB
SINAD: 60 dB
THD: -72 dB
ENOB: 10.2 bits

ACQUISITION MEMORY

Data Storage: In on-board memory

Memory Sizes: 1M, 8M, 128M, 512M, 1G (14 bit samples)

Maximum Memory Depth:
Single-Channel: Full on-board memory
Dual-Channel: Half on-board memory per channel

TRIGGERING

Source: CH A, CH B, Ext or Software

Type: Analog triggering

Sensitivity: ±10% of Full Scale

Level Accuracy: ±5% of Full Scale

Slope: Positive or Negative

Post Trigger Data: 64 *(128)* points minimum.
Can be defined with a 64 *(128)* point resolution in dual *(single)* channel mode

EXTERNAL TRIGGER

Impedance: 1 MΩ, 35 pF

Amplitude: Absolute Max ±15V

Voltage Range: ±1V and ±5V

Bandwidth: 25 MHz

Coupling: AC or DC

Connector: BNC

INTERNAL CLOCK

Source: Clock Oscillator

Accuracy: ±50 ppm (0 to 70 deg C)

EXTERNAL CLOCK

Max. Frequency: 50 MHz in Single
25 MHz in Dual

Min. Frequency: 40 MHz in Single
20 MHz in Dual

Signal Level: MIN 1 V RMS
MAX 2 V RMS

Impedance: 50Ω

Sampling Edge: Rising

Duty Cycle: 50% ± 30% in Single
50% ± 5% in Dual

MULTIPLE RECORD

Pre-trigger Data: None

Record Length: 128 *(256)* points minimum. Can be defined with a 64 *(128)* point resolution in dual *(single)* channel mode

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 (1M models)

MASTER/SLAVE SYSTEM TRIGGERING

of Trigger Input: 2 per system

Trigger Source: CHA, CHB, EXT or Software (Master card only)

Sensitivity: ±10% of full scale

Level Accuracy: ±5% of full scale

Slope: Positive or Negative

OPERATING SYSTEMS

Windows 95/98/ME/NT*/2000/XP Support
*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 and Interruptions (Perf.Crit B)
EN 61000-3-2 AC Power Line Harmonics Emissions
AS/NZS 2064
Australian emissions standard for Industrial, Scientific and Medical Equipment

Compliance demonstrated on a single card configuration

MATERIALS SUPPLIED

One CompuScope 1450 card
One Hardware Manual
One Gage Software Disk on CD
One GageScope Lite Edition Software

WARRANTY

One year parts and labor

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