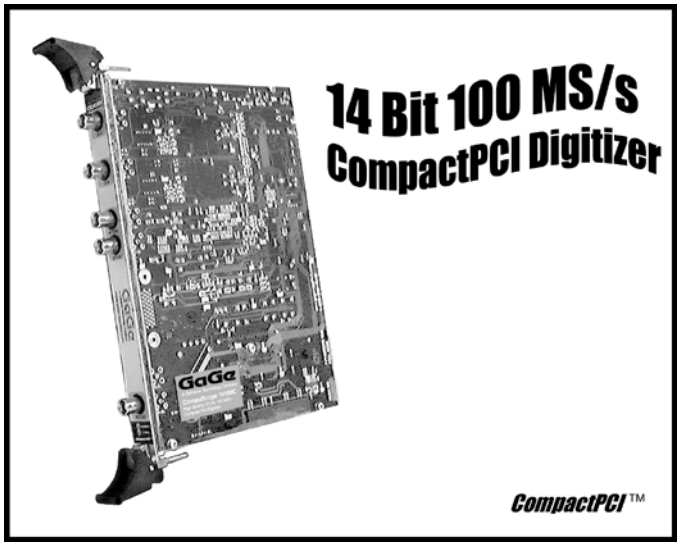
CompuScope 14100C

Ultra-fast high resolution digitizer card for compactPCI/PXI bus



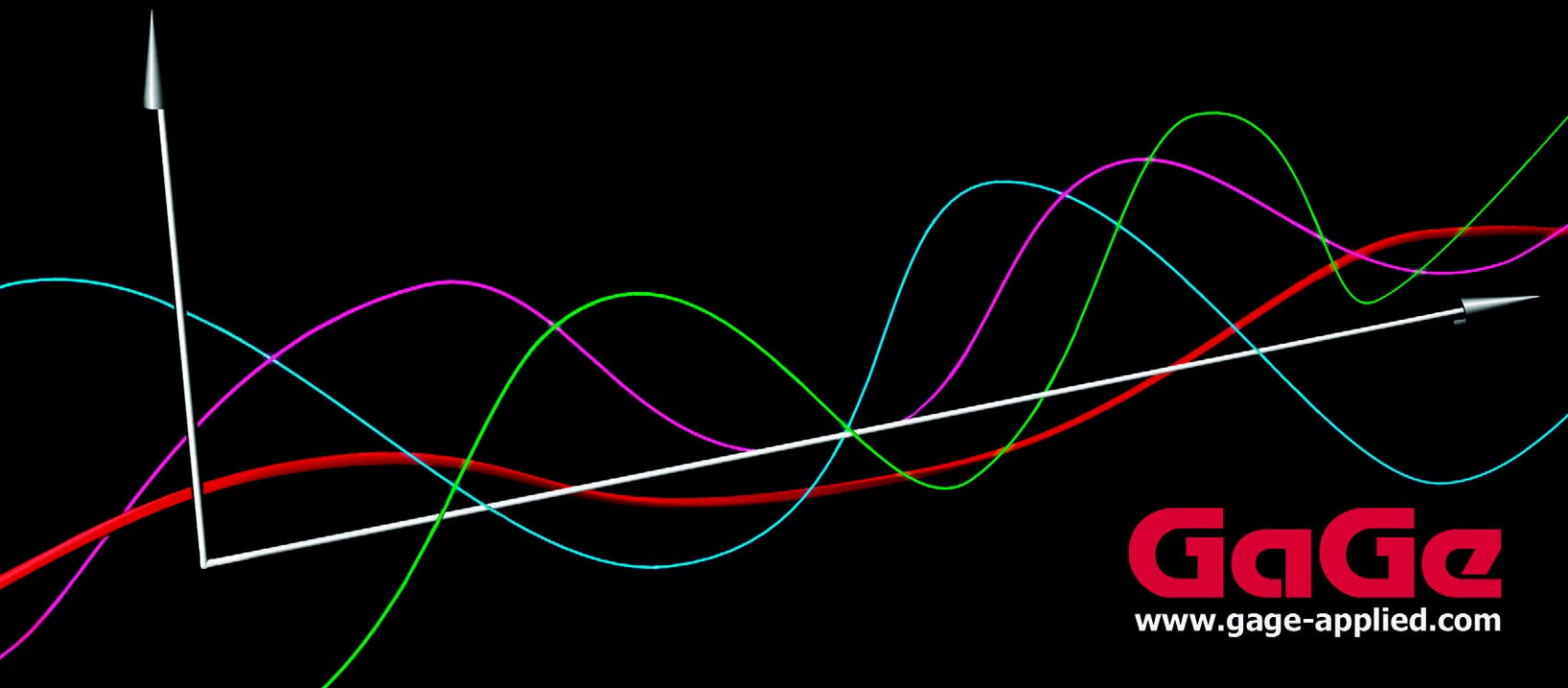
General-purpose digitizer module for high-accuracy synthetic instrumentation, automated test systems and scientific research.

FEATURES

- 14 bit, 100 MS/s A/D
- Up to 1 GigaSample acquisition memory
- 63 dB signal to noise ratio
- Multi-card systems of up to 6 channels at 100 MS/s (12 channels at 50 MS/s)
- Fast data transfer rate to system RAM
- GageScope compatible
- SDKs for C/C++, MATLAB, LabVIEW & LabWindows/CVI under Win 95/ 98/ME and Win NT/2000/XP

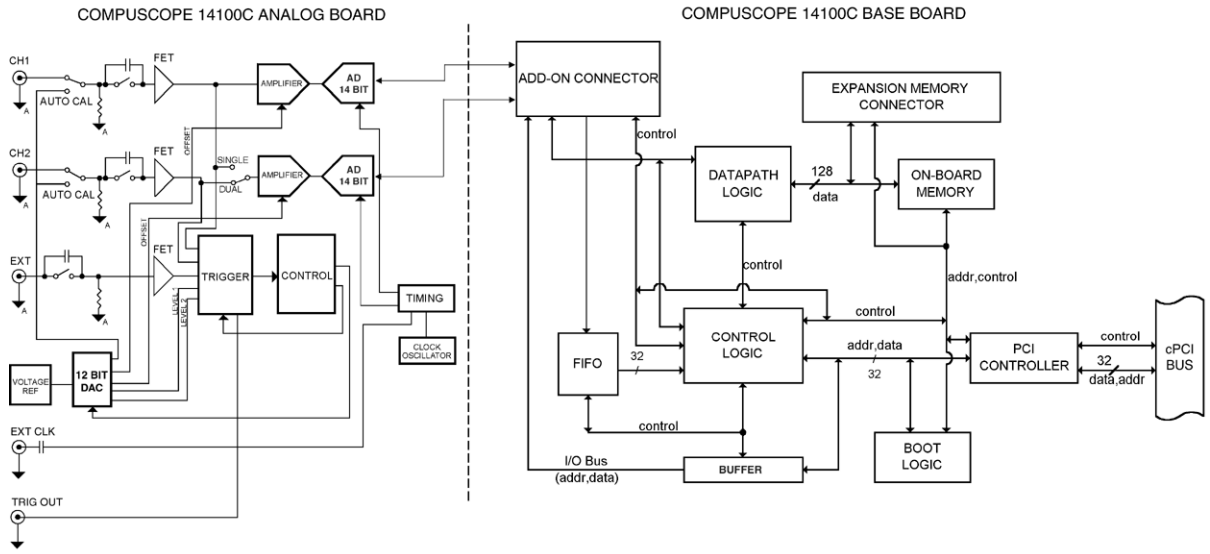
APPLICATIONS

Non-destructive testing
Military & Aerospace
Communications & wireless
Synthetic instrumentation
Radar/Lidar
Laser
High energy physics
Embedded digitizer



GaGe
www.gage-applied.com

CompuScope 14100C Simplified Block Diagram



COMPUSCOPE 14100C

CompuScope 14100C is a 6U form factor CompactPCI card that can sample analog signals at speeds up to 100 MS/s with 14 bit resolution and store the data in the on-board memory.

14 BIT, 100 MS/S SAMPLING

CompuScope 14100C uses two monolithic sub-ranging A/D converters, each running at 50 MS/s, to provide a dual-channel simultaneous sampling rate of 50 MS/s.

In the single-channel mode the two ADCs are clocked in a "ping-pong" mode to achieve up to 100 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 CompactPCI 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 14100C is available with memory depths of 1 Megasample, 8 Megasamples, 128 Megasamples and 1 Gigasample (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 14100C 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 14100C 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 CompactPCI bus allows the data from the on-board memory of the CompuScope 14100C to be transferred to system RAM, or any other CompactPCI 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 transfer speed to the system RAM.

BUS MASTERING

CompuScope 14100C is fully capable of becoming a CompactPCI bus master in order to transfer data at the maximum rate of 80 MB/s.

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

FLEXIBLE TRIGGERING

CompuScope 14100C features state-of-the-art analog triggering.

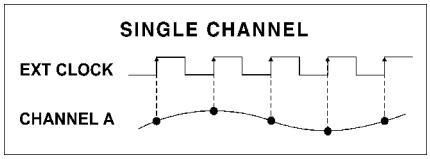
An analog comparator provides triggering from either one of the input channels, or from an external signal or from software.

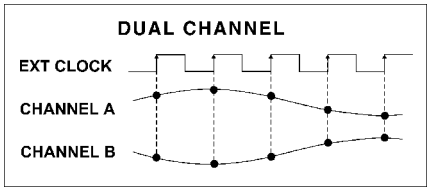
In addition to the trigger source, trigger level and slope are also selectable by software, making the trigger system similar to traditional oscilloscopes.

EXTERNAL CLOCK

An external clock input is included as standard on the CS14100C 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 100 MHz for single channel mode or 20 to 50 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.

TRIGGER OUT

CompuScope 14100C provides a TTL output that signifies the occurrence of a trigger event on the card. This signal can be used to synchronize other parts of the measurement system to the CompuScope 14100C.

MULTIPLE RECORD

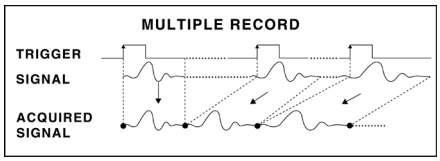
Even though the CompactPCI bus allows very fast data throughput to system RAM, there may still be applications in which data bursts cannot be off-loaded either because of very fast trigger repeat frequency or because of software limitations.

Multiple Recording allows CompuScope 14100C to capture data on successive triggers and stack it in the on-board memory.

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 CS14100C has finished capturing a Multiple Record segment, the trigger circuitry is automatically re-armed within 16 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 system RAM.

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.

UNIQUE CALIBRATION SCHEME

CompuScope 14100C employs a very unique calibration scheme to optimize accuracy while minimizing signal distortion.

One of the main problems high resolution, high bandwidth measurement instruments run into is that variable gain amplifiers for high bandwidth applications start to produce significant harmonic distortion.

The noise spectral density of the amplifiers also increases the noise floor, thereby reducing the signal to noise ratio.

CompuScope 14100C uses low noise amplifiers to switch gain and then uses a digital multiplier to scale the signal according to calibration data.

This scheme allows the achievement of 63 dB signal to noise ratio and yet provides better than 0.5% accuracy.

ORDERING INFORMATION

Hardware

CompuScope 14100C-1M	741-001-002
CompuScope 14100C-8M	741-001-003
CompuScope 14100C-128M	741-001-004
CompuScope 14100C-1G	741-001-006
CS14100C-1M: 2 Card Master/Slave Set	741-001-010
CS14100C-1M: 4 Card Master/Slave Set	741-001-011
CS14100C-1M: 6 Card Master/Slave Set	741-001-012
CS14100C-8M: 2 Card Master/Slave Set	741-001-020
CS14100C-8M: 3 Card Master/Slave Set	741-001-021
CS14100C-8M: 4 Card Master/Slave Set	741-001-022
CS14100C: Memory Upgrade Charge	741-181-004

GageScope Software

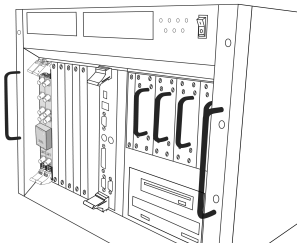
GageScope: Lite Edition	Included
GageScope: Standard Edition with purchase of hardware	300-100-351
GageScope: Standard Edition purchased independently	300-100-352
GageScope: Professional Edition with purchase of hardware	300-100-354
GageScope: Professional Edition purchased independently	300-100-355

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
CompuScope SDK for LabWindows/CVI	200-300-100

All Upgrades performed at the factory.

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 5 Slave CS14100C boards, can be ordered 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 CompuScope 14100C-1M Master/Slave Sets can be configured:

- 2 Card Master/Slave Set
- 4 Card Master/Slave Set
- 6 Card Master/Slave Set

The following CompuScope 14100C-8M Master/Slave Sets can be configured:

- 2 Card Master/Slave Set
- 3 Card Master/Slave Set
- 4 Card Master/Slave Set

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

Another class of Multi-Card systems is the Multiple/Independent type. A Multiple/Independent system does not have common clock and triggering but can consist of CompuScope boards of different types and memory depths.

COMPUSCOPE 14100C GENERAL SPECIFICATIONS

SYSTEM REQUIREMENTS

CompactPCI-based PICMG compliant computer with the required number of free 6U slots, 128 MB RAM, 50 MB hard disk and SVGA video.

The CompuScope 14100C must be installed in a slot that supports bus mastering to achieve stated performance.

SIZE

6U CompactPCI

1M Memory:	Occupies 1 slot
8M Memory:	Occupies 2 slots
128M Memory:	Occupies 2 slots
1G Memory:	Occupies 2 slots

COMPUSCOPE 14100C SPECIFICATIONS

POWER (IN WATTS)

5 V		
	Worst	Typical
All Memory Models	24.8	22.5
- 5V		
	Worst	Typical
All Memory Models	0.0	0.0
12 V		
	Worst	Typical
All Memory Models	1.7	1.5
-12 V		
	Worst	Typical
All Memory Models	0.6	0.5

CHANNELS 1 & 2

Inputs per card: 2

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

Coupling: AC or DC

Resolution: 14 bits

Bandwidth: DC to 50 MHz (DC)
10 Hz to 50 MHz (AC)

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

Absolute Max. Amplitude:

1 MΩ: ±15 Volts (continuous)

50Ω: ±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 Mode (Channel 1 only):

MS/s: 100, 50, 25,10, 5, 2, 1

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

Dual-Channel Mode
(Channels 1 and 2 simultaneously):

MS/s: 50, 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 for a single card configuration using 1 MHz sine wave input at 50 MS/s dual channel mode with amplitude of 95% of full scale on the ±1V range. Typical values listed below.

SNR: 63 dB
SFDR: 73 dB
SINAD: 60 dB
THD: -72 dB
ENOB: 10.2 bits

ACQUISITION MEMORY

Data Storage: In on-board memory

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

Maximum Memory Depth:

Single-channel: Up to full on-board memory

Dual-Channel: Up to half on-board memory per channel

TRIGGERING

Source: CH 1, CH 2, EXT or Software

Type: Analog triggering

Sensitivity: ± 10% of full scale

Level Accuracy: ± 5% of full scale

Slope: Positive or Negative, software selectable

Post Trigger Data: 128 *(256)* 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: 30 MHz
Coupling: AC or DC
Connector: BNC

TRIGGER OUTPUT

Signal Type: TTL

Active Edge: Rising (low-to-high)

Synchronization: Synchronized to on-board system clock

INTERNAL CLOCK

Source: Clock oscillator
Accuracy: ±50 ppm (0 to 70 deg C)

EXTERNAL CLOCK

Max. Freq.: 100 MHz in Single
50 MHz in Dual

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

Signal Type: Sine Wave

Signal Level: MIN 1 V RMS
MAX 2 V RMS

Impedance: 50Ω

Sampling Edge: Rising

Coupling: AC

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

MULTIPLE RECORD

Pre-trigger Data: None

Record Length: 256 *(512)* points minimum can be defined with a 64 *(128)* point resolution in dual *(single)* channel mode

MULTI-CARD SYSTEMS

Operating Mode: Master/Slave or Multiple Independent

Number of Cards:

Master/Slave: 2, 4 or 6 cards for 1M memory models
2, 3 or 4 cards for 8M memory models

Multiple/Ind: Limited by backplane

Max. # Channels in Master/Slave Mode: 12 at 50 MS/s
6 at 100 MS/s

MASTER/SLAVE TRIGGERING

of Trigger Inputs: 2 per system

Trigger Source: CH 1, CH 2, EXT or Software (Master Board Only)

Sensitivity : ± 10% of full scale

Level Accuracy : ± 5% of full scale

Trigger Slope: Positive or Negative, software selectable

OPERATING SYSTEMS

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

*Version 4, SP3 or higher

ELECTROMAGNETIC COMPATIBILITY

CE Compliant

The following CS14100C configurations have been tested for CE Compliance:

For 1M memory models:
1 Card Independent: CE Compliant
2 & 4 Card M/S Sets: CE Compliant
6 Card M/S Set: Contact Gage for details

For 8M memory models:
1 Card Independent: CE Compliant
2 Card M/S Sets: CE Compliant
3 & 4 Card M/S Sets: Contact Gage for details

For Extreme Memory models (128M & more): Contact Gage for details

MATERIALS SUPPLIED

One CompuScope 14100C card
Two Clip-On Ferrite Beads
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 2004