We offer the widest range of high-speed and high-resolution digitizers available on the market today. Our powerful PC-based instrumentation products allow you to create reliable, flexible and high-performance solutions quickly and easily.

Reduce development time and costs for testing complex applications such as radar, wireless communications, spectroscopy, etc. by using our GageScope software or SDKs.

APPLICATIONS

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

CompuScope 14100C

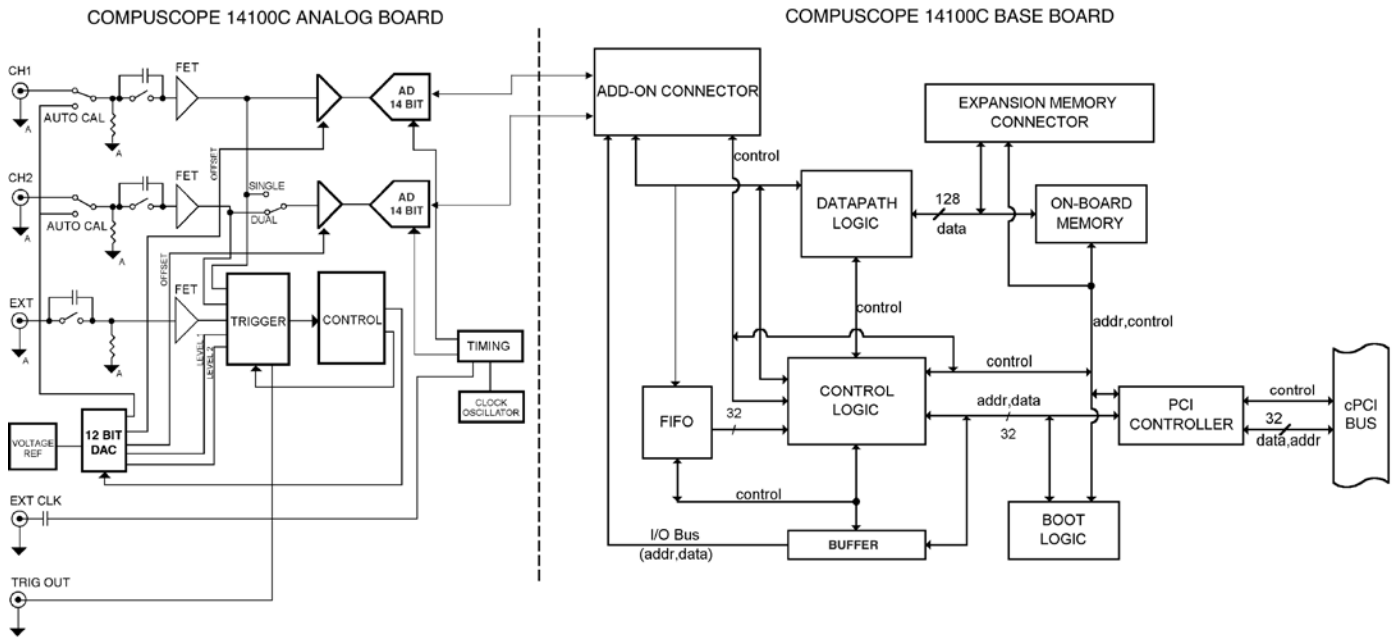
Ultra-fast high resolution digitizer card for CompactPCI/PXI bus

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
- Programming-free operation with GageScope® oscilloscope software
- Software Development Kits available for LabVIEW, MATLAB, C/C#

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.

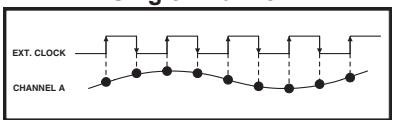
In addition to the trigger source, trigger level and slope are also selectable by software, making the trigger system similar to traditional oscilloscopes.

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.

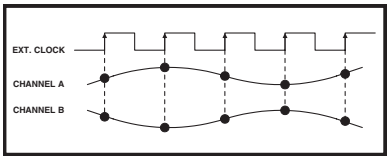
This External Clocking scheme is a marked improvement over the options available for previous CompuScope models.

Single Channel



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

Dual Channel



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.

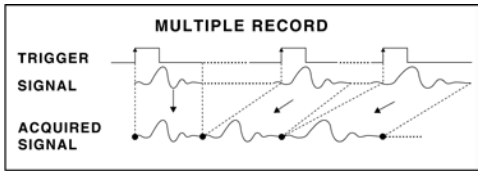
MULTIPLE RECORD

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 onsuccessive 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.

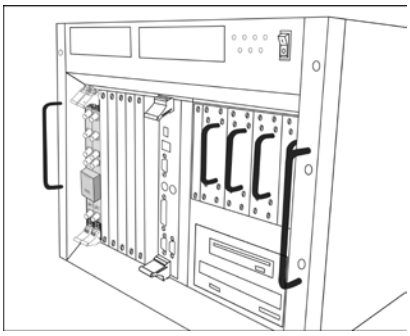
CompuScope 14100C uses low noise amplifiers to switch gain and then uses a digital multiplier to scale the signal according to calibration data.

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

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 CS14100C-1M Master/Slave Sets can be configured:

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

The following CS14100C-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.

SYSTEM REQUIREMENTS

CompactPCI PICMG compliant system with the required number of free 6U slots; controller or PC with 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

POWER (IN WATTS)

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

GaGe

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 coupled)
10 Hz to 50 MHz (AC coupled)
Input Voltage Ranges: ±100 mV, ±200 mV, ±500 mV, ±1 V, ±2 V, ±5 V
Absolute Maximum Amplitude:
1 MΩ Impedance: ±15 Volts (continuous)
50 Ω Impedance: ±5 Volts (continuous)
DC Accuracy relative to full scale input:

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

Internal 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
50 Ω 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 ±1 V 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

Number of Trigger Inputs: 2 per system
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 Maximum ±15 V
Voltage Range: ±1 V and ±5 V
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° C)

EXTERNAL CLOCK

Maximum Frequency: 100 MHz in single-channel mode
50 MHz in dual-channel mode
Minimum Frequency: 40 MHz in single-channel mode
20 MHz in dual-channel mode
Signal Type: Sine Wave
Signal Level: MIN 1 V RMS
MAX 2 V RMS
Impedance: 50 Ω
Sampling Edge: Rising
Coupling: AC
Duty Cycle: 50% ±30% in single-channel mode
50% ±5% in dual-channel mode

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 Mode: 2, 4 or 6 cards for 1M mem. models
2, 3 or 4 cards for 8M memory models.
Available upon request: 128M & 1G models.
Multiple/Independent Mode: Limited by backplane
Maximum Number of Channels in Master/Slave Mode: 12 at 50 MS/s (for 1M model)
6 at 100 MS/s (for 1M model)

MASTER/SLAVE SYSTEM TRIGGERING

Number of Trigger Inputs: 2 per system
Trigger Source: CH 1, CH 2, EXT or Software (Master Card Only)
Sensitivity : ± 10% of full scale
Level Accuracy : ± 5% of full scale
Trigger Slope: Positive or Negative; software-selectable

OPERATING SYSTEMS SUPPORTED

Windows 98/ME/NT* CompuScope Driver version 3.60.22
* Version 4, SP3 or higher
Windows 2000**/XP CompuScope Driver version 4.xx.xx
** SP1 or higher

APPLICATION SOFTWARE

GageScope: Windows-based software for programming-free operation

LITE Edition:	Included with purchase, provides basic functionality
Standard Edition:	Provides limited functionality of advanced analysis tools, except for Extended Math
Professional Edition:	Provides full functionality of all advanced analysis tools

SOFTWARE DEVELOPMENT KITS (SDK)

CompuScope SDK for C/C# for Windows*
CompuScope SDK for MATLAB for Windows
CompuScope SDK for LabVIEW for Windows

*C/C# SDK is compatible with LabWindows/CVI 7.0+ compiler.
Visual Basic.NET support available with purchase of C/C# SDK.

Contact your Gage Sales Agent for information on Linux support.

ELECTROMAGNETIC COMPATIBILITY

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

WARRANTY

One year parts and labor
Certificate of NIST Traceable Calibration is included.

All specifications subject to change without notice;
specifications are not guaranteed under all possible combinations of modes of operation

ORDERING INFORMATION

Hardware & Upgrades

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 Upgrades	Contact Factory

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.

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900 N. State St.
Lockport, IL 60441-2200

Toll-Free (US and Canada):
phone 1-800-567-4243
fax 1-800-780-8411

Direct:
phone +1-514-633-7447
fax +1-514-633-0770

Email:
prodinfo@gage-applied.com

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

www.gage-applied.com