

## Octopus multi-channel digitizer product introduction

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The GaGe Octopus™ family of multi-channel digitizers features up to 8 channels in a single-slot PCI card with up to 125 MS/s sampling per channel, and up to 4 GB of on-board acquisition memory.

The Octopus family represents a new generation of GaGe digitizers and has the advanced features you would expect from a top performance signal capture card:

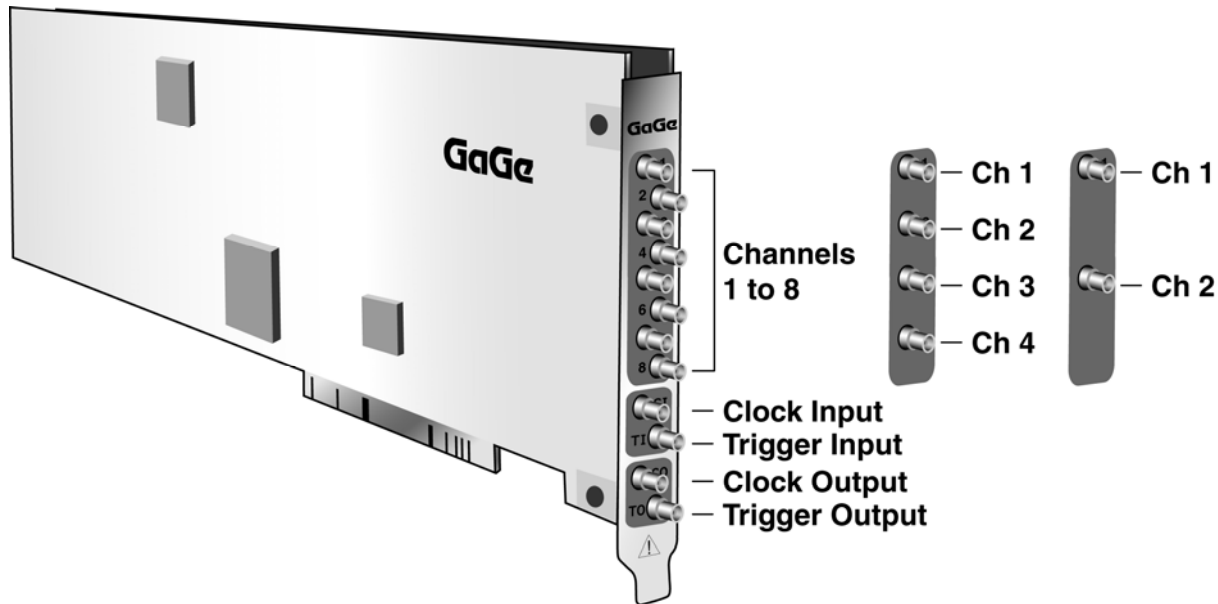
- 2, 4, or 8 simultaneous digitizing channels.
- Maximum sampling rates of 10, 25, 50, 65, 100, or 125 MS/s per channel (maximum sampling rate on 16-bit Octopus digitizer is 25 MS/s).
- 128 MS to 2 GS on-board acquisition memory in a single full-length PCI slot.
- 12, 14, or 16-bit vertical resolution
- Data transfer rates from CompuScope memory to PC memory as high as 200 MB/s through PCI Bus Mastering on a 66 MHz, 32 bit PCI bus.
- Greater than 100 MHz input analog bandwidth specification (greater than 20 MHz for 16-bit Octopus digitizers)
- Ease of integration with External Clock In (available on 12 and 14-bit Octopus digitizers) and Clock Out, External Trigger In and Out.
- Ease of system development with Software Development Kits (SDKs) for C/C#, MATLAB, and LabVIEW. Operation under Visual Basic.NET and LabWindows/CVI is also possible from the C/C# Software Development Kit.
- Pre-Trigger Multiple Record functionality, which help optimize the use of the on-board memory by stacking data from successive acquisitions.
- Accuracy of  $\pm 0.5\%$  for precise absolute measurements of fine signal details.
- On-board self-calibration to guarantee consistent accuracy across input ranges and modes of operation. Self-calibration can be automatic or user-controlled to minimize down time and ensure availability of the card for measurement in test systems.
- Full-featured front-end, with software control over input ranges, coupling and impedances.
- Software selectable low-pass filter available for each channel on 12 and 14-bit Octopus digitizers.
- Excellent frequency response and minimal phase distortion characteristics; designed for optimal cross-channel synchronization and smooth frequency response that is within  $\pm 0.5$  dB of ideal response up to 90 MHz (up to 7 MHz for 16-bit Octopus digitizers).
- Time-stamping acquired records using an on-board 44 bit counter that is clocked by a 66 MHz crystal oscillator. This is particularly useful in Multiple Record mode. Optionally, the time-stamp counter can use the sample clock as its source.
- On-board Phase Lock Loop (PLL) circuitry allows an external 10 MHz clock reference to synchronize the on-board internal sampling oscillator to provide the sampling clock signal.

## Octopus family connectors and headers

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CompuScope cards connect to the outside world through connectors, both analog (SMBs) and digital (PCI bus). This section describes these connectors for the Octopus card.

The connectors and headers on the 8-channel, 4-channel, and 2-channel Octopus digitizers are shown below:



*Figure 1: Connectors on the Octopus family*

- **Channel 1 SMB** connector is the single-ended signal input for Channel 1.
- **Channel 2 SMB** connector is the single-ended signal input for Channel 2.
- **Channel 3 SMB** connector is the single-ended signal input for Channel 3.
- **Channel 4 SMB** connector is the single-ended signal input for Channel 4.
- **Channel 5 SMB** connector is the single-ended signal input for Channel 5.
- **Channel 6 SMB** connector is the single-ended signal input for Channel 6.
- **Channel 7 SMB** connector is the single-ended signal input for Channel 7.
- **Channel 8 SMB** connector is the single-ended signal input for Channel 8.
- **Clock Input SMB** connector is the input for an External Clocking signal that is used as the ADC sampling clock. (available on 12 or 14-bit Octopus digitizers). The clock input SMB may also be used to input a 10 MHz Reference Signal (supported on all Octopus models).
- **Trigger Input SMB** connector is used to input an External Trigger signal. External Triggering is defined exactly as for an oscilloscope. This signal can be used to trigger the system but cannot be viewed or digitized.
- **Clock Output SMB** connector supplies the ADC clocking signal, whether it comes from the internal oscillator or from the External Clock Input, to another module of the test system or experimental setup. The clock output SMB connector may also be configured to output the Octopus' on-board high accuracy 10 MHz Reference Signal. The characteristics of the Output are detailed in the Specifications section.
- **Trigger Output SMB** connector supplies a trigger signal generated by the card to another module of the test system or experimental setup.

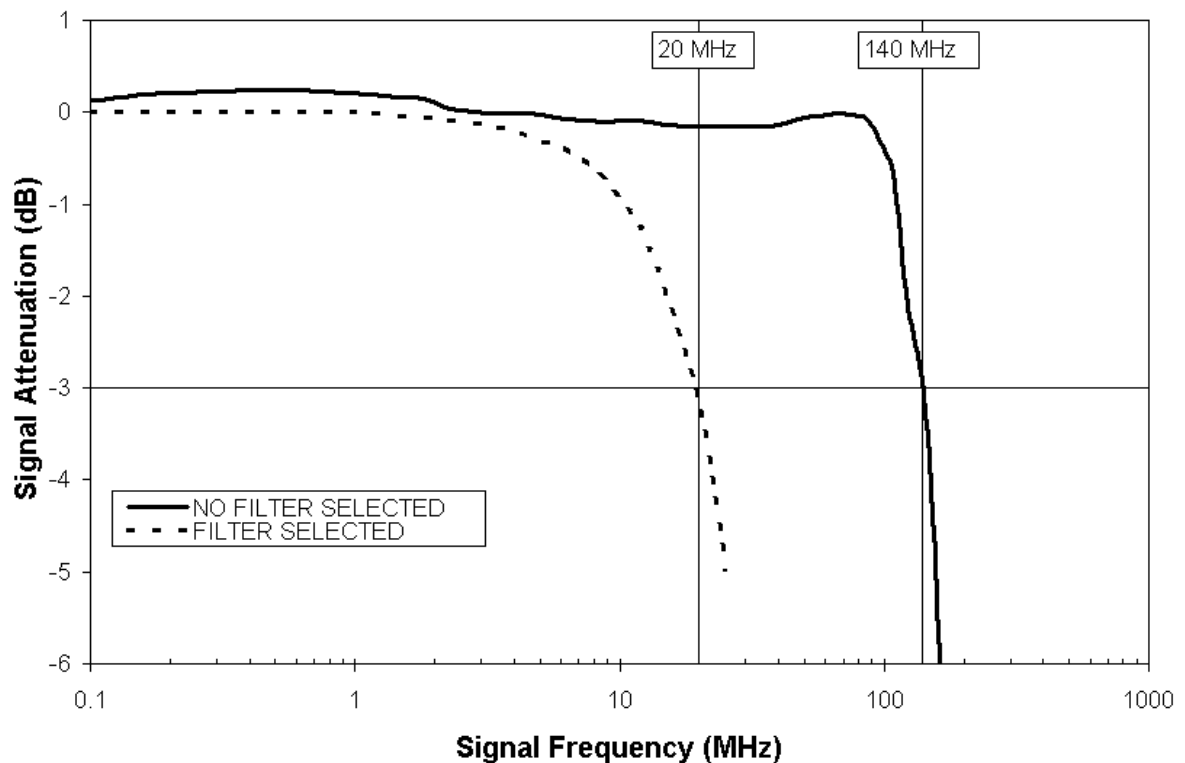
## Octopus family frequency response and bandwidth-limiting filter

The Octopus family has a very flat frequency response, minimizing the attenuation or amplification of frequency components, so that the signals from each input channel are as identical as possible from the SMB connectors to the ADCs.

The figure below illustrates as a solid line the actual frequency response of the 12 and 14-bit Octopus family using the following acquisition parameters: 125 MS/s sampling rate,  $\pm 2\text{V}$  input range, DC input coupling, and  $50\ \Omega$  terminating input impedance. The signal attenuation is shown as a function of input signal frequency with and without the software-selectable 20 MHz low-pass Bessel filter applied.

For optimal flexibility each channel on the 12 and 14-bit Octopus digitizers is equipped with a software selectable low-pass Bessel filter with a 3 dB roll-off frequency of 20 MHz. A Bessel filter produces an extremely smooth response curve at all frequencies. Bessel filters are also ideal for their flat in-band group delay, flat pass-band response, and limited in-band distortion. Application of this filter provides improved noise performance by removing high-frequency noise components from lower-frequency input signals.

In addition, the figure below illustrates as a dashed line the input frequency response of the 12 and 14-bit Octopus digitizers with the Bessel filter applied. The same dashed line also represents the frequency response of the 16-bit Octopus digitizers.



*Figure 2: Illustration of the frequency response*

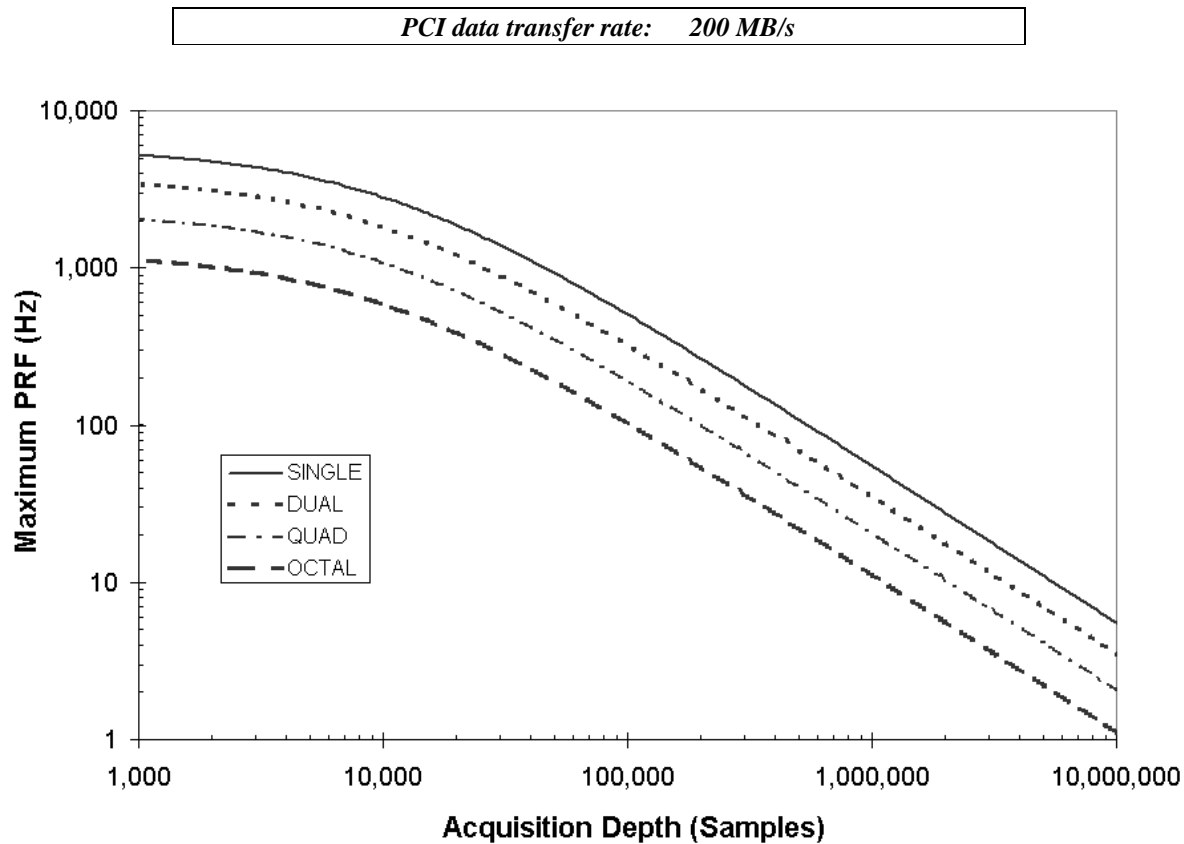
## Octopus multi-channel digitizer throughput & maximum PRF

A number of applications require the Octopus digitizer to acquire data based on a rapidly occurring trigger signal. These high Pulse Repeat Frequency (PRF) applications include radio, radar and ultrasound signal capture.

Representative repetitive capture benchmarks in Single Record mode are shown below for the Octopus family. In Single Record mode, the signal is captured into on-board CompuScope memory and the captured data are transferred through the PCI bus using PCI bus mastering to PC RAM.

Please note that much higher PRFs will be achieved using CompuScope Multiple Record mode.

Curves are shown for the Octopus digitizer in single, dual, quad and octal channel acquisition modes as a function of capture depth. Results are shown for a 32-bit, 66 MHz PCI bus (PCI-X). The Octopus PCI transfer rate, calculated from the linear portion of the curves at high depths, is shown below.



*Figure 3: Maximum PRF vs. acquisition length*

The GaGe Octopus™ family of multi-channel digitizers features up to 8 channels in a single-slot PCI card with up to 125 MS/s sampling per channel, and up to 4 GB of on-board acquisition memory. Combine several Octopus cards for up to 64 channels in a single system.

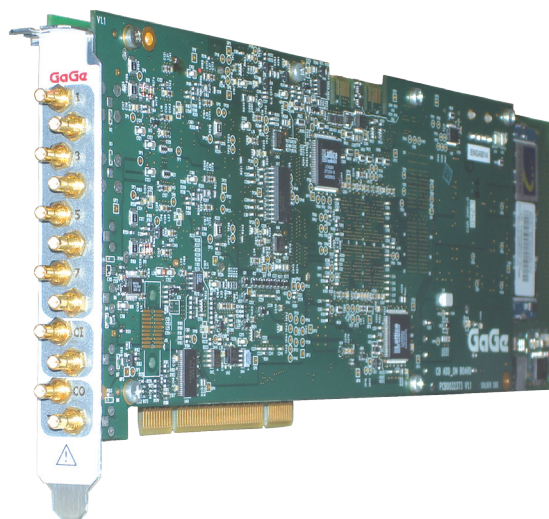
With more than 35 new digitizers to choose from, we offer you many more options than ever before.

## APPLICATIONS

Radar Design and Test  
Disk Drive Testing  
Manufacturing Test  
Signal Intelligence  
Lidar Systems  
Communications  
Non-Destructive Testing  
Spectroscopy  
High-Performance Imaging  
Ultrasound Test

## Octopus CompuScope 82XX

**12-Bit Family of Multi-channel Digitizers for the PCI Bus**

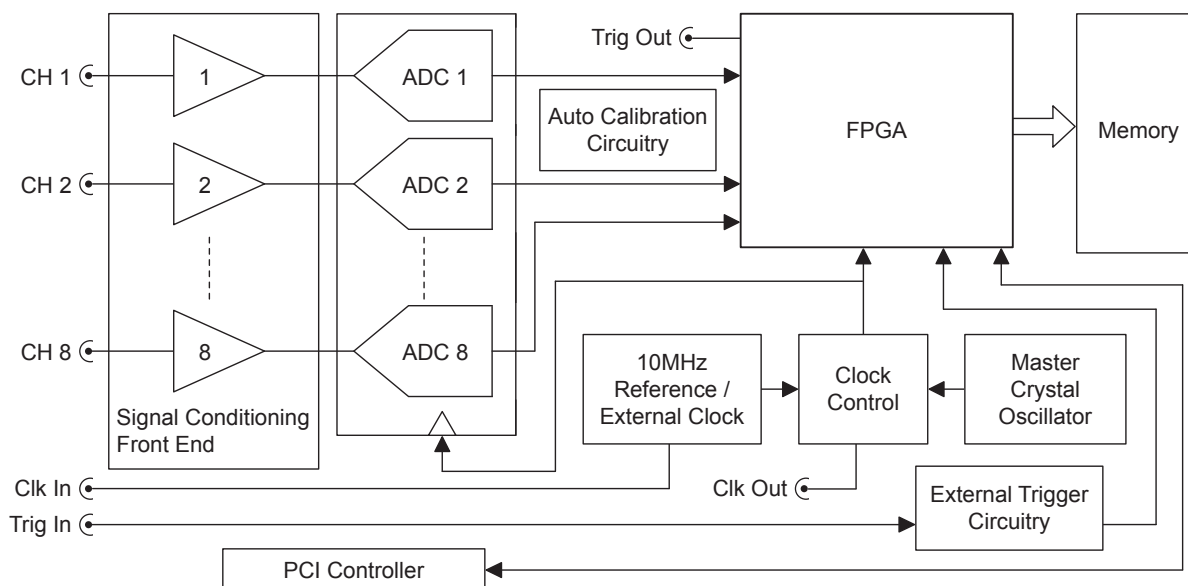


The Octopus family represents a new generation of GaGe digitizers that has all of the advanced features you would expect from a top performance signal capture card:

### FEATURES

- 2, 4, or 8 digitizing channels
- 10, 25, 50, 65, 100, or 125 MS/s sampling per channel
- 12 bits vertical resolution
- 128 MS to 2 GS on-board acquisition memory
- More than 100 MHz bandwidth
- Full-size, single-slot PCI card
- Full-featured front-end, with software control over input ranges, coupling and impedances
- 32 bits, 66 MHz PCI standard for 200 MB/s transfer to PC memory
- Ease of integration with External or Reference Clock In and Clock Out, External Trigger In and Trigger Event Out
- Programming-free operation with GageScope® oscilloscope software
- Software Development Kits available for LabVIEW, MATLAB, C/C#

## Octopus CompuScope 82XX Simplified Block Diagram



### A/D SAMPLING

Number of Inputs: 2, 4 or 8  
 Resolution: 12 bits  
 ENOB (see Note 1): 10.3 bits  
 SNR (see Note 1): 64 dB  
 SFDR (see Note 1): 79 dB  
 SINAD (see Note 1): 63.6 dB  
 Maximum Sampling Rate Per Channel (product-dependent):  
 10, 25, 50, 65, 100 or 125 MS/s

Sampling Rates (product-dependent):

125 MS/s, 100 MS/s, 65 MS/s, 50 MS/s,  
 40 MS/s, 25 MS/s, 20 MS/s, 10 MS/s,  
 5 MS/s, 2 MS/s, 1 MS/s, 500 kS/s,  
 200 kS/s, 100 kS/s, 50 kS/s, 20 kS/s,  
 10 kS/s, 5 kS/s, 2 kS/s, 1 kS/s

Connector: SMB

Impedance: 1 M $\Omega$  or 50  $\Omega$ ; (software-selectable)

Coupling: AC or DC; (software-selectable)

AC Coupled Bandwidth: 10 Hz to >100 MHz (see Note 2)

DC Coupled Bandwidth: DC to >100 MHz (50  $\Omega$  see Note 5, slightly less for 1 M $\Omega$ )

Flatness (see Note 3): Within  $\pm 0.5$  dB of ideal response to 90 MHz

DC Accuracy (see Note 4):  $\pm 0.5$  %

Input Voltage Ranges:  $\pm 100$  mV,  $\pm 200$  mV,  $\pm 500$  mV,  $\pm 1$  V,  $\pm 2$  V,  $\pm 5$  V,  $\pm 10$  V ( $\pm 10$  V is only available in 1 M $\Omega$ )

DC Offset:  $\pm 1 \times$  Full Range (above  $\pm 5$  V is limited to  $\pm 2.5$  V)

### LOW-PASS FILTER

Type: 3-pole Bessel, 1 per channel

Cut-off Frequency: 24 MHz

Operation: Individually software-selectable

### ACQUISITION MEMORY

Active Channels	Total On-board Memory				
	128 M	256 M	512 M	1 G	2 G
1	128 M	256 M	512 M	1 G	2 G
2	64 M	128 M	256 M	512 M	1 G
4	32 M	64 M	128 M	256 M	512 M
8	16 M	32 M	64 M	128 M	256 M

### TRIGGERING

Trigger Engines:

Source:

Input Combination:

Trigger Level Accuracy:

Slope:

Sensitivity:

Post-Trigger Data:

Maximum Record Length:

### EXTERNAL TRIGGER

Impedance:

Amplitude:

Voltage Range:

Bandwidth:

Coupling:

Connector:

2 per channel, 1 for external trigger

CH 1 to 8, EXT or Software

All combinations of sources logically OR'ed  
 Less than  $\pm 2\%$  of Full Scale for channel triggering

Positive or Negative; software-selectable  
 $\pm 2\%$  of Full Scale

This implies that signal amplitude must be at least 4% of full scale to cause a trigger to occur. Smaller signals are rejected as noise.

128 points minimum.

Can be defined with a 64 point resolution.

Maximum memory depth

2 k $\Omega$

Absolute maximum  $\pm 15$  V

$\pm 1$  V,  $\pm 5$  V (software-selectable)

>100 MHz

AC or DC

SMB

## TRIGGER OUT

Impedance:	50 $\Omega$ compatible
Amplitude:	0-2.5 V
Connector:	SMB

## INTERNAL CLOCK

Accuracy:	$\pm 1$ ppm (0 to 50°C ambient)
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## EXTERNAL CLOCK

Maximum Frequency:	Maximum product sample rate
Minimum Frequency:	2 MHz
Signal Level:	Minimum 1 V RMS Maximum 2 V RMS
Termination Impedance:	50 $\Omega$
Sampling Edge:	Rising
Duty Cycle:	50% $\pm 5\%$
Connector:	SMB
Coupling:	AC

## EXTERNAL REFERENCE

The External Reference timebase is used to synchronize the Internal Sampling Clock

Frequency:	10 MHz $\pm 1000$ ppm; (software-selectable)
Signal Level:	Minimum 1 V RMS Maximum 2 V RMS
Impedance:	50 $\Omega$
Sampling Edge:	Rising
Duty Cycle:	50% $\pm 5\%$
Connector:	SMB

## CLOCK OUT

Maximum Frequency:	Maximum product sample rate
Minimum Frequency:	2 MHz (from External Clock) 1 kHz (from Internal Clock)
Signal Level:	0-2.5 V
Impedance:	50 $\Omega$ compatible
Duty Cycle:	50% $\pm 10\%$
Connector:	SMB

## MULTIPLE RECORD

Pre-trigger Data:	Up to virtually full record length
Record Length:	128 points minimum. Can be defined with a 64 points resolution.

## TIMESTAMPING

Resolution:	One sampling interval
Counter turnover:	>24 hours continuous

## CARD SIZE

Single-slot, full-length PCI

## SYSTEM REQUIREMENTS

PCI-based computer, minimum Pentium II 500 MHz, with at least one free full-length PCI slot, 128 MB RAM, 100 MB hard disk.

## COOLING SYSTEM

Minimum CFM Requirement: *Characterization in progress*

## †POWER (IN WATTS, PER CARD)

25.0 W (typical)

†Measured on a typical 4-channel Octopus card.

## PCI BUS INTERFACE

Plug-&-Play:	Fully supported
Bus Mastering:	Fully supported
Scatter-Gather:	Fully supported
Bus Width:	32 bits
Bus Speed:	66 MHz or 33 MHz
Bus Throughput:	200 MB/s to PC memory (66 MHz PCI; dependent on motherboard and number of PCI-PCI bridges)
Compatibility:	PCI-compliant, v.2.2 Also v.2.1 systems that supply 3.3 V to PCI slot

## MULTI-CARD SYSTEMS

Supported by all Octopus CompuScope models, GageScope, and SDKs.

## OPERATING SYSTEMS

Windows Vista, XP:	All Versions
Windows 2000:	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.

## WARRANTY

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

All specifications subject to change without notice.



#### Notes to specifications:

- 1) Measured at 125 MS/s in the  $\pm 500$  mV range with 50  $\Omega$  input impedance using a 10 MHz sine wave with an amplitude of 95% of full scale and the on-board filtering capability.
- 2) 10 Hz at 1 M $\Omega$  only.
- 3) Measured at 125 MS/s in the  $\pm 500$  mV range with 50  $\Omega$  input impedance with an amplitude of 95% of full scale.
- 4) Measured on  $\pm 500$  mV,  $\pm 1$  V,  $\pm 2$  V input ranges for both 50  $\Omega$  and 1 M $\Omega$  input impedance settings.
- 5) Measured on  $\pm 1$  V,  $\pm 2$  V,  $\pm 5$  V input ranges using the 50  $\Omega$  input impedance setting.

Unless otherwise specified, all dynamic performance specs have been qualified on engineering boards.

## ORDERING INFORMATION

### Hardware & Upgrades

Octopus 12-bit Family	2 Channel	4 Channel	8 Channel
10 MS/s	CS8220: OCT-822-000	CS8240: OCT-824-000	CS8280: OCT-828-000
25 MS/s	CS8222: OCT-822-002	CS8242: OCT-824-002	CS8282: OCT-828-002
50 MS/s	CS8224: OCT-822-004	CS8244: OCT-824-004	CS8284: OCT-828-004
65 MS/s	CS8225: OCT-822-005	CS8245: OCT-824-005	CS8285: OCT-828-005
100 MS/s	CS8227: OCT-822-007	CS8247: OCT-824-007	CS8287: OCT-828-007
125 MS/s	CS8229: OCT-822-009	CS8249: OCT-824-009	CS8289: OCT-828-009

Memory Upgrade: 128 MS to 256 MS	OCT-181-001
Memory Upgrade: 128 MS to 512 MS	OCT-181-003
Memory Upgrade: 128 MS to 1 GS	OCT-181-005
Memory Upgrade: 128 MS to 2 GS	OCT-181-007

36" SMB to BNC male cable	ACC-001-001
36" SMB to BNC male cable - 4 pack	ACC-001-003
6" SMB to BNC female cable	ACC-001-011
6" SMB to BNC female cable - 4 pack	ACC-001-013
6" SMB to SMB jumper cable	ACC-001-021
6" SMB to SMB jumper cable - 4 pack	ACC-001-023

#### eXpert™ Firmware Options

eXpert Signal Averaging Firmware Option	250-181-001
eXpert FIR Filtering Firmware Option	250-181-002
eXpert Peak Detection Firmware Option	250-181-003
eXpert FFT Firmware Option	250-181-004
eXpert Firmware Option bundle (Signal Averaging, FIR Filtering and Peak Detection)	888-100-026

#### 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

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prodinfo@gage-applied.com

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

**[www.gage-applied.com](http://www.gage-applied.com)**

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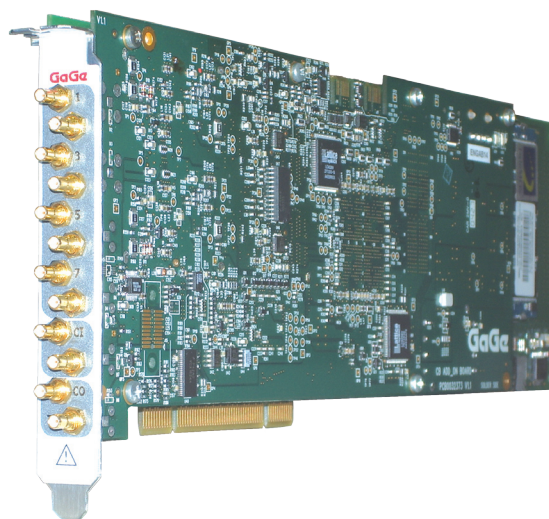
With more than 35 new digitizers to choose from, we offer you many more options than ever before.

## APPLICATIONS

Radar Design and Test  
Disk Drive Testing  
Manufacturing Test  
Signal Intelligence  
Lidar Systems  
Communications  
Non-Destructive Testing  
Spectroscopy  
High-Performance Imaging  
Ultrasound Test

## Octopus CompuScope 83XX

**14-Bit Family of Multi-channel Digitizers for the PCI Bus**

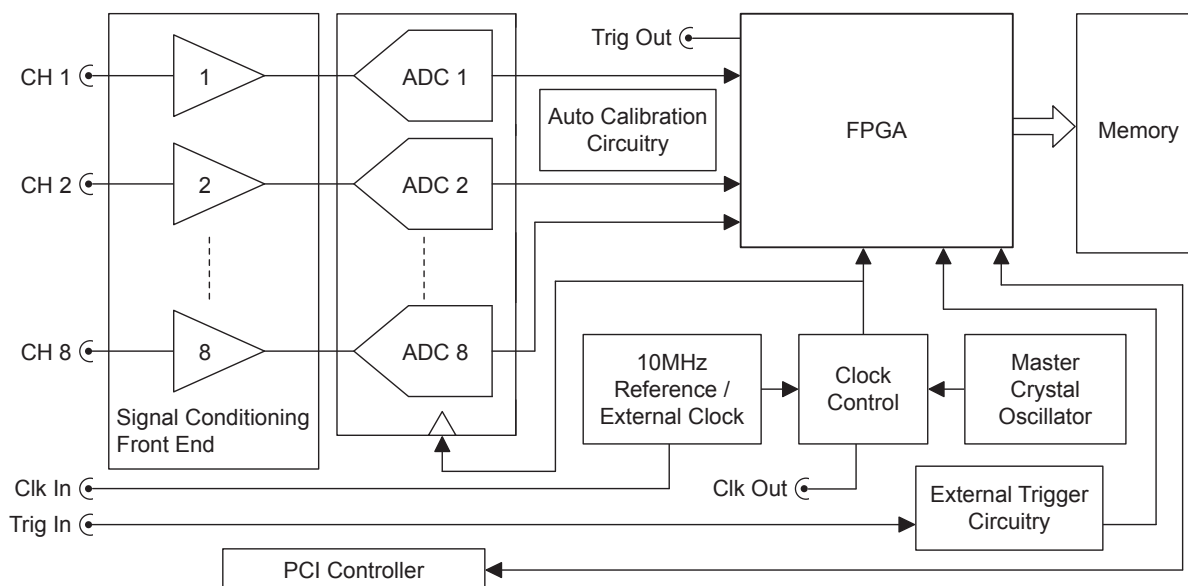


The Octopus family represents a new generation of GaGe digitizers that has all of the advanced features you would expect from a top performance signal capture card:

## FEATURES

- 2, 4, or 8 digitizing channels
- 10, 25, 50, 65, 100, or 125 MS/s sampling per channel
- 14 bits vertical resolution
- 128 MS to 2 GS on-board acquisition memory
- More than 100 MHz bandwidth
- Full-size, single-slot PCI card
- Full-featured front-end, with software control over input ranges, coupling and impedances
- 32 bits, 66 MHz PCI standard for 200 MB/s transfer to PC memory
- Ease of integration with External or Reference Clock In and Clock Out, External Trigger In and Trigger Event Out
- Programming-free operation with GageScope® oscilloscope software
- Software Development Kits available for LabVIEW, MATLAB, C/C#

## Octopus CompuScope 83XX Simplified Block Diagram



### A/D SAMPLING

Number of Inputs: 2, 4 or 8  
 Resolution: 14 bits  
 ENOB (see Note 1): 11.0 bits  
 SNR (see Note 1): 68 dB  
 SFDR (see Note 1): 80 dB  
 SINAD (see Note 1): 67.4 dB  
 Maximum Sampling Rate Per Channel (product-dependent):  
 10, 25, 50, 65, 100 or 125 MS/s

Sampling Rates (product-dependent):

125 MS/s, 100 MS/s, 65 MS/s, 50 MS/s,  
 40 MS/s, 25 MS/s, 20 MS/s, 10 MS/s,  
 5 MS/s, 2 MS/s, 1 MS/s, 500 kS/s,  
 200 kS/s, 100 kS/s, 50 kS/s, 20 kS/s,  
 10 kS/s, 5 kS/s, 2 kS/s, 1 kS/s

Connector: SMB

Impedance: 1 M $\Omega$  or 50  $\Omega$ ; (software-selectable)

Coupling: AC or DC; (software-selectable)

AC Coupled Bandwidth: 10 Hz to >100 MHz (see Note 2)

DC Coupled Bandwidth: DC to >100 MHz (50  $\Omega$  see Note 5, slightly less for 1 M $\Omega$ )

Flatness (see Note 3): Within  $\pm 0.5$  dB of ideal response to 90 MHz

DC Accuracy (see Note 4):  $\pm 0.5$  %

Input Voltage Ranges:  $\pm 100$  mV,  $\pm 200$  mV,  $\pm 500$  mV,  $\pm 1$  V,  
 $\pm 2$  V,  $\pm 5$  V,  $\pm 10$  V ( $\pm 10$  V is only available  
 in 1 M $\Omega$ )

DC Offset:  $\pm 1 \times$  Full Range (above  $\pm 5$  V is limited to  
 $\pm 2.5$  V)

### LOW-PASS FILTER

Type: 3-pole Bessel, 1 per channel

Cut-off Frequency: 24 MHz

Operation: Individually software-selectable

### ACQUISITION MEMORY

Active Channels	Total On-board Memory				
	128 M	256 M	512 M	1 G	2 G
1	128 M	256 M	512 M	1 G	2 G
2	64 M	128 M	256 M	512 M	1 G
4	32 M	64 M	128 M	256 M	512 M
8	16 M	32 M	64 M	128 M	256 M

### TRIGGERING

Trigger Engines:

Source:

Input Combination:

Trigger Level Accuracy:

Slope:

Sensitivity:

Post-Trigger Data:

Maximum Record Length:

### EXTERNAL TRIGGER

Impedance:

Amplitude:

Voltage Range:

Bandwidth:

Coupling:

Connector:

2 per channel, 1 for external trigger

CH 1 to 8, EXT or Software

All combinations of sources logically OR'ed  
 Less than  $\pm 2\%$  of Full Scale for channel  
 triggering

Positive or Negative; software-selectable  
 $\pm 2\%$  of Full Scale

This implies that signal amplitude must be at  
 least 4% of full scale to cause a trigger to  
 occur. Smaller signals are rejected as noise.

128 points minimum.

Can be defined with a 64 point resolution.

Maximum memory depth

2 k $\Omega$

Absolute maximum  $\pm 15$  V

$\pm 1$  V,  $\pm 5$  V (software-selectable)

>100 MHz

AC or DC

SMB

## TRIGGER OUT

Impedance:	50 $\Omega$ compatible
Amplitude:	0-2.5 V
Connector:	SMB

## INTERNAL CLOCK

Accuracy:	$\pm 1$ ppm (0 to 50°C ambient)
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## EXTERNAL CLOCK

Maximum Frequency:	Maximum product sample rate
Minimum Frequency:	2 MHz
Signal Level:	Minimum 1 V RMS Maximum 2 V RMS
Termination Impedance:	50 $\Omega$
Sampling Edge:	Rising
Duty Cycle:	50% $\pm 5\%$
Connector:	SMB
Coupling:	AC

## EXTERNAL REFERENCE

The External Reference timebase is used to synchronize the Internal Sampling Clock

Frequency:	10 MHz $\pm 1000$ ppm; (software-selectable)
Signal Level:	Minimum 1 V RMS Maximum 2 V RMS
Impedance:	50 $\Omega$
Sampling Edge:	Rising
Duty Cycle:	50% $\pm 5\%$
Connector:	SMB

## CLOCK OUT

Maximum Frequency:	Maximum product sample rate
Minimum Frequency:	2 MHz (from External Clock) 1 kHz (from Internal Clock)
Signal Level:	0-2.5 V
Impedance:	50 $\Omega$ compatible
Duty Cycle:	50% $\pm 10\%$
Connector:	SMB

## MULTIPLE RECORD

Pre-trigger Data:	Up to virtually full record length
Record Length:	128 points minimum. Can be defined with a 64 points resolution.

## TIMESTAMPING

Resolution:	One sampling interval
Counter turnover:	>24 hours continuous

## CARD SIZE

Single-slot, full-length PCI

## SYSTEM REQUIREMENTS

PCI-based computer, minimum Pentium II 500 MHz, with at least one free full-length PCI slot, 128 MB RAM, 100 MB hard disk.

## COOLING SYSTEM

Minimum CFM Requirement: *Characterization in progress*

## †POWER (IN WATTS, PER CARD)

25.0 W (typical)

†Measured on a typical 4-channel Octopus card.

## PCI BUS INTERFACE

Plug-&-Play:	Fully supported
Bus Mastering:	Fully supported
Scatter-Gather:	Fully supported
Bus Width:	32 bits
Bus Speed:	66 MHz or 33 MHz
Bus Throughput:	200 MB/s to PC memory (66 MHz PCI; dependent on motherboard and number of PCI-PCI bridges)
Compatibility:	PCI-compliant, v.2.2 Also v.2.1 systems that supply 3.3 V to PCI slot

## MULTI-CARD SYSTEMS

Supported by all Octopus CompuScope models, GageScope, and SDKs.

## OPERATING SYSTEMS

Windows Vista, XP:	All Versions
Windows 2000:	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.

## WARRANTY

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

All specifications subject to change without notice.



#### Notes to specifications:

- 1) Measured at 125 MS/s in the  $\pm 500$  mV range with 50  $\Omega$  input impedance using a 10 MHz sine wave with an amplitude of 95% of full scale and the on-board filtering capability.
- 2) 10 Hz at 1 M $\Omega$  only.
- 3) Measured at 125 MS/s in the  $\pm 500$  mV range with 50  $\Omega$  input impedance with an amplitude of 95% of full scale.
- 4) Measured on  $\pm 500$  mV,  $\pm 1$  V,  $\pm 2$  V input ranges for both 50  $\Omega$  and 1 M $\Omega$  input impedance settings.
- 5) Measured on  $\pm 1$  V,  $\pm 2$  V,  $\pm 5$  V input ranges using the 50  $\Omega$  input impedance setting.

Unless otherwise specified, all dynamic performance specs have been qualified on engineering boards.

## ORDERING INFORMATION

### Hardware & Upgrades

Octopus 14-bit Family	2 Channel	4 Channel	8 Channel
10 MS/s	CS8320: OCT-832-000	CS8340: OCT-834-000	CS8380: OCT-838-000
25 MS/s	CS8322: OCT-832-002	CS8342: OCT-834-002	CS8382: OCT-838-002
50 MS/s	CS8324: OCT-832-004	CS8344: OCT-834-004	CS8384: OCT-838-004
65 MS/s	CS8325: OCT-832-005	CS8345: OCT-834-005	CS8385: OCT-838-005
100 MS/s	CS8327: OCT-832-007	CS8347: OCT-834-007	CS8387: OCT-838-007
125 MS/s	CS8329: OCT-832-009	CS8349: OCT-834-009	CS8389: OCT-838-009

Memory Upgrade: 128 MS to 256 MS	OCT-181-001
Memory Upgrade: 128 MS to 512 MS	OCT-181-003
Memory Upgrade: 128 MS to 1 GS	OCT-181-005
Memory Upgrade: 128 MS to 2 GS	OCT-181-007

36" SMB to BNC male cable	ACC-001-001
36" SMB to BNC male cable - 4 pack	ACC-001-003
6" SMB to BNC female cable	ACC-001-011
6" SMB to BNC female cable - 4 pack	ACC-001-013
6" SMB to SMB jumper cable	ACC-001-021
6" SMB to SMB jumper cable - 4 pack	ACC-001-023

#### eXpert™ Firmware Options

eXpert Signal Averaging Firmware Option	250-181-001
eXpert FIR Filtering Firmware Option	250-181-002
eXpert Peak Detection Firmware Option	250-181-003
eXpert FFT Firmware Option	250-181-004
eXpert Firmware Option bundle (Signal Averaging, FIR Filtering and Peak Detection)	888-100-026

#### 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

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fax 1-800-780-8411

#### Direct:

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fax +1-514-633-0770

#### Email:

prodinfo@gage-applied.com

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

**[www.gage-applied.com](http://www.gage-applied.com)**

Updated Nov. 17th, 2008

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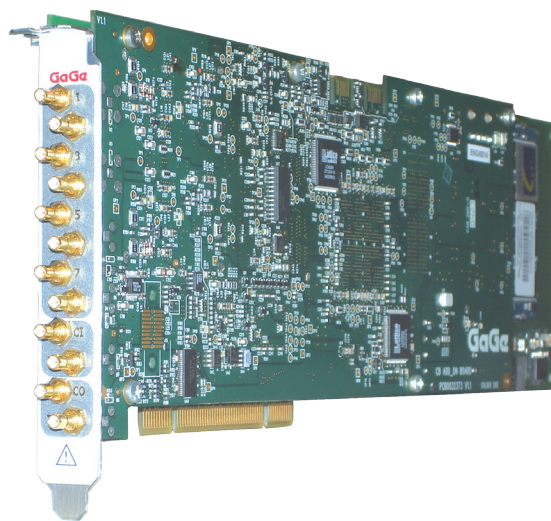
The GaGe Octopus™ family of multi-channel digitizers features up to 8 channels in a single-slot PCI card with up to 25 MS/s sampling per channel, and up to 4 GB of on-board acquisition memory. Combine several Octopus cards for up to 64 channels in a single system.

## APPLICATIONS

Radar Design and Test  
Disk Drive Testing  
Manufacturing Test  
Signal Intelligence  
Lidar Systems  
Communications  
Non-Destructive Testing  
Spectroscopy  
High-Performance Imaging  
Ultrasound Test

## Octopus CompuScope 84XX

**16-Bit Family of Multi-channel Digitizers for the PCI Bus**

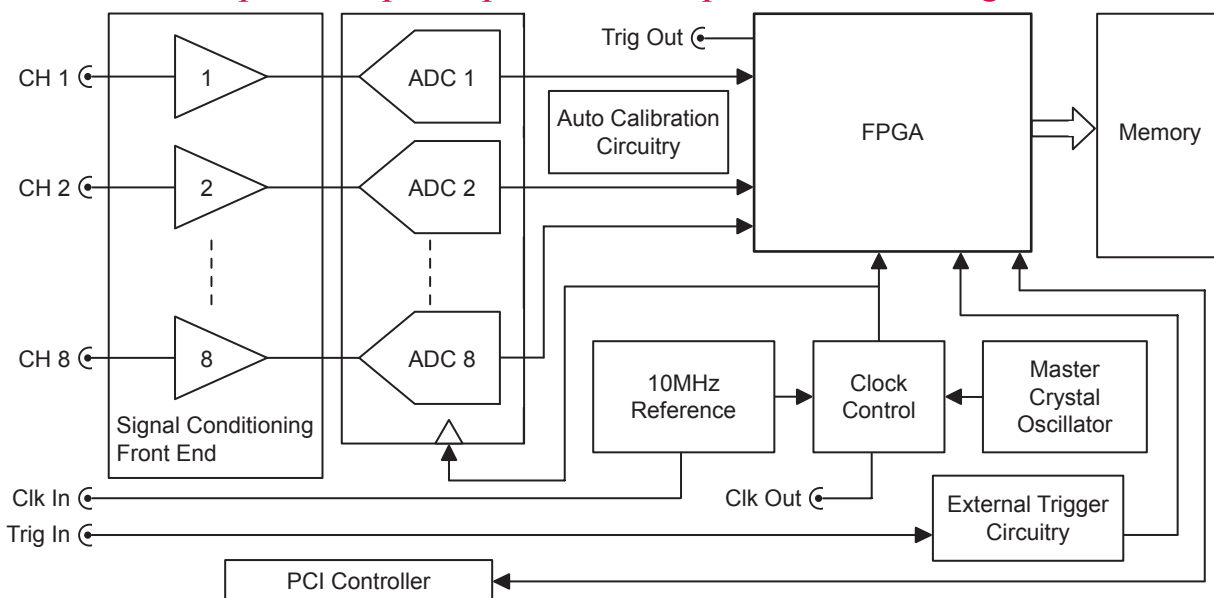


The Octopus family represents a new generation of GaGe digitizers that has all of the advanced features you would expect from a top performance signal capture card:

## FEATURES

- 2, 4, or 8 digitizing channels
- 10 or 25 MS/s sampling per channel
- 16 bits vertical resolution
- 128 MS to 2 GS on-board acquisition memory
- More than 20 MHz bandwidth
- Full-size, single-slot PCI card
- Full-featured front-end, with software control over input ranges, coupling and impedances
- 32 bits, 66 MHz PCI standard for 200 MB/s transfer to PC memory
- Ease of integration with Reference Clock In and Clock Out, External Trigger In and Trigger Event Out
- Programming-free operation with GageScope® oscilloscope software
- Software Development Kits available for LabVIEW, MATLAB, C/C#

## Octopus CompuScope 84XX Simplified Block Diagram



### A/D SAMPLING

Number of Inputs:	2, 4 or 8
Resolution:	16 bits
ENOB (see Note 1):	12.0 bits
SNR (see Note 1):	74 dB
SFDR (see Note 1):	85 dB
SINAD (see Note 1):	73.5 dB
Maximum Sampling Rate Per Channel (product-dependent):	10, 25 MS/s
Sampling Rates (product-dependent):	25 MS/s, 20 MS/s, 12.5 MS/s, 10 MS/s, 5 MS/s, 2.5 MS/s, 2 MS/s, 1 MS/s, 500 kS/s, 200 kS/s, 100 kS/s, 50 kS/s, 20 kS/s, 10 kS/s, 5 kS/s, 2 kS/s, 1 kS/s SMB
Connector:	1 M $\Omega$ or 50 $\Omega$ ; (software-selectable)
Impedance:	AC or DC; (software-selectable)
Coupling:	10 Hz to >20 MHz (see Note 2)
AC Coupled Bandwidth:	DC to >20 MHz (50 $\Omega$ see Note 5, slightly less for 1 M $\Omega$ )
DC Coupled Bandwidth:	Within $\pm 0.5$ dB of ideal response to 7 MHz
Flatness (see Note 3):	$\pm 0.5$ %
DC Accuracy (see Note 4):	$\pm 100$ mV, $\pm 200$ mV, $\pm 500$ mV, $\pm 1$ V, $\pm 2$ V, $\pm 5$ V, $\pm 10$ V ( $\pm 10$ V is only available in 1 M $\Omega$ )
Input Voltage Ranges:	$\pm 1 \times$ Full Range (above $\pm 5$ V is limited to $\pm 2.5$ V)
DC Offset	

### ACQUISITION MEMORY

Active Channels	Total On-board Memory				
	128 M	256 M	512 M	1 G	2 G
1	128 M	256 M	512 M	1 G	2 G
2	64 M	128 M	256 M	512 M	1 G
4	32 M	64 M	128 M	256 M	512 M
8	16 M	32 M	64 M	128 M	256 M

### TRIGGERING

Trigger Engines:	2 per channel, 1 for external trigger
Source:	CH 1 to 8, EXT or Software
Input Combination:	All combinations of sources logically OR'ed
Trigger Level Accuracy:	Less than $\pm 2\%$ of Full Scale for channel triggering
Slope:	Positive or Negative; software-selectable
Sensitivity:	$\pm 2\%$ of Full Scale This implies that signal amplitude must be at least 4% of full scale to cause a trigger to occur. Smaller signals are rejected as noise.
Post-Trigger Data:	128 points minimum. Can be defined with a 64 point resolution.
Maximum Record Length:	Maximum memory depth

### EXTERNAL TRIGGER

Impedance:	2 k $\Omega$
Amplitude:	Absolute maximum $\pm 15$ V
Voltage Range:	$\pm 1$ V, $\pm 5$ V (software-selectable)
Bandwidth:	>100 MHz
Coupling:	AC or DC
Connector:	SMB



## TRIGGER OUT

Impedance:	50 $\Omega$ compatible
Amplitude:	0-2.5 V
Connector:	SMB

## INTERNAL CLOCK

Accuracy:	$\pm 1$ ppm (0 to 50°C ambient)
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## EXTERNAL REFERENCE

The External Reference timebase is used to synchronize the Internal Sampling Clock

Frequency:	10 MHz $\pm 1000$ ppm; (software-selectable)
Signal Level:	Minimum 1 V RMS Maximum 2 V RMS
Impedance:	50 $\Omega$
Sampling Edge:	Rising
Duty Cycle:	50% $\pm 5\%$
Connector:	SMB

## CLOCK OUT

Maximum Frequency:	Maximum product sample rate
Minimum Frequency:	2 MHz (from External Clock) 1 kHz (from Internal Clock)
Signal Level:	0-2.5 V
Impedance:	50 $\Omega$ compatible
Duty Cycle:	50% $\pm 10\%$
Connector:	SMB

## MULTIPLE RECORD

Pre-trigger Data:	Up to virtually full record length
Record Length:	128 points minimum. Can be defined with a 64 points resolution.

## TIMESTAMPING

Resolution:	One sampling interval
Counter turnover:	>24 hours continuous

## CARD SIZE

Single-slot, full-length PCI

## SYSTEM REQUIREMENTS

PCI-based computer, minimum Pentium II 500 MHz, with at least one free full-length PCI slot, 128 MB RAM, 100 MB hard disk.

## COOLING SYSTEM

Minimum CFM Requirement: *Characterization in progress*

†POWER (IN WATTS, PER CARD)

25.0 W (typical)

†Measured on a typical 4-channel Octopus card.

## PCI BUS INTERFACE

Plug-&-Play:	Fully supported
Bus Mastering:	Fully supported
Scatter-Gather:	Fully supported
Bus Width:	32 bits
Bus Speed:	66 MHz or 33 MHz

Bus Throughput:	200 MB/s to PC memory (66 MHz PCI; dependent on motherboard and number of PCI-PCI bridges)
Compatibility:	PCI-compliant, v.2.2 Also v.2.1 systems that supply 3.3 V to PCI slot

## MULTI-CARD SYSTEMS

Supported by all Octopus CompuScope models, GageScope, and SDKs.

## OPERATING SYSTEMS

Windows Vista, XP:	All Versions
Windows 2000:	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.

## WARRANTY

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

All specifications subject to change without notice.

Notes to specifications:

- 1) Measured at 25 MS/s in the  $\pm 500$  mV range with 50  $\Omega$  input impedance using a 10 MHz sine wave with an amplitude of 95% of full scale and the on-board filtering capability.
- 2) 10 Hz at 1 M $\Omega$  only.
- 3) Measured at 25 MS/s in the  $\pm 500$  mV range with 50  $\Omega$  input impedance with an amplitude of 95% of full scale.
- 4) Measured on  $\pm 500$  mV,  $\pm 1$  V,  $\pm 2$  V input ranges for both 50  $\Omega$  and 1 M $\Omega$  input impedance settings.
- 5) Measured on  $\pm 1$  V,  $\pm 2$  V,  $\pm 5$  V input ranges using the 50  $\Omega$  input impedance setting.

Unless otherwise specified, all dynamic performance specs have been qualified on engineering boards.



## ORDERING INFORMATION

### Hardware & Upgrades

Octopus 16-bit Family	2 Channel	4 Channel	8 Channel
10 MS/s	CS8420: OCT-842-000	CS8440: OCT-844-000	CS8480: OCT-848-000
25 MS/s	CS8422: OCT-842-002	CS8442: OCT-844-002	CS8482: OCT-848-002

Memory Upgrade: 128 MS to 256 MS	OCT-181-001
Memory Upgrade: 128 MS to 512 MS	OCT-181-003
Memory Upgrade: 128 MS to 1 GS	OCT-181-005
Memory Upgrade: 128 MS to 2 GS	OCT-181-007

36" SMB to BNC male cable	ACC-001-001
36" SMB to BNC male cable - 4 pack	ACC-001-003
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6" SMB to SMB jumper cable	ACC-001-021
6" SMB to SMB jumper cable - 4 pack	ACC-001-023

#### eXpert™ Firmware Options

eXpert Signal Averaging Firmware Option	250-181-001
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#### GageScope® Software

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Email:  
prodinfo@gage-applied.com

To find your local sales representative  
or distributor or to learn more about  
GaGe products visit:  
[www.gage-applied.com](http://www.gage-applied.com)

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