

GaGe is a worldwide industry leader in high speed data acquisition solutions featuring a portfolio of the highest performance digitizers, PC oscilloscope software, powerful SDKs for custom application development, and turnkey integrated PC-based measurement systems.



APPLICATIONS

RADAR Design and Test
Signals Intelligence (SIGINT)
Ultrasonic Non-Destructive Testing
LIDAR Systems
Communications
Spectroscopy
High-Performance Imaging
Time of Flight
Life Sciences
Particle Physics

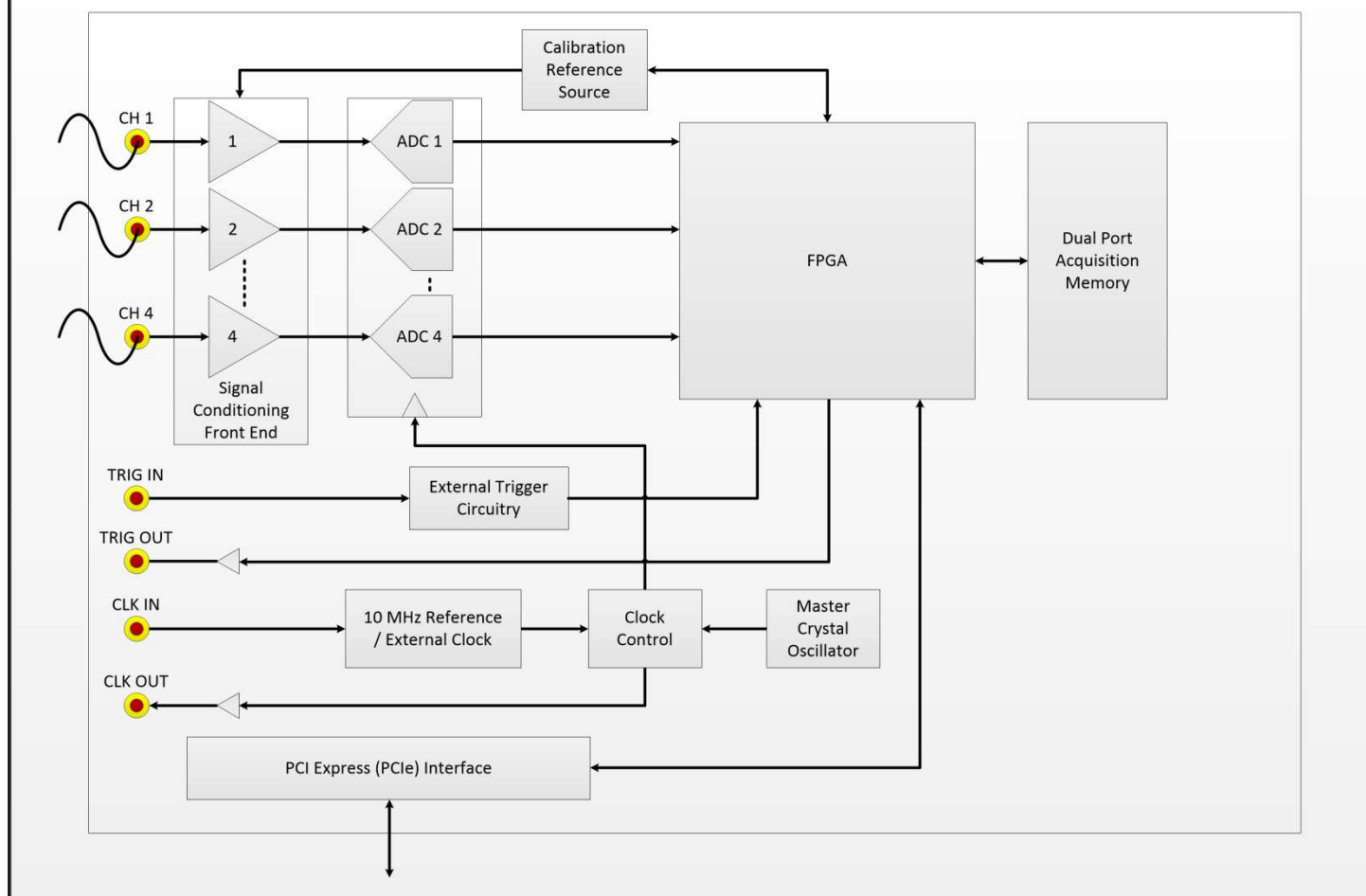
Razor Express CompuScope 2-4 CH, 200 MS/s, 12/14/16-Bit, PCIe Digitizer



FEATURES

- 2 or 4 Digitizing Input Channels
- 200 MS/s Maximum Sampling Rate per Channel
- 125 MHz Analog Input Bandwidth
- 16-Bit, 14-Bit, or 12-Bit Vertical A/D Resolution
- 4 GS (8 GB) Onboard Memory Standard, Expandable up to 8 GS (16 GB)
- Dual Port Memory with Sustained PCIe Data Streaming at 1.6 GB/s
- Full-Featured Front-End with AC/DC Coupling and 50 Ω /1M Ω Inputs
- Software Control of Input Voltage Ranges, Coupling and Impedances
- Ease of Integration with External or Reference Clock In & Clock Out
- External Trigger In & Trigger Out
- Synchronized Multi-Card Systems up to 8 Cards for 32 Channels
- Full-Height Full-Length PCI Express (PCIe) Generation 2.0 x8 Card
- Programming-Free Operation with GaGeScope PC Oscilloscope Software
- Software Development Kits Available for C/C#, LabVIEW and MATLAB
- Windows 10/8/7 and Linux Operating Systems Supported

Razor Express CompuScope Simplified Block Diagram



MAIN SPECIFICATIONS

Model #	:	CSE1222	CSE1242	CSE1422	CSE1442	CSE1622	CSE1642
# of Input Channels	:	2	4	2	4	2	4
Vertical A/D Resolution	:	12-bit	12-bit	14-bit	14-bit	16-bit	16-bit
Max. Rate per Channel	:	200 MS/s	200 MS/s	200 MS/s	200 MS/s	200 MS/s	200 MS/s

DYNAMIC PARAMETER PERFORMANCE

	<u>12-bit A/D</u>	<u>14-bit A/D</u>	<u>16-bit A/D</u>
ENOB	: 9.6 Bits	11.0 Bits	11.7 Bits
SNR	: 60.7 dB	68.3 dB	73.0 dB
THD	: -66.3 dB	-77.2 dB	-81.0 dB
SINAD	: 59.7 dB	67.8 dB	72.4 dB
SFDR	: 71.0 dB	83.2 dB	86.6 dB

Dynamic parameter measurements are done by acquiring a high purity 10 MHz sine wave with amplitude of 95% of the input range sampling at maximum 200 MS/s. These measurements were taken on the ± 500 mV input range using 50Ω termination and DC coupling and with applied anti-aliasing filter. Dynamic parameter calculations are done from a 16 kiloSample Fourier Spectrum after applying a 7-term Blackman Harris Windowing Function to the time-domain waveform.

A/D SAMPLING

Rates per Channel, Model dependent (software selectable)	:	200 MS/s, 100 MS/s, 50 MS/s, 25 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
Rate Accuracy	:	± 1 part-per-million (0° to 50° C ambient)

ACQUISITION MEMORY

Acquisition memory size is shared and equally divided among all active input channels (1, 2 or 4).

Standard Size	:	4 GS (8 GB)
Optional Sizes	:	8 GS (16 GB)
Architecture	:	Dual Port
Data Streaming	:	Yes



ANALOG INPUT CHANNELS

Connectors	: SMA
Impedance	: 50 Ω or 1M Ω (software selectable)
Coupling	: AC or DC (software selectable)
Analog Bandwidth	: DC (50 Ω) = DC to 125 MHz AC (1M Ω) = 10 Hz to 65 MHz
Voltage Ranges	: ± 100 mV, ± 200 mV, ± 500 mV, ± 1 V, ± 2 V, ± 5 V, ± 10 V, ± 20 V, ± 50 V (software selectable; ± 10 V, ± 20 V, ± 50 V only available on 1M Ω)
Flatness	: Within ± 5 dB of ideal response to 100 MHz. Measured at 100 MS/s in the ± 500 mV range with 50 Ω input impedance and 95% of full scale amplitude.
DC Accuracy	: $\pm 0.5\%$. Measured on ± 500 mV, ± 1 V, ± 2 V input ranges for both 50 Ω and 1M Ω input impedance settings.
DC User Offset	: $\pm 1 \times$ Full Range (above ± 5 V is limited to ± 2.5 V)
Absolute Max. Input	: ± 15 V (50 Ω), ± 75 V (1M Ω on all but two lowest Input Ranges, where Max is ± 25 V)

LOW-PASS FILTER

Type	: 3-pole, 1 per Channel
Cut-Off Frequency	: 25 MHz
Operation	: Individually Software Selectable

TRIGGERING

Engines	: 2 per Channel, 1 for External Trigger
Source	: Any Input Channel, External Trigger or Software
Input Combination	: All Combinations of Sources Logically OR'ed
Slope	: Positive or Negative (software selectable)
Sensitivity	: $\pm 2\%$ of Full Scale Input Range of Trigger Source. 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.
Accuracy	: Less than $\pm 2\%$ of Full Scale for Channel Triggering
Post-Trigger Data	: 32 points minimum. Can be defined with 32 point resolution.

EXTERNAL TRIGGER

Connector	: SMA
Impedance	: 2k Ω
Coupling	: AC or DC
Bandwidth	: >100 MHz
Voltage Range	: ± 1 V, ± 5 V (software selectable)

TRIGGER OUT

Connector	: SMA
Impedance	: 50 Ω
Amplitude	: 0 – 1.8 V

CLOCK IN

Connector	: SMA
Signal Level	: Minimum 1 V RMS, Maximum 2 V RMS
Impedance	: 50 Ω
Coupling	: AC
Duty Cycle	: 50% $\pm 5\%$
Input Modes	: External Clock or 10 MHz Reference Clock
External Clock Mode Rates	: Minimum 10 MHz to Maximum Sampling Rate of 200 MHz.
External Reference Clock Mode Rate	: 10 MHz ± 1000 ppm; the external reference time base is used to synchronize the internal sampling clock.

CLOCK OUT

Connector	: SMA
Signal Level	: 0 – 1.8 V
Impedance	: 50 Ω Compatible
Duty Cycle	: 50% $\pm 10\%$
Output Modes	: Maximum Sampling Clock Frequency or 10 MHz Reference Clock
Max. Frequency	: 200 MHz
Min. Frequency	: 10 MHz from External Clock, 1 kHz from Internal Clock

MULTIPLE RECORD

Pre-Trigger Data	: Up to 32 kS Total
Record Length	: 32 points minimum. Can be defined with 32 point resolution.

TIME-STAMPING

Timing Resolution	: One Sample Clock Cycle
Counter Turnover	: >48 Hours Continuous

MULTI-CARD SYSTEMS

Master/Slave Mode	: Provides synchronized triggering and sampling on all channels for all cards to create larger multi-channel systems.
Independent Mode	: Each card operates independently within the system.
Number of Cards	: 2 to 8 Cards for up to 32 Channels Total

DIMENSIONS

Size	: Single Slot, Full Height, Full Length
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POWER CONSUMPTION

Power	: 25 Watts (typical)
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PC SYSTEM REQUIREMENTS

PCI Express (PCIe) Slot	: 1 Free Full-Height Full-Length PCIe Gen1, Gen2 or Gen3, x8 or x16 Slot
Operating System	: Windows 10/8/7 (32-bit/64-bit), Linux – Requires SDK for C/C#



ORDERING INFORMATION

Hardware

Model Number	A/D Resolution	# of Channels	Max. Sampling Rate per Channel	Memory Size	Order Part Number
CSE1222	12-bit	2	200 MS/s	4 GS (8 GB)	RZE-002-400
CSE1242	12-bit	4	200 MS/s	4 GS (8 GB)	RZE-004-400
CSE1422	14-bit	2	200 MS/s	4 GS (8 GB)	RZE-002-300
CSE1442	14-bit	4	200 MS/s	4 GS (8 GB)	RZE-004-300
CSE1622	16-bit	2	200 MS/s	4 GS (8 GB)	RZE-002-200
CSE1642	16-bit	4	200 MS/s	4 GS (8 GB)	RZE-004-200

Memory Upgrades

Memory Upgrade: 4 GS (8 GB) to 8 GS (16 GB)	MEM-181-205
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Cable Accessories

Set 1 Cable SMA to BNC	ACC-001-031
Set 4 Cable SMA to BNC	ACC-001-033

Master/Slave Upgrades

Master Multi-Card Upgrade	RZE-181-012
Slave Multi-Card Upgrade	RZE-181-013

eXpert FPGA Firmware Options

eXpert PCIe Data Streaming	STR-181-000
eXpert Signal Averaging	250-181-001

GaGeScope Software

GaGeScope: Lite Edition	Included
GaGeScope: Standard Edition	300-100-351
GaGeScope: Professional Edition	300-100-354

Software Development Kits (SDKs)

GaGe SDK Pack (includes C/C#, MATLAB, LabVIEW SDKs)	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

WARRANTY

Standard two years parts and labor.

Unless otherwise specified, all dynamic performance specs have been qualified on engineering boards. All specifications subject to change without notice.

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