CobraMax Express CompuScope
1-2 CH, 4 GS/s, 8-Bit, PCIe Gen2 Digitizer

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

FEATURES
- 2 or 1 Digitizing Input Channels with 8-Bit Vertical A/D Resolution
- 4 GS/s or 2 GS/s Maximum Sampling Rates
- 19 Software Selectable A/D Sampling Rates from 5 kS/s to 4 GS/s
- 1.5 GHz Analog Input Bandwidth
- 2 GS (2 GB) Onboard Memory Standard, Expandable up to 16 GS (16 GB)
- Dual Port Memory with Sustained PCIe Data Streaming at 2 GB/s
- Full-Featured Front-End with AC/DC Coupling and 50 Ω Inputs
- Software Control of Input Voltage Ranges and Coupling
- Ease of Integration with Reference Clock In & Reference Clock Out
- External Trigger In & Trigger Out with Advanced Triggering Operations
- Synchronized Multi-Card Systems up to 8 Cards for 16 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

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MAIN SPECIFICATIONS

<table>
<thead>
<tr>
<th>Model #</th>
<th>CSE14G8</th>
<th>CSE24G8</th>
</tr>
</thead>
<tbody>
<tr>
<td># of Input Channels</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Vertical A/D Resolution</td>
<td>8-bit</td>
<td>8-bit</td>
</tr>
<tr>
<td>Max. Rate per Channel</td>
<td>4 GS/s</td>
<td>1-CH @ 4 GS/s</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2-CH @ 2 GS/s</td>
</tr>
</tbody>
</table>

DYNAMIC PARAMETER PERFORMANCE

| ENOB    | 7.6 Bits |
| SNR     | 47.2 dB   |
| THD     | -59.3 dB  |
| SINAD   | 47.0 dB   |
| SFDR    | 56.5 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 2 GS/s. These measurements were taken on the ±500 mV input range using 50 Ω 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) | 4 GS/s, 2 GS/s, 1 GS/s, 500 MS/s, 250 MS/s, 125 MS/s, 50 MS/s, 25 MS/s, 10 MS/s, 5 MS/s, 2.5 MS/s, 1 MS/s, 500 ks/s, 250 ks/s, 100 ks/s, 50 ks/s, 25 ks/s, 10 ks/s, 5 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 or 2).

| Standard Size | 2 GS (2 GB) |
| Optional Sizes | 16 GS (16 GB) |
| Architecture | Dual Port |
| Data Streaming | Yes |
## ANALOG INPUT CHANNELS

- **Connectors**: SMA
- **Impedance**: 50 Ω
- **Coupling**: DC or AC (software selectable)
- **Analog Bandwidth**:
  - DC (50 Ω) = DC to 1.5 GHz
  - AC (50 Ω) = 20 kHz to 1.5 GHz
- **Voltage Ranges**:
  - ±50 mV, ±100 mV, ±200 mV, ±500 mV
  - ±1 V, ±2 V, ±5 V (software selectable)
- **Flatness**: Within ±0.5 dB of ideal response to 800 MHz.
- **DC Accuracy**: ±1% on all input ranges
- **DC User Offset**: ±100% on all input ranges, except ±5V that is ±20%
- **Absolute Max. Input**: 6 V RMS on all input ranges, except ±5V that is 8.5V RMS

## LOW-PASS FILTER

- **Type**: 3-pole, 1 per Channel
- **Cut-Off Frequency**: 200 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**: ±5% of Full Scale Input Range of Trigger Source. This implies that signal amplitude must be at least 5% of full scale to cause a trigger to occur. Smaller signals are rejected as noise.
- **Accuracy**:
  - Internal: ±2% of Full Scale
  - External: ±10% of Full Scale
- **Post-Trigger Data**: 64 points minimum. Can be defined with 64 point resolution.

## EXTERNAL TRIGGER

- **Connector**: SMA
- **Impedance**: 2k Ω or 50 Ω
- **Coupling**: AC or DC
- **Bandwidth**: >300 MHz
- **Voltage Range**: ±1 V, ±5 V (software selectable)
- **Amplitude**: Absolute Maximum 6 V RMS

## EXTERNAL REFERENCE CLOCK IN

- **Connector**: SMA
- **Signal Level**: Minimum 200 mV RMS, Maximum 500 mV RMS
- **Impedance**: 50 Ω
- **External Reference Clock Mode Rate**: 10 MHz ±50 ppm; the external reference time base is used to synchronize the internal sampling clock.

## EXTERNAL REFERENCE CLOCK OUT

- **Connector**: SMA
- **Signal Level**: ±300 mV
- **Impedance**: 50 Ω
- **Output Modes**: 10 MHz Reference Clock
- **Frequency**: 10 MHz

## MULTIPLE RECORD

- **Pre-Trigger Data**: Up to almost full on-board memory
- **Record Length**: 64 points minimum. Can be defined with 64 point resolution.

## TIME-STAMPING

- **Timing Resolution**: One Sample Clock Cycle
- **Counter Turnover**: >24 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 16 Channels Total

## DIMENSIONS

- **Size**: Single Slot, Full Height, Full Length

## POWER CONSUMPTION

- **Power**: 34.8 Watts (typical)

## 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

<table>
<thead>
<tr>
<th>Model Number</th>
<th>A/D Resolution</th>
<th># of Channels</th>
<th>Max. Sampling Rate per Channel</th>
<th>Memory Size</th>
<th>Order Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSE14G8</td>
<td>8-bit</td>
<td>1</td>
<td>4 GS/s</td>
<td>2 GS (2 GB)</td>
<td>CXE-014-000</td>
</tr>
<tr>
<td>CSE24G8</td>
<td>8-bit</td>
<td>2</td>
<td>1-CH: 4 GS/s; 2-CH: 2 GS/s</td>
<td>2 GS (2 GB)</td>
<td>CXE-024-000</td>
</tr>
</tbody>
</table>

### Memory Upgrades

- Memory Upgrade: 2 GS (2 GB) to 4 GS (4 GB)  
  - MEM-181-101
- Memory Upgrade: 2 GS (2 GB) to 8 GS (8 GB)  
  - MEM-181-103
- Memory Upgrade: 2 GS (2 GB) to 16 GS (16 GB)  
  - MEM-181-105

### 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  
  - CXE-181-012
- Slave Multi-Card Upgrade  
  - CXE-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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