4-Channel 16-Bit PXIe Gen3 RazorMax Express

Unprecedented Speed & Resolution in a 1 GS/s Streaming Digitizer
700 MHz Bandwidth with Stream Rates at 4+ GB/s

FEATURES

- 16-Bit Vertical A/D Resolution with 4 or 2 Digitizing Input Channels
- 1 GS/s or 500 MS/s Maximum Sampling Rate per Channel
- 31 Software Selectable Sampling Rates from 1 kS/s to 1 GS/s
- Optional ADC Modes: Decimate-by-2 Filter, Decimate-by-4 Filter with Digital Mixer, Decimate-by-4 Filter with IQ Outputs
- 700 MHz Bandwidth @ 1 GS/s or 350 MHz Bandwidth @ 500 MS/s
- 4 GS (8 GB) Onboard Sample Memory Standard
- FPGA Based Applications for Real-Time DSP Functions
- Dual Port Memory with Sustained PXIe Gen3 Data Streaming at 4+ GB/s
- Full-Featured Front-End with DC Coupling (AC Optional) and 50 Ω Inputs
- Ease of Integration with External or Reference Clock In & Clock Out
- External Trigger In & Trigger Out
- 3U PXIe Generation 3.0 x8 Single-Slot 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
**MAIN SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Model #</th>
<th>CSX16502</th>
<th>CSX16504</th>
<th>CSX161G2</th>
<th>CSX161G4</th>
</tr>
</thead>
<tbody>
<tr>
<td># of Input Channels</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Vertical A/D Resolution</td>
<td>16-bit</td>
<td>16-bit</td>
<td>16-bit</td>
<td>16-bit</td>
</tr>
<tr>
<td>Max. Rate per Channel</td>
<td>500 MS/s</td>
<td>500 MS/s</td>
<td>1 GS/s</td>
<td>1 GS/s</td>
</tr>
</tbody>
</table>

**A/D SAMPLING**

Rates per Channel, Model dependent (software selectable):

- 1 GS/s, 875 MS/s, 800 MS/s, 750 MS/s, 650 MS/s, 600 MS/s, 525 MS/s, 500 MS/s, 425 MS/s, 400 MS/s, 375 MS/s, 325 MS/s, 300 MS/s, 250 MS/s, 200 MS/s, 100 MS/s, 50 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

Rate Accuracy: ±1 part-per-million (0° to 50° C ambient)

**Optional ADC Modes (Consult Factory)**

- **Decimate-by-2 Filter**: DDC block providing decimation FIR half-band filter with 41 taps for each ADC channel.
- **Decimate-by-4 Filter with Digital Mixer**: DDC block providing band-pass decimation filter with digital mixer and 3 concatenated FIR filters.
- **Decimate-by-4 Filter with IQ Outputs**: DDC block providing a fixed digital $f_s/4$ mixer with IQ pass band approximately at ±110 MHz centered at $f_s/4$ with 41 taps for decimation filter.

**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)
- Architecture: Dual Port
- Data Streaming: Yes
ANALOG INPUT CHANNELS

Connectors : SMA
Impedance : 50 Ω
Coupling : DC (standard) or AC (option, consult factory)
Analog Bandwidth : DC to 700 MHz at 1 GS/s Sample Rate
                    DC to 350 MHz at 500 MS/s Sample Rate
Voltage Ranges : ±1 V
                (contact us for custom ranges)
DC User Offset : Spans Full Scale Input Range (FSIR)
                (software selectable)
Absolute Max. Input : ±3 V (over-voltage protection included)

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. Signal amplitude must be at least 10% of full scale to cause a trigger to occur. Smaller signals are rejected as noise.
Post-Trigger Data : 32 points minimum. Can be defined with 32 point resolution.

EXTERNAL TRIGGER

Connector : SMA
Impedance : ≈ 1k Ω
Coupling : AC
Bandwidth : >100 MHz
Voltage Range : 0-3 V (unipolar)

TRIGGER OUT

Connector : SMA
Impedance : 50 Ω
Amplitude : 0 – TTL

CLOCK OUT

Connector : SMA
Signal Level : 0 – 1.5 V
Impedance : 50 Ω Compatible
Duty Cycle : 50%
Output Modes : Maximum Sampling Clock Frequency or 10 MHz Reference Clock
Max. Frequency : 1 GHz
Min. Frequency : 250 MHz
10 MHz Reference Clock Mode Rate : 10 MHz from Internal Reference

CLOCK IN

Connector : SMA
Signal Level : Minimum 0.2 V RMS,
               Maximum 0.5 V RMS
Impedance : 50 Ω
Coupling : DC
Duty Cycle : 50% ±5%
Input Modes : External Clock or 10 MHz Reference Clock
External Clock Mode Rates : Minimum 250 MHz,
                            Maximum 1 GHz
External Reference Clock Mode Rate : 10 MHz ±1000 ppm; the external reference time base is used to synchronize the internal sampling clock.
Variable/Inactive External Clock Mode : Supports variable rate k-clocking or inactive external clock, particularly useful for OCT applications.

MULTIPLE RECORD

Pre-Trigger Data : Up to FPGA Memory Size

TIME-STAMPING

Timing Resolution : One Sample Clock Cycle

DIMENSIONS

Size : Single Slot, 3U Height

POWER CONSUMPTION

Power : 30 Watts (typical)

SYSTEM REQUIREMENTS

PXIe Slot : 1 Free 3U Single Slot
           PXIe Gen1, Gen2 or Gen3
Operating System : Windows 10/8/7 (32-bit/64-bit),
                   Linux – Requires SDK for C/C#

Duty Cycle : 50% ±5%
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## 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>Input Bandwidth</th>
<th>Memory Size</th>
<th>Order Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSX16502</td>
<td>16-bit</td>
<td>2</td>
<td>500 MS/s</td>
<td>350 MHz</td>
<td>4 GS (8 GB)</td>
<td>RMX-X65-020</td>
</tr>
<tr>
<td>CSX16504</td>
<td>16-bit</td>
<td>4</td>
<td>500 MS/s</td>
<td>350 MHz</td>
<td>4 GS (8 GB)</td>
<td>RMX-X65-040</td>
</tr>
<tr>
<td>CSX161G2</td>
<td>16-bit</td>
<td>2</td>
<td>1 GS/s</td>
<td>700 MHz</td>
<td>4 GS (8 GB)</td>
<td>RMX-X61-G20</td>
</tr>
<tr>
<td>CSX161G4</td>
<td>16-bit</td>
<td>4</td>
<td>1 GS/s</td>
<td>700 MHz</td>
<td>4 GS (8 GB)</td>
<td>RMX-X61-G40</td>
</tr>
</tbody>
</table>

### Front End Options

AC-Coupled Front End Option (Consult Factory) RMX-FAC-001

### Cable Accessories

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

### eXpert FPGA Firmware Options

| eXpert PCIe Data Streaming | STR-181-000 |
| eXpert Signal Averaging    | 250-181-001 |
| eXpert Fast Fourier Transform (FFT) | 250-181-004 |
| eXpert Optical Coherence Tomography (OCT) | 250-181-006 |

### 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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Data Sheet Revision 2 – 09/27/2017
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