VTI Instruments / AMETEK PROGRAMMABLE POWER

EMX-2632/2616

FEATURES

- 32/16 input differential channels
- Ohms/RTD & voltage measurements
- 16-bit SAR ADC scanning or simultaneous sampling
- 8/4 channels simultaneous 1.6MSPS (16-bit)
- 32/16 channels 400KSPS (16-bit) maximum using 4-to-1 multiplexer
- Volts input ranges: 16V, 2V, 0.25V
- 4-wire ohms ranges: 400Ω, 4kΩ, 40kΩ
- Selectable 8kHz 1-pole lowpass filter
- 2/1 output channels: ±10V or ±20mA
- 16/8 DIO: 3.3V
- Built-in-self-test (BIST) & calibration
- IEEE 1588 synchronization
- PXIe 3U

32/16-CHANNEL MULTIFUNCTION DIGITIZER

ANALOG INPUT:
OHMS/RTD, VOLTS

ANALOG OUTPUT:
VOLTS OR CURRENT

DIGITAL IN/OUT (DIO)
3.3V Logic

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Overview

With 32/16 channels of voltage or Ohms, independent 16-bit ADCs per 4-channels, extensive software-selectable filtering, and independent signal conditioning paths, this instrument deliver exceptional accuracy and reliability. Built-in signal conditioning and programmable excitation integrated into the instrument and configurable on a per-channel basis greatly simplify setup and configuration. With unmatched performance, accuracy, and reliability, the EMX-2632/2616 is the “go-to” solution for a wide range of test applications worldwide.

The EMX-2632/2616 together with the EMX-2500 Controller support easy integration and synchronization of multiple devices through the IEEE-1588 v2 Precision Time Protocol standard for synchronization, providing an architecture that can be scaled from tens to thousands of channels. Multiple instruments can be easily distributed close to the measurement points of interest, reducing the run length of analog cabling and minimizing errors induced by noisy environments.

Confidence

Manufacturing and test environments of today are dynamic, dictating minimal downtime of test systems to meet increasing product throughput demands. Ensuring that acquired data is reliable and that instrument calibration can be turned around quickly are keys to the success of any production team. VTI embeds intelligence into the EMX-2632/2616 to facilitate maximum system “uptime” and increase manufacturing efficiency.

BIST, Self-CAL, can be executed prior to a critical test to provide confidence that the digitizer and connections to the transducers are OK.

Connectivity

The EMX-2632/2616 is designed for operation in any standard PXI(e) environment. These cards are engineered to work with any standard PXI chassis or card with a wide range of software tools and drivers available to make integration seamless. When used with the VTI EMX-2500 GigE controller, additional capabilities (including IEEE 1588) become available for both data time stamping and synchronization.

ANALOG INPUT SPECIFICATIONS

No. of Channels	EMX-2616: 16 channels; EMX-2632: 32 channels
Input Connector	Two 68-pin 0.8mm VHDCI receptacles (TE 5796055-1)
Input Type	Differential
Input Ranges	Volts: ± (16 V, 2 V, 0.25 V) Ohms: 400 Ω – Iexc=600 uA; 4 kΩ – Iexc=500uA; 40kΩ – Iexc=100 uA
Maximum Input (no damage)	±60V. ESD protected to ±4kV
Input Ground Isolation	No channel-to-channel ground isolation
Input Coupling	DC
Input Impedance	16V: 500 kΩ single-ended, 1MΩ differential Other ranges: >10 MΩ each input to ground
Slew Rate: 10% to 90% FS	1 V/μs typ.
Common Mode Rejection, (CMR) <1kHz	-100 dB typ.
Crosstalk @1kHz	-90 dB typ.
THD Range=16V, Vin=5V, 1kHz	THD: -84 dB typ.
	SFDR: -72 dB typ.
Wire Break Detection (WBD) Current	0.25 µA, 2 µA, 4 µA, or 16 µA
Analog Bandwidth (-3dB)	Input Low-Pass 1-Pole Filter OFF: >100 kHz Input Low-Pass 1-Pole Filter ON: 8 kHz typ.
Typical Noise @ 400 kSPS Input Low-Pass Filter OFF	16V: 3.0 mVrms typ. 2V: 0.3 mVrms typ. 0.25V: 0.1 mVrms typ.

ANALOG-TO DIGITAL CONVERTER (ADC)

ADC	SAR ADC with 4-to-1 multiplexer 16-bits @ 1.6 MSPS Higher resolution obtained by down sampling with digital decimation filters
Sample Rate (SPS)	Programmable with or without averaging 8 ADCs can sample 8 channels simultaneously Up to 1.6 MSPS for 8 channels enabled, simultaneous sampling Up to 400 kSPS for 32 channels enabled, each ADC with 4-input multiplexer
Settling Time	2 us max.

ANALOG INPUT ACCURACY

Range	Typical Accuracy @ADC_Clock<0.8 MHz, Tcal±3° C
0.25 V	± [(0.06%+42PPM/° C)*Reading + (0.007%+0.4PPM/° C)*Range]
2 V	± [(0.04%+42PPM/° C)*Reading + (0.002%+0.4PPM/° C)*Range]
16 V	± [(0.01%+7PPM/° C)*Reading + (0.001%+0.4PPM/° C)*Range]
40000 Ω	± [(0.16%+7PPM/° C)*Reading + (0.001%+0.4PPM/° C)*Range]
4000 Ω	± [(0.09%+42PPM/° C)*Reading + (0.001%+0.4PPM/° C)*Range]
400 Ω	± [(0.11%+42PPM/° C)*Reading + (0.001%+0.4PPM/° C)*Range]
Range	**Typical Accuracy @ADC_Clock<1.2 MHz, Tcal±3° C**
0.25 V	± [(0.08%+91PPM/°C)*Reading + (0.007%+0.7PPM/° C)*Range]
2 V	± [(0.06%+91PPM/°C)*Reading + (0.002%+0.7PPM/° C)*Range]
16 V	± [(0.03%+33PPM/°C)*Reading + (0.001%+0.7PPM/° C)*Range]
40000 Ω	± [(0.17%+33PPM/°C)*Reading + (0.001%+0.7PPM/° C)*Range]
4000 Ω	± [(0.12%+91PPM/°C)*Reading + (0.001%+0.7PPM/° C)*Range]
400 Ω	± [(0.13%+91PPM/°C)*Reading + (0.001%+0.7PPM/° C)*Range]
Range	**Typical Accuracy @ADC_Clock<1.6 MHz, Tcal±3° C**
0.25 V	± [(0.11%+139PPM/° C)*Reading + (0.007%+1.5PPM/° C)*Range]
2 V	± [(0.09%+139PPM/° C)*Reading + (0.002%+1.5PPM/° C)*Range]
16 V	± [(0.03%+44PPM/° C)*Reading + (0.002%+1.5PPM/° C)*Range]
40000 Ω	± [(0.17%+44PPM/° C)*Reading + (0.001%+1.5PPM/° C)*Range]
4000 Ω	± [(0.14%+139PPM/° C)*Reading + (0.001%+1.5PPM/° C)*Range]
400 Ω	± [(0.16%+139PPM/° C)*Reading + (0.001%+1.5PPM/° C)*Range]
Range	**Maximum Accuracy @ADC_Clock<0.8 MHz, Tcal±6° C**
0.25 V	± [(0.08%+43PPM/° C)*Reading + (0.009%+0.5PPM/° C)*Range]
2 V	± [(0.06%+43PPM/° C)*Reading + (0.003%+0.5PPM/° C)*Range]
16 V	± [(0.02%+8PPM/° C)*Reading + (0.002%+0.5PPM/° C)*Range]
40000 Ω	± [(0.32%+8PPM/° C)*Reading + (0.001%+0.5PPM/°C)*Range]
4000 Ω	± [(0.22%+43PPM/° C)*Reading + (0.001%+0.5PPM/°C)*Range]
400 Ω	± [(0.24%+43PPM/° C)*Reading + (0.001%+0.5PPM/°C)*Range]
Range	**Maximum Accuracy @ADC_Clock<1.2 MHz, Tcal±6° C**
0.25 V	± [(0.12%+94PPM/° C)*Reading + (0.009%+1.1PPM/° C)*Range]
2 V	± [(0.11%+94PPM/° C)*Reading + (0.004%+1.1PPM/° C)*Range]
16 V	± [(0.04%+37PPM/° C)*Reading + (0.002%+1.1PPM/° C)*Range]
40000 Ω	± [(0.34%+37PPM/° C)*Reading + (0.001%+1.1PPM/° C)*Range]
4000 Ω	± [(0.27%+94PPM/° C)*Reading + (0.001%+1.1PPM/° C)*Range]
400 Ω	± [(0.29%+94PPM/° C)*Reading + (0.001%+1.1PPM/° C)*Range]
Range	**Maximum Accuracy @ADC_Clock<1.6 MHz, Tcal±6° C**
0.25 V	± [(0.16%+141PPM/° C)*Reading + (0.010%+2.2PPM/° C)*Range]
2 V	± [(0.15%+141PPM/° C)*Reading + (0.005%+2.2PPM/° C)*Range]
16 V	± [(0.05%+47PPM/° C)*Reading + (0.003%+2.2PPM/° C)*Range]
40000 Ω	± [(0.35%+47PPM/° C)*Reading + (0.002%+2.2PPM/° C)*Range]
4000Ω	± [(0.30%+141PPM/° C)*Reading + (0.002%+2.2PPM/° C)*Range]
400 Ω	± [(0.32%+141PPM/° C)*Reading + (0.002%+2.2PPM/° C)*Range]

ANALOG OUTPUT

No. of Channels	EMX-2616: 1 channel; EMX-2632: 2 channels	
DAC Resolution	16-bits	
Output Type	Voltage or current	
Output Range	±10 Vpk, ±20 mA ±20 mA, ±10 V compliance	
Accuracy	Typ. accuracy DAC volts, Tcal±3° C: Max. accuracy DAC volts, Tcal±6° C:	±[(0.02%+6PPM/°C)*Rdng + (0.03%+1PPM/° C)*Rng] ±[(0.03%+10PPM/°C)*Rdng + (0.05%+2.3PPM/° C)*Rng]
	Typ. accuracy DAC current, Tcal±3° C: Max. accuracy DAC current, Tcal±6° C:	±[(0.03%+15PPM/° C)*Rdng + (0.06%+1.4PPM/° C)*Rng] ±[(0.05%+32PPM/° C)*Rdng + (0.10%+2.2PPM/° C)*Rng]
Update Rate	100 kHz max.	
Settling Time	8us typ.	
Slew Rate	Voltage out: 1 V/us typ. Current out: 1.3 mA/us typ.	
Bandwidth	Voltage out: 300 kHz, -3 dB typ. Current out: 160 kHz, -3 dB typ.	

DIGITAL IN/OUT (DIO)

No. of Channels	EMX-2616: 8 channels; EMX-2632: 16 channels
Logic	3.3 V referenced to GND-D
Direction Control	Input or output
Input Voltage Protection	±5 V
Propagation Delay	<10 ns
Enable/Disable Time	<20 ns
Trigger latency to/from ADC or DIO	<0.5 us
ADC & DAC Synchronization	Any DIO lines can trigger or be triggered by ADC

EXCITATION CURRENT

No. of Channels	EMX-2616: 16 channels; EMX-2632: 32 channels
Output Current Range	Programmable 100uA to 1.5 mA in 100 uA steps
Drift	±300PPM/° C typ.
Compliance Voltage	3.0 V @ 1.5 mA 3.5 V @ 1.0 mA 4.3 V @ 0.3 mA 4.7 V @ 0.1 mA

SELF-CALIBRATION & SELF-TEST (BIST)

BIST	Calibration reference voltages, calibration date, and internal PCB temperature

ENGINEERING UNITS (EU) CONVERSION

Digitized signal is available as raw ADC counts or EU: volts or ohms; user can provide scaling factors (gain & offset) to convert to EU any other transducer type (i.e., volts to pressure or force, ohms to temperature °C or °F)

POWER REQUIREMENTS

3.3 V	2 W max.
12 V	4 W max.

ENVIRONMENTAL

Temperature	Operating temperature: 0° C to +50° C Storage temperature: -40° C to +80° C MIL-PRF-28800 Class 3
Relative Humidity, non-condensing	Operating: 10%-90% Storage: 5% to 95% MIL-PRF-28800 Class 3
Vibration & Shock	MIL-PRF-28800F Class 3 Operational shock: 30 g peak, half-sine, 11 ms pulse Operational random vibration: 5 Hz to 500Hz, 0.3 grms Non-operational random vibration: 5 Hz to 500 Hz, 2.4 grms
Altitude	4600 M, MIL-PRF-28800 Class 3
CE Compliance	Yes
MTBF	200k operational hours
Service Life	> 10 Years

PHYSICAL

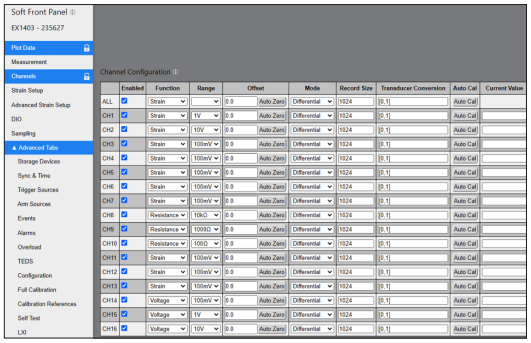
Dimensions	Standard 3U PXIe
Weight	226 g (8 oz)

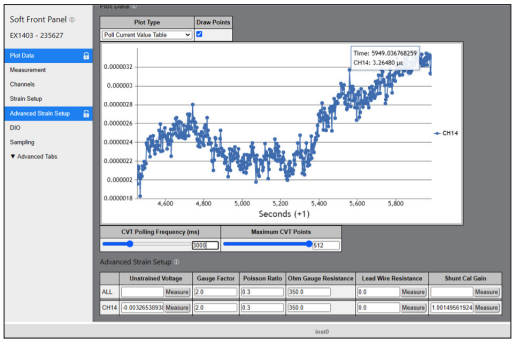
ORDERING INFORMATION

Model	Description
70-0409-026R	EMX-2632-1 32-channel, 16-bit 1.6MSPS, 2-channel DAC, 16 DIO
70-0409-027R	EMX-2616-1 16-channel, 16-bit 1.6MSPS, 1-channel DAC, 8 DIO
70-0409-007R	EMX-2500 gigabit Ethernet LXI-based interface

Software and Drivers

Built-in GUI available via a standard web browser





Driver support for operation in Windows, Linux, MATLAB, and LabVIEW

Windows

MATLAB

LabVIEW

EXLab Turnkey Solution

- Easy-to-use spreadsheet configuration
- Flexible real-time data displays
- Data can be viewed and exported in several data formats
- Provides extended features such as “snapshot,” calculated channels and Rosette support, event handling, and alarms
- Multiple configurations and options