

General Standards Corporation

High Performance Bus Interface Solutions

CCPMC-16AICS32R

32-CHANNEL 16-BIT TRANSDUCER INPUT PMC

With Conduction Cooling and Scanning Input Current Source

Available also in PMC, PCI, cPCI and PC104-Plus and PCI Express form factors as:

PMC-16AICS32:	PMC, Single-width
PCI-16AICS32:	PCI, short length
cPCI-16AICS32:	cPCI, 3U
PC104P-16AICS32:	PC104-Plus
PCIe-16AICS32:	PCI Express
PCIe104-16AICS32:	PCIe, one-lane on PC/104 form factor

See Ordering Information for details.

Call for availability of other form factors, such as XMC, etc.

Features:

- 32 Differential or 60 Single-Ended 16-Bit Scanned Analog Voltage Input Channels
- 32-Channel Precision Scanning Excitation Current Source; 0.4ma to 10ma Options
- Input Ranges Selectable as $\pm 10V$, $\pm 5V$ or $\pm 2.5V$
- Excitation Applied to any Channel Combination Under a Control Mask
- High Input Impedance for Channels Not Requiring Excitation
- Scan Rate Internally Adjustable from 0.06 to 3000 32-Channel Scans per Second
- External Hardware Sync Input/Output (Alternate Function for Channel 31)
- Data Buffered through a 64K-sample FIFO
- Continuous and Burst (One-Shot) Input Modes
- Scan Sizes from Two to 32 Channels-per-Scan; or Single-Channel sampling of any Channel
- On-Demand Internal Autocalibration
- DMA Engine Supports Block Mode Transfers
- Conforms to PCI Specification 2.3; D32; 33MHz; 3.3V,5V signaling.
- Single-width Conduction-cooled PMC Form Factor with EMI Shield and Rear-panel I/O.

Applications:

- | | | |
|--------------------------|----------------------|------------------------------|
| ✓ Resistance Transducers | ✓ Voltage Inputs | ✓ Temperature Measurement |
| ✓ Data Acquisition | ✓ Process Monitoring | ✓ Environmental Test Systems |

Rev: 041013

Functional Description:

The CCPMC-16AICS32R board is a conduction-cooled scanning 16-Bit analog digitizer that provides voltage measurement for up to 32 differential (28 full differential, four pseudo differential) or 60 single-ended input channels, with precision current excitation available for 32 channels. A precision current source is switched synchronously with the input scanner to supply excitation for each channel as it is sampled. The excitation current can be programmed to occur in any combination of input channels, and those channels programmed not to receive the excitation can be used as basic analog voltage inputs. Input ranges are selectable as $\pm 2.5V$, $\pm 5V$ or $\pm 10V$, and factory-configured excitation current is available from 0.4ma to 10ma. 16-bit sampled data is available to the PCI bus through a 64K-Sample FIFO buffer. All operational parameters are software configurable.

The analog inputs can be sampled in scans of 2, 4, 8, 16 or 32 differential channels, or 2, 4, 8, 16, 32 or 60 single-ended channels, or any individual channel can be selected for sampling. The scan rate can be controlled internally from 0.06 scans per second up to 50,000 scans per second for a 2-channel scan, or any single channel can be sampled at up to 100,000 samples per second. A Sync input/output signal can replace Channel 31 inputs to permit multiple boards to operate from a common scan-rate generator. An internal auto calibration utility uses hardware D/A converters to correct for offset and gain errors in the input signal path, and calibrates the inputs, but not the excitation source, to a precision internal calibration reference.

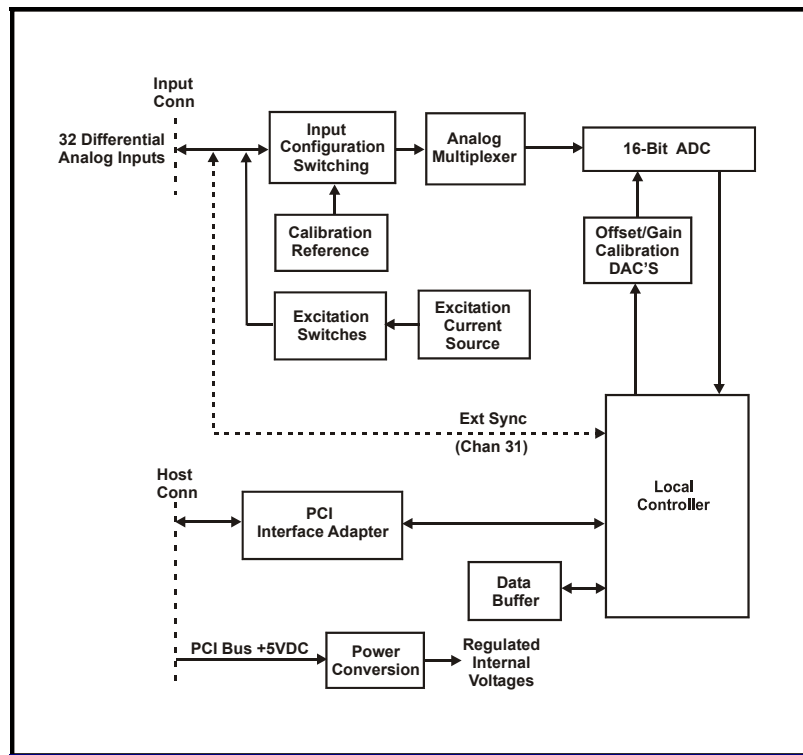


Figure 1. CCPMC-16AICS32R; Functional Organization

This product is functionally compatible with the IEEE PCI local bus specification Revision 2.3, and supports the "plug-n-play" initialization concept. System connections are made through a rear-panel I/O connector. Power requirements consist of +5 VDC, in compliance with the PCI specification, and operation over the specified temperature range is achieved with either conduction cooling or conventional convection cooling.

ELECTRICAL SPECIFICATIONS

At +25 °C, with specified operating conditions

□ Input Characteristics:

Configuration:	32 differential (29 full differential plus three pseudo-differential) or 60 single-ended analog voltage input channels, 32 of which support current excitation for resistance transducers.
Voltage Ranges:	Software configurable as ±10 Volts, ±5 Volts or ±2.5 Volts.
Input Impedance:	20 Megohms line to line, typical at zero to 100 Hz scan rate. Typically 10 Megohms at 1000 Hz scan rate.
Common Mode Rejection:	60 dB typical, DC-60 Hz (Differential inputs)
Common Mode Range:	Same as selected voltage range, with zero normal mode signal (Diff inputs)
Crosstalk Rejection:	85dB channel-to-channel, typical, DC-1.0 kHz, 0-1000 scans per second
Overtoltage Protection:	±25 Volts with power applied *; ±40 Volts with power removed.

* Channel 31 HI/LO pins are limited to -0.5 to +7.0 Volts when software-configured as alternate TTL Sync-I/O function.

□ Transfer Characteristics:

Resolution:	16 Bits (0.0015 percent of FSR)												
Maximum Sample Rate:	100K samples per second												
Maximum Scan Rate:	100K scans per second, divided by number of channels in scan												
Channels per scan:	2, 4, 8, 16, 32 differential channels, or 2, 4, 8, 16, 32, 64 single-ended channels, or any single differential or single-ended channel.												
DC Accuracy: (Maximum composite error after autocalibration)	<table><thead><tr><th>Range</th><th>Midscale Accuracy</th><th>±Fullscale Accuracy</th></tr></thead><tbody><tr><td>±10V</td><td>± 3mv</td><td>± 4mv</td></tr><tr><td>±5V</td><td>± 2mv</td><td>± 3mv</td></tr><tr><td>±2.5V</td><td>± 1mv</td><td>± 2mv</td></tr></tbody></table>	Range	Midscale Accuracy	±Fullscale Accuracy	±10V	± 3mv	± 4mv	±5V	± 2mv	± 3mv	±2.5V	± 1mv	± 2mv
Range	Midscale Accuracy	±Fullscale Accuracy											
±10V	± 3mv	± 4mv											
±5V	± 2mv	± 3mv											
±2.5V	± 1mv	± 2mv											
Integral Nonlinearity:	±0.007 percent of FSR, typical												

□ Excitation Current Source:

Current:	1.000 milliamp source. Optional 0.400, 2, 3, 5 or 10 milliamps.
Accuracy:	±0.04 percent maximum
Compliance:	±10 Volts to 3ma; ±8V to 10ma
Impedance:	50 Megohms minimum to 3ma; 20 Megohms to 10ma
Application:	All HI inputs in differential mode; all even-numbered single-ended inputs.

□ Analog Input Operating Modes and Controls

Input Data Buffer:	64K-sample FIFO
Analog Input Modes:	Continuous Scan: Selected analog inputs are scanned continuously at a rate determined by the internal rate generator. Single Scan: Each scan is initiated either by a software command or by a hardware TTL input. Single Channel: Any single selected channel is sampled continuously Selftest: Autocalibration and Selftest modes
Rate Generator:	Programmable from 0.06 - 100,000 conversions per second. External triggering is available through Channel 31 pins.
Input Data Format:	Selectable as offset binary or as two's complement

PCI INTERFACE

- ❑ **Compatibility:** Conforms to PCI Specification 2.3; D32; 33MHz; 3.3V,5V signaling.
Supports "plug-n-play" initialization.
Single multifunction interrupt.
Supports block mode DMA transfers as bus master.

MECHANICAL AND ENVIRONMENTAL SPECIFICATIONS

Mechanical Outline

Height: 13.5 mm (0.53 in)
Depth: 143.75 mm (5.66 in)
Width: 74.0 mm (2.91 in)

Environmental Specifications

Ambient Temperature Range:

Standard Temperature: Operating: 0 to +65 Degrees Celsius at thermal interface
Storage: -40 to +85 Degrees Celsius

Extended Temperature: Operating: -40 to +80 Degrees Celsius at thermal interface
Storage: -40 to +85 Degrees Celsius

Relative Humidity: Operating: 0 to 80%, non-condensing
Storage: 0 to 95%, non-condensing

Altitude: Operation to 10,000 ft.

Cooling: Standard conduction cooling thermal interfaces.

Power Requirements

+5VDC \pm 0.2 VDC at 0.70 Amp, maximum, 0.50 Amp typical

Power Dissipation: Typical : 2.1 Watts, Side 1; 0.4 Watt, Side 2.
Maximum: 3.0 Watts, Side 1; 0.5 Watt, Side 2.

ORDERING INFORMATION

Specify the basic product model number followed by an option suffix "-A", as indicated below. For example, model number CCPMC-16AICS32R-2.0 describes a board with an excitation current of 2.000 milliamps.

Basic Model Number	Form Factor
CCPMC-16AICS32R	Conduction-cooled PMC (Native)
PMC-16AICS32	PMC (Native)
PCI-16AICS32¹	PCI, short length
cPCI-16AICS32¹	cPCI, 3U
PCle-16AICS32¹	cPCI, 3U
PC104P-16AICS32	PC104- <i>Plus</i>
PCle104-16AICS32^{1,2}	PCle, one-lane on PC/104 form factor

¹ Module installed and tested on an adapter, with mechanical and functional equivalency. Contact factory for availability in native form factors.

² PCle104 supports only the PCle bus.

Optional Parameter	Value	Specify Option As:
Excitation Current	0.400 ma	A = 0.4
	1.000 ma	A = 1.0 or blank
	2.000 ma	A = 2.0
	3.000 ma	A = 3.0
	5.000 ma	A = 5.0
	10.000 ma	A = 10.0

System Interface Connector

**Table 1. PMC Pn4 System I/O Connector
(Rear Panel)**

ROW-A ¹			ROW-B ¹		
PIN	SIGNAL		PIN	SIGNAL	
	S.E. MODE	DIFF MODE		S.E. MODE	DIFF MODE
63	INP00 ²	INP00 HI ²	64	INP02 ²	INP01 HI ²
61	INP01	INP00 LO	62	INP03	INP01 LO
59	INP04 ²	INP02 HI ²	60	INP06 ²	INP03 HI ²
57	INP05	INP02 LO	58	INP07	INP03 LO
55	INP08 ²	INP04 HI ²	56	INP10 ²	INP05 HI ²
53	INP09	INP04 LO	54	INP11	INP05 LO
51	INP12 ²	INP06 HI ²	52	INP14 ²	INP07 HI ²
49	INP13	INP06 LO	50	INP15	INP07 LO
47	INP16 ²	INP08 HI ²	48	INP18 ²	INP09 HI ²
45	INP17	INP08 LO	46	INP19	INP09 LO
43	INP20 ²	INP10 HI ²	44	INP22 ²	INP11 HI ²
41	INP21	INP10 LO	42	INP23	INP11 LO
39	INP24 ²	INP12 HI ²	40	INP26 ²	INP13 HI ²
37	INP25	INP12 LO	38	INP27	INP13 LO
35	INP28 ²	INP14 HI ²	36	INP30 ²	INP15 HI ²
33	INP29	INP14 LO	34	INP31	INP15 LO
31	INP32 ²	INP16 HI ²	32	INP34 ²	INP17 HI ²
29	INP33	INP16 LO	30	INP35	INP17 LO
27	INP36 ²	INP18 HI ²	28	INP38 ²	INP19 HI ²
25	INP37	INP18 LO	26	INP39	INP19 LO
23	INP40 ²	INP20 HI ²	24	INP42 ²	INP21 HI ²
21	INP41	INP20 LO	22	INP43	INP21 LO
19	INP44 ²	INP22 HI ²	20	INP46 ²	INP23 HI ²
17	INP45	INP22 LO	18	INP47	INP23 LO
15	INP48 ²	INP24 HI ²	16	INP50 ²	INP25 HI ²
13	INP49	INP24 LO	14	INP51	INP25 LO
11	INP52 ²	INP26 HI ²	12	INP54 ²	INP27 HI ²
9	INP53	INP26 LO	10	INP55	INP27 LO
7	INP56 ²	INP28 HI ^{1,2}	8	INP58 ²	INP29 HI ^{1,2}
5	INP57 ²	INP30 HI ^{1,2}	6	INP59 ²	INP31 HI ^{2,3} SYNC I/O
3	(Reserved)	INP28-30 LO ¹	4	(Reserved)	INP31 LO ³ SYNC I/O RTN
1	INPUT RTN	INPUT RTN	2	INPUT RTN	INPUT RTN

¹ 32 channels are present and are numbered from '00' through '31'. Channels 00-27 and 31 are full-differential while, due to pin-count constraints, Channels 28-30 are pseudo-differential and share a common 'LO' input.

² Selectable for current excitation.

³ In addition to serving as an analog input, the Channel 31 HI/LO pins can alternatively be programmed as a bidirectional TTL Sync input/output pin pair.

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