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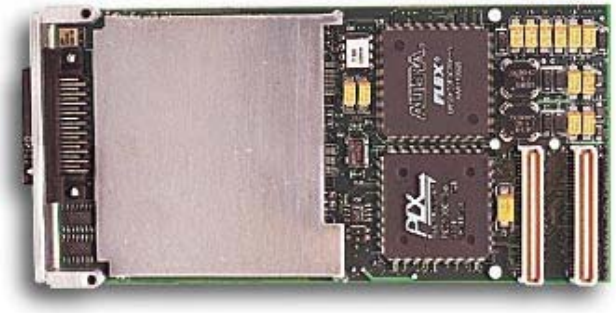
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General Standards Corporation

High Performance Bus Interface Solutions

PMC-ADADIO

12-Channel 16-Bit Analog I/O PMC
With 8 Simultaneous Input Channels at 200K Samples per Second per Channel, 4 Output Channels, and Byte-Wide Digital I/O Port



Features Include:

- 8 Analog Input Channels, 4 Analog Output Channels
- 16-Bit Resolution; Analog Inputs and Outputs
- 8-Bit Bi-directional Digital Port with Two Control Lines
- Auto calibration of all Analog Channels; Internally Controlled
- Simultaneous Analog Input Sampling; 16-Bit A/D Converter per Channel
- Analog Input Sample Rates adjustable up to 200,000 Samples per Second per Channel
- 32K-Sample Analog Input FIFO Buffer
- Continuous and Triggered-Burst Input Modes. Supports Multiboard Synchronization.
- 16-Bit D/A Converter per Analog Output Channel
- Analog Outputs Disconnect from System Under Software Control
- Simultaneous Updating of Outputs with Hardware or Software Strobe
- Analog Output Aggregate Data Rates to 250K Samples per Second, host dependent
- Loopback Feature for Built-in-Test Support and Auto calibration
- Single-width PMC Form Factor
- VxWorks™ Driver available

Applications:

- ✓ Supervisory Control Systems
- ✓ Data Acquisition Systems
- ✓ Research Instrumentation
- ✓ Automatic Test Equipment
- ✓ Simulators and Trainers
- ✓ Process Control

REV: 090406

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Overview:

The PMC-ADADIO board is a single-width PMC module which contains eight 16-Bit A/D converters, four 16-bit D/A converters, and all supporting functions necessary for adding flexible analog I/O capability to a PCI host. The board is designed for minimum off-line maintenance, and includes internal monitoring and loopback features that eliminate the need for disconnecting or removing the module from the system for calibration. All analog input and output system connections are made through a single 68-pin subminiature-D front-access I/O connector. The analog outputs can be internally disconnected from the system I/O connector under software control.

Offset and gain trimming of the 16-bit ADC and output DAC's is performed by 24 12-bit DAC's (Figure 1). System analog inputs pass through a selftest network that can replace the system signals either with a precision voltage standard or with the four analog output channels, under software control. This arrangement is used during auto calibration to determine the offset and gain correction parameters for the ADC, and for each of the output D/A converters. The correction parameters are stored in a calibration EEPROM for subsequent transfer to the calibration DAC's during board initialization. Auto calibration can be invoked at any time from the PCI bus.

Each analog output channel is accessed through an independent 16-bit data register in PCI memory space. ADC conversion data are read by the bus through an analog input FIFO buffer. An auxiliary digital port contains eight bits of bi-directional data and two control lines, and is controlled through a single register.

Communication with the host PCI bus is provided by a PCI Interface Adapter which furnishes a 32-bit local bus for exchanging information between the FIFO buffers, the adapter, and the Local Controller. All internal operations are managed by the Local Controller.

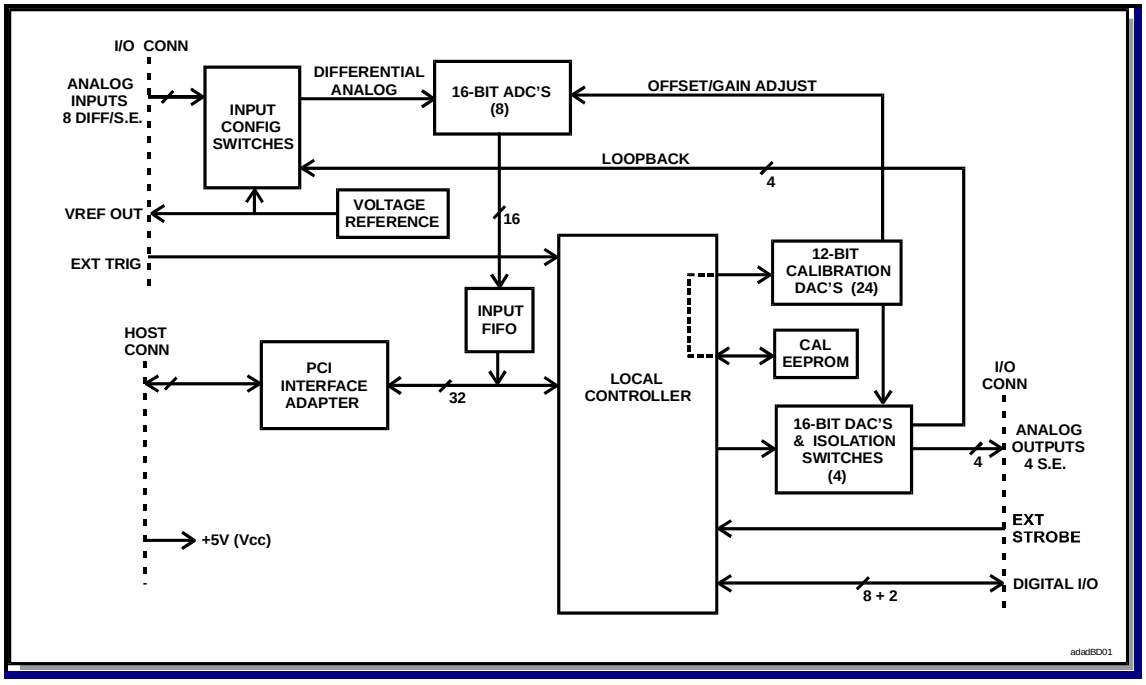


Figure 1. PMC-ADADIO Analog I/O Board, Simplified Functional Diagram

ELECTRICAL SPECIFICATIONS

At +25 ^{O}C, with specified operating conditions

ANALOG INPUT CHANNELS

Input Characteristics:

Configuration:	8 differential or single-ended input channels; software selected
Voltage Ranges:	Factory configured as ±10 Volts, ±5 Volts or ±2.5 Volts
Input Impedance:	1.0 Megohms in parallel with 20 pF; 2.0 Megohms line-to-line
Common Mode Rejection:	75 dB minimum, DC-60 Hz (Differential mode)
Common Mode Range:	±11.0 Volts; with zero input signal level
Offset Voltage:	±1.0 millivolts, maximum
Signal to Noise Ratio (SNR):	88dB 10 Hz to 20 kHz; 80 dB to 100 kHz. Reference = fullscale input signal.
Remote Ground Sensing:	All single-ended inputs are measured relative to the external return, which is isolated from the internal analog return by approximately 200 Ohms.
Overvoltage Protection:	±30 Volts with power applied; ±15 Volts with power removed
External Trigger Input:	TTL level, active LOW

Transfer Characteristics:

Resolution:	16 Bits (0.0015 percent of FSR)
Conversion Rate	305 Hz to 200 kHz (Optional 100 kHz) per channel, controlled with 16-bit integer. (170-200KSPS in burst and multiboard sync modes). At very low rates (below 150SPS) the conversion cycle time is 9 us.
Accuracy:	±0.007 percent of reading, ±0.006 percent of Full-Scale-Range, ±1.0 mV. e.g.: ± 2.8 mV, while reading +8 Volts on the ±10V range (20V FSR).
Crosstalk Rejection:	80dB minimum; DC-1000Hz
Integral Nonlinearity:	±0.006 percent of FSR, maximum
Differential Nonlinearity:	±0.003 percent of FSR, maximum
External Trigger Latency:	Single card: 0.25µs maximum; Multiboard synchronization: 0.35µs

Analog Input Operating Modes and Controls

Input Sampling Mode:

Continuous Conversion Mode (Default): Analog inputs are converted continuously at the selected conversion rate. Inputs are software selected as differential or single-ended.

Burst Scan Mode: A single conversion of selected channels is initiated by a external hardware trigger or by a software trigger. Applies in both differential or single-ended modes.

Loopback Mode: Connects a selected analog output channel to all input channels.

Reference Modes: Used during calibration verification. Replace system inputs with an internal reference voltage or with signal return

Analog Input Operating Modes and Controls (Continued)

Active Channels:	Software selected as from 1 to 8 channels. Conversion data from active channels appear in the analog input buffer. Active channels are contiguous, beginning with Channel-0 and proceeding upward to the highest active channel number.
Data Buffer:	FIFO buffer with a capacity of 1 to 32,768 samples. Buffer size is software selected in 2:1 ratios with a 4-bit register field.
Buffer Flags:	Buffer empty, buffer half full and buffer full. Corresponding interrupts supported.
Data Format:	Software selected as offset binary or two's complement format
Multiboard Synchronization:	A single initiator card can be used to trigger synchronized conversions in up to three target cards.

ANALOG OUTPUT CHANNELS

Output Characteristics:

Configuration:	Four single-ended output channels
Voltage Ranges:	Factory configured as ±10 Volts, ±5 Volts or ±2.5 Volts
Output Resistance:	1.0 Ohm, maximum if outputs are enabled; 22 kOhms to ground if outputs are disabled
Output protection:	Withstands sustained short-circuiting to ground. Also withstands overvoltage transients to ±40 Volts through 80 Ohms for 10 milliseconds.
Load Current:	±5 mA maximum; ±2 mA recommended for minimum crosstalk and line loss
Load Capacitance:	Stable with zero to 2000 pF shunt capacitance
Noise:	1.2 kHz Filter: 0.3 mVrms, 10Hz-10MHz 4 kHz Filter: 0.6 mVrms, 10Hz-10MHz No Filter (75 kHz): 1.4 mVrms, 10Hz-10MHz

Transfer Characteristics:

Resolution:	16 Bits (0.0015 percent of FSR)
Maximum Sample Rate:	250K channels per second, typical aggregate rate. Useable rate is host-dependent.
Accuracy (No load):	±0.007 percent of reading, ±0.005 percent of Full-Scale-Range, ±1.0 mV. e.g.: ±2.3mV, while generating +4 Volts on the ±5V range (10V FSR). Add ±1.0 mV per milliamp of loading.
Settling Time (0.01%):	No output filter: 25 us 4 kHz Filter: 0.40 ms 1.2 kHz Filter: 1.50 ms
Crosstalk Rejection:	75 dB minimum, DC-1000Hz
Integral Nonlinearity:	±0.007 percent of FSR, maximum
Differential Nonlinearity:	±0.003 percent of FSR, maximum
External Strobe Input:	TTL level, active LOW

- **Analog Output Operating Modes and Controls**

Output Strobing:	When software configured for output strobing, all outputs are updated simultaneously in response to a software strobe or to an external hardware strobe.
Output Enabling:	Analog outputs are connected to the system I/O connector if analog outputs are enabled, or are disconnected if analog outputs are disabled.
Data Registers:	16-bit data register per output channel
Data Format:	Software selected as offset binary or two's complement format

DIGITAL I/O PORT

Configuration:	8 bidirectional data lines and two control lines. One control line is a dedicated output, the other control line is a dedicated input. All lines use standard TTL logic levels.
Data and Control Register:	Single 16-bit register
Transfer Rate:	Typically 10^6 transfers per second, host-dependent

CALIBRATION

During autocalibration, all analog channels are calibrated against a single precision internal voltage reference. The reference is adjustable with a single internal trimmer, or by an external remote trimmer. Analog outputs are disabled during autocalibration, which has a typical duration of four seconds.

PCI INTERFACE

- **Compatibility:** Conforms to PCI Specification 2.3; D32, 33MHz, Universal 3.3V/5V signaling.
  Supports "plug-n-play" initialization.
  Provides multifunction interrupt.
  Supports 2-Channel DMA transfers as bus master; block and demand modes.

MECHANICAL AND ENVIRONMENTAL SPECIFICATIONS

Power Requirements

+5VDC ±0.2 VDC at 1.5 Amp, maximum, 1.1 Amp typical

Maximum Power Dissipation: 6.0 Watts, Side 1
1.0 Watt, Side 2

Physical Characteristics

Height: 13.5 mm (0.53 in)
Depth: 149.0 mm (5.87 in)
Width: 74.0 mm (2.91 in)
Shield: Side 1 is protected by an EMI shield.

Environmental Specifications

Ambient Temperature Range: Operating: 0 to +65 degrees Celsius inlet air
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: Conventional convection cooling; 50 LFPM minimum air flow

System Mating Connector:

Standard 68-pin 0.050" D-Subminiature male connector;
AMP# 1-750913-7 or equivalent.
(Contact factory for availability of the 68-pin AMP SCSI-3 connector.)

ORDERING INFORMATION

Specify the basic product model number followed by an option suffix "-ABC", as indicated below. For example, model number PMC-ADADIO-321 describes a card with ±10 Volt input/output ranges, 1.2 kHz output filters, and a 100 kHz sample rate per channel.

Optional Parameter	Value	Specify Option As:
Input/output Range	±2.5 Volts	A = 1
	±5 Volts	A = 2
	±10 Volts	A = 3
Output Lowpass Filter	No output Filter *	B = 1
	1.2 kHz Output Filter	B = 2
	4 kHz Output Filter	B = 3
Max Sample Rate	100 kHz per Channel	C = 1
	200 kHz per Channel	C = 2

* Output frequency response with no output filter is approximately 75 kHz.

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