

VMICPCI-3322

16-Channel 16-bit CompactPCI Analog-to-Digital Converter (ADC) Board

- CompactPCI® bus compliant R2.1
- Single CompactPCI slot
- 16 differential or single-ended inputs
- 16-bit A/D conversion
- Aggregate conversion rate 99.5 kHz
- Program-selectable scanning of 8 or 16 channels
 Sequentially digitizes selected channels and stores the results in RAM
- registers
 Jumper-selectable A/D ranges of 0 to +5 V, 0 to +10 V, ±2.5 V, ±5 V, and ±10 V
 Optional low pass filters
- Overvoltage protected inputs
- Selectable output coding
- 3U board size with optional 3U or 6U front panel
- Poll mode when enabled, continually polls selected channel

APPLICATIONS

- Factory automation and instrumentation
- Process control
- Laboratory instrumentation
- Machine monitoring
 Data acquisition
- Data acquisition

INTRODUCTION — The VMICPCI-3322 is designed to operate on the industrial standard 5 V CompactPCI bus and supports up to 16 channels of differential or single-ended inputs within the full-scale range of ± 2.5 to ± 10 V. The board continuously scans the selected inputs, converts each sample to a digital value and stores the results in dual-port data registers. The number of channels scanned is program selectable between 8 or 16. The output format is program selectable between straight/offset binary and two's complement.

The VMICPCI-3322 converts at an aggregate rate of 99.5 kHz. The channel sample rate is 99.5 kHz divided by the number of channels scanned.

A functional block diagram is provided in Figure 1 and the Ordering Options are provided on the first page of this document.

FUNCTIONAL CHARACTERISTICS

(At +25 °C unless otherwise stated.)

CompactPCI Compliance: This product complies with the CompactPCI Specification, Revision 2.1, for 5 V boards and for active PCI clock frequencies from 10 to 33 MHz

Vendor Identification: The CompactPCI configuration register reserved for the Vendor Identification shall have the value 114A(HEX) which designates VMIC

Device Identification: The CompactPCI configuration register reserved for the Device Identification shall have the value 3322(HEX) which designates the VMICPCI-3322 board



Base Address Register 1: The CompactPCI configuration register, called Base Address Register 1, contains the starting address of a group of 128 I/O byte addresses that are reserved for CompactPCI bus access of the VMICPCI-3322 functions. The base address is dynamically specified by the system BIOS. The 128 I/O addresses access the 16 dual-port data registers, sixteen spare data registers, and a single Control and Status Register (CSR).





Control and Status Register (CSR): The CSR

contains eleven control bits which control the following: Fail/Status LED Software Reset Autoscan Enable Output Data Format

Test bit Poll Mode Enable Selected Number of Channels Scanned (8 or 16) Channel to be Polled

When read back as status, the CSR echoes back the states of the control bits and also includes an A/D calibration busy flag.

Fail/Status LED: The VMCIPCI-3322 contains a Fail/Status LED located on the front panel. The LED is controlled through a bit in the CSR.

Output Data Format: One control bit in the CSR selects the output data format between two's complement and offset binary

Poll Mode: Poll mode is entered by writing a **1** to the POLLENA bit and writing the channel to be continuously polled in the PB bits of the CSR. Once entered, the selected channel is polled continually and its converted digital value is stored in SRAM.

Reset Operations: A board reset occurs in response to a system reset or to a software reset. Immediately upon release of the reset, the A/D Converter performs a self-calibration which takes 41 ms to complete. A reset also clears the CSR to zero so the LED will be on, autoscanning will be disabled, Poll mode disabled, and the output data format is offset binary.

INPUT CHARACTERISTICS

Number of Input Channels: 16 differential or single-ended channels

Full-Scale A/D Ranges: ± 2.5 V, ± 5 V, ± 10 V, 0 to +5 V, and 0 to +10 V, jumper-selectable

Accuracy: Maximum error = ± 0.005 percent Reading ± 0.005 percent Range $\pm 100 \,\mu V$

Stability: Temperature drift, per $^{\circ}C = \pm 2$ PPM of FSR

Input Noise: $\left(0.6 + \frac{0.3}{G}\right)$ mVRMS

Input Bias Current: 40 nA maximum at zero input

Input Impedance: 5 M Ω minimum in parallel with 50 pF

Interchannel Crosstalk (DC to 1 kHz): Adjacent Channel = 50 dB Alternate Channel = 90 dB

Common-Mode Voltage: $[V_{CM} + (V_{DIFF}/2)] = \pm 12 V$

Common-Mode Rejection: DC to 60 Hz with 350 Ω source imbalance

For the ± 5 V, ± 10 V, and 0 to ± 10 V ranges: Minimum = 90 dB Typical = 100 dB

For the ± 2.5 V and 0 to +5 V ranges: Minimum = 75 dB Typical = 85 dB

Overvoltage Protection: ± 35 V, sustained power On or power Off

±80 V, transient (1 s maximum)

Input Filters: Optional low pass single-pole filters:

-3 dB at 50 Hz -3 dB at 100 Hz -3 dB at 500 Hz

The above values apply to differential inputs. The cutoff frequency doubles for single-ended inputs. The cutoff frequency has a tolerance of ± 25 percent.

The no filter maximum input frequency is the Nyquist limit:

3.109 kHz for 16 channels 6.219 kHz for 8 channels

Common-Mode/Floating Input Protection: All

inputs are referenced to the on-board analog ground through 22 $M\Omega$ resistors.

TRANSFER CHARACTERISTICS

Resolution: 16 bits

Input Sampling: Sequential, starting at channel 0

Input Transfer Function:

EIN = ELO + [EFSR x (NADC/65,536)]

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Where: EIN = Input Voltage ELO = Lower End of Input Range EFSR = Full-Scale Input Range NADC = A/D Converter Reading

Example: For a NADC value of D99A HEX (55,706 decimal) in the ± 10 V Range:

EIN = -10 + [20.000 x (55,706/65,536)] = +7.000

Integral Nonlinearity: ±0.005 percent maximum from best straight line

Differential Nonlinearity: ±0.0015 percent, no missing codes at 16-bit resolution

A/D Conversion Rate: 99.5 kSPS

Channel Sample Rate:

99.5 ÷16 Channels = 6.219 kSPS 99.5 ÷ 8 Channels = 12.430 kSPS

Data Coding: Program selectable as two's complement or straight/offset binary

DATA BUFFER MEMORY

Buffer Size: 32 contiguous 16-bit data words

PCI bus Access Time: 270 ns typical (nonburst only)

PHYSICAL/ENVIRONMENTAL

Temperature: 0 to 70 °C, operating -40 to +85 °C, storage

Relative Humidity: 10 to 80 percent, noncondensing

Altitude: 0 to 10,000 feet (3,048 m), operating

Cooling: Forced air convection (standard CompactPCI slot)

Dimensions: 3U board size

I/O Connector: 37-pin D subminiature receptacle (AMP 747847-4)

Power: 2 A at 5 VDC

MTBF: >179,000 hours (217F)

TRADEMARKS

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Figure 1. VMICPCI-3322 Functional Block Diagram