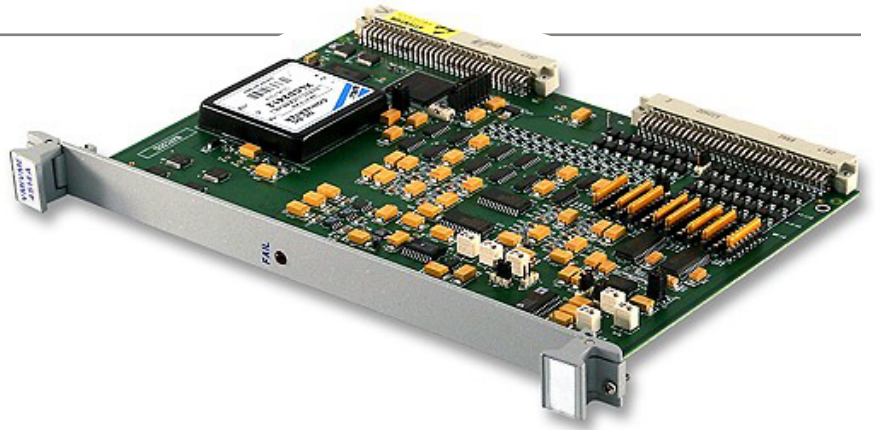




VME-4514A

16-Channel Scanning Analog I/O Board with Built-in-Test and P2 I/O

Features:

- Continually digitizes all input channels and stores the results in a dedicated channel dual-port register (autoscanning mode)
- Three A/D operating modes
 - Autoscanning mode (entered on power up)
 - Random polling mode
 - Scanning poll mode
- P2 I/O connection
- Built-in-Test onboard
 - Tests 100 percent of active components
 - Semiconductor output switches
 - Does not compromise accuracy (0.1Ω output impedance)
- Power up board replacement
- 16 SE/Diff analog input channels
 - 12-bit A/D converter
 - Unipolar (0 to +10V, 0 to +5V) or bipolar ($\pm 2.5V$, $\pm 5V$, $\pm 10V$)
 - 40kHz A/D throughput
 - Optional low pass filter
 - Overvoltage protected
 - Fail-safe with power off
- 16 S&H analog output channels
 - 12-bit D/A converter
 - Output short circuit protected
 - Unipolar (0 to +10V, 0 to +5V) or bipolar ($\pm 2.5V$, $\pm 5V$, $\pm 10V$)
 - Program-selectable scan rates provide improved response for complex output functions 10mA outputs

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Functional Characteristics

Introduction: The VME-4514A* provides the user with 16 analog outputs and 16 analog input channels. The resolution of inputs and outputs is 12 bits. The analog outputs are designed with an S&H output per channel. A 12-bit Analog-to-Digital Converter (ADC), controlled by a scanner, which scans and stores data in a dual-port memory, digitizes the 16 analog inputs.

The VME-4514A Analog I/O (AIO) Board provides 16 high-quality analog output channels which can be programmed with onboard jumpers to operate in a variety of voltage ranges. Each output can source or sink 10mA at $\pm 10V$. For offline testing, the analog outputs can be disconnected from the I/O connector.

The product also accepts 16 differential or pseudo-differential (single-ended) analog inputs. The onboard 12-bit ADC may be configured using jumpers for several analog input ranges. The board supports the following ADC operating modes that are described below:

- Autoscanning Mode
- Random Polling Mode
- Scanning Poll Mode

A 16-word dual-port memory provides storage for a continuous scan of all channels. The scanning modes are executed automatically at power up, system reset, or via program control. The dual-port registers allow VME access at any time to read the latest stored data. A functional block diagram is provided in Figure 1.

Autoscanning Mode: The mode is executed by a power up system reset or program selection. All channels are continuously scanned and the digitized data is stored in sixteen 16-bit dual-port registers. No other programming is required other than a read from the dual-port register.

Random Polling Mode: This mode requires the controlling program to generate a single conversion. End-of-conversion is determined by polling an end-of-conversion status bit.

Scanning Poll Mode: This is a scanning mode that executes a single scan of all channels. An end-of-scan control bit is polled to determine when the scan is completed.

Board Address: Onboard jumpers may select the physical address for the board. VME address lines A06 through A15 are decoded for board selection.

VMEbus Access: Address modifier bits are jumper-selected and decoded to support nonprivileged short I/O, supervisory short I/O, or both. The board is factory configured for supervisory short I/O.

Output Data Transfer: Data for each analog output channel is written directly into an onboard RAM location dedicated to a specific channel. The data is then periodically retrieved from the RAM and converted to an analog voltage that is transferred to one of 16 output sample-and-hold buffers.

Analog Input Format: Analog inputs are first digitized, and then the 12-bit digital values (D11 to D00) are read at a single memory word location from a channel dedicated dual-port register. The upper four bits (D15, D14, D13, and D12) are read as the sign extension of the 12-bit digital value in two's complement mode; otherwise, they are read as logical zeros.

Analog I/O Test Mode: Built-in-Test logic provides the user with the capability to test all of the active components on the board including the output switches. The test logic supports real-time and offline testing. This test scheme utilizes the onboard ADC multiplexers as shown in Figure 1.

Memory Test: The VME-4514A is designed with dual-port onboard memory that may be tested by executing a memory diagnostic for additional operational verification.

System Reset: Application of the system reset signal through the VME initializes the board into a state with all analog outputs disconnected from the output connector (P2).

Front Panel Fail LED: If an error condition occurs during diagnostics, a software-controlled LED may be illuminated to visually indicate a failure. The LED is illuminated by system reset at power up and is extinguished upon successful diagnostic execution.

(Typical at +25 °C and rated power supplies unless otherwise stated.)

Analog Inputs

Number of Input Channels: Thirty-two, including 16 which are used for loopback testing of 16 analog output channels. Sixteen undedicated differential (or pseudo-differential) analog inputs are available.

Input Type: Sixteen differential or 16 single-ended

A/D Conversion Time: 15 μ s

Analog Input Acquisition Time: 10 μ s

A/D Throughput: 40kHz (maximum)

Monotonicity: Monotonic over full temperature range

Common-Mode Range: $\pm 11V$ (maximum)



VME-4514A 16-Channel Scanning Analog I/O Board with Built-in-Test and P2 I/O

Common-Mode Rejection: 82db

Channel Conversion Rate: 40kHz ÷ number of scanned channels

Accuracy: 0.04 percent of range ±2mV may be calibrated to 0.02 percent ±0.5mV

Input Bias Current: 2nA (maximum)

Optional Single Pole Analog Input Filter: -3db at 36Hz

Full-Scale Input Ranges: ±2.5V, ±5V, ±10V, 0 to +5V, or 0 to +10V

Analog Input Code: 12 bits, right justified in a 16-bit word

Input Overvoltage Protection: ±40V, maximum

Data Transfer Type: D16

Analog Outputs

Number of Output Channels: Sixteen

Full-Scale Analog Output (Jumper-Selectable):

Unipolar: 0 to +10V, 0 to 5V

Bipolar: ±2.5V, ±5.0V, ±10.0V

Analog Output Code: The 12-bit DAC accepts digital codes in straight binary and offset binary.

Output Load Current: 10mA, maximum at full accuracy

Resolution: 12 bits, S&H per channel

Output Impedance: 0.2Ω

Total Error: 0.05 percent of full-scale range

Maximum Settling Time to 1 LSB: 1.7ms

Refresh Update Rate¹: 550Hz (default); 1,600Hz (FAST REFRESH).

The FAST REFRESH rate provides a filtered output for complex functions; whereas, the 550Hz rate provides settling to 0.01 percent for stepped outputs at each update. The 1,600Hz rate provides settling to 0.2db (2.3 percent). Both rates provide settling to 0.01 percent in 1.7ms.

Output Short Circuit Protection: Indefinite short to common; momentary short to ±25V

Monotonicity: Monotonic over the full temperature range

Compatibility: The VME-4514A complies with the VMEbus specification Rev. C. 1 with the following mnemonics:

A16:29, 2D: D16, D08 (EO) (SLAVE): 6U form factor

Physical/Environmental Specifications

Dimensions: 6U (8HP) dual slot Eurocard form factor

Height 9.2 in. (233.4mm)

Depth 6.3 in. (160mm)

Thickness 0.8 in. (20.3mm)

Power Requirements:

+5VDC (±5 percent), 3.0A (typical), 5.6A (maximum)

Cooling: Convection

Temperature:

Operating: 0° to 60° C

Storage: -40° to 85° C

Vibration: 5Hz to 100Hz random, 0.04g²/Hz spectrum

Shock: 20Gs, 11ms half-sinusoidal

Humidity: 20% to 80%, noncondensing

Output and Input Connector:

Standard P2 user I/O

(Extended ground pins on P1 and P2)

MTBF: Contact factory

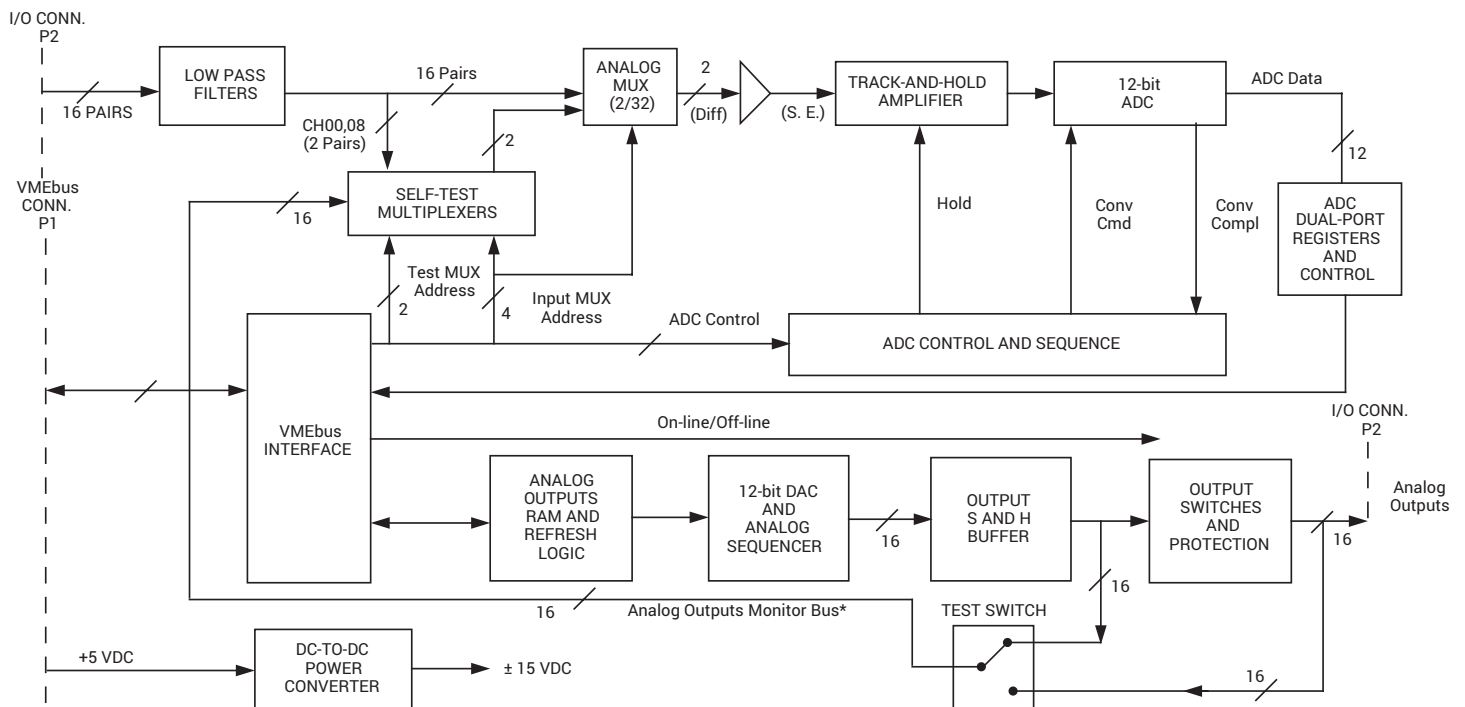
Trademarks

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¹ The output refresh temporarily halts when the input analog-to-digital conversion is taking place. Therefore, the output refresh rate decreases as the rate of analog-to-digital conversions increases. The worst-case is Autoscan Mode in which the output refresh rate is 300Hz (default) or 900Hz (fast refresh).



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*Monitors board outputs in "on-line" mode; buffer outputs in "off-line" mode.

Figure 1. VME-4514A Functional Block Diagram

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Americas: 866-OK-ABACO or +1-866-652-2226 **Asia & Oceania:** +81-3-5544-3973

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