# VMIVME-3111
## 48 Analog-to-Digital Inputs
## 2-Channel Digital-to-Analog Output Boards

- 32-channel SE/16 differential P2 connector inputs
- Front panel inputs, 16-channel, single-ended — compatible with VMIC's 3V/5V signal conditioning assemblies. This feature allows the VMIVME-3111 board to digitize the following input signals: low-level voltage, AC voltage, thermocouple, RTD, current, frequency, strain gauge, LVDT, and high-level voltage
- Two analog outputs (12-bit) on P2 connector
- 12-bit resolution
- 27 µs conversion time at gain = x1 (multiplexer acquisition + A/D conversion time) — analog pipeline mode (53 kHz throughput at gain = x1)
- Overvoltage protected inputs
- Fail safe with power off
- Software real-time programmable gain x1, x10, x100, x500
- Optional low pass filters on all inputs
- Optional current loop termination resistors available for all inputs
- Allows acquisition of low-level input signals: ±20 mV FSR to ±10 V FSR
- Full-scale input range options: 0 to 5 V, 0 to +10 V, ± 2.5 V, ± 5 V, ±10 V
- A/D data coding program — selectable as either binary, offset binary, or two's complement format
- Programmable end-of-conversion interrupts
- External start convert capability
- Optional autozero and autogain calibration
- Loopback test mode for Built-in-Test of all active components
- Double Eurocard form factor with front panel and fail LED

## FUNCTIONAL CHARACTERISTICS

**Compliance:** VMEbus specification Rev. C. 1
A16:D16:D08 (EO): 29, 2D: Slave
Interrupter I(1) to I(7) ROAK (DYN):D08 (O)(DYN)
6U form factor

**Board Address:** The address for the board is selected by on-board jumpers. This board can be plugged into any available slot (except slot 1) in the backplane.

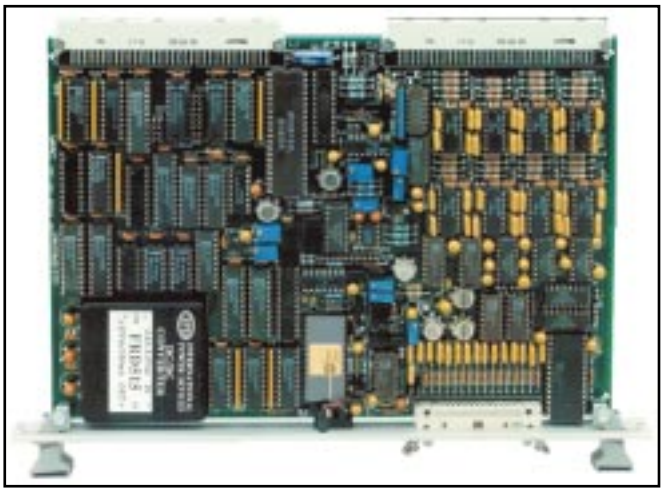
**Address Modifier Codes:** Jumper-selectable for short supervisory or short nonprivileged I/O access. Factory configured for short supervisory I/O access.

**VMEbus Reply:** DTACK is generated from data strobes (DS0 or DS1) and the board address

**Data Conversion:** Conversion may be initiated by program control or upon receipt of an externally generated pulse. Mode selection control is available to enable or disable the external trigger feature. Data conversion completion is determined by polling an end-of-conversion bit in the Control and Status Register (CSR) or by an interrupt to the processor.

**Mode Selection:** Operational modes of the board are selected by writing to the CSR with appropriate data bits set.

**Analog Inputs:** This product is designed to accept 32 single-ended or 16 differential inputs through the user I/O pins on the VMEbus P2 connector and 16 single-ended inputs through the front panel P3 connector, giving a possible total of 48 input channels. The P3 connector is directly compatible with the VMIVME-3V and VMIVME-5V signal conditioning assemblies. All inputs are available with optional low pass filters or with optional 250 Ω current loop termination resistors.



**Analog Outputs:** To enable the user to close system servo loops, analog outputs are available as two independent, 12-bit channels. The outputs are multirange and are capable of supplying 10 mA at ±10 V. Both outputs can be monitored through the ADC for Built-in-Test of all active components. Both analog outputs are disconnected from the P2 connector at power up. This allows the user to initialize the Digital-to-Analog Converters (DACs) to the proper voltage before enabling the outputs through the Control Register.

**Ordering Options**

| December 5, 1993 800-003111-000 D | A | B | C | – | D | E | F |
|---|---|---|---|---|---|---|---|
| VMIVME-3111 – | | | | – | | | |

**A = Input Options**
0 = 32 Single-Ended or 16 Differential Inputs (P2 Connector) with No Front Panel Connector (P3)
1 = Same as Above with Additional 16 Single-Ended Inputs Through Front Panel (P3) Connector. Connector Is 3V/5V Series Signal Conditioning Compatible. *

**B = Filter Options (3 dB Attenuation)**
0 = No Filter or Terminators
1 = 6 Hz (3 dB Attenuation)
2 = 9 Hz (3 dB Attenuation)
3 = 36 Hz (3 dB Attenuation)
4 = Current Loop Terminator (250 W)

**C = Autocal, Built-in-Test, and Analog Output Options**
0 = No Autocal, No Auto Zero, No Built-in-Test, and No Analog Outputs
1 = Autocal, Auto Zero, Built-in-Test, and Two 12-bit D/A Analog Outputs

* Call VMIC for further information concerning the 3V/5V Series signal conditioning assemblies.

**Connector Data**

| Connecting Component | P2 (Panduit) | P3 (3M Scotchflex) |
|---|---|---|
| Compatible Mating Connector | No. 120-964-455E | 3399-6600 |
| Strain Relief | No. 100-000-032 | 3448-3026 |
| PC Board Header Connector | Header Connector is on Backplane | 3429-5002 |

**For Ordering Information, Call:**
**1-800-322-3616 or 1-256-880-0444 • FAX (256) 882-0859**
**E-mail: info@vmic.com Web Address: www.vmic.com**

A 16-bit word location is reserved for each output channel. Data is transferred to each channel as a 12-bit, right-justified (D11 to D00) word.

**Autocalibration:** Optional autocalibration provides on-board adjustment of analog input zero and gain. Correction values are accepted as 12-bit, right-justified data in two 16-bit locations.

**Self-Test Standards:** Three precision on-board reference voltages (zero and ± full scale) are available for Built-in-Test and autocalibration. These voltages are routed via the analog configuration multiplexer for maximum accuracy.

**Converter Code:** A jumper is provided for user selection of straight binary for unipolar inputs and offset binary and two's complement for bipolar inputs.

**Data Transfer Type:** D8, D16

## ELECTRICAL CHARACTERISTICS*

### Analog Inputs:

Resolution: 12 bits

Analog Ranges: Jumper-selectable as 0 to +5 V, 0 to +10 V, ±2.5 V, ±5 V, and ±10 V

Gain: Program-selectable as x1, x10, x100, and x500

A/D Conversion Time: 19 µs (sum of sample and conversion times)

Acquisition Time:

| Gain | Input Settling |
|---|---|
| x1 | 8 µs |
| x10 | 20 µs |
| x100 | 50 µs |
| x500 | 120 µs |

Throughput: 53 kHz (maximum) in pipelined mode

Monotonicity: Monotonic over full temperature range

Common-Mode Range: ±[12.5 V - range/2] (e.g., ±7.5 V on 10 V range)

Common-Mode Rejection: 100 dB

Accuracy:

| Gain | Percent FSR |
|---|---|
| x1 | ±0.03 |
| x10 | ±0.08 |
| x100 | ±0.13 |
| x500 | ±0.50 |

Input Impedance: 10 MΩ (minimum)

Input Zero Offset: Autocalibratable to ±50 µV (x500 gain)

Overvoltage Protection: ±40 V

Optional Single-Pole Filters: -3 dB at 6 Hz, 9 Hz, 36 Hz**

### Analog Outputs:

Resolution: 12 bits

Analog Ranges: Jumper-selectable as 0 to +5 V, 0 to +10 V, ±2.5 V, ±5 V, ±10 V

Monotonicity: Monotonic over full temperature range

Accuracy: ±0.03 percent

Settling Time: 25 µs, to 0.01 percent

Output Current: ±10 mA over full output range

Source Impedance: 0.2 Ω (maximum)

Off-Line Leakage: 200 nA (maximum)

Protection: Sustained shorts to ground; transients to ±40 V

Power Requirements: +5 V at 2.5 A (maximum)

## PHYSICAL/ENVIRONMENTAL

**Dimensions:** Standard VME double width board 160 x 233.5 mm

**VMEbus Connector:** Two 96-pin DIN connectors (P1 and P2)

**Temperature:** 0 to +55 °C, operating
-20 to +85 °C, storage

**Humidity:** 20 to 80 percent relative, noncondensing

**SYSTEM THROUGHPUT** — For sequentially switched multiplexer channels, each channel will be sampled at a rate of:

$$F_S = \frac{1}{N(T1 + T2)} \text{ samples per second, where}$$

- N is the number of channels,
- T1 is the multiplexer acquisition time,
- T2 is the total A/D conversion time, which is the sum of instrument amplifier settling time, the sample-and-hold transient settling time, and the A/D conversion time.

* Typical at 25 ˚C, unless specified otherwise.

** Contact VMIC for special filter requirements.

For example, the throughput rate of 16 differential P2 inputs would be:

$$F_S = \frac{1}{16\ (8\ \mu s + 19\ \mu s)} = 2.315\ \text{kHz}$$ samples of each channel per second with a gain of x1.

**INTERFACING TO VMIC'S 3V/5V SERIES SIGNAL CONDITIONERS —** The 3V/5V series modular signal conditioners convert a wide variety of low-level voltages, thermocouples, RTDs, etc., to high-level voltages. In addition, many of the modules provide up to ±1,500 VRMS continuous isolation. Up to 16 of these modules may be installed in a signal conditioning backplane with an optional 19-inch rack mount kit. The high-level outputs are routed to a 26-pin connector, from which a ribbon cable connects the signal conditioning backplane to the front panel of the VMIVME-3111 ADC board.

The 3V/5V series signal conditioning subsystem, in conjunction with the VMIVME-3111 ADC board, provides a complete solution enabling almost any type of sensor data to be available to the VMEbus. The following input modules are available: low level (mV), AC, thermocouple, RTD, current, frequency, strain gage, LVDT, and high-level (V) inputs.

## TRADEMARKS



**APPLICATION AND CONFIGURATION GUIDES —** The following Application and Configuration Guides are available to assist the user in configuring systems based on VMIC's products.

| Title | Document No. |
|---|---|
| Digital Input Board Application Guide | 825-000000-000 |
| Change-of-State Board Application Guide | 825-000000-002 |
| Digital I/O (with Built-in-Test) Product Line Description | 825-000000-003 |
| Synchro/Resolver (Built-in-Test) Subsystem Configuration Guide | 825-000000-004 |
| Connector and I/O Cable Application Guide | 825-000000-006 |

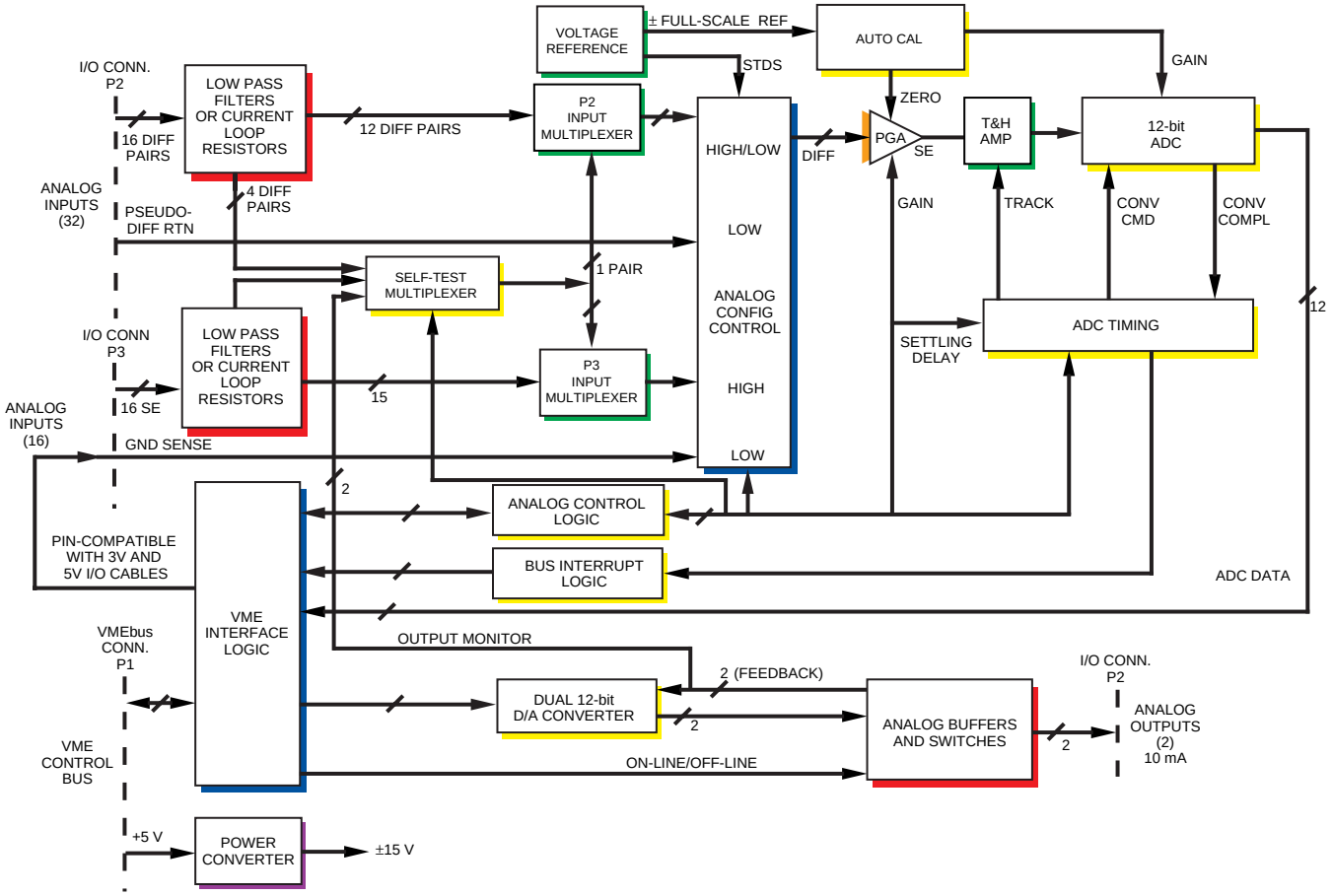



**Figure 1. VMIVME-3111 Functional Block Diagram**