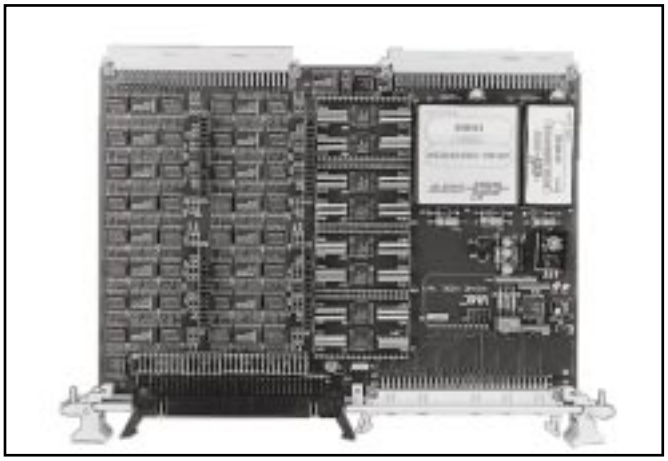
VMIVME-3419

32-Channel Signal Conditioning Board with Selectable Gain and Built-in-Test (BIT)

- 32 differential or single-ended analog inputs
- Selectable gain per channel
- Gain selection of x1, x10, x100, x1,000 provides input ranges from ±10 mV to ±10 V
- Input BIT switches provide in-system calibration and autozeroing when used with the VMIVME-4125A TESTCAL™ board
- Each channel provides individual
  - — Selectable gain amplifier
  - — 3-pole active filter, available in 4, 40, 400 Hz, or 4 kHz
    - User-configurable
- Configurable for RTD, strain gauge bridge, or direct analog input
- Open sensor detection for all inputs(1) (2)
- Signal identical with VMIVME-3413 systems, except no CIC compensation
- Provision for half-bridge completion for strain gauge bridges

APPLICATIONS

- Transducer input conditioning
- Low-level input filtering
- Pressure monitoring
- Temperature monitoring



FUNCTIONAL CHARACTERISTICS — The VMIVME-3419 (Figure 1) is a 32-channel signal conditioning board designed for low-level analog input signals. The VMIVME-3419 can be used in conjunction with any VMIVME high-level analog input boards, but is designed specifically as a companion for VMIC's scanning A/D boards (for example,VMIVME-3113A, -3122, and -3128).

INPUT DESCRIPTION — All 32 Analog Inputs can be individually gain-selectable. The VMIVME-3419 can be used with any high-level analog multiplexer, although it is designed specifically as a companion to VMIC's Scanning A/D Boards. When used in conjunction with a 64-channel A/D board, the VMIVME-3419 accepts full-scale input ranges from ±10 mV to ±10 V, depending on the gain selected for the A/D board. Low pass filters are available with cutoff frequencies of 4, 40, 400 Hz, or 4 kHz(3). Optional current loop termination input resistors are available.

Open inputs are detected by forcing the open channel off scale in either the negative or positive direction. An input bias current of approximately 50 nA is provided for this function, and will force the channel output off scale within 5 seconds at a gain of x1,000. Open sensor detection is jumper-selectable for positive or negative drive.(1) (2)

BUILT-IN-TEST (BIT) — Built-in-Test (BIT) is supported by connecting the input section of the VMIVME-3419 to an externally supplied reference voltage through the P2 connector. BIT is controlled by a TTL signal provided from a P2 input. The VMIVME-4125A System Test and Calibration (TESTCAL) Board is designed to control BIT and provide a precision external calibration reference or an internal zero-reference.

The VMIVME-4125A can produce a reference voltage of zero (selected by cal zero) and a variety of positive and negative reference voltages that approach full scale for most ADC applications (cal span).

1. Open sensor detection is nonfunctional on current options.
2. Open sensor detection functions for gains of x10, x100, and x1,000.
3. Active filters are configured as pluggable filter modules.

Ordering Options

June 7, 1999 800-003419-000 E	A	B	C	–	D	E	F
VMIVME-3419 –		0		–			

A = Filter Options
0 = 4 Hz Butterworth
1 = 40 Hz Butterworth
2 = 400 Hz Butterworth
3 = 4 kHz Butterworth
4 = No Filters

B = 0 (Option reserved for future use)

C = Current Option
0 = No Current Terminator
1 = 250 Ω Current Loop Terminator (1)

I/O Connector Data for Input and Output, P3/P4

Mating Connector	3M Part No. 7964-6500EC
Strain Relief	3M Part No. 3448-7964
PC Board Connector	
With Strain Relief	3M Part No. 3764-D302
Without Strain Relief	3M Part No. 3764-D202

I/O Connector Component Data for P5

Component Description	Part Number	Manufacturer
PC Board Connector	120-964-1470	Panduit
Compatible Mating Connector	120-964-435	Panduit
Strain Relief Device	100-000-072	Panduit

Note

Panduit is also known as ITW/Pancon.

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

RTD AND STRAIN GAUGE BRIDGE EXCITATION — Excitation for strain gauge bridges is selectable as 2.5, 5, or 10 VDC, with a total capacity of 250 mA. Remote sensing of both the drive and return lines ensures accurate control of bridge excitation voltages. Provision for bridge completion is implemented by a single input pin which carries one-half the excitation voltage. The total RTD excitation available from the excitation supply is 250 mA.

FUNCTIONAL CHARACTERISTICS

VMEbus Compliance: This product complies with VMEbus specification ANSI/IEEE STD 1014-1987.

IEC 821 and 297 with regard to form factor (6U) and utilization of 5 V power from P1and P2. The VMIVME-3419 does not utilize VMEbus control features.

ELECTRICAL CHARACTERISTICS

(At 25˚C with rated power supply.)

Number of Channels: 32

Configuration: Differential

Input Ranges, Full Scale: Selectable decade gains of x1 to x1,000 provide input ranges from ±10 mV to ±10 V full scale for ±10 V A/D Converter boards

Low Pass Filters: 3-pole active Butterworth filter. Standard options of 4 Hz, 40 Hz, 400 Hz, or 4 kHz. See the Ordering Options.

Current Loop Termination (Optional Input Configuration): 250 Ω, 0.01 percent resistors across the differential inputs(1)

Resistance: 10 MΩ minimum, line-to-line and line-to-line common, power applied. 4.5 kΩ line-to-line, 2,250 Ω line-to-common, power disconnected.

Common-Mode Voltage (CMV): ±11 V (input zero)

Overvoltage: Protected to ±60 V (power applied); ±30 V (power removed)

Input Offset Voltage (Maximum Channel Offset, Referred to Input)*:

Gain	Offset Voltage
x1,000	250 µV
x100	300 µV
x10	600 µV
x1	3.5 µV

*Adjustable to zero with system calibration.

Offset Voltage Stability (Maximum Drift with Temperature and Time, Referred to Input*):

Gain	Offset Drift	
x1,000	1.6 µV/ ˚C	4 µV/mo
x100	2.0 µV/ ˚C	5 µV/mo
x10	5.0 µV/ ˚C	15 µV/mo
x1	25 µV/ ˚C	75 µV/mo

*Eliminated with system calibration.

Input Noise µVp-p (3 σ), 10 Hz to 10 kHz (Referred to Input):

Gain	Filter Option			
	4 Hz	40 Hz	400 Hz	4 kHz*
x1,000	6	11	14	15
x100	25	40	55	60
x10	100	160	190	200
x1	1,000	1,500	1,800	2,000

*Or none.

CMRR (PGA Instrumentation Amp) (DC to 60 Hz, 250 Ω Unbalance):

Gain	Filter Option			
	4 Hz	40 Hz	400 Hz	4 kHz*
x1,000	140 dB	110 dB	105 dB	105 dB
x100	140 dB	110 dB	105 dB	105 dB
x10	120 dB	95 dB	90 dB	90 dB
x1	100 dB	80 dB	74 dB	74 dB

*Or none.

Input Bias Current: ±20 nA maximum, with Open Sensor Detection (OSD) disabled. ±100 nA maximum with OSD selected.

Isolation: ±15 V channel-to-channel; ±15 V channel-to-VMEbus. (500 V isolation from VMEbus is field-selectable; P2 bit inputs are not usable with 500 V isolation).

TRANSFER CHARACTERISTICS

Channel Gain: Field selectable as x1, x10, x100, x1,000

Gain Error:

Selected Gain	Maximum Gain Error*	Nonlinearity
x1,000	0.1%	0.03% of FSR
x100	0.06%	0.005% of FSR
x10	0.06%	0.005% of FSR
x1	0.06%	0.003% of FSR

*Adjustable to 0.01 percent with system calibration.

Gain Stability: Maximum Gain drift with temperature (Gain = 1 to 1,000)

Typical: ±2.5 ppm/˚C
Maximum: ±11 ppm/˚C

Bandwidth: The table below is the small signal bandwidth for an output of 0.1 VRMS.

Gain	Maximum Bandwidth (No Filter)
x1,000	1 kHz
x100	9 kHz
x10	15 kHz
x1	18 kHz

The full power bandwidth for an output of 20 Vpp at a gain of one is 2.5 kHz.

Input Filter: Optional low pass Butterworth 3-pole filters:

-3 dB @ 4 Hz
-3 dB @ 40 Hz
-3 dB @ 400 Hz
-3 dB @ 4 kHz

The -3 dB cutoff frequency has a tolerance of ±25 percent.

Channel Settling Time: To 0.01 percent with filter specified

Filter Option	Maximum Settling Time
4 Hz	1.2 s
40 Hz	870 ms
400 Hz	87 ms
4 kHz	47 ms
None	44 ms

Interchannel Crosstalk: Maximum DC to 1,000 Hz (Referred to Input):

Gain	Filter Option			
	4 Hz	40 Hz	400 Hz	4 kHz*
x1,000	137 dB	127 dB	110 dB	106 dB
x100	132 dB	117 dB	100 dB	96 dB
x10	127 dB	112 dB	95 dB	90 dB
x1	118 dB	101 dB	82 dB	75 dB

*Or none.

CHANNEL OUTPUT CHARACTERISTICS

Output Voltage Range: ±10 V maximum full-scale output range

Output Resistance: 50 Ω maximum

Output Loading: ±2 mA over ±10 V output range

STRAIN GAUGE BRIDGE EXCITATION SUPPLY

Output Voltage: Jumper-selectable as +2.5, +5, or +10 VDC

Loading: 0 to 250 mA maximum; 10 µF maximum capacitance

Remote Sensing: Remote sensing for both output and return lines through single pin on the P4 connector

Accuracy, No Load: ±0.03 percent of nominal output

Stability: Maximum drift with temperature (2.5, 5, or 10 VDC)

Typical: ±25 µV/˚C

Maximum: ±50 µV/˚C

Output Resistance:

Local Sensing: 0.2 Ω maximum

Remote Sensing: 0.05 Ω plus 1 percent of total line resistance, maximum

Output Noise: 10 mV p-p, 10 Hz to 10 kHz, at 3 σ[4]

Electrical Connections: Front panel access through P3 and P4

Bridge Completion: 0.500 V_{EXC} ±0.03 percent through 1 kΩ, available at P4 input connector

4. Three standard deviations (3 σ) includes 99.7 percent of all noise in a normal distribution.

RTD EXCITATION OUTPUTS

Configuration: Provision for individual series resistor per channel from internal excitation supply

Current Range: 0 to 10 mA per output. 250 mA maximum total current from the Strain Bridge excitation bus at 2.5, 5.0, 10 VDC.

BUILT-IN-TEST (BIT) INPUTS

BIT Reference Input: Signal and signal return pins provided on P2 connector interface directly with the VMIVME-4125A TESTCAL board

Reference Loading: 6 µA maximum at ±10 VDC input

BIT Control Inputs: BIT control signals are open-collector, active-low TTL levels, 0.5 mA maximum at low level, 10 µA at high level

ELECTRICAL CONNECTIONS

Power: P1; 96-pin DIN connector

Inputs: P3/P4; 128-pin dual connector

Outputs: P5; 64-pin DIN connector

BIT and Power Control: P2; 96-pin DIN connector

PHYSICAL/ENVIRONMENTAL

Temperature: 0 to +65 ˚C, operating
-20 to +85 ˚C, storage

Humidity: 10 to 80 percent, relative noncondensing

Cooling: Forced air convection, standard VMEbus chassis

Altitude: Operation to 10,000 ft (3,048 m)

Dimensions: Double height Eurocard (6U); 160 x 233.35 mm

Power: 4.0 A (maximum) at +5 VDC

MTBF: 113,000 hours (217F)

TRADEMARKS

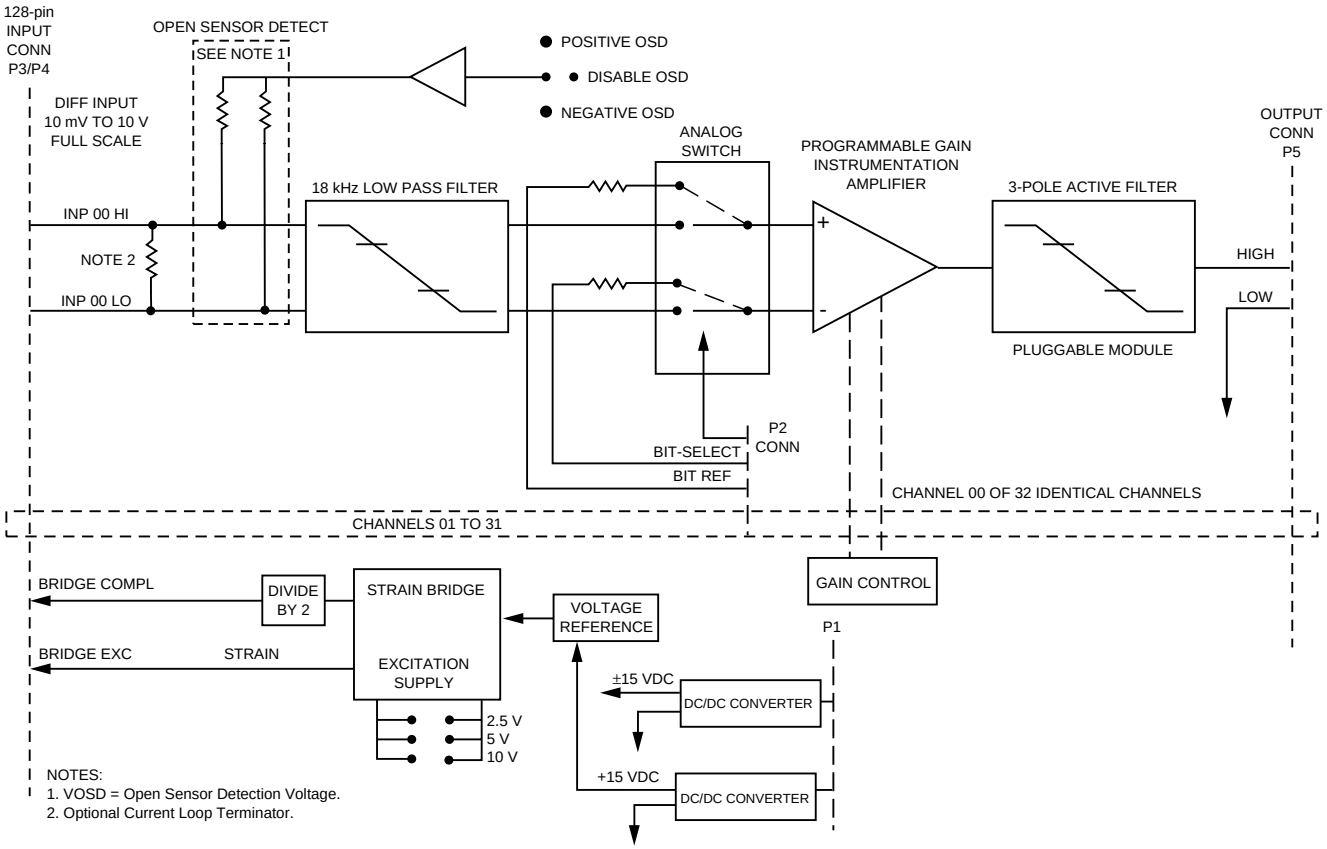


Figure 1. VMIVME-3419 Functional Block Diagram