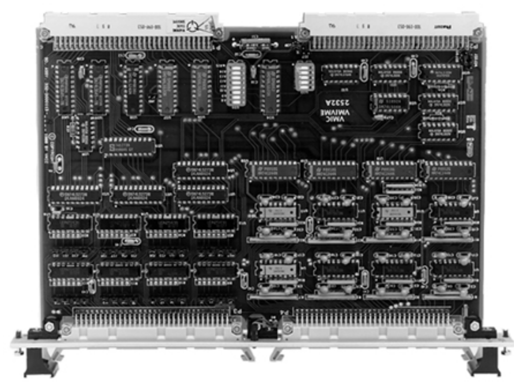
VMIVME-2532A
32-bit High-Voltage Digital Input/Output Board

- 32 bits of high-voltage outputs
  - — High current sink (600 mA)
  - — High breakdown voltage (70 V)
  - — Output clamp diodes
  - — Automatic surge current shutdown protection option
  - — Thermal shutdown protection for driving incandescent or inductive loads
- 8- or 16-bit data transfers
- 32 bits of high-voltage inputs
  - — 5 to 48 V input voltage range
  - — Voltage sourcing or current sinking input
- Built-in-Test (off-line and real-time support)
- Front panel with fail LED
- Optional output test jumpers for 100 percent testing of output drivers
- Compatible with VMIC's family of intelligent I/O controllers
- Power up replacement



GENERAL SPECIFICATION SUMMARY

Compliance: This product complies with the VMEbus specification Rev. C. 1 with the following mnemonics: A16:D16,D08 (EO): 29, 2D: Slave
6U form factor

Built-in-Test Features: This board is designed with internal self-test logic. Special output test registers are provided to generate comparator inputs that may be used as a *health test* during off-line operation. The VMIVME-2532A also supports real-time testing to support fault detection and isolation to the board/bit level.

The VMIVME-2532A is designed with data output loopback selection jumpers. They provide the capability of testing the output drivers. Utilization of this feature precludes the use of the digital inputs from the field (input logic is dedicated to testing outputs if the jumpers are installed). A special test mode bit is provided in the Control and Status Register (CSR) that enables the Output Test Register.

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

Control and Status Register (CSR): One CSR is provided to control the front panel LED and internal Built-in-Test features.

Board Address: DIP switches are provided to select the board's base address within the short I/O memory map.

Fail LED: A front panel Fail LED, which can be turned ON and OFF under program control, is provided. This LED is illuminated at power on and after a system reset.

OUTPUT SPECIFICATION SUMMARY

Output Connector Type: 64-pin connector - DIN 41612

Output Organization: Four ports, eight bits wide. Addressable to any address within short supervisory or short nonprivileged I/O map.

Addressing Scheme: Four ports individually addressable on 8- or 16-bit boundaries.

Ordering Options

Oct. 28, 1994 800-000113-000 D		A	B	C	–	D	E	F
VMIVME-2532A	–				–			

A = Output Voltage
0 = Open Collector No Pull-Up Resistor Installed (70 V Absolute Maximum)
1 = 560 Ω, 5 V Range (8 V Absolute Maximum)
2 = 270 Ω, 5 V Range (6 V Absolute Maximum)
3 = 1.5 k, 12 V Range (14 V Absolute Maximum)
4 = 6.8 k, 24 V Range (30 V Absolute Maximum)
5 = 27 k, 48 V Range (60 V Absolute Maximum)
(1–5: Electronic Switch ** Pull-Up Resistor)

B = Input Voltage/Data Polarity
0 = TTL
1 = 5/12 V
2 = 24 V
3 = 48 V
(0–3: Positive True I/O and CSR Data)
5 = TTL
6 = 5/12 V
7 = 24 V
8 = 48 V
(5–8: Negative True I/O and CSR Data)

C = Input Filter/Output Protection
0 = No Filter
1 = 2 µs Filter
2 = 10 µs Filter
3 = 5 ms Filter
(0–3: Automatic Surge Current Shutdown Protection)
5 = No Filter
6 = 2 µs Filter
7 = 10 µs Filter
8 = 5 ms Filter
(5–8: Thermal Shutdown Protection **)

Notes

* Required for driving incandescent lamps without external warming or current limiting resistor.
** The absolute maximum output voltage is determined by the power dissipation of the pull-up resistor (0.12 W maximum) and by the output driver.

Connector Data

Compatible Cable Connector	Panduit No. 120-964-435E
Strain Relief	Panduit No. 100-000-032
PC Board Connector	Panduit No. 120-964-033A

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

Output Drivers: This product may be ordered with a variety of output driver options as shown on the Ordering Information. As the Ordering Options show, the board can be manufactured with (1) automatic surge current shutdown protection, (2) no shutdown protection, or (3) thermal shutdown protection for driving incandescent lamps. A detailed description for the output drivers is shown on page 6 (surge current shutdown) and on page 7 (thermal shutdown protection).

Output Data Option: This board may be ordered with positive true or negative true data polarity. Refer to the discussion of this topic on this page before ordering.

INPUT SPECIFICATION SUMMARY

FUNCTIONAL CHARACTERISTICS

Input Connector Type: 64-pin connector - DIN 41612

Input Organization: Four input ports, eight bits wide. Addressable to any address within short supervisory or short nonprivileged I/O map.

Addressing Scheme: Four ports individually addressable on 8- or 16-bit boundaries

Input Reference Voltage: The input signal conditioning circuitry requires a reference voltage be applied to each input comparator. This voltage may be derived from the on-board +5 V power supply or an external positive voltage applied to the P2 connector. The allowable external voltage range is 5 to 50 V.

Signal Conditioning Filter Option: The board may be ordered with one of three nominal time constant (2, 10, or 5 ms) filter capacitors for the input signal conditioning circuits.

Input Circuit Configurations: Voltage sensing (voltage source), contact sensing (current sink), or logic level input.

Input Data Option: This board may be ordered with positive true or negative true data polarity. Refer to the Positive/Negative discussion below before ordering.

PHYSICAL/ENVIRONMENTAL

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

Relative Humidity Range: 20 to 80 percent, noncondensing

Cooling: Convection

Power Requirements: +5 V at 3.786 A maximum

Voext	Maximum Current at Rp = Minimum
5 V	1.25 A
12 V	0.55 A
24 V	0.25 A
48 V	0.13 A

POSITIVE/NEGATIVE TRUE ORDERING INFORMATION — This board may be ordered with positive or negative true I/O options. The data conversion (inversion) is determined by the selection of data transceivers at the VMEbus. These transceivers assert (positive true and TTL option) or negate (negative true) all data lines to and from the board.

A positive true I/O option causes a VMEbus logical *one* to turn the corresponding output transistor ON, which supplies the user with *zero* V. This option allows a high-voltage input from the user to become a logical *one(s)* on the corresponding VMEbus data bit(s). Data written to the CSR is not inverted.

The negative true I/O option causes a VMEbus logical *one* to turn the corresponding output transistor OFF, which supplies the user with an open-for-open collector output circuits or with a high for electronic switch type output circuits. Low voltage (0 V) user inputs will become logical *one(s)* on the corresponding VMEbus bit(s). The data written to the CSR is inverted; therefore, the software must take this into account when using the CSR.

Boards manufactured with the negative true TTL option are designed such that a VMEbus logical *one* causes the driven output to produce a logic *one* (high) to the user and will convert a user-supplied TTL logic *zero* (low) to a VMEbus logical *one*.

Conversely, the positive true TTL option is designed such that a VMEbus logical *one* causes the output driver to produce a logic *zero* (low) to the user and will convert a user-supplied TTL logic *one* (high) to a VMEbus logical *one*.

OUTPUT ELECTRICAL SPECIFICATIONS

1. Electronic Switch Option (Open Collector with Pull-up Resistor)

Output Voltage	RP Min	IOH Maximum	IOH	IOL Maximum	Absolute Maximum Output Voltage
5 V	270 Ω	18.5 mA	9.3 mA at Vout = 2.5 V	600 mA	6 V
12 V	1.5 kΩ	8.0 mA	4.0 mA at Vout = 6.0 V	600 mA	14 V
24 V	6.8 kΩ	3.5 mA	1.8 mA at Vout = 12.0 V	600 mA	30 V
48 V	27 kΩ	1.8 mA	0.9 mA at Vout = 24.0 V	600 mA	60 V

External Power Supply Requirements

VOEXT MAX Current at RP = MINIMUM

VOEXT	Supply Max	Absolute Max VOEXT
5	1.25 A	6 V
12	0.55 A	14 V
24	0.25 A	30 V
48	0.13 A	60 V

2. TTL Option (Open Collector with Pull-up Resistor)

Parameter	RP = 560 Ω Conditions	Min	Max	Unit
VOH	IOH = 400 µA	4.7	—	V
	IOH = 4.1 mA	2.7	—	V
VOL	IOL = 300 mA	—	0.7	V

3. Open Collector Option (No Pull-Up Resistors Installed)

IOL	Vol Typ	Vol Max
300 mA	0.20	0.7
600 mA	0.55	1.5

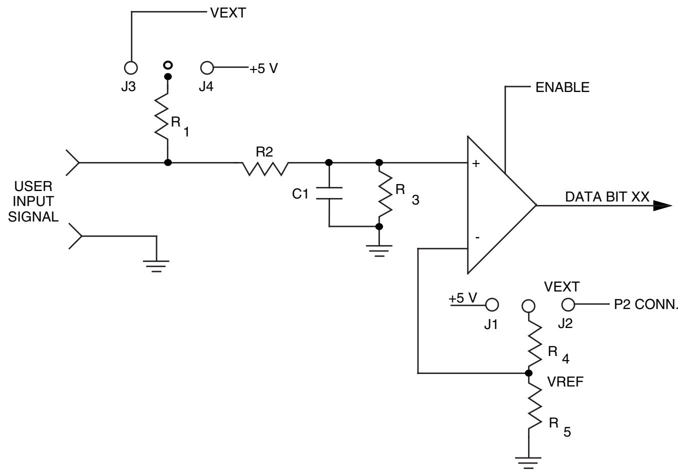


Figure 1. Current Sinking Input Configuration

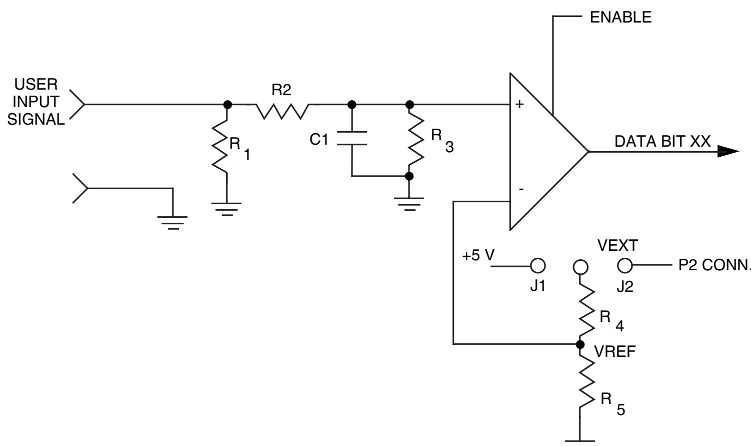
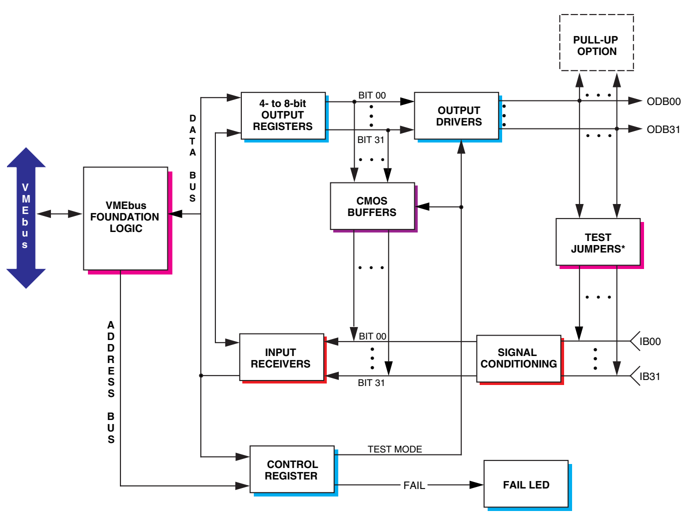


Figure 2. Voltage Sourcing Input Configuration



* Installed if the user requires output driver testing (installation disables the use of field inputs).

Figure 3. VMIVME-2532A Functional Block Diagram

LOGIC INPUT SPECIFICATIONS (TTL COMP)

Voltage Range 0 to 5 VDC (Any Data Input) Data Input

SWITCHING VOLTAGE	CONDITION	MIN	TYP	MAX	UNIT
V_{IH}	———	2.4	1.7	———	V
V_{IL}	———	———	1.5	0.8	V
I_{IH}	VIN = 2.4 V	———	———	200	µA
I_{IL}	VIN = 0.0 V	———	———	40	µA

5 to 12 VDC DIGITAL INPUTS VOLTAGE SOURCE OR CURRENT SINK

Absolute Maximum Data Input Range 0 to 17 VDC

VEXT = 5 VDC IEXT = 150 mA maximum
VEXT = 12 VDC IEXT = 350 mA maximum

SWITCHING VOLTAGE	CONDITION	MIN	TYP	MAX	UNIT
V_{IH}	VEXT = 5 VDC VEXT = 12 VDC	4.0 8.8	2.9 6.9	——— ———	V V
V_{IL}	VEXT = 5 VDC VEXT = 12 VDC	——— ———	2.7 6.7	1.5 4.8	V V
I_{IH}	VEXT = 5 VDC, VIN = 5.0 V VEXT = 12 VDC, VIN = 12.0 V (VOLTAGE SOURCE OPTIONS)	——— ———	——— ———	2.8 6.5	mA mA
I_{IL}	VEXT = 5 VDC, VIN = 0.0 V VEXT = 12 VDC, VIN = 0.0 V (CURRENT SINK OPTION)	——— ———	——— ———	2.1 4.5	mA mA

24 VDC DIGITAL INPUT VOLTAGE SOURCE OR CURRENT SINK

Absolute Maximum Data Input Range 0 to 35 VDC

VEXT = 24 VDC IEXT = 200 mA maximum

SWITCHING VOLTAGE	CONDITION	MIN	TYP	MAX	UNIT
V_{IH}	VEXT = 24 VDC	14.0	9.9	———	V
V_{IL}	VEXT = 24 VDC	———	9.7	5.6	V
I_{IH}	VEXT = 24 VDC, VIN = 2.40 V (VOLTAGE SOURCE OPTION)	———	———	3.5	mA
I_{IL}	VEXT = 24 VDC, VIN = 0.0 V (CURRENT SINK OPTION)	———	———	2.1	mA

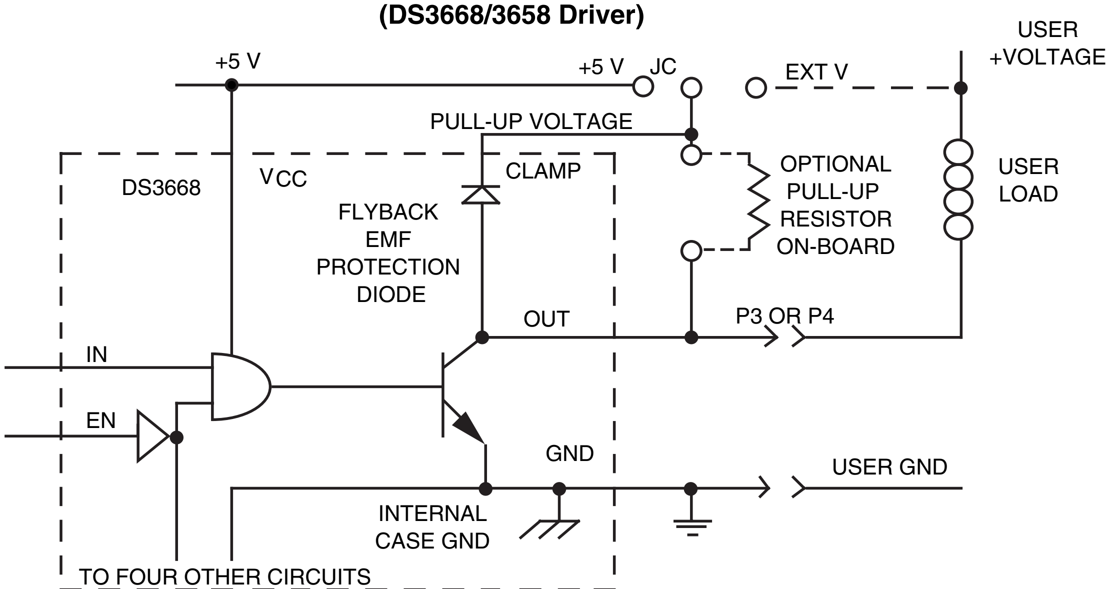
48 VDC DIGITAL INPUT VOLTAGE SOURCE OR CURRENT SINK

Absolute Maximum Data Input Range 0 to 50 VDC

VEXT = 48 VDC IEXT = 200 mA

SWITCHING VOLTAGE	CONDITION	MIN	TYP	MAX	UNIT
V_{IH}	VEXT = 48 VDC	25.5	19.0	———	V
V_{IL}	VEXT = 48 VDC	———	18.8	11.3	V
I_{IH}	VEXT = 48 VDC, VIN = 48 V (VOLTAGE SOURCE OPTION)	———	———	4.0	mA
I_{IL}	VEXT = 48 VDC, VIN = 0.0 V (CURRENT SINK OPTION)	———	———	2.5	mA

Output Description
Automatic Surge Current Shutdown or No Shutdown
(DS3668/3658 Driver)



GENERAL DESCRIPTION — The DS3668* quad peripheral driver is designed for those applications where low operating power, high breakdown voltage, high output current, and low output ON voltage are required. Unlike most peripheral drivers, a unique fault protection is incorporated on each output. When the load current exceeds 1.0 A (approximately) on any output for more than a built-in delay time, nominally 25 µs, that output will be shut OFF by its protection circuitry with no affect on other outputs. This condition will prevail until that protection circuitry is reset by toggling the corresponding input or the enable pin low for at least 0.5 µs. The 25 µs built-in delay is provided to ensure that the protection circuitry is not triggered by turn-on surge currents associated with certain kinds of loads.

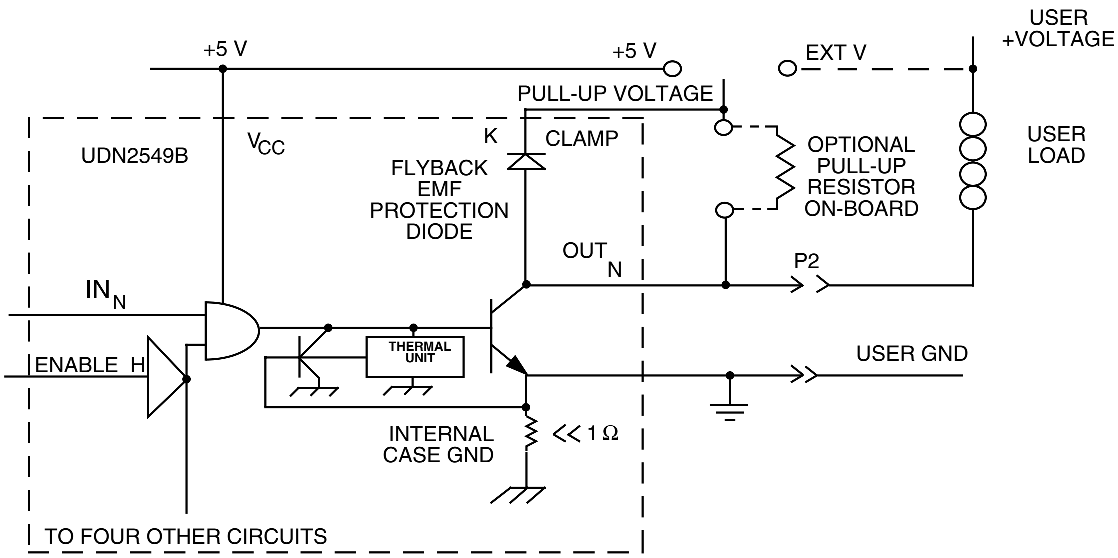
*As an option, the user may select a DS3658 quad driver that does not support output fault protection. If the application involves incandescent lamps, the option described on this page is required.

The outputs are capable of sinking 600 mA each and offer a 70 V breakdown. However, for inductive loads, the output should be clamped to 35 V or less to avoid latch-up during turn-off (inductive flyback protection). An on-chip clamp diode capable of handling 800 mA is provided at each output for this purpose. In addition, the driver incorporates circuitry that guarantees glitch-free power up or down operation and a fail-safe feature which puts the output in high impedance state when the input is open.

FEATURES —

Output fault protection
High impedance TTL compatible inputs
High output current - 600 mA per output
No output latch-up at 35 V
Low output ON voltage (550 mV typical at 600 mA)
High breakdown voltage (70 V)
Open-collector outputs
Output clamp diodes for inductive flyback protection
NPN inputs for minimal input currents (1 µA typical)
Low operating power
Standard 5 V power supply
Power up/down protection
Fail-safe operation
2 W power package
Pin-for-pin compatible with SN75437

Output Description
Thermal Shutdown Protection
(UDN2549B Drivers)



INCANDESCENT LAMP DRIVER — High incandescent lamp turn on/inrush current can destroy semiconductor lamp drivers and contributes to poor lamp reliability. However, individual lamps with steady-state current ratings up to 600 mA can be driven with the UDN2549B without the need for warming or current limiting resistors.

When an incandescent lamp is initially turned ON, the cold lamp filament is at minimum resistance and would normally allow a 10 x to 12 x inrush current. With the UDN2549B, the high inrush current is sensed by an internal sense resistor. The load current is limited to approximately 1 A by the shunting transistor sensing the output current through the sense resistor. During this short transition period, the output driver is driven in a linear fashion. As the lamp warms up, the filament resistance increases to its maximum value. The output driver then goes into saturation and applies the full supply voltage to the lamp. However, inrush currents of 1 A or more will force the driver into foldback current limiting. To preclude foldback current limiting during inrush currents of greater than 1 A, external current limiting resistors are required.

INDUCTIVE LOAD DRIVER — Bifilar (unipolar) stepper motors can be driven directly. The internal flyback diodes prevent damage to the output transistors by suppressing the high-voltage spikes which occur when turning OFF an inductive load.

FAULT CONDITIONS — In the event of a shorted load, shorted winding, or stalled motor, the load current will attempt to increase. As described above, the drive current to the output stage is diverted (limiting the load current to about 1 A), causing the output stage to go linear. As the junction temperature of the output stage increases, the thermal limit circuit will become operational, further decreasing the drive current. The load current (junction temperature) is then a function of ambient temperature, state of remaining drivers, supply voltage, and load resistance. If the fault condition is corrected, the output driver will return to its normal saturated condition.

TRADEMARKS