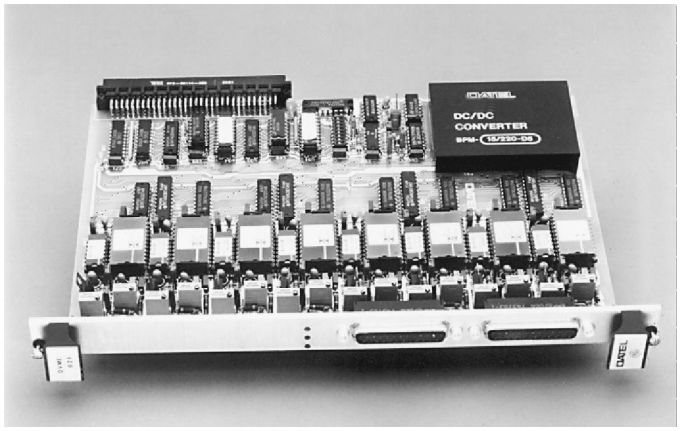
INNOVATION and EXCELLENCE

DVME-628
12-Bit, 8-Channel VMEbus D/A Board Board

FEATURES

- 8 D/A channels
- 12-Bit resolution
- Complete hardware-compatible with VMEbus specifications.
- 6 μSecond settling time.
- Three types of input coding:
  - A. Bipolar 2's complement
  - B. Bipolar offset binary
  - C. Unipolar straight binary
- Five output voltage ranges:
  - A. 0 to +5V dc
  - B. 0 to +10V dc
  - C. ±2.5V dc
  - D. ±5V dc
  - E. ±10V dc
- Up to 0.05% full-scale range accuracy.
- ±1/2 LSB differential nonlinearity
- 4-to-20 mA current loop output capability for DVME-628C model.
- On-board dc-to-dc power converter supplies ±15V dc for internal logic circuits.



The DVME-628 is DATEL's high-end, VMEbus-based D/A board that provides analog output for up to 8 channels. The 12-bit D/A board, with 6 microsecond settling time, is designed to deliver high-performance in process control, test instrumentation and similar applications. The three input coding schemes and five analog output voltage ranges makes the board an ideal choice for the most industrial applications.

GENERAL DESCRIPTION

DATEL's VMEbus family of boards offer a complete solution to various data acquisition applications. The DVME-628 is the D/A member of this family, providing up to 8 analog outputs for the host VMEbus system. The D/A board offers a resolution of 12 bits and operates with an accuracy of beter than 0.05% of full-scale range. The board is rigorously tested under extreme environmental conditions for DATEL's stringent quality assurance requirements.

The DVME-628 easily fits into a VMEbus card cage and is addressable using short I/O space address lines. The on-board switches select the base address of the board. Functions relating to input data coding and output voltage range are easily selectable using jumpers.

Functionally, the DVME-628 consists of a VMEbus interface section and a digital-to-analog conveter (DAC) section. The DAC data register section contains a data register and D/A converter for each section. For DVME-628C models the DAC section also contains voltage to 4-to-20 mA current loop conversion logic for each channel. One unique feature of the DVME-628 is that the DAC outputs will reset to 0.000V during reset regardless of whether unipolar or bipolar outputs are selected.

The DVME-628 D/A board will be shipped with a user's manual. The user's manual describes the installation and calibration procedures for different applications and explains the theory of operation of the board. The user's manual also contains information on troubleshooting the board.

The board is shipped with an example 68010 assembly language diagnostic program on a 5 1/4" floppy diskette, formatted using VERSAdos. The diagnostic program source code is available in hard copy from DATEL. Consult the factory regarding the availability of the diagnostic program's source code in other disk formats.

ORDERING INFORMATION

DVME-628

- V - Voltage outputs only
- C - Voltage and 4-to-20mA current loop outputs

VMEbus Interface

The DVME-628 interfaces to the host system using the P1 connector. The board uses short I/O space address lines and 16 data lines. On-board switches select the base address of the board. The board responds to address modifier codes 29H, 2DH, 39H, and 3DH for data output purposes. The DVME-628 generates the data acknowledge (DTACK★) signal to notify acceptance of data from the VMEbus data lines, D00 through D15. The DTACK★ signal is jumper-selectable for delay times from 125 nanoseconds to 1000 nanoseconds, accommodating different host systems.
The interface logic decodes the VMEbus control lines WRITE★, DS0★, DS1★, and AS★ to provide the interface control signals. These signals control the board select and the VMEbus transfer functions. The DVME-628 uses programmable array logic (PAL) devices for interface and control, guaranteeing true asynchronous operation.

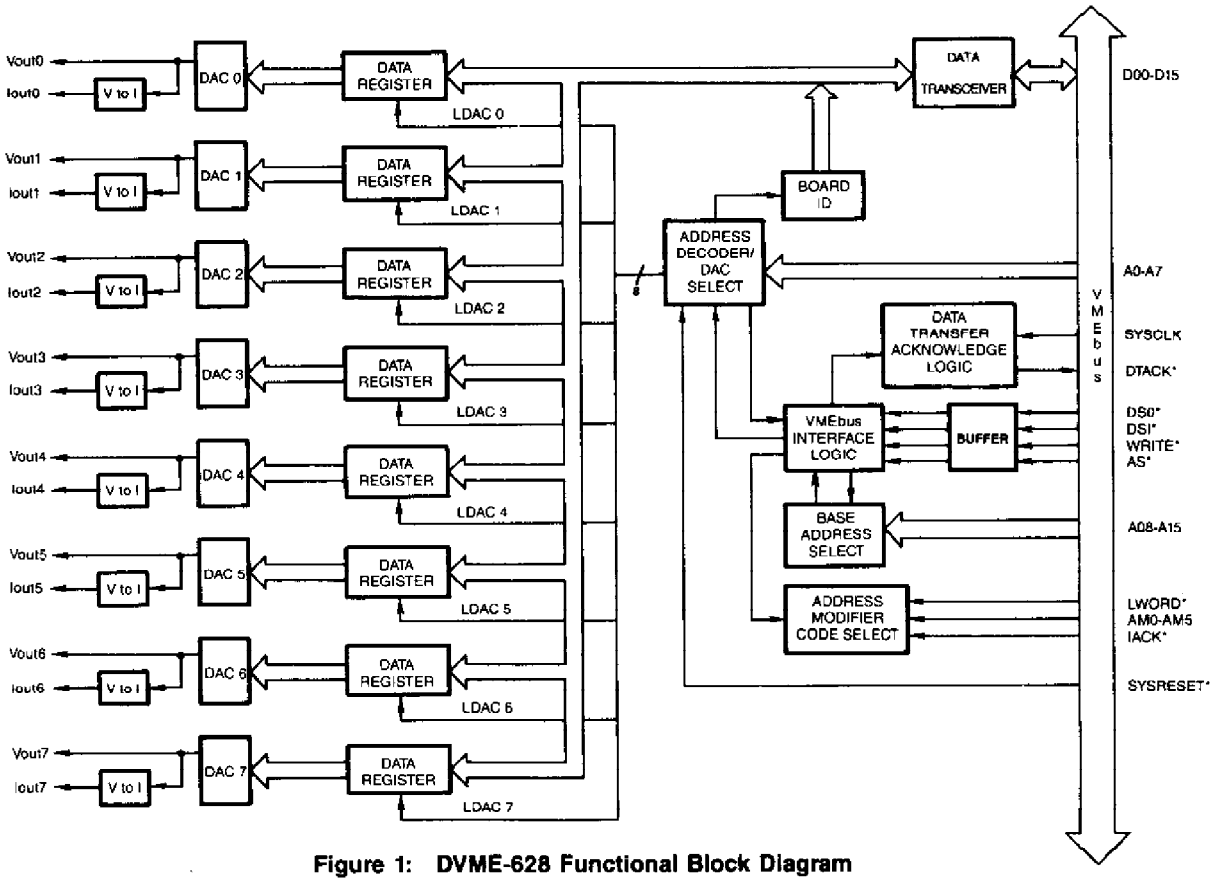


Figure 1: DVME-628 Functional Block Diagram

FUNCTIONAL SPECIFICATIONS

(Typical at 25 degrees Celcius, unless otherwise noted)

Interface specifications

Data Bus . . . . . 16 Bits (A16:D16 slave)

Address Bus . . . . . Short I/O Space; 16 address lines

Address Modifier Codes . . . . . Codes used 29H, 2DH, 39H, and 3DH

Memory Mapping . . . . . Short I/O space, user or supervisor. 256 words allocated per board

Data Transfer . . . . . DTACK★ signal line. Acknowledges the VMEbus host that data has been placed or accepted from the VMEbus data lines

CONNECTOR SPECIFICATIONS

VMEbus P1 Connector . . . . . 96-pin male DIN connector

J1 and J2 Analog Output Connectors . . . . 25-pin D-type female connector.

ANALOG SPECIFICATONS

ANALOG OUTPUT

Number of Channels . . . . . 8 non-isolated, single-ended

Output Range . . . . . 0 to +5V dc
0 to +10V dc
± 2.5V dc
± 5V dc
± 10V dc

Digital Input Coding . . . . . Bipolar 2's complement
Bipolar offset binary
Unipolar straight binary

NOTE: The VMEbus SYSCLK signal is required.

Resolution . . . . . 12 Bits

Reset . . . . . Output resets to 0.000V dc at power-on

Accuracy . . . . . 0.05% of FSR, minimum

Differential . . . . . 0.5 LSB, maximum non-linearity

Zero Temperature Drift . . . . . 3 ppm/ °C, typical
5 ppm/ °C, maximum

Offset Temperature Drift . . . . . 5 ppm/ °C, typical
10 ppm/ °C, maximum

Gain Temperature Drift . . . . . 15 ppm/ °C, typical
30 ppm/ °C, maximum

Settling Time . . . . . 6 μSeconds, maximum

Output Current . . . . . ±5 mA, typical

Output Impedance . . . . . 50 milliohms, typical

CURRENT LOOP

Current Loop . . . . . 4-to-20 mA, conforming to ISA Standard 550.1, Type 4, Class U

Accuracy . . . . . 0.1% of FSR, minimum

Excitation (User-supplied) . . . . . +15V dc, minimum
+24V dc, typical
+36V dc, maximum

Load Resistance . . . . . 100 Ohms, minimum
1000 Ohms, maximum

POWER SUPPLY REQUIREMENTS

+5V dc ±0.5% at . . . . . 2.0 Amperes, typical
2.3 Amperes, maximum

PHYSICAL CHARACTERISTICS

Outline Dimensions . . . . . 9.19″W x 6.3″D x 0.6″H (233.35 x 160 x 15.24 mm)

Weight . . . . . 1 lb. (453.6 grams)

Operating Temperature Range . . . . . 0 to +60 °C

Storage Temperature Range . . . . . -20 to +80 °C

Humidity . . . . . 0 to 90%, non-condensing

DVME-628 PROGRAMMING INFORMATION

The DVME-628 contains eight programmable registers that store digital data for the D/A converters. The board responds only to word data transfers on write operations. Since the DVME-628 uses 12-bit D/A converters, the 12 most significant bits of the DAC data registers are used for conversion. Table 1 shows the addresses of the identification code and the registers. Figure 2 shows the format of the DAC data register.

Table 1: DVME-628 Register Locations

ADDRESS	FUNCTION	CONTENTS
Base + 0 through Base + 63	Read	Manufacturer's/Board's identification code
Base + 160	Write	D/A Channel 0
Base + 162	Write	D/A Channel 1
Base + 164	Write	D/A Channel 2
Base + 166	Write	D/A Channel 3
Base + 168	Write	D/A Channel 4
Base + 170	Write	D/A Channel 5
Base + 172	Write	D/A Channel 6
Base + 174	Write	D/A Channel 7

Word Address: Base + 160, Base + 162, Base + 164, Base + 166, Base + 168, Base + 170, Base + 172, and Base + 174

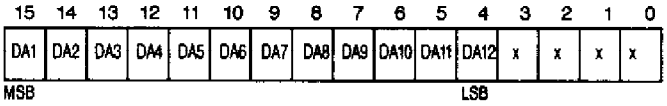


Figure 2: DVME-628 DAC Data Register Format

OUTPUT CONNECTIONS

The DVME-628 D/A boards use the J1 and J2 connectors for analog output connections. Tables 2 and 3 list the output signals of the J1 and J2 connector respectively.

Table 2: DVME-628 Analog Output Pinout Details (J1)

PIN #	DESCRIPTION
1	DAC 0 V OUT
2	DAC 0 I LOOP
3	DAC 0 V LOOP
4	DAC 1 V OUT
5	DAC 1 I LOOP
6	DAC 1 V LOOP
7	DAC 2 V OUT
8	DAC 2 I LOOP
9	DAC 2 V LOOP
10	DAC 3 V OUT
11	DAC 3 I LOOP
12	DAC 3 V LOOP
13	NO CONNECTION
14	DAC 0 ANALOG RETURN
15	DAC 0 ANALOG RETURN
16	NO CONNECTION
17	DAC 1 ANALOG RETURN
18	DAC 1 ANALOG RETURN
19	NO CONNECTION
20	DAC 2 ANALOG RETURN
21	DAC 2 ANALOG RETURN
22	NO CONNECTION
23	DAC 3 ANALOG RETURN
24	DAC 3 ANALOG RETURN
25	NO CONNECTION

Table 3: DVME-628 Analog Output Pinout Details (J2)

PIN #	DESCRIPTION
1	DAC 4 V OUT
2	DAC 4 I LOOP
3	DAC 4 V LOOP
4	DAC 5 V OUT
5	DAC 5 I LOOP
6	DAC 5 V LOOP
7	DAC 6 V OUT
8	DAC 6 I LOOP
9	DAC 6 V LOOP
10	DAC 7 V OUT
11	DAC 7 I LOOP
12	DAC 7 V LOOP
13	NO CONNECTION
14	DAC 4 ANALOG RETURN
15	DAC 4 ANALOG RETURN
16	NO CONNECTION
17	DAC 5 ANALOG RETURN
18	DAC 5 ANALOG RETURN
19	NO CONNECTION
20	DAC 6 ANALOG RETURN
21	DAC 6 ANALOG RETURN
22	NO CONNECTION
23	DAC 7 ANALOG RETURN
24	DAC 7 ANALOG RETURN
25	NO CONNECTION

DVME-628 BOARD IDENTIFICATION CODE

Byte Address	ASCII Code	Function
Base + 1	V	Identifier
+ 3	M	This ASCII code is present
+ 5	E	for all DATEL VMEbus boards
+ 7	I	
+ 9	D	
+ 0B	D	Manufacturer ID
+ 0D	A	DAT is the ID for DATEL
+ 0F	T	
+ 11	d	Board model number
+ 13	V	
+ 15	M	
+ 17	E	
+ 19	—	
+ 1B	6	
+ 1D	2	
+ 1F	8	

DATEL VMEbus Short I/O Memory Organization*

Base Address	Board Model Number	Function
Base + 0 through Base + 63	All DATEL VMEbus boards	Manufacturer's and Board's identification code
Base + 64 through Base + 77	DVME-660	48 line digital I/O board
Base + 78 through Base + 127	----------	Not Used ----------
Base + 128 through Base + 143	DVME-611 DVME-612	DVME-611: 32 single-ended/ 16 differential channel A/D board DVME-612: 32 single-ended/ 16 differential channel A/D board with 2 D/A channels
Base + 152 through Base + 159	----------	Not Used ----------
Base + 160 through Base + 175	DVME-612 DVME-624 DVME-628	DVME-612: 32 single-ended/ 16 differential channel A/D board with 2 D/A channels DVME-624: 4-channel isolated D/A board DVME-628: 8-channel D/A board
Base + 176 through Base + 191	----------	Not Used ----------
Base + 192 through Base + 255	----------	Not Used ----------

*This chart does not apply to the following products:

DVME-601
DVME-613
DVME-614
DVME-622
DVME-630

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DATEL, Inc. 11 Cabot Boulevard, Mansfield, MA 02048-1151
Tel: (508) 339-3000 / Fax: (508) 339-6356
For immediate assistance: (800) 233-2765

DATEL (UK) LTD. Tadley, England Tel: (01256)-880444
DATEL S.A.R.L. Montigny Le Bretonneux, France Tel: 1-34-60-01-01
DATEL GmbH Munchen, Germany Tel: 89-544334-0
DATEL KK Tokyo, Japan Tel: 3-3779-1031, Osaka Tel: 6-354-2025