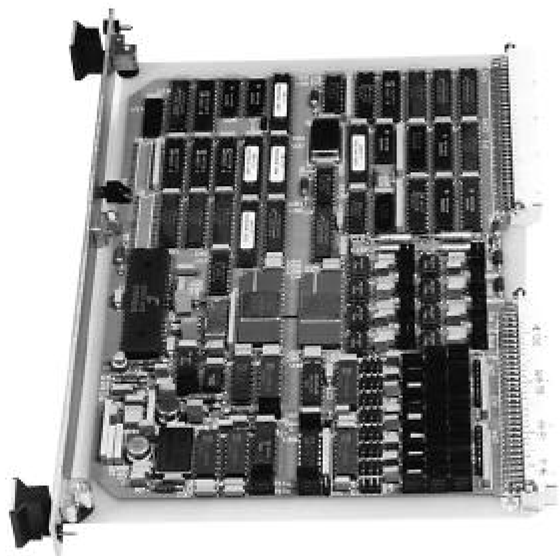
SVME-667/DMV-666

A/D & D/A Input/Output Board

Features

- *8 differential/ 16 single-ended analog input channels*
- *12-bit A/D resolution*
- *Programmable gain control*
- *Input ranges of ± 32V, ± 8V, or +16 mA*
- *Input channel reference/comparison circuitry*
- *Fast conversion speed (20 µs)*
- *8 channels of D/A conversion*
- *12-bit D/A resolution*
- *On-board electronic input calibration*
- *On-board temperature sensor*
- *A16:D16 VMEbus interface*
- *Conduction cooled per IEEE 1101.2 (0.65-inch dot pitch) for MIL-E-5400/4158, and MIL-STD-2036 applications*
- *Built-In-Test (BIT)*
- *Location monitor*
- *Bus Isolation mode (BI-mode®)*

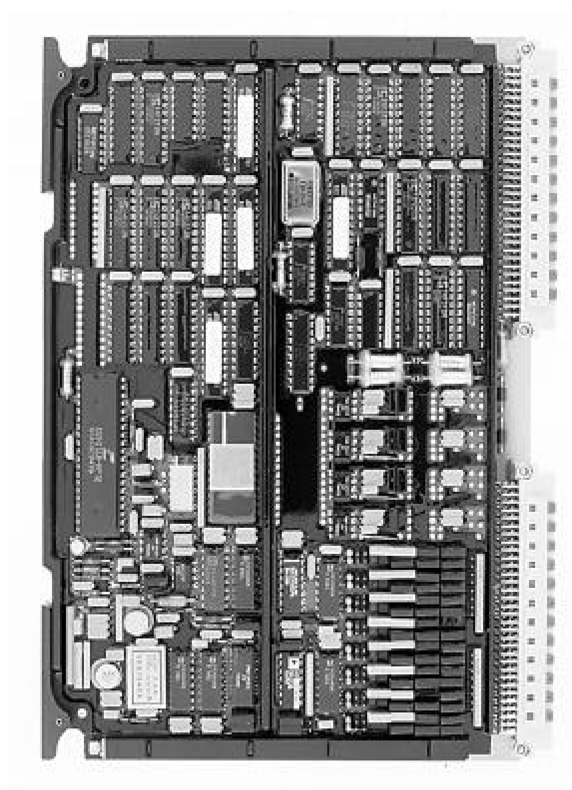


Description

The SVME-667/DMV-666 Analog-to-Digital/Digital-to- Analog (A/D-D/A) Converter is a non-intelligent slave card that provides up to eight differential or 16 single-ended channels of analog-to-digital conversion and eight channels of digital-to-analog conversion.

The card also supports DY 4 Systems' common features such as a location monitor, BIT, and BI-mode.

DY 4 Systems' common features support diagnostics, interprocessor communications, and logistics maintenance on-line. Built-In-Test (BIT) provides hardware features to verify all operational circuit blocks on the module. Bus Isolation mode (BI-mode) provides a means to electrically isolate the module from the VMEbus. The location monitor provides an addressed mechanism for entry into and exit out of BI-mode. These features allow the users to perform fault



detection and isolation during operation to build fault-tolerant systems. In addition, they allow for on-line maintenance and system configuration control to minimize field maintenance, time, and sparing logistics.

All versions of the SVME-667/DMV-666 are functionally identical. SVME versions for air-cooled environments are available in DY 4 ruggedization levels 0, 2 and 3.

The SVME-667/DMV-666 is designed for use in airborne, land-mobile, and naval military applications in which the circuit cards must be installed in a sealed chassis to prevent contamination due to moisture, salt-fog, sand, and dust.

Figure 1 provides a functional block diagram of the SVME-667/DMV-666 A/D-D/A Converter.

DY 4 Systems' conduction-cooled products are designed for severe environmental conditions as defined by MIL-E-4158, MIL-E-5400, and MIL-STD-2036. Thermal management is provided by an aluminum plane, bonded to a standard VMEbus-compatible circuit module. Integral to the cooling plane are vibration stiffening channels

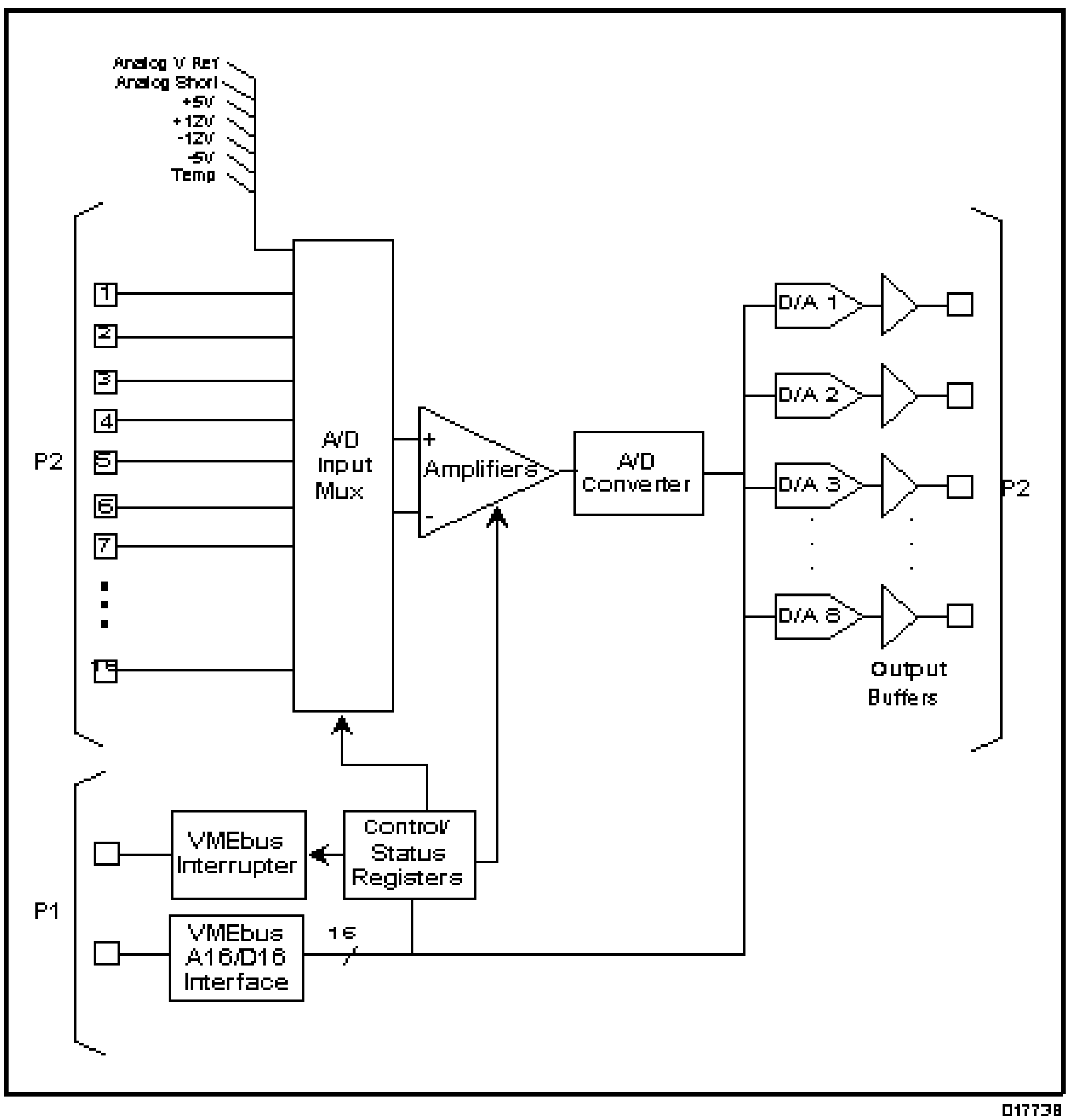


Figure 1: SVME-667/DMV-666 A/D-D/A Converter Block Diagram

which improve the thermal dissipation ability, vibration resistance, and maximizes usable real-estate area without sacrificing the environmental abilities of the modules. Standard wedgelock fasteners provide a reliable thermal and mechanical connection in the chassis.

Interrupt Acknowledge Control

The SVME-667/DMV-666 A/D-D/A Converter is capable of asserting any one of the seven VMEbus interrupt requests. Both the interrupt level and the interrupt status/ID vector are software programmable.

Interrupts can be acknowledged as vectored or auto-vectored depending on user programming. If no on-board interrupt is active, this card provides the necessary IACK daisy-chain continuity. A vectored interrupt is accomplished via the standard IACK cycle. An auto-vectored interrupt does not use the IACK hardware on-board and the software interrupt service routine (ISR) must determine the appropriate action.

Control/Status Registers

On-board control registers allow user access to hardware control lines that control:

- analog test inputs
- short circuit input test
- Analog-to-Digital Converter (ADC)
- Digital-to-Analog Converter (DAC)
- mode control
- ADC channel select.

An on-board status register allows the user to query the status of the control signals listed above. In addition, the user is given access to two other status bits: Port Interrupt Request and ADC Conversion Status.

Analog-to-Digital (A/D) Inputs

For analog-to-digital conversion, there are eight pairs of inputs. Each pair can be configured to operate as a pair of single-ended inputs or as a single differential input. Each input has a low-pass filter to attenuate high frequency noise.

Attenuators are provided for the following input ranges:

- -8V to +8V
- -32V to +32V
- –16 mA to 16 mA (through 500 ohm current sense resistor).

There are seven test channels available for performing A/D conversions on known reference voltages in order to verify proper operation. These consist of:

- analog short circuit for nulling
- +5V, -5V
- +12V, -12V
- temperature sensor
- analog reference voltage

To achieve maximum resolution over temperature, the temperature sensor can be used to determine adequate re-calibration sequences.

Analog-to-Digital Converter

Analog-to-digital conversion is provided by a 12-bit successive approximation type converter. The ADC always sees an input signal to be converted from the input multiplexor. A conversion is started on this signal only when a conversion request is made. The ADC proceeds to convert this signal and latches the data after the conversion is complete into a data output register which can be read from the VMEbus.

Sample and Hold Amplifier

A Sample and Hold Amplifier (SHA) provides a stable voltage to the ADC during the conversion time.

Digital-to-Analog Conversion

The SVME-667/DMV-666 A/D-D/A Converter provides eight voltage-output digital-to-analog converter channels. Each channel is independently programmable and has a resolution of 12 bits, and an output voltage range of ±10 volts. The outputs are presented at the P2 I/O connector. Other features of the D/A converters are:

- read-back capability to allow for verification of the contents of the internal data register
- asynchronous reset to zero on the D/A outputs
- monotonic performance
- maximum linearity error of one LSB.

Low Power Dissipation

Maximum power dissipation is 6.2 watts. Extensive use of CMOS components minimizes power consumption.

Product Variants

Optional variants of this product give the flexibility to achieve desired trade-offs of functionality, performance and ruggedization versus cost. SVME-667/DMV-666 A/D-D/A Converter options include:

- input ranges of ± 40V, ± 10V, or +20 mA, with longer settling time after channel select
- customized A/D input attenuators
- A/D only
- D/A only
- 4 D/A output channels

all in standard DY 4 ruggedization levels 0, 2 and 3.

Table 1
Specifications

ENVIRONMENTAL SPECIFICATIONS		
Temperature	**(Levels 0)**	
†Operating	0°C to 50°C	MIL-STD-810
Storage	-40°C to 85°C	Methods 501.3 & 502.3
Temperature	**(Levels 2,3)**	
†Operating	-55°C to 85°C	MIL-STD-810
Storage	-62°C to 125°C	Methods 501.3 & 502.3
Humidity (DMV CCA and SVME CCA - Level 3)		
Operating	0 to 95% non-condensing	MIL-STD-810 Method 507.3
Non-Operating	0 to 100% condensing	
Vibration (DMV CCA)		
Sine	5g at 15 to 2,000 Hz	MIL-STD-810 Method 514.4
Random	$0.1g^2/Hz$	
Shock (DMV CCA)		
	40g/11ms half sine	MIL-STD-810 Method 516.4, Proc 1
Altitude (DMV CCA)		
	21,350m (70,000 ft)	MIL-STD-810 Method 500.3

PHYSICAL DIMENSIONS	**DMV CCA**	**SVME CCA**
Height	233.4 mm (9.2 in.)	233.4 mm (9.2 in.)
Depth	160 mm (6.3 in.)	160 mm (6.3 in.)
Thickness	15.0 mm (0.6 in.)	20.0 mm (0.8 in.)
Weight	<900g (<2 lb)	<600g (<1.32 lb)

POWER REQUIREMENTS		
+5v (+5%, -2.5%)	1.0 A (maximum)	0.8 A (typical)
+12v (+5%, -2.5%)	0.3 A (maximum)	0.18 A (typical)
-12v (+5%, -2.5%)	0.3 A (maximum)	0.18 A (typical)

† As a general design objective, the junction temperature of all components on the DMV-666-XXX is limited to 110°C maximum (when the chassis cold-wall temperature is 85°C.) When reliability or performance factors permit, a component's junction temperature may exceed 110°C marginally.

SVME board operating temperature is based on air flow of 11 cfm.

SVME-667/DMV-666

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