

VME 6U SCSI Disk or Flash Storage System - SV6

GENERAL DESCRIPTION

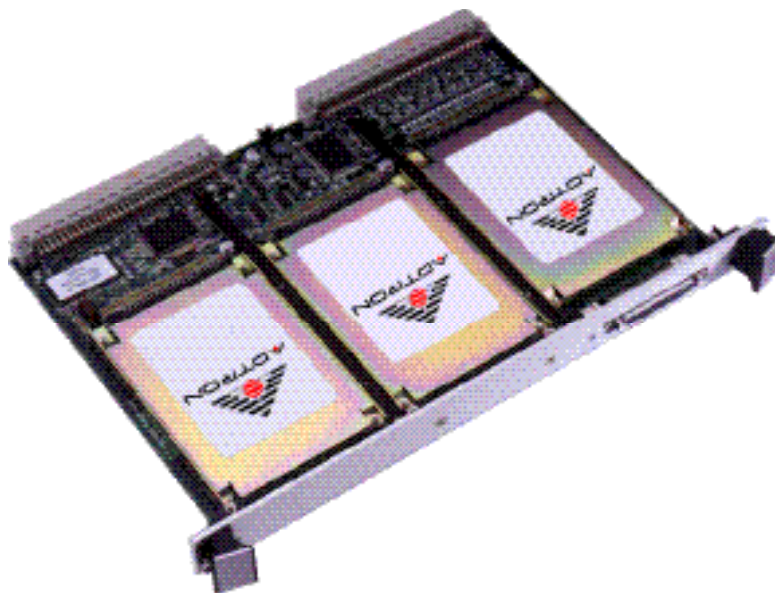
- The Adtron SV6 product family provides SCSI mass storage on a single slot VME 6U plug-in card.
- These products replace industry standard 3.5" and 2.5" SCSI and SCSI-2 fast and narrow disk and tape drives, thus eliminating drive mounting brackets and cabling.
- The Adtron SV6H incorporates hard disks to offer SCSI disk or tape emulation in capacities up to 240 GBytes.
- Using flash memory, the Adtron SV6F offers highly durable and reliable solid-state SCSI disk or tape emulation in capacities from 64 MBytes to 12 GBytes.

APPLICATIONS

- Telecommunications
- Airborne avionics
- Military COTS computer systems
- Factory automation
- Hardened industrial control systems

FEATURES

- Single slot 6U VME SCSI mass storage module
- Standard SCSI-2 interface through P2 and J1 on the front panel
- SCSI disk or tape command set independent of hard disk or flash storage media
- Adtron qualifies each new model of hard disk and flash memory and ships equivalently configured SV6 products, thereby ensuring long term availability of SCSI mass storage systems
- No software drivers required for full SCSI disk or tape emulation
- Compliant with ANSI X3.13-1986 (American National Standards Institute, SCSI) specification
- Compliant with ANSI/VITI 1-1994 (American National Standards Institute) for VME64 specification
- Factory configurable operating parameters include "destroking" to match system capacity requirements
- Built-in support for 256 Byte and 512 Byte sector operation
- 5V only operation supplied through P1 eliminates the requirement for 12V power supplies
- Available in extended operating temperature ranges
- Standard Warranty: 3 year



OPERATION OVERVIEW

The SV6 mass storage subsystem uses the Adtron media controller chip set to provide a flexible mass storage platform for VME computing platforms. The Adtron media controller allows tailoring of the SV6 to meet the special requirements of any VME applications while consistently delivering the same SCSI command set throughout the production life of your application.

By converting current technology 2.5-inch IDE hard or flash disks to the standard SCSI-2 interface the SV6 effectively eliminates the periodic efforts of qualifying new disk drives, and keeps your application up to the technology of the day without impacting deployment of the SV6 to your application.

To meet the application capacity requirements, 1 to 3 2.5-inch drives may be mounted to deliver up to 3x the individual drive capacity. In other words, 3 60GByte hard disks appear to the operating system as a single 180GByte logical unit. In this way, the SV6 achieves high storage capacity in a single 6U VME slot.

In some applications it is advantageous to have separate logical units and the SV6 can support 1 to 3 drives as 1 to 3 logical units within a single SCSI address. When configured as individual logical units the drives can be different capacities.

For some applications, the data and application software may demand higher reliability than hard disks, especially in harsh environments. IDE flash disks are used to accomplish this increased requirement for reliability. The flash disk provides higher shock, vibration and operating temperature characteristics than a hard disk.

As mentioned above, 1 to 3 drives may be mounted as discrete logical units. These can be mixed capacities and technologies between hard disk and flash disk. For example, an O/S and application software may reside in a 10 GByte hard disk and the critical data be stored in a 256MBytes flash disk.

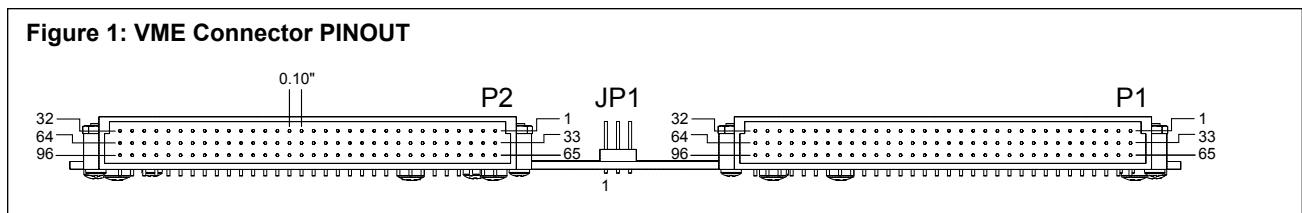
Many combinations are possible through the flexible architecture of the Adtron media controller found on the SV6. Adtron sales can assist with the tailoring of special configurations if the standard versions illustrated in this product specification do not meet your application requirements.

PIN CONFIGURATION

Table 1: P1 VME Connector Pinout

Pin Number	Signal	Pin Number	Signal	Pin Number	Signal
1		33		65	
2		34		66	
3		35		67	
4		36	BG0IN*	68	
5		37	BG0OUT*	69	
6		38	BG1IN*	70	
7		39	BG1OUT*	71	
8		40	BG2IN*	72	
9	GND	41	BG2OUT*	73	GND
10		42	BG3IN*	74	
11	GND	43	BG3OUT*	75	
12		44		76	-SYSRST
13		45		77	
14		46		78	
15	GND	47		79	
16		48		80	
17	GND	49		81	
18		50		82	
19	GND	51		83	
20		52	GND	84	
21	IACKIN*	53		85	
22	IACKOUT*	54		86	
23		55	GND	87	
24		56		88	
25		57		89	
26		58		90	
27		59		91	
28		60		92	
29		61		93	
30		62		94	
31		63		95	
32	+5V SUPPLY	64	+5V SUPPLY	96	+5V SUPPLY

* Inputs are tied to associated outputs.



PIN CONFIGURATION
Table 2: P2 VME Connector Pinout

Pin Number	Signal (Force)	Signal (Motorola)	Pin Number	Signal	Pin Number	Signal
1	-DB0	-DB0	33	+5V SUPPLY	65	GND
2	-DB1	-DB1	34	GND	66	GND
3	-DB2	-DB2	35		67	GND
4	-DB3	-DB3	36		68	GND
5	-DB4	-DB4	37		69	GND
6	-DB5	-DB5	38		70	GND
7	-DB6	-DB6	39		71	GND
8	-DB7	-DB7	40		72	GND
9	-DBP	-DBP	41		73	GND
10	GND	-ATN	42		74	GND
11	[See Note 1]	-BSY	43		75	GND
12	GND	-ACK	44	GND	76	GND
13	TERMPWR	-RST	45	+5V SUPPLY	77	GND
14	GND	-MSG	46		78	GND
15	GND	-SEL	47		79	GND
16	-ATN	-C/D	48		80	GND
17	GND	-REQ	49		81	GND
18	-BSY	-I/O	50		82	GND
19	-ACK		51		83	
20	-RST		52		84	
21	-MSG		53		85	
22	-SEL		54	GND	86	
23	-C/D		55		87	
24	-REQ		56		88	
25	-I/O		57		89	
26			58		90	
27			59		91	
28			60		92	
29			61		93	
30			62		94	
31			63	GND	95	
32			64	+5V SUPPLY	96	

Note 1: Used for Automatic SCSI Termination.

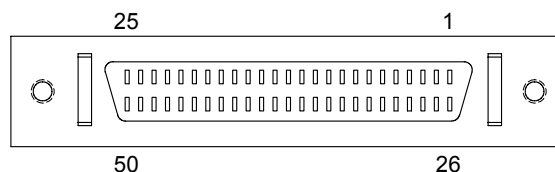
PIN CONFIGURATION

Table 3: J1 SCSI Pinout

Pin Number	Signal	Pin Number	Signal
1	GND	26	-DB0
2	GND	27	-DB1
3	GND	28	-DB2
4	GND	29	-DB3
5	GND	30	-DB4
6	GND	31	-DB5
7	GND	32	-DB6
8	GND	33	-DB7
9	GND	34	-DBP
10	GND	35	GND
11	GND	36	[See Note 1]
12	[Reserved]	37	[Reserved]
13	[Blank]	38	TERMPWR
14	[Reserved]	39	[Reserved]
15	GND	40	GND
16	GND	41	-ATN
17	GND	42	GND
18	GND	43	-BSY
19	GND	44	-ACK
20	GND	45	-RST
21	GND	46	-MSG
22	GND	47	-SEL
23	GND	48	-C/D
24	GND	49	-REQ
25	GND	50	-I/O

Note 1: Pin 36 is used for Automatic SCSI Termination by detecting the presence of attached SCSI devices.

Figure 2: J1 SCSI Connector



SIGNAL DESCRIPTION
Table 4: Signal Descriptions

Signal Name	Force P1/P2	Motorola P1/P2	J1	Description
-BSY (BUSY)	P2-18	P2-11	43	An "OR-tied" signal that indicates that the SCSI bus is in use.
-SEL (SELECT)	P2-22	P2-15	47	An "OR-tied" signal used by an initiator to select a target or by a target to reselect an initiator.
-C/D	P2-23	P2-16	48	A signal sourced by a target that indicates whether
(CONTROL/ DATA)				control or DATA phase information is on the DATA BUS. Asserted indicates CONTROL (i.e., COMMAND, STATUS, and MESSAGE phases).
-I/O (INPUT/ OUTPUT)	P2-25	P2-18	50	A signal sourced by a target that controls the direction of data movement on the DATA BUS with respect to an initiator. Asserted indicates INPUT. This signal is also used to distinguish between SELECTION and RESELECTION phases.
-MSG (MESSAGE)	P2-21	P2-14	46	A signal sourced by a target to indicate the MESSAGE phase or a DATA phase depending on whether C/D is true or false. Asserted indicates MESSAGE or DT DATA.
-REQ (REQUEST)	P2-24	P2-17	49	A signal sourced by a target to indicate a request for an information transfer on the SCSI bus.
-ACK (ACKNOWLEDGE)	P2-19	P2-12	44	A signal sourced by an initiator to respond with an acknowledgment of an information transfer on the SCSI bus.
-ATN (ATTENTION)	P2-16	P2-10	41	A signal sourced by an initiator to indicate the
-RST (RESET)	P2-20	P2-13	45	An "OR-tied" signal that indicates the RESET condition.
-DB[7:0] (DATA BUS)	P2-1 thru P2-8	P2-1 thru P2-8	26 thru 33	Eight data-bit signals that form the lower 8-bit DATA BUS
-DBP (PARITY)	P2-9	P2-9	34	This signal is associated with the DB[7:0] signals and is used to detect the presence of an odd number of bit errors within the byte. The parity bit is driven such that the number of logical ones in the byte plus the parity bit is odd.

SIGNAL DESCRIPTION (CONTINUED)

Table 4 (continued from page 6)

Signal Name	Force P1/P2	Motorola P1/P2	J1	Description
TERMPWR	P2-13	N/A	38	Normally sourced by the SCSI host adapter and used to supply Termination Power to SCSI devices on the bus. Standard configuration uses Vcc for TERMPWR.
IACKIN	P1-21	P1-21	N/A	Interrupt Acknowledge In (tied to IACKOUT)
IACKOUT	P1-22	P1-22	N/A	Interrupt Acknowledge Out (tied to IACKIN)
BG[3..0]IN	P1-[36, 38, 40, 42]	P1-[36, 38, 40, 42]	N/A	Bus Grant [3..0] In (each one tied to associated output)
BG[3..0]OUT	P1-[37, 39, 41, 43]	P1-[37, 39, 41, 43]	N/A	Bus Grant [3..0] Out (each one tied to associated input)
-SYSRST	P1-76	P1-76	N/A	System Reset
GND	P1- [9, 11, 15, 17, 19, 52, 55, 73] P2- [10, 12, 14, 15, 17, 34, 44, 54, 63, 65 thru 82]	P1- [9, 11, 15, 17, 19, 52, 55, 73] P2- [34, 44, 54, 63, 65 thru 82]	1-11, 15-25, 35, 40, 42	Ground
+5V Supply	P1-32, P1-64 P1-96 P2-33, P2-45, P2-64	P1-32, P1-64 P1-96 P2-33, P2-45, P2-64	N/A	Supply voltage

PRODUCT CHARACTERISTICS - SV6H HARD DISK VERSION
Table 5: Absolute Maximum Ratings

Parameter	Symbol	Value	Units
Vcc	Vcc	-0.3 to 6.0	V
All input/output voltages	Vin, Vout	-0.3 to Vcc 0.5	V
Storage temperature range	Tstg	-40 to 65	°C

Table 6: Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Units
Vcc	Vcc	4.75	5	5.25	V
Commercial operating temperature	Ta	5	25	55	°C

Table 7: Environmental

Parameter	HDD - Operating Conditions
Relative Humidity	8 to 90% noncondensing
Altitude	-300m to 3048m (10,000ft.)
Operating Shock	150G @ 2ms, 15G @ 11ms
Operating Vibration-random	1G (5-500Hz) @ 2.0 oct/min

Table 8: Power Requirements (Note 1)

Parameter	HDD - Value
Startup current	2.5A (max)
Active current	1.9A (max)
Standby current	0.6A (max)
Standby w/media powered down	0.4A (max)
Startup from standby w/media powered down	1.6A (max)

Note 1: Device under test: 3 - 20GB IBM Travelstar™ HDDs.

Table 9: Physical Characteristics (Note 2)

Parameter	Value
Width	Single Width Front Panel
Depth	169.9mm[6.69"]
Height	Double Height
Weight	Dependent on configuration.

Note 2: ANSI/VITA 1-1994 American Nation Standards for VME64.

Table 10: Performance

Item	Performance
Start up times (Reset to Selection)	250 ms or less
Start up times (Standby to Active)	4 ms (max)
Read (Sustained)	4.5 MBytes/sec (min) (Note 1)
Write (Sustained)	6.6 MBytes/sec (min) (Note 1)
Read (Burst)	5.2 MBytes/sec (max) (Note 2)
Write (Burst)	7.2 MBytes/sec (max) (Note 2)

Note 1: 128 blocks/transfer, Pentium 200, Win98, SCSI Pro™ sequential transfer

Note 2: 1 block/transfer, Pentium 200, Win98, SCSI Pro™ sequential transfer

PRODUCT CHARACTERISTICS - SV6F FLASH MEMORY VERSION

Table 11: Absolute Maximum Ratings

Parameter	Symbol	Value	Units
Vcc	Vcc	-0.3 to 6.7	V
All input/output voltages	Vin, Vout	-0.3 to Vcc 0.5	V
Storage temperature range	Tstg	-55 to 90	°C

Table 12: Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Units
Vcc	Vcc	4.5	5	5.5	V
Commercial operating temperature	Ta	0	25	70	°C
Enhanced operating temperature	Ta	-25	—	75	°C
Industrial operating temperature	Ta	-45	—	85	°C

Table 13: Environmental

Parameter	Operating Conditions
Relative Humidity	8 to 90% noncondensing
Altitude	21,336m (70,000ft.)
Operating Shock	20G @ 11ms
Operating Vibration-random	11G (15-2000Hz)

Table 14: Power Requirements (Note 3)

Parameter	Value	Units
Startup current	0.32 (max)	A
Active current	0.46 (max)	A
Standby current	0.30 (max)	A

Note 3: Device under test: three 256MB flash disks.

Table 15: Physical Characteristics (Note 1)

Parameter	Value
Width	Single Width Front Panel
Depth	169.9mm[6.69"]
Height	Double Height
Weight	Dependent on configuration.

Note 1: ANSI/VITA 1-1994 American Nation Standards for VME64.

Table 16: Performance

Item	Performance
Start up times (Reset to Selection)	250 ms or less
Start up times (Standby to Active)	4 ms (max)
Read (Sustained)	2.3 MBytes/sec (min) (Note 2)
Write (Sustained)	2.1 MBytes/sec (min) (Note 2)
Read (Burst)	4.3 MBytes/sec (max) (Note 3)
Write (Burst)	5.7 MBytes/sec max (Note 3)

Note 2: 128 blocks/transfer, Pentium 200, Win98, SCSI Pro™ sequential transfer

Note 3: 1 block/transfer, Pentium 200, Win98, SCSI Pro™ sequential transfer

Table 17: Reliability

Item	Hard Disk Value	Flash Value
MTBF	Based on active duty cycles	250,000 hours (Note 4)
Data Reliability	<1 non-recoverable error in 10 ¹³ bits read	<1 non-recoverable error in 10 ¹⁴ bits read
Write Endurance	Dependent on disk.	Minimum: 300,000 write/erase cycles Per Sector Typical: > 1,000,000 write/erase cycles
Read Endurance	Dependent on disk.	Unlimited
Data Retention at 25°C	Dependent on disk.	>10 years

Note 4: Predicted by analysis performed per MIL-HDBK-217F, 30°C ground benign.

SCSI INTERFACE CHARACTERISTICS

Table 18

Parameter Symbol	Parameter Description	Test Condition	Min	Max	Unit
V _{IH}	Input High Voltage		2.0	V _{CC} + 0.5	V
V _{IL}	Input Low Voltage		V _{SS} -0.5	0.8	V
V _{OH}	Output High Voltage	I _{OH} = -2mA	2.4	V _{CC}	v
V _{OL}	Output Low Voltage	I _{OL} = 48mA	V _{SS}	0.5	V
C	Capacitance			16.0	pF

SCSI COMMAND SET

For a detailed description of supported commands, refer to the Adtron SCSI Command Set OEM Manual (PN: 610200044, EN: J15047)

Table 19: Common SCSI Commands

SCSI Command Set (common to both disk and tape)			
Command	Command Code	Type	See Note
Inquiry	12h	M	
Log Sense	4Dh		
Mode Select (6)	15h	O	3
Mode Select (10)	55h	O	
Mode Sense (6)	1Ah	O	4
Mode Sense (10)	5Ah	O	
Prevent Allow Medium Removal	1Eh	O	
Read Buffer	3Ch	O	
Request Sense	03h	M	
Send Diagnostic	1Dh	M	
Test Unit Ready	00h	M	
Write Buffer	3Fh	O	

Type: M = Mandatory, O = Optional, V = Vendor Unique

Notes:

1. No operation; returns good status.
2. The mandatory implementation of CmpLst bits are not supported.
3. Parameter list length must be zero (0).
4. Self-test only supported.
5. Does not verify. Performs a Write (10) operation.

Table 20: SCSI Disk (Direct Access) Command Set

SCSI Disk (Direct Access) Command Set			
Command	Command Code	Type	See Note
Change Definition	40h	O	
Format Unit	04h	M	2
Read (6)	08h	M	3
Read (10)	28h	M	
Read Capacity	25h	M	
Read Defect Data	37h	O	
Read Long	3Eh	O	
Release	17h	M	
Reserve	16h	M	
Seek (6)	0Bh	O	1
Seek (10)	2Bh	O	1
Start Stop Unit	1Bh	O	
Verify	2Fh	O	1
Write (6)	0Ah	M	
Write (10)	2Ah	M	
Write and Verify	2Eh	O	5

Table 21: SCSI Tape (Sequential Access) Command Set

SCSI Tape (Sequential access) Command Set			
Command	Command Code	Type	See Note
Erase	19h	M	
Load Unload	1Bh	O	
Locate	2Bh	O	
Read	08h	M	
Read Block Limits	05h	M	
Read Position	34h	O	
Rewind	01h	M	1
Space	11h	M	
Verify	13h	O	1
Write	0Ah	M	
Write Filemarks, Set-marks	10h	M	

Type: M = Mandatory, O = Optional, V = Vendor Unique

Notes:

1. No operation; returns good status.
2. The mandatory implementation of CmpLst bits are not supported.
3. Parameter list length must be zero (0).
4. Self-test only supported.
5. Does not verify. Performs a Write (10) operation.

JP1 DESCRIPTIONS

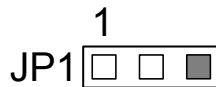
Table 22: JP1 Jumper Descriptions

None	Termination enable (default)
1-2	Automatic termination
2-3	Termination disabled

Termination

SCSI Termination is supplied by onboard Active SCSI Terminators. Termination is enabled by default and can either be set to automatic termination by placing a jumper on JP1 pins 1 - 2, or disabled by placing a jumper on JP1 pins 2 - 3.

Figure 3: JP1 Jumper Termination



Note: Grayed pin is Ground.

JP4 DESCRIPTIONS

Table 23: JP4 Jumper Descriptions

1,2,4	SCSI ID (See table below)
A	Reserved
B	Disable Disconnects

Table 24: SCSI IDs

SCSI ID	JP4 "4"	JP4 "2"	JP4 "1"
0	OFF	OFF	OFF
1	OFF	OFF	ON
2	OFF	ON	OFF
3	OFF	ON	ON
4	ON	OFF	OFF
5	ON	OFF	ON
6	ON	ON	OFF
7	ON	ON	ON

Disable Disconnects

SCSI Disconnects are enabled by default and can be disabled by placing a jumper on JP4, pin labeled "B".

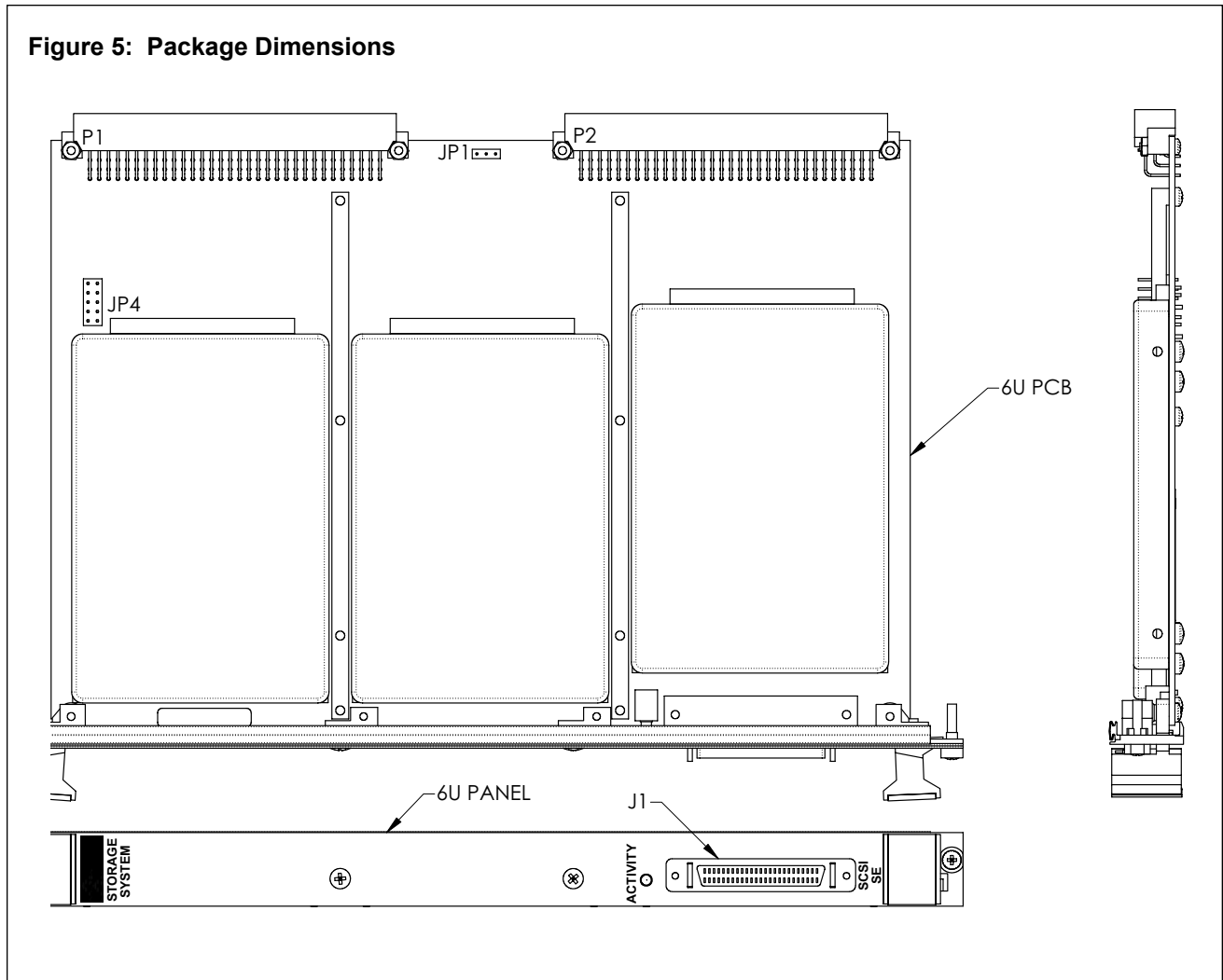
Figure 4: JP4 SCSI ID and Options Jumper



Note: Grayed pins are Ground.

PACKAGE DIMENSIONS

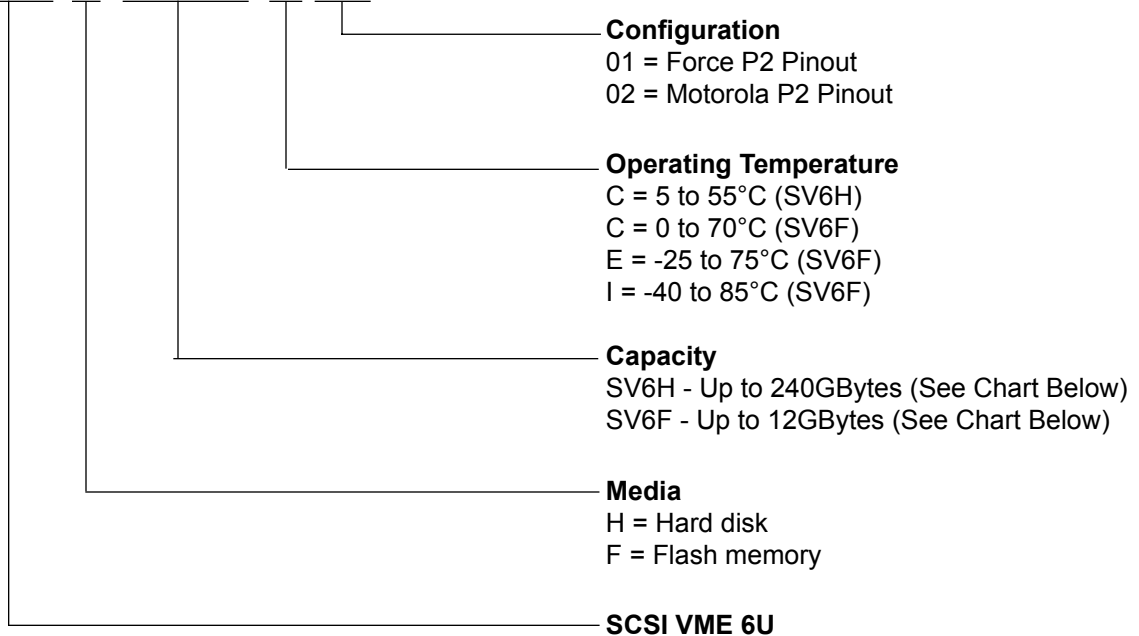
Refer to the figure below for enclosure and mounting dimensions of the SV6 Drive. Dimensions shown in mm [inches].



Mechanical Mounting And Interconnects Comply With American National Standard For Vme64. (Ansi/vita 1-1994)

ORDERING INFORMATION

SV6 M-CCCC T YY



Note: All standard models are configured as one logical unit (LU).

SV6H Capacity Options	Units
20G, 30G, 40G, 60G, 80G, 120G, 160G, 180G, 240G	GBytes

SV6F Capacity Options	Units
256, 512, 1024, 1536, 2048, 3072, 4096, 5376, 6144, 9216	MBytes
12G	GBytes

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