

MEMTECH

SC3500 3.5" Solid State SCSI Drive

User Guide

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1. HIGHLIGHTS

- 36864 Mbyte uncompressed capacity
- Full -40°C to +85°C operating temp range
- Active Remap™ Technology with ECC
- Unmatched SCSI-II compatibility
- On-board active termination
- 5 volt, low power operation
- Completely solid state - no moving parts
- 500G operating shock
- 10G operating vibration
- Rugged, 3.5" half height drive form factor
- Single-ended 50-pin shrouded SCSI interface
- 0.7 millisecond random access time
- 2.3 Mbyte/sec sustained Read throughput
- 1.0 Mbyte/sec sustained Write throughput
- 10 year guaranteed data integrity
- NO installable device drivers

2. INTRODUCTION

The SC3500 series is a line of 100% compatible SCSI-II solid state drives in a 3.5-inch half-height format. It is completely solid state, with no moving parts. This accounts for the unit's exceptional ruggedness and wide operating temperature range.

Sector Erasable NAND E²PROM (Flash) are used to provide up to 36864 Mbytes of nonvolatile, solid state storage in an extremely small, rugged form factor. The drive is 100% SCSI-2 compatible direct access device and requires no special drivers to operate. It is essentially a drop in replacement for standard rotating media.

The SC3500 can be used in applications where operating conditions are harsh and when reliability is critical. A 100% CMOS logic design minimizes power consumption, and the +5 volt only power requirement simplifies system supply needs. An on-board microprocessor implements all control functions, and oversees SCSI communications via a Qlogic FAS209 SCSI-II processor. The microprocessor performs all power up diagnostics, data transfers, and error handling in the unit. The SC3500 can sustain a 2.3 Mbyte per second read throughput and 1.0 Mbyte per second write throughput. The unit responds to all Direct-Access device commands, uses a single-ended, unitized 50-pin interface and as with all single-ended SCSI devices, the SC3500 may be placed up to 18 feet (6 m) from the host SCSI controller. Data integrity is maintained using Memtech's proprietary Active Remap™ technology.

The drive is available in capacities ranging from 128 Mbytes to 36864 Mbytes. Please contact the factory with your requirements. Every drive is fully tested under environmental extremes using Memtech's Enduro Test, which guarantees data integrity under even the harshest conditions.



3. GENERAL DESCRIPTION

3.1 SCSI Interface

An intelligent SCSI controller from Qlogic, the FAS209, handles the SCSI interface for the SC3500. The FAS209 is SCSI-I and SCSI II compliant, and automates much of the interface overhead. It has a 16 byte FIFO, a DMA interface, and numerous command and control registers.

The SC3500 employs the following attributes:

1. Single-ended drivers
2. Termination power derived from cable or drive
3. Selectable parity on the interface
4. "Hard" RESET implemented
5. Reservation queuing

The SC3500 has implemented all mandatory SCSI-I and SCSI- II commands and several optional commands to enhance functionality. The following is a list of commands and their equivalent hexadecimal representation.

1.	Test Unit Ready	00h	M
2.	Rezero Unit	01h	O
3.	Request Sense	03h	M
4.	Format Unit	04h	M
5.	Read	08h	M
6.	Write	0Ah	O
7.	Inquiry	12h	M
8.	Mode Select	15h	O
9.	Reserve Unit	16h	M
10.	Release Unit	17h	M
11.	Mode Sense	1Ah	O
12.	Receive Diagnostics	1Ch	O
13.	Send Diagnostics	1Dh	M
14.	Read Capacity	25h	M
15.	Extended Read	28h	M
16.	Extended Write	2Ah	O
17.	Erase	2Ch	O
18.	Write & Verify	2Eh	O
19.	Verify	2Fh	O
20.	Read Defect	27h	O
21.	Write Buffer	3Bh	O
22.	Read Buffer	3Ch	O
23.	Change Definition	40h	O



The implemented messages on the SC3500 are as follows:

1. Command Complete	00h	Generated
2. Extended Message	01h	Both
3. Init Detected Error	05h	Received
4. Abort	06h	Received
5. Message Reject	07h	Generated
6. NoOp Message	08h	Received
7. Message Parity Error	09h	Received
8. Bus Device Reset	0Ch	Received
9. Identify	80h	Received

3.2 SCSI Connector

The SC3500 uses a unitized SCSI-2 connector incorporating both the 50-pin right angle 0.1 inch center connector and the 4-pin AT power connector. Maximum cable length is 6 meters. The diagram below depicts connector orientation and location.

3.2.1 SCSI Connector Physical Orientation

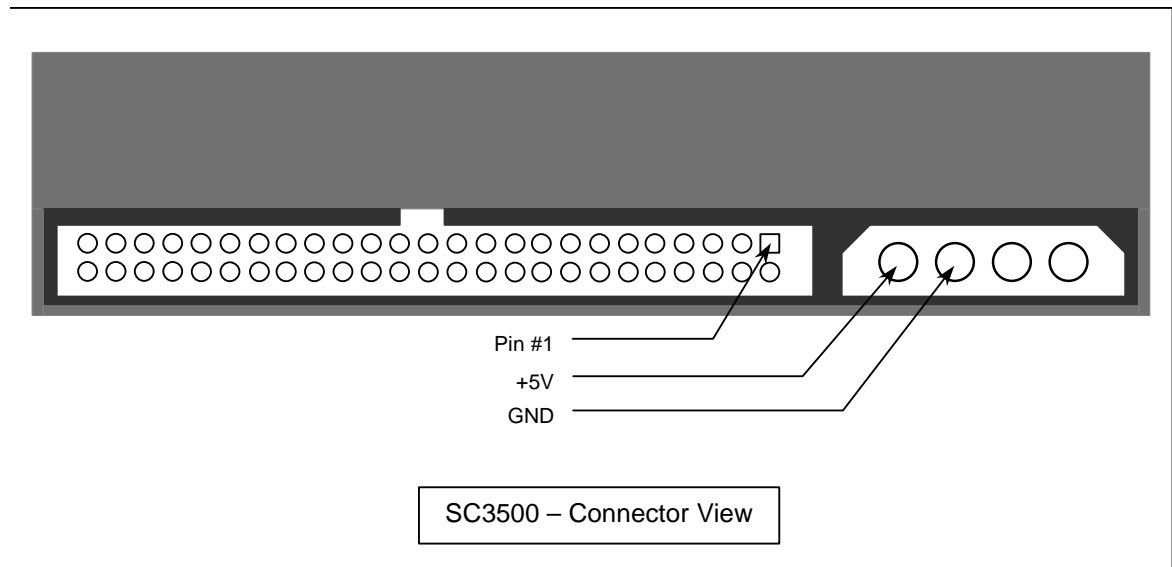


Fig. 1: SC3500 SCSI connector view



3.2.2 SCSI Connector Pinout

The following shows the pin connections for the SCSI connector used on the SC3500.

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



3.3 SCSI Commands

3.3.1 Test Unit Ready Command – 00h

Bit Byte	7	6	5	4	3	2	1	0
0	Operation code (00h)							
1	Logical unit number			Reserved				
2	Reserved							
3	Reserved							
4	Reserved							
5	Control							

Test Unit Ready CDB

The TEST UNIT READY command provides a means to check if the logical unit is ready. This is not a request for a self-test. If the logical unit would accept an appropriate medium-access command without returning CHECK CONDITION status, this command shall return a GOOD status. If the logical unit cannot become operational or is in a state such that an initiator action is required to make the unit ready, the target shall return CHECK CONDITION status with a sense key of NOT READY.

3.3.2 Rezero Unit Command – 01h

Bit Byte	7	6	5	4	3	2	1	0
0	Operation code (01h)							
1	Logical unit number			Reserved				
2	Reserved							
3	Reserved							
4	Reserved							
5	Control							

Rezero Unit CDB

The REZERO UNIT command requests that the target set the logical unit to a specific state. This is implemented on the SC3500 as a NOP command and has no effect other than to verify the CDB.



3.3.3 Request Sense Command – 03h

Bit Byte	7	6	5	4	3	2	1	0
0	Operation code (03h)							
1	Logical unit number			Reserved				
2	Reserved							
3	Reserved							
4	Allocation length							
5	Control							

Request Sense CDB

The REQUEST SENSE command requests that the SC3500 transfer sense data to the initiator. If the SC3500 has no sense data available to return, it will return a sense key of NO SENSE and an additional sense code of NO ADDITIONAL SENSE INFORMATION. The sense data shall be preserved by the target for the initiator until retrieved by a REQUEST SENSE command or until the receipt of any other I/O process for the same I_T_x nexus. Sense data shall be cleared upon receipt of any subsequent I/O process (including REQUEST SENSE) to the same I_T_x nexus.

The target shall return CHECK CONDITION status for a REQUEST SENSE command only to report exception conditions specific to the command itself. For example:

- a) A non-zero reserved bit is detected in the command descriptor block;
- b) An unrecovered parity error is detected on the data bus;
- c) A target malfunction prevents return of the sense data.

If a recovered error occurs during the execution of the REQUEST SENSE command, the target shall return the sense data with GOOD status. If a target returns CHECK CONDITION status for a REQUEST SENSE command, the sense data may be invalid.

The SC3500 is capable of returning eighteen bytes of data in response to a REQUEST SENSE command. If the allocation length is eighteen or greater, and the SC3500 returns less than eighteen bytes of data, the initiator should assume that the bytes not transferred would have been zeros had the target returned those bytes. Initiators can determine how much sense data was returned by examining the allocation length parameter in the command descriptor block and the additional sense length in the sense data.

The sense data format for error codes 70h (current errors) and 71h (deferred errors) are defined below. For further details on the Request Sense command, please refer to the SCSI specification.



Bit Byte	7	6	5	4	3	2	1	0
0	Valid	Error code (70h or 71h)						
1	Segment number							
2	Filemark	ECM	ILI	Reserved	Sense key			
3 -- 6	(MSB)	Information						(LSB)
7	Additional sense length (n-7)							
8 -- 11	(MSB)	Command-specific information						(LSB)
12	Additional sense code							
13	Additional sense code qualifier							
14	Field replaceable unit code							
15 -- 17	SKSV	Sense-key specific						
18 -- n	Additional sense bytes							

Sense data format



3.3.4 Format Unit Command – 04h

The FORMAT UNIT command formats the medium into initiator addressable logical blocks per the initiator-defined options. In addition, the medium may be certified and control structures may be created for the management of the medium and defects.

Bit Byte	7	6	5	4	3	2	1	0	
0	Operation code (04h)								
1	Logical unit number			FmtData	CmpLst	Defect list format			
2	Vendor-specific								
3	(MSB)	Interleave							
4								(LSB)	
5	Control								

Format Unit CDB

Only the simplest and mandatory forms of the FORMAT UNIT command (with no format data) are implemented on the SC3500. This routine accomplishes medium formatting with little initiator control over defect management.

The FORMAT UNIT command shall be rejected with RESERVATION CONFLICT status if the logical unit is reserved, or any extent reservation, from any initiator, is active in the specified logical unit. During the execution of the FORMAT UNIT command, the SC3500 may perform a medium defect management algorithm.

A FmtData bit of zero indicates that a DATA OUT phase shall not occur. The source of defect information is not specified. This is the only form of the command the SC3500 supports.

A complete list (CmpLst) bit of one indicates that the defect list sent by the initiator is a complete list of defects. The existing defect list is discarded by the SC3500 and a new primary defect list is constructed. A CmpLst bit of zero indicates that the current defect list should be maintained. As a result a new primary is constructed that contains the existing list and any new defects the SC3500 may add during the format operation.



3.3.5 Read (6) Command – 08h

The READ (6) command requests that the SC3500 transfer data to the initiator. The most recent data value written in the addressed logical block shall be returned.

Bit Byte	7	6	5	4	3	2	1	0
0	Operation code (08h)							
1	Logical unit number			(MSB)				
2	Logical block address							
3								(LSB)
4	Transfer length							
5	Control							

Read (6) CDB

The logical block address field specifies the logical block at which the read operation shall begin. The transfer length field specifies the number of contiguous logical blocks of data to be transferred. A transfer length of zero indicates that 256 logical blocks shall be transferred. Any other value indicates the number of logical blocks that shall be transferred.

3.3.6 Write (6) Command – 0Ah

The WRITE (6) command requests that the target write the data transferred by the initiator to the medium.

Bit Byte	7	6	5	4	3	2	1	0
0	Operation code (0Ah)							
1	Logical unit number			(MSB)				
2	Logical block address							
3								(LSB)
4	Transfer length							
5	Control							

Write (6) CDB

The logical block address field specifies the logical block at which the write operation shall begin.

The transfer length field specifies the number of contiguous logical blocks of data to transfer. A transfer length of zero indicates that 256 logical blocks shall be transferred. Any other value indicates the number of logical blocks that shall be transferred.



3.3.7 Inquiry Command – 12h

The INQUIRY command requests that information regarding parameters of the SC3500 be sent to the initiator.

Bit Byte	7	6	5	4	3	2	1	0
0	Operation code (12h)							
1	Logical unit number			Reserved				EVPD
2	Page code							
3	Reserved							
4	Allocation length							
5	Control							

Inquiry CDB

An enable vital product data (EVPD) bit of one specifies that the SC3500 return the optional vital product data specified by the page code field. If any optional fields in the CDB are set that the SC3500 does not support, it will return a CHECK CONDITION status with the sense key set to ILLEGAL REQUEST and an additional sense code of INVALID FIELD IN CDB.

An EVPD bit of zero specifies that the SC3500 return the standard INQUIRY data. If the page code field is not zero, the target shall return CHECK CONDITION status with the sense key set to ILLEGAL REQUEST and an additional sense code of INVALID FIELD IN CDB. The page code field specifies which page of vital product data information the SC3500 return.

The INQUIRY command shall return CHECK CONDITION status only when the target cannot return the requested INQUIRY data. The INQUIRY data should be returned even though the peripheral device may not be ready for other commands. If an INQUIRY command is received from an initiator with a pending unit attention condition, the SC3500 will perform the INQUIRY command and not clear the unit attention condition.



Bit Byte	7	6	5	4	3	2	1	0
0	Peripheral qualifier			Peripheral device type				
1	RMB	Device-type modifier						
2	ISO version		ECMA version			ANSI-approved version		
3	AENC	TrmIOP	Reserved		Response data format			
4	Additional length (n-4)							
5	Reserved							
6	Reserved							
7	RelAdr	WBus32	WBus16	Sync	Linked	Reserved	CmdQue	SftRe
8	(MSB) Vendor identification							
15	(LSB)							
16	(MSB) Product identification							
31	(LSB)							
32	(MSB) Product revision level							
35	(LSB)							
36	Vendor-specific							
55								
56	Reserved							
95								
	Vendor-specific parameters							
96	Vendor-specific							
n								

Standard Inquiry Data Format

Please refer to the SCSI specification for further details on the vital product data pages and formats.



3.3.8 Reserve Unit – 16h

The RESERVE command is used to reserve a logical unit or, if the extent reservation option is implemented, extents within a logical unit.

Bit Byte	7	6	5	4	3	2	1	0
0	Operation code (16h)							
1	Logical unit number			3rdPty	Third party device ID			Extent
2	Reservation identification							
3	(MSB)							
4	Extent list length							(LSB)
5	Control							

Reserve CDB

3.3.9 Release Unit – 17h

The RELEASE command is used to release a previously reserved logical unit, or, if the extent release option is implemented, to release previously reserved extents within a logical unit.

Bit Byte	7	6	5	4	3	2	1	0
0	Operation code (17h)							
1	Logical unit number			3rdPty	Third party device ID			Extent
2	Reservation identification							
3	Reserved							
4	Reserved							
5	Control							

Release CDB



3.3.10 Mode Sense

The MODE SENSE (6) command provides a means for a target to report parameters to the initiator. It is a complementary command to the MODE SELECT (6) command.

Bit Byte	7	6	5	4	3	2	1	0
0	Operation code (1Ah)							
1	Logical unit number			Reserved	DBD	Reserved		
2	PC		Page code					
3	Reserved							
4	Allocation length							
5	Control							

Mode Sense CDB

A disable block descriptors (DBD) bit of zero indicates that the target may return zero or more block descriptors in the returned MODE SENSE data, at the target's discretion. A DBD bit of one specifies that the target shall not return any block descriptors in the returned MODE SENSE data. The page control (PC) field defines the type of mode parameter values to be returned in the mode pages. The page code specifies which mode page to return.

Page code	Description	Subclause
00h	Vendor-specific (does not require page format)	
01h - 1Fh	See specific device-types	
20h - 3Eh	Vendor-specific (page format required)	
3Fh	Return all mode pages	



3.3.11 Send Diagnostics – 1Dh

The SEND DIAGNOSTIC command requests that the SC3500 perform diagnostic operations on itself. The only mandatory implementation of this command is the self-test feature with the parameter list length of zero.

Bit Byte	7	6	5	4	3	2	1	0
0	Operation code (1Dh)							
1	Logical unit number			PF	Reserved	SelfTest	DevOfL	UnitOfL
2	Reserved							
3	(MSB)							
4	Parameter list length							(LSB)
5	Control							

Send Diagnostics CDB

3.3.12 Read Capacity – 25h

The READ CAPACITY command provides a means for the initiator to request information regarding the capacity of the logical unit.

Bit Byte	7	6	5	4	3	2	1	0
0	Operation code (25h)							
1	Logical unit number			Reserved				RelAdr
2	(MSB)							
3								
4	Logical block address							
5								
6								
7								
8	Reserved							PMI
9	Control							

Read Capacity CDB



3.3.13 Extended Read (10) – 28h

The READ (10) command requests that the target transfer data to the initiator. The most recent data value written in the addressed logical block is returned.

Bit Byte	7	6	5	4	3	2	1	0
0	Operation code (28h)							
1	Logical unit number			DPO	FUA	Reserved		RelAdr
2	(MSB) _____							
3	_____							
4	Logical block address							
5	_____ (LSB)							
6	Reserved							
7	(MSB) _____							
8	Transfer length							
9	_____ (LSB)							
9	Control							

Read (10) CDB

3.3.14 Extended Write (10)

The WRITE (10) command requests that the SC3500 write the data transferred by the initiator to the medium.

Bit Byte	7	6	5	4	3	2	1	0
0	Operation code (2Ah)							
1	Logical unit number			DPO	FUA	Reserved	Reserved	RelAdr
2	(MSB) _____							
3	_____							
4	Logical block address							
5	_____ (LSB)							
6	Reserved							
7	(MSB) _____							
8	Transfer length							
9	_____ (LSB)							
9	Control							

Write (10) CDB



3.3.15 Erase Command

Bit Byte	7	6	5	4	3	2	1	0
0	Operation code (2Ch)							
1	Logical unit number			Reserved		ERA	Reserved	RelAdr
2	(MSB)							
3	Logical block address							
4								
5								
6	Reserved							
7	(MSB)							
8	Transfer length							
9	(LSB)							
9	Control							

Erase CDB

The ERASE (10) command requests that the target erase the specified number of blocks starting at the specified logical block address on the medium. As used here, erased means the medium shall be erased. The previous data recorded on the medium, if any, shall not be recoverable. The Remap Table™ is retained, thus allowing write and read access to the memory.

The erase all (ERA) bit set to one indicates that all blocks on the medium shall be erased. If the ERA bit is set to one and if the number of blocks is not zero, the SC3500 will return CHECK CONDITION, and the sense key shall be set to ILLEGAL REQUEST, with an additional sense code of INVALID FIELD IN CDB. If the ERA bit is zero a transfer length of zero indicates that no blocks shall be erased. This condition is not considered an error and no data is erased. Any other value indicates the number of logical blocks that shall be erased.

A note about the Erase Command –

The erase command has been implemented as a security erase mechanism on the SC3500. The command was originally created and used by tape backup devices. When executed with ERA set, a 1 Gbyte drive can be wiped clean in about 10 seconds. All storage locations on the drive are erased, including both user and system (protected) data areas. At the conclusion of the erase command, the existing Remap Table™ is restored to memory.



4. GENERAL SPECIFICATIONS

Interface

SCSI Compatibility	ANSI X3.131-1994
SCSI Device Type	0 - Direct Access Device
Maximum Capacity	36864 Mbytes
Bytes/Block	512
Bus Width	8 bits
Termination	Active – on board

Data Transfer Specifications

Bus width	1 byte (8 bits)
Synchronous Transfer Rate	10 Mbyte/sec
Media Transfer Rate	8 Mbyte/sec
Read Transfer Rate	2.3 Mbyte/sec., sustained
Write Transfer Rate	1.0 Mbyte/sec sustained
Data Access time	0.7 msec

Environmental Requirements

Operating Ambient Temperature	
Commercial	0°C to +70°C
Extended	-20°C to +75°C
Industrial	-40°C to +85°C
Storage Temperature	-55°C to +125°C Ambient
Humidity	5% to 95% non-condensing
Airflow Requirements	none
Ceiling	no limit

Mechanical (Full Capacity)

Length	146mm (5.75 in.)
Width	102mm (4.00 in.)
Min Height	16.0mm (0.63 in.)
Drive Form Factor	3.5" low profile drive
Mounting Considerations	None (any orientation)
Max Weight	18.5 ounces (525 grams)

Power Requirements

Vcc Supply	+5 volts +/- 5%
Vdd Supply	+12 volts not used
Power Idle	0.50 watts
Power Active	0.90 watts
Power Max	1.10 watts

5. JUMPER CONFIGURATION

5.1 Jumper and Switch Locations

The following diagrams show the unit and the relative jumper and switch locations.

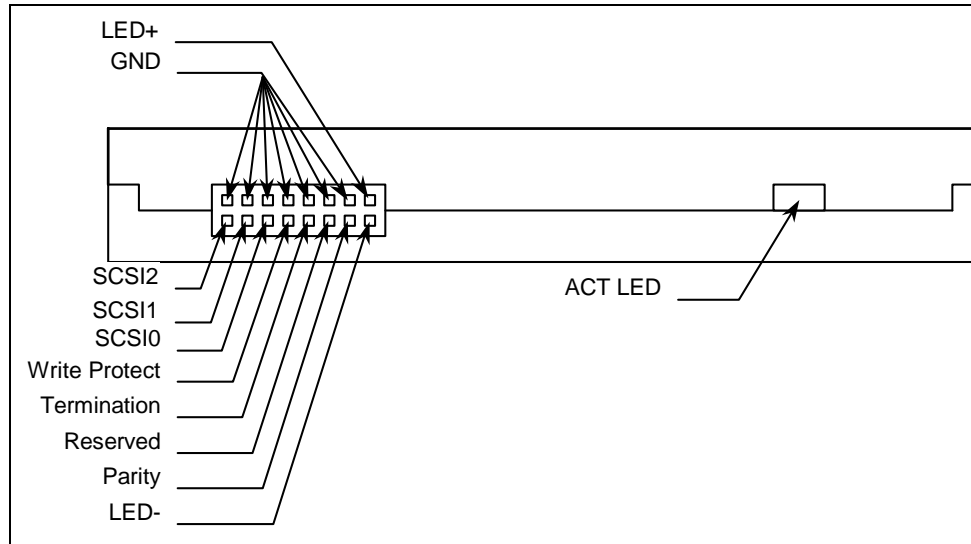


Figure 2: SC3500 Front view

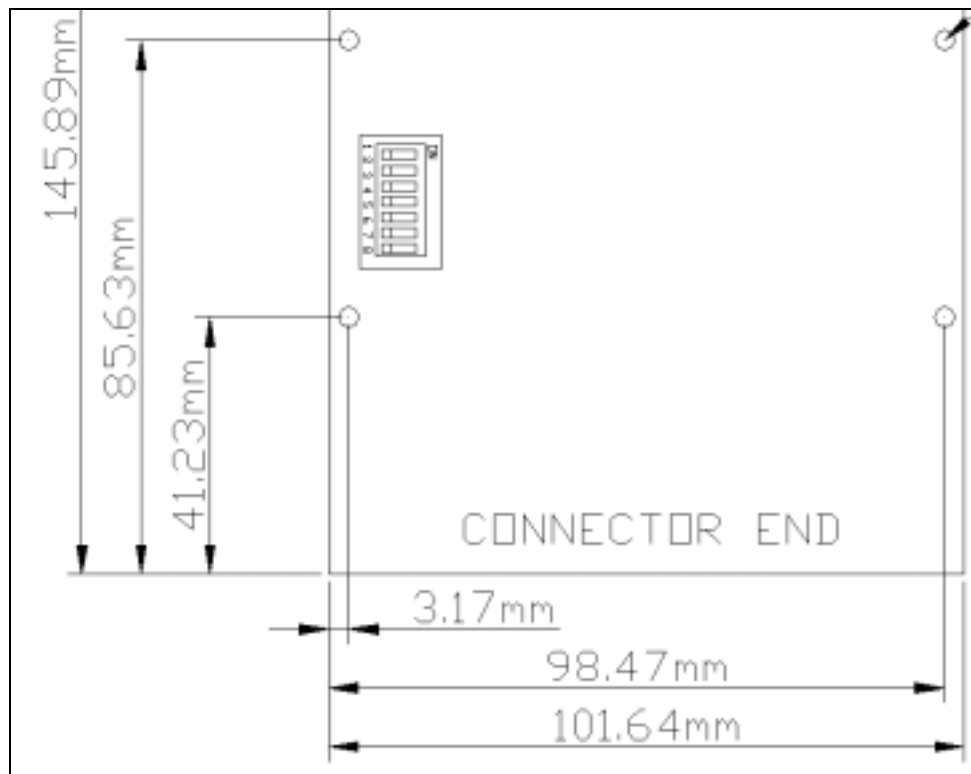


Fig 3: SC3500 Bottom View



5.2 SCSI ID Selection

The SC3500 can use any of the 8 SCSI IDs available on the SCSI bus, although the highest priority device, SCSI ID 7, is usually reserved for the initiator. Switch selection for each SCSI ID is shown below. The SCSI Selection switch, E8, determines whether the jumper block or switch is used to select the SCSI ID.

SWITCH SCSI SEL	JUMP SCSI2	JUMP SCSI1	JUMP SCSI0	SW E3	SW E2	SW E1	SCSI ID SELECTED
OFF	X	X	X	OFF	OFF	OFF	0
OFF	X	X	X	OFF	OFF	ON	1
OFF	X	X	X	OFF	ON	OFF	2
OFF	X	X	X	OFF	ON	ON	3
OFF	X	X	X	ON	OFF	OFF	4
OFF	X	X	X	ON	OFF	ON	5
OFF	X	X	X	ON	ON	OFF	6
OFF	X	X	X	ON	ON	ON	7
ON*	OFF	OFF	OFF	X	X	X	0*
ON	OFF	OFF	ON	X	X	X	1
ON	OFF	ON	OFF	X	X	X	2
ON	OFF	ON	ON	X	X	X	3
ON	ON	OFF	OFF	X	X	X	4
ON	ON	OFF	ON	X	X	X	5
ON	ON	ON	OFF	X	X	X	6
ON	ON	ON	ON	X	X	X	7

* default setting is SCSI ID0 selected from jumpers

5.3 Write Protection

Switch position E6 or the WP jumper is used to write protect the SC3500. When the host processor sends a write command, the condition of this switch is checked. If the switch or jumper is on, writes are disabled, and an error message will be returned to the SCSI controller. Moving both the switch and jumper to the off position will enable writes on the board, allowing full read/write access to the memory array.

5.4 Termination

The SC3500 employs active termination. Termination is normally disabled on the drive. To enable termination, set the switch at location E4 on or install the Termination jumper on the jumper block.



5.5 Termination Power

The SC3500 can supply termination power to the drive and cable by setting the switch at position E5 on. Normally, the SCSI initiator supplies power for termination.

5.6 Parity

Parity on the SCSI interface can be enabled or disabled by using the parity jumper. If the jumper is not installed (default), parity is enabled. Installing the parity jumper disables parity.

5.7 Remote LED

The SC3500 can drive a remote LED by attaching it to the last set of pins on the jumper block. Note the polarity of the pins as indicated in the jumper block drawing.

5.8 Reserved locations

There are two reserved jumper or switch locations that should never be set. Never install a jumper in the sixth jumper location, and do not use the drive with switch setting 7 in the ON position.

5.9 Memory Size

Jumpers are not used to determine the drive's memory size. The memory size is determined when the SC3500 is built and preformatted at the factory. With some SCSI adapter cards the memory size is displayed when the BIOS message is returned at power up. If that memory size changes, contact Memtech factory repair. Memory capacity can only be upgraded at the factory.



6. INSTALLATION

6.1 Default Configuration

By default, no jumpers are installed on the jumper block at the front (LED) side of drive, and no switch positions on the switch block, accessed from the bottom of the drive, are set to the on position. This configures the drive as follows:

DEFAULT JUMPER AND SWITCH CONFIGURATION

- SCSI ID 0, controlled by switch block
- Write Protect disabled
- Termination disabled
- Termination power sourced by cable
- Parity enabled

Always power down the unit before changing the any jumper or switch settings. Changing these settings with power applied may result in the changes not being recognized or worse, damage to the drive.

Note that some settings are controlled by both the jumper block (at the LED end of the drive) and the DIP switch located on the under side of the drive. A setting is made active (low) at either location. To deactivate a control, it must be deactivated (jumper off and switch set to off) at both locations.

See section 5 for a detailed description of the jumper and switch block and their locations.

6.2 Hardware Installation Procedure

- 6.2.1 Verify that the drive is configured as required by the application. Many SCSI controllers require that the system disk be addressed as device 0 or 1 on the SCSI bus. If a different ID is required, refer to section 5 for proper switch settings.
- 6.2.2 Power off the computer system by throwing the main power switch.
- 6.2.3 Disconnect the AC power cord from the computer system.
- 6.2.4 Open the system to allow access to the drive bays and the card slots as required.
- 6.2.5 If a SCSI initiator is not already installed in the system or on the motherboard, then install that card.
- 6.2.6 Install the SC3500 into a standard 3 1/2" drive bay, or using adapter hardware, place the unit into a 5 1/4" drive bay. Any mounting orientation is acceptable.
- 6.2.7 Attach the 50-pin flat ribbon connector from the SCSI initiator to the SC3500. If multiple devices are to be attached to the SCSI bus, then remove any terminating resistors or disable active termination on those units not at the END of the cable. Only the two devices at the ends of the SCSI bus should have



termination enabled. Failure to comply with this requirement may cause erroneous operation of the SCSI bus.

- 6.2.8 Make sure that pin one on the cable, on the SCSI controller and on the SC3500 are correctly aligned. The SC3500 connector is keyed, so a keyed cable is recommended to maintain proper pin one orientation.
- 6.2.9 Attach the power cable from the system power supply to the SC3500. This cable is keyed and cannot be inserted backwards. At this point, installation is complete.
- 6.2.10 Reattach the AC power cable to the system and power the system up.

6.3 Power and Cable Attachments

The following diagram depicts the SC3500 as viewed from the connector (Back View). Pin 1 of the SCSI interface and the power connections are as labeled.

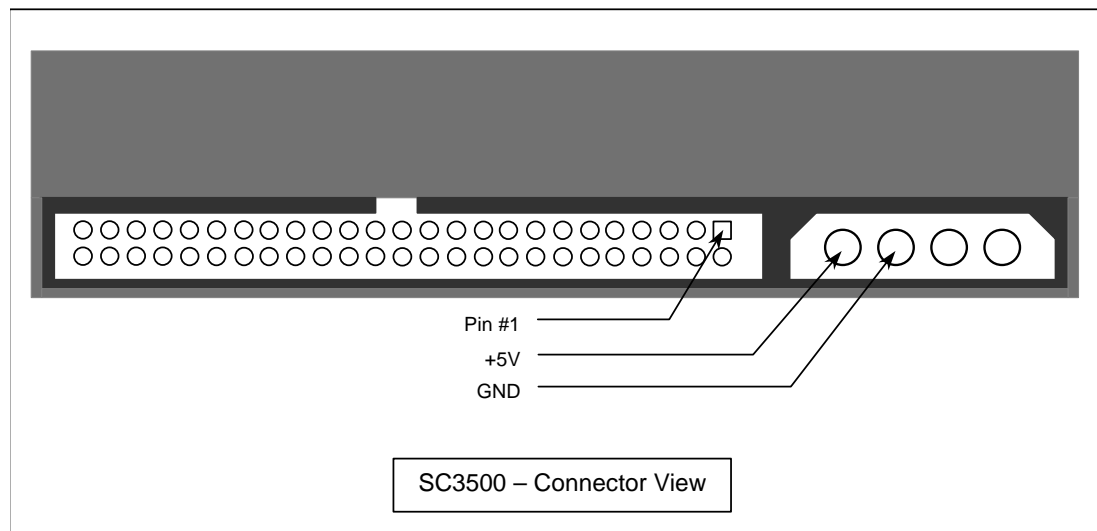


Figure 4: SC3500 back view

6.4 Software Installation Procedure

With the SC3500 installed, the user can now treat the device as a standard Direct Access SCSI device. Standard implementation of the SC3500 will include building a partition table with FDISK and high-level formatting. Low level formatting is not required or recommended as the drive is low-level formatted at the factory. Refer to your system documentation for detailed OS installation instructions.



7. MECHANICAL DRAWINGS

The following are mechanical drawings for the SC3500. All mounting screws are 6-32 with a 0.25" maximum penetration.

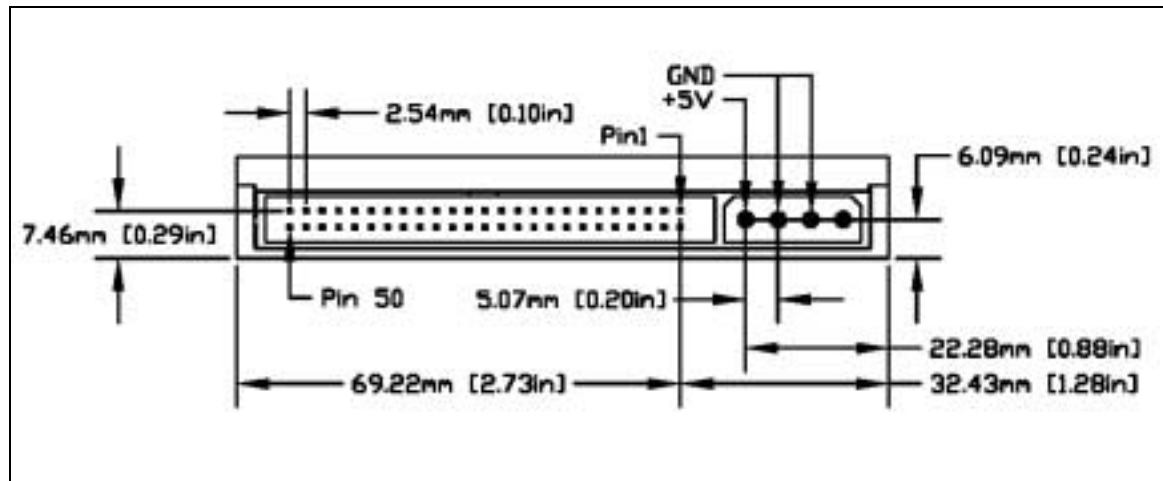


Fig 5: SC3500 connector view

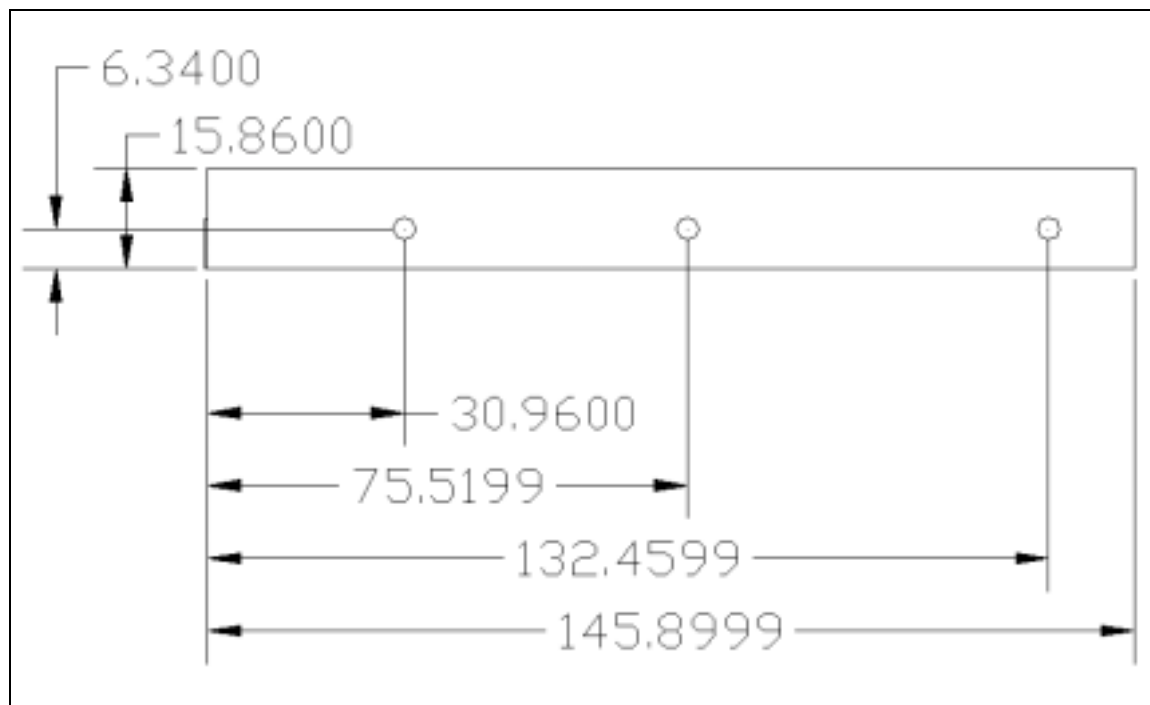


Figure 6: SC3500 Side View

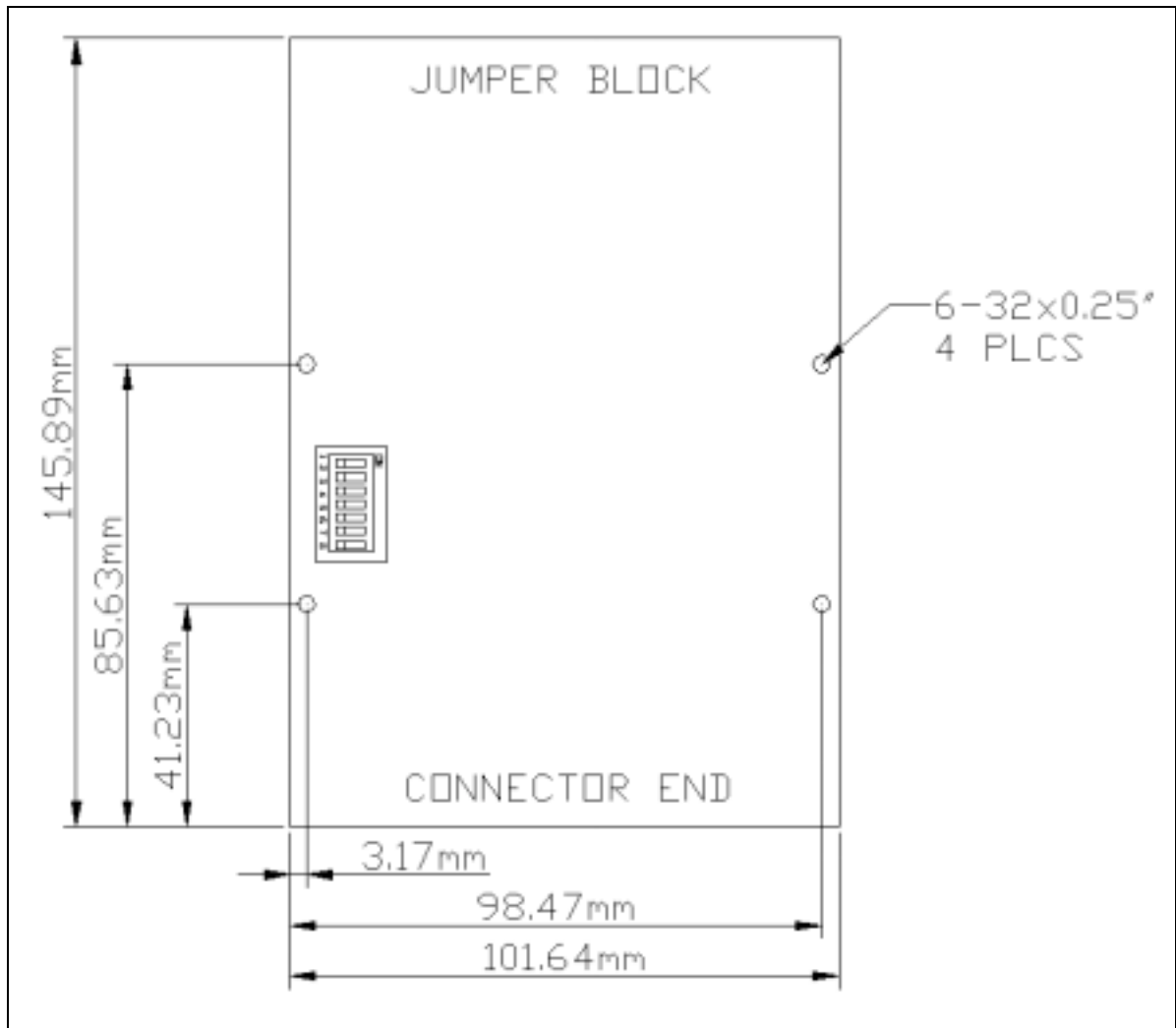


Fig 7: SC3500 Bottom View



8. TROUBLE SHOOTING GUIDE

The following is a list of possible error indicators or messages, what they indicate, and possible solutions to the source problem. If no solution is found, contact the factory for further assistance.

8.1 Error Blink Codes -

If the green LED issues a repeating blink code (accompanied by the drive not responding to SCSI commands), this indicates a hard error condition as listed in the table below. Contact the Memtech factory for repair service.

Number of Blinks	Error
2	ROM Firmware Checksum error
3	ASIC initialization error
4	SRAM Test failed
5	Remap Table error
6	SCSI controller error
7	Flash/Data Path error

8.2 Warning Blink Codes –

The green LED is also used to indicate a number of warning conditions. If a warning condition is encountered, the green LED will issue the number of rapid or warbling blinks indicated below a single time, then continue the power-up procedure. Please note that the warning condition is also entered after each SCSI reset, so the blink code may be issued several times during power-up at irregular intervals.

Number of Blinks	Error
1	No Flash memory
2	Invalid Remap Table
3	Remap Table disabled

8.3 Red LED on steady at power-up-

The red LED will come on when the remap table becomes full. One or more memory devices have exceeded their useful life. Contact Memtech repair department for repair or upgrade options.

8.4 Unit does not respond to SCSI commands -

If the unit passes power-up diagnostics, but does not respond to SCSI commands, there may be a SCSI ID contention among the SCSI bus units. Make sure that every SCSI ID used on the bus is different. See section 5 to find out how to change the SCSI ID of the unit.



9. APPENDIX

9.1 Contact Information

For Technical Support or Warranty Repair information, please contact Memtech:

7628 Las Positas Road
Livermore, CA 94551 U.S.A.
Phone: (925) 294-8483
Fax: (925) 294-5920
Email: Info@memtech.com

9.2 SCSI specification information

Information regarding the SCSI-II specification may be obtained from the following locations:

Global Engineering
15 Inverness Way East
Englewood, Co. 80112-5704
Phone: (303) 792-2181 or (800) 854-7179
Fax: (303) 792-2192

9.3 Limited Lifetime Warranty

Memtech SSD Corporation (Memtech) warrants your SC3500 against defects in material and workmanship for the life of the drive. The warranty is void in the case of misuse, accident, alteration, improper installation, misapplication or the result of unauthorized service or repair.

The implied warranties of merchantability and fitness for a particular purpose, and all other warranties, expressed or implied, except as set forth in this warranty, shall not apply to the products delivered.

In no event shall Memtech be liable for any lost profits, lost savings or other incidental or consequential damages arising out of the use of, or inability to use, this product.

BEFORE RETURNING PRODUCT, A RETURN MATERIAL AUTHORIZATION (RMA) MUST BE OBTAINED FROM MEMTECH.

Product shall be returned to Memtech with shipping prepaid. If the product fails to conform and warranty repair is necessary, Memtech will reimburse customer for the transportation charges incurred.