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User's Manual

PMCSCU2A

Enhanced Ultra2 SCSI
PMC Module

Board Revision **A**
Manual **Revision A** 30 March 2001

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1. Introduction

1.1 Scope

This manual provides:-

A getting started guide.
Configuration details.
A user reference guide.
Details of implementation specific considerations for major devices.
General Hardware Description.

This user manual *does not* provide:-

Detailed data on the operation of the SCSI controller device.
Detailed data on the operation of the EEPROM.
Detailed data on the operation of the FLASH EPROM.
Details on the content of the PMC specification.
Details on the content of the SCSI specification.

Information is provided to allow the module to be integrated into a system and configured by the system engineer. The User manual is intended for use by system integrators, service personnel, software engineers and end users.

Unless otherwise stated, address information is in hexadecimal notation.

1.2 PMCSCU2A Part Numbers

Part Number	Description
853-10315	Enhanced Ultra2 SCSI PMC Module

A Windows® driver disc is available containing the Symbios™ SCSI Controller drivers, BVM installation files & diagnostic software.

Part Number	Description
850-10351	Windows® Driver Disc

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2. Overview

2.1 Board Layout

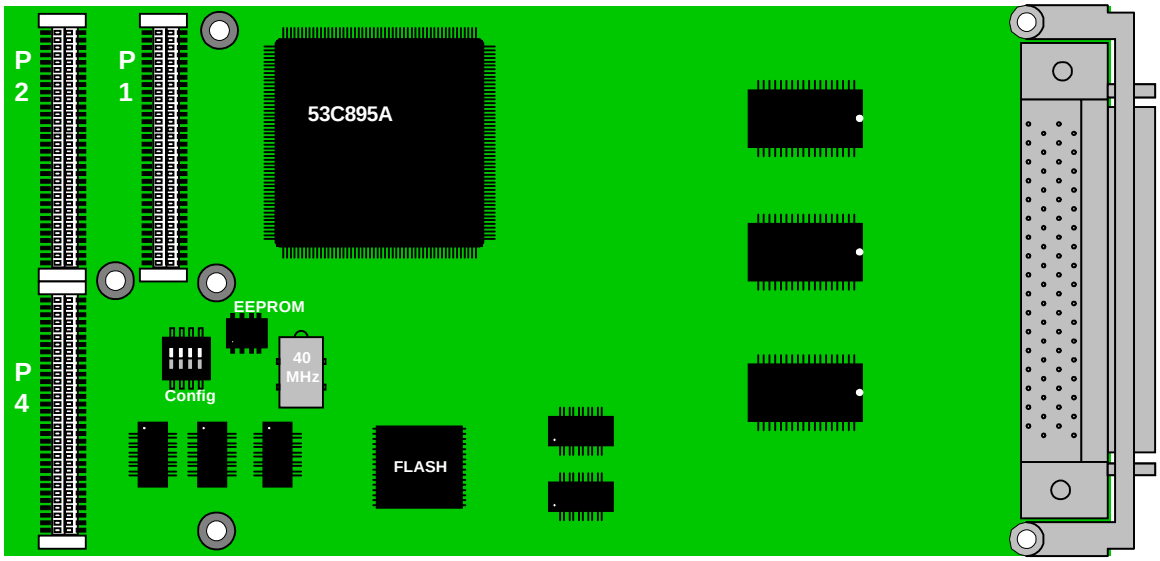


Figure 1 Board Layout Topside

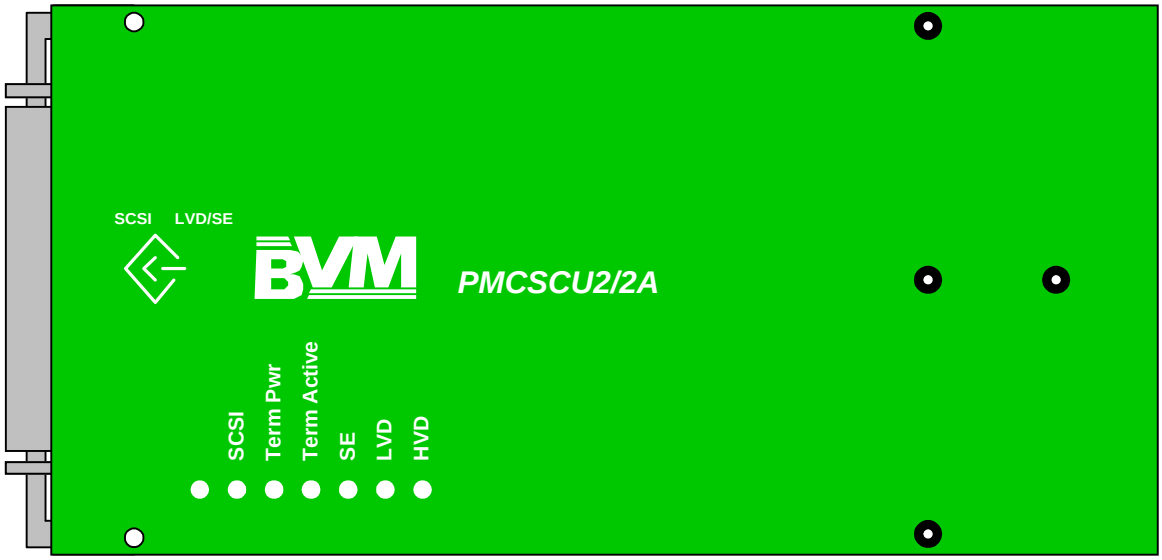


Figure 2 Board Layout Underside

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2.2 Features

- 32-bit PCI single chip Ultra 2 SCSI controller (SYM53C895A).
- Auto-sensing of LVD (low voltage differential) or SE (single ended) SCSI connection.
- Accidental connection to HVD (high voltage differential) causes board shut-down.
- Supports up to 80Mbytes/sec transfer rate using Wide Ultra 2 SCSI (LVD mode) and 40Mbytes/sec in SE mode.
- Software control of SCSI terminators. Automatic selection LVD or SE termination.
- Support for up to 16 devices in LVD mode or 8 in SE mode (including PMCSCU2A).
- Configuration EEPROM (16Kbits) for set-up parameters and other configuration information.
- On-board FLASH for BIOS & SDMS™ (SCSI Device Management System).
- SCSI signals accessible via 68-way SCSI-II front panel connector as well as rear I/O via PMC connector P4.
- Conforms to PMC standard IEEE P1386.1/Draft 2.3 9th October 2000.
- Conforms to PCI Local Bus Specification Revision 2.2.

2.3 Applications

- High performance storage interface for industrial PC's or servers.
- Interface to high performance hard disc's
- Interface to CD-ROM drives.
- Interface to tape streamers.
- Interface to SCSI scanners.

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3. Operation

3.1 Block Diagram

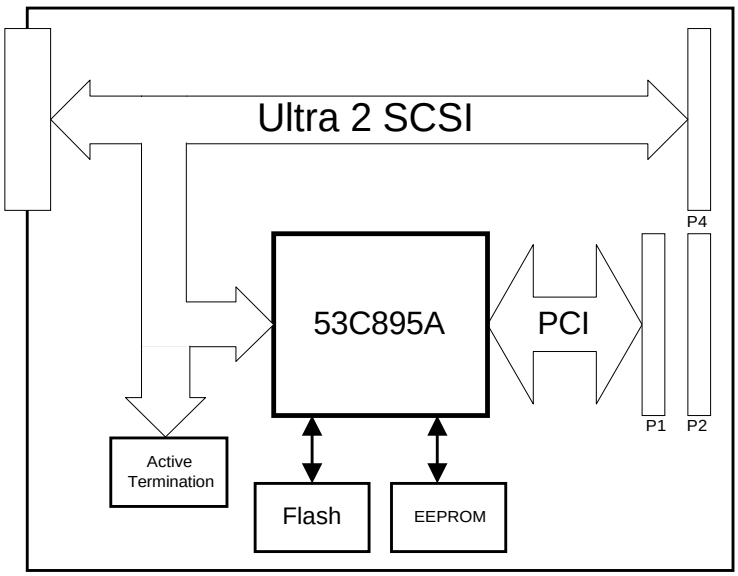


Figure 3 Block Diagram

3.2 SYM53C895A SCSI Controller

The PMCSCU2A uses a SYM53C895A PCI-to-Ultra2 SCSI I/O Processor, which incorporates Universal Low Voltage Differential (LVD) signalling for SCSI. The SYM53C895A uses LVDlink™ transceivers, which remove the distance and device constraints in SCSI single-ended designs and offer higher data transfer rates. As compared to Ultra SCSI designs, the SYM53C895A provides twice the performance and allows four times the cable length and number of connected devices.

The SYM53C895A can support up to 12m cables and up to 15 peripheral LVD devices on a wide LVD SCSI bus, with the same cables and connectors defined in the SCSI-3 Parallel Interface ANSI standard. For backward compatibility to existing single-ended devices, the Universal I/O features of LVDlink™ transceivers allow the chip to switch between LVD and single-ended mode. In single-ended mode, the SYM53C895A performs synchronous data transfers up to Ultra SCSI rates, subject to Ultra SCSI distance and device constraints.

3.2.1 Ultra2 SCSI Support

The performance advantage of Ultra2 SCSI over Fast SCSI-2 and Ultra SCSI is most noticeable in applications that use large block size transfers such as video production and editing, or medical imaging, where large files must be stored or transported. The high SCSI bandwidth of Ultra2 SCSI, and the improvements in distance, connectivity, and reliability, make the SYM53C895A an ideal host connection to a RAID controller. Ultra2 SCSI performance along with the other features in the SYM53C895A make it ideal for these and other demanding applications in the high performance RAID subsystem, workstation, and server markets.

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3.2.2 Major Features

- Ultra2 SCSI I/O Processor.
  - Performs SCSI data transfers up to 80Mbytes/sec, synchronous operation on a wide LVD SCSI bus.
  - Transfers SCSI data synchronously up to Ultra SCSI speeds in single-ended mode.
  - Allows total SCSI cable lengths up to 12m (longer cables may be possible in point-to-point solutions).
  - Allows up to 15 peripheral LVD SCSI devices on the wide bus.
- Extra large 944byte DMA FIFO for improved bus-to-bus speed matching.
  - Accommodates extra data while data bursting is occurring.
  - Provides better support for large block size transfers at Ultra2 SCSI speeds.
  - Allows the chip to handle a full disc sector.
  - Supports up to 512byte bursts across the PCI bus.
- 31 levels of SCSI Synchronous Offset.
  - Increases the pace of synchronous transfers to match Ultra2 SCSI transfer speed.
- On-chip LVDlink™ Universal Low Voltage Differential transceivers.
  - Do not require external precision regulators or resistors to operate.
  - Allows greater device connectivity and longer cable length.
  - Transceivers switch between single-ended and LVD to support backward compatibility.
  - Provides reliability and distance of differential.
  - SCSI without the cost of external differential transceivers.
  - LVDlink™ supports a long-term performance migration path to over 100 mega-transfers per second.
- On-chip clock quadrupler for achieving 160MHz internal SCSI clock while using an external 40MHz oscillator.

3.2.3 PCI Features

- Connects directly as one load to the PCI bus.
- 944byte DMA FIFO for improved speed matching.
- Functions as full 32-bit PCI DMA Bus Master.
- Supports 64-bit PCI Dual Address Cycles.
- Complies with PCI 2.2 Specification.
- Supports 33MHz PCI Bus zero wait state operation.
- Performs zero wait-state bus master data bursts faster than 110 Mbytes/sec (@ 33 MHz).
- Supports PCI extended access cycles.

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3.2.4 SCSI Features

- Includes 8Kbytes of internal RAM for SCSI SCRIPTS™ instruction storage, to reduce or eliminate instruction fetches over the PCI bus.
- Pre-fetches up to 8 dwords of SCSI SCRIPTS instructions, reducing PCI bus overhead.
- Expands arithmetic capabilities with enhanced Register Move instruction support.
- Supports SCSI SCRIPTS Load and Store instructions, for more efficient moving of data between memory and chip register space.
- Integrates local memory bus for BIOS storage in FLASH memory.
- LVDlink™ transceivers utilise LSI Logic TolerANT® active negation technology for improved single-ended SCSI signal integrity.

3.2.5 LVD Transceivers

The SYM53C895A has integrated Universal LVDlink™ transceivers, and uses the Differential Sense (DIFFSENS) signal to detect the bus cabling condition. The universal features of LVDlink™ transceiver's support single-ended (SE) or low-voltage-differential (LVD) SCSI modes, depending on the type of devices connected to the bus.

3.2.6 SYM53C895A Enhancements

The SYM53C895A SCSI controller used on the PMCSCU2A features a number of enhancements to the original SYM53C895 SCSI controller used on the PMCSCU2 - the major differences are summarised below.

- Supports 32-bit PCI Interface with 64-bit addressing (Dual Address Cycle).
- Handles SCSI phase mismatches in SCRIPTS without interrupting the CPU.
- Supports RAID ready alternative interrupt signalling.
- Supports PC99 Power Management.
- Automatically downloads Subsystem Vendor ID, Subsystem ID, and PCI power management levels D0, D1, D2, and D3.
- Improves PCI bus efficiency through improved PCI Caching design.
- Transfers Load and Store data to or from 8 Kbytes of internal SCRIPTS RAM.
- Hardware control of SCSI activity LED.
- 32-bit ISTAT register (Interrupt Status (ISTAT0), Interrupt Status 1 (ISTAT1), Mailbox0 (MBOX0), Mailbox1 (MBOX1)).
- Optional 944byte DMA FIFO supports large block transfers at Ultra2 SCSI speeds. The default FIFO size of 112bytes is also supported.

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3.3 SCSI Termination

Active SCSI bus terminators are fitted on the PMCSCU2A, which are able to terminate the SCSI bus in either low-voltage-differential (LVD) or single-ended (SE) mode depending on the mode detected.

Normally the terminators are controlled by software, but a switch allows permanent enabling or disabling of the terminators. A 1.5A (max) resettable fuse protects the external termination power line against external short circuits.

See the information referenced in "A.6 SCSI Terminators (page 17)" for further details.

3.4 FLASH Memory

The PMCSCU2A is fitted with 128Kbytes of FLASH memory using an Am29F010 (90ns) device, which can be programmed (and erased) on board via the SYM53C895A device. It is designed to contain boot code to allow operating system booting via the SCSI interface.

See section "7.2 BIOS FLASH EPROM (page 15)" and the information referenced in "A.1 SYM53C895A (page 17)" and "A.5 Am29F010 FLASH EPROM (page 17)" for further details.

3.5 EEPROM

The PMCSCU2A is fitted with 16Kbits of EEPROM using a 24C16 device, which is supplied pre-programmed by BVM.

The contents of the EEPROM are read by the SYM53C895A on coming out of reset and are used to set up the control registers after reset, allowing the following to be set:

- PCI interface configuration.
- PCI Subsystem and Subsystem Vendor ID.
- BIOS configuration parameters.

See section "7.3 Configuration EEPROM (page 15)" and the information referenced in "A.1 SYM53C895A (page 17)" and "A.4 NM24C16 EEPROM (page 17)" for further details.

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4. Installation

1. PMC modules should only be installed when the host carrier board is in a powered-off condition to avoid damage to the PMC module and host carrier board. Normal ESD protection procedures should be followed to avoid damage to the board.
2. After removing any blanking panels on the host carrier front panel, the PMC module should be offered up to the host carrier site and the front panel carefully positioned through the host carrier front panel opening, taking care not to damage the EMC gasket on the PMC module front panel.
3. The PMC module should be fixed to the host carrier using four M2.5 x 6mm pan-head screws into the four fixing holes provided (two on the front panel and two on the spacers).
4. There is no voltage keying on the PMC100, it will work in both +3.3V and +5V host carriers.
5. The PMCSCU2A can be used with a standard 68-way SCSI cable which should be terminated with a suitable SCSI terminator - either single-ended (SE), low-voltage-differential (LVD) or automatic switching SE/LVD depending on the application - see section "6.1 Front Panel Connector (page 10)".
6. The PMCSCU2A switch must be set accordingly for SCSI termination on-board the PMCSCU2A - see section "5.2 Switch Settings (page 9)".
7. The installation can be tested with the Symbios™ SCSI BIOS Configuration Utility, which is entered from the SCSI BIOS - see section "7.2 BIOS FLASH EPROM (page 15)". The on-board LED's will assist this process - see section "5.1 LED Indicators (page 9)".

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5. Configuration

5.1 LED Indicators

Seven LED indicators are fitted, viewable from the top of the board when it is fitted onto a host carrier. The functions are shown below in order (1st closest to the front-panel).

LED Function	Colour
Software Controlled (via GPIO1)	**AMBER**
SYM53C895A is accessing the SCSI bus if ON	**RED**
SCSI Terminator Power ON or OFF	**GREEN**
SCSI Terminator Active if ON	**GREEN**
SCSI is SE if ON	**GREEN**
SCSI is LVD if ON	**GREEN**
SCSI is HVD if ON #	**GREEN**

Notes:

The PMCSCU2A does not support HVD mode - if this is indicated, the SYM53C895A will have shut down.

5.2 Switch Settings

SW1 poles 1 & 2 are used to select the SCSI termination mode as shown below. Switch poles 3 & 4 are unused.

Pole	ON	OFF
1	Enable software control of SCSI termination.	Disable software control of SCSI termination.
2	Enable SCSI termination. Software control must be disabled.	Disable SCSI termination or use auto if enabled.

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6. Connections

6.1 Front Panel Connector

Figure 4 shows the front panel SCSI connector pin numbering.

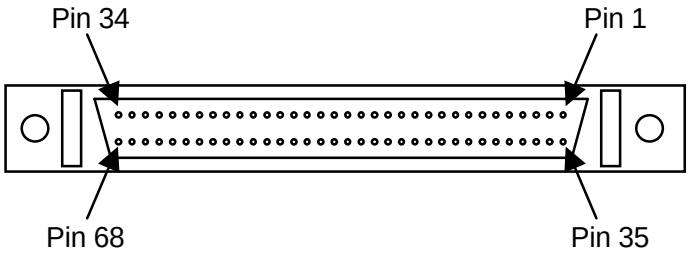


Figure 4 Front Panel SCSI Connection

The SCSI signal pin out is shown below:

Signal Name	Pin	Pin	Singal Name
+DB(12)	1	35	-DB(12)
+DB(13)	2	36	-DB(13)
+DB(14)	3	37	-DB(14)
+DB(15)	4	38	-DB(15)
+DB(P1)	5	39	-DB(P1)
+DB(0)	6	40	-DB(0)
+DB(1)	7	41	-DB(1)
+DB(2)	8	42	-DB(2)
+DB(3)	9	43	-DB(3)
+DB(4)	10	44	-DB(4)
+DB(5)	11	45	-DB(5)
+DB(6)	12	46	-DB(6)
+DB(7)	13	47	-DB(7)
+DB(P)	14	48	-DB(P)
GROUND	15	49	GROUND
DIFFSENS	16	50	GROUND
TERMPWR	17	51	TERMPWR
TERMPWR	18	52	TERMPWR
RESERVED	19	53	RESERVED
GROUND	20	54	GROUND
+ATN	21	55	-ATN
GROUND	22	56	GROUND
+BSY	23	57	-BSY
+ACK	24	58	-ACK
+RST	25	59	-RST
+MSG	26	60	-MSG
+SEL	27	61	-SEL
+C/D	28	62	-C/D
+REQ	29	63	-REQ
+I/O	30	64	-I/O
+DB(8)	31	65	-DB(8)
+DB(9)	32	66	-DB(9)
+DB(10)	33	67	-DB(10)
+DB(11)	34	68	-DB(11)

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6.2 Rear I/O Connector

The SCSI signals are also connected to the P4 connector, the pin-out is shown below. Both the Front Panel and Rear I/O Connectors may be used simultaneously - ensure that SCSI termination is disabled in this instance (as the PMCSCU2A is no longer at the end of the SCSI cable) - see section "5.2 Switch Settings (page 9)".

P4 I/O			
Pin	Signal Name	Signal Name	Pin
1	+DB(12)	-DB(12)	2
3	+DB(13)	-DB(13)	4
5	+DB(14)	-DB(14)	6
7	+DB(15)	-DB(15)	8
9	+DB(P1)	-DB(P1)	10
11	+DB(0)	-DB(0)	12
13	+DB(1)	-DB(1)	14
15	+DB(2)	-DB(2)	16
17	+DB(3)	-DB(3)	18
19	+DB(4)	-DB(4)	20
21	+DB(5)	-DB(5)	22
23	+DB(6)	-DB(6)	24
25	+DB(7)	-DB(7)	26
27	+DB(P)	-DB(P)	28
29	GROUND	GROUND	30
31	DIFFSENS	GROUND	32
33	TERMPWR	TERMPWR	34
35	GROUND	GROUND	36
37	+ATN	-ATN	38
39	GROUND	GROUND	40
41	+BSY	-BSY	42
43	+ACK	-ACK	44
45	+RST	-RST	46
47	+MSG	-MSG	48
49	+SEL	-SEL	50
51	+C/D	-C/D	52
53	+REQ	-REQ	54
55	+I/O	-I/O	56
57	+DB(8)	-DB(8)	58
59	+DB(9)	-DB(9)	60
61	+DB(10)	-DB(10)	62
63	+DB(11)	-DB(11)	64

This pin out is compatible with the BVM cIO200 used with cPC200.

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6.3 PCI Connections

P1 and P2 provide the standard PCI signals on the PMC module, as defined in the PMC specification and reproduced for reference purposes below.

P1 32 Bit PCI				P2 32 Bit PCI			
Pin	Signal Name	Signal Name	Pin	Pin	Signal Name	Signal Name	Pin
1	TCK	-12V	2	1	+12V	TRST#	2
3	Ground	INTA#	4	3	TMS	TDO	4
5	INTB#	INTC#	6	5	TDI	Ground	6
7	BUSMODE1#	+5V	8	7	Ground	PCI-RSVD*	8
9	INTD#	PCI-RSVD*	10	9	PCI-RSVD*	PCI-RSVD*	10
11	Ground	PCI-RSVD*	12	11	BUSMODE2#	+3.3V	12
13	CLK	Ground	14	13	RST#	BUSMODE3#	14
15	Ground	GNT#	16	15	3.3V	BUSMODE4#	16
17	REQ#	+5V	18	17	PME#	Ground	18
19	V (I/O)	AD[31]	20	19	AD[30]	AD[29]	20
21	AD[28]	AD[27]	22	21	Ground	AD[26]	22
23	AD[25]	Ground	24	23	AD[24]	+3.3V	24
25	Ground	C/BE[3]#	26	25	IDSEL	AD[23]	26
27	AD[22]	AD[21]	28	27	+3.3V	AD[20]	28
29	AD[19]	+5V	30	29	AD[18]	Ground	30
31	V (I/O)	AD[17]	32	31	AD[16]	C/BE[2]#	32
33	FRAME#	Ground	34	33	Ground	PMC-RSVD	34
35	Ground	IRDY#	36	35	TRDY#	+3.3V	36
37	DEVSEL#	+5V	38	37	Ground	STOP#	38
39	Ground	LOCK#	40	39	PERR#	Ground	40
41	SDONE#	SBO#	42	41	+3.3V	SERR#	42
43	PAR	Ground	44	43	C/BE[1]#	Ground	44
45	V (I/O)	AD[15]	46	45	AD[14]	AD[13]	46
47	AD[12]	AD[11]	48	47	Ground	AD[10]	48
49	AD[09]	+5V	50	49	AD[08]	+3.3V	50
51	Ground	C/BE[0]#	52	51	AD[07]	PMC-RSVD	52
53	AD[06]	AD[05]	54	53	+3.3V	PMC-RSVD	54
55	AD[04]	Ground	56	55	PMC-RSVD	Ground	56
57	V (I/O)	AD[03]	58	57	PMC-RSVD	PMC-RSVD	58
59	AD[02]	AD[01]	60	59	Ground	PMC-RSVD	60
61	AD[00]	+5V	62	61	ACK64#	+3.3V	62
63	Ground	REQ64#	64	63	Ground	PMC-RSVD	64

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6.4 SCSI Connection Details

SCSI bus connections to the PMCSCU2A can be made with an unshielded 68-conductor Ultra2 SCSI PVC ribbon cable. Standard PVC ribbon cable will not allow Ultra SCSI speeds without data errors. One side of this cable is marked with a coloured stripe to indicate pin 1.

All external SCSI bus connections to the PMCSCU2A should be made with high quality shielded 68 conductor cables.

6.4.1 SCSI Bus Widths and Speeds

Up to 8 SCSI, Fast SCSI and Ultra SCSI devices (including the PMCSCU2A) can be connected on a single-ended Ultra SCSI bus only if they are evenly spaced on a 1.5m Ultra2 SCSI cable (0.19m between devices). Up to 4 devices can be connected if they are evenly spaced on a 3m Ultra SCSI cable (0.75m between devices). A single-ended SCSI bus should not exceed 3m (total internal and external cable lengths), even with fewer than four devices.

For LVD applications, up to 16 devices (including the PMCSCU2A) can be connected if they are evenly spaced on a 12m Ultra SCSI cable (0.19m minimum between devices).

SCSI Mode *	SCSI Bus Width (bits)	Max. Data Rate (Mbytes/s)
SCSI-1	8	5
Fast SCSI	8	10
Fast Wide SCSI	16	20
Ultra SCSI	8	20
Wide Ultra SCSI	16	40
Ultra2 SCSI	8	40
Wide Ultra2 SCSI	16	80

Note:

* Absence of the word “Wide” means an 8-bit bus width. It is acceptable to use the word “Narrow” to avoid ambiguity.

6.4.2 SCSI Bus Lengths

SCSI Mode	Maximum Bus Length (m) *			Max. No. Devices +
	Single-ended	Differential	LVD	
SCSI-1	6	25	12.5	8
Fast SCSI	3	25	12.5	8
Fast Wide SCSI	3	25	12.5	16
Ultra SCSI	1.5	25	12.5	8
Ultra SCSI	3	-	-	4
Wide Ultra SCSI	-	25	12.5	16
Wide Ultra SCSI	1.5	-	-	8
Wide Ultra SCSI	3	-	-	4
Ultra2 SCSI	#	#	12.5	8
Wide Ultra2 SCSI	#	#	12.5	16

Notes:

* This parameter may be exceeded in point to point and specifically engineered applications.

Single-ended and high-power differential are not defined at Ultra2 speeds.

+ The Maximum Number of Devices includes the PMCSCU2A itself.

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6.4.3 SCSI Bus Termination

The devices making up the SCSI bus are connected serially (chained together) with SCSI cables. The first and last physical SCSI devices connected on the ends of the SCSI bus must have their terminators active. All other SCSI devices on the bus must have their terminators removed or disabled. The PMCSCU2A is also on the SCSI bus, its termination is automatically enabled when it is connected to the end of the bus.

The peripheral device terminators are usually set with jumpers, resistor modules, a switch on the peripheral or a separate terminator module, refer to the peripheral manufacturer's on how to change it.

Caution: The auto-enable/disable sensing feature in the SYM53C895A may enable termination erroneously if it is directly cabled to another SCSI device or controller using the same sensing method. The SYM53C895A senses the presence of SCSI devices by detecting the ground signal on conductor 50 of the SCSI cable.

Any SCAM and SCSI devices connected to your SCSI bus will automatically set their own termination and identification codes.

6.4.4 Setting SCSI Bus ID's

Each SCSI device and the host adapter must be set to a separate SCSI ID 0 to 15. SCSI ID 7 is the pre-set SYM53C895A setting, giving it the highest priority on the SCSI bus. If you plan to boot your computer from a SCSI hard disc drive on the SCSI bus, that drive should have SCSI ID 0, or the lowest SCSI ID on the bus. For system performance optimisation this may be set to an ID other than ID 0. The SYM53C895A SCSI Bus ID may be set using the SCSI BIOS Configuration Utility.

The peripheral device SCSI ID's are usually set with jumpers or with a switch on the peripheral. Refer to the peripheral manufacturer's instructions to determine the ID of each device and how to change it. You must have no duplication of SCSI ID's on a SCSI bus.

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7. Programming

7.1 Windows® Driver Disc

BVM can supply a disc containing the SYM53C895A Symbios™ driver files for Windows® from LSI Logic, along with BVM installation files. The BVM installation files will ensure that the correct driver configuration is selected upon installation. Windows® 95, 98, NT4.0 and 2000 are currently supported.

7.2 BIOS FLASH EPROM

The FLASH memory is supplied pre-programmed with a BIOS from Symbios™ which supports controller configuration, device booting, device booting order and many other SCSI functions. The BIOS also contains the SDMS™ Configuration Utility which is entered by typing Ctrl<C> at the BIOS prompt during the bootstrap phase.

See the information referenced in "A.5 Am29F010 FLASH EPROM (page 17)" for further details.

7.3 Configuration EEPROM

The EEPROM is supplied pre-programmed by BVM, and contains the BVM PCI Subsystem Vendor ID, which is 15C0 (hexadecimal) and the PCI Subsystem ID, which is 0121 (hexadecimal). Use of these ID's in addition to the standard Symbios™ SCSI Controller ID allows selection of the Symbios™ driver via the BVM supplied installation files.

The EEPROM also contains other SYM53C895A configuration parameters. In particular it should be noted that SYM53C895A GPIO2 pin is configured to control the SCSI terminators (low for active).

See the information referenced in "A.4 NM24C16 EEPROM (page 17)" for further details.

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8. Specification

8.1 On-Board Functions

8.1.1 SYM53C895A PCI SCSI Controller

Ultra2 SCSI I/O Processor, 80MB/s synchronous wide LVD, SE synchronous up to Ultra SCSI, up to 16 LVD SCSI devices, 944byte DMA FIFO, up to 512byte PCI bursts, 32-bit PCI DMA Bus Master, PCI 2.2 33MHz PCI zero wait state, PCI bus master data bursts > 110 Mb/s (@ 33 MHz), 8Kb internal RAM for SCSI SCRIPTS™, LVDlink™ transceivers with LSI Logic TolerANT®.

8.2 Board Configuration

SWITCH:	SCSI Termination
EEPROM:	16Kbits - PCI Configuration
FLASH EPROM:	128Kbytes - BIOS
LED Indicators (7):	S/W, SCSI, TERMPWR, ACT/PSV, SE, LVD, HVD

8.3 PMC Interface

Bus Interface:	PCI 2.2 compliant
Bus Width:	32-bit
Data Transfer:	PCI 2.2 Bus Mastering
Interrupts:	PCI INT #A & INT #B
Memory Address:	BIOS assigned
PCI configuration:	DWORD, WORD & BYTE

8.4 SCSI Interface

Bus Interface:	synchronous or asynchronous
Bus Width:	8-bit or 16-bit
Arbitration:	8-bit or 16-bit
Signal Level:	single-ended or low-voltage-differential
Termination:	active single-ended or low-voltage-differential

8.5 Operating Environment

Dimensions:	74.0mm x 149.0mm (single PMC size)
Power:	+5v 230mA typical, +3.3v 140mA typical
Environmental:	0 to 70 °C, 95% humidity non-condensing (extended range to order)

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Appendix A - Data Sheets & Manual References

A.1 SYM53C895A SCSI Controller

Symbios™ SYM53C895A PCI to Ultra2 SCSI Controller Technical Manual, Version 1.1
(http://www.lsilogic.com)

A.2 SCSI Specification

ANSI - X3.131-1994 (SCSI-2)
(http://www.ansi.org)

A.3 PMC Specification

IEEE Draft Standard Physical and Environmental Layers for PCI Mezzanine Cards: PMC P1386.1/Draft 2.3 9th October 2000.
(http://www.ieee.org)

A.4 NM24C16 EEPROM

NM24C16/17 – 16K-Bit Standard 2-Wire Bus Interface Serial EEPROM
NM24C16/17 Rev. C.2, March 1999
(http://www.fairchildsemi.com)

A.5 Am29F010 FLASH EPROM

AMD Am29F010A 1 Megabit (128 K x 8-bit) CMOS 5.0 Volt-only, Uniform Sector Flash Memory
Publication #22181 Rev: B Amendment/+1 Issue Date: March 23, 1999
(http://www.amd.com)

A.6 SCSI Terminators

Dallas Semiconductors DS2118M Ultra2 LVD/SE SCSI Terminator
Date: 090199
(http://www.dalsemi.com)

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