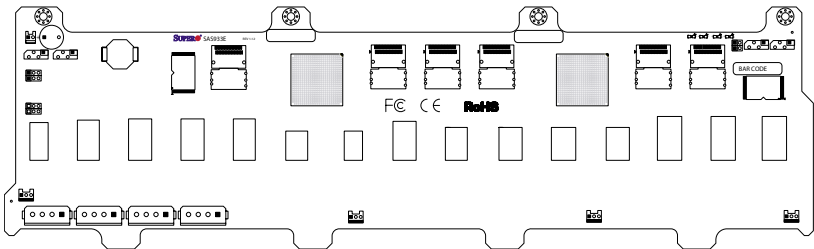


SUPER[®]



SAS-933E

The SAS-933E2/E1 Storage Backplane

USER'S GUIDE

Rev. 1.0

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Safety Information and Technical Specifications

1. Safety Guidelines



To avoid personal injury and property damage, please carefully follow all the safety steps listed below when accessing your system or handling the components:

ESD Safety Guidelines

Electric Static Discharge (ESD) can damage electronic components. To prevent damage to your system, it is important to handle it very carefully. The following measures are generally sufficient to protect your equipment from ESD.

- Use a grounded wrist strap designed to prevent static discharge.
- Touch a grounded metal object before removing a component from the antistatic bag.
- Handle the RAID card by its edges only; do not touch its components, peripheral chips, memory modules or gold contacts.
- When handling chips or modules, avoid touching their pins.
- Put the card and peripherals back into their antistatic bags when not in use.

General Safety Guidelines

- Always disconnect power cables before installing or removing any components from the computer, including the SAS-933E Backplane.
- Disconnect the power cable before installing or removing any cable from the SAS-933E Backplane.
- Make sure that the SAS-933E Backplane is securely and properly installed to prevent damage to the system due to power shortage.

An Important Note to the User

- All images and layouts shown in this user's guide are based upon the latest PCB Revision available at the time of publishing of this User's Guide. The card you've received may or may not look exactly the same as the graphics shown in this manual.

2. Introduction to the SAS-933E2/E1

A. Overview

The Supermicro SAS-933E2/E1 is a highly efficient, highly compatible and easy to use SES-2 Management System that offers the most advanced functionality provided by today's Serial Attached/SCSI Protocol. Capable of cascading up to 128 disk drives, the SAS-933E2/E1 supports fully-redundant Enterprise SAS (Serial Attached SCSI) and high-capacity SATA disk drives that support up to 288 TB, using a 3-PCI-E SAS HBA configuration, providing the user with the maximum data storage capability currently available on the market. Additionally, the SAS-933E2/E1 also supports up to 3Gbps of data transfer, offering superior data transferring efficiency. Combined with SES-2 (SCSI Enclosure Services-2) capabilities, the SAS-933E2/E1 provides complete Serial Attached Services and Serial Link Solutions to the market.

B. SAS-933E2/E1 Features

The SAS-933E2/E1 supports the following features:

1. Capable of cascading up to 128 disk drives with Supermicro's proprietary cable cascading configuration,
2. Supports fully redundant Enterprise SAS and High Capacity SATA Disk Drives (*for the SAS-933E2 with a dual-port expander),
3. Supports Enterprise SAS and High Capacity SATA Disk Drives (*for the SAS-933E1 with a single-port expander),
4. Supports the I²C Interface to communicate with SAS/SATA Host Bus Adaptors (HBA),
5. Minimizing the need for cables and connectors, uncluttering server space, and providing a trouble-free installation environment for the user,
6. Supports the SES-2 (SCSI Enclosure Services-2) protocol, providing the following features:
 - RAID Rebuilt LED Indication
 - Hot Spare LED Indication
 - Thermal Monitoring and PWM (Pulse Width Modulation) Fan Speed Control
 - Drive activity and drive failure indication for each drive slot
 - Overheat/drive failure alarm via a buzzer installed on the backplane
 - Overheat/drive failure LED Indicators built in
 - Temperature Monitoring via a 2 wire (I²C) temperature sensor

C. SAS-933E2/E1 Storage Capacity

- Using 1 PCI-E SAS HBA: SATA 750GB x 128 Drives = 96 TB
- Using 2 PCI-E SAS HBA: SATA 750GB x 256 Drives = 192 TB
- Using 3 PCI-E SAS HBA: SATA 750GB x 384 Drives = 288 TB

D. SMC BPN-SAS-933E Specifications

- Supports 15 devices,
- Supports multiple data rates and auto-negotiation between SAS and SATA drives,
- Supports the Serial SCSI Protocol (SSP), Serial ATA Tunneled Protocol (STP) and Serial Management Protocol (SMP),
- Supports the SFF-8485 protocol to communicate drive status to remote locations
- Meets the SAS standard with BROADCAST (SES), BROADCAST primitive for virtual resets with the capabilities of enabling, disabling and reporting manufacturing information; BREAK handling clarifications; and ALIGN transmissions from expanders and SATA port selectors,
- Provides a serial GPIO Interface that supports the SFF-8485 protocol
- Provides a low-latency connection router to create and maintain connections effectively,
- Provides configurable drive spin-up sequencing on a per-phy basis,
- Provides ESD protection,
- OS-Independent, easy to install and configure.

E. Advanced SAS/SATA Features

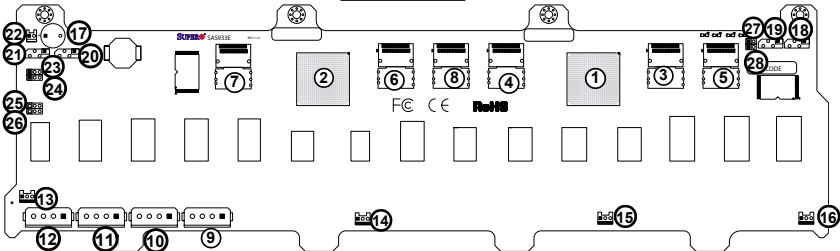
- Supports 1.5 Gbps and 3 Gbps SAS data transfer per port,
- Supports dual-port SAS hard drives for redundancy,
- Supports serial, point-to-point, enterprise-level storage interface,
- Supports the SFF-8485 protocol to communicate the drive status to remote locations
- Compatible with SATA devices,
- With user-customized firmware and SSP initiator functions, provides drive management on SAS drives,
- Supports enclosure management through the SSP target with the SES protocol,
- Supports SATA II functions including staggered spin-up, hot plug, native command queuing and port selector,
- Allows flexible allocations of routing and concurrent connections to SAS/SATA targets.

3. The SAS-933E Connectors and Jumpers

A. Front Components

A-1 Front Connector and Jumper Locations

Front View



A-2. Front Panel Components and Connectors

1. LSI SAS X28 Controller (Primary Chip)
2. LSI SAS X28 Controller (Secondary Chip)
3. Primary SAS Connector#1
4. Primary SAS Connector#2
5. Primary SAS Connector#3
6. Secondary SAS Connector#1*
7. Secondary SAS Connector#2*
8. Secondary SAS Connector#3*
9. 4-pin Power Connector#0*
10. 4-pin Power Connector#1*
11. 4-pin Power Connector#2*
12. 4-pin Power Connector#3*
13. Fan Header#1*
14. Fan Header#2*
15. Fan Header#3*
16. Fan Header#4*
17. Buzzer
18. Primary I²C*
19. Primary IPMI*
20. Secondary I²C*
21. Secondary IPMI*

(*Refer to Page 1-6 for more information.)

A-3. Front Jumpers (*)

- 22. Buzzer Enable
- 23. Primary Mode_4
- 24. Primary Mode_5
- 25. Secondary Mode_4
- 26. Secondary Mode_5
- 27. Remote Fan-Failure LED Indicator Enable
- 28. External Fan-Failure Buzzer Enable

(*Refer to Page 1-8 for the Front LED Indicators.)

A-4. Front Connector Pin Definitions

1. Backplane Main Power Connectors (#9,#10,#11,#12) Pin Definitions

You must use the 4-pin power connectors to provide adequate power to the Backplane. See the table on the right for pin definitions.

12V 4-pin Power Connector Pin Definitions	
Pins	Definition
1	+12V
2 & 3	Ground
4	+5V

2. 3-pin Fan Headers (#13,#14,#15,#16) Pin Definitions

There are four 3-pin fan headers located on the front panel. To prevent overheat, connect a 3-pin fan cable to each fan header. **Default:** Fan Enabled. See the table on the right for pin definitions.

Fan Header Pin Definitions	
Pin#	Definition
1	Ground
2	+12V
3	Tachometer

***Notes:** 1. The fan headers use DC power.
 2. For external fan failure audio alerts, you will need to enable the Buzzer Jumper (marked #22) and External Fan-Failure Buzzer Jumper (marked#28) concurrently. (Refer to the jumper section.)

3. Primary/Secondary I²C (marked #18,#20) and IPMI (marked #19, #21) Connector Pin Definitions

There are two pairs of I²C and IPMI Monitoring Connectors on the SAS-933E. These components monitor the status of the power supply, fan and temperature for their respective SAS channel. See the table on the right for pin definitions.

I ² C/IPMI Pin Definitions	
Pin#	Definition
1	Data
2	Ground
3	Clock
4	No Connection

A-5. Front Jumpers and LED Indicators

1. Buzzer Enable (marked#22)

Close Pin 1 and Pin 2 of this jumper to enable the onboard buzzer (marked#17) to provide an audible alert when an overheat occurs. If the Fan-Failure Buzzer Jumper (marked #28) is also "enabled," this buzzer will also provide an audible alert in an event of a fan failure. See the table on the right for jumper settings.

Buzzer Enable (#22)	
Setting	Description
Closed	Buzzer Enabled (*Default)
Open	Buzzer Disabled

(*Note: Please enable this jumper to receive overheat or fan-failure alerts, since the Overheat and Fan Failure LED indicators may not be visible from outside the chassis.)

2. External Fan-Failure Buzzer Enable (marked#28)

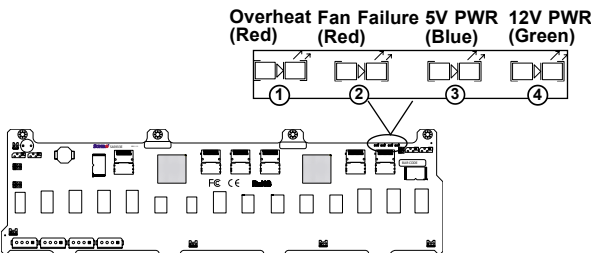
In addition to enabling the Buzzer Jumper (#22) indicated above, you will need to close both Pin 1 and Pin 2 of this jumper (marked#28) to receive the audible alert in an event of a fan failure. See the table on the right for jumper settings.

Buzzer Enable (#22)	
Setting	Description
Closed	Buzzer Enabled (*Default)
Open	Buzzer Disabled

(*Note: If both Buzzer Jumper and Fan-Failure-Buzzer Jumper are set to "Enabled", the buzzer will be activated in the event of overheat or fan failure. To determine if it is an overheat or a fan failure, you will need to refer to the Overheat LED and the Fan-Failure LED below. If the Overheat LED is on, it indicates a chip overheat. If the Fan-Failure LED is on, it indicates a fan failure. If both LEDs are on, both chip overheat and fan failure have occurred.)

External Fan-Failure Buzzer Enable (#28)	
Setting	Description
Closed	Buzzer Enabled (*Default)
Open	Buzzer Disabled

Front LED Locations (See Page 1-9 for more details)



3. Pri Mode 4 (marked#23) and Pri Mode 5 (marked#24): Primary SAS Controller Enable

Close Pin 2 and Pin 3 of Pri_Mode_4 (high) (marked#23) and Pin 2 and Pin 3 of Pri_Mode_5 (low) to enable the Primary SAS Controller (marked 1).

(*Note: Please do not change the manufacturer default setting.)

Primary SAS Controller Mode Settings (#23/#24)		
*Default Setting	Pin	Mode
Mode_4	1-2	High
Mode_5	2-3	Low

4. Sec. Mode 4 (marked#25) and Sec. Mode 5 (marked#26): Secondary SAS Controller Enable (marked#2)

Close Pin 2 and Pin 3 of Pri_Mode_4 (high) (marked#25) and Pin 2 and Pin 3 of Pri_Mode_5 (low) to enable the Secondary SAS Controller (marked#26).

(*Note: Please do not change the manufacturer default setting.)

Primary SAS Controller Mode Settings (#25/#26)		
*Default Setting	Pin	Mode
Mode_4	1-2	High
Mode_5	2-3	Low

5. Remote Fan-Failure LED Enable (marked #27)

Close both pins of this jumper (marked#27) to enable a remote fan failure LED indicator. Please connect a cable to an external LED to provide a Fan-Failure LED Indication that is visible from outside the chassis. See the table on the right for details.

Remote Fan Failure LED Enable (#27)	
Setting	Description
Closed	Remote Fan Failure LED Enabled
Open	Remote Fan Failure LED Disabled

6. Front LED Indicators (Refer to Page 1-8 for LED Locations)

#1. Overheat LED: Red (Solid On: chip overheat. In this case, the buzzer is activated if Buzzer Jumper is enabled.)

#2. Fan Failure LED: Red (Solid On: fan failure. In this case, the buzzer is activated if both Buzzer Jumper ((#22)) and Fan-Failure Buzzer ((#28)) Jumper are enabled.)

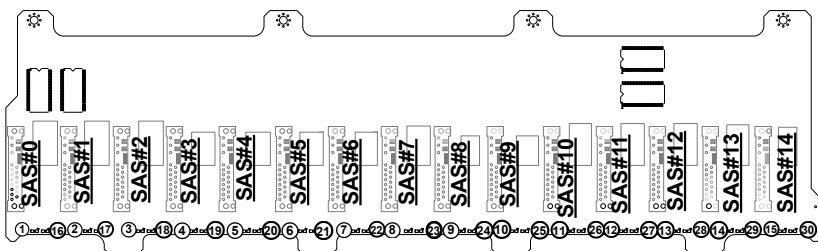
#3. 5V Power On: Blue (Solid On: The 5V Power is on. Please unplug all power cables before removing, installing or changing components.)

#4. 12V Power On: Green (Solid On: The 12V Power is on. Please unplug all power cables before removing, installing or changing components.)

B. Rear Connectors and LED Indicators

B-1 Rear Connector/LED Locations

Rear View



SAS Connectors (#0-14): (*See above)

B-2 Rear LED Indicators (*See the tables below for details.)

A. Drive Activity LED Indicators

SAS Connector Activity LED	
#16	SAS#0 Active
#17	SAS#1 Active
#18	SAS#2 Active
#19	SAS#3 Active
#20	SAS#4 Active
#21	SAS#5 Active
#22	SAS#6 Active
#23	SAS#7 Active
#24	SAS#8 Active
#25	SAS#9 Active
#26	SAS#10 Active
#27	SAS#11 Active
#28	SAS#12 Active
#29	SAS#13 Active
#30	SAS#14 Active

B. Drive Failure LED Indicators

SAS Connector Failure LED	
#1	SAS#0 failed
#2	SAS#1 failed
#3	SAS#2 failed
#4	SAS#3 failed
#5	SAS#4 failed
#6	SAS#5 failed
#7	SAS#6 failed
#8	SAS#7 failed
#9	SAS#8 failed
#10	SAS#9 failed
#11	SAS#10 failed
#12	SAS#11 failed
#13	SAS#12 failed
#14	SAS#13 failed
#15	SAS#14 failed