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LSI® SAS 9300-16e PCI Express® to 12Gb/s Serial Attached SCSI (SAS) Host Bus Adapter

User Guide

Version 2.0
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Revision History

Version and Date	Description of Changes
Version 2.0, May 2013	Updated Section 5.5, Electrical Characteristics.
Version 1.0, March 2013	Initial release of this document.

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Table of Contents

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1 Overview

The LSI® PCI Express® (PCIe®)-to-Serial Attached SCSI (SAS) host bus adapter (HBA), referred to as the LSI 12Gb/s SAS HBA, provides high-performance external storage connectivity for servers and workstations. The LSI 12Gb/s SAS HBA provides sixteen lanes of 12Gb/s SAS connectivity and is matched with eight lanes of PCIe 3.0 8Gb/s performance. The LSI 12Gb/s SAS HBA is based on the Fusion-MPT™-architected LSI SAS 3008 controller that integrates the latest enhancements in PCIe 3.0 technology and 12Gb/s SAS technology.

The LSI 12Gb/s SAS HBA has onboard Flash memory for the firmware.

2 Features

This section lists the LSI 12Gb/s SAS HBA features.

- Implements two LSI SAS 3008 eight-port 12Gb/s SAS to PCIe 3.0 controllers
- Supports eight-lane, full-duplex PCIe 3.0 performance
- Supports sixteen external 12Gb/s SATA+SAS ports
- Supports SATA link rates of 3Gb/s and 6Gb/s
- Supports SAS link rates of 3Gb/s, 6Gb/s, and 12Gb/s
- Provides four x4 external mini-SAS HD connectors (SFF-8644)
- Supports passive copper cable, active copper cable, and optical cable
- Supports up to 1024 SATA or SAS end devices
- Offered with a full-height bracket
- Provides two heartbeat LEDs

3 Functional Descriptions

3.1 PCI Express Interface

The LSI SAS 9300-16e HBA uses two LSI SAS 3008 controller chips and one PCI Express switch to provide high-bandwidth interconnection ability. PCIe is a high-speed standard local bus for point-to-point interfacing of I/O components to the processor and the memory subsystems in high-end computers and servers.

The LSI 12Gb/s SAS HBA supports eight-lane PCIe performance up to 64Gb/s single direction and 128Gb/s dual direction.

3.2 SAS-3 Interface

The LSI SAS 3008 controller chip contains the SATA+SAS functionality for the LSI 12Gb/s SAS HBA. The following table shows the LSI SAS 12Gb/s SAS performance.

Half Duplex	Full Duplex
Narrow port (one lane), 1200 MB/s	Narrow port (one lane), 2400 MB/s
Wide port (four lanes), 4800 MB/s	Wide port (four lanes), 9600 MB/s

4 Operating System Support

The LSI 12Gb/s SAS HBA supports all major operating systems: Windows®, Linux® Red Hat®, Linux SuSE® Enterprise Server (SLES), Solaris®, and VMware®. Refer to http://www.lsi.com/support/products/Pages/default.aspx for details on the software versions and device driver support. For Solaris support, contact the LSI Technical Support team.

NOTE The LSI 12Gb/s SAS HBA supports the Solaris 10 operating system, and Oracle® provides a built-in driver; installation of an LSI driver is not required. For more information on the Oracle Solaris 10 driver and installation, sign in at the following Oracle link.

https://support.oracle.com/

Contact Oracle support for Oracle driver or software support.

5 LSI SAS 9300-16e HBA Characteristics

5.1 Memory

The LSI 12Gb/s SAS HBA provides two 4-M × 16-bit Flash ROMs to store the firmware and the BIOS.

5.2 LED

The LSI 12Gb/s SAS HBA Heartbeat LEDs, CR3 and CR4, blink green to indicate the HBA is capable of general activity.

5.3 Connectors

PCIe Connector (EC1). The LSI 12Gb/s SAS HBA supports a x8 interface. The PCIe host interface connection is through the edge connector, EC1, which provides connections on both the top (EC1 B) and bottom (EC1 A) of the board. The signal definitions and pin numbers conform to the PCIe specification.

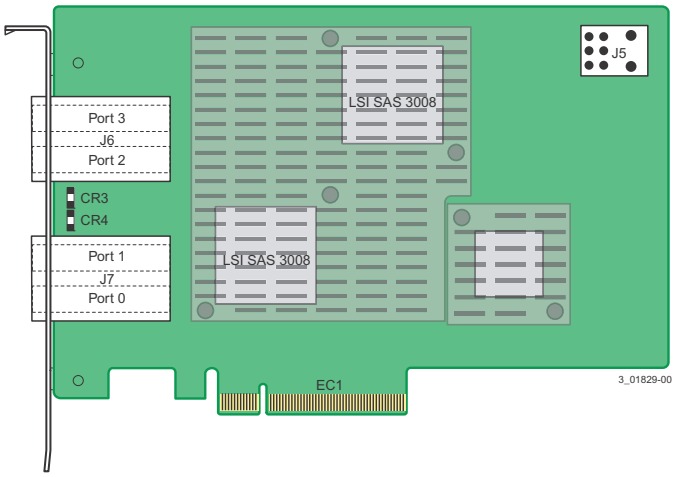
SATA+SAS Connectors (J6, J7). The LSI 12Gb/s SAS HBA supports SATA and SAS connectors through connectors that are SFF-8644 mini-SAS HD, external connectors.

Auxiliary Power Connector (J5). The LSI 12Gb/s SAS HBA provides a 6-pin PCIe power connector.

5.4 Physical Characteristics

The LSI 12Gb/s SAS HBA is a 6.6-in. × 4.4-in board. The component height on the top and bottom of the LSI 12Gb/s SAS HBA is in accordance with the PCIe specification. The following figure shows the HBA board layout.

Figure 1 LSI SAS 9300-16e HBA Board Layout



- **EC1** – PCIe x8 board edge connector
- **CR3, CR4** – Heartbeat LEDs
- **J5** – Auxiliary power connector
- **J6, J7** – SFF-8644 mini-SAS HD, external, right-angle connectors

5.5 Electrical Characteristics

The maximum power requirements for the LSI SAS 9300-16e HBA under normal operation are as follows:

- PCIe 12.0 V = 2.35 A
- PCIe 3.3 V = 0.13 A
- Passive cable, nominal = 28.6 W

5.6 Thermal and Atmospheric Limits

The atmospheric limits for the LSI 12Gb/s SAS HBA are as follows:

- Temperature range: 0 °C to 55 °C (32 °F to 131 °F) (dry bulb)
- Relative humidity range: 5% to 90% noncondensing
- Maximum dew point temperature: 32 °C (89.6 °F)
- Minimum airflow for the LSI SAS 9300-16e HBA:
  - 220 LFPM at 35 °C inlet temperature
  - 270 LFPM at 45 °C inlet temperature
  - 350 LFPM at 55 °C inlet temperature

The following limits define the storage and transit environment for the LSI 12Gb/s SAS HBA:

- Temperature range: –45 °C to +105 °C (–49 °F to +221 °F) (dry bulb)
- Relative humidity range: 5% to 90% noncondensing

6 LSI 12Gb/s SAS HBA Certifications and Safety Characteristics

All LSI 12Gb/s SAS HBAs meet or exceed the requirements of UL flammability rating 94V-0. Each bare board is marked with the supplier's name or trademark, type, and UL flammability rating. Because these boards are installed in a PCIe bus slot, all voltages are less than the SELV 42.4-V limit.

The design and implementation of the LSI 12Gb/s SAS HBA minimizes electromagnetic emissions, susceptibility to radio frequency energy, and the effects of electrostatic discharge.

The LSI 12Gb/s SAS HBA meets the following integrated electromagnetic interference (EMI) compliance labels:

- CE mark
- CISPR Class B
- C-Tick mark
- Canadian Compliance Statement
- FCC Class B, marked with the FCC Self-Certification logo
- Japan VCCI
- Korean KCC
- Taiwan BSMI

The LSI 12Gb/s SAS HBA meets the following environmental directives:

- RoHS
- WEEE

7 Hardware Detailed Installation Instructions

To install the LSI 12Gb/s SAS HBA, follow these steps:

1. **Unpack the HBA, and inspect it for damage.** Unpack the HBA in a static-free environment. Remove the HBA from the antistatic bag, and carefully inspect the device for damage. If you notice any damage, contact LSI or your reseller support representative.

   ATTENTION To avoid the risk of data loss, make a backup of your data before changing your system configuration.

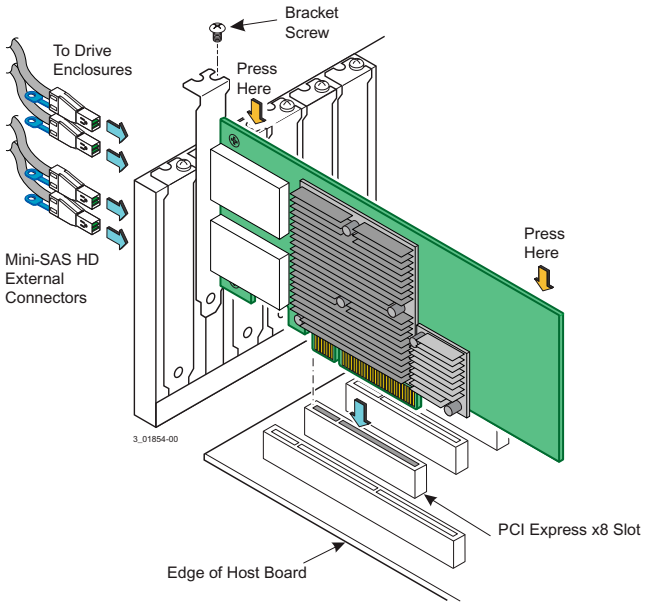
2. **Prepare the computer.** Turn off the computer, and disconnect the power cord from the rear of the power supply.

   CAUTION Disconnect the computer from the power supply and from any networks to which you will install the HBA, or you risk damaging the system or experiencing electrical shock.

3. **Remove the cover from the chassis.**
4. **Check the mounting bracket on the HBA (system-dependent).** If required for your system, replace the full-height mounting bracket that ships on the HBA with the low-profile bracket supplied.
5. **Insert the HBA into an available PCIe slot.** Locate an empty x8 PCIe slot. Remove the blank bracket panel on the rear of the computer that aligns with the empty PCIe slot. Save this bracket screw, if applicable. Align the HBA to a PCIe slot. Press down gently, but firmly, to seat the HBA correctly in the slot. The following figure shows how to insert the HBA into a PCIe slot.

   NOTE The shape, size, and locations of the components on your HBA and its bracket might vary from this illustration. The HBA requires a x8 PCIe slot.

Figure 2 Install an LSI 12Gb/s x8 HBA in a PCIe Slot



6. **Secure the HBA bracket to the system's chassis.** Install the bracket screw, if applicable, or engage the system retention mechanism to secure the HBA to the system's chassis.
7. **Replace the cover of the chassis.**
8. **Connect SAS cables between the HBA and the SAS enclosure that contains SATA or SAS devices.** The LSI 12Gb/s SAS HBA has four SFF-8644, external x4 mini-SAS HD connectors. Use a cable with an external mini-SAS HD connector (SFF-8644) on one end (to connect to the HBA) and the appropriate connector to attach to the enclosure that contains SAS or SATA devices on the other end.
9. **Replace the cover and any power cords, and power up the system.** Replace the chassis's cover, reconnect any power cords, and reconnect any network cables. Turn on the power.

The hardware installation of your LSI 12Gb/s SAS HBA is complete.

8 Technical Support

For assistance installing, configuring, or running the LSI 12Gb/s SAS HBA, contact LSI Technical Support:

E-mail: support@lsi.com
Phone: 1-800-633-4545 (North America)
00-800-5745-6442 (International)
Website: www.lsi.com/support

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