Intel® RAID Controller RS3UC080 User Guide

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Safety Information

Important Safety Instructions

Read all caution and safety statements in this document before performing any of the instructions. See also Intel Server Boards and Server Chassis Safety Information on the *Intel® Server Deployment Toolkit 2.0 CD* and/or at http://support.intel.com/support/motherboards/server/sb/cs-010770.htm.

Wichtige Sicherheitshinweise

Lesen Sie zunächst sämtliche Warnund Sicherheitshinweise in diesem Dokument, bevor Sie eine der Anweisungen ausführen. Beachten Sie hierzu auch die Sicherheitshinweise zu Intel-Serverplatinen und Servergehäusen auf der *Intel® Server Deployment Toolkit 2.0 CD* oder unter http://support.intel.com/support/motherboards/server/sb/cs-010770.htm.

Consignes de sécurité

Lisez attention toutes les consignes de sécurité et les mises en garde indiquées dans ce document avant de suivre toute instruction. Consultez Intel Server Boards and Server Chassis Safety Information sur le *Intel® Server Deployment Toolkit 2.0 CD* ou bien rendez-vous sur le site http://support.intel.com/support/motherboards/server/sb/cs-010770.htm.

Instrucciones de seguridad importantes

Lea todas las declaraciones de seguridad y precaución de este documento antes de realizar cualquiera de las instrucciones. Vea Intel Server Boards and Server Chassis Safety Information en el *Intel® Server Deployment Toolkit 2.0 CD* y/o en http://support.intel.com/support/motherboards/server/sb/cs-010770.htm.

重要安全指导

在执行任何指令之前，请阅读本文档中的所有注意事项及安全声明。 和/或 http://support.intel.com/support/motherboards/server/sb/CS-010770.htm 上的 *Intel Server Boards and Server Chassis Safety Information*（*《Intel 服务器主板与服务器机箱安全信息》*）。

Warnings

Heed safety instructions: Before working with your server product, whether you are using this guide or any other resource as a reference, pay close attention to the safety instructions. You must adhere to the assembly instructions in this guide to ensure and maintain compliance with existing product certifications and approvals. Use only the described, regulated components specified in this guide. Use of other products / components will void the UL listing and other regulatory approvals of the product and will most likely result in noncompliance with product regulations in the region(s) in which the product is sold.

System power on/off: The power button DOES NOT turn off the system AC power. To remove power from system, you must unplug the AC power cord from the wall outlet. Make sure the AC power cord is unplugged before you open the chassis, add, or remove any components.

Hazardous conditions, devices and cables: Hazardous electrical conditions may be present on power, telephone, and communication cables. Turn off the server and disconnect the power cord, telecommunications systems, networks, and modems attached to the server before opening it. Otherwise, personal injury or equipment damage can result.

Electrostatic discharge (ESD) and ESD protection: ESD can damage disk drives, boards, and other parts. We recommend that you perform all procedures in this chapter only at an ESD workstation. If one is not available, provide some ESD protection by wearing an antistatic wrist strap attached to chassis ground any unpainted metal surface on your server when handling parts.

ESD and handling boards: Always handle boards carefully. They can be extremely sensitive to ESD. Hold boards only by their edges. After removing a board from its protective wrapper or from the server, place the board component side up on a grounded, static free surface. Use a conductive foam pad if available but not the board wrapper. Do not slide board over any surface.

Installing or removing jumpers: A jumper is a small plastic encased conductor that slips over two jumper pins. Some jumpers have a small tab on top that you can grip with your fingertips or with a pair of fine needle nosed pliers. If your jumpers do not have such a tab, take care when using needle nosed pliers to remove or install a jumper; grip the narrow sides of the jumper with the pliers, never the wide sides. Gripping the wide sides can damage the contacts inside the jumper, causing intermittent problems with the function controlled by that jumper. Take care to grip with, but not squeeze, the pliers or other tool you use to remove a jumper, or you may bend or break the pins on the board.

Intel warranties that this product will perform to its published specifications. However, all computer systems are inherently subject to unpredictable system behavior under various environmental and other conditions.

This product is not intended to be the sole source for any critical data and the user must maintain a verified backup. Failure to do so or to comply with other user notices in the product user guide and specification documents may result in loss of or access to data.

Preface

This is the primary user guide for the Intel 12Gb/s SAS Controller. It contains installation instructions and specifications.

Audience

The people who benefit from this document are:

- Engineers who are designing an Intel 12Gb/s SAS Controller.
- Anyone installing an Intel 12Gb/s SAS Controller.

Organization

This document includes the following chapters:

- Chapter 1 provides a general overview of the Intel 12Gb/s SAS Controller.
- Chapter 2 provides an overview of the Intel 12Gb/s SAS Controller features.
- Chapter 3 describes the functionalities of the Intel 12Gb/s SAS Controller.
- Chapter 4 describes the major operating systems that Intel 12Gb/s SAS Controller support.
- Chapter 5 describes the characteristics of the Intel 12Gb/s SAS Controller.
- Chapter 6 describes the certifications and safety characteristics of the Intel 12Gb/s SAS Controller.
- Chapter 7 describes how to install the Intel 12Gb/s SAS Controller.

Related Publication

This is the primary hardware guide for the Intel 12Gb/s SAS Controller. It contains installation instructions and specifications to aid in the configuration and use of this product.

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1 Overview

The Intel® PCI Express® (PCIe®)-to-Serial Attached SCSI (SAS) Controller, referred to as the Intel 12Gb/s SAS Controller, provides high-performance internal storage connectivity for servers and workstations. The Intel 12Gb/s SAS Controller provides eight lanes of 12Gb/s SAS connectivity and is matched with eight lanes of PCIe 3.0 8GT/s performance. The low-profile design of the SAS controller includes a full-height bracket and low-profile mounting bracket that create a universal fit for any server. The Intel 12Gb/s SAS Controller 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 Intel 12Gb/s SAS Controller has onboard Flash memory for the firmware, and BIOS and NVSRAM for RAID support (RAID 0, RAID 1, and RAID 10/1E).

2 Features

This section lists the Intel 12Gb/s SAS Controller features:

- Implements one LSI* SAS 3008 eight-port 12Gb/s SAS to PCIe 3.0 controller
- Supports eight-lane, full-duplex PCIe 3.0 performance
- Supports eight internal 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
- Supports passive copper cable, active copper cable, and optical cable
- Supports Integrated RAID (RAID 0, RAID 1, and RAID 10/1E)
- Supports up to 1024 SATA or SAS end devices
- Offered with a full-height bracket and a low-profile vented bracket

3 Functional Descriptions

PCI Express Interface

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* SAS 3008 controller chip contains the PCIe functionality for the Intel 12Gb/s SAS Controller. The LSI* SAS 3008 controller chip connects to the PCIe bus and generates timing and protocol in compliance with the PCIe specifications.

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

SAS-3 Interface

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

Table 1. Intel SAS 12 Gb/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

LED Management

The Intel 12Gb/s SAS Controller offers LED management support for your backplane implementation. This configuration option lets you use the Intel 12Gb/s SAS Controller with backplanes configured for the SGPIO interface. The Intel 12Gb/s SAS Controller is in accordance with *SFF-8485: Specification for Serial GPIO (SGPIO) Bus, Revision 0.7*.

4 Operating System Support

The Intel 12Gb/s SAS Controller supports all major operating systems: Windows*, Linux Red Hat*, Linux SUSE* Enterprise Server (SLES), Solaris*, and VMware*. Refer to http://www.intel.com/support for details on the software versions and device driver support. For Solaris support, contact the Intel Technical Support team.

Note: *The Intel 12Gb/s SAS Controller also supports the Solaris 10 Update 11 and Solaris 11 Update 1 operating systems. Oracle provides a built-in driver, and Intel does not provide an additional Intel driver installation for Solaris operating systems. For more information on the Oracle Solaris driver and installation, sign in at the following Oracle link.*
https://support.oracle.com/
Contact Oracle support for Oracle driver or software support.

5 Intel® RAID Controller RS3UC080 Characteristics

Memory

The Intel 12Gb/s SAS Controller provides one 4-M × 16-bit Flash ROM to store the firmware and the BIOS. The Intel 12Gb/s SAS Controller can provide up to 32 K × 8-bit NVSRAM for storing nonvolatile RAID information when a system failure occurs or to reflash the board to run IR firmware.

LED

The Intel 12Gb/s SAS Controller Heartbeat LED, CR1, blinks green to indicate the controller is capable of general activity.

Connectors

PCIe Connector (EC1). The Intel 12Gb/s SAS Controller 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 Connector (J1). The Intel 12Gb/s SAS Controller supports SATA and SAS connectors through connectors that are SFF-8643 mini-SAS HD, internal connectors.

Physical Characteristics

The Intel 12Gb/s SAS Controller is a 6.0-in. × 2.7-in., low-profile board. The component height on the top and bottom of the Intel 12Gb/s SAS Controller is in accordance with the PCIe specification. The following figure shows the controller board layout.

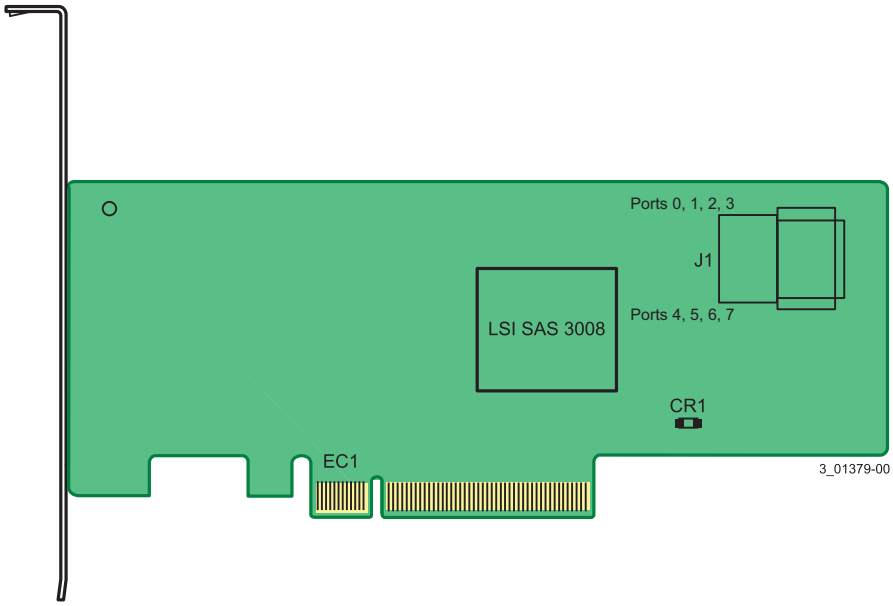

Figure 1. Intel® RAID Controller RS3UC080 Board Layout

- **EC1** – PCIe x8 board edge connector
- **CR1** – Heartbeat LED
- **J1** – SFF-8643 mini-SAS HD, internal, right-angle connectors

Electrical Characteristics

The maximum power requirements for the Intel® RAID Controller RS3UC080 under normal operation are as follows:

- PCIe 12.0 V = 1.59 A
- Power values:
  - Nominal = 13.0 W
  - Worst case = 19.04 W

Thermal and Atmospheric Limits

The atmospheric limits for the Intel 12Gb/s SAS Controller 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: 200 linear feet per minute

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

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

6 Intel 12Gb/s SAS Controller Certifications and Safety Characteristics

All Intel 12Gb/s SAS Controllers 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 Intel 12Gb/s SAS Controller minimizes electromagnetic emissions, susceptibility to radio frequency energy, and the effects of electrostatic discharge.

The Intel 12Gb/s SAS Controller 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 Intel 12Gb/s SAS Controller meets the following environmental directives:

- RoHS
- WEEE

7 Hardware Detailed Installation Instructions

To install the Intel 12Gb/s SAS Controller, follow these steps:

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

   Caution: *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 controller, or you risk damaging the system or experiencing electrical shock.*

3. **Remove the cover from the chassis.**

4. **Check the mounting bracket on the controller (system-dependent).** If required for your system, replace the full-height mounting bracket that ships on the controller with the low-profile bracket supplied.

5. **Insert the controller 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 controller to a PCIe slot. Press down gently, but firmly, to seat the controller correctly in the slot. The following figure shows how to insert the controller into a PCIe slot.

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

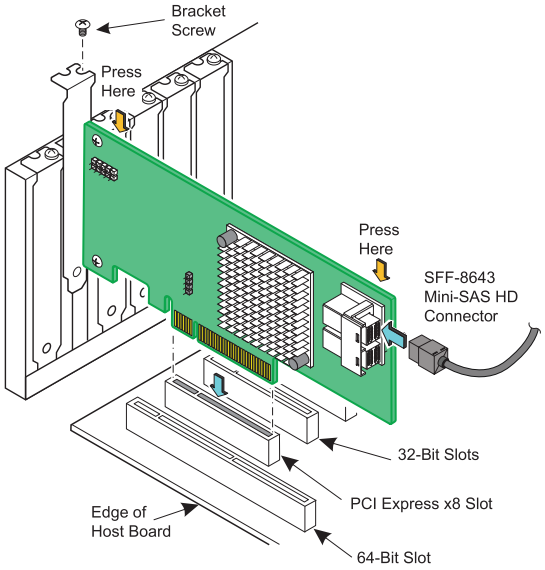

Figure 2. Install an Intel 12Gb/s x8 Controller in a PCIe Slot

6. **Secure the controller bracket to the system's chassis.** Install the bracket screw, if applicable, or engage the system retention mechanism to secure the controller to the system's chassis.
7. **Connect SAS cables between the controller and the SAS backplane or any other SATA or SAS device.** The Intel 12Gb/s SAS Controller has two SFF-8643, internal x4, mini-SAS HD connectors. Use cables with an internal mini-SAS HD connector on one end (to connect to the controller) and the appropriate connector on the other end to attach to the backplane or SAS/SATA devices.
8. **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 Intel 12Gb/s SAS Controller is complete.