

# Intel<sup>®</sup> RAID Module RMS3JC080 User Guide

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# Safety Information

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## 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 CD* and/or at <http://support.intel.com/support/motherboards/server/sb/cs-010770.htm>.

## Wichtige Sicherheitshinweise

Lesen Sie zunächst sämtliche Warnung und 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 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 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 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 warrants 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

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

## Audience

The people who benefit from this document are:

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

## Organization

This document includes the following chapters:

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

## Related Publication

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

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# 1 Overview

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The Intel® PCI Express\* (PCIe\*)-to-Serial Attached SCSI (SAS) Module, referred to as the Intel 12Gb/s SAS Module, provides high-performance internal storage connectivity for servers and workstations. The Intel 12Gb/s SAS Module 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 module includes a full-height bracket and low-profile mounting bracket that create a universal fit for any server. The Intel 12Gb/s SAS Module 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 Module has onboard Flash memory for the firmware, and BIOS and NVSRAM for RAID support (RAID 0, RAID 1, and RAID 10/1E).

## 2 Features

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This section lists the Intel 12Gb/s SAS Module 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 customized board-to-board PCIe\* 3.0 compliant 80-pin connector capable of performance up to 8 GT/s per lane

# 3 Functional Descriptions

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

# 4 Operating System Support

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The Intel 12Gb/s SAS Module 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 Module 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 Module RMS3JC080 Characteristics

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## Memory

The Intel 12Gb/s SAS Module provides 8MB x 8bit Flash ROM to store the firmware and the BIOS. The Intel 12Gb/s SAS Module can provide up to 32K x 8bit 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 Module Heartbeat LED blinks green to indicate the module is capable of general activity.

## Connectors

**PCIe Connector (EC1).** The Intel 12Gb/s SAS Module supports a PCIe\* x8 mezzanine connector. Refer to the following table for the PCIe\* mezzanine connector J6 signal definitions and pin numbers.

**Table 2. PCIe\* Mezzanine Connector J6**

Pin	Signal	Signal	Pin
	(PCIe from HBA perspective)	(PCIe from HBA perspective)	
1	RSVD_SE	GND	2
3	GND	PCIe_TX0_P	4
5	PCIe_RX0_P	PCIe_TX0_N	6
7	PCIe_RX0_N	GND	8
9	GND	PCIe_TX1_P	10
11	PCIe_RX1_P	PCIe_TX1_N	12
13	PCIe_RX1_N	GND	14

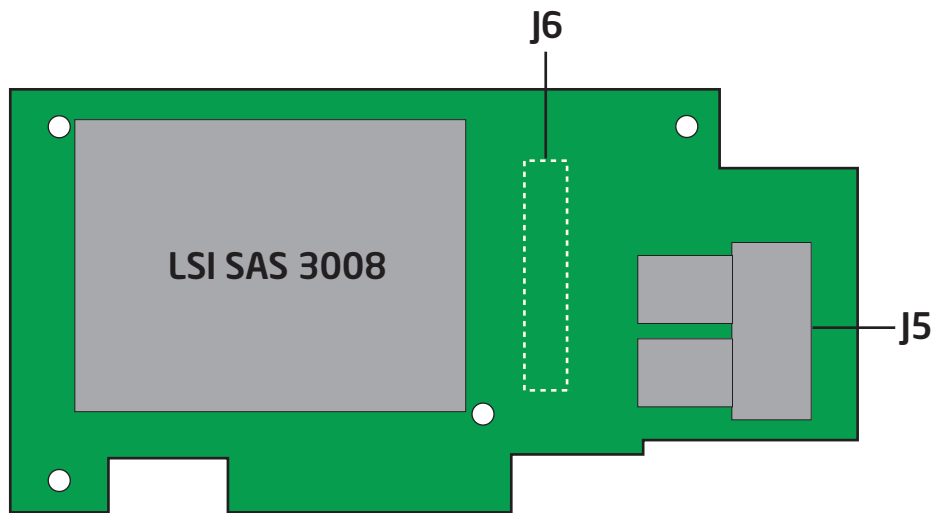
Pin	Signal	Signal	Pin
	(PCIe from HBA perspective)	(PCIe from HBA perspective)	
15	GND	PCIe_TX2_P	16
17	PCIe_RX2_P	PCIe_TX2_N	18
19	PCIe_RX2_N	GND	20
21	GND	PCIe_TX3_P	22
23	PCIe_RX3_P	PCIe_TX3_N	24
25	PCIe_RX3_N	GND	26
27	GND	PCIe_TX4_P	28
29	PCIe_RX4_P	PCIe_TX4_N	30
31	PCIe_RX4_N	GND	32
33	GND	PCIe_TX5_P	34
35	PCIe_RX5_P	PCIe_TX5_N	36
37	PCIe_RX5_N	GND	38
39	GND	PCIe_TX6_P	40
41	PCIe_RX6_P	PCIe_TX6_N	42
43	PCIe_RX6_N	GND	44
45	GND	PCIe_TX7_P	46
47	PCIe_RX7_P	PCIe_TX7_N	48
49	PCIe_RX7_N	GND	50
51	GND	PCIe_REFCLK_N	52
53	SMB DAT	PCIe_REFCLK_P	54
55	SMB CLK	GND	56
57	GND	PCIe_RESET_L	58
59	RSVD_DN	NC_WAKE	60
61	RSVD_DP	PRESENT_L	62
63	GND	LED_HDD_N	64
65	RSVD_DN	3.3VAUX_PCIE	66
67	RSVD_DP	MODULE_EN	68
69	GND	NC_5VSB	70
71	RSVD_SE	FRU_TEMP_ADDR	72
73	3.3V	12V	74

Pin	Signal	Signal	Pin
	(PCIe from HBA perspective)	(PCIe from HBA perspective)	
75	3.3V	12V	76
77	3.3V	12V	78
79	3.3V	12V	80

**SATA+SAS Connector (J5).** The Intel 12Gb/s SAS Module supports SATA and SAS connectors through connectors that are dual SFF-8643 mini-SAS HD, internal connectors.

## Physical Characteristics

The Intel 12Gb/s SAS Module is a 64.39 x 128.98 mm, custom form factor card. The following figure shows the module board layout.



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**Figure 1. Intel® RAID Module RMS3JC080 Board Layout**

- **EC1 (J6)** – PCIe\* x8 mezzanine connector on the backside
- **J5** – Dual SFF-8643 internal mini-SAS connectors

## Electrical Characteristics

The Intel® RAID Module RMS3JC080 consumes power from the 12.0V and 3.3V power rails. The maximum power requirements for RMS3JC080 is around 18.86W.



## Thermal and Atmospheric Limits

The atmospheric limits for the Intel 12Gb/s SAS Module 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 Module:

- 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 Module Certifications and Safety Characteristics

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

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

- RoHS
- WEEE

# 7 Hardware Detailed Installation Instructions

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

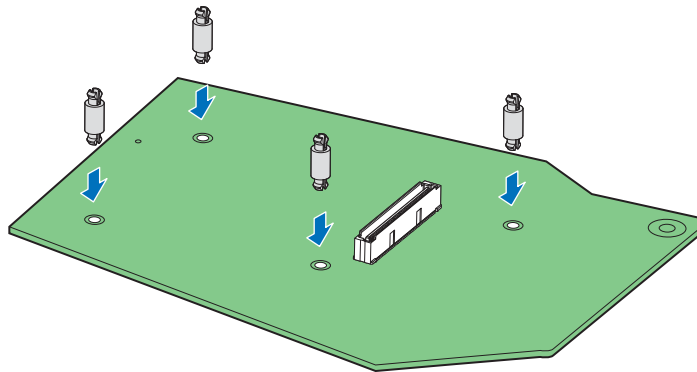
1. Unpack the module in a static-free environment. Remove the module from the antistatic bag, and carefully inspect the device for damage. If you notice any damage, contact Intel or your reseller support representative.

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

2. 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 module, or you risk damaging the system or experiencing electrical shock.

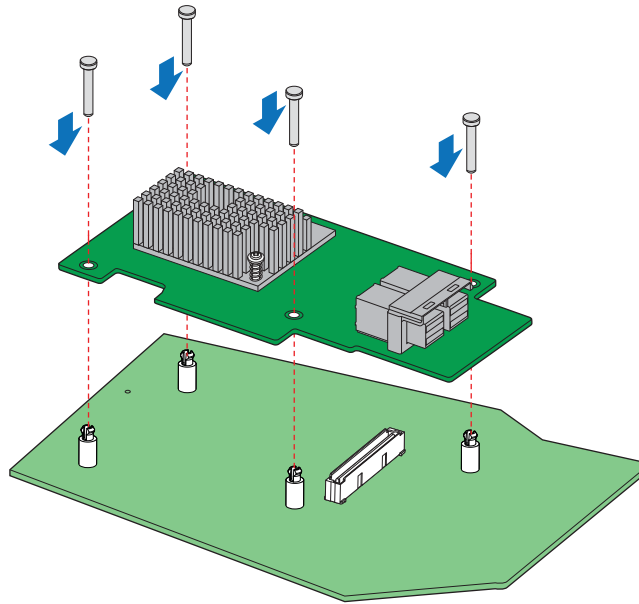
3. Remove the cover from the chassis.
4. Locate the matching SAS Module connector on your server board. See your server board documentation.
5. Insert the barrel standoffs into the matching holes in the server board.



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**Figure 2. Install the Barrel Standoffs**

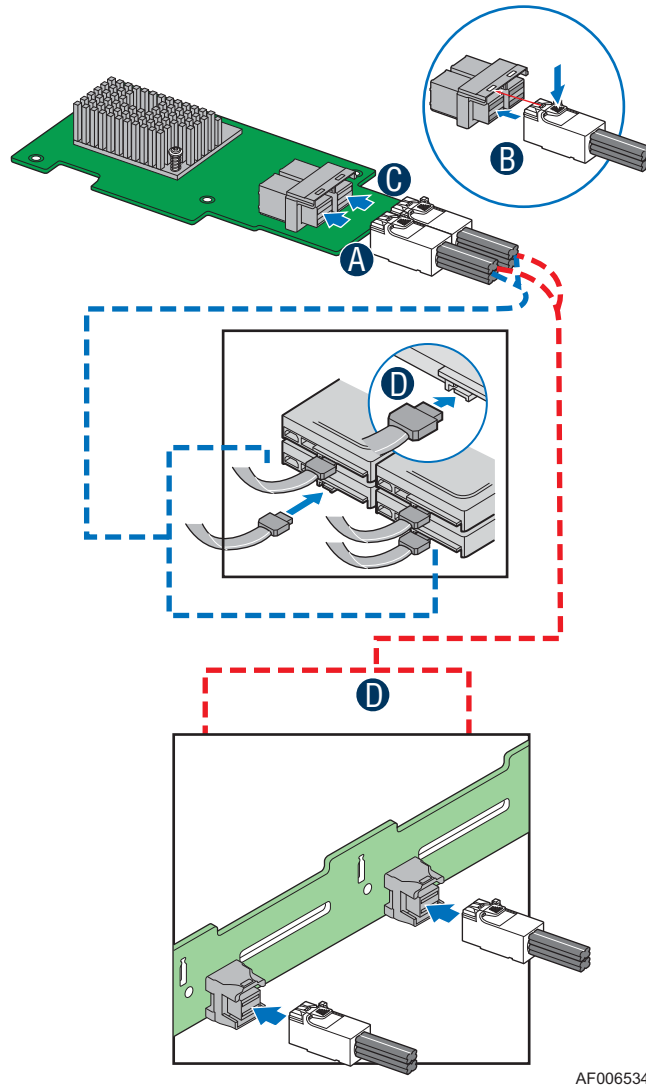
6. Attach the RAID Module to the matching server board connector and press the module card firmly to engage the barrel standoffs.
7. Press down gently but firmly to ensure that the card is properly seated in the connectors, and then insert the four pin standoffs into the barrel standoffs respectively.



**Figure 3. Install the RAID Module**

8. Configure and install the SAS devices, SATA devices, or both in the host computer case. Refer to the documentation for the devices for any pre-installation configuration requirements.

9. Connect SAS cables between the module and the SAS backplane or any other SATA or SAS device. The Intel 12Gb/s SAS Module 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 module) and the appropriate connector on the other end to attach to the backplane or SAS/SATA devices.



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**Figure 4. Connect the RAID Module to the SAS/SATA Devices**

10. 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 Module is complete.