IBM® High IOPS Modular Adapters

User Guide

Version 1.2
July 2013

IBM P/N: 00D2409

Revision History

Version and Date	Description of Changes
Version 1.1, July 2013	Added Shipping Considerations on page11.
Version 1.1, November 2012	Minor document updates
Version 1.0, October 2012	Initial release of the document

Electromagnetic Compatibility Notices

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Shielded cables for SCSI connection external to the cabinet are used in the compliance testing of this Product. IBM is not responsible for any radio or television interference caused by unauthorized modification of this equipment or the substitution or attachment of connecting cables and equipment other than those specified by IBM. The correction of interferences caused by such unauthorized modification, substitution, or attachment will be the responsibility of the user.

The IBM High IOPS Modular Adapter is tested to comply with FCC standards for home or office use.

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＢ情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。
取扱説明書に従って正しい取り扱いをして下さい。

This is a Class B product based on the standard of the Voluntary Control Council for Interference from Information Technology Equipment (VCCI). If this is used near a radio or television receiver in a domestic environment, it may cause radio interference. Install and use the equipment according to the instruction guide.

D33156

Third Edition (July 2013)

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Statement 1:

DANGER

Electrical current from power, telephone, and communication cables is hazardous.

To avoid a shock hazard:

- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **Connect all power cords to a properly wired and grounded electrical outlet.**
- **Connect to properly wired outlets any equipment that will be attached to this product.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
- **Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.**

To Connect:	To Disconnect:
1. Turn everything OFF.	1. Turn everything OFF.
2. First, attach all cables to devices.	2. First, remove power cords from outlet.
3. Attach signal cables to connectors.	3. Remove signal cables from connectors.
4. Attach power cords to outlet.	4. Remove all cables from devices.
5. Turn device ON.	

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

Antes de instalar este produto, leia as Informações de Segurança.

在安装本产品之前，请仔细阅读 Safety Information (安全信息)。

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

Ennen kuin asennat tämän tuotteen, lue turvaohjeet kohdasta Safety Information.

Avant d'installer ce produit, lisez les consignes de sécurité.

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

Πριν εγκαταστήσετε το προϊόν αυτό, διαβάστε τις πληροφορίες ασφάλειας (safety information).

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza.

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

Пред да се инсталира овој продукт, прочитајте информацијата за безбедност.

Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

Przed zainstalowaniem tego produktu, należy zapoznać się
z książką "Informacje dotyczące bezpieczeństwa" (Safety Information).

Antes de instalar este produto, leia as Informações sobre Segurança.

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto, lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

Youq mwngz yungh canjbinj neix gaxgonq, itdingh aeu doeg aen
canjbinj soengq cungj vahgangj ancien siusik.

مەزكۇر مەھسۇلاتنى ئورنىتىشتىن بۇرۇن بىخەتەرلىك ئۇچۇرلىرىنى ئوقۇپ چىقىڭ.

ཐོན་རྫས་འདི་བདེ་སྒྲིག་མ་བྱས་གོང་། སྔོར་ཀྱི་ཡིད་གཟབ་བྱ་འདུ་མིན་ཡོད་པའི་འོད་སྟེར་བལྟ་དགོས།

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

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Important:

Each caution and danger statement in this document is labeled with a number. This number is used to cross reference an English-language caution or danger statement with translated versions of the caution or danger statement in the *Safety Information* document.

For example, if a caution statement is labeled "Statement 1," translations for that caution statement are in the *Safety Information* document under "Statement 1."

Be sure to read all caution and danger statements in this document before you perform the procedures. Read any additional safety information that comes with the server or optional device before you install the device.

This device is intended for use with UL Listed IBM devices.

Statement 1:

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5. Turn device ON.	

Statement 3:

CAUTION:
When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

DANGER

Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following.

Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.

Class 1 Laser Product
Laser Klasse 1
Laser Klass 1
Luokan 1 Laserlaite
Appareil À Laser de Classe 1

Statement 8:

CAUTION:
Never remove the cover on a power supply or any part that has the following label attached.

Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

Chapter 1: Introduction

1.1 Overview

The IBM® High IOPS Modular Adapters are block storage devices. The cards present themselves to the operating system through a Fusion-MPT™ interface as single or multiple drives that require minimal user configuration. You can use these cards for either nonpersistent or persistent data.

The IBM High IOPS Modular Adapters have Flash ROM for storing the BIOS and firmware, and NVRAM for storing nonvolatile user data. The cards have three LEDs on the PCI bracket to indicate activity, drive life, and status.

The IBM High IOPS Modular Adapters have a PCIe® interface that complies with the *PCI Express Specification 2.0*.

The functionality of the IBM High IOPS Modular Adapters comes from a SAS2008 I/O controller with firmware that runs on the internal processor.

1.2 Features

This section lists the features of the IBM High IOPS Modular Adapters.

- Proven enterprise firmware stack
- Best-in-class read and write performance
- Average latency of less than 50 ms
- Low host burden – No static CPU and memory overhead
- Supports Windows® and Linux® operating systems
- Supports VMWare® operating system
- Bootable
- PCIe 2.0, x8
- Profile and form factor varies
- PCIe standard or low-profile bracket
- LEDs for data activity, drive life, and drive status

High reliability includes block-level, page-level, and die-level failure protection.

Chapter 2: Installation

2.1 Quick Installation Instructions

Use the quick installation instructions to install your IBM High IOPS Modular Adapter if you are comfortable with the installation procedure. See the next section if you need more detailed installation instructions.

To quickly install your IBM High IOPS Modular Adapter, follow these instructions.

1. Unpack the IBM High IOPS Modular Adapter and inspect it for damage.
2. Turn off the server, and remove the power cord.
3. Remove the cover from the server.
4. Insert the adapter in an available PCIe® slot.
5. Secure the bracket to the system's chassis.
6. Replace the cover and the power cord, then turn on the server.

The IBM High IOPS Modular Adapter hardware installation is complete.

2.2 Detailed Installation Instructions

2.2.1 Hardware Installation

1. **Unpack the IBM High IOPS Modular Adapter and inspect it for damage.** Unpack the adapter in a static-free environment and follow good antistatic grounding procedures. Remove the IBM High IOPS Modular Adapter from the antistatic bag, and carefully inspect it for damage. If you notice any damage, contact IBM, or your reseller support representative.

   NOTE Back up your data before changing your system configuration.

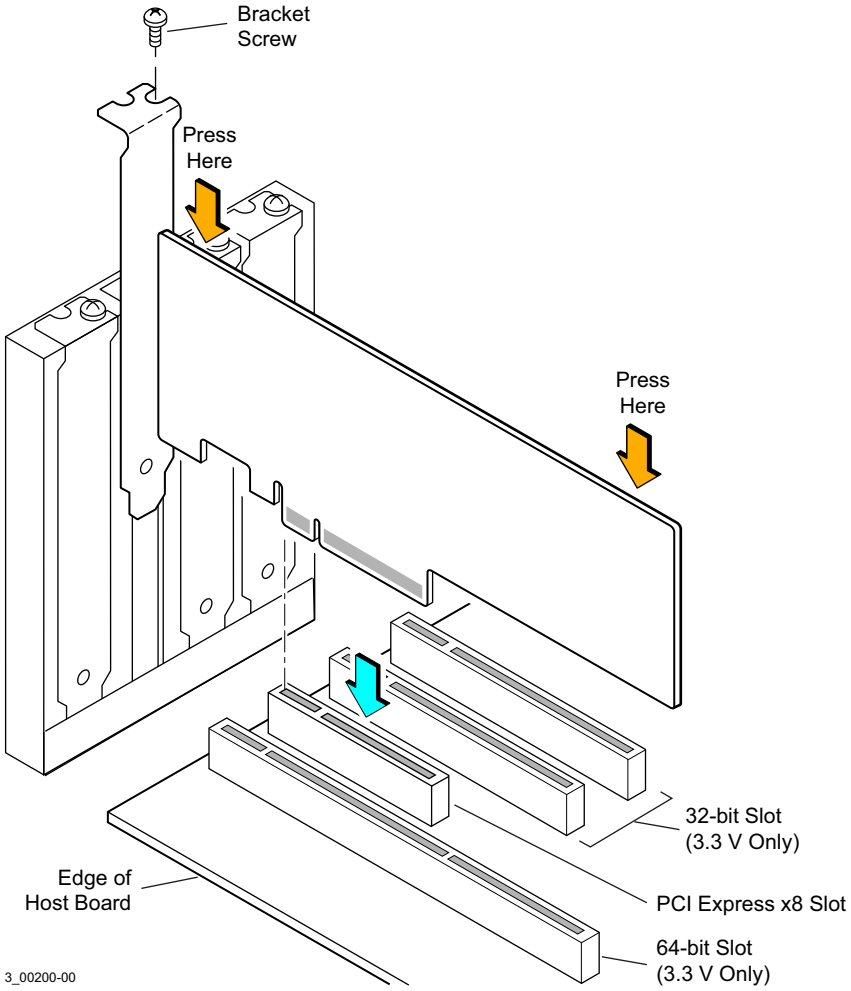
2. **Prepare the computer.** Turn off the server, and disconnect the power cords from the power supply. Remove the cover from the chassis.

   NOTE To avoid electrical shock, disconnect the server from the main power and from any networks before installing the adapter.

3. **Replace the PCI mounting bracket (system dependent).** If required for your system, replace the full-height PCI mounting bracket that ships on the IBM High IOPS Modular Adapter with the shorter bracket supplied. Save the two screws from the full-height bracket and use the screws to attach the short bracket.
4. **Insert the IBM High IOPS Modular Adapter in an available PCIe slot.** Locate an empty PCIe slot. Remove the blank bracket panel on the server chassis that aligns with the empty PCIe slot. Save the bracket screw, if applicable.
   Align the adapter to the PCIe slot. Press down gently, but firmly, to properly seat the adapter in the slot. The following figure shows how to insert the adapter in a PCIe slot.

Figure 1 IBM High IOPS Modular Adapter Installation Diagram



NOTE The shape, size, and locations of components on your IBM High IOPS Modular Adapter might vary from this illustration.

5. For highest performance, make sure that the PCIe slot is PCIe 2.0 and make sure that it has an active width of eight or sixteen lanes. The IBM High IOPS Modular Adapter functions with an active width of four lanes or two lanes, but with reduced performance.

CAUTION The location must meet the 300 LFPM (linear feet/minute) minimum airflow requirement.

6. **Secure the bracket to the system's chassis.** Install the bracket screw, if applicable, or engage the system retention mechanism to secure the adapter to the system's chassis.
7. **Replace the cover, reconnect the power cords, and power up the system.** Replace the server's cover, reconnect the power cords, and any network cables. Turn on the power.

The IBM High IOPS Modular Adapter hardware installation is complete.

2.2.2 Shipping Considerations

Some server configurations do not support High IOPS Modular adapters shipping installed or transported inside IBM System x servers. In these configurations, the Modular adapters must be packaged in the original box, electrostatic discharge (ESD) bag, and packing materials. An alternate packaging equivalent intended for fragile, ESD-sensitive electronic devices may also be used. Configured Modular adapters must be removed and repackaged before shipping. For more information, see the following websites:

IBM High IOPS Modular Adapters configuration information and requirements:

http://www.ibm.com/support/entry/portal/docdisplay?lndocid=SERV-IOMA

2.2.3 New Windows Driver Installation

The High IOPS Modular drivers for Windows Server® 2003 (x64), Windows Server 2008 (x64), are available online at the link listed in step 1.

To load the driver during a new Windows system installation, you can boot directly from the Microsoft® installation CD-ROM.

To install a new Windows operating system and its appropriate device driver, follow these steps:

1. Follow the links on the USB drive to download the Windows driver from the IBM website, http://www.ibm.com/support/entry/portal/docdisplay?lndocid=MIGR-65723.
2. Copy the appropriate driver files onto a disk.
3. Open the file and follow the directions in the .txt file.

2.2.4 Windows Driver Installation

The following is a sample driver installation for Windows Server® 2008. Additional versions of Windows drivers are available online. Consult the `ReadMe.txt` file for each driver.

The IBM drivers for Windows Server 2003 (x86, x64, or IA64) and Windows Server 2008 (x86, x64, or IA64) are available online. Use the following procedure to install or upgrade the driver onto an existing Windows Server 2008 system. Consult the `ReadMe.txt` file for each driver.

NOTE When a High IOPS Modular adapter is added to an existing system installation, the new adapter is automatically detected at the next reboot. When the Device Driver Wizard appears at boot, click on the Next button and continue with step 8.

1. Boot Windows Server 2008 and log on as a user with Administrator privileges.
2. Click the **Start** button, then right-click the **My Computer** entry in the menu.
3. Click the **Properties** selection.
4. Click the **Hardware** tab, then click the **Device Manager** button on the left side of the dialog.
5. Click the **+** to the left of the SCSI and RAID controllers line. Find the adapter desired for the driver upgrade and double-click the entry. Click on the **Driver** tab.

NOTE If no driver was installed prior to the installation, your device might appear in the **Other devices** section as a **SAS Controller** with an exclamation point in the icon.

6. Information on the currently installed driver is displayed, and additional driver details can be viewed by clicking the **Driver Details** button.

7. Click the **Update Driver** button to update the existing driver or install the correct driver. The Hardware Update Wizard begins.
8. Click the **Browse my computer for driver software** button to select it.
9. Click the **Browse** button or type the correct path name to the driver file.
10. Select the folder for the driver package that matches the processor architecture of the system (IA64, or x64). After the path to the driver has been established, click the **OK** button.
11. Click the **Next** button again to start the driver update.
12. The **installing driver software** progress bar appears.
13. Click the **Close** button.
14. Your new device now appears under the **Storage Controllers** section.
15. Click the **STOP Installation** button to cancel the installation if a nonsigned driver is not desired.
    or
    Click the **Continue Anyway** button to continue the installation.

    The system loads the driver from the Windows Server 2003 driver diskette. A message box might display indicating that the target (existing) driver is newer than the source (upgrade) driver.
16. Click **No** to cancel the driver upgrade at this point.
    or
    Click **Yes** to continue the installation.

    The system copies the driver to the system disk. For any adapter other than the boot adapter, the updated driver becomes active immediately. For the boot adapter, a message box displays indicating that you must reboot your system for the new driver to take effect.
17. Click the **Finish** button to complete the driver upgrade.

Download the latest Windows drivers from the IBM website. Consult the `ReadMe.txt` file available online with the driver if more detail is needed.

2.2.5 Linux Driver Installation

Download the latest Linux drivers from IBM website http://www.ibm.com/support/entry/portal/docdisplay?lndocid=MIGR-65723. Consult the `Linux ReadMe.txt` file available online with the driver.

IBM provides open source drivers in the following ways:

- Precompiled binaries to add to an existing installation using driver update disks or RPMs for selected distributions.
- Fusion-MPT source to add or update any distribution.

2.2.6 VMware Driver Installation

2.2.6.1 VMware ESX4.1

1. Download the latest VMware ESX/ESXi 4.1 driver from the VMware Knowledge Base site at: http://kb.vmware.com/selfservice/microsites/search.do?language=en_US&cmd=displayKC&externalId=2012308

2.2.6.2 VMware ESXi 5.x

Download the latest VMware ESXi 5.x driver from the VMware website using the following steps:

1. Go to this website: http://www.vmware.com/resources/compatibility/search.php?deviceCategory=io.
2. Search for the device with the vendor ID (VID) 1000 and the device ID (DID) 007E.

3. Click on the desired IBM High IOPS Modular Adapter from the search result.
4. Copy the information string under Device Driver(s).
5. Go to this website: http://downloads.vmware.com to download the driver.
6. Enter the information string in the search box.
7. Click on the topmost link of the search results.
8. After downloading the driver zip file, refer to the *readme.txt* file for all installation instructions.

Chapter 3: Characteristics

3.1 IBM High IOPS Modular Adapter General Characteristics

The IBM High IOPS Modular Adapters contain Flash ROM for storing the BIOS and firmware. Three LEDs are located on the PCI bracket to indicate activity, drive life, and status.

The following table shows the characteristics of each model of IBM High IOPS Modular Adapter.

Table 1 IBM High IOPS Modular Adapter Characteristics Summary

Device Name	Manufacturing Name	Capacity	Connector	Firmware	Flash Controller	NAND Type	Product Class	Card Style
IBM 300 High IOPS MLC Modular Adapter	NWD-BLP3-300	300 GB	X8 PCIe 2.0	DD/IR	SF 2500	MLC (Multi-Level Cell)	Balanced Read/Write	Half height, half length (HHHL)
IBM 300 High IOPS SLC Modular Adapter	NWD-WLP3-300	300 GB	X8 PCIe 2.0	DD/IR	SF 2500	SLC	Write Intensive	HHHL
IBM 600 High IOPS MLC Modular Adapter	NWD-BLP3-600	600 GB	X8 PCIe 2.0	DD/IR	SF 2500	MLC	Balanced Read/Write	HHHL
IBM 800 High IOPS MLC Modular Adapter	NWD-BLP4-800	800 GB	X8 PCIe 2.0	DD/IR	SF 2500	MLC	Balanced Read/Write	HHHL

3.2 IBM High IOPS Modular Adapter Physical Characteristics

The IBM High IOPS Modular Adapter uses a low-profile, half-height, and half-length PCIe board.

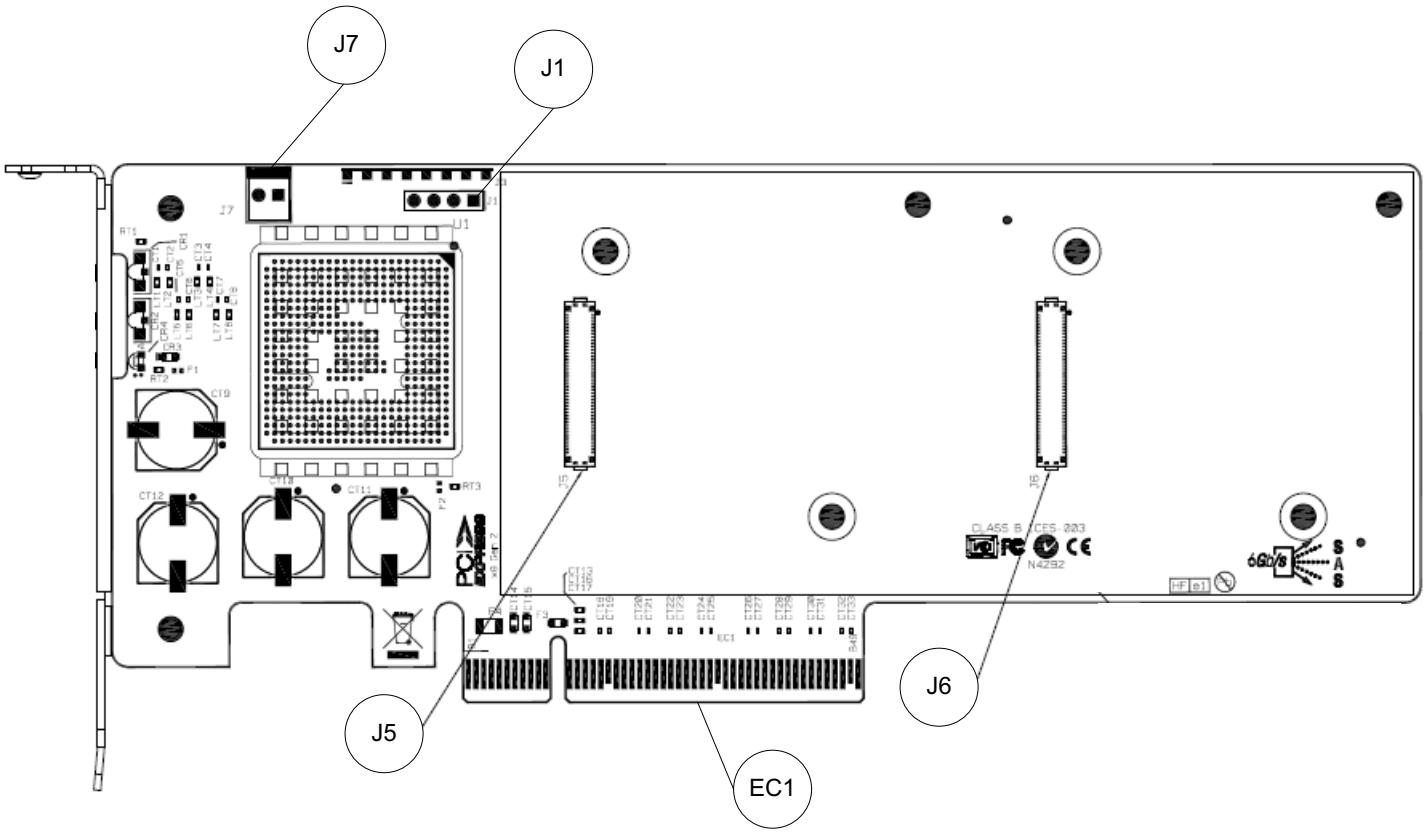
The IBM High IOPS Modular Adapter uses a SAS2008 controller with drive firmware running on its internal processor. The controller connects to up to four embedded nonvolatile memory modules.

You can use the IBM High IOPS Modular Adapter for either persistent or nonpersistent data and the IBM High IOPS Modular Adapter offers high-performance with low latency and a low CPU burden.

3.2.1 Connectors

This section describes the different connectors on the IBM High IOPS Modular Adapter. See the following figure for connector locations.

Figure 1 IBM High IOPS Modular Adapter Layout



- J1: UART connector, used for test purposes only
- J5 and J6: DFF connectors
- J7: TSOC key
- EC1: PCIe x8 edge connector

3.2.2 LEDs

Three board-mounted, right-angle LEDs shine through holes in the PCI bracket: one is for data activity, one is for drive life, and one is for drive status. The LEDs are labeled on the bracket.

3.2.3 Troubleshooting the IBM High IOPS Modular Adapter

The LEDs provide key status information to diagnose any problem with the IBM High IOPS Modular Adapter.

1. Life LED
2. Status LED
3. Activity LED

Table 2 Status Indicators on a Running System

LED Name	LED Color	LED Description
Activity	Green	On, blinking - Indicates data activity on the card. No action required.
Life	Green	On, steady- Card has sufficient life remaining for programming and erasing the Flash memory. No action required.
	Yellow	On, steady - Card has approximately 10%, or less, of life remaining for programming and erasing the Flash memory. Plan for replacements.
	Red	On, steady - Card has no program or erase cycles left, and data can be read, but not written. Backup data, copy to a new card.
Status	Green	On, steady - Normal. On, blinking - This lets the user locate a specific card in a rack of servers.
	Yellow	On, steady - Warning. One of the following conditions applies: ■ Temperature warning. If this condition persists, you might damage your card. Increase cooling for the card or shut down your system to prevent damage. ■ Other component issues: Run the list and health commands in the ddcli utility to determine which component has an issue.
	Red	On, blinking - Firmware fault code: ■ Run the ddcli utility to determine which component has an issue. ■ If no information appears, reboot the system and retry. ■ If no information appears, call your field application engineer. On, steady - One of the following conditions applies: ■ One or more of the SSDs has failed (IT mode). ■ At least one SSD has exceeded its temperature. ■ RAID volume has failed (DD mode). ■ No RAID volume is configured (DD mode). ■ Backup power store has failed. ■ Other component issues: Run the list and health commands in the ddcli utility to determine which component has an issue. If no information appears, reboot the system and retry the utility (DD mode).

If you experience a problem with your IBM High IOPS Modular Adapter card that you cannot resolve, report it to your field applications engineer (FAE) or, if you obtained the product from an OEM, report it to the OEM. Keep these tips in mind when reporting a problem:

- Clearly identify and report the revision level of the IBM High IOPS Modular Adapter card. To view this information, use the `ddcli` command, option 1.
- Report the part number listed on the label, and clearly identify the board revision.

- Describe the steps leading up to the error.
- Report the operating system version and the host driver version.

3.2.4 Electrical and Environmental Specifications

The IBM High IOPS Modular Adapter is designed to minimize electromagnetic emissions, susceptibility to radio frequency energy, and the effects of electrostatic discharge. The card carries the CE mark, C-Tick mark, Canadian Compliance Statement, KCC, HF, Taiwan BSMI, Japan VCCI, FCC Class B and the card is marked with the FCC Self-Certification logo. The card also meets the requirements of CISPR Class B.

3.2.5 Electrical Characteristics

The IBM High IOPS Modular Adapter receives power from the PCIe 12-V and 3.3-V power rails.

3.2.6 Thermal and Atmospheric Characteristics

The IBM High IOPS Modular Adapter operates in an environment defined by the following parameters.

- Temperature range: 5°C to 45°C (dry bulb)
- Maximum wet bulb temperature: 28°C
- Relative humidity range: 8% to 80% noncondensing
- Minimum airflow requirement: 300 LFPM (linear feet/minute)

The IBM High IOPS Modular Adapter is designed for a storage and transit environment defined by the following parameters.

- Temperature range: -20°C to+ 75°C (dry bulb)
- Relative humidity range: 5% to 95% noncondensing

3.2.7 Safety Characteristics

All IBM PCIe boards 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 below the SELV 42.4-V limit.

3.3 Technical Support

For assistance installing, configuring, or running the IBM High IOPS Modular Adapter, contact IBM Technical Support:

Phone: 1-800-IBM-SERV (1–800–426–7378)

Website: http://www.ibm.com/support/

Appendix A: Getting Help and Technical Assistance

If you need help, service, or technical assistance or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you. This section contains information about where to go for additional information about IBM and IBM products, what to do if you experience a problem with your system, and whom to call for service, if it is necessary.

A.1 Before You Call

Before you call, make sure that you have taken these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your system.
- Go to the IBM support website at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.

You can solve many problems without outside assistance by following the troubleshooting procedures that IBM provides in the online help or in the documentation that is provided with your IBM product. The documentation that comes with IBM systems also describes the diagnostic tests that you can perform. Most systems, operating systems, and programs come with documentation that contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

A.2 Using the Documentation

Information about your IBM system and preinstalled software, if any, or optional device is available in the documentation that comes with the product. That documentation can include printed documents, online documents, readme files, and help files. See the troubleshooting information in your system documentation for instructions for using the diagnostic programs. The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. IBM maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. To access these pages, go to http://www.ibm.com/supportportal/ and follow the instructions.

A.3 Getting Help and Information from the World Wide Web

On the World Wide Web, the IBM website has up-to-date information about IBM systems, optional devices, services, and support. You can find service information for IBM systems and optional devices at http://www.ibm.com/supportportal/.

A.4 Software Service and Support

Through IBM Support Line, you can get telephone assistance, for a fee, with usage, configuration, and software problems. For information about which products are supported by Support Line in your country or region, see http://www.ibm.com/services/supline/products/.

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A.5 Hardware Service and Support

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A.6 IBM Taiwan Product Service

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台灣國際商業機器股份有限公司
台北市松仁路 7 號 3 樓
電話：0800-016-888

IBM Taiwan product service contact information:
IBM Taiwan Corporation
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Taipei, Taiwan
Telephone: 0800-016-888

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Industry Canada Class A emission compliance statement

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Avis de conformité à la réglementation d'Industrie Canada

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European Community contact:
IBM Deutschland GmbH
IBM Technical Regulations, Department M372
IBM-Allee 1,71139 Ehningen, Germany
Telephone: +49 7032 15 2941
Email: lugi@de.ibm.com

Germany Class A statement

Deutschsprachiger EU Hinweis:

Hinweis für Geräte der Klasse A EU-Richtlinie zur Elektromagnetischen Verträglichkeit

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Deutschland: Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Geräten

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Generelle Informationen:

Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022 Klasse A.

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People's Republic of China Class A electronic emission statement

中华人民共和国“A类”警告声明

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