



MICROCHIP

Adaptec® HBA 1200 Installation and User Guide

Table of Contents

1. Regulatory Compliance Statements.....	4
2. About This Guide.....	7
2.1. What You Need to Know Before You Begin.....	7
2.2. Terminology Used in this Guide.....	7
2.3. How to Find More Information.....	7
3. Kit Contents and System Requirements.....	8
3.1. Kit Contents.....	8
3.2. System Requirements.....	8
4. About Your HBA 1200 Series Host Bust Adapter.....	9
4.1. Standard Features.....	9
4.2. Mechanical Information.....	9
4.3. Visual Indicators.....	10
4.4. About the HBA Ultra 1200-32i Adapter.....	10
4.5. About the HBA Ultra 1200-16i and HBA 1200-16i Adapters.....	13
4.6. HBA 1200-8i.....	15
4.7. About the HBA Ultra 1200-16e Adapter.....	17
5. Installing the Controller and Disk Drives.....	19
5.1. Before You Begin.....	19
5.2. Selecting Disk Drives and Cables.....	19
5.3. Using the Microchip HII BIOS Configuration Utility to Configure Controller Settings for Direct-Attached Devices.....	19
5.4. Tri-Mode Connectivity Tips for Integration.....	20
5.5. Installing the Host Bus Adapter.....	20
6. Installing the Driver and an Operating System.....	23
6.1. Download the Driver Package.....	23
6.2. Installing with Windows.....	23
6.3. Installing with Red Hat Linux.....	23
6.4. Installing with SuSE Linux Enterprise Server.....	24
6.5. Installing with Oracle Linux.....	24
6.6. Installing with Ubuntu Linux.....	25
6.7. Installing with Debian Linux.....	25
6.8. Installing with FreeBSD.....	25
6.9. Installing with Solaris.....	27
6.10. Installing with Citrix XenServer.....	29
6.11. Installing with VMware.....	29
7. Installing the Driver on an Existing Operating System.....	31
7.1. Download the Driver Package.....	31
7.2. Installing on Windows.....	31
7.3. Installing on Red Hat.....	31
7.4. Installing on SuSE Linux Enterprise Server.....	32
7.5. Installing on Oracle Linux.....	32

7.6.	Installing on Ubuntu Linux.....	32
7.7.	Installing on Debian Linux.....	32
7.8.	Installing on FreeBSD.....	33
7.9.	Installing on Solaris.....	33
7.10.	Installing on Citrix XenServer.....	34
7.11.	Installing on VMware.....	35
8.	Solving Problems	36
8.1.	Troubleshooting Checklist.....	36
8.2.	Resetting the Adapter	36
9.	Using the Microchip SAS/SATA HII Configuration Utility.....	37
9.1.	Running the Microchip SAS/SATA Configuration Utility: UEFI/HII.....	37
9.2.	Modifying HBA 1200 Controller Settings.....	37
9.3.	Out of Band Messaging Settings.....	37
9.4.	Device Information.....	38
9.5.	Identifying a Disk Drive.....	38
9.6.	Updating Drive Firmware.....	38
9.7.	Clearing Configuration Meta-data.....	39
9.8.	Setting the Bootable Device(s) for Legacy Boot Mode.....	39
9.9.	Updating the HBA 1200 Firmware.....	39
9.10.	Creating a Support Archive.....	40
10.	Installing the SmartPQI Drivers from Source	41
10.1.	Installation Instructions for Supported Linux OSes.....	41
10.2.	Using the Installation DVD as the Repository.....	42
11.	Safety Information.....	44
11.1.	Electrostatic Discharge (ESD).....	44
12.	Technical Specifications.....	45
12.1.	Environmental Specifications.....	45
12.2.	DC Power Requirements.....	45
12.3.	Current and Power Requirements	45
13.	Revision History.....	46
	The Microchip Website.....	47
	Product Change Notification Service.....	47
	Customer Support.....	47
	Microchip Devices Code Protection Feature.....	47
	Legal Notice.....	48
	Trademarks.....	48
	Quality Management System.....	49
	Worldwide Sales and Service.....	50

1. Regulatory Compliance Statements

Federal Communications Commission Radio Frequency Interference Statement



Attention: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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 instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. However, if this equipment does cause interference to radio or television equipment 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 equipment and receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/television technician for help.
- Use a shielded and properly grounded I/O cable and power cable to ensure compliance of this unit to the specified limits of the rules.

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.

UL Compliance Statement




From Microchip Adaptec products are tested and listed by Underwriters Laboratories, Inc. to UL 60950-1 /IEC 62368-1 Second Edition and IEC-60950-1/IEC 62368-1 Second Edition standards, file numbers E516387. Microchip Adaptec products are for use only with UL listed ITE.

Microchip Corporation

Use only with the listed ITE:

Adaptec HBA 1200-8i
Adaptec HBA 1200-16i
Adaptec HBA 1200-16e
Adaptec HBA Ultra 1200-16i
Adaptec HBA Ultra 1200-32i

 Tested to Comply
With FCC Standards

FOR HOME OR OFFICE USE

European Union Compliance Statement



This Information Technology Equipment has been tested and found to comply with EMC Directive 2014/30/EU, in accordance with:

- EN55032 (2014) Emissions:
 - Class B ITE radiated and conducted emissions
- EN 55035:2017 Immunity:
 - EN61000-4-2 (2009) Electrostatic discharge: ± 4 kV contact, ± 8 kV air
 - EN61000-4-3 (2010) Radiated immunity: 3V/m
 - EN61000-4-4 (2012) Electrical fast transients/burst: ± 1 kV AC, ± 0.5 kV I/O
 - EN61000-4-5 (2014) Surges: ± 1 kV differential mode, ± 2 kV common mode
 - EN61000-4-6 (2014) Conducted immunity: 3 Vrms
 - EN61000-4-11 (2004) Supply dips and variations: 30% and 100%
- EN 63000:2018 Technical Documentation:
 - For the assessment of electrical and electronic products with respect to the restriction of hazardous substances
- EC 62368-1:2014 (EU)
- IEC 60950-1:2005 (US)

In addition, all equipment requiring U.L. listing has been found to comply with EMC Directive 2014/35/EU, in accordance with EN 62368 with amendments A1, A2, A3, A4, A11, A12.



The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 – SI 2012 No. 3032.

Electromagnetic Compatibility Regulations 2016 – SI 2008 No. 1597.

The Electrical Equipment (Safety) Regulations 2016 – SI 2016 No. 1101.

Australian/New Zealand Compliance Statement



This device has been tested and found to comply with the limits for a Class B digital device, pursuant to the Australian/New Zealand standard AS/NZS 3548 set out by the Spectrum Management Agency.

Canadian Compliance Statement



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.

Japanese Compliance (Voluntary Control Council Initiative)



This equipment complies to class B Information Technology equipment based on VCCI (Voluntary Control Council for Interface). This equipment is designed for home use but it may causes radio frequency interference problem if used too near to a television or radio. Please handle it correctly per this documentation.

Korean Compliance (KCC) Statement



Microchip Adaptec® products are tested and certified by KCC:

Korean Compliance (KCC) Statement:

R-R-M5P-3258P-32i

The above certification covers the following series:

Adaptec HBA Ultra 1200-32i

Korean Compliance (KCC) Statement:

R-R-M5P-3258-16i

The above certification covers the following series:

Adaptec HBA 1200-16i

Adaptec HBA 1200-8i

B급 기기

(가정용 방송통신기자재)

Class B Equipment

(For Home Use Broadcasting & Communication Equipment)

이 기기는 가정용(B급) 전자파적합기기로서 주로 가정에서 사용하는 것을 목적으로 하며, 모든 지역에서 사용할 수 있습니다.

This equipment is home use (Class B) electromagnetic wave suitability equipment and to be used mainly at home and it can be used in all areas.

2. About This Guide

This Installation and User's Guide explains how to install and setup your HBA 1200 Series Host Bus Adapter, including driver installation, BIOS operations, troubleshooting tips, and instructions for flashing the adapter firmware.

These HBA 1200 Series adapter models are described in this guide:

- Adaptec HBA 1200-8i
- Adaptec HBA 1200-16i
- Adaptec HBA 1200-16e
- Adaptec HBA Ultra 1200-16i
- Adaptec HBA Ultra 1200-32i

2.1 What You Need to Know Before You Begin

This guide is written for data storage and IT professionals who are responsible for installing, configuring, and maintaining HBA 1200 Series Host Bus Adapters in computers or servers in a "cloud" or data center environment. You should be familiar with computer hardware, operating system administration, data storage devices, and SAS and Serial ATA (SATA) technology.

2.2 Terminology Used in this Guide

Many of the terms and concepts referred to in this guide are known to computer users by multiple names. This guide uses these terms:

- Host Bus Adapter or HBA (also known as controller, adapter, or I/O card)
- Disk drive (also known as hard disk, hard drive, or hard disk drive)
- Solid State Drive (also known as SSD or non-rotating storage media)
- Enclosure (also known as a storage enclosure, disk drive enclosure, or JBOD)

2.3 How to Find More Information

You can find more information about your HBA 1200 Series Host Bus Adapter by referring to these documents, available for download at start.adaptec.com.

- *ARCCONF Command Line Utility User's Guide for Adaptec Smart Storage Controllers*—Describes how to use the ARCCONF utility to perform configuration and storage management tasks from an interactive command line. (DS-60001685)
- *HBA 1200 Series Host Bus Adapters Installation and User's Guide* (this manual)—Describes how to install HBA 1200 Series adapters in a computer or server, install drivers, and configure the adapter for initial use. (DS-00004086A)

3. Kit Contents and System Requirements

This section lists the contents of your HBA 1200 Series kit and the system requirements for successfully installing and using your adapter.

3.1 Kit Contents

HBA 1200 Series kits:

- HBA 1200 Series adapter
- Full-height ("FH") and Low-profile ("LP") brackets, with mounting screws

Note: The latest firmware, drivers, utilities software, and documentation can be downloaded at start.adaptec.com.

3.2 System Requirements

- PC-compatible computer with Intel Pentium, or equivalent, processor
- 4 GB of RAM minimum
- Available compatible PCIe slot (depending on your adapter model—see the descriptions in [4. About Your HBA 1200 Series Host Bust Adapter](#))
- One of the supported operating systems listed in the *HBA 1200 Software/Firmware Release Notes* (DS-00004088A). See the *Release Notes* for a complete list of supported OS versions.
- USB flash drive or CD burner, for creating driver disks and bootable media

4. About Your HBA 1200 Series Host Bust Adapter

This section provides an overview of the features of the HBA 1200 Series adapters.

4.1 Standard Features

- Low-profile, MD2 form factor on all boards with up to 16-ports; full-height, half-length form factor for 32-port variants
- Fully tri-mode capable: 16 Gbps NVMe Gen 4, 24 Gbps SAS4, and 6 Gbps SATA
- 8-lane (x8) or 16-lane (x16 ultra) PCIe Gen 4 host interface
- Internal SlimSAS (SFF-8654) and external mini-SAS HD connectors (using SFF-9402 pinout to support U.2 and U.3)
- Dynamic adapter power management
- arconf/maxView support
- Support for 64 NVMe devices and up to 256 SAS/SATA devices
- Broad inbox OS coverage
- Comprehensive out of box driver support
- Multi initiator support for SAS only
- SGPIO, SES, UBM, and VPP enclosure management support
- Support for x86 platform
- Self-Encrypting Drive (SED) management software

Note: See the Product Brief for a complete list of supported features.

4.2 Mechanical Information

4.2.1 Board Dimensions

This table shows the board dimensions of the HBA 1200 Series adapters, in inches.

Table 4-1. Full-Height (FH) Board Dimensions (32 port)

Dimension	Measure
Height	4.376
Length	6.60
PCB thickness	0.062
Max. component height, top side	Not to exceed 0.57 in.
Max. component height, bottom side	Not to exceed 0.105 in.

Table 4-2. Low-Profile (LP) Board Dimensions (16 port, 8 port)

Dimension	Measure
Height	2.731
Length	6.60
PCB thickness	0.062
Max. component height, top side	Not to exceed 0.57 in.
Max. component height, bottom side	Not to exceed 0.105 in.

4.2.2 Heat Sink

HBA 1200 Series adapters include a passive heat sink. For airflow requirements, see Environmental Specifications.

4.3 Visual Indicators

LEDs on HBA 1200 Series adapters provide a visual indication of the board hardware status. The LED locations vary, and may be on the front of the board or back of the board. The LED states are described in the following tables.

For LED locations, see the board images in [4.4. About the HBA Ultra 1200-32i Adapter](#), [4.5. About the HBA Ultra 1200-16i and HBA 1200-16i Adapters](#), and [4.6. HBA 1200-8i](#).

Table 4-3. HBA 1200 Series Status LEDs

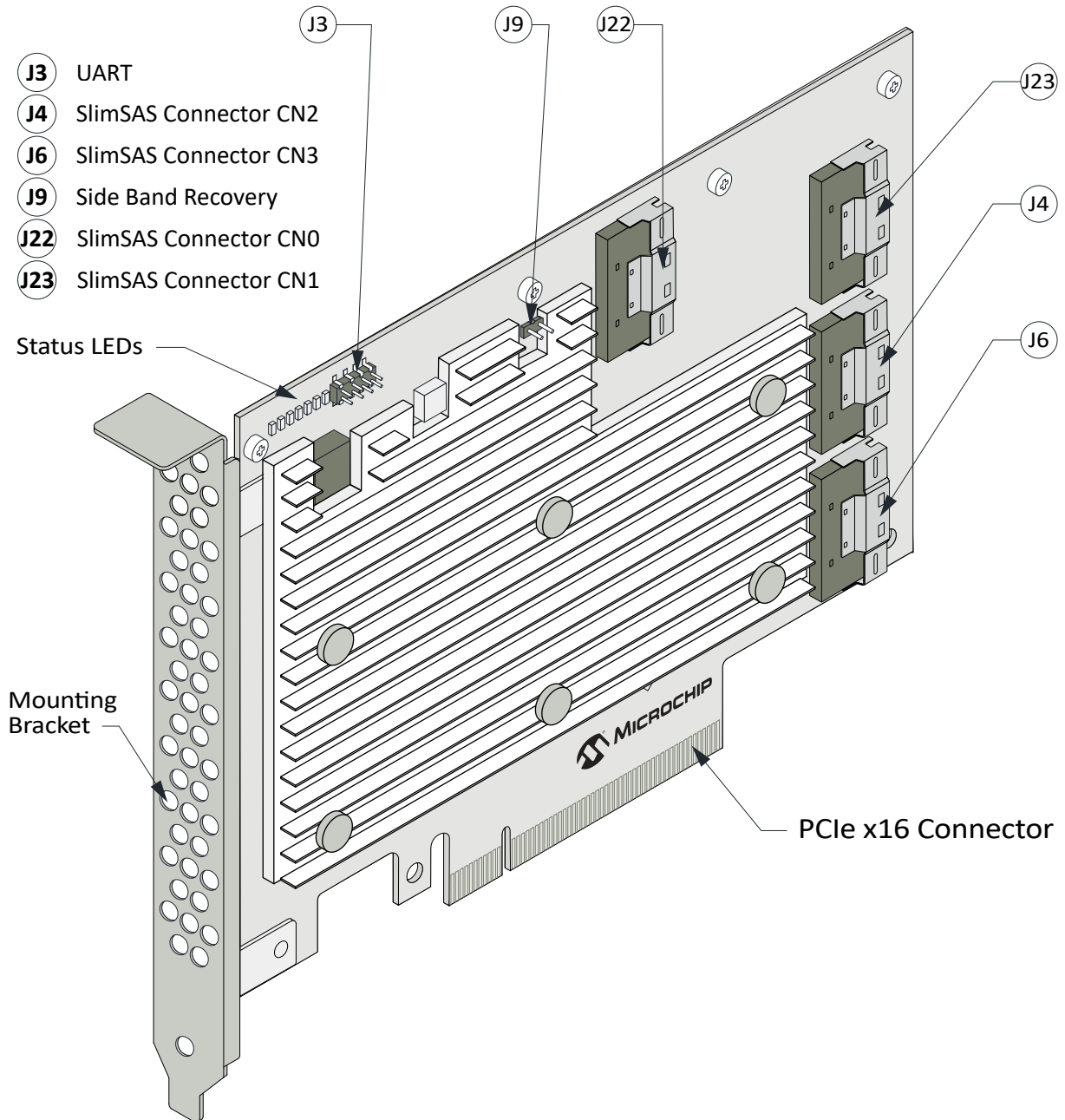
LED	Color	Meaning
HEARTBEAT	Green	Heartbeat (blinks once per/second when firmware operating normally)
FAULT	Yellow	Hardware Lockup/Fault: OFF = NORMAL OPERATION, ON = FAULT
CRYPTO	Green	Cryptographic State: Off = NON-ENCRYPTING, On = ENCRYPTING
PAL_DEBUG	Yellow (8i adapters) Red (16i adapters)	Debug LED control signal

4.4 About the HBA Ultra 1200-32i Adapter

The HBA Ultra 1200-32i Adapter is a tri-mode (SAS/SATA/NVMe) Host Bus Adapter with these features:

About Your HBA 1200 Series Host Bust Adapter

Figure 4-1. HBA Ultra 1200-32i Adapter



Form Factor	Full height; half length
Bus compatibility	PCIe 4.0
PCIe bus width	x16
Data transfer rate (SAS)	24 Gb/s per port
PHYs (Unified Serial Ports)	32
Standard memory	32 MB SPI Flash
Connectors, internal	4x SlimSAS x8

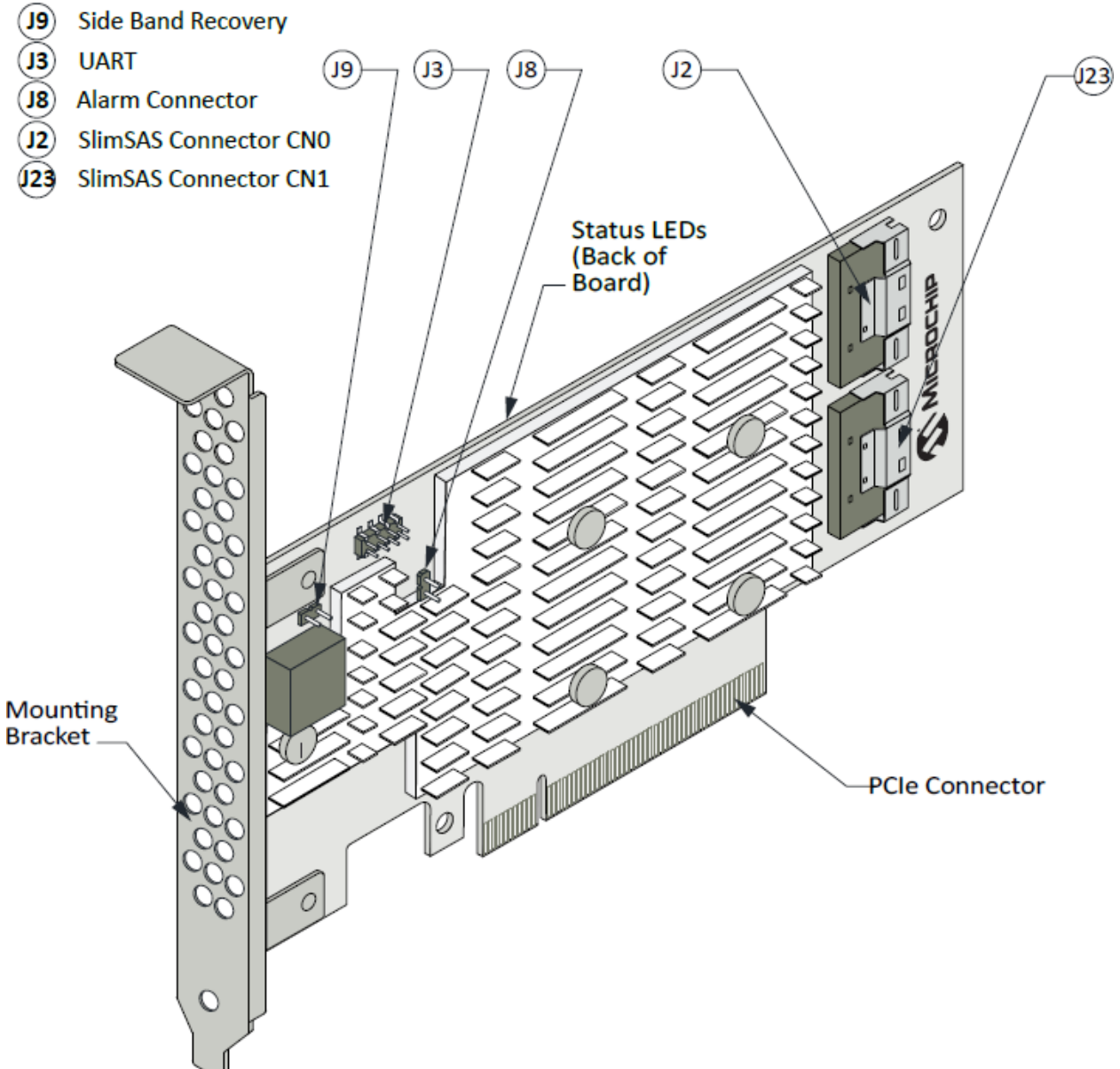
About Your HBA 1200 Series Host Bust Adapter

Maximum number of disk drives	32 (SAS/SATA/NVMe)
Enclosure Support	UBM, VPP, SGPIO
Controller-Based Encryption	No
Thermal sensors	Processor temperature, Ambient temperature

4.5 About the HBA Ultra 1200-16i and HBA 1200-16i Adapters

The HBA Ultra 1200-16i and HBA 1200-16i Adapters are tri-mode (SAS/SATA/NVMe) Host Bus Adapters with these features:

Figure 4-2. HBA Ultra 1200-16i and HBA 1200-16i Adapters



Form Factor	Half height; half length
Bus compatibility	PCIe 4.0
PCIe bus width	HBA Ultra 1200-16i: x16 HBA 1200-16i: x8
Data transfer rate (SAS)	24 Gb/s per port
PHYs (Unified Serial Ports)	16

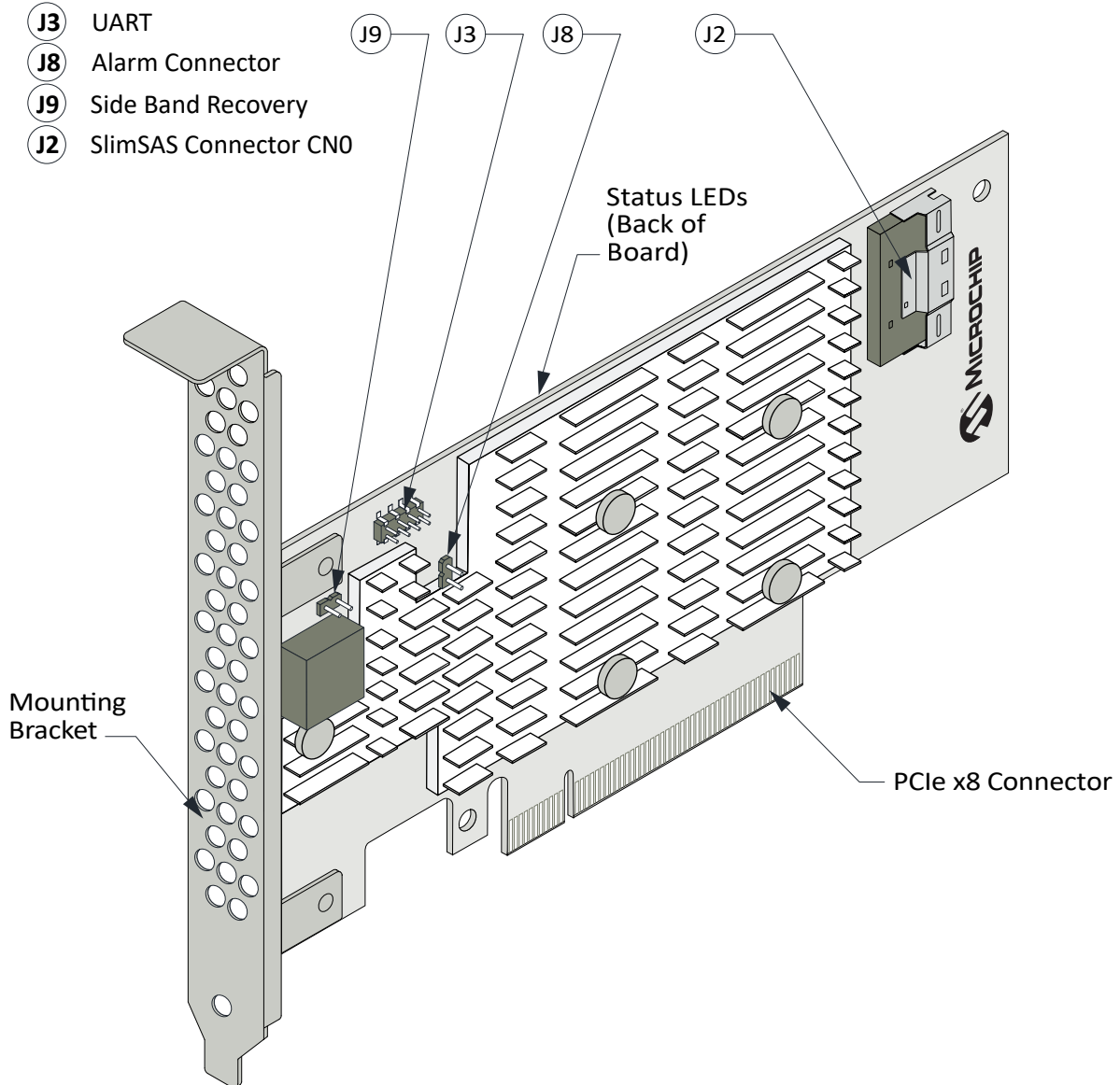
About Your HBA 1200 Series Host Bust Adapter

Standard memory	32 MB SPI Flash
Connectors, internal	2x SlimSAS x8
Maximum number of disk drives	16 (SAS/SATA/NVMe)
Enclosure Support	UBM, VPP, SGPIO
Controller-Based Encryption	HBA Ultra 1200-16i: No HBA 1200-16i: No
Thermal sensors	Processor temperature, Ambient temperature

4.6 HBA 1200-8i

The HBA 1200-8i Adapter is a tri-mode (SAS/SATA/NVMe) Host Bus Adapter with these features:

Figure 4-3. HBA 1200-8i Adapter



Form Factor	Half height; half length
Bus compatibility	PCIe 4.0
PCIe bus width	x8
Data transfer rate (SAS)	24 Gb/s per port
PHYs (Unified Serial Ports)	8
Standard memory	32 MB SPI Flash
Connectors, internal	1x SlimSAS x8

About Your HBA 1200 Series Host Bust Adapter

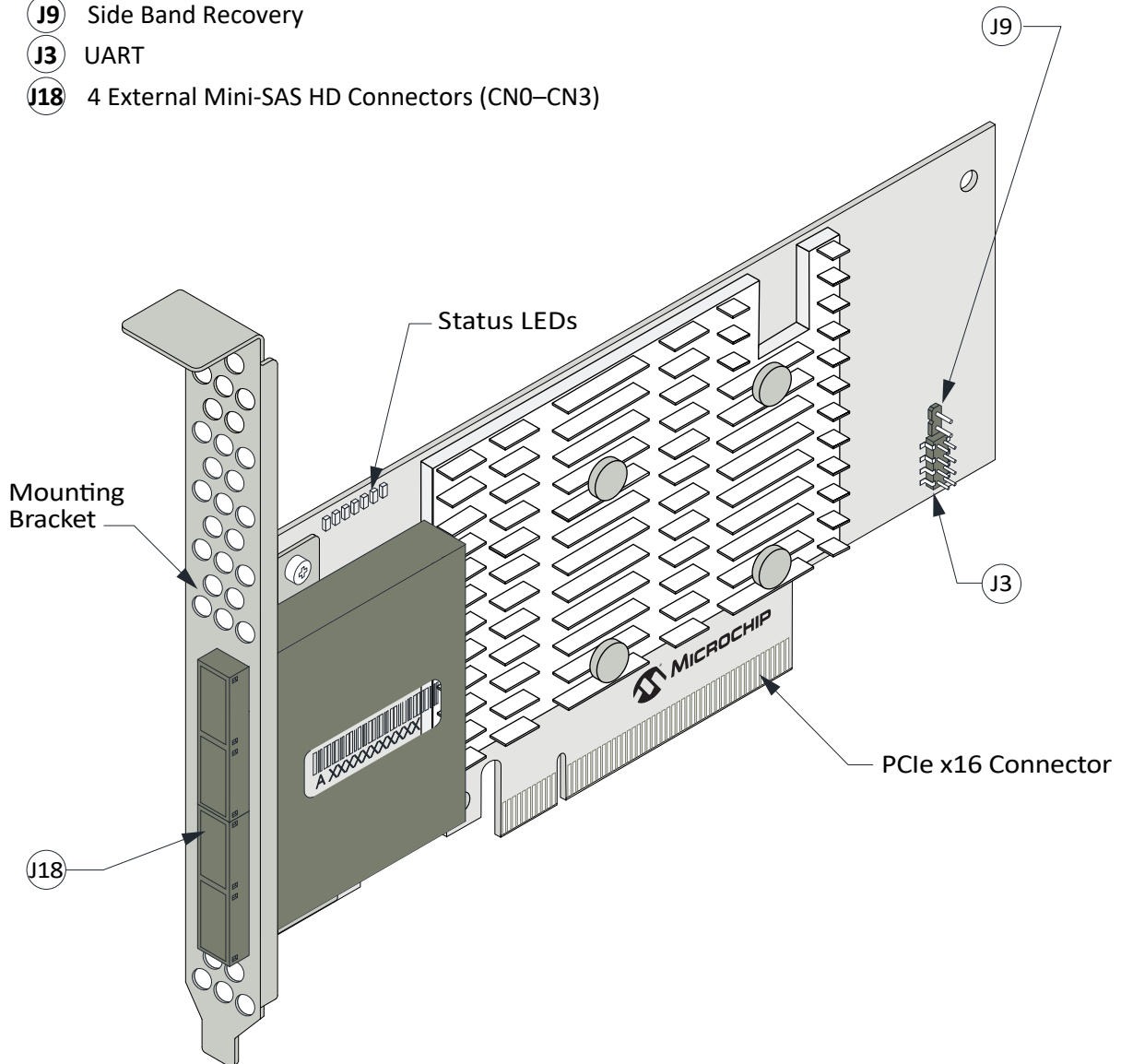
Maximum number of disk drives	8 (SAS/SATA/NVMe)
Enclosure Support	UBM, VPP, SGPIO
Controller-Based Encryption	No
Thermal sensors	Processor temperature, Ambient temperature

4.7 About the HBA Ultra 1200-16e Adapter

The HBA Ultra 1200-16e Adapter is a tri-mode (SAS/SATA/NVMe) Host Bus Adapter with these features:

Figure 4-4. HBA Ultra 1200-16e Adapter

- Ⓧ J9 Side Band Recovery
- Ⓧ J3 UART
- Ⓧ J18 4 External Mini-SAS HD Connectors (CN0–CN3)



Form Factor	Half height; half length
Bus compatibility	PCIe 4.0
PCIe bus width	x16
Data transfer rate (SAS)	24 Gb/s per port
PHYs (Unified Serial Ports)	16
Standard memory	32 MB SPI Flash
Connectors, external	4x Mini-SAS HD

About Your HBA 1200 Series Host Bust Adapter

Maximum number of disk drives	16 (SAS/SATA/NVMe)
Enclosure Support	UBM, VPP, SGPIO
Controller-Based Encryption	No
Thermal sensors	Processor temperature, Ambient temperature

5. Installing the Controller and Disk Drives

This section explains how to install your HBA 1200 Series adapter in a computer cabinet or server and connect it to internal and external disk drives.

5.1 Before You Begin

- Read [Safety Information](#).
- Familiarize yourself with your host bus adapter's physical features (see [4.1. Standard Features](#)).
- Ensure that you have the right number of disk drives for your application (see [5.2. Selecting Disk Drives and Cables](#)).

5.2 Selecting Disk Drives and Cables

5.2.1 Disk Drives

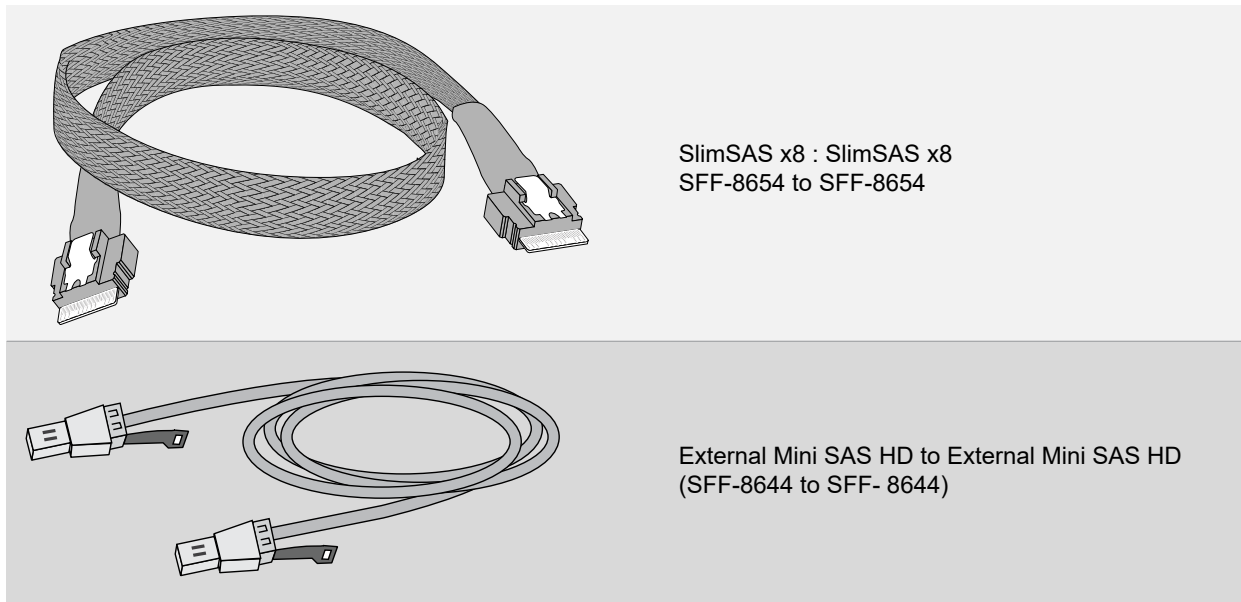
Your HBA 1200 Series adapter supports SAS and SATA disk drives, and Solid State Drives (SSDs). For more information about compatible disk drives, refer to www.adaptec.com/compatibility.

5.2.2 Cables

Depending on your application requirements, you can use any of the cables listed below (for typical applications; list not exhaustive). For more information about cabling options for your HBA 1200 Series adapter, visit www.adaptec.com/cables

Note: We recommend using Microchip Adaptec cables only.

SlimSAS Cables



5.3 Using the Microchip HII BIOS Configuration Utility to Configure Controller Settings for Direct-Attached Devices

This section will be used to configure the port discovery protocol in the HII BIOS utility of the RAID/HBA controller through the system BIOS during server boot.

1. Configure direct-attached devices per NVMe protocol with required cabling and power connections.
2. Power on system and access System BIOS menu. Navigate to the Adaptec RAID/HBA Controller.
3. Navigate to Configure Controller Settings → Configure Port Discovery Protocol → Set Port Discovery Protocol.
4. Set Port CN# to be configured and change setting from "Auto Detect" to "Direct-Attached Cable," and submit changes.
5. Configure the number of targets for the direct-attached devices. Selection is equal to the number of connectors on the cable (i.e., 2, 4, or 8). Adaptec by Microchip proprietary cables are required. Submit Changes.
6. After submitting changes, this screen will indicate a successful configuration change. Save changes in the BIOS menu and restart.

5.4 Tri-Mode Connectivity Tips for Integration

Devices connected via enclosure/backplane

- Verify the correct cable type for the specific configuration is used.
 - Refer to the systems compatibility report (CR) for tested configuration settings.
 - <https://adaptec.com/compatibility>
 - Refer to the qualified cable description list for configurations not listed on systems CR.
 - <https://adaptec.com/cables>
- Verify the backplane is set to the correct mode.
 - Refer to the systems compatibility report (CR) for tested configuration settings.
 - <https://adaptec.com/compatibility>
- Refer to enclosure documentation for configurations not listed on systems CR.
- Verify the controller Backplane Mode setting is correct for the configuration
 - Available options:
 - View Current port Discovery Protocol
 - View Pending port Discovery Protocol
 - Set port Discovery Protocol
 - Reset port Discovery Protocol to default
 - Backplane Mode settings can be reviewed/changed in the UEFI BIOS utility, ARCCONF CLI utility, or maxView GUI
 - Available options are Auto-detect(default)/UBM/SGPIO/VPP
- This operation requires reboot.
- Additional guidelines
 - NVMe drives following U.3 pinout **are** compatible with enclosures intended for U.2 NVMe drives. NVMe drives following the U.2 pinout **are not** compatible with enclosures intended for use with NVMe U.3 drives.
 - Verify controller BIOS/firmware is at latest release
 - SlimSAS to Occulink is 1:1 connection to NVMe devices
- When configuring mixed devices in a single backplane, it is recommended to confirm configuration of NVMe devices before adding SAS/SATA devices
- If devices are not recognized
 - Verify all settings above
- If devices are not on NVMe/Systems CR, it's possible it is not compatible. Please select a tested device from list or contact Adaptec Apps Engineering at <https://ask.adaptec.com>

5.5 Installing the Host Bus Adapter

This section describes how to install your HBA 1200 Series adapter in a computer cabinet or server and connect internal and external storage devices.

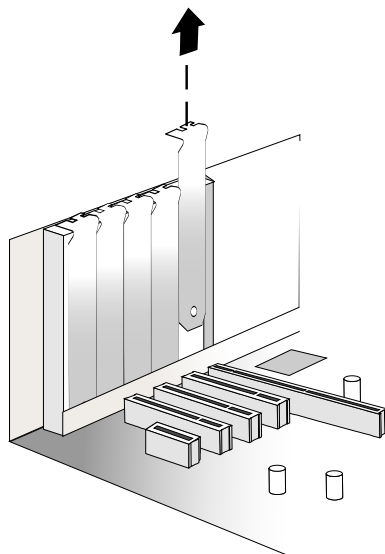
1. Turn off your computer and disconnect the power cord and any network cables. Open the cabinet, following the manufacturer's instructions.

Installing the Controller and Disk Drives

2. Select an available PCIe expansion slot that's compatible with your adapter model and remove the slot cover, as shown in the figure below. (To check PCIe bus compatibility of your adapter, see [4. About Your HBA 1200 Series Host Bust Adapter.](#))



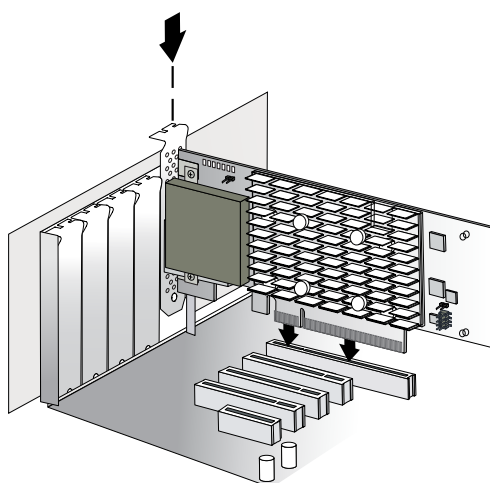
Touch a grounded metal object before handling the adapter.



3. Insert the adapter into the expansion slot and press down gently but firmly until it clicks into place. When installed properly, the adapter should appear level with the expansion slot.



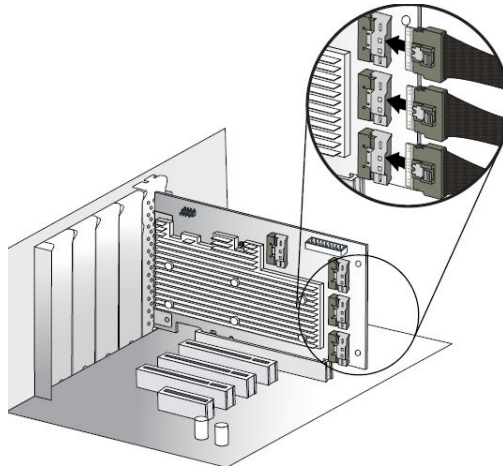
Be sure to handle the adapter by its bracket or edges only. Apply pressure only on the edges when inserting the card into expansion slot.



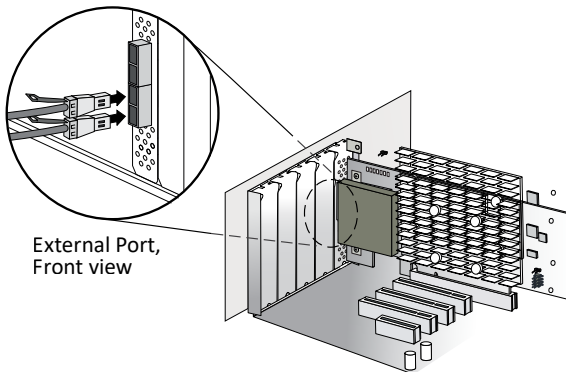
4. Secure the bracket in the expansion slot, using the retention device (for instance, a screw or lever) supplied with your computer.
5. Connect cables between the adapter and internal or external disk drives or enclosures, as required:

Installing the Controller and Disk Drives

- For adapters with internal ports, connect SlimSAS cables between the adapter and internal disk drives or enclosures:



- For adapters with external ports, connect miniSAS HD cables between the adapter and external disk drives or enclosures:



6. Close your computer cabinet, reconnect the power cord and network cables, then power up the system.

6. Installing the Driver and an Operating System

This chapter explains how to install the SmartPQI controller driver and an operating system on a bootable volume. It assumes that the HBA 1200 is installed in a computer or server.

Note: For information about building the SmartPQI drivers from source, see [10. Installing the SmartPQI Drivers from Source](#).

6.1 Download the Driver Package

Complete these steps to download the drivers for your operating system(s):

1. Open a browser window, then type start.adaptecc.com in the address bar.
2. Enter your product or adapter model number, then select HBA 1200.
3. Select your operating system version, for instance, Microsoft Windows Server 2019 or Red Hat Enterprise Linux 7; then select the appropriate driver from the list.
4. Download the controller driver package (zip file archive).
5. When the download completes, extract the package contents to a temporary location on your machine. Each driver is stored in a separate folder (\windows 2019, \rhel7, and so on).

Notes:

- For OSs that provide an inbox smartpqi driver with support for Microchip Smart Storage Controllers, it is not necessary to create a driver disk from the downloaded driver files. Refer to the instructions for each OS for specific driver disk requirements.
- See the *Release Notes* for a complete list of available driver files.

6.2 Installing with Windows

Note: Use the following procedure for all supported Windows versions. You will need your Windows Installation DVD (or equivalent virtual media/iso image) to complete this task.

To install the controller SmartPQI driver while installing Windows:

1. Insert the Windows installation DVD, then restart the computer.
2. Follow the on-screen instructions to begin the Windows installation.
3. When prompted to specify a location for Windows, select **Load Driver**.
4. Insert the USB driver disk, browse to the driver location, then click **Ok**.
5. When prompted to select the driver to install, click **Next**.
6. Follow the on-screen instructions to complete the installation.

6.3 Installing with Red Hat Linux

To install the controller SmartPQI driver while installing Red Hat Linux, follow the steps in the sections below.

RHEL7 Update 6 Installation and Above

To install the RHEL7 driver with a Linux system:

1. Install the Linux system using the inbox smartpqi driver.
2. After the installation completes, install the latest smartpqi driver rpm by using the following command (where `###-###` is the build number):

```
rpm -ivh kmod-smartpqi-###-###.rhel7u9.x86_64.rpm
```

RHEL7 Installation with Secure Boot

To install the RHEL driver with a Linux system with secure boot enabled:

Note: For more information about installing RHEL with secure boot, refer to the RedHat online resources for "Signing Kernel Modules for Secure Boot".

1. Install the Linux system using the inbox smartpqi driver in secure boot mode.
2. Enroll the Microchip public key for secure boot:
 - a. Import public key:

```
mokutil --import smart_driver_key_pub.der
```

- b. Reboot system.
 - c. During boot, perform MOK key enrollment to accept the new key.
3. After the installation completes, install the signed driver rpm using the following command (where `##.##-###` is the build number):

```
rpm -ivh kmod-smartpqi-##.##-###.<rhel_version>.x86_64.rpm
```

4. Reboot.

6.4 Installing with SuSE Linux Enterprise Server

To install the controller SmartPQI driver while installing SuSE Linux, follow the steps in the sections below.

Installing with SLES 12 SP3 and Above

Follow these steps to install the driver while installing SLES 12 SP5:

1. Install the Linux system using the inbox smartpqi driver.
2. After the installation completes, install the latest smartpqi driver rpm by using the following command (where `##.##-###` is the build number):

```
rpm -ivh smartpqi-ueficert-##.##-###.sles12sp5.x86_64.rpm
```

```
rpm -ivh smartpqi-kmp-default-##.##-###.sles12sp5.x86_64.rpm
```

SLES 12 Installation with Secure Boot

To install the SLES driver with a Linux system with secure boot enabled:

1. Install the Linux system using the inbox smartpqi driver in secure boot mode.
2. Enroll the Microchip public key for secure boot.
 - a. Install the ueficert package:

```
rpm -ivh smartpqi-ueficert-##.##-###.<sles_version>.x86_64.rpm
```

- b. Import public key:
- ```
mokutil --import /etc/uefi/certs/17A8B2BE.crt
```
- c. Reboot.
  - d. During boot, perform MOK key enrollment to accept the new key.
3. Install Microchip signed driver rpm package:

```
rpm -ivh smartpqi-kmp-default-##.##-###.<sles_version>.x86_64.rpm
```

4. Reboot.

## 6.5 Installing with Oracle Linux

To install the controller SmartPQI driver while installing Oracle Linux, follow the steps in the sections below.



### Installing with Oracle Linux 7.6 and Above

Follow these steps to install the driver while installing Oracle Linux 7.6:

1. Install the Linux system using the inbox smartpqi driver.
2. After the installation completes, install the latest smartpqi driver rpm for the kernel you intend to run (where `###-###` is the build number):

```
Base Kernel: rpm -ivh kmod-smartpqi-###-###.ol7u9.x86_64.rpm
UEK Kernel: rpm -ivh kmod-smartpqi-uek-###-###.ol7u9.x86_64.rpm
```

## 6.6 Installing with Ubuntu Linux

To install the controller SmartPQI driver while installing Ubuntu Linux:

**Note:** The following instructions apply to Ubuntu Server 18.04 LTS and above only.

1. Install the Linux system using the inbox smartpqi driver.
2. Install the smartpqi DKMS package (`smartpqi-dkms_###-###_all.deb`) by using the following commands (where `###-###` is the build number):

**Note:** The smartpqi DKMS package rebuilds the smartpqi driver automatically whenever the kernel on the system is updated. This ensures that you have a smartpqi driver to support the new kernel.

```
apt-get update
apt-get -f install build-essential dkms
dpkg -i smartpqi-dkms_###-###_all.deb
```

## 6.7 Installing with Debian Linux

To install the controller SmartPQI driver while installing Debian Linux 9.13 and above:

1. Install the Linux system using the inbox smartpqi driver.
2. Reboot the system.
3. Install the smartpqi DKMS package (`smartpqi-dkms_###-###_all.deb`) by using the following commands (where `###-###` is the build number):

**Note:** The smartpqi DKMS package rebuilds and activates the smartpqi driver automatically any time the kernel on the system is updated. This insures you have a smartpqi driver to support the new kernel.

```
apt-get install build-essential dkms
dpkg -i smartpqi-dkms_###-###_all.deb
```

## 6.8 Installing with FreeBSD

To install the controller SmartPQI driver while installing FreeBSD:

1. Copy the driver module (`smartpqi.ko`) to a USB drive.  
Disk partition the USB key, using `gpart` on a unix system.

For example:

```
gpart create -s GPT da1
gpart add -t freebsd-ufs da1
newfs /dev/da1p1
mount /dev/da1p1 /mnt
cp smartpqi.ko /mnt
```

2. Insert the USB driver disk.

## Installing the Driver and an Operating System

---

3. Insert the FreeBSD Installation disk into the CD/DVD drive and boot from it.
4. From the FreeBSD boot menu, press Escape to launch the boot loader prompt.
5. Perform the following steps at the boot loader prompt:

- a. Check all the present modules by executing following command.

```
lsmod
```

Expected Output: It will show all the present modules.

- b. Unload the kernel module by executing the following command:

```
unload
```

- c. Check whether the kernel is unloaded or not by executing the following command:

```
lsmod
```

Expected Output: It will show all the present modules.

- d. Check whether the USB drive is detected or not by executing the following command:

```
lsdev
```

Expected Output:

part 0: ..... (removable)

part 1: ..... (removable)

part 2: ..... (removable)

- e. Load the kernel by executing the following command:

```
load /boot/kernel/kernel
```

- f. Load the driver module by executing the following command:

```
load part< USB key location >:smartpqi.ko
```

For example: # load part2:smartpqi.ko

- g. Continue the Installation procedure by typing the following command and pressing **Enter**.

```
boot
```

- h. After completing the kernel installation and before rebooting the system, add the driver to the new system. Choose "YES" when it prompts the following message for the manual configuration.

*"The installation is now finished. Before exiting the installer, would you like to open a shell in the new system to make any final manual modifications?"*

- i. Use the following commands to complete the manual configuration:

- i. Mount the USB key by using the following command:

```
mount /dev/dalpl /media
```

- ii. Copy the driver to the boot directory by using the following command:

```
cp /media/smartpqi.ko /boot/modules/smartpqi.ko
```

- iii. Ensure that the boot loader loads by using the following command:

```
vi /boot/loader.conf
```

- iv. Add the following line:

```
smartpqi_load="YES"
reboot
```

6. If the system halts at # `mountroot>`, check for the boot partition using the following command:

```
mountroot> ?
```

**Note:** The boot partition is primarily present in P2, so use the following command:

```
mountroot> ufs:/dev/<da0p2>
```

## 6.9 Installing with Solaris

To install the controller SmartPQI driver while installing Solaris, follow the steps in the sections below.

### 6.9.1 Installing with Solaris Live Media

To install the SmartPQI controller driver with Solaris Live Media:

1. Copy the `smartpqi.pkg` or `iso` file and `adddriver.sh` file to a USB flash drive and insert that drive into the installation system.
2. Boot to the Solaris 11 live media DVD in the installation system. Select the Solaris version and press **Enter**.
3. Select the keyboard (default is 27) and language (default is 3).
4. Enter your login credentials.

The GUI will appear.

5. Open the terminal and switch to the root user by using the following command:

```
su
```

Use "solaris" as the root password.

6. Adaptec controllers are shipped with the inbox `aac` driver, so it is necessary to remove the driver. Use the following command to remove the inbox `aac` driver:

```
rem_drv aac
```

7. Open the "Device driver utility" from the desktop and enter the root password.
8. The DD utility scans and automatically highlights the controller or devices that are not claimed by the driver.
9. Click **Browse** to load the driver image from the USB flash drive.
10. Select `smartpqi.pkg` or `iso` file and click **OK**.
11. Click **Install**.  
The **Installation Successful** message gets displayed.
12. The DD utility rescans the devices.
13. The available disks are viewable in the terminal by typing the `format` command. Press **Ctrl+C** to return to the command prompt.
14. Return to the desktop by typing `exit` at the `~#` prompt.
15. Double click the **Install Oracle Solaris** icon for OS installation and follow the steps to complete the OS installation.

**Notes:** After the OS is installed, perform following procedure:

1. Open the terminal and copy the `adddriver.sh` file to `/tmp` directory.

```
cp /media/USB_DRIVE/adddriver.sh /tmp/
cd /tmp
```

2. Execute the `adddriver.sh` script file with the parameter `live` as follows:

```
chmod +x adddriver.sh
./adddriver.sh live
```

3. Reboot the system using the following command:

```
reboot
```

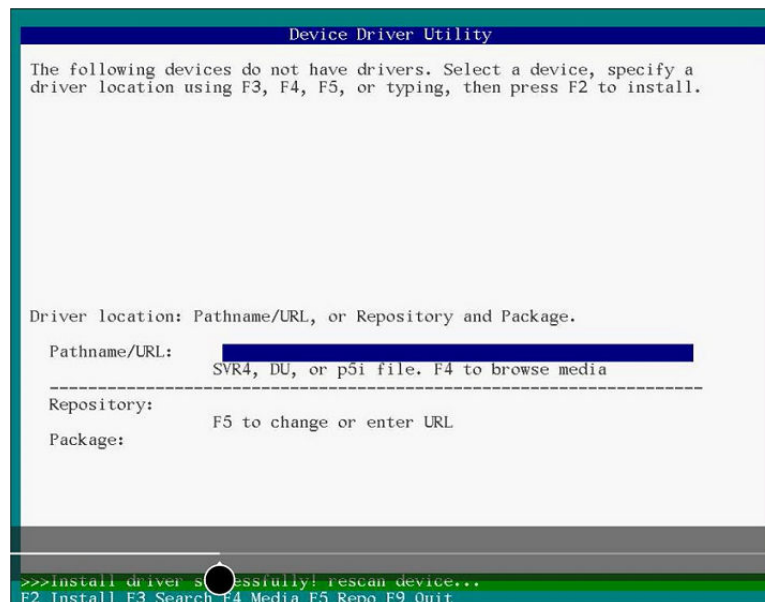
### 6.9.2 Installing with Solaris Text Installer

To install the SmartPQI driver with Solaris Text Installer:

1. Copy the `smartpqi.pkg` or `iso` file and `adddriver.sh` files to a USB flash drive and plug that drive into the installation system.
2. Boot to the Solaris 11.3 or 11.4 text installer DVD in the installation system, and select the keyboard and language.
3. After the DVD boots, select option 3 (**Shell**) from the list.
4. Remove the inbox `aac` driver and exit the shell using the following commands:

```
#rem_drv aac
#exit
```

5. Select option 2 (**Install Additional Drivers**) from the list. The **Device Driver Utility** screen appears.
6. Press the **F4** key (**Media**) to search for the driver image file on your flash drive.
7. Select **USB drive** and press **Enter**.
8. Find the location of the `smartpqi.pkg` or `iso` file on the flash drive, highlight it, and press the **F2** key to select it.
9. Press the **F2** key again to install the driver.
10. If the installation succeeds, the following screen will appear:



11. Press the **F9** key to exit to the **Options** menu.

12. Select option 3 (**Shell**) from the list.
13. Type the format command in the terminal window to list the available disks. Press **Ctrl+C** to return to the command prompt.
14. Type **exit** at the `~#` prompt to go back to the **Options** menu.
15. Enter option 1 to **Install Oracle Solaris**.

The **Welcome to Oracle Solaris** screen appears.

16. Press the **F2** key to continue.
17. Select the disk discovery method and press the **F2** key to continue.
18. Follow installation steps accordingly.
19. At the installation summary, press the **F2** key to install the Oracle package; or, press the **F3** key to go back to make changes.
20. After the OS has been installed, press **F9** to go back to the Options menu.
21. Select Option 3 (**Shell**).
22. Open the terminal and copy the `adddriver.sh` file to `/tmp` directory using the following commands:

```
cp /media/USB_DRIVE/adddriver.sh /tmp/
cd /tmp
```

23. In the terminal, execute the `adddriver.sh` script file with the parameter text as follows:

```
chmod +x adddriver.sh
./adddriver.sh text
```

24. Reboot the system using the following command:

```
#reboot
```

### 6.10 Installing with Citrix XenServer

**Note:** For Hypervisor 8.2 or later, install Hypervisor on the system using the driver included in the release. Then update driver as necessary using the latest driver release from the Citrix support site.

**Note:** For XenServer 7.6 and above, a USB key is supported for the driver update ISO. On a Linux system, use the `dd` command to write the SmartPQI driver ISO image to the USB key. You will need the XenServer installation DVD (or equivalent virtual media/iso image) to complete this task. You must have administrator privilege to install the driver image.

To install the controller SmartPQI driver while installing Citrix XenServer:

1. On the machine where you want to install the OS and SmartPQI driver, insert the XenServer installation DVD, then restart your computer.
2. When prompted to add a driver, insert the driver USB key, press **F9**, then select **local media**.  
**Note:** Leave the driver USB key inserted throughout the installation.
3. Verify the SmartPQI driver and **“use”**.
4. Continue the XenServer installation, following the on-screen instructions.
5. Remove the driver USB key, then reboot your computer.

### 6.11 Installing with VMware

**Note:** You will need a writable CD or USB flash drive to complete this task. You must have administrator privileges to create the driver disk and install the driver image.

To install the controller SmartPQI driver with VMware ESXi, you must create a custom boot image using the ESXi-Customizer tool. This tool automates the process of customizing the ESXi install-ISO and runs as a script under Microsoft PowerShell.

## Installing the Driver and an Operating System

You can download the ESXi-Customizer tool, `ESXi-Customizer-PS-v2.5.ps1`, from <https://github.com/VFrontDe/ESXi-Customizer-PS> and other locations on the Web.

**Note:** Be sure to install the prerequisite software first, including Powershell and VMware POWERCLI, before you install ESXi-Customizer.

To install the SmartPQI controller driver while installing VMware:

1. Download and install Microsoft PowerShell and VMware POWERCLI, as needed. You can download PowerShell from the Microsoft Download Center at [www.microsoft.com/download](http://www.microsoft.com/download), and POWERCLI from [my.vmware.com](http://my.vmware.com).

**Note:** PowerShell is pre-installed on many Windows systems, including Windows Server 2012/2016/2019.

2. Download the ESXi-Customizer tool from <https://github.com/VFrontDe/ESXi-Customizer-PS> or other Web location. Then, unpack the archive to a local directory on your Windows system; `C:\ESXi-Customizer`, for instance.
3. Copy the VMware driver vib for your OS version to a temp directory, such as `C:\temp\pkg`. The driver vib files (listed below, where xxxxxx is the driver version/build number) should be in the driver download directory on your Windows system.

| Option          | Description                                                      |
|-----------------|------------------------------------------------------------------|
| ESXi 6.5        | <code>smartpqi-1.0.0.xxxx-1OEM.650.0.0.xxxxxxx.x86_64.vib</code> |
| <b>ESXi 6.7</b> | <code>smartpqi-1.0.0-xxx-1OEM.670.0.0.xxxxxxxx.x86_64.vib</code> |

4. Run ESXi-Customizer from the installation directory:

```
C:\ESXi-Customizer>ESXi-Customizer.cmd
```

5. In PowerShell, enter the following command:

```
.\ESXi-Customizer-PS-v2.5.ps1 -Vxx -pkgDir C:\temp\pkg
```

where `Vxx` is the VMware OS version: `v67` for VMware 6.7, `v65` for VMware 6.5.

PowerShell begins creating the custom ESXi install-ISO with embedded SmartPQI driver. It displays "All done" when the ISO is ready.

6. Burn the custom ISO image to a writable CD or USB drive.

**Note:** Use whatever tool you prefer to burn the CD or USB drive.

Remove the CD or USB drive after you finish burning the image.

7. On the VMware ESXi machine, insert the custom boot CD/USB, then restart your computer.
8. Follow the on-screen instructions to begin the VMware installation.
9. Complete the VMware installation, following the on-screen instructions.
10. Remove the custom boot CD or USB drive, then reboot your computer.

## 7. Installing the Driver on an Existing Operating System

This chapter explains how to install the SmartPQI controller driver on an existing operating system. It assumes that the HBA 1200 is installed in a computer or server and the OS is already installed.

### Notes:

- To install the driver while you're installing an operating system, see [Installing the Driver and an Operating System](#).
- For information about building the SmartPQI drivers from source, see [10. Installing the SmartPQI Drivers from Source](#).

### 7.1 Download the Driver Package

Complete these steps to download the drivers for your operating system(s):

1. Open a browser window, then type [start.adaptec.com](http://start.adaptec.com) in the address bar.
2. Enter your product or adapter model number, then select HBA 1200.
3. Select your operating system version, for instance, Microsoft Windows Server 2019 or Red Hat Enterprise Linux 7; then select the appropriate driver from the list.
4. Download the controller driver package (zip file archive).
5. When the download completes, extract the package contents to a temporary location on your machine. Each driver is stored in a separate folder (\windows 2019, \rhel7, and so on).

### Notes:

- For OSs that provide an inbox smartpqi driver with support for Microchip Smart Storage Controllers, it is not necessary to create a driver disk from the downloaded driver files. Refer to the instructions for each OS for specific driver disk requirements.
- See the *Release Notes* for a complete list of available driver files.

### 7.2 Installing on Windows

**Note:** The following instructions apply to all supported Windows operating systems.

To install the controller SmartPQI driver on Windows:

1. Start or restart Windows.
2. In the Control Panel, launch the Device Manager, right-click your Smart Storage Controller, then select **Update Driver Software**.
3. Insert the driver disk, then select **Browse my computer for driver software**.
4. Browse to the driver disk location, then click **Next**.
5. Select the driver from the list, then click **Next**.
6. When the installation is complete, remove the driver disk and restart your computer.

### 7.3 Installing on Red Hat

To install the controller SmartPQI driver on Red Hat Linux, follow the steps in the sections below.

#### Installing on RHEL7 Update 6 and Above

To install the RHEL7 driver on a Linux system:

1. Install the latest smartpqi driver rpm by using the following command (where `##.##-###` is the build number):

```
rpm -ivh kmod-smartpqi-##.##-###.rhel7u9.x86_64.rpm
```
2. Reboot the system.

### 7.4 Installing on SuSE Linux Enterprise Server

To install the controller SmartPQI driver on SLES, follow the steps below.

#### Installing on SLES 12 SP3 and Above

Follow these steps to install the driver on SLES 12 SP5:

1. Install the latest smartpqi driver rpm by using the following command (where `##.##-###` is the build number):

```
rpm -ivh smartpqi-ueficert-##.##-###.sles12sp5.x86_64.rpm
rpm -ivh smartpqi-kmp-default-##.##-###.sles12sp5.x86_64.rpm
```

2. Reboot the system.

### 7.5 Installing on Oracle Linux

To install the controller SmartPQI driver on Oracle Linux, follow the steps below.

#### Installing on Oracle Linux 7.6 and Above

To install the SmartPQI driver on an Oracle Linux system:

1. Install the latest smartpqi package using the following commands (where `##.##-###` is the build number):

```
Base Kernel: rpm -ivh kmod-smartpqi-##.##-###.ol7u9.x86_64.rpm
UEK Kernel: rpm -ivh kmod-smartpqi-uek-##.##-###.ol7u9.x86_64.rpm
UEK6ol7 Kernel: rpm -ivh kmod-smartpqi-uek6ol7-##.##-###.x86_64.rpm
UEK6ol8 Kernel: rpm -ivh kmod-smartpqi-uek6ol8-##.##-###.x86_64.rpm
```

### 7.6 Installing on Ubuntu Linux

#### Notes:

1. For driver installation on Ubuntu Linux, you may need to create the root account and password.
2. The SmartPQI driver is available as inbox for Ubuntu 18.04 and above.

To install the controller SmartPQI driver on Ubuntu:

1. Login to the system using the root user credentials.
2. Update the Ubuntu package index by using the following command:  

```
sudo apt-get update
```
3. Load the Ubuntu unpacking tools:  

```
sudo apt-get -f install build-essential dkms
```
4. Install the latest SmartPQI DKMS DEB driver package by using the following command (where `##.##-###` is the build number):

```
dpkg -i smartpqi-dkms_##.##-###_all.deb
```

### 7.7 Installing on Debian Linux

To install the controller SmartPQI driver on Debian 9.13 and above:

1. Login to the system as root, or sudo to root.
2. Install the supporting package for the SmartPQI DKMS deb package:

```
apt-get update
apt-get install build-essential dkms
```



3. Install the SmartPQI DKMS DEB driver package using the following command (where `##.##-###` is the build number):

```
dpkg -i smartpqi-dkms_#.##-###_all.deb
```

4. Reboot system.

### 7.8 Installing on FreeBSD

To install the controller SmartPQI driver on FreeBSD:

1. Check whether the driver package is installed or not.

```
pkg info | grep smartpqi
```

2. Install the SmartPQI package by using the following command:

```
pkg add smartpqi10x-amd64.txz
```

**Note:** Upgrade the package if it already exists, using the following command.

```
pkg upgrade smartpqi10x-amd64.txz
```

3. Restart the system.

```
reboot
```

### 7.9 Installing on Solaris

To install the controller SmartPQI driver on Solaris, follow the steps in the sections below.

1. Remove the inbox aac driver, since the Adaptec Smart Storage Controller is shipped with the inbox aac driver.

```
#rem_drv aac
```

2. Extract the SmartPQI driver package from a .zip or .tar file.
3. Perform the following instructions to load the driver package.

- a. If "smartpqi.pkg" is present, execute the following command:

```
pkgadd -d smartpqi.pkg
```

or,

- b. Ensure that the MCHPsmartpqi folder is present in the current directory. The dot (.) in following the command will read this folder as a driver package:

```
pkgadd -d .
```

In the terminal, the following messages will appear:

```
The following packages are available:
 1 MCHPsmartpqi MICROCHIP Smart PQI RAID Controller driver
 (i386) 1.0.0-100,REV=2016.06.06.22.10

Select package(s) you wish to process (or 'all' to process
all packages). (default: all) [?,??,q]:
```

Enter "1" or "all".

## Installing the Driver on an Existing Operating Sys...

The following prompt will appear:

```
Do you want to continue with the installation of <MCHPsmartpqi> [y,n,?]
```

Enter "y".

The following message appears after a successful installation:

```
Installation of <MCHPsmartpqi> was successful.
```

4. Reboot the system using the following command:

```
reboot
```

5. Use the following command to confirm whether the driver is loaded or not:

```
modinfo -c | grep smartpqi
```

6. Use the following command to identify the driver package information:

```
pkginfo -l MCHPsmartpqi
```

### Removing the Driver Package

1. Remove the loaded driver package using the following command:

```
pkgrm MCHPsmartpqi
```

In the terminal, the following messages will appear:

```
The following package is currently installed:
MCHPsmartpqi MICROCHIP Smart PQI RAID Controller driver
 (i386) 1.0.0-100,REV=2016.06.06.22.10
```

The following prompt will appear:

```
Do you want to remove this package? [y,n,?,q]
```

Enter "y". Once the selection is made, the following prompt will appear:

```
Do you want to continue with the removal of this package [y,n,?,q]
```

Enter "y". The following message will appear to signify the successful removal of the driver package:

```
Removal of <MCHPsmartpqi> was successful
```

2. Reboot the system using the following command:

```
reboot
```

## 7.10 Installing on Citrix XenServer

**Note:** For Hypervisor 8.2 or later, if Hypervisor was installed on the system using the driver included in the release, then update the driver as necessary using the latest driver release from the Citrix support site.

**Note:** To copy the driver RPM file to XenServer, you must have access to a remote copy utility, such as WinSCP, putty, or Linux scp. You must have root privilege to install the driver.

To install the controller SmartPQI driver on Citrix XenServer (where `##.##-###` is the build #):

1. Using a remote copy utility, copy the driver RPM file to a local directory on XenServer. This example uses Linux `scp` to copy the driver to `/tmp/smartpqi`:  

```
scp citrix-smartpqi-#. #. #-###.xen7.6.rpm root@<xen-server-ip>:/tmp/smartpqi
```
2. Install the driver module rpm:  

```
rpm -ivh /tmp/smartpqi/citrix-smartpqi-#. #. #-###.xen7.6.rpm
```
3. Reboot your computer.

### 7.11 Installing on VMware

**Note:** The instructions in this section must be executed on the ESXi server's command line. To access the command line:

1. Enable ESXi system console login. At ESXi system console, press **F2** and log in as root.
2. Select "Troubleshooting Options" and press **ENTER**.
3. Select "Enable ESXi shell".
4. Select "Enable SSH".
5. Press **ESC** to exit from the menus back to the ESXi splash screen.
6. Press **ALT + F1** to open the ESXi shell login screen.
7. Log in as root.

To install the controller SmartPQI driver on VMware:

1. Using a remote copy utility, such as Linux `scp`, copy the downloaded driver VIB package onto the ESXi server's `tmp` directory using the following command (where `xxxxxx` is the version/build number):

```
scp smartpqi-67.xxxx.0.xxx-1OEM.670.0.0xxxxxxx.x86_64.vib
root@<esxi_server_address>:/tmp
```

2. On the ESXi server console, install the driver package (.vib file).

```
esxcli software vib install -v file:/tmp/
smartpqi-67.xxxx.0.xxx-1OEM.670.0.0xxxxxxx.x86_64 -maintenance-mode
```

3. Restart the system.

```
reboot
```

4. After rebooting the system, check whether the driver package is installed. Compare the driver vib version shown by the command below with the version that was installed, to make sure they are the same.

```
esxcli software vib list | grep smartpqi
```

5. Restore system console security settings:
  - a. At ESXi system console, press **F2** and log in as root.
  - b. Select "Troubleshooting Options" and press **ENTER**.
  - c. Select "Disable ESXi shell".
  - d. Select "Disable SSH".
  - e. Press **ESC** to exit back to the ESXi splash screen.

## 8. Solving Problems

This section provides basic troubleshooting information and solutions for solving problems with your HBA 1200 Series Host Bus Adapter.

### 8.1 Troubleshooting Checklist

If you encounter difficulties installing or using your HBA 1200 Series Host Bus Adapter, check these items first:

- With your computer powered off, check the connections to each disk drive, power supply, enclosure, and so on.
- Try disconnecting and reconnecting disk drives from the adapter.
- Check that your adapter is installed in a compatible PCIe expansion slot. To verify the bus compatibility of your adapter, see [4. About Your HBA 1200 Series Host Bust Adapter](#).
- Ensure that your adapter is firmly seated and secured in the PCIe expansion slot.
- If your adapter is not detected during system boot, try installing it in a different compatible expansion slot. (See [Installing the Host Bus Adapter](#) for instructions.)
- Did the driver install correctly? It may need to be reloaded after a reboot or kernel update; see [6. Installing the Driver and an Operating System](#).
- Check the Release Notes for compatibility issues and known problems.

If you are still unable to resolve a problem, contact Microchip Support.

### 8.2 Resetting the Adapter

You may need to reset your HBA 1200 if it becomes inoperable or if a firmware upgrade is unsuccessful. HBA 1200 adapters support a reset protocol called Side Band Recovery. For information about Side Band Recovery, contact your support representative. To locate the Side Band Recovery jumper on your adapter, see the board illustrations in [4. About Your HBA 1200 Series Host Bust Adapter](#).

## 9. Using the Microchip SAS/SATA HII Configuration Utility

The Microchip SAS/SATA Configuration Utility (MSCU) is a BIOS-based utility that you can use to manage your HBA 1200 adapters and the devices attached to them. It comprises a set of tools for creating and managing arrays, viewing and modifying adapter properties, viewing disk drive properties, flashing the HBA firmware, and managing disk drives and spares.

### 9.1 Running the Microchip SAS/SATA Configuration Utility: UEFI/HII

On servers that support the Unified Extensible Firmware Interface, or UEFI (version 2.10 or higher), the BIOS-level configuration options are presented with a UEFI/HII interface (Human Interaction Infrastructure). UEFI/HII provides an architecture-independent mechanism for initializing add-in cards, like the HBA 1200, and rendering contents.

In the UEFI/HII interface, the server's standard BIOS provides access to the HBA 1200 configuration options. How you access the BIOS varies, depending on the server manufacturer, but typically it's started by simply pressing `DEL`. Once you enter setup, navigate to the menu where forms of third-party vendors are displayed. The menu location depends on server manufacturer. Select your controller from the list. Menus are categorized for Controller Settings, Array Configuration, Disk Utilities, and Administration.

Menu-based instructions for completing tasks appear on-screen. Menus can be navigated using the arrows, `ENTER`, `ESC`, and other keys on your keyboard or using mouse, depending on browser capability.

**This appendix provides instructions for navigating and completing tasks with the UEFI/HII interface.**

### 9.2 Modifying HBA 1200 Controller Settings

For the HBA 1200 controller, no options are available when you select **Modify Controller Settings** from the **Configure Controller Settings** menu

### 9.3 Out of Band Messaging Settings

Use this option to configure the Out of Band Messaging Interface to PBSI, MCTP, or Disable.

**Note:** This option is supported in the UEFI/HII interface only.

To change the Out of Band Messaging settings for a controller:

1. Start the Microchip Configuration Utility in UEFI mode.
2. Select your controller, then press `Enter`.
3. From the main menu, select **Configure Controller Settings**.
4. Select **Out of Band Messaging Settings**.
5. Select **OOB Interface** and press `Enter`.
6. From the pop-up menu, select **PBSI**, **MCTP**, or **Disable OOB interface**.
7. To configure Out of Band Messaging for PBSI, set these parameters:

| PBSI Parameters        | Description                                                                                                                                                                          |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SMBus Slave Address    | Sets the SMBus (System Management Bus) slave address of the controller to a valid hexadecimal address value.                                                                         |
| SMBus Clock Speed      | Sets the SMBus clock speed: <ul style="list-style-type: none"> <li>• Feature Disabled (Default)</li> <li>• SMBus clock speed 100 kHz</li> <li>• SMBus clock speed 400 kHz</li> </ul> |
| SMBus Clock Stretching | Sets the SMBus Clock Stretching mode:                                                                                                                                                |

| PBSI Parameters | Description                                                                                                                                    |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | <ul style="list-style-type: none"> <li>• Enable: Enables SMBus clock stretching</li> <li>• Disable: Disables SMBus clock stretching</li> </ul> |

8. To configure Out of Band Messaging for MCTP, set these parameters:

| MCTP Parameters                       | Description                                                                                                                                                                                                                                     |
|---------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SMBus Slave Address                   | Sets the SMBus (System Management Bus) slave address of the controller to a valid hexadecimal address value. (For valid range, refer to the Management Component Transport Protocol (MCTP) SMBus/I2C Transport Binding Specification document.) |
| SMBus Device Type                     | Sets the SMBus Device Type: <ul style="list-style-type: none"> <li>• Default</li> <li>• Fixed</li> <li>• ARP (Address Resolution Protocol)</li> </ul>                                                                                           |
| SMBus Physical Channel                | Sets the SMBus Channel mode: <ul style="list-style-type: none"> <li>• Enable: Enables SMBus channel</li> <li>• Disable: Disables SMBus channel</li> </ul>                                                                                       |
| Use Static EIDs during Initialization | Sets the Static End Point Identifier (EID) mode: <ul style="list-style-type: none"> <li>• Enable: Enables Static EID</li> <li>• Disable: Disables Static EID</li> </ul>                                                                         |
| VDM Discovery Notify                  | Sets the Vendor Defined Message (VDM) discovery notification mode: <ul style="list-style-type: none"> <li>• Enable: Enables VDM discovery notification</li> <li>• Disable: Disables VDM discovery notification</li> </ul>                       |

9. Select **Submit Changes**.

## 9.4 Device Information

The Device Information menu provides details about the device, such as the Model, Serial Number, and Device Type. To view the device information, start the Microchip Configuration Utility, select your controller, then press `Enter`. From the main menu, select **Disk Utilities**, select the disk drive, then press `Enter`.

## 9.5 Identifying a Disk Drive

You can use the disk utilities to physically locate and identify a disk drive by turning on its Identification LED.

To identify a disk drive:

1. From the main menu, select **Disk Utilities**.
2. Select the disk drive you want to locate, then press `ENTER`.
3. Select **Identify Device**, then enter a value into **Identification Duration (seconds)**. This value determines how long the LED on the device will remain on.
4. Select **Start**, then press `Enter`.
5. To turn off the Identification LED, press `ESC` to return to the previous menu, select **Stop** and press `Enter`.

## 9.6 Updating Drive Firmware

You can use the disk utilities to flash a hard drive with new firmware.

To update drive firmware:

1. Copy the firmware binary file to a USB flash drive, then connect the USB drive to the machine. Alternatively, copy the firmware binary to a known location on your machine.
2. From the main menu, select **Disk Utilities**, then select **Update Drive Firmware**.
3. Select a disk drive, then enter the firmware update mode:

| Option                          | Description                                        |
|---------------------------------|----------------------------------------------------|
| <b>Mode 5</b>                   | Download and Activate                              |
| <b>Mode 7</b>                   | Download in Multiple Transfers                     |
| <b>Mode E</b>                   | Download in Multiple Transfers but Do Not Activate |
| <b>Mode E+F (HBA Mode only)</b> | Download in Multiple Transfers and Activate        |

4. Enter the Transfer Size, in 512 byte-increments. The default transfer size is 32768 (32K) bytes. The maximum transfer size is 262144 (256K) bytes.  
**Note:** Transfer Size is not applicable for Mode 5.
5. Select **Proceed**.
6. Select the storage device where the firmware binary file is located (the USB drive, for instance), navigate the folder hierarchy, then select the firmware binary file.  
The firmware is sent to the hard drive.
7. When the update is complete, reboot the server.

### 9.7 Clearing Configuration Meta-data

You can use the disk utilities to clear the controller configuration meta-data from any drive that is not part of an array.

**Note:** This option is enabled only if the selected drive contains controller configuration meta-data. A drive may contain configuration meta-data even if it is not part of an array.

To clear the configuration meta-data from a drive:

1. From the main menu, select **Disk Utilities**.
2. Select a disk drive with configuration meta-data, then press `Enter`.
3. Select **Clear Configuration Metadata**, then select **Continue**.

### 9.8 Setting the Bootable Device(s) for Legacy Boot Mode

**Note:** This option is applicable only for Legacy Boot Mode.

This option sets the primary and secondary physical boot device(s) for Legacy Boot Mode. The secondary boot device acts as a failover to the primary boot device.

To set the physical boot device(s) for a controller:

1. From the menu, select **Set Bootable Device(s) for Legacy Boot Mode**, then select **Select Bootable Physical Drive**.
2. To set the default bootable device, select a physical drive from the list, then select **Set as Primary Bootable Device**.
3. To set the secondary bootable device, select a physical drive from the list, then select **Set as Secondary Bootable Device**.

**Note:** To clear previously set boot devices, select **Clear Bootable Device(s)**.

### 9.9 Updating the HBA 1200 Firmware

To update the HBA 1200 firmware:

1. Copy the firmware binary file (.bin) to a USB flash drive, then connect the USB drive to the machine. Alternatively, copy the firmware binary to a known location on your machine.

2. From the main menu, select **Administration**, then select **Flash Controller Firmware**.
3. Select **Continue with flashing Firmware**.
4. Select the storage device where the firmware binary file is located (the USB drive, for instance), navigate the folder hierarchy, then select the firmware binary file.  
The firmware is sent to the controller.
5. When the update is complete, reboot the server.

### 9.10 Creating a Support Archive

Use this option to save configuration and status information to help Customer Support diagnose a problem with your system. Saved information includes device logs, drive logs, event logs, error logs, controller logs, and statistics.

To create a support archive:

1. From the main menu, select **Administration**, then select **Save Support Archive**.
2. Select the device where the support archive information will be gathered and stored, then press `Enter`.  
The system gathers the logs and statistics for the device and displays the path where the information is saved.
3. Press any key to complete the operation and exit.



### 10. Installing the SmartPQI Drivers from Source

This section explains how to build and install the SmartPQI drivers from source code for the supported Linux OSes, including how to install the packages using the installation DVD as the repository.

#### 10.1 Installation Instructions for Supported Linux OSes

This section explains how to install the driver from source for the following Linux OSes:

- RHEL OS images
- SuSE OS images

Use the following command to determine the type of OS installed on a Linux system:

```
lsb_release -a
```

**Note:** The following instructions assume you are installing the packages from the RHEL or SuSE repositories; if not, refer to [10.2. Using the Installation DVD as the Repository](#).

##### RHEL OS Images

The instructions below apply to the following RHEL OS images:

- Red Hat® Enterprise Linux 7.4, 7.3, 7.2, 7.1, 7.0 (64-bit only)
- Red Hat® Enterprise Linux 6.9, 6.8, 6.7, 6.6 (64-bit only)

To install the SmartPQI driver from source for RHEL-based OS images:

1. Build the driver from the source using the following command: `$ sudo su`  
**Note:** You must have administrator privileges to perform the installation steps.
2. Install the following driver dependency packages and reboot the system if necessary: `# yum install kernel kernel-devel kernel-headers gcc`
3. Extract the driver source code from the source tar.bz2 file by using the following command: `# tar -jxvf smartpqi-1.1.2-125.tar.bz2`
4. Compile the `smartpqi.ko` file by using the following command:

```
cd smartpqi-1.1.2
make -f Makefile.alt
```

**Note:** After the compilation you will get a `smartpqi.ko` driver file, which is the driver module.

5. Use the following command to backup the existing inbox driver:  

```
mv /lib/modules/`uname -r`/kernel/drivers/scsi/smartpqi/smartpqi.ko \
/lib/modules/`uname -r`/kernel/drivers/scsi/smartpqi/smartpqi.ko.org
```
6. Copy the `smartpqi.ko` driver file to the destination by using the following command: `# cp ./smartpqi.ko /lib/modules/`uname -r`/kernel/drivers/scsi/smartpqi`
7. Use the following command to rebuild `initramfs` process with the newly installed `smartpqi` driver: `# dracut -v -f --add-drivers smartpqi`  
**Note:** RHEL provides `dracut` command to place the newly installed `smartpqi.ko` driver modules into the `initramfs` file to include them in the Linux kernel.
8. Reboot the system to load the new `initramfs`, which will contain the newly installed `smartpqi.ko` driver.

##### SuSE OS Images

The instructions below apply to the following SuSE OS images:

- SuSE Linux Enterprise Server 12, SuSE Linux Enterprise Server 12 SP1, SP2, SP3 (64-bit only)
- SuSE Linux Enterprise Server 11 SP3, SP4 (64-bit only)

To install the SmartPQI driver from source for SuSE OS images:

1. Build the driver from the source using the following command: `$ sudo su`

## Installing the SmartPQI Drivers from Source

**Note:** You must have administrator privileges to perform the installation steps.

2. Install the following driver dependency packages and reboot the system if necessary:

```
zypper install kernel-devel gcc make
```
3. Extract the driver source code from the source tgz file by using the following command:

```
tar -jxvf smartpqi-1.1.2-125.tar.bz2
```
4. Compile the `smartpqi.ko` file by using the following command:

```
cd smartpqi-1.1.2
make -f Makefile.alt
```

**Note:** After the compilation you will get a `smartpqi.ko` driver file, which is the driver module.

5. Backup the already existing inbox driver.

```
mv /lib/modules/`uname -r`/kernel/drivers/scsi/smartpqi/smartpqi.ko \
/lib/modules/`uname -r`/kernel/drivers/scsi/smartpqi/smartpqi.ko.org
```

6. Copy the kernel driver file to the destination by using the following command:

```
cp ./smartpqi.ko /lib/modules/`uname -r`/kernel/drivers/scsi/smartpqi
```
7. Use the following command to rebuild `initramfs` process with the newly installed `smartpqi` driver:

```
mkinitrd -v -m smartpqi
```

**Note:** SLES provides `mkinitrd` command to place the newly installed `smartpqi.ko` driver modules into the `initramfs` file to include them in the Linux kernel.
8. Reboot the system to load the new `initramfs`, which will contain the newly installed `smartpqi.ko` driver.

## 10.2 Using the Installation DVD as the Repository

Follow the instructions in this section to install the packages required to compile the driver modules using the OS installation DVD as the repository. In these procedures, the DVD is used as the package repository.

### Installing Packages on a RHEL-based OS

The following steps install the packages required to compile the driver modules from source on a RHEL-based OS.

1. Execute the following command to become a super user to edit and make changes to various system files:

```
$ sudo -i
```

**Note:** Super user rights are required to edit and make changes in various system files.

2. Get the name of the installation DVD entry in `/dev` directory. The DVD is visible as `/dev/srX`. Use the following command to list all the scsi devices on the system.

```
lsscsi
```

3. Once the DVD name is confirmed, create a location to mount the DVD, for example:

```
mkdir /media/iso
```

4. Mount the DVD to the `/media/iso` directory by using the following command:

```
/dev/srX /media/iso udf,iso9660 noauto,user,ro 0 0
```

5. Use the following command to mount the DVD, once the entry is placed in `/etc/fstab`:

```
mount /dev/srX
```

6. Create a `dvd.repo` to use the packages from the mounted DVD location:

```
[dvd]
name=Red Hat Enterprise Linux Installation
DVD baseurl=file:///media/iso enabled=1
```

7. Import the GPG keys for YUM to authenticate the RPM packages in the DVD:

```
rpm --import /media/iso/RPM-GPG*
```

8. Run the following commands to enable the DVD repository:

```
yum repolist
yum install
```

### Installing Packages on a SuSE-based OS

The following steps install the packages required to compile the driver modules from source on a SuSE-based OS.

1. Execute the following command to become a super user:

```
$ sudo su
```

**Note:** Super user rights are required to edit and make changes in various system files.

2. Get the name of the installation DVD entry in `/dev` directory. The DVD is visible as `/dev/srX`. Use the following command to list all the scsi devices on the system.

```
ls SCSI
```

3. Once the DVD name is confirmed, create a location to save the DVD image, for example:

```
mkdir /var/iso
```

4. Create an ISO image from the installation disk. Once the DVD image is saved, zypper uses the ISO as an installation service and install the packages from it by using the following command:

```
dd if=/dev/srX of=/var/iso/sles.iso
```

5. Once the installation disk is saved as an ISO image, set it as an installation service by using the following command:

```
zypper sa "iso:/?iso=/var/iso/sles.iso" "SLES xy spz"
```

Where, xy z is the SLES distribution ID eg 10 sp1.

6. Run the following command after adding the ISO image as an installation service:

```
zypper sl
```

## 11. Safety Information

To ensure your personal safety and the safety of your equipment:

- Keep your work area and the computer clean and clear of debris.
- Before opening the system cabinet, unplug the power cord.

### 11.1 Electrostatic Discharge (ESD)



ESD can damage electronic components when they are improperly handled, and can result in total or intermittent failures. Always follow ESD-prevention procedures when removing and replacing components.

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To prevent ESD damage:

- Use an ESD wrist or ankle strap and ensure that it makes skin contact. Connect the equipment end of the strap to an unpainted metal surface on the chassis.
- Avoid touching the adapter against your clothing. The wrist strap protects components from ESD on the body only.
- Handle the adapter by its bracket or edges only. Avoid touching the printed circuit board or the connectors.
- Put the adapter down only on an antistatic surface such as the bag supplied in your kit.
- If you are returning the adapter to Microchip Product Support, put it back in its antistatic bag immediately.

If a wrist strap is not available, ground yourself by touching the metal chassis before handling the adapter or any other part of the computer.

## 12. Technical Specifications

### 12.1 Environmental Specifications

**Note:** HBA 1200 Series adapters require adequate airflow to operate reliably. Forced airflow is **required**. See the Recommended Airflow table below for more information.

|                                         |                            |
|-----------------------------------------|----------------------------|
| Ambient temperature with forced airflow | 0 °C to 55 °C              |
| Relative humidity                       | 20% to 80%, non-condensing |
| Altitude                                | Up to 3,000 meters         |

**Note:** Ambient temperature is measured 1" from the HBA processor.

**Table 12-1. Recommended Airflow**

| Controller                 | Recommended Airflow/Linear Feet per Minute (LFM) |
|----------------------------|--------------------------------------------------|
| Adaptec HBA 1200-8i        | 250 LFM                                          |
| Adaptec HBA 1200-16i       | 250 LFM                                          |
| Adaptec HBA Ultra 1200-16i | 300 LFM                                          |
| Adaptec HBA Ultra 1200-16e | 330 LFM                                          |
| Adaptec HBA Ultra 1200-32i | 200 LFM                                          |

### 12.2 DC Power Requirements

| Bus Type | Description | Requirements                                                          |
|----------|-------------|-----------------------------------------------------------------------|
| PCIe     | DC voltage  | 3.3 V ± 9%, 12 V ± 8%, 3.3 V ± 9%<br>(auxiliary power from PCIe slot) |

### 12.3 Current and Power Requirements

| Adapter Model              | Typical Power | Typical Current                     |
|----------------------------|---------------|-------------------------------------|
| Adaptec HBA 1200-8i        | 15.6 W        | 0.09 A at 3.3 VDC; 1.28 A at 12 VDC |
| Adaptec HBA 1200-16i       | 19.6 W        | 0.09 A at 3.3 VDC; 1.61 A at 12 VDC |
| Adaptec HBA Ultra 1200-16i | 25 W          | 0.15 A at 3.3 VDC; 2.04 A at 12 VDC |
| Adaptec HBA Ultra 1200-16e | 25 W          | 0.15 A at 3.3 VDC; 2.04 A at 12 VDC |
| Adaptec HBA Ultra 1200-32i | 31.3 W        | 0.15 A at 3.3 VDC; 2.56 A at 12 VDC |

**Note:** Smart adapters with a x16 PCIe interface require a x16 PCIe expansion slot that can supply 75 watts of power.

**13. Revision History****Table 13-1. Revision History**

| <b>Revision</b> | <b>Date</b> | <b>Description</b>   |
|-----------------|-------------|----------------------|
| C               | 06/2022     | Updated for SR 3.1.8 |
| B               | 08/2021     | Updated for SR 3.1.4 |
| A               | 06/2021     | Document created.    |

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