QuantaGrid Series

S54S-1U

The Ultimate Scale-Out Building Block for
Software-Define-Storage

Service Guide

Version: 1.0

About the System

Installing Hardware

BIOS

BMC

Connectors

Troubleshooting

Regulatory and Compliance Information

Revision History

Refer to the table below for the updates made to this guide.

DATE	SECTION	UPDATES

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Version 1.0 / August 23, 2023

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For the latest information and updates please see www.qct.io

All the illustrations in this guide are for reference only and are subject to change without prior notice.

About the Book

This guide is written for users who want to know the system featuers.

For the latest version of this guide, see www.qct.io.

Intended Application Uses

This product was evaluated as Information Technology Equipment (ITE), which may be installed in offices, schools, computer rooms, and similar commercial type locations. The suitability of this product for other product categories and environments (such as medical, industrial, residential, alarm systems, and test equipment), other than an ITE application, may require further evaluation.

Conventions

Several different typographic conventions are used throughout this manual. Refer to the following eples for common usage.

Bold type face denotes menu items, buttons and application names.

Italic type face denotes references to other sections, and the names of the folders, menus, programs, and files.

<Enter> type face denotes keyboard keys.

WARNING!

Warning information appears before the text it references and should not be ignored as the content may prevent damage to the device.

CAUTION!

CAUTIONS APPEAR BEFORE THE TEXT IT REFERENCES, SIMILAR TO NOTES AND WARNINGS. CAUTIONS, HOWEVER, APPEAR IN CAPITAL LETTERS AND CONTAIN VITAL HEALTH AND SAFETY INFORMATION.

Note:

Highlights general or useful information and tips.

Structure of this guide

- Chapter 1: About the System

  "This section introduces the system, its different configuration(s) and the main features."

- Chapter 2: Installing Hardware

  "This section provides guidance information to properly service components in the system."

- Chapter 3: BIOS

  "This section provides information regarding the BIOS architecture, BIOS update utility, server management, checkpoints, and error handling found in the system."

- Chapter 4: BMC

  "This section provides information and key features of BMC (Baseboard Management Controller)."

- Chapter 5: Connectors

  "This section provides guidance information for the position and configuration of connectors."

- Chapter 6: Troubleshooting

  "This section provides guidance information for the position and configuration of connectors."

- Chapter 7: Regulatory and Compliance Information

  "This section provides regulatory and compliance information applicable to this system."

About the System

Chapter 1

This section introduces the system, its different configuration(s) and the main features.

1.1 Introduction

This document provides an overview of the hardware features of the chassis, troubleshooting information, and instructions on how to add and replace components of the server.

For the latest version of this manual, see www.qct.io.

System Features

The system comprises a 1U/35.43" long chassis. Major features include:

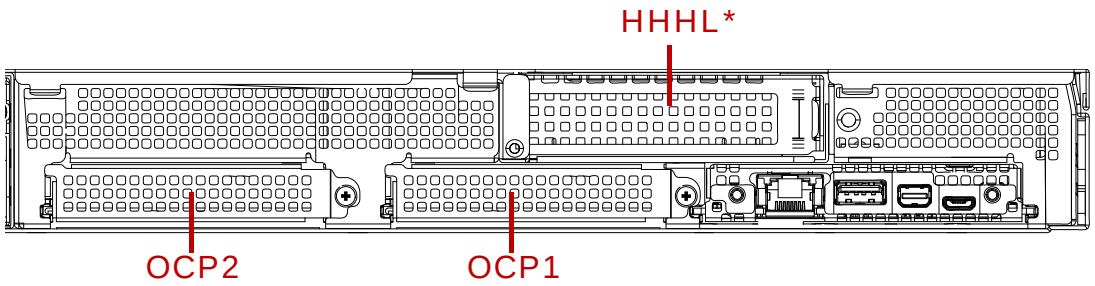
- **Processor**: Intel® Xeon® processor scalable family
- **Expansion Slots (CPU, PCIe Gen5 x 16):**

CAUTION!

SOME ADD-ON CARDS MIGHT BE HOT AFTER SYSTEM POWER IS OFF. CONTACT SHOULD BE MADE WITH CARE.

  - **Rear Chassis**

    HHHL slot* + 2xSFF OCP NIC 3.0 slots
    *Only for certain models



  - **Internal**

    HHHL slot (for RAID or HBA card only)

- **Memory:** Up to 8 DIMM slots are available; ECC DDR5 4800 MHz RDIMM-3DS/ RDIMM memory
  - Up to 2TB (256Gx8) of memory for RDIMM-3DS/RDIMM
- **Network*:** Dedicated GbE management NIC port from RTL8211E to BMC
  *Visit www.qct.io for the latest Network support listings.

Note:

The system supports: 2x 1600W 73.5mm Titanium redundant PSU, 100-240VAC 50/ 60Hz, AC/ HVDC

Specifications

Table 1.1: System Specifications

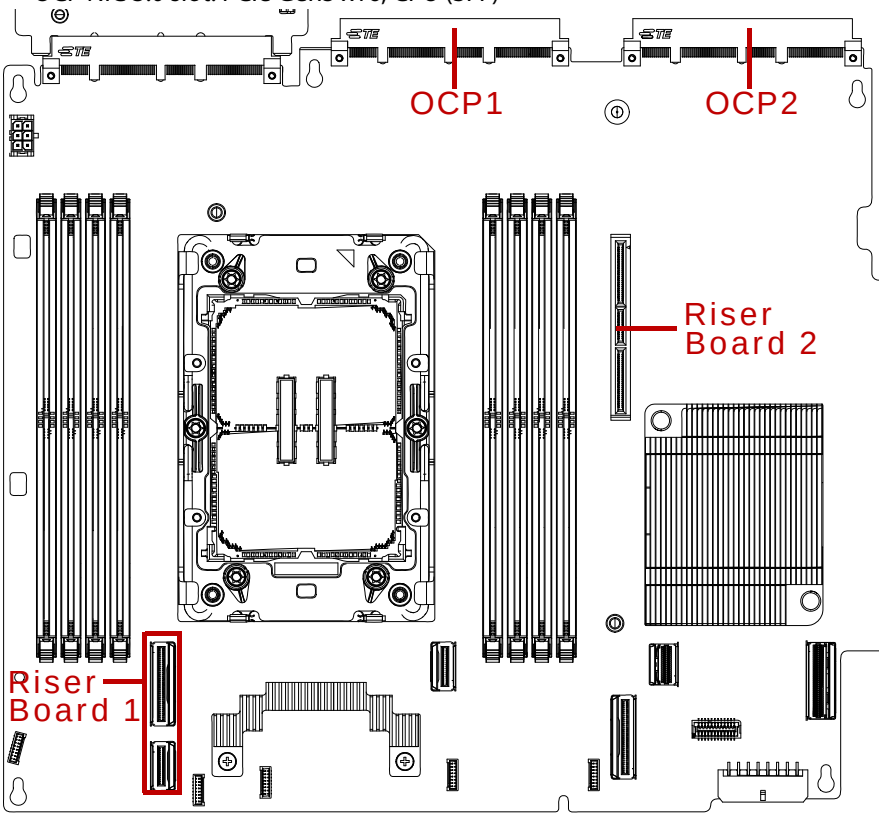
SPECIFICATIONS	DESCRIPTION
Form factor	1U rack mount
Dimensions (W x H x D)	17.64 x 1.7 x 35.43 inches 448 x 43.2 x 900 mm
Processor	**Processor type:** Intel® Xeon® processor scalable family **Max. TDP support:** 350W
Memory	**Total slots:** 8 **Memory type:** DDR5 4800 MHz RDIMM-3DS/RDIMM **Memory size:** 16GB, 32 GB* *More options refer to the AVL
Networking	• Dedicated GbE management NIC port from PHY RTL8211E to BMC
Expansion slots	• Riser board1 : PCIe Gen5 x16, CPU (MD2 low-profile card)* *Only for certain models • Riser board2 : PCIe Gen5 x16, CPU (for internal SAS RAID or HBA card only) • OCP NIC 3.0 slot: PCIe Gen5 x16, CPU (SFF) 
Storage	• 12x 3.5" top loading hot-swappable SATA/SAS HDD • 4x 2.5" front loading hot-swappable (7mm height) PCIe Gen5 x4 NVMe SSD • 2x M.2 SSD supporting 2230 PCIe Gen3 x1
Video	Integrated AST2600 with 16MB video memory

Table 1.1: System Specifications (Continued)

SPECIFICATIONS	DESCRIPTION
Front I/O	● LEDs: Power/Location/System Status/PFR/HDD row fault/7mm SSD Status ● Buttons: Power/Location ● USB 2.0 port
Rear I/O	1x Power Button 1x Location Button 1x Mini-Display port 1x Micro-USB port (Serial signal) 1x GbE RJ45 management port 1x USB 3.0 port 1x PFR LED 1x Location LED 2x OCP card I/O (optional) 1x Low-profile card I/O (optional)
TPM	Yes (optional, SPI mode)
ACPI	ACPI compliance, S0, S5 support
Power supply	(2) 1600W 73.5mm Titanium redundant PSU, 100-240VAC 50/60Hz, AC/ HVDC
System rating	● 100-127/200-240Vac, 50/60Hz, 10/8A or 240Vdc, 7A ● Detailed PSU options please refer to “ordering info” or “CCL”
Fan	(7) single rotor fans
System management	IPMI v2.0 Compliant, on board "KVM over IP" support
Operating environment	● Operating temperature: 5°C to 35°C (41°F to 95°F)* *Specific CPU TDP only support on 33°C ● Non-operating temperature: -40°C to 70°C (-40°F to 158°F) ● Operating relative humidity: 20% to 85%RH ● Non-operating relative humidity: 10% to 95%RH

1.2 Package Contents

- (1) the system
- (1) processor heat sink
- (2) power supply unit
- (2) power cord

Note:

Note: For exact shipping contents, contact your sales representative.

1.3 A Tour of the System

System Overview

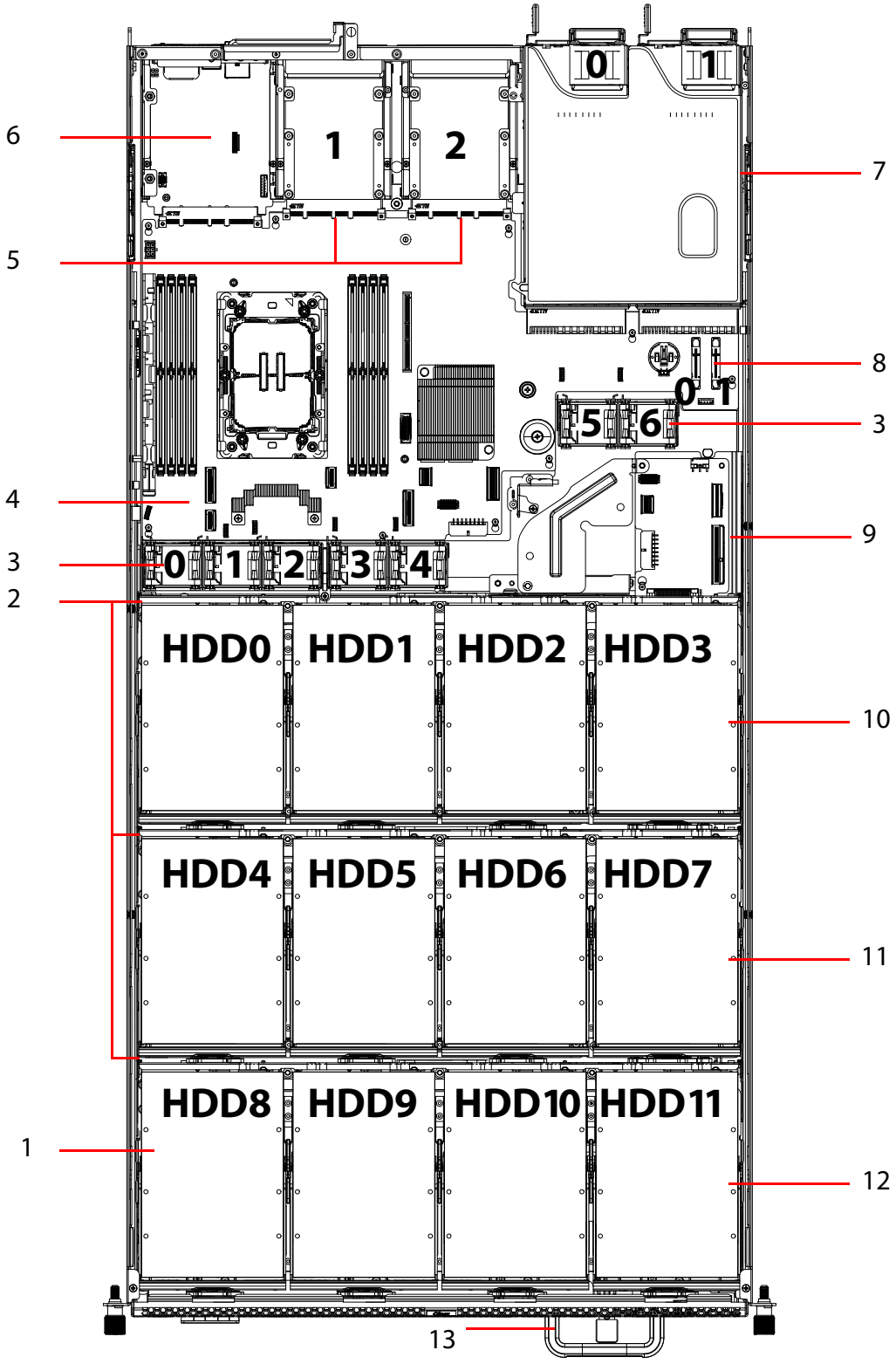


Figure 1-1. System Component Overview

Table 1.2: Component Overview

NO.	ITEM	DESCRIPTION
1	Storage drive bay	Support storage drive: 3.5" SAS / SATA hard disk drive (HDD)
2	Storage drive board	Connect to storage drive
3	Fans	x7 single rotor system fan module assemblies
4	Mainboard	Provide all the basic function and information for system operation
5	OCP NIC slot	Support SFF OCP NIC 3.0 card
6	DC-SCM board	Datacenter Secure Control Module board provides common server management, security, and control features.
7	Power Supply Unit	Redundant Power Supply Unit (PSU). 1600W high efficiency redundant PSU, 240Vac
8	M.2 slot	Support 2230 M.2 SSD (PCH, PCIe Gen3 x1)
9	Repeater board	Extend signal transmission.
10	HDD row 3	This row is composed of HDD0, HDD1, HDD2, HDD3
11	HDD row 2	This row is composed of HDD4, HDD5, HDD6, HDD7
12	HDD row 1	This row is composed of HDD8, HDD9, HDD10, HDD11
13	Release lever and handle	Pull the drawer release lever up on the drawer. Hold the drawer handle and pull the drawer out of the chassis smoothly until fully extend

System Front View

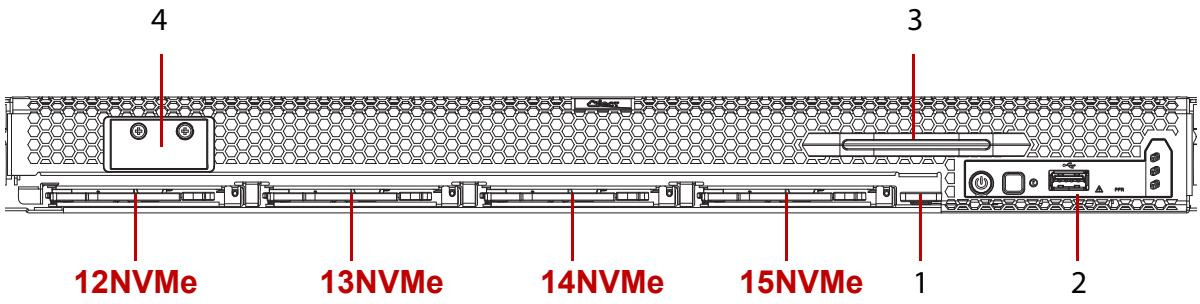


Figure 1-2. System Front View

Table 1.3: Front Control Panel View

NO.	NAME	DESCRIPTION
1	Release lever	Pull up to release the HDD drawer.
2	Control panel	Control system and status display.
3	HDD drawer handle	Pull up release lever to release the HDD drawer and hold handle to pull out the HDD drawer from the chassis or push the HDD drawer into the chassis until the release lever is locked in place with clicking.
4	Asset tag	Record serial number or other important information.

Front Control Panel

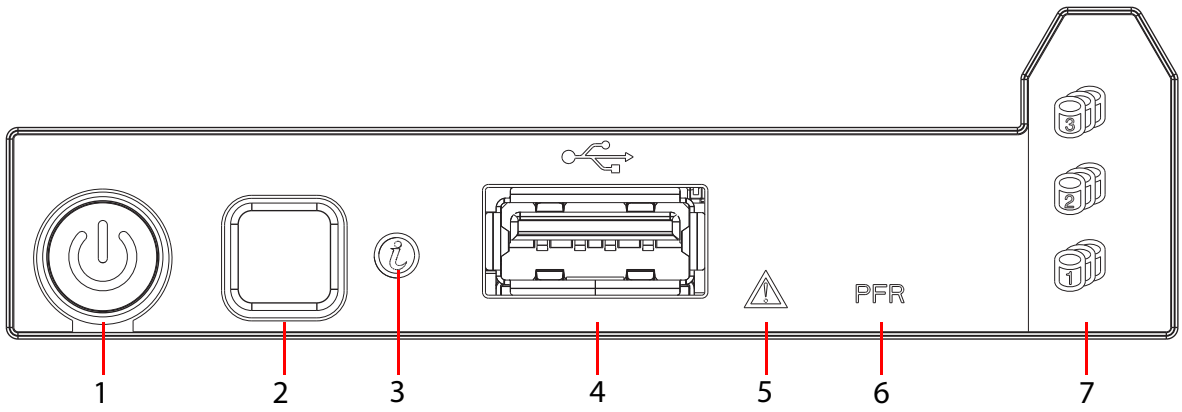


Figure 1-3. Front Control Panel View

Table 1.4: Front Control Panel View

NO.	NAME	DESCRIPTION

Table 1.4: Front Control Panel View (Continued)

1	Power Button with LED	Power Button: Push button to power the system on /off. Press more than 4 sec. to shut down the system. Power LED (Blue): On, S0 system power on Off, S5 system power off
2	Location Button	Press to light up / off the Location LED to identify this system
3	Location LED (Blue)	On, selected unit ID Off, no ID requested
4	USB 2.0 port	Connects to USB device
5	Status LED (Amber)	Off, Normal & Warning Event Blinking, Critical Event and FW Update.
6	PFR Status LED (Only for certain models)	Off: Power Off/PFR Module is not installed Green On: Authenticated Amber On: Failed Amber Blinking: Authentication /Recovery is executing in T-1
7	HDD row# LED (Amber)	Off, HDD row # normal On, HDD row # fault

System Rear View

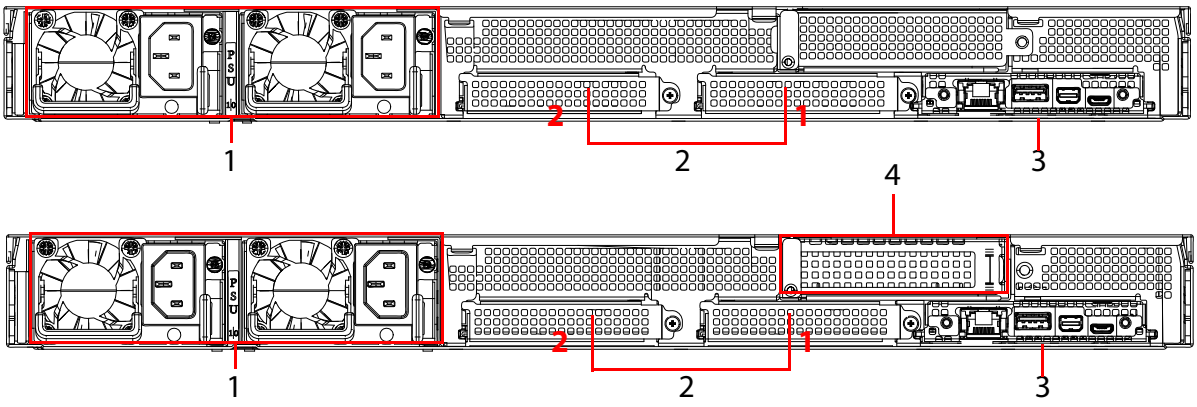


Figure 1-4. System Rear View

Table 1.5: Rear Panel View

NO.	NAME	DESCRIPTION
1	PSU	Redundant Power Supply Unit
2	OCP NIC slot	Support SFF OCP NIC 3.0 card
3	System Rear I/O	Datacenter Secure Control Module (DC-SCM) I/O features

Table 1.5: Rear Panel View (Continued)

NO.	NAME	DESCRIPTION
4	Expansion slot	Support PCIe card (CPU, PCIe Gen5, x16)

Rear I/O

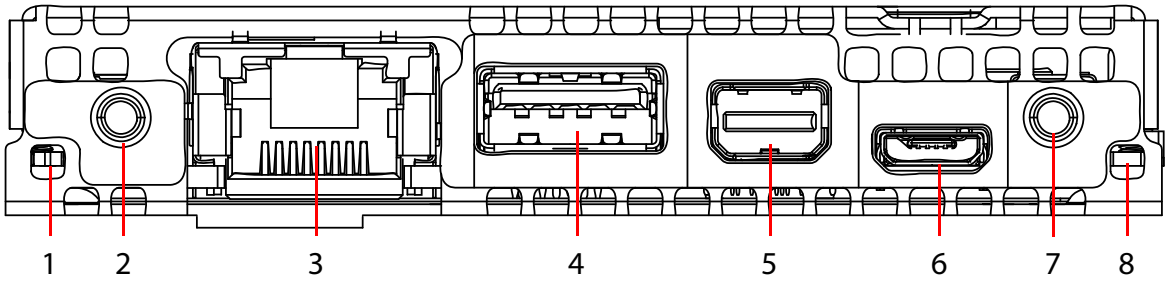


Figure 1-5. Rear I/O View

Table 1.6: Rear Panel View

NO.	NAME	DESCRIPTION
1	PFR Status LED (Only for certain models)	Off: Power Off/PFR Module is not installed Green On: Authenticated Amber On: Failed Amber Blinking: Authentication /Recovery is executing in T-1
2	Power Button	Push button to power the system on /off. Press more than 4 sec. to shut down the system.
3	Management port	Connects for remote management
4	USB port	Connects to USB device **Note:** The USB device connected must be: No bigger than 17.7 mm (W) x 9.5 mm (H) to avoid interference with other ports.
5	Mini-Display port	Connects to a display device
6	Micro-USB port	Connects to USB port on system lauching terminal service for debug-ging. (Serial signal)
7	Location Button	Press to light up / off the Location LED to identify this system
8	Location LED (Blue)	Light up for identification.

PSU View

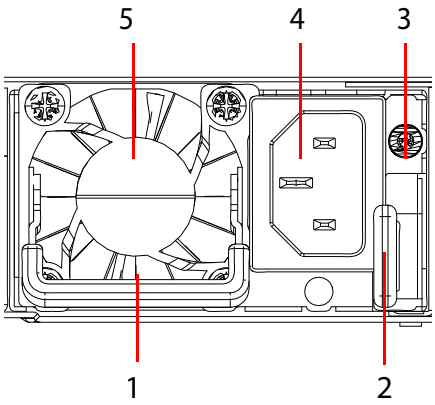


Figure 1-6. PSU View

Table 1.7: PSU View

NO.	NAME	DESCRIPTION
1	Handle	Hold to remove the PSU from the chassis bay.
2	Release latch	Press and hold to unlock PSU from chassis bay.
3	PSU LED	Power LED (Green): On: Output on and OK Blinking: AC present Status LED (Amber): On: AC core unplugged or AC power lost; with a second power supply in parallel still with AC input power; Power supply critical event causing shutdown Blinking: Power supply warning events where the power supply continues to operate; high temp, high power, high current, slow fan
4	AC input power connector	Connect power plug.
5	Fan	Cooling the PSU

LED Definitions

Front NVMe SSD LED

The system features storage drive cage supporting up to 4x 2.5” NVMe SSD (7mm) on front bottom chassis.

Each carrier has one Present / Fault LED. See the following illustration and table for details.

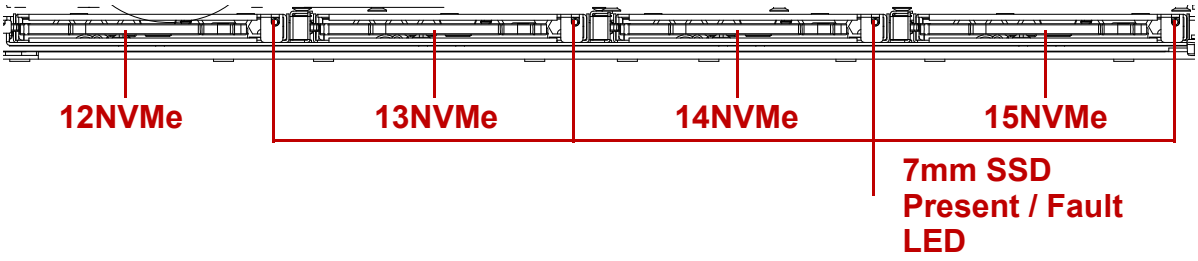


Table 1.8: Front bottom 7mm 2.5" NVMe SSD LED Description

COLOR	STATUS
Blue On Continuously	Drive present
Blue Blinking	Rebuild(1Hz), Locate(2Hz)
Amber On	HDD Failed / Drive present
Off	Slot Empty

BMC Management Port LED

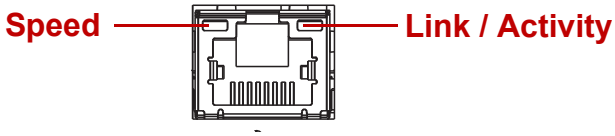


Figure 1-7. Management Port LED

Table 1.9: Management Port LED Behavior

STATUS	SPEED LED	LINK / ACTIVITY LED
Unplug	Off	Off
Plug in no access	Off	Green: on
1G Link +Active	Amber: on	Green: blinking
100M Link + Active	Green: on	Green: blinking
10M Link + Active	Off	Green: blinking

Installing Hardware

Chapter 2

This section provides guidance information to properly service components in the system.

2.1 Safety Measures

WARNING!
Always ask for assistance to move or lift the system.

WARNING!
Only perform troubleshooting as authorized by the product documentation, or as directed by a service and support team. Repairs not authorized by warranty may void the warranty and damage the system.

WARNING!
Always make sure to disconnect the system from the AC electrical source. Powering down the system DOES NOT ensure there is no electrical activity in the system.

WARNING!
Server components and circuit boards are easily damaged by discharges of static electricity. Working on servers that are connected to a power supply can be extremely dangerous. Follow the guidelines below to avoid personal injury or damage to the server.

WARNING!
Always disconnect the server from the power outlet whenever you are working inside the server case.

WARNING!
Wear a grounded wrist strap. If none are available, discharge any personal static electricity by touching the bare metal chassis of the server case, or the bare metal body of any other grounded device.

WARNING!
Humid environments tend to have less static electricity than dry environments. A grounding strap is warranted whenever danger of static electricity exists.

WARNING!
Do not touch the components on the unless it is necessary to do so. Do not flex or stress circuit boards.

WARNING!
Leave all replacement components inside their static-proof packaging until you are ready to use them.

2.2 Power Supply Unit

If your server is configured in a redundant configuration, you can replace a failed or failing power supply without powering down the server. Use the LED on the power supply to determine the status of the target PSU.

Each power supply module has a single bi-color LED, see *PSU View* on page 1-10.

Removing the Power Supply Unit

CAUTION!

ENSURE ALL POWER IS DISCONNECTED FROM THE SYSTEM BEFORE PROCEEDING.

1. Locate the power supply to service.
2. Release power cord from the power cord clamp.
3. Unplug the AC power cord from the power supply.
4. Press in the latch to release the power supply module.
5. Grasp the handle and press and hold the locking latch.
6. Pull the power supply from the chassis and set it on a clean workspace.

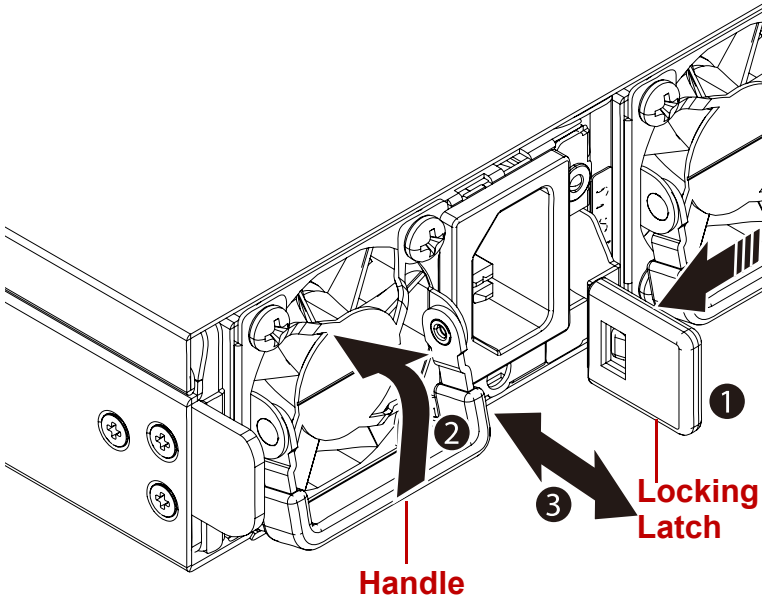


Figure 2-1. Removing a PSU

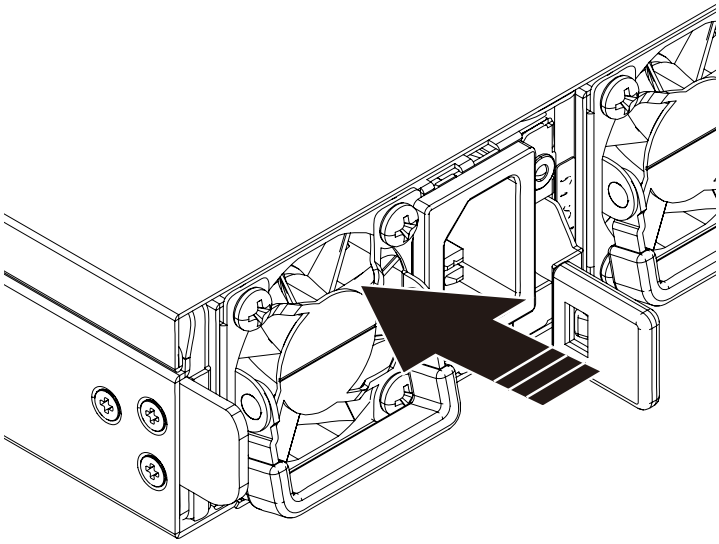
7. Replace with a new power supply.

Installing the Power Supply Unit

CAUTION!

ENSURE ALL POWER IS DISCONNECTED FROM THE SYSTEM BEFORE PROCEEDING.

1. Locate the target power bay.
2. Remove the new power supply from the protective packaging and place it on a clean ESD protected work surface.
3. Make sure the connectors are positioned on the bottom.
4. Align the AC inlet connector on the right side and slide the new power supply module into the power supply bay and gently press it in place until it is flush with the chassis.
5. The locking latch clicks when the power supply is correctly seated.
6. Plug the power cord into the AC receptacle on the power supply.
7. Secure the AC power cord with the power cord clamp.
8. Use the LED on the power supply to confirm that the power supply is functioning.



2.3 2.5" SSD Assembly

CAUTION!
SSDs may be removed while the system is operational but should be immediately replaced by another hard drive or an empty SSD tray.

WARNING!
Repairs should be perfomed by a certified service technician. Damage to the system or components due to unauthorized servicing is not covered by the warranty agreement.

Removing the 2.5" SSD Tray Assembly

1. Press the SSD tray assembly handle button (A).
2. Pull the SSD tray assembly handle open (B).

WARNING!
Make sure the tray handle is in the fully open position before attempting to pull the tray out of the bay. Damage may occur if the tray is not fully unlocked. To prevent damage while servicing, do not hold the SSD module by the ejector handle.

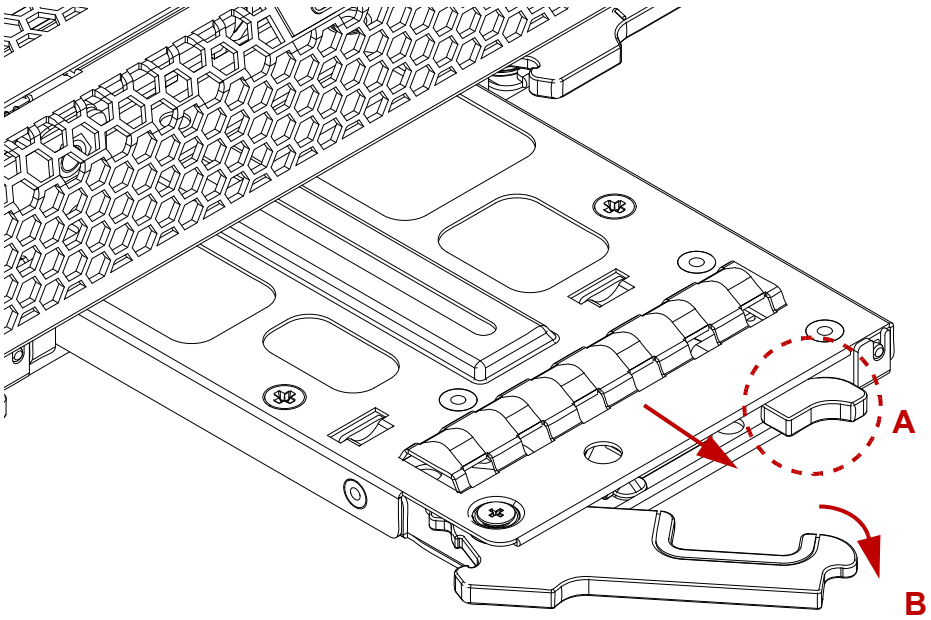


Figure 2-2. Removing the 2.5" SSD tray assembly

3. Pull the SSD tray assembly out of the system.

Installing the 2.5" SSD Assembly

WARNING!

Do not force the tray handle closed. If resistance is encountered, check the storage drive is properly inserted and the storage drives on either side are properly inserted. To prevent damage while servicing, do not hold the SSD module by the ejector handle.

1. Insert the SSD tray assembly into of the chassis.
2. Push the SSD tray assembly handle closed.

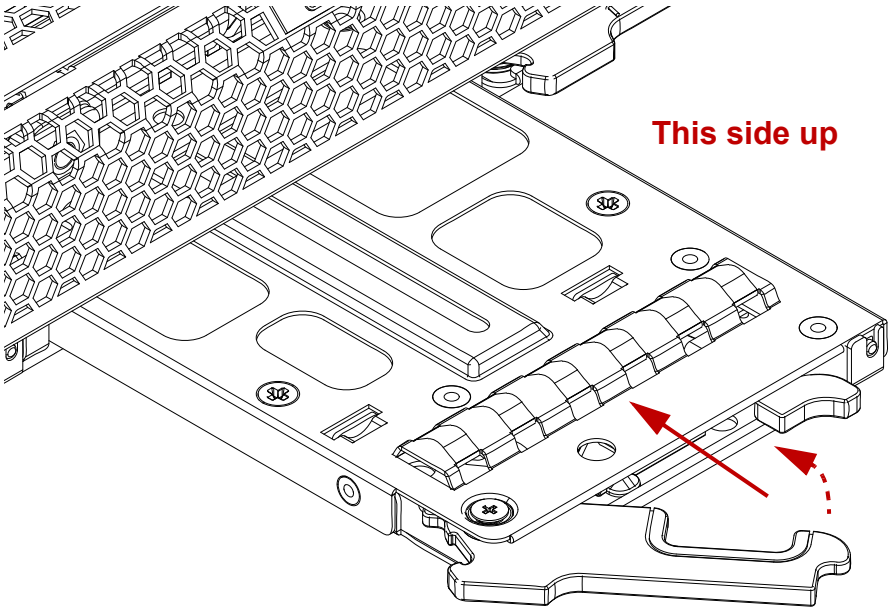


Figure 2-3. Installing the 2.5" SSD tray assembly

Removing a 2.5" SSD from an SSD Tray

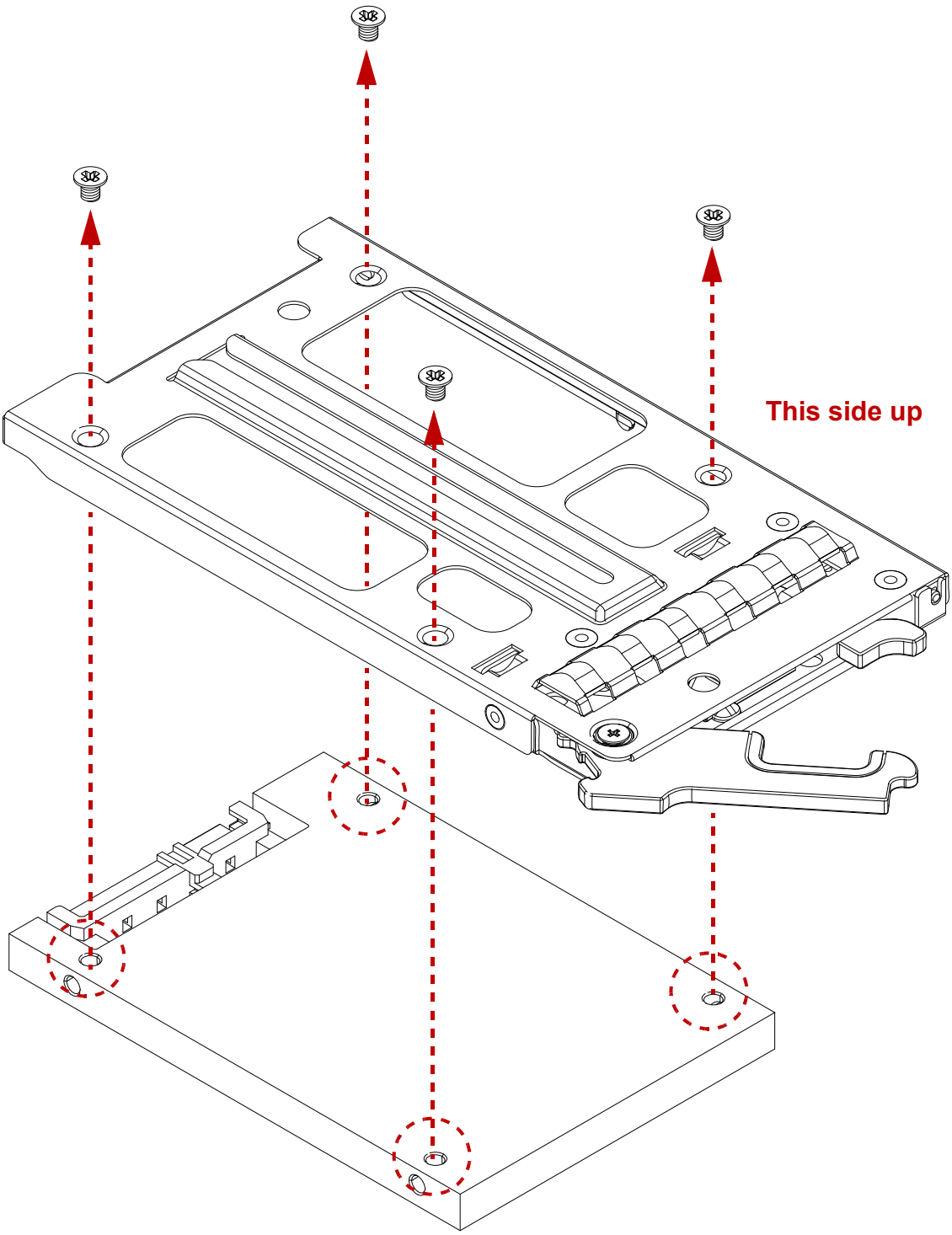


Figure 2-4. Removing a 2.5" SSD from a Tray

1. Remove the SSD tray. See *Removing the 2.5" SSD Tray Assembly* on page 2-4
2. Remove the securing screws to separate the SSD and tray.
3. Remove the SSD module from the tray.

Installing a 2.5" SSD into an SSD Tray

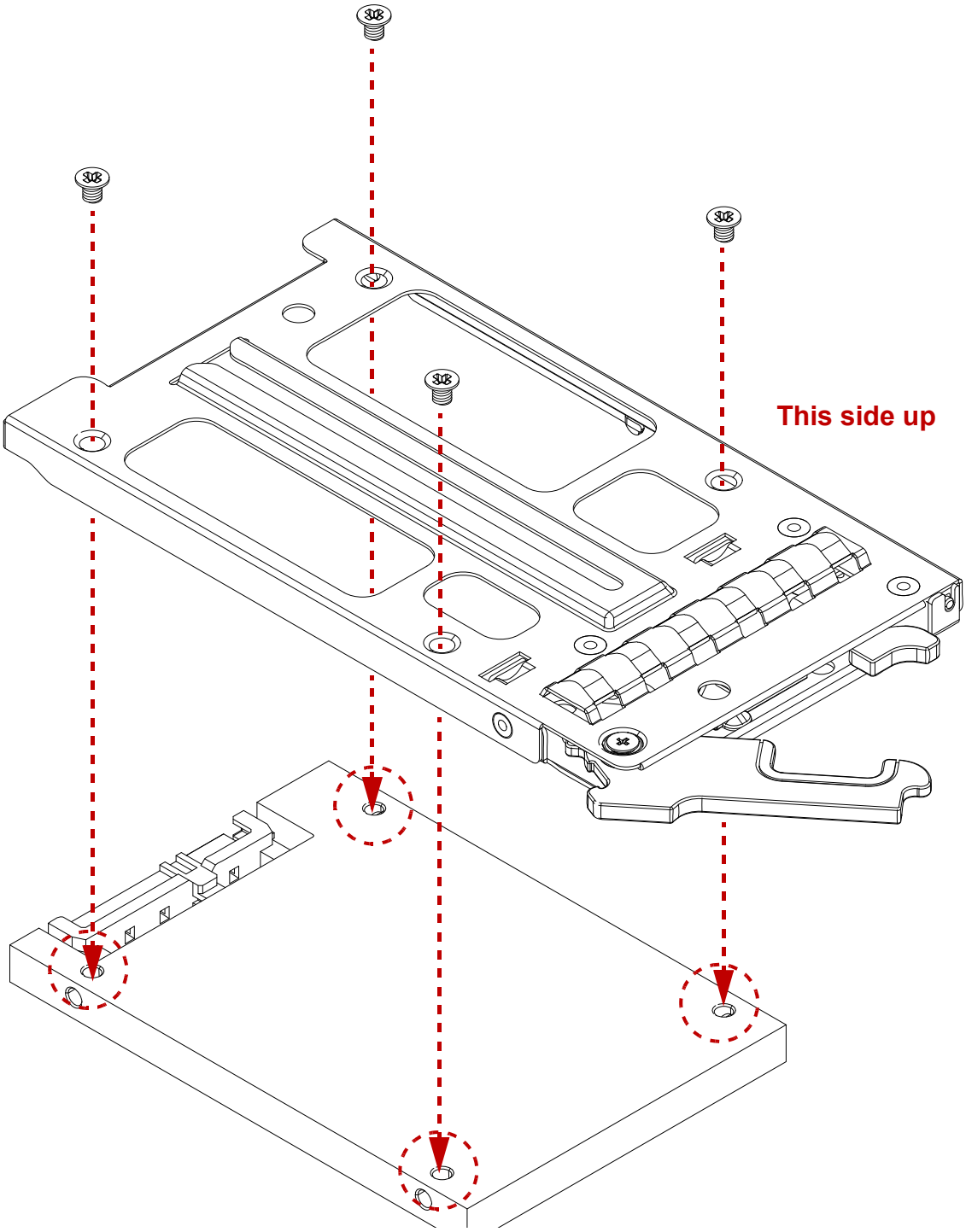


Figure 2-5. Installing a 2.5" SSD in a Tray

1. Align the connectors on the SSD module in the tray. The connectors must face the rear of the tray.
2. Install the SSD into the tray. Make sure the screw holes on the tray and SSD align. Adjust the SSD if it is necessary.
3. Secure with the provided screws.

2.4 HDD Drawer

WARNING!
All the service procedures for the HDD drawer including hot-plug Hard Disk Drives replacement must be performed within 30 minutes without turning-off system.

The HDD drawer houses the HDD bay and various other components. All components other than the HDD bay require the full extension of the HDD drawer before servicing.

The hot-plug HDDs can be serviced without removing the system from the rack:

All other component servicing require the system to be removed from the rack and placed on a stable, clean flat surface.

Releasing the HDD Drawer

CAUTION!
REFER TO SAFETY INSTRUCTIONS FOR PROPER HANDLING IF SYSTEM IS STILL POWERED ON.

To release the HDD drawer:

1. Pull the release lever up on the HDD drawer as shown.

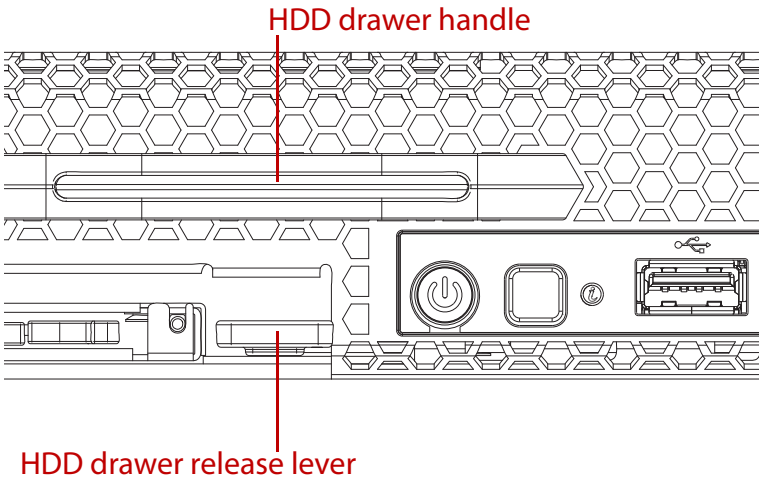


Figure 2-6. Locate the HDD drawer handle and release lever on the system front panel.

2. Hold the drawer handle and pull the drawer out of the chassis smoothly until it's fully extended.

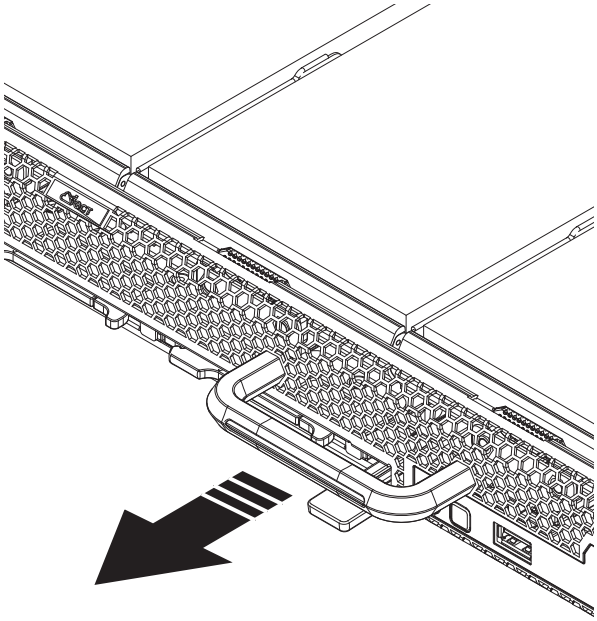


Figure 2-7. Releasing and pulling the HDD drawer out from the chassis

Securing a HDD Drawer

- Using the drawer handle, gently push the drawer into the chassis.

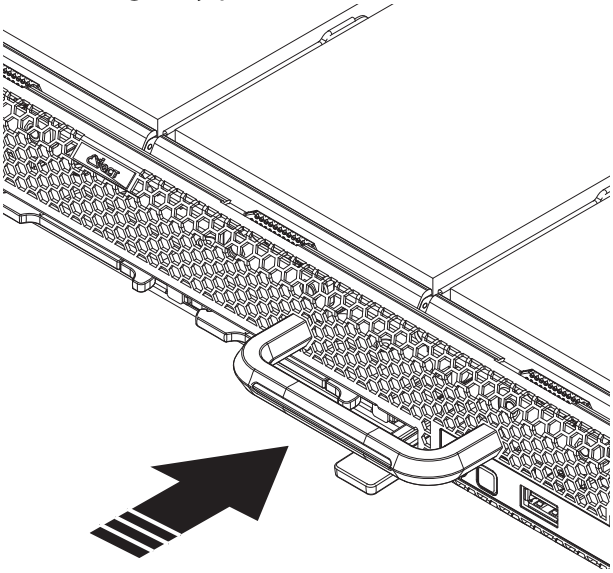


Figure 2-8. Pushing the HDD Drawer into the chassis

3. Continue to push the drawer until it is fully seated in the chassis and locks in place.

2.5 Hot-plug HDD

WARNING!
All the service procedures for the HDD drawer including hot-plug Hard Disk Drives replacement must be performed within 30 minutes without turning-off system.

WARNING!
Repairs should be performed by a certified service technician. Damage to the system or components due to unauthorized servicing is not covered by the warranty agreement.

Hot-Plug HDD Assembly Overview

The system supports up to twelve (12) 3.5″/2.5″ hot-plug HDDs.

Storage Drive 0	Storage Drive 1	Storage Drive 2	Storage Drive 3
Storage Drive 4	Storage Drive 5	Storage Drive 6	Storage Drive 7
Storage Drive 8	Storage Drive 9	Storage Drive10	Storage Drive11

Figure 2-9. Hot-plug 3.5″/2.5″ HDD Assembly Overview

Removing a HDD carrier and HDD from the HDD drawer

Prerequisite:

Check the HDD row fault LED on the front control panel and pull out the HDD drawer from the chassis. See "Releasing the HDD Drawer" on page 8. Locate the HDD carrier in the HDD row.

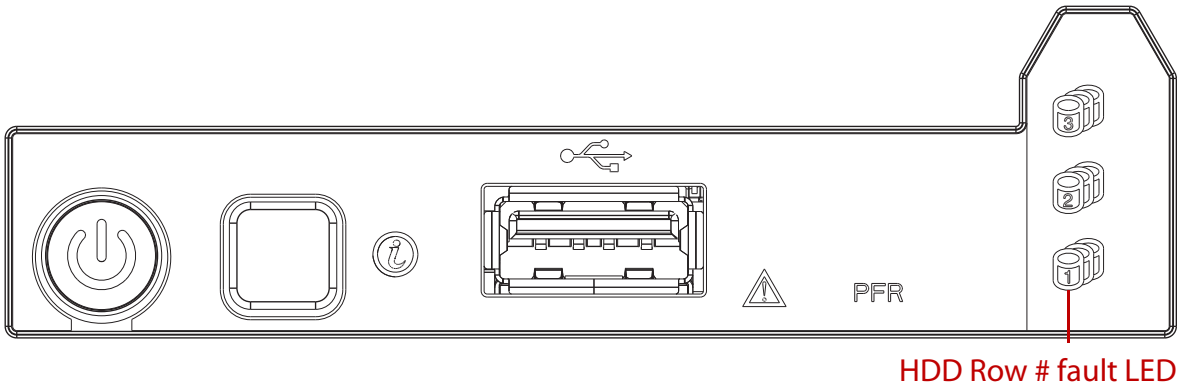


Figure 2-10. Check the HDD row fault LED on the system front control panel and release the HDD drawer to locate the HDD carrier for servicing.

1. Press the release button on HDD carrier handle and pull the handle to open position as shown.

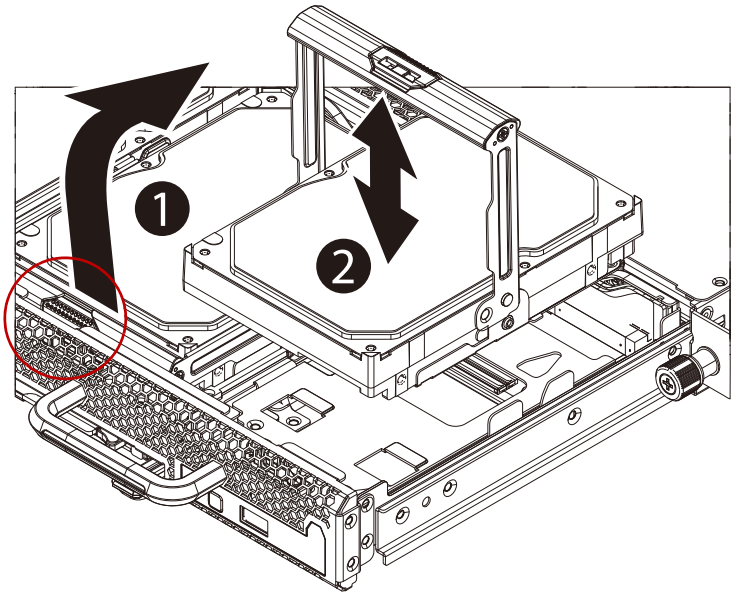


Figure 2-11. Removing a HDD carrier from the HDD drawer

2. Remove the HDD carrier assembly from the HDD drawer on the chassis.

3. Remove screw(s) securing the HDD to the assembly bracket as shown.

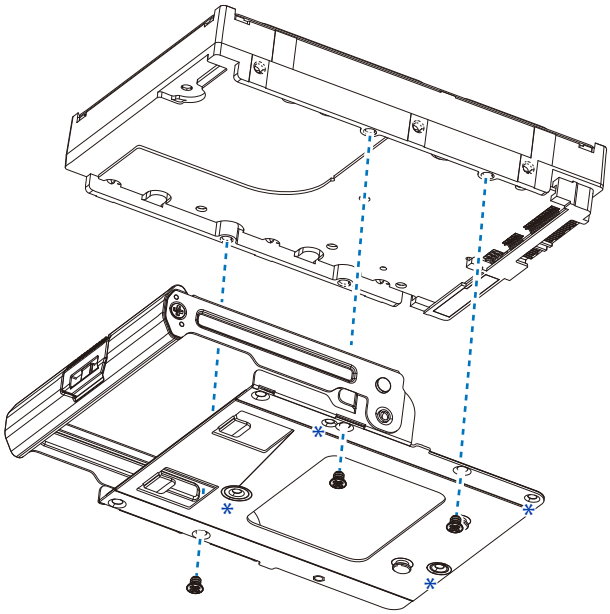


Figure 2-12. Removing a Storage Drive Assembly Bracket

4. Remove the HDD from the HDD carrier assembly.

Installing a HDD carrier with HDD to HDD drawer

Prerequisite:

Locate the HDD carrier slot on the chassis for servicing.

1. Align the screw holes on the HDD carrier assembly bracket with the wells on the HDD. Secure the carrier assembly bracket to the HDD with screws.

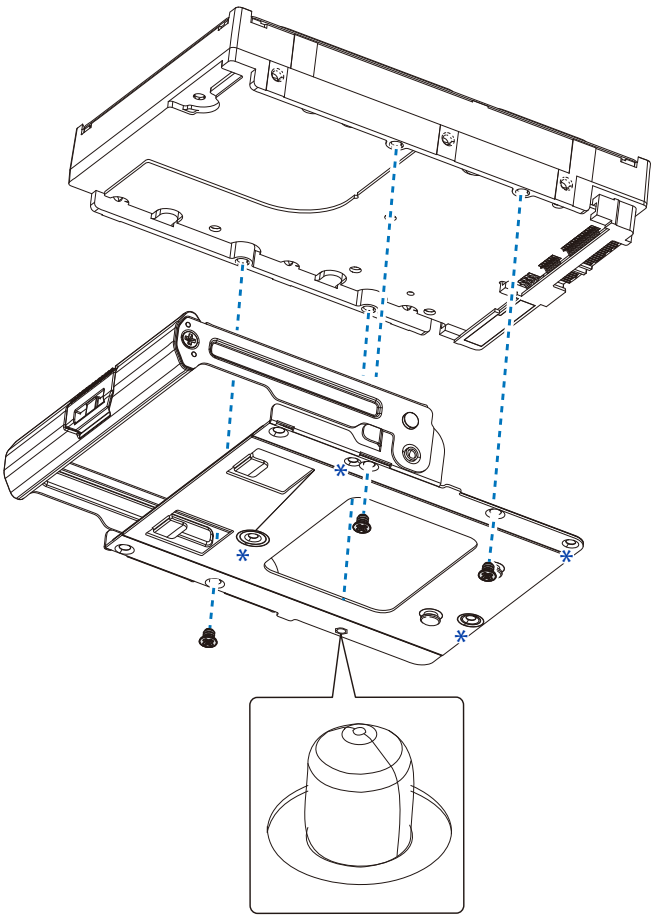


Figure 2-13. Installing a HDD carrier Assembly Bracket

2. Align the HDD carrier assembly with the carrier slot on the HDD drawer on the chassis. Place the HDD carrier on the HDD drawer on the chassis. Push the handle of HDD carrier assembly to close position to secure the HDD carrier assembly to the HDD drawer as shown.

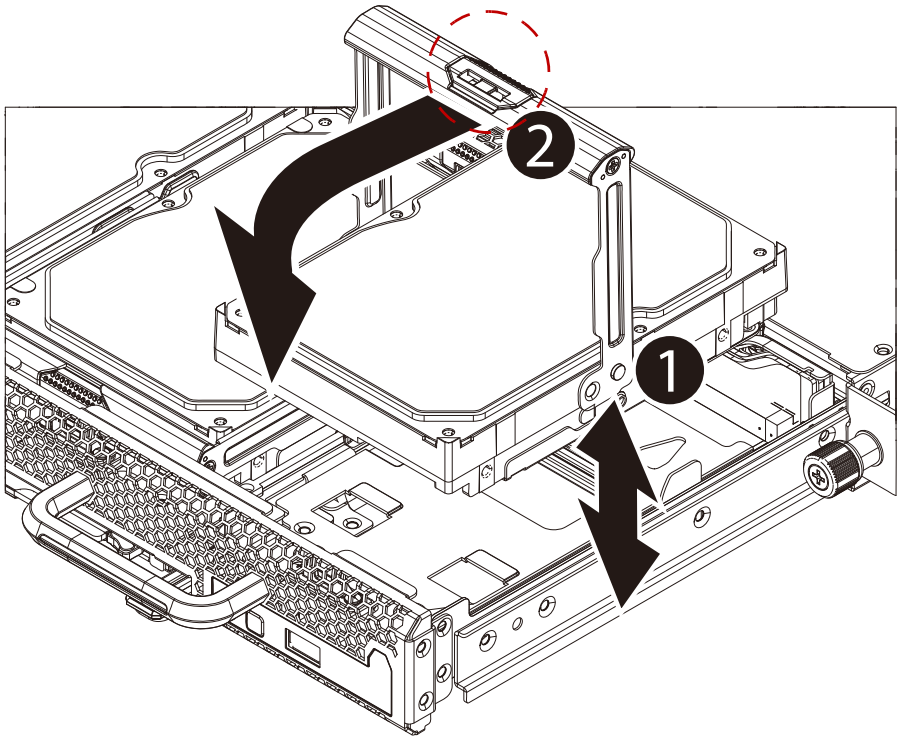


Figure 2-14. Installing a HDD carrier Assembly Bracket to HDD drawer

2.6 Top Cover

Removing the Top Cover

The following procedure illustrates the system.

CAUTION!
ENSURE ALL POWER IS DISCONNECTED FROM THE SYSTEM BEFORE PROCEEDING.

1. Press the top cover release button.
2. Slide the top cover away from the HDDs.

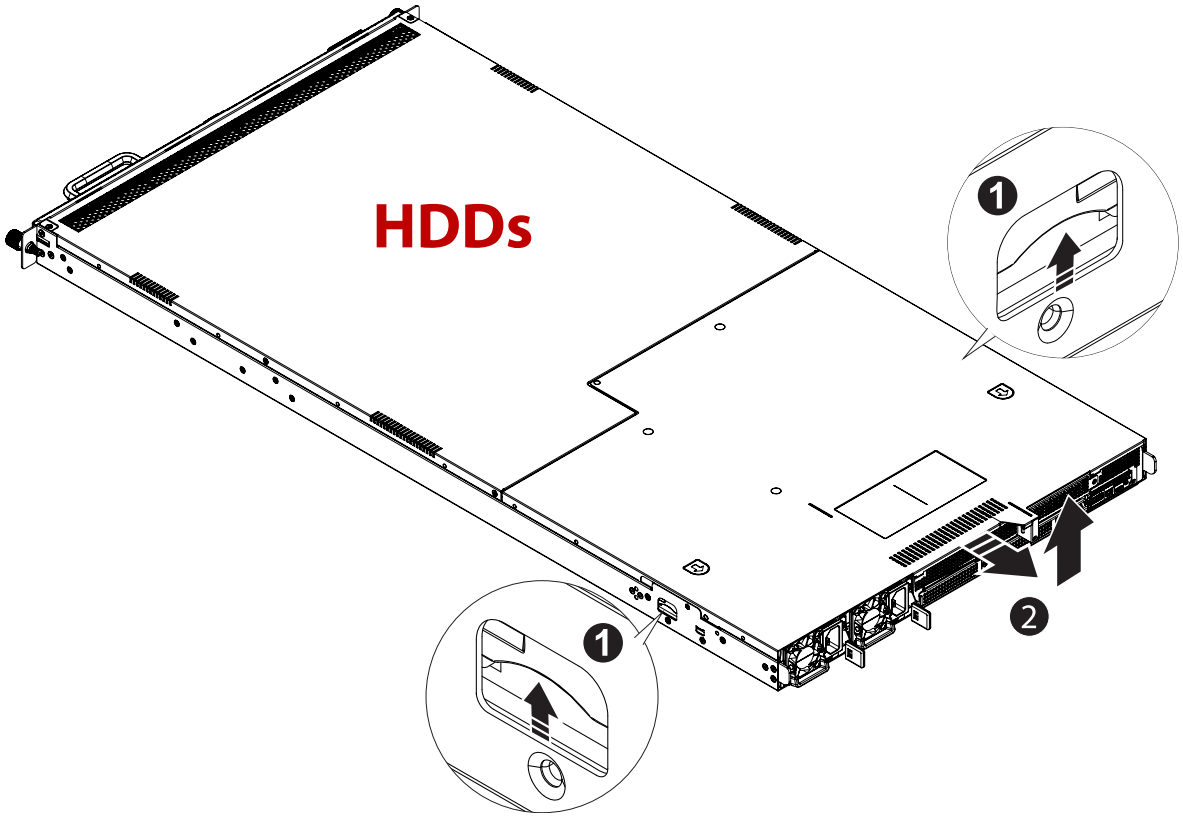


Figure 2-15. Removing the Top Cover

Installing the Top Cover

1. Place the top cover on the chassis.

2. Slide the cover toward the front of the chassis until it locks in place.

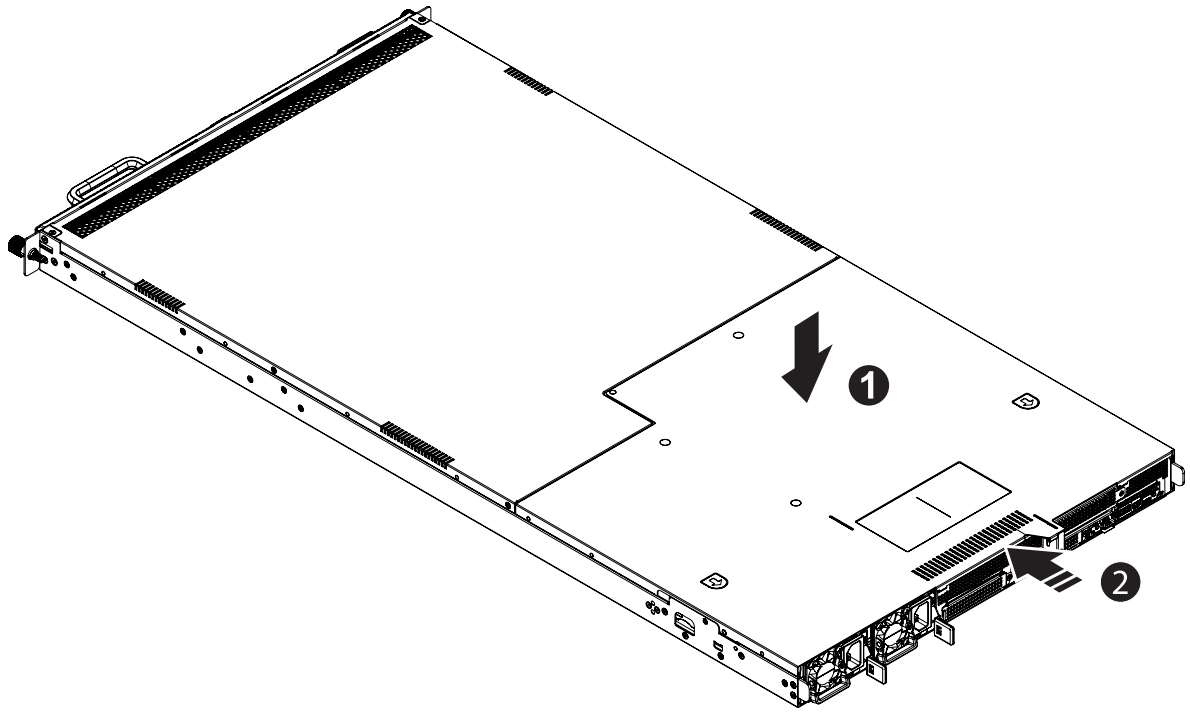


Figure 2-16. Installing the Top Cover

2.7 Air Duct

Removing an Air Duct

CAUTION!

ENSURE ALL POWER IS DISCONNECTED FROM THE SYSTEM BEFORE PROCEEDING.

1. Remove the top cover. See *Removing the Top Cover* on page 2-15.
2. Locate the air duct and grasp from the sides.
3. Remove the air duct from the mainboard.

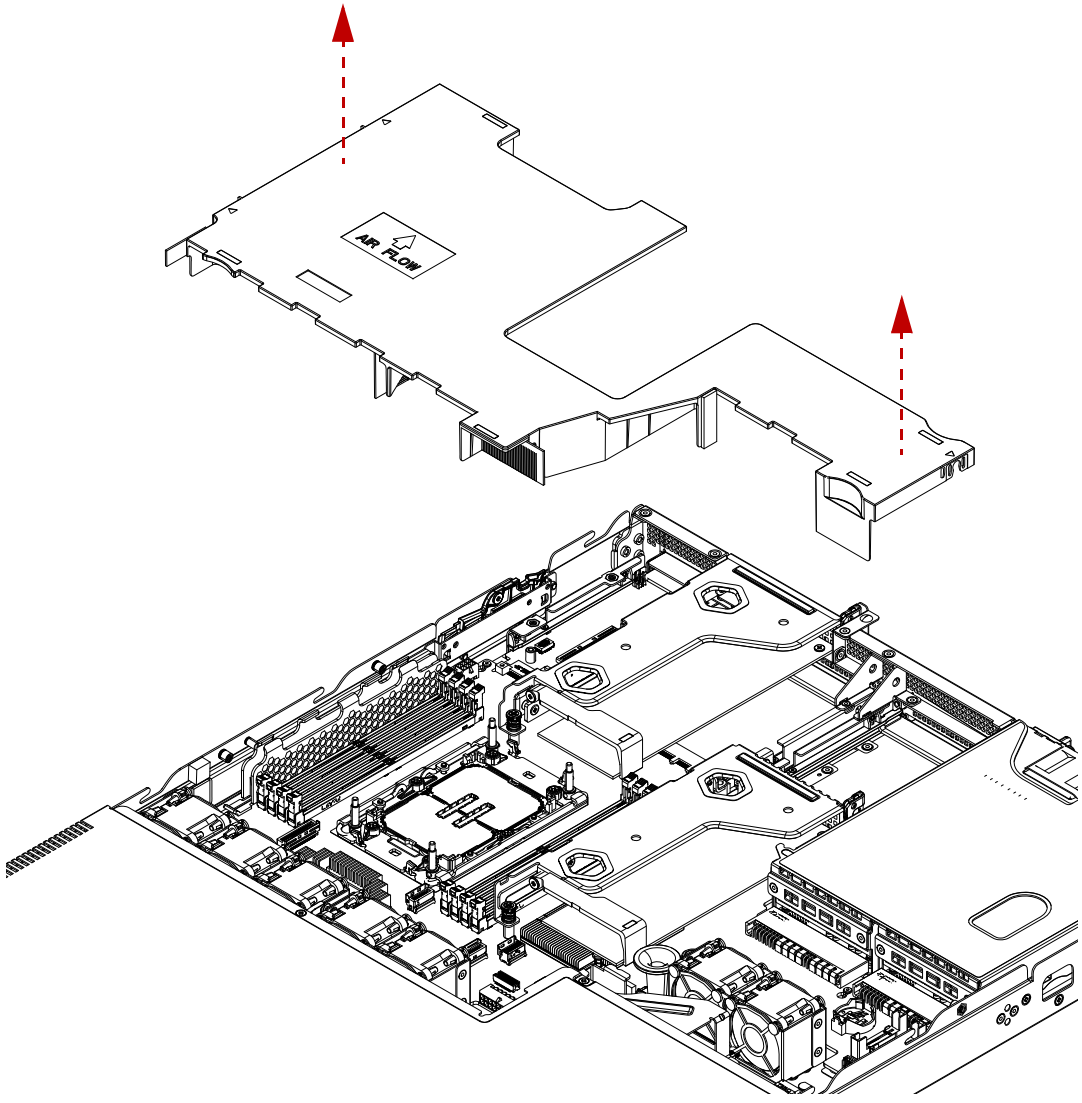


Figure 2-17. Removing the Air Duct

Installing an Air Duct

1. Remove the top cover. See *Removing the Top Cover* on page 2-15.
2. Position the air duct in the chassis, aligning it with the indents and opening next to the fan module.
3. Carefully lower the air duct in the chassis. Make sure the air duct is secured in place.

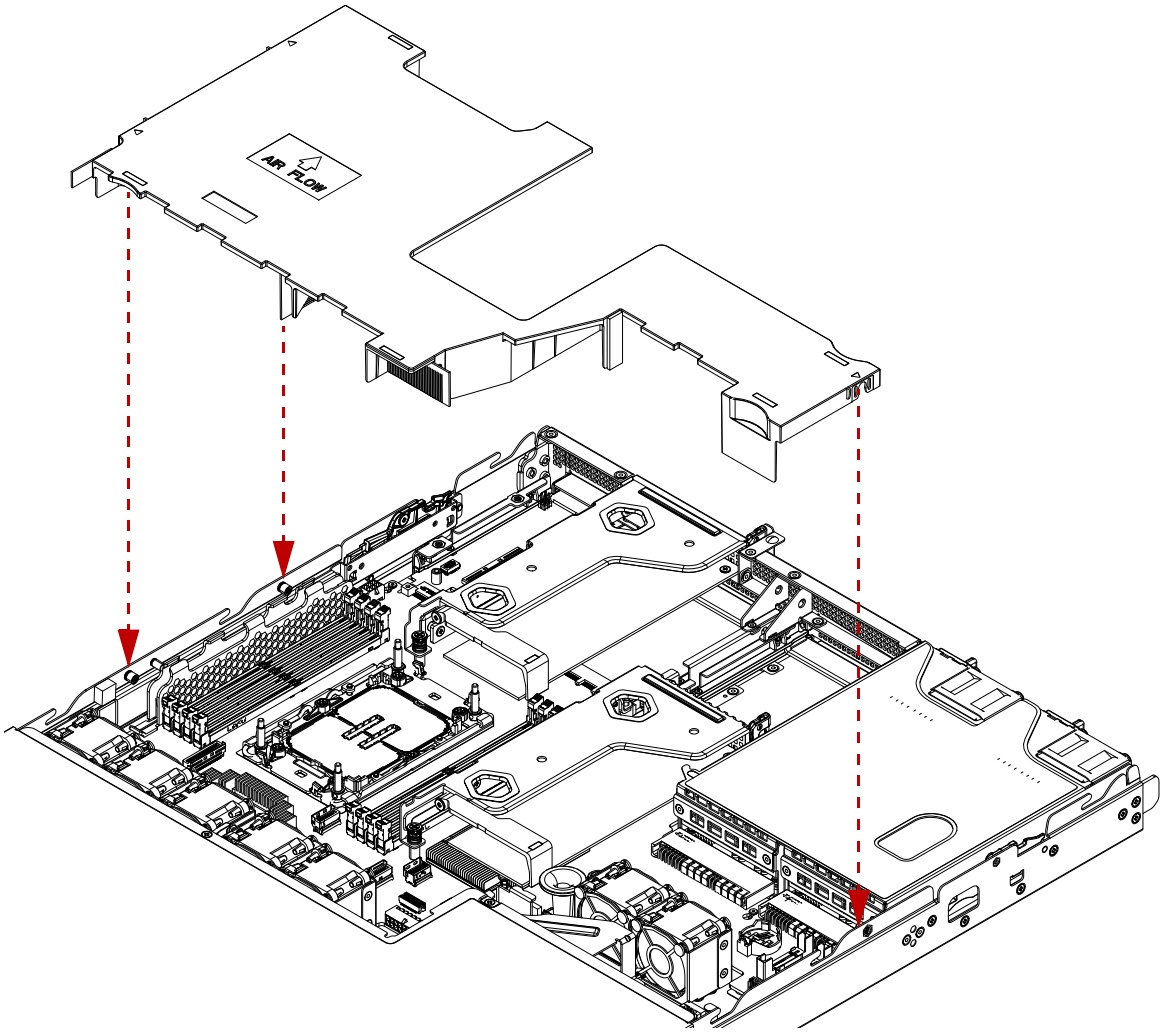


Figure 2-18. Installing the Air Duct

4. Intall the top cover. See *Installing the Top Cover* on page 2-15.

2.8 Fan Module

The system supports seven fan modules with three fan cages on the system. See the following image for fan module identification.

CAUTION!

ENSURE ALL POWER IS DISCONNECTED FROM THE SYSTEM BEFORE PROCEEDING.

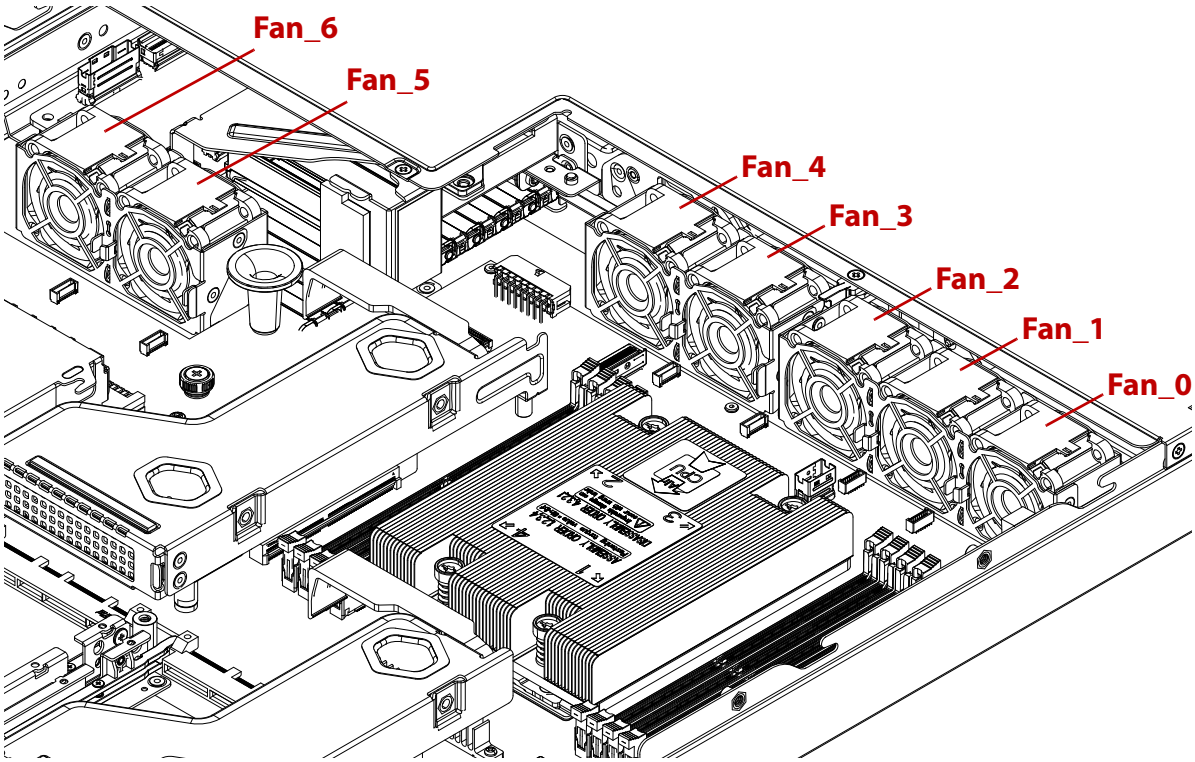


Figure 2-19. Fan Module

Removing Fan

The system supports seven fan modules with three fan cages.

1. Pull the system out of the rack.
2. Remove the top cover.
3. Remove the air duct.
4. Locate the fan cage the failed or failing fan modules installed to remove.
5. Disconnect the cable from the corresponding connector on mainboard.

6. Pull the fan cage up to remove it.

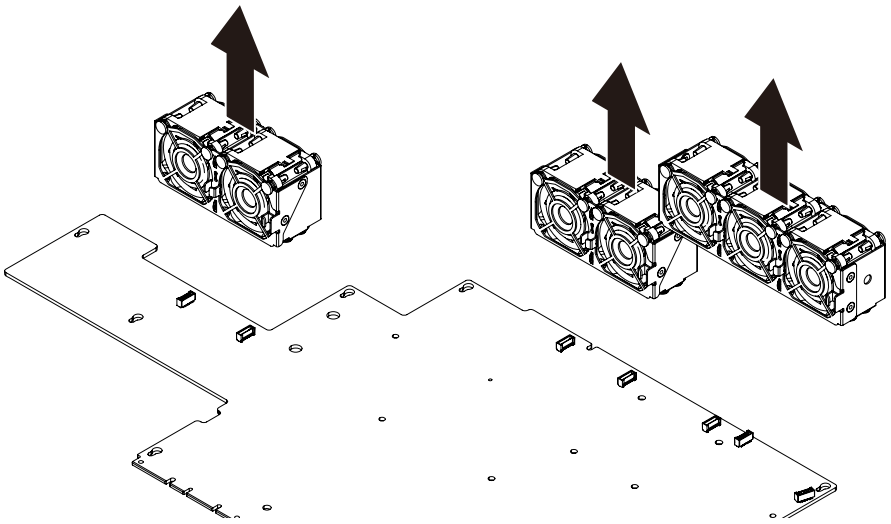


Figure 2-20. Removing a Fan Cage

Installing Fan

CAUTION!

POSITION THE FAN CAGE CORRECTLY, TO AVOID SEVERE SYSTEM OVERHEATING.

1. Locate the slot for the fan cage.
2. Install the fan cage and seat in the chassis.

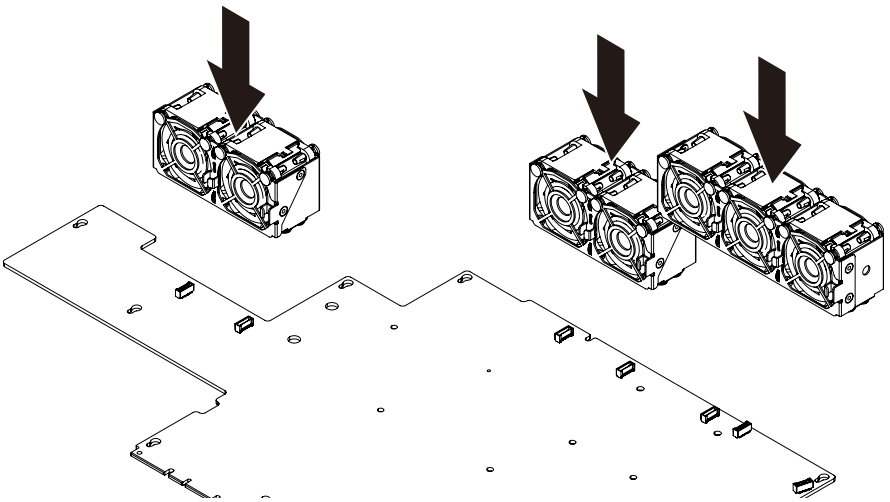


Figure 2-21. Installing a Fan Cage

3. Guide the cable through the corresponding opening.
4. Replace the air duct.
5. Replace the chassis top cover.
6. Replace the system in the rack.

2.9 Memory Modules

General Guidelines

All servers have specific rules for population of memory on the mainboard. Refer to the following individual server rules for information on how to populate the particular server required.

Memory Population Support

DIMMs are organized into physical slots on DDR5 memory channels that belong to processor sockets. The memory channels are identified as Channel A, B, C, D, E, F, G and H.

The DIMM identifiers on the silkscreen on the board provide information about the channel, and therefore the processor, to which they belong. For example, DIMM_A is the slot on Channel A of processor; DIMM_B is the DIMM slot on Channel B of processor. The detailed configuration is shown as below:

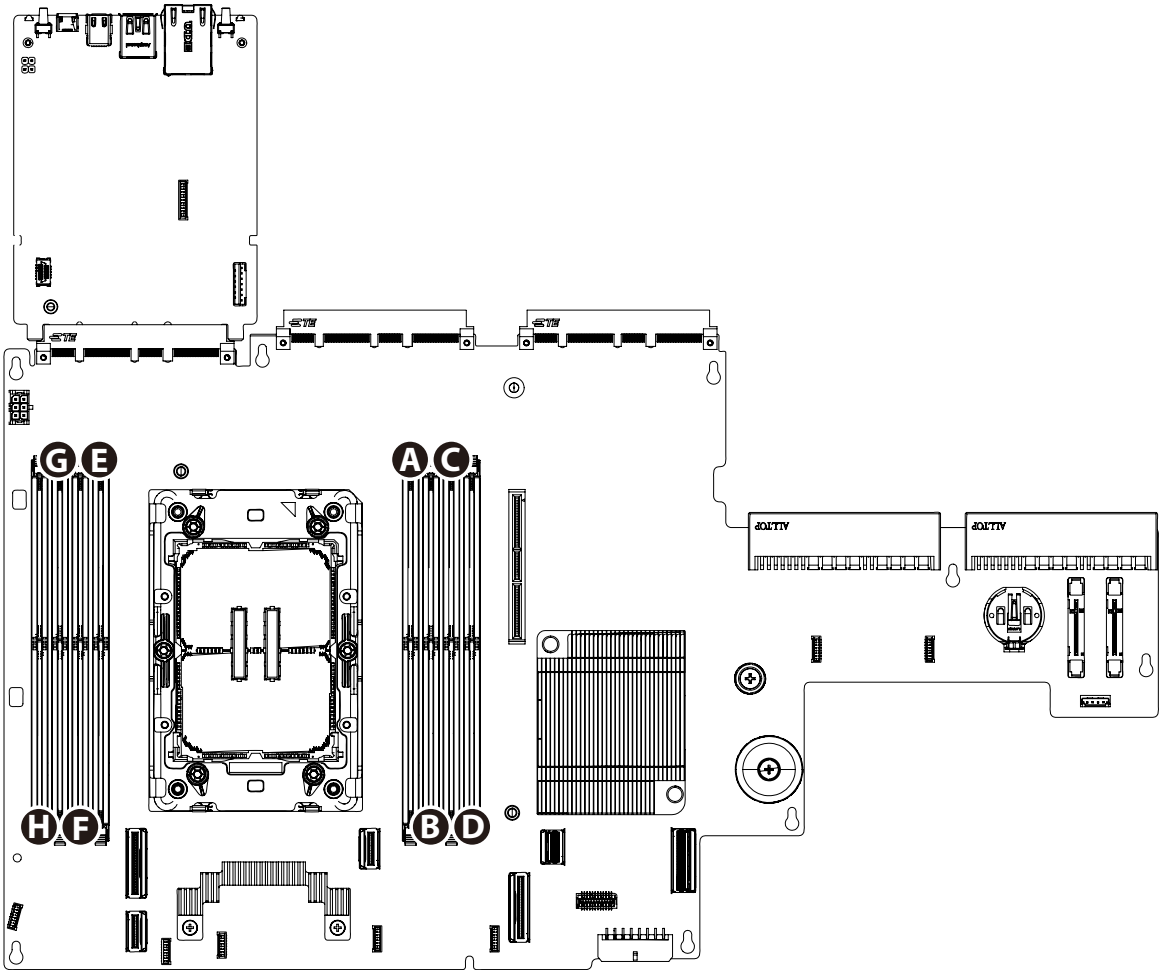


Figure 2-22. DIMM nomenclature

Removing a Memory Module

CAUTION!
HANDLE THE MEMORY MODULE BY THE EDGES AT ALL TIMES.

WARNING!
Memory modules remain hot after the system is powered down. Allow sufficient time for the memory modules to cool before handling system components.

1. Remove the top cover. See *Removing the Top Cover* on page 2-15.
2. Remove the air duct. See *Removing an Air Duct* on page 2-17.
3. Press down on the two ejector levers (A) at both ends of the DIMM slot. The memory module partially ejects.
4. Hold the DIMM module by the ends and remove it from the system. Place the DIMM module in an antistatic packaging.

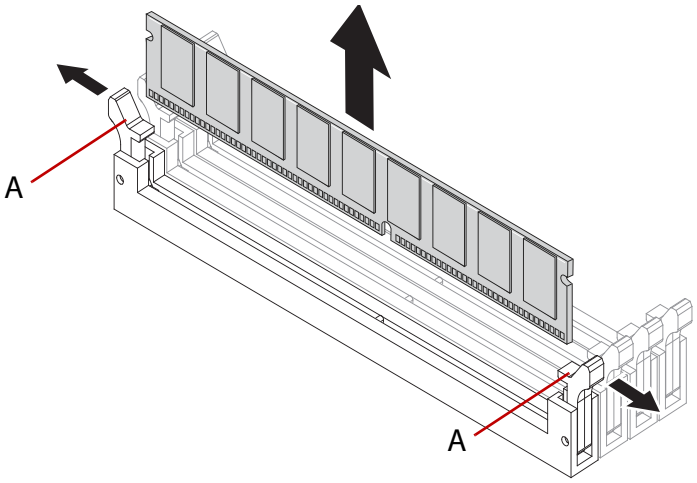


Figure 2-23. Removing a Memory Module

Installing a Memory Module

CAUTION!
HANDLE THE MEMORY MODULE BY THE EDGES AT ALL TIMES.

1. Locate the DIMM slot to populate and open the ejector levers (A) at both ends of the DIMM slot.
2. Align the notch on the DIMM module with the protrusion on the slot.

3. Press down on both corners of the DIMM module until the ejector levers lock in place.

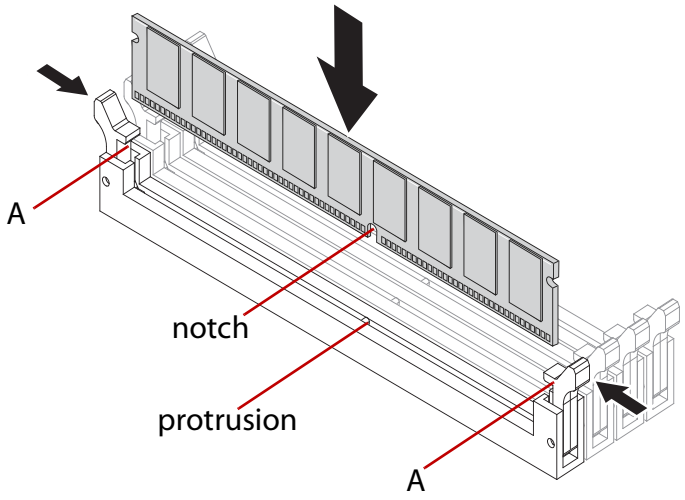


Figure 2-24. Installing a Memory Module

4. Install the air duct. See *Installing an Air Duct* on page 2-18.
5. Install the top cover. See *Installing the Top Cover* on page 2-15.

2.10 Processor Heat Sink Module

WARNING!
The heat sink module remains hot after the system has been powered down. Allow sufficient time to cool before handling system components.

WARNING!
Irreparable damage can occur with wrong assembly / disassembly order.

WARNING!
Torque value =8 in-lbf.

Note:
All the instructions and images in this section are for illustration purposes only and may not reflect the actual product.

Heat Sink Mapping

The following illustration provides a reference for the system's CPU location.

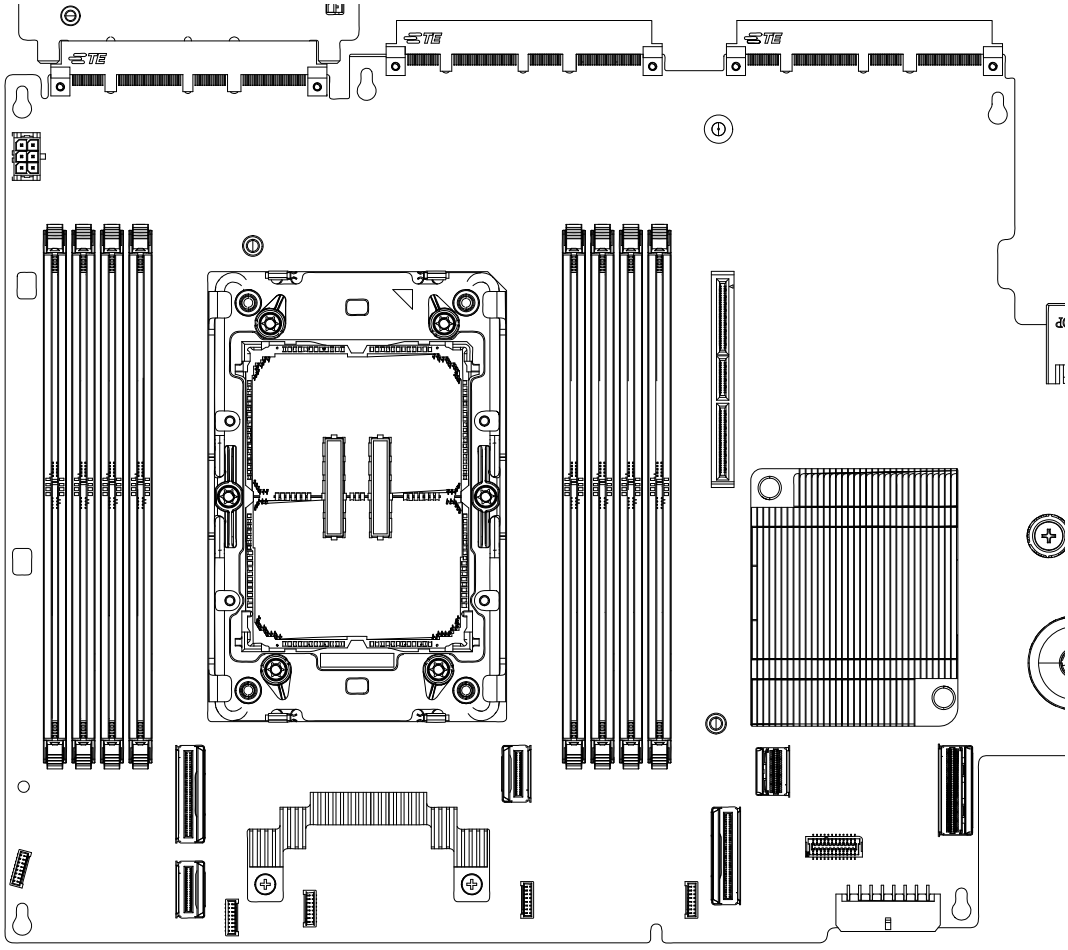


Figure 2-25. Heat Sink Mapping

Removing a Processor Heat Sink

1. Remove the top cover. See *Removing the Top Cover* on page 2-15.

2. Loosen the nuts securing the heat sink in a sequential order.

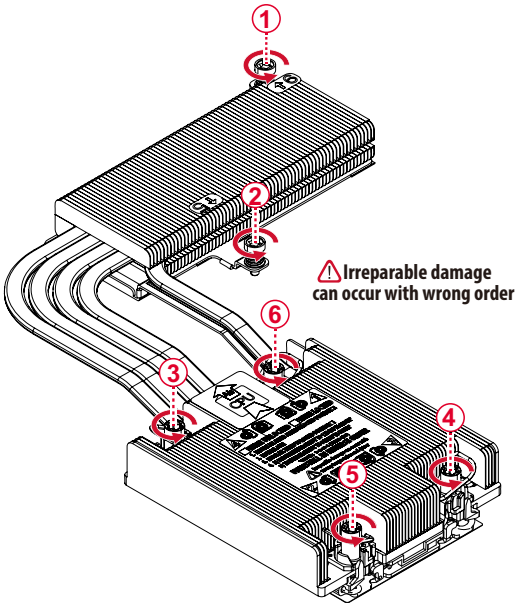


Figure 2-26. Loosen the nuts in order

3. Fully unlock all the four anti-tilt wires.

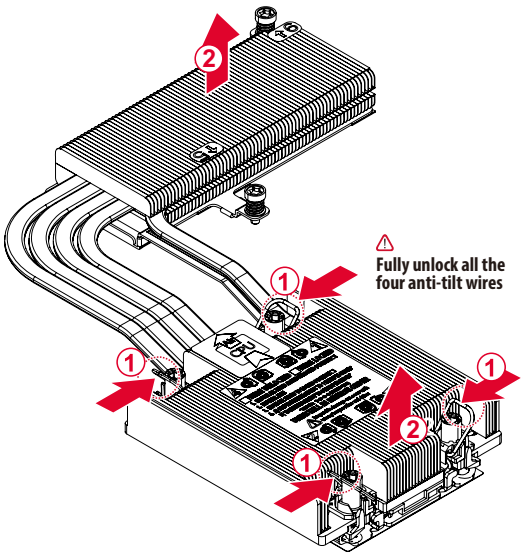


Figure 2-27. Unlock the wires

4. Remove the heat sink module.

Note:
Use the socket cover to protect the socket when the socket is empty.

Installing a Processor Heat Sink Module

1. Remove the top cover. See *Removing the Top Cover* on page 2-15.
2. Align the heat sink module over the processor bracket. Install the heat sink module. Fully lock all the four wires.

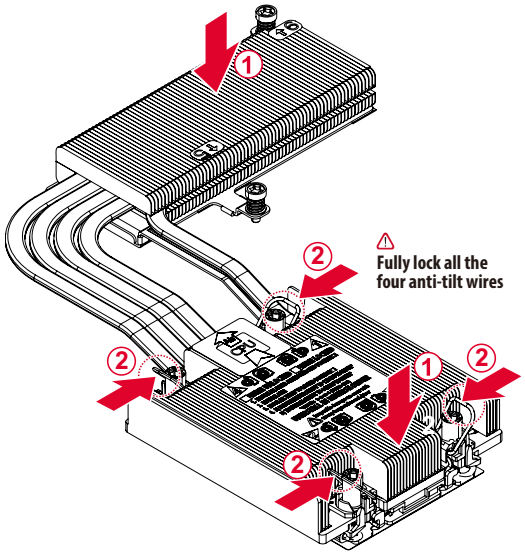


Figure 2-28. Lock the four wires

3. Make sure the nuts are inserted into the screw wells.

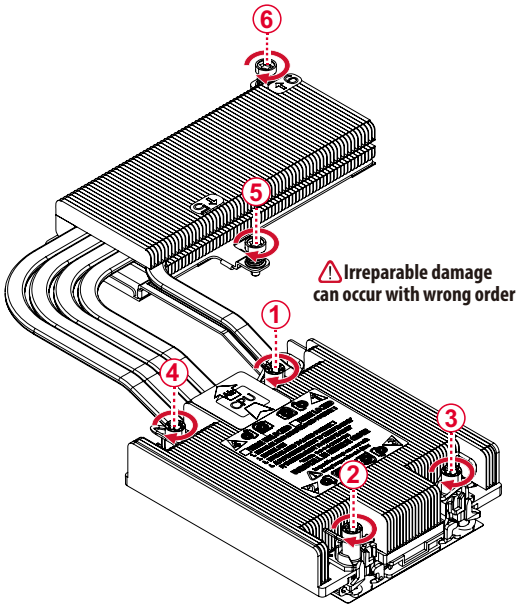


Figure 2-29. Securing the heat sink moudle in order.

4. Tighten the screw(s) in the order shown.
5. Install the top cover. See *Installing the Top Cover* on page 2-15.

2.11 Processor

Note:
All the instructions and images in this section are for illustration purposes only and may not reflect the actual product.

CAUTION!
ENSURE ALL POWER IS DISCONNECTED FROM THE SYSTEM BEFORE PROCEEDING.

WARNING!
The processor remains hot after the system has been powered down. Allow sufficient time to cool before handling system components.

Removing the Processor

To remove the processor:

1. Disconnect the power source and pull the system out of the rack frame.
2. Remove the top cover. See *Removing the Top Cover* on page 2-15.
3. Remove the processor heat sink module. See *Removing a Processor Heat Sink* on page 2-25.
4. Reverse the processor heat sink module and use lever to remove the processor.

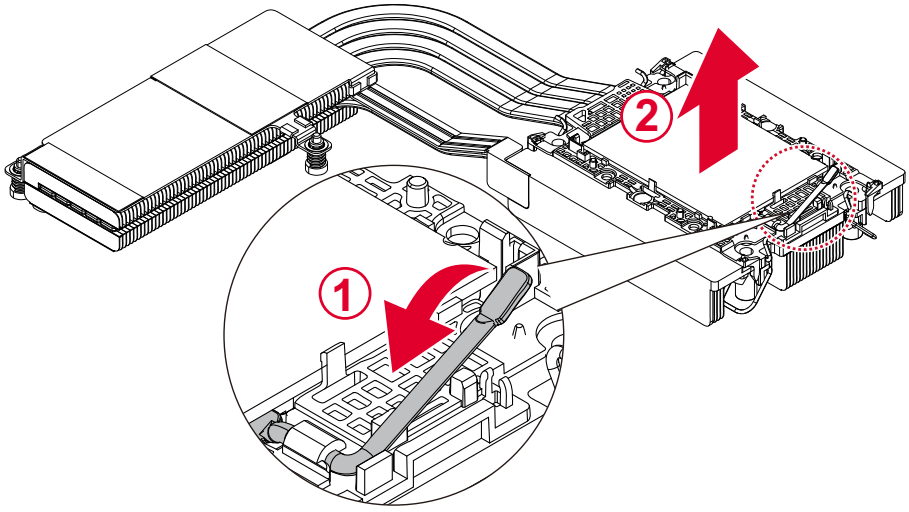


Figure 2-30. Remove the processor from the heat sink module

CAUTION!
AVOID CONTACT WITH ANY THERMAL GREASE ON THE PROCESSOR.

Installing the Processor

1. If there is a processor dust cover, remove it at this time.
2. Remove the new processor from its packaging. Make sure to hold the processor by the sides. Do NOT touch the underside of the processor.
3. Align the triangle identifying pin 1 of the processor with the triangular cutout on the clip.
4. Locate the pin1 (A) on processor and the pin1 (B) corner of the clip.
5. Locate the indents (C) on processor and corresponding tab (D) on clip.
6. Install the processor to the clip.

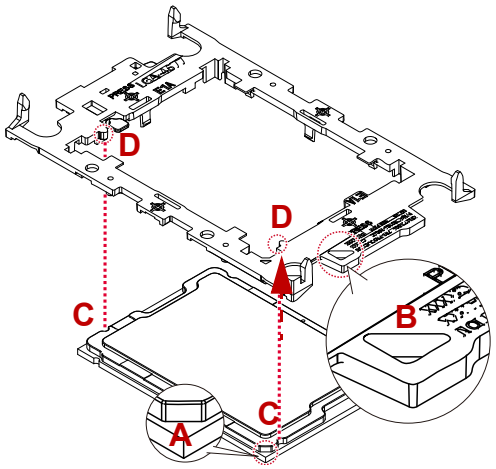


Figure 2-31. Installing the processor

Note:
Use the socket cover to protect the socket when the socket is empty.

7. Secure the processor clip with the heat sink.
8. Install the processor heat sink module. See *Installing a Processor Heat Sink Module* on page 2-26.
9. Install the top cover. See *Removing the Top Cover* on page 2-15.
10. Replace the system in the rack frame.

2.12 PCIe Expansion Cards

CAUTION!

ENSURE ALL POWER IS DISCONNECTED FROM THE SYSTEM BEFORE PROCEEDING.

The system supports the riser assembly configuration. It is designed for the installation of HHHL PCIe card.

PCIe Slots View

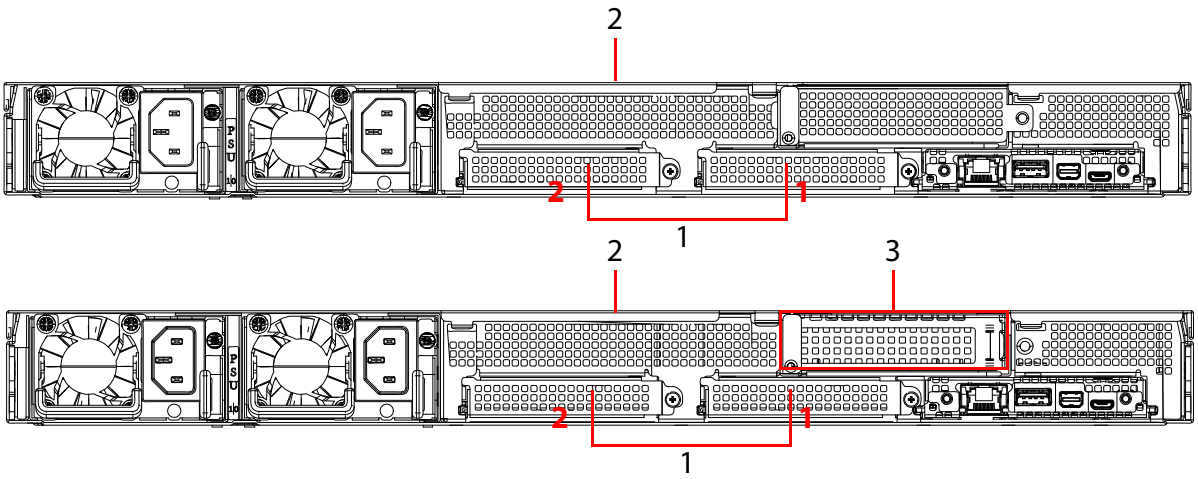


Figure 2-32. System Rear View

Table 2.1: Rear Panel View

NO.	NAME	DESCRIPTION
1	OCP NIC Slot	Support SFF OCP NIC 3.0 card
2	Inner Expansion Slot	Support HHHL PCIe card (CPU, PCIe Gen5, x16)
3	Expansion Slot*	Support HHHL PCIe card (CPU, PCIe Gen5, x16)

*Not available while remote heat sink installed.

Removing a PCIe Riser Assembly

Note:

Disconnect all the cablings while removing

To remove a riser assembly for the installation of a PCIe card, follow these guidelines:

1. Disconnect the power source and remove the system from the rack frame.

2. Remove the top cover. See *Removing the Top Cover* on page 2-15.
3. Locate the PCIe riser assembly in the rear of the chassis.
4. Release the riser assembly screw and lift it. Grasp the two holes on the riser assembly and lift it up carefully. Remove the inner riser assembly from the mainboard.

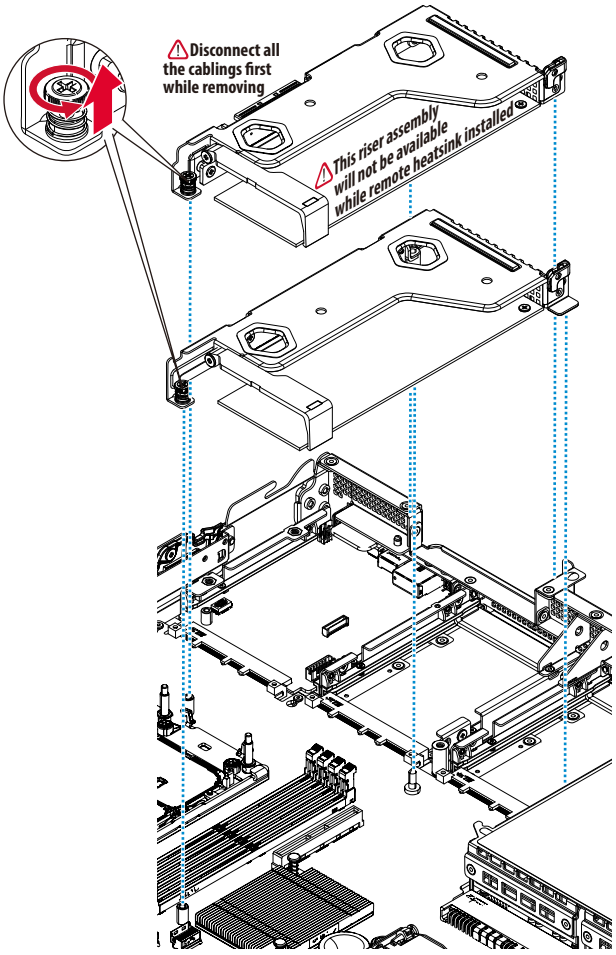


Figure 2-33. Grasp the Riser Assembly

Installing the PCIe Riser Assembly

Note:
Connecting all the cablings while installing

1. Align the guide hole / screw on the riser assembly with the guide pin / screw hole on the mainboard. Install the inner riser assembly on the chassis and press down firmly to connect it to the mainboard. Make sure the the assembly is secured in place.

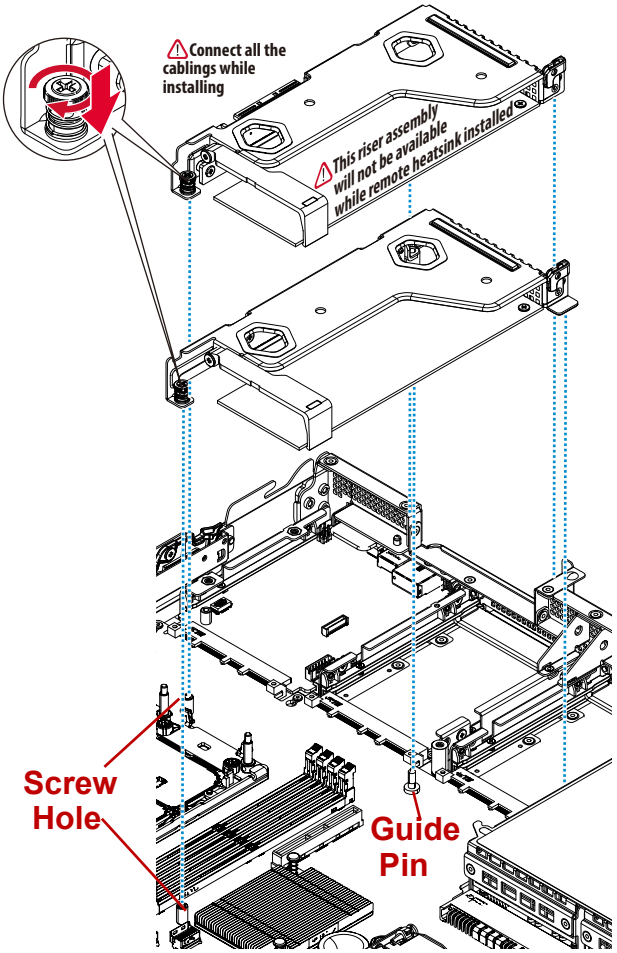


Figure 2-34. Installing and Securing the Riser Assembly

2. Install the top cover. See *Installing the Top Cover* on page 2-15.
3. Replace the system in the rack frame and connect to power source.

Removing a PCIe Card

Note:
Check the PCIe Card size before installing to ensure compatibility.

1. Remove the PCIe riser assembly from the system. See *Removing a PCIe Riser Assembly* on page 2-29.
2. Rotate the latch securing the PCIe card to the riser bracket to the open position.
3. Remove the PCIe card from the riser assembly.

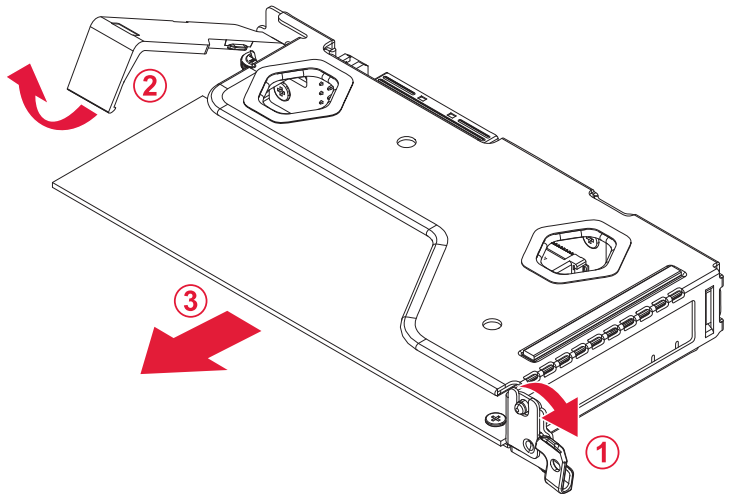


Figure 2-35. Removing a PCIe Card

4. Replace the PCIe card.

Installing a PCIe Card

Note:
Check the PCIe Card size before installing to ensure compatibility.

1. Remove the PCIe riser assembly from the system. See *Removing a PCIe Riser Assembly* on page 2-29.
2. If a dust plate is attached to the riser bracket, remove it at this time. Rotate the latch securing the dust plate to the riser bracket to the open position. Keep the dust plate for future use.
3. Align the PCIe card with the PCIe slot in the riser board and install.
4. Rotate the latch to secure the PCIe card to the riser assembly.

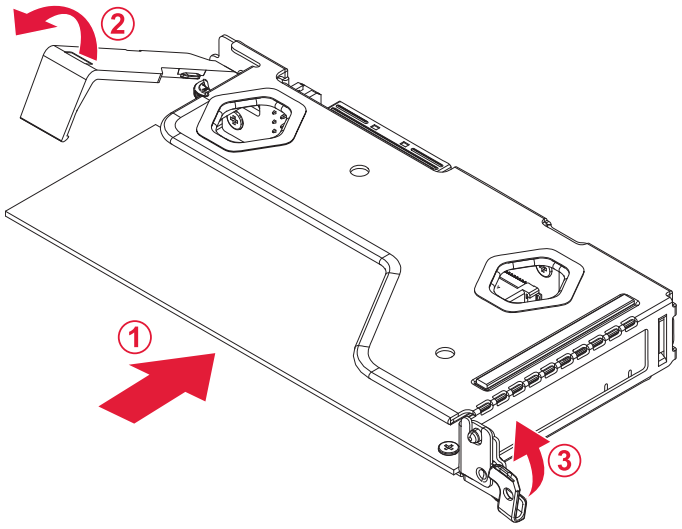


Figure 2-36. Installing a PCIe Card

5. Install the PCIe riser assembly in the system. See *Installing the PCIe Riser Assembly* on page 2-31.

2.13 Replacing the OCP Card

CAUTION!

ENSURE ALL POWER IS DISCONNECTED FROM THE SYSTEM BEFORE PROCEEDING.

Tab Type

There is a thumbscrew on the side of the NIC to secure the module in place.

Removing

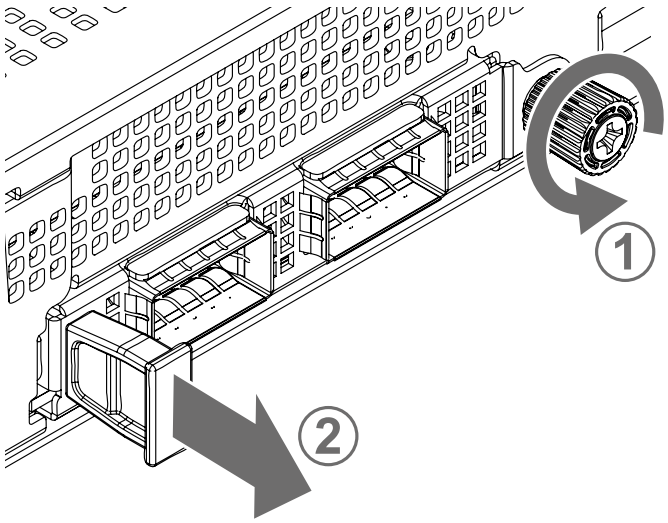


Figure 2-37. Removing the OCP card

Installing

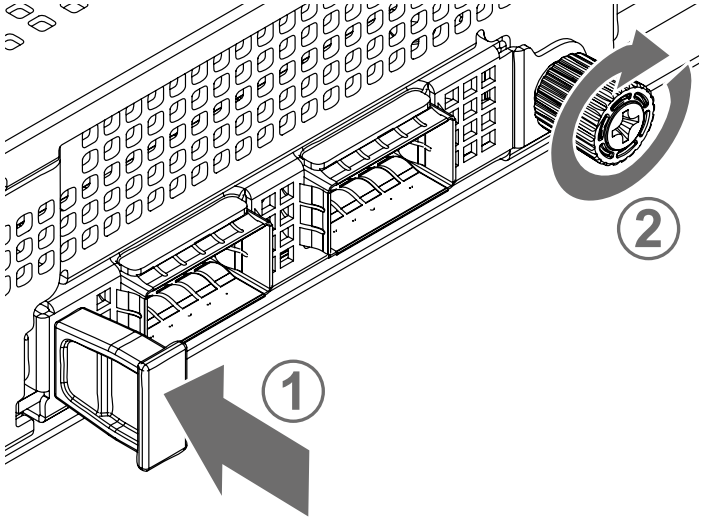


Figure 2-38. Installing the OCP card

Ejector Latch Type

There is an ejector latch arm that secures the NIC in place.

Removing

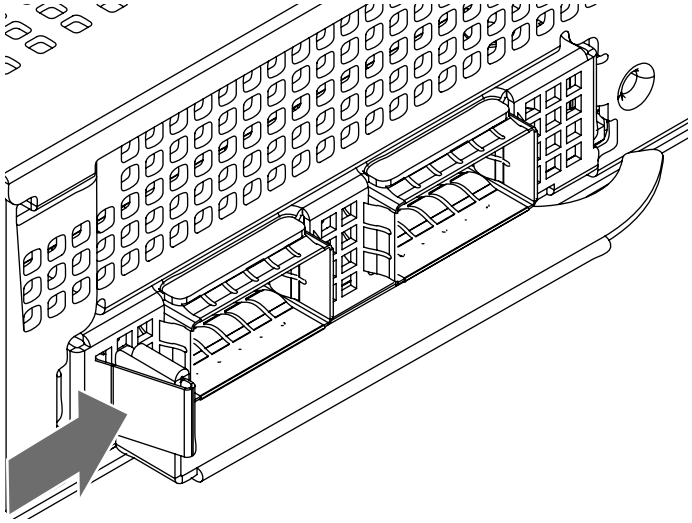


Figure 2-39. Press to release the ejector latch

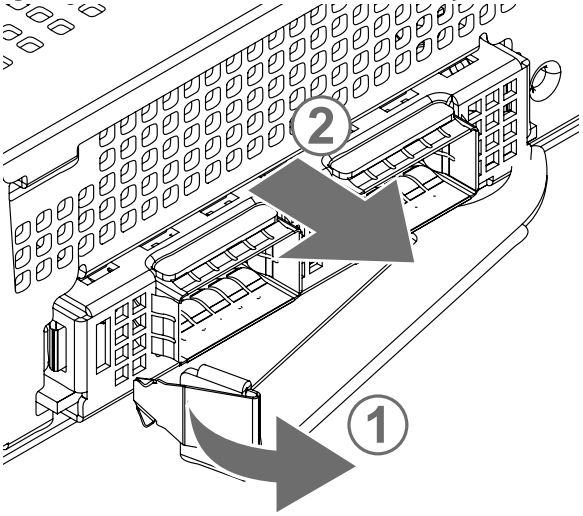


Figure 2-40. Extend the ejector latch to open position and removing the OCP card

Installing

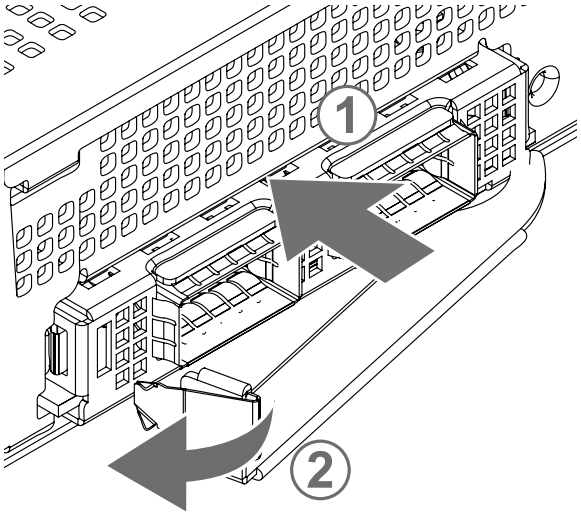


Figure 2-41. Inserting the OCP card and close the ejector latch

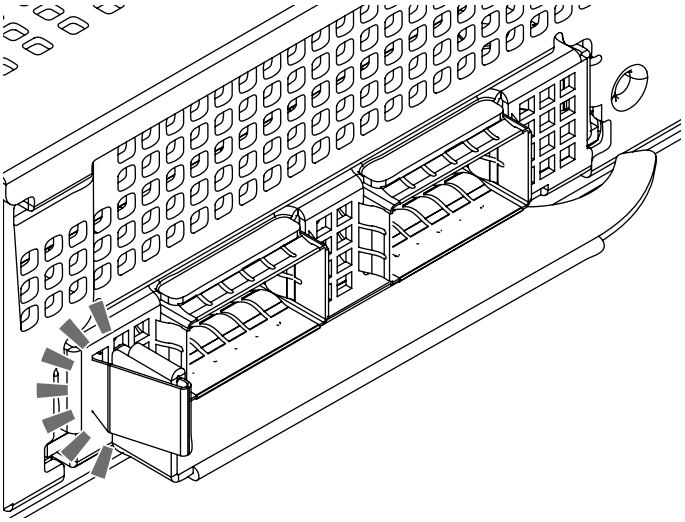


Figure 2-42. Lock the ejector latch in place

Internal Lock Type

Installing an internal lock OCP Card

Note:

Remove the riser assembly if necessary, see *Removing a PCIe Riser Assembly* on page 2-17

1. Remove the top cover. See *Removing the Top Cover* on page 2-15.
2. Remove the PCIe riser assembly from the system if necessary. See *Removing a PCIe Riser Assembly* on page 2-17.
3. Remove the screw securing the dummy bracket to the chassis. Keep the screw for the future use.
4. Align the connector on the internal lock OCP card to the slot on the mainboard and secure with screws.

5. Secure OCP card to the motherboard with two screws and rear panel with one screw.

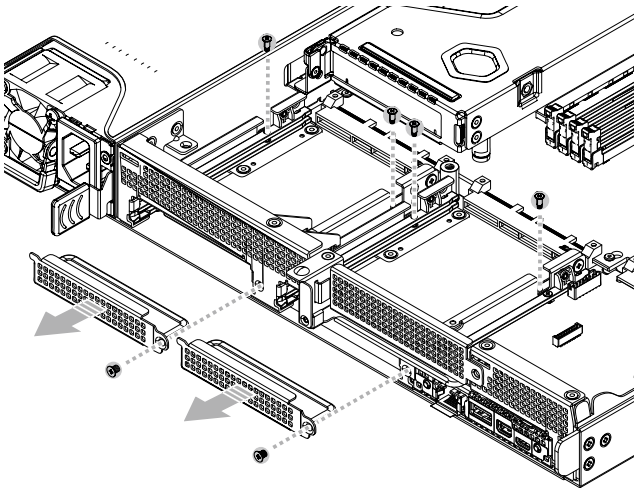


Figure 2-43. Installing the OCP card

6. Install the PCIe riser assembly in the system if removed. See *Installing an internal lock OCP Card* on page 2-36.
7. Install the top cover. See *Installing the Top Cover* on page 2-15.
8. Replace the system in the rack and connect to power source.

Removing an internal lock OCP Card

1. Disconnect the power source and remove the system from the rack frame.
2. Remove the top cover. See *Removing the Top Cover* on page 2-15.
3. Remove the PCIe riser assembly from the system if necessary. See *Removing a PCIe Riser Assembly* on page 2-17.
4. Remove two screws from the mainboard and one screw from the rear panel.

5. Disconnect the internal lock OCP card from the mainboard.

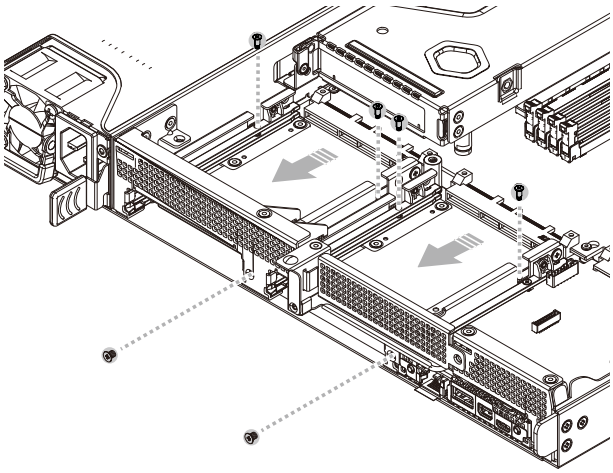


Figure 2-44. Removing the internal lock OCP card

6. Place the OCP card in an anti-static bag.
7. Replace the OCP card.

BIOS

Chapter 3

This section provides information regarding the BIOS architecture, BIOS update utility, server management, checkpoints, and error handling found in the system.

3.1 BIOS Setup Utility

Note:
Following AMI Security Advisory, BIOS has set a default admin password to protect setup varilable. Default admin password: soib9.admin

The BIOS Setup utility is provided to perform system configuration changes and to display current settings and environment information.

The BIOS Setup utility stores configuration settings in system non-volatile storage. Changes affected by BIOS Setup will not take effect until the system is rebooted. The BIOS Setup Utility can be accessed during POST by using the <**DEL**> or <**F2**> key.

The following sections describe the look and behavior for platform Setup.

Operation

BIOS Setup has the following features:

- The server board BIOS will only be available in English.
- BIOS Setup is functional via console redirection over various terminal emulation standards. This may limit some functionality for compatibility, e.g., usage of colors, some keys or key sequences, or support of pointing devices.

Setup Page Layout

The setup page layout is sectioned into functional areas. Each occupies a specific area of the screen and has dedicated functionality. The following table lists and describes each functional area.

Table 1: BIOS Setup Page Layout

FUNCTIONAL AREA	DESCRIPTION
Title Bar	The title bar is located at the top of the screen and displays the title of the form (page) the user is currently viewing. It may also display navigational information.

Table 1: BIOS Setup Page Layout (Continued)

FUNCTIONAL AREA	DESCRIPTION
Setup Item List	The Setup Item List is a set of controllable and informational items. Each item in the list occupies the left column of the screen. A Setup Item may also open a new window with more options for that functionality on the board.
Item Specific Help Area	The Item Specific Help area is located on the right side of the screen and contains help text for the highlighted Setup Item. Help information may include the meaning and usage of the item, allowable values, effects of the options, etc.
Keyboard Command Bar	The Keyboard Command Bar is located at the bottom right of the screen and continuously displays help for keyboard special keys and navigation keys.

Entering BIOS Setup

BIOS Setup is started by pressing <**DEL**> or <**F2**> during boot time when the QCT logo is displayed.

When Quiet Boot is disabled, the message “press <**DEL**> or <**F2**> to enter setup” will be displayed on the diagnostics screen.

Keyboard Commands

The bottom right portion of the Setup screen provides a list of commands that are used to navigate through the Setup utility. These commands are displayed at all times.

Each Setup menu page contains a number of features. Except those used for informative purposes, each feature is associated with a value field. This field contains user-selectable parameters. Depending on the security option chosen and in effect by the password, a menu feature's value may or may not be changeable. If a value is non-changeable, the feature's value field is inaccessible and displays as "grayed out."

Table 2: Keyboard Commands

KEY	OPTION	DESCRIPTION
<**Enter**>	Select and Execute Command	The <**Enter**> key is used to activate sub-menus when the selected feature is a sub-menu, or to display a pick list if a selected option has a value field, or to select a sub-field for multi-valued features like time and date. If a pick list is displayed, the <**Enter**> key will select the currently highlighted item, undo the pick list, and return the focus to the parent menu.

Table 2: Keyboard Commands (Continued)

KEY	OPTION	DESCRIPTION
<**Esc**>	Exit	The <**Esc**> key provides a mechanism for backing out of any field. When the <**Esc**> key is pressed while editing any field or selecting features of a menu, the parent menu is re-entered. When the <**Esc**> key is pressed in any sub-menu, the parent menu is re-entered. When the <**Esc**> key is pressed in any major menu, the exit confirmation window is displayed and the user is asked whether changes can be discarded. If *No* is selected and the <**Enter**> key is pressed, or if the <**Esc**> key is pressed, the user is returned to where he/she was before <**Esc**> was pressed, without affecting any existing any settings. If *Yes* is selected and the <**Enter**> key is pressed, setup is exited and the BIOS returns to the main System Options Menu screen.
↑	Select Item	The up arrow is used to select the previous value in a pick list, or the previous option in a menu item's option list. The selected item must then be activated by pressing the <**Enter**> key.
↓	Select Item	The down arrow is used to select the next value in a menu item's option list, or a value field's pick list. The selected item must then be activated by pressing the <**Enter**> key.
←→	Select Screen	The left and right arrow keys are used to move between the major menu pages. The keys have no affect if a sub-menu or pick list is displayed.
<**Tab**>	Select Field	The <**Tab**> key is used to move between fields. For example, <**Tab**> can be used to move from hours to minutes in the time item in the main menu.
-	Change Value	The minus key on the keypad is used to change the value of the current item to the previous value. This key scrolls through the values in the associated pick list without displaying the full list.
+	Change Value	The plus key on the keypad is used to change the value of the current menu item to the next value. This key scrolls through the values in the associated pick list without displaying the full list. On 106-key Japanese keyboards, the plus key has a different scan code than the plus key on the other keyboard, but will have the same effect.
k	Scroll Bar	The k key is used to scroll up in the item specific help area. The scroll bar keys have no affect if help string was not longer than the maximum allocated space in item specific help area.
m	Scroll Bar	The m key is used to scroll down in the item specific help area. The scroll bar keys have no affect if help string was not longer than the maximum allocated space in item specific help area.

Table 2: Keyboard Commands (Continued)

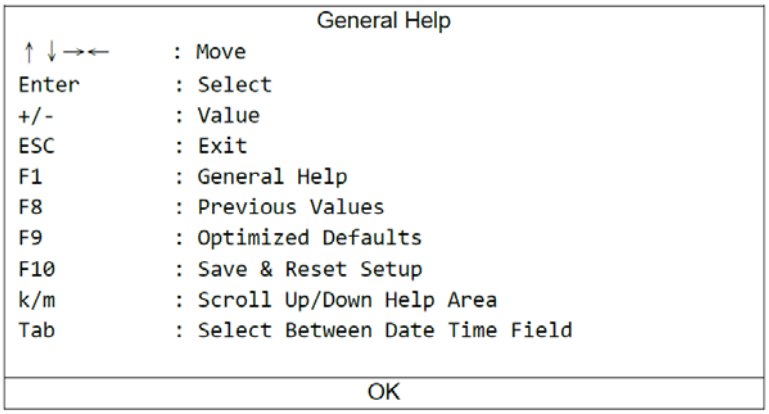
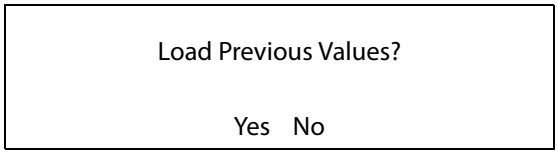
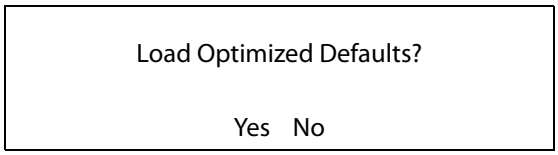
KEY	OPTION	DESCRIPTION
<**F1**>	Previous Values	Pressing <**F1**> causes the following to appear:  General Help shows the keys that we can use on Setup Menu and their Features. If the <**Esc**> or <**Enter**> key is pressed, the screen is returned to where the screen is before <**F1**> was pressed without any affecting.
<**F8**>	Previous Values	Pressing <**F8**> causes the following to appear:  If Yes is highlighted and <**Enter**> is pressed, all Setup fields are set to their previous values. If No is highlighted and <**Enter**> is pressed, or if the <**Esc**> key is pressed, the user is returned to where they were before <**F8**> was pressed without affecting any existing field values.
<**F9**>	Setup Defaults	Pressing <**F9**> causes the following to appear:  If Yes is highlighted and <**Enter**> is pressed, all Setup fields are set to their optimized values. If No is highlighted and <**Enter**> is pressed, or if the <**Esc**> key is pressed, the user is returned to where they were before <**F9**> was pressed without affecting any existing field values.

Table 2: Keyboard Commands (Continued)

KEY	OPTION	DESCRIPTION
<**F10**>	Save and Reset	Pressing <**F10**> causes the following message to appear: Save configuration and reset? Yes No If Yes is highlighted and <**Enter**> is pressed, all changes are saved and system is reset. If No is highlighted and <**Enter**> is pressed, or the <**Esc**> key is pressed, the user is returned to where they were before <**F10**> was pressed without affecting any existing values.

Menu Selection Bar

The Menu Selection Bar is located at the top of the BIOS Setup Utility screen. It displays the major menu selections available to the user. By using the left and right arrow keys, the user can select the menus listed here.

Server Platform Setup Utility Screens

The sections below describe the screens available for the configuration of a server platform. In these sections, tables are used to describe the contents of each screen. These tables follow the following guidelines:

- The text and values in the Setup Item, Options, and Help columns in the tables are displayed on the BIOS Setup screens.
- **Bold text** in the Options column of the tables indicates default values. These values are not displayed in bold on the setup screen. The bold text in this document is to serve as a reference point.
- The Comments column provides additional information where it may be helpful. This information does not appear in the BIOS Setup screens.
- Information in the screen shots that is enclosed in brackets (< >) indicates text that varies, depending on the option(s) installed. For example <Current Date> is replaced by the actual current date.
- Information that is enclosed in square brackets ([ ]) in the tables indicates areas where the user needs to type in text instead of selecting from a provided option.
- Whenever information is changed (except Date and Time) the systems requires a save and reboot to take place. Pressing <**ESC**> will discard the changes and boot the system according to the boot order set from the last boot.

Main Screen

The Main screen is the screen that is first displayed when BIOS Setup is entered, unless an error has occurred.

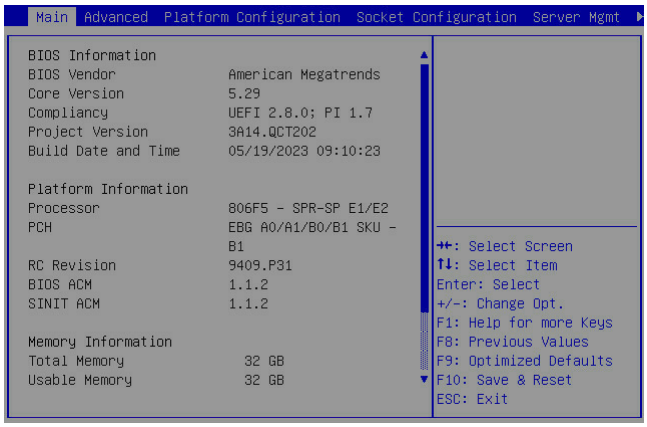


Figure 3-1. Main Screen

Table 3: Main Screen Description

SETUP ITEM	OPTIONS	HELP TEXT	COMMENTS
BIOS Vendor			Information only. Displays the BIOS Vendor.
Core Version			Information only. Displays the AMI BIOS Core version.
Compliancy			Information only. Displays the BIOS compliancy.
Project Version			Information only. Displays the Project version.
Build Date and Time			Information only. Displays the BIOS build date.
Processor			Information only. Displays the Processor information.
PCH			Information only. Displays the PCH information.
RC Revision			Information only. Displays the RC Revision.
BIOS ACM			Information only. Displays the BIOS ACM.
SINIT ACM			Information only. Displays the SINIT ACM.
Total Memory			Information only. Displays the Total System Memory Size.

Table 3: Main Screen Description (Continued)

SETUP ITEM	OPTIONS	HELP TEXT	COMMENTS
Usable Memory			Information only. Displays the logical System Memory Size. Adjust the unit automatically depends on multiple of GB or not.
Access Level			Information only. Displays the Access Level.
System Date	[Day of week MM/DD/YYYY]	Set the Date. Use Tab to switch between date elements.	
System Time	[HH:MM:SS]	Set the Time. Use Tab to switch between time elements.	

Advanced Screen

The Advanced screen provides an access point to configure several options. On this screen, you can select the option that is to be configured. Configurations are performed on the selected screen, not directly on the Advanced screen.

Note:
Some additional pages may be created in Advanced Screen by some additional EFI Firmware. Since it is not created by BIOS, this spec will not define it.

To access this screen from the Main screen, press the right arrow until the Advanced screen is chosen.

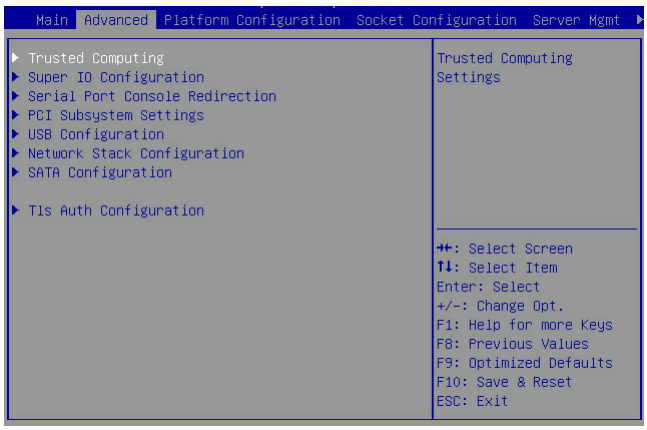


Figure 3-2. Advanced Screen

Table 4: Advanced Screen Description

SETUP ITEM	OPTIONS	HELP TEXT	COMMENTS
Trusted Computing		Trusted Computing Settings	
Super IO Configuration		System Super IO Chip Parameters.	

Table 4: Advanced Screen Description (Continued)

SETUP ITEM	OPTIONS	HELP TEXT	COMMENTS
Serial Port Console Redirection		Serial Port Console Redirection	
PCI Subsystem Settings		PCI, PCI-X and PCI Express Settings	
USB Configuration		USB Configuration Parameters	
Network Stack Configuration		Network Stack Settings	
SATA Configuration		SATA Device Configuration Settings	
Tls Auth Configuration		Press <Enter> to select Tls Auth Configuration.	
Driver Health		Provides Health Status for the Drivers/Controllers	

Platform Configuration Screen

The Platform Configuration screen provides an access point to configure several options. On this screen, the user selects the option that is to be configured. Configurations are performed on the selected screen, not directly on the Platform Configuration screen.

To access this screen from the Main screen, press the right arrow until the Platform Configuration screen is chosen.

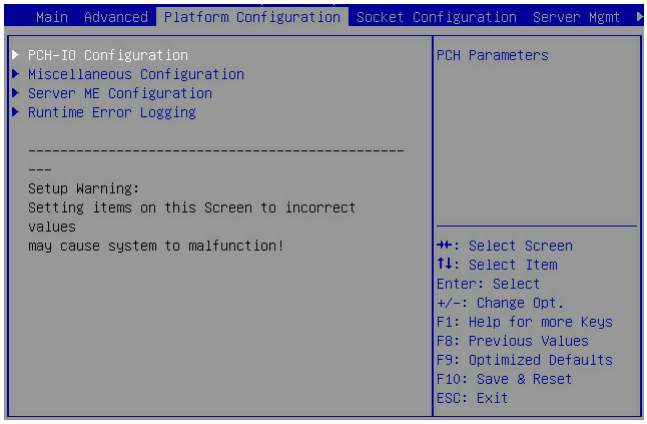


Figure 3-3. Platform Configuration Screen

Table 5: Platform Configuration Screen Description

SETUP ITEM	OPTIONS	HELP TEXT	COMMENTS
PCH-IO Configuration		Displays and provides option to change the PCH Settings	
Miscellaneous Configuration			
Server ME Configuration		Configure Server ME Technology Parameters	

Table 5: Platform Configuration Screen Description (Continued)

SETUP ITEM	OPTIONS	HELP TEXT	COMMENTS
Runtime Error Logging		Press <Enter> to view or change the runtime error log configuration.	

Socket Configuration Screen

The Socket Configuration screen provides an access point to configure several options. On this screen, the user selects the option that is to be configured. Configurations are performed on the selected screen, not directly on the Socket Configuration screen.

To access this screen from the Main screen, press the right arrow until the Socket Configuration screen is chosen.

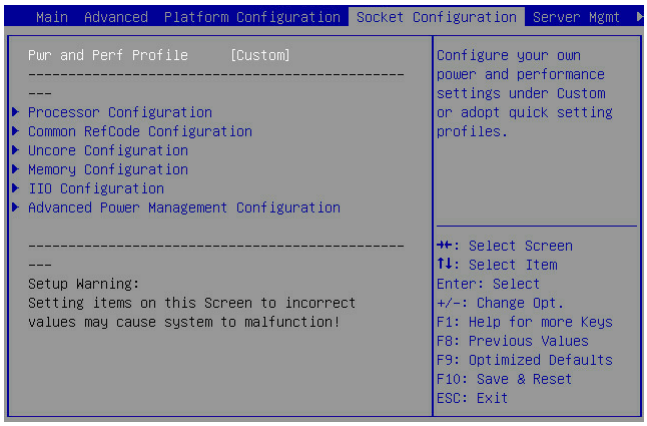


Figure 3-4. Socket Configuration Screen

Table 6: Socket Configuration Screen Description

SETUP ITEM	OPTIONS	HELP TEXT	COMMENTS
Pwr and Perf Profile	[**Custom**] [Energy-Saving Mode] [High Performance]	Configure your own power and performance settings under Custom or adopt quick setting profiles.	
Processor Configuration		Displays and provides option to change the Processor Settings	
Common RefCode Configuration		Displays and provides option to change the Common RefCode Settings	
Uncore Configuration		Displays and provides option to change the Uncore Settings	
Memory Configuration		Displays and provides option to change the Memory Settings	
IIO Configuration		Displays and provides option to change the IIO Settings	

Table 6: Socket Configuration Screen Description (Continued)

SETUP ITEM	OPTIONS	HELP TEXT	COMMENTS
Advanced Power Management Configuration		Displays and provides option to change the Power Management Settings	

Server Management Screen

The Server Management screen displays information of the BMC, and allows the user to configure desired settings.

To access this screen from the Main screen, select Server Mgmt Options.

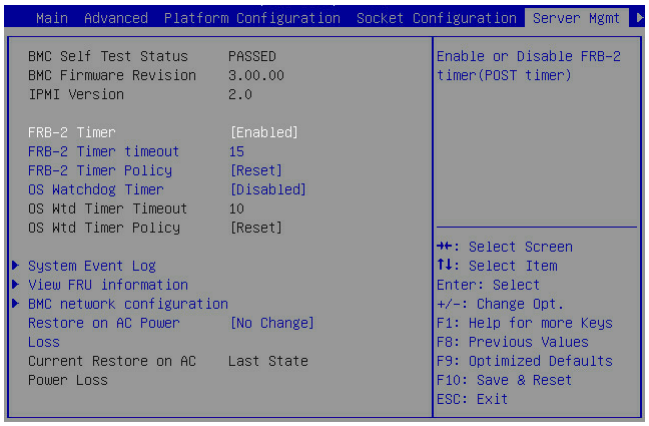


Figure 3-5. Server Management Screen

Table 7: Server Management Screen Description

SETUP ITEM	OPTIONS	HELP TEXT	COMMENTS
BMC Self Test Status			Information only. Displays the BMC Self Test Status.
BMC Firmware Revision			Information only. Displays the BMC firmware version.
IPMI Version			Information only. Displays the IPMI version.
FRB-2 Timer	[**Enabled**] [Disabled]	Enable or Disable FRB-2 timer (POST timer)	
FRB-2 Timer timeout	[**15**]	Enter value Between 1 to 30 min for FRB-2 Timer Expiration value	It will be grayout if "FRB-2 Timer" disabled.
FRB-2 Timer Policy	[Do Nothing] [**Reset**] [Power Down] [Power Cycle]	Configure how the system should respond if the FRB-2 Timer expires. Not available if FRB-2 Timer is disabled.	It will be grayout if "FRB-2 Timer" disabled.

Table 7: Server Management Screen Description (Continued)

SETUP ITEM	OPTIONS	HELP TEXT	COMMENTS
OS Watchdog Timer	[Enabled] [**Disabled**]	If enabled, it determines the success of OS load by following the Watchdog Timer policy to start a BIOS timer (only can be shut off by Management SW) after the OS loads.	
OS Wtd Timer Timeout	[**10**]	Enter the value Between 1 to 30 min for OS Boot Watchdog Timer Expiration. Not available if OS Boot Watchdog Timer is disabled	It will be grayout if "OS Watchdog Timer" disabled.
OS Wtd Timer Policy	[Do Nothing] [**Reset**] [Power Down] [Power Cycle]	Configure how the system should respond if the OS Boot Watchdog Timer expires. Not available if OS Boot Watchdog Timer is disabled.	It will be grayout if "OS Watchdog Timer" disabled.
System Event Log		Press <**Enter**> to change the SEL event log configuration.	
View FRU information		Press <**Enter**> to view FRU information.	
BMC network configuration		Configure BMC network parameters	
Restore on AC Power Loss	[Power off] [Power On] [Last State] [**No Change**]	System action to take on AC power loss.	
Current Restore on AC Power Loss			Current system action to take on AC power loss.

Security Screen

The Security screen provides fields to enable and set the user and administrative password and to lockout the front panel buttons so they cannot be used.

To access this screen from the Main screen, select the Security option.

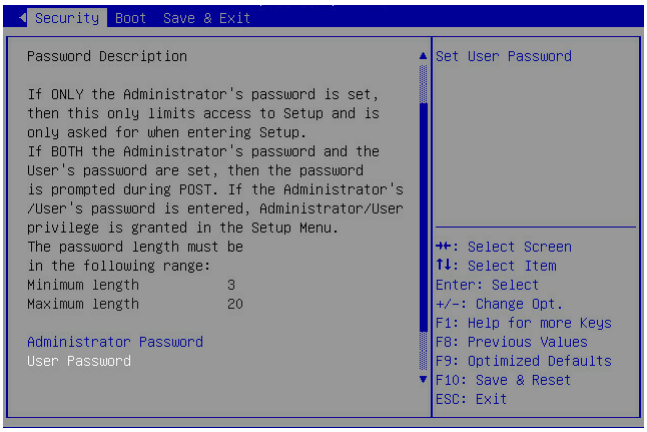


Figure 3-6. Security Screen

Table 8: Security Screen Description

SETUP ITEM	OPTIONS	HELP TEXT	COMMENTS
Administrator Password		Set Setup Administrator Password	
User Password		Set User Password	
Secure Boot		Secure Boot configuration	

Boot Options Screen

The Boot Options screen displays any bootable media encountered during POST, and allows the user to configure desired boot device.

If no boot devices are available – for example, both onboard LAN are disabled and no bootable device connected when Boot Mode is set to Legacy – the system will auto boot into BIOS setup menu.

To access this screen from the Main screen, select Boot Options.

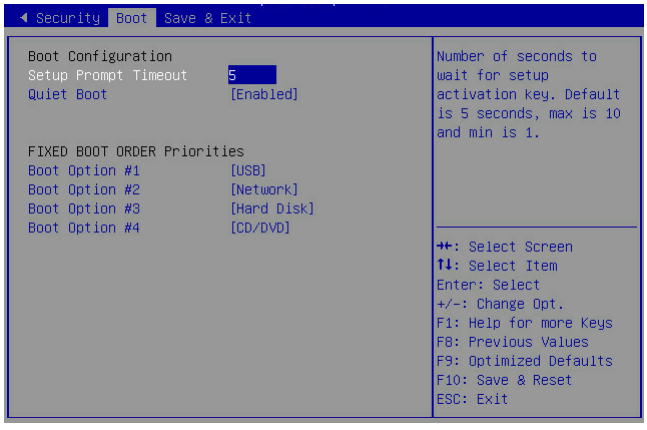


Figure 3-7. Boot Options Screen

Table 9: Boot Options Screen Description

SETUP ITEM	OPTIONS	HELP TEXT	COMMENTS
Setup Prompt Timeout	[5]	Number of seconds to wait for setup activation key. Default is 5 seconds, max is 10 and min is 1.	
Quiet Boot	[Disabled] [**Enabled**]	Enables or disables Quiet Boot option	
Boot Option #1	[<Device String 1>] [<Device String 2>] … [Disabled]	Sets the system boot order	
Boot Option #2	[<Device String 1>] [<Device String 2>] … [Disabled]	Sets the system boot order	
Boot Option #3	[<Device String 1>] [<Device String 2>] … [Disabled]	Sets the system boot order	
Boot Option #4	[<Device String 1>] [<Device String 2>] … [Disabled]	Sets the system boot order	

Exit Screen

The Exit screen allows the user to choose to save or discard the configuration changes made on the other screens. It also provides a method to restore the server to the factory defaults or to save or restore a set of user defined default values. If Restore Defaults is selected, the default settings, noted in bold in the tables in this chapter, will be applied. If

Restore User Default Values is selected, the system is restored to the default values that the user saved earlier, instead of being restored to the factory defaults.

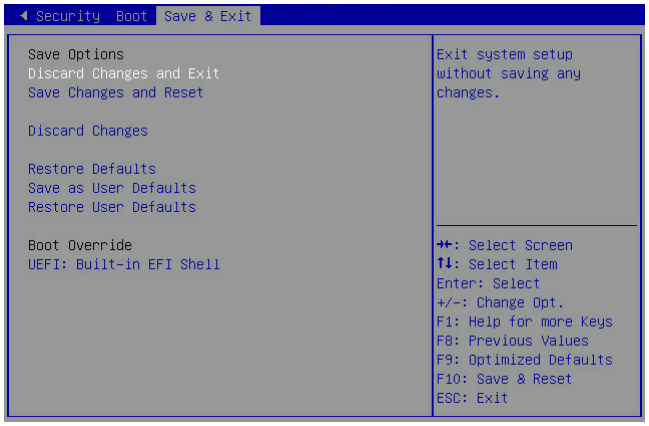


Figure 3-8. Exit Screen

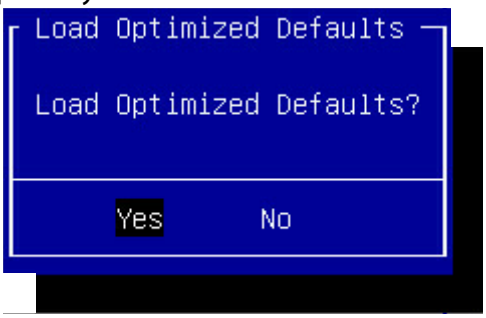
Table 10: Exit Screen Description

SETUP ITEM	OPTIONS	HELP TEXT	COMMENTS
Discard Changes and Exit		Exit system setup without saving any changes.	
Save Changes and Reset		Reset the system after saving the changes.	
Discard Changes		Discards changes done so far to any of the setup options.	
Restore Defaults		Restore/Load Default values for all the setup options.	
Save as User Defaults		Save the changes done so far as User Defaults.	
Restore User Defaults		Restore the User Defaults to all the setup options.	
[<Device String 1>]			Boot with Device <Device String 1>.
[<Device String 2>]			Boot with Device <Device String 2>.
[<Device String 3>]			Boot with Device <Device String 3>.
[<Device String 4>]			Boot with Device <Device String 4>.
[<Device String 5>]			Boot with Device <Device String 5>.
[<Device String 6>]			Boot with Device <Device String 6>.

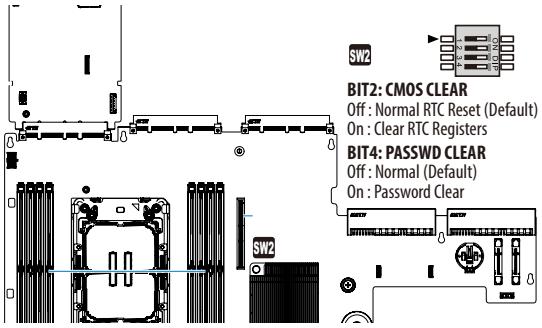
Loading BIOS Defaults

Different mechanisms exist for resetting the system configuration to the default values. When a request to reset the system configuration is detected, the BIOS loads the default system configuration values during the next POST. The request to reset the system to the defaults can be sent in the following ways:

- A request to reset the system configuration can be generated by pressing <**F9**> from within the BIOS Setup utility



- Load BIOS defaults by jumper as follows:
  a. Power down the system.
  b. Adjust CMOS CLEAR DIP from Off to On for a few seconds.



  c. Move CMOS CLEAR DIP back to off.
  d. Power on the system.
  e. Check BIOS defaults are loaded.

Note:

Complementary Metal-Oxide-Semiconductor (CMOS) is a technology for constructing integrated circuits. CMOS technology is used in microprocessors, microcontrollers, static RAM, and other digital logic ciruits. CMOS Clear Jumper would provide “Clear the current setting stored in the NVRAM and restore BIOS setting to Factory Default.”

3.2 BIOS Update Utility

The flash ROM contains system initialization routines, the BIOS Setup Utility, and runtime support routines. The exact layout is subject to change, as determined by BIOS. The flash ROM also contains initialization code in compressed form for onboard peripherals, like SCSI, NIC and video controllers. The complete ROM is visible, starting at physical address 4 GB minus the size of the flash ROM device.

A 16-KB parameter block in the flash ROM is dedicated to storing configuration data that controls the system configuration (ESCD). Application software must use standard APIs to access these areas; application software cannot access the data directly.

BIOS Update Utility

Server platforms support UEFI Shell and Linux-based firmware update utilities. This utility loads a fresh copy of the BIOS into the flash ROM.

The BIOS update may affect the following items:

- The system BIOS setup utility and strings
- Onboard video BIOS and other option ROMS for the devices embedded on the server board
- Memory reference code
- Microcode updates
- ME Firmware

ME Region Update

Update utility also provide ME region update function, please refer to the README.txt that each official release BIOS attached.

Note:

There's another Server Platform Services firmware running in Management Engine (ME) microcontroller present in the Intel® chipset. And this ME firmware placed in the region which included in the BIOS BIN file for Intel® platform only. We provide two script file which could update BIOS and update ME region separately.

BIOS Setting Utility

Use AMISCE to import/export BIOS setting in OS:

1. Export BIOS setting and generate script file:

   ./SCELNX_64 /o /s NVRAM.txt

2. Import BIOS setting with script file:

./SCELNX_64 /i /s NVRAM.txt /cpwd soib9.admin

Note:

After importing the BIOS settings, it would need to do system full reset (DC cycle) to let the new BIOS settings enabled.

Note:

AMI Setup Control Environment (AMISCE) is a command line tool which provides an easy way to update NVRAM variables, extract variables directly from the BIOS, change settings using either a text editor or a setup program and update the BIOS. AMISCE produces a script file that lists all setup questions on the system being modified by AMISCE. The user can then modify the script fle and use it as input to change the current NVRAM setup variables. See ami.com for more information.

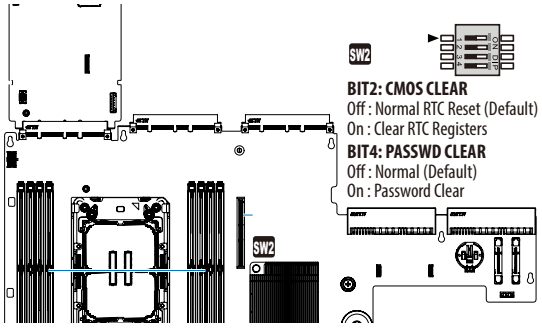
BIOS Revision

The BIOS revision is used to identify the BIOS image and BIOS phase.

Clear CMOS

The following steps will load the BIOS defaults by jumper:

1. Power down the system.
2. Locate the switch SW2 on the mainboard.
3. Adjust CMOS CLEAR DIP from Off to On for a few seconds.

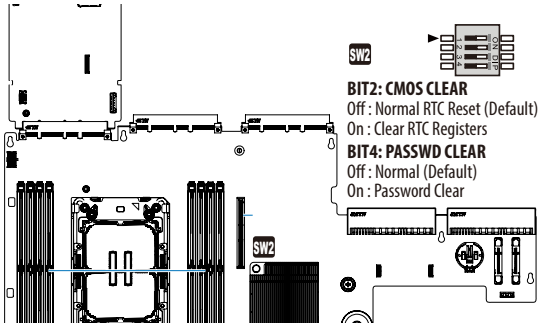


4. Move CMOS CLEAR DIP back to off.
5. Power on the system.
6. Check BIOS defaults are loaded.

Clear Password

To clear password by jumper, use the following steps:

1. Power down the system.
2. Locate the switch SW2 on the mainboard.
3. Adjust the PASSWD CLEAR DIP from off to on.



4. Power on the system.
5. Check password is cleared.
6. Power down the system.
7. Adjust the PASSWD CLEAR DIP from off to on.
8. Power on the system.
9. Set new password.

Note:

Complementary Metal-Oxide-Semiconductor (CMOS) is a technology for constructing integrated circuits. CMOS technology is used in microprocessors, microcontrollers, static RAM, and other digital logic ciruits. CMOS Clear Jumper would provide “Clear the current setting stored in the NVRAM and restore BIOS setting to Factory Default.”

Firmware Update Instructions

Note:

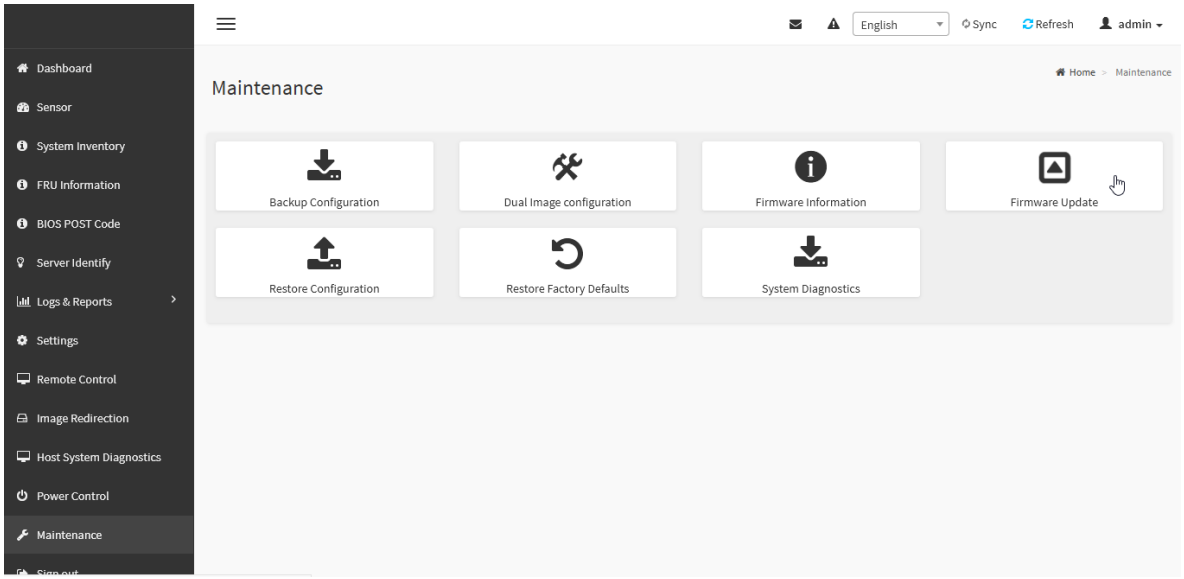
In-band means user performs FW update on the system which has installed UEFI/ Linux operating system. Using the in-band update, the firmware package is readable in the platform system interface so that the user can execute update script to perform firmware update.

Note:

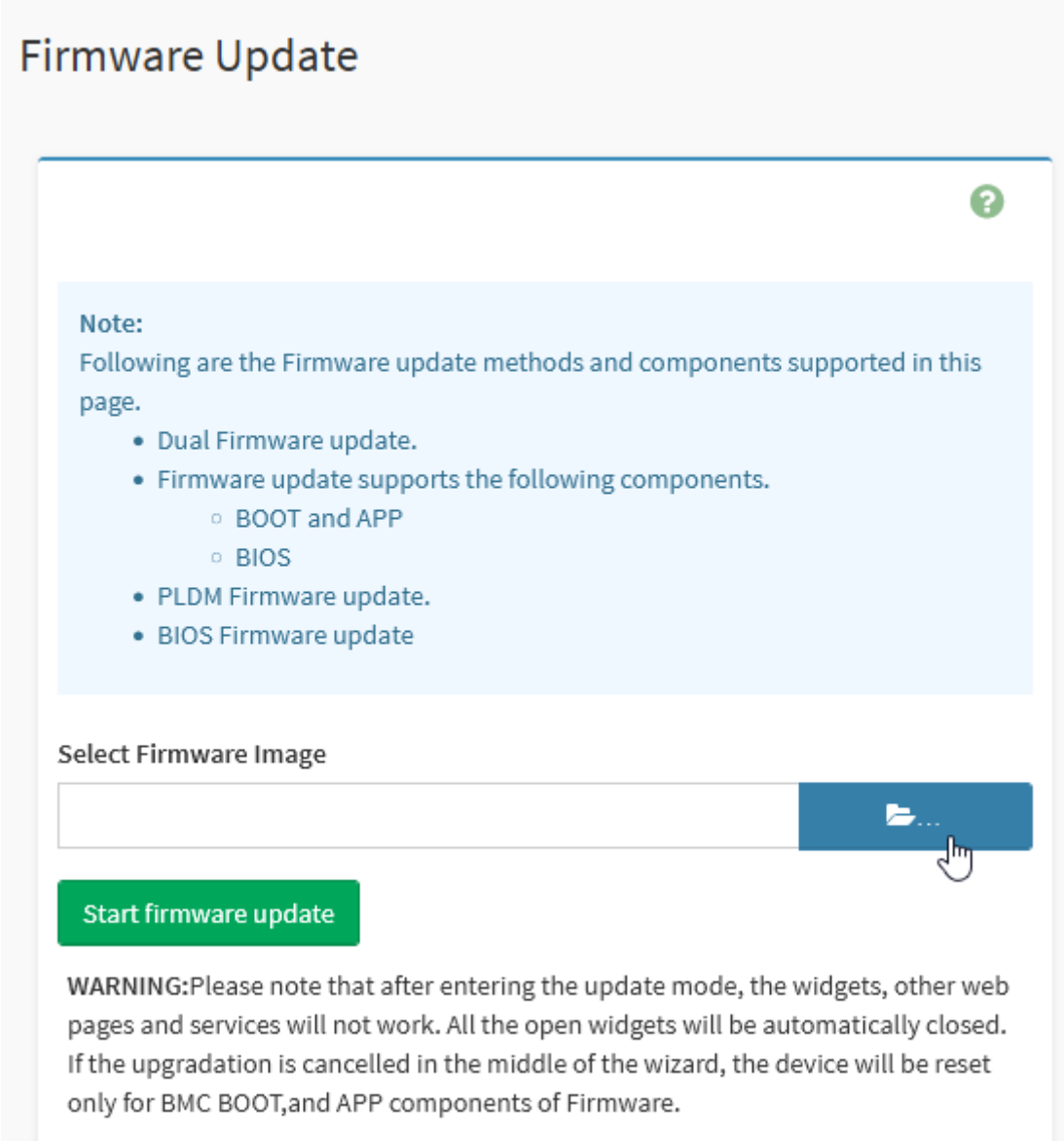
Out-of-band (OOB) means the FW update is perform remotely, User execute the FW update which the FW image and command will be delivered to BMC through network interface. BMC receive the command and image to perform firmware update.

Out-of-band (Offline) update (via BMC WebUI)

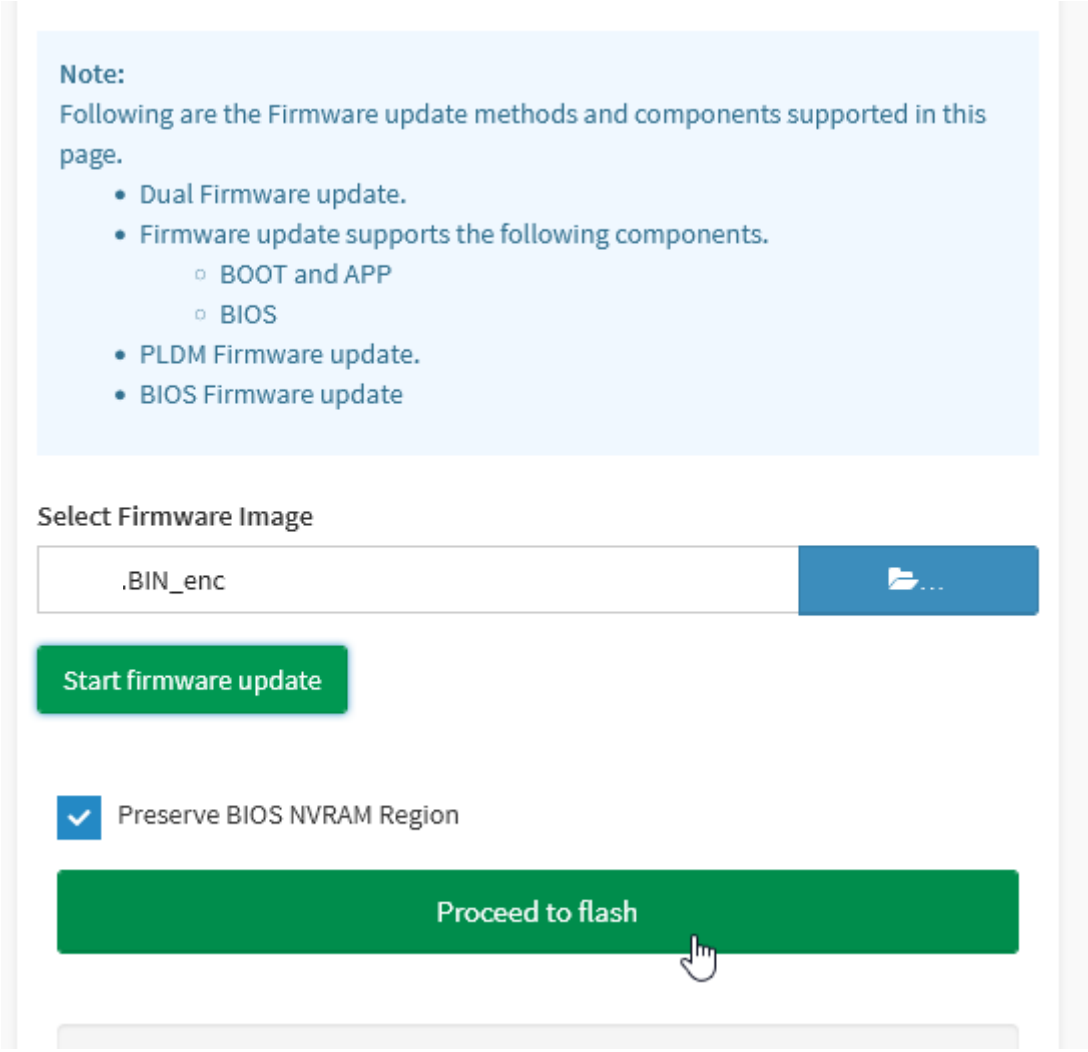
- Make sure the Server is power off and keep AC power source connected.
- Connect one end of network cable to the Server BMC NIC port and another end to remote client or server.
- Login BMC WEBUI via http protocol, enter 192.168.0.120 in Edge/Safari/chrome/ firefox. (default: admin/cmb9.admin; 192.168.0.120 or check wit your administrator for accessing)
- Select "**Maintenance**" > "**Firmware Update**" option



- Click select file button and Browse BIOS XXX.BIN_ENC file to upload and Click "**Start firmware update"**.



- Check Preserve BIOS NVRAM Region if you would like to preserve the BIOS configuration when updating BIOS firmware to preserve BIOS configuration and click "**Proceed to flash**".



- After a period of time, you will find BIOS firmware upgrade complete with 100% done

Out-of-band (Offline) update (via YAFUFLASH tool)

Note:

Please download the latest Yafuflash tool from qct.io or contact with your QCT sales representative for more information.

- Make sure the Server is power off and keep AC power source connected.
- Connect one end of network cable to the Server BMC NIC port and another end to remote client or server.
- Unzip the release packages to a folder in the remote client or server
- Remotely update the BIOS firmware through BMC IP Address (Default static IP address = 192.168.0.120).

In Linux environment:

- Launch Terminal, change directory to the folder with release package located.
- Enter command "./ubios_ip.sh <User name> <Password> <BMC IP> XXX.bin_enc"

Out-of-band (Offline) update (via Redfish RESTful API)

Note:

Please download the Redfish RESTful API BMC_Redfish_Common_API_RTP13.4_v17.1 from qct.io or contact with your QCT sales representative for more information.

About redfish update BIOS, the related API are defined in "BMC_Redfish_Common_API_RTP13.4_v17.1."

The ImageType in OemParamters can be one of the following values: "***BMC***", "***HPM***","***BIOS***","***PFR***", "***PLDM***".

The Targets in Parameters should be an array whose element is FirmwareInventory URI or an empty array. Refer Table UpdateService – Actions – MultipartHttpPush UpdateParameters Properties.

```
POST https://{{ip}}/redfish/v1/UpdateService/upload
Content-Type: multipart/form-data; boundary=--------493918603359346570222237
```

Example POST Request Body:

```
--------493918603359346570222237
Content-Disposition: form-data; name="UpdateFile"; filename="encrypted_rom.ima_enc"
Content-Type: application/octet-stream

<image_binary>
--------493918603359346570222237
Content-Disposition: form-data; name="UpdateParameters"; filename="parameters.json"
Content-Type: application/json

{
  "Targets":[
    "/redfish/v1/UpdateService/FirmwareInventory/BMC "
  ]
}
--------493918603359346570222237
Content-Disposition: form-data; name="OemParameters"; filename="oem_parameters.json"
Content-Type: application/json

{
  "ImageType":"BMC"
}
--------493918603359346570222237--
```

Example command as below:

- curl -k -u **admin:cmb9.admin** -H 'Expect:' -F'
- UpdateParameters={"Targets":["/redfish/v1/UpdateService/FirmwareInventory/BIOS"]};type=application/json' -F '
- OemParameters={"ImageType":"BIOS"};type=application/json' -F

- UpdateFile=**@/root/xxx.bin_enc** https:/**192.168.0.120**/redfish/v1/UpdateService/upload

Note:

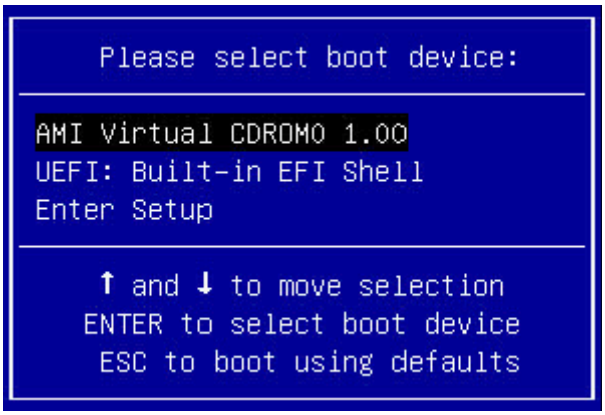
replace **bold text** to meet actual information for server and local image path

In-band update (via AFUFLASH tool)

For EFI-Shell environment

Follow the steps shown as below to update BIOS FW:

- Unzip the release package to the USB Flash Drive.
- Power on the system and press hotkey <**F11**> and select to boot into Built-in EFI Shell.



- Move to the USB file system for example **FS0:** and **CD** the BIOS release package folder.
- Execute nsh file "**BIOS_efi64.nsh**" to update BIOS.
- Execute nsh file "**ME_efi64.nsh**" to update ME FW.
- After the firmware update finished, perform a DC cycle, the new BIOS/ME FW runs.
- Then, please enter setup, press <F9> to load default and save before any test run.
- After the update finished, perform a DC cycle, the new BIOS/ME FW runs.
- Then, please enter setup, press <F9> to load default and save before any test run.

For x64 Linux environment

Follow the steps shown as below to update both BIOS and ME FW:

- Power on the system and boot into Linux OS.
- Unzip the release package to the same folder in the HDD.
- Open Terminal in the release package folder, or change to the folder with release package located.

- Execute batch file "**BIOS_lnx64.sh**" to update BIOS.
- Execute batch file "**ME_lnx64.sh**" to update ME FW.
- After the update finished, perform a DC cycle, the new BIOS/ME FW runs.
- Then, please enter setup, press <F9> to load default and save before any test run.

3.3 Server Management

The BIOS supports many standard-based server management features and several proprietary features. The Intelligent Platform Management Interface (IPMI) is an industry standard and defines standardized, abstracted interfaces to platform management hardware. The BIOS implements many proprietary features that are allowed by the IPMI specification, but these features are outside the scope of the IPMI specification. This section describes the implementation of the standard and proprietary features.

Console Redirection

The BIOS supports redirection of both video and keyboard via a serial link (serial port). When console redirection is enabled, the local, or host server, keyboard input and video output are passed both to the local keyboard and video connections, and to the remote console through the serial link. Keyboard inputs from both sources are considered valid and video is displayed to both outputs.

As an option, the system can be operated without a host keyboard or monitor attached to the system and run entirely via the remote console. Utilities that can be executed remotely include BIOS Setup.

Serial Configuration Settings

The BIOS does not require that the splash logo be turned off for console redirection to function. The BIOS supports multiple consoles, some of which are in graphics mode and some in text mode. The graphics consoles can display the logo and the text consoles receive the redirected text.

Keystroke Mapping

During console redirection, the remote terminal sends keystrokes to the local server. The remote terminal can be a dumb terminal with a direct connection and running a communication program. The keystroke mapping follows VT-UTF8 format with the following extensions.

Table 3.1: Keystroke Mappings

KEY	ANSI ESCAPE SEQUENCE	WINDOWS PLATFORM DESIGN NOTE
F1	<ESC>OP	<ESC>1
F2	<ESC>OQ	<ESC>2
F3	<ESC>OR	<ESC>3
F4	<ESC>OS	<ESC>4
F5		<ESC>5
F6		<ESC>6
F7		<ESC>7

Table 3.1: Keystroke Mappings (Continued)

KEY	ANSI ESCAPE SEQUENCE	WINDOWS PLATFORM DESIGN NOTE
F8		<ESC>8
F9		<ESC>9
F10		<ESC>0
F11		<ESC>!
F12		<ESC>@
Home	<ESC>[H	<ESC>h
End	<ESC>[K	<ESC>k
Ins		<ESC>+
Del		<ESC>-
Page Up		<ESC>?
Page Down		<ESC>/
Reset		<ESC>R<ESC>r<ESC>R

Standalone <Esc> Key for Headless Operation

The Microsoft Headless Design Guidelines describes a specific implementation for the <**Esc**> key as a single standalone keystroke:

To complete an escape sequence, the timeout must be two seconds for entering additional characters following an escape.

- <**Esc**> followed by a two-second pause must be interpreted as a single escape.
- <**Esc**> followed within two seconds by one or more characters that do not form a sequence described in this specification must be interpreted as <**Esc**> plus the character or characters, not as an escape sequence.

The escape sequence in the following table is an input sequence. This means it is sent to the BIOS from the remote terminal.

Limitations

- BIOS Console redirection terminates after an operating system has being loaded. The operating system is responsible for continuing console redirection after that.
- BIOS console redirection is a text console. Graphical data, such as a logo, are not redirected.

Interface to Server Management (Optional)

If the BIOS determines that console redirection is enabled, it will read the current baud rate and pass this value to the appropriate management controller via the Intelligent Platform Management Bus (IPMB).

Network BIOS Support

PXE Boot

The PXE implementation on this platform is compliant with UEFI Specification 2.5, Section 21 Network Protocols - SNP, PXE and BIS. To utilize this, the user must load EFI Simple Network Protocol driver and the UNDI driver specific for the network interface card being used. The UNDI driver should be included with the network interface card. The Simple Network Protocol driver can be obtained from https://developer.intel.com/technology/framework.

The BIOS supports legacy PXE option ROMs in legacy mode and includes the necessary PXE ROMs in the BIOS image for the onboard controllers. The legacy PXE ROM is required to boot a non-EFI operating system over the network.

HTTP Boot

The HTTP Boot implementation on this platform is compliant with UEFI Specification 2.5, Section 23.7 HTTP Boot. To utilize this, the user must select the right LAN device from BIOS setup menu because HTTP boot has different “Architectural Types” to distinguish from PXE. With this Architectural Types, this LAN device can send the right DHCP options to DHCP server then server will respond with DHCPOFFER that includes the boot file HTTP URI for the requested processor architecture. After resolving URI server name from DNS, the Network Boot Program (NBP) will be downloaded from HTTP server via IPV6 or IPV4 HTTP protocol.

HTTP boot addresses PXE issues: HTTPs addresses security, TCP reliability and HTTP load balancing. Moreover, unlike PXE only can get NBP from DHCP server, HTTP boot has the ability to get NBP from remote HTTP server as long as right URL.

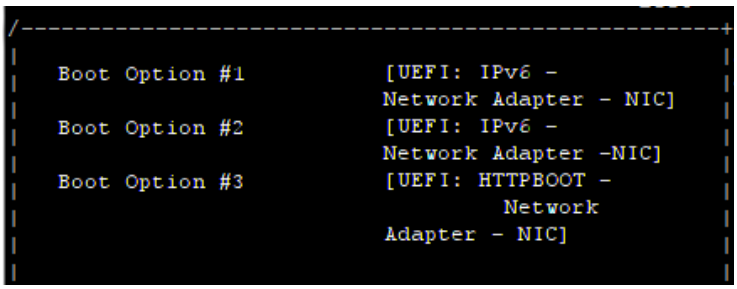


Figure 3-9. HTTP BOOT Device in BIOS Setup Menu

Checkpoints

A checkpoint is either a byte or word value output to Debug port. The BIOS outputs checkpoints throughout bootblock and Power-On Self Test (POST) to indicate the task the system is currently executing. Checkpoints are very useful in aiding software developers or technicians in debugging problems that occur during the pre-boot process.

Checkpoints can be defined as follow:

- Standard Checkpoint
- ACPI/ASL Checkpoint
- OEM-Reserved Checkpoint
- MRC POST Code Checkpoints

Standard Checkpoint

The Standard checkpoints are the largest set of checkpoints during the BIOS pre-boot process. The following tables describe the type of checkpoints that may occur during the POST portion of the BIOS:

Table 3.2: Checkpoint Range Description

STATUS CODE RANGE	DESCRIPTION
0x01 – 0x0B	SEC execution
0x0C – 0x0F	SEC errors
0x10 – 0x2F	PEI execution up to and including memory detection
0x30 – 0x4F	PEI execution after memory detection
0x50 – 0x5F	PEI errors
0x60 – 0x8F	DXE execution up to BDS
0x90 – 0xCF	BDS execution
0xD0 – 0xDF	DXE errors
0xE0 – 0xE8	S3 Resume (PEI)
0xE9 – 0xEF	S3 Resume errors (PEI)

SEC Phase

Table 3.3: SEC Phase

STATUS CODE	DESCRIPTION
0x00	Not used
Progress Codes	
0x01	Power on. Reset type detection (soft/hard).
0x02	AP initialization before microcode loading
0x03	North Bridge initialization before microcode loading
0x04	South Bridge initialization before microcode loading
0x05	OEM initialization before microcode loading
0x06	Microcode loading
0x07	AP initialization after microcode loading

Table 3.3: SEC Phase (Continued)

STATUS CODE	DESCRIPTION
0x08	North Bridge initialization after microcode loading
0x09	South Bridge initialization after microcode loading
0x0A	OEM initialization after microcode loading
0x0B	Cache initialization
SEC Error Codes	
0x0C – 0x0D	Reserved for future AMI SEC error codes
0x0E	Microcode not found
0x0F	Microcode not loaded

PEI Phase

Table 3.4: PEI Phase

STATUS CODE	DESCRIPTION
Progress Codes	
0x10	PEI Core is started
0x11	Pre-memory CPU initialization is started
0x12	Pre-memory CPU initialization (CPU module specific)
0x13	Pre-memory CPU initialization (CPU module specific)
0x14	Pre-memory CPU initialization (CPU module specific)
0x15	Pre-memory North Bridge initialization is started
0x16	Pre-Memory North Bridge initialization (North Bridge module specific)
0x17	Pre-Memory North Bridge initialization (North Bridge module specific)
0x18	Pre-Memory North Bridge initialization (North Bridge module specific)
0x19	Pre-memory South Bridge initialization is started
0x1A	Pre-memory South Bridge initialization (South Bridge module specific)
0x1B	Pre-memory South Bridge initialization (South Bridge module specific)
0x1C	Pre-memory South Bridge initialization (South Bridge module specific)
0x1D – 0x2A	OEM pre-memory initialization codes
0x2B	Memory initialization. Serial Presence Detect (SPD) data reading
0x2C	Memory initialization. Memory presence detection
0x2D	Memory initialization. Programming memory timing information
0x2E	Memory initialization. Configuring memory
0x2F	Memory initialization (other).
0x30	Reserved for ASL (see ASL Status Codes section below)
0x31	Memory Installed
0x32	CPU post-memory initialization is started

Table 3.4: PEI Phase (Continued)

STATUS CODE	DESCRIPTION
0x33	CPU post-memory initialization. Cache initialization
0x34	CPU post-memory initialization. Application Processor(s) (AP) initialization
0x35	CPU post-mem ory initialization. Boot Strap Processor (BSP) selection
0x36	CPU post-memory initialization. System Management Mode (SMM) initialization
0x37	Post-Memory North Bridge initialization is started
0x38	Post-Memory North Bridge initialization (North Bridge module specific)
0x39	Post-Memory North Bridge initialization (North Bridge module specific)
0x3A	Post-Memory North Bridge initialization (North Bridge module specific)
0x3B	Post-Memory South Bridge initialization is started
0x3C	Post-Memory South Bridge initialization (South Bridge module specific)
0x3D	Post-Memory South Bridge initialization (South Bridge module specific)
0x3E	Post-Memory South Bridge initialization (South Bridge module specific)
0x3F – 0x4E	OEM post memory initialization codes
0x4F	DXE IPL is started
PEI Error Codes	
0x50	Memory initialization error. Invalid memory type or incompatible memory speed
0x51	Memory initialization error. SPD reading has failed
0x52	Memory initialization error. Invalid memory size or qmemory modules do not match.
0x53	Memory initialization error. No usable memory detected
0x54	Unspecified memory initialization error.
0x55	Memory not installed
0x56	Invalid CPU type or Speed
0x57	CPU mismatch
0x58	CPU self test failed or possible CPU cache error
0x59	CPU micro-code is not found or micro-code update is failed
0x5A	Internal CPU error
0x5B	reset PPI is not available
0x5C	PEI phase BMC self-test failures
0x5D – 0x5F	Reserved for future AMI error codes
S3 Resume Progress Codes	
0xE0	S3 Resume is stared (S3 Resume PPI is called by the DXE IPL)
0xE1	S3 Boot Script execution
0xE2	Video repost
0xE3	OS S3 wake vector call
0xE4 – 0xE7	Reserved for future AMI progress codes
S3 Resume Error Codes	

Table 3.4: PEI Phase (Continued)

STATUS CODE	DESCRIPTION
0xE8	S3 Resume Failed
0xE9	S3 Resume PPI not Found
0xEA	S3 Resume Boot Script Error
0xEB	S3 OS Wake Error
0xEC-0xEF	Reserved for future AMI error codes

DXE Phase

Table 3.5: DXE Phase

STATUS CODE	DESCRIPTION
0x60	DXE Core is started
0x61	NVRAM initialization
0x62	Installation of the South Bridge Runtime Services
0x63	CPU DXE initialization is started
0x64	CPU DXE initialization (CPU module specific)
0x65	CPU DXE initialization (CPU module specific)
0x66	CPU DXE initialization (CPU module specific)
0x67	CPU DXE initialization (CPU module specific)
0x68	PCI host bridge initialization
0x69	North Bridge DXE initialization is started
0x6A	North Bridge DXE SMM initialization is started
0x6B	North Bridge DXE initialization (North Bridge module specific)
0x6C	North Bridge DXE initialization (North Bridge module specific)
0x6D	North Bridge DXE initialization (North Bridge module specific)
0x6E	North Bridge DXE initialization (North Bridge module specific)
0x6F	North Bridge DXE initialization (North Bridge module specific)
0x70	South Bridge DXE initialization is started
0x71	South Bridge DXE SMM initialization is started
0x72	South Bridge devices initialization
0x73	South Bridge DXE Initialization (South Bridge module specific)
0x74	South Bridge DXE Initialization (South Bridge module specific)
0x75	South Bridge DXE Initialization (South Bridge module specific)
0x76	South Bridge DXE Initialization (South Bridge module specific)
0x77	South Bridge DXE Initialization (South Bridge module specific)
0x78	ACPI module initialization
0x79	CSM initialization

Table 3.5: DXE Phase (Continued)

STATUS CODE	DESCRIPTION
0x7A – 0x7F	Reserved for future AMI DXE codes
0x80 – 0x8F	OEM DXE initialization codes
0x90	Boot Device Selection (BDS) phase is started
0x91	Driver connecting is started
0x92	PCI Bus initialization is started
0x93	PCI Bus Hot Plug Controller Initialization
0x94	PCI Bus Enumeration
0x95	PCI Bus Request Resources
0x96	PCI Bus Assign Resources
0x97	Console Output devices connect
0x98	Console input devices connect
0x99	Super IO Initialization
0x9A	USB initialization is started
0x9B	USB Reset
0x9C	USB Detect
0x9D	USB Enable
0x9E – 0x9F	Reserved for future AMI codes
0xA0	IDE initialization is started
0xA1	IDE Reset
0xA2	IDE Detect
0xA3	IDE Enable
0xA4	SCSI initialization is started
0xA5	SCSI Reset
0xA6	SCSI Detect
0xA7	SCSI Enable
0xA8	Setup Verifying Password
0xA9	Start of Setup
0xAA	Reserved for ASL (see ASL Status Codes section below)
0xAB	Setup Input Wait
0xAC	Reserved for ASL (see ASL Status Codes section below)
0xAD	Ready To Boot event
0xAE	Legacy Boot event
0xAF	Exit Boot Services event
0xB0	Runtime Set Virtual Address MAP Begin
0xB1	Runtime Set Virtual Address MAP End
0xB2	Legacy Option ROM Initialization

Table 3.5: DXE Phase (Continued)

STATUS CODE	DESCRIPTION
0xB3	System Reset
0xB4	USB hot plug
0xB5	PCI bus hot plug
0xB6	Clean-up of NVRAM
0xB7	Configuration Reset (reset of NVRAM settings)
0xB8 – 0xBF	Reserved for future AMI codes
0xC0 – 0xCF	OEM BDS initialization codes
DXE Error Codes	
0xD0	CPU initialization error
0xD1	North Bridge initialization error
0xD2	South Bridge initialization error
0xD3	Some of the Architectural Protocols are not available
0xD4	PCI resource allocation error. Out of Resources
0xD5	No Space for Legacy Option ROM
0xD6	No Console Output Devices are found
0xD7	No Console Input Devices are found
0xD8	Invalid password
0xD9	Error loading Boot Option (LoadImage returned error)
0xDA	Boot Option is failed (StartImage returned error)
0xDB	Flash update is failed
0xDC	Reset protocol is not available
0xDD	DXE phase BMC self-test failure

ACPI/ASL Checkpoints

Table 3.6: ACPI/ASL Checkpoints

STATUS CODE	DESCRIPTION
0x01	System is entering S1 sleep state
0x02	System is entering S2 sleep state
0x03	System is entering S3 sleep state
0x04	System is entering S4sleep state
0x05	System is entering S5 sleep state
0x10	System is waking up from the S1 sleep state
0x20	System is waking up from the S2 sleep state
0x30	System is waking up from the S3 sleep state
0x40	System is waking up from the S4 sleep state

Table 3.6: ACPI/ASL Checkpoints (Continued)

STATUS CODE	DESCRIPTION
0xAC	System has transitioned into ACPI mode. Interrupt controller is in PIC mode.
0xAA	System has transitioned into ACPI mode. Interrupt controller is in APIC mode.

Extra Checkpoint Ranges

Table 4: Extra Checkpoint Ranges

STATUS CODE	DESCRIPTION
0x05	SEC initialization before microcode loading
0x0A	SEC initialization after microcode loading
0x1D – 0x2A	Pre-memory initialization codes
0x3F – 0x4E	PEI post memory initialization codes
0x80 – 0x8F	DXE initialization codes
0xC0 – 0xCF	BDS initialization codes

BMC

Chapter 4

This section provides information and key features of BMC (Baseboard Management Controller).

4.1 Server Management Software

Server System Overview

In a server system, BMC is an independent system of the host server system. This independent system has its own processor and memory; the host system can be managed by the BMC system even if the host hardware or OS hangs or is unable to function.

BMC Key Features and Functions

- Support IPMI v1.5 and v2.0.
- Support SNMP v3.
- Support alerts such as SNMP traps (V1/V3) in the Platform Event Trap (PET) format.
- Out-of-band monitoring and control for server management over LAN.
- Share NIC for remote management via network.
- The FRU information report includes mainboard part number, product name and manufacturer, etc.
- Health status/Hardware monitoring report.
- Events log, view, and clear.
- Event notification via lighting chassis LED indicator and Platform Event Trap (by SNMP trap) or Mail (by Simple Mail Transfer Protocol).
- Platform Event Filtering (PEF) to take selected actions for selected events.
- Chassis management includes power control and status report, front panel buttons and LEDs control.
- Watchdog and auto server restart and recovery.
- Support multi-session users, and alert destination for LAN channel.
- Support IPMB connecter that advanced server management card can communicate with BMC.

Power System

BMC controls system power through GPIO pins and IPMI chassis commands.

Front Panel User Interface

The BMC provides control panel interface functionality including indicators (Power/Status and Location LEDs) and buttons (Power/Location).

Power Button

The Power button allows to control the system status.

Location Button

The control panel Chassis Identify button toggles the state of the Chassis Location LED. If the Location LED is off, then a button press will turn the LED on (blinking). If the LED is on, a button press or IPMI Chassis Identify command will turn the LED off.

LEDs

The following table contains information on Power, Status, Location and Heartbeat LED's.

Table 4.1: Power LED, Status LED, Location LED, and Heartbeat LED

LEDS	COLOR	STATUS	DESCRIPTION
Power LED	Blue	On	DC On
		Off	DC Off
Status LED	Amber	Blinking	Critical Event & FW update
		Off	Normal & Warning Event
Location LED	Blue	Blinking	Identify the system with interval
		Off	Normal
Heartbeat LED	Green	On/Off	BMC is not Ready
		Blinking	BMC is Ready

LAN Interface

BMC LAN interface in AST2600 is assigned to its Shared NIC LAN and a dedicated NIC (Default) in the system. IPMI Specification v2.0 defines how IPMI messages, encapsulated in RMCP/RMCP+ packet format, can be sent to and from the BMC. This capability allows a remote console application to access the BMC and perform the following operations:

- Get system sensor status
- Get and Set system boot options
- Get Field Replaceable Unit (FRU) information
- Get System Event Log (SEL) entries
- Get Sensor Data Records (SDR)
- Set Platform Event Filtering (PEF)
- Set LAN configurations

Session and User

This BMC supports ten (10) user accounts. Each can have a different user name, password and privilege level. All 10 accounts can login simultaneously. The available user privilege levels are User, Operator, Administrator and No Access.

RMCP+

Besides RMCP defined by DMTF, AST2600 also supports RMCP+ protocol defined in IPMI 2.0.

- Authentication Algorithm types supported:
  RAKP-none, RAKP-HMAC-SHA1, RAKP-HMAC-MD5, RAKP-HMAC-SHA256.
- Integrity Algorithm types supported:
  none, HMAC-SHA1-96, HMAC-MD5-128, MD5-128, HMAC-SHA256-128.
- Confidentiality Algorithm types supported:
  none, AES-CBC-128.

Session Support

BMC supports 20 sessions for RMCP/RMCP+.

- Issue IPMI command through RMCP will establish RMCP sessions.
- Issue IPMI command through RMCP+ will establish RMCP+ sessions.
- Activate Serial over LAN will establish one RMCP+ session, BMC only supports one SOL session at one time.

Vritaul LAN

BMC supports VLAN feature. BMC accepts the packets from LAN channel if they have 802.1q fields and their VLAN ID matched with the VLAN ID given in the LAN configuration Parameters command. The valid VLAN IDs are 2 ~ 4094.

NMI

The system supports NMI assertion, there are possible NMI assertion sources, Chassis Control command and Watchdog timer pre-interrupt. It is not available at BIOS POST period.

Serial Over LAN

BMC supports 1 IPMI (Spec v2.0) specific SOL session. BMC supports redirect data from UART interface, the data from UART will be packed and then transfer to the NIC interface.

DHCP

In addition to support static IP, the BMC support DHCP, DNS and dynamic update in DNS (DDNS). When DHCP lease fails, BMC will use 192.168.0.120 as the default IP.

Time Sync

In BMC design, BMC has a local RTC and PCH to know what time it is. Each time when server power on, BMC will issue command to PCH to get RTC and then set BMC time. If PCH is alive, the PCH time will store in local RTC and the system will sync PCH time. If the PCH can't work, the system will use the local RTC time. BMC will sync with host RTC every one hour even if the time gap is quite small (less than 1sec).

SEL

BMC supports IPMI 1.5/2.0 standard SEL operation. It can keep to maximum 1136 entries SEL log. Event happened in BIOS side will be logged by using Add SEL Entry command. BMC will store them in flash, the time stamp field will be filled by BMC. When SEL full, the new SEL won't be logged but will go through PEF still. If AC power off, all SEL will be remained in NV

PSU Redundancy Mode

Table 4.2: PSU Redundancy Mode

CASE	PSU COMBINATION	PSU OPERATION
1	PSU0 WITH AC + PSU1 WITH AC (SAME POWER SOURCE)	(1) NORMAL (DEFAULT) (2) COLD REDUNDANCY
2	PSU0 WITH DC+ PSU1 WITH DC (SAME POWER SOURCE)	(1) NORMAL (DEFAULT) (2) COLD REDUNDANCY

Platform Event

Platform Event Filter

The BMC implements selectable action on an event or LAN alerting base on event. By default, no any PEF entries or actions exist, applications need to configure it to enable.

- The number of Platform Event Filter Table is 40.
- The number of Alert Policy Table and Alert Destination Table is 60.
- The policy to match an event to Platform Event Filter Table entry is IPMI 1.5 standard.
- The action support Alert, Power off, Power Reset, Power Cycle and Extra-defined.
- All Platform Event Filter Table is default disabled.

- PEF Startup Delay and Last Processed Event tracking is not supported.
- PEF table lookup isn't correlated to log SEL to SEL Repository.
- Serial Alerting is not supported.
- Support IPMI Platform Event Trap Specification.

Firmware Update

The BMC will allow users to upgrade firmware image on following entities:

- BIOS
- BMC
- All other upgradable entities

The update capability is provided by local and remote interfaces.

WebUI Update

Remote update can be performed through the remote Web console. (default DHCP\static IP address=192.168.0.120)

Windows/Linux Update

Local update can be performed through the Yafuflash utility

4.2 BMC Firmware Update

This section provides guidelines on BMC firmware update process in Linux and Windows systems.

Note:

In-band means user performs firmware update on the system which has installed Windows/Linux operating system. Using the in-band update, the firmware package is readable in the platform system interface so that the user can execute update script to perform firmware update.

Note:

Out-of-band (OOB) means the firmware update is performed remotely. User execute the firmware update which the firmware image and command will be delivered to BMC through network interface. BMC receive the command and image to perform firmware update.

In-band and Out-of-band are two different ways to update BMC firmware.

Please be aware that the way to update BMC firmware through In-band YAFUFLASH tool or other YAFUFLASH and BMC WebUI through out-of-band ways can all support for preserving BMC configurations.

Out-of-band (Offline) update (via YAFUFLASH tool)

- Get the BMC firmware package named xxx.zip.
- Unzip package xxx.zip to \tmp\xxx in Linux (or C:\xxx for Windows operating system) and change directory into folder xxx.
- Setup environment: User needs to setup the environment under Linux Operating System (Windows Operating System does not require to setup the environment):

In Linux:

- run "./linux_oob.sh <BMC IP> <Password>" (default BMC static IP address = 192.168.0.120)

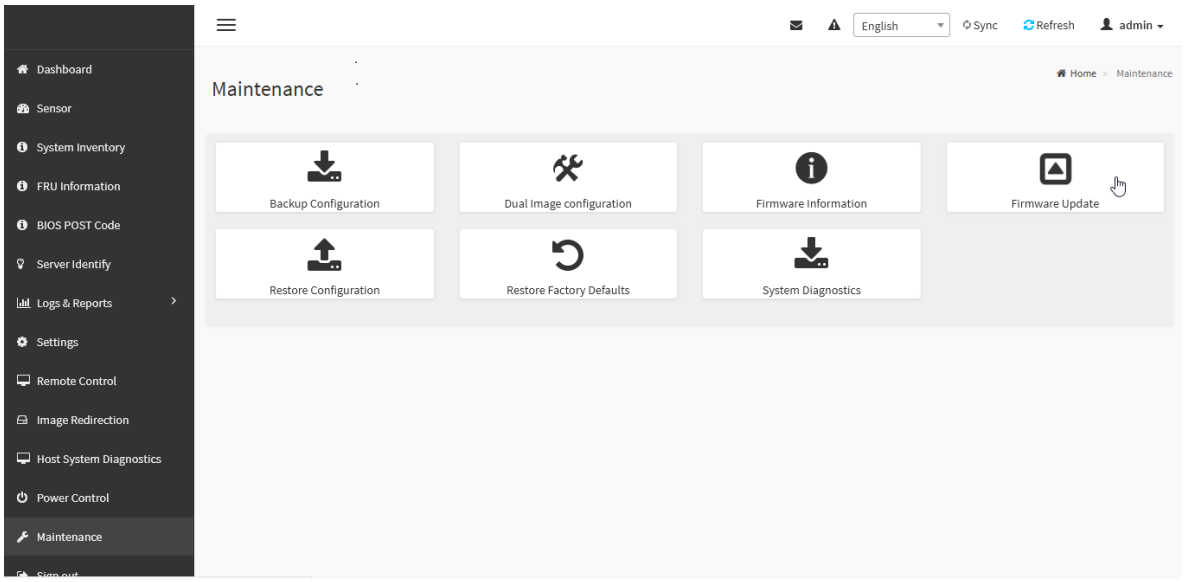
In Windows:

- Launch a cmd.exe console and change directory into the folder of C:\xxx.
- run "win_oob.bat <BMC IP> <Password>" (default BMC static IP address = 192.168.0.120)

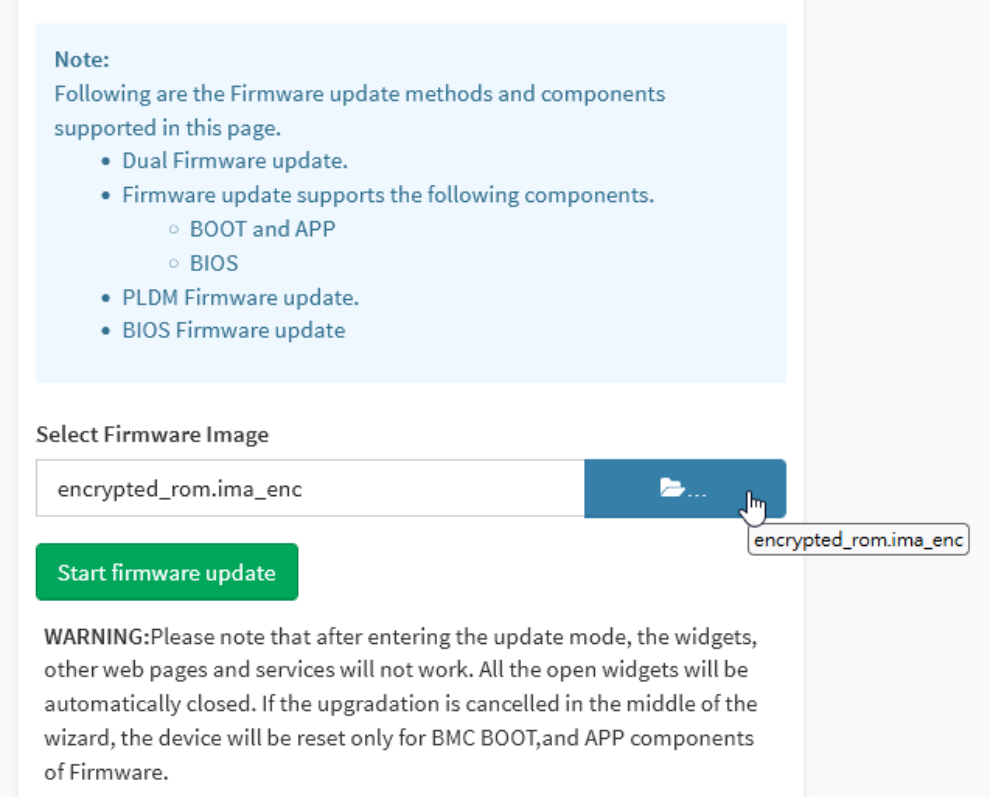
Out-of-band (Offline) update (via BMC WebUI)

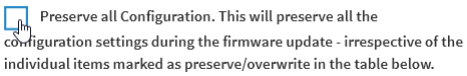
- Unzip the BMC firmware package to USB flash drive and rename the folder name to xxx (xxx that mean BMC version).

- Login BMC WEBUI via http protocol, enter 192.168.0.120 in safari/chrome/firefox. (default: admin/cmb9.admin; 192.168.0.120 or check with your administrator for accessing)
- Select "**Maintenance**" > "**Firmware Update**" item to enter BMC update mode.

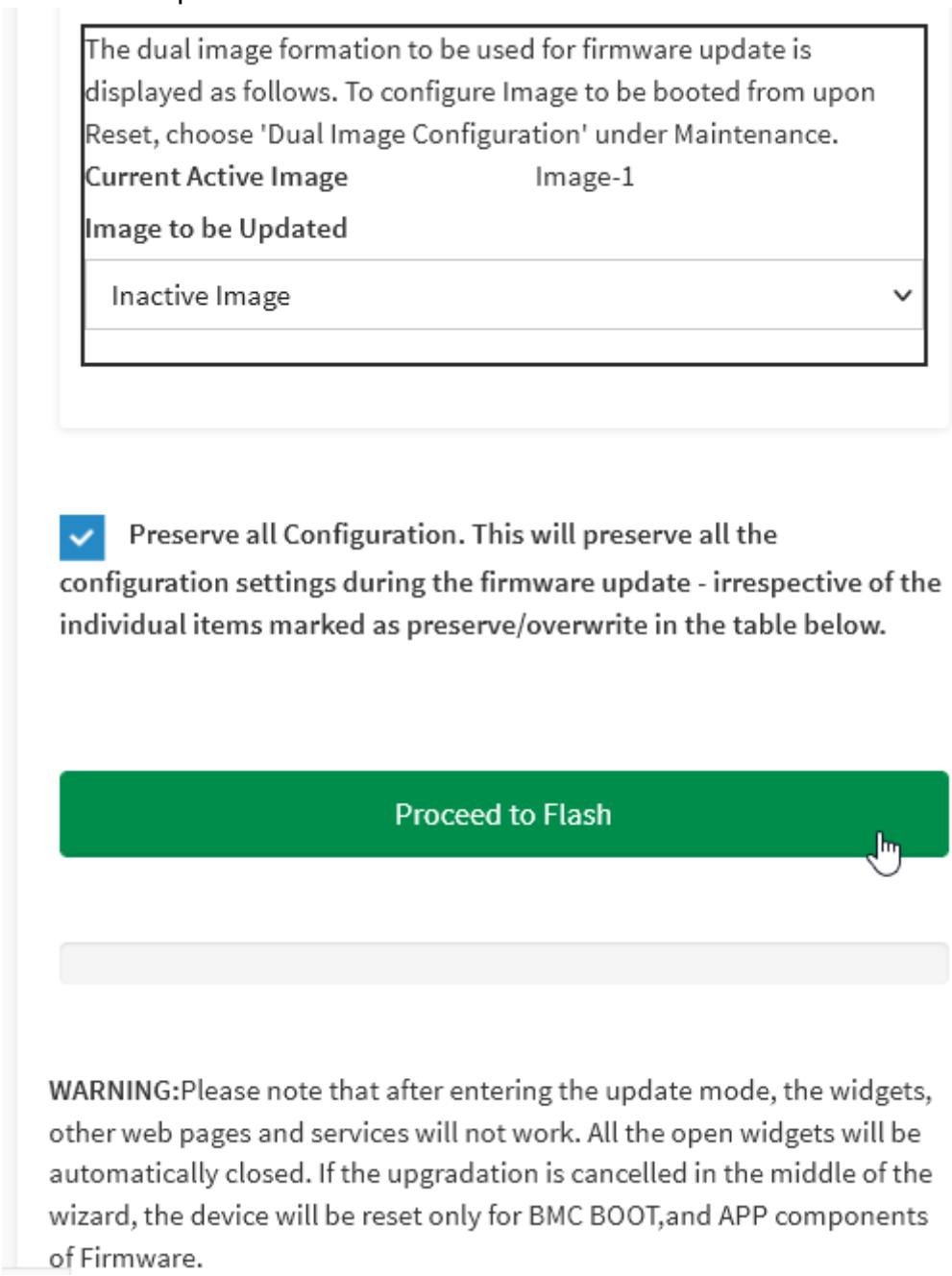


- Click select file to browse the BMC firmware. Please take ROM.ima_enc file that there is "ima_enc" postfix at the end of file string to update BMC frimware. Click "**Start firmware update"** to upload.



- Check 

if you would like to preserve all the BMC configuration when updating BMC firmware. And click "**Proceed to flash"** to process the firmware update.



In-band update (via YAFUFLASH tool)

- Get the BMC firmware package named xxx.zip.
- Unzip package xxx.zip to \tmp\xxx in Linux (or C:\xxx for Windows operating system) and change directory into folder xxx.
- Setup environment: User need to setup the environment under Linux Operating System (Windows Operating System does not require to setup the environment):

In Linux:

- run "./linux.sh <Password>"

In Windows:

- Launch a cmd.exe console and change directory into the folder of C:\xxx.
- run "win.bat <Password>"

4.3 Web Graphical User Interface (GUI)

Using the Web GUI

The BMC firmware features an embedded web server enabling users to connect to the BMC using a Web browser (e.g. Microsoft Internet Explorer). The Web GUI shows system information, system events, system status of managed servers, and other system-related information.

The Web-based GUI is supported on the following browsers:

- Google Chrome
- Mozilla Firefox
- Microsoft Edge
- Apple Safari

Login

Enter the IP address or URL (default DHCP\static IP address=192.168.0.120) into the address bar of the web browser.

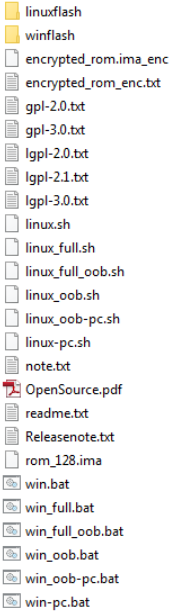


Figure 4-1. Files list in the compressed BMC firmware

When connecting to the BMC the Login screen prompts for the username and password. Please check the IPMI access account for WEBGUI and IPMITOOL information from the file “ReleaseNote.txt” packed in the BMC firmware compressed file. This authentication with

SSL protection prevents unauthorized intruders from gaining access to the BMC web server.

```
login account:
     a) IPMI access account for WEBGUI and IPMITOOL.
     username: admin
     password: cmb9.admin
```

Figure 4-2. Finding Username and Password from Releasenote.txt

When a user is authenticated they can manage the server according to the privilege of their role.

The Administrator and Operator privilege levels are authorized to login to the web interface. The User and No Access privilege levels do not allow access through the BMC web GUI.

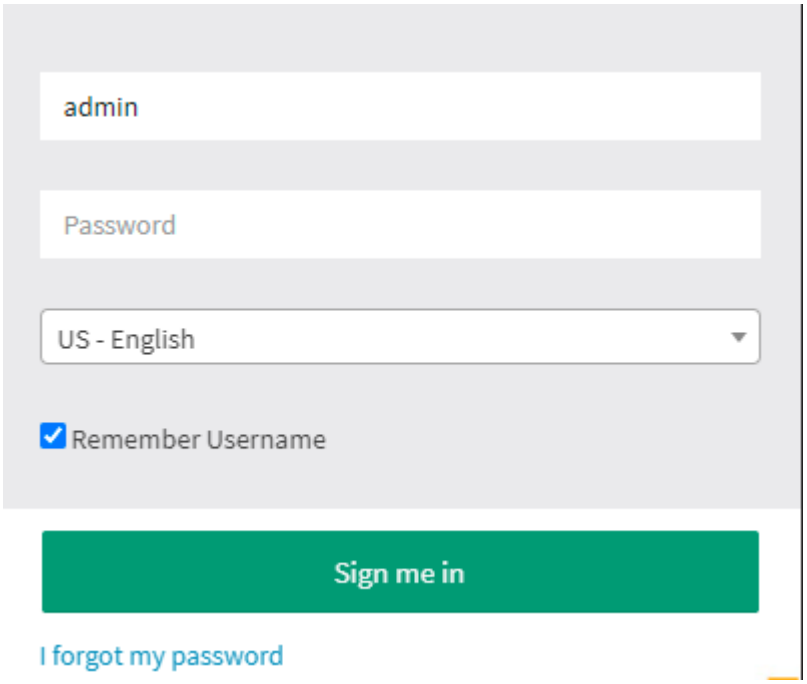


Figure 4-3. Login Web Page

I forgot my password: If you forget your password, you can generate a new one using this link. Enter the username, click on Forgot Password link. This will send the newly generated password to the configured Email-ID for your account.

Table 5: Default Username and Password

FIELD	DEFAULT
Username	admin
Password	cmb9.admin

After passing authentication, the following web page appears.

Note:
The default username and password are in lowercase characters. It is advised to change the admin password once you have logged in.

The BMC GUI consists of various menu items. **Menu Bar** located at left pane displays *Dashboard*, *Sensor*, *System Inventory*, *FRU Information*, *BIOS POST Code*, *Server Identify*, *Logs & Reports*, *Settings*, *Remote Control*, *Image Redirection*, *Host System Diagnostics*, *Power Control*, *Maintenance* and *Sign out*. **Quick Button** and **Logged-in User** are located at the upper right of the main web page.

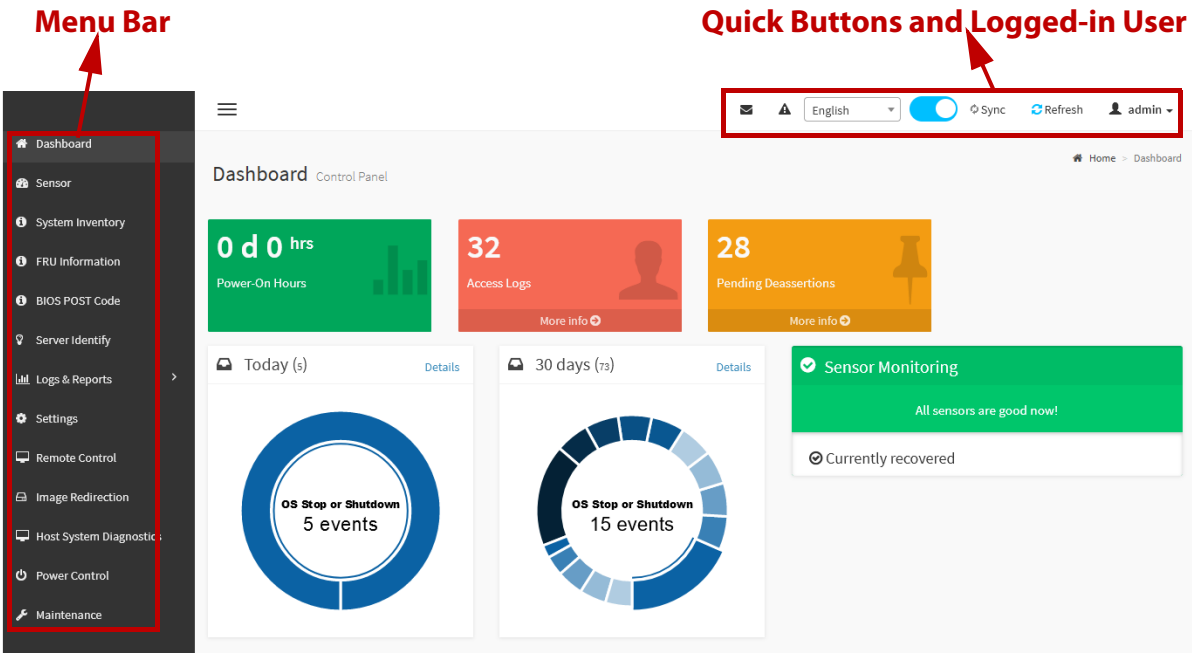


Figure 4-4. Main Web Page

Quick Button and Logged-in User

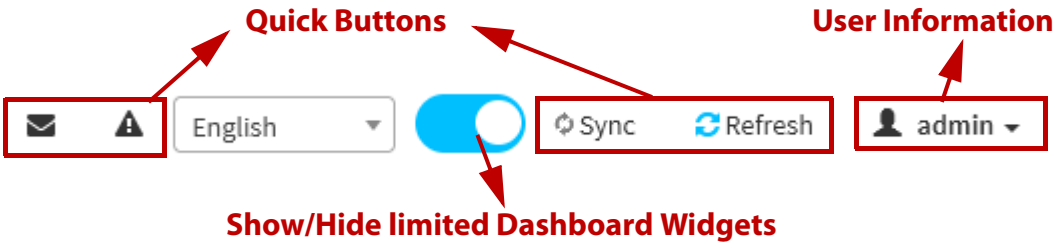


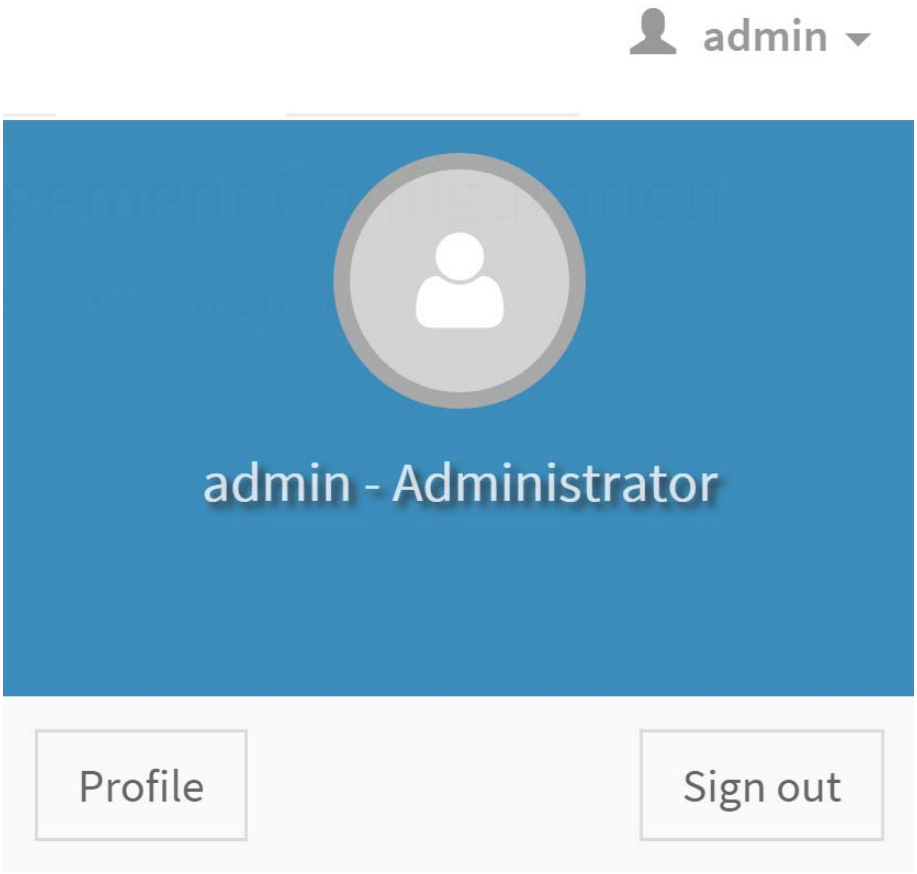
Figure 4-5. Quick Buttons and Logged-in User

User Information

The logged-in user information shows the logged-in user, his/her privilege and the four quick buttons allowing you to perform the following functions.

admin: Click the admin icon to view the User profile and Sign Out.

Signout: Click the Sign out icon to log out of the Web GUI.



Logged-in user and its privilege level

There are four kinds of privileges.

- **User:** Only valid commands are allowed.
- **Operator:** All BMC commands are allowed except for the configuration commands that can change the behavior of the out-of-hand interfaces.
- **Administrator:** All BMC commands are allowed.
- **No Access:** Login access denied.

Quick Buttons

Refresh: Click the Refresh icon to reload the current page.

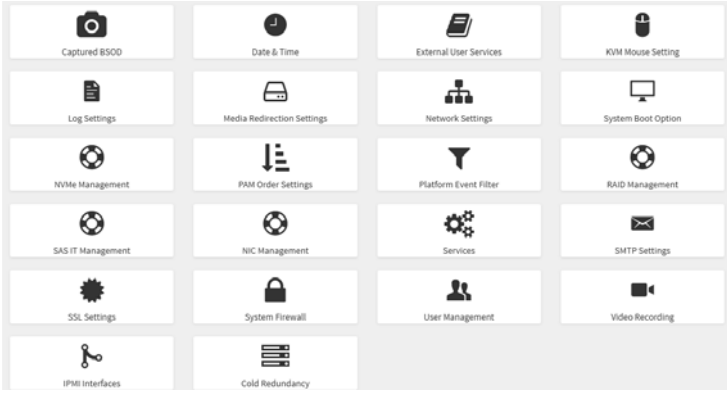
Sync: Click the Sync icon to synchronize with Latest Sensor and Event Log updates.

Warning: Click the icon to view any BMC notification messages.

Message: Click the icon to view any BMC messages.

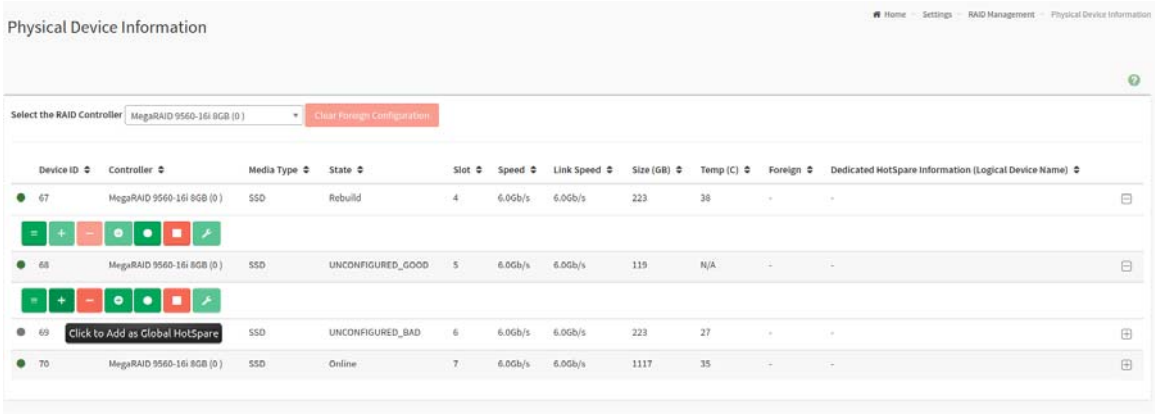
Click the **Help** icon on the the web pages for assistance.

Table 6: Main Web Page

MENU ITEM	DESCRIPTION
Dashboard	Displays the device, network, sensor monitoring and event logs information.
Sensor	The Sensor Readings page displays all the sensor related information.
System Inventory	This page displays the server's usage information in the network that includes details such as Vendor Name, Model, and Software Version.
FRU Information	FRU Information Page displays the BMC's FRU device information. FRU page shows information like Basic Information, Chassis Information, Board Information and Product Information of the FRU device.
BIOS POST Code	BIOS POST Code can display post code during BIOS post. It can display the current and previous code.
Server Identify	Light up the Location LED.
Logs & Reports	The Logs & Reports page displays the IPMI Event Log information.
Settings	This group of pages allows you to access various configuration settings. 
Remote Control	This page allows you to view and control your server.
Image Redirection	This page shows you the remote images available to BMC
Host System Diagnostics	This page shows you the information of autonomous crash dump in JSON format as logs that contains raw CPU register names and values from the failed system.
Power Control	This page allows you to view and control the power of your server.
Maintenance	This group of pages allows you to do maintenance tasks on the device. 
Sign out	Click to exit the Web GUI.

RAID Management

You can see the RAID settings while HBA or RAID card is installed in the internal riser and configured.



Note:

Command privilege level table defined in IPMI 2.0 Specification Appendix G – Command Assignments. According to IPMI 2.0 Specification, **Chassis Identify** command is allowed for Operator privilege. Because this command didn't change BMC configuration, just to trigger Identify LED used to display where Server is. So it is expected behavior. After checked other Operator privilege command by IPMI 2.0 Specification, **Chassis Control command** (Power On/Off) is also allowed. But in our code base, we raise **Chassis Control** command to be Administrator to protect system. So, in **Server Power Control** page, only Administrator can control server power.

Connectors

Chapter 5

This section provides guidance information for the position and configuration of connectors.

5.1 Connectors and Jumpers

Mainboard

Connectors

See the following figure for information on mainboard connectors.

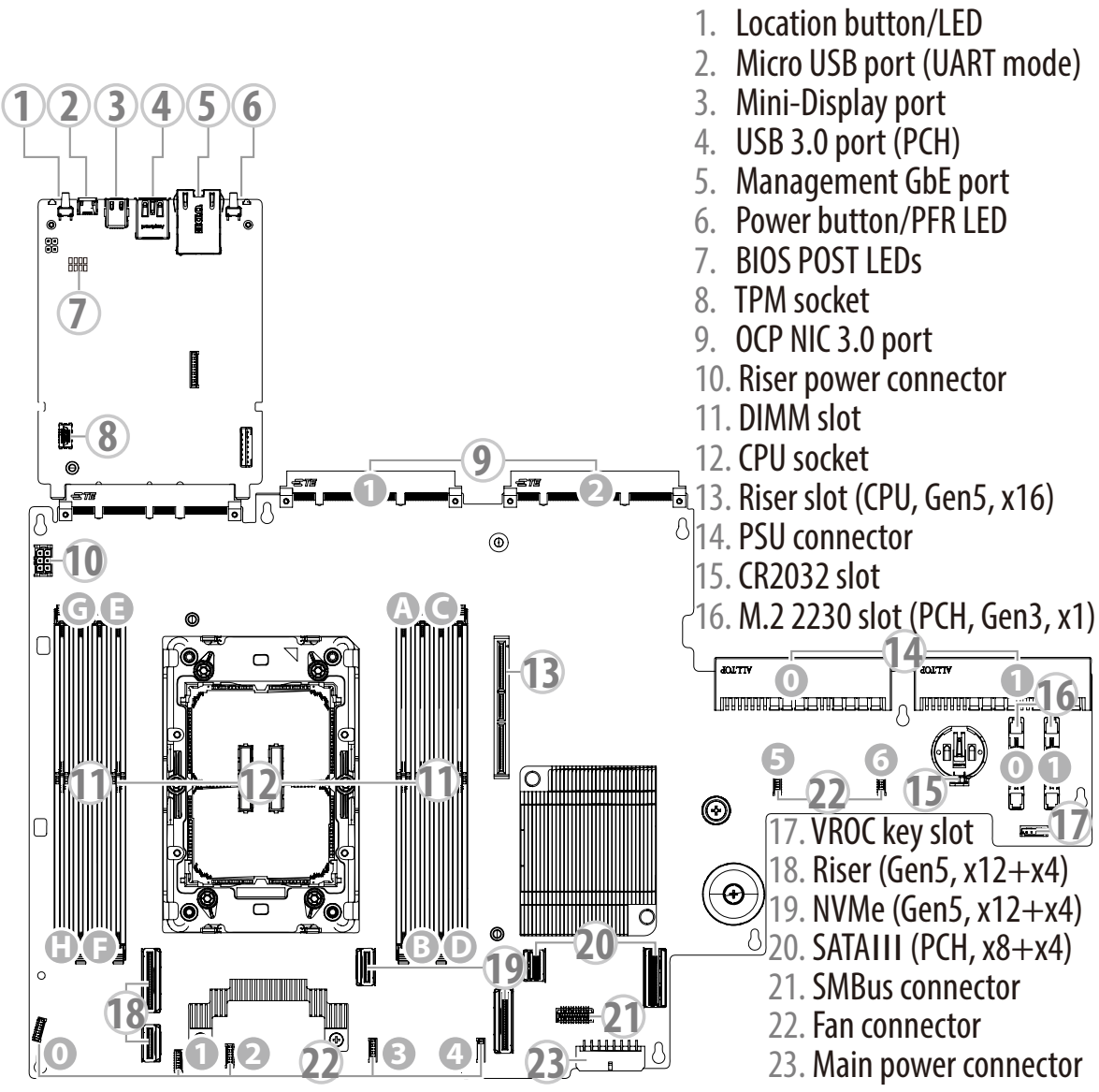


Figure 5-1. Mainboard Connectors

Jumpers

See the following figure for information on mainboard jumpers.

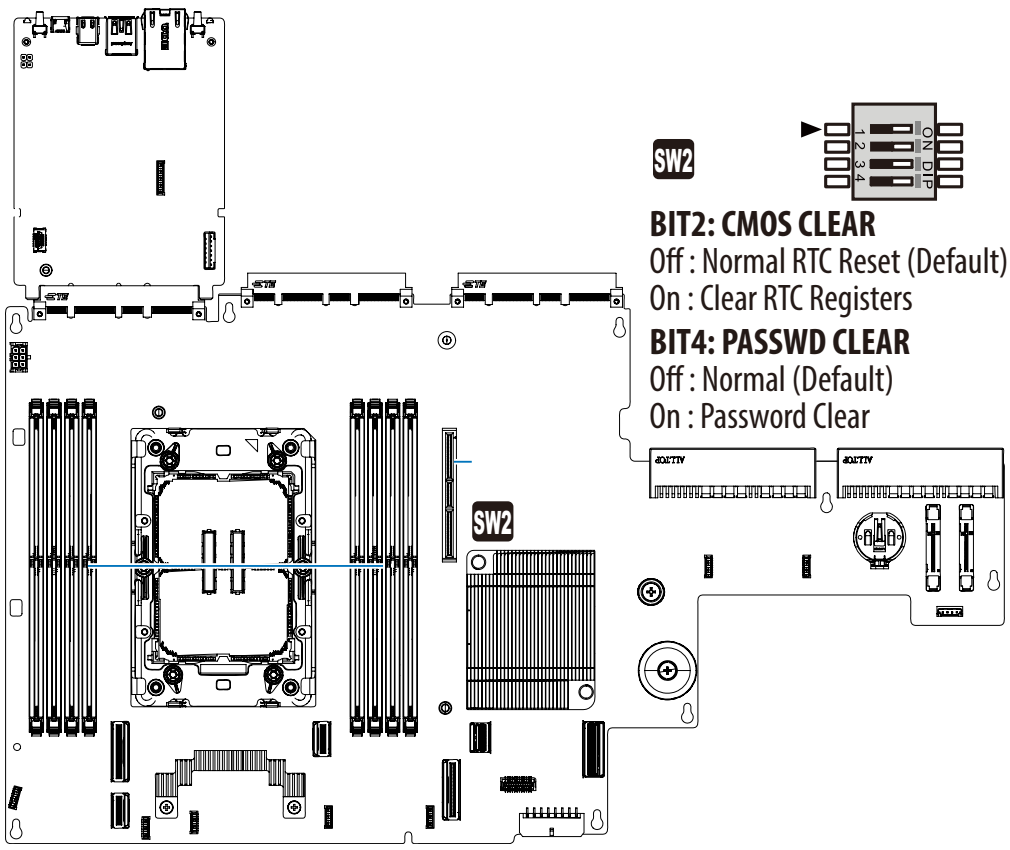


Figure 5-2. Mainboard Jumpers

Troubleshooting

Chapter 6

This section provides guidance information for the position and configuration of connectors.

6.1 Troubleshooting

This section provides information for the monitoring and identification of system faults.

Server Boot Issue Topics

System does not Boot after initial installation:

- Power Cord Not Plugged In
- Processor Issues
- Memory Issues
- Power Supply, Chassis and Fan Issues
- Cable Issues
- Electrical Short or Overload
- Defective Components

System does not boot after configuration changes:

- Hardware Changes
- Software Changes
- BIOS Changes
- Installation Problems
- Troubleshooting External Connections

System does not Boot after Initial Installation

Power Cord Not Plugged In

If the power supply cable is not plugged into the chassis power connector, the system cannot boot up, even though chassis front panel LEDs and the fan may be operational. Verify that the power connections are good.

Processor Issues

Boot failure situations are also caused by the following:

Incompatible processor - ensure the selected processor model is correct for your server board. If the processor is compatible, try removing and reinstalling the processor to ensure it is installed correctly.

Processor overheat-the system does not boot or shuts down shortly after booting.

- Ensure that the cooling fans are correctly installed and running.

- Ensure that the correct thermal interface material or the thermal grease is applied to the processor.
- Ensure that the power supply fan is running.
- Ensure that the air intakes for the fans are unobstructed.

Memory Issues

If you have installed incompatible memory modules, the system may not boot. Verify the memory you've installed has been tested with your board (Please refer to www.qct.io for details on valid memory). If the installed memory is compatible, remove and reinstall the memory modules. Defective memory modules may cause boot errors. To isolate a specific memory module as defective, boot the system with just one memory module installed at a time.

Power Supply, Chassis and Fan Issues

- Ensure that the chassis and power supply is appropriate for system requirement.
- Ensure all power cables and connectors are firmly connected to the power supply and the AC outlet.
- Check for foreign objects inside the chassis such as screws that can short circuit connections.
  - To isolate a specific PSU as defective, boot the system with just one PSU installed at a time.
  - Check fan speed in WEBUI & event log to find out if there are any defective fans. If failure happens, please contact your dealer for assistance.

Cable Issues

Ensure that all cable connections, both internal and external, are attached correctly and securely.

Electrical Short or Overload

Remove non-essential items such as extra controller cards or HDD devices to check for shorts and overloads.

If the system boots correctly, there may be a short or overload associated with one of the components.

Replace each of non-essential items one at a time to isolate which one is causing the problem.

If the problem occurs even after removing the non-essential components, the problem has to be with the server board, power supply, memory, or processor.

Defective Components

Defective components, especially processor and memory, can cause system boot issues.

- Swap the memory modules with known good memory. Verify correct operation of the suspected memory in a known working system.
- Swap the processor with a known good processor. Verify correct operation of the suspected processor in a known working system.

System does not boot after Configuration Changes

Hardware Changes

If the system does not boot after making changes to hardware or adding new components, verify that the component installed is compatible with the server.

Software Changes

If you recently installed new software or new device drivers:

> Try booting into Safe Mode and uninstall the new software or driver. If you can now boot normally, there may be a compatibility issue between the new software or driver and some component in your system. Contact the software manufacturer for assistance

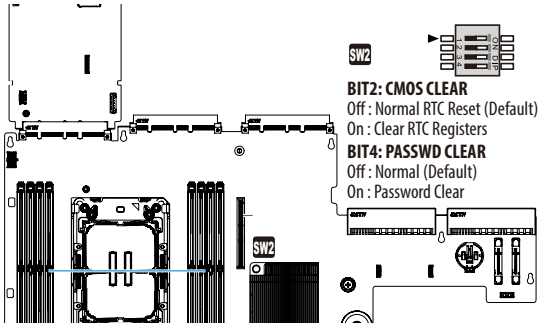
BIOS Changes

Changes to some advanced BIOS settings can cause boot issues. Changes to Advanced BIOS settings should only be made by experienced users.

If the BIOS Setup Utility is accessible by pressing F2 during boot, reset the BIOS to factory defaults by pressing F9. Save and exit the BIOS Setup

If you cannot access the BIOS Setup Utility, clear the CMOS by performing the following steps:

1. Power down the server. Do not unplug the power cord.
2. Open the server chassis
3. Adjust CMOS clear DIP from Off to On for a few seconds.



4. Move CMOS clear DIP back to off.
5. Close the server chassis and power up the server.
6. Power on the system.
7. Check BIOS defaults are loaded.

The CMOS is now cleared and can be reset by going into BIOS setup.

Please refer to http://www.qct.io for the BIOS update.

Installation Problems

Perform the following checks if you are troubleshooting an installation problem:

Check all cable and power connections (including all rack cable connections). Unplug the power cord, and wait one minute. Then reconnect the power cord and try again. If the network is reporting an error, see if the server has enough memory and disk space available. Remove all added options, one at a time, and try to power up the system. If after removing an option the server works, you may find that it is a problem with the option or a configuration problem between the option and the server. Contact the option vendor for assistance.

> If the system doesn't power on, check the LED display. If the power LED is not on, you may not be receiving AC power. Check the AC power cord to make sure that it is securely connected.

Troubleshooting External Connections

Loose or improperly connected cables are the most likely source of problems for the system, monitor, and other peripherals (such as a keyboard, mouse, or other external device). Ensure that all external cables are securely attached to the external connectors on your system.

Regulatory and Compliance Information

Chapter 7

This section provides regulatory and compliance information applicable to this system.

System Safety Information

To reduce the risk of bodily injury, electrical shock, fire, and equipment damage, read this document and observe all warnings and precautions in this guide before installing or maintaining your system product.

In the event of a conflict between the information in this document and information provided with the product or on the website for a particular product, the product documentation takes precedence.

Your system should be integrated and serviced only by technically qualified persons.

You must adhere to the guidelines in this guide and the assembly instructions in your equipment manuals to ensure and maintain compliance with existing product certifications and approvals. Use only the described, regulated components specified in this guide. Use of other products / components will void the UL Listing and other regulatory approvals of the product, and may result in noncompliance with product regulations in the region(s) in which the product is sold.

Safety Warnings and Cautions

To avoid personal injury or property damage, before you begin installing the product, read, observe, and adhere to all of the following safety instructions and information. The following safety symbols may be used throughout the documentation and may be marked on the product and / or the product packaging.

CAUTION	Indicates the presence of a hazard that may cause minor personal injury or property damage if the CAUTION is ignored.
WARNING	Indicates the presence of a hazard that may result in serious personal injury if the WARNING is ignored.
	Indicates potential hazard if indicated information is ignored.
	Indicates shock hazards that result in serious injury or death if safety instructions are not followed.
	Indicates hot components or surfaces.
	Indicates do not touch fan blades, may result in injury.
	Indicates to unplug all AC power cord(s) to disconnect AC power.
	Please recycle battery.
	The rail racks are designed to carry only the weight of the equipment. Do not use rail-mounted equipment as a workspace. Do not place additional load onto any rail-mounted equipment.
	Indicates four or more people are required to safely handle the system.
	This equipment is not suitable for use in locations where children are likely to be present.

Intended Application Uses

This product was evaluated as Information Technology Equipment (ITE), which may be installed in server rooms, computer rooms, and similar commercial type locations. The suitability of this product for other product categories and environments (such as medical, industrial, residential, alarm systems, and test equipment), other than an ITE application, may require further evaluation.

Site Selection

The system is designed to operate in a typical office environment. Choose a site that is:

- Clean, dry, and free of airborne particles (other than normal room dust).
- Well-ventilated and away from sources of heat including direct sunlight and radiators.
- Away from sources of vibration or physical shock.
- Isolated from strong electromagnetic fields produced by electrical devices.
- In regions that are susceptible to electrical storms, we recommend you plug your system into a surge suppressor and disconnect telecommunication lines to your modem during an electrical storm.
- Provided with a properly grounded wall outlet.
- Provided with sufficient space to access the power supply cord(s), because they serve as the product's main power disconnect.
- Provided with either two independent AC power sources or two independent phases from a single source.

Equipment Handling Practices

Reduce the risk of personal injury or equipment damage:

- Conform to local occupational health and safety requirements when moving and lifting equipment.
- Use mechanical assistance or other suitable assistance when moving and lifting equipment.
- To reduce the weight for easier handling, remove any easily detachable components.

Power and Electrical Warnings

Caution: The power button, indicated by the stand-by power marking, DOES NOT completely turn off the system AC power, 5V standby power is active whenever the system is plugged in. To remove power from system, you must unplug the AC power cord from the wall outlet. Your system may use more than one AC power cord. Make sure all AC power cords are unplugged. Make sure the AC power cord(s) is / are unplugged before you open the chassis, or add or remove any non hot-plug components.

Do not attempt to modify or use an AC power cord if it is not the exact type required. A separate AC cord is required for each system power supply.

Some power supplies in equipment use Neutral Pole Fusing. To avoid risk of shock use caution when working with power supplies those use Neutral Pole Fusing.

The power supply in this product contains no user-serviceable parts. Do not open the power supply. Hazardous voltage, current and energy levels are present inside the power supply. Return to manufacturer for servicing.

When replacing a hot-plug power supply, unplug the power cord to the power supply being replaced before removing it from the equipment.

To avoid risk of electric shock, turn off the equipment and disconnect the power cord, telecommunications systems, networks, and modems attached to the equipment before opening it.

Power Cord Warnings

If an AC power cord was not provided with your product, purchase one that is approved for use in your country.

Only use certified AC power cord to connect to both the power distribution unit (PDU) and equipment installed in your rack.

Caution: To avoid electrical shock or fire, check the power cord(s) that will be used with the product as follows:

- *Do not attempt to modify or use the AC power cord(s) if they are not the exact type required to fit into the grounded electrical outlets.*
- *The power cord(s) must meet the following criteria:*
  - *The power cord must have an electrical rating that is greater than that of the electrical current rating marked on the product.*
  - *The power cord must have safety ground pin or contact that is suitable for the electrical outlet.*
  - *The power supply cord(s) is / are the main disconnect device to AC power. The socket outlet(s) must be near the equipment and readily accessible for disconnection.*
  - *The power supply cord(s) must be plugged into socket-outlet(s) that is /are provided with a suitable earth ground.*

System Access Warnings

Caution: To avoid personal injury or property damage, the following safety instructions apply whenever accessing the inside of the product:

- *Turn off all peripheral devices connected to this product.*
- *Turn off the system by pressing the power button to off.*
- *Disconnect the AC power by unplugging all AC power cords from the system or wall outlet.*
- *Disconnect all cables and telecommunication lines that are connected to the system.*
- *Retain all screws or other fasteners when removing access cover(s). Upon completion of accessing inside the product, refasten access cover with original screws or fasteners.*
- *Do not access the inside of the power supply. There are no serviceable parts in the power supply. Return to manufacturer for servicing.*
- *Power down the equipment and disconnect all power cords before adding or replacing any non hot-plug component.*
- *When replacing a hot-plug power supply, unplug the power cord to the power supply being replaced before removing the power supply from the equipment.*

Caution: If the equipment has been running, any installed processor(s) and heat sink(s) may be hot.

Unless you are adding or removing a hot-plug component, allow the system to cool before opening the covers. To avoid the possibility of coming into contact with hot component(s) during a hot-plug installation, be careful when removing or installing the hot-plug component(s).

Caution: To avoid injury do not contact moving fan blades. If your system is supplied with a guard over the fan, do not operate the system without the fan guard in place.

Slide-rail Warnings for SRME

Caution: Stability hazard

"The rack may tip over causing serious personal injury"

Before extending the rack to the installation position, read the installation instructions.

Do not put any load on the slide-rail mounted equipment in the installation position.

Do not leave the slide-rail mounted equipment in the installation position.

Rack Mount Warnings

Note: The following installation guidelines are required by UL for maintaining safety compliance when installing your system into a rack.

The equipment rack must be anchored to an unmovable support to prevent it from tipping when a equipment or piece of equipment is extended from it. The equipment rack must be installed according to the rack manufacturer's instructions.

Install equipment in the rack from the bottom up, with the heaviest equipment at the bottom of the rack.

Extend only one piece of equipment from the rack at a time.

You are responsible for installing a main power disconnect for the entire rack unit. This main disconnect must be readily accessible, and it must be labeled as controlling power to the entire unit, not just to the equipment(s).

To avoid risk of potential electric shock, a proper safety ground must be implemented for the rack and each piece of equipment installed in it.

Elevated Operating Ambient - If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (Tma) specified by the manufacturer.

Reduced Air Flow - Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.

Mechanical Loading - Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.

Circuit Overloading - Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.

Reliable Earthing - Reliable earthing of rack-mounted equipment should be maintained.

Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips).

Electrostatic Discharge (ESD)

Caution: ESD can damage drives, boards, and other parts. We recommend that you perform all procedures at an ESD workstation. If one is not available, provide some ESD protection by wearing an antistatic wrist strap attached to chassis ground -- any unpainted metal surface -- on your equipment when handling parts.

Always handle boards carefully. They can be extremely sensitive to ESD. Hold boards only by their edges. After removing a board from its protective wrapper or from the equipment, place the board

component side up on a grounded, static free surface. Use a conductive foam pad if available but not the board wrapper. Do not slide board over any surface.

Other Hazards

Battery Replacement

Caution: *There is the danger of explosion if the battery is incorrectly replaced. When replacing the battery, use only the battery recommended by the equipment manufacturer.*

Dispose of batteries according to local ordinances and regulations.

Do not attempt to recharge a battery.

Do not attempt to disassemble, puncture, or otherwise damage a battery.

- replacement of a BATTERY with an incorrect type that can defeat a SAFEGUARD (for example, in the case of some lithium BATTERY types);
- disposal of a BATTERY into fire or a hot oven, or mechanically crushing or cutting of a BATTERY, that can result in an EXPLOSION;
- leaving a BATTERY in an extremely high temperature surrounding environment that can result in an EXPLOSION or the leakage of flammable liquid or gas;
- a BATTERY subjected to extremely low air pressure that may result in an EXPLOSION or the leakage of flammable liquid or gas

Cooling and Airflow

Caution: Carefully route cables as directed to minimize airflow blockage and cooling problems. For proper cooling and airflow, operate the system only with the chassis covers installed. Operating the system without the covers in place can damage system parts. To install the covers:

- *Check first to make sure you have not leaved loose tools or parts inside the system.*
- *Check that cables, add-in cards, and other components are properly installed.*
- *Attach the covers to the chassis according to the product instructions.*

Laser Peripherals or Devices

Caution: *To avoid risk of radiation exposure and / or personal injury:*

- *Do not open the enclosure of any laser peripheral or device*
- *Laser peripherals or devices are not serviceable*
- *Return to manufacturer for servicing*

Use certified Optical Fiber Transceiver Class I Laser Product

Restricted Access Location:
The equipment is intended for installation only in a Server Room or Computer Room where both these condition apply:

- access can only be gained by SKILLED PERSONS or by INSTRUCTED PERSONS about the reasons for the restrictions applied to the location and about any precautions that shall be taken; and
- access is through the use of a TOOL or lock and key. or other means of security, and is controlled by the authority responsible for the location.

This equipment is designed for installation in restricted access locations and suitable for installation in Information Technology Rooms in accordance with Article 645 of the National Electrical Code and NFPA 75, not suitable for use in locations where children are likely to be present.

Cet équipement est conçu pour être installé dans des endroits à accès restreint et peut être installé dans des salles informatiques conformément à l'article 645 du Code national de l'électricité et à la norme NFPA 75, ne pouvant être utilisé dans des endroits où des enfants sont susceptibles d'être présents.

Connect to DC source

For DC input, this product is intended to be supplied by an UL certified earthed DC source. The earthed pin shall be connected to the earthed pin of DC source, if need further assistance, please contact Quanta for further information.

CAUTION：

Wiring methods used for the connection of the equipment to the DC mains supply are accordance with the National Electrical Code, ANSI/NFPA 70, and the Canadian Electrical Code, Part I, CSA C22.1.

CAUTION:

This equipment has a connection between the earthed conductor of the D.C. supply circuit and the earthing conductor. See installation instructions.

This equipment has a connection between the earthed conductor of the D.C. supply circuit and the earthing conductor. All of the following installation conditions must be met:

- This equipment shall be connected directly to the D.C. supply system earthing electrode conductor or to a bonding jumper from an earthing terminal bar or bus to which the D.C. supply system earthing electrode conductor is connected.
- This equipment shall be located in the same immediate area (such as adjacent cabinets) as any other equipment that has a connection between the earthed conductor of the same D.C. supply circuit and the earthing conductor, and also the point of earthing of the D.C. system. The D.C. system shall not be earthed elsewhere.
- The D.C. supply source shall be located within the same premises as this equipment.
- Switching or disconnecting devices shall not be in the earthed circuit conductor between the D.C. source and the point of the connection of the earthing electrode conductor.
- a circuit isolated from the MAINS is connected to the main PROTECTIVE EARTHING terminal through a PROTECTIVE BONDING CONDUCTOR

WARNING: The equipment has a separate protective earthing terminal on the chassis that must be permanently connected to earth ground to adequately ground the chassis and protect the operator from electrical hazards.

To connect earth ground to equipment:

1. Connect one end of the grounding cable to a proper earth ground.
2. Place the ground lug attached to the ground cable over the protective earthing terminal.
3. Secure the grounding lug to the protective earthing terminal with washers and screws
4. Dress the grounding cable and ensure that it does not touch or block access to other components.

WARNING: Before powering on the equipment, connect the earthing screw of the equipment to earth.
For earthing wire, green and yellow insulation is required and the cross-sectional area of the conductor must be more than 6 mm^2 or 8 AWG min.

Installation manual of field wiring for DC Power connected

Attention:

This equipment must be installed and removed by trained skilled person in a restricted-access location, as defined by the NEC and IEC 62368-1/IEC 60950-1, The Standard for Safety of Audio/video, information and communication technology equipment.

Safety statement

1. CAUTION:

To reduce the risk of electric shock or energy hazards:
It is the customer's responsibility to supply the necessary power cable.

- Use a circuit breaker that is rated at 20 amps.
- Use 1.5 mm^2 (14 AWG) single copper wire, or 1.5 mm^2 (14 AWG) Multi-core copper at 60° C min.
- Stripping the wire, leave the bare lead approximately 10mm for terminals connection.
- Torque the wiring-terminal screws to 0.5 Remove0 ~ 0.60 newton-meters (4.43 ~ 7 inch-pounds)

To Connected DC Power to Equipment:

1. Turn OFF all power sources and equipment that is to be attached to this product.
2. Connected protective earthing first, at least 14 AWG G/Y color PE conductor, diameter 4mm min., screw type PE terminal, and a Spring/Star washer provide satisfactory locking.
3. Attach signal cables to the product.
4. Attach power cords to the product.
   - For D.C. systems, ensure correct polarity of +-48V dc connections.
5. Attach signal cables to other devices.
6. Connect power cords to their sources.
7. Turn ON all the power sources.

To Disconnected DC Power to Equipment:

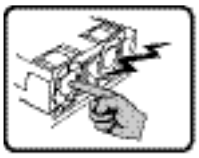
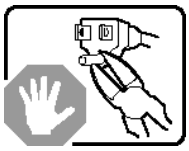
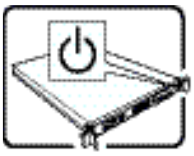
1. Turn OFF all power sources and equipment that is to be attached to this product.
   - Disconnect D.C. power sources at the breaker panel or by turning off the power source. Then, remove the D.C. cables.
2. Remove the signal cables from the connectors.
3. Remove all cables from the devices.

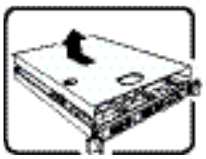
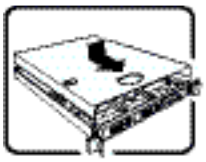
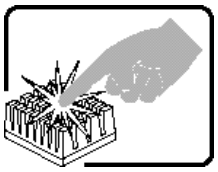
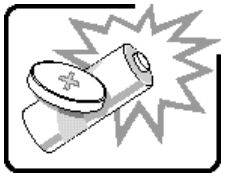
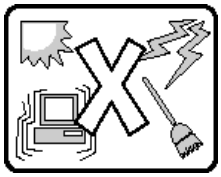
Caution, Shock hazard

Disconnect all power sources

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 to properly wired power sources 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 dc power sources, network connections, telecommunications systems, and serial cables before you open the device covers, unless you are instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following table when you install, move, or open covers on this product or attached devices.

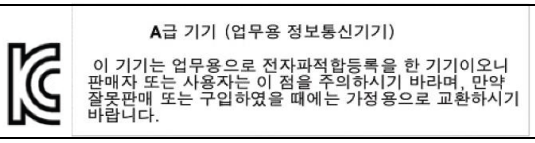
	The power supply in this product contains no user-serviceable parts. Refer servicing only to qualified personnel.
	Do not attempt to modify or use the supplied AC power cord if it is not the exact type required. A product with more than one power supply will have a separate AC power cord for each supply.
	The power button on the system does not turn off system AC power. To remove AC power from the system, you must unplug each AC power cord from the wall outlet or power supply. The power cord(s) is considered the disconnect device to the main (AC) power. The socket outlet that the system plugs into shall be installed near the equipment and shall be easily accessible.
	SAFETY STEPS: Only skilled person can remove the chassis covers to access the inside of the system, and follow these steps: 1. Turn off all peripheral devices connected to the system. 2. Turn off the system by pressing the power button. 3. Unplug all AC power cords from the system or from wall outlets. 4. Label and disconnect all cables connected to I/O connectors or ports on the back of the system. 5. Provide some electrostatic discharge (ESD) protection by wearing an antistatic wrist strap attached to chassis ground of the system-any unpainted metal surface-when handling components. 6. Do not operate the system with the chassis covers removed.

	After you have completed the six SAFETY steps above, you can remove the system covers. To do this: 1. Unlock and remove the padlock from the back of the system if a padlock has been installed. 2. Remove and save all screws from the covers. 3. Remove the cover(s).
	For proper cooling and airflow, always reinstall the chassis covers before turning on the system. Operating the system without the covers in place can damage system parts. To install the covers: 1. Check first to make sure you have not left loose tools or parts inside the system. 2. Check that cables, add-in cards, and other components are properly installed. 3. Attach the covers to the chassis with the screws removed earlier, and tighten them firmly. 4. Insert and lock the padlock to the system to prevent unauthorized access inside the system. 5. Connect all external cables and the AC power cord(s) to the system.
	A microprocessor and heat sink may be hot if the system has been running. Also, there may be sharp pins and edges on some board and chassis parts. Contact should be made with care. Consider wearing protective gloves.
	Danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the equipment manufacturer. Dispose of used batteries according to manufacturer's instructions.
	The system is designed to operate in a typical office environment. Choose a site that is: • Clean and free of airborne particles (other than normal room dust). • Well ventilated and away from sources of heat including direct sunlight. • Away from sources of vibration or physical shock. • Isolated from strong electromagnetic fields produced by electrical devices. • In regions that are susceptible to electrical storms, we recommend you plug your system into a surge suppressor and disconnect telecommunication lines to your modem during an electrical storm. • Provided with a properly grounded wall outlet. • Provided with sufficient space to access the power supply cord(s), because they serve as the product's main power disconnect.
	The rail racks are designed to carry only the weight of the equipment. Do not use rail-mounted equipment as a workspace. Do not place additional load onto any rail-mounted equipment.
	Heavy object. Indicates four or more people are required to safely handle the system.

Product Regulatory Compliance Markings

This product is marked with the following Product Certification Markings:

Product Regulatory Compliance Markings

Regulatory Compliance	Region	Marking
cULus Listing Mark	USA / Canada	
CE Mark	Europe	
FCC Marking (Class A)	USA	This device complies with Part 15 of the FCC Rules. Operation of this device 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.
VCCI Marking (Class A)	Japan	
BSMI Certification Number & Class A Warning	Taiwan	 警告:為避免電磁干擾,本產品不應安裝或使用於住宅環境
Recycling Package Mark	Other than China	
MSIP	Korea	
UKCA	United Kingdom	

Electromagnetic Compatibility Notices

FCC Verification Statement (USA)

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 A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. 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. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Europe (CE Declaration of Conformity)

This product has been tested in accordance too, and complies with the Low voltage Directive (2006/95/EC) and EMC Directive (2004/108/EC). The product has been marked with the CE Mark to illustrate its compliance.

VCCI (Japan)

この装置は、クラス A 機器です。この装置を住宅環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

VCCI-A

English translation of the notice above:

This is a Class A equipment. Operation of this equipment in a residential environment could cause radio interference. In such a case, the user may be required to take corrective actions.

BSMI (Taiwan)

The BSMI Certification Marking and EMC warning is located on the outside rear area of the product.

警告:為避免電磁干擾,本產品不應安裝或使用於住宅環境

MSIP (Korea)

Ministry of Science, ICT & Future Planning (MSIP) Class A Statement:

A 급 기기(업무용 정보통신기기)
이 기기는 업무용으로 전자파적합등록을 한 기기이오니 판매자 또는 사용자는 이 점을 주의하시기 바라며, 만약 잘못 판매 또는 구입하였을 때에는 가정용으로 교환하시기 바랍니다.

사 용 자 안 내 문
이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서 가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다

"A" class equipment (info / technology equipment for business purpose)

As this equipment has undergone EMC registration for business purpose, the seller and/or the buyer is asked to beware of this point and in case a wrongful sale or purchase has been made, it is asked that a change to household use be made.

Regulated Specified Components

To maintain the UL listing and compliance to other regulatory certifications and/or declarations, the following regulated components must be used and conditions adhered to.

Interchanging or use of other component will void the UL listing and other product certifications and approvals.

Updated product information for configurations can be found on the site at the following URL:

www.qct.io

If you do not have access to the Web address, please contact your local representative.

- Add-in cards: must have a printed wiring board flammability rating of minimum UL94V-1. Add-in cards containing external power connectors and/or lithium batteries must be UL recognized or UL listed. Any add-in card containing modem telecommunication circuitry must be UL listed. In addition, the modem must have the appropriate telecommunications, safety, and EMC approvals for the region in which it is sold.
- Peripheral Storage Devices: must be UL recognized or UL listed accessory and TUV or VDE licensed. Maximum power rating of any one device is 19 watts. Total system configuration is not to exceed the maximum loading conditions of the power supply.

Restriction of Hazardous Substances (RoHS) Compliance

Quanta® Computer Inc. has a system in place to restrict the use of banned substances in accordance with the European Directive 2011/65/EU. Compliance is based on declaration that materials banned in the RoHS Directive are either (1) below all applicable threshold limits or (2) an approved / pending RoHS exemption applies.

RoHS implementation details are not fully defined and may change.

Threshold limits and banned substances are noted below:

- Quantity limit of 0.1% by mass (1000 PPM) for:

— Lead

— Mercury

— Hexavalent Chromium

— Polybrominated Diphenyl Ethers (PBDE)

- Quantity limit of 0.01% by mass (100 PPM) for:

— Cadmium

End of Life / Product Recycling

Product recycling and end-of-life take-back systems and requirements vary by country. Contact the retailer or distributor of this product for information about product recycling and / or take-back.