ESC8000-E12 Series

ESC8000-E12/ESC8000-E12P

4U Rackmount Server

User Guide

E26857
Revised Edition V2
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Safety information

Electrical Safety

- Before installing or removing signal cables, ensure that the power cables for the system unit and all attached devices are unplugged.
- To prevent electrical shock hazard, disconnect the power cable from the electrical outlet before relocating the system.
- When adding or removing any additional devices to or from the system, ensure that the power cables for the devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you add a device.
- If the power supply is broken, do not try to fix it by yourself. Contact a qualified service technician or your dealer.

Operation Safety

- Any mechanical operation on this server must be conducted by certified or experienced engineers.
- Before operating the server, carefully read all the manuals included with the server package.
- Before using the server, ensure all cables are correctly connected and the power cables are not damaged. If any damage is detected, contact your dealer as soon as possible.
- To avoid short circuits, keep paper clips, screws, and staples away from connectors, slots, sockets and circuitry.
- Avoid dust, humidity, and temperature extremes. Place the server on a stable surface.

CAUTION: This product is equipped with a three-wire power cable and plug for the user's safety. Use the power cable with a properly grounded electrical outlet to avoid electrical shock.

Restricted Access Area

This equipment should only be installed in a Restricted Access Area where both these conditions apply:

- Access can only be gained by skilled or instructed persons who have been instructed about the reasons for the restrictions applied to the area and about any precautions that shall be taken; and
- Access is through the use of a TOOL, or other means of security, and is controlled by the authority responsible for the area.

Lithium-Ion Battery Warning

CAUTION! Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Heavy System

CAUTION! This server system is heavy. Ask for assistance when moving or carrying the system.

Shock Hazard

CAUTION! Risk of electric shock.

Disconnect all power supply input plugs before servicing.

About this guide

Audience

This user guide is intended for system integrators and experienced users with at least basic knowledge of configuring a server.

Contents

This guide contains the following parts:

1. **Chapter 1: Product Introduction**

   This chapter describes the general features of the server. It includes sections on front panel and rear panel specifications.

2. **Chapter 2: Hardware Setup**

   This chapter lists the hardware setup procedures that you have to perform when installing or removing system components.

3. **Chapter 3: Motherboard Information**

   This chapter gives information about the motherboard that comes with the server. This chapter includes the motherboard layout, jumper settings, and connector locations.

4. **Chapter 4: BIOS Setup**

   This chapter tells how to change system settings through the BIOS Setup menus and describes the BIOS parameters.

5. **Chapter 5: RAID Configuration**

   This chapter provides instructions for setting up, creating, and configuring RAID sets using the available utilities.

Conventions

To ensure that you perform certain tasks properly, take note of the following symbols used throughout this manual.

DANGER/WARNING: Information to prevent injury to yourself when trying to complete a task.

CAUTION: Information to prevent damage to the components when trying to complete a task.

IMPORTANT: Instructions that you MUST follow to complete a task.

NOTE: Tips and additional information to help you complete a task.

Typography

Bold text	Indicates a menu or an item to select.
Italics	Used to emphasize a word or a phrase.
<Key>	Keys enclosed in the less-than and greater-than sign means that you must press the enclosed key. Example: <Enter> means that you must press the Enter or Return key.
<Key1>+<Key2>+<Key3>	If you must press two or more keys simultaneously, the key names are linked with a plus sign (+). Example: <Ctrl>+<Alt>+<Del>
`Command`	Means that you must type the command exactly as shown, then supply the required item or value enclosed in brackets. Example: At the command prompt, type the command line: **`format A:/S`**

References

Refer to the following sources for additional information, and for product and software updates.

1. **ASUS Control Center (ACC) user guide**

   This manual tells how to set up and use the proprietary ASUS server management utility.

2. **ASUS websites**

   The ASUS websites provide updated information for all ASUS hardware and software products. Visit https://www.asus.com for more information.

1 Product Introduction

This chapter describes the general features of the server. It includes sections on front panel and rear panel specifications.

1.1 System package contents

Check your system package for the following items.

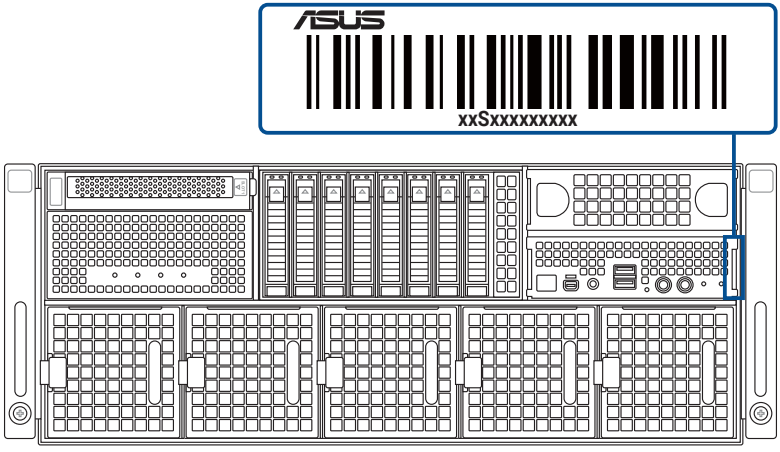
	ESC8000-E12/ESC8000-E12P
Chassis	ASUS 4U rackmount chassis
Motherboard	ASUS Z14PG-D32 server board
Accessories	1 x ASMB12 instruction card 1 x ASUS Control Center instruction card 4 x AC power cables 2 x CPU heatsinks 2 x CPU carriers 1 x Foam padding for NVIDIA® H200 GPUs 8 x GPU brackets 1 x Set of GPU screws
Optional items	1 x Rail kit 1 x Mini DisplayPort to VGA dongle 1 x Broadcom HBA card cable kit 1 x Cable arm

NOTE:

- If any of the above items is damaged or missing, contact your retailer.
- Optional items come bundled if you selected them when purchasing the system and cannot be bought separately.

1.2 Serial number label

When requesting support from the ASUS Technical Support Team, provide the product's serial number. The serial number has 12 characters, such as xxSxxxxxxxxx, and is printed on the asset tag. Refer to the below illustration for the location of the asset tag.



1.3 System specifications

The ASUS ESC8000-E12 series features the ASUS Z14PG-D32 server board designed for Intel® Xeon® 6 processors.

Model name		ESC8000-E12/ESC8000-E12P
Motherboard		Z14PG-D32
Processor support		2 x LGA4710 sockets for Intel® Xeon® 6 processors* * **Up to 350W TDP**
Memory	Total slots	32 (8 channels per CPU, 16 DIMMs per CPU)
	Capacity	Maximum up to 4TB
	Memory type	DDR5 6400 (1DPC) / 5200 (2DPC) RDIMM * **Refer to ASUS server AVL for the latest update**
	Memory size	128GB, 96GB, 64GB, 32GB * **Refer to ASUS server AVL for the latest update**
Expansion slots	Total PCIe slots	**ESC8000-E12:** SKU1 (with RAID): Up to 11 slots SKU2 (without RAID): Up to 10 slots **ESC8000-E12P:** Up to 14 slots
	PCIe slot type	**ESC8000-E12 SKU1 (with RAID):** - 8 x PCIe x16 for dual-slot GPU cards (Gen5 x16 link, FHFL) - 1 x PCIe x16 for NIC/BlueField-3 cards (Gen5 x16 link, FHHL) - 1 x PCIe x16 for NIC cards (Gen5 x8 link, FHHL) - 1 x PCIe x16 for HBA/RAID cards (Gen5 x8 link, FHHL)* **ESC8000-E12 SKU2 (without RAID):** - 8 x PCIe x16 for dual-slot GPU cards (Gen5 x16 link, FHFL) - 1 x PCIe x16 for NIC/BlueField-3 cards (Gen5 x16 link, FHHL) - 1 x PCIe x16 for NIC cards (Gen5 x8 link, FHHL)* **ESC8000-E12P:** - 8 x PCIe x16 for dual-slot GPU cards (Gen5 x16 link, FHFL) - 5 x PCIe x16 for NIC/BlueField-3 cards (Gen5 x16 link, FHHL) - 1 x PCIe x16 (Gen5 x8 link, FHHL)* * **Located on the front riser**
	M.2	2 x M.2 sockets (Gen5 x4 link, up to 22110)* * **Not available on ESC8000-E12 SKU2 (without RAID)**
Storage	Storage bays	8 x 2.5” front hot-swap storage bays
	NVMe support	**ESC8000-E12 SKU1 (with RAID):** Up to 6 NVMe devices based on the HBA/RAID card model installed **ESC8000-E12 SKU2 (without RAID):** Up to 4 NVMe devices **ESC8000-E12P:** Up to 8 NVMe devices

(continued on the next page)

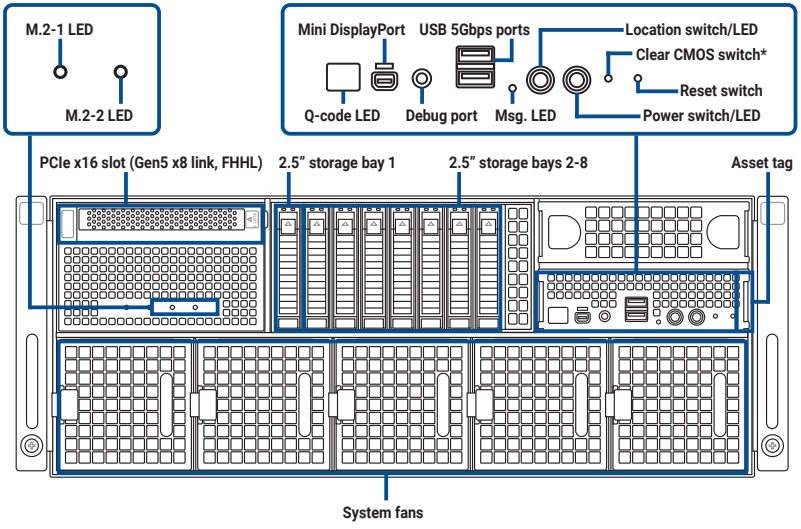
Model name		ESC8000-E12/ESC8000-E12P
Storage	Connectors	**Backplane:** - 4 x MCIO connectors (x8 link) for NVMe devices - 2 x SLIMSAS connectors (x4 link) for HBA cards only **PCIe switch:** - 4 x MCIO connectors (x8 link) for NVMe devices
	Default cables	4 x Backplane MCIO cables
Networking		2 x 10GbE RJ-45 LAN ports (Intel® X710-AT2 LAN controller)* 1 x Management port * **ESC8000-E12P only**
Onboard graphics		Aspeed AST2600 64MB (Mini DisplayPort)
Graphics card support		Up to 8 dual-slot GPU cards * **Supports 12VHPWR power connectors by default**
Front I/O ports		1 x Mini DisplayPort 2 x USB 5Gbps ports 1 x Debug port
Rear I/O ports		1 x USB 5Gbps port 2 x 10GbE RJ-45 LAN ports* 1 x RJ-45 management LAN port * **ESC8000-E12P only**
Switch/LEDs		**Front:** 1 x Power switch/LED 1 x Location switch/LED 1 x Message LED 1 x Clear CMOS switch 1 x Reset switch 2 x M.2 LEDs* 2 x LAN LEDs** 1 x Q-Code/Port 80 LED **Rear:** 1 x Power switch/LED 1 x Location switch/LED 1 x Message LED * **Not available on ESC8000-E12 SKU2 (without RAID)** ** **ESC8000-E12P only**

Model name	ESC8000-E12/ESC8000-E12P
OS support	Windows® Server, RedHat® Enterprise Linux, SuSE® Linux Enterprise Server, CentOS, Ubuntu, VMware * **Refer to https://servers.asus.com/support/os for the latest supported OS list**
Management solutions	**Hardware (Out-of-band remote management):** Onboard ASMB12-iKVM **Software:** ASUS Control Center
Regulatory compliance	BSMI, CB, CE, FCC (Class A), RCM
Dimensions (HH x WW x DD)	800mm x 439.5mm x 175mm / 31.5" x 17.3" x 6.9" (4U)
Net weight	42kg
Gross weight	44.23kg
Power supply and rating	3+1 redundant 3200W 80 PLUS Titanium power supply 220-240 Vac, 16A (x4) 50/60Hz
Environment	Operating temperature: 10°C ~ 35°C* Non-operating temperature: -40°C ~ 60°C Non-operating humidity: 20% ~ 95% (Non-condensing) * **For operating temperatures above 30°C, please contact your local sales representative**

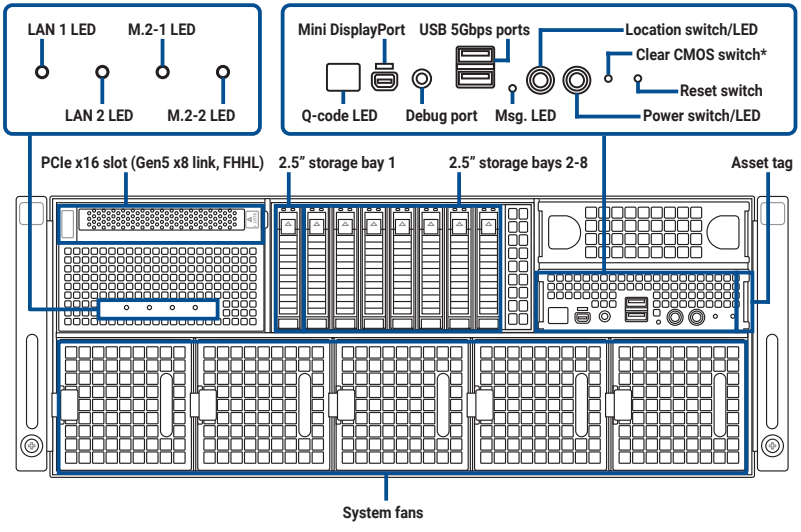
NOTE: Specifications are subject to change without notice.

1.4 Front panel features

ESC8000-E12



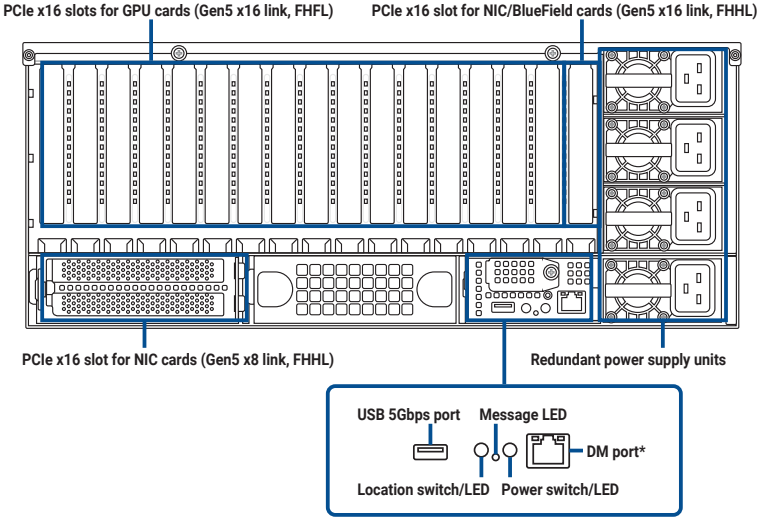
ESC8000-E12P



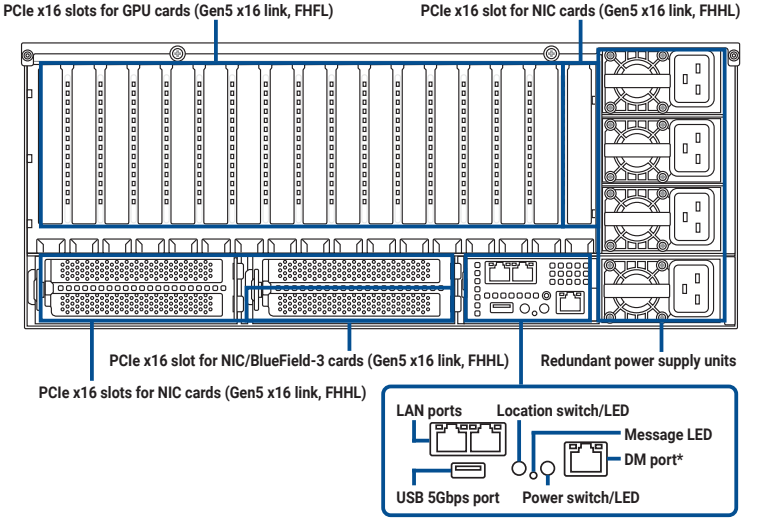
NOTE: To clear the CMOS memory, ensure the server is completely powered off, press the Clear CMOS switch for five seconds, then disconnect and reconnect all power cables.

1.5 Rear panel features

ESC8000-E12



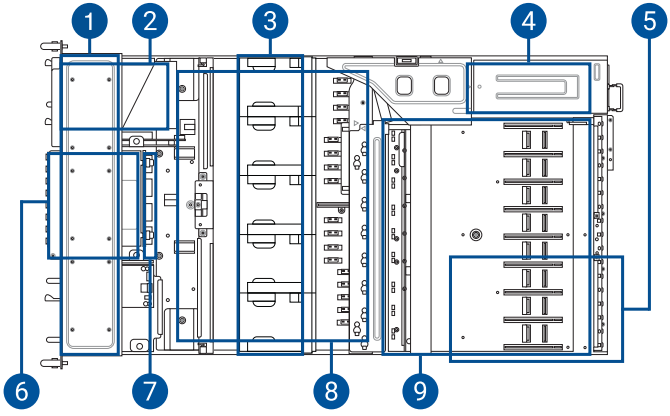
ESC8000-E12P



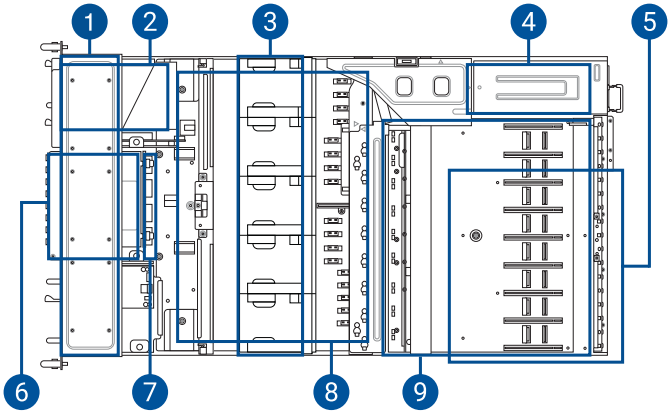
NOTE: The DM (Dedicated Management) port is for ASUS ASMB12-iKVM only.

1.6 Internal features

ESC8000-E12



ESC8000-E12P



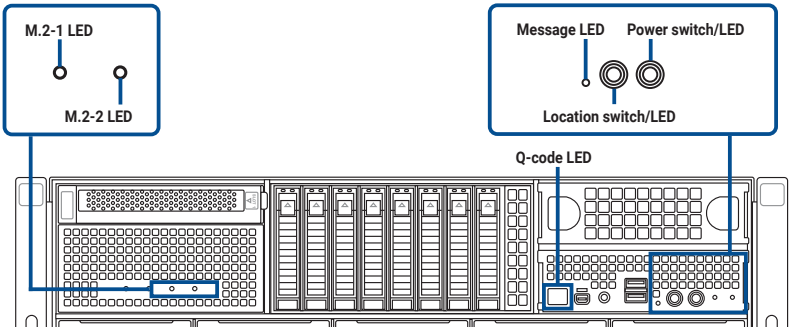
1. System fans
2. PCIe expansion card slot
3. GPU fans
4. Redundant power supply units
5. PCIe expansion card brackets
6. 2.5” storage bays
7. Storage device backplane
8. Motherboard
9. GPU SKU board

WARNING
HAZARDOUS MOVING PARTS
KEEP FINGERS AND OTHER BODY PARTS AWAY

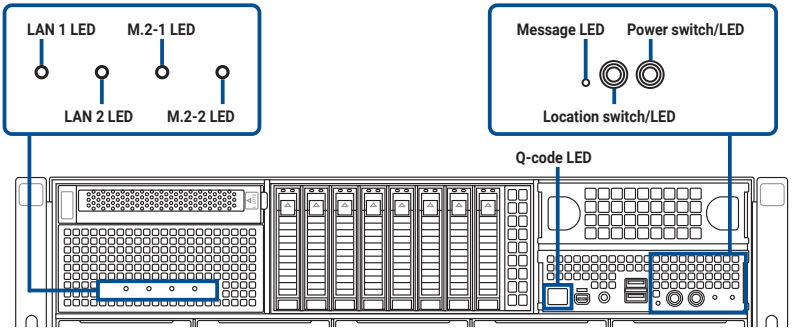
1.7 LED information

1.7.1 Front panel LEDs

ESC8000-E12

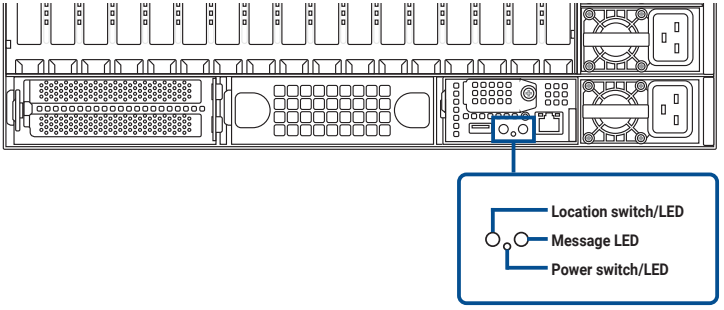


ESC8000-E12P



LED	Status	Description
Power switch/LED	ON	System power on
Location switch/LED	ON	Received user command to locate the system
	OFF	Function off
LAN LEDs	Blinking	LAN is transmitting or receiving data
	OFF	No LAN connection
Message LED	ON	A hardware monitor event is indicated
	OFF	System is normal; no incoming event
M.2 LEDs	Blinking	M.2 storage device reading or writing data

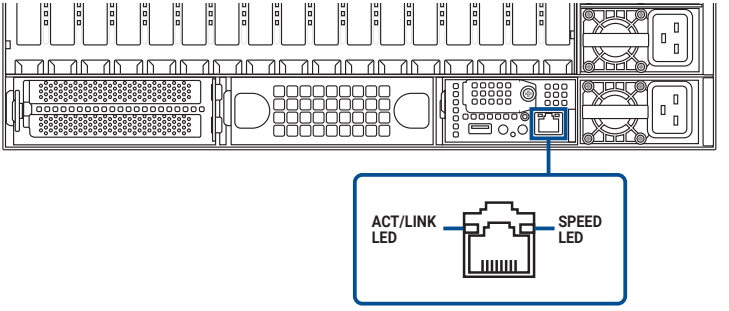
1.7.2 Rear panel LEDs



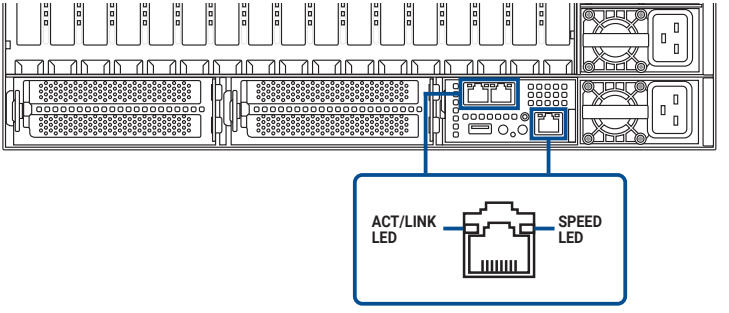
LED	Status	Description
Power switch/LED	ON	System power on
Location switch/LED	ON	Received user command to locate the system
	OFF	Function off
Message LED	ON	A hardware monitor event is indicated
	OFF	System is normal; no incoming event

1.7.3 LAN (RJ-45) LEDs

ESC8000-E12



ESC8000-E12P



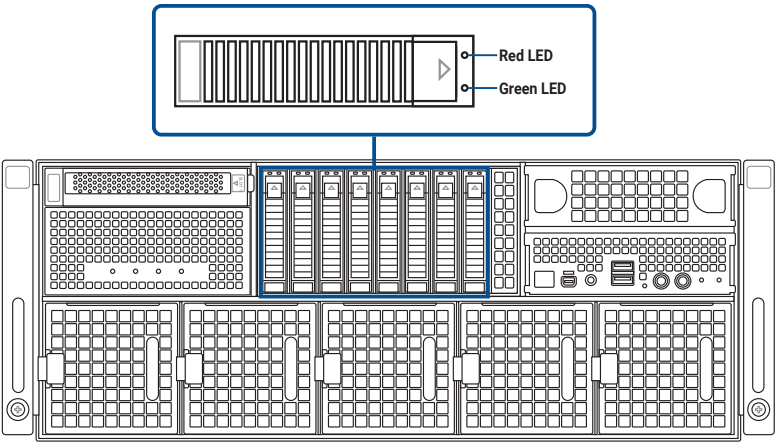
Intel® X710-AT2 10GbE LAN port LEDs (on selected models)

SPEED LED		ACT/LINK LED	
Status	Description	Status	Description
OFF	100 Mbps connection	OFF	No link
ORANGE	1-5 Gbps connection	GREEN	Linked
GREEN	10 Gbps connection	BLINKING	Data activity

Dedicated Management LAN port (DM_LAN1) LEDs

SPEED LED		ACT/LINK LED	
Status	Description	Status	Description
OFF	10 Mbps connection	OFF	No link
ORANGE	100 Mbps connection	ORANGE	Linked
GREEN	1 Gbps connection	BLINKING	Data activity

1.7.4 Storage device status LEDs



Storage Device LED Description		
Status (RED)	ON	Storage device has failed
	Blinking	RAID rebuilding or locating
Activity (GREEN)	ON	Storage device power ON
	Blinking	Storage device reading or writing data
	OFF	Storage device not found

Hardware Setup

2

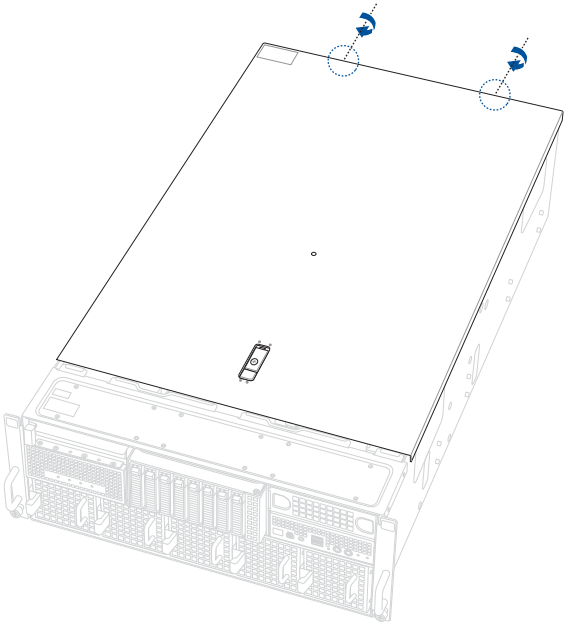
This chapter lists the hardware setup procedures that you have to perform when installing or removing system components.

2.1 Chassis cover

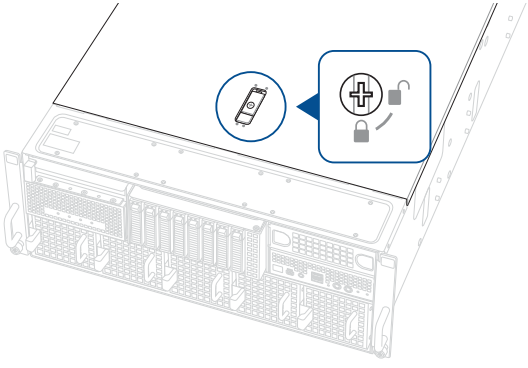
NOTE: A protective film is pre-attached to the system cover before shipping. Remove the protective film before turning on the system for proper heat dissipation.

2.1.1 Removing the rear cover

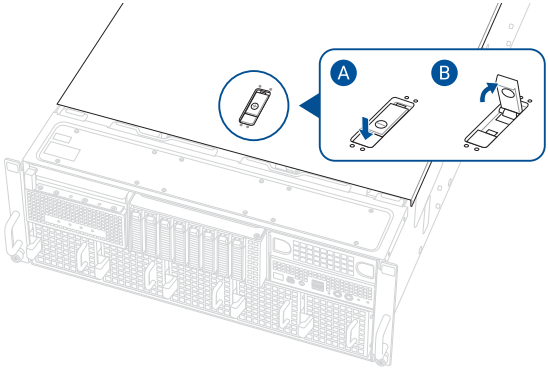
1. Loosen the thumbscrews.



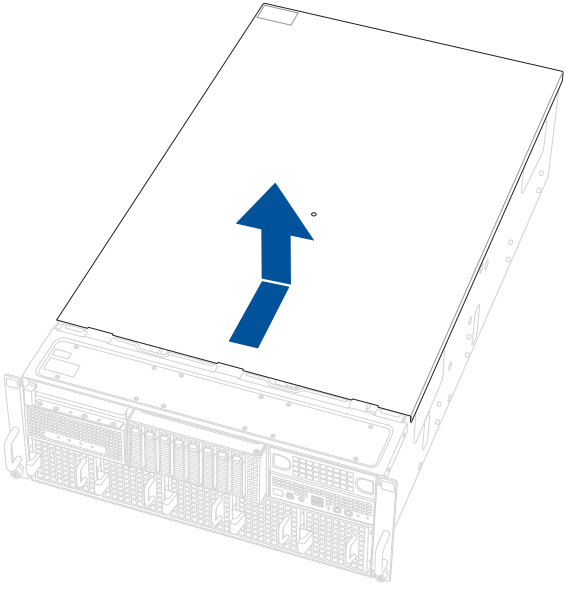
2. Turn the screw counter-clockwise to unlock the latch.



3. Press the spring lock to release the latch, then pull the latch upwards to disengage the chassis cover from the chassis.

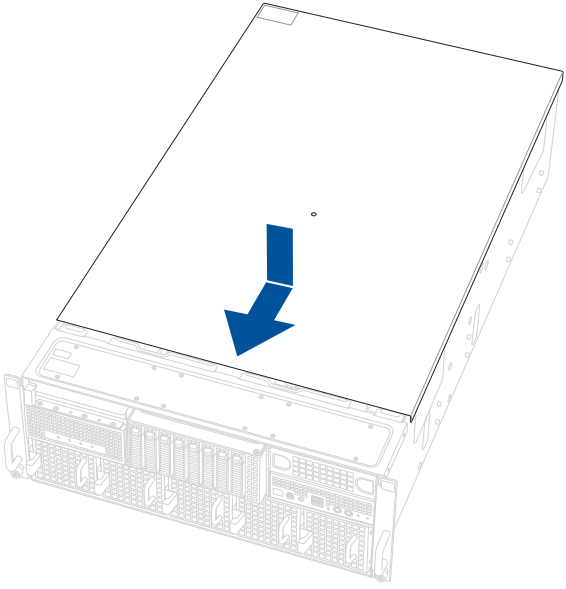


4. Slide the chassis cover towards the rear of the chassis, then lift and remove it from the chassis.

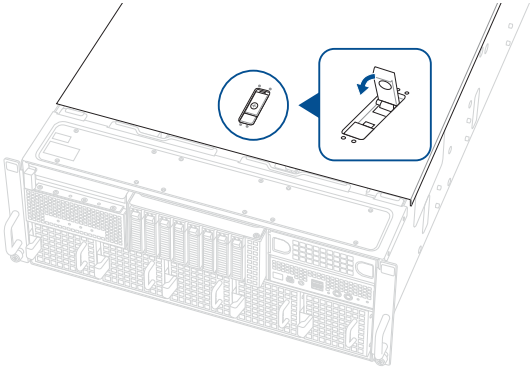


2.1.2 Installing the chassis cover

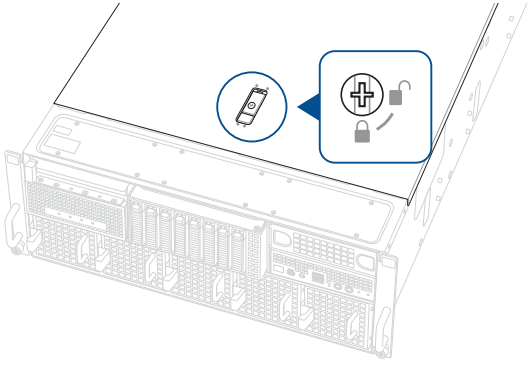
1. Place the chassis cover onto the chassis, then slide the chassis cover towards the front of the chassis.



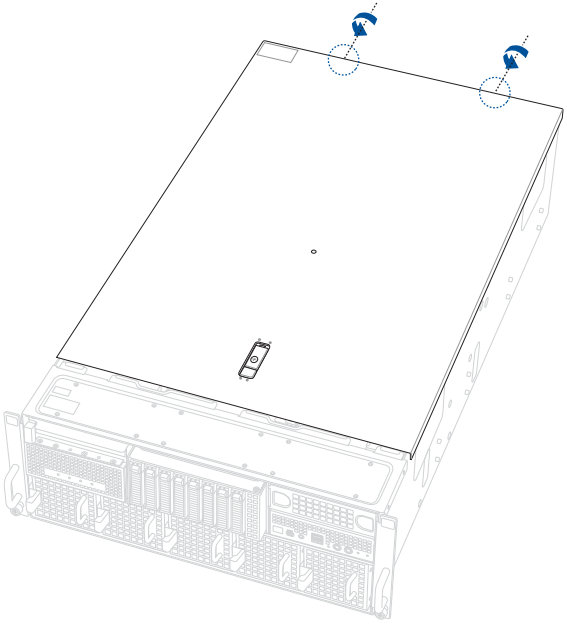
2. Push the latch downwards to lock the chassis cover into place.



3. Turn the screw clockwise to lock the latch.



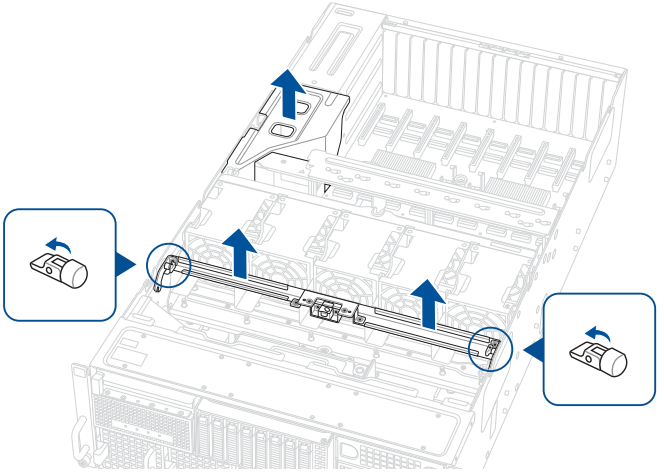
4. Tighten the thumbscrews.



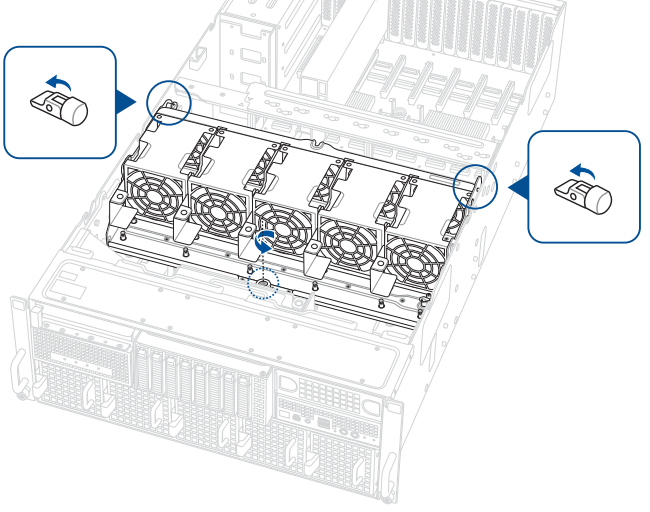
2.2 Air duct

2.2.1 Removing the air duct

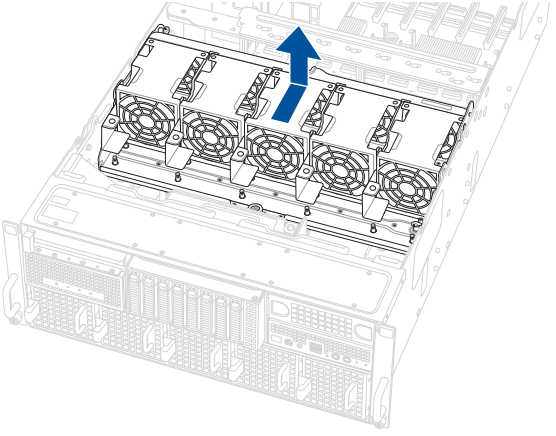
1. Disengage the latches, then remove the metal brackets.



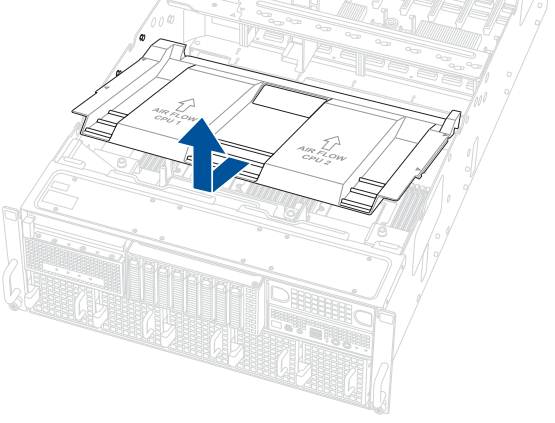
2. Disconnect the cables connected to the GPU fan cage.
3. Disengage the latch and loosen the thumbscrew.



4. Push the GPU fan cage towards the rear of the chassis, then lift and remove the GPU fan cage.



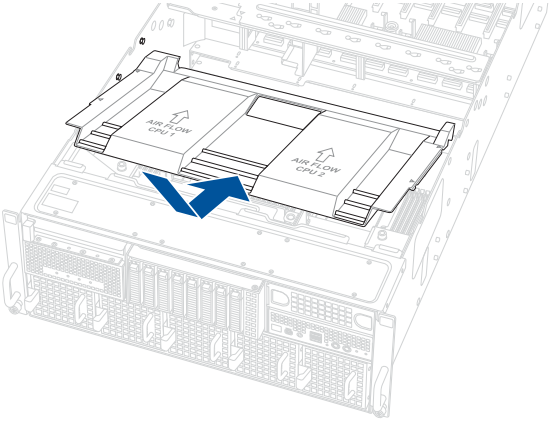
5. Lift and remove the air duct.



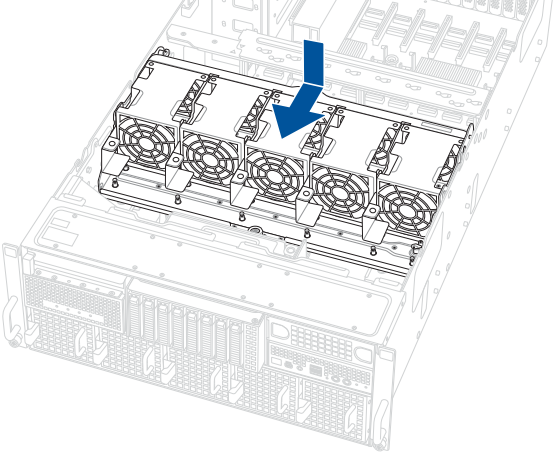
2.2.2 Installing the air duct

1. Align and install the air duct.

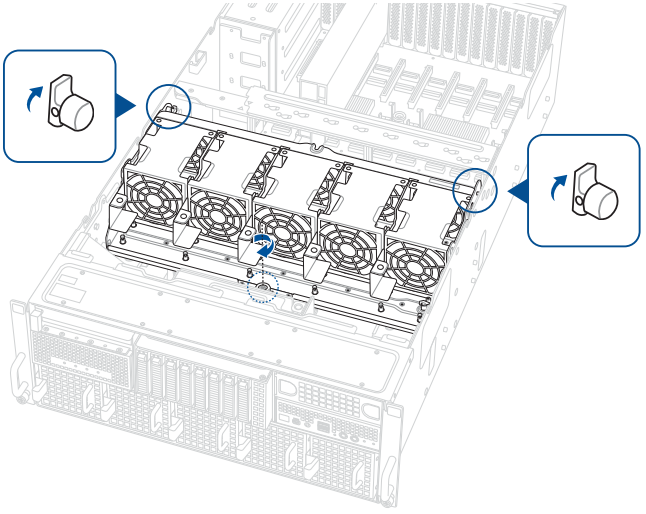
NOTE: Ensure that the triangle marks on the air duct are aligned with the triangle marks on the chassis.



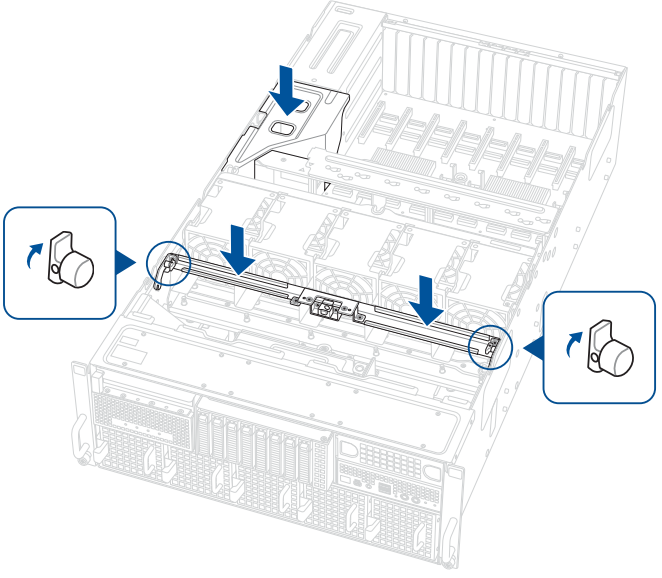
2. Install the GPU fan cage.



3. Return the latch to the locked position and tighten the thumbscrew.
4. Reconnect the cables to the GPU fan cage.



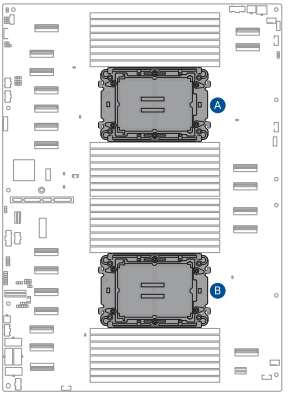
5. Install the metal brackets, then return the latches to the locked position.



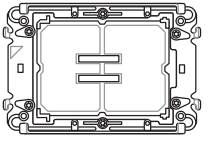
2.3 Central Processing Unit (CPU)

The motherboard comes with two (2) surface mount LGA 4710 sockets designed for Intel® Xeon® 6 processors.

- Upon purchase of the motherboard, ensure that the PnP cap is on the socket and the socket contacts are not bent. Contact your retailer immediately if the PnP cap is missing, or if you see any damage to the PnP cap/socket contacts/motherboard components. ASUS will shoulder the cost of repair only if the damage is shipment/transit-related.
- Keep the cap after installing the motherboard. ASUS will process Return Merchandise Authorization (RMA) requests only if the motherboard comes with the cap on the socket.
- The product warranty does not cover damage to the socket contacts resulting from incorrect CPU installation/removal, or misplacement/loss/incorrect removal of the PnP cap.



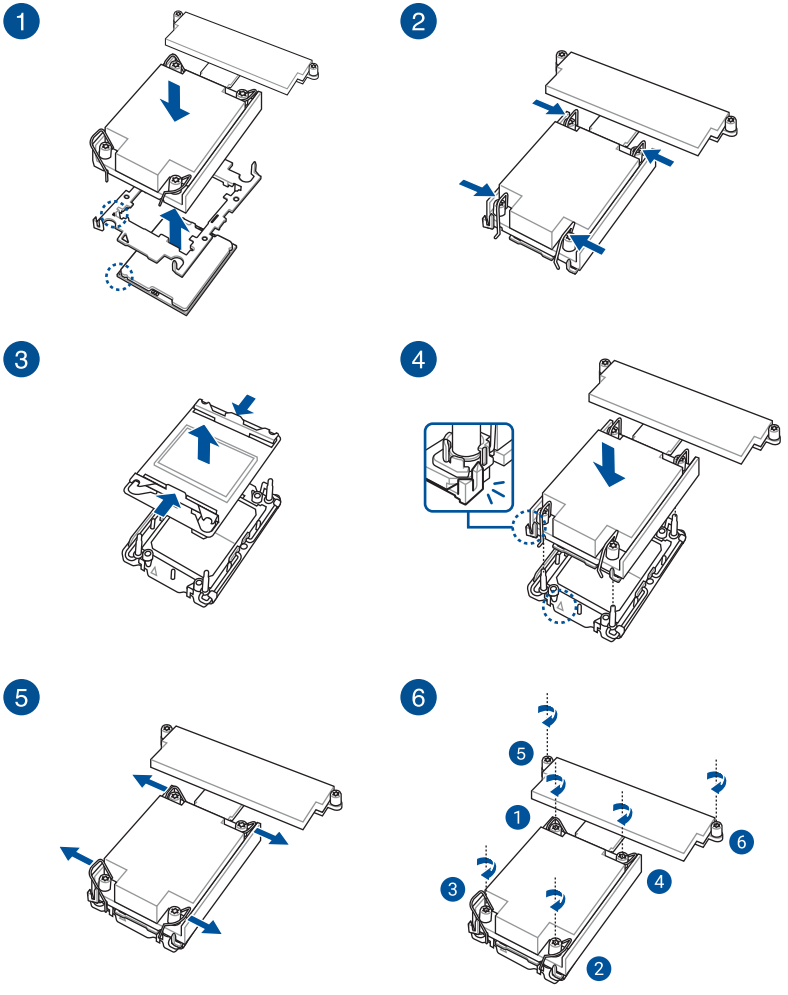
A CPU2
B CPU1



2.3.1 Installing the CPU and heatsink

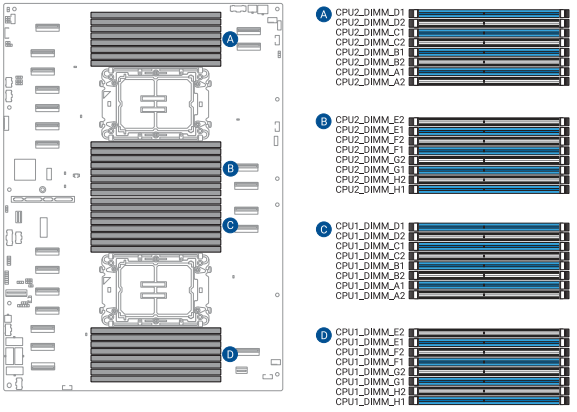
NOTE:

- Ensure that the triangle mark on the CPU is located in the same corner as the CPU socket.
- Intel® recommends using a torque driver with a T-30 bit and a torque value of 8 lbf-in to prolong the longevity of all PEEK nuts after the quality of the load post is corrected.



2.4 System memory

The motherboard comes with twenty four (24) Double Data Rate 5 (DDR5) Dual Inline Memory Modules (DIMM) sockets.



2.4.1 Memory configurations

NOTE:

- Refer to ASUS Server AVL for the updated list of compatible DIMMs.
- Always install DIMMs with the same CAS latency. For optimum compatibility, it is recommended that you obtain memory modules from the same vendor.

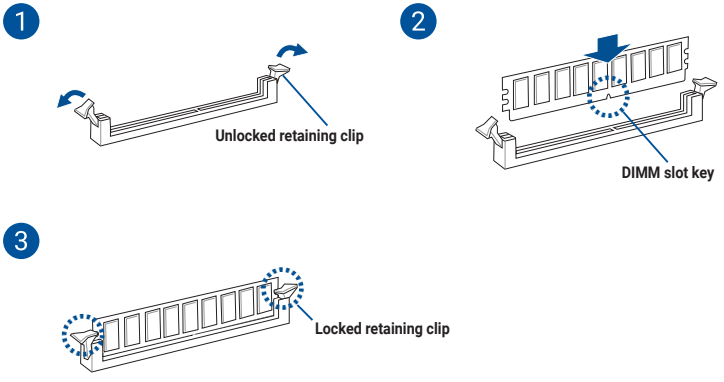
Recommended dual CPU memory configuration

	2 DIMMs	8 DIMMs	16 DIMMs	24 DIMMs	32 DIMMs
CPU1/2 A1	●	●	●	●	●
CPU1/2 A2				●	●
CPU1/2 B1			●	●	●
CPU1/2 B2					●
CPU1/2 C1		●	●	●	●
CPU1/2 C2				●	●
CPU1/2 D1			●	●	●
CPU1/2 D2					●
CPU1/2 E1		●	●	●	●
CPU1/2 E2				●	●
CPU1/2 F1			●	●	●
CPU1/2 F2					●
CPU1/2 G1		●	●	●	●
CPU1/2 G2				●	●
CPU1/2 H1			●	●	●
CPU1/2 H2					●

2.4.2 Installing a DIMM

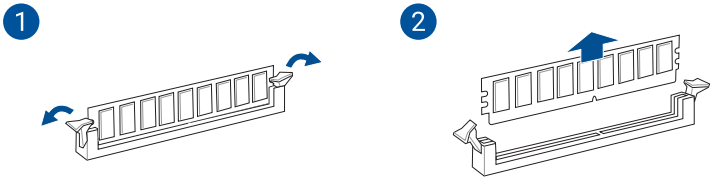
NOTE: A DIMM is keyed with a notch so that it fits in only one direction. DO NOT force a DIMM into a socket in the wrong direction to avoid damaging the DIMM.

CAUTION: Always insert the DIMM into the socket vertically to prevent DIMM notch damage.



2.4.3 Removing a DIMM

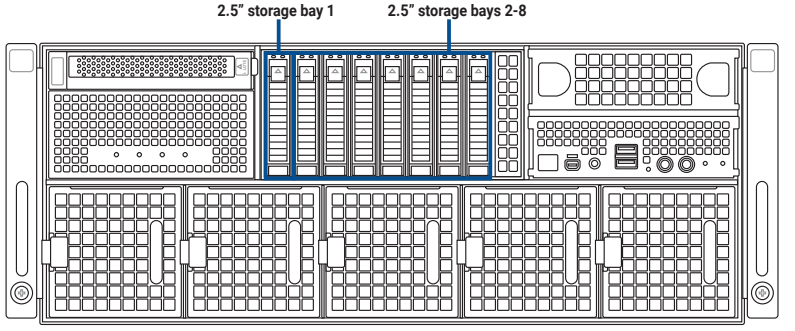
NOTE: Support the DIMM lightly with your fingers when pressing the retaining clips. The DIMM might get damaged when it springs out with extra force.

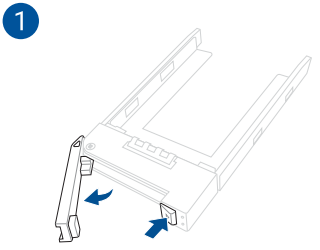


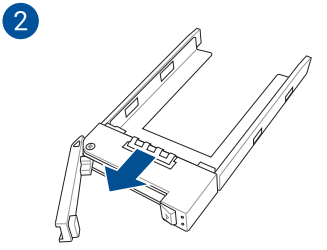
2.5 Storage devices

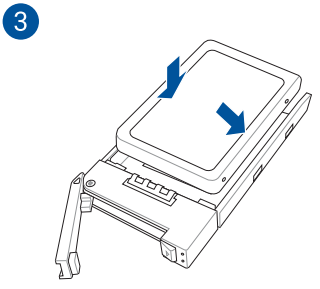
2.5.1 Installing a 2.5” storage device

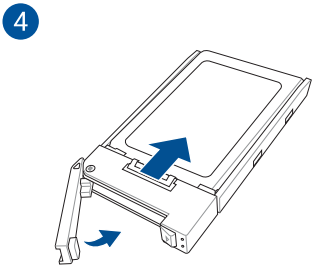
NOTE: To remove this component, follow the instructions in reverse order.





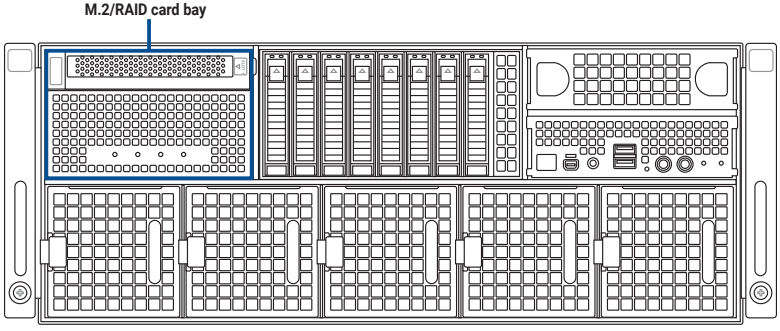




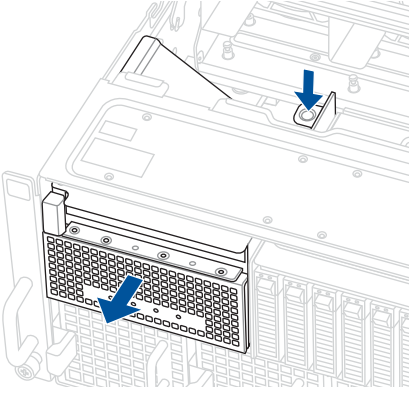


2.5.2 Installing an M.2 SSD module

NOTE: To remove this component, follow the instructions in reverse order.

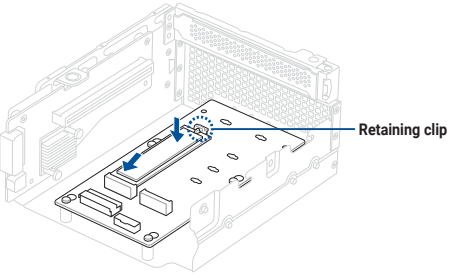


1. Disconnect the cables from the M.2/RAID card bay.
2. Press down on the latch and pull the M.2/RAID card bay out of the chassis.

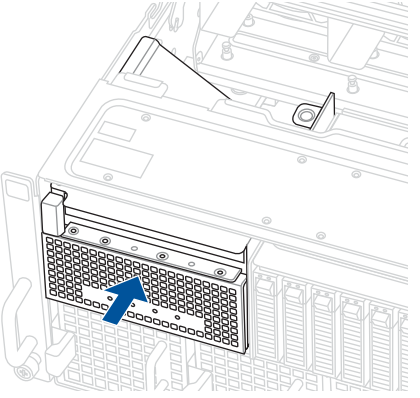


3. Insert the M.2 SSD module into the M.2 slot and push down until the retaining clip locks the M.2 SSD module into place.

NOTE: To install M.2 SSD modules of different lengths, rotate the retaining clip 90 degrees, then remove and install it in a different position. The arrow on the retaining clip should be pointing away from the M.2 slot.



4. Push the M.2/RAID card bay all the way into the chassis.
5. Reconnect the cables to the M.2/RAID card bay.



2.6 Expansion slots

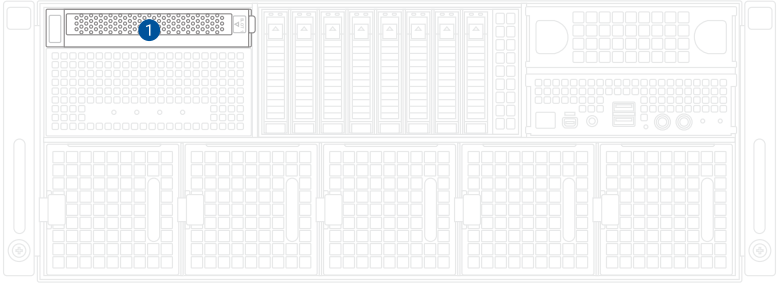
WARNING: Unplug the power cord before adding or removing expansion cards. Failure to do so may cause you physical injury and damage motherboard components.

NOTE:

- Before installing an expansion card, read the documentation that came with it and ensure that the proper hardware settings are configured.
- To remove this component, follow the instructions in reverse order.

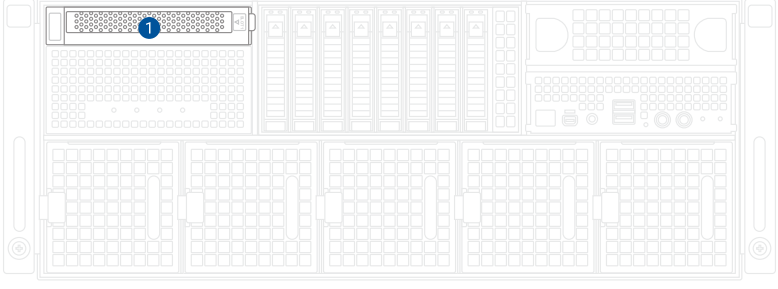
Front panel

ESC8000-E12



#	Name	Slot type	PCIe link	Size	Intended use
1	SLOT 1	PCIe x16 slot	Gen5 x8 link	FHHL	HBA/RAID cards

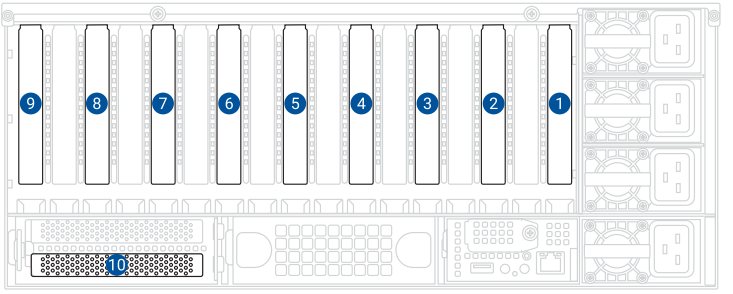
ESC8000-E12P



#	Name	Slot type	PCIe link	Size	Intended use
1	SLOT 1	PCIe x16 slot	Gen5 x8 link	FHHL	Expansion cards

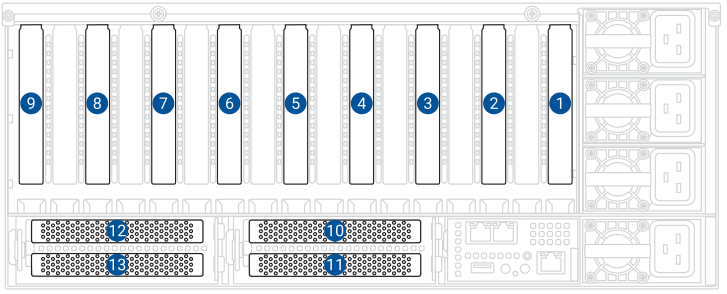
Rear panel

ESC8000-E12



#	Name	Slot type	PCIe link	Size	Intended use
1	SLOT 2	PCIe x16 slot	Gen5 x16 link	FHHL	NIC/BlueField-3 cards
2	GPU 1	PCIe x16 slot	Gen5 x16 link	FHFL	GPU cards
3	GPU 2				
4	GPU 3				
5	GPU 4				
6	GPU 5				
7	GPU 6				
8	GPU 7				
9	GPU 8				
10	SLOT 6	PCIe x16 slot	Gen5 x8 link	FHHL	NIC cards

ESC8000-E12P

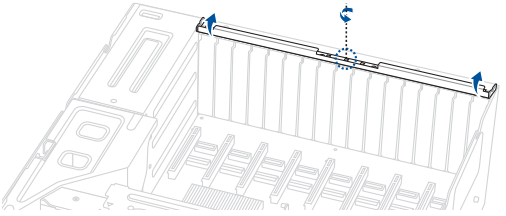


#	Name	Slot type	PCIe link	Size	Intended use
1	SLOT 2	PCIe x16 slot	Gen5 x16 link	FHHL	NIC cards
2	GPU 1	PCIe x16 slot	Gen5 x16 link	FHFL	GPU cards
3	GPU 2				
4	GPU 3				
5	GPU 4				
6	GPU 5				
7	GPU 6				
8	GPU 7				
9	GPU 8				
10	SLOT 3	PCIe x16 slot	Gen5 x16 link	FHHL	NIC cards
11	SLOT 4	PCIe x16 slot	Gen5 x16 link	FHHL	NIC/BlueField-3 cards
12	SLOT 5	PCIe x16 slot	Gen5 x16 link	FHHL	NIC cards
13	SLOT 6	PCIe x16 slot	Gen5 x16 link	FHHL	NIC cards

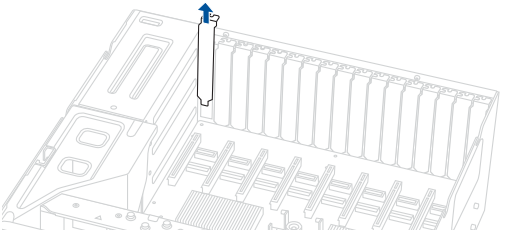
2.6.1 Installing a PCIe expansion card

Upper expansion card slots on the rear panel

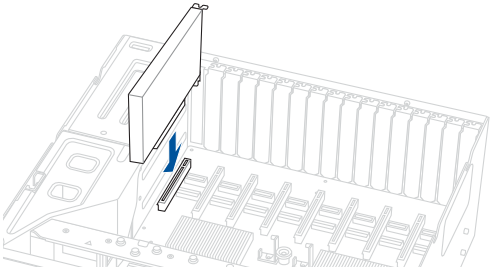
1. Loosen the thumbscrew, then lift the slot cover lock.



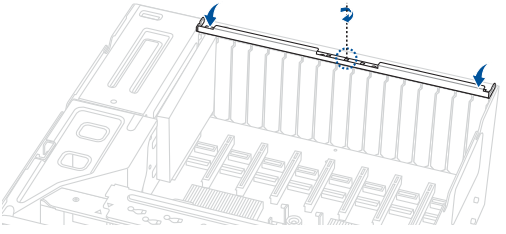
2. Remove the slot cover(s).



3. Install the expansion card.

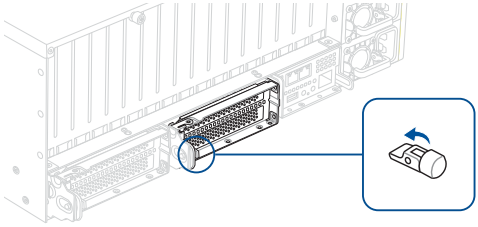


4. Lower the slot cover lock, then tighten the thumbscrew.

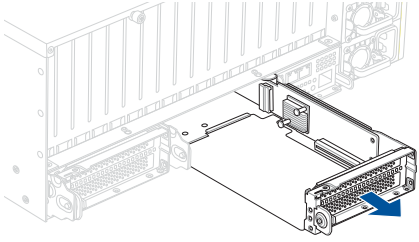


Lower expansion card slots on the rear panel

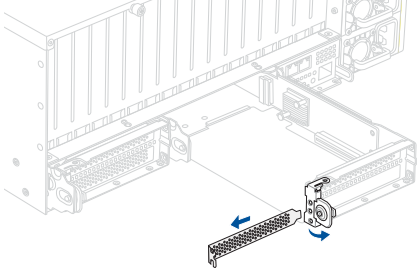
1. Disengage the latch.



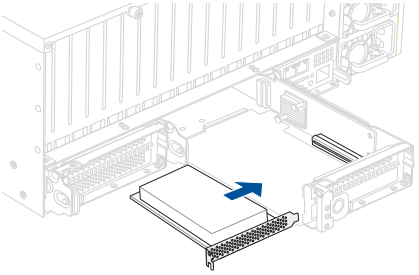
2. Pull the expansion card bay out of the chassis without removing it completely.



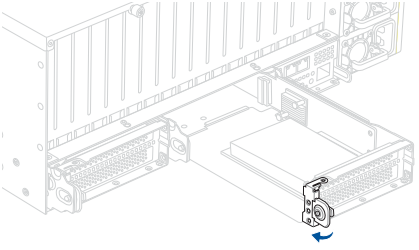
3. Flip the slot cover lock outwards, then remove the slot cover(s).



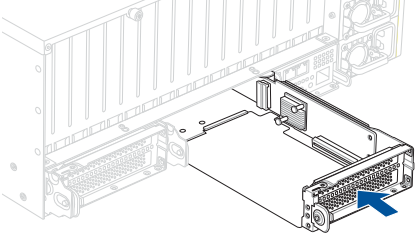
4. Install the expansion card.



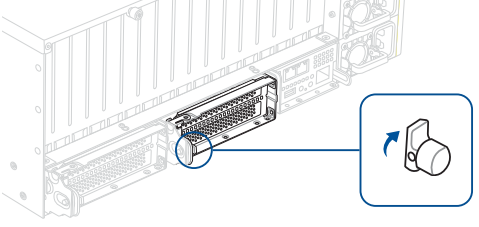
5. Return the slot cover lock to the locked position.



6. Push the expansion card bay all the way into the chassis.



7. Return the latch to the locked position.



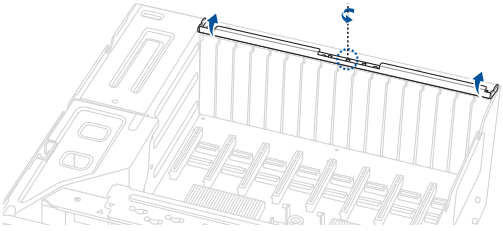
2.6.2 Installing a GPU card

NOTE:

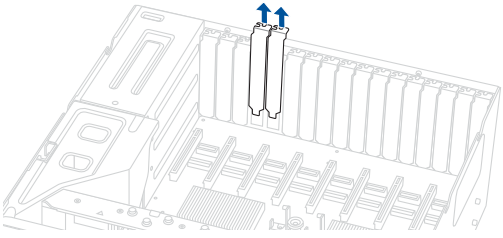
- Video output through the ports on installed GPU cards is not supported.
- Use both of your hands in performing the following steps.
- Read the documentation that comes with your GPU card before installing them.
- When installing more than one GPU card, it is recommended to install the cards in the following order: GPU1 > GPU2 > GPU3 > ... > GPU8. Refer to the **GPU SKU board** section for location of the PCIe slots.

Upper expansion card slots on the rear panel

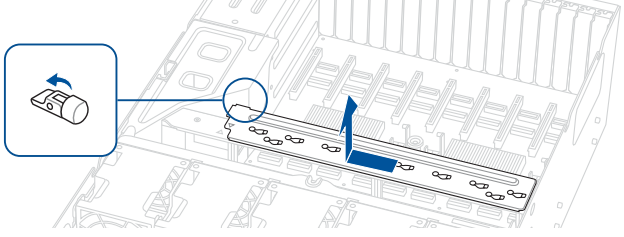
1. Loosen the thumbscrew, then lift the slot cover lock.



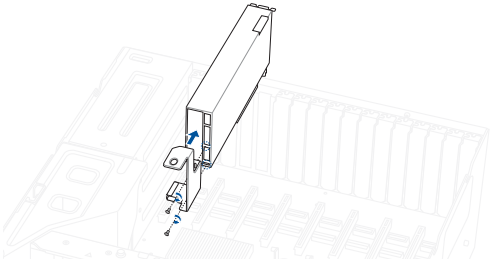
2. Remove the slot cover(s).



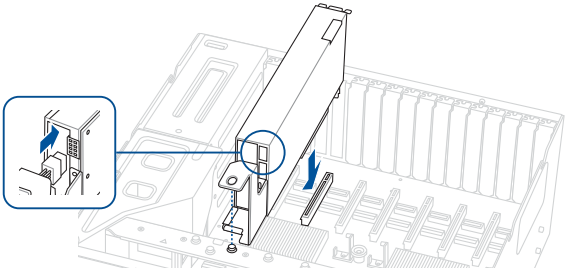
3. Disengage the latch, then remove the GPU bracket.



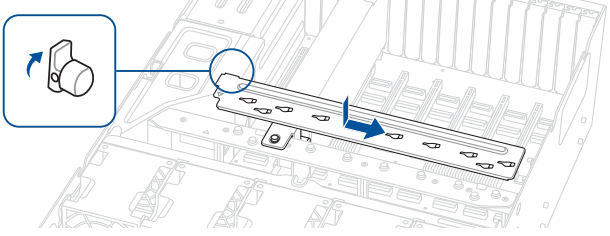
4. Secure the air duct to the GPU card with two screws.



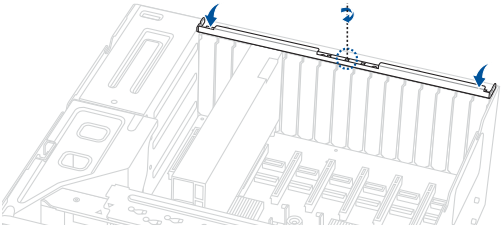
5. Install the GPU card, then connect the GPU power cable to the GPU card.



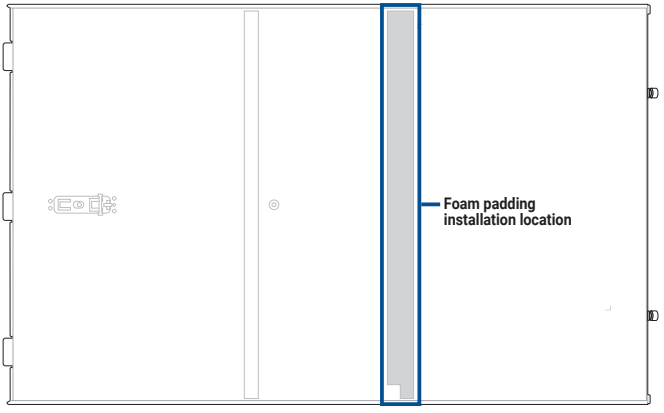
6. Install the GPU bracket, then return the latch to the locked position.



7. Lower the slot cover lock, then tighten the thumbscrew.



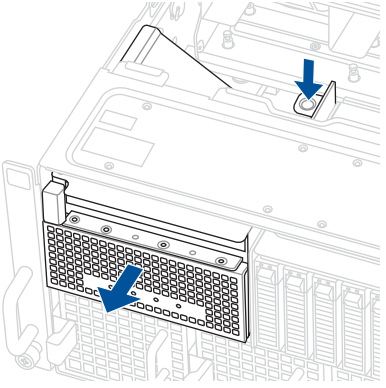
8. If NVIDIA® H200 GPUs are installed, attach the bundled foam padding to the underside of the chassis cover.



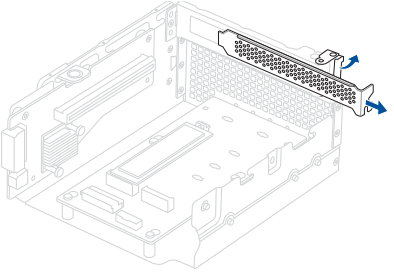
2.6.3 Installing an HBA/RAID card

Upper expansion card slot on the front panel

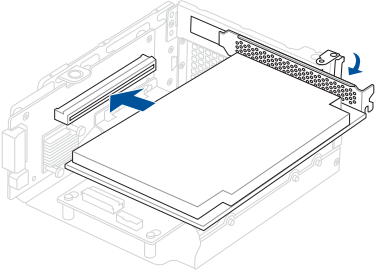
1. Disconnect the cables from the M.2/RAID card bay.
2. Press down on the latch and pull the M.2/RAID card bay out of the chassis.



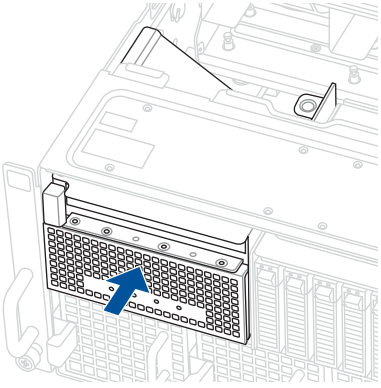
3. Flip the slot cover lock outwards, then remove the slot cover(s).



4. Install the HBA/RAID card, then return the slot cover lock to the locked position.



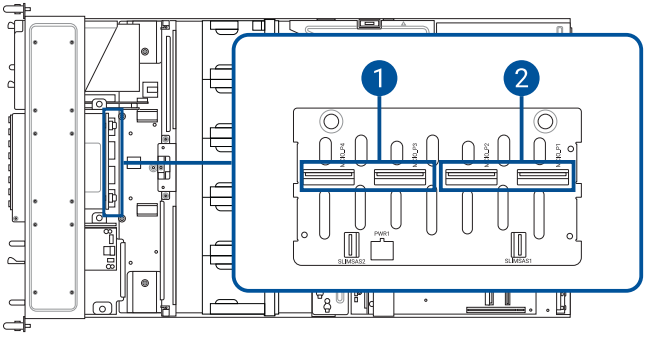
5. Push the M.2/RAID card bay all the way into the chassis.
6. Reconnect the cables to the M.2/RAID card bay.



2.7 Cable connections

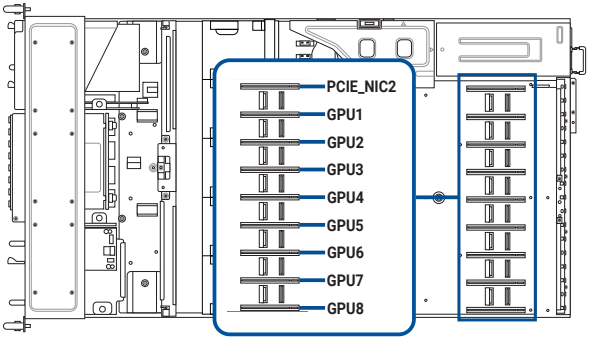
NOTE: The bundled system cables are pre-connected before shipment. You do not need to disconnect these cables unless you remove the pre-installed components to install additional devices.

2.7.1 Storage device backplane

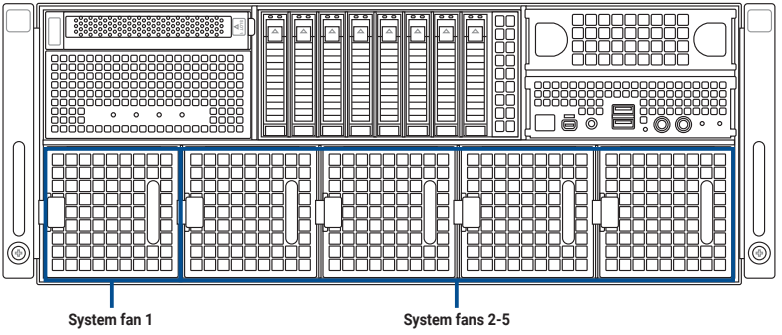


1. Connect to a RAID card for NVMe support on storage bays 5 to 8.
2. Connect to a RAID card for NVMe support on storage bays 1 to 4.

2.7.2 GPU SKU board

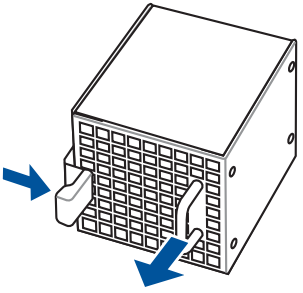


2.8 System fans



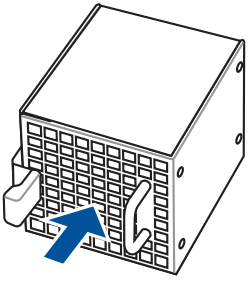
2.8.1 Removing a system fan

Press the latch inwards, then pull and remove the fan from the fan cage.

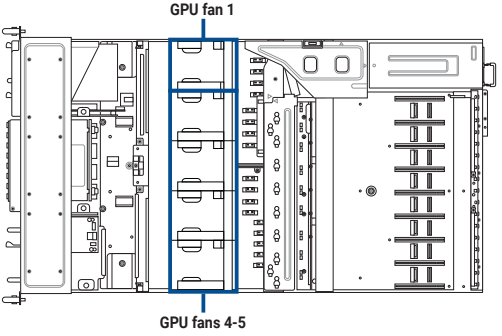


2.8.2 Installing a system fan

Install the fan into the fan cage and ensure it is securely seated.

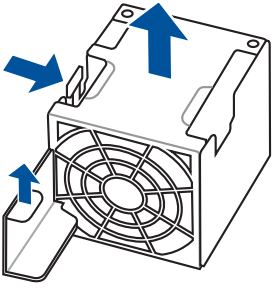


2.9 GPU fans



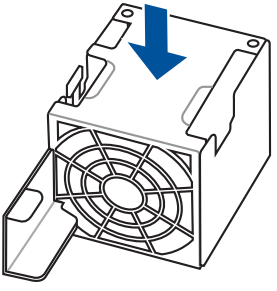
2.9.1 Removing a GPU fan

Press the latch inwards, then pull and remove the fan from the fan cage.



2.9.2 Installing a GPU fan

Install the fan into the fan cage and ensure it is securely seated.



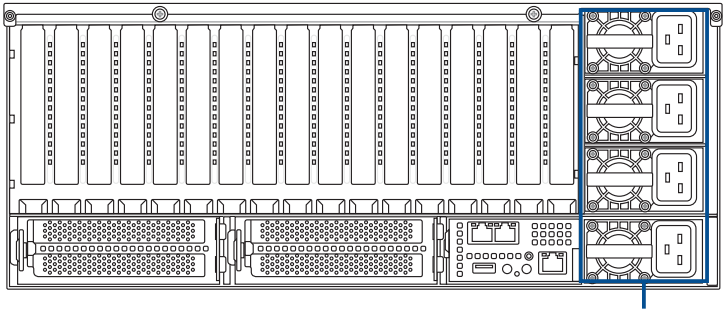
2.10 Redundant power supply units

NOTE:

- The system automatically combines the redundant power supply units. The combined output power varies with input voltages.
- To enable the hot-swap feature (redundant mode), keep the total power consumption of the system under the maximum output power of an individual power supply module.

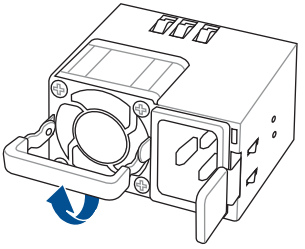
WARNING:

- Always use PSUs with the same watt and power rating. Combining PSUs with different wattages may yield unstable results and potential damage to your system.
- At least three working power supply units are required in order for the system to boot normally.
- For a steady power input, use only the power cables that come with the server system package.

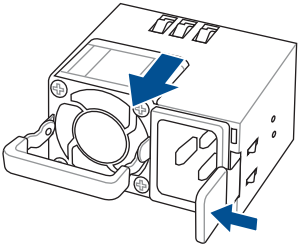


2.10.1 Removing a power supply unit

1. Lift up the PSU lever.

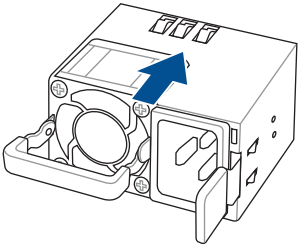


2. Hold the PSU lever and press the PSU latch inwards, then carefully pull the PSU out of the system chassis.



2.10.2 Installing a power supply unit

Align and install the PSU into the server chassis until it clicks into place.



2.11 Motherboard

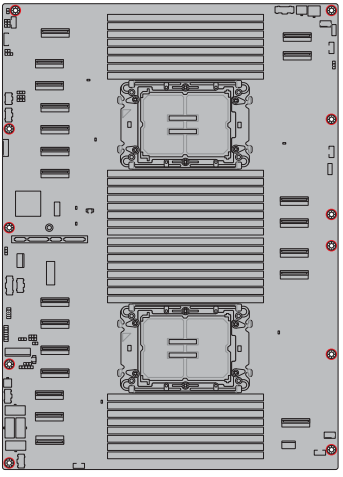
2.11.1 Removing the motherboard

To remove the system motherboard:

1. Disconnect the cables from the motherboard and remove any installed components on the motherboard.

   NOTE: Take a photo or make a note of which components are removed, which cables are disconnected, and which connectors the cables were connected to.

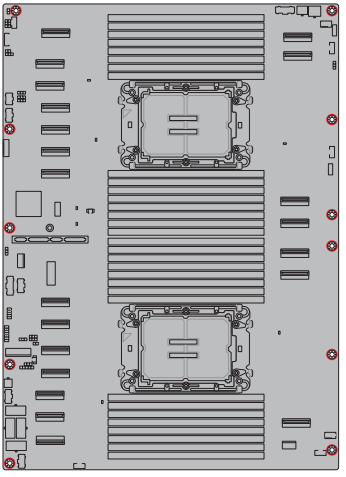
2. Remove the screws, then remove the motherboard.



2.11.2 Installing the motherboard

To install the system motherboard:

1. Place the motherboard into the chassis and ensure the screw holes on the motherboard are aligned with the screw holes in the chassis, then secure the motherboard to the chassis using the screws removed previously.

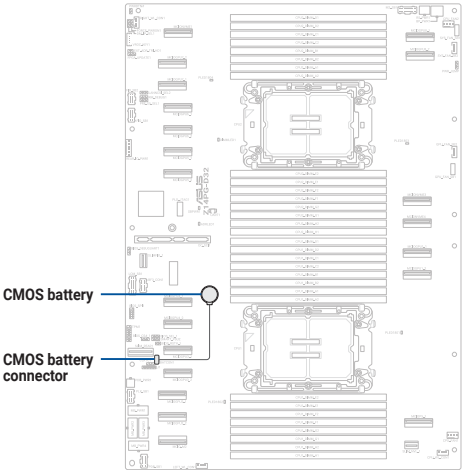


2. Reinstall any removed components and reconnect the cables to the motherboard.

2.12 CMOS battery

2.12.1 Replacing the CMOS battery

1. Disconnect and remove the CMOS battery.



2. Install the replacement CMOS battery and reconnect it to the motherboard.

2.13 Rail kit options

This server system supports the rail kit options listed below. For more information on rail kit installation, refer to corresponding documentation on the ASUS support site or on the official product site for this server system.

NOTE:

- We strongly recommend that at least two able-bodied persons perform the installation of the rail kit.
- We recommend the use of an appropriate lifting tool or device, if necessary.

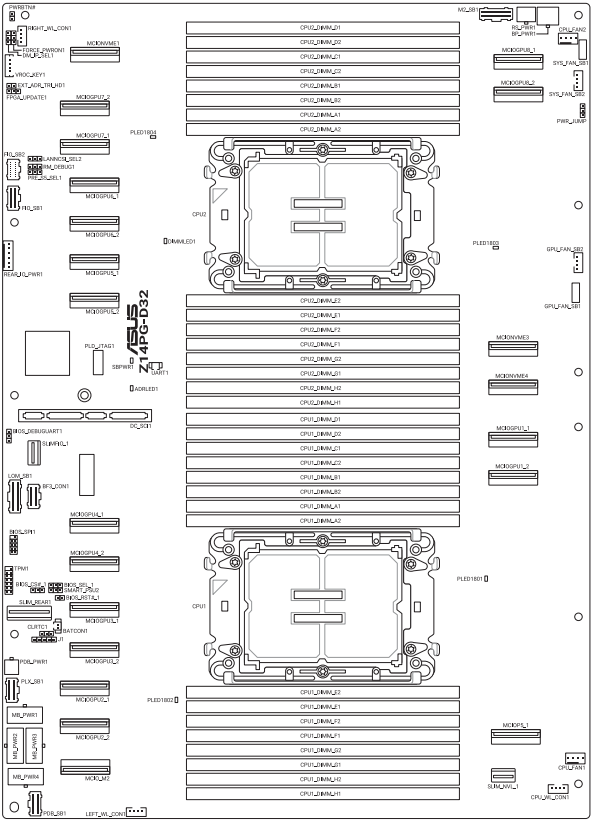
- 2U full extension ball bearing rail kit

Motherboard Information

3

This chapter gives information about the motherboard that comes with the server. This chapter includes the motherboard layout, jumper settings, and connector locations.

3.1 Motherboard layout



Layout contents

Sockets/slots		Page
1.	CPU sockets (CPU1-2)	3-3
2.	DIMM sockets (CPU1/CPU2_DIMM_A1-H2)	3-3

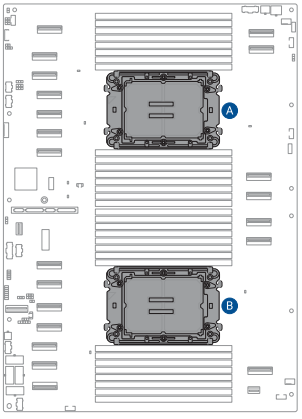
Jumpers		Page
1.	DMLAN setting (3-pin DM_IP_SEL1)	3-4

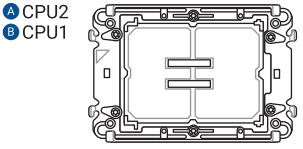
Internal connectors		Page
1.	TPM connector (14-1 pin TPM1)	3-4

3.2 Sockets

1. CPU sockets (CPU1-2)

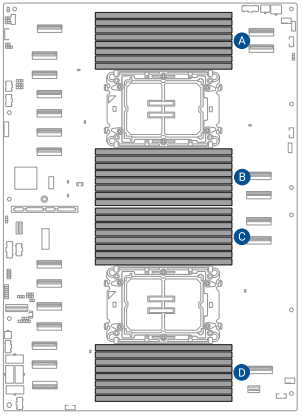
The motherboard comes with two surface mount LGA4710 sockets designed for Intel® Xeon® 6 processors.

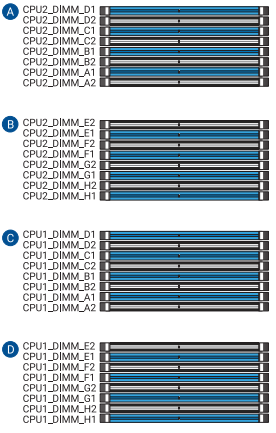




2. Dual Inline Memory Module (DIMM) sockets (CPU1/CPU2_DIMM_A1-H2)

The motherboard comes with thirty two Double Data Rate 5 (DDR5) Dual Inline Memory Modules (DIMM) sockets.

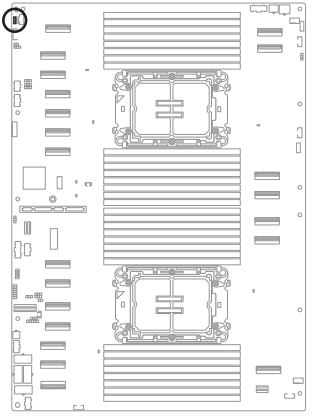


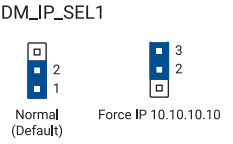


3.3 Jumpers

1. DMLAN setting (3-pin DM_IP_SEL1)

This jumper allows you to select the DMLAN setting. Set to pins 2-3 to force the DMLAN IP to static mode (IP=10.10.10.10, submask=255.255.255.0).

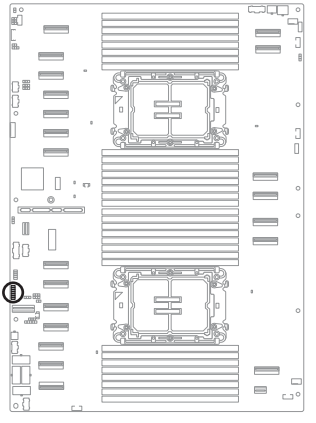


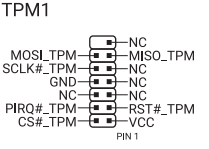


3.4 Internal connectors

1. TPM connector (14-1 pin TPM1)

This connector supports a Trusted Platform Module (TPM) system, which can securely store keys, digital certificates, passwords, and data.





BIOS Setup

4

This chapter tells how to change the system settings through the BIOS Setup menus. Detailed descriptions of the BIOS parameters are also provided.

4.1 Managing and updating your BIOS

The following utilities allow you to manage and update the motherboard Basic Input/Output System (BIOS) setup:

1. **ASUS CrashFree BIOS 3**

   To recover the BIOS using a bootable USB flash disk drive if the BIOS file fails or gets corrupted.

2. **ASUS EzFlash**

   Updates the BIOS using a USB flash disk.

Refer to the corresponding sections for details on these utilities.

4.1.1 ASUS CrashFree BIOS 3 Utility

The ASUS CrashFree BIOS 3 is an auto recovery tool that allows you to restore the BIOS file if it fails or gets corrupted during the updating process. You can update a corrupted BIOS file using a USB flash drive that contains the updated BIOS file.

NOTE: Prepare a USB flash drive containing the updated motherboard BIOS before using this utility.

Recovering the BIOS from a USB flash drive

To recover the BIOS from a USB flash drive:

1. Insert the USB flash drive with the original or updated BIOS file to one USB port on the system.
2. The utility will automatically recover the BIOS. It resets the system when the BIOS recovery finished.

CAUTION: DO NOT shut down or reset the system while recovering the BIOS! Doing so would cause system boot failure!

NOTE: The recovered BIOS may not be the latest BIOS version for this motherboard. Visit the ASUS website at www.asus.com to download the latest BIOS file.

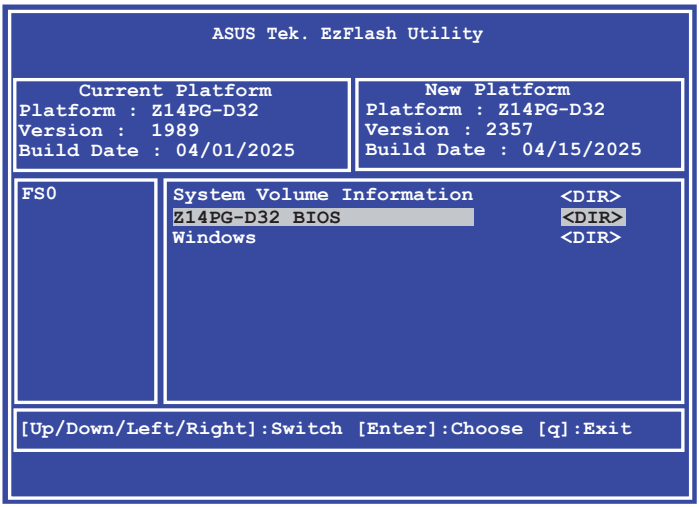
4.1.2 ASUS EZ Flash Utility

The ASUS EZ Flash Utility feature allows you to update the BIOS without having to use a DOS-based utility.

NOTE: Before you start using this utility, download the latest BIOS from the ASUS website at www.asus.com.

To update the BIOS using EZ Flash Utility:

1. Insert the USB flash disk that contains the latest BIOS file into the USB port.
2. Enter the BIOS setup program. Go to the **Tool** menu, then select **Start ASUS EZ Flash**. Press <Enter>.



3. Press the Left/Right arrow keys to switch to the **Drive** field.
4. Press the Up/Down arrow keys to find the USB flash disk that contains the latest BIOS, then press <Enter>.
5. Press Left/Right arrow keys to switch to the **Folder Info** field.
6. Press the Up/Down arrow keys to find the BIOS file, then press <Enter> to perform the BIOS update process. Reboot the system when the update process is done.

CAUTION:

- This function can support devices such as a USB flash disk with FAT 32/16 format and single partition only.
- DO NOT shut down or reset the system while updating the BIOS to prevent system boot failure!

NOTE: Use the default BIOS settings to ensure system compatibility and stability. Press <F5> and select **Yes** to load the default BIOS settings.

4.2 BIOS setup program

This motherboard supports a programmable firmware chip that you can update using the provided utility described in the **Managing and updating your BIOS** section.

Use the BIOS Setup program when you are installing a motherboard, reconfiguring your system, or prompted to "Run Setup." This section explains how to configure your system using this utility.

Even if you are not prompted to use the Setup program, you can change the configuration of your computer in the future. For example, you can enable the security password feature or change the power management settings. This requires you to reconfigure your system using the BIOS Setup program so that the computer can recognize these changes and record them in the CMOS RAM of the firmware chip.

The firmware chip on the motherboard stores the Setup utility. When you start up the computer, the system provides you with the opportunity to run this program. Press <Del> during the Power-On Self-Test (POST) to enter the Setup utility; otherwise, POST continues with its test routines.

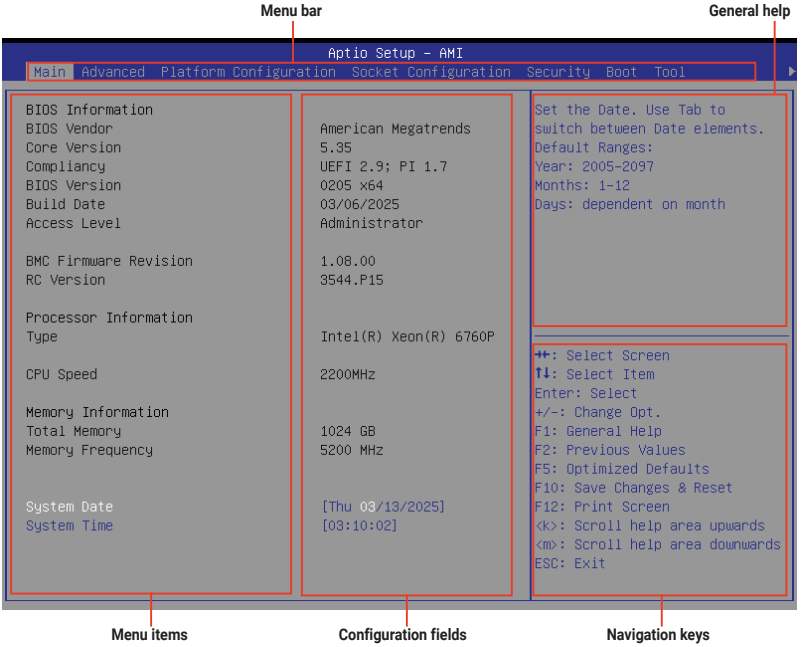
If you wish to enter Setup after POST, restart the system by pressing <Ctrl>+<Alt>+<Delete>, or by pressing the reset button on the system chassis. You can also restart by turning the system off and then back on. Do this last option only if the first two failed.

The Setup program is designed to make it as easy to use as possible. Being a menu-driven program, it lets you scroll through the various sub-menus and make your selections from the available options using the navigation keys.

NOTE:

- The default BIOS settings for this motherboard apply for most conditions to ensure optimum performance. If the system becomes unstable after changing any BIOS settings, load the default settings to ensure system compatibility and stability. Press <F5> and select **Yes** to load the BIOS default settings.
- The BIOS setup screens shown in this section are for reference purposes only, and may not exactly match what you see on your screen.
- Visit the ASUS website (www.asus.com) to download the latest BIOS file for this motherboard.

4.2.1 BIOS menu screen



4.2.2 Menu bar

The menu bar on top of the screen has the following main items:

Main	For changing the basic system configuration
Advanced	For changing the advanced system settings
Chipset	For changing the chipset settings
Security	For changing the security settings
Boot	For changing the system boot configuration
Tool	For configuring options for special functions
Event Logs	For changing the event log settings
Server Mgmt	For changing the Server Mgmt settings
Exit	For selecting the exit options

To select an item on the menu bar, press the right or left arrow key on the keyboard until the desired item is highlighted.

Menu items

The highlighted item on the menu bar displays the specific items for that menu. For example, selecting **Main** shows the Main menu items.

The other items (such as Advanced) on the menu bar have their respective menu items.

Submenu items

A solid triangle before each item on any menu screen means that the item has a submenu. To display the submenu, select the item then press <Enter>.

Navigation keys

At the bottom right corner of a menu screen are the navigation keys for the BIOS setup program. Use the navigation keys to select items in the menu and change the settings.

General help

At the top right corner of the menu screen is a brief description of the selected item.

Configuration fields

These fields show the values for the menu items. If an item is user-configurable, you can change the value of the field opposite the item. You cannot select an item that is not user-configurable.

A configurable field is enclosed in brackets, and is highlighted when selected. To change the value of a field, select it and press <Enter> to display a list of options.

Pop-up window

Select a menu item and press <Enter> to display a pop-up window with the configuration options for that item.

Scroll bar

A scroll bar appears on the right side of a menu screen when there are items that do not fit on the screen. Press the Up/Down arrow keys or <Page Up> / <Page Down> keys to display the other items on the screen.

4.3 Main menu

When you enter the BIOS Setup program, the Main menu screen appears. The Main menu provides you an overview of the basic system information, and allows you to set the system date, time, and language settings.

System Date [MM/DD/YYYY]

Allows you to set the system date.

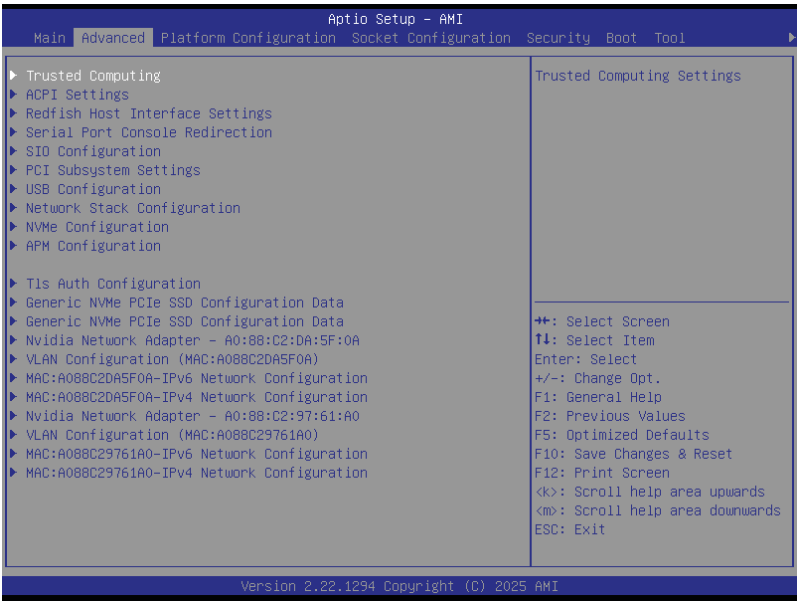
System Time [HH:MM:SS]

Allows you to set the system time.

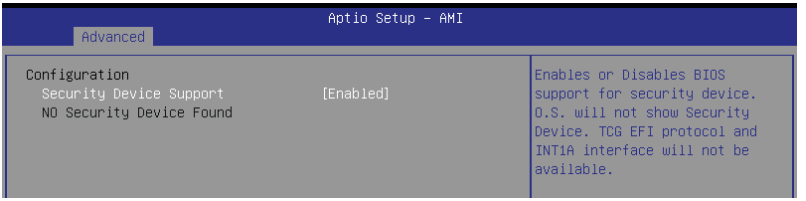
4.4 Advanced menu

The Advanced menu items allow you to change the settings for the CPU and other system devices.

CAUTION: Take caution when changing the settings of the Advanced menu items. Incorrect field values can cause the system to malfunction.



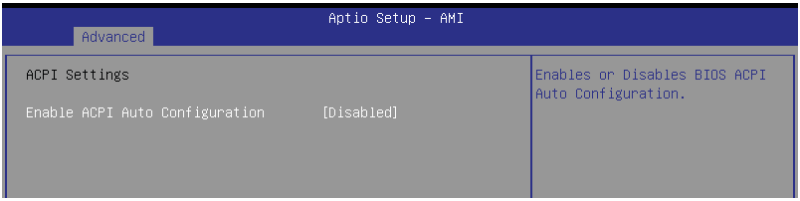
4.4.1 Trusted Computing



Security Device Support [Enabled]

Allows you to enable or disable the BIOS support for security devices.
Configuration options: [Disabled] [Enabled]

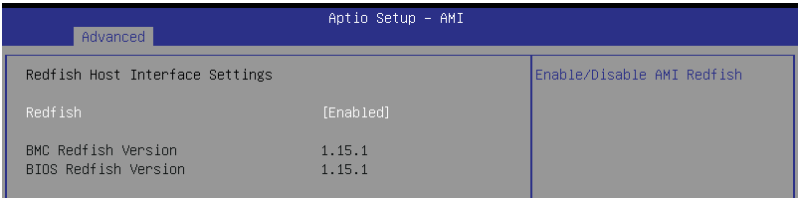
4.4.2 ACPI Settings



Enable ACPI Auto Configuration [Disabled]

Allows you to enable or disable the BIOS ACPI Auto Configuration.
Configuration options: [Disabled] [Enabled]

4.4.3 Redfish Host Interface Settings



Redfish [Enabled]

Allows you to enable or disable AMI Redfish.
Configuration options: [Disabled] [Enabled]

NOTE: The following item is available only when **Redfish** is set to **[Enabled]**.

Authentication Mode [Basic Authentication]

Configuration options: [Basic Authentication] [Session Authentication] [Authentication None]

IP Address

Allows you to set the IP address

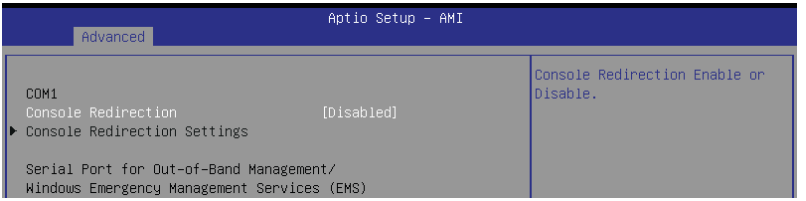
IP Mask Address

Allows you to set the IP mask address

IP Port

Allows you to set the IP port

4.4.4 Serial Port Console Redirection



COM1

Console Redirection [Disabled]

Allows you to enable or disable the console redirection feature.
Configuration options: [Disabled] [Enabled]

NOTE: The following items are available only when **Console Redirection** is set to **[Enabled]**.

Terminal Type [VT100Plus]

Allows you to set the terminal type.

[VT100]	ASCII char set.
[VT100Plus]	Extends VT100 to support color, function keys, etc.
[VT-UTF8]	Uses UTF8 encoding to map Unicode chars onto 1 or more bytes.
[ANSI]	Extended ASCII char set.

Bits per second [115200]

Selects serial port transmission speed. The speed must be matched on the other side. Long or noisy lines may require lower speeds.
Configuration options: [9600] [19200] [38400] [57600] [115200]

Data Bits [8]

Configuration options: [7] [8]

Parity [None]

A parity bit can be sent with the data bits to detect some transmission errors. [Mark] and [Space] parity do not allow for error detection.

[None]	None
[Even]	parity bit is 0 if the num of 1's in the data bits is even
[Odd]	parity bit is 0 if num of 1's in the data bits is odd
[Mark]	parity bit is always 1
[Space]	parity bit is always 0

Stop Bits [1]

Stop bits indicate the end of a serial data packet. (A start bit indicates the beginning.) The standard setting is 1 stop bit. Communication with slow devices may require more than 1 stop bit.
Configuration options: [1] [2]

Flow Control [Hardware RTS/CTS]

Flow control can prevent data loss from buffer overflow. When sending data, if the receiving buffers are full, a "stop" signal can be sent to stop the data flow. Once the buffers are empty, a "start" signal can be sent to re-start the flow. Hardware flow control uses two wires to send start/stop signals.
Configuration options: [None] [Hardware RTS/CTS]

VT-UTF8 Combo Key Support [Enabled]

This allows you to enable the VT-UTF8 Combination Key Support for ANSI/VT100 terminals.
Configuration options: [Disabled] [Enabled]

Recorder Mode [Disabled]

With this mode enabled only text will be sent. This is to capture Terminal data.
Configuration options: [Disabled] [Enabled]

Resolution 100x31 [Enabled]

This allows you to set the number of rows and columns supported on the Legacy OS.
Configuration options: [Disabled] [Enabled]

Putty Keypad [VT100]

This allows you to select the FunctionKey and Keypad on Putty.
Configuration options: [VT100] [LINUX] [XTERMR6] [SCO] [ESCN] [VT400]

Serial Port for Out-of-Band Management/ Windows Emergency Management Service (EMS)

Console Redirection EMS [Disabled]

Allows you to enable or disable the console redirection feature.
Configuration options: [Disabled] [Enabled]

NOTE: The following items are available only when **Console Redirection EMS** is set to **[Enabled]**.

Console Redirection Settings

Terminal Type EMS [VT-UTF8]

Configuration options: [VT100] [VT100Plus] [VT-UTF8] [ANSI]

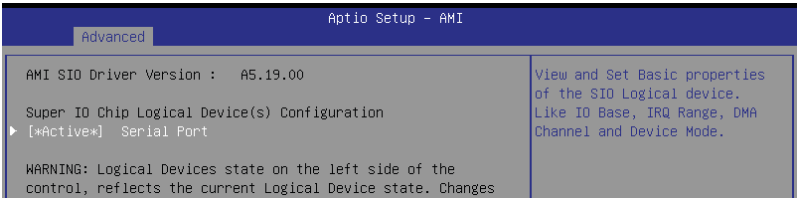
Bits per second EMS [115200]

Configuration options: [9600] [19200] [57600] [115200]

Flow Control EMS [None]

Configuration options: [None] [Hardware RTS/CTS] [Software Xon/Xoff]

4.4.5 SIO Configuration



WARNING: Logical Devices state on the left side of the control, reflects the current Logical Device state. Changes made during Setup Session will be shown after you restart the system.

[*Active*] Serial Port

Allows you to view and set basic properties of the SIO Logical device such as IO Base, IRQ Range, DMA Channel, and Device Mode.

Use This Device [Enabled]

Allows you to enable or disable this Logical Device.
Configuration options: [Disabled] [Enabled]

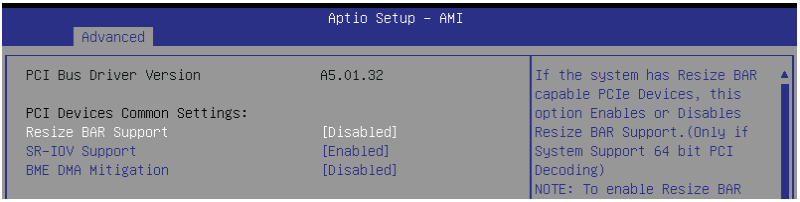
NOTE: The following item is available only when **Use This Device** is set to **[Enabled]**.

WARNING: Disabling SIO Logical Devices may have unwanted side effects. PROCEED WITH CAUTION.

Possible: [Use Automatic Settings]

Allows the user to change the device resource settings. New settings will be reflected no this setup page after system restarts.
Configuration options: [Use Automatic Settings] [IO=3F8h; IRQ=4; DMA;] [IO=3F8h; IRQ=3, 4, 5, 7, 9, 10, 11, 12; DMA;] [IO=2F8h; IRQ=3, 4, 5, 7, 9, 10, 11, 12; DMA;] [IO=3E8h; IRQ=3, 4, 5, 7, 9, 10, 11, 12; DMA;] [IO=2E8h; IRQ=3, 4, 5, 7, 9, 10, 11, 12; DMA;]

4.4.6 PCI Subsystem Settings



Re-Size BAR Support [Disabled]

If system has Resizable BAR capable PCIe Devices, this option enables or disables Resizable BAR Support. (Only if system supports 64-bit PCI Decoding).
Configuration options: [Disabled] [Auto]

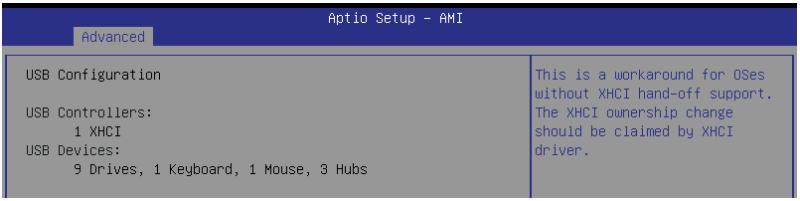
SR-IOV Support [Enabled]

Allows you to enable or disable Single Root IO Virtualization Support if the system has SR-IOV capable PCIe devices.
Configuration options: [Disabled] [Enabled]

BME DMA Mitigation [Disabled]

Allows you to enable or disable BME DMA mitigation.
Configuration options: [Disabled] [Enabled]

4.4.7 USB Configuration



XHCI Hand-off [Enabled]

Configuration options: [Enabled] [Disabled]

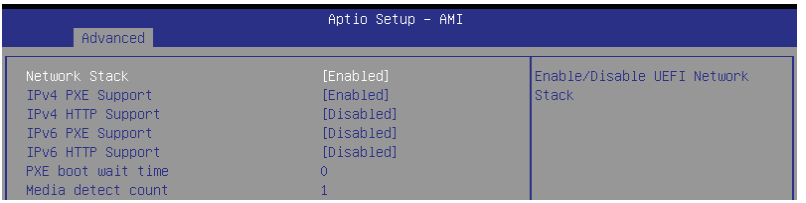
USB Mass Storage Driver Support [Enabled]

Configuration options: [Disabled] [Enabled]

Mass Storage Devices

Allows you to select the mass storage device emulation type for devices connected.
Configuration options: [Auto] [Floppy] [Forced FDD] [Hard Disk] [CD-ROM]

4.4.8 Network Stack Configuration



Network Stack [Enabled]

Configuration options: [Disabled] [Enabled]

NOTE: The following items are available only when **Network Stack** is set to **[Enabled]**.

IPv4 PXE Support [Enabled]

Configuration options: [Disabled] [Enabled]

IPv4 HTTP Support [Disabled]

Configuration options: [Disabled] [Enabled]

IPv6 PXE Support [Disabled]

Configuration options: [Disabled] [Enabled]

IPv6 HTTP Support [Disabled]

Configuration options: [Disabled] [Enabled]

PXE boot wait time [0]

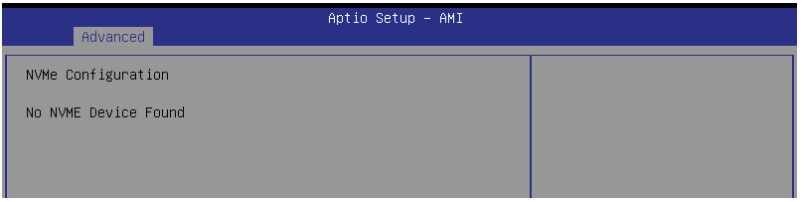
Wait time to press ESC key to abort the PXE boot.

Media detect count [1]

Wait time (in seconds) to detect media.

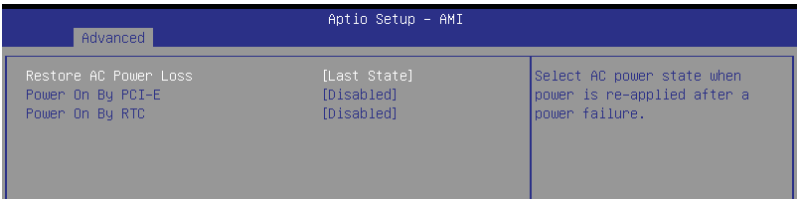
4.4.9 NVMe Configuration

This page will display the NVMe controller and drive information.



4.4.10 APM Configuration

Allows you to configure the Advance Power Management (APM) settings.



Restore AC Power Loss [Last State]

When set to [Power Off], the system goes into off state after an AC power loss. When set to [Power On], the system will reboot after an AC power loss. When set to [Last State], the system goes into either off or on state, whatever the system state was before the AC power loss.
Configuration options: [Power On] [Power Off] [Last State]

Power On By PCI-E [Disabled]

[Disabled] Disables the PCIE devices to generate a wake event.

[Enabled] Enables the PCIE devices to generate a wake event.

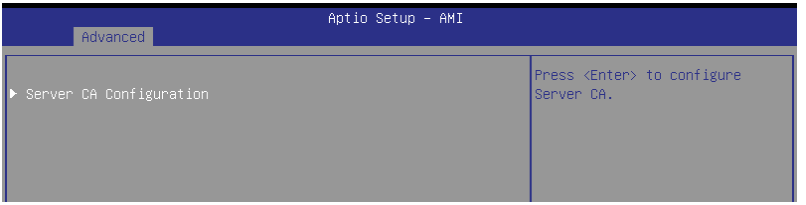
Power On By RTC [Disabled]

[Disabled] Disables RTC to generate a wake event.

[Enabled] When set to [Enabled], the items **RTC Alarm Date (Days)** and **Hour/Minute/Second** will become user-configurable with set values.

4.4.11 T1s Auth

Allows you to configure the Server Certificate Authority (CA).



Server / Client CA Configuration

Enroll Cert

Allows you to enroll a certificate using a certificate file or manually input a certificate GUID.

Enroll Cert Using File
Allows you to enroll a certificate using a certificate file. You will be prompted to select a storage device and navigate to the location of the certificate file.

Cert GUID
Allows you to enroll a certificate by manually inputting the certificate GUID.

Commit Changes and Exit
Exit Server CA configuration after saving the changes.

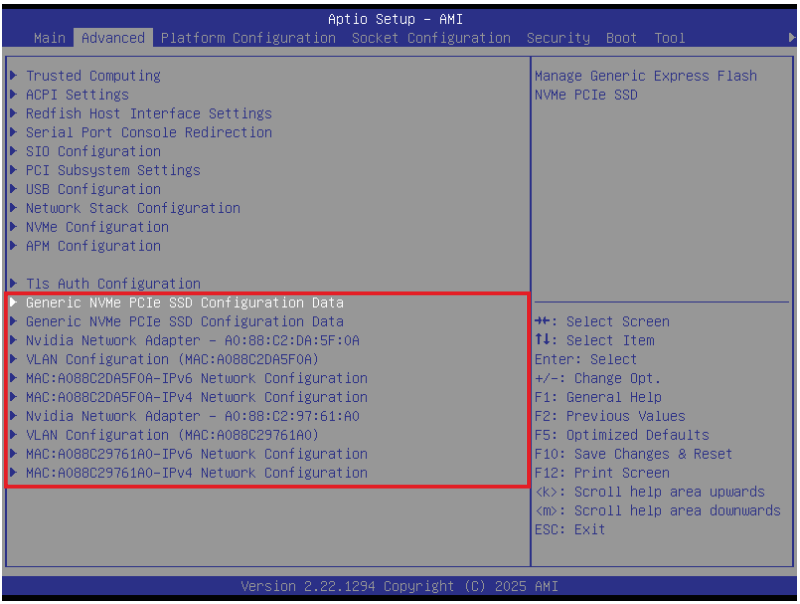
Discard Changes and Exit
Exit Server CA configuration without saving any changes.

Delete Cert

Allows you to delete the certificate.

4.4.12 Third-party UEFI driver configurations

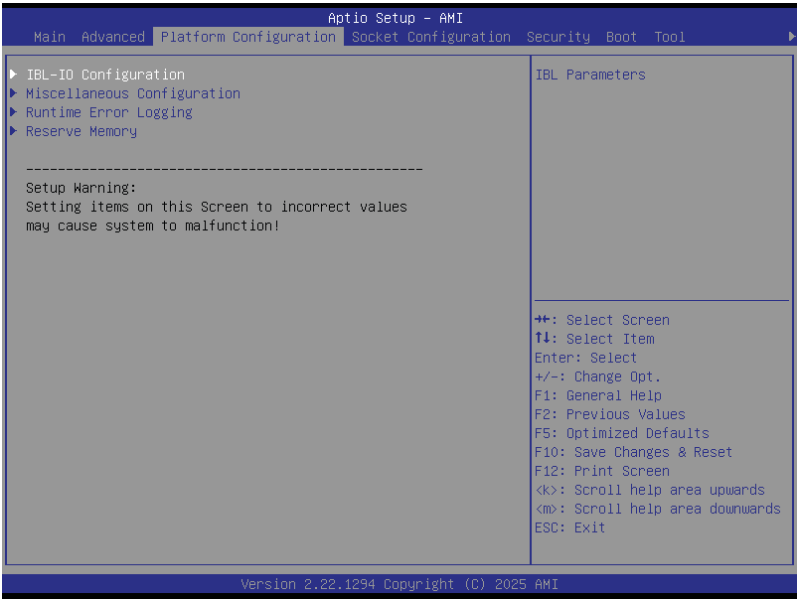
Additonal configuration options for third-party UEFI drivers installed to the system will appear in the section marked in red in the screenshot below.



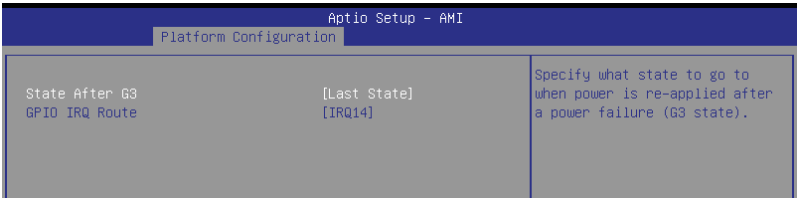
4.5 Platform Configuration menu

The Platform Configuration menu items allow you to change the platform settings.

WARNING: Setting items in this menu to incorrect values may cause the system to malfunction!



4.5.1 IBL-IO Configuration



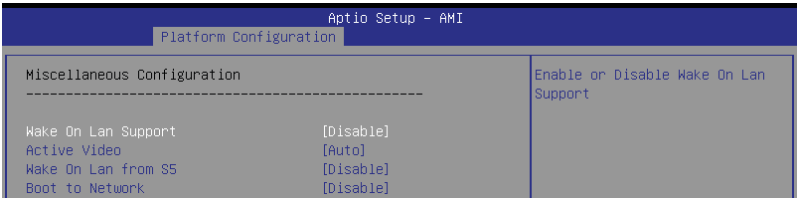
State After G3 [Last State]

Configuration options: [S0 State] [S5 State] [Last State]

GPIO IRQ Route [IRQ14]

Configuration options: [IRQ14] [IRQ15]

4.5.2 Miscellaneous Configuration



Wake On LAN Support [Disabled]

Configuration options: [Disabled] [Enabled]

Active Video [Auto]

Configuration options: [Auto] [Onboard Device] [PCIE Device]

Wake On LAN From S5 [Disabled]

Configuration options: [Disabled] [Enabled]

Boot to Network [Disabled]

Configuration options: [Disabled] [Enabled]

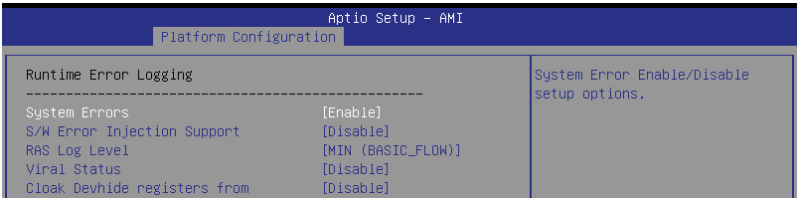
RTC Wake System From S5 [Disabled]

Configuration options: [Disabled] [Enabled] [Enable and set wake on time]

Clock SSC Support [Hardware]

Configuration options: [SSC Off] [SSC = -0.3%] [SSC = -0.5%] [Hardware]

4.5.3 Runtime Error Logging



System Errors [Enabled]

Configuration options: [Disabled] [Enabled]

NOTE: The following item is available only when **System Errors** is set to **[Enabled]**.

S/W Error Injection Support [Disabled]

Configuration options: [Disabled] [Enabled]

RAS Log Level [MIN (BASIC_FLOW)

Configuration options: [None] [MIN (BASIC_FLOW)] [MID (BASIC_FLOW, FUNC_FLOW)] [MAX (BASIC_FLOW, FUNC_FLOW, REG)

Viral Status [Disabled]

Configuration options: [Disabled] [Enabled]

NOTE: The following items are available only when **Viral Status** is set to **[Enabled]**.

Clear Viral Status [Disabled]

Configuration options: [Disabled] [Enabled]

Cloak Devhide registers from being accessible from OS [Disabled]

Configuration options: [Disabled] [Enabled]

NOTE: The following items are available only when **System Errors** is set to **[Enabled]**.

Corrected Error Cloaking [Disabled]

Configuration options: [Disabled] [Enabled]

UCNA Cloaking [Disabled]

Configuration options: [Disabled] [Enabled]

UboxToPcuMca Enabling [Enabled]

Configuration options: [Disabled] [Enabled]

FatalErrDebugHalt [Disabled]

Configuration options: [Disabled] [Enabled]

Mca Bank Warm Boot Clear Errors [Enabled]

Configuration options: [Disabled] [Enabled]

Clear Shadow Registers [Enabled]

Configuration options: [Disabled] [Enabled]

OOB RAS Support [Disabled]

Configuration options: [Disabled] [Enabled]

RAS Performance Support [Enabled]

Configuration options: [Disabled] [Enabled]

eMCA Settings

Allows you to configure eMCA options.

Whea Settings

Allows you to configure Whea options.

Memory Error Enabling

Allows you to configure Memory Error options.

IIO Error Enabling

Allows you to configure IIO Error options.

CXL Error Enabling

Allows you to configure CXL Error options.

PCIe Error Enabling

Allows you to configure PCIe Error options.

Error Control Setting

Allows you to configure Error Control options.

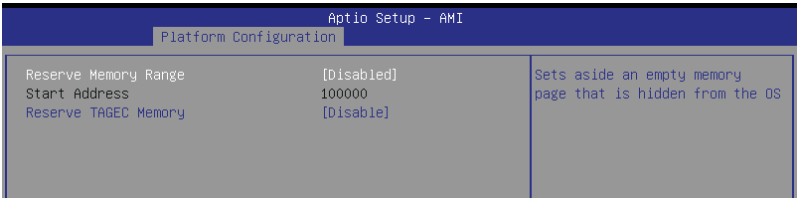
Crash Log Enabling

Allows you to configure Crash Log options.

AWR Configuration

Allows you to configure AWR options.

4.5.4 Reserve Memory



Reserve Memory Range [Disabled]

Configuration options: [Disabled] [Enabled]

Start Address [100000]

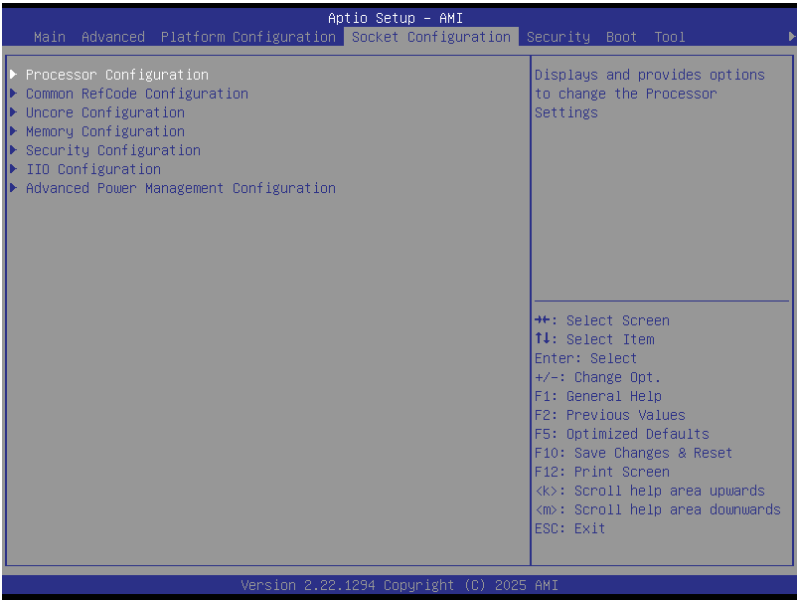
Allows you to set the start address.

Reserve TAGEC Memory [Disabled]

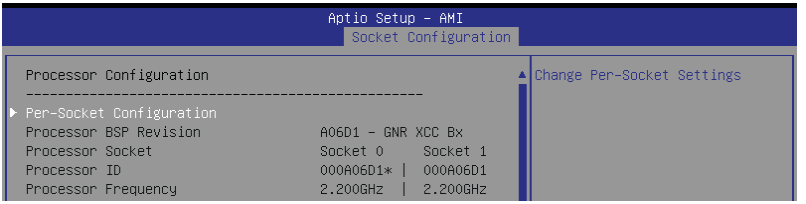
Configuration options: [Disabled] [Enabled]

4.6 Socket Configuration menu

The Socket Configuration menu items allow you to change the socket settings.



4.6.1 Processor Configuration



Per-Socket Configuration

Allows you to configure per-socket options.

Hyper-Threading [All LPs]

Configuration options: [All LPs] [Single LP]

Skip Flex Ratio Override [Disabled]

Configuration options: [Disabled] [Enabled]

Check CPU BIST Result [Enabled]

Configuration options: [Disabled] [Enabled]

3StrikeTimer [Enabled]

Configuration options: [Enabled] [Disabled]

Fast String [Enabled]

Configuration options: [Disabled] [Enabled]

Machine Check [Enabled]

Configuration options: [Disabled] [Enabled]

Hardware Prefetcher [Enabled]

Configuration options: [Disabled] [Enabled]

Adjacent Cache Prefetch [Enabled]

Configuration options: [Enabled] [Disabled]

DCU Streamer Prefetcher [Auto]

Configuration options: [Enabled] [Disabled] [Auto]

DCU IP Prefetcher [Enabled]

Configuration options: [Enabled] [Disabled]

LLC Prefetch [Disabled]

Configuration options: [Disabled] [Enabled]

Homeless Prefetch [Auto]

Configuration options: [Disabled] [Enabled] [Auto]

FB Thread Slicing [Disabled]

Configuration options: [Disabled] [Enabled]

AMP Prefetch [Enabled]

Configuration options: [Disabled] [Enabled]

Lowest APICID as BSP [Enabled]

Configuration options: [Disabled] [Enabled]

APIC Physical Mode [Disabled]

Configuration options: [Disabled] [Enabled]

IIO LLC Ways Mask (Hex) [0]

Allows you to adjust the IIO LLC Ways Mask.

SMM Blocked and Delayed [Disabled]

Configuration options: [Disabled] [Enabled]

eSMM Save State [Disabled]

Configuration options: [Disabled] [Enabled]

SMBus Error Recovery [SMI]

Configuration options: [Disabled] [SMI] [Error Pin]

Enable Intel(R) TXT [Disabled]

Configuration options: [Disabled] [Enabled]

NOTE: The following items are available only when **Enable Intel(R) TXT** is set to **[Disabled]**.

VMX [Enabled]

Configuration options: [Disabled] [Enabled]

Enable SMX [Disabled]

Configuration options: [Disabled] [Enabled]

Lock Chipset [Enabled]

Configuration options: [Enabled] [Disabled]

BIOS ACM Error Reset [Disabled]

Configuration options: [Disabled] [Enabled]

MSR Lock Control [Enabled]

Configuration options: [Disabled] [Enabled]

PPIN Control [Unlock/Enable]

Configuration options: [Lock/Disable] [Unlock/Enable]

AES-NI [Enabled]

Configuration options: [Disabled] [Enabled]

Core Crash Data GPRs [Disabled]

Configuration options: [Disabled] [Gprs Enabled, Smm Gprs Enabled] [Gprs Enabled, Smm Gprs Disabled]

Processor Trace [Disabled]

Configuration options: [Disabled] [Enabled]

NOTE: The following items are available only when **Processor Trace** is set to **[Enabled]**.

Processor Trace Output Scheme [Single Range Output]

Configuration options: [Single Range Output] [ToPA Output]

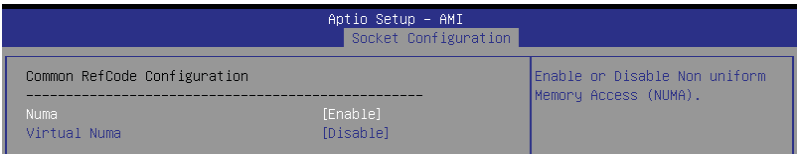
Processor trace memory allocation [4K]

Configuration options: [4-64K]

PSMI Configuration

Allows you to configure PSMI options.

4.6.2 Common RefCode Configuration



Numa [Enabled]

Configuration options: [Disabled] [Enabled]

NOTE: The following item is available only when **Numa** is set to **[Enabled]**.

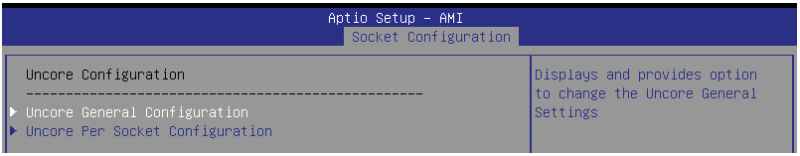
Virtual Numa [Disabled]

Configuration options: [Disabled] [Enabled]

NOTE: The following item is available only when **Virtual Numa** is set to **[Enabled]**.

Number of Virtual Numa Nodes [0]
Allows you to set the number of virtual Numa nodes.

4.6.3 Uncore Configuration



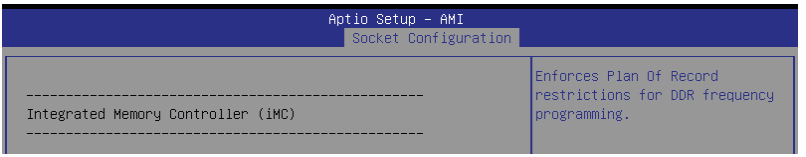
Uncore General Configuration

Allows you to configure Uncore General options.

Uncore Per Socket Configuration

Allows you to configure Uncore Per Socket options.

4.6.4 Memory Configuration



Enforce DDR Memory Frequency POR [Enforce POR]

Configuration options: [Enforce POR] [Enforce Stretch Goals] [Disabled]

Enforce Population POR [Enabled]

Configuration options: [Disabled] [Enabled]

Host Memory Frequency [Auto]

Configuration options: [Auto] [4800-6400]

Global Scrambling [Enabled]

Configuration options: [Disabled] [Enabled]

Memory Topology

Allows you to configure Memory Topology options.

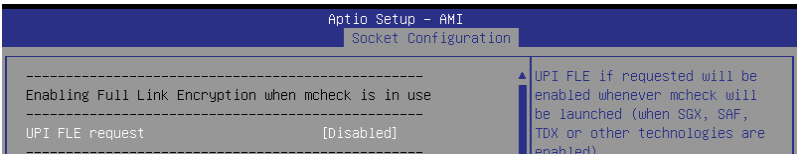
Memory Map

Allows you to configure Memory Map options.

Memory RAS Configuration

Allows you to configure Memory RAS options.

4.6.5 Security Configuration



UPI FLE Request [Disabled]

Configuration options: [Disabled] [Enabled]

Memory Encryption (TME) [Disabled]

Configuration options: [Disabled] [Enabled]

Total Memory Encryption Multi-Tenant (TME-MT) [Disabled]

Configuration options: [Disabled] [Enabled]

Memory Integrity [Disabled]

Configuration options: [Disabled] [Enabled]

TME Encryption Algorithms [AES-XTS-256]

Configuration options: [AES-XTS-128] [AES-XTS-256]

Trust Domain Extensions (TDX) [Disabled]

Configuration options: [Disabled] [Enabled]

NOTE: The following items are available only when **Trust Domain Extensions (TDX)** is set to **[Enabled]**.

TDX Secure Arbitration Mode Loader (SEAM Loader) [Disabled]

Configuration options: [Disabled] [Enabled]

TME-MT/TDX key split [1]

Allows you to set the TME-MT/TDX key split.

SGX Error Code (HEX) [16]

Allows you to set the SGX error code.

SGX Factory Reset [Disabled]

Configuration options: [Disabled] [Enabled]

SW Guard Extensions (SGX) [Disabled]

Configuration options: [Disabled] [Enabled]

SGX Package Info In-Band Access [Disabled]

Configuration options: [Disabled] [Enabled]

NOTE: The following items are available only when **Software Guard Extensions (SGX)** is set to **[Enabled]**.

SGX PRMRR Size Requested [Auto]

Configuration options: [Auto] [128M-512G]

Select Owner EPOCH Input Type [SGX Owner EPOCH Deactivated]

Configuration options: SGX Owner EPOCH Deactivated] [Change to New Random Owner EPOCHs] [Manual User Defined Owner EPOCHs]

Software Guard Extensions Epoch 0-1

Allows you to set the Software Guard Extensions EPOCH.

SGXLEPUBKEYHASHx Write Enable [Enabled]

Configuration options: [Disabled] [Enabled]

NOTE: The following item is available only when **SGXLEPUBKEYHASHx Write Enable** is set to **[Enabled]**.

SGXLEPUBKEYHASH0-3 [0]
Allows you to set the SGXLEPUBKEYHASH.

SGX Auto MP Registration [Disabled]

Configuration options: [Disabled] [Enabled]

In Field Scan (IFS)

Allows you to configure In Field Scan options.

4.6.6 IIO Configuration

Socket0 Configuration

Allows you to configure Socket0 options.

Socket1 Configuration

Allows you to configure Socket1 options.

Intel VT for Directed I/O (VT-d)

Allows you to configure VT-d options.

Global Configuration

Allows you to configure Global options.

4.6.7 Advanced Power Management Configuration

CPU P State Control

Allows you to configure CPU P State Control options.

Hardware PM State Control

Allows you to configure Hardware PM State Control options.

CPU C State Control

Allows you to configure CPU C State Control options.

Package C State Control

Allows you to configure Package C State Control options.

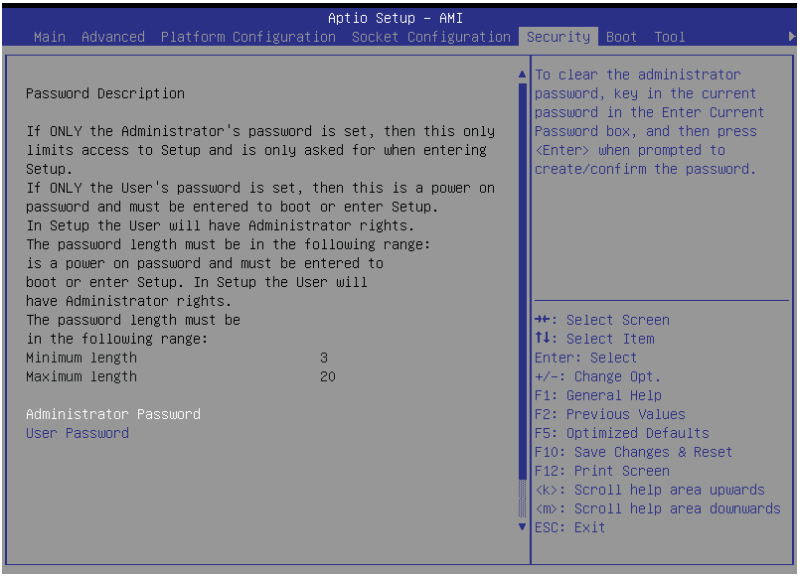
CPU - Advanced PM Tuning

Allows you to configure Advanced PM Tuning options.

Memory Power & Thermal Configuration

Allows you to configure Memory Power and Thermal options.

4.7 Security menu



Administrator Password

To set an administrator password:

1. Select the Administrator Password item and press <Enter>.
2. From the Create New Password box, key in a password, then press <Enter>.
3. Confirm the password when prompted.

To change an administrator password:

1. Select the Administrator Password item and press <Enter>.
2. From the Enter Current Password box, key in the current password, then press <Enter>.
3. From the Create New Password box, key in a new password, then press <Enter>.
4. Confirm the password when prompted.

NOTE: To clear the administrator password, follow the same steps as in changing an administrator password, but press <Enter> when prompted to create/confirm the password.

User Password

To set a user password:

1. Select the User Password item and press <Enter>.
2. From the Create New Password box, key in a password, then press <Enter>.
3. Confirm the password when prompted.

To change a user password:

1. Select the User Password item and press <Enter>.
2. From the Enter Current Password box, key in the current password, then press <Enter>.
3. From the Create New Password box, key in a new password, then press <Enter>.
4. Confirm the password when prompted.

NOTE: To clear the user password, follow the same steps as in changing a user password, but press <Enter> when prompted to create/confirm the password.

Secure Boot

Secure Boot [Disabled]

Secure Boot can be enabled if the system is running in User mode with enrolled platform Key (EPK) or if the CSM function is disabled.
Configuration options: [Disabled] [Enabled]

Secure Boot Mode [Custom]

Allows you to set the Secure Boot selector.
Configuration options: [Standard] [Custom]

Restore Factory Keys

Allows you to restore the factory keys.

Reset To Setup Mode

Allows you to reset to setup mode.

Expert Key Management

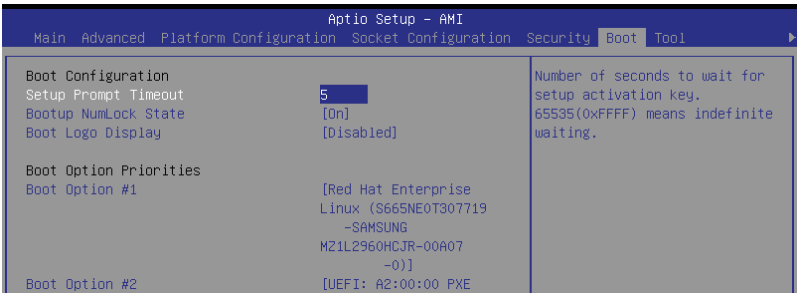
Allows you to configure Expert Key Management options.

Secure Flash Update

Allows you to configure Secure Flash Update options.

4.8 Boot menu

The Boot menu items allow you to change the system boot options.



Setup Prompt Timeout [5]

Allows you to set the number of seconds that the firmware waits before initiating the original default boot selection. 65535 (0xFFFF) means indefinite waiting. Use the <+> or <-> to adjust the value.

Bootup NumLock State [On]

Allows you to select the power-on state for the NumLock.
Configuration options: [On] [Off]

Boot Logo Display [Disabled]

Allows you to enable or disable Quiet Boot option.
Configuration options: [Disabled] [Enabled]

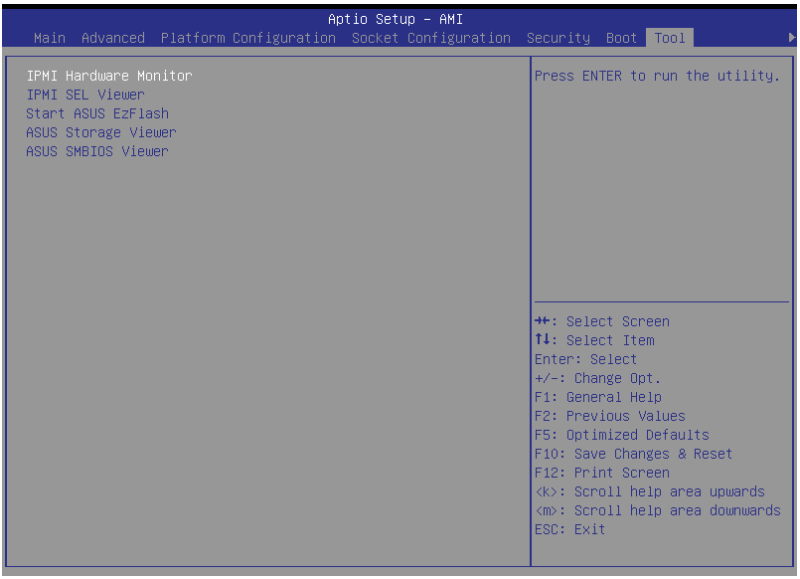
Boot Option Priorities

These items specify the boot device priority sequence from the available devices. The number of device items that appears on the screen depends on the number of devices installed in the system.

NOTE: To select the boot device during system startup, press <F8> when ASUS Logo appears.

4.9 Tool menu

The Tool menu items allow you to configure options for special functions. Select an item and press <Enter> to display the submenu.



IPMI Hardware Monitor

Allows you to run the IPMI hardware monitor.

IPMI SEL Viewer

Allows you to run the IPMI SEL viewer.

Start ASUS EzFlash

Allows you to run ASUS EZ Flash BIOS ROM Utility. Refer to the **ASUS EZ Flash Utility** section for details.

ASUS Storage Viewer

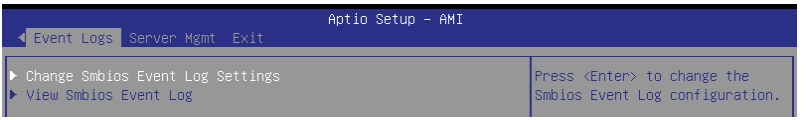
Allows you to run ASUS Storage Viewer.

ASUS SMBIOS Viewer

Allows you to run ASUS SMBIOS Viewer.

4.10 Event Logs menu

The Event Logs menu items allow you to change the event log settings and view the system event logs.



4.10.1 Change Smbios Event Log Settings

Press <Enter> to change the Smbios Event Log configuration.

NOTE: All values changed here do not take effect until computer is restarted.

Smbios Event Log [Enabled]

Change this to enable or disable all features of Smbios Event Logging during boot.
Configuration options: [Disabled] [Enabled]

NOTE: The following items are available only when **Smbios Event Log** is set to **[Enabled]**.

Erase Event Log [No]

Choose options for erasing Smbios Event Log. Erasing is done prior to any logging activation during reset.
Configuration options: [No] [Yes, Next reset] [Yes, Every reset]

When Log is Full [Do Nothing]

Choose options for reactions to a full Smbios Event Log.
Configuration options: [Do Nothing] [Erase Immediately]

Log EFI Status Code [Enabled]

This option allows you to enable or disable logging of the EFI Status Codes.
Configuration options: [Disabled] [Enabled]

NOTE: The following item is available only when **Log EFI Status Code** is set to **[Enabled]**.

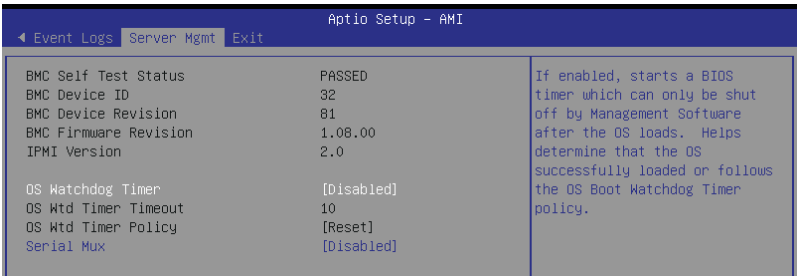
Convert EFI Status Codes to Standard Smbios Type [Disabled]
This option allows you to enable or disable converting of EFI Status Codes to Standard Smbios Type (Not all may be translated).
Configuration options: [Disabled] [Enabled]

4.10.2 View Smbios Event Log

Press <Enter> to view all smbios event logs.

4.11 Server Mgmt menu

The Server Management menu displays the server management status and allows you to change the settings.



OS Watchdog Timer [Disabled]

This item allows you to start a BIOS timer which can only be shut off by management software after the OS loads.
Configuration options: [Enabled] [Disabled]

NOTE: The following items are available only when **OS Watchdog Timer** is set to **[Enabled]**.

OS Wtd Timer Timeout [10]

Enter the value between 1 to 30 minutes to configure the length fo the OS Boot Watchdog Timer.

OS Wtd Timer Policy [Reset]

This item allows you to configure the how the system should respond if the OS Boot Watch Timer expires.
Configuration options: [Do Nothing] [Reset] [Power Down] [Power Cycle]

Serial Mux [Disabled]

Configuration options: [Disabled] [Enabled]

4.11.1 System Event Log

Allows you to change the SEL event log configuration.

SEL Components [Enabled]

Configuration options: [Disabled] [Enabled]

Erase SEL [No]

Allows you to choose options for erasing SEL.
Configuration options: [No] [Yes, On next reset] [Yes, On every reset]

4.11.2 View FRU information

Allows you to view FRU information.

4.11.3 BMC network configuration

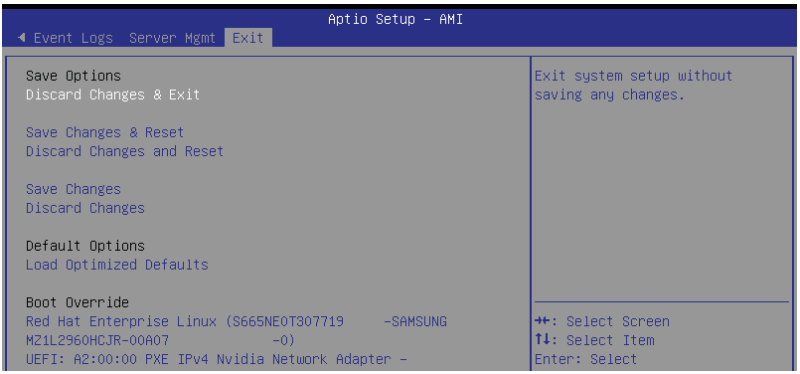
The sub-items in this configuration allow you to configure the BMC network parameters.

4.11.4 View System Event Log

This item allows you to view the system event log records.

4.12 Exit menu

The Exit menu items allow you to save or discard your changes to the BIOS items.



Discard Changes and Exit

Exit system setup without saving any changes.

Save Changes and Reset

Reset the system after saving the changes.

Discard Changes and Reset

Reset system setup without saving any changes.

Save Changes

Save changes done so far to any of the setup options.

Discard Changes

Discard changes done so far to any of the setup options.

Load Optimized Defaults

Load optimized default values for all the setup options.

Boot Override

These items displays the available devices. The device items that appears on the screen depends on the number of devices installed in the system. Click an item to start booting from the selected device.

Launch EFI Shell from filesystem device

This item allows you to attempt to launch the EFI Shell application (shellx64.efi) from one of the available filesystem devices.

5 RAID Configuration

This chapter provides instructions for setting up, creating, and configuring RAID sets using the available utilities.

5.1 Setting up RAID

The motherboard supports the **Intel® Rapid Storage Technology enterprise Option ROM Utility** with RAID 0, RAID 1, RAID 10, and RAID 5 support (for Windows OS and Linux).

5.1.1 RAID definitions

RAID 0 (Data striping) optimizes two identical hard disk drives to read and write data in parallel, interleaved stacks. Two hard disks perform the same work as a single drive but at a sustained data transfer rate, double that of a single disk alone, thus improving data access and storage. Use of two new identical hard disk drives is required for this setup.

RAID 1 (Data mirroring) copies and maintains an identical image of data from one drive to a second drive. If one drive fails, the disk array management software directs all applications to the surviving drive as it contains a complete copy of the data in the other drive. This RAID configuration provides data protection and increases fault tolerance to the entire system. Use two new drives or use an existing drive and a new drive for this setup. The new drive must be of the same size or larger than the existing drive.

RAID 10 is data striping and data mirroring combined without parity (redundancy data) having to be calculated and written. With the RAID 10 configuration you get all the benefits of both RAID 0 and RAID 1 configurations. Use four new hard disk drives or use an existing drive and three new drives for this setup.

RAID 5 stripes both data and parity information across three or more hard disk drives. Among the advantages of RAID 5 configuration include better HDD performance, fault tolerance, and higher storage capacity. The RAID 5 configuration is best suited for transaction processing, relational database applications, enterprise resource planning, and other business systems. Use a minimum of three identical hard disk drives for this setup.

NOTE: If you want to boot the system from a hard disk drive included in a created RAID set, copy first the RAID driver from the support DVD to a floppy disk before you install an operating system to the selected hard disk drive.

5.1.2 Installing hard disk drives

The motherboard supports Serial ATA and NVMe for RAID set configuration. For optimal performance, install identical drives of the same model and capacity when creating a disk array.

To install the SATA or NVMe hard disks for RAID configuration, please refer to the **Storage devices** section for more information.

5.1.3 RAID configuration utilities

Depending on the RAID connectors that you use, you can create a RAID set using the utilities embedded in each RAID controller. For example, use the **Intel® Rapid Storage Technology** if you installed Serial ATA hard disk drives on the Serial ATA connectors supported by the chipset.

Refer to the succeeding section for details on how to use the RAID configuration utility.

5.2 Intel® Virtual Raid on CPU in BIOS

This feature allows you to do CPU RAID functions with Intel® CPU RSTe.

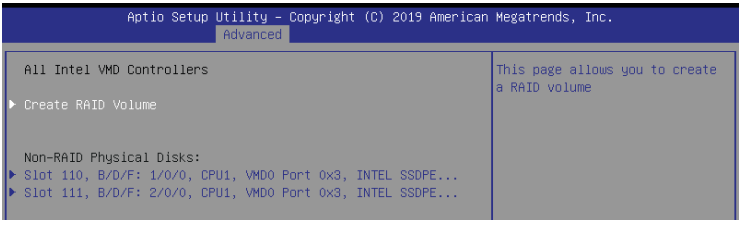
NOTE:

- Due to chipset behavior, enabling the Intel® RSTe CPU RAID functions requires an Intel® VROC hardware key module.
- Refer to the **Internal connectors** section for the location of the VROC_KEY1 connector.
- The KEY module is purchased separately.

To enter the Intel® Virtual Raid on CPU in BIOS:

1. Enter the BIOS Setup during POST.
2. Go to the **Advanced** menu **> Intel(R) Virtual Raid on CPU** > **All Intel VMD Controllers**, then press <Enter> to display the Intel® Virtual Raid on CPU menu.

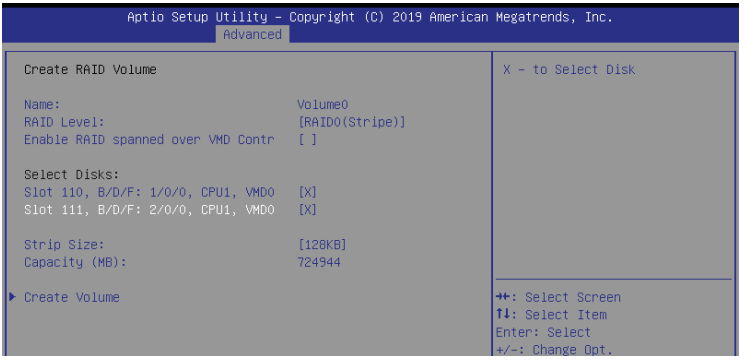
NOTE: Refer to the **BIOS Setup** chapter for details on entering and navigating through the BIOS Setup.



5.2.1 Creating a RAID set

To create a RAID set:

1. From the Intel® Virtual Raid on CPU menu, select **Create RAID Volume** and press <Enter>. The following screen appears:



2. When the **Name** item is selected, enter a name for the RAID set and press <Enter>.
3. When the **RAID Level** item is selected, press <Enter> to select the RAID level to create, and then press <Enter>.
4. When the **Enable RAID spanned over VMD Controllers** item is selected, press <Enter> and select **X** to enable this function.
5. Under Select Disks, press <Enter> and select **X** for the disks you want to include in the RAID set.
6. When the **Strip Size** item is selected, press <Enter> to select strip size for the RAID array (for RAID 0, 10 and 5 only), and then press <Enter>. The available strip size values range from 4 KB to 128 KB. The following are typical values:
   - RAID 0: 128 KB
   - RAID 10: 64 KB
   - RAID 5: 64 KB

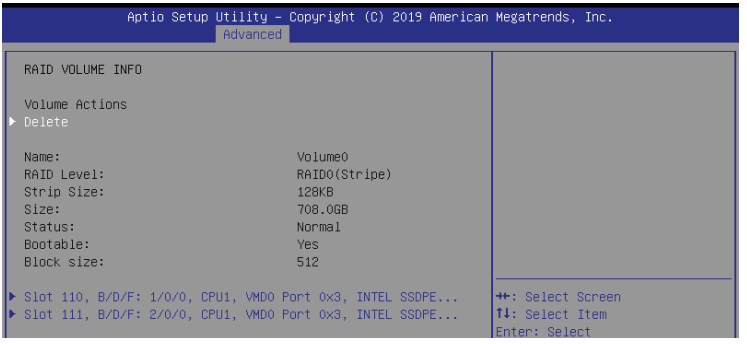
   NOTE: We recommend a lower strip size for server systems, and a higher strip size for multimedia computer systems used mainly for audio and video editing.
7. When the **Capacity (MB)** item is selected, enter the RAID volume capacity that you want and press <Enter>. The default value indicates the maximum allowed capacity.
8. When the **Create Volume** item is selected, press <Enter> to create the RAID volume and return to the Intel® Rapid Storage Technology menu.

5.2.2 Deleting a RAID set

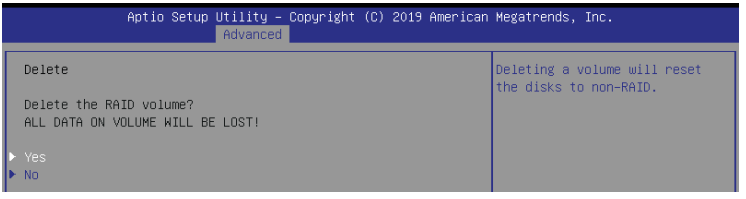
CAUTION: Be cautious when deleting a RAID set. You will lose all data on the hard disk drives when you delete a RAID set.

To delete a RAID set:

1. From the Intel® Virtual Raid on CPU menu, select the RAID volume you want to delete and press <Enter>. The following screen appears:



2. When the **Delete** item is selected, press <Enter>, then select **Yes** to delete the RAID volume and return to the Intel® Virtual Raid on CPU menu, or select **No** to cancel.



5.3 Intel® Rapid Storage Technology enterprise (Windows)

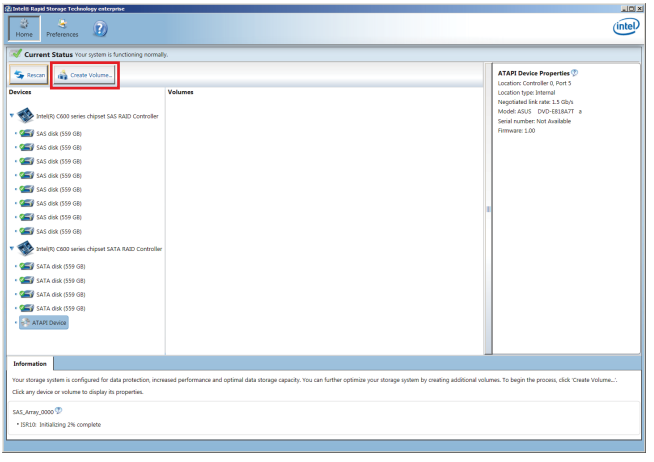
The Intel® Rapid Storage Technology enterprise allows you to create RAID 0, RAID 1, RAID 10 (RAID 1+0), and RAID 5 set(s) from Serial ATA hard disk drives that are connected to the Serial ATA connectors supported by the Southbridge.

IMPORTANT: You need to manually install the Intel® Rapid Storage Technology enterprise utility on a Windows® operating system.

To enter the Intel® Rapid Storage Technology enterprise utility under Windows operating system:

1. Turn on the system and go to the windows desktop.
2. Click the **Intel® Rapid Storage Technology enterprise** icon to display the main menu.

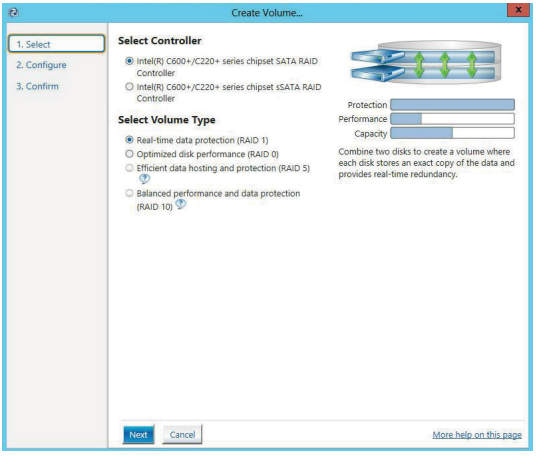
   Your storage system is configured for data protection, increased performance and optimal data storage capacity. You can create additional volumes to further optimize your storage system.



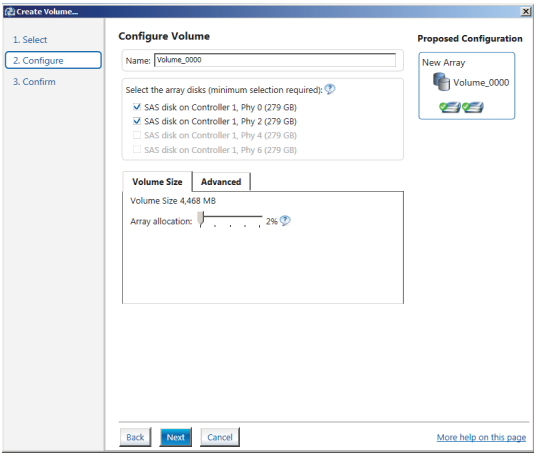
NOTE: You can click **Rescan** to re-scan any attached hard disks.

5.3.1 Creating a RAID set

1. From the utility main menu, select **Create Volume** and select volume type.
2. Click **Next**.



3. Enter a name for the RAID set, then select the array disks.
4. Select **Volume Size** tab, you can drag the bar to decide the volume size.
5. Click **Next**.

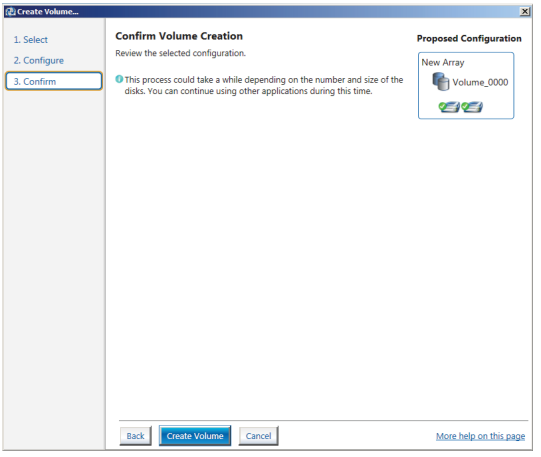


NOTE:

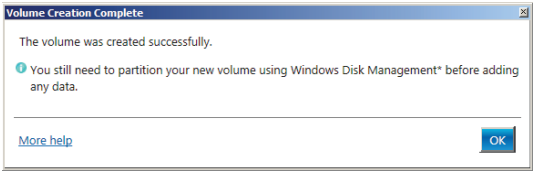
- If you do not want to keep the data on one of the selected disks, select **NO** when prompted.
- If you want to **Enable volume write-back cache** or **Initialize volume**, click **Advanced**.

6. Confirm the volume creation, than click **Create Volume** to continue.

NOTE: This process could take a while depending on the number and size of the disks. You can continue using other applications during this time.

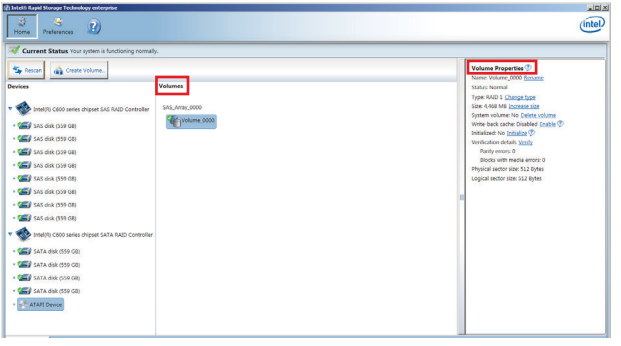


7. Wait until the process is completed, then click **OK** when prompted.



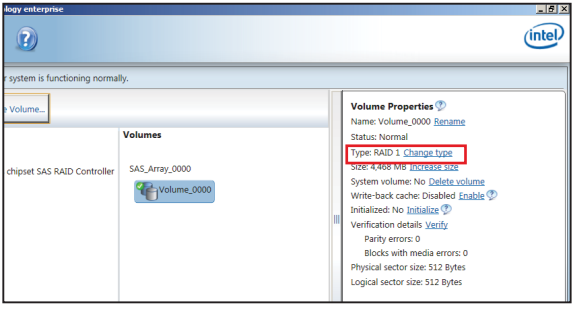
NOTE: You still need to partition your new volume using Windows Disk Management before adding any data.

The RAID set is displayed in the **Volumes** list and you can change the settings in **Volume Properties**.

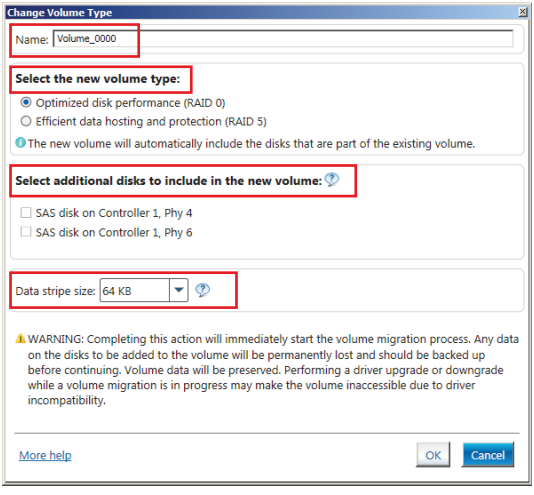


5.3.2 Changing a Volume Type

1. Click the SATA array items you want to change in **Volumes** field.
2. From the **Volume Properties** field, select **Type: RAID 1 Change type**.



3. You can change the **Name**, **Select the new volume type**, and **Select additional disks to include in the new volume** if needed.
4. Select the **Data stripe size** for the RAID array (for RAID 0, 10 and 5 only), and click **OK**. The available stripe size values range from 4 KB to 128 KB. The following are typical values:
   RAID 0: 128KB
   RAID 10: 64KB
   RAID 5: 64KB



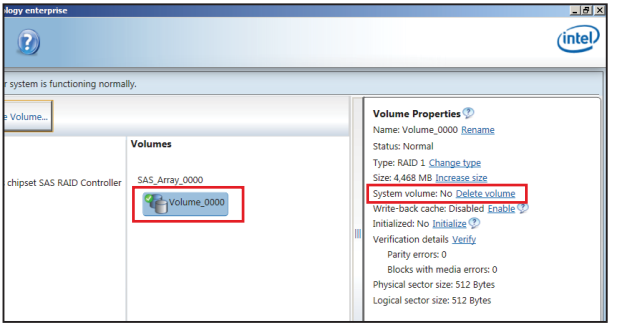
IMPORTANT: We recommend a lower stripe size for server systems, and a higher stripe size for multimedia computer systems used mainly for audio and video editing.

5.3.3 Deleting a volume

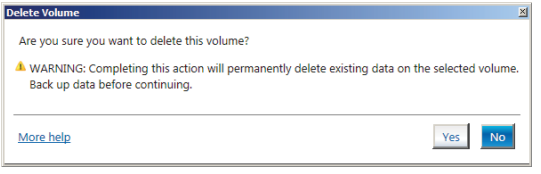
CAUTION: Be cautious when deleting a volume. You will lose all data on the hard disk drives. Before you proceed, ensure that you back up all your important data from your hard drives.

To delete a volume:

1. From the utility main menu, select the volume (ex. Volume_0000) in **Volumes** field you want to delete.



2. Select **Delete volume** in **Volume Properties** field. The following screen appears.

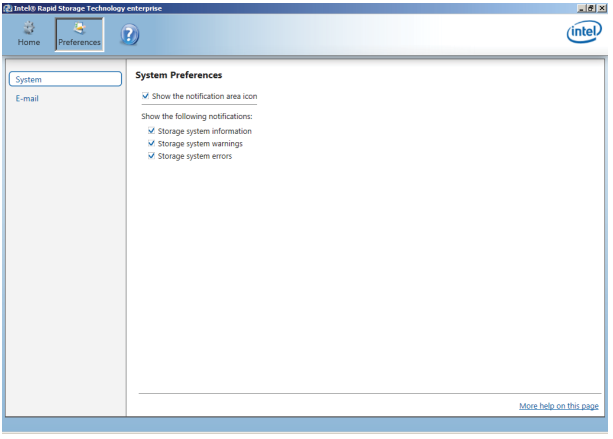


3. Click **Yes** to delete the volume and return to the utility main menu, or click **No** to return to the main menu.

5.3.4 Preferences

System Preferences

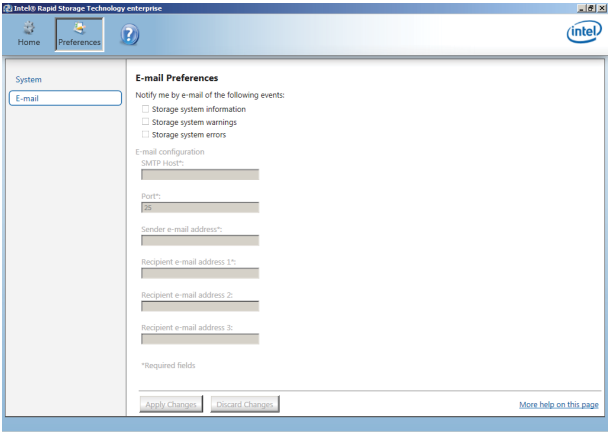
Allow you to set to show the notification area icon and show system information, warning, or errors here.



E-Mail Preferences

Allow you to set to sent e-mail of the following events:

- Storage system information
- Storage system warnings
- Storage system errors

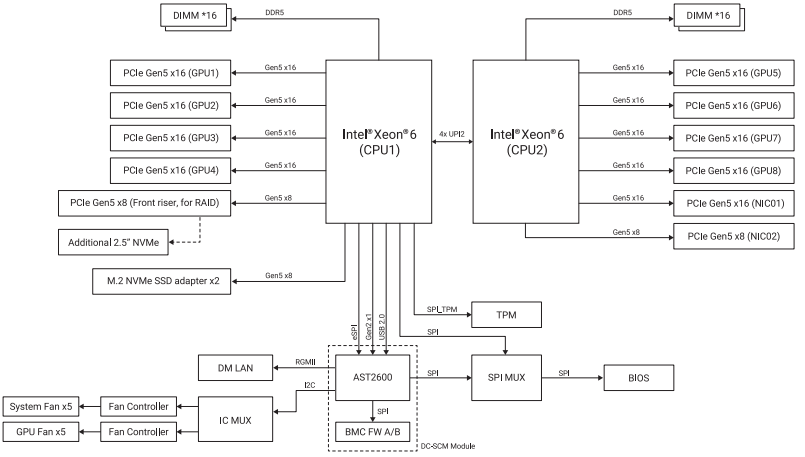


Appendix

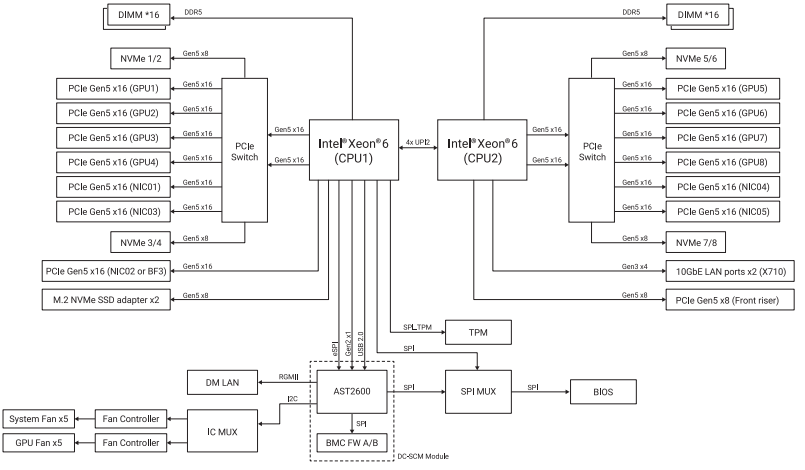
This appendix includes additional information that you may refer to when configuring the motherboard.

Block diagram

ESC8000-E12



ESC8000-E12P



Q-Code table

ACTION	PHASE	POST CODE	TYPE	DESCRIPTION
Normal boot	Security Phase	01	Progress	First post code(POWER_ON_POST_CODE)
		02	Progress	Load BSP microcode(MICROCODE_POST_CODE)
		03	Progress	Set cache as ram for PEI phase(CACHE_ENABLED_POST_CODE)
		06	Progress	CPU Early init.(CPU_EARLY_INIT_POST_CODE)
		04	Progress	initializes South bridge for PEI preparation
	PEI(Pre-EFI initialization) phase	10	Progress	PEI Core Entry
		15	Progress	NB initialize before installed memory
		19	Progress	SB initialize before installed memory
		78~00	Progress	Wait BMC ready(duration: 120 seconds).
		A1	MRC Progress	QPI initialization
		A3	MRC Progress	QPI initialization
		A7	MRC Progress	QPI initialization
		A8	MRC Progress	QPI initialization
		A9	MRC Progress	QPI initialization
		AA	MRC Progress	QPI initialization
		AB	MRC Progress	QPI initialization
		AC	MRC Progress	QPI initialization
		AD	MRC Progress	QPI initialization
		AE	MRC Progress	QPI initialization
		AF	MRC Progress	QPI initialization Complete
		2F	Progress	Memory Init.
		B0	MRC Progress	Memory Init.
		B1	MRC Progress	Memory Init.
		AF	MRC Progress	RC Reset if require
		B4	MRC Progress	Memory Init.
		B2	MRC Progress	Memory Init.
		B3	MRC Progress	Memory Init.
		B5	MRC Progress	Memory Init.
		B6	MRC Progress	Memory Init.
		B7	MRC Progress	Memory Init.
		B8	MRC Progress	Memory Init.
		B9	MRC Progress	Memory Init.
		BA	MRC Progress	Memory Init.

(continued on the next page)

ACTION	PHASE	POST CODE	TYPE	DESCRIPTION
Normal boot	PEI(Pre-EFI initialization) phase	BB	MRC Progress	Memory Init.
		BC	MRC Progress	Memory Init.
		BF	MRC Progress	Memory Init. Done
		5A	MRC Progress	Other config. After RC end
		31	Progress	Memory already installed.
		32	Progress	CPU Init.
		34	Progress	CPU Init.
		36	Progress	CPU Init.
		4F	Progress	DXE Initial Program Load(IPL)
	DXE(Driver Execution Environment) phase	60	Progress	DXE Core Started
		61	Progress	DXE NVRAM Init.
		62	Progress	SB run-time init.
		63	Progress	DXE CPU Init
		68	Progress	NB Init.
		69	Progress	NB Init.
		6A	Progress	NB Init.
		70	Progress	SB Init.
		71	Progress	SB Init.
		72	Progress	SB Init.
		78	Progress	ACPI Init.
		79	Progress	CSM Init.
	BDS(Boot Device Selection) phase	90	Progress	BDS started
		91	Progress	Connect device event
		92	Progress	PCI Bus Enumeration.
		93	Progress	PCI Bus Enumeration.
		94	Progress	PCI Bus Enumeration.
		95	Progress	PCI Bus Enumeration.
		96	Progress	PCI Bus Enumeration.
		97	Progress	Console outout connect event
		98	Progress	Console input connect event
		99	Progress	AMI Super IO start
		9A	Progress	AMI USB Driver Init.
		9B	Progress	AMI USB Driver Init.
		9C	Progress	AMI USB Driver Init.
		9D	Progress	AMI USB Driver Init.
		b2	Progress	Legacy Option ROM Init.
		b3	Progress	Reset system
		b4	Progress	USB hotplug
		b6	Progress	NVRAM clean up
		b7	Progress	NVRAM configuration reset
		A0	Progress	IDE, AHCI Init.
		A1	Progress	IDE, AHCI Init.
		A2	Progress	IDE, AHCI Init.
		A3	Progress	IDE, AHCI Init.
		A8	Progress	BIOS Setup Utility password verify
		A9	Progress	BIOS Setup Utility start
		AB	Progress	BIOS Setup Utility input wait
		AD	Progress	Ready to boot event
		AE	Progress	Legacy boot event
	Operating system phase	AA	Progress	APIC mode
		AC	Progress	PIC mode

Notices

Federal Communications Commission Statement

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

- This device may not cause harmful interference.
- 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.

NOTE: The use of shielded cables for connection of the monitor to the graphics card is required to assure compliance with FCC regulations. Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

Compliance Statement of Innovation, Science and Economic Development Canada (ISED)

This device complies with Innovation, Science and Economic Development Canada licence exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

CAN ICES(A)/NMB(A)

Déclaration de conformité de Innovation, Sciences et Développement économique Canada (ISED)

Le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

CAN ICES(A)/NMB(A)

Australia statement notice

From 1 January 2012 updated warranties apply to all ASUS products, consistent with the Australian Consumer Law. For the latest product warranty details please visit https://www.asus.com/support/. Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

If you require assistance please call ASUS Customer Service 1300 2787 88 or visit us at https://www.asus.com/support/.

DO NOT throw the motherboard in municipal waste. This product has been designed to enable proper reuse of parts and recycling. This symbol of the crossed out wheeled bin indicates that the product (electrical and electronic equipment) should not be placed in municipal waste. Check local regulations for disposal of electronic products.

DO NOT throw the mercury-containing button cell battery in municipal waste. This symbol of the crossed out wheeled bin indicates that the battery should not be placed in municipal waste.

Declaration of compliance for product environmental regulation

ASUS follows the green design concept to design and manufacture our products, and makes sure that each stage of the product life cycle of ASUS product is in line with global environmental regulations. In addition, ASUS disclose the relevant information based on regulation requirements.

Please refer to https://esg.asus.com/Compliance.htm for information disclosure based on regulation requirements ASUS is complied with:

EU REACH and Article 33

Complying with the REACH (Registration, Evaluation, Authorization, and Restriction of Chemicals) regulatory framework, we publish the chemical substances in our products at ASUS REACH website at https://esg.asus.com/Compliance.htm.

EU RoHS

This product complies with the EU RoHS Directive. For more details, see https://esg.asus.com/Compliance.htm

Japan JIS-C-0950 Material Declarations

Information on Japan RoHS (JIS-C-0950) chemical disclosures is available on https://esg.asus.com/Compliance.htm

India RoHS

This product complies with the "India E-Waste (Management) Rules, 2016" and prohibits use of lead, mercury, hexavalent chromium, polybrominated biphenyls (PBBs) and polybrominated diphenyl ethers (PBDEs) in concentrations exceeding 0.1% by weight in homogenous materials and 0.01% by weight in homogenous materials for cadmium, except for the exemptions listed in Schedule II of the Rule.

Vietnam RoHS

ASUS products sold in Vietnam, on or after September 23, 2011,meet the requirements of the Vietnam Circular 30/2011/TT-BCT.

Các sản phẩm ASUS bán tại Việt Nam, vào ngày 23 tháng 9 năm2011 trở về sau, đều phải đáp ứng các yêu cầu của Thông tư 30/2011/TT-BCT của Việt Nam.

Türkiye RoHS

AEEE Yönetmeliğine Uygundur

ASUS Recycling/Takeback Services

ASUS recycling and takeback programs come from our commitment to the highest standards for protecting our environment. We believe in providing solutions for you to be able to responsibly recycle our products, batteries, other components as well as the packaging materials. Please go to https://esg.asus.com/en/Takeback.htm for detailed recycling information in different regions.

Ecodesign Directive

The European Union announced a framework for the setting of ecodesign requirements for energy-related products (2009/125/EC). Specific implementing measures are aimed at improving environmental performance of specific products or across multiple product types. ASUS provides product information at https://esg.asus.com/Compliance.htm.

インターネット回線への接続に関するご注意

本製品は電気通信事業者（移動通信会社、固定通信会社、インターネットプロバイダ等）の通信回線（公衆無線LANを含む）に直接接続することができません。本製品をインターネットに接続する場合は、必ずルーター等を経由し接続してください。

Japan statement notice

This product cannot be directly connected to the Internet (including public wireless LAN) of a telecom carrier (mobile network companies, landline network companies, Internet providers, etc.). When connecting this product to the Internet, be sure to connect it through a router or switch.

Safety Precautions

Accessories that came with this product have been designed and verified for the use in connection with this product. Never use accessories for other products to prevent the risk of electric shock or fire.

安全上のご注意

付属品は当該専用品です。他の機器には使用しないでください。機器の破損もしくは、火災や感電の原因となることがあります。

Access Advance Patent Notice

HEVC Advance™

Covered by patents at patentlist.accessadvance.com

Simplified EU Declaration of Conformity

English ASUSTeK Computer Inc. hereby declares that this device is in compliance with the essential requirements and other relevant provisions of related Directives. Full text of EU declaration of conformity is available at: www.asus.com/support

Français AsusTek Computer Inc. déclare par la présente que cet appareil est conforme aux critères essentiels et autres clauses pertinentes des directives concernées. La déclaration de conformité de l'UE peut être téléchargée à partir du site Internet suivant : www.asus.com/support

Deutsch ASUSTeK Computer Inc. erklärt hiermit, dass dieses Gerät mit den wesentlichen Anforderungen und anderen relevanten Bestimmungen der zugehörigen Richtlinien übereinstimmt. Der gesamte Text der EU-Konformitätserklärung ist verfügbar unter: www.asus.com/support

Italiano ASUSTeK Computer Inc. con la presente dichiara che questo dispositivo è conforme ai requisiti essenziali e alle altre disposizioni pertinenti con le direttive correlate. Il testo completo della dichiarazione di conformità UE è disponibile all'indirizzo: www.asus.com/support

Русский Компания ASUS заявляет, что это устройство соответствует основным требованиям и другим соответствующим условиям соответствующих директив. Подробную информацию, пожалуйста, смотрите на www.asus.com/support

Български С настоящото ASUSTeK Computer Inc. декларира, че това устройство е в съответствие със съществените изисквания и другите приложими постановления на свързаните директиви. Пълният текст на декларацията за съответствие на ЕС е достъпна на адрес: www.asus.com/support

Hrvatski ASUSTeK Computer Inc. ovim izjavljuje da je ovaj uređaj sukladan s bitnim zahtjevima i ostalim odgovarajućim odredbama vezanih direktiva. Cijeli tekst EU izjave o sukladnosti dostupan je na: www.asus.com/support

Čeština Společnost ASUSTeK Computer Inc. tímto prohlašuje, že toto zařízení splňuje základní požadavky a další příslušná ustanovení souvisejících směrnic. Plné znění prohlášení o shodě EU je k dispozici na adrese: www.asus.com/support

Dansk ASUSTeK Computer Inc. erklærer hermed, at denne enhed er i overensstemmelse med hovedkravene og andre relevante bestemmelser i de relaterede direktiver. Hele EU-overensstemmelseserklæringen kan findes på: www.asus.com/support

Nederlands ASUSTeK Computer Inc. verklaart hierbij dat dit apparaat voldoet aan de essentiële vereisten en andere relevante bepalingen van de verwante richtlijnen. De volledige tekst van de EU-verklaring van conformiteit is beschikbaar op: www.asus.com/support

Eesti Käesolevaga kinnitab ASUSTeK Computer Inc, et see seade vastab asjakohaste direktiivide oluliste nõuetele ja teistele asjassepuutuvatele sätetele. EL vastavusdeklaratsiooni täielik tekst on saadaval järgmisel aadressil: www.asus.com/support

Suomi ASUSTeK Computer Inc. ilmoittaa täten, että tämä laite on asiaankuuluvien direktiivien olennaisten vaatimusten ja muiden tätä koskevien säädösten mukainen. EU-yhdenmukaisuusilmoituksen koko teksti on luettavissa osoitteessa: www.asus.com/support

Ελληνικά Με το παρόν, η AsusTek Computer Inc. δηλώνει ότι αυτή η συσκευή συμμορφώνεται με τις θεμελιώδεις απαιτήσεις και άλλες σχετικές διατάξεις των Οδηγιών της ΕΕ. Το πλήρες κείμενο της δήλωσης συμβατότητας είναι διαθέσιμο στη διεύθυνση: www.asus.com/support

Magyar Az ASUSTeK Computer Inc. ezennel kijelenti, hogy ez az eszköz megfelel a kapcsolódó Irányelvek lényeges követelményeinek és egyéb vonatkozó rendelkezéseinek. Az EU megfelelőségi nyilatkozat teljes szövege innen letölthető: www.asus.com/support

Latviski ASUSTeK Computer Inc. ar šo paziņo, ka šī ierīce atbilst saistīto Direktīvu būtiskajām prasībām un citiem citiem saistošajiem nosacījumiem. Pilns ES atbilstības paziņojuma teksts pieejams šeit: www.asus.com/support

Lietuvių „ASUSTeK Computer Inc." šiuo tvirtina, kad šis įrenginys atitinka pagrindinius reikalavimus ir kitas svarbias susijusių direktyvų nuostatas. Visą ES atitikties deklaracijos tekstą galima rasti: www.asus.com/support

Norsk ASUSTeK Computer Inc. erklærer herved at denne enheten er i samsvar med hovedsaklige krav og andre relevante forskrifter i relaterte direktiver. Fullstendig tekst for EU-samsvarserklæringen finnes på: www.asus.com/support

Polski Firma ASUSTeK Computer Inc. niniejszym oświadcza, że urządzenie to jest zgodne z zasadniczymi wymogami i innymi właściwymi postanowieniami powiązanych dyrektyw. Pełny tekst deklaracji zgodności UE jest dostępny pod adresem: www.asus.com/support

Português A ASUSTeK Computer Inc. declara que este dispositivo está em conformidade com os requisitos essenciais e outras disposições relevantes das Diretivas relacionadas. Texto integral da declaração da UE disponível em: www.asus.com/support

Română ASUSTeK Computer Inc. declară că acest dispozitiv se conformează cerinţelor esenţiale şi altor prevederi relevante ale directivelor conexe. Textul complet al declaraţiei de conformitate a Uniunii Europene se găseşte la: www.asus.com/support

Srpski ASUSTeK Computer Inc. ovim izjavljuje da je ovaj uređaj u saglasnosti sa osnovnim zahtevima i drugim relevantnim odredbama povezanih Direktiva. Pun tekst EU deklaracije o usaglašenosti je dostupan da adresi: www.asus.com/support

Slovensky Spoločnosť ASUSTeK Computer Inc. týmto vyhlasuje, že toto zariadenie vyhovuje základným požiadavkám a ostatým príslušným ustanoveniam príslušných smerníc. Celý text vyhlásenia o zhode pre štáty EÚ je dostupný na adrese: www.asus.com/support

Slovenščina ASUSTeK Computer Inc. izjavlja, da je ta naprava skladna z bistvenimi zahtevami in drugimi ustreznimi določbami povezanih direktiv. Celotno besedilo EU-izjave o skladnosti je na voljo na spletnem mestu: www.asus.com/support

Español Por la presente, ASUSTeK Computer Inc. declara que este dispositivo cumple los requisitos básicos y otras disposiciones pertinentes de las directivas relacionadas. El texto completo de la declaración de la UE de conformidad está disponible en: www.asus.com/support

Svenska ASUSTeK Computer Inc. förklarar härmed att denna enhet överensstämmer med de grundläggande kraven och andra relevanta föreskrifter i relaterade direktiv. Fulltext av EU-försäkran om överensstämmelse finns på: www.asus.com/support

Українська ASUSTeK Computer Inc. заявляє, що цей пристрій відповідає основним вимогам та іншим відповідним положенням відповідних Директив. Повний текст декларації відповідності стандартам ЄС доступний на: www.asus.com/support

Türkçe AsusTek Computer Inc., bu aygıtın temel gereksinimlerle ve ilişkili Yönergelerin diğer ilgili koşullarıyla uyumlu olduğunu beyan eder. AB uygunluk bildiriminin tam metni şu adreste bulunabilir: www.asus.com/support

Bosanski ASUSTeK Computer Inc. ovim izjavljuje da je ovaj uređaj usklađen sa bitnim zahtjevima i ostalim odgovarajućim odredbama vezanih direktiva. Cijeli tekst EU izjave o usklađenosti dostupan je na: www.asus.com/support

Simplified UKCA Declaration of Conformity

ASUSTeK Computer Inc. hereby declares that this device is in compliance with the essential requirements and other relevant provisions of related Regulations. Full text of UKCA declaration of conformity is available at: www.asus.com/support

FCC COMPLIANCE INFORMATION

Per FCC Part 2 Section 2.1077

Responsible Party:	**Asus Computer International**
Address:	**48720 Kato Rd., Fremont, CA 94538**
Phone/Fax No:	**(510)739-3777/(510)608-4555**

hereby declares that the product

Product Name :	**Server**
Model Number :	**ESC8000-E12, ESC8000-E12P**

compliance statement:

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.

Ver. 180125

Service and Support

Visit our multi-language website at https://www.asus.com/support.

ASUSTeK COMPUTER INC.

Address: 1F., No. 15, Lide Rd., Beitou Dist., Taipei City 112

Phone: +886-2-2894-3447