



ESC4000A-E12

2U Rackmount Server User Guide



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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.



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.

Avertissement sur les batteries Lithium-Ion

ATTENTION : Danger d'explosion si la batterie n'est pas correctement remplacée. Remplacer uniquement avec une batterie de type semblable ou équivalent, recommandée par le fabricant. Jeter les batteries usagées conformément aux instructions du fabricant.

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, including 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: Driver Installation**

This chapter provides instructions for installing the necessary drivers for different system components.

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>+

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.

[illegible]

Product Introduction

1

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.

| | ESC4000A-E12 |
|----------------|---|
| Chassis | ASUS 2U Rackmount Chassis |
| Motherboard | ASUS K14PG-U12 Server Board |
| Accessory box | 1 x MB Support DVD 1 x ACC Instruction Card 1 x Bag of Screws 2 x AC Power Cables 8 x GPU Power Cables (Single-slot GPU Cards) 4 x GPU Power Cables (Dual-slot GPU Cards) 4 x Passive GPU Air Ducts 4 x Active GPU Air Ducts 1 x CPU Heatsink |
| Optional items | 1 x Rail Kit 1 x Broadcom 9560 Cable Kit 1 x Broadcom 9540 Cable Kit 1 x ASUS PIKE Cable Kit 4 x GPU-specific Power Cables |



- 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

Before requesting support from the ASUS Technical Support team, you must take note of the product's serial number containing 12 characters such as xxS0xxxxxxx. See the figure below.

With the correct serial number of the product, ASUS Technical Support team members can then offer a quicker and satisfying solution to your problems.



The serial number is printed on the Asset tag.

1.3 System specifications

The ASUS ESC4000A-E12 Series servers features the ASUS K14PG-U12 server board that supports the AMD EPYC™ 9004/9005 Series Processor Family.

| Model Name | | ESC4000A-E12 |
|-----------------|----------------------------|---|
| Processor | | 1 x Socket SP5 (LGA 6096) AMD EPYC™ 9004/9005* Series Processor Family (up to TDP 400W) * The BIOS update for 9005 Series (Turin) is only supported on servers with build models after May 2025. Please contact your sales representative for more information. |
| Memory | Total Slots | 12 (12 channels per CPU, 12 DIMM per CPU) |
| | Capacity | Up to 3TB per CPU socket |
| | Memory Type | DDR5 4800/5600 RDIMM / 3DS RDIMM * Please refer to www.asus.com for latest memory AVL update |
| | Memory Size | 96GB, 64GB, 32GB, 16GB RDIMM 256GB, 128GB 3DS RDIMM * Please refer to ASUS server AVL for the latest update |
| Expansion Slots | Total PCI/PCI-X/PCIe Slots | 12 |
| | Slot Type | Rear: - 4 x PCIe x16 slots (Gen5 x16 link, FH, FL) for dual-slot GPU cards, or 8 x PCIe x16 slots (Gen5 x8 link, FH, FL) for single-slot GPU cards - 1 x PCIe x16 slot (Gen5 x16 link, FH, HL) - 1 x PCIe x16 slot (Gen5 x16/x8 link, FH, HL) or OCP socket - 1 x PCIe x8 slot (Gen5 x0/x8 link, LP, HL) Front: - 1 x PCIe x8 slot (Gen5 x8 link, LP, HL)* * SKU-1 only |
| Storage | SATA Controller | 6 x SATA 6Gb/s ports |
| | SAS Controller | Optional Kits: ASUS PIKE II 3008 8-port SAS 12Gb/s HBA card ASUS PIKE II 3108 8-port SAS HW 12Gb/s RAID card Broadcom MegaRAID 9540-8i Broadcom MegaRAID 9560-16i * RAID card requires additional cables |

(continued on the next page)

| Model Name | | ESC4000A-E12 |
|-----------------|------------------------|---|
| Storage | Storage Bay | SKU-1** 2 x 2.5" SATA/SAS*/NVME 2 x 3.5" SATA/SAS*/NVME 2 x 3.5" SATA/SAS* SKU-2 (by request, one PCIe x8 link will be occupied) 2 x 2.5" SATA/SAS*/NVME 4 x 3.5" SATA/SAS*/NVME * SAS support requires an optional RAID card ** Additional 2 x NVME support for SKU-1 requires an optional RAID card |
| | | |
| | MB on-board connectors | 1 x Slimline SAS x8 link 3 x MCIO x8 link |
| | Default Cable | Backplane default cables: 1 x Slimline SAS cable 3 x MCIO cables |
| Networking | | 2 x Gigabit LAN ports (Intel® I350) 1 x Dedicated Management port |
| VGA | | AST2600 64MB |
| Graphics | | Up to 4 dual-slot or 8 single-slot GPU cards (up to 400W H100 NVL) |
| Front I/O ports | | 4 x USB 3.2 Gen 1 ports |
| Rear I/O ports | | 2 x USB 3.2 Gen 1 ports 2 x Gigabit LAN ports (RJ45) 1 x Management port (RJ45) 1 x VGA port |

(continued on the next page)

| Model Name | | ESC4000A-E12 |
|---------------------|-----------------------------|---|
| Switch/LED | | Front Switch/LED: 1 x Power Switch/LED 1 x Location Switch/LED 1 x Message LED 1 x Q-Code/Port 80 LED 2 x LAN LED Rear Switch/LED: 1 x Power switch/LED 1 x Location LED 1 x Message LED |
| Security | | TPM-SPI module (optional) PFR module (optional) |
| OS Support | | Windows® Server, RedHat®, SuSE®, CentOS, Ubuntu, Vmware * Refer to https://servers.asus.com/support/os for the latest supported OS list |
| Management Solution | Out of Band Remote Hardware | On-Board ASMB11-iKVM for KVM-over-IP |
| | Software | ASUS Control Center |
| Dimension | | 800mm x 439.5mm x 88.9mm (2U) 31.50" x 17.30" x 3.5" |
| Net Weight Kg | | 24 kg (excluding CPU, DRAM, and HDD) |
| Gross Weight Kg | | 33 kg (including packing, excluding CPU, DRAM, and HDD) |
| Power Supply | | 1+1 Redundant 2600W 80 PLUS Titanium CRPS-R Power Supply |
| Environment | | Operating temperature: 10° ~ 35° Non-operating temperature: -40° ~ 70° Non-operating humidity: 20% ~ 90% (Non-condensing) |

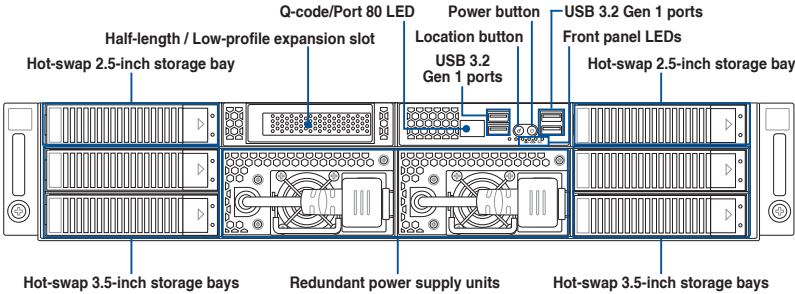


Always use PSUs with the same watt and power rating. Combining PSUs with different wattage (e.g. 1 x 2200 W + 1 x 2600 W) may yield unstable results and potential damage to your system.



Specifications are subject to change without notice.

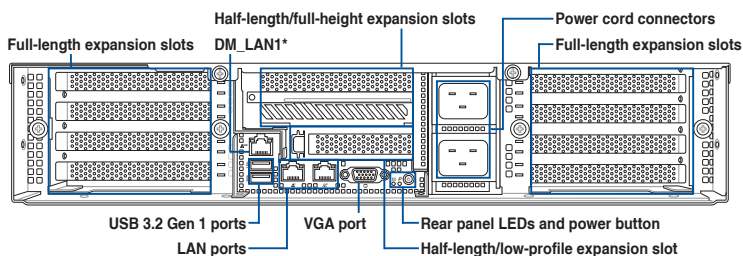
1.4 Front panel features



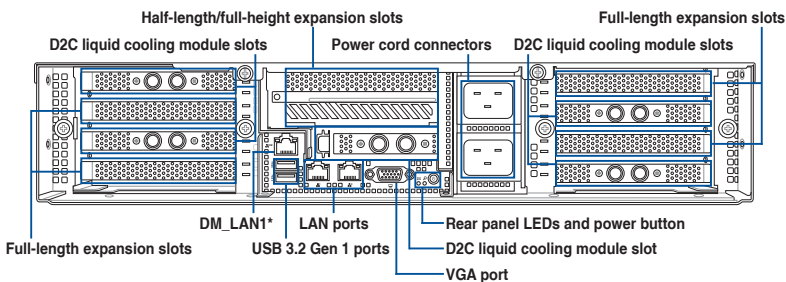
Refer to the **Front panel LEDs** section for the LED descriptions.

1.5 Rear panel features

Air-cooled SKU

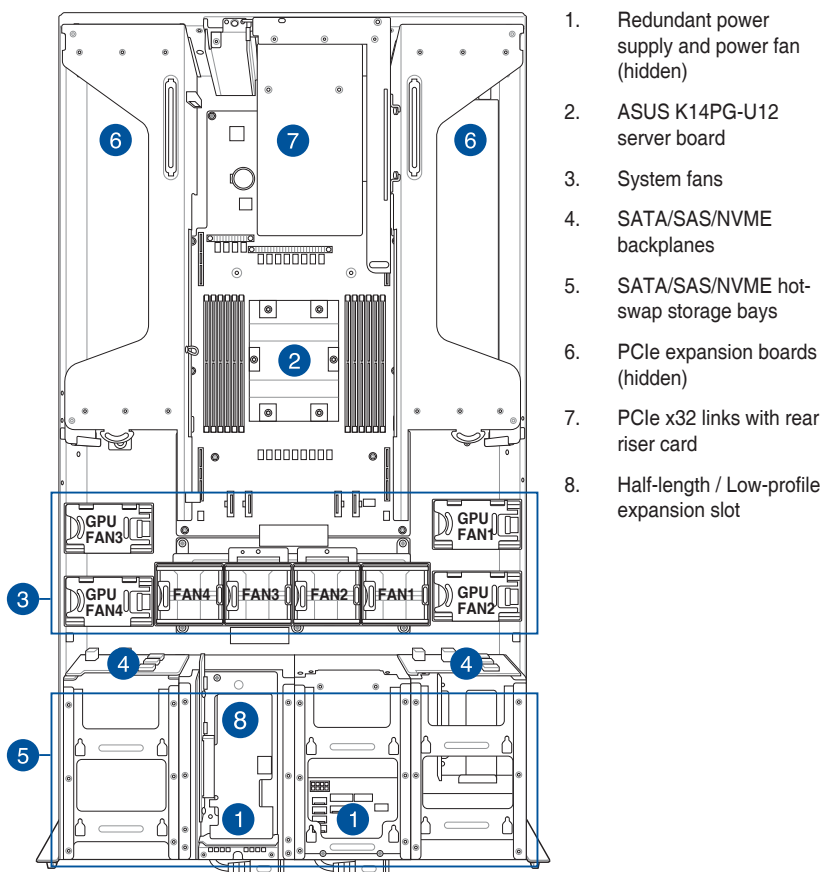


Liquid-cooled SKU



- The rear I/O ports do not appear on the rear panel if motherboard is not present.
- The DM_LAN1 port is for ASUS ASMB11-iKVM controller only.
- The D2C liquid cooling module slots require a Liquid-to-Air Coolant Distribution Unit.
- Refer to the **Rear panel LEDs** section for the LED descriptions.

1.6 Internal features



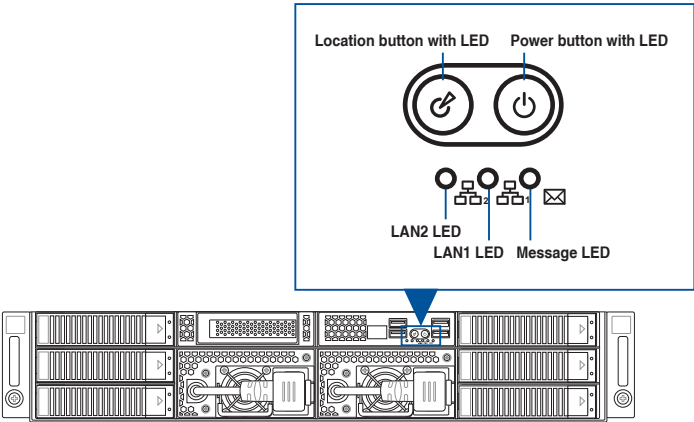
A protection film is pre-attached to the front cover before shipping. Please remove the protection film before turning on the system for proper heat dissipation.

WARNING

HAZARDOUS MOVING PARTS
KEEP FINGERS AND OTHER BODY PARTS AWAY

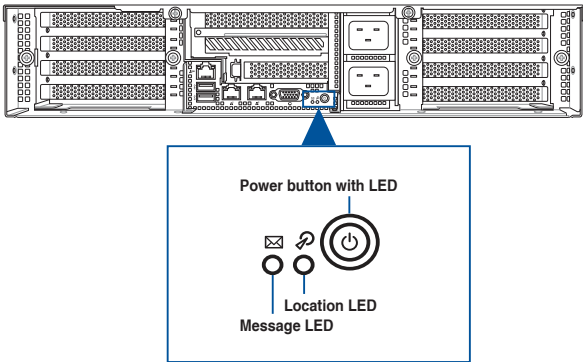
1.7 LED information




1.7.1 Front panel LEDs



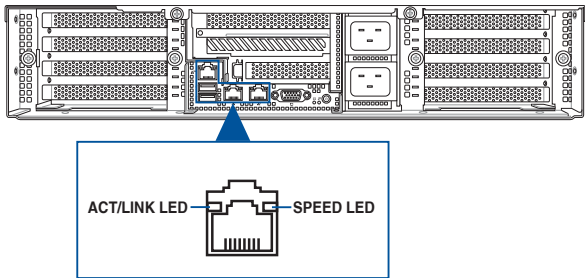
| LED | Icon | Display status | Description |
|--------------------------|------|----------------|--|
| Power button with LED | | ON | System power on |
| Message LED | | OFF | System is normal; no incoming event |
| | | ON | A hardware monitor event is indicated |
| Location button with LED | | ON | Location switch is pressed (Press the location switch again to turn off) |
| | | OFF | Function off |
| LAN LEDs | | ON | LAN connection is present |
| | | Blinking | LAN is transmitting or receiving data |
| | | OFF | No LAN connection |

1.7.2 Rear panel LEDs



| LED | Icon | Display status | Description |
|-----------------------|---|----------------|--|
| Power button with LED |  | ON | System power on |
| Message LED |  | OFF | System is normal; no incoming event |
| | | ON | A hardware monitor event is indicated |
| Location LED |  | ON | Location switch is pressed (Press the location switch again to turn off) |
| | | OFF | Function off |

1.7.3 LAN (RJ-45) LEDs



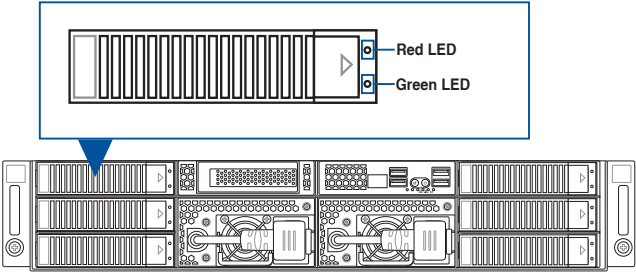
LAN1/LAN2 LEDs

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

Dedicated Management LAN (for ASMB11 and DM_LAN1)

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

1.7.4 HDD 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

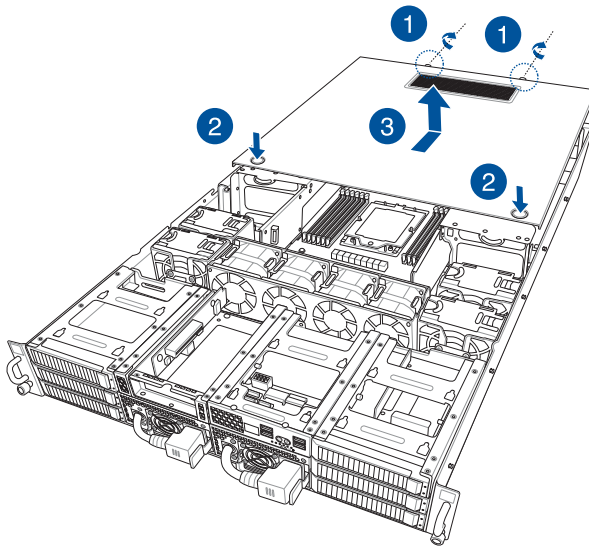
There are three parts of the chassis cover you may remove.



The diagrams in this section are for reference only. The system layout may vary with models, but the installation steps are the same for all models.

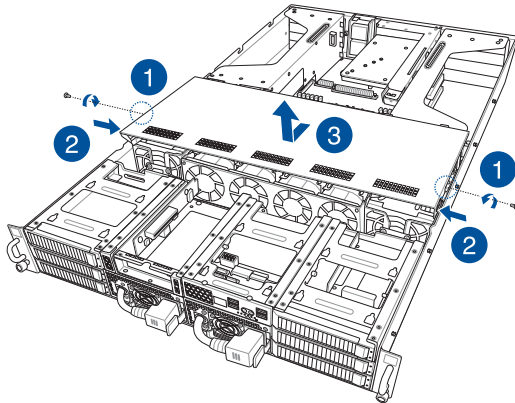
To remove the rear chassis cover:

1. Loosen the two (2) thumbscrews on the rear of the chassis.
2. Push and hold the cover buttons down, then slide the chassis cover towards the rear to disengage it from the chassis.
3. Lift the chassis cover to completely remove it from the chassis.



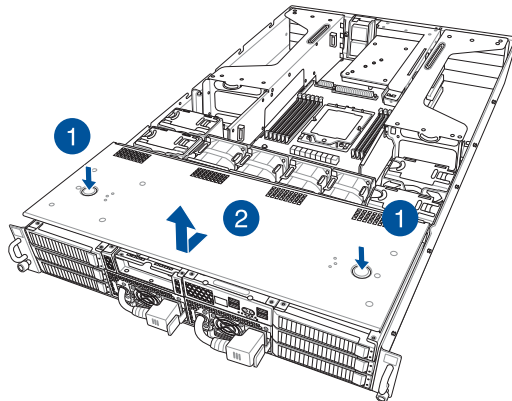
To remove the middle chassis cover:

1. Remove the two screws as shown.
2. Press the cover latches down on both sides of the middle chassis cover.
3. Lift the chassis cover to completely remove it from the chassis.



To remove the front chassis cover:

1. Push and hold the cover buttons down, then slide the chassis cover towards the front to disengage it from the chassis.
2. Lift the chassis cover to completely remove it from the chassis.



A protection film is pre-attached to the system cover before shipping. Please remove the protection film before turning on the system for proper heat dissipation.

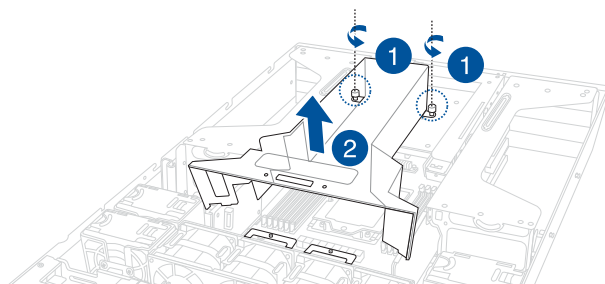
2.1.1 Air duct



The diagrams in this section are for reference only. The system layout may vary with models, but the installation steps are the same for all models.

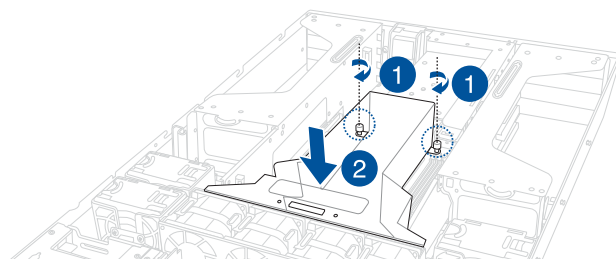
To remove the air duct:

1. Loosen the two (2) thumbscrews as shown.
2. Lift the air duct to remove it from the chassis.



To reinstall the air duct:

1. Align and install the air duct to the chassis ensuring that the screw holes on the air duct match the screw holes on the chassis.
2. Tighten the two (2) thumbscrews to secure the air duct.



2.2 Central Processing Unit (CPU)

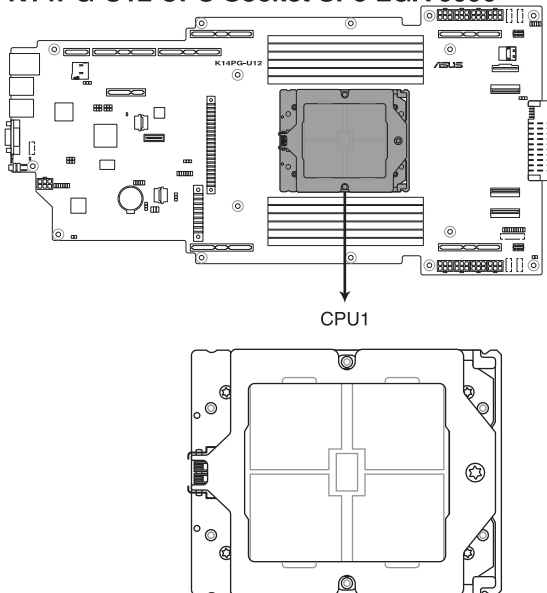


- Upon purchase of the motherboard, ensure that the PnP cap is on the socket and the socket contacts are not bent. Contact your retailer immediately if the PnP cap is missing, or if you see any damage to the PnP cap/socket contacts/motherboard components. ASUS will bear the cost of repair only if the 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 PnP 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.

2.2.1 Installing the CPU and air cooled heatsink

1. Remove the rear chassis cover. For more information, see the **Chassis cover** section.
2. Remove the air duct. For more information, see the **Air Duct** section.
3. Locate the CPU socket on the motherboard.

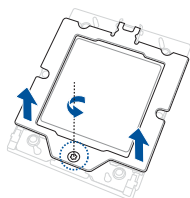
K14PG-U12 CPU Socket SP5 LGA 6096



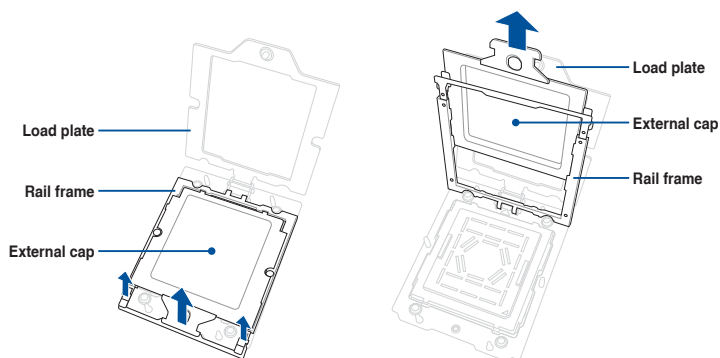
4. Loosen the screw on the socket to open the load plate.



A T20 screwdriver with a torque value of 13.5 ± 1.0 kgf-cm is recommended.



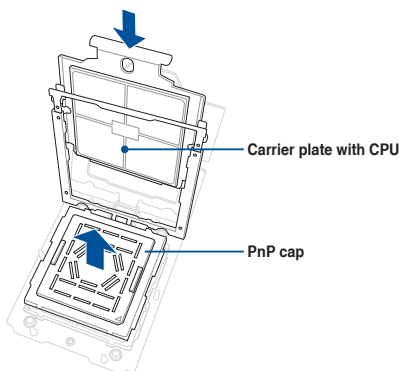
5. Lift open the rail frame, then slide the external cap out of the rail frame.



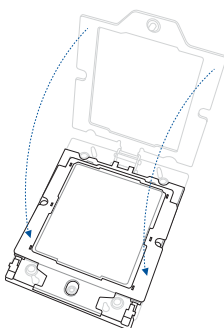
6. Slide the carrier frame with CPU into the rail frame, then remove the PnP cap.



The carrier frame with CPU fits in only one correct orientation. DO NOT force the carrier frame with CPU into the rail frame.



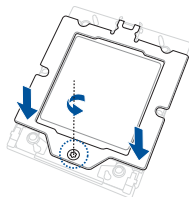
7. Gently close the rail frame just enough to let it sit on top of the CPU socket.



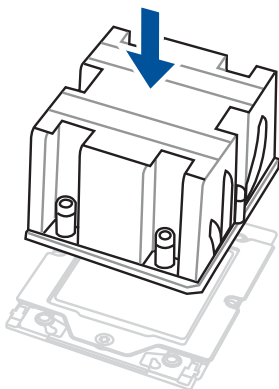
8. Close the load plate just enough to let it sit on top of the CPU, then secure the load plate using the screw on the socket.



A T20 screwdriver with a torque value of 13.5 ± 1.0 kgf-cm is recommended.



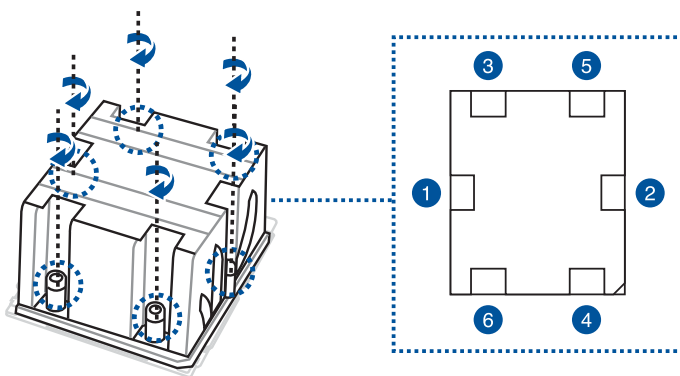
9. Place the heatsink on the CPU socket and make sure the heatsink screws are aligned with the CPU socket.



10. The below instructions must be followed when securing the heatsink to the motherboard. The order in which the screws should be tightened is shown both in the illustration below and on the heatsink.
- A. Tighten screw ① just enough to attach the heatsink to the motherboard.
 - B. Fully tighten screw ②, then fully tighten screw ①.
 - C. Fully tighten the remaining screws in order from ③ to ⑥



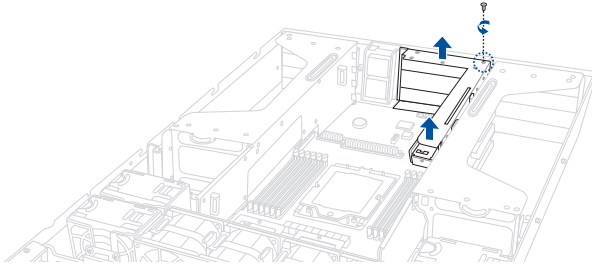
The heatsink screws are T20 models. A torque value of 12.5 ± 2.5 kg-cm (11.0 ± 2.1 lbf-in) is recommended.



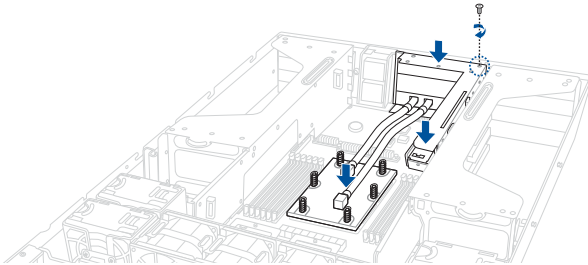
11. Reinstall the air ducts. For more information, refer to the **Air ducts** section.

2.2.2 Installing the CPU and liquid cooling module

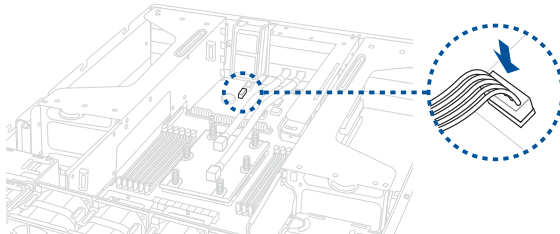
1. Refer to steps 1 to 8 in the previous section to install the CPU.
2. Remove the screw securing the PCIe riser card to the chassis.
3. Firmly hold the riser card, then pull it up to detach it from the PCIe slot on the motherboard.



4. Align and place the liquid cooling module assembly in the correct orientation as shown in the illustration below, then secure the PCIe riser card with the screw you removed earlier.



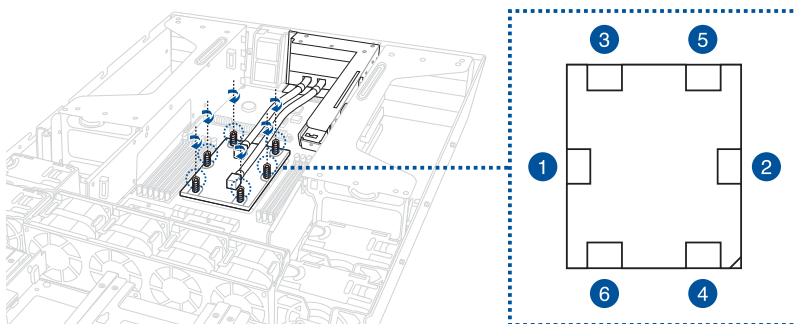
5. Connect the leak detection sensor cable to **LIQUID_CONN1** on the motherboard.



6. The below instructions must be followed when securing the heatsink to the motherboard. The order in which the screws should be tightened is shown both in the illustration below and on the heatsink.
- A. Tighten screw ① just enough to attach the heatsink to the motherboard.
 - B. Fully tighten screw ②, then fully tighten screw ①.
 - C. Fully tighten the remaining screws in order from ③ to ⑥



A T20 screwdriver with a torque value of $12.5 \pm 2.5 \text{ kg-cm}$ is recommended.



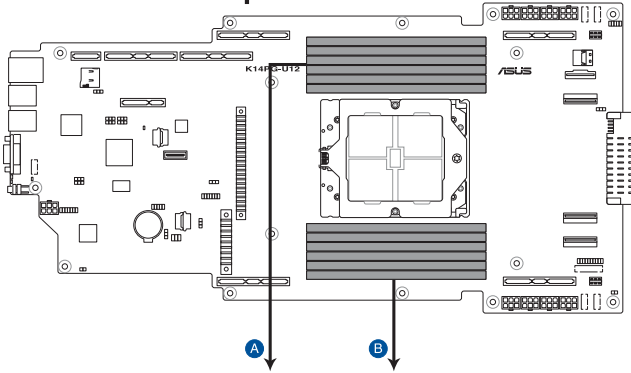
2.3 System memory

2.3.1 Overview

The motherboard comes with twelve (12) Double Data Rate 5 (DDR5) Dual Inline Memory Modules (DIMM) sockets.

The figure illustrates the location of the DDR5 DIMM sockets:

K14PG-U12 288-pin DDR5 DIMM sockets



- A**
- CPU1_DIMM_L1
 - CPU1_DIMM_K1
 - CPU1_DIMM_J1
 - CPU1_DIMM_I1
 - CPU1_DIMM_H1
 - CPU1_DIMM_G1

- B**
- CPU1_DIMM_A1
 - CPU1_DIMM_B1
 - CPU1_DIMM_C1
 - CPU1_DIMM_D1
 - CPU1_DIMM_E1
 - CPU1_DIMM_F1

2.3.2 Memory Configurations

You may install 16 GB, 32 GB, 64 GB DDR5 RDIMM / 128 GB, 256 GB DDR5 3DS RDIMM into the DIMM sockets using the memory configurations in this section.

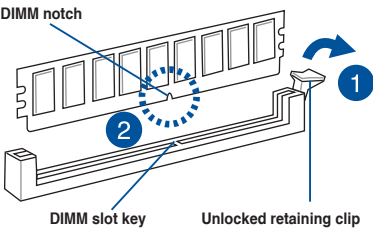


- Refer to ASUS Server AVL for the updated list of compatible DIMMs.
- Always install DIMMs with the same CAS latency. For optimum compatibility, it is recommended that you obtain memory modules from the same vendor.

| 1 CPU Configuration | | | | | | | | | | | | |
|---------------------|----|----|----|----|----|----|----|----|----|----|----|----|
| | A1 | B1 | C1 | D1 | E1 | F1 | G1 | H1 | I1 | J1 | K1 | L1 |
| 1 DIMM | • | | | | | | | | | | | |
| 2 DIMMs | • | | | | | | • | | | | | |
| 4 DIMMs | • | | • | | | | • | | • | | | |
| 6 DIMMs | • | • | • | | | | • | • | • | | | |
| 8 DIMMs | • | • | • | | • | | • | • | • | | • | |
| 10 DIMMs | • | • | • | • | • | | • | • | • | • | • | |
| 12 DIMMs | • | • | • | • | • | • | • | • | • | • | • | • |

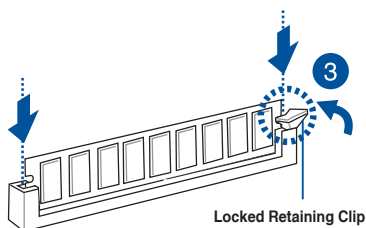
Installing a DIMM on a single clip DIMM socket

1. Press the retaining clip outward to unlock a DIMM socket.
2. Align a DIMM on the socket such that the notch on the DIMM matches the DIMM slot key on the socket.



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.

3. Hold the DIMM on both ends, then insert the DIMM vertically into the socket. Apply force to both ends of the DIMM simultaneously until the retaining clip snaps back into place, and the DIMM cannot be pushed in any further to ensure proper sitting of the DIMM.



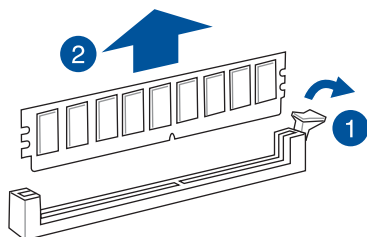
Always insert the DIMM into the socket VERTICALLY to prevent damage to the DIMM notch.



- To install two or more DIMMs, refer to the user guide bundled in the motherboard package.
- Refer to www.asus.com for vendor lists of the memory modules.

Removing a DIMM from a single clip DIMM socket

1. Press the retaining clip outward to unlock the DIMM.
2. Remove the DIMM from the socket.

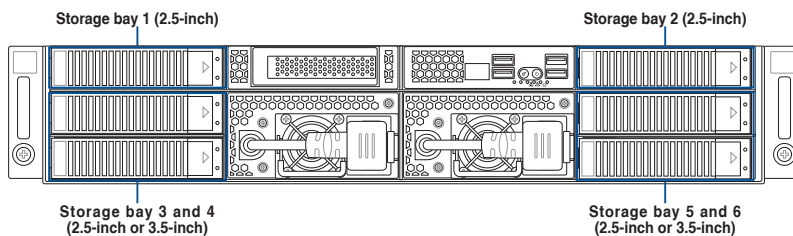


Support the DIMM lightly with your fingers when pressing the retaining clips. The DIMM might get damaged when it flips out with extra force.

2.4 Storage devices

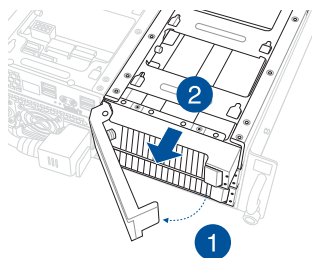
The chassis supports the following storage configurations:

- 2 x 2.5-inch storage devices and 4 x 3.5-inch storage devices
- 6 x 2.5-inch storage devices

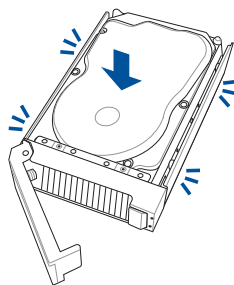


2.4.1 Installing a 3.5-inch SATA/SAS storage device.

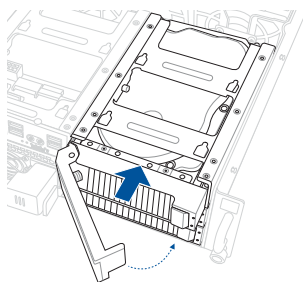
1. Press the spring lock.
2. Pull the tray lever outwards to remove the drive tray.



3. Prepare the SATA/SAS storage device, then insert it into the tray until it clicks into place.



4. Push the storage device and drive tray assembly all the way into the drive bay until the tray lever and spring lock clicks and secures the drive tray in place.



- When installed, the SATA/SAS connector on the drive connects to the SATA/SAS interface on the backplane.
- The drive tray is correctly placed when its front edge aligns with the bay edge.

5. Repeat steps 1 to 4 to install additional 3.5" storage devices..

2.4.2 Installing a 2.5-inch SATA/SAS/NVMe storage device.

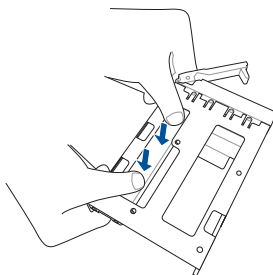
To install 2.5-inch storage devices into storage bays 1 and 2:

1. Remove the drive tray.

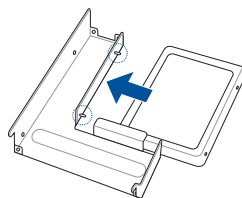


Refer to the **Installing a 3.5-inch SATA/SAS storage device** section for the steps on removing the drive tray.

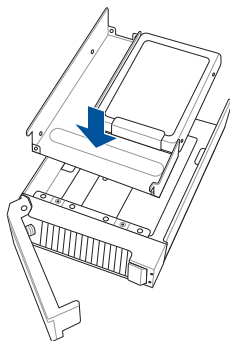
2. Push the tool-less 2.5-inch tray through the openings on the bottom of the drive tray.



3. Prepare the 2.5-inch storage device, then place it into the tool-less 2.5-inch tray.



4. Insert the tool-less 2.5-inch tray into the device tray until it clicks in place.



5. Push the storage device and drive tray assembly all the way into the drive bay until the tray lever and spring lock clicks and secures the drive tray in place.
6. Repeat steps 1 to 5 to install additional 2.5" storage devices.

To install 2.5-inch storage devices into storage bays 3, 4, 5, and 6:

1. Remove the drive tray.

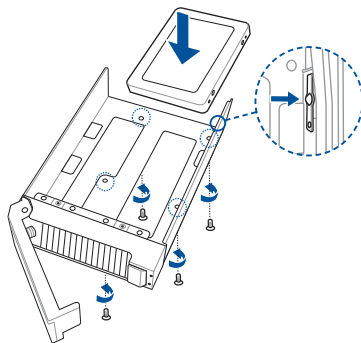


Refer to the **Installing a 3.5-inch SATA/SAS storage device** section for the steps on removing the drive tray.

2. Prepare the 2.5-inch storage device and the bundled set of screws.
3. Place the 2.5-inch storage device into the tray, then secure it with four screws.



The tool-less notch may interfere when trying to align the screw holes. Press the storage device against the notch if you are experiencing issues trying to align the screw holes.



4. Push the storage device and drive tray assembly all the way into the drive bay until the tray lever and spring lock clicks and secures the drive tray in place.
5. Repeat steps 1 to 4 to install additional 2.5" storage devices.

2.5 Expansion slots



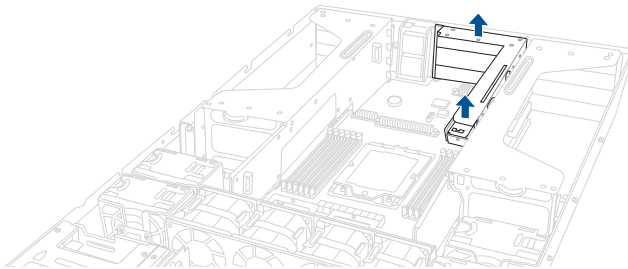
Make sure to unplug the power cord before adding or removing expansion cards. Failure to do so may cause you physical injury and damage motherboard components.

2.5.1 Installing a PCIe expansion card

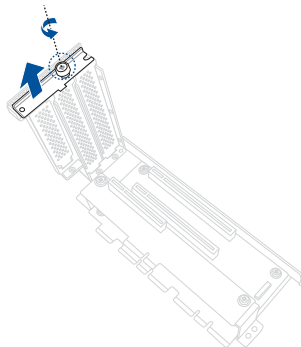
The onboard PCI Express slot on the motherboard comes pre-installed with a riser card that supports two x16 slots (1 x Gen5 x16 link, 1 x Gen5 x8/x16 link) for full-height/half-length PCIe cards and one x8 slot (Gen5 x0/x8 link) for installing low-profile/half-length PCIe cards.

To install PCIe expansion cards to the riser card:

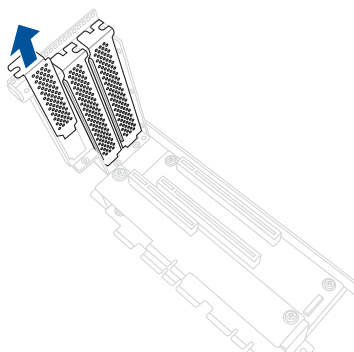
1. Firmly hold the riser card, then pull it up to detach it from the PCIe slot on the motherboard.



2. Remove the screw from the PCIe lock on the riser card, then remove the PCIe lock from the riser card.



3. Remove the metal covers from the riser card.



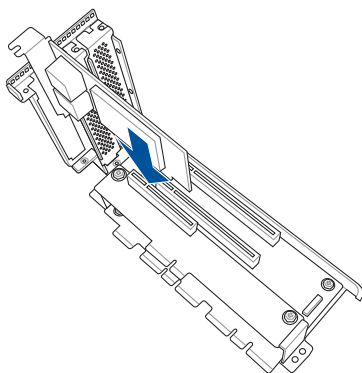
4. Prepare the expansion cards.



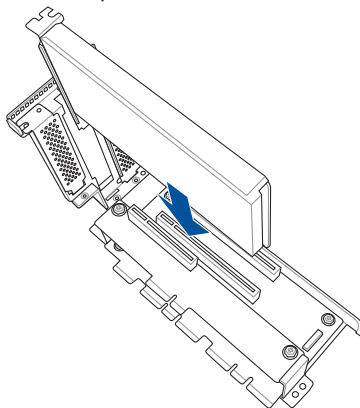
Before installing an expansion card, read the documentation that came with it and ensure that the proper hardware settings are configured.

5. Align and insert the golden finger connectors of the expansion cards into the PCIe slot connectors on the riser card as shown.

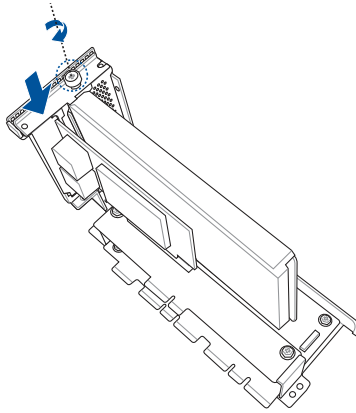
For PCIe x8 expansion cards



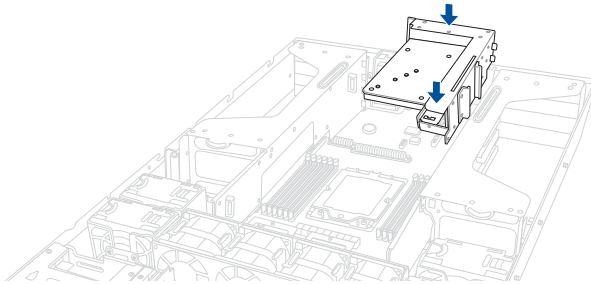
For PCIe x16 expansion cards



6. Replace the metal covers for any unused PCIe slots, then secure the PCIe lock using the screw removed earlier.



7. Align and insert the riser card and expansion card assembly into the PCIe slot on the motherboard.



2.5.2 Installing an OCP3.0 slot baseboard

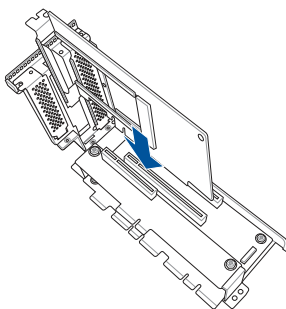
The onboard PCI Express slot on the motherboard comes pre-installed with a riser card that supports an OCP3.0 slot baseboard.

1. Remove the riser card, then remove the PCIe lock and metal covers.

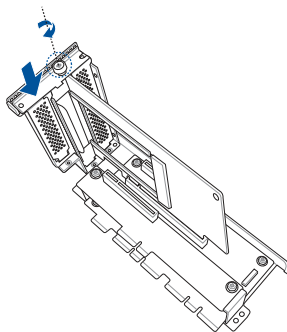


Refer to the **Installing a PCIe expansion card** section for the steps on removing the riser card, PCIe lock, and metal covers.

2. Prepare the OCP3.0 slot baseboard and insert the golden finger connectors into the PCIe connectors on the riser card as shown.



3. Replace the metal covers for any unused PCIe slots, then secure the PCIe lock using the screw removed earlier.



4. Connect **OCP_SIDE1** and **OCP_NCSI1** on the OCP3.0 slot baseboard to **OCP_SIDE1** and **OCP_BUS1** on the riser card using the bundled cables.
5. Align and insert the riser card and expansion card assembly into the PCIe slot on the motherboard.

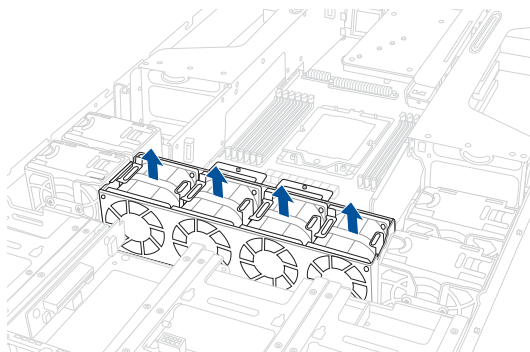
2.5.3 Installing a PIKE II or RAID card

A PIKE II or RAID card can be installed in the internal SAS/HBA/Storage bracket located in the front of the system.

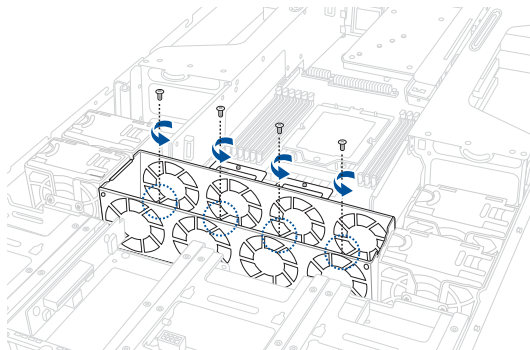
1. Remove the four (4) system fans as shown.



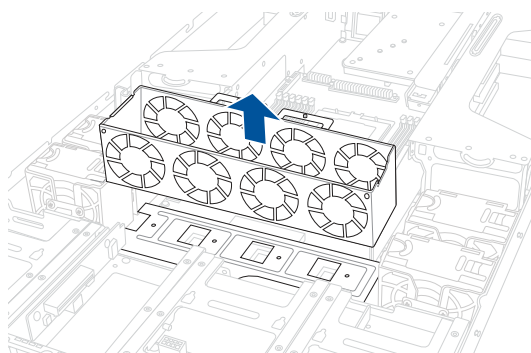
Refer to the **Removable/Optional Components** section for the steps on removing the system fans.



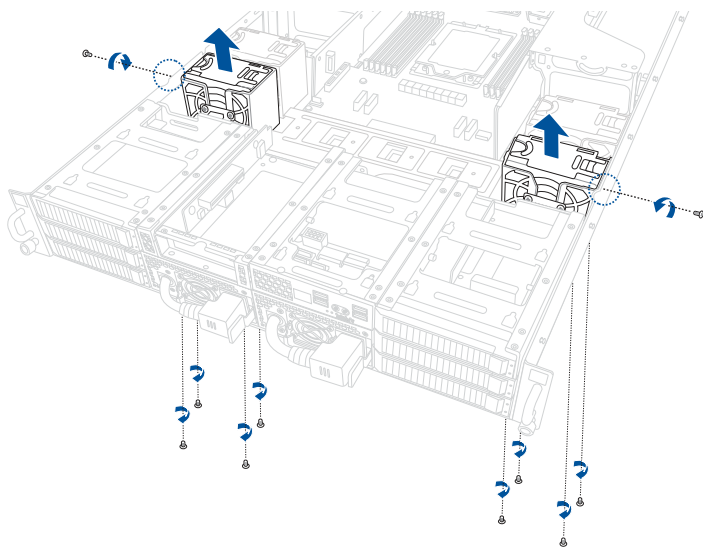
2. Remove the four (4) screws from the fan cage as shown.



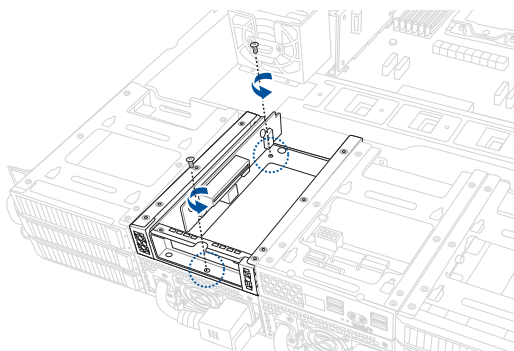
3. Remove the fan cage from the system chassis.



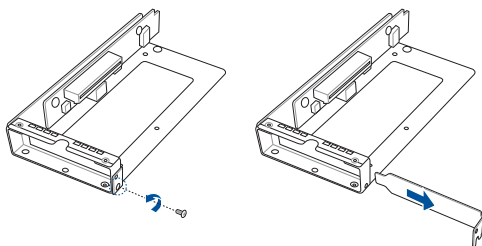
4. Remove the ten (10) screws as shown, then remove the two (2) fans and fan cages from the system chassis.



5. Remove the two (2) screws from the internal bracket as shown.

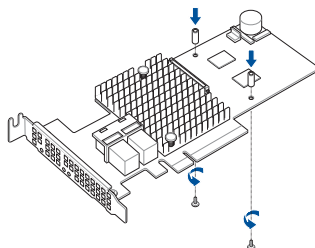


6. Remove the screw from the metal cover, then remove the metal cover.

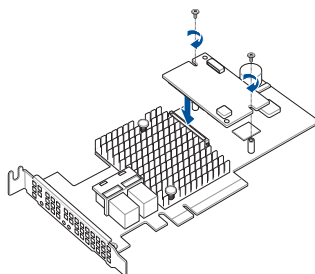


7. (Optional) To install an ASUS PIKE II 3108 RAID card and cache vault, follow the below instructions to install the cache vault add-on card:

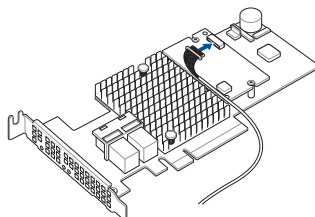
- a. Align the two spacers with the screw holes on the ASUS PIKE II card, then secure the two spacers with two screws from the bottom of the card.



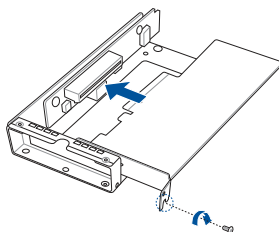
- b. Align and install the bundled cache vault add-on card onto the connector on the ASUS PIKE II card, then secure it to the two spacers with two screws.



- c. Connect the bundled power cable to the cache vault add-on card.



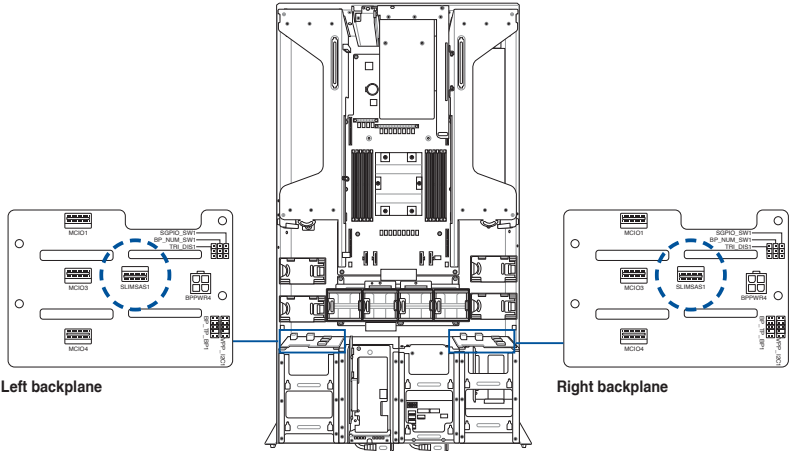
8. Insert the PIKE II or RAID card into the internal bracket, then secure it using the screw you removed earlier.



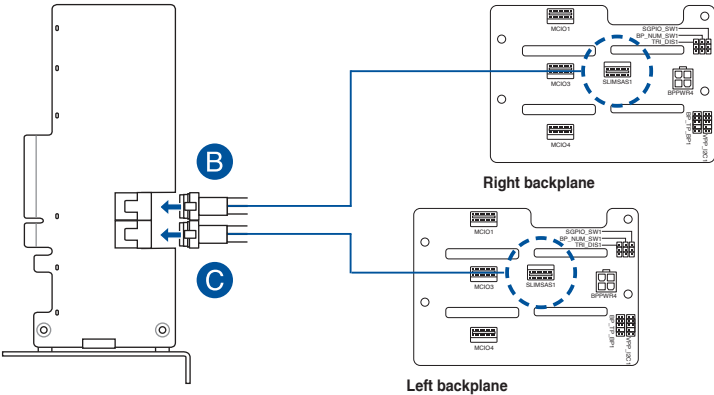
9. Refer to the below instructions to connect the PIKE II or RAID card:

To connect a PIKE II 3008 / PIKE II 3108 card:

- a. Disconnect the default SLIMSAS cables connected to **SLIMSAS1** on the left and right backplanes.

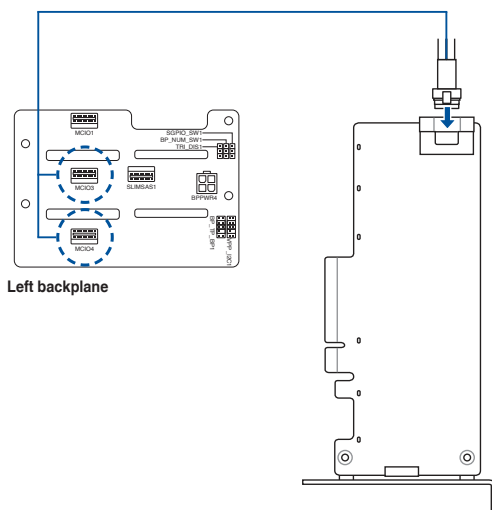


- b. Connect the upper MiniSAS (ISAS1) connector (B) on the PIKE II card to **SLIMSAS1** on the right backplane using the bundled cables.
- c. Connect the lower MiniSAS (ESAS1) connector (C) on the PIKE II card to **SLIMSAS1** on the left backplane using the bundled cables.



To connect a 9540 RAID card in NVME configuration:

- a. Connect the SLIMSAS connector on the RAID card to **MCIO3** and **MCIO4** on the left backplane using the bundled cables.



- a. Disconnect the default SLIMSAS cables connected to **SLIMSAS1** on the left and right backplanes.

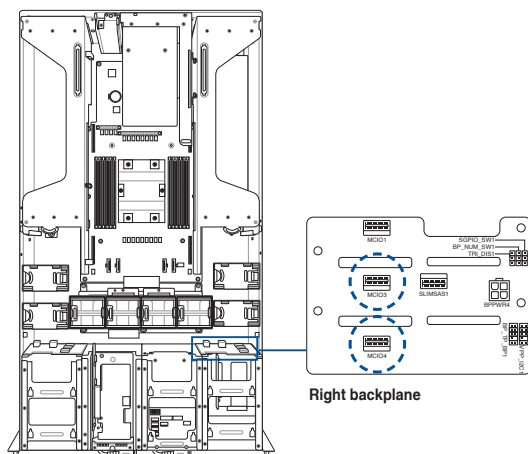


- ### Right backplane

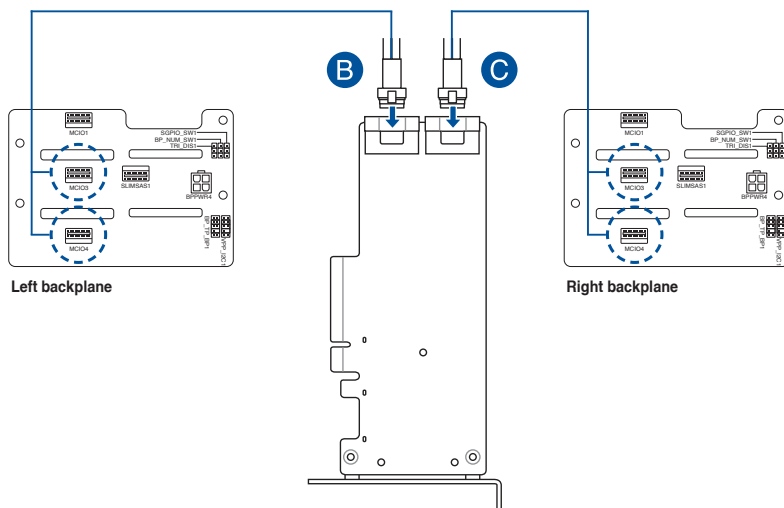


To connect a 9560 RAID card in NVME configuration:

- a. Disconnect the default MCIO cables connected to **MCIO3** and **MCIO4** on the right backplane.

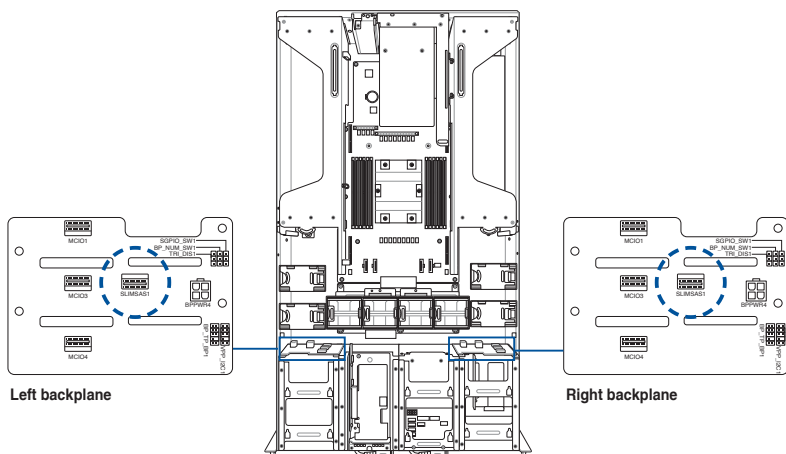


- b. Connect the left SLIMSAS connector (B) on the RAID card to **MCIO3** and **MCIO4** on the left backplane using the bundled cables.
- c. Connect the right SLIMSAS connector (C) on the RAID card to **MCIO3** and **MCIO4** on the right backplane using the bundled cables.

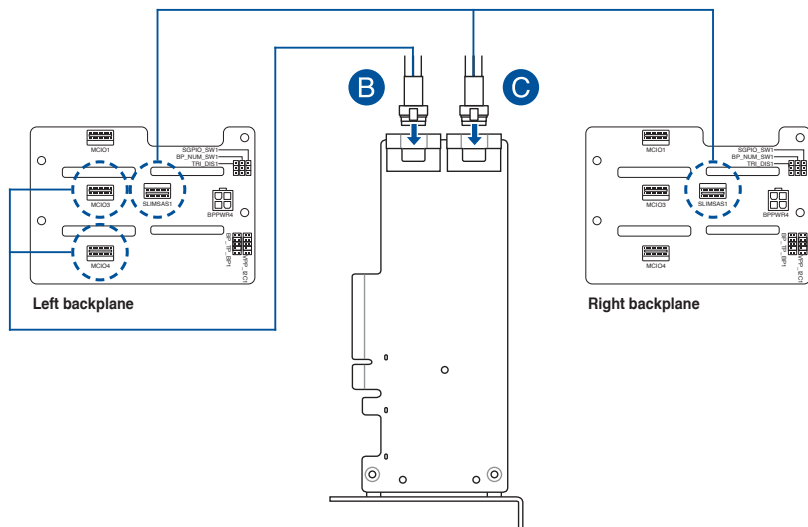


To connect a 9560 RAID card in SATA configuration:

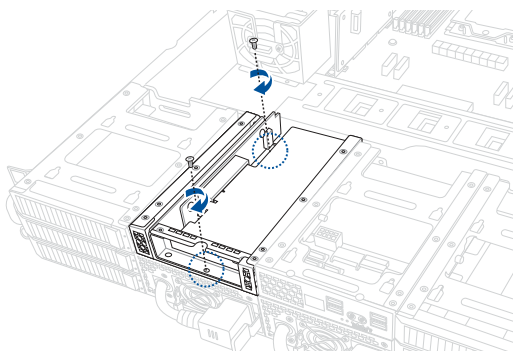
- a. Disconnect the default SLIMSAS cables connected to **SLIMSAS1** on the left and right backplanes.



- b. Connect the left SLIMSAS connector (B) on the RAID card to **MCIO3** and **MCIO4** on the left backplane using the bundled cables.
- c. Connect the right SLIMSAS connector (C) on the RAID card to **MCIO3** and **MCIO4** on the right backplane using the bundled cables.



10. Secure the internal bracket using the two screws removed earlier.

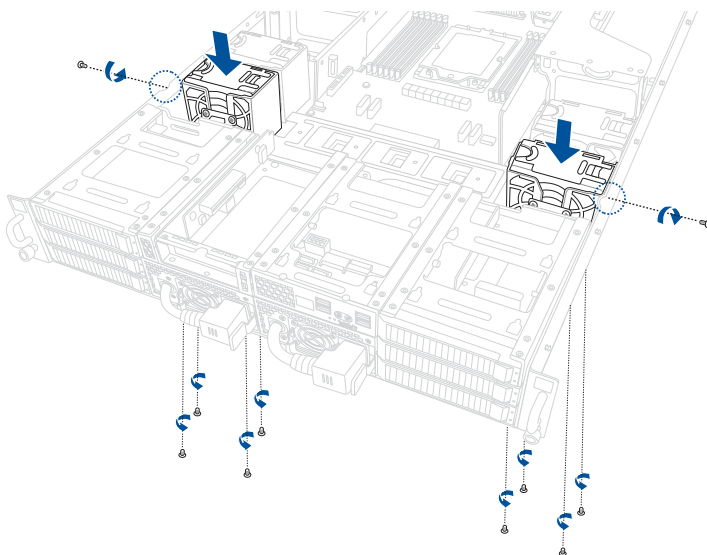


11. (Optional) Refer to the **Installing the Cache Vault Power Module** section to install and connect the Cache Vault Power Module.

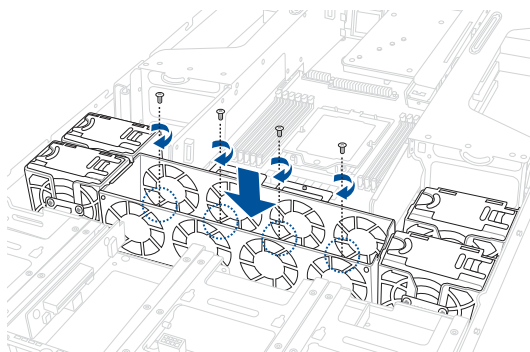


The cache vault is required for the PIKE II 3108 card or the 9560 RAID card.

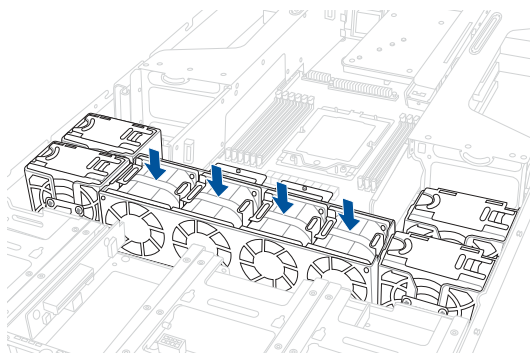
12. Align and install the two (2) fans and fan cages, then secure it using the ten (10) screws removed previously.



13. Align and install the fan cage, then secure it using the four (4) screws removed earlier.

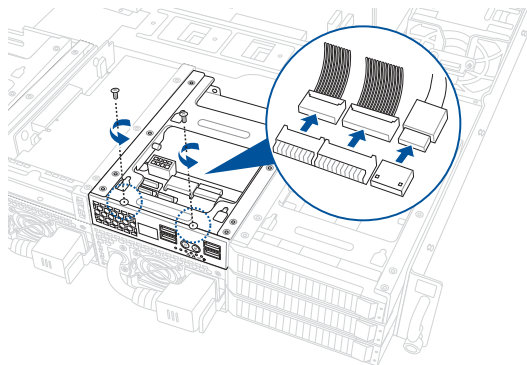


14. Install the four (4) system fans into the fan cage.

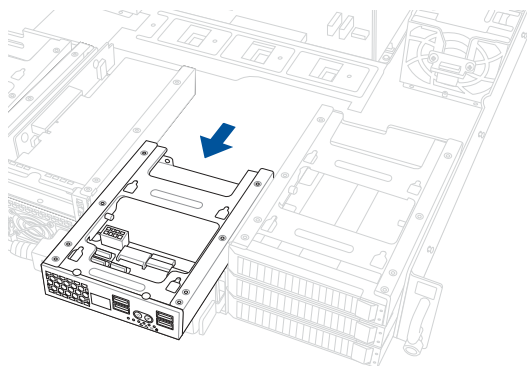


2.5.4 Installing the Cache Vault Power Module

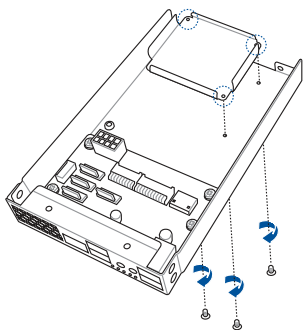
1. Disconnect the three (3) cables from the Front Panel Module, then remove the two (2) screws.



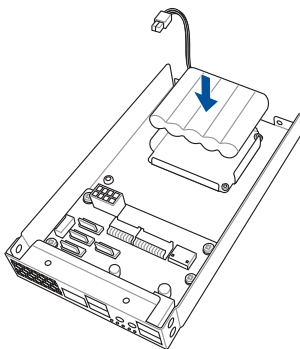
2. From the back of the Front Panel Module, push the Front Panel Module out of the system.



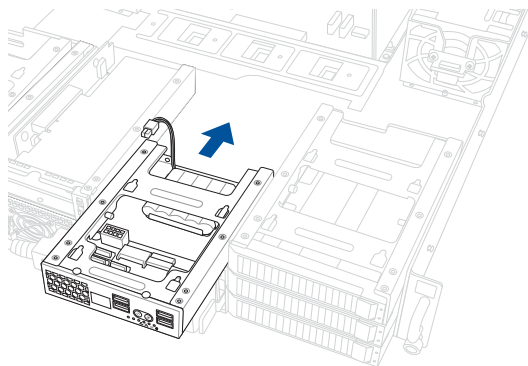
3. Align the three screw holes on the Cache Vault Power Module clip with the three screw holes on the Front Panel Module, then secure the clip with the three bundled screws.



4. Align and install the Cache Vault Power Module into the Cache Vault Power Module clip.



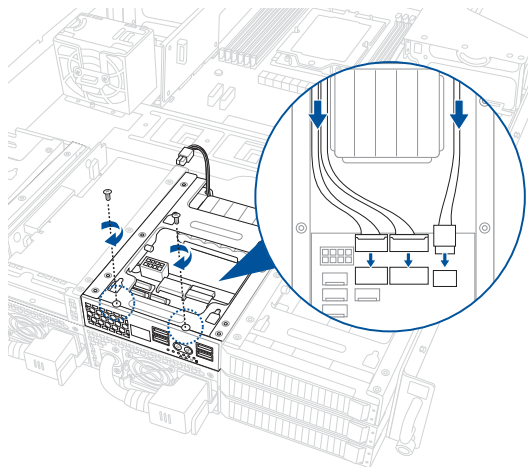
5. Insert the Front Panel Module into the system.



6. Connect the Cache Vault Power Module to the PIKE II card or RAID card.
7. Reconnect the three (3) cables to the Front Panel Module, then secure the Front Panel Module using the two (2) screws removed earlier.



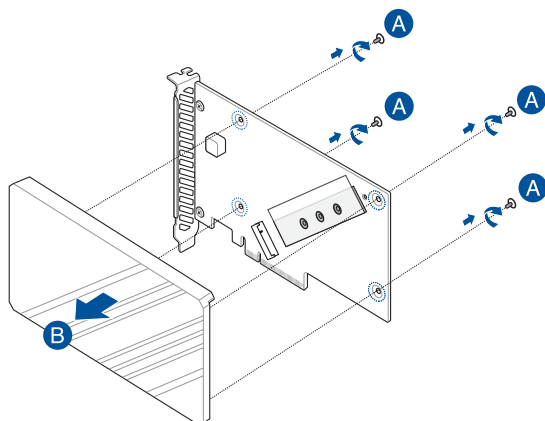
When reconnecting the cables, ensure that the cables are not placed on top of the Cache Vault Power Module.



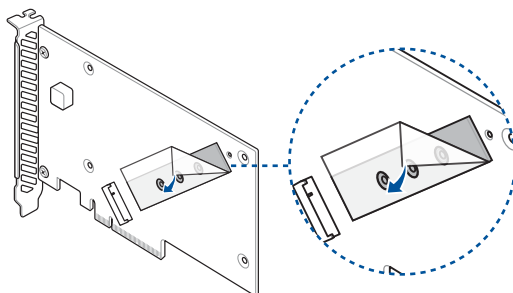
2.5.5 Installing an M.2 (NGFF) card

You may install an M.2 card (up to 22110) to the PCIe 5.0 M.2 card.

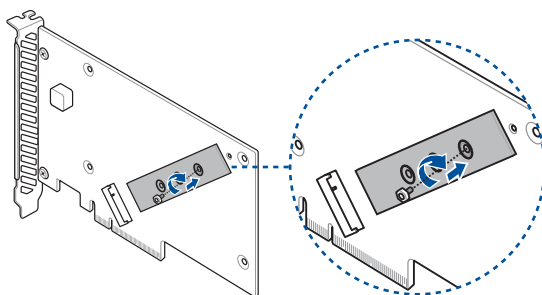
1. Remove the four (4) cover screws that secure the cover to the PCIe 5.0 M.2 card, then remove the cover and set it aside.



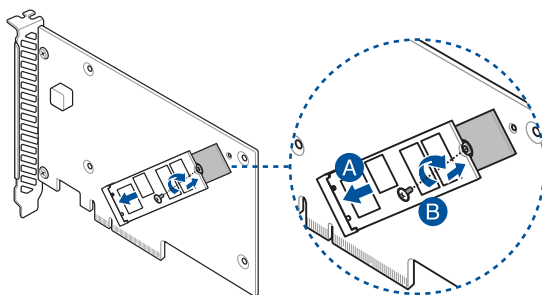
2. Peel the plastic film off the thermal pad next to the M.2 slot.



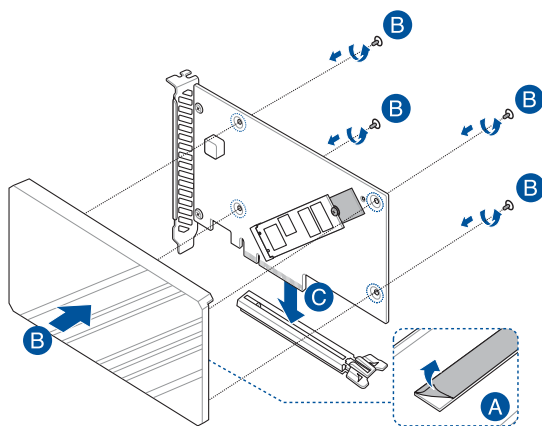
3. Secure the bundled stand screw onto the PCIe 5.0 M.2 card.



4. Install the M.2 storage device into the onboard M.2 slot (A), then secure the M.2 storage device with the bundled screw (B).



5. Peel the plastic film off the thermal pad on the heatsink (A), secure the cover onto the PCIe 5.0 M.2 card with the cover screws that you removed earlier (B), then install the PCIe 5.0 M.2 card into the PCIe slot on the rear riser card.



2.5.6 (optional) Installing the PFR module

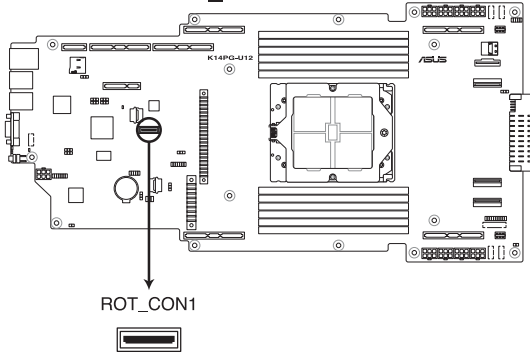
The optional PFR module will come pre-installed on your system and is connected to the PFR module connector on your motherboard.



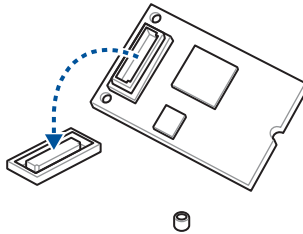
- The illustration below is for reference only.
- For more information or assistance, please refer to www.asus.com.

1. Locate the PFR module connector on your motherboard.

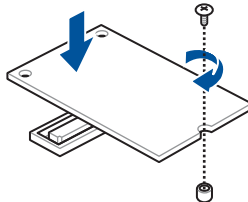
K14PG-U12 ROT_CON1 connector



2. Align and connect the PFR module to the PFR module connector.



3. Push the PFR module down so that it is seated securely on the PFR module connector, then secure it using a screw.



2.5.7 Configuring an expansion card

After installing the expansion card, configure it by adjusting the software settings.

1. Turn on the system and change the necessary BIOS settings, if any. Refer to the **BIOS Setup** chapter for information on BIOS setup.
2. Assign an IRQ to the card. Refer to the **Standard Interrupt assignments** table for more information.
3. Install the software drivers for the expansion card.

Standard Interrupt assignments

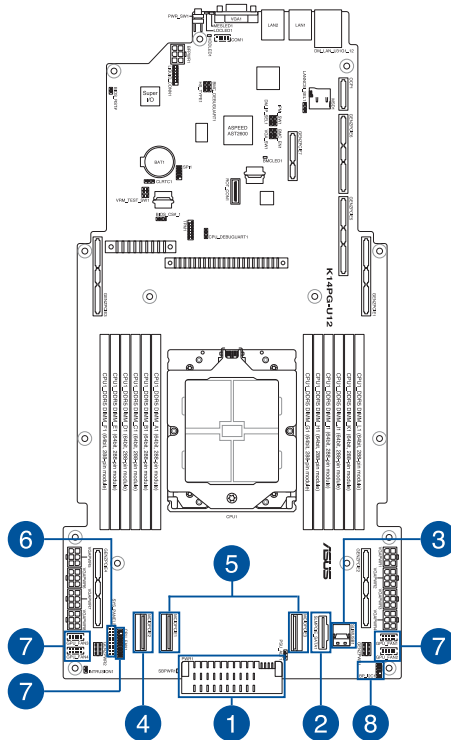
| IRQ | Priority | Standard function |
|-----|----------|-----------------------------|
| 0 | 1 | System Timer |
| 1 | 2 | Keyboard Controller |
| 2 | - | Programmable Interrupt |
| 3* | 11 | Communications Port (COM2) |
| 4* | 12 | Communications Port (COM1) |
| 5* | 13 | -- |
| 6 | 14 | Floppy Disk Controller |
| 7* | 15 | -- |
| 8 | 3 | System CMOS/Real Time Clock |
| 9* | 4 | ACPI Mode when used |
| 10* | 5 | IRQ Holder for PCI Steering |
| 11* | 6 | IRQ Holder for PCI Steering |
| 12* | 7 | PS/2 Compatible Mouse Port |
| 13 | 8 | Numeric Data Processor |
| 14* | 9 | Primary IDE Channel |
| 15* | 10 | Secondary IDE Channel |

* These IRQs are usually available for ISA or PCI devices.

2.6 Cable connections



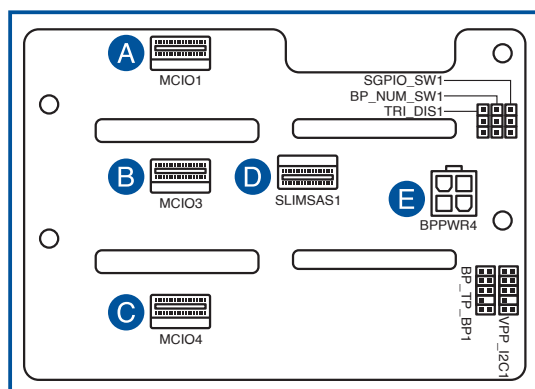
- The bundled system cables are pre-connected before shipment. You do not need to disconnect these cables unless you remove the pre-installed components to install additional devices.
- Refer to the **Motherboard Information** chapter for detailed information on the connectors.



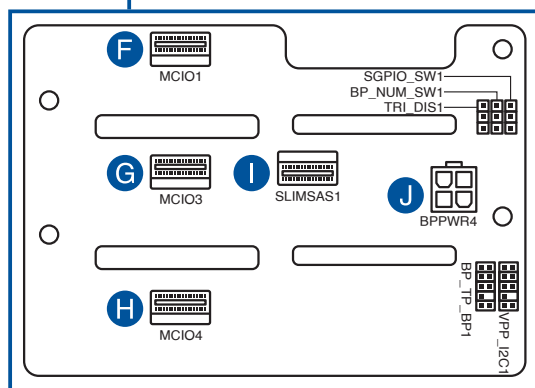
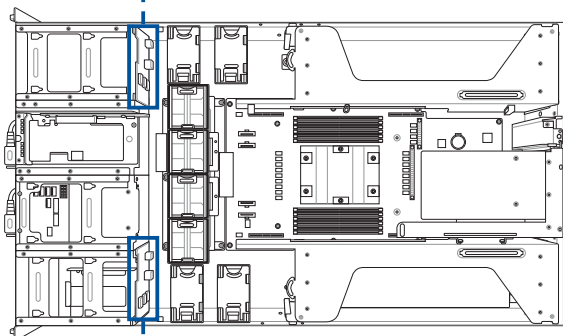
Pre-connected system cables

1. PWR1 power connector (from the power distribution board to the motherboard)
2. SLIMPCIE_SATA1 connector (from the motherboard to the backplane board)
3. SLIMUSB1 connector (from the motherboard to the front I/O board)
4. MCIOPCIE2 connector (from the motherboard to the internal riser board)
5. MCIOPCIE1, MCIOPCIE3 connectors (from motherboard to the backplane board)
6. SYS_PANEL2 connector (from the motherboard to the front I/O board)
7. Fan connectors (from the motherboard to the system fans)
8. BP_I2C1 connector (from the motherboard to the backplane board)

2.7 SATA/SAS/NVMe backplane cabling



Left backplane



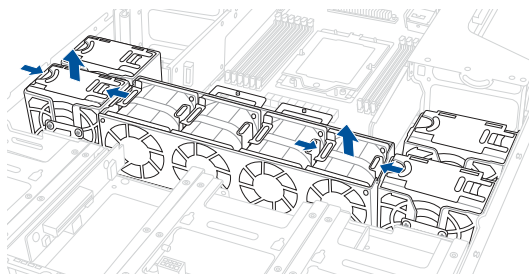
Right backplane

| | |
|----------|---|
| A | Connect MCIO1 on the Left Backplane to MCIO3PCIE on the Motherboard |
| B | Connect MCIO2 on the Left Backplane to MCIO2PCIE on the Motherboard |
| C | Connect MCIO3 on the Left Backplane to MCIO2PCIE on the Motherboard |
| D | Connect SLIMSAS1 on the Left Backplane to SLIMPCIE_SATA1 on the Motherboard |
| E | Connect BPPWR4 on the Left Backplane to BPPWR2 on the Power Distribution Board |
| F | Connect MCIO1 on the Right Backplane to MCIO3PCIE on the Motherboard |
| G | Connect MCIO2 on the Right Backplane to MCIO1PCIE on the Motherboard |
| H | Connect MCIO3 on the Right Backplane to MCIO1PCIE on the Motherboard |
| I | Connect SLIMSAS1 on the Right Backplane to SLIMPCIE_SATA1 on the Motherboard |
| J | Connect BPPWR4 on the Right Backplane to BPPWR1 on the Power Distribution Board |

2.8 System fans

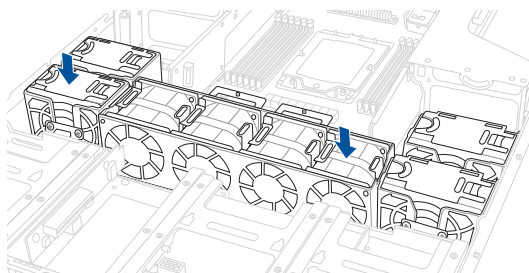
To uninstall the system fans:

1. Hold the system fan by the notches, then press the latch inwards to release the system fan from the fan cage.
2. Lift the fan, then set it aside.
3. Repeat steps 1 to 2 to uninstall the other system fans.



To reinstall the system fans:

1. Insert the fan into the fan cage. Ensure the fan connector is seated firmly within the cable holder.



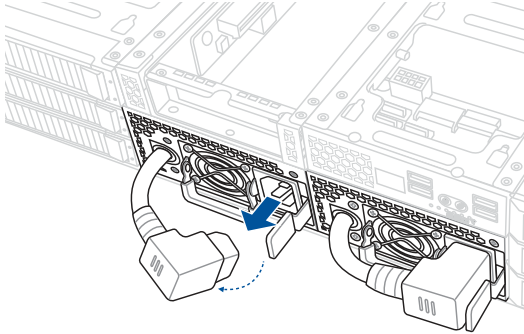
2.9 Redundant power supply units



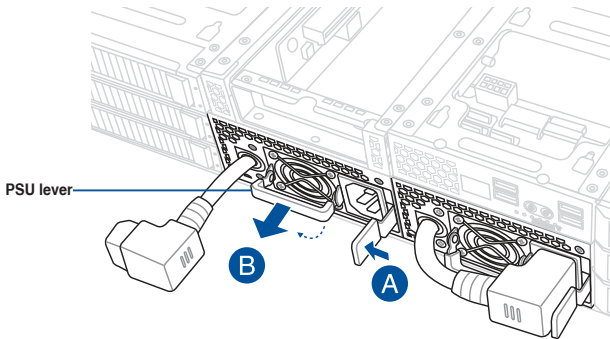
We recommend that you use both of your hands when performing the following steps.

To replace a power supply unit (PSU):

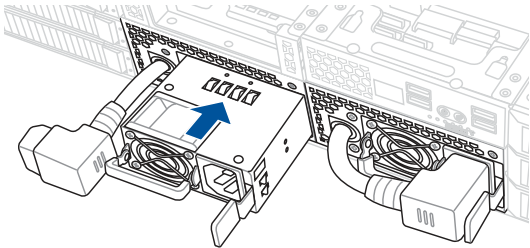
1. Unplug the PSU power cable.



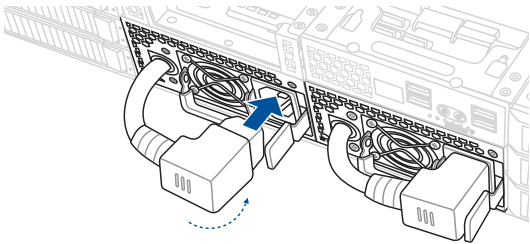
2. Lift up the PSU lever.
3. Hold the PSU lever, press the PSU latch (A), then carefully pull the PSU out of the system chassis (B).



- 4. Prepare the replacement PSU.
- 5. Align and insert the replacement PSU into the empty PSU bay until it clicks in place.



- 6. Reconnect the PSU power cable.



- The system automatically combines the two power supply modules into one. The combined output power varies with input voltages. Refer to the table below for details.

2600W (Air-cooled SKU)

| Input Voltage | Max. Output Power (Watt) per PSU |
|-----------------------------|----------------------------------|
| 100V-127Vac, 13.8A, 50/60Hz | 1000W |
| 220-240Vac, 16A, 50/60Hz | 2600W |

2600W (Liquid-cooled SKU)

| Input Voltage | Max. Output Power (Watt) per PSU |
|----------------------|----------------------------------|
| 220Vac, 16A, 50/60Hz | 2600W |

- 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.

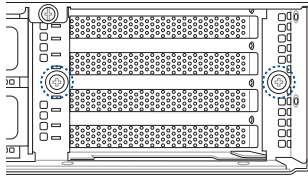


- Always use PSUs with the same watt and power rating. Combining PSUs with different wattage (e.g. 1 x 1620 W + 1 x 2000 W) may yield unstable results and potential damage to your system.
- For a steady power input, use only the power cables that come with the server system package.

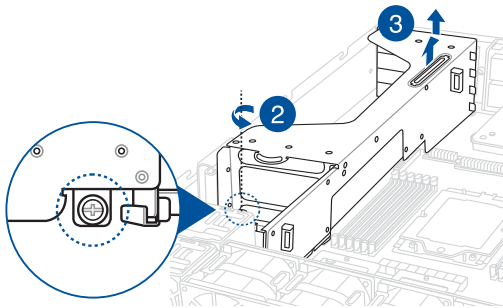
2.10 Installing a GPU

Follow the steps below to install a GPU card to the system.

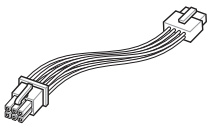
1. Locate and loosen the two thumbscrews at the rear of the chassis.



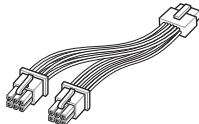
2. Locate and loosen the thumbscrew at the front of the GPU bracket.
3. Firmly hold and pull the GPU bracket upwards to detach it from the motherboard.



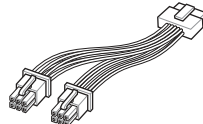
4. Prepare the appropriate GPU power cable depending on the type of GPU card.



Tesla/AMD
8pin to 6pin power cable



Quadro
8pin to 2x6pin power cable



12VHPWR
12+4pin to 2x6pin power cable

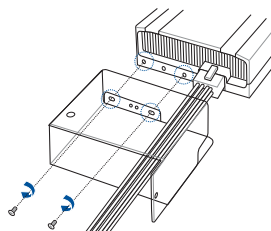
5. Install the air duct, if supported by the GPU card, and connect the GPU power cable.



The GPU air duct is designed and recommended for dual-slot GPU cards with a length of 10.5 inches.

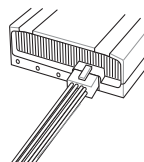
For GPU card installation with an air duct

Pass the power cable through the air duct and connect it to the GPU card, then secure the air duct to the GPU card with two screws.

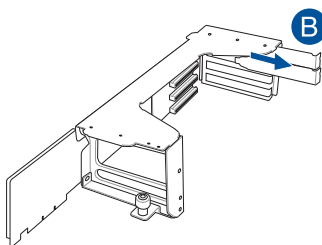
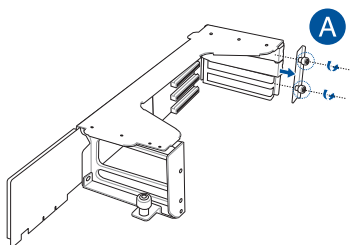


For GPU card installation without an air duct

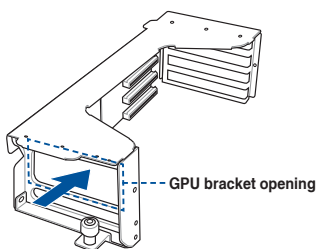
Connect the power cable to the GPU.



6. Place the GPU bracket on a flat and stable surface.
7. Loosen the two thumbscrews and remove the PCIe lock (A), then remove the metal covers (B).



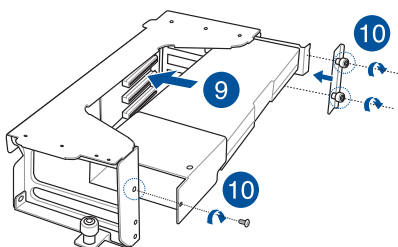
8. Insert the GPU cables into the opening on the GPU bracket.



9. Align and insert the golden fingers of the GPU card into the card slot on the bracket and ensure that it is securely seated in the slot.
10. Secure the GPU card and air duct assembly to the GPU bracket.

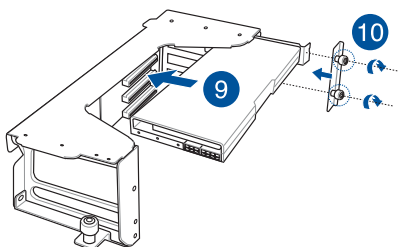
For GPU card installation with an air duct

Secure the GPU card and air duct to the GPU bracket with a screw, then install the PCIe lock and secure the two thumbscrews.



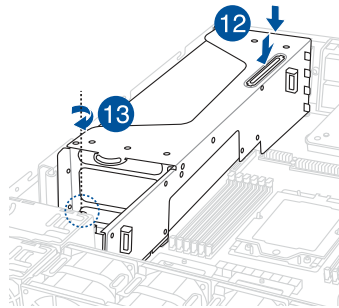
For GPU card installation without an air duct

Install the PCIe lock and secure the two thumbscrews.

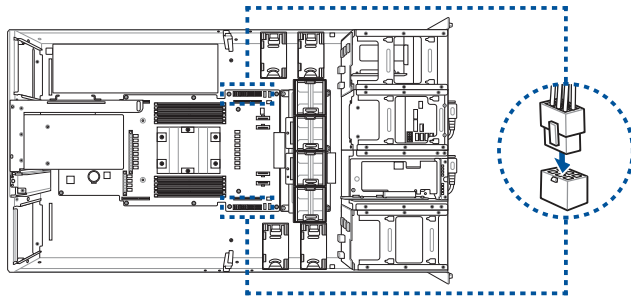


11. Repeat steps 4 to 10 if you need to install an additional GPU card to the bracket.

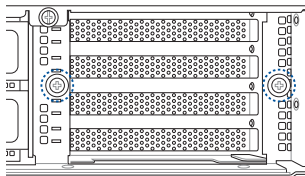
12. Align and insert the golden fingers of the GPU bracket into the card slot on the motherboard and ensure that it is securely seated in the slot.
13. Secure the thumbscrew at the front of the GPU bracket.



14. Connect the other end of the GPU power cable to an available 6-pin power connector in front of the GPU bracket.



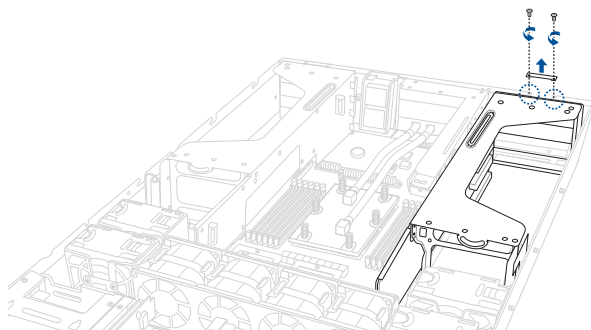
15. Secure the two thumbscrews at the rear of the chassis.



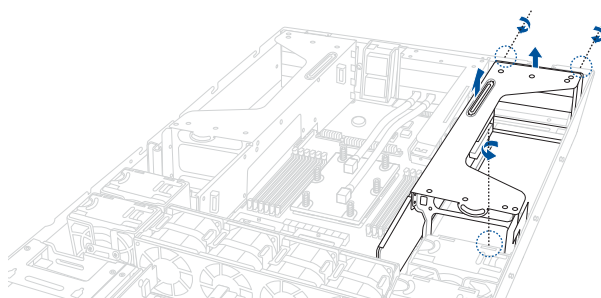
2.11 Installing a GPU liquid cooling module

Follow the steps below to install an optional liquid cooling module for supported GPU cards.

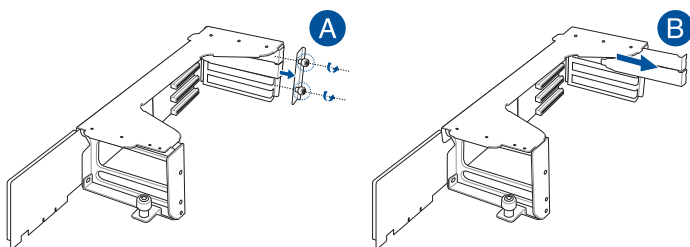
1. Remove the two screws, then remove the metal cover from the rear of the GPU bracket.



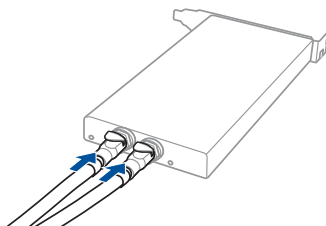
2. Locate and loosen the three thumbscrews, then firmly hold and pull the GPU bracket upwards to detach it from the motherboard.



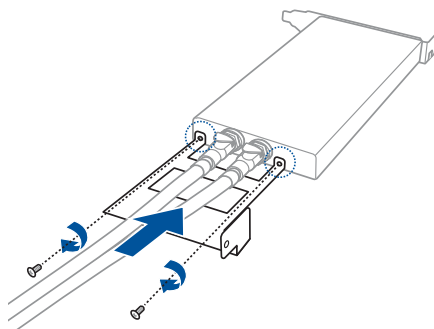
3. Place the GPU bracket on a flat and stable surface.
4. Loosen the two thumbscrews and remove the PCIe lock (A), then remove the metal covers (B).



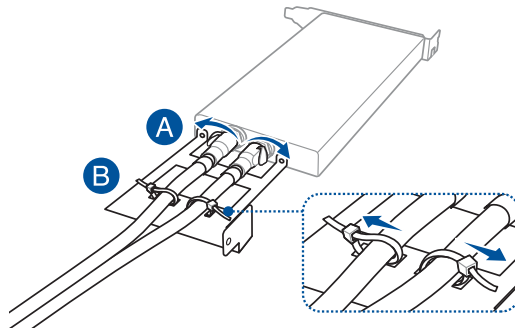
5. Connect the liquid cooling pipes to a supported GPU card.



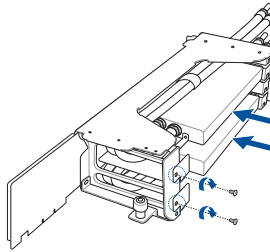
6. Install the liquid cooling pipe bracket, then secure it using two screws.



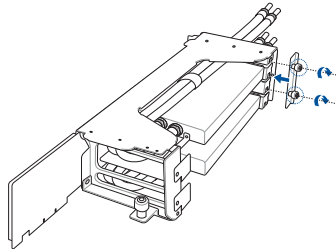
7. Push the latches on the liquid cooling pipes outwards (A), then use cable ties to secure the liquid cooling pipes (B).



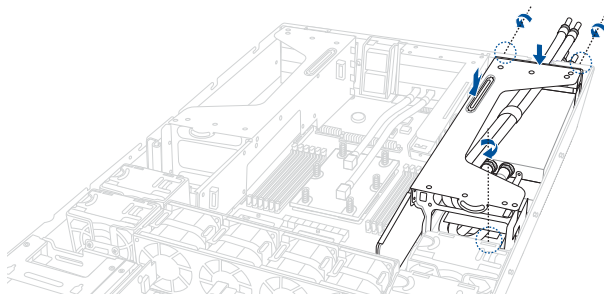
8. Install the GPU, liquid cooling assembly into the GPU bracket, then secure it using two screws.



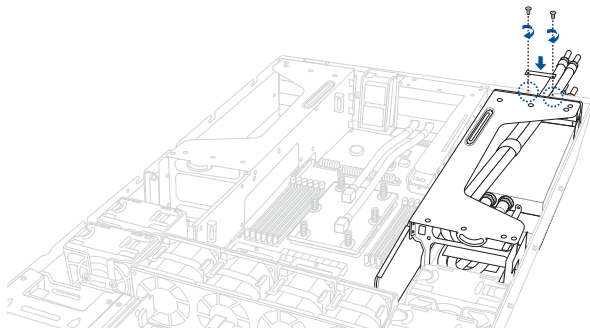
9. Install the PCIe lock, then secure the two thumbscrews.



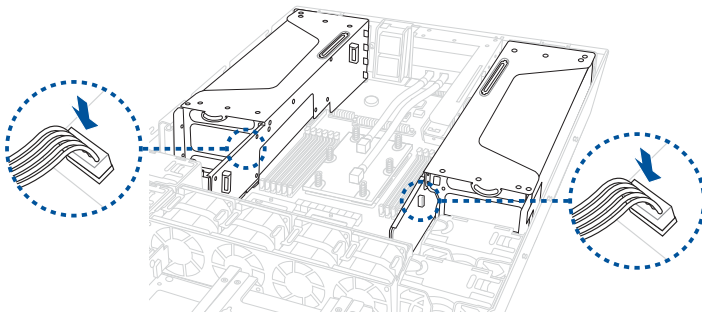
10. Align and insert the golden fingers of the GPU bracket into the card slot on the motherboard and ensure that it is securely seated in the slot, then secure the three thumbscrews.



11. Install the metal cover, then secure it using two screws.



12. Connect the leak detection sensor cable to **WL_CON1_L** for the left GPU bracket or **WL_CON1_R** for the right GPU bracket.

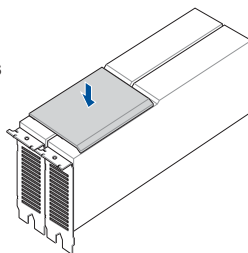


2.12 Installing a GPU bridge

Follow the steps below to install an optional GPU bridge to supported GPU cards.

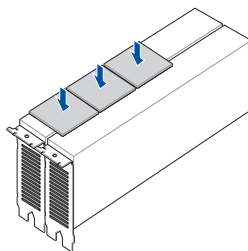
For AMD GPU cards with GPU bridge support

Align the GPU bridge with the golden finger connectors on the GPU cards, then install the GPU bridge.



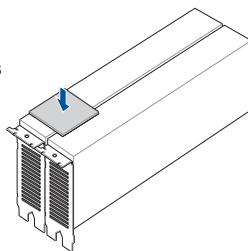
For NVidia A100 GPU cards

Align the three GPU bridges with the golden finger connectors on the GPU cards, then install the GPU bridges.



For NVidia RTX A5000 / A6000 GPU cards

Align the GPU bridge with the golden finger connectors on the GPU cards, then install the GPU bridge.



2.13 Motherboard

2.13.1 Removing the motherboard

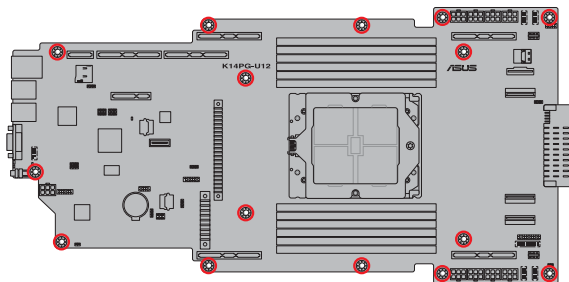
To remove the system motherboard:

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



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

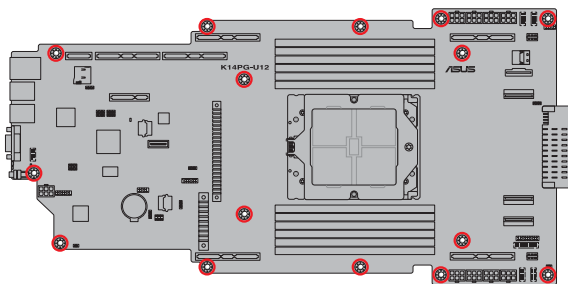
2. Remove the screws, then remove the motherboard.



2.13.2 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.

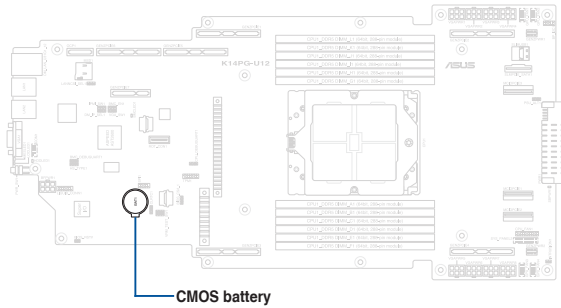


2. Reinstall any removed components and reconnect the cables to the motherboard.

2.14 CMOS battery

To replace a CMOS battery:

1. Locate and remove the CMOS battery.



2. Place the replacement CMOS battery into the battery compartment.

2.15 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.



- 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.
-
- 1.5U full extension ball bearing rail kit

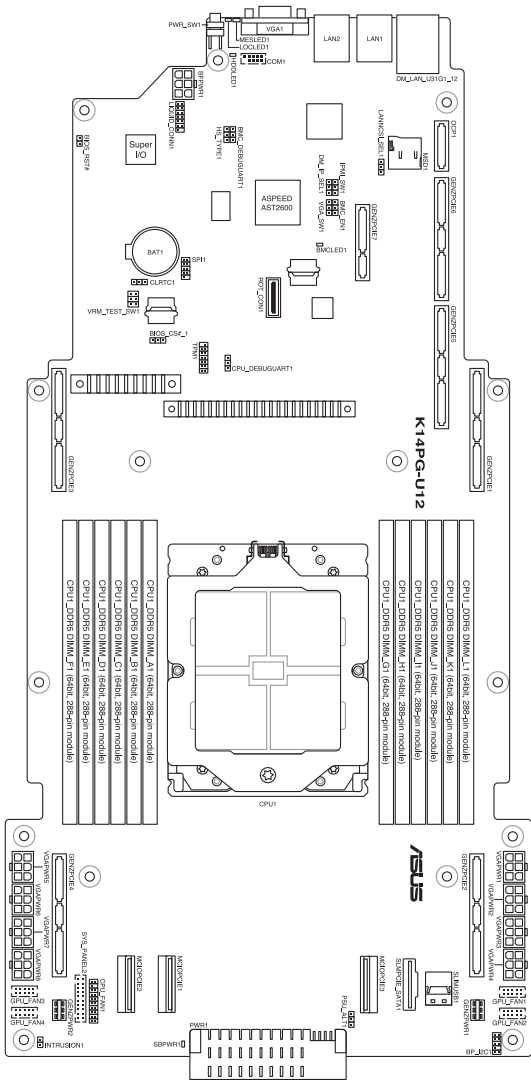
[illegible]

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.

3

3.1 Motherboard layout



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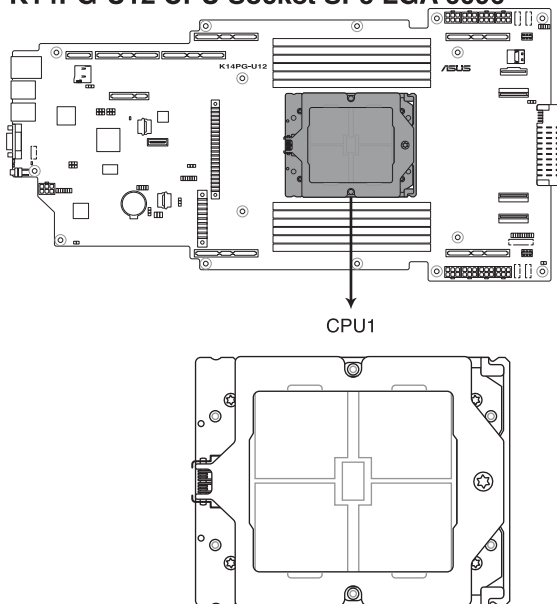
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| 1. | Standby Power LED (SBPWR1) | 3-20 |
| 2. | Baseboard Management Controller LED (BMCLED1) | 3-20 |
| 3. | Hard Disk Activity LED (HDDLED1) | 3-21 |
| 4. | Message LED (MESLED1) | 3-21 |
| 5. | Location LED (LOCLED1) | 3-22 |

3.2 Central Processing Unit (CPU)

The motherboard comes with a surface mount SP5 socket designed for compatible AMD EPYC™ processors.

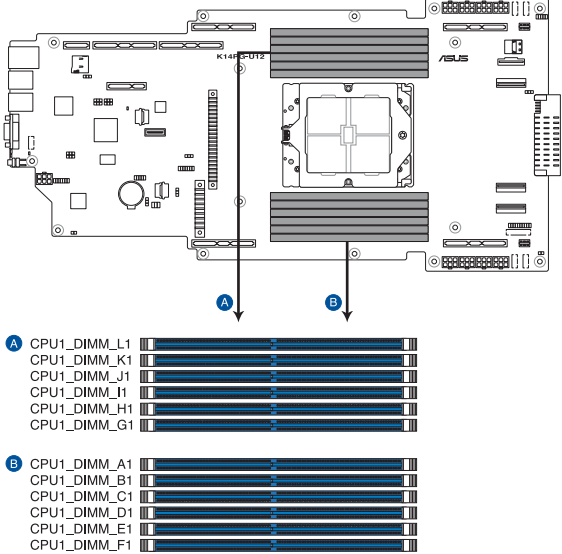
K14PG-U12 CPU Socket SP5 LGA 6096



3.3 Dual Inline Memory Module (DIMM)

The motherboard comes with twelve (12) Double Data Rate 5 (DDR5) Dual Inline Memory Modules (DIMM) sockets.

K14PG-U12 288-pin DDR5 DIMM sockets



3.4 Jumpers

1. Clear RTC RAM (CLRRTC1)

This jumper allows you to clear the CMOS memory system setup parameters by erasing the CMOS Real Time Clock (RTC) RAM data. The onboard button cell battery powers the RAM data in CMOS, which includes system setup information such as system passwords.

To erase the RTC RAM:

1. Turn OFF the computer and unplug the power cord.
2. Move the jumper cap from pins 1–2 (default) to pins 2–3. Keep the cap on pins 2–3 for about 5–10 seconds, then move the cap back to pins 1–2.
3. Plug the power cord and turn ON the computer.
4. Hold down the key during the boot process and enter BIOS setup to re-enter data.

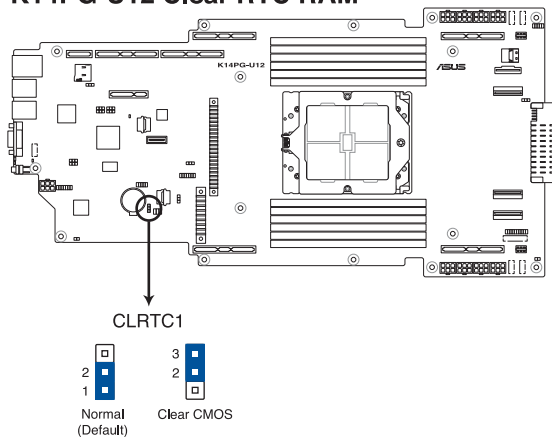


Except when clearing the RTC RAM, never remove the cap on CLRRTC jumper default position. Removing the cap will cause system boot failure!



If the steps above do not help, remove the onboard battery and move the jumper again to clear the CMOS RTC RAM data. After the CMOS clearance, reinstall the battery.

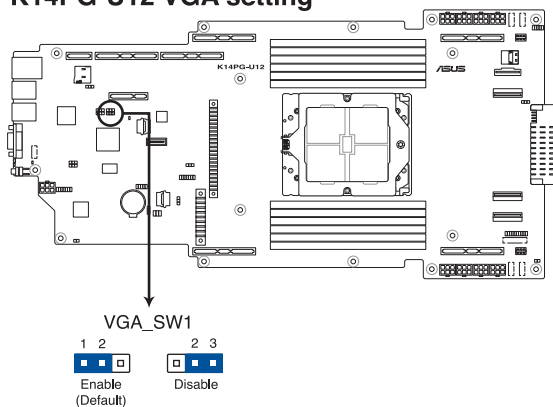
K14PG-U12 Clear RTC RAM



2. VGA Controller setting (3-pin VGA_SW1)

This jumper allows you to enable or disable the onboard VGA controller. Set to pins 1–2 to activate the VGA feature.

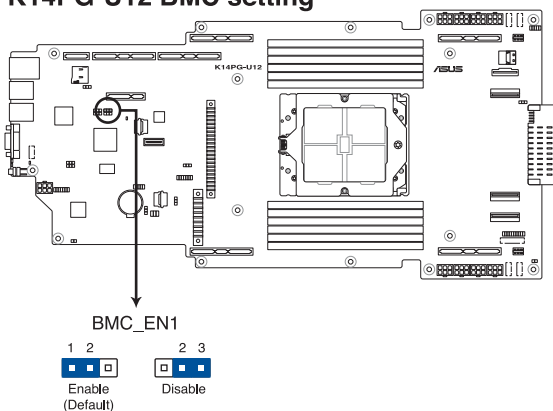
K14PG-U12 VGA setting



3. Baseboard Management Controller setting (3-pin BMC_EN1)

This jumper allows you to enable (default) or disable on-board BMC. Ensure to set this BMC jumper to enabled to avoid system fan control and hardware monitor error.

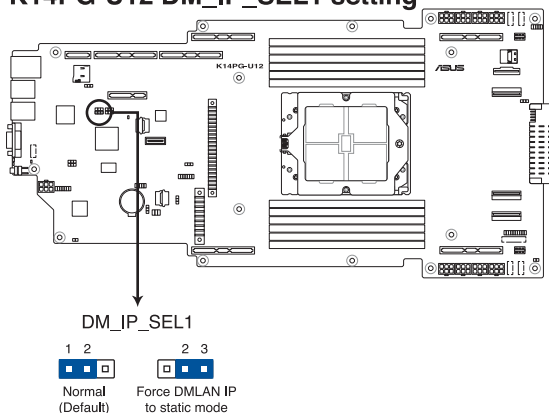
K14PG-U12 BMC setting



4. 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).

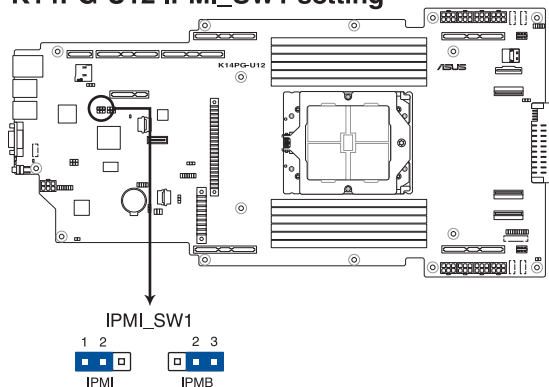
K14PG-U12 DM_IP_SEL1 setting



5. IPMI SW setting (3-pin IPMI_SW1)

This jumper allows you to select which protocol in the GPU sensor to function.

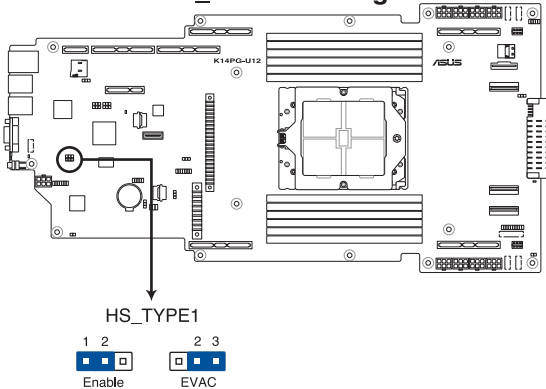
K14PG-U12 IPMI_SW1 setting



6. **Heatsink Type setting (3-pin HS_TYPE1)**

This jumper allows you to set the fan curve used.

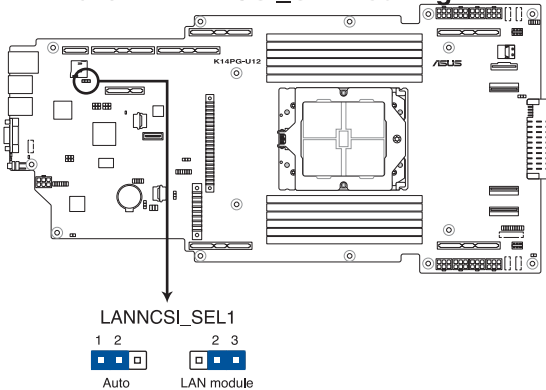
K14PG-U12 HS_TYPE1 setting



7. **LANNCSE setting (3-pin LANNCSE_SEL1)**

This jumper allows you to select the NCSI device.

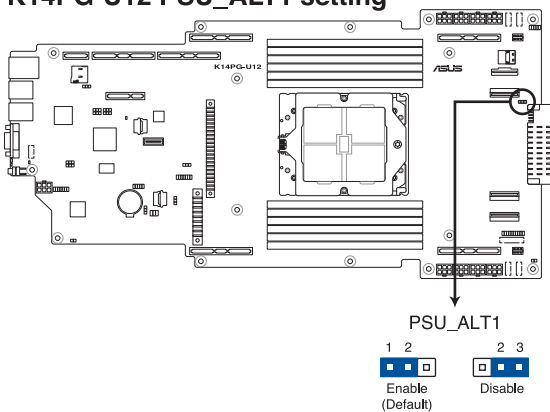
K14PG-U12 LANNCSE_SEL1 setting



8. PSU_ALT1 (3-pin PSU_ALT1)

This jumper allows you to enable or disable the PSU SMB alert.

K14PG-U12 PSU_ALT1 setting

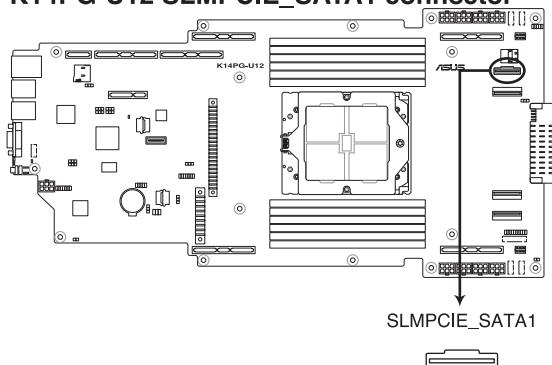


3.5 Internal connectors

1. SLIMPCIE connector (SLIMPCIE_SATA1)

Connects the SATA signal to the SLIMSAS1 ports on the backplanes.

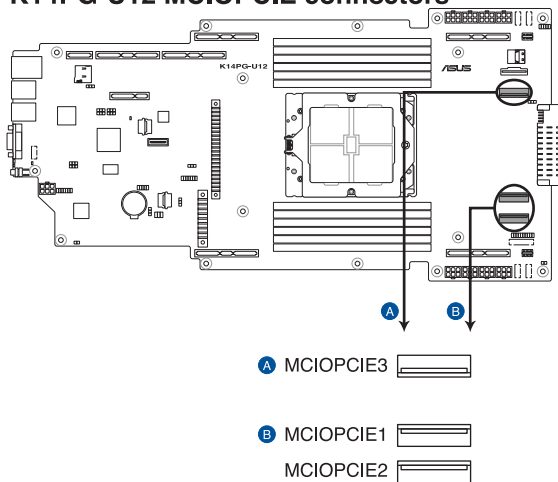
K14PG-U12 SLIMPCIE_SATA1 connector



2. MCIOPCIE connectors (MCIOPCIE1-3)

Connects the PCIe signal to the MCIO ports on the backplanes.

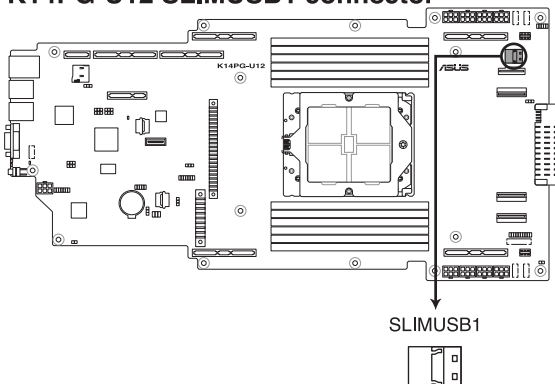
K14PG-U12 MCIOPCIE connectors



3. USB 3.2 Gen 1 connectors (SLIMUSB1)

Connect a compatible USB module cable to the SLIMUSB1 connector, and then install the module to a slot opening at the back or front of the system chassis. (SLIMUSB1 connector is used for the front USB panel by default).

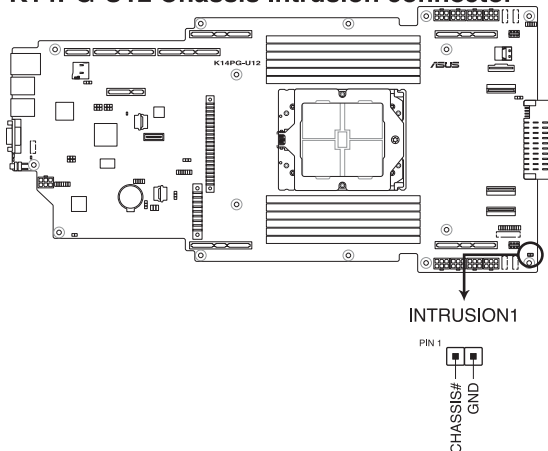
K14PG-U12 SLIMUSB1 connector



4. Chassis Intrusion connector (2-pin INTRUSION1)

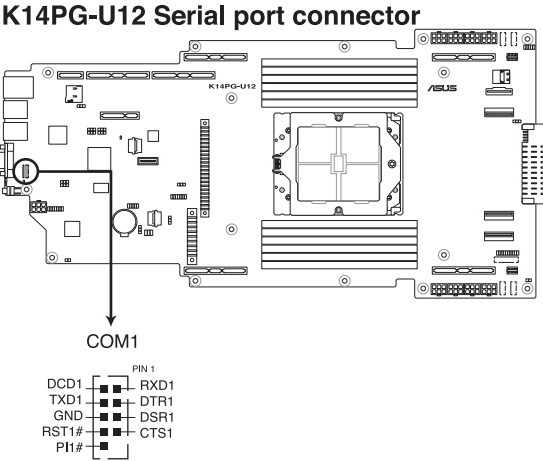
These leads are for the intrusion detection feature for chassis with intrusion sensor or microswitch. When you remove any chassis component, the sensor triggers and sends a high level signal to these leads to record a chassis intrusion event. The default setting is to short the CHASSIS# and the GND pin with a jumper cap to disable the function.

K14PG-U12 Chassis Intrusion connector



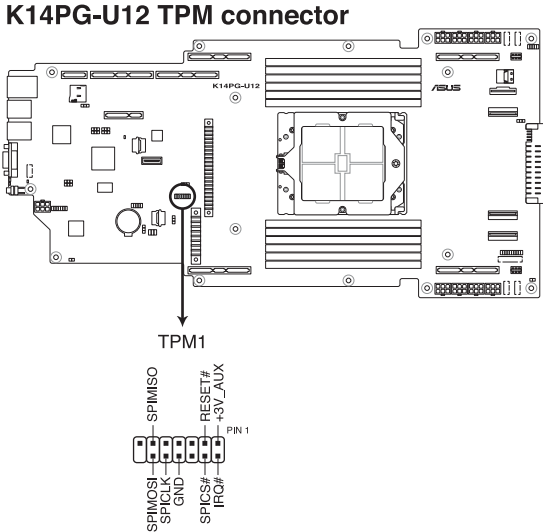
5. Serial Port connector (10-1 pin COM1)

This connector is for the serial COM port. Connect the serial port module cable to one of these connectors, then install the module to a slot opening at the back of the system chassis.



6. 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.



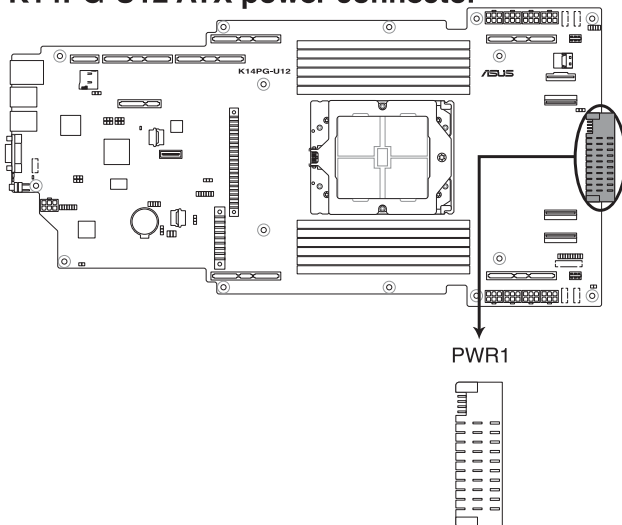
7. Power connector (PWR1)

Connects to the power sharing board and supplies power to the motherboard.



- Use of a PSU with a higher power output is recommended when configuring a system with more power-consuming devices. The system may become unstable or may not boot up if the power is inadequate.
- Ensure that your power supply unit (PSU) can provide at least the minimum power required by your system.

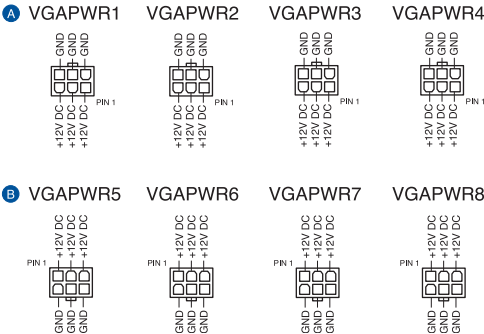
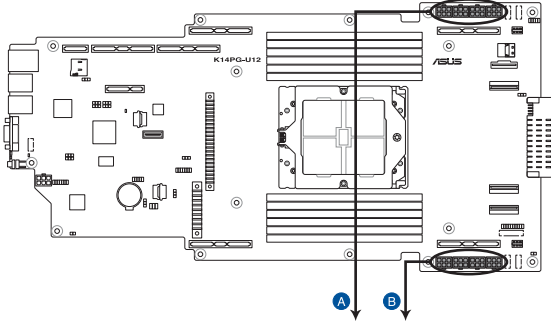
K14PG-U12 ATX power connector



8. VGA Power Connectors (8-pin VGAPWR1-8)

These 12V connectors supply power to the VGA cards. The 6-pin ATX power supply plugs are designed to fit these connectors in only one orientation. Find the proper orientation and push down firmly until the connectors completely fit.

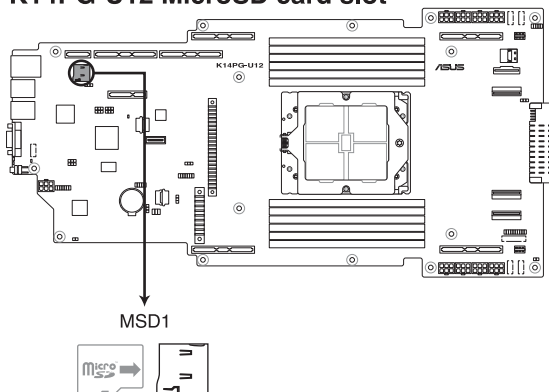
K14PG-U12 VGA Power connectors



9. MicroSD Card slot (MSD1)

The microSD card slot allows you to install a microSD memory card v2.00 (SDHC) / v3.00 (SDXC) to log BMC events.

K14PG-U12 MicroSD card slot



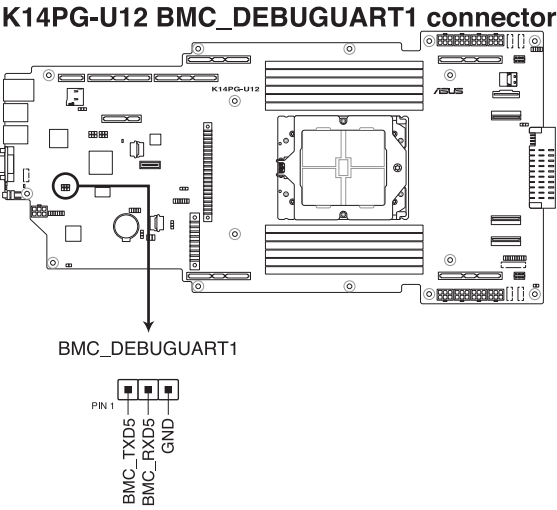
Disconnect all power (including redundant PSUs) from the existing system before you add or remove a memory card, then reboot the system to access the memory card.



Some memory cards may not be compatible with your motherboard. Ensure that you use only compatible memory cards to prevent loss of data, damage to your device or memory card, or both.

10. **BMC Debug UART connector (3-pin BMC_DEBUGUART1)**

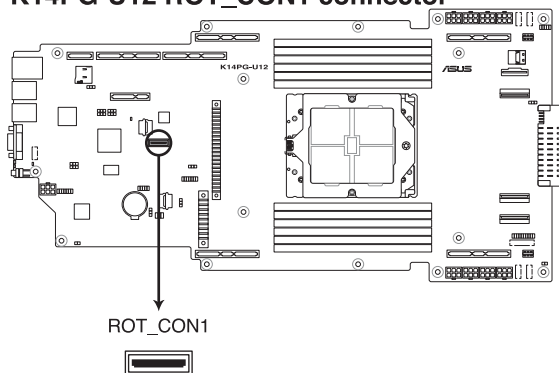
This connector is used for reading the BMC UART Debug log.



11. Platform Firmware Resilience (PFR) Module connector (ROT_CON)

This connector allows you to connect a PFR module to enable platform firmware resilience functions.

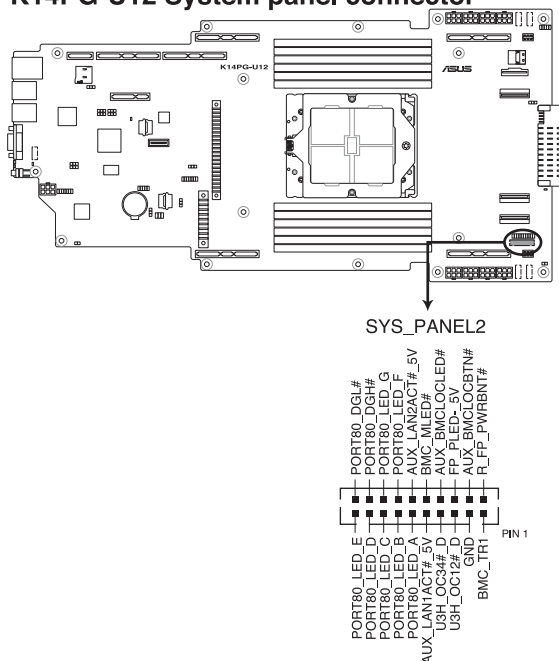
K14PG-U12 ROT_CON1 connector



12. System Panel connector (20-pin SYS_PANEL2)

This connector supports several chassis-mounted functions.

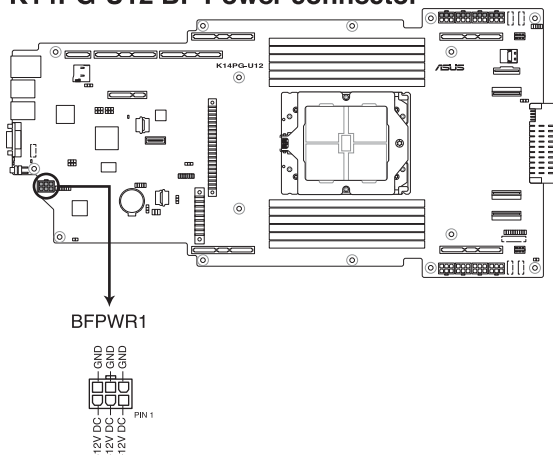
K14PG-U12 System panel connector



13. BF Power connector (6-pin BFPWR1)

This connector supplies power to the optional BlueField Ethernet DPU card. The 6-pin ATX power supply plug is designed to fit this connector in only one orientation. Find the proper orientation and push down firmly until the connector completely fits.

K14PG-U12 BF Power connector



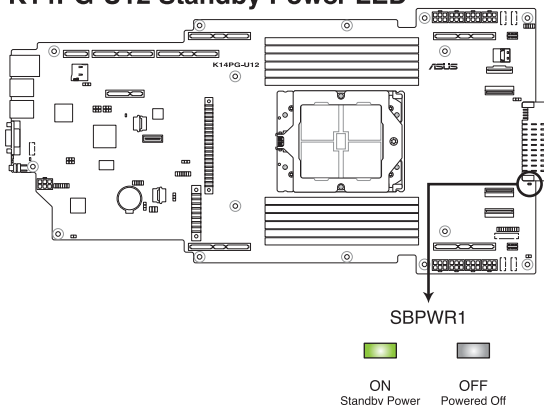
This power connector supplies a maximum of 150W and is only intended for use with a Bluefield Ethernet DPU card.

3.6 Onboard LEDs

1. Standby Power LED (SBPWR1)

The motherboard comes with a standby power LED. The green LED lights up to indicate that the system is ON, in sleep mode, or in soft-off mode. This is a reminder that you should shut down the system and unplug the power cable before removing or plugging in any motherboard component. The illustration below shows the location of the onboard LED.

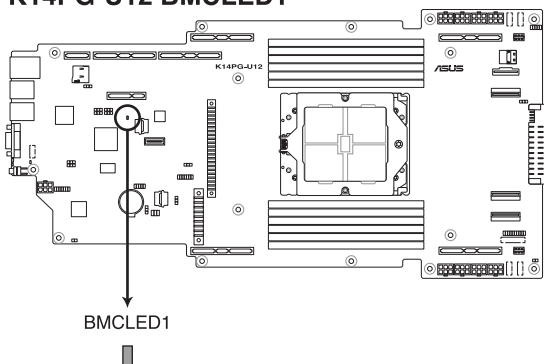
K14PG-U12 Standby Power LED



2. Baseboard Management Controller LED (BMCLED1)

The BMC LED lights up to indicate that the on-board BMC is functional.

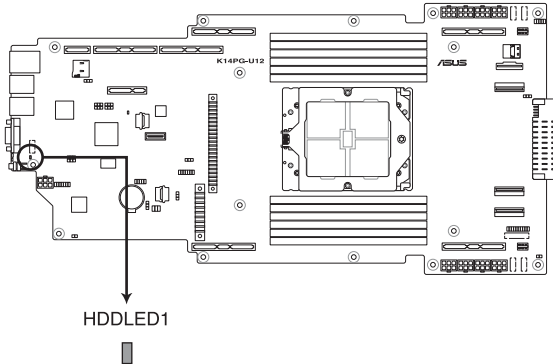
K14PG-U12 BMCLED1



3. Hard Disk Activity LED (HDDLED1)

This LED is for the storage devices connected to the onboard SATA, or SATA/SAS add-on card. The read or write activities of any device connected to the onboard SATA, or SATA/SAS add-on card causes the rear panel LED to light up.

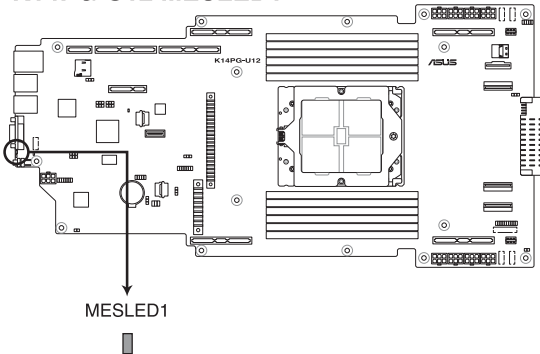
K14PG-U12 HDDLED1



4. Message LED (MESLED1)

This onboard LED lights up to red when there is temperature warning or a BMC event log is generated.

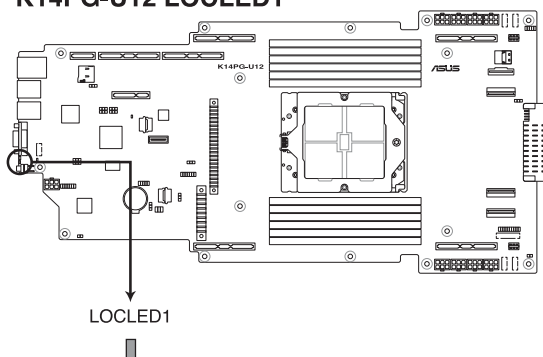
K14PG-U12 MESLED1



5. Location LED (LOCLED1)

This onboard LED lights up when the Location button on the server is pressed or when triggered by a system management software. The Location LED helps visually locate and quickly identify the server on a server rack.

K14PG-U12 LOCLED1



BIOS Setup

4

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

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.



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.



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



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

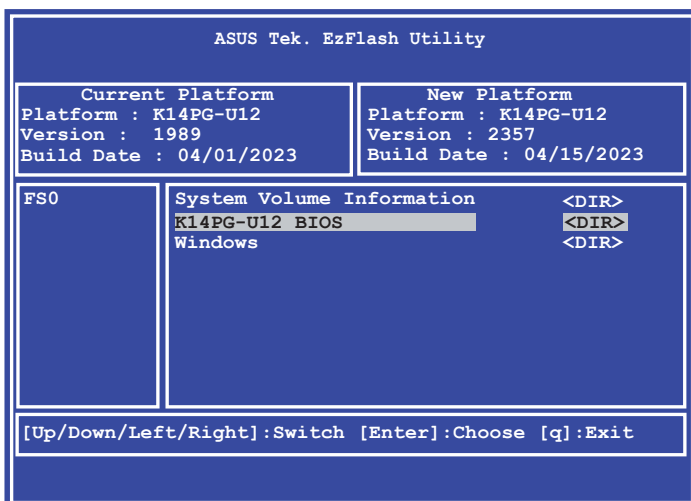
The ASUS EZ Flash Utility feature allows you to update the BIOS without having to use a DOS-based utility.



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.



- 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!



Ensure to load the BIOS default settings to ensure system compatibility and stability. Press <F5> and select **Yes** to load the BIOS default 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 during the Power-On Self-Test (POST) to enter the Setup utility; otherwise, POST continues with its test routines.

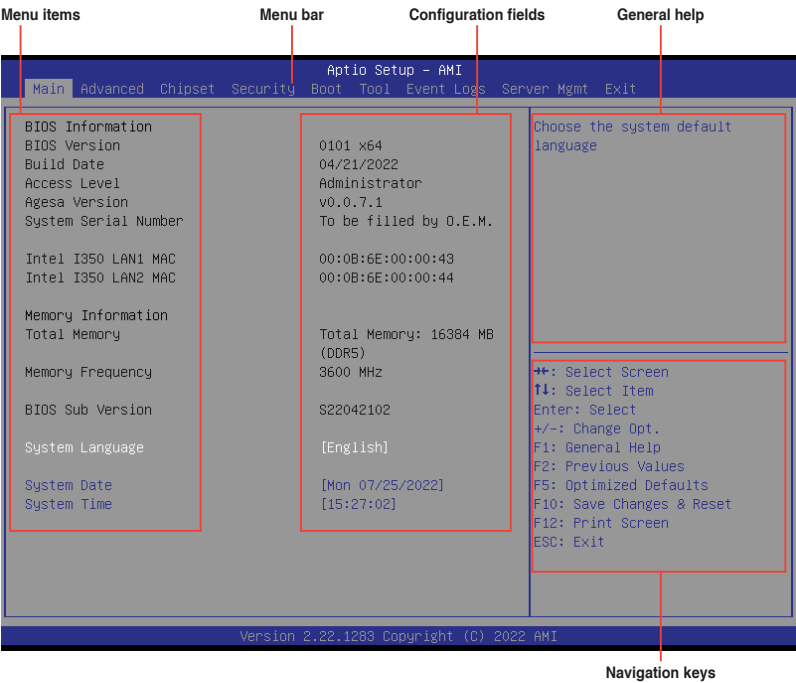
If you wish to enter Setup after POST, restart the system by pressing <Ctrl>+<Alt>+<Delete>, or by pressing the reset button on the system chassis. You can also restart by turning the system off and then back on. Do this last option only if the first two failed.

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.



-
- 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

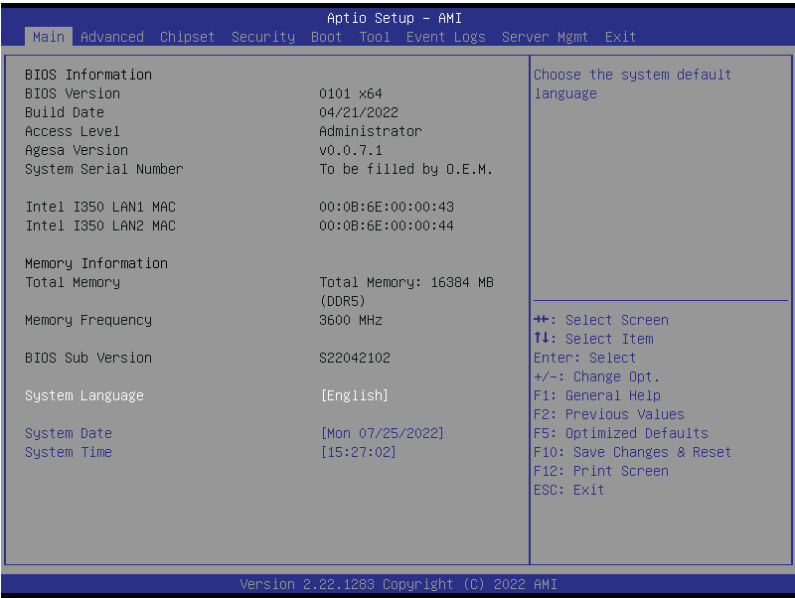
Select a menu item and press <Enter> to display a pop-up window with the configuration options for that item.

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, language, and security settings.



System Language

Allows you to set the system language.

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 Performance Tuning menu


The Performance Tuning menu items allow you to change performance related settings for different scenarios.

| Aptio Setup - AMI | | |
|-------------------------------|--------------------|--|
| Main | Performance Tuning | Advanced Chipset Security Boot Tool Event Logs Server Mgmt |
| Optimized Performance Setting | [Default] | Dynamically adjusts the frequency of all CPU cores based on their current utilization, delivering better performance per watt for improved system energy |
| Core Optimizer | [Disabled] | |
| Engine Boost | [Disabled] | |
| Overclocking | [Disabled] | |
| Power Balancer | [Disabled] | |


Optimized Performance Setting [Default]

Allows you to select performance settings for different scenarios.

- [Default] Default settings.
- [By Benchmark] Optimize for different kinds of benchmarks. Select this option, then select a benchmark type from the >> list.
- [By Workload] Optimize for different kinds of workloads. Select this option, then select a workload type from the >> list.



This function will reset some BIOS settings that you have changed back to their default values. Please check your BIOS settings again.




The following item appears only when **Power Balancer** is set to **[Disabled]**, or if Optimized Performance Setting is set to **[Default]** or **[By Benchmark]**.

Core Optimizer [Disabled]

Allows you to keep the processor operating at the turbo highest frequency for the maximum performance.


Configuration options: [Disabled] [Auto] [Manual]



The following item appears only when you set **Core Optimizer** to **[Manual]**.

CPU Max frequency [XXXX]

The default value for this option will be the maximum supported frequency of the CPU installed and may vary between different CPUs.




The following item appears only when **Optimized Performance Setting** is set to **[Default]** or **[By Benchmark]**.

Engine Boost [Disabled]

Enable this item to boost the CPU's frequency. Recommended operation at an ambient temperature of 25°C or below for optimized performance.

Configuration options: [Disabled] [Normal] [Aggressive]



Operate with an ambient temperature of 25°C or lower for optimized performance.

Overclocking [Disabled]

Enable this item to increase the CPU's clock. Please use an external PCIe storage controller for your hard drives when enabling this feature.

Configuration options: [Disabled] [Enabled]



Please note that overclocking might cause component damage or system crashes, which may reduce the lifespan of the system and the CPU. Use this tool at your own risk.



The following item appears only when **Core Optimizer** is set to [Disabled], or if **Optimized Performance Setting** is set to [Default] or [By Benchmark].

Power Balancer [Disabled]

Allows you to dynamically adjust the frequency of all CPU cores based on their current utilization, delivering better performance per watt for improved system energy efficiency.

Configuration options: [Disabled] [Enabled by ACC]



When setting **Power Balancer** to [Enabled by ACC], make sure that you have the latest ASUS Control Center software installed to support Power Balancer. Please see below for recommended software versions:

- **ACC**: 1.4.3.5 version or above.



The following item appears only when **Power Balancer** is set to [Enabled by ACC].

Policy [Auto]

Configuration options: [Auto] [Manual]



The following item appears only when set **Policy** is set to [Manual].

CPU Max frequency [XXXX]

The default value for this option will be the maximum supported frequency of the CPU installed and may vary between different CPUs.

4.5 Advanced menu

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



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

| Aptio Setup - AMI | | |
|--|--|----------------------------|
| Main Advanced Chipset Security Boot Tool Event Logs Server Mgmt Exit | | |
| ▶ Trusted Computing | | Trusted Computing Settings |
| ▶ AMD CBS | | |
| ▶ Onboard LAN Configuration | | |
| ▶ Serial Port Console Redirection | | |
| ▶ CPU Configuration | | |
| ▶ PCI Subsystem Settings | | |
| ▶ USB Configuration | | |
| ▶ Network Stack Configuration | | |
| ▶ NVMe Configuration | | |
| ▶ SATA Configuration | | |
| ▶ APM Configuration | | |
| ▶ AMD Mem Configuration Status | | |
| ▶ Tls Auth Configuration | | |
| ▶ Intel(R) I350 Gigabit Network Connection - 00:0B:6E:00:00:43 | | |
| | | ↔: Select Screen |
| | | ↑↓: Select Item |

4.5.1 Trusted Computing

| Aptio Setup - AMI | | |
|-----------------------------------|--|---|
| Advanced | | |
| Configuration | | |
| Security Device Support [Disable] | | Enables or Disables BIOS support for security device. O.S. will not show Security Device, TCG EFI protocol and INT1A interface will not be available. |
| NO Security Device Found | | |

Security Device Support [Disabled]

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

4.5.2 AMD CBS

| Aptio Setup - AMI | | |
|-----------------------------|--|--------------------|
| Advanced | | |
| AMD CBS | | CPU Common Options |
| AMD CBS Revision Number 0x0 | | |
| ▶ CPU Common Options | | |
| ▶ DF Common Options | | |
| ▶ UMC Common Options | | |
| ▶ NBIO Common Options | | |
| ▶ FCH Common Options | | |
| ▶ NTB Common Options | | |
| ▶ Soc Miscellaneous Control | | |

CPU Common Options

Performance

Allows you to configure performance options.

REP-MOV/STOS Streaming [Enabled]

Allows you to enable or disable the use of non-caching streaming stores for large sizes.

Configuration options: [Disabled] [Enabled]

Prefetcher Settings

Allows you to configure prefetcher options.

Core Watchdog

Allows you to configure core watchdog options.

RedirectForReturnDis [Auto]

Allows you to set RedirectForReturnDis to 0, 1, or Auto as a workaround for GCC/C000005 issue for XV Core on CZ A0.

Configuration options: [Auto] [1] [0]

Platform First Error Handling [Auto]

Allows you to enable or disable PFEH, cloak individual banks, and mask deferred error interrupts from each bank.

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

Core Performance Boost [Auto]

Configuration options: [Disabled] [Auto]

Global C-State Control [Auto]

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

Power Supply Idle Control [Auto]

Configuration options: [Low Current Idle] [Typical Current Idle] [Auto]

SEV-ES ASID Space Limit Control [Auto]

Configuration options: [Auto] [Manual]



The following item appears only when **SEV-ES ASID Space Limit Control** is set to **[Manual]**.

SEV-ES ASID Space Limit [1]

Allows you to set the SEV-ES ASID Space Limit. SEV VMs using ASIDs below the space limit must enable the SEV-ES feature. If this field is set to SEV ASID Count + 1, all ASIDs are forced to be SEV-ES ASIDs. Valid values for this field are 1 - SEV ASID Count.

Streaming Stores Control [Auto]

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

Local APIC Mode [Auto]

Configuration options: [Compatibility] [xAPIC] [x2APIC] [Auto]

ACPI _CST C1 Declaration [Auto]

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

MCA Error Threshold Enable [Auto]

Configuration options: [False] [True] [Auto]

MCA FruText [Auto]

Configuration options: [False] [True]

SMU and PSP Debug Mode [Auto]

If this option is enabled, uncorrected errors detected by the PSP FW or SMU FW will hang and not reset the system instead of causing a cold reset.

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

PPIN Opt-in [Auto]

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

SNP Memory (RMP Table) Coverage [Auto]

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



The following item appears only when **SNP Memory (RMP Table) Coverage** is set to [Custom].

Amount of Memory to Cover [0]

Allows you to set the amount of system memory (MB) to be covered in hex.

Secure Memory Encryption Enable (SMEE) [Auto]

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

Action on BIST Failure [Auto]

Allows you to configure what action is taken when a CCD BIST failure is detected.

Configuration options: [Do nothing] [Down-CCD] [Auto]

Fast Short REP MOVSB (FSRM) [Auto]

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

Enhanced Short REP MOVSB (ESRM) [Auto]

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

Log Transparent Errors [Auto]

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

AVX512 [Auto]

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

MONITOR and MWAIT Disable [Auto]

When this option is enabled, MONITOR, MWAIT, MONITORX, and MWAITX opcodes become invalid.

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

DF Common Options**Memory Addressing**

Allows you to configure memory addressing options.

ACPI

Allows you to configure ACPI options.

Link

Allows you to configure Link options.

DF Watchdog Timer Interval [Auto]

Allows you to set the Data Fabric watchdog timer interval.

Configuration options: [Auto] [41ms] [166ms] [334ms] [669ms] [1.34 seconds] [2.68 seconds] [5.36 seconds]

Disable DF to external IP Sync Flood Propagation [Auto]

Allows you to enable or disable sync flood to UMC and downstream slaves.

Configuration options: [Sync flood disabled] [Sync flood enabled] [Auto]

Sync Flood Propagation to DF Components [Auto]

Allows you to enable or disable sync flood to DF components.

Configuration options: [Sync flood disabled] [Sync flood enabled] [Auto]

Freeze DF Module Queues on Error [Auto]

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

CC6 Memory Region Encryption [Auto]

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

UMC Common Options

DDR Addressing Options

Allows you to configure DDR addressing options.

DDR Controller Configuration

Allows you to configure DDR controller options.

DDR MBIST Options

Allows you to configure DDR MBIST options.

DDR RAS

Allows you to configure DDR RAS options.

DDR Bus Configuration

Allows you to configure DDR Bus options.

DDR Timing Configuration

Allows you to configure DDR Timing options.

DDR Training Options

Allows you to configure DDR Training options.

DDR Security

Allows you to configure DDR Security options.

NBIO Common Options

IOMMU [Auto]

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

DMAr Support [Auto]

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

DRTM Virtual Device Support [Auto]

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

DRTM Memory Reservation [Auto]

Allows you to enable or disable reservation of 128MB memory below Bottom IO for DRTM. This option is required for Secured-Core Server functionality.

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

ACS Enable [Auto]

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

PCIe Alternative Routing ID (ARI) Support [Auto]

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

PCIe ARI Enumeration [Auto]

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

PCIe Ten Bit Tag Support [Auto]

Allows you to enable PCIe ten bit tags for supported devices. Support is disabled if this option is enabled.

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

SMU Common Options

Allows you to configure SMU Common options.

NBIO RAS Common Options

Allows you to configure NBIO RAS Common options.

Enable AER Cap [Auto]

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

Early Link Speed [Auto]

Configuration options: [Gen1] [Gen2] [Auto]

Hot Plug Handling Mode [Auto]

Configuration options: [OS First] [Firmware First] [System Firmware Intermediary] [Auto]

Presence Detect Select Mode [Auto]

Configuration options: [OR] [AND] [Auto]

Data Link Feature Cap [Auto]

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

CV Test [Auto]

Allows you to enable or disable support for PCIECV tool. Hardware defaults are preserved if this option is set to Auto.

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

SEV-SNP Support [Disabled]

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

Allow Compliance [Auto]

Allows you to enable or disable PCIe RP entering the polling compliance state.

SRIS [Auto]

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

Multi Upstream Auto Speed Change [Auto]

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

Multi Auto Speed Change on Last Rate [Auto]

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

PCIe Link Speed [Auto]

Configuration options: [Maximum speed] [Gen1] [Gen2] [Gen3] [Gen4] [Gen5] [Auto]

FCH Common Options**I3C/I2C Configuration Options**

Allows you to configure I3C/I2C options.

SATA Configuration Options

Allows you to configure SATA options.

USB Configuration Options

Allows you to configure USB options.

AC Power Loss Options

Allows you to configure AC power loss options.

UART Configuration Options

Allows you to configure UART options.

ESPI Configuration Options

Allows you to configure ESPI options.

FCH RAS Options

Allows you to configure FCH RAS options.

Miscellaneous Options

Allows you to configure miscellaneous FCH options.

NTB Common Options**Socket-0 P0 NTB Enable [Auto]**

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

Socket-0 P2 NTB Enable [Auto]

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

Socket-0 G0 NTB Enable [Auto]

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

Socket-0 G2 NTB Enable [Auto]

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

SOC Miscellaneous Control

ABL Console Out Control [Auto]

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



The following items appear only when **ABL Console Out Control** is set to **[Enabled]**.

ABL Console Out Serial Port [Auto]

Configuration options: [eSPI UART] [SOC UART0] [SOC UART1] [Auto]

ABL Basic Console Out Control [Auto]

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

ABL PMU Message Control [Auto]

Allows you to control the number of PMU debug messages.

Configuration options: [Detailed debug messages] [Coarse debug messages] [Stage completion] [Assertion messages] [Firmware completion messages only] [Auto]

PSP Error Injection Support [False]

Configuration options: [False] [True]

DRAM Survives Warm Reset [Enabled]

Allows you to enable or disable preservation of DRAM content upon warm reset.

Configuration options: [Disabled] [Enabled]

Workload Tuning

Workload Profile [Auto]

Allows you to set the workload profile.

Configuration options: [Disabled] [CPU Intensive] [Java Throughput] [Java Latency] [Power Efficiency] [Memory Throughput Intensive] [Storage IO Intensive] [NIC Throughput Intensive] [NIC Latency Sensitive] [Accelerator Throughput] [VMware vSphere Optimized] [Linux KVM Optimized] [Container Optimized] [RDBMS Optimized] [Big Data Analytics Optimized] [IOT Gateway] [HPC Optimized] [OpenStack NFV] [OpenStack for RealTime Kernel] [Auto]

Performance Tracing [Auto]

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

CXL Common Options

CXL Control [Auto]

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

CXL ASPM [Auto]

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

CXL vLSM Power Management

Allows you to configure vLSM Power Management options.

CXL Encryption [Disabled]

Configuration options: [Disabled] [Enabled]

4.5.3 Onboard LAN Configuration

| Aptio Setup - AMI | |
|----------------------------------|---------------------------------|
| Advanced | |
| ▶ Onboard I350 LAN Configuration | Onboard I350 LAN Enable/Disable |

Onboard I350 LAN Configuration

Intel I350 LAN1

LAN Enable [JumperState]

Allows you to enable or disable the Intel LAN.
Configuration options: [Disabled] [JumperState]



The following item appears only when **LAN Enable** is set to [JumperState].

ROM Type [PXE]

Allows you to select the Intel LAN ROM type.
Configuration options: [Disabled] [PXE]

Intel I350 LAN2

LAN Enable [JumperState]

Allows you to enable or disable the Intel LAN.
Configuration options: [Disabled] [JumperState]

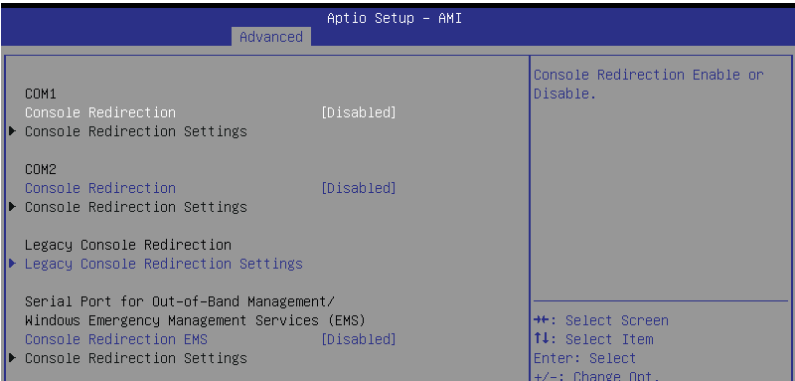


The following item appears only when **LAN Enable** is set to [JumperState].

ROM Type [Disabled]

Allows you to select the Intel LAN ROM type.
Configuration options: [Disabled] [PXE]

4.5.4 Serial Port Console Redirection



COM1/COM2

Console Redirection [Disabled]

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



The following item appears only when **Console Redirection** is set to **[Enabled]**.

Console Redirection Settings

These items become configurable only when you enable the **Console Redirection** item. The settings specify how the host computer and the remote computer (which the user is using) will exchange data. Both computers should have the same or compatible settings.

Terminal Type [ANSI]

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 [None]

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] [XTERM6] [SCO] [ESCN] [VT400]

Legacy Console Redirection Settings

Redirection COM Port [COM1]

Allows you to select a COM port to display redirection of Legacy OS and Legacy OPRM Messages.

Configuration options: [COM1] [COM2]

Resolution [80x24]

This allows you to set the number of rows and columns supported on the Legacy OS.

Configuration options: [80x24] [80x25]

Redirection After BIOS POST [Always Enable]

This setting allows you to specify if Bootloader is selected than Legacy console redirection.
Configuration options: [Always Enable] [BootLoader]

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

Console Redirection EMS [Disabled]

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



The following item appears only when **Console Redirection EMS** is set to **[Enabled]**.

Console Redirection Settings

Out-of-Band Mgmt Port [COM1]

Microsoft Windows Emergency Management Services (EMS) allow for remote management of a Windows Server OS through a serial port.
Configuration options: [COM1] [COM2]

Terminal Type EMS [VT-UTF8]

Microsoft Windows Emergency Management Services (EMS) allow for remote management of a Windows Server OS through a serial port.
Configuration options: [VT100] [VT100Plus] [VT-UTF8] [ANSI]

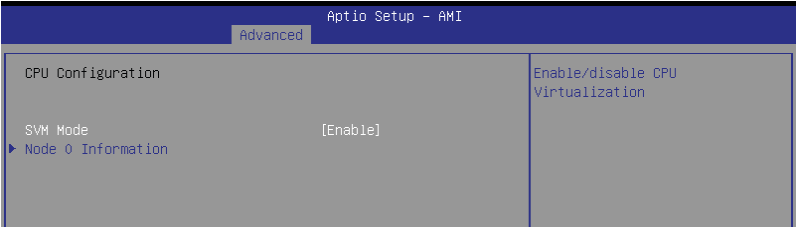
Bits per second EMS [115200]

Microsoft Windows Emergency Management Services (EMS) allow for remote management of a Windows Server OS through a serial port.
Configuration options: [9600] [19200] [57600] [115200]

Flow Control EMS [None]

Microsoft Windows Emergency Management Services (EMS) allow for remote management of a Windows Server OS through a serial port.
Configuration options: [None] [Hardware RTS/CTS] [Software Xon/Xoff]

4.5.5 CPU Configuration



SVM Mode [Enable]

This item allows you enable or disable CPU Virtualization.

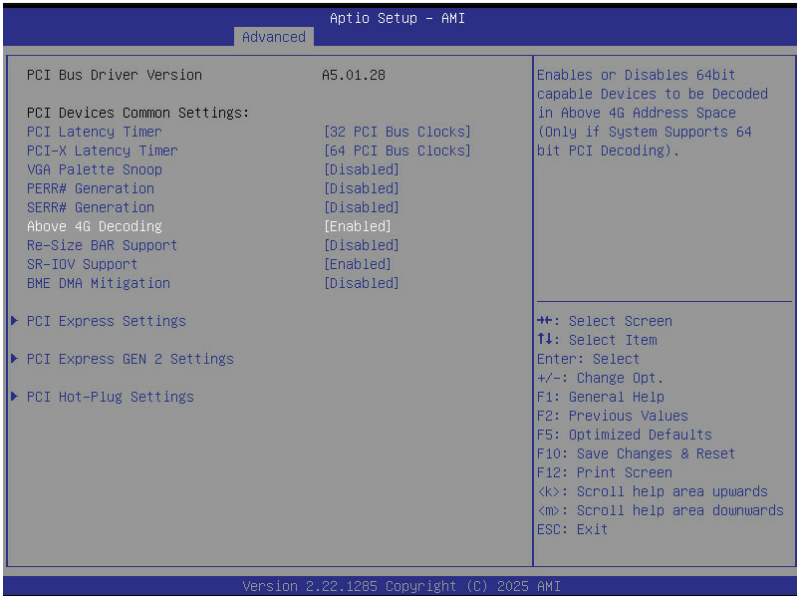
Configuration options: [Disabled] [Enable]

Node 0 Information

This item allows you to view memory information related to Node 0.

4.5.6 PCI Subsystem Settings

Allows you to configure PCI, PCI-X, and PCI Express Settings.



PCI Latency Timer [32 PCI Bus Clocks]

Configuration options: [32 PCI Bus Clocks] [64 PCI Bus Clocks] [96 PCI Bus Clocks] [128 PCI Bus Clocks] [160 PCI Bus Clocks] [192 PCI Bus Clocks] [224 PCI Bus Clocks] [248 PCI Bus Clocks]

PCI-X Latency Timer [64 PCI Bus Clocks]

Configuration options: [32 PCI Bus Clocks] [64 PCI Bus Clocks] [96 PCI Bus Clocks] [128 PCI Bus Clocks] [160 PCI Bus Clocks] [192 PCI Bus Clocks] [224 PCI Bus Clocks] [248 PCI Bus Clocks]

VGA Palette Snoop [Disabled]

Configuration options: [Disabled] [Enabled]

PERR# Generation [Disabled]

Configuration options: [Disabled] [Enabled]

SERR# Generation [Disabled]

Configuration options: [Disabled] [Enabled]

Above 4G Decoding [Enabled]

Allows you to enable or disable 64-bit capable devices to be decoded in above 4G address space. It only works if the system supports 64-bit PCI decoding.

Configuration options: [Disabled] [Enabled]



The following item appears only when **Above 4G Decoding** is set to **[Enabled]**.

First VGA 4G Decode [Auto]

Configuration options: [Auto] [Above 4G]

LAN device 4G Decode [Auto]

Configuration options: [Auto] [Above 4G]

Re-Size BAR Support [Disabled]

Configuration options: [Disabled] [Auto]

SR-IOV Support [Disabled]

This option enables or disables Single Root IO Virtualization Support if the system has SR-IOV capable PCIe devices.

Configuration options: [Disabled] [Enabled]

BME DMA Mitigation [Disabled]

Configuration options: [Disabled] [Enabled]

PCI Express Settings

Allows you to configure PCI Express options.

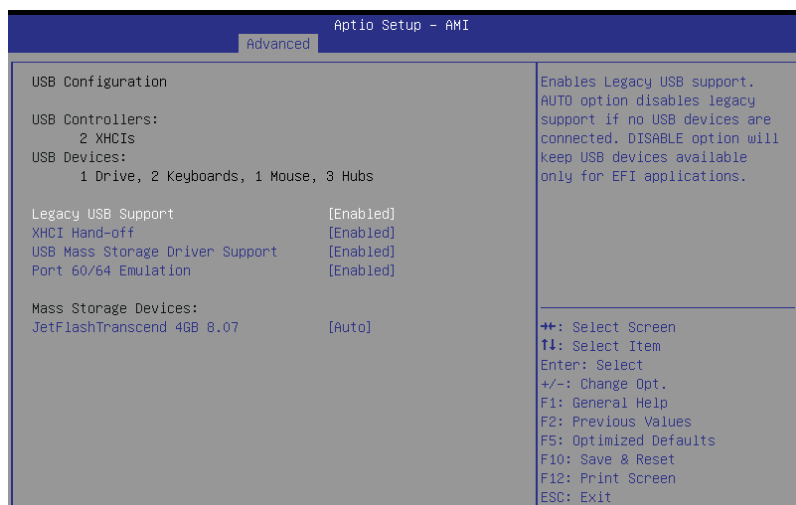
PCI Express GEN 2 Settings

Allows you to configure PCI Express Gen 2 options.

PCI Express Hot-Plug Settings

Allows you to configure PCI Express Hot-Plug options.

4.5.7 USB Configuration



Legacy USB Support [Enabled]

Allows you to enable or disable Legacy USB device support.

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

XHCI Hand-off [Enabled]

Allows you to enable or disable workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.

Configuration options: [Enabled] [Disabled]

USB Mass Storage Driver Support [Enabled]

Allows you to enable or disable the USB Mass Storage driver support.

Configuration options: [Disabled] [Enabled]

Port 60/64 Emulation [Enabled]

Allows you to enable or disable I/O port 60h/64h emulation support. This should be enabled for the complete keyboard legacy support for non-USB aware OSes.

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]

4.5.8 Network Stack Configuration

| Aptio Setup - AMI | | |
|-------------------|------------|-----------------------------------|
| Advanced | | |
| Network Stack | [Disabled] | Enable/Disable UEFI Network Stack |

Network Stack [Disabled]

Enables or disables the network stack feature.

Configuration options: [Disable] [Enable]



The following items appear only when **Network Stack** is set to **[Enabled]**.

Ipv4 PXE Support [Disabled]

Enables or disables the Ipv4 PXE Boot Support. If disabled, Ipv4 PXE boot option will not be created.

Configuration options: [Disabled] [Enabled]

Ipv4 HTTP Support [Disabled]

Enables or disables the Ipv4 HTTP Boot Support. If disabled, Ipv4 HTTP boot option will not be created.

Configuration options: [Disabled] [Enabled]

Ipv6 PXE Support [Disabled]

Enables or disables the Ipv6 PXE Boot Support. If disabled, Ipv6 PXE boot option will not be created.

Configuration options: [Disabled] [Enabled]

Ipv6 HTTP Support [Disabled]

Enables or disables the Ipv6 HTTP Boot Support. If disabled, Ipv6 HTTP boot option will not be created.

Configuration options: [Disabled] [Enabled]

PXE boot wait time [0]

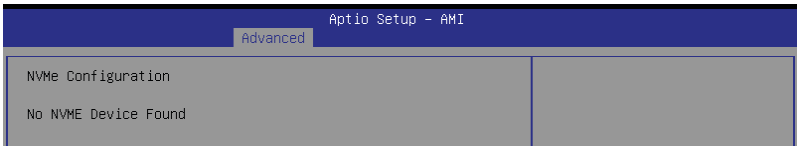
Wait time to press ESC key to abort the PXE boot.

Media detect count [1]

Wait time (in seconds) to detect media.

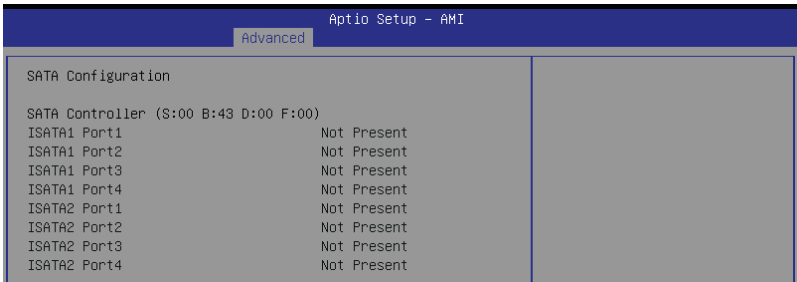
4.5.9 NVMe Configuration

This page will display the NVMe controller and drive information.



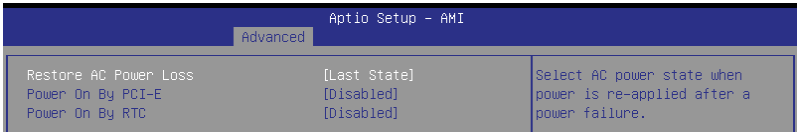
4.5.10 SATA Configuration

This page will display the SATA controller and drive information.



4.5.11 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.

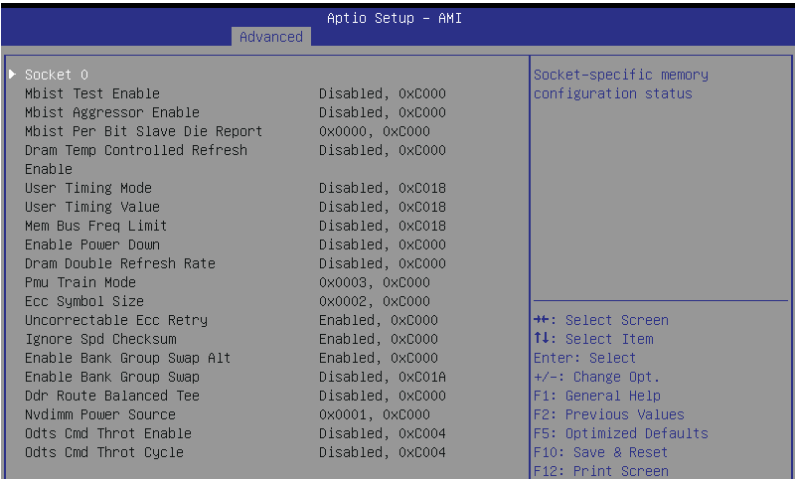
Power On By RTC [Disabled]

[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.

4.5.12 AMD Mem Configuration Status

The items in this menu display the memory configuration (initialized by ABL) status.



4.5.13 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.

4.5.14 Driver Health

This page will display the driver and controller health status.

| Advanced | | | Aptio Setup - AMI |
|---|--|--|--|
| ▶ Intel(R) PRO/1000 7.1.07 PCI-E Healthy | | | Provides Health Status for the Drivers/Controllers |

4.6 Chipset menu

The Chipset menu items allow you to change the Chipset settings.

| Main Performance Tuning Advanced | | | Aptio Setup - AMI | | | | |
|----------------------------------|--|--|-------------------|------|------------------------------|------------|-------------|
| Chipset | | | Security | Boot | Tool | Event Logs | Server Mgmt |
| PCIe Link Training Type | | | [1 Step] | | PCIe Link training in 1 or 2 | | |
| PCIe Compliance Mode | | | [Off] | | steps. | | |
| ▶ South Bridge | | | | | | | |
| ▶ North Bridge | | | | | | | |

PCIe Link Training Type [1 Step]

This item allows you to select PCIe Link Training in 1 or 2 steps.

Configuration options: [1 Step] [2 Step]

PCIe Compliance Mode [Off]

This item allows you to turn the PCIe Compliance Mode on or off.

Configuration options: [Off] [On]

South Bridge

SB Debug Configuration

This item displays options for SB Debug Features.

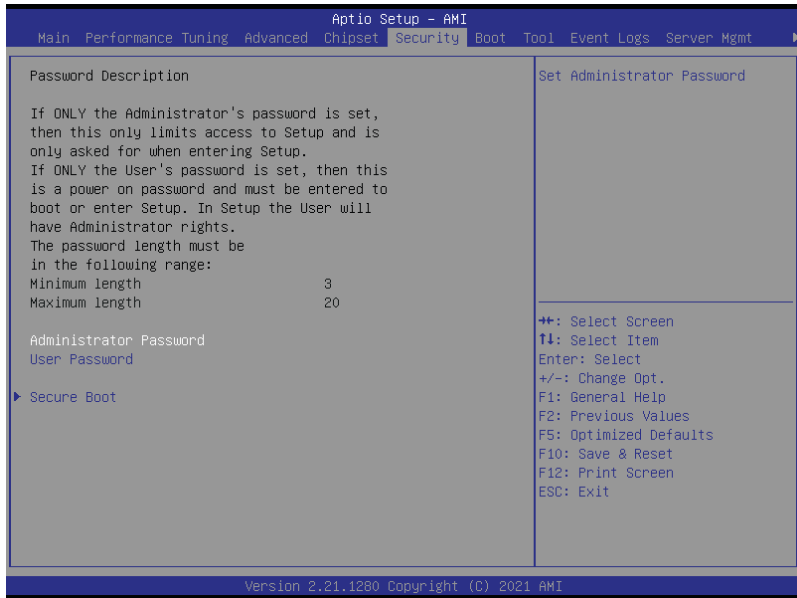
North Bridge

Socket 0 Information

This item displays the memory information on Socket 0.

4.7 Security menu

This menu allows a new password to be created or a current password to be changed. The menu also enables or disables the Secure Boot state and lets the user configure the System Mode state.



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.



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.



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

This item allows you to customize the Secure Boot settings.

| Aptio Setup - AMI | | |
|------------------------|--------------------------|---|
| Security | | |
| System Mode | User | Secure Boot feature is Active if Secure Boot is Enabled, Platform Key(PK) is enrolled and the System is in User mode. The mode change requires platform reset |
| Secure Boot | [Disabled] Not Active | |
| Secure Boot Mode | [Custom] | |
| ▶ Restore Factory Keys | | |
| ▶ Reset To Setup Mode | | |
| ▶ Key Management | | |

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

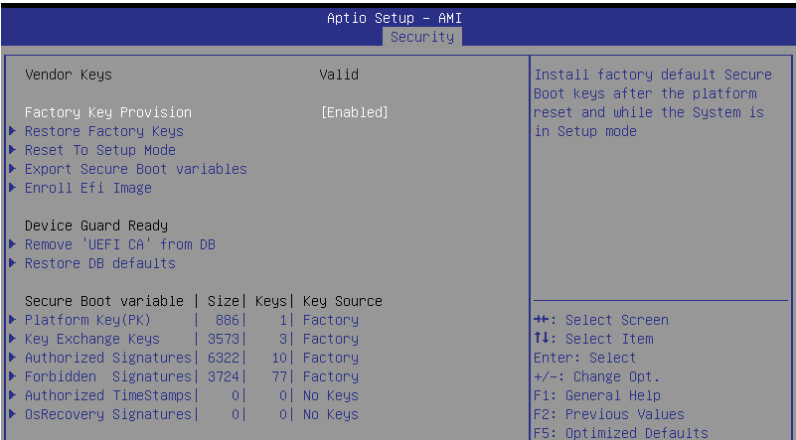
This option will force the system to User Mode, and install factory default Secure Boot key databases.

Reset to Setup Mode

This option will delete all Secure Boot key databases from NVRAM.

Key Management

This item only appears when the item Secure Boot Mode is set to [Custom]. The Key Management item allows you to modify Secure Boot variables and set Key Management page.



Factory Key Provision [Enabled]

Allows you to provision factory default Secure Boot keys when the system is in Setup Mode.

Configuration options: [Disabled] [Enabled]

Restore Factory keys

This item will install all Factory Default keys.

Reset to Setup Mode

This item appears only when you load the default Secure Boot keys. This item allows you to clear all default Secure Boot keys.

Export Secure Boot Variables

This item will ask you if you want to save all secure boot variables. Select Yes if you want to save all secure boot variables, otherwise select No.

Enroll Efi Image

This item will allow the image to run in Secure Boot mode.

Device Guard Ready

Remove 'UEFI CA' from DB

Remove Microsoft UEFI CA from Secure Boot DB.

Restore DB defaults

Restore DB variable to factory defaults.

Platform Key (PK)

Configuration options: [Details] [Export] [Update] [Delete]

Key Exchange Keys (KEK) / Authorized Signatures (DB) / Forbidden Signatures (DBX)

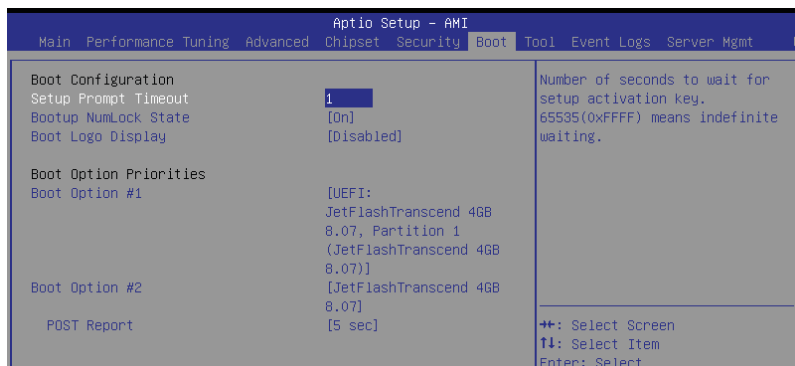
Configuration options: [Details] [Export] [Update] [Append] [Delete]

Authorized TimeStamps (DBT) / OsRecovery Signatures

Configuration options: [Update] [Append]

4.8 Boot menu

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



Setup Prompt Timeout [1]

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.



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

POST Report [5 sec]

Allows you to set the desired POST Report waiting time from 1 to 10 seconds.

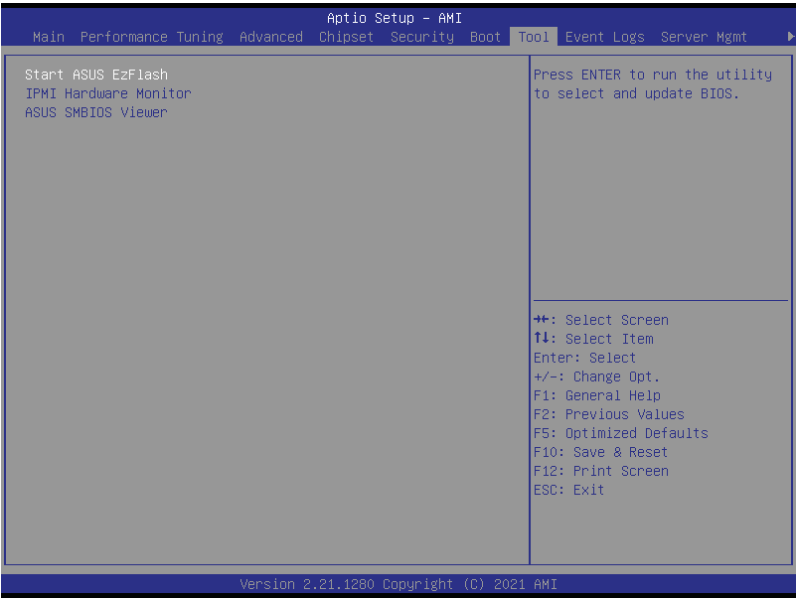
Configuration options: [1 sec] - [10 sec] [Until Press ESC]

Hard Drive BBS Priorities

These items appear only when you connect a network cable or SATA ODD to the SATA port, and allows you to set the booting order of the Network / SATA devices.

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.



Start ASUS EzFlash

Allows you to run ASUS EZ Flash BIOS ROM Utility when you press <Enter>. Refer to the **ASUS EZ Flash Utility** section for details.

IPMI Hardware Monitor

Allows you to run the IPMI hardware monitor.

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.



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

Enabling/Disabling Options

Smbios Event Log [Enabled]

Change this to enable or disable all features of Smbios Event Logging during boot.

Configuration options: [Disabled] [Enabled]



The following item appears only when **Smbios Event Log** is set to **[Enabled]**.

Erasing Settings

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]

Custom Options

Log EFI Status Code [Enabled]

This option allows you to enable or disable logging of the EFI Status Codes.

Configuration options: [Disabled] [Enabled]



The following item appears 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).

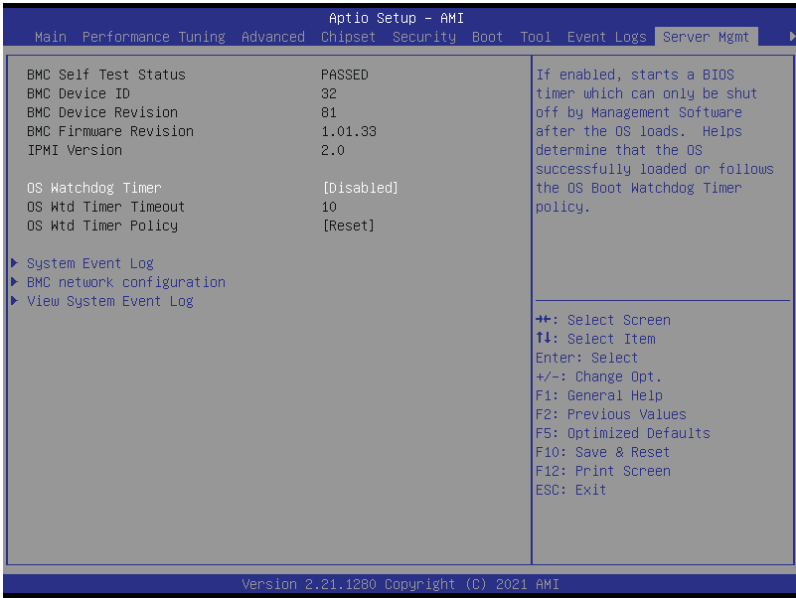
Configuration options: [Disabled] [Enabled]

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]



The following items appear only when **OS Watchdog Timer** is set to **[Enabled]**.

OS Wtd Timer Timeout

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]

System Event Log

Allows you to change the SEL event log configuration.

Erase SEL [No]

Allows you to choose options for erasing SEL.

Configuration options: [No] [Yes, On next reset] [Yes, On every reset]

View FRU Information

Allows you to view the FRU information.

BMC network configuration

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

Configure IPv4 support

DM_LAN1

Configuration Address source [Previous State]

This item allows you to configure LAN channel parameters statistically or dynamically (by BIOS or BMC). Unspecified option will not modify any BMC network parameters during BIOS phase.

Configuration options: [Previous State] [Static] [DynamicBmcDhcp]

Shared LAN

Configuration Address source [Previous State]

This item allows you to configure LAN channel parameters statistically or dynamically (by BIOS or BMC). Unspecified option will not modify any BMC network parameters during BIOS phase.

Configuration options: [Previous State] [Static] [DynamicBmcDhcp]

Configure IPv6 support

DM_LAN1

IPv6 Support [Enabled]

Allows you to enable or disable LAN1 IPv6 Support.

Configuration options: [Enabled] [Disabled]



The following item appears only when **IPv6 Support** is set to **[Enabled]**.

Configuration Address source [Previous State]

This item allows you to configure LAN channel parameters statistically or dynamically (by BIOS or BMC). Unspecified option will not modify any BMC network parameters during BIOS phase.

Configuration options: [Previous State] [Static] [DynamicBmcDhcp]

Configuration Router Lan1 Address source [Previous State]

This item allows you to configure LAN channel parameters statistically or dynamically (by BIOS or BMC). Unspecified option will not modify any BMC network parameters during BIOS phase.

Configuration options: [Previous State] [Static] [DynamicBmcDhcp]

Shared LAN

IPv6 Support [Enabled]

Allows you to enable or disable LAN2 IPv6 Support.

Configuration options: [Enabled] [Disabled]



The following item appears only when **IPv6 Support** is set to **[Enabled]**.

Configuration Address source [Previous State]

This item allows you to configure LAN channel parameters statistically or dynamically (by BIOS or BMC). Unspecified option will not modify any BMC network parameters during BIOS phase.

Configuration options: [Previous State] [Static] [DynamicBmcDhcp]

Configuration Router Lan2 Address source [Previous State]

This item allows you to configure LAN channel parameters statistically or dynamically (by BIOS or BMC). Unspecified option will not modify any BMC network parameters during BIOS phase.

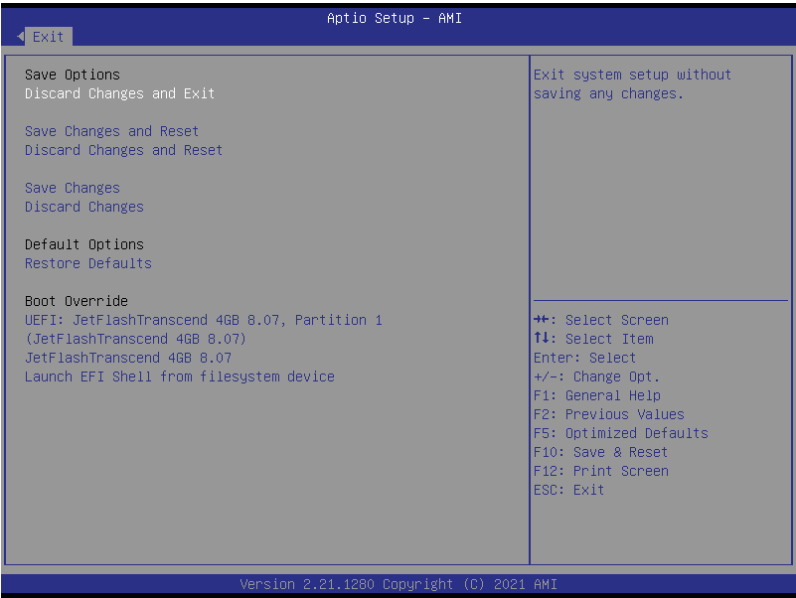
Configuration options: [Previous State] [Static] [DynamicBmcDhcp]

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.

Restore Defaults

Restore/load 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

Driver Installation

This chapter provides instructions for installing the necessary drivers for different system components.

5.1 Running the Support DVD

The support DVD that is bundled with your motherboard contains drivers, management applications, and utilities that you can install to maximize the features of your motherboard.



The contents of the support DVD are subject to change at any time without notice. Visit the ASUS website (www.asus.com) for the latest updates on software and utilities.

The main screen of the Support DVD contains the following tabs:

1. Drivers - Shows the available device drivers that the system detects.
2. Utilities - Displays the software applications and utilities that the motherboard supports.
3. Manual - Provides the link to the user guide(s).



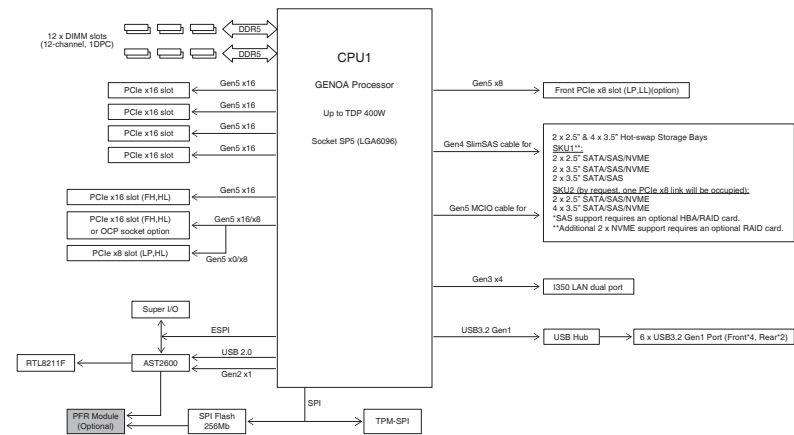
You need an internet browser installed in your OS to view the User Guide.

4. Contact - Displays the ASUS contact information, e-mail addresses, and useful links if you need more information or technical support for your motherboard.

Appendix

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

Block diagram



Q-Code table

| ACTION | PHASE | POST CODE | TYPE | DESCRIPTION |
|--------------|--|-----------|----------|---|
| SEC Start up | Security Phase | 0x01 | Progress | First post code |
| | | 0x02 | Progress | Load BSP microcode |
| | | 0x03 | Progress | Perform early platform Initialization |
| | | 0x04 | Progress | Set cache as ram for PEI phase |
| | | 0x05 | Progress | Establish Stack |
| | | 0x06 | Progress | CPU Early Initialization |
| PSP Boot | PSP Boot Loader phase (Error Post Codes) | 0x00 | error | General - Success |
| | | 0x01 | error | Generic Error Code |
| | | 0x02 | error | Generic Memory Error |
| | | 0x03 | error | Buffer Overflow |
| | | 0x04 | error | Invalid Parameter(s) |
| | | 0x05 | error | Invalid Data Length |
| | | 0x06 | error | Data Alignment Error |
| | | 0x07 | error | Null Pointer Error |
| | | 0x08 | error | Unsupported Function |
| | | 0x09 | error | Invalid Service ID |
| | | 0x0A | error | Invalid Address |
| | | 0x0B | error | Out of Resource Error |
| | | 0x0C | error | Timeout |
| | | 0x0D | error | Data abort exception |
| | | 0x0E | error | Prefetch abort exception |
| | | 0x0F | error | Out of Boundary Condition Reached |
| | | 0x10 | error | Data corruption |
| | | 0x11 | error | Invalid command |
| | | 0x12 | error | The package type provided by BR is incorrect |
| | | 0x13 | error | Failed to retrieve FW header during FW validation |
| | | 0x14 | error | Key size not supported |
| | | 0x15 | error | Agesa0 verification error |
| | | 0x16 | error | SMU FW verification error |
| | | 0x17 | error | OEM SINGING KEY verification error |
| | | 0x18 | error | Generic FW Validation error |
| | | 0x19 | error | RSA operation fail - bootloader |
| | | 0x1A | error | CCP Passthrough operation failed - internal status |
| | | 0x1B | error | AES operation fail |
| | | 0x1C | error | CCP state save failed |
| | | 0x1D | error | CCP state restore failed |
| | | 0x1E | error | SHA256/384 operation fail - internal status |
| | | 0x1F | error | ZLib Decompression operation fail |
| | | 0x20 | error | HMAC-SHA256/384 operation fail - internal status |
| | | 0x21 | error | Booted from boot source not recognized by PSP |
| | | 0x22 | error | PSP directory entry not found |
| | | 0x23 | error | PSP failed to set the write enable latch |
| | | 0x24 | error | PSP timed out because spirom took too long |
| | | 0x25 | error | Cannot find BIOS directory |
| | | 0x26 | error | SpiRom is not valid |
| | | 0x27 | error | Slave die has different security state from master |
| | | 0x28 | error | SMI interface init failure |
| | | 0x29 | error | SMI interface generic error |
| | | 0x2A | error | Invalid die ID executes MCM related function |
| | | 0x2B | error | Invalid MCM configuration table read from bootrom |
| | | 0x2C | error | Valid boot mode wasn't detected |
| | | 0x2D | error | NVStorage init failure |
| | | 0x2E | error | NVStorage generic error |
| | | 0x2F | error | MCM 'error' to indicate slave has more data to send |
| | | 0x30 | error | MCM error if data size exceeds 32B |
| | | 0x31 | error | Invalid client id for SVC MCM call |
| | | 0x32 | error | MCM slave status register contains bad bits |
| | | 0x33 | error | MCM call was made in a single die environment |
| | | 0x34 | error | PSP secure mapped to invalid segment (should be 0x400_0000) |
| | | 0x35 | error | No physical x86 cores were found on die |
| | | 0x36 | error | Insufficient space for secure OS (range of free SRAM to SVC stack base) |
| | | 0x37 | error | SYSHUB mapping memory target type is not supported |
| | | 0x38 | error | Attempt to unmap permanently mapped TLB to PSP secure region |
| | | 0x39 | error | Unable to map an SMN address to AXI space |
| | | 0x3A | error | Unable to map a SYSHUB address to AXI space |

(continued on the next page)

| ACTION | PHASE | POST CODE | TYPE | DESCRIPTION |
|----------|--|-----------|-------|---|
| PSP Boot | PSP Boot Loader phase (Error Post Codes) | 0x3B | error | The count of CCXs or cores provided by bootrom is not consistent |
| | | 0x3C | error | Uncompressed image size doesn't match value in compressed header |
| | | 0x3D | error | Compressed option used in case where not supported |
| | | 0x3E | error | Fuse info on all dies don't match |
| | | 0x3F | error | PSP sent message to SMU; SMU reported an error |
| | | 0x40 | error | Function RunPostX86ReleaseUnitTests failed in memcmp() |
| | | 0x41 | error | Interface between PSP to SMU not available. |
| | | 0x42 | error | Timer wait parameter too large |
| | | 0x43 | error | Test harness module reported an error |
| | | 0x44 | error | x86 wrote C2PMSG_0 interrupting PSP, but the command has an invalid format |
| | | 0x45 | error | Failed to read from SPI the Bios Directory or Bios Combo Directory |
| | | 0x46 | error | Failed to find FW entry in SPL Table |
| | | 0x47 | error | Failed to read the combo bios header |
| | | 0x48 | error | SPL version mismatch |
| | | 0x49 | error | Error in Validate and Loading AGESA APOB SVC call |
| | | 0x4A | error | Correct fuse bits for DIAG_BL loading not set |
| | | 0x4B | error | The UmcProgramKeys() function was not called by AGESA |
| | | 0x4C | error | Unconditional Unlock based on serial numbers failure |
| | | 0x4D | error | Syshub register programming mismatch during readback |
| | | 0x4E | error | Family ID in MP0_SFUSE_SEC[7:3] not correct |
| | | 0x4F | error | An operation was invoked that can only be performed by the GM |
| | | 0x50 | error | Failed to acquire host controller semaphore to claim ownership of SMB |
| | | 0x51 | error | Timed out waiting for host to complete pending transactions |
| | | 0x52 | error | Timed out waiting for slave to complete pending transactions |
| | | 0x53 | error | Unable to kill current transaction on host, to force idle |
| | | 0x54 | error | One of: Illegal command, Unclaimed cycle, or Host time out |
| | | 0x55 | error | An smbus transaction collision detected, operation restarted |
| | | 0x56 | error | Transaction failed to be started or processed by host, or not completed |
| | | 0x57 | error | An unsolicited smbus interrupt was received |
| | | 0x58 | error | An attempt to send an unsupported PSP-SMU message was made |
| | | 0x59 | error | An error/data corruption detected on response from SMU for sent msg |
| | | 0x5A | error | MCM Steady-state unit test failed |
| | | 0x5B | error | S3 Enter failed |
| | | 0x5C | error | AGESA BL did not set PSP SMU reserved addresses via SVC call |
| | | 0x5D | error | Reserved PSP/SMU memory region is invalid |
| | | 0x5E | error | CcxSecBisEn not set in fuse RAM |
| | | 0x5F | error | Received an unexpected result |
| | | 0x60 | error | VMG Storage Init failed |
| | | 0x61 | error | Failure in mbedTLS user app |
| | | 0x62 | error | An error occurred whilst attempting to SMN map a fuse register |
| | | 0x63 | error | Fuse burn sequence/operation failed due to internal SOC error |
| | | 0x64 | error | Fuse sense operation timed out |
| | | 0x65 | error | Fuse burn sequence/operation timed out waiting for burn done |
| | | 0x66 | error | The PMU FW Public key certificate loading or authentication fails |
| | | 0x67 | error | This PSP FW was revoked |
| | | 0x68 | error | The platform model/vendor id fuse is not matching the BIOS public key token |
| | | 0x69 | error | The BIOS OEM public key of the BIOS was revoked for this platform |
| | | 0x6A | error | PSP level 2 directory not match expected value. |
| | | 0x6B | error | BIOS level 2 directory not match expected value. |
| | | 0x6C | error | Reset image not found |
| | | 0x6D | error | Generic error indicating the CCP HAL initialization failed |
| | | 0x6E | error | Failure to copy NVRAM to DRAM. |
| | | 0x6F | error | Invalid key usage flag |
| | | 0x70 | error | Unexpected fuse set |
| | | 0x71 | error | RSMU signaled a security violation |
| | | 0x72 | error | Error programming the WAFL PCS registers |
| | | 0x73 | error | Error setting wall PCS threshold value |
| | | 0x74 | error | Error loading OEM trustlets |
| | | 0x75 | error | Recovery mode across all dies is not sync'd |
| | | 0x76 | error | Uncorrectable WAFL error detected |
| | | 0x77 | error | Fatal MP1 error detected |
| | | 0x78 | error | Bootloader failed to find OEM signature |
| | | 0x79 | error | Error copying BIOS to DRAM |
| | | 0x7A | error | Error validating BIOS image signature |
| | | 0x7B | error | OEM Key validation failed |
| | | 0x7C | error | Platform Vendor ID and/or Model ID binding violation |

(continued on the next page)

| ACTION | PHASE | POST CODE | TYPE | DESCRIPTION |
|----------|---|-----------|-------|---|
| PSP Boot | PSP Boot Loader phase (Status Post Codes) | 0x7D | error | Bootloader detects BIOS request boot from SPI-ROM, which is unsupported for PSB. |
| | | 0x7E | error | Requested fuse is already blown, reblow will cause ASIC malfunction |
| | | 0x7F | error | Error with actual fusing operation |
| | | 0x80 | error | (Local Master PSP on P1 socket) Error reading fuse info |
| | | 0x81 | error | (Local Master PSP on P1 socket) Platform Vendor ID and/or Model ID binding violation |
| | | 0x82 | error | (Local Master PSP on P1 socket) Requested fuse is already blown, reblow will cause ASIC malfunction |
| | | 0x83 | error | (Local Master PSP on P1 socket) Error with actual fusing operation |
| | | 0x84 | error | SEV FW Rollback attempt is detected |
| | | 0x85 | error | SEV download FW command fail to broadcast and clear the IsInSRAM field on slave dies |
| | | 0x86 | error | Agesa error injection failure |
| | | 0x87 | error | Uncorrectable TWIX error detected |
| | | 0x88 | error | Error programming the TWIX PCS registers |
| | | 0x89 | error | Error setting TWIX PCS threshold value |
| | | 0x8A | error | SW CCP queue is full, cannot add more entries |
| | | 0x8B | error | CCP command description syntax error detected from input |
| | | 0x8C | error | Return value stating that the command has not yet be scheduled |
| | | 0x8D | error | The command is scheduled and being worked on |
| | | 0x8E | error | The DXIO PHY SRAM Public key certificate loading or authentication fails |
| | | 0x8F | error | TPM binary size exceeds limit allocated in Private DRAM, need to increase the limit |
| | | 0x90 | error | The TWIX link for a particular CCD is not trained Fatal error |
| | | 0x91 | error | Security check failed (not all dies are in same security state) |
| | | 0x92 | error | FW type mismatch between the requested FW type and the FW type embedded in the FW binary header |
| | | 0x93 | error | SVC call input parameter address violation |
| | | 0x94 | error | Firmware Compatibility Level mismatch |
| | | 0x95 | error | Bad status returned by I2CKnollCheck |
| | | 0x96 | error | NACK to general call (no device on Knoll I2C bus) |
| | | 0x97 | error | Null pointer passed to I2CKnollCheck |
| | | 0x98 | error | Invalid device-ID found during Knoll authentication |
| | | 0x99 | error | Error during Knoll/Prom key derivation |
| | | 0x9A | error | Null pointer passed to Crypto function |
| | | 0x9B | error | Error in checksum from wrapped Knoll/Prom keys |
| | | 0x9C | error | Knoll returned an invalid response to a command |
| | | 0x9D | error | Bootloader failed in Knoll Send Command function |
| | | 0x9E | error | No Knoll device found by verifying MAC |
| | | 0x9F | error | The maximum allowable error post code |
| | | 0xA0 | error | Bootloader successfully entered C Main |
| | | 0xA1 | error | Master initialized C2P / slave waited for master to init C2P |
| | | 0xA2 | error | HMAC key successfully derived |
| | | 0xA3 | error | Master got Boot Mode and sent boot mode to all slaves |
| | | 0xA4 | error | SpiRom successfully initialized |
| | | 0xA5 | error | BIOS Directory successfully read from SPI to SRAM |
| | | 0xA6 | error | Early unlock check |
| | | 0xA7 | error | Inline Aes key successfully derived |
| | | 0xA8 | error | Inline-AES key programming is done |
| | | 0xA9 | error | Inline-AES key wrapper derivation is done |
| | | 0xAA | error | Bootloader successfully loaded HW IP configuration values |
| | | 0xAB | error | Bootloader successfully programmed MBAT table |
| | | 0xAC | error | Bootloader successfully loaded SMU FW |
| | | 0xAD | error | Progress code is available |
| | | 0xAE | error | User mode test Uapp completed successfully |
| | | 0xAF | error | Bootloader loaded Agesa0 from SpiRom |
| | | 0xB0 | error | AGESA phase has completed |
| | | 0xB1 | error | RunPostDramTrainingTests() completed successfully |
| | | 0xB2 | error | SMU FW Successfully loaded to SMU Secure DRAM |
| | | 0xB3 | error | Sent all required boot time messages to SMU |
| | | 0xB4 | error | Validated and ran Security Gasket binary |
| | | 0xB5 | error | UMC Keys generated and programmed |
| | | 0xB6 | error | Inline AES key wrapper stored in DRAM |
| | | 0xB7 | error | Completed FW Validation step |
| | | 0xB8 | error | Completed FW Validation step |
| | | 0xB9 | error | BIOS copy from SPI to DRAM complete |
| | | 0xBA | error | Completed FW Validation step |

(continued on the next page)

| ACTION | PHASE | POST CODE | TYPE | DESCRIPTION |
|-----------|---|-----------|----------|--|
| PSP Boot | PSP Boot Loader phase (Status Post Codes) | 0xBB | error | BIOS load process fully complete |
| | | 0xBC | error | Bootloader successfully release x86 |
| | | 0xBD | error | Early Secure Debug completed |
| | | 0xBE | error | GetFWVersion command received from BIOS is completed |
| | | 0xBF | error | SMIInfo command received from BIOS is completed |
| | | 0xC0 | error | Successfully entered WarmBootResume() |
| | | 0xC1 | error | Successfully copied SecureOS image to SRAM |
| | | 0xC2 | error | Successfully copied trustlets to PSP Secure Memory |
| | | 0xC3 | error | About to jump to Secure OS (SBL about to copy and jump) |
| | | 0xC4 | error | Successfully restored CCP and UMC state on S3 resume |
| | | 0xC5 | error | PSP SRAM HMAC validated by Mini BL |
| | | 0xC6 | error | About to jump to <t-base in Mini BL |
| | | 0xC7 | error | VMG ECDH unit test started |
| | | 0xC8 | error | VMG ECDH unit test passed |
| | | 0xC9 | error | VMG ECC CDH primitive unit test started |
| | | 0xCA | error | VMG ECC CDH primitive unit test passed |
| | | 0xCB | error | VMG SP800-108 KDF-CTR HMAC unit test started |
| | | 0xCC | error | VMG SP800-108 KDF-CTR HMAC unit test passed |
| | | 0xCD | error | VMG LAUNCH_* test started |
| | | 0xCE | error | VMG LAUNCH_* test passed |
| | | 0xCF | error | MP1 has been taken out of reset, and executing SMUFW |
| | | 0xD0 | error | PSP and SMU Reserved Addresses correct |
| | | 0xD1 | error | Reached Naples steady-state WFI loop |
| | | 0xD2 | error | Knoll device successfully initialized |
| | | 0xD3 | error | 32-byte RandOut successfully returned from Knoll |
| | | 0xD4 | error | 32-byte MAC successfully received from Knoll. |
| | | 0xD5 | error | Knoll device verified successfully |
| | | 0xD6 | error | CNLI Keys generated and programmed |
| | | 0xD7 | error | Enter recovery mode due to trustlet validation fail. |
| | | 0xD8 | error | Enter recovery mode due to OS validation fail. |
| | | 0xD9 | error | Enter recovery mode due to OEM public key not found. |
| | | 0xDA | error | Enter recovery mode with header corruption |
| | | 0xDB | error | We should not treat this error as blocking |
| | | 0xDC | error | When same fw image type is already loaded in SRAM |
| | | 0xDD | error | 0xE2 progress codes are available |
| | | 0xE0 | error | Unlock return |
| | | 0xE2 | error | Token expiration reset triggered |
| | | 0xE3 | error | Completed DXIO PHY SRAM FW key Validation step |
| | | 0xE4 | error | MP1 firmware load to SRAM success |
| | | 0xE5 | error | Bootloader read the MP1 SRAM successfully |
| | | 0xE6 | error | Bootloader successfully reset MP1 |
| | | 0xE7 | error | DF init successfully done (in absence of AGESA) |
| | | 0xE8 | error | UMC init successfully done (in absence of AGESA) |
| | | 0xE9 | error | LX6 Boot ROM code ready |
| | | 0xEA | error | Bootloader successfully asserted LX6 reset |
| | | 0xEB | error | LX6 load to SRAM success |
| | | 0xEC | error | Bootloader successfully set LX6 reset vector to SRAM |
| | | 0xED | error | Bootloader successfully de-asserted LX6 reset |
| | | 0xEE | error | LX6 firmware is running and ready |
| | | 0xEF | error | Loading of S3 image done successfully |
| | | 0xF0 | error | Bootloader successfully verify signed image using 4K/2K key |
| | | 0xF1 | error | Bootloader identified as running on SP32P or multi-socket boot |
| | | 0xF2 | error | Security Policy check successful (only in secure boot) |
| | | 0xF3 | error | Bootloader successfully loaded SS3 |
| | | 0xF4 | error | Bootloader successfully load fTPM Driver |
| | | 0xF5 | error | Bootloader successfully loaded sys_drv |
| | | 0xF6 | error | Bootloader successfully loaded secure OS |
| | | 0xF7 | error | Bootloader about to transfer control to secureOS |
| | | 0xFF | error | Bootloader sequence finished |
| Quick VGA | PEI (Pre-EFI Initialization) phase | 0x10 | Progress | PEI Core Entry |
| | | 0x11 | Progress | PEI cache as ram CPU initial |
| | | 0x15 | Progress | NB Initialization before installed memory |
| | | 0x19 | Progress | SB Initialization before installed memory |

(continued on the next page)

| ACTION | PHASE | POST CODE | TYPE | DESCRIPTION |
|-------------|---|-----------|----------|--|
| Quick VGA | D X E (D r i v e r E x e c u t i o n E n v i r o n m e n t) phase | 0x32 | Progress | CPU POST-Memory Initialization |
| | | 0x33 | Progress | CPU Cache Initialization |
| | | 0x34 | Progress | Application Processor(s) (AP) Initialization |
| | | 0x35 | Progress | BSP Selection |
| | | 0x36 | Progress | CPU Initialization |
| | | 0x37 | Progress | Pre-memory NB Initialization |
| | | 0x3B | Progress | Pre-memory SB Initialization |
| | | 0x4F | Progress | DXE Initial Program Load(IPL) |
| | | 0x60 | Progress | DXE Core Started |
| | | 0x61 | Progress | DXE NVRAM Initialization |
| | | 0x62 | Progress | SB run-time Initialization |
| | | 0x63 | Progress | CPU DXE Initialization |
| | | 0x68 | Progress | PCI HB Initialization |
| | | 0x69 | Progress | NB DXE Initialization |
| | | 0x6A | Progress | NB DXE SMM Initialization |
| | | 0x70 | Progress | SB DXE Initialization |
| | | 0x71 | Progress | SB DXE SMM Initialization |
| | | 0x72 | Progress | SB DEVICES Initialization |
| | | 0x78 | Progress | ACPI Module Initialization |
| | | 0xD0 | Progress | CPU PM Structure Initialization |
| Normal boot | BDS(Boot Device Selection) phase | 0x90 | Progress | BDS started |
| | | 0x91 | Progress | Connect device event |
| | | 0x92 | Progress | PCI Bus Enumeration |
| | | 0x93 | Progress | PCI Bus Enumeration |
| | | 0x94 | Progress | PCI Bus Enumeration |
| | | 0x95 | Progress | PCI Bus Enumeration |
| | | 0x96 | Progress | PCI Bus Enumeration |
| | | 0x97 | Progress | Console output connect event |
| | | 0x98 | Progress | Console input connect event |
| | | 0x99 | Progress | AMI Super IO start |
| | | 0x9A | Progress | AMI USB Driver Initialization |
| | | 0x9B | Progress | AMI USB Driver Initialization |
| | | 0x9C | Progress | AMI USB Driver Initialization |
| | | 0x9D | Progress | AMI USB Driver Initialization |
| | | 0xb3 | Progress | Reset system |
| | | 0xb4 | Progress | USB hotplug |
| | | 0xb6 | Progress | NVRAM clean up |
| | | 0xb7 | Progress | NVRAM configuration reset |
| | | 0xA0 | Progress | IDE, AHCI Initialization |
| | | 0xA1 | Progress | IDE, AHCI Initialization |
| | | 0xA2 | Progress | IDE, AHCI Initialization |
| | | 0xA3 | Progress | IDE, AHCI Initialization |
| | | 0x00-0xFF | Progress | Wait BMC ready |
| | | 0xA8 | Progress | BIOS Setup Utility password verify |
| | | 0xA9 | Progress | BIOS Setup Utility start |
| | | 0xAB | Progress | BIOS Setup Utility input wait |
| | | 0xAD | Progress | Ready to boot event |
| | Operating system phase | 0xAA | Progress | APIC mode |
| | | 0xAC | 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.



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-003(A)/NMB-003(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-003(A)/NMB-003(A)

KC: Korea Warning Statement



R-R-MSO-ESC4000A-E12

이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서 가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다.

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 năm 2011 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（移动通信会社、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



ENERGY STAR® Qualified Product



ENERGY STAR® is a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy helping us all save money and protect the environment through energy efficient products and practices.

All ASUS products with the ENERGY STAR® logo comply with the ENERGY STAR® standard, and the power management feature is enabled by default. The monitor is automatically set to sleep within 10 minutes of user inactivity; the computer is automatically set to sleep within 30 minutes of user inactivity. To wake your computer, click the mouse, press any key on the keyboard, or press the power button.

Please visit <https://www.energystar.gov> for detailed information on the ENERGY STAR® joint program, power management, and the benefits to the environment.



ENERGY STAR® is NOT supported on FreeDOS and Linux-based products.

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 asjaspepuutuvatele 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 megfeleléségi 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 cerințelor esențiale și altor prevederi relevante ale directivelor conexe. Textul complet al declarației de conformitate a Uniunii Europene se găsește 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 uyumluluk 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 : ESC4000A-E12

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>.

