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 Location

This product is intended for installation only in a Computer Room where:

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

Heavy System

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

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.

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>+<Del>
`Command`	Means that you must type the command exactly as shown, then supply the required item or value enclosed in brackets.
	Example: At the DOS 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.

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 xxS0xxxxxxxx. 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 Series Processor Family.

Model Name		ESC4000A-E12
Processor		1 x Socket SP5 (LGA 6096)
		AMD EPYC™ 9004 Series Processor Family (up to TDP 400W)
Memory	Total Slots	12 (12 channels per CPU, 12 DIMM per CPU)
	Capacity	Up to 3TB per CPU socket
	Memory Type	DDR5 4800/4400 RDIMM / 3DS RDIMM * Please refer to www.asus.com for latest memory AVL update
	Memory Size	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
Storage Bays	Storage Bay	<u>SKU-1**</u> 2 x 2.5" SATA/SAS*/NVME 2 x 3.5" SATA/SAS*/NVME 2 x 3.5" SATA/SAS* <u>SKU-2 (by request, one PCIe x8 link will be occupied)</u> 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

(continued on the next page)

Model Name	ESC4000A-E12
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
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
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
	* **Please find the latest OS support from https://www.asus.com/event/ Server/OS_support_list/OS.html**
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	Operation temperature: 10° ~ 35°
	Non-operation temperature: -40° ~ 70°
	Non-operation 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

Q-code/Port 80 LED　**Power button**　**USB 3.2 Gen 1 ports**

Half-length / Low-profile expansion slot　**Location button**　**Front panel LEDs**

Hot-swap 2.5-inch storage bay　**USB 3.2 Gen 1 ports**　**Hot-swap 2.5-inch storage bay**

Hot-swap 3.5-inch storage bays　**Redundant power supply units**　**Hot-swap 3.5-inch storage bays**
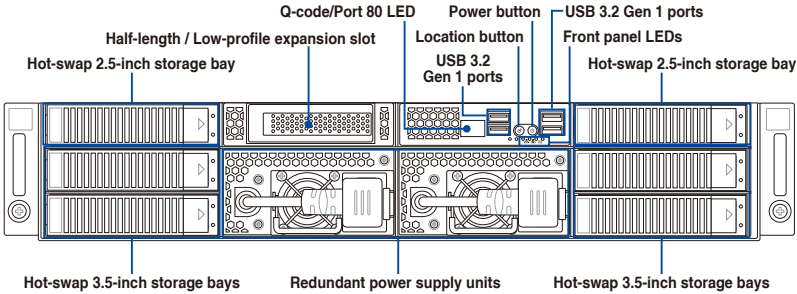
Refer to the **Front panel LEDs** section for the LED descriptions.

1.5 Rear panel features

Air-cooled SKU

Half-length/full-height expansion slots
Full-length expansion slots   DM_LAN1*
Power cord connectors
Full-length expansion slots
USB 3.2 Gen 1 ports   VGA port
LAN ports
Rear panel LEDs and power button
Half-length/low-profile expansion slot

Liquid-cooled SKU

Half-length/full-height expansion slots   Full-length expansion slots
D2C liquid cooling module slots   Power cord connectors   D2C liquid cooling module slots
DM_LAN1*   LAN ports   Rear panel LEDs and power button
Full-length expansion slots   USB 3.2 Gen 1 ports   D2C liquid cooling module slot
VGA port

- 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

1. Redundant power supply and power fan (hidden)

2. ASUS K14PG-U12 server board

3. System fans

4. SATA/SAS/NVME backplanes

5. SATA/SAS/NVME hot-swap storage bays

6. PCIe expansion boards (hidden)

7. PCIe x32 links with rear riser card

8. Half-length / Low-profile expansion slot
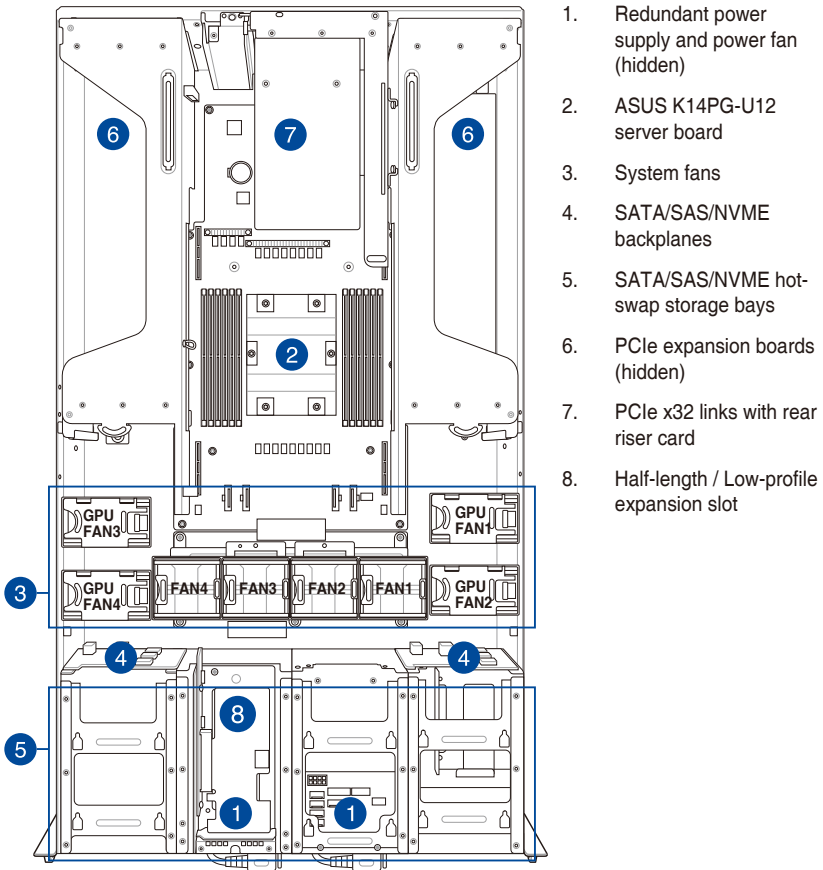
A protection film is pre-attached to the front cover before shipping. Please remove the protection film before turning on the system for proper heat dissipation.

WARNING

HAZARDOUS MOVING PARTS
KEEP FINGERS AND OTHER BODY PARTS AWAY

1.7   LED information

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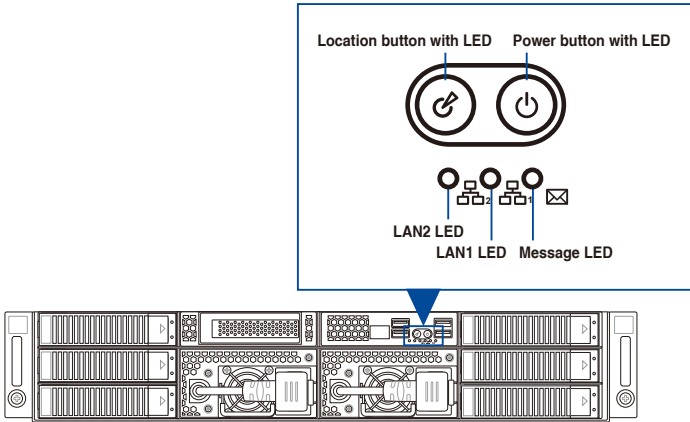
LED	Icon	Display status	Description
Power button with LED	⏻	ON	System power on
Message LED	✉	OFF	System is normal; no incoming event
		ON	A hardware monitor event is indicated
Location button with LED	✏	ON	Location switch is pressed (Press the location switch again to turn off)
		OFF	Function off
LAN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

1.7.2   Rear panel LEDs
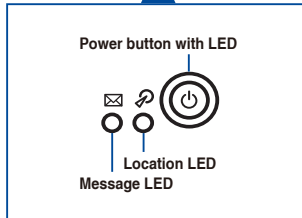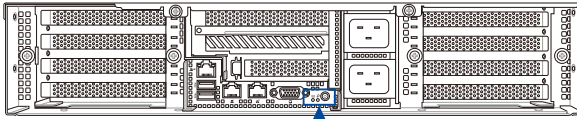
Power button with LED

Location LED
Message LED

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

ACT/LINK LED — **SPEED LED**
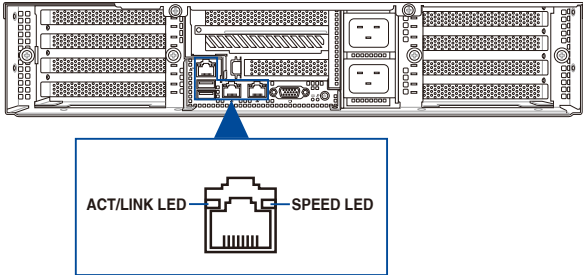
LAN1/LAN2 LEDs

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
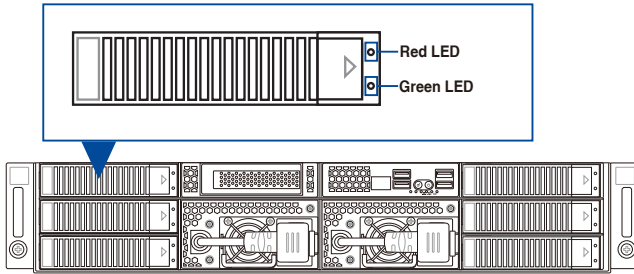
Storage Device LED Description		
Status (RED)	ON	Storage device has failed
	Blinking	RAID rebuilding or locating
Activity (GREEN)	ON	Storage device power ON
	Blinking	Read/write data from/into the SATA/SAS/NVMe storage device
	OFF	Storage device not found

1.7.5 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
		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
PSP Boot	PSP Boot Loader phase (Error Post Codes)	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	CcxSecBisiEn 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 occured 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 wafl PCS threshold value
		0x74	error	Error loading OEM trustlets
		0x75	error	Recovery mode accross 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 been 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	fTPM 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	DXE(Driver Execution Environment) 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

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.
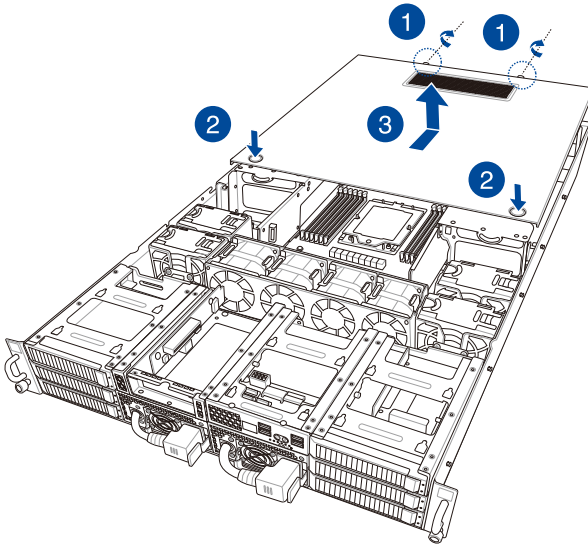
To remove the middle chassis cover:

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.
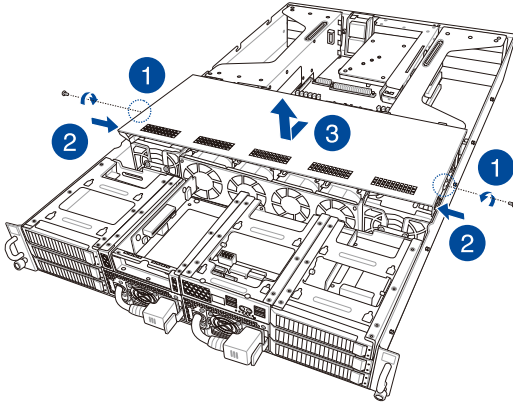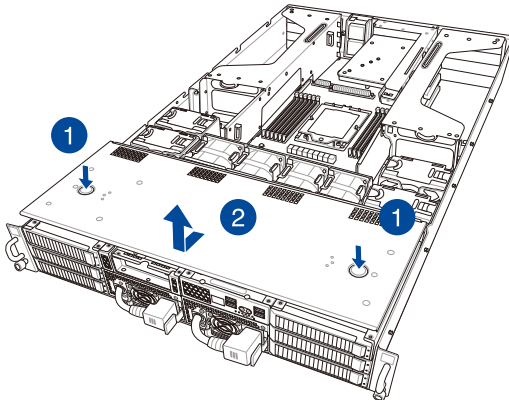
To remove the air duct:

1. Loosen the two (2) thumbscrews as shown.

2. Lift the air duct to remove it from the chassis.
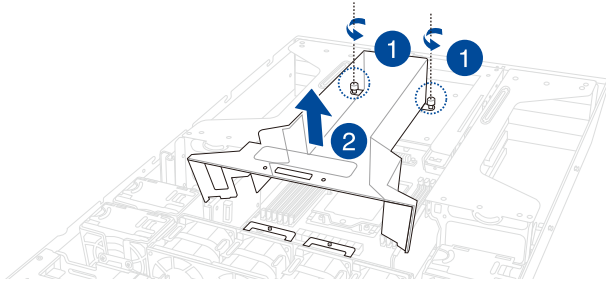
To reinstall the air duct:

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.
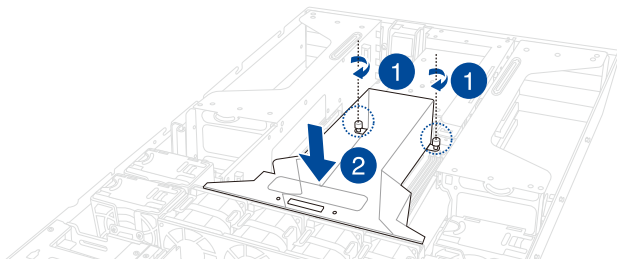
2.2 Central Processing Unit (CPU)

The motherboard comes with a surface mount SP5 socket designed for the AMD EPYC™ 9004 Series Family processors.

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

CPU1

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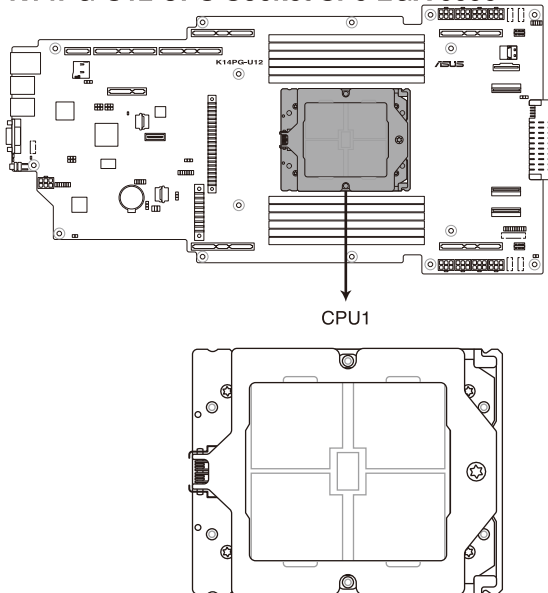
4. Loosen the screw on the socket to open the load plate.

A T20 screwdriver with a torque value of 13.5±1.0 kgf-cm is recommended.
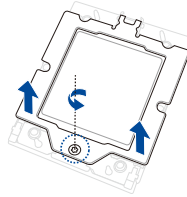
5. Lift open the rail frame, then slide the external cap out of the rail frame.

Load plate

External cap

Rail frame

Load plate

Rail frame

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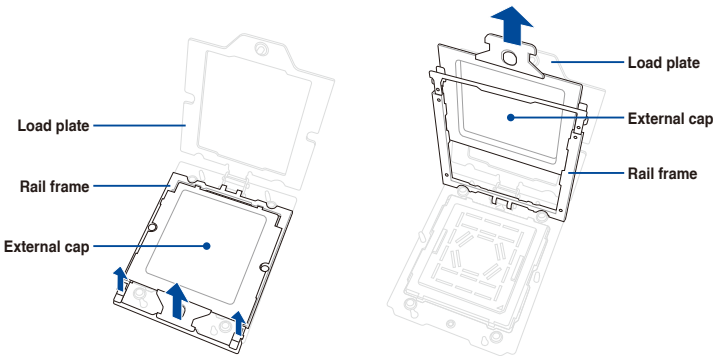
6. Slide the carrier frame with CPU into the rail frame, then remove the PnP cap.

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

Carrier plate with CPU

PnP cap
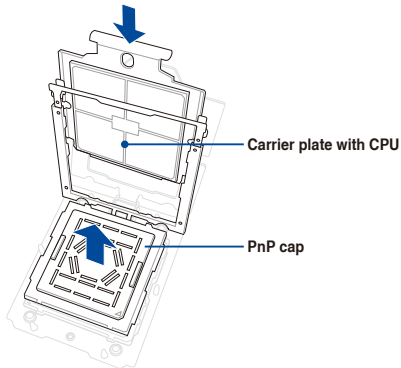
7. Gently close the rail frame just enough to let it sit on top of the CPU socket.
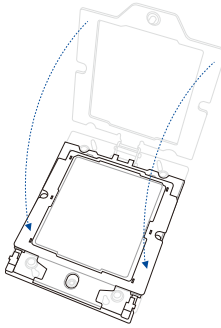
8. Close the load plate just enough to let it sit on top of the CPU, then secure the load plate using the screw on the socket.

A T20 screwdriver with a torque value of 13.5±1.0 kgf-cm is recommended.
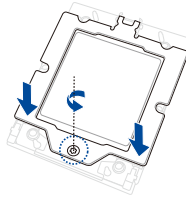
9.   Place the heatsink on the CPU socket and make sure the heatsink screws are aligned with the CPU socket.
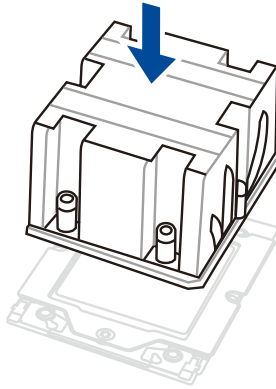
10.   The below instructions must be followed when securing the heatsink to the motherboard. The order in which the screws should be tightened is shown both in the illustration below and on the heatsink.

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±2.5kg-cm (11.0±2.1 lbf-in) is recommended.
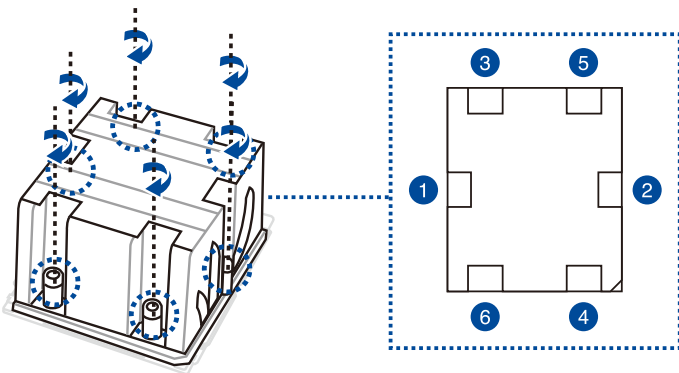
11.   Reinstall the air ducts. For more information, refer to the **Air ducts** section.

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.
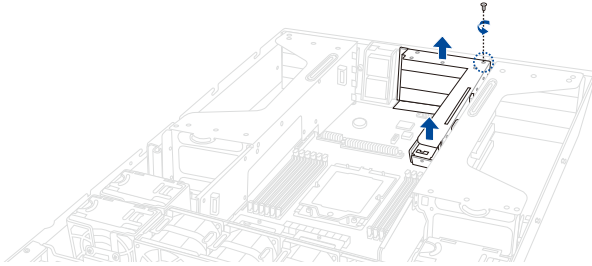
4.   Align and place the liquid cooling module assembly in the correct orientation as shown in the illustration below, then secure the PCIe riser card with the screw you removed earlier.
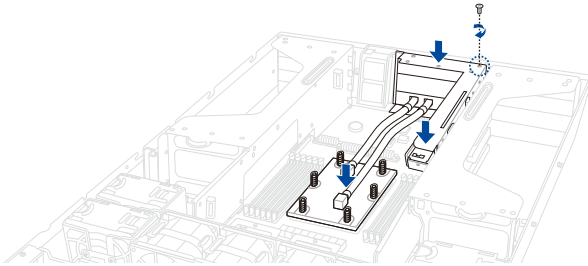
5.   Connect the leak detection sensor cable to **LIQUID_CONN1** on the motherboard.
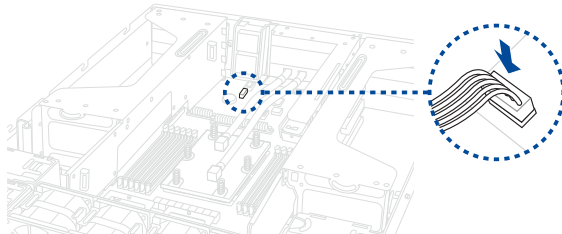
5.   The below instructions must be followed when securing the heatsink to the motherboard. The order in which the screws should be tightened is shown both in the illustration below and on the heatsink.

   A.   Tighten screw ➊ just enough to attach the heatsink to the motherboard.

   B.   Fully tighten screw ➋, then fully tighten screw ➊.

   C.   Fully tighten the remaining screws in order from ➌ to ➏

A T20 screwdriver with a torque value of 12.5±2.5kg-cm is recommended.
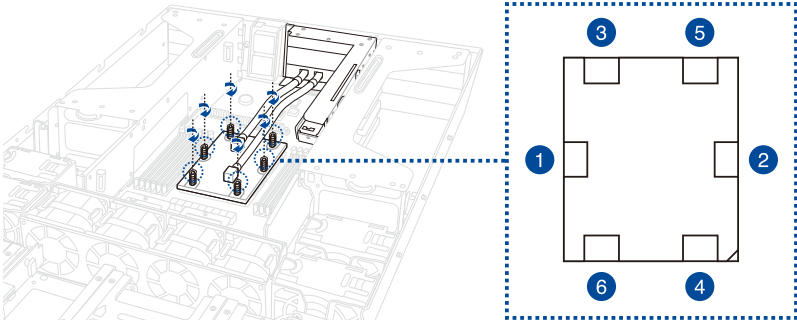
2.3 System memory

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
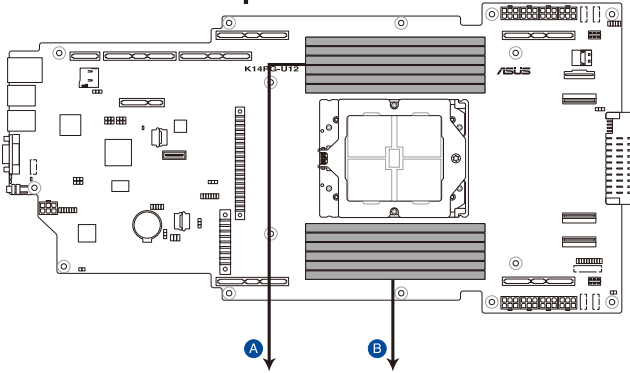
A   CPU1_DIMM_L1
    CPU1_DIMM_K1
    CPU1_DIMM_J1
    CPU1_DIMM_I1
    CPU1_DIMM_H1
    CPU1_DIMM_G1

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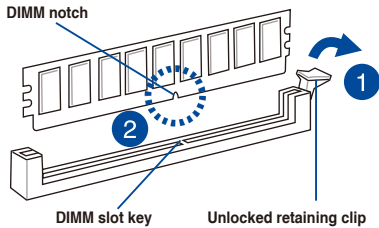
A DIMM is keyed with a notch so that it fits in only one direction. DO NOT force a DIMM into a socket in the wrong direction to avoid damaging the DIMM.

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.

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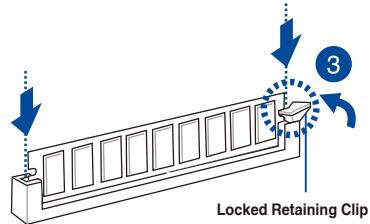
Always insert the DIMM into the socket VERTICALLY to prevent damage to the DIMM notch.

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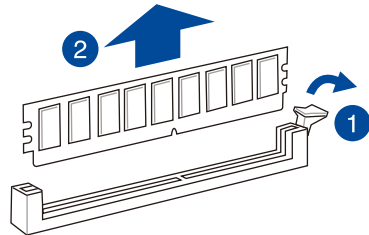
Support the DIMM lightly with your fingers when pressing the retaining clips. The DIMM might get damaged when it flips out with extra force.

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

Storage bay 1 (2.5-inch)　　　　　　　　　　　　　　**Storage bay 2 (2.5-inch)**

Storage bay 3 and 4
(2.5-inch or 3.5-inch)　　　　　　　　　　　　**Storage bay 5 and 6**
(2.5-inch or 3.5-inch)
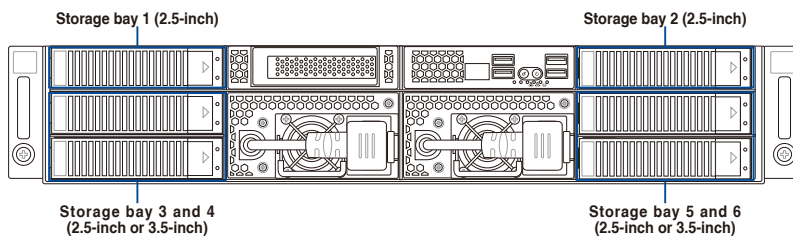
2.4.1　Installing a 3.5-inch SATA/SAS storage device.

1.　Press the spring lock.

2.　Pull the tray lever outwards to remove the drive tray.
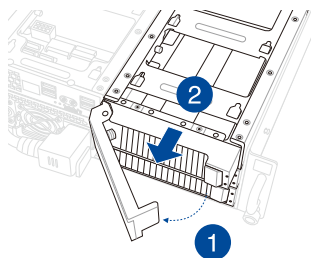
3.　Prepare the SATA/SAS storage device, then insert it into the tray until it clicks into place.
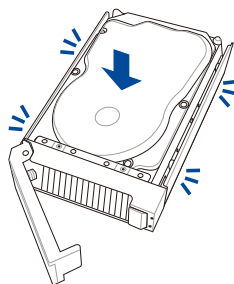
4. Push the storage device and drive tray assembly all the way into the the drive bay until the tray lever and spring lock clicks and secures the drive tray in place.
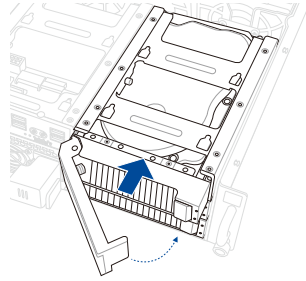
- When installed, the SATA/SAS connector on the drive connects to the SATA/SAS interface on the backplane.

- 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.
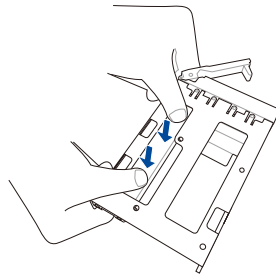
3. Prepare the 2.5-inch storage device, then place it into the tool-less 2.5-inch tray.
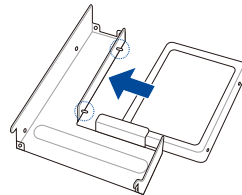
4. Insert the tool-less 2.5-inch tray into the device tray until it clicks in place.
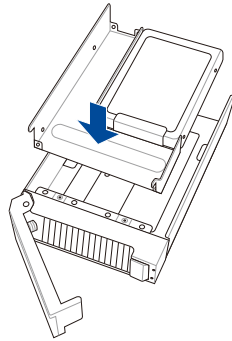
5. Push the storage device and drive tray assembly all the way into the the drive bay until the tray lever and spring lock clicks and secures the drive tray in place.

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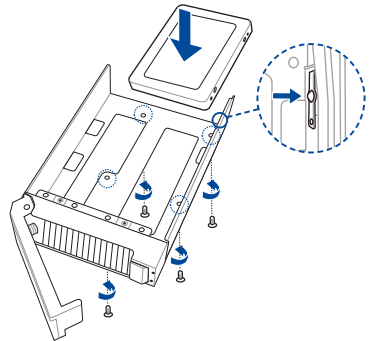
4. Push the storage device and drive tray assembly all the way into the the drive bay until the tray lever and spring lock clicks and secures the drive tray in place.

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.
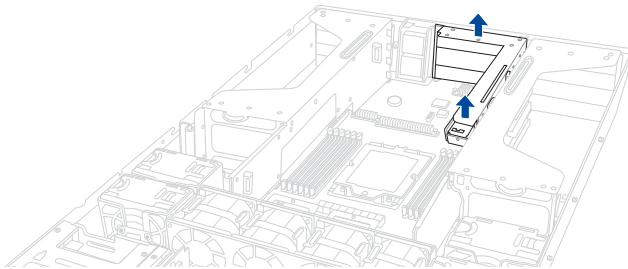
2. Remove the screw from the PCIe lock on the riser card, then remove the PCIe lock from the riser card.
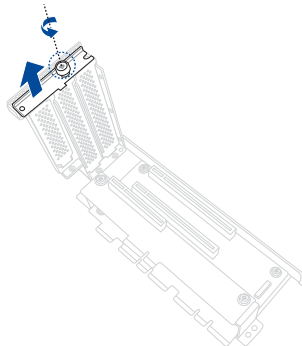
3.   Remove the metal covers from the riser card.
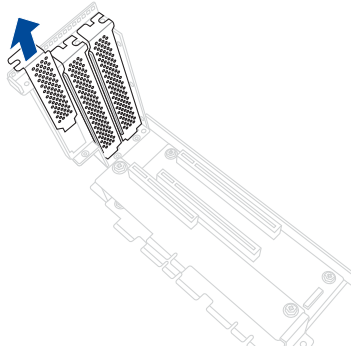
4.   Prepare the expansion cards.

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**
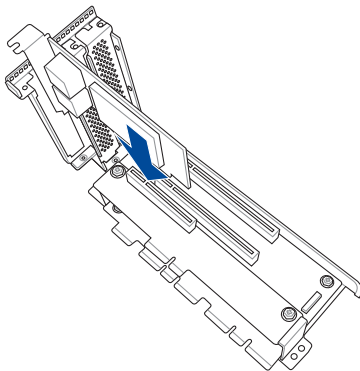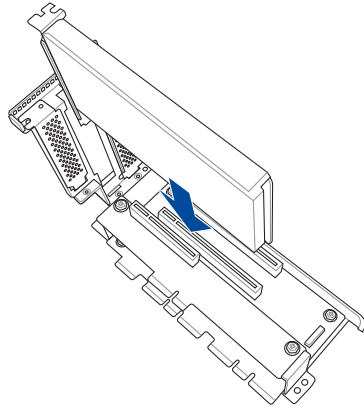
6. Replace the metal covers for any unused PCIe slots, then secure the PCIe lock using the screw removed earlier.
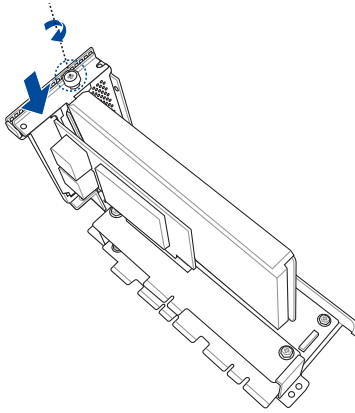
7. Align and insert the riser card and expansion card assembly into the PCIe slot on the motherboard.
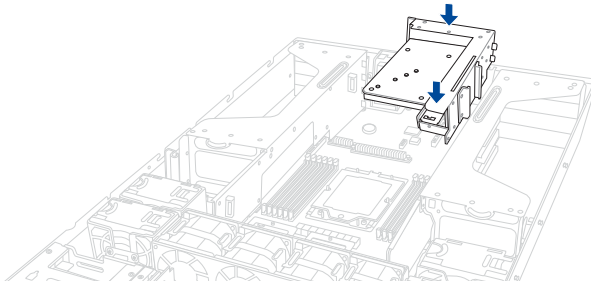
2.5.2   Installing an OCP3.0 slot baseboard

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.
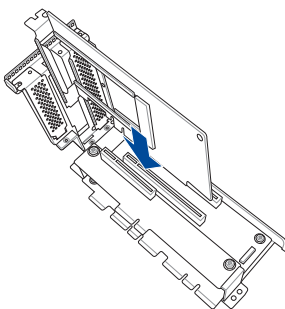
3.   Replace the metal covers for any unused PCIe slots, then secure the PCIe lock using the screw removed earlier.
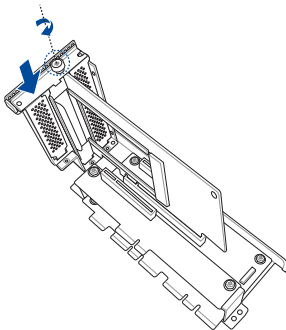
4.   Connect **OCP_SIDE1** and **OCP_NCSI1** on the OCP3.0 slot baseboard to **OCP_SIDE1** and **OCP_BUS1** on the riser card using the bundled cables.

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.
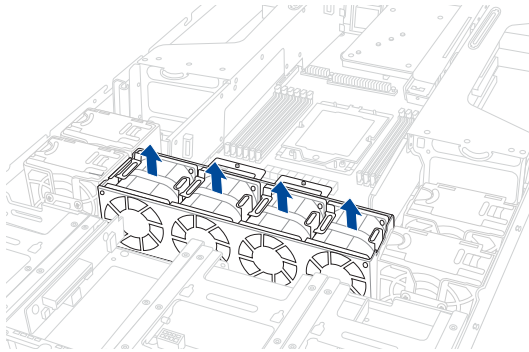
2.   Remove the four (4) screws from the fan cage as shown.
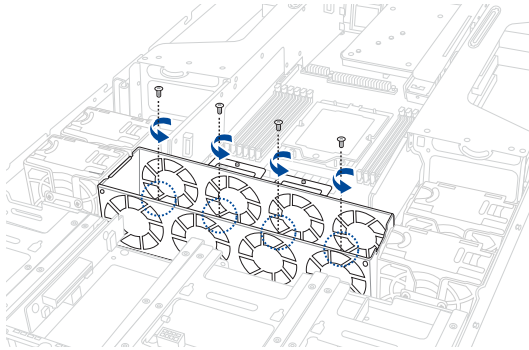
3. Remove the fan cage from the system chassis.
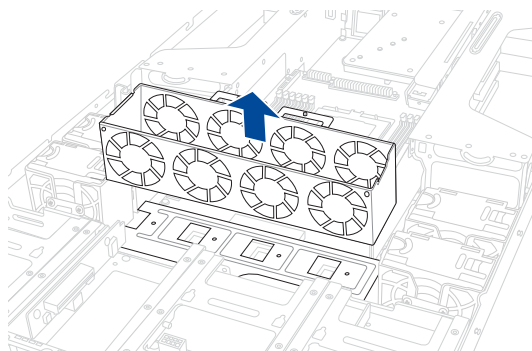
4. Remove the ten (10) screws as shown, then remove the two (2) fans and fan cages from the system chassis.
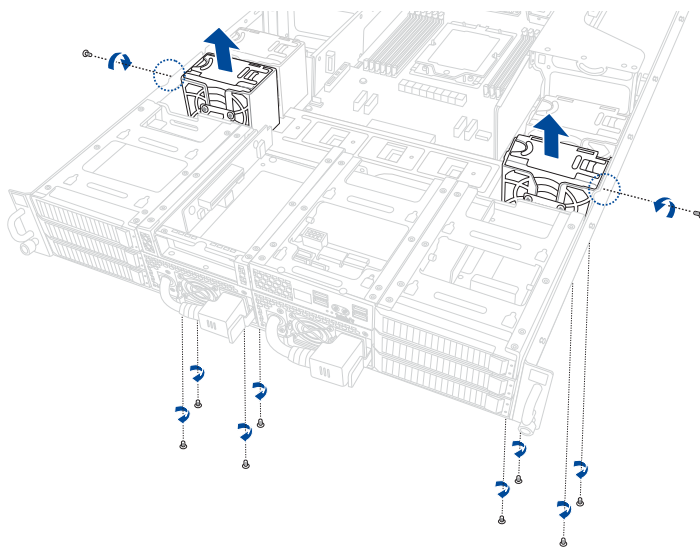
5. Remove the two (2) screws from the internal bracket as shown.
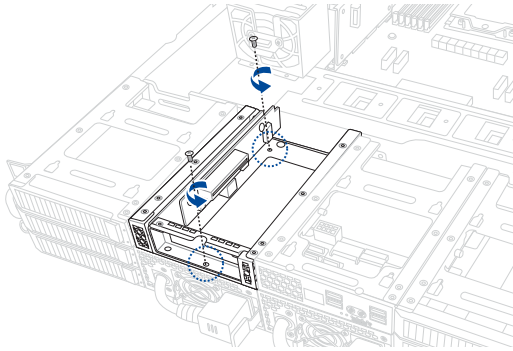
6. Remove the screw from the metal cover, then remove the metal cover.
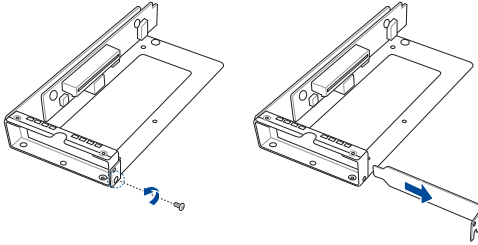
7.   (Optional) To install an ASUS PIKE II 3108 RAID card and cache vault, follow the below instructions to install the cache vault add-on card:

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.
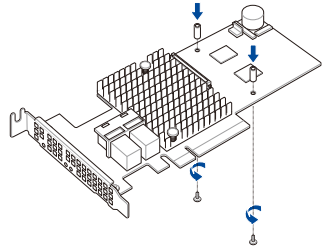
b.   Align and install the bundled cache vault add-on card onto the connector on the ASUS PIKE II card, then secure it to the two spacers with two screws.
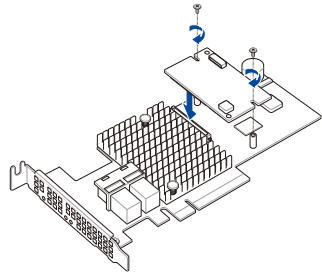
c.   Connect the bundled power cable to the cache vault add-on card.
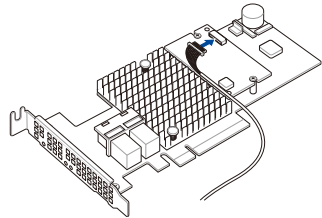
8.   Insert the PIKE II or RAID card into the internal bracket, then secure it using the screw you removed earlier.
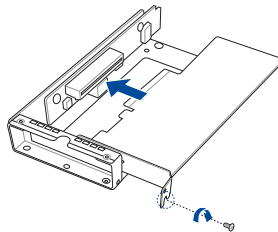
9. Refer to the below instructions to connect the PIKE II or RAID card:

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.

Left backplane   Right backplane
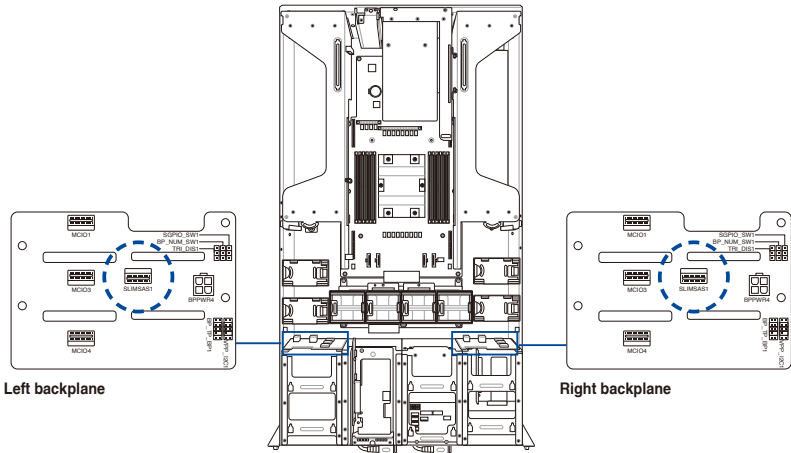
b. Connect the upper MiniSAS (ISAS1) connector (B) on the PIKE II card to **SLIMSAS1** on the right backplane using the bundled cables.

c. Connect the lower MiniSAS (ESAS1) connector (C) on the PIKE II card to **SLIMSAS1** on the left backplane using the bundled cables.

Right backplane
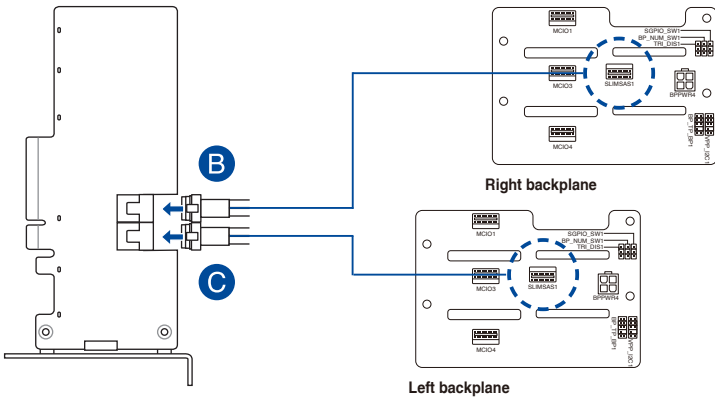
Left backplane

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.

Left backplane

To connect a 9540 RAID card in SATA configuration:
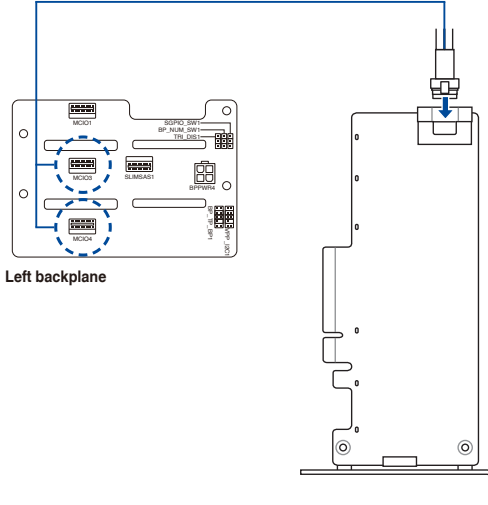
a. Disconnect the default SLIMSAS cables connected to **SLIMSAS1** on the left and right backplanes.

Left backplane
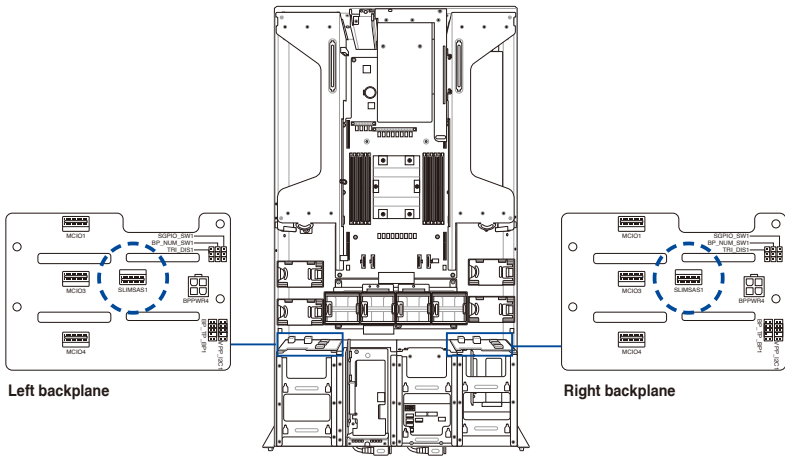
Right backplane

b. Connect the SLIMSAS connector on the RAID card to **SLIMSAS1** on the left and right backplanes using the bundled cables.

Left backplane
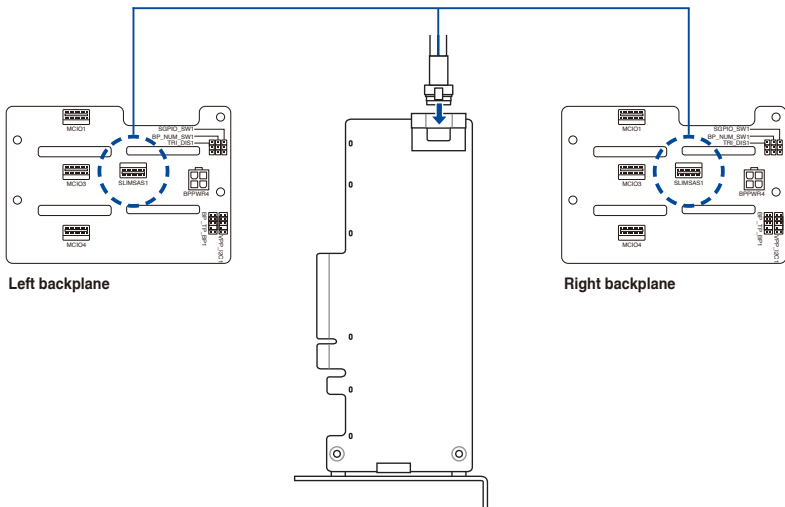
Right backplane

To connect a 9560 RAID card in NVME configuration:

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

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.

Left backplane

Right backplane

To connect a 9560 RAID card in SATA configuration:

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

Left backplane   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.

Left backplane   Right backplane

10. Secure the internal bracket using the two screws removed earlier.
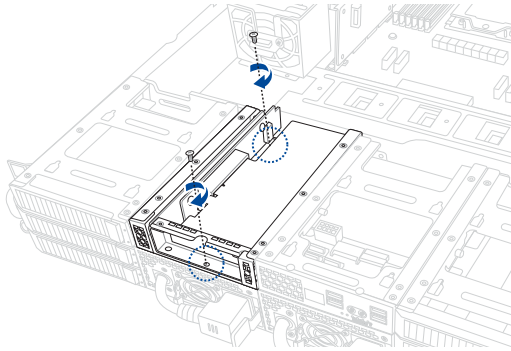
11. (Optional) Refer to the **Installing the Cache Vault Power Module** section to install and connect the Cache Vault Power Module.

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.
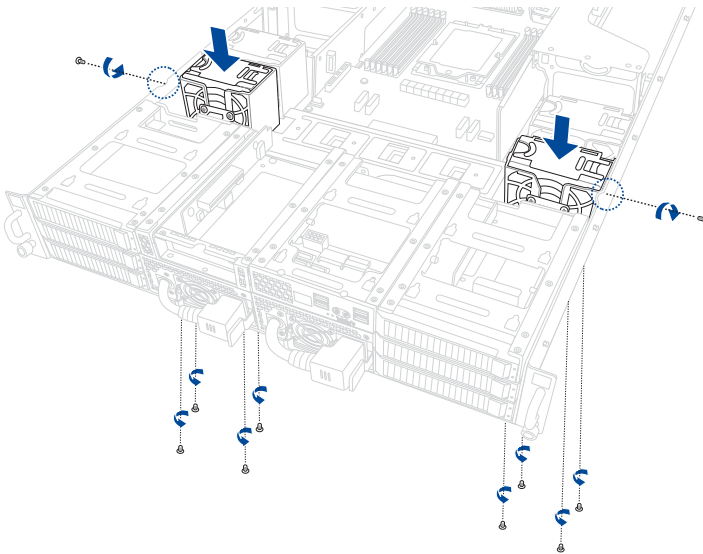
13. Align and install the fan cage, then secure it using the four (4) screws removed earlier.
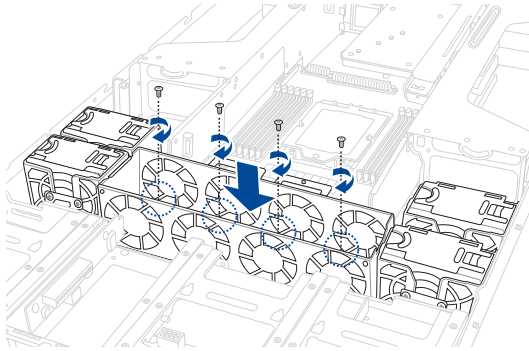
14. Install the four (4) system fans into the fan cage.
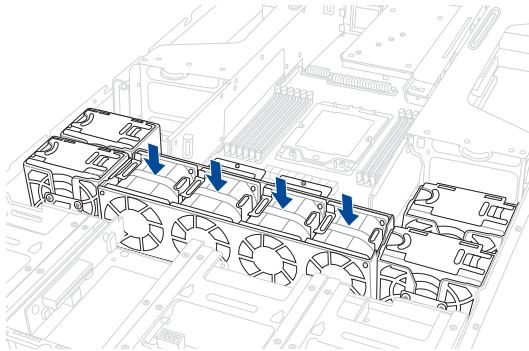
2.5.4 Installing the Cache Vault Power Module

1. Disconnect the three (3) cables from the Front Panel Module, then remove the two (2) screws.
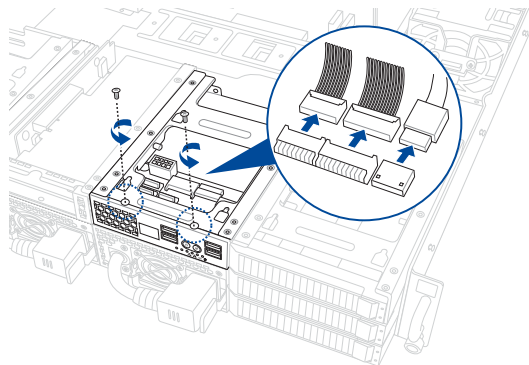
2. From the back of the Front Panel Module, push the Front Panel Module out of the system.
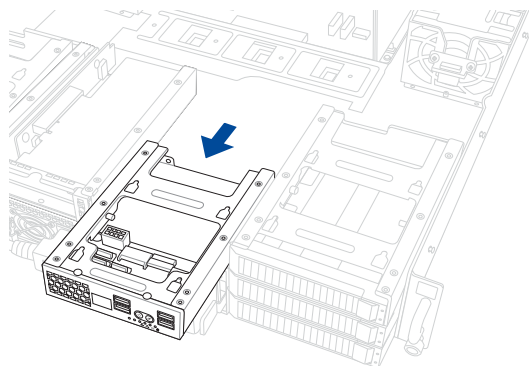
3.   Align the three screw holes on the Cache Vault Power Module clip with the three screw holes on the Front Panel Module, then secure the clip with the three bundled screws.
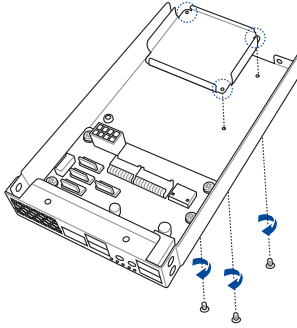
4.   Align and install the Cache Vault Power Module into the Cache Vault Power Module clip.
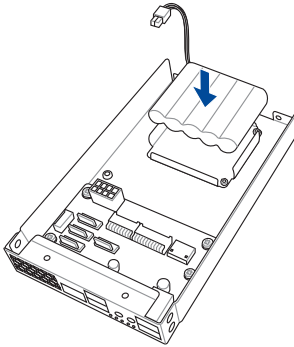
5.   Insert the Front Panel Module into the system.
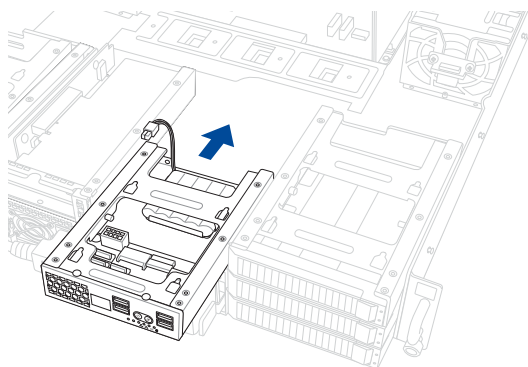
6.   Connect the Cache Vault Power Module to the PIKE II card or RAID card.

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.
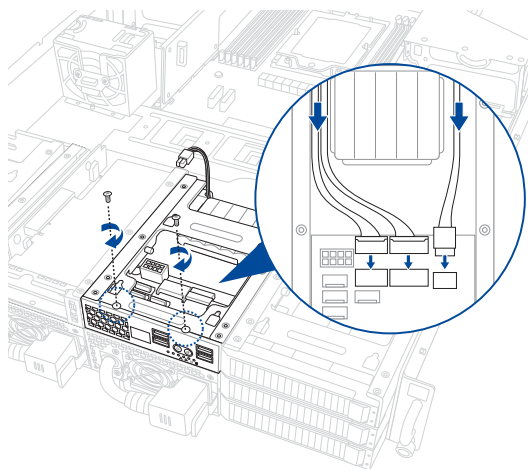
2.5.5   Installing an M.2 (NGFF) card

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.
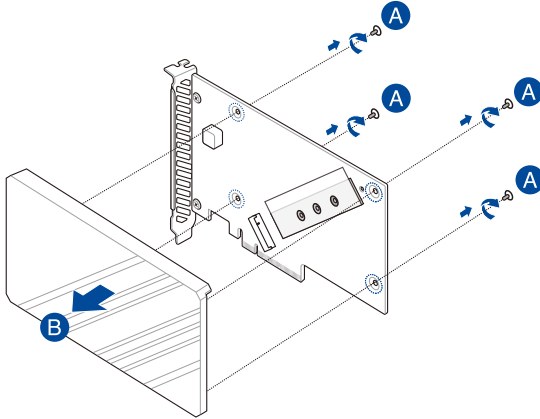
2.   Peel the plastic film off the thermal pad next to the M.2 slot.
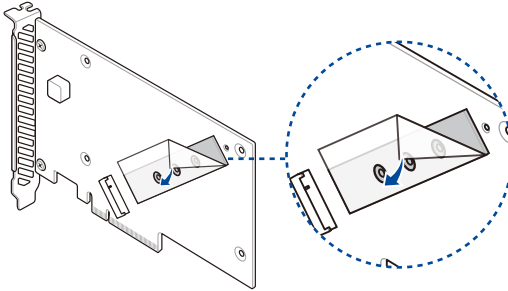
3. Secure the bundled stand screw onto the PCIe 5.0 M.2 card.
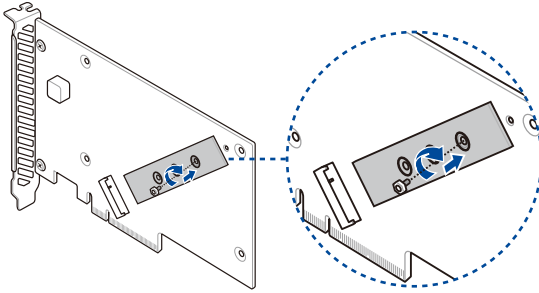
4. Install the M.2 storage device into the onboard M.2 slot (A), then secure the M.2 storage device with the bundled screw (B).
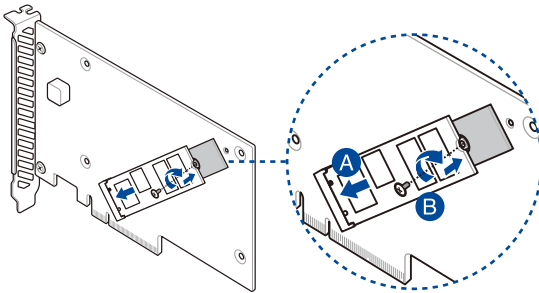
5. Peel the plastic film off the thermal pad on the heatsink (A), secure the cover onto the PCIe 5.0 M.2 card with the cover screws that you removed earlier (B), then install the PCIe 5.0 M.2 card into the PCIe slot on the rear riser card.
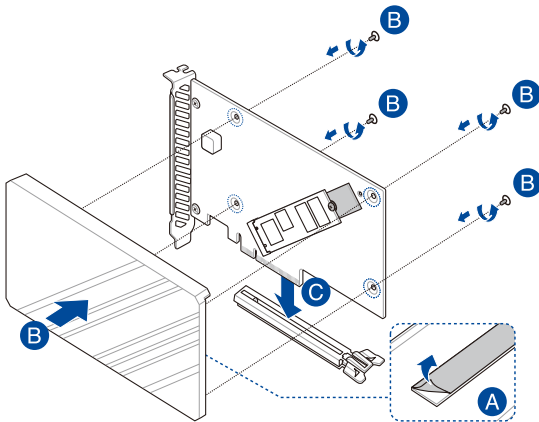
2.5.6 (optional) Installing the PFR module

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

ROT_CON1
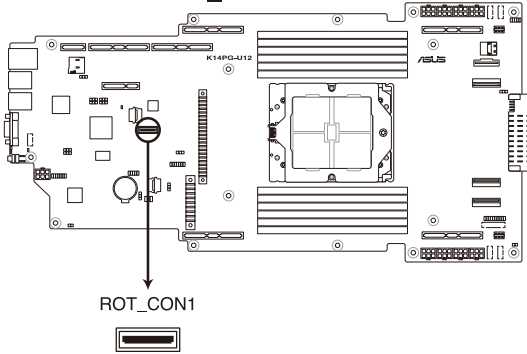
2. Align and connect the PFR module to the PFR module connector.
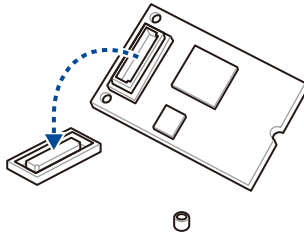
3. Push the PFR module down so that it is seated securely on the PFR module connector, then secure it using a screw.
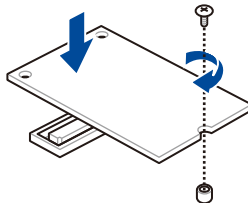
2.5.7 Configuring an expansion card

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.
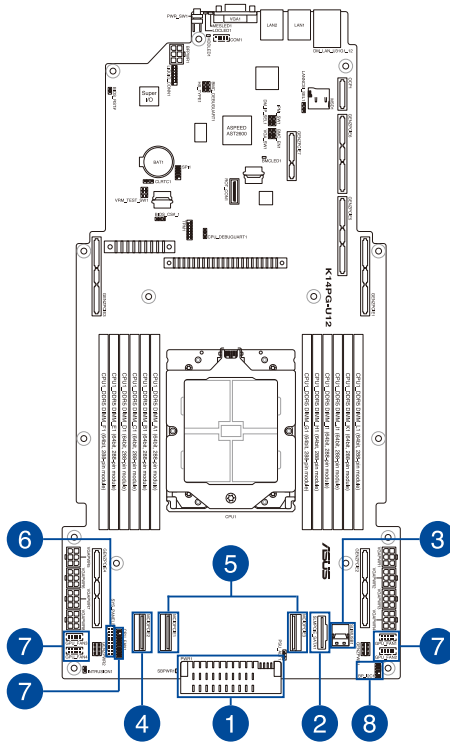
Pre-connected system cables

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
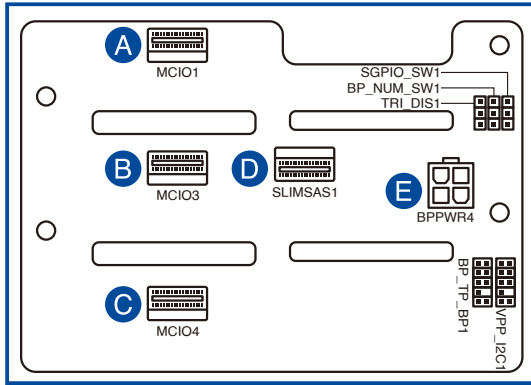
Left backplane
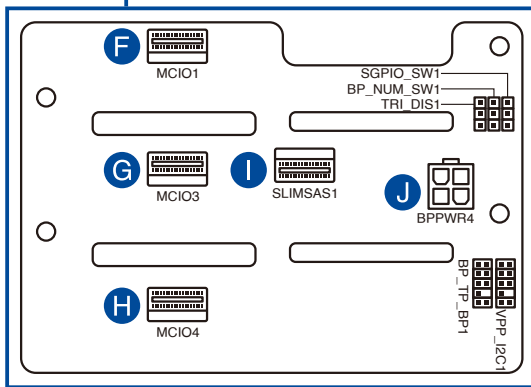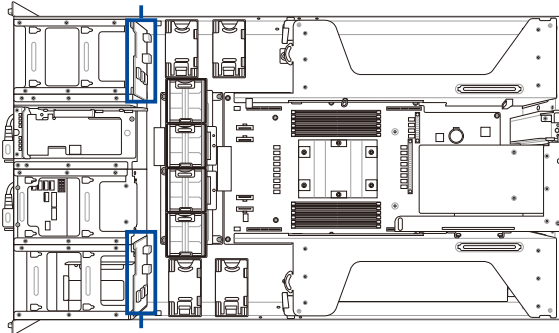
Right backplane

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 Removable/optional components

The following sections describe installation or removal instructions for the following removable/optional components:

1. System fans

2. Redundant power supply units

3. GPUs, GPU liquid cooling modules, and GPU bridges

⚠️ Ensure that the system is turned off before removing any components.

2.8.1 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.
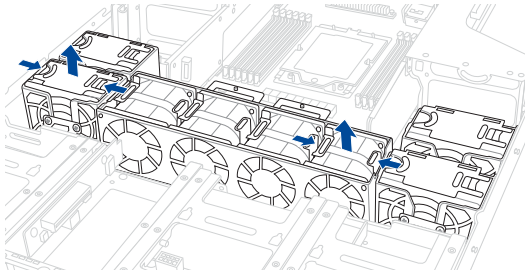
To reinstall the system fans:

1. Insert the fan into the fan cage. Ensure the fan connector is seated firmly within the cable holder.
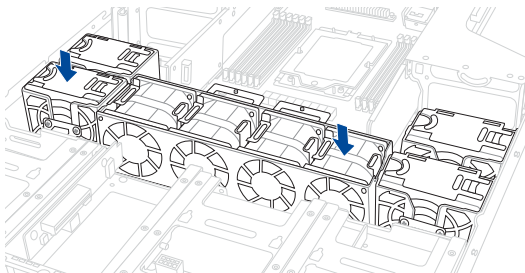
2.8.2   Redundant power supply units

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.
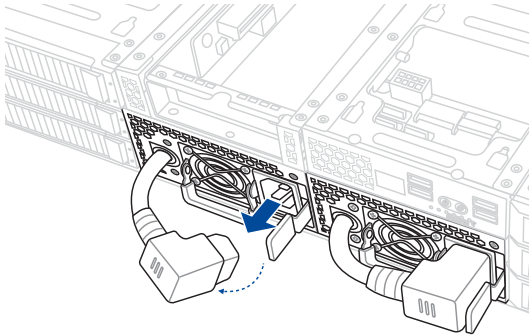
2.   Lift up the PSU lever.

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

PSU lever
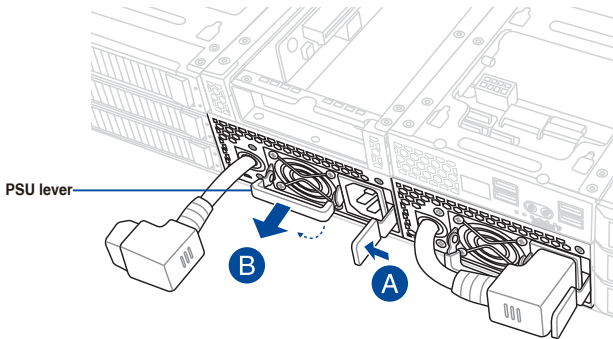
4. Prepare the replacement PSU.

5. Align and insert the replacement PSU into the empty PSU bay until it clicks in place.
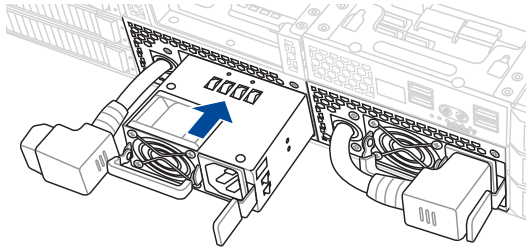
6. Reconnect the PSU power cable.
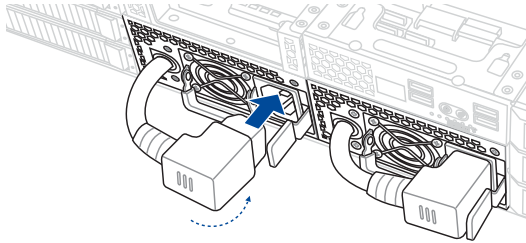
• The system automatically combines the two power supply modules into one. The combined output power varies with input voltages. Refer to the table below for details.

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.

2.8.3 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.
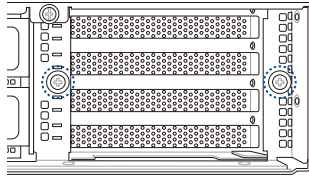
2. Locate and loosen the thumbscrew at the front of the GPU bracket.

3. Firmly hold and pull the GPU bracket upwards to detach it from the motherboard.
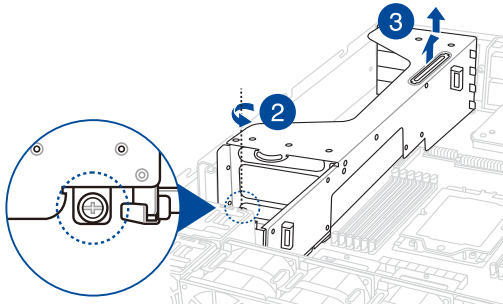
4. Prepare the appropriate GPU power cable depending on the type of GPU card.
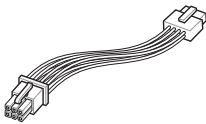
Tesla/AMD
8pin to 6pin power cable
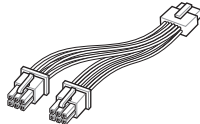
Quadro
8pin to 2x6pin power cable
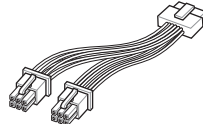
12VHPWR
12+4pin to 2x6pin power cable

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.
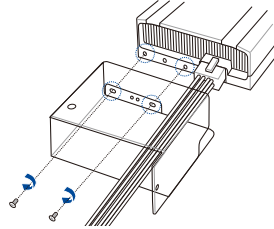
For GPU card installation without an air duct

Connect the power cable to the GPU.
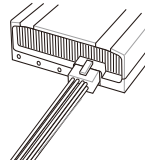
6. Place the GPU bracket on a flat and stable surface.

7. Loosen the two thumbscrews and remove the PCIe lock (A), then remove the metal covers (B).
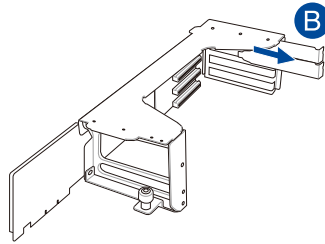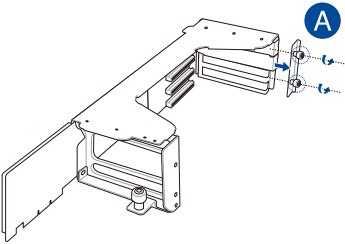
8. Insert the GPU cables into the opening on the GPU bracket.

GPU bracket opening
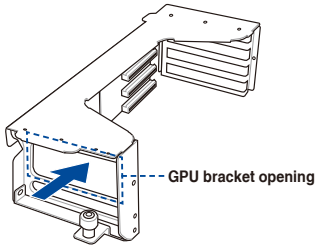
9. Align and insert the golden fingers of the GPU card into the card slot on the bracket and ensure that it is securely seated in the slot.

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.
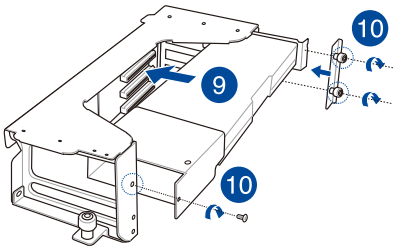
For GPU card installation without an air duct

Install the PCIe lock and secure the two thumbscrews.
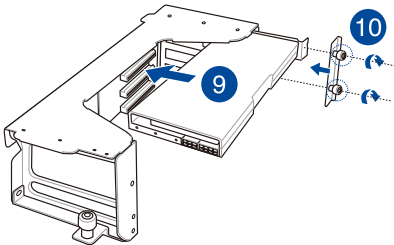
11. Repeat steps 4 to 10 if you need to install an additional GPU card to the bracket.

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.
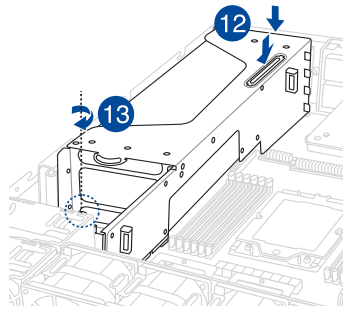
14. Connect the other end of the GPU power cable to an available 6-pin power connector in front of the GPU bracket.
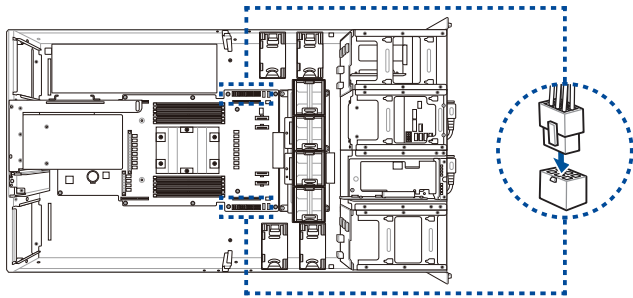
15. Secure the two thumbscrews at the rear of the chassis.
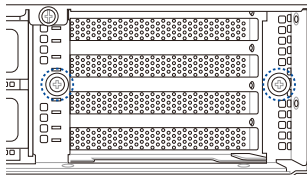
2.8.4 Installing a GPU liquid cooling module

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.
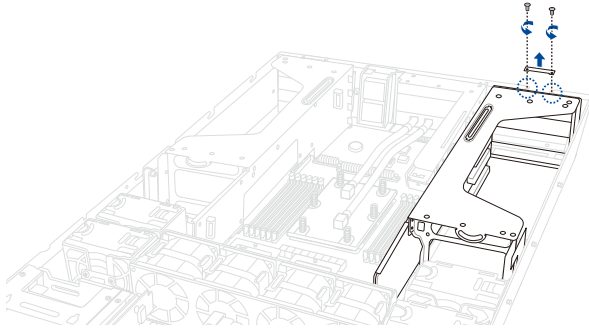
2. Locate and loosen the three thumbscrews, then firmly hold and pull the GPU bracket upwards to detach it from the motherboard.
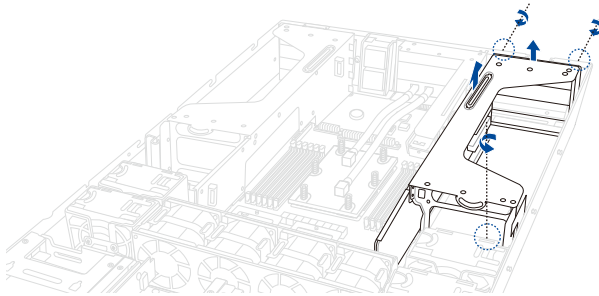
3. Place the GPU bracket on a flat and stable surface.

4. Loosen the two thumbscrews and remove the PCIe lock (A), then remove the metal covers (B).
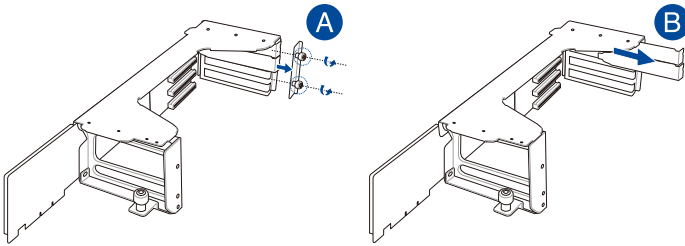
5. Connect the liquid cooling pipes to a supported GPU card.
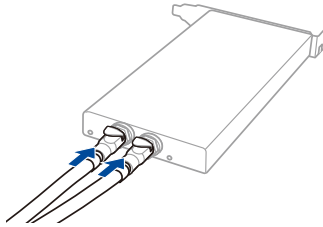
6. Install the liquid cooling pipe bracket, then secure it using two screws.
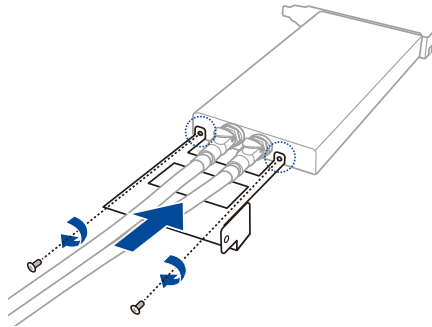
7. Push the latches on the liquid cooling pipes outwards (A), then use cable ties to secure the liquid cooling pipes (B).
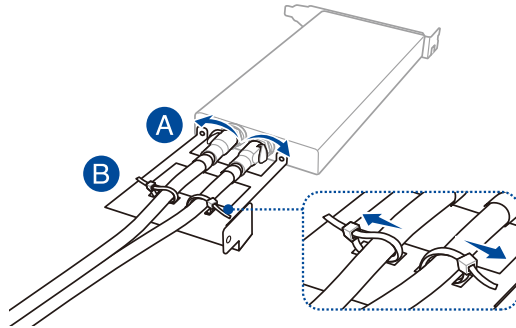
8. Install the GPU, liquid cooling assembly into the GPU bracket, then secure it using two screws.
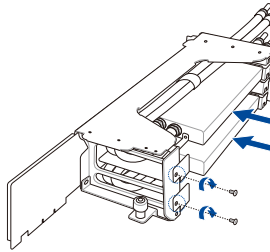
9. Install the PCIe lock, then secure the two thumbscrews.
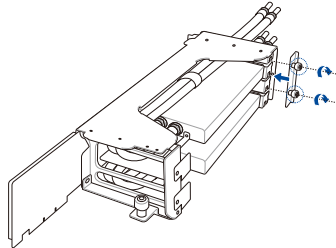
10.   Align and insert the golden fingers of the GPU bracket into the card slot on the
       motherboard and ensure that it is securely seated in the slot, then secure the three
       thumbscrews.
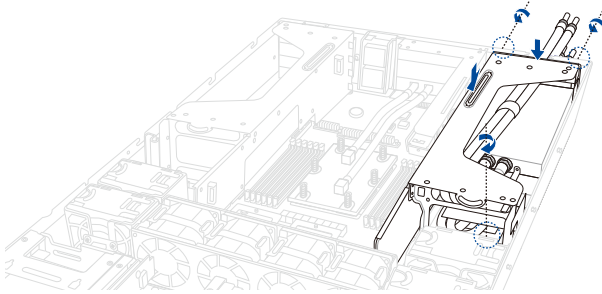
11.   Install the metal cover, then secure it using two screws.
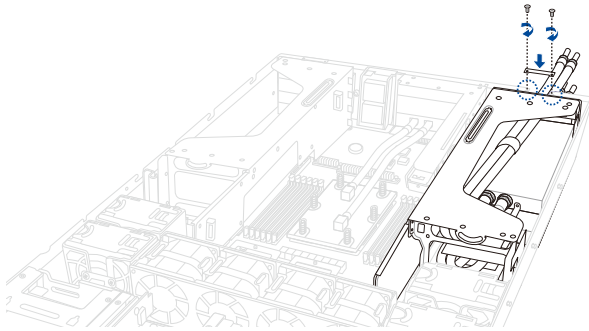
12.   Connect the leak detection sensor cable to **WL_CON1_L** for the left GPU bracket or
       WL_CON1_R for the right GPU bracket.
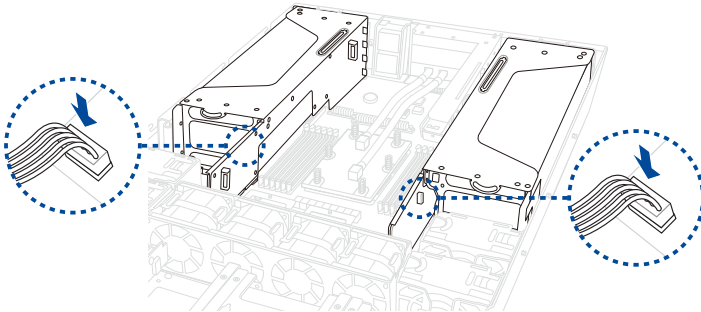
2.8.5   Installing a GPU bridge

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.
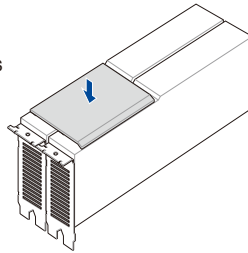
For NVidia A100 GPU cards

Align the three GPU bridges with the golden finger connectors on the GPU cards, then install the GPU bridges.
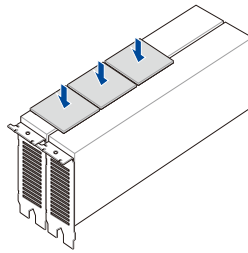
For NVidia RTX A5000 / A6000 GPU cards

Align the GPU bridge with the golden finger connectors on the GPU cards, then install the GPU bridge.
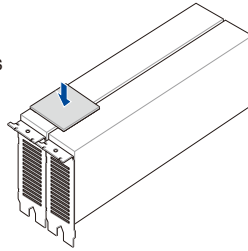
2.9   Rail Kit Options

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

Motherboard Information

3

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

3.1   Motherboard layout
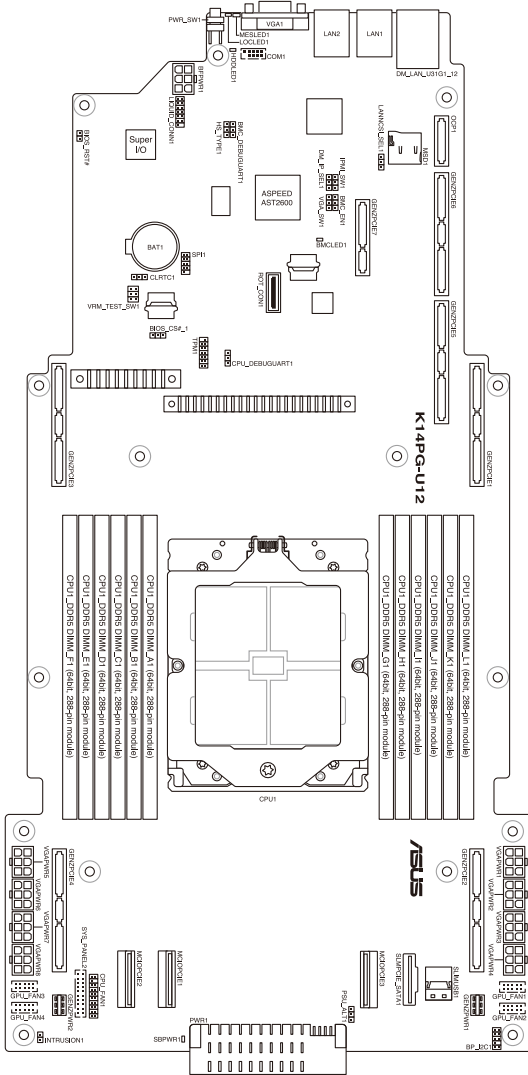
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3.2 Central Processing Unit (CPU)

The motherboard comes with a surface mount SP5 socket designed for the AMD EPYC™ 9004 Series Family processors.

K14PG-U12 CPU Socket SP5 LGA 6096
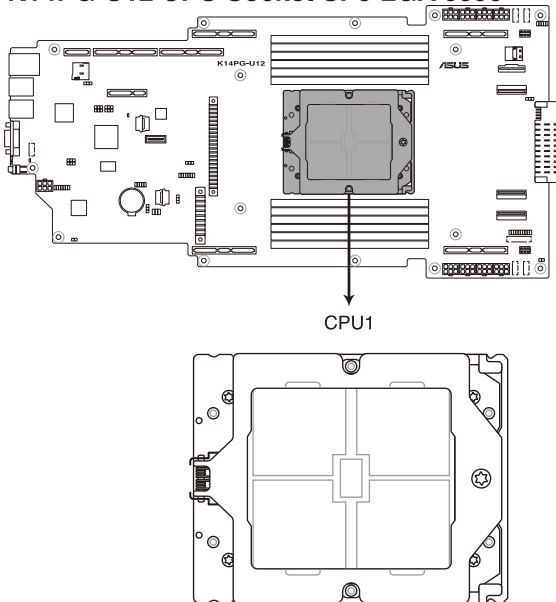
CPU1

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
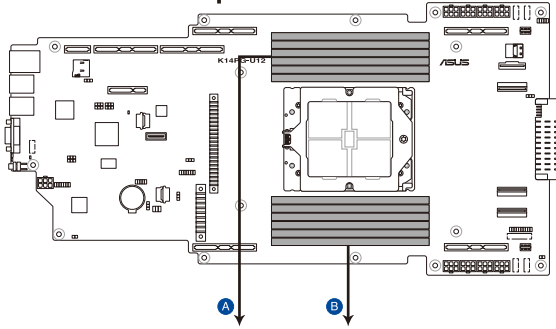
3.4 Jumpers

1. **Clear RTC RAM (CLRTC1)**

   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 <Del> key during the boot process and enter BIOS setup to re-enter data.

   > Except when clearing the RTC RAM, never remove the cap on CLRTC 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

CLRTC1

Normal (Default)   Clear CMOS
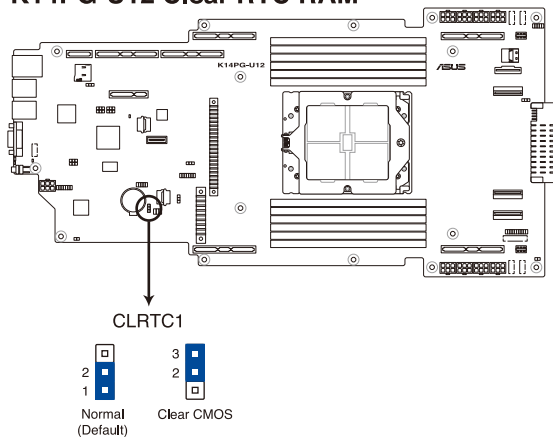
2.   **VGA Controller setting (3-pin VGA_SW1)**

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

VGA_SW1
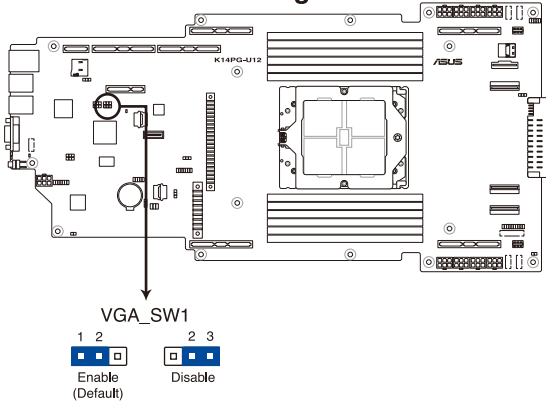
3.   **Baseboard Management Controller setting (3-pin BMC_EN1)**

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

BMC_EN1
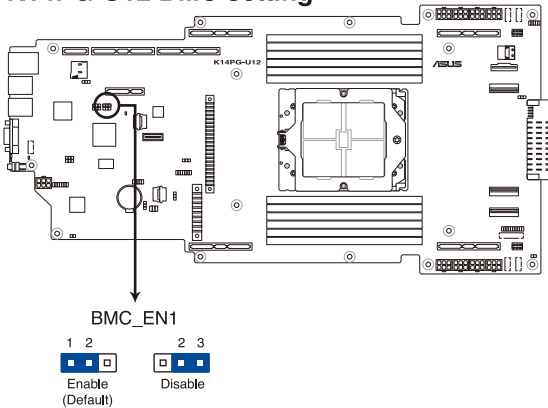
4. **DMLAN setting (3-pin DM_IP_SEL1)**

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

DM_IP_SEL1

1 2   2 3

Normal   Force DMLAN IP
(Default)   to static mode
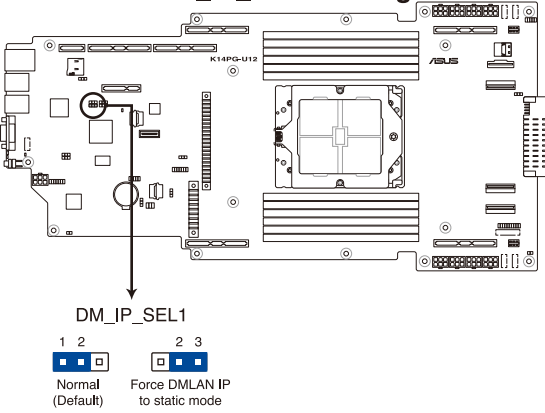
5. **IPMI SW setting (3-pin IPMI_SW1)**

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

K14PG-U12 IPMI_SW1 setting

IPMI_SW1

1 2   2 3

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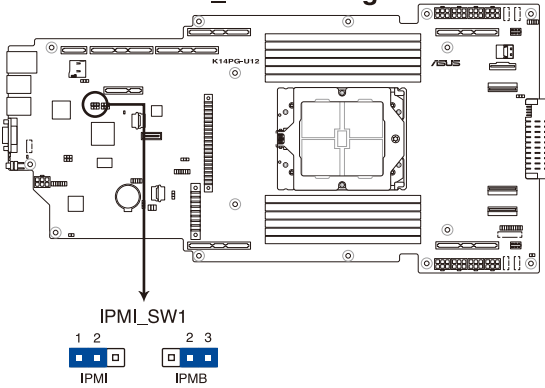
6.   **Heatsink Type setting (3-pin HS_TYPE1)**

This jumper allows you to set the fan curve used.

K14PG-U12 HS_TYPE1 setting

HS_TYPE1

| 1 | 2 | | 2 | 3 |
| Enable | | | EVAC | |
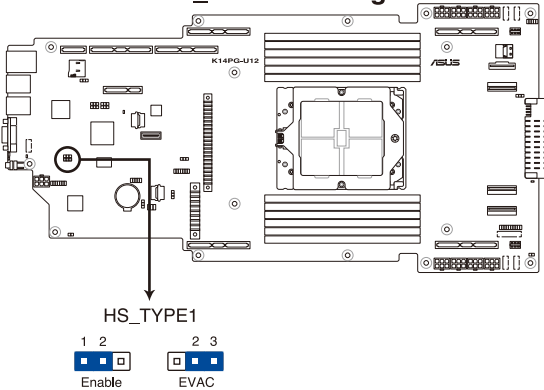
7.   **LANNCSI setting (3-pin LANNCSI_SEL1)**

This jumper allows you to select which LAN NCSI function to use.

K14PG-U12 LANNCSI_SEL1 setting

LANNCSI_SEL1

| 1 | 2 | | 2 | 3 |
| Auto | | | LAN module | |
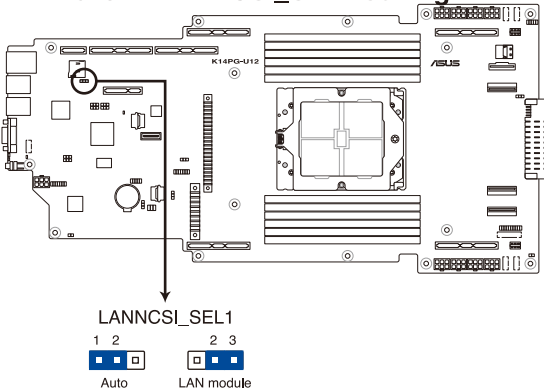
8.   **PSU_ALT1 (3-pin PSU_ALT1)**

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

K14PG-U12 PSU_ALT1 setting

PSU_ALT1
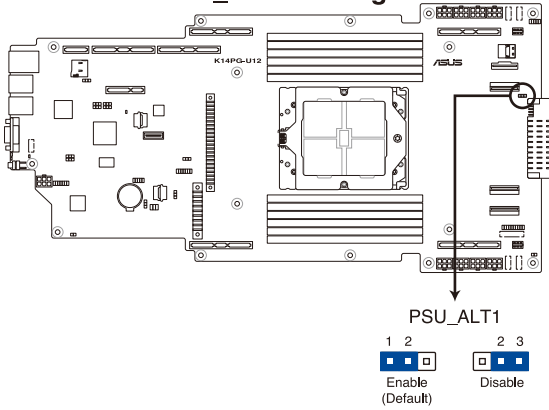
3.5 Internal connectors

1. **SLIMPCIE connector (SLIMPCIE_SATA1)**

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

K14PG-U12 SLMPCIE_SATA1 connector

SLMPCIE_SATA1
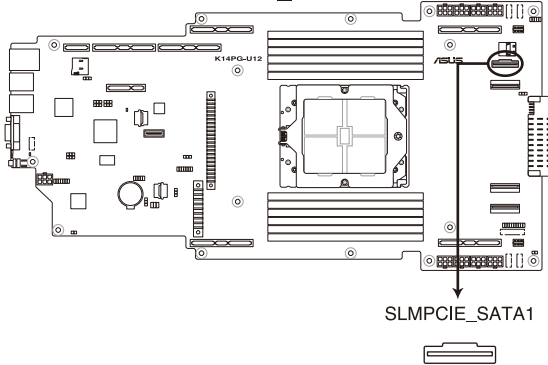
2. **MCIOPCIE connectors (MCIOPCIE1-3)**

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

K14PG-U12 MCIOPCIE connectors

A MCIOPCIE3

B MCIOPCIE1

MCIOPCIE2
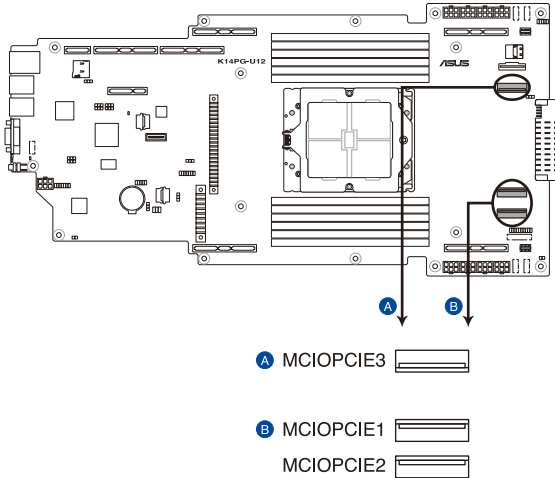
3. **USB 3.2 Gen 1 connectors (SLIMUSB1)**

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

SLIMUSB1
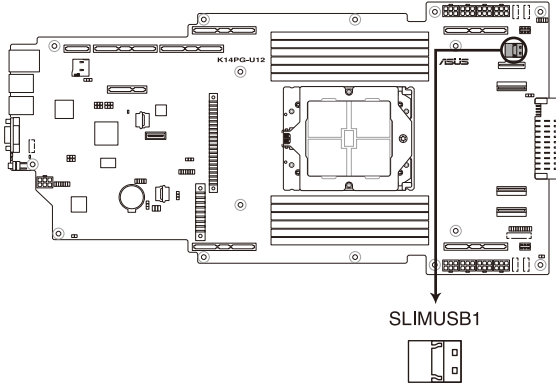
4. **Chassis Intrusion connector (2-pin INTRUSION1)**

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

INTRUSION1

PIN 1

CHASSIS#   GND
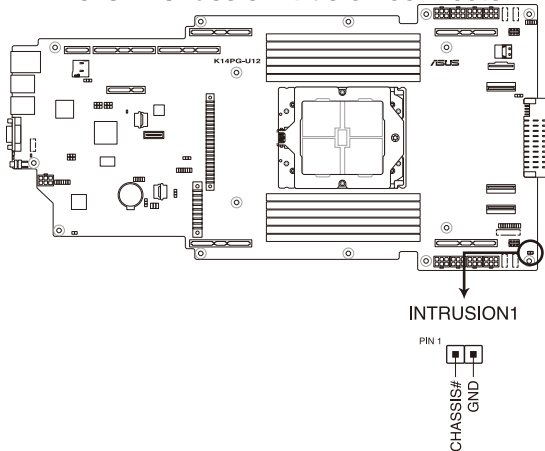
5. **Serial Port connector (10-1 pin COM1)**

    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.

K14PG-U12 Serial port connector

COM1
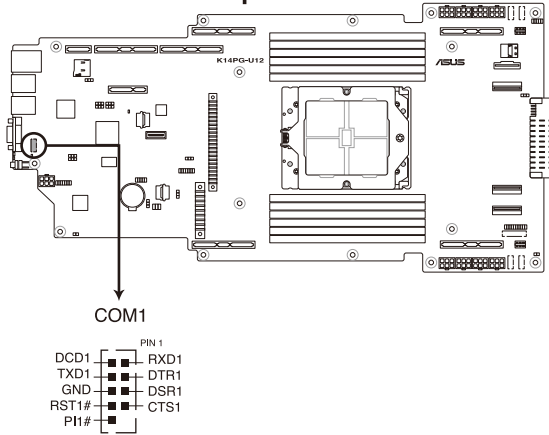
6. **TPM connector (14-1 pin TPM1)**

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

K14PG-U12 TPM connector

TPM1
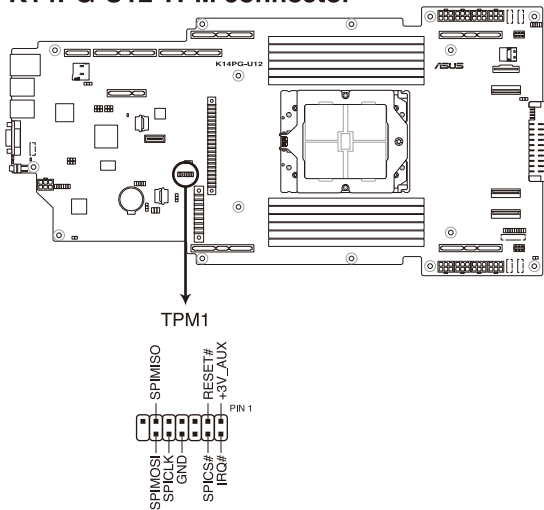
7. **Power connector (PWR1)**

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
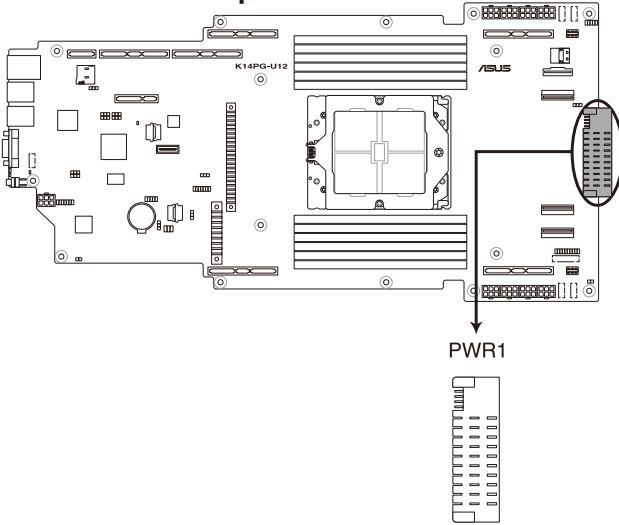
PWR1

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
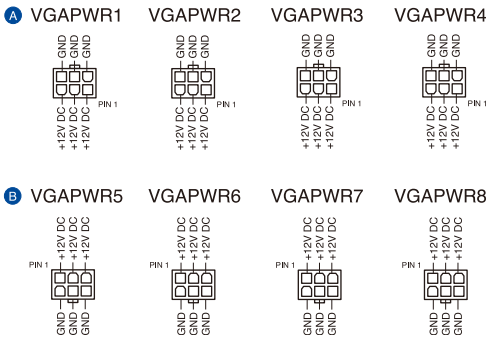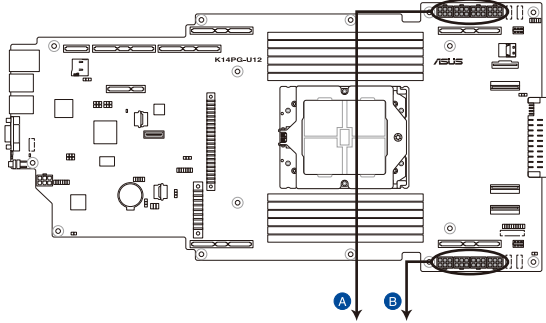
9.   MicroSD Card slot (MSD1)

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

MSD1
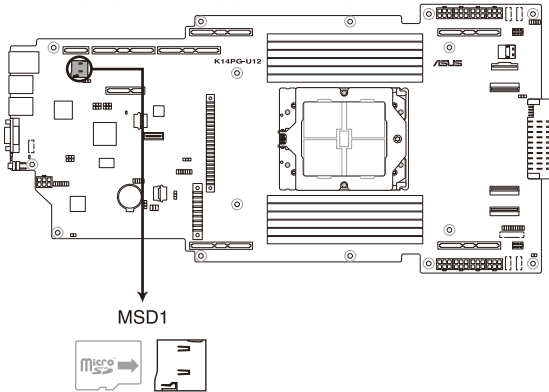
Disconnect all power (including redundant PSUs) from the existing system before you add or remove a memory card, then reboot the system to access the memory card.

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.

K14PG-U12 BMC_DEBUGUART1 connector

BMC_DEBUGUART1
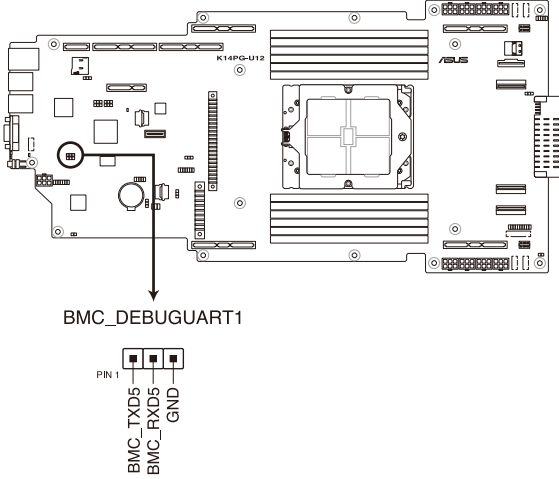
11. **Platform Firmware Resilience (PFR) Module connector (ROT_CON)**

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

K14PG-U12 ROT_CON1 connector

ROT_CON1
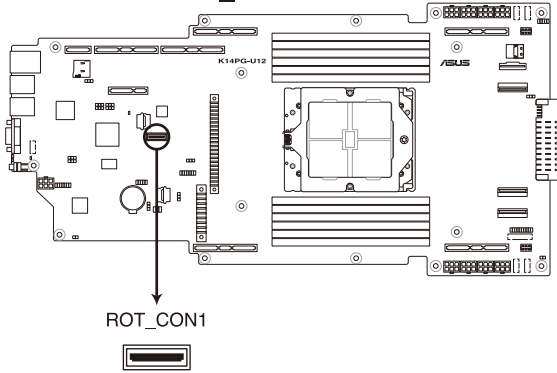
12. **System Panel connector (20-pin SYS_PANEL2)**

This connector supports several chassis-mounted functions.

K14PG-U12 System panel connector

SYS_PANEL2

PORT80_DGL#
PORT80_DGH#
PORT80_LED_G
PORT80_LED_F
AUX_LAN2ACT#_5V
BMC_MLED#
AUX_BMCLOCLED#
FP_PLED-5V
AUX_BMCLOCBTN#
R_FP_PWRBNT#

PIN 1

PORT80_LED_E
PORT80_LED_D
PORT80_LED_C
PORT80_LED_B
PORT80_LED_A
AUX_LAN1ACT#_5V
U3H_OC34#_D
U3H_OC12#_D
GND
BMC_TR1
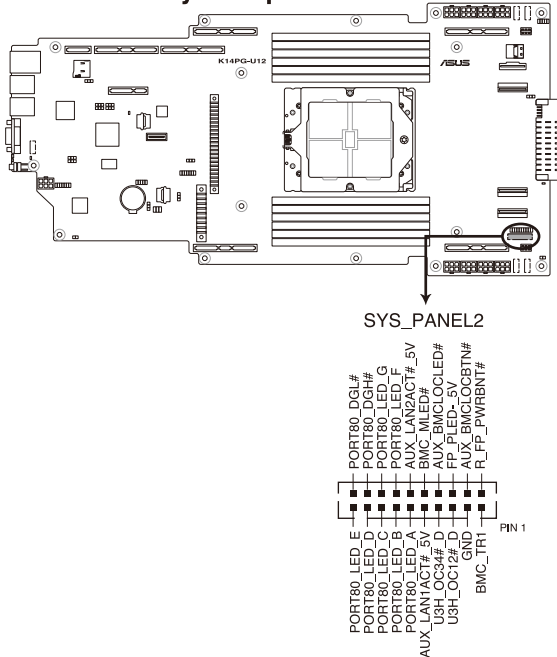
13. BF Power connector (6-pin BFPWR1)

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

BFPWR1
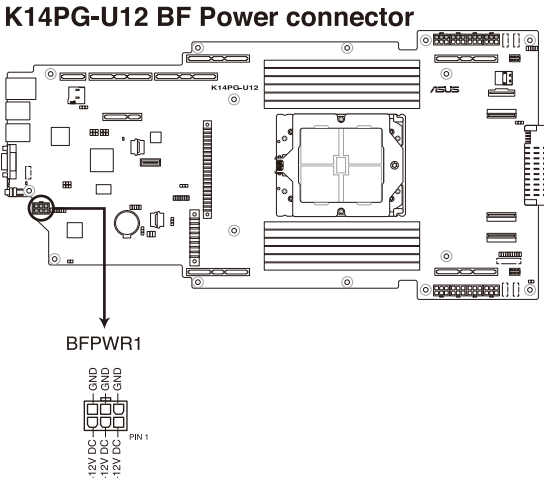
This power connector supplies a maximum of 150W and is only intended for use with a Bluefield Ethernet DPU card.

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

SBPWR1

ON   OFF
Standby Power   Powered Off
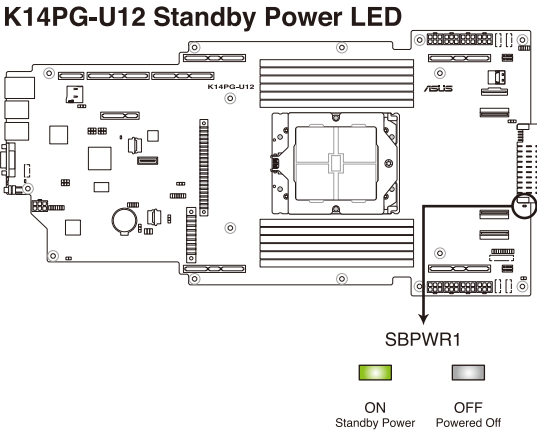
2.   **Baseboard Management Controller LED (BMCLED1)**

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

K14PG-U12 BMCLED1

BMCLED1
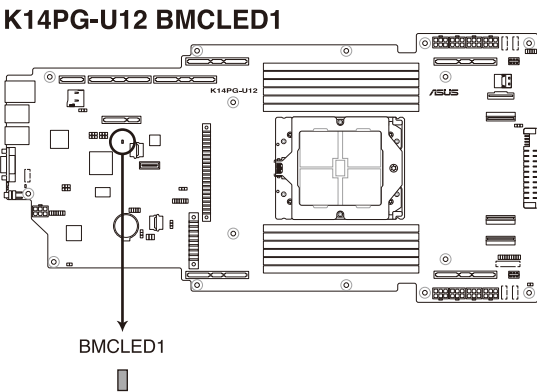
3. **Hard Disk Activity LED (HDDLED1)**

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

HDDLED1
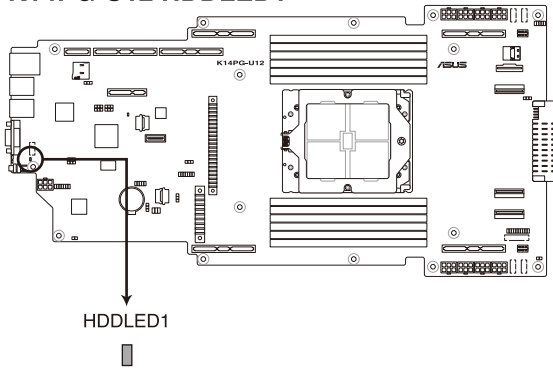
4. **Message LED (MESLED1)**

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

K14PG-U12 MESLED1

MESLED1
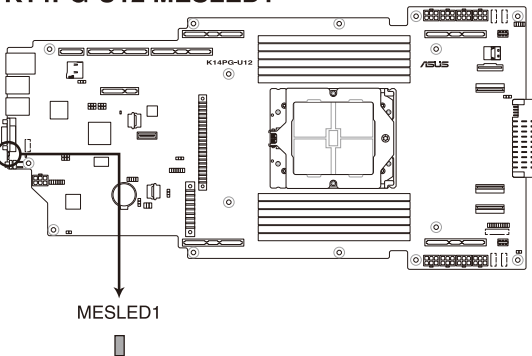
5.   Location LED (LOCLED1)

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
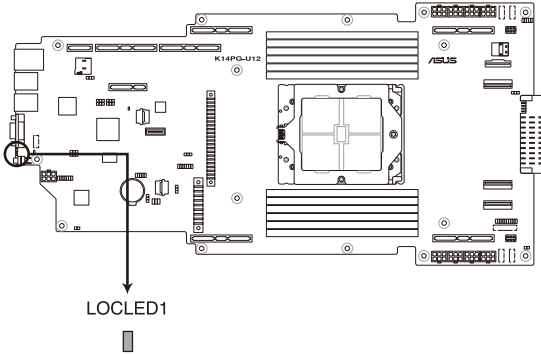
LOCLED1

4

BIOS Setup

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>.

```
                    ASUS Tek. EzFlash Utility

       Current Platform                 New Platform
 Platform : K14PG-U12             Platform : K14PG-U12
 Version  : 1989                  Version  : 2357
 Build Date : 04/01/2023          Build Date : 04/15/2023

 FS0          System Volume Information          <DIR>
              K14PG-U12 BIOS                     <DIR>
              Windows                            <DIR>




 [Up/Down/Left/Right]:Switch [Enter]:Choose [q]:Exit
```
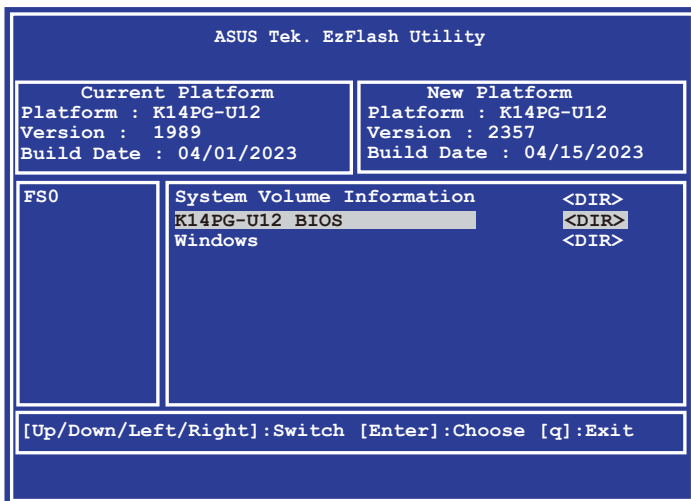
3.   Press the Left/Right arrow keys to switch to the **Drive** field.

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 <Del> during the Power-On Self-Test (POST) to enter the Setup utility; otherwise, POST continues with its test routines.

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

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

- 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

Menu items   Menu bar   Configuration fields   General help

```
                              Aptio Setup - AMI
   Main  Advanced  Chipset  Security  Boot  Tool  Event Logs  Server Mgmt  Exit

   BIOS Information                                          Choose the system default
   BIOS Version               0101 x64                       language
   Build Date                 04/21/2022
   Access Level               Administrator
   Agesa Version              v0.0.7.1
   System Serial Number       To be filled by O.E.M.

   Intel I350 LAN1 MAC        00:0B:6E:00:00:43
   Intel I350 LAN2 MAC        00:0B:6E:00:00:44

   Memory Information
   Total Memory               Total Memory: 16384 MB
                              (DDR5)
   Memory Frequency           3600 MHz                      ++: Select Screen
                                                            ↑↓: Select Item
   BIOS Sub Version           S22042102                     Enter: Select
                                                            +/-: Change Opt.
   System Language            [English]                     F1: General Help
                                                            F2: Previous Values
   System Date                [Mon 07/25/2022]              F5: Optimized Defaults
   System Time                [15:27:02]                    F10: Save Changes & Reset
                                                            F12: Print Screen
                                                            ESC: Exit

                    Version 2.22.1283 Copyright (C) 2022 AMI
```

Navigation keys

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.

```
                            Aptio Setup - AMI
   Main  Advanced  Chipset  Security  Boot  Tool  Event Logs  Server Mgmt  Exit

   BIOS Information                                        Choose the system default
   BIOS Version                  0101 x64                  language
   Build Date                    04/21/2022
   Access Level                  Administrator
   Agesa Version                 v0.0.7.1
   System Serial Number          To be filled by O.E.M.

   Intel I350 LAN1 MAC           00:0B:6E:00:00:43
   Intel I350 LAN2 MAC           00:0B:6E:00:00:44

   Memory Information
   Total Memory                  Total Memory: 16384 MB
                                 (DDR5)
   Memory Frequency              3600 MHz                 →←: Select Screen
                                                          ↑↓: Select Item
   BIOS Sub Version              S22042102                Enter: Select
                                                          +/-: Change Opt.
   System Language               [English]                F1: General Help
                                                          F2: Previous Values
   System Date                   [Mon 07/25/2022]         F5: Optimized Defaults
   System Time                   [15:27:02]               F10: Save Changes & Reset
                                                          F12: Print Screen
                                                          ESC: Exit


                    Version 2.22.1283 Copyright (C) 2022 AMI
```

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
     Core Optimizer                      [Disabled]         frequency of all CPU cores
     Engine Boost                        [Disabled]         based on their current
     Overclocking                        [Disabled]         utilization, delivering better
     Power Balancer                      [Disabled]         performance per watt for
                                                            improved system energy
```
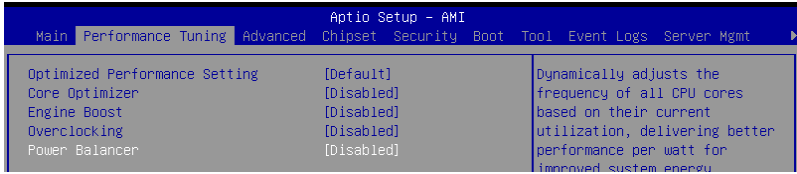
Optimized Performance Setting [Default]

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                  │ ⟷: Select Screen             │
│ ▶ Tls Auth Configuration                        │ ↑↓: Select Item              │
│ ▶ Intel(R) I350 Gigabit Network Connection - 00:0B:6E:00:00:43│               │
└────────────────────────────────────────────────┴──────────────────────────────┘
```

4.5.1 Trusted Computing

```
                            Aptio Setup - AMI
     Advanced
┌────────────────────────────────────────────────┬──────────────────────────────┐
│ Configuration                                   │ Enables or Disables BIOS      │
│    Security Device Support         [Disable]    │ support for security device. │
│    NO Security Device Found                     │ O.S. will not show Security  │
│                                                 │ Device. TCG EFI protocol and │
│                                                 │ INT1A interface will not be  │
│                                                 │ available.                    │
└────────────────────────────────────────────────┴──────────────────────────────┘
```

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                     │                              │
└────────────────────────────────────────────────┴──────────────────────────────┘
```
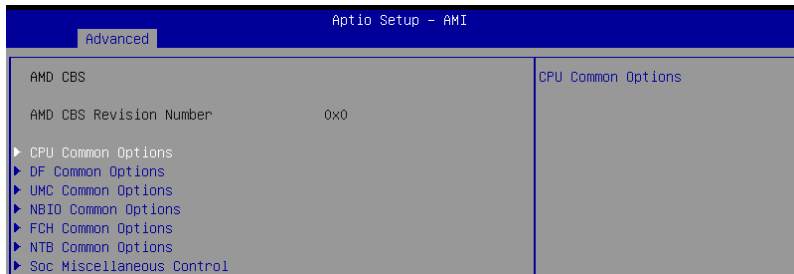
CPU Common Options

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
```
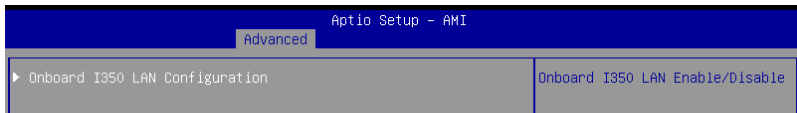
Onboard I350 LAN Configuration

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

```
                         Aptio Setup - AMI
                Advanced

                                              Console Redirection Enable or
                                              Disable.
   COM1
   Console Redirection            [Disabled]
 ▶ Console Redirection Settings

   COM2
   Console Redirection            [Disabled]
 ▶ Console Redirection Settings

   Legacy Console Redirection
 ▶ Legacy Console Redirection Settings

   Serial Port for Out-of-Band Management/
   Windows Emergency Management Services (EMS)   ↔: Select Screen
   Console Redirection EMS         [Disabled]    ↑↓: Select Item
 ▶ Console Redirection Settings                  Enter: Select
                                                 +/-: Change Opt.
```

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] [XTERMR6] [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 OPROM 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

```
                            Aptio Setup - AMI
                  Advanced

  CPU Configuration                                    Enable/disable CPU
                                                       Virtualization

  SVM Mode                          [Enable]
▶ Node 0 Information
```
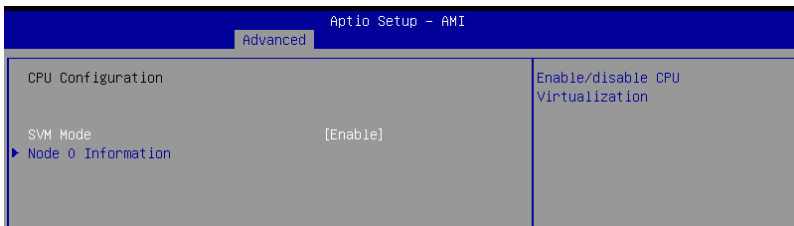
SVM Mode [Enable]

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.

```
                               Aptio Setup - AMI
                      Advanced

  PCI Devices Common Settings:                              Enables or Disables 64bit
  Above 4G Decoding                    [Enabled]            capable Devices to be Decoded
    First VGA 4G Decode                [Auto]               in Above 4G Address Space
    LAN Device 4G Decode               [Auto]               (Only if System Supports 64
  Re-Size BAR Support                  [Disabled]           bit PCI Decoding).
  OnBrd/Ext VGA Select                 [Onboard]
  SR-IOV Support                       [Disabled]
```
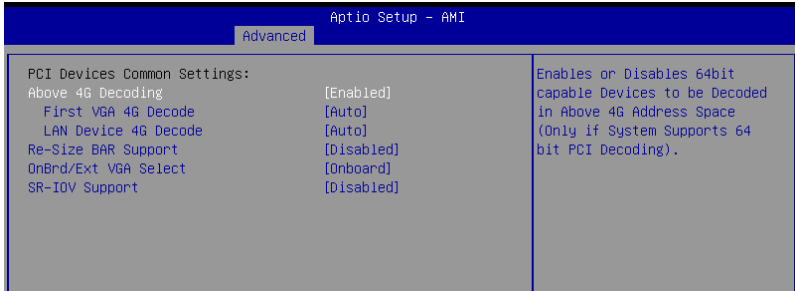
Above 4G Decoding [Enabled]

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]

OnBrd/Ext VGA Select [Onboard]

Configuration options: [Auto] [Onboard] [External]

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]

4.5.7   USB Configuration

```
                          Aptio Setup - AMI
            Advanced

 USB Configuration                              Enables Legacy USB support.
                                                AUTO option disables legacy
 USB Controllers:                               support if no USB devices are
    2 XHCIs                                      connected. DISABLE option will
 USB Devices:                                   keep USB devices available
    1 Drive, 2 Keyboards, 1 Mouse, 3 Hubs       only for EFI applications.

 Legacy USB Support                 [Enabled]
 XHCI Hand-off                      [Enabled]
 USB Mass Storage Driver Support    [Enabled]
 Port 60/64 Emulation               [Enabled]

 Mass Storage Devices:
 JetFlashTranscend 4GB 8.07         [Auto]
                                                ↔: Select Screen
                                                ↑↓: Select Item
                                                Enter: Select
                                                +/-: Change Opt.
                                                F1: General Help
                                                F2: Previous Values
                                                F5: Optimized Defaults
                                                F10: Save & Reset
                                                F12: Print Screen
                                                ESC: Exit
```

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
```
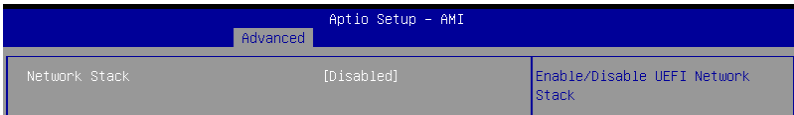
Network Stack [Disabled]

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.

```
                              Aptio Setup – AMI
                    Advanced

 NVMe Configuration

 No NVME Device Found
```
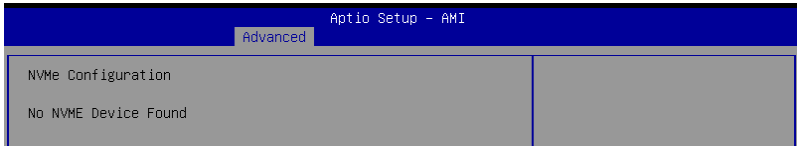
4.5.10   SATA Configuration

This page will display the SATA controller and drive information.

```
                              Aptio Setup – AMI
                    Advanced

 SATA Configuration

 SATA Controller (S:00 B:43 D:00 F:00)
 ISATA1 Port1                       Not Present
 ISATA1 Port2                       Not Present
 ISATA1 Port3                       Not Present
 ISATA1 Port4                       Not Present
 ISATA2 Port1                       Not Present
 ISATA2 Port2                       Not Present
 ISATA2 Port3                       Not Present
 ISATA2 Port4                       Not Present
```
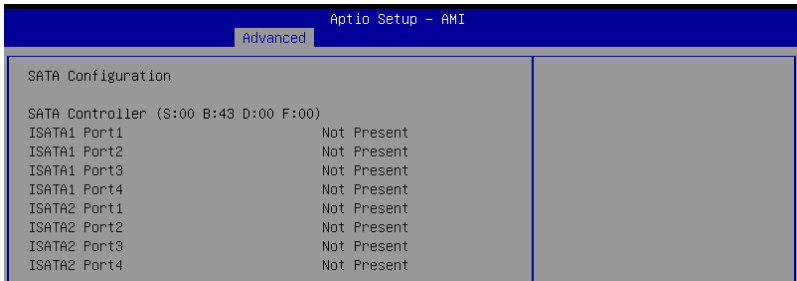
4.5.11   APM Configuration

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

```
                              Aptio Setup – AMI
                    Advanced

 Restore AC Power Loss        [Last State]     Select AC power state when
 Power On By PCI-E            [Disabled]       power is re-applied after a
 Power On By RTC              [Disabled]       power failure.
```
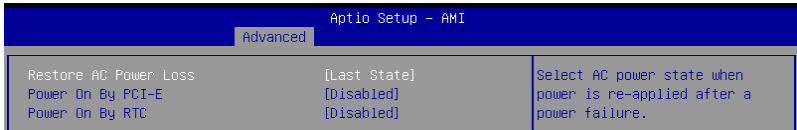
Restore AC Power Loss [Last State]

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.

```
                              Aptio Setup - AMI
                  Advanced
┌────────────────────────────────────────────────┬─────────────────────────────┐
│ ▶ Socket 0                                      │ Socket-specific memory      │
│   Mbist Test Enable              Disabled, 0xC000│ configuration status        │
│   Mbist Aggressor Enable         Disabled, 0xC000│                             │
│   Mbist Per Bit Slave Die Report 0x0000, 0xC000 │                             │
│   Dram Temp Controlled Refresh   Disabled, 0xC000│                             │
│   Enable                                        │                             │
│   User Timing Mode               Disabled, 0xC018│                             │
│   User Timing Value              Disabled, 0xC018│                             │
│   Mem Bus Freq Limit             Disabled, 0xC018│                             │
│   Enable Power Down              Disabled, 0xC000│                             │
│   Dram Double Refresh Rate       Disabled, 0xC000│                             │
│   Pmu Train Mode                 0x0003, 0xC000 │                             │
│   Ecc Symbol Size                0x0002, 0xC000 │                             │
│   Uncorrectable Ecc Retry        Enabled, 0xC000 │ →←: Select Screen           │
│   Ignore Spd Checksum            Enabled, 0xC000 │ ↑↓: Select Item             │
│   Enable Bank Group Swap Alt     Enabled, 0xC000 │ Enter: Select               │
│   Enable Bank Group Swap         Disabled, 0xC01A│ +/-: Change Opt.            │
│   Ddr Route Balanced Tee         Disabled, 0xC000│ F1: General Help            │
│   Nvdimm Power Source            0x0001, 0xC000 │ F2: Previous Values         │
│   Odts Cmd Throt Enable          Disabled, 0xC004│ F5: Optimized Defaults      │
│   Odts Cmd Throt Cycle           Disabled, 0xC004│ F10: Save & Reset           │
│                                                 │ F12: Print Screen           │
└────────────────────────────────────────────────┴─────────────────────────────┘
```

4.5.13 T1s Auth

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

```
                              Aptio Setup - AMI
          Advanced
┌────────────────────────────────────────────────┬─────────────────────────────┐
│                                                 │ Press <Enter> to configure  │
│ ▶ Server CA Configuration                       │ Server CA.                  │
│                                                 │                             │
│ ▶ Client Cert Configuration                     │                             │
│                                                 │                             │
└────────────────────────────────────────────────┴─────────────────────────────┘
```

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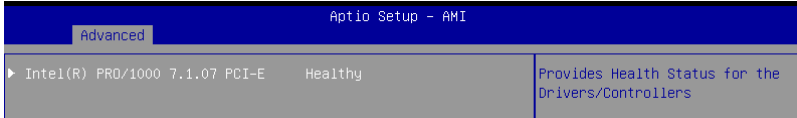
Discard Changes and Exit
Exit Server CA configuration without saving any changes.

Delete Cert

Allows you to delete the certificate.

4.5.14   Driver Health

This page will display the driver and controller health status.
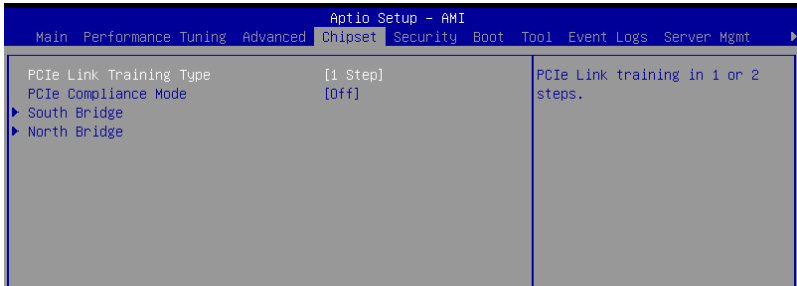
```
                              Aptio Setup - AMI
          Advanced

 ▶ 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.

```
                              Aptio Setup - AMI
    Main  Performance Tuning  Advanced  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.

```
                              Aptio Setup – AMI
      Main   Performance Tuning   Advanced   Chipset   Security   Boot   Tool   Event Logs   Server Mgmt        ▶

   Password Description                                   Set Administrator Password

   If ONLY the Administrator's password is set,
   then this only limits access to Setup and is
   only asked for when entering Setup.
   If ONLY the User's password is set, then this
   is a power on password and must be entered to
   boot or enter Setup. In Setup the User will
   have Administrator rights.
   The password length must be
   in the following range:
   Minimum length                      3
   Maximum length                      20                 ──────────────────────────────

   Administrator Password                                 ←→: Select Screen
   User Password                                          ↑↓: Select Item
                                                          Enter: Select
 ▶ Secure Boot                                            +/-: Change Opt.
                                                          F1: General Help
                                                          F2: Previous Values
                                                          F5: Optimized Defaults
                                                          F10: Save & Reset
                                                          F12: Print Screen
                                                          ESC: Exit



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```

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

 ▶ Key Management
```
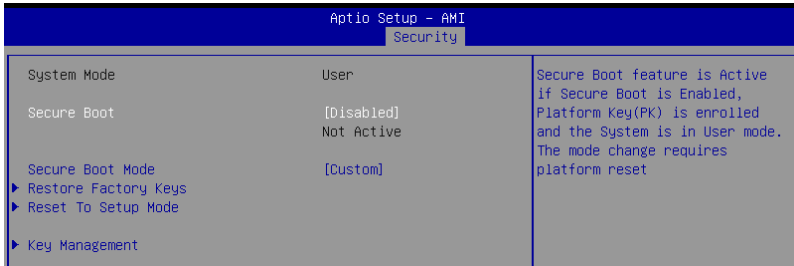
Secure Boot [Disabled]

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.

```
                        Aptio Setup - AMI
                                    Security

  Vendor Keys                  Valid                    Install factory default Secure
                                                        Boot keys after the platform
  Factory Key Provision        [Enabled]                reset and while the System is
▶ Restore Factory Keys                                  in Setup mode
▶ Reset To Setup Mode
▶ Export Secure Boot variables
▶ Enroll Efi Image

  Device Guard Ready
▶ Remove 'UEFI CA' from DB
▶ Restore DB defaults

  Secure Boot variable | Size| Keys| Key Source
▶ Platform Key(PK)     |  886|    1| Factory
▶ Key Exchange Keys    | 3573|    3| Factory          →←: Select Screen
▶ Authorized Signatures| 6322|   10| Factory          ↑↓: Select Item
▶ Forbidden  Signatures| 3724|   77| Factory          Enter: Select
▶ Authorized TimeStamps|    0|    0| No Keys          +/-: Change Opt.
▶ OsRecovery Signatures|    0|    0| No Keys          F1: General Help
                                                      F2: Previous Values
                                                      F5: Optimized Defaults
```

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.

```
                          Aptio Setup - AMI
    Main  Performance Tuning  Advanced  Chipset  Security  Boot  Tool  Event Logs  Server Mgmt    ▶

 Boot Configuration                                    Number of seconds to wait for
 Setup Prompt Timeout            1                      setup activation key.
 Bootup NumLock State            [On]                   65535(0xFFFF) means indefinite
 Boot Logo Display               [Disabled]             waiting.

 Boot Option Priorities
 Boot Option #1                  [UEFI:
                                 JetFlashTranscend 4GB
                                 8.07, Partition 1
                                 (JetFlashTranscend 4GB
                                 8.07)]
 Boot Option #2                  [JetFlashTranscend 4GB
                                 8.07]
                                                        →←: Select Screen
   POST Report                   [5 sec]                ↑↓: Select Item
                                                        Enter: Select
```

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.

- To access Windows OS in Safe Mode, please press <F8> after POST.

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.

```
                              Aptio Setup - AMI
    Main  Performance Tuning  Advanced  Chipset  Security  Boot │Tool│ Event Logs  Server Mgmt    ▶

  Start ASUS EzFlash                                    Press ENTER to run the utility
  IPMI Hardware Monitor                                 to select and update BIOS.
  ASUS SMBIOS Viewer




                                                        ↔: Select Screen
                                                        ↑↓: Select Item
                                                        Enter: Select
                                                        +/-: Change Opt.
                                                        F1: General Help
                                                        F2: Previous Values
                                                        F5: Optimized Defaults
                                                        F10: Save & Reset
                                                        F12: Print Screen
                                                        ESC: Exit

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```

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.

```
                          Aptio Setup – AMI
     Main  Performance Tuning  Advanced  Chipset  Security  Boot  Tool │ Event Logs │ Server Mgmt    ▶

 ▶ Change Smbios Event Log Settings              Press <Enter> to change the
 ▶ View Smbios Event Log                         Smbios Event Log configuration.





                                                 →←: Select Screen
                                                 ↑↓: Select Item
                                                 Enter: Select
                                                 +/-: Change Opt.
                                                 F1: General Help
                                                 F2: Previous Values
                                                 F5: Optimized Defaults
                                                 F10: Save & Reset
                                                 F12: Print Screen
                                                 ESC: Exit


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```

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.

```
                              Aptio Setup - AMI
     Main  Performance Tuning  Advanced  Chipset  Security  Boot  Tool  Event Logs  Server Mgmt  ▶

   BMC Self Test Status          PASSED              If enabled, starts a BIOS
   BMC Device ID                 32                  timer which can only be shut
   BMC Device Revision           81                  off by Management Software
   BMC Firmware Revision         1.01.33             after the OS loads.  Helps
   IPMI Version                  2.0                 determine that the OS
                                                     successfully loaded or follows
   OS Watchdog Timer             [Disabled]          the OS Boot Watchdog Timer
   OS Wtd Timer Timeout          10                  policy.
   OS Wtd Timer Policy           [Reset]

 ▶ System Event Log
 ▶ BMC network configuration
 ▶ View System Event Log
                                                     ↔: Select Screen
                                                     ↑↓: Select Item
                                                     Enter: Select
                                                     +/-: Change Opt.
                                                     F1: General Help
                                                     F2: Previous Values
                                                     F5: Optimized Defaults
                                                     F10: Save & Reset
                                                     F12: Print Screen
                                                     ESC: Exit


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```

OS Watchdog Timer [Disabled]

This item allows you to start a BIOS timer which can only be shut off by Intel 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.

```
                            Aptio Setup - AMI
◄  Exit

   Save Options                              Exit system setup without
   Discard Changes and Exit                  saving any changes.

   Save Changes and Reset
   Discard Changes and Reset

   Save Changes
   Discard Changes

   Default Options
   Restore Defaults

   Boot Override
   UEFI: JetFlashTranscend 4GB 8.07, Partition 1
   (JetFlashTranscend 4GB 8.07)
   JetFlashTranscend 4GB 8.07               →←: Select Screen
   Launch EFI Shell from filesystem device  ↑↓: Select Item
                                             Enter: Select
                                             +/-: Change Opt.
                                             F1: General Help
                                             F2: Previous Values
                                             F5: Optimized Defaults
                                             F10: Save & Reset
                                             F12: Print Screen
                                             ESC: Exit

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```

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.

Driver Installation

5

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.

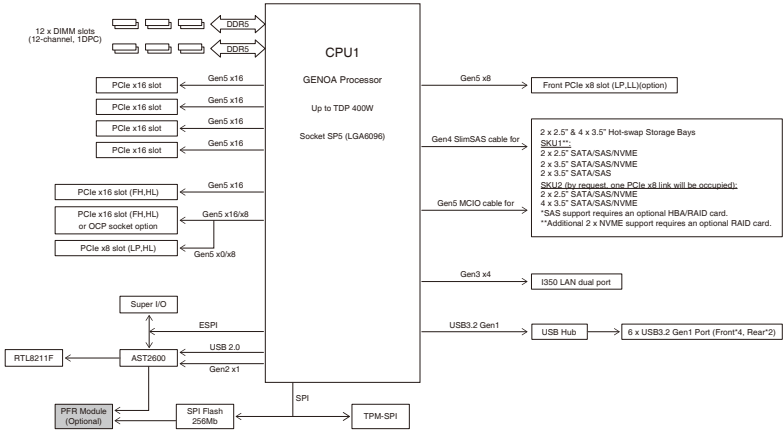3. Manual - Provides the link to the user guide(s).

> 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

12 x DIMM slots
(12-channel, 1DPC)

DDR5

DDR5

CPU1

GENOA Processor

Up to TDP 400W

Socket SP5 (LGA6096)

PCIe x16 slot — Gen5 x16

PCIe x16 slot — Gen5 x16

PCIe x16 slot — Gen5 x16

PCIe x16 slot — Gen5 x16

PCIe x16 slot (FH,HL) — Gen5 x16

PCIe x16 slot (FH,HL) or OCP socket option — Gen5 x16/x8

PCIe x8 slot (LP,HL) — Gen5 x0/x8

Gen5 x8 — Front PCIe x8 slot (LP,LL)(option)

Gen4 SlimSAS cable for

2 x 2.5" & 4 x 3.5" Hot-swap Storage Bays
SKU1**:
2 x 2.5" SATA/SAS/NVME
2 x 3.5" SATA/SAS/NVME
2 x 3.5" SATA/SAS
SKU2 (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 HBA/RAID card.
**Additional 2 x NVME support requires an optional RAID card.

Gen5 MCIO cable for

Gen3 x4 — I350 LAN dual port

USB3.2 Gen1 — USB Hub — 6 x USB3.2 Gen1 Port (Front*4, Rear*2)

Super I/O

ESPI

AST2600

USB 2.0

Gen2 x1

RTL8211F

PFR Module (Optional)

SPI Flash 256Mb

SPI

TPM-SPI

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)

Japan JATE

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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.

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 http://csr.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 http://csr.asus.com/english/REACH.htm.

EU RoHS

This product complies with the EU RoHS Directive. For more details, see http://csr.asus.com/english/article.aspx?id=35

Japan JIS-C-0950 Material Declarations
Information on Japan RoHS (JIS-C-0950) chemical disclosures is available on http://csr.asus.com/english/article.aspx?id=19

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.

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

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

Türkiye RoHS

AEEE Yönetmeliğine Uygundur

ASUS Recycling/Takeback Services

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

Ecodesign Directive

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 on the CSR website. The further information could be found at https://csr.asus.com/english/article.aspx?id=1555.

KC: Korea Warning Statement

R-R-MSQ-ESC4000A-E12

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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。

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