



# **RS500A-E10 Series**

**RS500A-E10-PS4**

**RS500A-E10-RS4**

**RS500A-E10-RS12U**

## **1U 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

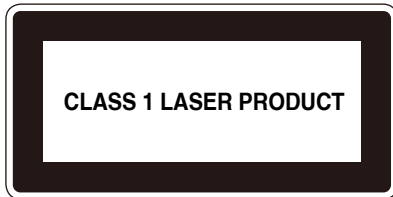
- Any mechanical operation on this server must be conducted by certified or experienced engineers.
- Before operating the server, carefully read all the manuals included with the server package.
- Before using the server, ensure all cables are correctly connected and the power cables are not damaged. 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.

### Lithium-Ion Battery Warning

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



### Heavy System

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

# 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 Information**

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

**3. Chapter 3: Installation Options**

This chapter describes how to install optional components into the barebone server.

**4. Chapter 4: 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.

**5. Chapter 5: BIOS Setup**

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

**6. Chapter 6: 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 chassis kit. It includes sections on front panel and rear panel specifications.

# 1.1 System package contents

Check your system package for the following items.

Model Name	RS500A-E10-PS4, RS500A-E10-RS4, RS500A-E10-RS12U
Chassis	ASUS R10E 1U Rackmount Chassis
Motherboard	ASUS KRPA-U16/SYS Server Board
Component	1 x 650W Single Power Supply (RS500A-E10-PS4)
	1 x 1+1 650W Redundant Power Supply (RS500A-E10-RS4, RS500A-E10-RS12U)
	4 x Hot-swap 3.5-inch or 2.5-inch Storage Device Trays (RS500A-E10-PS4, RS500A-E10-RS4)
	12 x Hot-swap 2.5-inch Storage Device Trays (RS500A-E10-RS12U)
	1 x SAS/SATA Backplane (RS500A-E10-PS4, RS500A-E10-RS4)
	1 x SAS/SATA/NVMe Backplane (RS500A-E10-RS12U)
	1 x PCI-E Riser Card
	1 x Front I/O Board
	6 x System Fans (40 mm x 28 mm)
	1 x Redundant Power Supply Power Distribution Board (RS500A-E10-RS4, RS500A-E10-RS12U)
	1 x 4-port oculink card (RS500A-E10-RS12U)
Accessories	1 x Support DVD
	1 x Bag of Screws
	1 x AC Power Cable (RS500A-E10-PS4)
	2 x AC Power Cable (RS500A-E10-RS4, RS500A-E10-RS12U)
Optional Items	1 x CPU Heatsink
	1 x Tool-less Friction Rail Kit
	DVD-ROM/DVD-RW
	If any of the above items is damaged or missing, contact your retailer.

# 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 xxSxxxxxxxxx shown as 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.



## 1.3 System specifications

The ASUS RS500A-E10 Series is a 1U barebone server system featuring the ASUS KRPA-U16/SYS Server Board. The server supports AMD EPYC™ 7002 & 7003 Series processors plus other latest technologies through the chipsets onboard.

Model Name		RS500A-E10-PS4	RS500A-E10-RS4	RS500A-E10-RS12U
<b>Processor Support</b>		1 x Socket SP3 (LGA 4094) AMD EPYC™ 7002 & 7003 Series Processor (up to TDP 225W)		
<b>Memory</b>	<b>Total Slots</b>	16 (8-channel, 2-DIMM per Channel)		
	<b>Capacity</b>	Maximum up to 2048GB		
	<b>Memory Type</b>	DDR4 3200/2933/2666 RDIMM/LR-DIMM/LR-DIMM 3DS		
	<b>Memory Size</b>	32GB, 16GB, 8GB, 4GB (RDIMM) 64GB, 32GB (LRDIMM) 128GB, 64GB (LRDIMM 3DS) <b>* Refer to <a href="http://www.asus.com">www.asus.com</a> for the latest memory AVL update.</b>		
<b>Expansion Slots</b>	<b>Total PCI/PCI-X/PCI-E Slots</b>	2+1		
	<b>Slot Type</b>	- 1 x PCIe 4.0 x16 slot (x16 link); FH, HL (LF only when RS12-U) - 1 x PCIe 4.0 x16 slot (x8 link); FH, HL (Occupied when RS12-U) - 1 x OCP 2.0 Mezzanine (x16 link)		
<b>Disk Controller</b>	<b>SATA Controller</b>	CPU Integrated		
	<b>SAS Controller</b>	<b>Optional kits:</b> - ASUS PIKE II 3008 8-port SAS HBA Card - ASUS PIKE II 3108 8-port SAS HW RAID Card Support SAS 12Gbps		
	<b>NVMe Controller</b>	N/A	CPU Integrated	
<b>Storage Bays</b>	<b>I = internal A or S = hot-swappable</b>	4 x 3.5" or 2.5" Hot-swap Storage Bays (SATA/SAS Supported)	12 x 2.5" Hot-swap Storage Bays (SATA/SAS/NVMe Supported)	
<b>Networking</b>	<b>LAN</b>	2 x 1GbE LAN port 1 x Management port Optional OCP Adapter: - 2 or 4 x 1G port - 2x 10G port - 2x 25G port or higher bandwidth		
<b>Graphic</b>	<b>VGA</b>	Aspeed AST2500 64MB		

(continued on the next page)

Model Name		RS500A-E10-PS4	RS500A-E10-RS4	RS500A-E10-RS12U
Auxiliary Storage Device Bay (Optical Drive)		1 x Slim-type Optical Drive		N/A
Front I/O Ports		2 x USB 3.0 ports 1 x VGA port		N/A
Rear I/O Ports		2 x USB 3.0 ports 1 x VGA port 2 x RJ-45 1GbE LAN ports 1 x RJ-45 Management port 1 x COM port		
Switch/LED		<b>Rear:</b> - 1 x Power Switch/LED - 1 x Q-Code/Port 80 LED - 1 x Location LED <b>Front:</b> - 1 x Power Switch/LED - 1 x Location Switch/LED - 1 x Reset Switch - 1 x Message LED - 4 x LAN LED (LED1~2 for on-board LAN, 3~4 for OCP LAN)		<b>Rear:</b> - 1 x Power Switch/LED - 1 x Q-Code/Port 80 LED - 1 x Location LED <b>Front:</b> - 1 x Power Switch/LED - 1 x Message LED - 4 x LAN LED (LED1~2 for on-board LAN, 3~4 for OCP LAN) - 1 x Location LED
OS Support		Please find the latest OS support from <a href="http://www.asus.com/">http://www.asus.com/</a>		
Management Solution	Software	ASUS Control Center		
	Out of Band Remote Management	On-Board ASMB9-iKVM for KVM-over-IP		
Regulatory Compliance		BSMI, CE, FCC		
Dimension (HH x WW x DD)		615 x 444 x 44mm (1U) 24.21" x 17.48" x 1.73"		
Net Weight Kg (CPU, DRAM & Storage device not included)		10 Kg	11 Kg	11.5 Kg
Gross Weight Kg (CPU, DRAM & Storage device not included, Packing included)		16 Kg	17 Kg	17.5 Kg

(continued on the next page)

Model Name	RS500A-E10-PS4	RS500A-E10-RS4	RS500A-E10-RS12U
<b>Power Supply (following different configuration by region)</b>	Single 650W 80 PLUS Platinum Power Supply Rating: 100~127/200~240Vac, 9A/5A, 50~60Hz, Class I	1+1 Redundant 650W 80 PLUS Platinum Power Supply Rating: 100~ 127/200~240Vac, 7.8A/3.8A (for each inlet), 50~60Hz or 240Vdc, 4.6A	
<b>Environment</b>	Operating temperature: 10°C – 35°C Non operating temperature: -40°C – 70°C Non operating humidity: 20% – 90% (Non condensing)		

\*Specifications are subject to change without notice.

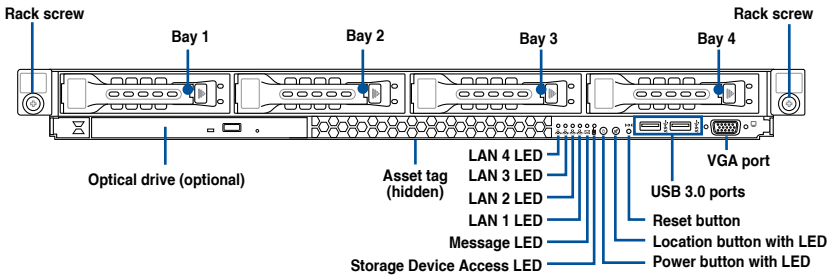
## 1.4 Front panel features

The barebone server displays a simple yet stylish front panel with easily accessible features. The power and reset buttons, LED indicators, slim type optical drive, and two USB ports are located on the front panel.

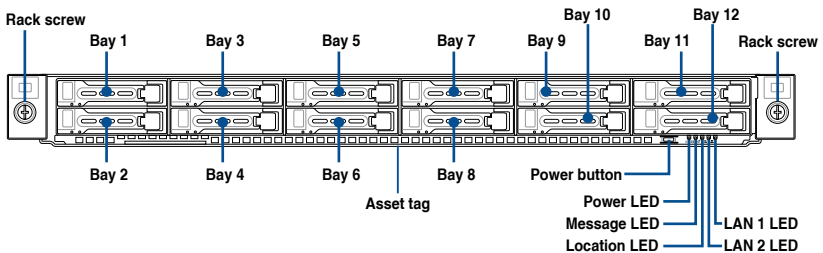


Refer to the **Front panel LEDs** section for the LED descriptions.

### RS500A-E10-RS4 / RS500A-E10-PS4



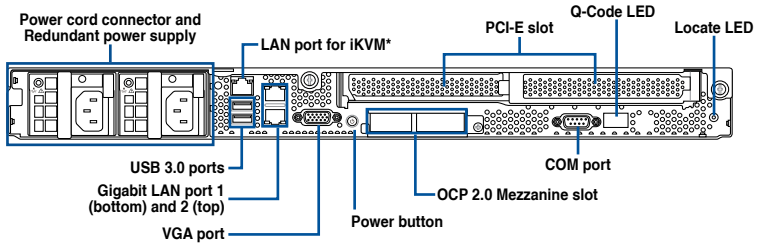
### RS500A-E10-RS12U



# 1.5 Rear panel features

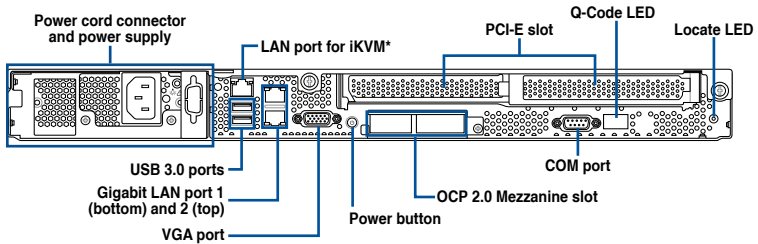
The rear panel includes the expansion slots, system power socket, and rear fans. The middle part includes the I/O shield with openings for the rear panel connectors on the motherboard.

## RS500A-E10-RS4 / RS500A-E10-RS12U



\*This port is for ASUS ASMB9-iKVM controller card only.

## RS500A-E10-PS4



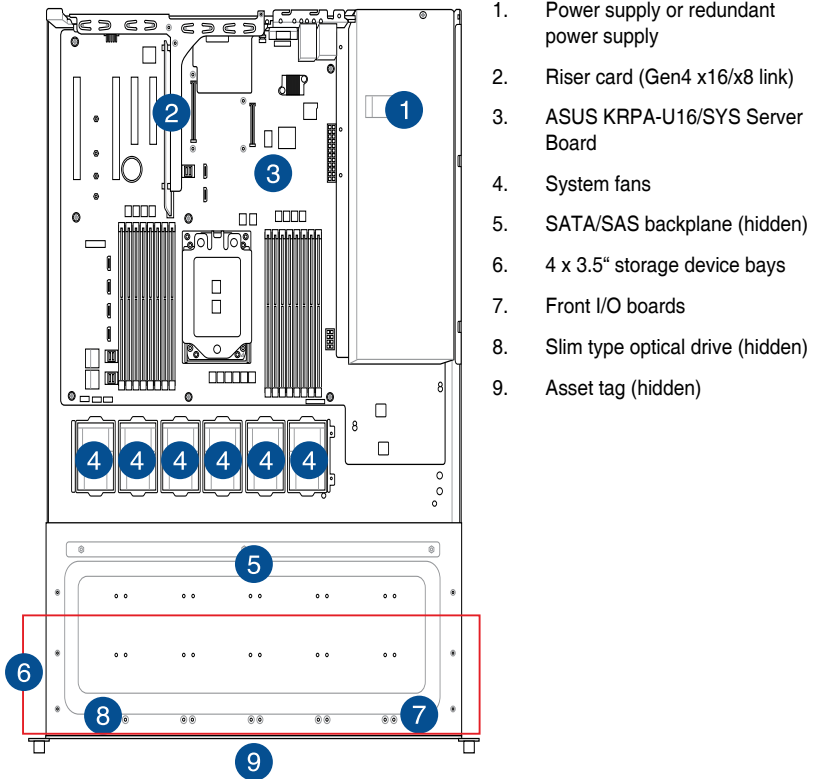
\*This port is for ASUS ASMB9-iKVM controller card only.



## 1.6 Internal features

The barebone server includes the basic components as shown.

### RS500A-E10-RS4 / RS500A-E10-PS4



1. Power supply or redundant power supply
2. Riser card (Gen4 x16/x8 link)
3. ASUS KRPA-U16/SYS Server Board
4. System fans
5. SATA/SAS backplane (hidden)
6. 4 x 3.5" storage device bays
7. Front I/O boards
8. Slim type optical drive (hidden)
9. Asset tag (hidden)



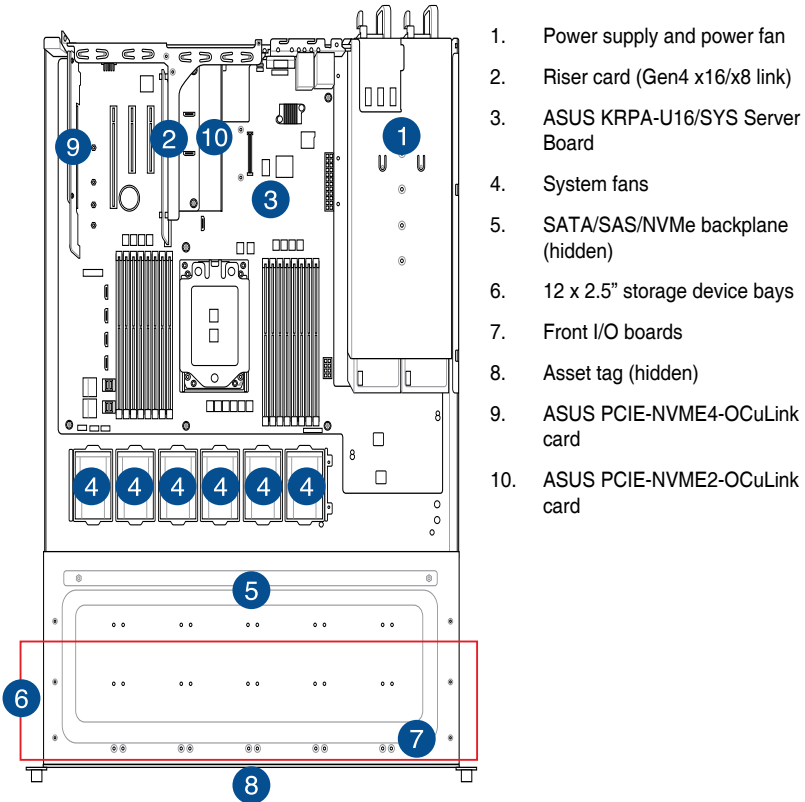
Turn off the system power and detach the power supply before removing or replacing any system component.



The barebone server does not include a floppy disk drive. Connect a USB floppy disk drive to any of the USB ports on the front or rear panel if you need to use a floppy disk.

**WARNING**  
**HAZARDOUS MOVING PARTS**  
**KEEP FINGERS AND OTHER BODY PARTS AWAY**

# RS500A-E10-RS12U



Turn off the system power and detach the power supply before removing or replacing any system component.



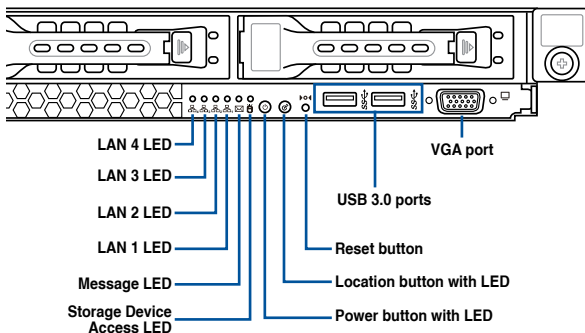
The barebone server does not include a floppy disk drive. Connect a USB floppy disk drive to any of the USB ports on the front or rear panel if you need to use a floppy disk.

**WARNING**  
**HAZARDOUS MOVING PARTS**  
**KEEP FINGERS AND OTHER BODY PARTS AWAY**

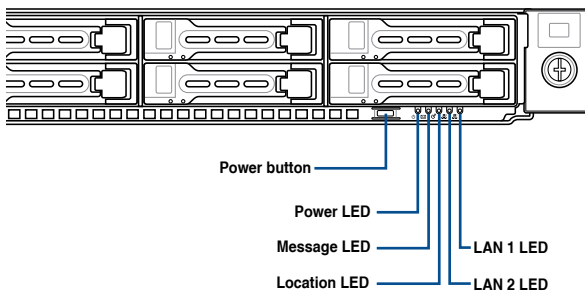
## 1.7 LED information

### 1.7.1 Front panel LEDs

#### RS500A-E10-RS4 / RS500A-E10-PS4



#### RS500A-E10-RS12U

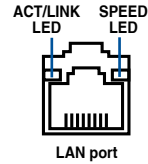


LED	Icon	Display status	Description
Power button with LED		ON	System power on
Storage Device Access LED		OFF	No activity
		Blinking	Data activity (when optional PIKE card is installed)
Message LED		OFF	System is normal; no incoming event
		ON	A hardware monitor event is indicated
Location button with LED		OFF	Function off
		ON	Location switch is pressed (Press the location switch again to turn off)
LAN LEDs		OFF	No LAN connection
		Blinking	LAN is transmitting or receiving data
		ON	LAN connection is present

## 1.7.2 LAN (RJ-45) LEDs

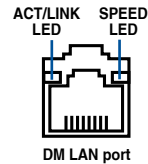
### LAN port LED indications

Activity/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



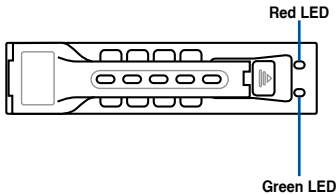
### Dedicated Management LAN port (DM\_LAN1) LED indications

Activity/Link LED		Speed LED	
Status	Description	Status	Description
OFF	No link	OFF	10 Mbps connection
YELLOW	Linked	ORANGE	100 Mbps connection
BLINKING	Data activity	GREEN	1 Gbps connection

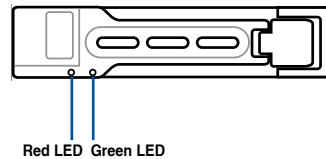


## 1.7.3 Storage device status LED

### RS500A-E10-RS4 / RS500A-E10-PS4



### RS500A-E10-RS12U



Storage Device Access LED Description		
GREEN	ON	Storage device power ON
RED	ON	Storage device has failed and should be swapped immediately
GREEN/ RED	Blinking	RAID rebuilding
GREEN/ RED	Blinking	Locate
GREEN/ RED	OFF	Storage device not found
GREEN	Blinking	Read/write data from/into the storage device

## 1.7.4 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 operation fail - internal status
		0x1F	Error	ZLib Decompression operation fail
		0x20	Error	HMAC-SHA256 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		

(continued on the next page)

Action	PHASE	POST CODE	TYPE	DESCRIPTION
PSP Boot	PSP Boot Loader phase (Error Post Codes)	0x39	Error	Unable to map an SMN address to AXI space
		0x3A	Error	Unable to map a SYSHUB address to AXI space
		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
		0x45	Error	A write to an L3 register failed
		0x46	Error	Mini-BL
		0x47	Error	Mini-BL CCP HMAC Unit-test failed
		0x48	Error	Potential stack corruption in jump to Mini BL
		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	Secure unlock error
		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
		0x54	Error	One of: illegal command
		0x55	Error	An SMBus transaction collision detected
		0x56	Error	Transaction failed to be started or processed by host
		0x57	Error	An unsolicited SMBus interrupt was received
		0x58	Error	An attempt to send an unsupported PSP-SMU message was made
		0x59	Error	An error/data corruption detected on response from SMU for sent msg
		0x5A	Error	MCM Steady-state unit test failed
		0x5B	Error	S3 Enter failed
		0x5C	Error	AGESA BL did not set PSP SMU reserved addresses via SVC call
		0x5E	Error	CcxSecBisEn not set in fuse RAM
		0x5F	Error	Received an unexpected result
		0x60	Error	VMG Storage Init failed
		0x61	Error	Failure in mbedTLS user app
		0x62	Error	An error occurred whilst attempting to SMN map a fuse register
		0x63	Error	Fuse burn sequence/operation failed due to internal SOC error
		0x64	Error	Fuse sense operation timed out
		0x65	Error	Fuse burn sequence/operation timed out waiting for burn done
		0x66	Error	Failure status indicating that the given SecureOS has been
		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	HVB validation failure for BIOS RTM volume (OEM public/signature failed to validate).		
0x6D	Error	Generic error indicating the CCP HAL initialization failed		
0x94	Error	Knoll failed to idle correctly after being reset		
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		

(continued on the next page)

Action	PHASE	POST CODE	TYPE	DESCRIPTION
		0xA0	Progress	Bootloader successfully entered C Main
		0xA1	Progress	Master initialized C2P / slave waited for master to init C2P
		0xA2	Progress	HMAC key successfully derived
		0xA3	Progress	Master got Boot Mode and sent boot mode to all slaves
		0xA4	Progress	SpiRom successfully initialized
		0xA5	Progress	BIOS Directory successfully read from SPI to SRAM
		0xA6	Progress	Early unlock check
		0xA7	Progress	Inline Aes key successfully derived
		0xA8	Progress	Inline-AES key programming is done
		0xA9	Progress	Inline-AES key wrapper derivation is done
		0xAA	Progress	Bootloader successfully loaded HW IP configuration values
		0xAB	Progress	Bootloader successfully programmed MBAT table
		0xAC	Progress	Bootloader successfully loaded SMU FW
		0xAD	Progress	PSP and SMU configured WAFL
		0xAE	Progress	User mode test harness completed successfully
		0xAF	Progress	Bootloader loaded Agesa0 from SpiRom
		0xB0	Progress	AGESA phase has completed
		0xB1	Progress	RunPostDramTrainingTests() completed successfully
		0xB2	Progress	SMU FW Successfully loaded to SMU Secure DRAM
		0xB3	Progress	Sent all required boot time messages to SMU
		0xB4	Progress	Validated and ran Security Gasket binary
		0xB5	Progress	UMC Keys generated and programmed
		0xB6	Progress	Inline AES key wrapper stored in DRAM
		0xB7	Progress	Completed FW Validation step
		0xB8	Progress	Completed FW Validation step
		0xB9	Progress	BIOS copy from SPI to DRAM complete
		0xBA	Progress	Completed FW Validation step
		0xBB	Progress	BIOS load process fully complete
		0xBC	Progress	Bootloader successfully release x86
		0xBD	Progress	Early Secure Debug completed
		0xBE	Progress	GetFWVersion command received from BIOS is completed
		0xBF	Progress	SMInfo command received from BIOS is completed
		0xC0	Progress	Successfully entered WarmBootResume()
		0xC1	Progress	Successfully copied SecureOS image to SRAM
		0xC2	Progress	Successfully copied trustlets to PSP Secure Memory
		0xC3	Progress	About to jump to Secure OS (SBL about to copy and jump)
		0xC4	Progress	Successfully restored CCP and UMC state on S3 resume
		0xC5	Progress	PSP SRAM HMAC validated by Mini BL
		0xC6	Progress	About to jump to <t-base in Mini BL
		0xC7	Progress	VMG ECDH unit test started
		0xC8	Progress	VMG ECDH unit test passed
		0xC9	Progress	VMG ECC CDH primitive unit test started
		0xCA	Progress	VMG ECC CDH primitive unit test passed
		0xCB	Progress	VMG SP800-108 KDF-CTR HMAC unit test started
		0xCC	Progress	VMG SP800-108 KDF-CTR HMAC unit test passed
		0xCD	Progress	VMG LAUNCH_* test started
		0xCE	Progress	VMG LAUNCH_* test passed
		0xCF	Progress	MP1 has been taken out of reset
		0xD0	Progress	PSP and SMU Reserved Addresses correct
		0xD1	Progress	Reached Naples steady-state WFI loop
		0xD2	Progress	Knoll device successfully initialized
		0xD3	Progress	32-byte RandOut successfully returned from Knoll
		0xD4	Progress	32-byte MAC successfully received from Knoll.
		0xD5	Progress	Knoll device verified successfully
		0xD6	Progress	Done enabling power for Knoll
		0xD7	Progress	Enter recovery mode due to trustlet validation fail.
		0xD8	Progress	Enter recovery mode due to OS validation fail.
		0xD9	Progress	Enter recovery mode due to OEM public key not found.

(continued on the next page)

Action	PHASE	POST CODE	TYPE	DESCRIPTION	
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	
	DXE(Driver Execution Environment) phase	0x19	Progress	SB Initialization before installed memory	
		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		
	0x79	Progress	CSM 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	
0xb2			Progress	Legacy Option ROM 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		
0xAE		Progress	Legacy boot event		
Operating system phase		0xAA	Progress	APIC mode	
		0xAC	Progress	PIC mode	



# Hardware Information

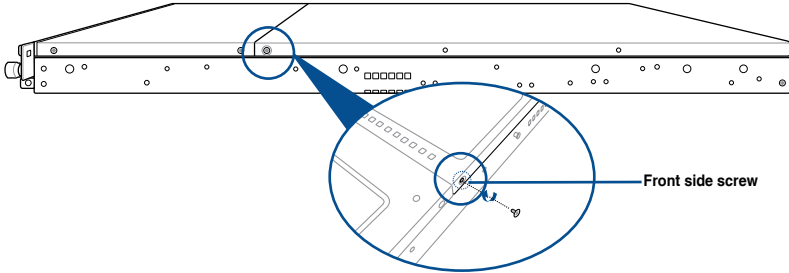
# 2

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

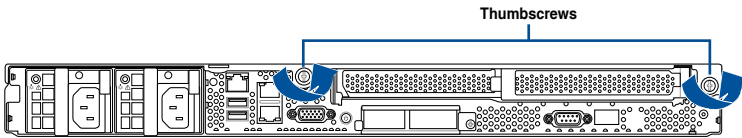
# 2.1 Chassis cover

## Removing the rear cover

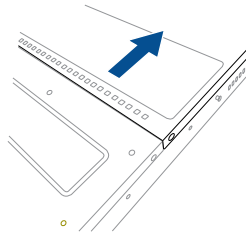
1. Locate and remove the front side screws.



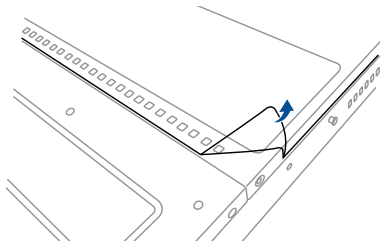
2. Loosen the two thumbscrews on the rear panel to release the rear cover from the chassis.



3. Firmly hold the cover and slide it toward the rear panel for about half an inch until it is disengaged from the chassis.
4. Lift the cover from the chassis.
5. To reattach the rear cover, reverse step 1 to 4.



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.



## 2.2 Central Processing Unit (CPU)

The motherboard comes with a surface mount Socket SP3 designed for the AMD EPYC™ 7002 & 7003 Series.

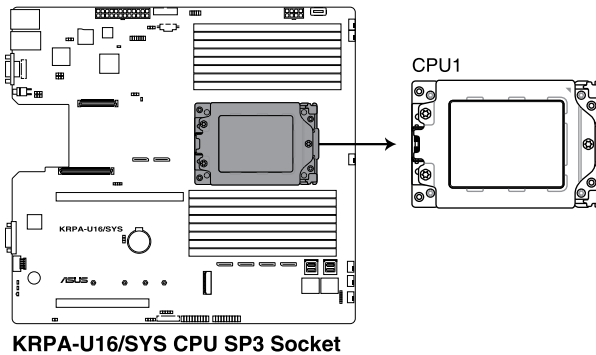


- Upon purchase of the motherboard, ensure that the PnP cap is on the socket and the socket contacts are not bent. Contact your retailer immediately if the PnP cap is missing, or if you see any damage to the PnP cap/socket contacts/motherboard components. ASUS will shoulder the cost of repair only if the damage is shipment/transit-related.
- Keep the cap after installing the motherboard. ASUS will process Return Merchandise Authorization (RMA) requests only if the motherboard comes with the cap on the Socket SP3.
- 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.

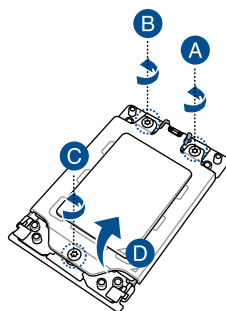
### 2.2.1 Installing the CPU and heatsink

To install the CPU and heatsink:

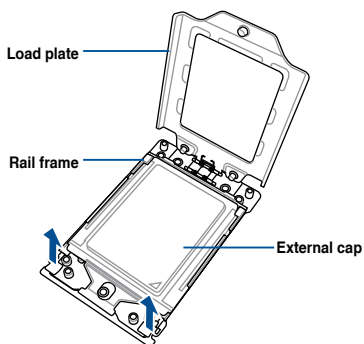
1. Remove the rear cover. For more information, see the section **Chassis cover**.
2. Locate the CPU socket on your motherboard..



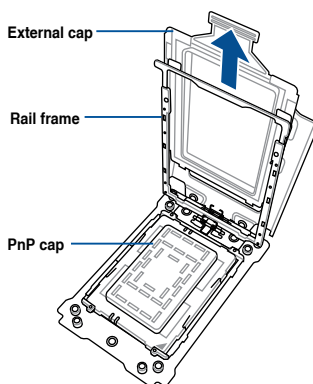
- Loosen each screw one by one in the sequence shown on the socket to open the load plate.



- Slightly lift open the rail frame.



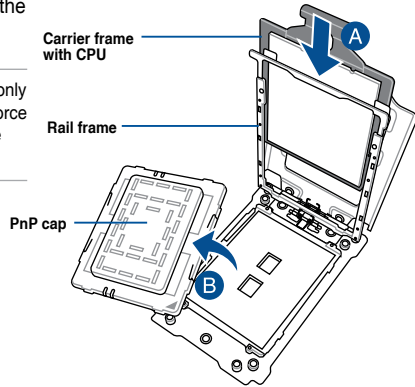
- Slide the external cap out of the rail frame.



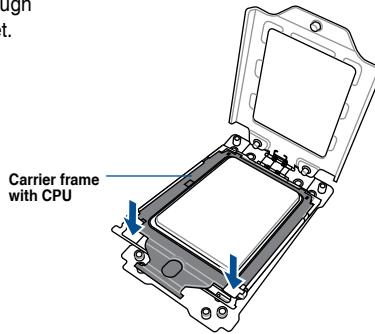
- Slide the carrier frame with CPU into the rail frame, then remove the PnP cap.



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



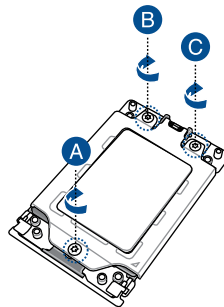
- Gently push the rail frame just enough to let it sit on top of the CPU socket.



- Close the load plate just enough to let it sit on top of the CPU, then secure each screw one by one in the sequence shown on the socket to completely secure the load plate.



The load plate screws are T20 models. A torque value of  $16.1 \pm 1.2$  kgf-cm ( $14.0 \pm 1.0$  lbf-in) is recommended.



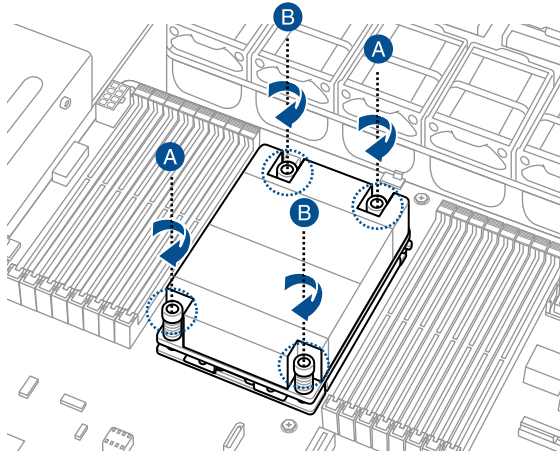
9. Twist each of the four screws with a screwdriver just enough to attach the heatsink to the motherboard. When the four screws are attached, tighten them one by one in a diagonal sequence to complete the installation.



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The heatsink screws are T20 models. A torque value of  $16.1 \pm 1.2$  kgf-cm ( $14.0 \pm 1.0$  lbf-in) is recommended.

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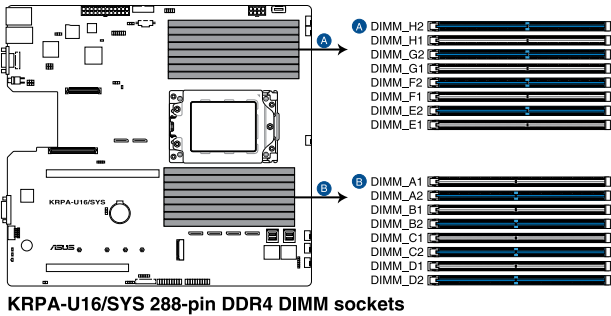


## 2.3 System memory

### 2.3.1 Overview

The motherboard comes with sixteen (16) Double Data Rate 4 (DDR4) Dual Inline Memory Modules (DIMM) sockets.

The figure illustrates the location of the DDR4 DIMM sockets:



### 2.3.2 Memory Configurations

You may install 32GB, 16GB, 8GB, 4GB RDIMM, 64GB, 32GB LRDIMM, or 128GB, 64GB LRDIMM 3DS into the DIMM sockets using the memory configurations in this section.

	Memory configurations															
	DIMM															
	A1	A2	B1	B2	C1	C2	D1	D2	E1	E2	F1	F2	G1	G2	H1	H2
<b>1 DIMM</b>						✓										
<b>2 DIMMs</b>						✓		✓								
<b>4 DIMMs</b>						✓		✓								
<b>8 DIMMs</b>		✓		✓		✓		✓		✓		✓		✓		✓
<b>10 DIMMs</b>		✓		✓		✓	✓	✓	✓	✓		✓		✓		✓
<b>12 DIMMs</b>		✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓		✓
<b>14 DIMMs</b>		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
<b>16 DIMMs</b>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓



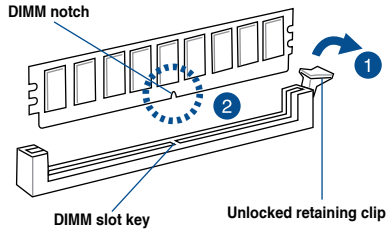
- 6 DIMM configuration is not recommended for AMD EPYC™ 7002 Series processors.
- When mixing 2DPC and 1DPC, ensure that each channel's total DIMM size should be equal. The DIMM size of 2DPC should equal to that of 1DPC, for example, if 2DPC is using a 32GB memory module (32GB \* 2), then a 64GB memory module should be installed for 1DPC.
- All memory modules for 2DPC should be the same.
- Always install DIMMs with the same CAS latency. For optimum compatibility, it is recommended that you obtain memory modules from the same vendor.

### 2.3.3 Installing a DIMM on a single clip DIMM socket



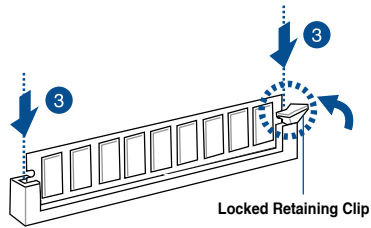
Ensure to unplug the power supply before adding or removing DIMMs or other system components. Failure to do so may cause severe damage to both the motherboard and the components.

1. Unlock a DIMM socket by pressing the retaining clip outward.
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.

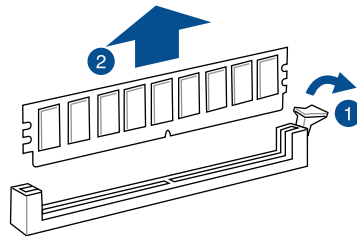
3. Hold the DIMM by both of its ends then insert the DIMM vertically into the socket. Apply force to both ends of the socket simultaneously until the retaining clip snaps back into place and the DIMM cannot be pushed in any further to ensure proper sitting of the DIMM.



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

### 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.



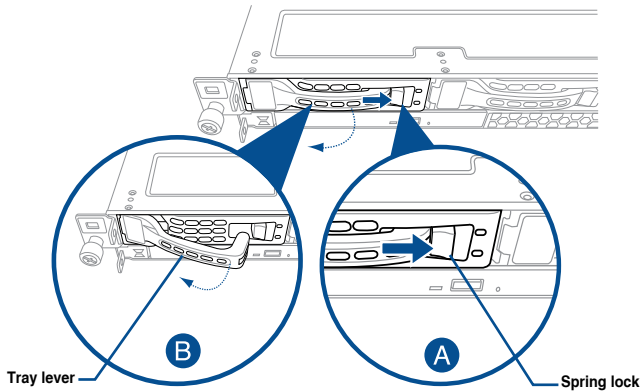
## 2.4 Storage device

### RS500A-E10-RS4 / RS500A-E10-PS4

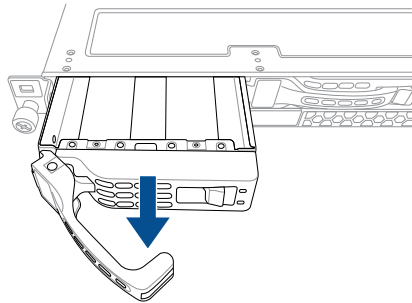
The system supports four hot-swap SATA/SAS storage devices. The storage device installed on the storage device tray connects to the motherboard SATA/SAS ports via the SATA/SAS backplane (SAS drives require an optional ASUS PIKE II card).

To install a 3.5" hot-swap SATA/SAS storage device:

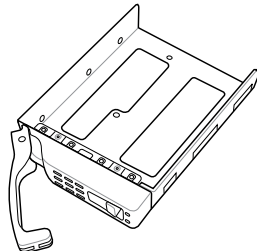
1. Push the spring lock to the right (A) then pull the tray lever outward (B) to release the storage device tray. The storage device tray ejects slightly after you pull out the lever.



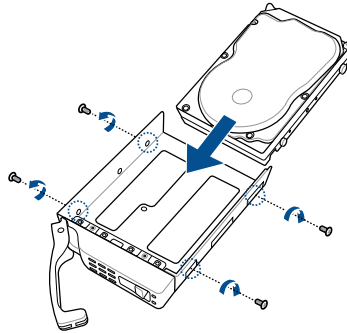
2. Firmly hold the tray lever and pull the storage device tray out of the bay.



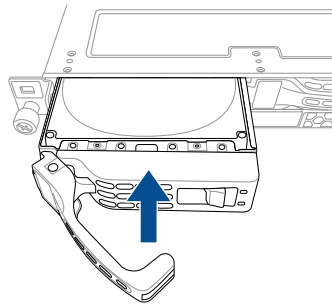
3. Place the storage device tray on a flat and stable surface.
4. Prepare the SATA/SAS storage device and the bundled set of screws.



5. Place the 3.5" SATA/SAS storage device into the tray then secure it with four screws.



6. Insert the storage device tray and storage device assembly all the way into the depth of the bay until just a small fraction of the tray edge protrudes.



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When installed, the SATA/SAS connector on the drive connects to the SATA/SAS interface on the backplane.

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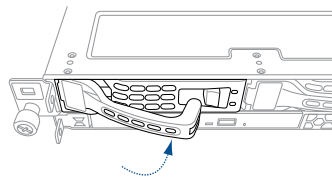
7. Push the tray lever until it clicks and secures the storage device tray in place.



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The storage device tray is correctly placed when its front edge aligns with the bay edge.

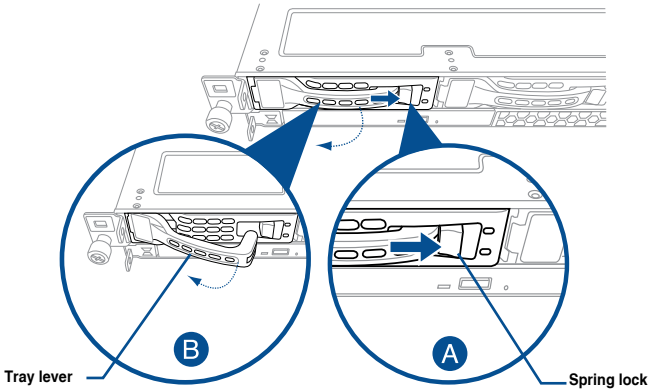
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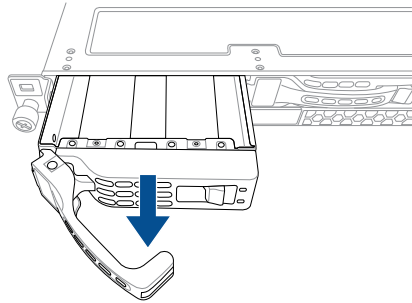
8. Repeat steps 1 to 7 to install the other SATA/SAS storage devices.

To install a 2.5" storage device to the front panel:

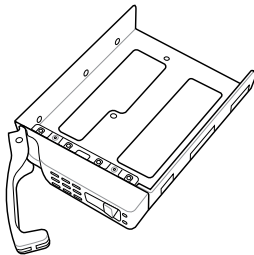
1. Push the spring lock to the right (A) then pull the tray lever outward (B) to release the storage device tray. The storage device tray ejects slightly after you pull out the lever.



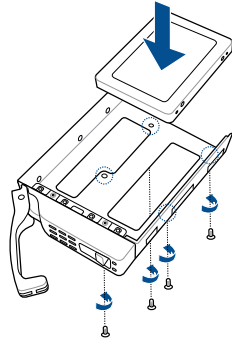
2. Firmly hold the tray lever and pull the tray out of the bay.



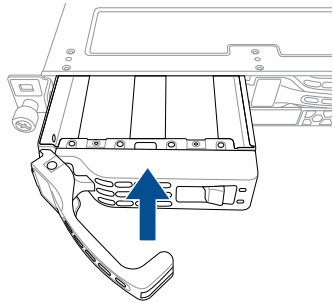
3. Place the tray on a flat and stable surface.
4. Prepare the 2.5" storage device and the bundled set of screws.



- 5. Place the 2.5" storage device into the tray then secure it with four screws.



- 6. Insert the tray and storage device assembly all the way into the depth of the bay until just a small fraction of the tray edge protrudes.

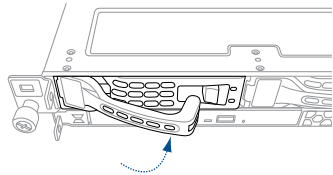


When installed, the SATA/NVMe connector on the storage device connects to the SATA/NVMe interface on the backplane.

- 7. Push the tray lever until it clicks and secures the tray in place.



The tray is correctly placed when its front edge aligns with the bay edge.



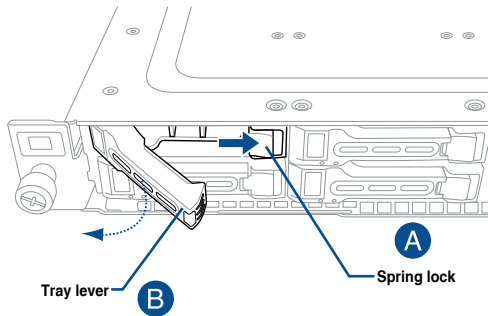
- 8. Repeat steps 1 to 7 to install the other storage devices.

## RS500A-E10-RS12U

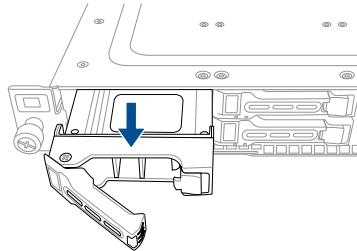
The system supports twelve (12) 2.5" hot-swap SATA/SAS/NVMe storage devices. The storage device installed on the storage tray connects to the motherboard SATA/SAS/NVMe ports via the SATA/SAS/NVMe backplane (SAS drives require an optional ASUS PIKE II card).

To install a 2.5" hot-swap SATA/SAS/NVMe storage device:

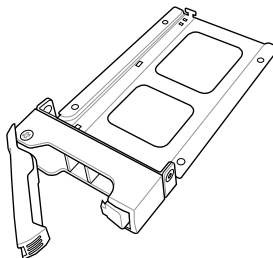
1. Push the spring lock to the right (A) then pull the tray lever outward (B) to release the storage tray. The storage tray ejects slightly after you pull out the lever.



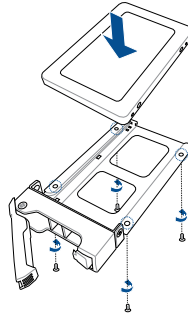
2. Firmly hold the tray lever and pull the storage tray out of the bay.



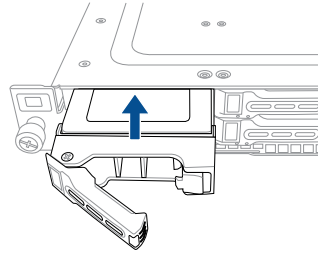
3. Place the storage tray on a flat and stable surface.
4. Prepare the SATA/SAS/NVMe storage device and the bundled set of screws.



5. Place the SATA/SAS/NVMe storage device into the tray then secure it with four screws.



6. Insert the storage tray and storage device assembly all the way into the depth of the bay until just a small fraction of the tray edge protrudes.



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When installed, the SATA/SAS/NVMe connector on the storage device connects to the SATA/SAS/NVMe interface on the backplane.

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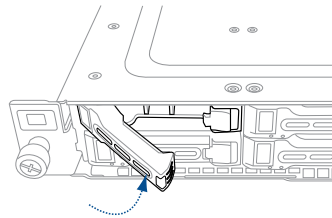
7. Push the tray lever until it clicks and secures the storage tray in place.



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The storage tray is correctly placed when its front edge aligns with the bay edge.

---



8. Repeat steps 1 to 7 to install the other SATA/SAS/NVMe storage devices.

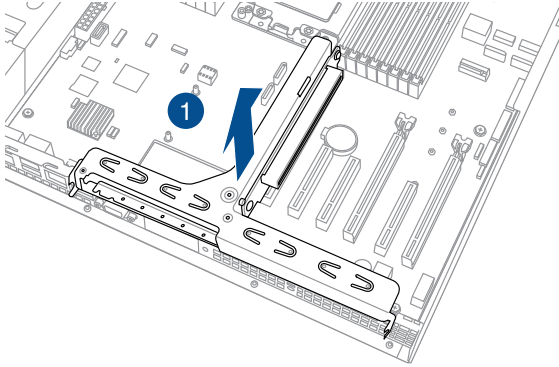
## 2.5 Expansion slot

### 2.5.1 Installing an expansion card to the riser card bracket

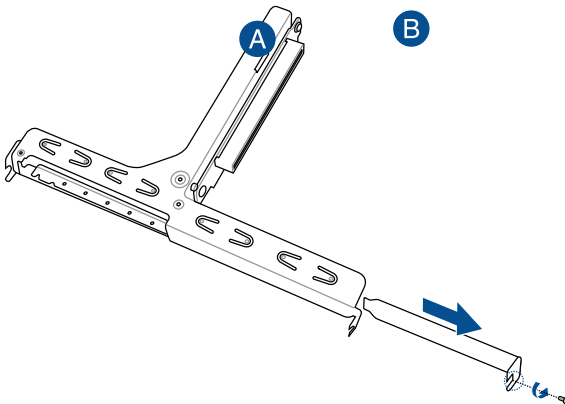
The barebone server comes with a riser card bracket. You need to remove the bracket if you want to install PCI Express x8 or x16 expansion cards.

To install a PCI Express x8 or x16 card:

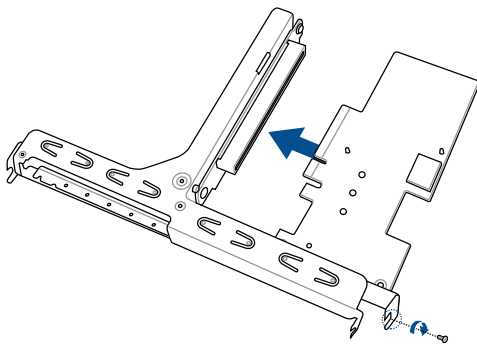
1. Firmly hold the riser card bracket, then pull it up to detach it from the PCI Express slot on the motherboard.



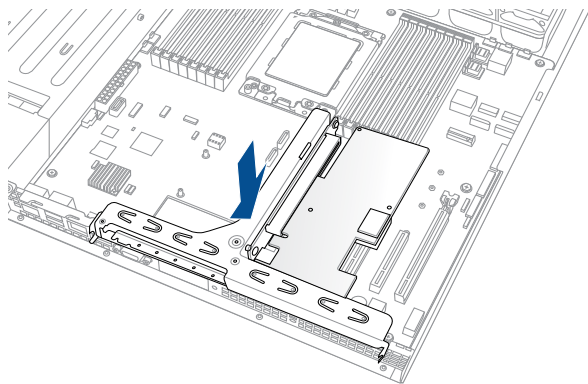
2. Place the riser card bracket on a flat and stable surface.
3. Remove the screw from the metal bracket (A), then remove the metal bracket (B).



4. Insert the expansion card into the PCI-E slot. Ensure that the golden fingers are totally inserted into the slot, then secure the expansion card with the screw removed before.



5. Install the riser card bracket and PCI Express card assembly back into the PCI Express slot on the motherboard. Ensure that the golden connectors of the riser card bracket are firmly seated in place.



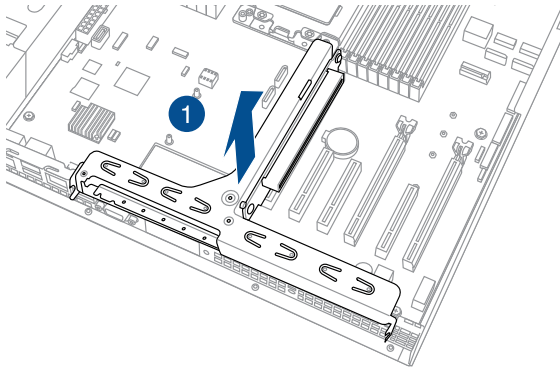


## 2.5.2 Installing an ASUS PIKE II card

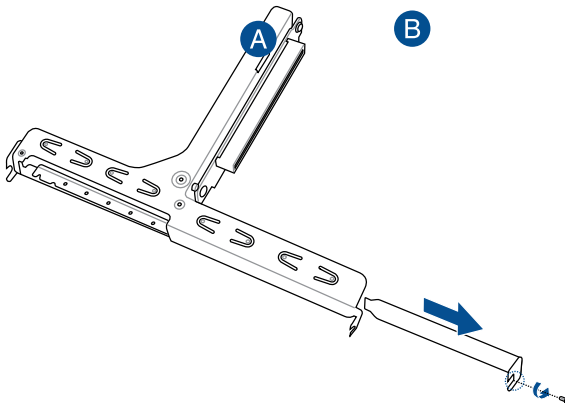
You can install an ASUS PIKE II card on the provided riser card bracket.

To install an ASUS PIKE II card:

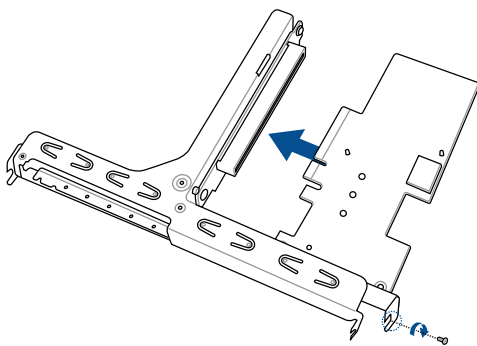
1. Firmly hold the riser card bracket, then pull it up to detach it from the PCI Express slot on the motherboard.



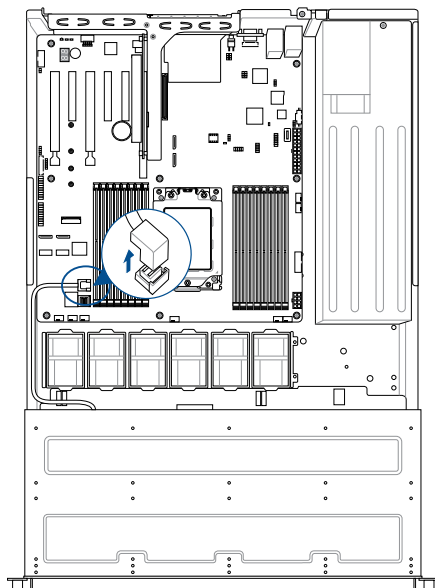
2. Place the riser card bracket on a flat and stable surface.
3. Remove the screw from the metal bracket (A), then remove the metal bracket (B).



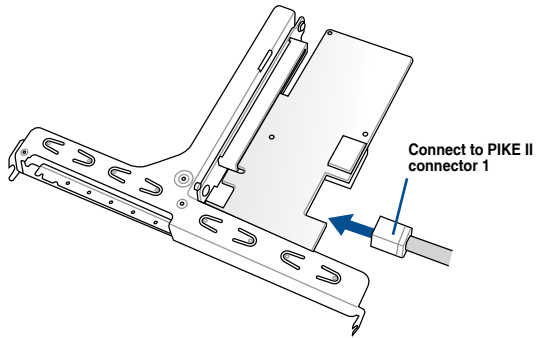
4. Insert the expansion card into the PCI-E slot. Ensure that the golden fingers are totally inserted into the slot, then secure the ASUS PIKE II card with the screw removed before.



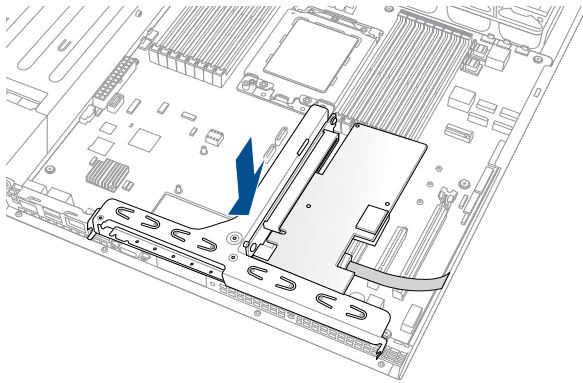
5. Remove the default mini-SAS HD cable from the motherboard.



6. Connect the mini-SAS HD cable to connector 1 of the ASUS PIKE II card.



7. Reinstall the riser card bracket into the PCI Express slot on the motherboard. Ensure that the golden connectors of the riser card bracket is firmly seated in place.

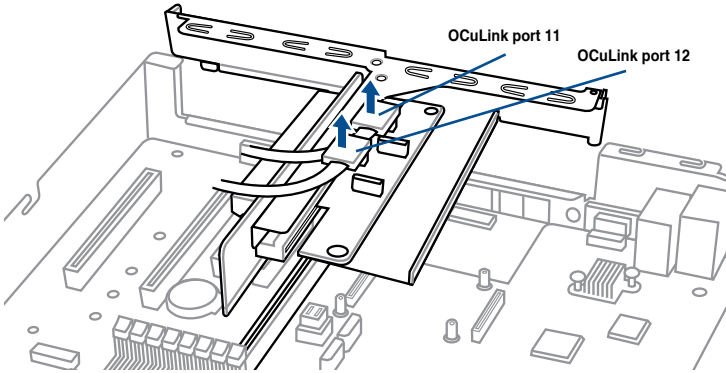


### 2.5.3 Replacing the ASUS PCIe-NVME2-OCuLink card to the butterfly riser card bracket (for RS500A-E10-RS12U only)

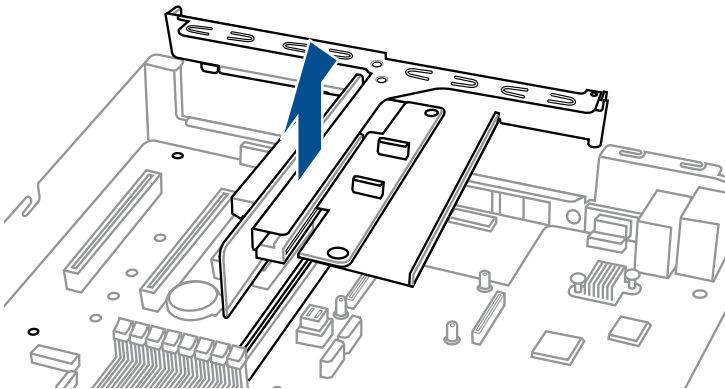
The ASUS PCIe-NVME2-OCuLink card pre-installed on the butterfly riser card bracket on the PCIe2 slot supports NVME storage devices on Bay 11 and Bay 12.

To replace the ASUS PCIe-NVME2-OCuLink card on the butterfly riser card bracket:

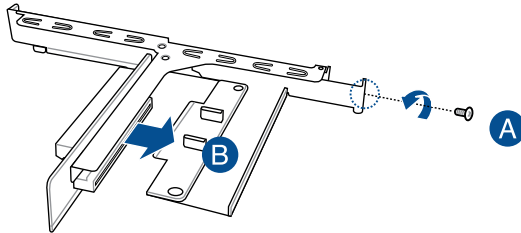
1. Remove the OCuLink cables (right angle connectors) from its corresponding slots.



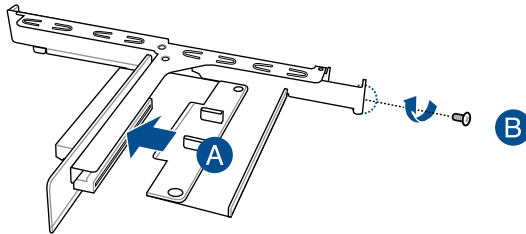
2. Firmly hold the riser card bracket, then pull it up to detach it from the PCI slot on the motherboard.



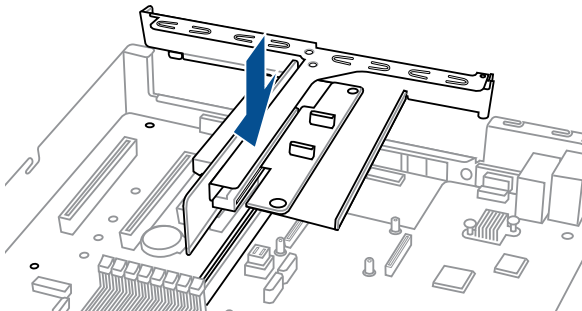
3. Place the butterfly riser card bracket on a flat and stable surface.
4. Remove the screw from the metal cover (A), then remove the ASUS PCIe-NVME2-OCuLink card (B) from the butterfly riser card bracket.



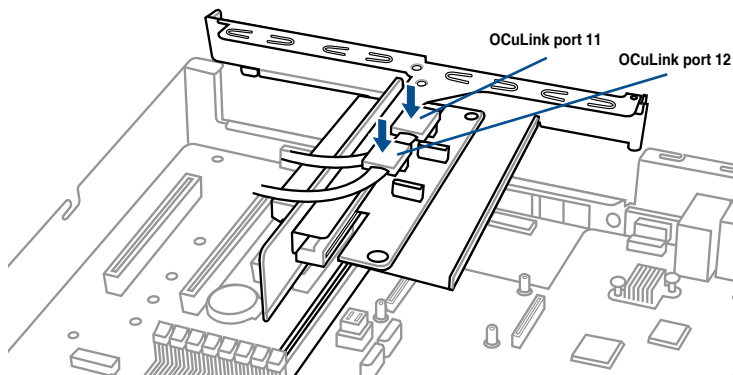
5. Prepare the replacement ASUS PCIe-NVME2-OCuLink card.
6. Install the ASUS PCIe-NVME2-OCuLink card into the butterfly riser card bracket (A), then secure the ASUS PCIe-NVME2-OCuLink card with the screw (B).



7. Install the butterfly riser card bracket and the ASUS PCIe-NVME2-OCuLink card assembly into the PCIe connector on the motherboard. Ensure that the golden connectors of the butterfly riser card bracket is firmly seated in place.



8. Connect the OCuLink cables back into the corresponding slots to complete.

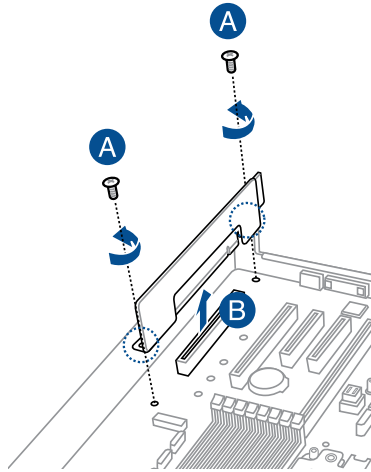


## 2.5.4 Replacing the ASUS PCIe-NVME4-OCuLink card (for RS500A-E10-RS12U only)

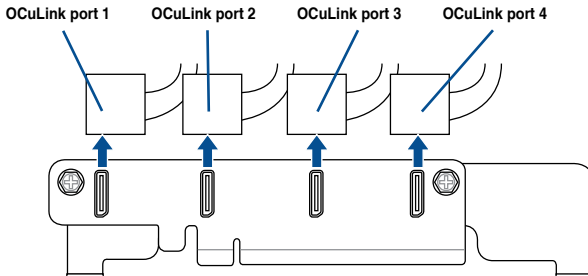
The ASUS PCIe-NVME4-OCuLink card pre-installed on the PCIe1 slot supports NVME storage devices on Bay 1 to Bay 4.

To replace the ASUS PCIe-NVME4-OCuLink card:

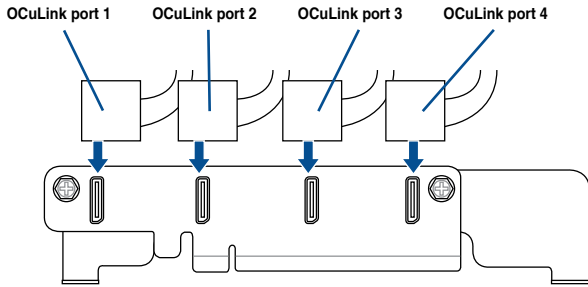
1. Remove the two (2) screws that secure the ASUS PCIe-NVME4-OCuLink card to the motherboard (A), then remove the ASUS PCIe-NVME4-OCuLink card from the motherboard (B).



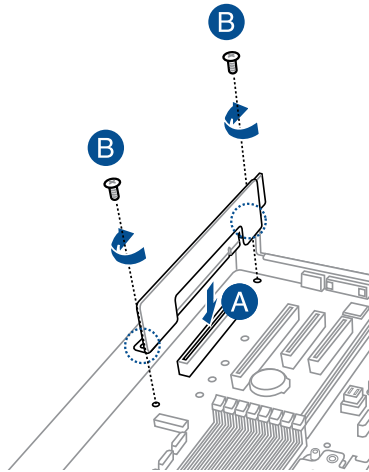
2. Remove the OCuLink cables (right angle connectors) from its corresponding slots.



3. Prepare the replacement ASUS PCIE-NVME4-OCuLink card.
4. Connect the OCuLink cables back into the corresponding slots.



5. Install the ASUS PCIE-NVME4-OCuLink card into the PCIe connector on the motherboard, ensure that the golden connectors is firmly seated in place (A). Secure the ASUS PCIE-NVME4-OCuLink card with the two (2) screws that you removed earlier to complete (B).

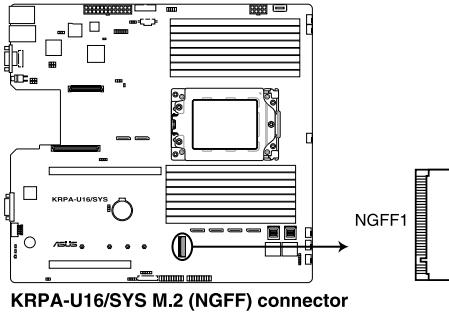




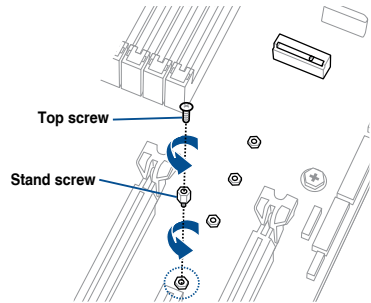
## 2.5.5 Installing M.2 (NGFF) cards

To install an M.2 (NGFF) card:

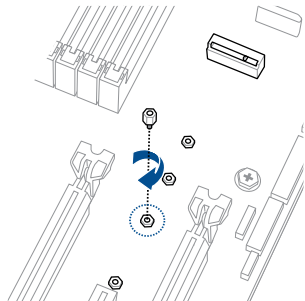
1. Locate the M.2 (NGFF) connector on your motherboard.



2. Remove the top screw and the stand from the motherboard.



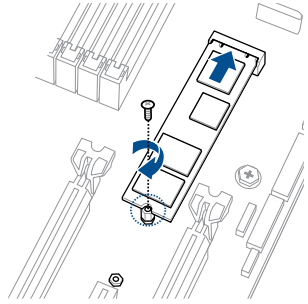
3. Select an appropriate screw hole on the motherboard for your M.2 card, then secure the stand to the motherboard.



4. Prepare the M.2 card.
5. Align and insert the M.2 card into the M.2 connector on the motherboard.

Ensure that the golden connector of the M.2 card is inserted firmly in place and that the screw hole on the M.2 card matches the stand screw on the motherboard.

6. Secure the M.2 card with the top screw.



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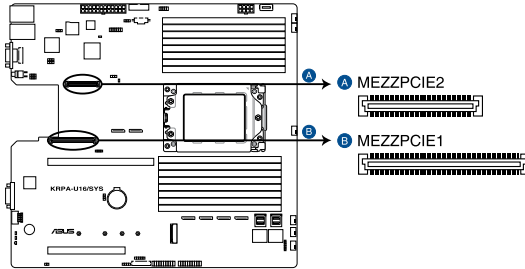
Ensure that the M.2 card is positioned between the top screw and the stand screw before securing it.

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## 2.5.6 Installing Mezzanine cards

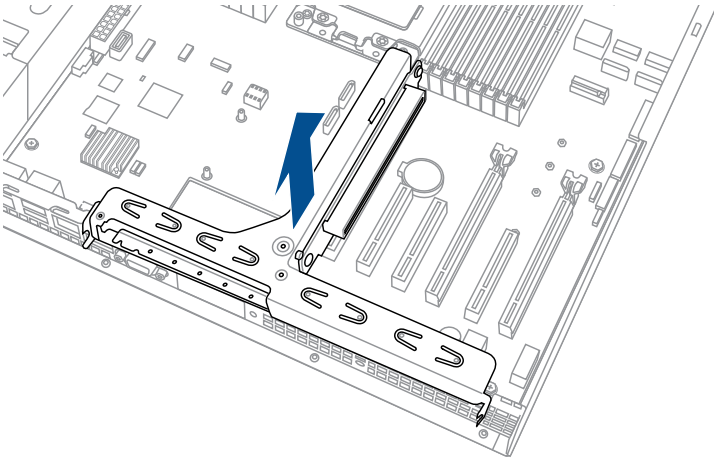
To install a Mezzanine card:

1. Locate the Mezzanine card connector on your motherboard.

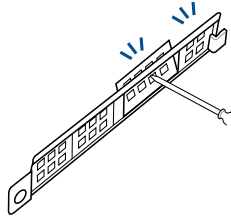


KRPA-U16/SYS Mezzanine PCIe card connectors

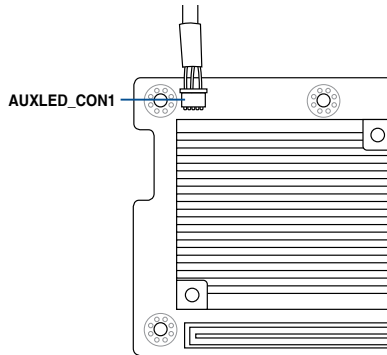
2. Firmly hold the riser card bracket, then pull it up to detach it from the PCI Express slot on the motherboard.



3. Select the slots that are going to be used for your Mezzanine card, then use a screwdriver and pry the corresponding slots until it pops off.

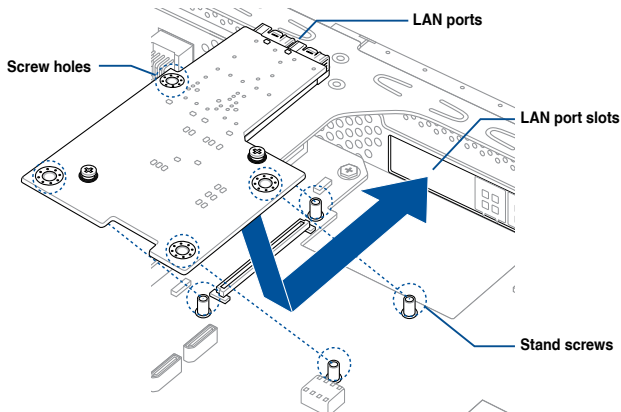


4. Prepare your Mezzanine card and the signal cable. Connect the signal transmission end (white) to the AUXLED\_CON header on the card.

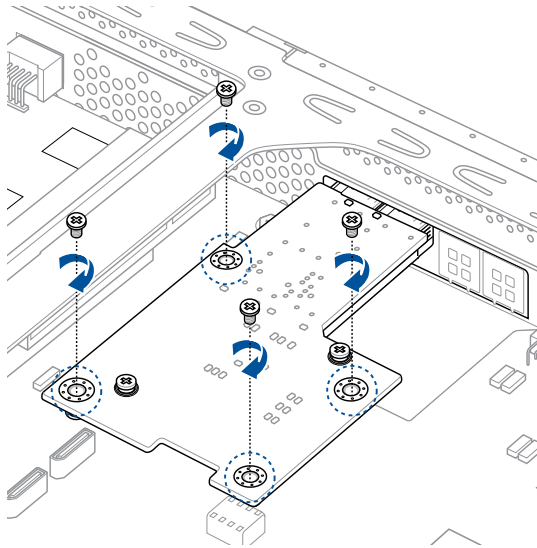


5. Insert the ports of the Mezzanine card into the mounting hole on the chassis, then insert the golden connector of the Mezzanine card into the **MEZZPCIE1** (OCP) connector on the motherboard.

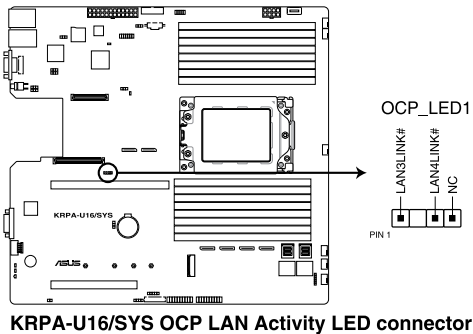
Ensure that the stand screws on the motherboard is aligned and matched to the screw holes of the Mezzanine card.



- Secure the Mezzanine card with the four (4) bundled screws.



- Connect the signal end (black) to the OCP\_LED1 header on the motherboard.



The two ends of the signal cable are different in size and color for easy recognition. Please refer to your exact cable.

- Reinstall the riser card bracket into the PCI Express slot on the motherboard. Ensure that the golden connectors of the riser card bracket is firmly seated in place.

## 2.5.7 Configuring an expansion card

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

1. Turn on the system and change the necessary BIOS settings, if any. See Chapter 5 for information on BIOS setup.
2. Assign an IRQ to the card. Refer to the following tables.
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

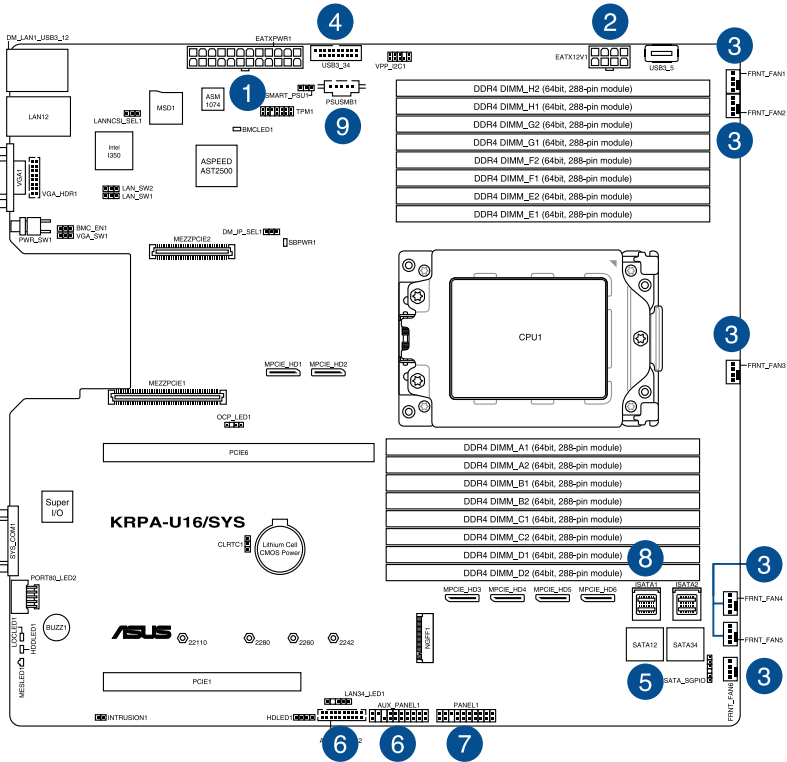
\* These IRQs are usually available for ISA or PCI devices.

## 2.6 Cable connections



- The bundled system cables are pre-connected before shipment. You do not need to disconnect these cables unless you will remove pre-installed components to install additional devices.
- Refer to Chapter 4 for detailed information on the connectors.

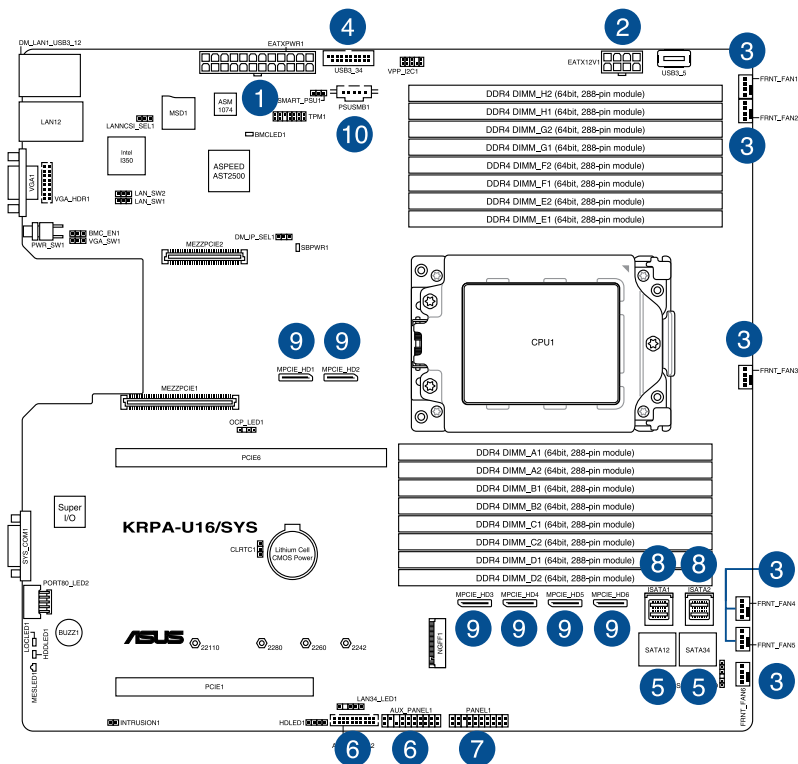
### RS500A-E10-RS4 / RS500A-E10-PS4



#### Standard cables connected to the motherboard

1. 24-pin ATX power connector (from power supply to motherboard)
2. 8-pin 12V power connector (from power supply to motherboard)
3. System fan connector (from motherboard to system fan)
4. USB connector (from motherboard to front I/O board)
5. SATA connector (from motherboard to optional optical drive)
6. System auxiliary panel connector (from motherboard to front I/O board)
7. System panel connector (from motherboard to front I/O board)
8. Mini-SAS HD connector (from motherboard to backplane)
9. PSUSMB connector (from motherboard to power board)

# RS500A-E10-RS12U



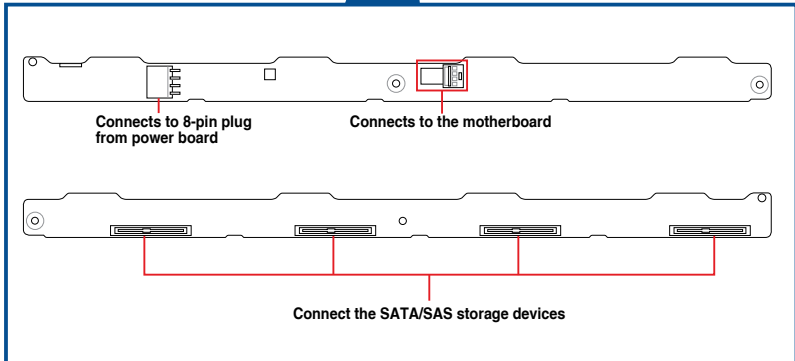
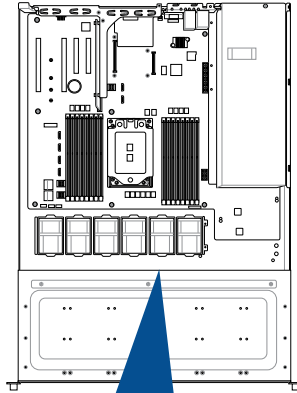
## Standard cables connected to the motherboard

1. 24-pin ATX power connector (from power supply to motherboard)
2. 8-pin 12V power connector (from power supply to motherboard)
3. System fan connector (from system fan to motherboard)
4. USB connector (from motherboard to front I/O board)
5. SATA connector (from motherboard to backplane)
6. System auxiliary panel connector (from motherboard to front I/O board)
7. System panel connector (from motherboard to front I/O board)
8. Mini-SAS HD connector (from motherboard to backplane)
9. OCuLink connector (from motherboard to backplane)
10. PSUSMB connector (from motherboard to power board)

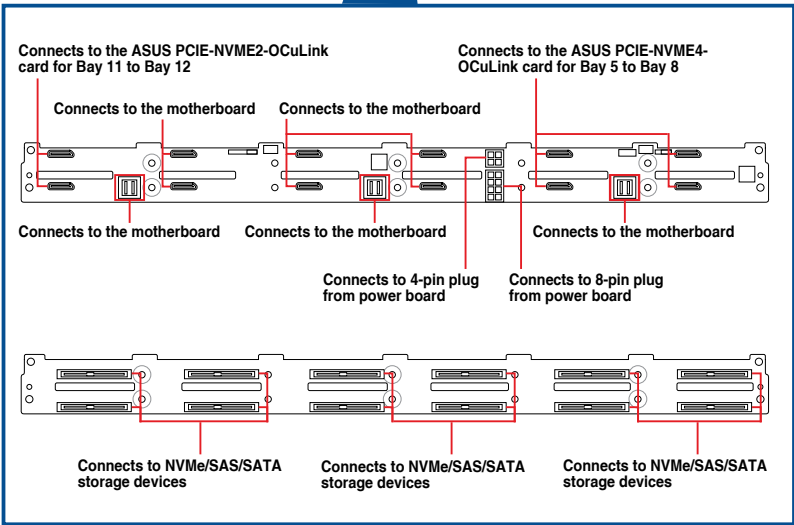
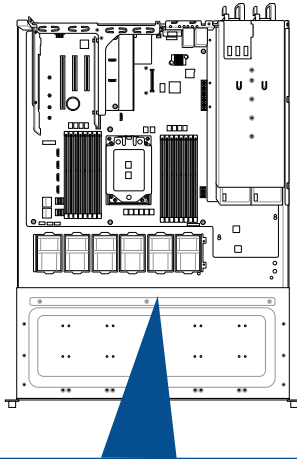


## 2.7 SATA/SAS backplane cabling

RS500A-E10-RS4 / RS500A-E10-PS4



# RS500A-E10-RS12U



## 2.8 Optional components

This section describes on how to replace previously installed system components or install optional components into the system.



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

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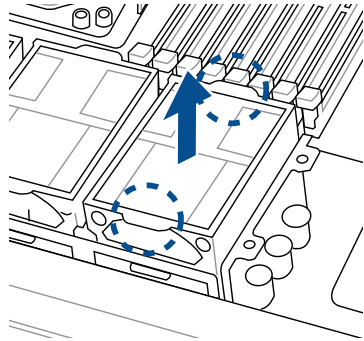
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You may need to remove previously installed component or factory shipped components when installing optional components.

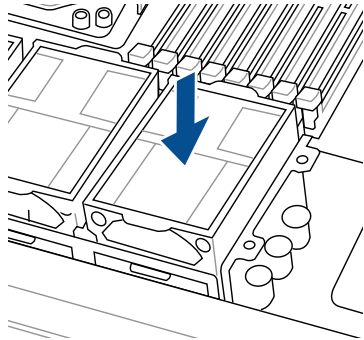
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### 2.8.1 System fans

To uninstall the system fans, hold the system fan by the tabs and lift the fan out of the fan cage.



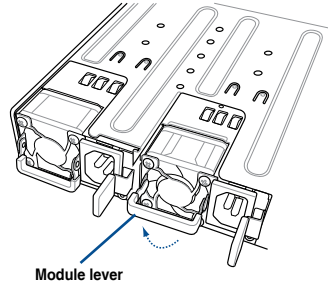
To reinstall the system fans, insert the fan into the fan cage. Ensure the fan connector is seated firmly within the cable holder.



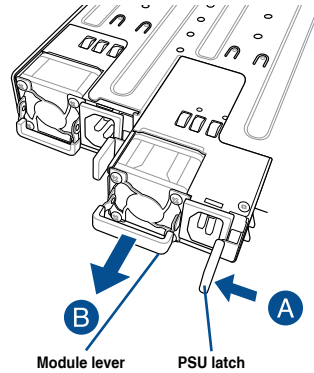
## 2.8.2 Redundant power supply module (for RS500A-E10-RS4 / RS500A-E10-RS12U only)

To replace a failed redundant power supply module:

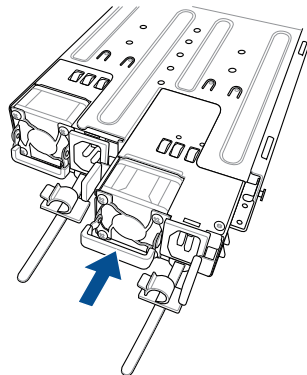
1. Lift up the power supply module lever.



2. Hold the power supply module lever and press the PSU latch, then pull the power supply module out of the system chassis.



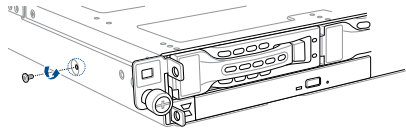
3. Prepare the replacement power supply module.
4. Insert the replacement power supply module into the chassis then push it inwards until the latch locks into place.



## 2.8.3 Replacing the optical drive (for RS500A-E10-RS4 / RS500A-E10-PS4 only)

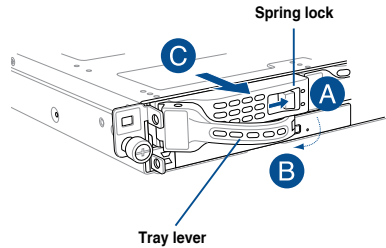
To replace the optical disk drive:

1. Remove the screw that secures the optical drive and set it aside.



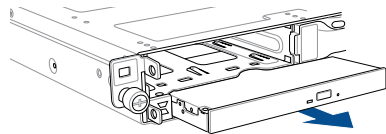
2. Push the spring lock to the right (A) to remove the storage device tray, then pull the tray lever outward (B).

The storage device tray ejects slightly after you pull out the lever (C).

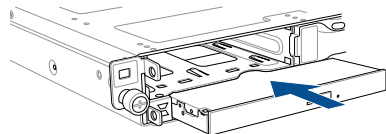


3. Hold the tray lever and pull the storage device tray out of the bay.

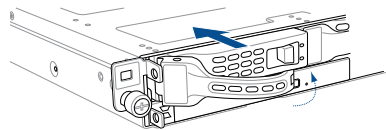
4. Pull the optical drive module out of the drive bay.



5. Carefully insert the replacement optical disk drive module into the drive bay until it is securely seated in place.

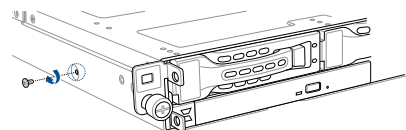


6. Carefully insert the storage device tray and push it all the way to the depth of the bay until just a small fraction of the tray edge protrudes.



7. Push the tray lever until it clicks, and secure the storage device tray in place. The storage device tray is correctly placed when its front edge aligns with the bay edge.

8. Secure the optical drive with the screw that you removed in step 1.





# Installation Options

# 3

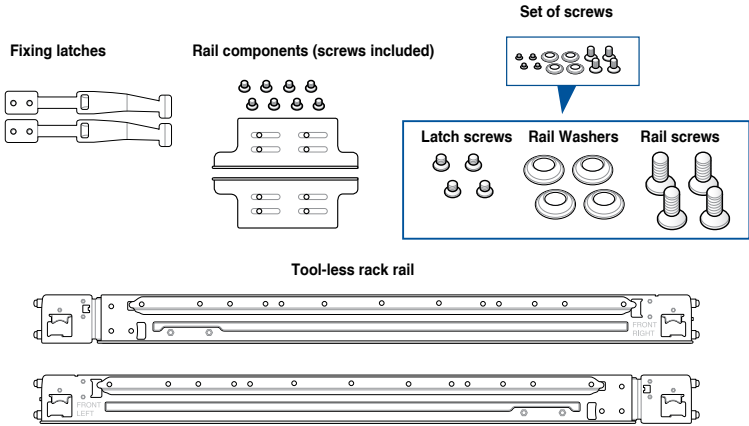
This chapter describes how to install the optional components and devices into the barebone server.

# 3.1 Rail kit installation

## 3.1.1 Tool-less Friction Rail Kit

The tool less design of the rail kit allows you to easily install the rack rails into the server rack without the need for additional tools. The kit also comes with a metal stopping bracket that can be installed to provide additional support and stability to the server.

The tool-less rail kit package includes:



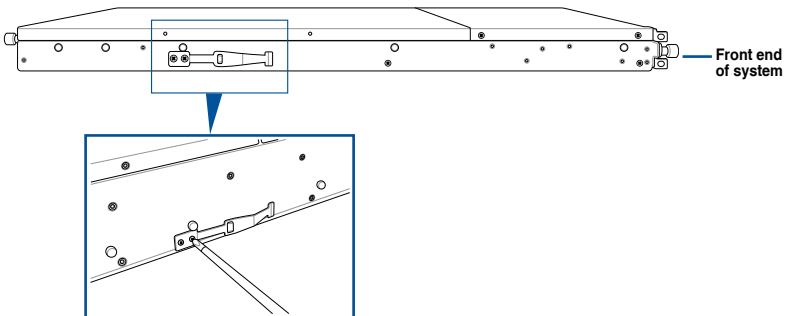
## 3.1.2 Installing the tool-less rack rail

To install the tool-less rack rails into the rack:

1. Secure the two fixing latches to the two sides of the server using the set of latch screws.



The locations of the screw holes vary with different server models. Refer to your server user manual for details.

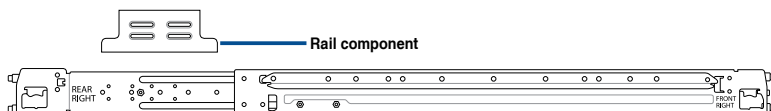




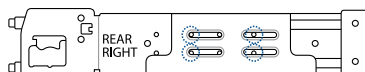


Follow steps 2 to 4 if the depth of your server rack exceeds 850mm, if the depth of your server rack is less than 850mm, please skip steps 2 to 4 and proceed with step 5.

2. Slightly slide out and extend the right rack rail, then prepare one of the bundled rail components.



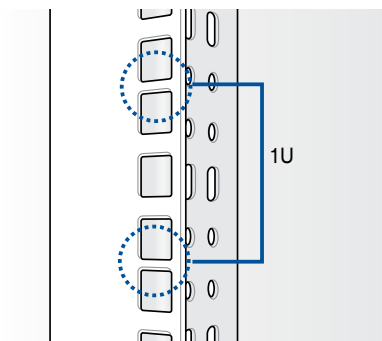
3. Align the rail component with the right rack rail and secure it using four (4) bundled screws.



4. Follow steps 2 and 3 to secure the rail component to the left rail rack.
5. Select a desired space and place the appropriate rack rail (left and right) on opposite positions on the rack.



A 1U space consists of three square mounting holes with two thin lips on the top and the bottom.



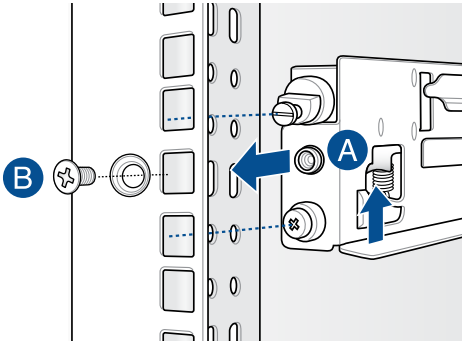
6. Secure the rail components to the rail using the bundled screws.
7. Press the spring lock (A) then insert the studs into the selected square mounting holes on the rack post.
8. Press the spring lock on the other end of rail then insert the stud into the mounting hole on the rack post. Extend the rack rail, if necessary.
9. (Optional) Use the rail screw and rail washer (B) that comes with the kit to secure the rack rail to the rack post.
10. Perform steps 3 to 5 for the other rack rail.



---

Ensure that the installed rack rails (left and right) are aligned, secured, and stable in place.

---



11. Lift the server chassis and insert into the rack rail.

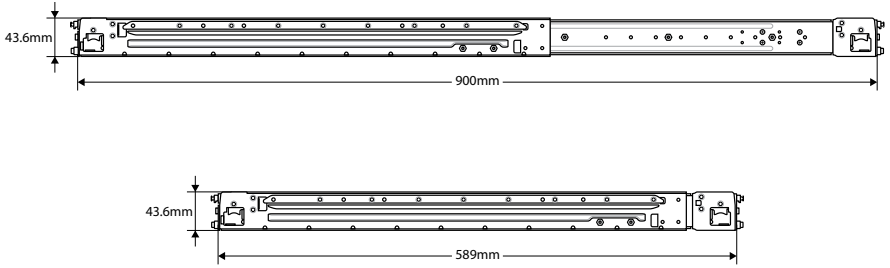


---

Ensure that the rack rail cabinet and the rack posts are stable and standing firmly on a level surface.

---

### 3.2 Rail kit dimensions



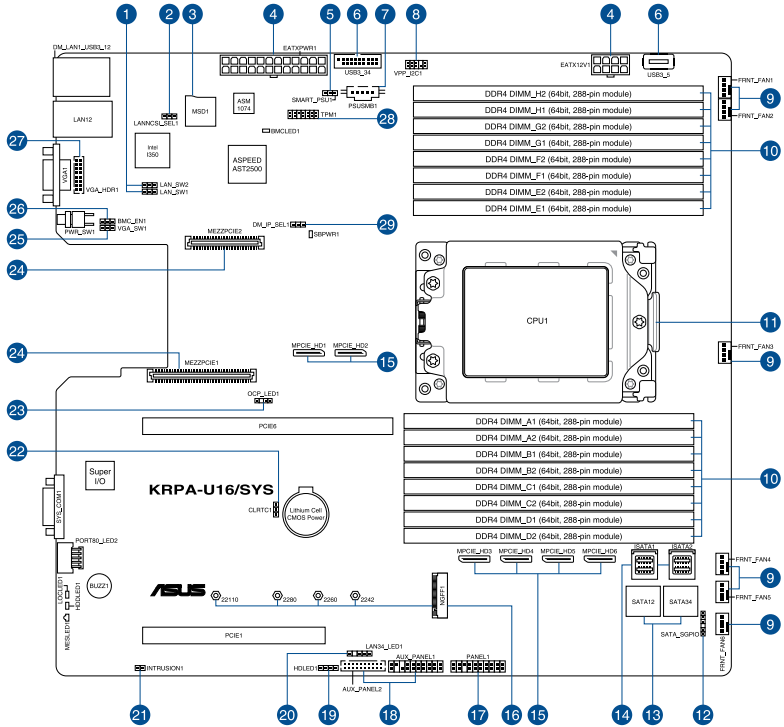


# Motherboard Information

# 4

This chapter includes the motherboard layout and brief descriptions of the jumpers and internal connectors.

# 4.1 Motherboard layout



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## 4.2 Jumpers

### 1. Clear RTC RAM (3-pin CLRTC1)

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

To erase the RTC RAM:

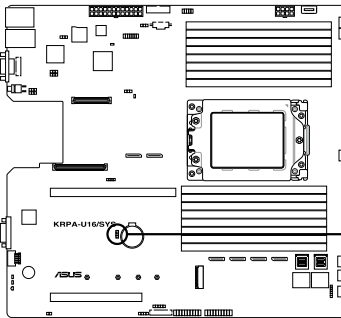
1. Turn OFF the computer and unplug the power cord.
2. Move the jumper cap from the default pins 1–2 to pins 2–3. Keep the cap on pins 2–3 for about 5 to 10 seconds, then move the cap back to pins 1–2.
3. Plug the power cord and turn ON the computer.
4. Hold down the <Del> key during the boot process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



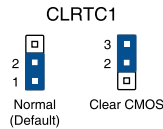
DO NOT remove the cap on CLRTC jumper default position except when clearing the RTC RAM. Removing the cap will cause system boot failure!



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.



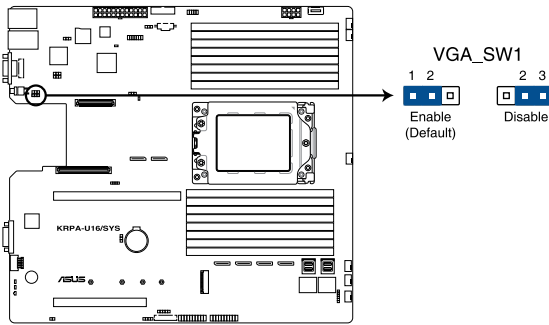
**KRPA-U16/SYS Clear RTC RAM**





## 2. VGA controller setting (3-pin VGA\_SW1)

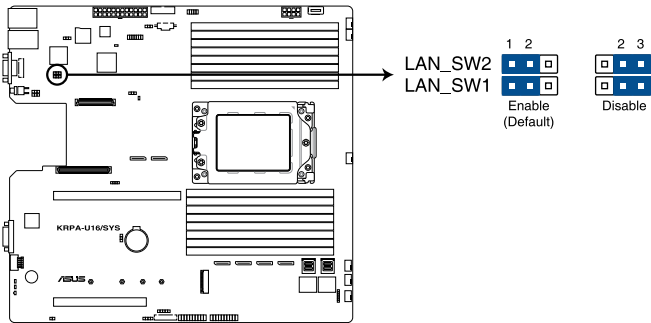
This jumper allows you to enable or disable the onboard VGA controller. Set to pins 1–2 to activate the VGA feature.



**KRPA-U16/SYS VGA controller setting**

## 3. LAN controller settings (3-pin LAN\_SW1-2)

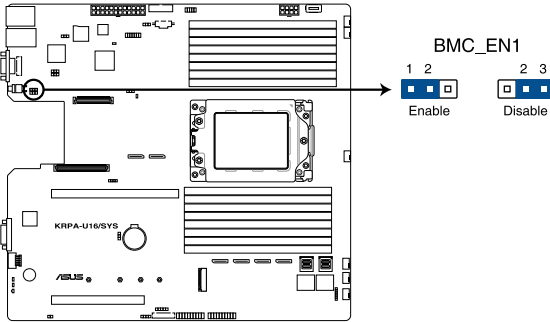
These jumpers allow you to enable or disable the onboard LAN\_SW1 or LAN\_SW2. Set to pins 1-2 to activate the Gigabit LAN feature.



**KRPA-U16/SYS LAN controller setting**

**4. BMC Setting (3-pin BMC\_EN1)**

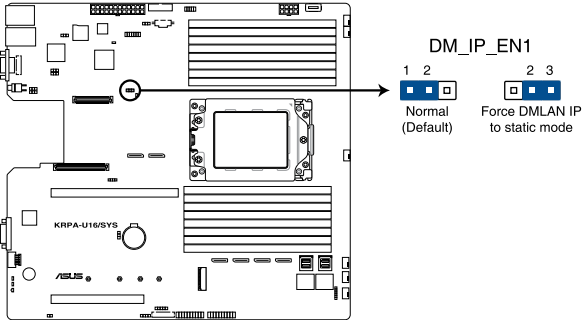
This jumper allows you to enable or disable the Baseboard Management Controller (ASMB9).



**KRPA-U16/SYS BMC setting**

**5. DMLAN setting (3-pin DM\_IP\_EN1)**

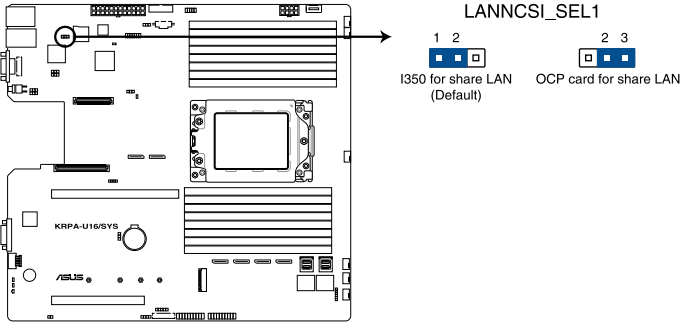
This jumper allows you to select the DMLAN setting. Set to pins 2-3 to force the DMLAN IP to static mode (IP=10.10.10.10, submask=255.255.255.0).



**KRPA-U16/SYS DMLAN setting**

## 6. LANNCISI setting (3-pin LANNCISI\_SEL1)

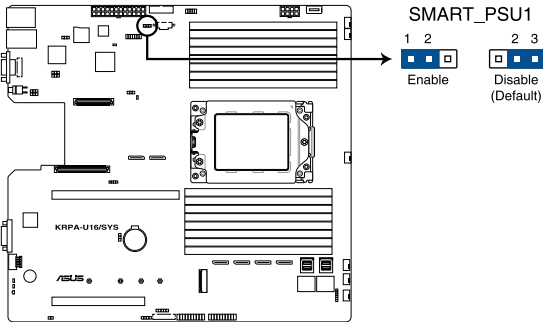
This jumper allows you to select which LAN NCSI to function.



**KRPA-U16/SYS LANNCISI setting**

## 7. Smart Ride Through (SmaRT) setting (3-pin SMART\_PSU1)

This jumper allows you to enable or disable the Smart Ride Through (SmaRT) function. This feature is enabled by default. Set to pins 2-3 to disable it. When enabled, SmaRT allows uninterrupted operation of the system during an AC loss event.

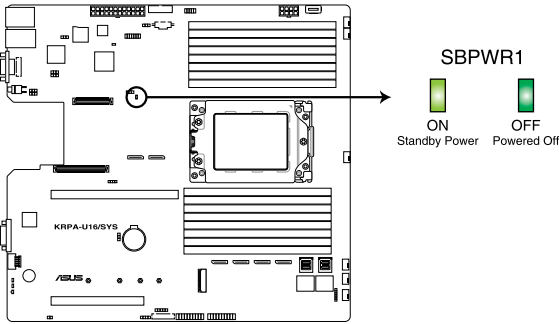


**KRPA-U16/SYS Smart Ride Through setting**

## 4.3 Onboard LEDs

### 1. Standby Power LED (SBPWR1)

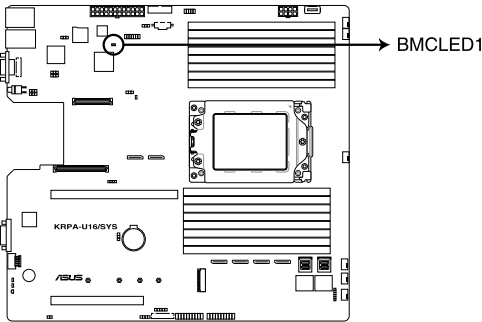
The motherboard comes with a standby power LED. The green LED lights up to indicate that the system is ON, in sleep mode, or in soft-off mode. This is a reminder that you should shut down the system and unplug the power cable before removing or plugging in any motherboard component. The illustration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



**KRPA-U16/SYS Standby Power LED**

### 2. BMC LED (BMCLED1)

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



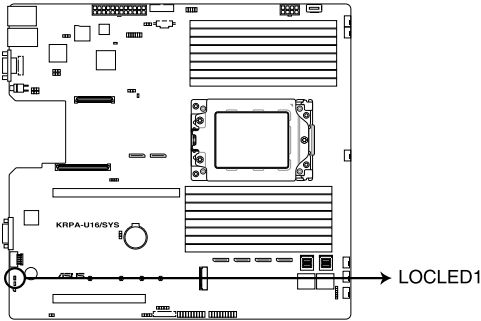
**KRPA-U16/SYS BMC LED**



This LED functions only when you enable ASUS ASMB9.

### 3. Location LED (LOCLED1)

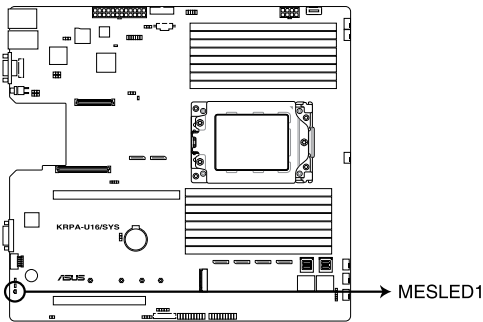
This onboard LED lights up when the Location button on the server is pressed or when triggered by a system management software. The Location LED helps visually locate and quickly identify the server in error on a server rack.



**KRPA-U16/SYS Location LED**

### 4. Message LED (MESLED1)

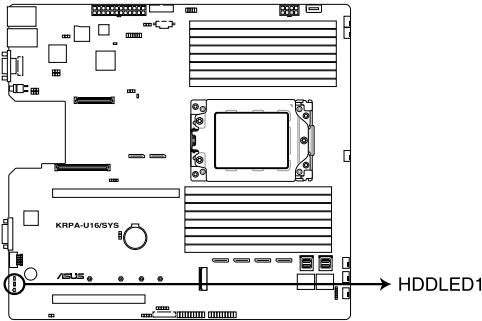
This onboard LED lights up to red when there is a BMC event log is generated.



**KRPA-U16/SYS MESLED**

**5. 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.

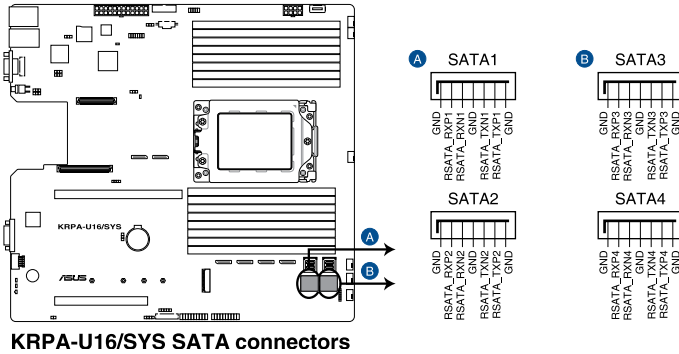


**KRPA-U16/SYS Storage device activity LED**

## 4.4 Internal connectors

### 1. Serial ATA connectors (7-pin SATA1-4)

These connectors, controlled by AMD integrated SATA controller, are for the Serial ATA signal cables for Serial ATA drives (SATA 1 connector is used for the optical drive by default).



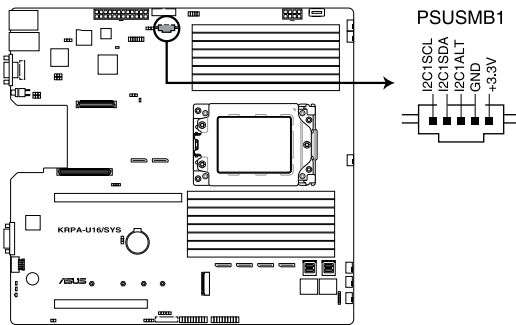
**KRPA-U16/SYS SATA connectors**



The actual data transfer rate depends on the speed of Serial ATA hard disks installed.

### 2. Power Supply SMBus connector (5-pin PSUSMB1)

This connector allows you to connect SMBus (System Management Bus) to the PSU (power supply unit) to read PSU information. Devices communicate with an SMBus host and/or other SMBus devices using the SMBus interface.



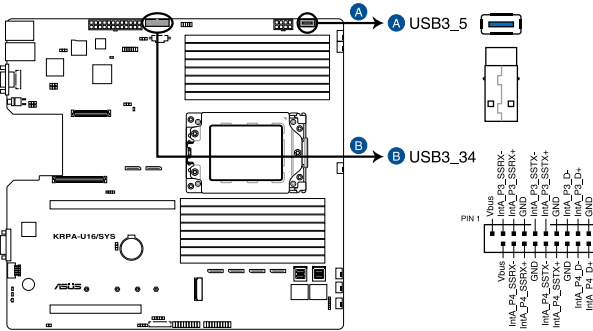
**KRPA-U16/SYS Power supply SMBus connector**



This connector functions only when you enable ASUS ASMB9.

**3. USB 3.0 connector (20-1 pin USB3\_34; 4-pin Type-A USB3\_5)**

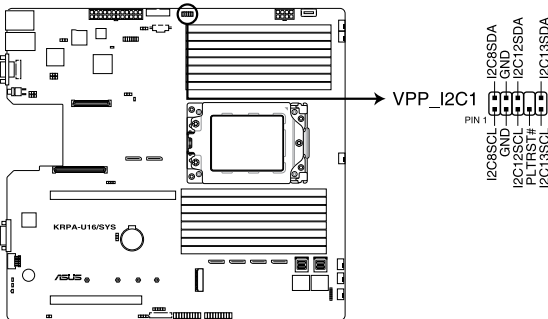
The 20-1 pin connector allows you to connect a USB 3.0 module for additional USB 3.0 front or rear panel ports. The 4-pin USB (Universal Serial Bus) Type-A port is available for connecting USB 3.0 devices.



**KRPA-U16/SYS USB 3.0 connectors**

**4. VPP\_I2C1 connector (10-1 pin VPP\_I2C1)**

This connector is used for the Intel VMD function and sensor readings.



**KRPA-U16/SYS VPP\_I2C1 connector**

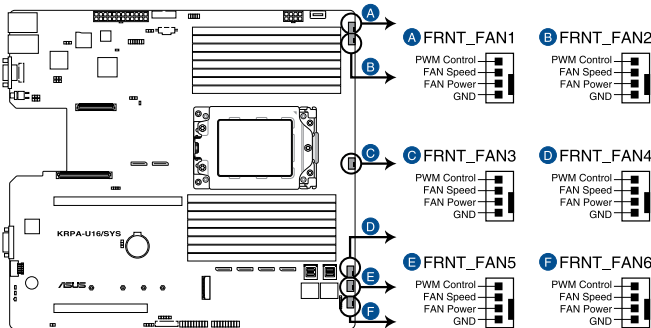


## 5. Front fan connectors (4-pin FRNT\_FAN1-6)

The fan connectors support cooling fans. Connect the fan cables to the fan connectors on the motherboard, ensuring that the black wire of each cable matches the ground pin of the connector.



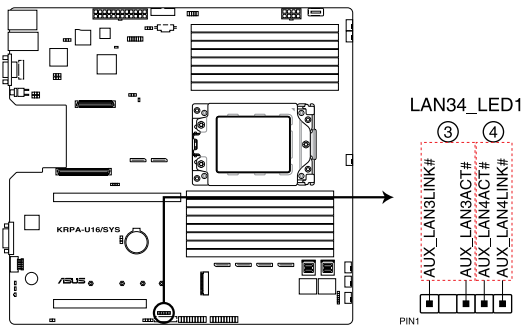
- DO NOT forget to connect the fan cables to the fan connectors. Insufficient air flow inside the system may damage the motherboard components.
- These are not jumpers! DO NOT place jumper caps on the fan connectors!
- All fans feature the ASUS Smart Fan technology.



**KRPA-U16/SYS FAN connectors**

## 6. LAN Activity LED connector (5-1 pin LAN34\_LED1)

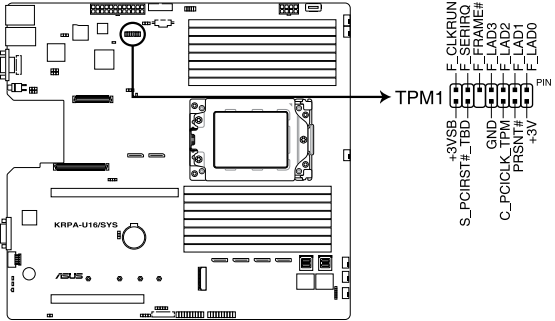
These leads are for 10G LAN activity LEDs on the front panel. Connect the LAN LED cable to the backplane for LAN activity indication.



**KRPA-U16/SYS LAN Activity LED connector**

### 7. Trusted Platform Module connector (14-1 pin TPM1)

This connector supports a Trusted Platform Module (TPM) system, which can securely store keys, digital certificates, passwords, and data. A TPM system also helps enhance network security, protects digital identities, and ensures platform integrity.



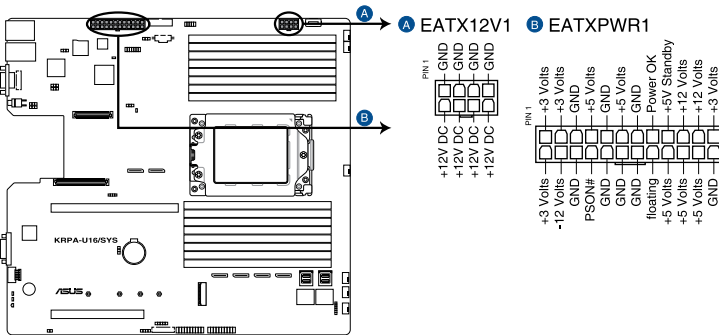
**KRPA-U16/SYS Trusted Platform Module connector**

### 8. ATX power connectors (24-pin EATXPWR1, 8-pin EATX12V1)

These connectors are for the ATX power supply plugs. The 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.



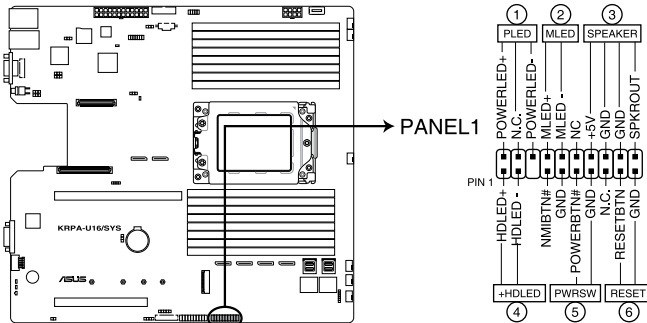
- DO NOT forget to connect the 24-pin and the 8-pin power plugs; otherwise, the system will not boot up.
- Use of a power supply unit (PSU) with a higher power output is recommended when configuring a system with more power-consuming devices. The system may become unstable or may not boot up if the power is inadequate.
- This motherboard supports ATX2.0 PSU or later version.
- Ensure that your PSU can provide at least the minimum power required by your system.



**KRPA-U16/SYS ATX power connectors**

## 9. System panel connector (20-1 pin PANEL1)

This connector supports several chassis-mounted functions.



**KRPA-U16/SYS System panel connector**

### 1. System power LED (3-pin PLED)

This 3-pin connector is for the system power LED. Connect the chassis power LED cable to this connector. The system power LED lights up when you turn on the system power, and blinks when the system is in sleep mode.

### 2. Message LED (2-pin MLED)

This 2-pin connector is for the message LED cable that connects to the front message LED. The message LED is controlled by the BMC to indicate an abnormal event occurrence.

### 3. System warning speaker (4-pin SPEAKER)

This 4-pin connector is for the chassis-mounted system warning speaker. The speaker allows you to hear system beeps and warnings.

### 4. Hard disk drive activity LED (2-pin HDLED)

This 2-pin connector is for the HDD Activity LED. Connect the HDD Activity LED cable to this connector. The LED lights up or flashes when data is read from or written to the HDD.

### 5. ATX power button/soft-off button (2-pin PWRSW)

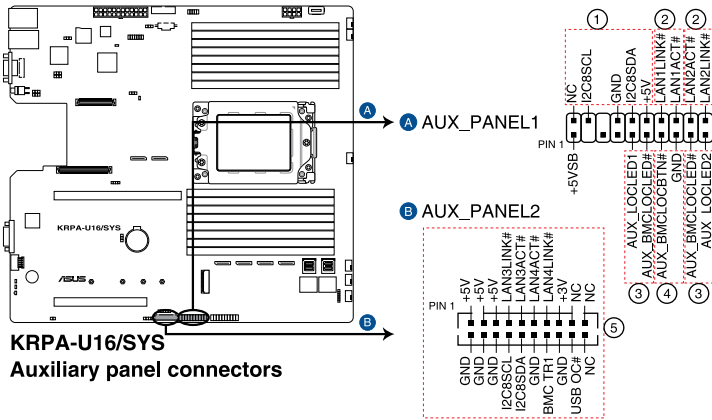
This connector is for the system power button. Pressing the power button turns the system on or puts the system in sleep or soft-off mode depending on the BIOS settings. Pressing the power switch for more than four seconds while the system is ON turns the system OFF.

### 6. Reset button (2-pin RESET)

This 2-pin connector is for the chassis-mounted reset button for system reboot without turning off the system power.

## 10. Auxiliary panel connector (20-2 pin AUX\_PANEL1, 20-pin AUX\_PANEL2)

This connector is for additional front panel features including front panel SMB, locator LED and switch, chassis intrusion, and LAN LEDs.



### 1. Front panel SMB (6-1 pin FPSMB)

These leads connect the front panel SMBus cable.

### 2. LAN activity LED (2-pin LAN1\_LED, LAN2\_LED)

These leads are for the Gigabit LAN activity LEDs on the front panel.

### 3. Locator LED (2-pin LOCATORLED1, LOCATORLED2)

These leads are for the locator LED1 and LED2 on the front panel. Connect the Locator LED cables to these 2-pin connector. The LEDs will light up when the Locator button is pressed.

### 4. Locator Button/Switch (2-pin LOCATORBTN)

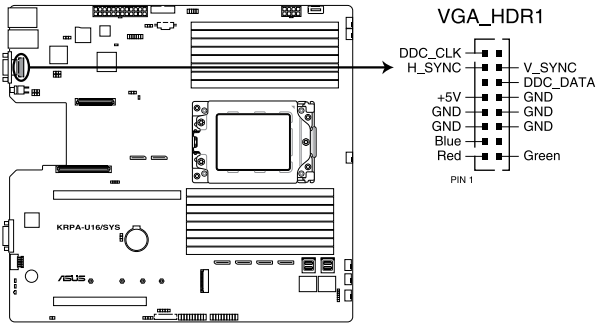
These leads are for the locator button on the front panel. This button queries the state of the system locator.

### 5. LAN activity LED and USB port (2-pin LAN3\_LED, LAN4\_LED, USB ports)

These leads are for the Gigabit LAN activity LEDs and USB ports on the front panel.

### 11. VGA connector (10-1 pin VGA\_HDR1)

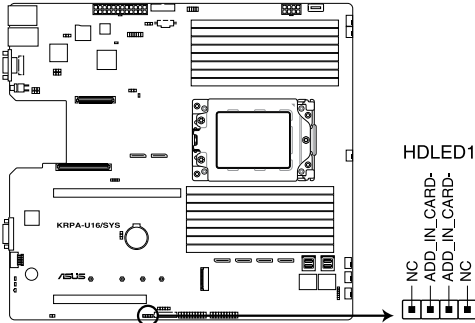
This connector supports the VGA High Dynamic-Range interface.



**KRPA-U16/SYS Internal VGA connector**

### 12. Hard disk activity LED connector (4-pin HDLED1)

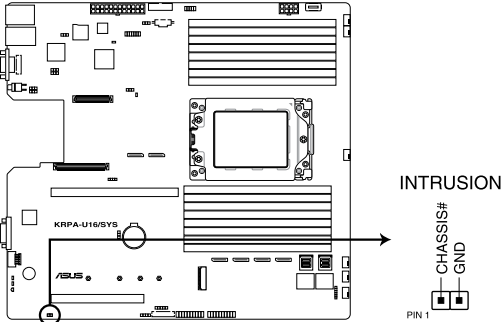
This LED connector is for the storage add-on card cable connected to the SATA or SAS add-on card. The read or write activities of any device connected to the SATA or SAS add-on card causes the front panel LED to light up.



**KRPA-U16/SYS Storage device activity LED connector**

### 13. Chassis Intrusion connectors (2-pin INTRUSION1)

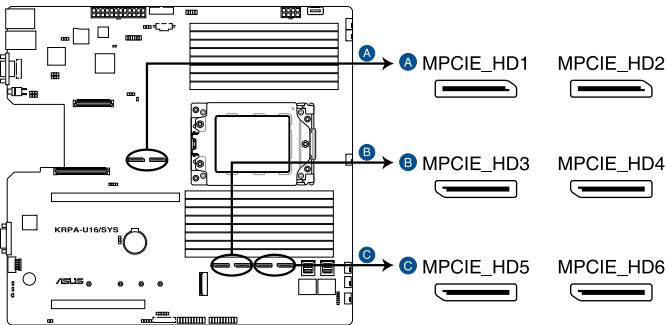
This lead is for the intrusion detection feature for chassis with intrusion sensor or microswitch. When you remove any chassis component, the sensor triggers and sends a high level signal to these leads to record a chassis intrusion event. The default setting is short CASEOPEN and GND pin by jumper cap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



**KRPA-U16/SYS Chassis Intrusion connector**

### 14. OCUPCIE connectors (MPCIE\_HD1-6)

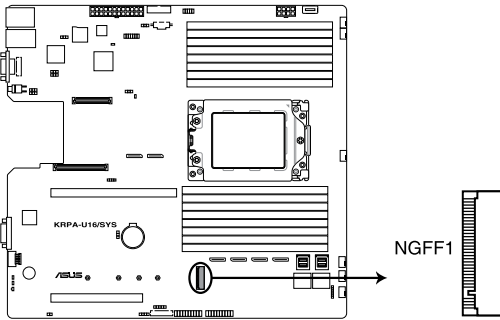
Connects the PCIE signal to the NVME port on the backplane.



**KRPA-U16/SYS OCUPCIE connectors**

## 15. M.2 (NGFF) connectors (NGFF1)

This connector allows you to install M.2 devices.



**KRPA-U16/SYS M.2 (NGFF) connector**



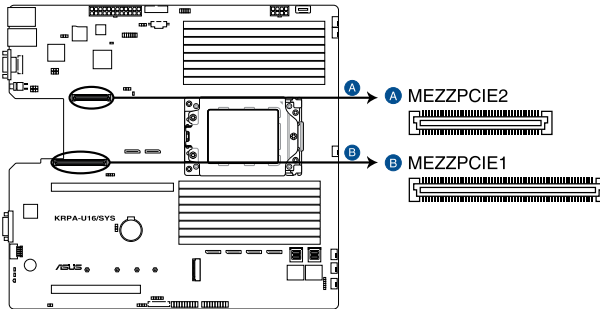
This connector supports type 2242/2260/2280/22110 devices on both PCI-E and SATA interface.



The M.2 (NGFF) device is purchased separately.

## 16. Mezzanine PCIe card connectors (MEZZPCIE1-2)

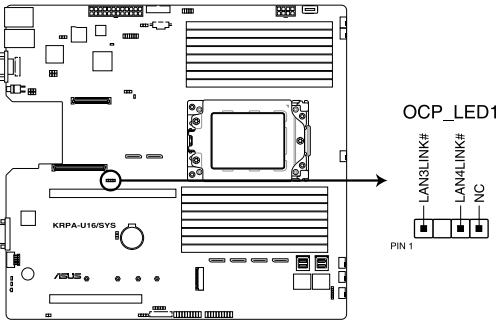
The Mezzanine PCIe connector supports Open Compute Project (OCP) cards.



**KRPA-U16/SYS Mezzanine PCIe card connectors**

**17. OCP LAN Activity LED connector (4-1 pin OCP\_LED1)**

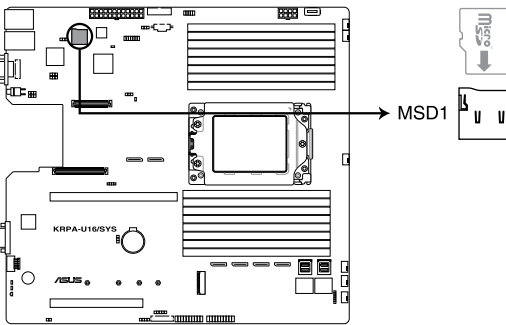
OCP LAN LED connector supports OCP LAN card Active LED.



**KRPA-U16/SYS OCP LAN Activity LED connector**

**18. Micro SD card slot (MSD1)**

Your motherboard supports SD Memory Card v2.00 (SDHC) / v3.00 (SDXC).



**KRPA-U16/SYS Micro SD card slot**



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

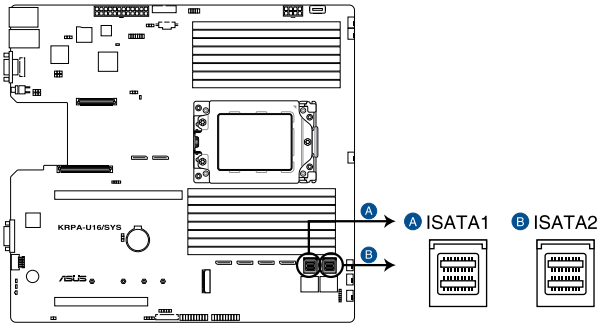


- This Micro SD card slot functions only when you enable ASUS ASMB9.
- Some memory cards may not be compatible with your motherboard. Ensure that you use only compatible memory cards to prevent loss of data, damage to your device, or memory card, or both.



## 19. Mini-SAS HD connectors (ISATA1-2)

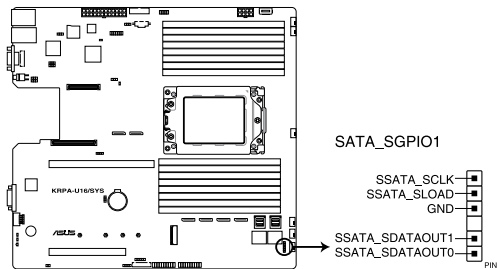
This motherboard comes with mini Serial Attached SCSI (SAS) HD connectors, the storage technology that supports Serial ATA. Each connector supports up to four devices.



**KRPA-U16/SYS Mini-SAS HD connectors**

## 20. Serial General Purpose Input/Output connector (6-1 pin SATA\_SGPIO1)

The Serial General Purpose Input/Output (SGPIO) connector allows you to connect the Intel Rapid Storage Technology Enterprise SGPIO interface. The SGPIO interface controls the LED pattern generation, device information, and general purpose data.



**KRPA-U16/SYS SATA\_SGPIO1 connector**



# **BIOS Setup**

# 5

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

## 5.1 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 when the BIOS file fails or gets corrupted.

### 2. **ASUS EzFlash**

Updates the BIOS using a USB flash disk.

### 3. **BUPDATER**

Updates the BIOS in DOS mode using a bootable USB flash disk drive.

Refer to the corresponding sections for details on these utilities.



---

Save a copy of the original motherboard BIOS file to a bootable USB flash disk drive in case you need to restore the BIOS in the future. Copy the original motherboard BIOS using the BUPDATER utility.

---

### 5.1.1 **ASUS CrashFree BIOS 3 utility**

The ASUS CrashFree BIOS 3 is an auto recovery tool that allows you to restore the BIOS file when 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](http://www.asus.com) to download the latest BIOS file.

---

## 5.1.2 ASUS EZ Flash Utility

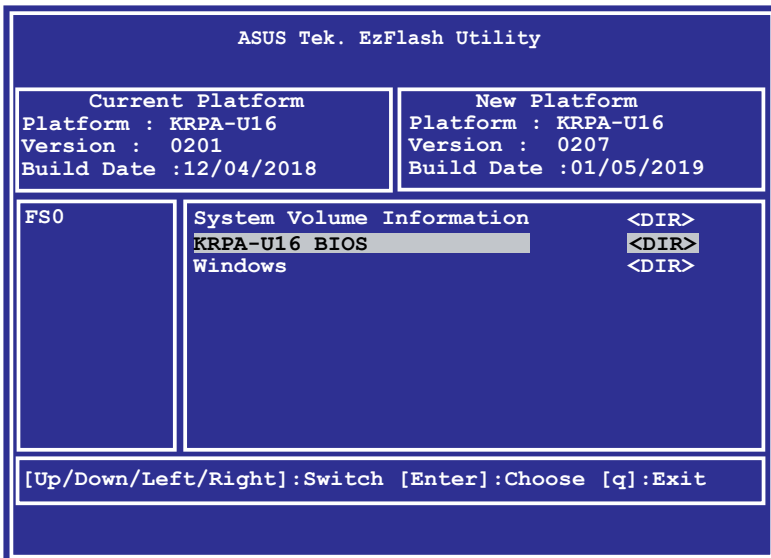
The ASUS EZ Flash Utility feature allows you to update the BIOS without having to use a DOS-based utility.



Before you start using this utility, download the latest BIOS from the ASUS website at [www.asus.com](http://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 **ASUS EZ Flash Utility**. Press <Enter>.



3. Press <Tab> 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 <Tab> to switch to the **Folder Info** field.

6. Press the Up/Down arrow keys to find the BIOS file, and 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.

### 5.1.3 BUPDATER utility



The succeeding BIOS screens are for reference only. The actual BIOS screen displays may not be the same as shown.

The BUPDATER utility allows you to update the BIOS file in the DOS environment using a bootable USB flash disk drive with the updated BIOS file.

#### Updating the BIOS file

To update the BIOS file using the BUPDATER utility:

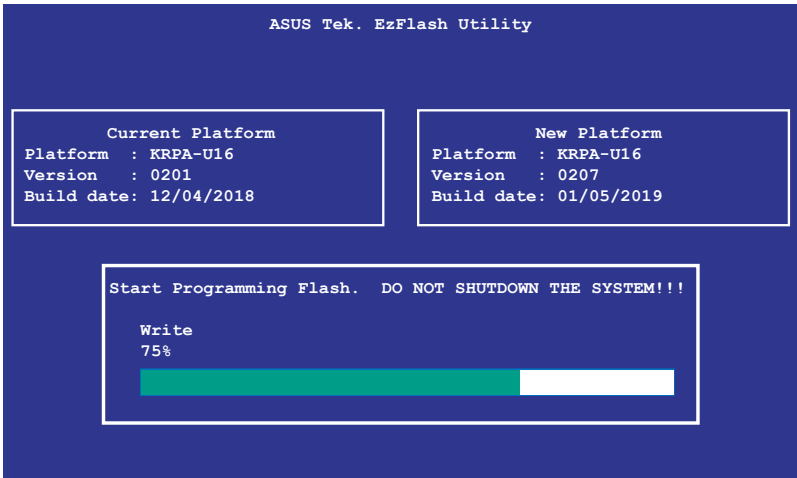
1. Visit the ASUS website at [www.asus.com](http://www.asus.com) and download the latest BIOS file for the motherboard. Save the BIOS file to a bootable USB flash disk drive.
2. Copy the BUPDATER utility (BUPDATER.exe) from the ASUS support website at <https://www.asus.com/support> to the bootable USB flash disk drive you created earlier.
3. Boot the system in DOS mode, then at the prompt, type:

```
BUPDATER /i [filename] .CAP
```

where [filename] is the latest or the original BIOS file on the bootable USB flash disk drive, then press <Enter>.

```
A:\>BUPDATER /i[file name].CAP
```

- The utility verifies the file, then starts updating the BIOS file.

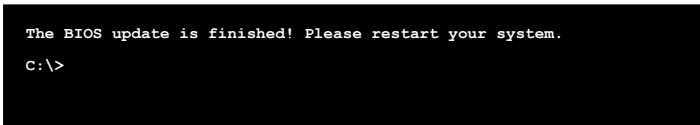


---

DO NOT shut down or reset the system while updating the BIOS to prevent system boot failure!

---

- The utility returns to the DOS prompt after the BIOS update process is completed. Reboot the system from the hard disk drive.



## 5.2 BIOS setup program

This motherboard supports a programmable firmware chip that you can update using the provided utility described in section **5.1 Managing and updating your BIOS**.

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.

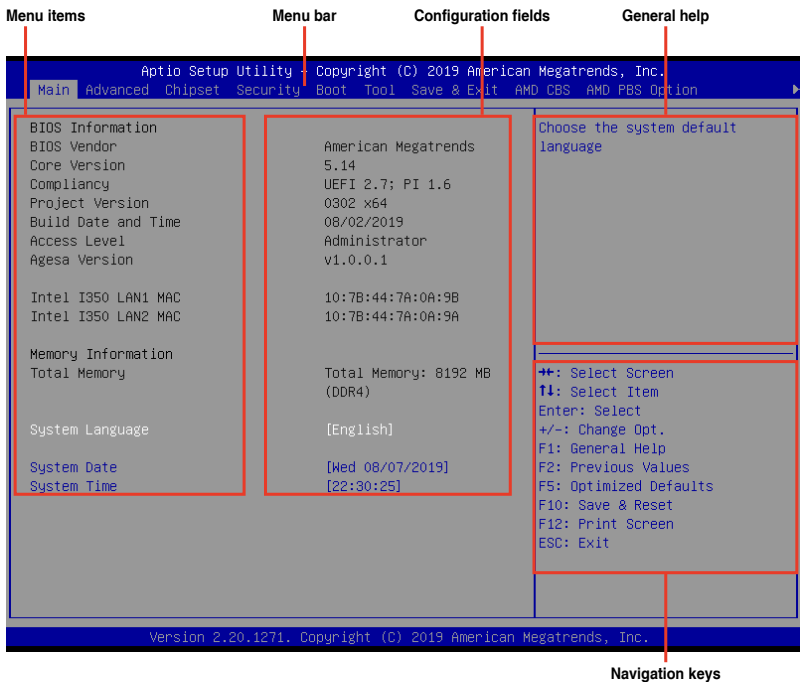
The Setup program is designed to make it as easy to use as possible. Being a menu-driven program, it lets you scroll through the various sub-menus and make your selections from the available options using the navigation keys.



- 
- 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](http://www.asus.com)) to download the latest BIOS file for this motherboard.
-



## 5.2.1 BIOS menu screen



## 5.2.2 Menu bar

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

<b>Main</b>	For changing the basic system configuration
<b>Performance Tuning</b>	For changing the performance settings
<b>Advanced</b>	For changing the advanced system settings
<b>Chipset</b>	For changing the chipset settings
<b>Security</b>	For changing the security settings
<b>Boot</b>	For changing the system boot configuration
<b>Tool</b>	For configuring options for special functions
<b>Save &amp; Exit</b>	For selecting the exit options
<b>AMD CBS</b>	For configuring AMD CBS settings
<b>AMD PBS Option</b>	For configuring AMD PBS settings
<b>Event Logs</b>	For changing the event log settings
<b>Server Mgmt</b>	For changing the Server Mgmt settings

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

### **5.2.3 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.

### **5.2.4 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>.

### **5.2.5 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.

### **5.2.6 General help**

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

### **5.2.7 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.

### **5.2.8 Pop-up window**

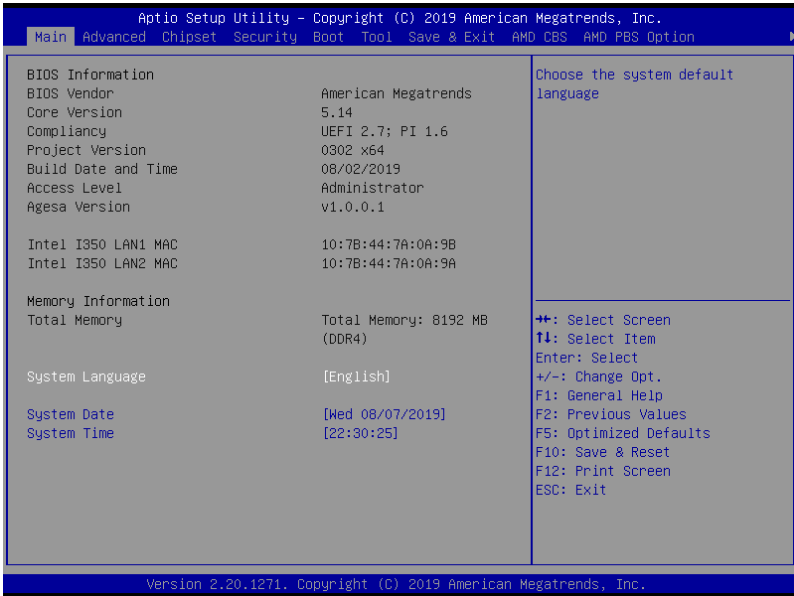
Select a menu item and press <Enter> to display a pop-up window with the configuration options for that item.

### **5.2.9 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.

## 5.3 Main menu

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



### System Date [Day xx/xx/xxxx]

Allows you to set the system date.

### System Time [xx:xx:xx]

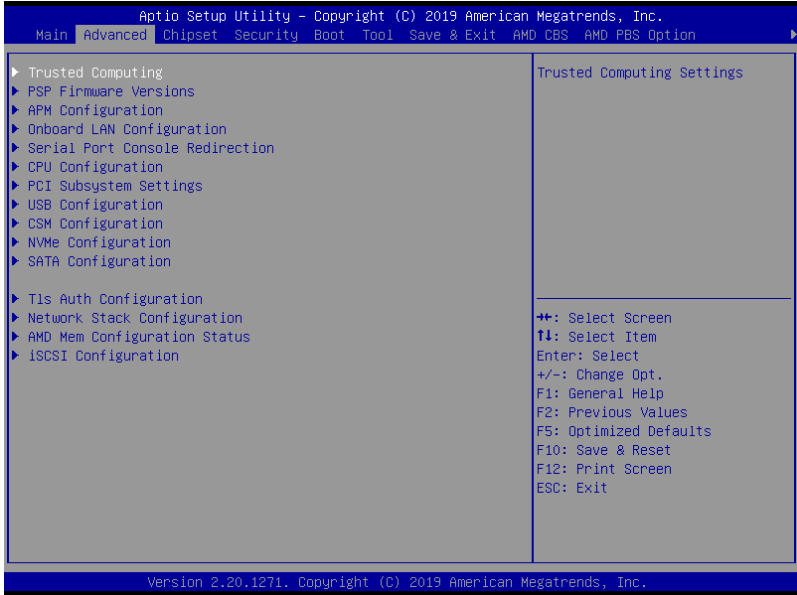
Allows you to set the system time.

# 5.4 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.



## 5.4.1 Trusted Computing

Aptio Setup Utility - Copyright (C) 2019 American Megatrends, Inc.		
Advanced		
Configuration		
Security Device Support	[Enable]	Enables or Disables BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and TPM interface will not be
NO Security Device Found		

### Configuration

#### Security Device Support [Disabled]

Allows you to enable or disable the BIOS support for security device.

Configuration options: [Disabled] [Enabled]

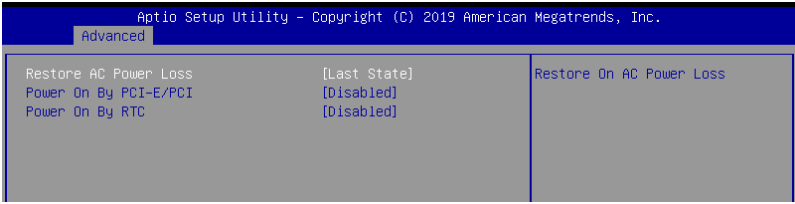
## 5.4.2 PSP Firmware Versions

This page displays the PSP firmware versions.

Aptio Setup Utility - Copyright (C) 2019 American Megatrends, Inc.		
Advanced		
PSP Firmware Versions		
PSP Directory Level 1 (Fixed)		
PSP Recovery BL Ver	FF.C.0.68	
SMU FW Version	0.36.74.0	
ABL Version	00000000	
APCB Version	0000	
APDB Version	0000	
APPB Version	0000	
PSP Directory Level 2 (Updateable)		
PSP BootLoader Version	0.C.0.68	
SMU FW Version	0.36.74.0	
ABL Version	00000000	
APCB Version	0000	
APDB Version	0000	
APPB Version	0000	
		++: 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
Version 2.20.1271. Copyright (C) 2019 American Megatrends, Inc.		

### 5.4.3 APM Configuration

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



#### Restore AC Power Loss [Last State]

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

Configuration options: [Power Off] [Power On] [Last State]

#### Power On By PCI-E/PCI [Disabled]

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

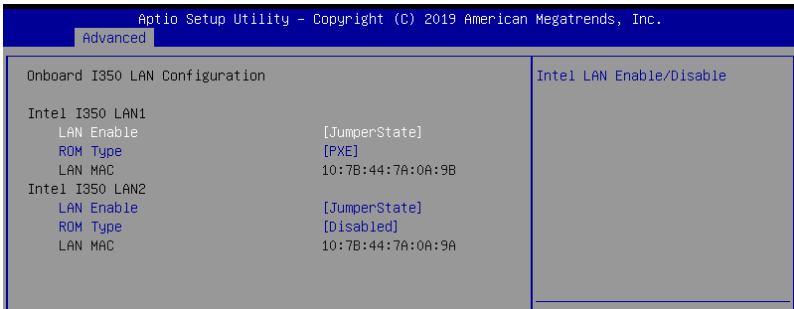
[Enabled] Enables the PCIE devices to generate a wake event.

#### 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.

## 5.4.4 Onboard LAN Configuration



### Onboard I350 LAN Configuration

#### Intel LAN1 I350

##### LAN Enable [JumperState]

Allows you to enable or disable the Intel LAN.

Configuration options: [Disabled] [JumperState]



---

The following items appear only when **LAN Enable** is set to [JumperState].

##### ROM Type [PXE]

Allows you to select the Intel LAN ROM type.

Configuration options: [PXE] [iSCSI] [Disabled]

#### Intel LAN2 I350

##### LAN Enable [JumperState]

Allows you to enable or disable the Intel LAN.

Configuration options: [Disabled] [JumperState]



---

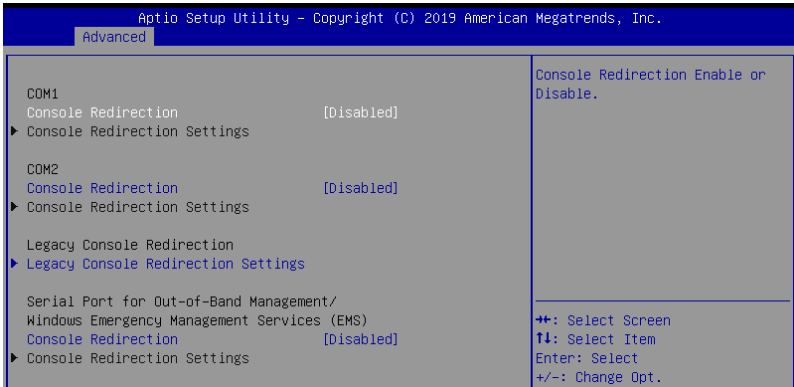
The following items appear only when **LAN Enable** is set to [JumperState].

##### ROM Type [Disabled]

Allows you to select the Intel LAN ROM type.

Configuration options: [PXE] [iSCSI] [Disabled]

## 5.4.5 Serial Port Console Redirection



### COM1/COM2

#### Console Redirection [Disabled]

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



The following item appears only when you set **Console Redirection** 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.
- [VT100+] 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 [Disabled] [Enabled]**

This allows you to enable or disable extended terminal resolution.

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 OPRM Messages.

Configuration options: [COM1] [COM2]

**Resolution [80x24]**

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

Configuration options: [80x24] [80x25]

**Redirect After 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 [Disabled]

Allows you to enable or disable the console redirection feature.

Configuration options: [Disabled] [Enabled]



---

The following item appears only when you set **Console Redirection** 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 [VT-UTF8]

Microsoft Windows Emergency Management Services (EMS) allow for remote management of a Windows Server OS through a serial port.

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

#### Bits per second [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]

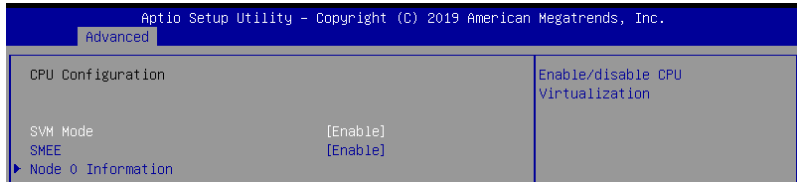
#### Flow Control [None]

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]

## 5.4.6 CPU Configuration

This page displays the CPU node information.



### SVM Mode [Enabled]

Allows you to enable or disable SVM Mode.  
Configuration options: [Disabled] [Enabled]

### SMEE [Enabled]

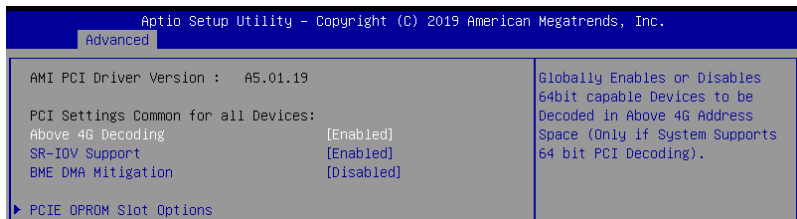
Allows you to enable or disable SMEE.  
Configuration options: [Disabled] [Enabled]

### Node 0 Information

This page displays the Node 0 Information.

## 5.4.7 PCI Subsystem Settings

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



### 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]

### SR-IOV Support [Enabled]

This option enables or disables Single Root IO Virtualization Support if the system has SR-IOV capable PCIe devices.  
Configuration options: [Disabled] [Enabled]

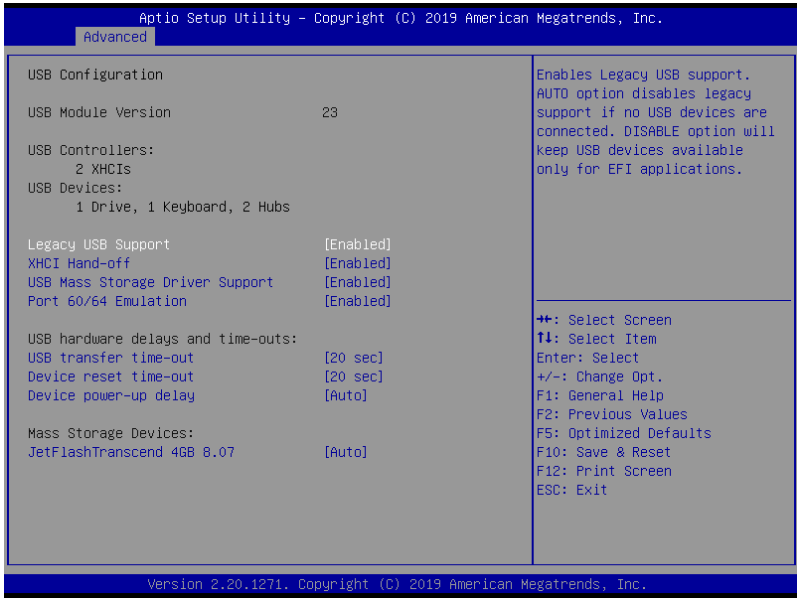
### BME DMA Mitigation [Disabled]

This allows you to enable or disable re-enabling Bus Master Attribute disabled during PCI enumeration for PCI Bridges after SMM locked.  
Configuration options: [Disabled] [Enabled]

### PCIE OPROM Slot Options

This page allows you to enable or disable OpROM on each PCIe Slot.

## 5.4.8 USB Configuration



### Legacy USB Support [Enabled]

Allows you to enable or disable Legacy USB device support.  
Configuration options: [Enabled] [Disabled] [Auto]

### XHCI Hand-off [Enabled]

Allows you to enable or disable workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.  
Configuration options: [Enabled] [Disabled]

### USB Mass Storage Driver Support [Enabled]

Allows you to enable or disable the USB Mass Storage driver support.  
Configuration options: [Disabled] [Enabled]

### Port 60/64 Emulation [Enabled]

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

## USB hardware delays and time-outs

### USB transfer time-out [20 sec]

Allows you to select time-out value for Control, Bulk, and Interrupt transfers.

Configuration options: [1 sec] [5 sec] [10 sec] [20 sec]

### Device reset time-out [20 sec]

Allows you to select time-out value for USB mass storage device Start Unit command.

Configuration options: [10 sec] [20 sec] [30 sec] [40 sec]

### Device power-up delay [Auto]

Allows you to select maximum time the device will take before it properly reports itself to the Host Controller.

Configuration options: [Auto] [Manual]

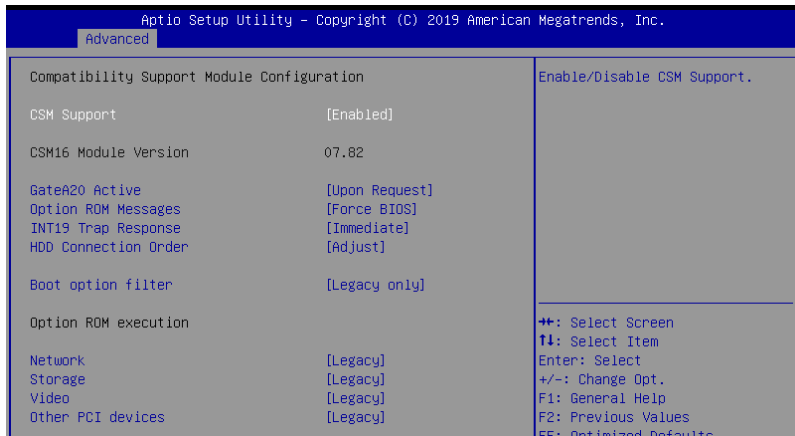
## Mass Storage Devices

### AMI Virtual CDROM0-2 / Floppy / HDisk0 1.00 [Auto]

Allows you to select the mass storage device emulation type.

Configuration options: [Auto] [Floppy] [Forced FDD] [Hard Disk] [CD-ROM]

## 5.4.9 CSM Configuration



### CSM Support [Enabled]

This option allows you to enable or disable CSM Support.

Configuration options: [Disabled] [Enabled]



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

### GateA20 Active [Upon Request]

This allows you to set the GA20 option.

Configuration options: [Upon Request] [Always]

### Option ROM Messages [Force BIOS]

This allows you to set the display mode for option ROM.

Configuration options: [Force BIOS] [Keep Current]

### INT19 Trap Response [Immediate]

[Immediate]           Execute the trap right away.

[Postponed]           Execute the trap during legacy boot.

### HDD Connection Order [Adjust]

This option allows you to change the HDD order required for some OSes.

Configuration options: [Adjust] [Keep]

### Boot Option filter [Legacy only]

This option allows you to control the Legacy/UEFI ROMs priority.

Configuration options: [UEFI and Legacy] [Legacy only] [UEFI only]

### Network / Storage / Video [Legacy]

This option allows you to control the execution of UEFI and Legacy PXE / Storage / Video OpROM.

Configuration options: [UEFI] [Legacy]

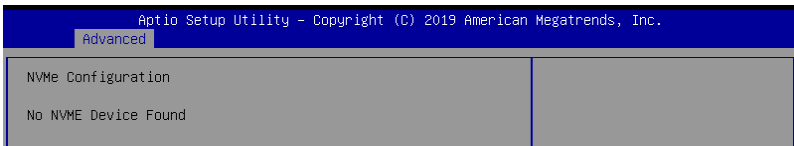
### Other PCI devices [Legacy]

This item determines the OpROM execution policy for devices other than Network, Storage, or Video.

Configuration options: [UEFI] [Legacy]

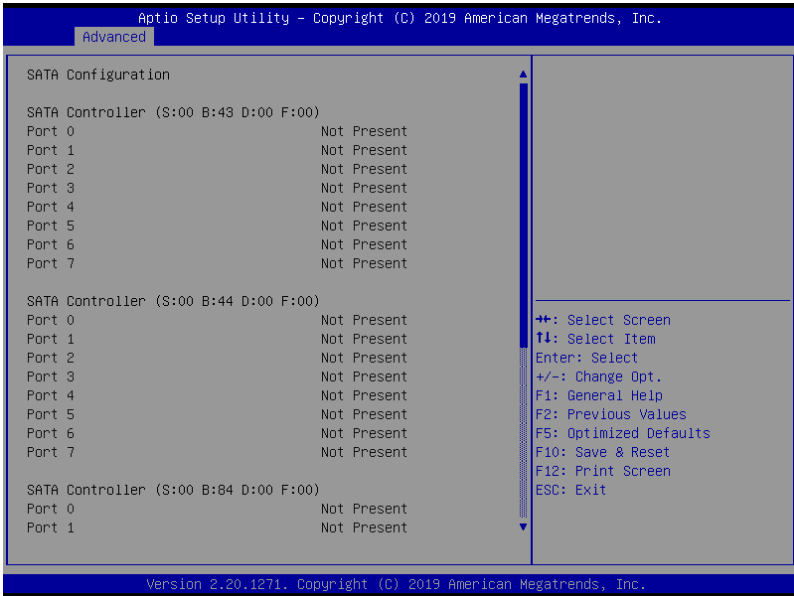
## 5.4.10 NVMe Configuration

This page will display the NVMe controller and drive information.



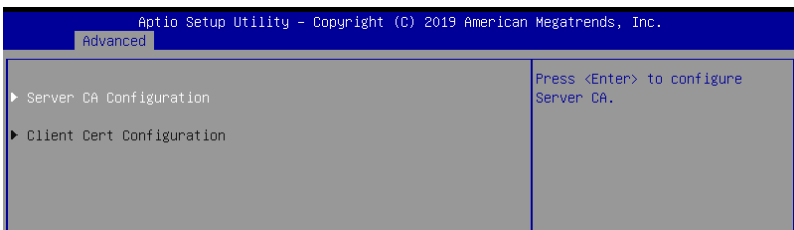
## 5.4.11 SATA Configuration

This page will display the SATA controller and drive information.

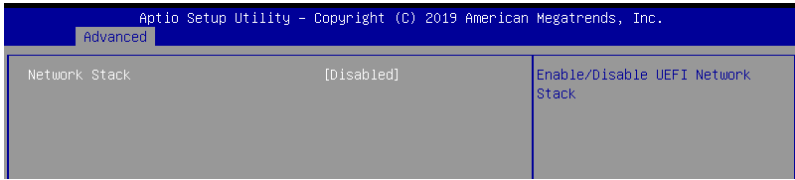


## 5.4.12 Tls Auth Configuration

Allows you to configure the Tls parameters.



## 5.4.13 Network Stack Configuration



### Network stack [Disabled]

Enables or disables the network stack feature.

Configuration options: [Disable] [Enable]



---

The following item appears 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]

### IPSEC Certificate [Disabled]

This item allows you to enable or disable IPSEC Certificate for Ikev.

Configuration options: [Disabled] [Enabled]

### PXE boot wait time [0]

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

### Media detect time [1]

Wait time (in seconds) to detect media.



## 5.4.14 AMD Mem Configuration Status

Allows you to view the memory status.

Aptio Setup Utility - Copyright (C) 2019 American Megatrends, Inc.		
Advanced		
▶ Socket 0	Socket-specific memory configuration status	
▶ Socket 1		
Mbist Test Enable		Disabled, 0xD003
Mbist Aggressor Enable		Disabled, 0xD000
Mbist Per Bit Slave Die Report		0x0000, 0xD000
Dram Temp Controlled Refresh		Disabled, 0xD000
Enable		
User Timing Mode		Disabled, 0xD015
User Timing Value		Disabled, 0xD015

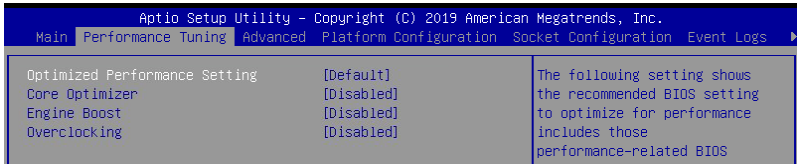
## 5.4.15 iSCSI Configuration

Allows you to configure the iSCSI parameters.

Aptio Setup Utility - Copyright (C) 2019 American Megatrends, Inc.	
Advanced	
iSCSI Initiator Name	The worldwide unique name of iSCSI Initiator. Only IQN format is accepted. Range is from 4 to 223
▶ Add an Attempt	
▶ Delete Attempts	
▶ Change Attempt Order	

## 5.5 Performance Tuning menu

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



### 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.

Configuration options:

**[Peak Frequency Optimized]** - Applies settings with performance and power consumption balance. Recommended for users that need higher performance.

**[Latency Optimized]** - Applies settings with low latency results. Recommended for latency-sensitive users.

**[Power Efficient Optimized]** - Applies settings with power efficiency. Recommended for general users.

**[HPC]** - Applies settings with optimized compute capability. Recommend for traditional HPC applications.



---

**Core Optimizer** and **Engine Boost** appear only when you set **Optimized Performance Setting** to **[Default]** or **[By Benchmark]**.

---

### Core Optimizer [Disabled]

Enable this item to keep the processor operating at the turbo frequency.

Configuration options: [Disabled] [Enabled]



---

Linux support may vary by version of the OS.

---

### Engine Boost [Disabled]

Enable this item to boost the CPU's frequency.

Configuration options: [Disabled] [Level1] [Level2] [Level3(Max)]

### Overclocking [Disabled]

Enable this item to increase the CPU's clock.

Configuration options: [Disabled] [Level1] [Level2] [Level3(Max)]



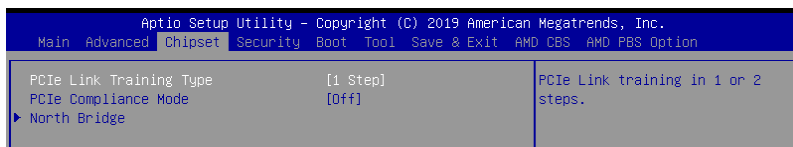
Operate with an ambient temperature of 25°C or lower for optimized performance.



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.

## 5.6 Chipset menu

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



### PCIe Link Training Type [1 Step]

Allows you to select the PCIe training in 1 or 2 steps.

Configuration options: [1 Step] [2 Step]

### PCIe Compliance Mode [Off]

Allows you to select the PCIe Compliance Mode.

Configuration options: [On] [Off]

### North Bridge

#### Memory Configuration

##### Socket 0 Information

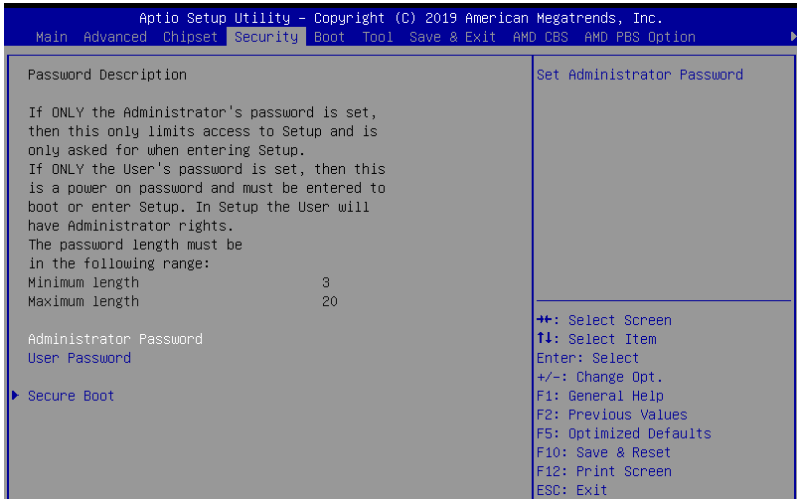
This item displays the memory information on Socket 0.

##### Socket 1 Information

This item displays the memory information on Socket 1.

# 5.7 Security menu

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



## Administrator Password

To set an administrator password:

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

To change an administrator password:

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



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

## User Password

To set a user password:

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

To change a user password:

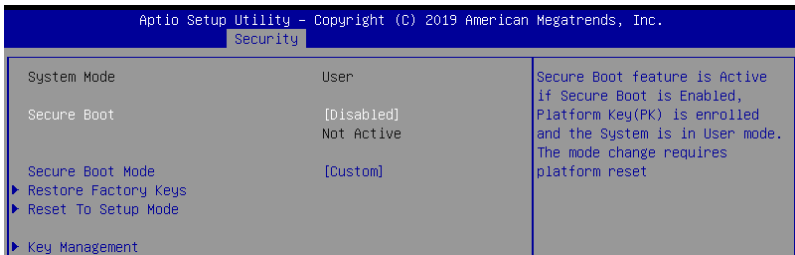
1. Select the User Password item and press <Enter>.
2. From the Enter Current Password box, key in the current password, then press <Enter>.
3. From the Create New Password box, key in a new password, then press <Enter>.
4. Confirm the password when prompted.

To clear a user password:

1. Select the Clear User Password item and press <Enter>.
2. Select **Yes** from the Warning message window then press <Enter>.

## Secure Boot

This item allows you to customize the Secure Boot settings.



### 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: [Custom] [Standard]

## Restore Factory Keys

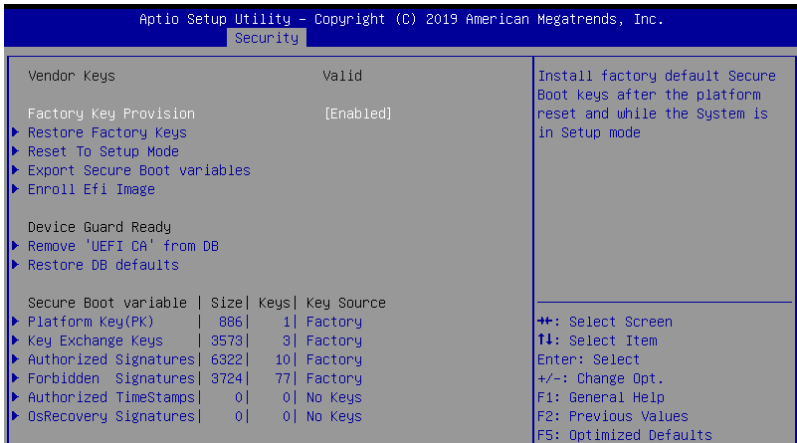
This option will force the system to User Mode, and install factory default Secure Boot key databases.

## Reset to Setup Mode

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

## Key Management

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



### Factory Key Provision [Enabled]

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

Configuration options: [Disabled] [Enabled]

### Restore Factory keys

This item will install all Factory Default keys.

### Reset to Setup Mode

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

### Export Secure Boot Variables

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

### Enroll Efi Image

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

Configuration options: [Set New] [Append]

### **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)**

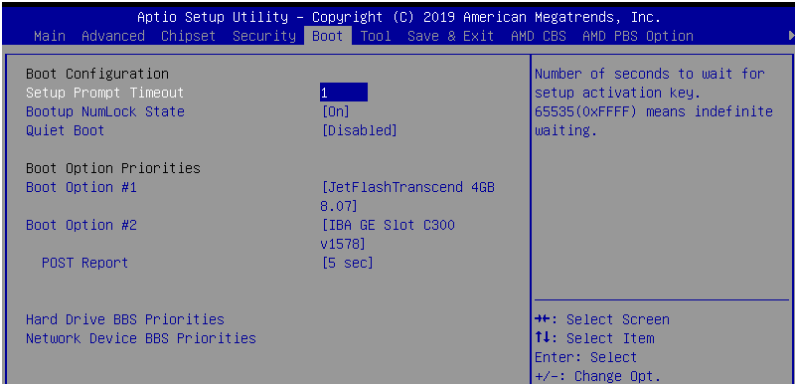
Configuration options: [Details] [Export] [Update] [Append] [Delete]

#### **Authorized TimeStamps (DBT) / OsRecovery Signatures**

Configuration options: [Update] [Append]

# 5.8 Boot menu

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



## Setup Prompt Timeout [1]

Allows you to set the number of seconds to wait for setup activation key.

## Bootup NumLock State [On]

Allows you to select the power-on state for the NumLock.

Configuration options: [Off] [On]

## Quiet Boot [Disabled]

Allows you to enable or disable Quiet Boot.

Configuration options: [Disabled] [Enabled]

## 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]

## 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.

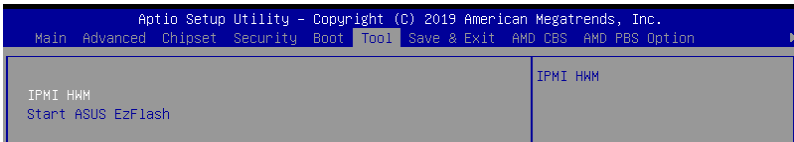
## Floppy Drive BBS Priorities / Hard Drive BBS Priorities / CD/DVD ROM Drive BBS Priorities

These items appear only when you connect Floppy / SATA ODD or HDD to the SATA ports and allow you to set the booting order of the SATA devices.



## 5.9 Tool menu

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



### IPMI HMM

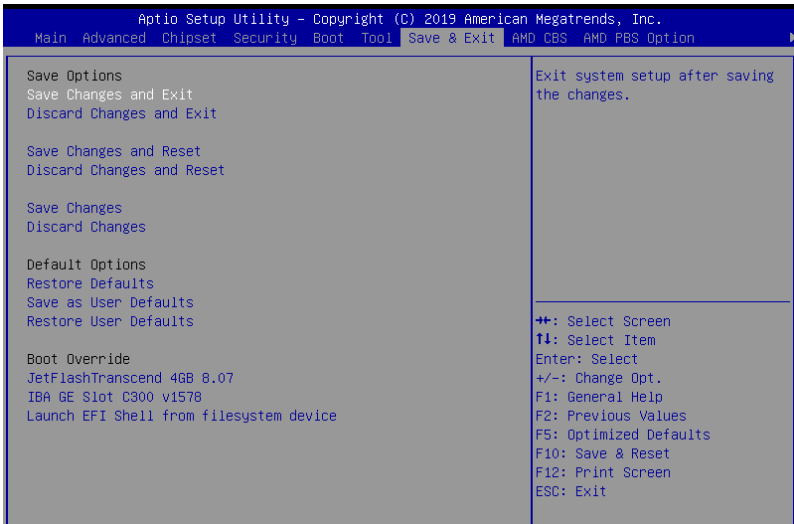
Allows you to run the IPMI hardware monitor.

### Start EZ Flash

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

## 5.10 Save & Exit menu

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





---

Pressing <Esc> does not immediately exit this menu. Select one of the options from this menu or <F10> from the legend bar to exit.

---

### **Save Changes and Exit**

Exit system setup after saving the changes.

### **Discard Changes and Exit**

Exit system setup without saving any changes.

### **Save Changes and Reset**

Rest system setup after saving the changes.

### **Discard Changes and Rest**

Rest 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.

### **Save as User Defaults**

Save all the current setup options as user default values.

### **Restore as User Defaults**

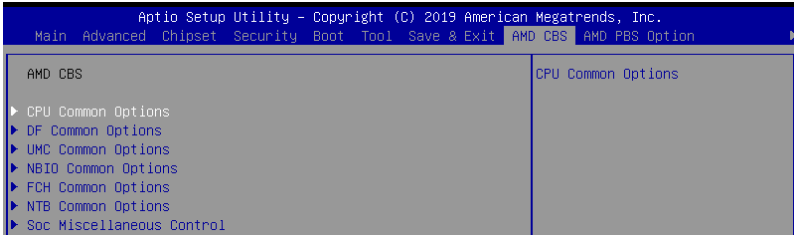
Restore/load user default values for all the setup options.

### **Boot Override**

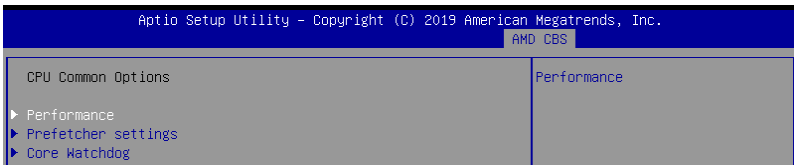
These items displays the available devices. The device items that appears on the screen depends on the number of devices installed in the system. Click an item to start booting from the selected device.

## 5.11 AMD CBS menu

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



### 5.11.1 CPU Common Options



#### Performance

##### Custom Core Pstates

This option allows you to enable Core Pstates. Read the disclaimer and select **I Accept** to continue.

##### CCD/Core/Thread Enablement

This option allows you to enable CCD/Core/Thread Enablement. Read the disclaimer and select **I Accept** to continue.

#### Prefetcher settings

##### L1 Stream HW Prefetcher [Auto]

This option allows you to enable or disable L1 Stream HW Prefetcher.  
Configuration options: [Disabled] [Enabled] [Auto]

##### L2 Stream HW Prefetcher [Auto]

This option allows you to enable or disable L2 Stream HW Prefetcher.  
Configuration options: [Disabled] [Enabled] [Auto]

#### Core Watchdog

##### Core Watchdog Timer Enable [Auto]

This option allows you to enable or disable Core Watchdog Timer.  
Configuration options: [Disabled] [Enabled] [Auto]

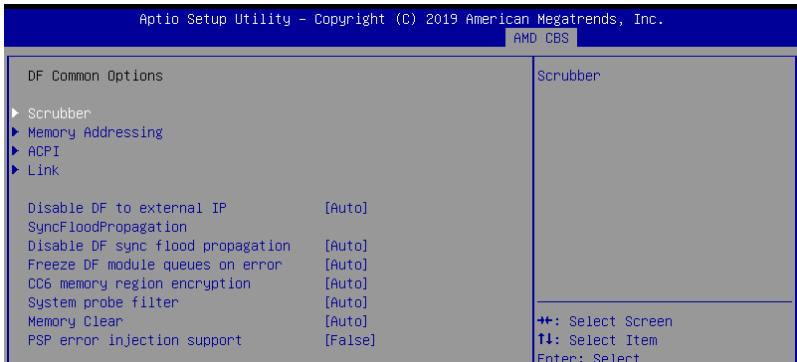
#### Core Performance Boost [Auto]

Configuration options: [Disabled] [Auto]

#### Global C-state Control [Auto]

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

## 5.11.2 DF Common Options



### Scrubber

#### DRAM scrub time [Auto]

Configuration options: [Disabled] [1 hour] [4 hours] [8 hours] [16 hours] [24 hours] [48 hours] [Auto]

#### Poison scrubber control [Auto]

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

#### Redirect scrubber control [Auto]

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

#### Redirect scrubber limit [Auto]

Configuration options: [2] [4] [Infinite] [Auto]

### Memory Addressing

#### NUMA nodes per socket [Auto]

Configuration options: [NPS0] [NPS1] [NPS2] [NPS4] [Auto]

#### Memory interleaving [Auto]

This option allows you to control fabric level memory interleaving.

Configuration options: [Disabled] [Auto]

#### Memory interleaving size [Auto]

This option allows you to control the memory interleaving size.

Configuration options: [256 Bytes] [512 Bytes] [1 KB] [2 KB] [Auto]

#### 1TB remap [Auto]

Configuration options: [Do not remap] [Attempt to remap] [Auto]

#### DRAM map inversion Auto

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

### **Disable DF to external IP SyncFloodPropagation [Auto]**

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

### **Disable DF sync flood propagation [Auto]**

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]

### **System probe filter [Auto]**

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

### **Memory Clear [Auto]**

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

### **PSP error injection support [False]**

Configuration options: [False] [True]

## **5.11.3 UMC Common Option**



### **DDR4 Common Options**

#### **DRAM Timing Configuration**

This option allows you to set memory overclock settings. Read the disclaimer and select **I Accept** to continue.

#### **DRAM Controller Configuration**

##### **Power Down Options**

##### ***Power Down Enable [Auto]***

This option allows you to enable or disable DDR power down mode.  
Configuration options: [Disabled] [Enabled] [Auto]

##### **Cmd2T [Auto]**

This option allows you to select between 1T and 2T mode on ADDR/CMD.  
Configuration options: [1T] [2T] [Auto]

### **Gear Down Mode [Auto]**

This option allows you to select the Gear Down Mode.

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

### **CAD Bus Configuration**

#### **CAD Bus Timing User Controls [Auto]**

This option allows you to set the setup time on CAD bus signals to Auto or manual.

Configuration options: [Manual] [Auto]

#### **CAD Bus Drive Strength User Controls [Auto]**

This option allows you to set the Drive Strength on CAD bus signals to Auto or manual.

Configuration options: [Manual] [Auto]

### **Data Bus Configuration**

#### **Data Bus Configuration User Controls [Auto]**

This option allows you to interleave memory blocks across DRAM chip selects for node 0.

Configuration options: [Auto] [Manual]



---

The following item appears only when **Data Bus Configuration User Controls** is set to **[Manual]**.

---

#### ***RttNom* [Auto]**

Configuration options: [Rtt\_Nom Disable] [RZQ/4] [RZQ/2] [RZQ/6] [RZQ/1] [RZQ/5] [RZQ/3] [RZQ/7] [Auto]

#### ***RttWr* [Auto]**

Configuration options: [Dynamic ODT Off] [RZQ/2] [RZQ/1] [Hi-Z] [RZQ/3] [Auto]

#### ***RttPark* [Auto]**

Configuration options: [Rtt\_PARK Disable] [RZQ/4] [RZQ/2] [RZQ/6] [RZQ/1] [RZQ/5] [RZQ/3] [RZQ/7] [Auto]

### **Common RAS**

#### **Data Poisoning [Auto]**

This option allows you to enable or disable Data Poisoning.

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

#### **DRAM Post Package Repair [Disabled]**

Configuration options: [Disabled] [Enabled]

#### **RCD Parity [Auto]**

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

#### **DRAM Address Command Parity Retry [Auto]**

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

**Write CRC Enable [Auto]**

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

**DRAM Write CRC Enable and Retry Limit [Auto]**

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

**Disable Memory Error Injection [True]**

Configuration options: [False] [True]

**ECC Configuration*****DRAM ECC Symbol Size [Auto]***

This option allows you to set the DRAM ECC Symbol Size.

Configuration options: [Auto] [x4] [x8]

***DRAM ECC Enable [Auto]***

This option allows you to enable or disable DRAM ECC.

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

***DRAM UECC Retry [Auto]***

This option allows you to enable or disable DRAM UECC Retry.

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

**Security****TSME [Auto]**

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

**Data Scramble [Auto]**

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

**DRAM Memory Mapping****Chipselect Interleaving [Auto]**

This option allows you to interleave memory blocks across DRAM chip selects for node 0.

Configuration options: [Disabled] [Auto]

**BankGroupSwap [Auto]**

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

**Address Hash Bank [Auto]**

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

**Address Hash CS [Auto]**

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

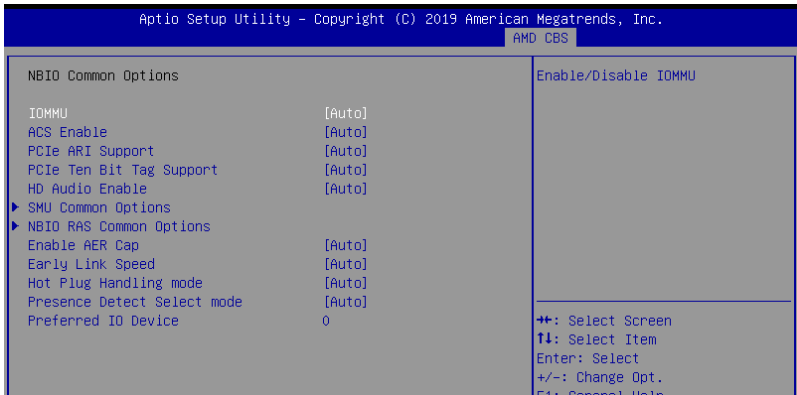
**Address Hash Rm [Auto]**

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

**SPD Read Optimization [Auto]**

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

## 5.11.4 NBIO Common Options



### IOMMU [Auto]

This option allows you to enable or disable IOMMU.

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

### ACS Enable [Auto]

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

### PCIe ARI Support [Auto]

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

### PCIe Ten Bit Tag Support [Auto]

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

### SMU Common Options

#### Determinism Control [Auto]

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

#### cTDP Control [Manual]

This option allows you to set the cTDP.

Configuration options: [Manual] [Auto]



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

#### **cTDP [200]**

This option allows you to set the cTDP value.



## **Package Power Limit Control [Manual]**

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



---

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

---

### ***Package Power Limit [240]***

This option allows you to set the cTDP value.

### **APBDIS [Auto]**

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

### **DF Cstates [Auto]**

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

### **CPPC [Auto]**

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

### **BoostFmaxEn [Auto]**

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

## **NBIO RAS Common Options**

### **Determinism Control [Auto]**

Configuration options: [Manual] [Auto]

### **NBIO RAS Global Control [Auto]**

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

### **NBIO RAS Control [MCA]**

Configuration options: [MCA] [Legacy] [Disabled]

### **Egress Poison Severity High**

This option allows you to set the Egress Poison Severity High value.

### **Egress Poison Severity Low**

This option allows you to set the Egress Poison Severity Low value.

### **NBIO SyncFlood Generation [Auto]**

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

### **NBIO SyncFlood Reporting [Disabled]**

Configuration options: [Disabled] [Enabled]

### **Egress Poison Mask High**

This option allows you to set the Egress Poison Mask High value.

### **Egress Poison Mask Low**

This option allows you to set the Egress Poison Mask Low value.

### **Uncorrected Converted to Poison Enable Mask High**

This option allows you to set the Uncorrected Converted to Poison Enable Mask High value.

### **Uncorrected Converted to Poison Enable Mask Low**

This option allows you to set the Uncorrected Converted to Poison Enable Mask Low value.

**System Hub Watchdog Timer**

This option allows you to set the System Hub Watchdog Timer value.

**SLINK Read Response OK [Disabled]**

Configuration options: [Disabled] [Enabled]

**SLINK Read Response Error Handling [Log Error in MCA]**

Configuration options: [Log Error in MCA][Enabled] [Trigger MCOMMIT error]

**Log Poison Data from SLINK [Disabled]**

Configuration options: [Disabled] [Enabled]

**PCIe Aer Reporting Mechanism [Auto]**

Configuration options: [Firmware First] [OS First] [MCA] [Auto]

**Edpc Control [Disabled]**

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

**NBIO Poison Consumption [Auto]**

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

**Sync Flood on PCIe Fatal Error [Auto]**

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

**Enable AER Cap [Auto]**

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

**Early Link Speed [Auto]**

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

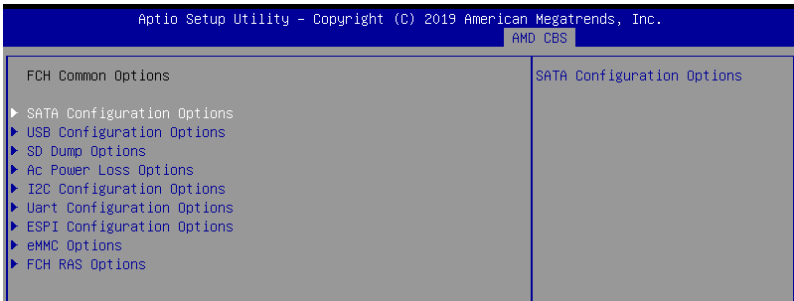
**Hot Plug Handling mode [Auto]**

Configuration options: [A0 Mode] [OS First (No Error Handling)]  
[OS First (Error Handling - Not Implemented)]  
[Firmware First (Not Implemented)] [Auto]

**Presence Detect Select mode [Auto]**

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

## 5.11.5 FCH Common Options



### USB Configuration Options

**XHCI Controller0 enable [Auto]**

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

**XHCI Controller1 enable [Auto]**

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

**USB ecc SMI Enable [Auto]**

Configuration options: [Off] [Enabled] [Auto]

**MCM USB**

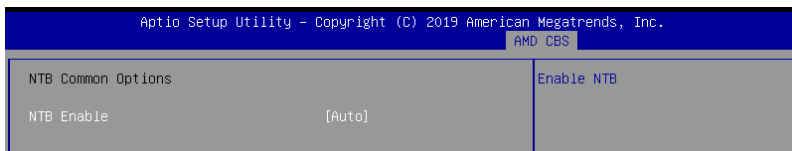
***XHCI2 enable (Socket1) [Auto]***

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

***XHCI3 enable (Socket1) [Auto]***

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

## 5.11.6 NTB Common Options



### NTB Enable [Auto]

Configuration options: [Enabled] [Auto]



---

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

---

#### NTB Location [Auto]

Configuration options: [Auto] [Socket0-Die0] [Socket0-Die1] [Socket0-Die2]  
[Socket0-Die3] [Socket1-Die0] [Socket1-Die1]  
[Socket1-Die2] [Socket1-Die3]

#### NTB active on PCIeCore [Auto]

Configuration options: [Auto] [Core0] [Core1]

#### NTB Mode [Auto]

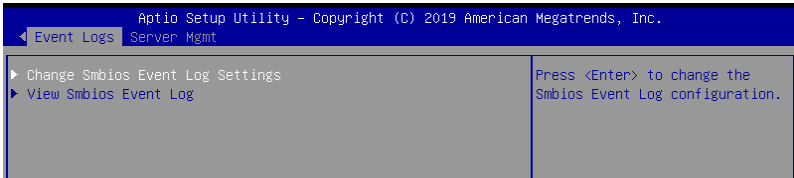
Configuration options: [NTB Disabled] [NTB Primary] [NTB Secondary]  
[NTB Random] [Auto]

#### Link Speed [Auto]

Configuration options: [MAX Speed] [Gen 1] [Gen 2] [Gen 3] [Auto] [Gen 4]

## 5.12 Event Logs menu

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



### 5.12.1 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]

#### 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]

#### Smbios Event Log Standard Settings

##### Log System Boot Event [Disabled]

Allows you to choose options to enable/disable logging of System boot event.  
Configuration options: [Enabled] [Disabled]

##### MECI [1]

Multiple Event Count Increment (MECI). The number of occurrences of a duplicate event that must pass before the multiple-event counter associated with the log entry is updated, specified as a numeric value in the range 1 to 255.

##### METW [60]

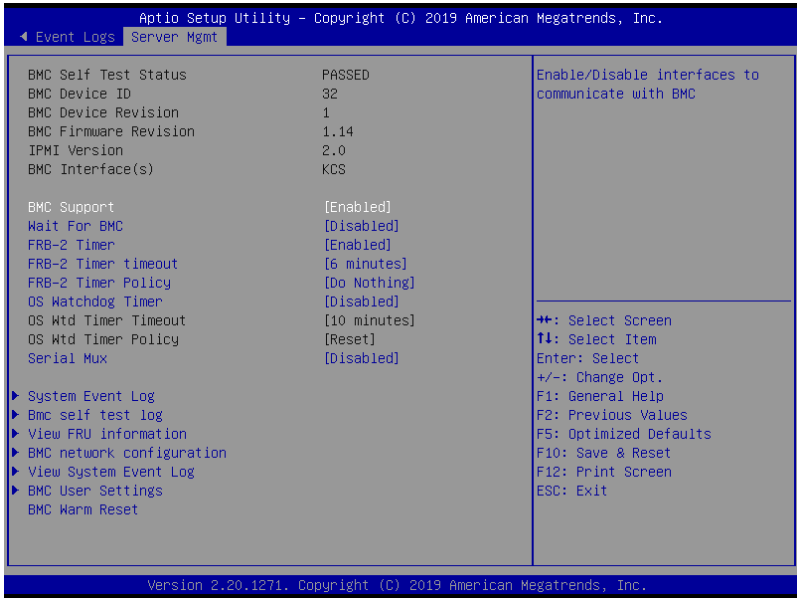
Multiple Event Time Windows (METW). The number of minutes which must pass between duplicate log entries which utilize a multiple-event counter. The value ranges from 0 to 99 minutes.

### 5.12.2 View Smbios Event Log

Press <Enter> to view all smbios event logs.

## 5.13 Server Mgmt menu

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



### BMC Support [Enabled]

Configuration options: [Disabled] [Enabled]

### Wait For BMC [Disabled]

Configuration options: [Disabled] [Enabled]

### FRB-2 Timer [Enabled]

Configuration options: [Disabled] [Enabled]

### FRB-2 Timer timeout [6 minutes]

Configuration options: [3 minutes] [4 minutes] [5 minutes] [6 minutes]

### FRB-2 Timer Policy [Do Nothing]

Configuration options: [Do Nothing] [Reset] [Power Down] [Power Cycle]

### 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: [Disabled] [Enabled]



---

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

---

#### **OS Wtd Timer Timeout [10 minutes]**

Allows you to configure the length of the OS Boot Watchdog Timer.  
Configuration options: [5 minutes] [10 minutes] [15 minutes] [20 minutes]

#### **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]

### **System Event Log**

Allows you to change the SEL event log configuration.

#### **SEL Components [Enabled]**

This option allows you to enable or disable SEL Components.  
Configuration options: [Disabled] [Enabled]



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The following items is configurable only when the **SEL Components** is set to **[Enabled]**.

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#### **Erase SEL [No]**

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

#### **When SEL is Full [Do Nothing]**

Allows you to choose options for reactions to a full SEL.  
Configuration options: [Do Nothing] [Erase Immediately]

#### **Log EFI Status Codes [Error code]**

Configuration options: [Disabled] [Both] [Error code] [Progress code]

### **BMC self test log**

#### **Erase Log [Yes, On every reset]**

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

#### **When log is full [Clear Log]**

Configuration options: [Clear Log] [Do not log any more]

### **BMC network configuration**

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

### **View System Event Log**

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





# Driver Installation

# 6

This chapter provides the instructions for installing the necessary drivers for different system components in the Windows® Operating System.

## 6.1 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.



1. The contents of the support DVD are subject to change at any time without notice. Visit the ASUS website ([www.asus.com](http://www.asus.com)) for the latest updates on software and utilities.
2. The support DVD is supported on Windows® Server 2012 R2 and Windows® Server 2016.

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).



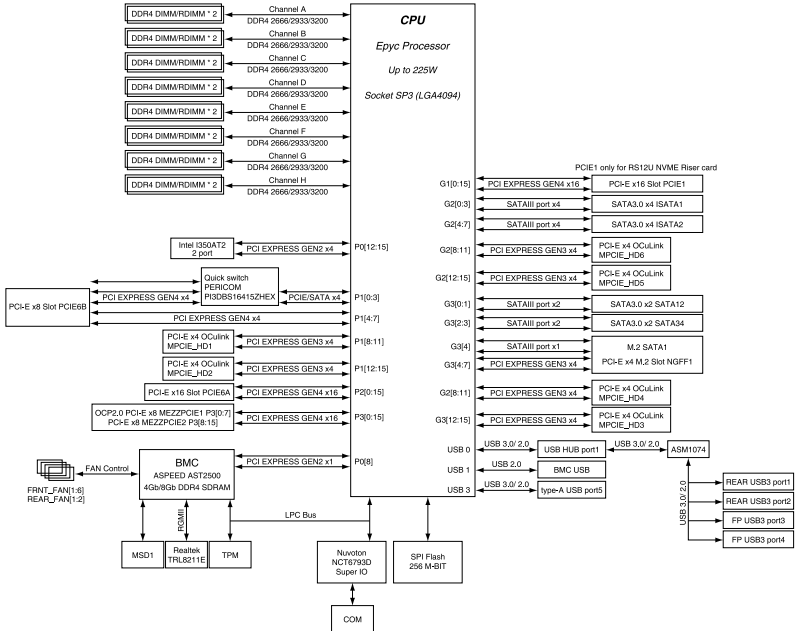
You need an internet browser installed in your OS to view the User Guide.

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

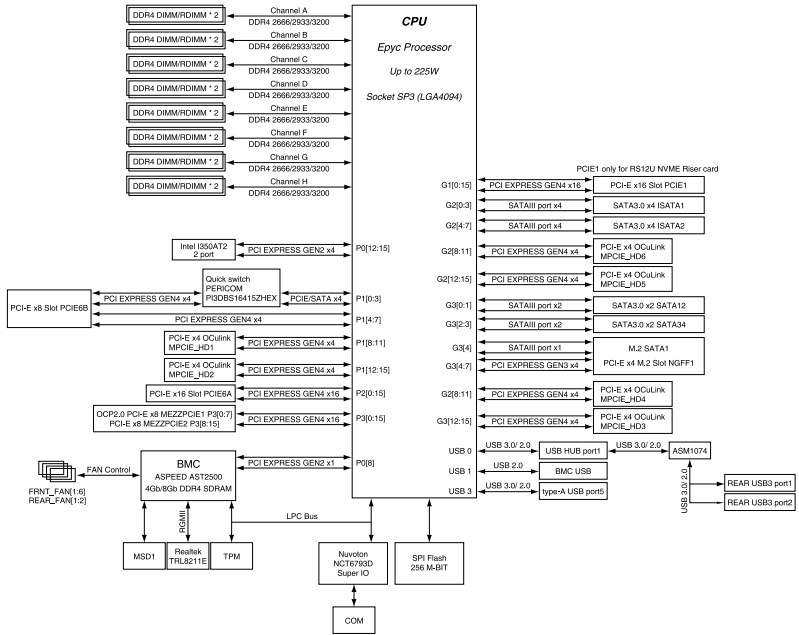
# **Appendix**

# KRPA-U16 block diagram

## RS500A-E10-RS4 / RS500A-E10-PS4



# RS500A-E10-RS12U



# 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, and
- 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.



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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.

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## Canadian Department of Communications Statement

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.



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.

## 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/>.

## 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.

## 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, Authorisation, and Restriction of Chemicals) regulatory framework, we published 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.

## Vietnam RoHS

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

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

## Türkiye RoHS

AEEE Yönetmeliğine Uygundur

## ASUS Recycling/Takeback Services

ASUS recycling and takeback programs come from our commitment to the highest standards for protecting our environment. We believe in providing solutions for you to be able to responsibly recycle our products, batteries, other components as well as the packaging materials. Please go to <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>.

## Service and Support

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

