Pro ER100A B6

WORKSTATION SYSTEM

USER GUIDE

E26129
First Edition
June 2025

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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 workstation must be conducted by certified or experienced engineers.
- Before operating the workstation, carefully read all the manuals included with the workstation package.
- Before using the workstation, 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 workstation on a stable surface.
- If you encounter technical problems with the product, contact a qualified service technician or your retailer.

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

Restricted Access Area

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

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

Button/Coin Batteries Safety Information

1. Remove and immediately recycle or dispose of used batteries according to local regulations and keep out of reach of children. Do not incinerate or dispose of batteries in household trash.
2. If ingested or inserted inside any part of the body, call a local poison control center for treatment information. Even used batteries may cause serious injury or death.
3. This product uses CR2032 type batteries with a nominal voltage of 3V.
4. Do not attempt to recharge non-rechargeable batteries.
5. Do not forcibly discharge, recharge, disassemble, heat above the battery manufacturer's specified temperature rating, or incinerate. Doing so may result in injury or chemical burns caused by venting, leakage, or explosion.
6. When installing batteries, ensure that the polarity (+ and -) is correct.
7. Do not mix old and new batteries, or batteries of different brands or types (such as alkaline, carbon-zinc, or rechargeable batteries).
8. Remove and immediately recycle or dispose of batteries from equipment not used for an extended period of time according to local regulations.
9. Always completely secure the battery compartment. If the battery compartment cannot be securely closed, stop using the product, remove the batteries, and keep the batteries out of reach of children.

⚠ WARNING

- **INGESTION HAZARD**: This product contains a button cell or coin battery.
- **DEATH** or serious injury can occur if ingested.
- A swallowed button cell or coin battery can cause **Internal Chemical Burns** in as little as **2 hours**.
- **KEEP** new and used batteries **OUT OF REACH of CHILDREN**.
- **Seek immediate medical attention** if a battery is suspected to be swallowed or inserted inside any part of the body.

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 workstation 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 workstation.

Contents

This guide contains the following parts:

1. **Chapter 1: Product Introduction**

   This chapter describes the general features of the workstation, 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: Motherboard Information**

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

4. **Chapter 4: Software Configuration**

   This chapter provides instructions for changing software configuration settings.

5. **Chapter 5: BIOS Setup**

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

Conventions

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

CAUTION	Information to prevent damage to the components and injuries to yourself when trying to complete a task.
IMPORTANT	Instructions that you MUST follow to complete a task.
NOTE	Tips and additional information to help you complete a task.

Typography

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

References

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

ASUS websites

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

1 Product Introduction

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

1.1 System package contents

Check your system package for the following items.

	Pro ER100A B6
Chassis	ASUS 1U Rackmount Chassis
Motherboard	ASUS B650M-S Motherboard
Components	1 x PSU FLEX 500W GOLD 1 x 2.5-inch Storage Device Backplane 2 x 2.5-inch Storage Device Tray or Dummy Trays 1 x Front Panel Board 1 x Q-code Extension Board 1 x Riser Card 4 x System Fans (3 set of dual motor fans) 1 x CPU Air Duct 1 x Side Air Duct
Accessories	2 x Support DVD* 1 x CPU Cooler 2 x SATA power and signal cables (up to 2, depends on different SKU)
Optional Items	1 x Ball Bearing Rail Kit (590mm) 1 x Bag of Screws 1 x Window Server OS DVD 1 x Power cord 1 x CPU 1 x VGA card 4 x SATA drives (up to 4, depends on different SKU)** 2 x U.2 NVMe SSD (up to 2, depends on different SKU)** 4 x U-DIMM (up to 4, depends on different SKU)

NOTE:

- If any of the above items is damaged or missing, contact your retailer.
- Optional items come bundled if you selected them when purchasing the system and cannot be bought separately.
- * The bundled SDVDs are to be used for different Windows systems. Please check the SDVD cover:
  - "**AMD EPYC™ Series**" DVD: This DVD is for systems running a supported **Windows Server operating system** with an EPYC™ CPU.
  - "**AMD Ryzen™ Series**" DVD: This DVD is for systems running **Windows 11** with an Ryzen™ CPU.
- ** U.2 devices will not be supported if 4 x SATA is selected when purchasing the system.

1.2 Serial number label

The product's serial number contains 12 characters, such as xxSxxxxxxxx, and printed on the sticker on the worskstation's top cover.

The correct serial number of the product is required if you need to request for support from the ASUS Technical Support team.

1.3 System specifications

The ASUS Pro ER100A B6 features the ASUS B650M-S motherboard. The workstation system supports AMD EPYC™ 400X Series Processors and AMD Ryzen™ 9000/7000 Series Processors, plus other latest technologies through the chipsets onboard.

Model Name		Pro ER100A B6
Motherboard		B650M-S
Processor Support		1 x Socket AM5 AMD EPYC™ 400X Series and AMD Ryzen™ 9000/7000 Series
Core Logic		AMD B650 Chipset
Memory	Total slots	4 (2-channel)
	Capacity	Maximum up to 192GB UDIMM
	Memory type	Dual Channel DDR5 5600 ECC/non-ECC UDIMM * **Please refer to www.asus.com for latest memory AVL update** * **Actual memory frequency differs from AMD CPU types and memory module. Please check AMD official site for more detail about the memory types supported by each CPU.**
	Memory size	48GB, 32GB, 16GB, 8GB UDIMM * **Refer to www.asus.com/support for more information**
Expansion Slots	Total PCIe slots	1
	Slot Type	1 x PCIe x16 slot (Gen 5.0 x16/x8 link, FH, HL) * **Specifications vary by CPU types.**
	M.2	M.2 slot (Key M), type 2242/2260/2280 (supports PCIe 5.0 x4 mode)
	microSD	1
Storage	Storage controllers	**SATA controller:** 4 x SATA 6Gb/s ports
	Storage bays	2 x Front 2.5-inch SATA Hot-swap storage bays - 2 x SATA 2 x Internal 2.5-inch SATA or U.2 NVMe storage bays - 2 x NVMe/SATA
	Backplane connectors	2 x SATA connectors
	Motherboard connectors	2 x SATA connectors 2 x SlimSAS x4 connectors
	Default cables	2 x SATA power cables (on selected SKUs)
Networking		2 x Intel 2.5Gb Ethernet ports 1 x Realtek 1Gb Ethernet port (Dedicated management LAN for AST2600)
Onboard graphics		2 x VGA from Aspeed AST2600 64MB* 1 x USB Type-C® display output (integrated graphics from CPU)** * **Maximum Display resolution: 1920x1200 32bpp@60Hz** ** **Supports max. 4K@60Hz as specified in DisplayPort 1.4a**
Graphics card support		Up to 1 single slot GPU

(continued on the next page)

Model Name		Pro ER100A B6
I/O ports	Front	2 x USB 5Gbs ports 1 x VGA port
	Rear	1 x USB 10Gbps port (1 x USB Type-C® with ALT mode; 15W, 5Vdc/3A) 1 x USB 10Gbps port (1 x Type-A) 2 x USB 2.0 ports (2 x Type-A) 1 x VGA port 2 x Intel 2.5Gb Ethernet ports 1 x Serial COM port
	Internal	1 x USB 2.0 port
Switch/LED	Front	1 x Power Button 1 x Locate Button 1 x Reset Button 1 x Storage Activity LED 1 x System Message LED 2 x LAN Activity LEDs 1 x Q-Code LED
	Rear	1 x Locate Button 1 x Message LED 1 x BMC LED
Security Options		TPM-SPI
OS Support		Windows Server 2022/2025* (non-Preinstall) Windows 11 Pro** RedHat® Enterprise Linux SuSE® Linux Enterprise Server CentOS Ubuntu * EPYC™ 4005 Series Only ** Ryzen™ Series only
Management Solution	Software	ASUS Control Center Express
	Out of Band Remote Management	AST2600
Regulatory Compliance		BSMI, CE, FCC (Class B), UL, Energy Star
Dimension		438.5mm x 43.2mm x 409mm (1U) 17.3-inch x 1.7-inch x 16.1-inch
Net Weight Kg		5.695kg (excluding CPU, DRAM, and storage drives)
Gross Weight Kg		12.425kg (including packaging, excluding CPU, DRAM, and storage drives)
Power Supply (different configuration by region)		1 x 500W Gold ATX Power Supply Rating: 100-240Vac, 8-4A, 60-50Hz

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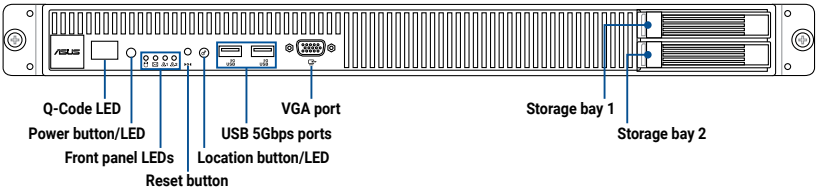
Model Name	Pro ER100A B6
Environment	Operation temperature: 10°C ~ 35°C, max supported CPU TDP is 65W Operation temperature: 10°C ~ 30°C, max supported CPU TDP is 105W Operation temperature: 10°C ~ 25°C, max supported CPU TDP is 120W Non-operating temperature: -40°C ~ 70°C Non-operating humidity: 20% ~ 90% (Non-condensing)

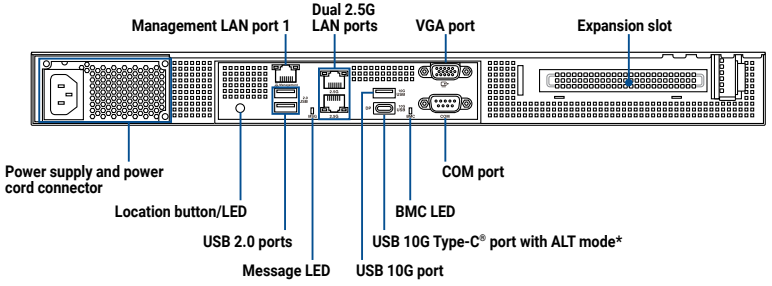
***Specifications are subject to change without notice.**

1.4 Front panel features

NOTE: Refer to the **LED information** section for the LED descriptions.



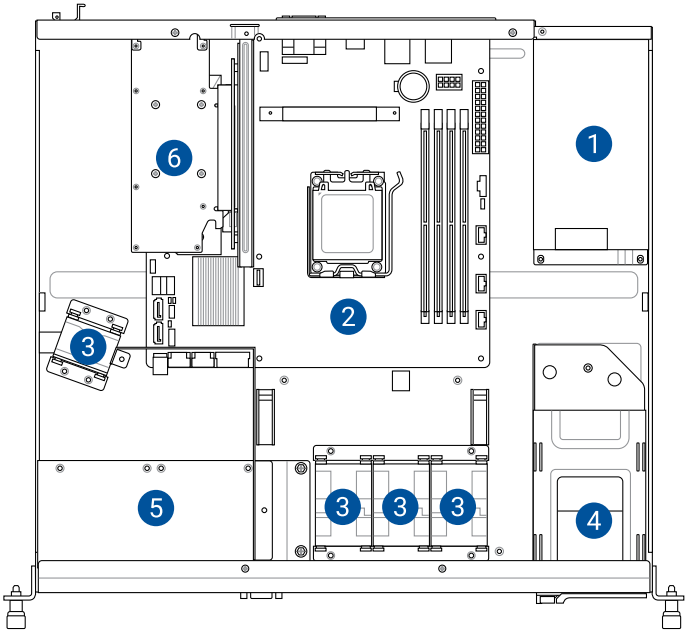
1.5 Rear panel features



NOTE: *This port supports integrated graphics from CPU

1.6 Internal features

The barebone workstation includes the basic components as shown.



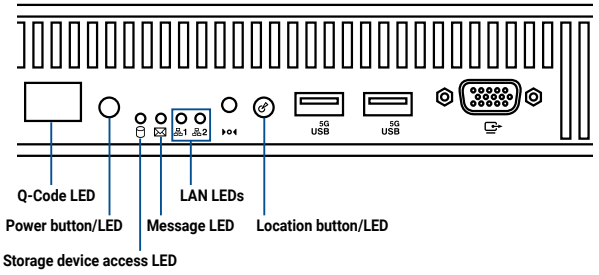
1. Power supply
2. ASUS B650M-S motherboard
3. System fans
4. 2.5-inch storage device trays
5. Internal 2.5-inch storage device trays
6. Low-profile graphics card

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

WARNING
HAZARDOUS MOVING PARTS
KEEP FINGERS AND OTHER BODY PARTS AWAY

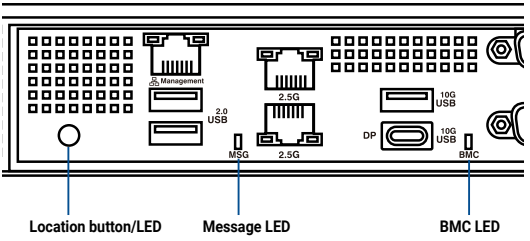
1.7 LED information

1.7.1 Front panel LEDs



LED	Status	Description
Power LED	ON	System power is on
	OFF	System power is off
Storage device access LED	Blinking	Read/write data into the storage device
	OFF	No activity
Message LED	ON	A hardware monitor event is indicated
	OFF	System is normal; no incoming event
LAN LEDs	ON	LAN connection is present
	Blinking	LAN is transmitting or receiving data
	OFF	No LAN connection
Location LED	ON	Received user command to locate the system
	OFF	System is normal; no incoming event

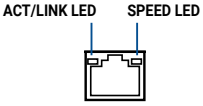
1.7.2 Rear panel LEDs



LED	Status	Description
Message LED	ON	A hardware monitor event is indicated
	OFF	System is normal; no incoming event
BMC LED	Blinking	BMC is ready
	OFF	BMC is off
Location LED	ON	Received user command to locate the system
	OFF	System is normal; no incoming event

1.7.3 LAN (RJ45) LEDs

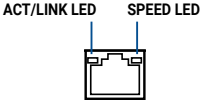
Intel® 2.5Gb Ethernet port LED indications



Activity Link LED	
Status	Description
OFF	No link
GREEN	Linked
BLINKING	Data activity

Speed LED	
Status	Description
OFF	No link
OFF	100 Mbps / 10 Mbps connection
GREEN	2.5 Gbps connection
ORANGE	1 Gbps connection

Dedicated Management LAN port (DM_LAN1) LED indications



Activity Link LED	
Status	Description
OFF	No link
ORANGE	Linked
BLINKING	Data activity

Speed LED	
Status	Description
OFF	10 Mbps connection
ORANGE	100 Mbps connection
GREEN	1 Gbps connection

1.7.4 Q-Code table

ACTION	PHASE	POST CODE	TYPE	DESCRIPTION
SEC Start up	Security Phase	0x01	Progress	Power on post code
		0x02	Progress	Load BSP microcode
		0x03	Progress	Perform early platform cache Initialization
		0x04	Progress	Set cache as ram for PEI phase
		0x05	Progress	Establish Stack
		0x06	Progress	CPU Early Initialization
Quick VGA	PEI(Pre-EFI initialization)phase	0x10	Progress	PEI Core Entry
		0x11		PEI cache as ram CPU initial
		0x15		NB Initialization before installed memory
		0x19		SB Initialization before installed memory
	VR initialization	0xC8	Progress	Infineon Address
		0xCC		
		0xD4		Ti Address
		0xDC		
		0xB8		
		0xBC		
		0xB0		
		0xB4		
	OCMR initialization	0x11	Progress	Enter OCMR Procedures
		0x12		Enter OCMR On S3
		0x13		Check New CPU
		0x14		Check Cmos Fail
		0x16		Check Overclock Fail
		0x18		Prepare Parameters
		0x21		Build Voltage Table
		0x22		Patch Voltage Table
		0x23		Adjust Voltage Table
		0x24		Before Set Voltages
		0x25		Set Voltages
		0x31		Before Set Spread Spectrum
		0x32		SetBclkStrapAndFrequencyPei
		0x33		Set Spread Spectrum
		0x34		After Set Frequency
	KTI initialization	0xA0	Progress	Initialize KTI input structure
		0xA1		Collect info such as SBSP, Boot Mode, Reset type
		0xA3		Setup up minimum path between SBSP & other sockets
		0xA6		Sync up with PBSPs
		0xA7		Topology discovery and route calculation
		0xA8		Program final route
		0xA9		Program final IO SAD setting
		0xAA		Protocol layer and other Uncore settings
		0xAB		Transition links to full speed opeartion
		0xAE		Coherency Settings
		0xAF		KTI Complete
	IIO Early initialization	0xE0	Progress	IIO early init
		0xE1		Early Pre-link training setting
		0xE2		IIO Gen3 EQ programming
		0xE3		IIO Link training
		0xE4		IIO Gen3 override
		0xE5		IIO early init exit
		0xE6		IIO late init
		0xE7		PCIE port init
		0xE8		IOAPIC init
		0xE9		VTD init
		0xEA		IOAT init
		0xEB		IIO DFX init
		0xEC		NTB init
		0xED		Security init
		0xEE		IIO late init exit
		0xEF		IIO On ready to boot

(continued on the next page)

ACTION	PHASE	POST CODE	TYPE	DESCRIPTION
Quick VGA	MRC Memory initialization	0x70	Progress	High Bandwidth Memory
		0x7E		Pipe Sync AP Boot Mode
		0xB0		Detect DIMM Configuration
		0xB1		Initialize clocks for all MemSs
		0xB2		Gather SPD Data
		0xB3		Early Configuration
		0xB4		Check DIMM Ranks
		0xB5		Parallel Mode Dispatch
		0xB6		DDRIO Initialization
		0xB7		DDR Training
		0xB8		Initialize Throttling
		0xB9		Memory Test
		0xBA		Memory Init
		0xBB		Initialize Memory Map
		0xBC		Set RAS Configuration
		0xBD		Get Margin
		0xBE		BIOS SSA Initialization
		0xBF		MRC Done
		0xC1		Check POR Compatibility
		0xC2		Unlock Memory
		0xC3		Check Status
		0xC4		Check XMP
		0xC5		Initialize Memory
		0xC6		Socket DIMM Information
		0xC7		Prep NVDIMM for Training
		0xC9		Setup SVL and Scrambling
		0xCA		Init CMI Credit Programming
		0xCB		Check Ras Support After MemInit
		0xCC		Initialize ADR
		0xCD		Init Structures Late
		0xCE		Memory Late
		0xCF		Select Boot Mode
	DXE (Driver Execution Environment)phase	0x32	Progress	CPU POST-Memory Initialization
		0x33		CPU Cache Initialization
		0x34		Application Processor(s) (AP) Initialization
		0x35		BSP Selection
		0x36		CPU Initialization
		0x37		Pre-memory NB Initialization
		0x3B		Pre-memory SB Initialization
		0x4F		DXE Initial Program Load(IPL)
		0x60		DXE Core Started
		0x61		DXE NVRAM Initialization
		0x62		SB run-time Initialization
		0x63		CPU DXE Initialization
		0x68		PCI HB Initialization
		0x69		NB DXE Initialization
		0x6A		NB DXE SMM Initialization
		0x70		SB DXE Initialization
		0x71		SB DXE SMM Initialization
		0x72		SB DEVICES Initialization
		0x78		ACPI Module Initialization
		0x79		CSM Initialization
Normal boot	BDS (Boot Device Selection) phase	0x90	Progress	BDS started
		0x91		Connect device event
		0x92		PCI Bus Enumeration
		0x93		PCI Bus Enumeration
		0x94		PCI Bus Enumeration
		0x95		PCI Bus Enumeration
		0x96		PCI Bus Enumeration
		0x97		Console output connect event
		0x98		Console input connect event
		0x99		AMI Super IO start
		0x9A		AMI USB Driver Initialization

(continued on the next page)

ACTION	PHASE	POST CODE	TYPE	DESCRIPTION
Normal boot	BDS (Boot Device Selection) phase	0x9B	Progress	AMI USB Driver Initialization
		0x9C		AMI USB Driver Initialization
		0x9D		AMI USB Driver Initialization
		0xA0		AHCI Initialization
		0xA1		AHCI Initialization
		0xA2		AHCI Initialization
		0xA3		AHCI Initialization
		0xA8		BIOS Setup password verify
		0xA9		BIOS Setup start
		0xAB		BIOS Setup input wait
		0xAD		Ready to Boot event
		0xAE		Legacy Boot event
		0xAF		Exit Boot Services
		0xB2		Legacy Option ROM Initialization
		0xB3		Reset system
		0xB4		USB Hotplug
		0xB5		PCI Bus Hotplug
		0xB6		NVRAM clean up
		0xB7		NVRAM configuration reset

Hardware Information

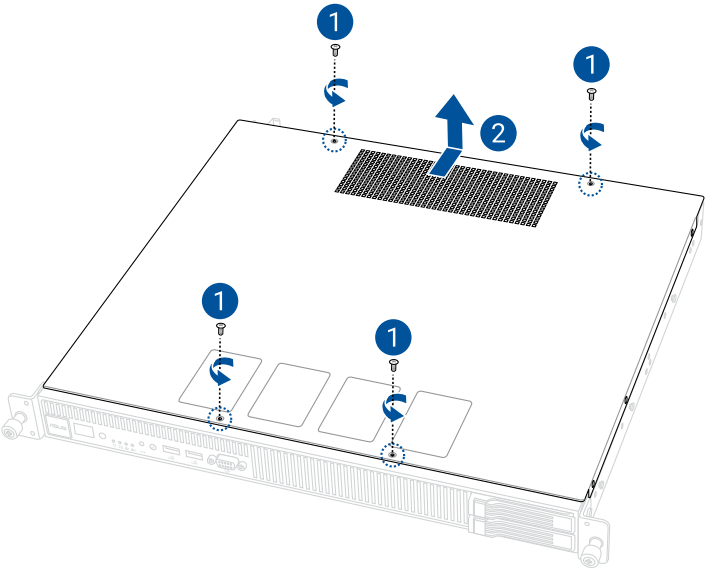
2

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

2.1 Chassis cover

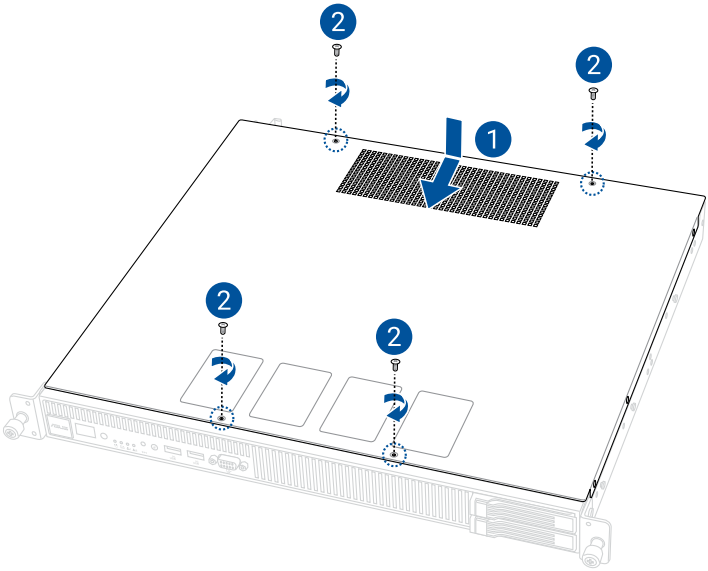
2.1.1 Removing the top cover

1. Remove the four (4) screws on the top cover with a Phillips screwdriver.
2. Firmly hold the cover and slide it towards the rear panel until it is disengaged from the chassis, then lift and remove the cover.



2.1.2 Replacing the top cover

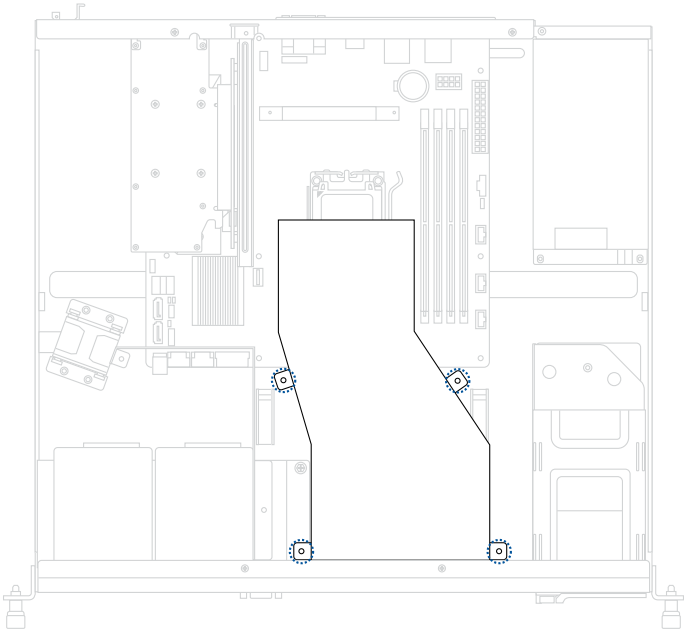
1. Align the top cover to the chassis, then push the top cover towards the front panel.
2. Secure the top cover using the four (4) screws removed earlier.



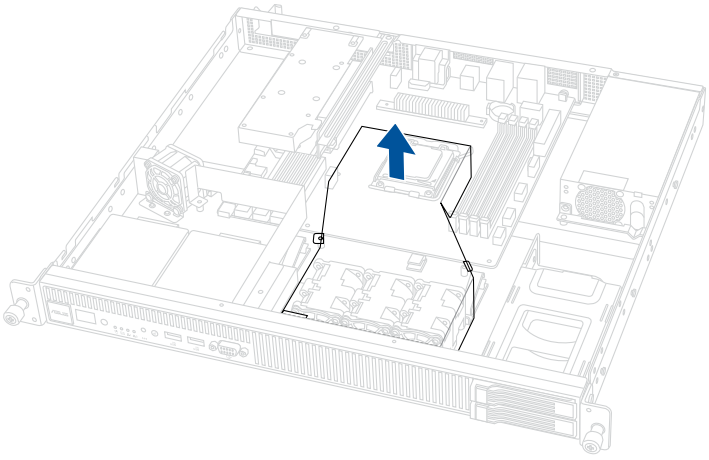
2.2 Air duct

2.2.1 Removing the air duct

1. Remove the four (4) screws securing the airduct.

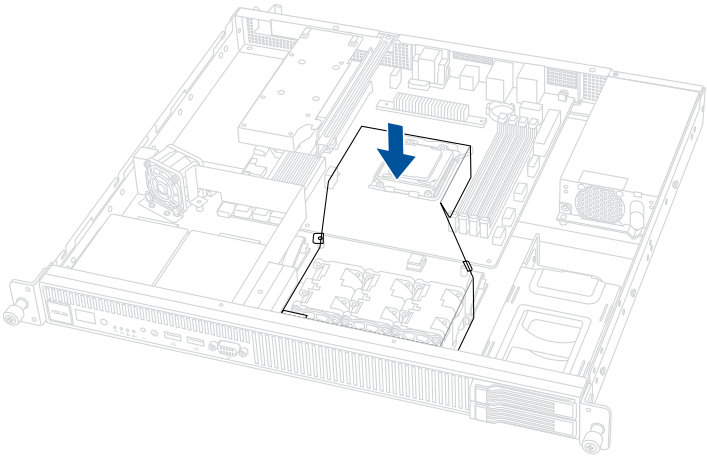


2. Gently lift the air duct vertically out of the chassis.

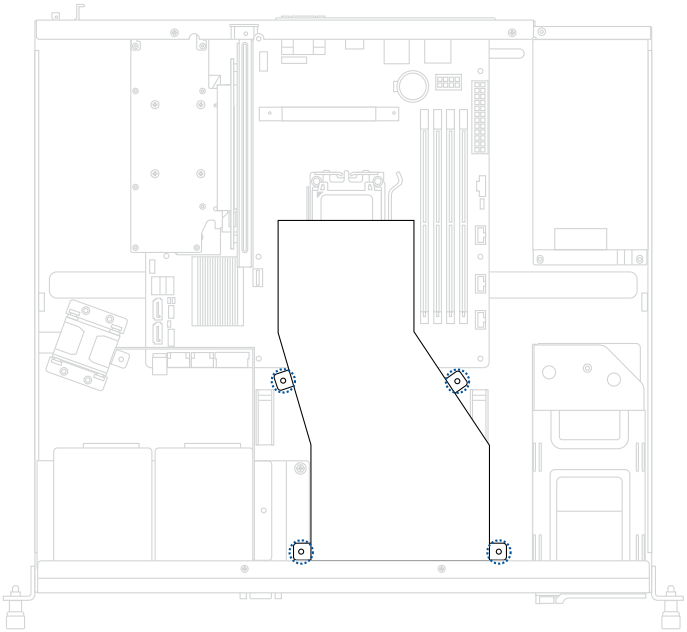


2.2.2 Replacing the air duct

1. Align the air duct along the edges of the DIMM slots, and then place the air duct in the chassis

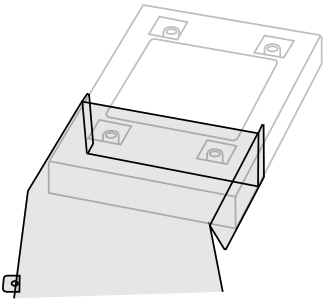


2. Secure the air duct using the four (4) screws removed earlier.

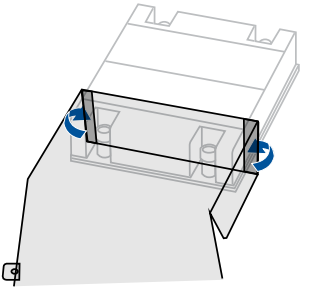


3. Ensure the air duct is sealed against the heatsink, adjust the flaps and fold them to create an airflow seal if required.

105W and 120W



65W



2.3 Central Processing Unit (CPU)

The motherboard comes with a surface mount Socket AM5 designed for AMD EPYC™ 400X Series Processors and AMD Ryzen™ 9000/7000 Series Processors.

CAUTION!

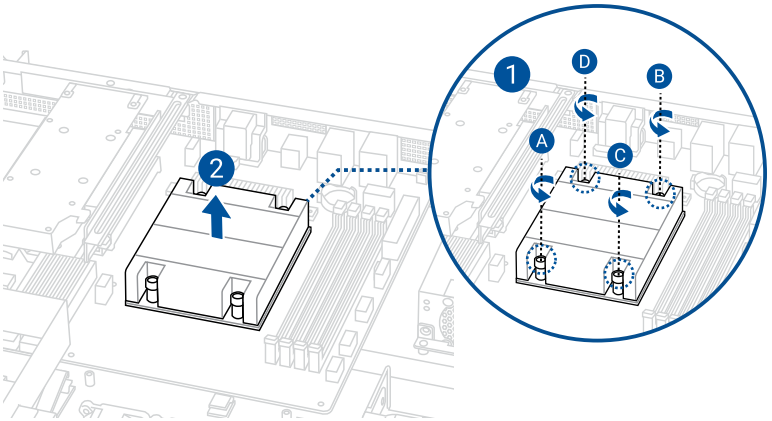
- Upon purchase of the motherboard, ensure that the PnP cap is on the socket and the socket contacts are not bent. Contact your retailer immediately if the PnP cap is missing, or if you see any damage to the PnP cap/socket contacts/motherboard components. ASUS will shoulder the cost of repair only if the damage is shipment/transit-related.
- Ensure that you use a CPU designed for the AM5 socket. The CPU fits in only one correct orientation. DO NOT force the CPU into the socket to prevent bending the pins and damaging the CPU
- Ensure that all power cables are unplugged before installing the CPU.
- 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.

2.3.1 Removing the heatsink (65W)

1. Slightly loosen the heatsink screws in the order shown below, then completely loosen the heatsink screws in the same order.

NOTE: A torque value of 10±0.5kgf-cm (8.68±0.43 lbf-in) is recommended to prolong the longetivity of all PEEK nuts after the quality of the load post is corrected.

2. Lift and remove the heatsink.



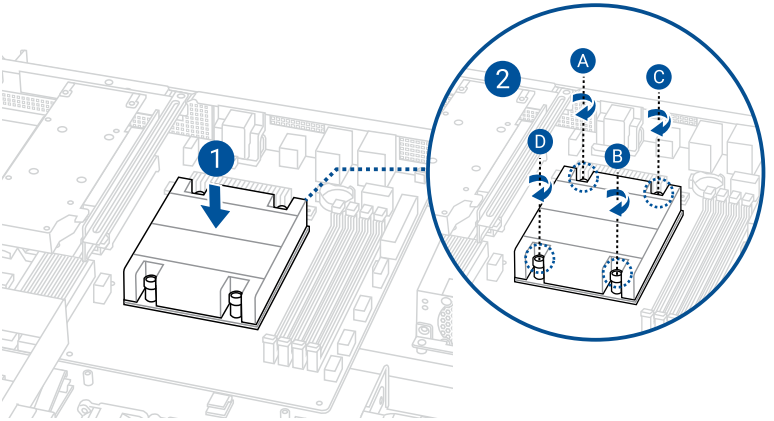
2.3.2 Installing the heatsink (65W)

1. Align and place the heatsink on the CPU socket.

IMPORTANT! Ensure the CPU is installed before installing the heatsink.

2. Slightly tighten the heatsink screws in the order shown below, then completely tighten the heatsink screws in the same order.

NOTE: A torque value of 10±0.5kgf-cm (8.68±0.43 lbf-in) is recommended to prolong the longetivity of all PEEK nuts after the quality of the load post is corrected.

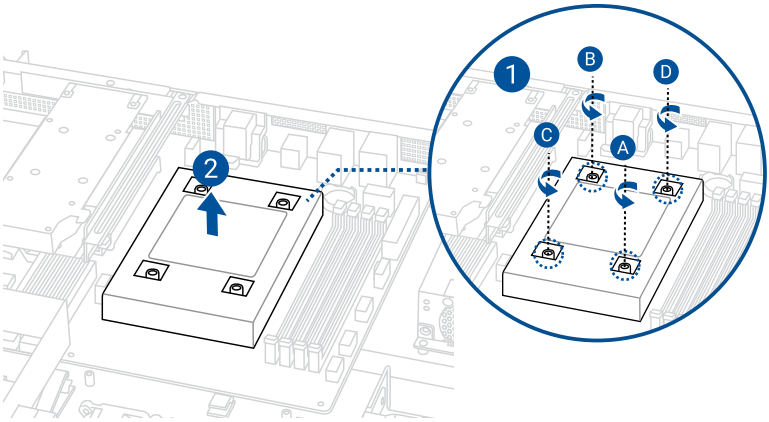


2.3.3 Removing the heatsink (105W and 120W)

1. Slightly loosen the heatsink screws in the order shown below, then completely loosen the heatsink screws in the same order.

NOTE: A torque value of 10±0.5kgf-cm (8.68±0.43 lbf-in) is recommended to prolong the longetivity of all PEEK nuts after the quality of the load post is corrected.

2. Lift and remove the heatsink.



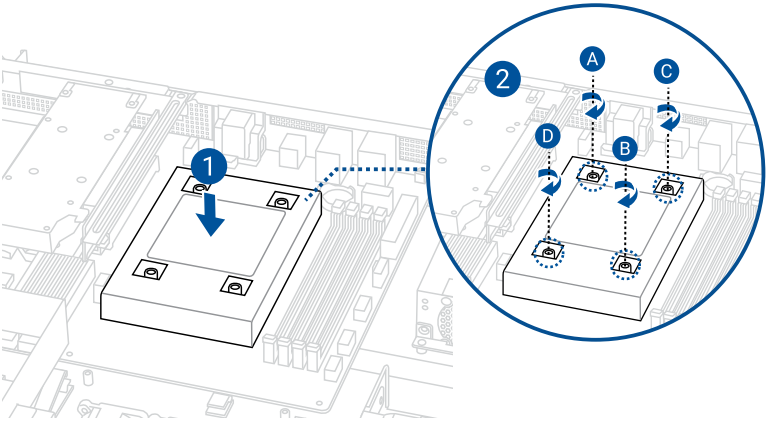
2.3.4 Installing the heatsink (105W and 120W)

1. Align and place the heatsink on the CPU socket.

IMPORTANT! Ensure the CPU is installed before installing the heatsink.

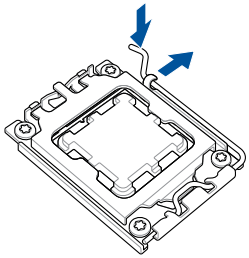
2. Slightly tighten the heatsink screws in the order shown below, then completely tighten the heatsink screws in the same order.

NOTE: A torque value of 10±0.5kgf-cm (8.68±0.43 lbf-in) is recommended to prolong the longetivity of all PEEK nuts after the quality of the load post is corrected.

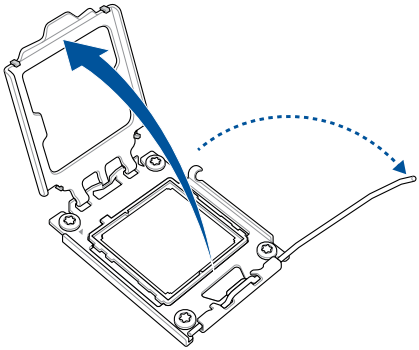


2.3.5 Removing the CPU

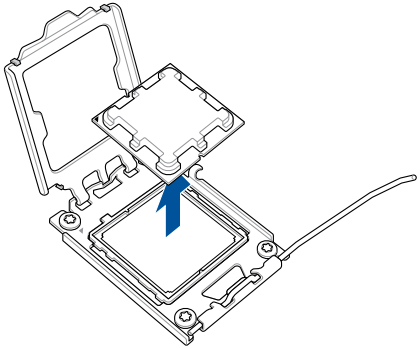
1. Push the lever outwards from under the latch.



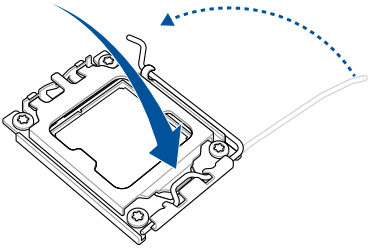
2. Pull the lever in the opposite direction to release the CPU socket cover, then flip open the CPU socket cover.



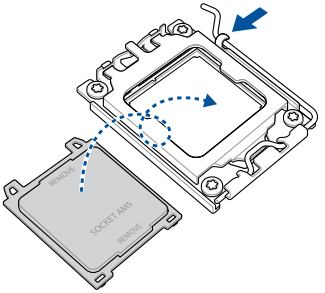
3. Remove the CPU from the CPU socket.



4. Close the CPU cover, then push the lever back to its original position.

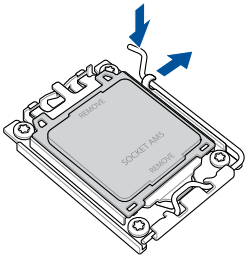


5. Make sure the lever is pushed under the latch.
6. Attach the PnP cap to the CPU cover.

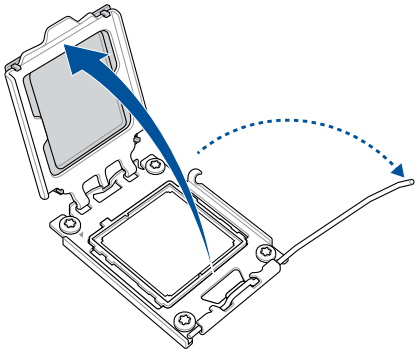


2.3.5 Installing the CPU

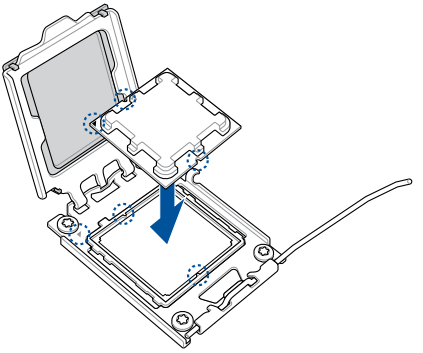
1. Push the lever outwards from under the latch.



2. Pull the lever in the opposite direction to release the CPU socket cover, then flip open the CPU socket cover.



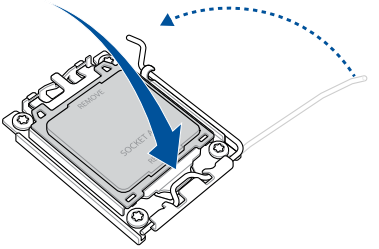
3. Install the CPU into the CPU socket.



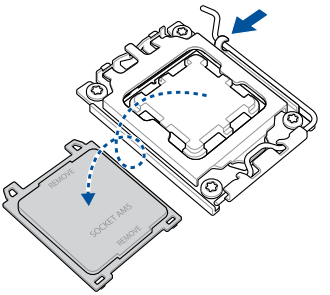
CAUTION!

- Ensure the notches on the CPU are aligned to the protrusions on the CPU socket.
- Ensure the CPU is orientated so that the triangle on the CPU is in the same corner as the triangle on the CPU socket.

4. Close the CPU cover, then push the lever back to its original position.



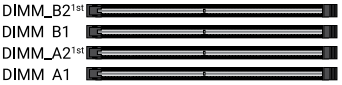
5. Make sure the lever is pushed under the latch.
6. The PnP cap should pop out by itself.



2.4 System memory

2.4.1 Overview

The motherboard comes with Dual Inline Memory Modules (DIMM) slots designed for DDR5 (Double Data Rate 5) memory modules.



CAUTION! A DDR5 memory module is notched differently from a DDR, DDR2, DDR3, or DDR4 module. DO NOT install a DDR, DDR2, DDR3, or DDR4 memory module to the DDR5 slot.

2.4.2 Memory Configurations

You may install 8GB, 16GB, 32GB, and 48GB UDIMMs into the DIMM sockets. If you are not sure on which slots to install the DIMMs, you can use the recommended memory configuration in this section for reference.

NOTE:

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

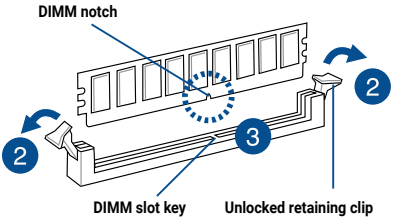
Recommended memory configuration

Memory configurations				
	DIMM			
	A1	A2[1st]	B1	B2[1st]
1 DIMM		✓		
2 DIMMs		✓		✓
4 DIMMs	✓	✓	✓	✓

2.4.3 Installing a DIMM

CAUTION! 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.

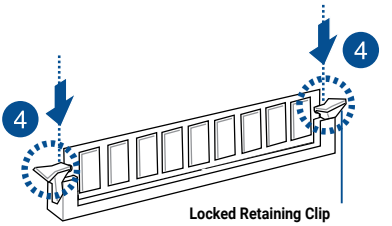
1. Unlock a DIMM socket by pressing the retaining clips outward.
2. Align a DIMM on the socket such that the notch on the DIMM matches the DIMM slot key on the socket.



IMPORTANT! 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 DIMM simultaneously until the retaining clips snaps back into place.

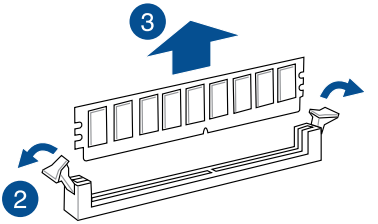
   Ensure that the DIMM is sitting firmly on the DIMM slot.



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

2.4.4 Removing a DIMM

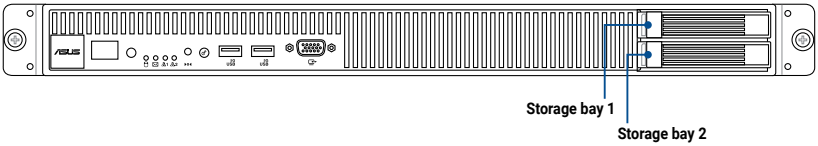
1. Remove the chassis cover. For more information, see the section **Chassis cover**.
2. Simultaneously press the retaining clips outward to unlock the DIMM.
3. Remove the DIMM from the socket.



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

2.5 Storage devices

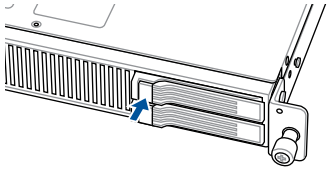
The system supports two (2) 2.5-inch hot-swap SATA storage devices in the front of the system and two (2) internal 2.5-inch NVMe/SATA storage devices. The storage device installed in the front of the system connects to the motherboard SATA ports via the SATA backplane.



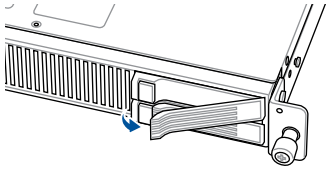
2.5.1 Installing a 2.5-inch hot-swap SATA storage device

NOTE: To remove a 2.5-inch storage device from the front of the system, follow the instructions in reverse order.

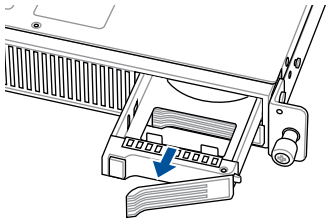
1. Press the spring lock.



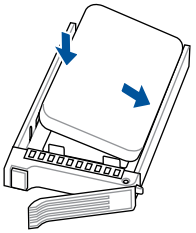
2. Pull the tray lever outwards.



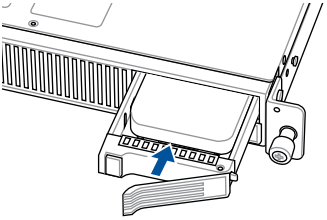
3. Pull the tray lever outwards.



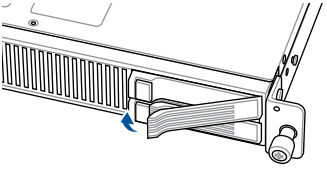
4. Place the 2.5-inch storage device into the storage device tray.



5. Push the storage device tray all the way into the depth of the bay.



6. Push down on the tray lever until the spring lock clicks and secures the storage device tray in place.



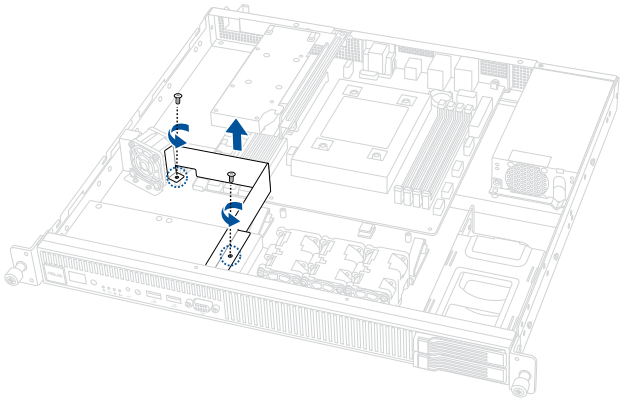
NOTE: When installed, the SATA connector on the storage device connects to the SATA interface on the backplane.

7. Repeat steps 1 to 6 to install the other 2.5-inch storage device.

2.5.2 Installing an internal 2.5-inch NVMe/SATA storage device

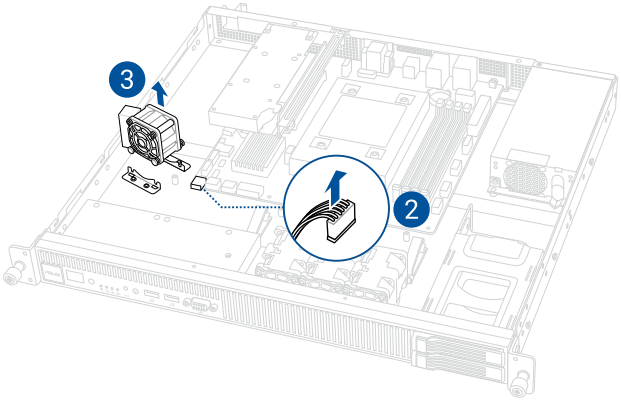
NOTE: To remove a 2.5-inch storage device from inside the system, follow the instructions in reverse order.

1. Remove the two (2) screws securing the L-shaped mylar, then remove the L-shaped mylar.

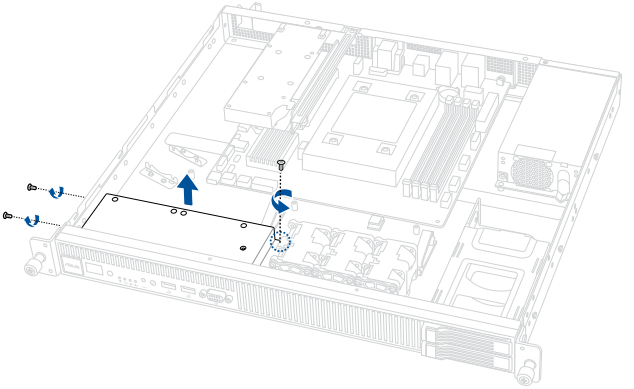


2. Disconnect the fan cable from the VGA_FAN connector on the motherboard.
3. Lift and remove the side system fan and sponge.

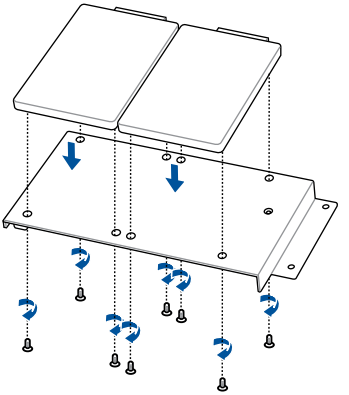
NOTE: The sponge is glued to the system fan.



4. Remove the three (3) screws securing the internal storage device tray, then lift and remove the internal storage device tray.

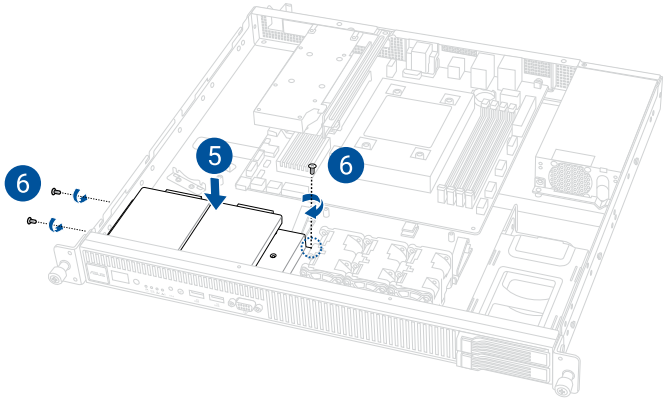


5. Align and place the 2.5-inch storage devices to the screw holes on the internal storage device tray, then secure the 2.5-inch storage devices using four (4) screws per storage device.



5. Place the internal storage device tray back into the system and make sure the screw holes on the internal storage device tray is properly aligned to the screw holes in the system chassis.

6. Secure the internal storage device tray using the three (3) screws removed previously.



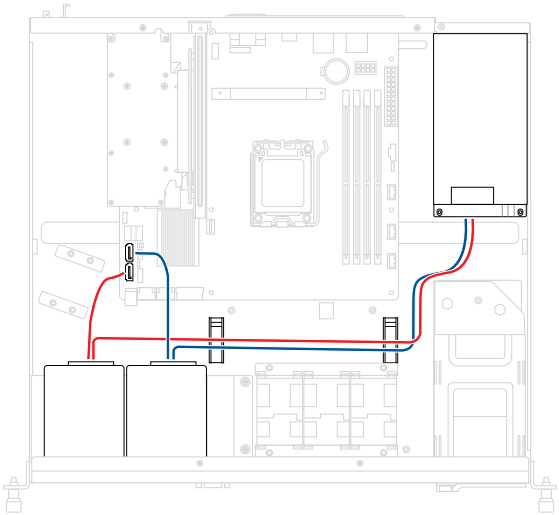
7. Connect the cables from the storage devices to the power supply and the connectors on the motherboard. These connections will differ between different storage devices, please refer to the diagrams below for the cable connections for SATA storage devices or NVMe storage devices.

NOTE:

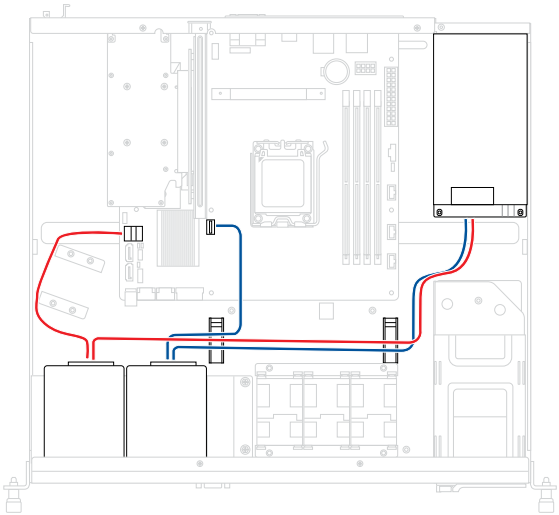
- Data signal cables and power extension cables are not included with the system and are purchased separately.
- Use the cable clips when routing the power supply cables and power extension cables.

IMPORTANT! Data signal cables need to be routed around the side system fan cage as shown in the illustrations.

SATA storage devices

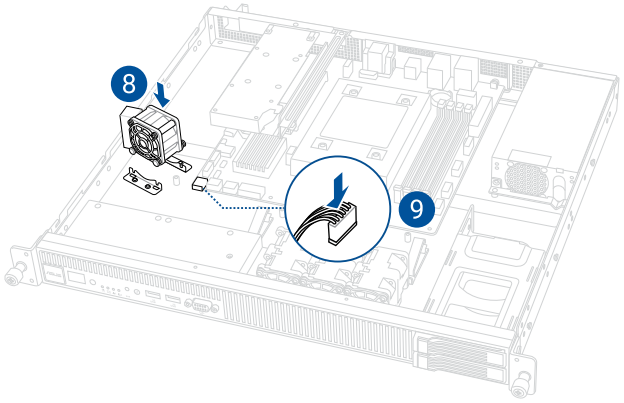


NVMe storage devices



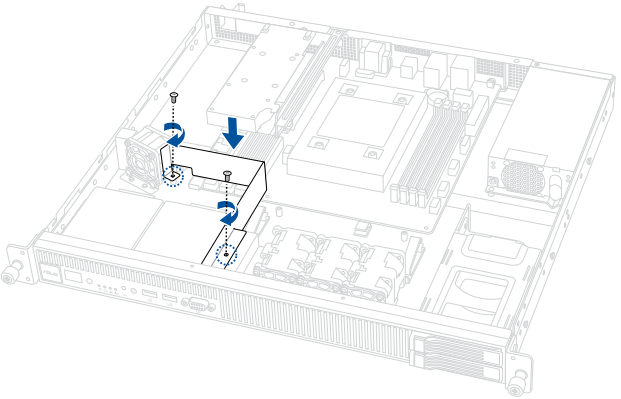
8. Replace the side system fan, and make sure the data signal cables of the storage devices are secured under the sponge.

9. Connect the side system fan cable to the VGA_FAN connector on the motherboard.



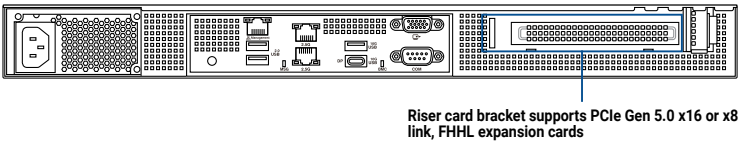
10. (optional) Align and place the L-shaped mylar into the system, then secure the L-shaped mylar using the two (2) screws removed previously.

NOTE: Only replace the L-shaped mylar if you have installed NVMe storage devices.



2.6 Expansion slots

The barebone server comes with a PCIe slot. The PCIe slot is pre-installed with a riser card bracket for installing PCIe expansion cards.



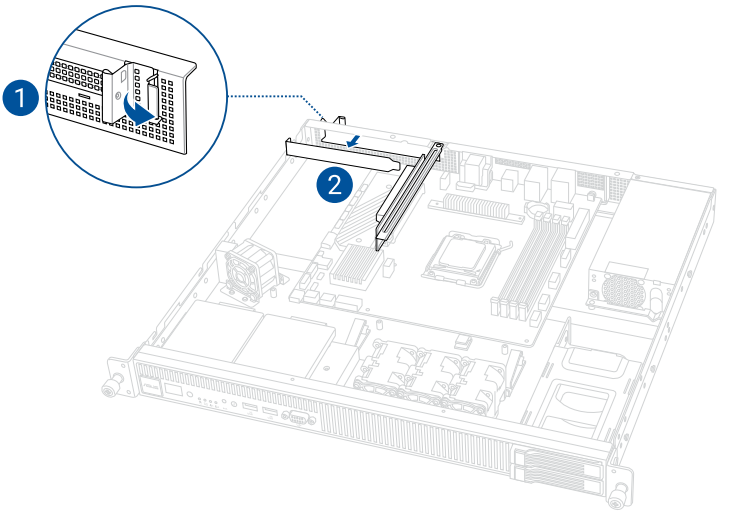
2.6.1 Installing an expansion card to the PCIe riser card bracket

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

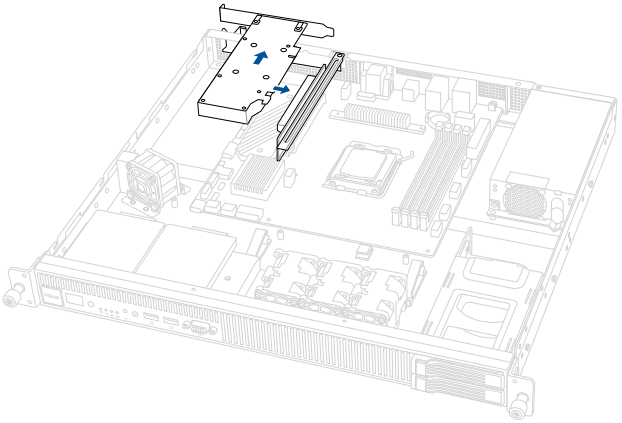
1. Push the lock latch open.

CAUTION! We recommend wearing gloves to avoid injuries.

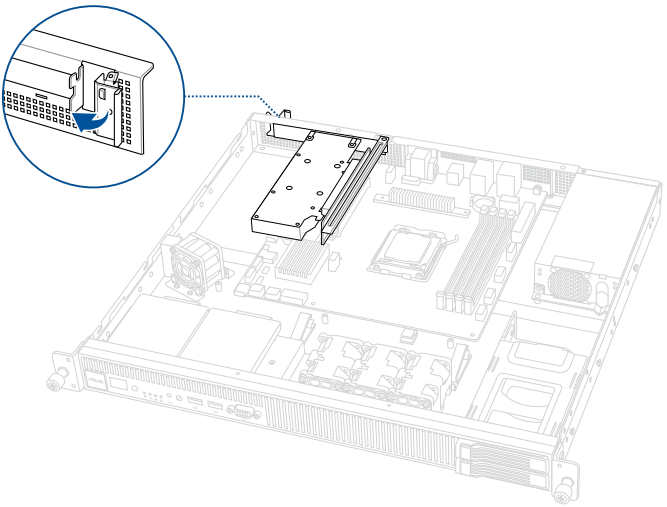
2. Remove the metal bracket.



3. Install the PCIe expansion card into the riser card bracket.



4. Once the expansion card is properly installed, close the lock latch and make sure the lock latch is secured properly once closed.

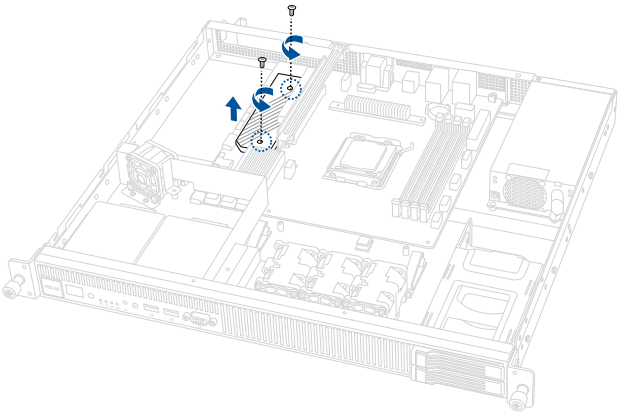


2.6.2 Installing an M.2 module

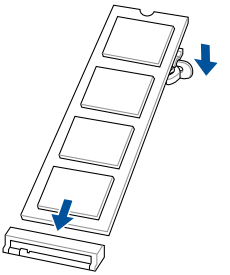
NOTE: To remove this component, follow the instructions in reverse order.

You may install a M.2 module (supports 2242, 2260, 2280) to the onboard M.2 (SOCKET3) slot on the motherboard.

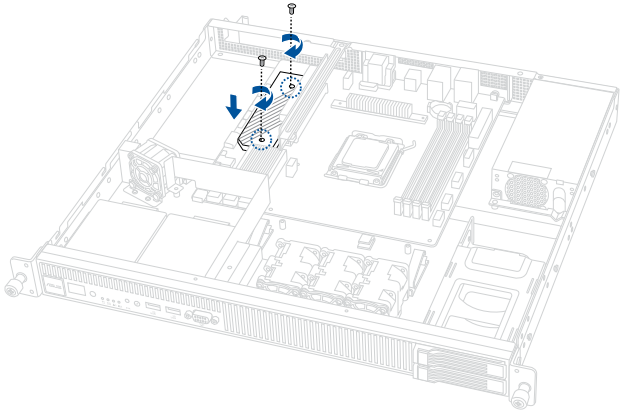
1. Completely loosen the two (2) M.2 heatsink screws, then remove the M.2 heatsink.



2. Insert the M.2 module into the M.2 (SOCKET3) slot, then push the M.2 module down until it is secured by the M.2 Q-Latch



3. Replace the M.2 heatsink, then secure it by tightening the two (2) screws.



2.6.3 Configuring an expansion card

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

1. Turn on the system and change the necessary BIOS settings, if any. See the BIOS Setup chapter 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

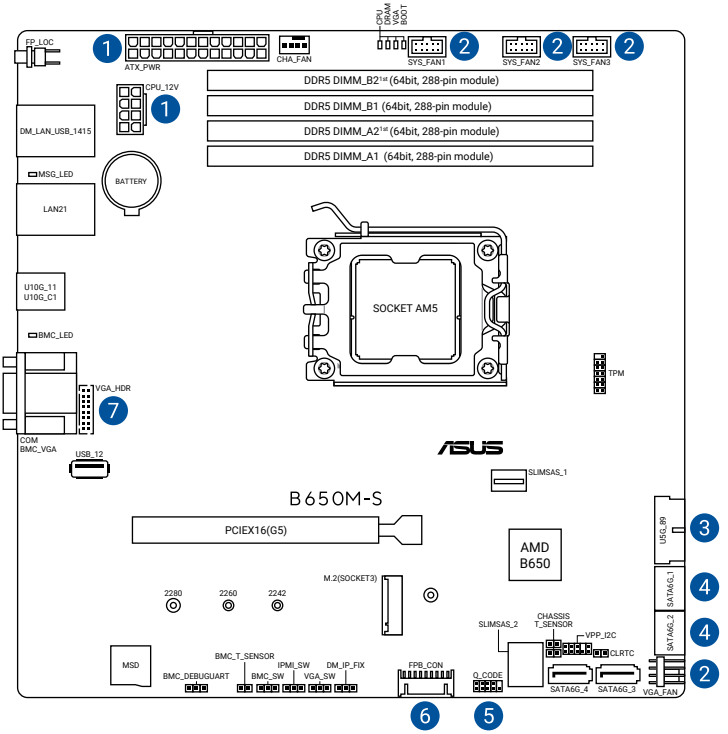
IRQ	Priority	Standard function
0	1	System Timer
1	2	Keyboard Controller
2	-	Programmable Interrupt
3*	11	Communications Port (COM2)
4*	12	Communications Port (COM1)
5*	13	--
6	14	Floppy Disk Controller
7*	15	--
8	3	System CMOS/Real Time Clock
9*	4	ACPI Mode when used
10*	5	IRQ Holder for PCI Steering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

2.7 Cable connections

NOTE:

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



Pre-connected system cables

1. 8-pin CPU_12V and 24-pin ATX_PWR power connectors (connected to power supply)
2. System fan connectors
3. USB 5Gbps header
4. SATA port
5. Q-Code LED header
6. Panel connector (connected to front I/O board)
7. VGA port connector

2.8 Motherboard

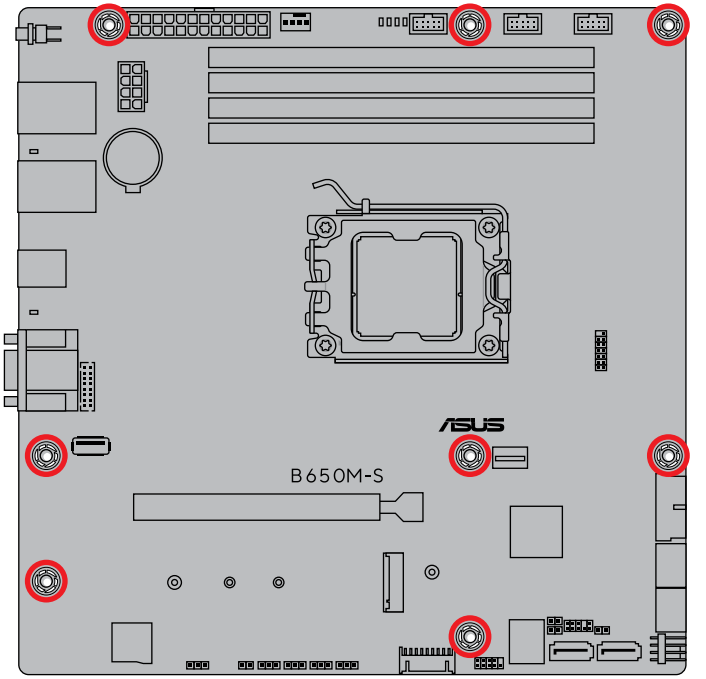
2.8.1 Removing the motherboard

To remove the system motherboard:

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

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

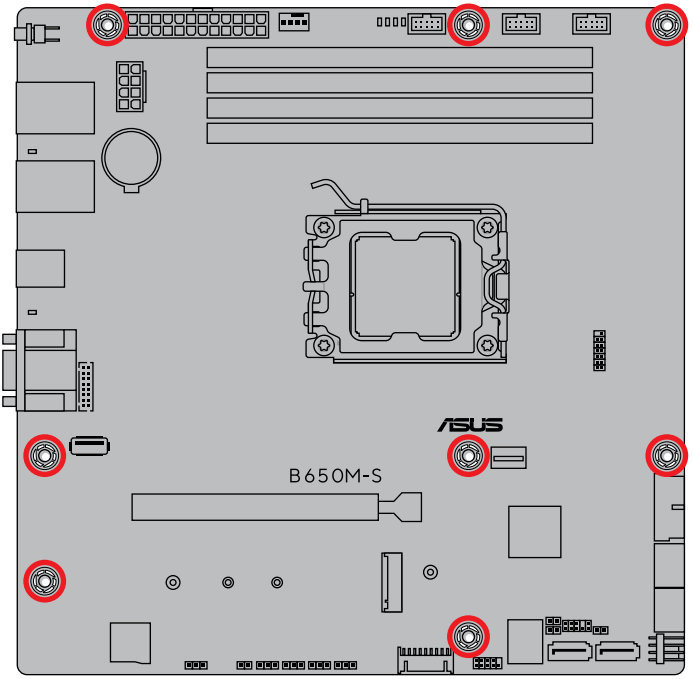
2. Remove the screws, then remove the motherboard.



2.8.2 Installing the motherboard

To install the system motherboard:

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



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

2.9 Removable/optional components

This section explains how to install optional components into the system and covers the following components:

1. System fans
2. CMOS battery

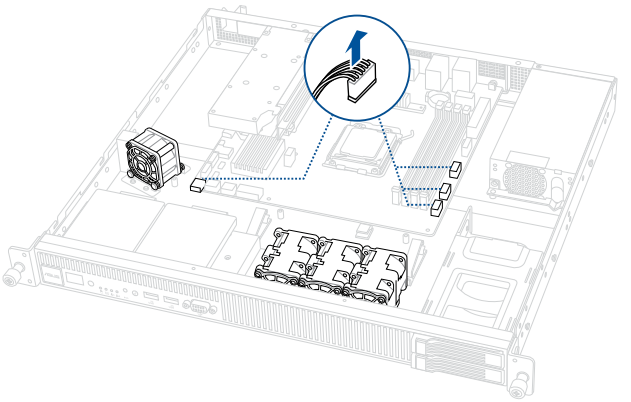
CAUTION! Ensure that the system is turned off before removing any components.

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

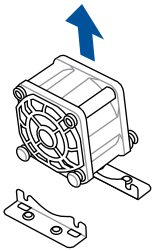
2.9.1 System fans

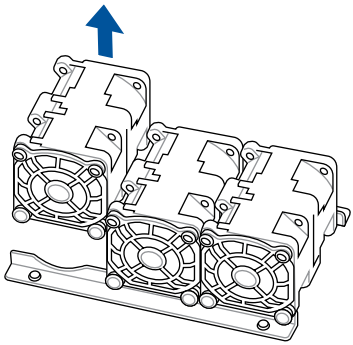
To uninstall the system fans:

1. Disconnect the system fan cable from the fan connectors on the motherboard.



2. Lift and remove the fans from the system.

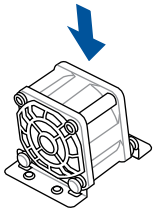


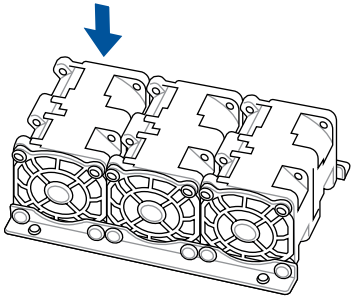


To reinstall the system fans:

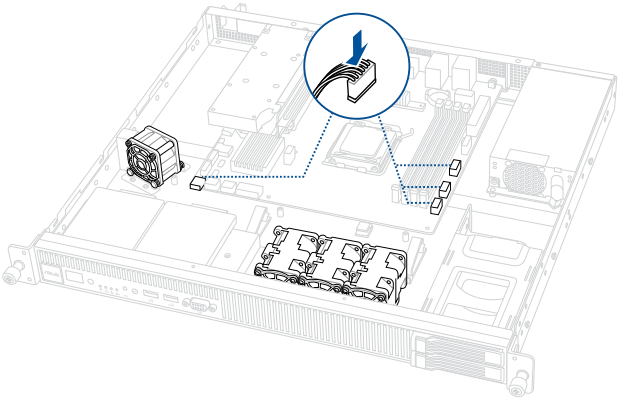
1. Insert the fans into the fan cage. The airflow directional arrow on the fan should point towards the system rear panel.

NOTE: Ensure the notches on the fan module sit firmly into the notch holes in the chassis.





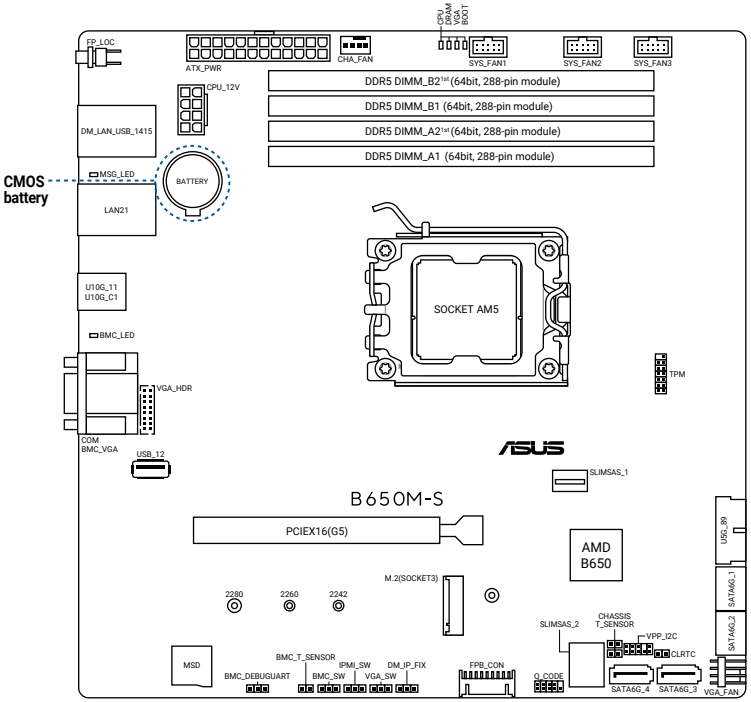
2. Connect the system fan cable to the fan connector on the motherboard.



2.9.2 CMOS battery

To replace a CMOS battery:

1. Locate and remove the CMOS battery.



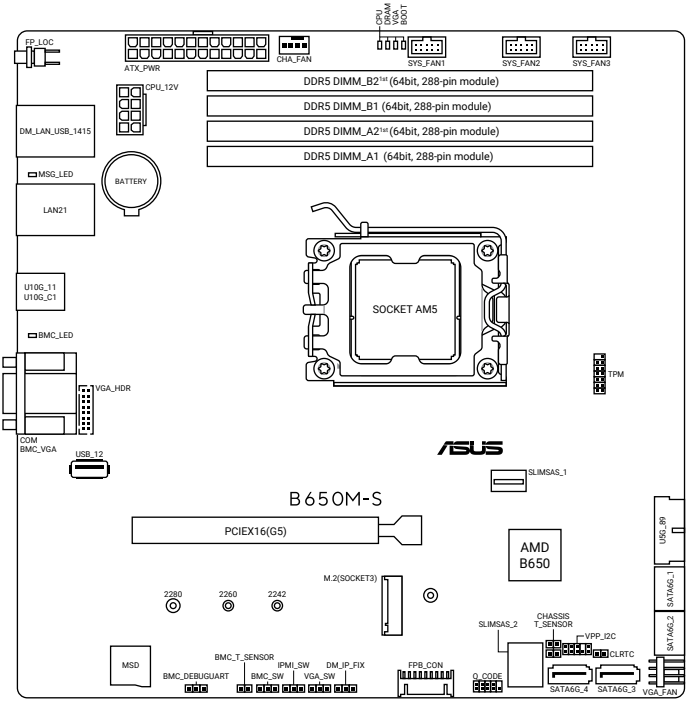
2. Place the replacement CMOS battery into the battery compartment.

Motherboard Information

3

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

3.1 Motherboard layout

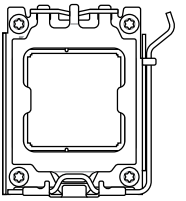


Layout contents

3.2 Central Processing Unit (CPU)

The motherboard comes with a Socket AM5 designed for AMD EPYC™ 400X Series Processors and AMD Ryzen™ 9000/7000 Series Processors.

Socket AM5

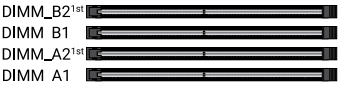


CAUTION!

- The AM5 socket has a different pinout design. Ensure that you use a CPU designed for the AM5 socket.
- The CPU fits in only one correct orientation. DO NOT force the CPU into the socket to prevent bending the connectors on the socket and damaging the CPU.
- Ensure that all power cables are unplugged before installing the CPU.
- Upon purchase of the motherboard, ensure that the PnP cap is on the socket and the socket contacts are not bent. Contact your retailer immediately if the PnP cap is missing, or if you see any damage to the PnP cap/socket contacts/motherboard components. ASUS will 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 AM5 socket.
- The product warranty does not cover damage to the socket contacts resulting from incorrect CPU installation/removal, or misplacement/loss/incorrect removal of the PnP cap.

3.3 Dual Inline Memory Module (DIMM)

The motherboard comes with four (4) Double Data Rate 5 (DDR5) Dual Inline Memory Modules (DIMM) sockets.

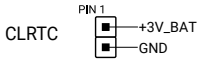


CAUTION! A DDR5 memory module is notched differently from a DDR, DDR2, DDR3, or DDR4 module. DO NOT install a DDR, DDR2, DDR3, or DDR4 memory module to the DDR5 slot.

3.4 Jumpers

1. Clear CMOS header (2-pin CLRTC)

The Clear CMOS header allows you to clear the Real Time Clock (RTC) RAM in the CMOS, which contains the date, time, system passwords, and system setup parameters.



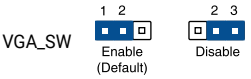
To erase the RTC RAM:

1. Turn OFF the computer and unplug the power cord.
2. Short-circuit pin 1-2 with a metal object or jumper cap for about 5-10 seconds.
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.

CAUTION! DO NOT short-circuit the pins except when clearing the RTC RAM. Short-circuiting or placing a jumper cap will cause system boot failure!

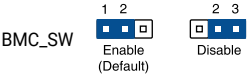
2. VGA Controller setting (3-pin VGA_SW)

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



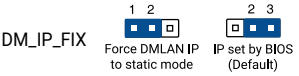
3. Baseboard Management Controller setting (3-pin BMC_SW)

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



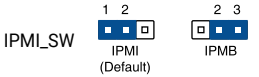
4. DMLAN setting (3-pin DM_IP_FIX)

This jumper allows you to select the DMLAN setting. Set to pins 1-2 to force the DMLAN IP to static mode (IP=10.10.10.10, submask=255.255.255.0).



5. IPMI SW setting (3-pin IPMI_SW)

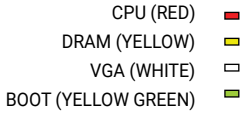
This jumper allows you to select which protocol in the GPU sensor to function.



3.5 Internal LEDs

1. Q-LEDs (CPU, DRAM, VGA, BOOT)

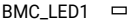
The Q-LEDs check key components (CPU, DRAM, VGA, and booting devices) during the motherboard booting process. If an error is found, the critical component's LED stays lit up until the problem is solved.



NOTE: The Q-LEDs provide the most probable cause of an error code as a starting point for troubleshooting. The actual cause may vary from case to case.

2. Baseboard Management Controller LED (BMC_LED)

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



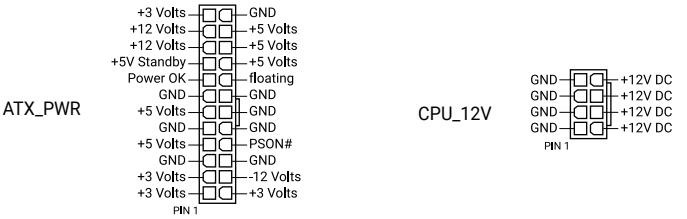
3. Message LED (MSG_LED)

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

3.4 Internal connectors

1. Power connectors (24-pin ATX_PWR; 8-pin CPU_12V)

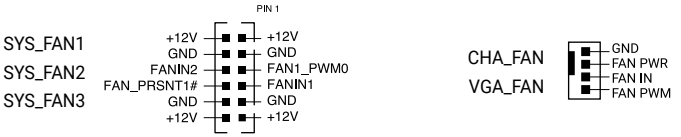
These Power connectors allow you to connect your motherboard to a power supply. The power supply plugs are designed to fit in only one orientation. Find the proper orientation and push down firmly until the power supply plugs are fully inserted.



CAUTION! Ensure to connect the 8-pin power plug.

2. Fan headers (4-pin CHA_FAN; 10-pin SYS_FAN1-3; 4-pin VGA_FAN)

The Fan headers allow you to connect fans to cool the system.

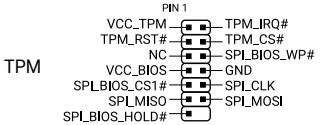


CAUTION!

- DO NOT forget to connect the fan cables to the fan headers. Insufficient air flow inside the system may damage the motherboard components. These are not jumpers! Do not place jumper caps on the fan headers!
- Ensure the cable is fully inserted into the header.

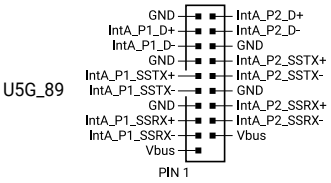
3. TPM header (14-1 pin TPM)

The TPM header allows you to connect a TPM module, which securely stores keys, digital certificates, passwords, and data. A TPM system also helps enhance network security, protect digital identities, and ensures platform integrity.



4. USB 5Gbps header (20-1 pin U5G_89)

The USB 5Gbps header allows you to connect a USB 5Gbps module for additional USB 5Gbps ports. The USB 5Gbps header provides data transfer speeds of up to 5 Gb/s.

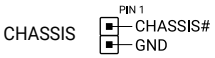


5. USB 2.0 port (USB_12)

The USB 2.0 port allows you to connect a USB drive. The USB 2.0 port provides data transfer speeds of up to 480 Mb/s.

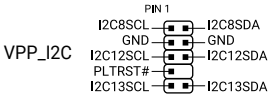
6. Chassis Intrusion header (2-pin CHASSIS)

The Chassis Intrusion header allows you to connect a intrusion sensor or microswitch for the chassis intrusion detection feature. When you remove any chassis component, the sensor or microswitch triggers and sends a high level signal and records a chassis intrusion event.



7. VPP_I2C header (10-1 pin VPP_I2C)

The VPP_I2C header is used for the storage backplane with sensor readings.

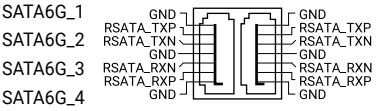


8. Thermal Sensor header (2-pin T_SENSOR)

The Thermal Sensor header allows you to connect a sensor to monitor the temperature of the devices and the critical components inside the motherboard. Connect the thermal sensor and place it on the device or the motherboard's component to detect its temperature.

9. SATA 6Gb/s connectors (7-pin SATA6G_1-4)

Supported by the AMD B650 chipset, these connectors are for the Serial ATA signal cables for Serial ATA hard disk drives that allows up to 6Gb/s of data transfer rate. If you installed Serial ATA hard disk drives, you can create a RAID 0, RAID 1, RAID 10, or RAID 5 configuration.

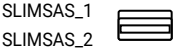


NOTE:

- If you installed SATA storage devices to the **SATA6G_1-4** ports, you can create RAID configurations through the onboard AMD B650 chipset.
- These connectors are set to **[AHCI]** by default. If you intend to create a Serial ATA RAID set using these connectors, set the SATA Mode Selection item in the BIOS to **[RAID]**.
- Before creating a RAID set, refer to the **RAID Configuration Guide**. You can download the **RAID Configuration Guide** from the ASUS support site.

10. SlimSAS connector (SLIMSAS_2)

The SlimSAS connector allows you to connect PCIe storage devices.



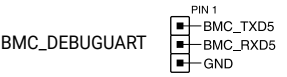
IMPORTANT! SLIMSAS_1 and SLIMSAS_2 both support PCIE 4.0 x4 mode NVMe devices.

11. BMC Thermal Sensor header (2-pin BMC_T_SENSOR)

The BMC Thermal Sensor header allows you to connect a sensor to monitor the temperature of the devices and the critical components inside the motherboard through BMC. Connecting the T sensor cables and setting **BMC_SW** to enabled will allow you to view the sensor readings in both the BIOS and on the web UI.

12. BMC Debug UART connector (3-pin BMC_DEBUGUART)

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



13. microSD Card slot (MSD)

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

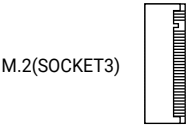
CAUTION!

- Disconnect all power (including redundant PSUs) from the existing system before you add or remove a memory card, then reboot the system to access the memory card.
- Some memory cards may not be compatible with your motherboard. Ensure that you use only compatible memory cards to prevent loss of data, damage to your device, or memory card, or both.

NOTE: The microSD Slot is only supported with BMC Function and not supported for normal use under the OS.

14. M.2 slot (M.2(SOCKET3))

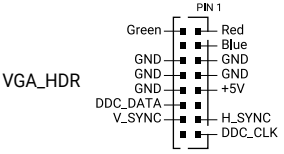
The M.2 slot allows you to install M.2 devices such as M.2 SSD modules.



NOTE: M.2 slot (Key M), type 2242/2260/2280 (supports PCIe 5.0 x4 mode)

15. VGA connector (16-pin VGA_HDR)

The VGA connector allows you to connect a display for BMC Remote Management.



4 Software Configuration

This chapter provides instructions for changing software configuration settings.

4.1 System recovery and removing personal files

You can restore your device to its original settings and optionally remove all personal files.

NOTE: Ensure all your files are backed up before recovering your device.

1. In Windows, go to **Settings** > **Update & Security** > **Recovery**.
2. Click **Restart now** under **Recovery**, then select **Other (Unplanned)**.

4.2 Putting your device into the lowest power mode

For ErP requirements, you can put your device into the lowest power mode by following the below steps:

- Enter BIOS setup by pressing <Del> or <ESC> during the boot process, then go to **Advanced** > **APM Configuration** > **ErP Ready** and select **Enabled (S5)**.

NOTE: When set to enabled, all other PME options are switched off. RGB LEDs and RGB/Addressable RGB Headers will also be disabled.

- In Windows, go to **Settings** > **All Control Panel Items** > **Power Options** > **Choose what the power button does** and click **Change settings that are currently unavailable**, then uncheck **Turn on fast startup (recommended)** and click **Save changes**.
- Open the Start menu, select the power icon, then select **Shut down**.
- From the log-in screen, select the power icon, then select **Shut down**.
- Press <Alt>+<F4>, then select **Shut down** from the drop-down list and select **OK**.
- If your device is unresponsive, press and hold the power button for at least four seconds until your device turns off.

4.3 Putting your device into sleep mode

To set the power button to enter sleep mode on press, please follow the following steps:

1. In Windows, use the search bar and search for **Control Panel**.
2. Click **Hardware and Sound** > **Power Options**, then select **Choose what the power buttons do** from the menu on the left.
3. Set the **When I press the power button** option to **Sleep** under the **Power button setting**s block, then click **Save changes**.

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.

Refer to the corresponding sections for details on these utilities.

IMPORTANT! 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.

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.

IMPORTANT! Prepare a USB flash drive containing the updated motherboard BIOS before using this utility.

Recovering the BIOS from a USB flash drive

To recover the BIOS from a USB flash drive:

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

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

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

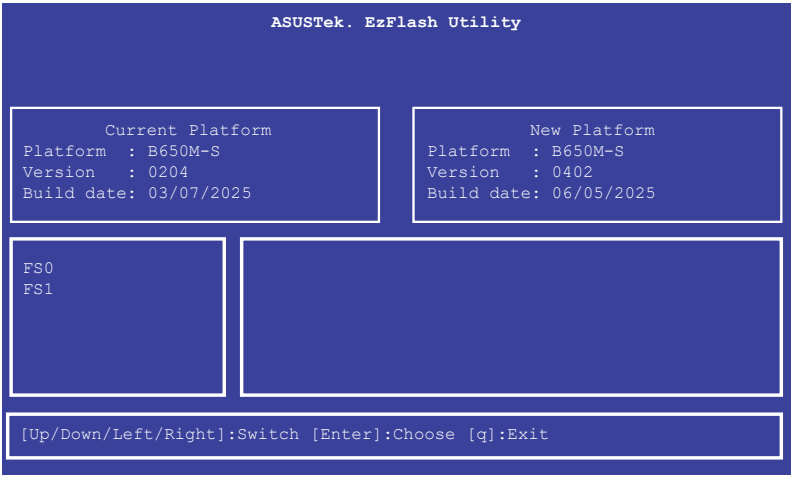
5.1.2 ASUS EZ Flash Utility

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

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

To update the BIOS using EZ Flash Utility:

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



3. Press Left arrow key 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 Right arrow key 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.

CAUTION!

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

IMPORTANT! Ensure to load the BIOS default settings to ensure system compatibility and stability. Press <F5> and select **Yes** to load the BIOS default settings.

5.2 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.

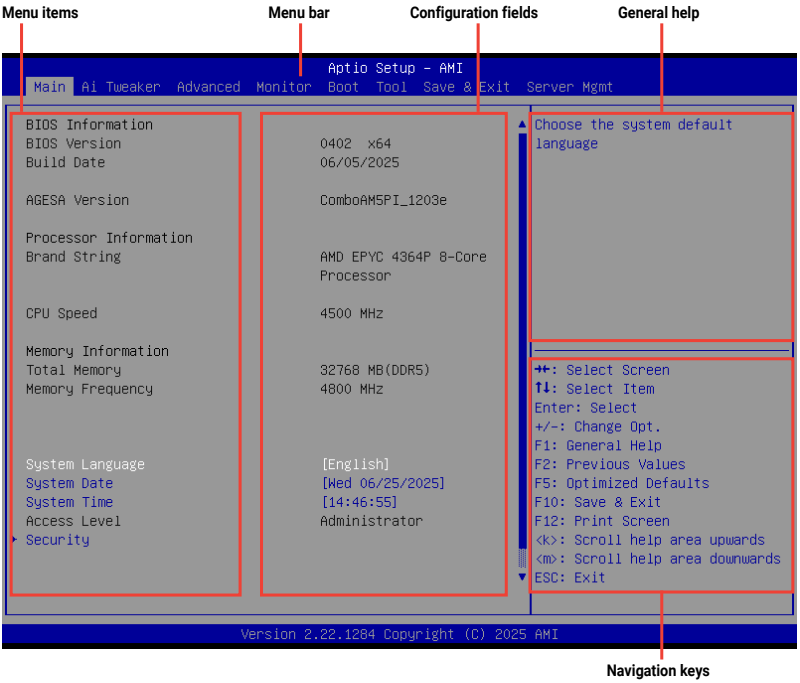
If you wish to enter Setup after POST, restart the system by pressing <Ctrl>+<Alt>+<Delete>, or by pressing the reset button on the system chassis. You can also restart by turning the system off and then back on. Do this last option only if the first two failed.

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.

IMPORTANT!

- 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.
- Support for BIOS functions and options may vary based on AVL testing progress. Please contact your sales representative for more information.
- The BIOS setup screens shown in this section are for reference purposes only, and may not exactly match what you see on your screen.
- Visit the ASUS website (www.asus.com) to download the latest BIOS file for this motherboard.

5.2.1 BIOS menu screen



5.2.2 Menu bar

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

Main	For changing the basic system configuration
Ai Tweaker	For changing the overclocking settings
Advanced	For changing the advanced system settings
Monitor	For displaying the system temperature, power status, and changing the fan settings
Boot	For changing the system boot configuration
Tool	For configuring options for special functions
Save & Exit	For selecting the save & exit options
Server Mgmt	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

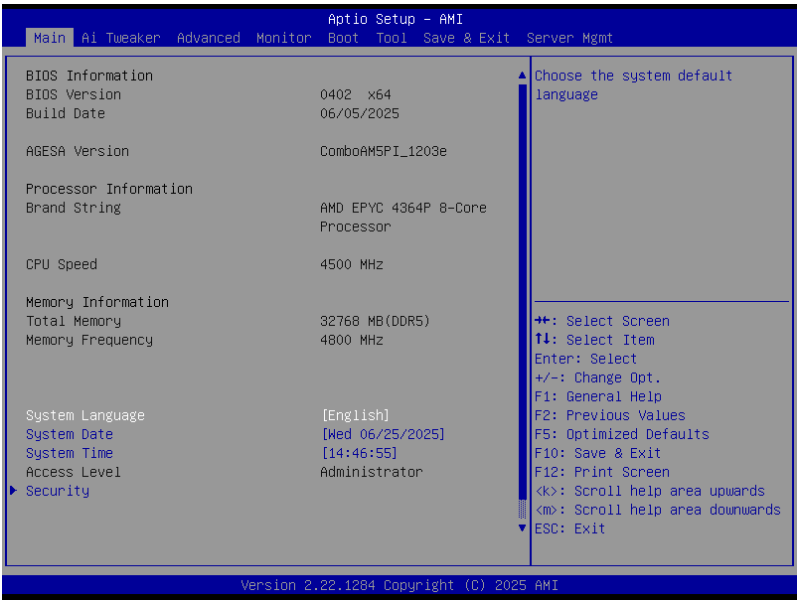
Select a menu item and press <Enter> to display a pop-up window with the configuration options for that item.

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, and language settings.



System Language [English]

Allows you to select the system default language.

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.

Security

The Security menu items allow you to change the system security settings.

NOTE:

- If you have forgotten your BIOS password, erase the CMOS Real Time Clock (RTC) RAM to clear the BIOS password. See the motherboard for information on how to erase the RTC RAM via the Clear CMOS jumper.
- The Administrator or User Password items on top of the screen show the default **[Not Installed]**. After you set a password, these items show **[Installed]**.

Administrator Password

If you have set an administrator password, we recommend that you enter the administrator password for accessing the system. Otherwise, you might be able to see or change only selected fields in the BIOS setup program.

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. Re-type to confirm the password then select **OK**.

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. Re-type to confirm the password then select **OK**.

To clear the administrator password:

Follow the same steps as in changing an administrator password, but leave other fields blank then select **OK** to continue. After you clear the password, the **Administrator Password** item on top of the screen shows **[Not Installed]**.

User Password

If you have set a user password, you must enter the user password for accessing the system. The User Password item on top of the screen shows the default **[Not Installed]**. After you set a password, this item shows **[Installed]**.

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. Re-type to confirm the password then select **OK**.

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. Re-type to confirm the password then select **OK**.

To clear the user password:

Follow the same steps as in changing a user password, but leave other fields blank then select **OK** to continue. After you clear the password, the **User Password** item on top of the screen shows **[Not Installed]**.

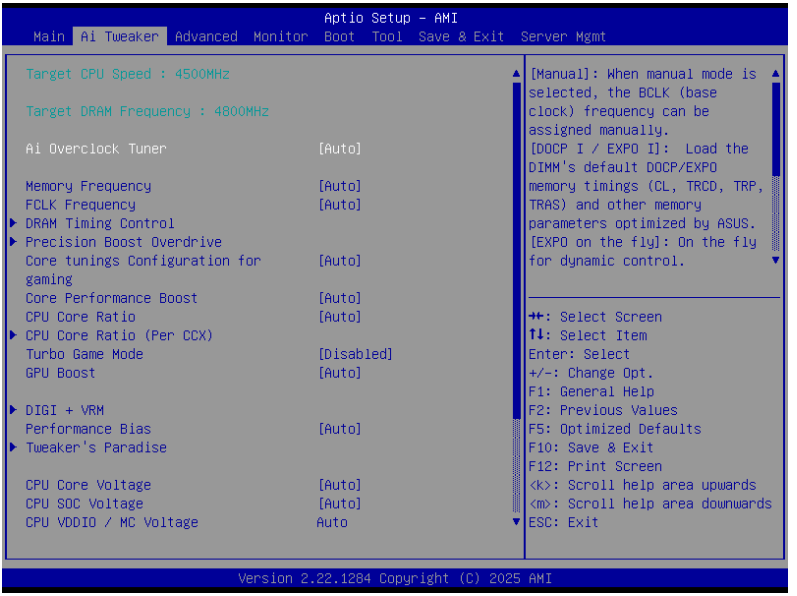
5.4 Ai Tweaker menu

The Ai Tweaker menu items allow you to configure overclocking-related items.

CAUTION! Be cautious when changing the settings of the Ai Tweaker menu items. Incorrect field values can cause the system to malfunction.

NOTE: The configuration options for this section vary depending on the CPU and DIMM model you installed on the motherboard.

Scroll down to display other BIOS items.



Ai Overclock Tuner [Auto]

[Auto]	Loads the optimal settings for the system.
[Manual]	When the manual mode is selected, the BCLK (base clock) frequency can be assigned manually.
[EXPO I]	Load the DIMM's default EXPO memory timings (CL, TRCD, TRP, TRAS) with BCLK frequency and other memory parameters optimized by ASUS.
[EXPO II]	Load the DIMM's complete default EXPO profile.
[EXPO on the fly]	On the fly for dynamic control.
[EXPO Tweaked]	Load EXPO profile with tweaks for improved performance if config matches.
[DOCP I]	Load the DIMM's default DOCP memory timings (CL, TRCD, TRP, TRAS) with BCLK frequency and other memory parameters optimized by ASUS.
[DOCP II]	Load the DIMM's complete default DOCP profile.
[DOCP Tweaked]	Load DOCP profile with tweaks for improved performance if config matches.
[AEMP]	Load the memory parameters profile optimized by ASUS if no DIMM profiles detected.

NOTE:

- The configuration options for this item vary depending on the DIMM model you installed on the motherboard.
- **NOTE:** The following items appear only when **Ai Overclock Tuner** is set to **[Manual]**, **[EXPO I]**, **[EXPO II]**, **[EXPO on the fly]**, **[EXPO Tweaked]**, **[DOCP I]**, **[DOCP II]**, **[DOCP Tweaked]**, or **[AEMP]**.

BCLK Frequency [100.0000]

Adjusts Base Clock Frequency for CPU and also PCIE. Default is 100.

NOTE:

- Please note that changing the BCLK will affect stability of devices, in particular SATA devices.
- The following item appears only when **Ai Overclock Tuner** is set to **[EXPO I]**, **[EXPO II]**, **[EXPO on the fly]**, or **[EXPO Tweaked]**

EXPO

Each profile has its own DRAM frequency, timing and voltage.

NOTE: The following item appears only when **Ai Overclock Tuner** is set to **[DOCP I]**, **[DOCP II]**, or **[DOCP Tweaked]**.

DOCP

Each profile has its own DRAM frequency, timing and voltage.

NOTE: The following item appears only when **Ai Overclock Tuner** is set to **[AEMP]**.

AEMP

Each profile has its own DRAM frequency, timing and voltage.

Memory Frequency [Auto]

Forces a DDR5 frequency slower than the common tCK detected via SPD.
[Auto] [DDR5-2000 MHz] ~ [DDR5-12000 MHz]

FCLK Frequency [Auto]

Specifies the FCLK frequency.
Configuration options: [Auto] [800 MHz] ~ [3000 MHz]

DRAM Timing Control

The sub-items in this menu allow you to set the DRAM timing control features. Use the <+> and <-> keys to adjust the value. To restore the default setting, type **[Auto]** using the keyboard and press the <Enter> key. You can also select various Memory Presets to load settings suitably tuned for some memory modules.

CAUTION! Changing the values in this menu may cause the system to become unstable! If this happens, revert to the default settings.

DDR Training Runtime Reduction [Auto]

[Disabled]	Force Disable DDR Training Runtime Reduction.
[Enabled]	Force Enable DDR Training Runtime Reduction.
[Auto]	Default code behavior. If OC is ENABLE, DDR Training Runtime Reduction will be DISABLE by DEFAULT.

Memory Context Restore [Auto]

Allows you to configure the memory context restore mode. When enabled, DRAM re-training is avoided when possible and the POST latency is minimized.
Configuration options: [Auto] [Enabled] [Disabled]

Mem Over Clock Fail Count [Auto]

Mem Over Clock Fail Count.

Power Down Enable [Auto]

Power Down Enable.
Configuration options: [Disabled] [Enabled] [Auto]

UCLK DIV1 MODE [Auto]

Set UCLK DIV mode.
Configuration options: [Auto] [UCLK=MEMCLK] [UCLK=MEMCLK/2]

ADDR_CMD_MODE [Auto]

Configuration options: [Auto] [Buf] [UnBuf]

Primary Timings

Tcl [Auto]

DRAM CAS# Latency, the value stepping is 2.

Trcd [Auto]

DRAM RAS# to CAS# Delay.

Trp [Auto]

DRAM RAS# PRE Time.

Tras [Auto]

DRAM RAS# ACT Time.

Secondary Timings

Trc [Auto]

DRAM Row Cycle Time.

Twr [Auto]

DRAM WRITE to READ Delay, the value stepping is 6.

Refresh Interval [Auto]

Allows you to set Refresh Interval.

Trfc1 [Auto]

DRAM REF Cycle Time.

Trfc2 [Auto]

Allows you to set Trfc2.

Trfcsb [Auto]

Allows you to set Trfcsb.

Trtp [Auto]

DRAM READ to PRE Time.

TrrdL [Auto]

DRAM RAS# to RAS# Delay(tRRDL).

TrrdS [Auto]

DRAM RAS# to RAS# Delay(tRRDS).

Tfaw [Auto]

Allows you to set Tfaw.

TwtrL [Auto]

DRAM WRITE to READ Delay(tWTR_L).

TwtrS [Auto]

DRAM WRITE to READ Delay(tWTR_S).

TrdrdScl [Auto]

Allows you to set TrdrdScl.

TrdrdSc [Auto]

Allows you to set TrdrdSc.

TrdrdSd [Auto]

Allows you to set TrdrdSd.

Trdrddd [Auto]

Allows you to set Trdrddd.

TwrwrScl [Auto]

Allows you to set TwrwrScl.

TwrwrSc [Auto]

Allows you to set TwrwrSc.

TwrwrSd [Auto]

Allows you to set TwrwrSd.

TwrwrDd [Auto]

Allows you to set TwrwrDd.

Twrrd [Auto]

Allows you to set Twrrd.

Trdwr [Auto]

Allows you to set Trdwr.

Additional Timings

IBUF_LPWR_MODE [Auto]

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

M_ORDERING [Auto]

Configuration options: [Auto] [NORM] [STRICT] [RELAXED]

S_COL_WIDTH [Auto]

Allows you to set S_COL_WIDTH.

MC_SVA_TRIM0 [Auto]

Allows you to set MC_SVA_TRIM0.

MC_SVA_TRIM1 [Auto]

Allows you to set MC_SVA_TRIM1.

MC_SVA_TRIM2 [Auto]

Allows you to set MC_SVA_TRIM2.

MMCM_MULT_F [Auto]

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

DRAM Signal Control

Processor ODT P0-P3 Page

CA ODT GroupA [Auto]
Specifies the CA ODT.
Configuration options: [Auto] [RTT_OFF] [RZQ/0.5 (480)] [RZQ/1 (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RFU] [RZQ/6 (40)]

CK ODT GroupA [Auto]
Specifies the CK ODT.
Configuration options: [Auto] [RTT_OFF] [RZQ/0.5 (480)] [RZQ/1 (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RFU] [RZQ/6 (40)]

CS ODT GroupA [Auto]
Specifies the CS ODT.
Configuration options: [Auto] [RTT_OFF] [RZQ/0.5 (480)] [RZQ/1 (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RFU] [RZQ/6 (40)]

CA ODT GroupB [Auto]
Specifies the CA ODT.
Configuration options: [Auto] [RTT_OFF] [RZQ/0.5 (480)] [RZQ/1 (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RFU] [RZQ/6 (40)]

CK ODT GroupB [Auto]
Specifies the CK ODT.
Configuration options: [Auto] [RTT_OFF] [RZQ/0.5 (480)] [RZQ/1 (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RFU] [RZQ/6 (40)]

CS ODT GroupB [Auto]
Specifies the CS ODT.
Configuration options: [Auto] [RTT_OFF] [RZQ/0.5 (480)] [RZQ/1 (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RFU] [RZQ/6 (40)]

Processor ODT P state mode [Sync all P-states]
Processor ODT P state mode.
Configuration options: [Sync all P-states] [By per P-states]

Processor ODT P0 Page
Processor ODT Impedance Pull Up P0 [Auto]
Specifies the Processor ODT Impedance Pull Up P0.
Configuration options: [Auto] [High Impedance] [480 ohm] [240 ohm] [160 ohm] [120 ohm] [96 ohm] [80 ohm] [68 ohm] [60 ohm] [53 ohm] [48 ohm] [43 ohm] [40 ohm] [36 ohm] [34 ohm] [32 ohm] [30 ohm] [28 ohm] [26 ohm] [25 ohm]

Processor ODT Impedance Pull Down P0 [Auto]
Specifies the Processor ODT Impedance Pull Down P0.
Configuration options: [Auto] [High Impedance] [480 ohm] [240 ohm] [160 ohm] [120 ohm] [96 ohm] [80 ohm] [68 ohm] [60 ohm] [53 ohm] [48 ohm] [43 ohm] [40 ohm] [36 ohm] [34 ohm] [32 ohm] [30 ohm] [28 ohm] [26 ohm] [25 ohm]

Processor DQ drive strengths Pull Up P0 [Auto]
Processor DQ drive strengths Pull Up P0.
Configuration options: [Auto] [High Impedance] [240 ohm] [120 ohm] [80 ohm] [60 ohm] [48 ohm] [40 ohm] [34.3 ohm]

Processor DQ drive strengths Pull Down P0 [Auto]
Processor DQ drive strengths Pull Down P0.
Configuration options: [Auto] [High Impedance] [240 ohm] [120 ohm] [80 ohm] [60 ohm] [48 ohm] [40 ohm] [34.3 ohm]

Dram ODT Impedance RTT_NOM_WR P0 [Auto]
Dram ODT Impedance RTT_NOM_WR P0.
Configuration options: [Auto] [RTT_OFF] [RZQ (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RZQ/5 (48)] [RZQ/6 (40)] [RZQ/7 (34)]

Dram ODT impedance RTT_NOM_RD P0 [Auto]
Dram ODT impedance RTT_NOM_RD P0.
Configuration options: [Auto] [RTT_OFF] [RZQ (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RZQ/5 (48)] [RZQ/6 (40)] [RZQ/7 (34)]

Dram ODT impedance RTT_WR P0 [Auto]
Dram ODT impedance RTT_WR P0.
Configuration options: [Auto] [RTT_OFF] [RZQ (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RZQ/5 (48)] [RZQ/6 (40)] [RZQ/7 (34)]

Dram ODT impedance RTT_PARK P0 [Auto]
Dram ODT impedance RTT_PARK P0.
Configuration options: [Auto] [RTT_OFF] [RZQ (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RZQ/5 (48)] [RZQ/6 (40)] [RZQ/7 (34)]

Dram ODT impedance DQS_RTT_PARK P0 [Auto]
Dram ODT impedance DQS_RTT_PARK P0.
Configuration options: [Auto] [RTT_OFF] [RZQ (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RZQ/5 (48)] [RZQ/6 (40)] [RZQ/7 (34)]

Dram DQ drive strengths Pull Up P0 [Auto]
Dram DQ drive strengths Pull Up P0.
Configuration options: [Auto] [48 ohm] [40 ohm] [34 ohm]

Dram DQ drive strengths Pull Down P0 [Auto]
Dram DQ drive strengths Pull Down P0.
Configuration options: [Auto] [48 ohm] [40 ohm] [34 ohm]

Proc CS Drive Strength [Auto]

Proc CS Drive Strength.
Configuration options: [Auto] [120 ohm] [60 ohm] [40 ohm] [30 ohm]

Proc CK Drive Strength [Auto]

Proc CK Drive Strength.
Configuration options: [Auto] [120 ohm] [60 ohm] [40 ohm] [30 ohm]

Proc CA Drive Strength [Auto]

Proc CA Drive Strength.
Configuration options: [Auto] [120 ohm] [60 ohm] [40 ohm] [30 ohm]

Proc Data Drive Strength [Auto]

Proc Data Drive Strength.
Configuration options: [Auto] [High Impedance] [240 ohm] [120 ohm] [80 ohm] [60 ohm] [48 ohm] [40 ohm] [34.3 ohm]

CPU On-Die Termination [Auto]

CPU On-Die Termination(ProcODT).
Configuration options: [Auto] [High Impedance] [480 ohm] [240 ohm] [160 ohm] [120 ohm] [96 ohm] [80 ohm] [68.6 ohm] [60 ohm] [53.3 ohm] [48 ohm] [43.6 ohm] [40 ohm] [36.9 ohm] [34.3 ohm] [32 ohm] [30 ohm] [28.2 ohm] [26.7 ohm] [25.3 ohm]

DRAM Data Drive Strength [Auto]

DRAM Data Drive Strength.
Configuration options: [Auto] [48 ohm] [40 ohm] [34 ohm]

Rtt Nom Wr [Auto]

Rtt Nom Wr.
Configuration options: [Auto] [RTT_OFF] [RZQ (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RZQ/5 (48)] [RZQ/6 (40)] [RZQ/7 (34)]

Rtt Nom Rd [Auto]

Rtt Nom Rd.
Configuration options: [Auto] [RTT_OFF] [RZQ (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RZQ/5 (48)] [RZQ/6 (40)] [RZQ/7 (34)]

Rtt Wr [Auto]

Rtt Wr.
Configuration options: [Auto] [RTT_OFF] [RZQ (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RZQ/5 (48)] [RZQ/6 (40)] [RZQ/7 (34)]

Rtt Park [Auto]

Rtt Park.
Configuration options: [Auto] [RTT_OFF] [RZQ (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RZQ/5 (48)] [RZQ/6 (40)] [RZQ/7 (34)]

Rtt Park Dqs [Auto]

Rtt Park Dqs.
Configuration options: [Auto] [RTT_OFF] [RZQ (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RZQ/5 (48)] [RZQ/6 (40)] [RZQ/7 (34)]

CA Tx Phase Shift Clk [Auto]

CA Tx Phase Shift Clk.
Configuration options: [Auto] [0] ~ [7]

CS Tx Phase Shift Clk [Auto]

CS Tx Phase Shift Clk.
Configuration options: [Auto] [0] ~ [7]

CK Tx Phase Shift Clk [Auto]

CK Tx Phase Shift Clk.
Configuration options: [Auto] [0] ~ [7]

CA Rx Phase Shift Clk [Auto]

CA Rx Phase Shift Clk.
Configuration options: [Auto] [0] ~ [7]

CS Rx Phase Shift Clk [Auto]

CS Rx Phase Shift Clk.
Configuration options: [Auto] [0] ~ [7]

CK Rx Phase Shift Clk [Auto]

CK Rx Phase Shift Clk.
Configuration options: [Auto] [0] ~ [7]

FIFO Wr En Fine Delay [Auto]

FIFO Wr En Fine Delay.
Configuration options: [Auto] [0] [1]

POC Sample PD [Auto]

POC Sample PD.
Configuration options: [Auto] [Enabled] [Disabled]

Bank Swap Mode [Auto]

Bank Swap Mode.
Configuration options: [Auto] [Disabled] [Swap CPU] [Swap APU]

Precision Boost Overdrive

Prochot VRM Throttling [Auto]

Disabling Prochot will disable the VRMs ability to throttle the CPU when the voltage regulator is approaching its thermal limits.
Configuration options: [Auto] [Disable] [Enable]

Peak Current Control [Auto]

Enable or Disable PCC Feature. Only need to Disable during extreme overclocking.
Configuration options: [Auto] [Disable] [Enable]

Medium Load Boostit [Auto]

Enabling may help improve performance under medium loads.
Configuration options: [Auto] [Disabled] [Enabled]

Precision Boost Overdrive [Auto]

When this item is enabled, it allows the processor to run beyond defined values for PPT, VDD_CPU EDC, VDD_CPU TDC, VDD_SOC EDC, VDD_SOC TDC to the limits of the board, and allows it to boost at higher voltages for longer durations than default operation.
Configuration options: [Auto] [Disabled] [Enabled] [Enhancement] [Manual] [AMD ECO Mode]

NOTE: The following item appears only when **Precision Boost Overdrive** is set to **[Enhancement]**.

Thermal Limit [Level 2 (80°C)]

Thermal Limit.
Configuration options: [Level 1 (90°C)] [Level 2 (80°C)] [Level 3 (70°C)]

NOTE: The following items appear only when **Precision Boost Overdrive** is set to **[Manual]**.

PPT Limit [Auto]

PPT Limit [W], Board Socket Power capability, adjustable up to motherboard programed PPT limit.

TDC Limit [Auto]

TDC Limit [A], Board thermally constrained current delivery capability, adjustable up to motherboard programed board TDC limit.

EDC Limit [Auto]

EDC Limit [A], Board electrically constrained current delivery capability, adjustable up to motherboard programed board EDC limit.

NOTE: The following items appear only when **Precision Boost Overdrive** is set to **[AMD ECO Mode]**.

AMD ECO Mode [Auto]

Adjust the CPU control limits to manage performance. Performance may vary depending on the CPU cooler or other components.
cTDP 65W (88W/75A/150A)
cTDP 105W (142W/110A/170A)
cTDP 170W (230W/160A/225A)
Configuration options: [Auto] [cTDP 65W] [cTDP 105W] [cTDP 170W]

Disable Current Limiter [Auto]

Enabling will disable current limiting. Use at your own risk.
Configuration options: [Auto] [Disabled] [Enabled]

Precision Boost Overdrive Scalar [Auto]

[Auto]	Part runs with a scalar of 1X, i.e. normal operation.
[Manual]	Part runs with a scalar of customized value.

NOTE: The following item appears only when **Precision Boost Overdrive Scalar** is set to **[Manual]**.

Customized Precision Boost Overdrive Scalar [2x]

Precision Boost Overdrive increases the maximum boost voltage used (runs above parts specified maximum) and the amount of time spent at that voltage. The larger the value entered the larger the boost voltage used and the longer that voltage will be maintained.
Configuration options: [1X] ~ [10X]

CPU Boost Clock Override [Auto]

Allows you to increase (positive) or decrease (negative) the maximum CPU frequency that may be automatically achieved by the CPU Boost Algorithm.
Configuration options: [Auto] [Disabled] [Enabled (Positive)] [Enabled (Negative)]

Per-Core Boost Clock Limit

Per-Core Boost Clock Limit [Auto]
Set specific limits to each core in MHz unit. This will still be capped by the global CPU Boost clock but limiting down from this for each core will restrain it's frequency.
Limiting a weaker core may improve it's curve optimizer margin.
Configuration options: [Auto] [Disabled] [Enabled]

NOTE: The following items appear only when **Per-Core Boost Clock Limit** is set to **[Enabled]**.

Core 0~7 [Auto]
The recommended value is based on parameters of your setup with the current settings of Ai Tweaker Menu.

Platform Thermal Throttle Limit [Auto]

Allows the user to decrease the maximum allowed processor temperature (celsius).
Configuration options: [Manual] [Auto]

NOTE: The following items appear only when **Per-Core Boost Clock Limit** is set to **[Manual]**.

Platform Thermal Throttle Limit [0]

Allows the user to decrease the maximum allowed processor temperature (celsius).

Curve Optimizer

Curve Optimizer [Auto]
Allows the user to shift the Voltage / Frequency (AVFS) curve to include higher voltages (positive values) or lower voltages (negative values). The larger the value entered the larger the magnitude of the voltage limit.
Configuration options: [Auto] [All Cores] [Per Core]

NOTE: The following items appear only when **Curve Optimizer** is set to **[All Cores]**.

All Core Curve Optimizer Sign [Positive]
Determines the direction of the curve shift on all cores. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages.
Configuration options: [Positive] [Negative]

All Core Curve Optimizer Magnitude [0]
Determines the magnitude of the curve shift to be made (entered in whole numbers) the larger the value entered the larger the magnitude of the shift.

NOTE: The following items appear only when **Curve Optimizer** is set to **[Per Core]**.

Core 0-7 Curve Optimizer Sign [Positive]
Determines the direction of the curve shift on this core. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages.
Configuration options: [Positive] [Negative]

Core 0-7 Curve Optimizer Magnitude [0]
Determines the magnitude of the curve shift to be made to this core (entered in whole numbers) the larger the value entered the larger the magnitude of the shift.

GFX Curve Optimizer

GFX Curve Optimizer [Auto]
Allows the user to shift the GFX Voltage / Frequency (AVFS) curve to include higher voltages (positive values) or lower voltages (negative values). The larger the value entered the larger the magnitude of the voltage shift.
Configuration options: [Auto] [GFX Curve Optimizer]

NOTE: The following items appear only when **GFX Curve Optimizer** is set to **[GFX Curve Optimizer]**.

GFX Curve Optimizer Sign [Positive]
Determines the direction of the curve shift for GFX. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages.
Configuration options: [Positive] [Negative]

GFX Curve Optimizer Magnitude [0]
Determines the magnitude of the GFX curve shift to be made (entered in whole numbers) the larger the value entered the larger the magnitude of the shift. Field defaults to 0 and the user can enter whole integer numbers. Value entered, combined with the sign above, is used to send the SMU a GFX Curve Optimizer command.

Curve Shaper

Min Frequency - Low Temperature [Auto]
Curve Shaper is an advanced overclocking tuning suite utilizing the same "Curve optimizer" steps. It changes variable voltage across all cores for finite (overlapping) frequency and temperature regions. This can be used to more precisely tune the voltage required by your system. In general, Low temperature corresponds to idle temps, Med Temperature corresponds to 1T/Gaming Workloads, and high temperature is for stress tests. Additionally, Min and Low frequencies are idle/background tasks, Medium is high core count workloads, and high and Max frequency are for gaming and 1T workloads. These settings work as "bands" so you may find that for particular cases several settings impact the behavior. Ex, A workload running at 65 Celsius will likely be influenced by Low temp and Med temp values. Workloads lower than 65C will be more impacted by Low. Workloads above 65C will be more impacted by Medium.
Configuration options: [Auto] [Enable] [Disable]

NOTE: The following items appear only when **Min Frequency - Low Temperature** is set to **[Enable]**.

Min Frequency - Low Temperature Sign [Positive]
Determines the direction of the shift. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages. Configuration options: [Positive] [Negative]

Min Frequency - Low Temperature Magnitude [0]
Determines the magnitude of the shift to be made (entered in whole numbers) the larger the value entered the larger the magnitude of the shift.

Min Frequency - Med Temperature [Auto]
Curve Shaper is an advanced overclocking tuning suite utilizing the same "Curve optimizer" steps. It changes variable voltage across all cores for finite (overlapping) frequency and temperature regions. This can be used to more precisely tune the voltage required by your system. In general, Low temperature corresponds to idle temps, Med Temperature corresponds to 1T/Gaming Workloads, and high temperature is for stress tests. Additionally, Min and Low frequencies are idle/background tasks, Medium is high core count workloads, and high and Max frequency are for gaming and 1T workloads. These settings work as "bands" so you may find that for particular cases several settings impact the behavior. Ex, A workload running at 65 Celsius will likely be influenced by Low temp and Med temp values. Workloads lower than 65C will be more impacted by Low. Workloads above 65C will be more impacted by Medium.
Configuration options: [Auto] [Enable] [Disable]

NOTE: The following items appear only when **Min Frequency - Med Temperature** is set to **[Enable]**.

Min Frequency - Med Temperature Sign [Positive]
Determines the direction of the shift. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages. Configuration options: [Positive] [Negative]

Min Frequency - Med Temperature Magnitude [0]
Determines the magnitude of the shift to be made (entered in whole numbers) the larger the value entered the larger the magnitude of the shift.

Min Frequency - High Temperature [Auto]
Curve Shaper is an advanced overclocking tuning suite utilizing the same "Curve optimizer" steps. It changes variable voltage across all cores for finite (overlapping) frequency and temperature regions. This can be used to more precisely tune the voltage required by your system. In general, Low temperature corresponds to idle temps, Med Temperature corresponds to 1T/Gaming Workloads, and high temperature is for stress tests. Additionally, Min and Low frequencies are idle/background tasks, Medium is high core count workloads, and high and Max frequency are for gaming and 1T workloads. These settings work as "bands" so you may find that for particular cases several settings impact the behavior. Ex, A workload running at 65 Celsius will likely be influenced by Low temp and Med temp values. Workloads lower than 65C will be more impacted by Low. Workloads above 65C will be more impacted by Medium.
Configuration options: [Auto] [Enable] [Disable]

NOTE: The following items appear only when **Min Frequency - High Temperature** is set to **[Enable]**.

Min Frequency - High Temperature Sign [Positive]
Determines the direction of the shift. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages.
Configuration options: [Positive] [Negative]

Min Frequency - High Temperature Magnitude [0]
Determines the magnitude of the shift to be made (entered in whole numbers) the larger the value entered the larger the magnitude of the shift.

Low Frequency - Low Temperature [Auto]
Curve Shaper is an advanced overclocking tuning suite utilizing the same "Curve optimizer" steps. It changes variable voltage across all cores for finite (overlapping) frequency and temperature regions. This can be used to more precisely tune the voltage required by your system. In general, Low temperature corresponds to idle temps, Med Temperature corresponds to 1T/Gaming Workloads, and high temperature is for stress tests. Additionally, Min and Low frequencies are idle/background tasks, Medium is high core count workloads, and high and Max frequency are for gaming and 1T workloads. These settings work as "bands" so you may find that for particular cases several settings impact the behavior. Ex, A workload running at 65 Celsius will likely be influenced by Low temp and Med temp values. Workloads lower than 65C will be more impacted by Low. Workloads above 65C will be more impacted by Medium.
Configuration options: [Auto] [Enable] [Disable]

NOTE: The following items appear only when **Min Frequency - High Temperature** is set to **[Enable]**.

Low Frequency - Low Temperature Sign [Positive]
Determines the direction of the shift. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages.
Configuration options: [Positive] [Negative]

Low Frequency - Low Temperature Magnitude [0]
Determines the magnitude of the shift to be made (entered in whole numbers) the larger the value entered the larger the magnitude of the shift.

Low Frequency - Med Temperature [Auto]
Curve Shaper is an advanced overclocking tuning suite utilizing the same "Curve optimizer" steps. It changes variable voltage across all cores for finite (overlapping) frequency and temperature regions. This can be used to more precisely tune the voltage required by your system. In general, Low temperature corresponds to idle temps, Med Temperature corresponds to 1T/Gaming Workloads, and high temperature is for stress tests. Additionally, Min and Low frequencies are idle/background tasks, Medium is high core count workloads, and high and Max frequency are for gaming and 1T workloads. These settings work as "bands" so you may find that for particular cases several settings impact the behavior. Ex, A workload running at 65 Celsius will likely be influenced by Low temp and Med temp values. Workloads lower than 65C will be more impacted by Low. Workloads above 65C will be more impacted by Medium.
Configuration options: [Auto] [Enable] [Disable]

NOTE: The following items appear only when **Low Frequency - Med Temperature** is set to **[Enable]**.

Low Frequency - Med Temperature Sign [Positive]
Determines the direction of the shift. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages.
Configuration options: [Positive] [Negative]

Low Frequency - Med Temperature Magnitude [0]
Determines the magnitude of the shift to be made (entered in whole numbers) the larger the value entered the larger the magnitude of the shift.

Low Frequency - High Temperature [Auto]
Curve Shaper is an advanced overclocking tuning suite utilizing the same "Curve optimizer" steps. It changes variable voltage across all cores for finite (overlapping) frequency and temperature regions. This can be used to more precisely tune the voltage required by your system. In general, Low temperature corresponds to idle temps, Med Temperature corresponds to 1T/Gaming Workloads, and high temperature is for stress tests. Additionally, Min and Low frequencies are idle/background tasks, Medium is high core count workloads, and high and Max frequency are for gaming and 1T workloads. These settings work as "bands" so you may find that for particular cases several settings impact the behavior. Ex, A workload running at 65 Celsius will likely be influenced by Low temp and Med temp values. Workloads lower than 65C will be more impacted by Low. Workloads above 65C will be more impacted by Medium.
Configuration options: [Auto] [Enable] [Disable]

NOTE: The following items appear only when **Min Frequency - High Temperature** is set to **[Enable]**.

Low Frequency - High Temperature Sign [Positive]
Determines the direction of the shift. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages.
Configuration options: [Positive] [Negative]

Low Frequency - High Temperature Magnitude [0]
Determines the magnitude of the shift to be made (entered in whole numbers) the larger the value entered the larger the magnitude of the shift.

Med Frequency - Low Temperature [Auto]
Curve Shaper is an advanced overclocking tuning suite utilizing the same "Curve optimizer" steps. It changes variable voltage across all cores for finite (overlapping) frequency and temperature regions. This can be used to more precisely tune the voltage required by your system. In general, Low temperature corresponds to idle temps, Med Temperature corresponds to 1T/Gaming Workloads, and high temperature is for stress tests. Additionally, Min and Low frequencies are idle/background tasks, Medium is high core count workloads, and high and Max frequency are for gaming and 1T workloads. These settings work as "bands" so you may find that for particular cases several settings impact the behavior. Ex, A workload running at 65 Celsius will likely be influenced by Low temp and Med temp values. Workloads lower than 65C will be more impacted by Low. Workloads above 65C will be more impacted by Medium.
Configuration options: [Auto] [Enable] [Disable]

NOTE: The following items appear only when **Med Frequency - Low Temperature** is set to **[Enable]**.

Med Frequency - Low Temperature Sign [Positive]
Determines the direction of the shift. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages.
Configuration options: [Positive] [Negative]

Med Frequency - Low Temperature Magnitude [0]
Determines the magnitude of the shift to be made (entered in whole numbers) the larger the value entered the larger the magnitude of the shift.

Med Frequency - Med Temperature [Auto]
Curve Shaper is an advanced overclocking tuning suite utilizing the same "Curve optimizer" steps. It changes variable voltage across all cores for finite (overlapping) frequency and temperature regions. This can be used to more precisely tune the voltage required by your system. In general, Low temperature corresponds to idle temps, Med Temperature corresponds to 1T/Gaming Workloads, and high temperature is for stress tests. Additionally, Min and Low frequencies are idle/background tasks, Medium is high core count workloads, and high and Max frequency are for gaming and 1T workloads. These settings work as "bands" so you may find that for particular cases several settings impact the behavior. Ex, A workload running at 65 Celsius will likely be influenced by Low temp and Med temp values. Workloads lower than 65C will be more impacted by Low. Workloads above 65C will be more impacted by Medium.
Configuration options: [Auto] [Enable] [Disable]

NOTE: The following items appear only when **Med Frequency - Med Temperature** is set to **[Enable]**.

Med Frequency - Med Temperature Sign [Positive]
Determines the direction of the shift. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages.
Configuration options: [Positive] [Negative]

Med Frequency - Med Temperature Magnitude [0]
Determines the magnitude of the shift to be made (entered in whole numbers) the larger the value entered the larger the magnitude of the shift.

Med Frequency - High Temperature [Auto]
Curve Shaper is an advanced overclocking tuning suite utilizing the same "Curve optimizer" steps. It changes variable voltage across all cores for finite (overlapping) frequency and temperature regions. This can be used to more precisely tune the voltage required by your system. In general, Low temperature corresponds to idle temps, Med Temperature corresponds to 1T/Gaming Workloads, and high temperature is for stress tests. Additionally, Min and Low frequencies are idle/background tasks, Medium is high core count workloads, and high and Max frequency are for gaming and 1T workloads. These settings work as "bands" so you may find that for particular cases several settings impact the behavior. Ex, A workload running at 65 Celsius will likely be influenced by Low temp and Med temp values. Workloads lower than 65C will be more impacted by Low. Workloads above 65C will be more impacted by Medium.
Configuration options: [Auto] [Enable] [Disable]

NOTE: The following items appear only when **Med Frequency - High Temperature** is set to **[Enable]**.

Med Frequency - High Temperature Sign [Positive]
Determines the direction of the shift. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages. Configuration options: [Positive] [Negative]

Med Frequency - High Temperature Magnitude [0]
Determines the magnitude of the shift to be made (entered in whole numbers) the larger the value entered the larger the magnitude of the shift.

High Frequency - Low Temperature [Auto]
Curve Shaper is an advanced overclocking tuning suite utilizing the same "Curve optimizer" steps. It changes variable voltage across all cores for finite (overlapping) frequency and temperature regions. This can be used to more precisely tune the voltage required by your system. In general, Low temperature corresponds to idle temps, Med Temperature corresponds to 1T/Gaming Workloads, and high temperature is for stress tests. Additionally, Min and Low frequencies are idle/background tasks, Medium is high core count workloads, and high and Max frequency are for gaming and 1T workloads. These settings work as "bands" so you may find that for particular cases several settings impact the behavior. Ex, A workload running at 65 Celsius will likely be influenced by Low temp and Med temp values. Workloads lower than 65C will be more impacted by Low. Workloads above 65C will be more impacted by Medium.
Configuration options: [Auto] [Enable] [Disable]

NOTE: The following items appear only when **High Frequency - Low Temperature** is set to **[Enable]**.

High Frequency - Low Temperature Sign [Positive]
Determines the direction of the shift. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages. Configuration options: [Positive] [Negative]

High Frequency - Low Temperature Magnitude [0]
Determines the magnitude of the shift to be made (entered in whole numbers) the larger the value entered the larger the magnitude of the shift.

High Frequency - Med Temperature [Auto]
Curve Shaper is an advanced overclocking tuning suite utilizing the same "Curve optimizer" steps. It changes variable voltage across all cores for finite (overlapping) frequency and temperature regions. This can be used to more precisely tune the voltage required by your system. In general, Low temperature corresponds to idle temps, Med Temperature corresponds to 1T/Gaming Workloads, and high temperature is for stress tests. Additionally, Min and Low frequencies are idle/background tasks, Medium is high core count workloads, and high and Max frequency are for gaming and 1T workloads. These settings work as "bands" so you may find that for particular cases several settings impact the behavior. Ex, A workload running at 65 Celsius will likely be influenced by Low temp and Med temp values. Workloads lower than 65C will be more impacted by Low. Workloads above 65C will be more impacted by Medium.
Configuration options: [Auto] [Enable] [Disable]

NOTE: The following items appear only when **High Frequency - Med Temperature** is set to **[Enable]**.

High Frequency - Med Temperature Sign [Positive]
Determines the direction of the shift. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages.
Configuration options: [Positive] [Negative]

High Frequency - Med Temperature Magnitude [0]
Determines the magnitude of the shift to be made (entered in whole numbers) the larger the value entered the larger the magnitude of the shift.

High Frequency - High Temperature [Auto]
Curve Shaper is an advanced overclocking tuning suite utilizing the same "Curve optimizer" steps. It changes variable voltage across all cores for finite (overlapping) frequency and temperature regions. This can be used to more precisely tune the voltage required by your system. In general, Low temperature corresponds to idle temps, Med Temperature corresponds to 1T/Gaming Workloads, and high temperature is for stress tests. Additionally, Min and Low frequencies are idle/background tasks, Medium is high core count workloads, and high and Max frequency are for gaming and 1T workloads. These settings work as "bands" so you may find that for particular cases several settings impact the behavior. Ex, A workload running at 65 Celsius will likely be influenced by Low temp and Med temp values. Workloads lower than 65C will be more impacted by Low. Workloads above 65C will be more impacted by Medium.
Configuration options: [Auto] [Enable] [Disable]

NOTE: The following items appear only when **High Frequency - High Temperature** is set to **[Enable]**.

High Frequency - High Temperature Sign [Positive]
Determines the direction of the shift. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages.
Configuration options: [Positive] [Negative]

High Frequency - High Temperature Magnitude [0]
Determines the magnitude of the shift to be made (entered in whole numbers) the larger the value entered the larger the magnitude of the shift.

Max Frequency - Low Temperature [Auto]
Curve Shaper is an advanced overclocking tuning suite utilizing the same "Curve optimizer" steps. It changes variable voltage across all cores for finite (overlapping) frequency and temperature regions. This can be used to more precisely tune the voltage required by your system. In general, Low temperature corresponds to idle temps, Med Temperature corresponds to 1T/Gaming Workloads, and high temperature is for stress tests. Additionally, Min and Low frequencies are idle/background tasks, Medium is high core count workloads, and high and Max frequency are for gaming and 1T workloads. These settings work as "bands" so you may find that for particular cases several settings impact the behavior. Ex, A workload running at 65 Celsius will likely be influenced by Low temp and Med temp values. Workloads lower than 65C will be more impacted by Low. Workloads above 65C will be more impacted by Medium.
Configuration options: [Auto] [Enable] [Disable]

NOTE: The following items appear only when **Max Frequency - Low Temperature** is set to **[Enable]**.

Max Frequency - Low Temperature Sign [Positive]
Determines the direction of the shift. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages.
Configuration options: [Positive] [Negative]

Max Frequency - Low Temperature Magnitude [0]
Determines the magnitude of the shift to be made (entered in whole numbers) the larger the value entered the larger the magnitude of the shift.

Max Frequency - Med Temperature [Auto]
Curve Shaper is an advanced overclocking tuning suite utilizing the same "Curve optimizer" steps. It changes variable voltage across all cores for finite (overlapping) frequency and temperature regions. This can be used to more precisely tune the voltage required by your system. In general, Low temperature corresponds to idle temps, Med Temperature corresponds to 1T/Gaming Workloads, and high temperature is for stress tests. Additionally, Min and Low frequencies are idle/background tasks, Medium is high core count workloads, and high and Max frequency are for gaming and 1T workloads. These settings work as "bands" so you may find that for particular cases several settings impact the behavior. Ex, A workload running at 65 Celsius will likely be influenced by Low temp and Med temp values. Workloads lower than 65C will be more impacted by Low. Workloads above 65C will be more impacted by Medium.
Configuration options: [Auto] [Enable] [Disable]

NOTE: The following items appear only when **Max Frequency - Med Temperature** is set to **[Enable]**.

Max Frequency - Med Temperature Sign [Positive]
Determines the direction of the shift. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages.
Configuration options: [Positive] [Negative]

Max Frequency - Med Temperature Magnitude [0]
Determines the magnitude of the shift to be made (entered in whole numbers) the larger the value entered the larger the magnitude of the shift.

Max Frequency - High Temperature [Auto]
Curve Shaper is an advanced overclocking tuning suite utilizing the same "Curve optimizer" steps. It changes variable voltage across all cores for finite (overlapping) frequency and temperature regions. This can be used to more precisely tune the voltage required by your system. In general, Low temperature corresponds to idle temps, Med Temperature corresponds to 1T/Gaming Workloads, and high temperature is for stress tests. Additionally, Min and Low frequencies are idle/background tasks, Medium is high core count workloads, and high and Max frequency are for gaming and 1T workloads. These settings work as "bands" so you may find that for particular cases several settings impact the behavior. Ex, A workload running at 65 Celsius will likely be influenced by Low temp and Med temp values. Workloads lower than 65C will be more impacted by Low. Workloads above 65C will be more impacted by Medium.
Configuration options: [Auto] [Enable] [Disable]

NOTE: The following items appear only when **Max Frequency - High Temperature** is set to **[Enable]**.

Max Frequency - High Temperature Sign [Positive]
Determines the direction of the shift. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages.
Configuration options: [Positive] [Negative]

Max Frequency - High Temperature Magnitude [0]
Determines the magnitude of the shift to be made (entered in whole numbers) the larger the value entered the larger the magnitude of the shift.

Core tunings Configuration for gaming [Auto]

Configuration options: [Auto] [Legacy] [Level 1] [Level 2]

Core Performance Boost [Auto]

Automatically overclocks the CPU and DRAM to enhance system performance.
Configuration options: [Auto] [Enabled] [Disabled]

CPU Core Ratio [Auto]

Configuration options: [Auto] [CPU Core Ratio]

NOTE: The following item appears only when **CPU Core Ratio** is set to **[CPU Core Ratio]**.

CPU Core Ratio [Auto]

Allows you to set the CPU core ratio. Use the <+> or <-> to adjust the value.

CPU Core Ratio (Per CCX)

The sub-items in this menu allow you to adjust Core Ratios for each CCX.

Core VID [Auto]

Allows you to specify a custom CPU core VID. Power saving features for idle cores (e.g. cc6 sleep) remain active.

CCD 0

CCX0 Ratio [Auto]

Allows you to specify a custom Core Ratio for this CCX. Use the <+> or <-> to adjust the value.

Turbo Game Mode [Disabled]

When this item is enabled, the mode optimizes gaming performance by disabling the second CCD (Core Complex Die) and SMT (Simultaneous Multithreading), allowing for a more focused and efficient use of processing power in certain games.
Configuration options: [Disabled] [Enabled]

NOTE:

- The optimized gaming performance may vary depending on the game.
- Disabling the second CCD and SMT may impact the performance of other applications, particularly those related to productivity. Use this mode selectively based on your specific needs.
- The item appears depending on your CPU installed.

GPU Boost [Auto]

Set to [Manual] if you want to select the desired value in frequency range.
Configuration options: [Auto] [Manual Mode]

NOTE: The following item appears only when **GPU Boost** is set to **[Manual Mode]**.

GPU clock frequency [Auto]

Allows you to set the GPU clock frequency.

Digi+ VRM

Voltage training [Auto]

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

CPU Load-line Calibration [Auto]

CPU Load-Line Calibration is defined by AMD VRM spec and affects CPU voltage. The CPU working voltage will decrease proportionally to CPU loading. Higher value could get higher voltage and good overclocking performance but increase the CPU and VRM thermal.
Configuration options [Auto] [Level 1] [Level 2] [Level 3] [Level 4]

CAUTION! DO NOT remove the thermal module. The thermal conditions should be monitored.

CPU Current Capability [100%]

A higher value brings a wider total power range and extends the overclocking frequency range simultaneously.
Configuration options: [Auto] [100%] ~ [140%]

NOTE: Configure higher values when overclocking or under a high loading for extra power support.

CPU VRM Switching Frequency [Auto]

Sets the VRM switching frequency. VRM switching frequency affects transient response and VRM component temperatures. Setting a higher switching frequency will result in better transient response at the expense of higher VRM temperatures. Active cooling of the VRM heatsink is recommended when running high CPU voltage and high load-line calibration values.
Configuration options: [Auto] [Manual]

CAUTION! Do not remove the VRM heatsink.

NOTE: The following item appears only when **CPU VRM Switching Frequency** is set to **[Manual]**.

Fixed CPU VRM Switching Frequency(KHz) [350]

Allows you to set a higher frequency for a quicker transient response speed. The values range from 300 KHz to 450 KHz with an interval of 50 KHz.

CPU Power Duty Control [Extreme]

CPU power duty control adjusts the duty cycle of each VRM phase based upon current and/or temperature.

[T. Probe]	Select to maintain VRM thermal balance
[Extreme]	Select to maintain VRM current balance.

CAUTION! DO NOT remove the thermal module when setting this item to **[Extreme]**. The thermal conditions should be monitored.

CPU Power Phase Control [Auto]

Allows you to set the power phase control of the CPU.

[Auto]	Automatically selects the power phase control.
[Optimized]	Set to the ASUS optimized phase tuning profile.
[Extreme]	Sets full phase mode.
[Manual]	Manually select the power phase response speed.

CAUTION! DO NOT remove the thermal module when setting this item to **[Extreme]**. The thermal conditions should be monitored.

NOTE: The following item appears only when **CPU Power Phase Control** is set to **[Manual]**.

Power Phase Response [Fast]

Select the ultra fast mode for a faster power phase response. The reaction time will be longer when the regular mode is selected.
Configuration options: [Ultra Fast] [Fast] [Medium] [Regular]

VDDSOC Current Capability [100%]

Configuration options: [Auto] [100%] ~ [140%]

VDDSOC Switching Frequency [Auto]

Configuration options: [Auto] [Manual]

NOTE: The following item appears only when **VDDSOC Switching Frequency** is set to **[Manual]**.

Fixed VDDSOC VRM Switching Frequency(KHz) [650]

The switching frequency will affect the VDDSOC transient response speed and the component thermal production. Configure a higher frequency for a quicker transient response speed. The values range from 350 KHz to 650 KHz with an interval of 100 KHz.

Performance Bias [Auto]

Different Values may help different Software's performance.
Configuration options: [Auto] [None] [CB R23] [GB3]

Tweaker's Paradise

Clock Spread Spectrum [Auto]

Allows you to enable or disable Clock Spread Spectrum.
Configuration options: [Auto] [Enabled] [Disabled]

Stretch mode for L3 DFLL [Auto]

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

1.8V PLL Voltage [Auto]

Allows you to set the 1.8V PLL Voltage. Use the <+> or <-> to adjust the value. The values range from 1.500V to 2.500V with an interval of 0.010V.

1.8V Standby Voltage [Auto]

Allows you to set the 1.8V Standby Voltage. Use the <+> or <-> to adjust the value. The values range from 1.500V to 2.500V with an interval of 0.010V.

Misc_ALW [Auto]

Allows you to set the Misc_ALW Voltage. Use the <+> or <-> to adjust the value. The values range from 0.600V to 1.500V with an interval of 0.010V.

Chipset 1.05V [Auto]

Use the <+> or <-> to adjust the value. The values range from 1.050V to 1.200V with an interval of 0.005V.

CPU Core Voltage [Auto]

Increase to help CPU Core Frequency overclock. The reading shown on the right is the Core Voltage Reading from the remote ADC Sensing. The reading shown below is the true Core Voltage sensed from the Processor's sensor.
Configuration options: [Auto] [Manual Mode] [Offset Mode]

NOTE: The following item appears only when **CPU Core Voltage** is set to **[Manual Mode]**.

CPU Core Voltage Override [Auto]

Use the <+> and <-> keys to adjust the value. The values range from 0.800V to 1.550V with an interval of 0.005V.

NOTE: The following items appear only when **CPU Core Voltage** is set to **[Offset Mode]**.

Offset Mode Sign [-]

[-] Offset the CPU core voltage by a negative value.

CPU Core Voltage Offset [Auto]

Use the <+> and <-> keys to adjust the value. The values range from 0.005V to 0.500V with an interval of 0.005V.

CPU SOC Voltage [Auto]

Increase to help Memory Frequency overclock. The reading shown on the right is the SOC Voltage Reading from the remote ADC Sensing. The reading shown below is the true SOC Voltage sensed from the Processor's sensor.
Configuration options: [Auto] [Manual Mode] [Offset Mode]

NOTE: The following item appears only when **CPU SOC Voltage** is set to **[Manual Mode]**.

VDDSOC Voltage Override [Auto]

Use the <+> and <-> keys to adjust the value. The values range from 0.625V to 1.300V with an interval of 0.005V.

NOTE: The following items appear only when **CPU SOC Voltage** is set to **[Offset Mode]**.

VDDSOC Offset Mode Sign [-]

[-] Offset the VDDSOC voltage by a negative value.

VDDSOC Voltage Offset [Auto]

Use the <+> and <-> keys to adjust the value. The values range from 0.005V to 0.500V with an interval of 0.005V.

CPU VDDIO / MC Voltage [Auto]

Use the <+> or <-> to adjust the value. The values range from 1.100V to 2.000V with an interval of 0.010V.

VDDP Voltage [Auto]

Use the <+> or <-> to adjust the value. The values range from 0.700V to 1.800V with an interval of 0.001V.

High DRAM Voltage Mode [Auto]

If disabled, the upper range for DRAM Voltage will be 1.435V. If enabled, the upper range will be 2.070V. If enabled on non-supported DRAM, the voltage will be lower than requested.
Configuration options: [Auto] [Disabled] [Enabled]

DRAM VDD Voltage [Auto]

Allows you to set the power for the DRAM IC's VDD portion.

DRAM VDDQ Voltage [Auto]

Allows you to set the power for the DRAM IC's VDD Data portion.

VDDG CCD Voltage [Auto]

VDDG CCD represents voltage for the data portion of the Infinity Fabric. Range is 650mV~1650mV of stepping 10mV.
Configuration options: [Auto] [650 mV] ~ [1650 mV]

VDDG IOD Voltage [Auto]

VDDG IOD represents voltage for the data portion of the Infinity Fabric. Range is 650mV~1650mV of Stepping 10mV.
Configuration options: [Auto] [650 mV] ~ [1650 mV]

Advanced Memory Voltages

PMIC Force Continuous Current Mode [Auto]

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

PMIC Voltages [Auto]

Configuration options: [Auto] [Sync All PMICs]

NOTE: The following items appear only when **PMIC Voltages** is set to **[Sync All PMICs]**.

SPD HUB VLDO (1.8V) [Auto]

Allows you to set the main power for the SPD Hub Logic. Default set to 1.8V.

SPD HUB VDDIO (1.0V) [Auto]

Allows you to set the main power for the SPD Hub side-band interface. Default set to 1.0V.

Memory VDD Voltage [Auto]

Allows you to set the power for the DRAM IC's VDD portion.

Memory VDDQ Voltage [Auto]

Allows you to set the power for the DRAM IC's Data portion.

Memory VPP Voltage [Auto]

Allows you to set the power for the DRAM Activating Power Supply.

Memory Voltage Switching Frequency [Auto]

Allows you to set the switching frequency of memory voltage regulator in MHz.

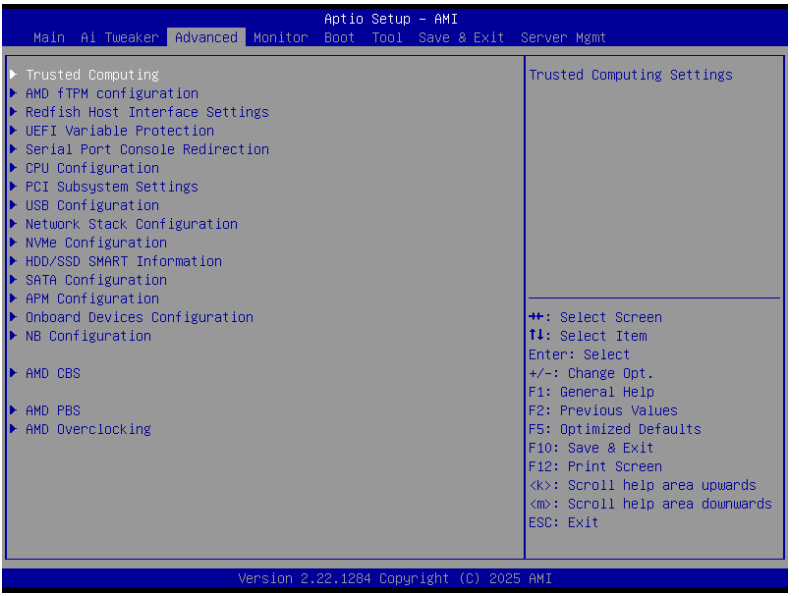
Memory Current Capability [Auto]

Allows you to set the current capability for the Switching Regulators in Amps.

5.5 Advanced menu

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

CAUTION! Be cautious when changing the settings of the Advanced menu items. Incorrect field values can cause the system to malfunction.



5.5.1 Trusted Computing

The items in this menu allow you to configure the Trusted Computing settings.

Security Device Support [Enabled]

Allows you to enable or disable the BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available.
Configuration options: [Disabled] [Enabled]

NOTE: The following items appear only when **Security Device Support** is set to **[Enabled]**.

SHA256 PCR Bank [Enabled]

Enable or disable SHA256 PCR Bank.
Configuration options: [Disabled] [Enabled]

Pending operation [None]

Schedule an Operation for the Security Device.
Configuration options: [None] [TPM Clear]

NOTE: Your computer will reboot during restart in order to change the State of the Security Device.

Platform Hierarchy [Enabled]

Enable or Disable Platform Hierarchy.
Configuration options: [Disabled] [Enabled]

Storage Hierarchy [Enabled]

Enable or disable Storage Hierarchy.
Configuration options: [Disabled] [Enabled]

Endorsement Hierarchy [Enabled]

Enable or disable Endorsement Hierarchy.
Configuration options: [Disabled] [Enabled]

Physical Presence Spec Version [1.3]

Allows you to select to Tell O.S. to support PPI Version 1.2 or 1.3.
Configuration options: [1.2] [1.3]

NOTE: Some HCK tests might not support 1.3.

5.5.2 AMD fTPM configuration

The items in this menu show the AMD fTPM configuration options.

Selects TPM device [Enable Firmware TPM]

Allows you to select between Firmware TPM or Discrete TPM.

[Enable Firmware TPM]	Enables platform Firmware TPM, disable Discrete TPM.
[Enable Discrete TPM]	Enables Discrete TPM, disable platform Firmware TPM.

NOTE: If you plug in a Discrete TPM card on you motherboard, please select the **[Enable Discrete TPM]** option.

Erase fTPM NV for factory reset [Enabled]

Allows you to enable or disable fTPM reset for newly installed CPUs.

[Disabled]	Keep previous fTPM records and continue system boot, fTPM will not be enabled with the new CPU unless fTPM is reset (reinitialized). Swapping back to the old CPU may allow you to recover TPM related keys and data.
[Enabled]	Reset fTPM, if you have Bitlocker or encryption-enabled system, the system will not boot without a recovery key.

5.5.3 Redfish Host Interface Settings

The items in this menu allow you to configure Redfish Host Interface Settings.

Redfish [Enabled]

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

NOTE: The following items appear only when **Redfish** is set to **[Enabled]**.

Authentication mode [Basic Authentication]

Allows you to select the authentication mode.
Configuration options: [Authentication None] [Basic Authentication] [Session Authentication]

Redfish Server Settings

IP address [xxx.xxx.x.xx]

Enter Redfish Server IP address.

IP Mask address [xxx.xxx.x.x]

Enter Redfish Server IP Mask address.

IP Port [xxx]

Enter Redfish Server IP Port number.

5.5.4 UEFI Variables Protection

Password protection of Runtime Variables [Enable]

Control the NVRAM Runtime Variable protection through System Admin Password.
Configuration options: [Enable] [Disable]

5.5.5 Serial Port Console Redirection

The items in this menu allow you to configure serial port console redirection settings.

COM1 / COM2

Console Redirection [Disabled]

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

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

Console Redirection Settings

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

Terminal Type [ANSI]

Allows you to set the terminal type.

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

Bits per second [115200]

Selects serial port transmission speed. The speed must be matched on the other side. Long or noisy lines may require lower speeds.
Configuration options: [9600] [19200] [38400] [57600] [115200] [230400] [460800] [921600]

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. They can be used as an additional data bit.

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

Stop Bits [1]

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

Flow Control [None]

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

VT -UTF8 Combo Key Support [Enabled]

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

Recorder Mode [Disabled]

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

Resolution 100x31 [Enabled]

This allows you enable or disable extended terminal solution.
Configuration options: [Disabled] [Enabled]

Putty Keypad [VT100]

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

Legacy Console Redirection Settings

Redirection COM Port [COM1]

Allows you to select a COM port to display redirection of Legacy OS and Legacy OPROM Messages.
Configuration options: [COM1] [COM2]

Resolution [80x24]

This allows you to set the number of rows and columns supported on the Legacy OS.
Configuration options: [80x24] [80x25]

Redirection After POST [Always Enable]

The default setting for this option is set to **[Always Enable]**.

[Bootloader]	The legacy Console Redirection is disabled before booting to legacy OS.
[Always Enable]	Legacy Console Redirection is enabled for legacy OS.

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

Console Redirection EMS [Disabled]

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

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

Console Redirection Settings

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.

Out-of-Band Mgmt Port [COM1]

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

Terminal Type EMS [VT-UTF8]

VT-UTF8 is the preferred terminal type for out-of-band management. The next best choice is VT100+, and then VT100. See above, in Console Redirection Settings page for more help with Terminal Type/Emulation.
Configuration options: [VT100] [VT100Plus] [VT-UTF8] [ANSI]

Bits per second EMS [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] [230400] [460800] [921600]

Flow Control EMS [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] [Software Xon/Xoff]

5.5.6 CPU Configuration

The items in this menu show the CPU-related information that the BIOS automatically detects. Scroll down to display other BIOS items.

PSS Support [Enabled]

Allows you to enable or disable the generation of ACPI_PPC, and _PCT objects.
Configuration options: [Disabled] [Enabled]

NX Mode [Enabled]

Allows you enable or disable No-execute page protection Function.
Configuration options: [Disabled] [Enabled]

SVM Mode [Enabled]

Allows you enable or disable CPU Virtualization.
Configuration options: [Disabled] [Enabled]

5.5.7 PCI Subsystem Settings

The items in this menu allow you to configure PCI, PCI-X, and PCI Express settings.

Above 4G Decoding [Enabled]

Allows you to enable or disable 64bit capable Devices to be Decoded in Above 4G Address Space (Only if System supports 64 bit PCI Decoding).
Configuration options: [Disabled] [Enabled]

NOTE:

- Only enabled under 64bit operating system.
- The following item appears only when **Above 4G Decoding** is set to **[Enabled]**.

Re-Size BAR Support [Enabled]

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

NOTE: To enable Re-Size BAR Support for harnessing full GPU memory, please go to the **Boot** section and set **CSM(Compatibility Support Module)** to **[Disabled]**.

SR-IOV Support [Disabled]

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

5.5.8 USB Configuration

The items in this menu allow you to change the USB-related features.

NOTE: The **Mass Storage Devices** item shows the auto-detected values. If no USB device is detected, the item shows **None**.

Legacy USB Support [Enabled]

[Enabled] Enables the Legacy USB support.

[Disabled] USB devices are available only for EFI applications.

[Auto] Automatically disables the Legacy USB support if USB devices are not connected.

XHCI Hand-off [Enabled]

This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.

[Disabled] Support XHCI by XHCI drivers for operating systems with XHCI support.

[Enabled] Support XHCI by BIOS for operating systems without XHCI support.

USB Mass Storage Driver Support [Enabled]

Allows you to enable or disable USB Mass Storage Driver Support
Configuration options: [Disabled] [Enabled]

Mass Storage Devices:

Allows you to select the mass storage device emulation type for devices connected. **[Auto]** enumerates devices according to their media format. Optical drives are emulated as **[CD-ROM]**, drives with no media will be emulated according to a drive type.
Configuration options: [Auto] [Floppy] [Forced FDD] [Hard Disk] [CD-ROM]

USB Single Port Control

Allows you to enable or disable the individual USB ports.

U10G_C1 [Enabled]

Configuration options: [Disabled] [Enabled]

U5G_8 [Enabled]

Configuration options: [Disabled] [Enabled]

U5G_9 [Enabled]

Configuration options: [Disabled] [Enabled]

U10G_11 [Enabled]

Configuration options: [Disabled] [Enabled]

USB_12 [Enabled]

Configuration options: [Disabled] [Enabled]

USB_14 [Enabled]

Configuration options: [Disabled] [Enabled]

USB_15 [Enabled]

Configuration options: [Disabled] [Enabled]

5.5.9 Network Stack Configuration

The items in this menu allow you to change the Network Stack Configuration.

Network stack [Disabled]

Allows you to disable or enable the UEFI network stack.
Configuration options: [Disabled] [Enabled]

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

Ipv4 PXE Support [Enabled]

Allows you to enable or disable the Ipv4 PXE boot support.
Configuration options: [Disabled] [Enabled]

Ipv6 PXE Support [Enabled]

Allows you to enable or disable the Ipv6 PXE boot support.
Configuration options: [Disabled] [Enabled]

5.5.10 NVMe Configuration

This menu displays the NVMe controller and Drive information of the connected devices. You may press <Enter> on a connected NVMe device which appears in this menu to view more information on the NVMe device.

NOTE: The options displayed in this menu may vary depending on the devices connected to your motherboard. Please refer to the BIOS of your motherboard for the actual settings and options.

5.5.11 HDD/SSD SMART Information

The items in this menu allow you to view the SMART information for connected storage devices.

NOTE:

- The options displayed in this menu may vary depending on the devices connected to your motherboard. Please refer to the BIOS of your motherboard for the actual settings and options.
- NVM Express devices do not support SMART information.

5.5.12 SATA Configuration

While entering Setup, the BIOS automatically detects the presence of SATA devices. The SATA Port items show **Empty** if no SATA device is installed to the corresponding SATA port. Scroll down to display the other BIOS items.

SATA Controller(s) [Enabled]

Allows you to enable or disable the SATA Device.
Configuration options: [Disabled] [Enabled]

NOTE: The following items appear only when **SATA Controller(s)** is set to **[Enabled]**.

SATA Mode [AHCI]

This item allows you to set the SATA configuration.

[AHCI]	Set to [AHCI] when you want the SATA hard disk drives to use the AHCI (Advanced Host Controller Interface). The AHCI allows the onboard storage driver to enable advanced Serial ATA features that increases storage performance on random workloads by allowing the drive to internally optimize the order of commands.
[RAID]	Set to [RAID] when you want to create a RAID configuration from the SATA hard disk drives.

NVMe RAID Mode [Disabled]

This item allows you to enable or disable the NVMe RAID mode.
Configuration options: [Disabled] [Enabled]

SMART Self Test [Enabled]

The S.M.A.R.T. (self-monitoring, analysis and reporting technology) is a monitor system. Enable this item to show a warning message during the POST (power-on self-test) when any error occurs in hard disks.
Configuration options: [Disabled] [Enabled]

SATA6G_1 [Enabled]

Allows you to enable or disable the selected SATA port.
Configuration options: [Disabled] [Enabled]

SATA6G_1 Hot Plug [Disabled]

Designates this port as Hot Pluggable.
Configuration options: [Disabled] [Enabled]

SATA6G_2 [Enabled]

Allows you to enable or disable the selected SATA port.
Configuration options: [Disabled] [Enabled]

SATA6G_2 Hot Plug [Disabled]

Designates this port as Hot Pluggable.
Configuration options: [Disabled] [Enabled]

SATA6G_3 [Enabled]

Allows you to enable or disable the selected SATA port.
Configuration options: [Disabled] [Enabled]

SATA6G_3 Hot Plug [Disabled]

Designates this port as Hot Pluggable.
Configuration options: [Disabled] [Enabled]

SATA6G_4 [Enabled]

Allows you to enable or disable the selected SATA port.
Configuration options: [Disabled] [Enabled]

SATA6G_4 Hot Plug [Disabled]

Designates this port as Hot Pluggable.
Configuration options: [Disabled] [Enabled]

5.5.13 APM Configuration

The items in this menu allow you to change the advanced power management settings.

Restore AC Power Loss [Power Off]

Select AC power state when power is re-applied after a power failure.
Configuration options: [Power Off] [Power On] [Last State]

ErP Ready [Disabled]

Allow BIOS to switch off some power at S5 to get the system ready for ErP requirement. When set to Enabled, all other PME options will be switched off. RGB LEDs and RGB/ Addressable RGB Headers will also be disabled.
Configuration options: [Disabled] [Enabled (S5)]

Max Power Saving [Disabled]

Configuration options: [Disabled] [Enabled]

Power On By PCI-E [Disabled]

Enable or disable the wake-on-LAN function of the onboard LAN controller or other installed PCI-E LAN cards.
Configuration options: [Disabled] [Enabled]

Power On By RTC [Disabled]

Enable or disable the RTC (Real-Time Clock) to generate a wake event and configure the RTC alarm date. When enabled, you can set the days, hours, minutes, or seconds to schedule an RTC alarm date.
Configuration options: [Disabled] [Enabled]

5.5.14 Onboard Devices Configuration

The items in this menu allow you to change the onboard devices settings. Scroll down to view the other BIOS items.

Native ASPM [Auto]

[Auto]	Default setting
[Enabled]	OS Controlled ASPM
[Disabled]	BIOS Controlled ASPM

CPU PCIE ASPM Mode Control [Auto]

Configuration options: [Disabled] [L0s Entry] [L1 Entry] [L0s And L1 Entry] [Auto]

PCIEX16(G5) Bandwidth Bifurcation Configuration [PCIE X16 Mode]

[PCIE X16 Mode]	Switch PCIEX16(G5) to x16.
[PCIE RAID Mode]	Up to 4 SSDs installed onto the Hyper M.2 X16 series card can be detected.

NOTE: Use **[PCIE RAID Mode]** when installing the Hyper M.2 X16 series card or other M.2 adapter cards. Installing other devices may result in a boot-up failure. The number of SSDs supported varies with the PCIe bifurcation abilities enabled by each processor.

Intel LAN Controller [Enabled]

Allows you to enable or disable Intel LAN Controller.
Configuration options: [Disabled] [Enabled]

Intel LAN2 Controller [Enabled]

Allows you to enable or disable Intel LAN2 Controller.
Configuration options: [Disabled] [Enabled]

Onboard LED [Enabled]

This switch enables you to turn on/off the HDD and PLED LEDs.
Configuration options: [Disabled] [Enabled]

Q-Code LED Function [Auto]

[Disabled]	Turn off Q-Code LED.
[POST Code Only]	Show POST (Power-On Self-Test) code on Q-Code LED.
[Auto]	The Q-Code LED, by default, displays the POST code. To show the CPU temperature after the system boots into the OS, set the BMC_SW header to Disabled.

USB power delivery in Soft Off state (S5) [Enabled]

Allows you to enable or disable USB power when your PC is in the S5 state.
Configuration options: [Disabled] [Enabled]

Serial Port Configuration

This submenu allows you to set parameters for Serial Port.

NOTE: This item will only function if there is a serial port (COM) connector on your motherboard.

Serial Port [Enabled]

Allows you to enable or disable the Serial port (COM).
Configuration options: [Enabled] [Disabled]

NOTE: The following item appears only when **Serial Port** is set to **[Enabled]**.

Change settings [IO=3F8h; IRQ=4]

Allows you to select an optimal setting for super IO device.
Configuration options: [IO=3F8h; IRQ=4] [IO=3E8h; IRQ=4] [IO=2E8h; IRQ=3]

Serial Port 2 Configuration

This submenu allows you to set parameters for Serial Port 2 (COMB).

NOTE: This item will only function if there is a serial port (COM) connector on your motherboard.

Serial Port [Enabled]

Allows you to enable or disable the Serial port (COM).
Configuration options: [Enabled] [Disabled]

NOTE: The following item appears only when **Serial Port** is set to **[Enabled]**.

Change settings [IO=2F8h; IRQ=3]

Allows you to select an optimal setting for super IO device.
Configuration options: [IO=2F8h; IRQ=3] [IO=3E8h; IRQ=4] [IO=2E8h; IRQ=3]

PCIE Link Speed

This submenu allows you to set parameters for PCIE Link Speed.

PCIEX16(G5) Link Mode [Auto]

Allows you to set the link speed for PCIEX16 Slot.
Configuration options: [Auto] [GEN 1] [GEN 2] [GEN 3] [GEN 4] [GEN 5]

M.2 Link Mode [Auto]

Allows you to set the link speed for M.2 Device.
Configuration options: [Auto] [GEN 1] [GEN 2] [GEN 3] [GEN 4] [GEN 5]

Chipset Link Mode [Auto]

Allows you to set the link speed between CPU and Chipset.
Configuration options: [Auto] [GEN 1] [GEN 2] [GEN 3] [GEN 4]

SLIMSAS_1 Link Mode [Auto]

Allows you to set the link speed for SLIMSAS_1 Slot.
Configuration options: [Auto] [GEN 1] [GEN 2] [GEN 3] [GEN 4]

SLIMSAS_2 Link Mode [Auto]

Allows you to set the link speed for SLIMSAS_2 Slot.
Configuration options: [Auto] [GEN 1] [GEN 2] [GEN 3] [GEN 4]

5.5.15 NB Configuration

The items in this menu allow you to change the NB Configurations.

Primary Video Device [PCIE Video]

Allows you to select Primary Video Device BIOS will use for output.
Configuration options: [IGFX Video] [PCIE Video]

UMA Frame Buffer Size [Auto]

Allows you to set the UMA FB Size.
Configuration options: [Auto] [64M] [80M] [96M] [128M] [256M] [384M] [512M] [768M] [1G] [2G] [3G] [4G] [8G] [16G]

5.5.16 AMD CBS

The items in this menu shows the AMD Common BIOS Specifications.

NOTE: The configuration options for this section vary depending on the motherboard. Please refer to the BIOS of your motherboard for the actual settings and options.

Global C-state Control [Auto]

Allows you to control IO based C-state generation and DF C-states.
Configuration options: [Disabled] [Enabled] [Auto]

IOMMU [Auto]

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

ECC [Auto]

Allows you to enable or disable ECC. Setting this item to **[Auto]** will set ECC to enable.
Configuration options: [Disabled] [Enabled] [Auto]

SMT Control [Auto]

Can be used to disable symmetric multithreading. To re-enable SMT, a POWER CYCLE is needed after setting this item to **[Auto]**.
Configuration options: [Disable] [Auto]

Core Performance Boost [Auto]

Allows you to disable Core Performance Boost.
Configuration options: [Disabled] [Auto]

App Compatibility Database [Disabled]

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

CPU Common Options

Thread Enablement

Performance

Prefetcher settings

L1 Stream HW Prefetcher [Auto]
Allows you to enable or disable L1 Stream HW Prefetcher.
Configuration options: [Disable] [Enable] [Auto]

L2 Stream HW Prefetcher [Auto]
Allows you to enable or disable L2 Stream HW Prefetcher.
Configuration options: [Disable] [Enable] [Auto]

L1 Stride Prefetcher [Auto]
Uses memory access history of individual instructions to fetch additional lines when each access is a constant distance from the previous.
Configuration options: [Disable] [Enable] [Auto]

L1 Region Prefetcher [Auto]
Uses memory access history to fetch additional lines when the data access for a given instruction tends to be followed by other data accesses.
Configuration options: [Disable] [Enable] [Auto]

L1 Burst Prefetch Mode [Auto]
Allows you to enable or disable L1 Burst Prefetch Mode.
Configuration options: [Disable] [Enable] [Auto]

L2 Up/Down Prefetcher [Auto]
Uses memory access history to determine whether to fetch the next or previous line for all memory accesses.
Configuration options: [Disable] [Enable] [Auto]

Core Watchdog

Core Watchdog Timer Enable [Auto]
Allows you to enable or disable CPU Watchdog Timer.
Configuration options: [Disabled] [Enabled] [Auto]

NOTE: The following items appear only when **Core Watchdog Timer Enable** is set to **[Enabled]**.

Core Watchdog Timer Interval [Auto]
Allows you to select CPU Watchdog Timer interval.
Configuration options: [Auto] [39.68us] [80.64us] [162.56us] [326.4us] [654.08us] [1.309ms] [2.620ms] [5.241ms] [10.484ms] [20.970ms] [40.64ms] [82.53ms] [166.37ms] [334.05ms] [669.41ms] [1.340s] [2.681s] [5.364s] [10.730s] [21.461s]

Core Watchdog Timer Severity [Auto]
Allows you to specify the CPU Watchdog Time severity (MSRC001_0074[CpuWdTmrCfgSeverity]).
Configuration options: [No Error] [Transparent] [Corrected] [Deferred] [Uncorrected] [Fatal] [Auto]

RedirectForReturnDis [Auto]

From a workaround for GCC/C000005 issue for XV Core on CZ A0, setting MSRC001_1029 Decode Configuration (DE_CFG) bit 14 [DecfgNoRdrctForReturns] to 1.
Configuration options: [1] [0] [Auto]

Power Supply Idle Control [Auto]

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

Opcache Control [Auto]

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

Streaming Stores Control [Auto]

Allows you to enable or disable the Streaming Stores functionality.
Configuration options: [Disabled] [Enabled] [Auto]

Local APIC Mode [Auto]

Allows you to select local APIC operation modes.
Configuration options: [Compatibility] [xAPIC] [x2APIC] [Auto]

ACPI _CST C1 Declaration [Auto]

Determines whether or not to declare the C1 state to the OS.
Configuration options: [Disabled] [Enabled] [Auto]

Platform First Error Handling [Auto]

Allows you to enable or disable PFEH, cloack individual banks, and mask deferred error interrupts from each bank.
Configuration options: [Enabled] [Disabled] [Auto]

MCA error thresh enable [Auto]

Allows you to enable MCA error thresholding.
Configuration options: [False] [True] [Auto]

NOTE: The following item appears only when **MCA error thresh enable** is set to **[True]**.

MCA error thresh count [4094]

Effective error threshold count = 4095(0xFFF) - <this value> (e.g. the default value of 0xFF5 results in a threshold of 10)

MCA FruText [True]

Allows you to enable MCA FruText.
Configuration options: [False] [True]

SMU and PSP Debug Mode [Auto]

When this item is set to **[Enabled]**, uncorrected errors detected by the PSP FW or SMU FW that should cause a cold reset, will hang and not restart the system.
Configuration options: [Disabled] [Enabled] [Auto]

PPIN Opt-in [Auto]

Allows you to turn on PPIN feature.
Configuration options: [Disabled] [Enabled] [Auto]

REP-MOV/STOS Streaming [Auto]

Allow REP-MOV/STOS to use non-caching streaming store for large sizes.
Configuration options: [Disabled] [Enabled] [Auto]

Enhanced REP MOVSB/STOSB [Auto]

This item is set to 1 by default, but can be set to zero for analysis purposes as long as OS supports it.
Configuration options: [Disabled] [Enabled] [Auto]

Fast Short REP MOVSB (FSRM) [Auto]

This item is set to 1 by default, but can be set to zero for analysis purposes as long as OS supports it.
Configuration options: [Disabled] [Enabled] [Auto]

SNP Memory (RMP Table) Coverage [Auto]

When this item is set to **[Enabled]**, the ENTIE system memory is covered.
Configuration options: [Disabled] [Enabled] [Custom] [Auto]

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

Amount of Memory to Cover [0]

Specify MB of System Memory to be covered in Hex.

SMEE [Auto]

Control secure memory enryption enable.
Configuration options: [Disable] [Enable] [Auto]

Action on BIST Failure [Auto]

Allows you to set the action to take when a CCD BIST failure is detected.
Configuration options: [Do nothing] [Down-CCD] [Auto]

Log Transparent Errors [Auto]

Log transparent errors in MCA in addition to debug registers.
Configuration options: [Disabled] [Enabled] [Auto]

AVX512 [Auto]

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

MONITOR and MWAIT Disable [Auto]

When this option is enabled, MONITOR, MWAIT, MONITORX, and MWAITX opcodes become invalid.
Configuration options: [Disabled] [Enabled] [Auto]

Corrector Branch Predictor [Auto]

Enabling for branch heavy codes may reduce conditional branch mispredicts.
Configuration options: [Disabled] [Enabled] [Auto]

PAUSE Delay [Auto]

Number of cycles thread will be idle after a PAUSE instruction.
Configuration options: [Auto] [Disabled] [16 cycles] [32 cycles] [64 cycles] [128 cycles]

CPU Speculative Store Modes [Auto]

[Balanced]	Store instructions may delay sending out their invalidations to remote cacheline copies when the cacheline is present but not in a writable state in the local cache.
[More Speculative]	Store instructions will send out invalidations to remote cacheline copies as soon as possible.
[Less Speculative]	Store instructions may delay sending out their invalidations to remote cacheline copies when the cacheline is not present in the local cache or not in a writable state in the local cache.
[Auto]	Default setting is applied.

SVM Lock [Auto]

Allows you to enable or disable VM_CR[Lock].
Configuration options: [Enabled] [Disabled] [Auto]

SVM Enable [Auto]

Allows you to enable or disable VM_CR[SvmeDisable].
Configuration options: [Enabled] [Disabled] [Auto]

DF Common Options

Memory Addressing

Memory interleaving [Auto]
Allows for disabling memory channel interleaving.
Configuration options: [Disabled] [Enabled] [Auto]

Memory interleaving size [Auto]
Controls the memory interleaving size. The valid values are AUTO, 256 bytes, 512 bytes, 1 Kbytes, or 2 Kbytes. This determines the starting address of the interleave (bit 8, 9, 10 or 11).
Configuration options: [256 Bytes] [512 Bytes] [1KB] [2KB] [Auto]

DRAM map inversion [Auto]
Inverting the map will cause the highest memory channels to get assigned the lowest addresses in the system.
Configuration options: [Disable] [Enable] [Auto]

Location of private memory regions [Auto]
Controls whether or not the private memory regions (PSP, SMU and CC6) are at the top of DRAM pair or distributed. Note that distributed requires memory on all dies. Note that it will always be at the top of DRAM if some dies don't have memory regardless of this option's setting.
Configuration options: [Distributed] [Consolidated] [Consolidated to 1st DRAM pair] [Auto]

ACPI

ACPI SRAT L3 Cache as NUMA Domain [Auto]

[Disabled]	Memory Addressing \ NUMA nodes per socket will be declared.
[Enabled]	Each CCX in the system will be declared as a separate NUMA domain.
[Auto]	Sets to the default option.

Disable DF to external downstream IP Sync Flood Propagation [Auto]

Disables Error propagation to UMC or any downstream slaves eg. FCH. Use this to avoid reset in failure scenario.
Configuration options: [Sync flood disabled] [Sync flood enabled] [Auto]

Disable DF sync flood propagation [Auto]

Disables propagation from PIE to other DF components and eventually to SDP ports.
Configuration options: [Sync flood disabled] [Sync flood enabled] [Auto]

Freeze DF module queues on error [Auto]

This item allows you to enable or disable freezing of all DF queues on error and also forces a sync flood on HWA even if MCAs are disabled.
Configuration options: [Disabled] [Enabled] [Auto]

DF Cstates [Auto]

When DF Cstate feature is set to **[Enabled]**, FW programs the registers required to enable this feature is the DF HW. (For **[Auto]** option, it means this option will synchronize with Global C State).
Configuration options: [Disabled] [Enabled] [Auto]

PSP error injection support [Auto]

Configuration options: [False] [True]

UMC Common Options

DDR Options

DDR Timing Configuration

CAUTION! Damage caused by use of your AMD processor outside of specification or in excess of factory settings are not covered by your system manufacturers warranty.

NOTE: The following items appear only when **[Accept]** is selected for **DRAM Timing Configuration**.

Active Memory Timing Settings [Auto]

Configuration options: [Auto] [Enabled]

NOTE: The following items appear only when **[Enabled]** is selected for **Active Memory Timing Settings**.

Memory Target Speed [3200]

Specifies the memory target speed in MT/s. The valid input is 2000 MT/s, 2400 MT/s, and range of 3200 MT/s ~ 12000 MT/s (stepping of 200 MT/s). The value is in decimal. The user input value will be rounded down to align with the stepping of 200 MT/s. The maximum speed defined in the JEDEC spec is 8400 MT/s, any input value that is greater than 8400 MT/s will be limited to 8400 MT/s.

DDR SPD Timing [Auto]

Tcl Ctrl

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **Tcl Ctrl** is set to **[Manual]**.

Tcl [22]

Specifies the CAS Latency. Valid values: 22 ~ 64, with a stepping of 2.

Trcd Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **Trcd Ctrl** is set to **[Manual]**.

Trcd [8]

Specifies the RAS# Active to CAS# Read Delay Time. Valid values: 8 ~ 62.

Trp Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **Trp Ctrl** is set to **[Manual]**.

Trp [8]

Specifies Row Precharge Delay Time. Valid values: 8 ~ 62.

Tras Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **Tras Ctrl** is set to **[Manual]**.

Tras [30]

Specifies Active to Precharge Delay Time. Valid values: 30 ~ 126.

Trc Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **Trc Ctrl** is set to **[Manual]**.

Trc [32]

Specifies Active to Active/Refresh Delay Time. Valid values: 32 ~ 255.

Twr Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **Twr Ctrl** is set to **[Manual]**.

Twr [48]

Specifies the Minimum Write Recovery Time. Valid values: 48 ~ 138, with a stepping of 6.

Trfc1 Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **Trfc1 Ctrl** is set to **[Manual]**.

Trfc1 [50]

Specifies the Refresh Recovery Delay Time (tRFC1). Valid values: 50 ~ 4095.

Trfc2 Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **Trfc2 Ctrl** is set to **[Manual]**.

Trfc2 [50]

Specifies the Refresh Recovery Delay Time (tRFC2). Valid values: 50 ~ 4095.

TrfcSb Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **TrfcSb Ctrl** is set to **[Manual]**.

TrfcSb [50]

Specifies the Refresh Recovery Delay Time (tRFCSB). Valid values: 50 ~ 2047.

DDR Non-SPD Timing

Trtp Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **Trtp Ctrl** is set to **[Manual]**.

Trtp [9]

Specifies the Read CAS# to Precharge command delay time. Valid values: 5 ~ 31.

TrrdL Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **TrrdL Ctrl** is set to **[Manual]**.

TrrdL [4]

Specifies the Activate to Activate Delay Time, same bank group (tRRD_L). Valid values: 4 ~ 32.

TrrdS Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **TrrdS Ctrl** is set to **[Manual]**.

TrrdS [4]

Specifies the Activate to Activate Delay Time, different bank group (tRRD_S). Valid values: 4 ~ 20.

Tfaw Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **Tfaw Ctrl** is set to **[Manual]**.

Tfaw [26]

Specifies the Four Activate Window Time. Valid values: 20 ~ 80.

TwtrL Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **TwtrL Ctrl** is set to **[Manual]**.

TwtrL [8]

Specifies the Minimum Write to Read Time, the same bank group. Valid values: 8 ~ 48.

TwtrS Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **TwtrS Ctrl** is set to **[Manual]**.

TwtrS [3]

Specifies the Minimum Write to Read Time, different bank group. Valid values: 2 ~ 16.

TrdrdScL Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **TrdrdScL Ctrl** is set to **[Manual]**.

TrdrdScL [1]

Specifies the CAS to CAS delay time, same bank group. Valid values: 1 ~ 15.

TrdrdSc Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **TrdrdSc Ctrl** is set to **[Manual]**.

TrdrdSc [1]

Specifies the Read to Read turnaround timing in the same chipselect. Valid values: 1 ~ 15.

TrdrdSd Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **TrdrdSd Ctrl** is set to **[Manual]**.

TrdrdSd [3]

Specifies the Read to Read turnaround timing in the same DIMM. Valid values: 1 ~ 15.

TrdrdDd Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **TrdrdDd Ctrl** is set to **[Manual]**.

TrdrdDd [3]

Specifies the Read to Read turnaround timing in a different DIMM. Valid values: 1 ~ 15.

TwrwrScL Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **TwrwrScL Ctrl** is set to **[Manual]**.

TwrwrScL [1]

Specifies the CAS to CAS Delay Time, same bank group. Valid values: 1 ~ 63.

TwrwrSc Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **TwrwrSc Ctrl** is set to **[Manual]**.

TwrwrSc [1]

Specifies the Write to Write turnaround timing in the same chipselect. Valid values: 1 ~ 15.

TwrwrSd Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **TwrwrSd Ctrl** is set to **[Manual]**.

TwrwrSd [3]

Specifies the Write to Write turnaround timing in the same DIMM. Valid values: 1 ~ 15.

TwrwrDd Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **TwrwrDd Ctrl** is set to **[Manual]**.

TwrwrDd [3]

Specifies the Write to Write turnaround timing in a different DIMM. Valid values: 1 ~ 15.

Twrrd Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **Twrrd Ctrl** is set to **[Manual]**.

Twrrd [5]

Specifies the Write to Read turnaround timing. Valid values: 1 ~ 15.

Trdwr Ctrl [Auto]

[Auto]	Follow default setting.
[Manual]	Manually specify.

NOTE: The following item appears only when **Trdwr Ctrl** is set to **[Manual]**.

Trdwr [5]

Specifies the Read to Write turnaround timing. Valid values: 1 ~ 31.

DDR BUS Configuration

Processor CK drive strengths [Auto]

Specifies the Processor CK drive strengths.
Configuration options: [Auto] [120.0 Ohm] [60.0 Ohm] [40.0 Ohm] [30.0 Ohm]

Processor CA drive strengths [Auto]

Specifies the Processor CA drive strengths.
Configuration options: [Auto] [120.0 Ohm] [60.0 Ohm] [40.0 Ohm] [30.0 Ohm]

Processor CS drive strengths [Auto]

Specifies the Processor CS drive strengths.
Configuration options: [Auto] [120.0 Ohm] [60.0 Ohm] [40.0 Ohm] [30.0 Ohm]

CA ODT GroupA [Auto]

Specifies the CA ODT.
Configuration options: [Auto] [RTT_OFF (Disable)] [RZQ/0.5 (480)] [RZQ/1 (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RFU] [RZQ/6 (40)]

CK ODT GroupA [Auto]

Specifies the CK ODT.
Configuration options: [Auto] [RTT_OFF (Disable)] [RZQ/0.5 (480)] [RZQ/1 (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RFU] [RZQ/6 (40)]

CS ODT GroupA [Auto]

Specifies the CS ODT.
Configuration options: [Auto] [RTT_OFF (Disable)] [RZQ/0.5 (480)] [RZQ/1 (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RFU] [RZQ/6 (40)]

CA ODT GroupB [Auto]

Specifies the CS ODT.
Configuration options: [Auto] [RTT_OFF (Disable)] [RZQ/0.5 (480)] [RZQ/1 (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RFU] [RZQ/6 (40)]

CK ODT GroupB [Auto]

Specifies the CK ODT.
Configuration options: [Auto] [RTT_OFF (Disable)] [RZQ/0.5 (480)] [RZQ/1 (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RFU] [RZQ/6 (40)]

CS ODT GroupB [Auto]

Specifies the CS ODT.
Configuration options: [Auto] [RTT_OFF (Disable)] [RZQ/0.5 (480)] [RZQ/1 (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RFU] [RZQ/6 (40)]

Processor ODT impedance Pull Up P0-3 [Auto]

Specifies the Processor ODT impedance Pull Up P0.
Configuration options: [Auto] [High Impedance] [480 ohm] [240 ohm] [160 ohm] [120 ohm] [96 ohm] [80 ohm] [68 ohm] [60 ohm] [53 ohm] [48 ohm] [43 ohm] [40 ohm] [36 ohm] [34 ohm] [32 ohm] [30 ohm] [28 ohm] [26 ohm] [25 ohm]

Processor ODT impedance Pull Down P0-3 [Auto]

Specifies the Processor ODT impedance Pull Down P0.
Configuration options: [Auto] [High Impedance] [480 ohm] [240 ohm] [160 ohm] [120 ohm] [96 ohm] [80 ohm] [68 ohm] [60 ohm] [53 ohm] [48 ohm] [43 ohm] [40 ohm] [36 ohm] [34 ohm] [32 ohm] [30 ohm] [28 ohm] [26 ohm] [25 ohm]

Processor DQ drive strengths Pull Up P0-3 [Auto]

Specifies the Processor DQ drive strengths Pull Up P0.
Configuration options: [Auto] [High Impedance] [240 ohm] [120 ohm] [80 ohm] [60 ohm] [48 ohm] [40 ohm] [34.3 ohm]

Processor DQ drive strengths Pull Down P0-3 [Auto]

Specifies the Processor DQ drive strengths Pull Down P0.
Configuration options: [Auto] [High Impedance] [240 ohm] [120 ohm] [80 ohm] [60 ohm] [48 ohm] [40 ohm] [34.3 ohm]

Dram ODT Impedance RTT_NOM_WR P0-3 [Auto]

Specifies the Dram ODT Impedance RTT_NOM_WR P0.
Configuration options: [Auto] [RTT_OFF] [RZQ (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RZQ/5 (48)] [RZQ/6 (40)] [RZQ/7 (34)]

Dram ODT Impedance RTT_NOM_RD P0-3 [Auto]

Specifies the Dram ODT Impedance RTT_NOM_RD P0.
Configuration options: [Auto] [RTT_OFF] [RZQ (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RZQ/5 (48)] [RZQ/6 (40)] [RZQ/7 (34)]

Dram ODT Impedance RTT_WR P0-3 [Auto]

Specifies the Dram ODT Impedance RTT_WR P0.
Configuration options: [Auto] [RTT_OFF] [RZQ (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RZQ/5 (48)] [RZQ/6 (40)] [RZQ/7 (34)]

Dram ODT Impedance RTT_PARK P0-3 [Auto]

Specifies the Dram ODT Impedance RTT_PARK P0.
Configuration options: [Auto] [RTT_OFF] [RZQ (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RZQ/5 (48)] [RZQ/6 (40)] [RZQ/7 (34)]

Dram ODT Impedance DQS_RTT_PARK P0-3 [Auto]

Specifies the Dram ODT Impedance DQS_RTT_PARK P0.
Configuration options: [Auto] [RTT_OFF] [RZQ (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RZQ/5 (48)] [RZQ/6 (40)] [RZQ/7 (34)]

DRAM DQ drive strengths Pull Up P0-3 [Auto]

Specifies the DRAM DQ drive strengths Pull Up P0.
Configuration options: [Auto] [48 ohm] [40 ohm] [34 ohm]

DRAM DQ drive strengths Pull Down P0-3 [Auto]

Specifies the DRAM DQ drive strengths Pull Up P0.
Configuration options: [Auto] [48 ohm] [40 ohm] [34 ohm]

DDR Controller Configuration

DDR Power Options

Power Down Enable [Auto]

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

DDR RAS

Disable Memory Error Injection [Auto]

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

DDR ECC Configuration

Allows you to configure DDR ECC configurations.

DDR Security

TSME [Auto]

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

Data Scramble [Auto]

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

DDR Addressing Options

Chipselect Interleaving [Auto]

Interleave memory blocks across the DRAM chip selects for node 0.
Configuration options: [Disabled] [Auto]

Address Hash Bank [Auto]

Allows you to enable or disable bank address hashing.
Configuration options: [Disabled] [Enabled] [Auto]

Address Hash CS [Auto]

Enable or disable CS address hashing.
Configuration options: [Auto] [Enabled] [Disabled]

Address Hash Subchannel [Auto]

Enable or disable sub-channel address hashing.
Configuration options: [Auto] [Enabled] [Disabled]

BankSwapMode [Auto]

Configuration options: [Auto] [Disabled] [Swap CPU] [Swap APU]

DDR Training Options

DFE Read Training [Auto]

Perform 2D Read Training with DFE on.
Configuration options: [Auto] [Enable] [Disable]

DRAM PDA Enumerate ID Programming Mode [Auto]

Configuration options: [Auto] [Sequential PDA enumeration mode] [Legacy PDA enumeration mode]

TX DFE Taps [Auto]

Specifies the number of TX DFE taps.
Configuration options: [Auto] [1 Tap] [2 Taps] [3 Taps] [4 Taps]

PPT Control [Auto]

Specifies the PPT Control.
Configuration options: [Auto] [Disabled] [Relock+Retrain only] [UMC Snoop PPT] [DFI Retrain PPT] [Relock Only] [Relock Only with DFI PPT]

DDR Training Runtime Reduction [Auto]

[Disabled] Force Disable DDR Training Runtime Reduction.
[Enabled] Force Enable DDR Training Runtime Reduction.
[Auto] Default code behavior. If OC is ENABLE, DDR Training Runtime Reduction will be DISABLE by DEFAULT.

RX Burst Length [Auto]

Extended sequence for read training.
[Auto] Default code behavior.
[1 x] 1 x burst length.
[2 x] 2 x burst length.
[4 x] 4 x burst length.
[8 x] 8 x burst length.

TX Burst Length [Auto]

Extended sequence for write training.
[Auto] Default code behavior.
[1 x] 1 x burst length.
[2 x] 2 x burst length.
[4 x] 4 x burst length.
[8 x] 8 x burst length.

RX2D_TrainOpt [Auto]

Configuration options: [Auto] [Manual]

NOTE: The following items appear only when **RX2D_TrainOpt** is set to **[Manual]**.

RX2D_DFE [Auto]

Used to force Rx DFE on or off.
Configuration options: [Auto] [Disabled] [Enabled]

RX2D Voltage Step Size (2^n) [0]

0 = 1 DAC setting between checked values. 1 = 2 DAC settings between checked values. 2 = 4 DAC settings between checked values. 3 = 8 DAC settings between checked values.

RX2D Delay Step Size (2^n) [0]

0 = 1 LCDL delays between checked values. 1 = 2 LCDL delays between checked values. 2 = 4 LCDL delays between checked values. 3 = 8 LCDL delays between checked values.

TX2D_TrainOpt [Auto]

Configuration options: [Auto] [Manual]

NOTE: The following items appear only when **TX2D_TrainOpt** is set to **[Manual]**.

TX2D_DFE [Auto]

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

TX2D Voltage Step Size (2^n) [0]

0 = 1 DAC setting between checked values. 1 = 2 DAC settings between checked values. 2 = 4 DAC settings between checked values. 3 = 8 DAC settings between checked values.

TX2D Delay Step Size (2^n) [0]

0 = 1 LCDL delays between checked values. 1 = 2 LCDL delays between checked values. 2 = 4 LCDL delays between checked values. 3 = 8 LCDL delays between checked values.

TX2D Voltage Step Multiplier [0]

0 = Voltage Step Size is not modified. 1 = Voltage Step Size is multiplied by 16.

TX2D Delay Step Multiplier [No Multiplier]

0 = Delay Step Size is not modified. 1 = Delay Step Size is multiplied by 16.
Configuration options: [Auto] [Multiply DAC step size by 16] [No Multiplier]

RX DFE Taps [Auto]

Specifies the number of RX DFE taps.
Configuration options: [Auto] [1 Tap] [2 Taps] [3 Taps] [4 Taps]

DDR MBIST Options

MBIST Enable [Auto]

Allows you to enable or disable Memory MBIST.
Configuration options: [Disabled] [Enabled] [Auto]

NOTE: The following items appear only when **MBIST Enable** is set to **[Enabled]**.

MBIST Test Mode [Auto]

Allows you to select the MBIST Test Mode - Interface Mode (Tests Single and Multiple CS transactions and Basic Connectivity) or Data Eye Mode (Measures Voltage vs. Timing).
Configuration options: [Interface Mode] [Data Eye Mode] [Both] [Auto]

MBIST Aggressors [Auto]

Allows you to enable or disable Memory Aggressor test.
Configuration options: [Disabled] [Enabled] [Auto]

MBIST Per Bit Slave Die Reporting [Auto]

Reports 2D Data Eye Results in ABL Log for each DQ, Chipselect, and Channel.
Configuration options: [Disabled] [Enabled] [Auto]

DDR Data Eye

Pattern Select [Auto]

Configuration options: [Auto] [PRBS] [SSO] [Both]

Pattern Length Select [Auto]

Configuration options: [Auto] [Manual]

NOTE: The following items appear only when **Pattern Length Select** is set to **[Manual]**.

Pattern Length [6]

This token helps to determine the pattern length. The possible options are N=3...12.

Aggressor Channel [Auto]

This helps read the aggressors channels. If set to **[Enabled]**, you can read from one or more than one aggressor channel. The default is set to **[Disabled]**.
Configuration options: [Auto] [Disabled] [1 Aggressor Channel] [3 Aggressor Channels] [7 Aggressor Channels]

DDR Memory Features

Memory Context Restore [Auto]

Allows you to configure the memory context restore mode. When enabled, DRAM re-training is avoided when possible and the POST latency is minimized.
Configuration options: [Auto] [Enabled] [Disabled]

DDR Turnaround Times

Read Drift Adjustment [Auto]

AUTO - Read Drift Adjustment 0.
Configuration options: [Auto] [minus 4] [minus 3] [minus 2] [minus 1] [plus 1] [plus 2] [plus 3] [plus 4]

Read Drift Adjustment P0-3 [Auto]

AUTO - Read Drift Adjustment 0.
Configuration options: [Auto] [minus 4] [minus 3] [minus 2] [minus 1] [plus 1] [plus 2] [plus 3] [plus 4]

Write Drift Adjustment [Auto]

AUTO - Write Drift Adjustment 0.
Configuration options: [Auto] [minus 4] [minus 3] [minus 2] [minus 1] [plus 1] [plus 2] [plus 3] [plus 4]

Write Drift Adjustment P0-3 [Auto]

AUTO - Write Drift Adjustment 0.
Configuration options: [Auto] [minus 4] [minus 3] [minus 2] [minus 1] [plus 1] [plus 2] [plus 3] [plus 4]

NBIO Common Options

PCIe ARI Support [Auto]

Enables Alternative Routing-ID Interpretation.
Configuration options: [Disabled] [Enabled] [Auto]

PCIe All Port ECRC [Auto]

Enable or disable PCIe all port ECRC.
Configuration options: [Disabled] [Enabled] [Auto]

Advanced Error Reporting (AER) [Auto]

Enable or disable support for Advanced Error Reporting (AER).
Configuration options: [Not Supported] [Supported] [Auto]

PCIe ARI Enumeration [Auto]

ARI Forwarding enabled for each downstream port.
Configuration options: [Disable] [Enable] [Auto]

GFX Configuration

UMA Version [Auto]

[Legacy]	UMA Legacy Version
[Non-Legacy]	UMA Non-Legacy Version
[Auto]	Hybrid Secure

GPU Host Translation Cache [Auto]
Allows you to enable or disable GPU Host Translation Cache.
Configuration options: [Disabled] [Enabled] [Auto]

Audio Configuration

NB Azalia [Auto]
Allows you to enable or disable the integrated HD audio controller.
Configuration options: [Disabled] [Enabled] [Auto]

Audio IOs [Auto]
Configuration options: [Auto] [HDA(3SDI) + PDM(2CH)(Default)] [HDA (1SDI) + PDM(6CH)] [HDA(1SDI) + SW0(1MDATA) + PDM(2CH)] [SW0(4MDATA) + PDM(6CH)] [SW0(4MDATA) + SW1(1MDATA) + PDM(2CH)]

PCIe loopback Mode [Auto]

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

Persistence mode for legacy endpoints [Auto]

Enable or disable persistence mode for legacy endpoints. Enable this option if some legacy PCIe devices are not detected.
Configuration options: [Auto] [Disabled] [Enabled]

Retimer margining support [Auto]

[Auto]	Disabled. Root port receiver margining support is enabled by default.
[Enabled]	Enables support for margining a retimer.
[Disabled]	Retimer margining is not supported.

SMU Common Options

TDP Control [Auto]

[Auto]	Use the default sustained power limit.
[Manual]	User can set customized sustained power limit.

NOTE: The following item appears only when **TDP Control** is set to **[Manual]**.

TDP [0]

Allows you to set the sustained power limit [mW].

ECO Mode [Disable]

Adjust the CPU control limits to manage operation within a 65w thermal design power.

[Enable]	Enables 65W processor power definition.
[Disable]	System uses default processor power definition.

PPT Control [Auto]

Specifies the PPT Control.
Configuration options: [Manual] [Auto]

NOTE: The following item appears only when **PPT Control** is set to **[Manual]**.

PPT [0]

Allows you to set the PPT [mW].

Thermal Control [Auto]

[Auto] Use the default TctlMax.

[Manual] User can set customized TctlMax.

NOTE: The following item appears only when **Thermal Control** is set to **[Manual]**.

TjMax [0]

Allows you to set the maximum operating temperature [°C] (IRM limit will be enforced).

TDC Control [Auto]

[Auto] Use the default TDC Limits.

[Manual] User can set customized TDC Limits.

NOTE: The following item appears only when **TDC Control** is set to **[Manual]**.

TDC_VDDCR_VDD [0]

Allows you to set the VDDCR_VDD TDC Limit [mA] (IRM limit will be enforced).

EDC Control [Auto]

[Auto] Use the default EDC Limits.

[Manual] User can set customized EDC Limits.

NOTE: The following item appears only when **EDC Control** is set to **[Manual]**.

EDC_VDDCR_VDD [0]

Allows you to set the VDDCR_VDD EDC Limit [mA] (IRM limit will be enforced).

Fan Control

[Auto] Use the default fan controller settings.
[Manual] User can set customized fan controller setting.

NOTE: The following item appears only when **Fan Control** is set to **[Manual]**.

Fan Table Control [Auto]

[Auto] Use the default fan table.

[Manual] User can set customized fan table.

NOTE: The following items appear only when **Fan Table Control** is set to **[Manual]**.

Low Temperature [0]

Allows you to set the low temperature [°C].

Medium Temperature [0]

Allows you to set the medium temperature [°C].

High Temperature [0]

Allows you to set the high temperature [°C].

Critical Temperature [0]

Allows you to set the critical temperature [°C].

Low Pwm [0]

Configuration options: [0] ~ [100]

Medium Pwm [0]

Configuration options: [0] ~ [100]

High Pwm [0]

Configuration options: [0] ~ [100]

Temperature Hysteresis [0]

Allows you to set the temperature hysteresis [°C].

PWM Frequency [Auto]

[Auto]	Sets to the default option
[1]	100Hz
[0]	25kHz

Fan Polarity [Auto]

[Auto]	Sets to the default option
[1]	Positive
[0]	Negative

VDDP Voltage Control [Auto]

[Auto]	Use the default VDDP Voltage.
[Manual]	User can set custom VDDP Voltage.

NOTE: The following items appear only when **VDDP Voltage Control** is set to **[Manual]**.

VDDP Voltage [0]

Allows you to specify the target VDDP voltage [mV].

Infinity Fabric Frequency and Dividers [Auto]

Configuration options: [Auto] [100 MHz] ~ [1066 MHz]

SyncFifo Mode Override [Auto]

Configuration options: [Disable] [Enable] [Auto]

Sustained PowerLimit [0]

PcdMsgSetSustainedPowerLimit.

Fast PPT Limit [0]

PcdMsgSetFastPPTLimit.

Slow PPT Limit [0]

PcdMsgSetSlowPPTLimit.

Slow PPT Time Constant [0]

Slow PPT Time Constant [seconds].

GFXOFF [Auto]

Configuration options: [Disable] [Enable] [Auto]

5.5.17 AMD PBS

The items in this menu shows the AMD PBS Setup page.

NOTE: The configuration options for this section vary depending on the motherboard. Please refer to the BIOS of your motherboard for the actual settings and options.

Graphics Features

This submenu allows you to configure Graphics Featurs - HG, DGPU Features and BOMACO configurations.

Special Display Features [Disabled]

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

D3Cold Support [Disabled]

Allows you to enable or disable PCIe x8 Slot D3Cold.
Configuration options: [Disabled] [Enabled] [Dummy D3Cold]

Discrete CPU_DSM Function A [Disabled]

Allows you to enable or disable PCI-SIG ECN_DSM Function A for Discrete GPU's GPP Bridge.
Configuration options: [Disabled] [Enabled]

Discrete CPU_DSM Function B [Disabled]

Allows you to enable or disable PCI-SIG ECN_DSM Function B for Discrete GPU's GPP Bridge.
Configuration options: [Disabled] [Enabled]

NVIDIA DGPU Power Enable [Disabled]

For NVIDIA mobile DGPU card only. Output DGPU_EN# A19 pin and DGPU_SEL# B17 pin to high at every power on state.
Configuration options: [Disabled] [Enabled]

Non-Eval Discrete GPU Support [Disabled]

Set to **[Enabled]** to support Non-Eval Discrete GPU that doesn't have specific EVAL_PWRGD(B30), EVAL_PRESENT#(A5).
Configuration options: [Disabled] [Enabled]

Discrete GPU HPD Circuitry [OR Circuitry]

Allows you to enable or disable Discrete GPU Display HPD Circuitry.
Configuration options: [OR Circuitry] [Pulse Circuitry]

Discrete GPU's USB Port [Keep Default Setting]

Allows you to disable Discrete GPU's USB Port or keep default setting.
Configuration options: [Keep Default Setting] [Disabled]

Discrete GPU's SSID/SVID [Keep Default Setting]

Program Discrete GPU's SSID/SVID depends on HybridGraphics setting.
Configuration options: [Keep Default Setting] [Program by Vendor]

Discrete GPU BOMACO Support [Disabled]

Allows you to enable or disable Discrete GPU BOMACO Support.
Configuration options: [Disabled] [Enabled]

AMD Variable Protection [Enabled]

Protect some AMD specific variables for CBS, PBS and AOD. If locked, some utilities like RU that modify variable at runtime do not work.
Configuration options: [Disabled] [Enabled]

Processor Aggregator Device [Disabled]

Enable or disable Processor Aggregator Device.
Configuration options: [Disabled] [Enabled]

NOTE: The following item appears only when **Processor Aggregator Device** is set to **[Enabled]**.

Core Count Control [Disabled]

Enable or disable Core Count Control.
Configuration options: [Disabled] [Enabled]

HDMI 3.0G Tx SLEW [Disabled]

Configuration options: [Disabled] [Enabled]

NOTE: The following item appears only when **HDMI 3.0G Tx SLEW** is set to **[Enabled]**.

HDMI 3.0G Tx Slew Control Value [20]

HDMI 3.0G Tx Slew Control Value (0 ~ 255).

5.5.18 AMD Overclocking

The items in this menu shows the AMD Overclocking Setup page.

NOTE: The configuration options for this section vary depending on the motherboard. Please refer to the BIOS of your motherboard for the actual settings and options.

CAUTION! Damage caused by use of your AMD processor outside of specification or in excess of factory settings are not covered by your system manufacturers warranty.

NOTE: The following items appear only when **[Accept]** is selected for **AMD Overclocking**.

Manual CPU Overclocking

CPU Frequency [0]

Specifies a custom CPU core frequency. Should be combined with a custom CPU VOLTAGE that is REQUIRED to be set by the user. Power saving features for idle cores (e.g. cc6 sleep) remain active. Manual CPU OC overrides PBO settings. Please note that the frequency cannot drop below 1200MHz on AMD Ryzen 9000 series processors.

CPU Voltage [0]

Specifies a custom CPU core voltage (mV). Should be combined with a custom CPU core frequency. Power saving features for idle cores (e.g. cc6 sleep) remain active. Stepping is 5mV. Voltage ranges allowed to be set will be limited outside of] ~ [. If in] ~ [(and CPU temp is below -40C) the allowable range of settable voltages will be extended.

CPU Core Count Control

CCD 00 Bit Map Down Core Control
Setting this item to 1 means core is enabled, setting this item to 0 means core is software down.

Bit Map Down Core Discard Changes
Discard changes.

Bit Map Down Core Apply Changes
Check and apply changes, need to make sure core number is equaled in each CCD.

SMT Control [Auto]
Can be used to disable symmetric multithreading. To re-enable SMT, a POWER CYCLE is needed after selecting the **[Auto]** option.
Configuration options: [Auto] [Disable]

CAUTION! S3 is NOT SUPPORTED on systems where SMT is disabled.

Prochot VRM Throttling [Auto]

Disabling Prochot will disable the VRMs ability to throttle the CPU when the voltage regulator is approaching its thermal limits.
Configuration options: [Auto] [Disable] [Enable]

Peak Current Control [Auto]

Enable or Disable PCC Feature. Only need to Disable during extreme overclocking.
Configuration options: [Auto] [Disable] [Enable]

DDR and Infinity Fabric Frequency/Timings

DDR Options

DDR Timing Configuration

Active Memory Timing Settings [Auto]

Configuration options: [Auto] [Enabled]

NOTE: The following items appear only when **Active Memory Timing Settings** is set to **[Enabled]**.

Memory Target Speed [Auto]

Specifies the memory target speed in MT/s. The valid input is 2000 MT/s, 2400 MT/s, and range of 3200 MT/s ~ 12000 MT/s (stepping of 200 MT/s). The user input value will be rounded down to align with the stepping of 200 MT/s.
Configuration options: [Auto] [2000 MTs] ~ [12000 MTs]

DDR SPD Timing

Tcl Ctrl [Auto]

[Auto]	Follow default setting.
[Manual]	Manually specify.

NOTE: The following item appears only when **Tcl Ctrl** is set to **[Manual]**.

Tcl [22]

Specifies the CAS Latency. Valid values: 22 ~ 62, with a stepping of 2.

Trcd Ctrl [Auto]

[Auto]	Follow default setting.
[Manual]	Manually specify.

NOTE: The following item appears only when **Trcd Ctrl** is set to **[Manual]**.

Trcd Wr [8]

Specifies the RAS# Active to CAS# Read Delay Time of Write. Valid values: 8 ~ 62.

Trcd Rd [8]

Specifies the RAS# Active to CAS# Read Delay Time of Read. Valid values: 8 ~ 62.

Trp Ctrl [Auto]

[Auto]	Follow default setting.
[Manual]	Manually specify.

NOTE: The following item appears only when **Trp Ctrl** is set to **[Manual]**.

Trp [8]

Specifies Row Precharge Delay Time. Valid values: 8 ~ 62.

Tras Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **Tras Ctrl** is set to **[Manual]**.

Tras [30]

Specifies Active to Precharge Delay Time. Valid values: 30 ~ 126.

Trc Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **Trc Ctrl** is set to **[Manual]**.

Trc [32]

Specifies Active to Active/Refresh Delay Time. Valid values: 32 ~ 255.

Twr Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **Twr Ctrl** is set to **[Manual]**.

Twr [48]

Specifies the Minimum Write Recovery Time. Valid values: 48 ~ 96, stepping of 6.

Trfc1 Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **Trfc1 Ctrl** is set to **[Manual]**.

Trfc1 [50]

Specifies the Refresh Recovery Delay Time (tRFC1). Valid values: 50 ~ 4095.

Trfc2 Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **Trfc2 Ctrl** is set to **[Manual]**.

Trfc2 [50]

Specifies the Refresh Recovery Delay Time (tRFC2). Valid values: 50 ~ 4095.

TrfcSb Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **TrfcSb Ctrl** is set to **[Manual]**.

TrfcSb [50]

Specifies the Refresh Recovery Delay Time (tRFCSb). Valid values: 50 ~ 2047.

Trtp Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **Trtp Ctrl** is set to **[Manual]**.

Trtp [9]

Specifies the Read CAS# to Precharge command delay time. Valid values: 5 ~ 31.

TrrdL Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **TrrdL Ctrl** is set to **[Manual]**.

TrrdL [4]

Specifies the Activate to Activate Delay Time, same bank group (tRRD_L). Valid values: 4 ~ 32.

TrrdS Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **TrrdS Ctrl** is set to **[Manual]**.

TrrdS [4]

Specifies the Activate to Activate Delay Time, different bank group (tRRD_S). Valid values: 4 ~ 20.

Tfaw Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **Tfaw Ctrl** is set to **[Manual]**.

Tfaw [26]

Specifies the Four Activate Window Time. Valid values: 20 ~ 80.

TwtrL Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **TwtrL Ctrl** is set to **[Manual]**.

TwtrL [8]

Specifies the Minimum Write to Read Time, the same bank group. Valid values: 8 ~ 48.

TwtrS Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **TwtrS Ctrl** is set to **[Manual]**.

TwtrS [3]

Specifies the Minimum Write to Read Time, different bank group. Valid values: 2 ~ 16.

DDR Non-SPD Timing

TrdrdScL Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **TrdrdScL Ctrl** is set to **[Manual]**.

TrdrdScL [1]

Specifies the CAS to CAS delay time, same bank group. Valid values: 1 ~ 15.

TrdrdSc Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **TrdrdSc Ctrl** is set to **[Manual]**.

TrdrdSc [1]

Specifies the Read to Read turnaround timing in the same chipselect. Valid values: 1 ~ 15.

TrdrdSd Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **TrdrdSd Ctrl** is set to **[Manual]**.

TrdrdSd [3]

Specifies the Read to Read turnaround timing in the same DIMM. Valid values: 1 ~ 15.

TrdrdDd Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **TrdrdDd Ctrl** is set to **[Manual]**.

TrdrdDd [3]

Specifies the Read to Read turnaround timing in a different DIMM. Valid values: 1 ~ 15.

TwrwrScL Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **TwrwrScL Ctrl** is set to **[Manual]**.

TwrwrScL [1]

Specifies the CAS to CAS Delay Time, same bank group. Valid values: 1 ~ 63.

TwrwrSc Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **TwrwrSc Ctrl** is set to **[Manual]**.

TwrwrSc [1]

Specifies the Write to Write turnaround timing in the same chipselect. Valid values: 1 ~ 15.

TwrwrSd Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **TwrwrSd Ctrl** is set to **[Manual]**.

TwrwrSd [3]

Specifies the Write to Write turnaround timing in the same DIMM. Valid values: 1 ~ 15.

TwrwrDd Ctrl [Auto]

[Auto] Follow default setting.
[Manual] Manually specify.

NOTE: The following item appears only when **TwrwrDd Ctrl** is set to **[Manual]**.

TwrwrDd [3]

Specifies the Write to Write turnaround timing in a different DIMM. Valid values: 1 ~ 15.

Twrrd Ctrl [Auto]

[Auto]	Follow default setting.
[Manual]	Manually specify.

NOTE: The following item appears only when **Twrrd Ctrl** is set to **[Manual]**.

Twrrd [5]

Specifies the Write to Read turnaround timing. Valid values: 1 ~ 15.

Trdwr Ctrl [Auto]

[Auto]	Follow default setting.
[Manual]	Manually specify.

NOTE: The following item appears only when **Trdwr Ctrl** is set to **[Manual]**.

Trdwr [5]

Specifies the Read to Write turnaround timing. Valid values: 1 ~ 31.

Tref Ctrl [Auto]

[Auto]	Follow default setting.
[Manual]	Manually specify.

NOTE: The following item appears only when **Tref Ctrl** is set to **[Manual]**.

Tref [5]

Specifies the tRef time. Valid values: 0 ~ 65535.

DDR BUS Configuration

Processor CS drive strengths [Auto]

Specifies the Processor CS drive strengths.
Configuration options: [Auto] [120.0 Ohm] [60.0 Ohm] [40.0 Ohm] [30.0 Ohm]

Processor CK drive strengths [Auto]

Specifies the Processor CK drive strengths.
Configuration options: [Auto] [120.0 Ohm] [60.0 Ohm] [40.0 Ohm] [30.0 Ohm]

Processor CA drive strengths [Auto]

Specifies the Processor CA drive strengths.
Configuration options: [Auto] [120.0 Ohm] [60.0 Ohm] [40.0 Ohm] [30.0 Ohm]

Processor DQ drive strengths [Auto]

Select the drive strength for all DQ and DMI IOs.
Configuration options: [Auto] [High Impedance] [240 ohm] [120 ohm] [80 ohm] [60 ohm] [48 ohm] [40 ohm] [34.3 ohm]

Processor ODT impedance [Auto]

Select the impedance for all DBYTE IOs.
Configuration options: [Auto] [High Impedance] [480 ohm] [240 ohm] [160 ohm] [120 ohm] [96 ohm] [80 ohm] [68.8 ohm] [60 ohm]

Dram DQ drive strengths [Auto]

Selects the Dram Pull-up ahnd Pull-down Output Driver Impedance for all DQ and DMI IOs.
Configuration options: [Auto] [48 ohm] [40 ohm] [34 ohm]

Dram ODT impedance RTT_NOM_WR [Auto]

Select the DRAMs On-die Termination impedance RTT_NOM_WR.
Configuration options: [Auto] [RTT_OFF] [RZQ (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RZQ/5 (48)] [RZQ/6 (40)] [RZQ/7 (34)]

Dram ODT impedance RTT_NOM_RD [Auto]

Select the DRAMs On-die Termination impedance RTT_NOM_RD.
Configuration options: [Auto] [RTT_OFF] [RZQ (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RZQ/5 (48)] [RZQ/6 (40)] [RZQ/7 (34)]

Dram ODT impedance RTT_WR [Auto]

Select the DRAMs On-die Termination impedance RTT_WR.
Configuration options: [Auto] [RTT_OFF] [RZQ (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RZQ/5 (48)] [RZQ/6 (40)] [RZQ/7 (34)]

Dram ODT impedance RTT_PARK [Auto]

Select the DRAMs On-die Termination impedance RTT_PARK.
Configuration options: [Auto] [RTT_OFF] [RZQ (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RZQ/5 (48)] [RZQ/6 (40)] [RZQ/7 (34)]

Dram ODT impedance DQS_RTT_PARK [Auto]

Select the DRAMs On-die Termination impedance DQS_RTT_PARK.
Configuration options: [Auto] [RTT_OFF] [RZQ (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RZQ/5 (48)] [RZQ/6 (40)] [RZQ/7 (34)]

DDR Controller Configuration

DDR Power Options

Power Down Enable [Auto]

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

Additional Memory Tweaks

RX2D_TrainOpt [Auto]

Configuration options: [Auto] [Manual]

NOTE: The following items appear only when **RX2D_TrainOpt** is set to **[Manual]**.

RX2D_DFE [Auto]

Used to force Rx DFE on or off. This is always enabled when Runtime Reduction is disabled.
Configuration options: [Auto] [Disable] [Enable]

RX2D Voltage Step Size (2^n) [1 DAC steps per loop]

0 = 1 DAC setting between checked values. 1 = 2 DAC settings between checked values. 2 = 4 DAC settings between checked values. 3 = 8 DAC settings between checked values.
Configuration options: [Auto] [1 DAC steps per loop] [2 DAC steps per loop] [4 DAC steps per loop] [8 DAC steps per loop]

RX2D Delay Step Size (2^n) [1 DAC steps per loop]

0 = 1 LCDL delays between checked values. 1 = 2 LCDL delays between checked values. 2 = 4 LCDL delays between checked values. 3 = 8 LCDL delays between checked values.
Configuration options: [Auto] [1 DAC steps per loop] [2 DAC steps per loop] [4 DAC steps per loop] [8 DAC steps per loop]

TX2D_TrainOpt [Auto]

Configuration options: [Auto] [Manual]

NOTE: The following items appear only when **TX2D_TrainOpt** is set to **[Manual]**.

TX2D_DFE [Auto]

Configuration options: [Auto] [Disable] [Enable]

TX2D Voltage Step Size (2^n) [1 DAC steps per loop]

0 = 1 DAC setting between checked values. 1 = 2 DAC settings between checked values. 2 = 4 DAC settings between checked values. 3 = 8 DAC settings between checked values.
Configuration options: [Auto] [1 DAC steps per loop] [2 DAC steps per loop] [4 DAC steps per loop] [8 DAC steps per loop]

TX2D Delay Step Size (2^n) [1 DAC steps per loop]

0 = 1 LCDL delays between checked values. 1 = 2 LCDL delays between checked values. 2 = 4 LCDL delays between checked values. 3 = 8 LCDL delays between checked values.
Configuration options: [Auto] [1 DAC steps per loop] [2 DAC steps per loop] [4 DAC steps per loop] [8 DAC steps per loop]

TX2D Voltage Step Multiplier [No Multiply]

0 = Voltage Step Size is not modified. 1 = Voltage Step Size is multiplied by 16.
Configuration options: [Multiply DAC step size by 16] [No Multiply]

TX2D Delay Step Multiplier [No Multiply]

0 = Delay Step Size is not modified. 1 = Delay Step Size is multiplied by 16.
Configuration options: [Multiply DAC step size by 16] [No Multiply]

RX DFE Taps [Auto]

Specifies the number of RX DFE taps. Value only applies when RX2D_DFE is enabled.
Configuration options: [Auto] [1 Tap] [2 Tap] [3 Tap] [4 Tap]

TX DFE Taps [Auto]

Specifies the number of TX DFE taps. Value only applies when TX2D_DFE is enabled.
Configuration options: [Auto] [1 Tap] [2 Tap] [3 Tap] [4 Tap]

DDR5 Nitro Mode [Auto]

Can improve overclocked memory support for modules over 6000Mt/s with potential boot time and/or latency tradeoffs.
Configuration options: [Auto] [Enable] [Disable]

NOTE: The following items appear only when **DDR Nitro Mode** is set to **[Enable]**.

DDR5 Robust Training Mode [Auto]
A more comprehensive memory training algorithm that increases boot time but can result in improved stability at overclocked memory settings.
Configuration options: [Auto] [Enable] [Disable]

Nitro RX Data [Auto]
Configures the RX Timing between memory controller and PHY. Higher value may enable increased memory frequency at the expense of increased latency.
Configuration options: [Auto] [1] [2] [Disabled]

Nitro TX Data [Auto]
Configures the TX Timing between memory controller and PHY. Higher value may enable increased memory frequency at the expense of increased latency.
Configuration options: [Auto] [0] [1] [2] [3] [Disabled]

Nitro Control Line [Auto]
Configures the command timing latency between the memory controller and PHY. Higher value may enable increased memory frequency at the expense of increased latency.
Configuration options: [Auto] [0] [1] [Disabled]

Nitro RX Burst Length [Auto]
DQ Training Pattern Length - Higher number results in more robust training and longer runtime. Lower number results in less robust training and shorter runtime, but potentially less stability.
Configuration options: [Auto] [1x] [2x] [4x] [8x]

Nitro TX Burst Length [Auto]
DQ Training Pattern Length - Higher number results in more robust training and longer runtime. Lower number results in less robust training and shorter runtime, but potentially less stability.
Configuration options: [Auto] [1x] [2x] [4x] [8x]

Nitro DFE Vref Offset Limits [Auto]
Disabling the TxDFE/RxDEF Vref offset limit to give them more margin for those edge cases where the guardband is not sufficient.
Configuration options: [Auto] [Disable]

Infinity Fabric Frequency and Dividers

Infinity Fabric Frequency and Dividers [Auto]
Allows you to set Infinity Fabric Frequency (FCLK). Auto = FCLK = MCLK. Manual = FCLK must be less than MCLK for best performance in most cases. Latency penalties are incurred if FCLK and MCLK are mismatched, but sufficiently high MCLK can negate or overcome this penalty.
Configuration options: [Auto] [100 MHz] - [3000 MHz]

UCLK DIV1 MODE [Auto]
Allows you to set UCLK DIV mode.
Configuration options: [Auto] [UCLK=MEMCLK] [UCLK=MEMCLK/2]

Fclk VDCI Mode Pref [Auto]
Allows you to set UCLK DIV mode.

[Auto]	Allow SyncFifo and Bypass mode. Lower latency.
[Predictive]	Force VDCI predictive mode. Higher latency, but better stability at higher voltages/frequencies.

Precision Boost Overdrive

Precision Boost Overdrive [Auto]

When this item is enabled, it allows the processor to run beyond defined values for PPT, VDD_CPU EDC, VDD_CPU TDC, VDD_SOC EDC, VDD_SOC TDC to the limits of the board, and allows it to boost at higher voltages for longer durations than default operation.
Configuration options: [Auto] [Disable] [Enabled] [Advanced]

NOTE: The following items appear only when **Precision Boost Overdrive** is set to **[Advanced]**.

PBO Limits [Auto]

[Auto]	Loads AMD default socket power (PPT), electrically-limited VRM current (EDC), and thermally-limited VRM current (TDC) limits.
[Disable]	Disabled PBO limits.
[Motherboard]	Allows the processor to run according to increased PPT, EDC, and TDC limits defined by your motherboard.
[Manual]	Allows the processor to ignore AMD default limits for PPT, EDC, and TDC and instead use manual values (up to the maximum capabilities of the motherboard).

NOTE: The following items appear only when **PBO Limits** is set to **[Manual]**.

PPT Limit [mW] [0]

Adjust total CPU socket power delivery capability. Adjustable up to the limit supported bu your motherboard.

TDC Limit [mA] [0]

Adjust peak current from your motherboard's CPU core VRM phases in thermally-limited scenarios. Adjustable up to the limit supported by you motherboard.

EDC Limit [mA] [0]

Adjust peak current from your motherboard's CPU core VRM phases in electrically-limited scenarios. Adjustable up to the limit supported by you motherboard.

Precision Boost Overdrive Scalar Ctrl [Auto]

Configuration options: [Auto] [Manual]

NOTE: The following item appears only when **Precision Boost Overdrive Scalar Ctrl** is set to **[Manual]**.

Precision Boost Overdrive Scalar [1X]

Overrides the AMD default silicon health management to potentially achieve higher sustained frequencies under CPU load.
Configuration options: [1X] ~ [10X]

CPU Boost Clock Override [Disabled]

Increases (Positive) or Decreases (Negative) the maximum CPU frequency that may be automatically achieved by the CPU Boost Algorithm.
Configuration options: [Disabled] [Enabled (Positive)] [Enabled (Negative)]

NOTE: The following item appears only when **CPU Boost Clock Override** is set to **[Enabled (Positive)]**.

Max CPU Boost Clock Override(+) [25]

Increases the maximum CPU frequency that may be automatically achieved by the Precision Boost 2 algorithm. Use the <+> or <-> to adjust the value.

NOTE: The following item appears only when **CPU Boost Clock Override** is set to **[Enabled (Negative)]**.

Max CPU Boost Clock Override(-) [25]

Decreases the maximum CPU frequency that may be automatically achieved by the Precision Boost 2 algorithm. Use the <+> or <-> to adjust the value.

Platform Thermal Throttle Ctrl [Auto]

Allows the user to decrease the maximum allowed processor temperature (celsius)
Configuration options: [Manual] [Auto]

NOTE: The following item appears only when **Platform Thermal Throttle Ctrl** is set to **[Manual]**.

Platform Thermal Throttle Limit [0]

Allows the user to decrease the maximum allowed processor temperature (celsius)

GFX Curve Optimizer

GFX Curve Optimizer [Disable]
Allows the user to shift the GFX Voltage / Frequency (AVFS) curve to include higher voltages (positive values) or lower voltages (negative values). The larger the value entered the larger the magnitude of the voltage shift.
Configuration options: [Disable] [GFX Curve Optimizer]

NOTE: The following items appear only when **GFX Curve Optimizer** is set to **[GFX Curve Optimizer]**.

GFX Curve Optimizer Sign [Positive]
Determines the direction of the curve shift for GFX. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages.
Configuration options: [Positive] [Negative]

GFX Curve Optimizer Magnitude [0]
Determines the magnitude of the GFX curve shift to be made (entered in whole numbers) the larger the value entered the larger the magnitude of the shift. Field defaults to 0 and the user can enter whole integer numbers. Value entered, combined with the sign above, is used to send the SMU and GFX Curve Optimizer.

Curve Optimizer

Curve Optimizer [Disable]
Allows the user to shift the Voltage / Frequency (AVFS) curve to include higher voltages (positive values) or lower voltages (negative values). The larger the value entered the larger the magnitude of the voltage limit.
Configuration options: [Disable] [All Cores] [Per Core] [Per CCD]

NOTE: The following items appear only when **Curve Optimizer** is set to **[All Cores]**.

All Core Curve Optimizer Sign [Positive]
Determines the direction of the curve shift on all cores. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages.
Configuration options: [Positive] [Negative]

All Core Curve Optimizer Magnitude [0]
Determines the magnitude of the curve shift to be made (entered in whole numbers) the larger the value entered the larger the magnitude of the shift.

NOTE: The following items appear only when **Curve Optimizer** is set to **[Per Core]**.

Core 0-7 Curve Optimizer Sign [Negative]
Determines the direction of the curve shift on this core. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages.
Configuration options: [Positive] [Negative]

Core 0-7 Curve Optimizer Magnitude [0]
Determines the magnitude of the curve shift to be made to this core (entered in whole numbers) the larger the value entered the larger the magnitude of the shift.

NOTE: The following items appear only when **Curve Optimizer** is set to **[Per CCD]**.

CCD 0 Curve Optimizer Sign [Negative]
Determines the direction of the curve shift on this core. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages.
Configuration options: [Positive] [Negative]

CCD 0 Curve Optimizer Magnitude [0]
Determines the magnitude of the curve shift to be made to this core (entered in whole numbers) the larger the value entered the larger the magnitude of the shift.

VDDG Voltage Control

VDDG Voltage Control [Auto]

VDDG represents voltage for the data portion of the Infinity Fabric. It is derived from the CPU SoC/Uncore Voltage (VDD_SOC). VDDG can approach but not exceed VDD_SOC.
Configuration options: [Auto] [Global VDDG Voltage Control] [Per-CCD VDDG Voltage Control]

NOTE: The following items appear only when **VDDG Voltage Control** is set to **[Global VDDG Voltage Control]**.

Global VDDG CCD Voltage [Auto]

VDDG CCD represents voltage for the data portion of the Infinity Fabric. Range is 650mV ~ 1650mV. Stepping is 10mV.
Configuration options: [Auto] [VDDG voltage 650mV] ~ [VDDG voltage 1650mV]

Global VDDG IOD Voltage [Auto]

VDDG IOD represents voltage for the data portion of the Infinity Fabric. . Range is 650mV - 1650mV. Stepping is 10mV.
Configuration options: [Auto] [VDDG voltage 650mV] ~ [VDDG voltage 1650mV]

NOTE: The following items appear only when **VDDG Voltage Control** is set to **[Per-CCD VDDG Voltage Control]**.

CCD0-CCD VDDG Voltage [Auto]

VDDG CCD represents voltage for the data portion of the Infinity Fabric. Range is 650mV ~ 1650mV. Stepping is 10mV.
Configuration options: [Auto] [VDDG voltage 650mV] ~ [VDDG voltage 1650mV]

CCD0-IOD VDDG Voltage [Auto]

VDDG IOD represents voltage for the data portion of the Infinity Fabric. . Range is 650mV - 1650mV. Stepping is 10mV.
Configuration options: [Auto] [VDDG voltage 650mV] ~ [VDDG voltage 1650mV]

VDDP Voltage Control

VDDP Voltage Control [Auto]

Allows the user to adjust the VDDP voltage.

[Auto]	VDDP is system default.
[Manual]	Set voltage for the DDR bus signaling (PHY).

NOTE: The following items appear only when **VDDP Voltage Control** is set to **[Manual]**.

VDDP Voltage Adjust [0]

VDDP is a voltage for the DDR bus signaling (PHY), and it is dervied from your DRAM Voltage (VDDIO_Mem). As a result, VDDP voltage in mV can approach but not exceed your DRAM Voltage. Stepping is 5mv.

SoC/Uncore OC Mode

SoC/Uncore OC Mode [Auto]

Forces CPU SoC/Uncore components (e.g. Infinity Fabric, memory, and integrated graphics) to run at their maximum specified frequency at all times. May improve performance at the expense of idle power savings.
Configuration options: [Auto] [Enabled] [Disabled]

SoC Voltage

SoC Voltage [0]

Specifies the SoC/Uncore voltage (VDD_SOC) in mV to support memory and Infinity Fabric overclocking. VDD_SOC also determines the GPU voltage on processors with integrated graphics. Stepping is 5mv. Voltage ranges allowed to be set will be limited outside of] ~ [. If in] ~ [(and CPU temp is below -40c) the allowable range of settable voltages will be extended.

] ~ [

] ~ [[Auto]

Enables settings that provide additional stability at extreme cold operating temperatures. Configuration options: [Auto] [Enabled] [Disabled]

VDD Misc

VDD Misc Control [Auto]

Allows the user to adjust the VDD Misc Voltage.

[Auto] VDD MISC is set to system default.

[Manual] Set voltage for the GMI PHY.

NOTE: The following item appears only when **VDD Misc Control** is set to **[Manual]**.

VDD Misc Voltage [1100]

Specifies the VDD MISC Voltage in mV, definitely follow SVI3 type 2 Slave VID (500-5600mV, step 10mV). Note that the minimum voltage supported is based on the specific processor, such as Raphael OC require the voltage higher than 1100mv. Voltage ranges allowed to be set will be limited outside of] ~ [. If] ~ [(and CPU temp is below -40c) the allowable range of settable voltages will be extended.

LCLK Frequency Control

LCLK Frequency Control [Auto]

[Auto] Use default settings.

[Manual] Manually configure LCLK frequency.

NOTE: The following item appears only when **LCLK Frequency Control** is set to **[Manual]**.

Maximum Frequency [1029]

Allows you to set the maximum LCLK frequency. Range: 1029 ~ 2500.

Onboard Voltage Control

VDDIO Voltage Control

VDDIO Ctrl [Auto]

Allows the user to adjust the VDDIO voltage.

[Auto] Use the default VDDIO voltage.

[Manual] Set DIMM VDD/VDDQ to synchronize to APU VDDIO.

[Separate] Independent control of APU VDDIO, DIMM VDD/VDDQ.

IMPORTANT! Running VDDQ != VDD is non-standard and may cause memory stability issues. Take care that during ramp down and ramp up, the VDDQ-VDD voltage must be less than 200mV.

PMIC VDD Stepping Control [Auto]

PMIC VDD Stepping Control by R2B, select 10mv will set PMIC R2B BIT5. Configuration options: [Auto] [10 mv] [5 mv]

NOTE: The following item appears only when **VDDIO Ctrl** is set to **[Manual]** or **[Separate]**.

DIMM VDD Adjust [1100]

Adjust DIMM Power Supply, stepping is 10mV. Range is from 800mV to 1430mV. Take care that during ramp down and ramp up, the VDDQ-VDD voltage must be less than 200mV.

PMIC VDDQ Stepping Control [Auto]
PMIC VDD Stepping Control by R2B, select 10mv will set PMIC R2B BIT4.
Configuration options: [Auto] [10 mv] [5 mv]

NOTE: The following items appear only when **VDDIO Ctrl** is set to **[Separate]**.

DIMM VDDQ Adjust [1100]
Adjust DIMM DQ Power Supply, stepping is 10mV. Range is from 800mV to 1430mV. Take care that during ramp down and ramp up, the VDDQ-VDD voltage must be less than 200mV, and Vpp must always be equal to or greater than VDDQ.

APU VDDIO Adjust [1100]
Adjust APO VDDIO, stepping is 10mV. Range is from 700mV to 1400mV.

Enable Platform PMIC Control [Auto]
When Enable Platform PMIC Control is enabled, the DDR PMIC voltages are not adjusted by processor FW, and may be adjusted directly by EC or other platform based mechanism.
Configuration options: [Auto] [Enable] [Disable]

VPP Voltage Control

VPP Ctrl [Auto]
[Auto] Use the default setting.

[Manual] Manually specify the memory VPP Voltage.

NOTE: The following item appears only when **VPP Ctrl** is set to **[Manual]**.

VPP Adjust [1800]
Adjust MEM VPP, stepping is 10mV. Range is from 1500mV to 2135mV.
Configuration options: [1500] - [2135]

ECO Mode

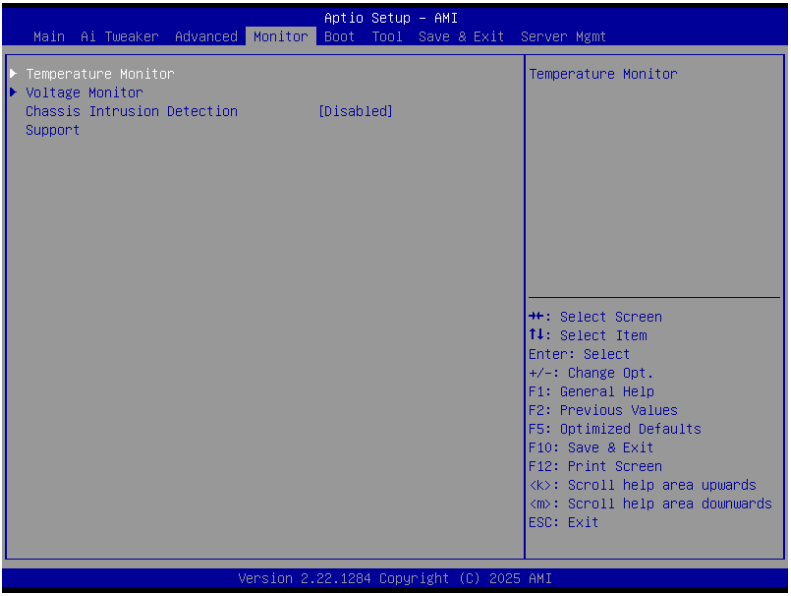
ECO Mode
Adjust CPU Control limits to manage operation within specific thermal design power limits. Motherboard and Cooling solution support required for chosen power level..
65W: PPT=88W/TDC=75A/EDC=150A
105W: PPT=142W/TDC=110A/EDC=170A
Configuration options: [Auto] [65W]

5.6 Monitor menu

The Monitor menu displays the system temperature/power status, and allows you to change the fan settings.

Scroll down to display the other BIOS items.

NOTE: The settings and options of this menu may vary depending on your motherboard. Please refer to the BIOS of your motherboard for the actual settings and options.



Temperature Monitor

MotherBoard Temperature, VRM Thermistor Temperature, Chipset Temperature, T_Sensor Temperature, DIMM A1 Temperature, DIMM A2 Temperature, DIMM B1 Temperature, DIMM B2 Temperature [xxx°C/xxx°F]

The onboard hardware monitor automatically detects and displays the temperatures for the different components. Select **[Ignore]** if you do not wish to display the detected temperatures.

Voltage Monitor

CPU Core Voltage, 12V Voltage, 5V Voltage, 3.3V Voltage, CPU VDDIO / MC Voltage, CHIPSET Standby Voltage [x.xxx V]

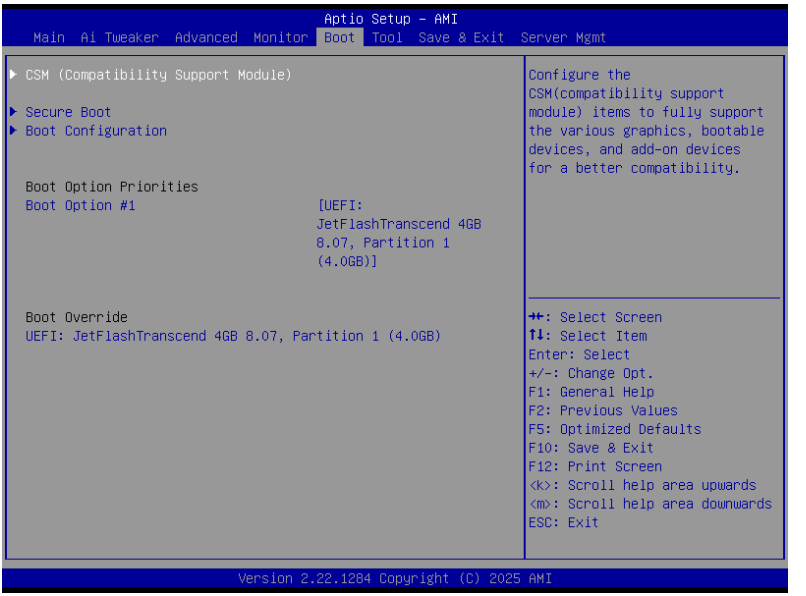
The onboard hardware monitor automatically detects the voltage output through the onboard voltage regulators. Select **[Ignore]** if you do not want to detect this item.

Chassis Intrusion Detection Support [Disabled]

Set this item to **[Enabled]** to enable the chassis intrusion detection function.
Configuration options: [Enabled] [Disabled]

5.7 Boot menu

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



CSM (Compatibility Support Module)

Allows you to configure the CSM (Compatibility Support Module) items to fully support the various VGA, bootable devices and add-on devices for better compatibility.

IMPORTANT! Launch CSM will be set to **[Disabled]** and cannot be configured when using the integrated graphics.

Launch CSM [Disabled]

[Enabled]	For better compatibility, enable the CSM to fully support the non-UEFI driver add-on devices or the Windows® UEFI mode.
[Disabled]	Disable the CSM to fully support the non-UEFI driver add-on devices or the Windows® UEFI mode.

NOTE: The following items appear only when **Launch CSM** is set to **[Enabled]**.

Boot Device Control [UEFI and Legacy OPROM]

Allows you to select the type of devices that you want to boot.
Configuration options: [UEFI and Legacy OPROM] [Legacy OPROM only] [UEFI only]

Boot from Network Devices [Legacy only]

Allows you to select the type of network devices that you want to launch.
Configuration options: [Ignore] [Legacy only] [UEFI only]

Boot from Storage Devices [Legacy only]

Allows you to select the type of storage devices that you want to launch.
Configuration options: [Ignore] [Legacy only] [UEFI only]

Boot from PCI-E/PCI Expansion Devices [Legacy only]

Allows you to select the type of PCI-E/PCI expansion devices that you want to launch.
Configuration options: [Ignore] [Legacy only] [UEFI only]

Secure Boot

Allows you to configure the Windows® Secure Boot settings and manage its keys to protect the system from unauthorized access and malwares during POST.

OS Type [Other OS]

[Windows UEFI Mode]	This item allows you to select your installed operating system. Execute the Microsoft® Secure Boot check. Only select this option when booting on Windows® UEFI mode or other Microsoft® Secure Boot compliant OS.
[Other OS]	Get the optimized function when booting on Windows® non-UEFI mode. Microsoft® Secure Boot only supports Windows® UEFI mode.

NOTE: The Microsoft secure boot can only function properly on Windows UEFI mode.

Secure Boot Mode [Custom]

This option allows you to select the Secure Boot mode from between Standard or Custom. In Custom mode, Secure Boot Policy variables can be configured by a physically present user without full authentication.
Configuration options: [Standard] [Custom]

NOTE: The following item appears only when **Secure Boot Mode** is set to **[Custom]**.

Key Management

Install Default Secure Boot keys

Allows you to immediately load the default Security Boot keys, Platform key (PK), Key-exchange Key (KEK), Signature database (db), and Revoked Signatures (dbx). When the default Secure boot keys are loaded, the PK state will change from Unloaded mode to loaded mode.

Clear Secure Boot keys

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

Save all Secure Boot variables

Allows you to save all secure boot keys to a USB storage device.

PK Management

The Platform Key (PK) locks and secures the firmware from any permissible changes. The system verifies the PK before your system enters the OS.

Save To File
Allows you to save the PK to a USB storage device.

Set New key
Allows you to load the downloaded PK from a USB storage device.

Delete key
Allows you to delete the PK from your system. Once the PK is deleted, all the system's Secure Boot keys will not be active.
Configuration options: [Yes] [No]

IMPORTANT! The PK file must be formatted as a UEFI variable structure with time-based authenticated variable.

KEK Management

The KEK (Key-exchange Key or Key Enrollment Key) manages the Signature database (db) and Revoked Signature database (dbx).

NOTE: Key-exchange Key (KEK) refers to Microsoft® Secure Boot Key-Enrollment Key (KEK).

Save to file
Allows you to save the KEK to a USB storage device.

Set New key
Allows you to load the downloaded KEK from a USB storage device.

Append Key
Allows you to load the additional KEK from a storage device for an additional db and dbx loaded management.

Delete key
Allows you to delete the KEK from your system.

Configuration options: [Yes] [No]

IMPORTANT! The KEK file must be formatted as a UEFI variable structure with time-based authenticated variable.

DB Management

The db (Authorized Signature database) lists the signers or images of UEFI applications, operating system loaders, and UEFI drivers that you can load on the single computer.

Save to file
Allows you to save the db to a USB storage device.

Set New key
Allows you to load the downloaded db from a USB storage device.

Append Key
Allows you to load the additional db from a storage device for an additional db and dbx loaded management.

Delete key
Allows you to delete the db file from your system.
Configuration options: [Yes] [No]

IMPORTANT! The db file must be formatted as a UEFI variable structure with time-based authenticated variable.

DBX Management

The dbx (Revoked Signature database) lists the forbidden images of db items that are no longer trusted and cannot be loaded.

Save to file
Allows you to save the dbx to a USB storage device.

Set New key
Allows you to load the downloaded dbx from a USB storage device.

Append Key
Allows you to load the additional dbx from a storage device for an additional db and dbx loaded management.

Delete key
Allows you to delete the dbx file from your system.
Configuration options: [Yes] [No]

IMPORTANT! The dbx file must be formatted as a UEFI variable structure with time-based authenticated variable.

Boot Configuration

Fast Boot [Enabled]

Allows you to enable or disable boot with initialization of a minimal set of devices required to launch active boot option. Has no effect for BBS boot options.
Configuration options: [Disabled] [Enabled]

NOTE: The following item appears only when **Fast Boot** is set to **[Enabled]**.

Next Boot after AC Power Loss [Fast Boott]

[Normal Boot]	Returns to normal boot on the next boot after an AC power loss.
[Fast Boot]	Accelerates the boot speed on the next boot after an AC power loss.

Boot Logo Display [Auto]

[Auto]	Automatically adjust the boot logo size for Windows requirements.
[Full Screen]	Maximize the boot logo size.
[Disabled]	Hide the logo during POST.

NOTE: The Following item appears only when **Boot Logo Display** is set to **[Auto]** or **[Full Screen]**.

Post Delay Time [3 sec]

Allows you to select a desired additional POST waiting time to easily enter the BIOS Setup. You can only execute the POST delay time during normal boot.
Configuration options: [0 sec] ~ [10 sec]

IMPORTANT! This feature only works when set under normal boot.

NOTE: The following item appears only when **Boot Logo Display** is set to **[Disabled]**.

Post Report [5 sec]

Allows you to select a desired POST report waiting time or until ESC is pressed.
Configuration options: [1 sec] ~ [10 sec] [Until Press ESC]

Boot up NumLock State [On]

Allows you to select the keyboard NumLock state.
Configuration options: [On] [Off]

Wait For 'F1' If Error [Enabled]

Allows your system to wait for the <F1> key to be pressed when error occurs.
Configuration options: [Disabled] [Enabled]

Option ROM Messages [Force BIOS]

[Force BIOS] The Option ROM Messages will be shown during the POST.
[Keep Current] Only the ASUS logo will be shown during the POST.

Interrupt 19 Capture [Disabled]

Enable this item to allow the option ROMs to trap the interrupt 19.
Configuration options: [Enabled] [Disabled]

AMI Native NVMe Driver Support [Enabled]

Allows you to enable or disable AMI Native NVMe driver.
Configuration options: [Disabled] [Enabled]

Boot Option Priorities

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

IMPORTANT!

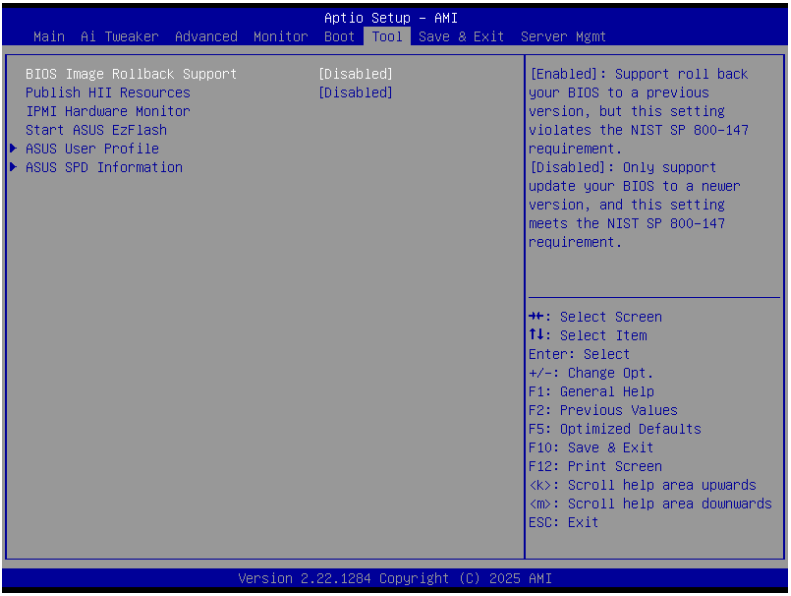
- To access Windows® OS in Safe Mode, press <F8 > after POST (Windows® 8 not supported).
- To select the boot device during system startup, press <F8> when ASUS Logo appears.

Boot Override

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

5.8 Tool menu

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



BIOS Image Rollback Support [Disabled]

[Enabled] Support roll back your BIOS to a previous version, but this setting violates the NIST SP 800-147 requirement.

[Disabled] Only support updating your BIOS to a newer version, and this setting meets the NIST SP 800-147 requirement.

Publish HII Resources [Disabled]

Configuration options: [Disabled] [Enabled]

IPMI Hardware Monitor

Allows you to run the IPMI hardware monitor.

Start ASUS EzFlash

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

5.8.1 ASUS User Profile

This item allows you to store or load multiple BIOS settings.

Load from Profile

Allows you to load the previous BIOS settings saved in the BIOS Flash. Key in the profile number that saved your BIOS settings, press <Enter>, and then select **Yes**.

NOTE:

- DO NOT shut down or reset the system while updating the BIOS to prevent the system boot failure!
- We recommend that you update the BIOS file only coming from the same memory/CPU configuration and BIOS version.

Profile Name

Allows you to key in a profile name.

Save to Profile

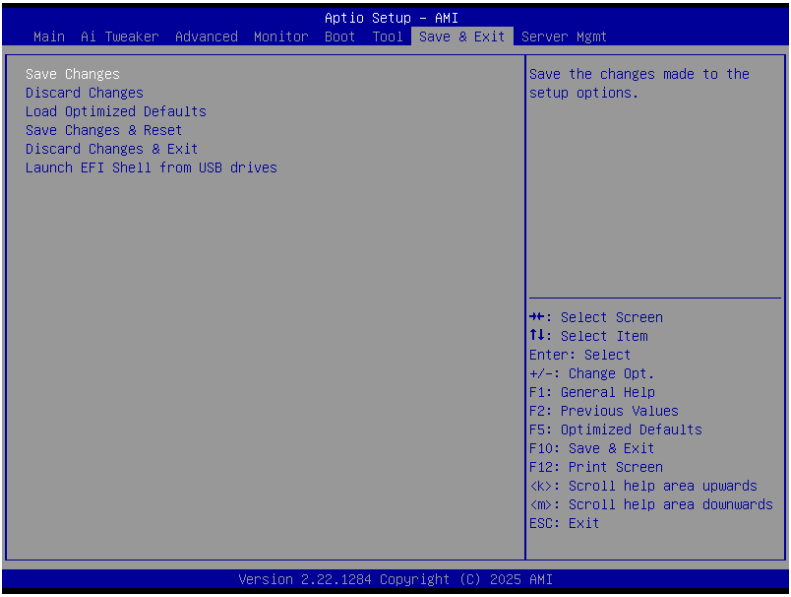
Allows you to save the current BIOS settings to the BIOS Flash, and create a profile. Key in a profile number from one to eight, press <Enter>, and then select **Yes**.

5.8.2 ASUS SPD Information

This item allows you to view the DRAM SPD information.

5.9 Save & Exit menu

The Save & Exit menu items allow you to load the optimal default values for the BIOS items, and save or discard your changes to the BIOS items.



Save Changes

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

Discard Changes

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

Load Optimized Defaults

Restores/loads the default values for all the setup options. When you select this option or if you press <F5>, a confirmation window appears. Select **OK** to load the default values.

Save Changes & Reset

Resets the system after saving the changes made. When you select this option or if you press <F10>, a confirmation window appears. Select **OK** to save changes and exit.

Discard Changes & Exit

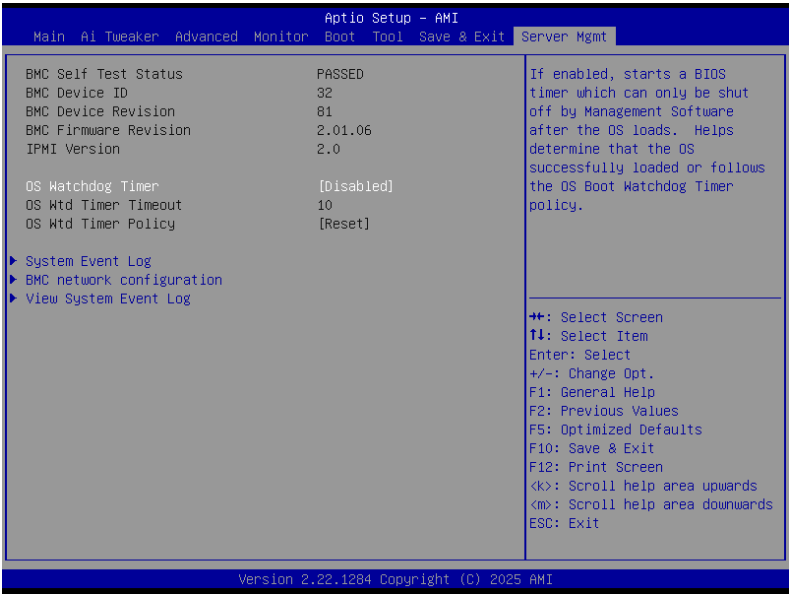
This option allows you to exit the Setup program without saving your changes. When you select this option or if you press <Esc>, a confirmation window appears. Select **Yes** to discard changes and exit.

Launch EFI Shell from USB drives

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

5.10 Server Mgmt menu

The Server Mgmt menu items allow you to configure Server management settings.



OS Watchdog Timer [Disabled]

When this option is set to **[Enabled]** it starts a BIOS timer which can only be shut off by Management Software after the OS loads. Helps determine if the OS successfully loaded or follows the OS Boot Watchdog Timer policy.
Configuration options: [Enabled] [Disabled]

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

OS Wtd Timer Timeout [10]

Enter a value between 1 and 30 min for OS Boot Watchdog Expiration, Not available if OS Boot Watchdog Timer is disabled.
Configuration options: [1] ~ [30]

OS Wtd Timer Policy [Reset]

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

5.10.1 System Event Log

Allows you to change the SEL event log configuration.

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

SEL Components [Enabled]

Allows you to enable or disable event logging for error/progress codes during boot.
Configuration options: [Disabled] [Enabled]

NOTE: The following item appears only when **SEL Components** is set to **[Enabled]**.

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]

Disable the logging of EFI Status Codes or log only error code or only progress code or both.
Configuration options: [Disabled] [Both] [Error code] [Progress code]

5.10.2 BMC network configuration

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

IMPORTANT! Ensure to enable the BMC_SW on your motherboard to view and configure BMC network parameters. This LAN controller is dedicated to BMC and for the connections of IPMI only, you may not connect to the Internet using the dedicated management LAN port.

Configure IPV4 support

DM_LAN

Configuration Address source [Unspecified]

This item allows you to configure LAN channel parameters statistically or dynamically (by BIOS or BMC). **[Unspecified]** option will not modify any BMC network parameters during BIOS phase.
Configuration options: [Unspecified] [Static] [DynamicBmcDhcp] [DynamicBmcNonDhcp]

NOTE: The following items are available only when **Configuration Address source** is set to **[Static]**.

Station IP address

Allows you to set the station IP address.

Subnet mask

Allows you to set the subnet mask. We recommend that you use the same Subnet Mask you have specified on the operating system network for the used network card.

Router IP Address

Allows you to set the router IP address.

Router MAC Address

Allows you to set the router MAC address.

Configure IPV6 support

DM_LAN

IPV6 Support [Enabled]

Allows you to enable or disable LAN1 IPv6 support.
Configuration options: [Enabled] [Disabled]

NOTE: The following items appear only when **IPV6 support** is set to **[Enabled]**.

Configuration Address source [Unspecified]

Allows you to set the LAN channel parameters statically or dynamically (by BIOS or by BMC). **[Unspecified]** option will not modify any BMC network parameters during BIOS phase.
Configuration options: [Unspecified] [Static] [DynamicBmcDhcp]

NOTE: The following items are available only when **Configuration Address source** is set to [Static].

Station IPV6 address

Allows you to set the station IPV6 address.

Prefix Length

Allows you to set the prefix length (maximum of Prefix Length is 128).

Configuration Router Lan1 Address source [Unspecified]

Allows you to set the LAN channel parameters statically or dynamically (by BIOS or by BMC). **[Unspecified]** option will not modify any BMC network parameters during BIOS phase.
Configuration options: [Unspecified] [Static] [DynamicBmcDhcp]

NOTE: The following items are available only when **Configuration Router Lan Address source** is set to **[Static]**.

IPV6 Router1 IP address

Allows you to set the IPV6 Router1 IP address.

IPV6 Router1 Prefix Length Lan1 [0]

Allows you to set the IPV6 Router prefix length (maximum of Prefix Length is 128).

IPV6 Router1 Prefix Value Lan1

Allows you to set the IPV6 Router prefix value.

Configure VLAN support

DM_LAN

VLAN Support [Unspecified]

Enable VLAN Support to specify the 802.1q VLAN ID.
Configuration options: [Enabled] [Disabled] [Unspecified]

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

VLAN ID [0]

VLAN ID Range is from 1-4094. VLAN ID 0 & 4095 are reserved VLAN IDs.

VLAN Priority [0]

Value ranges from 0 to 7. 7 is the highest priority for VLAN.

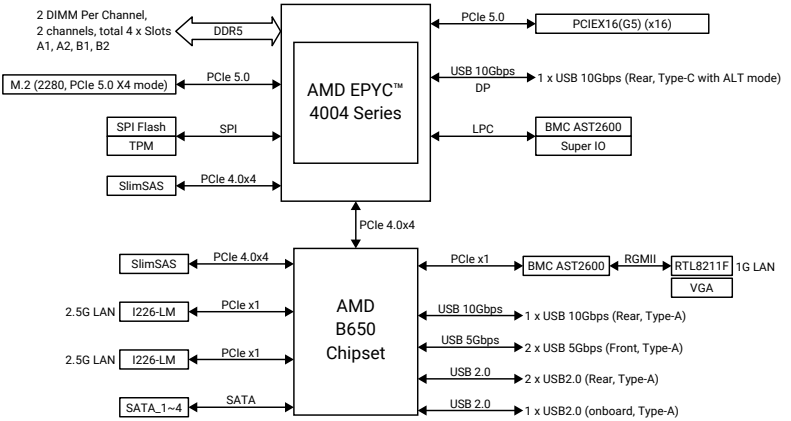
5.10.3 View System Event Log

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

Appendix

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

ASUS B650M-S block diagram



Notices

FCC Compliance Information

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

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

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

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

CAN ICES(B)/NMB(B)

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

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

CAN ICES(B)/NMB(B)

Australia statement notice

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

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

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

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

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.

インターネット回線への接続に関するご注意

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

Safety Precautions

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

安全上のご注意

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

Declaration of compliance for product environmental regulation

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

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

EU REACH and Article 33

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

EU RoHS

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

Japan JIS-C-0950 Material Declarations

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

India RoHS

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

Vietnam RoHS

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

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

Türkiye RoHS

AEEE Yönetmeliğine Uygundur

ASUS Recycling/Takeback Services

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

Ecodesign Directive

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

Access Advance Patent Notice

HEVC Advance™
Covered by patents at patentlist.accessadvance.com

FCC COMPLIANCE INFORMATION

Per FCC Part 2 Section 2.1077

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

hereby declares that the product

Product Name :	**Server**
Model Number :	**RS700-E11-RS12U, RS700-E11-RS4U**

compliance statement:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Ver. 180620

ENERGY STAR® Qualified Product

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

All ASUS products with the ENERGY STAR® logo comply with the ENERGY STAR® standard, and the power management feature is enabled by default. The display is automatically set to sleep within 10 minutes of user inactivity; the setting of sleep mode can refer to 4.3 Putting your device into sleep mode in user guide.

Please visit https://www.energystar.gov for detailed information on power management and its benefits to the environment.

NOTE: ENERGY STAR® is NOT supported on Freedos and Linux-based products.

Simplified UKCA Declaration of Conformity

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

Simplified EU Declaration of Conformity

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Service and Support

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