



PE8000G Series

Embedded Computer

User Manual

E25351

Revised Edition V2

January 2025

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About this manual

This manual provides information about the hardware and software features of your Embedded Computer, organized through the following chapters:

Chapter 1: Getting to know your Embedded Computer

This chapter details the hardware components of your Embedded Computer.

Chapter 2: Using your Embedded Computer

This chapter provides you with information on using your Embedded Computer.

Chapter 3: Upgrading your Embedded Computer

This chapter provides you with information on how to upgrade the memory modules, wireless modules, and hard disk drive / solid state drive of your Embedded Computer.

Chapter 4: BIOS Setup

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

Appendix

This section includes notices and safety statements for your Embedded Computer.

Conventions used in this manual

To highlight key information in this manual, some text are presented as follows:

IMPORTANT! This message contains vital information that must be followed to complete a task.

NOTE: This message contains additional information and tips that can help complete tasks.

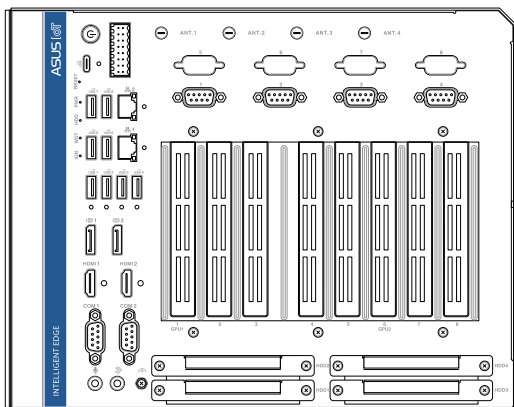
WARNING! This message contains important information that must be followed to keep you safe while performing certain tasks and prevent damage to your Embedded Computer's data and components.

Typography

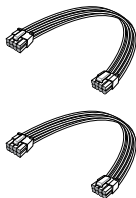
Bold text	Indicates a menu or an item to select.
<i>Italic</i>	Indicates sections that you can refer to in this manual.

Package contents

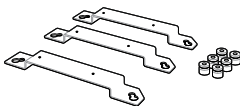
Your Embedded Computer package contains the following items:



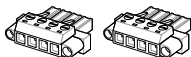
PE8000G Series



GPU power cables*



Desk mount with dampers



Power terminal blocks



IO port dust covers**



DIO terminal block**

NOTE:

- * The GPU power cable may vary depending on the specifications of the GPU card that is bundled with your Embedded Computer. If you need further clarification, please contact your local dealer or ASUS IoT.
 - ** These accessories are not bundled and need to be purchased separately.
 - Some bundled accessories may vary depending on model. For details on these accessories, refer to their respective user manuals.
 - The device illustration is for reference only. Actual product specifications may vary depending on model.
 - If the device or its components fail or malfunction during normal and proper use within the warranty period, bring the warranty card to the ASUS Service Center for replacement of the defective components.
-

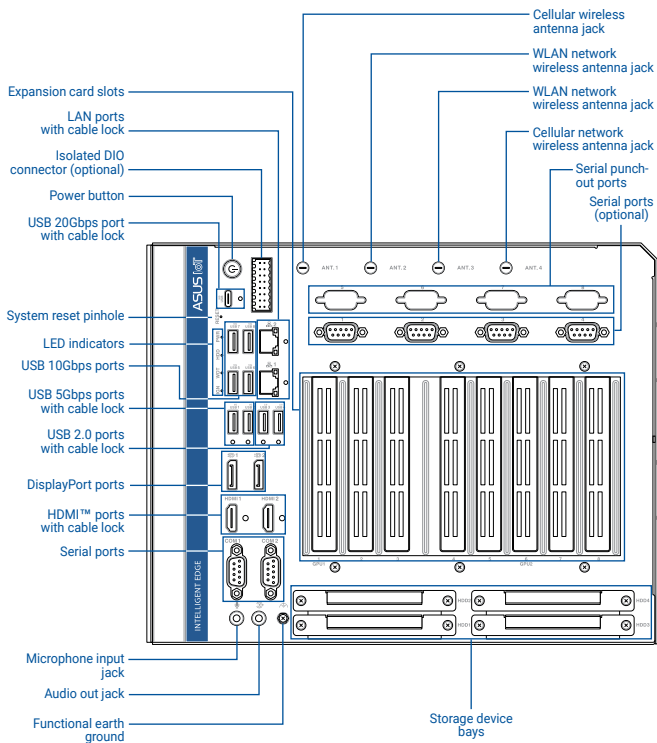
This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

1

***Getting to know your
Embedded Computer***

1.1 Features

1.1.1 Front view



1 2 3 4 Expansion card slot

5 6 7 8 The expansion card slot allows you to install additional hardware components, such as graphics cards or network adapters.



2 LAN port with cable lock

The Intel i219 (1 GbE) Gigabit Ethernet controller with 8-pin RJ-45 LAN port supports a standard Ethernet cable for connection to a local network and PXE boot.

NOTE: The cable lock helps to prevent disconnection caused by tension or vibration.



1 LAN port with cable lock

The Intel i226 (2.5 GbE) Gigabit Ethernet controller with 8-pin RJ-45 LAN port supports a standard Ethernet cable for connection to a local network and PXE boot.

NOTE: The cable lock helps to prevent disconnection caused by tension or vibration.

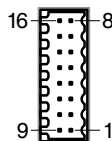
DI DO

Isolated DIO connector (optional)

The Isolated Digital Input/Output (DIO) connector provides electrical isolation of digital input and output signals, which allow micro controllers to detect and output logic states. The high voltage protection can be used in industrial level uses. Please refer to the illustration below for the specification and pin definitions of the Isolated DIO connector.

Signal	Specifications	
DO	Output voltage range	0~48 VDC
	Rated output current	4 A
DI	Voltage for logic "0"	0~3 VDC
	Voltage for logic "1"	10~48 VDC
	Rated input current	±50 mA

Pin	DIO	Pin	DIO
16	DO4	8	DO_PWR
15	DO3	7	DO_PWR
14	DO2	6	DIO_GND
13	DO1	5	DIO_GND
12	DI4	4	DIO_GND
11	DI3	3	DIO_GND
10	DI2	2	DI_COM
9	DI1	1	DI_COM



G

Power button

The power button allows you to turn the Embedded Computer on or off. You can use the power button to put your Embedded Computer to sleep mode or press it for four (4) seconds to force shutdown your Embedded Computer.

^{20G}
USB

USB 20Gbps Type-C® port with cable lock

The USB (Universal Serial Bus) 20Gbps Type-C® port provides a transfer rate up to 20 Gbit/s and a maximum of 5 V / 3 A power output.

NOTE: The cable lock helps to prevent disconnection caused by tension or vibration.

RESET

System reset pinhole

The hard reset pinhole allows you to reboot your Embedded Computer

IGN

Ignition LED

The ignition LED lights up when your Embedded Computer is powered on and in ignition mode.

WDT

Watchdog LED

The watchdog LED lights up when a watchdog time out event occurs.

HDD

Drive activity LED

The drive activity LED lights up when your Embedded Computer is accessing the internal storage drive.

PWR

Power LED

The power LED lights up when your Embedded Computer is turned on and blinks slowly when in sleep mode.

^{10G}
USB 5

USB 10Gbps port

^{10G}
USB 6

The USB (Universal Serial Bus) 10Gbps port provides a transfer rate up to 10 Gbit/s.

^{10G}
USB 7

^{10G}
USB 8

^{5G}
USB 1

USB 5Gbps port with cable lock

^{5G}
USB 2

The USB (Universal Serial Bus) 5Gbps port provides a transfer rate up to 5 Gbit/s.

NOTE: The cable lock helps to prevent disconnection caused by tension or vibration.

^{2.0}
USB 3

USB 2.0 port with cable lock

^{2.0}
USB 4

The USB (Universal Serial Bus) port is compatible with USB 2.0 or USB 1.1 devices, such as keyboards, pointing devices, flash disk drives, external HDDs, speakers, cameras, and printers.

NOTE: The cable lock helps to prevent disconnection caused by tension or vibration.

 1

Dual-mode DisplayPort

 2

The DisplayPort 1.2 port can support resolutions up to 4096 x 2160 @ 60 Hz on external display devices.

HDMI 1

HDMI™ 1.4 port with cable lock

HDMI 2

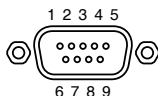
The integrated HDMI (High Definition Multimedia Interface) port with a receptacle connector can support resolutions up to 4096 x 2160 @ 30 Hz on external display devices.

NOTE: The cable lock helps to prevent disconnection caused by tension or vibration.

COM 1**Serial (COM) connector****COM 2**

The 9-pin DB9 connector allows you to connect RS-232/422/485 serial (COM) devices, such as bar code scanners, modems, and printers. Please refer to the table below for the pin definitions of the different COM connectors.

NOTE: Default set to RS-232. Setting can be changed through the onboard jumper.



Pin	RS-232	RS-422	RS-485
1	DCD#	TX-	D-
2	RXD	TX+	D+
3	TXD	RX+	NA
4	DTR	RX-	NA
5	GND	GND	GND
6	DSR	NA	NA
7	RTS	NA	NA
8	CTS	NA	NA
9	RI	NA	NA

**Microphone input jack**

The microphone input jack is used to connect your Embedded Computer to an external microphone.

**Audio output jack**

This stereo audio jack is used to connect the system's audio out signal to amplified speakers.

**Functional earth ground**

The functional earth ground provides you with a grounding point.

ANT. 1 Cellular network wireless antenna jack

ANT. 4 The cellular network wireless antenna jack allows you to connect a wireless antenna for cellular signals.

NOTE: The cellular network wireless antenna is optional and may not come bundled.

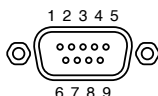
ANT. 2 WLAN wireless antenna jack

ANT. 3 The WLAN wireless antenna jack allows you to connect a wireless antenna for Wi-Fi signals.

NOTE: The WLAN wireless antenna is optional and may not come bundled.

1 2 3 4 Serial (COM) connector (optional)

The 9-pin DB9 connector allows you to connect RS-232 serial devices, such as bar code scanners, modems, and printers. Refer to the table below for the pin definitions.



Pin	RS-232
1	DCD#
2	RXD
3	TXD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

5 6 7 8 Serial punch-out ports

The serial punch-out ports allow you to install additional serial ports to expand your Embedded Computer's connectivity options.

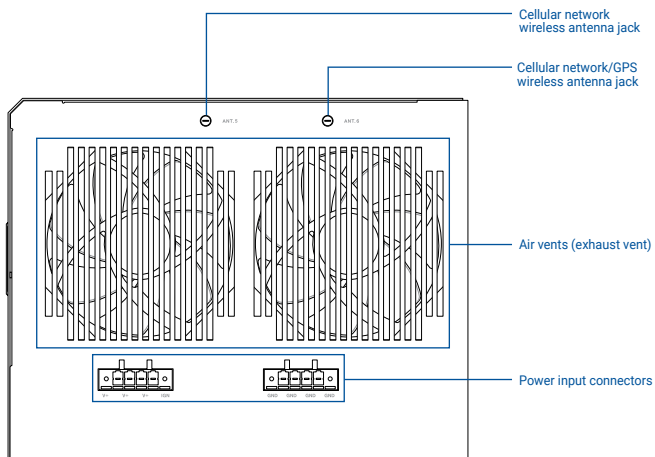
HDD1 **2.5-inch hot-swap storage bay**

HDD2 The 2.5-inch hot-swap storage bay allows you to install a

HDD3 2.5-inch HDD/SSD and supports RAID 0/1.

HDD4

1.1.2 Rear view



ANT.5 Cellular network wireless antenna jack

The cellular network wireless antenna jack allows you to connect a wireless antenna for cellular network signals.

NOTE: The cellular network wireless antenna is optional and may not come bundled.

ANT.6 Cellular network/GPS Wireless antenna jack

The cellular network/GPS wireless antenna jack allows you to connect a wireless antenna for cellular network signals or GPS signals.

NOTE: The cellular network/GPS wireless antenna is optional and may not come bundled.

Air vents (exhaust vent)

The air vents allow the chassis to expel hot air.

IMPORTANT! For optimal heat dissipation and air ventilation, ensure that the air vents are free from obstructions.



Power input

The power input jack allows you to connect the bundled power terminal block.

2

Using your Embedded Computer

2.1 Getting started

2.1.1 Connect a power adapter to your Embedded Computer

IMPORTANT!

- Power input
 - +8-48 Vdc, 120-23 A for DC-in
(operating temperature -20 to 60°C)
 - When using a GPU card, the input voltage must be at least 12 V.
 - If you need further assistance with the purchasing of a power source, please contact your local dealer or ASUS IoT.
 - We strongly recommend that you use a grounded wall socket while using your Embedded Computer.
 - To disconnect your Embedded Computer from its main power supply, unplug your Embedded Computer from the power socket.
-

2.1.2 Connect a display panel to your Embedded Computer

You can connect a display panel or projector that has the following connectors to your Embedded Computer:

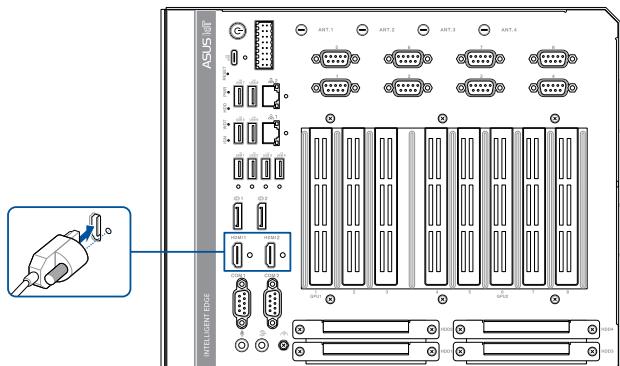
- HDMI™
- DisplayPort

To connect an HDMI™ display panel:

Connect one end of the HDMI™ cable to an external display, and the other end of the cable to your Embedded Computer's HDMI™ port.

NOTE: If you are using a HDMI™ cable with a locking screw connector, tighten the lock screw onto the cable lock screw hole on the chassis to prevent disconnection caused by tension or vibration.

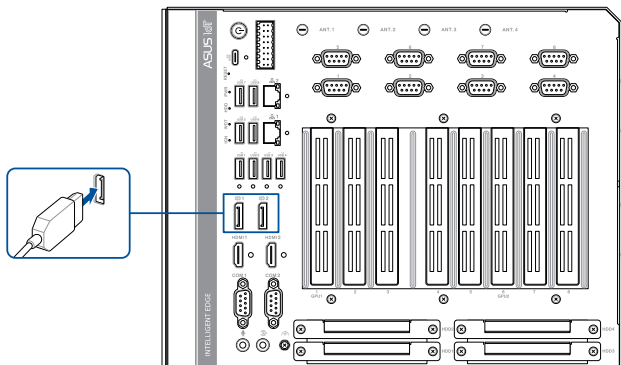
Connect display via HDMI™ port



To connect a DisplayPort display panel:

Connect one end of the DisplayPort cable to an external display, and the other end of the cable to your Embedded Computer's DisplayPort.

Connect display via DisplayPort



2.1.3 Connect the USB cable from keyboard or mouse

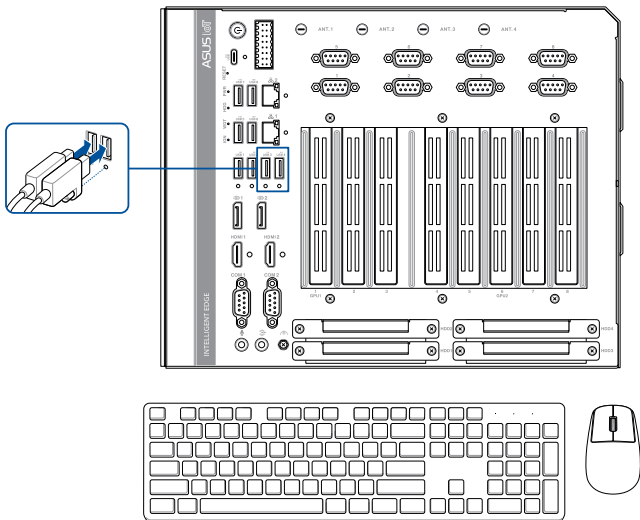
You can connect generally any USB keyboard and mouse to your Embedded Computer. You can also connect a USB dongle for a wireless keyboard and mouse set.

To connect a keyboard and mouse to your Embedded Computer:

Connect the USB cable from your keyboard and mouse to any of the USB ports of your Embedded Computer.

NOTE:

- The keyboard varies with country or region.
 - The keyboard and mouse are purchased separately.
-

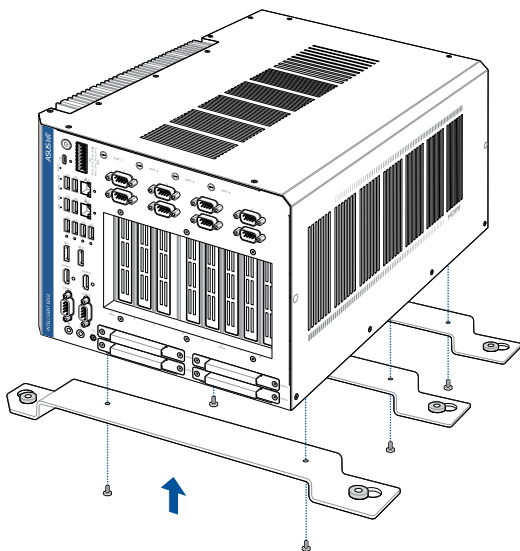


2.2 Installing the desk mount

Place the Embedded Computer on a flat stable surface with its top side facing down.

Align the desk mount with the screw holes on the bottom of the Embedded Computer, then secure the desk mount to your Embedded Computer using the bundled screws.

IMPORTANT! When installing the Embedded Computer into a cabinet or on the ground, we strongly recommend positioning it upright with the top facing upwards to allow for optimal heat dissipation.

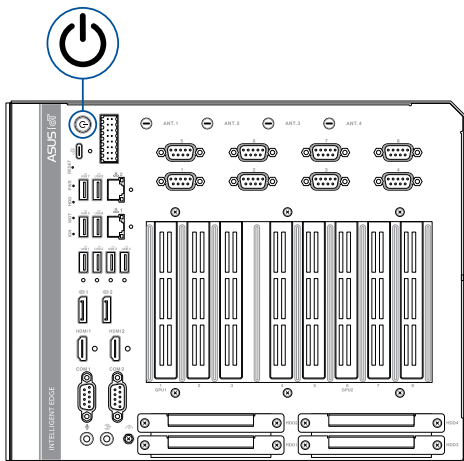


2.3 Turning your Embedded Computer off

If your Embedded Computer is unresponsive, press and hold the power button for at least four (4) seconds until your Embedded Computer turns off.

2.4 Putting your Embedded Computer to sleep

To put your Embedded Computer to Sleep mode, press the Power button once.



This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

3

Upgrading your Embedded Computer

IMPORTANT!

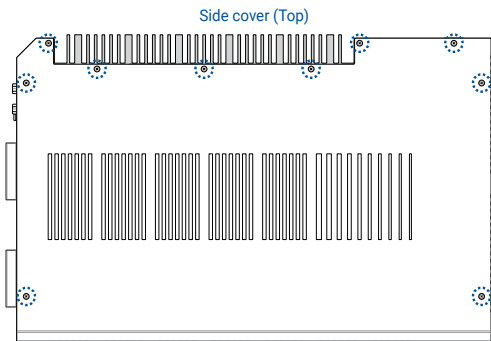
- Ensure that your hands are dry before proceeding with the rest of the installation process. Before installing any of the features in this guide, use a grounded wrist strap or touch a safely grounded object or metal object to avoid damaging them due to static electricity.
 - Power off your Embedded Computer, and allow it to cool for at least 10 minutes before performing any installation/uninstallation process.
-

NOTE: The illustrations in this section are for reference only. The slots may vary depending on model.

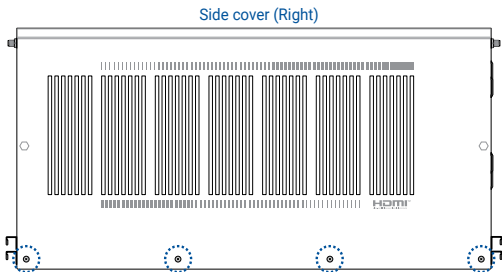
3.1 Removing the side cover

1. Turn off your Embedded Computer, then disconnect all cables and peripherals.
2. Place the Embedded Computer on a flat stable surface.
3. Remove the ten (10) screws from the top side (A) and four (4) screws from the right side (B) of the Embedded Computer.

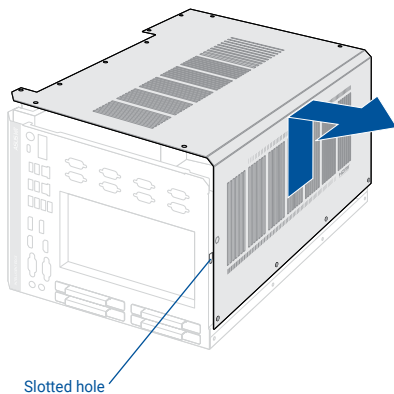
A



B

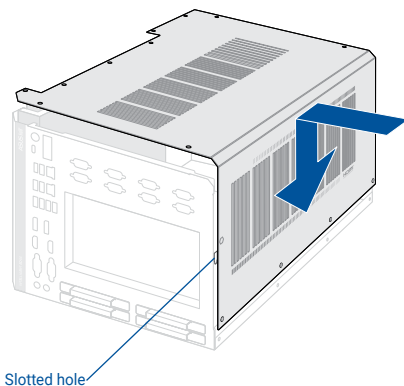


4. Lift the side cover to clear the two (2) knobs from the slotted holes on the chassis, then move it away from the chassis to remove it.

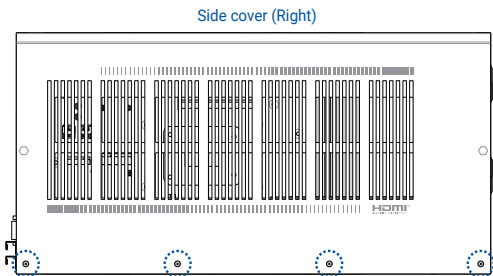
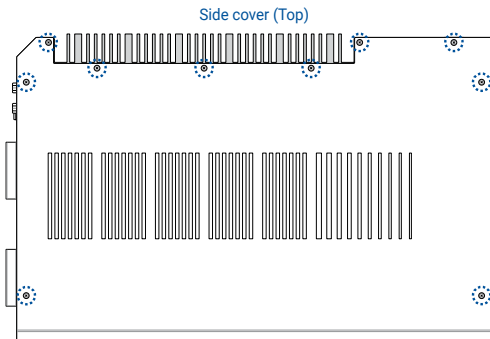


3.2 Replacing the side cover

1. Align and insert the two (2) knobs on the side cover into the slotted holes on the chassis.
2. Lower the side cover until the knobs are seated securely at the bottom of the slotted holes.



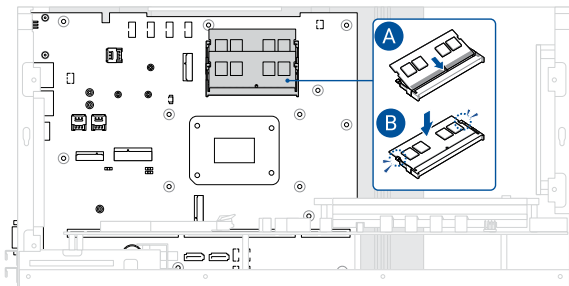
3. Secure the side cover to the top side and right side of the chassis using the screws removed previously.



3.3 Installing memory modules

Your Embedded Computer comes with a SO-DIMM memory slot that allow you to install two (2) DDR5 SO-DIMMs, ECC*, with a maximum of 64GB.

Align and insert the memory module into the slot on the motherboard (A) and press down (B) until it is securely seated in place.



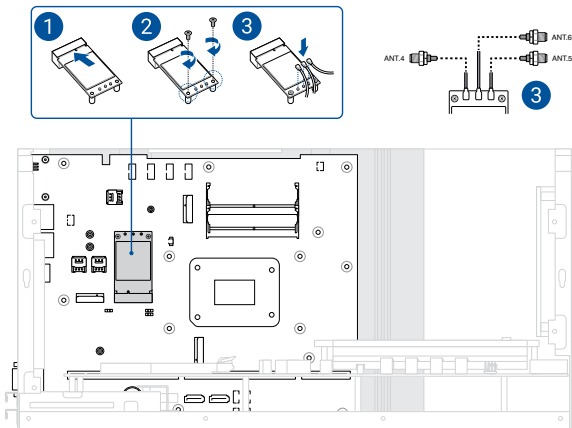
3.4 Installing an mPCIe / mSATA module

Your Embedded Computer comes with a mini PCIe / mini SATA slot that allow you to install an LTE mPCIe module or mSATA storage module.

WARNING! RF modules are intended for OEM or host integrators only. For availability of system level RF certification, check with your OEM integrator.

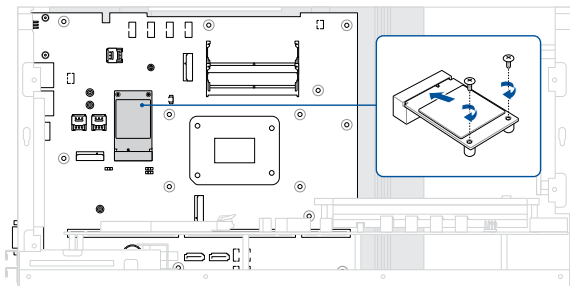
To install an LTE mPCIe module:

1. Align and insert the LTE mPCIe module into the slot.
2. Press down, and secure it in place using two (2) screws.
3. Connect the antennas to your LTE mPCIe module.



To install an mSATA storage module

Align and insert the mSATA storage module into the slot, press it down and secure it in place using two (2) screws.



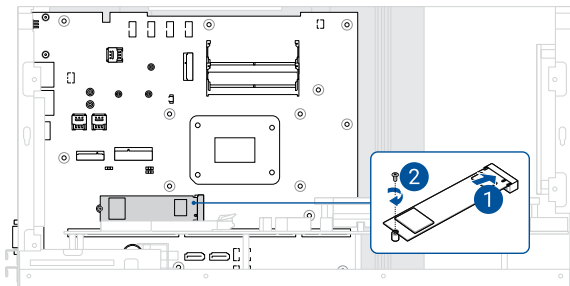
3.5 Installing an M.2 M-key module

Your Embedded Computer comes with an M.2 (M-key) slot that allow you to install an M.2 SSD (M-key, supports 2280 PCIe x4) module.

To install an M.2 SSD module:

1. Align and insert the M.2 SSD into its slot inside the Embedded Computer.
2. Gently push down the M.2 SSD on top of the standoff, and fasten it using a screw.

NOTE: We recommend using a PH1 screwdriver with a torque of 2.0 ± 0.2 kgf-cm when tightening the screw(s).



3.6 Installing an M.2 E-key module

Your Embedded Computer comes with an M.2 (E-key) slot that allow you to install an M.2 Wi-Fi module.

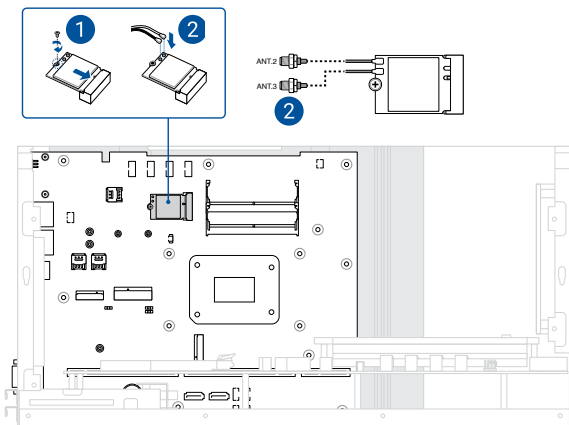
WARNING! RF modules are intended for OEM or host integrators only. For availability of system level RF certification, check with your OEM integrator.

To install an M.2 Wi-Fi module:

1. Align and insert the M.2 Wi-Fi module into the slot, press it down, and secure it in place using a screw.

NOTE: We recommend using a PH1 screwdriver with a torque of 2.0 ± 0.2 kgf-cm when tightening the screw(s).

2. Connect the antennas to your M.2 Wi-Fi module.



3.7 Installing an M.2 B-key module

Your Embedded Computer comes with an M.2 (B-key, supports 3042/3052) slot that allows you to install an M.2 5G/4G/UDR GPS module.

WARNING! RF modules are intended for OEM or host integrators only. For availability of system level RF certification, check with your OEM integrator.

To install an M.2 5G module:

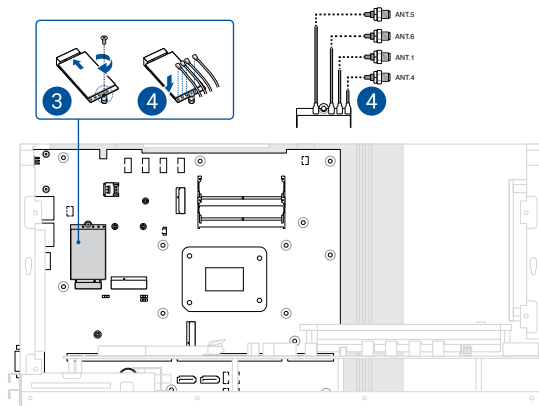
1. If the standoff is already seated in the right mounting hole to fit your M.2 module, skip to step 3.
2. Unscrew the standoff and install it to a mounting hole that matches the length of your M.2 module.

NOTE: We recommend using a PH1/sleeve screwdriver with a torque of 2.0 ± 0.2 kgf-cm when tightening the standoff.

3. Align and insert the M.2 module into the slot, press it down, and secure it in place using a screw.

NOTE: We recommend using a PH1 screwdriver with a torque of 2.0 ± 0.2 kgf-cm when tightening the screw(s).

4. Connect the antennas to your M.2 module.



To install an M.2 4G module:

1. If the standoff is already seated in the right mounting hole to fit your M.2 module, skip to step 3.
2. Unscrew the standoff and install it to a mounting hole that matches the length of your M.2 module.

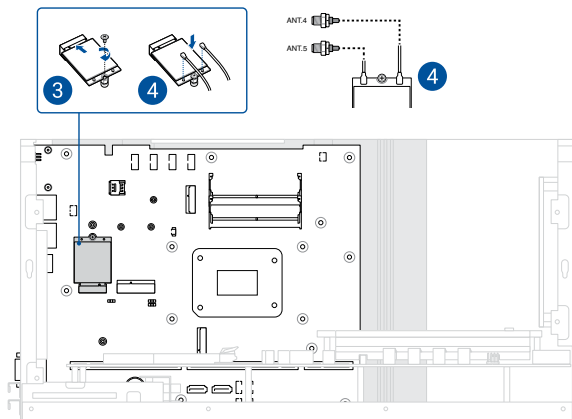
NOTE: We recommend using a PH1/sleeve screwdriver with a torque of 2.0 ± 0.2 kgf-cm when tightening the standoff.

3. Align and insert the M.2 module into the slot, press it down, and secure it in place using a screw.

NOTE: We recommend using a PH1 screwdriver with a torque of 2.0 ± 0.2 kgf-cm when tightening the screw(s).

4. Connect the antennas to your M.2 module.

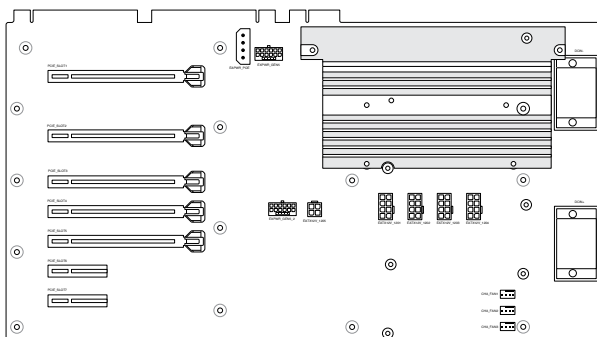
NOTE: Connect ANT. 6 for GPS satellite tracking capability.



3.8 Installing a PCIe expansion card

Your Embedded Computer comes with five (5) PCIe expansion slots on the riser board, which will auto-detect the expansion card(s) installed and adjust bandwidth between Mode 1 (1 x PCIe Gen4 x16 + 3 x PCIe Gen 3 x4 + 2 x PCIe Gen 3 x1) and Mode 2 (2 x PCIe Gen4 x8 + 3 x PCIe Gen3 x4 + 2 x PCIe Gen 3 x1).

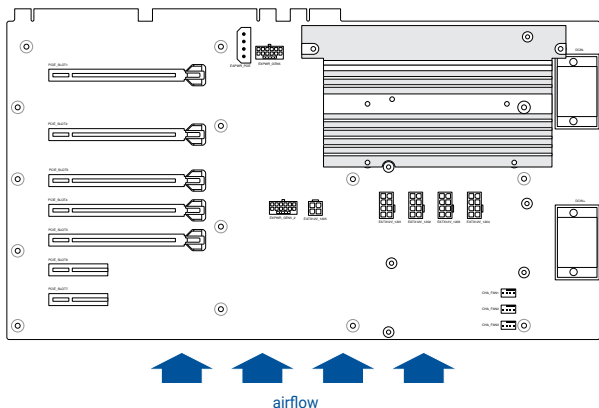
PCIe slot	Operation mode		Power allocation	
	Mode 1	Mode 2	Maximum	Shared with
PCIE_SLOT1	-	x8	450 W	PCIE_SLOT2 PCIE_SLOT3
PCIE_SLOT2	x4	x4	450 W	PCIE_SLOT1 PCIE_SLOT3
PCIE_SLOT3	x4	x4	450 W	PCIE_SLOT1 PCIE_SLOT2
PCIE_SLOT4	x4	x4	450 W	PCIE_SLOT5 PCIE_SLOT6 PCIE_SLOT7
PCIE_SLOT5	x16	x8	450 W	PCIE_SLOT4 PCIE_SLOT6 PCIE_SLOT7
PCIE_SLOT6	x1	x1	450 W	PCIE_SLOT4 PCIE_SLOT5 PCIE_SLOT7
PCIE_SLOT7	x1	x1	450 W	PCIE_SLOT4 PCIE_SLOT5 PCIE_SLOT6



NOTE: The PCIe slots support expansion cards with a maximum length of 350 mm.

3.8.1 Recommended configurations

The below illustrates some recommended PCIe expansion card configurations for your Embedded Computer.



NOTE:

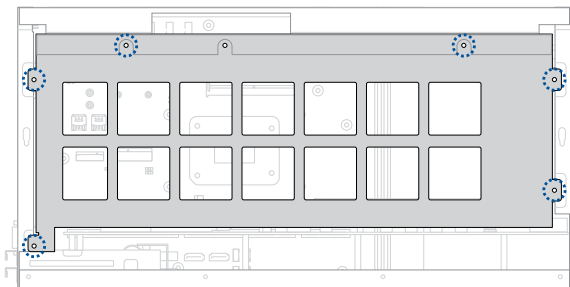
- We recommend that you install your GPU card to **PCIE_SLOT5**.
- For improved air flow within the system, leave **PCIE_SLOT6** and **PCIE_SLOT7** empty.

PCIe card(s)	Recommended slot(s)
One (1) GPU card	 PCIe_SLOT1
	 PCIe_SLOT2
	 PCIe_SLOT3
	 PCIe_SLOT4
	 PCIe_SLOT5
	 PCIe_SLOT6
	 PCIe_SLOT7
Two (2) GPU cards	 PCIe_SLOT1
	 PCIe_SLOT2
	 PCIe_SLOT3
	 PCIe_SLOT4
	 PCIe_SLOT5
	 PCIe_SLOT6
	 PCIe_SLOT7

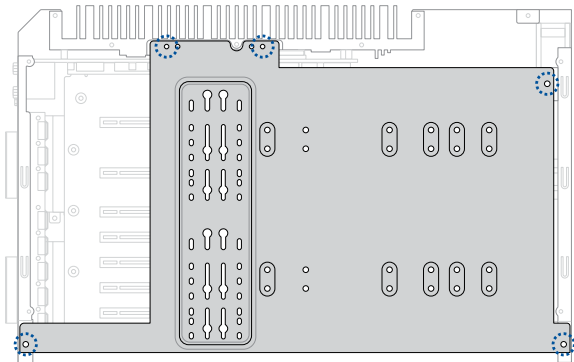
-  GPU card
-  Add-on card

3.8.2 Installing a GPU card

1. Remove the side cover. Refer to the *Removing the side cover* section for instructions.
2. Remove the six (6) screws securing the inner side panel, and remove the inner side panel.



3. Remove the five (5) screws securing the GPU support plate to the chassis, and remove the GPU support plate.

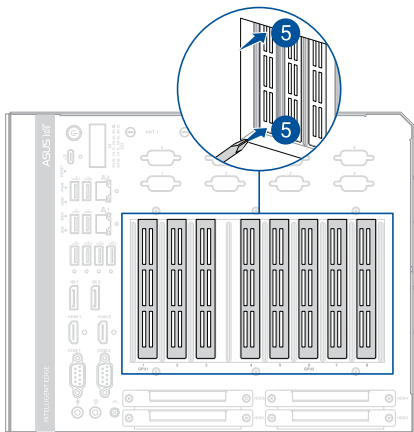


4. Identify the punch-out port(s) on the front of your Embedded Computer corresponding to the slot(s) that will be occupied by the GPU card.

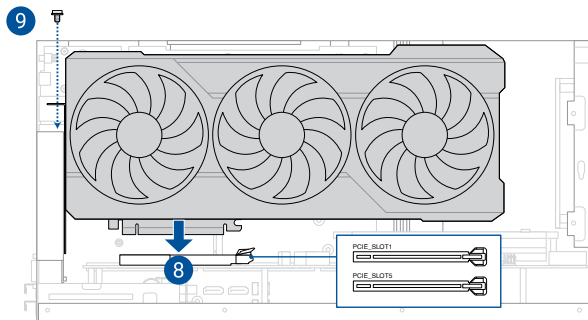
NOTE: If you are installing only one (1) GPU card, we recommend that you install it to **PCIE_SLOT5**. If you have two (2) GPU cards, we recommend that you install them to **PCIE_SLOT1** and **PCIE_SLOT5**. Refer to the *Recommended configurations* section for more detailed information regarding PCIe configuration options.

5. Detach the metal cover(s) of the punch-out port by repeatedly pushing the top and bottom edges of the cover into the chassis until it breaks loose.

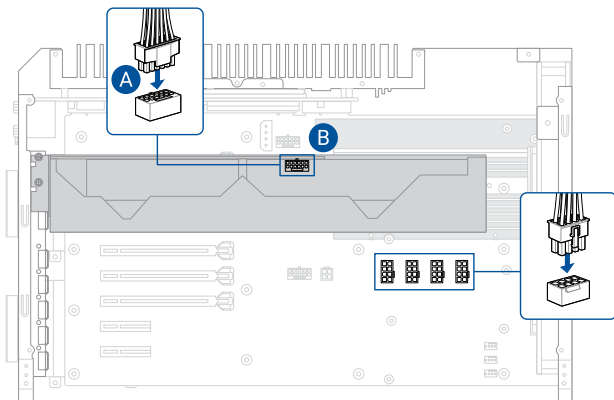
WARNING! Take extra care when removing the metal cover. Use tools, such as a screw driver, to bend and detach the metal cover to avoid physical injury.



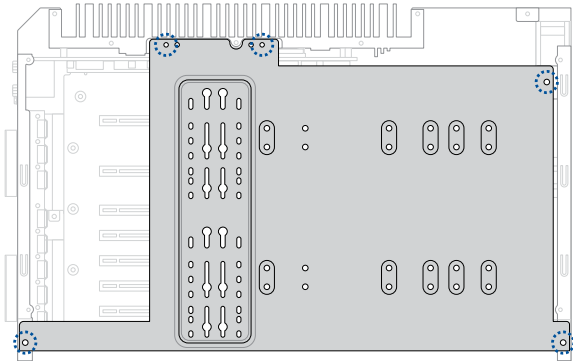
6. Carefully remove the detached metal cover from the chassis.
7. (Optional) Install a GPU support bracket (purchased separately) to keep the GPU card from moving in the vertical direction. Refer to the *Installing a GPU support bracket* section for instructions, and then skip to step 12.
8. Insert your GPU card to the empty PCIe slot corresponding to the punch-out port(s) with the metal cover(s) you removed earlier, and ensure that it is securely seated in the slot.
9. Ensure the bracket on your GPU card is properly aligned to the opening on the front of the Embedded Computer, and secure it from the top using a screw to tighten its bracket to the chassis.



10. Depending on your GPU card's power requirements, you may need to connect one or two power cables from the riser board to your GPU card.



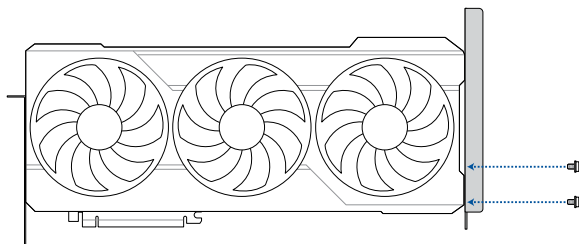
11. Secure the GPU support plate to the chassis using the screws removed earlier.



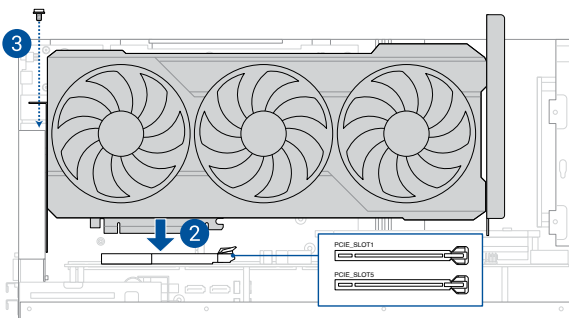
12. (Optional) Install a set of GPU holders (purchased separately) to keep the GPU card from moving and dislodging due to vibration and shock. Refer to the *Installing GPU holders* section for detailed instructions.

3.8.3 Installing a GPU support bracket (optional)

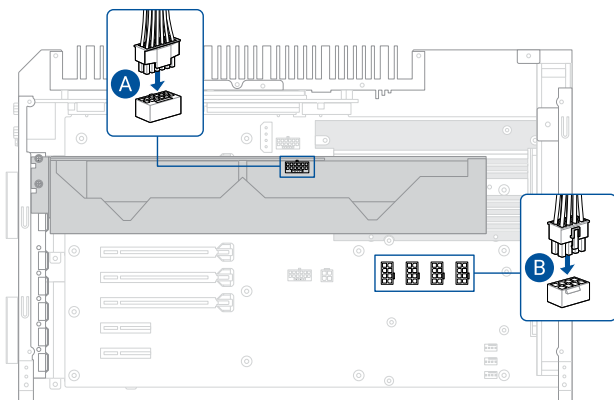
1. Secure the GPU support bracket (purchased separately) to the back of your GPU card with two (2) screws.



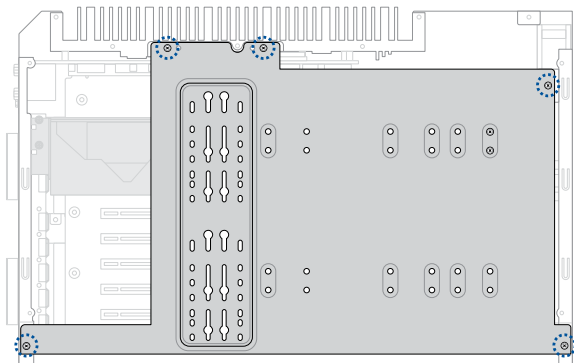
2. Insert your GPU card to the empty PCIe slot corresponding to the punch-out port(s) with the metal cover(s) you removed earlier, and ensure that it is securely seated in the slot.
3. Ensure the bracket on your GPU card is properly aligned to the opening on the front of the Embedded Computer, and secure it from the top using a screw to tighten its bracket to the chassis.



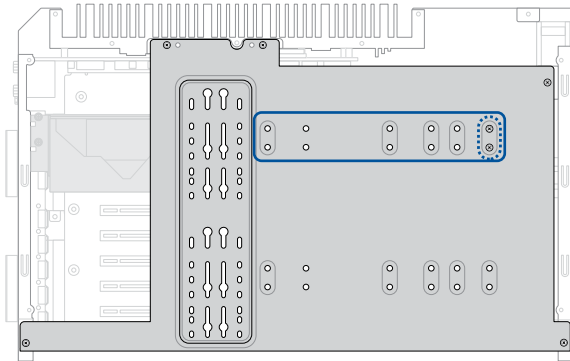
4. Depending on your GPU card's power requirements, you may need to connect one or two power cables from the riser board to your GPU card.



5. Secure the GPU support plate to the chassis using the screws removed earlier.

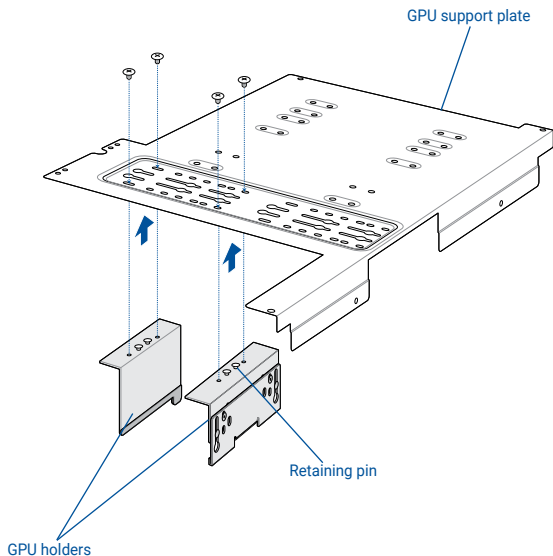


6. Secure the GPU support bracket to the GPU support plate using one of the six sets of screw holes that aligns with the length of your GPU card.

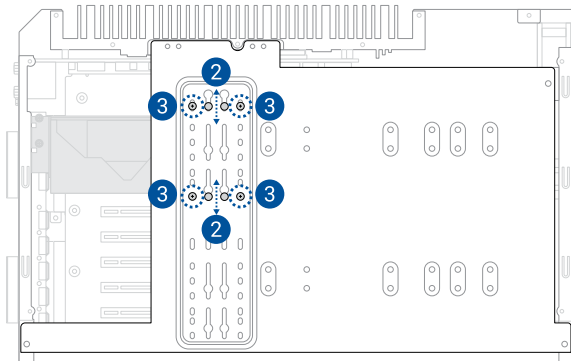


3.8.4 Installing GPU holders (optional)

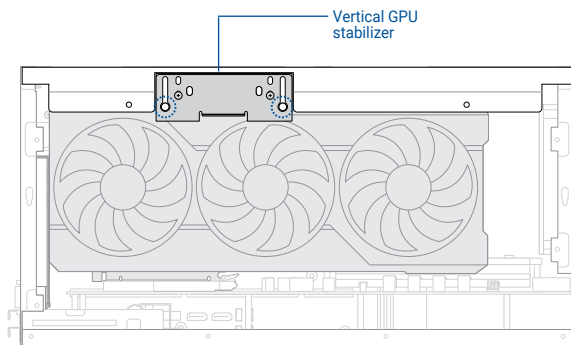
1. Insert the two retaining pins on each of the two GPU holders to the slotted holes on the GPU support plate.



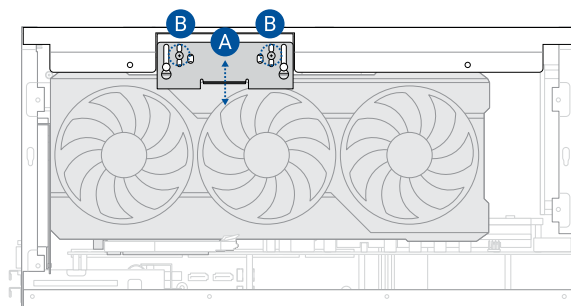
2. Slide the two GPU holders as closely as possible to both sides of the GPU card to provide support.
3. Secure the two GPU holders to the GPU support plate using four (4) screws.



4. Fit the bottom rounded end of the slotted holes on the vertical GPU stabilizer over the two retaining pins on the side of the GPU support plate as shown.



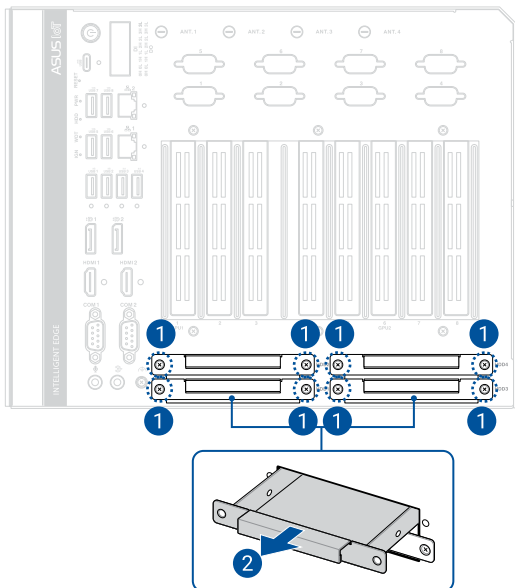
5. Move the vertical GPU stabilizer down until it rests securely on top of the GPU card (A), and secure it to the GPU support plate with two (2) screws.



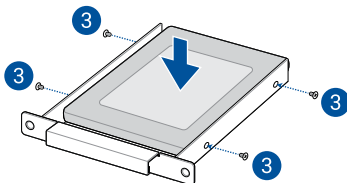
3.9 Installing a storage device

You may install up to four (4) 2.5" storage devices (hot-swappable, 7~7.5mm) to your Embedded Computer—two (2) from the front and two (2) from the rear.

1. Loosen the two (2) screws of the storage device tray located on the front of your Embedded Computer.
2. Pull the storage device tray out of the chassis.



3. Install your storage device to the storage device tray, then secure it with four (4) screws.



4. Replace the storage device tray. To ensure that the connector of the storage device is properly inserted into the HDD slot inside the Embedded Computer, the screw holes on the storage device tray should be properly aligned to the screw holes on the front of the Embedded Computer.
5. Secure the storage device trays with the two (2) screws removed previously.

4

BIOS Setup

4.1 Getting to know your BIOS

The BIOS (Basic Input and Output System) stores system hardware settings such as Storage Device Configuration, Advanced Power Management, and Boot Device Configuration that are needed for system startup. Under normal circumstances, the default BIOS settings apply to most conditions to ensure optimal performance. DO NOT change the default BIOS settings except in the following circumstances:

- An error message appears on the screen during the system bootup and requests you to run the BIOS setup.
- You have installed a new system component that requires further BIOS settings or update.

WARNING! Inappropriate BIOS settings may result to instability or boot failure. We strongly recommend that you change the BIOS settings only with the help of a trained service personnel.

NOTE:

- The BIOS setup screens shown in this section are for reference purposes only, and may not exactly match what you see on your screen.
 - BIOS settings and options may vary due to different BIOS release versions. Please refer to the latest BIOS version for settings and options.
-

4.2 BIOS setup program

Use the BIOS Setup program to update the BIOS or configure its parameters. The BIOS screens include navigation keys and brief online help to guide you in using the BIOS Setup program.

Entering BIOS Setup at startup

To enter BIOS Setup at startup:

- Press or <ESC> during the Power-On Self Test (POST). If you do not press or <ESC>, POST continues with its routines.

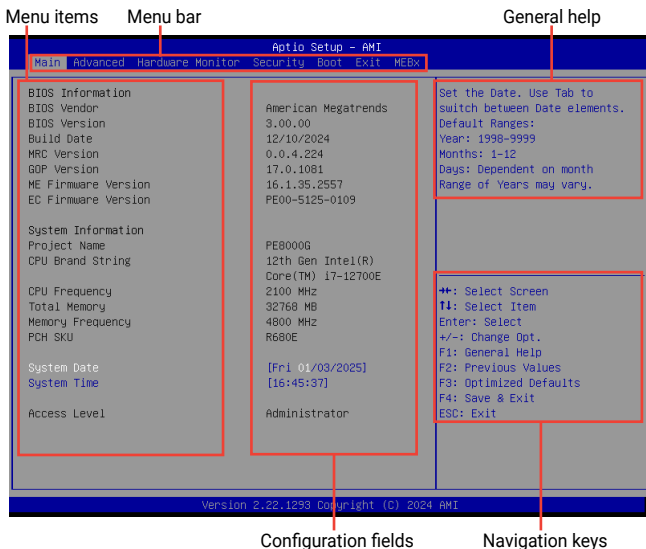
Entering BIOS Setup after POST

To enter BIOS Setup after POST:

- Press <Ctrl>+<Alt>+<Delete> simultaneously.
- Press the power button to turn the system off then back on. Do this option only if you failed to enter BIOS Setup using the first option.

BIOS menu screen

This section provides a brief introduction of the BIOS Interface of your Embedded Computer.



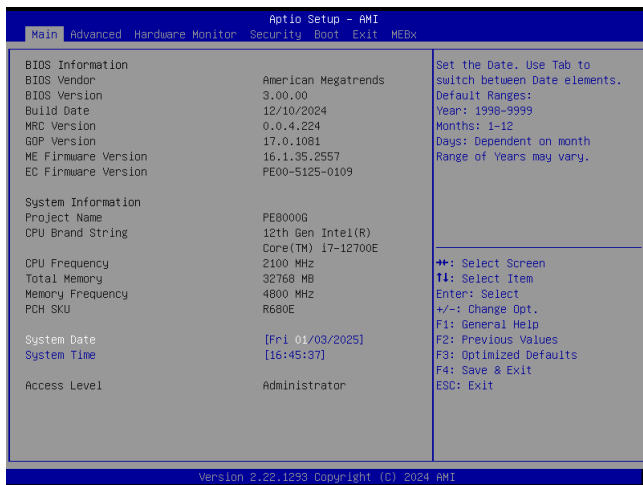
Menu bar

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

Main	For changing the basic system configuration
Advanced	For changing advanced system settings
Hardware Monitor	For viewing system temperature/power status and changing the fan mode
Security	For changing security settings
Boot	For changing system boot configuration
Exit	For selecting save and exit options or loading default settings
MEBx	For viewing and changing Intel® Management Engine settings

4.3 Main Menu

When you enter the BIOS Setup program, the Main menu screen appears. The Main menu provides you an overview of the basic system information, and allows you to set the system date and time. Scroll down to display the other BIOS items.



System Date [Day mm/dd/yyyy]

Allows you to set the system date.

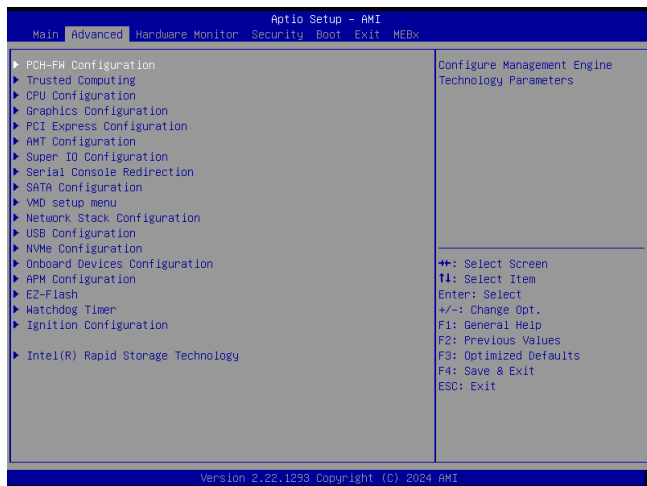
System Time [hh:mm:ss]

Allows you to set the system time.

4.4 Advanced menu

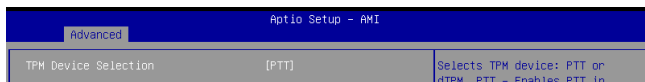
The Advanced menu items allow you to change the settings for the CPU and other system devices.

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



4.4.1 PCH-FW Configuration

The items in this menu allow you to configure Management Engine Technology Parameters.



TPM Device Selection

Allows you to select the TPM device.

[dTPM] Discrete TPM

[PTT] Intel Platform Trust Technology firmware TPM

NOTE:

- When **[dTPM]** is selected, PTT (firmware TPM) will be disabled, and the TPM device connected to the SPI TPM connector on the motherboard will be enabled. If no TPM device is connected, the TPM feature will be disabled.
- When **[PTT]** is selected, PTT (firmware TPM) is enabled.

WARNING! When **[dTPM]** is selected, PTT (firmware TPM) will be disabled and all data saved on it will be lost.

4.4.2 Trusted Computing

Aptio Setup - AMI		
Advanced		
TPM 2.0 Device Found		Enables or Disables BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available.
Firmware Version:	600.18	
Vendor:	INTC	
Security Device Support	[Enable]	
Active PCR banks	SHA256	
Available PCR banks	SHA256,SHA384,SM3	
SHA256 PCR Bank	[Enabled]	
SHA384 PCR Bank	[Disabled]	
SM3_256 PCR Bank	[Disabled]	
Pending operation	[None]	
Platform Hierarchy	[Enabled]	F1: Select Screen F2: Select Item Enter: Select +/-: Change Opt. F1: General Help F9: Restore Defaults
Storage Hierarchy	[Enabled]	
Endorsement Hierarchy	[Enabled]	
Physical Presence Spec Version	[1.3]	
PH Randomization	[Enabled]	

NOTE: Changes here do not take effect until computer is restarted.

Security Device Support

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]**.
 - The availability of the following items depends on support of the TPM device installed.
-

SHA256 PCR Bank

Allows you to enable or disable SHA256 PCR Bank.

Configuration options: [Disabled] [Enabled]

SHA384 PCR Bank

Allows you to enable or disable SHA384 PCR Bank.

Configuration options: [Disabled] [Enabled]

SM3_256 PCR Bank

Allows you to enable or disable SM3_256 PCR Bank.

Configuration options: [Disabled] [Enabled]

Pending Operation

Schedule and 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

Allows you to enable or disable Platform Hierarchy.

Configuration options: [Disabled] [Enabled]

Storage Hierarchy

Allows you to enable or disable Storage Hierarchy.

Configuration options: [Disabled] [Enabled]

Endorsement Hierarchy

Allows you to enable or disable Endorsement Hierarchy.

Configuration options: [Disabled] [Enabled]

Physical Presence Spec Version

Select to tell O.S. to support PPI Spec Version 1.2 or 1.3.

Configuration options: [1.2] [1.3]

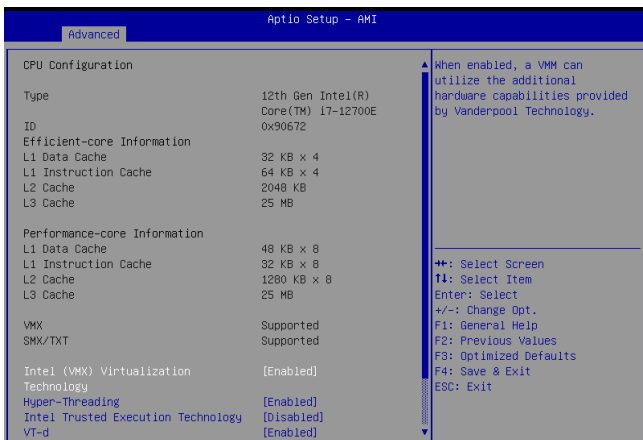
PH Randomization

Allows you to enable or disable Platform Hierarchy randomization.

Configuration options: [Disabled] [Enabled]

4.4.3 CPU Configuration

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



Intel (VMX) Virtualization Technology

When set to [Enabled], a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.

Configuration options: [Disabled] [Enabled]

Hyper-Threading

This item is enabled for Windows 10 and Linux (OS optimized for Hyper-Threading Technology) and Disabled for other OS (OS not optimized for Hyper-Threading Technology).

Configuration options: [Disabled] [Enabled]

Intel Trusted Execution Technology

Allows you to enable or disable utilization of additional hardware capabilities provided by Intel (R) Trusted Execution Technology. Changes require a full power cycle to take effect.
Configuration options: [Disabled] [Enabled]

VT-d

Allows you to enable or disable VT-d capability.
Configuration options: [Disabled] [Enabled]

Active Performance-cores

Allows you to select the number of CPU cores to activate in each processor package. Configuration options: [All] [7] [6] [5] [4] [3] [2] [1]

Active Efficient-cores

Allows you to select the number of Efficient cores to activate in each processor package. Configuration options: [All] [3] [2] [1] [0]

NOTE: Number of Cores and Efficient Cores are looked at together. When both are {0,0}, Pcode will enable all cores.

CPU - Power Management Control

Intel(R) SpeedStep(tm)

Allows more than two frequency to be supported.
Configuration options: [Disabled] [Enabled]

Intel(R) Speed Shift Technology

Allows you to enable or disable Intel(R) Speed Shift Technology support. When enabled, CPPC v2 interface allows hardware controlled P-states.
Configuration options: [Disabled] [Enabled]

Turbo Mode

Allows you to enable or disable processor Turbo Mode (requires Intel Speed Step or Intel Speed Shift to be available when enabled).
Configuration options: [Disabled] [Enabled]

C states

Allows you to enable or disable CPU Power Management. Allows CPU to go to C states when it's not 100% utilized.

Configuration options: [Disabled] [Enabled]

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

Enhanced C-States

Allows you to enable or disable C1E. When enabled, CPU will switch to minimum speed when all cores enter C-State.

Configuration options: [Disabled] [Enabled]

Power Limit 1 Override

Allows you to enable or disable Power Limit 1 override. If this option is disabled, BIOS will program the default values for Power Limit 1 and Power Limit 1 Time Window.

Configuration options: [Disabled] [Enabled]

Power Limit 2 Override

Allows you to enable or disable Power Limit 2 override. If this option is disabled, BIOS will program the default values for Power Limit 2.

Configuration options: [Disabled] [Enabled]

Power Limit 2

Allows you to configure Power Limit 2 value in milliwatts (e.g., enter 12500 for 12.5 W).

Max TOLUD

Allows you to select the maximum memory size of TOLUD (Top of Low Usable DRAM). Dynamic assignment will adjust TOLUD automatically based on the largest MMIO length of installed graphics controller.

Configuration options: [Dynamic] [0.75 GB] [1 GB] [1.25 GB] [1.5 GB] [1.75 GB] [2 GB] [2.25 GB] [2.5 GB]

4.4.4 Graphics Configuration

The items in this menu allow you to select a primary display from IGFX and PEG graphical devices.

Aptio Setup - AMI		
Advanced		
Graphics Configuration		Select which of IGFX/PEG/PCIE Graphics device should be Primary Display Or select HG for Hybrid Gfx.
Primary Display	[FORCE]	
Internal Graphics	[Enabled]	
RC6(Render Standby)	[Enabled]	

Primary Display

Allows you to select which of the IGFX/PEG/PCI Graphics devices should be the primary display or select HG for Hybrid Gfx.

Configuration options: [FORCE] [Auto] [IGFX] [PEG Slot] [PCH PCIE]

Internal Graphics

[Disabled] Disables internal graphics.

[Enabled] Enables internal graphics.

RC6(Render Standby)

Allows you to enable or disable render standby support.

Configuration options: [Disabled] [Enabled]

4.4.5 PCI Express Configuration

The items in this menu allow you to configure PCI Express settings.



Re-Size BAR Support

Allows you to enable or disable resizable BAR support, if your system has resizeable BAR capable PCIe devices.

Configuration options: [Disabled] [Enabled]

PCIE_SLOT1 Slot

PCIE_SLOT1 Slot

Allows you to control the PCI Express Root Port.

Configuration options: [Disabled] [Enabled]

NOTE: The following items appear only when **PCIE_SLOT1** is set to **[Enabled]**.

PCIe Speed

Allows you to configure the PCIe speed.

Configuration options: [Gen1] [Gen2] [Gen3] [Gen4]

Detect Timeout

Allows you to set the time (milliseconds) of waiting for link to exit Detect state for enabled ports before assuming there is no device and potentially disabling the port. Use the <+> and <-> keys to adjust the value or input the desired value.

Detect Non-Compliance Device

When set to [Enabled], this item allows you to detect the non-compliance device in PCIE_SLOT1 Slot.

Configuration options: [Disabled] [Enabled]

PCIE_SLOT2 Slot

PCIE_SLOT2 Slot

Allows you to control the PCI Express Root Port.

Configuration options: [Disabled] [Enabled]

NOTE: The following items appear only when **PCIE_SLOT2** is set to **[Enabled]**.

PCIe Speed

Allows you to configure the PCIe speed.

Configuration options: [Gen1] [Gen2] [Gen3]

Detect Timeout

Allows you to set the time (milliseconds) of waiting for link to exit Detect state for enabled ports before assuming there is no device and potentially disabling the port. Use the <+> and <-> keys to adjust the value or input the desired value.

Detect Non-Compliance Device

When set to [Enabled], this item allows you to detect the non-compliance device in PCIE_SLOT2 Slot.

Configuration options: [Disabled] [Enabled]

PCIE_SLOT3 Slot

PCIE_SLOT3 Slot

Allows you to control the PCI Express Root Port.

Configuration options: [Disabled] [Enabled]

NOTE: The following items appear only when **PCIE_SLOT3** is set to **[Enabled]**.

PCIe Speed

Allows you to configure the PCIe speed.

Configuration options: [Gen1] [Gen2] [Gen3]

Detect Timeout

Allows you to set the time (milliseconds) of waiting for link to exit Detect state for enabled ports before assuming there is no device and potentially disabling the port. Use the <+> and <-> keys to adjust the value or input the desired value.

Detect Non-Compliance Device

When set to [Enabled], this item allows you to detect the non-compliance device in PCIE_SLOT3 Slot.

Configuration options: [Disabled] [Enabled]

PCIE_SLOT4 Slot

PCIE_SLOT4 Slot

Allows you to control the PCI Express Root Port.

Configuration options: [Disabled] [Enabled]

NOTE: The following items appear only when **PCIE_SLOT4** is set to **[Enabled]**.

PCIe Speed

Allows you to configure the PCIe speed.

Configuration options: [Gen1] [Gen2] [Gen3]

Detect Timeout

Allows you to set the time (milliseconds) of waiting for link to exit Detect state for enabled ports before assuming there is no device and potentially disabling the port. Use the <+> and <-> keys to adjust the value or input the desired value.

Detect Non-Compliance Device

When set to [Enabled], this item allows you to detect the non-compliance device in PCIE_SLOT4 Slot.

Configuration options: [Disabled] [Enabled]

PCIE_SLOT5 Slot

PCIE_SLOT5 Slot

Allows you to control the PCI Express Root Port.

Configuration options: [Disabled] [Enabled]

NOTE: The following items appear only when **PCIE_SLOT5** is set to **[Enabled]**.

PCIe Speed

Allows you to configure the PCIe speed.

Configuration options: [Gen1] [Gen2] [Gen3] [Gen4]

Detect Timeout

Allows you to set the time (milliseconds) of waiting for link to exit Detect state for enabled ports before assuming there is no device and potentially disabling the port. Use the <+> and <-> keys to adjust the value or input the desired value.

Detect Non-Compliance Device

When set to [Enabled], this item allows you to detect the non-compliance device in PCIE_SLOT5 Slot.

Configuration options: [Disabled] [Enabled]

PCIE_SLOT6 Slot

PCIE_SLOT6 Slot

Allows you to control the PCI Express Root Port.

Configuration options: [Disabled] [Enabled]

NOTE: The following items appear only when **PCIE_SLOT6** is set to **[Enabled]**.

PCIe Speed

Allows you to configure the PCIe speed.

Configuration options: [Gen1] [Gen2] [Gen3]

Detect Timeout

Allows you to set the time (milliseconds) of waiting for link to exit Detect state for enabled ports before assuming there is no device and potentially disabling the port. Use the <+> and <-> keys to adjust the value or input the desired value.

Detect Non-Compliance Device

When set to [Enabled], this item allows you to detect the non-compliance device in PCIE_SLOT6 Slot.

Configuration options: [Disabled] [Enabled]

PCIE_SLOT7 Slot

PCIE_SLOT7 Slot

Allows you to control the PCI Express Root Port.

Configuration options: [Disabled] [Enabled]

NOTE: The following items appear only when **PCIE_SLOT7** is set to **[Enabled]**.

PCIe Speed

Allows you to configure the PCIe speed.

Configuration options: [Gen1] [Gen2] [Gen3]

Detect Timeout

Allows you to set the time (milliseconds) of waiting for link to exit Detect state for enabled ports before assuming there is no device and potentially disabling the port. Use the <+> and <-> keys to adjust the value or input the desired value.

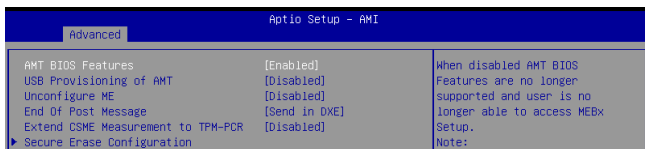
Detect Non-Compliance Device

When set to [Enabled], this item allows you to detect the non-compliance device in PCIE_SLOT7 Slot.

Configuration options: [Disabled] [Enabled]

4.4.6 AMT Configuration

The items in this menu allow you to configure Intel(R) Active Management Technology parameters.



AMT BIOS Features

Allows you to enable or disable AMT BIOS features.

Configuration options: [Disabled] [Enabled]

IMPORTANT! When set to **[Disabled]**, AMT features are no longer supported, and you will no longer be able to access MEBx setup.

NOTE: Setting this option to **[Disabled]** will not disable the manageability features in the firmware.

USB Provisioning of AMT

Allows you to enable or disable AMT USB Provisioning.

Configuration options: [Disabled] [Enabled]

Unconfigure ME

Allows you to enable or disable unconfigure ME by resetting the MEBx password to its default.

Configuration options: [Disabled] [Enabled]

End Of Post Message

Allows you to enable or disable End of Post message sent to ME.

Configuration options: [Disabled] [Send in DXE]

Extend CSME Measurement to TPM-PCR

Allows you to enable or disable Extend CSME Measurements to TPM-PCR[0] and AMR Config to TPM-PCR[1]

Configuration options: [Disabled] [Send in DXE]

Secure Erase Configuration

Secure Erase mode

Allows you to change Secure Erase module behavior.

Configuration options: [Simulated] [Real]

Force Secure Erase

Allows you to enable or disable a forced Secure Erase on next boot.

Configuration options: [Disabled] [Enabled]

4.4.7 Super IO Configuration

The items in this menu allow you to configure system super IO chip parameters.



Super IO Chip NCT6126D

Serial Port 1-2 Configuration

Allows you to set the parameters of Serial Port 1-2.

Serial Port

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

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

COM1-2 Control

Configuration options: [RS422] [RS485] [RS232]

Serial Port 3-6 Configuration

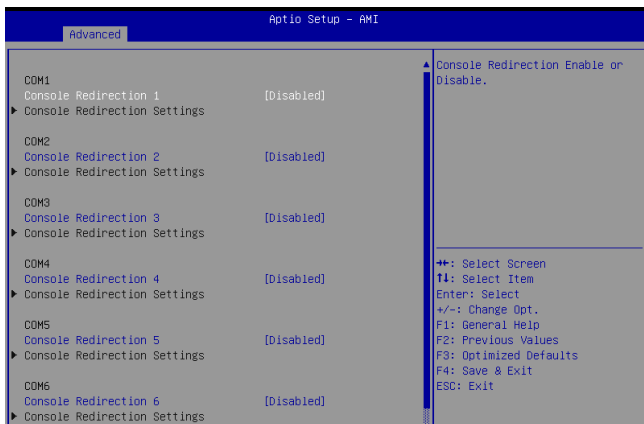
Allows you to set the parameters of Serial Port 3-6.

Serial Port

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

4.4.8 Serial Console Redirection

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



COM1-6

Console Redirection

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

This item becomes 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

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

Selects serial port transmission speed. The speed must be matched on the other side. Long or noisy lines may require lower speeds.

Configuration options: [9600] [19200] [38400] [57600] [115200]

Data Bits

Configuration options: [7] [8]

Parity

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

[None] None.

[Even] parity bit is 0 if the num of 1's in the data bits is even.

[Odd] parity bit is 0 if num of 1's in the data bits is odd.

[Mark] parity bit is always 1.

[Space] parity bit is always 0.

Stop Bits

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

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

Allows you to enable the VT-UTF8 Combo Key Support for ANSI/VT100 terminals.

Configuration options: [Disabled] [Enabled]

Recorder Mode

With this mode enabled only text will be sent. This is to capture Terminal data.

Configuration options: [Disabled] [Enabled]

Resolution 100x31

Allows you to enable or disable extended terminal resolution.

Configuration options: [Disabled] [Enabled]

Putty KeyPad

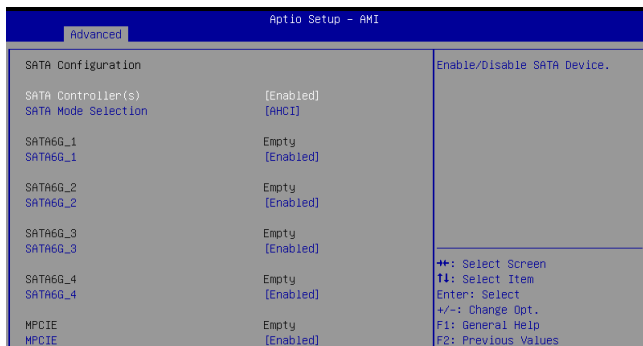
This allows you to select the FunctionKey and Keypad on Putty.

Configuration options: [VT100] [LINUX] [XTERM6] [SCO] [ESCN] [VT400]

4.4.9 SATA configuration

The items in this menu allow you to configure SATA device options.

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.



SATA Controller(s)

Allows you to enable or disable the SATA Controller.

Configuration options: [Disabled] [Enabled]

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

SATA Mode Selection

Allows you to configure how the SATA Controller operates.

[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.

SATA6G_1-4

Allows you to enable or disable the SATA port.

Configuration options: [Disabled] [Enabled]

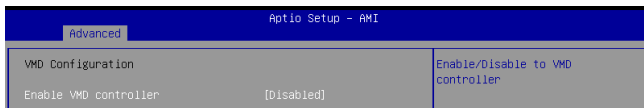
MPCIE

Allows you to enable or disable the Mini PCIe port.

Configuration options: [Disabled] [Enabled]

4.4.10 VMD setup menu

The items in this menu allow you to configure VMD options.



Enable VMD controller

Allows you to enable or disable the VMD controller.

Configuration options: [Disabled] [Enabled]

NOTE: The following item appears only when **Enable VMD controller** is set to **[Enabled]**.

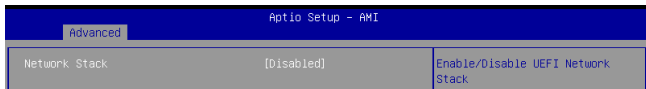
Map this Root Port under VMD

Allows you to map/unmap this root port to VMD.

Configuration options: [Disabled] [Enabled]

4.4.11 Network Stack Configuration

Allows you to configure network stack settings.



Network Stack

Allows you to enable or disable UEFI Network Stack.

Configuration options: [Disabled] [Enabled]

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

IPv4 PXE Support

Enables or disables the IPv4 PXE Boot Support. If disabled, IPv4 PXE boot support will not be available.

Configuration options: [Disabled] [Enabled]

IPv6 PXE Support

Enables or disables the IPv6 PXE Boot Support. If disabled, IPv6 PXE boot support will not be available.

Configuration options: [Disabled] [Enabled]

4.4.12 USB Configuration

Aptio Setup - AMI		
Advanced		
USB Configuration		This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.
USB Module Version	34	
USB Controllers:		
1 XHCI		
USB Devices:		
1 Drive, 2 Keyboards, 1 Mouse		
XHCI Hand-off	[Enabled]	
USB Mass Storage Driver Support	[Enabled]	
USB_20G	[Enabled]	
USB1_5G	[Enabled]	
USB2_5G	[Enabled]	
USB3_2.0	[Enabled]	
USB4_2.0	[Enabled]	
USB5_10G	[Enabled]	
USB6_10G	[Enabled]	
USB7_10G	[Enabled]	
USB8_10G	[Enabled]	

→: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit

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

XHCI Hand-off

NOTE: This item is set to **[Disabled]** by default for the EHCI (enhanced host controller interface) support by XHCI drivers in operating systems.

- [Enabled] Support XHCI by BIOS for operating systems without XHCI support.
- [Disabled] Support XHCI by XHCI drivers for operating systems with XHCI support.

USB Mass Storage Driver Support

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

USB_20G

Allows you to enable or disable each USB port. When set to **[Disabled]**, any USB devices plugged into the connector will not be detected by the BIOS or OS.

Configuration options: [Disabled] [Enabled]

USB1_5G / USB2_5G

Allows you to enable or disable each USB port. When set to **[Disabled]**, any USB devices plugged into the connector will not be detected by the BIOS or OS.

Configuration options: [Disabled] [Enabled]

USB3_2.0 / USB4_2.0

Allows you to enable or disable each USB port. When set to **[Disabled]**, any USB devices plugged into the connector will not be detected by the BIOS or OS.

Configuration options: [Disabled] [Enabled]

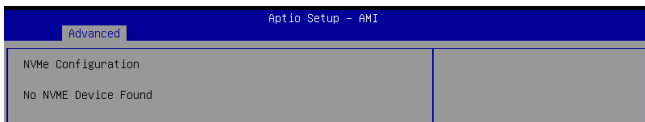
USB5_10G / USB6_10G / USB7_10G / USB8_10G

Allows you to enable or disable each USB port. When set to **[Disabled]**, any USB devices plugged into the connector will not be detected by the BIOS or OS.

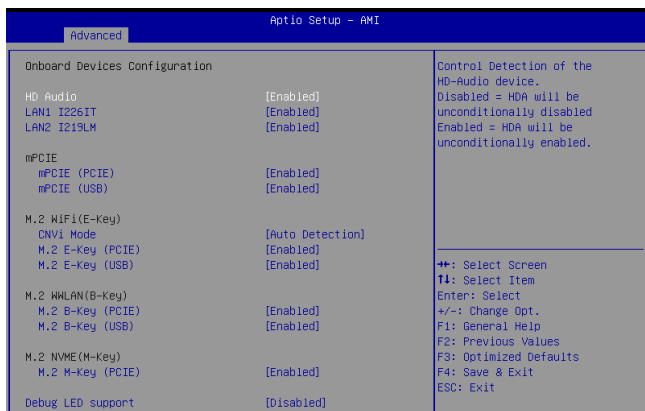
Configuration options: [Disabled] [Enabled]

4.4.13 NVMe Configuration

This menu displays the NVMe controller and drive information of the connected devices.



4.4.14 Onboard Devices Configuration



HD Audio Support

Allows you to enable or disable HD-Audio support.

Configuration options: [Disabled] [Enabled]

LAN1 I226IT

Allows you to enable or disable LAN1 I226IT.

Configuration options: [Enabled] [Disabled]

LAN2 I219LM

Allows you to enable or disable I219LM.

Configuration options: [Enabled] [Disabled]

mPCIe

mPCIe (PCIe)

Allows you to enable or disable the mPCIe PCIe port.

Configuration options: [Disabled] [Enabled]

mPCIE (USB)

Allows you to enable or disable the mPCIE USB port.

Configuration options: [Disabled] [Enabled]

M.2 WiFi(E-Key)

CNVi Mode

This option configures Connectivity.

[Disable Integrated] Disabled Integrated Solution.

[Auto Detection] If Discrete solution is discovered it will be enabled by default. Otherwise Integrated solution (CNVi) will be enabled.

M.2 E-Key (PCIe)

Allows you to enable or disable the M.2 E-key PCIe port.

Configuration options: [Disabled] [Enabled]

M.2 E-Key (USB)

Allows you to enable or disable the M.2 E-key USB port.

Configuration options: [Disabled] [Enabled]

M.2 WWLAN(B-Key)

M.2 B-Key (PCIe)

Allows you to enable or disable the M.2 B-key PCIe port.

Configuration options: [Disabled] [Enabled]

M.2 B-Key (USB)

Allows you to enable or disable the M.2 B-key USB port.

Configuration options: [Disabled] [Enabled]

M.2 NVME(M-Key)

M.2 M-Key (PCIe)

Allows you to enable or disable the M.2 M-key PCIe port.

Configuration options: [Disabled] [Enabled]

Debug LED support

Allows you to enable or disable the power LED debug function.
Configuration options: [Disabled] [Enabled]

4.4.15 APM Configuration

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

Aptio Setup - AMI		
Advanced		
APM Configuration		
ErP Ready	[Disabled]	Allow BIOS to switch off some power at S4/S5 to get the system ready for ErP requirement. When set to Enabled, all other PME options will be switched off.
Restore AC Power Loss	[S5 State]	
Power On By PCIE	[Disabled]	
Power On By Ring	[Disabled]	
Power On By RTC	[Disabled]	

ErP Ready

Allows the BIOS to switch off some power at S4/S5 to get the system ready for ErP requirement.

Configuration options: [Disabled] [Enabled]

NOTE: When set to **[Enabled]**, all other PME options will be switched off.

Restore AC Power Loss

[S5 State] The system goes into OFF state after an AC power loss.

[S0 State] The system goes into ON state after an AC power loss.

Power On By PCIE

Allows you to enable or disable the wake-on-LAN function for the onboard LAN controller or other installed PCIe LAN cards.

Configuration options: [Disabled] [Enabled]

Power On By Ring

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

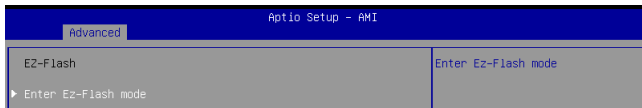
[Enabled] Enables the Ring devices to generate a wake event.

Power On By RTC

Allows you to disable the real-time clock (RTC) or enable it to schedule a wake event.

Configuration options: [Disabled] [Single event] [Daily event] [Weekly event] [Monthly event]

4.4.16 EZ-Flash



Enter Ez-Flash mode

Allows you to enter Ez-Flash mode to run the ASUS Ez-Flash BIOS ROM utility.

WARNING! Make sure to back up your Bitlocker recovery key and suspend Bitlocker encryption in the operating system before updating your BIOS.

4.4.17 Watchdog Timer

The items in this menu allow you to configure settings related to Watchdog Timer.

Advanced		Aptio Setup - AMI
Watchdog Timer		Enabled/Disabled watchdog timer during system booting. Watchdog timer resets the system if unsuccessful boot
Watchdog Support	[Disabled]	

Watchdog Support

Allows you to enable or disable Watchdog Support.

Configuration options: [Disabled] [Enabled]

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

Watchdog Count Mode

Allows you to select the Watchdog Timer count mode.

Configuration options: [Second Mode] [Minute Mode]

Watchdog Timer

Allows you to input the Watchdog time-out interval.

Watchdog Mode

Allows you to enable Watchdog Timer during POST.

Configuration options: [POST]

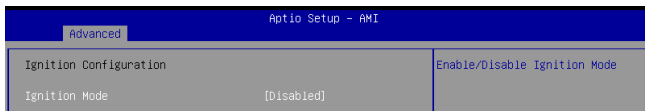
LED Alarm After Time's up

Allows you to enable or disable the LED alarm after the time is up.

Configuration options: [Disabled] [Enabled]

4.4.18 Ignition Configuration

The items in this menu allow you to configure settings related to ignition.



Ignition Mode

Allows you to enable or disable ignition mode.

Configuration options: [Disabled] [Enabled]

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

Ignition Delay Time Unit

Allows you to select ignition delay time unit.

Configuration options: [Second] [Minute]

Power On Delay

Allows you to specify the ignition power on delay time.

Configuration options: [0] - [255]

Power Off Delay

Allows you to specify the ignition power off delay time.

Configuration options: [0] - [255]

Power Hard Off Delay

Allows you to specify the ignition power hard off delay time.

Configuration options: [0] - [255]

Battery Voltage Monitor

Allows you to enable or disable the battery voltage monitor.

Configuration options: [Disabled] [Enabled]

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

Battery Voltage Monitor Timeout Unit

Allows you to select the battery voltage monitor timeout unit.

Configuration options: [Second] [Minute]

Power On Voltage of Battery

Allows you to set the minimum battery voltage to power on the system.

Use the <+> and <-> keys to adjust the value or input the desired value.

Configuration options: [0] - [65535]

Hard Off Voltage of Battery

Allows you to set the voltage after which to power hard off. Use the <+> and <-> keys to adjust the value or input the desired value.

Configuration options: [0] - [65535]

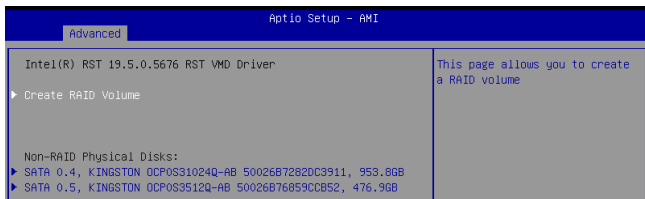
Hard Off Voltage Timeout

Allows you to set the duration time of hard off voltage. Use the <+> and <-> keys to adjust the value or input the desired value.

Configuration options: [0] - [255]

4.4.19 Intel(R) Rapid Storage Technology

The items in this menu allow you manage RAID volumes on the Intel(R) RAID Controller.



NOTE: Ensure to set the VMD configuration settings before using Intel(R) Rapid Storage Technology to create a RAID set.

Create RAID Volume

Allows you to create a RAID volume.

Name

Allows you to enter a unique volume name that has no special characters and is 16 characters or less.

RAID Level

Allows you to select RAID level.

Configuration options: [RAID0 (Stripe)] [RAID1 (Mirror)]

Select Disks

Allows you to select disks to include in the RAID set. Press <Enter> and select X for the disks you want to include in the RAID array.

NOTE: You need to select at least two disks to create a RAID volume.

Strip Size

Allows you to select strip size for the RAID array (for RAID 0, 10 and 5 only).

Configuration options: [4KB] [8KB] [16KB] [32KB] [64KB] [128KB]

Capacity (MB)

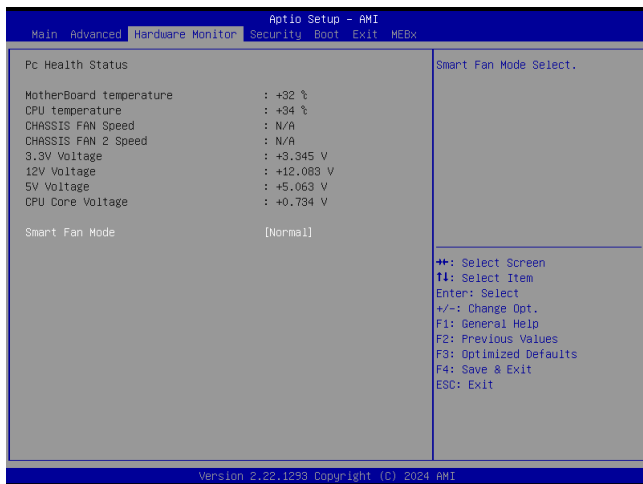
Allows you enter the desired RAID volume capacity. The default value indicates the maximum allowed capacity.

Create Volume

Allows you to create a RAID volume.

4.5 Hardware Monitor menu

The Hardware Monitor menu displays the system temperature/power status, and allows you to change the fan mode.



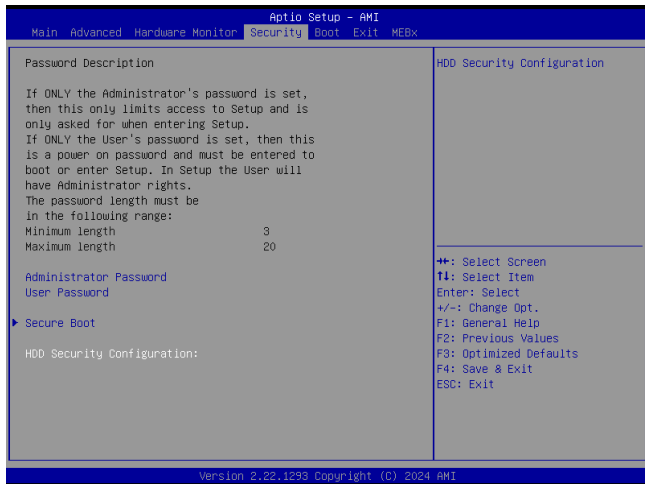
Smart Fan Mode

Allows you to select a smart fan mode.

Configuration options: [Disabled] [Normal] [Manual]

4.6 Security menu

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



Administrator Password

To set an administrator password:

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

To change an administrator password:

1. Select the Administrator Password item and press <Enter>.
2. From the Enter Current Password box, key in the current password, then press <Enter>.

3. From the Create New Password box, key in a new password, then press <Enter>.
4. Confirm the password when prompted. **NOTE:** To clear the administrator password, follow the same steps as in changing an administrator password, but press <Enter> when prompted to create/confirm the password.

User Password

To set a user password:

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

To change a user password:

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

To clear a user password:

1. Follow the same steps as in changing a user password, but press <Enter> when prompted to create a new password.
2. Select Yes from the Warning message window, then press <Enter>.

Secure Boot

Secure Boot can be enabled if the system is running in User mode with enrolled platform Key (EPK) or if the CSM function is disabled.

Configuration options: [Disabled] [Enabled]

Secure Boot Mode

In Custom Mode, the secure boot policy variables can be configured by a physically present user without full authentication.

Configuration options: [Standard] [Custom]

Key Management

The Key Management item allows you to modify Secure Boot variables and set Key Management page.

Platform Key (PK)

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

Key Exchange Keys / Authorized Signatures / Forbidden Signatures

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

HDD Security Configuration

The HDD Security Configuration item allows you to set up passwords to protect your HDD.

NOTE: This item is only available when you have a SATA HDD connected.

To set a password for your HDD:

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

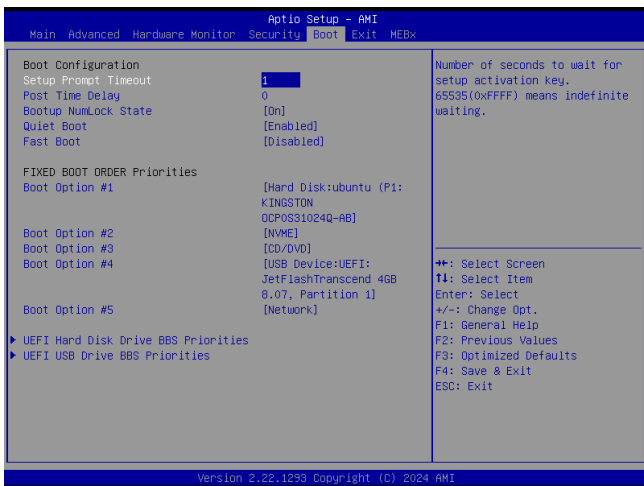
To change the password for your HDD:

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

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

4.7 Boot menu

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



Boot Configuration

Setup Prompt Timeout

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

Post Time Delay

Allows you to select a desired additional POST waiting time to easily enter the BIOS Setup. You can only execute the POST time delay during normal boot. The values range from 0 to 10 seconds.

NOTE: This feature only works when set under normal boot.

Bootup NumLock State

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

Configuration options: [On] [Off]

Quiet Boot

Allows you to enable or disable the Quiet Boot option.

Configuration options: [Disabled] [Enabled]

Fast Boot

[Disabled] Allows your system to go back to its normal boot speed.

[Enabled] Allows your system to accelerate the boot speed.

FIXED BOOT ORDER Priorities

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

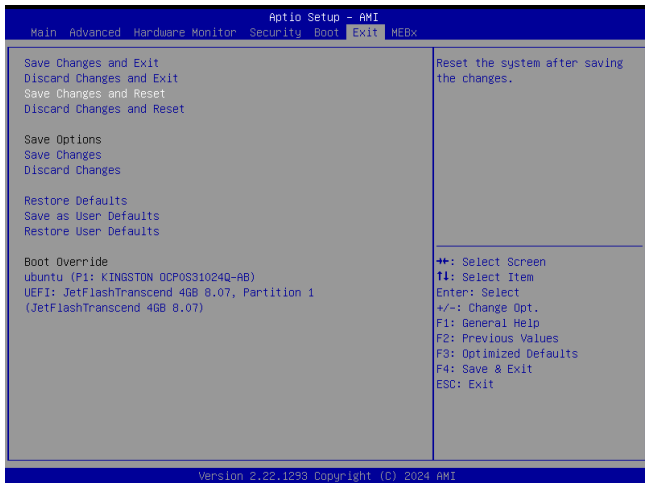
NOTE: To select the boot device during system startup, press <F8> when the ASUS Logo appears.

UEFI Hard Disk Drive BBS Priorities

Specifies the Boot Device Priority sequence from available UEFI Hard Disk Drives.

4.8 Exit menu

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



NOTE: Pressing <ESC> does not immediately exit this menu. Select one of the options from this menu or press <F4> to save and exit.

Save Changes and Exit

Exit system setup after saving changes.

Discard Changes and Exit

Exit system setup without saving changes.

Save Changes and Reset

Reset the system after saving changes.

Discard Changes and Reset

Reset the system without saving any changes.

Save Options

Save Changes

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

Discard Changes

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

Restore Defaults

Restore/load default values for all the setup options.

Save as User Defaults

Save the changes done so far as User Defaults.

Restore User Defaults

Restore/load default values for all the setup options.

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.

4.9 MEBx menu

The MEBx menu allows you to configure Intel(R) Management Engine (ME) features.



Intel(R) ME Password

Allows you to login to access the Intel(R) MEBx configuration settings.

NOTE: The default password is **admin**. After logging in with the default password, you must change the password before any features can be used.

4.10 Updating your BIOS

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

1. **ASUS CrashFree BIOS**

To recover the BIOS using a bootable USB flash disk drive when the BIOS file fails or is corrupt.

2. **ASUS EzFlash**

Updates the BIOS using a USB flash disk.

Refer to the corresponding sections for details on these utilities.

4.10.1 ASUS CrashFree BIOS utility

The ASUS CrashFree BIOS 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 BIOS file to one of the USB ports on the system.
2. The utility will automatically recover the BIOS. It resets the system when the BIOS recovery finished.

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

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

4.10.2 ASUS EzFlash Utility

The ASUS EzFlash Utility feature allows you to update the BIOS using a USB flash disk without having to use a DOS-based utility.

IMPORTANT! Download the latest BIOS from the ASUS website at www.asus.com before using this utility.

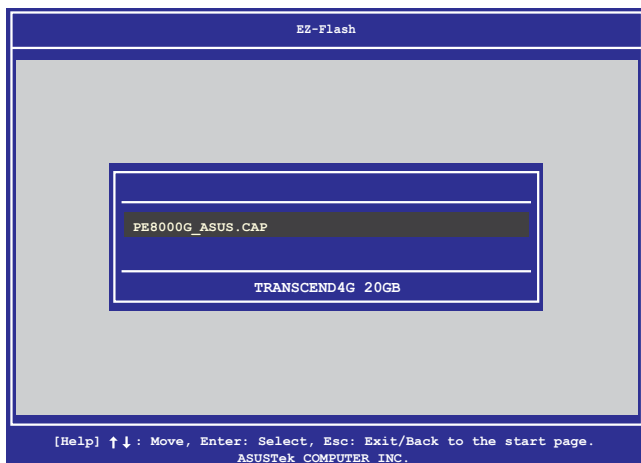
NOTE: The succeeding BIOS screens are for reference only. The actual BIOS screen displayed may not be the same as shown.

To update the BIOS using EzFlash Utility:

1. Insert the USB flash disk that contains the latest BIOS file to a USB port.
2. Enter the BIOS setup program. Go to the **Advanced** menu > **EZ-Flash** > **Enter Ez-Flash mode**. Select Yes and then OK to auto reboot and enter EZ-Flash mode.

WARNING! Make sure to back up your Bitlocker recovery key and suspend Bitlocker encryption in the operating system before updating your BIOS.

3. Use the Up/Down arrow keys to find the USB flash disk that contains the latest BIOS, and then press <Enter>.
4. Use the Up/Down arrow keys to find the BIOS file then press <Enter>.



5. Reboot the system when the update process is done.

WARNING!

- 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! Make sure to load the BIOS default settings to ensure system compatibility and stability. Press <F3> and select Yes to load the BIOS default settings.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Appendix

Safety information

Your Embedded Computer is designed and tested to meet the latest standards of safety for information technology equipment. However, to ensure your safety, it is important that you read the following safety instructions.

Setting up your system

- Read and follow all instructions in the documentation before you operate your system.
- Do not use this product near water or a heated source.
- Set up the system on a stable surface.
- Peripherals with extended temperature tolerance (such as industrial grade DRAM, SSD) will allow this product to be used in environments with ambient temperatures between -20°C and 60°C.
- If you use an extension cord, make sure that the total ampere rating of the devices plugged into the extension cord does not exceed its ampere rating.
- This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body.
- Restricted Access Area:
The equipment should only be installed in a Restricted Access Area where both these conditions apply:
 - Access can only be gained by skilled 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 lock and key, or other means of security, and is controlled by the authority responsible for the area.
- This device shall not be connected to an Ethernet network with outside plant routing.

Care during use

- Do not walk on the power cord or allow anything to rest on it.
- Do not spill water or any other liquids on your system.
- When the system is turned off, a small amount of electrical current still flows. Always unplug the power cord from the power outlets before cleaning the system.
- If you encounter the following technical problems with the product, unplug the power cord and contact a qualified service technician or your retailer.
 - The power cord or plug is damaged.
 - Liquid has been spilled into the system.
 - The system does not function properly even if you follow the operating instructions.
 - The system was dropped or the cabinet is damaged.
 - The system performance changes.

Lithium-Metal 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.

NO DISASSEMBLY

The warranty does not apply to the products that have been disassembled by users



DO NOT throw the Embedded Computer 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, electronic equipment, and mercury-containing button cell battery) should not be placed in municipal waste. Check local technical support services for product recycling.

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。

Regulatory notices

COATING NOTICE

IMPORTANT! To provide electrical insulation and maintain electrical safety, a coating is applied to insulate the device except on the areas where the I/O ports are located.

Federal Communications Commission Statement

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

- This device may not cause harmful interference, and
- This device must accept any interference received including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

IMPORTANT! Outdoor operations in the 5.15~5.25 GHz band is prohibited. This device has no Ad-hoc capability for 5250~5350 and 5470~5725 MHz.

CAUTION! Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC RF Exposure Information

This device meets the government's requirements for exposure to radio waves. This device is designed and manufactured not to exceed the emission limits for exposure to radio frequency (RF) energy set by the Federal Communications Commission of the U.S. Government. The exposure standard employs a unit of measurement known as the Specific Absorption Rate, or SAR. The SAR limit set by the FCC is 1.6 W/kg. Tests for SAR are conducted using standard operating positions accepted by the FCC with the EUT transmitting at the specified power level in different channels. The FCC has granted an Equipment Authorization for this device with all reported SAR levels evaluated as in compliance with the FCC RF exposure guidelines. SAR information on this device is on file with the FCC and can be found under the Display Grant section of www.fcc.gov/oet/ea/fccid.

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

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

CAN ICES-003(A)/NMB-003(A)

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

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

CAN ICES-003(A)/NMB-003(A)

Wireless Operation Channel for Different Domains

N. America	2.412-2.462 GHz	Ch01 through CH11
Japan	2.412-2.484 GHz	Ch01 through Ch14
Europe ETSI	2.412-2.472 GHz	Ch01 through Ch13

RF Module Warning Statement

RF modules are intended for OEM or host integrators only. For availability of system level RF certification, check with your OEM integrator.

VCCI: Japan Compliance Statement

Class A ITE

この装置は、クラスA機器です。この装置を住宅環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

VCCI – A

Japan RF Equipment Statement

屋外での使用について

5GHz帯 (W52/53) 及び6GHz帯 (LPI) の屋外での使用は、電波法により禁じられています (法令により許可された場合は除く) (6GHz帯は対応製品のみ)。

法律および規制遵守

本製品は電波法及びこれに基づく命令の定めるところに従い使用してください。日本国外では、その国の法律または規制により、本製品の使用ができないことがあります。このような国では、本製品を運用した結果、罰せられることがあります。当社は一切責任を負いかねますのでご了承ください。

KC: Korea Warning Statement

Class A:

사용자 안내문

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

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>

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Service and Support

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



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