



PE2100S Series

Embedded Computer

User Manual



E23940

First Edition

November 2024

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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: Watchdog Timer

This chapter will guide you in implementing and programming the Watchdog Timer to allow you to monitor and manage system reliability.

Chapter 5: 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:

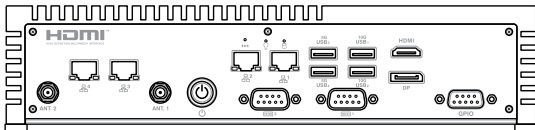
IMPORTANT! This message contains vital information that must be followed to complete a task.

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

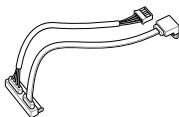
WARNING! This message contains important information that must be followed to keep you safe while performing certain tasks and prevent damage to your Embedded Computer's data and components.

Package contents

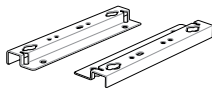
Your Embedded Computer package contains the following items:



PE2100S Series



SATA and power cable



Wall mount kit with two (2) brackets

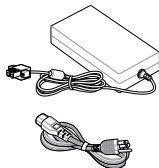
Optional item(s)



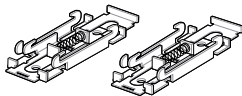
Cellular network antenna



Wi-Fi antenna



Power adapter and cord*



DIN rail clips

NOTE:

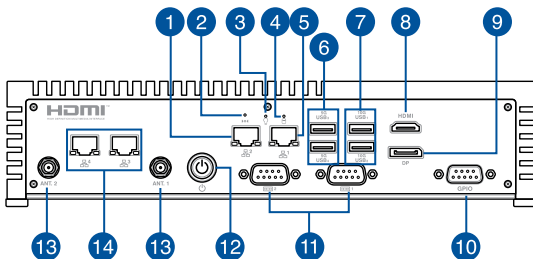
- *The power adapter and power cord may vary depending on model and country (or region) of sale.
 - Some bundled accessories may vary depending on model. For details on these accessories, refer to their respective user manuals.
 - The device illustration is for reference only. Actual product specifications 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.
-

1

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

1.1 Features

1.1.1 Front view



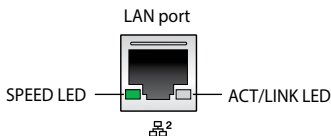
1



LAN port

The 8-pin RJ-45 LAN port supports a standard Ethernet cable for 10/100/1000 Mbps connection to a local network. It further supports Wake-on-LAN (WOL) and Preboot Execution Environment (PXE) to enable remote wake-up and the loading of an operating system over a network connection.

LAN port 2 LED indications



Activity Link LED	
Status	Description
Off	No link
Yellow	Linked
Yellow (blinking)	Data activity
Yellow (blinking then steady)	Ready to wake up from suspend mode

Speed LED	
Status	Description
Off	10 Mbps connection
Orange	100 Mbps connection
Green	1 Gbps connection

2



System reset pinhole

The hard reset pinhole allows you to reboot your Embedded Computer.

3



Power indicator

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

4



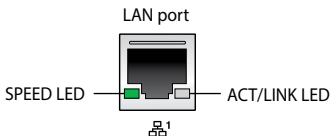
Drive activity indicator

This indicator lights up when your Embedded Computer is accessing the internal storage drive.

5 LAN port

The 8-pin RJ-45 LAN port supports a standard Ethernet cable for 10/100/1000/2500 Mbps connection to a local network. It further supports Wake-on-LAN (WOL) and Preboot Execution Environment (PXE) to enable remote wake-up and the loading of an operating system over a network connection.

LAN port 1 LED indications



Activity Link LED	
Status	Description
Off	No link
Green	Linked
Green (blinking)	Data activity
Green (blinking then steady)	Ready to wake up from suspend mode

Speed LED	
Status	Description
Off	10/100 Mbps connection
Orange	1 Gbps connection
Green	2.5 Gbps connection

6 USB 5Gbps port

5G
USB₃
5G
USB₄

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

7 USB 10Gbps port

10G
USB₁
10G
USB₂

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

8 HDMI **HDMI™ port**

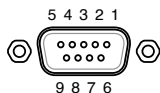
The integrated HDMI (High Definition Multimedia Interface) port with a receptacle connector can support resolutions up to 4K x 2K @ 60 Hz on external display devices.

9 DP **DisplayPort**

The DisplayPort 1.4 port can support resolutions up to 4096 x 2304 @ 60 Hz on external display devices.

10 GPIO **GPIO connector**

The 9-pin GPIO (General-purpose Input/Output) connector allows you to program it for input or output use, such as lighting control, door control or alarm control.



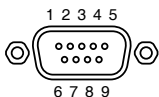
Pin	GPIO
1	DIO_0
2	DIO_4
3	DIO_1
4	DIO_5
5	DIO_2
6	DIO_6
7	DIO_3
8	DIO_7
9	GND

11

Serial (COM) connector

ANT. 1 The 9-pin DB9 connector allows you to connect RS-232/RS-422/RS-485 devices that have serial ports, such as bar code scanner, modem, and printers.

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



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

12

**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.

13

ANT. 1 Antenna jack (on selected models)

ANT. 2 The antenna jack allows you to connect a wireless antenna to enhance wireless signal reception.

NOTE: To install an antenna jack yourself, refer to the **Installing antennas** section.

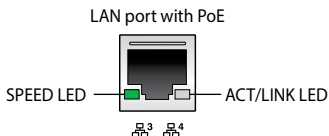
14



LAN port with PoE (on selected models)

The 8-pin RJ-45 LAN port supports a standard Ethernet cable for connection to a local network, and supports Power over Ethernet (PoE).

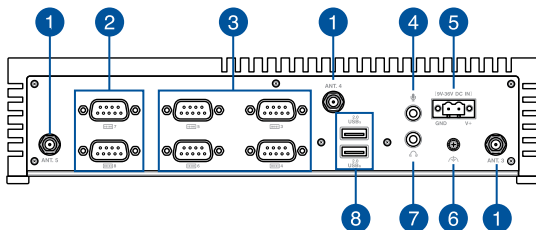
LAN port 3 & 4 LED indications



Activity Link LED	
Status	Description
Off	No link
Green	Linked
Green (blinking)	Data activity
Green (blinking then steady)	Ready to wake up from suspend mode

Speed LED	
Status	Description
Off	10 Mbps connection
Orange	100 Mbps connection
Green	1 Gbps connection

1.1.2 Rear view






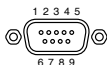
- 1** **ANT. 3 Antenna jack (on selected models)**
ANT. 4 The antenna jack allows you to connect a wireless antenna
ANT. 5 to enhance wireless signal reception.

NOTE: To install an antenna jack yourself, refer to the **Installing antennas** section.

- 2** **7 Serial (COM) connector (on selected models)**
8 The 9-pin DB9 connector allows you to connect RS-232 devices that have serial ports, such as bar code scanners, modems, and printers.

3 **Serial (COM) connector**

-  4 The 9-pin RS-232 serial (COM) connector allows you to connect devices that have serial ports, such as bar code scanners, modems, and printers. Refer to the table below for the pin definitions of the connector.
-  5
-  6



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

4 **Microphone**



The built-in microphone can be used for video conferencing, voice narrations, or simple audio recording.

5 **Power input**



The supplied terminal block power adapter converts AC power to DC power for use with this jack. Power supplied through this jack supplies power to the Embedded Computer.

WARNING! The power adapter may become warm to hot when in use. Do not cover the adapter and keep it away from your body.

6



Functional Earth Ground (on selected models)

The Functional Earth Ground provides you with a grounding point.

7



Headphone jack

This port allows you to connect amplified speakers or headphones.

8



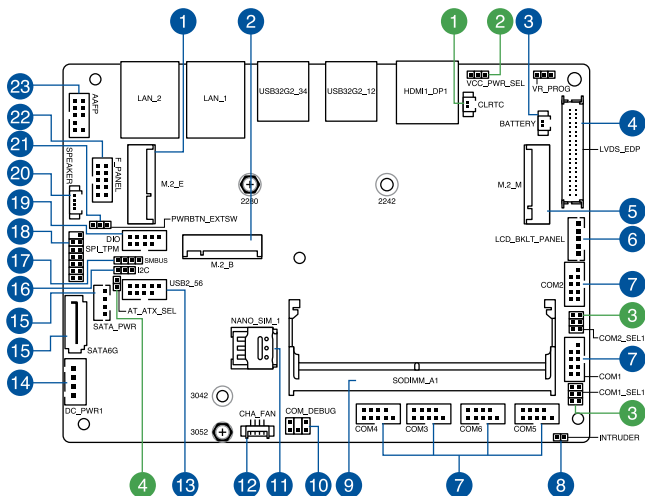
USB 2.0 port

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.

1.2 Motherboard Overview

1.2.1 Motherboard layout

The PE2100S Series features a motherboard with a 3.5" dimension (146mm x 105mm).



Jumpers

- | | |
|----|--|
| 1. | Clear RTC RAM jumper |
| 2. | Display Panel VCC Power Selection jumper |
| 3. | COM +5V/+12V Selection jumper |
| 4. | AT/ATX Mode Configuration jumper |

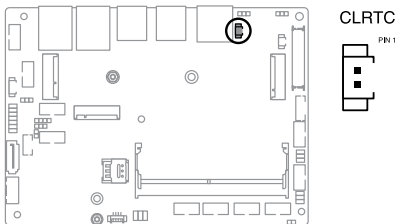
Internal slots and connectors

- | | |
|-----|--|
| 1. | M.2 E-key slot |
| 2. | M.2 B-key slot |
| 3. | Battery connector |
| 4. | LVDS EDP Signal connector |
| 5. | M.2 M-key slot |
| 6. | Backlight Inverter Power connector |
| 7. | Serial (COM) Port connector |
| 8. | Chassis Intrusion connector |
| 9. | DIMM slot |
| 10. | COM Debug connector |
| 11. | Nano SIM Card slot |
| 12. | Chassis Fan connector |
| 13. | USB 2.0 connector |
| 14. | DC-in 4-pin Power connector |
| 15. | SATA 6Gb/s & SATA Power connector |
| 16. | I2C connector |
| 17. | SMBus connector |
| 18. | SPI TPM connector |
| 19. | GPIO connector |
| 20. | Stereo Speaker connector |
| 21. | Power Button connector |
| 22. | Front Panel connector |
| 23. | Front Panel Audio (Line Out / Mic) connector |

1.2.2 Jumpers

1. Clear RTC RAM jumper

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



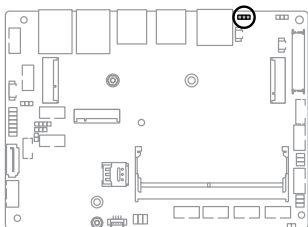
To erase the RTC RAM:

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

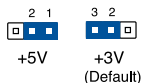
NOTE: If the steps above do not help, disconnect the battery cable from the motherboard and move the jumper again to clear the CMOS RTC RAM data. After clearing the CMOS, reconnect the battery cable.

2. Display Panel VCC Power Selection jumper

The Display Panel VCC Power Selection jumper allows you to select the voltage for the LVDS panel.

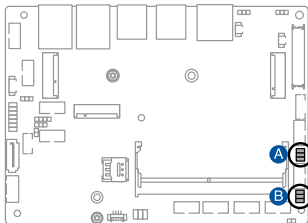


VCC_PWR_SEL

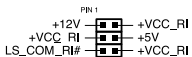


3. COM +5V/+12V Selection jumper

The COM +5V/+12V Selection jumper allows you to select the voltage for the COM1 and COM2 ports.

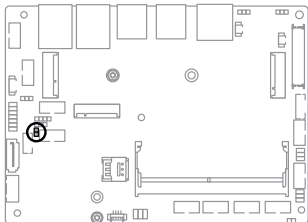


A COM2_SEL
B COM1_SEL



4. AT/ATX Mode Configuration jumper

The AT/ATX Mode Configuration jumper allows you to switch between AT and ATX modes. The default setting for this jumper is set to ATX mode with a jumper cap attached. To switch to AT mode, remove the jumper cap.



AT_ATX_SEL

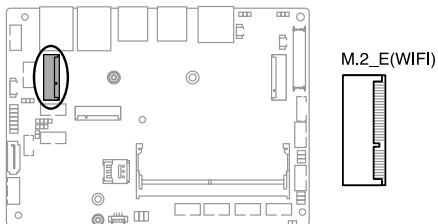
PIN 1



1.2.3 Internal slots and connectors

1. M.2 E-key slot

The M.2 E-key slot allows you to install an M.2 Wi-Fi module (E-key, type 2230).

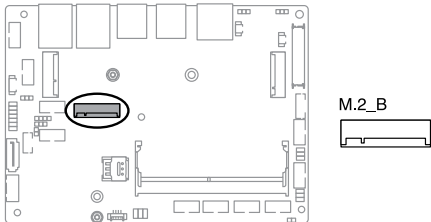


NOTE:

- The M.2 Wi-Fi module is purchased separately.
 - We recommend using a PH1 screwdriver with a torque of 2.0 ± 0.2 kgf-cm when tightening the screw.
-

2. M.2 B-key slot

The M.2 B-key slot allows you to install a B-key (PCIe/USB2.0/USB3.2 Gen 2) type 2242/3042/3052 M.2 device, such as a 4G LTE or 5G NR module.

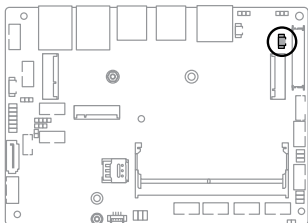


NOTE:

- The M.2 4G LTE or 5G NR module is purchased separately.
 - We recommend using a PH1 screwdriver with a torque of 2.0 ± 0.2 kgf-cm when tightening the screw.
-

3. Battery connector

The Battery connector allows you to connect a lithium CMOS battery.

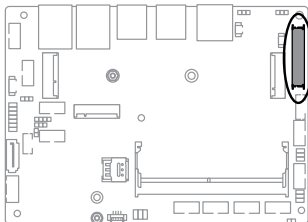


BATTERY

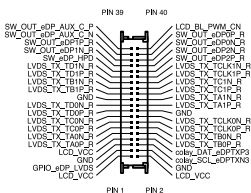


4. LVDS EDP Signal connector

The LVDS EDP Signal connector allows you to connect an LCD monitor that supports a Low-voltage Differential Signaling (LVDS) interface.



LVDS_EDP

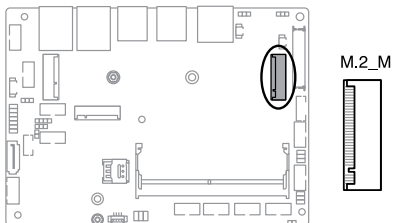


Connector type

WtoB 2x20p, 1.25mm pitch

5. M.2 M-key slot

The M.2 M-key slot allows you to install 2242/2280 M.2 devices, such as 2242/2280 M.2 SSD modules.



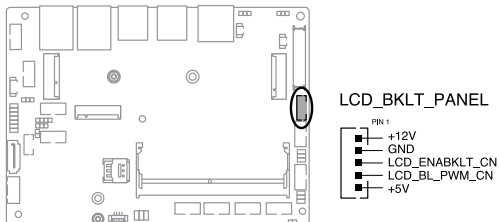
NOTE:

- The M.2 SSD module is purchased separately.
 - We recommend using a PH1/sleeve screwdriver with a torque of 2.0 ± 0.2 kgf-cm when tightening the screw/standoff.
-

6. Backlight Inverter Power connector

The Backlight Inverter Power connector allows you to power the backlight inverter on a display panel via a backlight inverter module.

IMPORTANT! The Backlight Inverter Power connector supports a maximum current of 2 A.

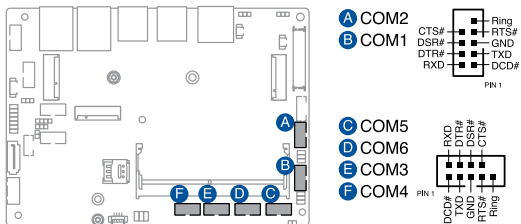


Connector type

Header 1x5p, K6, 2.0mm pitch

7. Serial (COM) Port connector

The Serial (COM) Port connector allows you to connect a serial cable. Connect the 2x5p connector from the serial cable to this connector, then align and secure the DB9 connector to the cut-out on the system chassis panel.



Connector type

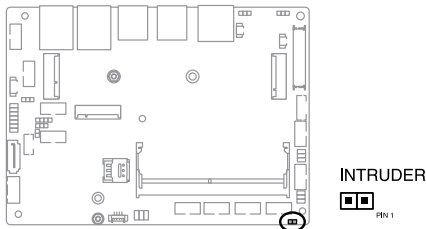
BOX header 2x10p, K10, 2.0mm pitch

NOTE:

- The serial port module is purchased separately.
- **COM1** and **COM2** support RS-232/422/485.

8. Chassis Intrusion connector

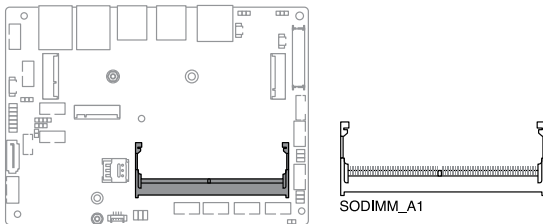
The Chassis Intrusion connector allows you to connect an intrusion sensor or microswitch for the chassis intrusion detection feature. When you remove any chassis component, the sensor or microswitch triggers and sends a high level signal and records a chassis intrusion event.



NOTE: By default, a jumper cap that disables the intrusion detection feature is installed on the connector to prevent accidental triggers.

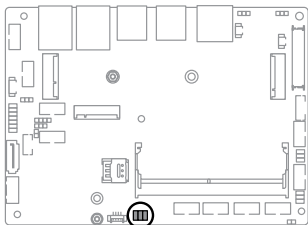
9. DIMM slot

The motherboard comes with a Small Outline Dual Inline Memory Module (SODIMM) slot designed for DDR5 (Double Data Rate 5) memory modules.

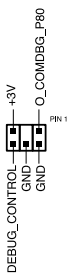


10. COM Debug connector

The COM Debug connector allows you to connect a COM debug card.



COM_DBG

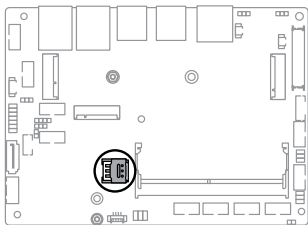


Connector type

Header 2x3p, 2.54mm pitch

11. Nano SIM Card slot

The Nano SIM Card slot allows you to install a Nano SIM card.



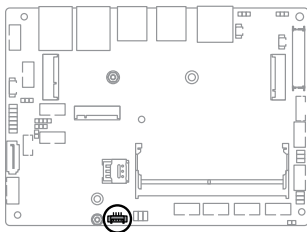
NANO_SIM_1



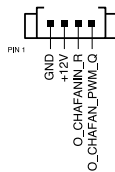
NOTE: The Nano SIM card is purchased separately.

12. Chassis Fan connector

The Chassis Fan connector allows you to connect a fan to actively cool the system.



CHA_FAN

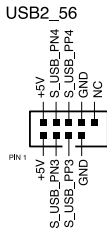
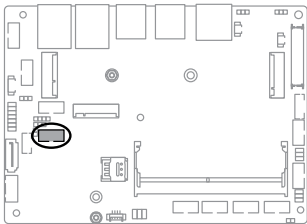


Connector type

WtoB 1x4p, 1.25mm pitch

13. USB 2.0 connector

The USB 2.0 connector allows you to connect a USB module for additional USB 2.0 ports. The USB 2.0 connector provides data transfer speeds of up to 480 MB/s connection speed.



Connector type

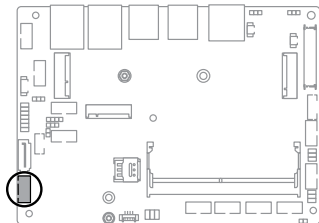
BOX header 2x5p, K9, 2.0mm pitch

WARNING! DO NOT connect a 1394 cable to the USB connectors. Doing so will damage the motherboard!

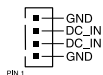
NOTE: The USB 2.0 module is purchased separately.

14. DC-in 4-Pin Power connector

The DC-in 4-pin Power connector is for DC power input. Using a compatible power cable, you may connect a suitable power supply with DC-in jacks.



DC_PWR1

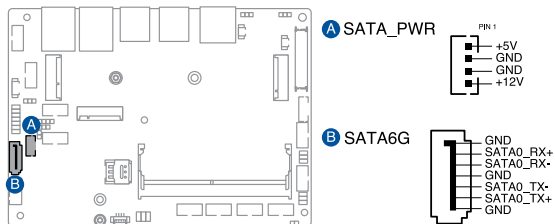


Connector type

POWER CON 4P S/T

15. SATA 6Gb/s & SATA Power connector

The SATA 6Gb/s and SATA Power connectors allow you to connect SATA devices such as optical disc drives and hard disk drives via a SATA cable and power cable.



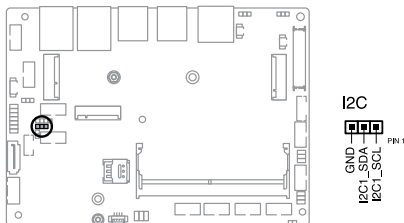
Connector type

Wafer HD 4P, 2.0mm pitch & Wafer HD 7p, 1.27mm pitch

NOTE: Ensure to use the bundled cable when connecting a storage device to this connector.

16. I2C connector

The I2C (Inter-Integrated Circuit) connector allows you to connect an I2C-compatible IoT security module.

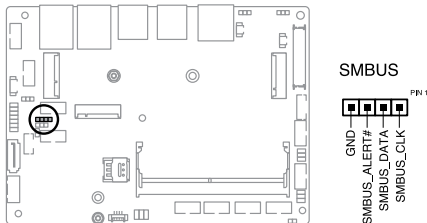


Connector type

Header 1x3p, K6, 2.0mm pitch

17. SMBus connector

The System Management Bus (SMBus) connector allows you to connect SMBus devices. This connector is generally used for communication with system and power management-related tasks.

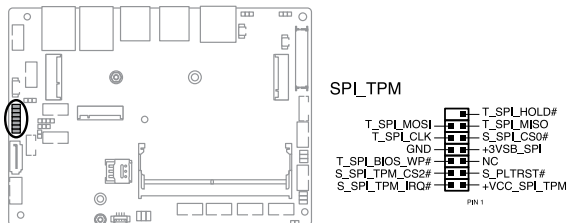


Connector type

Header 1x4p, 2.0mm pitch

18. SPI TPM connector

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

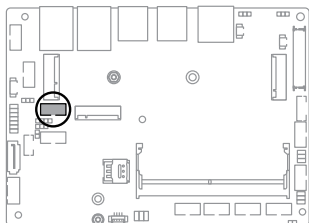


Connector type

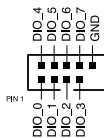
Header 2x7p, K14, 2.0mm pitch

19. GPIO connector

The GPIO connector allows you to connect a general purpose input/output module to customize digital signal input/output.



DIO

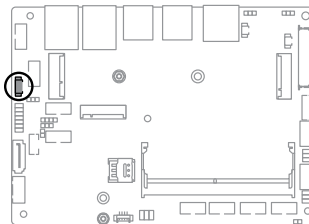


Connector type

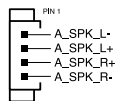
BOX header 2x5p, K9, 2.0mm pitch

20. Stereo Speaker connector

The Stereo Speaker connector allows you to connect a stereo speaker. This connector supports 2 W at 4 Ω stereo speakers.

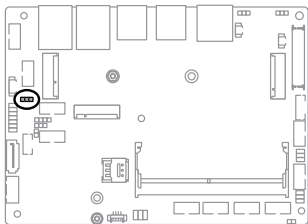


SPEAKER



21. Power Button connector

The Power Button connector allows you to connect an external power button.

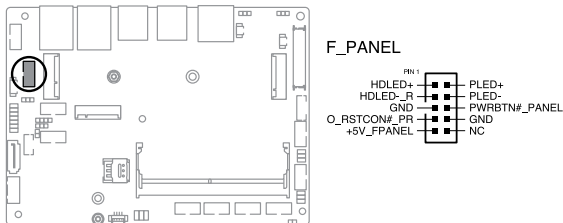


PWRBTN_EXTSW



22. Front Panel connector

The Front Panel connector supports several chassis-mounted functions.



Connector type

BOX header 2x5p 2.0mm pitch

- **System Power LED connector (PLED)**

The 2-pin connector allow you to connect the System Power LED. The System Power LED lights up when the system is connected to a power source, or when you turn on the system power, and blinks when the system is in sleep mode.

- **Storage Device Activity LED connector (HDLED)**

The 2-pin connector allows you to connect the Storage Device Activity LED. The Storage Device Activity LED lights up or blinks when data is read from or written to the storage device or storage device add-on card.

- **Power button/Soft-off button connector (PWRBTN)**

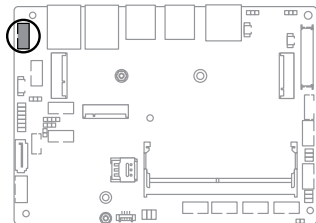
The 3-1 pin connector allows you to connect the system power button. Press the power button to power up the system, or put the system into sleep or soft-off mode (depending on the operating system settings).

- **Reset button connector (O_RSTCON)**

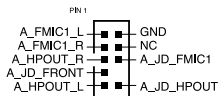
The 2-pin connector allows you to connect the chassis-mounted reset button. Press the reset button to reboot the system.

23. Front Panel Audio (Line Out / Mic) connector

The Front Panel Audio connector is for a line out /microphone module that supports HD Audio. Connect one end of the line out / mic module cable to this connector.



AAFP



Connector type

BOX header 2x5p, K8, 2.0mm pitch

NOTE: We recommend that you connect a high-definition line out / mic module to this connector to avail of the motherboard's high-definition audio capability.

2

Using your Embedded Computer

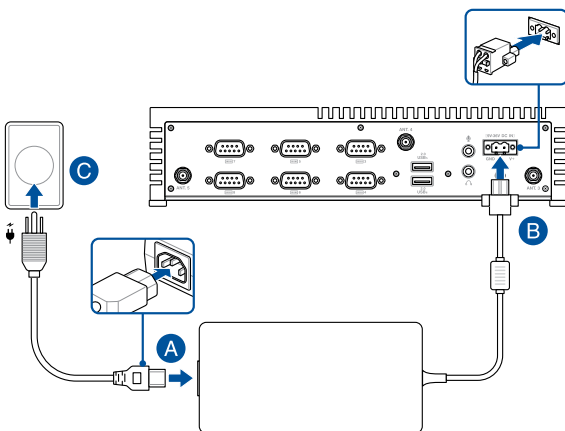
2.1 Getting started

2.1.1 Connect the AC power adapter to your Embedded Computer

To connect the AC power adapter to your Embedded Computer:

- Connect the power cord to the AC power adapter.
- Connect the DC power connector to your Embedded Computer's power (DC) input.
- Plug the AC power adapter into a 100 V~240 V power source.

NOTE: The power adapter may vary in appearance, depending on model and country (or region) of sale.



IMPORTANT!

- The power adapter may vary in appearance, depending on the model and your region. Refer to the following for more information on the different power adapters, as well as the system:

150 W Power adapter

Input voltage:	100 - 240 Vac
Input frequency:	50 - 60 Hz
Output current:	7.89 A max (150 W)
Output voltage:	19 Vdc

System

Rated input current:	13.33 A - 3.33 A
Rated input voltage:	9 - 36 Vdc

- When using the bundled power adapter (FSP Group FSP150-ABAN3 with PCB layout type 3BD03679) to power your Embedded Computer, the system can operate at a maximum temperature of 60°C.
 - If you opt to use an alternate power adapter that meets the specifications above, then the maximum operating temperature will be limited to 40°C.
 - When using a DC-in power supply, the system can operate at a maximum temperature of 60°C.
 - We strongly recommend that you use only the AC power adapter and cable that came with your Embedded Computer.
 - We strongly recommend that you use a grounded wall socket while using your Embedded Computer.
 - The socket outlet must be easily accessible and near your Embedded Computer.
 - To disconnect your Embedded Computer from its main power supply, unplug your Embedded Computer from the power socket.
-

WARNING!

- Do not use power adapters or batteries from other devices to reduce the risk of injury to persons due to fire or explosion. Use only UL certified power adapters or batteries supplied by the manufacturer or authorized retailers.
 - Do not disable or remove the power cord grounding plug, the grounding is an important safety feature.
 - Ensure to plug the power cord into a grounded (earthed) electrical outlet that is easily accessible at all times.
-

2.1.2 Connect a display panel to your Embedded Computer

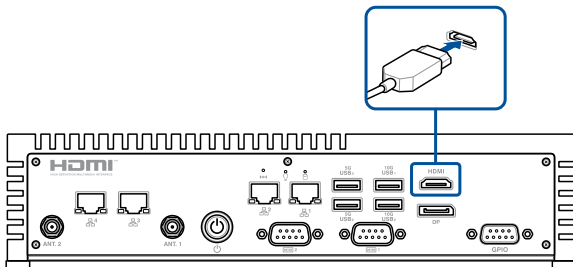
You can connect a display panel or projector to your Embedded Computer that has the following connectors:

- HDMI™ connector
- DisplayPort

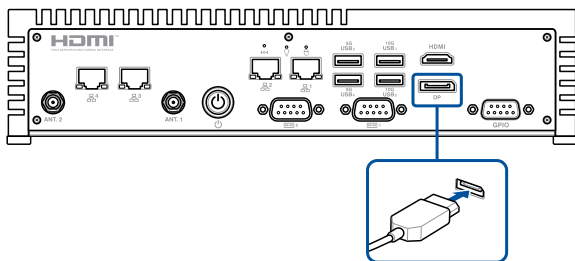
To connect a display panel to your Embedded Computer:

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

Connect display via HDMI™ port



Connect display via DisplayPort



2.1.3 Connect the USB cable from keyboard or mouse

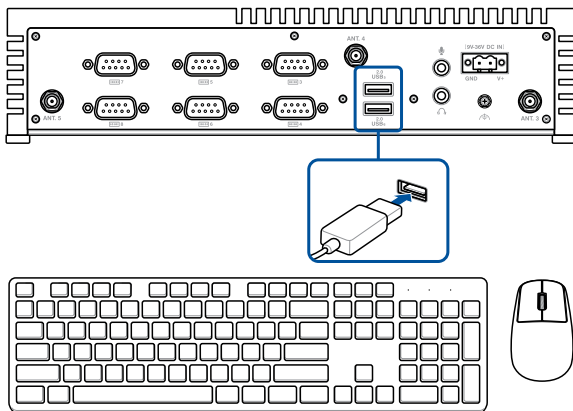
You can connect generally any USB keyboard and mouse to your Embedded Computer. You can also connect a USB dongle for a wireless keyboard and mouse set.

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.

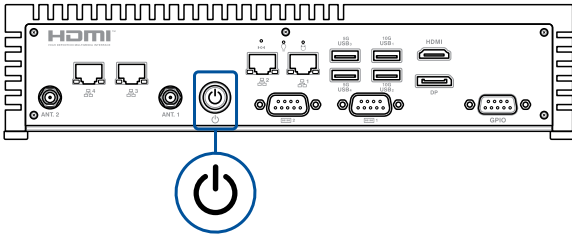
NOTE:

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



2.1.4 Turn on your Embedded Computer

Press the power button to turn on your Embedded Computer.



2.2 Turning off your Embedded Computer

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

2.3 Putting your Embedded Computer to sleep

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

2.4 Entering the BIOS Setup

BIOS (Basic Input and Output System) stores system hardware settings that are needed for system startup in the Embedded Computer.

In 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.

2.4.1 Load default BIOS settings

To load the default values for each of the parameters in your BIOS:

1. Enter the BIOS by pressing <ESC> or on the POST screen.

NOTE: POST (Power-On Self Test) is a series of software controlled diagnostic tests that run when you turn on your Embedded Computer.

2. Navigate to the Exit menu.
3. Select the Load Optimized Defaults option, or you may press <F3>.
4. Select OK to load the default BIOS values.

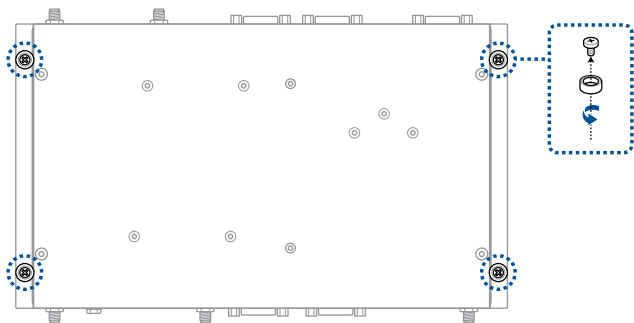
3

Upgrading your Embedded Computer

IMPORTANT!

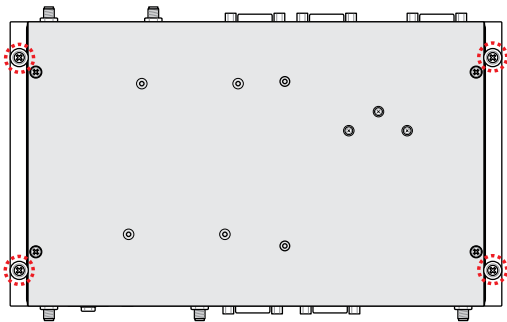
- Ensure that your hands are dry before proceeding with the rest of the installation process. Before installing any of the features in this guide, use a grounded wrist strap or touch a safely grounded object or metal object to avoid damaging them due to static electricity.
 - Turn off the power of your Embedded Computer, and allow it to cool for at least 3 minutes before performing any installation/uninstallation process.
-

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

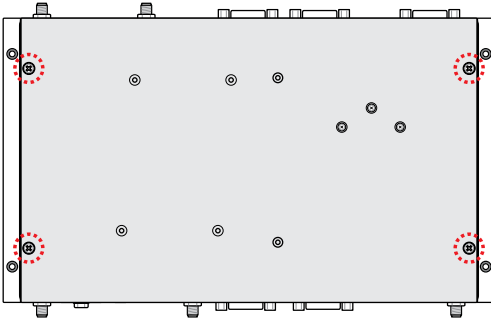


3.1 Removing the bottom cover

1. Turn off your Embedded Computer then disconnect all cables and peripherals.
2. Place the Embedded Computer on a flat stable surface, with its top side facing down.
3. Remove the four (4) rubber feet screws from the bottom cover.



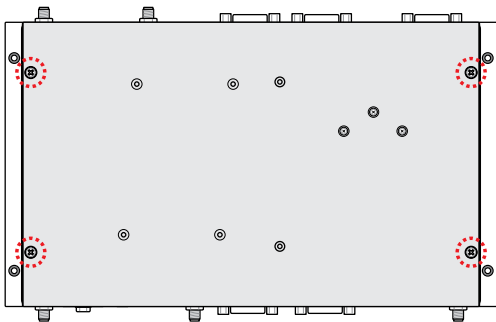
4. Remove the four (4) screws securing the bottom cover.



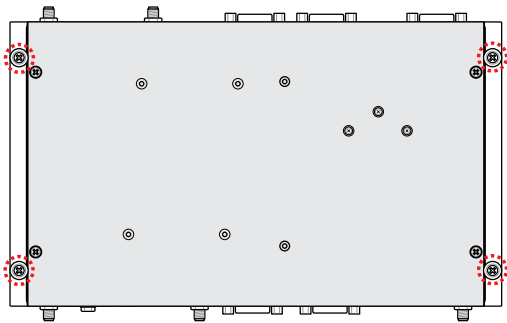
5. After removing the screws, remove the bottom cover and place it aside.

3.2 Replacing the bottom cover

1. Align the bottom cover with the screw holes, then replace the bottom cover onto the Embedded Computer.
2. Secure the bottom cover using the four (4) screws removed previously.



3. Replace the four (4) rubber feet screws removed previously.

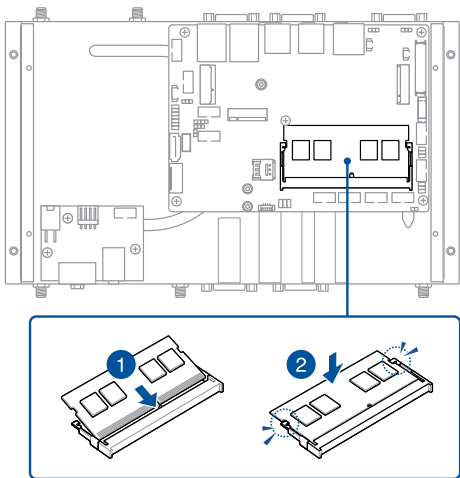


3.3 Installing a memory module

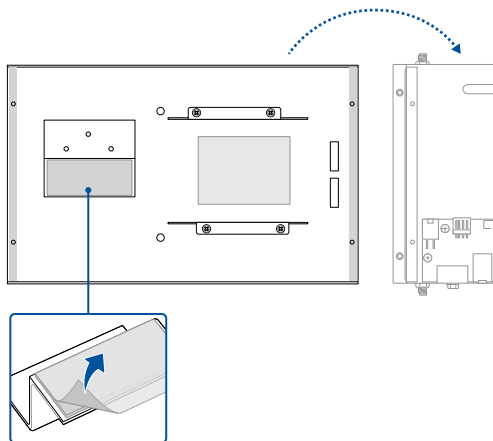
Your Embedded Computer comes with an SO-DIMM slot that allows you to install DDR5 SO-DIMMs.

To install a memory module:

1. Align and insert the memory module into the slot.
2. Press the memory module down until it is securely seated in place.



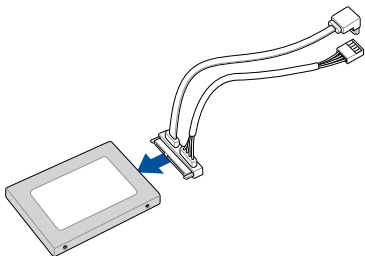
3. Before replacing the bottom cover, ensure to remove the plastic film from the thermal pad on the heat spreader that is attached to the bottom cover.



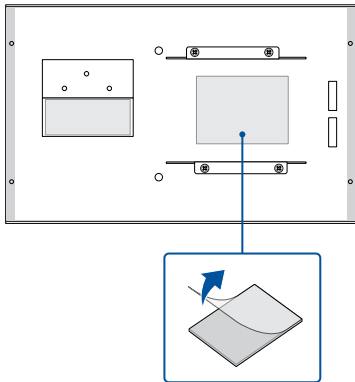
3.4 Installing 2.5" storage device

IMPORTANT! This device only supports 7mm 2.5" SSD.

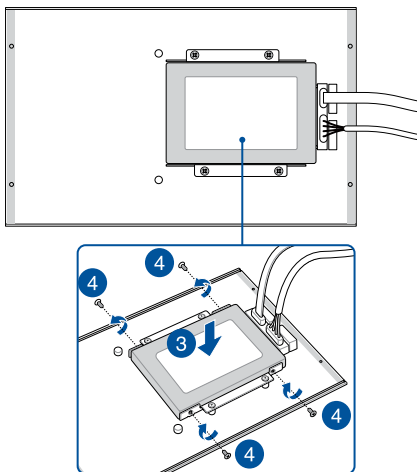
1. Connect the storage device cable to the storage device.



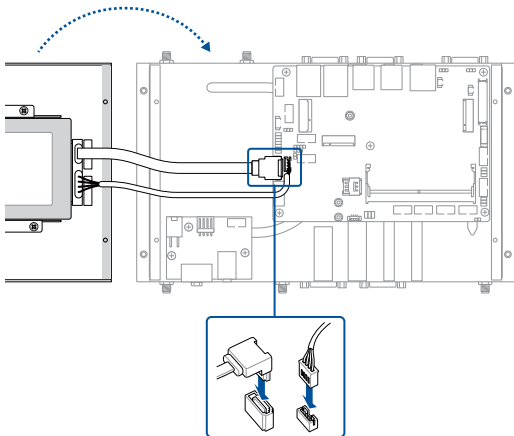
2. Locate the storage device thermal pad that is adhered to the bottom cover and remove the plastic film from the thermal pad.



3. Align and insert your storage device between the two supporting brackets on the bottom cover as shown.
4. Secure the storage device to the storage bay using four (4) screws.



5. Connect the storage device cable to the **SATA6G** and **SATA_PWR** connectors on the motherboard.



6. Replace the bottom cover. Refer to **Replacing the bottom cover** for details.

3.5 Installing an M.2 SSD

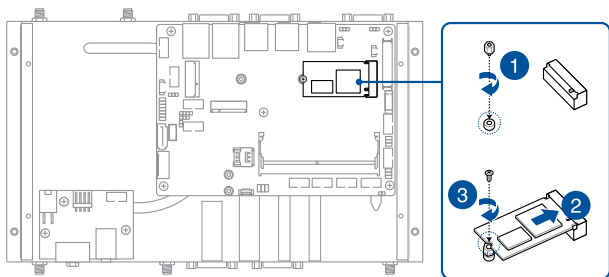
To install an M.2 2242 SSD:

1. (Optional) Replace the standoff if it was removed.

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

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

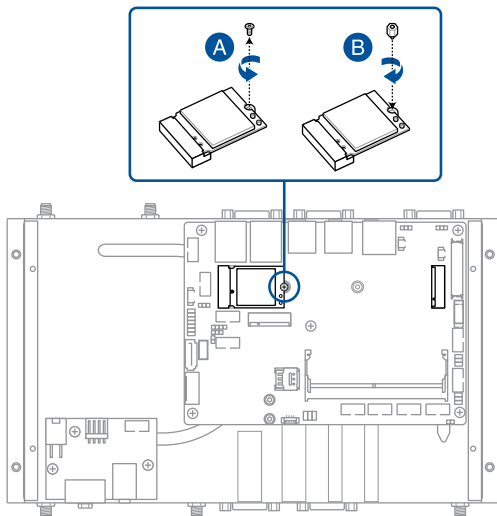
NOTE: We recommend using a PH1 screwdriver with a torque of 2.0 ± 0.2 kgf-cm when tightening the screw.



To install an M.2 2280 SSD:

1. (Optional) If a wireless card is installed, remove the screw holding it in place (A), replace it with a standoff (B), and skip to step 3.

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

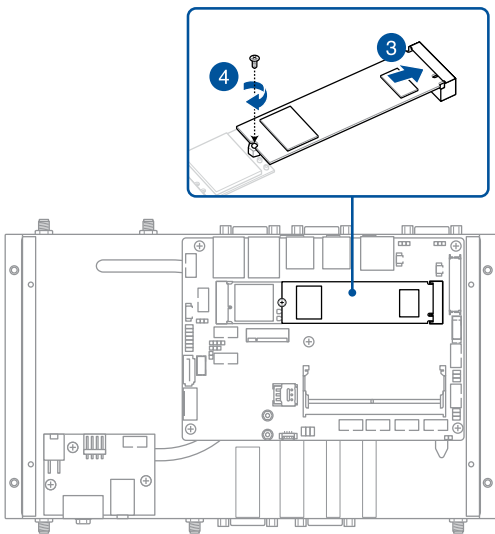


2. (Optional) Replace the standoff if it was removed.

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 SSD into its slot inside the Embedded Computer.
4. 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.

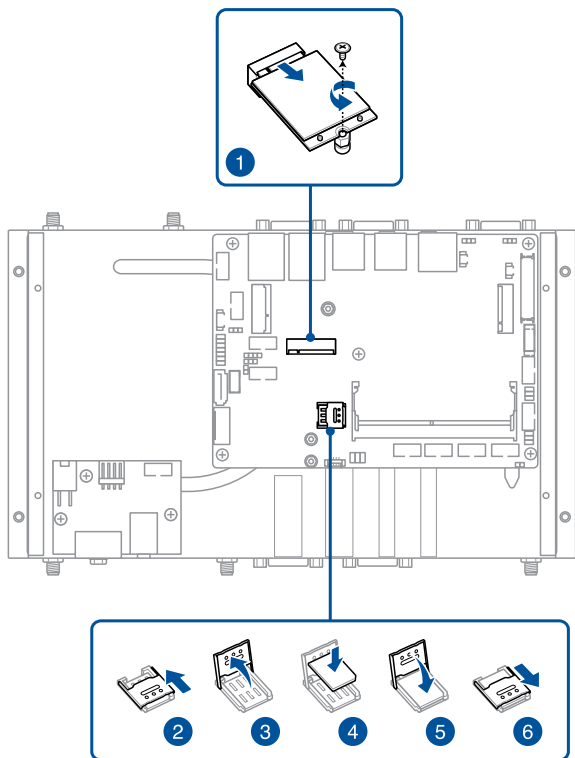


3.6 Installing a nano SIM card

1. (Optional) Remove the M.2 B-key module, if one is installed, by first removing the screw securing the module, then removing the module.

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

2. Push the nano SIM cover in the direction away from the SO-DIMM slot.
3. Lift the nano SIM cover.
4. Place the nano SIM into the nano SIM slot.
5. Replace the nano SIM cover.
6. Push the nano SIM cover towards the SO-DIMM slot to secure the nano SIM card.



3.7 Installing a wireless module to the M.2 E-key slot

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

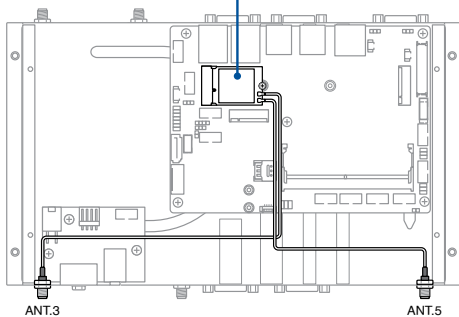
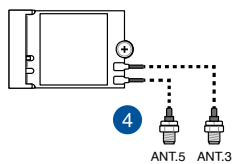
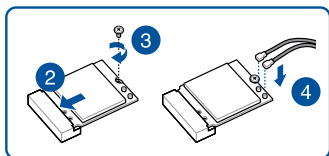
1. Remove the M.2 screw.
 2. Align and insert the wireless module into the M.2 slot inside the Embedded Computer.
 3. Gently push down the wireless module on top of the standoff, and then fasten it using the previously removed screw.
-

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

4. (Optional) Connect the RF cables from the antennas to your wireless module. Make sure that the correct cable is attached to each of the connectors by referring to the illustration on the next page.
-

NOTE:

- Please refer to the **Installing antennas** section for more information on installing the antennas.
 - Connecting antennas to your wireless card may strengthen the wireless signal.
 - A soft clicking sound indicates that the antenna has been securely attached on the wireless card.
-



3.8 Installing an M.2 B-key module

Your Embedded Computer comes with an M.2 B-key slot that allows you to install a 4G LTE, 5G NR, PoE LAN, or serial port module.

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

NOTE: For PoE LAN and serial modules, refer to the **Installing a PoE LAN module** and **Installing a serial port module** sections for details.

To install a 4G LTE module:

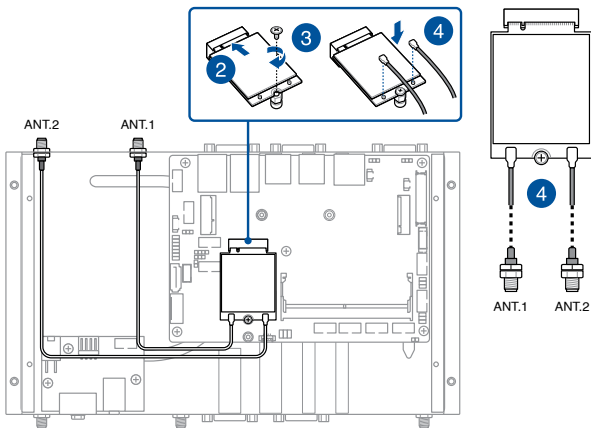
1. Remove the screw from the M.2 standoff.
2. Align and insert the module into the slot.
3. Press down, and then secure it in place using the screw previously removed.

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

4. (Optional) Connect the RF cables from the antennas to your LTE module. Make that the correct cable is attached to each of the connectors by following chart on the next page.

NOTE:

- Refer to **Installing antennas** for more information on installing the antennas.
 - Connecting antennas to your 4G LTE module may strengthen the signal.
 - A soft clicking sound indicates that the antenna has been securely attached on the 4G LTE module.
-

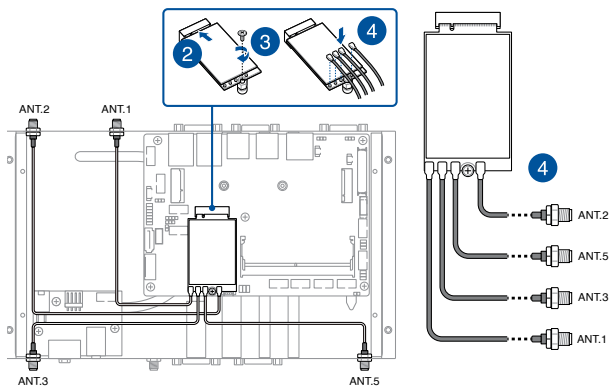


To install a 5G NR module:

1. Remove the screw from the M.2 standoff.
 2. Align and insert the 5G NR module into the slot.
 3. Press down, and then secure it in place using the screw previously removed.
 4. (Optional) Connect the RF cables from the antennas to your 5G NR module. Make that the correct cable is attached to each of the connectors by following chart on the next page.
 5. (Optional) Use the cable clip to organize the cables.
-

NOTE:

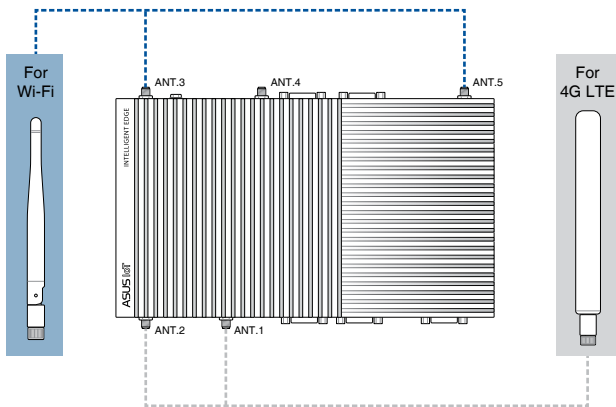
- Refer to **Installing antennas** for more information on installing the antennas.
 - Connecting antennas to your 5G NR module may strengthen the signal.
 - A soft clicking sound indicates that the antenna has been securely attached on the 5G NR module.
-



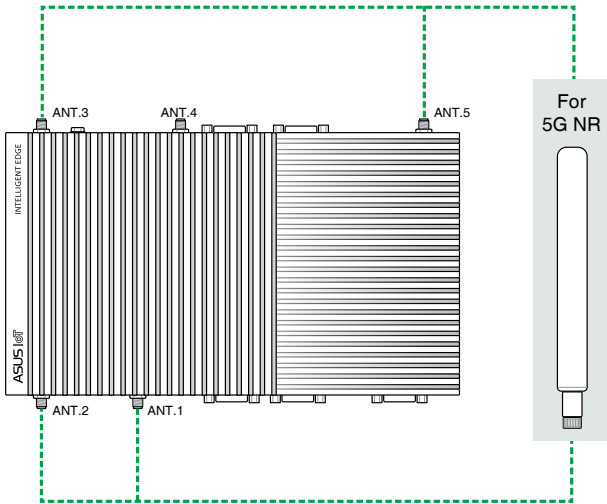
3.9 Installing antennas (optional)

You may install antennas to the five (5) antenna jacks located on the front and rear panels. The installed antennas can be connected to a 4G LTE or 5G NR module installed in the M.2 B key slot or to a wireless module installed in the M.2 E-key (Wi-Fi) slot.

For Wi-Fi and 4G LTE modules



For 5G NR modules



To install an antenna:

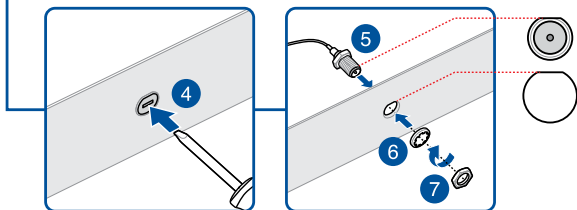
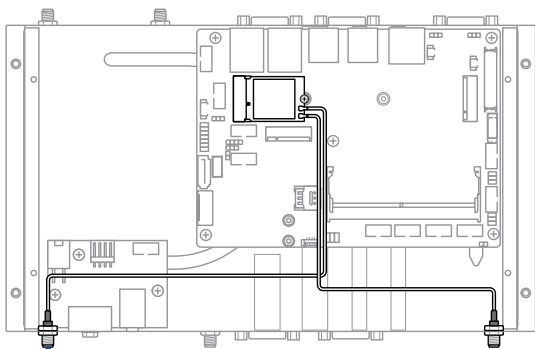
NOTE: If your Embedded Computer came pre-installed with antenna jacks, skip to step 8.

1. Remove the bottom cover. Refer to **Removing the bottom cover** for details.
 2. Prepare the RF connector and cable.
 3. Identify the antenna punch-out port on the front or rear of your Embedded Computer that you want to install an antenna jack.
 4. Detach the metal cover of the punch-out port by repeatedly pushing the cover into the chassis until it breaks loose.
-

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

5. Insert the antenna jack end of the RF connector and cable into the antenna hole from within the chassis outwards.
-

NOTE: Ensure to align the flat (keyed) feature on the antenna jack to the corresponding feature on the panel's antenna hole.



6. Insert the bundled O-ring over the antenna jack.
7. Secure the antenna jack using one of the bundled hex screws.
8. Connect the other end of the RF connector and cable to your wireless module (refer to **Installing a wireless module to the M.2 E-key slot** for details) or to your WWAN card (refer to **Installing an M.2 B-key module** for details).
9. Repeat steps 2 to 8 to install other antenna jacks.
10. Replace the bottom cover. Refer to **Replacing the bottom cover** for details.
11. Screw the external Wi-Fi antennas onto their corresponding antenna jacks on the front and rear panels by turning them in a clockwise direction.
12. Position the antennas for optimal signal reception.

3.10 Installing a PoE LAN module (on selected models)

NOTE:

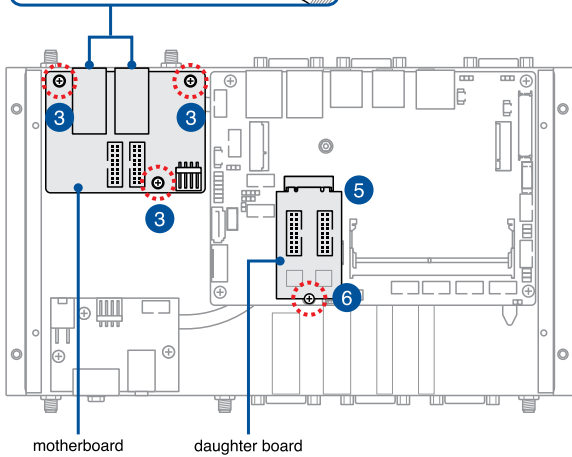
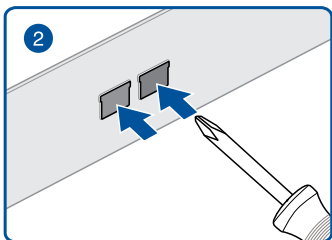
- The PoE LAN module supports up to 15W per port for powering IEEE802.11af.
 - Operating temperature when using PoE with your device: 0°C~60°C.
-

1. Locate the PoE LAN punch-out ports on the front panel of your Embedded Computer (refer to the **Front view** section for the location).
 2. Detach the metal cover of each punch-out port by repeatedly pushing the cover into the chassis until it breaks loose.
-

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

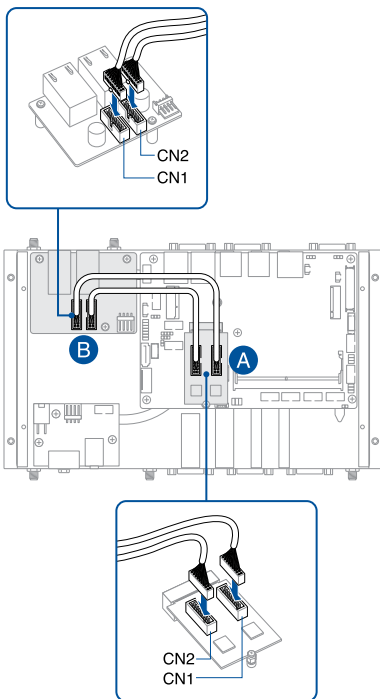
3. Align and insert the LAN ports on the PoE LAN module's motherboard into the punch-out ports, then secure it in place with the three (3) screws bundled with the PoE LAN module.
 4. Remove the screw from the M.2 B-key standoff.
 5. Align and insert the PoE LAN module's daughter board into the M.2 B-key slot.
 6. Press down, and then secure it in place using the screw previously removed.
-

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

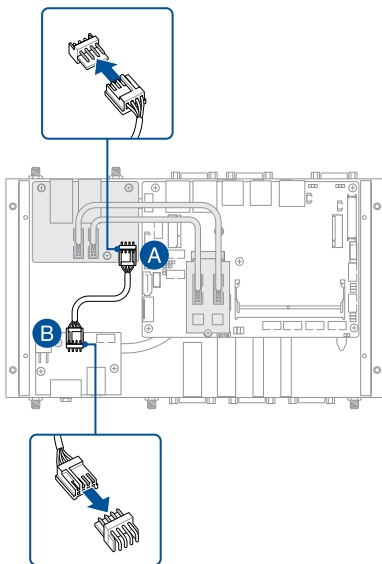


7. Connect the **CN1** and **CN2** connectors on the PoE LAN module's daughter board (A) to the **CN1** and **CN2** connectors on the PoE LAN module's motherboard (B) using the two (2) bundled LAN signal cables.

NOTE: Make sure to connect the **CN1** connector on the daughter board to the **CN1** connector on the motherboard, and the **CN2** connector on the daughter board to the **CN2** connector on the motherboard.



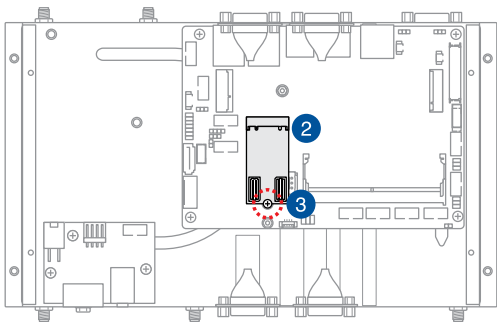
8. Connect the power connector on the motherboard (A) to the power connector on the power board (B).



3.11 Installing a serial port module (on selected models)

1. Remove the screw from the M.2 B-key standoff.
2. Align and insert the serial port module into the M.2 B-key slot.
3. Press down, and then secure it in place using the screw previously removed.

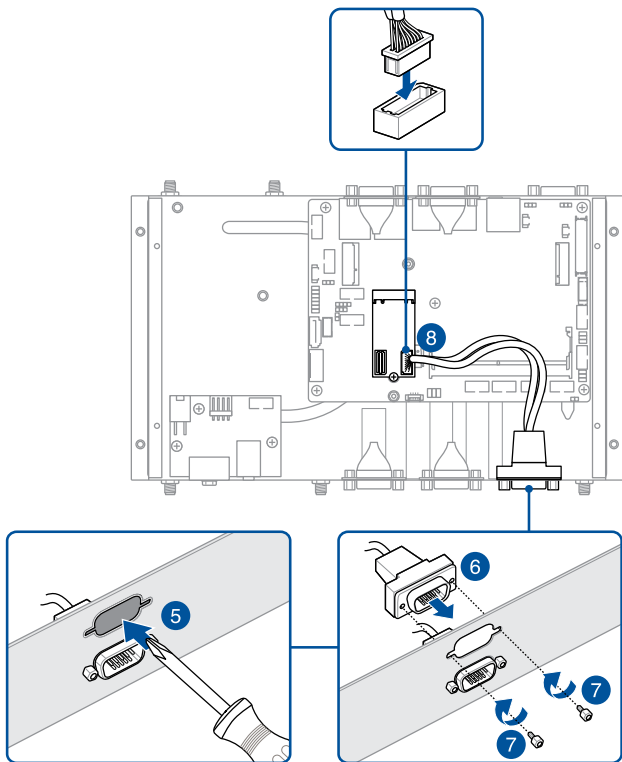
NOTE: We recommend using a PH1 screwdriver with a torque of 2.0 ± 0.2 kgf-cm when tightening the screw.



4. Locate the serial punch-out ports on the rear panel of your Embedded Computer (refer to the **Rear view** section for the location).
5. Detach the metal cover of each punch-out port by repeatedly pushing the cover into the chassis until it breaks loose.

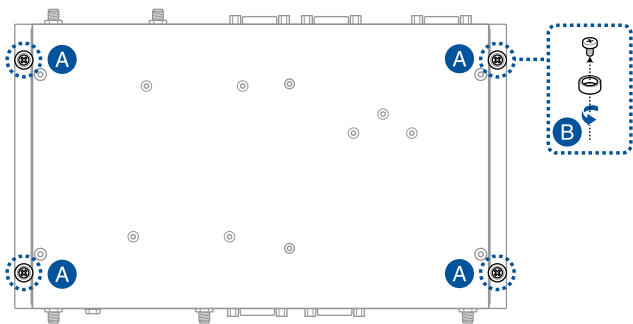
WARNING! Take extra care when removing the metal cover. Use tools, such as a screwdriver, to bend and detach the metal cover to avoid physical injury.

6. Align and insert the two DB9 serial connectors on the serial Y-cable bundled with the serial port module into the punch-out ports on the rear panel.
7. Secure the DB9 serial connectors to the rear panel using the hex screws bundled with the serial port module.
8. Connect the other end of the serial Y-cable one of the two 20-pin serial headers on the serial port module.

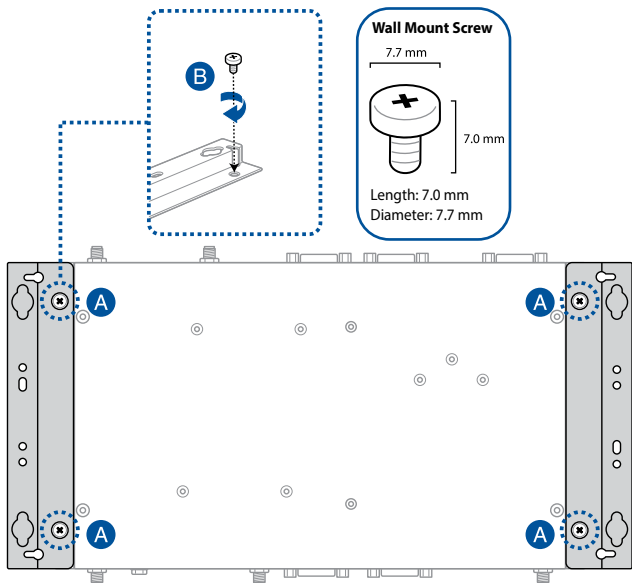


3.12 Installing wall mount brackets (optional)

1. Remove the four (4) rubber feet screws (A), and then remove the rubber feet from the rubber feet screws (B).



- Align the wall mount with the rubber feet screw holes (A), and secure the wall mount brackets to your Embedded Computer using the rubber feet screws (B).



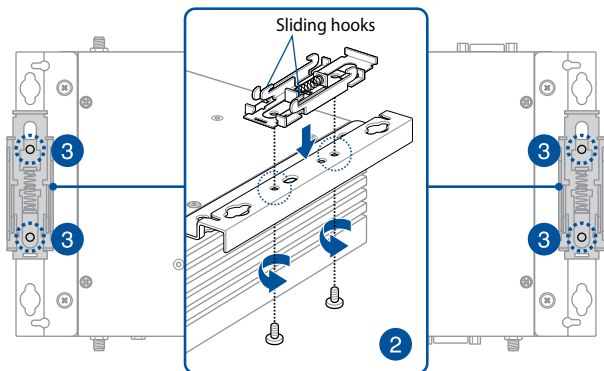
3.13 Installing DIN rail clips (optional)

1. Make sure that the wall mount brackets are already installed. Refer to the section **Installing wall mount brackets** for installation instructions.
2. Align the screw holes on the DIN rail clips to the ones on the wall mount brackets as shown below.

NOTE:

- The wall mount brackets and DIN rail clips are designed to allow the DIN rail clips to be installed as shown or rotated 180° to accommodate your needs. We recommend that you install the clips so that the sliding hooks on them can be hooked onto the top of the DIN rail.
 - Ensure that the orientation of both DIN rail clips are consistent or you will experience difficulty clipping the final assembly to the DIN rail.
-

3. Secure the DIN rail clips to the wall mount brackets using the screws bundled with the DIN rail clips.



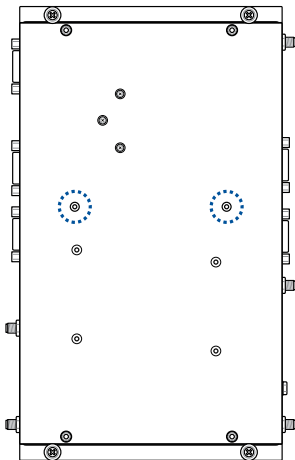
4. Clip the final assembly to a DIN rail by hooking the DIN rail clips to the top of the DIN rail and then pressing down until you hear the clips snap into place.

3.14 Installing a VESA mount (optional)

You may install a VESA mount to your Embedded Computer which allows you to install your Embedded Computer to a VESA mount-compatible device.

NOTE: The VESA mount is purchased separately.

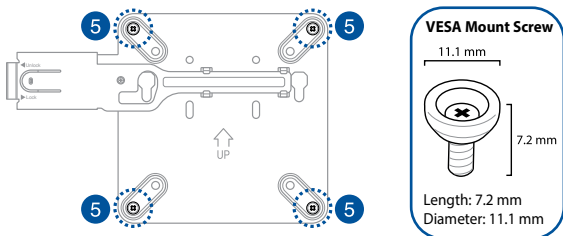
1. Place your Embedded Computer upside down on a flat and stable surface.
2. Attach the two (2) bundled 12mm screws into the screw holes at the bottom of your Embedded Computer.



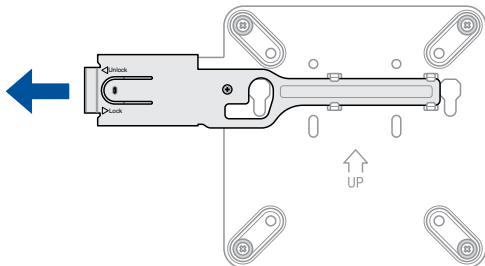
3. Remove any screw hole covers on the back of your VESA mount-compatible device.

4. With the arrow on the VESA mounting plate pointing upward, align its screw holes to the screw holes of the VESA mount-compatible device.
5. Secure the VESA mounting plate to the VESA mount-compatible device using the bundled screws.

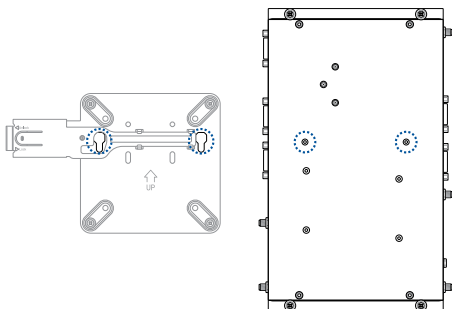
WARNING! Do not overtighten the screws as it may cause damage to your VESA mount-compatible device.



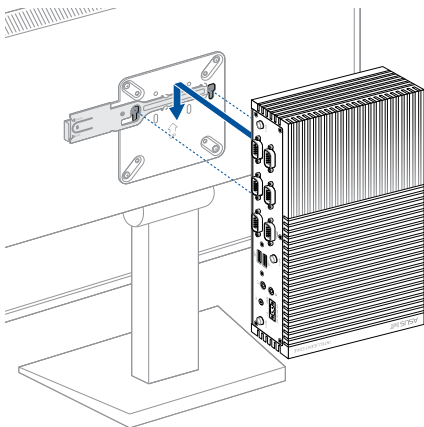
6. Pull the metal lock on the VESA mounting plate outwards.



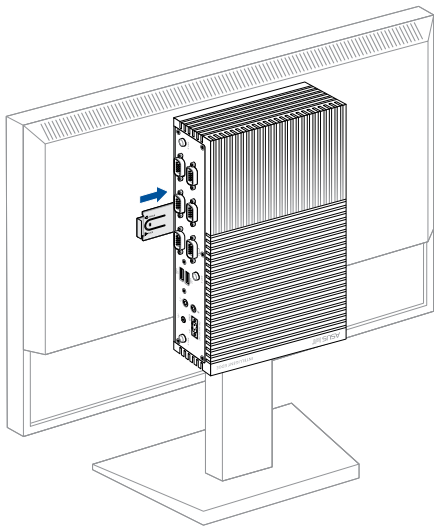
7. Position the Embedded Computer and insert the screws attached on the Embedded Computer to the mounting holes of the VESA mounting plate.



8. Gently push the Embedded Computer down as shown in the illustration to ensure it is securely seated.



9. Push the metal lock back towards the Embedded Computer until it snaps in place.





4

Watchdog Timer

4.1 Watchdog Timer implementation

There are two watchdog timer implementations designed on this product, the HW and POST watchdog timers. The watchdog timer circuit is in SuperIO and can be controlled by a hardware jumper and BIOS setup menu through the system BIOS for different boot phases.

Please refer to the table below for the different implementations of the Watchdog Timer.

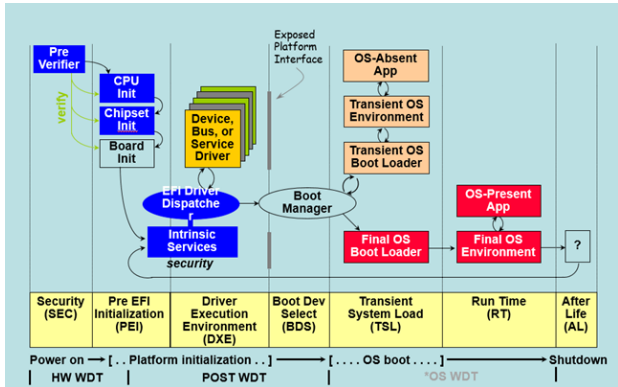
Watchdog timer	Implementation	Default Timeout
HW Watchdog Timer	<p>This Watchdog Timer can prevent the system from failing before BIOS takeover. After the system is powered on, the watchdog timer will start automatically through the jumper setting.</p> <hr/> <p>NOTE:</p> <ul style="list-style-type: none">• Refer to the HW WDT enable jumper in the section Motherboard Overview for more information.• The default setting for this jumper is set to HW WDT enabled with a jumper cap attached. <hr/>	6 seconds.

(continued on the next page)

Watchdog timer	Implementation	Default Timeout
POST Watchdog Timer	<p>This Watchdog Timer is for recovering the system from crashes during BIOS takeover to OS. After system BIOS takeover, the BIOS will stop the HW watchdog timer and start the POST watchdog timer on the same hardware watchdog circuit.</p> <hr/> <p>NOTE: The default setting for the BIOS item is set to enabled.</p> <hr/>	The timeout value is determined by the BIOS settings.
*OS Watchdog Timer	<p>No implementation. User needs to write software in OS to keep updating the watchdog timer to prevent it from timing out. The application is executed on payload.</p> <hr/> <p>NOTE: Please refer to the section Watchdog Timer Programming for more information.</p> <hr/>	N/A

4.2 Watchdog Timer flowchart

Please refer to the Watchdog Timer initialization flowchart below:



4.3 Watchdog Timer Programming

Please refer to the pseudo code for the NCT6116D watchdog timer programming below:

SIO_INDEX_PORT is 0x2E

SIO_DATA_PORT is 0x2F

1. Set WDT Time Unit

```
Outputb(SIO_INDEX_PORT, 0x87); // Unlock SIO
```

```
Outputb(SIO_INDEX_PORT, 0x87); // Unlock SIO
```

```
Outputb(SIO_INDEX_PORT, 0x07);
```

```
Outputb(SIO_DATA_PORT, 0x08);
```

```
Outputb(SIO_INDEX_PORT, 0xF0);
```

```
val = Inportb(SIO_DATA_PORT) // Read current WDT setting
```

```
val = val | 0x08; // minute mode, val = val & 0xF7 if second mode
```

```
Outputb(SIO_INDEX_PORT, 0xF0);
```

```
Outputb(SIO_DATA_PORT, val); // Write back WDT setting
```

```
Outputb(SIO_INDEX_PORT, 0xAA); // Lock SIO
```

2. Set WDT Time

```
Outputb(SIO_INDEX_PORT, 0x87); // Unlock SIO
Outputb(SIO_INDEX_PORT, 0x87); // Unlock SIO

Outputb(SIO_INDEX_PORT, 0x07);
Outputb(SIO_DATA_PORT, 0x08);
Outputb(SIO_INDEX_PORT, 0xF1);
Outputb(SIO_DATA_PORT, Time); // Write WDT time, value 1 to 255

Outputb(SIO_INDEX_PORT, 0xAA); // Lock SIO
```

3. Enable WDT

```
Outputb(SIO_INDEX_PORT, 0x87); // Unlock SIO
Outputb(SIO_INDEX_PORT, 0x87); // Unlock SIO

Outputb(SIO_INDEX_PORT, 0x07);
Outputb(SIO_DATA_PORT, 0x08);
Outputb(SIO_INDEX_PORT, 0x30);
val = Inportb(SIO_DATA_PORT) // Read current WDT status

val = val | 0x01; // Enable WDT Timer
Outputb(SIO_INDEX_PORT, 0x30);
Outputb(SIO_DATA_PORT, val); // Write back WDT status

Outputb(SIO_INDEX_PORT, 0xAA); // Lock SIO
```

4. Disable WDT

```
Outputb(SIO_INDEX_PORT, 0x87); // Unlock SIO
Outputb(SIO_INDEX_PORT, 0x87); // Unlock SIO

Outputb(SIO_INDEX_PORT, 0x07);
Outputb(SIO_DATA_PORT, 0x08);
Outputb(SIO_INDEX_PORT, 0xF1);

Outputb(SIO_DATA_PORT, 0x00); // Clear WDT time, it means WDT Time-
Out disable

Outputb(SIO_INDEX_PORT, 0x30);

val = Inportb(SIO_DATA_PORT) // Read current WDT status
val = val & 0xFE; // Disable WDT Timer
Outputb(SIO_INDEX_PORT, 0x30);
Outputb(SIO_DATA_PORT, val); // Write back WDT status

Outputb(SIO_INDEX_PORT, 0xAA); // Lock SIO
```


5

BIOS Setup

5.1 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.
-

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

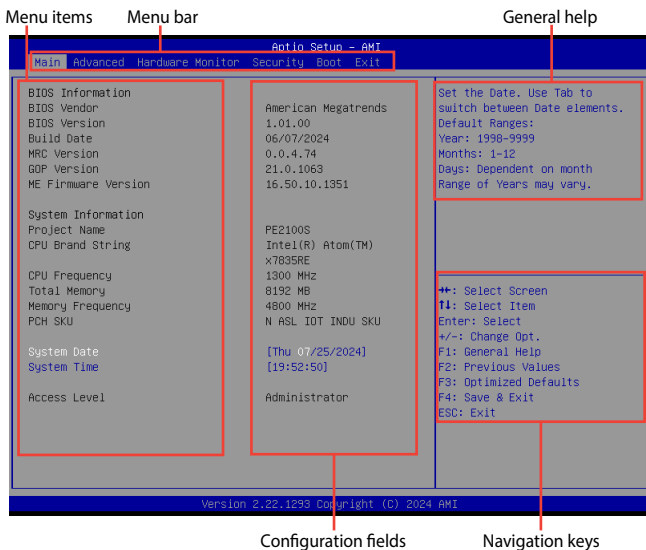
Entering BIOS Setup after POST

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.



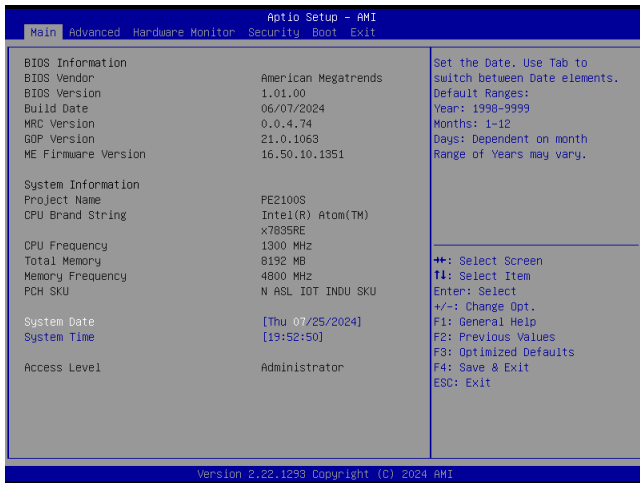
Menu bar

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

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 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.

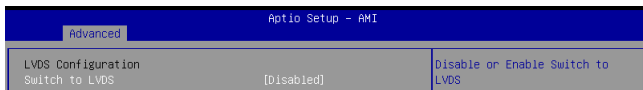
5.4 Advanced menu

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.



5.4.1 LVDS Configuration



Switch to LVDS

Allows you to enable or disable Switch to LVDS.

Configuration options: [Disable] [Enable]

NOTE: The following item appears when you set **Switch to LVDS** to **[Enabled]**.

All-in-One Chassis

Allows you to select All-in-One (AiO) chassis (if applicable) for simplified AiO configuration.

Configuration options: [None] [1920*1080 LVDS1] [1920*1080 LVDS2] [1920*1080 LVDS3] [1600*900 LVDS4]

NOTE:

- Be cautious when selecting AiO chassis. Incorrect selection of AiO chassis can cause incorrect operation or potential damage to AiO chassis hardware.
 - The following items appear only when you set **All-in-One Chassis** to **[None]**.
-

EDID Data Source

Configuration options: [Pre-defined] [Flat Panel Display]

NOTE: The following item appears when you set **EDID Data Source** to **[Pre-defined]**.

LFP Panel Type

Allows you to select LFP panel used by Internal Graphics Device.

Configuration options: [VBIOS Default] [640x480] [800x600] [1024x768] [1280x1024] [1400x1050 LVDS1] [1400x1050 LVDS2] [1600x1200] [1366x768] [1680x1050] [1920x1200] [1440x900] [1600x900] [1024x768] [1280x800] [1920x1080] [2048x1536]

Inverter Polarity

Allows you to set the inverter board polarity.

Configuration options: [Inverted] [Normal]

NOTE:

- Normal: PWM = 0% (Dim)
Inverted: PWM = 0% (Bright)
 - Consult inverter board specifications for proper value.
-

Channel Select

Configuration options: [Dual Channel] [Single Channel]

Mode Select

Configuration options: [JEIDA] [VESA 6bit] [VESA 8bit] [VESA 10bit]

DIGON enable to LVDS_ON enable(T2)

Use the <+> or <-> to adjust the value. The values range from 0 to 50.

LVDS_ON enable to BLON enable (T3)

Use the <+> or <-> to adjust the value. The values range from 0 to 1023.

BLON disable to LVDS_ON disable (T4)

Use the <+> or <-> to adjust the value. The values range from 0 to 1023.

LVDS_ON disable to DIGON disable (T5)

Use the <+> or <-> to adjust the value. The values range from 0 to 50.

Completion of power down to power up (T7)

Use the <+> or <-> to adjust the value. The values range from 0 to 1023.

VARY_BL enable to BL_EN enable (T9)

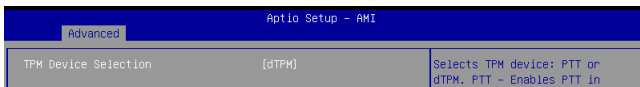
Use the <+> or <-> to adjust the value. The values range from 0 to 1023.

BL_EN disable to VARY_BL disable (T10)

Use the <+> or <-> to adjust the value. The values range from 0 to 1023.

5.4.2 PCH-FW Configuration

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



TPM Device Selection

This item 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 Embedded Computer 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.

5.4.3 Trusted Computing

Advanced		
Aptio Setup - AMI		
Configuration		
Security Device Support	[Enable]	Enables or Disables BIOS support for security device.
Disable Block Sid	[Disabled]	O.S. will not show Security Device. TCG EFI protocol and UEFI interface will not be
NO Security Device Found		

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.

Configuration options: [Disable] [Enable]

NOTE: The following items appear when a TPM device is installed on your Embedded Computer.

SHA-1 PCR Bank

Configuration options: [Disabled] [Enabled]

SHA256 PCR Bank

Configuration options: [Disabled] [Enabled]

SHA384 PCR Bank

Configuration options: [Disabled] [Enabled]

Pending operation

Allows you to schedule an operation for security device.

Configuration options: [None] [TPM Clear]

NOTE: Your computer will reboot during restart in order to change the state of security device.

Platform Hierarchy

Configuration options: [Disabled] [Enabled]

Storage Hierarchy

Configuration options: [Disabled] [Enabled]

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]

NOTE: Some HCK tests might not support 1.3.

Disable Block Sid

Allows you to override to allow SID authentication in TCG Storage device. Configuration options: [Disable] [Enable]

5.4.4 CPU Configuration

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

Aptio Setup - AMI		
Advanced		
CPU Configuration		When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.
Type	Intel(R) Atom(TM) x7835RE	
ID	0xB06E0	
Efficient-core Information		
L1 Data Cache	32 KB x 8	
L1 Instruction Cache	64 KB x 8	
L2 Cache	2048 KB x 2	
L3 Cache	6 MB	
Performance-core Information		
L1 Data Cache	N/A	
L1 Instruction Cache	N/A	
L2 Cache	N/A	
L3 Cache	N/A	
VMX	Supported	
SMX/TXT	Not Supported	
Intel (VMX) Virtualization Technology	[Enabled]	
VT-d	[Enabled]	
▶ CPU - Power Management Control		
		++: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit

Intel (VMX) Virtualization Technology

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

Configuration options: [Disabled] [Enabled]

VT-d

Allows you to enable or disable VT-d capability.

Configuration options: [Disabled] [Enabled]

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.

Power Limit 2 Override

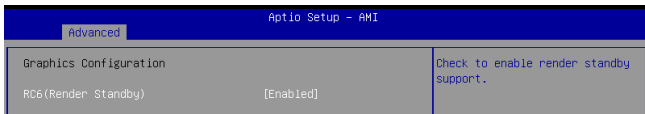
Allows you to enable or disable Power Limit 2 override. If this option is disabled, BIOS will program the default values for Power Limit 2.

Power Limit 2

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

5.4.5 Graphics Configuration

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



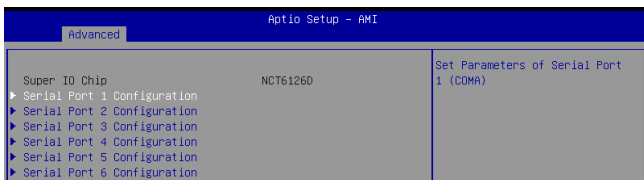
RC6(Render Standby)

Allows you to enable or disable render standby support.

Configuration options: [Disabled] [Enabled]

5.4.6 Super IO Configuration

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



Super IO Chip

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: [RS232] [RS422] [RS485]

Serial Port 3-6 Configuration

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

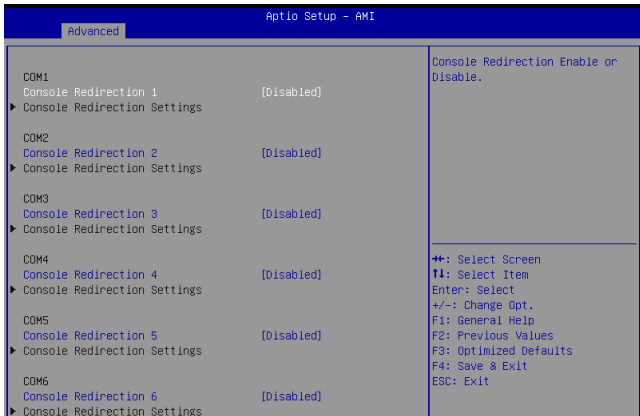
Serial Port

Allows you to enable or disable Serial Port.

Configuration options: [Disabled] [Enabled]

5.4.7 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

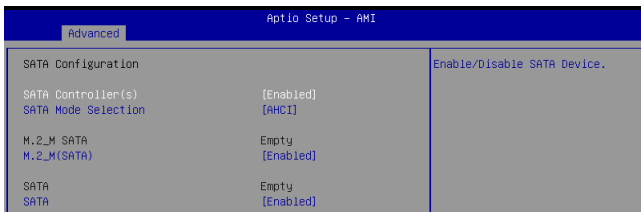
Allows you to select the FunctionKey and Keypad on Putty.

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

5.4.8 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: [Enabled] [Disabled]

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

M.2_M SATA

Allows you to enable or disable the SATA port.

Configuration options: [Disabled] [Enabled]

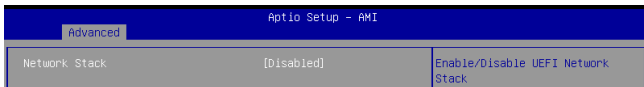
SATA

Allows you to enable or disable the SATA port.

Configuration options: [Disabled] [Enabled]

5.4.9 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 option will not be created.

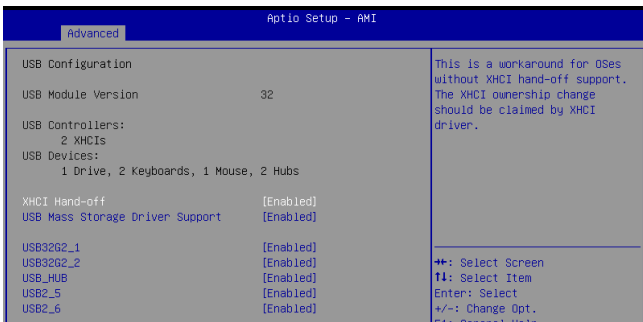
Configuration options: [Disabled] [Enabled]

IPv6 PXE Support

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

Configuration options: [Disabled] [Enabled]

5.4.10 USB Configuration



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]

USB32G2_1-2

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]

USB_HUB

Allows you to enable or disable the two USB 3.2 Gen 1 ports. When set to **[Disabled]**, any USB devices plugged into these connectors will not be detected by the BIOS or OS.

Configuration options: [Disabled] [Enabled]

USB2_5-6

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.

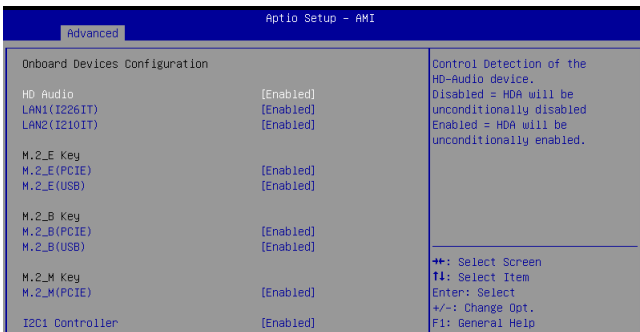
Configuration options: [Disabled] [Enabled]

5.4.11 NVMe Configuration

This menu displays the controller and drive information for NVMe devices connected and allows you to configure NVMe device options.

Advanced		Aptio Setup - AMI	
NVMe controller and Drive information			
Bus:3 Dev:0 Func:0		H.2 (P80) 3TE6	
Nvme Size		480.1GB	

5.4.12 Onboard Devices Configuration



HD Audio

Allows you to enable or disable HD audio support.

Configuration options: [Disabled] [Enabled]

LAN1(I226IT)

Allows you to enable or disable LAN 1.

Configuration options: [Enabled] [Disabled]

LAN2(I210IT)

Allows you to enable or disable LAN 2.

Configuration options: [Disabled] [Enabled]

M.2_E Key

M.2_E(PCIE) Port

Allows you to enable or disable the M.2 E-Key (PCIe) controller.

Configuration options: [Disabled] [Enabled]

M.2_E(USB) Port

Allows you to enable or disable the M.2 E-Key (USB) controller.

Configuration options: [Disabled] [Enabled]

M.2_B Key

M.2_B(PCIE) Port

Allows you to enable or disable the M.2 B-Key (PCIe) controller.
Configuration options: [Disabled] [Enabled]

M.2_B(USB) Port

Allows you to enable or disable the M.2 B-Key (USB) controller.
Configuration options: [Disabled] [Enabled]

M.2_M Key

M.2_M(PCIE) Port

Allows you to enable or disable the M.2 M-Key (PCIe) controller.
Configuration options: [Disabled] [Enabled]

I2C1 Controller

Allows you to enable or disable I2C controller support.
Configuration options: [Disabled] [Enabled]

5.4.13 APM Configuration

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

Advanced		ApMio Setup - AMI
APM Configuration		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.
ErP Ready	[Disabled]	
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] The system goes into OFF state after an AC power loss.

[S0] 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/PCI LAN cards.

Configuration options: [Disabled] [Enabled]

Power On By Ring

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

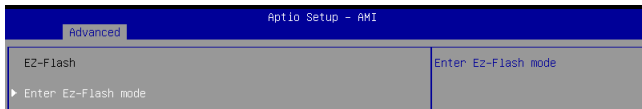
[Enabled] Enables the Ring devices to generate a wake event.

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]

5.4.14 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.

5.4.15 Watchdog Timer

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

Advanced		Aptio Setup - AMI	
Watchdog Timer		Enable/Disable Watchdog Support	
Watchdog Support	[Enabled]		
Watchdog Count Mode	[Second Mode]		
Watchdog Timer	120		

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.

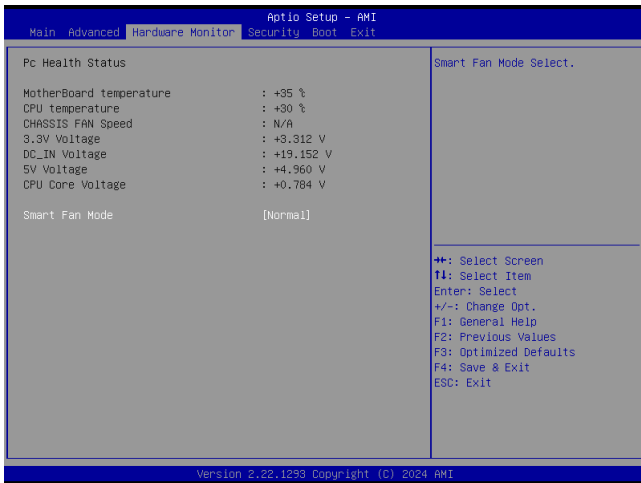
Configuration options: [Second Mode] [Minute Mode]

Watchdog Timer

Allows you to input the Watchdog time-out interval.

5.5 Hardware Monitor menu

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



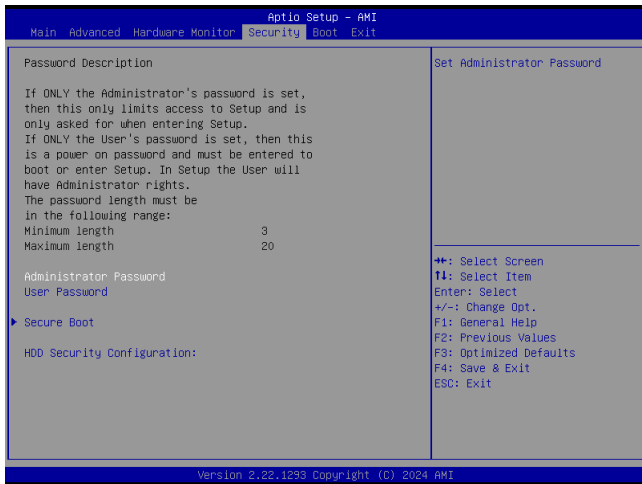
Smart Fan Mode

Allows you to select a smart fan mode.

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

5.6 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 Set Master 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.
5. Select the User Password item and press <Enter>.
6. From the Create New Password box, key in a password, then press <Enter>.
7. Confirm the password when prompted.

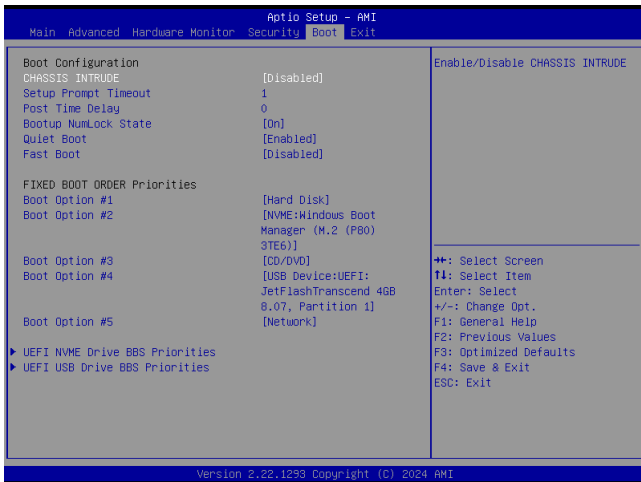
To change the password for your HDD:

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.

5.7 Boot menu

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



Boot Configuration

CHASSIS INTRUDE

Allows you to enable or disable the chassis intrusion detection function. Configuration options: [Disabled] [Enabled]

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.

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 NVME Drive BBS Priorities

Allows you to specify the Boot Device Priority sequence from available UEFI NVMe drives.

UEFI USB Drive BBS Priorities

Allows you to specify the Boot Device Priority sequence from available UEFI USB drives.

5.8 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

Exit system setup after saving changes.

Discard Changes and Reset

Reset the system without saving any changes.

Save Option

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

This 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.

5.9 Updating your BIOS

The following utilities allow you to manage and update the Embedded Computer 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 EZ-Flash**

Updates the BIOS using a USB flash disk.

Refer to the corresponding sections for details on these utilities.

5.9.1 **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 Embedded Computer 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 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 Embedded Computer. Visit the ASUS website at www.asus.com to download the latest BIOS file.

5.9.2 ASUS EZ-Flash Utility

The ASUS EZ-Flash 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.

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 tolerance (such as industrial grade memory and storage) will allow this product to be used in environments with ambient temperatures between -20°C and 60°C with adequate airflow.
- 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.
- Exercise caution when operating this product at full load, as the product may reach elevated temperatures, especially the outer casing.
- 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.

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.

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

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.

FCC 5.925-7.125 GHz Caution Statement

Operation of transmitters in the 5.925-7.125 GHz band is prohibited for control of or communications with unmanned aircraft systems.

ISED 5.925-7.125 GHz Caution Statement

RLAN devices:

- Devices shall not be used for control of or communications with unmanned aircraft systems.
- Les dispositifs ne doivent pas être utilisés pour commander des systèmes d'aéronef sans pilote ni pour communiquer avec de tels systèmes.

ISED Radiation Exposure Statement for Canada

This equipment complies with ISED radiation exposure limits set forth for an uncontrolled environment. To maintain compliance with ISED RF exposure compliance requirements, please avoid direct contact to the transmitting antenna during transmitting. End users must follow the specific operating instructions for satisfying RF exposure compliance.

Operation is subject to the following two conditions:

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

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)

End Product Labeling

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users.

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.

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

KC: Korea Warning Statement

Class A:

사용자 안내문

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

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。

HDMI Trademark Notice

The terms HDMI, HDMI High-Definition Multimedia Interface, HDMI Trade Dress, and the HDMI Logos are trademarks or registered trademarks of HDMI Licensing Administrator, Inc.

Declaration of compliance for product environmental regulation

ASUS follows the green design concept to design and manufacture our products, and makes sure that each stage of the product life cycle of ASUS product is in line with global environmental regulations. In addition, ASUS disclose the relevant information based on regulation requirements.

Please refer to <https://esg.asus.com/Compliance.htm> for information disclosure based on regulation requirements ASUS is complied with.

EU REACH and Article 33

Complying with the REACH (Registration, Evaluation, Authorization, and Restriction of Chemicals) regulatory framework, we publish the chemical substances in our products at ASUS REACH website at <https://esg.asus.com/Compliance.htm>

EU RoHS

This product complies with the EU RoHS Directive. For more details, see <https://esg.asus.com/Compliance.htm>

Japan JIS-C-0950 Material Declarations

Information on Japan RoHS (JIS-C-0950) chemical disclosures is available on <https://esg.asus.com/Compliance.htm>

India RoHS

This product complies with the “India E-Waste (Management) Rules, 2016” and prohibits use of lead, mercury, hexavalent chromium, polybrominated biphenyls (PBBs) and polybrominated diphenyl ethers (PBDEs) in concentrations exceeding 0.1% by weight in homogenous materials and 0.01% by weight in homogenous materials for cadmium, except for the exemptions listed in Schedule II of the Rule.

Vietnam RoHS

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

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

Türkiye RoHS

AEEE Yönetmeliğine Uygundur

ASUS Recycling/Takeback Services

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

Ecodesign Directive

The European Union announced a framework for the setting of ecodesign requirements for energy-related products (2009/125/EC). Specific implementing measures are aimed at improving environmental performance of specific products or across multiple product types. ASUS provides product information at <https://esg.asus.com/Compliance.htm>.

低功率電波輻射性電機管理辦法

第十二條：經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。

第十四條：低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。

Taiwan NCC Warning Statement

Article 12: Without permission, any company, firm or user shall not alter the frequency, increase the power, or change the characteristic and functions of the original design of the certified lower power frequency electric machinery.

Article 14: The application of lower power frequency electric machineries shall not affect the navigation safety nor interfere alegal communication, if an interference is found, the service will be suspended until improvement is made and theinterference no longer exists.

甲類警語

警告：為避免電磁干擾，本產品不應安裝或使用於住宅環境。

「產品之限用物質含有情況」之相關資訊，請參考下表：
Taiwan Declaration of Restricted Substances Marking

單元 (Unit)	限用物質及其化學符號 (Restricted substances and its chemical symbols)					
	鉛 Lead (Pb)	汞 Mercury (Hg)	鎘 Cadium (Cd)	六價鉻 Hexavalent chromium (Cr ⁶⁺)	多溴聯苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyls ethers (PBDE)
印刷電路板 及電子組件 PCB	—	○	○	○	○	○
外殼 Chassis	—	○	○	○	○	○
硬碟 Disk drive	—	○	○	○	○	○
散熱設備 Thermal solutions	—	○	○	○	○	○
其他及其 配件 (線材等) Accessories (e.g., cables)	—	○	○	○	○	○

備考 1. “○” 係指該項限用物質之百分比含量未超出百分比含量基準值。

備考 2. “—” 係指該項限用物質為排除項目。

Note 1 “○” indicates that the percentage content of the restricted substance does not exceed the percentage of reference value of presence.

Note 2 The “—” indicates that the restricted substance corresponds to the exemption.

Service and Support

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



