



C7156ES-IM-AA

C5153ES-IM-AA

User Manual

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About this manual

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

Chapter 1: Specifications Summary

This chapter details the hardware and software features of your Single Board Computer.

Chapter 2: Product Introduction

This chapter describes the features of the motherboard. It includes description of the connectors, and I/O ports on the motherboard.

Chapter 3: Upgrading your Single Board 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 Single Board Computer.

Chapter 4: BIOS Setup

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

Appendix

This section includes notices and safety statements for your Single Board Computer.

Conventions used in this manual

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

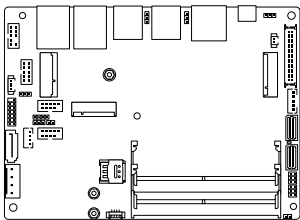
IMPORTANT! This message contains vital information that must be followed to complete a task.

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

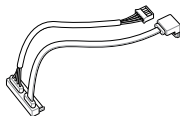
WARNING! This message contains important information that must be followed to keep you safe while performing certain tasks and prevent damage to your Single Board Computer's data and components.

Package contents

Your Single Board Computer package contains the following items:



C7156ES-IM-AA / C5153ES-IM-AA



SATA and power cable

NOTE:

- 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 with models.
 - If the device or its components fail or malfunction during normal and proper use within the warranty period, bring the warranty card to the ASUS Service Center for replacement of the defective components.
-

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

1

Specifications Summary

Specifications Summary

Product Name		CPU Intel® Core™	Processor Base Fre- quency	Memory
C7156ES-IM-AA		Ultra 7	2.1 GHz, 12 core	DDR5 Max. 64 GB
C5153ES-IM-AA		Ultra 5	2.0 GHz, 12 core	
Form factor		3.5", 146 x 105 mm		
Display	HDMI	1 x HDMI 2.1 up to 4096 x 2160 @ 60 Hz		
	DisplayPort	1 x DisplayPort supports DP 1.4 up to 5120 x 3200 @ 60 Hz		
	LVDS	1 x LVDS supports 1920 x 1080 @ 60 Hz (co-lay with eDP)		
	Multi Display	HDMI+DP+USB Type-C®+LVDS HDMI+DP+USB Type-C®+eDP Supports up to 4 displays simultaneous under OS		
Expansion slot	M.2	1 x M.2 2230 E-key slot (USB 2.0, PCIe x1, CNVi) supports Wi-Fi/BT modules 1 x M.2 2280 M-key slot (PCIe x4) supports M.2 SSD/PCIe modules 1 x M.2 3042/3052 B-key slot (PCIe x1) supports 4G LTE/5G NR modules		
Storage	SATA	1 x SATA Gen 3.0, up to 6 Gb/s		
Audio	Codec	Realtek® ALC897		
Ethernet		2 x Intel® Ethernet controllers: 1 x Intel® I219-LM supports 10/100/1000 Mbps 1 x Intel® I226-IT supports 10/100/1000/2500 Mbps		
Rear I/O		1 x HDMI port 1 x DisplayPort 1 x USB 10G port (USB Type-C®) 4 x USB 10G ports (Type-A) 2 x RJ-45 LAN ports 2 x LED indicators		

(continued on the next page)

Internal connectors	2 x Serial connectors support 4 x RS-232/422/485 ports 1 x USB 2.0 connector supports additional 2 USB 2.0 ports 1 x Chassis Fan connector 1 x Chassis Intrusion connector 1 x Front Panel Audio (AAFP) connector 1 x Internal Stereo Speaker connector 1 x System Panel connector 1 x SATA Power connector 1 x GPIO connector (8-bit) 1 x SMBus connector 1 x I ² C connector 1 x Power connector 1 x COM Debug connector 1 x AT/ATX Select jumper 1 x Display Panel VCC Power Selection jumper 1 x COM +5V/+12V Selection jumper	
Watchdog Timer	H/W: No S/W: Yes	
Security	TPM 2.0	
Power Supply	DC input 9-36 V	
Operating System	Windows® 11 IoT Enterprise LTSC Windows® 10 IoT Enterprise LTSC Ubuntu	
Environment	Operating Temperature: Non-operating Temperature: Operating Humidity:	-20°C ~ 60°C -40°C ~ 85°C 40°C @ 95%

NOTE: Specifications are subject to change without notice.

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

2

Product Introduction

2.1 Before you proceed

Take note of the following precautions before you install motherboard components or change any motherboard settings.

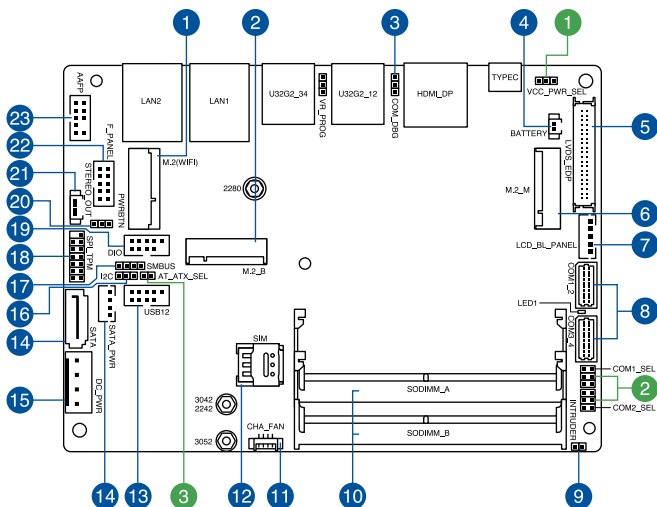
WARNING!

- Unplug the power cord from the wall socket before touching any component.
- Before handling components, use a grounded wrist strap or touch a safely grounded object or a metal object, such as the power supply case, to avoid damaging them due to static electricity.
- Hold components by the edges to avoid touching the ICs on them.
- Whenever you uninstall any component, place it on a grounded antistatic pad or in the bag that came with the component.
- Before you install or remove any component, ensure that the ATX power supply is switched off or the power cord is detached from the power supply. Failure to do so may cause severe damage to the motherboard, peripherals, or components.

IMPORTANT! Components shown in this section may require additional purchase. Refer to **Package contents** section for more information about the contents of your Single Board Computer package.

NOTE: The diagrams in this chapter are for reference only. The motherboard layout may vary with model.

2.2 Motherboard layout



Jumpers

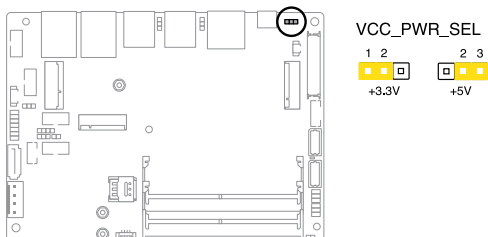
1. Display Panel VCC Power Selection jumper
2. COM +5V/+12V Selection jumper
3. AT/ATX Mode Configuration jumper

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

2.3 Onboard jumpers & switches

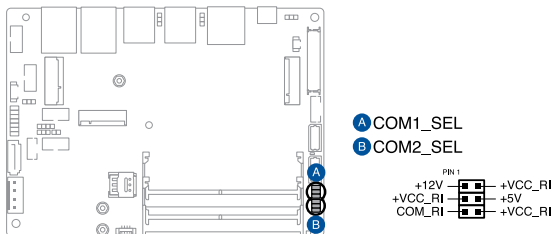
1. Display Panel VCC Power Selection jumper (on selected models)

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



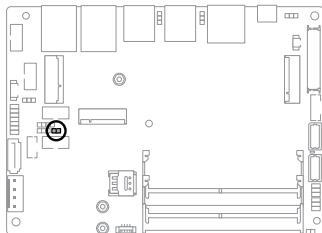
2. COM +5V/+12V Selection jumper

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



3. 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.



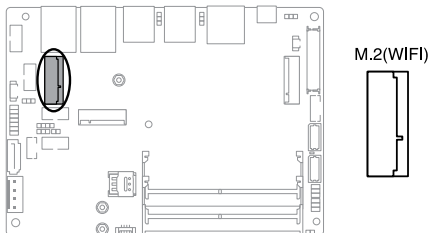
AT_ATX_SEL



2.4 Internal slots and connectors

1. M.2 (E-key) Wi-Fi slot

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

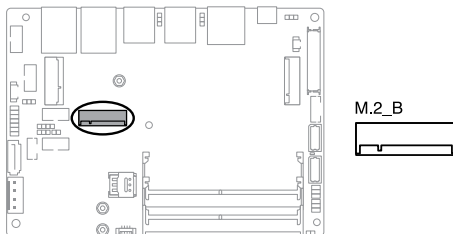


NOTE:

- 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 x1) type 3042/3052 M.2 device, such as a 4G LTE or 5G NR module.

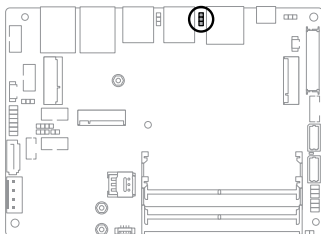


NOTE:

- 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. COM Debug connector

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



COM_DBG

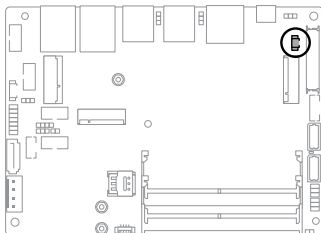


Connector type

Header 2x3p, 2.54mm pitch

4. Battery connector

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



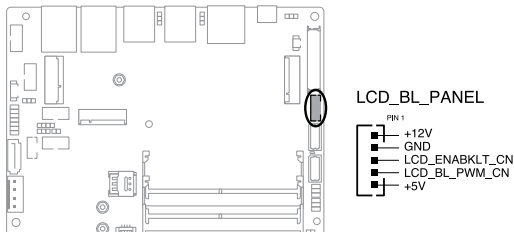
BATTERY



7. 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 3 A.

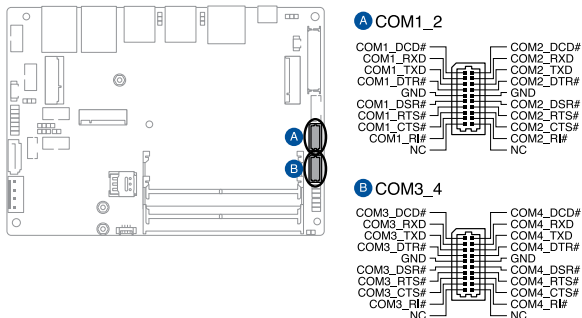


Connector type

Header 1x5p, K6, 2.0mm pitch

8. Serial Port connector

The Serial (COM) Port connector allows you to connect a serial port module. Connect the serial port module cable to this connector, then install the module to a slot opening on the system chassis.



Connector type

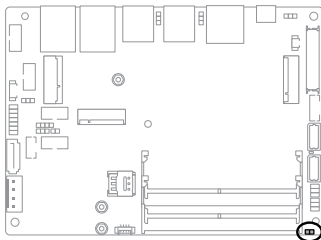
BOX header 2x10p, K10, 2.0mm pitch

NOTE:

- The serial port module is purchased separately.
- **COM1_2** and **COM3_4** support RS-232/422/485.

9. 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.



INTRUDER

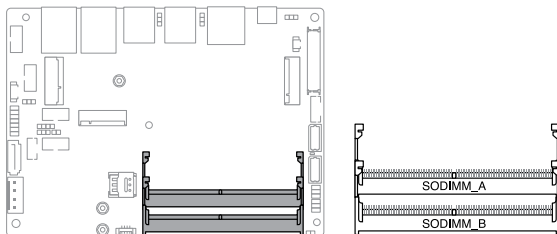


NOTE: By default, a jumper cap that disables the intrusion detection feature is installed on the connector to prevent accidental triggers.

10. DIMM slot

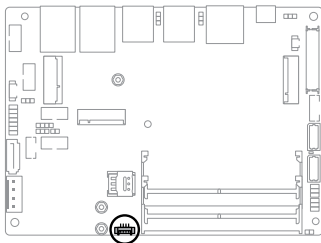
The motherboard comes with two Small Outline Dual Inline Memory Module (SODIMM) slots designed for DDR5 (Double Data Rate 5) memory modules.

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

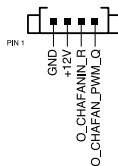


11. Fan connector

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



CHA_FAN

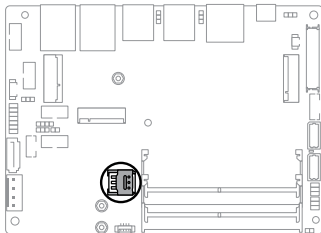


Connector type

WtoB 1x4p, 1.25mm pitch

12. Nano SIM Card slot

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



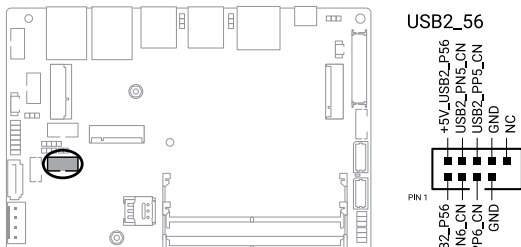
SIM



NOTE: The Nano SIM card is purchased separately.

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

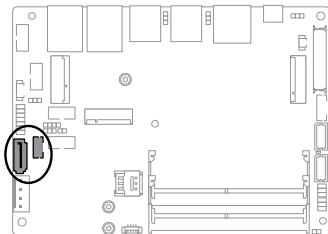
BOX header 2x5p, K9, 2.0mm pitch

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. SATA 6Gb/s & SATA Power connector

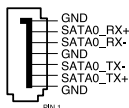
The SATA 6Gb/s and SATA Power connectors allow you to connect SATA devices such as optical disc drives and hard disk drives via a SATA cable and power cable.



SATA_PWR



SATA



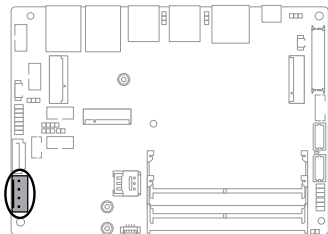
Connector type

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.

15. 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.



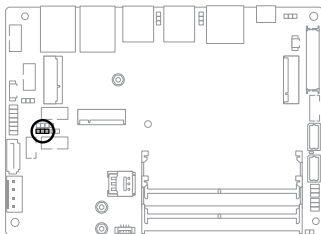
DC_PWR



Connector type	WAFER HD 1x4P 3.96MM NAT S/T DIP		
Reference mating connector	Vendor	XINYA	
	P/N	M3962-4AC	

16. I²C connector

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



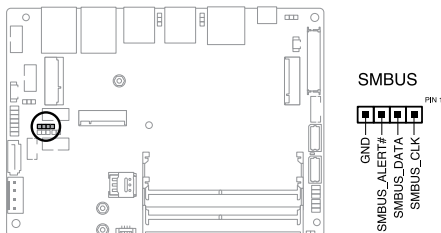
I2C



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.

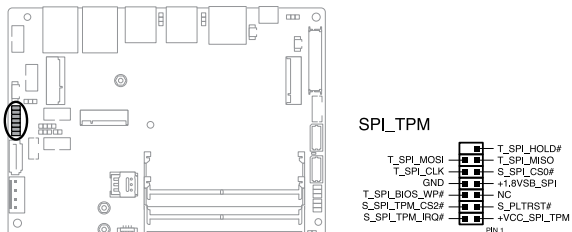


Connector type

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.

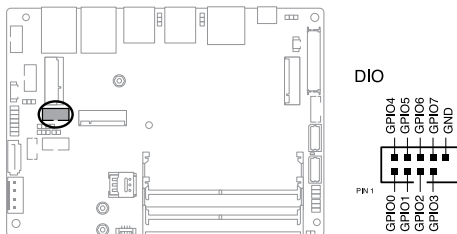


Connector type

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.

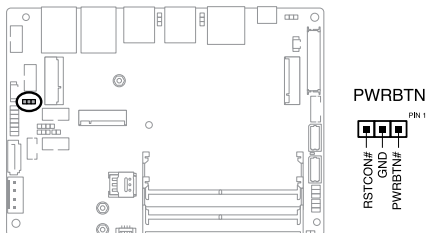


Connector type

BOX header 2x5p, K9, 2.0mm pitch

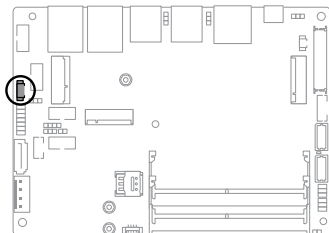
20. Power Button connector

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

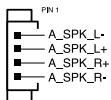


21. Stereo Out connector

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

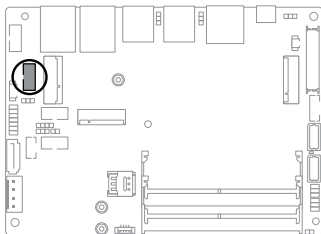


STEREO_OUT

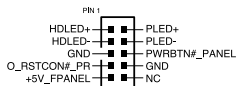


22. Front Panel connector

The Front Panel connector supports several chassis-mounted functions.



F_PANEL



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)**

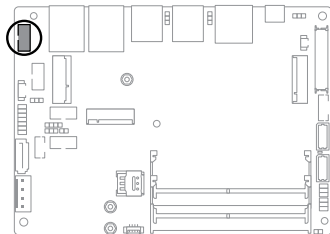
The 3-1 pin connector allows you to connect the system power button. Press the power button to power up the system, or put the system into sleep or soft-off mode (depending on the operating system settings).

- **Reset button connector (O_RSTCON)**

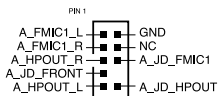
The 2-pin connector allows you to connect the chassis-mounted reset button. Press the reset button to reboot the system.

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



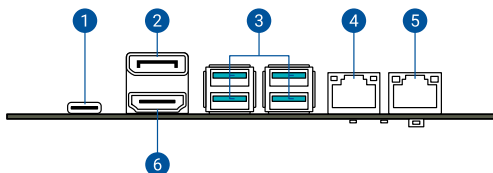
Connector type

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.

2.5 I/O connectors

Front panel



Front panel connectors

- | | |
|----|-----------------------------|
| 1. | USB 10G ports (USB Type-C®) |
| 2. | DisplayPort |
| 3. | USB 10G ports (Type-A) |
| 4. | LAN (RJ-45) 1 GbE port |
| 5. | LAN (RJ-45) 2.5 GbE port |
| 6. | HDMI port |

3

Upgrading your Single Board Computer

IMPORTANT!

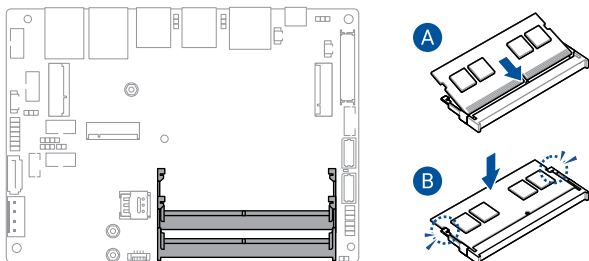
- Ensure that your hands are dry before proceeding with the rest of the installation process. Before installing any of the features in this guide, use a grounded wrist strap or touch a safely grounded object or metal object to avoid damaging them due to static electricity.
 - Turn off the power of your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

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

3.1 Installing memory modules

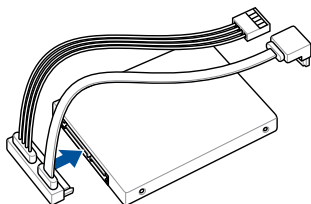
Your Single Board Computer comes with two (2) SO-DIMM slots that allow you to install DDR5 SO-DIMMs.

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

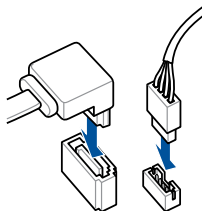
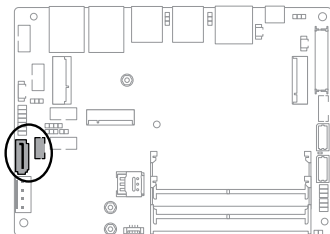


3.2 Installing a 2.5-inch storage device

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



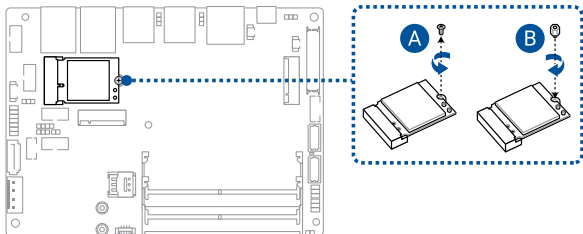
2. Connect the storage device cable to the **SATA** and **SATA_PWR** connectors on the motherboard.



3.3 Installing an M.2 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.

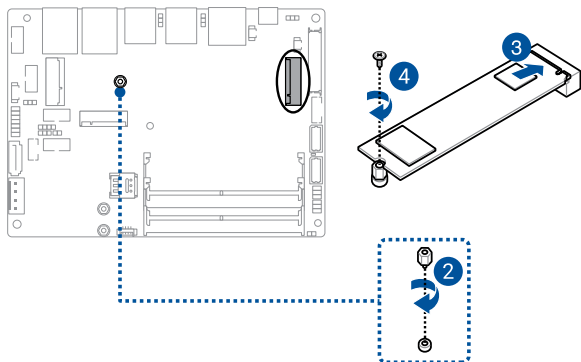


2. (Optional) Replace the standoff if it was removed.

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

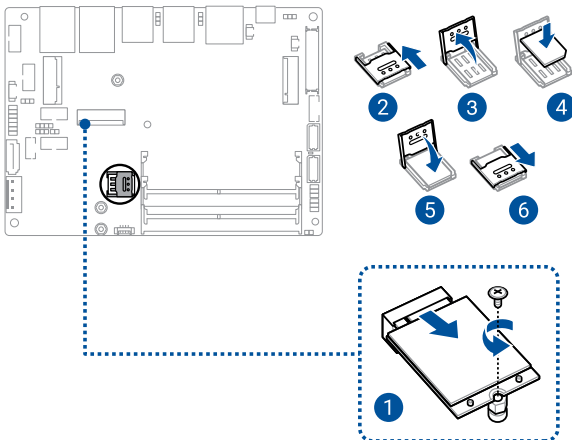
3. Align and insert the M.2 SSD into its slot inside the Single Board Computer.
4. Gently push down the M.2 SSD on top of the standoff, and then fasten it using a screw.

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



3.4 Installing a nano SIM card

1. (Optional) Remove the M.2 module from the M.2 B-key slot, if one is installed, by first removing the screw securing the module, and then removing the module.
2. Push the nano SIM cover in the direction away from the SO-DIMM slots.
3. Lift the nano SIM cover.
4. Place the nano SIM into the nano SIM slot.
5. Close the nano SIM cover.
6. Push the nano SIM cover towards the SO-DIMM slots to secure the nano SIM card.

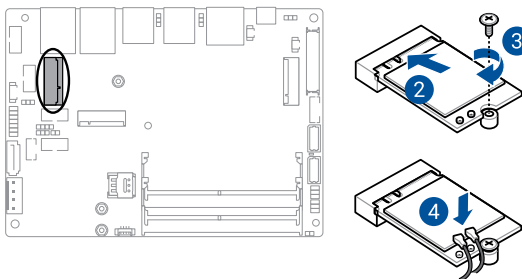


3.5 Installing a wireless card

1. Remove the screw from the M.2 standoff.
2. Align and insert the wireless card into its slot on the motherboard.
3. Gently push down the wireless card on top of the standoff, and then secure it using the previously removed screw. If you will also be installing an M.2 SSD, secure it using a standoff instead.

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

4. (Optional) Connect the antennas to your wireless card.



NOTE:

- 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.
 - The antennas are purchased separately.
-

3.6 Installing an M.2 B-key module

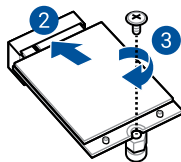
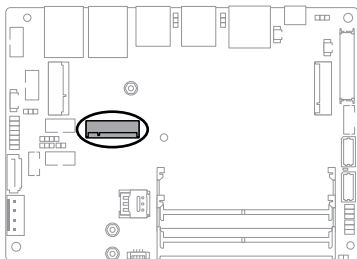
1. Remove the screw from the M.2 standoff.
2. Align and insert the module into the slot.
3. Press down, and then secure it in place using the screw previously removed.

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 module.

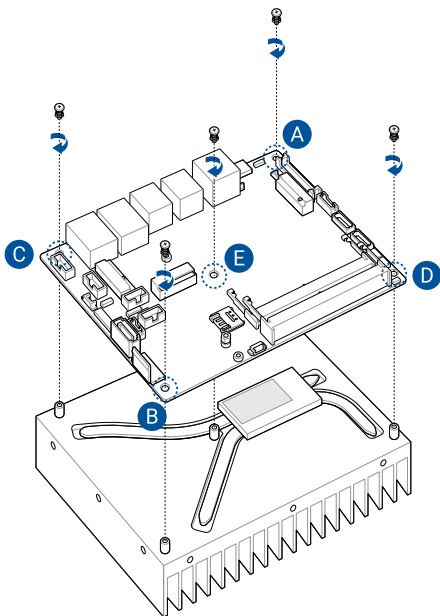
NOTE:

- Connecting antennas to your module may strengthen the signal.
 - A soft clicking sound indicates that the antenna has been securely attached to the module.
 - The antennas are purchased separately.
-



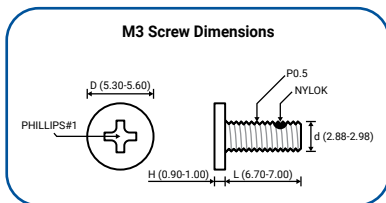
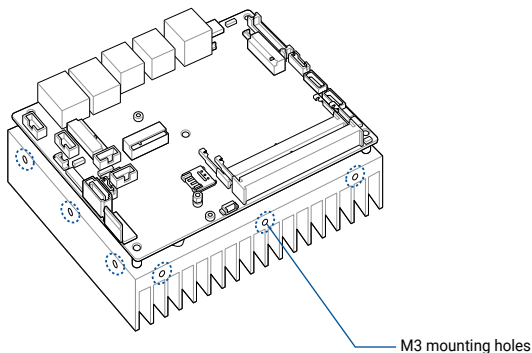
3.7 Installing a heatsink

1. Place the heatsink with its fins faced down on a flat surface.
2. Remove the plastic film on the thermal pads.
3. Orient the motherboard so that the CPU on its backside are in direct contact with the copper pad on the heatsink, and the five (5) screw holes on the motherboard are aligned to the five (5) standoffs on the heatsink as shown below.
4. Secure the motherboard to the heatsink using the five (5) spring screws bundled with the heatsink in the sequence shown below.



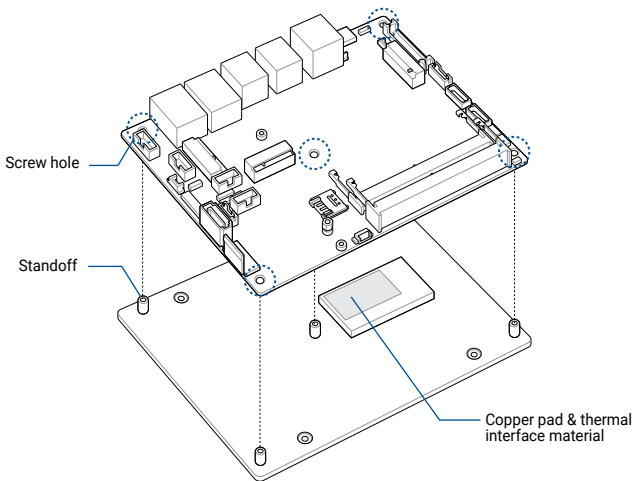
5. (Optional) Attach the heatsink and motherboard assembly to your chassis using the M3 mounting holes along the four sides of the heatsink together with the bundled M3 screws.

NOTE: A total of twelve (12) mounting holes are provided for more flexibility in attaching the assembly to your chassis.



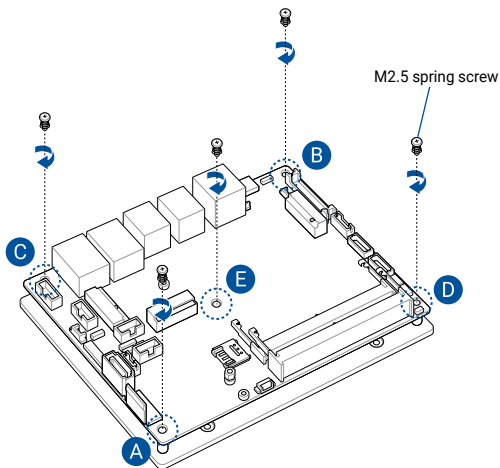
3.8 Installing a heat spreader

1. Place the heat spreader with its copper pad and thermal interface material facing up on a flat surface.
2. Remove the plastic protective film from the copper pad and thermal interface material on the heat spreader, if there is one.

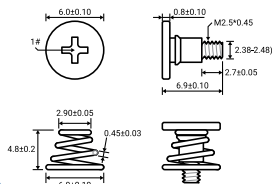


3. Orient the motherboard so that the CPU on its backside is in direct contact with the copper pad on the heat spreader, and the five (5) screw holes on the motherboard are aligned to the five (5) standoffs on the heat spreader.

4. Secure the motherboard to the heat spreader using the five (5) M2.5 spring screws bundled with the heat spreader in the sequence shown below.



M2.5 Spring Screw Dimensions



[illegible]

4

BIOS Setup

4.1 Getting to know your BIOS

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

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

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

4.2 BIOS setup program

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

Entering BIOS Setup at startup

To enter BIOS Setup at startup:

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

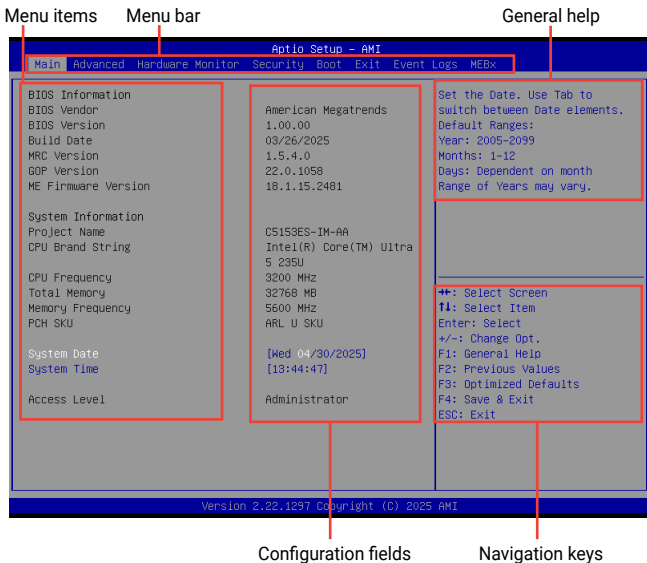
Entering BIOS Setup after POST

To enter BIOS Setup after POST:

- Press <Ctrl>+<Alt>+<Delete> simultaneously.
- Press the power switch 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 Single Board Computer.



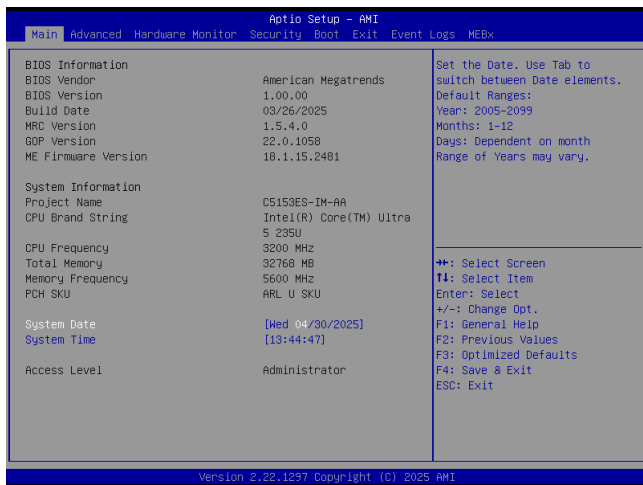
Menu bar

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

Main	For changing the basic system configuration
Advanced	For changing the advanced system settings
Hardware Monitor	For viewing system temperature/power status and changing the fan mode
Security	For changing the security settings
Boot	For changing the system boot configuration
Exit	For selecting the save and exit options or loading default settings
Event Logs	For viewing system event logs and changing Smbios event log settings
MEBx	For configuring Intel Management Engine BIOS Extension (MEBx) settings

4.3 Main menu

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



4.3.1 System Date [Day xx/xx/xxxx]

Allows you to set the system date.

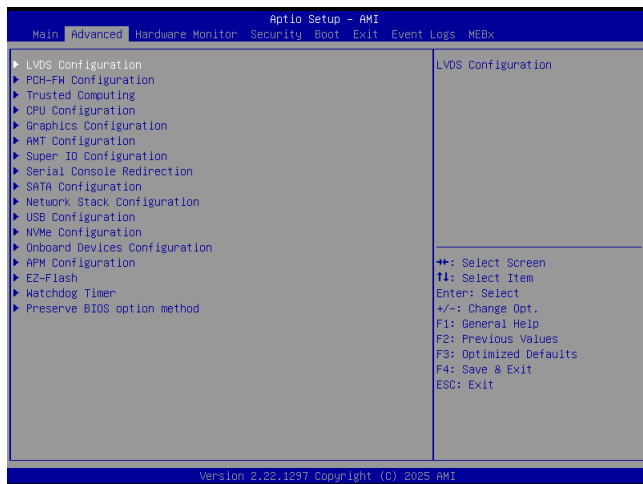
4.3.2 System Time [xx:xx:xx]

Allows you to set the system time.

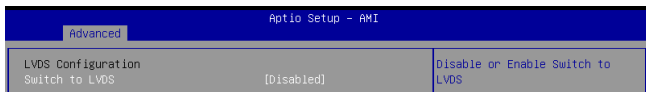
4.4 Advanced menu

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

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



4.4.1 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]

IMPORTANT! Be cautious when selecting AiO chassis. Incorrect selection of AiO chassis can cause incorrect operation or potential damage to AiO chassis hardware.

NOTE: 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 enable to enable VARY_BL disable (T10)

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

4.4.2 PCH-FW Configuration

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

Aptio Setup - AMI		
Advanced		
TPM Device Selection	[dTPM]	Selects TPM device: PTT or dTPM. PTT - Enables PTT in

TPM Device Selection

Allows you to select the TPM device.

[dTPM] Discrete TPM

[PTT] Intel Platform Trust Technology firmware TPM

NOTE:

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

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

4.4.3 Trusted Computing

Aptio Setup - AMI		
Advanced		
Configuration		
Security Device Support	[Enabled]	Enables or Disables BIOS support for security device.
NO Security Device Found		O.S. will not show Security Device. TCG EFI protocol and

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

Security Device Support

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

Configuration options: [Disabled] [Enabled]

NOTE:

- The following items appear only when **Security Device Support** is set to **[Enabled]**.
 - The availability of the following items depends on support of the TPM device installed.
-

SHA256 PCR Bank

Allows you to enable or disable SHA256 PCR Bank.

Configuration options: [Disabled] [Enabled]

SHA384 PCR Bank

Allows you to enable or disable SHA384 PCR Bank.

Configuration options: [Disabled] [Enabled]

SM3_256 PCR Bank

Allows you to enable or disable SM3_256 PCR Bank.

Configuration options: [Disabled] [Enabled]

Pending Operation

Schedule and Operation for the Security Device.

Configuration options: [None] [TPM Clear]

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

Platform Hierarchy

Allows you to enable or disable Platform Hierarchy.

Configuration options: [Disabled] [Enabled]

Storage Hierarchy

Allows you to enable or disable Storage Hierarchy.

Configuration options: [Disabled] [Enabled]

Endorsement Hierarchy

Allows you to enable or disable Endorsement Hierarchy.

Configuration options: [Disabled] [Enabled]

Physical Presence Spec Version

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

Configuration options: [1.2] [1.3]

PH Randomization

Allows you to enable or disable Platform Hierarchy randomization.

Configuration options: [Disabled] [Enabled]

4.4.4 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) Core(TM) Ultra 5 235U	
ID	0xB0650	
Performance-core		
L1 Data Cache	96 KB	
L1 Instruction Cache	128 KB	
L2 Cache	4096 KB	
L3 Cache	12 MB	
VMX	Supported	
SMX/TXT	Supported	
Intel (VMX) Virtualization Technology	[Enabled]	→: Select Screen
Hyper-Threading	[Enabled]	F1: Select Item
Intel Trusted Execution Technology	[Disabled]	Enter: Select
VT-d	[Enabled]	+/-: Change Opt.
▶ CPU - Power Management Control		F1: General Help
Max TOLUD	[Dynamic]	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]

Hyper-Threading

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

Configuration options: [Disabled] [Enabled]

Intel Trusted Execution Technology

Allows you to enable or disable utilization of additional hardware capabilities provided by Intel (R) Trusted Execution Technology.

Changes require a full power cycle to take effect.

Configuration options: [Disabled] [Enabled]

VT-d

Allows you to enable or disable VT-d capability.

Configuration options: [Disabled] [Enabled]

Active Performance-cores

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

Active Efficient-cores

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

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

CPU - Power Management Control

Intel(R) SpeedStep(tm)

Allows more than two frequency to be supported.

Configuration options: [Disabled] [Enabled]

Intel(R) Speed Shift Technology

Allows you to enable or disable Intel(R) Speed Shift Technology support. When enabled, CPPC v2 interface allows hardware controlled P-states.

Configuration options: [Disabled] [Enabled]

Turbo Mode

Allows you to enable or disable processor Turbo Mode (requires Intel Speed Step or Intel Speed Shift to be available when enabled).

Configuration options: [Disabled] [Enabled]

C states

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

Configuration options: [Disabled] [Enabled]

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

Enhanced C-States

Allows you to enable or disable C1E. When enabled, CPU will switch to minimum speed when all cores enter C-State.
Configuration options: [Disabled] [Enabled]

Power Limit 1

Allows you to configure Power Limit 1 value in milliwatts (e.g., enter 12500 for 12.5 W).

Power Limit 2

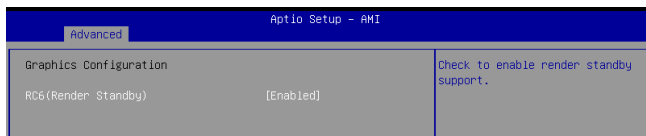
Allows you to configure Power Limit 2 value in milliwatts (e.g., enter 12500 for 12.5 W).

Max TOLUD

Allows you to select the maximum memory size of TOLUD (Top of Low Usable DRAM). Dynamic assignment will adjust TOLUD automatically based on the largest MMIO length of installed graphics controller.
Configuration options: [Dynamic] [0.75 GB] [1 GB] [1.25 GB] [1.5 GB] [1.75 GB] [2 GB] [2.25 GB] [2.5 GB]

4.4.5 Graphics Configuration

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



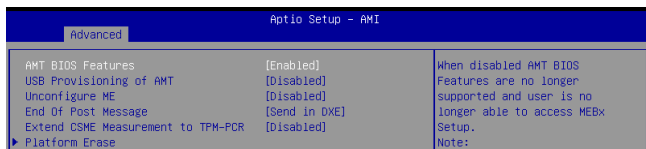
RC6(Render Standby)

Allows you to enable or disable render standby support.

Configuration options: [Disabled] [Enabled]

4.4.6 AMT Configuration

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



AMT BIOS Features

Allows you to enable or disable AMT BIOS features.

Configuration options: [Disabled] [Enabled]

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

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

USB Provisioning of AMT

Allows you to enable or disable AMT USB Provisioning.

Configuration options: [Disabled] [Enabled]

Unconfigure ME

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

Configuration options: [Disabled] [Enabled]

End Of Post Message

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

Configuration options: [Disabled] [Send in DXE]

Extend CSME Measurement to TPM-PCR

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

Configuration options: [Disabled] [Enabled]

Platform Erase

Enable Remote Platform Erase Feature

Allows you to enable or disable the remote platform erase feature.

This feature only works in vPro Enterprise.

Configuration options: [Disable] [Enable]

NOTE: The following item appears only when **Enable Remote Platform Erase Feature** is set to **[Enable]**.

SSD Erase Mode

Allows you to enable or disable remote platform erase feature.

Configuration options: [Simulated] [Real]

Storage Erase Configuration

Allows you to erase data on storage device according to the method order.

Configuration options: [Block Erase] [Crypto Erase] [Override Erase] [Clear]

4.4.7 Super IO Configuration

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



Super IO Chip NCT6126D

Serial Port 1-4 Configuration

Allows you to set the parameters of Serial Port 1-4.

Serial Port

Allows you to enable or disable Serial Port.

Configuration options: [Disabled] [Enabled]

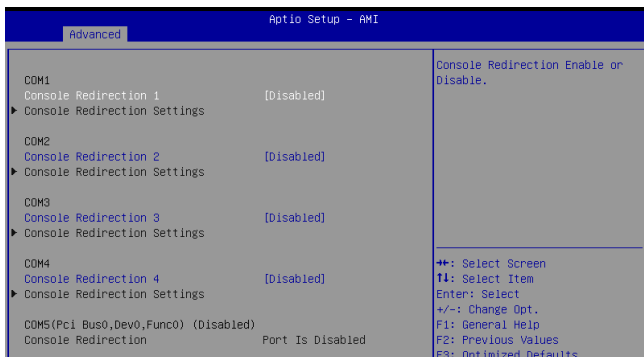
NOTE: The following items appear only when **Serial Port** is set to **[Enabled]**.

COM1-4 Control

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

4.4.8 Serial Console Redirection

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



COM1-4

Console Redirection

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

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

Console Redirection Settings

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

Terminal Type

Allows you to set the terminal type.

[VT100] ASCII char set.

[VT100Plus] Extends VT100 to support color, function keys, etc.

[VT-UTF8] Uses UTF8 encoding to map Unicode chars onto 1 or more bytes.

[ANSI] Extended ASCII char set.

Bits per second

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

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

Data Bits

Configuration options: [7] [8]

Parity

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

[None] None.

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

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

[Mark] parity bit is always 1.

[Space] parity bit is always 0.

Stop Bits

Stop bits indicate the end of a serial data packet. (A start bit indicates the beginning.) The standard setting is 1 stop bit.

Communication with slow devices may require more than 1 stop bit.

Configuration options: [1] [2]

Flow Control

Flow control can prevent data loss from buffer overflow. When sending data, if the receiving buffers are full, a “stop” signal can be sent to stop the data flow. Once the buffers are empty, a “start” signal can be sent to re-start the flow. Hardware flow control uses two wires to send start/stop signals.

Configuration options: [None] [Hardware RTS/CTS]

VT-UTF8 Combo Key Support

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

Configuration options: [Disabled] [Enabled]

Recorder Mode

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

Configuration options: [Disabled] [Enabled]

Resolution 100x31

Allows you to enable or disable extended terminal resolution.

Configuration options: [Disabled] [Enabled]

Putty KeyPad

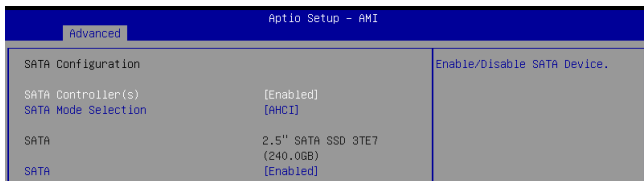
This allows you to select the FunctionKey and Keypad on Putty.

Configuration options: [VT100] [LINUX] [XTMR6] [SCO] [ESCN] [VT400]

4.4.9 SATA Configuration

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

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



SATA Controller(s)

Allows you to enable or disable the SATA Controller.

Configuration options: [Disabled] [Enabled]

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

SATA Mode Selection

Allows you to configure how the SATA Controller operates.

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

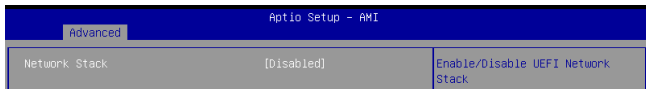
SATA

Allows you to enable or disable the SATA port.

Configuration options: [Disabled] [Enabled]

4.4.10 Network Stack Configuration

Allows you to configure network stack settings.



Network Stack

Allows you to enable or disable UEFI Network Stack.

Configuration options: [Disabled] [Enabled]

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

IPv4 PXE Support

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

Configuration options: [Disabled] [Enabled]

IPv6 PXE Support

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

Configuration options: [Disabled] [Enabled]

4.4.11 USB Configuration

Aptio Setup - AMI		
Advanced		
USB Configuration		This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.
USB Module Version	38	
USB Controllers:		
2 XHCIs		
USB Devices:		
2 Keyboards, 1 Mouse		
XHCI Hand-off	[Enabled]	
USB Mass Storage Driver Support	[Enabled]	
U32G2_1	[Enabled]	++: Select Screen !/: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values
U32G2_2	[Enabled]	
U32G2_3	[Enabled]	
U32G2_4	[Enabled]	
USB2_5	[Enabled]	
USB2_6	[Enabled]	
TypeC	[Enabled]	

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]

U32G2_1 / U32G2_2 / U32G2_3 / U32G2_4

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]

USB2_5 / USB2_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]

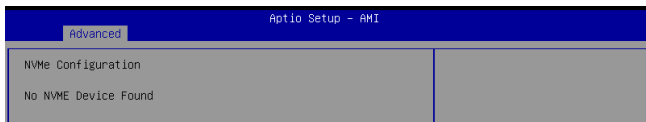
TYPEC

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

Configuration options: [Disabled] [Enabled]

4.4.12 NVMe Configuration

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



4.4.13 Onboard Devices Configuration

Aptio Setup - AMI		
Advanced		
Onboard Devices Configuration		Control Detection of the HD-Audio device. Disabled = HDA will be unconditionally disabled Enabled = HDA will be unconditionally enabled.
HD Audio	[Enabled]	
LAN1 I219-LM	[Enabled]	
LAN2 I226-IT	[Enabled]	
NPU Device	[Enabled]	
M.2 WWLAN(B-Key)		
M.2 B-Key (PCIe)	[Enabled]	
M.2 B-Key (USB)	[Enabled]	
M.2 HiFi(E-Key)		
CNVl Mode	[Auto Detection]	
M.2 E-Key (PCIe)	[Enabled]	
M.2 E-Key (USB)	[Enabled]	
M.2 NVME(M-Key)		
M.2 M-Key (PCIe)	[Enabled]	
		++: Select Screen Tl: Select Item Enter: Select +/-: Change Opt. F1: General Help

HD Audio

Allows you to enable or disable HD-Audio support.

Configuration options: [Disabled] [Enabled]

LAN2 I219-LM

Allows you to enable or disable I219-LM.

Configuration options: [Enabled] [Disabled]

LAN1 I226-IT

Allows you to enable or disable LAN1 I226-IT.

Configuration options: [Disabled] [Disabled]

NPU Device

Allows you to enable or disable the NPU.

Configuration options: [Enabled] [Disabled]

M.2 WWLAN(B-Key)

M.2 B-Key (PCIE)

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

Configuration options: [Disabled] [Enabled]

M.2 B-Key (USB)

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

Configuration options: [Disabled] [Enabled]

M.2 WiFi(E-Key)

CNVi Mode

This option configures Connectivity.

[Disable Integrated] Disabled Integrated Solution.

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

M.2 E-Key (PCIE)

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

Configuration options: [Disabled] [Enabled]

M.2 E-Key (USB)

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

Configuration options: [Disabled] [Enabled]

M.2 NVME(M-Key)

M.2 M-Key (PCIE)

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

Configuration options: [Disabled] [Enabled]

4.4.14 APM Configuration

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

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

ErP Ready

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

Configuration options: [Disabled] [Enabled]

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

Restore AC Power Loss

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

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

Power On By PCIE

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

Configuration options: [Disabled] [Enabled]

Power On By Ring

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

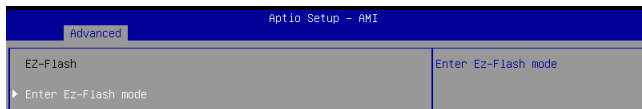
[Enabled] Enables the Ring devices to generate a wake event.

Power On By RTC

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

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

4.4.15 EZ-Flash



Enter Ez-Flash mode

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

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

4.4.16 Watchdog Timer

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

Aptio Setup - AMI		
Advanced		
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.

4.4.17 Preserve BIOS option method

The items in this menu allow you to configure the preserve BIOS option method.

Advanced		Aptio Setup - AMI	
Preserve BIOS option method		Enabled/Disabled preserve BIOS option after flash BIOS	
Preserve BIOS option	[Disabled]		

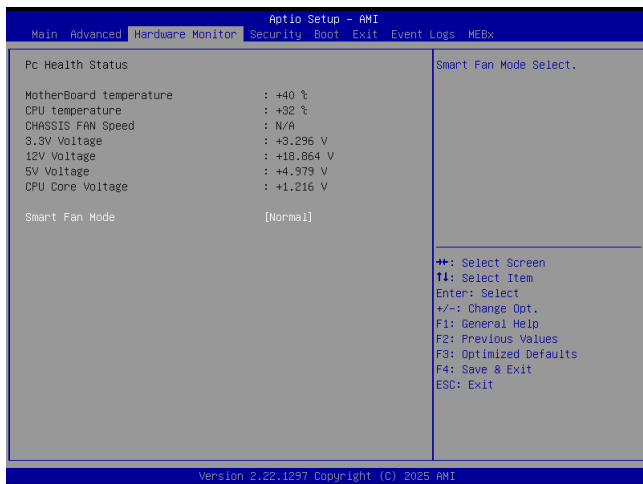
Preserve BIOS option

Allows you to enable or disable the preserve BIOS option after flash BIOS.

Configuration options: [Disabled] [Enabled]

4.5 Hardware Monitor menu

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



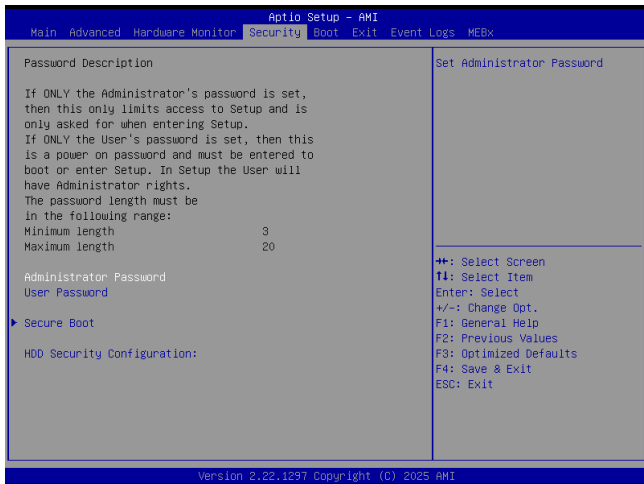
Smart Fan Mode

Allows you to select a smart fan mode.

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

4.6 Security menu

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



Administrator Password

To set an administrator password:

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

To change an administrator password:

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

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

User Password

To set a user password:

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

To change a user password:

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

To clear a user password:

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

Secure Boot

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

Configuration options: [Disabled] [Enabled]

Secure Boot Mode

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

Configuration options: [Standard] [Custom]

Key Management

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

Platform Key (PK)

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

Key Exchange Keys / Authorized Signatures / Forbidden Signatures

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

HDD Security Configuration

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

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

To set a password for your HDD:

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

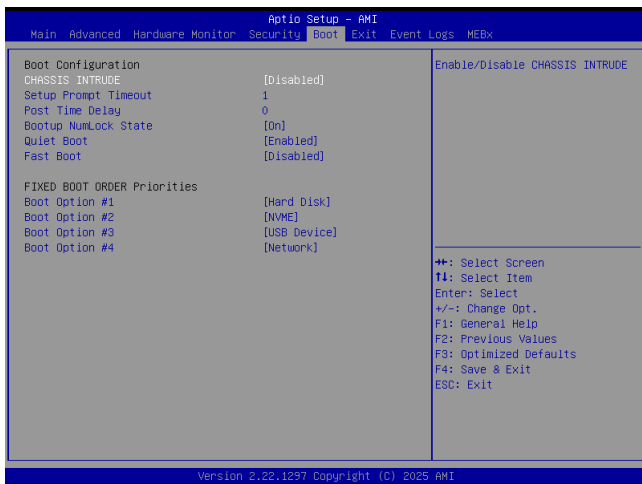
To change the password for your HDD:

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

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

4.7 Boot menu

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



Boot Configuration

CHASSIS INTRUDE

Allows you to enable or disable 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.

Post Time Delay

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

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

Bootup NumLock State

Allows you to select the power-on state for the NumLock.
Configuration options: [On] [Off]

Quiet Boot

Allows you to enable or disable the Quiet Boot option.
Configuration options: [Disabled] [Enabled]

Fast Boot

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

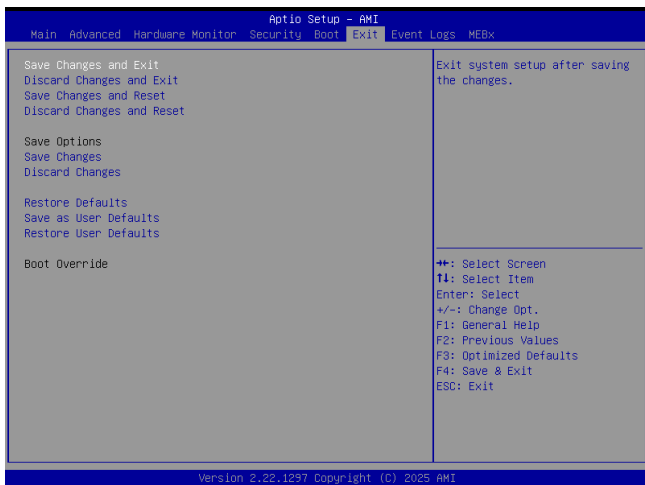
FIXED BOOT ORDER Priorities

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

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

4.8 Exit menu

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



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

Save Changes and Exit

Exit system setup after saving changes.

Discard Changes and Exit

Exit system setup without saving changes.

Save Changes and Reset

Reset the system after saving changes.

Discard Changes and Reset

Reset the system without saving any changes.

Save Options

Save Changes

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

Discard Changes

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

Restore Defaults

Restore/load default values for all the setup options.

Save as User Defaults

Save the changes done so far as User Defaults.

Restore User Defaults

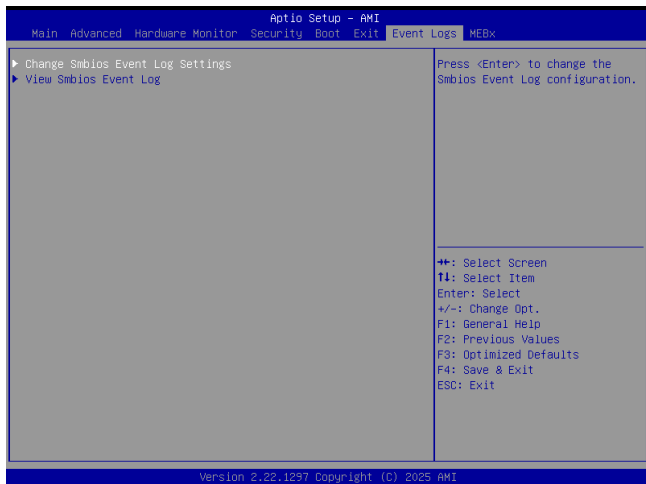
Restore/load default values for all the setup options.

Boot Override

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

4.9 Event Logs menu

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



Change Smbios Event Log Settings

Allows you to change the Smbios Event Log settings.

NOTE: All values changed here do not take effect until computer is restarted.

View Smbios Event Log

Allows you to view all Smbios event logs.

4.10 MEBx menu

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



Intel(R) ME Password

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

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

4.11 Updating your BIOS

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

1. **ASUS CrashFree BIOS**

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

2. **ASUS EzFlash**

Updates the BIOS using a USB flash disk.

Refer to the corresponding sections for details on these utilities.

4.11.1 ASUS CrashFree BIOS utility

The ASUS CrashFree BIOS is an auto recovery tool that allows you to restore the BIOS file when it fails or gets corrupted during the updating process. You can update a corrupted BIOS file using a USB flash drive that contains the updated BIOS file.

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

Recovering the BIOS from a USB flash drive

To recover the BIOS from a USB flash drive:

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

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

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

4.11.2 ASUS EzFlash Utility

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

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

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

To update the BIOS using EzFlash Utility:

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

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

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



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

WARNING!

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

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

Appendix

Safety information

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

Setting up your system

- Read and follow all instructions in the documentation before you operate your system.
- Do not use this product near water or a heated source.
- Set up the system on a stable surface.
- Peripherals with extended temperature tolerance (such as industrial grade DRAM, SSD, etc.) will allow this product to be used in environments with ambient temperatures between 0°C and 60°C, with adequate air flow.
- 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.
- This device shall not be connected to an Ethernet network with outside plant routing.

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.

Care during use

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

Lithium-Metal Battery Warning

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

NO DISASSEMBLY

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

Regulatory Notices

Federal Communications Commission Statement

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

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

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

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

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.

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(B)/NMB(B)

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

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

CAN ICES(B)/NMB(B)

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

Regional notice for Singapore

Complies with
IMDA Standards
DB103778

This ASUS product complies with IMDA Standards.

Regional notice for Malaysia



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.

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/en/Takeback.htm>.



DO NOT throw the device in municipal waste. This product has been designed to enable proper reuse of parts and recycling. This symbol of the crossed out wheeled bin indicates that the product (electrical, electronic equipment, and mercury-containing button cell battery) should not be placed in municipal waste. Check local technical support services for product recycling.

EPEAT (Electronic Product Environmental Assessment Tool) registered products

The public disclosure of key environmental information for ASUS EPEAT registered products is available at <https://esg.asus.com/en/Ecolabel.htm>. More information about EPEAT program and purchaser guidance can be found on the EPEAT website www.epeat.net.

Service and Support

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

