H310M-IM-A

Industrial Motherboard

E25080
Revised Edition v4
September 2024

Contents

Chapter 1 Product overview

1.1 Package contents 1-1
1.2 Features 1-1
1.3 Specifications 1-2

Chapter 2 Motherboard information

2.1 Before you proceed 2-1
2.2 Motherboard layout 2-2
2.3 Central Processing Unit (CPU) 2-4
2.3.1 Installing the CPU 2-5
2.3.2 CPU heatsink and fan assembly installation 2-7
2.4 System memory 2-9
2.5 Jumpers 2-11
2.6 Connectors 2-12
2.6.1 Rear panel connectors 2-12
2.6.2 Internal connectors 2-14

Chapter 3 BIOS setup

3.1 BIOS setup program 3-1
3.1.1 BIOS menu screen 3-2
3.2 Main menu 3-2
3.2.1 Language [English] 3-2
3.2.2 System Date [Day MM/DD/YYYY] 3-2
3.2.3 System Time [HH:MM:SS] 3-2
3.2.4 Security 3-2
3.3 Ai Tweaker menu 3-4
3.3.1 CPU Power Enhancement 3-4
3.3.2 CPU Core Ratio 3-4
3.3.3 DRAM Odd Ratio Mode 3-5
3.3.4 DRAM Frequency 3-5
3.3.5 Power-saving & Performance Mode 3-5
3.3.6 DRAM Timing Control 3-6
3.3.7 DIGI+ VRM 3-13
3.3.8 Internal CPU Power Management 3-14
3.3.9 CPU Core/Cache Current Limit Max. 3-14
3.3.10 CPU Graphics Current Limit 3-15

3.3.11 Min. CPU Cache Ratio 3-15
3.3.12 Max. CPU Cache Ratio 3-15
3.3.13 Max. CPU Graphics Ratio 3-15
3.3.14 DRAM Voltage 3-15
3.3.15 DRAM REF Voltage Control 3-15
3.4 Advanced menu 3-16
3.4.1 Platform Misc Configuration 3-16
3.4.2 CPU Configuration 3-17
3.4.3 System Agent (SA) Configuration 3-19
3.4.4 PCH Configuration 3-20
3.4.5 PCH Storage Configuration 3-20
3.4.6 PCH-FW Configuration 3-21
3.4.7 Onboard Devices Configuration 3-21
3.4.8 APM Configuration 3-23
3.4.9 PCI Subsystem Settings 3-24
3.4.10 USB Configuration 3-24
3.4.11 Network Stack Configuration 3-24
3.4.12 NVMe Configuration 3-25
3.4.13 HDD Secure Erase 3-25
3.4.14 HDD/SSD SMART Information 3-25
3.5 Monitor menu 3-25
3.6 Boot menu 3-29
3.7 Tool menu 3-33
3.8 Exit menu 3-34

Appendix

Notices A-1
Service and Support A-5

Chapter 1
Product overview

1.1 Package contents

Check your industrial motherboard package for the following items.

- ☑ 1 x ASUS H310M-IM-A Motherboard
- ☑ 1 x Serial ATA 6.0 Gb/s cable
- ☑ 1 x M.2 screw package
- ☑ 1 x ASUS I/O Shield

NOTE: If any of the above items is damaged or missing, contact your distributor or sales representative immediately.

1.2 Features

- Intel® socket 1151 for 9th/8th Gen Intel® Core™ i7/ i5/ i3, Pentium®, and Celeron® processors
- Two DDR4 2666/2400/2133MHz Non-ECC un-buffered DIMMs up to 32GB
- 4 x SATA 6.0 Gb/s ports, 4 x USB 3.2 Gen 1 ports, 6 x USB 2.0 ports, 1 x COM header, 1 x COM connector
- 1 x PCIe3.0/2.0 x16 slot, 2 x PCIe 2.0 x1 slots,1 x M.2 (Key M, 2260/2280) with PCIe and SATA modes
- Multi-display: 1 x DVI-D, 1 x D-Sub

1.3 Specifications

CPU	Intel® socket 1151 for 9th/8th Gen Intel® Core™ i7/ i5/ i3, Pentium®, and Celeron® processors Supports Intel® 14nm CPU
Chipset	Intel® H310 Chipset
Memory	2 x DIMM, max.32GB, DDR4 2666*/2400/2133 MHz, non-ECC, un-buffered memory *** DDR4 2666MHz and higher memory modules will run at max. 2666MHz on Intel® 8th Gen. 6 core or higher processors.**
Graphics	Multi-VGA output support: 1x DVI-D port, 1x D-Sub port with max. resolution of 1920 x 1200 @60Hz Supports up to 2 displays simultaneously
Expansion slots	1 x PCI Express 3.0/2.0 x16 slot 2 x PCI Express 2.0 x1 slots 1 x PCI slot
USB	- 4 x USB 3.2 Gen 1 ports (2 ports at the mid-board; 2 ports at the rear panel) - 6 x USB 2.0/1.1 ports (2 ports at the mid-board; 4 ports at the rear panel)
Serial port	1 x COM port (RS232) 1 x COM connector (RS232)
LAN	1X RJ45 port (1 x RTL8111H Gb LAN)
Audio	Realtek® ALC887-VD2 / ALC897 8-channel High Definition Audio CODEC* 3 X Audio Jacks *** The audio codec may vary between motherboards, please consult your sales window for the motherboards' exact codec type.**
Rear panel I/O ports	2 x USB 3.2 Gen 1 ports 4 x USB 2.0/1.1 ports 1 x D-Sub port 1 x DVI-D port 1 x COM port (RS232) 3 x Audio jacks support 8-channel audio output 1 x LAN (RJ45) port 1 x P/S2 Keyboard port 1 x P/S2 Mouse port
Front panel I/O ports	1 x USB 3.2 Gen 1 header supports additional 2 USB 3.2 Gen 1 ports 1 x USB 2.0/1.1 header supports additional 2 USB 2.0/1.1 ports 1 x M.2 Socket 3 with M Key, Type 2260/2280 storage devices support (both SATA & PCIe x2 mode) 4 x SATA 6.0Gb/s ports 1 x 4-pin CPU Fan header 1 x 4-pin Chassis Fan header for PWM & DC mode

(continued on the next page)

Front panel I/O ports	1 x Front Panel Audio header (AAFP) 1 x System Panel header 1 x 24-pin ATX Power connector 1 x 4-pin ATX Power connector 1 x Chassis Intrusion header 1 x Speaker connector 1 x COM Port header (RS232) 1 x Parallel header 1 x Clear CMOS header 1 x 14-1 pin TPM header 1 x LPC Debug header
TPM	1 x TPM header (LPC)
BIOS features	128 Mb Flash ROM, UEFI AMI BIOS, PnP, SM BIOS 3.1, ACPI 6.1, Multi-language BIOS
Manageability	WfM 2.0, DMI 2.0, WOL by PME
Watch dog timer	Yes
Power requirement	ATX Mode
Operation Temperature	0~60°C
Non-Operation Temperature	-40~85°C
Relative Humidity	0%~85%
OS support	Linux, Windows® 10 (64-bit)
Form Factor	Micro ATX Form Factor, 9.6"x 7.6" (24.4cm x 19.3cm)

NOTE: Specifications are subject to change without notice.

Chapter 2
Motherboard information

2.1 Before you proceed

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

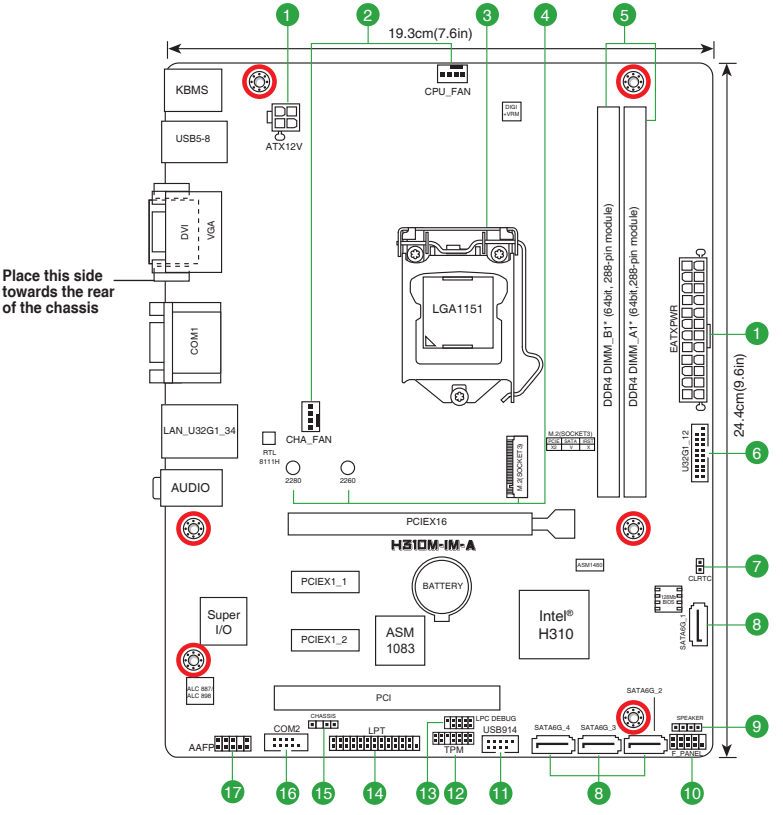
CAUTION!

- 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, always remove the AC power by unplugging the power cord from the power outlet. Failure to do so may cause severe damage to the motherboard, peripherals, or components.

2.2 Motherboard layout

NOTE: Place six screws into the holes indicated by circles to secure the motherboard to the chassis.

CAUTION! Do not overtighten the screws! Doing so can damage the motherboard.

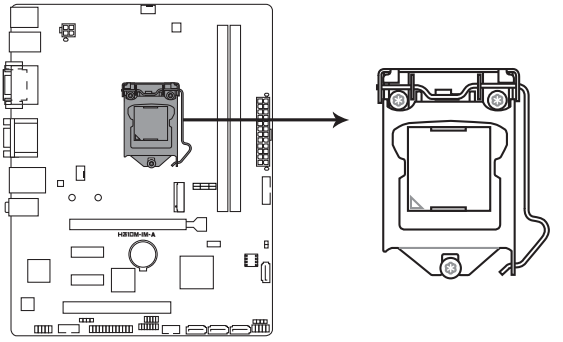


NOTE: The audio codec may vary between motherboards, please consult your sales window for the motherboards' exact codec type.

Connectors/Jumpers/Slots		Page
1.	ATX Power connectors (24-pin EATXPWR, 4-pin ATX12V)	2-19
2.	CPU and Chassis Fan headers (4-pin CPU_FAN, 4-pin CHA_FAN)	2-16
3.	Intel® LGA1151 CPU socket	2-4
4.	M.2 socket 3	2-18
5.	DDR4 DIMM slots	2-9
6.	USB 3.2 Gen 1 header (20-1 pin U32G1_12)	2-14
7.	Clear RTC RAM (2-pin CLRTC)	2-11
8.	Serial ATA 6.0Gb/s ports (7-pin SATA6G_1-4)	2-20
9.	Speaker header (4-pin SPEAKER)	2-15
10.	System Panel header (10-1 pin F_PANEL)	2-17
11.	USB 2.0 header (10-pin USB914)	2-15
12.	TPM header (14-1 pin TPM)	2-14
13.	LPC Debug header	2-16
14.	LPT header	2-20
15.	Chassis Intrusion header	2-11
16.	COM Port header (10-1 pin COM2)	2-18
17.	Front Panel Audio header (10-1 pin AAFP)	2-19

2.3 Central Processing Unit (CPU)

The motherboard comes with a surface mount LGA1151 socket designed for the Intel® 9th/8th Generation Core™ i7 / Core™ i5 / Core™ i3, Pentium®, and Celeron® processors.

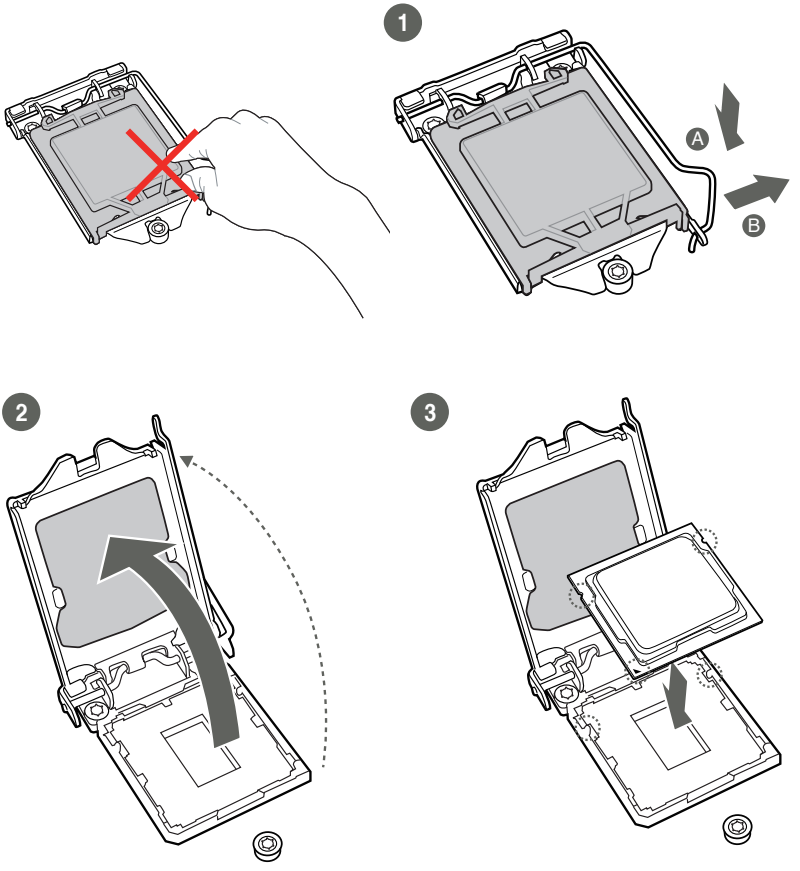


IMPORTANT: Unplug all power cables before installing the CPU.

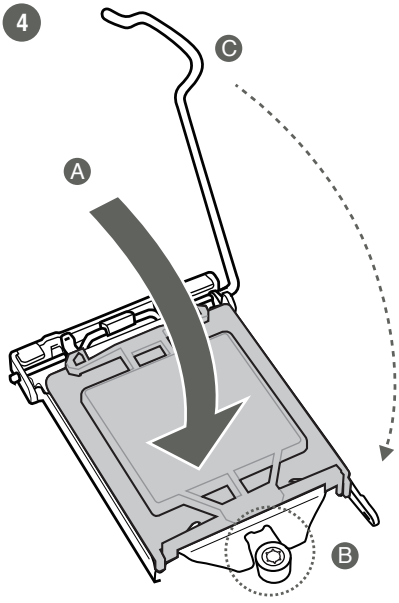
CAUTION!

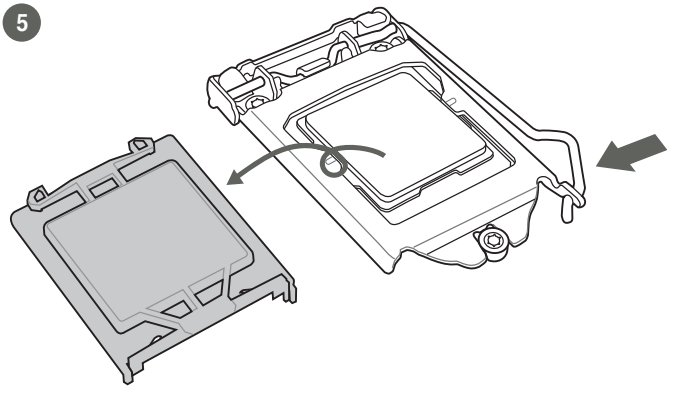
- Upon purchase of the motherboard, ensure that the PnP cap is on the socket and the socket contacts are not bent. Contact your retailer immediately if the PnP cap is missing, or if you see any damage to the PnP cap/socket contacts/motherboard components. The manufacturer will shoulder the cost of repair only if the damage is shipment/transit-related.
- Keep the cap after installing the motherboard. The manufacturer will process Return Merchandise Authorization (RMA) requests only if the motherboard comes with the cap on the LGA1151 socket.
- The product warranty does not cover damage to the socket contacts resulting from incorrect CPU installation/removal, or misplacement/loss/ incorrect removal of the PnP cap.

2.3.1 Installing the CPU

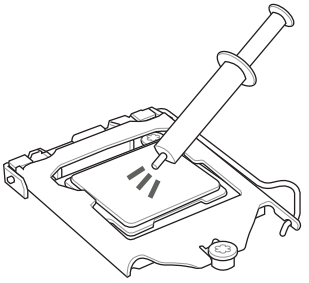


CAUTION! LGA1156 CPU is not compatible with the LGA1151 socket. DO NOT install an LGA1156 CPU on the LGA1151 socket.


4
C
A
B

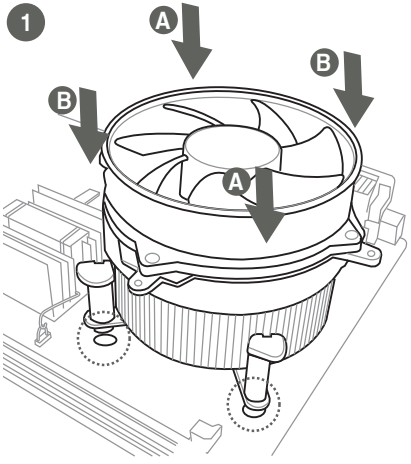

5

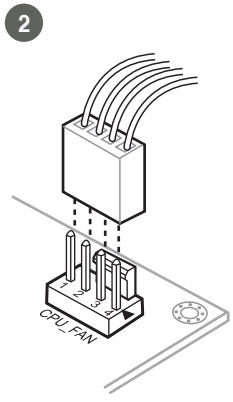
2.3.2 CPU heatsink and fan assembly installation

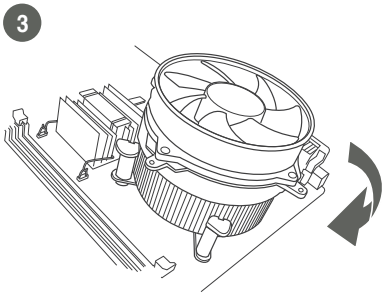


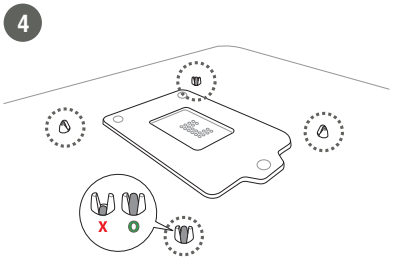
CAUTION! Apply the Thermal Interface Material to the CPU heatsink and CPU before you install the heatsink and fan if necessary.

To install the CPU heatsink and fan assembly



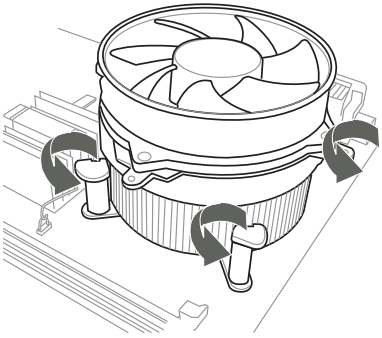




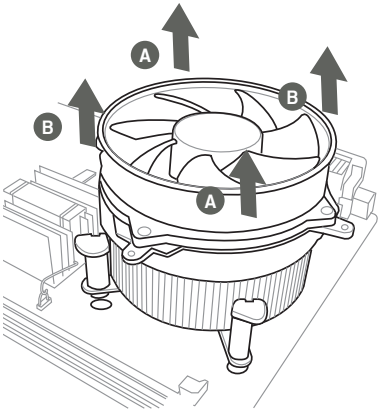


To uninstall the CPU heatsink and fan assembly

1

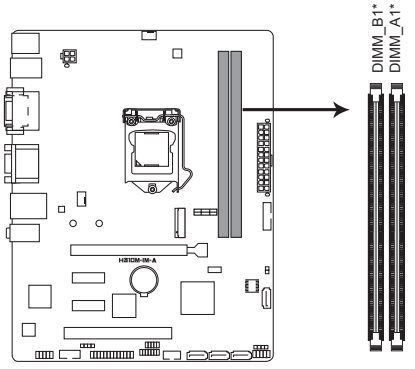


2



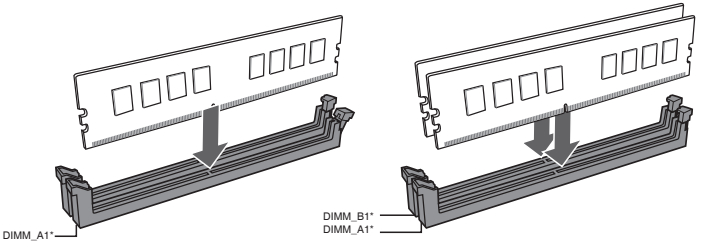
2.4 System memory

This motherboard comes with two Double Data Rate 4 (DDR4) Dual Inline Memory Module (DIMM) sockets. The figure below illustrates the location of the DDR4 DIMM sockets:

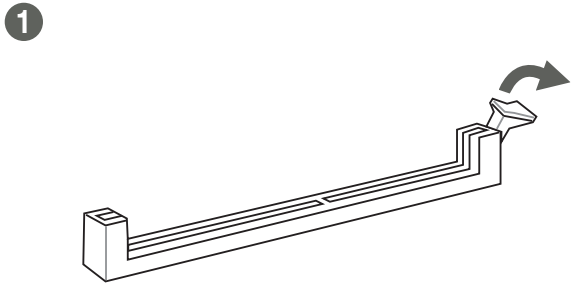


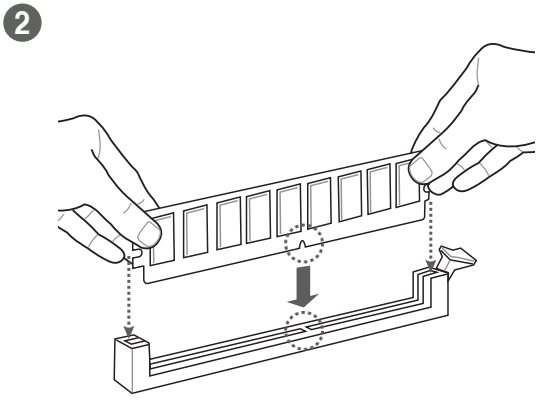
Channel	Sockets
Channel A	DIMM_A1*
Channel B	DIMM_B1*

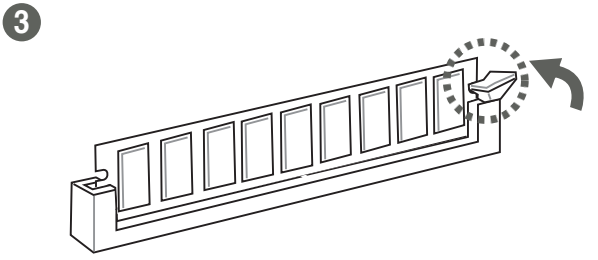
Recommended memory configuration



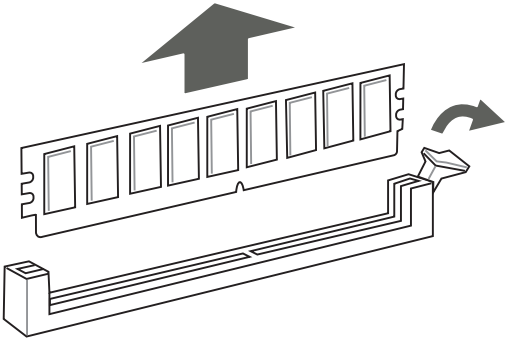
Installing a DIMM







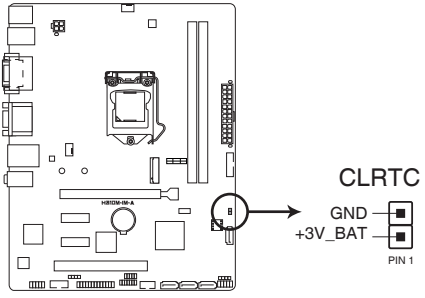
To remove a DIMM



2.5 Jumpers

1. Clear RTC RAM (2-pin CLRTC)

This header allows you to clear the CMOS RTC RAM data of the system setup information such as date, time, and system passwords.



To erase the RTC RAM:

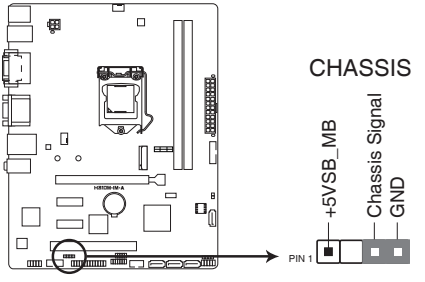
1. Turn OFF the computer and unplug the power cord.
2. Use a metal object such as a screwdriver to short the two pins.
3. Plug the power cord and turn ON the computer.
4. Hold down the **<Del>** key during the boot process and enter BIOS setup to re-enter data.

NOTE: If the steps above do not help, remove the onboard battery and move the jumper again to clear the CMOS RTC RAM data. After clearing the CMOS, reinstall the battery.

2. Chassis Intrusion jumper (4-1 pin CHASSIS)

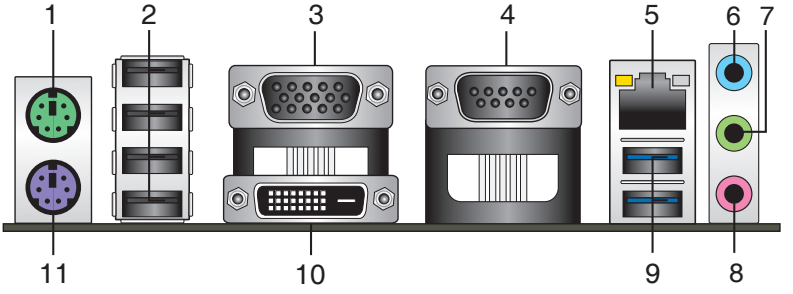
This header is for a chassis-mounted intrusion detection sensor or switch. Connect one end of the chassis intrusion sensor or switch cable to this header. The chassis intrusion sensor or switch sends a high-level signal to this header when a chassis component is removed or replaced. The signal is then generated as a chassis intrusion event.

Move the jumper cap to pins 1-2 when you intend to use the chassis intrusion detection feature.



2.6 Connectors

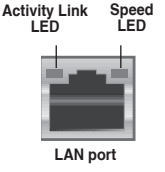
2.6.1 Rear panel connectors



1. **PS/2 Mouse port (green).** This port is for a PS/2 mouse.
2. **USB 2.0 ports.** These 4-pin Universal Serial Bus (USB) ports are for USB 2.0/1.1 devices.
3. **D-Sub port.** This 15-pin port is for a D-Sub monitor or other D-Sub compatible devices.
4. **COM port (COM).** This port connect a modem, or other devices that conform with serial specification.
5. **LAN (RJ-45) ports.** These ports allow Gigabit connection to a Local Area Network (LAN) through a network hub.

   LAN port LED indications

Activity/Link LED		Speed LED	
Status	Description	Status	Description
Off	No link	OFF	10Mbps connection
Orange	Linked	ORANGE	100Mbps connection
Orange (Blinking)	Data activity	GREEN	1Gbps connection
Orange (Blinking then steady)	Ready to wake up from S5 mode		



6. **Line In port (light blue).** This port connects to the tape, CD, DVD player, or other audio sources.
7. **Line Out port (lime).** This port connects to a headphone or a speaker. In the 4.1, 5.1and 7.1-channel configurations, the function of this port becomes Front Speaker Out.

8. **Microphone port (pink).** This port connects to a microphone.

Refer to the audio configuration table for the function of the audio ports in 2.1, 4.1, 5.1, or 7.1-channel configuration.

Audio 2, 4, 5.1 or 7.1-channel configuration

Port	Headset 2-channel	4-channel	5.1-channel	7.1-channel
Light Blue (Rear panel)	Line In	Rear Speaker Out	Rear Speaker Out	Rear Speaker Out
Lime (Rear panel)	Line Out	Front Speaker Out	Front Speaker Out	Front Speaker Out
Pink (Rear panel)	Mic In	Mic In	Bass/Center	Bass/Center
Lime (Front panel)	—	—	—	Side Speaker Out* / Headphone
Pink (Front panel)	—	—	—	Mic In* / Side Speaker Out

To configure a 7.1-channel audio output:

Use a chassis with HD audio module in the front panel to support a 7.1-channel audio output.

9. **USB 3.2 Gen 1 (up to 5Gbps) ports.** These 9-pin Universal Serial Bus (USB) ports are for USB 3.2 Gen 1 devices.

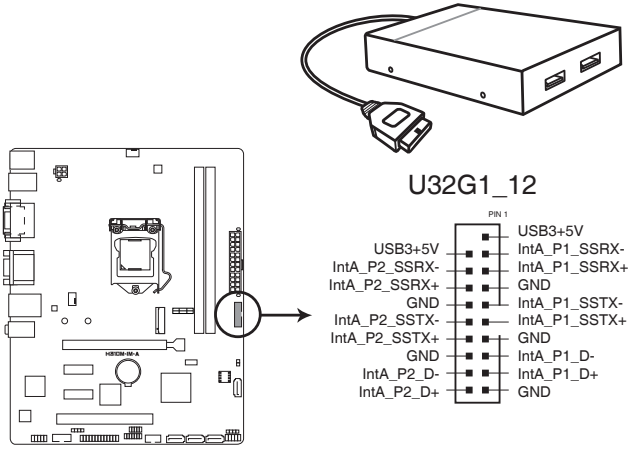
- USB 3.2 Gen 1 devices can only be used for data storage.
- We strongly recommend that you connect USB 3.2 Gen 1 devices to USB 3.2 Gen 1 ports for faster and better performance from your USB 3.2 Gen 1 devices.
- Due to the design of the Intel® 300 series chipset, all USB devices connected to the USB 2.0 and USB 3.2 Gen 1 ports are controlled by the xHCI controller. Some legacy USB devices must update their firmware for better compatibility.

10. **DVI-D port.** This port is for any DVI-D compatible device.
11. **PS/2 Keyboard port (purple).** This port is for a PS/2 keyboard.

2.6.2 Internal connectors

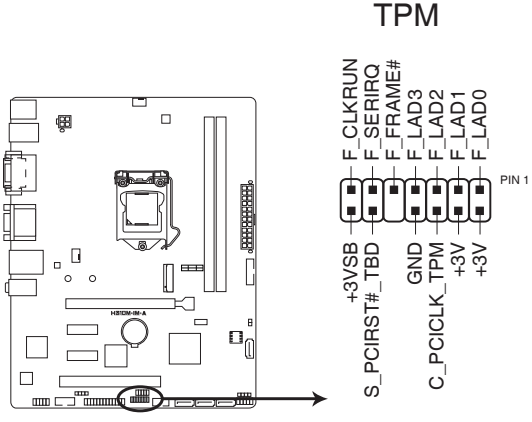
1. USB 3.2 Gen 1 header (20-1 pin U32G1_12)

Connect a USB 3.2 Gen 1 module to this header for additional USB 3.2 Gen 1 front or rear panel ports. This header complies with USB 3.2 Gen 1 specifications and provides faster data transfer speeds of up to 5 Gbps, faster charging time for USB-chargeable devices, optimized power efficiency, and backward compatibility with USB 2.0.



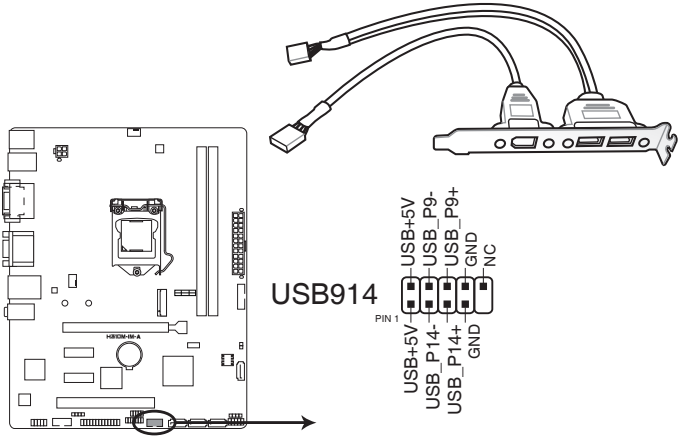
2. TPM header (14-1 pin TPM)

This header 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.



3. USB 2.0 header (10-pin USB914)

This header is for USB 2.0 port. Connect the USB cable to this header. This USB header complies with USB 2.0 specification that supports up to 480 Mbps connection speed.

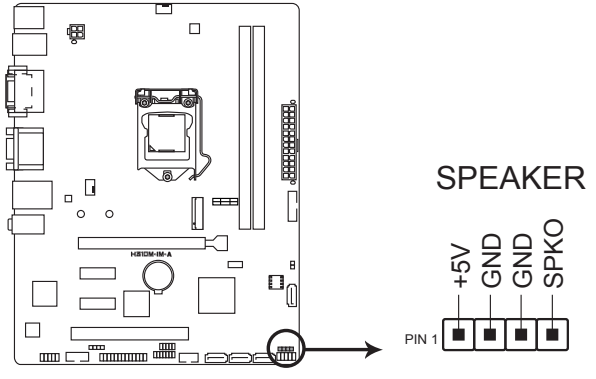


CAUTION! Never connect a 1394 cable to the USB header. Doing so will damage the motherboard.

NOTE: The USB cable is purchased separately.

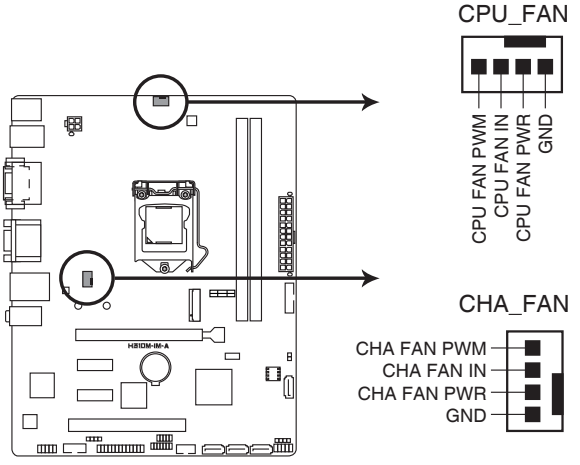
4. Speaker header (4-pin SPEAKER)

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



5. CPU and Chassis Fan headers (4-pin CPU_FAN, 4-pin CHA_FAN)

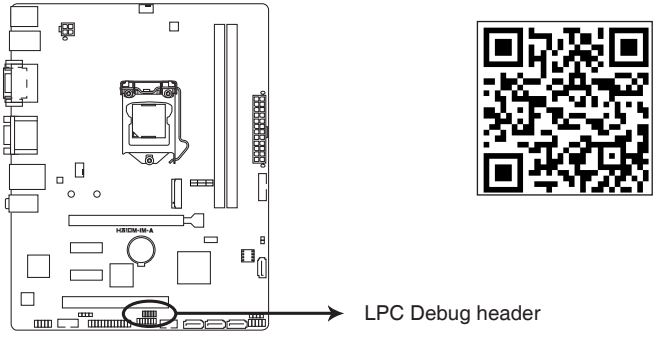
Connect the fan cables to the fan headers on the motherboard, ensuring that the black wire of each cable matches the ground pin of the header.



CAUTION: Do not forget to connect the fan cables to the fan headers. Insufficient air flow inside the system may damage the motherboard components. These are not jumpers! Do not place jumper caps on the fan headers!

6. LPC Debug header

This header allows connection to a LPC debug card.

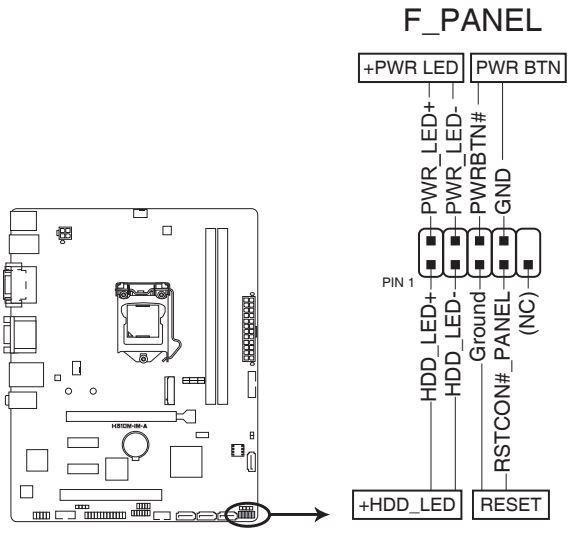


IMPORTANT!

- Scan the QR code to view the meaning of each debug code.
- Debug codes are only available for ASUS LPC debug card.
- Contact your region sales representative for LPC debug header ordering.

7. System Panel header (10-1 pin F_PANEL)

This header supports several chassis-mounted functions.



- **System power LED (2-pin +PWR_LED)**

  This 2-pin header is for the system power LED. Connect the chassis power LED cable to this header. The system power LED lights up when you turn on the system power, and blinks when the system is in sleep mode.

- **Hard disk drive activity LED (2-pin +HDD_LED)**

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

- **ATX power button/soft-off button (2-pin PWR_BTN)**

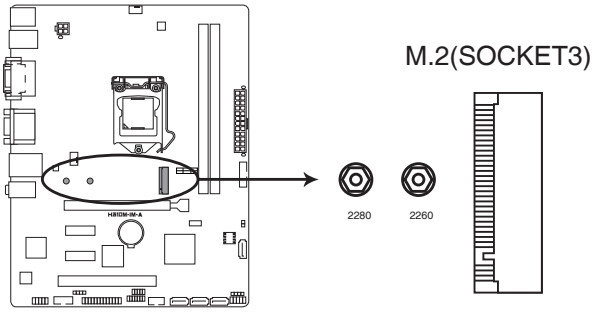
  This 2-pin header is for the system power button.

- **Reset button (2-pin RESET)**

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

8. M.2 socket 3

This socket allows you to install an M.2 SSD module.

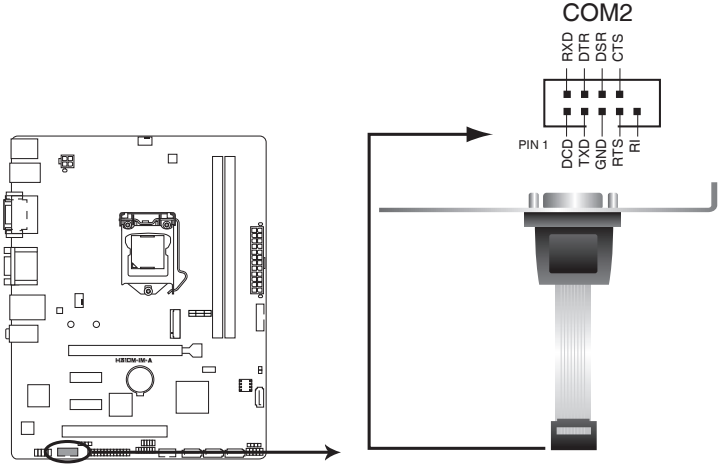


NOTES:

- The M.2 SSD module is purchased separately.
- This socket supports M Key and 2260/2280 storage devices.
- We recommend using a PH1 screwdriver with a torque of 2.0 +/- 0.2 kgf.cm when tightening the screw.

9. COM Port header (10-1 pin COM2)

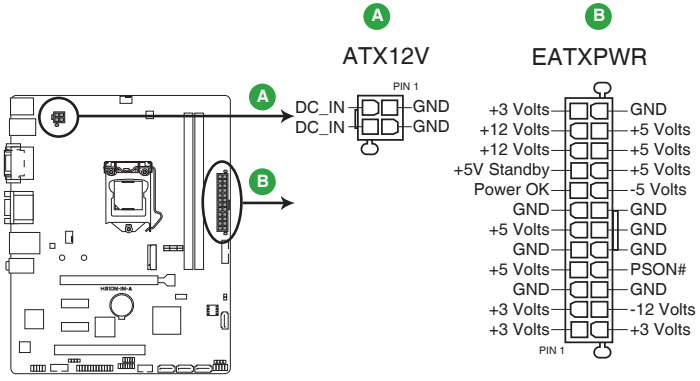
This header is for a serial (COM) port. Connect the serial port cables to this header, then install the module to a slot opening at the back of the system chassis.



NOTE: The serial port cables are purchased separately.

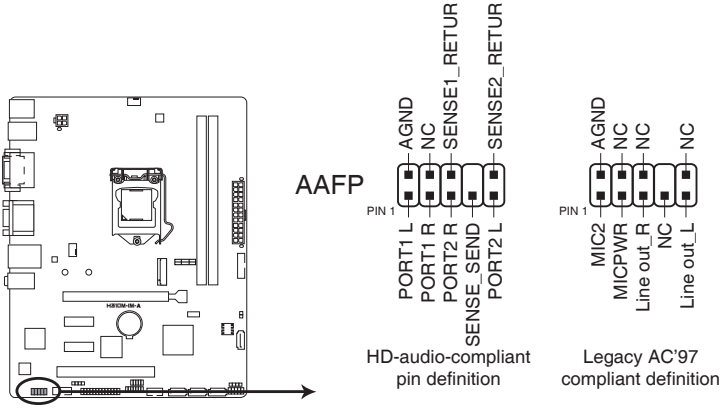
10. ATX Power connectors (24-pin EATXPWR, 4-pin ATX12V)

Correctly orient the ATX power supply plugs into these connectors and push down firmly until the connectors completely fit.



11. Front Panel Audio header (10-1 pin AAFP)

This header is for a chassis-mounted front panel audio I/O module that supports HD Audio standard. Connect one end of the front panel audio I/O module cable to this header.

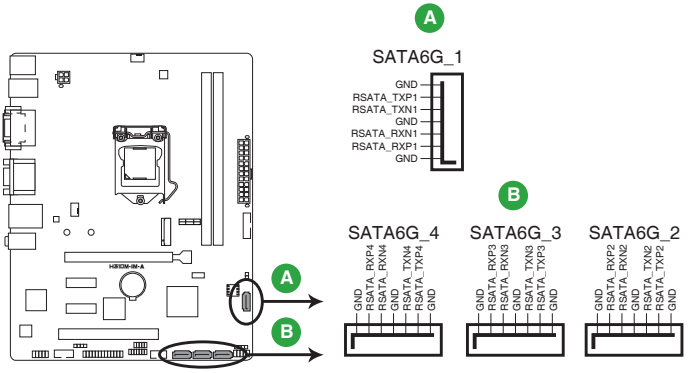


IMPORTANT!

- We recommend that you connect a high-definition front panel audio module to this header to avail of the motherboard's high-definition audio capability.
- If you want to connect a high-definition front panel audio module to this header, set the HD Audio Controller item in the BIOS setup to [Enabled].

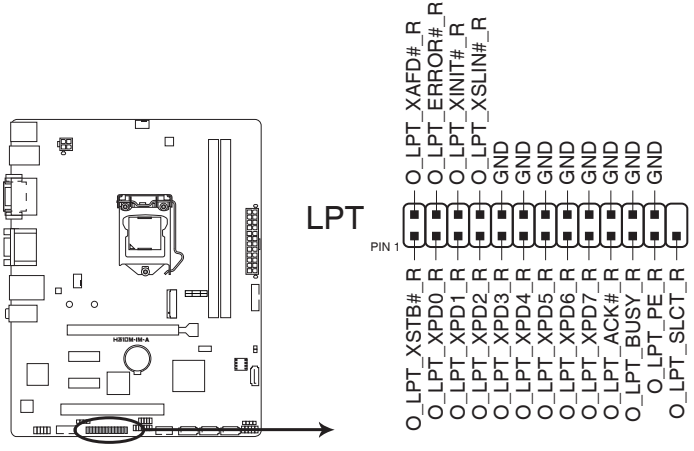
12. Serial ATA 6.0Gb/s ports (7-pin SATA6G_1-4)

These ports connect to Serial ATA 6.0 Gb/s hard disk drives or optical drives via Serial ATA 6.0 Gb/s signal cables.



13. LPT header (26-1 pin LPT)

The LPT (Line Printing Terminal) header supports devices such as a printer. LPT standardizes as IEEE 1284, which is the parallel port interface on IBM PC-compatible computers.



Chapter 3
BIOS setup

Scan the QR code to view the BIOS update guide.

3.1 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 <F2> during the Power-On Self Test (POST). If you do not press <Delete> or <F2>, POST continues with its routines.

Entering BIOS Setup after POST

To enter BIOS Setup after POST:

- Press **<Ctrl>+<Alt>+<Del>** simultaneously.
- Press the reset button on the system chassis.
- 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 two options.

NOTE: Using the power button, reset button, or the <Ctrl>+<Alt>+<Del> keys to reboot a running operating system can cause damage to your data or system. Always shut down the system properly from the operating system.

IMPORTANT:

- Visit the ASUS website at www.asus.com to download the latest BIOS file for this motherboard.
- The default BIOS settings for this motherboard apply to most working conditions and ensures optimal performance. If the system becomes unstable after changing any BIOS settings, load the default settings to regain system stability. Select the option **Load Optimized Defaults** under the Exit Menu or press hotkey F5.
- The BIOS setup screens shown in this section are for reference purposes only, and may not exactly match what you see on your screen.

3.1.1 BIOS menu screen

Menu bar

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

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

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

3.2 Main menu

The Main menu provides you an overview of the basic system information, and allows you to set the system date, time, language, and security settings.

3.2.1 Language [English]

Allows you to choose the BIOS language version from the options. Configuration options: [English] [Français] [Deutsch] [简体中文] [繁體中文] [日本語] [Español] [Русский] [Korean]

3.2.2 System Date [Day MM/DD/YYYY]

Allows you to set the system date.

3.2.3 System Time [HH:MM:SS]

Allows you to set the system time.

3.2.4 Security

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

- If you have forgotten your BIOS password, erase the CMOS Real Time Clock (RTC) RAM to clear the BIOS password. See section **2.5 Jumpers** for information on how to erase the RTC RAM.
- The **Administrator** or **User Password** items on top of the screen show the default **Not Installed**. After you set a password, these items show **Installed**.

Administrator Password

If you have set an administrator password, we recommend that you enter the administrator password for accessing the system.

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. From the **Confirm New Password** box, key in your password again to confirm the password, then click **OK**.

To change an administrator password:

1. Select the **Administrator Password** item and press <Enter>.
2. From the **Enter Current Password** box, key in the current password, then press <Enter>.
3. From the **Create New Password** box, key in a new password, then press <Enter>.
4. From the **Confirm New Password** box, key in your password again to confirm the password, then click **OK**.

To clear the administrator password, follow the same steps as in changing an administrator password, but click **OK** when prompted to create/confirm the password. After you clear the password, the **Administrator Password** item on top of the screen shows **Not Installed**.

User Password

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

To set a user password:

1. Select the **User Password** item and press <Enter>.
2. From the **Create New Password** box, key in a password, then press <Enter>.
3. From the **Confirm New Password** box, key in your password again to confirm the password, then click **OK**.

To change a user password:

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

4. From the **Confirm New Password** box, key in your password again to confirm the password, then click **OK**.

To clear the user password, follow the same steps as in changing a user password, but click **OK** when prompted to create/confirm the password. After you clear the password, the **User Password** item on top of the screen shows **Not Installed**.

3.3 Ai Tweaker menu

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

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

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

3.3.1 CPU Power Enhancement

This item allows you to reset the CPU load-line to the Intel default settings.

Configuration options: [Auto] [Disabled]

3.3.2 CPU Core Ratio

This item allows you to set the CPU core ratio limit per core or synchronize automatically to all cores.
Configuration options: [Auto] [Sync All Cores] [Per Core]

When the CPU Core Ratio is set to **[Sync All Cores]** or **[Per Core]**, the following item appears.

1-Core Ratio Limit

Enter **[Auto]** to apply the CPU default Turbo Ratio setting or manually assign a 1-Core Limit value that must be higher than or equal to the 2-Core Ratio Limit.

When the CPU Core Ratio is set to **[Per Core]**, the following items appears.

2-Core Ratio Limit

Enter **[Auto]** to apply the CPU default Turbo Ratio setting or manually assign a 2-core ratio limit that must be higher than or equal to the 3-core ratio limit.

If you assign a value for 2-Core Ratio Limit, do not set the 1-Core Ratio Limit to **[Auto]**.

3-Core Ratio Limit

Enter **[Auto]** to apply the CPU default Turbo Ratio setting or manually assign a 3-core ratio limit that must be higher than or equal to the 4-core ratio limit.

If you assign a value for 3-Core Ratio Limit, do not set the 1-Core Ratio Limit and 2-Core Ratio Limit to **[Auto]**.

4-Core Ratio Limit

Enter **[Auto]** to apply the CPU default Turbo Ratio setting or manually assign a 4-core ratio limit that must be higher than or equal to the 5-core ratio limit.

If you assign a value for 4-Core Ratio Limit, do not set the 1-Core Ratio Limit, 2-Core Ratio Limit, and 3-Core Ratio Limit to **[Auto]**.

5-Core Ratio Limit

Enter **[Auto]** to apply the CPU default Turbo Ratio setting or manually assign a 5-core ratio limit that must be higher than or equal to the 6-core ratio limit.

If you assign a value for 5-Core Ratio Limit, do not set the 1-Core Ratio Limit, 2-Core Ratio Limit, 3-Core Ratio Limit and 4-Core Ratio Limit to **[Auto]**.

6-Core Ratio Limit

Enter **[Auto]** to apply the CPU default Turbo Ratio setting or manually assign a 6-core ratio limit that must be lower than or equal to the 5-core ratio limit.

If you assign a value for 4-Core Ratio Limit, do not set the 1-Core Ratio Limit, 2-Core Ratio Limit, 3-Core Ratio Limit, 4-Core Ratio Limit, and 5-Core Ratio Limit to **[Auto]**.

3.3.3 DRAM Odd Ratio Mode

This item allows you to enable or disable availability of odd DRAM ratios for improved granularity.
Configuration options: [Enabled] [Disabled]

3.3.4 DRAM Frequency

This item allows you to set the memory operating frequency. The configurable options vary with the BCLK (base clock) frequency setting. Select the auto mode to apply the optimized setting.
Configuration options: [Auto] [DDR4-800MHz] - [DDR4-8533MHz]

3.3.5 Power-saving & Performance Mode

Power-saving & Performance Mode lets you configure the power usage to boost or enhance system performance.

[Auto]	Automatically adjusts the power usage based on the system load.
[Max Power-Saving Mode]	Enables all power-saving settings for maximum energy-saving condition
[Performance Mode]	Disables all power-saving settings to achieve a high system performance.

3.3.6 DRAM Timing Control

The sub-items in this menu allow you to set the DRAM timing control features. Use the <+> and <-> keys to adjust the value. To restore the default setting, type [auto] using the keyboard and press the <Enter> key.

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

Primary Timings

DRAM CAS# Latency

Configuration option: [Auto]

DRAM RAS# to CAS# Delay

Configuration option: [Auto]

DRAM RAS# ACT Time

Configuration options: [Auto]

DRAM Command Rate

Configuration options: [Auto] [1N] [2N] [3N] [N:1]

Secondary Timings

DRAM RAS# to RAS# Delay L

Configuration option: [Auto]

DRAM RAS# to RAS# Delay S

Configuration option: [Auto]

DRAM REF Cycle Time

Configuration option: [Auto]

DRAM Refresh Interval

Configuration option: [Auto]

DRAM WRITE Recovery Time

Configuration option: [Auto]

DRAM READ to PRE Time

Configuration option: [Auto]

DRAM FOUR ACT WIN Time

Configuration option: [Auto]

DRAM WRITE to READ Delay

Configuration option: [Auto]

DRAM WRITE to READ Delay L

Configuration option: [Auto]

DRAM WRITE to READ Delay S

Configuration option: [Auto]

DRAM CKE Minimum Pulse Width

Configuration option: [Auto]

DRAM Write Latency

Configuration option: [Auto]

Skew Control

ODT RTT WR (CHA)

Configuration options: [Auto] [0 DRAM CLOCK] [80 DRAM CLOCK] [120 DRAM CLOCK] [240 DRAM CLOCK] [255 DRAM CLOCK]

ODT RTT PARK (CHA)

Configuration options: [Auto] [0 DRAM CLOCK] [34 DRAM CLOCK] [40 DRAM CLOCK] [48 DRAM CLOCK] [60 DRAM CLOCK] [80 DRAM CLOCK] [120 DRAM CLOCK] [240 DRAM CLOCK]

ODT RTT NOM (CHA)

Configuration options: [Auto] [0 DRAM CLOCK] [34 DRAM CLOCK] [40 DRAM CLOCK] [48 DRAM CLOCK] [60 DRAM CLOCK] [80 DRAM CLOCK] [120 DRAM CLOCK] [240 DRAM CLOCK]

ODT RTT WR (CHB)

Configuration options: [Auto] [0 DRAM CLOCK] [80 DRAM CLOCK] [120 DRAM CLOCK] [240 DRAM CLOCK] [255 DRAM CLOCK]

ODT RTT PARK (CHB)

Configuration options: [Auto] [0 DRAM CLOCK] [34 DRAM CLOCK] [40 DRAM CLOCK] [48 DRAM CLOCK] [60 DRAM CLOCK] [80 DRAM CLOCK] [120 DRAM CLOCK] [240 DRAM CLOCK]

ODT RTT NOM (CHB)

Configuration options: [Auto] [0 DRAM CLOCK] [34 DRAM CLOCK] [40 DRAM CLOCK] [48 DRAM CLOCK] [60 DRAM CLOCK] [80 DRAM CLOCK] [120 DRAM CLOCK] [240 DRAM CLOCK]

ODT_READ_DURATION

Configuration option: [Auto]

ODT_READ_DELAY

Configuration option: [Auto]

ODT_WRITE_DURATION

Configuration option: [Auto]

ODT_WRITE_DELAY

Configuration option: [Auto]

Data Rising Slope

Configuration option: [Auto]

Data Rising Slope Offset

Configuration option: [Auto]

Cmd Rising Slope

Configuration option: [Auto]

Cmd Rising Slope Offset

Configuration option: [Auto]

Ctl Rising Slope

Configuration option: [Auto]

Ctl Rising Slope Offset
Configuration option: [Auto]

Clk Rising Slope
Configuration option: [Auto]

Clk Rising Slope Offset
Configuration option: [Auto]

Data Falling Slope
Configuration option: [Auto]

Data Falling Slope Offset
Configuration option: [Auto]

Cmd Falling Slope
Configuration option: [Auto]

Cmd Falling Slope Offset
Configuration option: [Auto]

Ctl Falling Slope
Configuration option: [Auto]

Ctl Falling Slope Offset
Configuration option: [Auto]

Clk Falling Slope
Configuration option: [Auto]

Clk Falling Slope Offset
Configuration option: [Auto]

RTL IOL Control

DRAM RTL INIT Value
Configuration option: [Auto]

DRAM RTL (CHA DIMM0 Rank0)
Configuration option: [Auto]

DRAM RTL (CHA DIMM0 Rank1)
Configuration option: [Auto]

DRAM RTL (CHA DIMM1 Rank0)
Configuration option: [Auto]

DRAM RTL (CHA DIMM1 Rank1)
Configuration option: [Auto]

DRAM RTL (CHB DIMM0 Rank0)
Configuration option: [Auto]

DRAM RTL (CHB DIMM0 Rank1)
Configuration option: [Auto]

DRAM RTL (CHB DIMM1 Rank0)
Configuration option: [Auto]

DRAM RTL (CHB DIMM1 Rank1)
Configuration option: [Auto]

DRAM IOL (CHA DIMM0 Rank0)
Configuration option: [Auto]

DRAM IOL (CHA DIMM0 Rank1)
Configuration option: [Auto]

DRAM IOL (CHA DIMM1 Rank0)
Configuration option: [Auto]

DRAM IOL (CHA DIMM1 Rank1)
Configuration option: [Auto]

DRAM IOL (CHB DIMM0 Rank0)
Configuration option: [Auto]

DRAM IOL (CHB DIMM0 Rank1)
Configuration option: [Auto]

DRAM IOL (CHB DIMM1 Rank0)
Configuration option: [Auto]

DRAM IOL (CHB DIMM1 Rank1)
Configuration option: [Auto]

IO Latency offset

CHA IO_Latency_offset
Configuration option: [Auto]

CHB IO_Latency_offset
Configuration option: [Auto]

IO Latency RFR delay

CHA RFR delay
Configuration option: [Auto]

CHB RFR delay
Configuration option: [Auto]

Memory Training Algorithms

Early Command Training
Configuration options: [Enabled] [Disabled]

SenseAmp Offset Training
Configuration options: [Enabled] [Disabled]

Early ReadMPR Timing Centering 2D
Configuration options: [Enabled] [Disabled]

Read MPR Training
Configuration options: [Enabled] [Disabled]

Receive Enable Training
Configuration options: [Enabled] [Disabled]

Jedec Write Leveling
Configuration options: [Enabled] [Disabled]

Early Write Time Centering 2D
Configuration options: [Enabled] [Disabled]

Early Read Time Centering 2D
Configuration options: [Auto] [Enabled] [Disabled]

Write Timing Centering 1D
Configuration options: [Enabled] [Disabled]

Write Voltage Centering 1D
Configuration options: [Enabled] [Disabled]

Read Timing Centering 1D
Configuration options: [Enabled] [Disabled]

DIMM ODT Training
Configuration options: [Auto] [Enabled] [Disabled]

Max RTT_WR
Configuration options: [ODT Off] [120Ohms]

DIMM RON Training
Configuration options: [Auto] [Enabled] [Disabled]

Write Drive Strength/Equalization 2D
Configuration options: [Enabled] [Disabled]

Write Slew Rate Training
Configuration options: [Enabled] [Disabled]

Read ODT Training
Configuration options: [Enabled] [Disabled]

Read Equalization Training
Configuration options: [Enabled] [Disabled]

Read Amplifier Training
Configuration options: [Enabled] [Disabled]

Write Timing Centering 2D
Configuration options: [Enabled] [Disabled]

Read Timing Centering 2D
Configuration options: [Enabled] [Disabled]

Command Voltage Centering
Configuration options: [Enabled] [Disabled]

Write Voltage Centering 2D
Configuration options: [Enabled] [Disabled]

Read Voltage Centering 2D
Configuration options: [Enabled] [Disabled]

Late Command Training
Configuration options: [Auto] [Enabled] [Disabled]

Round Trip Latency
Configuration options: [Auto] [Enabled] [Disabled]

Turn Around Timing Training
Configuration options: [Enabled] [Disabled]

Rank Margin Tool
Configuration options: [Enabled] [Disabled]

Memory Test
Configuration options: [Enabled] [Disabled]

DIMM SPD Alias Test
Configuration options: [Enabled] [Disabled]

Receive Enable Centering 1D
Configuration options: [Enabled] [Disabled]

Retrain Margin Check
Configuration options: [Enabled] [Disabled]

Write Drive Strength Up/Dn independently
Configuration options: [Enabled] [Disabled]

Third Timings

tRDRD_sg

Configuration option: [Auto]

tRDRD_dg

Configuration option: [Auto]

tRDWR_sg

Configuration option: [Auto]

tRDWR_dg

Configuration option: [Auto]

tWRWR_sg

Configuration option: [Auto]

tWRWR_dg

Configuration option: [Auto]

tWRRD_sg

Configuration option: [Auto]

tWRRD_dg

Configuration option: [Auto]

tRDRD_dr

Configuration option: [Auto]

tRDRD_dd

Configuration option: [Auto]

tRDWR_dr

Configuration option: [Auto]

tRDWR_dd

Configuration option: [Auto]

tWRWR_dr

Configuration option: [Auto]

tWRWR_dd

Configuration option: [Auto]

tWRRD_dr

Configuration option: [Auto]

tWRRD_dd

Configuration option: [Auto]

TWRPRE

Configuration option: [Auto]

TRDPRE

Configuration option: [Auto]

tREFIX9

Configuration option: [Auto]

OREF_RI

Configuration option: [Auto]

Misc.

MRC Fast Boot

Allows you to enable, disable or automatically set the MRC fast boot.
Configuration options: [Auto] [Enabled] [Disabled]

DRAM CLK Period

Configuration options: [Auto] [1] – [58]

Memory Scrambler

Set this item to enable or disable memory scrambler support.
Configuration options: [Enabled] [Disabled]

Channel A DIMM Control

Allows you to enable or disable the Channel A DIMM slots.
Configuration options: [Enable Both DIMMs] [Disable DIMM0] [Disable DIMM1] [Disable Both DIMMs]

Channel B DIMM Control

Allows you to enable or disable the Channel B DIMM slots.
Configuration options: [Enable Both DIMMs] [Disable DIMM0] [Disable DIMM1] [Disable Both DIMMs]

MCH Full Check

Enable this item to enhance the stability of your system. Disable this item to enhance the DRAM overclocking capability.
Configuration options: [Auto] [Enabled] [Disabled]

Training Profile

Configuration options: [Auto] [Standard Profile] [ASUS User Profile]

DLLBwEn

Configuration option: [Auto]

SPD Write Disable

Configuration options: [TRUE] [FALSE]

3.3.7 DIGI+ VRM

CPU Load-line Calibration

Load-line is defined by Intel® specification and affects CPU power voltage. The CPU working voltage decreases proportionally to CPU loading. Higher load-line calibration could get higher voltage and good overclocking performance, but increases the CPU and VRM thermal conditions. Select from levels 1 to 7 to adjust the load-line slope.
Configuration options [Auto] [Default] [Level 1] - [Level 7]

The actual performance boost may vary depending on your CPU specification.

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

CPU Power Phase Control

This item allows you to set the power phase control of the CPU.

[Auto]	Automatically set the phase control mode.
[Standard]	The phase control will be based on the CPU command.
[Optimized]	Set to the ASUS optimized phase tuning profile.
[Extreme]	Set to the full phase mode.

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

CPU VRM Thermal Control

This item allows you to adjust the temperature limit of the CPU VRM.
Configuration options: [Atuo] [Enabled] [Disabled]

CPU Graphics Load-Line Calibration

Load-line is defined by Intel VRM specification and affects the GT power voltage. The GT working voltage will decrease proportionally depending on the GT loading. Higher levels of the load-line calibration can get a higher voltage and a better overclocking performance but increases the GT and VRM thermal. Select from level 1 to 7 to adjust the GT power voltage from 0% to 100%. Configuration options: [Auto] [Level 1] [Level 2] [Level 3] [Level 4] [Level 5] [Level 6] [Level 7]

The boosted performance may vary depending on the GT specification. Do not remove the thermal module.

3.3.8 Internal CPU Power Management

The subitems in this menu allow you to set the CPU ratio and features.

Intel(R) SpeedStep(tm)

Allows the operating system to dynamically adjust the processor voltage and cores frequency to decrease the average power consumption and decrease average heat production. Configuration options: [Auto] [Enabled] [Disabled]

Turbo Mode

Allows you to enable your processor cores to run faster than the base operating frequency when it is below power, current and specification limit. Configuration options: [Disabled] [Enabled]

Turbo Mode Parameters

The following items appear only when you set the Turbo Mode to **[Enabled]**.

Long Duration Package Power Limit

As know as the power limit 1 in Watts. The default value will be the TDP (thermal design power). The turbo ratio can be maintained for a duration to exceed the TDP for the maximum system performance.
Configuration options: [Auto] [1] - [4095]

Package Power Time Window

As know as the power limit 1 in seconds. The value indicates the maintained duration for the turbo ratio to exceed TDP (thermal design power).
Configuration options: [Auto] [1] - [127]

Short Duration Package Power Limit

Also know as the power limit 2 in Watts. It is the second power limit to provide a rapid protection when the package power exceed power limit 1. The default setting is 1.25 times the power limit 1. According to Intel, the platform must be capable of supporting the duration for up to 10 msec when the turbo ratio exceeds the power limit 2.
Configuration options: [Auto] [1] - [4095]

IA AC Load Line

This item allows you to set the AC loadline defined in 1/100 mOhms. Use the <+> and <-> keys to adjust the value.
Configuration options: [Auto] [0.01] - [62.49]

IA DC Load Line

This item allows you to set the DC loadline defined in 1/100 mOhms. Use the <+> and <-> keys to adjust the value.
Configuration options: [Auto] [0.01] - [62.49]

3.3.9 CPU Core/Cache Current Limit Max.

This item allows you to configure a higher current limit to prevent a frequency or power throttling when overclocking. Use the <+> and <-> keys to adjust the value.
Configuration options: [Auto] [0.00] - [255.50]

3.3.10 CPU Graphics Current Limit

Allows you to set a higher current limit to prevent a frequency or power throttling when overclocking. Use the <+> or <-> keys to adjust the value.

3.3.11 Min. CPU Cache Ratio

This item allows you to set the minimum possible CPU cache ratio. Use the <+> and <-> keys to adjust the value.
Configuration option: [Auto]

3.3.12 Max. CPU Cache Ratio

This item allows you to set the maximum possible CPU cache ratio. Use the <+> and <-> keys to adjust the value.
Configuration option: [Auto]

3.3.13 Max. CPU Graphics Ratio

This item allows you to set the maximum possible CPU graphics ratio. Use the <+> and <-> keys to adjust the value.
Configuration option: [Auto]

3.3.14 DRAM Voltage

This item allows you to configure the voltage for the DRAM.

Configuration options: [Auto] [1.20V] [1.25V] [1.35V] [1.40V]

3.3.15 DRAM REF Voltage Control

DRAM CTRL REF Voltage

Configures the DRAM reference voltage on the control lines. The reference voltage will be the DRAM voltage times the configured value.
Configuration options: [Auto] [0.39500X] - [0.63000X]

DRAM DATA REF Voltage on CHA DIMM0 Rank0 BL0-7

Configures the DRAM Data REF Voltage.
Configuration option: [Auto]

DRAM DATA REF Voltage on CHA DIMM0 Rank1 BL0-7

Configures the DRAM Data REF Voltage.
Configuration option: [Auto]

DRAM DATA REF Voltage on CHB DIMM0 Rank0 BL0-7

Configures the DRAM Data REF Voltage.
Configuration option: [Auto]

DRAM DATA REF Voltage on CHB DIMM0 Rank1 BL0-7

Configures the DRAM Data REF Voltage.
Configuration option: [Auto]

3.4 Advanced menu

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

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

3.4.1 Platform Misc Configuration

The items in this menu allow you to configure the platform-related features.

PCI Express Native Power Management [Disabled]

This item allows you to enhance the power saving feature of PCI Express and perform ASPM operations in the operating system. Configuration options: [Disabled] [Enabled]

The following item appears only when you set the PCI Express Native Power Management to **[Enabled]**.

Native ASPM [Disabled]

[Enabled]	Windows® Vista OS controls the ASPM (active state power management) support for devices.
[Disabled]	BIOS controls the ASPM support for the device.
[Auto]	Automatic configuration.

PCH - PCI Express options

PCH DMI ASPM [Disabled]

This item allows you to control the Active State Power Management on both NB (NorthBridge) side and SB (SouthBridge) side of the DMI Link.
Configuration options: [Disabled] [L0s] [L1] [L0sL1] [Auto]

ASPM [Disabled]

This item allows you to select the ASPM state for energy-saving conditions.
Configuration options: [Disabled] [L0s] [L1] [L0sL1] [Auto]

L1 Substates [Disabled]

This item allows you to select the PCI Express L1 Substates settings.
Configuration options: [Disabled] [L1.1] [L1.1 & L1.2]

PCI Express Clock Gating [Enabled]

This item allows you to enable or disable PCI Express Clock Gating for each port.
Configuration options: [Disabled] [Enabled]

SA - PCI Express options

DMI Link ASPM Control [Disabled]

This item allows you to control the Active State Power Management on both CPU and PCH (platform controller hub) Both DMI link ASPM control items of the CPU and PCH sides must be enabled for the ASPM to take effect. Configuration options: [Disabled] [L0s] [L1] [L0sL1]

PEG-ASPM [Disabled]

This item allows you to select the ASPM state for energy-saving conditions, or use the ASUS optimized energy saving profile. Configuration options: [Disabled] [Auto] [ASPM L0s] [ASPM L1] [ASPM L0sL1]

3.4.2 CPU Configuration

The items in this menu show CPU-related information the BIOS automatically detects.

The items shown in the submenu may be different depending on the type of CPU installed.

SW Guard Extensions [Software Controlled]

This item enables/disables the Software Guard Extensions (SGX). Configuration options: [Disabled] [Software Controlled]

Tcc Offset Time Window [Auto]

This item allows you to specify the time window for the Running Average Temperature Limit (RATL) feature. Configuration options: [Auto] [Disabled] [5 ms] [10 ms] [55 ms] [156 ms] [375 ms] [500 ms] [750 ms] ~ [448 sec]

Hardware Prefetcher [Enabled]

This item allows you to turn on/off the MLC streamer prefetcher. Configuration options: [Disabled] [Enabled]

Adjacent Cache Line Prefetcher [Enabled]

This item allows you to turn on/off prefetching adjacent cache lines. Configuration options: [Disabled] [Enabled]

Intel Virtualization Technology [Disabled]

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

Active Processor Cores [All]

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

For some CPU types, only [**All**] and [**1**] appear.

Hyper-threading [Enabled]

The Intel Hyper-Threading Technology allows a hyper-threading processor to appear as two logical processors to the operating system, allowing the operating system to schedule two threads or processes simultaneously.

[Enabled] Two threads per activated core are enabled.
[Disabled] Only one thread per activated core is enabled.

Hyper-Threading appears only when using a CPU supporting Hyper-Threading Technology.

Thermal Monitor [Enabled]

The item allows you to enable or disable Thermal Monitor.

Configuration options: [Disabled] [Enabled]

CPU Power Management Control

This item allows you to manage and configure the CPU's power.

Intel(R) SpeedStep(tm) [Auto]

This item allows your system to support more than two frequency ranges. Configuration options: [Auto] [Disabled] [Enabled]

Intel(R) Speed Shift Technology [Auto]

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

Turbo Mode [Enabled]

This item allows you to automatically set the CPU cores to run faster than the base operating frequency when it is below the operating power, current and temperature specification limit. Configuration options: [Enabled] [Disabled]

Turbo Mode is only available on selected CPU models only.

CPU C-states [Auto]

This item allows you to set the power saving of the CPU states. Configuration options: [Auto] [Disabled] [Enabled]

The following items appear only when you set the CPU C-States to [Enabled].

Enhanced C-states [Enabled]

[Enabled] Enables enhanced C1 state.
[Disabled] Disables enhanced C1 state.

CPU C3 Report [Enabled]

Allows you to disable or enable the CPU C3 report to OS. Configuration options:

[Enabled] [Disabled]

CPU C6 Report [Disabled]

Allows you to disable or enable the CPU C6 report to OS. Configuration options: [Enabled] [Disabled]

CPU C7 Report [Disabled]

Allows you to disable or enable the CPU C7 report to OS. Configuration options: [Disabled] [CPU C7] [CPU C7s]

CPU C8 Report [Disabled]

Allows you to disable or enable the CPU C8 report to OS. Configuration options: [Enabled] [Disabled]

CPU C9 Report [Disabled]

Allows you to disable or enable the CPU C9 report to OS. Configuration options: [Enabled] [Disabled]

CPU C10 Report [Disabled]

Allows you to disable or enable the CPU C10 report to OS. Configuration options: [Enabled] [Disabled]

Package C State Limit [Auto]

Allows you to disable or enable the whole C-State package support. Configuration options: [C0/C1] [C2] [C3] [C6] [C7] [C7s] [C8] [C9] [C10] [Auto] [CPU Default] [Auto]

CFG Lock [Disabled]

This item allows you to enable or disable the CFG lock. Configuration options: [Disabled] [Enabled]

3.4.3 System Agent (SA) Configuration

VT-d [Disabled]

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

Above 4G Decoding [Disabled]

Allows you to enable or disable the 4G decoding for 64-bit devices when the system supports the 64-bit PCI decoding. Configuration options: [Enabled] [Disabled]

Memory Configuration

Memory Remap [Enabled]

Allows you to enable or disable remapping the memory above 4GB. Configuration options: [Disabled] [Enabled]

Graphics Configuration

Allows you to select a primary display from iGPU, and PCIe graphical devices.

Primary Display [Auto]

Allows you to select which of the iGPU/PCIE Graphics device should be the

Primary Display. Configuration options: [Auto] [CPU Graphics] [PCIE] [PEG]

iGPU Multi-Monitor [Disabled]

Allows you to enable the iGPU Multi-Monitor. Set this item to [Enabled] to empower both integrated and discrete graphics. The iGPU shared system memory size will be fixed at 64MB. Configuration options: [Disabled] [Enabled]

DVMT Pre-Allocated [64M]

Allows you to select DVMT 5.0 Pre_Allocated (Fixed) Graphics Memory size used by the Internal Graphics Device. Configuration options: [32M] [64M] [96M] ~ [1024M]

RC6(Render Standby) [Auto]

Allows you to enable or disable render standby support. Configuration options: [Disabled] [Auto]

PEG Port Configuration

Allows you to configure the PEG Port settings.

PCIEX16_1 Link Speed [Auto]

Allows you to configure the PCIEX16_1 speed. Configuration options: [Auto] [Gen1] [Gen2] [Gen3]

3.4.4 PCH Configuration

PCI Express Configuration

PCIe Speed [Auto]

Allows you to configure the PCIe speed. Configuration options: [Auto] [Gen1] [Gen2]

IOAPIC 24-119 Entries [Enabled]

Sets to whether allow IOAPIC 24-119 Entries to expand to PIRQI-PIRQX. Configuration options: [Disabled] [Enabled]

IOAPIC 24-119 Entries [Enabled]

Sets to whether allow IOAPIC 24-119 Entries to expand to PIRQI-PIRQX. Configuration options: [Disabled] [Enabled]

System Time and Alarm Source [ACPI Time and Alarm Device]

Allows you to select source of system time and alarm functions.

Configuration options: [ACPI Time and Alarm Device] [Legacy RTC]

3.4.5 PCH Storage Configuration

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

corresponding SATA port.

SATA Controller(s) [Enabled]

Enables or disables onboard the SATA device. Configuration options: [Disabled] [Enabled]

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

SATA Mode Selection [AHCI]

Determines how SATA controller(s) operate. This PCH SKU does not support RST feature.

Configuration options: [AHCI]

Aggressive LPM Support [Disabled]

This item is designed for LPM (link power management) support with a better energy saving conditions. When disabled, the hot plug function of SATA ports are disabled. Configuration options: [Disabled] [Enabled]

Smart Self Test [Enabled]

This item allows you to enable or disable the SMART Self Test on all HDDs during POST. Configuration options: [Disabled] [Enabled]

SATA6G_1~4(Gray) [Enabled]

Allow you to enable/disable the SATA6G_1~4 port. Configuration options: [Disabled] [Enabled]

SATA6G_1~4 Hot Plug [Disabled]

These items allow you to enable/disable SATA Hot Plug Support. Configuration options: [Disabled] [Enabled]

3.4.6 PCH-FW Configuration

TPM Device Selection [Discrete TPM]

This item allows you to select the TPM device. Configuration options: [Discrete TPM] [Firmware TPM]

3.4.7 Onboard Devices Configuration

HD Audio Controller [Enabled]

[Enabled] Enables the HD Audio Device.

[Disabled] Disables the HD Audio Device.

The following items appear only when you set the HD Audio Controller item to [Enabled].

DVI Port Audio [Disabled]

This item allows you to enable or disable DVI Port Audio.

Configuration options: [Disabled] [Enabled]

Realtek LAN Controller [Enabled]

[Enabled] Enables the Realtek LAN controller.

[Disabled] Disables the controller.

The following items appear only when you set the HD Audio Controller item to [Enabled].

Realtek PXE OPROM [Disabled]

This item allows you to enable or disablethe PXE Option ROM of the Realtek LAN controller.

Configuration options: [Disabled] [Enabled]

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

Allows you to disable or enable USB power when your PC is in the S5 state.

Configuration options: [Disabled] [Enabled]

Serial Port Configuration

The sub-items in this menu allow you to set the serial port configuration.

Serial Port [Enabled]

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

The following item appears only when you set **Serial Port** to **[Enabled]**.

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

Allows you to choose the setting for Super IO device.
Configuration options: [IO=3F8h; IRQ=4] [IO=2F8h; IRQ=3] [IO=3E8h; IRQ=4] [IO=2E8h; IRQ=3]

Serial Port 2 Configuration

The sub-items in this menu allow you to set the serial port configuration.

Serial Port [Enabled]

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

The following item appears only when you set **Serial Port** to **[Enabled]**.

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

Allows you to choose the setting for Super IO device.
Configuration options: [IO=3F8h; IRQ=4] [IO=2F8h; IRQ=3] [IO=3E8h; IRQ=4] [IO=2E8h; IRQ=3]

Parallel Port Configuration

Allows you to set parameters of Parallel Port.

Parallel Port [Enabled]

Allows you to enable or disable the parallel port (LPT/LPTE).

Configuration options: [Disabled] [Enabled]

The following item appears only when you set **Serial Port** to **[Enabled]**.

Change Settings [Auto]

Allows you to choose the setting for Super IO device.
Configuration options: [IO=378h; IRQ=5] [IO=378h; IRQ=5,6,7,9,10,11,12] [IO=278h; IRQ=5,6,7,9,10,11,12] [IO=3BCh; IRQ=5,6,7,9,10,11,12]

3.4.8 APM Configuration

ErP Ready [Disabled]

Allows BIOS to switch off some power at S5 to get the system ready for ErP requirement. When set to [Enabled], all other PME options will be switched off. Configuration options: [Enable(S4+S5)] [Enable(S5)] [Disabled]

CEC Ready [Disabled]

Enable this item to allow your system to comply with CEC (California Energy Commission) regulations to save some power at S0 state. Configuration options: [Enable] [Disabled]

Restore AC Power Loss [Power Off]

[Power On] The system goes into on state after an AC power loss.

[Power Off] The system goes into off state after an AC power loss.

[Last State] The system goes into either off or on state, whatever the system state was before the AC power loss.

Power On By PCI-E [Disabled]

This item allows you to enable or disable the Wake-on-LAN function of the onboard LAN controller or other installed PCIe LAN cards. Configuration options: [Disabled] [Enabled]

Power On By Ring [Disabled]

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

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

Power On By RTC [Disabled]

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

3.4.9 PCI Subsystem Settings

SR-IOV Support [Disabled]

Allows you to enable or disable Single Root IO Virtualization Support.

Configuration options: [Enable] [Disabled]

3.4.10 USB Configuration

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

Legacy USB Support [Enabled]

[Enabled] Enables the support for USB devices on legacy operating systems (OS).

[Disabled] USB devices are only available when running BIOS Setup.

[Auto] Allows the system to detect the presence of USB devices at startup. If detected, the USB controller legacy mode is enabled. If no USB device is detected, the legacy USB support is disabled.

XHCI Hand-off [Disabled]

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

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

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

USB Single Port Control

This item allows you to enable or disable the individual USB ports.

Refer to the manual for the location of the USB ports.

3.4.11 Network Stack Configuration

Network Stack [Disabled]

This item allows user to disable or enable the UEFI network stack. Configuration options: [Disabled] [Enabled]

The following two items appear only when you set the previous item to [Enabled].

Ipv4 PXE Support [Enabled]

This item allows user to disable or enable the Ipv4 PXE Boot support.
Configuration options: [Disabled] [Enabled]

Ipv6 PXE Support [Enabled]

This item allows user to disable or enable the Ipv6 PXE Boot support.
Configuration options: [Disabled] [Enabled]

3.4.12 NVMe Configuration

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

3.4.13 HDD Secure Erase

This menu displays the HDDs that suppot Secure Erase function.

3.4.14 HDD/SSD SMART Information

This menu displays the SMART information of the connected devices.

3.5 Monitor menu

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

CPU / MotherBoard Temperature [xxxºC/xxxºF]

The onboard hardware monitor automatically detects and displays the CPU/ motherboard temperatures. Select **Ignore** if you do not wish to display the detected temperature.

CPU / Chassis Fan Speed [xxxx RPM] or [Ignore] / [N/A]

The onboard hardware monitor automatically detects and displays the CPU / chassis fan speeds in rotations per minute (RPM). If the fan is not connected to the motherboard, the field shows N/A. Select Ignore if you do not wish to display the detected speed.

CPU Core Voltage, 3.3V Voltage, 5V Voltage, 12V Voltage

The onboard hardware monitor automatically detects the voltage output through the onboard voltage regulators. Select Ignore if you do not want to detect this item.

Q-Fan Configuration

Q-Fan Tuning

Click [OK] button to detect the lowest speed and configure the minimum duty circle for each fan. Do not shut down or reset your system during the tuning progress.
Configuration options: [Ok] [Cancel]

CPU Q-Fan Control [PWM Mode]

[Disabled] Disables the CPU Q-Fan control feature.

[PWM Mode] Enable the CPU Q-Fan control in PWM mode for 4-pin CPU fan.

The following items appear only when you set **CPU Q-Fan Control** to [PWM Mode].

CPU Fan Step Up [0 sec]

This item allows you to set the value of the CPU fan step up.

Configuration options: [0 sec] [2.1 sec] [2.8 sec] [3.6 sec] [4.2 sec] [5.0 sec] [6.3 sec] [8.5 sec] [12 sec] [25 sec]

CPU Fan Step Down [0 sec]

This item allows you to set the value of the CPU fan step down.

Configuration options: [0 sec] [2.1 sec] [2.8 sec] [3.6 sec] [4.2 sec] [5.0 sec] [6.3 sec] [8.5 sec] [12 sec] [25 sec]

CPU Fan Speed Low Limit [200 RPM]

This item appears only when you enable the CPU Q-Fan Control feature and allows you to disable or set the CPU fan warning speed. Configuration options: [Ignore] [200RPM] [300 RPM] [400 RPM] [500 RPM] [600RPM]

CPU Fan Profile [Standard]

This item appears only when you enable the CPU Q-Fan Control feature and allows you to set the appropriate performance level of the CPU fan.

[Standard] Sets to [Standard] to make the CPU fan automatically adjust depending on the CPU temperature.

[Silent] Sets to [Silent] to minimize the fan speed for quiet CPU fan operation.

[Turbo] Sets to [Turbo] to achieve maximum CPU fan speed.

[Manual] Sets to [Manual] to assign detailed fan speed control parameters.

The following four items appear only when you set **CPU Fan Profile** to [Manual].

CPU Upper Temperature [70]

Use the <+> and <-> keys to adjust the upper limit of the CPU temperature.

CPU Fan Max. Duty Cycle(%) [100]

Use the <+> and <-> keys to adjust the maximum CPU fan duty cycle. The values range from 20% to 100%. When the CPU temperature reaches the upper limit, the CPU fan will operate at the maximum duty cycle.

CPU Middle Temperature [25]

Use the <+> or <-> keys to set the value for CPU Middle Temperature. The range of the values depends on the CPU installed.

CPU Fan Middle Duty Cycle(%) [20]

Use the <+> or <-> keys to adjust the CPU fan middle duty cycle. When the CPU temperature reaches the middle value, the CPU fan operates at the middle duty cycle.

CPU Lower Temperature [20]

Displays the lower limit of the CPU temperature.

CPU Fan Min. Duty Cycle(%) [20]

Use the <+> and <-> keys to adjust the minimum CPU fan duty cycle. When the CPU temperature is under the lower limit, the CPU fan will operate at the minimum duty cycle.

Chassis Fan(s) Configuration

Chassis Fan Q-Fan Control [PWM mode]

[PWM mode] Enables the chassis Q-Fan control in PWM mode for 4-pin chassis fan.

[DC mode] Enables the chassis Q-Fan control in DC mode for 3-pin chassis fan.

[Disabled] Disables the chassis Q-Fan control feature.

The following items appear only when you set the Chassis Fan Q-Fan Control to **[PWM Mode]** or **[DC Mode]**.

Chassis Fan Q-Fan Source [CPU]

This item controls the assigned fan according to the selected temperature source.
Configuration options: [CPU] [MotherBoard]

Chassis Fan1 Step Up [0 sec]

This item allows you to set the value of the Chassis fan1 step up.
Configuration options: [0 sec] [12 sec] [25 sec] [51 sec] [76 sec] [102 sec] [127 sec] [153 sec] [178 sec] [204 sec]

Chassis Fan1 Step Down [0 sec]

This item allows you to set the value of the Chassis fan1 step down.
Configuration options: [0 sec] [12 sec] [25 sec] [51 sec] [76 sec] [102 sec] [127 sec] [153 sec] [178 sec] [204 sec]

Chassis Fan Speed Low Limit [200 RPM]

This item appears only when you enable the Chassis Q-Fan Control feature and allows you to disable or set the chassis fan warning speed. Configuration options: [Ignore] [200RPM] [300 RPM] [400 RPM] [500 RPM] [600 RPM]

Chassis Fan Profile [Standard]

This item appears only when you enable the Chassis Q-Fan Control feature and allows you to set the appropriate performance level of the chassis fan.

[Standard]	Sets to [Standard] to make the chassis fan automatically adjust depending on the chassis temperature.
[Silent]	Sets to [Silent] to minimize the fan speed for quiet chassis fan operation.
[Turbo]	Sets to [Turbo] to achieve maximum chassis fan speed.
[Manual]	Sets to [Manual] to assign detailed fan speed control parameters.

The following four items appear only when you set **Chassis Fan Q-Fan Control** to **[PWM mode]** and **Chassis Fan Profile** to **[Manual]**.

Chassis Fan Upper Temperature [70]

Use the <+> and <-> keys to adjust the upper limit of the chassis temperature.

Chassis Fan Max. Duty Cycle(%) [100]

Use the <+> and <-> keys to adjust the maximum chassis fan duty cycle. When the chassis temperature reaches the upper limit, the chassis fan will operate at the maximum duty cycle.

Chassis Fan Middle Temperature [25]

Use the <+> or <-> keys to set the value for Chassis Fan Middle Temperature.

Chassis Fan Middle Duty Cycle(%) [20]

Use the <+> or <-> keys to adjust the chassis fan middle duty cycle.

Chassis Fan Lower Temperature [20]

Displays the lower limit of the Chassis Fan temperature.

Chassis Fan Min. Duty Cycle(%) [20]

Use the <+> and <-> keys to adjust the minimum chassis fan duty cycle. The values range from 20% to 100%. When the chassis temperature is under 40ºC, the chassis fan will operate at the minimum duty cycle.

The following four items appear only when you set **Chassis Fan Q-Fan Control** to **[DC Mode]** and **Chassis Fan Profile** to **[Manual]**.

Chassis Fan Upper Temperature [70]

Use the <+> and <-> keys to adjust the upper limit of the chassis temperature.

Chassis Fan Max. Duty Cycle(%) [100]

Use the <+> and <-> keys to adjust the maximum chassis fan duty cycle. When the chassis temperature reaches the upper limit, the chassis fan will operate at the maximum duty cycle.

Chassis Fan Middle Temperature [45]

Use the <+> or <-> keys to set the value for Chassis Fan Middle Temperature.

Chassis Fan Middle Duty Cycle(%) [60]

Use the <+> or <-> keys to adjust the chassis fan middle duty cycle.

Chassis Fan Lower Temperature [40]

Displays the lower limit of the Chassis Fan temperature.

Chassis Fan Min. Duty Cycle(%) [60]

Use the <+> and <-> keys to adjust the minimum chassis fan duty cycle. The values range from 20% to 100%. When the chassis temperature is under 40ºC, the chassis fan will operate at the minimum duty cycle.

Chassis Intrusion Detection Support [Disabled]

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

3.6 Boot menu

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

Boot Configuration

Fast Boot [Enabled]

[Enabled] Select to accelerate the boot speed.

[Disabled] Select to go back to normal boot speed.

The following item appears only when you set Fast Boot to [Enabled].

Next Boot after AC Power Loss [Normal Boot]

[Normal Boot] Returns to normal boot on the next boot after AC power loss.

[Fast Boot] Accelerates the boot speed on the next boot after AC power loss.

Boot Logo Display [Auto]

[Auto] Adjusts logo automatically based on Windows® display requrements.

[Full Screen] Maximize the boot logo size.

[Disabled] Hide the logo during POST.

POST Delay Time [3 sec]

This item appears only when you set Boot Logo Display to [Auto] and [Full Screen] This item allows you to select the desired additional POST waiting time to easily enter the BIOS setup. You can only execute the POST delay time during Normal Boot. The values range from 0 to 10 seconds.

This feature will only work under normal boot.

Bootup NumLock State [On]

This item allows you to enable or disable power-on state of the NumLock. Configuration options: [On] [Off]

Wait for 'F1' If Error [Enabled]

When this item is set to [Enabled], the system waits for the F1 key to be pressed when error occurs. Configuration options: [Disabled] [Enabled]

Option ROM Messages [Force BIOS]

[Force BIOS] The third-party ROM messages will be forced to display during the boot sequence.

[Keep Current] The third-party ROM messages will be displayed only if the third-party manufacturer had set the add-on device to do so.

Interrupt 19 Capture [Disabled]

This item allows you to trap Interrupt 19 by the option ROMs. Configuration options: [Disabled] [Enabled]

AMI Native NVMe Driver Support [Enabled]

Configuration options: [Disabled] [Enabled]

Secure Boot

Allows you to configure the Windows® Secure Boot settings and manage its keys to protect the system from unauthorized access and malwares during POST.

OS Type [Other OS]

Allows you to select your installed operating system.

[Windows UEFI mode]	This item allows you to select your installed operating system. Execute the Microsoft® Secure Boot check. Only select this option when booting on Windows® UEFI mode or other Microsoft® Secure Boot compliant OS.
[Other OS]	Get the optimized function when booting on Windows® non-UEFI mode. Microsoft® Secure Boot only supports Windows® UEFI mode.

Key Management

This allows you to manage the Secure Boot keys.

Install Default Secure Boot keys

This item allows you to load the defualt secure boot keys.

Clear Secure Boot keys

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

Save all Secure Boot variables

This item allows you to save all the Secure Boot keys to a USB storage device.

PK Management

The Platform Key (PK) locks and secures the firmware from any non-permissible changes. The system verifies the PK before your system enters the OS.

Save to File

This item allows you to save the downloaded PK to a USB storage device.

Set New Key

This item allows you to load the downloaded PK from a USB storage device.

The PK file must be formatted as a UEFI variable structure with time-based authenticated variable.

Delete Key

This item allows you to delete the PK from your system. Once the PK is deleted, all the system's Secure Boot keys will not be active.

KEK Management

The KEK (Key-exchange Key or Key Enrollment Key) manages the Signature database (db) and Revoked Signature database (dbx).

Key-exchange Key (KEK) refers to Microsoft® Secure Boot Key-Enrollment Key (KEK).

Save to File

Allows you to save the downloaded KEK to a USB storage device.

Set New Key

Allows you to load the downloaded KEK from a USB storage device.

Append Key

Allows you to load the additional KEK from a storage device for an additional db and dbx loaded management.

The KEK file must be formatted as a public key certificate or UEFI variable structure with time-based authenticated variable.

Delete key

Allows you to delete the Key from your system. Configuration options: [Yes] [No]

DB Management

The db (Authorized Signature database) lists the signers or images of UEFI applications, operating system loaders, and UEFI drivers that you can load on the single computer.

Save to File

Allows you to save the downloaded db to a USB storage device.

Set New Key

Allows you to load the downloaded db from a USB storage device.

Append Key

Allows you to load the additional KEK from a storage device for an additional db
and dbx loaded management.

The db file must be formatted as a UEFI variable structure with time-based authenticated variable.

Delete Key

Allows you to delete the db file from your system. Configuration options: [Yes] [No]

DBX Management

The DBX (Revoked Signature database) lists the forbidden images of db items that are no longer trusted and cannot be loaded.

Save to File

Allows you to load the downloaded dbx to a USB storage device.

Set New Key

Allows you to load the downloaded dbx from a USB storage device.

Append Key

Allows you to load the additional KEK from a storage device for an additional db and dbx loaded management.

The dbx file must be formatted as a UEFI variable structure with time-based authenticated variable.

Delete key

Allows you to delete the Key from your system. Configuration options: [Yes] [No]

Boot Option Priorities

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

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

Boot Override

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

3.7 Tool menu

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

ASUS EZ Flash 3 Utility

This item allows you to run ASUS EZ Flash 3 utility. When you press <Enter>, a confirmation message appears. Use the left/right arrow key to select between [Yes] or [No], then press <Enter> to confirm your choice.

ASUS SPD Information

This item allows you to view the DRAM SPD information.

Event Log

A built-in event log enables easier troubleshooting by capturing useful system information.

3.8 Exit menu

The Exit menu items allow you to load the optimal default values for the BIOS items, and save or discard your changes to the BIOS items. You can access the EZ Mode from the Exit menu.

Load Optimized Defaults

This option allows you to load the default values for each of the parameters on the Setup menus. When you select this option or if you press <F5>, a confirmation window appears. Select **OK** to load the default values.

Save Changes & Reset

Once you are finished making your selections, choose this option from the Exit menu to ensure the values you selected are saved. When you select this option or if you press <F10>, a confirmation window appears. Select **OK** to save changes and exit.

Discard Changes & Exit

This option allows you to exit the Setup program without saving your changes. When you select this option or if you press <Esc>, a confirmation window appears. Select **Yes** to discard changes and exit.

Launch EFI Shell from USB drives

This item allows you to attempt to launch the EFI Shell application (shellx64.efi) from one of the available filesystem devices.

Appendix

Notices

FCC Compliance Information

Responsible Party:	Asus Computer International
Address:	48720 Kato Rd., Fremont, CA 94538, USA
Phone / Fax No:	(510)739-3777 / (510)608-4555

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

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

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

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

VCCI: Japan Compliance Statement

Class B ITE

この装置は、クラスB情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。

取扱説明書に従って正しい取り扱いをして下さい。

ＶＣＣＩ－Ｂ

KC: Korea Warning Statement

B급 기기 (가정용 방송통신기자재)
이 기기는 가정용(B급) 전자파적합기기로서 주로 가정에서 사용하는 것을 목적으로 하며, 모든 지역에서 사용할 수 있습니다.

REACH

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

DO NOT throw the motherboard in municipal waste. This product has been designed to enable proper reuse of parts and recycling. This symbol of the crossed out wheeled bin indicates that the product (electrical and electronic equipment) should not be placed in municipal waste. Check local regulations for disposal of electronic products.

DO NOT throw the mercury-containing button cell battery in municipal waste. This symbol of the crossed out wheeled bin indicates that the battery should not be placed in municipal waste.

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/Compliance.htm for detailed recycling information in different regions.

English ASUSTeK Computer Inc. hereby declares that this device is in compliance with the essential requirements and other relevant provisions of related Directives. Full text of EU declaration of conformity is available at: www.asus.com/support

Français AsusTek Computer Inc. déclare par la présente que cet appareil est conforme aux critères essentiels et autres clauses pertinentes des directives concernées. La déclaration de conformité de l'UE peut être téléchargée à partir du site Internet suivant : www.asus.com/support

Deutsch ASUSTeK Computer Inc. erklärt hiermit, dass dieses Gerät mit den wesentlichen Anforderungen und anderen relevanten Bestimmungen der zugehörigen Richtlinien übereinstimmt. Der gesamte Text der EU-Konformitätserklärung ist verfügbar unter: www.asus.com/support

Italiano ASUSTeK Computer Inc. con la presente dichiara che questo dispositivo è conforme ai requisiti essenziali e alle altre disposizioni pertinenti con le direttive correlate. Il testo completo della dichiarazione di conformità UE è disponibile all'indirizzo: www.asus.com/support

Русский Компания ASUS заявляет, что это устройство соответствует основным требованиям и другим соответствующим условиям соответствующих директив. Подробную информацию, пожалуйста, смотрите на www.asus.com/support

Български С настоящото ASUSTeK Computer Inc. декларира, че това устройство е в съответствие със съществените изисквания и другите приложими постановления на свързаните директиви. Пълният текст на декларацията за съответствие на ЕС е достъпна на адрес: www.asus.com/support

Hrvatski ASUSTeK Computer Inc. ovim izjavljuje da je ovaj uređaj sukladan s bitnim zahtjevima i ostalim odgovarajućim odredbama vezanih direktiva. Cijeli tekst EU izjave o sukladnosti dostupan je na: www.asus.com/support

Čeština Společnost ASUSTeK Computer Inc. tímto prohlašuje, že toto zařízení splňuje základní požadavky a další příslušná ustanovení souvisejících směrnic. Plné znění prohlášení o shodě EU je k dispozici na adrese: www.asus.com/support

Dansk ASUSTeK Computer Inc. erklærer hermed, at denne enhed er i overensstemmelse med hovedkravene og andre relevante bestemmelser i de relaterede direktiver. Hele EU-overensstemmelseserklæringen kan findes på: www.asus.com/support

Nederlands ASUSTeK Computer Inc. verklaart hierbij dat dit apparaat voldoet aan de essentiële vereisten en andere relevante bepalingen van de verwante richtlijnen. De volledige tekst van de EU-verklaring van conformiteit is beschikbaar op: www.asus.com/support

Eesti Käesolevaga kinnitab ASUSTeK Computer Inc, et see seade vastab asjakohaste direktiivide oluliste nõuetele ja teistele asjassepuutuvatele sätetele. EL vastavusdeklaratsiooni täielik tekst on saadaval järgmisel aadressil: www.asus.com/support

Suomi ASUSTeK Computer Inc. ilmoittaa täten, että tämä laite on asiaankuuluvien direktiivien olennaisten vaatimusten ja muiden tätä koskevien säädösten mukainen. EU-yhdenmukaisuusilmoituksen koko teksti on luettavissa osoitteessa: www.asus.com/support

Ελληνικά Με το παρόν, η AsusTek Computer Inc. δηλώνει ότι αυτή η συσκευή συμμορφώνεται με τις θεμελιώδεις απαιτήσεις και άλλες σχετικές διατάξεις των Οδηγιών της ΕΕ. Το πλήρες κείμενο της δήλωσης συμβατότητας είναι διαθέσιμο στη διεύθυνση: www.asus.com/support

Magyar Az ASUSTeK Computer Inc. ezennel kijelenti, hogy ez az eszköz megfelel a kapcsolódó Irányelvek lényeges követelményeinek és egyéb vonatkozó rendelkezéseinek. Az EU megfelelőségi nyilatkozat teljes szövege innen letölthető: www.asus.com/support

Latviski ASUSTeK Computer Inc. ar šo paziņo, ka šī ierīce atbilst saistīto Direktīvu būtiskajām prasībām un citiem citiem saistošajiem nosacījumiem. Pilns ES atbilstības paziņojuma teksts pieejams šeit: www.asus.com/support

Lietuvių „ASUSTeK Computer Inc." šiuo tvirtina, kad šis įrenginys atitinka pagrindinius reikalavimus ir kitas svarbias susijusių direktyvų nuostatas. Visą ES atitikties deklaracijos tekstą galima rasti: www.asus.com/support

Norsk ASUSTeK Computer Inc. erklærer herved at denne enheten er i samsvar med hovedsaklige krav og andre relevante forskrifter i relaterte direktiver. Fullstendig tekst for EU-samsvarserklæringen finnes på: www.asus.com/support

Polski Firma ASUSTeK Computer Inc. niniejszym oświadcza, że urządzenie to jest zgodne z zasadniczymi wymogami i innymi właściwymi postanowieniami powiązanych dyrektyw. Pełny tekst deklaracji zgodności UE jest dostępny pod adresem: www.asus.com/support

Português A ASUSTeK Computer Inc. declara que este dispositivo está em conformidade com os requisitos essenciais e outras disposições relevantes das Diretivas relacionadas. Texto integral da declaração da UE disponível em: www.asus.com/support

Română ASUSTeK Computer Inc. declară că acest dispozitiv se conformează cerințelor esențiale și altor prevederi relevante ale directivelor conexe. Textul complet al declarației de conformitate a Uniunii Europene se găsește la: www.asus.com/support

Srpski ASUSTeK Computer Inc. ovim izjavljuje da je ovaj uređaj u saglasnosti sa osnovnim zahtevima i drugim relevantnim odredbama povezanih Direktiva. Pun tekst EU deklaracije o usaglašenosti je dostupan da adresi: www.asus.com/support

Slovensky Spoločnosť ASUSTeK Computer Inc. týmto vyhlasuje, že toto zariadenie vyhovuje základným požiadavkám a ostatým príslušným ustanoveniam príslušných smerníc. Celý text vyhlásenia o zhode pre štáty EÚ je dostupný na adrese: www.asus.com/support

Slovenščina ASUSTeK Computer Inc. izjavlja, da je ta naprava skladna z bistvenimi zahtevami in drugimi ustreznimi določbami povezanih direktiv. Celotno besedilo EU-izjave o skladnosti je na voljo na spletnem mestu: www.asus.com/support

Español Por la presente, ASUSTeK Computer Inc. declara que este dispositivo cumple los requisitos básicos y otras disposiciones pertinentes de las directivas relacionadas. El texto completo de la declaración de la UE de conformidad está disponible en: www.asus.com/support

Svenska ASUSTeK Computer Inc. förklarar härmed att denna enhet överensstämmer med de grundläggande kraven och andra relevanta föreskrifter i relaterade direktiv. Fulltext av EU-försäkran om överensstämmelse finns på: www.asus.com/support

Українська ASUSTeK Computer Inc. заявляє, що цей пристрій відповідає основним вимогам та іншим відповідним положенням відповідних Директив. Повний текст декларації відповідності стандартам ЄС доступний на: www.asus.com/support

Türkçe AsusTek Computer Inc., bu aygıtın temel gereksinimlerle ve ilişkili Yönergelerin diğer ilgili koşullarıyla uyumlu olduğunu beyan eder. AB uygunluk bildiriminin tam metni şu adreste bulunabilir: www.asus.com/support

Bosanski ASUSTeK Computer Inc. ovim izjavljuje da je ovaj uređaj usklađen sa bitnim zahtjevima i ostalim odgovarajućim odredbama vezanih direktiva. Cijeli tekst EU izjave o usklađenosti dostupan je na: www.asus.com/support

Service and Support

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