MAXIMUS X HERO (WI-FI AC)
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Safety information

Electrical safety

• To prevent electrical shock hazard, disconnect the power cable from the electrical outlet before relocating the system.
• When adding or removing devices to or from the system, ensure that the power cables for the devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you add a device.
• Before connecting or removing signal cables from the motherboard, ensure that all power cables are unplugged.
• Seek professional assistance before using an adapter or extension cord. These devices could interrupt the grounding circuit.
• Ensure that your power supply is set to the correct voltage in your area. If you are not sure about the voltage of the electrical outlet you are using, contact your local power company.
• If the power supply is broken, do not try to fix it by yourself. Contact a qualified service technician or your retailer.

Operation safety

• Before installing the motherboard and adding devices on it, carefully read all the manuals that came with the package.
• Before using the product, ensure all cables are correctly connected and the power cables are not damaged. If you detect any damage, contact your dealer immediately.
• To avoid short circuits, keep paper clips, screws, and staples away from connectors, slots, sockets and circuitry.
• Avoid dust, humidity, and temperature extremes. Do not place the product in any area where it may become wet.
• Place the product on a stable surface.
• If you encounter technical problems with the product, contact a qualified service technician or your retailer.
About this guide
This user guide contains the information you need when installing and configuring the motherboard.

How this guide is organized
This guide contains the following parts:

- **Chapter 1: Product Introduction**
  This chapter describes the features of the motherboard and the new technology it supports. It includes description of the switches, jumpers, and connectors on the motherboard.

- **Chapter 2: Basic Installation**
  This chapter lists the hardware setup procedures that you have to perform when installing system components.

- **Chapter 3: BIOS Setup**
  This chapter tells how to change system settings through the BIOS Setup menus. Detailed descriptions of the BIOS parameters are also provided.

- **Chapter 4: RAID Support**
  This chapter describes the RAID configurations.

Where to find more information
Refer to the following sources for additional information and for product and software updates.

1. **ASUS website**
   The ASUS website (www.asus.com) provides updated information on ASUS hardware and software products.

2. **Optional documentation**
   Your product package may include optional documentation, such as warranty flyers, that may have been added by your dealer. These documents are not part of the standard package.
Conventions used in this guide

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

**DANGER/WARNING:** Information to prevent injury to yourself when trying to complete a task.

**CAUTION:** Information to prevent damage to the components when trying to complete a task.

**IMPORTANT:** Instructions that you MUST follow to complete a task.

**NOTE:** Tips and additional information to help you complete a task.

### Typography

- **Bold text** indicates a menu or an item to select.
- **Italicics** are used to emphasize a word or a phrase.
- **<Key>** means that you must press the enclosed key.
  - Example: `<Enter>` means that you must press the Enter or Return key.
- `<Key1> + <Key2> + <Key3>` If you must press two or more keys simultaneously, the key names are linked with a plus sign (+).
# MAXIMUS X HERO (WI-FI AC) specifications summary

| **CPU** | Intel® Socket 1151 for 8th Gen Intel® Core™ Processor  
| **Chipset** | Supports 14nm CPU  
| **Supports Intel® Turbo Boost Technology 2.0** |  
| **Intel® Turbo Boost Technology 2.0 support depends on the CPU type.** |  
| **Chipset** | Intel® Z370 Chipset  
| **Memory** |  
| 4 x DIMM, Max. 64GB DDR4 4133+(OC)* / 4000(OC)* / 3866(OC)* / 3733(OC)* / 3600(OC)* / 3466(OC)* / 3400(OC)* / 3333(OC)* / 3300(OC)* / 3200(OC)* / 3000(OC)* / 2800(OC)* / 2666 / 2400 / 2133 MHz, non-ECC, un-buffered memory  
| **Dual Channel Memory Architecture** |  
| **Supports Intel® Extreme Memory Profile (XMP)** |  
| **Hyper DIMM support is subject to the physical characteristics of individual CPUs.** |  
| **Please refer to Memory QVL (Qualified Vendors List) for details.** |  
| **Expansion slots** | New 8th Gen Intel® Core™ Processors  
| 2 x PCIe 3.0 x16 slots (supports x16, x8/x8, x8/x4+x4*) |  
| **Intel® Z370 Chipset** |  
| 1 x PCIe 3.0 x16 slot (max at x4 mode)** |  
| 3 x PCIe 3.0 x1 slots |  
| **For 2 Intel® SSD on CPU support, install a Hyper M.2 X16 card (sold separately) into the PCIeX8_2 slot, then enable this card under BIOS settings.** |  
| **The PCIe x4_3 slot shares bandwidth with the PCIe x1_3 slot. The PCIe x4_3 slot is set to x2 mode by default.** |  
| **Graphic** | Integrated Graphics Processor- Intel® HD Graphics support  
| Multi-VGA output support : HDMI/DisplayPort |  
| - Supports DisplayPort 1.2 with max. resolution 4096 x 2304 @ 60Hz |  
| - Supports HDMI 1.4b with max. resolution 4096 x 2160 @ 24Hz |  
| Maximum shared memory of 1024MB |  
| **Multi-GPU support** | Supports NVIDIA® 2-Way/Quad-GPU SLI™ Technology  
| Supports AMD® 3-Way/Quad-GPU CrossFireX™ Technology |  
| **LAN** | Intel® I219-V Gigabit LAN  
| Anti-surge LANGuard |  
| ROG GameFirst IV |  
| **Wi-Fi** | Wi-Fi 802.11 a/b/g/n/ac supports dual frequency band 2.4/5 GHz with MU-MIMO support  
| Bluetooth v4.2 |  

*(continued on the next page)*
**MAXIMUS X HERO (WI-FI AC) specifications summary**

| Storage | Intel® Z370 Chipset with RAID 0, 1, 5, 10, and Intel Rapid Storage Technology support  
- 1 x M.2_1 Socket 3 with M Key, type 2242/2260/2280 (supports PCIE 3.0 x4 and SATA modes)*  
- 1 x M.2_2 Socket 3 with M Key, type 2242/2260/2280 (supports PCIE 3.0 x4 mode)**  
- 6 x SATA 6Gb/s ports  
- Supports Intel® Smart Response Technology***  
- Ready for Intel® Optane™ Memory  
* When the M.2_1 Socket 3 is operating in SATA mode, SATA port 1 will be disabled.  
** When the M.2_2 Socket 3 is operating in PCIEX4 mode, SATA port 5, 6 will be disabled.  
*** This function will work depending on the CPU installed. |
|---|---|
| Audio | ROG SupremeFX S1220 8-Channel High Definition Audio CODEC  
- Supports up to 32-Bit/192kHz playback*  
- Impedance sense for front and rear headphone outputs  
- ES9023P High Definition DAC  
- SupremeFX Shielding Technology  
- Jack-detection, Multi-streaming, and Front Panel Jack-retasking  
- Optical S/PDIF out port at back panel  
- High quality 120 dB SNR stereo playback output and 113 dB SNR recording input  
Audio Features:  
- Sonic Studio III  
- Sonic Radar III  
* Due to limitations in HDA bandwidth, 32-Bit/192kHz is not supported for 8-channel audio. |
| USB | Intel® Z370 Chipset  
- 6 x USB 3.1 Gen 1 ports (4 ports at back panel [blue], 2 ports at mid-board)  
- 6 x USB 2.0 ports (2 ports at back panel [black], 4 ports at mid-board)  
ASMedia® USB 3.1 Gen 2 controller  
- 1 x USB 3.1 Gen 2 front panel connector  
- 2 x USB 3.1 Gen 2 ports (1 Type-A [red] and 1 Type-C [black] at back panel) |

(continued on the next page)
MAXIMUS X HERO (WI-FI AC) specifications summary

**ROG Exclusive Features**

**Extreme Engine Digi+**
- MicroFine Alloy Choke
- NexFET Power Block MOSFET
- 10K Black Metallic Capacitors

**OC Zone**
- Start Button
- Reset Button
- Safe Boot Button
- ReTry Button
- LN2 Mode
- Slow Mode switch

**Mem TweakIt**

**GameFirst IV**

**MemOK! Button**

**ROG RAMDisk**

**ROG RAMCache II**

**ROG CloneDrive**

**ROG CPU-Z**

**Overwolf**

**ROG Aura**
- Aura Lighting Control
- Aura RGB Strip Headers
- Aura Addressable RGB Header

**KeyBot II**
- One-click overclocking
- DirectKey
- Clr CMOS
- Power On

**UEFI BIOS features:**
- Extreme Tweaker
- Tweakers’ Paradise
- ROG SSD Secure Erase
- O.C. Profile

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### MAXIMUS X HERO (WI-FI AC) specifications summary

<table>
<thead>
<tr>
<th>Special Features</th>
<th>Back I/O Ports</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ASUS Dual Intelligent Processors 5</strong></td>
<td>1 x Clear CMOS Button</td>
</tr>
<tr>
<td>- 5-Way Optimization tuning key perfectly consolidates TPU, DIGI+ Power Control, Fan Xpert 4, and Turbo App</td>
<td>1 x BIOS Flashback Button</td>
</tr>
<tr>
<td><strong>ASUS Exclusive Features</strong></td>
<td>1 x ASUS Wi-Fi GO! module (2x2 MU-MIMO 802.11 a/b/g/n/ac and Bluetooth v4.2)</td>
</tr>
<tr>
<td>- AI Suite 3</td>
<td></td>
</tr>
<tr>
<td>- Disk Unlocker</td>
<td>1 x HDMI 1.4b</td>
</tr>
<tr>
<td><strong>ASUS EZ DIY</strong></td>
<td>1 x DisplayPort 1.2</td>
</tr>
<tr>
<td>- ASUS CrashFree BIOS 3</td>
<td>2 x USB 2.0 ports [black]</td>
</tr>
<tr>
<td>- ASUS EZ Flash 3</td>
<td>4 x USB 3.1 Gen1 ports [blue]</td>
</tr>
<tr>
<td>- ASUS C.P.R.(CPU Parameter Recall)</td>
<td>1 x Anti-surge LAN (RJ45) port</td>
</tr>
<tr>
<td>- MemOK!</td>
<td>2 x USB 3.1 Gen 2 ports (1 x Type-A [red] and 1 x Type-C™ [black])</td>
</tr>
<tr>
<td><strong>ASUS Q-Design</strong></td>
<td>1 x Optical S/PDIF out</td>
</tr>
<tr>
<td>- SafeSlot</td>
<td>5 x Gold-plated audio jacks</td>
</tr>
<tr>
<td>- Q-Code</td>
<td></td>
</tr>
<tr>
<td>- Q-Connector</td>
<td></td>
</tr>
</tbody>
</table>
### MAXIMUS X HERO (WI-FI AC) specifications summary

| Internal I/O Ports | 2 x AURA RGB headers  
| 1 x AURA Addressable RGB header  
| 1 x USB 3.1 Gen 2 front panel connector  
| 1 x USB 3.1 Gen 1 header supports additional 2 USB 3.1 Gen 1 ports  
| 2 x USB 2.0 headers support additional 4 USB 2.0 ports  
| 6 x SATA 6Gb/s ports  
| 1 x M.2_1 Socket 3 for M Key, type 2242/2260/2280 storage devices support (Supports PCIE 3.0 x4 and SATA modes)  
| 1 x M.2_2 Socket 3 for M Key, type 2242/2260/2280 storage devices support (Supports PCIE 3.0 x4 mode)  
| 1 x 4-Pin CPU fan connector  
| 1 x 4-Pin CPU_OPT fan connector  
| 3 x 4-Pin Chassis fan connectors  
| 1 x EXT_Fan header  
| 1 x 4-Pin W_PUMP+ connector  
| 1 x W_IN header  
| 1 x W_OUT header  
| 1 x W_FLOW header  
| 1 x 4-Pin AIO_PUMP connector  
| 1 x H_AMP fan connector  
| 1 x Thermal sensor connector  
| 1 x 24-pin EATX power connector  
| 1 x 8-pin EATX 12V power connector  
| 1 x Start button  
| 1 x Reset button  
| 1 x Safe Boot button  
| 1 x Retry button  
| 1 x LN2 mode jumper  
| 1 x Slow mode switch  
| 1 x MemOK! Button  
| 1 x Front panel audio connector (AAFP)  
| 1 x TPM connector  
| 1 x System panel connector |

| BIOS | 1 x 128 Mb Flash ROM, UEFI AMI BIOS, PnP, DMI3.0, WIM2.0, SM BIOS 3.0, ACPI 6.0, Multi-language BIOS, ASUS EZ Flash 3, CrashFree BIOS 3, F11 EZ Tuning Wizard, F6 Qfan Control, F3 My Favorites, Last Modified log, F12 PrintScreen, F3 Shortcut functions and ASUS DRAM SPD (Serial Presence Detect) memory information. |

| Manageability | WIM2.0, DMI3.0, WOL by PME, PXE |

*(continued on the next page)*
# MAXIMUS X HERO (WI-FI AC) specifications summary

| Software | Drivers  
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AURA</td>
</tr>
<tr>
<td></td>
<td>ROG GameFirst IV</td>
</tr>
<tr>
<td></td>
<td>ROG RAMDisk</td>
</tr>
<tr>
<td></td>
<td>ROG RAMCache II</td>
</tr>
<tr>
<td></td>
<td>ROG CPU-Z</td>
</tr>
<tr>
<td></td>
<td>ROG Mem TweakIt</td>
</tr>
<tr>
<td></td>
<td>Overwolf</td>
</tr>
<tr>
<td></td>
<td>ROG Keybot II</td>
</tr>
<tr>
<td></td>
<td>CloneDrive</td>
</tr>
<tr>
<td></td>
<td>Kaspersky® Anti-Virus</td>
</tr>
<tr>
<td></td>
<td>DAEMON Tools Software</td>
</tr>
<tr>
<td></td>
<td>Winzip</td>
</tr>
<tr>
<td></td>
<td>ASUS Utilities</td>
</tr>
<tr>
<td></td>
<td>Sonic Studio III</td>
</tr>
<tr>
<td></td>
<td>Sonic Radar III</td>
</tr>
<tr>
<td></td>
<td>Fan Xpert 4</td>
</tr>
<tr>
<td>Operating System Support</td>
<td>Windows® 10 64-bit</td>
</tr>
<tr>
<td>Form Factor</td>
<td>ATX Form Factor, 12”x 9.6” (30.5cm x 24.4cm)</td>
</tr>
</tbody>
</table>

Specifications are subject to change without notice. Please refer to the ASUS website for the latest specifications.
## Package contents

Check your motherboard package for the following items.

<table>
<thead>
<tr>
<th>Category</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motherboard</td>
<td>1 x ROG MAXIMUS X HERO (WI-FI AC) motherboard</td>
</tr>
<tr>
<td>Cables</td>
<td>1 x RGB LED extension cable</td>
</tr>
<tr>
<td></td>
<td>1 x RGB Addressable LED extension cable</td>
</tr>
<tr>
<td></td>
<td>2 x 2-in-1 SATA 6Gb/s cables</td>
</tr>
<tr>
<td>Accessories</td>
<td>1 x SLI™ HB Bridge(2-way-M)</td>
</tr>
<tr>
<td></td>
<td>1 x Q-Connector</td>
</tr>
<tr>
<td></td>
<td>1 x ROG Coaster</td>
</tr>
<tr>
<td></td>
<td>1 x 3D printing mount</td>
</tr>
<tr>
<td></td>
<td>1 x 10-in-1 ROG cable label</td>
</tr>
<tr>
<td></td>
<td>1 x CPU Installation Tool</td>
</tr>
<tr>
<td></td>
<td>1 x 2-in-1 M.2 Screw set</td>
</tr>
<tr>
<td></td>
<td>1 x ROG sticker</td>
</tr>
<tr>
<td></td>
<td>1 x Fan holder</td>
</tr>
<tr>
<td></td>
<td>1 x ASUS 2x2 dual band Wi-Fi moving antenna (Wi-Fi 802.11a/b/g/n/ac compliant)</td>
</tr>
<tr>
<td>Application DVD</td>
<td>1 x ROG motherboard support DVD</td>
</tr>
<tr>
<td>Documentation</td>
<td>1 x User guide</td>
</tr>
</tbody>
</table>

If any of the above items is damaged or missing, contact your retailer.
## Installation tools and components

<table>
<thead>
<tr>
<th>Tool/Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Bag of screws</td>
<td>Phillips (cross) screwdriver</td>
</tr>
<tr>
<td>PC chassis</td>
<td>Power supply unit</td>
</tr>
<tr>
<td>Intel® LGA 1151 CPU</td>
<td>Intel® LGA 1151 compatible CPU Fan</td>
</tr>
<tr>
<td>DDR4 DIMM</td>
<td>SATA hard disk drive</td>
</tr>
<tr>
<td>SATA optical disc drive (optional)</td>
<td>Graphics card (optional)</td>
</tr>
</tbody>
</table>

The tools and components in the table above are not included in the motherboard package.
Chapter 1: Product Introduction

1.1 Motherboard overview

1.1.1 Before you proceed

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

- 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.
Refer to 1.1.9 Internal connectors and 2.3.1 Rear I/O connection for more information about rear panel connectors and internal connectors.
Layout contents

<table>
<thead>
<tr>
<th>Connectors/Jumpers/Buttons and switches/Slots</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ATX power connectors (24-pin EATXPWR; 8-pin EATX12V)</td>
<td>1-20</td>
</tr>
<tr>
<td>2. LGA1151 CPU Socket</td>
<td>1-4</td>
</tr>
<tr>
<td>3. CPU, CPU optional, high amp, extension, and chassis fan connectors; water pump+, and AIO pump connectors</td>
<td>1-19</td>
</tr>
<tr>
<td>4. AURA RGB headers (4-pin RGB_HEADER1-2)</td>
<td>1-23</td>
</tr>
<tr>
<td>5. DDR4 DIMM slots</td>
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<td>22. RESET button (RESET)</td>
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<td>24. Addressable RGB header (4-1 pin ADD_HEADER)</td>
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<tr>
<td>26. LED connector (5-pin LED2_CON1)</td>
<td>1-22</td>
</tr>
</tbody>
</table>
1.1.3 Central Processing Unit (CPU)

This motherboard supports the New 8th Gen Intel® Core™ processors on the LGA1151 package, with memory and PCI Express controllers integrated to support dual-channel (4 DIMM) DDR4 memory and 16 PCI Express 3.0/2.0 lanes.

Ensure that you install the correct CPU designed for LGA1151 socket only. DO NOT install a CPU designed for LGA1150, LGA1155 and LGA1156 sockets in the LGA1151 socket.

- Ensure that all power cables are unplugged before installing the CPU.
- Upon purchase of the motherboard, ensure that the PnP cap is on the socket and the socket contacts are not bent. Contact your retailer immediately if the PnP cap is missing, or if you see any damage to the PnP cap/socket contacts/motherboard components. ASUS will shoulder the cost of repair only if the damage is shipment/transit-related.
- Keep the cap after installing the motherboard. ASUS will process Return Merchandise Authorization (RMA) requests only if the motherboard comes with the cap on the 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.
1.1.4 System memory

The motherboard comes with four Double Data Rate 4 (DDR4) Dual Inline Memory Modules (DIMM) slots.

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

Recommended memory configurations
Memory configurations
You may install 2 GB, 4 GB, 8 GB, and 16 GB unbuffered and non-ECC DDR4 DIMMs into the DIMM sockets.

You may install varying memory sizes in Channel A and Channel B. The system maps the total size of the lower-sized channel for the dual-channel configuration. Any excess memory from the higher-sized channel is then mapped for single-channel operation.

• The default memory operation frequency is dependent on its Serial Presence Detect (SPD), which is the standard way of accessing information from a memory module. Under the default state, some memory modules for overclocking may operate at a lower frequency than the vendor-marked value.

• For system stability, use a more efficient memory cooling system to support a full memory load (4 DIMMs) or overclocking condition.

• Always install the DIMMS with the same CAS Latency. For an optimum compatibility, we recommend that you install memory modules of the same version or data code (D/C) from the same vendor. Check with the vendor to get the correct memory modules.
1.1.5 Expansion slots

Unplug the power cord before adding or removing expansion cards. Failure to do so may cause you physical injury and damage motherboard components.

<table>
<thead>
<tr>
<th>Slot No.</th>
<th>Slot Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PCIe x1_1 slot</td>
</tr>
<tr>
<td>2</td>
<td>PCIe x16/x8_1 slot</td>
</tr>
<tr>
<td>3</td>
<td>PCIe x1_2 slot</td>
</tr>
<tr>
<td>4</td>
<td>PCIe x8_2 slot</td>
</tr>
<tr>
<td>5</td>
<td>PCIe x1_3 slot</td>
</tr>
<tr>
<td>6</td>
<td>PCIe x4_3 slot</td>
</tr>
</tbody>
</table>
Chapter 1: Product Introduction

- We recommend that you provide sufficient power when running CrossFireX™ or SLI™ mode.
- Connect chassis fans to the motherboard chassis fan connectors when using multiple graphics cards for better thermal environment.

<table>
<thead>
<tr>
<th>VGA Configuration</th>
<th>PCIe operating mode</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PCIe_x16/x8_1</td>
</tr>
<tr>
<td>Single VGA/PCIe card</td>
<td>x16 (Recommend for single VGA)</td>
</tr>
<tr>
<td>Dual VGA/PCIe card</td>
<td>x8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PCIe Lane</th>
<th>PCIe operating mode</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Auto mode</td>
</tr>
<tr>
<td>PCIe_x1_3</td>
<td>x1</td>
</tr>
<tr>
<td>PCIe_x4_3</td>
<td>x2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hyper M.2 X16 card configuration</th>
<th>PCIe operating mode</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PCIe_x16/x8_1</td>
</tr>
<tr>
<td>2 Intel® SSD on CPU support</td>
<td>x8</td>
</tr>
</tbody>
</table>

- Hyper M.2 X16 card is purchased separately.
- Enable the Hyper M.2 X16 card under BIOS settings.
1.1.6 Onboard buttons and switches

Onboard buttons and switches allow you to fine-tune performance when working on a bare or open-case system. This is ideal for overclockers and gamers who continually change settings to enhance system performance.

1. **Power-on button (START)**

The motherboard comes with a power-on button that allows you to power up or wake up the system. The button also lights up when the system is plugged to a power source indicating that you should shut down the system and unplug the power cable before removing or installing any motherboard component.

2. **RESET button (RESET)**

Press the reset button to reboot the system.
3. **MemOK! button (MemOK!)**

Installing DIMMs that are not compatible with the motherboard may cause system boot failure, and the DRAM_LED near the MemOK! button lights continuously. Press and hold the MemOK! button until the DRAM_LED starts blinking to begin automatic memory compatibility tuning for successful boot.

- Refer to section 1.1.8 Onboard LEDs for the exact location of the DRAM_LED.
- The DRAM_LED also lights up when the DIMM is not properly installed. Turn off the system and reinstall the DIMM before using the MemOK! function.
- The MemOK! button does not function under Windows® OS environment.
- During the tuning process, the system loads and tests failsafe memory settings. It takes about 30 seconds for the system to test one set of failsafe settings. If the test fails, the system reboots and test the next set of failsafe settings. The blinking speed of the DRAM_LED increases, indicating different test processes.
- Due to memory tuning requirement, the system automatically reboots when each timing set is tested. If the installed DIMMs still fail to boot after the whole tuning process, the DRAM_LED lights continuously. Replace the DIMMs with ones recommended in the Memory QVL (Qualified Vendors Lists) at [www.asus.com](http://www.asus.com).
- If you turn off the computer and replace DIMMs during the tuning process, the system continues memory tuning after turning on the computer. To stop memory tuning, turn off the computer and unplug the power cord for about 5–10 seconds.
- If your system fails to boot up due to BIOS overclocking, press the MemOK! button to boot and load the BIOS default settings. A message will appear during POST reminding you that the BIOS has been restored to its default settings.
- We recommend that you download and update to the latest BIOS version from [www.asus.com](http://www.asus.com) after using the MemOK! function.
4. **Safe Boot button (SAFE_BOOT)**

The Safe Boot button can be pressed anytime to force the system to reboot into the BIOS safe mode. This button temporarily applies safe settings to the BIOS while retaining any overclocked settings allowing you to modify the settings causing boot failure. Use this button when overclocking or tweaking the settings of your system.

5. **ReTry button (RETRY_BUTTON)**

The ReTry button is specially designed for overclockers and is most useful during the booting process where the Reset button is rendered useless. When pressed, it forces the system to reboot while retaining the same settings to be retried in quick succession to achieve a successful POST.
6. **Slow Mode Switch (SLOW_MODE)**

Slow Mode Switch is employed during LN2 benching. The system may crash due to the CPU being unstable when using extreme overclocking, enabling slow mode will decrease the processor frequency and stabilize the system, allowing overclockers to keep track of their overclocking data.

---

**ROG MAXIMUS X HERO (WI-FI AC) Slow Mode switch**
1.1.7 Jumper and holes

1. LN2 Mode jumper (3-pin LN2_MODE)

With LN2 mode activated, the ROG motherboard is optimized to remedy the cold-boot bug during POST and help the system boot successfully.

2. 3D Mount

Secure 3D printed parts to these 3D Mount holes for a personalized motherboard.

- Use the bundled 3D Mount screws to install the 3D printed parts.
1.1.8 Onboard LEDs

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

   Q LEDs check key components (CPU, DRAM, VGA card, and booting devices) in sequence during motherboard booting process. If an error is found, the corresponding LED remains lit until the problem is solved. This user-friendly design provides an intuitive way to locate the root problem within seconds.

   ![ROG MAXIMUS X HERO (WI-FI AC) CPU/ DRAM/ BOOT DEVICE/ VGA LED](image)

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

2. **Hard Disk LED (HD_LED)**

   The Hard Disk LED is designed to indicate the hard disk activity. It blinks when data is being written into or read from the hard disk drive. The LED does not light up when there is no hard disk drive connected to the motherboard or when the hard disk drive does not function.

   ![ROG MAXIMUS X HERO (WI-FI AC) Hard Disk LED](image)
3. **Q-Code LED**

The Q-Code LED design provides you with a 2-digit error code that displays the system status. Refer to the Q-Code table on the following page for details.

![Q-Code LED Diagram]

- The Q-Code LED provides the most probable cause of an error code as a starting point for troubleshooting. The actual cause may vary from case to case.

- Please refer to the Q-Code table in the Appendix section for more details.
1.1.9 Internal connectors


If you installed Serial ATA hard disk drives, you can create a RAID 0, 1, 5, and 10 configuration with the Intel® Rapid Storage Technology through the onboard Intel® Z370 chipset.

![Diagram of Intel® Z370 Serial ATA 6 Gb/s connectors]

These connectors are set to [AHCI] by default. If you intend to create a Serial ATA RAID set using these connectors, set the SATA Mode Selection item in the BIOS to [Intel RST Premium With Intel Optane System Acceleration (RAID)].

Before creating a RAID set, refer to section RAID configurations or the manual bundled in the motherboard support DVD.

When using NCQ, set the SATA Mode in the BIOS to [AHCI]. Refer to section SATA Configuration for details.

NOTE: Connect the right-angle side of SATA signal cable to SATA device. You may also connect the right-angle side of SATA cable to the onboard SATA port to avoid mechanical conflict with huge graphics cards.
2. **USB 3.1 Gen 2 front panel connector (U31G2_E3)**

This connector allows you to connect a USB 3.1 Gen 2 module for additional USB 3.1 Gen 2 ports. The latest USB 3.1 Gen 2 connectivity provides data transfer speeds of up to 10 Gbps. The next-generation standard is completely backward-compatible with your existing USB devices.

![USB 3.1 Gen 2 front panel connector](image1)

3. **USB 3.1 Gen 1 connector (20-1 pin U31G1_12)**

This connector allows you to connect a USB 3.1 Gen 1 module for additional USB 3.1 Gen 1 front or rear panel ports. With an installed USB 3.1 Gen 1 module, you can enjoy all the benefits of USB 3.1 Gen 1 including 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.

![USB 3.1 Gen 1 connector](image2)

---

The USB 3.1 Gen 1 module is purchased separately.

The plugged USB 3.1 gen 1 device may run on xHCI or EHCI mode depending on the operating system’s setting.
4. **USB 2.0 connectors (10-1 pin USB910; USB1112)**

These connectors are for USB 2.0 ports. Connect the USB module cable to any of these connectors, then install the module to a slot opening at the back of the system chassis. These USB connectors comply with USB 2.0 specification that supports up to 480 MBps connection speed.

![USB connectors diagram]

**Never connect a 1394 cable to the USB connectors. Doing so will damage the motherboard!**

5. **Front panel audio connector (10-1 pin AAFP)**

This connector 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 connector.

![Front panel audio connector diagram]

**We recommend that you connect a high-definition front panel audio module to this connector to avail of the motherboard’s high-definition audio capability.**
6. CPU, CPU optional, high amp, extension, and chassis fan connectors; water pump+, and AIO pump connectors (4-pin CPU_FAN; 4-pin CPU_OPT; 4-pin H_AMP; 5-pin EXT_FAN; 4-pin W_PUMP+; 4-pin AIO_PUMP; 4-pin CHA_FAN1-3)

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

- DO NOT forget to connect the fan cables to the fan connectors. Insufficient air flow inside the system may damage the motherboard components. These are not jumpers! Do not place jumper caps on the fan connectors!

- Ensure to fully insert the 4-pin CPU fan cable to the CPU fan connector.

- For better Q-Fan functions, we recommend using 4-pin PWM fans when you connect powerful fans (1A or above) onto the H_AMP_FAN connector.

- Ensure to disable Q-Fan functions if you want to connect powerful 3-pin DC fans (1A or above) onto the H_AMP_FAN connector.

- Connect the pump cable from the all-in-one cooler (AIO cooler) to the AIO_PUMP header, and connect the fan cables to the CPU_FAN and/or CPU_OPT header(s).

- W_PUMP+ function support depends on water cooling device.
For a fully configured system, we recommend that you use a power supply unit (PSU) that complies with ATX 12 V Specification 2.0 (or later version) and provides a minimum power of 350 W.

Do not forget to connect the 8-pin EATX12V power plug. Otherwise, the system will not boot.

We recommend that you use a PSU with a higher power output when configuring a system with more power-consuming devices. The system may become unstable or may not boot up if the power is inadequate.

If you want to use two or more high-end PCIe x16 cards, use a PSU with 1000W power or above to ensure the system stability.
Chapter 1

8. System panel connectors (10-1 pin F_PANEL; 4-pin SPEAKER)
   These connectors supports several chassis-mounted functions.

   ![Diagram of ROG Maximus X Hero (Wi-Fi AC) motherboard with system panel connectors]

   - **System power LED (2-pin PLED)**
     This 2-pin connector is for the system power LED. Connect the chassis power LED cable to this connector. 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 connector is for the HDD Activity LED. Connect the HDD Activity LED cable to this connector. The HDD LED lights up or flashes when data is read from or written to the HDD.

   - **System warning speaker (4-pin SPEAKER)**
     This 4-pin connector is for the chassis-mounted system warning speaker. The speaker allows you to hear system beeps and warnings.

   - **ATX power button/soft-off button (2-pin PWRBTN)**
     This connector is for the system power button. Pressing the power button turns the system on or puts the system in sleep or soft-off mode depending on the BIOS settings. Pressing the power button for more than four seconds while the system is ON turns the system OFF.

   - **Reset button (2-pin RESET)**
     This 2-pin connector is for the chassis-mounted reset button for system reboot without turning off the system power.
9. **Thermal sensor connector (2-pin T_SENSOR)**
   This connector is for the thermistor cable that allows you to monitor the temperature of your motherboard's critical components and connected devices.

![Thermal sensor connector diagram]

10. **LED connector (5-pin LED2_CON1)**
    This connector is for connecting LED strips on your cover.

![LED connector diagram]
11. **AURA RGB headers (4-pin RGB_HEADER1-2)**

These connectors are for RGB LED strips.

![RGB HEADER Connectors](image)

The RGB header supports 5050 RGB multi-color LED strips (12V/G/R/B), with a maximum power rating of 3A (12V), and no longer than 3 m.

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.

- Actual lighting and color will vary with LED strip.
- If your LED strip does not light up, check if the RGB LED extension cable and the RGB LED strip is connected in the correct orientation, and the 12V connector is aligned with the 12V header on the motherboard.
- The LED strip will only light up when the system is operating.
- The LED strip is purchased separately.
12. **Addressable RGB header (4-1 pin ADD_HEADER)**

This connector is for individually addressable RGB WS2812B LED strips or WS2812B based LED strips.

![Addressable RGB header](image)

The addressable RGB header supports WS2812B addressable RGB LED strips (5V/Data/Ground), with a maximum power rating of 3A (5V) and a maximum of 60 LEDs.

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.

- Actual lighting and color will vary with LED strip.
- If your LED strip does not light up, check if the addressable RGB LED strip is connected in the correct orientation, and the 5V connector is aligned with the 5V header on the motherboard.
- The addressable RGB LED strip will only light up under the operating system.
- The addressable RGB LED strip is purchased separately.
13. **M.2 sockets (M.2_1; M.2_2)**

These sockets allow you to install M.2 SSD modules.

- M.2_1 socket supports PCIe 3.0 x4 and SATA mode M Key design and type 2242 / 2260 / 2280 PCIe storage devices.
- M.2_2 socket supports PCIe 3.0 x4 M Key design and type 2242 / 2260 / 2280 PCIe storage devices.
- These sockets support IRST (Intel® Rapid Storage Technology).
- These sockets are Intel® Optane™ Memory Ready.

The M.2 SSD module is purchased separately.

14. **Water in, water out, and water flow connectors (2-pin W_IN; 2-pin W_OUT; 3-pin W_FLOW)**

These connectors allow you to connect sensors to monitor the temperature and flow rate of your liquid cooling system. You can manually adjust the fans and water pump to optimize the thermal efficiency of your liquid cooling system.
15. **TPM connector (14-1 pin TPM)**

This connector supports a Trusted Platform Module (TPM) system, which securely stores keys, digital certificates, passwords and data. A TPM system also helps enhance network security, protect digital identities, and ensures platform integrity.

The TPM module is purchased separately.
Basic Installation

2.1 Building your PC system

The diagrams in this section are for reference only. The motherboard layout may vary with models, but the installation steps are the same for all models.

2.1.1 CPU installation

Ensure that you install the correct CPU designed for LGA1151 socket only. DO NOT install a CPU designed for LGA1155 and LGA1156 sockets on the LGA1151 socket.

1. [Diagram of CPU installation steps]

2. [Diagram of CPU installation steps]

3. [Diagram of CPU installation steps]

4. [Diagram of CPU installation steps]

5. [Diagram of CPU installation steps]
- The CPU Installation Tool is only compatible on ASUS motherboards with a Intel® LGA1151 socket.

- Ensure that the CPU is firmly clicked into place before installing it onto the CPU socket on the motherboard.

- Use the CPU Installation Tool for installing the CPU only. DO NOT damage or bend the CPU Installation Tool.

- Always firmly hold both sides of the CPU Installation Tool when installing, removing, or picking up the CPU Installation Tool.

- Ensure to use a soft stable surface when installing the CPU to the CPU Installation Tool to prevent CPU damage.

- ASUS will not cover damages resulting from incorrect CPU installation/removal, incorrect CPU orientation/placement, or other damages resulting from negligence by the user.
2.1.2 Cooling system installation

Apply the Thermal Interface Material to the CPU cooling system and CPU before you install the cooling system, if necessary.

To install the CPU heatsink and fan assembly

1. Apply the Thermal Interface Material to the CPU cooling system and CPU before you install the cooling system, if necessary.

2. Install the CPU heatsink and fan assembly.

3. Connect the fan cable to the motherboard.

4. Secure the heatsink with screws.

ROG MAXIMUS X HERO (WI-FI AC)
To install an AIO cooler

1. Connect the AIO_PUMP to the motherboard.
2. Connect the CPU_FAN and CPU_OPT to the motherboard.

Chapter 2: Basic Installation
2.1.3 Motherboard installation

1. Place the motherboard into the chassis, ensuring that its rear I/O ports are aligned to the chassis' rear I/O panel.

2. Place nine (9) screws into the holes indicated by circles to secure the motherboard to the chassis.

DO NOT over tighten the screws! Doing so can damage the motherboard.
2.1.4 DIMM installation

1. 

2. 

3. 

To remove a DIMM

B

A
2.1.5 ATX power connection

Ensure to connect the 8-pin power plug.

2.1.6 SATA device connection
2.1.7 Front I/O connector

To install ASUS Q-Connector

To install USB 3.1 Gen 2 connector

This connector will only fit in one orientation. Push the connector until it clicks into place.

To install USB 3.1 Gen 1 connector

To install USB 2.0 connector

To install front panel audio connector

To install system speaker connector
2.1.8 Expansion card installation

To install PCIe x16 cards

To install PCIe x1 cards
To install Hyper M.2 x4 card
2.1.9 M.2 installation

1. [Diagram showing M.2 installation steps]

2. [Diagram showing M.2 installation steps]

3. [Diagram showing M.2 installation steps]

---

Supported M.2 type varies per motherboard.
2.1.10 Fan holder installation

To install the Fan holder and fan

When using high performance settings whilst overclocking, ensure to install the fan holder for additional fan(s).

- You may install 12V (1A, 12W), 40mm x 40mm fans or 50mm x 50mm fans.
- Ensure to use the bundled screws that came with your fans.
- Fans are purchased separately.
2.1.11  **Wi-Fi antenna installation**

**Installing the ASUS 2x2 dual band W-Fi antenna**

Connect the bundled ASUS 2x2 dual band Wi-Fi antenna connector to the Wi-Fi ports at the back of the chassis.

- Ensure that the ASUS 2x2 dual band Wi-Fi antenna is securely installed to the Wi-Fi ports.
- Ensure that the antenna is at least 20 cm away from all persons.

The illustration above is for reference only. The I/O port layout may vary with models, but the Wi-Fi antenna installation procedure is the same for all models.
2.2 BIOS update utility

USB BIOS Flashback

USB BIOS Flashback allows you to easily update the BIOS without entering the existing BIOS or operating system. Simply insert a USB storage device to the USB port, press the USB BIOS Flashback button for three seconds, and the BIOS is updated automatically.

To use USB BIOS Flashback:

1. Insert a USB storage device to the USB Flashback port.

   We recommend you to use a USB 2.0 storage device to save the latest BIOS version for better compatibility and stability.

2. Visit https://www.asus.com/support/ and download the latest BIOS version for this motherboard.

3. Rename the file as M10H.CAP, then copy it to your USB storage device.

4. Shut down your computer.

5. Press the BIOS Flashback button for three seconds until the Flashback LED blinks three times, indicating that the BIOS Flashback function is enabled.

   ![USB BIOS Flashback button KeyBot port USB BIOS Flashback port]

6. Wait until the light goes out, indicating that the BIOS updating process is completed.

   For more BIOS update utilities in BIOS setup, refer to the section 3.11 Updating BIOS in Chapter 3.

   - Do not unplug portable disk, power system, or press the CLR_CMOS button while BIOS update is ongoing, otherwise update will be interrupted. In case of interruption, please follow the steps again.
   
   - If the light flashes for five seconds and turns into a solid light, this means that the BIOS Flashback is not operating properly. This may be caused by improper installation of the USB storage device and filename/file format error. If this scenario happens, please restart the system to turn off the light.

   - Updating BIOS may have risks. If the BIOS program is damaged during the process and results to the system’s failure to boot up, please contact your local ASUS Service Center.
2.3 Motherboard rear and audio connections

2.3.1 Rear I/O connection

---

### Rear panel connectors

1. Clear CMOS button (CLR_CMOS). Press this button to clear the BIOS setup information only when the systems hangs due to overclocking.
2. Wi-Fi 802.11 a/b/g/n/ac, Bluetooth V4.2
3. DisplayPort
4. Intel® USB 2.0 ports 7, and 8. Upper port supports the KeyBot II feature, and lower port supports USB BIOS Flashback function.
5. Intel® USB 3.1 Gen 1 ports 3, 4, 5, and 6
6. LAN (RJ-45) port*
7. USB BIOS Flashback button
8. HDMI port
9. USB 3.1 Gen 2 Type-A port EA1
10. USB 3.1 Gen 2 Type-C™ port EC2
11. Optical S/PDIF OUT port
12. Audio I/O ports**

* and **: Refer to the tables on the next page for LAN port LEDs, and audio port definitions.

---

- USB 3.1 Gen 1/Gen 2 devices can only be used as data storage only.
- We strongly recommend that you connect your devices to ports with matching data transfer rate. Please connect your USB 3.1 Gen 1 devices to USB 3.1 Gen 1 ports and your USB 3.1 Gen 2 devices to USB 3.1 Gen 2 ports for faster and better performance for your devices.
- Due to the design of the Intel chipset, all USB devices connected to the USB 3.1 Gen 1 ports are controlled by the xHCI controller. Some legacy USB devices must update their firmware for better compatibility.
- When KeyBot II is activated, USB hot plug function of the KeyBot port (USB 3.1 Gen 1 port 7) will be temporarily disabled.
### *LAN ports LED indications*

<table>
<thead>
<tr>
<th>Status</th>
<th>Description</th>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>No link</td>
<td>OFF</td>
<td>10 Mbps connection</td>
</tr>
<tr>
<td>ORANGE</td>
<td>Linked</td>
<td>ORANGE</td>
<td>100 Mbps connection</td>
</tr>
<tr>
<td>BLINKING</td>
<td>Data activity</td>
<td>GREEN</td>
<td>1 Gbps connection</td>
</tr>
</tbody>
</table>

### **Audio 2, 4, 6 or 8-channel configuration**

<table>
<thead>
<tr>
<th>Port</th>
<th>Headset 2-channel</th>
<th>4-channel</th>
<th>6-channel</th>
<th>8-channel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light Blue</td>
<td>Line In</td>
<td>Line In</td>
<td>Line In</td>
<td>Side Speaker Out</td>
</tr>
<tr>
<td>Lime</td>
<td>Line Out</td>
<td>Front Speaker Out</td>
<td>Front Speaker Out</td>
<td>Front Speaker Out</td>
</tr>
<tr>
<td>Pink</td>
<td>Mic In</td>
<td>Mic In</td>
<td>Mic In</td>
<td>Mic In</td>
</tr>
<tr>
<td>Orange</td>
<td>–</td>
<td>–</td>
<td>Center/Sub woofer</td>
<td>Center/Sub woofer</td>
</tr>
<tr>
<td>Black</td>
<td>–</td>
<td>Rear Speaker Out</td>
<td>Rear Speaker Out</td>
<td>Rear Speaker Out</td>
</tr>
</tbody>
</table>
2.3.2 Audio I/O connections

Audio I/O ports

Connect to Headphone and Mic

Connect to Stereo Speakers

Connect to 2 Speakers
Chapter 2: Basic Installation

Connect to 4 Speakers

Connect to 6 Speakers

Connect to 8 Speakers
2.4 Starting up for the first time

1. After making all the connections, replace the system case cover.
2. Ensure that all switches are off.
3. Connect the power cord to the power connector at the back of the system chassis.
4. Connect the power cord to a power outlet that is equipped with a surge protector.
5. Turn on the devices in the following order:
   a. Monitor
   b. External SCSI devices (starting with the last device on the chain)
   c. System power
6. After applying power, the system power LED on the system front panel case lights up. For systems with ATX power supplies, the system LED lights up when you press the ATX power button. If your monitor complies with the "green" standards or if it has a "power standby" feature, the monitor LED may light up or change from orange to green after the system LED turns on.

The system then runs the power-on self tests (POST). While the tests are running, the BIOS beeps (refer to the BIOS beep codes table) or additional messages appear on the screen. If you do not see anything within 30 seconds from the time you turned on the power, the system may have failed a power-on test. Check the jumper settings and connections or call your retailer for assistance.

<table>
<thead>
<tr>
<th>BIOS Beep</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>One short beep</td>
<td>VGA detected</td>
</tr>
<tr>
<td></td>
<td>Quick boot set to disabled</td>
</tr>
<tr>
<td></td>
<td>No keyboard detected</td>
</tr>
<tr>
<td>One continuous beep followed by two short beeps</td>
<td>No memory detected</td>
</tr>
<tr>
<td>then a pause (repeated)</td>
<td></td>
</tr>
<tr>
<td>One continuous beep followed by three short beeps</td>
<td>No VGA detected</td>
</tr>
<tr>
<td>One continuous beep followed by four short beeps</td>
<td>Hardware component failure</td>
</tr>
</tbody>
</table>

7. At power on, hold down the <Delete> key to enter the BIOS Setup. Follow the instructions in Chapter 3.

2.5 Turning off the computer

While the system is ON, press the power button for less than four seconds to put the system on sleep mode or soft-off mode, depending on the BIOS setting. Press the power button for more than four seconds to let the system enter the soft-off mode regardless of the BIOS setting.
Chapter 3: BIOS Setup

3.1 Knowing BIOS

The new ASUS UEFI BIOS is a Unified Extensible Interface that complies with UEFI architecture, offering a user-friendly interface that goes beyond the traditional keyboard-only BIOS controls to enable a more flexible and convenient mouse input. You can easily navigate the new UEFI BIOS with the same smoothness as your operating system. The term “BIOS” in this user manual refers to “UEFI BIOS” unless otherwise specified.

BIOS (Basic Input and Output System) stores system hardware settings such as storage device configuration, overclocking settings, advanced power management, and boot device configuration that are needed for system startup in the motherboard CMOS. In normal circumstances, the default BIOS settings apply to most conditions to ensure optimal performance. **DO NOT change the default BIOS settings** except in the following circumstances:

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

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.**

When downloading or updating the BIOS file, rename it as **M10H.CAP** for this motherboard.
3.2 BIOS setup program

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

Entering BIOS 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>+<Delete> 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.

After doing either of the three options, press <Delete> key to enter BIOS.

- The BIOS setup screens shown in this section are for reference purposes only, and may not exactly match what you see on your screen.
- Ensure that a USB mouse is connected to your motherboard if you want to use the mouse to control the BIOS setup program.
- If the system becomes unstable after changing any BIOS setting, load the default settings to ensure system compatibility and stability. Select the Load Optimized Defaults item under the Exit menu or press hotkey <F5>. See section 3.10 Exit Menu for details.
- If the system fails to boot after changing any BIOS setting, try to clear the CMOS and reset the motherboard to the default value. See section 2.3.1 Rear I/O connection for the location of the Clear CMOS button to clear RTC RAM.
- The BIOS setup program does not support the Bluetooth devices.

Please visit ASUS website for the detailed BIOS content manual.

BIOS menu screen

The BIOS Setup program can be used under two modes: EZ Mode and Advanced Mode. You can change modes from Setup Mode in Boot menu or by pressing the <F7> hotkey.
3.2.1 Advanced Mode

The Advanced Mode provides advanced options for experienced end-users to configure the BIOS settings. The figure below shows an example of the Advanced Mode. Refer to the following sections for the detailed configurations.

The default screen for entering the BIOS setup program can be changed. Refer to the Setup Mode item in section Boot menu for details.
Menu bar

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

<table>
<thead>
<tr>
<th>Menu</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>My Favorites</td>
<td>For saving the frequently-used system settings and configuration.</td>
</tr>
<tr>
<td>Main</td>
<td>For changing the basic system configuration</td>
</tr>
<tr>
<td>Extreme Tweaker</td>
<td>For changing the overclocking settings</td>
</tr>
<tr>
<td>Advanced</td>
<td>For changing the advanced system settings</td>
</tr>
<tr>
<td>Monitor</td>
<td>For displaying the system temperature, power status, and changing the fan settings.</td>
</tr>
<tr>
<td>Boot</td>
<td>For changing the system boot configuration</td>
</tr>
<tr>
<td>Tool</td>
<td>For configuring options for special functions</td>
</tr>
<tr>
<td>Exit</td>
<td>For selecting the exit options and loading default settings</td>
</tr>
</tbody>
</table>

Menu items

The highlighted item on the menu bar displays the specific items for that menu. For example, selecting Main shows the Main menu items.

The other items (My Favorites, Ai Tweaker, Advanced, Monitor, Boot, Tool, and Exit) on the menu bar have their respective menu items.

Submenu items

A greater than sign (>) before each item on any menu screen means that the item has a submenu. To display the submenu, select the item and press <Enter>.

Language

This button above the menu bar contains the languages that you can select for your BIOS. Click this button to select the language that you want to display in your BIOS screen.

My Favorites (F3)

This button above the menu bar shows all BIOS items in a Tree Map setup. Select frequently-used BIOS settings and save it to MyFavorites menu.

Refer to section 3.3 My Favorites for more information.

Q-Fan Control (F6)

This button above the menu bar displays the current settings of your fans. Use this button to manually tweak the fans to your desired settings.

Refer to section 3.2.3 Q-Fan Control for more information.

EZ Tuning Wizard (F11)

This button above the menu bar allows you to view and tweak the overclocking settings of your system. It also allows you to change the motherboard’s SATA mode from AHCI to RAID mode.

Refer to section 3.2.4 EZ Tuning Wizard for more information.
Search on FAQ
Move your mouse over this button to show a QR code, scan this QR code on your mobile device to connect to the BIOS FAQ web page of the ASUS support website. You can also scan the following QR code:

![QR Code]

Hot keys
This button above the menu bar contains the navigation keys for the BIOS setup program. Use the navigation keys to select items in the menu and change the settings.

Scroll bar
A scroll bar appears on the right side of a menu screen when there are items that do not fit on the screen. Press the Up/Down arrow keys or <Page Up> / <Page Down> keys to display the other items on the screen.

General help
At the bottom of the menu screen is a brief description of the selected item. Use <F12> key to capture the BIOS screen and save it to the removable storage device.

Configuration fields
These fields show the values for the menu items. If an item is user-configurable, you can change the value of the field opposite the item. You cannot select an item that is not user-configurable.

A configurable field is highlighted when selected. To change the value of a field, select it and press <Enter> to display a list of options.

Last Modified button
This button shows the items that you last modified and saved in BIOS Setup.
3.2.2 EZ Mode

The EZ Mode provides you an overview of the basic system information, and allows you to select the display language, system performance, mode and boot device priority. To access the Advanced Mode, select Advanced Mode or press the <F7> hotkey for the advanced BIOS settings.

To switch from Advanced Mode to EZ Mode, click EZ Mode(F7) or press the <F7> hotkey.

The boot device options vary depending on the devices you installed to the system.
3.2.3 QFan Control

The QFan Control allows you to set a fan profile or manually configure the operating speed of your CPU and chassis fans.

Q-Fan Control
Select your target fan and then move the slider to select any of these profiles: Standard, Silent, Turbo and Full Speed. You can also move the slider to Manual and manually configure the fan’s operating speed.

Select a profile to apply to your fans
Click to apply the fan setting
Click to undo the changes
Click to go back to main menu
Select to manually configure your fans
Click to activate PWM Mode
Click to activate DC Mode
Click to select a fan to be configured
Select to manually configure your fans
Select a profile to apply to your fans
Click to apply the fan setting
Click to undo the changes
Click to go back to main menu

Select to manually configure your fans
Click to activate PWM Mode
Click to activate DC Mode
Click to select a fan to be configured

Optimize All
CPU FAN
CHA1 FAN
CHA2 FAN
CHA3 FAN
AIO PUMP
HAMP FAN
EXT FAN1
EXT FAN2
EXT FAN3
W_PUMP+
Configuring fans manually
Select Manual from the list of profiles to manually configure your fans’ operating speed.

To configure your fans:
1. Select the fan that you want to configure and to view its current status.
2. Click and drag the speed points to adjust the fans’ operating speed.
3. Click Apply to save the changes then click Exit (ESC).
3.2.4 EZ Tuning Wizard

EZ Tuning Wizard allows you to easily overclock your CPU and DRAM, computer usage, and CPU fan to their best settings. You can also set RAID in your system using this feature.

**OC Tuning**

To start OC Tuning:

1. Press `<F11>` on your keyboard or click `EZ Tuning Wizard(F11)` from the BIOS screen to open EZ Tuning Wizard screen.
2. Click **OC** then click **Next**.
3. Select a PC scenario **Daily Computing** or **Gaming/Media Editing**, then click **Next**.
4. Select a Main Cooling System **BOX cooler, Tower cooler, Water cooler, or I'm not sure**, then click **Next**.

5. After selecting the Main Cooling System, click **Next** then click **Yes** to start the OC Tuning.

**Creating RAID**
To create RAID:

1. Press <F11> on your keyboard or click **EZ Tuning Wizard(F11)** from the BIOS screen to open EZ Tuning Wizard screen.

2. Click **RAID** then click **Next**.

   - Ensure that your HDDs have no existing RAID volumes.
   - Ensure to connect your HDDs to Intel® SATA connectors.

3. Select the port that you want to set to [RAID] mode, **PCIE** or **SATA**, then click **Next**.
4. Select the type of storage for your RAID, **Easy Backup** or **Super Speed**, then click **Next**.

![Storage Function Selection](image)

| Easy Backup | Super Speed |

a. For Easy Backup, click **Next** then select from **Easy Backup (RAID1)** or **Easy Backup (RAID10)**.

![Easy Backup Options](image)

| Easy Backup (RAID1) | Easy Backup (RAID10) |

You can only select Easy Backup (RAID 10) if you connect four (4) HDDs.

b. For Super Speed, click **Next** then select from **Super Speed (RAID0)** or **Super Speed (RAID5)**.

![Super Speed Options](image)

| Super Speed (RAID0) | Super Speed (RAID5) |

5. After selecting the type of RAID, click **Next** then click **Yes** to continue the RAID setup.

6. After the RAID setup is done, click **Yes** to exit the setup then click **OK** to reset your system.
3.3 My Favorites

My Favorites is your personal space where you can easily save and access your favorite BIOS items.

My Favorites comes with several performance, power saving, and fast boot related items by default. You can personalize this screen by adding or removing items.
Adding items to My Favorites

To add BIOS items:

1. Press <F3> on your keyboard or click from the BIOS screen to open Setup Tree Map screen.

2. On the Setup Tree Map screen, select the BIOS items that you want to save in My Favorites screen.

3. Select an item from main menu panel, then click the submenu that you want to save as favorite from the submenu panel and click or press <Enter> on your keyboard.

   You cannot add the following items to My Favorite items:
   - Items with submenu options
   - User-managed items such as language and boot order
   - Configuration items such as Memory SPD Information, system time and date.

4. Click Exit (ESC) or press <Esc> key to close Setup Tree Map screen.

5. Go to My Favorites menu to view the saved BIOS items.
### 3.4 Main menu

The Main menu screen appears when you enter the Advanced Mode of the BIOS Setup program. 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.

**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 2.3.1 Rear I/O connection for the location of the Clear CMOS button to clear 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].

### 3.5 Extreme Tweaker menu

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

Be cautious when changing the settings of the Extreme 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.

**Ai Overclock Tuner**

Allows you to select the CPU overclocking options to achieve the desired CPU internal frequency. Configuration options:

- **[Auto]** Loads the optimal settings for the system.
- **[Manual]** Allows you to individually set overclocking parameters.
- **[X.M.P.]** If you install memory modules supporting the eXtreme Memory Profile (X.M.P.) Technology, choose this item to set the profiles supported by your memory modules for optimizing the system performance.

The [X.M.P.] configuration option appears only when you install memory modules supporting the eXtreme Memory Profile (X.M.P.) Technology.

The following item appears only when you set the Ai Overclocking Tuner to [Manual].

**BCLK Frequency**

This item allows you to set the BCLK (base clock) frequency to enhance the system performance. Use the <-> or <-> to adjust the value. The values range from 40.0 MHz to 650.0 MHz.

We recommend you to set the value based on the CPU specification, as high BCLK frequencies may damage the CPU permanently.
ASUS MultiCore Enhancement

[Auto] This item allows you to maximize the overclocking performance optimized by ASUS core ratio settings.

[Disabled] This item allows you to set to default core ratio settings.

CPU Core Ratio

This item allows you to set the CPU core ratios.

Configuration options: [Auto] [Sync All Cores] [Per Core]

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]

TPU

This item allows you to automatically overclock the CPU and DRAM frequencies and voltage for an enhanced system performance.

[Keep Current Settings] Keep the current settings without changing anything.

[TPU I] Applies air cooling overclocking conditions.

[TPU II] Applies water cooling overclocking conditions.

Ensure to use water cooling device before selecting [TPU II].

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: [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]
3.6 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.

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

The items in this menu may vary based on the CPU installed.

Hyper-threading
This item allows a hyper-threading processor to appear as two logical processors, allowing the operating system to schedule two threads or processors simultaneously.
Configuration options: [Disabled] [Enabled]

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

**Intel(R) SpeedStep(tm)**
This item allows more than two frequency to be supported.
Configuration options: [Auto] [Enabled] [Disabled]

**Turbo Mode**
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]

**CPU C-States**
This item allows you to set the power saving of the CPU states.
Configuration options: [Auto] [Disabled] [Enabled]
3.6.2 Platform Misc Configuration
The items in this menu allow you to change the ASPM for PCH and SA PCI Express.

3.6.3 System Agent (SA) Configuration
The items in this menu allow you to adjust the Link Speed for PEG Port and Multi-Monitor.

3.6.4 PCH Configuration
The items in this menu allow you to adjust the PCH PCI Express speed.

PCI Express Configuration
This item allows you to configure the PCI Express slots.

   PCIe Speed
   This item allows your system to automatically select the PCI Express port speed.
   Configuration options: [Auto] [Gen1] [Gen2] [Gen3]

3.6.5 PCH Storage Configuration
While entering Setup, the BIOS automatically detects the presence of SATA devices. The SATA Port items show Not Present if no SATA device is installed to the corresponding SATA port.

SATA Controller(s)
This item allows you to enable or disable the SATA Device.
Configuration options: [Disabled] [Enabled]

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

SATA Mode Selection
This item allows you to set the SATA configuration.

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

   [Intel RST Premium With Intel Optane System Acceleration (RAID)] Set to [Intel RST Premium With Intel Optane System Acceleration (RAID)] when you want to create a RAID configuration from the SATA hard disk drives.
S.M.A.R.T. Status Test
S.M.A.R.T. (Self-Monitoring, Analysis and Reporting Technology) is a monitoring system that shows a warning message during POST (Power-on Self Test) when an error occurs in the hard disks.
Configuration options: [On] [Off]

SATA6G_1 - SATA6G_6
- SATA6G_1 - SATA6G_6
  This item allows you to enable or disable the selected SATA port.
  Configuration options: [Disabled] [Enabled]

  Hot Plug
  These items appear only when the SATA Mode Selection is set to [AHCI] and allows you to enable or disable SATA Hot Plug Support.
  Configuration options: [Disabled] [Enabled]

3.6.6 PCH-FW Configuration
This item allows you to configure the firmware TPM.

3.6.7 ROG Effects
The items in this menu allow you to configure the LEDs on your motherboard and the functions for the Q-Code LED.

Onboard LED
This item allows you to enable all the onboard LEDs.
Configuration options: [Enabled] [Disabled]

Q-Code LED Function
  [Auto] Automatically display POST (Power-On Self-Test) code and CPU temperature on Q-Code LED.
  [POST Code Only] Show POST (Power-On Self-Test) code on Q-Code LED.

3.6.8 Onboard Devices Configuration
The items in this menu allow you to switch between PCIe Lanes and configure onboard devices.

HD Audio Controller
This item allows you to use the Azalia High Definition Audio Controller
Configuration options: [Disabled] [Enabled]
M.2_1 Configuration: [Auto][SATA mode][PCIE mode]

[Auto] Auto-detects the M.2 device mode. If a SATA device is detected, SATA6G_1 will be disabled.

[SATA mode] Only supports M.2 SATA devices. Please note that SATA6G_1 port cannot be used in this mode.

[PCIE mode] Only supports M.2 PCIE devices.

M.2_2 PCIe Bandwidth Configuration: [X2][X4]

[X2] Run at X2 mode with SATA6G_56 enabled.


USB Type C Power Switch

[Auto] The system will automatically detect your USB Type C devices and provide suitable power if needed.

[Enabled] The USB Type C port will always provide power to your devices.

RGB LED lighting

When system is in working state
This item allows you to turn the RGB LED lighting on or off when the system is in the working state.
Configuration options: [On] [Off]

When system is in sleep, hibernate or soft off states
This item allows you to turn the RGB LED lighting on or off when the system is in the sleep, hibernate or soft off states.
Configuration options: [On] [Off]

Bluetooth Controller
This item allows you to enable or disable the Intel Bluetooth controller.
Configuration options: [Disabled] [Enabled]

Wi-Fi Controller
This item allows you to enable or disable the Intel Wi-Fi 802.11ac controllers.
Configuration options: [Disabled] [Enabled]

Intel LAN Controller
This item allows you to enable or disable the Intel LAN controllers.
Configuration options: [Disabled] [Enabled]
3.6.9  APM Configuration
The items in this menu allow you to set system wake and sleep settings.

ErP Ready [Disabled]
This item allows you to switch off some power at S4+S5 or S5 to get the system ready for ErP requirement. When set to [Enabled], all other PME options are switched off.
Configuration options: [Disabled] [Enable(S4+S5)] [Enable(S5)]

3.6.10  Network Stack Configuration
The items in this menu allow you to configure IPv4 / IPv6 PXE support.

3.6.11  HDD/SSD SMART Information
This menu displays the SMART information of the connected devices.

NVM Express devices do not support SMART information.

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

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

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

Refer to section 1.1.2 Motherboard layout for the location of the USB ports.
3.7 Monitor menu
The Monitor menu displays the system temperature/power status, and allows you to change the fan settings.
Scroll down to display the other BIOS items.

Qfan Configuration
Qfan Tuning
Click this item to automatically detect the lowest speed and configure the minimum duty cycle for each fan.

AIO PUMP/W_PUMP+ Control
[Disabled] Disable the Water Pump control feature.
[Auto] Detects the type of water pump installed and automatically switches the control modes.
[DC mode] Enable the Water Pump control in DC mode for 3-pin chassis fan.
[PWM mode] Enable the Water Pump control in PWM mode for 4-pin chassis fan.

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

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

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

Next Boot after AC Power Loss
[Normal Boot] Returns to normal boot on the next boot after an AC power loss.
[Fast Boot] Accelerates the boot speed on the next boot after an AC power loss.

Setup Mode
[Advanced Mode] This item allows you to go to Advanced Mode of the BIOS after POST.
[EZ Mode] This item allows you to go to EZ Mode of the BIOS after POST.
CSM (Compatibility Support Module)

This item allows you to configure the CSM (Compatibility Support Module) items to fully support the various VGA, bootable devices and add-on devices for better compatibility.

**Launch CSM**

- **[Auto]** The system automatically detects the bootable devices and the add-on devices.
- **[Enabled]** For better compatibility, enable the CSM to fully support the non-UEFI driver add-on devices or the Windows® UEFI mode.
- **[Disabled]** Disable the CSM to fully support the non-UEFI driver add-on devices or the Windows® UEFI mode.

The following items appear only when you set the **Launch CSM** to **[Enabled]**.

**Boot Devices Control**

This item allows you to select the type of devices that you want to boot.

Configuration options: [UEFI and Legacy OPROM] [Legacy OPROM only] [UEFI only]

**Boot from Network Devices**

This item allows you to select the type of network devices that you want to launch.

Configuration options: [Ignore] [Legacy only] [UEFI driver first]

**Boot from Storage Devices**

This item allows you to select the type of storage devices that you want to launch.

Configuration options: [Ignore] [Legacy only] [UEFI driver first]

**Boot from PCI-E/PCI Expansion Devices**

This item allows you to select the type of PCI-E/PCI expansion devices that you want to launch.

Configuration options: [Legacy only] [UEFI driver first]

**Secure Boot**

This item allows you to configure the Windows® Secure Boot settings and manage its keys to protect the system from unauthorized access and malwares during POST.
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 access Windows® OS in Safe Mode, press <F8> after POST (Windows® 8 not supported).
- To select the boot device during system startup, press <F8> when the 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.

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

Setup Animator
This item allows you to enable or disable the Setup animator.
Configuration options: [Disabled] [Enabled]

3.9.1 ASUS EZ Flash 3 Utility
This item allows you to run ASUS EZ Flash 3. 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.

For more details, refer to section 3.11.2 ASUS EZ Flash 3.
3.9.2 Secure Erase

SSD speeds may lower over time as with any storage medium due to data processing. Secure Erase completely and safely cleans your SSD, restoring it to factory performance levels.

Secure Erase is only available in AHCI mode. Ensure to set the SATA mode to AHCI. Click Advanced > PCH Storage Configuration > SATA Mode Selection > AHCI.

To launch Secure Erase, click Tool > Secure Erase on the Advanced mode menu.

Check the ASUS support site for a full list of SSDs tested with Secure Erase. The drive may become unstable if you run Secure Erase on an incompatible SSD.

- The time to erase the contents of your SSD may take a while depending on its size. Do not turn off the system during the process.
- Secure Erase is only supported on Intel SATA port. For more information about Intel SATA ports, refer to section 1.1.2 Motherboard layout of this manual.

Status definition:

- **Frozen.** The frozen state is the result of a BIOS protective measure. The BIOS guards drives that do not have password protection by freezing them prior to booting. If the drive is frozen, a power off or hard reset of your PC must be performed to proceed with the Secure Erase.

- **Locked.** SSDs might be locked if the Secure Erase process is either incomplete or was stopped. This may be due to a third party software that uses a different password defined by ASUS. You have to unlock the SSD in the software before proceeding with Secure Erase.
3.9.3 ASUS Overclocking Profile
This item allows you to store or load multiple BIOS settings.

Load from Profile
This item allows you to load the previous BIOS settings saved in the BIOS Flash. Key in the profile number that saved your BIOS settings, press <Enter>, and then select Yes.

• DO NOT shut down or reset the system while updating the BIOS to prevent the system boot failure!
• We recommend that you update the BIOS file only coming from the same memory/CPU configuration and BIOS version.

Profile Name
This item allows you to key in a profile name.

Save to Profile
This item allows you to save the current BIOS settings to the BIOS Flash, and create a profile. Key in a profile number from one to eight, press <Enter>, and then select Yes.

Load/Save Profile from/to USB Drive
This item allows you to load or save profile from your USB drive, load and save profile to your USB drive.

3.9.4 ASUS SPD Information
This item allows you to view the DRAM SPD information.

3.9.5 Graphics Card Information
This item displays the information about the graphics card installed in your system.

GPU Post
This item displays the information and recommended configuration for the PCIE slots that the graphics card is installed in your system.

This feature is only supported on selected ASUS graphics cards.

Bus Interface
This item allows you to select the bus interface.
Configuration options: [PCIEX16/X8_1]
3.10 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.
3.11 Updating BIOS

The ASUS website publishes the latest BIOS versions to provide enhancements on system stability, compatibility, and performance. However, BIOS updating is potentially risky. If there is no problem using the current version of BIOS, DO NOT manually update the BIOS. Inappropriate BIOS updating may result in system’s failure to boot. Carefully follow the instructions in this chapter to update your BIOS when necessary.

Visit [http://www.asus.com](http://www.asus.com) to download the latest BIOS file for this motherboard.

The following utilities allow you to manage and update the motherboard BIOS setup program.

1. **EZ Update**: Updates the BIOS in Windows® environment.
2. **ASUS EZ Flash 3**: Updates the BIOS using a USB flash drive.
3. **ASUS CrashFree BIOS 3**: Restores the BIOS using the motherboard support DVD or a USB flash drive when the BIOS file fails or gets corrupted.

### 3.11.1 EZ Update

The EZ Update is a utility that allows you to update the motherboard BIOS in Windows® environment.

- EZ Update requires an Internet connection either through a network or an ISP (Internet Service Provider).
- This utility is available in the support DVD that comes with the motherboard package.
3.11.2 ASUS EZ Flash 3

ASUS EZ Flash 3 allows you to download and update to the latest BIOS through the Internet without having to use a bootable floppy disk or an OS-based utility.

Updating through the Internet varies per region and Internet conditions. Check your local Internet connection before updating through the Internet.

To update the BIOS by USB:

1. Enter the Advanced Mode of the BIOS setup program. Go to the Tool menu to select **ASUS EZ Flash Utility** and press <Enter>.
2. Insert the USB flash disk that contains the latest BIOS file to the USB port.
3. Select via Storage Device(s).
4. Press <Tab> to switch to the Drive field.
5. Press the Up/Down arrow keys to find the USB flash disk that contains the latest BIOS, and then press <Enter>.
6. Press <Tab> to switch to the Folder Info field.
7. Press the Up/Down arrow keys to find the BIOS file, and then press <Enter> to perform the BIOS update process. Reboot the system when the update process is done.
• 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!

Ensure to load the BIOS default settings to ensure system compatibility and stability. Select the Load Optimized Defaults item under the Exit menu. See section 3.10 Exit Menu for details.

To update the BIOS by Internet:
1. Enter the Advanced Mode of the BIOS setup program. Go to the Tool menu to select ASUS EZ Flash Utility and press <Enter>.
2. Select via Internet.
3. Press the Left/Right arrow keys to select an Internet connection method, and then press <Enter>.
4. Follow the onscreen instructions to complete the update.
5. Reboot the system when the update process is done.

Ensure to load the BIOS default settings to ensure system compatibility and stability. Select the Load Optimized Defaults item under the Exit menu. See section 3.10 Exit Menu for details.
3.11.3 ASUS CrashFree BIOS 3

The ASUS CrashFree BIOS 3 utility 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 restore a corrupted BIOS file using the motherboard support DVD or a USB flash drive that contains the BIOS file.

The BIOS file in the motherboard support DVD may be older than the BIOS file published on the ASUS official website. If you want to use the newer BIOS file, download the file at https://www.asus.com/support/ and save it to a USB flash drive.

Recovering the BIOS

To recover the BIOS:

1. Turn on the system.
2. Insert the motherboard support DVD to the optical drive, or the USB flash drive containing the BIOS file to the USB port.
3. The utility automatically checks the devices for the BIOS file. When found, the utility reads the BIOS file and enters ASUS EZ Flash 3 automatically.
4. The system requires you to enter BIOS Setup to recover the BIOS setting. To ensure system compatibility and stability, we recommend that you press <F5> to load default BIOS values.

DO NOT shut down or reset the system while updating the BIOS! Doing so can cause system boot failure!
RAID Support

4.1 RAID configurations

The motherboard supports Intel® Rapid Storage Technology with RAID 0, RAID 1, RAID 5, and RAID 10 solution.

If you want to install a Windows® operating system to a hard disk drive included in a RAID set, you have to create a RAID driver disk and load the RAID driver during OS installation. Refer to section 4.2 Creating a RAID driver disk for details.

4.1.1 RAID definitions

RAID 0 (Data striping) optimizes two identical hard disk drives to read and write data in parallel, interleaved stacks. Two hard disks perform the same work as a single drive but at a sustained data transfer rate, double that of a single disk alone, thus improving data access and storage. Use of two new identical hard disk drives is required for this setup.

RAID 1 (Data mirroring) copies and maintains an identical image of data from one drive to a second drive. If one drive fails, the disk array management software directs all applications to the surviving drive as it contains a complete copy of the data in the other drive. This RAID configuration provides data protection and increases fault tolerance to the entire system. Use two new drives or use an existing drive and a new drive for this setup. The new drive must be of the same size or larger than the existing drive.

RAID 5 strips both data and parity information across three or more hard disk drives. Among the advantages of RAID 5 configuration include better HDD performance, fault tolerance, and higher storage capacity. The RAID 5 configuration is best suited for transaction processing, relational database applications, enterprise resource planning, and other business systems. Use a minimum of three identical hard disk drives for this setup.

RAID 10 is data striping and data mirroring combined without parity (redundancy data) having to be calculated and written. With the RAID 10 configuration you get all the benefits of both RAID 0 and RAID 1 configurations. Use four new hard disk drives or use an existing drive and three new drives for this setup.
4.1.2 Installing storage devices
The motherboard supports Serial ATA hard disk drives and PCIE SSD storage devices. For optimal performance, install identical drives of the same model and capacity when creating a disk array.

Refer to Chapter 2 for details on installing storage devices to your motherboard.

4.1.3 Intel® Rapid Storage Technology in UEFI BIOS
To enter the Intel® Rapid Storage Technology in UEFI BIOS:

1. Enter the BIOS Setup during POST.
2. Go to the Advanced menu > PCH Storage Configuration, then press <Enter>.
3. Set the SATA Mode Selection item to [Intel RST Premium With Intel Optane System Acceleration (RAID)].

If you are using PCIE storage devices, ensure to enable all the PCIE Storage RAID Support items.

4. Go to the Boot menu > CSM (Compatibility Support Module) > Launch CSM, then set the item to [Disabled].
5. Save your changes and exit the BIOS Setup, then enter the BIOS Setup again.
6. Go to the Advanced menu > Intel(R) Rapid Storage Technology, then press <Enter> to display the Intel® Rapid Storage Technology menu.

Refer to Chapter 3 for details on entering and navigating through the BIOS Setup.

Due to chipset limitation, when SATA ports are set to RAID mode, all SATA ports run at RAID mode together.
Creating a RAID set

To create a RAID set:

1. From the Intel® Rapid Storage Technology menu, select Create RAID Volume and press <Enter>. The following screen appears:

2. When the Name item is selected, enter a name for the RAID set and press <Enter>.

3. When the RAID Level item is selected, press <Enter> to select the RAID level to create, and then press <Enter>.

4. Under Select Disks, press <Enter> and select X for the disks you want to include in the RAID set.
5. When the **Strip Size** item is selected, press <Enter> to select strip size for the RAID array (for RAID 0, 10 and 5 only), and then press <Enter>. The available strip size values range from 4 KB to 128 KB. The following are typical values:

- RAIDX: 128 KB
- RAIDX: 64 KB
- RAIDX: 64 KB

We recommend a lower strip size for server systems, and a higher strip size for multimedia computer systems used mainly for audio and video editing.

6. When the **Capacity (MB)** item is selected, enter the RAID volume capacity that you want and press <Enter>. The default value indicates the maximum allowed capacity.

7. When the **Create Volume** item is selected, press <Enter> to create the RAID volume and return to the Intel® Rapid Storage Technology menu.
Deleting a RAID set

Be cautious when deleting a RAID set. You will lose all data on the hard disk drives when you delete a RAID set.

To delete a RAID set:

1. From the Intel® Rapid Storage Technology menu, select the RAID volume you want to delete and press <Enter>. The following screen appears:

   ![Image of RAID volume info]

   - Name:
   - RAID Level:
   - Stripe Size:
   - Size:
   - Status:
   - Bootable:

   - Volume Info:
     - RAID Volume Info
     - Delete

2. When the **Delete** item is selected, press <Enter>, then select **Yes** to delete the RAID volume and return to the Intel® Rapid Storage Technology menu, or select **No** to cancel.

   ![Image of RAID delete confirmation]

   - Delete
   - ALL DATA ON VOLUME WILL BE LOST!
4.1.4  Intel® Rapid Storage Technology Option ROM utility

To enter the Intel® Rapid Storage Technology Option ROM utility:

1. Turn on the system.
2. During POST, press <Ctrl> + <I> to display the utility main menu.

```
[ MAIN MENU ]
1. Create RAID Volume  4. Recovery Volume Options
2. Delete RAID Volume   5. Acceleration Options
3. Reset Disks to Non-RAID  6. Exit

RAID Volumes:
None defined.

Physical Devices:
Port  Device Model     Serial #  Size   Type/Status (Vol ID)
 0  ST3160812AS        9LS0HJA4  149.0GB  Non-RAID Disk
 1  ST3160812AS        9LS0F4HL  149.0GB  Non-RAID Disk
 2  ST3160812AS        3LS0JYL8  149.0GB  Non-RAID Disk
 3  ST3160812AS        9LS0BJ5H  149.0GB  Non-RAID Disk

[+] - Select  [ESC] - Exit  [ENTER] - Select Menu
```

The navigation keys at the bottom of the screen allow you to move through the menus and select the menu options.

The RAID BIOS setup screens shown in this section are for reference only and may not exactly match the items on your screen.

The utility supports maximum four hard disk drives for RAID configuration.
Creating a RAID set
To create a RAID set:

1. From the utility main menu, select **1. Create RAID Volume** and press <Enter>. The following screen appears:

   ![CREATE VOLUME MENU](image)

   **[CREATE VOLUME MENU]**
   
   Name: Volume 0  
   RAID Level: 
   Disks: 
   Strip Size: 
   Capacity: 
   Sync: 
   Create volume

2. Enter a name for the RAID set and press <Enter>.

3. When the RAID Level item is selected, press the up/down arrow key to select a RAID level to create, and then press <Enter>.

4. When the Disks item is selected, press <Enter> to select the hard disk drives you want to include in the RAID set. The SELECT DISKS screen appears:

   ![SELECT DISKS](image)

   **[SELECT DISKS]**
   
   Port     Device Model     Serial #     Size     Status
   0    ST3160812AS   9LS0HJA4       149.0GB   Non-RAID Disk
   1    ST3160812AS   9LS0F4HL       149.0GB   Non-RAID Disk
   2    ST3160812AS   3LS0JYL8       149.0GB   Non-RAID Disk
   3    ST3160812AS   9LS0BJSK       149.0GB   Non-RAID Disk

   Select 2 to 6 to use in creating the volume.
5. Use the up/down arrow key to select a drive, and then press <Space> to select. A small triangle marks the selected drive. Press <Enter> after completing your selection.

6. Use the up/down arrow key to select the strip size for the RAID array (for RAID 0, 10 and 5 only), and then press <Enter>. The available strip size values range from 4 KB to 128 KB. The following are typical values:
   - RAID 0: 128 KB
   - RAID 10: 64 KB
   - RAID 5: 64 KB

   We recommend a lower strip size for server systems, and a higher strip size for multimedia computer systems used mainly for audio and video editing.

7. When the Capacity item is selected, enter the RAID volume capacity that you want and press <Enter>. The default value indicates the maximum allowed capacity.

8. When the Create Volume item is selected, press <Enter>. The following warning message appears:

   WARNING: ALL DATA ON SELECTED DISKS WILL BE LOST.
   Are you sure you want to create this volume? (Y/N)

9. Press <Y> to create the RAID volume and return to the main menu, or <N> to go back to the CREATE VOLUME menu.
Deleting a RAID set

Be cautious when deleting a RAID set. You will lose all data on the hard disk drives when you delete a RAID set.

To delete a RAID set:

1. From the utility main menu, select 2. Delete RAID Volume and press <Enter>. The following screen appears:

   ![DELETE VOLUME MENU]

   Deleting a volume will reset the disks to non-RAID.
   
   WARNING: ALL DISK DATA WILL BE DELETED. 
   (This does not apply to Recovery volumes)

   ![HELP]

2. Use the up/down arrow key to select the RAID set you want to delete, and then press <Delete>. The following warning message appears:

   ![DELETE VOLUME VERIFICATION]

   ALL DATA IN THE VOLUME WILL BE LOST! 
   (This does not apply to Recovery volumes)

   Are you sure you want to delete “Volume0”? (Y/N):

3. Press <Y> to delete the RAID set and return to the utility main menu, or press <N> to return to the DELETE VOLUME menu.
Exiting the Intel® Rapid Storage Technology Option ROM utility

To exit the utility:

1. From the utility main menu, select 6. Exit, then press <Enter>. The following warning message appears:

   ![Confirm Exit]

   Are you sure you want to exit? (Y/N):

2. Press <Y> to exit or press <N> to return to the utility main menu.

4.2    Creating a RAID driver disk

4.2.1    Creating a RAID driver disk in Windows®

To install the RAID driver for Windows® OS:

1. During the OS installation, click Load Driver to allow you to select the installation media containing the RAID driver.

2. Insert the support USB drive with RAID driver into the USB port, and then click Browse.

3. Click the name of the device you’ve inserted, go to Drivers > RAID, and then select the RAID driver for the corresponding OS version. Click OK.

4. Follow the succeeding screen instructions to complete the installation.

To set up a Windows® UEFI operating system under RAID mode, ensure to load the UEFI driver for your optical drive.
### Appendix

#### Q-Code table

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>Not used</td>
</tr>
<tr>
<td>01</td>
<td>Power on. Reset type detection (soft/hard).</td>
</tr>
<tr>
<td>02</td>
<td>AP initialization before microcode loading</td>
</tr>
<tr>
<td>03</td>
<td>System Agent initialization before microcode loading</td>
</tr>
<tr>
<td>04</td>
<td>PCH initialization before microcode loading</td>
</tr>
<tr>
<td>06</td>
<td>Microcode loading</td>
</tr>
<tr>
<td>07</td>
<td>AP initialization after microcode loading</td>
</tr>
<tr>
<td>08</td>
<td>System Agent initialization after microcode loading</td>
</tr>
<tr>
<td>09</td>
<td>PCH initialization after microcode loading</td>
</tr>
<tr>
<td>0B</td>
<td>Cache initialization</td>
</tr>
<tr>
<td>0C – 0D</td>
<td>Reserved for future AMI SEC error codes</td>
</tr>
<tr>
<td>0E</td>
<td>Microcode not found</td>
</tr>
<tr>
<td>0F</td>
<td>Microcode not loaded</td>
</tr>
<tr>
<td>10</td>
<td>PEI Core is started</td>
</tr>
<tr>
<td>11 – 14</td>
<td>Pre-memory CPU initialization is started</td>
</tr>
<tr>
<td>15 – 18</td>
<td>Pre-memory System Agent initialization is started</td>
</tr>
<tr>
<td>19 – 1C</td>
<td>Pre-memory PCH initialization is started</td>
</tr>
<tr>
<td>2B – 2F</td>
<td>Memory initialization</td>
</tr>
<tr>
<td>30</td>
<td>Reserved for ASL (see ASL Status Codes section below)</td>
</tr>
<tr>
<td>31</td>
<td>Memory Installed</td>
</tr>
<tr>
<td>32 – 36</td>
<td>CPU post-memory initialization</td>
</tr>
<tr>
<td>37 – 3A</td>
<td>Post-Memory System Agent initialization is started</td>
</tr>
<tr>
<td>3B – 3E</td>
<td>Post-Memory PCH initialization is started</td>
</tr>
<tr>
<td>4F</td>
<td>DXE IPL is started</td>
</tr>
<tr>
<td>50 – 53</td>
<td>Memory initialization error. Invalid memory type or incompatible memory speed</td>
</tr>
<tr>
<td>54</td>
<td>Unspecified memory initialization error</td>
</tr>
<tr>
<td>55</td>
<td>Memory not installed</td>
</tr>
<tr>
<td>56</td>
<td>Invalid CPU type or Speed</td>
</tr>
<tr>
<td>57</td>
<td>CPU mismatch</td>
</tr>
<tr>
<td>58</td>
<td>CPU self test failed or possible CPU cache error</td>
</tr>
<tr>
<td>59</td>
<td>CPU micro-code is not found or micro-code update is failed</td>
</tr>
<tr>
<td>5A</td>
<td>Internal CPU error</td>
</tr>
<tr>
<td>5B</td>
<td>Reset PPI is not available</td>
</tr>
<tr>
<td>5C – 5F</td>
<td>Reserved for future AMI error codes</td>
</tr>
</tbody>
</table>

(continued on the next page)
### Q-Code table

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>E0</td>
<td>S3 Resume is stared (S3 Resume PPI is called by the DXE IPL)</td>
</tr>
<tr>
<td>E1</td>
<td>S3 Boot Script execution</td>
</tr>
<tr>
<td>E2</td>
<td>Video repost</td>
</tr>
<tr>
<td>E3</td>
<td>OS S3 wake vector call</td>
</tr>
<tr>
<td>E4 – E7</td>
<td>Reserved for future AMI progress codes</td>
</tr>
<tr>
<td>E8</td>
<td>S3 Resume Failed</td>
</tr>
<tr>
<td>E9</td>
<td>S3 Resume PPI not Found</td>
</tr>
<tr>
<td>EA</td>
<td>S3 Resume Boot Script Error</td>
</tr>
<tr>
<td>EB</td>
<td>S3 OS Wake Error</td>
</tr>
<tr>
<td>EC – EF</td>
<td>Reserved for future AMI error codes</td>
</tr>
<tr>
<td>F0</td>
<td>Recovery condition triggered by firmware (Auto recovery)</td>
</tr>
<tr>
<td>F1</td>
<td>Recovery condition triggered by user (Forced recovery)</td>
</tr>
<tr>
<td>F2</td>
<td>Recovery process started</td>
</tr>
<tr>
<td>F3</td>
<td>Recovery firmware image is found</td>
</tr>
<tr>
<td>F4</td>
<td>Recovery firmware image is loaded</td>
</tr>
<tr>
<td>F5 – F7</td>
<td>Reserved for future AMI progress codes</td>
</tr>
<tr>
<td>F8</td>
<td>Recovery PPI is not available</td>
</tr>
<tr>
<td>F9</td>
<td>Recovery capsule is not found</td>
</tr>
<tr>
<td>FA</td>
<td>Invalid recovery capsule</td>
</tr>
<tr>
<td>FB – FF</td>
<td>Reserved for future AMI error codes</td>
</tr>
<tr>
<td>60</td>
<td>DXE Core is started</td>
</tr>
<tr>
<td>61</td>
<td>NVRAM initialization</td>
</tr>
<tr>
<td>62</td>
<td>Installation of the PCH Runtime Services</td>
</tr>
<tr>
<td>63 – 67</td>
<td>CPU DXE initialization is started</td>
</tr>
<tr>
<td>68</td>
<td>PCI host bridge initialization</td>
</tr>
<tr>
<td>69</td>
<td>System Agent DXE initialization is started</td>
</tr>
<tr>
<td>6A</td>
<td>System Agent DXE SMM initialization is started</td>
</tr>
<tr>
<td>6B – 6F</td>
<td>System Agent DXE initialization (System Agent module specific)</td>
</tr>
<tr>
<td>70</td>
<td>PCH DXE initialization is started</td>
</tr>
<tr>
<td>71</td>
<td>PCH DXE SMM initialization is started</td>
</tr>
<tr>
<td>72</td>
<td>PCH devices initialization</td>
</tr>
<tr>
<td>73 – 77</td>
<td>PCH DXE Initialization (PCH module specific)</td>
</tr>
<tr>
<td>78</td>
<td>ACPI module initialization</td>
</tr>
<tr>
<td>79</td>
<td>CSM initialization</td>
</tr>
<tr>
<td>7A – 7F</td>
<td>Reserved for future AMI DXE codes</td>
</tr>
</tbody>
</table>

(continued on the next page)
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<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>90</td>
<td>Boot Device Selection (BDS) phase is started</td>
</tr>
<tr>
<td>91</td>
<td>Driver connecting is started</td>
</tr>
<tr>
<td>92</td>
<td>PCI Bus initialization is started</td>
</tr>
<tr>
<td>93</td>
<td>PCI Bus Hot Plug Controller Initialization</td>
</tr>
<tr>
<td>94</td>
<td>PCI Bus Enumeration</td>
</tr>
<tr>
<td>95</td>
<td>PCI Bus Request Resources</td>
</tr>
<tr>
<td>96</td>
<td>PCI Bus Assign Resources</td>
</tr>
<tr>
<td>97</td>
<td>Console Output devices connect</td>
</tr>
<tr>
<td>98</td>
<td>Console input devices connect</td>
</tr>
<tr>
<td>99</td>
<td>Super IO Initialization</td>
</tr>
<tr>
<td>9A</td>
<td>USB initialization is started</td>
</tr>
<tr>
<td>9B</td>
<td>USB Reset</td>
</tr>
<tr>
<td>9C</td>
<td>USB Detect</td>
</tr>
<tr>
<td>9D</td>
<td>USB Enable</td>
</tr>
<tr>
<td>9E - 9F</td>
<td>Reserved for future AMI codes</td>
</tr>
<tr>
<td>A0</td>
<td>IDE initialization is started</td>
</tr>
<tr>
<td>A1</td>
<td>IDE Reset</td>
</tr>
<tr>
<td>A2</td>
<td>IDE Detect</td>
</tr>
<tr>
<td>A3</td>
<td>IDE Enable</td>
</tr>
<tr>
<td>A4</td>
<td>SCSI initialization is started</td>
</tr>
<tr>
<td>A5</td>
<td>SCSI Reset</td>
</tr>
<tr>
<td>A6</td>
<td>SCSI Detect</td>
</tr>
<tr>
<td>A7</td>
<td>SCSI Enable</td>
</tr>
<tr>
<td>A8</td>
<td>Setup Verifying Password</td>
</tr>
<tr>
<td>A9</td>
<td>Start of Setup</td>
</tr>
<tr>
<td>AA</td>
<td>Reserved for ASL (see ASL Status Codes section below)</td>
</tr>
<tr>
<td>AB</td>
<td>Setup Input Wait</td>
</tr>
<tr>
<td>AC</td>
<td>Reserved for ASL (see ASL Status Codes section below)</td>
</tr>
<tr>
<td>AD</td>
<td>Ready To Boot event</td>
</tr>
<tr>
<td>AE</td>
<td>Legacy Boot event</td>
</tr>
<tr>
<td>AF</td>
<td>Exit Boot Services event</td>
</tr>
<tr>
<td>B0</td>
<td>Runtime Set Virtual Address MAP Begin</td>
</tr>
<tr>
<td>B1</td>
<td>Runtime Set Virtual Address MAP End</td>
</tr>
<tr>
<td>B2</td>
<td>Legacy Option ROM Initialization</td>
</tr>
<tr>
<td>B3</td>
<td>System Reset</td>
</tr>
</tbody>
</table>

(continued on the next page)
### Q-Code table

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>B4</td>
<td>USB hot plug</td>
</tr>
<tr>
<td>B5</td>
<td>PCI bus hot plug</td>
</tr>
<tr>
<td>B6</td>
<td>Clean-up of NVRAM</td>
</tr>
<tr>
<td>B7</td>
<td>Configuration Reset (reset of NVRAM settings)</td>
</tr>
<tr>
<td>B8–BF</td>
<td>Reserved for future AMI codes</td>
</tr>
<tr>
<td>D0</td>
<td>CPU initialization error</td>
</tr>
<tr>
<td>D1</td>
<td>System Agent initialization error</td>
</tr>
<tr>
<td>D2</td>
<td>PCH initialization error</td>
</tr>
<tr>
<td>D3</td>
<td>Some of the Architectural Protocols are not available</td>
</tr>
<tr>
<td>D4</td>
<td>PCI resource allocation error. Out of Resources</td>
</tr>
<tr>
<td>D5</td>
<td>No Space for Legacy Option ROM</td>
</tr>
<tr>
<td>D6</td>
<td>No Console Output Devices are found</td>
</tr>
<tr>
<td>D7</td>
<td>No Console Input Devices are found</td>
</tr>
<tr>
<td>D8</td>
<td>Invalid password</td>
</tr>
<tr>
<td>D9</td>
<td>Error loading Boot Option (LoadImage returned error)</td>
</tr>
<tr>
<td>DA</td>
<td>Boot Option is failed (StartImage returned error)</td>
</tr>
<tr>
<td>DB</td>
<td>Flash update is failed</td>
</tr>
<tr>
<td>DC</td>
<td>Reset protocol is not available</td>
</tr>
</tbody>
</table>

### ACPI/ASL Checkpoints

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x01</td>
<td>System is entering S1 sleep state</td>
</tr>
<tr>
<td>0x02</td>
<td>System is entering S2 sleep state</td>
</tr>
<tr>
<td>0x03</td>
<td>System is entering S3 sleep state</td>
</tr>
<tr>
<td>0x04</td>
<td>System is entering S4 sleep state</td>
</tr>
<tr>
<td>0x05</td>
<td>System is entering S5 sleep state</td>
</tr>
<tr>
<td>0x10</td>
<td>System is waking up from the S1 sleep state</td>
</tr>
<tr>
<td>0x20</td>
<td>System is waking up from the S2 sleep state</td>
</tr>
<tr>
<td>0x30</td>
<td>System is waking up from the S3 sleep state</td>
</tr>
<tr>
<td>0x40</td>
<td>System is waking up from the S4 sleep state</td>
</tr>
<tr>
<td>0xAC</td>
<td>System has transitioned into ACPI mode. Interrupt controller is in PIC mode.</td>
</tr>
<tr>
<td>0xAA</td>
<td>System has transitioned into ACPI mode. Interrupt controller is in APIC mode.</td>
</tr>
</tbody>
</table>
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.
• 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 manufacturer’s 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 to 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.

The use of shielded cables for connection of the monitor to the graphics card is required to assure compliance with FCC regulations. Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user’s authority to operate this equipment.
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.

Operation in the band 5150–5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems.

CAN ICES-3(B)/NMB-3(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.

La bande 5150–5250 MHz est réservée uniquement pour une utilisation à l’intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les mêmes canaux.

CAN ICES-3(B)/NMB-3(B)

VCCI: Japan Compliance Statement

Class B ITE

KC: Korea Warning Statement

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

* 당해 무선설비는 전파호신 가능성이 있으므로 인명안전과 관련된 서비스는 할 수 없습니다.
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 http://csr.asus.com/english/REACH.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 http://csr.asus.com/english/Takeback.htm for detailed recycling information in different regions.

Regional notice for California

WARNING

Cancer and Reproductive Harm - www.P65Warnings.ca.gov

RF exposure warning

This equipment must be installed and operated in accordance with provided instructions and the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. End-users and installers must be provide with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance.
FCC Bluetooth Wireless Compliance

The antenna used with this transmitter must not be co-located or operated in conjunction with any other antenna or transmitter subject to the conditions of the FCC Grant.

Bluetooth Industry Canada Statement

This Class B device meets all requirements of the Canadian interference-causing equipment regulations.

Déclaration d’Industrie Canada relative aux modules sans fil Bluetooth

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

NCC: Taiwan Wireless Statement

日本無線設備の警告声明

本製品は、5GHz帯域での通信に対応しています。電波法の定めにより5.2GHz、5.3GHz帯域の電波は屋外で使用が禁じられています。

法律および規制遵守

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

Japan RF Equipment Statement

屋外での使用について

本製品は、5GHz帯域での通信に対応しています。電波法の定めにより5.2GHz、5.3GHz帯域の電波は屋外で使用が禁じられています。

法律および規制遵守

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Précautions d’emploi de l’appareil :

a. Soyez particulièrement vigilant quant à votre sécurité lors de l’utilisation de cet appareil dans certains lieux (les avions, les aéroports, les hôpitaux, les stations-service et les garages professionnels).

b. Évitez d’utiliser cet appareil à proximité de dispositifs médicaux implantés. Si vous portez un implant électronique (stimulateurs cardiaques, pompes à insuline, neurostimulateurs…), veuillez impérativement respecter une distance minimale de 15 centimètres entre cet appareil et l’implant pour réduire les risques d’interférence.

c. Utilisez cet appareil dans de bonnes conditions de réception pour minimiser le niveau de rayonnement. Ce n’est pas toujours le cas dans certaines zones ou situations, notamment dans les parkings souterrains, dans les ascenseurs, en train ou en voiture ou tout simplement dans un secteur mal couvert par le réseau.

d. Tenez cet appareil à distance du ventre des femmes enceintes et du bas-ventre des adolescents.

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http://www.apache.org/licenses/LICENSE-2.0

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Appendix

For the 대한민국, 위에 언급된akers는 2014년 5월 1일 한국 시간 12시에 작동하지 않습니다. 이 기간 동안 웹사이트의 작동이 제한됩니다. 

An example of a diagram or figure relevant to the content provided in the text is shown below.

The diagram depicts a network topology with various devices connected through wireless connections. The diagram includes labels for each device and the wireless signals they are transmitting. The network diagram illustrates the layout and connectivity of the devices, showing how they interconnect through wireless communications.

The text accompanying the diagram further explains the functionality and configuration of the devices within the network. It describes the protocols and standards used, such as Wi-Fi or Bluetooth, and how they are integrated into the overall network architecture.

The diagram is a valuable visual representation of the network setup, allowing a better understanding of the network's structure and the relationships between the different components.

The diagram is followed by a section of text that elaborates on the technical details, such as the specifications of the devices, the wireless frequencies used, and the security measures in place to ensure data integrity and confidentiality.

The text is formatted in a clear and concise manner, with appropriate headings and subsections to guide the reader through the various aspects of the network setup. Each section provides a detailed explanation, backed by relevant technical specifications and industry standards.

The overall presentation is well-organized, making it easy for the reader to follow along and understand the information provided. The combination of the diagram and the accompanying text creates a comprehensive resource for those interested in learning about network topology and wireless communications.

The appendix concludes with a summary or conclusion that highlights the key points discussed in the text. It provides a brief overview of the main takeaways and directions for further reading or exploration.

Appendix
Suprapristina ES atitikties deklaracija


Forenklët EU-samsvarserklaring

ASUSTek Computer Inc. enklærer herved at denne enheten er i samsvar med hovedsaklige krav og andre relevante forskrifter i direktivet 2014/53/EU. Fullstendig tekst for EU-samsvarserklaringen finnes på: https://www.asus.com/support/

Wi-Fi-føremålde 5150-5350 MHz skal begrenses til innendørs bruk for landene som er oppført i tabellen:

UPROCESZOWA DEDKACJA ZGODNOŚCI UE

Firma ASUSTek Computer Inc. niniejszym oświadcza, że urządzenie to jest zgodne z zasadniczymi wymogami i innymi właściwymi postanowieniami dyrektywy 2014/53/EU. Pełny tekst deklaracji zgodności UE jest dostępny pod adresem: https://www.asus.com/support/

W krajach wymienionych w tabeli działanie sieci Wi-Fi w pasmie 5150-5350 MHz powinno być ograniczone wyłącznie do pomieszczeń:

Declaración de Conformidad Simplificada da UE

A ASUSTek Computer Inc. declara que este dispositivo está en conformidade com os requisitos essenciais e outras disposições relevantes da Diretiva 2014/53/UE. O texto integral da declaração de conformidade da UE está disponível em https://www.asus.com/support/

A utilização das frequências WiFi de 5150 a 5350MHz está restrita a ambientes interiores nos países apresentados na tabela:

Declaración de conformidad UE, versión simplificada


Pentru ţările listate în tabelul de mai jos, reţelele WiFi care funcţionează în banda de frecvenţă de 5.150-5.350 MHz trebuie utilizate doar în interioare:

Pojednostavljena Deklaracija o usaglašenosti EU

ASUSTek Computer Inc. ovom izjavljuje da je ovaj uređaj usaglašen sa osnovnim zahtevima i drugim relevantnim odredbama Direktive 2014/53/EU. Ceno tekst Deklaracije o usaglašenosti EU dostupan je na lokaciji https://www.asus.com/support/

WiFi koji radi u frekventnom opsegu od 5150 MHz do 5350 MHz ograničen je isključivo na upotrebu u zatvorenom prostoru za zemlje navedene u tabeli ispod:

Zjednodušené vyhlašenie o zhode platné pre EU

Spoločnosť ASUSTek Computer Inc. týmto vyhlašuje, že toto zariadenie je v súlade so základnými požiadavkami a ďalšími príslušnými ustanoveniami Direktivy č. 2014/53/EÚ. Plné znenie vyhlásenia o zhode pre EU je k dispozícii na lokalite https://www.asus.com/support/

Činnosť WiFi v pásmo 5150–5350 MHz musí být obmedzena na použití vo vnútornom prostredí pre krajiny navedené v tabuľke nižšie:

Poenostavljena izjava EU o skladnosti

ASUSTek Computer Inc. tužak izjava, da je ta naprava skladna s temeljnimi zahtevami in drugimi relevantnimi določbami Direktive 2014/53/EU. Plemeno besedilo izjave EU o skladnosti je na voljo na https://www.asus.com/support/

WiFi, ki deluje v pasovem območju 5150–5350 MHz, mora biti v državah, podanih v tabeli nižje:

Declarație de conformitate UE, versiune simplificată


WiFi, care funcționează în banda de frecvență de 5.150–5.350 MHz trebuie utilizate doar în interior pentru țările menționate în tabelul de mai jos:

Sprøvdækleration for viderindighed normer EM

ASUSTek Computer Inc. erklærer herved at denne enheten er i samsvar med de grundlæggende krav og andre relevante bestemmelser i direktivet 2014/53/EU. Det fulde tekst for EU-erklæringen er tilgængeligt på https://www.asus.com/support/

W-Fi na częstotliwości 5150-5350 MHz, wolno używać w państwach wymienionych w tabeli:

Basištěničtím AB Uyumluuluk Bildirimini


2014/53/EU uygunluğu için kısalma: WiFi 5150-5350 MHz arası, tabloda listelenen ülkeler için iç mekân kullanımları kısıtlanacaktır.


WRF808L-AD (Model: RTL8822BE) output power table:

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Maximum Output Power (EIRP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2412-2472 MHz</td>
<td>19 dBm</td>
</tr>
<tr>
<td>5150-5350 MHz</td>
<td>19 dBm</td>
</tr>
<tr>
<td>5470-5725 MHz</td>
<td>20 dBm</td>
</tr>
<tr>
<td>Bluetooth</td>
<td>8 dBm</td>
</tr>
</tbody>
</table>

Generałe informacje o zakresie zastosowania w tabeli wymienionych krajuach

ASUSTek Computer Inc. nie podaje, jakie kraje przyjmuje podstawowe wymagania w zakresie szerokopasmowych sieci WiFi w pasmach 5150–5350 MHz.

公益宣言について

ASUSTek Computer Inc. は、表記した国家において本製品のWi-Fiの使用を制限することを宣言します。

Proof of Compliance for each country

ASUSTek Computer Inc. deklarera härmed att denna enhet överensstämmer med de grundläggande krav och andra relevanta bestämmelser i direktivet 2014/53/EU. Fullständig text av EU-försäkran om överensstämmelse finns på https://www.asus.com/support/

WiFi som använder 5150-5350 MHz kommer att begränsas för användning inomhus i de länder som anges i tabellen:

ROG MAXIMUS X HERO (WI-FI AC)
ASUS contact information

ASUSTeK COMPUTER INC.
Address  4F, No. 150, Li-Te Road, Peitou, Taipei 112, Taiwan
Telephone   +886-2-2894-3447
Fax    +886-2-2890-7798
Web site  www.asus.com

Technical Support
Telephone   +86-21-38429911
Fax    +86-21-5866-8722, ext. 9101#
Online support  http://qr.asus.com/techserv

ASUS COMPUTER INTERNATIONAL (America)
Address  800 Corporate Way, Fremont, CA 94539, USA
Telephone  +1-510-739-3777
Fax   +1-510-608-4555
Web site  http://www.asus.com/us/

Technical Support
Support fax   +1-812-284-0883
Telephone   +1-812-282-2787
Online support  http://qr.asus.com/techserv

ASUS COMPUTER GmbH (Germany and Austria)
Address  Harkort Str. 21-23, 40880 Ratingen, Germany
Fax   +49-2102-959931
Web site  http://www.asus.com/de
Online contact  http://eu-rma.asus.com/sales

Technical Support
Telephone  +49-2102-5789555
Support Fax  +49-2102-959911
Online support  http://qr.asus.com/techserv
DECLARATION OF CONFORMITY
Compliance Information Statement
Per FCC Part 2 Section 2. 1077(a)

Responsible Party Name: Asus Computer International

Address: 800 Corporate Way, Fremont, CA 94539.

Phone/Fax No: (510)739-3777/(510)608-4555

hereby declares that the product

Product Name: Motherboard

Model Number: ROG MAXIMUS X HERO,
ROG MAXIMUS X HERO(WI-FI AC)

Conforms to the following specifications:

☒ FCC Part 15, Subpart B, Unintentional Radiators

Supplementary Information:

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.