

**X99-A II**



**Motherboard**

E11090  
First Edition  
April 2016

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# Contents

Safety information.....	vi
About this guide.....	vii
X99-A II specifications summary .....	ix
Package contents.....	xv
Installation tools and components.....	xvi
<b>Chapter 1: Product Introduction</b>	
<b>1.1 Motherboard overview.....</b>	<b>1-1</b>
1.1.1 Before you proceed.....	1-1
1.1.2 Motherboard layout.....	1-2
1.1.3 Central Processing Unit (CPU) .....	1-4
1.1.4 System memory .....	1-5
1.1.5 Expansion slots.....	1-7
1.1.6 Onboard buttons and switches.....	1-9
1.1.7 Jumpers .....	1-12
1.1.8 Onboard LEDs .....	1-14
1.1.9 Internal connectors.....	1-21
<b>Chapter 2: Basic installation</b>	
<b>2.1 Building your PC system.....</b>	<b>2-1</b>
2.1.1 Motherboard installation.....	2-1
2.1.2 CPU installation.....	2-3
2.1.3 CPU heatsink and fan assembly installation .....	2-6
2.1.4 DIMM installation.....	2-7
2.1.5 ATX Power connection.....	2-8
2.1.6 SATA device connection .....	2-9
2.1.7 Front I/O Connector .....	2-10
2.1.8 Expansion Card installation.....	2-11
<b>2.2 BIOS update utility .....</b>	<b>2-12</b>
<b>2.3 Motherboard rear and audio connections .....</b>	<b>2-13</b>
2.3.1 Rear I/O connection .....	2-13
2.3.2 Audio I/O connections.....	2-15
<b>2.4 Starting up for the first time.....</b>	<b>2-17</b>
<b>2.5 Turning off the computer .....</b>	<b>2-18</b>

## **Chapter 3: BIOS setup**

<b>3.1</b>	<b>Knowing BIOS</b> .....	<b>3-1</b>
<b>3.2</b>	<b>BIOS setup program</b> .....	<b>3-2</b>
	3.2.1 EZ Mode .....	3-3
	3.2.2 Advanced Mode .....	3-4
	3.2.3 QFan Control .....	3-7
	3.2.4 EZ Tuning Wizard .....	3-9
<b>3.3</b>	<b>My Favorites</b> .....	<b>3-12</b>
<b>3.4</b>	<b>Main menu</b> .....	<b>3-14</b>
<b>3.5</b>	<b>Ai Tweaker menu</b> .....	<b>3-15</b>
<b>3.6</b>	<b>Advanced menu</b> .....	<b>3-18</b>
	3.6.1 CPU Configuration .....	3-19
	3.6.2 PCH Configuration .....	3-20
	3.6.3 PCH Storage Configuration .....	3-21
	3.6.4 System Agent Configuration .....	3-23
	3.6.5 USB Configuration .....	3-23
	3.6.6 Platform Misc Configuration .....	3-24
	3.6.7 Onboard Devices Configuration .....	3-24
	3.6.8 APM Configuration .....	3-26
	3.6.9 Network Stack Configuration .....	3-26
	3.6.10 HDD/SSD SMART Information .....	3-27
<b>3.7</b>	<b>Monitor menu</b> .....	<b>3-28</b>
<b>3.8</b>	<b>Boot menu</b> .....	<b>3-29</b>
<b>3.9</b>	<b>Tool menu</b> .....	<b>3-32</b>
	3.9.1 ASUS EZ Flash 3 Utility .....	3-32
	3.9.2 Secure Erase .....	3-33
	3.9.3 ASUS Overclocking Profile .....	3-34
	3.9.4 ASUS SPD Information .....	3-35
<b>3.10</b>	<b>Exit menu</b> .....	<b>3-36</b>
<b>3.11</b>	<b>Updating BIOS</b> .....	<b>3-37</b>
	3.11.1 EZ Update .....	3-37
	3.11.2 ASUS EZ Flash 3 .....	3-38
	3.11.3 ASUS CrashFree BIOS 3 .....	3-40



## **Chapter 4: RAID Support**

<b>4.1</b>	<b>RAID configurations .....</b>	<b>4-1</b>
4.1.1	RAID definitions .....	4-1
4.1.2	Installing Serial ATA hard disks .....	4-2
4.1.3	Intel® Rapid Storage Technology in UEFI BIOS.....	4-2
4.1.4	Intel® Rapid Storage Technology Option ROM utility.....	4-6
<b>4.2</b>	<b>Creating a RAID driver disk.....</b>	<b>4-10</b>
4.2.1	Creating a RAID driver disk in Windows®.....	4-10

## **Appendix**

<b>Notices .....</b>	<b>A-1</b>
<b>ASUS contact information.....</b>	<b>A-5</b>

# 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:

### 1. 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.

### 2. Chapter 2: Basic Installation

This chapter lists the hardware setup procedures that you have to perform when installing system components.

### 3. 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.

### 4. 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](http://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.

*Italics*

Used to emphasize a word or a phrase.

<Key>

Keys enclosed in the less-than and greater-than sign 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 (+).

## X99-A II specifications summary

CPU	<p>New Intel® Core™ i7 X-Series Processors on LGA 2011-3 socket          Supports 14nm CPU          Supports Intel® Turbo Boost Technology 3.0*</p> <p>* The Intel® Turbo Boost Technology 2.0 support depends on the CPU types.</p>
Chipset	Intel® X99 Chipset
Memory	<p>8 x DIMM, max. 128GB, DDR4 3333(O.C.) / 3300(O.C.) / 3200(O.C.) / 3000(O.C.) / 2800(O.C.)* / 2666(O.C.)* / 2400(O.C.)* / 2133 MHz, non-ECC, un-buffered memory          Quad channel memory architecture          Supports Intel® Extreme Memory Profile (XMP)</p> <p>* Hyper DIMM support is subject to the physical characteristics of individual CPUs. Please refer to Memory QVL (Qualified Vendors List) for details.</p>
Expansion Slots	<p><b>40-Lane CPU</b>          3 x PCI Express 3.0/2.0 x16 slots* (single at x16, dual at x16/x16, triple at x8/x16/x8)          1 x PCI Express 2.0 x16 slot** (PCIe x16_2, max. at x4 mode, compatible with PCIe x1 and x4 devices)          2 x PCI Express 2.0 x1 slots** (compatible with PCIe x1 devices)</p> <p><b>28-Lane CPU</b>          3 x PCI Express 3.0/2.0 x16 slots* (single@x16, dual@x16/x8, triple@x8/x8**/x8)          1 x PCI Express 2.0 x16 slot** (PCIe x16_2, max. at x4 mode, compatible with PCIe x1 and x4 devices)          2 x PCI Express 2.0 x1 slots** (compatible with PCIe x1 devices)</p> <p>* PCIe x16_1 and PCIe x16_4 slots share the same bandwidth. PCIe x16_4 slot support up to x8 mode.          ** The PCIe x16_2 slot shares bandwidth with USB 3.1 and PCIe x1_2 slots. By default, the PCIe x16_2 slot automatically runs at x1 mode.          *** When using a 28-lane CPU, the PCIe x16_3 slot support up to x8 mode.</p>
Multi-GPU Support	<p>Supports NVIDIA® 3-Way/Quad-GPU SLI™ Technology (with 2 PCIe x16 graphics card)          Supports AMD® 3-Way/Quad-GPU CrossFireX™ Technology (with 2 PCIe x16 graphics card)</p>
Storage	<p><b>New Intel® Core™ i7 X-Series Processors</b></p> <ul style="list-style-type: none"> <li>- 1 x M.2 PCIe 3.0 x4 Socket 3 with M Key, type 2242/2260/2280/22110 (support PCIe storage device only)*</li> <li>- 1 x U.2 port (support PCIe 3.0 x4 NVM Express storage)*</li> </ul> <p><b>Intel® X99 Chipset with RAID 0, 1, 5, 10 and Intel Rapid Storage Technology 14 support</b></p> <ul style="list-style-type: none"> <li>- 1 x SATA Express port (compatible with 2 x SATA 6.0 Gb/s ports)</li> <li>- 8 x SATA 6.0 Gb/s ports**</li> </ul>

(continued on the next page)

## X99-A II specifications summary

Storage	<ul style="list-style-type: none"> <li>- Supports Intel® Smart Response Technology***</li> <li>* M.2 shares bandwidth with U.2. Only one device can be activated at a time.</li> <li>** Due to chipset behavior, The SATA6G_78, SATA6G_910 ports (black) do not support IRST including RAID configuration.</li> <li>*** These functions will work depending on the CPU installed.</li> </ul>
LAN	<p>Gigabit Intel® LAN connection - 802.3az Energy Efficient Ethernet (EEE) appliance</p> <p>Intel® I218-V Gigabit LAN- Dual interconnect between the integrated Media Access Controller (MAC) and physical layer (PHY)</p> <p>ASUS LAN Guard</p> <p>ASUS Turbo LAN Utility</p>
Audio	<p>Realtek® ALC1150 8-channel high definition audio CODEC featuring Crystal Sound 3</p> <ul style="list-style-type: none"> <li>- Power pre-regulator: Reduces power input noise to ensure consistent performance</li> <li>- Separate layer for left and right track, ensuring both sound deliver equal quality</li> <li>- Top notch audio sensation delivers according to the audio configuration</li> <li>- Audio shielding ensures precision analog/digital separation and greatly reduced multi-lateral interference</li> <li>- EMI protection cover to prevent electrical noise to affect the amplifier quality</li> <li>- Audio Amplifier to enhance the highest quality sound for headphone and speakers</li> <li>- Unique de-pop circuit to reduce start-up popping noise to audio outputs</li> <li>- Premium Japan-made audio capacitors provide warm, natural, and immersive sound with exceptional clarity and fidelity</li> <li>- High quality 112 dB SNR stereo playback output (Line-out at back) and 104 dB SNR recording input (Line-in) support</li> <li>- Absolute Pitch 192 khz/24 bit True BD Lossless Sound</li> <li>- BD audio layer content protection</li> <li>- DTS Studio Sound</li> <li>- DTS Connect</li> <li>- Supports jack-detection, multi-streaming and front panel jack-retasking (MIC)</li> <li>- Optical S/PDIF out ports at rear I/O</li> </ul>
USB	<p><b>Intel® X99 Chipset- supports ASUS USB 3.1 Boost</b></p> <ul style="list-style-type: none"> <li>- 4 x USB 3.0/2.0 ports at mid-board for front panel support</li> <li>- 1 x USB 3.0/2.0 port at rear panel (Supports USB BIOS Flashback)</li> <li>- 8 x USB 2.0/1.1 ports (4 ports at mid-board, 4 ports at rear panel)</li> </ul> <p><b>ASMedia® USB 3.1 controllers- supports ASUS USB 3.1 Boost</b></p> <ul style="list-style-type: none"> <li>- 2 x USB 3.1/3.0/2.0 ports at back panel (Type-A and Type-C)</li> </ul> <p><b>ASMedia® USB 3.0 controllers- supports ASUS USB 3.1 Boost</b></p> <ul style="list-style-type: none"> <li>- 3 x USB 3.0/2.0 ports at back panel (blue)</li> </ul>

# X99-A II specifications summary

## ASUS Exclusive Features

### Performance

#### 5-Way Optimization by Dual Intelligent Processors 5

- Whole system optimization with a single click! Perfectly consolidates better CPU performance, power saving, digital power control, system cooling and app usages.

#### DIGI+ Power Control

- CPU Power: Digital 8-phase power design
- DRAM Power: Digital 4-phase power design

#### TPU

- Auto Tuning, TPU

#### EPU

#### Fan Xpert4

#### Turbo Core App

### UEFI BIOS

#### EZ Tuning Wizard

#### S.M.A.R.T.

#### Secure Erase

#### GPU Post

#### AURA Lighting Effect

#### CrashFree BIOS 3

#### EZ Flash 3

### 32Gb/s U.2 & M.2 onboard

- PCIe 3.0 x4

### Special Memory O.C. Design

- Superb memory O.C. capability under full load by minimizing the coupling noise and signal reflection effect

### Gaming

#### AURA

#### Turbo LAN

- Fast and smooth online gaming with lower pings and less lags

#### Crystal Sound 3

- Hear the cleanest sound with dedicated audio design onboard!

### Connectivity

### 32Gb/s U.2 & M.2 onboard

- PCIe 3.0 x4

### Thunderbolt 3 Support

- Blistering-fast 40Gb/s data transfers upgrades with ThunderboltEX 3 Card.

*(continued on the next page)*

# X99-A II specifications summary

<b>ASUS Exclusive Features</b>	<p><b>Entertainment</b></p> <p><b>Remote GO!</b></p> <ul style="list-style-type: none"><li>- Remote GO! Function: Cloud GO!, Remote Desktop, Remote Keyboard &amp; Mouse, File Transfer</li><li>- Wi-Fi GO! &amp; NFC Remote app for portable smartphone/tablet, supporting iOS 9 and Android™ 4.0 systems</li></ul> <p><b>Media Streamer</b></p> <ul style="list-style-type: none"><li>- Pipe music or movies from your PC to a smart TV, your entertainment goes wherever you go!</li><li>- Media Streamer app for portable smartphone/tablet, supporting iOS 9 and Android™ 4.0 systems</li></ul> <p><b>HyStream</b></p> <ul style="list-style-type: none"><li>- Stream iOS devices' screen on your PC screen*</li></ul> <p>* Contact your device vendor for supporting information.</p> <p><b>Mobo Connect</b></p> <p><b>EZ DIY</b></p> <p><b>Push Notice</b></p> <ul style="list-style-type: none"><li>- Monitor your PC status with smart devices in real time</li></ul> <p><b>USB BIOS Flashback</b></p> <p><b>PC Cleaner</b></p> <ul style="list-style-type: none"><li>- Fast and easy way to get rid of unnecessary junk files</li></ul> <p><b>Q-Design</b></p> <ul style="list-style-type: none"><li>- Q-Code</li><li>- Q-Connector</li><li>- Q-DIMM</li><li>- Q-LED (CPU, DRAM, VGA, BOOT, PCIE_LED)</li><li>- Q-Shield</li><li>- Q-Slot</li></ul>
<b>ASUS Special Features</b>	<p><b>ASUS 5X Protection II:</b></p> <ul style="list-style-type: none"><li>- ASUS LANGuard - 2.5X higher surge tolerance</li><li>- ASUS Overvoltage Protection - World-class circuit-protecting power design</li><li>- ASUS DIGI+ VRM - 8 Phase digital power design</li><li>- ASUS DRAM Overcurrent Protection - Prevents damage from short circuits</li><li>- ASUS Stainless-Steel Back I/O - 3X corrosion-resistance for greater durability</li></ul> <ul style="list-style-type: none"><li>- Mobo Connect</li><li>- LAN Guard</li><li>- USB 3.1 Boost</li><li>- Ai Charger+</li><li>- Disk Unlocker</li><li>- AI Suite 3</li><li>- MemOK!</li><li>- EZ XMP</li></ul>



## X99-A II specifications summary

<b>ASUS Quiet Thermal Solution</b>	<b>Quiet Thermal Design</b> <ul style="list-style-type: none"> <li>- ASUS Fan Xpert 3</li> <li>- ASUS Fanless Design: Heatsink solution</li> </ul>
<b>ASUS Exclusive Overclocking Features</b>	<b>Precision Tweaker 2</b> <ul style="list-style-type: none"> <li>- vCore: Adjustable CPU Core voltage at 0.001 V increment</li> <li>- vCache: Adjustable CPU Cache voltage at 0.001 V increment</li> <li>- vCCIN: Adjustable CPU Input voltage at 0.01 V increment</li> <li>- vCCSA: Adjustable CPU System Agent voltage at 0.001 V increment</li> <li>- vDRAM Bus: 110-step Memory voltage control</li> <li>- vPCH: 176-step Chipset voltage control</li> </ul> <b>SFS (Stepless Frequency Selection)</b> <ul style="list-style-type: none"> <li>- BCLK/PCIE frequency tuning from 80 MHz up to 300 MHz at 0.1 MHz increment.</li> </ul> <b>Overclocking Protection</b> <ul style="list-style-type: none"> <li>- ASUS C.P.R. (CPU Parameter Recall)</li> </ul>
<b>Rear Panel I/O Ports</b>	<ul style="list-style-type: none"> <li>1 x BIOS Flashback button</li> <li>1 x Optical S/PDIF out port</li> <li>1 x Intel® LAN (RJ45) port</li> <li>1 x USB 3.1/3.0 port (Type-A, Teal blue)</li> <li>1 x USB 3.1/3.0 port (Type-C)</li> <li>4 x USB 3.0/2.0 ports (Blue, right bottom port supports USB BIOS Flashback)</li> <li>4 x USB 2.0/1.1 ports</li> <li>1 x PS/2 Keyboard/Mouse combo port</li> <li>8-channel Audio I/O ports</li> </ul>
<b>Internal I/O Connectors</b>	<ul style="list-style-type: none"> <li>2 x USB 3.0/2.0 connectors, support additional 4 USB ports (19-pin)</li> <li>2 x USB 2.0/1.1 connectors, support additional 4 USB ports</li> <li>1 x U.2 connector</li> <li>1 x M.2 Socket 3 with M Key design, type 2242/2260/2280/22110 storage devices support (supports PCIE SSD only)</li> <li>1 x SATA Express connector (gray)</li> <li>8 x SATA 6.0 Gb/s connectors (2 from SATA Express)</li> <li>1 x CPU Fan connector (4-pin) for both 3-pin (DC mode) and 4-pin (PWM mode) CPU coolers control with auto detection support</li> <li>1 x CPU_OPT Fan connector (4-pin)</li> <li>1 x W_Pump connector (4-pin)</li> <li>1 x High AMP Fan connector (4-pin)</li> <li>2 x Chassis Fan connectors (4-pin) for both 3-pin (DC Mode) and 4-pin (PWM Mode) fans control</li> <li>1 x Front panel audio connector (AAFP)</li> </ul>

*(continued on the next page)*

## X99-A II specifications summary

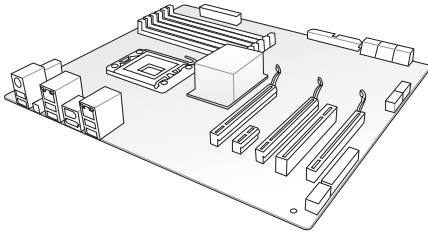
<b>Internal I/O Connectors</b>	<ul style="list-style-type: none"> <li>1 x S/PDIF Out header</li> <li>1 x Thunderbolt header (5-pin) for ASUS ThunderboltEX series support</li> <li>1 x TPM connector</li> <li>1 x Serial port (COM) header</li> <li>1 x RGB header</li> <li>1 x 24-pin EATX Power connector</li> <li>1 x 8-pin EATX 12V Power connector</li> <li>1 x 4-pin EATX 12V Power connector</li> <li>1 x System Panel (Q-Connector)</li> <li>1 x 5-pin EXT_FAN (Extension Fan) connector</li> <li>1 x 3-pin CHASSIS (Chassis intrusion) connector</li> <li>1 x 2-pin Thermal sensor header</li> <li>1 x 3-pin CPU OverVoltage (OV) header</li> <li>1 x MemOK! button</li> <li>1 x Clear CMOS jumper</li> <li>1 x DRCT (Direct Key) connector</li> <li>1 x EZ XMP switch</li> <li>1 x Power-on button</li> <li>1 x Reset button</li> </ul>
<b>BIOS Features</b>	128 Mb Flash ROM, UEFI AMI BIOS, PnP, WfM2.0, SM BIOS 3.0, ACPI 5.0, Multi-language BIOS, ASUS EZ Flash 3, CrashFree BIOS 3, F11 EZ Tuning Wizard, F6 Qfan Control, F3 My Favorites, Quick Note, Last Modified log, F12 PrintScreen and ASUS DRAM SPD (Serial Presence Detect) memory information
<b>Manageability</b>	WfM 2.0, WOL by PME, PXE
<b>Support DVD</b>	<ul style="list-style-type: none"> <li>Drivers</li> <li>ASUS Utilities</li> <li>EZ Update</li> <li>Anti-virus software (OEM version)</li> </ul>
<b>Operating System</b>	<ul style="list-style-type: none"> <li>Windows® 10*</li> <li>Windows® 8.1 / Windows® 8</li> <li>Windows® 7</li> <li><b>*64-bit only</b></li> </ul>
<b>Form Factors</b>	ATX Form Factor, 12 in. x 9.6 in. (30.5 cm x 24.4 cm)



Specifications are subject to change without notice.

# Package contents

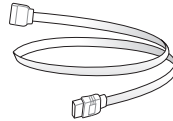
Check your motherboard package for the following items



ASUS X99-A II motherboard



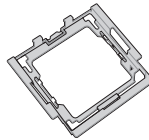
1 x M.2 screws package



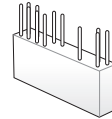
4 x Serial ATA 6 Gb/s cables



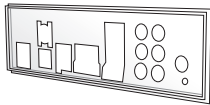
1 x RGB LED extension cable



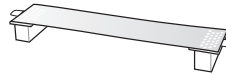
1 x CPU installation tool



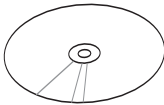
1 x ASUS Q-Connector



1 x ASUS Q-Shield



1 x ASUS SLI™ bridge connector



1 x Support DVD

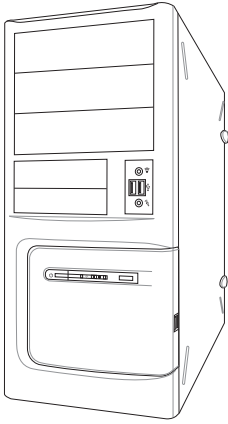


1 x User Manual

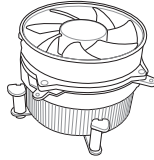


- 
- If any of the above items is damaged or missing, contact your retailer.
  - The illustrated items above are for reference only. Actual product specifications may vary with different models.
-

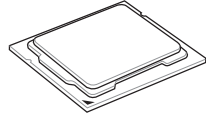
# Installation tools and components



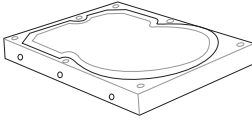
PC chassis



Intel® LGA2011-3 compatible CPU Fan



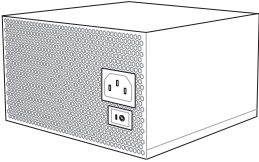
Intel® LGA2011-3 CPU



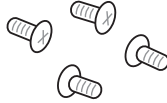
SATA hard disk drive



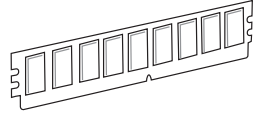
Phillips (cross) screwdriver



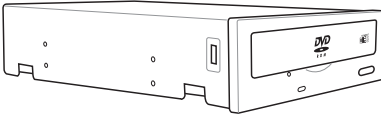
Power supply unit



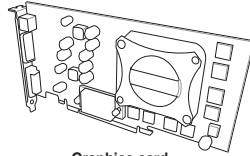
1 bag of screws



DIMM



SATA optical disc drive (optional)



Graphics card



---

The tools and components in the table above are not included in the motherboard package.

---

# Product Introduction

# 1

## 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.
-

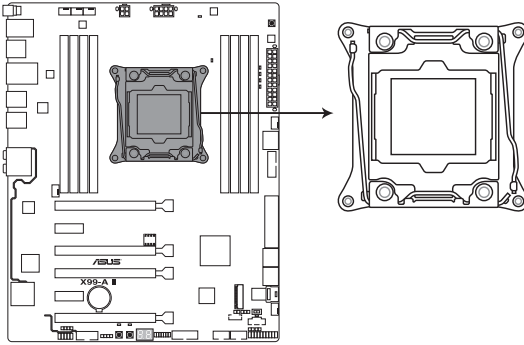


## Layout contents

Connectors/Jumpers/Buttons and switches/Slots	Page
1. DDR4 DIMM slots	1-5
2. CPU, CPU optional, extension, and chassis fan connectors (4-pin CPU_FAN; 4-pin CPU_OPT; 4-pin W_PUMP; 4-pin H_AMP_FAN; 5-pin EXT_FAN, 4-pin CHA_FAN1-2)	1-25
3. LGA2011-3 CPU socket	1-4
4. ATX power connectors (24-pin EATXPWR; 8-pin EATX12V_1; 4-pin EZTX12V_2)	1-26
5. MemOK! button	1-10
6. Intel® X99 Serial ATA 6 Gb/s connectors (7-pin SATA6G_12, SATA6G_34, SATA6G_56/SATAEXPRESS, SATA6G_78, SATA6G_910)	1-21
7. USB 3.0 connectors (20-1 pin USB3_12, USB3_34)	1-23
8. CPU Over Voltage jumper (3-pin CPU_OV)	1-13
9. U.2 connector (U.2)	1-33
10. EZ XMP switch	1-11
11. Thunderbolt header (5-pin TB_HEADER)	1-29
12. Clear RTC RAM jumper (2-pin CLRRTC)	1-12
13. System panel connector (20-8 pin PANEL)	1-27
14. DirectKey connector (2-pin DRCT)	1-28
15. USB 2.0 connectors (10-1 pin USB1112; USB1314)	1-24
16. T_Sensor connector (2-pin T_SENSOR1)	1-29
17. M.2 socket 3	1-22
18. TPM connector (14-1 pin TPM)	1-28
19. Q-Code LEDs	1-15
20. Reset button	1-9
21. Power-on button	1-9
22. Aura Strip Headers (4-pin RGB_HEADER)	1-32
23. Serial port connector (10-1 pin COM)	1-30
24. Front panel audio connector (10-1 pin AAFP)	1-31
25. Digital audio connector (4-1 pin SPDIF_OUT)	1-22

### 1.1.3 Central Processing Unit (CPU)

The motherboard comes with a surface mount LGA2011-3 socket designed for Intel® Core™ i7 processors.



**X99-A II CPU LGA2011-3 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 LGA2011-3 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.

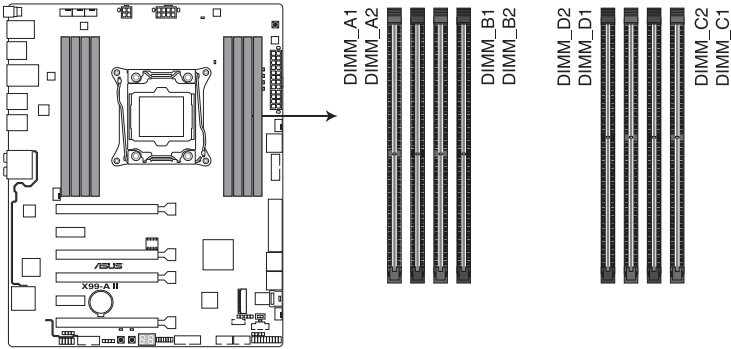


## 1.1.4 System memory

The motherboard comes with eight (8) DDR4 (Double Data Rate 4) Quad Inline Memory Modules (DIMM) slots.

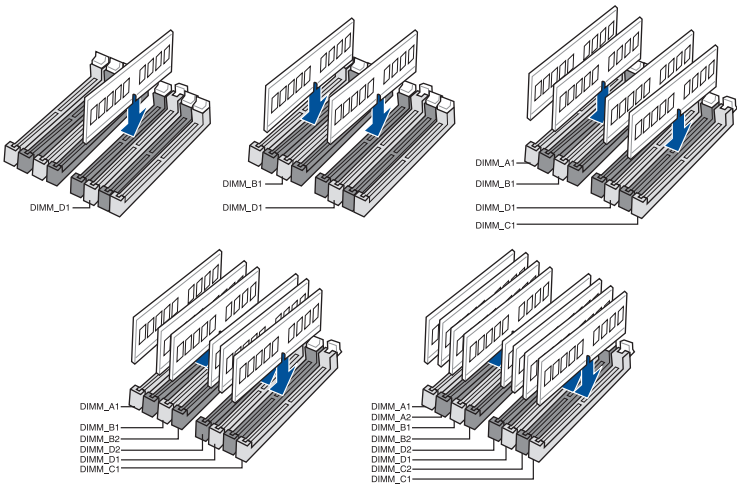


A DDR4 module is notched differently from a DDR, DDR2, or DDR3 module. DO NOT install a DDR, DDR2, or DDR3 memory module to the DDR4 slot.



X99-A II 288-pin DDR4 DIMM socket

### Recommended memory configurations



## Memory configurations

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



- 
- You may install varying memory sizes in Channel A, Channel B, Channel C, and Channel D. 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.
  - According to Intel® CPU spec, DIMM voltage below 1.65 V is recommended to protect the CPU.
  - Due to the memory address limitation on 32-bit Windows® OS, when you install 4GB or more memory on the motherboard, the actual usable memory for the OS can be about 3GB or less. For effective use of memory, we recommend that you do any of the following:
    - a) Use a maximum of 3GB system memory if you are using a 32-bit Windows® OS.
    - b) Install a 64-bit Windows® OS when you want to install 4 GB or more on the motherboard.
    - c) For more details, refer to the Microsoft® support site at <http://support.microsoft.com/kb/929605/en-us>.
- 

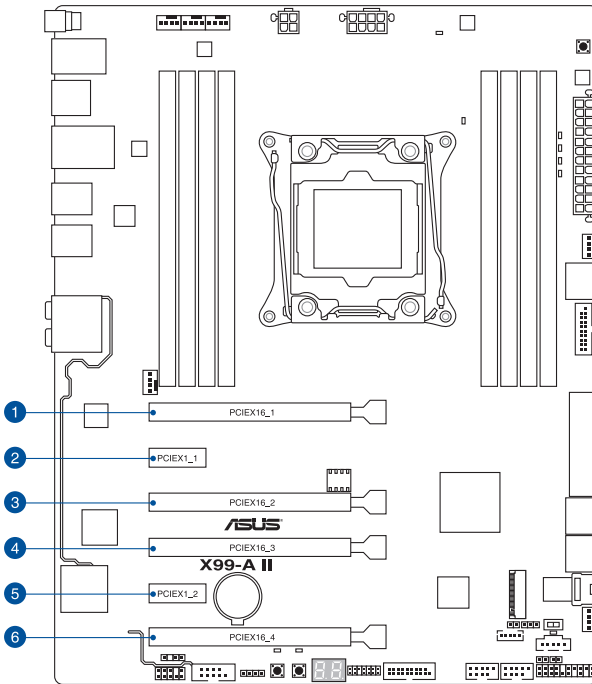


- 
- The default memory operation frequency is dependent on its Serial Presence Detect (SPD), which is the standard way of accessing information from a memory module. Under the default state, some memory modules for overclocking may operate at a lower frequency than the vendor-marked value. To operate at the vendor-marked or at a higher frequency, refer to section **3.5 Ai Tweaker menu** for manual memory frequency adjustment.
  - For system stability, use a more efficient memory cooling system to support a full memory load (8 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.
  - The design of the DIMM fan may vary. Ensure that the DIMM fan fits to the motherboard.
-

## 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.



Slot No.	Slot Description	
	40-LANE	28-LANE
1	PCIe 3.0/2.0 x16_1 slot	PCIe 3.0/2.0 x16_1 slot
2	PCIe 2.0 x1_1 slot	PCIe 2.0 x1_1 slot
3	PCIe 2.0 x16_2 slot	PCIe 2.0 x16_2 slot
4	PCIe 3.0/2.0 x16_3 slot	PCIe 3.0/2.0 x16_3 slot
5	PCIe 2.0 x1_2 slot	PCIe 2.0 x1_2 slot
6	PCIe 3.0/2.0 x16_4 slot	PCIe 3.0/2.0 x16_4 slot

40-LANE CPU		PCI Express 3.0 operating mode		
VGA configuration	PCIe 3.0/2.0 x16_1	PCIe 3.0/2.0 x16_3	PCIe 3.0/2.0 x16_4	
Single VGA/PCIe card	x16 (single VGA recommended)	N/A	N/A	
Dual VGA/PCIe cards	x16	x16	N/A	
Triple VGA/PCIe cards	x8	x16	x8	

28-LANE CPU		PCI Express 3.0 operating mode		
VGA configuration	PCIe 3.0/2.0 x16_1	PCIe 3.0/2.0 x16_3	PCIe 3.0/2.0 x16_4	
Single VGA/PCIe card	x16 (single VGA recommended)	N/A	N/A	
Dual VGA/PCIe cards	x16	x8	N/A	
Triple VGA/PCIe cards	x8	x8	x8	



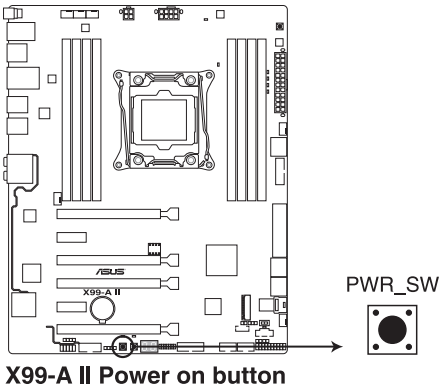
- We recommend that you provide sufficient power when running CrossFireX™ or SLI™ mode.
- Connect a chassis fan to the motherboard connector labeled CHA\_FAN1-2 when using multiple graphics cards for better thermal environment.

## 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.

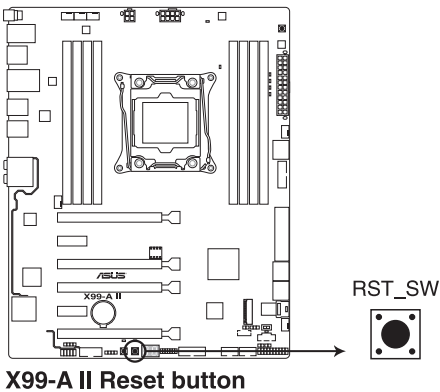
### 1. Power-on button

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.



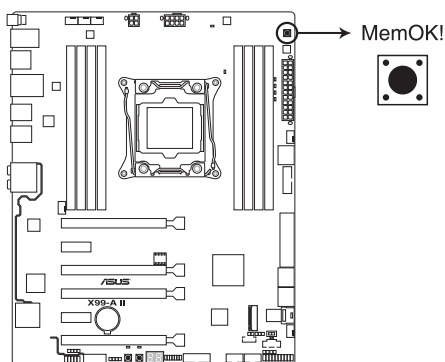
### 2. Reset button

Press the reset button to reboot the system.



### 3. MemOK! button

Installing DIMMs that are not compatible with the motherboard may cause system boot failure. If the system fail to boot during POST stage and the DRAM\_LED near the MemOK! button lights continuously, press the MemOK! button until the DRAM\_LED starts blinking. System will begin automatic memory compatibility tuning and reboot for successful boot.



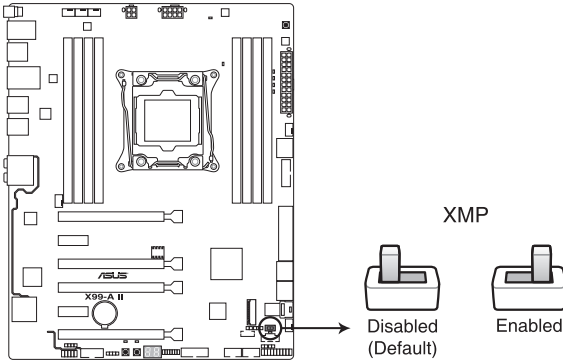
**X99-A II MemOK! button**



- Refer to section **1.1.8 Onboard LEDs** for the exact location of the DIAG\_DRAM LED.
- The DIAG\_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 tests the next set of failsafe settings. The blinking speed of the DIAG\_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 DIAG\_DRAM LED lights continuously. Replace the DIMMs with ones recommended in the Memory QVL (Qualified Vendors Lists) in this user manual or 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 overlocking, 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. EZ XMP switch

Enable this switch to overclock the installed DIMMs, allowing you to enhance the DIMM's speed and performance.



**X99-A II XMP switch**



---

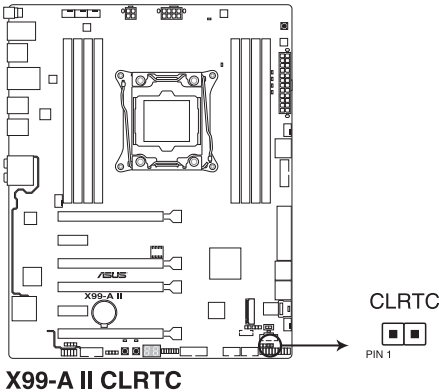
The EZ XMP LED (XLED1) lights up when you enable the EZ XMP switch. For the location of the EZ XMP LED, refer to section 1.1.8 Onboard LEDs.

---

## 1.1.7 Jumpers

### 1. Clear RTC RAM jumper (2-pin CLRTC)

This jumper allows you to clear the Real Time Clock (RTC) RAM in CMOS. You can clear the CMOS memory of date, time, and system setup parameters by erasing the CMOS RTC RAM data. The onboard button cell battery powers the RAM data in CMOS, which include system setup information such as system passwords.



To erase the RTC RAM:

1. Turn OFF the computer and unplug the power cord.
2. Short-circuit pin 1-2 with a metal object or jumper cap for about 5-10 seconds.
3. Plug the power cord and turn ON the computer.
4. Hold down the <Delete> key during the boot process and enter BIOS setup to re-enter data.



---

Except when clearing the RTC RAM, never remove the cap on CLRTC jumper default position. Removing the cap will cause system boot failure!

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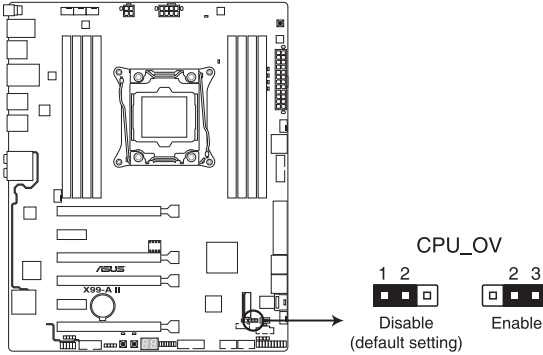


- If the steps above do not help, remove the onboard battery and move the jumper again to clear the CMOS RTC RAM data. After the CMOS clearance, reinstall the battery.
  - You do not need to clear the RTC when the system hangs due to overclocking. For system failure due to overclocking, use the C.P.R. (CPU Parameter Recall) feature. Shut down and reboot the system so the BIOS can automatically reset parameter settings to default values.
  - Due to the chipset behavior, AC power off is required to enable C.P.R. function. You must turn off and on the power supply or unplug and plug the power cord before rebooting the system.
-



## 2. CPU Over Voltage jumper (3-pin CPU\_OV)

The CPU Over Voltage jumper allows you to set a higher CPU voltage for a flexible overclocking system, depending on the type of the installed CPU. To gain more CPU voltage setting, insert the jumper to pins 2-3. To go back to its default CPU voltage setting, insert the jumper to pins 1-2.

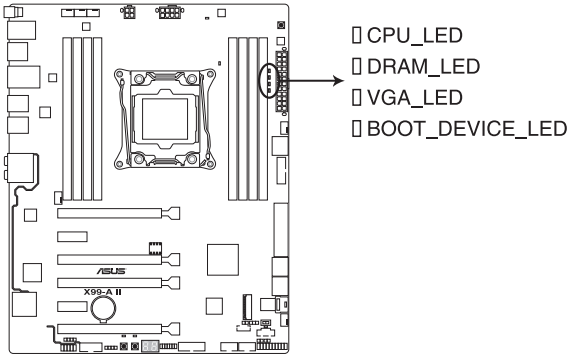


**X99-A II CPU\_OV setting**

## 1.1.8 Onboard LEDs

### 1. POST State LEDs

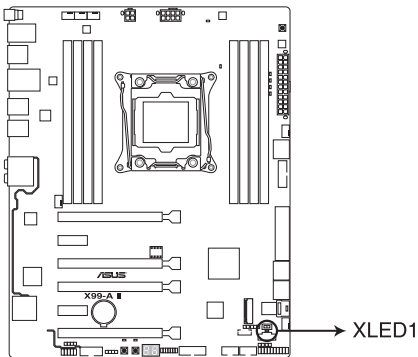
The POST State LEDs provide the status of these key components during POST (Power-On Self-Test): CPU, memory modules, VGA card, and hard disk drives. If an error is found, the critical component's LED stays lit up until the problem is solved.



**X99-A II CPU/ DRAM/  
BOOT\_DEVICE/ VGA LED**

### 2. EZ XMP LED (XLED1)

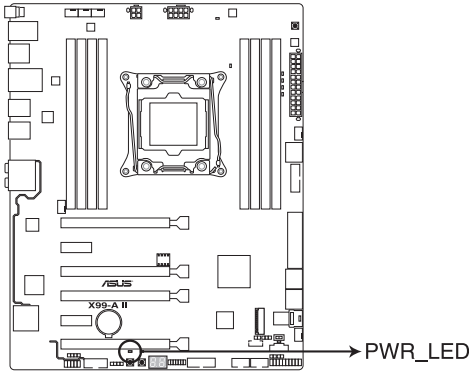
This LED lights up when you enable the EZ XMP switch.



**X99-A II XLED1**

### 3. Standby Power LED (PWR\_LED)

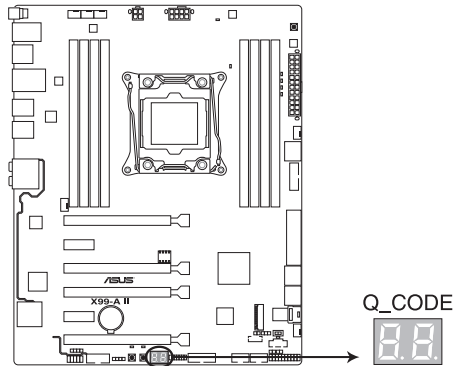
The motherboard comes with a standby power LED that lights up to indicate that the system is ON, in sleep mode, or in soft-off mode. This is a reminder that you should shut down the system and unplug the power cable before removing or plugging any motherboard components. The illustration below shows the location of the onboard LED.



**X99-A II PWR\_LED**

### 4. Q-Code LEDs

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 next page for details.



**X99-A II Q-Code LED**

## Q-Code table

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

*(continued on the next page)*

## Q-Code table

Code	Description
5A	Internal CPU error
5B	Reset PPI is not available
5C – 5F	Reserved for future AMI error codes
E0	S3 Resume is started (S3 Resume PPI is called by the DXE IPL)
E1	S3 Boot Script execution
E2	Video repost
E3	OS S3 wake vector call
E4 – E7	Reserved for future AMI progress codes
E8	S3 Resume Failed
E9	S3 Resume PPI not Found
EA	S3 Resume Boot Script Error
EB	S3 OS Wake Error
EC – EF	Reserved for future AMI error codes
F0	Recovery condition triggered by firmware (Auto recovery)
F1	Recovery condition triggered by user (Forced recovery)
F2	Recovery process started
F3	Recovery firmware image is found
F4	Recovery firmware image is loaded
F5 – F7	Reserved for future AMI progress codes
F8	Recovery PPI is not available
F9	Recovery capsule is not found
FA	Invalid recovery capsule
FB – FF	Reserved for future AMI error codes
60	DXE Core is started
61	NVRAM initialization
62	Installation of the PCH Runtime Services
63 – 67	CPU DXE initialization is started
68	PCI host bridge initialization
69	System Agent DXE initialization is started
6A	System Agent DXE SMM initialization is started
6B – 6F	System Agent DXE initialization (System Agent module specific)

*(continued on the next page)*

## Q-Code table

Code	Description
70	PCH DXE initialization is started
71	PCH DXE SMM initialization is started
72	PCH devices initialization
73 – 77	PCH DXE Initialization (PCH module specific)
78	ACPI module initialization
79	CSM initialization
7A – 7F	Reserved for future AMI DXE codes
90	Boot Device Selection (BDS) phase is started
91	Driver connecting is started
92	PCI Bus initialization is started
93	PCI Bus Hot Plug Controller Initialization
94	PCI Bus Enumeration
95	PCI Bus Request Resources
96	PCI Bus Assign Resources
97	Console Output devices connect
98	Console input devices connect
99	Super IO Initialization
9A	USB initialization is started
9B	USB Reset
9C	USB Detect
9D	USB Enable
9E – 9F	Reserved for future AMI codes
A0	IDE initialization is started
A1	IDE Reset
A2	IDE Detect
A3	IDE Enable
A4	SCSI initialization is started
A5	SCSI Reset
A6	SCSI Detect
A7	SCSI Enable
A8	Setup Verifying Password

*(continued on the next page)*

## Q-Code table

Code	Description
A9	Start of Setup
AA	Reserved for ASL (see ASL Status Codes section below)
AB	Setup Input Wait
AC	Reserved for ASL (see ASL Status Codes section below)
AD	Ready To Boot event
AE	Legacy Boot event
AF	Exit Boot Services event
B0	Runtime Set Virtual Address MAP Begin
B1	Runtime Set Virtual Address MAP End
B2	Legacy Option ROM Initialization
B3	System Reset
B4	USB hot plug
B5	PCI bus hot plug
B6	Clean-up of NVRAM
B7	Configuration Reset (reset of NVRAM settings)
B8– BF	Reserved for future AMI codes
D0	CPU initialization error
D1	System Agent initialization error
D2	PCH initialization error
D3	Some of the Architectural Protocols are not available
D4	PCI resource allocation error. Out of Resources
D5	No Space for Legacy Option ROM
D6	No Console Output Devices are found
D7	No Console Input Devices are found
D8	Invalid password
D9	Error loading Boot Option (LoadImage returned error)
DA	Boot Option is failed (StartImage returned error)
DB	Flash update is failed
DC	Reset protocol is not available

## ACPI/ASL Checkpoints

Code	Description
0x01	System is entering S1 sleep state
0x02	System is entering S2 sleep state
0x03	System is entering S3 sleep state
0x04	System is entering S4 sleep state
0x05	System is entering S5 sleep state
0x10	System is waking up from the S1 sleep state
0x20	System is waking up from the S2 sleep state
0x30	System is waking up from the S3 sleep state
0x40	System is waking up from the S4 sleep state
0xAC	System has transitioned into ACPI mode. Interrupt controller is in PIC mode.
0xAA	System has transitioned into ACPI mode. Interrupt controller is in APIC mode.

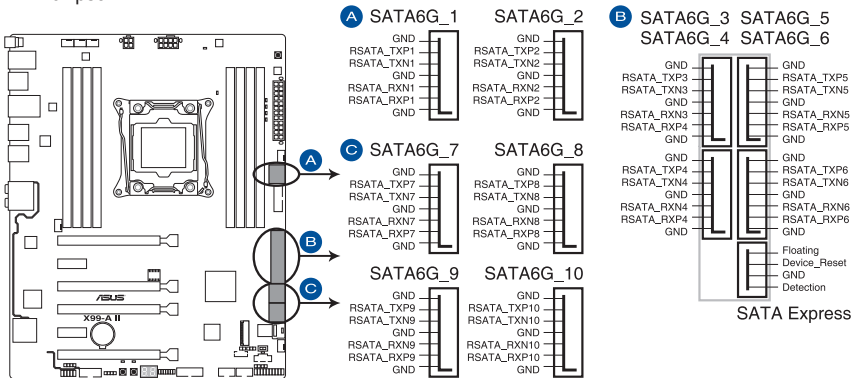


## 1.1.9 Internal connectors

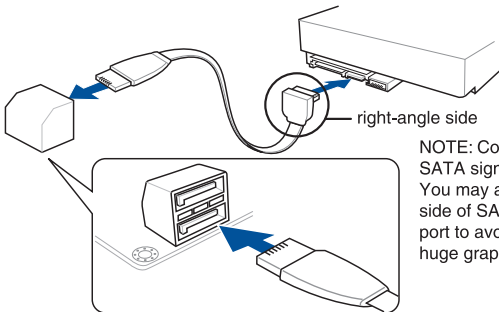
### 1. Intel® X99 Serial ATA 6 Gb/s connectors (7-pin SATA6G\_12, SATA6G\_34, SATA6G\_56/SATAEXPRESS, SATA6G\_78, SATA6G\_910)

These connectors connect to Serial ATA 6 Gb/s hard disk drives via Serial ATA 6 Gb/s signal cables.

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® X99 chipset.



X99-A II Intel® SATA 6 Gb/s connectors



**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.



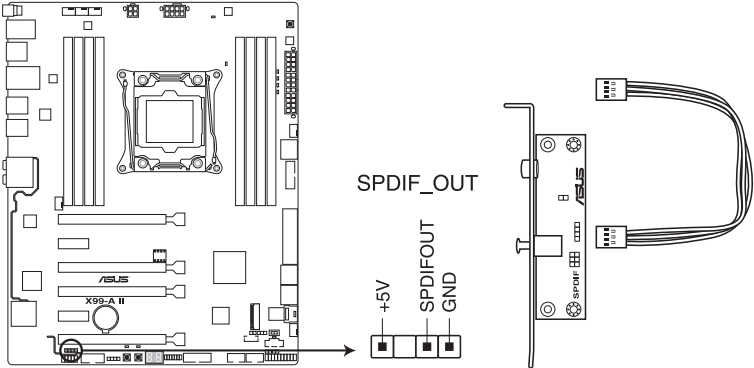
- These connectors are set to **[AHCI Mode]** by default. If you intend to create a Serial ATA RAID set using these connectors, set the SATA Mode item in the BIOS to **[RAID Mode]**. Refer to section 3.6.3 PCH Storage Configuration for details.
- Before creating a RAID set, refer to the manual bundled in the motherboard support DVD.



- The SATAEXPRESS\_1 connector can support one SATA Express device or two SATA devices.
- Due to chipset behavior, the SATA6G\_78 and SATA6G\_910 ports (black) do not support Intel® Rapid Storage Technology and RAID configuration.

## 2. Digital audio connector (4-1 pin SPDIF\_OUT)

This connector is for an additional Sony/Philips Digital Interface (S/PDIF) port. Connect the S/PDIF Out module cable to this connector, then install the module to a slot opening at the back of the system chassis.



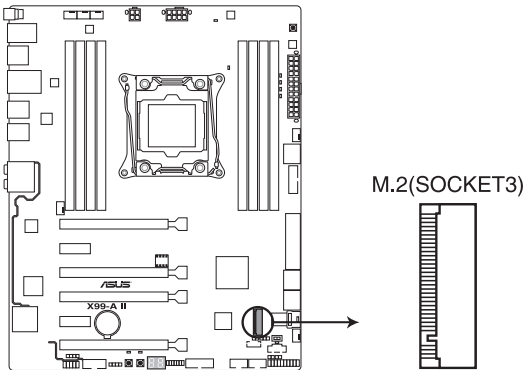
**X99-A II Digital audio connector**



The S/PDIF module is purchased separately.

## 3. M.2 socket 3

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



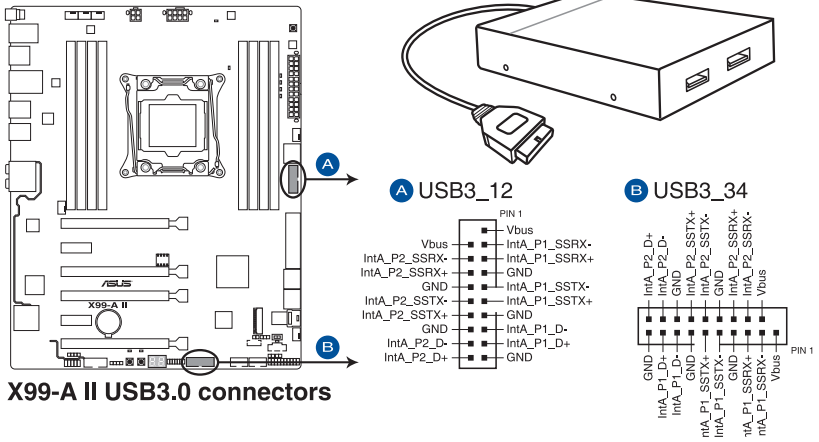
**X99-A II M.2(SOCKET3)**



This socket supports M Key and type 2242/2260/2280/22110 storage devices.

#### 4. USB 3.0 connectors (20-pin USB3\_12, USB3\_34)

These connectors allow you to connect a USB 3.0 module for additional USB 3.0 front or rear panel ports. With an installed USB 3.0 module, you can enjoy all the benefits of USB 3.0 including faster data transfer speeds of up to 5 Gb/s, faster charging time for USB-chargeable devices, optimized power efficiency, and backward compatibility with USB 2.0.



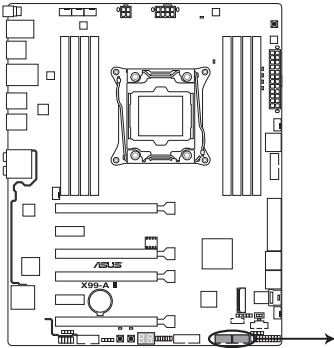
The USB 3.0 module is purchased separately.



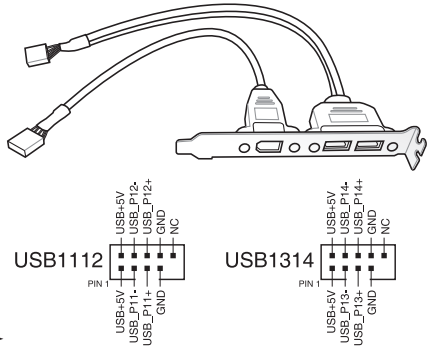
- Ensure to install the related driver to fully use the USB 3.0 ports under Windows® 7.
- The plugged USB 3.0 device may run on xHCI or EHCI mode depending on the operating system's setting.
- These USB 3.0 ports support native UASP transfer standard in Windows® 8 / Windows® 8.1 and Turbo Mode when using USB 3.0 Boost feature.

**5. USB 2.0 connectors (10-1 pin USB1112; USB1314)**

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 Mb/s connection speed.



**X99-A II USB2.0 connectors**



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



You can connect the front panel USB cable to the ASUS Q-Connector (USB) first, and then install the Q-Connector (USB) to the USB connector onboard if your chassis supports front panel USB ports.



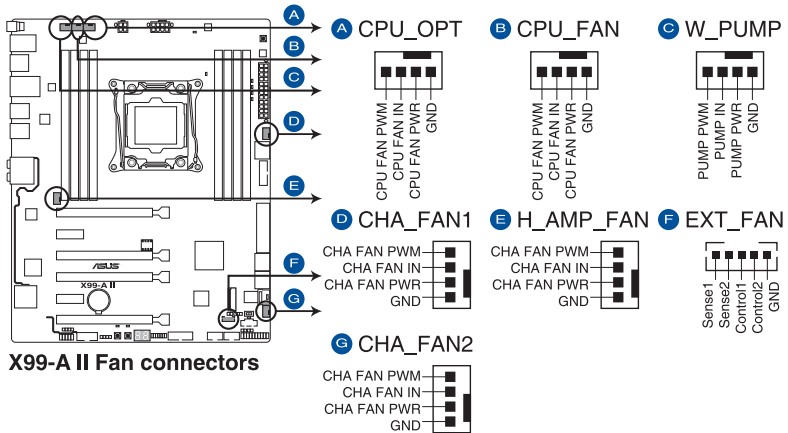
The USB 2.0 module is purchased separately.

**6. CPU, CPU optional, extension, and chassis fan connectors (4-pin CPU\_FAN; 4-pin CPU\_OPT; 4-pin W\_PUMP; 4-pin H\_AMP\_FAN; 5-pin EXT\_FAN, 4-pin CHA\_FAN1-2)**

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 that the CPU fan cable is securely installed to the CPU fan connector.



- The CPU\_FAN connector supports the CPU fan of maximum 1A (12 W) fan power.
- The CPU\_FAN, CHA\_FAN, and EXT\_FAN connectors support the ASUS FAN Xpert 3 feature on X99 platform.
- W\_PUMP function support depends on water cooling device. When using a water cooling device, connect the device's fan connector(s) to the motherboard's CPU\_FAN connector, and the water pump connector to the W\_PUMP connector.
- The EXT\_FAN connector supports 3 of 10 thermal sensor sources.
- All fan connectors detect the type of fan installed and automatically switches the control modes. To configure the fan's control mode, go to **Advanced Mode > Monitor > CPU Q-Fan Control** item in BIOS.
- 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.
- The chassis fan connectors support DC and PWM modes. To set these fans to DC or PWM, go to **Advanced Mode > Monitor > Chassis Fan 1/2 Q-Fan Control** items in BIOS.



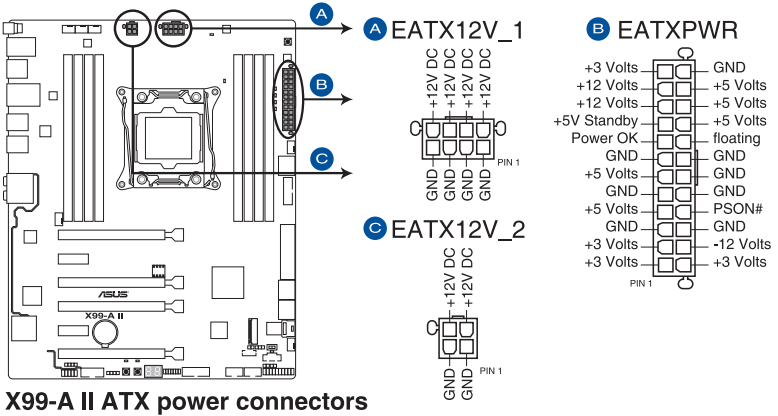
The FAN EXTENSION CARD is purchased separately.

**7. ATX power connectors (24-pin EATXPWR; 8-pin EATX12V\_1; 4-pin EZTX12V\_2)**

These connectors are for ATX power supply plugs. The power supply plugs are designed to fit these connectors in only one orientation. Find the proper orientation and push down firmly until the connectors completely fit.



DO NOT forget to connect BOTH of the 4-pin and 8-pin EATX12 V power plug.



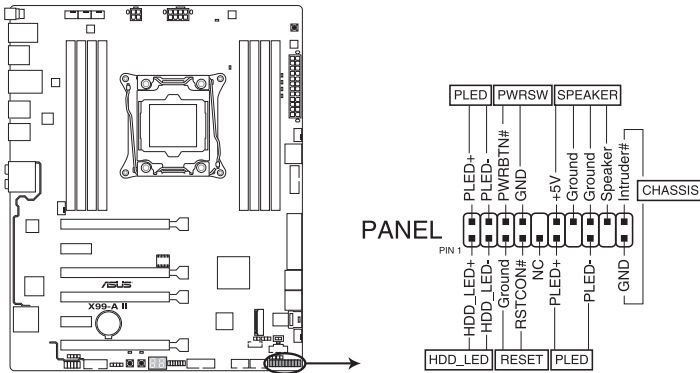
**X99-A II ATX power connectors**



- 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.
- 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 PCI Express x16 cards, use a PSU with 1000W power or above to ensure the system stability.

## 8. System panel connector (20-3 pin PANEL)

This connector supports several chassis-mounted functions.



**X99-A II System panel connector**

- **System power LED (4-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 PWRSW)**

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 operating system settings. Pressing the power switch for more than four seconds while the system is ON turns the system OFF.

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

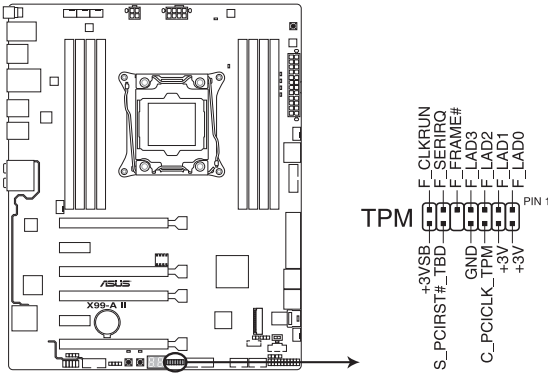
This 2-pin connector is for the chassis-mounted reset button for system reboot without turning off the system power.

- **Chassis intrusion connector (2-pin CHASSIS)**

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

### 9. 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.



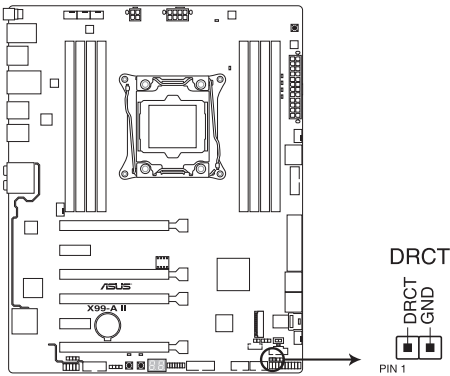
**X99-A II TPM connector**



The TPM module is purchased separately.

### 10. DirectKey connector (2-pin DRCT)

This connector is for the chassis-mounted button that supports the DirectKey function. Connect the button cable that supports DirectKey, from the chassis to this connector on the motherboard.



**X99-A II DRCT connector**

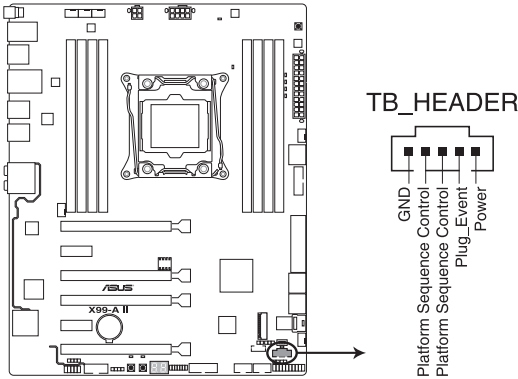


Ensure that your chassis comes with the extra button cable that supports the DirectKey feature. Refer to the technical documentation that came with the chassis for details.



## 11. Thunderbolt header (5-pin TB\_HEADER)

This connector is for the add-on Thunderbolt I/O card that supports Intel's Thunderbolt Technology, allowing you to connect up to six Thunderbolt-enabled devices and a DisplayPort-enabled display in a daisy-chain configuration.



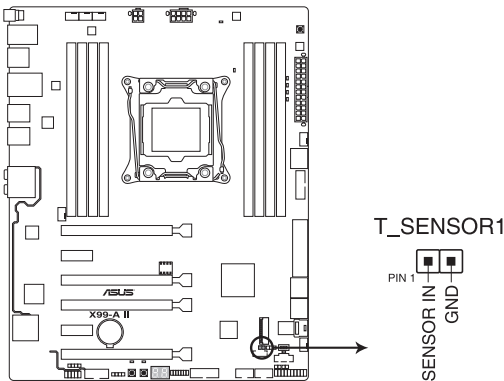
### X99-A II TB\_HEADER connector



The add-on Thunderbolt I/O card and Thunderbolt cables are purchased separately.

## 12. T\_Sensor connector (2-pin T\_SENSOR1)

This connector is for the thermistor cable that allows you to monitor the temperature of your motherboard's critical components and connected devices.



### X99-A II T\_SENSOR connector

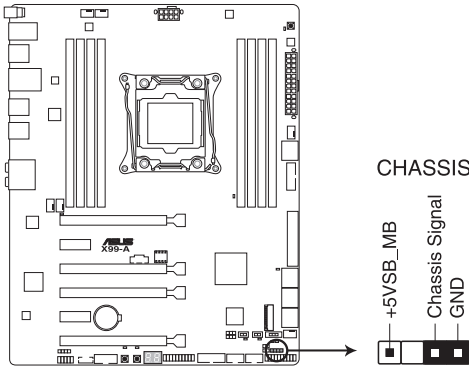


The thermistor cable is purchased separately.

### 13. Chassis intrusion connector (4-1 pin CHASSIS)

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

By default, the pin labeled “Chassis Signal” and “Ground” are shorted with a jumper cap. Remove the jumper caps and enable the related options in BIOS if you intend to use the chassis intrusion detection feature.



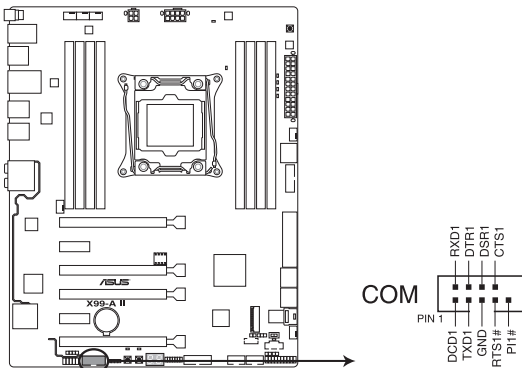
**X99-A Chassis intrusion connector**



A message appears when you connect the sensor or switch at the first time or when you reconnect the sensor or switch to this connector. Reset the system to exit the message.

### 14. Serial port connector (10-1 pin COM)

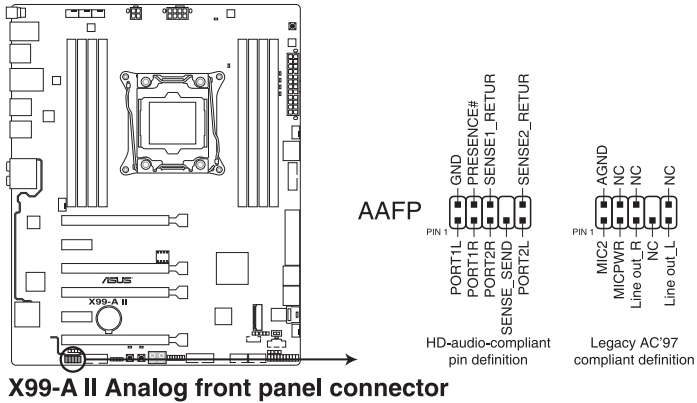
These connectors are for the serial (COM) port. Connect the serial port module cable to one of these connectors, then install the module to a slot opening at the back of the system chassis.



**X99-A II Serial port connector**

## 15. Front panel audio connector (10-1 pin AAFP)

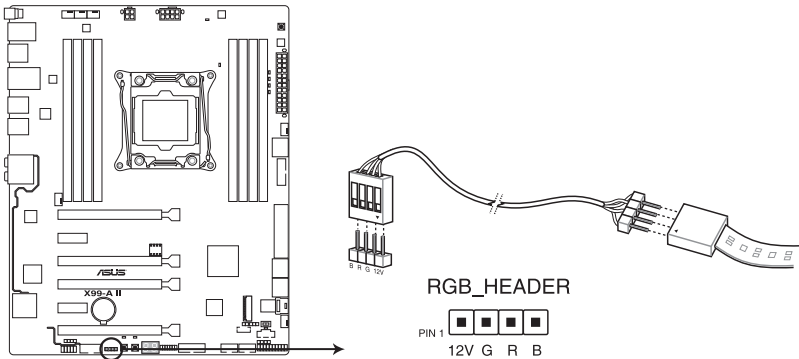
This connector is for a chassis-mounted front panel audio I/O module that supports either HD Audio or legacy AC'97 audio standard. Connect one end of the front panel audio I/O module cable to this connector.



- 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.
- If you want to connect a high-definition or an AC'97 front panel audio module to this connector, set the Front Panel Type item in the BIOS setup to **[HD]** or **[AC97]**.

## 16. Aura Strip Headers (4-pin RGB\_HEADER)

This connector is for RGB LED strips.



**X99-A II RGB\_HEADER connector**



The RGB header supports 5050 RGB multi-color LED strips (12V/G/R/B), with a maximum power rating of 2A (12V), and no longer than 2 meters.



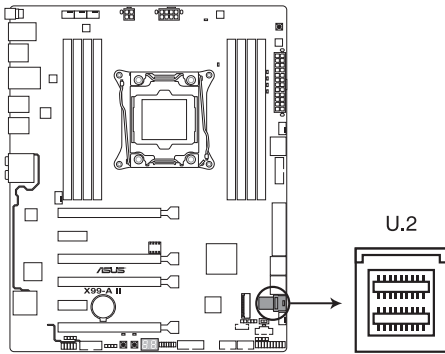
Before you install or remove any component, ensure that the ATX power supply is switched off or the power cord is detached from the power supply. Failure to do so may cause severe damage to the motherboard, peripherals, or components.



- 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. Make sure your LED stripe pins are in the exact order (12V/G/R/B), for more details, please contact your product vendor.

## 17. U.2 connector (U.2)

This motherboard comes with a U.2 connector which supports PCIe 3.0 x4 NVM Express storage.



**X99-A II U.2**



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NVM Express devices currently do not support BIOS S.M.A.R.T. information.

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# Basic Installation

# 2

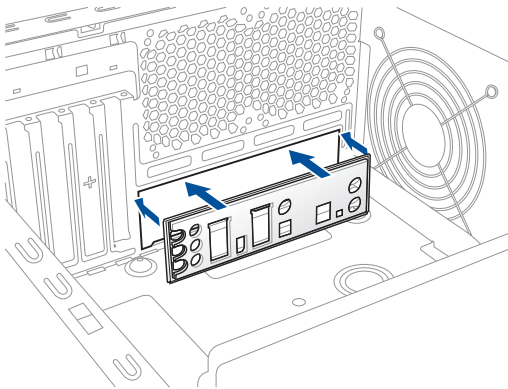
## 2.1 Building your PC system

### 2.1.1 Motherboard installation

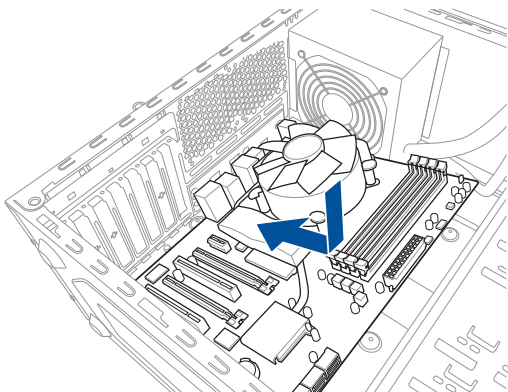


The diagrams in this section are for reference only. The motherboard layout may vary with models, but the installation steps are the same for all models.

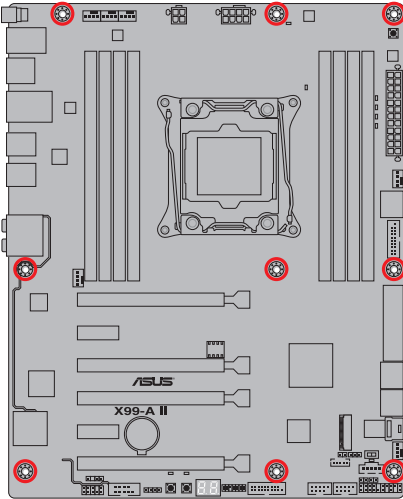
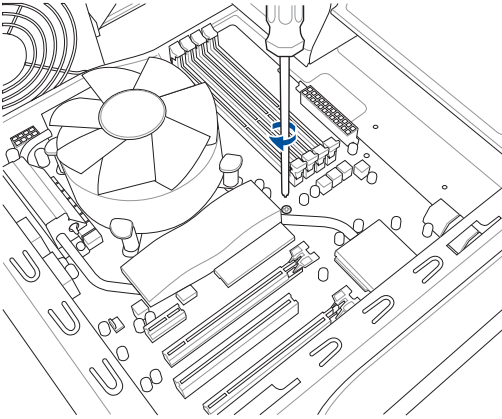
1. Install the ASUS Q-Shield to the chassis rear I/O panel.



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



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



DO NOT overtighten the screws! Doing so can damage the motherboard.

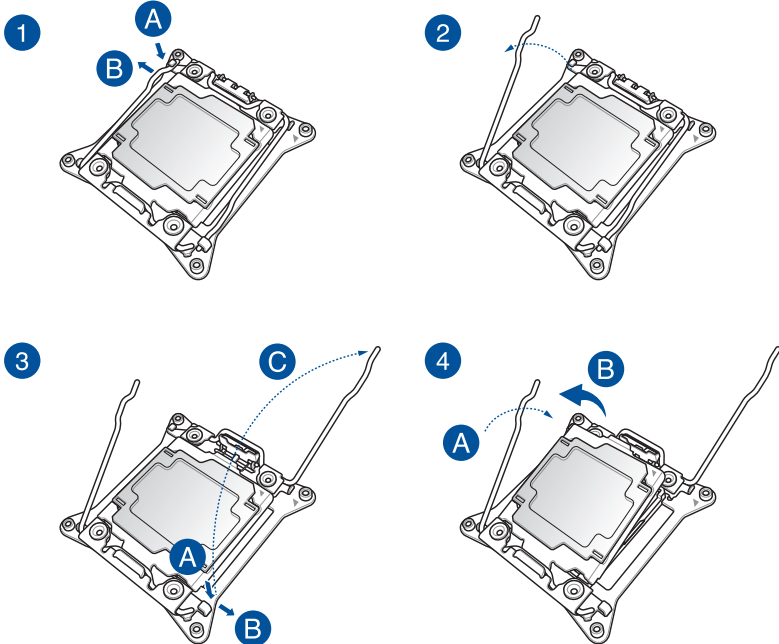


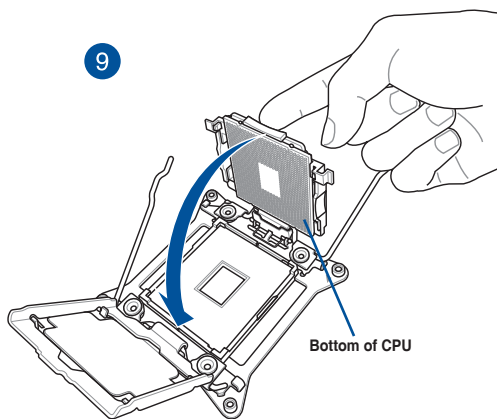
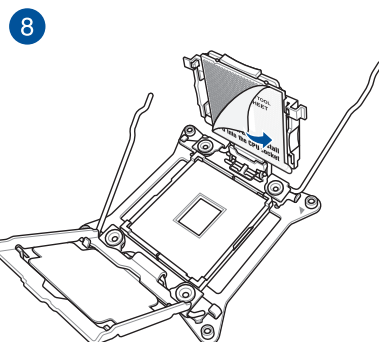
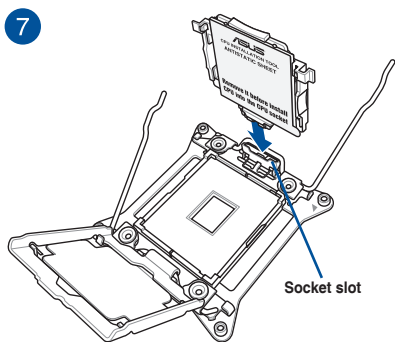
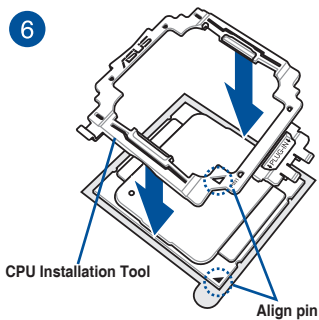
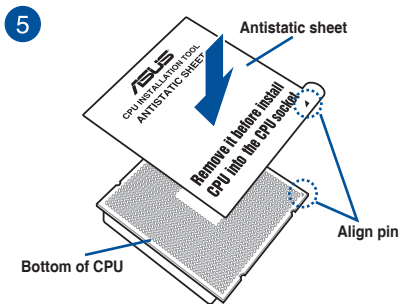
## 2.1.2 CPU installation



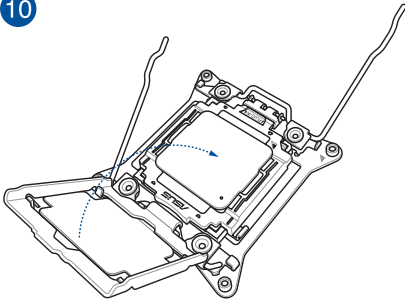
- Please note the order in opening/ closing the double latch. Follow the instructions printed on the metal sealing hatch or the illustrations shown below in this manual. The plastic cap will pop up automatically once the CPU is in place and the hatch properly sealed down.
- The illustrations are for reference only.
- The CPU Installation Tool is only compatible on ASUS motherboards with an Intel® LGA2011-3 socket.
- Ensure that the CPU is firmly clicked into place before installing it into the CPU socket or socket slot.
- 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.

### Installing CPU

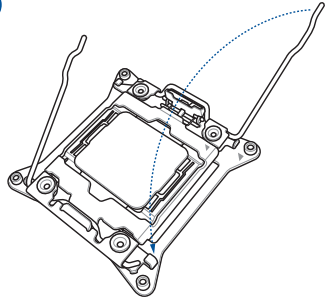




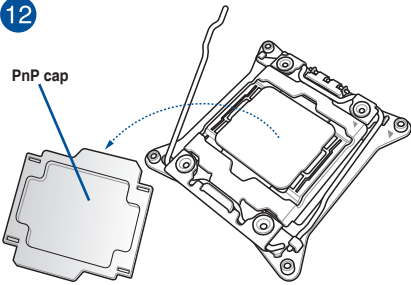
10



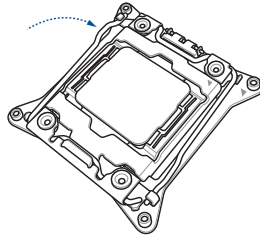
11



12

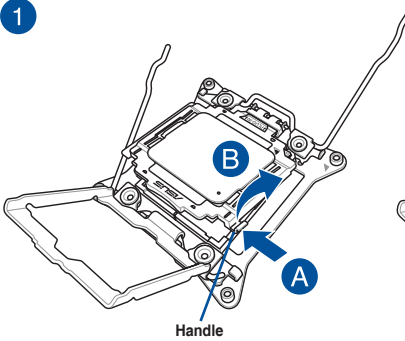


13

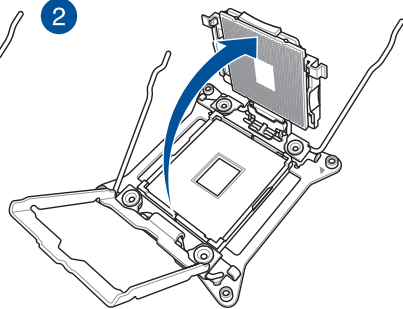


### Removing CPU

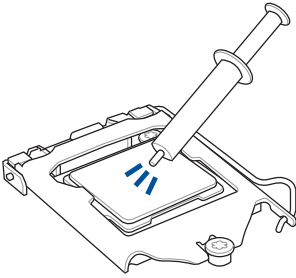
1



2

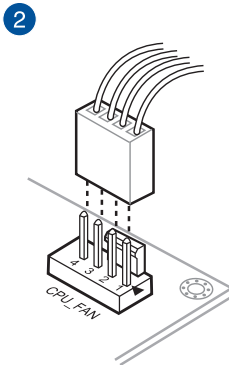
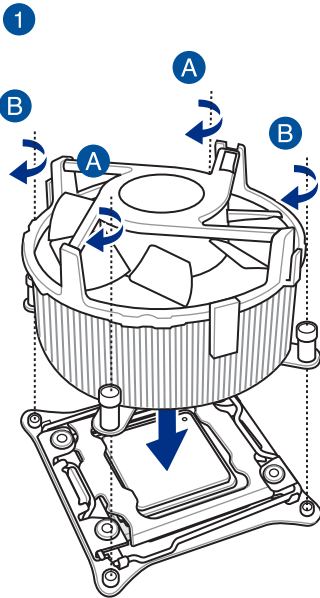


### 2.1.3 CPU heatsink and fan assembly installation

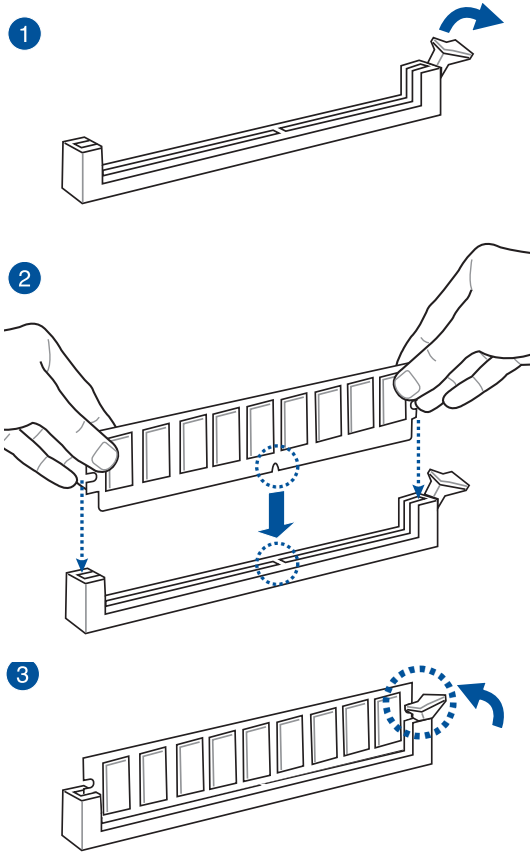


Apply the Thermal Interface Material to the CPU heatsink and CPU before you install the heatsink and fan, if necessary.

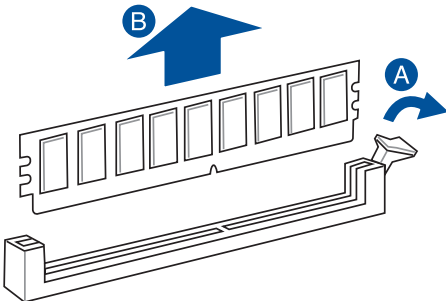
To install the CPU heatsink and fan assembly



## 2.1.4 DIMM installation

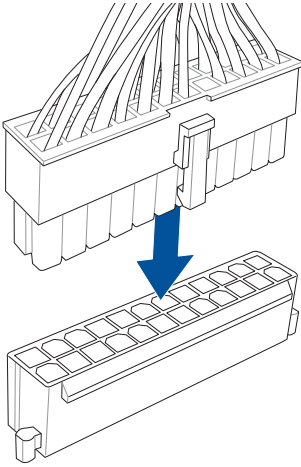


To remove a DIMM

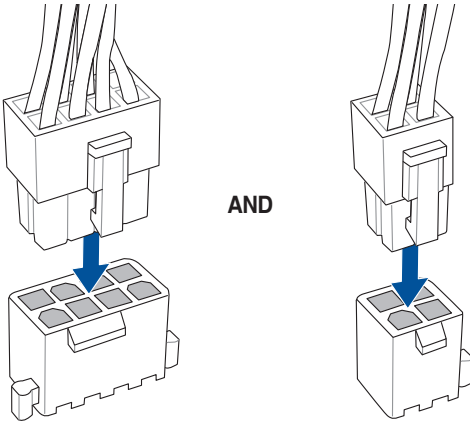


## 2.1.5 ATX Power connection

1

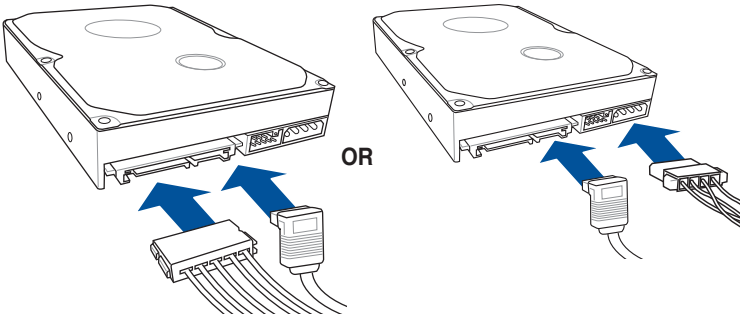


2

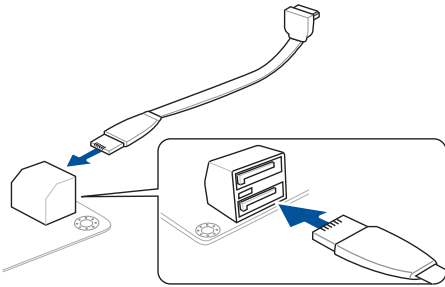


## 2.1.6 SATA device connection

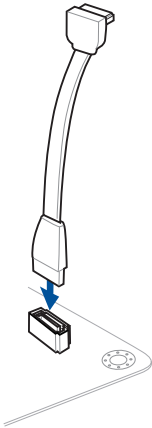
1



2

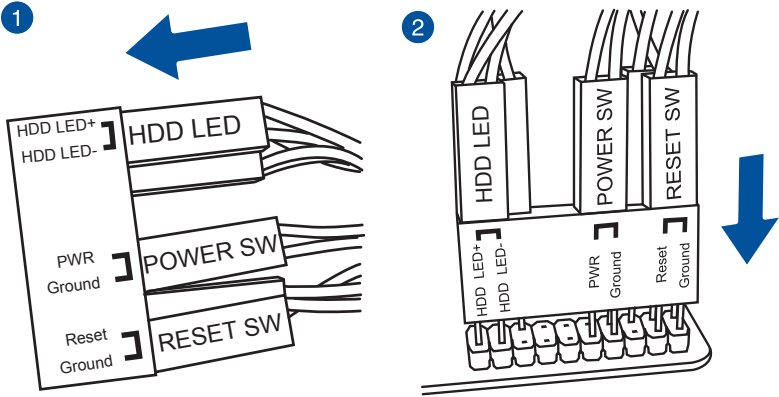


OR

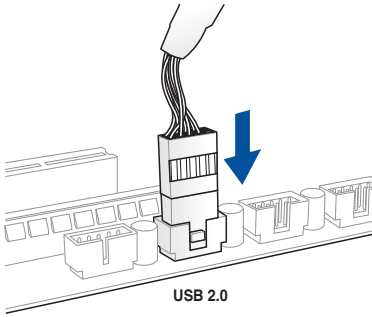


## 2.1.7 Front I/O Connector

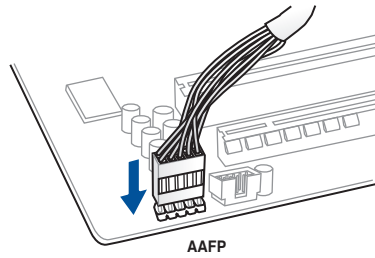
### To install ASUS Q-Connector



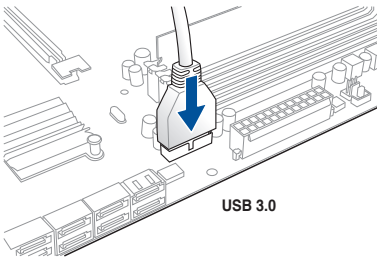
### To install USB 2.0 connector



### To install front panel audio connector



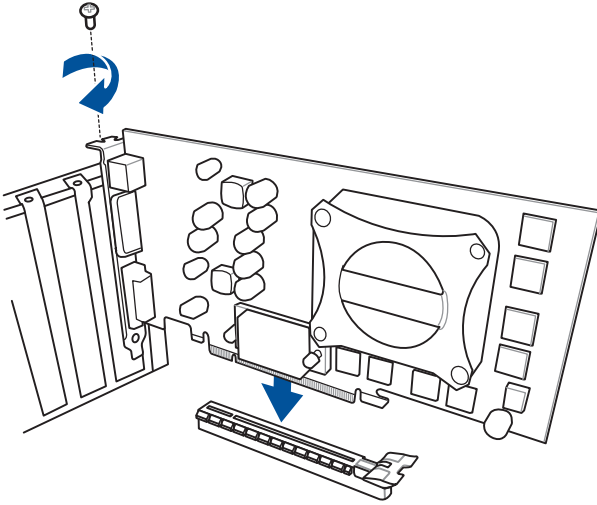
### To install USB 3.0 connector



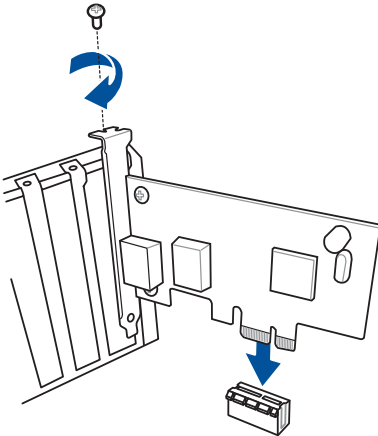


## 2.1.8 Expansion Card installation

To install PCIe x16 cards



To install PCIe x1 cards



## 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 (the USB port hole marked in green on the I/O shield) then press the USB BIOS Flashback button for three seconds to automatically update the BIOS.

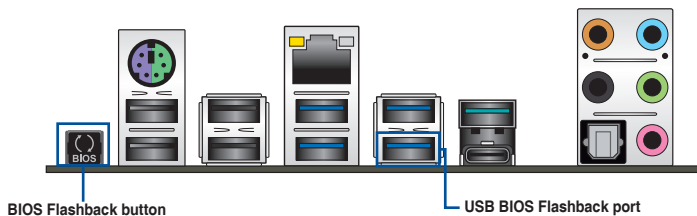
#### To use USB BIOS Flashback:

1. Place the bundled support DVD to the optical drive and install the USB BIOS Flashback Wizard. Follow the onscreen instructions to complete the installation.
2. Insert the 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.
- Refer to section **2.3.1 Rear I/O connection** for the location of the USB port that supports USB BIOS Flashback.

3. Launch the USB BIOS Flashback Wizard to automatically download the latest BIOS version.
4. Shut down your computer.
5. Press the BIOS Flashback button for three seconds until the Flashback LED begins to blink, indicating that the BIOS Flashback function is enabled, then release.



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



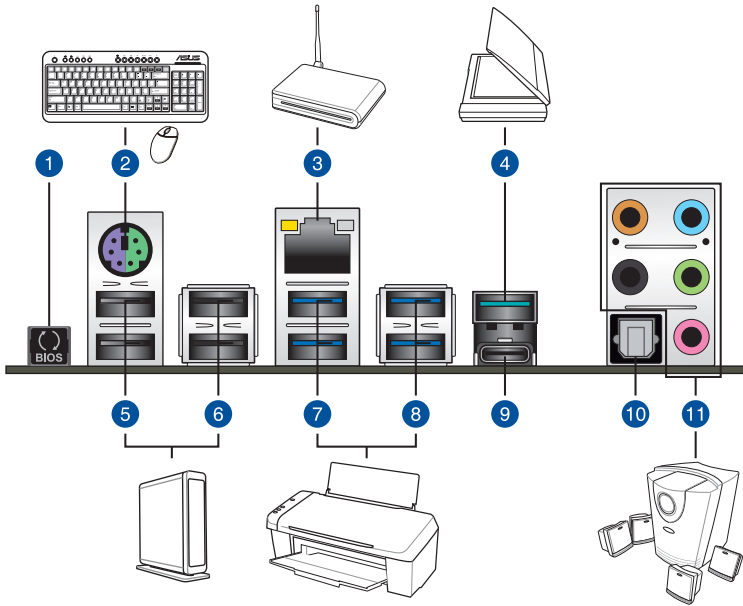
For more BIOS update utilities in BIOS setup, refer to the section **3.11 Updating BIOS** in Chapter 3.



- 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. USB BIOS Flashback	7. USB 3.0 ports E34 (Supports USB 3.0 Boost)
2. PS/2 keyboard/mouse port	8. USB 3.0 ports E2_5 (Bottom port supports USB BIOS Flashback)
3. Intel® LAN port	9. USB 3.1 port EC1 (supports USB 3.1 Boost)
4. USB 3.1 port EA2	10. Optical S/PDIF Out port
5. USB 2.0 ports 78	11. Audio I/O ports**
6. USB 2.0 ports 910	

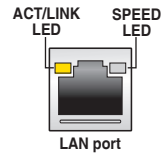
\* and \*\*: Refer to the tables on the next page for LAN port LEDs and audio port definitions.



- The plugged USB 3.0 device may run on xHCI mode or EHCI mode, depending on the operating system's setting.
- USB 3.0 devices can only be used as data storage only.
- We strongly recommend that you connect USB 3.0 devices to USB 3.0 ports for faster and better performance for your USB 3.0 devices.
- Due to the design of the Intel® X99 series chipset, all USB devices connected to the USB 2.0 and USB 3.0 ports are controlled by the xHCI controller. Some legacy USB devices must update their firmware for better compatibility.

### \* LAN ports LED indications

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



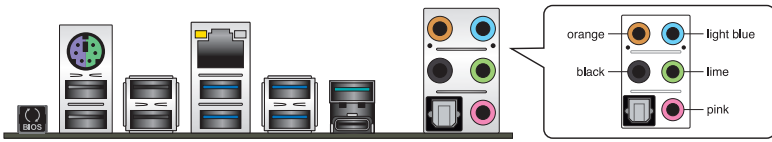
You can disable the LAN controllers in BIOS. Due to hardware design, the LAN port's LEDs may continue to blink even when disabled.

### \*\* Audio 2.1, 4.1, 5.1 or 7.1-channel configuration

Port	Headset 2.1-channel	4.1-channel	5.1-channel	7.1-channel
Light Blue	Line In	Line In	Line In	Side Speaker Out
Lime	Line Out	Front Speaker Out	Front Speaker Out	Front Speaker Out
Pink	Mic In	Mic In	Mic In	Mic In
Orange	–	–	Center/Sub woofer	Center/Sub woofer
Black	–	Rear Speaker Out	Rear Speaker Out	Rear Speaker Out

## 2.3.2 Audio I/O connections

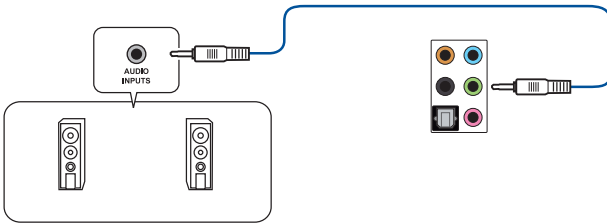
### Audio I/O ports



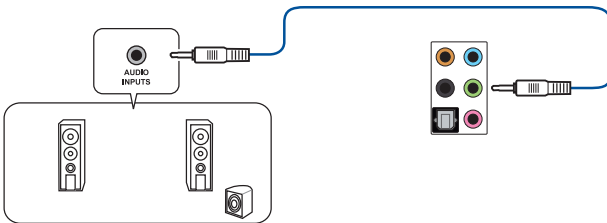
### Connect to Headphone and Mic



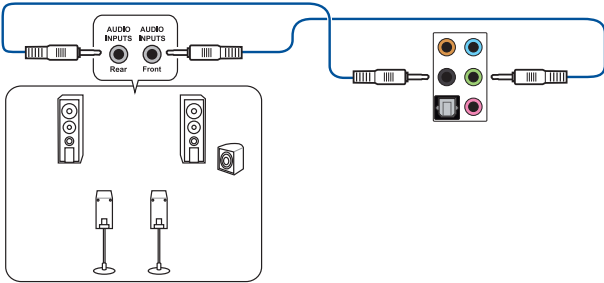
### Connect to Stereo Speakers



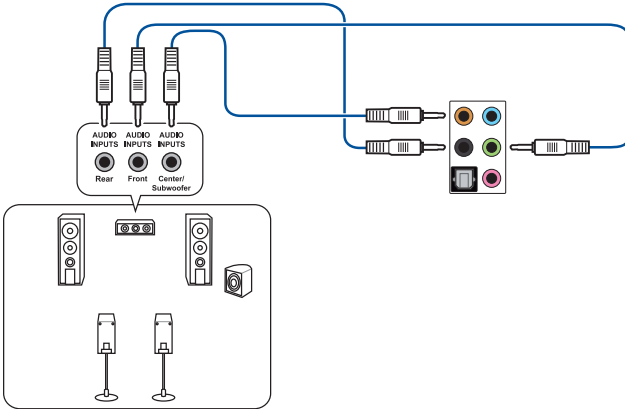
### Connect to 2.1 channel Speakers



## Connect to 4.1 channel Speakers



## Connect to 5.1 channel Speakers





BIOS Beep	Description
One short beep	VGA detected Quick boot set to disabled No keyboard detected
One continuous beep followed by two short beeps then a pause (repeated)	No memory detected
One continuous beep followed by three short beeps	No VGA detected
One continuous beep followed by four short beeps	Hardware component failure

- 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 switch for more than four seconds to let the system enter the soft-off mode regardless of the BIOS setting.



# BIOS Setup

# 3

## 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.**

---



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When downloading or updating the BIOS file, rename it as **X99A2.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> during the Power-On Self Test (POST). If you do not press <Delete>, 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 **1.1.6 Onboard buttons and switches** for information on how to erase the RTC RAM via the Clear CMOS button.
  - The BIOS setup program does not support the Bluetooth devices.
- 

### 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 EZ Mode

By default, the EZ Mode screen appears when you enter the BIOS setup program. 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.



The default screen for entering the BIOS setup program can be changed between EZ Mode or Advanced Mode. Refer to the **Setup Mode** item in section 3.8 **Boot menu** for details.

The screenshot shows the ASUS UEFI BIOS Utility - EZ Mode interface. The top bar displays the date (03/03/2016), time (10:40), language (English), and EZ Tuning Wizard (F11). The main area is divided into several sections:

- Information:** Shows system details like BIOS Ver. 0208, CPU (Intel(R) Core(TM) i7-5960X CPU @ 3.00GHz), Speed (3000 MHz), and Memory (4096 MB).
- CPU Temperature:** Displays CPU Core Voltage (0.880 V) and Motherboard Temperature (29°C).
- DRAM Status:** Lists DIMM slots and their configurations.
- SATA Information:** Shows SATA ports (P1-P7) and their status.
- FAN Profile:** Lists various fans (CPU, CHA1, CHA2, EXT1, EXT2, HAMP) and their status.
- Intel Rapid Storage Technology:** Includes a graph for CPU FAN speed and QFan Control.
- EZ System Tuning:** Offers Performance and Energy Saving modes.
- Boot Priority:** Allows users to choose and drag boot items.

Callouts and annotations include:

- Displays the system properties of the selected mode. Click < or > to switch EZ System Tuning modes
- Displays the CPU/motherboard temperature, CPU voltage output, CPU/chassis/power fan speed, and SATA information
- Selects the display language of the BIOS setup program
- Creates storage RAID and configures system overlocking
- Enables or disables the SATA RAID mode for Intel Rapid Storage Technology
- Displays the CPU Fan's speed. Click the button to manually tune the fans
- Loads optimized default settings
- Saves the changes and resets the system
- Shows the bootable devices
- Displays the Advanced mode menus
- Search on the FAQ
- Selects the boot device priority



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

### 3.2.2 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.



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

The screenshot shows the ASUS UEFI BIOS Utility in Advanced Mode. The interface is dark-themed with blue and white text. At the top, there's a menu bar with options like My Favorites, Main, Ai Tweaker, Advanced (highlighted), Monitor, Boot, Tool, and Exit. Below the menu bar, there are several configuration sections. On the left, a list of menu items includes Hyper-Threading [ALL], Intel Adaptive Thermal Monitor, Limit CPUID Maximum, Execute Disable Bit, Intel Virtualization Technology, Hardware Prefetcher, Adjacent Cache Line Prefetcher, Boot Performance Mode, Maximum CPU Core Temperature, Active Processor Cores, and CPU Power Management Configuration. The CPU Power Management Configuration section is expanded, showing a sub-menu item 'Enables Hyper Threading (Software Method to Enable/Disable Logical Processor threads.)' with an item description and a configuration field set to 'Enabled'. On the right, there's a Hardware Monitor section displaying CPU and Memory status, including Frequency, Temperature, BCLK, Core Voltage, Ratio, and Voltage levels. At the bottom, there's a scroll bar and a 'Last Modified' section with an 'EzMode(F7)' button and a 'Search on FAQ' option. Red lines and boxes highlight these various elements, with labels pointing to them.

Labels in the image include: Language, MyFavorite, Q-Fan control, EZ Tuning Wizard, Quick Note, Hot Keys, Menu bar, My Favorites, Main, Ai Tweaker, Advanced, Monitor, Boot, Tool, Exit, Hardware Monitor, CPU, Frequency, Temperature, 3000 MHz, 62°C, BCLK, Core Voltage, 100.0 MHz, 0.885 V, Ratio, 30x, Memory, Frequency, Vol\_CHAB, 2133 MHz, 1.196 V, Capacity, Vol\_CHCD, 4096 MB, 1.184 V, Voltage, +12V, +5V, 11.808 V, 4.760 V, +3.3V, 2.976 V, Last Modified, EzMode(F7), Search on FAQ, Version 2.17.1246, Copyright (C) 2016 American Megatrends, Inc., Sub-menu item, Item description, Configuration fields, Scroll bar, Last modified settings, Goes back to EZ Mode, Displays the CPU/motherboard temperature, CPU and memory voltage output.

## Menu bar

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

<b>My Favorites</b>	For saving the frequently-used system settings and configuration.
<b>Main</b>	For changing the basic system configuration
<b>Ai Tweaker</b>	For changing the overclocking settings
<b>Advanced</b>	For changing the advanced system settings
<b>Monitor</b>	For displaying the system temperature, power status, and changing the fan settings.
<b>Boot</b>	For changing the system boot configuration
<b>Tool</b>	For configuring options for special functions
<b>Exit</b>	For selecting the exit options and loading default settings

## 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 the language that you want to display in your BIOS screen.

## MyFavorites (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 QFan 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:



## Quick Note (F9)

This button above the menu bar allows you to key in notes of the activities that you have done in BIOS.



- 
- The Quick Note function does not support the following keyboard functions: delete, cut, copy and paste.
  - You can only use the alphanumeric characters to enter your notes.
- 

## 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.

### 3.2.3 QFan Control

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

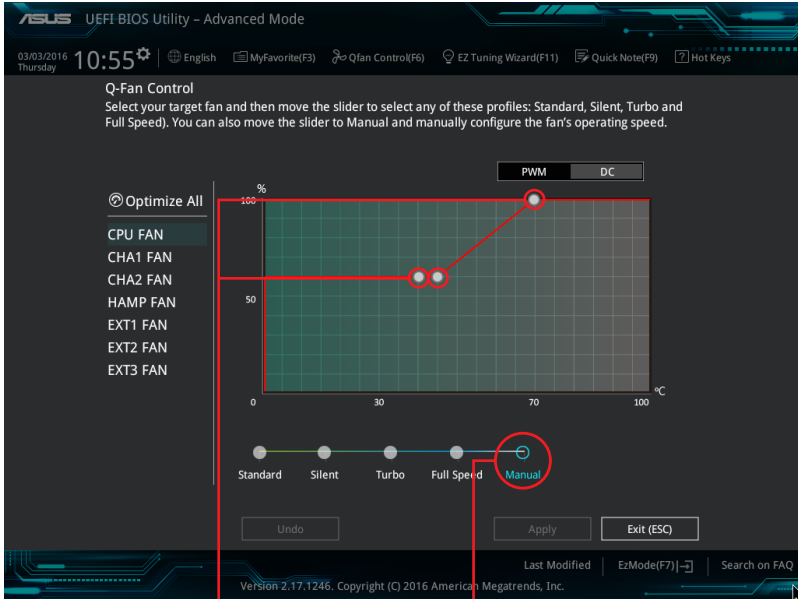
The screenshot shows the ASUS QFan Control interface in the UEFI BIOS Utility. The interface includes a fan selection list, a graph showing fan speed (%) vs. temperature (°C), and profile selection buttons. Red lines and boxes highlight specific features with the following annotations:

- Click to select a fan to be configured**: Points to the fan selection list on the left.
- Click to activate PWM Mode**: Points to the 'PWM' button above the graph.
- Click to activate DC Mode**: Points to the 'DC' button above the graph.
- Select a profile to apply to your fans**: Points to the radio buttons for Standard, Silent, Turbo, Full Speed, and Manual.
- Click to apply the fan setting**: Points to the 'Apply' button.
- Click to undo the changes**: Points to the 'Undo' button.
- Click to go back to main menu**: Points to the 'Exit (ESC)' button.
- Select to manually configure your fans**: Points to the 'Manual' radio button.

The graph shows a fan speed profile that is constant at approximately 60% until 30°C, then increases linearly to 100% at 70°C, and remains at 100% up to 100°C.

## Configuring fans manually

Select **Manual** from the list of profiles to manually configure your fans' operating speed.



Speed points

Click or tap to manually configure your fans

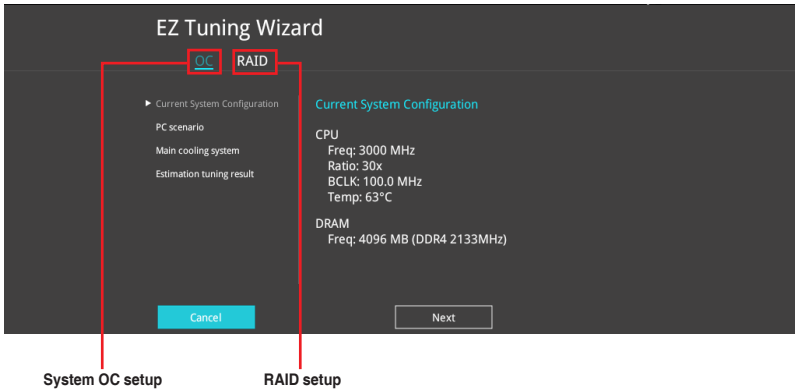
To configure your fans:

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)**.



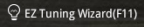
### 3.2.4 EZ Tuning Wizard

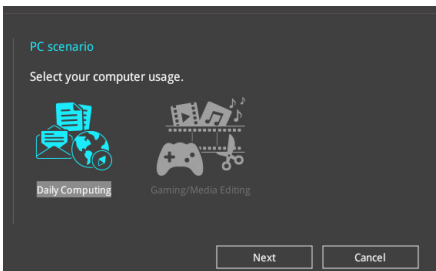
EZ Tuning Wizard allows you to overclock your CPU and DRAM, computer usage, and CPU fan to their best settings. You can also easily set RAID in your system using this feature.



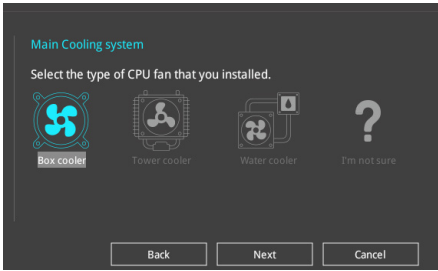
#### OC Tuning

To start OC Tuning:

1. Press <F11> on your keyboard or click  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

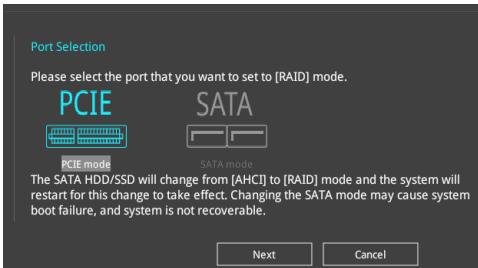
To create RAID:

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**.

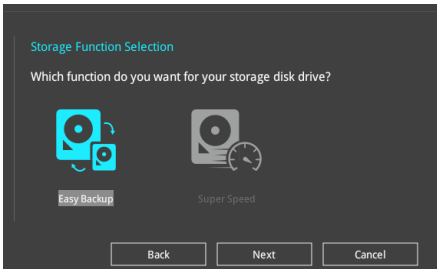


- Ensure that your HDDs have no existing RAID volumes.
- Ensure to connect your HDDs to Intel® SATA connectors.

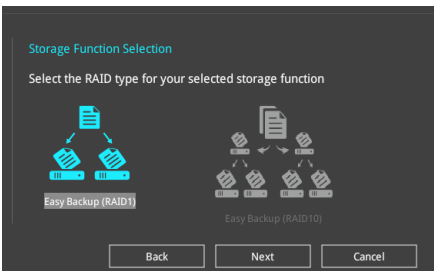
3. Select the port that you want to set to [RAID] mode, **PCIe** or **SATA**, then click **Next**.



4. Select the type of storage for your RAID, **Easy Backup** or **Super Speed**, then click **Next**.



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

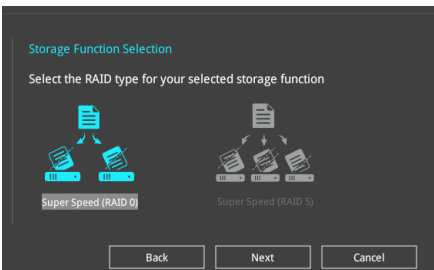


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You can only select Easy Backup (RAID 10) if you connect four (4) HDDs.

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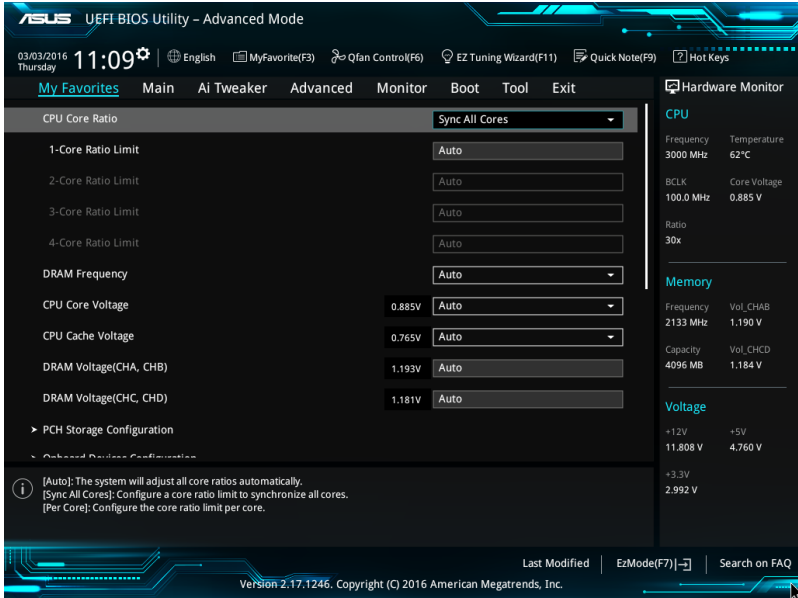
- b. For Super Speed, click **Next** then select from **Super Speed (RAID0)** or **Super Speed (RAID5)**.



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

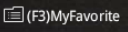
MyFavorites is your personal space where you can easily save and access your favorite BIOS items.

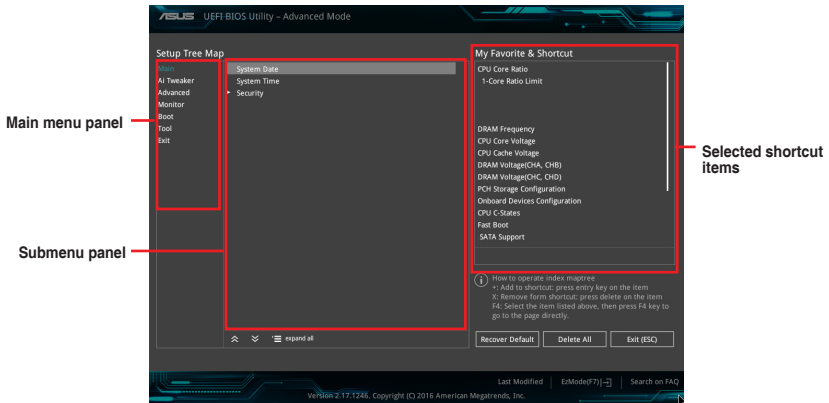



My Favorites comes with several performance, power saving, and fast boot related items by default. You can personalize this screen by adding or removing items.

## 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 MyFavorites 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 tap or click  or press <Enter> on your keyboard.



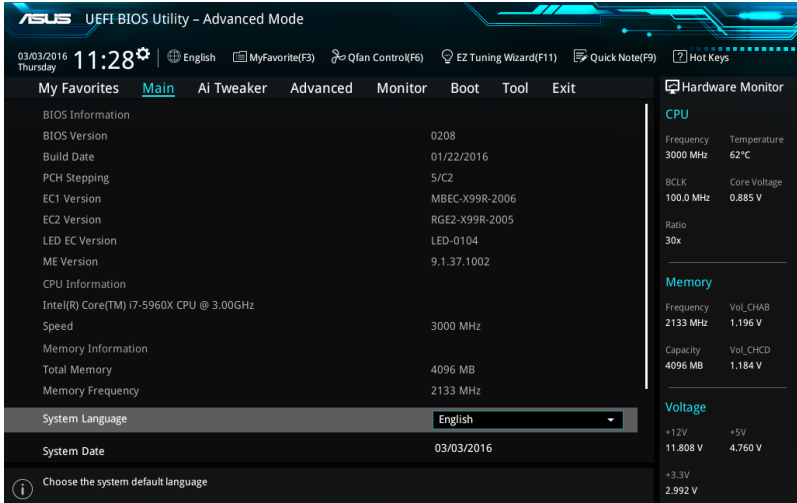
You cannot add the following items to My Favorite items:

- 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.

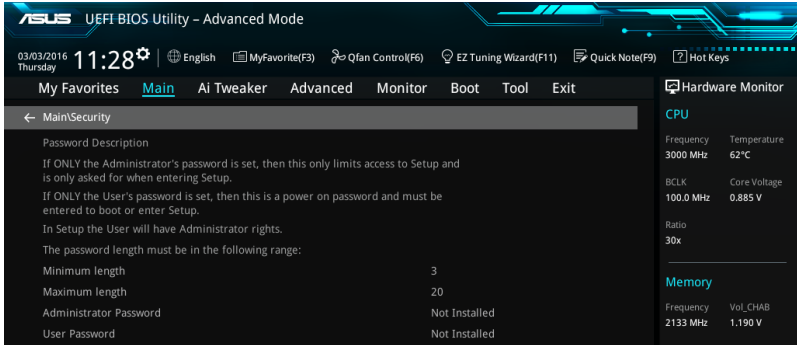
### 3.4 Main menu

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 1.1.6 Onboard buttons and switches for information on how to erase the RTC RAM via the Clear CMOS button.
- 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 Ai Tweaker menu

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

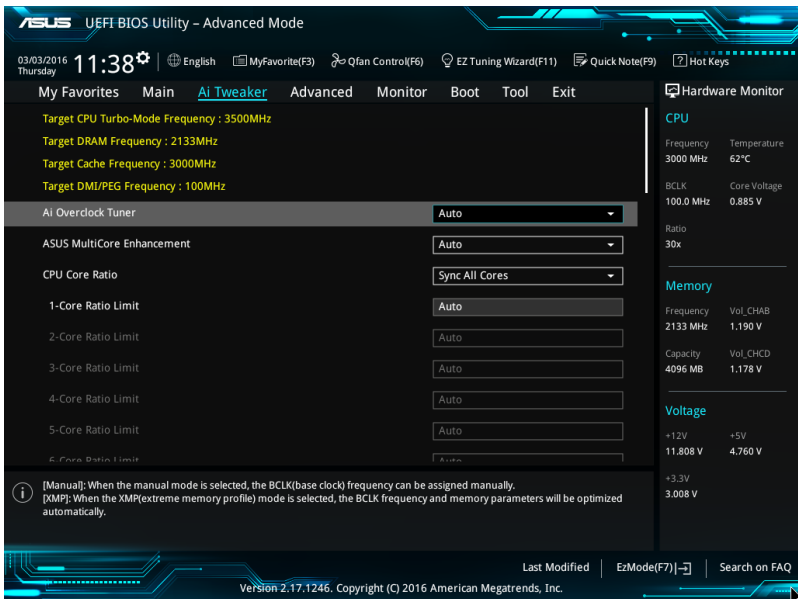


Be cautious when changing the settings of the Ai Tweaker menu items. Incorrect field values can cause the system to malfunction.



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

Scroll down to display other BIOS items.



### Ai Overclock Tuner

This item allows you to select the CPU overclocking options to achieve the desired CPU internal frequency. Select any of these preset overclocking configuration options:

- [Auto] Loads the optimal settings for the system.
- [Manual] Automatically optimizes the CPU ratio and BCLK frequency.



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 80.0 MHz to 300.0 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 overlocking 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 ratio limit per core or synchronize automatically to all cores.

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

### **1-Core Ratio Limit [Auto]**

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

## BCLK Frequency: DRAM Frequency Ratio

This item allows you to set the base clock frequency of the DRAM frequency ratio.

[Auto] The DRAM ratio is set to its optimized settings.

[100:100] The DRAM ratio is set to 100:100.

[100:133] The DRAM ratio is set to 100:133.

## 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] [DDR4-4000MHz]

## 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].

---



## **EPU Power Saving Mode**

The ASUS EPU (Energy Processing Unit) sets the CPU in its minimum power consumption settings. Enable this item to set lower CPU VCCIN and Vcore voltages and achieve the best energy saving condition.

Configuration options: [Disabled] [Enabled]

## **Internal CPU Power Management**

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

### **Enhanced Intel SpeedStep Technology [Enabled]**

This item allows the operating system to dynamically adjust the processor voltage and cores frequency which decreases the average power consumption the average heat production.

Configuration options: [Enabled] [Disabled]

### **Turbo Mode [Enabled]**

This item allows you to enable your core processor's speed to run faster than the base operating frequency when it is below operating power, current and temperature specification limit.

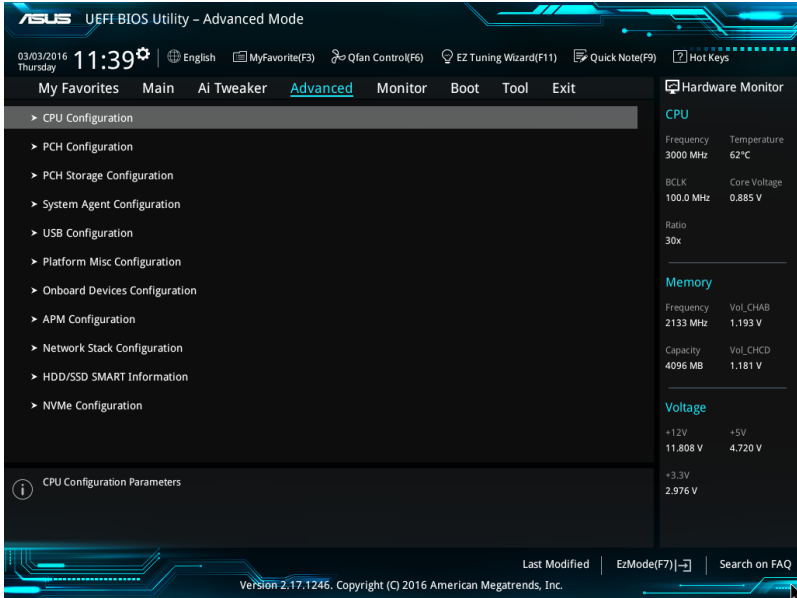
Configuration options: [Disabled] [Enabled]

### 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.

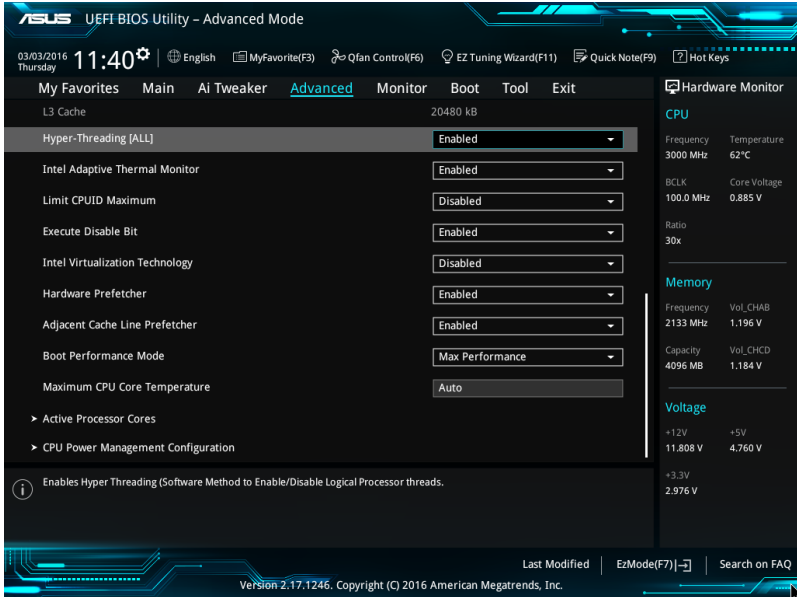


### 3.6.1 CPU Configuration

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 [ALL]

This item allows you to enable/disable the Hyper-Threading for logical processor threads.  
Configuration options: [Enabled] [Disabled]

## CPU Power Management Configuration

The items in this menu allow you to manage and configure the CPU's power.

### Enhanced Intel SpeedStep Technology [Enabled]

This item allows your system to adjust the CPU's voltage and cores frequency, resulting in decreased power consumption and heat production.

[Disabled]      The CPU runs at its default speed.

[Enabled]      The system controls the CPU speed.

### Turbo Mode [Enabled]

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

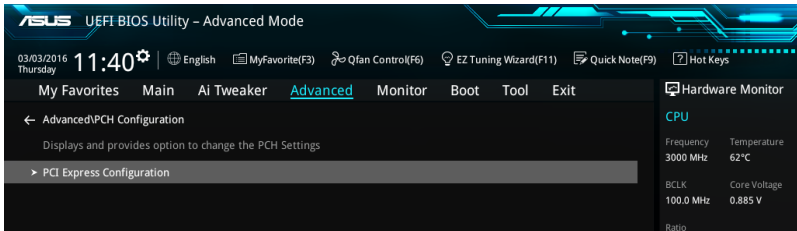
Configuration options: [Enabled] [Disabled]

### CPU C-states [Auto]

This item allows you to set the power saving of the CPU states.

Configuration options: [Auto] [Disabled] [Enabled]

## 3.6.2 PCH Configuration



### PCI Express Configuration

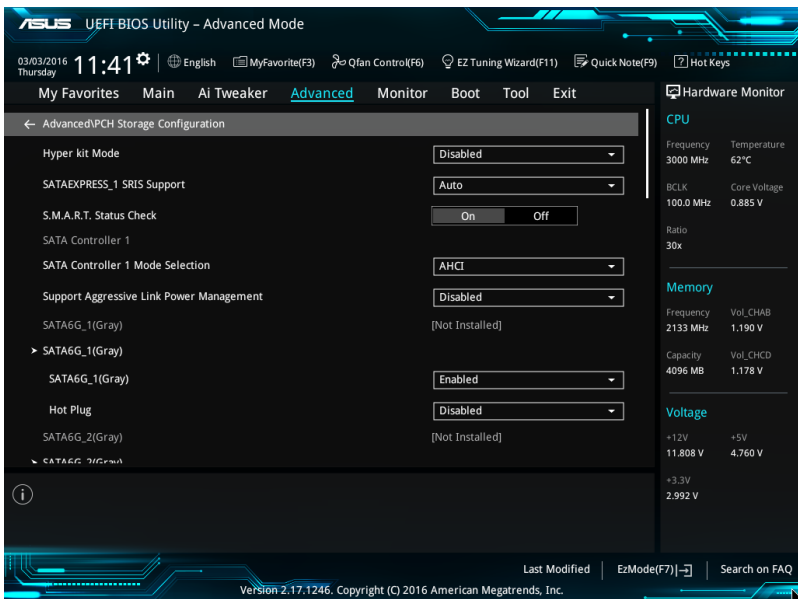
This item allows your system to automatically select the PCI Express port speed.

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

### 3.6.3 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.

Scroll down to display the other BIOS items.



#### SATA Controller(s)

This item allows you to enable or disable the SATA Device.

Configuration options: [Disabled] [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.
- [RAID] Set to **[RAID]** when you want to create a RAID configuration from the SATA hard disk drives.

## S.M.A.R.T. Status Check

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(Gray) - SATA6G\_10(Black)

This item allows you to enable or disable the selected SATA port.

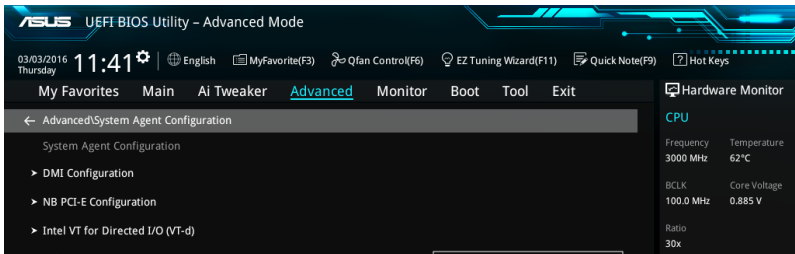
Configuration options: [Disabled] [Enabled]

## Hot Plug

This item appears only when the SATA Mode Selection is set to **[AHCI]** and allows you to enable or disable SATA Hot Plug Support.

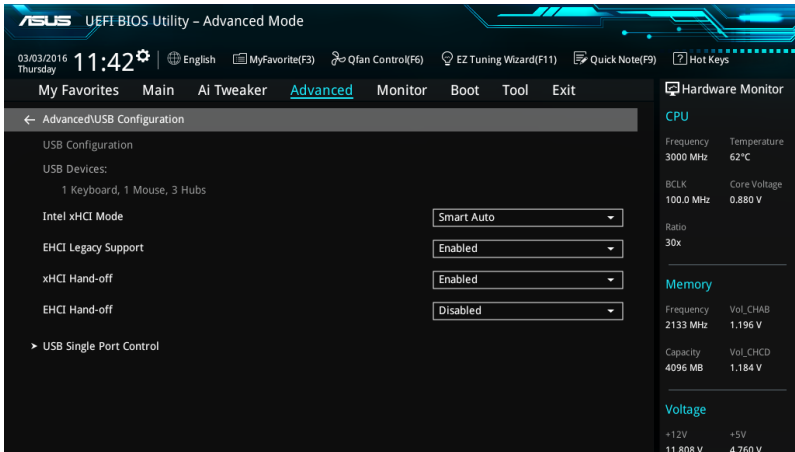
Configuration options: [Disabled] [Enabled]

### 3.6.4 System Agent Configuration



### 3.6.5 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

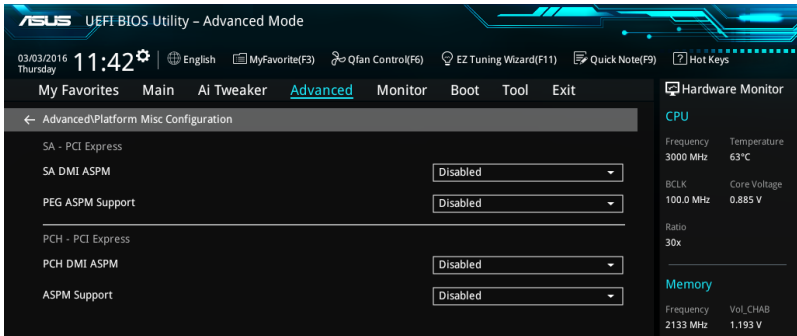
This item allows you to enable or disable the individual USB ports.



Refer to section **1.1.2 Motherboard layout** for the location of the USB ports.

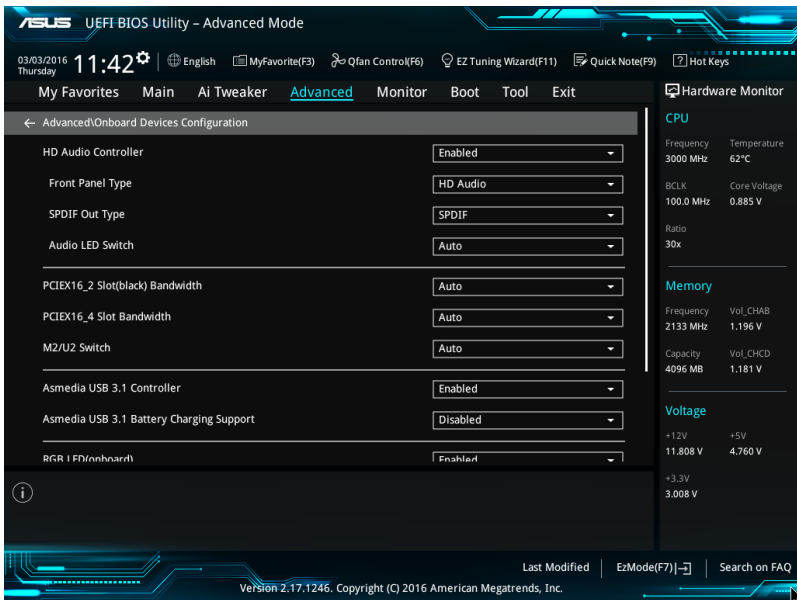
### 3.6.6 Platform Misc Configuration

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



### 3.6.7 Onboard Devices Configuration

Scroll down to view the other BIOS items.



#### HD Audio Controller

This item allows you to use the Azalia High Definition Audio Controller  
Configuration options: [Disabled] [Enabled]



### **PCIEX16\_2 Slot Bandwidth**

- [Auto] Runs at AUTO with USB3\_E56 port and PCIEX1\_1 slot enabled.
- [X1 Mode] Runs at x1 mode with USB3\_E56 port and PCIEX1\_1 slot enabled.
- [X4 Mode] Runs at x4 mode for a high performance support with USB3\_E56 port and PCIEX1\_1 slot disabled.

### **PCIEX16\_4 Slot Bandwidth**

- [Auto] When a PCIe device higher than x4 interface is installed on the PCIEX16\_4 slot, PCIEX16\_1 and PCIEX16\_4 slots will automatically run at x8 mode.
- [X8 Mode] PCIEX16\_1 and PCIEX16\_4 slots run at x8 mode. Supports x1/x2/x4/x8 devices.

### **M2/U2 Switch**

- [Auto] The bandwidth will be switched to U.2 by default. When a M.2 device is detected, the bandwidth will automatically be switched to M.2.
- [M.2 Mode] The bandwidth will be switched to M.2 with U.2 mode disabled.
- [U.2 Mode] The bandwidth will be switched to U.2 with M.2 mode disabled.

### **ASMedia USB 3.1 Controller**

This item allows you to enable/disable the ASMedia® USB 3.1 controller of your system.

Configuration options: [Disabled] [Enabled]

### **RGB LED lighting**

This item allows you to turn the RGB LED lighting on or off.

Configuration options: [On] [Off]

### **RGB LED lighting color**

This item allows you to select the RGB LED lighting color.

### **RGB LED lighting effects**

This item allows you to select the RGB LED lighting effects.

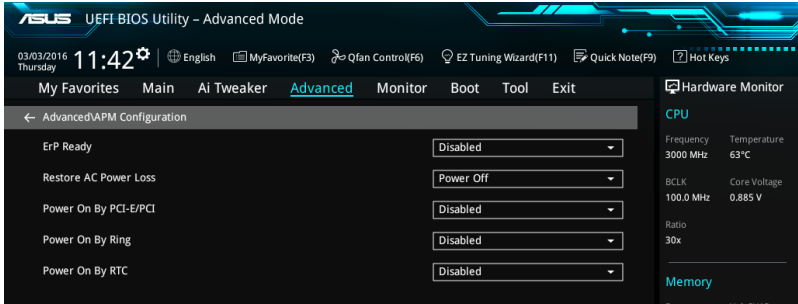
Configuration options: [Default] [Static] [Breathing] [Strobing] [Color Cycle]

### **Intel LAN Controller**

This item allows you to enable or disable the Intel LAN controller.

Configuration options: [Disabled] [Enabled]

### 3.6.8 APM Configuration

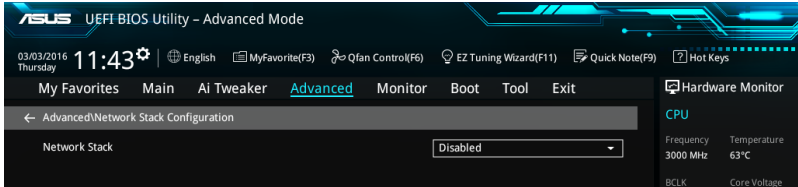


#### ErP Ready

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.

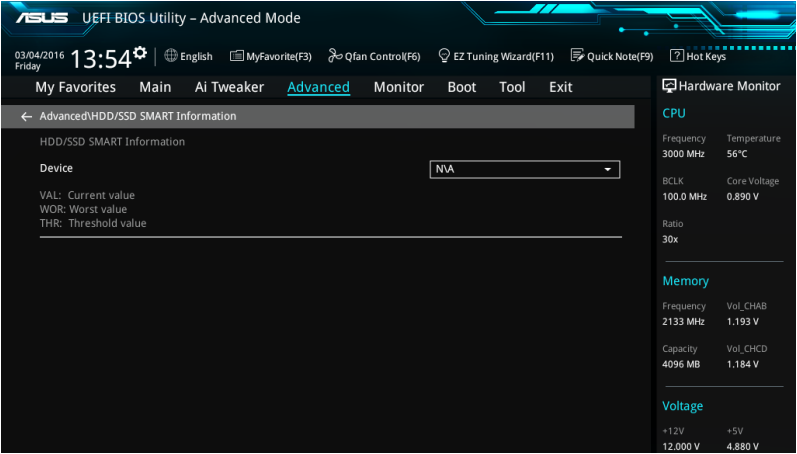
Configuration options: [Disabled] [Enabled (S4+S5)] [Enabled (S5)]

### 3.6.9 Network Stack Configuration



### 3.6.10 HDD/SSD SMART Information

This menu displays the SMART information of the connected devices.

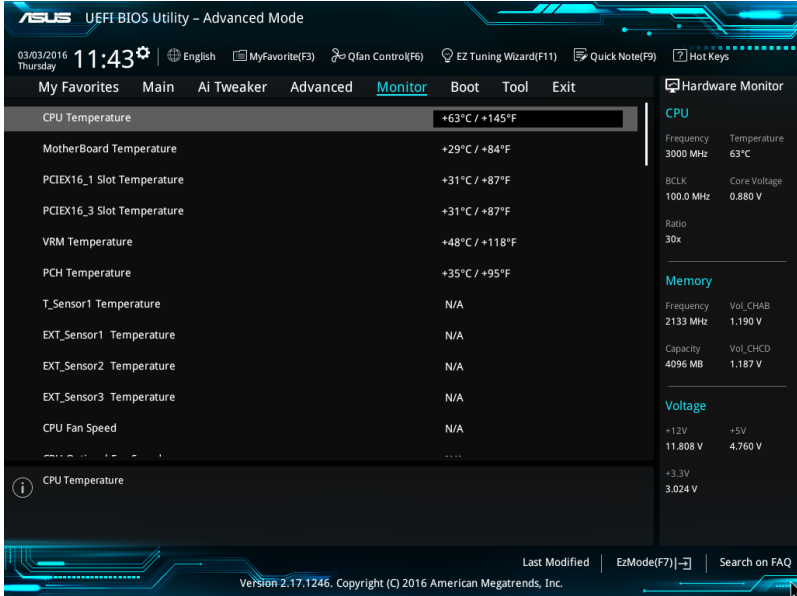


NVM Express devices currently do not support SMART information.

### 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

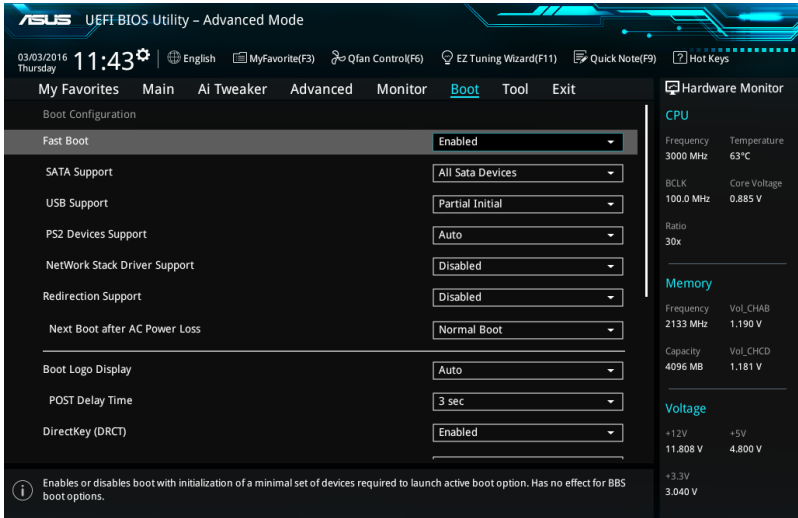
Click this item to automatically detect the lowest speed and configure the minimum duty cycle for each fan.

##### Water Pump Control

- [Disabled]      Disable the Water Pump control feature.
- [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.



### Boot Configuration

#### Fast Boot

[Disabled] This item allows your system to go back to its normal boot speed.

[Enabled] This item allows your system to accelerate the boot speed.



The following items appear only when you set the Fast Boot to **[Enabled]**.

#### Next Boot after AC Power Loss [Normal Boot]

[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.

## DirectKey (DRCT)

- [Disabled] Disables the DirectKey button. The system will only power on or off when you press the DirectKey button.
- [Enabled] Allows the system to power on and go to the BIOS Setup directly when you press the Reset button. Connect the 2-pin connector of the chassis reset button cable to the onboard DRCT header.

## 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 [Enabled]

- [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] Disables 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 Device Control [UEFI and Legacy OPRM]

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 [Legacy only]

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

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

### Boot from Storage Devices [Legacy only]

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

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

### Boot from PCIE/PCI Expansion Devices [Legacy only]

This item allows you to select the type of PCIe/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.



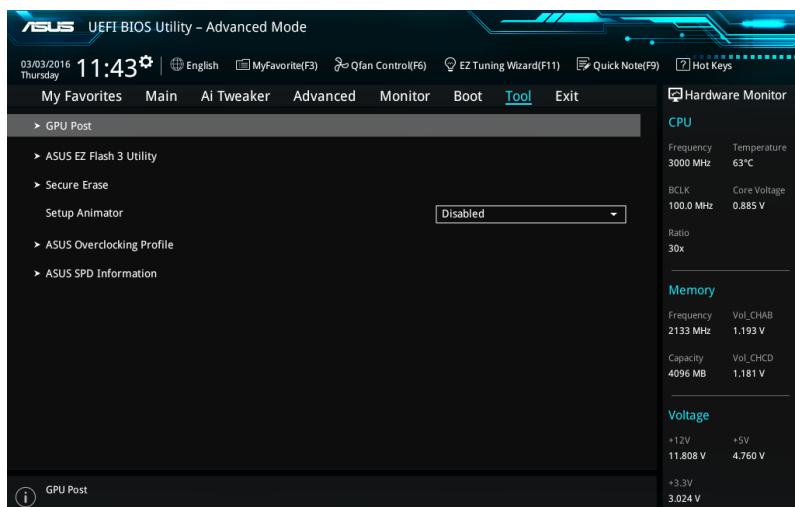
- 
- To access Windows® OS in Safe Mode, press <F8 > after POST (Windows® 8 not supported).
  - To select the boot device during system startup, press <F8> when ASUS Logo appears.
- 

## Boot Override

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

## 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]

### 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.

---

### 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 > SATA Configuration > AHCI**.

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

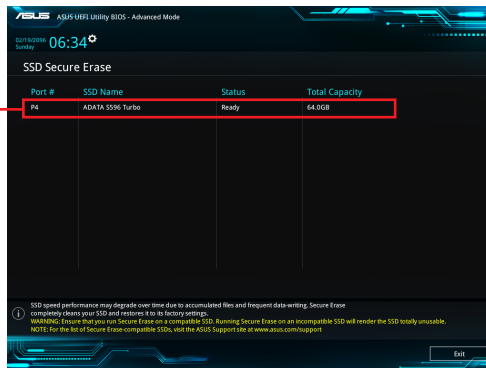


Check the ASUS support site for a full list of SSDs tested with Secure Erase. The drive may become unstable if you run Secure Erase on an incompatible SSD.



- 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.

Displays the available SSDs

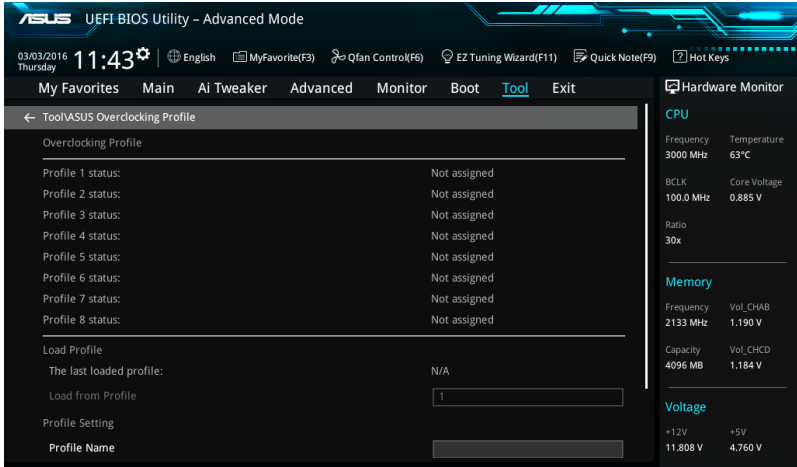


**Status definition:**

- **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.

ASUS UEFI BIOS Utility - Advanced Mode

03/03/2016 11:44 Thursday English MyFavorite(F3) Qfan Control(F6) EZ Tuning Wizard(F11) Quick Note(F9) Hot Keys

My Favorites Main Ai Tweaker Advanced Monitor Boot **Tool** Exit Hardware Monitor

← Tool\ASUS SPD Information

DIMM Slot Number: DIMM\_A1

Manufacturer: SK-Hynix  
Module Size: 4GB  
Maximum Bandwidth: 2133MHz  
Part Number: HMM451UGMFR8N-TF  
Serial Number: 1052b191  
Product Week/Year: 28/2014

SPD Ext.

JEDEC ID	JEDEC	JEDEC ID	JEDEC
Frequency(MHz)	2133	twR	16
Voltage(V)	1.200	tRRD	4
tCL	15	tRFC	278
tRCD	15	twTR	3
tRP	15	tRTP	8
tRAS	36	tFAW	23
tRC	50		

**CPU**

Frequency: 3000 MHz Temperature: 62°C  
BCLK: 100.0 MHz Core Voltage: 0.880 V  
Ratio: 30x

**Memory**

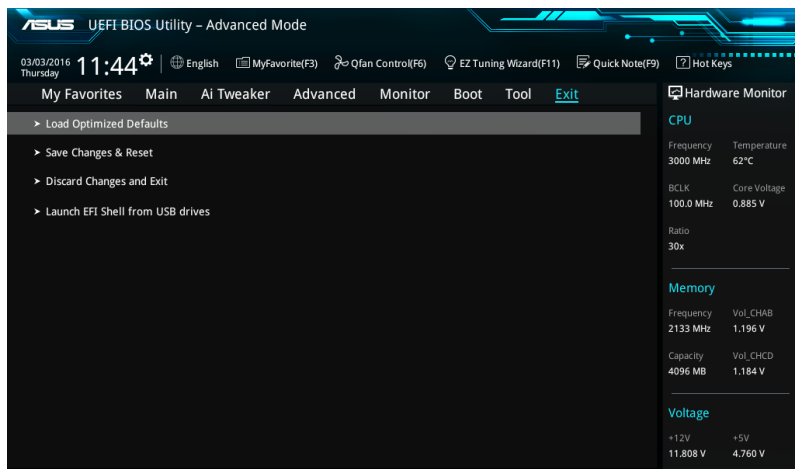
Frequency: 2133 MHz Vol\_CHAB: 1.193 V  
Capacity: 4096 MB Vol\_CHCD: 1.181 V

**Voltage**

+12V: 11.808 V +5V: 4.760 V  
+3.3V: 3.024 V

## 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 and 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 option 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 to system's failure to boot. Carefully follow the instructions in this chapter to update your BIOS when necessary.



---

Visit <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

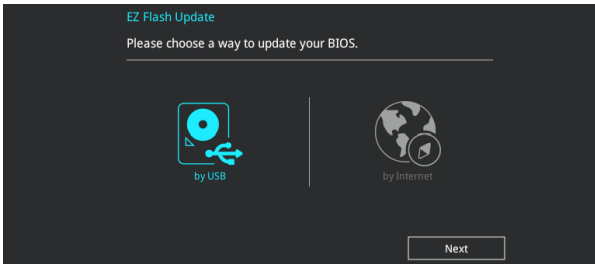
ASUS EZ Flash 3 allows you to download and update to the latest BIOS through the Internet without having to use a bootable floppy disk or an OS-based utility.



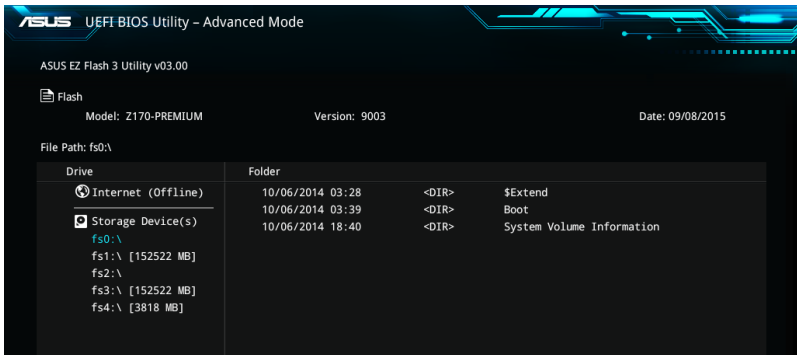
Updating through the Internet varies per region and Internet conditions. Check your local Internet connection before updating through the Internet.

#### 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 by **USB**.



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.





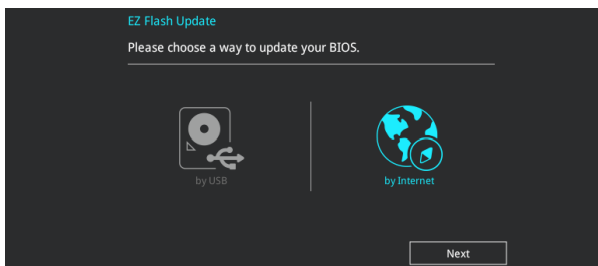
- This function can support devices such as a USB flash disk with FAT 32/16 format and single partition only.
- DO NOT shut down or reset the system while updating the BIOS to prevent system boot failure!



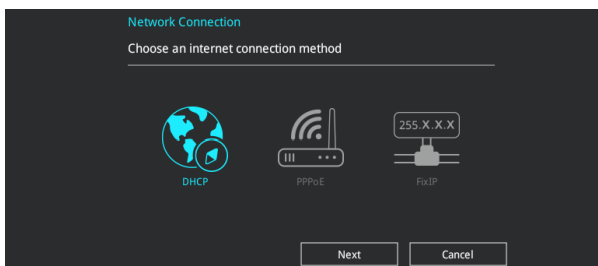
Ensure to load the BIOS default settings to ensure system compatibility and stability. Select the Load Optimized Defaults item under the Exit menu. See section 3.10 **Exit Menu** for details.

### 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 **by 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

## 4.1 RAID configurations

The motherboard supports Intel® Rapid Storage Technology with RAID 0, RAID 1, RAID 10, and RAID 5 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 Serial ATA hard disks

The motherboard supports Serial ATA hard disk drives. For optimal performance, install identical drives of the same model and capacity when creating a disk array.

To install the SATA hard disks for a RAID configuration:

1. Install the SATA hard disks into the drive bays.
2. Connect the SATA signal cables.
3. Connect a SATA power cable to the power connector on each drive.

## 4.1.3 Intel® Rapid Storage Technology in UEFI BIOS

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

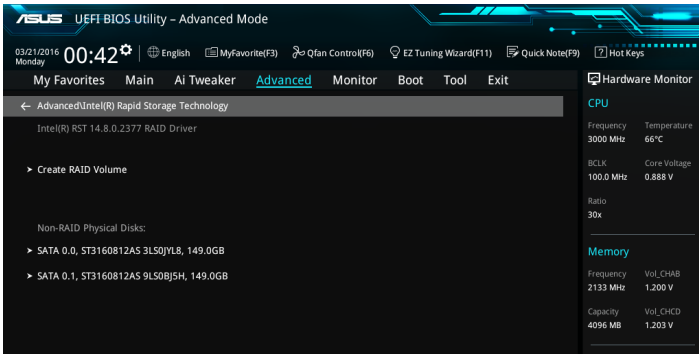
1. Enter the BIOS Setup during POST.
2. Go to the **Advanced** menu > **PCH Storage Configuration**, then press <Enter>.
3. Set the SATA Controller Mode Selection item to **[RAID Mode]**.
4. Go to the **Boot** menu > **CSM (Compatibility Support Module)** > **Launch CSM**, then set the item to **[Disabled]**.
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.



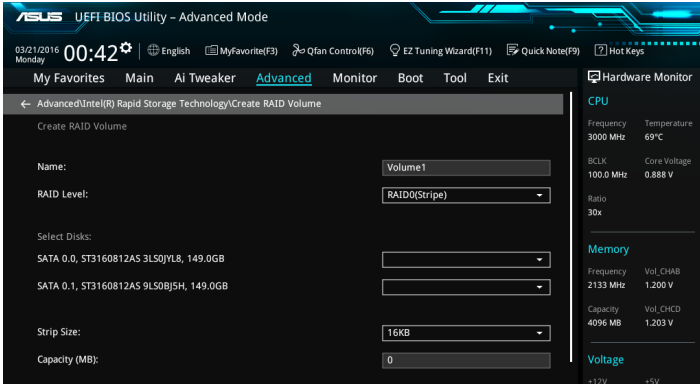
Due to chipset limitation, when SATA ports are set to RAID mode, all SATA ports run at RAID mode together.



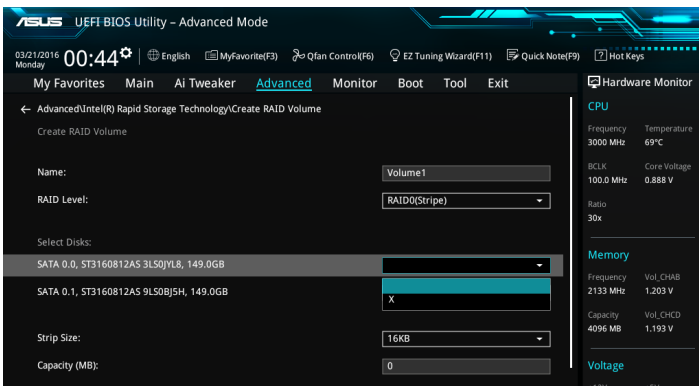
## Creating a RAID set

To create a RAID set:

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



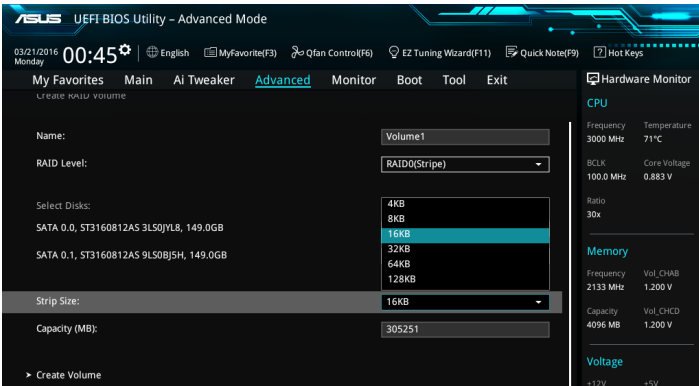
2. When the Name item is selected, enter a name for the RAID set and press <Enter>.
3. When the RAID Level item is selected, press <Enter> to select the RAID level to create, and then press <Enter>.
4. Under Select Disks, press <Enter> and select **X** for the disks you want to include in the RAID set.



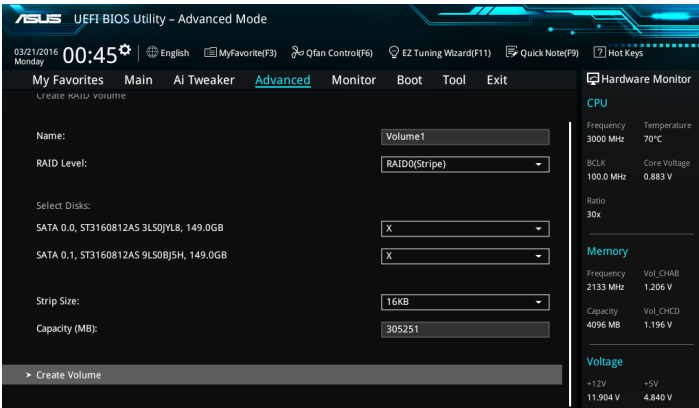
5. When the Strip Size item is selected, press <Enter> to select strip size for the RAID array (for RAID 0, 10 and 5 only), and then press <Enter>. The available strip size values range from 4 KB to 128 KB. The following are typical values:
  - RAID 0: 128 KB
  - RAID 10: 64 KB
  - RAID 5: 64 KB



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.



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.



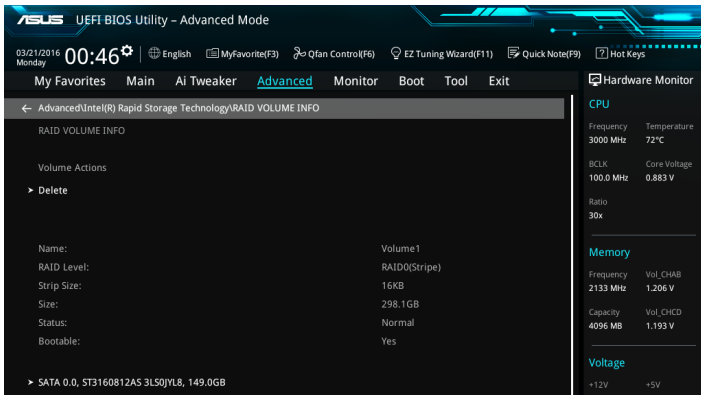
## Deleting a RAID set



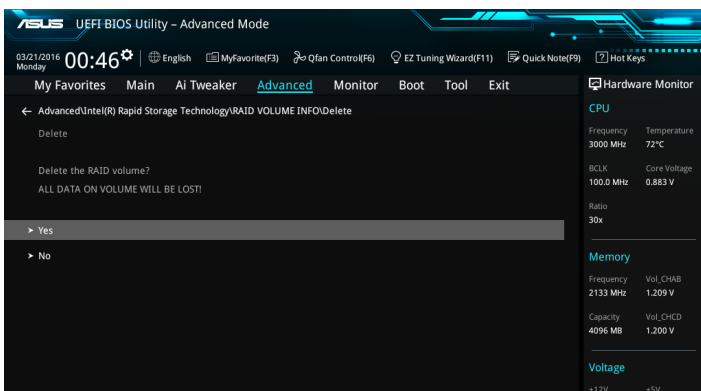
Be cautious when deleting a RAID set. You will lose all data on the hard disk drives when you delete a RAID set.

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:



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.



## 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.

```
Intel(R) Rapid Storage Technology - Option - v10.5.1.1070
Copyright(C) 2003-14 Intel Corporation. All Rights Reserved.

[ 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

[ DISK/VOLUME INFORMATION ]

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.

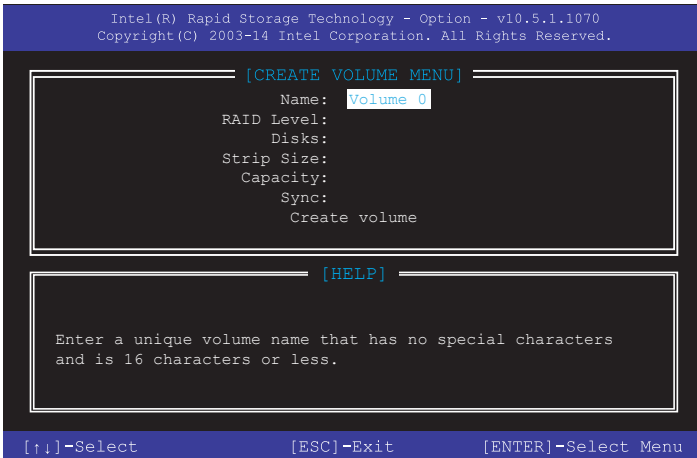


The utility supports maximum four hard disk drives for RAID configuration.

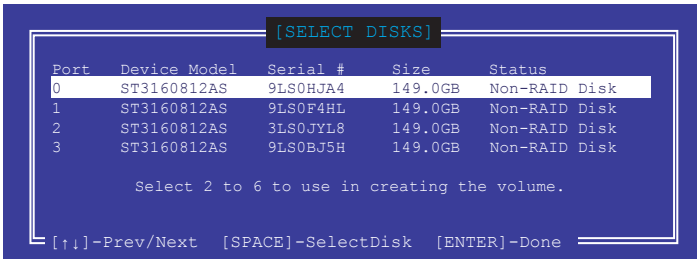
## Creating a RAID set

To create a RAID set:

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



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:



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.



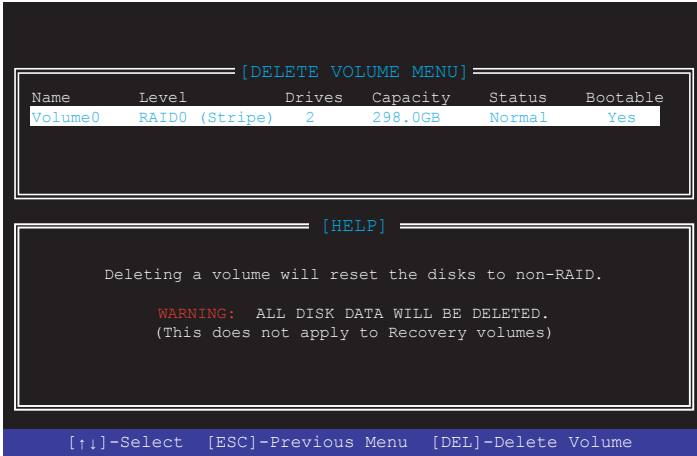
## Deleting a RAID set



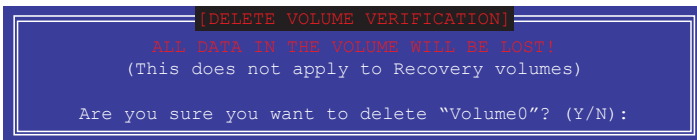
Be cautious when deleting a RAID set. You will lose all data on the hard disk drives when you delete a RAID set.

To delete a RAID set:

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



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:

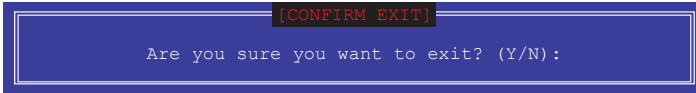


3. Press <Y> to delete the RAID set and return to the utility main menu, or press <N> to return to the DELETE VOLUME menu.

## Exiting the Intel® Rapid Storage Technology Option ROM utility

To exit the utility:

1. From the utility main menu, select **5. Exit**, then press <Enter>. The following warning message appears:



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 USB flash drive with RAID driver into the USB port or the support DVD into the optical drive, 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.



---

Before loading the RAID driver from a USB flash drive, you have to use another computer to copy the RAID driver from the support DVD to the USB flash drive.

---



---

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

---

# Appendix

## 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.

---

## IC: Canadian Compliance Statement

Complies with the Canadian ICES-003 Class B specifications. This device complies with RSS 210 of Industry Canada. This Class B device meets all the requirements of the Canadian interference-causing equipment regulations.

This device complies with Industry Canada license 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.

Cet appareil numérique de la Classe B est conforme à la norme NMB-003 du Canada. Cet appareil numérique de la Classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Cet appareil est conforme aux normes CNR exemptes de licence d'Industrie Canada. Le fonctionnement est soumis aux deux conditions suivantes :

- (1) cet appareil ne doit pas provoquer d'interférences et
- (2) cet appareil doit accepter toute interférence, y compris celles susceptibles de provoquer un fonctionnement non souhaité de l'appareil.

## Canadian Department of Communications Statement

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

This class B digital apparatus complies with Canadian ICES-003.

## VCCI: Japan Compliance Statement

### Class B ITE

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取扱説明書に従って正しい取り扱いをして下さい。

VCCI-B

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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.

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Support Fax +49-2102-959911  
Online support <http://qr.asus.com/techserv>

# DECLARATION OF CONFORMITY

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 :** X99-A II

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.

Representative Person's Name : Steve Chang / President

A handwritten signature in blue ink that reads "Steve Chang". The signature is written in a cursive style and is placed over a light blue rectangular background.

Signature :

Date : Mar. 14, 2016

Ver. 140331