ESC500 G4

Workstation
User Guide

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Safety information

Electrical Safety

- Before installing or removing signal cables, ensure that the power cables for the system unit and all attached devices are unplugged.
- To prevent electrical shock hazard, disconnect the power cable from the electrical outlet before relocating the system.
- When adding or removing any additional 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.
- If the power supply is broken, do not try to fix it by yourself. Contact a qualified service technician or your dealer.

Operation Safety

- Any mechanical operation on this server must be conducted by certified or experienced engineers.
- Before operating the server, carefully read all the manuals included with the server package.
- Before using the server, ensure all cables are correctly connected and the power cables are not damaged. If any damage is detected, contact your dealer as soon as possible.
- To avoid short circuits, keep paper clips, screws, and staples away from connectors, slots, sockets and circuitry.
- Avoid dust, humidity, and temperature extremes. Place the server on a stable surface.
- If you encounter technical problems with the product, contact a qualified service technician or your retailer.

This product is equipped with a three-wire power cable and plug for the user's safety. Use the power cable with a properly grounded electrical outlet to avoid electrical shock.

Lithium-Ion Battery Warning

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

Heavy System

CAUTION! This server system is heavy. Ask for assistance when moving or carrying the system.

Optical Drive Safety Information

Laser Safety Information

CLASS 1 LASER PRODUCT

To prevent exposure to the optical drive's laser, do not attempt to disassemble or repair the optical drive by yourself. For your safety, contact a professional technician for assistance.

About this guide

Audience

This user guide is intended for system integrators, and experienced users with at least basic knowledge of configuring a server.

Contents

This guide contains the following parts:

1. **Chapter 1: Product Introduction**

    This chapter describes the general features of the server, including sections on front panel and rear panel specifications.

2. **Chapter 2: Hardware Setup**

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

3. **Chapter 3: Motherboard Information**

    This chapter includes the motherboard layout and brief descriptions of the jumpers and internal connectors.

4. **Chapter 4: BIOS Setup**

    This chapter tells how to change system settings through the BIOS Setup menus and describes the BIOS parameters.

5. **Chapter 5: RAID Configuration**

    This chapter provides instructions for setting up, creating and configuring RAID sets using the available utilities.

6   **Chapter 6: Driver Installation**

    This chapter provides instructions for installing the necessary drivers for different system components.

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 (+).
	Example: <Ctrl> + <Alt> + <Del>
`Command`	Means that you must type the command exactly as shown, then supply the required item or value enclosed in brackets.
	Example: At DOS prompt, type the command line:
	`format A:/S`

References

Refer to the following sources for additional information, and for product and software updates.

1. **ASUS Server Web-based Management (ASWM) user guide**

    This manual tells how to set up and use the proprietary ASUS server management utility.

2. **ASUS websites**

    The ASUS websites worldwide provide updated information for all ASUS hardware and software products. Refer to the ASUS contact information.

Product Introduction

1

This chapter describes the general features of the server, including sections on front panel and rear panel specifications.

1.1 System package contents

Check your system package for the following items.

Model Name	ESC500 G4
Accessories	1 x ESC500 G4 Support CD
	1 x Windows 10 RDVD (for OS bundled SKU)
	1 x AC Power Cable
	1 x COM port Cable
Optional Items	Smart Card Reader
	Anti-Virus CD pack
	DVD-ROM/DVD-RW

> If any of the above items is damaged or missing, contact your retailer.

1.2 Serial number label

Before requesting support from the ASUS Technical Support team, you must take note of the product's serial number containing 12 characters such as xxS0xxxxxxxx shown as the figure below. With the correct serial number of the product, ASUS Technical Support team members can then offer a quicker and satisfying solution to your problems.
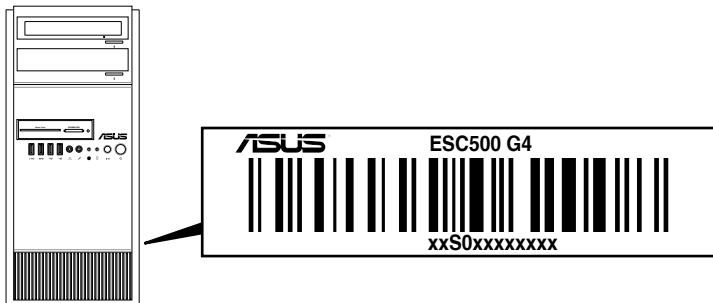
1.3 ESC500 G4 specifications summary

The ASUS ESC500 G4 is a workstation featuring the ASUS P10S WS server board.

Processor / System Bus		1 x Socket LGA1151
		Intel® Xeon® E3-1200 v6/v5 Processor Family
		Intel® 7th/6th Generation Core™ i7/i5/i3 processors
		Intel® Pentium™ processors
		Intel® Celeron™ processors
Core Logic		Intel® C236 Chipset
Memory	**Total Slots**	4 (2-channel per CPU, 4 DIMM per CPU)
	Capacity	Maximum up to 64GB (UDIMM)
	Memory Type	4 x DIMM, Max 64GB, DDR4 2400/2133 MHz, ECC/ non-ECC UDIMM *** Refer to ASUS server AVL for the latest update**
	Memory Size	1 GB, 2GB, 4GB, 8GB, 16GB (UDIMM)
Expansion Slots	**Total PCI/PCI-X /PCI-E Slots**	4
	Slot Type	PCIEX16_1: PCI-E x16 slot, x16/ x8 Gen3 Link
		PCIEX16_2: PCI-E x16 slot, x8 Gen3 Link, switched from PCIEX16_1
		PCIEX16_3: PCI-E x16 slot, x4 Gen3 Link, from PCH
		PCIEX16_4: PCI-E x16 slot, x4 Gen3 Link, from PCH
Disk Controller	**SATA Controller**	**Intel® C236 Chipset:**
		8 x SATA 6Gb/s ports or 6 * SATA 6Gb/s with 2* M.2 (SATA 6Gb/s & PCIe Gen3 x1 link, NGFF 22110/2280/2260/2242)
		Intel® RSTe (Windows & Linux)
		(Support software RAID 0, 1, 10 & 5)
Storage Bays	**I = internal A or S will be hot-swappable**	3 x Internal 3.5" HDD Bays
		1 x Internal 2.5" HDD/SSD Bays
Networking	**LAN**	2 x Intel® I210 GbE LAN
Graphic	**VGA**	Integrated Graphics Processor x 1
		Multi-VGA output support: DVI-D/HDMI/DisplayPort/VGA
		- Supports DVI-D with Max resolution 1920 x 1200@60 Hz
		- Supports HDMI with Max resolution 4096 x 2160@60/24 Hz
		- Supports DisplayPort with Max resolution 4096 x 2304@60 Hz
		- Supports VGA with Max resolution 1920 x 1200@60 Hz
		- Supports Intel® HD Graphics, InTru™ 3D, Quick Sync Video, Clear Video HD Technology, Insider™
		- Maximum shared memory of 512MB
Auxiliary Storage Device Bay (Floppy / Optical Drive)		2 x 5.25" media bays
		(Options: DVD-ROM/DVD-RW)

(continued on the next page)

ESC500 G4 specifications summary

Onboard I/O	2 x USB 3.1 ports (1 port at TypeA, 1 port at Type C)
	1 x Optical S/PDIF Out
	1 x HDMI
	1 x DisplayPort
	4 x USB 3.0 ports
	2 x RJ-45 ports
	1 x DVI-D
	1 x VGA
	8-channel Audio I/O ports (6 x Audio jacks)
OS Support	Windows 8.1
	Windows 7 SP1
	Windows 10
	* Refer to http://www.asus.com/ for the latest OS support.
Dimension (HH x WW x DD)	423 mm x 190 mm x 435 mm
Net Weight Kg (CPU, DRAM & HDD not inclu ded)	12.65 Kg
Power Supply	Power Supply:
	- 300W 80PLUS Single Power Supply
	- 500W 80PLUS Single Power Supply
	- 700W 80PLUS Single Power Supply
	Power Rating:
	100-240Vac, 10-5A, 50/60Hz Class I
Environment	Operating temperature: 10°C ~ 35°C
	Non operating temperature: -40°C ~ 70°C
	Non operating humidity: 20% ~ 90% (Non condensing)

Specifications are subject to change without notice.

1.4   Front panel features

The ESC500 G4 workstation features a simple yet stylish front panel design. The power and reset buttons, LED indicators, optical drive, and USB ports are all conveniently located at the front panel for easy access.

Optical Drive (Optional)

Empty 5.25-inch bay

Card reader (optional)

Power LED

Reset button
Power button

USB 3.0 ports

USB 2.0 ports

Headphone port

Microphone port

HDD access LED
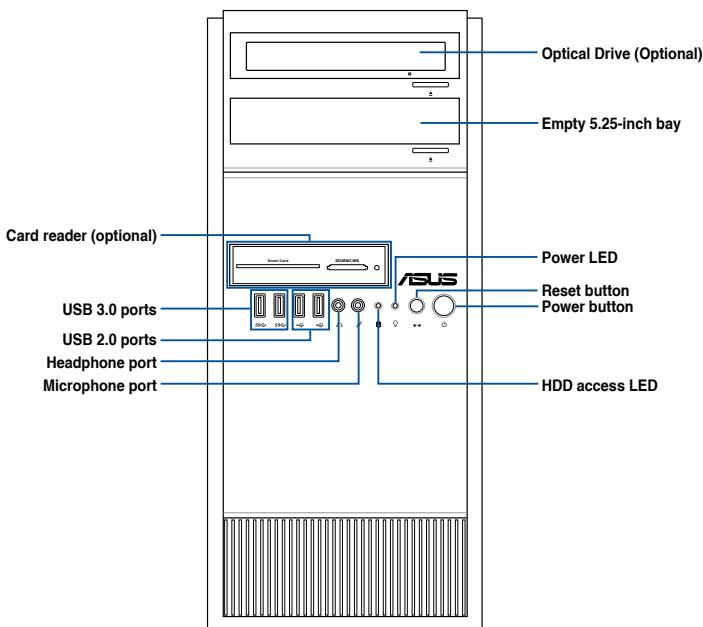
Refer to the Front panel LEDs section for the LED descriptions.

1.5 Rear panel features

The rear panel includes a slot for the motherboard rear I/O ports, expansion slots, a vent for the system fan (optional), and the power supply module.

Power connector

Single power supply

Optical S/PDIF Out port

HDMI 1.4b port

DisplayPort

USB 3.1 Type-C™ port

USB 3.1 Type-A port

DVI-D port

VGA port

120 mm x 120 mm system fan vents (system fan optional)

USB 3.0 ports

Intel® LAN port 1 and 2

Audio ports

PCI-E latch

Expansion slots
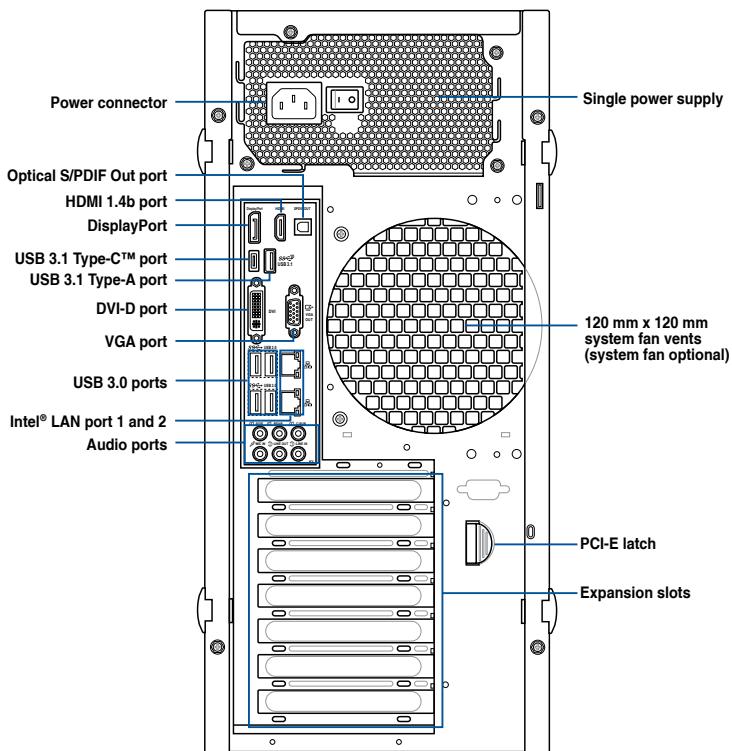
1.6 Internal features

The ASUS ESC500 G4 Pedestal server system includes the basic components as shown:
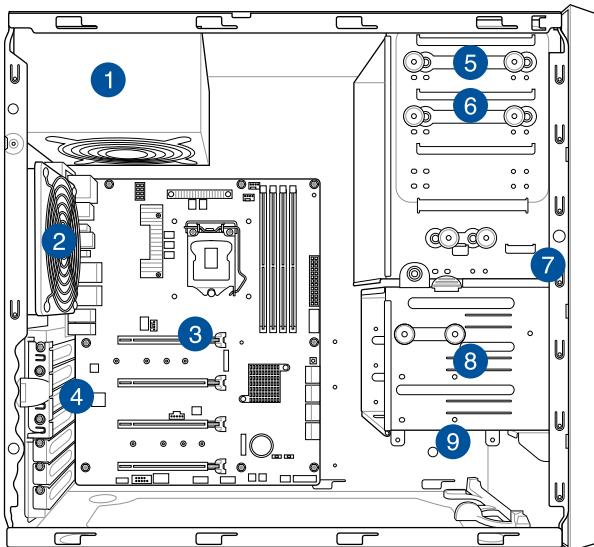
1. Power supply unit

2. 120 mm x 120 mm system fan (optional)

3. ASUS P10S WS Server Board

4. Expansion card locks

5. Optical drive (optional)

6. 1 x 5.25-inch drive bay

7. Front I/O board (hidden)

8. 3 x 3.5-inch Internal HDD bays

9. 1 x 2.5-inch Internal HDD/SSD bay

> Turn off the system power and detach the power supply before removing or replacing any system component.

> The barebone server does not include a floppy disk drive. If you need to use a floppy disk, connect the USB floppy disk drive to any of the USB ports on the front or rear panel.

WARNING
HAZARDOUS MOVING PARTS
KEEP FINGERS AND OTHER BODY PARTS AWAY

1.7 LED information

1.7.1 Front panel LEDs
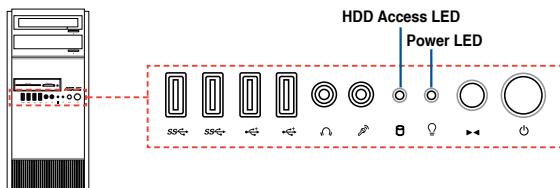
LED	Icon	Display status	Description
Power LED	💡	ON	System power ON
HDD Access LED	🖱	OFF Blinking	No activity Read/write data into the HDD

1.7.2 Rear panel LEDs
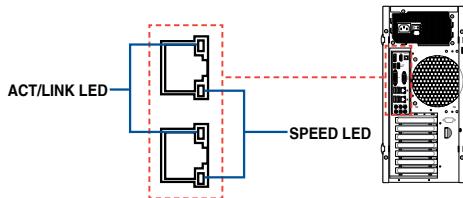
ACT/LINK LED		SPEED LED	
Status	Description	Status	Description
OFF	No link	OFF	10 Mbps connection
GREEN	Linked	ORANGE	100 Mbps connection
BLINKING	Data activity	GREEN	1 Gbps connection

Hardware Setup

2

This chapter lists the hardware setup procedures that you have to perform when installing system components. It includes description of the jumpers and connectors on the motherboard.

2.1 Chassis cover

2.1.1 Removing the side cover

- Ensure that you unplug the power cord before removing the side cover.

- Take extra care when removing the side cover. Keep your fingers from components inside the chassis that can cause injury, such as the CPU fan, rear fan, and other sharp-edged parts.

- The images of the barebone server shown in this section are for reference purposes only and may not exactly match the model you purchase.

To remove the side cover:

1. Remove the two screws that secure the side cover.

Screws
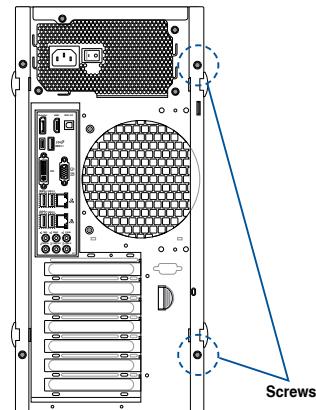
2. Press the side cover locks outward.

Side cover locks
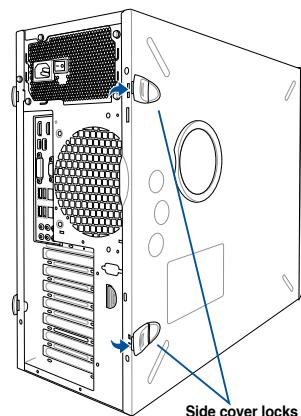
3. Slightly pull the side cover toward the rear just enough to detach it from the chassis.
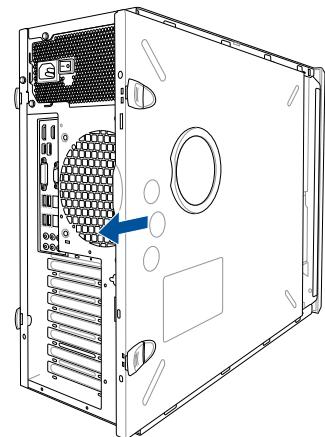
4. Remove the cover and set it aside.
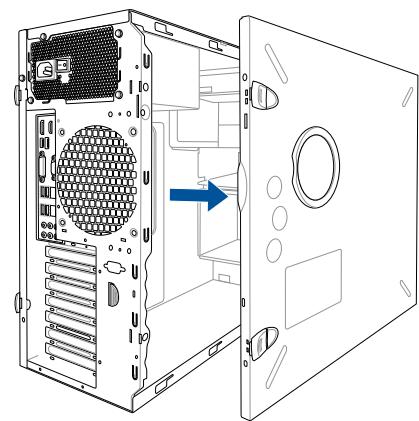
2.2 CPU installation

The motherboard comes with a surface mount LGA1151 socket designed for the 6th Generation Intel® Core™ i7 / Intel® Core™ i5 / Intel® Core™ i3, Pentium®, Celeron®, and Intel® Xeon® E3-1200 v5 processors.
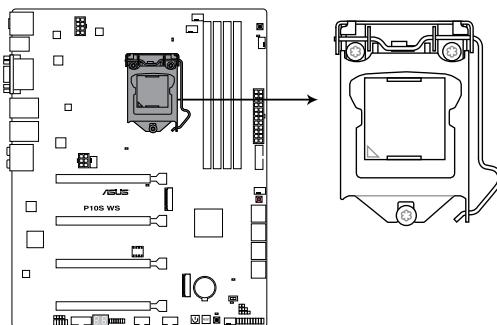
P10S WS CPU LGA1151

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

- Ensure that all power cables are unplugged before installing the CPU.

- Upon purchase of the motherboard, ensure that the PnP cap is on the socket and the socket contacts are not bent. Contact your retailer immediately if the PnP cap is missing, or if you see any damage to the PnP cap/socket contacts/motherboard components. ASUS will shoulder the cost of repair only if the damage is shipment/transit-related.

- Keep the cap after installing the motherboard. ASUS will process Return Merchandise Authorization (RMA) requests only if the motherboard comes with the cap on the LGA1151 socket.

- The product warranty does not cover damage to the socket contacts resulting from incorrect CPU installation/removal, or misplacement/loss/incorrect removal of the PnP cap.

1   Load lever
  A
  B
  Retention tab

2   Load plate

3   CPU notches
  Gold triangle mark
  Alignment key
  Alignment key

4   Load lever   C
  A
  B   Retention lock

5   Load lever
  Retention tab
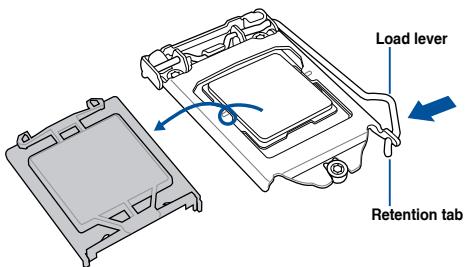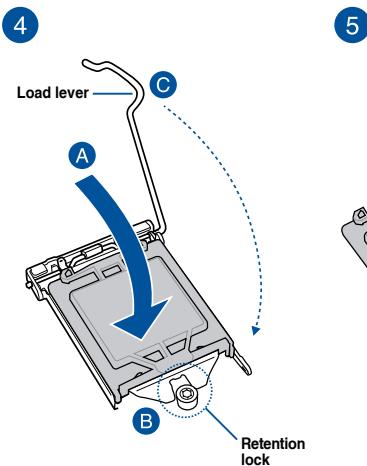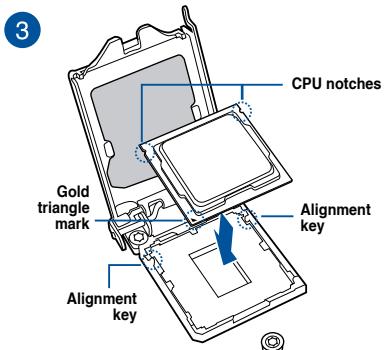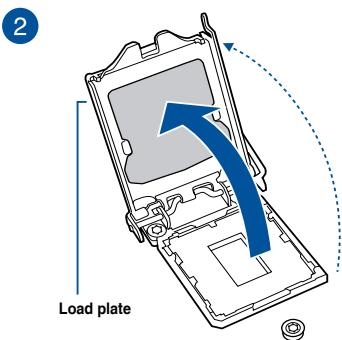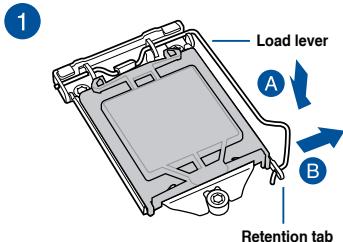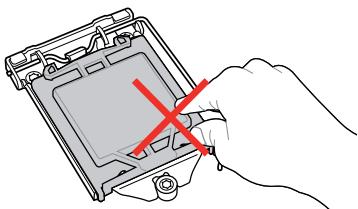
2.3 CPU heatsink and fan assembly installation
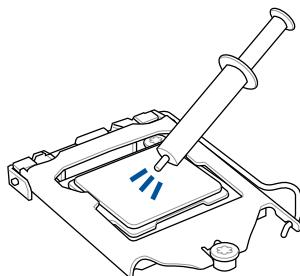
Apply the Thermal Interface Material to the CPU heatsink and CPU before you install the heatsink and fan, if necessary.

To install the CPU heatsink and fan assembly
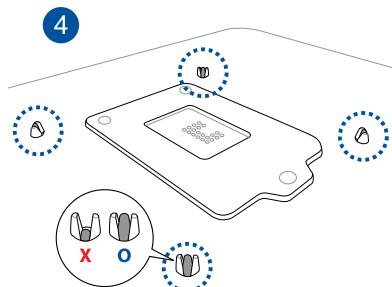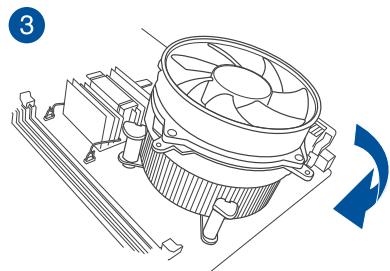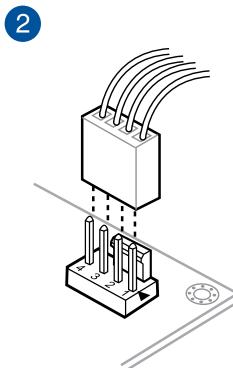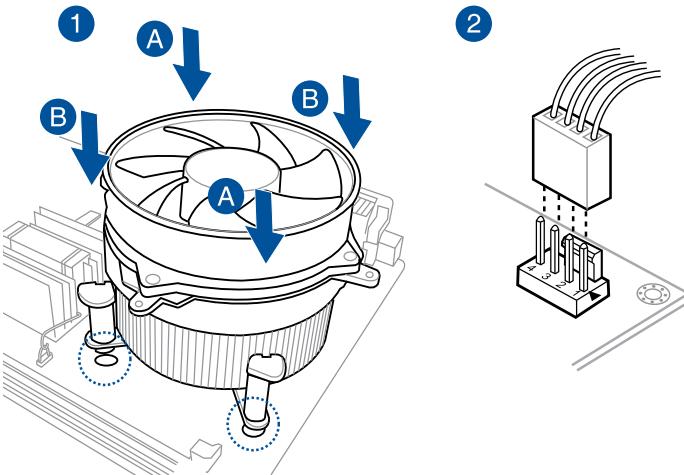
2.4 System memory

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

A DDR4 module is notched differently from a DDR, DDR2 or DDR3 module. DO NOT install a DDR, DDR2 or DDR3 memory module to the DDR4 slot.
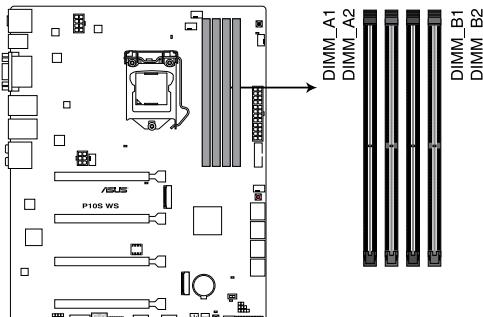
P10S WS 288-pin DDR4 DIMM socket

Recommended memory configurations
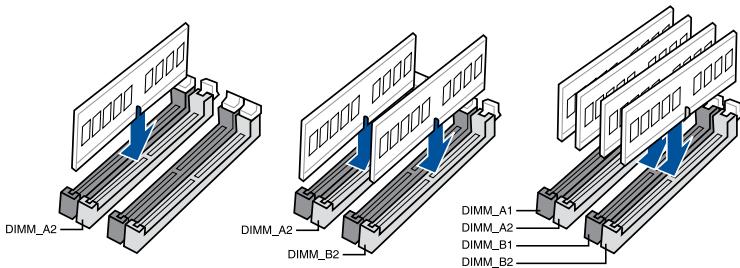
Memory configurations

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

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

- 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.

- This motherboard does not support DIMMs made up of 512 Mb (64 MB) chips or less (Memory chip capacity counts in Megabit, 8 Megabit/Mb = 1 Megabyte/MB).

- For system stability, use a more efficient memory cooling system to support a full memory load (4 DIMMs).

- 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.

- Visit the ASUS website for the latest QVL.

2.4.1 Installing a DIMM on a single clip DIMM socket

1. Unlock a DIMM socket by pressing the retaining clip outward.

2. Align a DIMM on the socket such that the notch on the DIMM matches the DIMM slot key on the socket.

DIMM notch

DIMM slot key   **Unlocked retaining clip**
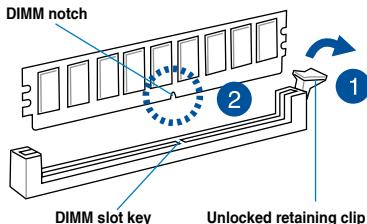
A DIMM is keyed with a notch so that it fits in only one direction. DO NOT force a DIMM into a socket in the wrong direction to avoid damaging the DIMM.

3. Hold the DIMM by both of its ends then insert the DIMM vertically into the socket. Apply force to both ends of the DIMM simultaneously until the retaining clip snaps back into place and the DIMM cannot be pushed in any further to ensure proper sitting of the DIMM.

Locked Retaining Clip
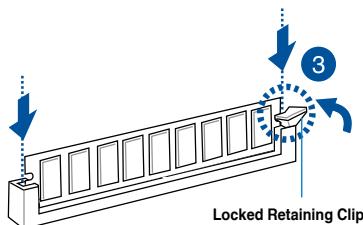
Always insert the DIMM into the socket vertically to prevent DIMM notch damage.

• To install two or more DIMMs, refer to the user guide bundled in the motherboard package.

• Refer to the user guide for qualified vendor lists of the memory modules.

Removing a DIMM from a single clip DIMM socket

1. Press the retaining clip outward to unlock the DIMM.

2. Remove the DIMM from the socket.
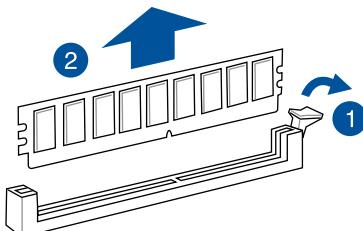
Support the DIMM lightly with your fingers when pressing the retaining clips. The DIMM might get damaged when it flips out with extra force.

2.5   Front panel cover

Before you can install a 5.25-inch drive, you should first remove the front panel cover.

⚡ Ensure to unplug the power cable before installing or removing any system components. Failure to do so may cause damage to the motherboard and other system components!

2.5.1   Removing the front panel cover

To remove the front panel cover:

1.   Locate the front panel assembly lock then slide it outward to unlock the latches that secures the front panel cover to the chassis.

Assembly lock
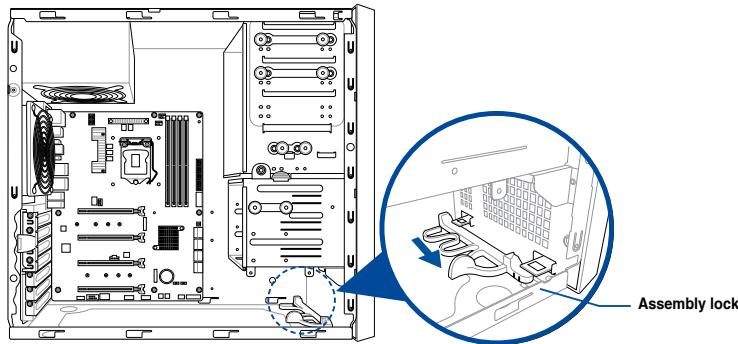
2.   Remove the front panel assembly from the chassis and set it aside.

Front panel assembly
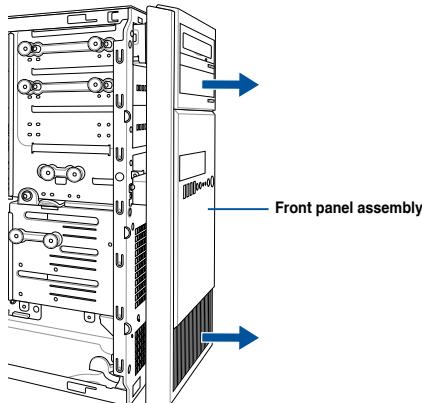
2.6   5.25-inch drives

This system comes with three 5.25-inch drive bays located on the upper front section of the chassis.

If your system came with an optical drive, the optical drive occupies the topmost bay (1). The lower bays (2 and 3) are available for additional 5.25-inch optical, zip, or floppy disk drives.
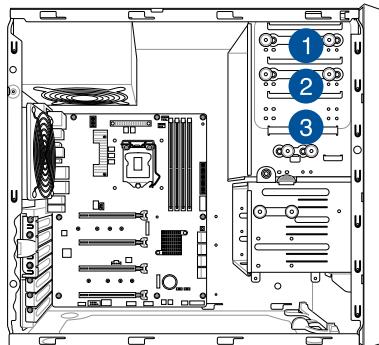
Installing a 5.25-inch drive

To install a 5.25-inch drive:

1.   Remove the front panel cover. Refer to the **Removing the front panel cover** section for more information.

2.   Pull the bay locks outward.

Bay locks
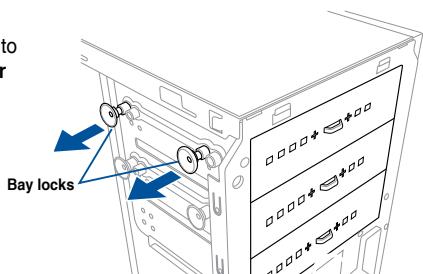
3.   Remove the metal cover of the bay you intend to use.

Take extra care when removing the metal cover. Use tools such as a screw driver to bend and remove the metal cover to avoid physical injury.

Screw driver

Metal cover
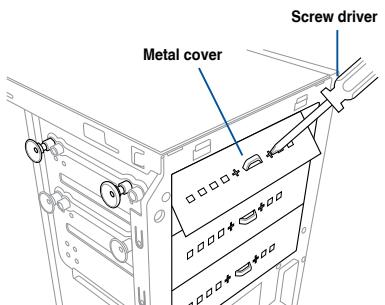
4. Prepare the 5.25-inch drive.

5. Insert and carefully push the drive into the bay until its screw holes align with the holes on the bay.
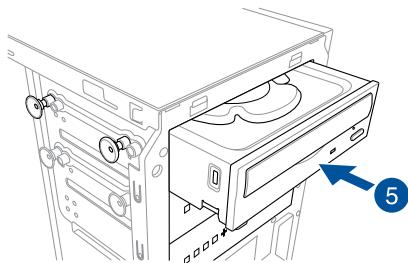
6. Push the bay locks to secure the drive in place.

Bay locks
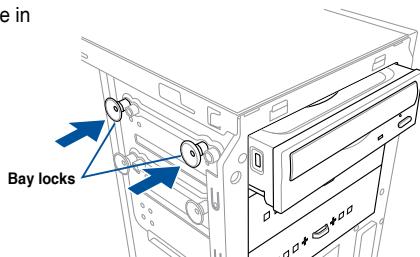
7. Connect the SATA cable to the SATA connector of the drive.

8. Connect a SATA power cable from the power supply to the power connector of the drive.

9. Reinstall the front panel cover.

SATA power cable   **SATA cable**
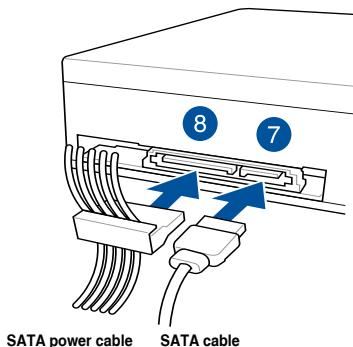
2.7   Hard disk drives (HDD)

The server system supports three (3) 3.5-inch Serial ATA hard disk drives via the hard disk drive bays and one 2.5-inch HDD/SSD drive at the bottom of the HDD cage.

Installing 3.5-inch HDDs

To install 3.5-inch Serial ATA hard disk drives:

1.   Remove the side cover of the chassis. Refer to the **Removing the side cover** section for more information.

2.   Prepare the 3.5-inch HDD and the bundled set of screws.

3.   Locate the HDD cage lock, press the it up (A), then swing the HDD cage outwards (B) until it clicks in place.
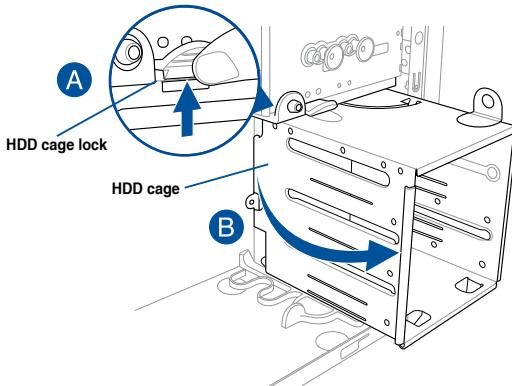
4.   Align and insert the 3.5-inch HDD into the drive bay ensuring that the screw holes on the HDD matches the screw holes on the HDD cage.
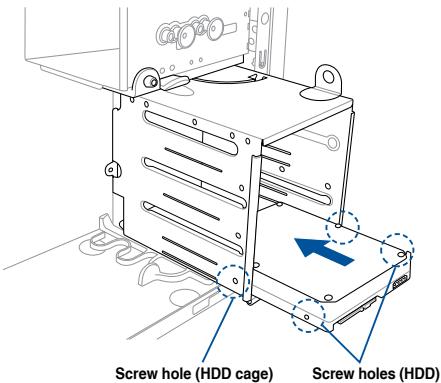
5. Secure the 3.5-inch HDD to the HDD cage using the bundled set of screws.
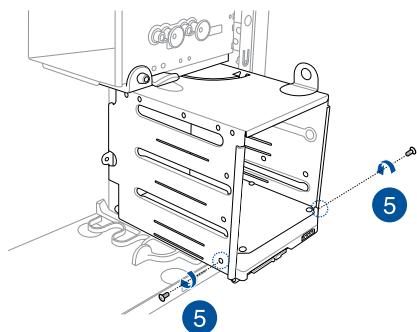
6. Swing the HDD cage inwards until it clicks back into place.

7. Connect the SATA cable and SATA power cable to the 3.5-inch HDD.
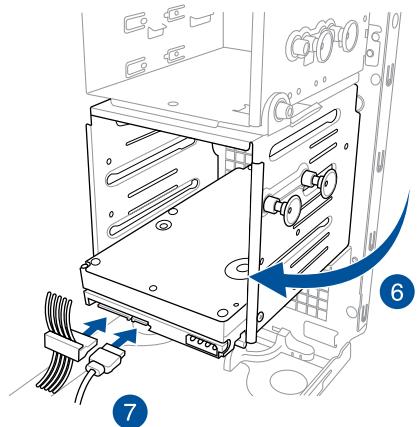
Installing 2.5-inch HDD/SSD

To install a 2.5-inch HDD/SSD:

1. Remove the side cover of the chassis. Refer to the **Removing the side cover** section for more information.

2. Prepare the 2.5-inch HDD/SDD and the bundled set of screws.

3. Lay the system on its side on a flat and stable surface.

4. Locate the HDD cage lock, press it up (A), then swing the HDD cage outwards (B).

5. Align and insert the 2.5-inch HDD/SSD into the drive bay as shown. Push it all the way until its screw holes align with the holes on the drive bay.
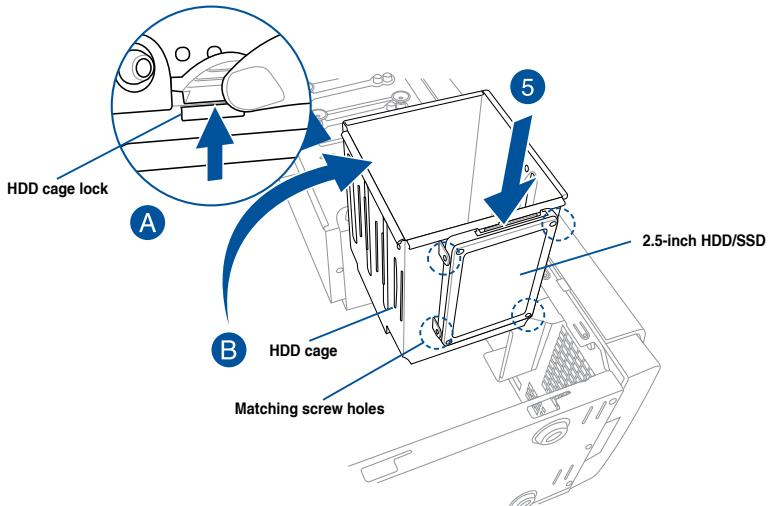
6. Secure the 2.5-inch HDD/SSD to the HDD cage using the bundled set of screws.
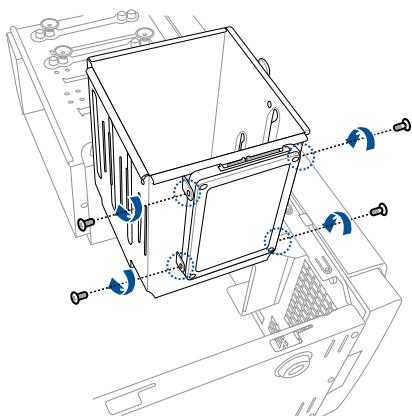
7. Swing the HDD cage inwards until it clicks back into place.
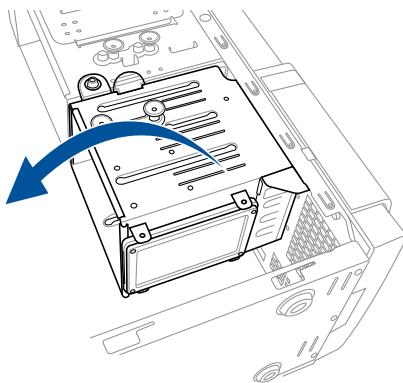
8. Connect a SATA cable and a SATA power cable to the 2.5-inch HDD/SSD.
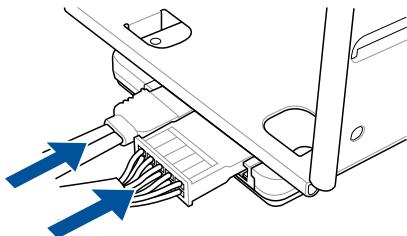
2.8 Expansion slots

⚡ Unplug the power cord before adding or removing expansion cards. Failure to do so may cause you physical injury and damage motherboard components.
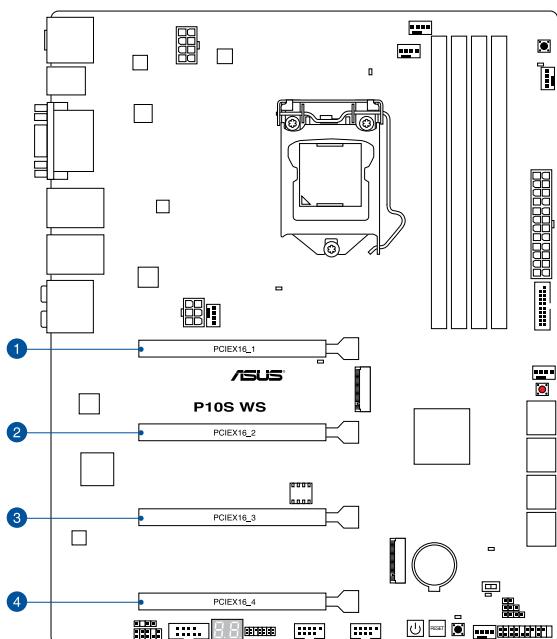
Slot No.	Slot Description
1	PCIe 3.0/2.0 x16_1 slot
2	PCIe 3.0/2.0 x16_2 slot
3	PCIe 3.0/2.0 x16_3 slot
4	PCIe 3.0/2.0 x16_4 slot

2.8.1 Installing an expansion card

To install an expansion card:

1. Lay the system on its side on a flat, stable surface.

2. Press the PCI-E latch (A), hold it by its edge then lift it towards the rear (B).

Edge of the PCI-E latch
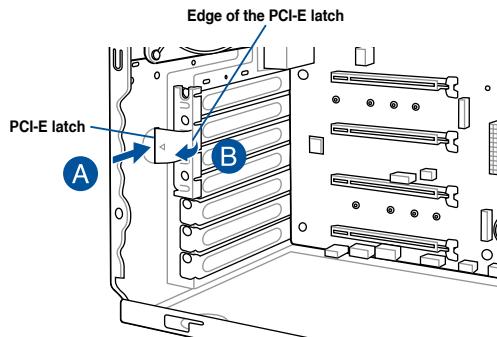
PCI-E latch

3. Remove the screw (A) that secures the metal bracket to the chassis then remove the metal bracket (B).

Screw
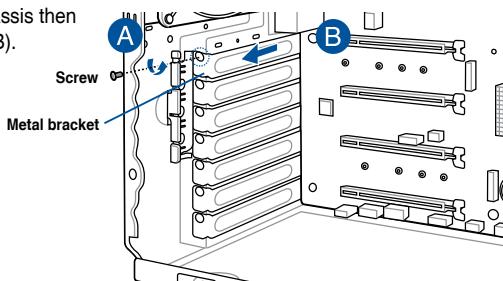
Metal bracket

4. Align and insert the expansion card into the PCI-E slot.

Expansion card

PCI-E slot
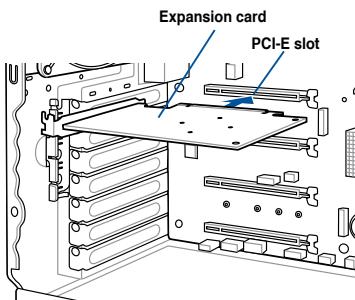
5. Lift the PCI-E latch inwards until it clicks into place securing the expansion card to the chassis.

PCI-E latch
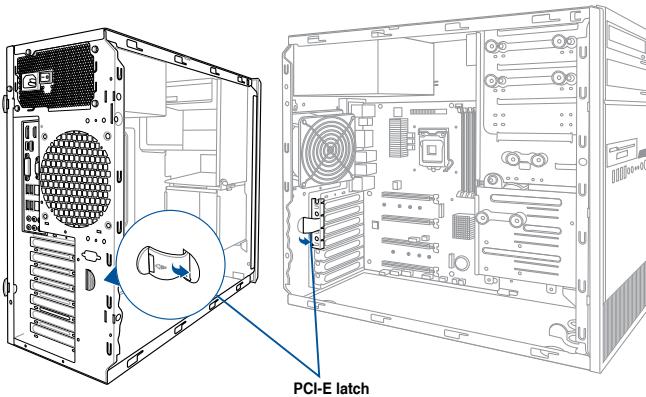
6. (Optional) Replace the screw of the metal bracket.
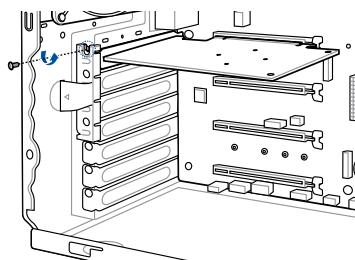
2.8.2 Configuring an expansion card

Slot No.	PCI Express 3.0 operating mode	
	Single VGA	CrossFireX
1	x16 (single VGA recommended)	x8
2	-	x8
3	-	-
4	-	-

- We recommend that you provide sufficient power when running CrossFireX™ mode.
- Connect a chassis fan to the motherboard connector labeled CHA_FAN1-4 when using multiple graphics cards for better thermal environment.
- We recommend you connect an EATX12V cable when running CrossFireX™.

IRQ assignments for this motherboard

	A	B	C	D	E	F	G	H
PCIe x16_1	shared	-	-	-	-	-	-	-
PCIe x16_2	shared	-	-	-	-	-	-	-
PCIe x16_3	shared	-	-	-	-	-	-	-
PCIe x16_4	shared	-	-	-	-	-	-	-
SMBUS Controller	shared	-	-	-	-	-	-	-
Intel SATA Controller	-	-	-	-	-	-	-	shared
Intel LAN1(I210)	shared	-	-	-	-	-	-	-
Intel LAN2(I210)	-	-	shared	-	-	-	-	-
Intel xHCI	shared	-	-	-	-	-	-	-
HD Audio	shared	-	-	-	-	-	-	-
ASMedia 1142_1	shared	-	-	-	-	-	-	-

2.8.3   Installing M.2 (NGFF) cards

To install an M.2 card:

1.   Locate the M.2 connector (NGFF1) on the motherboard.

2.   Remove the screw on the stand screw.

3.   Prepare the M.2 card.

4.   Align and insert the M.2 card into the M.2 connector (NGFF1).

5.   Secure the M.2 card with the screw you removed in step 2.
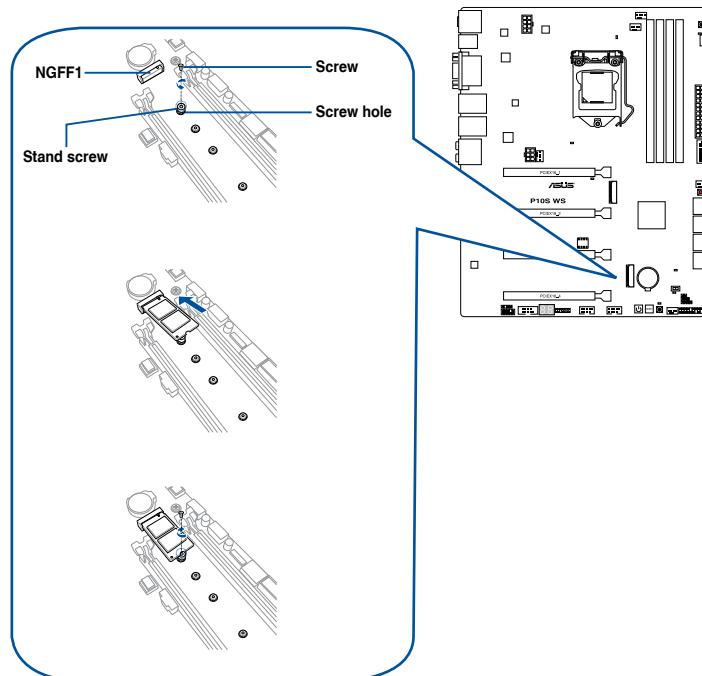
- Please pay attention when removing the screw, the stand screw might be removed together with it.

- Ensure that the M.2 card is positioned between the screw and the stand screw before securing it.

2.9 System fan (optional)

This section describes how to remove the system fan (optional) in the event that you need to install or remove previously installed or new system components, or when the system fan (optional) needs to be replaced because it was damaged or became defective.

To remove the system fan:

1. Disconnect the system fan cable from the REAR_FAN1 connector on the motherboard.
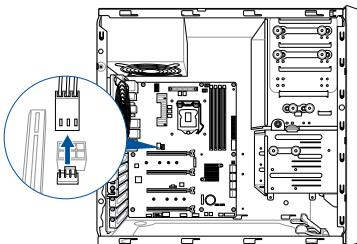
2. Remove the four system fan screws at the rear panel. Keep the screws for later use.

    > Hold the system fan with one hand while removing the system fan screws.
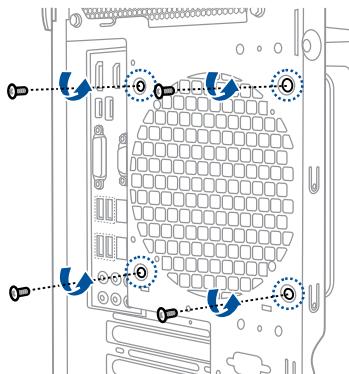
3. Remove the system fan.

    > Follow the previous instructions in reverse order if you want to reinstall the system fan.
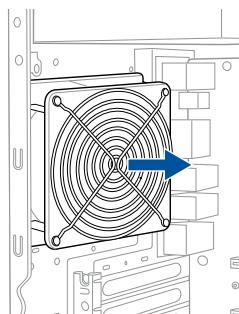
2.10 BIOS update utility

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 **2.11.1 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. On your motherboard, press the BIOS Flashback button for three seconds until the Flashback LED blinks three times, indicating that the BIOS Flashback function is enabled.

BIOS_FLBK

P10S WS BIOS_FLBK button
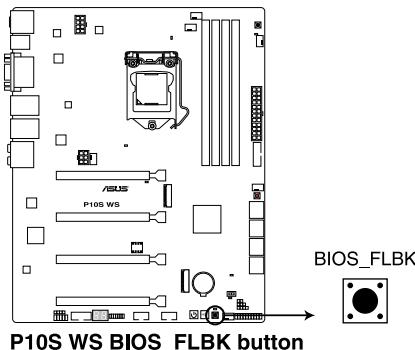
> Refer to section **3.4 Onboard LEDs** for more information of the Flashback LED.

> If the system fails to boot after flashing the BIOS, unplug the power core and restart the system.

2.11 Motherboard rear and audio connection

2.11.1 Rear I/O connection
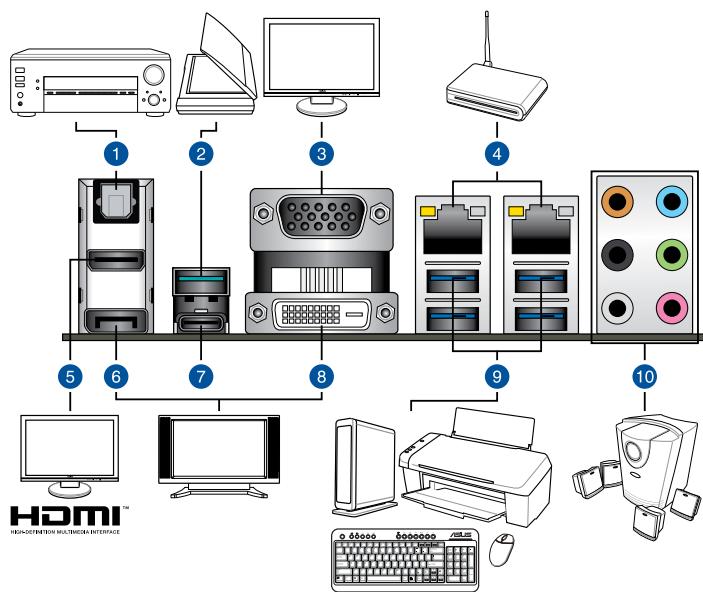
Rear panel connectors			
1.	Optical S/PDIF Out port	6.	DisplayPort
2.	USB 3.1 Type-A port EA2 (supports USB 3.1 Boost)	7.	USB 3.1 Type-C™ port EC1 (supports USB 3.1 Boost)
3.	VGA port	8.	DVI-D port
4.	Intel® LAN port 1 and 2 (I210-AT)*	9.	USB 3.0 ports 3, 4, 5, and 6 (lower left port supports USB BIOS Flashback)
5.	HDMI 1.4b port	10.	Audio I/O ports**

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

- USB 3.0 devices can only be used as data storage only.

- We strongly recommend that you connect USB 3.1/3.0 devices to USB 3.1/3.0 ports for faster and better performance for your USB devices.

- Multi-VGA output supports up to two displays under Windows® OS environment or BIOS, and one display under DOS.

- Intel display architecture design supports the following maximum supported pixel clocks (Pixel Clock = H total x V Total x Frame Rate (Fresh screen rate)):

  - DisplayPort / Mini DisplayPort: 675 MHz

  - HDMI 1.4b : 300 MHz

* 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		

ACT/LINK LED   SPEED LED

LAN port
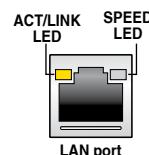
You can disable the LAN controllers in BIOS. Once disabled, the LAN2 port's ACT/LINK LED and SPEED LED stop blinking. For LAN1 port, the ACT/LINK LED still blinks even if you disabled it.

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

Port	Headset 2-channel	4-channel	6-channel	8-channel
Light Blue	Line In	Line In	Line In	Line In
Lime	Line Out	Front Speaker Out	Front Speaker Out	Front Speaker Out
Pink	Mic In	Mic In	Mic In	Mic In
Orange	–	–	Center/Subwoofer	Center/Subwoofer
Black	–	Rear Speaker Out	Rear Speaker Out	Rear Speaker Out
Gray	–	–	Side Speaker Out*	Side Speaker Out

* For Windows® 8.1 only

2.11.2   Audio I/O connections

Audio I/O ports
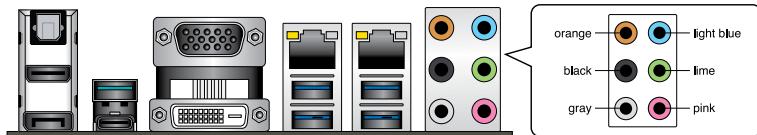
Connect to Headphone and Mic

Connect to Stereo Speakers
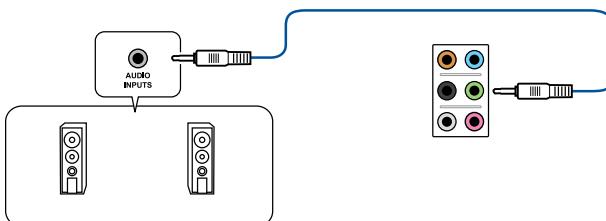
Connect to 2.1 channel Speakers
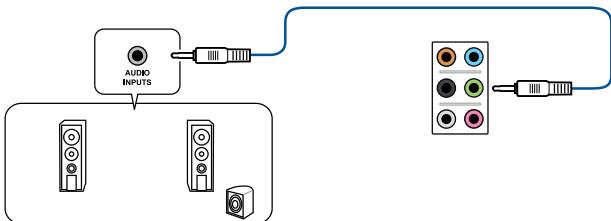
Connect to 4.1 channel Speakers
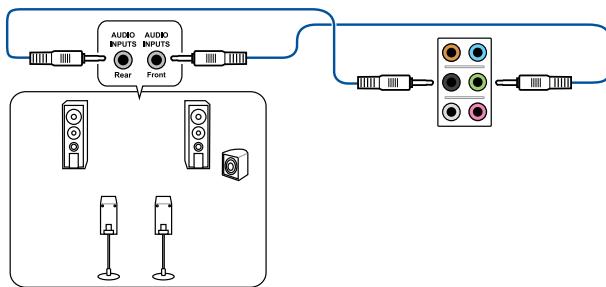
Connect to 5.1 channel Speakers
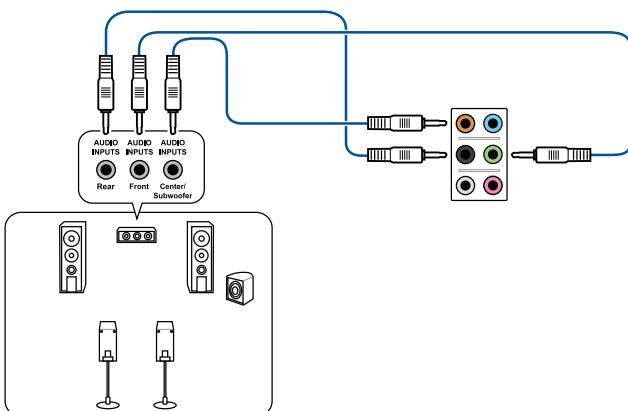
If you are using Windows 8.1 platform, use only the gray audio port for Side Speaker Out in a 6-channel configuration.

Connect to 7.1 channel Speakers
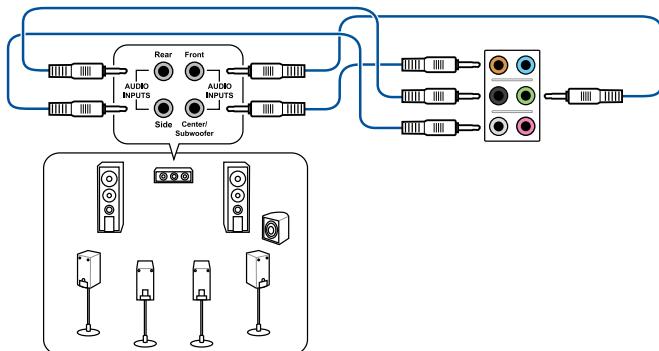
When the DTS UltraPC II function is enabled, ensure to connect the rear speaker to the gray port.

Motherboard Information

3

This chapter includes the motherboard layout and brief descriptions of the jumpers and internal connectors.

3.1 Motherboard layout
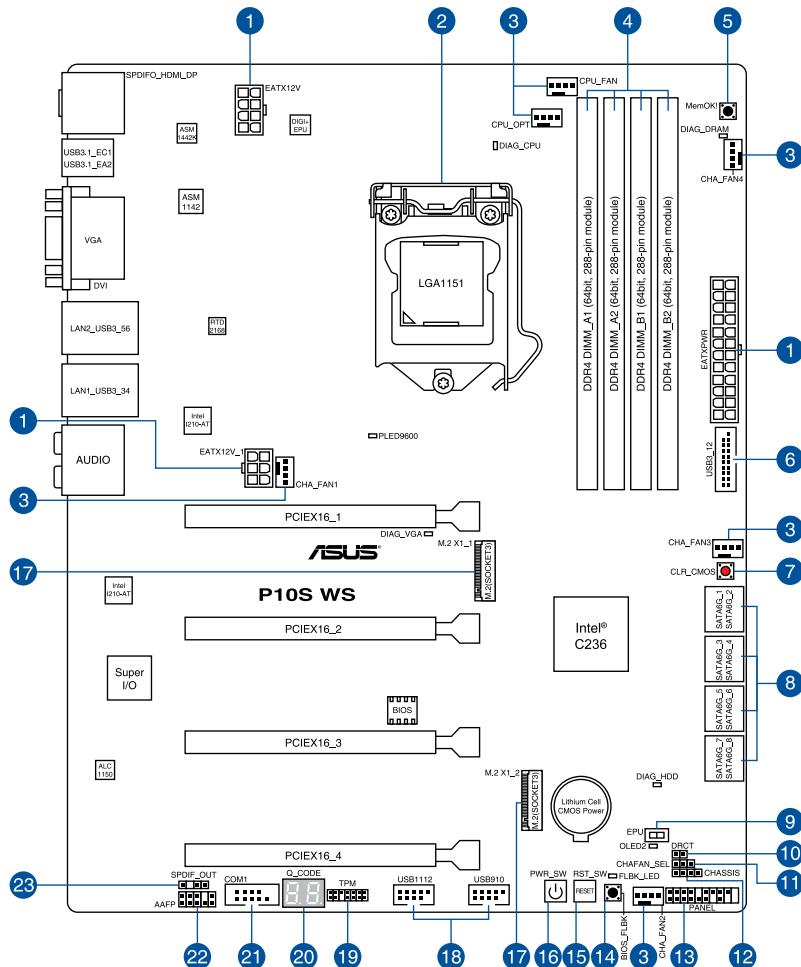
Refer to **3.5 Internal connectors** and **2.11.1 Rear I/O connection** for more information about rear panel connectors and internal connectors.

Layout contents

Connectors/Jumpers/Buttons and switches/Slots	Page
1. ATX power connectors (24-pin EATXPWR; 8-pin EATX12V; 6-pin EATX12V_1)	3-17
2. LGA1151 CPU socket	2-4
3. CPU, CPU optional, and chassis fan connectors (4-pin CPU_FAN; 4-pin CPU_OPT; 4-pin CHA_FAN1-4)	3-16
4. DDR4 DIMM slots	2-7
5. MemOK! button	3-5
6. USB 3.0 connectors (20-1 pin USB3_12)	3-15
7. Clear CMOS button (CLR_CMOS)	3-7
8. Intel® C236 Serial ATA 6 Gb/s connectors (7-pin SATA6G_1-8)	3-11
9. EPU switch	3-6
10. DirectKey connector (2-pin DRCT)	3-19
11. Chassis Fan control setting (3-pin CHAFAN_SEL)	3-8
12. Chassis intrusion connector (4-1 pin CHASSIS)	3-13
13. System panel connector (20-5 pin PANEL)	3-18
14. BIOS Flashback button	2-23
15. Reset button	3-4
16. Power-on button	3-4
17. M.2 socket 3 (M.2 X1_1; M.2 X1_2)	3-20
18. USB 2.0 connectors (10-1 USB1112; USB910)	3-14
19. TPM connector (14-1 pin TPM)	3-13
20. Q-Code LEDs	3-10
21. Serial port connector (10-1 pin COM1)	3-19
22. Front panel audio connector (10-1 pin AAFP)	3-12
23. Digital audio connector (4-1 pin SPDIF_OUT)	3-12

3.2 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.

PWR_SW

P10S WS Power on button
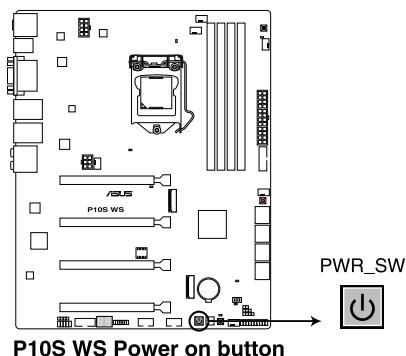
2. **Reset button**

   Press the reset button to reboot the system.

RST_SW

P10S WS Reset button
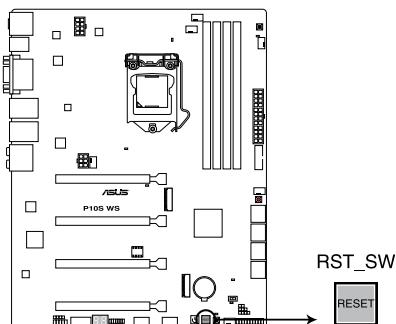
3. MemOK! button

Installing DIMMs that are not compatible with the motherboard may cause system boot failure, and the DRAM_LED near the MemOK! button lights continuously. Press and hold the MemOK! button until the DRAM_LED starts blinking to begin automatic memory compatibility tuning for successful boot.
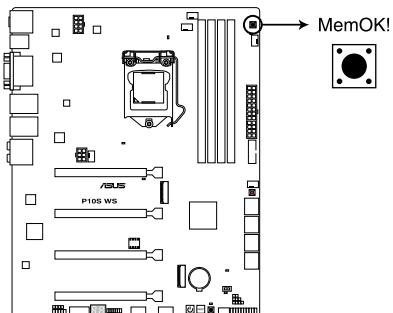
P10S WS MemOK! button

- Refer to section **3.4 Onboard LEDs** for the exact location of the DRAM_LED.

- The DRAM_LED also lights up when the DIMM is not properly installed. Turn off the system and reinstall the DIMM before using the MemOK! function.

- The MemOK! button does not function under Windows® OS environment.

- During the tuning process, the system loads and tests failsafe memory settings. It takes about 30 seconds for the system to test one set of failsafe settings. If the test fails, the system reboots and test the next set of failsafe settings. The blinking speed of the DRAM_LED increases, indicating different test processes.

- Due to memory tuning requirement, the system automatically reboots when each timing set is tested. If the installed DIMMs still fail to boot after the whole tuning process, the DRAM_LED lights continuously. Replace the DIMMs with ones recommended in the Memory QVL (Qualified Vendors Lists) in this user manual or at www.asus.com.

- If you turn off the computer and replace DIMMs during the tuning process, the system continues memory tuning after turning on the computer. To stop memory tuning, turn off the computer and unplug the power cord for about 5–10 seconds.

- If your system fails to boot up due to BIOS overclocking, press the MemOK! button to boot and load the BIOS default settings. A message will appear during POST reminding you that the BIOS has been restored to its default settings.

- We recommend that you download and update to the latest BIOS version from www.asus.com after using the MemOK! function.

4. EPU switch

Enable this switch to automatically detect the current PC loadings and intelligently moderate the power consumption.

Enable this switch when the system is powered off.

EPU

Disabled (Default)   Enabled
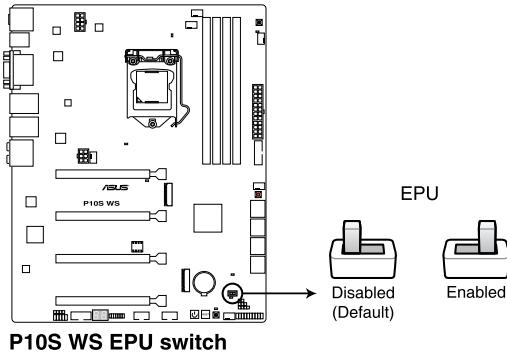
P10S WS EPU switch

- The EPU LED (OLED2) near the EPU switch lights up when the EPU switch is enabled. Refer to section **3.4 Onboard LEDs** for the exact location of the EPU LED.

- If you enable this switch under Windows® OS environment, the EPU function will be activated after the next system bootup.

- You may change the EPU settings in the software application or BIOS setup program and enable the EPU function at the same time. However, the system will use the last setting you have made.

5.   Clear CMOS button (CLR_CMOS)

Press this button to clear the BIOS setup information only when the systems hangs due to overclocking.
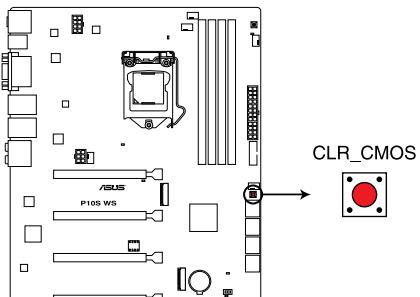
CLR_CMOS

P10S WS CLR_CMOS button

3.3 Jumpers

1. **Chassis Fan control setting (3-pin CHAFAN_SEL)**

   This jumpers allow you to switch fan pin selection. The CHAFAN_SEL jumper is for the front fans and rear fans control. Set pins 1-2 when using 3-pin fans or pins 2-3 when using 4-pin fans.

CHAFAN_SEL

1 2 — Chosen By BIOS

2 3 — 4Pin PWM FAN

P10S WS CHAFAN setting
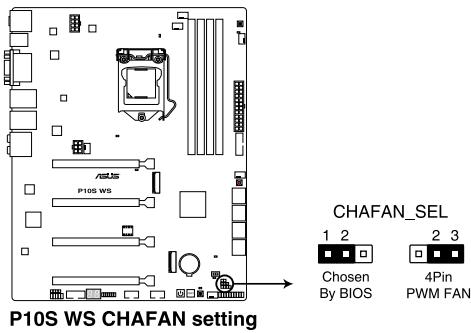
3.4   Onboard LEDs

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.

DIAG_DRAM

DIAG_CPU

DIAG_VGA

DIAG_HDD
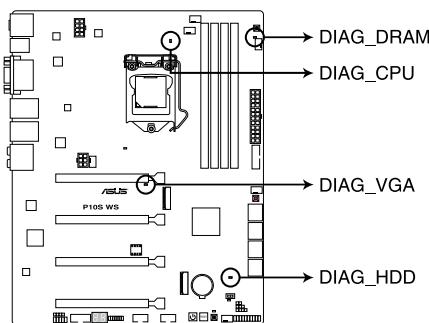
P10S WS Diagnosis LED

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

2.   **EPU LED (OLED2)**

The EPU LED lights up when the EPU switch is enabled.

OLED2
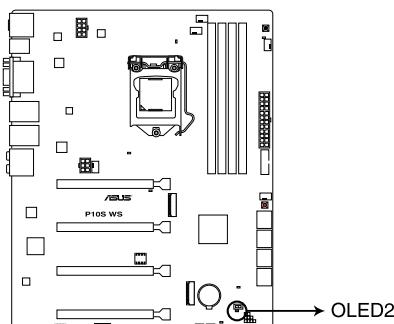
P10S WS EPU LED

3.   USB BIOS Flashback LED (FLBK_LED)

The BIOS Flashback LED flashes when you press the BIOS Flashback button for BIOS update.
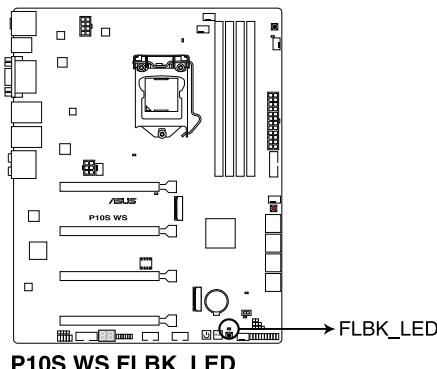
FLBK_LED

P10S WS FLBK_LED

4.   Q-Code LEDs

The Q-Code LED design provides you with a 2-digit error code that displays the system status.
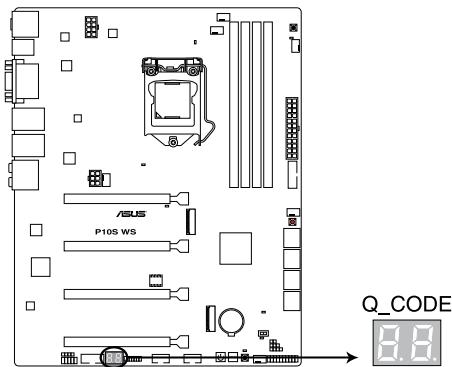
Q_CODE

P10S WS Q-Code LED

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

•   Please refer to the Q-Code table in the **Appendix** section for more details.

3.5 Internal connectors

1. **Intel® C236 Serial ATA 6 Gb/s connectors (7-pin SATA6G_1-8)**

   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 enterprise (Intel® RSTe) through the onboard Intel® C236 chipset.
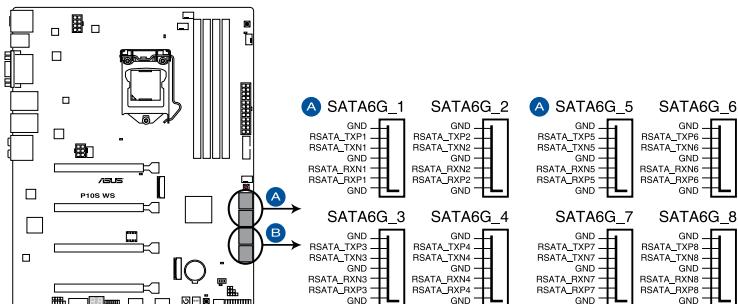
   P10S WS Intel® SATA 6 Gb/s connectors
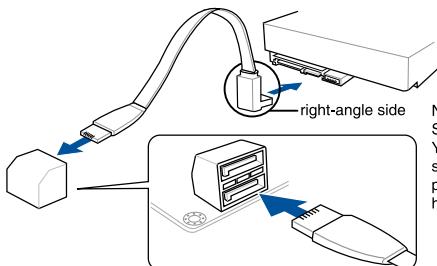
   right-angle side

   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 **4.6.4 PCH Configuration** for details.

   - Before creating a RAID set, refer to section **5.1 RAID configurations** or the manual bundled in the motherboard support DVD.

   - These SATA ports are for data drives only.

   - M.2_1 shares SATA ports with SATA6G_5.

   - M.2_2 shares SATA ports with SATA6G_6.

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.
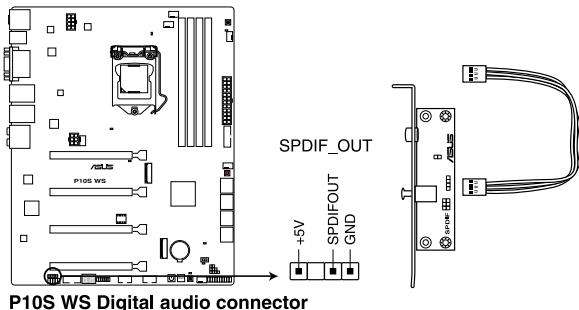
P10S WS Digital audio connector

> The S/PDIF module is purchased separately.

3. **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.
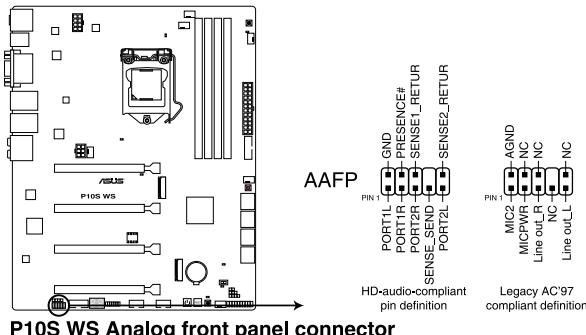
P10S WS Analog front panel connector

> • 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 Audio]** or **[AC97]**.

4. 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 component 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 only when you intend to use the chassis intrusion detection feature.
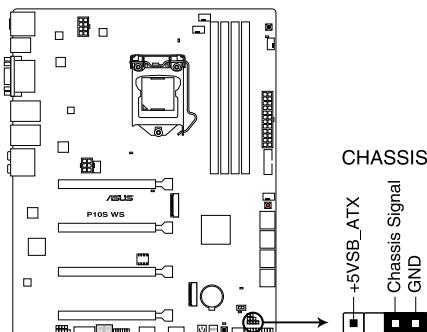
P10S WS Chassis intrusion connector

5. TPM connector (14-1 pin TPM)

This connector supports a Trusted Platform Module (TPM) system, which securely store keys, digital certificates, passwords and data. A TPM system also helps enhance network security, protect digital identities, and ensures platform integrity.
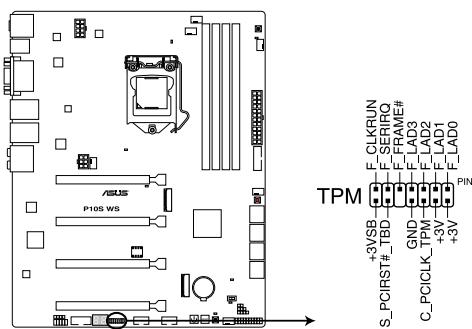
P10S WS TPM connector

The TPM module is purchased separately.

6.   **USB 2.0 connectors (10-1 USB1112; USB910)**

These connectors are for USB 2.0 ports. Connect the USB module cable to any of these connectors, then install the module to a slot opening at the back of the system chassis. These USB connectors comply with USB 2.0 specification that supports up to 480 Mbps connection speed.
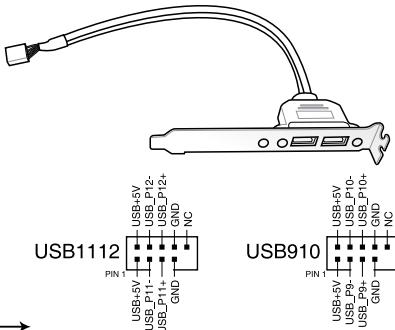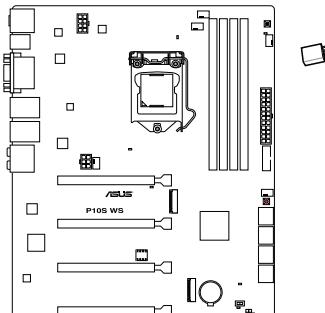
P10S WS USB2.0 connectors

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.

7. USB 3.0 connectors (20-1 pin USB3_12)

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.
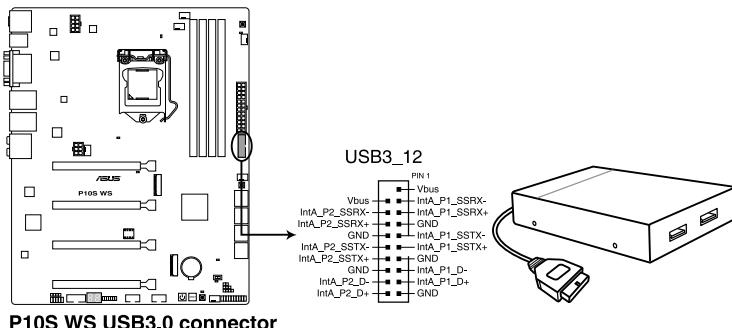
P10S WS USB3.0 connector

The USB 3.0 module is purchased separately.

- These connectors are based on xHCI specification. We recommend you 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 only support Turbo Mode when using USB 3.0 Boost feature.

8. **CPU, CPU optional, and chassis fan connectors (4-pin CPU_FAN; 4-pin CPU_OPT; 4-pin CHA_FAN1-4)**

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.

P10S WS Fan connectors
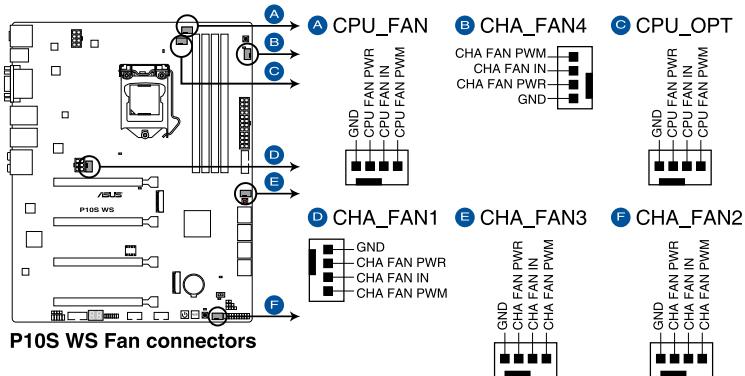
✎
- The CPU_FAN connector supports the CPU fan of maximum 1A (12 W) fan power.

- The CPU_FAN connector and CHA_FAN connectors support the ASUS FAN Xpert 3 feature.

- The CPU fan connector detects the type of CPU fan installed and automatically switches the control modes. To configure the CPU fan's control mode, go to **Advanced Mode > Monitor > CPU Q-Fan Control** item in BIOS.

- The chassis fan connectors support DC and PWM modes. To set these fans to DC or PWM, go to **Advanced Mode > Monitor > Chassis Fan 1/4 Q-Fan Control** items in BIOS.

9. **ATX power connectors (24-pin EATXPWR; 8-pin EATX12V; 6-pin EATX12V_1)**

    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.

A EATX12V

GND	+12V DC
GND	+12V DC
GND	+12V DC
GND	+12V DC

PIN 1

B EATXPWR

+3 Volts	GND
+12 Volts	+5 Volts
+12 Volts	+5 Volts
+5V Standby	+5 Volts
Power OK	floating
GND	GND
+5 Volts	GND
GND	GND
+5 Volts	PSON#
GND	GND
+3 Volts	-12 Volts
+3 Volts	+3 Volts

PIN 1

C EATX12V_1

PIN 1

GND	+12V DC
GND	+12V DC
GND	+12V DC

P10S WS ATX power connectors
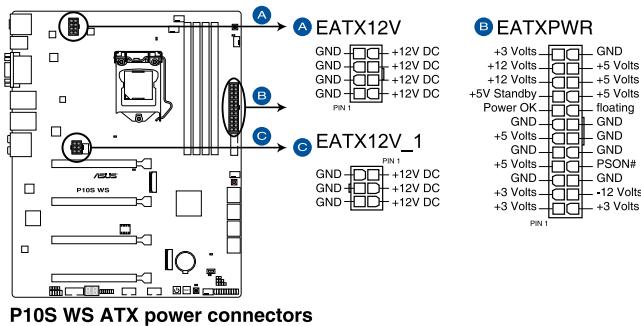
- For a fully configured system, we recommend that you use a power supply unit (PSU) that complies with ATX 12 V Specification 2.0 (or later version) and provides a minimum power of 350 W.

- DO NOT forget to connect the 6-pin/8-pin EATX12 V power plug. Otherwise, the system will not boot.

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

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

10. System panel connector (20-5 pin PANEL)

This connector supports several chassis-mounted functions.
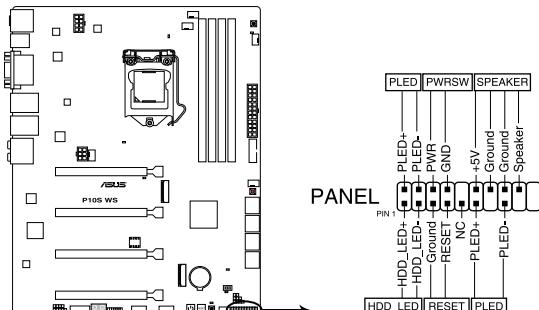
P10S WS System panel connector

- **System power LED (3-1 pin or 2-pin PLED)**

  This 3-1 pin or 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.

11. 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.

P10S WS DRCT connector
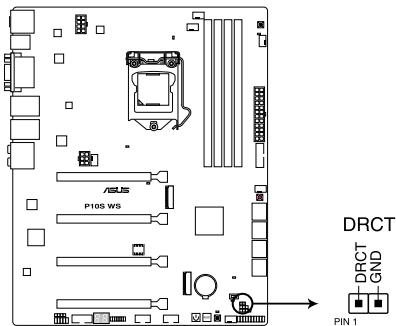
Ensure that your chassis comes with the extra button cable that supports the DirectKey feature. Refer to the technical documentation that came with the chassis for details.

12. Serial port connector (10-1 pin COM1)

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

P10S WS Serial port connector
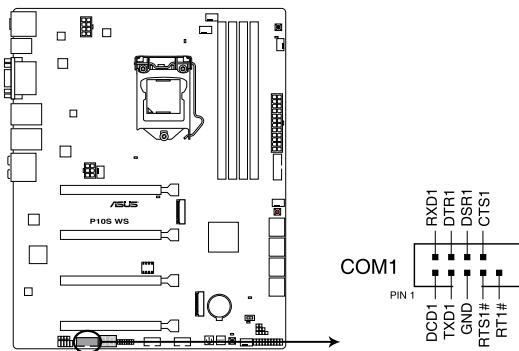
The COM module is purchased separately.

13. M.2 socket 3 (M.2 X1_1; M.2 X1_2)

This socket allows you to install an M.2 (NGFF) SSD module.
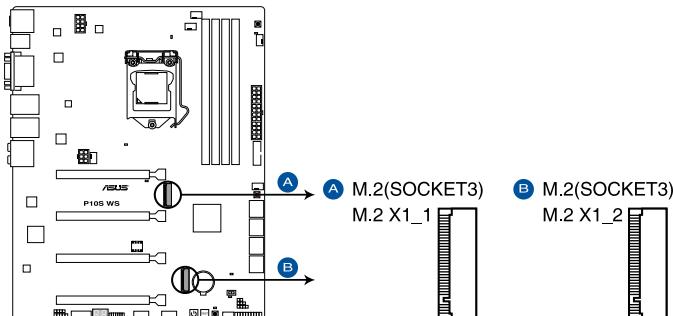
P10S WS M.2(SOCKET3)

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

- M.2 X1_1 shares SATA ports with SATA6G_5 and M.2 X1_2 shares SATA ports with SATA6G_6. When you use both M.2 and SATA connectors, the system will set a higher priority to M.2 Socket 3 than SATA interface. You can adjust the BIOS settings to set the priority.

- When set to [Auto], SATA6G_5 and SATA6G_6 are disabled when M.2 connectors are detected. You can adjust the BIOS settings to set the priority. Refer to section **4.6.4 PCH Configuration** of this user guide for more details.

The M.2 (NGFF) SSD module is purchased separately.

BIOS Setup

4

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

4.1 Knowing BIOS

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

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

- An error message appears on the screen during the system bootup and requests you to run the BIOS Setup.

- You have installed a new system component that requires further BIOS settings or update.

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

When downloading or updating the BIOS file, rename it as **P10SWS.CAP** for this motherboard.

4.2 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 **4.10 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 **3.2 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.

4.2.1 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. Refer to the **Setup Mode** item in section **Boot menu** for details.

**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 overclocking**

UEFI BIOS Utility – EZ Mode

12/28/2015
Monday 06:29 English

Information
P10S WS   BIOS Ver. 0401
Intel(R) Xeon(R) CPU E3-1230 v5 @ 3.40GHz
Speed: 3400 MHz
Memory: 8192 MB (DDR4 2133MHz)

CPU Temperature

CPU Core Voltage
1.152 V
Motherboard Temperature
36°C   27°C

EZ System Tuning
Click the icon below to apply a pre-configured
profile for improved system performance or
energy savings.
Quiet
Performance
Energy Saving

Normal

DRAM Status
DIMM_A1: Apacer 8192MB 2133MHz
DIMM_A2: N/A
DIMM_B1: N/A
DIMM_B2: N/A

SATA Information
P1: ASUS   DVD-E818A6T ATAPI
P2: ST3160812AS (160.0GB)

Boot Priority
Choose one and drag the items.   Switch all

Intel Rapid Storage Technology
On   Off

UEFI: JetFlashTranscend 4GB 8.07,
Partition 1 (3830MB)

FAN Profile
CPU FAN
4115 RPM
CHA1 FAN
N/A
CHA2 FAN
N/A
CHA3 FAN
N/A
CHA4 FAN
N/A
CPU OPT FAN
N/A

CPU FAN
%
100

50

0   30   70   100   ℃

QFan Control

JetFlashTranscend 4GB 8.07 (3830MB)

P2: ST3160812AS (152627MB)

P1: ASUS   DVD-E818A6T

Boot Menu(F8)

Default(F5)   Save & Exit(F10)   Advanced Mode(F7)   Search on FAQ

**Enables or disables the SATA RAID mode
for Intel Rapid Storage Technology**

**Saves the changes
and resets the system**

**Displays the CPU Fan's speed. Click
the button to manually tune the fans**

Click to go to Advanced mode

**Loads optimized
default settings**

Search on the FAQ

Click to display boot devices

Selects the boot device priority

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

4.2.2 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.

Configuration fields
Pop-up Menu
Menu bar   **Language**   **MyFavorite(F3)**   **Qfan Control(F6)**   **Quick Note (F9)**   **Hot Keys**   **Scroll bar**

Menu items   **General help**   **Last modified settings**   **Go back to EZ Mode**   **Search on the FAQ**   **Displays the CPU temperature, CPU, and memory voltage output**
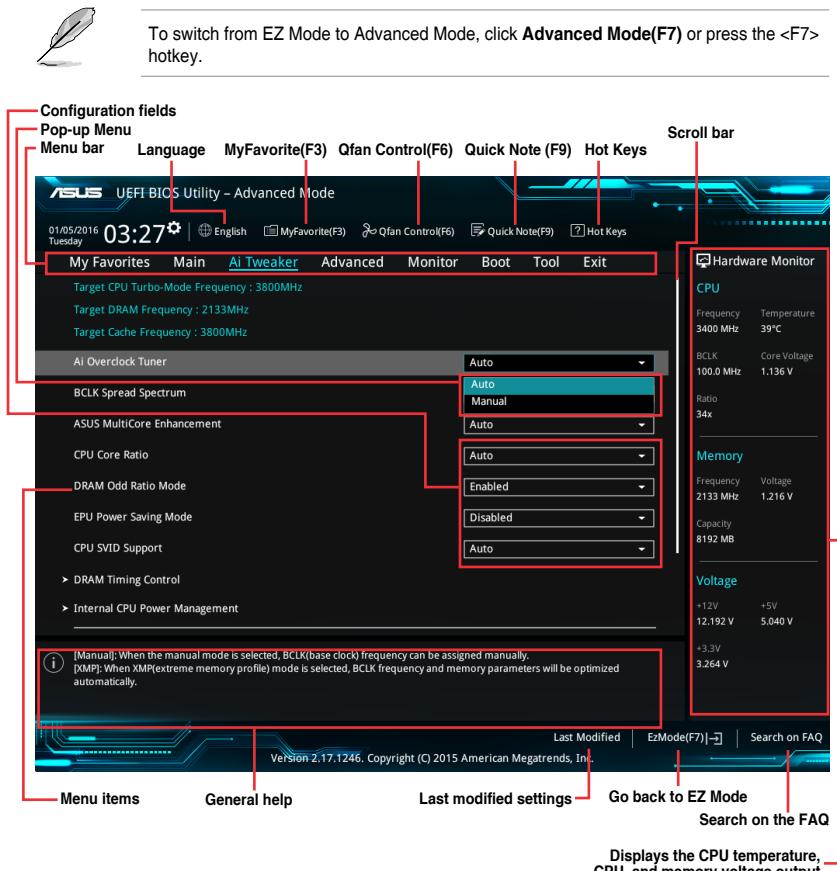
Menu bar

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

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

Menu items

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

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

Submenu items

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

Language

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

My Favorites (F3)

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

Refer to section **4.3 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 **4.2.3 QFan Control** 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 top right corner 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.

4.2.3   QFan Control

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

Click to select a fan to be configured

Click to activate PWM Mode

Click to activate DC Mode

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

PWM   DC

Optimize All

CPU FAN
CHA1 FAN
CHA2 FAN
CHA3 FAN
CHA4 FAN

%
100

50

0   30   70   100   °C

Standard   Silent   Turbo   Full Speed   Manual

Undo   Apply   Exit (ESC)

Select a profile to apply to your fans

Click to apply the fan setting

Click to undo the changes

Click to go back to main menu

Select to manually configure your fans

Configuring fans manually

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

Speed points

Select to manually configure your fans
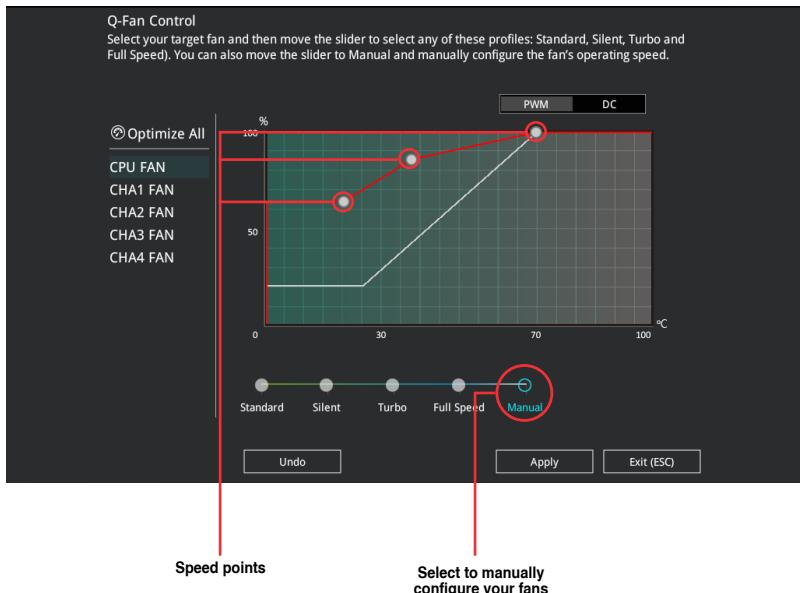
To configure your fans:

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)**.

4.3   My Favorites

My Favorites is your personal space where you can easily save and access your favorite BIOS items.
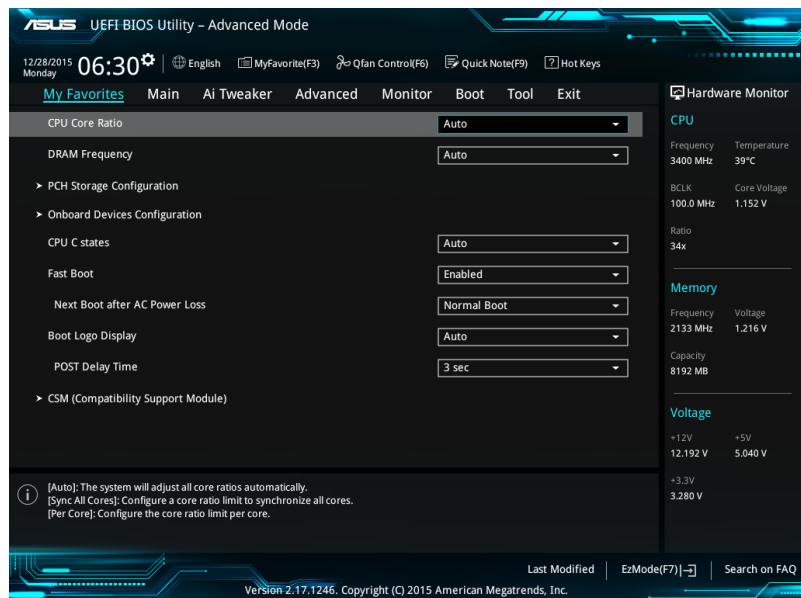
My Favorites comes with several performance, power saving, and fast boot related items by default. You can personalize this screen by adding or removing items.

Adding items to My Favorites

To add BIOS items:

1. Press <F3> on your keyboard or click ☐(F3)MyFavorite from the BIOS screen to open Setup Tree Map screen.
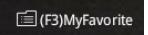
2. On the Setup Tree Map screen, select the BIOS items that you want to save in My Favorites screen.

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

You cannot add the following items to My Favorite items:

- Items with submenu options
- User-managed items such as language and boot order
- Configuration items such as Memory SPD Information, system time and date.

---

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

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

4.4 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.
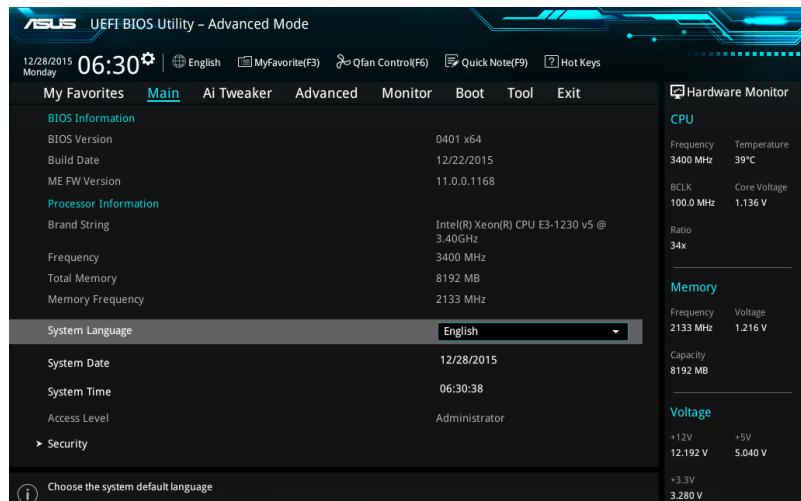
Security

The Security menu items allow you to change the system security settings.
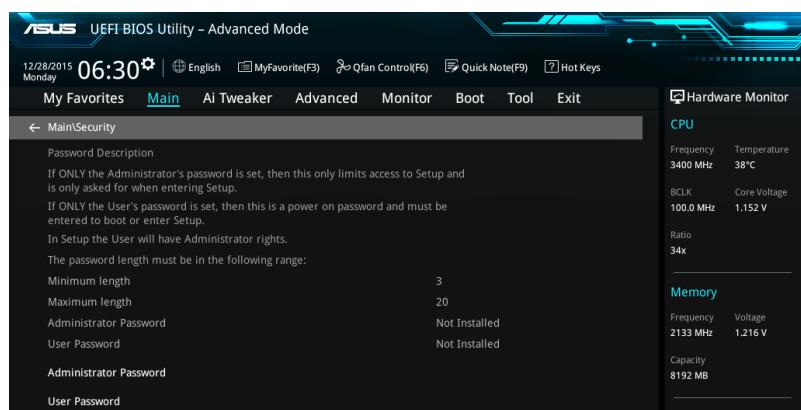
- If you have forgotten your BIOS password, erase the CMOS Real Time Clock (RTC) RAM to clear the BIOS password. See section **3.2 Onboard buttons and switches** for information on how to erase the RTC RAM via the Clear CMOS button.

- 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]**.

Administrator Password

If you have set an administrator password, we recommend that you enter the administrator password for accessing the system. Otherwise, you might be able to see or change only selected fields in the BIOS setup program.

To set an administrator password:

1.   Select the **Administrator Password** item and press <Enter>.

2.   From the **Create New Password** box, key in a password, then press <Enter>.

3.   Confirm the password when prompted.

To change an administrator password:

1.   Select the **Administrator Password** item and press <Enter>.

2.   From the **Enter Current Password** box, key in the current password, then press <Enter>.

3.   From the **Create New Password** box, key in a new password, then press <Enter>.

4.   Confirm the password when prompted.

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

User Password

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

To set a user password:

1.   Select the **User Password** item and press <Enter>.

2.   From the **Create New Password** box, key in a password, then press <Enter>.

3.   Confirm the password when prompted.

To change a user password:

1.   Select the **User Password** item and press <Enter>.

2.   From the **Enter Current Password** box, key in the current password, then press <Enter>.

3.   From the **Create New Password** box, key in a new password, then press <Enter>.

4.   Confirm the password when prompted.

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

4.5 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.
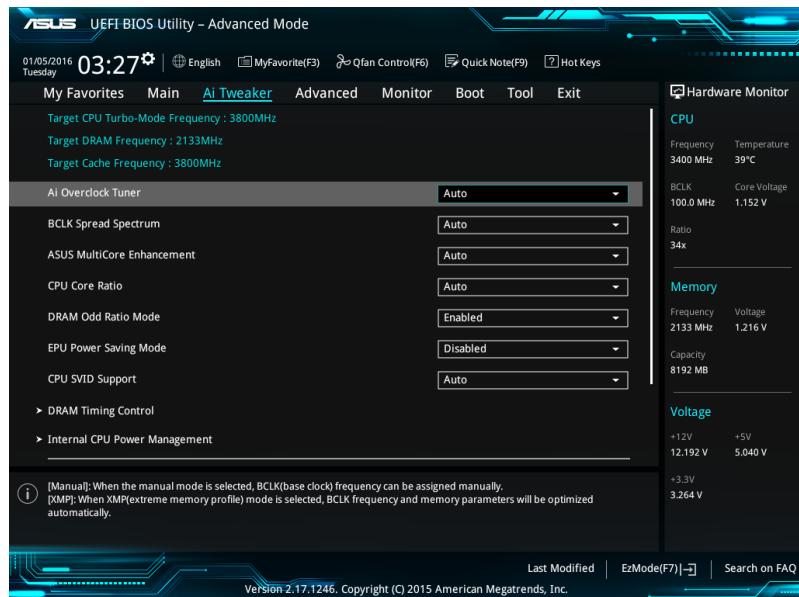
Ai Overclock Tuner [Auto]

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 [100.00]

This item allows you to set the BCLK (base clock) frequency to enhance the system performance. Use the <+> or <-> to adjust the value. The values range from 40.0 MHz to 500.0 MHz.

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

BCLK Spread Spectrum [Auto]

This item allows you to reduce the EMI. Disable to get more accurate base clocks.

Configuration options: [Auto] [Disabled] [-0.22] [-0.34] [-0.46] [+0.12] [+0.22] [+0.28] [+0.38]

ASUS MultiCore Enhancement [Auto]

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

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

CPU Core Ratio [Auto]

This item allows you to set the CPU core ratio limit per core or synchronize automatically to all cores.

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

✎ When the CPU Core Ratio is set to **[Synch All Cores]**, the following item appears:

> ### 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.

✎ When the CPU Core Ratio is set to **[Per Core]**, the following item appears:

> ### 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.
>
> ### 2-Core Ratio Limit [Auto]
> Select **[Auto]** to apply the CPU default Turbo Ratio setting or manually assign a 2-Core Limit value that must be higher than or equal to the 3-Core Ratio Limit.
>
> ### 3-Core Ratio Limit [Auto]
> Select **[Auto]** to apply the CPU default Turbo Ratio setting or manually assign a 3-Core Limit value that must be higher than or equal to the 4-Core Ratio Limit.

4-Core Ratio Limit [Auto]
Select **[Auto]** to apply the CPU default Turbo Ratio setting or manually assign a 4-Core Limit value that must be higher than or equal to the 3-Core Ratio Limit.

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

DRAM Odd Ratio Mode [Enabled]

This item allows you to enable or disable the odd ratio mode for better granularity.

Configuration options: [Disabled] [Enabled]

EPU Power Saving Mode [Disabled]

The ASUS EPU (Energy Processing Unit) sets the CPU in its minimum power consumption settings.

Configuration options: [Disabled] [Enabled]

CPU SVID Support [Auto]

Disable this item to stop the CPU from communicating with the external voltage regulator.

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

DRAM Timing Control

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

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

Primary Timings

DRAM CAS# Latency [Auto]

Configuration options: [Auto] [1] – [31]

DRAM RAS# to CAS# Delay [Auto]

Configuration options: [Auto] [1] – [31]

DRAM RAS# ACT Time [Auto]

Configuration options: [Auto] [1] – [63]

DRAM COMMAND Rate [Auto]

Configuration options: [Auto] [1] – [2]

Secondary Timings

DRAM RAS# to RAS# Delay L [Auto]

Configuration options: [Auto] [1] – [15]

DRAM RAS# to RAS# Delay S [Auto]

Configuration options: [Auto] [1] – [15]

DRAM REF Cycle Time [Auto]

Configuration options: [Auto] [1] – [1023]

DRAM Refresh Interval [Auto]

Configuration options: [Auto] [1] – [32767]

DRAM WRITE Recovery Time [Auto]

Configuration options: [Auto] [1] – [31]

DRAM READ to PRE Time [Auto]

Configuration options: [Auto] [1] – [15]

DRAM FOUR ACT WIN Time [Auto]

Configuration options: [Auto] [1] – [63]

DRAM WRITE to READ Delay [Auto]

Configuration options: [Auto] [1] – [15]

DRAM WRITE to READ Delay L [Auto]

Configuration options: [Auto] [1] – [15]

DRAM WRITE to READ Delay S [Auto]

Configuration options: [Auto] [1] – [15]

DRAM CKE Minimum Pulse Width [Auto]

Configuration options: [Auto] [1] – [15]

DRAM Write Latency [Auto]

Configuration options: [Auto] [1] – [31]

Skew Control

ODT RTT WR (CHA) [Auto]
Configuration options: [Auto] [0 DRAM CLOCK] [80 DRAM CLOCK] [120 DRAM CLOCK] [240 DRAM CLOCK] [255 DRAM CLOCK]

ODT RTT PARK (CHA) [Auto]
Configuration options: [Auto] [0 DRAM CLOCK] [34 DRAM CLOCK] [40 DRAM CLOCK] [48 DRAM CLOCK] [60 DRAM CLOCK] [80 DRAM CLOCK] [120 DRAM CLOCK] [240 DRAM CLOCK]

ODT RTT NOM (CHA) [Auto]
Configuration options: [Auto] [0 DRAM CLOCK] [34 DRAM CLOCK] [40 DRAM CLOCK] [48 DRAM CLOCK] [60 DRAM CLOCK] [80 DRAM CLOCK] [120 DRAM CLOCK] [240 DRAM CLOCK]

ODT RTT WR (CHB) [Auto]
Configuration options: [Auto] [0 DRAM CLOCK] [80 DRAM CLOCK] [120 DRAM CLOCK] [240 DRAM CLOCK] [255 DRAM CLOCK]

ODT RTT PARK (CHB) [Auto]
Configuration options: [Auto] [0 DRAM CLOCK] [34 DRAM CLOCK]
[40 DRAM CLOCK] [48 DRAM CLOCK] [60 DRAM CLOCK] [80 DRAM
CLOCK] [120 DRAM CLOCK] [240 DRAM CLOCK]

ODT RTT NOM (CHB) [Auto]
Configuration options: [Auto] [0 DRAM CLOCK] [34 DRAM CLOCK]
[40 DRAM CLOCK] [48 DRAM CLOCK] [60 DRAM CLOCK] [80 DRAM
CLOCK] [120 DRAM CLOCK] [240 DRAM CLOCK]

ODT_READ_DURATION [Auto]
Configuration options: [Auto] [0] - [7]

ODT_READ_DELAY [Auto]
Configuration options: [Auto] [0] - [7]

ODT_WRITE_DURATION [Auto]
Configuration options: [Auto] [0] - [7]

ODT_WRITE_DELAY [Auto]
Configuration options: [Auto] [0] - [7]

Data Rising Slope [Auto]
Configuration options: [Auto] [0] - [15]

Data Rising Slope Offset [Auto]
Configuration options: [Auto] [0] - [1]

CMD Rising Slope [Auto]
Configuration options: [Auto] [0] - [15]

CMD Rising Slope Offset [Auto]
Configuration options: [Auto] [0] - [1]

Ctl Rising Slope [Auto]
Configuration options: [Auto] [0] - [15]

Ctl Rising Slope Offset [Auto]
Configuration options: [Auto] [0] - [1]

Clk Rising Slope [Auto]
Configuration options: [Auto] [0] - [15]

Clk Rising Slope Offset [Auto]
Configuration options: [Auto] [0] - [1]

Data Falling Slope [Auto]
Configuration options: [Auto] [0] - [15]

Data Falling Slope Offset [Auto]
Configuration options: [Auto] [0] - [1]

CMD Falling Slope [Auto]
Configuration options: [Auto] [0] - [15]

CMD Falling Slope Offset [Auto]
Configuration options: [Auto] [0] - [1]

Ctl Falling Slope [Auto]
Configuration options: [Auto] [0] - [15]

Ctl Falling Slope Offset [Auto]
Configuration options: [Auto] [0] - [1]

Clk Falling Slope [Auto]
Configuration options: [Auto] [0] - [15]

Clk Falling Slope Offset [Auto]
Configuration options: [Auto] [0] - [1]

RTL IOL control

DRAM RTL INIT Value [Auto]
Configuration options: [Auto] [0] - [127]

DRAM RTL (CHA DIMM0 Rank0) [Auto]
Configuration options: [Auto] [0] - [127]

DRAM RTL (CHA DIMM0 Rank1) [Auto]
Configuration options: [Auto] [0] - [127]

DRAM RTL (CHA DIMM1 Rank0) [Auto]
Configuration options: [Auto] [0] - [127]

DRAM RTL (CHA DIMM1 Rank1) [Auto]
Configuration options: [Auto] [0] - [127]

DRAM RTL (CHB DIMM0 Rank0) [Auto]
Configuration options: [Auto] [0] - [127]

DRAM RTL (CHB DIMM0 Rank1) [Auto]
Configuration options: [Auto] [0] - [127]

DRAM RTL (CHB DIMM1 Rank0) [Auto]
Configuration options: [Auto] [0] - [127]

DRAM RTL (CHB DIMM1 Rank1) [Auto]
Configuration options: [Auto] [0] - [127]

DRAM IOL (CHA DIMM0 Rank0) [Auto]
Configuration options: [Auto] [0] - [15]

DRAM IOL (CHA DIMM0 Rank1) [Auto]
Configuration options: [Auto] [0] - [15]

DRAM IOL (CHA DIMM1 Rank0) [Auto]
Configuration options: [Auto] [0] - [15]

DRAM IOL (CHA DIMM1 Rank1) [Auto]
Configuration options: [Auto] [0] - [15]

DRAM IOL (CHB DIMM0 Rank0) [Auto]
Configuration options: [Auto] [0] - [15]

DRAM IOL (CHB DIMM0 Rank1) [Auto]
Configuration options: [Auto] [0] - [15]

DRAM IOL (CHB DIMM1 Rank0) [Auto]
Configuration options: [Auto] [0] - [15]

DRAM IOL (CHB DIMM1 Rank1) [Auto]
Configuration options: [Auto] [0] - [15]

> > > ***IO Latency offset***
> > > ***CHA IO_Latency_offset***
> > > Configuration options: [Auto] [0] - [127]
> > > ***CHB IO_Latency_offset***
> > > Configuration options: [Auto] [0] - [127]
> > > ***IO Latency RFR delay***
> > > ***CHA RFR delay***
> > > Configuration options: [Auto] [0] - [127]
> > > ***CHB RFR delay***
> > > Configuration options: [Auto] [0] - [127]

> **Third Timings**

> **tRDRD_sg [Auto]**

Configuration options: [Auto] [0] - [63]

> **tRDRD_dg [Auto]**

Configuration options: [Auto] [0] - [63]

> **tRDWR_sg [Auto]**

Configuration options: [Auto] [0] - [63]

> **tRDWR_dg [Auto]**

Configuration options: [Auto] [0] - [63]

> **tWRWR_sg [Auto]**

Configuration options: [Auto] [0] - [63]

> **tWRWR_dg [Auto]**

Configuration options: [Auto] [0] - [63]

> **tWRRD_sg [Auto]**

Configuration options: [Auto] [0] - [127]

> **tWRRD_dg [Auto]**

Configuration options: [Auto] [0] - [63]

> **tRDRD_dr [Auto]**

Configuration options: [Auto] [0] - [63]

> **tRDRD_dd [Auto]**

Configuration options: [Auto] [0] - [63]

> **tRDWR_dr [Auto]**

Configuration options: [Auto] [0] - [63]

> **tRDWR_dd [Auto]**

Configuration options: [Auto] [0] - [63]

> **tWRWR_dr [Auto]**

Configuration options: [Auto] [0] - [63]

tWRWR_dd [Auto]

Configuration options: [Auto] [0] - [63]

tWRRD_dr [Auto]

Configuration options: [Auto] [0] - [63]

tWRRD_dd[Auto]

Configuration options: [Auto] [0] - [63]

TWRPRE [Auto]

Configuration options: [Auto] [0] - [127]

TRDPRE [Auto]

Configuration options: [Auto] [0] - [15]

tREFIX9 [Auto]

Configuration options: [Auto] [0] - [127]

OREF_RI[Auto]

Configuration options: [Auto] [0] – [255]

Misc.

MRC Fast Boot [Auto]

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

DRAM CLK Period [Auto]

Configuration options: [Auto] [1] – [40]

Memory Scrambler [Enabled]

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

Channel A DIMM Control [Enable Both DIMMS]

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

Channel B DIMM Control [Enable Both DIMMS]

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

MCH Full Check [Auto]

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

DLLBwEn [Auto]

Configuration options: [Auto] [1] - [7]

DRAM SPD Write [Disabled]

For advanced DRAM programming only. Enable DRAM SPD Write to enable memory SMBus programming.

Internal CPU Power Management

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

Intel(R) SpeedStep(tm) [Auto]

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

Turbo Mode [Enabled]

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

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

Turbo Mode Parameters
Long Duration Package Power Limit [Auto]
Allows you to limit the Turbo Ratio's time duration that exceeds the TDP (Thermal Design Power) for maximum performance. Use the <+> and <-> keys to adjust the value.

Configuration options: [Auto] [1] - [4095]

Package Power Time Window [Auto]
Also known as Power Limit 1, and allows you to maintain the time window for Turbo Ratio over TDP (Thermal Design Power). Use the <+> and <-> keys to adjust the value.

Configuration options: [Auto] [1] - [127]

Short Duration Package Power Limit [Auto]
Also known as Power Limit 2, and allows you to provide rapid protection when the package power exceeds the Power Limit 1. Use the <+> and <-> keys to adjust the value.

Configuration options: [Auto] [1] - [4095]

IA AC Load Line [Auto]

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

IA DC Load Line [Auto]

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

CPU Core/Cache Current Limit Max. [Auto]

This item allows you to configure a higher current limit to prevent a frequency or power throttling when overclocking. Use the <+> and <-> keys to adjust the value.

Configuration options: [Auto] [0.00] - [255.50]

CPU Graphics Current Limit Max. [Auto]

Allows you to set a higher current limit to prevent a frequency or power throttling when overclocking. Use the <+> or <-> keys to adjust the value. The values range from 0.00A to 255.50A with a 0.25A interval.

Min. CPU Cache Ratio [Auto]

This item allows you to set the minimum possible CPU cache ratio. Use the <+> and <-> keys to adjust the value.

Configuration options: [Auto] [8] - [26]

Max. CPU Cache Ratio [Auto]

This item allows you to set the maximum possible CPU cache ratio. Use the <+> and <-> keys to adjust the value.

Configuration options: [Auto] [8] - [26]

Max. CPU Graphics Ratio [Auto]

Allows you to set the maximum possible CPU graphics ratio. Use the <+> or <-> keys to adjust the value. The values range from 1 to 60 with a 1 interval.

4.6   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.
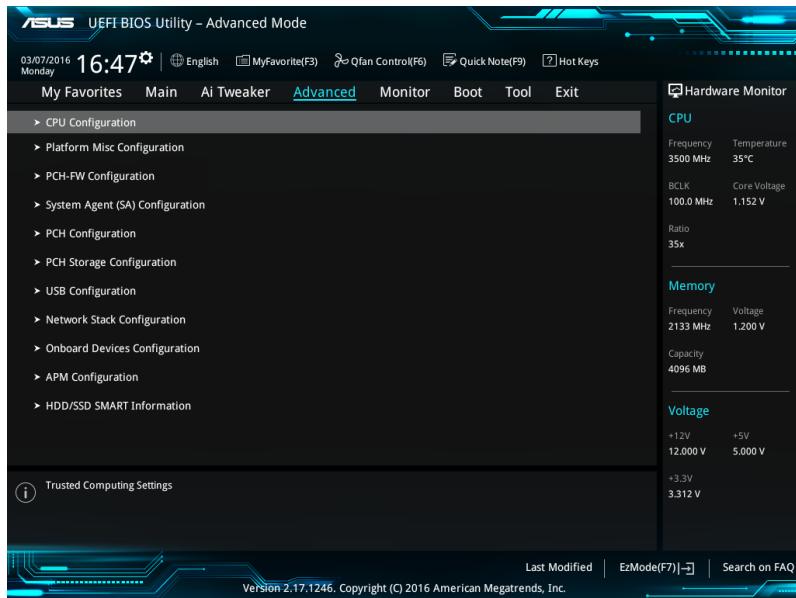
4.6.1 CPU Configuration

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 [Enabled]

This item allows a hyper-threading processor to appear as two logical processors, allowing the operating system to schedule two threads or processors simultaneously.

Configuration options: [Disabled] [Enabled]

Active Processor Cores [All]

This item allows you to select the number of CPU cores to activate in each processor package.

Configuration options: [All] [1] [2] [3]

Intel Virtualization Technology [Enabled]

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

Configuration options: [Disabled] [Enabled]

Hardware Prefetcher [Enabled]

This item allows the CPU to prefetch commands and data in the L2 cache, reduces the DRAM loading time and improves the system performance.

Configuration options: [Disabled] [Enabled]

Adjacent Cache Line Prefetcher [Enabled]

This item allows the mid level cache (L2) to prefetch adjacent cache lines, reducing the DRAM loading time and improves the system performance.

Configuration options: [Disabled] [Enabled]

Boot Performance Mode [Auto]

This item allows you to select the CPU performance state during system boot before the operating system takes control. The CPU runs at a selected performance ratio based on CPU configuration.

Configuration options: [Auto] [Max Non-Turbo Performance] [Max Battery] [Turbo Performance]

CPU Power Management Configuration

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

Intel(R) SpeedStep(tm) [Auto]

This item allows more than two frequency to be supported.
Configuration options: [Auto] [Enabled] [Disabled]

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]

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

Enhanced C-States [Enabled]
When enabled, CPU will switch to minimum speed when all cores enter C-State.

Configuration options: [Enabled] [Disabled]

CPU C3 Report [Enabled]
This item allows you to disable or enable the CPU C3 report to the operating system.

Configuration options: [Enabled] [Disabled]

CPU C6 Report [Enabled]
This item allows you to disable or enable the CPU C6 report to the operating system.

Configuration options: [Enabled] [Disabled]

CPU C7 Report [CPU C7s]
This item allows you to disable or enable the CPU C7 report to the operating system.

Configuration options: [CPU C7] [CPU C7s] [Disabled]

CPU C8 Report [Enabled]
This item allows you to disable or enable the CPU C8 report to the operating system.

Configuration options: [Enabled] [Disabled]

Package C State Limit [Auto]
This item allows you to set the a C-state limit for the CPU package.
Configuration options: [Auto] [C0/C1] [C2] [C3] [C6] [C7] [C7s] [C8]

CFG Lock [Disabled]

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

4.6.2   Platform Misc Configuration

The items in this menu allow you to configure the platform-related features.
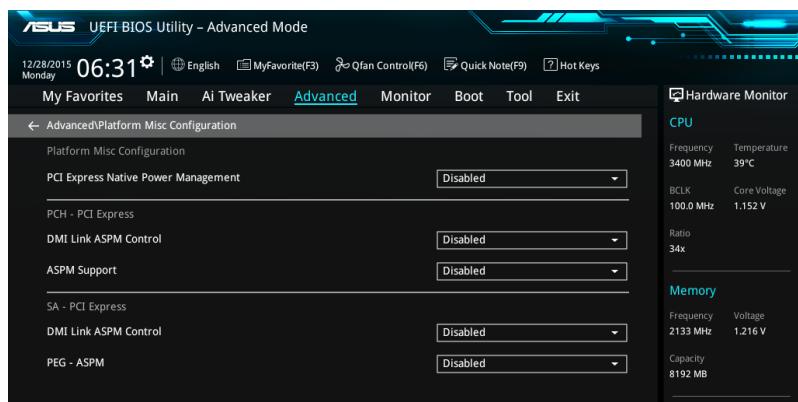
PCIE Native Power Management [Disabled]

This item allows you to enhance the power saving feature of PCI Express and perform ASPM operations in the operating system.

Configuration options: [Disabled] [Enabled]

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

Native ASPM [Disabled]

[Enabled]   Windows® Vista OS controls the ASPM (active state power management) support for devices.

[Disabled]   BIOS controls the ASPM support for the device.

PCH - PCI Express

DMI Link ASPM Control [Disabled]

This item allows you to control the Active State Power Management on both NB (NorthBridge) side and SB (SouthBridge) side of the DMI Link.

Configuration options: [Disabled] [Enabled]

ASPM Support [Disabled]

This item allows you to select the ASPM state for energy-saving conditions.

Configuration options: [Disabled] [L0s] [L1] [L0sL1] [Auto]

SA - PCI Express

DMI Link ASPM Control [Disabled]

This item allows you to control the Active State Power Management on both CPU and PCH (platform controller hub) Both DMI link ASPM control items of the CPU and PCH sides must be enabled for the ASPM to take effect.

Configuration options: [Disabled] [L1]

PEG ASPM [Disabled]

This item allows you to select the ASPM state for energy-saving conditions, or use the ASUS optimized energy saving profile.

Configuration options: [Disabled] [Auto] [ASPM L0s] [ASPM L1] [ASPM L0sL1]

4.6.3 PCH-FW Configuration
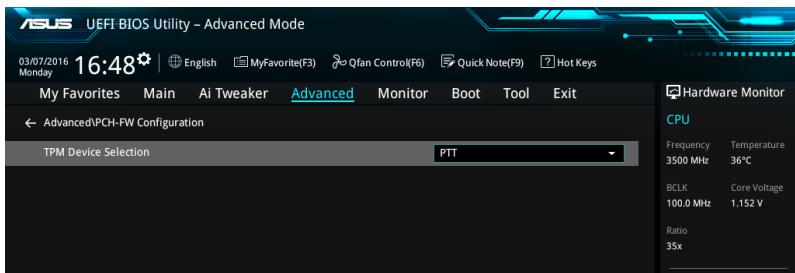
TPM Device Selection [PTT]

This item allows you to select a TPM device.

[PTT]   Enables PTT in SkuMgr

[dTPM 1.2]   Disables PTT in SkuMgr

⚠ PTT/dTPM will be disabled and all data saved on it will be lost.

4.6.4 System Agent (SA) Configuration
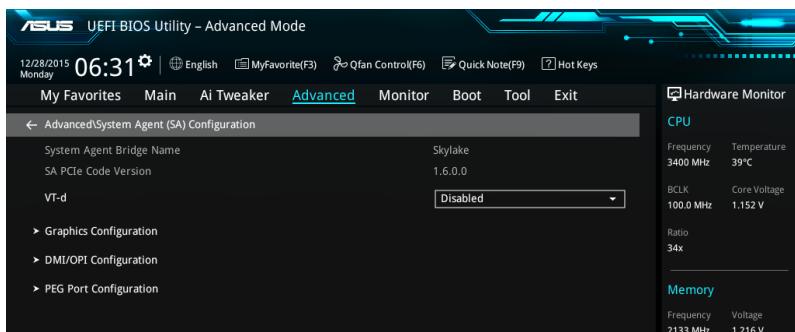
VT-d [Disabled]

Allows you to enable virtualization technology function on memory control hub.

Configuration options: [Enabled] [Disabled]

Graphics Configuration

This item allows you to select a primary display from CPU and PCIe graphical devices.

iGPU Multi-Monitor [Disabled]

Set this item to [Enabled] to empower both integrated and discrete graphics for multi-monitor output. iGPU shared system memory size will be fixed at 64M.
Configuration options: [Enabled] [Disabled]

RC6(Render Standby) [Enabled]

Enable this item for render standby support.
Configuration options: [Enabled] [Disabled]

DVMT Pre-Allocated [32M]

Select DVMT 5.0 Pre-Allocated (Fixed) Graphics Memory size used by the Internal Graphics Device.
Configuration options: [32M] [64M] [96M] [128M] [160M] [192M] [224M] [256M] [288M] [320M] [352M] [384M] [416M] [448M] [480M] [512M]

DMI/OPI Configuration

This item allows you to control various DMI (direct media interface) functions.

DMI Max Link Speed [Auto]

Set this item to **[Enabled]** to set DMI speed.
Configuration options: [Auto] [Gen1] [Gen2] [Gen3]

PEG Port Configuration

This item allows you to configure the PEG Port settings.

PCIEx16_1 Link Speed [Auto]

This item allows you to configure the PCIEx16_1 slot.
Configuration options: [Auto] [Gen1] [Gen2] [Gen3]

PCIEx16_2 Link Speed [Auto]

This item allows you to configure the PCIEx16_2 slot.
Configuration options: [Auto] [Gen1] [Gen2] [Gen3]

4.6.5   PCH Configuration
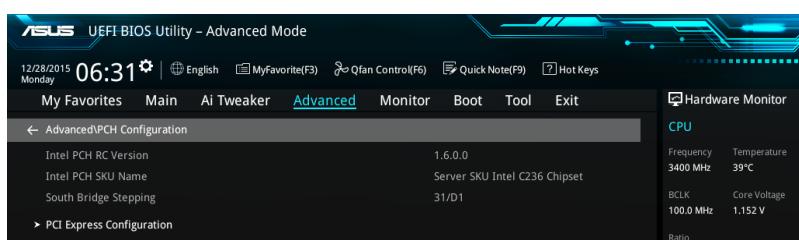
PCI Express Configuration

This item allows you to configure the PCI Express slots.

PCIe Speed [Auto]

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

4.6.6   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.
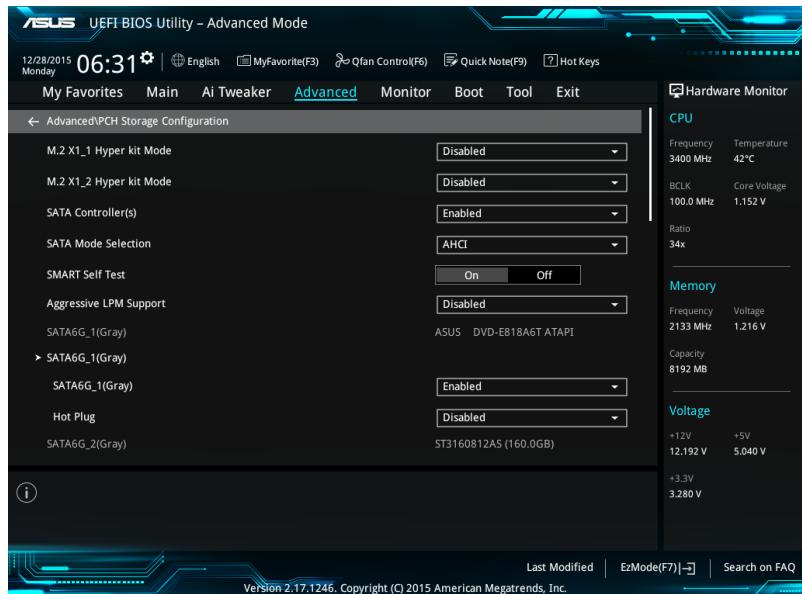
M.2 X1_1 Hyper kit Mode [Disabled]

Disable this option for M.2 devices. Enable this option for "ASUS Hyper kit" card.

Configuration options: [Disabled] [Enabled]

M.2 X1_2 Hyper kit Mode [Disabled]

Disable this option for M.2 devices. Enable this option for "ASUS Hyper kit" card.

Configuration options: [Disabled] [Enabled]

SATA Controller(s) [Enabled]

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

Configuration options: [Disabled] [Enabled]

SATA Mode Selection [AHCI]

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.

SMART Self Test [On]

SMART (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]

Aggressive LPM Support [Disabled]

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

Configuration options: [Disabled] [Enabled]

SATA6G_1(Gray) - SATA6G_8(Gray)

SATA6G_1(Gray) - SATA6G_8(Gray) [Enabled]

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

Hot Plug [Disabled]

These items 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]

4.6.7 USB Configuration

The items in this menu allow you to change the USB-related features.
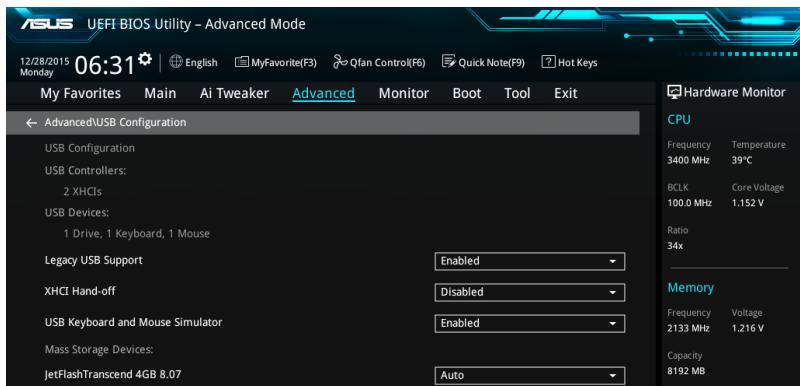
> The **Mass Storage Devices** item shows the auto-detected values. If no USB device is detected, the item shows **None**.

Legacy USB Support [Enabled]

[Enabled]   Your system supports the USB devices in legacy operating systems.

[Disabled]   Your USB devices can be used for BIOS setup only and cannot be recognized in the boot devices list.

[Auto]   Your system automatically detects the presence of USB devices at startup. If any USB devices are detected, the legacy USB support is enabled.

XHCI Hand-off [Disabled]

[Enabled]   Enables the support for operating systems without an XHCI hand-off feature.

[Disabled]   Disables the XHCI Hand-off support.

USB Keyboard and Mouse Simulator [Enabled]

[Enabled]   Enables the support for operating systems without a USB keyboard and mouse feature to simulate a USB keyboard and mouse in Windows 7.

[Disabled]   Disables the USB Keyboard and Mouse Simulator.

> Ensure to install USb driver in your system before you disable this item.

USB Single Port Control

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

> Refer to section **3.1 Motherboard layout** for the location of the USB ports.

4.6.8   Network Stack Configuration
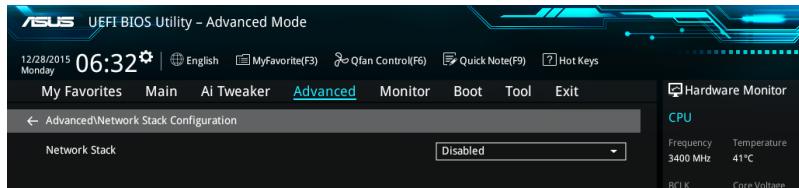
Network stack [Disable]

This item allows you to disable or enable the UEFI network stack.

Configuration options: [Disable] [Enable]

> The following item appears only when you set the Network Stack to **[Enabled]**.

Ipv4/Ipv6 PXE Support [Enabled]

This item allows you to enable or disable the Ipv4/Ipv6 PXE wake event.
Configuration options: [Disabled] [Enabled]

4.6.9   Onboard Devices Configuration

Scroll down to view the other BIOS items.
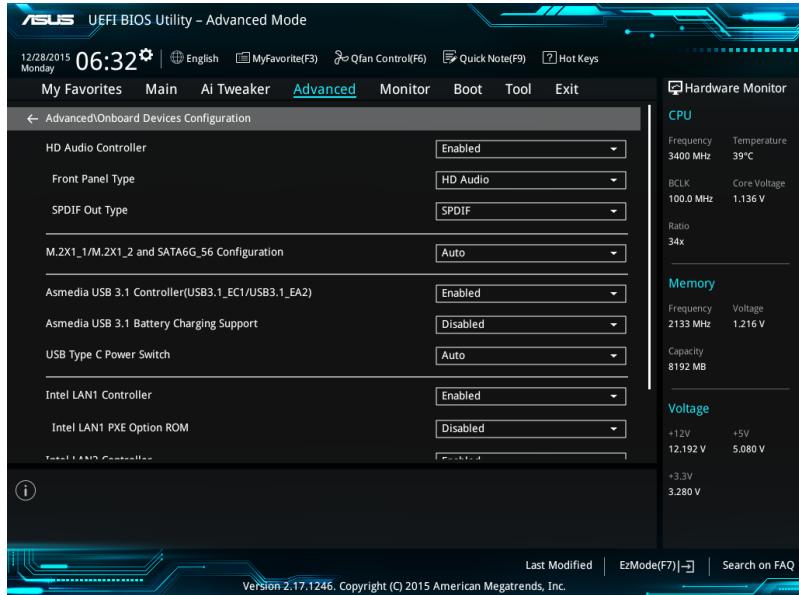
HD Audio Controller [Enabled]

This item allows you to use the Azalia High Definition Audio Controller

Configuration options: [Disabled] [Enabled]

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

Front Panel Type [HD Audio]

This item allows you to set the front panel audio connector (AAFP) mode to legacy AC'97 or high-definition audio depending on the audio standard that the front panel audio module supports.

[HD Audio]   Sets the front panel audio connector (AAFP) mode to high definition audio.

[AC97]   Sets the front panel audio connector (AAFP) mode to legacy AC'97

SPDIF Out Type [SPDIF]

[SPDIF]   Sets to an SPDIF audio output.

[HDMI]   Sets to an HDMI audio output.

M.2X1_1/ M.2X1_2 and SATA6G_56 Configuration [Auto]

This item allows you to set the SATA6G_56 Configuration.

[Auto]   M.2 have higher priority than SATA6G_56. SATA6G_56 are no function when any M.2 device is present.

[SATA6G_56]   SATA6G_56 is always available. M.2 are no function.

ASMedia USB 3.1 Controller(USB3.1_EC1/USB3.1EA2) [Enabled]

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

Configuration options: [Disabled] [Enabled]

ASMedia USB 3.1 Battery Charging Support [Disabled]

This item allows you to disable or enable the ASMedia USB 3.1 battery charging support of your system.

Configuration options: [Disabled] [Enabled]

USB Type C Power Switch [Auto]

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

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

Intel LAN1/LAN2 Controller [Enabled]

This item allows you to enable or disable the Intel LAN1/2 controllers.

Configuration options: [Disabled] [Enabled]

The following item appears only when you set the Intel LAN Controller to **[Enabled]**.

Intel PXE Option ROM LAN1/LAN2 [Disabled]

This item allows you to enable or disable the PXE Option Rom of the Intel® LAN controller.

Configuration options: [Enabled] [Disabled]

Serial Port Configuration

Serial Port [On]

This item allows you to enable or disable the Serial Port.

Configuration options: [On] [Off]

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

This item allows you to select an optimal setting for Super IO device.

Configuration options: [IO=3F8h; IRQ=4] [IO=2F8h; IRQ=3] [IO=3E8h; IRQ=4] [IO=2E8h; IRQ=3]

4.6.10   APM Configuration
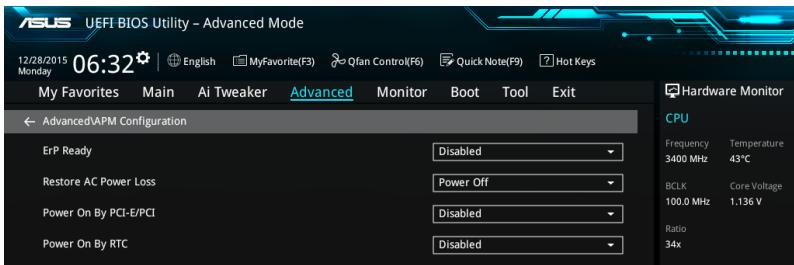
ErP Ready [Disabled]

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

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

Restore AC Power Loss [Power Off]

This item allows your system to go to ON state, OFF state, or both states after an AC power loss. When setting your system to [Last State], it goes to the previous state before the AC power loss.

Configuration options: [Power Off] [Power On] [Last State]

Power On By PCI-E/PCI [Disabled]

This item allows you to enable or disable the Wake-on-LAN function of the onboard LAN controller or other installed PCI-E LAN cards.

Configuration options: [Disabled] [Enabled]

Power On By RTC [Disabled]

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

Configuration options: [Disabled] [Enabled]

4.6.11 HDD/SSD SMART Information

This menu displays the SMART information of the connected devices.

4.7 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.
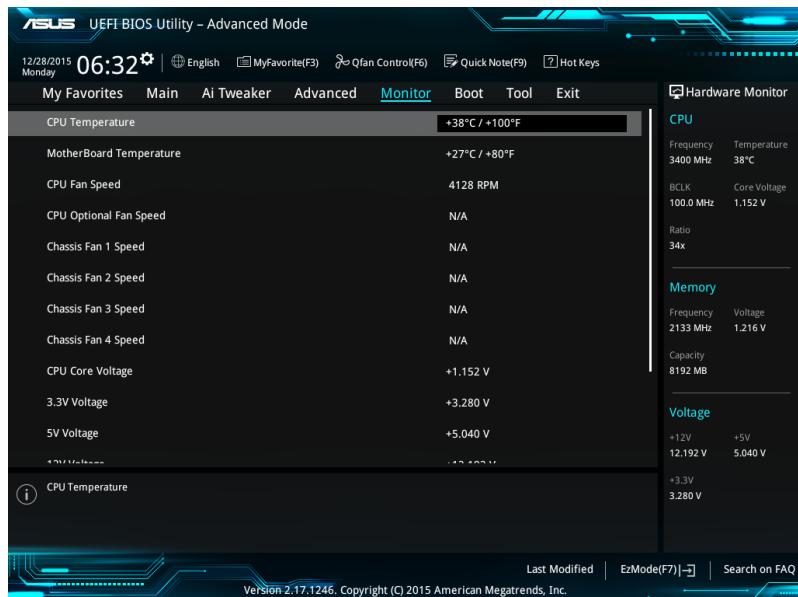
CPU Temperature / Motherboard Temperature [xxx°C/xxx°F]

The onboard hardware monitor automatically detects and displays the CPU, motherboard, VRM, PCH Core, and SENSOR1 temperatures. Select **[Ignore]** if you do not wish to display the detected temperatures.

CPU Fan Speed, CPU Optional Fan, Chassis Fan 1-4 Speed [xxxx RPM] or [Ignore] / [N/A]

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

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

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

Qfan Configuration

Qfan Tuning

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

CPU Q-Fan Control [Auto]

[Auto]	Detect the type of CPU fan installed and automatically switches the mode control.
[PWM Mode]	Enable the CPU Q-Fan control feature in PWM mode for 4-pin CPU fan.
[DC Mode]	Enable the CPU Q-Fan control feature in DC mode for 3-pin CPU fan.
[Disabled]	Disable the Q-Fan control.

CPU Fan Step Up [0 sec]

This item allows you to set the value of the CPU fan step up.
Configuration options: [0 sec] [2.1 sec] [2.8 sec] [3.6 sec] [4.5 sec] [5.0 sec] [6.3 sec] [8.5 sec] [12 sec] [25 sec]

CPU Fan Step Down [0 sec]

This item allows you to set the value of the CPU fan step down.
Configuration options: [0 sec] [2.1 sec] [2.8 sec] [3.6 sec] [4.5 sec] [5.0 sec] [6.3 sec] [8.5 sec] [12 sec] [25 sec]

CPU Fan Speed Lower Limit [200 RPM]

This item allows you to set the low limit warning for CPU Fan speed.
Configuration options: [Ignore] [200 RPM] [300 RPM] [400 RPM] [500 RPM] [600 RPM]

CPU Fan Profile [Standard]

This item allows you to set the appropriate performance level of the CPU fan.

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

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

CPU Upper Temperature [70]
Use the <+> or <-> keys to adjust the upper limit of the CPU temperature. The values range from 25 to 75.

CPU Fan Max. Duty Cycle (%) [100]
Use the <+> or <-> keys to adjust the maximum CPU fan duty cycle. The values range from 20% to 100%. When the CPU temperature reaches the upper limit, the CPU fan will operate at the maximum duty cycle.

CPU Middle Temperature [25]
Use the <+> or <-> keys to adjust the middle limit of the CPU temperature. The values range from 20 to 75.

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

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

CPU Lower Temperature [20]

Use the <+> or <-> keys to adjust the lower limit of the CPU temperature. The values range from 20 to 75. The CPU fan will operate at the minimum duty cycle when the temperature is lower than the limit.

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

Use the <+> or <-> keys to adjust the minimum CPU fan duty cycle. The values range from 0% to 100%. When the CPU temperature is under the limit, the CPU fan will operate at the minimum duty cycle.

Chassis Fan(s) Configuration

Chassis Fan 1-4 Q-Fan Control [DC Mode]

[Disabled]   Disable the Chassis Q-Fan control feature.

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

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

Chassis Fan 1-4 Q-Fan Source [CPU]

The assignment fan will be controlled according to the selected temperature source. Configuration options: [CPU] [MotherBoard] [PCH] [T_SENSOR1]

> For T_SENSOR1, connect a Thermistor cable to the T_SENSOR1 header then place the other end to the component to get the temperature.

Chassis Fan 1-4 Step Up [0 sec]

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

Chassis Fan 1-4 Step Down [0 sec]

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

Chassis Fan 1-4 Fan Speed Low Limit [200 RPM]

This item allows you to disable or set the chassis fan warning speed.
Configuration options: [Ignore] [200 RPM] [300 RPM] [400 RPM] [500 RPM] [600 RPM]

Chassis Fan 1-4 Profile [Standard]

This item allows you to set the appropriate performance level of the chassis fan.

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

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

[Turbo]   Sets to [Turbo] to achieve maximum chassis fan speed.
[Manual]   Sets to [Manual] to assign detailed fan speed control parameters.

The following four items appear only when you set Chassis Fan 1-4 Profile to **[Manual].**

Chassis Fan 1-4 Upper Temperature [70]
Use the <+> or <-> keys to adjust the upper limit of the Chassis Fan 1-4 temperature. The values range from 20 to 75.

Chassis Fan 1-4 Max. Duty Cycle (%) [100]
Use the <+> or <-> keys to adjust the maximum Chassis Fan 1-4 duty cycle. The values range from 20% to 100%. When the CPU temperature reaches the upper limit, the Chassis Fan 1-4 will operate at the maximum duty cycle.

Chassis Fan 1-4 Middle Temperature [45]
Use the <+> or <-> keys to adjust the middle limit of the Chassis Fan 1-4 temperature. The values range from 20 to 75.

Chassis Fan 1-4 Middle. Duty Cycle (%) [60]
Use the <+> or <-> keys to adjust the maximum Chassis Fan 1-4 duty cycle. The values range from 20% to 100%. When the CPU temperature reaches the middle limit, the Chassis Fan 1-4 will operate at the middle duty cycle.

Chassis Fan 1-4 Lower Temperature [40]
Use the <+> or <-> keys to adjust the lower limit of the Chassis Fan 1-4 temperature. The values range from 20 to 75. The Chassis Fan 1-4 will operate at the minimum duty cycle when the temperature is lower than the limit.

Chassis Fan 1-4 Min. Duty Cycle(%) [60]
Use the <+> or <-> keys to adjust the minimum Chassis Fan 1-4 fan duty cycle. The values range from 0% to 100%. When the CPU temperature is under the limit, the Chassis Fan 1-4 fan will operate at the minimum duty cycle.

Anti Surge Support [On]

Enable this item for Over Voltage Protection (OVP) and Under Voltage Protection (UVP) functions.

Configuration options: [On] [Off]

Chassis Intrude Detect Support [Off]

Enable this item for Chassis Intrude Detect Support function.

Configuration options: [On] [Off]

4.8 Boot menu

The Boot menu items allow you to change the system boot options.
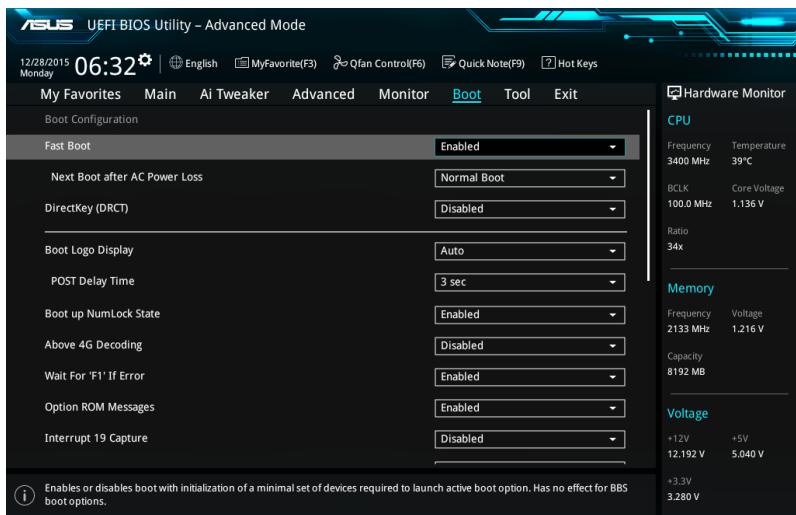
Fast Boot [Enabled]

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

[Enabled]   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]

[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.

Boot Logo Display [Auto]

[Auto]   Sets the boot logo to display during POST.

[Full Screen]   Sets the boot logo display in full screen during POST.

[Disabled]   Disables the boot logo display during POST.

> The following item appears only when you set the Boot Logo Display to **[Auto]** and **[Full Screen]**.

Post Delay Time [3 sec]

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

This feature only works when set under normal boot.

The following items appear only when you set the Boot Logo Display to **[Disabled]**.

Post Report [5 sec]

This item allows you to select a desired POST report waiting time.
Configuration options: [1 sec] - [10 sec] [Until Press ESC]

Bootup NumLock State [Enabled]

This item allows you to enable or disable power-on state of the NumLock.

Configuration options: [Disabled] [Enabled]

Above 4G Decoding [Disabled]

This item enables or disables 64-bit capable devices to be decoded in above 4G address space if your system supports 64-bit PCI Decoding.

Configuration options: [Enabled] [Disabled]

Wait For 'F1' If Error [Enabled]

This item allows your system to wait for the <F1> key to be pressed when error occurs.

Configuration options: [Disabled] [Enabled]

Option ROM Messages [Enabled]

[Enabled]   The Option ROM Messages will be shown during the POST.

[Disabled]   Only the ASUS logo will be shown during the POST.

Interrupt 19 Capture [Disabled]

[Enabled]   Execute the trap right away.

[Disabled]   Execute the trap during legacy boot.

Setup Mode [EZ 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]   Disable the CSM to fully support the non-UEFI driver add-on devices or the Windows® UEFI mode.

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

Boot Devices Control [UEFI and Legacy OPROM]
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 PCI-E/PCI Expansion Devices [Legacy only]
This item allows you to select the type of PCI-E/PCI expansion devices that you want to launch.

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

Secure Boot

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

OS Type [Windows UEFI mode]

[Windows UEFI Mode]   This item allows you to select your installed operating system. Execute the Microsoft® Secure Boot check. Only select this option when booting on Windows® UEFI mode or other Microsoft® Secure Boot compliant OS.

[Other OS]   Get the optimized function when booting on Windows® non-UEFI mode. Microsoft® Secure Boot only supports Windows® UEFI mode.

Key Management

Clear Secure Boot Keys

This item allows you to clear all default Secure Boot keys.

Save Secure Boot Keys

This item allows you to save the PK (Platform Keys) to a USB storage device.

PK Management

Set New Key

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

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

Delete Key

This item allows you to delete the PK from your system. Once the PK is deleted, all the system's Secure Boot keys will not be active.
Configuration options: [Yes] [No]

KEK Management

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

Delete Key

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

Set New Key

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

Append Key

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

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

DB Management

Delete Key

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

Set New Key

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

Append Key

Allows you to load the additional db from a storage device so that more images can be loaded securely.

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

DBX Management

Delete Key

Allows you to delete the dbx file from your system.

Set New Key

Allows you to load the downloaded dbx from a USB storage device.
Configuration options: [Yes] [No]

Append Key

Allows you to load the additional dbx from a storage device so that more db's images cannot be loaded.

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

Boot Option Priorities

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

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

Boot Override

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

4.9   Tool menu

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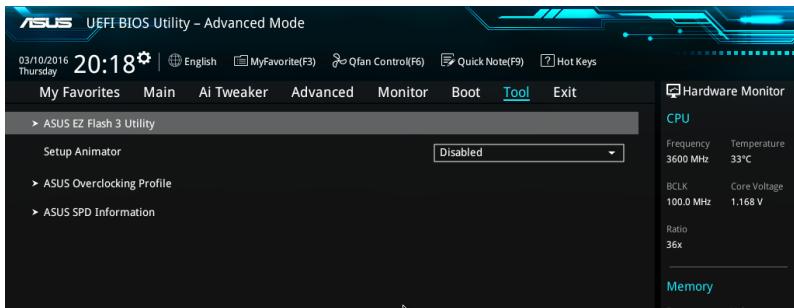
Setup Animator [Disabled]

This item allows you to enable or disable the Setup animator.

Configuration options: [Disabled] [Enabled]

4.9.1   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 **4.11.2 ASUS EZ Flash 3**.

4.9.2 ASUS Overclocking Profile

This item allows you to store or load multiple BIOS settings.
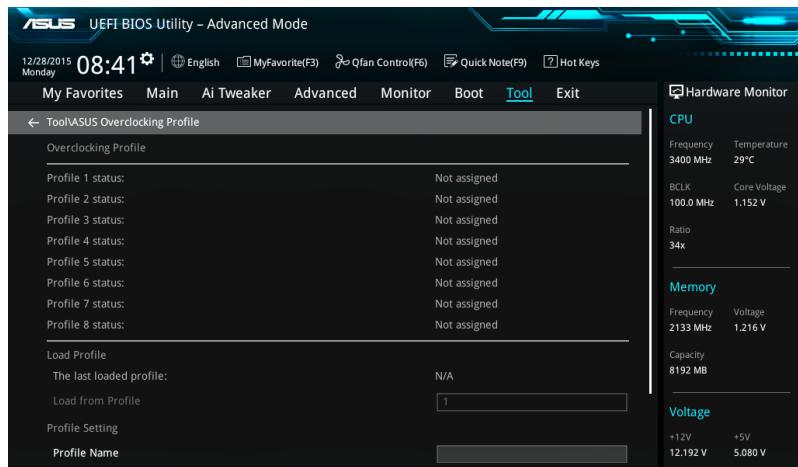
Load from Profile

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.

4.9.3 ASUS SPD Information

This item allows you to view the DRAM SPD information.

4.10   Exit menu

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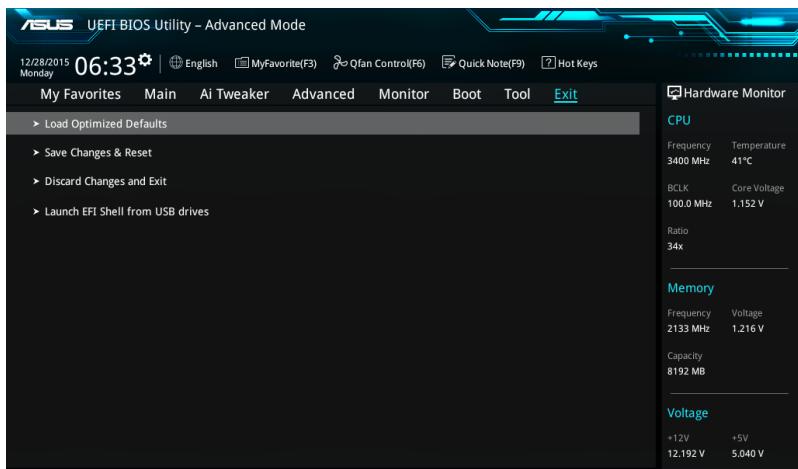
Load Optimized Defaults

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

Save Changes & Reset

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

Discard Changes & Exit

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

Launch EFI Shell from filesystem device

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

4.11   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.

4.11.1   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.
>
> •   Refer to section **6.4.3 EZ Update** of this user guide for more information.

4.11.2 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.**
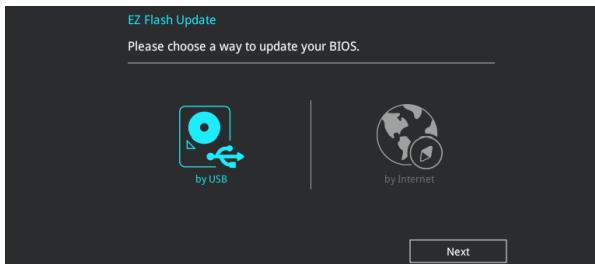
4. Press <Tab> to switch to the Drive field.

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 **4.10 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.**
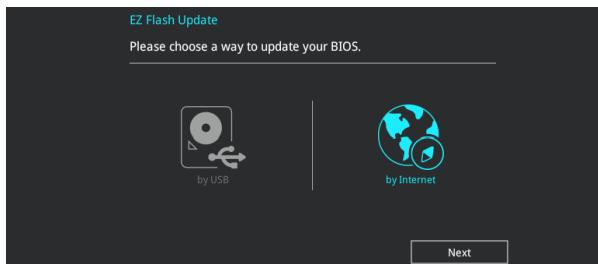
3. Press the Left/Right arrow keys to select an Internet connection method, and then press <Enter>.
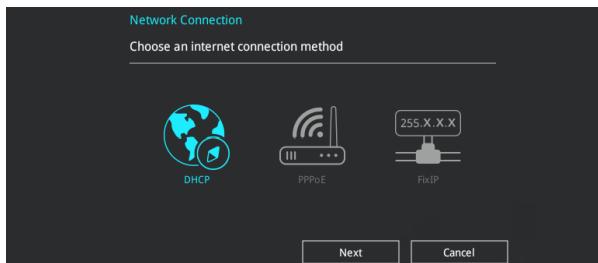
4. Follow the onscreen instructions to complete the update.

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 **4.10 Exit Menu** for details.

4.11.3 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 Configuration

5

This chapter provides instructions for setting up, creating, and configuring RAID sets using the available utilities.

5.1   RAID configurations

The motherboard supports Intel® Rapid Storage Technology enterprise Option ROM Utility with RAID 0, RAID 1, RAID 10, and RAID 5 support.

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 **5.2 Creating a RAID driver disk** for details.

5.1.1   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 stripes 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.

5.1.2 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.

5.1.3 Setting the RAID item in BIOS

You must enable the RAID function in the BIOS Setup before creating RAID sets using SATA HDDs.

To set the RAID item in BIOS:

1. Enter the BIOS Setup during POST.

2. Go to the **Advanced** menu > **SATA Configuration**, then press <Enter>.

3. Set the SATA Mode item to **[RAID Mode]**.

4. Save your changes, and then exit the BIOS Setup.

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.

5.1.4 Intel® Rapid Storage Technology enterprise SATA Option ROM Utility

The Intel® Rapid Storage Technology enterprise SATA Option ROM utility allows you to create RAID 0, RAID 1, RAID 10 (RAID 1+0), and RAID 5 set from Serial ATA hard disk drives that are connected to the Serial ATA connectors supported by the Southbridge.

To launch the Intel® Rapid Storage Technology enterprise SATA 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 enterprise - SATA Option ROM - 3.6.0.1023
            Copyright(C) 2003-12 Intel Corporation.  All Rights Reserved.
  ========================================[ MAIN MENU ]========================================
            1. Create RAID Volume               3. Reset Disks to Non-RAID
            2. Delete RAID Volume               4. Exit


  ==================================[ DISK/VOLUME INFORMATION]==================================
        RAID Volumes:
        None defined.

        Physical Disks:
        ID  Drive Model    Serial #              Size      Type/Status(Vol ID)
        0   ST3300656SS    HWAS0000991753TR      279.3GB   Non-RAID Disk
        1   ST3300656SS    37VN00009846RAJ1      279.3GB   Non-RAID Disk
        2   ST3300656SS    397600009846UEDY      279.3GB   Non-RAID Disk
        3   ST3300656SS    GWC50000991756G6      279.3GB   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.

5.1.5   Creating a RAID set

To create a RAID set:

1.   From the utility main menu, select **1. Create RAID Volume** and press <Enter>.

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

```
    Intel(R) Rapid Storage Technology enterprise - SATA Option ROM - 3.6.0.1023
           Copyright(C) 2003-12 Intel Corporation.  All Rights Reserved.
    ========================= [ CREATE VOLUME MENU ] =========================
                           Name:  Volume0
                     RAID Level:  RAID0(Strips)
                          Disks:  Select Disks
                     Strip Size:  128KB
                       Capacity:  0.0  GB
                           Syne:  N/A
                                  Create Volume

    ============================== [ HELP ] ==============================



         Enter a unique volume name that has no special characters and is
                           16 characters or less.




    [↑↓]Change        [TAB]-Next        [ESC]-Previous Menu      [ENTER]-Select
```

3.   Press the up/down arrow keys to select a RAID Level that you wish to create then press <Enter>.

4.   From the **Disks** item field, press <Enter> to select the hard disk drives that you want to include in the RAID set.

```
                      ========== [ SELECT DISKS ] ==========

    Port  Drive Model   Serial #              Size        Status
    0     ST3300656SS   HWAS0000991753TR      279.3GB     Non-RAID Disk
    1     ST3300656SS   37VN00009846RAJ1      279.3GB     Non-RAID Disk
    2     ST3300656SS   397600009846UEDY      279.3GB     Non-RAID Disk
    3     ST3300656SS   GWC50000991756G6      279.3GB     Non-RAID Disk

         Select 1 Master and 1 Recovery disk to create volume.

    ===== [↑↓]-Prev/Next [TAB]-(M)aster [SPACE]-(R)ecovery [ENTER]-Done =====
```

5.   Use the up/down arrow keys to move the selection bar then press <Space> to select a disk. A small triangle before the Port number marks the selected drive. Press <Enter> when you are done.

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

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

7.	In the **Capacity** field item, key in the RAID volume capacity that you want to use and press <Enter>. The default value field indicates the maximum allowed capacity.

8.	Press <Enter> to start creating the RAID volume.

9.	From the following warning message, press <Y> to create the RAID volume and return to the main menu, or press <N> to go back to the **CREATE VOLUME** menu.

```
WARNING: ALL DATA ON SELECTED DISKS WILL BE LOST.

Are you sure you want to create this volume? (Y/N):
```

5.1.6   Deleting a RAID set

⚠️ Take caution 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>.

2.   From the Delete Volume Menu, press the up/down arrow keys to select the RAID set you want to delete then press <Del>.

```
      Intel(R) Rapid Storage Technology enterprise - SATA Option ROM - 3.6.0.1023
            Copyright(C) 2003-12 Intel Corporation.  All Rights Reserved.
   ═══════════════════════════════[ DELETE VOLUME MENU ]═══════════════════════════

     Name         Level         Drives      Capacity      Status      Bootable
     Volume0      RAID0(Stripe)    2          298.0GB      Normal      Yes




   ══════════════════════════════════════[ HELP ]══════════════════════════════════


             Deleting a volume will reset the disks to non-RAID

                     WARNING: ALL DISK DATA WILL BE DELETED.
                     (This does not apply to Recovery volumes)



   ═════════════════════════════════════════════════════════════════════════════════
       [↑↓]-Select              [ESC]-Previous Menu         [DEL]-Delete Volume
```

3.   Press <Y> to confirm deletion of the selected RAID set and return to the utility main menu, or press <N> to return to the **DELETE VOLUME** menu.

```
   ═══════════════════[ DELETE VOLUME VERIFICATION ]═══════════════════

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

          Are you sure you want to delete volume "Volume0"? (Y/N):
```

5.1.7   Resetting disks to Non-RAID

> ⚠ Take caution before you reset a RAID volume hard disk drive to non-RAID. Resetting a RAID volume hard disk drive deletes all internal RAID structure on the drive.

To reset a RAID set:

1. From the utility main menu, select **3. Reset Disks to Non-RAID** and press <Enter>.

2. Press the up/down arrow keys to select the drive(s) or disks of the RAID set you want to reset, then press <Space>. A small triangle before the Port number marks the selected drive. Press <Enter> when you are done.

```
┌─────────────────────── [ RESET RAID DATA ] ───────────────────────┐
        Resetting RAID disk will remove its RAID structures
        and revert it to a non-RAID disk.

  WARNING: Resetting a disk causes all data on the disk to be lost.
  (This does not apply to Recovery volumes)

  Port  Drive Model      Serial #            Size        Status
  0     ST3300656SS      HWAS0000991753TR    279.3GB     Member Disk
  1     ST3300656SS      37VN00009846RAJ1    279.3GB     Member Disk

             Select the disks that should be reset.

└═══ [↑↓]-Previous/Next [SPACE]-Selects [ENTER]-Selection Complete ═══┘
```

3. Press <Y> in the confirmation window to reset the drive(s) or press <N> to return to the utility main menu.

5.1.8 Exiting the Intel® Rapid Storage Technology enterprise SATA Option ROM utility

To exit the utility:

1.   From the utility main menu, select **4. Exit** then press <Enter>.

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

```
╔═════════════════════[ CONFIRM EXIT ]═════════════════════╗
║                                                          ║
║              Are you sure you want to exit? (Y/N):       ║
║                                                          ║
╚══════════════════════════════════════════════════════════╝
```

5.1.9 Rebuilding the RAID

This option is only for the RAID 1 set.

Rebuilding the RAID with other non-RAID disk

If any of the SATA hard disk drives included in the RAID 1 array failed, the system displays the status of the RAID volume as "**Degraded**" during POST. You can rebuild the RAID array with other installed non-RAID disks.

To rebuild the RAID with other non-RAID disk:

1.   During POST, press <Ctrl>+<I> at the prompt to enter the Intel® Rapid Storage Technology enterprise.

2.   If there is a non-RAID SATA Hard Disk available, the utility will prompt you to rebuild the RAID. Press the up/down arrow keys to select the destination disk then Press <Enter> to start the rebuilding process, or press <ESC> to exit.

```
╔═══════════════[ DEGRADED VOLUME DETECTED ]═══════════════╗
║                                                          ║
║ "Degraded" volume and disk available for rebuilding detected. Selectign ║
║ a disk initiates a rebuild. Rebuild completes in the operating system.  ║
║                                                          ║
║   Select the port of destination disk for rebuilding (ESC to exit):   ║
║   Port  Drive Model   Serial #          Size             ║
║   X     XXXXXXXXXXX   XXXXXXXX           XXX.GB           ║
║                                                          ║
║                                                          ║
╚═══════════[↑↓]-Previous/Next [ENTER]-Select [ESC]-Exit═══╝
```
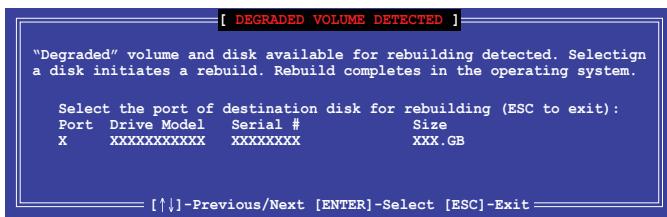
Select a destination disk with the same size as the original hard disk.

3.   The utility immediately starts rebuilding after the disk is selected. When done, the status of the degraded RAID volume is changed to "**Rebuild**".

```
Intel(R) Rapid Storage Technology enterprise - SATA Option ROM - 3.6.0.1023
        Copyright(C) 2003-12 Intel Corporation.  All Rights Reserved.
┌─────────────────────────────[ MAIN MENU ]─────────────────────────────┐
│     1. Create RAID Volume           3. Reset Disks to Non-RAID         │
│     2. Delete RAID Volume           4. Exit                            │
│                                                                        │
│                                                                        │
├──────────────────────[ DISK/VOLUME INFORMATION]──────────────────────┤
│   RAID Volumes:                              *=Data is Encrypted       │
│   ID   Name        Level1        Strip       Size   Status    Bootable │
│   1    Volume0    RAID1(Mirror)  N/A        149.0GB  Rebuild   Yes      │
│                                                                        │
│   Physical Devices:                                                    │
│   Port  Drive Model   Serial #          Size      Type/Status(Vol ID)  │
│   1     ST3160812AS   9LS0F4HL         149.0GB    Member Disk(0)        │
│   2     ST3160812AS   3LS0JYL8         149.0GB    Member Disk(0)        │
│                                                                        │
│                                                                        │
│                                                                        │
│   Volumes with "Rebuild" status will be rebuilt within the operating system. │
└────────────────────────────────────────────────────────────────────────┘
    [↑↓]-Select              [ESC]-Exit          [ENTER]-Select Menu
```

4.   Press <Esc> to exit Intel® Rapid Storage Technology enterprise and reboot the system.

5.   Select **Start > Programs > Intel Rapid Storage > Intel Rapid Storage Console** or click the **Intel® Rapid Storage Technology enterprise** tray icon to load the Intel Rapid Storage Manager utility.

6.   From the **View** menu, select **Advanced Mode** to display the details of the Intel Rapid Storage Console.

7.   From the Volumes view option, select **RAID volume** to view the rebuilding status. When finished, the status is changed to "**Normal**".

Rebuilding the RAID with a new hard disk

If any of the SATA hard disk drives included in the RAID array failed, the system displays the status of the RAID volume as "**Degraded**" during POST. You may replace the disk drive and rebuild the RAID array.

To rebuild the RAID with a new hard disk:

1.   Remove the failed SATA hard disk and install a new SATA hard disk of the same specification into the same SATA Port.

> Select a destination disk with the same size as the original hard disk.

2.   Reboot the system then follow the steps in section **Rebuilding the RAID with other non-RAID disk**.

5.1.10 Setting the Boot array in the BIOS Setup Utility

You can set the boot priority sequence in the BIOS for your RAID arrays when creating multi-RAID using the Intel® Rapid Storage Technology enterprise SATA Option ROM utility.

To set the boot array in the BIOS:

> Set at least one of the arrays bootable to boot from the hard disk.

1.   Reboot the system and press <Del> to enter the BIOS setup utility during POST.

2.   Go to the **Boot** menu and select the boot option priority.

3.   Use up/down arrow keys to select the boot priority and press <Enter>. See the **Boot menu** section of Chapter 4 for more details.

4.   From the **Exit** menu, select **Save Changes & Exit**, then press <Enter>.

5.   When the confirmation window appears, select **Yes**, then press <Enter>.

5.2 Intel® Rapid Storage Technology enterprise (Windows)

The Intel® Rapid Storage Technology enterprise allows you to create RAID 0, RAID 1, RAID 10 (RAID 1+0), and RAID 5 set(s) from Serial ATA hard disk drives that are connected to the Serial ATA connectors supported by the Southbridge.

You need to manually install the Intel® Rapid Storage Technology enterprise utility on a Windows® operating system. Please refer to the installation instructions in Chapter 4.

To enter the Intel® Rapid Storage Technology enterprise utility under Windows operating system:

1.   Turn on the system and go to the windows desktop.

2.   Click the **Intel® Rapid Storage Technology enterprise** icon to display the main menu.

Your storage system is configured for data protection, increased performance and optimal data storage capacity. You can create additional volumes to further optimize your storage system.
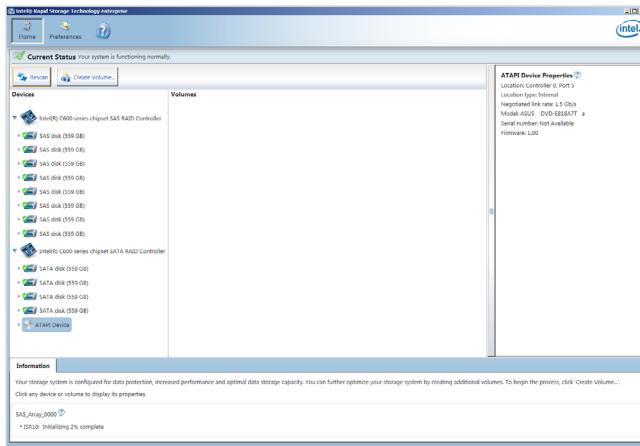
You can click **Rescan** to re-scan any attached hard disks.

5.2.1   Creating a RAID set

To create a RAID set:

1.   From the utility main menu, select Create Volume and select volume type.

2.   Click **Next**.
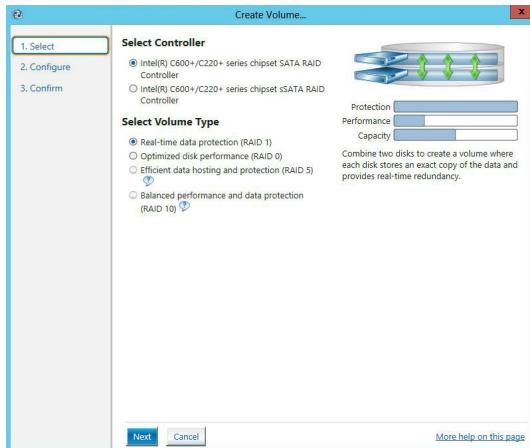
3.   Enter a name for the RAID set, then select the array disks.

4.   Select **Volume Size** tab, you can drag the bar to decide the volume size.

5.   Click **Next**.
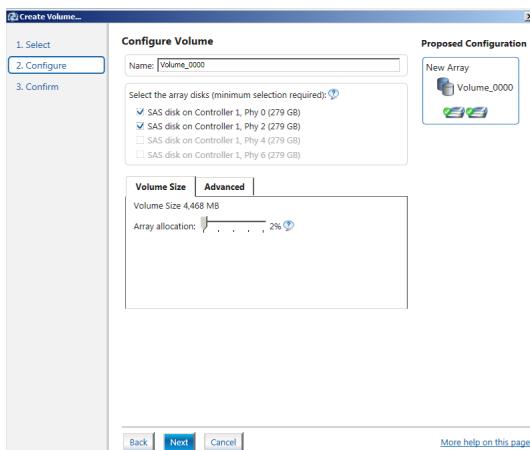
- •   If you do not want to keep the data on one of the selected disks, select NO when prompted.

- •   If you want to **Enable volume write-back cache** or **Initialize volume**, click **Advanced**.

6. Confirm the volume creation, than click **Create Volume** to continue.

> This process could take a while depending on the number and size of the disks. You can continue using other applications during this time.
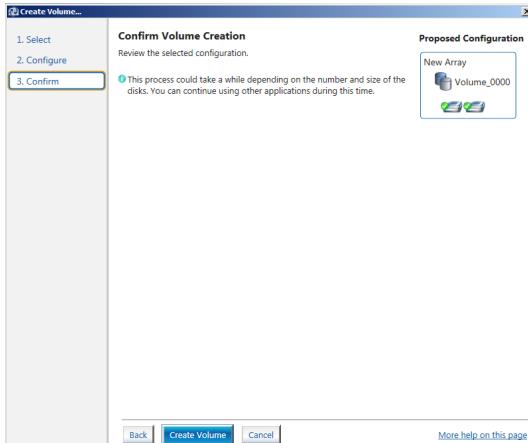
7. Wait until the process is completed, then click **OK** when prompted.
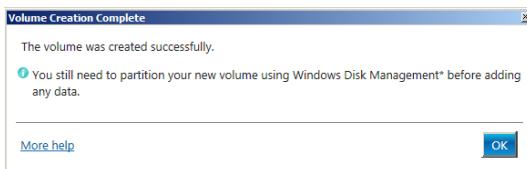
> You still need to partition your new volume using Windows Disk Management before adding any data.

The RAID set is displayed in the **Volumes** list and you can change the settings in **Volume Properties**.
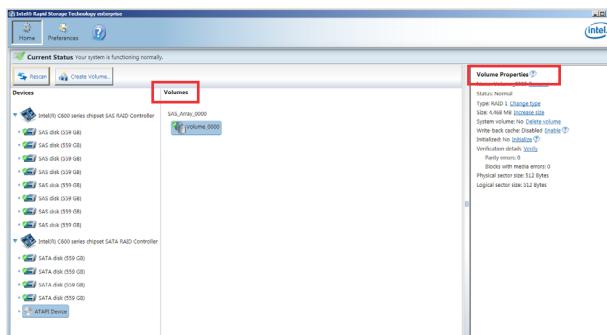
5.2.2 Changing a Volume Type

To change the volume type in **Volume Properties**:

1.   Click the SATA array items you want to change in **Volumes** field.

2   From the **Volume Properties** field, select **Type:RAID 1 Change type**.
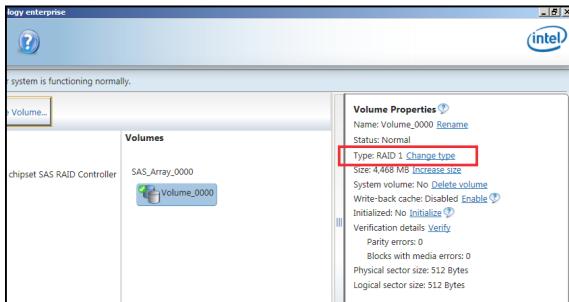
3.   You can change the **Name**, **Select the new volume type**, and **Select additional disks to include in the new volume** if needed.

4.   Select the Data stripe size for the RAID array (for RAID 0, 10 and 5 only), and click OK. The available stripe size values range from 4 KB to 128 KB. The following are typical values:
      RAID 0: 128KB
      RAID 10: 64KB
      RAID 5: 64KB
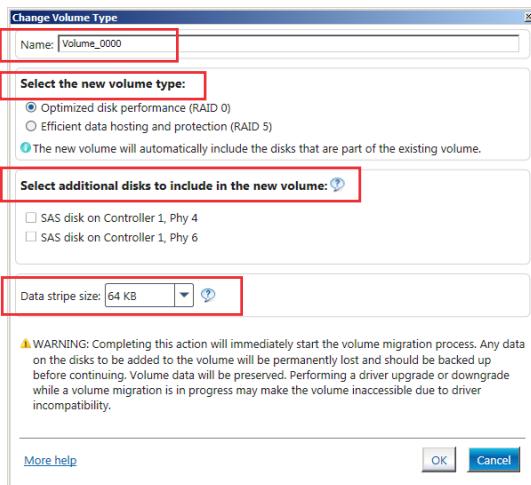
We recommend a lower stripe size for server systems, and a higher stripe size for multimedia computer systems used mainly for audio and video editing.

5.2.3   Deleting a volume

Be cautious when deleting a volume. You will lose all data on the hard disk drives. Before you proceed, ensure that you back up all your important data from your hard drives.

To delete a volume:

1.   From the utility main menu, select the volume (exp. Volume_0000) in **Volumes** field you want to delete.
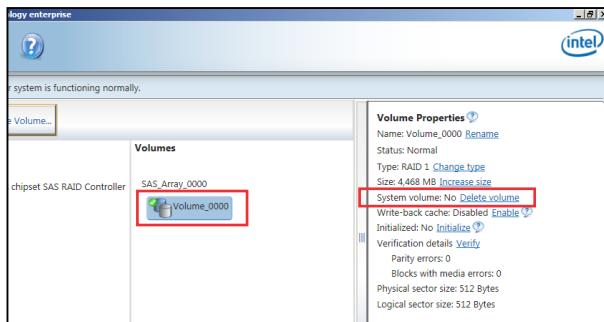
2.   Select **Delete volume** in **Volume Properties** field. The following screen appears.

3.   Click **Yes** to delete the volume and return to the utility main menu, or click **No** to return to the main menu.

5.2.4 Preferences

System Preferences

Allow you to set to show the notification area icon and show system information, warning, or errors here.
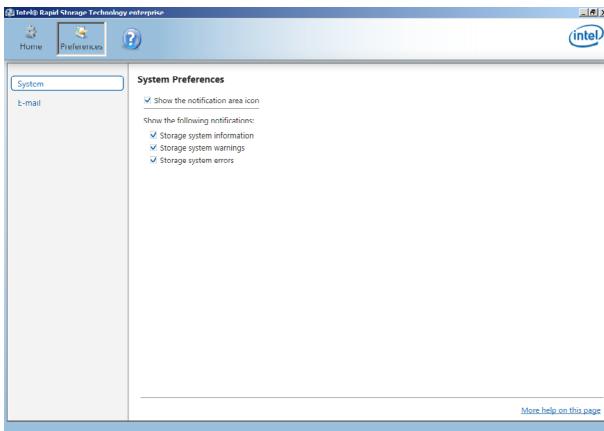
E-Mail Preferences

Allow you to set to sent e-mail of the following events:
- Storage system information
- Storage system warnings
- Storage system errors

Chapter 5: RAID Configuration

Driver Installation

6
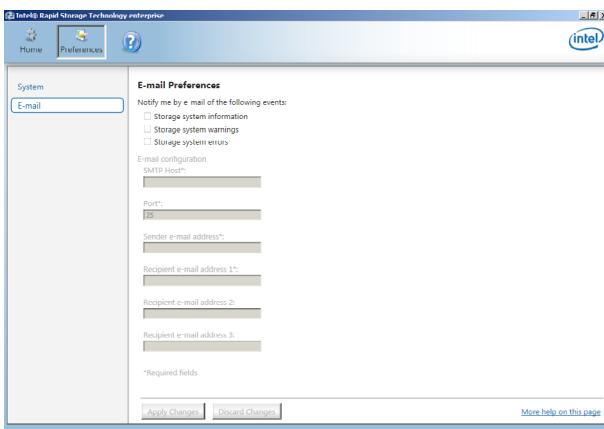
This chapter provides the instructions for installing the necessary drivers for different system components.

6.1 Installing an operating system

Motherboard settings and hardware options vary. The setup procedures presented in this chapter are for reference only. Refer to Windows® operating system documentation for detailed information.

6.1.1 Windows® 7 and USB 3.0 driver for 100 Series

Based on the chipset specification, the 100 series requires USB 3.0 drivers to be preloaded in order to use USB keyboard/mouse during Windows® 7 installation. This section is a guide on preloading USB 3.0 drivers and installing Windows® 7.

Method 1: Using SATA ODD & USB devices

Load USB 3.0 drivers using the ASUS support DVD and install Windows® 7 using a USB device.

Requirement:

- 1 x ASUS support DVD
- 1 x Windows® 7 installation source
- 1 x SATA ODD
- 1 x USB device (ODD or storage)

The USB storage device requires 8 GB or more capacity. It is recommended to format the storage device before use.

1. Insert the Windows® 7 installation DVD into a USB ODD, or copy all files on the Windows® 7 installation DVD to a USB storage device on a working system.

2. Connect the USB ODD or USB storage device to your 100 series platform.

3. Insert the ASUS support DVD into a SATA ODD on your 100 series platform.

4. Power on your system and press F8 during POST (Power-On Self Test) to enter the boot screen.

5.   Select the USB ODD or USB storage device as the boot device.

Please select boot device:
↑ and ↓ to move selection
ENTER to select boot device
ESC to boot using defaults

ASUS SDRW-0804P-D
P4: ASUS   DVD-E818A6T (5192MB)
P3: Hitachi HDP725050GLA380 (476940MB)
ADATA USB Flash Drive (7536MB)
UEFI: (FAT) ADATA USB Flash Drive (7536MB)
UEFI: ASUS   DVD-E818A6T (5192MB)
Enter Setup

OK   Cancel
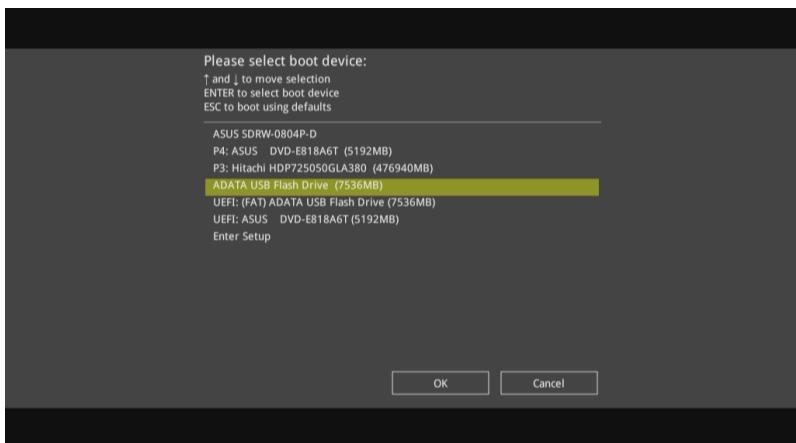
6.   The USB 3.0 driver will be loaded automatically during installation startup.
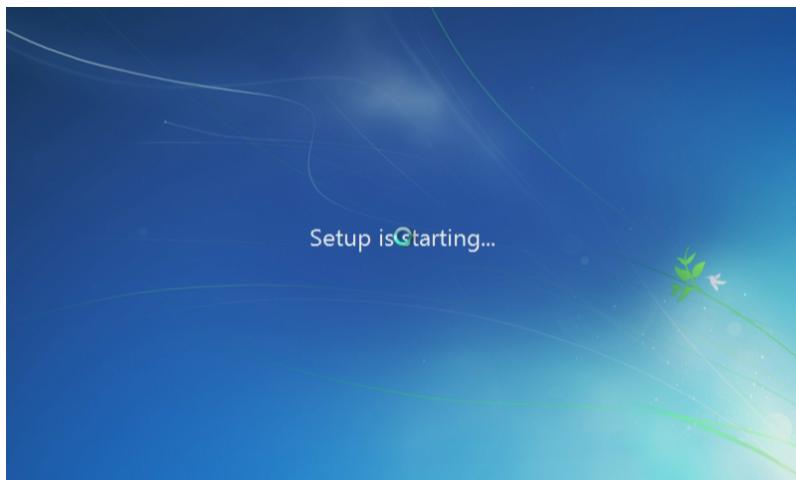
Setup is Starting...

The "Setup is starting..." screen will show up if the USB 3.0 driver is loaded correctly.

7.   Follow the onscreen instructions to complete the Windows® 7 installation.

Method 2: Using a modified Windows® 7 ISO

Load USB 3.0 drivers and install Windows® 7 using a modified Windows® 7 installation DVD.

Requirement:

- 1 x ASUS support DVD
- 1 x Windows® 7 installation source
- 1 x Working system (PC or notebook)
- 1 x SATA ODD

1. On your working system, create an ISO image file of the Windows® 7 installation source using a third-party ISO software.

2. Copy both "Auto_Unattend.xml" and "Auto_Unattend" folder from the root directory of the ASUS supporting DVD to your system.

3. Edit the ISO file and add both "Auto_Unattend.xml" and "Auto_Unattend" folder into the ISO file.

4. Burn this ISO file onto an empty DVD to create a modified Windows® 7 installation DVD.

5. Insert the modified Windows® 7 installation DVD into an ODD on your 100 series platform.

6. Power on your system and press F8 during POST (Power-On Self Test) to enter the boot screen.

7. Select the ODD as the boot device.

8. The USB 3.0 driver will be loaded automatically during installation startup.

The "Setup is starting..." screen will show up if the USB 3.0 driver is loaded correctly.

9. Follow the onscreen instructions to complete the Windows® 7 installation.

Method 3: Using ASUS EZ Installer

Use the ASUS EZ Installer to create a modified Windows® 7 installation source.

Requirement:

- 1 x ASUS support DVD
- 1 x Windows® 7 installation DVD
- 1 x Working system (PC or notebook)
- 1 x SATA ODD
- 1 x USB storage device (8 GB or more)

1. Insert the Windows® 7 installation DVD.

2. Launch the ASUS EZ Installer located on the ASUS support DVD.

3. Select a method of creating a modified Windows® 7 installation file:

    - Windows® 7 OS disk to USB storage device

        - Select **Windows 7 OS disk to USB storage device** then click **Next**.
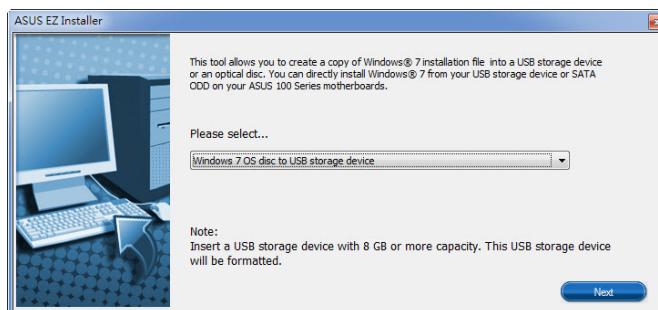
        - Check **I agree** and then click **Next**.
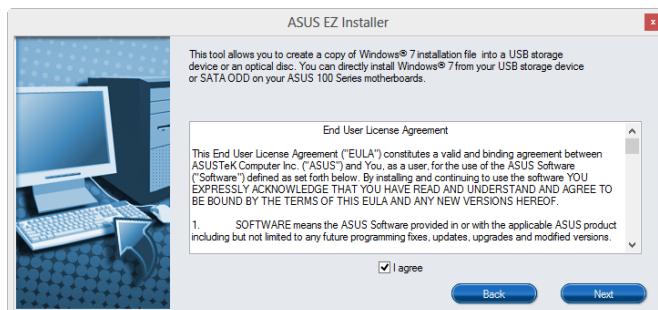
- Select the source of the Windows® 7 installation disk then click **Next**.
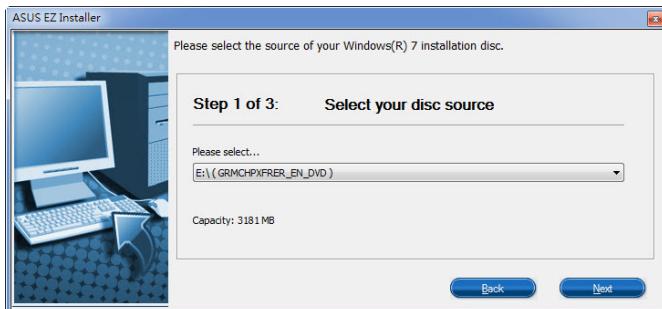
- Select the USB storage device and click **next**.

Click the refresh icon   if the USB storage device is not displayed.

- Click **Yes** to clear the contents on the USB storage device and create a bootable USB device.

Make sure to backup contents on the USB storage device, as it will be formatted.

- Once completed, click **OK** to finish.

- **Windows® 7 OS disk to ISO file**

    - Select **Windows 7 OS disk to ISO file** then click **Next**.
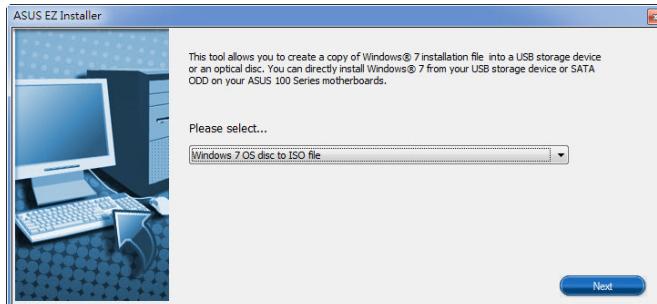
    - Check **I agree** and then click **Next**.
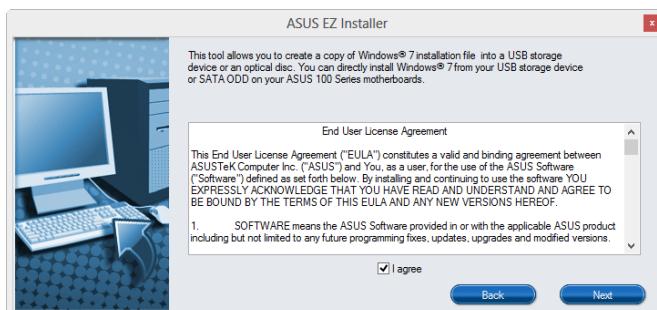
    - Select the source of the Windows® 7 installation disk then click **Next**.

- Select the folder to save the modified Windows® 7 installation ISO file and click **Next**.
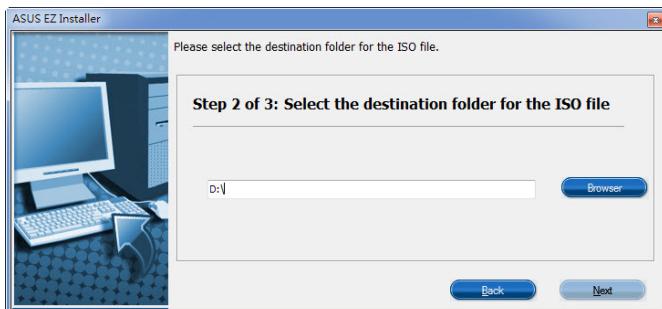
- Once completed, click OK to finish.

- Burn this ISO file onto an empty DVD to create a modified Windows® 7 installation DVD.

4. Insert the modified Windows® 7 installation DVD into an ODD or connect the USB storage device with modified Windows® 7 installation files onto your 100 series platform.

5. Power on your system and press F8 during POST (Power-On Self Test) to enter the boot screen.

6. Select the ODD or USB storage device as the boot device.

7. The USB 3.0 driver will be loaded automatically during installation startup.

The "Setup is starting..." screen will show up if the USB 3.0 driver is loaded correctly.

8. Follow the onscreen instructions to complete the Windows® 7 installation.

6.2 Support DVD information

The contents of the support DVD are subject to change at any time without notice. Visit the ASUS website at www.asus.com for updates.

6.2.1 Running the support DVD

Ensure that you have an Administrator account before running the support DVD in your operating system.

To run the Support DVD:

1. Place the Support DVD into the optical drive.

2. In the **AutoPlay** dialog box, Click **Run Instv2.EXE**.

DVD Drive (D:) MB Support...

Choose what to do with this disc.

Install or run program from your media

Run Instv2.exe
Published by ASUSTeK Computer Inc.

Other choices

Open folder to view files
File Explorer

Take no action
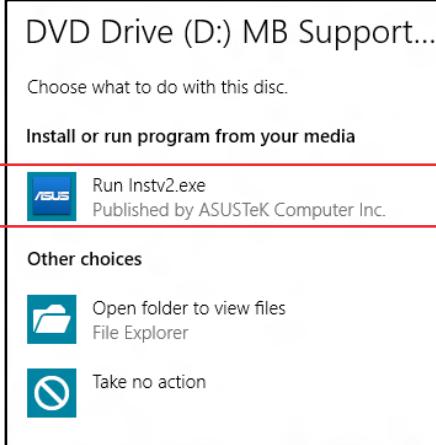
If the **AutoPlay** dialog box does not appear, browse the contents of the support DVD and double-Click **\bin\Instv2.EXE** to launch the **ASUS motherboard support DVD** main menu.

Support DVD main menu

Shows the available device drivers
if the system detects installed
devices. Install the necessary
drivers to use the devices.

Click to display the applications
and other software that the
motherboard supports

Contains the list of supplementary
user manuals. Click an item to
open the folder of the user guide

Click to display free
software for you to use

Click to select
an item to install

Click to display the ASUS contact information

Click to browse the file list of the support CD

Click to install the selected items
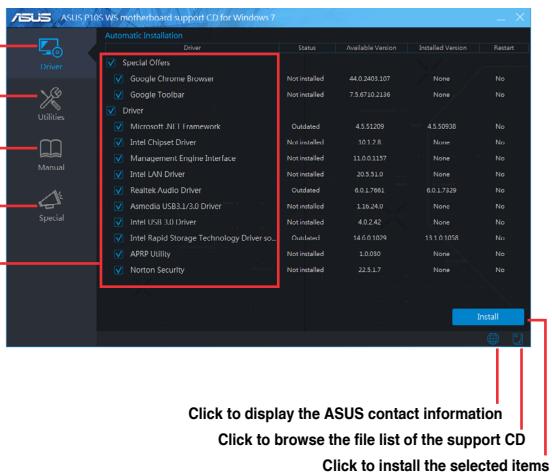
6.2.2 Obtaining the software manuals

The software manuals are included in the support DVD. Follow the instructions below to get the necessary software manuals.

> The software manual files are in Portable Document Format (PDF). Install the Adobe® Acrobat® Reader from the **Utilities** tab before opening the files.

To read about your motherboard's software manual:

1. Run the Support DVD.

2. In the Support DVD main menu, click the **Manual** tab.

3. Click the software manual that you wish to read.
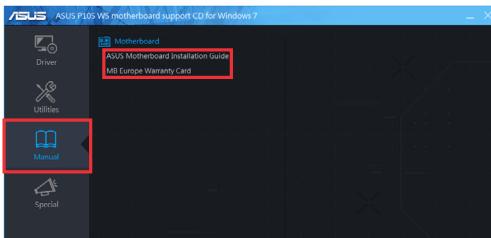
6.3   Software information

Most of the applications in the support DVD have wizards that will conveniently guide you through the installation. View the online help or readme file that came with the software application for more information.

6.4   AI Suite 3

AI Suite 3 is an all-in-one interface that integrates several ASUS utilities and allows you to launch and operate these utilities simultaneously.

Installing AI Suite 3

> Ensure that you have an Administrator account before installing AI Suite 3 in your operating system.

To install AI Suite 3 on your computer:

Windows® 7 OS

1.   Place the Support DVD into the optical drive.

2.   In the **AutoPlay** dialog box, Click **Run Instv2.EXE** then select the **Utilities** tab.
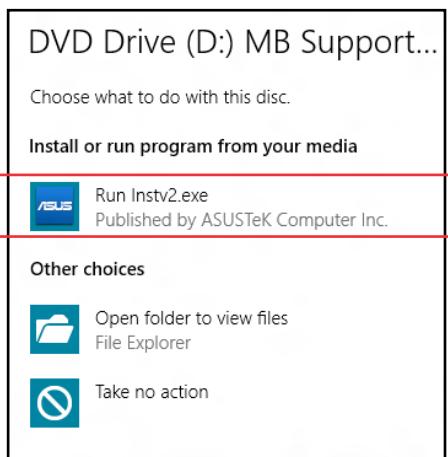
3.   From the **Utilities** tab, Click **AI Suite 3** then follow the succeeding onscreen instructions.

Windows® 8.1 OS

1. Place the Support DVD into the optical drive then follow onscreen instructions.

2. From the **ASUS motherboard support DVD** main menu, select the Utilities tab and Click **AI Suite 3**.

3. Follow the succeeding onscreen instructions.

    If the **ASUS motherboard support DVD** main menu did not appear, try the following:

    a. Go to the **Start Screen** then Click the **Desktop** app.

    b. On the lower left corner of the Desktop, Click **File Explorer** then select your DVD drive and tap or double-Click the **Setup** application.

Launching AI Suite 3

Windows® 7 OS

From the Desktop, Click **Start > All Programs > ASUS > AI Suite 3 > AI Suite 3**.

You can also launch AI Suite in Windows® 7 by clicking or tapping on the Notification area.

Windows® 8.1 OS

To launch AI Suite 3 in Windows® 8.1, tap the AI Suite 3 app on the Start Screen (or if you're using a mouse, Click the AI Suite 3 app on the Start Screen).
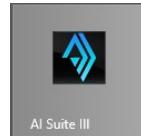
AI Suite 3 Main menu

The AI Suite 3 main menu gives you easy-access controls and insight to what's going on with your computer - allowing you to optimize performance settings while at the same time ensuring system stability.

The AI Suite main menu includes is a quick-access menu bar that allows you to swiftly launch any of the integrated ASUS utilities. Click ⊞ on the left of the menu to launch the menu bar.

✎ The AI Suite 3 screenshots in this section are for reference only and can vary depending on motherboard model.
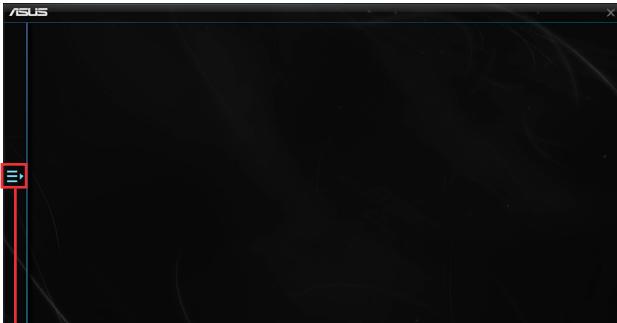
Click to launch AI Suite 3 menu bar

AI Suite 3 main menu bar
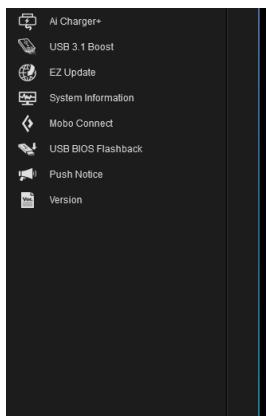
✎
- Some functions in the AI Suite 3 main menu in this user guide may vary depending on the motherboard model.

- Refer to the software manual in the support DVD or visit the ASUS website at www.asus.com for detailed software configuration.

6.4.1   Ai Charger+

Ai Charger+ allows you to fast-charge your portable BC 1.1* mobile devices on your computer's USB port three times faster than the standard USB devices**.

Launching Ai Charger+

To launch Ai Charger+, click ⊟ on the left of the AI Suite 3 main menu, then select **Ai Charger+**.

> Ai Charger+ is available only in selected motherboard models.

Ai Charger+ screen

Tick to enable or disable Ai Charger+   **Click to apply the selection**
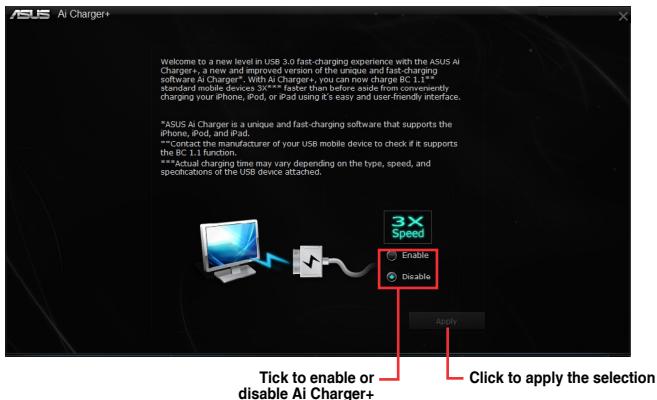
> • Check the manufacturer if your USB device is a Battery Charging Specification 1.1 (BC 1.1) compliant or compatible device.
>
> • Actual charging speeds may vary depending on the charging rate and specifications of your USB device.
>
> • To ensure normal charging function, disconnect and reconnect your USB device every time you enable or disable Ai Charger+.
>
> • Ai Charger+ does not support USB hubs, USB extension cables, and generic USB cables.

6.4.2 USB 3.1 Boost

USB 3.1 Boost technology supports UASP (USB Attached SCSI Protocol) that automatically speeds up the transfer rates of your USB storage devices.

Launching USB 3.1 Boost

To launch USB 3.1 Boost, click on the left of the AI Suite 3 main menu, then select **USB 3.1 Boost**.

Using the USB 3.1 Boost

Click to enable the USB device's normal data transfer rate

Click to select a USB device

Click to enable UASP or Turbo Mode for a faster data transfer rate

> Ensure to connect your USB 3.1/3.0 devices to the USB 3.1/3.0 ports that support USB 3.1 Boost. For more details, refer to section **2.11.1 Rear I/O connection.**

> • USB 3.1 Boost automatically detects the USB 3.1/3.0 devices that support UASP.
>
> • The data transfer speed varies with USB devices. For a higher data transfer performance, use a USB 3.1/3.0 device.

6.4.3 EZ Update

EZ Update is a utility that allows you to automatically update your motherboard's software, drivers and BIOS easily.

With this utility, you can also manually update the BIOS and select the boot logo that displays during POST.

Launching EZ Update

To launch EZ Update, click on the left of the AI Suite 3 main menu, then select **EZ Update**.

Using EZ Update

Click to automatically update your motherboard driver, software and firmware

Click to search and select the BIOS file

Click to select a boot logo

Click to update the BIOS

Manually update the BIOS and selecting a boot logo

Click to search an image file for your boot logo

**Click to go back to EZ
Update main screen**

**Click to proceed the updating
BIOS and boot logo**
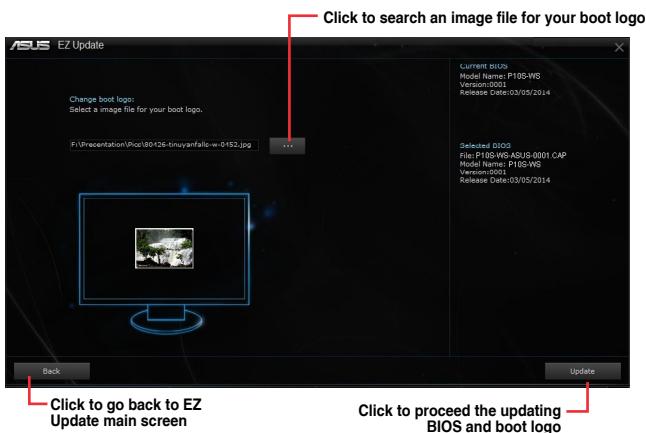
After you Click **BIOS Update** button, Click **Flash** to update the BIOS and upload the boot logo in your system.

6.4.4 System Information

This utility allows you get the detailed information of the motherboard, CPU, and memory settings.

Launching the System Information

To launch System Information, click ![icon] on the left of the AI Suite 3 main menu, then select **System Information**.

Viewing the motherboard information

Click the **MB** tab to view the motherboard's information.
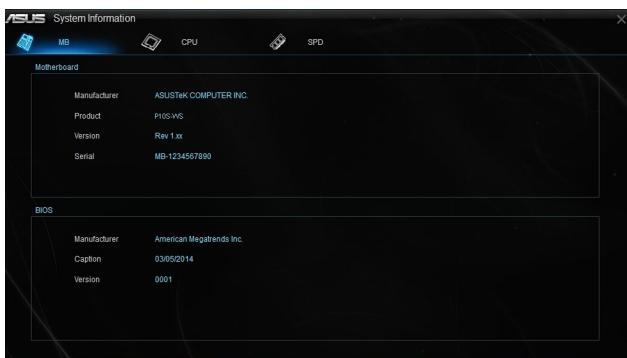
Viewing the CPU information

Click the **CPU** tab to view the processor's information.

Viewing the SPD information

Click the **SPD** tab to view the memory's information.

6.4.5 Mobo Connect

Mobo Connect allows you to share the PC's keyboard/mouse for smart devices, or stream audio playback from your smart device yo the PC.

Launching Mobo Connect

To launch Mobo Connect, click on the left of the AI Suite 3 main menu, then select **Mobo Connect.**

Mobo Connect screen

Set Hotkey for Keyboard/ Mouse sharing

Select device for Keyboard/Mouse sharing

Click to apply the settings
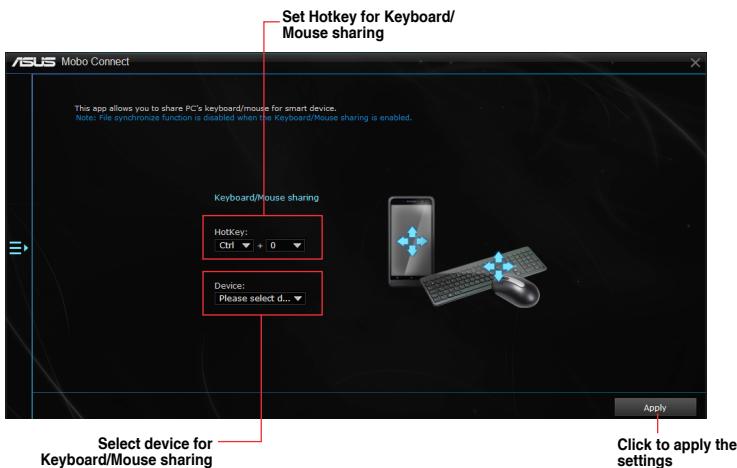
6.4.6 USB BIOS Flashback

USB BIOS Flashback allows you to check and save the latest BIOS version to a USB storage device. Use this utility to quickly check for the latest available BIOS and set the BIOS download schedule.

Launching USB BIOS Flashback

To launch USB BIOS Flashback, click on the left of the AI Suite 3 main menu, then select **USB BIOS Flashback**.

> USB BIOS Flashback is available only in selected motherboard models.

Using USB BIOS Flashback

Set a schedule for the BIOS Update download

Click to cancel the download schedule setting

Click to check for a new BIOS update available for download

Click to apply the download schedule setting

Scheduling the BIOS download

1. In the Download Setting field, tick **Schedule (days)** then select the number of days for the BIOS download schedule.

2. Click **Apply** to save the BIOS download schedule. Click **Cancel** to cancel the download schedule.

Downloading the latest BIOS

Before you start downloading, ensure that you have installed the USB storage device to your computer's USB port that supports USB BIOS Flashback. Refer to section **2.11.1 Rear I/O connection** of this user guide for more details.

To download the updated BIOS:

1. From the USB BIOS Flashback screen, Click **Check for New BIOS Update**.

   Wait for the system to check the latest BIOS version.
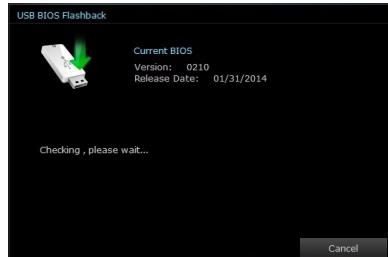
2. After the utility detects a new BIOS, Click [ ] from the Save to: field, select the USB flash drive, then Click **Download**.
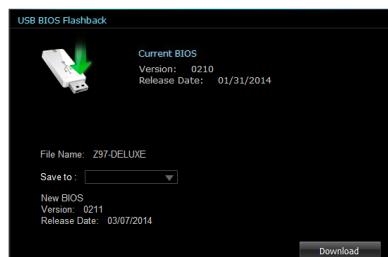
3. After the download is complete, Click **OK**.

6.4.7 Push Notice

This utility allows you get the detailed status of your system to your smart device. You can also send messages to your smart device using this utility.

> Before using this utility, ensure that you pair your computer with your smart device. For pairing information, refer to section **Pairing your computer and smart device**.

Launching Push Notice on your computer

To launch Push Notice, click ▤ on the left of the AI Suite 3 main menu, then select **Push Notice**.

Push Notice screen

Click to enable Push Notice

Tick to select the smart device

Click to discard the settings   **Click to apply the settings**
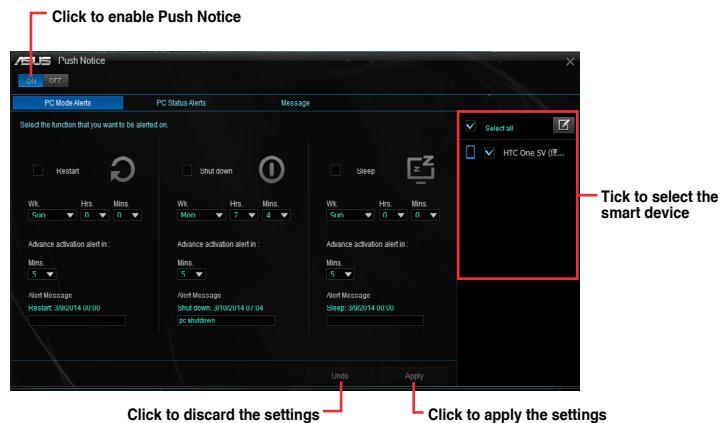
> You can also enable the Push Notice via the Push Notice shortcut on the lower-right corner of your screen. To do this, Click **<<** then Click ▤ then select ▤.

Pairing your computer and smart device

To pair your computer and smart device:

1.   On your smart device, tap ▤ to launch Push Notice.
     Push Notice

2.   Tap **Push Scan** then tap the name of your computer that you want to pair with.

> To pair your computer and smart device, ensure that both are connected to the same wireless network.

Setting up PC Mode alerts of your computer

This feature allows you to restart, shut down, or put your computer to sleep mode and sends an alert to your smart device.

Tick these to enable mode alerts

Set the day and time to enable the PC modes

Set the minutes to send the alert before the PC mode/s activation

Key in your messages for more information

Tick to select the smart device

Setting up PC Status alerts

This feature allows you to send alerts of the unusual activities of the voltage, temperature, and fan settings of your computer to your smart device.

Tick to select and send alerts to your smart device

Tick to select the smart device

Tick to send alert when the components selected are back to its normal status
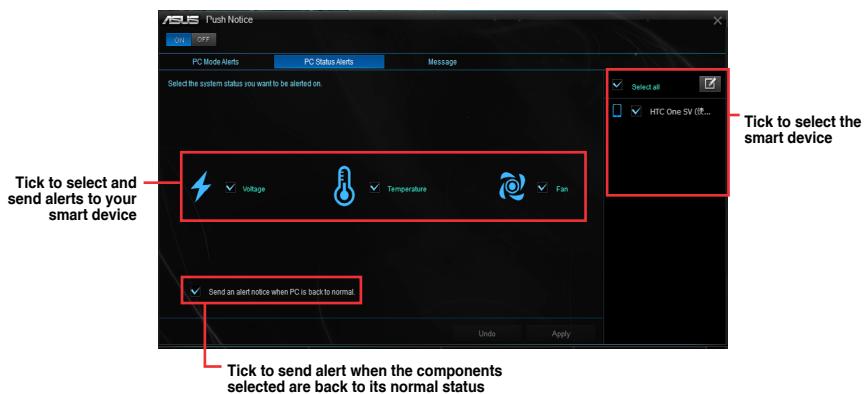
Sending messages to your smart device

This feature allows you to send messages to your smart device.

> You can also send messages via the Push Notice messaging shortcut on the lower-right corner of your screen. To do this, Click << then Click 📢 then select 💬.

Tick to select the smart device

Click to send your message

Click to key in your message
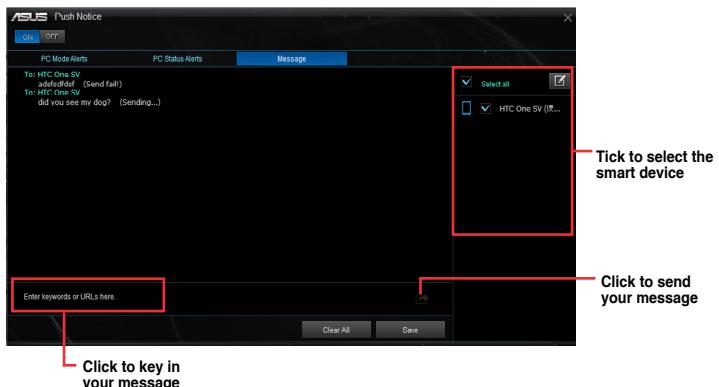
Viewing your computer status on your smart device

Tap (icon) on your smart device to launch Push Notice.

Push Notice

Tap to view PC mode alerts

Tap to view PC status alerts

Tap to view PC sent messages

Tap to scan more host computers

Tap to delete PC alerts
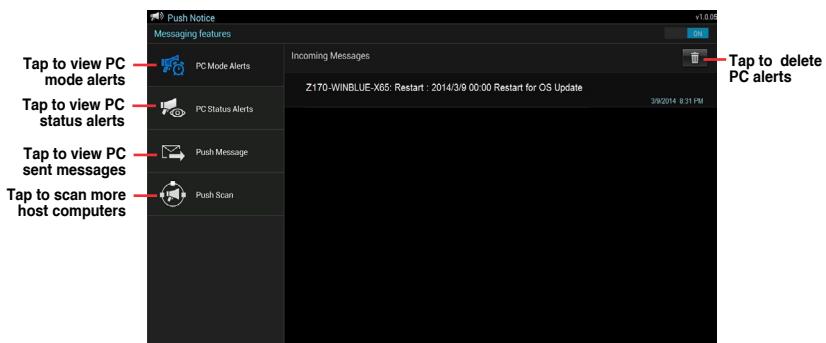
6.5　　Audio configurations

The Realtek® audio CODEC provides 8-channel audio capability to deliver the ultimate audio experience on your computer. The software provides Jack-Sensing function, S/PDIF Out support, and interrupt capability. The CODEC also includes the Realtek® proprietary UAJ® (Universal Audio Jack) technology for all audio ports, eliminating cable connection errors, and giving users plug and play convenience.

Follow the installation wizard to install the Realtek® Audio Driver from the support DVD that came with the motherboard package.

If the Realtek® audio software is correctly installed, you will find the Realtek® HD Audio Manager icon on the taskbar. Double-Click on the icon to display the Realtek® HD Audio Manager.

Realtek® HD Audio Manager

Realtek® HD Audio Manager with DTS Studio Sound™ for Windows® 8.1 / Windows® 7

Configuration option tabs (vary with the audio devices connected)

Advanced settings

Set default device button

Control settings panel

Analog and digital connector status
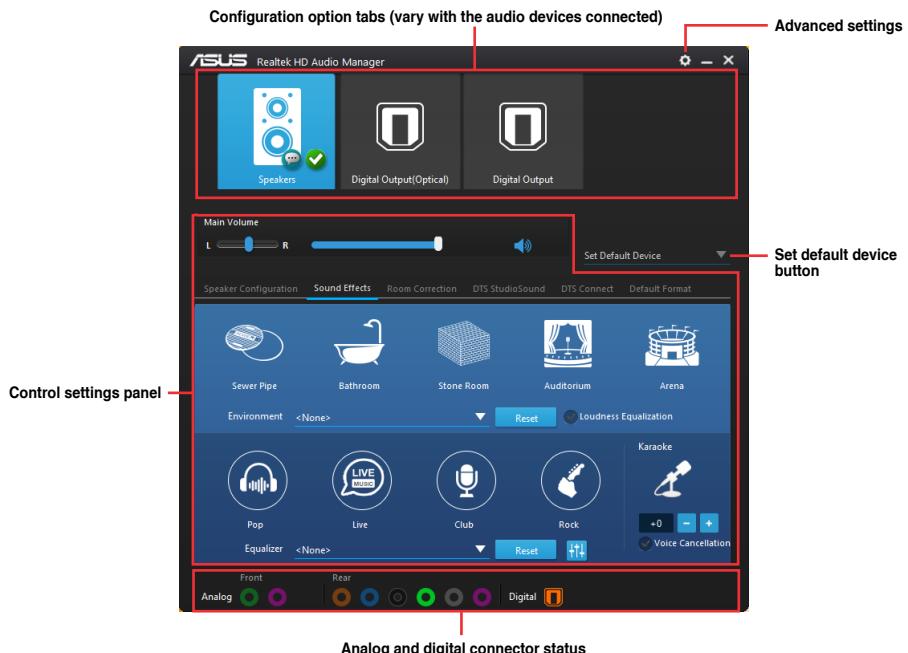
Selecting an audio output

Realtek HD Audio Manager allows you to select the type of audio output depending on the output device that you are using.

To select an audio output:

1. Insert the audio device's jack to the Line Out (lime) port. If the audio device's jack is already inserted to the corresponding port, Click ⬤ on the Realtek HD Audio Manager.

2. On the pop-up window, tick the audio device that you plugged to the Line Out port then Click **Next**.
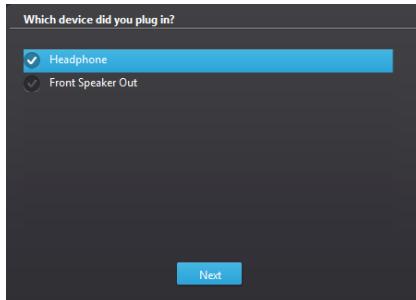
3.
   a. If you select **Headphone**, Click to select the type of headphone installed then Click **OK**.
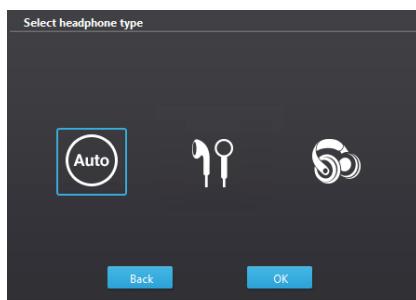
   b. If you select **Front Speaker Out,** Click to select the type of speaker installed then Click **OK**.
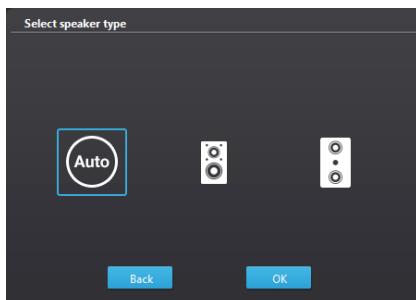
Appendix

A

P10S WS block diagram

DDR4

DDR4

2DPC, total 4* 288_Pin DDR4
2133 U-DIMM ECC/non-ECC

Skylake CPU
Up to 95W

x16/x8 Gen3

x16 Slot
PCIEX16_1

QSW

x8 Gen3

x16 Slot
PCIEX16_2

DMI3.0

8*SATA3

2* x1 Gen3

2* M.2

6* USB3.0 (Rear:4)

x16 Slot
PCIEX16_3

x4 Gen3

x16 Slot
PCIEX16_4

x4 Gen3

Skylake PCH
C236

ASM1142

x2 Gen3

USB3.1

I210

x1 Gen3

GbE

I210

x1 Gen3

GbE

64Mb
SPI Flash

TPM
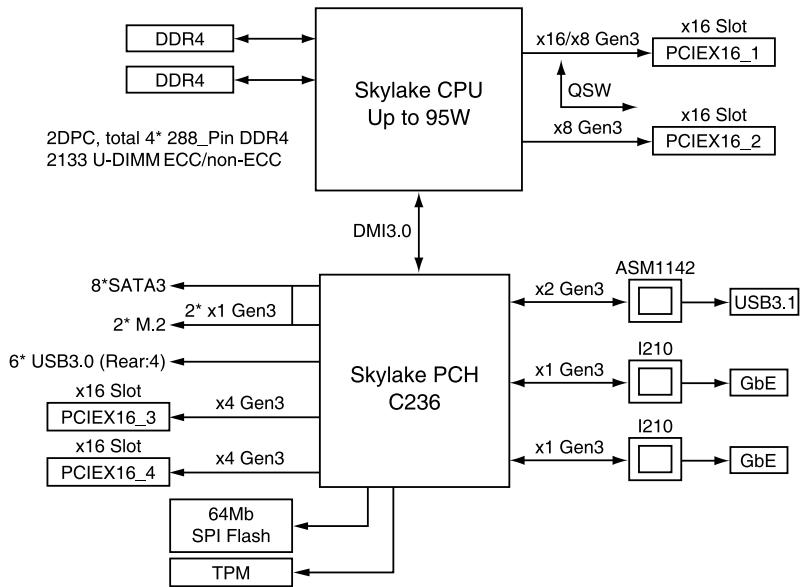
Q-Code table

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
5A	Internal CPU error
5B	Reset PPI is not available
5C – 5F	Reserved for future AMI error codes
E0	S3 Resume is stared (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

(continued on the next page)

Code	Description
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)
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

(continued on the next page)

Code	Description
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
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 (under OS)

Code	Description
03	System is entering S3 sleep state
04	System is entering S4 sleep state
05	System is entering S5 sleep state
30	System is waking up from the S3 sleep state
40	System is waking up from the S4 sleep state
AC	System has transitioned into ACPI mode. Interrupt controller is in PIC mode.
AA	System has transitioned into ACPI mode. Interrupt controller is in APIC mode.

Notices

Federal Communications Commission Statement

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

• This device may not cause harmful interference, and

• This device must accept any interference received including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class 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.

WARNING! 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.

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.

REACH

Complying with the REACH (Registration, Evaluation, Authorization, and Restriction of Chemicals) regulatory framework, we published the chemical substances in our products at ASUS website at http://csr.asus.com/english/REACH.htm.

ASUS Recycling/Takeback Services

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

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

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

Australia statement notice

From 1 January 2012 updated warranties apply to all ASUS products, consistent with the Australian Consumer Law. For the latest product warranty details please visit https://www.asus.com/support/. Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

If you require assistance please call ASUS Customer Service 1300 2787 88 or visit us at https://www.asus.com/support/.

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Technical Support

Telephone	+86-21-38429911
Fax	+86-21-58668722 ext: 9101
Online Support	http://support.asus.com/techserv/techserv.aspx

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Online Support	http://support.asus.com/techserv/techserv.aspx

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General support   +1-812-282-2787
Online support   http://support.asus.com/techserv/techserv.aspx

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Online support   http://support.asus.com/techserv/techserv.aspx

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Online Support   http://support.asus.com/techserv/techserv.aspx

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Technical Support

Telephone   +48-225718033
Online Support   http://support.asus.com/techserv/techserv.aspx

ASK-Service (Russia and CIS)

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Telephone   (495) 640-32-75
Web site   http://ru.asus.com

Technical Support

Telephone   008-800-100-ASUS (008-800-100-2787)
Online Support   http://vip.asus.com/eservice/techserv.aspx?SLanguage=ru