P8C WS

Motherboard

E7435

Revised Edition V2
May 2012

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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.

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

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

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

Safety information

Electrical safety

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

Operation safety

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

About this guide

This user guide contains the information you need when installing and configuring the motherboard.

How this guide is organized

This guide contains the following parts:

- **Chapter 1: Product introduction**

  This chapter describes the features of the motherboard and the new technology it supports.

- **Chapter 2: Hardware information**

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

- **Chapter 3: BIOS setup**

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

- **Chapter 4: Software support**

  This chapter describes the contents of the support DVD that comes with the motherboard package and the software.

- **Chapter 5: Multiple GPU technology support**

  This chapter describes how to install and configure multiple ATI® CrossFireX™ and NVIDIA® SLI™ graphics cards.

Where to find more information

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

1. **ASUS websites**

   The ASUS website provides updated information on ASUS hardware and software products. Refer to the ASUS contact information.

2. **Optional documentation**

   Your product package may include optional documentation, such as warranty flyers, that may have been added by your dealer. These documents are not part of the standard package.

Conventions used in this guide

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

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

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

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

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

Typography

Bold text	Indicates a menu or an item to select.
Italics	Used to emphasize a word or a phrase.
<Key>	Keys enclosed in the less-than and greater-than sign means that you must press the enclosed key. Example: <Enter> means that you must press the Enter or Return key.
<Key1> + <Key2> + <Key3>	If you must press two or more keys simultaneously, the key names are linked with a plus sign (+). Example: <Ctrl> + <Alt> + <Del>

P8C WS specifications summary

CPU	LGA1155 socket for Intel® 2nd / 3rd Generation Core™ i3 desktop processor LGA1155 socket for Intel® Xeon® E3-1200/ 12x5 v2 series processor Supports 32nm / 22nm CPU * Supports Intel® Turbo Boost technology 2.0. ** Refer to www.asus.com for Intel® CPU support list.
Chipset	Intel® C216 Chipset
Memory	4 x DIMMs, max. 32GB, DDR3 1600 / 1333 MHz, ECC non-ECC, un-buffered memory Dual-channel architecture Supports Intel® Extreme Memory Profile (XMP) **Refer to www.asus.com or this user manual for the Memory QVL (Qualified Vendors Lidts)
Expansion slots	1 x PCIe 3.0 x16 (at x16 or x8) (blue) 1 x PCIe 3.0 x16 (at x8) (black) 2 x PCIe 2.0 x16 (at x4) (white) 1 x PCIe 2.0 x1 (at x1) 1 x PCI
VGA Output	DVI-I port Supports DVI with max. resolution 1920 x 1200 at 60Hz Maximum shared memory of 1GB
Multi-GPU support	Supports ATI® Quad-GPU CrossFireX™ Technology
Storage	Intel® C216 Chipset: - 2 x SATA 6.0 Gb/s ports(gray) - 4 x SATA 3.0 Gb/s ports(blue) - Intel® Rapid Storage Technology supports RAID 0, 1, 5, and 10 * Supports on Intel® Smart Response Technology, Intel® Rapid Start Technology, Intel® Smart ConnectTechnology ** Supports on Intel® Core™ processor family with Windows 7 operating systems.
LAN	2*Intel® 82574L GbE LAN - Support teaming function
USB	Intel® C216 Chipset: - 4 x USB 3.0 ports (2 ports at mid-board, 2 ports at back panel) - 10 x USB 2.0 ports (4 ports at mid-board, 6 ports at back panel)
1394	VIA VT6308S controller supports 2 x 1394a port
Audio	Realtek® ALC892 8-channel High Definition Audio CODEC - BD audio layer content protection - Supports Jack-Detection, Multi-streaming and Front Panel Jack-Retasking - Optical S/PDIF out ports at back I/O
Workstation Unique Features	4 PCIe x 16 slots G.P. Diagnosis Card bundled Quick Gate: 1 vertical USB 2.0 on board
BIOS features	64 Mb Flash ROM, UEFI AMI BIOS, PnP, DMI2.0, WfM2.0, SM BIOS 2.6, ACPI 2.0a, Multi-language BIOS, ASUS EZ Flash Utility, ASUS CrashFree BIOS 3
Manageability	WfM 2.0, DMI 2.0, WOL by PME, WOR by PME, PXE

(continued on the next page)

P8C WS specifications summary

ASUS Unique Features	**GPU Boost with switch** **ASUS Power Design** - 8+2 Phase Power Design **ASUS EPU** - EPU, EPU Switch **ASUS Exclusive Features** - MemOK! - AI Suite II - Anti Surge - ASUS EFI BIOS EZ Mode featuring friendly graphics user interface **ASUS Quiet Thermal Solution:** - ASUS Fanless Design: Heat-pipe solution - ASUS Fan Xpert **ASUS EZ DIY:** - ASUS Q-Connector - ASUS CrashFree BIOS 3 - ASUS EZ Flash Utility
Back Panel I/O Ports	1 x PS/2 KB/MS port 1 x S/PDIF Out (Optical and Coxial) 6 x USB 2.0/ 1.1 ports 2 x USB 3.0/ 2.0 ports 1 x IEEE 1394a 2 x Lan Connector 1 x DVI-I port 6 x Audio jacks
Internal I/O connectors	1 x USB 3.0/2.0 connector supports additional 2 USB ports (19-pin) 1 x USB 2.0/1.1 connectors support additional 4 USB ports 2 x USB 2.0/1.1 vertical ports 24-pin ATX Power connector 8-pin ATX +12V Power connector CPU Fan with PWM control Chassis fan1 with Q-fan control Chassis fan2 with Q-fan control Chassis fan3 with Q-fan control Power fan AAFP connector 1 x COM port connector 1 x TPM header 1 x 1394a connector 1 x LTP1 header S/PDIF Out header 1 x MemOK! Button 20-pin front panel connector
OS	Win7 32/ 64 bit, WinXP 32/ 64 bit, Server 2003, Server 2008 and Server 2008 R2
Form factor	ATX Form Factor, 12in x 9.6in (30.5cm x 24.5cm)

***Specifications are subject to change without notice.**

1.1 Welcome!

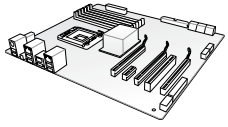
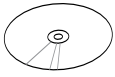
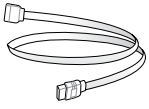
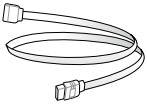
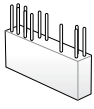
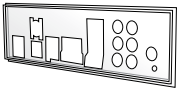
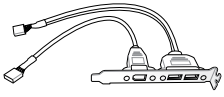
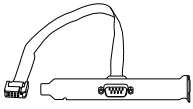
Thank you for buying an ASUS® P8C WS motherboard!

The motherboard delivers a host of new features and latest technologies, making it another standout in the long line of ASUS quality motherboards!

Before you start installing the motherboard, and hardware devices on it, check the items in your package with the list below.

1.2 Package contents

Check your motherboard package for the following items.

		
ASUS P8C WS motherboard	**User manual**	**Support DVD**
		
2 x Serial ATA 6.0 Gb/s cables	**4 x Serial ATA 3.0 Gb/s cables**	**1 x 2-in-1 ASUS Q-Connector kit**
		
1 x ASUS Q-Shield	**2 USB ports + 1394a cable with bracket**	**1 x COM port cable with bracket**

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

1.3 Special features

1.3.1 Product highlights

Green ASUS

This motherboard complies with the European Union's Energy-related Products (ErP) requirements, which requires products to meet certain energy efficiency criteria for energy consumption. This in in keeping with ASUS' vision of creating environment-friendly and energy-efficient products to reduce a product's carbon footprint and reduce its environmental impact.

LGA1155 socket for Intel® Second/Third Generation Core™ i3 and Xeon® E3-1200/ 12x5 v2 processors

This motherboard supports the latest Intel® 3rd/2nd generation Core™ i3 and Xeon® E3-1200/ 12x5 v2 processors in the LGA1155 package, with memory and PCI Express controllers to support 2-channel (4 DIMMs) DDR3 memory and 16 PCI Express 3.0 lanes for great graphics performance.

C216

Intel® C216 Express Chipset is a single-chipset that supports the 1155 socket Intel® 2nd / 3rd generation Core™ i3 and Intel® Xeon E3-1200 v2 server processors. It utilizes the serial point-to-point links, which increases bandwidth and enhances the system's performance. It comes with two SATA 6Gb/s and four SATA 3Gb/s ports for faster data retrieval, doubling the bandwidth of the current bus systems. It also enables the iGPU function for the latest Intel® integrated graphics performance.

PCI Express® 3.0

PCI Express® 3.0 (PCIe 3.0) is the latest PCI Express bus standard that provides twice the performance and speed of PCIe 2.0. It provides an optimal graphics performance, unprecedented data speed, and seamless transition with its complete backward compatibility to PCIe 1.0/2.0 devices.

Dual-Channel DDR3 1600/ 1333 support

This motherboard supports the dual-channel DDR3 architecture that features the data transfer rates of DDR3 1600/1333 MHz to boost the system's performance, and to meet the higher bandwidth requirements of the latest 3D graphics, multimedia, and Internet applications.

Native SATA 6Gb/s Support

With its Intel® C216 Chipset, this motherboard natively supports the next generation Seria ATA (SATA) storage interface, delivering up to 6.0 Gb/s data transfer rates. It provides enhanced scalability, faster data retrieval, and twice the bandwidth of current bus systems.

Complete USB 3.0 Integration

This motherboard offers you the strategic USB 3.0 accessibility for both the front and rear panels, allowing you to experience the convenience of the latest plug & play connectivity solution at speed up to ten times faster than USB 2.0.

GPU Boost

GPU Boost accelerates the integrated GPU for extreme graphics performance, facilitates flexible frequency adjustments, and easily delivers stable system-level upgrades for every use.

EPU

EPU (Energy Processing Unit), the world's first real-time system power-saving chip, automatically detects the current system load and intelligently moderates power usage. It offers a total system-wide energy optimization, reduces fan noise, and extends the components' lifespan.

1.3.2 ASUS Workstation Exclusive Features

Dual Intel® LAN

This motherboard features the built-in dual server class Intel® Gigabit LAN ports, which help reduce CPU usage, thus increasing throughput to achieve highly-reliable network connections, outstanding performance, and better support for diverse operating systems.

Multi CPU and Memory support

This motherboard offers you with flexible options on CPU and memory support to meet diverse computing needs.

For instance, you can choose to use the widely-available DDR3 un-buffered non-ECC memory modules or the more stable and reliable DDR3-unbuffered ECC memory modules.

CUDA parallel computing power support

This motherboard works with the discrete CUDA technology to attain the outstanding and dependable performance of a Personal Supercomputer on your desk instead of a computer cluster in a room, providing you with an unprecedented return on your investment. Its Tesla GPUs offers an intensive parallel computing on tons of data, which delivers up to four teraflops of performance.

Quick Gate

Quick Gate is a vertical USB connector on the motherboard that allows you to install USB devices directly without any messy cables and stops important data storage devices from breaking off unexpectedly. This revolutionary and unique design offers a convenient and safe way to install data and applications on your system.

Diagnosis LED

Diag. LED offers an intuitive way to locate the root problems in seconds. It checks these key components in sequence during bootup --- CPU, memory, graphics card, and hard drive. If an error is found, the critical component's LED stays lit up until the problem is solved.

G.P. Diagnosis Card (Bundled)

The bundled G.P. Diagnosis card double-checks the system quickly provides precise information everytime you turn on your computer.

1.3.3 ASUS features

8+2 Phase Power Design

This motherboard's 8-phase VRM power design unleashes the Intel® Ivy Bridge processor's potential, delivering high-power efficiency, supreme overclocking ability, and effectively lowers the system's temperature to extend the components' lifespan. This motherboard also features an extra 2-phase power area for the integrated memory controller.

MemOK!

MemOK!, the remarkable memory rescue tool, allows you to simply press a button to patch memory issues, ensure memory boot compatibility, determine fail-safe settings, and dramatically improve the system's bootup.

AI Suite II

With its user-friendly interface, ASUS AI Suite II integrates several ASUS utilities and allows you to launch and operate these utilities simultaneously. It allows you to configure the overclocking settings, adjust the frequencies and related voltages, remotely control the system via a mobile device, and other easy-to-use and helpful utilities.

ASUS Quiet Thermal Solution

ASUS Quiet Thermal solution provides a more stable system and enhances the overclocking capability.

ASUS Fanless Design—Heat-pipe solution

The aesthetically-designed crystal-shaped heatsink features the 0-dB thermal solution for a noiseless and stable computing environment.

DO NOT uninstall the heat-pipe by yourself. Doing so may bend the tubing and affect the heat dissipation performance.

Fan Xpert

ASUS Fan Xpert intelligently allows you to adjust both the CPU and chassis fan speeds based on different ambient temperatures and attain a quiet and cool computing environment.

ASUS EZ DIY

ASUS UEFI BIOS(EZ Mode)

ASUS UEFI BIOS, a UEFI compliant architecture, offers the first mouse-controlled intuitive graphical BIOS interface that goes beyond the traditional keyboard-only BIOS controls, providing you with more flexibility, convenience, and easy to navigate EFI BIOS than the traditional BIOS versions. It offers you with dual selectable modes and native support for hard drives larger than 2.2 TB.

ASUS UEFI BIOS includes the following new features:

* F12 BIOS snapshot hotkey

* F3 Shortcut for most accessed information

* ASUS DRAM SPD (Serial Presence Detect) information detecting faulty DIMMs, and helping with difficult POST situations

ASUS Q-Design

ASUS Q-Design enhances your DIY experience. All of Q-LED, Q-DIMM, and Q-Slot design speed up and simplify the DIY process!

ASUS Q-Connector

ASUS Q-Connector is a unique adapter that allows you to easily connect or disconnect the chassis front panel cables to one module, eliminating the hassle of plugging one cable at a time and making the connection quick and accurate.

ASUS EZ Flash 2

ASUS EZ Flash 2 is a user-friendly utility that allows you to update the BIOS without using a bootable floppy disk or an OS-based utility.

ASUS CrashFree BIOS 3

ASUS CrashFree BIOS 3 allows you to restore a corrupted BIOS file from a USB storage device containing the BIOS file.

Precision Tweaker 2

Precision Tweaker 2 allows you to adjust the CPU voltager in 0.01V steps and the DRAM voltage in 0.001V steps to achieve the most precise and ultimate overclocking settings.

IEEE 1394a interface

IEEE 1394a interface provides high speed digital interface for audio/video devices such as digital television, digital video camcorders, storage peripherals and other portable devices.

S/PDIF-out on Back I/O Port

This motherboard provides the coaxial and optical S/PDIF out ports for convenient connectivity to external home theater audio systems and for high-quality digital audio experience.

ASUS Crystal Sound

8 Channel Audio Codec

The onboard 8-channel HD audio (High Definition Audio, previously codenamed Azalia) CODEC enables high-quality Absolute Pitch 192khz/24bit audio output, true BD lossless sound, jack-sensing feature, retasking functions, and multi-streaming technology.

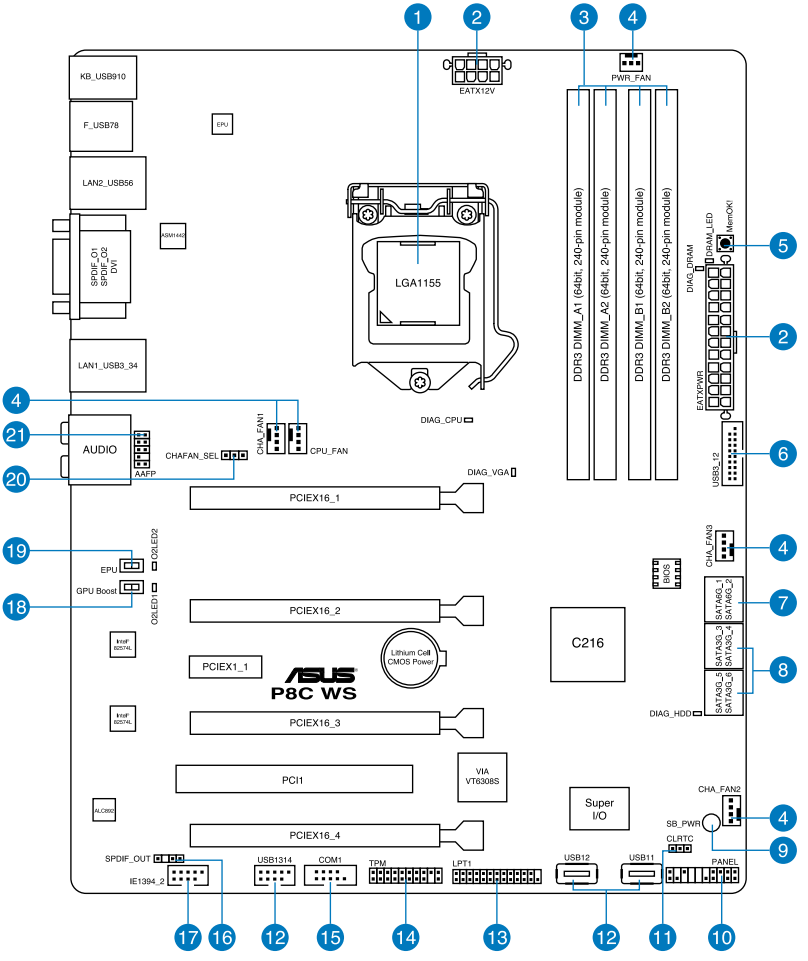
2.1 Before you proceed

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

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

2.2 Motherboard overview

2.2.1 Motherboard layout



Refer to **2.2.8 Internal connectors** and **2.3.10 Rear panel connection** for more information about rear panel connectors and internal connectors.

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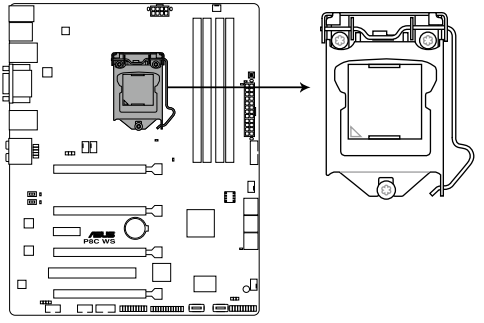
2.2.2 Central Processing Unit (CPU)

The motherboard comes with a surface mount LGA1155 socket designed for the Intel® 2nd/ 3rd Generation Core™ i3 desktop Processors and Intel® Xeon® E3-1200/ 12x5 v2 series Server/Workstation Processors.



P8C WS CPU LGA1155

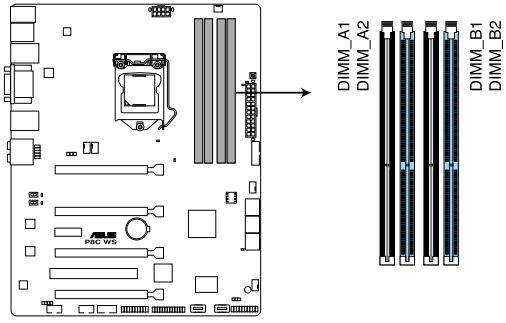
Ensure that all power cables are unplugged before installing the CPU.

- 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 LGA1155 socket.
- The product warranty does not cover damage to the socket contacts resulting from incorrect CPU installation/removal, or misplacement/loss/incorrect removal of the PnP cap.

2.2.3 System memory

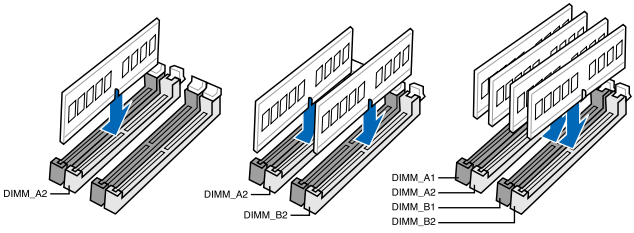
The motherboard comes with four Double Data Rate 3 (DDR3) Dual Inline Memory Modules (DIMM) slots.

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



P8C WS 240-pin DDR3 DIMM socket

Recommended memory configurations



Chapter 2

Memory configurations

You may install 1GB, 2GB, 4GB, 8GB unbuffered ECC or non-ECC DDR3 DIMMs into the DIMM sockets depending on the installed CPU.

- 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 1.65V is recommended to protect the CPU.
- The max. 32GB memory capacity can be supported with DIMMs of 8GB (or above).
- Always install DIMMs with the same CAS latency. For optimum compatibility, we recommend that you obtain memory modules from the same vendor.
- 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:
  - Use a maximum of 3GB system memory if you are using a 32-bit Windows OS.
  - Install a 64-bit Windows OS when you want to install 4GB or more on the motherboard.
    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 512Mb (64MB) chips or less (Memory chip capacity counts in Megabit, 8 Megabit/Mb = 1 Megabyte/MB).

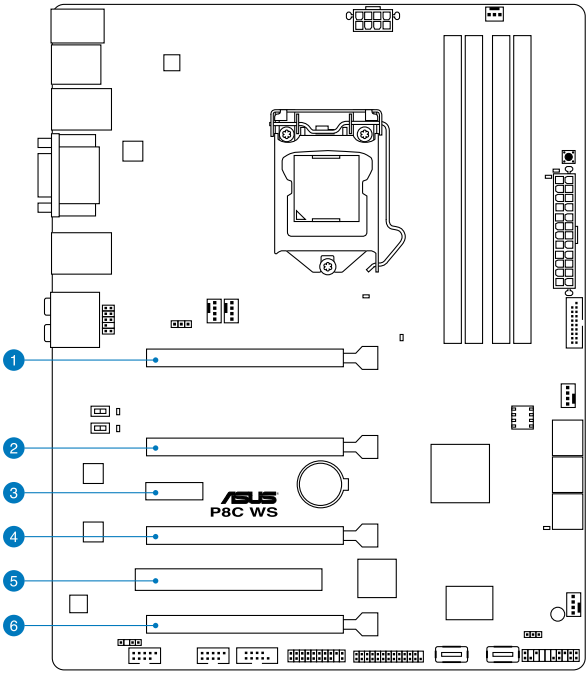
For system stability, use a more efficient memory cooling system to support a full memory load (4 DIMMs) or overclocking condition.

P8C WS Motherboard Qualified Vendors Lists (QVL)

- ASUS exclusively provides hyper DIMM support function.
- Hyper DIMM support is subject to the physical characteristics of individual CPUs. Load the X.M.P. or D.O.C.P. settings in the BIOS for the hyper DIMM support.
- Visit the ASUS website for the latest QVL.

2.2.4 Expansion slots

Ensure to 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 x16_1 slot (single at x16 or dual at x8/x8 mode)
2	PCIe 3.0 x16_2 slot (x8 mode)
3	PCIe 2.0 x1_1 slot
4	PCIe 2.0 x16_3 slot (x4 mode)
5	PCI1 slot
6	PCIe 2.0 x16_4 slot (x4 mode)

Standard Interrupt assignments

IRQ	Priority	Standard function
0	1	System Timer
1	2	Keyboard Controller
2	-	Programmable Interrupt
4	12	Communications Port (COM1)
5	13	IRQ Holder for PCI Steering
6	14	Reserved
7	15	Reserved
8	3	System CMOS/Real Time Clock
9	4	IRQ Holder for PCI Steering
10	5	IRQ Holder for PCI Steering
11	6	IRQ Holder for PCI Steering
12	7	Reserved
13	8	Numeric Data Processor
14	9	Primary IDE Channel

IRQ assignments for this motherboard

	A	B	C	D	E	F	G	H
PCIEx16_1	shared	–	–	–	–	–	–	–
PCIEx16_2		shared	–	–	–	–	–	–
PCIEx16_3	–	–	–	shared	–	–	–	–
PCIEx16_4	shared	–	–	–	–	–	–	–
PCIEx1_1	shared	–	–	–	–	–	–	–
PCI1	shared	–	–	–	–	–	–	–
VIA1394	–	–	–	shared	–	–	–	–
USB3.0	shared	–	–	–	–	–	–	–
LAN1 (82574)	–	shared	–	–	–	–	–	–
LAN2 (82574)	–	–	shared	–	–	–	–	–
SATA Controller 1	–	–	–	shared	–	–	–	–
SATA Controller 2	–	–	–	shared	–	–	–	–
USB 2.0 Controller 1	–	–	–	–	–	–	–	shared
USB 2.0 Controller 2	shared	–	–	–	–	–	–	–
HD Audio	–	–	–	–	–	–	shared	–

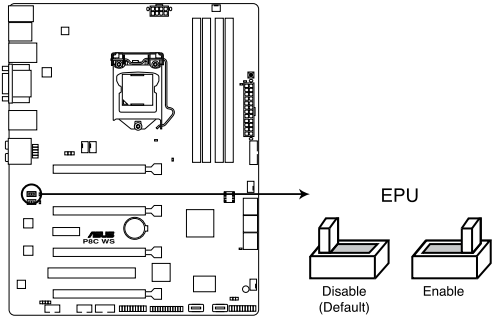
2.2.5 Onboard buttons and switches

Onboard buttons and switches enhance overclocking and gaming performance when working on a bare or open-case system.

1. EPU switch

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

For ensuring the system performance, turn the switch setting to **Enable** when the system is powered off.

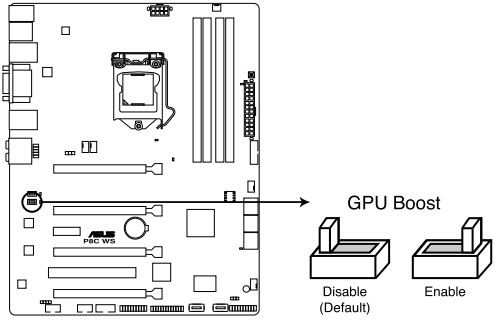


P8C WS EPU switch

2. GPU Boost switch

Turning this switch to **Enable** will automatically optimize the system for fast, yet stable GPU speed.

For ensuring the system performance, turn the switch setting to **Enable** when the system is powered off.

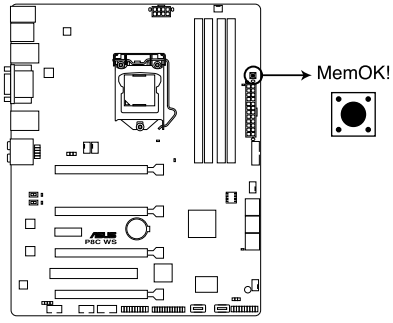


P8C WS GPU Boost switch

The GPU Boost Switch functions only when you install the DESKTOP CPU that supports onboard graphics.

3. MemOK! button

When you install DIMMs that are not compatible with the motherboard, this may cause the system boot failure, and the DRAM_LED near the MemOK switch lights continuously. Simply press the MemOK button until the DRAM_LED starts blinking to patch memory compatibility issues and ensure the system's successful bootup.



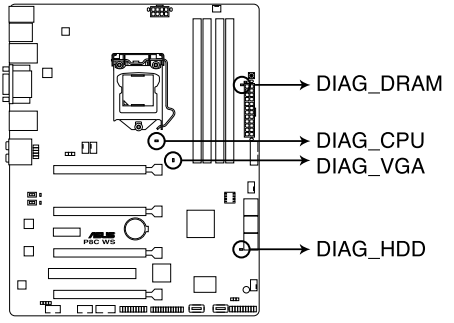
P8C WS MemOK! switch

- Refer to section **2.2.6 Onboard LEDs** for the exact location of the DRAM_LED.
- The DRAM_LED also lights 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 on the ASUS website 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 the ASUS website at www.asus.com after using the MemOK! function.

2.2.6 Onboard LEDs

1. POST State LEDs

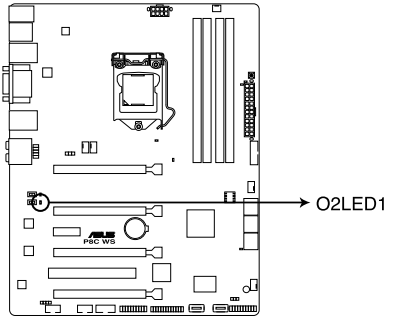
The POST State LEDs indicate the status of these key components during POST (Power-on-Self Test): CPU, memory modules, VGA card, and hard disk drive. If an error is found, the critical component's LED stays lit up until the problem is solved.



P8C WS DIAG_DRAM/ CPU/ VGA/ HDD LED

2. GPU Boost LED

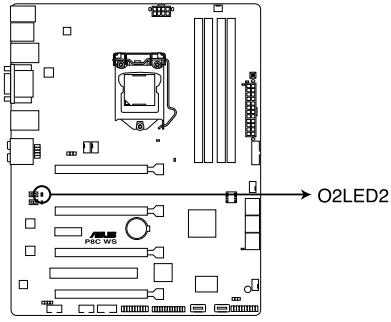
The GPU Boost LED lights up when the GPU Boost switch is turned to **Enable**.



P8C WS GPU Boost LED

3. EPU LED

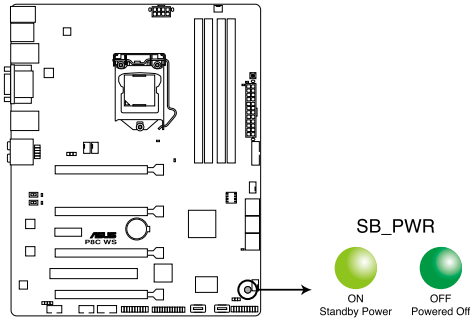
The EPU LED lights up when the EPU switch is turned to **Enable**.



P8C WS EPU LED

4. Standby power LED

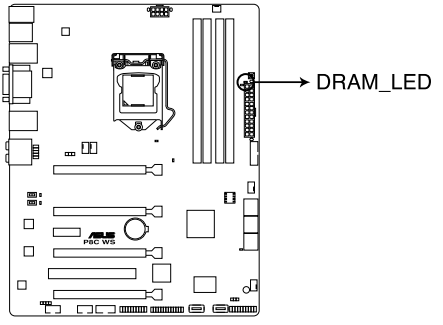
The motherboard comes with a standby power LED that lights up to indicate that the system is ON, in sleep mode, or in soft-off mode. This is a reminder that you should shut down the system and unplug the power cable before removing or plugging in any motherboard component. The illustration below shows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



P8C WS Onboard LED

5. DRAM LED

The DRAM_LED lights up when the installed DIMMs incompatible with the motherboard or improperly installed. When using the MemOK! switch for automatic memory compatibility tuning, the DRAM_LED will blink.



P8C WS DRAM LED

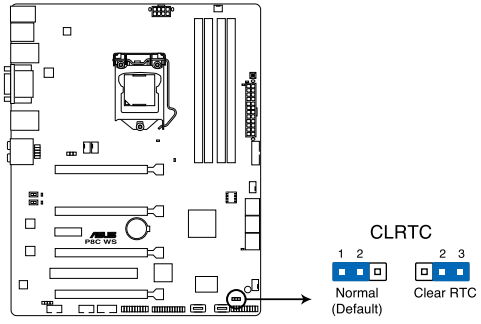
2.2.7 Jumper

1. Clear RTC RAM (3-pin CLRTC)

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

To erase the RTC RAM

1. Turn OFF the computer and unplug the power cord.
2. Move the jumper cap from pins 1-2 (default) to pins 2-3. Keep the cap on pins 2-3 for about 5–10 seconds, then move the cap back to pins 1-2.
3. Plug the power cord and turn ON the computer.
4. Hold down the <Del> key during the boot process and enter BIOS setup to re-enter data.



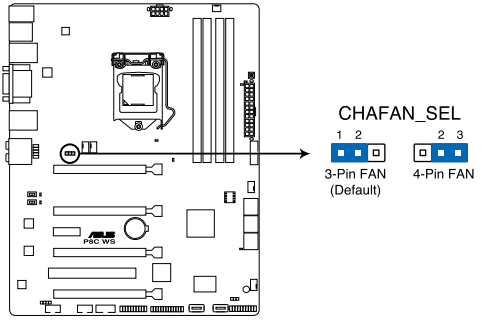
P8C WS Clear RTC RAM

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

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

2. Chassis Fan control setting (3-pin CHAFAN_SEL)

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



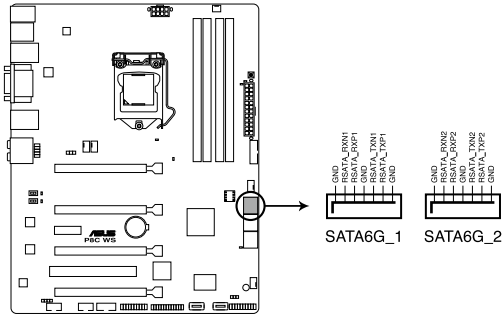
P8C WS CHAFAN setting

- If you use a 4-pin fan but set the jumper to pin 1-2, the fan you installed may not work.
- If you use a 3-pin fan but set the jumper for a 4-pin fan, the fan control will not work and the fan you installed will always run at full speed.

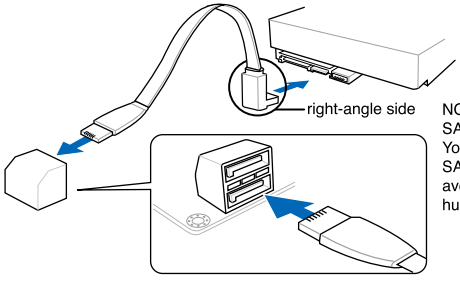
2.2.8 Internal connectors

1. Intel® C216 Serial ATA 6.0 Gb/s connectors (7-pin SATA6G_1-2 [gray])

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



P8C WS Intel® SATA 6.0 Gb/s connectors



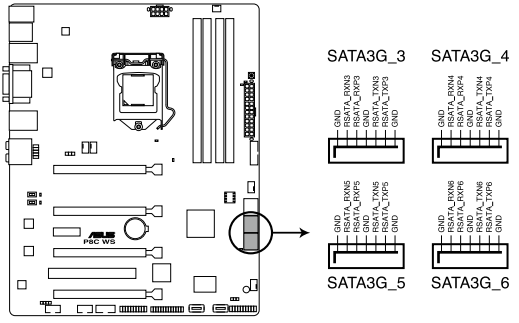
NOTE: Connect the right-angle side of SATA signal cable to SATA device. You may also connect the right-angle side SATA cable to the onboard SATA port to avoid mechanical conflict with huge graphics cards.

- These connectors are set to [AHCI Mode] by default. If you intend to create a Serial ATA RAID set using these connectors, set the **SATA Mode** item in the BIOS to [RAID Mode]. Refer to section **3.5.4 SATA Configuration** for details.
- Before creating a RAID set, refer to section **4.5 RAID configurations** or the manual bundled in the motherboard support DVD.
- When using NCQ, set the **SATA Mode** in the BIOS to [AHCI Mode]. Refer to section **3.5.4 SATA Configuration** for details.
- You must install Windows® XP Service Pack 3 or later versions before using Serial ATA hard disk drives. The Serial ATA RAID feature is available only if you are using Windows® XP SP3 or later versions.

2. Intel® C216 Serial ATA 3.0 Gb/s connectors (7-pin SATA3G_3–6 [blue])

These connectors connect to Serial ATA 3.0 Gb/s hard disk drives and optical disc drives via Serial ATA 3.0 Gb/s signal cables.

If you installed Serial ATA hard disk drives, you can create a RAID 0, 1, 5, and 10 configuration with the Intel® Rapid Storage Technology through the onboard Intel® C216 chipset.

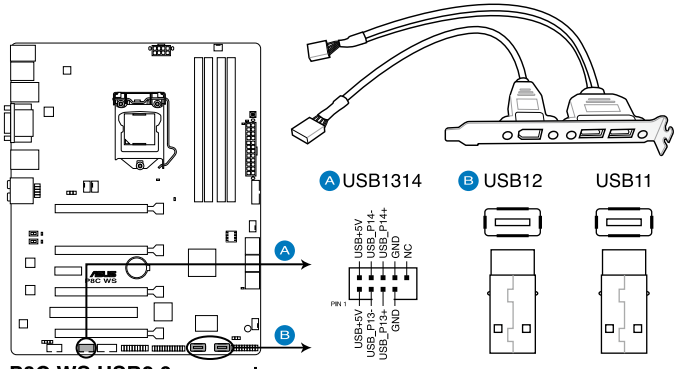


P8C WS Intel® SATA 3.0 Gb/s connectors

- These connectors are set to [IDE Mode] by default. If you intend to create a Serial ATA RAID set using these connectors, set the SATA Mode item in the BIOS to [RAID Mode]. Refer to section 3.5.4 SATA Configuration for details.
- Before creating a RAID set, refer to section **4.5 RAID configurations** or the manual bundled in the motherboard support DVD.
- When using hot-plug and NCQ, set the SATA Mode in the BIOS to [AHCI Mode]. Refer to section **3.5.4 SATA Configuration** for details.
- You must install Windows® XP Service Pack 3 or later versions before using Serial ATA hard disk drives. The Serial ATA RAID feature is available only if you are using Windows® XP SP3 or later versions.

3. USB 2.0 connectors
(Type A: 10-1 pin USB1314; Type B: USB11/ USB12)

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.



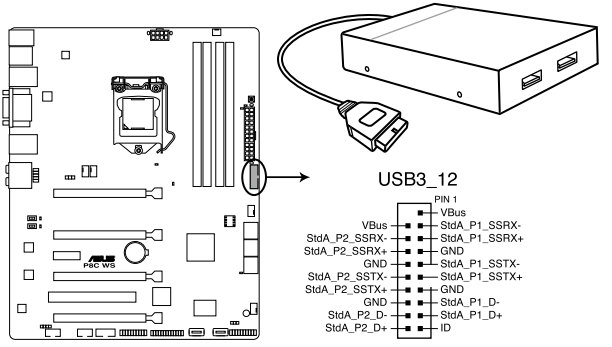
P8C WS USB2.0 connectors

Never 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, blue) first, and then install the Q-Connector (USB) to the USB connector onboard if your chassis supports front panel USB ports.

4. USB 3.0 connector (20-1 pin USB3_12)

This connector is for the additional USB 3.0 ports, and complies with the USB 3.0 specificaton that supports up to 5Gbps connection speed. If the USB 3.0 front panel cable is available from your system chassis, with this USB 3.0 connector, you can have a front panel USB 3.0 solution.

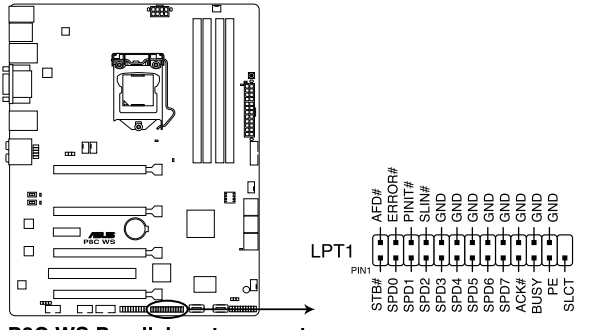


P8C WS USB3.0 connector

- You can connect the ASUS front panel USB 3.0 box to this connector to obtain the front panel USB 3.0 solution.
- Due to Intel® limitations, the USB3_12 only supports Windows® 7 operating system.

5. Parallel port connector (26-1 pin LPT1)

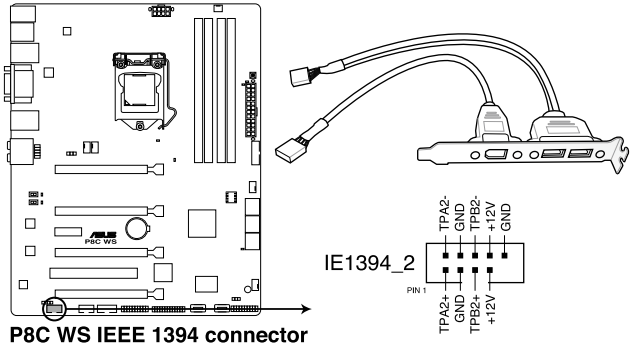
This connector is for a parallel port. Connect the parallel port module cable to this connector, then install the module to a slot opening at the back of the system chassis.



P8C WS Parallel port connector

6. IEEE 1394a port connector (10-1 pin IE1394_2)

This connector is for an IEEE 1394a port. Connect the IEEE 1394a module cable to this connector, then install the module to a slot opening at the back of the system chassis.



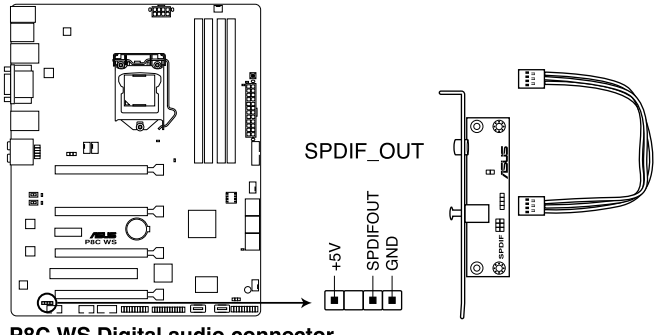
P8C WS IEEE 1394 connector

Never connect a USB cable to the IEEE 1394a connector. Doing so will damage the motherboard!

The IEEE 1394a module is purchased separately.

7. 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.

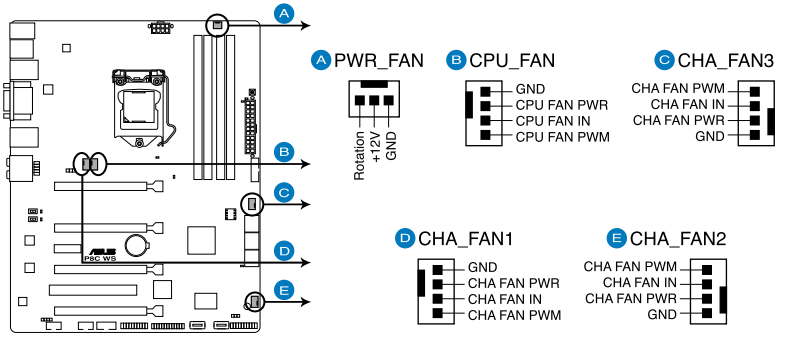


P8C WS Digital audio connector

The S/PDIF module is purchased separately.

8. CPU, chassis, and power fan connectors (4-pin CPU_FAN, 4-pin CHA_FAN1-3, 3-pin PWR_FAN)

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.



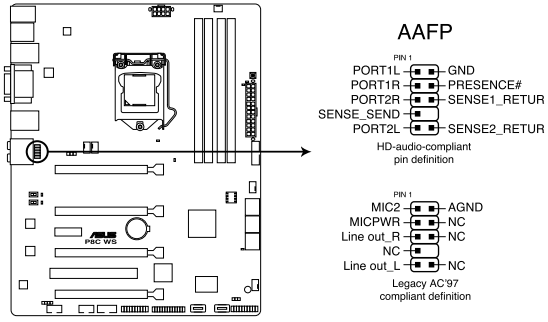
P8C WS Fan connectors

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!

- The CPU_FAN connector supports the CPU fan of maximum 2A (24 W) fan power.
- If you install two VGA cards, we recommend that you plug the rear chassis fan cable to the motherboard connector labeled CHA_FAN1, CHA_FAN2, CHA_FAN3 for better thermal environment.

9. 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.

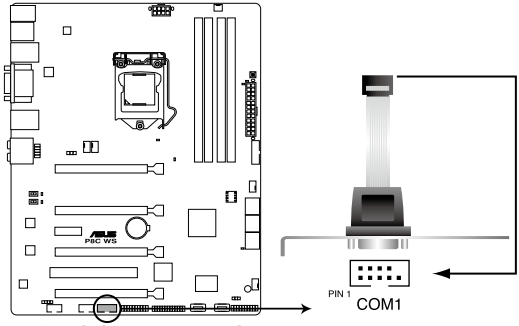


P8C WS Analog front panel connector

- 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 front panel audio module to this connector, set the Front Panel Type item in the BIOS setup to [HD]; if you want to connect an AC'97 front panel audio module to this connector, set the item to [AC97]. By default, this connector is set to [HD].

10. 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.

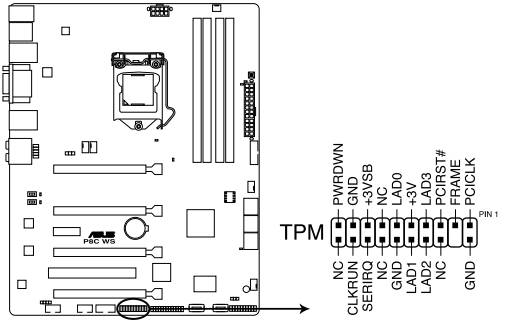


P8C WS Serial port (COM1) connector

The COM module is purchased separately.

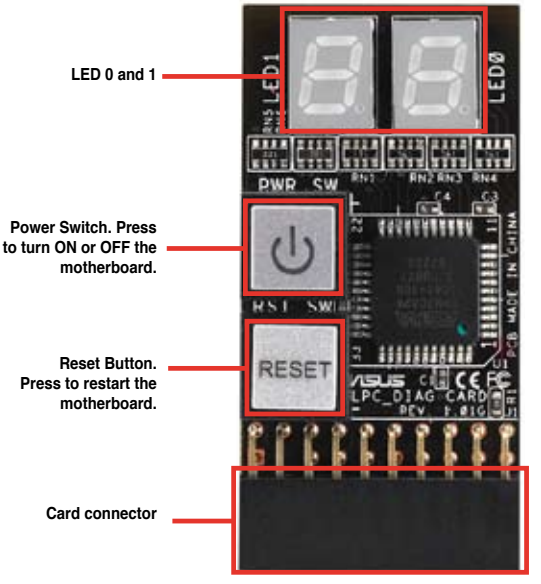
11. TPM connector (20-1 pin TPM)

This connector supports a Trusted Platform Module (TPM) system, which can securely store keys, digital certificates, passwords, and data. A TPM system also helps enhance network security, protects digital identities, and ensures platform integrity. This connector can also serve for G.P. Diagnosis card installtion.



P8C WS TPM connector

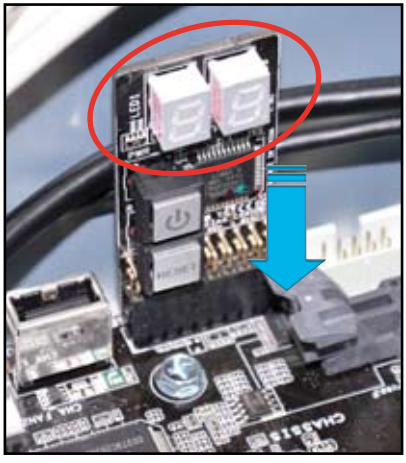
G.P. Diagnosis card layout



Installing G.P. Diagnosis card

Ensure to turn off the power supply unit before installing the diagnosis card to avoid electrical shock hazard.

1. Locate the **TPM connector (20-1 pin TPM)** on the motherboard.
2. With the LEDs of the diagnosis card facing to the PCIe slots, align the card connector with the TPM connector and press firmly until the card sits on the connector completely.

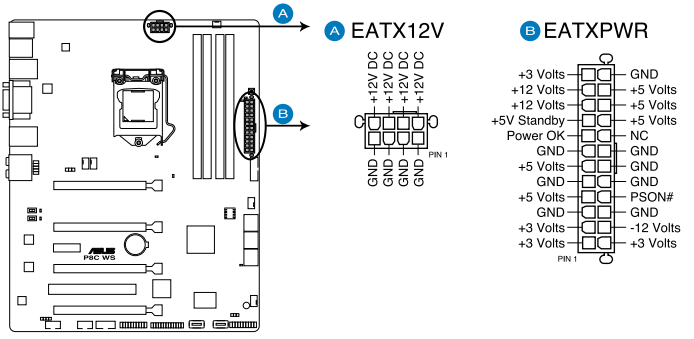


Code table for G.P. Diagnosis card

15, 19	Initiate chip	AC	OS in PIC mode
E0	Check and wake up system	AA	OS in APIC mode
2B-2F	Prepare system for memory detection and sizing	00	Leave BIOS and pass control to OS
32	Early CPU initiation	01	S1
34	Wake up AP	03	S3
98	Detect PS2 mouse/keyboard	04	S4
97	Initiate VGA BIOS	05	S5
9A-9D	USB initiation	10	Resume from S1
A2	Detect IDE	30	Resume from S3
B2	Initiate option ROM	40	Resume from S4

12. ATX power connectors
(24-pin EATXPWR, 8-pin EATX12V)

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.

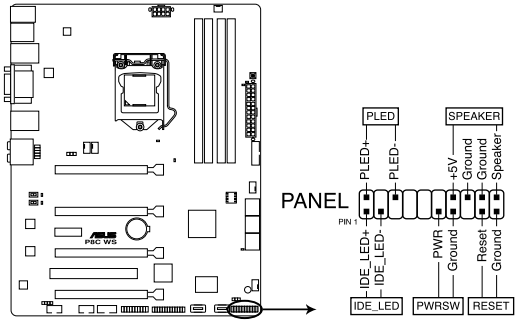


P8C WS ATX power connectors

- 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 8-pin EATX12 V power plug; otherwise, the system will not boot.
- Use of a PSU with a higher power output is recommended 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 are uncertain about the minimum power supply requirement for your system, refer to the Recommended Power Supply Wattage Calculator at **http://support.asus.com/PowerSupplyCalculator/PSCalculator.aspx?SLanguage=en-us** for details.
- 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.

13. System panel connector (20-8 pin PANEL)

This connector supports several chassis-mounted functions.



P8C WS System panel connector

- **System power LED (2-pin PLED)**

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

- **Hard disk drive activity LED (2-pin IDE_LED)**

  This 2-pin connector is for the HDD Activity LED. Connect the HDD Activity LED cable to this connector. The IDE 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)**

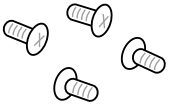
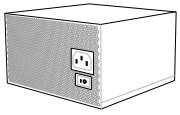
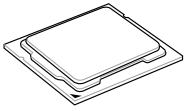
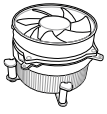
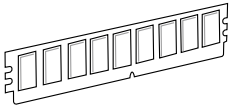
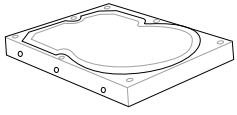
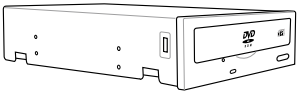
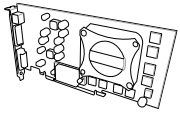
  This connector is for the system power button. Pressing the power button turns the system on or puts the system in sleep or soft-off mode depending on the BIOS settings. Pressing the power switch for more than four seconds while the system is ON turns the system OFF.

- **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.

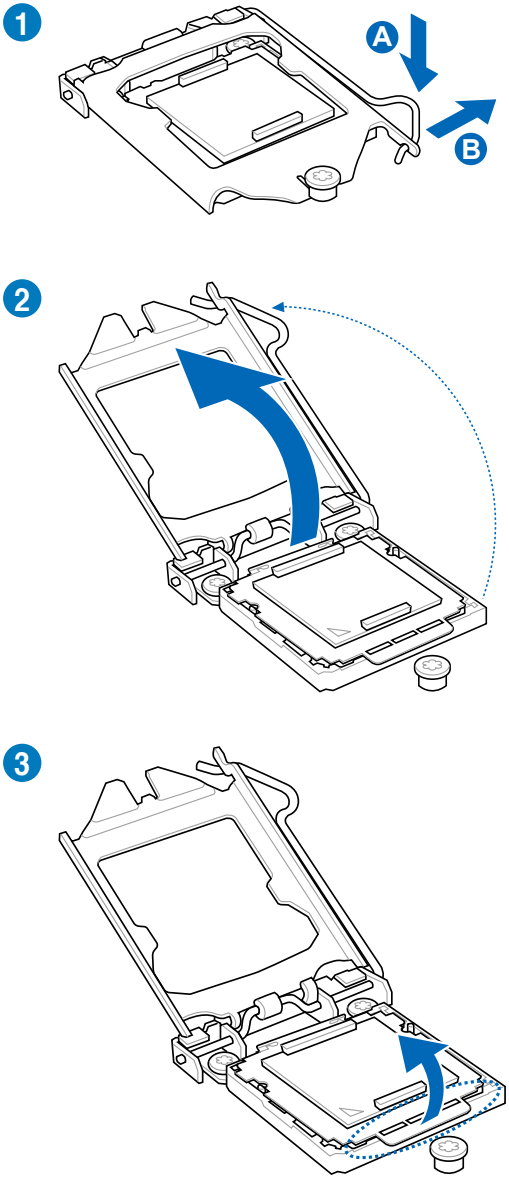
2.3 Building your computer system

2.3.1 Additional tools and components to build a PC system

	
1 bag of screws	Philips (cross) screwdriver
	
PC chassis	Power supply unit
	
Intel LGA 1155 CPU	Intel LGA 1155 compatible CPU Fan
	
DIMM	SATA hard disk drive
	
SATA optical disc drive (optional)	Graphics card (optional)

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

2.3.2 CPU installation



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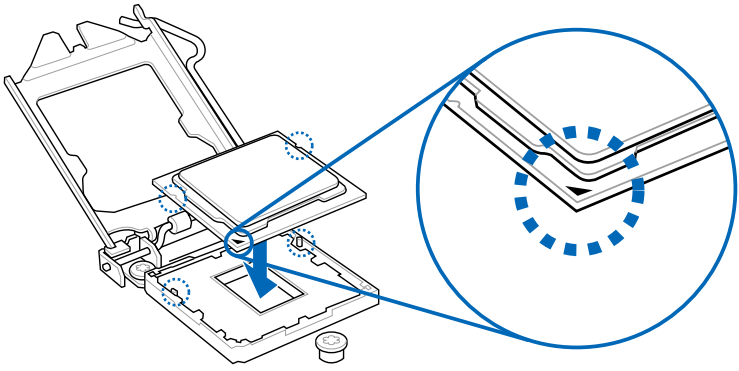

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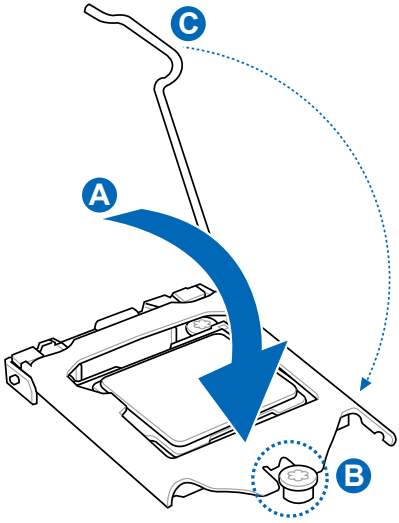

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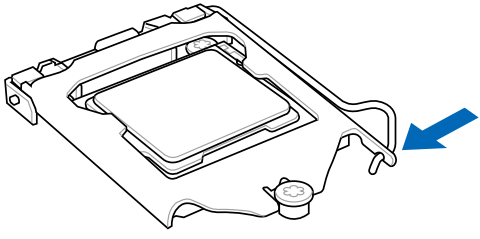
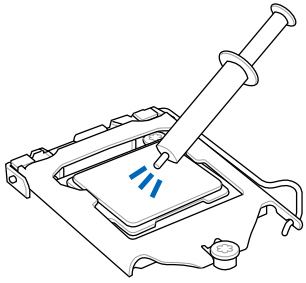
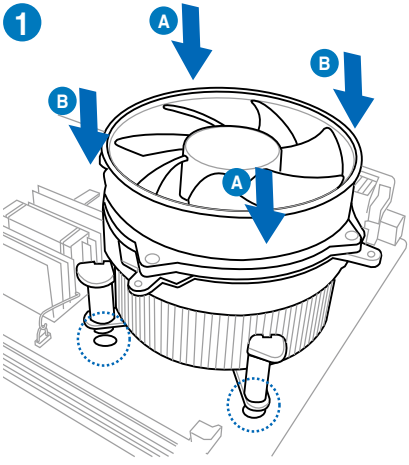


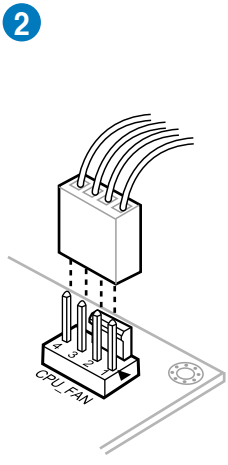
2.3.3 CPU heatsink and fan assembly installation

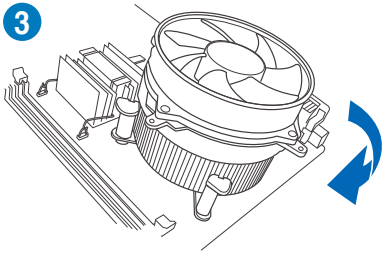


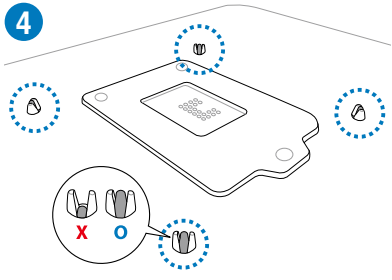
Apply the Thermal Interface Material to the CPU heatsink and CPU before you install the heatsink and fan if necessary.

To install the CPU heatsink and fan assembly



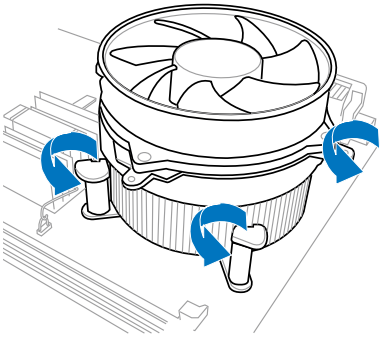




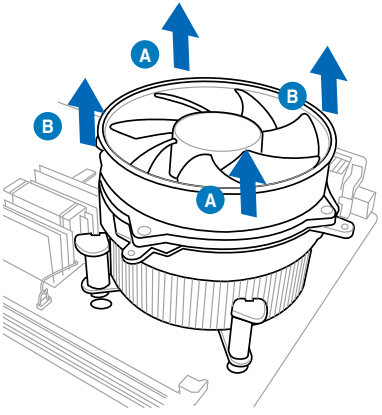


To uninstall the CPU heatsink and fan assembly

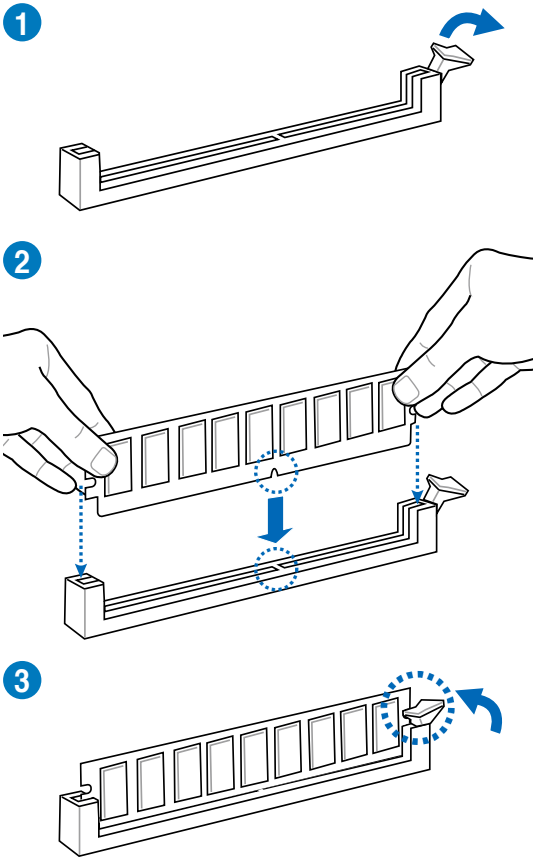
1



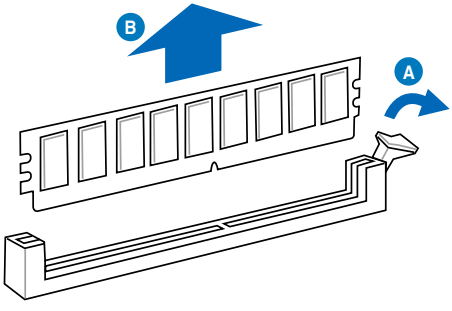
2



2.3.4 DIMM installation



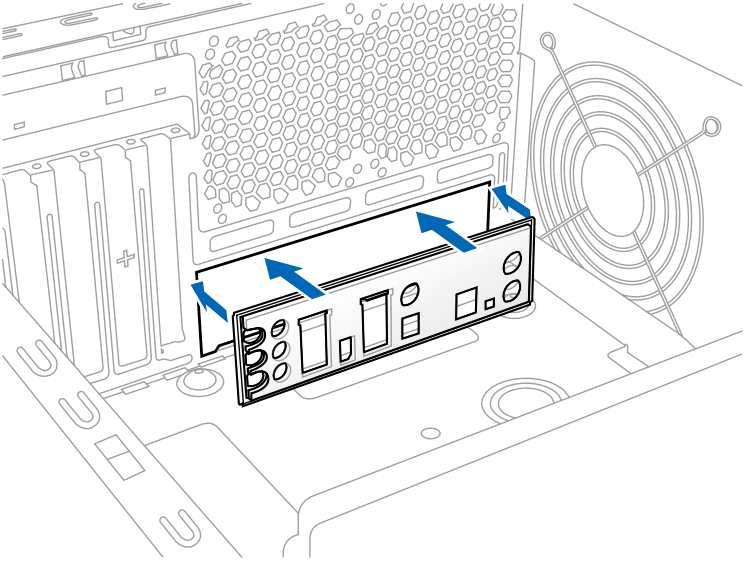
To remove a DIMM



2.3.5 Motherboard installation

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

1



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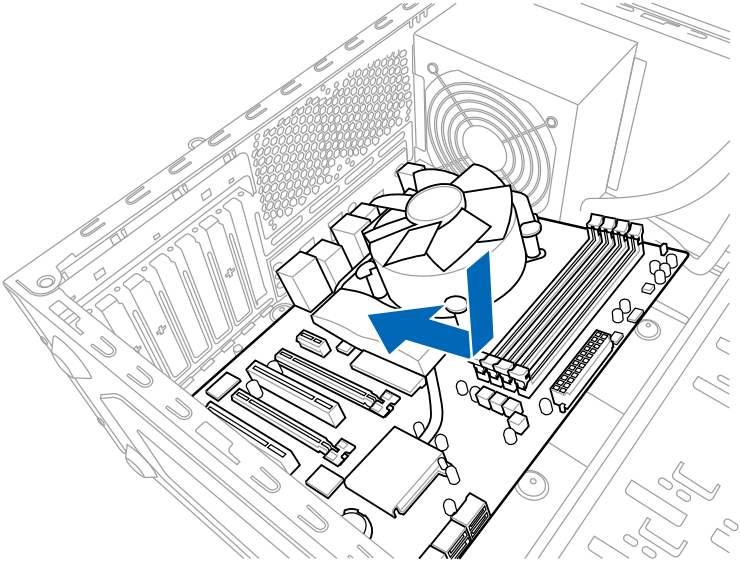

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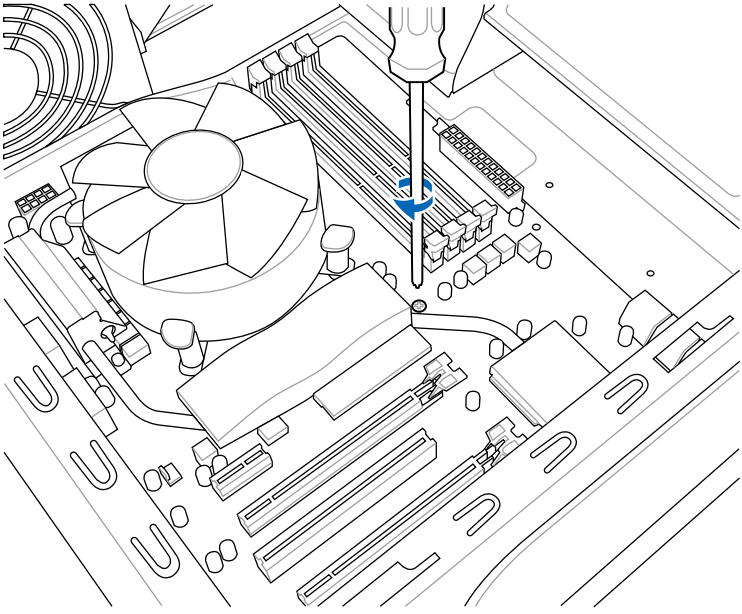
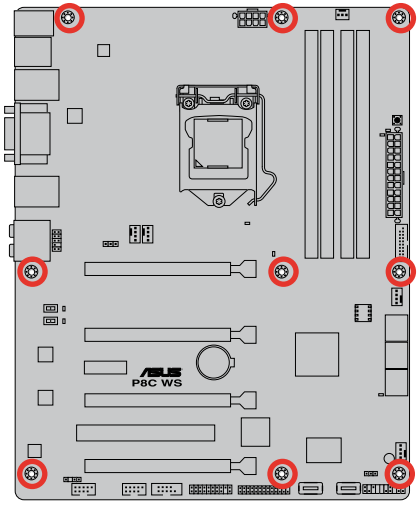
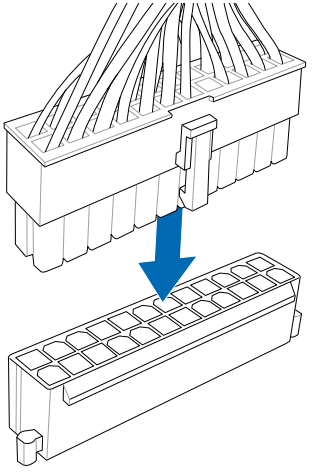




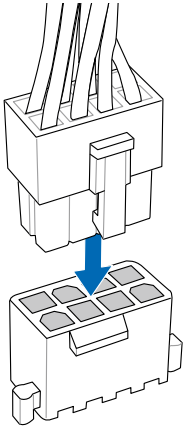
DO NOT overtighten the screws! Doing so can damage the motherboard.

2.3.6 ATX Power connection

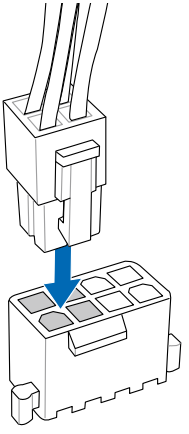
1



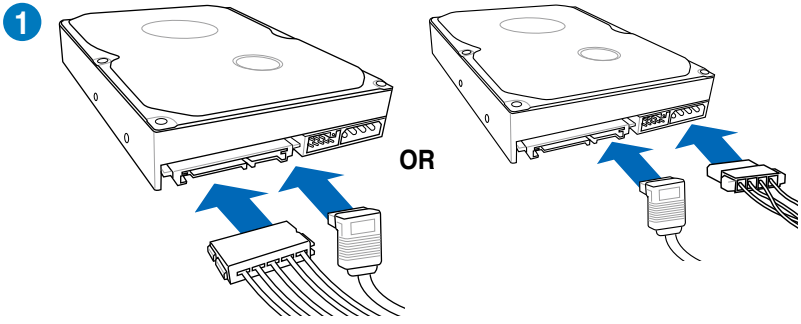
2

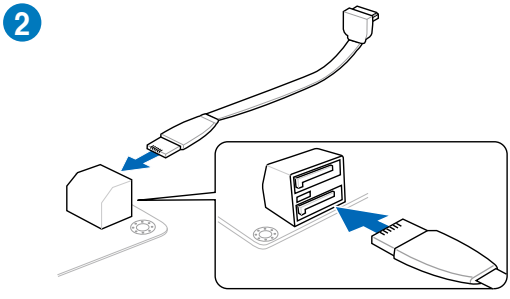


OR



2.3.7 SATA device connection





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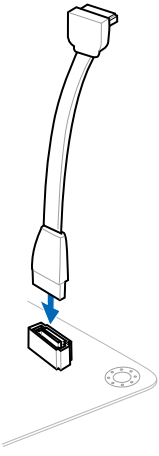
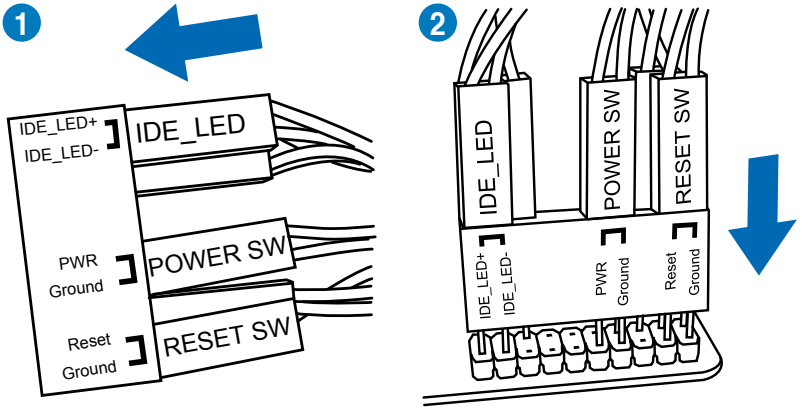
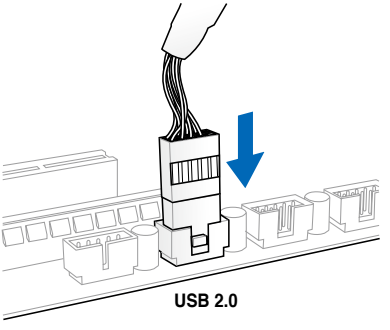


2.3.8 Front I/O Connector

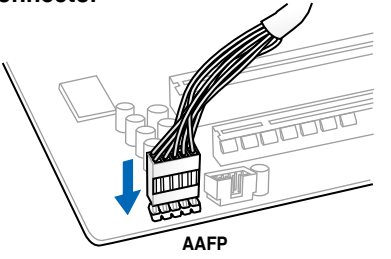
To install ASUS Q-Connector



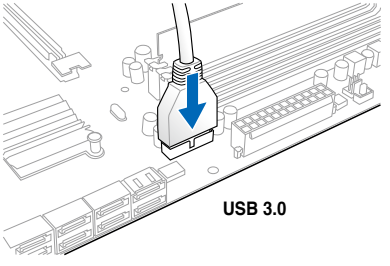
To install USB 2.0 Connector



To install front panel audio connector

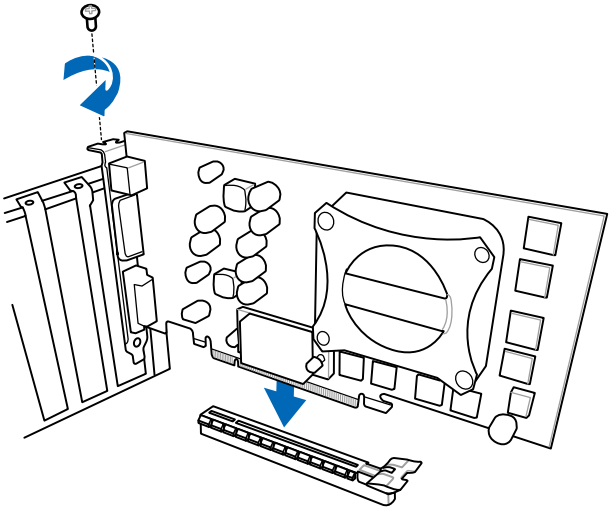


To install USB 3.0 Connector

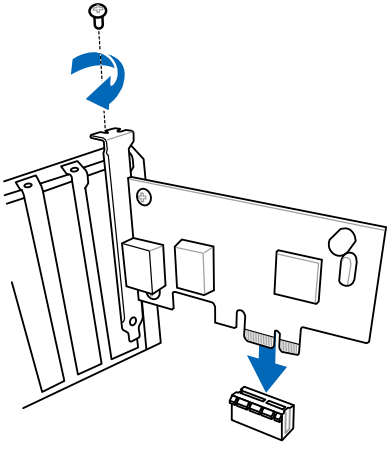


2.3.9 Expansion Card installation

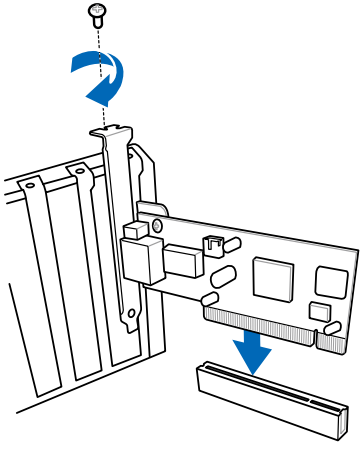
To install PCIe x16 cards



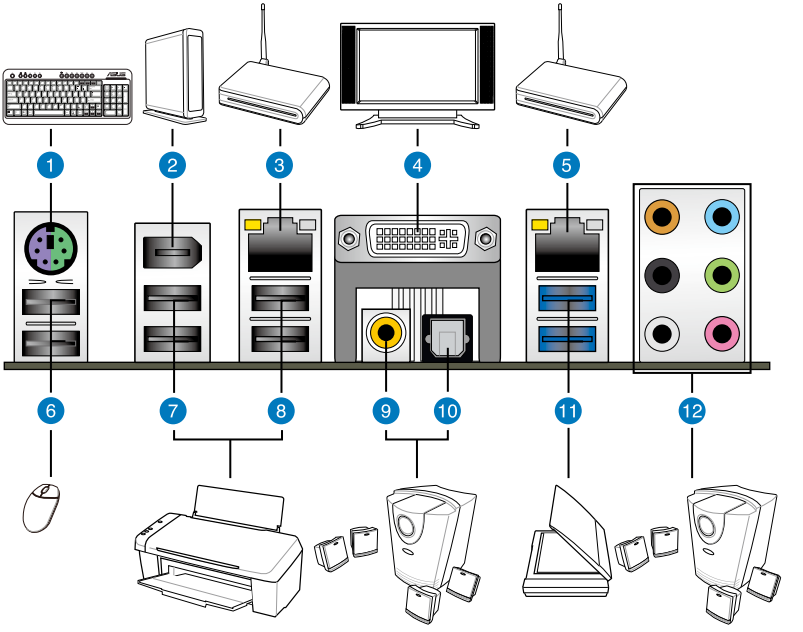
To install PCIe x1 cards



To install PCI cards



2.3.10 Rear panel connection



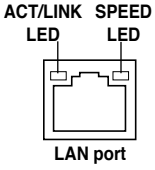
Rear panel connectors	
1. PS/2 mouse and keyboard port	7. USB 2.0 ports 7 and 8
2. IEEE 1394a port	8. USB 2.0 ports 5 and 6
3. LAN (RJ-45) port 2*	9. Coaxial S/PDIF Out port
4. DVI port	10. Optical S/PDIF Out port
5. LAN (RJ-45) port 1*	11. USB 3.0 ports 3 and 4
6. USB 2.0 ports 9 and 10	12. Audio I/O ports**

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

- Due to USB 3.0 controller limitation, USB 3.0 devices can only be used under Windows® OS environment and after the USB 3.0 driver installation.
- USB 3.0 devices can only be used as data storage only.
- We strongly recommend that you connect USB 3.0 devices to USB 3.0 ports for faster and better performance for your USB 3.0 devices.

* LAN port LED indications

Activity Link LED		Speed LED	
Status	Description	Status	Description
OFF	No link	OFF	10 Mbps connection
ORANGE	Linked	ORANGE	100 Mbps connection
BLINKING	Data activity	GREEN	1 Gbps connection

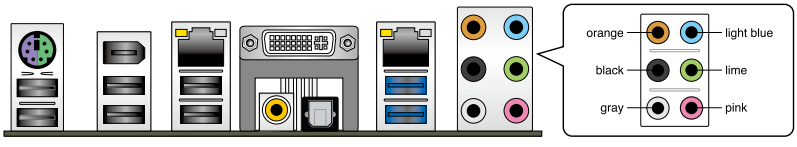


**Audio 2, 4, 6, or 8-channel configuration

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

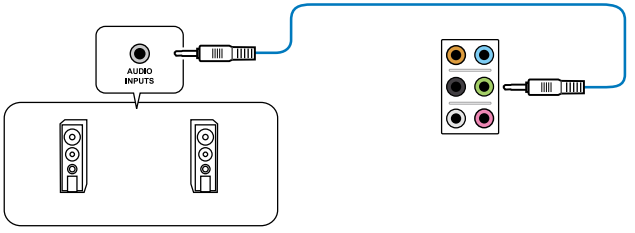
2.3.11 Audio I/O connections

Audio I/O ports

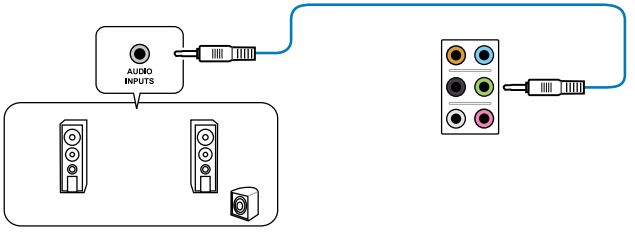


Connect to Headphone and Mic

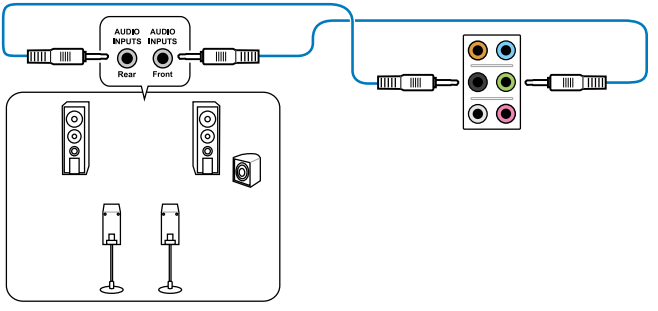
Connect to Stereo Speakers



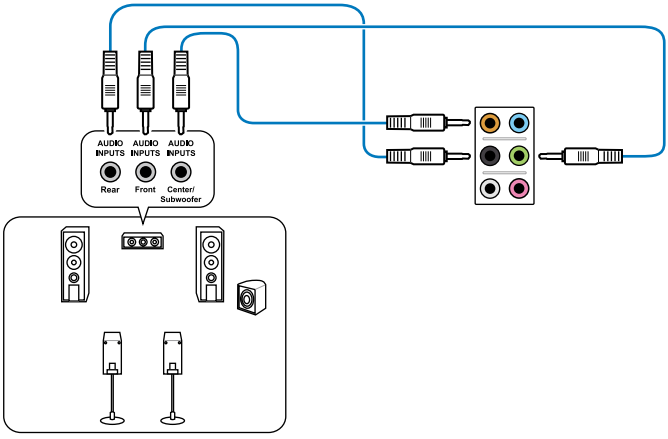
Connect to 2.1 channel Speakers



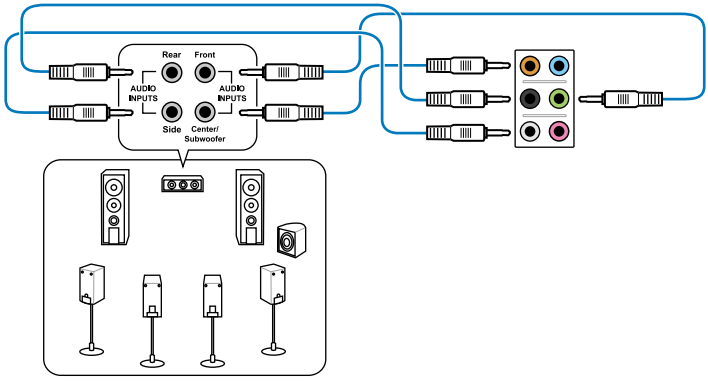
Connect to 4.1 channel Speakers



Connect to 5.1 channel Speakers



Connect to 7.1 channel Speakers



2.4 Starting up for the first time

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

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

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

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

2.5 Turning off the computer

While the system is ON, pressing the power switch for less than four seconds puts the system on sleep mode or soft-off mode, depending on the BIOS setting. Pressing the power switch for more than four seconds lets the system enter the soft-off mode regardless of the BIOS setting.

Chapter 3

3.1 Knowing BIOS

The new ASUS UEFI BIOS is a Unified Extensible Interface that complies with UEFI architecture, offering a user-friendly interface that goes beyond the traditional keyboard-only BIOS controls to enable a more flexible and convenient mouse input. Users can easily navigate the new UEFI BIOS with the same smoothness as their 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 optimum performance. **We recommend that you 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 settings of the BIOS may result to instability or failure to boot. **We strongly recommend that you change the BIOS settings only with the help of a trained service personnel**.

3.2 BIOS setup program

A BIOS setup program is provided for BIOS item modification. When you start up the computer, the system provides you with the opportunity to run this program. Press <Del> during the Power-On Self-Test (POST) to enter the Setup utility. Otherwise, POST continues with its test routines.

If you wish to enter Setup after POST, press <Ctrl> + <Alt> + <Delete>, or press the reset button on the system chassis to restart the system. You can also turn the system off and then turn it back on to restart the system. Do this last option only if the first two failed.

- 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. See section **3.9 Exit Menu** for details.
- If the system fails to boot after changing any BIOS setting, try to clear the CMOS and reset the motherboard to the default value. See section **2.2.5 Onboard switches** for information on how to erase the RTC RAM.
- The BIOS setup program does not support the bluetooth devices.

The BIOS setup program is designed to make it as easy to use as possible. Being a menu-driven program, it lets you scroll through the various submenus and select from the available options using a keyboard or a USB mouse.

The BIOS setup program can be used under two modes: **EZ Mode** and **Advanced Mode**. You can change modes from the **Exit** menu or from the **Exit/Advanced Mode** button in the **EZ Mode/Advanced Mode** screen.

3.2.1 EZ Mode

By default, the EZ Mode screen appears when you enter the BIOS setup program. The EZ Mode provides you an overview of the basic system information, and allows you to select the display language, system performance mode and boot device priority. To access the Advanced Mode, click **Exit/Advanced Mode**, then select **Advanced Mode** or press F7 hot key 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 **3.7 Boot memu** for details.

- The boot device options vary depending on the devices you installed to the system.
- The **Boot Menu(F8)** button is available only when the boot device is installed to the system.

3.2.2 Advanced Mode

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

To access the EZ Mode, click **Exit**, then select **ASUS EZ Mode**.

Menu bar

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

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

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

Back button

This button appears when entering a submenu. Press <Esc> or use the USB mouse to click this button to return to the previous menu screen.

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>.

Pop-up window

Select a menu item and press <Enter> to display a pop-up window with the configuration options for that item.

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.

Navigation keys

At the bottom right corner of the menu screen are the navigation keys for the BIOS setup program. Use the navigation keys to select items in the menu and change the settings.

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.

3.3 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.

3.3.1 System Language [English]

Allows you to choose the BIOS language version from the options. Configuration options:

[English] [Français] [Español] [Deutsch] [Русский] [日本語] [繁體中文] [简体中文]

3.3.2 System Date [Day xx/xx/xxxx]

Allows you to set the system date.

3.3.3 System Time [xx:xx:xx]

Allows you to set the system time.

3.3.4 Security

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

- If you have forgotten your BIOS password, erase the CMOS Real Time Clock (RTC) RAM to clear the BIOS password. See section **2.3.5 Onboard switches** for information on how to erase the RTC RAM.
- The **Administrator** or **User Password** items on top of the screen show the default **Not Installed**. After you set a password, these items show **Installed**.

Administrator Password

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

3.4 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 the following items:

Ai Overclock Tuner [Auto]

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.

[X.M.P.] If you install memory modules supporting the eXtreme Memory Profile (X.M.P.) Technology, choose this item to set the profiles supported by your memory modules for optimizing the system performance.

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

Memory Frequency [Auto]

Allows you to set the memory operating frequency. The configuration options vary with the **BCLK/PEG Frequency** item settings.
Configuration options: [Auto] [DDR3-800MHz] [DDR3-1066MHz] [DDR3-1333MHz] [DDR3-1400MHz] [DDR3-1600MHz]

Selecting a very high memory frequency may cause the system to become unstable! If this happens, revert to the default setting.

iGPU Max. Frequency [Auto]

Use the <+> and <-> keys to adjust the value. The minimum frequency vary depending on the type of CPU installed.
Configuration options: [Auto] [depending on CPU] [3000MHz]

iGPU Max. Frequency is available only when you install a desktop processor that supports onboard graphics to the motherboard and there is no other VGA cards installed on the motherboard.

EPU Power Saving Mode [Disabled]

Allows you to enable or disable the EPU power saving function.
Configuration options: [Disabled] [Enabled]

GPU Boost

GPU Boost accelerates the integrated GPU for extreme graphics performance. Configuration options: [Ok] [Cancel]

DRAM Timing Control

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

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

Primary Timings

DRAM CAS# Latency [Auto]
Configuration options: [Auto] [3 DRAM Clock] – [15 DRAM Clock]

DRAM RAS# to CAS# Delay [Auto]
Configuration options: [Auto] [4 DRAM Clock] – [15 DRAM Clock]

DRAM RAS# PRE Time [Auto]
Configuration options: [Auto] [4 DRAM Clock] – [15 DRAM Clock]

DRAM RAS# ACT Time [Auto]
Configuration options: [Auto] [4 DRAM Clock] – [40 DRAM Clock]

DRAM COMMAND Mode [Auto]
Configuration options: [Auto] [1 DRAM Clock] [2 DRAM Clock] [3 DRAM Clock]

Secondary Timings

DRAM RAS# to RAS# Delay [Auto]
Configuration options: [Auto] [4 DRAM Clock] – [15 DRAM Clock]

DRAM REF Cycle Time [Auto]
Configuration options: [Auto] [48 DRAM Clock] – [511 DRAM Clock]

DRAM Refresh Interval [Auto]
Configuration options: [Auto] [3120 DRAM Clock] – [9999 DRAM Clock]

DRAM WRITE Recovery Time [Auto]
Configuration options: [Auto] [5 DRAM Clock] – [16 DRAM Clock]

DRAM READ to PRE Time [Auto]
Configuration options: [Auto] [4 DRAM Clock] – [15 DRAM Clock]

DRAM FOUR ACT WIN Time [Auto]
Configuration options: [Auto] [16 DRAM Clock] – [63 DRAM Clock]

DRAM WRITE to READ Delay [Auto]
Configuration options: [Auto] [4 DRAM Clock] – [8 DRAM Clock]

DRAM CKE Minimum pulse width [Auto]
Configuration options: [Auto] [3 DRAM Clock] – [15 DRAM Clock]

DRAM CAS# Write Latency [Auto]
Configuration options: [Auto] [5 DRAM Clock] – [15 DRAM Clock]

DRAM RTL (CHA) [Auto]
Configuration options: [Auto] [16 DRAM Clock] – [63 DRAM Clock]

DRAM RTL (CHB) [Auto]
Configuration options: [Auto] [16 DRAM Clock] – [63 DRAM Clock]

Third Timings

tWRDR (DD) [Auto]
Configuration options: [Auto] [1 DRAM Clock] – [6 DRAM Clock]

tRWDR (DD) [Auto]
Configuration options: [Auto] [1 DRAM Clock] – [6 DRAM Clock]

tRWSR [Auto]
Configuration options: [Auto] [1 DRAM Clock] – [6 DRAM Clock]

tRR (DD) [Auto]
Configuration options: [Auto] [1 DRAM Clock] – [6 DRAM Clock]

tRR (DR) [Auto]
Configuration options: [Auto] [1 DRAM Clock] – [6 DRAM Clock]

tRRSR [Auto]
Configuration options: [Auto] [4 DRAM Clock] – [7 DRAM Clock]

tWW (DD) [Auto]
Configuration options: [Auto] [1 DRAM Clock] – [6 DRAM Clock]

tWW (DR) [Auto]
Configuration options: [Auto] [1 DRAM Clock] – [6 DRAM Clock]

tWWSR [Auto]
Configuration options: [Auto] [4 DRAM Clock] – [7 DRAM Clock]

CPU Power Management

The sub-items in this menu allow you to set the CPU ratio and features.

CPU Ratio [Auto]
Allows you to manually adjust the maximum non-turbo CPU ratio. Use <+> and <-> keys to adjust the value. The valid value ranges vary according to your CPU model.

Enhanced Intel SpeedStep Technology [Enabled]
Allows you to enable or disable the Enhanced Intel® SpeedStep Technology.

[Disabled] Disables this function.

[Enabled] The operating system dynamically adjusts the processor voltage and core frequency which may result in decreased average consumption and decreased average heat production.

Turbo Mode [Enabled]
This item appears only when you set the **Enhanced Intel SpeedStep Technology** item to [Enabled].

[Disabled] Disables this function.

[Enabled] Allows processor cores to run faster than marked frequency in specific condition.

The following five items appear only when you set the **Enhanced Intel SpeedStep Technology** and **Turbo Mode** items to [Enabled].

Long Duration Power Limit [Auto]
Use the <+> and <-> keys to adjust the value.

Long Duration Maintained [Auto]
Use the <+> and <-> keys to adjust the value.

Short Duration Power Limit [Auto]
Use the <+> and <-> keys to adjust the value.

Primary Plane Current Limit [Auto]
Use the <+> and <-> keys to adjust the value.

Secondary Plane Current Limit [Auto]
Use the <+> and <-> keys to adjust the value.

Some of the following items are adjusted by typing the desired values using the numeric keypad and press the <Enter> key. You can also use the <+> and <-> keys to adjust the value. To restore the default setting, type [auto] using the keyboard and press the <Enter> key.

CPU Offset Mode Sign [+]

[+] To offset the voltage by a positive value.
[–] To offset the voltage by a negative value.

CPU Voltage [Auto]

Allows you to set the CPU voltage. The values range from 0.005V to 0.635V with a 0.005V interval.

iGPU Offset Mode Sign [+]

[+] To offset the voltage by a positive value.
[-] To offset the voltage by a negative value.

iGPU Offset Voltage [Auto]
This item appears only when you set the iGPU Offset Voltage to [Offset Mode], and allows you to set the iGPU Offset voltage. The values range from 0.005V to 0.635V with a 0.005V interval.

iGPU Voltage [Offset Mode]

[Manual Mode] Allows you to set a fixed iGPU voltage.
[Offset Mode] Allows you to set the offset voltage.

iGPU Manual Voltage [Auto]
This item appears only when you set the iGPU Voltage to [Manual Mode], and allows you to set a fixed iGPU voltage. The values range from 0.800V to 1.990V with a 0.005V interval.

DRAM Voltage [Auto]

Allows you to set the DRAM voltage. The values range from 1.20V to 2.20V with a 0.01V interval.

According to Intel CPU spec, DIMMs with voltage requirement over 1.5V may damage the CPU permanently. We recommend you install the DIMMs with the voltage requirement below 1.5V.

VCCIO Voltage [Auto]

Allows you to set the VCCIO voltage. The values range from 0.90V to 1.70V with a 0.01V interval.

VCCSA Voltage [Auto]

Allows you to set the VCCSA voltage. The values range from 0.77V to 1.60V with a 0.01V interval.

CPU PLL Voltage [Auto]

Allows you to set the CPU PLL voltage. The values range from 1.20V to 2.20V with a 0.01V interval.

Load-Line Calibration [Auto]

Load-line is defined by Intel VRM spec and affects CPU voltage. The CPU working voltage will decrease proportionally to CPU loading. Higher load-line calibration would get higher voltage and better overclocking performance, but increase the CPU and VRM thermal. Configuration options: [Auto] [Disabled] [Enabled]

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

CPU Spread Spectrum [Auto]

[Auto]	Automatic configuration.
[Disabled]	Enhances the BCLK overclocking ability.
[Enabled]	Sets to [Enabled] for EMI control.

3.5 Advanced menu

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

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

3.5.1 Trusted Computing

TPM SUPORT [Disabled]

Allows you to enable or disable the TPM support.
Configuration options: [Disabled] [Enabled]

This item appears only when you install TPM module to the motherboard.

3.5.2 CPU Configuration

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

The items shown in this screen may be different due to the CPU you installed.

Scroll down to display the following items:

Intel Adaptive Thermal Monitor [Enabled]

[Disabled] Disables the CPU thermal monitor function.

[Enabled] Enables the overheated CPU to throttle its clock speed to cool down.

Active Processor Cores [All]

Allows you to choose the number of CPU cores to activate in each processor package. Configuration options: [All] [1] [2] [3]

Limit CPUID Maximum [Disabled]

[Disabled] Disables this function.

[Enabled] Allows legacy operating systems to boot even without support for CPUs with extended CPUID functions.

Execute Disable Bit [Enabled]

[Disabled] Forces the XD feature flag to always return to zero (0).

[Enabled] Enables the No-Execution Page Protection Technology.

Intel(R) Virtualization Technology [Disabled]

[Disabled] Disables this function.

[Enabled] Allows a hardware platform to run multiple operating systems separately and simultaneously, enabling one system to virtually function as several systems.

Hardware Prefetcher [Enabled]

[Enabled] Allows a hardware platform to run multiple operating systems separately and simultaneously, enabling one system to virtually function as several systems.

[Disabled] Disables this function.

Adjacent Cache Line Prefetch [Enabled]

[Enabled] Allows a hardware platform to perform adjacent cache line prefetching.

[Disabled] Disables this function.

CPU Power Management Configuration

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

CPU Ratio [Auto]

Allows you to set the ratio between the CPU Core Clock and the BCLK Frequency. Use <+> and <-> keys to adjust the ratio. The valid value ranges vary according to your CPU model.

Enhanced Intel SpeedStep Technology [Enabled]

Allows you to enable or disable the Enhanced Intel® SpeedStep Technology (EIST).

[Disabled] The CPU runs at its default speed.

[Enabled} The operating system controls the CPU speed.

Turbo Mode [Enabled]

Allows you to set the processor cores to run faster than the marked frequency in a specific condition.

Configuration options: [Enabled] [Disabled]

CPU C1E [Auto]

[Auto] Set this item automatically.

[Enabled] Enables the C1E support function. This function must be enabled to enable or disable the Intel® Turbo Mode Technology.

[Disabled] Disables the function.

CPU C3 Report [Auto]

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

[Auto] Set this item automatically.

[Enabled] Enables the C3 Report support function.

[Disabled] Disables the function.*CPU C6 Report [Auto]*

CPU C6 Report [Auto]
Allows you to disable or enable the CPU C6 report to OS.

[Auto] Set this item automatically.

[Enabled] Enables the C6 Report support function.

[Disabled] Disables the function.

3.5.3 PCH Configuration

High Precision Timer [Enabled]

Allows you to enable or disable the High Precision Event Timer.
Configuration options: [Enabled] [Disabled]

Intel(R) Rapid Start Technology

Intel(R) Rapid Start Technology [Disbled]

Allows you to enable or disable Intel(R) Rapid Start Technology.
Configuration options: [Enabled] [Disabled]

The following items appears only when you set the Intel(R) Rapid Start Technology to **[Enabled]**.

Entry on S3 RTC Wake [Enabled]
Allows you to enable or disable Entry on S3 RTC Wake.
Configuration options: [Enabled] [Disabled]

Entry After [Immediately]
Enable RTC wake timer at S3 enrty.
Configuration options: [Immediately] [1 minute] [2 minutes] [5 minutes] [10 minutes] [15 minutes] [30 minutes] [1 hour] [2 hours]

Chapter 3

Active Page Threshold Support [Enabled]
Allows you to enable or disable Active Page Threshold Support.
Configuration options: [Enabled] [Disabled]

Active Memory Threshold [0]
Try to support RST when partition size>Active Page Threshold size in MB. When setting to Zero, it will be in AUTO mode and check if partition size is enough at S3 entry.

Intel(R) Smart Connect Technology

ISCT Configuration [Disabled]

Allows you to enable or disable the ISCT configuration.
Configuration options: [Enabled] [Disabled]

3.5.4 SATA 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 following items:

SATA Mode Selection [AHCI]

Allows you to set the SATA configuration.

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

S.M.A.R.T. Status Check [Enabled]

S.M.A.R.T. (Self-Monitoring, Analysis and Reporting Technology) is a monitor system. When read/write of your hard disk errors occur, this feature allows the hard disk to report warning messages during the POST.
Configuration options: [Enabled] [Disabled]

Hot Plug [Disabled]

Allows you to enable or disable the hot plug function of each SATA port. This item appears only when you set **SATA Mode** to [AHCI Mode] or [RAID Mode]

3.5.5 System Agent Configuration

Memory Remap Feature [Enabled]

Allows you to enable remapping the memory above 4GB.

[Enabled] Enables the function.

[Disabled] Disables this function.

Graphics Configuration

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

Primary Display [Auto]

Allows you to select which of the iGPU/PCIE Graphics device should be the Primary Display.
Configuration options: [Auto] [PCIE] [PCI] [iGPU]

iGPU Memory [64M]

Allows you to select the iGPU share memory size.
Configuration options: [32M] [64M] [96M] [128M] [160M] [192M] [224M] [256M] [288M] [320M] [352M] [384M] [416M] [448M] [480M] [512M] [1024M]

Render Standby [Enabled]

Allows you to enable or disable the Render Standby by the internal graphics device.
Configuration options: [Disabled] [Enabled]

iGPU Multi-Monitor [Disabled]

Allows you to enable or disable the internal graphics device multi-monitor support for the add-on VGA devices. Configuration options: [Disabled] [Enabled]

3.5.6 USB Configuration

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

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

Legacy USB Support [Enabled]

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

[Disabled] The USB devices can be used only for the BIOS setup program.

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

Legacy USB3.0 Support [Enabled]

[Enabled] Enables the support for USB 3.0 devices on legacy operating systems (OS).

[Disabled] Disables the function.

Intel xHCI Mode [Smart Auto]

[Smart Auto] Enables optimized xHCI.

[Auto] Allows the system to set the xHCI.

[Enabled] Enables the operation of xHCI controller.

[Disabled] Disables the function.

EHCI Hand-off [Disabled]

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

[Disabled] Disables the function.

3.5.7 Onboard Devices Configuration

HD Audio Controller [Enabled]

[Disabled] Disables the controller.

[Enabled] Enables the High Definition Audio Controller.

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

Front Panel Type [HD]

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] 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.

VIA 1394 Controller [Enabled]

[Disabled] Disables the controller.

[Enabled] Enables the onboard IEEE 1394a controller.

Intel LAN1 Controller [Enabled]

[Disabled] Disables the controller.

[Enabled] Enables the Intel LAN1 controller.

Intel LAN1 OPROM [Disabled]

This item appears only when you set the previous item to [Enabled] and allows you to enable or disable the PXE OptionRom of the Intel LAN1 controller.
Configuration options: [Enabled] [Disabled]

Intel LAN2 Controller [Enabled]

[Disabled] Disables the controller.

[Enabled] Enables the Intel LAN2 controller.

Intel LAN2 OPROM [Disabled]

This item appears only when you set the previous item to [Enabled] and allows you to enable or disable the PXE OptionRom of the Intel LAN2 controller.
Configuration options: [Enabled] [Disabled]

Serial Port Configuration

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

This item functions only if there is a serial port (COM1) connector on the motherboard.

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

Change Settings [IO=3F8h; IRQ=4]
Allows you to select the **Serial Port** base address. This item appears when **Serial Port** is set to [Enabled].
Configuration options: [IO=3F8h; IRQ=4] [IO=2F8h; IRQ=3] [IO=3E8h; IRQ=4] [IO=2E8h; IRQ=3]

Parallel Port Configuration

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

Parallel Port [Enabled]
Allows you to enable or disable the parallel port (LPT/LPTE).
Configuration options: [Enabled] [Disabled]

Change Settings [Auto]
Allows you to select an optimal setting for the super IO device.
Configuration options: [Auto] [IO=378h; IRQ=5] [IO=378h: IRQ=5, 6, 7, 9, 10, 11, 12] [IO=278h; IRQ=5, 6, 7, 9, 10, 11, 12] [IO=3BCh; IRQ=5, 6, 7, 9, 10, 11, 12]

Device Mode [STD Printer Mode]
Allows you to select the printer port mode.
Configuration options: [STD Printer mode] [SPP Mode] [EPP-1.9 and SPP Mode] [EPP-1.7 and SPP Mode] [ECP Mode] [ECP and EPP 1.9 Mode] [ECP and EPP 1.7 Mode]

3.5.8 APM

ErP Ready [Disabled]

This item allows user to switch off some power at S5 to get the system ready for ErP requirement. When set enabled to Enabled, all other PME options will be switched off. Configuration options: [Disabled] [Enabled]

Restore AC Power Loss [Power Off]

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

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

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

Power On By PS/2 Keyboard [Disabled]

[Disabled] Disables the Power On by a PS/2 keyboard.

[Space Bar] Sets the Space Bar on the PS/2 keyboard to turn on the system.

[Ctrl-Esc] Sets the Ctrl+Esc key on the PS/2 keyboard to turn on the system.

[Power Key] Sets Power key on the PS/2 keyboard to turn on the system. This feature requires an ATX power supply that provides at least 1A on the +5VSB lead.

Power On By PS/2 Mouse [Disabled]

[Disabled] Disables the Power On by a PS/2 mouse.

[Enabled] Enables the Power On by a PS/2 mouse. This feature requires an ATX power supply that provides at least 1A on the +5VSB lead.

Power On By PCI [Disabled]

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

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

Power On By PCIE [Disabled]

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

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

Power On By Ring [Disabled]

[Disabled] Disables Ring to generate a wake event.

[Enabled] Enables Ring to generate a wake event.

Power On By RTC [Disabled]

[Disabled] Disables RTC to generate a wake event.

[Enabled] When set to [Enabled], the items **RTC Alarm Date (Days)** and **Hour/ Minute/Second** will become user-configurable with set values.

3.5.9 Network Stack

Network Stack [Disable Link]

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

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

Ipv4 PXE Support [Enable]

This item allows user to disable or enable the Ipv4 PXE Support.
Configuration options: [Disable Link] [Enabled]

Ipv6 PXE Support [Enable]

This item allows user to disable or enable the Ipv6 PXE Support.
Configuration options: [Disable Link] [Enabled]

3.6 Monitor menu

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

Scroll down to display the following items:

CPU Temperature / MB Temperature [xxx°C/xxx°F]

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

CPU Fan Speed [xxxx RPM] or [Ignore] / [N/A]
Chassis Fan 1/2/3 Speed [xxxx RPM] or [Ignore] / [N/A]
Power Fan 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 Q-Fan Control [Enabled]

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

[Enabled] Enables the CPU Q-Fan control feature.

CPU Fan Speed Low Limit [600 RPM]

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

CPU Fan Profile [Standard]

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

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

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

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

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

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

CPU Upper Temperature [70]
Use the <+> and <-> keys to adjust the upper limit of the CPU temperature. The values range from 20ºC to 75ºC.

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

CPU Lower Temperature [20]
Displays the lower limit of the CPU temperature. The values range from 20ºC to 75ºC.

CPU Fan Min. Duty Cycle(%) [20]
Use the <+> and <-> keys to adjust the minimum CPU fan duty cycle. The values range from 20% to 100%. When the CPU temperature is under 40ºC, the CPU fan will operate at the minimum duty cycle.

Chassis Q-Fan Control [Enabled]

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

[Enabled] Enables the Chassis Q-Fan control feature.

Chassis Fan Speed Low Limit [600 RPM]

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

Chassis Fan Profile [Standard]

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

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

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

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

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

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

Chassis Upper Temperature [70]
Use the <+> and <-> keys to adjust the upper limit of the CPU temperature. The values range from 40ºC to 90ºC.

Chassis Fan Max. Duty Cycle(%) [100]
Use the <+> and <-> keys to adjust the maximum chassis fan duty cycle. The values range from 60% to 100%. When the chassis temperature reaches the upper limit, the chassis fan will operate at the maximum duty cycle.

Chassis Lower Temperature [40]
Displays the lower limit of the chassis temperature.

Chassis Fan Min. Duty Cycle(%) [60]
Use the <+> and <-> keys to adjust the minimum chassis fan duty cycle. The values range from 60% to 100%. When the chassis temperature is under 40ºC, the chassis fan will operate at the minimum duty cycle.

CPU 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.

Anti Surge Support [Enabled]

This item allows you to enable or disable the Anti Surge function.
Configuration options: [Disabled] [Enabled]

3.7 Boot menu

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

Scroll down to display the following items:

Bootup NumLock State [On]

[On] Sets the power-on state of the NumLock to [On].

[Off] Sets the power-on state of the NumLock to [Off].

Full Screen Logo [Enabled]

[Disabled] Disables the full screen logo display feature.

[Enabled] Enables the full screen logo display feature.

Set this item to [Enabled] to use the ASUS MyLogo 2™ feature.

Wait For 'F1' If Error [Enabled]

[Disabled] Disables this function.

[Enabled] The system waits for the <F1> key to be pressed when error occurs.

Chapter 3

PCI ROM Priority [Legacy ROM]

[Legacy ROM]	Launch Legacy ROM
[EFI Compatibe ROM]	Launch UEFI Compatible ROM

Option ROM Messages [Force BIOS]

[Force BIOS]	The third-party ROM messages will be forced to display during the boot sequence.
[Keep Current]	The third-party ROM messages will be displayed only if the third-party manufacturer had set the add-on device to do so.

Setup Mode [EZ Mode]

[Advanced Mode]	Sets Advanced Mode as the default screen for entering the BIOS setup program.
[EZ Mode]	Sets EZ Mode as the default screen for entering the BIOS setup program.

UEFI/Legacy Boot [Enable both UEFI and Legacy]

[Enable both UEFI and Legacy]	Enables both UEFI and Legacy boot.
[Disable UEFI]	Enables the Legacy boot, and disables the UEFI boot.
[Disable Legacy]	Enables the UEFI booth, and disables the Legacy boot.

PCI ROM Priority [Legacy ROM]

[Legacy ROM]	Launch Legacy ROM
[EFI Compatibe ROM]	Launch UEFI Compatible ROM

Boot Option Priorities

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

- To select the boot device during system startup, press <F8> when ASUS Logo appears.
- To access Windows OS in Safe Mode, do any of the following:
  - Press <F5> when ASUS Logo appears.
  - Press <F8> after POST.

Boot Override

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

3.8 Tools menu

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

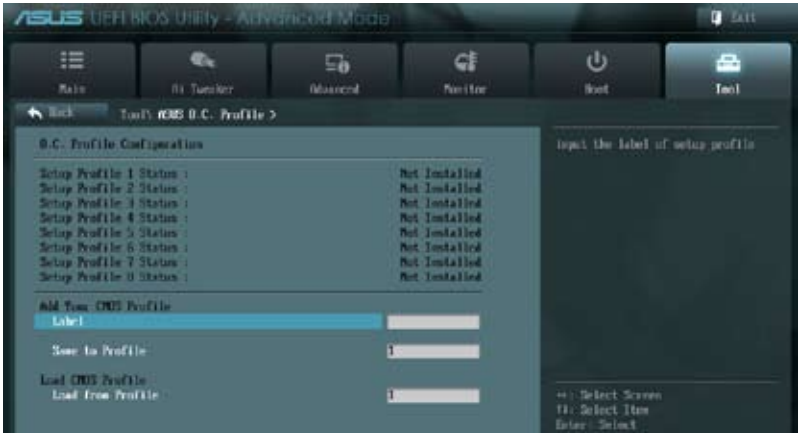
3.8.1 ASUS EZ Flash 2 Utility

Allows you to run ASUS EZ Flash 2. When you press <Enter>, a confirmation message appears. Use the left/right arrow key to select between [Yes] or [No], then press <Enter> to confirm your choice.

For more details, refer to **section 3.10.2 ASUS EZ Flash 2 utility**.

3.8.2 ASUS O.C. Profile

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



The **Setup Profile Status** items show **Not Installed** if no profile is created.

Label

Allows you to input the label of the setup profiles.

Save to Profile

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 from Profile

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**.

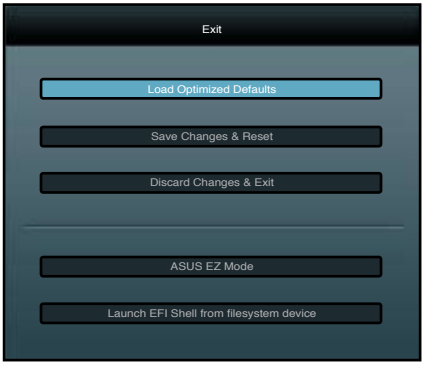
- DO NOT shut down or reset the system while updating the BIOS to prevent the system boot failure!
- We recommend that you update the BIOS file only coming from the same memory/CPU configuration and BIOS version.

3.8.3 ASUS SPD Information

Allows you to view the DRAM SPD information.

3.9 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 **Yes** 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 **Yes** 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.

ASUS EZ Mode

This option allows you to enter the EZ Mode screen.

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.

3.10 Updating BIOS

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

Visit the ASUS website (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. **ASUS Update:** Updates the BIOS in Windows® environment.
2. **ASUS EZ Flash 2:** 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. **ASUS BIOS Updater:** Updates and backups the BIOS in DOS environment using the motherboard support DVD and a USB flash disk drive.

Refer to the corresponding sections for details on these utilities.

Save a copy of the original motherboard BIOS file to a USB flash disk in case you need to restore the BIOS in the future. Copy the original motherboard BIOS using the **ASUS Update** or **BIOS Updater** utilities.

3.10.1 ASUS Update utility

The ASUS Update is a utility that allows you to manage, save, and update the motherboard BIOS in Windows® environment. The ASUS Update utility allows you to:

- Update the BIOS directly from the Internet
- Download the latest BIOS file from the Internet
- Update the BIOS from an updated BIOS file
- Save the current BIOS file
- View the BIOS version information

This utility is available in the support DVD that comes with the motherboard package.

ASUS Update requires an Internet connection either through a network or an Internet Service Provider (ISP).

Launching ASUS Update

After installing AI Suite II from the motherboard support DVD, launch ASUS Update by clicking **Update > ASUS Update** on the AI Suite II main menu bar.

Quit all Windows® applications before you update the BIOS using this utility.

Updating the BIOS through the Internet

To update the BIOS through the Internet:

1. From the ASUS Update screen, select **Update BIOS from Internet**, and then click **Next**.

2. Select the ASUS FTP site nearest you to avoid network traffic.

   If you want to enable the BIOS downgradable function and auto BIOS backup function, check the checkboxs before the two items on the screen.

3. Select the BIOS version that you want to download. Click **Next**.

4. You can decide whether to change the BIOS boot logo, which is the image appearing on screen during the Power-On Self-Tests (POST). Click **Yes** if you want to change the boot logo or **No** to continue.
5. Follow the onscreen instructions to complete the update process.

Updating the BIOS through a BIOS file

To update the BIOS through a BIOS file:

1. From the ASUS Update screen, select **Update BIOS from file**, and then click **Next**.

2. Locate the BIOS file from the Open window, click **Open**, and click **Next**.

3. You can decide whether to change the BIOS boot logo. Click **Yes** if you want to change the boot logo or **No** to continue.
4. Follow the onscreen instructions to complete the update process.

- The screenshots in this section are for reference only. The actual BIOS information vary by models.
- Refer to the software manual in the support DVD or visit the ASUS website at www.asus.com for detailed software configuration.

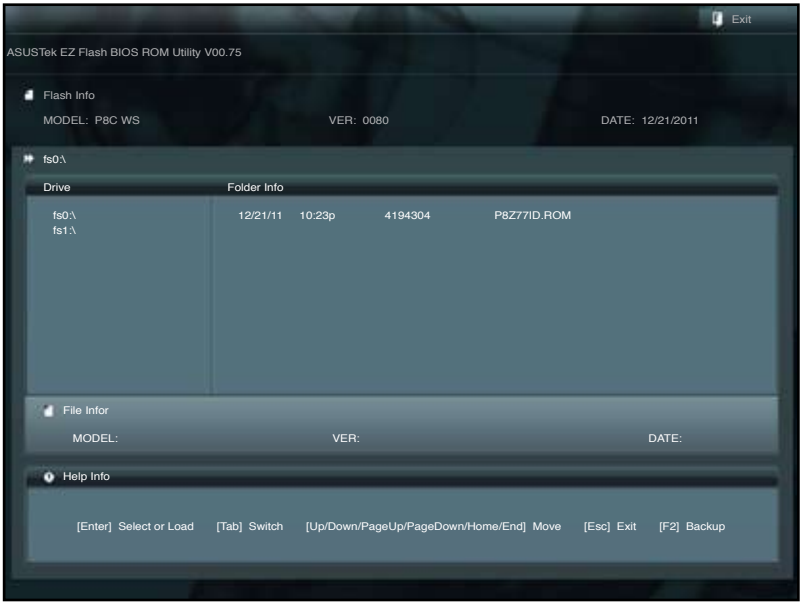
3.10.2 ASUS EZ Flash 2 utility

The ASUS EZ Flash 2 feature allows you to update the BIOS without having to use a bootable floppy disk or an OS-based utility.

Before you start using this utility, download the latest BIOS from the ASUS website at www.asus.com.

To update the BIOS using EZ Flash 2:

1. Insert the USB flash disk that contains the latest BIOS file to the USB port.
2. Enter the Advanced Mode of the BIOS setup program. Go to the **Tool** menu to select **ASUS EZ Flash Utility** and press <Enter> to enable it.



3. Press <Tab> to switch to the Drive field.
4. Press the Up/Down arrow keys to find the USB flash disk that contains the latest BIOS, and then press <Enter>.
5. Press <Tab> to switch to the Folder Info field.
6. Press the Up/Down arrow keys to find the BIOS file, and then press <Enter> to perform the BIOS update process. Reboot the system when the update process is done.

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

Ensure to load the BIOS default settings to ensure system compatibility and stability. Select the **Load Optimized Defaults** item under the **Exit** menu. See section **3.9 Exit Menu** for details.

3.10.3 ASUS CrashFree BIOS 3 utility

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 support.asus.com 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 2 utility automatically.
4. The system requires you to enter BIOS Setup to recover 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!

3.10.4 ASUS BIOS Updater

The ASUS BIOS Updater allows you to update BIOS in DOS environment. This utility also allows you to copy the current BIOS file that you can use as a backup when the BIOS fails or gets corrupted during the updating process.

The succeeding utility screens are for reference only. The actual utility screen displays may not be same as shown.

Before updating BIOS

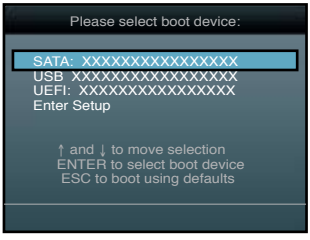
1. Prepare the motherboard support DVD and a USB flash drive in FAT32/16 format and single partition.
2. Download the latest BIOS file and BIOS Updater from the ASUS website at http://support.asus.com and save them on the USB flash drive.

- NTFS is not supported under DOS environment. Do not save the BIOS file and BIOS Updater to a hard disk drive or USB flash drive in NTFS format.
- Do not save the BIOS file to a floppy disk due to low disk capacity.

3. Turn off the computer and disconnect all SATA hard disk drives (optional).

Booting the system in DOS environment

1. Insert the USB flash drive with the latest BIOS file and BIOS Updater to the USB port.
2. Boot your computer. When the ASUS Logo appears, press <F8> to show the **BIOS Boot Device Select Menu**. Insert the support DVD into the optical drive and select the optical drive as the boot device.



3. When the **Make Disk** menu appears, select the **FreeDOS command prompt** item by pressing the item number.
4. At the FreeDOS prompt, type **d:** and press <Enter> to switch the disk from Drive C (optical drive) to Drive D (USB flash drive).

```
Welcome to FreeDOS (http://www.freedos.org)!
C:\>d:
D:\>
```

Backing up the current BIOS

To backup the current BIOS file using the BIOS Updater

Ensure that the USB flash drive is not write-protected and has enough free space to save the file.

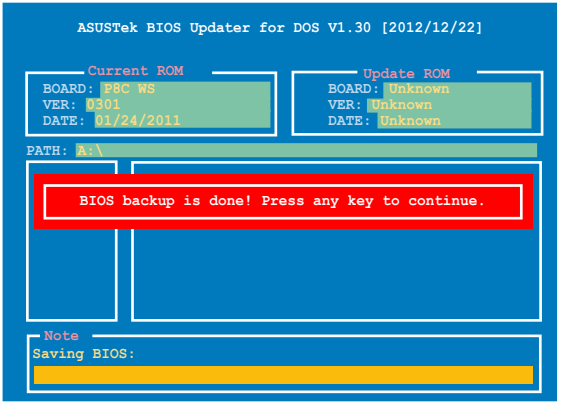
1. At the FreeDOS prompt, type **`bupdater /o[filename]`** and press <Enter>.

```
D:\>bupdater /oOLDBIOS1.rom
```

Filename **Extension**

The [filename] is any user-assigned filename with no more than eight alphanumeric characters for the filename and three alphanumeric characters for the extension.

2. The BIOS Updater backup screen appears indicating the BIOS backup process. When BIOS backup is done, press any key to return to the DOS prompt.



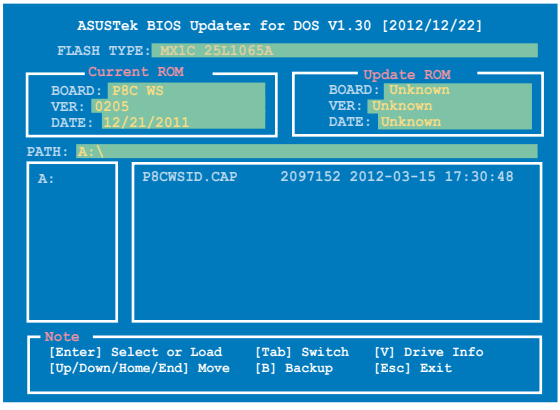
Updating the BIOS file

To update the BIOS file using BIOS Updater

1. At the FreeDOS prompt, type **`bupdater /i <xxxxx.rom>`** and press <Enter>.

```
D:\>bupdater /i <xxxxx.rom>
```

2. The BIOS Updater screen appears as below.



3. Press <Tab> to switch between screen fields and use the <Up/Down/Home/End> keys to select the BIOS file and press <Enter>. BIOS Updater checks the selected BIOS file and prompts you to confirm BIOS update.

4. Select **Yes** and press <Enter>. When BIOS update is done, press <ESC> to exit BIOS Updater. Restart your computer.

DO NOT shut down or reset the system while updating the BIOS to prevent system boot failure!

- For BIOS Updater version 1.04 or later, the utility automatically exits to the DOS prompt after updating BIOS.
- Ensure to load the BIOS default settings to ensure system compatibility and stability. Select the **Load Optimized Defaults** item under the **Exit** BIOS menu. See Chaper 3 of your motherboard user manual for details.
- Ensure to connect all SATA hard disk drives after updating the BIOS file if you have disconnected them.

Chapter 4

4.1 Installing an operating system

This motherboard supports Windows® XP/ 64-bit XP/ 7 / 64-bit 7 operating systems (OS). Always install the latest OS version and corresponding updates to maximize the features of your hardware.

- Motherboard settings and hardware options vary. Use the setup procedures presented in this chapter for reference only. Refer to your OS documentation for detailed information.
- Ensure that you install the Windows® XP Service Pack 3 or later versions before installing the drivers for better compatibility and system stability.

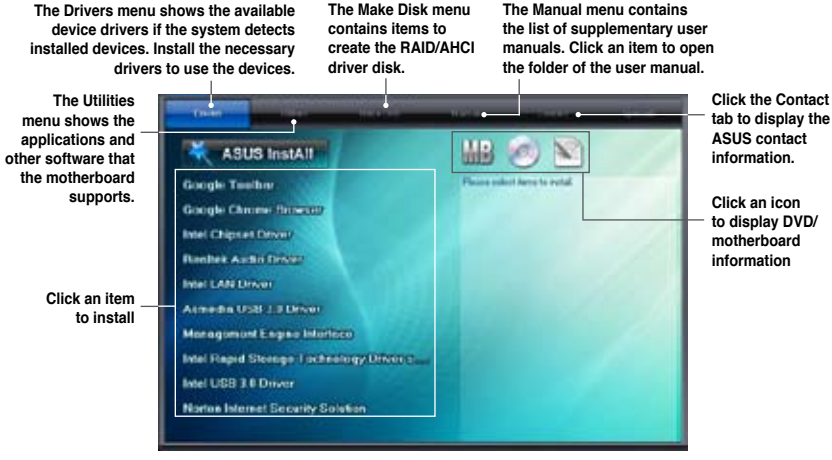
4.2 Support DVD information

The support DVD that comes with the motherboard package contains the drivers, software applications, and utilities that you can install to avail all motherboard features.

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.

4.2.1 Running the support DVD

Place the support DVD into the optical drive. The DVD automatically displays the Drivers menu if Autorun is enabled in your computer. Click each menu tab and select the items you want to install.



If Autorun is NOT enabled in your computer, browse the contents of the support DVD to locate the file ASSETUP.EXE from the BIN folder. Double-click the ASSETUP.EXE to run the DVD.

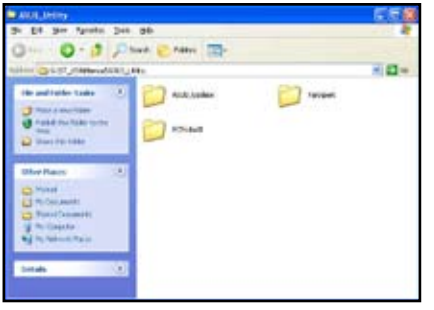
4.2.2 Obtaining the software manuals

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

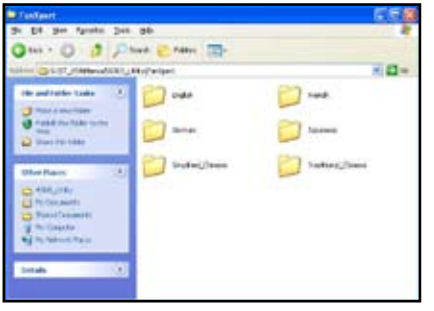
The software manual files are in Portable Document Format (PDF). Install the Adobe® Acrobat® Reader from the Utilities menu before opening the files.

1. Click the **Manual** tab. Click **ASUS Motherboard Utility Guide** from the manual list on the left.

2. The **Manual** folder of the support DVD appears. Double-click the folder of your selected software.



3. Some software manuals are provided in different languages. Double-click the language to show the software manual.



The screenshots in this section are for reference only. The actual software manuals containing in the support DVD vary by models.

4.3 Installing AI Suite II

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

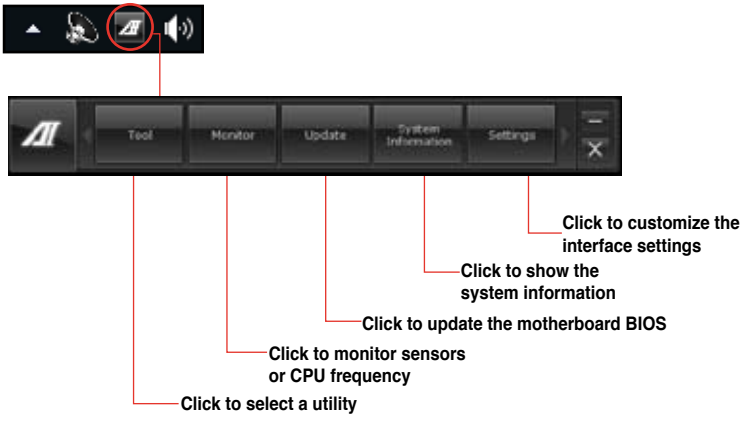
To install AI Suite II on your computer

1. Place the support DVD to the optical drive. The Drivers installation tab appears if your computer has enabled the Autorun feature.
2. Click **Utilities** tab **> AI Suite II**.
3. Follow the onscreen instructions to complete the installation.

Using AI Suite II

AI Suite II automatically starts when you enter the Windows® operating system (OS). The AI Suite II icon appears in the Windows® notification area. Click the icon to open the AI Suite II main menu bar.

Click each button to select and launch a utility, to monitor the system, to update the motherboard BIOS, to display the system information, and to customize the settings of AI Suite II.



- The applications in the Tool menu vary with models.
- The screeshots of AI Suite II in this user manual are for reference only. The actual screenshots vary with models.
- Refer to the software manual in the support DVD or visit the ASUS website at www.asus.com for detailed software configuration.

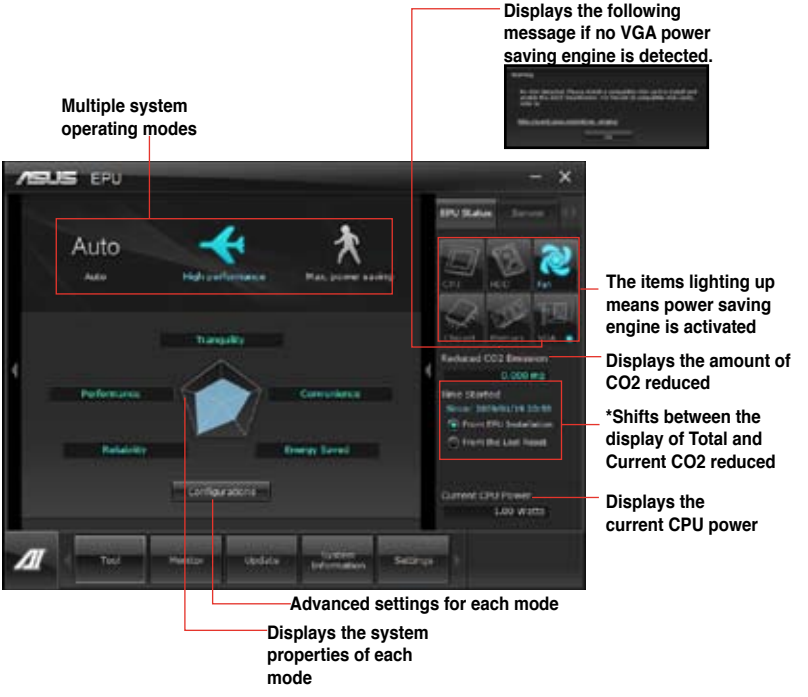
4.3.1 EPU

EPU is an energy-processing utility that provides several power-saving modes. When set to the Auto Mode, the system automatically changes its power-saving mode based on the current system condition.

You can also configure the system settings such as CPU frequency, GPU frequency, vCore Voltage, and Fan Control to customize a power-saving mode.

Launching EPU

To launch EPU, click **Tool > EPU** on the AI Suite II main menu bar.



*• Select **From EPU Installation** to show the CO2 that has been reduced since you installed EPU.

*• Select **From the Last Reset** to show the total CO2 that has been reduced since you click the Clear button Clear.

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

4.3.2 FAN Xpert

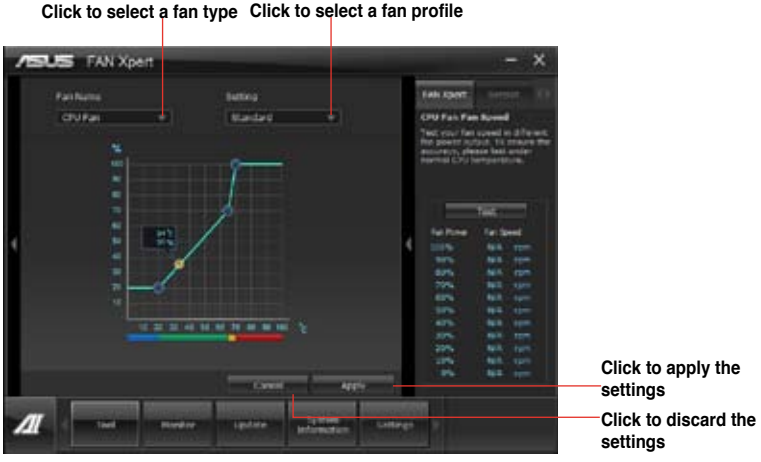
Fan Xpert intelligently allows you to adjust both the CPU and chassis fan speeds according to different ambient temperatures caused by different climate conditions in different geographic regions and your PC's system loading. The built-in variety of useful profiles offer flexible controls of fan speed to achieve a quiet and cool environment.

Launching FAN Xpert

After installing AI Suite II from the motherboard support DVD, launch FAN Xpert by clicking **Tool > Fan Xpert** on the AI Suite II main menu bar.

Using FAN Xpert

Click **Fan Name** to select a fan and then click **Setting** to select a preset mode for your selected fan.



Fan setting

- **Disable:** disables the **Fan Xpert** function.
- **Standard:** adjusts fan speed in a moderate pattern.
- **Silent:** minimizes fan speed for quiet fan operation.
- **Turbo:** maximizes the fan speed for the best cooling effect.
- **Intelligent:** automatically adjusts the CPU fan speed according to the ambient temperature.
- **Stable:** fixes the CPU fan speed to avoid noise caused by the unsteady fan rotation. However, the fan will speed up when the temperature exceeds 70°C.
- **User:** Allows you to configure the CPU fan profile under certain limitations.

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

4.3.3 Probe II

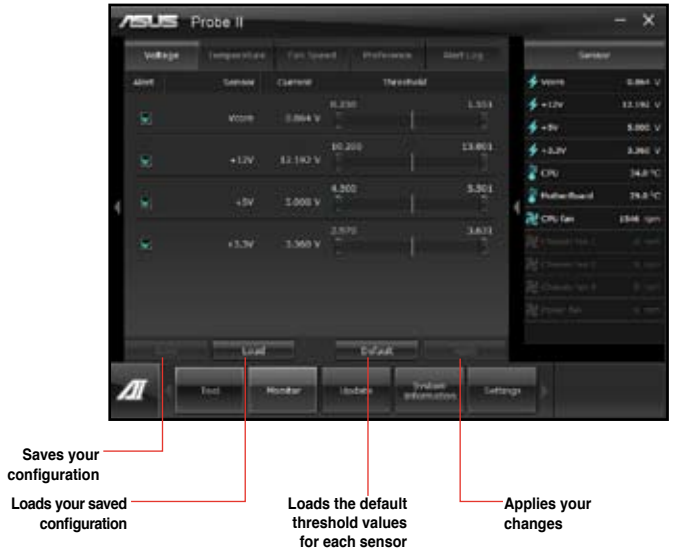
Probe II is a utility that monitors the computer's vital components, and detects and alerts you of any problem with these components. Probe II senses fan rotations, CPU temperature, and system voltages, among others. With this utility, you are assured that your computer is always at a healthy operating condition.

Launching Probe II

To launch Probe II, click **Tool > Probe II** on the AI Suite II main menu bar.

Configuring Probe II

Click the **Voltage/Temperature/Fan Speed** tabs to activate the sensors or to adjust the sensor threshold values. The **Preference** tab allows you to customize the time interval of sensor alerts, or change the temperature unit.



- Click **Monitor > Sensor** on the AI Suite II main menu bar and the system status will appear on the right panel.
- Refer to the software manual in the support DVD or visit the ASUS website at www.asus.com for detailed software configuration.

4.3.4 Sensor Recorder

Sensor Recorder monitors the changes in the system voltage, temperature, and fan speed on a timeline. The History Record function allows you to designate specific time spans on record to keep track of the three system statuses for certain purposes.

Launching Sensor Recorder

To launch Sensor Recorder, click **Tool > Sensor Recorder** on the AI Suite II main menu bar.

Using Sensor Recorder

Click on **Voltage/ Temperature/ Fan Speed** tabs for the status you want to monitor. Colored lines will automatically appear on the diagram to indicate the immediate changes in the system status.

Using History Record

1. Click the **History Record** tab and adjust the settings on the left for **Record Interval** and **Record Duration** according to need.
2. Click **Start Recording** to start measuring and recording each sensor.
3. To stop recording, click **Recording** again.
4. To track the recorded contents, set **Type**/ **Date**/ **Select display items** to display the history details.

Click on **Monitor > Sensor** on the AI Suite II main menu bar and a highlight of the system statuses will appear on the right panel.

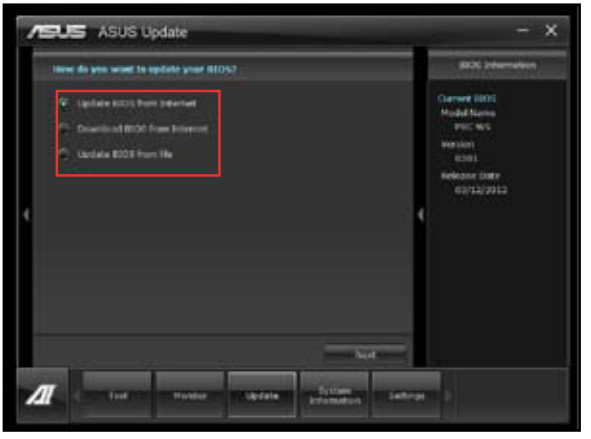
4.3.5 ASUS Update

ASUS Update is a utility that allows you to manage, save, and update the motherboard BIOS in Windows® environment.

Launching ASUS Update

To launch ASUS Update, click **Update > ASUS Update** on the AI Suite II main menu bar.

Using ASUS Update



Select any of these options to update the BIOS:

- **Update BIOS from Internet**

  Allows you to download the latest BIOS version from the ASUS website at www.asus.com and follow the onscreen instructions to update the BIOS.
- **Download BIOS from Internet**

  Download the latest BIOS version from the ASUS website at www.asus.com and save it for later use.
- **Update BIOS from file**

  Use the BIOS file that you had downloaded and saved to update the system BIOS.

Updating the BIOS poses some risks such as system instability or failure to boot. Before updating the BIOS, ensure that you back up the original BIOS file.

Chapter 4

4.3.6 MyLogo

MyLogo allows you to customize the boot logo, which is the image that appears on the screen during the Power On Self Tests (POST).

Launching ASUS Update

To launch MyLogo, click **Update > MyLogo** on the AI Suite II main menu bar.

Select the option that you want to use to update your boot logo, click **Next** and follow the instructions below.

Change the boot logo of a downloaded BIOS file and update (or do not update) this BIOS to the motherboard

1. From the **BIOS file** field, click **Browse** to locate the BIOS file.
2. From the Picture File field, click **Browse the image for your boot logo**, then click **Next**.

3. Do any of the following:
   - Click **Auto Tune** to adjust the image size or the image resolution.
   - Click **Booting Preview** to preview the boot image.
4. Click **Next**.

5. Click **Flash** to update the boot logo.
6. When prompted, click **Yes** to reboot the system. You will see the new boot logo the next time you start up the system.

Ensure to enable the **Full Screen Logo** in BIOS to use this feature.

4.4 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

A. Realtek HD Audio Manager for Windows® 7™

B. Realtek HD Audio Manager for Windows XP

- Refer to the software manual in the support DVD or visit the ASUS website at www.asus.com for detailed software configuration.
- Due to Intel® Z77 platform does not support Windows® Vista™, Realtek HD Audio driver is only supported by Windows® 7™/Windows® XP™.
- To play Blu-Ray disc, make sure to use an HDCP compliant monitor.

Chapter 4

4.5 RAID configurations

The motherboard supports the following SATA RAID solutions:

- **Intel® Rapid Storage Technology** with RAID 0, RAID 1, RAID 10 and RAID 5 support.
- **Mavell® RAID utility** with RAID 0 and RAID 1 support.

- You must install Windows® XP Service Pack 3 or later versions before using Serial ATA hard disk drives. The Serial ATA RAID feature is available only if you are using Windows® XP SP3 or later versions.
- Due to Windows® XP / Vista limitation, a RAID array with the total capacity over 2TB cannot be set as a boot disk. A RAID array over 2TB can only be set as a data disk only.
- If you want to install a Windows® operating system to a hard disk drive included in a RAID set, you have to create a RAID driver disk and load the RAID driver during OS installation. Refer to section **4.5 Creating a RAID driver disk** for details.

4.5.1 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.

4.5.2 Installing Serial ATA hard disks

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

To install the SATA hard disks for a RAID configuration:

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

4.5.3 Setting the RAID item in BIOS

You must enable the RAID function in the BIOS Setup before creating RAID set(s) using SATA HDDs. To do this:

1. Enter the BIOS Setup during POST.
2. Go to the **Advanced** menu > **SATA Configuration**, and then press <Enter>.
3. Set the **SATA Mode** item to [RAID Mode].
4. Save your changes, and then exit the BIOS Setup.

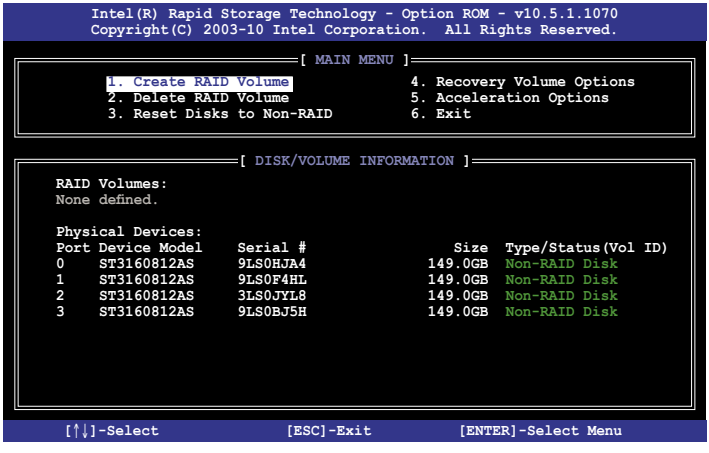
Refer to Chapter 3 for details on entering and navigating through the BIOS Setup.

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

4.5.4 Intel® Rapid Storage Technology Option ROM utility

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

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



Chapter 4

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

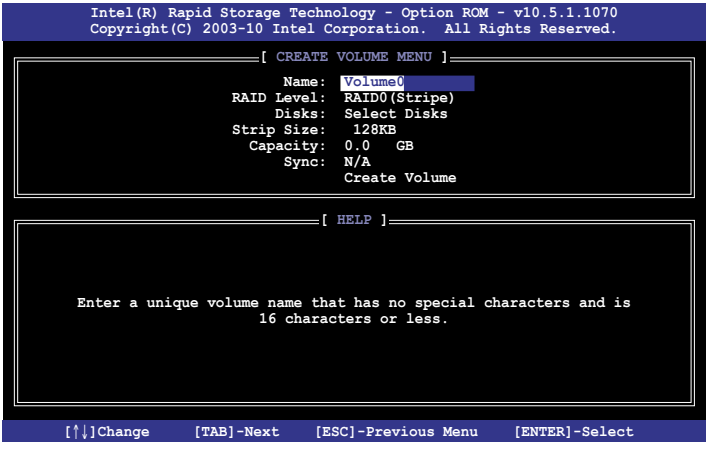
The RAID BIOS setup screens shown in this section are for reference only and may not exactly match the items on your screen.

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

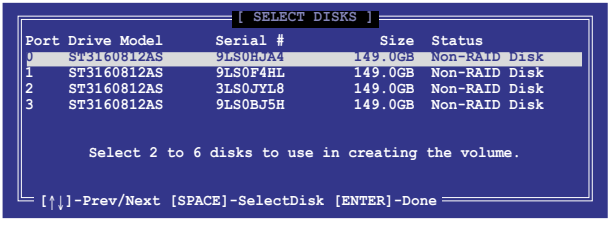
Creating a RAID set

To create a RAID set:

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



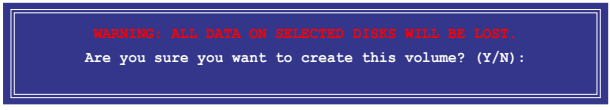
2. Enter a name for the RAID set and press <Enter>.
3. When the **RAID Level** item is selected, press the up/down arrow key to select a RAID level to create, and then press <Enter>.
4. When the **Disks** item is selected, press <Enter> to select the hard disk drives you want to include in the RAID set. The **SELECT DISKS** screen appears:



5. Use the up/down arrow key to select a drive, and then press <Space> to select. A small triangle marks the selected drive. Press <Enter> after completing your selection.
6. Use the up/down arrow key to select the stripe size for the RAID array (for RAID 0, 10 and 5 only),and then press <Enter>. The available stripe size values range from 4KB to 128KB. 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. When the **Capacity** item is selected, enter the RAID volume capacity that you want and press <Enter>. The default value indicates the maximum allowed capacity.
8. When the **Create Volume** item is selected, press <Enter>. The following warning message appears:



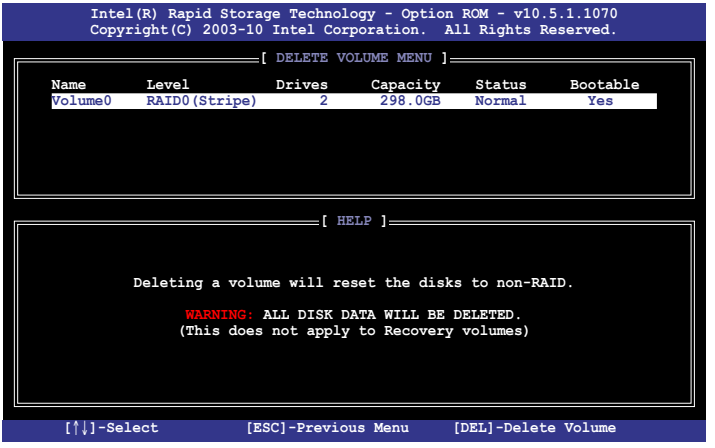
9. Press <Y> to create the RAID volume and return to the main menu, or <N> to go back to the **CREATE VOLUME** menu.

Deleting a RAID set

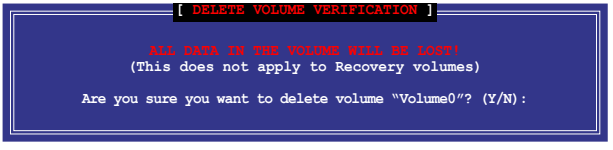
Take caution when deleting a RAID set. You will lose all data on the hard disk drives when you delete a RAID set.

To delete a RAID set:

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



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



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

Exiting the Intel® Rapid Storage Technology Option ROM utility

To exit the utility:

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

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

Chapter 4

Intel® Smart Response Technology

Intel® Smart Response Technology boosts overall system performance. It uses an installed fast SSD (min. 20GB available) as a cache for frequently accessed operations, speeding up hard drive/main memory interaction. Key benefits are expedited hard drive speeds, reduced load and wait times, and maximized storage utilization. Power consumption also goes down by reducing unnecessary hard drive spin.

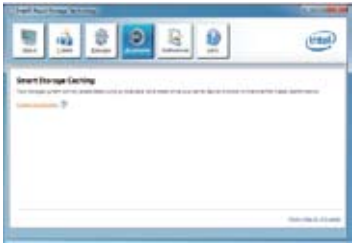
Before applying Intel® Smart Response Technology, setting the SATA Mode BIOS item to [RAID mode] in BIOS setup is necessary. Refer to section **3.5.3 SATA Configuration** for details

Installing Intel® Smart Response Technology

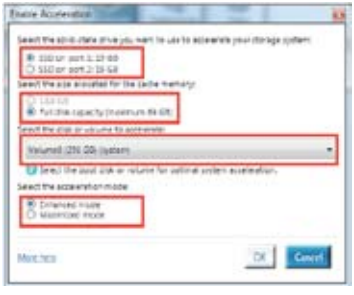
1. Place the support DVD to the optical drive. The Drivers installation tab appears if your computer has enabled the Autorun feature.
2. Click the **Drivers** tab, then click **Intel® Rapid Storage Technology Driver** software.
3. Follow the onscreen instructions to complete the installation.

Using the Intel® Smart Response Technology

1. Click **Accelerate** to launch Smart Response Technology settings.



2. a. Select the SSD you want to use to accelerate your storage system.
   b. Select the size allocated for SSD caching.
   c. Select which HDD for caching.
   d. **Enhanced mode**: WRITE THROUGH, write to SSD and HDD at the same time.
   Maximized mode: WRITE BACK, write to SSD and write back to HDD in a later time.



3. Select **Disable Acceleration** to disable this function, and select **Change Mode** to switch acceleration mode to Enhanced/ Maximized.

- To enable Intel® Smart Response Technology, you need at least one SSD (≧20GB) and a HDD, and only one SSD can be assigned for caching.
- If you want to restore the OS, go to **BIOS Option ROM > Acceleration Options** and remove the **Disks/Volume Acceleration** to disable Intel® Smart Response Technology. Refer to Chapter 4, section Installing Serial ATA hard disk for the entry of BIOS Option ROM.
- The maximum caching size on the SSD is 64GB. If it exceeds, the storage capacity left out for caching can still be identified by the system for normal storage.

Intel® Rapid Start Technology

Intel® Rapid Start Technology allows you to quickly resume your computer from sleeping mode. Saving your computer's system memory to the configured SSD provides a faster wake-up response time, but keeps the energy in a low profile.

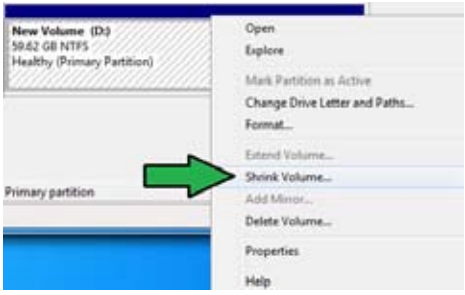
- Before applying Intel® Rapid Start Technology, go to **Advanced Mode > Advanced > PCH Configuration** in BIOS item, and enable Intel® Rapid Start Technology.
- Ensure to follow the procedure **Creating a partition** precisely to enable the Intel Rapid Start function. Error message appears if you install the Intel® Rapid Start Utility before creating a partition.

Creating a partition

- Ensure to backup your data before using the Microsoft partition tool. Incorrect partitioning process will result to data loss.
- Adjusting the DRAM to a high frequency will result to unstable system performance.

1. Go to Start, right-click **Computer > Manage > Disk Management**.
2. Select the SSD that you want to create the partition.

3. Right click the **New Volume** that you want to shrink from, and select **Shrink Volume**.

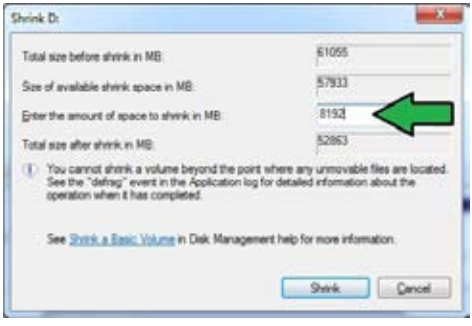


4. If your SSD is not initialized and unformatted:
   a. Right click the disk that you want to create the partition, and select **Initialize**.
   b. Right click the unallocated volume, select **New Simple Volume**, and follow the remaining steps.

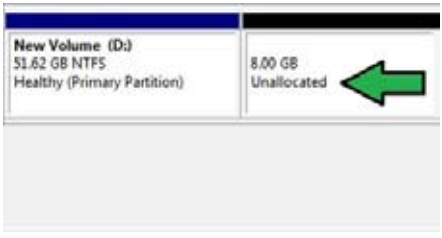
If your SSD is smaller than 64GB, and is set to **Full disk capacity** caching option for Intel® Smart Response, you can not see any volume in the Disk Management. Ensure to set your cache memory value of **18.6GB** in Intel® Smart Response to allow enough capacity for the Intel® Rapid Start partition.

5. Key in the required partition size, and must be equal to the system DRAM memory (1GB = 1024MB). Click **Shrink**.

   Go to **Start > Control Panel > System and Security > System**, and check the DRAM size information.



   The unallocated volume is allocated to the selected disk.



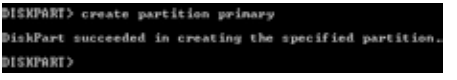
6. To launch the disk partitioning tool, click **Start > Programs > Accessories > Command Prompt** tool.

7. Type **`diskpart`** and press **Enter**.

8. In the diskpart prompt, type **`list disk`** after DISKPART, and press **Enter**. Select the disk with the unallocated volume by typing **`select disk x`** (x = disk number), and press **Enter** .

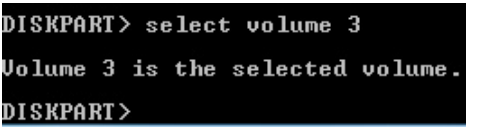
- The value "**`x`**" refers to a disk number where you created the unallocated partition.
- Refer to step 5 for details about the unallocated disk space in the SSD.

9. Type **`create partition primary`**, and press **Enter.**



10. After creating a primary partition, type **`detail disk`**, and press **Enter** to view the details of the partitioned disk.

11. Select the RAW volume which has the same size as the shrinked volume, type **`select volume x`** (x = number), and press **Enter** to store the Intel® Rapid Start partition.



- The value "**`x`**" refers to a disk number where you want to create the store partition.

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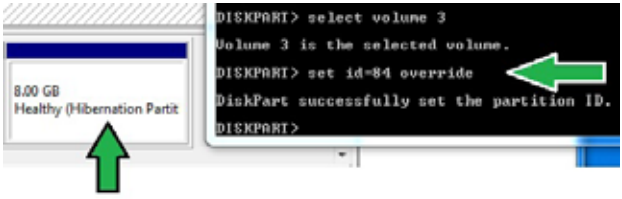
12. Type **`set id=84 override`**, press **Enter**, and wait for the “shrinking process” until the Disk Management utility identifies a new partition called **Hibernation Partition**.



The **Hibernation Partition** does not appear when you choose “GPT (GUID Partition Table store type”. Ensure the “Unallocated” disappears from the volume, and a new partition is identified.

13. Reboot the system after creating the partition.

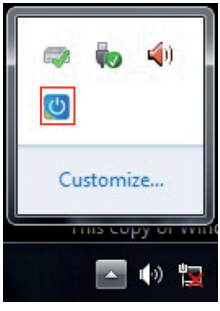
The partition for Intel® Rapid Start Technology is incomplete if the computer is not rebooted, and this results to function failure of Intel® Rapid Start Technology.

Enabling and disabling the Intel® Rapid Start Technology under the OS

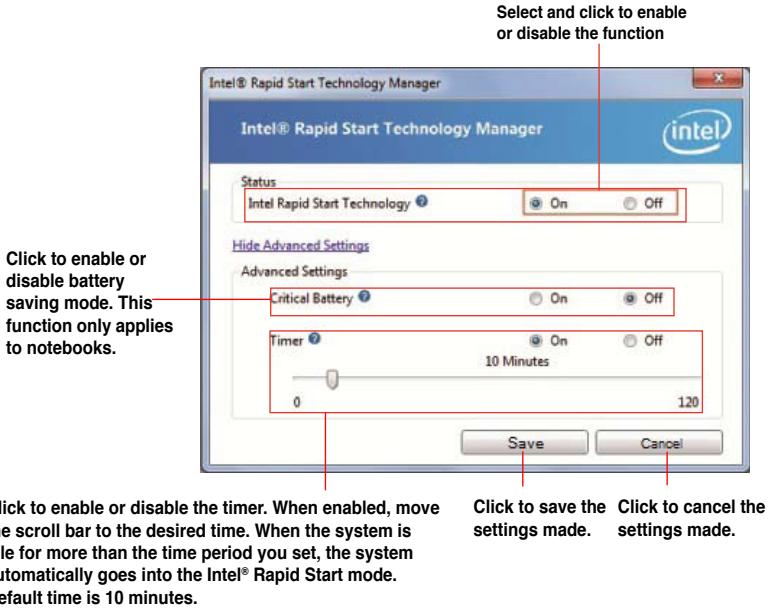
Install the Intel® Rapid Start Technology first from your support DVD in order to launch the Intel® Rapid Start Manager.

After creating the partition, launch the Intel® Rapid Start Manager to enable or disable the Intel® Rapid Start Technology.

1. Click the **Show hidden icons** arrow from the right side of the task bar, and click **Intel® Rapid Start Technology Manager** icon.



2. Tick **On** in the Status field to enable the function, and click **Save.**



Recovering the partition

This procedure allows you to delete the Intel® Rapid Start Technology from your system, and recover the partition you made for the Intel Rapid® Start Technology installation.

1. Run the **Command Prompt** tool.
2. Type **`diskpart`** and press **Enter**.
3. At the diskpart prompt, type **`list disk`** after DISKPART, and press **Enter.**

```
DISKPART> list disk

  Disk ###  Status         Size     Free     Dyn  Gpt
  --------  -------------  -------  -------  ---  ---
  Disk 0    Online         2794 GB  1024 KB        *
  Disk 1    Online           59 GB     0 B

DISKPART>
```

4. Select the disk (SSD) where the Intel® Rapid Start Technology is installed for volume recovery, type **`select disk x`** (x = number), and press **Enter**.

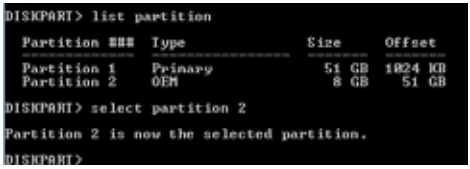
```
DISKPART> select disk 1

Disk 1 is now the selected disk.

DISKPART>
```

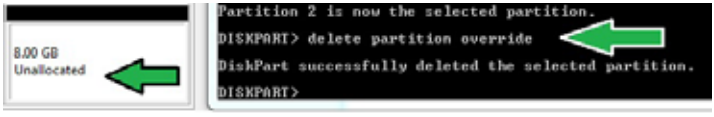
The value "**`x`**" refers to a disk number where you want to delete the store partition.

5. Type **`list partition`**, press **Enter,** and select the partition where the Intel® Rapid Start Technology is installed by typing **`select partition x`** (x = number), and press **Enter**.



The value "**x**" refers to a disk number where you want to delete the store partition.

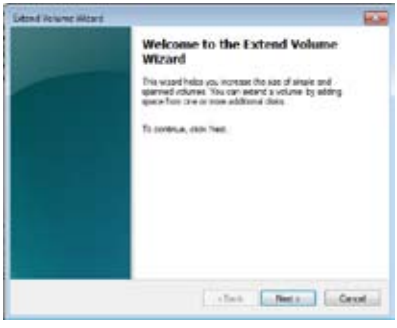
6. Type **`delete partition override`**, and press **Enter**. The diskpart utility deletes the selected partition.



7. In the desktop, click **Start**, right-click **Computer**, and click **Manage.**

8. In the Computer Management window, click **Disk Management**, right click the shrinked new volume, and select **Extend Volume**.

9. As the Extend Volume Wizard appears, click **Next**.



10. Click **Next** after selecting the default selected disk.

11. Extend volume setup is completed. Click **Finish** to recover the Intel® Rapid Start Technology partition.
12. Reboot the system after deleting the partition.
13. Go to **Start > Control Panel > Programs > Programs and Features >** to remove the Intel® Rapid Start Manager for the complete deletion of Intel® Rapid Start Technology.

Intel® Smart Connect Technology

The Intel® Smart Connect Technology is a feature that provides the latest content updates and energy efficiency to your computer's platform.

Once installed and activated, the Intel® Smart Connect Technology periodically wakes up the system from sleeping mode, performs user state gathering, and initiates re-entry to sleeping mode to wake-up after a set time interval.

- Intel® Smart Connect Technology supports Windows® Live Mail, Microsoft Outlook, and Seesmic applications.
- It is necessary to enable the items of the PCH Configuration in the BIOS before applying the Intel® Smart Connect Technology. Go to **Advanced Mode > Advanced > PCH Configuration**, and enable the Intel® Smart Connect Technology.

Installing the Intel® Smart Connect Technology

1. Place the support DVD to the optical drive.
2. Go to **Utilities**, and click **Intel® Smart Connect Technology**.
3. As the setup wizard appears, click **Next** to begin the setup.
4. Tick **I accept the terms in the License Agreement**, and click **Next**.

5. Select all and click **Next** for **Custom Setup**.

6. Click **Install** to proceed the installation.

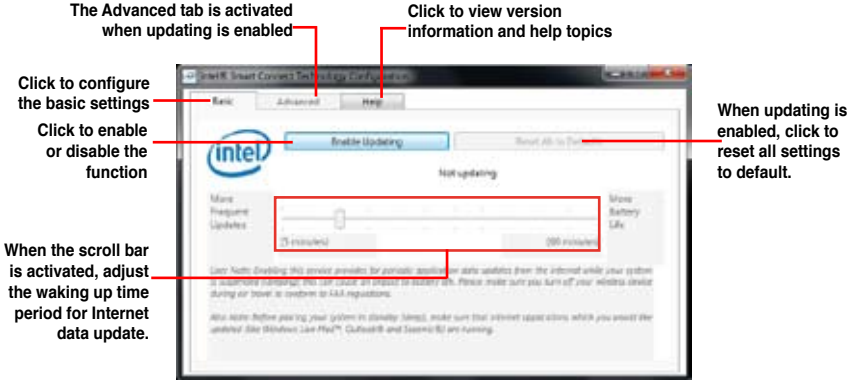
7. Click **Yes** to restart your system, and for the newly installed Intel® Smart Connect Technology to take effect.

Using the Intel® Smart Connect Technology

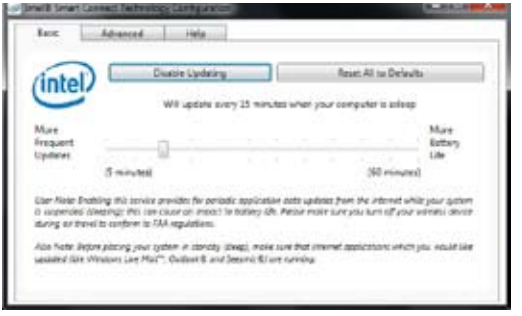
- Before the system goes to sleep mode, ensure to keep your applications on the desktop, and enter the applications, passwords.
- Ensure that the internet is in connection when enabling the Intel® Smart Connect Technology.

1. Click **Start > All Programs > Intel > Intel® Smart Connect Technology**.

2. In the **Basic** tab, click **Enable Updating**. When enabled, the **Advanced** tab is available for advanced function settings.



3. To disable the updating function, click **Disable Updating**. Clicking this button automatically disables the configuration in the **Advanced** tab. To reset to defaults, click **Reset All to Defaults**.



4. In the **Advanced** tab, set up the schedule during low power usage time period for power saving. This setting only applies to the assigned time period.

5. In the **Help** tab, click **About** to view the feature's version. Click **Topics** to learn more about the Intel® Smart Connect Technology and its configuration.

4.6 Creating a RAID driver disk

A floppy disk with the RAID driver is required when installing a Windows® operating system on a hard disk drive that is included in a RAID set.

- **The motherboard does not provide a floppy drive connector.** You have to use a USB floppy disk drive when creating a **SATA** RAID driver disk.
- Windows® XP may not recognize the USB floppy disk drive due to Windows® XP limitation. To work around this OS limitation, refer to section **4.5.4 Using a USB floppy disk drive**.

4.6.1 Creating a RAID driver disk without entering the OS

To create a RAID driver disk without entering the OS:

1. Boot your computer.
2. Press <Del> during POST to enter the BIOS setup utility.
3. Set the optical drive as the primary boot device.
4. Insert the support DVD into the optical drive.
5. Save changes and exit BIOS.
6. When the **Make Disk** menu appears, press <1> to create a RAID driver disk.
7. Insert a formatted floppy disk into the USB floppy disk drive, then press <Enter>.
8. Follow the succeeding screen instructions to complete the process.

4.6.2 Creating a RAID driver disk in Windows®

To create a RAID driver disk in Windows®:

1. Start Windows®.
2. Plug the USB floppy disk drive and insert a floppy disk.
3. Place the motherboard support DVD into the optical drive.
4. Go to the **Make Disk** menu, and then click **Intel AHCI/RAID Driver Disk** to create a RAID driver disk.
5. Select USB floppy disk drive as the destination disk.
6. Follow the succeeding screen instructions to complete the process.

Write-protect the floppy disk to avoid a computer virus infection.

4.6.3 Installing the RAID driver during Windows® OS installation

To install the RAID driver in Windows® XP:

1. During the OS installation, the system prompts you to press the F6 key to install third-party SCSI or RAID driver.
2. Press <F6>, and then insert the floppy disk with RAID driver into the USB floppy disk drive.
3. When prompted to select the SCSI adapter to install, select the RAID driver for the corresponding OS version.
4. Follow the succeeding screen instructions to complete the installation.

To install the RAID driver for Windows® Vista or later OS:

1. During the OS installation, click **Load Driver** to allow you to select the installation media containing the RAID driver.
2. Insert the USB flash drive with RAID driver into the USB port or the support DVD into the optical drive, and then click **Browse**.
3. Click the name of the device you've inserted, go to **Drivers** > **RAID**, and then select the RAID driver for the corresponding OS version. Click **OK**.
4. Follow the succeeding screen instructions to complete the installation.

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

4.6.4 Using a USB floppy disk drive

Due to OS limitation, Windows® XP may not recognize the USB floppy disk drive when you install the RAID driver from a floppy disk during the OS installation.

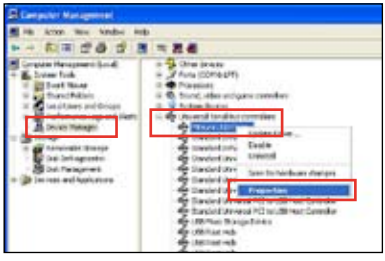
To solve this issue, add the USB floppy disk drive's Vendor ID (VID) and Product ID (PID) to the floppy disk containing the RAID driver. Refer to the steps below:

1. Using another computer, plug the USB floppy disk drive, and insert the floppy disk containing the RAID driver.

2. Right-click **My Computer** on the Windows® desktop or **start** menu, and then select **Manage** from the pop-up window.

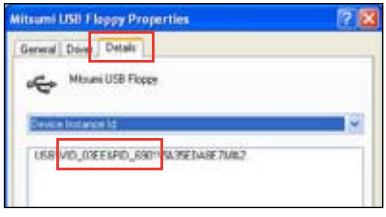

or


3. Select **Device Manager**. From the **Universal Serial Bus controllers**, right-click **xxxxxx USB Floppy**, and then select **Properties** from the pop-up window.

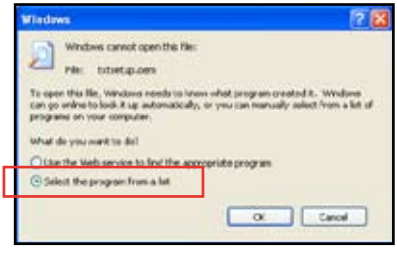


The name of the USB floppy disk drive varies with different vendors.

4. Click **Details** tab. The Vendor ID (VID) and Product ID (PID) are displayed.



5. Browse the contents of the RAID driver disk to locate the file **txtsetup.oem**.
6. Double-click the file. A window appears, allowing you to select the program for opening the oem file.



7. Use Notepad to open the file.

8. Find the **[HardwareIds.scsi.iaAHCI_DesktopWorkstationServer]** and **[HardwareIds.scsi.iaStor_DesktopWorkstationServer]** sections in the **txtsetup.oem** file.
9. Type the following line to the bottom of the two sections:
id = "USB\VID_xxxx&PID_xxxx", "usbstor"

```
[HardwareIds.scsi.iaAHCI_DesktopWorkstationServer]
id= "PCI\VEN_8086&DEV_1C02&CC_0106","iaStor"
id= "USB\VID_03EE&PID_6901", "usbstor"

[HardwareIds.scsi.iaStor_DesktopWorkstationServer]
id= "PCI\VEN_8086&DEV_2822&CC_0104","iaStor"
id= "USB\VID_03EE&PID_6901", "usbstor"
```

Add the same line to both sections.

The VID and PID vary with different vendors.

10. Save and exit the file.

5.1 AMD® CrossFireX™ technology

The motherboard supports the AMD® CrossFireX™ technology that allows you to install multi-graphics processing units (GPU) graphics cards. Follow the installation procedures in this section.

5.1.1 Requirements

- In Dual CrossFireX mode, you should have two identical CrossFireX-ready graphics cards or one CrossFireX-ready dual-GPU graphics card that are AMD® certified.
- Ensure that your graphics card driver supports the AMD CrossFireX technology. Download the latest driver from the AMD website (www.amd.com).
- Ensure that your power supply unit (PSU) can provide at least the minimum power required by your system. See Chapter 2 for details.

- We recommend that you install additional chassis fans for better thermal environment.
- Visit the AMD Game website (http://game.amd.com) for the latest certified graphics card and the supported 3D application list.

5.1.2 Before you begin

For AMD CrossFireX to work properly, you have to uninstall all existing graphics card drivers before installing AMD CrossFireX graphics cards to your system.

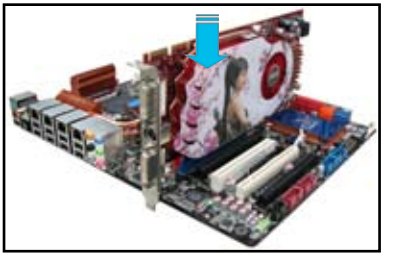
To uninstall existing graphics card drivers:

1. Close all current applications.
2. For Windows XP, go to **Control Panel > Add/Remove Programs**.
   For Windows Vista, go to **Control Panel > Programs and Features**.
3. Select your current graphics card driver/s.
4. For Windows XP, select **Add/Remove**.
   For Windows Vista, select **Uninstall**.
5. Turn off your computer.

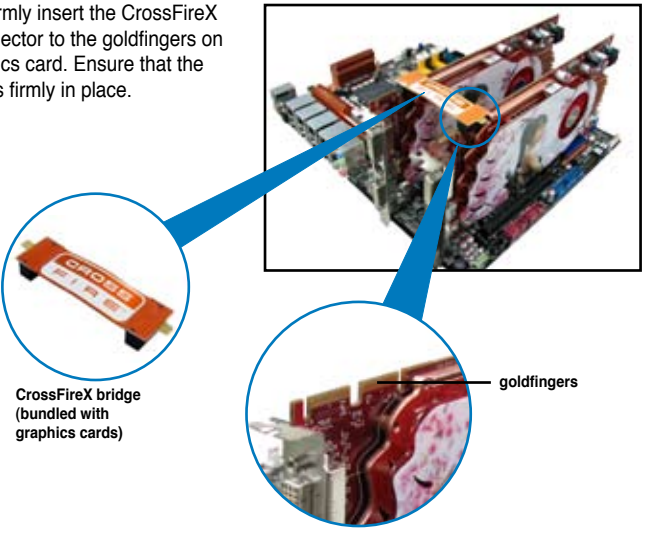
5.1.3 Installing two CrossFireX™ graphics cards

The following pictures are for reference only. The graphics cards and the motherboard layout may vary with models, but the installation steps remain the same.

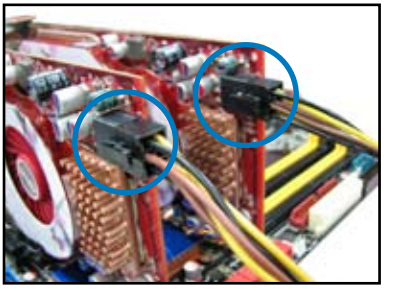
1. Prepare two CrossFireX-ready graphics cards.
2. Insert the two graphics card into the PCIEX16 slots. If your motherboard has more than two PCIEX16 slots, refer to Chapter 2 in this user manual for the locations of the PCIEX16 slots recommended for multi-graphics card installation.
3. Ensure that the cards are properly seated on the slots.



4. Align and firmly insert the CrossFireX bridge connector to the goldfingers on each graphics card. Ensure that the connector is firmly in place.



5. Connect two independent auxiliary power sources from the power supply to the two graphics cards separately.
6. Connect a VGA or a DVI cable to the graphics card.



5.1.4 Installing the device drivers

Refer to the documentation that came with your graphics card package to install the device drivers.

Ensure that your PCI Express graphics card driver supports the AMD® CrossFireX™ technology. Download the latest driver from the AMD website (www.amd.com).

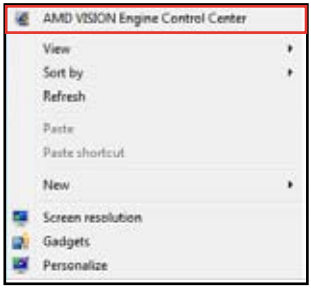
5.1.5 Enabling the AMD® CrossFireX™ technology

After installing your graphics cards and the device drivers, enable the CrossFireX™ feature through the AMD Catalyst™ Control Center in Windows environment.

Launching the AMD VISION Engine Control Center

To launch the AMD VISION Engine Control Center:

1. Right-click on the Windows® desktop and select **AMD VISION Engine Control Center**. You can also right-click the AMD icon in the Windows notificAMDon area and select **Vision Engine Control Center**.



2. The **VISION Engine Control Center Setup Assistant** appears when the system detects the existance of multi-graphics cards. Click **Go** to continue to the **VISION Engine Control Center Advanced View** window.

Enabling Dual CrossFireX technology

1. In the Catalyst Control Center window, click **Graphics Settings > Performance > AMD CrossFireX™ Configuration**.
2. From the Graphics Adapter list, select the graphics card to act as the display GPU.
3. Select **Enable CrossFireX™**.
4. Click **Apply**, and then click **OK** to exit the window.

ASUS contact information

ASUSTeK COMPUTER INC.

Address	15 Li-Te Road, Peitou, Taipei, Taiwan 11259
Telephone	+886-2-2894-3447
Fax	+886-2-2890-7798
E-mail	info@asus.com.tw
Web site	www.asus.com.tw

Technical Support

Telephone	+86-21-38429911
Online support	support.asus.com

ASUS COMPUTER INTERNATIONAL (America)

Address	800 Corporate Way, Fremont, CA 94539, USA
Telephone	+1-812-282-3777
Fax	+1-510-608-4555
Web site	usa.asus.com

Technical Support

Telephone	+1-812-282-2787
Support fax	+1-812-284-0883
Online support	support.asus.com

ASUS COMPUTER GmbH (Germany and Austria)

Address	Harkort Str. 21-23, D-40880 Ratingen, Germany
Fax	+49-2102-959911
Web site	www.asus.de
Online contact	www.asus.de/sales

Technical Support

Telephone	+49-1805-010923*
Support Fax	+49-2102-9599-11
Online support	support.asus.com

*** EUR 0.14/minute from a German fixed landline; EUR 0.42/minute from a mobile phone.**

DECLARATION OF CONFORMITY

Per FCC Part 2 Section 2. 1077(a)

Responsible Party Name: **Asus Computer International**

Address: **800 Corporate Way, Fremont, CA 94539.**

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

hereby declares that the product

Product Name : Motherboard

Model Number : P8C WS

Conforms to the following specifications:

- ☒ FCC Part 15, Subpart B, Unintentional Radiators
- ☐ FCC Part 15, Subpart C, Intentional Radiators
- ☐ FCC Part 15, Subpart E, Intentional Radiators

Supplementary Information:

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

Representative Person's Name : **Steve Chang / President**

Signature :

Date : **Mar. 23, 2012**

Ver. 110101

EC Declaration of Conformity

We, the undersigned,

Manufacturer:	ASUSTek COMPUTER INC.
Address, City:	No. 150, LI-TE RD., PEITOU, TAIPEI 112, TAIWAN R.O.C.
Country:	TAIWAN
Authorized representative in Europe:	ASUS COMPUTER GmbH
Address, City:	HARKORT STR. 21-23, 40880 RATINGEN
Country:	GERMANY

declare the following apparatus:

Product name :	**Motherboard**
Model name :	**P8C WS**

conform with the essential requirements of the following directives:

☒2004/108/EC-EMC Directive

☒ EN 55022:2010	☒ EN 55024:2010
☒ EN 61000-3-2:2006+A1:2009+A2:2009	☒ EN 61000-3-3:2008
☐ EN 55013:2001+A1:2003+A2:2006	☐ EN 55020:2007

☐1999/5/EC-R &TTE Directive

☐ EN 300 328 V1.7.1(2006-10)	☐ EN 301 489-1 V1.8.1(2008-04)
☐ EN 300 440-1 V1.4.1(2008-05)	☐ EN 301 489-3 V1.4.1(2002-08)
☐ EN 300 440-2 V1.2.1(2008-03)	☐ EN 301 489-4 V1.3.1(2002-08)
☐ EN 301 511 V9.0.2(2003-03)	☐ EN 301 489-7 V1.3.1(2005-11)
☐ EN 301 908-1 V3.2.1(2007-05)	☐ EN 301 489-9 V1.4.1(2007-11)
☐ EN 301 908-2 V3.2.1(2007-05)	☐ EN 301 489-17 V2.1.1(2009-05)
☐ EN 301 893 V1.4.1(2005-03)	☐ EN 301 489-24 V1.4.1(2007-09)
☐ EN 302 544-2 V1.1.1(2009-01)	☐ EN 302 326-2 V1.2.2(2007-06)
☐ EN 50360:2001	☐ EN 302 326-3 V1.3.1(2007-09)
☐ EN 50371:2002	☐ EN 301 357-2 V1.3.1(2006-05)
☐ EN 50385:2002	☐ EN 302 623 V1.1.1(2009-01)

☒2006/95/EC-LVD Directive

☒ EN 60950-1 / A11:2009	☐ EN 60065:2002+A1:2006+A11:2008
☐ EN 60950-1 / A12:2011	☐ EN 60065:2002 / A12:2011

☐2009/125/EC-ErP Directive

Regulation (EC) No. 1275/2008	Regulation (EC) No. 278/2009
☐ EN 62301:2005	☐ EN 62301:2005
Regulation (EC) No. 642/2009	
☐ EN 62301:2005	Ver. 111121

☒CE marking (EC conformity marking)

Position : **CEO**

Name : **Jerry Shen**

Signature :

Declaration Date: Mar. 23, 2012

Year to begin affixing CE marking:2012