

**P8P67 WS
Revolution**



Motherboard

E6086

First Edition
November 2010

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

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.



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.

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>

Command

Means that you must type the command exactly as shown, then supply the required item or value enclosed in brackets.

Example: At the DOS prompt, type the command line:

BUPTATER /iP8P67WSREV.ROM

P8P67 WS Revolution

specifications summary

CPU	<p>LGA1155 socket for Intel® 2nd Generation Core™ i7/ Core™ i5/ Core™ i3 Processors</p> <p>LGA 1155 socket for Intel® server processor</p> <p>Supports 32nm CPU</p> <p>* Supports Intel® Turbo Boost Technology 2.0</p> <p>** Refer to www.asus.com for Intel CPU support list</p>
Chipset	<p>Intel® P67 Express Chipset</p> <p>Nvidia NF200*1</p>
Memory	<p>4 x DIMM, max. 32GB, DDR3 2133(O.C.)*/ 1866(O.C.)/1600/1333/1066 MHz, non-ECC, un-buffered memory</p> <p>Dual channel architecture</p> <p>Support Intel Extreme Memory Profile (XMP)</p> <p>** Due to CPU behavior, DDR3 2000/1800 MHz memory module will run at DDR3 1866/1600 MHz frequency as default.</p> <p>** Refer to www.asus.com or this user manual for the Memory QVL(Qualified Vendors Lidts).</p>
Expansion Slots	<p>2 x PCIe 2.0 x16 (@ x16 or x8)</p> <p>2 x PCIe 2.0 x16 (@ x8)</p> <p>3 x PCIe 2.0 x1 (@ x1)</p>
Multi-GPU Technology	<p>Supports NVIDIA® Geforce 3-Way/2-Way SLI™ technology</p> <p>Supports ATI® CrossFireX™ technology, up to Quad CrossFireX™</p>
CUDA support	Up to 4 NVIDIA Tesla cards
Storage	<p>Intel® P67 Express Chipset</p> <ul style="list-style-type: none"> - 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 <p>Marvell® 9128 PCIe SATA6Gb/s controller:</p> <ul style="list-style-type: none"> - 2 x SATA 6.0 Gb/s ports (navy blue) - Support SATA RAID 0 and 1
LAN	<p>1 x Intel® 82574L Gb LAN</p> <p>1 x Intel® 82579 Gigabit LAN-Dual interconnect between the Integrated LAN controller and Physical Layer (PHY)</p> <ul style="list-style-type: none"> - Support teaming function
USB	<p>NEC USB 3.0 controller</p> <ul style="list-style-type: none"> - 2 x USB 3.0 ports (Blue, at back panel) <p>Intel® P67 Express Chipset</p> <ul style="list-style-type: none"> - 14 x USB 2.0 ports (6 ports at mid-board, 8 ports at back panel)

(continued on the next page)

P8P67 WS Revolution

specifications summary

1394	VIA VT6315N controller supports 2 x 1394a port
Audio	ALC889, 8 channels High Definition Audio CODEC <ul style="list-style-type: none"> - Multi-Streaming - Jack-Sensing - Front Panel Jack-Retasking - Optical/Coxial S/PDIF out ports at back I/O - ASUS Noise-Filer
ASUS Unique Features	ASUS Digi+ VRM Utility ASUS Exclusive Features <ul style="list-style-type: none"> - MemOK! - AI Suite II - ASUS EFI BIOS EZ Mode featuring friendly graphics user interface ASUS Quiet Thermal Solution <ul style="list-style-type: none"> - ASUS Fanless Design: Heat-pipe solution - ASUS Fan Xpert ASUS EZ DIY <ul style="list-style-type: none"> - ASUS Q-Shield - ASUS Q-Connector - ASUS CrashFree BIOS 3 - ASUS EZ Flash Utility
ASUS Q-Design	ASUS Q-LED (CPU, DRAM, VGA, Boot Device LED) ASUS Q-Slot ASUS Q-DIMM
Workstation Unique Features	4 PCIe x16 slots G.P. Diagnosis Card bundled Quick Gate:2 vertical USB 2.0 on board ASUS SASsaby series cards support ASUS WS Diag. LED ASUS WS Heartbeat
BIOS Features	32 Mb Flash ROM, EFI 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
Back Panel I/O Ports	PS/2 KB/MS port S/PDIF Out (Optical and Coxial) 8 x USB 2.0/1.1 ports 2 x USB 3.0/2.0 ports 1 x IEEE1394a 2 x Lan Connector 1 x 8-channel Audio I/O

(continued on the next page)

P8P67 WS Revolution

specifications summary

Internal I/O Connectors	24-pin ATX Power connector 8-pin ATX +12V Power connector 4pin EZ_PLUG 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 PWR fan AAFP connector 1 x COM port connector 2 x USB connectors support additional 4 USB ports 2 x USB 2.0/1.1 vertical ports TPM header S/PDIF Out header 1 x MemOK! Button 20-pin front panel connector
Manageability	WfM 2.0, DMI 2.0, WOL by PME, WOR by PME, PXE
OS	Win7 32/64 bit,Vista 32/64 bit and WinXP 32/64bit
Form Factor	ATX Form Factor, 12"x 9.6" (30.5cm x 24.5cm)

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

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

This chapter describes the motherboard features and the new technologies it supports.

1 **Product introduction**

Chapter summary

1

1.1	Welcome!	1-1
1.2	Package contents.....	1-1
1.3	Special features.....	1-2

1.1 Welcome!

Thank you for buying an ASUS P8P67 WS Revolution 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.

Motherboard	ASUS P8P67 WS Revolution
I/O modules	1 x 2-port USB 2.0 module and 1-port eSATA module
Cables	4 x Serial ATA 6.0 Gb/s signal cables 2 x Serial ATA 3.0 Gb/s power cables 4 x Serial ATA 3.0 Gb/s cables 1 x COM port cable
Accessories	1 x ASUS Q-Shield (I/O shield) 1 x ASUS 2-in-1 Q-Connector Kit (Retail version only) 1 x G.P. Diagnosis Card (Retail version only) 1 x ASUS SLI bridge connector 1 x ASUS 3-Way SLI bridge card
Application DVD	ASUS motherboard support DVD
Documentation	User guide



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

1.3 Special features

1.3.1 Product highlights

Green ASUS

This motherboard and its packaging comply with the European Union's Restriction on the use of Hazardous Substances (RoHS). This is in line with the ASUS vision of creating environment-friendly and recyclable products/packagings to safeguard consumers' health while minimizing the impact on the environment.

LGA1155 Intel® Sandy Bridge Processor Ready

This motherboard supports the latest Intel® Sandy Bridge processors in the LGA1155 package, with memory and PCI Express controllers integrated to support 2-channel (4 DIMM) DDR3 memory and 16 PCI Express 2.0 lanes. This provides great graphics performance. Intel® Sandy Bridge processors are among the most powerful and energy efficient CPUs in the world.

P67

The Intel® P67 Express is the latest single-chipset design to support new socket 1155 Intel® Core™ i3/Core™ i5/Core™ i7 2nd generation processors. It provides improved performance by utilizing serial point-to-point links, allowing increased bandwidth and stability. Additionally, the P67 provides 2 SATA 6Gb/s and 4 SATA 3Gb/s ports for faster data retrieval at double the bandwidth of current bus systems.

PCIe 2.0

Double Speed; Double Bandwidth

This motherboard supports the latest PCIe 2.0 devices for double speed and bandwidth that enhances system performance.

Dual-Channel DDR3 2133(O.C.)/1866(O.C.)/1333/ 1066 support

The motherboard supports DDR3 memory that features data transfer rates of 2133(O.C.)/1866(O.C.)/1333/1066 MHz to meet the higher bandwidth requirements of the latest 3D graphics, multimedia, and Internet applications. The dual-channel DDR3 architecture enlarges the bandwidth of your system memory to boost system performance.

Extra SATA 6Gb/s Supports

Extra Ports, Extra Speed and Accessibility

The Intel® P67 Express chipset natively supports the next-generation Serial ATA (SATA) interface, delivering up to 6Gb/s data transfer. ASUS provides extra SATA 6Gb/s ports with enhanced scalability, faster data retrieval, and double the bandwidth of current bus systems.

TPU

The Ultimate Turbo Processor

Experience the ultimate TPU processor performance boost through a simple onboard switch or AI Suite II utility. Auto tuning intelligently optimizes the system, achieving the fastest clock speeds while maintaining stability. TurboV gives users the option to adjust CPU frequency and ratio by different CPU type to achieve optimized results under a normal OS environment. This gives them the confidence to raise system performance to a safe level every time.

EPU

Energy Efficiency All Around

Tap into the world's first real time PC power saving engine through a simple onboard switch or AI Suite II utility. Get total system power savings by automatically detecting current PC loadings and intelligently moderating power consumption. This also reduces fan noise and extends component longevity!

1.3.2 ASUS Workstation Exclusive Features

Platinum Level Power efficiency

The P8P67 WS Revolution delivers 92% power efficiency at CPU working loads of 30% to 90%. It reduces total power consumption and helps achieve lower power bills. The longer you use the P8P67 WS Revolution, the more you save.

Built-in Dual Intel Server-Class Gigabit LAN

For more reliable networking, the P8P67 WS Revolution features built-in dual Intel server-class Gigabit LAN. It uses lower CPU utilization, increasing throughput to achieve outstanding performance as well as better support for diverse operating systems.

3-Way GeForce SLI and Quad-GPU CrossFireX

Four PCIe slots with ample I/O bandwidth bring you powerful 3-Way SLI and 4-Way CrossFireX graphics performance when engaging in high-end professional applications or the latest demanding PC game titles.

CUDA parallel computing power supported

The motherboard achieves outstanding , more dependable and better value for money performance when working in tandem with discrete CUDA graphics card technology. Users can count on up to 4 Tesla cards via 4 PCIe x 16 slots, connected to the P8P67 WS Revolution for intensive parallel computing . This delivers nearly 4 teraflops of processing power, and is the best choice for placing a personal supercomputer on your desk instead of a computer cluster that takes up an entire room.

Quick Gate

Quick Gate is a vertical USB connector on the motherboard, allowing you to install USB devices directly with no messy cables. This stops important data storage devices from breaking off unexpectedly. This unique design provides a convenient and safe way to install data and applications on your PC.

WS Diag. LED

Diag. LED checks key components (CPU, DRAM, graphics card and HDD) in sequence during motherboard boot. If an error is found, the LED next to the corresponding device lights up until the problem is solved. This user-friendly design provides an intuitive way to troubleshoot problems in seconds.

ASUS Heartbeat

Bright and vivid LEDs highlight the ASUS name on the motherboard after every successful boot up. With deep blue lighting keeping a regular, cool sequence, ASUS Heartbeat brings the motherboard to life.

G.P. Diagnosis Card (Bundled)

Bundled with the P8P67 WS Revolution, the G.P. Diagnosis card double checks the system by effortlessly and quickly providing precise info every time you switch on your PC.

ASUS SASsaby Card

This motherboard is fully compatible with the optional ASUS SASsaby card series. Faster, safer and more stable SAS provides users with a better choice for storage expansion and upgrades.

1.3.3 ASUS features

Digi+ VRM

Herald the Arrival of a New Digital Power Design Era

ASUS brings motherboard power phase design to a whole new digital era. The 16+3 digital architecture provides the highest power efficiency, generating less heat to enhance reliability and quality. With digital VRM components, users can easily adjust power phase performance, experiencing flexible Vcore voltage and frequency modulation. The 16+3 digital VRM design also ensures longer component lifespan and minimal power loss.

MemOK!

Any Memory is A-OK!

MemOK! quickly ensures memory boot compatibility. This remarkable memory rescue tool requires a mere push of a button to patch memory issues. MemOK! determines failsafe settings and dramatically improves your system boot success. Get your system up and running in no time!

AI Suite II

One-stop Access to Innovative ASUS Features

With its fast user-friendly interface, ASUS AI Suite II consolidates all exclusive ASUS features and allows you to supervise overclocking, energy management and fan speed control, voltage and sensor readings, even interact with your mobile via Bluetooth technology. All in one place so you enjoy different functions without switching utilities back and forth.

ASUS Quiet Thermal Solution

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

ASUS Fanless Design—Heat-pipe solution

The Heat Pipe design effectively directs the heat generated by the vCore area to the heatsink near the back IO ports, where it can be carried away by existing airflow from CPU fan. The purpose of the innovative heat pipe design on this motherboard is that the groundbreaking fanless design does not have lifetime problems as a chipset fan does. The Heat Pipe design is the most reliable fanless thermal solution to date.



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

Fan Xpert

Active Quiet & Cool

ASUS Fan Xpert intelligently allows users to adjust both the CPU and chassis fan speed according to different ambient temperature, which is caused by different climate conditions in different geographic regions and system loading. Built-in variety of useful profiles offer flexible controls of fan speed to achieve a quiet and cool environment.

ASUS EZ DIY

ASUS EZ DIY feature collection provides you easy ways to install computer components, update the BIOS or back up your favorite settings.

EFI BIOS(EZ Mode)

Flexible, Easy BIOS Interface

ASUS brand new EFI BIOS offers a user-friendly interface that goes beyond traditional keyboard BIOS input to enable more flexible and convenient mouse controls. Users can easily navigate the EFI BIOS with the same smoothness as their favorite operating system, while the exclusive EZ Mode displays frequently-accessed setup info with no additional steps needed to enter Advanced Mode for more settings.

ASUS Q-Design

DIY quickly, DIY easily!

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

Q-Shield

Easy and Comfortable Installations

The specially designed ASUS Q-Shield does without the usual "fingers" - making it convenient and easy to install. With better electric conductivity, it ideally protects your motherboard against static electricity and shields it against Electronic Magnetic Interference (EMI).

ASUS Q-Connector

Make connection quick and accurate!

The ASUS Q-Connector allows you to connect or disconnect chassis front panel cables in one easy step with one complete module. This unique module eliminates the trouble of plugging in one cable at a time, making connection quick and accurate.

ASUS EZ-Flash Utility

Simply update BIOS from a USB flash drive before entering the OS

EZ Flash Utility is a user-friendly BIOS update utility. Simply launch this tool and update BIOS from a USB flash drive before entering the OS. You can update your BIOS only in a few clicks without preparing an additional floppy diskette or using an OS-based flash utility.

ASUS CrashFree BIOS 3

The ASUS CrashFree BIOS 3 allows users to restore corrupted BIOS data from a USB flash disk containing the BIOS file.

IEEE 1394a interface

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

S/PDIF-out on Back I/O Port

This motherboard provides convenient connectivity to external home theater audio systems via coaxial and optical S/PDIF-out (SONY-PHILIPS Digital Interface) jacks. It allows to transfer digital audio without converting to analog format and keeps the best signal quality.

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.

DTS

DTS Surround Sensation UltraPC delivers exceptional 5.1 surround experience through the most common PC audio setups - your existing stereo speakers or headphones. In addition to virtual surround, "Bass enhancement" provides stronger low frequency bass sound, and "Voice clarification" provides clear human dialogue even with loud background sound. With these technologies, you may experience a better home-theater audio with ease.

[illegible]

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

2 Hardware information

Chapter summary

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2.1 Before you proceed

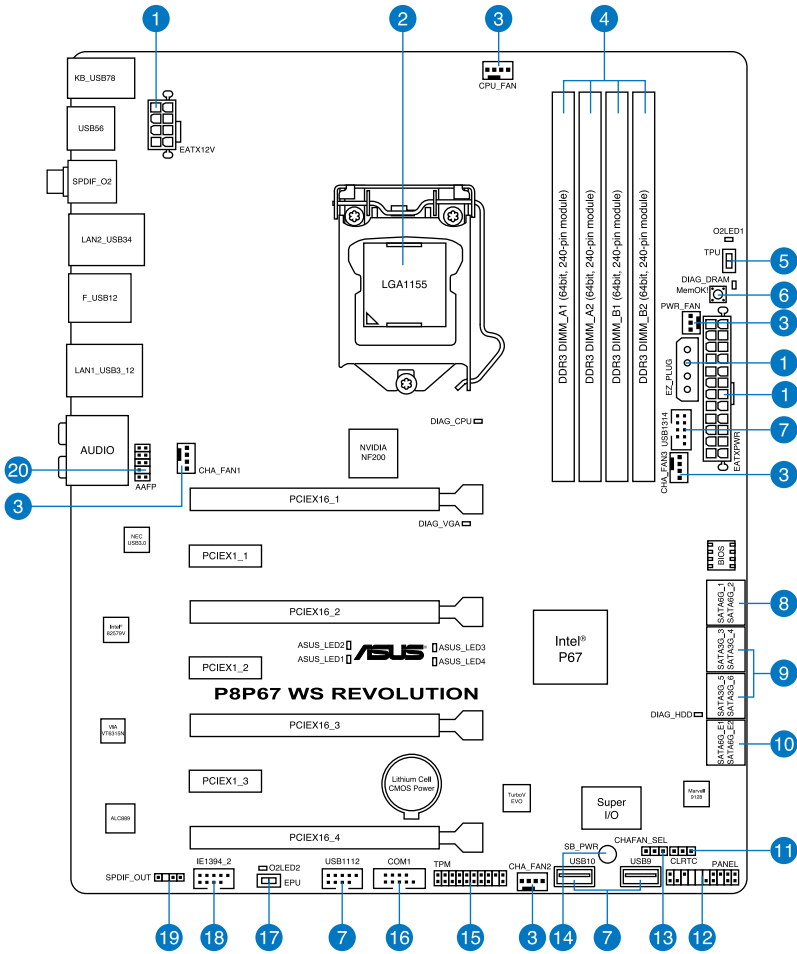
Take note of the following precautions before you install motherboard components or change any motherboard settings.



-
- 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



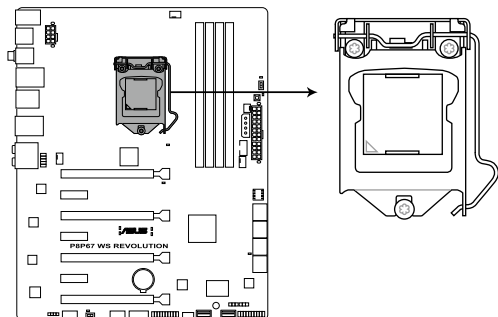
Refer to **2.8 Connectors** for more information about rear panel connectors and internal connectors.

2.2.2 Layout contents

Connectors/Jumpers/Switches/Slots		Page
1.	Power connectors (24-pin EATXPWR, 8-pin EATX12V, 4-pin EZ_PLUG)	2-26
2.	LGA1155 CPU Socket	2-4
3.	CPU, chassis, and power fan connectors (4-pin CPU_FAN, 4-pin CHA_FAN1-3, 3-pin PWR_FAN)	2-22
4.	DDR3 DIMM slots	2-5
5.	TPU Switch	2-11
6.	MemOK! switch	2-12
7.	USB 2.0 connectors (Type A: USB9/10; 10-1 pin USB1112; USB1314)	2-20
8.	Intel® P67 Serial ATA 6.0 Gb/s connectors (7-pin SATA6G_1/2 [gray])	2-17
9.	Intel® P67 Serial ATA 3.0 Gb/s connectors (7-pin SATA3G_3-6 [blue])	2-18
10.	Marvell® Serial ATA 6.0 Gb/s connectors (7-pin SATA6G_E1/E2 [navy blue])	2-19
11.	Clear RTC RAM (3-pin CLRTC)	2-15
12.	System panel connector (20-8 pin PANEL)	2-27
13.	Chassis Fan control setting (3-pin CHAFAN_SEL)	2-16
14.	Standby Power LED	2-14
15.	TPM connector (20-1 pin TPM)	2-24
16.	Serial port connector (10-1 pin COM1)	2-23
17.	EPU Switch	2-11
18.	IEEE 1394a port connector (10-1 pin IE1394_2)	2-21
19.	Digital audio connector (4-1 pin SPDIF_OUT)	2-21
20.	Front panel audio connector (10-1 pin AAFP)	2-23

2.2.2 Central Processing Unit (CPU)

The motherboard comes with a surface mount LGA1155 socket designed for the Intel® 2nd Generation Core™ i7 / Core™ i5 / Core™ i3 Processors.



P8P67 WS REVOLUTION CPU LGA1155



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



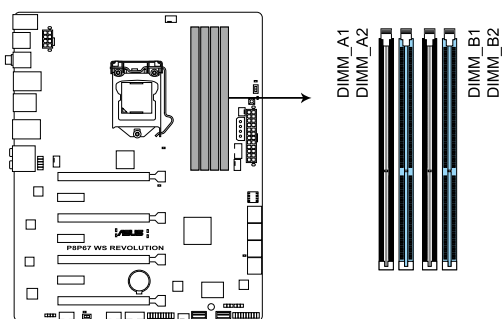
- Upon purchase of the motherboard, ensure that the PnP cap is on the socket and the socket contacts are not bent. Contact your retailer immediately if the PnP cap is missing, or if you see any damage to the PnP cap/socket contacts/motherboard components. ASUS will shoulder the cost of repair only if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

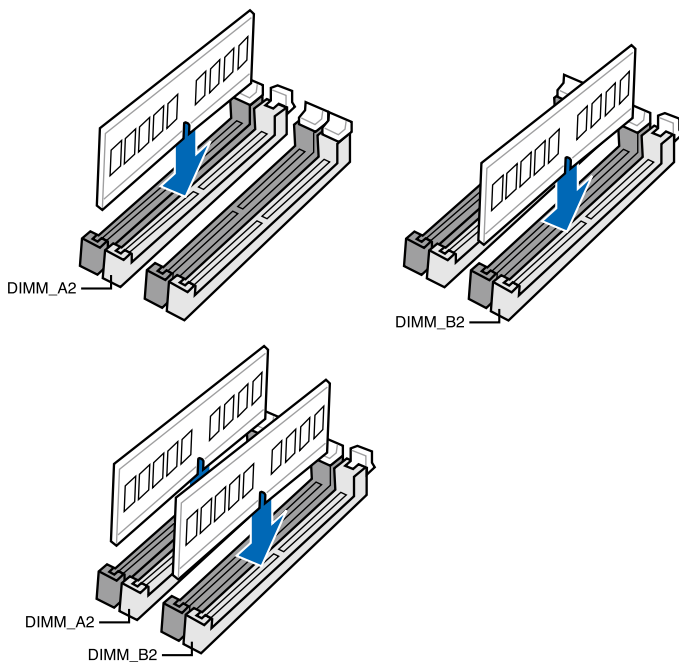


A DDR3 module is notched differently from a DDR or DDR2 module. DO NOT install a DDR or DDR2 memory module to the DDR3 slot.



P8P67 WS REVOLUTION 240-pin DDR3 DIMM socket

Recommended memory configurations



Memory configurations

You may install 1GB, 2GB, 4GB, 8GB unbuffered and non-ECC DDR3 DIMMs into the DIMM sockets.



- You may install varying memory sizes in Channel A and Channel B. The system maps the total size of the lower-sized channel for the dual-channel configuration. Any excess memory from the higher-sized channel is then mapped for single-channel operation.
- According to Intel spec definition, DDR3-1600 is supported for one DIMM per channel only. ASUS exclusively provides two DDR3-1600 DIMM support for each memory channel.
- According to Intel CPU spec, DIMM voltage below 1.65V is recommended to protect the CPU.
- According to Intel CPU spec, CPUs with a core frequency of 2.66G support the maximum DIMM frequency of up to DDR3-1333. To use DIMMs of a higher frequency with a 2.66G CPU, enable the DRAM O.C. Profile feature in BIOS. Refer to section 3.5.1 Ai Overclock Tuner for details.
- 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).



- The default memory operation frequency is dependent on its Serial Presence Detect (SPD), which is the standard way of accessing information from a memory module. Under the default state, some memory modules for overclocking may operate at a lower frequency than the vendor-marked value. To operate at the vendor-marked or at a higher frequency, refer to section 3.4 Ai Tweaker menu for manual memory frequency adjustment.
- For system stability, use a more efficient memory cooling system to support a full memory load (4 DIMMs) or overclocking condition.

P8P67 WS Revolution Motherboard

Qualified Vendors Lists (QVL) DDR3-1600MHz capability

Vendor	Part No.	Size	SS/DS	Timing	Voltage	DIMM socket support	
						2DIMM	4DIMM
CORSAIR	CMX6GX3M3A1600C9(XMP)	6GB (3x 2GB)	DS	9-9-9-24	1.65	●	●
CORSAIR	CMD8GX3M4A1600C8(XMP)	8GB(4 x 2GB)	DS	8-8-8-24	1.65	●	●
Crucial	BL25664BN1608.16FF(XMP)	4GB(2x 2GB)	DS	8-8-8-24	1.65	●	●
G.SKILL	F3-12800CL9D-2GBNQ	2GB(2 x 1GB)	SS	-	1.6	●	
G.SKILL	F3-12800CL7D-4GBRM(XMP)	4GB(2x 2GB)	DS	7-8-7-24	1.6	●	●
GEIL	GE34GB1600C9DC(XMP)	4GB(2x 2GB)	DS	9-9-9-28	1.65		●
KINGSTON	KHX1600C8D3T1K2/4GX(XMP)	4GB (2x 2GB)	DS	8	1.65	●	●
KINGSTON	KHX1600C9D3K3/6GX(XMP)	6GB (3x 2GB)	DS	9	1.65	●	●
OCZ	OCZ3P16004GK	4GB(2x 2GB)	DS	7-7-7	1.9	●	
Mushkin	998659(XMP)	6GB(3 x 2GB)	DS	9-9-9-24	1.5-1.6	●	
Patriot	PVV34G1600LLK(XMP)	4GB (2x 2GB)	DS	8-8-8-24	1.65	●	

P8P67 WS Revolution Motherboard

Qualified Vendors Lists (QVL) DDR3-1333MHz capability

Vendors	Part No.	Size	SS/ DS	Chip Brand	Chip NO.	Timing	Voltage	DIMM socket support (Optional)		
								1 DIMM	2 DIMM	4 DIMM
A-DATA	SU3U1333B1G9-B	1GB	SS	Hynix	H5TQ1G83TFR	-	-	●	●	●
A-DATA	SU3U1333B2G9-B	2GB	DS	Hynix	H5TQ1G83TFR	-	-	●	●	●
A-DATA	SU3U1333C4G9-B	4GB	DS	Hynix	H5TQ2G83AFR	-	-	●	●	●
Apacer	78.01GC6.9L0	1GB	SS	Apacer	AM5D5808DEJSBG	9	-	●	●	●
Apacer	78.A1GC6.9L1	2GB	DS	Apacer	AM5D5808FEQSBG	9	-	●	●	●
CORSAIR	CMX8GX3M4A1333C9	8GB(4 x 2GB)	DS	-	-	9-9-9-24	1.5	●	●	●
Crucial	BL25664BN1337.16FF (XMP)	2GB	DS	-	-	7-7-7-24	1.65	●	●	●
Crucial	CT25664BA1339.16FF	2GB	DS	MICRON	D9KPT	9	-	●	●	●
Crucial	CT25672BA1339.18FF	2GB	DS	MICRON	D9KPT(ECC)	9	-	●	●	●
ELPIDA	EBJ10UE8BDF0-DJ-F	1GB	SS	ELPIDA	J1108BDSE-DJ-F	-	-	●	●	●
ELPIDA	EBJ10UE8EDF0-DJ-F	1GB	SS	ELPIDA	J1108EDSE-DJ-F	-	-	●	●	●
ELPIDA	EBJ21UE8BDF0-DJ-F	2GB	DS	ELPIDA	J1108BDSE-DJ-F	-	-	●	●	●
G.SKILL	F3-10666CL7D-8GBRH(XMP)	4GB (2x 2GB)	DS	-	-	7-7-7-21	1.5	●	●	●
G.SKILL	F3-10666CL7D-4GBPI(XMP)	4GB(2 x 2GB)	DS	-	-	7-7-7-21	1.5	●	●	●
G.SKILL	F3-10666CL7D-4GBRH(XMP)	4GB(2 x 2GB)	DS	-	-	7-7-7-21	1.5	●	●	●
G.SKILL	F3-10666CL8D-4GBECO(XMP)	4GB(2 x 2GB)	DS	-	-	8-8-8-24	1.35	●	●	●

G.SKILL	F3-10666CL9D-8GBRL	8GB (2x 4GB)	DS	-	-	9-9-9-24	1.5	●	●	●
GEIL	GG34GB1333C9DC	4GB (2x 2GB)	DS	GEIL	GL1L128M88BA115FW	9-9-9-24	1.3	●	●	●
GEIL	GG34GB1333C9DC	4GB(2 x 2GB)	DS	GEIL	GL1L128M88BA12N	9-9-9-24	1.3	●	●	●
Hynix	HMT112U6TFR8A-H9	1GB	SS	Hynix	H5TC1G83TFR	-	-	●	●	●
Hynix	HMT325U6BFR8C-H9	2GB	SS	Hynix	H5TQ2G83BFR	-	-	●	●	●
Hynix	HMT125U6BFR8C-H9	2GB	DS	Hynix	H5TQ1G83BFRH9C	9	-	●	●	●
Hynix	HMT125U6TFR8A-H9	2GB	DS	Hynix	H5TC1G83TFR	-	-	●	●	●
Hynix	HMT351U6BFR8C-H9	4GB	DS	Hynix	H5TQ2G83BFR	-	-	●	●	●
KINGMAX	FLFE85F-C8KM9	2GB	SS	Kingmax	KFC8FNMXF- BXX-15A	-	-	●	●	●
KINGMAX	FLFE85F-B8KL9	2GB	DS	KINGMAX	KFB8FNLXL-BNF-15A	-	-	●	●	●
Kingston	KVR1333D3N9/1G	1GB	SS	Elpida	J1108BDSE-DJ-F	9	1.5	●	●	●
Kingston	KVR1333D3N9/2G	2GB	DS	Kingston	D1288JPNPDLD9U	9	1.5	●	●	●
MICRON	MT8JTF25664AZ- 1G4D1	2GB	SS	Micron	D9LGK	-	-	●	●	●
OCZ	OCZ3P1333LV3GK	3GB(3 x 1GB)	SS	-	-	7-7-7	1.65	●	●	●
OCZ	OCZX1333LV6GK(XMP)	6GB(3 x 2GB)	DS	NA	-	8-8-8	1.6	●	●	●
PSC	AL8F8G73D-DG1	2GB	DS	PSC	A3P1GF3DGF	-	-	●	●	●
SAMSUNG	M378B2873EH1-CH9	1GB	SS	SAMSUNG	K4B1G0846E	-	-	●	●	●
SAMSUNG	M378B2873FHS-CH9	1GB	SS	SAMSUNG	K4B1G0846F	-	-	●	●	●
SAMSUNG	M378B5673FH0-CH9	2GB	DS	SAMSUNG	K4B1G0846F	-	-	●	●	●
SAMSUNG	M378B5273BH1-CH9	4GB	DS	SAMSUNG	K4B2G0846B-HCH9	9	-	●	●	●
SAMSUNG	M378B5273CH0-CH9	4GB	DS	SAMSUNG	K4B2G0846C	K4B2G0846C	-	●	●	●
ACTICA	ACT1GHU72C8G1333S	1GB	SS	Samsung	K4B1G0846F(ECC)	-	-	●	●	●
ACTICA	ACT2GHU64B8G1333M	2GB	DS	Micron	D9KPT	-	-	●	●	●
ATP	AQ56M72E8BJH9S	2GB	DS	SAMSUNG	K4B1G0846D(ECC)	-	-	●	●	●
EK Memory	EKM324L28BP8-I13	4GB(2 x 2GB)	DS	-	-	9	-	●	●	●
Elixir	M2F4G64CB8HB5N-CG	4GB	DS	Elixir	N2CB2G808N-CG	-	-	●	●	●
GoodRam	GR1333D364L9/2G	2GB	DS	Qimonda	IDSH1G-03A1F1C- 13H	-	-	●	●	●
KINGTIGER	F10DA2T1680	2GB	DS	KINGTIGER	KTG1333PS1208NST- C9	-	-	●	●	●

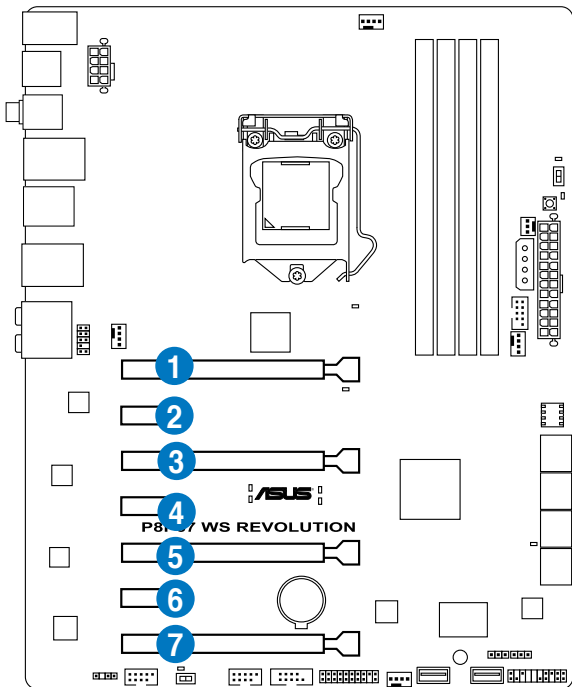


- 1 DIMM: Supports one module inserted in any slot as Single-channel memory configuration.
- 2 DIMMs: Supports one pair of modules inserted into either the blue slots or the black slots as one pair of Dual-channel memory configuration.
- 4 DIMMs: Supports 4 modules inserted into both the blue and black slots as two pairs of Dual-channel memory configuration.

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 2.0 x16_1 slot (single at x16 or dual at x8/x8 mode)
2	PCIe 2.0 x1_1 slot
3	PCIe 2.0 x16_2 slot (x8 mode)
4	PCIe 2.0 x1_2 slot
5	PCIe 2.0 x16_3 slot (single at x16 or dual at x8/x8 mode)
6	PCIe 2.0 x1_3 slot
7	PCIe 2.0 x16_4 slot (x8 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

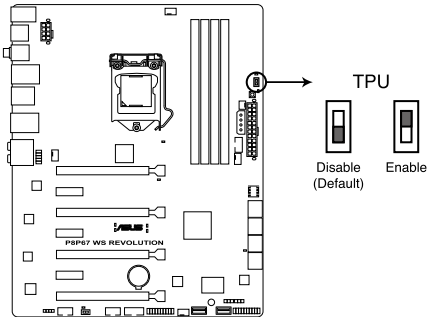
	A	B	C	D	E	F	G	H
PCIEx16_1	shared	–	–	–	–	–	–	–
PCIEx16_2	shared	–	–	–	–	–	–	–
PCIEx16_3	–	shared	–	–	–	–	–	–
PCIEx16_4	shared	–	–	–	–	–	–	–
PCIEx1_1	shared	–	–	–	–	–	–	–
PCIEx1_2	–	shared	–	–	–	–	–	–
PCIEx1_3	–	–	shared	–	–	–	–	–
VIA1394	–	–	–	shared	–	–	–	–
USB3.0	shared	–	–	–	–	–	–	–
LAN1 (82579)	–	–	shared	–	–	–	–	–
LAN2 (82574)	–	–	shared	–	–	–	–	–
Marvell	–	–	–	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 switches

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

1. TPU switch

This switch allows you to enable or disable the TPU function.



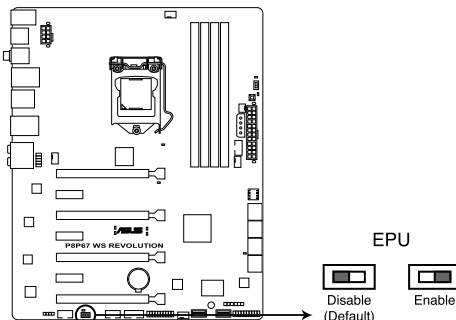
P8P67 WS REVOLUTION TPU switch

2. EPU switch

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



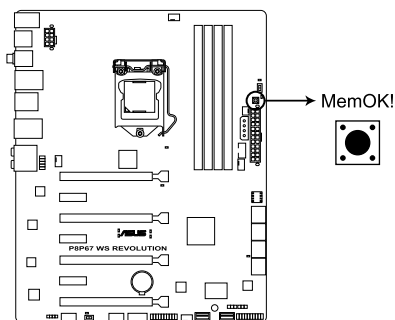
For ensuring the system performance, turn the switch setting to **Enable** when the system is powered off.



P8P67 WS REVOLUTION EPU switch

3. MemOK! switch

Installing DIMMs that are incompatible with the motherboard may cause system boot failure, and the DRAM_LED near the MemOK! switch lights continuously. Press and hold the MemOK! switch until the DRAM_LED starts blinking to begin automatic memory compatibility tuning for successful boot.



P8P67 WS REVOLUTION MemOK! switch

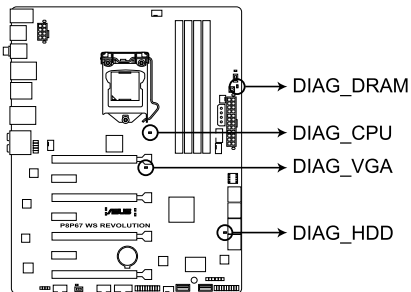


- Refer to section **2.2.6 Onboard LEDs** for the exact location of the DRAM_LED.
- The DRAM_LED also lights when the DIMM is not properly installed. Turn off the system and reinstall the DIMM before using the MemOK! function.
- The MemOK! switch does not function under Windows™ OS environment.
- During 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 fail to boot due to BIOS overclocking, press the MemOK! switch to boot and load BIOS default settings. A messgae 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

POST State LEDs check key components (CPU, DRAM, VGA card, and HDD) in sequence during motherboard booting process. If an error is found, the LED next to the error device will continue lighting until the problem is solved. This user-friendly design provides an intuitive way to locate the root problem within seconds.



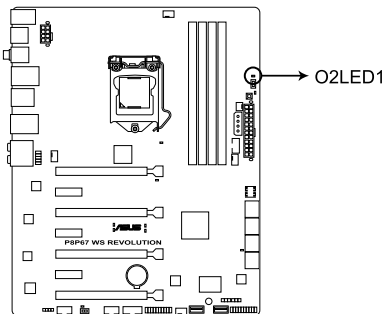
P8P67 WS REVOLUTION DIAG_DRAM/ CPU/ VGA/ HDD LED



You may disable the POST State LEDs in BIOS. Refer to section **3.7.2 Boot Setting Configuration** for details.

2. TPU LED

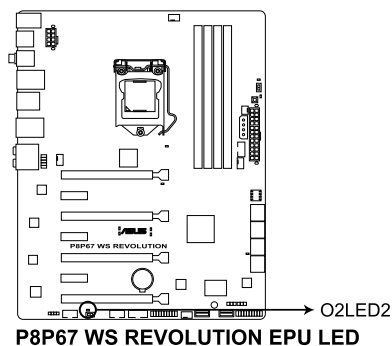
The TPU LED lights when the TPU switch is turned to **Enable**.



P8P67 WS REVOLUTION TPU LED

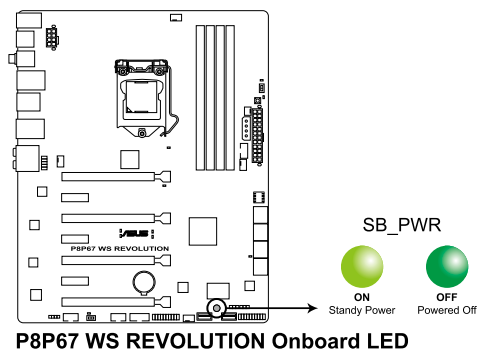
3. EPU LED

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



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.



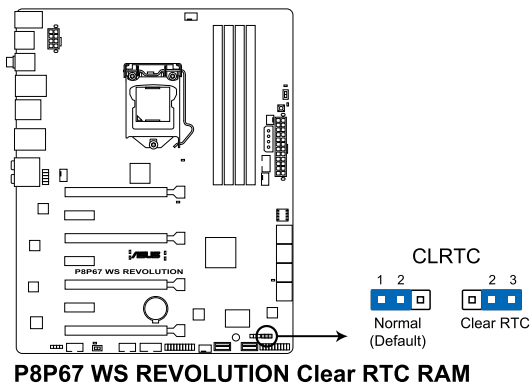
2.2.7 Jumper

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 key during the boot process and enter BIOS setup to re-enter data.



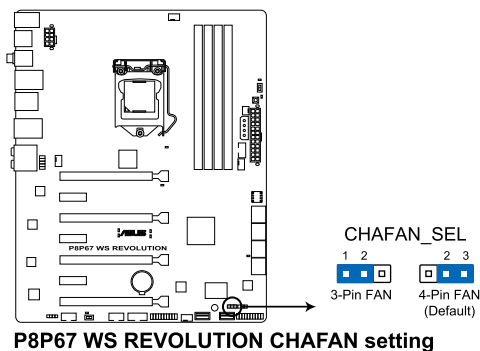
Except when clearing the RTC RAM, never remove the cap on CLRTC jumper default position. Removing the cap will cause system boot failure!



- 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.

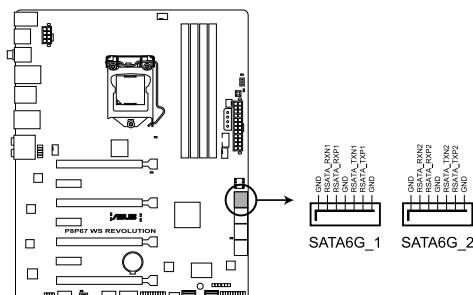


- If you use a 4-pin fan but set the jumper to pin 1-2, the fan you installed may not work.
- If you use a 3-pin fan but set the jumper for a 4-pin fan, the fan control will not work and the fan you installed will always run at full speed.

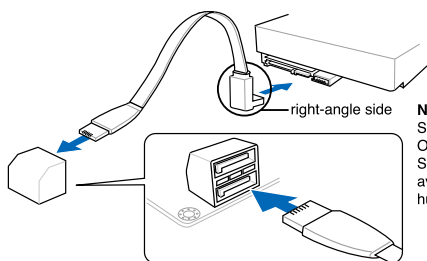
2.2.8 Internal connectors

1. Intel® P67 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.



P8P67 WS REVOLUTION Intel® SATA 6.0 Gb/s connectors



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

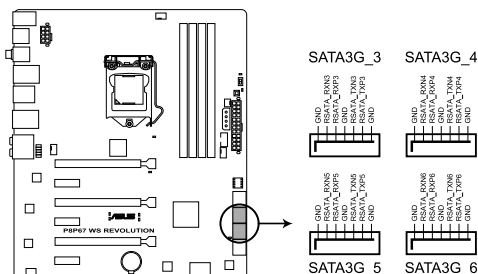


- These connectors are set to [AHCI Mode] by default. If you intend to create a Serial ATA RAID set using these connectors, set the SATA Mode item in the BIOS to [RAID Mode]. Refer to section **3.5.4 SATA Configuration** for details.
- Before creating a RAID set, refer to section 4.4 RAID configurations 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.

2. Intel® P67 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® P67 chipset.



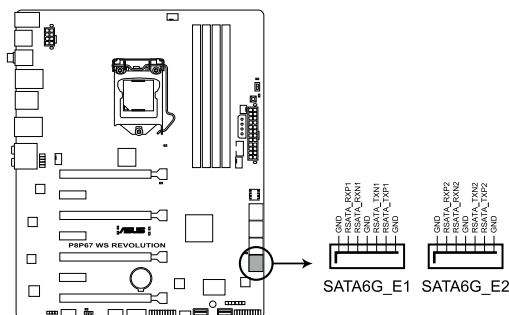
P8P67 WS REVOLUTION Intel® SATA 3.0 Gb/s connectors



- 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 4.4 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. Marvell® Serial ATA 6.0 Gb/s connectors (7-pin SATA6G_E1/E2 [navy blue])

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



P8P67 WS REVOLUTION Marvell® SATA 6.0 Gb/s connectors

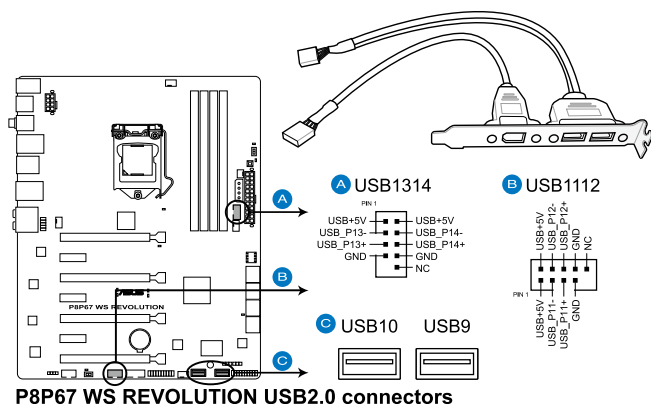


- These connectors are set to [AHCI] by default.
- You must install Windows® XP Service Pack 3 or later versions before using Serial ATA hard disk drives.
- Before creating a RAID set, refer to section **4.4.5 RAID configurations** or the manual bundled in the motherboard support DVD.
- When using hot-plug and NCQ, set the Marvell Controller item in the BIOS to [AHCI Mode]. Refer to section **3.5.6 Onboard Devices Configuration** for details.

4. USB 2.0 connectors (Type A: USB9/10; 10-1 pin USB1112; USB1314)

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

USB1314 connector is also for eSATA ports. If the SATA 6Gb/s front panel cable is available from your system chassis, with this USB1314 connector, you can have a front panel eSATA solution.



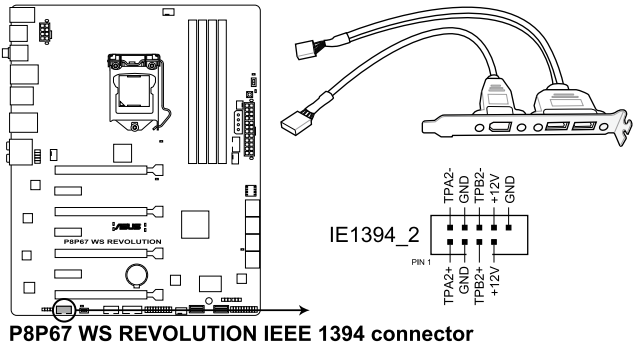
Never connect a 1394 cable to the USB connectors. Doing so will damage the motherboard!



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.

5. **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.



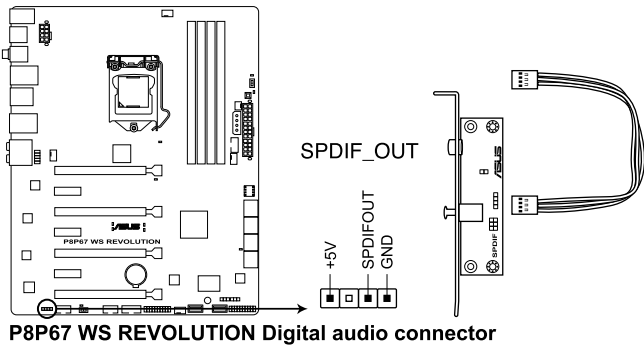
Never connect a USB cable to the IEEE 1394a connector. Doing so will damage the motherboard!



The IEEE 1394a module is purchased separately.

6. **Digital audio connector (4-1 pin SPDIF_OUT)**

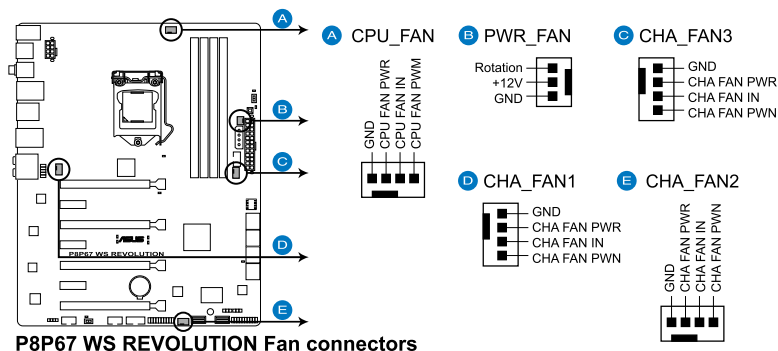
This connector is for an additional Sony/Philips Digital Interface (S/PDIF) port(s). Connect the S/PDIF Out module cable to this connector, then install the module to a slot opening at the back of the system chassis.



The S/PDIF module is purchased separately.

7. CPU, chassis, and power fan connectors (4-pin CPU_FAN; 4-pin CHA_FAN1/2/3; 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.



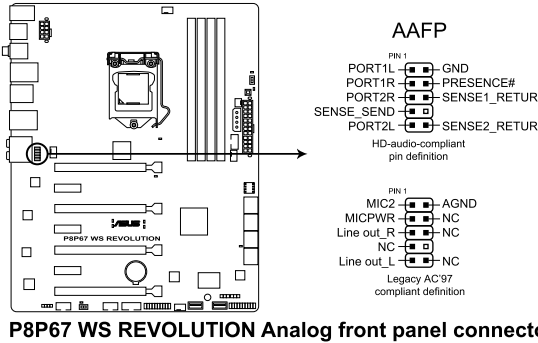
Do not forget to connect the fan cables to the fan connectors. Insufficient air flow inside the system may damage the motherboard components. These are not jumpers! Do not place jumper caps on the fan connectors!



- 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.

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

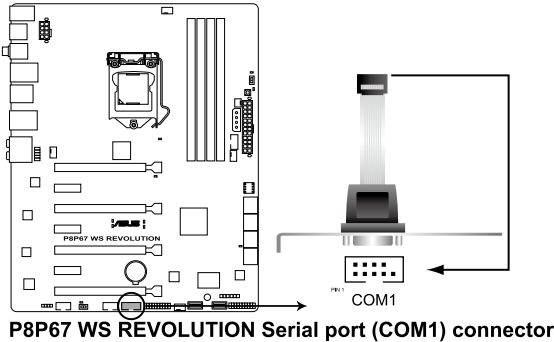
This connector is for a chassis-mounted front panel audio I/O module that supports either HD Audio or legacy AC'97 audio standard. Connect one end of the front panel audio I/O module cable to this connector.



- We recommend that you connect a high-definition front panel audio module to this connector to avail of the motherboard's high-definition audio capability.
- If you want to connect a high-definition 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].

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

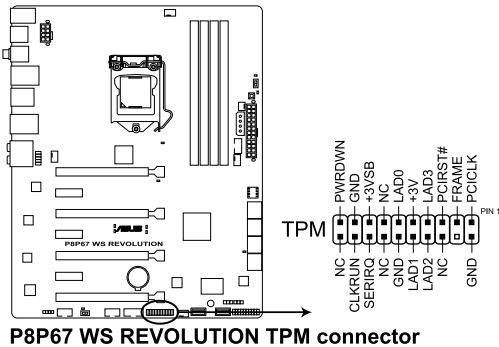
This connector is for a serial (COM) port. Connect the serial port module cable to this connector, then install the module to a slot opening at the back of the system chassis.



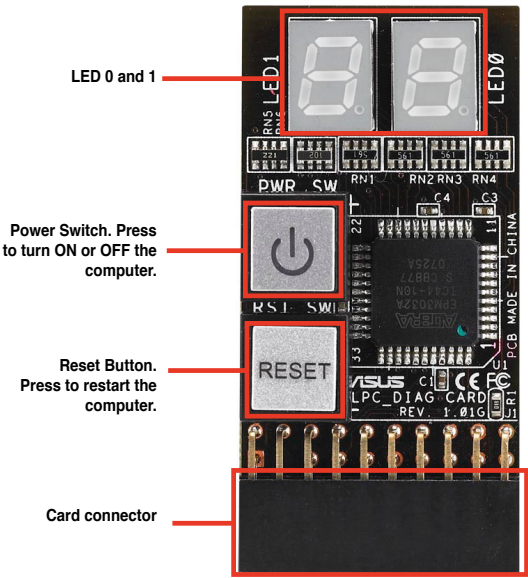
The COM module is purchased separately.

10. 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 installation.



G.P. Diagnosis card layout

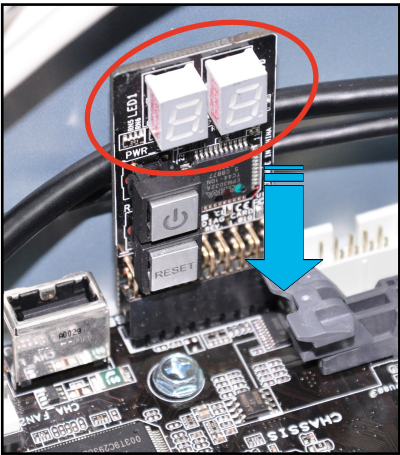


Installing G.P. Diagnosis card



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.



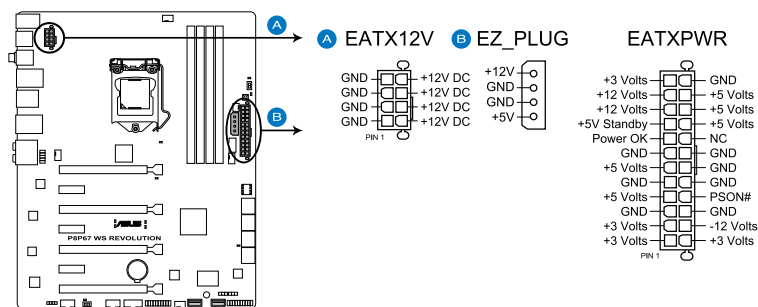
Code table for G.P. Diagnosis card

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

11. ATX power connectors

(24-pin EATXPWR; 8-pin EATX12V; 4-pin EZ_PLUG)

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.



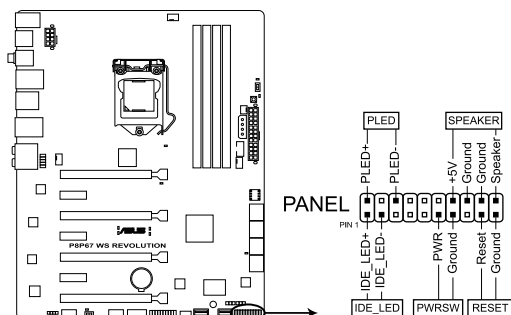
P8P67 WS REVOLUTION ATX power connectors



- 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.

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

This connector supports several chassis-mounted functions.



P8P67 WS REVOLUTION 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)**

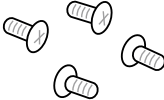


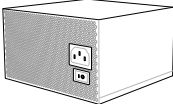


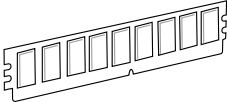
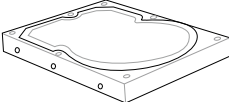
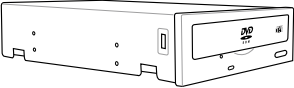
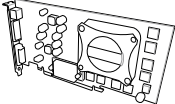
This connector is for the system power button. Pressing the power button turns the system on or puts the system in sleep or soft-off mode depending on the BIOS settings. Pressing the power switch for more than four seconds while the system is ON turns the system OFF.

- **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

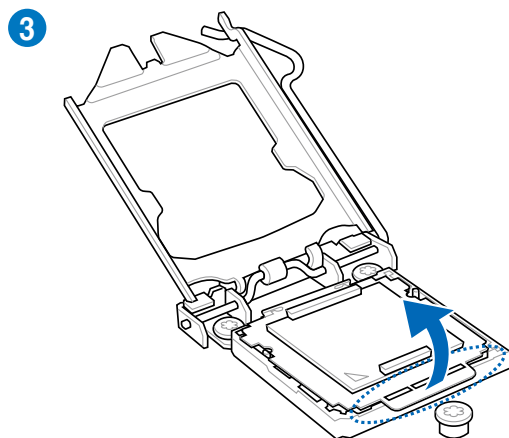
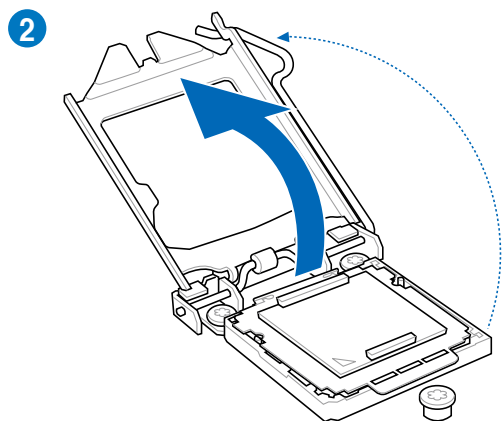
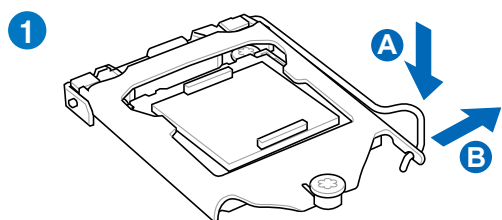
2.3.1 Additional tools and components to build a PC system

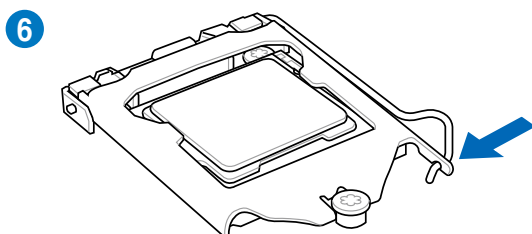
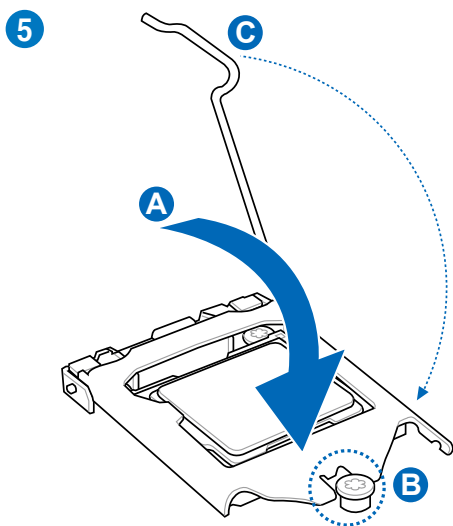
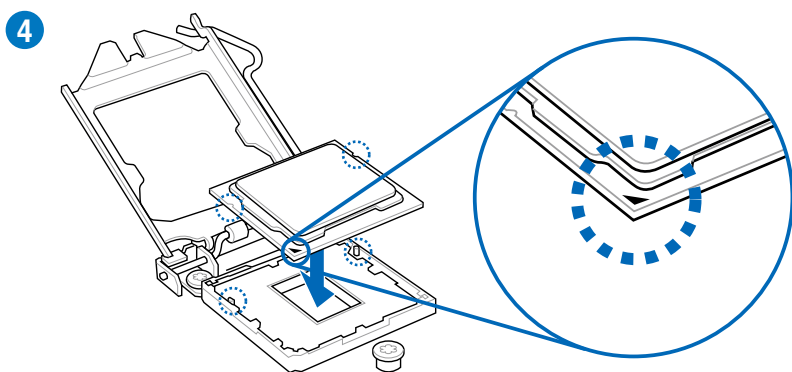
	
1 bag of screws	Philips (cross) screwdriver
	
PC chassis	Power supply unit
	
Intel LGA 1155 CPU	Intel LGA 1155 compatible CPU Fan
	
DIMM	SATA hard disk drive
	
SATA optical disc drive (optional)	Graphics card (optional)



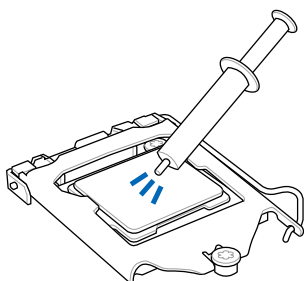
The tools and components in the table above are not included in the motherboard package.

2.3.2 CPU installation



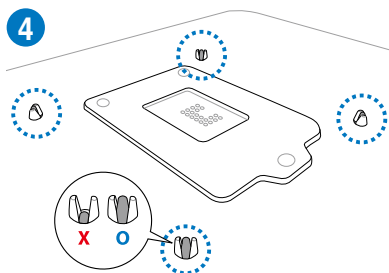
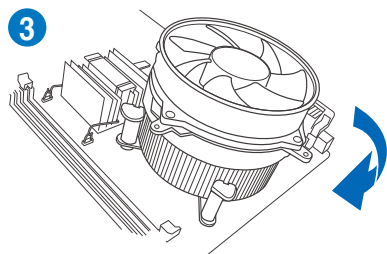
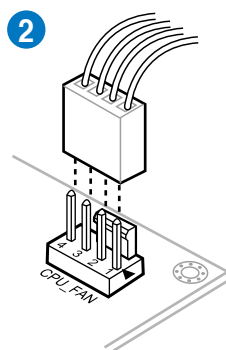
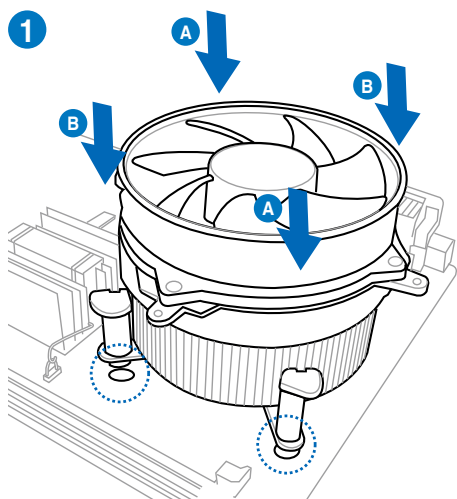


2.3.3 CPU heatsink and fan assembly installation



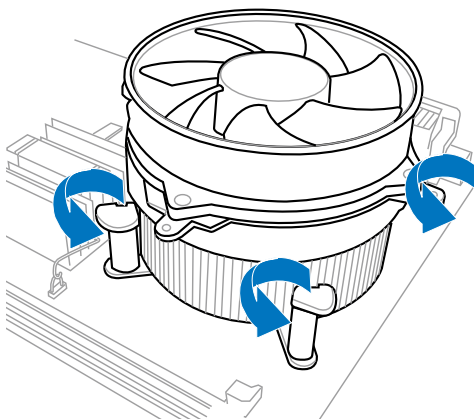
Apply the Thermal Interface Material to the CPU heatsink and CPU before you install the heatsink and fan if necessary.

To install the CPU heatsink and fan assembly

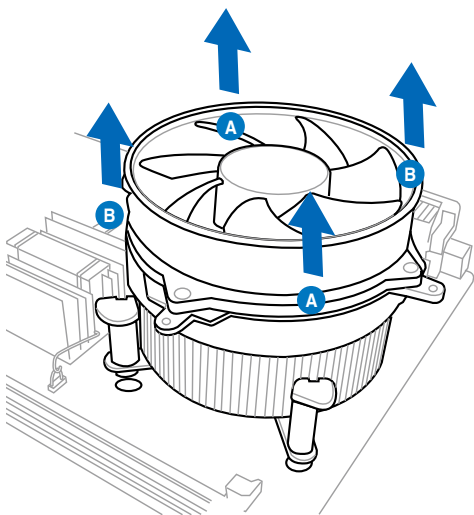


To uninstall the CPU heatsink and fan assembly

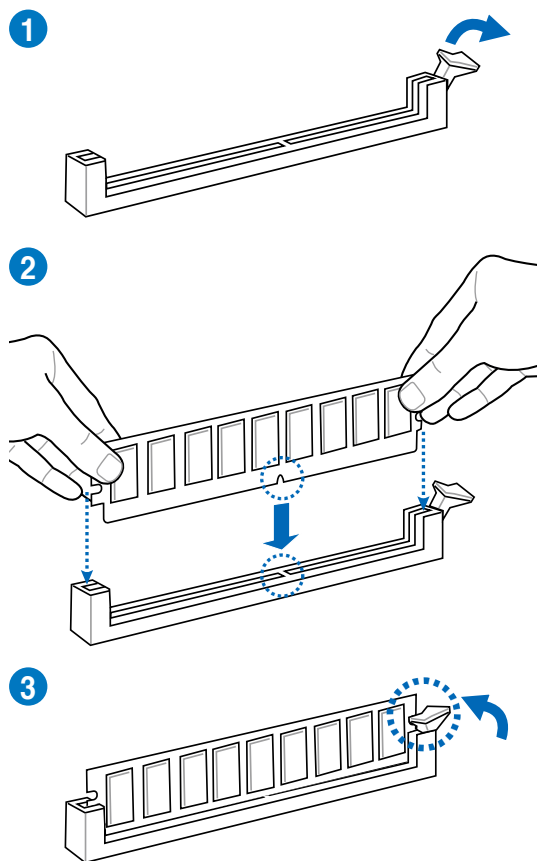
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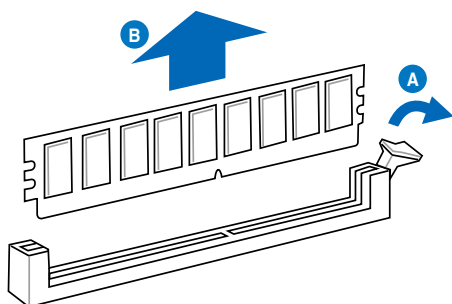
2



2.3.4 DIMM installation



To remove a DIMM

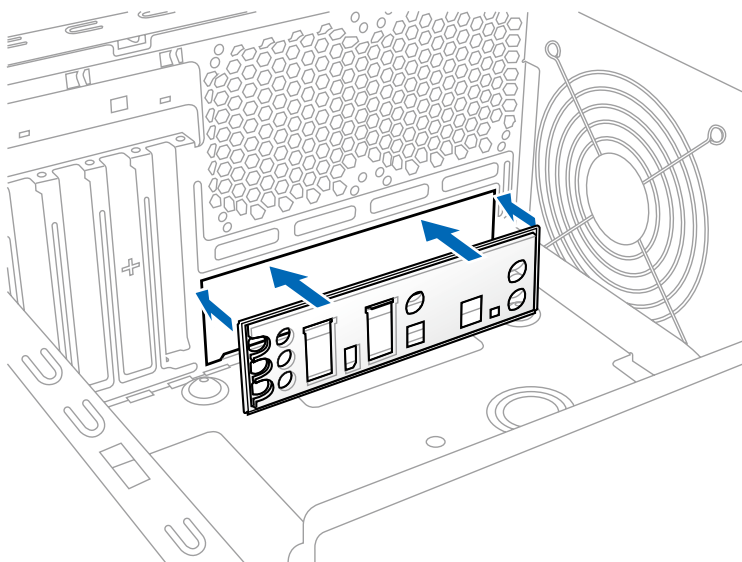


2.3.5 Motherboard installation

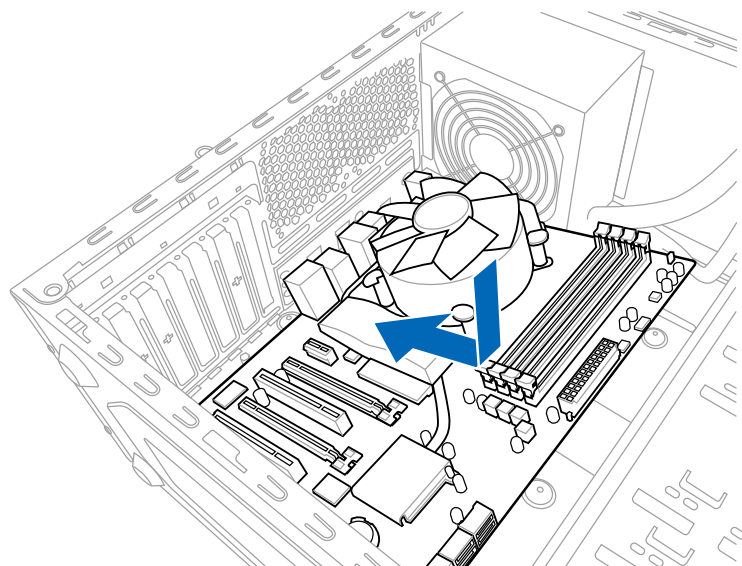


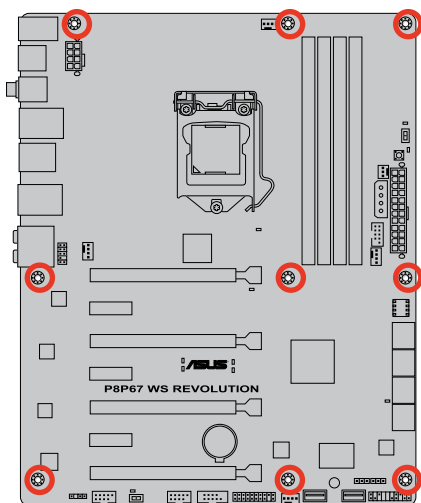
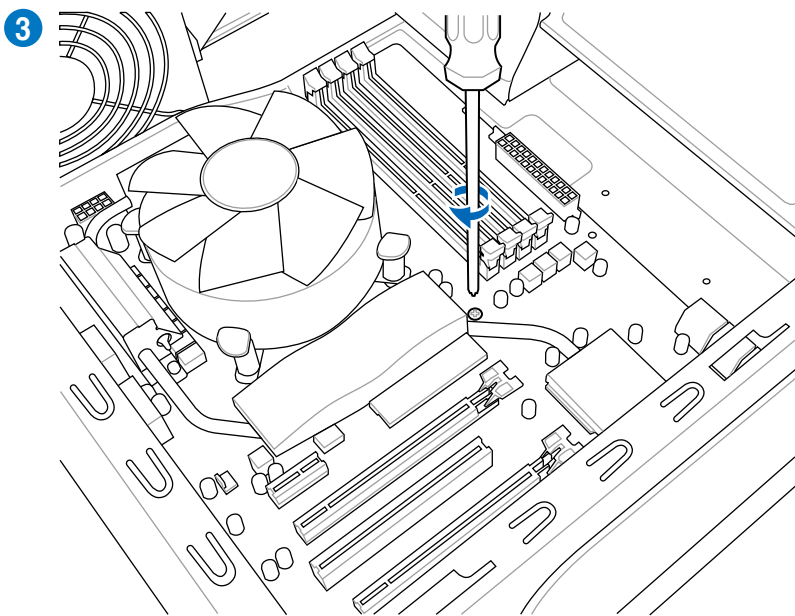
The diagrams in this section are for reference only. The motherboard layout may vary with models, but the installation steps remain the same.

1



2

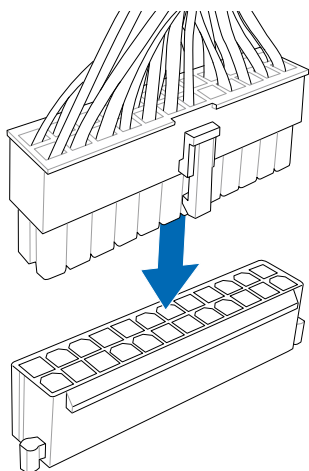




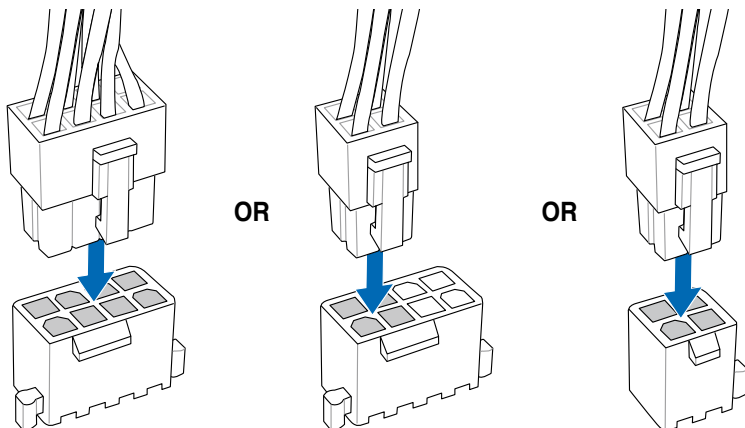
DO NOT overtighten the screws! Doing so can damage the motherboard.

2.3.6 ATX Power connection

1

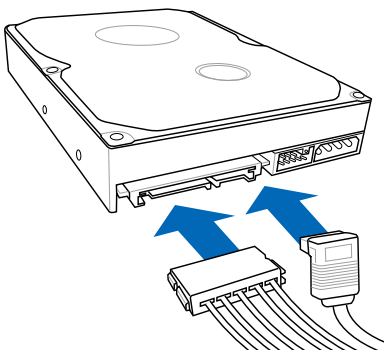


2

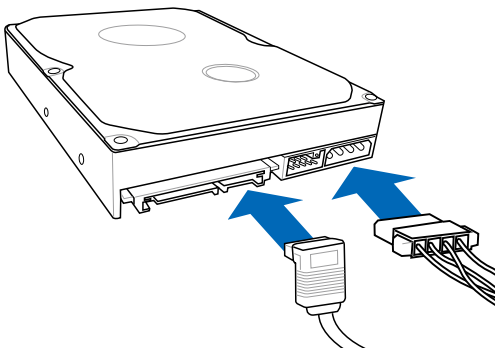


2.3.7 **SATA device connection**

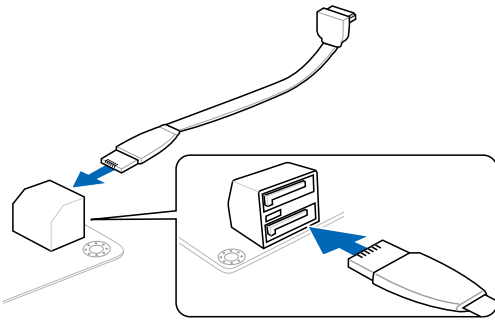
1



OR

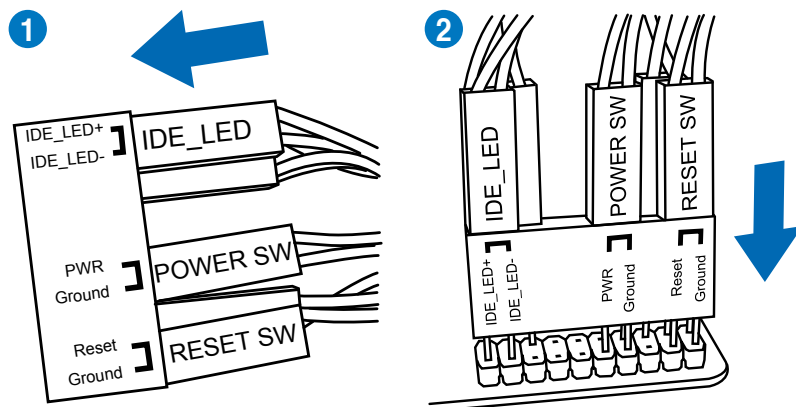


2

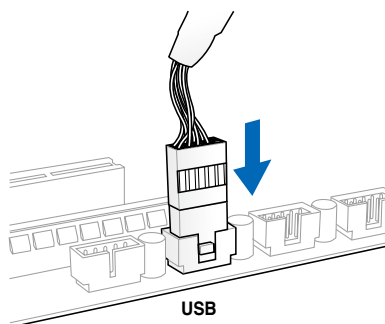


2.3.8 Front I/O Connector

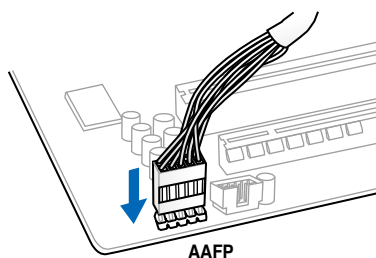
To install ASUS Q-Connector



To install USB Connector



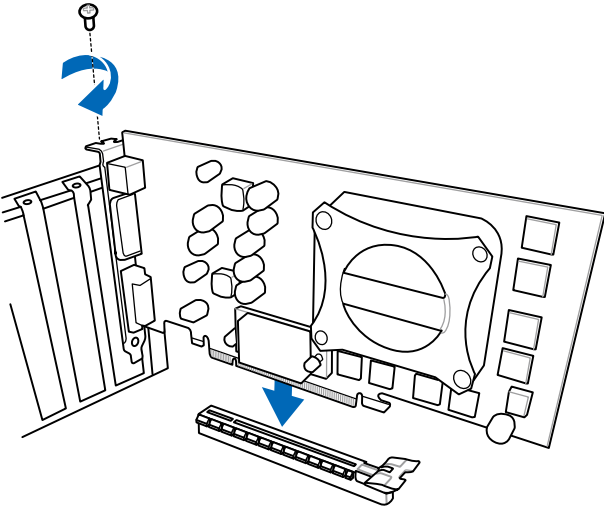
To install front panel audio connector



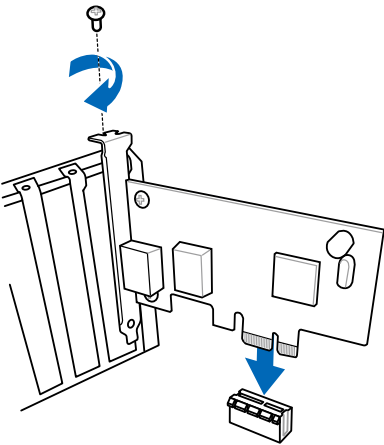
The actual location may vary with motherboards.

2.3.9 Expansion Card installation

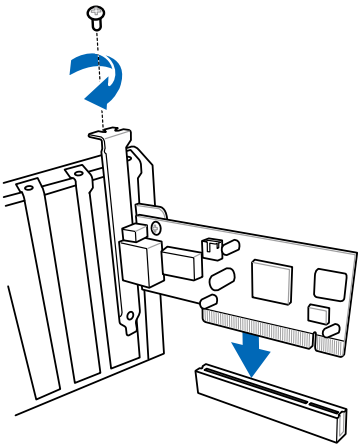
To install PCIe x16 cards



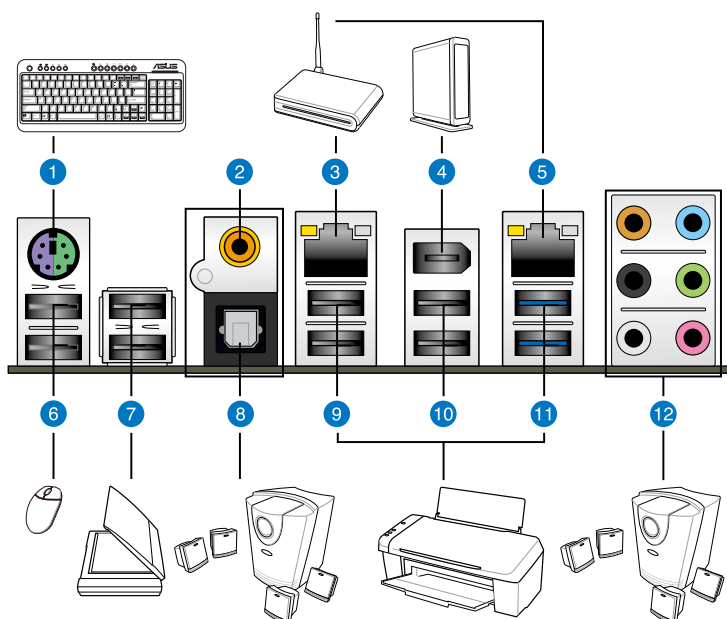
To install PCIe x1 cards



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

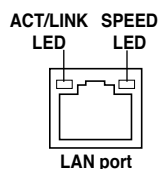
*and **: Refer to the tables on the next page for LAN port and audio port definitions.



- 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

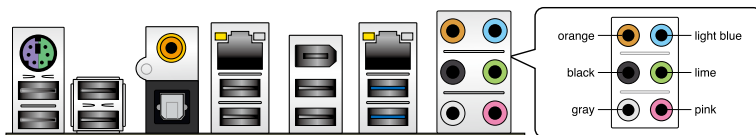


**Audio 2, 4, 6, or 8-channel configuration

Port	Head set 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

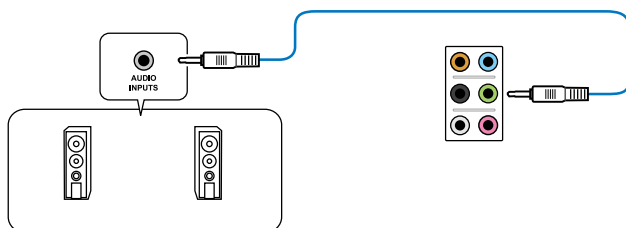
Audio I/O ports



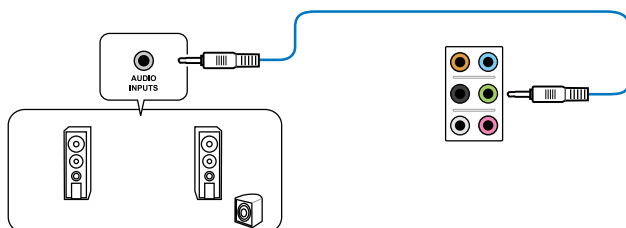
Connect to Headphone and Mic



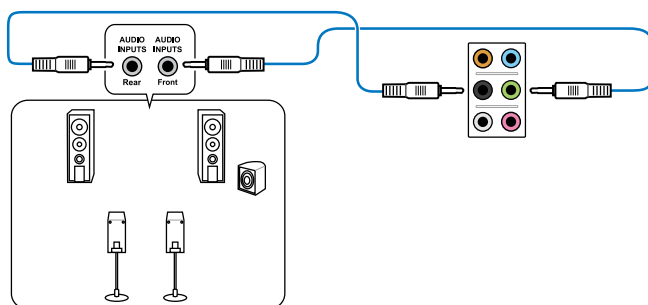
Connect to Stereo Speakers



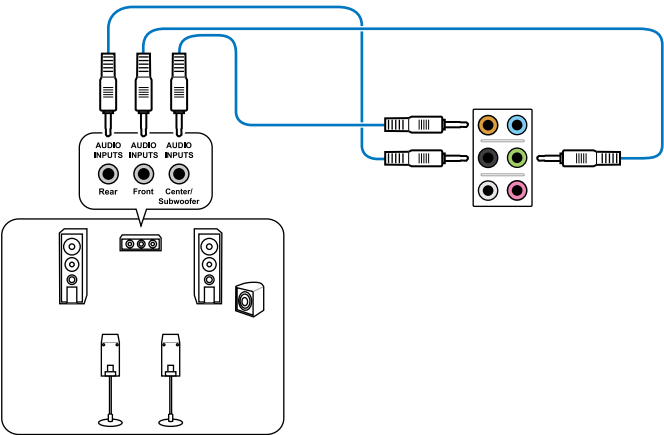
Connect to 2.1 channel Speakers



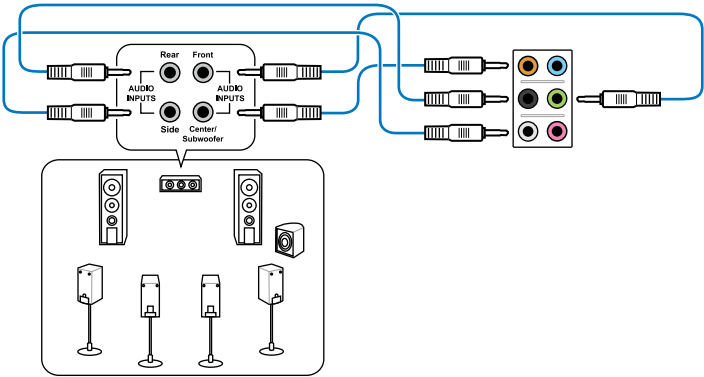
Connect to 4.1 channel Speakers



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. Refer to section **3.7 Power Menu** for details.

[illegible]

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

BIOS setup 3

3.1	Managing and updating your BIOS	3-1
3.2	BIOS setup program	3-7
3.3	Main menu	3-10
3.4	Ai Tweaker menu	3-15
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3.8	Tools menu	3-38
3.9	Exit menu	3-42

3.1 Knowing BIOS

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 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 2.2.7 **Jumper** for information on how to erase the RTC RAM.

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**.



The default screen for entering the BIOS setup program can be changed. Refer to the **Setup Mode** item in section 3.7 **Boot menu** for details.

Displays the CPU/motherboard temperature, CPU/5V/3.3V/12V voltage output, CPU/chassis/power fan speed

Selects the display language of the BIOS setup program

Clicks to display all fan speeds if available

Exits the BIOS setup program without saving the changes, saves the changes and resets the system, or enters the Advanced Mode

System Performance

Boot Priority

Use the mouse to drag or keyboard to navigate to decide the boot priority.

Boot Menu(F8) Default(F5)

Selects the boot device priority

Power Saving mode

Normal mode

Selects the boot device priority

ASUS Optimal mode

Displays the system properties of the selected mode on the right hand side



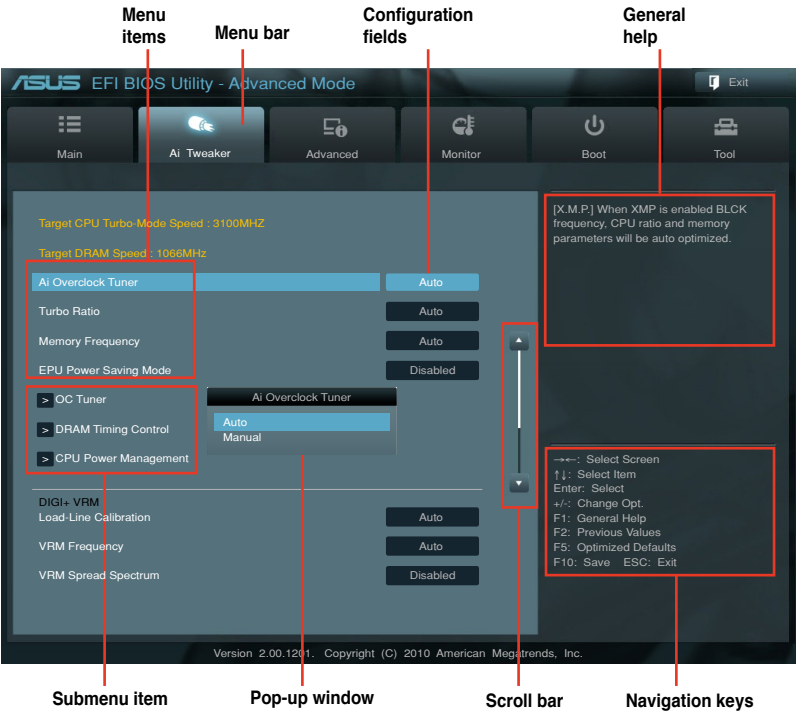
- The boot device options vary depending on the devices you installed to the system.
- The **Boot Menu(F8)** button is available only when the boot device is installed to the system.

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.

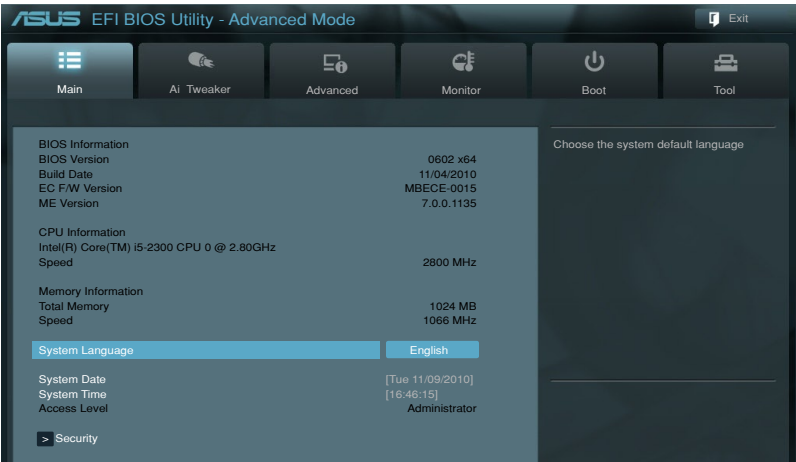
Configuration fields

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.

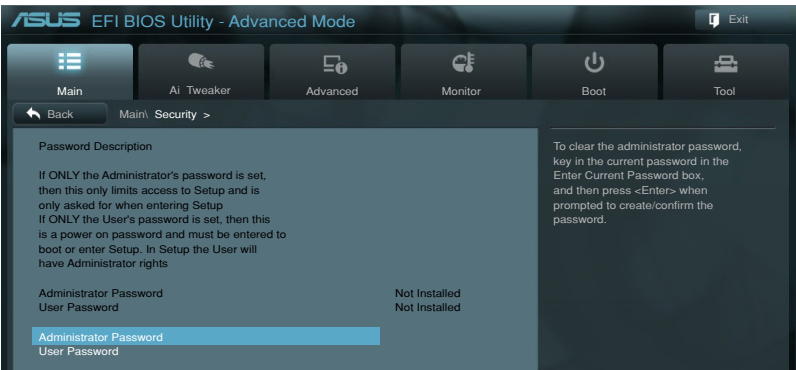
3.3 Main menu

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.



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 **2.2.7 Jumper** 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.



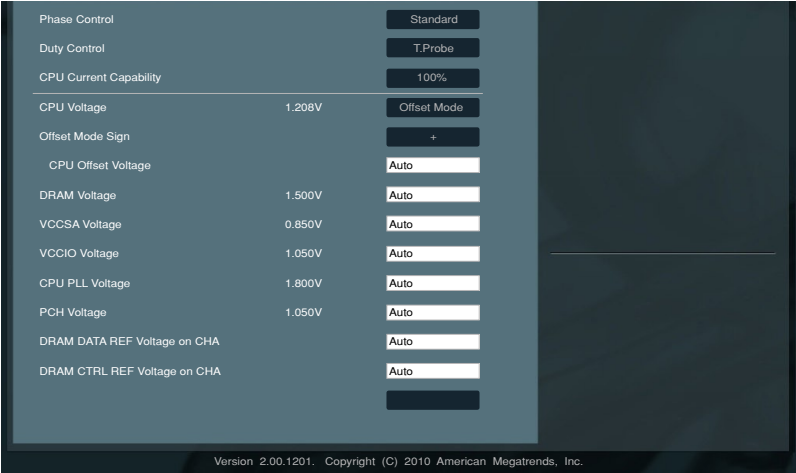
Be cautious when changing the settings of the Ai Tweaker menu items. Incorrect field values can cause the system to malfunction.



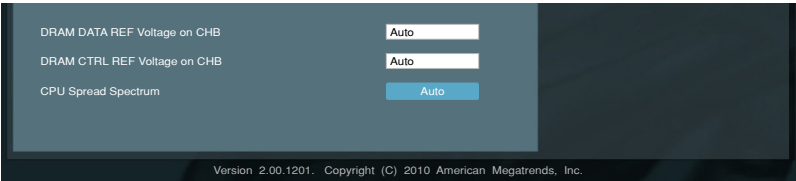
The configuration options for this section vary depending on the CPU and DIMM model you installed on the motherboard.



Scroll down to display the following items:



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.
- [Manual] Allows you to individually set overclocking parameters.

BCLK/PEG Frequency [XXX]

Allows you to adjust the CPU and VGA frequency to enhance the system performance. This item only appears when you set **Ai Overclock Tuner** to [Manual]. Use the <+> and <-> keys to adjust the value. You can also key in the desired value using the numeric keypad. The values range from 80.0MHz to 300.0MHz.

Turbo Ratio [Auto]

Allows you to manually adjust the Turbo CPU ratio.

- [Auto] All Turbo ratio are set by Intel CPU default settings
- [By All Cores (Can Adjust in OS)] All numbers of active cores will be set to one single Turbo ratio in OS
- [By Per Core (Cannot Adjust in BIOS)] All numbers of active cores can be set to an individual Turbo ratio in BIOS.

Memory Frequency [Auto]

Allows you to set the memory operating frequency. The configuration options vary with the **BCLK/PEG Frequency** item settings.



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

EPU Power Saving Mode [Disabled]

Allows you to enable or disable the EPU power saving function.

Configuration options: [Disabled] [Enabled]

EPU Setting [AUTO]

This item appears only when you set the **EPU Power Saving Mode** item to [Enabled.] and allows you to select the EPU power saving mode.

Configuration options: [AUTO] [Light Power Saving Mode] [Medium Power Saving Mode] [Max Power Saving Mode]

OC Tuner

OC Tuner automatically overclocks the frequency and voltage of CPU and DRAM for enhancing the system 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.

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.

Additional Turbo Voltage [Auto]

Use the <+> and <-> keys to adjust the value.

Primary Plane Current Limit [Auto]

Use the <+> and <-> keys to adjust the value.

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. From the Regular to Extreme mode allows you to adjust the voltage range from 0% to 100% to boost the system performance. Configuration options: [Auto] [Regular] [Medium] [High] [Ultra High] [Extreme]



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

VRM Frequency [Auto]

Switching frequency will affect the VRM transient response and component thermal. Setting a higher frequency gets faster transient response.

[Auto] Allows you to enable or disable the Spread Spectrum item.

[Manual] Allows you to manually set the frequency with a 10KHz interval.

VRM Spread Spectrum [Disabled]

This item appears only when you set the **VRM Frequency** item to [Auto] and allows you to enable the spread spectrum to enhance system stability.

VRM Fixed Frequency Mode [xxx]

This item appears only when you set the **VRM Frequency** item to [Manual] and allows you to set a fixed VRM frequency. Use the <+> and <-> keys to adjust the value. The values range from 300KHz to 500KHz with a 10KHz interval.

Phase Control [Standard]

Phase number is the number of working VRM phase. Increasing phase number under heavy system loading to get more transient and better thermal performance. Reducing phase number under light system loading to increase VRM efficiency

[Standard] Proceeds phase control depending on the CPU loading.

[Optimized] Loads the ASUS optimized phase tuning profile.

[Extreme] Proceeds the full phase mode.

[Manual Adjustment] Allows manual adjustment.

Manual Adjustment [Medium]

This item appears only when you set the **Phase Control** item to [Manual Adjustment]. Configuration options: [Ultra Fast] [Fast] [Medium] [Regular]

Duty Control [T.Probe]

[T.Probe] Maintains the VRM thermal balance.

[Extreme] Maintains the VRM current balance.

CPU Current Capability [100%]

This item provides wider total power range for overclocking. A higher value brings a wider total power range and extends the overclocking frequency range simultaneously. Configuration options: [100%] [110%] [120%] [130%] [140%]



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 Voltage [Offset Mode]

[Manual Mode] Allows you to set a fixed CPU voltage.

[Offset Mode] Allows you to set the Offset voltage.

Offset Mode Sign [+]

This item appears only when you set the **CPU Voltage** item to [Offset Mode].

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

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

CPU Offset Voltage [Auto]

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

CPU Manual Voltage [Auto]

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



Refer to the CPU documentation before setting the CPU voltage. Setting a high voltage may damage the CPU permanently, and setting a low voltage may make the system unstable.

DRAM Voltage [Auto]

Allows you to set the DRAM voltage. The values range from 1.20V to 2.20V with a 0.00625V interval.



According to Intel CPU spec, DIMMs with voltage requirement over 1.65V may damage the CPU permanently. We recommend you install the DIMMs with the voltage requirement below 1.65V.

VCCSA Voltage [Auto]

Allows you to set the VCCSA voltage. The values range from 0.80V to 1.70V with a 0.00625V interval.

VCCIO Voltage [Auto]

Allows you to set the VCCIO voltage. The values range from 0.80V to 1.70V with a 0.00625V interval.

CPU PLL Voltage [Auto]

Allows you to set the CPU PLL voltage. The values range from 1.20V to 2.20V with a 0.00625V interval.

PCH Voltage [Auto]

Allows you to set the Platform Controller Hub voltage. The values range from 0.80V to 1.70V with a 0.01V interval.



- The values of the **CPU Manual Voltage**, **CPU Offset Voltage**, **DRAM Voltage**, **VCCSA Voltage**, **VCCIO Voltage**, **CPU PLL Voltage**, and **PCH Voltage** items are labelled in different color, indicating the risk levels of high voltage settings.
- The system may need better cooling system to work stably under high voltage settings.

DRAM DATA REF Voltage on CHA/B [Auto]

Allows you to set the DRAM DATA Reference Voltage on Channel A/B. The values range from 0.395x to 0.630x with a 0.005x interval. Different ratio might enhance DRAM overclocking ability.

DRAM CTRL REF Voltage on CHA/B [Auto]

Allows you to set the DRAM Control Reference Voltage on Channel A/B. The values range from 0.395x to 0.630x with a 0.005x interval. Different ratio might enhance DRAM overclocking ability.

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.



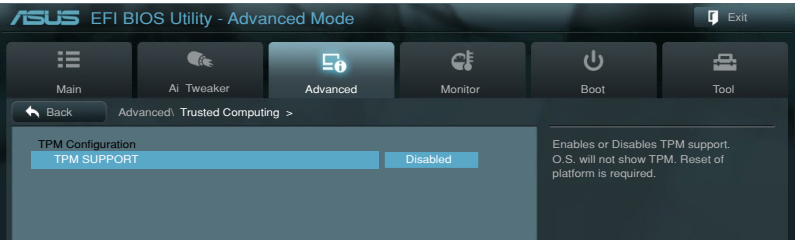
Be cautious when changing the settings of the Advanced menu items. Incorrect field values can cause the system to malfunction.



3.5.1 Trusted Computing

TPM SUPPORT [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

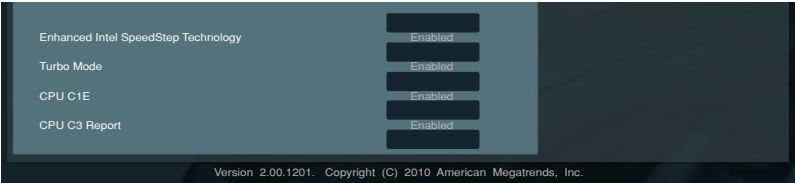
The items in this menu show the CPU-related information that the BIOS automatically detects.



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



Scroll down to display the following items:



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.

Intel Adaptive Thermal Monitor [Enabled]

- [Enabled] Enables the overheated CPU to throttle its clock speed to cool down.
- [Disabled] Disables the CPU thermal monitor function.

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.

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]

This item appears only when you set the **Enhanced Intel SpeedStep Technology** item to [Enabled] and allows you to enable or disable the Intel® Turbo Mode Technology.

[Disabled] Disables this function.

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

CPU C1E [Enabled]

[Disabled] Disables this function.

[Enabled] Enables the C1E support function. This item should be enabled in order to enable the Enhanced Halt State.

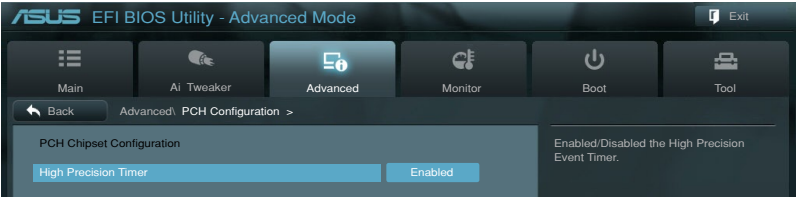
CPU C3 Report [Enabled]

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

CPU C6 Report [Enabled]

Allows you to disable or enable the CPU C6 report to OS.

3.5.3 PCH Configuration

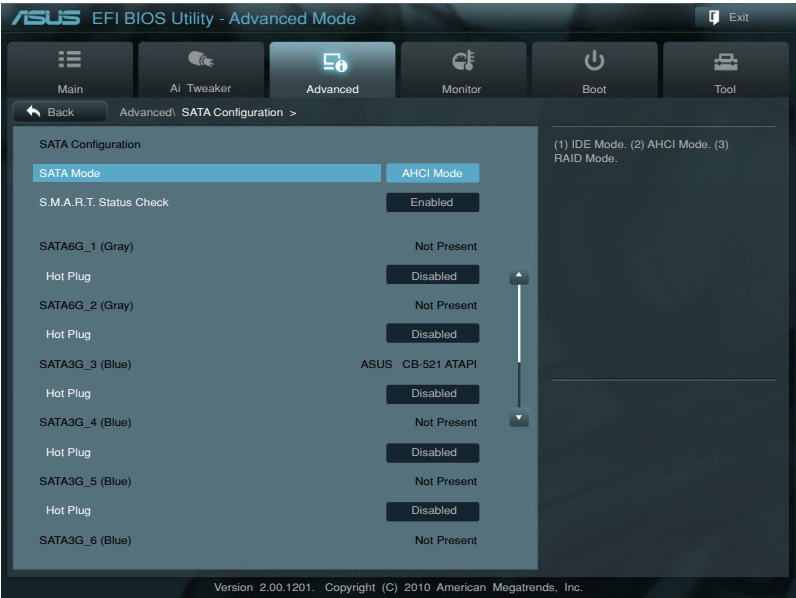


High Precision Timer [Enabled]

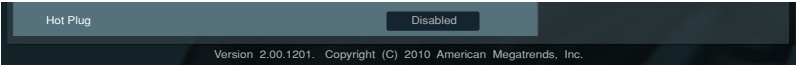
Allows you to enable or disable the High Precision Event Timer.
Configuration options: [Enabled] [Disabled]

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 [AHCI Mode]

Allows you to set the SATA configuration.

- [Disabled] Disables the SATA function.
- [IDE Mode] Set to [IDE Mode] when you want to use the Serial ATA hard disk drives as Parallel ATA physical storage devices.
- [AHCI Mode] Set to [AHCI Mode] 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 Mode] Set to [RAID Mode] when you want to create a RAID configuration from the SATA hard disk drives.

Serial-ATA Controller 0 [Enhanced]

This item appear only when you set **SATA Mode** to [IDE Mode]

- [Disabled] Disables the SATA function.
- [Enhanced] Set to [Enhanced] to support more than four SATA devices.
- [Compatible] Set to [Compatible] when using Windows 98/NT/2000/MS-DOS. Up to four SATA devices are supported under these operating systems.

Serial-ATA Controller 1 [Enhanced]

This item appear only when you set **SATA Mode** to [IDE Mode]

- [Disabled] Disables the SATA function.
- [Enhanced] Set to [Enhanced] to support more than four SATA devices.
- [Compatible] Set to [Compatible] when using Windows 98/NT/2000/MS-DOS. Up to four SATA devices are supported under these operating systems.

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]

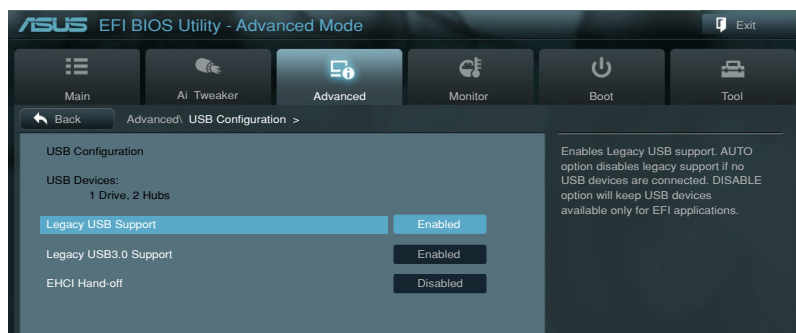
Hot Plug [Enabled]

Allows you to enable or disable the hot plug support of the SATA ports.

Configuration options: [Disabled] [Enabled]

3.5.5 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.

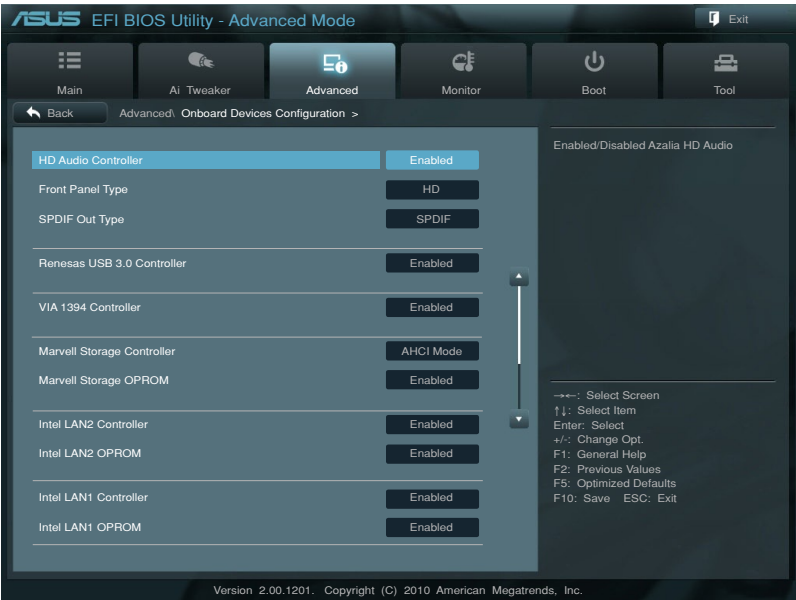
Legacy USB3.0 Support [Enabled]

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

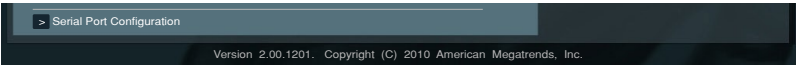
EHCI Hand-off [Disabled]

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

3.5.6 Onboard Devices Configuration



Scroll down for more items.



HD Audio Controller [Enabled]

[Enabled] Enables the High Definition Audio Controller.

[Disabled] Disables the 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.

SPDIF Out Type [SPDIF]

[SPDIF] Sets to [SPDIF] for SPDIF audio output.

[HDMI] Sets to [HDMI] for HDMI audio output.

Renesas USB 3.0 Controller [Enabled]

[Enabled] Enables the USB 3.0 controller.

[Disabled] Disables the controller.

VIA 1394 Controller [Enabled]

[Enabled] Enables the onboard IEEE 1394a controller.

[Disabled] Disables the controller.

Marvell Storage Controller [Enabled]

Allows you to select the Marvell storage controller operating mode.

[Disabled] Disables the controller.

[Enabled] Enables the controller.

Marvell Storage OPROM [Enabled]

This item appears only when you set the previous item to [Enabled] and allows you to enable or disable the OptionRom of the Marvell storage controller.

Configuration options: [Enabled] [Disabled]

Intel LAN2 Controller [Enabled]

[Enabled] Enables the Intel LAN2 controller.

[Disabled] Disables the 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]

Intel LAN1 Controller [Enabled]

[Enabled] Enables the GbE controller.

[Disabled] Disables the 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]

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).

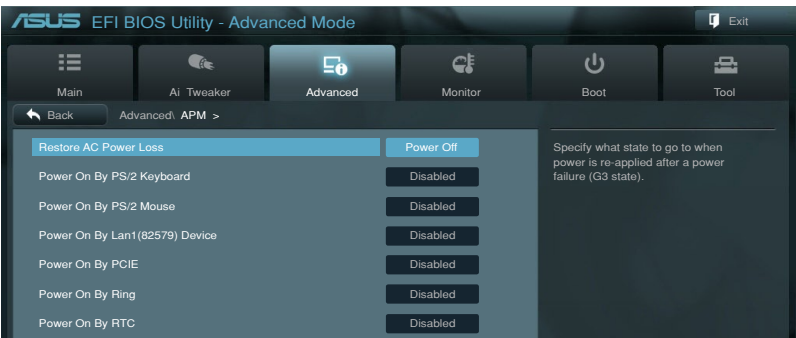
Configuration options: [Enabled] [Disabled]

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

Allows you to select the Serial Port base address.

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

3.5.7 APM



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

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

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

Power On By 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 Lan1(82579) Device [Disabled]

[Disabled] Disables the PME to wake up from S5 by PCI devices.

[Enabled] Allows you to turn on the system through a PCI LAN or modem card. This feature requires an ATX power supply that provides at least 1A on the +5VSB lead.

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.

3.6 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 20°C to 75°C.

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 0°C to 75°C.

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

Use the <+> and <-> keys to adjust the minimum CPU fan duty cycle. The values range from 0% to 100%. When the CPU temperature is under 40°C, 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 40°C to 90°C.

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 40°C, 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.

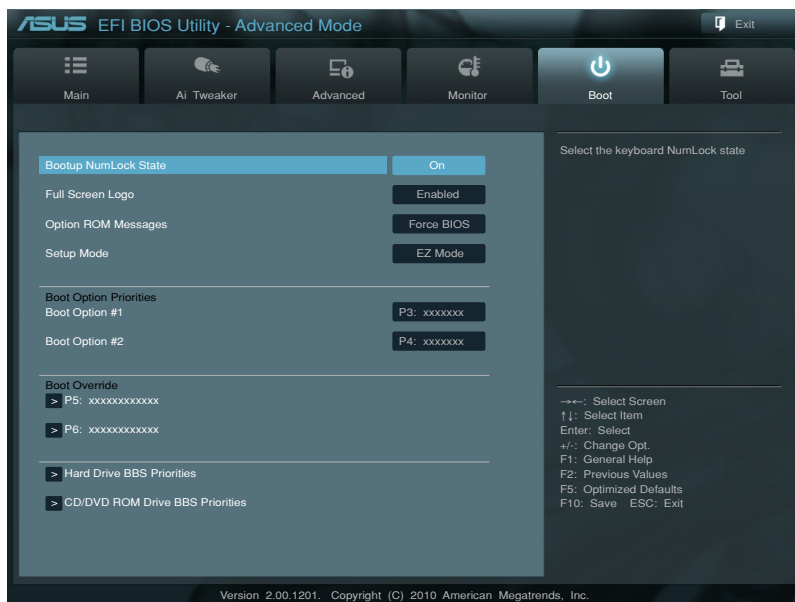
Anti Surge Support [Enabled]

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.



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]

[Enabled] Enables the full screen logo display feature.

[Disabled] Disables the full screen logo display feature.



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

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.

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.



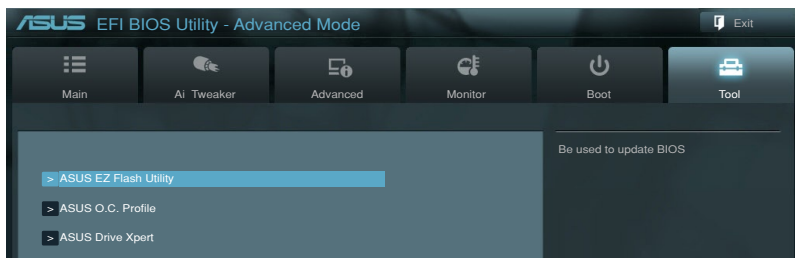
- To select the boot device during system startup, press <F8> when ASUS Logo appears.
- To access Windows OS in Safe Mode, do any of the following:
 - Press <F5> when ASUS Logo appears.
 - Press <F8> after POST.

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 Tool menu

The Tool 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 Utility

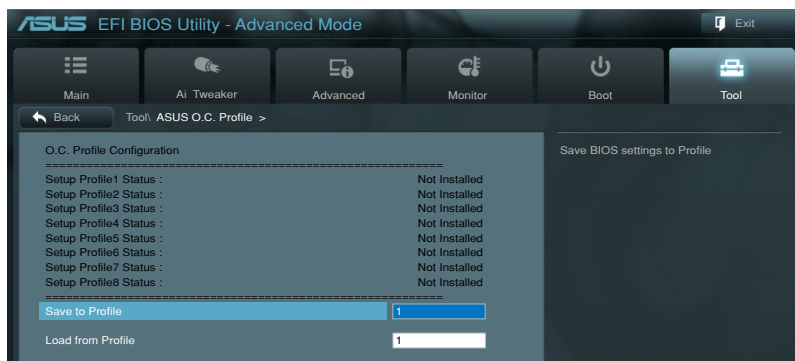
Allows you to run ASUS EZ Flash Utility. When you press <Enter> to start the application.



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

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**.

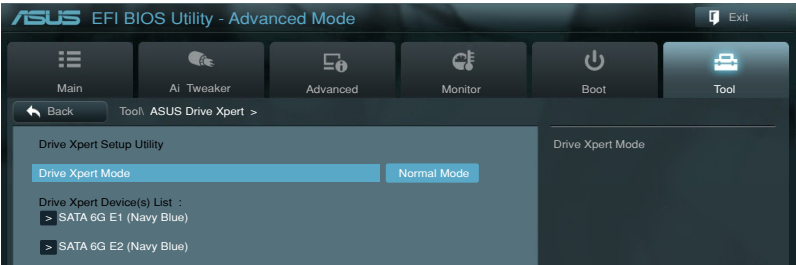
Load from Profile

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 Drive Xpert



- Before using the Drive Xpert function, ensure that you have connected the SATA signal cables and installed SATA hard disk drives to the **SATA6G_E1** and **SATA6G_E2** connectors.
- You can only make one Drive Xpert change a time before you save BIOS settings and restart the computer.

Drive Xpert Mode

[Normal Mode] Allows you to use the SATA6G_E1 and SATA6G_E2 connectors as normal SATA connectors.

[Super Speed] Allows you to use the **Super Speed** function that combines two hard drives as one single drive partition.

[EZ Backup] Allows you to use the **EZ Backup** function that copies and maintains an identical image of data from the SATA6G_E1 drive to the SATA6G_E2 drive.



When using only one hard disk in **Normal Mode**, connect the hard disk to the SATA6G_E1 connector on the motherboard.



- All original data of the two hard drives will be erased for Super Speed setup.
- All original data of the SATA6G_E2 hard disk will be erased for EZ Backup setup.

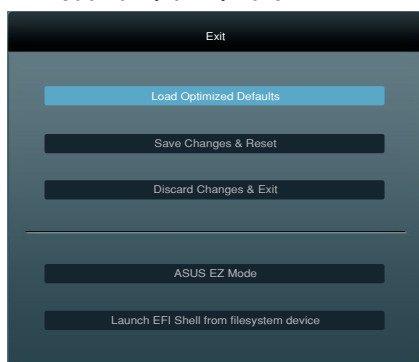
Drive Xpert Device(s) List:

SATA 6G E1 (Navy Blue) / SATA 6G E2 (Navy Blue)

Press <Enter> to display the information of the hard disks which are connected to the SATA6G_E1 and SATA6G_E2 connectors on the motherboard.

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.

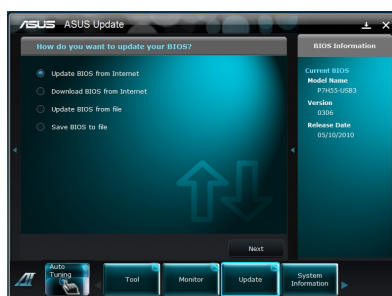


Quit all Windows® applications before you update the BIOS using this utility.

Updating the BIOS through the Internet

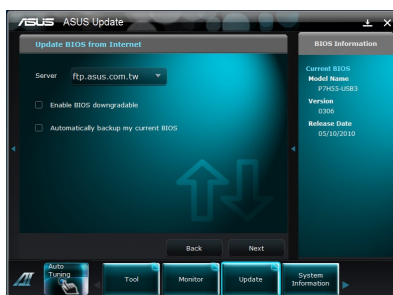
To update the BIOS through the Internet:

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.

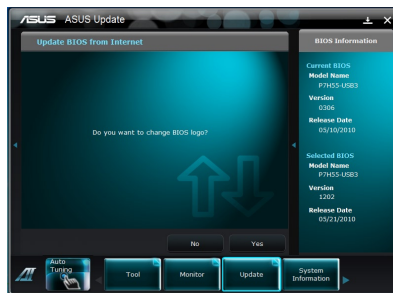
If you want to enable the BIOS downgradable function and auto BIOS backup function, check the checkboxes before the two items on the screen.



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



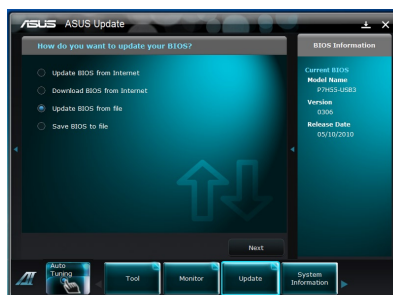
4. You can decide whether to change the BIOS boot logo, which is the image appearing on screen during the Power-On Self-Tests (POST). Click **Yes** if you want to change the boot logo or **No** to continue.
5. Follow the onscreen instructions to complete the update process.



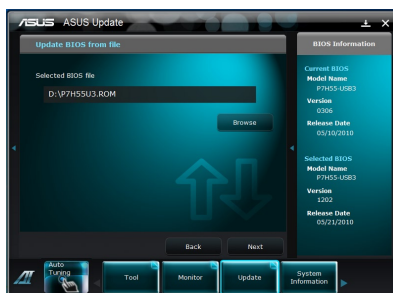
Updating the BIOS through a BIOS file

To update the BIOS through a BIOS file:

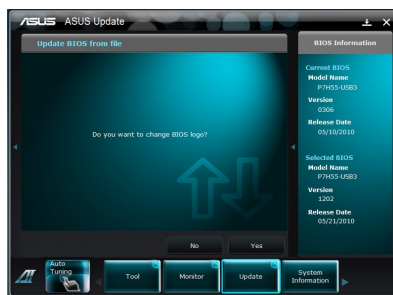
1. From the ASUS Update screen, select **Update BIOS from file**, and then click **Next**.



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 Utility

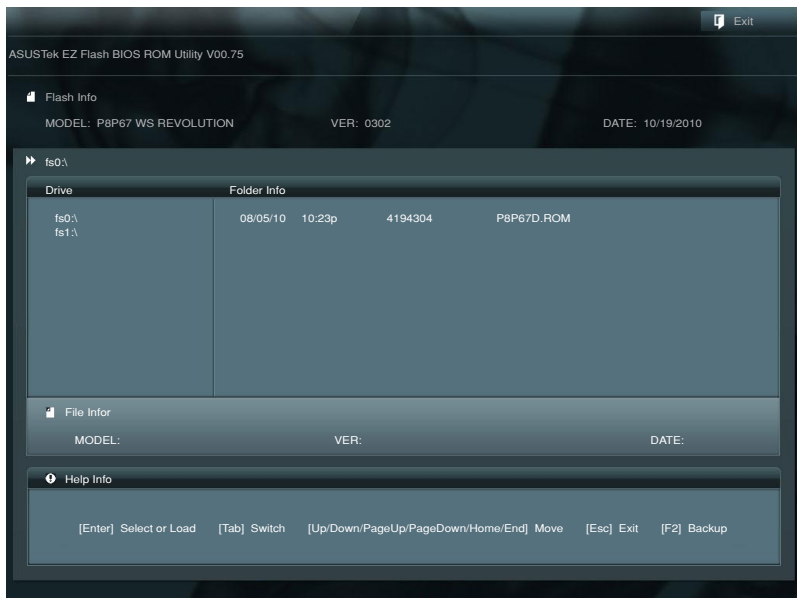
The ASUS EZ Flash Utility feature allows you to update the BIOS without having to use a bootable floppy disk or an OS-based utility.



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 Utility:

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 **3.10 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.

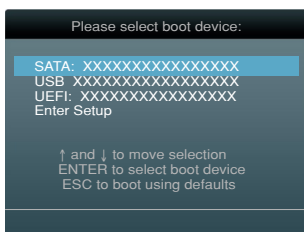


- NTFS is not supported under DOS environment. Do not save the BIOS file and BIOS Updater to a hard disk drive or USB flash drive in NTFS format.
- Do not save the BIOS file to a floppy disk due to low disk capacity.

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.

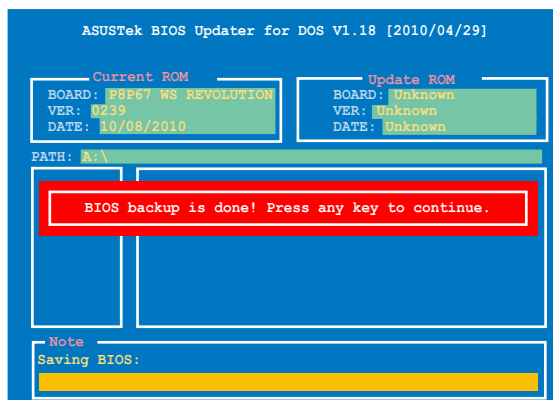
1. At the FreeDOS prompt, type **bupdater /o[filename]** and press <Enter>.

```
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 /pc /g` and press <Enter>.

```
D:\>bupdater /pc /g
```

2. The BIOS Updater screen appears as below.

ASUSTek BIOS Updater for DOS V1.18 [2010/04/29]

Current ROM	Update ROM
BOARD: P8P67 DELUXE	BOARD: Unknown
VER: 0204	VER: Unknown
DATE: 08/05/2010	DATE: Unknown

PATH: A:\

A:	File Name	Size	Date	Time
	P8P67D.ROM	4194304	2010-08-05	17:30:48

Note

[Enter] Select or Load [Tab] Switch [V] Drive Info
[Up/Down/Home/End] Move [B] Backup [Esc] Exit

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.

Are you sure to update BIOS?

Yes No

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 Chapter 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.

[illegible]

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

4 Software support

4.1	Installing an operating system	4-1
4.2	Support DVD information	4-1
4.3	Software information	4-3
4.4	RAID configurations	4-16
4.5	Creating a RAID driver disk.....	4-25

4.1 Installing an operating system

This motherboard supports Windows® XP/ 64-bit XP/ Vista / 64-bit Vista / 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.

The Drivers menu shows the available device drivers if the system detects installed devices. Install the necessary drivers to use the devices.

The Utilities menu shows the applications and other software that the motherboard supports.

Click an item to install

The Make Disk menu contains items to create the RAID/AHCI driver disk.

The Manual menu contains the list of supplementary user manuals. Click an item to open the folder of the user manual.

Click the Contact tab to display the ASUS contact information. Click an icon to display DVD/ motherboard information



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.

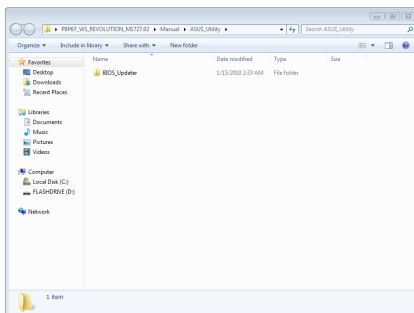


The software manual files are in Portable Document Format (PDF). Install the Adobe® Acrobat® Reader from the Utilities menu before opening the files.

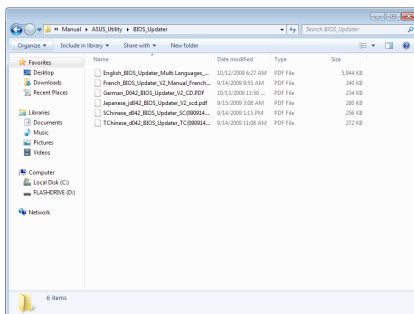
1. Click the **Manual** tab. Click **ASUS Motherboard Utility Guide** from the manual list on the left.



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 Software information

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

4.3.1 AI Suite II

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

Installing AI Suite II

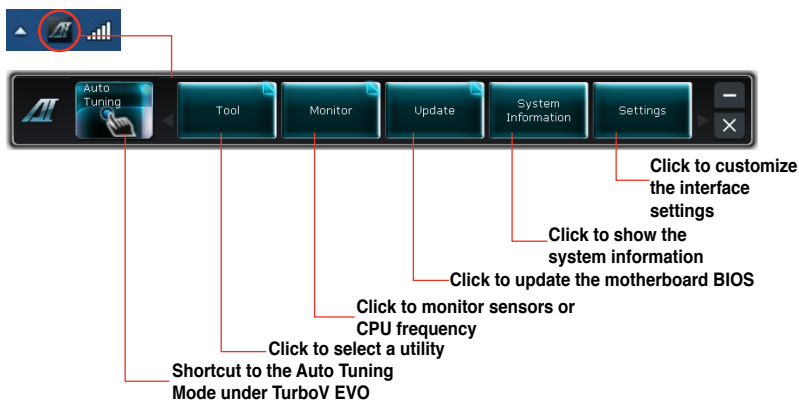
To install AI Suite II on your computer

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

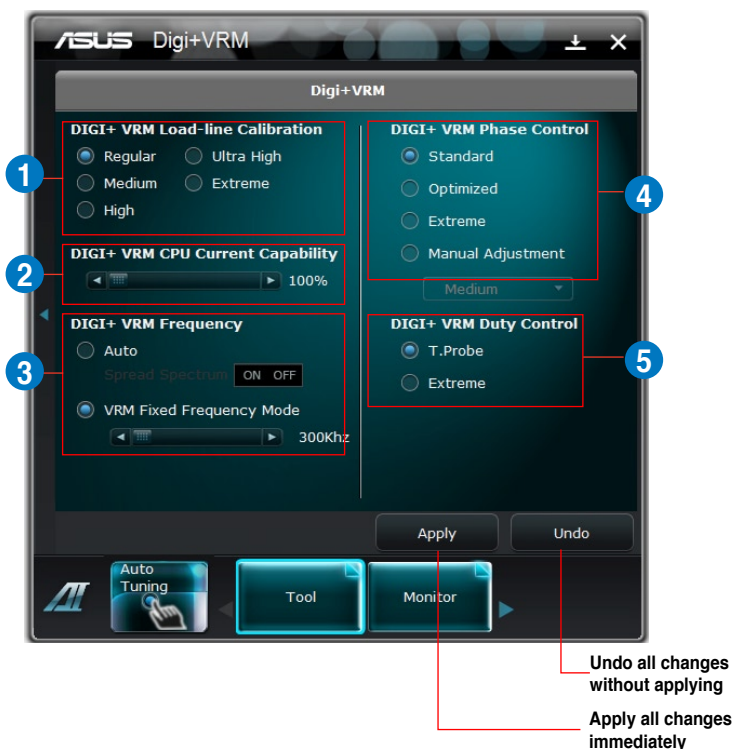


- The **Auto Tuning** button appears only on models with the TurboV EVO function.
- The applications in the Tool menu vary with models.
- The screenshots of AI Suite II in this user manual are for reference only. The actual screenshots vary with models.
- Refer to the software manual in the support DVD or visit the ASUS website at www.asus.com for detailed software configuration.

4.3.2 DIGI+ VRM

ASUS DIGI+ VRM allows you to adjust VRM voltage and frequency modulation to enhance reliability and stability. It also provides the highest power efficiency, generating less heat to longer component lifespan and minimize power loss.

After installing AI Suite II from the motherboard support DVD, launch DIGI+ VRM by clicking **Tool > DIGI+ VRM** on the AI Suite II main menu bar.



No.	Function description
1	DIGI+ VRM Load-line Calibration Higher load-line calibration could get higher voltage and good overclocking performance but increase the CPU and VRM thermal.
2	DIGI+ VRM CPU Current Capability DIGI+ VRM CPU Current Capability provides wider total power range for overclocking. A higher value setting gets higher VRM power consumption delivery.
3	DIGI+ VRM Frequency Switching frequency will affect the VRM transient response and component thermal. Higher frequency gets quicker transient response.
4	DIGI+ VRM Phase Control Increase phase number under heavy system loading to get more transient and better thermal performance. Reduce phase number under light system loading to increase VRM efficiency.
5	DIGI+ VRM Duty Control DIGI+ VRM Duty Control adjusts the current of every VRM phase and the thermal of every phase component.



- The actual performance boost may vary depending on your CPU specification.
- Do not remove the thermal module. The thermal conditions should be monitored.



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 TurboV EVO

ASUS TurboV EVO introduces **TurboV** that allows you to manually adjust the CPU frequency and related voltages as well as **Auto Tuning** function that offers automatic and easy overclocking and system level up. After installing AI Suite II from the motherboard support DVD, launch TurboV EVO by clicking **Tool > TurboV EVO** on the AI Suite II main menu bar.



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

TurboV

TurboV allows you to overclock the BCLK frequency, CPU voltage, IMC voltage, and DRAM Bus voltage in Windows® environment and takes effect in real-time without exiting and rebooting the OS.



Refer to the CPU documentation before adjusting CPU voltage settings. Setting a high voltage may damage the CPU permanently, and setting a low voltage may make the system unstable.



For system stability, all changes made in **TurboV** will not be saved to BIOS settings and will not be kept on the next system boot. Use the **Save Profile** function to save your customized overclocking settings and manually load the profile after Windows starts.

Auto Tuning Mode

TurboV Load profile Target values

Current values

Click to show / hide more settings

Click to restore all start-up settings

Save the current settings as a new profile

Voltage Adjustment bars

Undoes all changes without applying

Applies all changes immediately



For advanced overclock ability, adjust first the BIOS items, and then proceed more detailed adjustments in **More Settings**.

Using Advanced Mode

Click **More Settings**, and then click the **Advanced Mode** tab to adjust the advanced voltage settings.



CPU Ratio

Allows you to manually adjust the CPU ratio.



The first time you use **CPU Ratio**, go to **AI Tweaker > CPU Power Management** in BIOS and set the **Turbo Ratio** item to **[Maximum Turbo Ratio setting in OS]**, or activate CPU Ratio by clicking the ON button on the CPU Ratio function screen.

1. Click **More Settings**, and then click the **CPU Ratio** tab.
2. Click the ON button to activate CPU Ratio.
3. You will requested to restart the system. Click **Yes** to make the change take effect.



4. Drag the adjustment bar upwards or downwards to the desired value.



- Set the **CPU Ratio Setting** item in BIOS to [Auto] before using the CPU Ratio function in TurboV. Refer to Chapter 3 of your motherboard user manual for details.
- The CPU Ratio bars show the status of the CPU cores, which vary with your CPU model.

Auto Tuning

ASUS TurboV EVO includes two auto tuning modes, providing the most flexible auto-tuning options.



- The overclocking result varies with the CPU model and the system configuration.
- To prevent overheating from damaging the motherboard, a better thermal environment is strongly recommended.

- **Fast Tuning:** fast CPU overclocking
- **Extreme Tuning:** extreme overclocking for CPU and memory

Using Fast Tuning

1. Click the **Auto Tuning** tab and then click **Fast**.
2. Read through the warning messages and click **OK** to start auto-overclocking.



3. TurboV automatically overlocks the CPU, saves BIOS settings and restarts the system. After re-entering Windows, a message appears indicating auto tuning success. Click **OK** to exit.

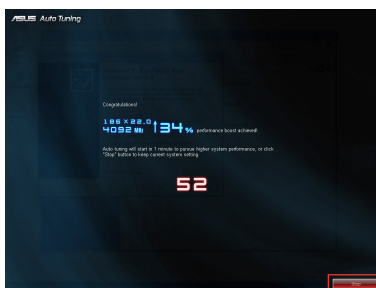


Using Extreme Tuning

1. Click the **Auto Tuning** tab and then click **Extreme**.
2. Read through the warning messages and click **OK** to start auto-overclocking.



3. TurboV automatically overlocks the CPU and memory and restarts the system. After re-entering Windows, a message appears indicating the current overlocking result. To keep the result, click **Stop**.



4. If you did not click **Stop** in the previous step, TurboV automatically starts further system overclocking and stability test. An animation appears indicating the overclocking process. Click **Stop** if you want to cancel the Overclocking process.



5. TurboV automatically adjusts and saves BIOS settings and restarts the system. After re-entering Windows, a message appears indicating auto tuning success. Click **OK** to exit.

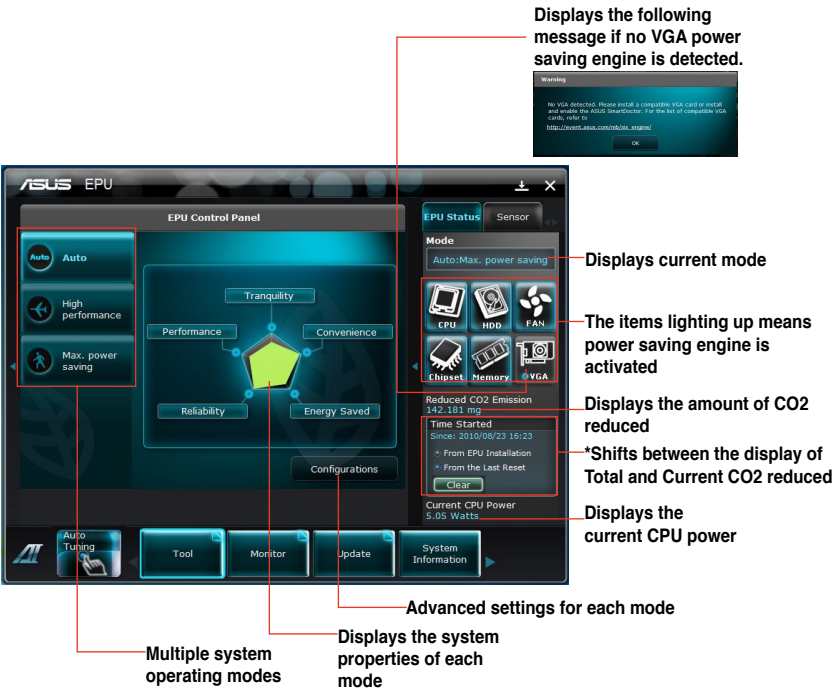


4.3.4 EPU

EPU is an energy-efficient tool that satisfies different computing needs. This utility provides several modes that you can select to save system power. Selecting Auto mode will have the system shift modes automatically according to current system status. You can also customize each mode by configuring settings like CPU frequency, GPU frequency, vCore Voltage, and Fan Control.

Launching EPU

After installing AI Suite II from the motherboard support DVD, launch EPU by clicking **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.

4.3.5 FAN Xpert

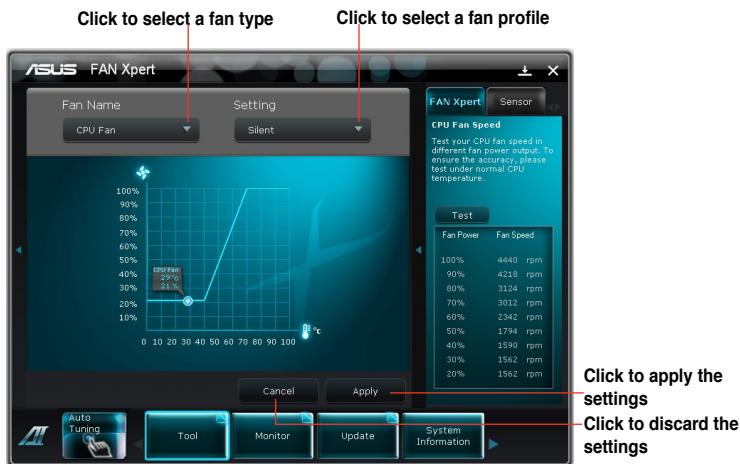
Fan Xpert intelligently allows you to adjust both the CPU and chassis fan speeds according to different ambient temperatures caused by different climate conditions in different geographic regions and your PC's system loading. The built-in variety of useful profiles offer flexible controls of fan speed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

4.3.6 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

After installing AI Suite II from the motherboard support DVD, launch Probe II by clicking **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.

The screenshot shows the ASUS Probe II application window. It has a top menu bar with 'Voltage', 'Temperature', 'Fan Speed', 'Preference', and 'Alert Log'. Below this is a table with columns 'Alert', 'Sensor', 'Current', and 'Threshold'. The 'Voltage' tab is active, showing settings for Vcore, +3.3V, +5V, and +12V. Each row has a checkbox in the 'Alert' column and a slider in the 'Threshold' column. At the bottom of the window are buttons for 'Save', 'Load', 'Default', and 'Apply'. Below the window, four red lines point to these buttons with the following text: 'Saves your configuration' (pointing to Save), 'Loads your saved configuration' (pointing to Load), 'Loads the default threshold values for each sensor' (pointing to Default), and 'Applies your changes' (pointing to Apply). On the right side of the window, there is a 'Sensor' panel showing real-time values for Vcore, +3.3V, +5V, +12V, CPU temperature, MB temperature, CPU fan speed, Chassis1 fan speed, and Power fan speed.

Alert	Sensor	Current	Threshold
<input checked="" type="checkbox"/>	Vcore	0.840 V	2.400
<input checked="" type="checkbox"/>	+3.3V	3.184 V	4.290
<input checked="" type="checkbox"/>	+5V	4.944 V	6.500
<input checked="" type="checkbox"/>	+12V	12.096 V	17.400

Buttons: Save, Load, Default, Apply

Annotations:

- Saves your configuration (Save)
- Loads your saved configuration (Load)
- Loads the default threshold values for each sensor (Default)
- Applies your changes (Apply)



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

4.3.7 Audio configurations

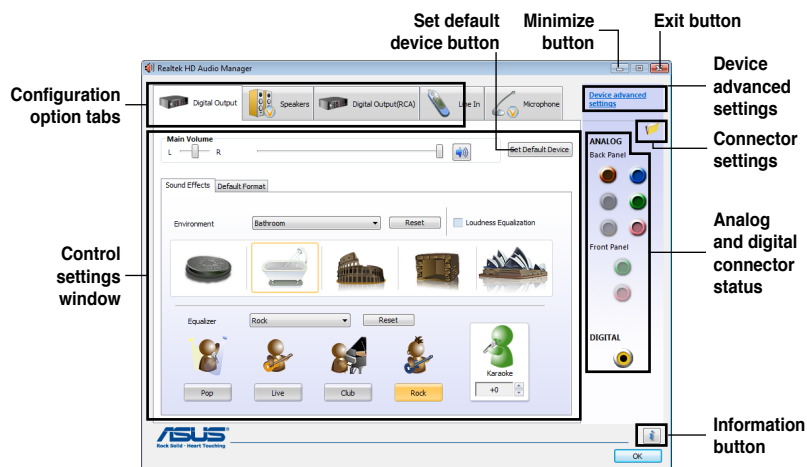
The Realtek® audio CODEC provides 8-channel audio capability to deliver the ultimate audio experience on your computer. The software provides Jack-Detection function, S/PDIF Out support, and interrupt capability. The CODEC also includes the Realtek® proprietary UAJ® (Universal Audio Jack) technology 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.



A. Realtek HD Audio Manager for Windows® Vista™



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.

4.4 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.

4.4.1 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.

4.4.2 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.

4.4.3 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.

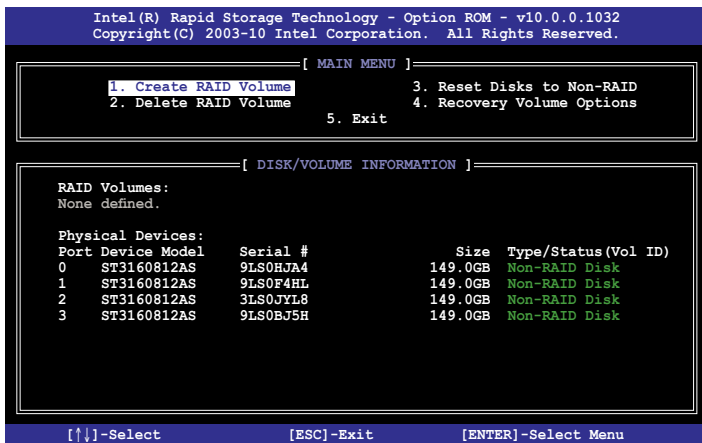


Due to chipset limitation, when set any of SATA ports to RAID mode, all SATA ports run at RAID mode together.

4.4.4 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.



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:

```
Intel(R) Rapid Storage Technology - Option ROM - v10.0.0.1032
Copyright(C) 2003-10 Intel Corporation. All Rights Reserved.

[ CREATE VOLUME MENU ]

Name: Volume0
RAID Level: RAID0 (Stripe)
Disks: Select Disks
Strip Size: 128KB
Capacity: 0.0 GB
Sync: N/A
Create Volume

[ HELP ]

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

[ F4 ]-Change [ TAB ]-Next [ ESC ]-Previous Menu [ ENTER ]-Select
```

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

```
[ SELECT DISKS ]

Port Drive Model      Serial #      Size      Status
0  ST3160812AS        9LS0H5A4     149.0GB   Non-RAID Disk
1  ST3160812AS        9LS0F4HL     149.0GB   Non-RAID Disk
2  ST3160812AS        3LS0JYL8     149.0GB   Non-RAID Disk
3  ST3160812AS        9LS0BJ5H     149.0GB   Non-RAID Disk

Select 2 to 6 disks to use in creating the volume.

[ F4 ]-Prev/Next [ SPACE ]-SelectDisk [ ENTER ]-Done
```

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:

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

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

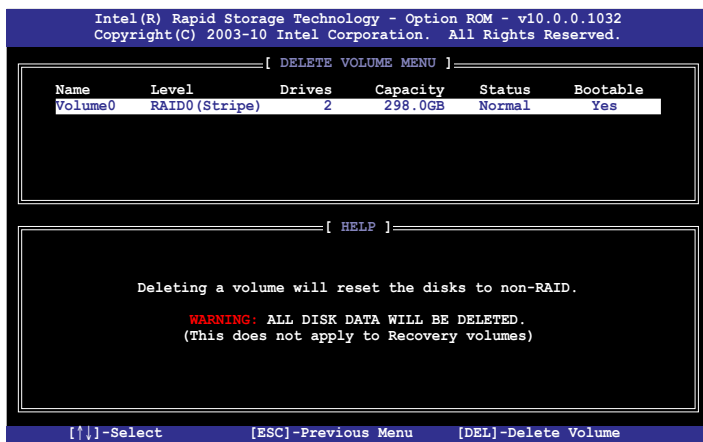
Deleting a RAID set



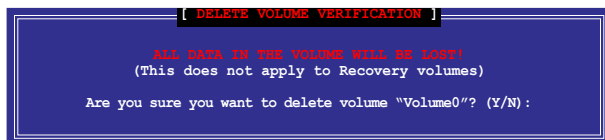
Take caution when deleting a RAID set. You will lose all data on the hard disk drives when you delete a RAID set.

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 . The following warning message appears:

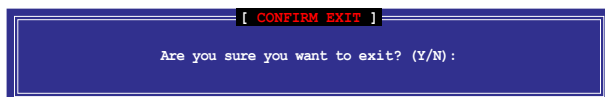


3. Press <Y> to delete the RAID set and return to the utility main menu, or press <N> to return to the **DELETE VOLUME** menu.

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.

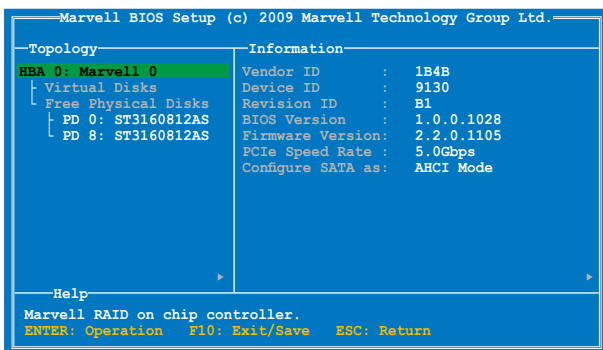
4.4.5 Marvell RAID utility

The onboard Marvell SATA 6.0 Gb/s controller allows you to create a RAID 0 or RAID 1 array using two SATA hard disk drives. Refer to Chapter 2 of your motherboard user manual for the exact location of the Marvell SATA 6.0 Gb/s connector.

To enter the Marvell utility, press **<Ctrl> + <M>** during POST.

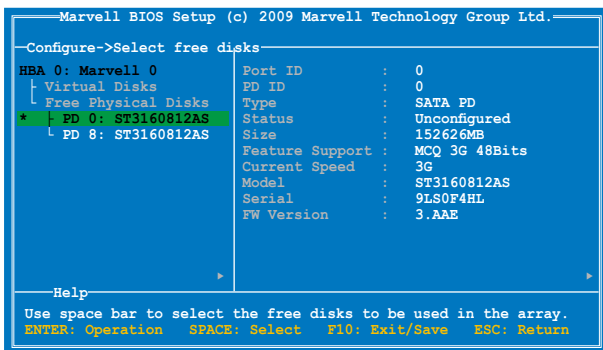


All existing data on the hard disk drives will be erased when creating or deleting a RAID array. Ensure that you have back up all your data in your hard disk drives before making any change to the drive status.

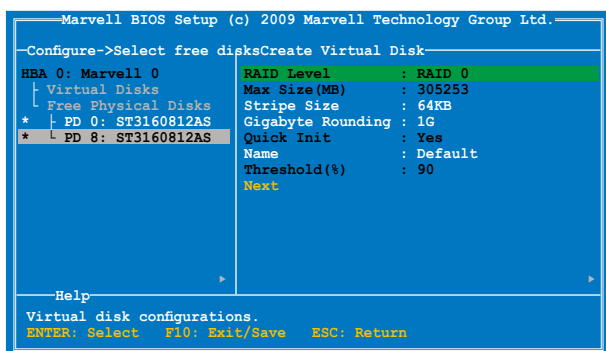


Create a RAID Array

1. Move the selection bar to **HBA 0: Marvell 0** and press **<Enter>**.
2. Select **Configuration Wizard** and press **<Enter>**.



3. Press **<Space>** to select the hard drives to be included in the RAID array. An asterisk (*) appears in front of the selected hard drive. After selecting all the drives needed for the RAID array, press **<Enter>** to continue.



4. Use the up or down arrow key to move the selection bar and press <Enter> to configure further RAID settings.

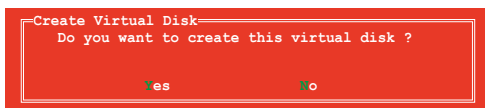
RAID Level: Select a RAID Level. Configuration options: [RAID 0] [RAID 1]

Stripe Size: Specifies the size of single data block on the virtual disk. In general, a larger stripe size is recommended for applications requiring large data transfers such as audio, video, and graphics. A smaller stripe size is better for applications with content in much smaller size, such as e-mails and documents.

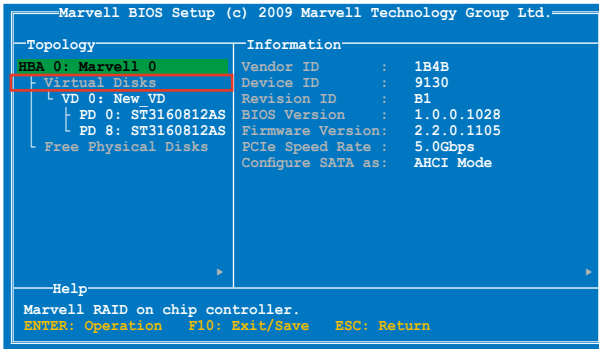
Configuration options: [32K] [64K]

Name: Enter a name with 1–10 letters (no special characters) for the RAID array.

5. Move the selection bar to **Next** and press <Enter>. The following warning message appears:



Press <Y> to create the RAID array, or press <N> to cancel. The new RAID array appears under Virtual Disks, as shown in the image below.



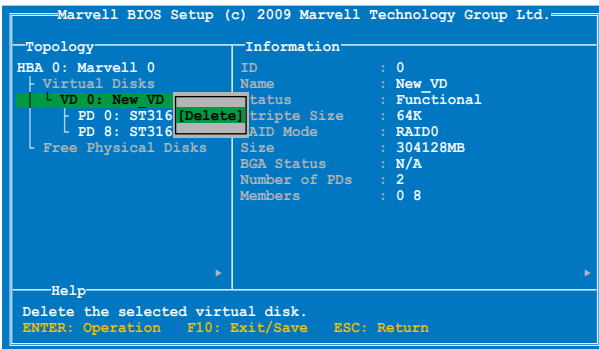
6. Press <F10>. The following warning message appears:



Press <Y> to save the RAID setting and exit the Marvell RAID utility.

Delete an existing RAID Array

1. Select the RAID array to delete and press <Enter>. Select **Delete** and press <Enter>.



2. The following warning message appears:



Press <Y> to delete the selected RAID array. The following warning message appears:



Press <Y> to delete the Master Boot Record (MBR) from the selected RAID array.

3. Press <F10>. The following warning message appears:



Press <Y> to save the RAID setting and exit the Marvell RAID utility.

4.5 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.**

4.5.1 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 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.

4.5.2 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.

4.5.3 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.

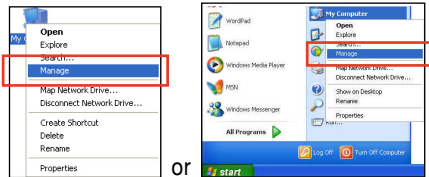
4.5.4 Using a USB floppy disk drive

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.

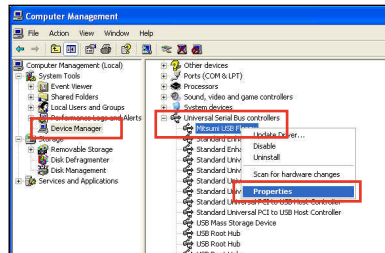
2. Right-click **My Computer** on the Windows® desktop or **start** menu, and then select **Manage** from the pop-up window.



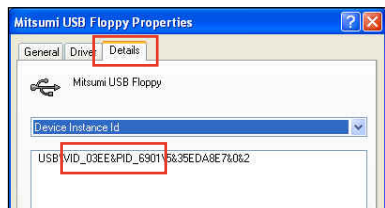
3. Select **Device Manager**. From the **Universal Serial Bus controllers**, right-click **xxxxxx USB Floppy**, and then select **Properties** from the pop-up window.



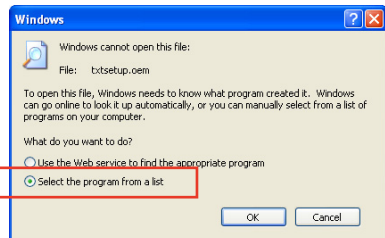
The name of the USB floppy disk drive varies with different vendors.



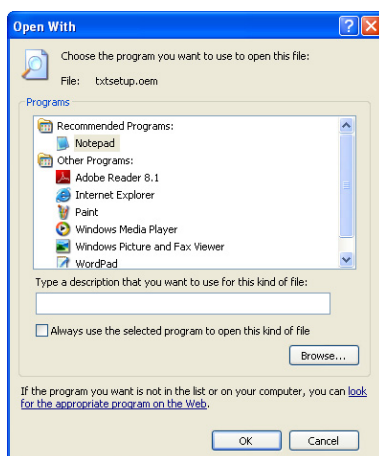
4. Click **Details** tab. The Vendor ID (VID) and Product ID (PID) are displayed.



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.

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

5 Multiple GPU technology support

5.1	ATI® CrossFireX™ technology	5-1
5.2	NVIDIA® SLI™ technology	5-5
5.3	NVIDIA® CUDA™ technology	5-11

5.1 ATI® CrossFireX™ technology

The motherboard supports the ATI® 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 CrossFireX mode, you should have two identical CrossFireX-ready graphics cards or one CrossFireX-ready dual-GPU graphics card that are ATI® certified.
- Ensure that your graphics card driver supports the ATI 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 page 2-43 for details.



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

5.1.2 Before you begin

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

To uninstall existing graphics card drivers

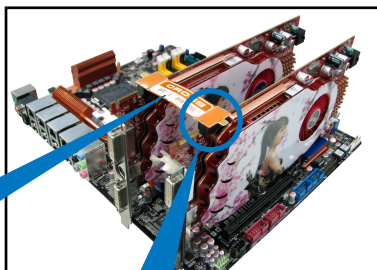
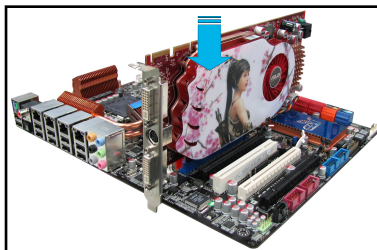
1. Close all current applications.
2. For Windows XP, go to **Control Panel > Add/Remove Programs**.
For Windows Vista, go to **Control Panel > Programs and Features**.
3. Select your current graphics card driver/s.
4. For Windows XP, select **Add/Remove**.
For Windows Vista, select **Uninstall**.
5.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

5.1.3 Installing CrossFireX graphics cards

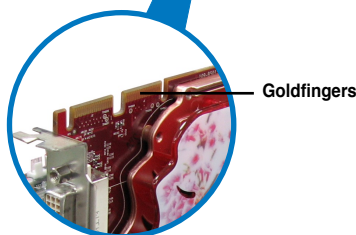


The following pictures are for reference only. The graphics cards and the motherboard layout may vary with models, but the installation steps remain the same.

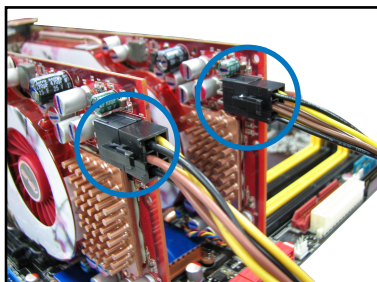
1. Prepare two CrossFireX-ready graphics cards.
2. Insert the two graphics card into the PCIEX16 slots. If your motherboard has more than two PCIEX16 slots, refer to Chapter 2 in this user manual for the locations of the PCIEX16 slots recommended for multi-graphics card installation.
3. Ensure that the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



CrossFireX bridge



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 ATI® CrossFireX™ technology. Download the latest driver from the AMD website at www.amd.com.

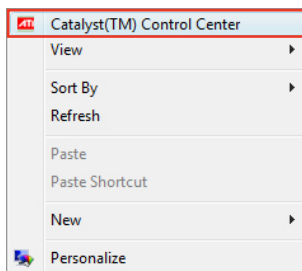
5.1.5 Enabling the ATI® CrossFireX™ technology

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

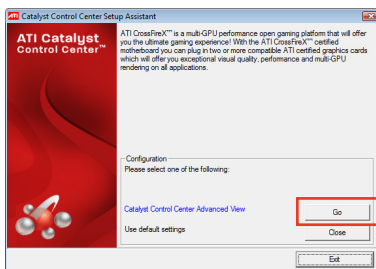
Launching the ATI Catalyst Control Center

To launch the ATI Catalyst Control Center

1. Right-click on the Windows® desktop and select **Catalyst(TM) Control Center**. You can also right-click the ATI icon in the Windows notification area and select **Catalyst Control Center**.

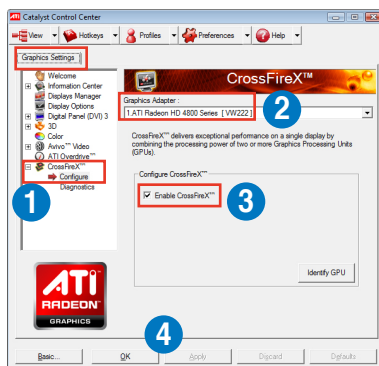


2. The **Catalyst Control Center Setup Assistant** appears when the system detects the existence of multi-graphics cards. Click **Go** to continue to the **Catalyst Control Center Advanced View** window.



Enabling Dual CrossFireX settings

1. In the Catalyst Control Center window, click **Graphics Settings > CrossFireX > Configure**.
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.



5.2 NVIDIA® SLI™ technology

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

5.2.1 Requirements

- In Dual SLI mode, you should have two identical SLI-ready graphics cards that are NVIDIA® certified.
- In Triple SLI mode, you should have three identical SLI-ready graphics cards that are NVIDIA® certified.
- Ensure that your graphics card driver supports the NVIDIA SLI technology. Download the latest driver from the NVIDIA website (www.nvidia.com).
- Ensure that your power supply unit (PSU) can provide at least the minimum power required by your system.



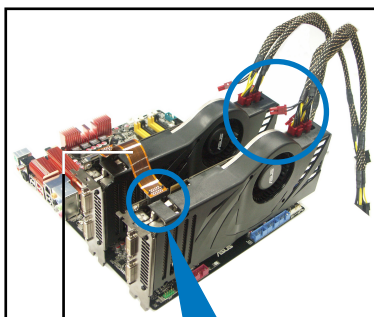
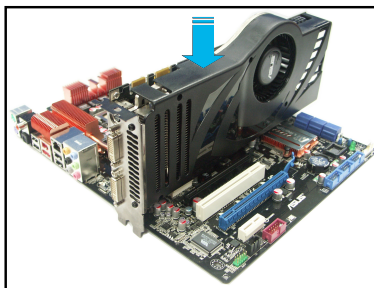
-
- We recommend that you install additional chassis fans for better thermal environment.
 - The NVIDIA Triple SLI technology is supported by Windows® Vista™ operating system only.
 - Visit the NVIDIA zone website at <http://www.nzone.com> for the latest certified graphics card and supported 3D application list.
-

5.2.2 Installing two SLI-ready graphics cards



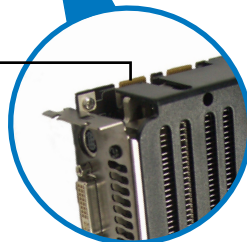
The following pictures are for reference only. The graphics cards and the motherboard layout may vary with models, but the installation steps remain the same.

1. Prepare two SLI-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 SLI 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.



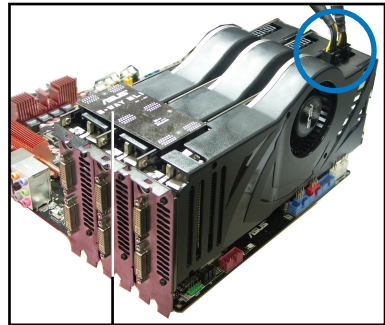
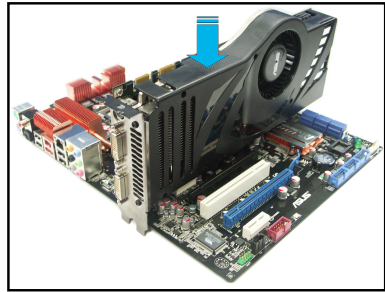
SLI bridge

Goldfingers



5.2.3 Installing three SLI-ready graphics cards

1. Prepare three SLI-ready graphics cards.
2. Insert the three 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 3-Way SLI bridge connector to the goldfingers on each graphics card. Ensure that the connector is firmly in place.
5. Connect three independent auxiliary power sources from the power supply to the three graphics cards separately.
6. Connect a VGA or a DVI cable to the graphics card.



3-Way SLI bridge

5.2.4 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 NVIDIA® SLI™ technology. Download the latest driver from the NVIDIA website at www.nvidia.com.
- If you are using a Triple SLI system, ensure to install the NVIDIA® 3-way SLI driver under Windows® Vista™. The NVIDIA 3-way SLI technology is supported by Windows® Vista™ only.

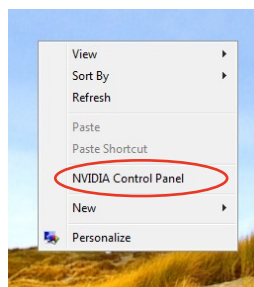
5.2.5 Enabling the NVIDIA® SLI™ technology

After installing your graphics cards and the device drivers, enable the SLI feature in NVIDIA® Control Panel under the Windows® Vista™ operating system.

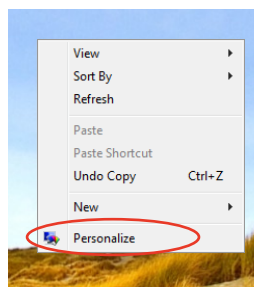
Launching the NVIDIA Control Panel

You can launch the NVIDIA Control Panel by the following two methods.

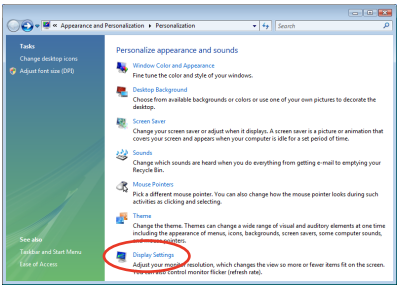
- A. Right click on the empty space of the Windows® desktop and select **NVIDIA Control Panel**.
The NVIDIA Control Panel window appears (See Step B5 on page 5-10).



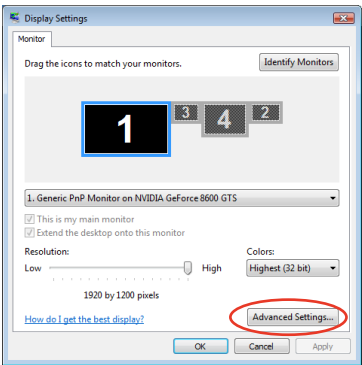
- B1. If you cannot see the NVIDIA Control Panel item in step (A), select **Personalize**.



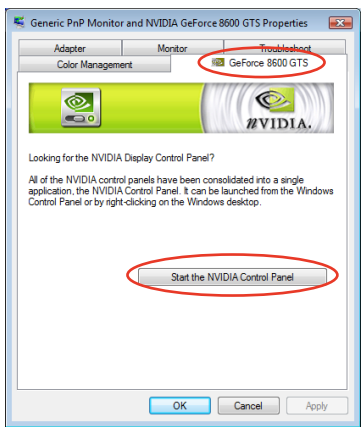
- B2. From the **Personalization** window, select **Display Settings**.



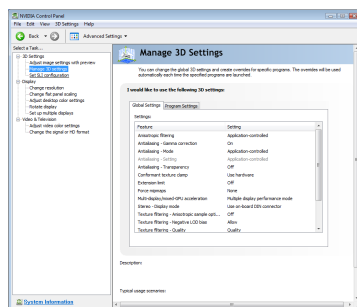
- B3. From the Display Settings dialog box, click **Advanced Settings**.



- B4. Select the **NVIDIA GeForce** tab, and then click **Start the NVIDIA Control Panel**.

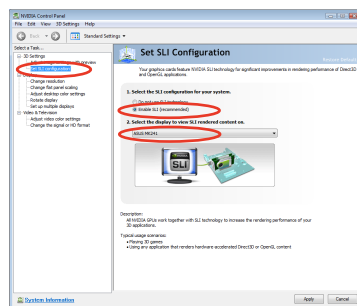


- B5. The NVIDIA Control Panel window appears.



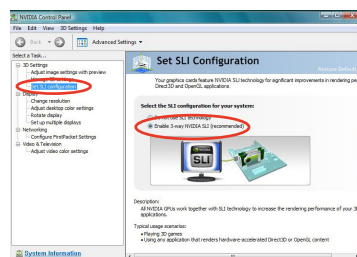
Enabling Dual SLI settings

From the NVIDIA Control Panel window, select **Set SLI Configuration**. Click **Enable SLI** and set the display for viewing SLI rendered content. When done, click **Apply**.

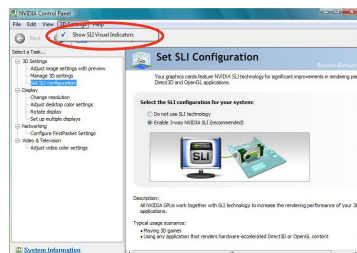


Enabling Triple SLI settings

- From the NVIDIA Control Panel window, select **Set SLI Configuration**, and then click **Enable 3-way NVIDIA SLI**. When done, click **Apply**.



- Select the **3D Settings** tab and enable the **Show SLI Visual Indicators** item. When this item is enabled, a green bar appears on the left side of the screen while 3D demonstrations are rendered, indicating the 3-way SLI status.



5.3 NVIDIA® CUDA™ technology

The motherboard supports the NVIDIA® CUDA™ technology and up to 4 NVIDIA® Tesla™ computing processor cards, providing the optimum multi purpose computing performance. Follow the installation procedures in this section.

5.3.1 Requirements

- 32/64-bit Microsoft® Windows XP/ Vista/ Linux RHEL5.X/ Open SuSE11.X OS
- The requirements of memory and power supply vary with the Tesla cards you installed.



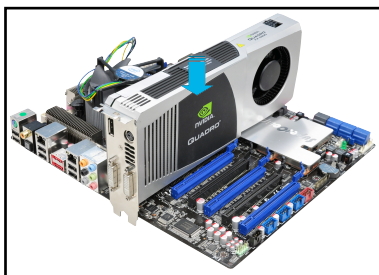
- We recommend that you install additional chassis fans for better thermal environment.
- The installation steps might be a little different with the Tesla cards you selected and the VGA output functions. Visit <http://www.nvidia.com> for more details if needed.
- Visit the NVIDIA CUDA Zone website at http://www.nvidia.com/object/cuda_home.html for the latest driver, list of CUDA-certified graphics card and supported 3D application list.

5.3.2 Installing CUDA-ready graphics cards

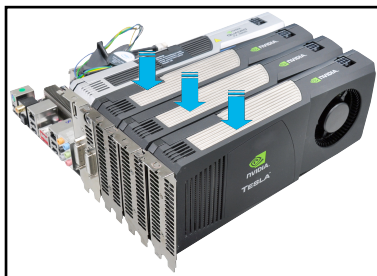


The following pictures are for reference only. The graphics cards and the motherboard layout may vary with models, but the general installation steps remain the same.

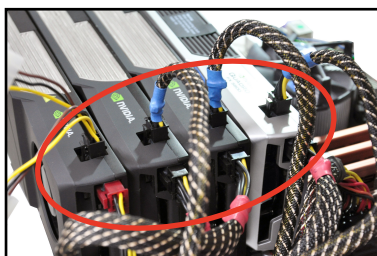
1. Prepare one NVIDIA Quadro graphics card and up to three NVIDIA Tesla computing processor cards.
2. Insert the Quadro graphics card into the PCIe x16_1 slot. Ensure that the card is properly seated on the slot.



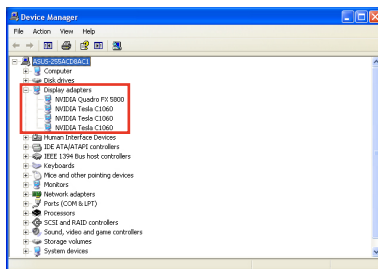
3. Insert the Tesla computing processor card(s) into the PCIe x16_2, PCIe x16_3 or PCIe x16_4 slot. Ensure that the cards are properly seated on the slot.



4. Connect either one 8-pin power connector or two 6-pin power connectors from the power supply to the Quadro graphics card and Tesla computing processor card(s).
5. Connect a display cable to the graphics card.



6. Refer to the documentation that came with your graphics card package to install the device drivers.
7. To verify graphics card driver installation, right-click **My Computer** and select **Properties** from the menu. Click the **Hardware** tab, and then click **Device Manager**. Click the “+” sign before **Display adapters**, and the installed graphics card and computing processor card(s) should appear.



The screen differs based on the components you installed.