

**P6T6 WS
Revolution**



Motherboard

E4665

Second Edition

May 2009

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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 publish the chemical substances in our products at ASUS REACH website at <http://green.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.
- Make sure 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, make sure 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 make sure 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+D>

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:

```
a.fudos /iP6T6WS.ROM
```

P6T6 WS Revolution specifications summary

CPU	LGA1366 socket for Intel® Core™ i7 Processor Extreme Edition / Core™ i7 Processor LGA1366 socket for Intel® Xeon® Processor 3500 Series LGA1366 socket for Intel® Xeon® Processor E5502 / E5504 / E5506 Supports Intel® Dynamic Speed Technology * Refer to www.asus.com for Intel CPU support list
Chipset	Intel® X58 / ICH10R NVIDIA® NF200
System Bus	Up to 6.4GT/s; Intel® QuickPath Interconnect
Memory	6 x DIMM, max. 24GB, DDR3 2000 (O.C.) / 1866 (O.C.) / 1800 (O.C.) / 1600 (O.C.) / 1333 / 1066 MHz, non-ECC/ECC, un-buffered memory Triple channel memory architecture Supports Intel® Extreme Memory Profile (XMP) * Due to Intel spec definition, DIMMs of DDR3-1333 or above are supported by specific CPU models only. ** Refer to www.asus.com or this user manual for the Memory QVL (Qualified Vendors Lists)
Expansion Slots	2 x PCI Express 2.0 x16 slots (at x16 or x8 mode) 1 x PCI Express 2.0 x16 slots (at x16 mode) 2 x PCI Express 2.0 x16 slots (at x8 / x8 mode) 1 x PCI Express 2.0 x16 slot (at x4 mode) * True @ x16 3-Way SLI™ in slots 1, 3 and 5 when slots 2 and 4 are not occupied
Multi-GPU Support	Supports NVIDIA® Native and GeForce 3-Way SLI™ Technology* Supports ATI® CrossFireX™ Technology, up to Quad CrossFireX™ * SLI support may need BIOS update. Visit www.asus.com for more details.
Storage	Intel® ICH10R Southbridge: - 6 x SATA 150/300 ports - Intel® Matrix Storage supporting SATA RAID 0, 1, 10, and 5 Marvell 88SE6320 controller: - 2 x SAS ports supporting SAS RAID 0 and 1 Marvell 88SE6121 controller: - 2 x eSATA 150/300 ports (SATA On-the-Go), supporting SATA RAID 0 and 1
LAN	2 x Realtek® 8111C PCIe Gigabit LAN controllers, supporting teaming function

(continued on the next page)

P6T6 WS Revolution specifications summary

USB	12 x USB 2.0 ports (6 ports at mid-board, 6 ports at back panel)
Audio	ADI® AD2000B 8-channel High Definition Audio CODEC <ul style="list-style-type: none"> - Supports Jack-Detection, Multi-streaming, and Front Panel Jack-Retasking technology - Coaxial / Optical S/PDIF out ports at back I/O - ASUS Noise Filtering
ASUS Special features	<p>ASUS Exclusive Features:</p> <ul style="list-style-type: none"> - ASUS EPU-6 Engine - ASUS True 16+2 Phase Power Design - ASUS AI Nap <p>ASUS Workstation Unique Features:</p> <ul style="list-style-type: none"> - G.P. Diagnosis card - ASUS SASsaby cards support - ASUS WS Diag. LED - ASUS WS Heartbeat - SAS onboard <p>ASUS AI Life Features:</p> <ul style="list-style-type: none"> - ASUS Express Gate <p>ASUS Quiet Thermal Solution:</p> <ul style="list-style-type: none"> - ASUS Fanless Design: Heat-pipe solution - ASUS Fanless Design: Stack Cool 2 - ASUS Fan Xpert <p>ASUS EZ DIY:</p> <ul style="list-style-type: none"> - ASUS Q-Shield - ASUS Q-Connector - ASUS O.C. Profile - ASUS CrashFree BIOS 3 - ASUS EZ Flash 2
ASUS Stylish Features	ASUS MyLogo 2 Multi-language BIOS
ASUS Exclusive Overclocking Features	<p>ASUS TurboV utility Precision Tweaker 2:</p> <ul style="list-style-type: none"> - vCore: Adjustable CPU voltage at 0.00625V increment - vCPU PLL: 36-step reference voltage control - vDRAM Bus: 49-step DRAM bus voltage control - vChipset(N.B.): 31-step chipset voltage control - vNB-PCIe: 65-step chipset-PCIe bus voltage control <p>SFS (Stepless Frequency Selection):</p> <ul style="list-style-type: none"> - Internal Base Clock tuning from 100MHz up to 500 MHz at 1MHz increment - PCI Express frequency tuning from 100MHz up to 180MHz at 1MHz increment <p>Overclocking Protection:</p> <ul style="list-style-type: none"> - ASUS C.P.R.(CPU Parameter Recall)

(continued on the next page)

P6T6 WS Revolution specifications summary

Back Panel I/O Ports	<ul style="list-style-type: none"> 1 x PS/2 Keyboard / Mouse combo port 1 x S/PDIF Out (Coaxial + Optical) 2 x External SATA ports 2 x RJ45 ports 6 x USB 2.0/1.1 ports 8-channel Audio I/O
Internal I/O Connectors	<ul style="list-style-type: none"> 3 x USB connectors support additional 6 USB ports 6 x SATA connectors (Blue) 2 x SAS connectors (Black) 1 x CPU Fan connector with PWM control 3 x Chassis Fan connectors with Q-fan control 1 x Power Fan connector Front panel audio connector 1 x S/PDIF Out Header Chassis Intrusion connector CD audio in 24-pin EATX Power connector 8-pin ATX+ 12V Power connector System Panel (Q-Connector) 1 x TPM connector
BIOS Features	<ul style="list-style-type: none"> 16 Mb AMI BIOS, PnP, DMI 2.0, WfM 2.0, SM BIOS 2.4, ACPI 2.0a, Green
Manageability	<ul style="list-style-type: none"> WOL by PME, WOR by PME, WOR by Ring, Chassis Intrusion, PXE, AI Net 2
Support DVD Contents	<ul style="list-style-type: none"> Drivers ASUS PC Probe II ASUS Update ASUS AI Suite Image-Editing Suite Anti-virus software (OEM version)
Form Factor	<ul style="list-style-type: none"> ATX Form Factor, 12"x 9.6" (30.5cm x 24.5cm)

*Specifications are subject to change without notice.

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

1 Product introduction

Chapter summary



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® P6T6 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 P6T6 WS Revolution
I/O modules	1 x 2-port USB 2.0 module
Cables	2 x Serial ATA power cables 6 x Serial ATA signal cables 2 x SAS + Power cables
Accessories	1 x ASUS Q-Shield (I/O shield) 1 x ASUS Q-Connector Kit (USB, 1394, system panel; Retail version only) 1 x G.P. Diagnosis Card (Retail version only) 1 x ASUS SLI bridge 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.

Intel® Core™ i7 Processor Extreme Edition / Core™ i7 Processor / Xeon™ Processor support



This motherboard supports the latest Intel® Core™ i7 processors Extreme Edition / Core™ i7 processor / Xeon™ processors in LGA1366 package with integrated memory controller to support 3-channel (6 DIMMs) DDR3 memory. Supports Intel® QuickPath Interconnect (QPI) with a system bus of up to 6.4GT/s and a max bandwidth of up to 25.6GB/s. Intel® Core™ i7 / Xeon™ series processor is one of the most powerful and energy efficient CPUs in the world. Refer to page 2-5 for details.

Intel® X58 Chipset

The Intel® X58 Express Chipset is the latest chipset designed to support latest Intel® Core™ i7 Processors and Intel's next generation system interconnect interface, Intel® QuickPath Interconnect (QPI), providing improved performance by utilizing serial point-to-point links, allowing increased bandwidth and stability. It also supports up to 36 PCI Express 2.0 lanes providing better graphics performance.

Triple-Channel DDR3 2000 (O.C.) / 1866 (O.C.) / 1800 (O.C.) / 1600 (O.C.) / 1333 / 1066 support



The motherboard supports DDR3 memory that features data transfer rates of 2000 (O.C.) / 1866 (O.C.) / 1800(O.C.) / 1600 (O.C.) / 1333 / 1066 MHz to meet the higher bandwidth requirements of the latest 3D graphics, multimedia, and Internet applications. The triple-channel DDR3 architecture enlarges the bandwidth of your system memory to boost system performance. See page 2-11 for details.

Six PCIe 2.0 x16 slots onboard

This motherboard brings users the revolutionary flexibility for simultaneously using a variety of expansion cards. See page 2-20 for details.

SLI and CrossFireX on Demand



The motherboard breaks the boundaries to bring you the multi-GPU choice of either 3-Way SLI™ or 2-Way CrossFireX™. Expect a brand-new gaming style you've never experienced before! While using 6 PCIe 2.0 x16 slots, three of them could work at x16 link. See page 2-20 for details.



SLI support may need BIOS update. Visit www.asus.com for more details.

1.3.2 ASUS Unique features

ASUS TurboV



Feel the adrenaline rush of real-time OC—now a reality with the ASUS TurboV. This extreme OC tool lets you set new ambitions on the OC stage with an advanced and easy-to-use interface—allowing you to overclock without exiting or rebooting the OS. With micro adjustments of the CPU PLL, NB, NB-PCIe, and DRAM voltages in 0.02v intervals, there are no limits—only extreme results to break new OC records! See page 4-28 for details.

ASUS True 16+2 Phase Power Design



The breakthrough technology of 16+2 phase VRM design is bringing to the ASUS motherboards. 16+2 phase power design (16-phase to vCore; 2-phase to vDRAM/QPI controller inside CPU) can reach high power efficiency, dispel heat generated by VRM module effectively, and lower more temperature compared to other VRM solution. With the high quality power components such as low RDS (on) MOSFETs, Ferrite core chokes with lower hysteresis loss, and 100% Japan-made high quality conductive polymer capacitors, ASUS 16+2 phase VRM design also ensure longer component life, minimum power loss, and help to reach the superior overclocking score ever than before.

ASUS Workstation Features

ASUS Workstation features provide complete support to system maintenance and storage technology.

SAS onboard



This motherboard provides onboard SAS ports for hard drive upgrade flexibility. Faster, safer and more stable, SAS will provide users with a better choice for storage expansion and upgrade needs. See pages 2-27 and 4-52 for details.

Diag LED



Diag LED checks 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 intuitional way to locate the root problem within a second.

ASUS Heartbeat



Brightly and vividly lighting LEDs shine around the ASUS brand name on the motherboard after successful booting process. With the breathing-like deep blue lighting shining in regular tempo, ASUS Heartbeat makes the motherboard as vivid as life.

G.P. Diagnosis card



Bundled with P6T6 WS Revolution motherboard (retail version), the G.P. Diagnosis card assists users in system checking by effortlessly and quickly providing precise system checks right after they switch on their PCs. See page 2-35 for details.

ASUS SASsaby cards support



This motherboard is fully compatible with ASUS SASsaby cards (optional). Faster, safer and more stable, SAS will provide users with a better choice for storage expansion and upgrade needs.

ASUS Power Saving Solution

ASUS Power Saving solution intelligently and automatically provides balanced computing power and energy consumption.

ASUS EPU-6 Engine



The new ASUS EPU—the world's first power saving engine, has been upgraded to a new 6 engine version, which provides total system power savings by detecting current PC loadings and intelligently moderating power in real-time. With auto phase switching for components (which includes the CPU, VGA card, memory, chipset, hard drives and CPU cooler / system fans), the EPU automatically provides the most appropriate power usage via intelligent acceleration and overclocking - helping save power and money. See page 4-24 for details.

AI Nap



With AI Nap, the system can continue running at minimum power and noise when you are temporarily away. To wake the system and return to the OS environment, simply click the mouse or press a key. See page 4-21 for details.

ASUS Quiet Thermal Solution

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

Fanless Design - Stack Cool 2



ASUS Stack Cool 2 is a fan-less and zero-noise cooling solution that lowers the temperature of critical heat generating components. The motherboard uses a special design on the printed circuit board (PCB) to dissipate heat these critical components generate.



Fanless Design - Heat-pipe

The Heat Pipe design effectively directs the heat generated by the chipsets to the heatsink near the back IO ports, where it can be carried away by existing airflow from CPU fan or bundled optional 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. Furthermore, it provides options for users to install side-flow fan or passive cooler. 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

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. See page 4-22 for details.

ASUS Crystal Sound

This feature can enhance speech-centric applications like Skype, online game, video conference and recording.



Noise Filter

This feature detects repetitive and stationary noises (non-voice signals) like computer fans, air conditioners, and other background noises then eliminates it in the incoming audio stream while recording. See page 4-32 for details.



TPM Support

This motherboard supports the Trusted Platform Module (TPM), which provides you with enhanced data protection via high-level encryption/decryption and ensures platform integrity. The TPM meets the Windows® Vista BitLocker™ Drive Encryption hardware requirement for a more secure working environment. See page 2-25 for details.



The TPM module is purchased separately.

ASUS Express Gate



Taking only 5 seconds to go online from bootup, Express Gate is the one-stop gateway to instant fun! It's a unique motherboard built-in OS. You can utilize the most popular Instant Messengers (IM) like MSN, Skype, Google talk, QQ, and Yahoo! Messenger to keep in touch with friends, or quickly check on the weather and e-mails just before leaving your house. What's more, the user-friendly picture manager lets you view your pictures without entering Windows at anytime! See page 4-35 for details.



The actual boot time depends on the system configuration.

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.

ASUS Q-Shield



The specially designed ASUS Q-Shield provides conductivity to best protect your motherboard against static electricity damage and shields it against Electronic Magnetic Interference (EMI). Without the usual "fingers" present, this new design is convenient and safe to install.

ASUS Q-Connector



ASUS Q-Connector allows you to easily connect or disconnect the chassis front panel cables to the motherboard. This unique module eliminates the trouble of connecting the system panel cables one at a time and avoiding wrong cable connections. See page 2-34 for details.

ASUS O.C. Profile



The motherboard features the ASUS O.C. Profile that allows users to conveniently store or load multiple BIOS settings. The BIOS settings can be stored in the CMOS or a separate file, giving users freedom to share and distribute their favorite settings. See page 3-38 for details.

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. See page 3-5 for details.

ASUS EZ Flash 2



EZ Flash 2 is a user-friendly BIOS update utility. Simply press the predefined hotkey to launch the utility and update the BIOS without entering the OS. Update your BIOS easily without preparing a bootable diskette or using an OS-based flash utility. See page 3-4 and 3-36 for details.

ASUS MyLogo2™



This feature allows you to convert your favorite photo into a 256-color boot logo for a more colorful and vivid image on your screen. See page 4-10 for details.

ASUS Multi-language BIOS



The multi-language BIOS allows you to select the language of your choice from the available options. The localized BIOS setup menu helps you configure your system easier and faster. See page 3-9 for details.

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.

Hardware ² information

Chapter summary

2

2.1	Before you proceed	2-1
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2.8	Installing the additional heatsink fan	2-35
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2.1 Before you proceed

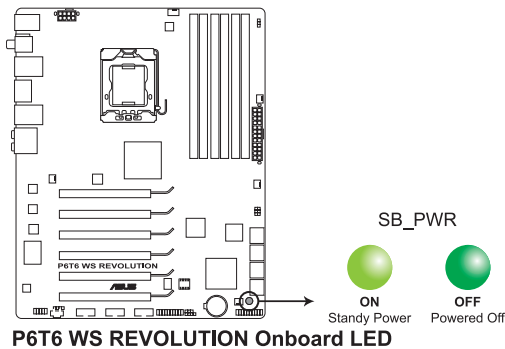
Take note of the following precautions before you install motherboard components or change any motherboard settings.



- Unplug the power cord from the wall socket before touching any component.
- Use a grounded wrist strap or touch a safely grounded object or a metal object, such as the power supply case, before handling components 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, and/or components.

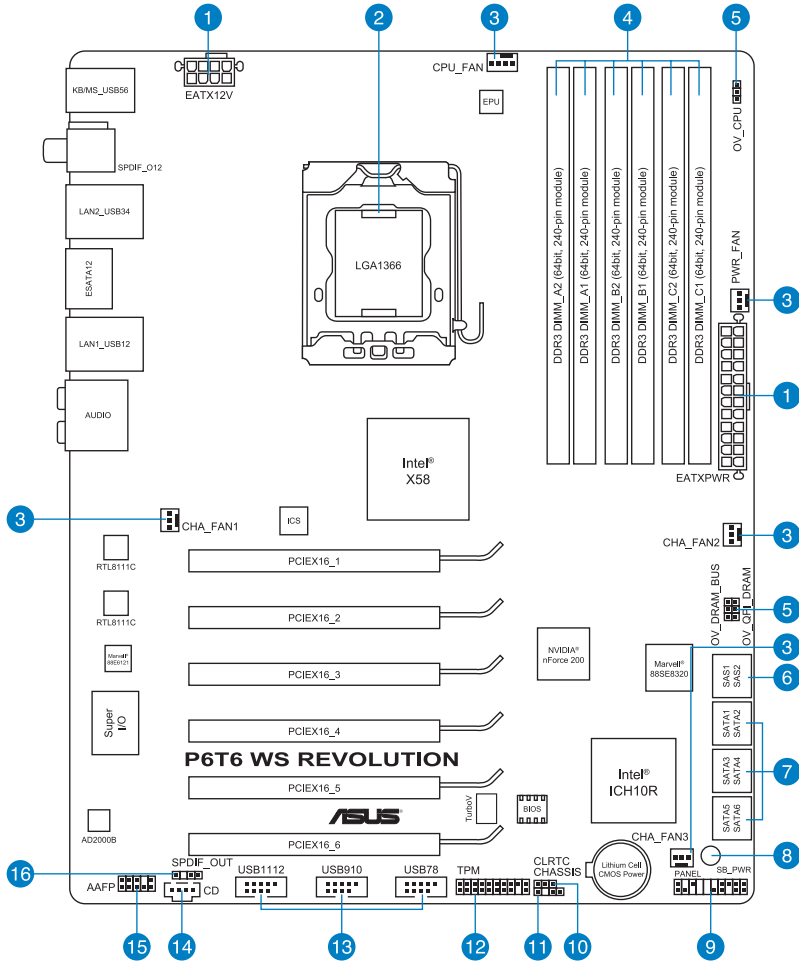
Onboard LED

The motherboard comes with a standby power LED. The green LED 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 Motherboard overview

2.2.1 Motherboard layout



Refer to **2.7 Connectors** for more information about rear panel connectors and internal connectors.

2.2.2 Layout contents

Connectors/Jumpers/Slots		Page
1.	ATX power connectors (24-pin EATXPWR, 8-pin EATX12V)	2-31
2.	LGA1366 CPU Socket	2-6
3.	CPU, chassis, and power fan connectors (4-pin CPU_FAN, 3-pin CHA_FAN1-3, 3-pin PWR_FAN)	2-29
4.	DDR3 DIMM slots	2-11
5.	CPU / DRAM Bus / QPI DRAM overvoltage settings (3-pin OV_CPU; 3-pin OV_DRAM_Bus; 3-pin OV_QPI_DRAM)	2-22
6.	Marvell® 88SE6320 SAS RAID connector [black] (7-pin SAS1-2)	2-27
7.	ICH10R Serial ATA connectors [blue] (7-pin SATA1-6)	2-26
8.	Standby power LED (SB_PWR)	2-1
9.	System panel connector (20-8 pin PANEL)	2-33
10.	Clear RTC RAM (3-pin CLRTC)	2-21
11.	Chassis intrusion connector (4-1 pin CHASSIS)	2-30
12.	TPM connector (20-1 pin TPM)	2-25
13.	USB connectors (10-1 pin USB78, USB910, USB1112)	2-28
14.	Optical drive audio connector (4-pin CD)	2-32
15.	Front panel audio connector (10-1 pin AAFP)	2-30
16.	Digital audio connector (4-1 pin SPDIF_OUT)	3-32

2.2.3 Placement direction

When installing the motherboard, make sure that you place it into the chassis in the correct orientation. The edge with external ports goes to the rear part of the chassis as indicated in the image below.

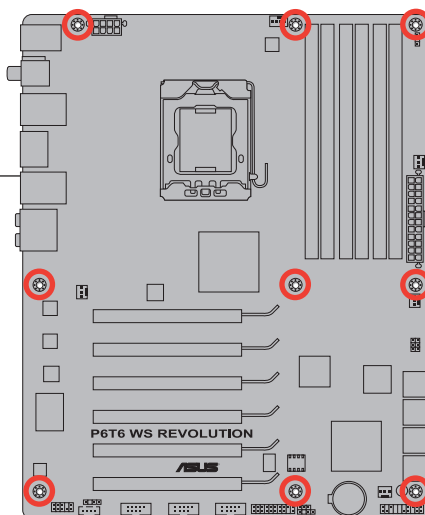
2.2.4 Screw holes

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



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

Place this side towards the rear of the chassis



2.3 Central Processing Unit (CPU)

The motherboard comes with a surface mount LGA1366 socket designed for the Intel® Core™ i7 Processor Extreme Edition / Core™ i7 Processor.



-
- Make sure that all power cables are unplugged before installing the CPU.
 - Connect the chassis fan cable to the CHA_FAN1 connector to ensure system stability.
-

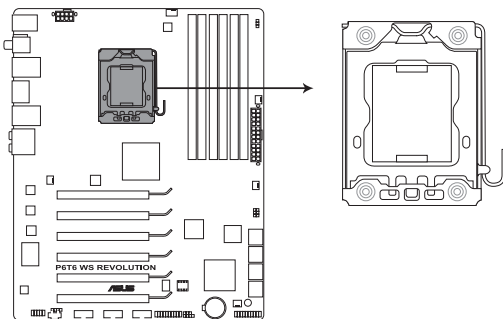


-
- Upon purchase of the motherboard, make sure that the PnP cap is on the socket and the socket contacts are not bent. Contact your retailer immediately if the PnP cap is missing, or if you see any damage to the PnP cap/socket contacts/motherboard components. ASUS will shoulder the cost of repair only 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 LGA1366 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.
-

2.3.1 Installing the CPU

To install a CPU:

1. Locate the CPU socket on the motherboard.



P6T6 WS REVOLUTION CPU LGA1366 socket

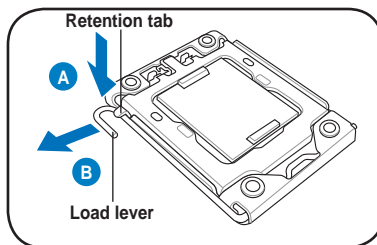


Before installing the CPU, make sure that the cam box is facing towards you and the load lever is on your left.

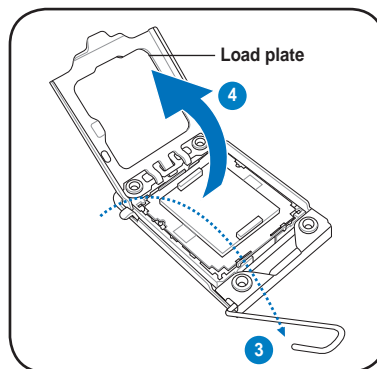
2. Press the load lever with your thumb (A), then move it to the left (B) until it is released from the retention tab.



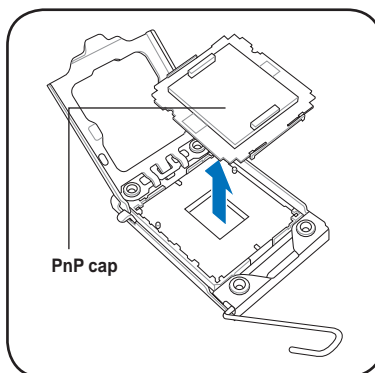
To prevent damage to the socket pins, do not remove the PnP cap unless you are installing a CPU.



3. Lift the load lever in the direction of the arrow to a 135° angle.
4. Lift the load plate with your thumb and forefinger to a 100° angle.



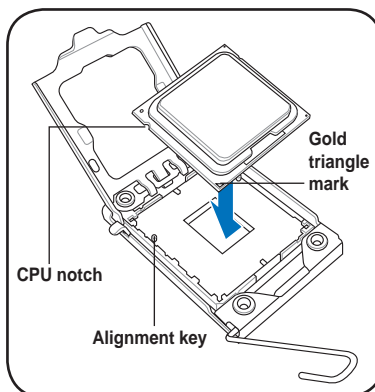
5. Remove the PnP cap from the CPU socket.



6. Position the CPU over the socket, making sure that the gold triangle is on the bottom-left corner of the socket, and then fit the socket alignment key into the CPU notch.



The CPU fits in only one correct orientation. DO NOT force the CPU into the socket to prevent bending the connectors on the socket and damaging the CPU!



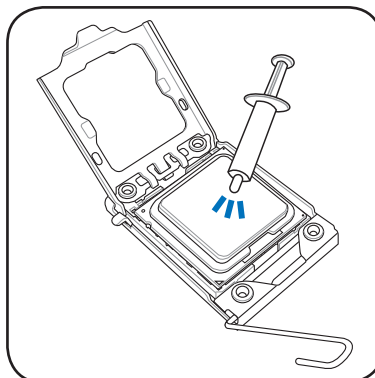
7. Apply several drops of thermal paste to the exposed area of the CPU that the heatsink will be in contact with, ensuring that it is spread in an even thin layer.



Some heatsinks come with pre-applied thermal paste. If so, skip this step.

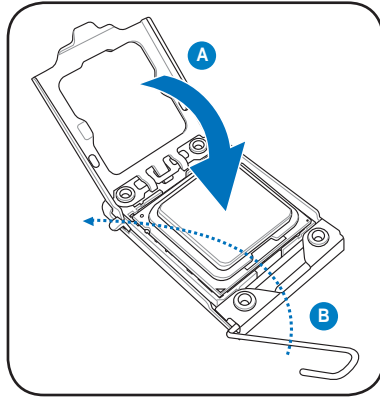


The thermal paste is toxic and inedible. If it gets into your eyes or touches your skin, ensure to wash it off immediately and seek professional medical help.



To prevent contaminating the paste, DO NOT spread the paste with your finger directly.

8. Close the load plate (A), and then push the load lever (B) until it snaps into the retention tab.



2.3.2 Installing the CPU heatsink and fan

The Intel® LGA1366 processor requires a specially designed heatsink and fan assembly to ensure optimum thermal condition and performance.



- When you buy a boxed Intel® processor, the package includes the CPU fan and heatsink assembly. If you buy a CPU separately, make sure that you use only Intel®-certified multi-directional heatsink and fan.
- Your Intel® LGA1366 heatsink and fan assembly comes in a push-pin design and requires no tool to install.
- If you purchased a separate CPU heatsink and fan assembly, make sure that you have properly applied Thermal Interface Material to the CPU heatsink or CPU before you install the heatsink and fan assembly.



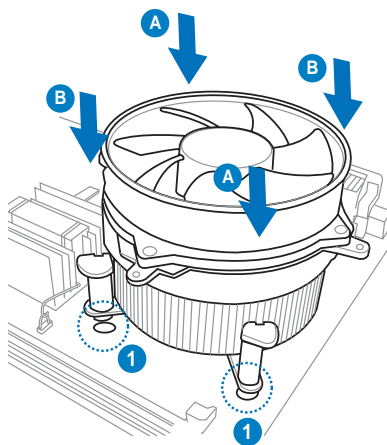
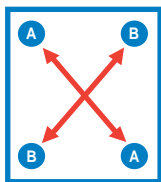
Make sure that you have installed the motherboard to the chassis before you install the CPU fan and heatsink assembly.



If you purchased a separate CPU heatsink and fan assembly, ensure that the Thermal Interface Material is properly applied to the CPU heatsink or CPU before you install the heatsink and fan assembly.

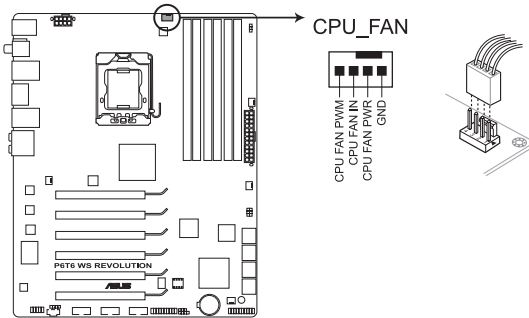
To install the CPU heatsink and fan:

1. Place the heatsink on top of the installed CPU, making sure that the four fasteners match the holes on the motherboard.
2. Push down two fasteners at a time in a diagonal sequence to secure the heatsink and fan assembly in place.



Orient the heatsink and fan assembly such that the CPU fan cable is closest to the CPU fan connector.

3. Connect the CPU fan cable to the connector on the motherboard labeled CPU_FAN.



P6T6 WS REVOLUTION CPU fan connector

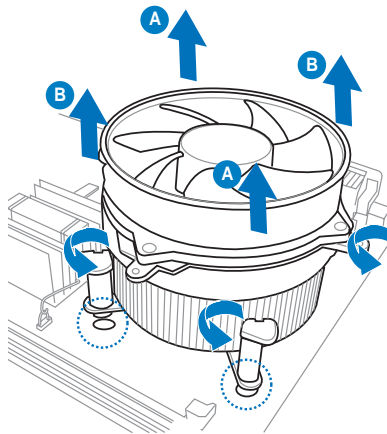
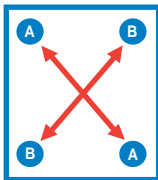


DO NOT forget to connect the CPU fan connector! Hardware monitoring errors can occur if you fail to plug this connector.

2.3.3 Uninstalling the CPU heatsink and fan

To uninstall the CPU fan and fan:

1. Disconnect the CPU fan cable from the connector on the motherboard.
2. Rotate each fastener counterclockwise.
3. Pull up two fasteners at a time in a diagonal sequence to disengage the heatsink and fan assembly from the motherboard.



4. Carefully remove the heatsink and fan assembly from the motherboard.

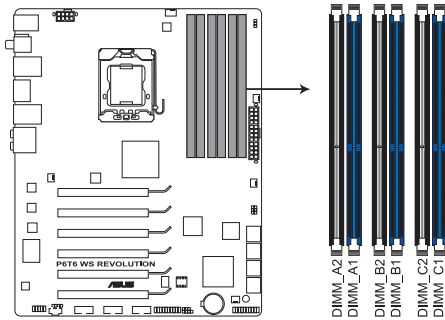
2.4 System memory

2.4.1 Overview

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

A DDR3 module has the same physical dimensions as a DDR2 DIMM but is notched differently to prevent installation on a DDR2 DIMM socket. DDR3 modules are developed for better performance with less power consumption.

The figure illustrates the location of the DDR3 DIMM sockets:



P6T6 WS REVOLUTION 240-pin DDR3 DIMM sockets

Channel	Sockets
Channel A	DIMM_A1 and DIMM_A2
Channel B	DIMM_B1 and DIMM_B2
Channel C	DIMM_C1 and DIMM_C2

Recommended memory configuration for better performance

Mode	Sockets					
	DIMM_A2	DIMM_A1	DIMM_B2	DIMM_B1	DIMM_C2	DIMM_C1
2 DIMMs	-	Populated	-	Populated	-	-
3 DIMMs	-	Populated	-	Populated	-	Populated
4 DIMMs	Populated	Populated	-	Populated	-	Populated
6 DIMMs	Populated	Populated	Populated	Populated	Populated	Populated



Due to Intel CPU spec definition, the system will not boot if only one DIMM is installed in DIMM slot A2, B2, or C2. Follow the table above for recommended memory configuration.

2.4.2 Memory configurations

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



-
- You may install varying memory sizes in Channel A, Channel B and Channel C. The system maps the total size of the lower-sized channel for the dual-channel or triple-channel configuration. Any excess memory from the higher-sized channel is then mapped for single-channel operation.
 - Due to Intel spec definition, X.M.P. DIMMs and DDR3-1600 are supported for one DIMM per channel only.
 - 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.
 - 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 256 Mb (32MB) chips or less (Memory chip capacity counts in Megabit, 8 Megabit/Mb = 1 Megabyte/MB).
-



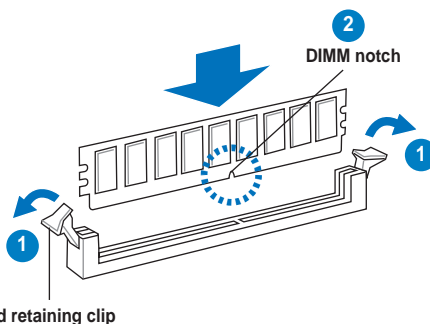
-
- The default memory operation frequency is dependent on its SPD. Under the default state, some memory modules for overclocking may operate at a lower frequency than the vendor-marked value.
 - For system stability, use a more efficient memory cooling system to support a full memory load (6 DIMMs) or overclocking condition.
-

2.4.3 Installing a DIMM



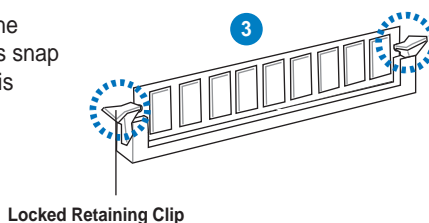
Make sure to unplug the power supply before adding or removing DIMMs or other system components. Failure to do so may cause severe damage to both the motherboard and the components.

1. Unlock a DIMM socket by pressing the retaining clips outward.
2. Align a DIMM on the socket such that the notch on the DIMM matches the break on the socket.



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

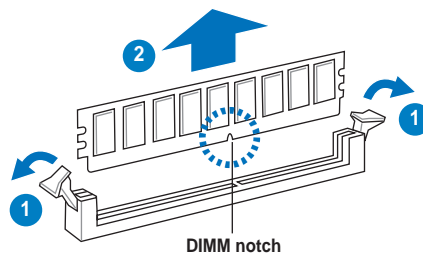
3. Firmly insert the DIMM into the socket until the retaining clips snap back in place and the DIMM is properly seated.



2.4.4 Removing a DIMM

Follow these steps to remove a DIMM.

1. Simultaneously press the retaining clips outward to unlock the DIMM.



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

2. Remove the DIMM from the socket.

P6T6 WS Revolution Motherboard Qualified Vendors Lists (QVL) DDR3-2000MHz capability

Vendor	Part No.	Size	SS/DS	Chip Brand	Chip NO.	Timing Dimm(Bios)	Voltage	DIMM socket support (Optional)			
								A*	B*	C*	D*
Crucial	BL12864BE2009.8SFB3(EPP)	2048MB	SS	N/A	Heat-Sink Package	9-9-9-28(1333-9-9-9-24)	2	V	V	V	
KINGSTON	KHX16000D3K2/2GN(EPP)	2048MB(Kit of 2)	SS	N/A	Heat-Sink Package		2.0	V	V	V	
KINGSTON	KHX16000D3K3/3GX(XMP)	3072MB(Kit of 3)	SS	N/A	Heat-Sink Package	(1333-9-9-9-24)	1.65	V			
OCZ	OCZ3FXT20002GK	2048MB(Kit of 2)	SS	N/A	Heat-Sink Package	8	1.9	V			
Giggle	9CAASS37AZZ01D1	2048MB	DS	N/A	Heat-Sink Package	9-9-9-24		V			

P6T6 WS Revolution Motherboard Qualified Vendors Lists (QVL) DDR3-1866MHz capability

Vendor	Part No.	Size	SS/DS	Chip Brand	Chip NO.	Timing Dimm(Bios)	Voltage	DIMM socket support (Optional)			
								A*	B*	C*	D*
KINGSTON	KHX14900D3K3/3GX(XMP)	3072MB(Kit of 3)	SS	N/A	Heat-Sink Package	(1333-9-9-9-24)	1.65	V	V		
Super Talent	W1866UX2GB	2048MB(Kit of 2)	SS	N/A	Heat-Sink Package	8-8-8-24(1333-9-9-9-24)		V	V	V	V
Aeneon	AXH760UD10-18J(XMP)	1024MB	SS	N/A	Heat-Sink Package	10(1333-8-8-8-24)		V	V	V	V
Aeneon	AXH860UD20-18J(XMP)	2048MB	DS	N/A	Heat-Sink Package	10(1333-8-8-8-24)		V	V	V	V
Patriot	PVS32G1866LLK(XMP)	2048MB(Kit of 2)	SS	N/A	Heat-Sink Package	8-8-8-24(1066-7-7-7-20)	1.9	V	V	V	
Patriot	PVS32G1866LLK(XMP)	2048MB(Kit of 2)	SS	N/A	Heat-Sink Package	8-8-8-24(1866-8-8-8-24)	1.9	V	V	V	

P6T6 WS Revolution Motherboard Qualified Vendors Lists (QVL) DDR3-1800MHz capability

Vendor	Part No.	Size	SS/DS	Chip Brand	Chip NO.	Timing Dimm(Bios)	Voltage	DIMM socket support (Optional)			
								A*	B*	C*	D*
Apacer	BoxP/N:DH.02GAL.F7LK2 (78.0AGCB.BN0)	2048MB(Kit of 2)	SS	N/A	Heat-Sink Package	7-7-7-20		V			
CORSAIR	CM3X1024-1800C7DIN(XMP)	1024MB	SS	N/A	Heat-Sink Package	7		V			
CORSAIR	BoxP/N:TW3X4G1800C8DF (CM3X2G1800C8D)Ver4.1	4096MB(Kit of 2)	DS	N/A	Heat-Sink Package	8-8-8-24	1.80	V			
KINGSTON	KHX14400D3/1G	1024MB	SS	N/A	Heat-Sink Package		1.9	V			
KINGSTON	KHX14400D3K2/2GN(EPP)	2048MB(Kit of 2)	SS	N/A	Heat-Sink Package		1.9	V	V	V	
KINGSTON	KHX14400D3K3/3GX(XMP)	3072MB(Kit of 3)	SS	N/A	Heat-Sink Package	(1333-9-9-9-24)	1.65	V			
OCZ	OCZ3P18002GK	2048MB(Kit of 2)	SS	N/A	Heat-Sink Package	8		V	V		
OCZ	OCZ3P18004GK	4096MB(Kit of 2)	DS	N/A	Heat-Sink Package	8	1.9		V	V	
Transcend	TX1800KLU-2GK(XMP)	2048MB(Kit of 2)	SS	N/A	Heat-Sink Package	8		V	V		
Patriot	PVS32G1800LLKN(EPP)	2048MB(Kit of 2)	SS	N/A	Heat-Sink Package	8-8-8-20(1066-7-7-7-20)	1.9	V	V		

P6T6 WS Revolution Motherboard Qualified Vendors Lists (QVL) DDR3-1600MHz capability

Vendor	Part No.	Size	SS/DS	Chip Brand	Chip NO.	Timing Dimm(Bios)	Voltage	DIMM socket support (Optional)			
								A*	B*	C*	D*
A-DATA	AD31600E001GMU(XMP)	3072MB(Kit of 3)	SS	N/A	Heat-Sink Package	8-8-8-24(1333-9-9-9-24)	1.65-1.85	V	V	V	V
A-DATA	AD31600F002GMU(XMP)	6144MB(Kit of 3)	DS	N/A	Heat-Sink Package	7-7-7-20(1333-9-9-9-24)	1.75-1.85	V	V	V	V
CORSAIR	BoxP/N:TWIN3X2048-1600C7DHXIN (CM3X1024-1600C7DHXIN)(XMP) Ver3.1	2048MB(Kit of 2)	SS	N/A	Heat-Sink Package	7-7-7-20(1333-9-9-9-24)	1.80	V	V	V	V
CORSAIR	TR3X3G1600C8D(XMP)Ver2.1	3072MB(Kit of 3)	SS	N/A	Heat-Sink Package	8-8-8-24(1601-8-8-8-24)	1.65	V	V		
CORSAIR	TR3X3G1600C9(XMP)Ver1.1	3072MB(Kit of 3)	SS	N/A	Heat-Sink Package	9-9-9-24(1601-9-9-9-24)	1.65	V	V		
CORSAIR	BoxP/N:TW3X4G1600C9DHXNV (CM3X2G1600C9DHXNV)Ver4.1	4096MB(Kit of 2)	DS	N/A	Heat-Sink Package	(1333-9-9-9-24)	1.80	V	V	V	V
CORSAIR	BoxP/N:TWIN3X4096-1600C7DHXIN (CM3X2048-1600C7DHXIN)Ver3.1	4096MB(Kit of 2)	DS	N/A	Heat-Sink Package	(1601-7-7-7-20)	1.90	V	V	V	V
CORSAIR	TR3X6G1600C8D(XMP)Ver2.1	6144MB(Kit of 3)	DS	N/A	Heat-Sink Package	8-8-8-24(1601-8-8-8-24)	1.65		V	V	V
CORSAIR	TR3X6G1600C9(XMP)Ver2.1	6144MB(Kit of 3)	DS	N/A	Heat-Sink Package	9-9-9-24(1333-9-9-9-24)	1.65	V	V	V	V
Crucial	BL12864BA1608.8SFB(XMP)	1024MB	SS	N/A	Heat-Sink Package	(1601-8-8-8-24)	1.8	V	V	V	V
G.SKILL	F3-12800CL7D-2GBHZ	2048MB(Kit of 2)	SS	N/A	Heat-Sink Package	(1601-7-7-7-18)	1.9	V	V	V	
G.SKILL	F3-12800CL9D-2GBNQ	2048MB(Kit of 2)	SS	N/A	Heat-Sink Package	(1333-9-9-9-24)	1.6	V	V	V	V
G.SKILL	F3-12800CL7D-4GBPI	4096MB(Kit of 2)	DS	N/A	Heat-Sink Package	7-7-7-18(1333-9-9-9-24)	1.9	V	V	V	
KINGSTON	KHX12800D3LLK3/3GX(XMP)	3072MB(Kit of 3)	SS	N/A	Heat-Sink Package	(1333-9-9-9-24)	1.65	V	V	V	
KINGSTON	KHX12800D3K2/4G	4096MB(Kit of 2)	SS	N/A	Heat-Sink Package	(1066-7-7-7-20)	1.9	V	V	V	V
OCZ	OCZ3P1600EB1G	1024MB	SS	N/A	Heat-Sink Package	7-6-6-24(1333-7-7-7-20)		V			
OCZ	OCZ3T1600XM2GK(XMP)	2048MB(Kit of 2)	SS	N/A	Heat-Sink Package	(1601-8-8-8-28)		V	V	V	V
OCZ	OCZ3G1600LV3GK	3072MB(Kit of 3)	SS	N/A	Heat-Sink Package	8-8-8(1066-7-7-7-20)	1.65		V	V	
OCZ	OCZ3P1600EB4GK	4096MB(Kit of 2)	DS	N/A	Heat-Sink Package	7-7-6(1333-7-7-7-20)	1.8	V	V	V	V
OCZ	OCZ3X16004GK	4096MB(Kit of 2)	DS	N/A	Heat-Sink Package	7-7-7-20	1.9	V	V	V	V
OCZ	OCZ3G1600LV6GK	6144MB(Kit of 3)	DS	N/A	Heat-Sink Package	8-8-8(1066-7-7-7-20)	1.65	V	V		
Aeneon	AXH760UD10-16H	1024MB	SS	N/A	Heat-Sink Package	(1601-9-9-9-28)		V	V	V	V
Aeneon	AXH860UD20-16H	2048MB	DS	N/A	Heat-Sink Package	(1601-9-9-9-28)		V	V	V	V
Mushkin	996657	4096MB(Kit of 2)	DS	N/A	Heat-Sink Package	7-7-7-20		V	V	V	V
Patriot	PVT33G1600ELK	3072MB(Kit of 3)	SS	N/A	Heat-Sink Package	9-9-9-24(1066-7-7-7-20)	1.65	V	V	V	V
Patriot	PVS34G1600LLKN	4096MB(Kit of 2)	DS	N/A	Heat-Sink Package	7-7-7-20(1066-7-7-7-20)	2.0	V	V	V	V
Patriot	PVT36G1600ELK	6144MB(Kit of 3)	DS	N/A	Heat-Sink Package	9-9-9-24(1066-7-7-7-20)	1.65	V	V	V	V
Team	BoxP/N:TXD32048M1600HC7DC (TXD31024M1600HC7)	2048MB(Kit of 2)	SS	N/A	Heat-Sink Package	7-7-7-21(1333-8-8-8-24)	1.75-1.85	V	V	V	V

P6T6 WS Revolution Motherboard Qualified Vendors Lists (QVL) DDR3-1333MHz capability

Vendor	Part No.	Size	SS/DS	Chip Brand	Chip NO.	Timing Dimm(Bios)	Voltage	DIMM socket support (Optional)			
								A*	B*	C*	D*
A-DATA	AD31333E002G0U	6144MB(Kit of 3)	DS	N/A	Heat-Sink Package	7-7-7-20(1333-9-9-24)	1.65-1.85	V	V	V	V
CORSAIR	TR3X3G1333C9 (Ver2.1)	3072MB(Kit of 3)	SS	N/A	Heat-Sink Package	9-9-9-24(1333-9-9-24)	1.5	V	V	V	
CORSAIR	CM3X1024-1333C9DHX	1024MB	DS	N/A	Heat-Sink Package	(1333-9-9-24)	1.1	V	V	V	
CORSAIR	BoxP/N:TWIN3X2048-1333C9 (CM3X1024-1333C9)Ver1.1	2048MB(Kit of 2)	DS	N/A	Heat-Sink Package	9-9-9-24(1066-7-7-20)	1.70	V	V	V	V
CORSAIR	BoxP/N:TW3X4G1333C9DHX (CM3X2048-1333C9DHX)Ver3.2	4096MB(Kit of 2)	DS	N/A	Heat-Sink Package	9-9-9-24(1066-7-7-20)	1.70	V	V		
CORSAIR	TR3X6G1333C9 (Ver2.1)	6144MB(Kit of 3)	DS	N/A	Heat-Sink Package	9-9-9-24(1333-9-9-24)	1.5	V	V	V	
Crucial	CT12864BA1339.8SFB	1024MB	SS	MICRON	D9GTS	(1333-9-9-24)		V	V	V	V
Crucial	CT12864BA1339.8SFD	1024MB	SS	MICRON	MT8JF12864AY-1G4D1	(1333-9-9-24)		V	V	V	V
Crucial	CT25664BA1339.16SFD	2048MB	DS	MICRON	D9JNM	(1333-9-9-24)		V	V	V	V
ELPIDA	EBJ11UD8BAFA-DG-E	1024MB	DS	ELPIDA	J5308BASE-DG-E	(1333-8-8-24)		V			
G.SKILL	F3-10600CL7D-2GBPI	2048MB(Kit of 2)	SS	N/A	Heat-Sink Package	(1337-7-7-18)	1.65	V	V	V	V
G.SKILL	F3-10600CL8D-2GBHK	2048MB(Kit of 2)	SS	N/A	Heat-Sink Package	(1337-8-8-22)	1.65	V	V	V	V
G.SKILL	F3-10600CL9D-2GBNQ	2048MB(Kit of 2)	DS	N/A	Heat-Sink Package	(1333-9-9-24)	1.5-1.65	V	V	V	V
KINGMAX	FLFD45F-88EE9	1024MB	SS	ELPIDA	J1108BASE-DJ-E	(1333-9-9-24)		V	V	V	V
KINGSTON	KVR1333D3N9/1G	1024MB	SS	ELPIDA	J1108BASE-DJ-E	(1333-9-9-24)	1.5	V	V	V	V
KINGSTON	KVR1333D3N9/2G	2048MB	DS	ELPIDA	J1108BASE-DJ-E	(1333-9-9-24)	1.5	V	V	V	V
MICRON	MT8JTF12864AY-1G4BYTES	1024MB	SS	MICRON	Z9HWR	(1333-9-9-24)		V	V		
MICRON	MT16JTF25664AY-1G4BYTES	2048MB	DS	MICRON	Z9HWR	(1333-9-9-24)		V	V	V	V
OCZ	OCZ3RPX1333EB2GK	1024MB	SS	N/A	Heat-Sink Package	(1066-6-5-20)			V		
OCZ	OCZ3X1333GK	3072MB(Kit of 3)	SS	N/A	Heat-Sink Package	7-7-7(1066-6-6-16)	1.6	V	V		
OCZ	OCZ3P1333GK	1024MB	DS	N/A	Heat-Sink Package	7-7-7-20(1333-9-9-24)		V			
OCZ	OCZ3P13334GK	4096MB(Kit of 2)	DS	N/A	Heat-Sink Package	7(1333-7-7-20)	1.8	V	V	V	V
OCZ	OCZ3RPX1333EB4GK	4096MB(Kit of 2)	DS	N/A	Heat-Sink Package	(1066-6-5-5)	1.85	V			
OCZ	OCZ3G1333LV6GK	6144MB(Kit of 3)	DS	N/A	Heat-Sink Package	9-9-9(1066-7-7-20)	1.65	V	V		
OCZ	OCZ3P1333LV6GK	6144MB(Kit of 3)	DS	N/A	Heat-Sink Package	7-7-7(1066-7-7-20)	1.65	V	V	V	V
Qimonda	IMS82GU13A1F1C-13H	2048MB	DS	Qimonda	IDS1G-03A1F1C-13H	9(1333-9-9-24)		V	V	V	V
SAMSUNG	M378B2873DZ1-CH9	1024MB	SS	SAMSUNG	K4B1G0846D	9(1333-9-9-24)		V	V	V	V
SAMSUNG	M391B2873DZ1-CH9	1024MB	SS	SAMSUNG	K4B1G0846D(ECC)	9(1333-9-9-24)		V	V	V	V
SAMSUNG	M378B5673DZ1-CH9	2048MB	DS	SAMSUNG	K4B1G0846D	9(1333-9-9-24)		V	V	V	V
SAMSUNG	M391B5673DZ1-CH9	2048MB	DS	SAMSUNG	K4B1G0846D(ECC)	9(1333-9-9-24)		V	V	V	V
Transcend	TS128MLK64V3U	1024MB	SS	SAMSUNG	K4B1G0846D	9(1333-9-9-24)		V	V	V	
Transcend	TS256MLK64V3U	2048MB	DS	SAMSUNG	K4B1G0846D	9(1333-9-9-24)		V	V	V	
Aeneon	AEH760UD00-13H	1024MB	DS	AENEON	AEH93R13H	(1333-9-9-24)		V	V	V	V
BUFFALO	FSX1333D3G-1G	1024MB	SS	N/A	Heat-Sink Package	(1066-7-7-20)		V	V	V	V
BUFFALO	FSX1333D3G-2G	2048MB	DS	N/A	Heat-Sink Package	(1066-7-7-20)		V	V	V	V
Elixir	M2F2G64CB8HA4N-CG	2048MB	DS	Elixir	N2CB1G80AN-CG	(1333-9-9-24)		V	V	V	V
Patriot	PDC32G1333LLK	1024MB	SS	PATRIOT	Heat-Sink Package	7(1337-7-7-20)		V	V	V	V
Patriot	PVT3G1333ELK	3072MB(Kit of 3)	SS	N/A	Heat-Sink Package	9-9-9-24(1066-7-7-20)	1.65	V	V	V	V
Patriot	PVT36G1333ELK	6144MB(Kit of 3)	DS	N/A	Heat-Sink Package	9-9-9-24(1066-7-7-20)	1.65	V	V	V	V

P6T6 WS Revolution Motherboard Qualified Vendors Lists (QVL) DDR3-1066MHz capability

Vendor	Part No.	Size	SS/ DS	Chip Brand	Chip NO.	Timing Dimm(Bios)	Voltage	DIMM socket support (Optional)			
								A*	B*	C*	D*
CORSAIR	CM3X1024-1066C7	1024MB	DS	N/A	Heat-Sink Package	7	1.1	V	V	V	
Crucial	CT12864BA1067.8SFB	1024MB	SS	MICRON	Z9HWQ	7		V	V	V	V
Crucial	CT12864BA1067.8SFD	1024MB	SS	MICRON	D9JNL	7		V	V	V	V
Crucial	CT25664BA1067.16SFD	2048MB	DS	MICRON	D9JNL	7		V	V	V	V
ELPIDA	EBJ11RD8BAFA-AE-E	1024MB	DS	ELPIDA	J5308BASE-AC-E(ECC)	7		V	V	V	V
ELPIDA	EBJ11UD8BAFA-AG-E	1024MB	DS	ELPIDA	J5308BASE-AC-E	8		V	V	V	
Hynix	HMT112U6AFP8C-G7N0	1024MB	SS	HYNIX	H5TQ1G83AFP6G7C	7		V	V	V	V
Hynix	HYMT112U64ZNF8-G7	1024MB	SS	HYNIX	HY5TQ1G831ZNF6-G7	7		V	V	V	
Hynix	HMT125U6AFP8C-G7N0	2048MB	DS	HYNIX	H5TQ1G83AFP6G7C	7		V	V	V	V
Hynix	HYMT125U64ZNF8-G7	2048MB	DS	HYNIX	HY5TQ1G831ZNF6-G7	7		V	V	V	
KINGSTON	KVR1066D3N7/1G	1024MB	DS	ELPIDA	J5308BASE-AC-E		1.5	V	V	V	V
KINGSTON	KVR1066D3N7/2G	2048MB	DS	SAMSUNG	K4B1G0846C-ZCF8		1.5	V	V	V	V
MICRON	MT8JTF12864AY-1G1D1	1024MB	SS	MICRON	7VD22	7		V	V	V	V
MICRON	MT16JTF25664AY-1G1D1	2048MB	DS	MICRON	7VD22	7		V	V	V	V
Qimonda	IMSH1GU03A1F1C-10F	1024MB	SS	Qimonda	IDSH1G-03A1F1C-10F	7		V	V	V	V
Qimonda	IMSH1GU03A1F1C-10G	1024MB	SS	Qimonda	IDSH1G-03A1F1C-10G	8		V	V	V	V
Qimonda	IMSH2GU13A1F1C-10F	2048MB	DS	Qimonda	IDSH1G-03A1F1C-10F	7		V	V	V	V
Qimonda	IMSH2GU13A1F1C-10G	2048MB	DS	Qimonda	IDSH1G-03A1F1C-10G	8		V	V	V	V
Aeneon	AEH760UD00-10FA98X	1024MB	DS	AENEON	AEH93R10F	7		V	V	V	V
Elixir	M2F2G64CB8HAN4-BE	2048MB	DS	Elixir	N2CB1G80AN-BE	7		V	V	V	V



Side(s): SS - Single-sided DS - Double-sided DIMM support:

- **A*:** Supports two (2) modules inserted into slots A1 and B1 as one pair of Dual-channel memory configuration.
- **B*:** Supports three (3) modules inserted into the blue slots (A1, B1 and C1) as one set of Triple-channel memory configuration.
- **C*:** Supports four (4) modules inserted into the blue slots (A1, B1 and C1) and the black slot A2 as one set of Triple-channel memory configuration.
- **D*:** Supports six (6) modules inserted into both the blue slots and the black slots as two set of Triple-channel memory configuration.



Visit the ASUS website for the latest QVL.

2.5 Expansion slots

In the future, you may need to install expansion cards. The following sub-sections describe the slots and the expansion cards that they support.



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

2.5.1 Installing an expansion card

To install an expansion card:

1. Before installing the expansion card, read the documentation that came with it and make the necessary hardware settings for the card.
2. Remove the system unit cover (if your motherboard is already installed in a chassis).
3. Remove the bracket opposite the slot that you intend to use. Keep the screw for later use.
4. Align the card connector with the slot and press firmly until the card is completely seated on the slot.
5. Secure the card to the chassis with the screw you removed earlier.
6. Replace the system cover.

2.5.2 Configuring an expansion card

After installing the expansion card, configure it by adjusting the software settings.

1. Turn on the system and change the necessary BIOS settings, if any. See Chapter 3 for information on BIOS setup.
2. Assign an IRQ to the card. Refer to the tables on the next page.
3. Install the software drivers for the expansion card.



When using PCI cards on shared slots, ensure that the drivers support “Share IRQ” or that the cards do not need IRQ assignments. Otherwise, conflicts will arise between the two PCI groups, making the system unstable and the card inoperable. Refer to the table on the next page for details.

2.5.3 Interrupt assignments

Standard interrupt assignments

IRQ	Priority	Standard function
0	1	System Timer
1	2	Keyboard Controller
2	–	Redirect to IRQ#9
4	12	Reserved
5	13	Reserved
6	14	Floppy Disk Controller
7	15	Reserved
8	3	System CMOS/Real Time Clock
9	4	Reserved
10	5	Reserved
11	6	Reserved
12	7	Reserved
13	8	Numeric Data Processor
14	9	Reserved

IRQ assignments for this motherboard

IOH

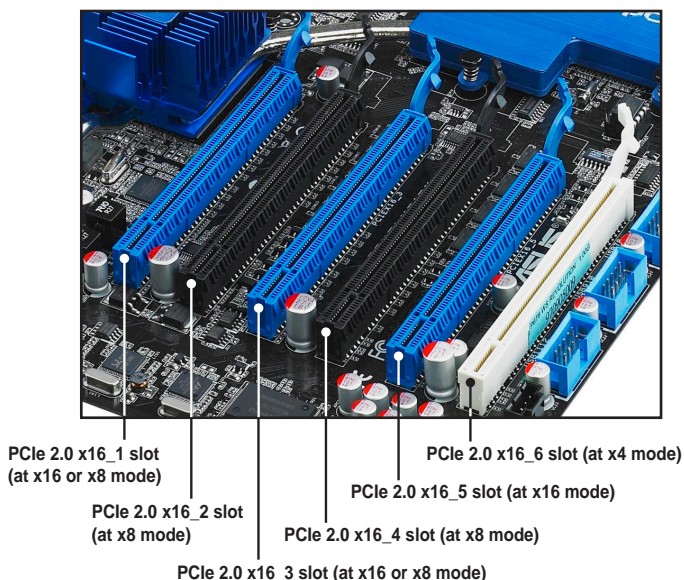
	24	25	26	27	28	29	30	31
PCI16_1	shared	–	–	–	–	–	–	–
PCI16_2	–	–	–	–	–	–	shared	–

ICH

	A	B	C	D	E	F	G	H
LAN1 (8111C)	–	shared	–	–	–	–	–	–
LAN2 (8111C)	–	–	shared	–	–	–	–	–
Marvell 6121	–	–	–	shared	–	–	–	–
Marvell SAS	shared	–	–	–	–	–	–	–
USB controller 1	–	–	–	–	–	–	–	shared
USB controller 2	–	–	–	shared	–	–	–	–
USB controller 3	–	–	shared	–	–	–	–	–
USB controller 4	shared	–	–	–	–	–	–	–
USB controller 5	–	–	–	–	–	shared	–	–
USB controller 6	–	–	–	shared	–	–	–	–
USB 2.0 controller 1	–	–	–	–	–	–	–	shared
USB 2.0 controller 2	–	–	shared	–	–	–	–	–
SATA controller 1	–	–	–	–	shared	–	–	–
SATA controller 2	–	–	–	–	shared	–	–	–
Audio Azalia	–	–	–	–	–	–	shared	–

2.5.4 PCI Express 2.0 x16 slots

This motherboard has six PCI Express 2.0 x16 slots that support PCI Express x16 2.0 graphic cards complying with the PCI Express specifications. Refer to the figure below for the location of the slots.

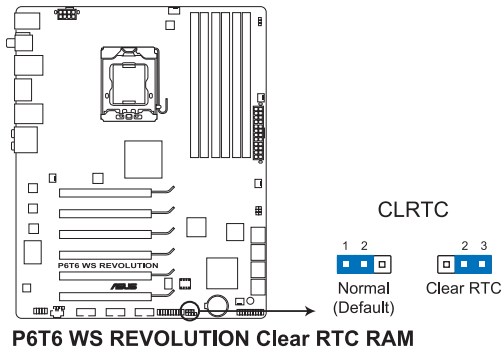


- In single VGA card mode, use first the PCIe 2.0 x16_1 slot for a PCI Express x16 graphics card to get better performance.
- In CrossFireX™ mode, use the PCIe 2.0 x16_1 and PCIe 2.0 x16_3 (or PCIe 2.0 x16_5) slots for PCI Express x16 graphics cards to get better performance.
- In 2-Way SLI™ mode, use the following slot combinations for PCI Express x16 graphics cards to get better performance:
 - PCIe 2.0 x16_1 and PCIe 2.0 x16_3 slots
 - PCIe 2.0 x16_3 and PCIe 2.0 x16_5 slots
 - PCIe 2.0 x16_1 and PCIe 2.0 x16_5 slots (The SLI bridge cable might not be long enough to connect the graphics cards installed on these two slots.)
- In 3-Way SLI™ mode, use the PCIe 2.0 x16_1, PCIe 2.0 x16_3 and PCIe 2.0 x16_5 slots for PCI Express x16 graphics cards to get better performance.
- When using the PCIe 2.0 x16_1, PCIe 2.0 x16_3 and PCIe 2.0 x16_5 slots for 3-Way SLI™ mode, the three slots will work at x16 link while PCIe 2.0 x16_2 and PCIe 2.0 x16_4 slots are not occupied.
- We recommend that you provide sufficient power when running CrossFireX™ or SLI™ mode. See page 2-31 for details.
- Connect a chassis fan to the motherboard connector labeled CHA_FAN1/2/3 when using multiple graphics cards for better thermal environment. See page 2-29 for details.

2.6 Jumpers

1. Clear RTC RAM (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.



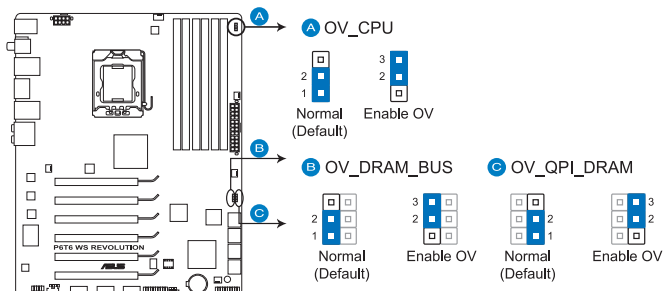
Except when clearing the RTC RAM, never remove the cap on CLRTC jumper default position. Removing the cap will cause system boot failure!



- 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. CPU / DRAM Bus / QPI DRAM overvoltage setting (3-pin OV_CPU, 3-pin OV_DRAM_BUS, 3-pin OV_QPI_DRAM)

These jumpers allow you to enable or disable the advanced CPU, DRAM Bus, and QPI DRAM overvoltage settings in BIOS. Read the following information before you change the jumper settings.



P6T6 WS REVOLUTION CPU/DRAM BUS/QPI DRAM overvoltage settings

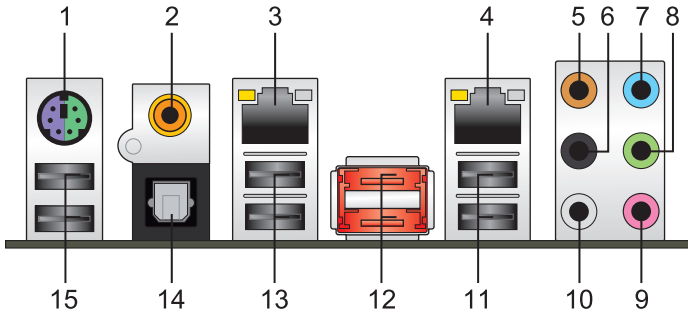
	OV_CPU	OV_DRAM_BUS	OV_QPI_DRAM
Pins 1-2 (Default)	up to 1.70V	up to 1.90V	up to 1.70V
Pins 2-3 (OV Enabled)	up to 1.9V	up to 2.46V	up to 1.9V



- Before you change the jumper settings for extra-high overvoltage ability, use the BIOS items first to adjust the desired CPU, DRAM, and QPI performance. Make sure your system functions well under the highest BIOS voltage settings before you change the setting of these three jumpers.
- DO NOT set the OV_CPU jumper to pins 2–3 when you install a new CPU and have not booted for the first time. Doing so may cause the system to halt. For system failure due to the wrong setting of the OV_CPU jumper, shut down the computer and move the cap back to pins 1–2.
- 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.
- The system may need a better cooling system (for example, a water-cooling system) to work stably under high voltage settings.

2.7 Connectors

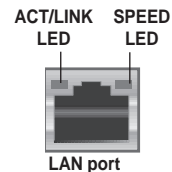
2.7.1 Rear panel connectors



1. **PS/2 keyboard / mouse combo port.** This port is for a PS/2 keyboard or a PS/2 mouse.
2. **Coaxial S/PDIF Out port.** This port connects an external audio output device via a coaxial S/PDIF cable.
3. **LAN 2 (RJ-45) port.** This Marvell® LAN port allows Gigabit connection to a Local Area Network (LAN) through a network hub. Refer to the table below for the LAN port LED indications.
4. **LAN 1 (RJ-45) port.** This Marvell® LAN port allows Gigabit connection to a Local Area Network (LAN) through a network hub. Refer to the table below for the LAN port LED indications.
 *To be compliant with Energy Star 4.0, LAN 1 and LAN 2 ports do not support WOL (Wake on LAN) function.
5. **Center/Subwoofer port (orange).** This port connects the center/subwoofer speakers.

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



6. **Rear Speaker Out port (black).** This port connects the rear speakers in a 4-channel, 6-channel, or 8-channel audio configuration..
7. **Line In port (light blue).** This port connects the tape, CD, DVD player, or other audio sources.

8. **Line Out port (lime).** This port connects a headphone or a speaker. In 4-channel, 6-channel, and 8-channel configuration, the function of this port becomes Front Speaker Out.
9. **Microphone port (pink).** This port connects a microphone.
10. **Side Speaker Out port (gray).** This port connects the side speakers in an 8-channel audio configuration.



Refer to the audio configuration table below for the function of the audio ports in 2, 4, 6, or 8-channel configuration.

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

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

11. **USB 2.0 ports 1 and 2.** These 4-pin Universal Serial Bus (USB) ports are available for connecting USB 2.0 devices.
12. **External SATA port.** This port connects to an external a Serial ATA hard disk drive.



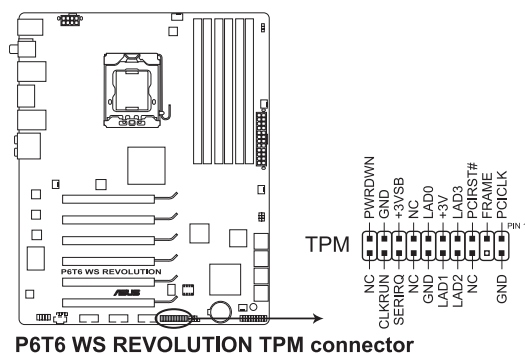
DO NOT insert a different connector to the external SATA port.

13. **USB 2.0 ports 3 and 4.** These 4-pin Universal Serial Bus (USB) ports are available for connecting USB 2.0 devices.
14. **Optical S/PDIF Out port.** This port connects an external audio output device via an optical S/PDIF cable.
15. **USB 2.0 ports 5 and 6.** These 4-pin Universal Serial Bus (USB) ports are available for connecting USB 2.0 devices.

2.7.2 Internal connectors

1. TPM connector (20-pin TPM) [Optional]

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.

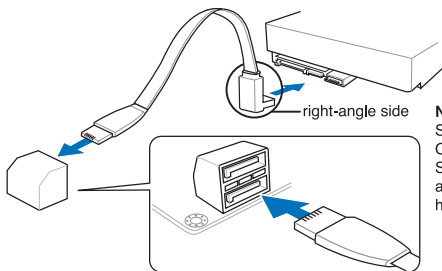
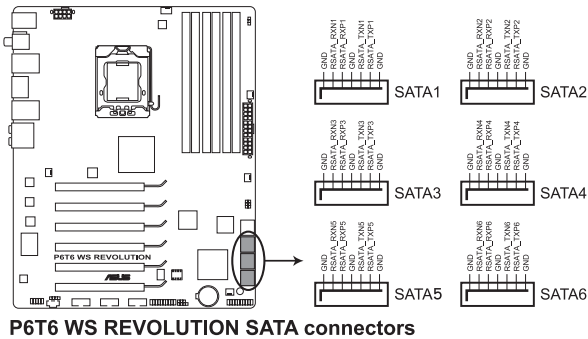


The TPM module is purchased separately.

2. ICH10R Serial ATA connectors (7-pin SATA 1-6 [blue])

These connectors are for the Serial ATA signal cables for Serial ATA hard disk drives and optical disc drives.

If you installed Serial ATA hard disk drives, you can create a RAID 0, 1, 5, and 10 configuration with the Intel® Matrix Storage Technology through the onboard Intel® ICH10R RAID controller.



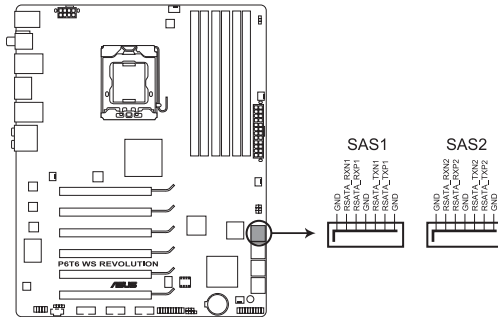
NOTE: Connect the right-angle side of SATA signal cable to SATA device. Or you may connect the right-angle side of SATA cable to the onboard SATA port to avoid mechanical conflict with huge graphics cards.



- These connectors are set to Standard IDE mode by default. In Standard IDE mode, you can connect Serial ATA boot/data hard disk drives to these connectors. If you intend to create a Serial ATA RAID set using these connectors, set the **Configure SATA as** item in the BIOS to [RAID]. See section 3.3.5 Storage Configuration for details.
- Before creating a RAID set, refer to section 4.4 RAID configurations or the manual bundled in the motherboard support DVD.
- You must install the Windows® XP Service Pack 2 before using Serial ATA hard disk drives. The Serial ATA RAID feature (RAID 0, 1, 5, and 10) is available only if you are using Windows® XP SP2 or later version.
- When using hot-plug and NCQ, set the **Configure SATA as** in the BIOS to [AHC]. See section 3.3.5 Storage Configuration for details.

3. Marvell® 88SE6320 SAS RAID connectors [black] (7-pin SAS1-2)

These connectors are for SAS (Serial Attached SCSI) signal cables that support SAS hard disk drives. To configure RAID 0 or RAID 1, install two SAS hard disk drives to these two connectors.



P6T6 WS REVOLUTION SAS connectors



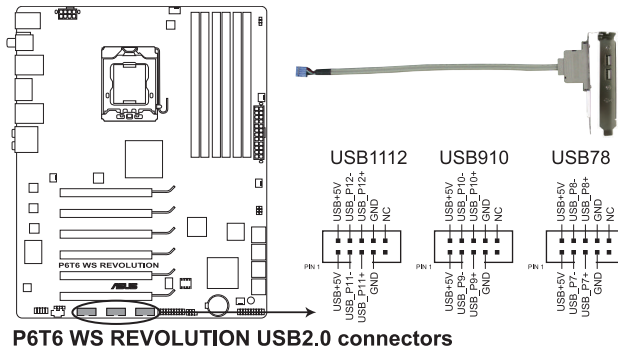
- When ICH10R SATA ports are set to RAID or AHCI mode, SAS HDDs can be detected in Windows environment only.
- Please install the Marvell® Controller driver before using the yellow SAS RAID connectors (SAS1-2). See section **4.2.2 Drivers menu** for details.
- Before creating a RAID set, see section **4.4.5 Marvell® SAS RAID configurations** for details..



Before creating a RAID set using SAS hard disk drives, make sure that you have connected the SAS signal cables and installed SAS hard disk drives; otherwise, you cannot enter the Marvell RAID utility and SAS BIOS setup during POST.

4. USB connectors (10-1 pin USB78, USB910, USB1112)

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



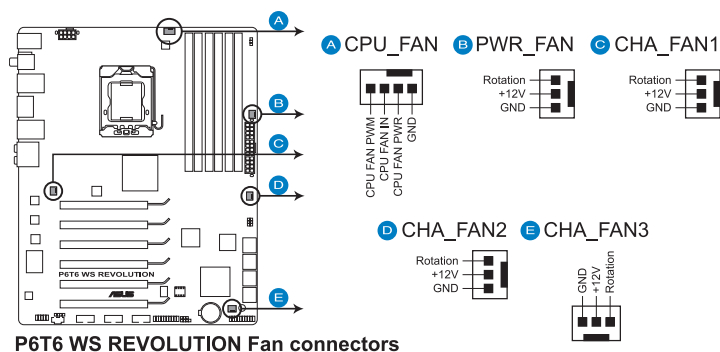
Never connect a 1394 cable to the USB connectors. Doing so will damage the motherboard!



If your chassis supports front panel USB ports, you can attach a front panel USB cable to these connectors. Connect the USB cable to ASUS Q-Connector (USB, blue) first, and then install the Q-Connector (USB) to the USB connector onboard.

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

The fan connectors support cooling fans of 350 mA ~ 2000 mA (24 W max.) or a total of 1 A ~ 7 A (84 W max.) at +12V. Connect the fan cables to the fan connectors on the motherboard, making sure that the black wire of each cable matches the ground pin of the connector.



P6T6 WS REVOLUTION Fan connectors



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

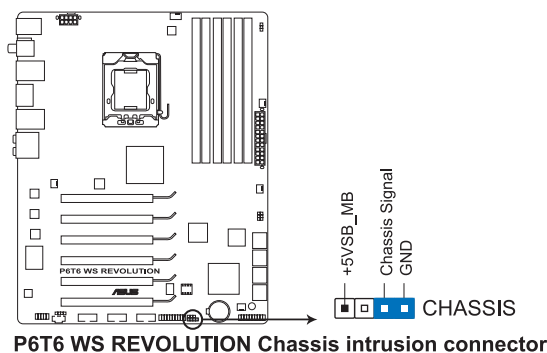


- Only the CPU-FAN and CHA-FAN 1–3 connectors support the ASUS Advanced Q-Fan feature.
- If you install two or more VGA cards, we recommend that you plug the rear chassis fan cable to the motherboard connector labeled CHA_FAN2 or CHA_FAN3 for better thermal environment.

6. Chassis intrusion connector (4-1 pin CHASSIS)

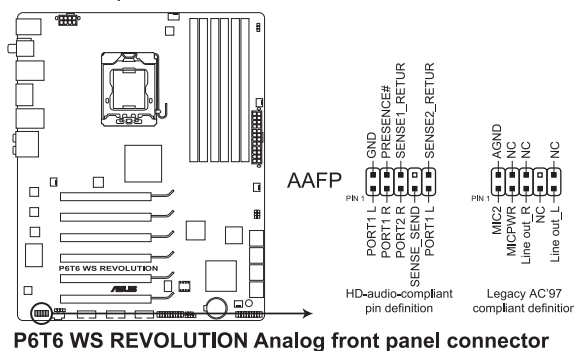
This connector is for a chassis-mounted intrusion detection sensor or switch. Connect one end of the chassis intrusion sensor or switch cable to this connector. The chassis intrusion sensor or switch sends a high-level signal to this connector when a chassis component is removed or replaced. The signal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

By default, the pin labeled “Chassis Signal” and “Ground” are shorted with a jumper cap. Remove the jumper caps only when you intend to use the chassis intrusion detection feature.



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

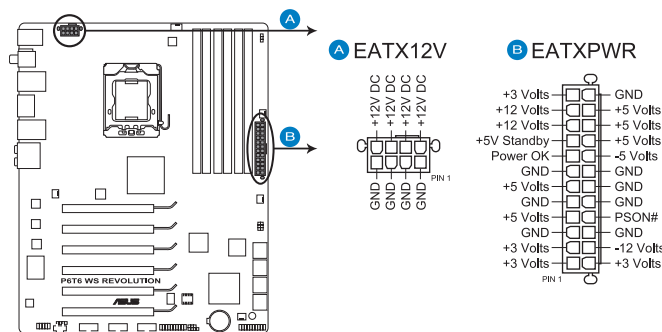
This connector is for a chassis-mounted front panel audio I/O module that supports either HD Audio or legacy AC'97 audio standard. Connect one end of the front panel audio I/O module cable to this connector.



- 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, ensure that the **Front Panel Type** item in the BIOS is set to [HD Audio]. If you want to connect an AC'97 front panel audio module to this connector, set the item to [AC97]. See page 3-25 or details.

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

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



P6T6 WS REVOLUTION ATX power connectors



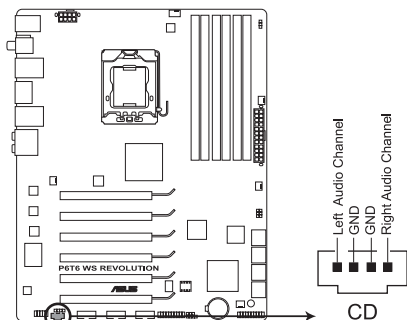
- For a fully configured system, we recommend that you use a power supply unit (PSU) that complies with ATX 12 V Specification 2.0 (or later version) and provides a minimum power of 600 W.
- Do not forget to connect the 8-pin EATX12 V power plug; otherwise, the system will not boot.
- Use of a PSU with 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 1000 W power or above to ensure the system stability.

PSU suggested list

PSU suggested list
SilverStone ST1000
Seasonic SS-600HT
Thermaltake W0083RE
Thermaltake PUREPower-600AP
Silverstone SST-ST75ZF
EnerMAX EG701AX-VE (E)(24P)

9. Optical drive audio connector (4-pin CD)

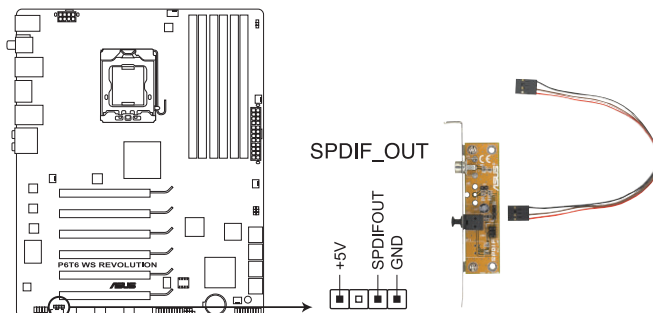
This connector allows you to receive stereo audio input from sound sources such as a CD-ROM, TV tuner, or MPEG card.



P6T6 WS REVOLUTION Internal audio connector

10. Digital audio connector (4-1 pin SPDIF_OUT)

This connector is for an additional Sony/Philips Digital Interface (S/PDIF) port(s). If you are using ASUS HDMI-equipped graphics card, connect the HDMI card to this connector with a S/PDIF out cable.



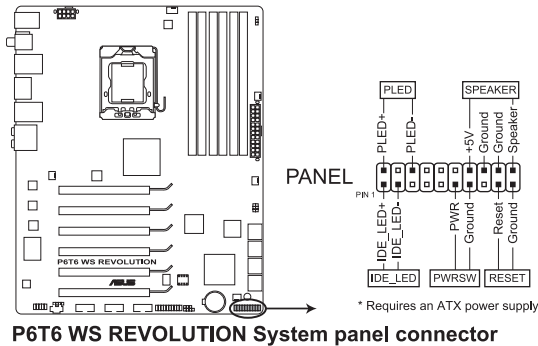
P6T6 WS REVOLUTION Digital audio connector



The S/PDIF out cable is purchased separately.

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

This connector supports several chassis-mounted functions.



P6T6 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.

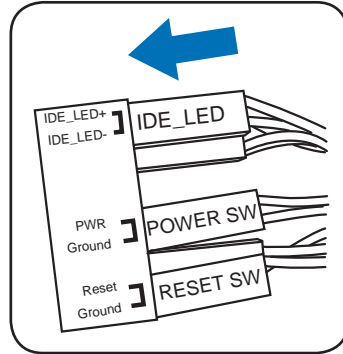
ASUS Q-Connector (system panel)

You can use the ASUS Q-Connector to connect/disconnect chassis front panel cables in a few steps. Refer to the instructions below to install the ASUS Q-Connector.

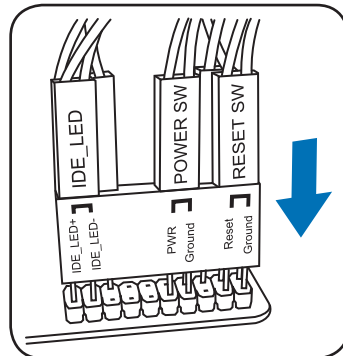
1. Connect the front panel cables to the ASUS Q-Connector.
Refer to the labels on the Q-Connector to know the detailed pin definitions, then match them to the respective front panel cable labels.



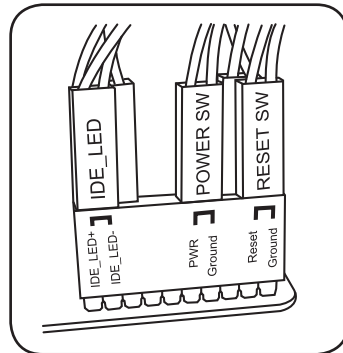
The labels on the front panel cables may vary depending on the chassis model.



2. Install the ASUS Q-Connector to the system panel connector, making sure the orientation matches the labels on the motherboard.

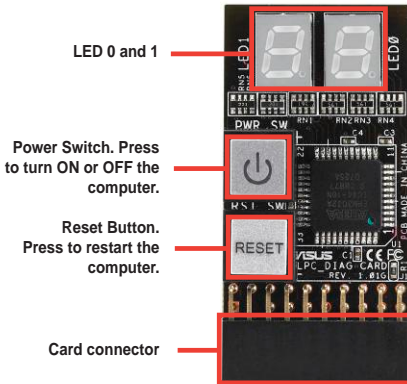


3. The front panel functions are now enabled. The figure shows the Q-Connector properly installed on the motherboard.



2.8 G.P. Diagnosis card installation

2.8.1 G.P. Diagnosis card layout

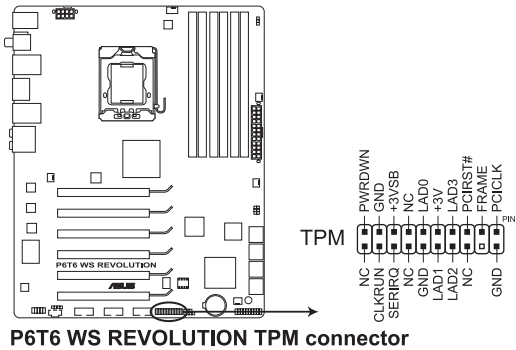


2.8.2 Installing G.P. Diagnosis card

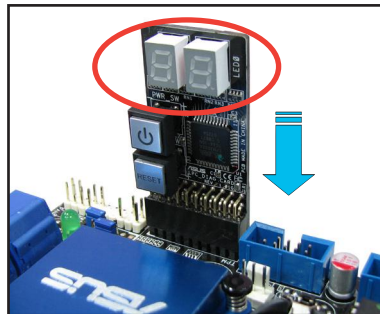


Make sure to turn off the power supply unit before installing the diagnosis card to avoid electrical shock hazard.

1. Locate the **TPM connector (20-1 pin TPM)** on the motherboard.



2. With the LEDs of the diagnosis card facing to the SATA ports, align the card connector with the TPM connector and press firmly until the card sits on the connector completely.



2.8.3 G.P. Diagnosis card check codes

D0	Initiate chip	75	Detect IDE
D1	Enable IO device for bootlock	78	Initiate option ROM
D2	Check and wake up system	85	Show post error
D3	Prepare system for memory detection and sizing	87	Enter BIOS setup
		A4	BIOS boot menu
D4	Memory test	AC	OS in PIC mode
D5	Copy BIOS from ROM to RAM	AA	OS in APIC mode
C0	Early CPU initiation	01	S1
C5	Wake up AP	03	S3
0A	Initiate KBC8042	04	S4
0B	Detect PS2 mouse	05	S5
0C	Detect PS2 keyboard	10	Resume from S1
2A	Initiate VGA BIOS	30	Resume from S3
38	USB initiation	40	Resume from S4
52	Detect System RAM	00	Leave BIOS and pass control to OS

2.9 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 "green" standards or if it has a "power standby" feature, the monitor LED may light up or switch between orange and 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 (see 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.

2.10 Turning off the computer

2.10.1 Using the OS shut down function

If you are using Windows® Vista™:

1. Click the **Start** button then select **Shut Down**.
2. The power supply should turn off after Windows® shuts down.

If you are using Windows® XP:

1. Click the **Start** button then select **Turn Off Computer**.
2. Click the **Turn Off** button to shut down the computer.
3. The power supply should turn off after Windows® shuts down.

2.10.2 Using the dual function power switch

While the system is ON, pressing the power switch for less than four seconds puts the system to sleep mode or to 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 **3.6 Power Menu** in Chapter 3 for details.

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**

Chapter summary

3

3.1	Managing and updating your BIOS	3-1
3.2	BIOS setup program	3-6
3.3	Main menu	3-9
3.4	Ai Tweaker	3-14
3.5	Advanced menu	3-22
3.6	Power menu.....	3-28
3.7	Boot menu	3-32
3.8	Tools menu	3-36
3.9	Exit menu.....	3-40

3.1 Managing and updating your BIOS

The following utilities allow you to manage and update the motherboard Basic Input/Output System (BIOS) setup.

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 utility:** Restores the BIOS using the motherboard support DVD or a USB flash drive when the BIOS file fails or gets corrupted.

Refer to the corresponding sections for details on these utilities.



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

3.1.1 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:

- Save the current BIOS file
- Download the latest BIOS file from the Internet
- Update the BIOS from an updated BIOS file
- Update the BIOS directly from the Internet
- 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).

Installing ASUS Update

To install ASUS Update:

1. Place the support DVD in the optical drive.
2. From the **Main** menu, click the **Utilities** tab, and then click **Install ASUS Update VX.XX.XX**.
3. The ASUS Update utility is copied to your system.

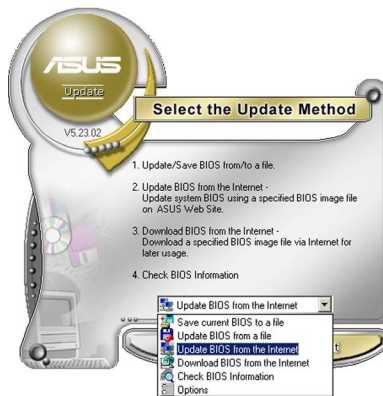
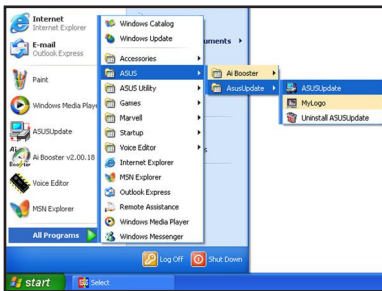
Updating the BIOS through the Internet



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

To update the BIOS through the Internet

1. From the Windows® desktop, click **Start > Programs > ASUS > ASUSUpdate > ASUSUpdate**. The ASUS Update main window appears.
2. Select **Update BIOS from the Internet** from the drop-down menu, and then click **Next**.



3. Select the ASUS FTP site nearest you to avoid network traffic, or click **Auto Select**. Click **Next**.
4. From the FTP site, select the BIOS version that you wish to download. Click **Next**.



5. Follow the onscreen instructions to complete the update process.

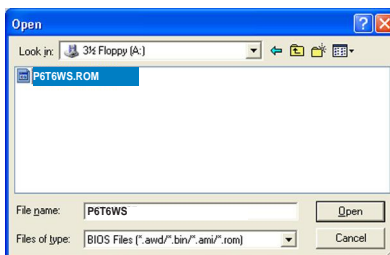
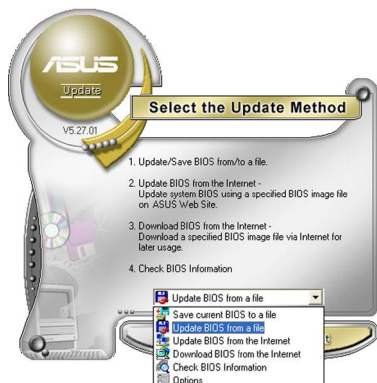


The ASUS Update utility is capable of updating itself through the Internet. Always update the utility to avail all its features.

Updating the BIOS through a BIOS file

To update the BIOS through a BIOS file

1. From the Windows® desktop, click **Start > Programs > ASUS > ASUSUpdate > ASUSUpdate**. The ASUS Update main window appears.
2. Select **Update BIOS from a file** from the dropdown menu, then click **Next**.
3. Locate the BIOS file from the Open window, then click **Open**.
4. Follow the onscreen instructions to complete the update process.



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

3.1.2 ASUS EZ Flash 2 utility

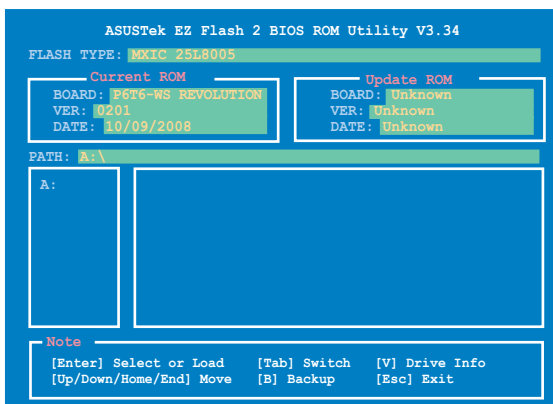
The ASUS EZ Flash 2 feature allows you to update the BIOS without having to use a bootable floppy disk or an OS-based utility.



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

To update the BIOS using EZ Flash 2

1. Insert the USB flash drive that contains the latest BIOS file to the USB port, and then launch EZ Flash 2 in any of these two ways:
 - Press <Alt> + <F2> during POST to display the following.
 - Enter the BIOS setup program. Go to the **Tools** menu to select **EZ Flash 2** and press <Enter> to enable it.



2. Press <Tab> to switch between drives until the correct BIOS file is found. When found, EZ Flash 2 performs the BIOS update process and automatically reboots the system when done.



-
- This function can support devices such as a USB flash drive 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 Setup Defaults** item under the **Exit** menu. Refer to section **3.9 Exit Menu** for details.

3.1.3 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 starts flashing the corrupted BIOS file.
4. Turn off the system after the utility completes the updating process and power on again.
5. The system requires you to enter BIOS Setup to recover BIOS setting. To ensure system compatibility and stability, we recommend that you press <F2> to load default BIOS values.



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

3.2 BIOS setup program

This motherboard supports a programmable firmware chip that you can update using the provided utility described in section **3.1 Managing and updating your BIOS**.

Use the BIOS Setup program when you are installing a motherboard, reconfiguring your system, or prompted to “Run Setup.” This section explains how to configure your system using this utility.

Even if you are not prompted to use the Setup program, you can change the configuration of your computer in the future. For example, you can enable the security password feature or change the power management settings. This requires you to reconfigure your system using the BIOS Setup program so that the computer can recognize these changes and record them in the CMOS RAM of the firmware chip.

The firmware chip on the motherboard stores the Setup utility. 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.

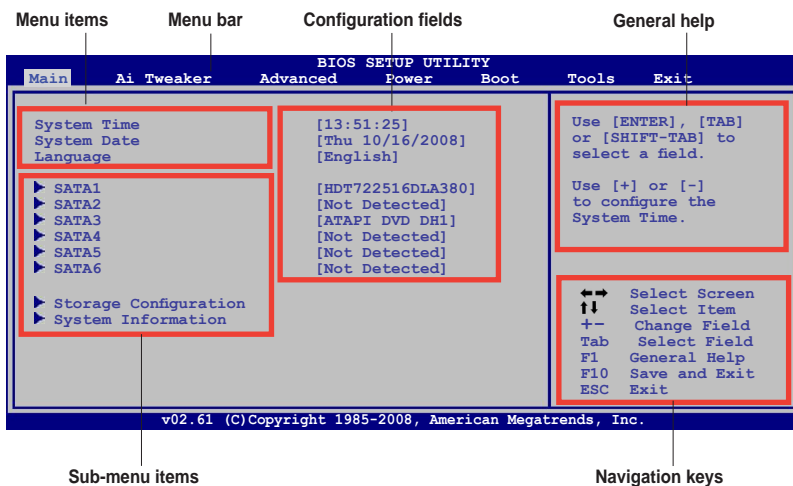
If you wish to enter Setup after POST, restart the system by pressing <Ctrl+Alt+Delete>, or by pressing the reset button on the system chassis. You can also restart by turning the system off and then back on. Do this last option only if the first two failed.

The 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 sub-menus and make your selections from the available options using the navigation keys.



- The default BIOS settings for this motherboard apply for most conditions to ensure optimum performance. If the system becomes unstable after changing any BIOS settings, load the default settings to ensure system compatibility and stability. Select the **Load Setup Defaults** item under the Exit Menu. See section **3.9 Exit Menu**.
- The BIOS setup screens shown in this section are for reference purposes only, and may not exactly match what you see on your screen.
- Visit the ASUS website (www.asus.com) to download the latest BIOS file for this motherboard.

3.2.1 BIOS menu screen



3.2.2 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
- Power** For changing the advanced power management (APM) configuration
- Boot** For changing the system boot configuration
- Tools** For configuring options for special functions
- Exit** For selecting the exit options and loading default settings

To select an item on the menu bar, press the right or left arrow key on the keyboard until the desired item is highlighted.

3.2.3 Navigation keys

At the bottom right corner of a menu screen are the navigation keys for that particular menu. Use the navigation keys to select items in the menu and change the settings.

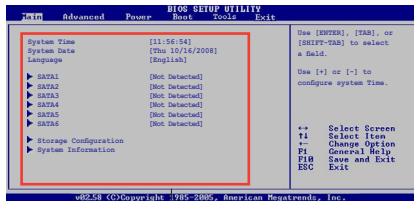


The navigation keys may differ from one screen to another.

3.2.4 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 (Advanced, Power, Boot, and Exit) on the menu bar have their respective menu items.



Main menu items

3.2.5 Sub-menu items

A solid triangle before each item on any menu screen means that the item has a sub-menu. To display the sub-menu, select the item and press <Enter>.

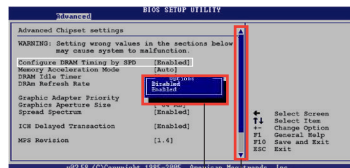
3.2.6 Configuration fields

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 enclosed in brackets, and is highlighted when selected. To change the value of a field, select it then press <Enter> to display a list of options. Refer to 3.2.7 Pop-up window.

3.2.7 Pop-up window

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



Pop-up window

Scroll bar

3.2.8 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.

3.2.9 General help

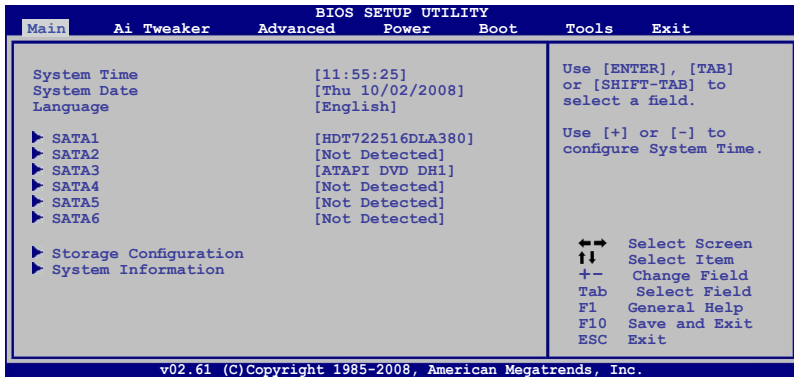
At the top right corner of the menu screen is a brief description of the selected item.

3.3 Main menu

When you enter the BIOS Setup program, the Main menu screen appears, giving you an overview of the basic system information.



Refer to section **3.2.1 BIOS menu screen** for information on the menu screen items and how to navigate through them.



3.3.1 System Time [xx:xx:xx]

Allows you to set the system time.

3.3.2 System Date [Day xx/xx/xxxx]

Allows you to set the system date.

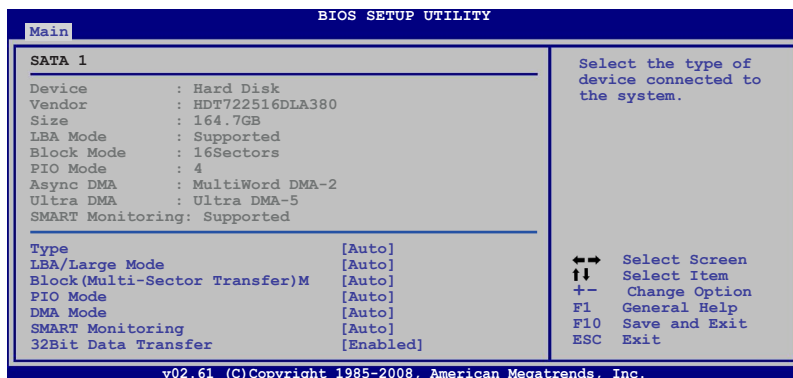
3.3.3 Language [English]

Allows you to select the display language for the BIOS setup screen.

Configuration options: [Chinese(BIG5)] [Chinese(GB)] [Japanese] [French] [German] [English]

3.3.4 SATA 1-6

While entering Setup, the BIOS automatically detects the presence of Serial ATA devices. There is a separate sub-menu for each SATA device. Select a device item then press <Enter> to display the SATA device information.



The BIOS automatically detects the values opposite the dimmed items (Device, Vendor, Size, LBA Mode, Block Mode, PIO Mode, Async DMA, Ultra DMA, and SMART monitoring). These values are not user-configurable. These items show N/A if no SATA device is installed in the system.

Type [Auto]

Selects the type of drive connected to the system. Setting to [Auto] allows automatic selection of the appropriate IDE device type. Select [CDROM] if you are specifically configuring a CD-ROM drive. Select [ARMD] (ATAPI Removable Media Device) if your device is either a ZIP, LS-120, or MO drive.

Configuration options: [Not Installed] [Auto] [CDROM] [ARMD]

LBA/Large Mode [Auto]

Enables or disables the LBA mode. Setting to [Auto] enables the LBA mode if the device supports this mode, and if the device was not previously formatted with LBA mode disabled. Configuration options: [Disabled] [Auto]

Block (Multi-Sector Transfer) M [Auto]

Enables or disables data multi-sectors transfers. When set to [Auto], the data transfer from and to the device occurs multiple sectors at a time if the device supports multi-sector transfer feature. When set to [Disabled], the data transfer from and to the device occurs one sector at a time.

Configuration options: [Disabled] [Auto]

PIO Mode [Auto]

Allows you to select the data transfer mode.

Configuration options: [Auto] [0] [1] [2] [3] [4]

DMA Mode [Auto]

Selects the DMA mode.

Configuration options: [Auto] [SWDMA0] [SWDMA1] [SWDMA2] [MWDMA0] [MWDMA1] [MWDMA2] [UDMA0] [UDMA1] [UDMA2] [UDMA3] [UDMA4] [UDMA5]

SMART Monitoring [Auto]

Sets the Self-Monitoring, Analysis, and Reporting Technology.

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

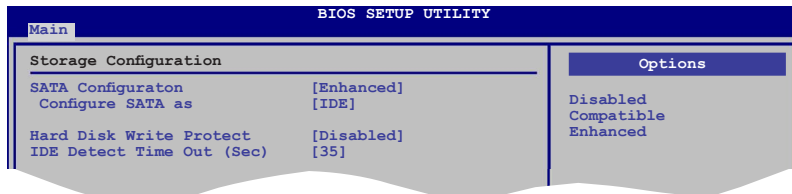
32Bit Data Transfer [Enabled]

Enables or disables 32-bit data transfer.

Configuration options: [Disabled] [Enabled]

3.3.5 Storage Configuration

The items in this menu allow you to set or change the configurations for the SATA devices installed in the system. Select an item then press <Enter> if you want to configure the item.



SATA Configuration [Enhanced]

Configuration options: [Disabled] [Compatible] [Enhanced]

Configure SATA as [IDE]

Sets the configuration for the Serial ATA connectors supported by the Southbridge chip. Configuration options: [IDE] [RAID] [AHCI]



- If you want to use the Serial ATA hard disk drives as Parallel ATA physical storage devices, keep the default setting [IDE].
- If you want the Serial ATA hard disk drives to use the Advanced Host Controller Interface (AHCI), set this item to [AHCI]. 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.
- If you want to create a RAID 0, RAID 1, RAID 5, RAID 10, or the Intel® Matrix Storage Technology configuration from the Serial ATA hard disk drives, set this item to [RAID].

Hard Disk Write Protect [Disabled]

Disables or enables device write protection. This will be effective only if the device is accessed through BIOS.

Configuration option: [Disabled] [Enabled]

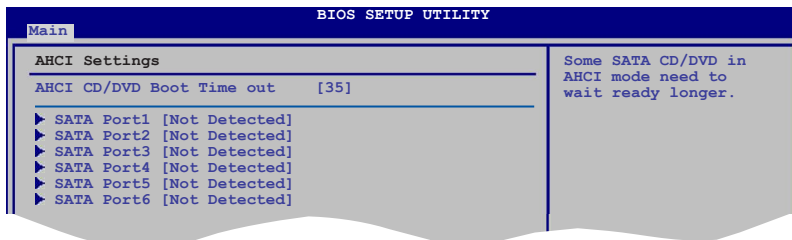
IDE Detect Time Out (Sec) [35]

Selects the time out value for detecting ATA/ATAPI devices.

Configuration options: [0] [5] [10] [15] [20] [25] [30] [35]

3.3.6 AHCI Configuration

This menu is the section for AHCI configuration. It appears only when you set the item **Configure SATA as** from the sub-menu of **SATA Configuration** to [AHCI].



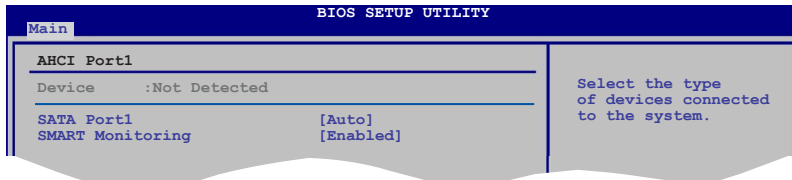
AHCI CD/DVD Boot Time out [35]

Selects the boot time out value for SATA CD/DVD devices in AHCI mode.

Configuration options: [0] [5] [10] [15] [20] [25] [30] [35]

AHCI Port1–6 [XXXX]

Displays the status of auto-detection of SATA devices.



SATA Port1 [Auto]

Allows you to select the type of device connected to the system.

Configuration options: [Auto] [Not Installed]

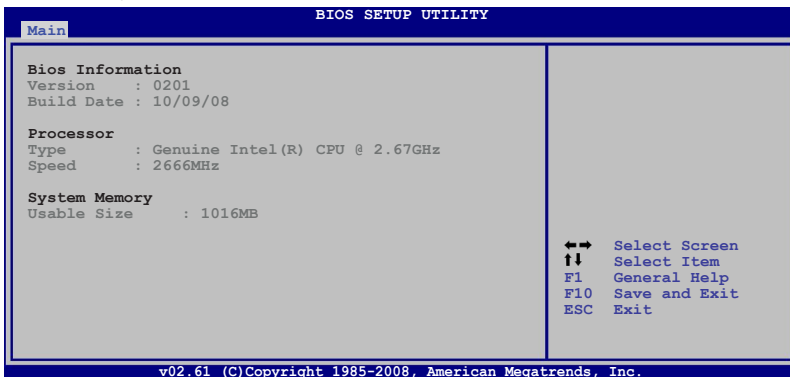
SMART Monitoring [Enabled]

Allows you to set the Self-Monitoring, Analysis and Reporting Technology.

Configuration options: [Disabled] [Enabled]

3.3.7 System Information

This menu gives you an overview of the general system specifications. The BIOS automatically detects the items in this menu.



Bios Information

Displays the auto-detected BIOS information.

Processor

Displays the auto-detected CPU specification.

System Memory

Displays the auto-detected system memory.

3.4 Ai Tweaker menu

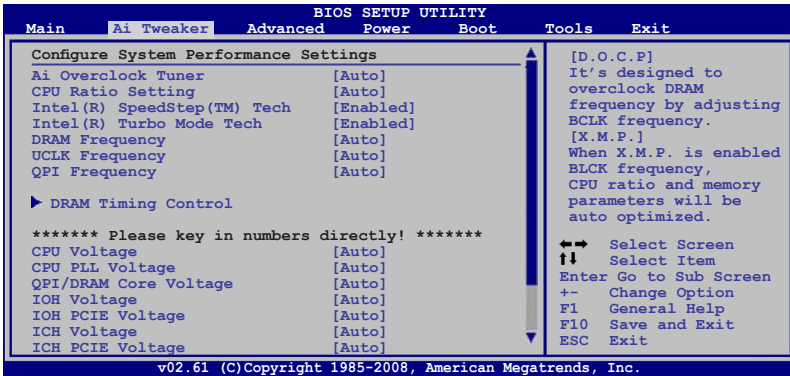
The Ai Tweaker menu items allow you to configure overclocking-related items.



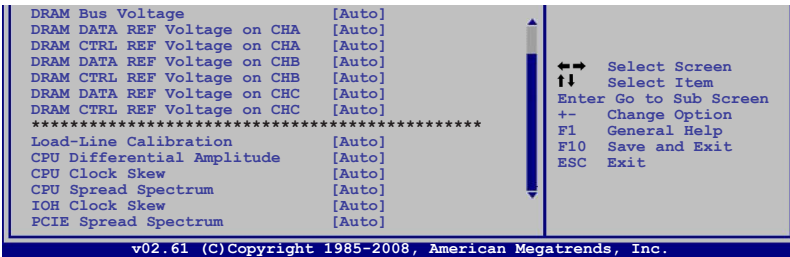
Take caution when changing the settings of the Ai Tweaker menu items. Incorrect field values can cause the system to malfunction.



The default values of the following items vary depending on the CPU and memory modules you install on the motherboard.



Scroll down to display the following items:



3.4.1 Ai Overclock Tuner [Auto]

Allows selection of CPU overclocking options to achieve desired CPU internal frequency. Select either one of the preset overclocking configuration options:

Manual	Allows you to individually set overclocking parameters.
Auto	Loads the optimal settings for the system.
D.O.C.P	Overclocks DRAM frequency by adjusting BCLK frequency.
X.M.P.	If you install memory module(s) supporting the eXtreme Memory Profile (X.M.P.) Technology, choose this item to set the profile(s) supported by your memory module(s) for optimizing the system performance.



The configuration options for the following sub-item vary depending on the DIMMs you install on the motherboard.

DRAM O.C. Profile [DDR3-1339MHz]

This item appears only when you set the **Ai Overclock Tuner** item to [D.O.C.P.] and allows you to select a DRAM O.C. profile, which applies different settings to DRAM frequency, DRAM timing and DRAM voltage.
Configuration options: [DDR3-1339MHz] [DDR3-1603MHz]

eXtreme Memory Profile [High Performance]

This item appears only when you set the **Ai Overclock Tuner** item to [X.M.P.] and allows you to select the X.M.P. mode supported by your memory module.
Configuration options: [High Performance] [High Frequency]



To obtain the best performance of the X.M.P. DIMM or 1600MHz DIMM, install only one DIMM on each memory channel.

3.4.2 CPU Ratio Setting [Auto]

Allows you to adjust the ratio between CPU Core Clock and BCLK Frequency. Use the <+> and <-> keys to adjust the value.

3.4.3 Intel(R) SpeedStep(TM) Tech [Enabled]

When set to [Disabled], the CPU runs at its default speed. When set to [Enabled], the CPU speed is controlled by the operating system.
Configuration options: [Disabled] [Enabled]

3.4.4 Intel(R) Turbo Mode Tech [Enabled]

Turbo mode allows processor cores to run faster than marked frequency in specific condition. Configuration options: [Disabled] [Enabled]



The following two items appear only when you set the **Ai Overclock Tuner** item to [Manual], [D.O.C.P.] or [X.M.P.].

BCLK Frequency [XXX]

Allows you to adjust the Internal Base Clock (BCLK). Use the <+> and <-> keys to adjust the value. You can also type the desired value using the numeric keypad. The values range from 100 to 500.

PCIe Frequency [XXX]

Allows you to set the PCI Express frequency. Use the <+> and <-> keys to adjust the PCIe frequency. The values range from 100 to 200.

3.4.5 DRAM Frequency [Auto]

Allows you to set the DDR3 operating frequency.

Configuration options: [Auto] [DDR3-800MHz] [DDR3-1066MHz]



The **DRAM Frequency** configuration options vary with the **BCLK Frequency** item settings.



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

3.4.6 UCLK Frequency [Auto]

Allows you to set the Uncore Clock Ratio (UCLK).

Configuration options: [Auto] [DDR3-1600MHz] [DDR3-2033MHz]



The **UCLK Frequency** configuration options vary with the **DRAM Frequency** item settings.

3.4.7 QPI Frequency [Auto]

Allows you to set the QuickPath Interconnect (QPI) frequency.

Configuration options: [Auto] [4331MHz] [5293MHz] [5774MHz]

3.4.8. DRAM Timing Control [Auto]

The items in this menu allow you to set the DRAM timing control features.



The configuration options for some of the following items vary depending on the DIMMs you install on the motherboard.

1st Information: 6-6-6-15-4-36-6-3-16-4

The values vary depending on your settings of the following sub-items:

DRAM CAS# Latency [Auto]

Configuration options: [Auto] [3 DRAM Clock] [4 DRAM Clock] – [10 DRAM Clock] [11 DRAM Clock]

DRAM RAS# to CAS# Delay [Auto]

Configuration options: [Auto] [3 DRAM Clock] [4 DRAM Clock] – [9 DRAM Clock] [10 DRAM Clock]

DRAM RAS# PRE Time [Auto]

Configuration options: [Auto] [3 DRAM Clock] [4 DRAM Clock] – [9 DRAM Clock] [10 DRAM Clock]

DRAM RAS# ACT Time [Auto]

Configuration options: [Auto] [3 DRAM Clock] [4 DRAM Clock] – [32 DRAM Clock] [33 DRAM Clock]

DRAM RAS# to RAS# Delay [Auto]

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

DRAM REF Cycle Time [Auto]

Configuration options: [Auto] [30 DRAM Clock] [36 DRAM Clock]
[48 DRAM Clock] [60 DRAM Clock] [72 DRAM Clock] [82 DRAM Clock]
[88 DRAM Clock] [90 DRAM Clock] [100 DRAM Clock] [110 DRAM Clock]

DRAM WRITE Recovery Time [Auto]

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

DRAM READ to PRE Time [Auto]

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

DRAM FOUR ACT WIN Time [Auto]

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

DRAM WRITE to READ Delay [Auto]

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

2nd Information: 1N-52-0-0

The values vary depending on your settings of the following sub-items:

DRAM Timing Mode [Auto]

Configuration options: [Auto] [1N] [2N] [3N]

DRAM Round Trip Latency on CHA [Auto]

[Auto] [Advance 15 Clock]–[Advance 1 Clock] [Normal] [Delay 1 Clock]
[Delay 15 Clock]

DRAM Round Trip Latency on CHB [Auto]

[Auto] [Advance 15 Clock]–[Advance 1 Clock] [Normal] [Delay 1 Clock]
[Delay 15 Clock]

DRAM Round Trip Latency on CHC [Auto]

[Auto] [Advance 15 Clock]–[Advance 1 Clock] [Normal] [Delay 1 Clock]
[Delay 15 Clock]

3rd Information: 6-6-13-9-9-7-6-4-7-7-4

The values vary depending on your settings of the following sub-items:

DRAM WRITE to READ Delay(DD) [Auto]

Configuration options: [Auto] [1 DRAM Clock] – [8 DRAM Clock]

DRAM WRITE to READ Delay(DR) [Auto]

Configuration options: [Auto] [1 DRAM Clock] – [8 DRAM Clock]

DRAM WRITE to READ Delay(SR) [Auto]

Configuration options: [Auto] [10 DRAM Clock] – [25 DRAM Clock]

DRAM READ to WRITE Delay(DD) [Auto]

Configuration options: [Auto] [2 DRAM Clock] – [14 DRAM Clock]

DRAM READ to WRITE Delay(DR) [Auto]

Configuration options: [Auto] [2 DRAM Clock] – [14 DRAM Clock]

DRAM READ to WRITE Delay(SR) [Auto]

Configuration options: [Auto] [2 DRAM Clock] – [14 DRAM Clock]

DRAM READ to READ Delay(DD) [Auto]

Configuration options: [Auto] [2 DRAM Clock] – [9 DRAM Clock]

DRAM READ to READ Delay(DR) [Auto]

Configuration options: [Auto] [2 DRAM Clock] – [9 DRAM Clock]

DRAM READ to READ Delay(SR) [Auto]

Configuration options: [Auto] [4 DRAM Clock] [6 DRAM Clock]

DRAM WRITE to WRITE Delay(DD) [Auto]

Configuration options: [Auto] [2 DRAM Clock] – [9 DRAM Clock]

DRAM WRITE to WRITE Delay(DR) [Auto]

Configuration options: [Auto] [2 DRAM Clock] – [9 DRAM Clock]

DRAM WRITE to WRITE Delay(SR) [Auto]

Configuration options: [Auto] [4 DRAM Clock] [6 DRAM Clock]



The following fourteen (14) 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.

3.4.9 CPU Voltage [Auto]

Allows you to set the CPU VCore voltage. The values range from 0.85000V to 2.10000V* with a 0.00625V interval.



- Refer to the CPU documentation before setting the CPU Vcore voltage. Setting a high VCore voltage may damage the CPU permanently, and setting a low VCore voltage may make the system unstable.
- The value [2.10000V] of the CPU Voltage item is supported only if the **OV_CPU** jumper is enabled. Otherwise the maximum voltage supported is [1.70000V]. See 2. **CPU / DRAM Bus / QPI DRAM overvoltage setting** on page 2-22 for details.

3.4.10 CPU PLL Voltage [Auto]

Allows you to set the CPU PLL voltage. The values range from 1.80V to 2.50V with a 0.02V interval.

3.4.11 QPI/DRAM Core Voltage [Auto]

Allows you to set the QPI/DRAM Core voltage. The values range from 1.20000V to 1.90000V* with a 0.00625V interval.



The value [1.90000V] of the **QPI/DRAM Core Voltage** item is supported only if the **OV_QPI_DRAM** jumper is enabled. Otherwise the maximum voltage supported is [1.70000V]. See 2. **CPU / DRAM Bus / QPI DRAM overvoltage setting** on page 2-22 for details.

3.4.12 IOH Voltage [Auto]

Allows you to set the I/O Hub (IOH) voltage. The values range from 1.10V to 1.70V with a 0.02V interval.

3.4.13 IOH PCIE Voltage [Auto]

Allows you to set the IOH PCIE voltage. The values range from 1.50V to 2.76V with a 0.02V interval.

3.4.14 ICH Voltage [Auto]

Allows you to set the I/O Controller Hub (ICH) voltage. The values range from 1.10V to 1.40V with a 0.10V interval.

3.4.15 ICH PCIE Voltage [Auto]

Allows you to set the SB PCIE voltage. The values range from 1.50V to 1.80V with a 0.10V interval.



The highest value of the **ICH PCIE Voltage** item is limited by the **DRAM Bus Voltage** item.

3.4.16 DRAM Bus Voltage [Auto]

Allows you to set the DRAM voltage. The values range from 1.50V to 2.46V* with a 0.02V interval.



-
- The value [2.46V] of the **DRAM Bus Voltage** item is supported only if the **OV_DRAM_BUS** jumper is enabled, otherwise the maximum voltage supported is [1.90V]. See **CPU / DRAM Bus / QPI DRAM overvoltage setting** on page 2-22 for details.
 - 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.
 - The values of the **CPU Voltage**, **CPU PLL Voltage**, **QPI/DRAM Core Voltage**, **IOH Voltage**, **IOH PCIE Voltage**, **ICH Voltage**, **ICH PCIE Voltage**, and **DRAM Bus Voltage** items are labeled in different color, indicating the risk levels of high voltage settings. Refer to the table on the next page for details.
 - The system may need better cooling system to work stably under high voltage settings.
-

	Blue	Yellow	Purple	Red
CPU Voltage	0.85000V– 1.22500V	1.23125V– 1.29375V	1.30000V– 1.35000V	1.35625V– 1.70000V
CPU PLL Voltage	1.80V–1.90V	1.92V–2.00V	2.02V–2.10V	2.12V–2.50V
QPI/DRAM Core Voltage	1.20000V– 1.26875V	1.27500V– 1.32500V	1.33125V– 1.40000V	1.40625V– 1.70000V
IOH Voltage	1.10V–1.18V	1.20V–1.24V	1.26V–1.30V	1.32V–1.70V
IOH PCIE Voltage	1.50V–1.58V	1.60V–1.66V	1.68V–1.74V	1.76V–2.76V
ICH Voltage	1.10V–1.20V	1.30V–1.40V	N/A	N/A
ICH PCIE Voltage	1.50V–1.60V	1.70V–1.80V	N/A	N/A
DRAM Bus Voltage	1.50V–1.64V	N/A	N/A	1.66V–2.46V

3.4.17 DRAM DATA REF Voltage on CHA/B/C [Auto]

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

3.4.18 DRAM CTRL REF Voltage on CHA/B/C [Auto]

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

3.4.19 Load-Line Calibration [Auto]

Allows you to select the CPU Load-Line mode. Set to [Disabled] to follow Intel specifications, or to [Enabled] to improve CPU VDrop directly.
Configuration options: [Auto] [Disabled] [Enabled]

3.4.20 CPU Differential Amplitude [Auto]

Different AMP might enhance BCLK overclocking ability.
Configuration options: [Auto] [700mV] [800mV] [900mV] [1000mV]

3.4.21 CPU Clock Skew [Auto]

Adjusting this item may help enhancing BCLK overclocking ability. You may need to adjust the **IOH Clock Skew** item at the same time.
Configuration options: [Auto] [Normal] [Delay 100ps]–[Delay 1500ps]

3.4.22 CPU Spread Spectrum [Auto]

Set to [Disabled] to enhance BCLK overclocking ability or [Auto] for EMI control.
Configuration options: [Auto] [Disabled] [Enabled]

3.4.23 IOH Clock Skew [Auto]

Adjusting this item may help enhancing BCLK overclocking ability. You may need to adjust the **CPU Clock Skew** item at the same time.

Configuration options: [Auto] [Normal] [Delay 100ps]–[Delay 1500ps]

3.4.24 PCIE Spread Spectrum [Auto]

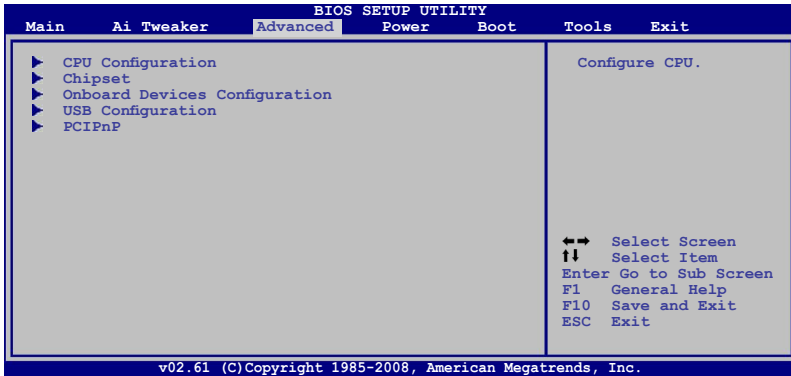
Set to [Disabled] to enhance PCIE overclocking ability or [Auto] for EMI control.
Configuration options: [Auto] [Disabled] [Enabled]

3.5 Advanced menu

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



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

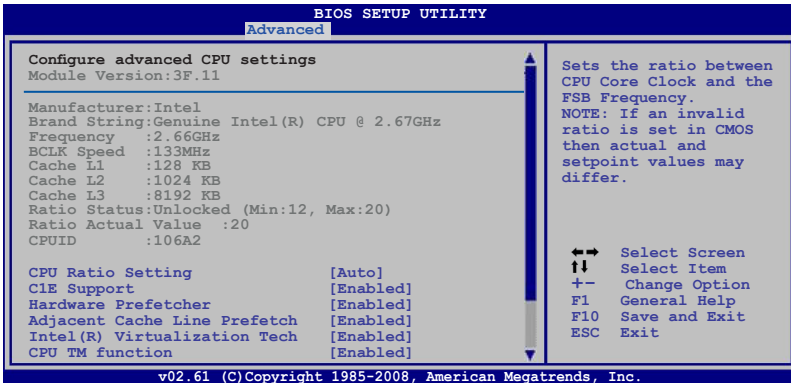


3.5.1 CPU Configuration

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 Setting [Auto]

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

C1E Support [Enabled]

Allows you to enable or disable Enhanced Halt State support.

Configuration options: [Disabled] [Enabled]

Hardware Prefetcher [Enabled]

Allows you to enable or disable the Hardware Prefetcher function.

Configuration options: [Disabled] [Enabled]

Adjacent Cache Line Prefetch [Enabled]

Allows you to enable or disable the Adjacent Cache Line Prefetch function.

Configuration options: [Disabled] [Enabled]

Intel(R) Virtualization Tech [Enabled]

The Intel® Virtualization Technology allows a hardware platform to run multiple operating systems separately and simultaneously, enabling one system to virtually function as several systems. Configuration options: [Disabled] [Enabled]

CPU TM Function [Enabled]

This function enables the overheated CPU to throttle the clock speed to cool down.

Configuration options: [Disabled] [Enabled]

Execute-Disable Bit [Enabled]

Allows you to enable or disable the No-Execution Page Protection Technology.

Setting this item to [Disabled] forces the XD feature flag to always return to zero (0). Configuration options: [Disabled] [Enabled]

Intel(R) HT Technology [Enabled]

Allows you to enable or disable the Intel Hyper-Threading Technology function.

When disabled, only one thread per activated core is enabled.

Configuration options: [Enabled] [Disabled]

Active Processor Cores [All]

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

A20M [Disabled]

Legacy OSeS and APs may need A20M enabled.

Configuration options: [Disabled] [Enabled]

Intel(R) SpeedStep (TM) Tech [Enabled]

When set to [Disabled], the CPU runs at its default speed. When set to [Enabled], the CPU speed is controlled by the operating system.

Configuration options: [Disabled] [Enabled]

Intel(R) TurboMode tech [Enabled]

Turbo mode allows processor cores to run faster than marked frequency in specific condition. Configuration options: [Disabled] [Enabled]

Intel(R) C-STATE Tech [Disabled]

The Intel® C-State Technology allows the CPU to save more power under idle mode. Enable this item only when you install a C-State Technology-supported CPU. Configuration options: [Disabled] [Enabled]

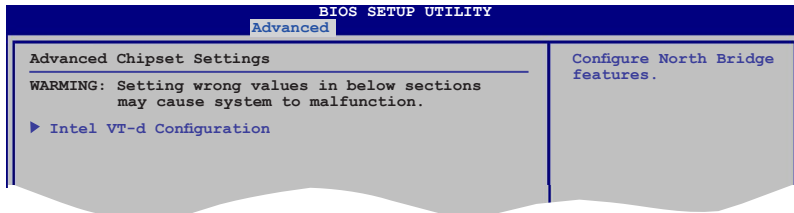
C State package limit setting [Auto]

This item appears only when you set the **Intel(R) C-STATE Tech** item to [Enabled]. We recommend that you set this item to [Auto] for BIOS to automatically detect the C-State mode supported by your CPU.

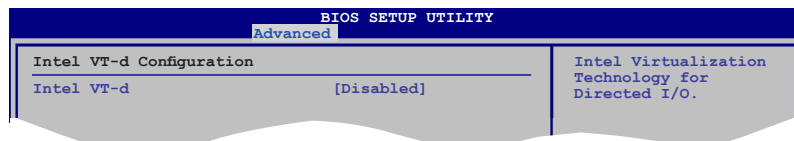
Configuration options: [Auto] [C1] [C3] [C6] [C7]

3.5.2 Chipset

The Chipset menu allows you to change the advanced chipset settings. Select an item then press <Enter> to display the sub-menu.



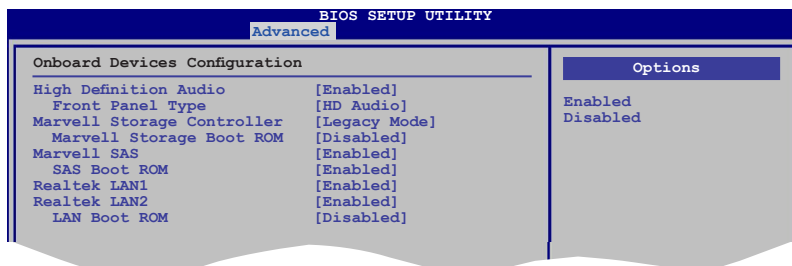
Intel VT-d Configuration



Intel VT-d [Disabled]

Allows you to enable or disable the Intel Virtualization Technology for Directed I/O. Configuration options: [Disabled] [Enabled]

3.5.3 Onboard Device Configuration



High Definition Audio [Enabled]

Allows you to enable or disable the High Definition Audio Controller.

Configuration options: [Enabled] [Disabled]

Front Panel Type [HD Audio]

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. Configuration options: [AC97] [HD Audio]

Marvell Storage Controller [Legacy Mode]

Allows you to select the onboard Marvell storage controller mode.

Configuration options: [Legacy Mode] [RAID Mode] [Disabled]

Marvell Storage Boot ROM [Disabled]

This item appears only when you set the previous item to [Legacy Mode] or [RAID Mode]. Configuration options: [Disabled] [Enabled]

Marvell SAS [Enabled]

Allows you to enable or disable the onboard Marvell SAS controller.

Configuration options: [Enabled] [Disabled]

SAS Boot ROM [Enabled]

This item appears only when you set the previous item to [Enabled].

Configuration options: [Disabled] [Enabled]



Due to DOS environment limitation, only one Boot ROM can be enabled and set as the boot device. If you enable the **Marvell Storage Boot ROM** item or set ICH10R SATA mode to [RAID], the **SAS Boot ROM** item will be disabled and hidden.

Realtek LAN1/2 [Enabled]

Allows you to enable or disable the onboard Realtek LAN port1/2.

Configuration options: [Enabled] [Disabled]

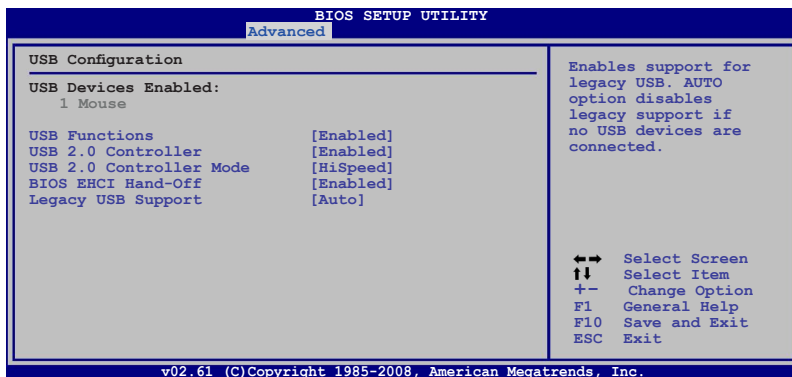
LAN Boot ROM [Disabled]

This item appears only when you enable the previous item.

Configuration options: [Disabled] [Enabled]

3.5.4 USB Configuration

The items in this menu allows you to change the USB-related features. Select an item then press <Enter> to display the configuration options.



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

USB Functions [Enabled]

Allows you to enable or disable the USB Host Controllers.
Configuration options: [Disabled] [Enabled]



The following items appear only when you set **USB Functions** to [Enabled].

USB 2.0 Controller [Enabled]

Allows you to enable or disable the USB 2.0 controller.
Configuration options: [Enabled] [Disabled]

USB 2.0 Controller Mode [HiSpeed]

Allows you to set the USB 2.0 controller mode to HiSpeed (480 Mbps) or FullSpeed (12 Mbps). Configuration options: [FullSpeed] [HiSpeed]



The **USB 2.0 Controller Mode** item appears only when you enable the **USB 2.0 Controller**.

BIOS EHCI Hand-off [Enabled]

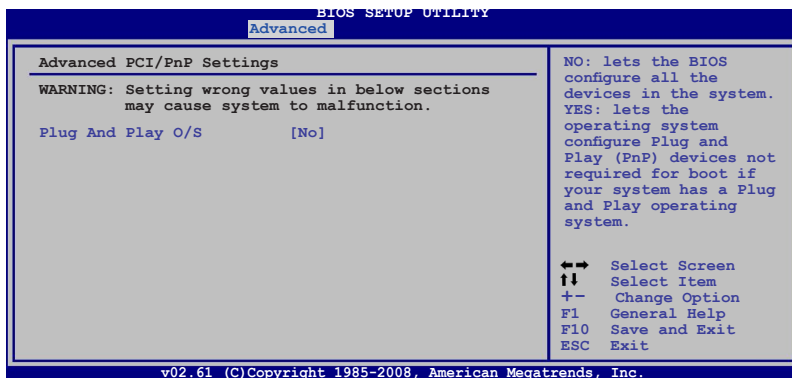
Allows you to enable the support for operating systems without an EHCI hand-off feature. Configuration options: [Disabled] [Enabled]

Legacy USB Support [Auto]

Allows you to enable or disable the support for legacy USB devices. Setting to [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. Configuration options: [Disabled] [Enabled] [Auto]

3.5.5 PCIPnP

The PCIPnP menu items allow you to change the advanced settings for PCI/PnP devices.



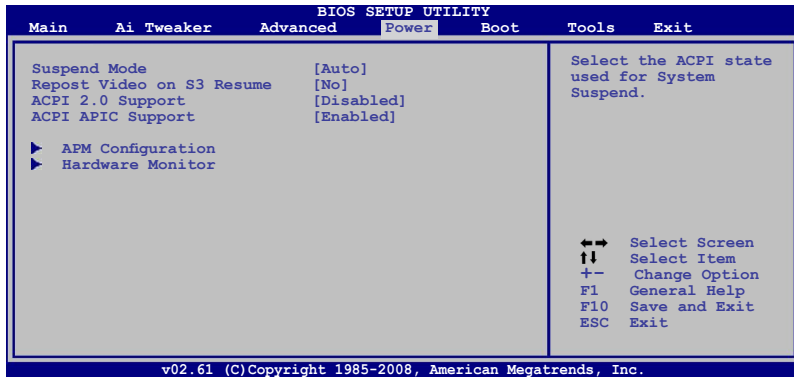
Plug And Play O/S [No]

When set to [NO], BIOS configures all the devices in the system. When set to [YES] and if you install a Plug and Play operating system, the operating system configures the Plug and Play devices not required for boot.

Configuration options: [No] [Yes]

3.6 Power menu

The Power menu items allow you to change the settings for the Advanced Power Management (APM). Select an item then press <Enter> to display the configuration options.



3.6.1 Suspend Mode [Auto]

Allows you to select the Advanced Configuration and Power Interface (ACPI) state to be used for system suspend.

Configuration options: [S1 (POS) Only] [S3 Only] [Auto]

3.6.2 Repost Video on S3 Resume [No]

Determines whether to invoke VGA BIOS POST on S3/STR resume.

Configuration options: [No] [Yes]

3.6.3 ACPI 2.0 Support [Disabled]

Add additional tables as per ACPI 2.0 specifications.

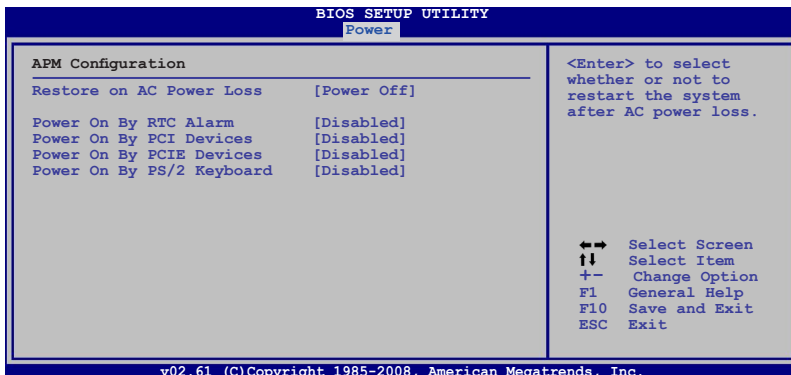
Configuration options: [Disabled] [Enabled]

3.6.4 ACPI APIC Support [Enabled]

Allows you to enable or disable the Advanced Configuration and Power Interface (ACPI) support in the Advanced Programmable Interrupt Controller (APIC). When set to [Enabled], the ACPI APIC table pointer is included in the RSDT pointer list.

Configuration options: [Disabled] [Enabled]

3.6.5 APM Configuration



Restore on AC Power Loss [Power Off]

When set to [Power Off], the system goes into off state after an AC power loss. When set to [Power On], the system goes on after an AC power loss. When set to [Last State], the system goes into either off or on state, whatever the system state was before the AC power loss.

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

Power On By RTC Alarm [Disabled]

Allows you to enable or disable RTC to generate a wake event. When this item is set to [Enabled], the items **RTC Alarm Date/ RTC Alarm Hour/ RTC Alarm Minute/ RTC Alarm Second** will become user-configurable with set values.

Configuration options: [Disabled] [Enabled]

Power On By PCI Devices [Disabled]

Allows you to enable or disable the PME to wake up from S5 by PCI devices.

Configuration options: [Disabled] [Enabled]

Power On By PCIE Devices [Disabled]

Allows you to enable or disable the PCIE devices to generate a wake event.

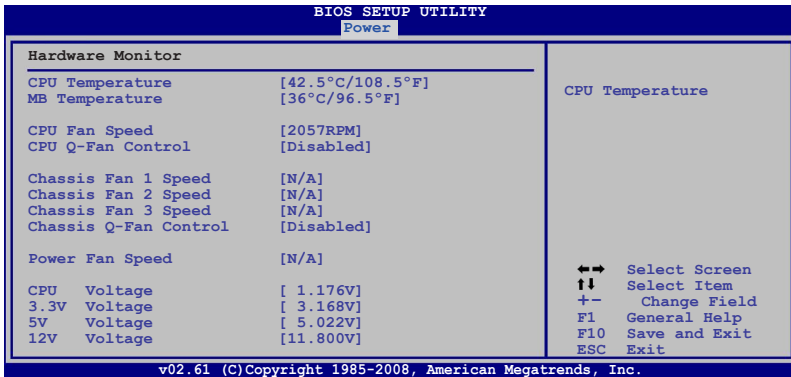
Configuration options: [Disabled] [Enabled]

Power On By PS/2 Keyboard [Disabled]

Allows you to disable the Power On by PS/2 keyboard function or set specific keys 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.

Configuration options: [Disabled] [Space Bar] [Ctrl-Esc] [Power Key]

3.6.6 Hardware Monitor



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

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

CPU Fan Speed [xxxxRPM] or [Ignored] / [N/A]

The onboard hardware monitor automatically detects and displays the CPU fan speed in rotations per minute (RPM). If the fan is not connected to the motherboard, the field shows [N/A].

CPU Q-Fan Control [Disabled]

Allows you to enable or disable the CPU Q-fan control feature.
Configuration options: [Disabled] [Enabled]



The following item appears only when you enable the **CPU Q-Fan Control** item.

CPU Fan Profile [Standard]

Allows you to set the appropriate performance level of the ASUS Q-Fan. When set to [Standard], the CPU fan automatically adjusts depending on the CPU temperature. Set this item to [Silent] to minimize fan speed for quiet CPU fan operation, or [Turbo] to achieve maximum CPU fan speed.
Configuration options: [Standard] [Silent] [Turbo]

Chassis Fan 1/2/3 Speed [xxxxRPM] or [Ignored] / [N/A]

The onboard hardware monitor automatically detects and displays the chassis fan speed in rotations per minute (RPM). If the fan is not connected to the motherboard, the field shows [N/A].

Chassis Q-Fan Control [Disabled]

Allows you to enable or disable the Chassis Q-fan control feature.

Configuration options: [Disabled] [Enabled]



The following item appears only when you enable the **Chassis Q-Fan Control** item.

Chassis Fan Profile [Standard]

Allows you to set the appropriate performance level of the ASUS Q-Fan. When set to [Standard], the chassis fan automatically adjusts depending on the chassis temperature. Set this item to [Silent] to minimize fan speed for quiet chassis fan operation, or [Turbo] to achieve maximum chassis fan speed. Configuration options: [Standard] [Silent] [Turbo]

Power Fan Speed [xxxxRPM] or [Ignored] / [N/A]

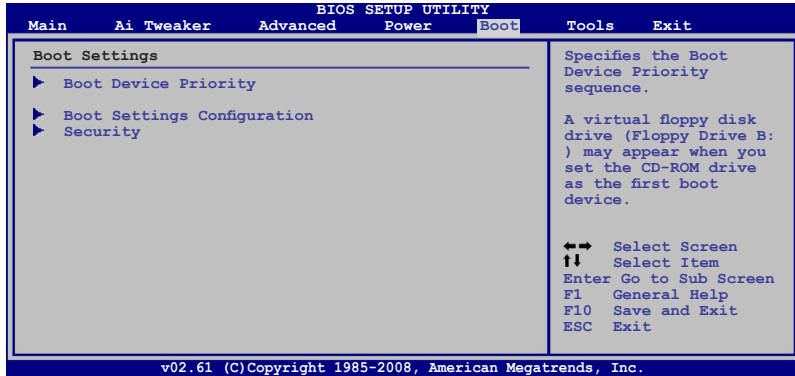
The onboard hardware monitor automatically detects and displays the power fan speed in rotations per minute (RPM). If the fan is not connected to the motherboard, the field shows [N/A].

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

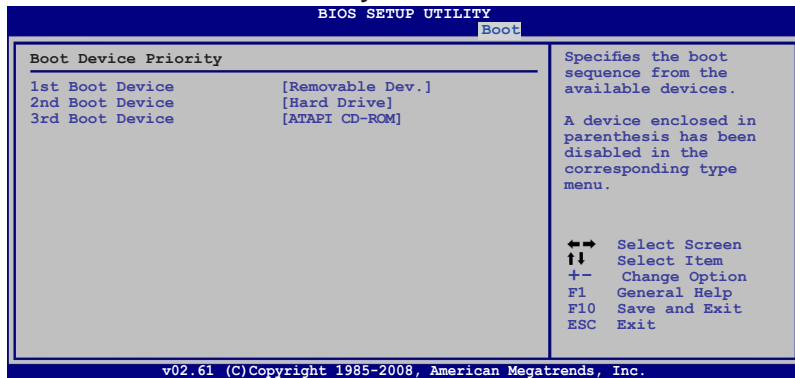
The onboard hardware monitor automatically detects the voltage output through the onboard voltage regulators. Select [Ignored] if you do not want to detect this item.

3.7 Boot menu

The Boot menu items allow you to change the system boot options. Select an item then press <Enter> to display the sub-menu.



3.7.1 Boot Device Priority

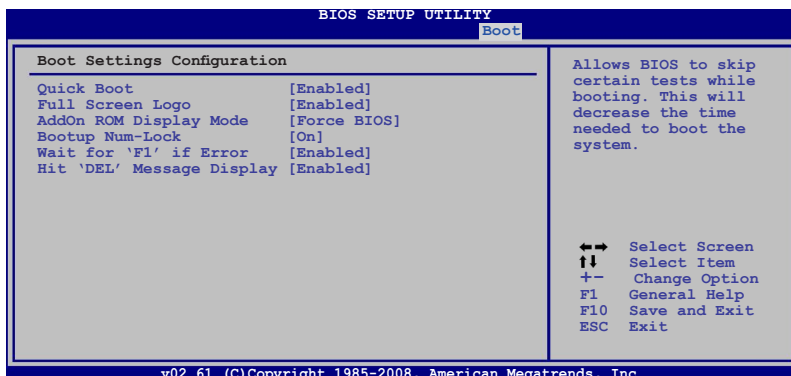


1st ~ xxth Boot Device [xxx Drive]

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.

Configuration options: [Removable Dev.] [Hard Drive] [ATAPI CD-ROM] [Disabled]

3.7.2 Boot Settings Configuration



Quick Boot [Enabled]

Enabling this item allows the BIOS to skip some power on self tests (POST) while booting to decrease the time needed to boot the system. When set to [Disabled], BIOS performs all the POST items. Configuration options: [Disabled] [Enabled]

Full Screen Logo [Enabled]

This allows you to enable or disable the full screen logo display feature. Configuration options: [Disabled] [Enabled]



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

AddOn ROM Display Mode [Force BIOS]

Sets the display mode for option ROM. Configuration options: [Force BIOS] [Keep Current]

Bootup Num-Lock [On]

Allows you to select the power-on state for the NumLock. Configuration options: [Off] [On]

Wait for 'F1' If Error [Enabled]

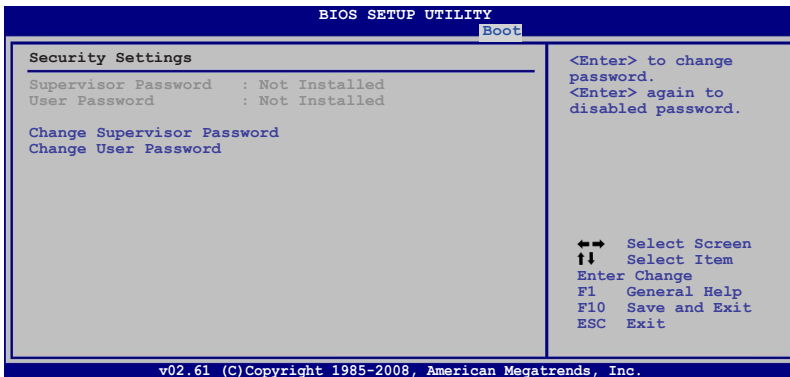
When set to [Enabled], the system waits for the <F1> key to be pressed when error occurs. Configuration options: [Disabled] [Enabled]

Hit 'DEL' Message Display [Enabled]

When set to [Enabled], the system displays the message "Press DEL to run Setup" during POST. Configuration options: [Disabled] [Enabled]

3.7.3 Security

The Security menu items allow you to change the system security settings. Select an item then press <Enter> to display the configuration options.



Change Supervisor Password

Select this item to set or change the supervisor password. The **Supervisor Password** item on top of the screen shows the default **Not Installed**. After you set a password, this item shows **Installed**.

To set a Supervisor Password:

1. Select the **Change Supervisor Password** item and press <Enter>.
2. From the password box, type a password composed of at least six letters and/or numbers, then press <Enter>.
3. Confirm the password when prompted.

The message "Password Installed" appears after you successfully set your password.

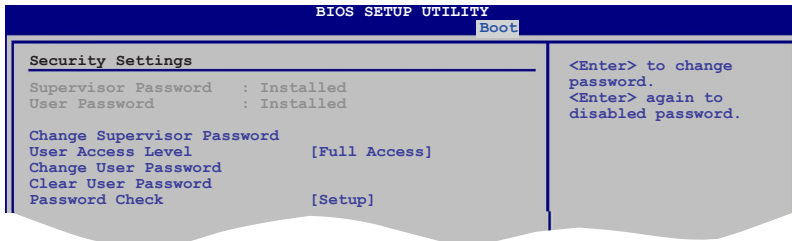
To change the supervisor password, follow the same steps as in setting a user password.

To clear the supervisor password, select the **Change Supervisor Password** then press <Enter>. The message "Password Uninstalled" appears.



If you forget your BIOS password, you can clear it by erasing the CMOS Real Time Clock (RTC) RAM. See section **2.6 Jumpers** for information on how to erase the RTC RAM.

After you have set a supervisor password, the other items appear to allow you to change other security settings.



User Access Level [Full Access]

This item allows you to select the access restriction to the Setup items.

Configuration options: [No Access] [View Only] [Limited] [Full Access]

[No Access] prevents user access to the Setup utility.

[View Only] allows access but does not allow change to any field.

[Limited] allows changes only to selected fields, such as Date and Time.

[Full Access] allows viewing and changing all the fields in the Setup utility.

Change User Password

Select this item to set or change the user password. 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 **Change User Password** item and press <Enter>.
2. On the password box that appears, type a password composed of at least six letters and/or numbers, then press <Enter>.
3. Confirm the password when prompted.

The message "Password Installed" appears after you set your password successfully.

To change the user password, follow the same steps as in setting a user password.

Clear User Password

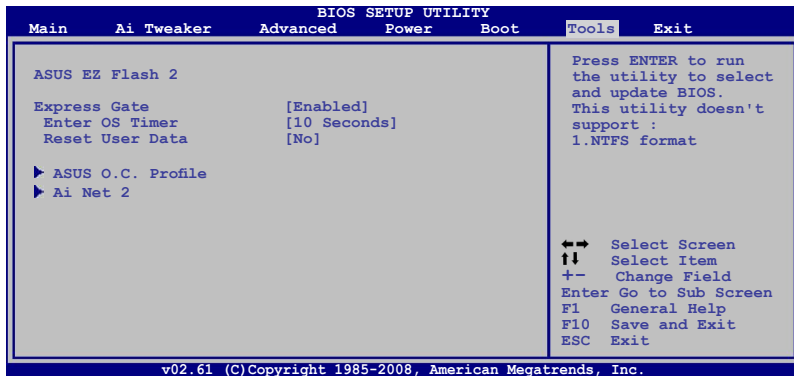
Select this item to clear the user password.

Password Check [Setup]

When set to [Setup], BIOS checks for user password when accessing the Setup utility. When set to [Always], BIOS checks for user password both when accessing Setup and booting the system. Configuration options: [Setup] [Always]

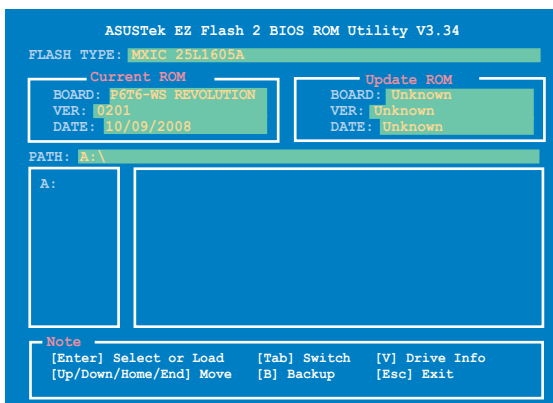
3.8 Tools menu

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



3.8.1 ASUS EZ Flash 2

Allows you to run ASUS EZ Flash 2. When you press <Enter>, a confirmation message appears. Use the left/right arrow key to select between [Yes] or [No], then press <Enter> to confirm your choice. Please refer to section 3.1.2 for details.



3.8.2 Express Gate [Enabled]

Allows you to enable or disable the ASUS Express Gate feature. The ASUS Express Gate feature is a unique instant-on environment that provides quick access to the Internet browser and Skype. Refer to section **4.3.10 ASUS Express GATE** for details.

Configuration options: [Enabled] [Disabled]

Enter OS Timer [10 Seconds]

Sets countdown duration that the system waits at the Express Gate's first screen before starting Windows or other installed OS. Choose [Prompt User] to stay at the first screen of Express Gate for user action.

Configuration options: [Prompt User] [1 second] [3 seconds] [5 seconds] [10 seconds] [15 seconds] [20 seconds] [30 seconds]

Reset User Data [No]

Allows you to clear Express Gate's user data.

Configuration options: [No] [Reset]

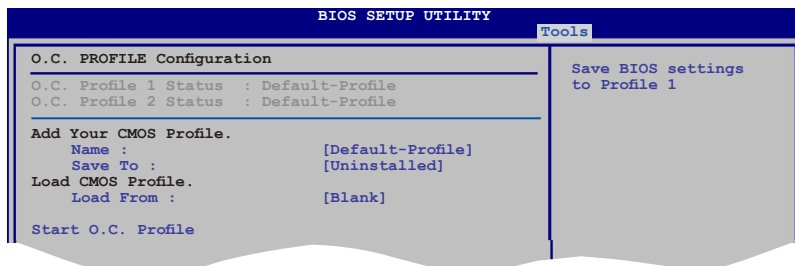
When setting this item to [Reset], make sure to save the setting to the BIOS so that the user data will be cleared the next time you enter the Express Gate. User data includes the Express Gate's settings as well as any personal information stored by the web browser (bookmarks, cookies, browsing history, etc.). This is useful in the rare case where corrupt settings prevent the Express Gate environment from launching properly.



The first time wizard will run again when you enter the Express Gate environment after clearing its settings.

3.8.3 ASUS O.C. Profile

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



Add Your CMOS Profile.

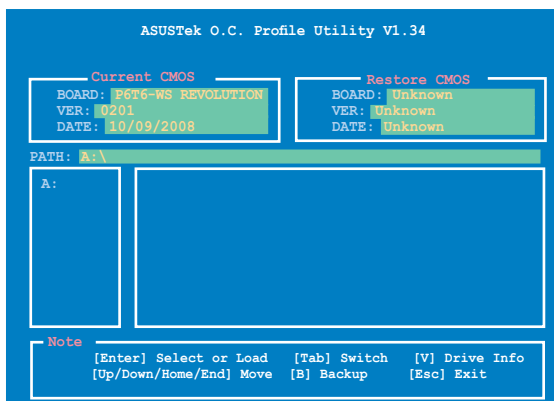
Allows you to save the current BIOS file to the BIOS Flash. In the **Name** sub-item, type your profile name and press <Enter>, and then choose a profile number to save your CMOS settings in the **Save To** sub-item. You can save two (2) CMOS profiles.

Load CMOS Profile.

Allows you to load the previous BIOS settings saved in the BIOS Flash. Press <Enter>, and choose a profile to load.

Start O.C. Profile

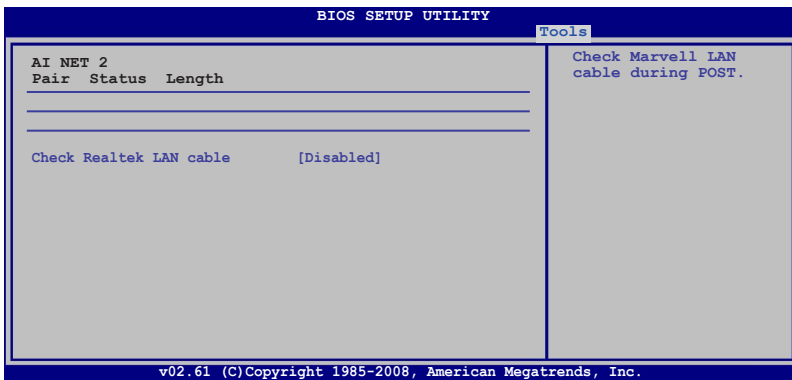
Allows you to run the utility to save and load CMOS. Press <Enter> to run the utility.





- 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 the system boot failure!
- We recommend that you update the BIOS file only coming from the same memory/CPU configuration and BIOS version.
- Only the CMO file can be loaded.

3.8.4 AI NET 2

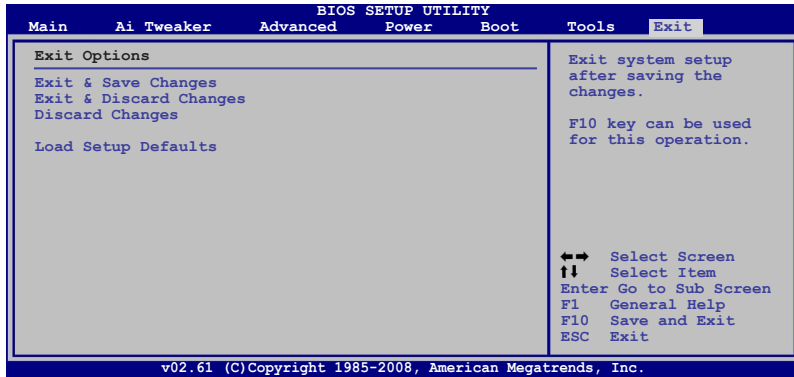


Check Realtek LAN Cable [Disabled]

Enables or disables checking of the Realtek LAN cable during the Power-On Self-Test (POST). Configuration options: [Disabled] [Enabled]

3.9 Exit menu

The Exit menu items allow you to load the optimal or failsafe default values for the BIOS items, and save or discard your changes to the BIOS items.



Pressing <Esc> does not immediately exit this menu. Select one of the options from this menu or <F10> from the legend bar to exit.

Exit & Save Changes

Once you are finished making your selections, choose this option from the Exit menu to ensure the values you selected are saved to the CMOS RAM. An onboard backup battery sustains the CMOS RAM so it stays on even when the PC is turned off. When you select this option, a confirmation window appears. Select **Ok** to save changes and exit.



If you attempt to exit the Setup program without saving your changes, the program prompts you with a message asking if you want to save your changes before exiting. Press <Enter> to save the changes while exiting.

Exit & Discard Changes

Select this option only if you do not want to save the changes that you made to the Setup program. If you made changes to fields other than System Date, System Time, and Password, the BIOS asks for a confirmation before exiting.

Discard Changes

This option allows you to discard the selections you made and restore the previously saved values. After selecting this option, a confirmation appears. Select **Ok** to discard any changes and load the previously saved values.

Load Setup Defaults

This option allows you to load the default values for each of the parameters on the Setup menus. When you select this option or if you press <F5>, a confirmation window appears. Select **Ok** to load default values. Select **Exit & Save Changes** or make other changes before saving the values to the non-volatile RAM.

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

4 Software support

Chapter summary

4

4.1	Installing an operating system	4-1
4.2	Support DVD information	4-1
4.3	Software information	4-10
4.4	RAID configurations	4-46
4.5	Creating a RAID driver disk.....	4-61

4.1 Installing an operating system

This motherboard supports Windows® XP/ 64-bit XP/ Vista™ 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.
- Make sure that you install the Windows® XP Service Pack2 or later versions before installing the drivers for better compatibility and system stability.

4.2 Support DVD information

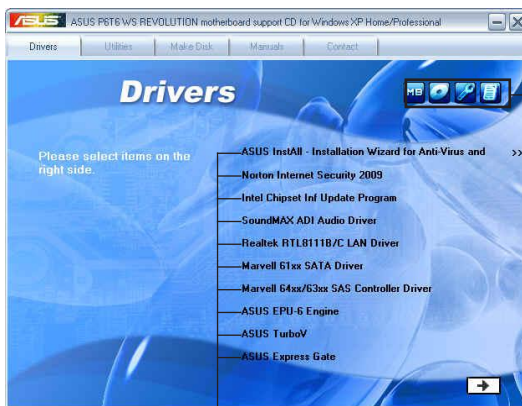
The support DVD that came with the motherboard package contains the drivers, software applications, and utilities that you can install to avail all motherboard features.



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

4.2.1 Running the support DVD

Place the support DVD to the optical drive. The DVD automatically displays the Drivers menu if Autorun is enabled in your computer.



Click an icon to display support DVD/motherboard information

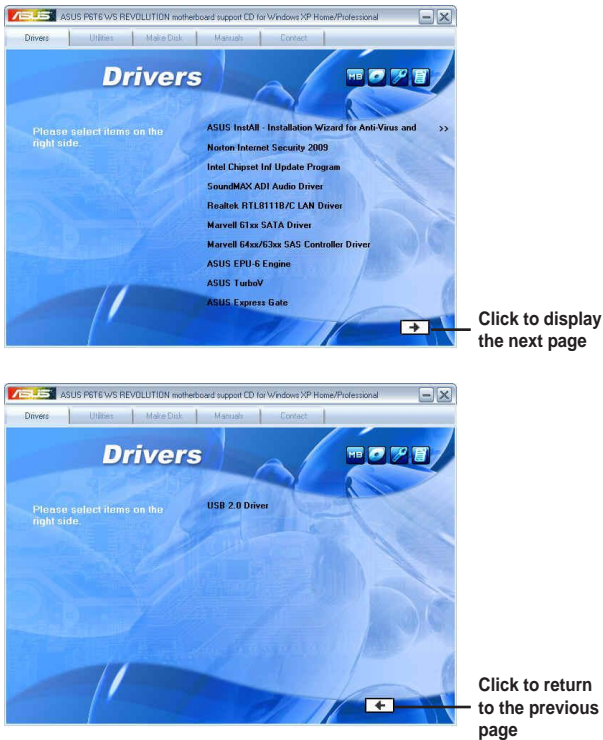
Click an item to install



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

4.2.2 Drivers menu

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



ASUS InstAll - Installation Wizard for Anti-Virus Utility and Drivers

Installs all of the drivers and anti-virus software through the Installation Wizard.

Norton Internet Security 2009

Installs the Norton Internet Security 2009 to protect your PC from the latest online threats.

Intel Chipset Inf Update Program

Installs the Intel® chipset Inf update program.

SoundMAX ADI Audio Driver

Installs the SoundMAX® AD2000B audio driver and application.

Realtek RTL8111B LAN Driver

Installs the Realtek® Gigabit Ethernet driver.

Marvell 61xx SATA Driver

Installs the Marvell® 61xx SATA driver.

Marvell 64xx/63xx SAS Controller Driver

Installs the Marvell® 64xx/63xx SAS controller driver.

ASUS EPU-6 Engine

Installs the ASUS EPU-6 Engine driver and utility.

ASUS TurboV

Installs ASUS TurboV, the advanced overclocking tool for extreme O.C. record.

ASUS Express Gate

Allows you to install or update Express Gate functions.

USB 2.0 Driver

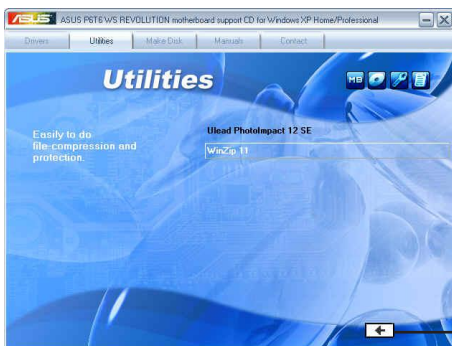
Installs the Universal Serial Bus 2.0 (USB 2.0) driver.

4.2.3 Utilities menu

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



Click to display the next page



Click to return to the previous page

ASUS InstAll - Installation Wizard for Utilities

Installs all of the utilities through the Installation Wizard.

ASUS Update

The ASUS Update utility allows you to update the motherboard BIOS in Windows® environment. This utility requires an Internet connection either through a network or an Internet Service Provider (ISP).

ASUS PC Probe II

This smart utility monitors the fan speed, CPU temperature, and system voltages, and alerts you of any detected problems. This utility helps you keep your computer in healthy operating condition.

ASUS AI Suite

The ASUS AI Suite is an innovative application to do overclocking, fan control, power saving and quiet thermal control.

Marvell RAID Utility

Installs Marvell RAUD Utility.

Realtek Teaming Utility

Installs the Realtek® Teaming Utility.

Adobe Reader 8

Installs the Adobe® Reader that allows you to open, view, and print documents in Portable Document Format (PDF).

Ulead Burn.Now

Installs the Ulead Burn.Now application for Audio DVD, CD and data disc creation.

Microsoft DirectX 9.0c

Installs the Microsoft® DirectX 9.0c driver. The Microsoft DirectX® 9.0c is a multimedia technology that enhances computer graphics and sound. DirectX® improves the multimedia features of your computer so you can enjoy watching TV and movies, capturing videos, or playing games in your computer. Visit the Microsoft website (www.microsoft.com) for updates.

Corel MediaOne Starter

Installs the Corel MediaOne Starter application to easily manage, edit share and protect your multimedia data.

Ulead PhotoImpact 12 SE

Installs the PhotoImpact image editing software.

Winzip 11

Installs the Winzip utility for easy file-compression and protection.

4.2.4 Make disk menu

The Make disk menu contains items to create the Intel ICH10R or Marvell® 61xx driver disk.



Intel ICH10R 32/64 bit AHCI/RAID Driver Disk

Allows you to create an ICH10R 32/64bit RAID/AHCI driver disk.

Marvell 61xx 32/64bit SATA RAID Driver

Allows you to create a Marvell® 61xx 32/64bit SATA RAID driver disk.

Marvell 64xx/63xx SAS Controller Driver

Allows you to create a Marvell® 63xx/64xx SAS controller driver disk for 32/64bit system.



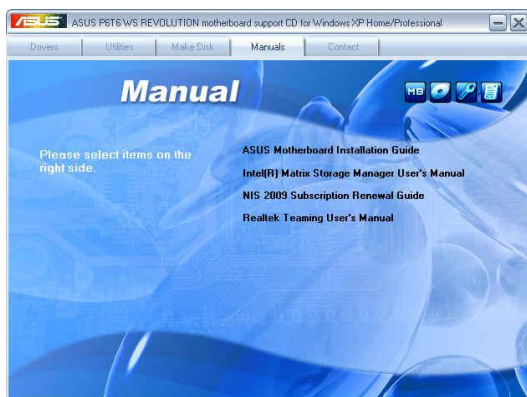
The motherboard does not provide a floppy drive connector. You have to use a USB floppy drive when creating a driver disk.

4.2.5 Manual menu

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

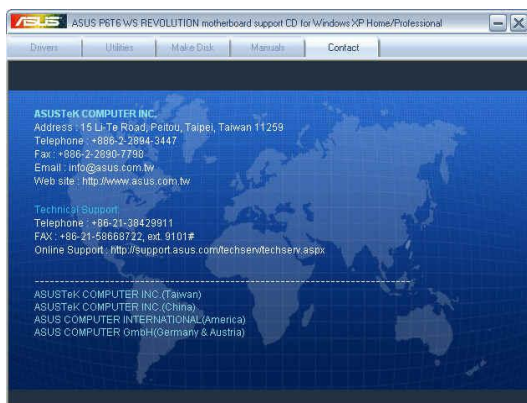


Most user manual files are in Portable Document Format (PDF). Install the Adobe® Acrobat® Reader from the Utilities menu before opening a user manual file.



4.2.6 ASUS Contact information

Click the Contact tab to display the ASUS contact information. You can also find this information on the inside front cover of this user guide.

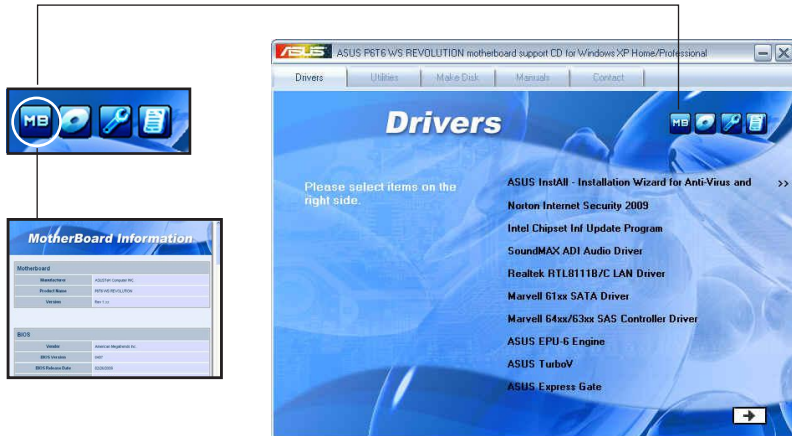


4.2.7 Other information

The icons on the top right corner of the screen give additional information on the motherboard and the contents of the support DVD. Click an icon to display the specified information.

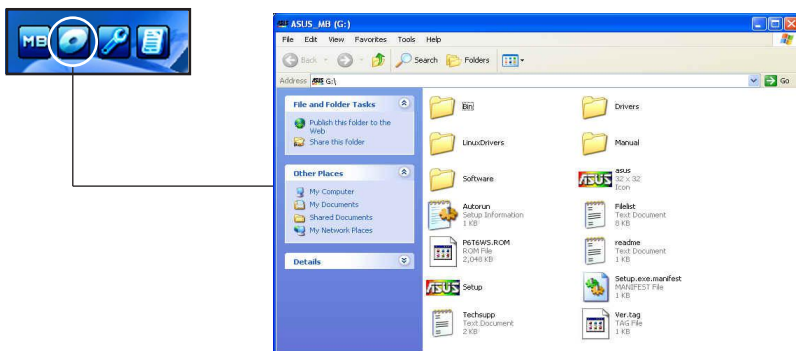
Motherboard Info

Displays the general specifications of the motherboard.



Browse this DVD

Displays the support DVD contents in graphical format.



Technical support Form

Displays the ASUS Technical Support Request Form that you have to fill out when requesting technical support.



Techuupp - Notepad

ASUSTeK TECHNICAL SUPPORT REQUEST FORM DATE:

ORIGINATOR DESCRIPTION

COMPANY NAME : CONTACT NAME :
 PHONE (AREA) : FAX # (AREA):
 EMAIL ADDRESS:

HARDWARE DESCRIPTION

MOTHERBOARD :	REVISION #:	BIOS:#40L0A-
CPU BRAND :	SPEED(MHz):	
DRAM BRAND :	SPEED(MHz):	SIZE(MB):
CACHE BRAND :	SPEED(MHz):	SIZE(KB):
HARD DISK :	MODEL NAME:	SIZE(MB):
CDROM BRAND :	MODEL NAME:	SIZE(MB):
BACKUP BRAND :	MODEL NAME:	SIZE(MB):
OTHER STORAGE :	MODEL NAME:	SIZE(MB):

ADD-IN CARD DESCRIPTION (MODEL NAME/VENDOR)

CF/ISA SLOT 1:
 (E)ISA SLOT 2:
 (E)ISA SLOT 3:
 (E)ISA SLOT 4:
 PCI-E SLOT 1:
 PCI-E SLOT 2:
 PCI-E SLOT 3:
 PCI SLOT 1:
 PCI SLOT 2:
 PCI SLOT 3:
 PCI SLOT 4:
 PCI SLOT 5:

Filelist

Displays the contents of the support DVD in text format.



Filelist - Notepad

File list for the included support software for P6T6 WS REVOLUTION motherboard

File name	Description
--drivers	
-chipset	-Intel(R) chipset software installation utility v9.1.0.1012 for windows
-Audio	
-32bit	-SoundMAX Audio driver v5.10.1.6320 for Windows XP/2003 (WHQL)
-64bit	-SoundMAX Audio driver v5.10.2.6320 for Windows 64bit XP/2003 (WHQL)
-Vista	-SoundMAX Audio driver v6.10.1.6320 for 32bit Windows Vista (WHQL)
	-SoundMAX Audio driver v6.10.2.6320 for 64bit Windows Vista (WHQL)
-RAID	
-IMPM	
-Install	-Intel(R) Matrix Storage Manager V8.7.0.1007 For Windows XP/Vista/200
-driver	-ICH10R AHCI/RAID Driver for Windows XP/Vista/2003/2008 & 64bit XP/Vi
-MakeDisk	-Make ICH10R AHCI/RAID driver disk for windows xp/vista/2003/2008 & 6
-Marvell	
-61xx	
-driver	-Marvell 88SE61xx SATA Controller Driver V1.2.0.37 For Windows XP/Vi
-MakeDisk	-Make Marvell 88SE61xx SATA Controller driver disk V1.2.0.37 For Wind
-63xx	
-driver	-Marvell 88SE6320 SAS Controller Driver v3.1.0.20 for Windows XP/Vist
-MakeDisk	-Make Marvell 88SE6320 SAS controller driver disk driver V3.1.0.37 fo
-Install	-Marvell 88SE6320 SAS controller driver v3.1.0.20 for Windows XP/Vist
	-Marvell 88SE6320 SAS controller driver V3.1.0.37 For Windows XP/Vi
-MRU	-Marvell 88SE6320 SAS driver utility V4.1.0.8 for windows XP/Vista/20
-LAN	
-Windows	
-XP	-Realtek RTL8111C Ethernet Driver v5.702.0806.2008 for Windows XP/200
-Vista	-Realtek RTL8111C Ethernet Driver v6.210.1003.2008 for Windows Vista,

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 ASUS MyLogo 2™

The ASUS MyLogo 2™ utility lets you customize the boot logo. The boot logo is the image that appears on screen during the Power-On-Self-Tests (POST). The ASUS MyLogo 2 is automatically installed when you install the ASUS Update utility from the support DVD. See section 4.2.3 **Utilities menu** for details.



- Before using the ASUS MyLogo 2, use the AFUDOS utility to make a copy of your original BIOS file, or obtain the latest BIOS version from the ASUS website. See section 3.1.1 **ASUS Update utility**.
- Make sure that the BIOS item Full Screen Logo is set to [Enabled] if you wish to use ASUS MyLogo 2. See section 3.7.2 **Boot Settings Configuration**.
- You can create your own boot logo image in GIF file format.

To launch the ASUS MyLogo 2:

1. Launch the ASUS Update utility. Refer to section 3.1.1 **ASUS Update utility** for details.
2. Select **Options** from the drop down menu, and then click **Next**.
3. Check the option **Launch MyLogo** to replace system boot logo before flashing BIOS, and then click **Next**.
4. Select **Update BIOS from a file** from the drop down menu, and then click **Next**.
5. When prompted, locate the new BIOS file, and then click **Next**. The ASUS MyLogo 2 window appears.
6. From the left window pane, select the folder that contains the image you intend to use as your boot logo.



7. When the logo images appear on the right window pane, select an image to enlarge by clicking on it.



8. Adjust the boot image to your desired size by selecting a value on the Ratio box.



9. When the screen returns to the ASUS Update utility, flash the original BIOS to load the new boot logo.
10. After flashing the BIOS, restart the computer to display the new boot logo during POST.

4.3.2 AI NET 2

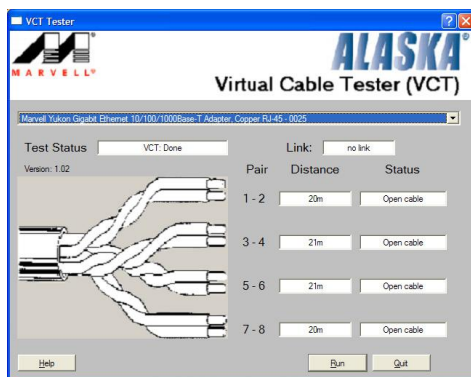
The AI NET 2 features the Marvell® Virtual Cable Tester™ (VCT). VCT is a cable diagnostic utility that reports LAN cable faults and shorts using the Time Domain Reflectometry (TDR) technology. The VCT detects and reports open and shorted cables, impedance mismatches, pair swaps, pair polarity problems, and pair skew problems of up to 64 ns at one meter accuracy.

The VCT feature reduces networking and support costs through a highly manageable and controlled network system. This utility can be incorporated in the network systems software for ideal field support as well as development diagnostics.

Using the Virtual Cable Tester™

To use the the Marvell® Virtual Cable Tester™ utility:

1. Launch the VCT utility from the Windows® desktop by clicking **Start > All Programs > Marvell > Virtual Cable Tester**.
2. Click **Virtual Cable Tester** from the menu to display the screen below.



3. Click the **Run** button to perform a cable test.



- The VCT utility only tests Ethernet cables connected to Gigabit LAN port(s).
- The Run button on the Virtual Cable Tester™ main window is disabled if no problem is detected on the LAN cable(s) connected to the LAN port(s).
- If you want the system to check the status of the LAN cable before entering the OS, enable the item Post Check LAN Cable in the BIOS Setup.

4.3.3 ASUS PC Probe II

PC Probe II is a utility that monitors the computer's vital components, and detects and alerts you of any problem with these components. PC Probe II senses fan rotations, CPU temperature, and system voltages, among others. Because PC Probe II is software-based, you can start monitoring your computer the moment you turn it on. With this utility, you are assured that your computer is always at a healthy operating condition.

Installing PC Probe II

To install PC Probe II on your computer:

1. Place the support DVD to the optical drive. The Drivers installation tab appears if your computer has an enabled Autorun feature.



If Autorun is not enabled in your computer, browse the contents of the support DVD to locate the setup.exe file from the ASUS PC Probe II folder. Double-click the setup.exe file to start installation.

2. Click the Utilities tab, then click ASUS PC Probe II.
3. Follow the screen instructions to complete installation.

Launching PC Probe II

You can launch the PC Probe II right after installation or anytime from the Windows® desktop.

To launch the PC Probe II from the Windows® desktop, click **Start > All Programs > ASUS > PC Probe II > PC Probe II v1.xx.xx**. The PC Probe II main window appears.

After launching the application, the PC Probe II icon appears in the Windows® taskbar. Click this icon to close or restore the application.










Using PC Probe II

Main window

The PC Probe II main window allows you to view the current status of your system and change the utility configuration. By default, the main window displays the Preference section. You can close or restore the Preference section by clicking on the triangle on the main window right handle.

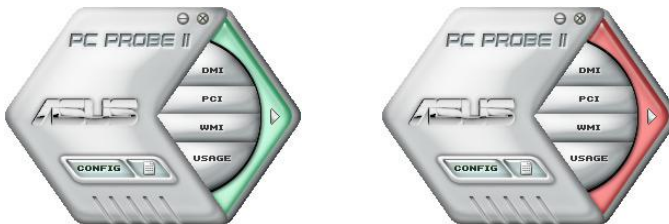


Click to close the Preference panel

Button	Function
	Opens the Configuration window
	Opens the Report window
	Opens the Desktop Management Interface window
	Opens the Peripheral Component Interconnect window
	Opens the Windows Management Instrumentation window
	Opens the hard disk drive, memory, CPU usage window
	Shows/Hides the Preference section
	Minimizes the application
	Closes the application

Sensor alert

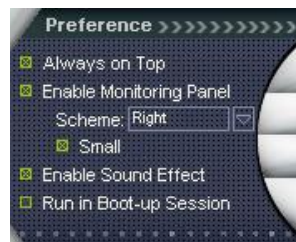
When a system sensor detects a problem, the main window right handle turns red, as the illustrations below show.



When displayed, the monitor panel for that sensor also turns red. Refer to the Monitor panels section for details.

Preference

You can customize the application using the Preference section in the main window. Click the box before each preference to activate or deactivate.



Hardware monitor panels

The hardware monitor panels display the current value of a system sensor such as fan rotation, CPU temperature, and voltages.

The hardware monitor panels come in two display modes: hexagonal (large) and rectangular (small). When you check the Enable Monitoring Panel option from the Preference section, the monitor panels appear on your computer's desktop.



Large display



Small display

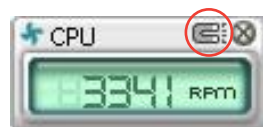
Changing the monitor panels position

To change the position of the monitor panels in the desktop, click the arrow down button of the Scheme options, then select another position from the list box. Click OK when finished.





Moving the monitor panels

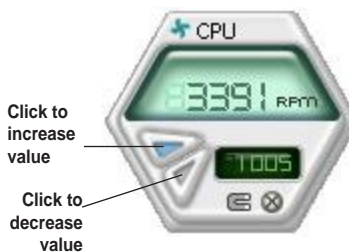
All monitor panels move together using a magnetic effect. If you want to detach a monitor panel from the group, click the horseshoe magnet icon. You can now move or reposition the panel independently.



Adjusting the sensor threshold value

You can adjust the sensor threshold value in the monitor panel by clicking the  or  buttons. You can also adjust the threshold values using the Config window.

You cannot adjust the sensor threshold values in a small monitoring panel.



Monitoring sensor alert

The monitor panel turns red when a component value exceeds or is lower than the threshold value. Refer to the illustrations below.



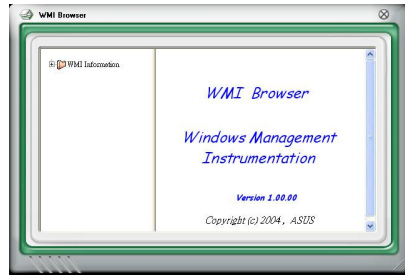
Large display



Small display

WMI browser

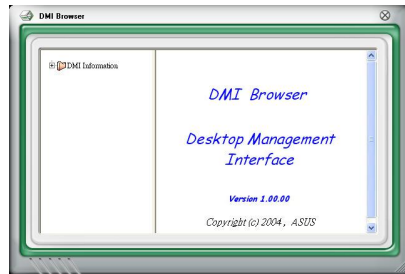
Click **WMI** to display the WMI (Windows Management Instrumentation) browser. This browser displays various Windows® management information. Click an item from the left panel to display on the right panel. Click the plus sign (+) before WMI Information to display the available information.



You can enlarge or reduce the browser size by dragging the bottom right corner of the browser.

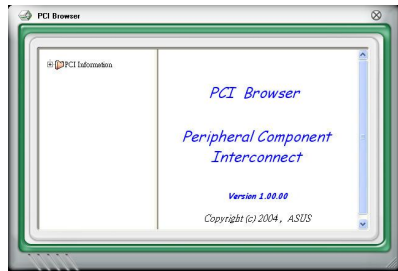
DMI browser

Click **DMI** to display the DMI (Desktop Management Interface) browser. This browser displays various desktop and system information. Click the plus sign (+) before DMI Information to display the available information.



PCI browser

Click **PCI** to display the PCI (Peripheral Component Interconnect) browser. This browser provides information on the PCI devices installed on your system. Click the plus sign (+) before the PCI Information item to display available information.

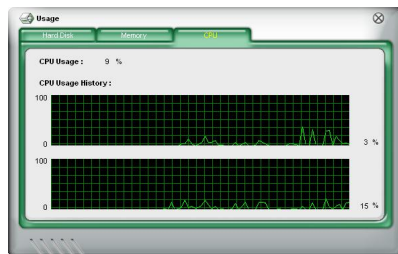


Usage

The Usage browser displays real-time information on the CPU, hard disk drive space, and memory usage. Click **USAGE** to display the Usage browser.

CPU usage

The CPU tab displays real-time CPU usage in line graph representation. If the CPU has an enabled Hyper-Threading, two separate line graphs display the operation of the two logical processors.



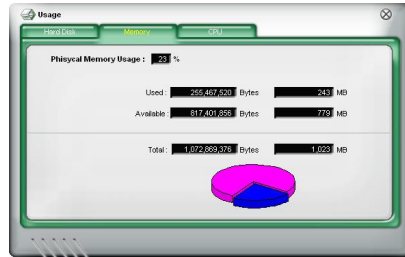
Hard disk drive space usage

The Hard Disk tab displays the used and available hard disk drive space. The left panel of the tab lists all logical drives. Click a hard disk drive to display the information on the right panel. The pie chart at the bottom of the window represents the used (blue) and the available HDD



Memory usage

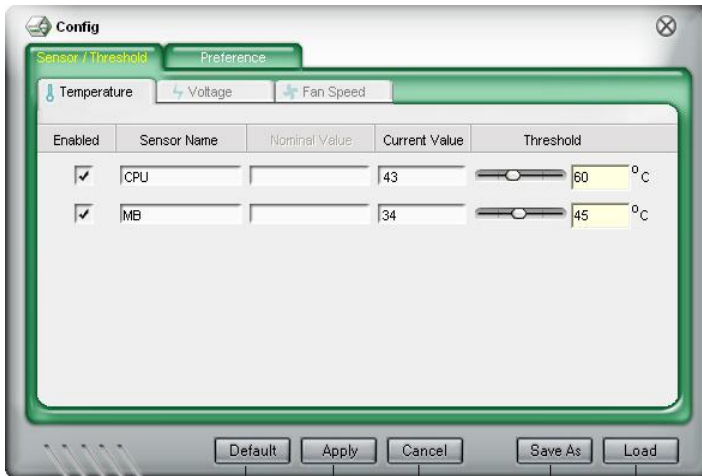
The Memory tab shows both used and available physical memory. The pie chart at the bottom of the window represents the used (blue) and the available physical memory.



Configuring PC Probe II

Click **CONFIG** to view and adjust the sensor threshold values.

The Config window has two tabs: Sensor/Threshold and Preference. The Sensor/Threshold tab enables you to activate the sensors or to adjust the sensor threshold values. The Preference tab allows you to customize sensor alerts, or change the temperature scale.



Loads the default threshold values for each sensor

Applies your changes

Cancels or ignores your changes

Loads your saved configuration
Saves your configuration

4.3.4 ASUS AI Suite

ASUS AI Suite allows you to launch EPU—6 Engine, AI Nap, Fan Xpert, and TurboV utilities easily.

Installing AI Suite

To install AI Suite on your computer:

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

Launching AI Suite

You can launch AI Suite right after installation or anytime from the Windows® desktop.

To launch AI Suite from the Windows® desktop, click **Start > All Programs > ASUS > AI Suite > AI Suite v1.xx.xx**. The AI Suite main window appears.


After launching the application, the AI Suite icon appears in the Windows® taskbar. Click this icon to close or restore the application.

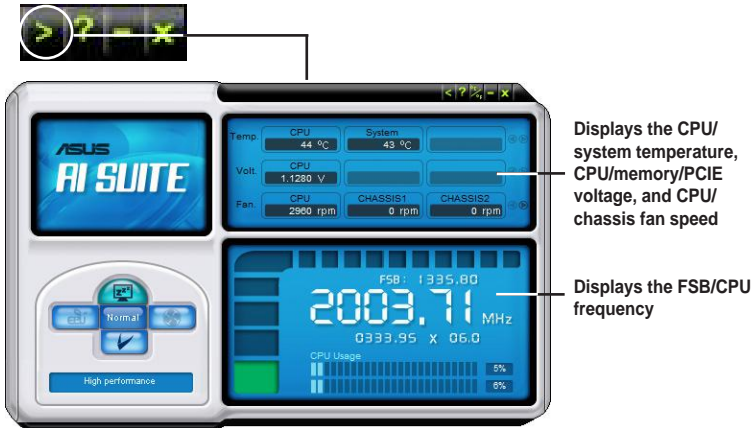
Using AI Suite


Click the **EPU—6 Engine**, **AI Nap**, or **Fan Xpert** icon to launch the utility, or click the **Normal** icon to restore the system to normal state.



Other feature buttons

Click  on right corner of the main window to open the monitor window.



Click  on right corner of the expanded window to switch the temperature from degrees Centigrade to degrees Fahrenheit.



4.3.5 ASUS AI Nap

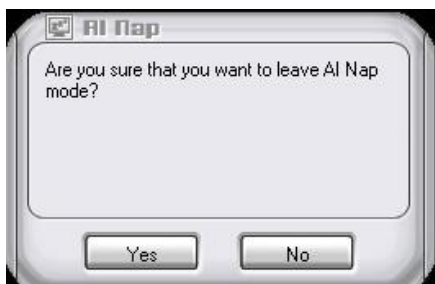
This feature allows you to minimize the power consumption of your computer whenever you are away. Enable this feature for minimum power consumption and a more quiet system operation.

After installing AI Suite from the bundled support DVD, you can launch the utility by double-clicking the AI Suite icon on the Windows OS taskbar and click the AI Nap button on the AI Suite main window.

Click **Yes** on the confirmation screen.



To exit AI Nap mode, press the system power or mouse button then click **Yes** on the confirmation screen.



To switch the power button functions from AI Nap to shutting down, just right click the **AI Suite** icon on the OS taskbar, select **AI Nap** and click **Use power button**. Unclick the the item to switch the function back.

4.3.6 ASUS Fan Xpert

Asus 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.

Install AI Suite from the bundled support DVD. To launch the ASUS Fan Xpert utility, double-click the **AI Suite** icon on the Windows® notification bar and click the **Fan Xpert** button on the AI Suite main window.

Click the dropdown list button and display the fan types. Select **CPU Fan** or **Chassis Fan**.



Fan profile modes

- **Disable:** Select this mode to disable the **Fan Xpert** function.
- **Standard:** This mode makes the fan adjust speed in moderate pattern.
- **Silent:** This mode minimizes fan speed for quiet fan operation.
- **Turbo:** This mode boosts the fan to achieve maximal fan speed for the best cooling effect.
- **Intelligent:** This mode automatically adjusts the CPU fan speed with the ambient temperature.
- **Stable:** This mode keeps the CPU fan at the same speed to avoid noise caused by the unsteady fan rotation. However, the fan will speed up when the temperature exceeds 70°C.
- **User:** This mode allows you to change the CPU fan profile under certain limitation.



For **Chassis Fan**, only Disable/Standard/Silent/Turbo modes could be selected.



Click to close the Calibration window

100%	N/A rpm
90%	N/A rpm
80%	N/A rpm
70%	N/A rpm
60%	N/A rpm
50%	N/A rpm
40%	N/A rpm
30%	N/A rpm
20%	N/A rpm

Click to get the calibration between the fan rotation and fan speed ratio

4.3.7 ASUS EPU—6 Engine

ASUS EPU—6 Engine is an energy-efficient tool that satisfies different computing needs. This utility provides four modes that you can select to enhance system performance or save 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, vCore Voltage, and Fan Control.

Installing 6 Engine

To install 6 Engine on your computer:

1. Place the support DVD to the optical drive. The Drivers installation tab appears if your computer has an enabled Autorun feature.
2. Click the **Drivers** tab and then click **ASUS EPU—6 Engine**.
3. Follow the screen instructions to complete installation.

Launching 6 Engine

Launch 6 Engine by double-clicking the 6 Engine icon on the Windows® notification area.

The first time you launch 6 Engine, the following message will appear, asking you to run Calibration first. Running calibration allows the system to detect CPU properties to optimize power management.



Click **Run Calibration** and wait for a few seconds. Then, the 6 Engine main menu appears.

6 Engine main menu

The screenshot shows the ASUS EPU-6 Engine main menu. At the top, there are two small windows: one displaying 'Current CPU Power' and 'Total CPU Energy Saving', and another displaying a message about VGA power saving. The main interface features a top row of component icons (CPU, VGA, Chipset, Memory, H.D.D., Fan) and a 'Reduced CO2 Emission' section with a bar chart and a 'Current' button. Below this is a 'Mode Setting' section with a tree view of modes (Auto, Turbo, High Performance, Medium Power Saving, Max. Power Saving) and a 'Current Status' section with a pentagon-shaped indicator and buttons for 'Performance', 'Convenience', 'Reliability', and 'Energy Saving'. An 'Exit' button is at the bottom right.

Displays CPU Power and Total CPU Energy Saving

Displays the following message if no VGA power saving engine is detected.

Lights up when power saving engine is activated

Displays the amount of CO2 reduced

***Shifts between the display of Total and Current CO2 reduced**

Displays current mode

Auto Mode

Turbo Mode

High Performance Mode

Medium Power Saving Mode

Max. Power Saving Mode




Runs calibration

Displays the system properties of each mode


Exits the utility

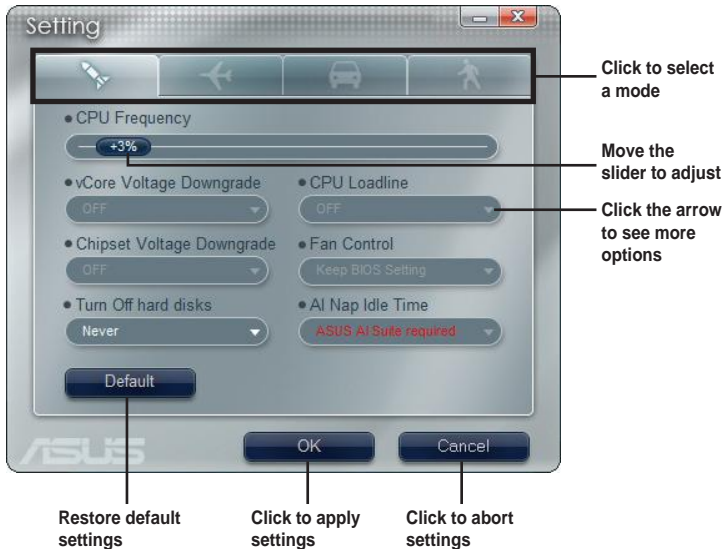
Advanced settings for each mode (refer to the next page for further information)



- * Click **Current**  to show the CO2 that has been reduced since you click the **Renew** button .
- * Click **Total**  to show the total CO2 that has been reduced since you launched 6 Engine.

Advanced settings menu

Click **Setting** () from the 6 Engine main menu to display configuration options in each mode. Some options in certain modes are dimmed, meaning that they are not available.



Configuration options in Advanced settings menu

The following lists the configuration options and their definitions in Advanced settings menu.

- **CPU Frequency:** Raises or lowers CPU frequency to a certain percentage.
- **vCore Voltage Downgrade:** Lowers CPU vCore voltage.
 - **High:** Downgrades voltage to the highest level for CPU power saving.
 - **Small:** Downgrades voltage to the minimum level.
- **Chipset Voltage Downgrade:** Turns on/off chipset voltage.
- **Turn Off hard disks:** Turns off hard disk drives when they are not accessed after a certain time.
- **CPU Loadline:** Sets up the CPU loadline to manage CPU power saving.
 - **Light:** Saves CPU power to the minimum level.
 - **Heavy:** Saves CPU power to the highest level.

- **Fan Control:** Adjusts fan speeds to reduce noise and save system power.
 - **Quiet:** Lowers CPU fan speed and shuts off two chassis fans.
 - **Slow:** Lowers CPU fan and two chassis fan speeds.
- **AI Nap Idle Time:** Enters AI Nap mode after a certain time during system idle process.

Refer to the following table for the configuration options in each mode.

Configuration options	Turbo Mode	High Performance Mode	Medium Power Saving Mode	Maximum Power Saving Mode
CPU Frequency	Overclocking +1% to +30%	N/A	Downclocking -1% to -50%	Downclocking -1% to -50%
vCore Voltage Downgrade	N/A	N/A	Small/High	Small/High
Chipset Voltage Downgrade	N/A	N/A	On/Off	On/Off
Turn Off hard disks	Never/After 3 mins–After 5 hours	Never/After 3 mins–After 5 hours	Never/After 3 mins–After 5 hours	Never/After 3 mins–After 5 hours
CPU Loadline	N/A	N/A	Light/Heavy	Light/Heavy
Fan Control	N/A	N/A	Keep Bios Setting/Slow	Keep Bios Setting/Quiet
AI Nap Idle Time	Never/After 3 mins–After 5 hours	Never/After 3 mins–After 5 hours	Never/After 3 mins–After 5 hours	Never/After 3 mins–After 5 hours



The values of the previous table are subject to change at any time without notice. Visit the ASUS website (www.asus.com) for updates.

4.3.8 ASUS TurboV

ASUS TurboV allows you to overclock the CPU frequency, CPU voltage, QPI/ Memory controller voltage, and DRAM 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 ASUS 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.
- For system stability, set ASUS EPU 6-Engine to **High Performance Mode** while using ASUS TurboV.

To launch ASUS TurboV

1. Install the ASUS TurboV utility from the motherboard support DVD.
2. Click **start > All Programs > ASUS > TurboV > TurboV**.

Save the current settings as a profile

Shows more settings

Default settings

Target settings

Applies all changes immediately

Undoes all changes without applying

Voltage Adjustment bars



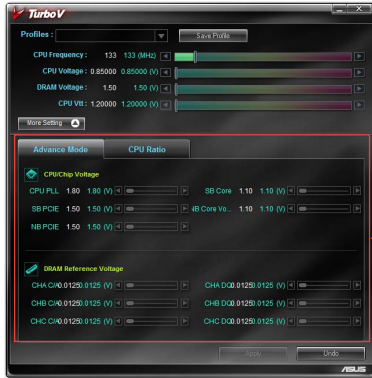
Overclocking tips:

- For advanced overclockability, adjust first the **Ai Tweaker** items in BIOS, and then proceed more detailed adjustments using TurboV.
- The **BCLK Frequency** setting in BIOS affects the adjustable range of CPU Frequency in TurboV.
For advanced overclocking: Set BCLK Frequency in BIOS to 200MHz or above for an adjustment range from 200MHz to 500MHz in TurboV.
For general overclocking: Set BCLK Frequency in BIOS below 200MHz for an adjustment range from 100MHz to 250MHz in TurboV.

Advanced settings menu

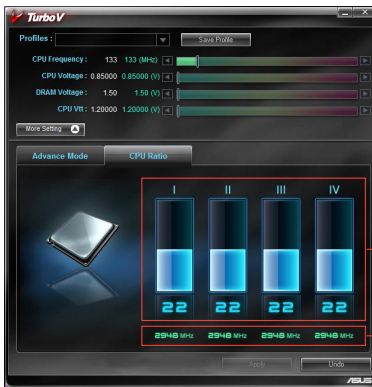
Click **More Setting** from the TurboV main screen to display detailed configuration options for CPU/chip voltage, DRAM Reference voltage, and CPU ratio.

Advance Mode



Advanced CPU and DRAM voltage settings

CPU Ratio Mode



Adjusts CPU core ratio

Displays CPU frequency



- Only Intel® Core™ i7 Extreme Edition processors support the CPU Ratio function.
- Set the **CPU Ratio Setting** BIOS item to [Auto] before using the CPU Ratio function in TurboV. See page 3-23 for details.
- The value shown in CPU Ratio Mode may be higher than your CPU default setting. This is due to Intel's Dynamic Speed Technology of automatic CPU ratio overclocking. You may turn off this feature in BIOS for manual CPU ratio adjustment. See page 3-24 for details.

4.3.9 SoundMAX® High Definition Audio utility

The ADI AD2000B High Definition Audio CODEC provides 8-channel audio capability through the SoundMAX® audio utility with AudioESP™ software to deliver the ultimate audio experience on your PC. The software implements high quality audio synthesis/rendering, 3D sound positioning, and advanced voice-input technologies.

Follow the installation wizard to install the ADI AD2000B Audio Driver from the support DVD that comes with the motherboard package to activate the SoundMAX® audio utility.

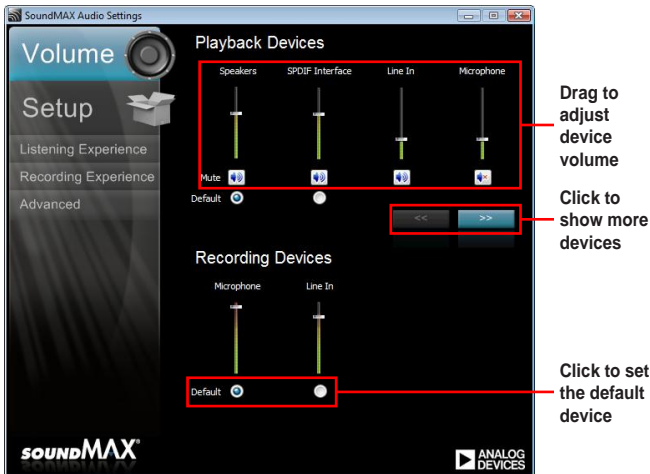
If the SoundMAX® audio utility is correctly installed, you will find the SoundMAX® icon on the taskbar.



A. SoundMAX audio utility for Windows Vista™

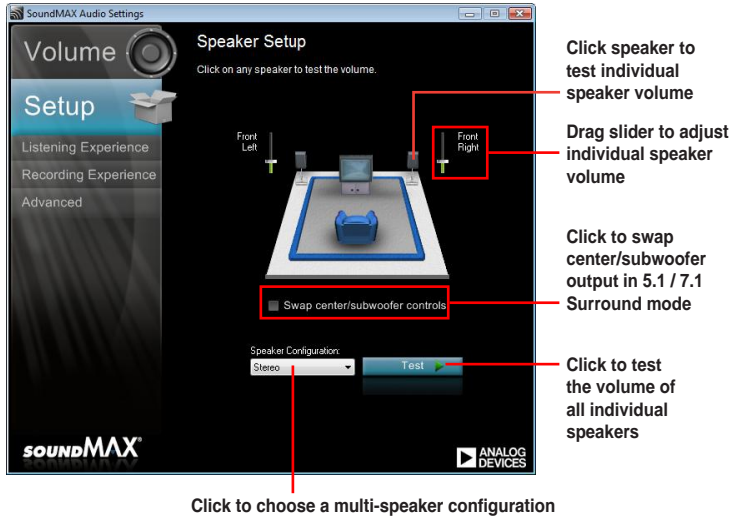
Volume

The **Volume** tab allows you to adjust the individual volume of playback and recording devices. You can also set the default audio output and input device in this tab.



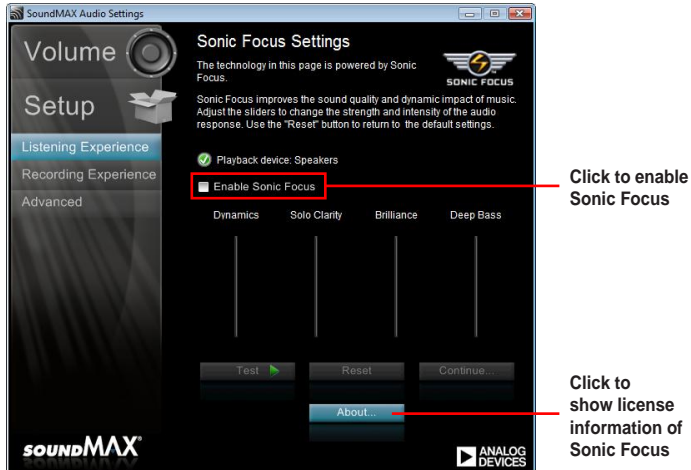
Setup

The **Setup** tab allows you to adjust multi-speaker settings.



Listening Experience

The **Listening Experience** tab allows you to enable or disable the Sonic Focus sound effects and adjust further sound settings.



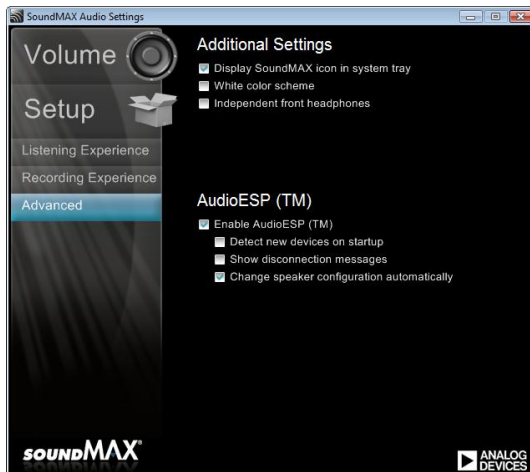
Recording Experience

The **Recording Experience** tab allows you to calibrate microphone settings for high quality recording effects.



Advanced


The **Advanced** tab allows you to configure detailed utility settings.



B. SoundMAX audio utility for Windows XP™



Audio Setup Wizard

By clicking the  icon from the SoundMAX® control panel, you can easily configure your audio settings. Simply follow the succeeding screen instructions and begin enjoying High Definition Audio.

Jack configuration

This screen helps you configure your computer's audio ports, depending on the audio devices you have installed.



Adjust speaker volume

This screen helps you adjust speaker volume. Click the **Test** button to hear the changes you have made.




Adjust microphone volume

This screen helps you adjust microphone volume. You will be asked to read pre-written text to allow the AudioWizard to adjust the volume as you speak.

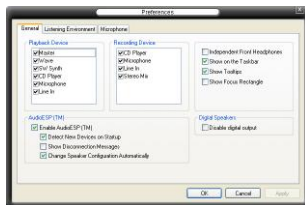


Audio preferences

Click the  icon to go to the Preferences page. This page allows you to change various audio settings.

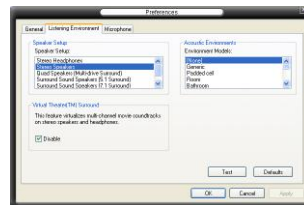
General options

Click the General tab to choose your playback and recording devices, enable/disable the AudioESPTM feature, and enable/disable digital output.



Listening Environment options

Click the Listening Environment tab to set up your speaker, acoustic environment, and enable/disable the Virtual Theater Surround function.



4.3.10 ASUS Express Gate

ASUS Express Gate is an instant-on environment that gives you quick access to the Internet, Skype, and viewing your pictures. Within a few seconds of powering on your computer, you will be at the Express Gate menu where you can start the web browser, Skype, or other Express Gate applications.



-
- Ensure to install ASUS Express Gate from the motherboard support DVD before use.
 - ASUS Express Gate supports SATA devices in IDE mode only. See the chapter of BIOS setup in your motherboard user manual for details.
 - ASUS Express Gate supports SATA devices connected to **motherboard chipset-controlled onboard SATA ports** only. All onboard extended SATA ports and external SATA ports are NOT supported. See the chapter of internal connectors in your motherboard user manual for the exact location of onboard SATA ports.
 - ASUS Express Gate supports installation on SATA HDDs, USB HDDs and Flash drives. When installed on USB HDDs and Flash drives, connect the drives to the motherboard USB port before turning on the computer.
 - Your monitor must support the screen resolution of **1024 x 768**, or ASUS Express Gate will be skipped during the booting process, and the existing OS will be launched directly.
 - Installation of at least 1GB system memory is recommended for better performance.
-

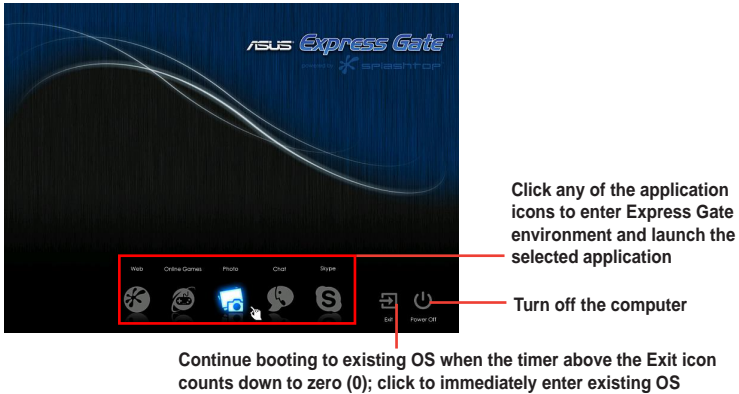
Installing ASUS Express Gate


To install Express Gate on your computer

1. Place the support DVD to the optical drive. The **Drivers** installation tab appears if your computer has enabled Autorun feature.
2. Click the **Utilities** tab, and then click **ASUS Express Gate Installer**.
3. Select the language for installation and click **OK**.
4. The InstallShield Wizard for Express Gate appears. Click **Next** to continue.
5. Select the target disk volume for you to install Express Gate. If you have multiple volumes and OS installed in your hard drive, it is recommended to install Express Gate in **Volume C**. Click **Next** to continue.
6. Follow the screen instructions to complete installation.

The First Screen

Express Gate's first screen appears within a few seconds after you power on the computer.



- To enter the motherboard BIOS setup program, click **Exit** on the Express Gate First Screen, and then press the key during POST.
- Click  in the Express Gate environment for detailed software instructions.

Knowing the Express Gate hot-keys

Here is a list of common-used hot-keys for Express Gate.

In the First Screen:

Key	Function
PAUSE/BREAK	Power-off
ESC	Continue to boot OS

In the Express Gate Environment:

Key	Function
<Alt> + <Tab>	Switch between applications
<Ctrl> + <Alt> + 	Bring up Power-Off dialog box
<Ctrl> + <Alt> + <Print Screen>	Save screen snapshot as picture to file
<Ctrl> + <Space>	Switch the input language between English and default input language
<Ctrl> + <Shift>	Switch between input languages

Using the LaunchBar

The LaunchBar allows you to launch applications or configure system settings. The LaunchBar can be configured to auto-hide and dock on any of the four sides of the screen.



Starts the **Web Browser** for quick access to the World Wide Web. You can also view PDF files on web pages or from your USB storage device.



Express Gate supports file uploading from ODD and USB drives and downloading to USB drives only.



Accesses the **Online Games** feature.



Starts the **Photo Manager** image viewer.



Starts the **Text Chat** instant messaging tool.



Starts the **Skype** application, which lets you call other people on Skype for free, as well as offering affordable, high quality voice communications to phones all over the world.

An indicator under an application icon denotes that the application is already running. In the rare case that one of the above applications stops responding, you can right-click on its icon and then select **Close** to force it to close.

The smaller icons on the right side of the LaunchBar are:



Opens **Express Gate Help**.



Shows "**About Express Gate**".



Opens **ASUS Utility Panel** (if supported).



Opens **Network** settings.



Opens **Volume Control**.



Opens **Configuration Panel**, which lets you specify network settings and other preferences.



USB drive indicator. This icon appears only when a removable storage device / USB drive is inserted into the system. Lift-clicking on it will open the **File Manager** window. Right-click on it to eject the removable storage device / USB drive.



Exit Express Gate. Click the **Yes** button to enter the operating system you installed on the hard disk drive.



Power Off. Click the **Yes** button to turn off the computer.

Getting on the Internet

In the first time of using Express Gate, or if Internet doesn't seem to be working, you have to manually configure network settings.

To configure network settings

1. Click **Configuration Panel** in the LaunchBar.
2. In the Configuration Panel, click **Network**.
3. Make the proper network configurations. Each network interface is enabled immediately when you check the box next to it.



The number of the LAN ports may differ from motherboards.

- **LAN settings:**

If you use a network cable connected to a home router (which is then connected to your DSL/cable modem), enable every LAN port(s). Express Gate will automatically use whichever port is connected.



If you plug the network cable into a different port while Express Gate is running (e.g. move the cable from LAN1 to LAN2), you may need to restart Express Gate in order for it to detect the change.

If your computer automatically obtains network settings via DHCP, you don't need to click **Setup** for any LAN port. Otherwise, click **Setup** to configure the static IP settings manually.

- **WiFi settings (Only the onboard WiFi modules are supported):**

If your motherboard supports wireless network, click **Setup** for the WiFi option. In the **WiFi** tab of the **Advanced Network Settings** box, enter the name of your wireless access point in the **SSID** field. If your wireless access point has security enabled, select the corresponding security algorithm from the drop-down list (e.g. WEP or WAP) in the **Encryption Type** field, and enter the password. Click **OK** to enable WiFi and establish the wireless connection.

- **xDSL / Cable dial-up (PPPoE) settings:**

If you use a network cable connected directly to your DSL/cable modem (no router in between), click **Setup** for xDSL/cable dial-up. Choose whether the DSL/cable modem is connected to your computer's LAN port. Then enter the user name and password of your dial-up account. Click **OK** to enable xDSL/cable dial-up and establish the PPPoE connection. When PPPoE is enabled, the port it uses will automatically be unchecked and grayed out.

Using the Online Games

Express Gate introduces a **Splashtop Gaming** portal site, which provides many interesting games in different categories. The game titles are updated from time to time. Enjoying these great games is just as easy as it gets!



-
- You have to enable the network connection to run the Online Games feature.
 - Avoid running several resource-consuming flash games at the same time to maintain system performance.
-

Using the Photo Manager

Express Gate provides a easy-to-use **Photo Manager** that allows you to view pictures stored in your hard drive or external storage devices (such as USB dongles, card readers, or optical disks). You can view pictures in thumbnail view; in an enlarged view individually; in a filename/data list view; or play them in a slideshow with background music and fancy transition effects. JPEG, GIF, BMP, and PNG formats are supported. Refer to the on-line Help for detailed application operation.



ASUS Express Gate supports HDDs or ODDs connected to **motherboard chipset-controlled onboard SATA ports** only. All onboard extended SATA ports and external SATA ports are NOT supported.

Restoring to factory settings

In the rare case that the system settings become corrupted, you can restore Express Gate to its factory settings.

To restore Express Gate to factory settings

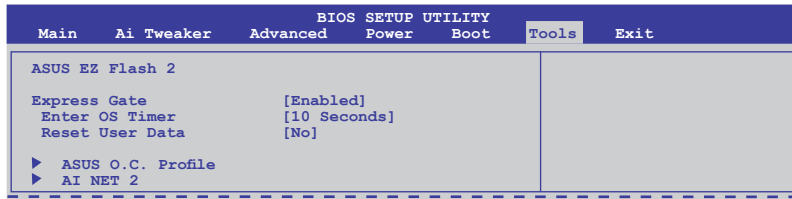
1. Click **Configuration Panel** in the LaunchBar.
2. In the Configuration Panel, click **Environment Settings**.
3. In the **General** tab, click **Restore**. A confirmation dialog box will open. Click **Yes** to immediately restart Express Gate to finish clearing system settings. All bookmarks, network settings, and other changes you made will be cleared.



The first-time Wizard will run again when you enter the Express Gate environment after clearing its settings.

Configuring Express Gate in BIOS Setup

Enter BIOS setup by clicking **Exit** on the Express Gate First Screen, and then press the key during POST. Express Gate configuration options are under the **Tools** menu. See chapter 3 for details.



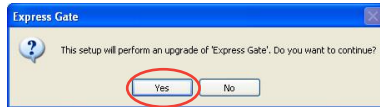
The BIOS setup screens shown in this section are for reference purposes only, and may not exactly match what you see on your screen.

Updating Express Gate

You may update your existing Express Gate application to new versions. New versions of the Express Gate application will be released regularly, adding refinements or new applications. You can find original version of the application on the support DVD or download new versions from the ASUS support website.

To update Express Gate

1. Double-click the Express Gate setup file to start application update.
2. A application update confirmation dialog box appears. Click **Yes** to continue.
3. The InstallShield Wizard for Express Gate appears. Click **Next** to continue.
4. Follow the screen instructions to complete installation.

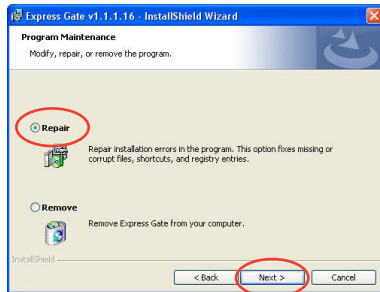


Repairing Express Gate

In case Express Gate cannot start normally, you can repair Express Gate by reinstalling the application or using the repairing utility.

To repair Express Gate

- Click **Start > All Programs > Express Gate > Express Gate Installer > Repair this application.**
- OR
- Double click the Express Gate setup file, choose **Repair**, and click **Next** to continue.



4.3.11 Realtek Teaming Utility

This motherboard features two Realtek® 8111C PCIe Gigabit LAN controllers and supports Teaming function, which allows two single connections to be grouped as one single connection, providing benefits such as bandwidth increase, load balancing, and fault tolerance.



The speed of transmission is subject to the actual network environment or status even with Teaming enabled.

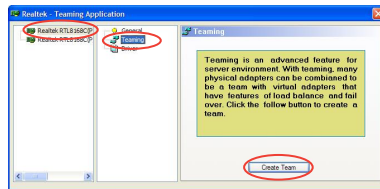
To install Realtek Teaming Utility

1. Place the support DVD to the optical drive. Click **Realtek Teaming Utility** from the **Drivers** tab.
2. Follow the screen instructions to complete installation.

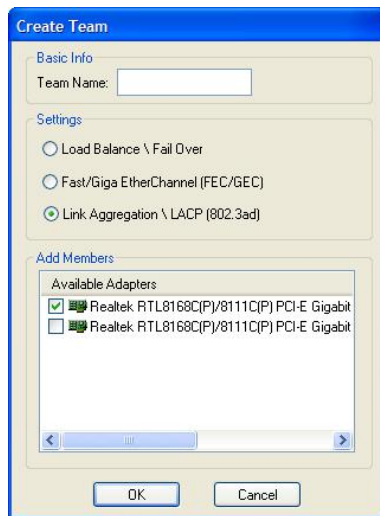
Configuring Realtek Teaming Utility in Windows® XP

To create a teaming set in Windows® XP

1. Launch the Realtek Teaming Utility by clicking **Start > All Programs > Realtek > Teaming Utility > Teaming Utility**.
2. Select a LAN adapter from the left column, select **Teaming** in the middle column, and then click **Create Team**.

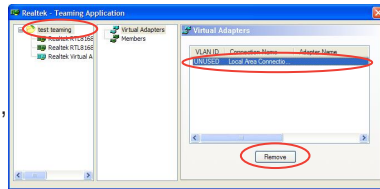


3. Enter a name for the teaming in the **Team Name** box. Select a teaming mode that best suits your network environment, and then choose the adapters to join the teaming set. Click **OK** to finish the teaming setting.



To remove a teaming set in Windows® XP

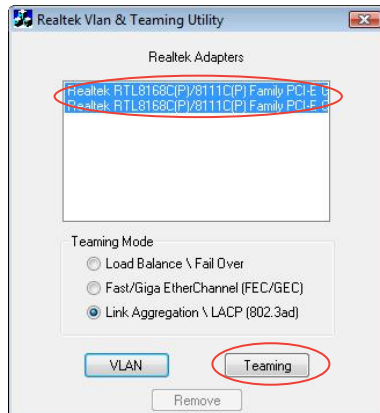
1. Launch the Realtek Teaming Utility.
2. Select the teaming set that you want to remove in the left column, select the virtual adapter in the right column, and then click **Remove**.



Configuring Realtek Teaming Utility in Windows® Vista

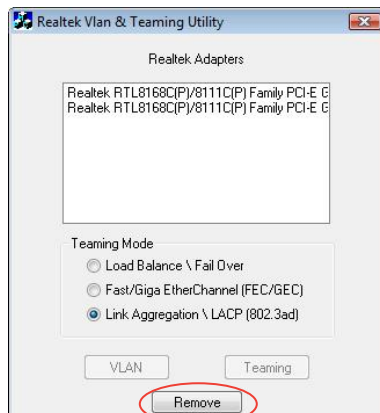
To create a teaming set in Windows® Vista

1. Launch the Realtek VLAN & Teaming Utility by clicking **Start > All Programs > Realtek Teaming and VLAN Utility > Realtek Teaming and VLAN Utility**.
2. Choose the adapters to join the teaming set, and then select a teaming mode that best suits your network environment. Click **Teaming** to create the teaming set. Click **OK** to close the message windows and finish creating the teaming set.



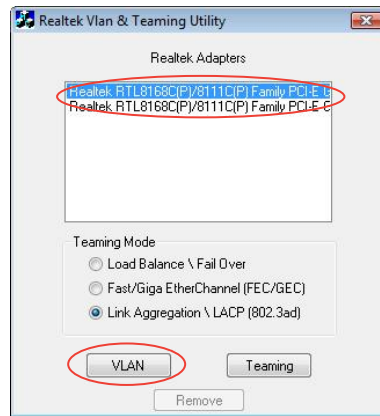
To remove a teaming set in Windows® Vista

1. Launch the Realtek VLAN & Teaming Utility.
2. Click **Remove** to remove the existing teaming set.

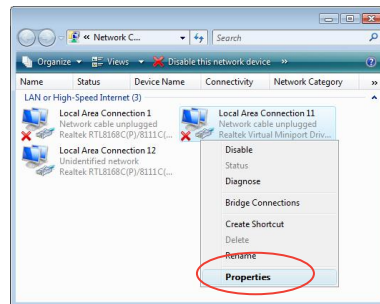


To create a virtual LAN adapter in Windows® Vista

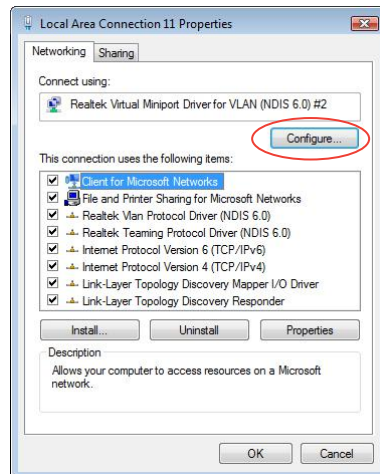
1. Launch the Realtek VLAN & Teaming Utility.
2. Choose one adapter to create the virtual LAN adapter, and then click **VLAN**. Click **OK** to close the message window and finish creating the virtual LAN adapter.



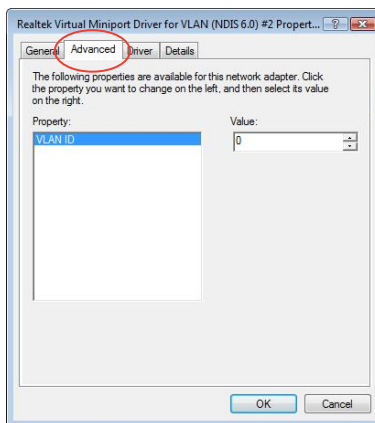
3. Click **Start > Control Panel > Network and Sharing Center**, and then click **Manage network connections** from the left **Tasks** list. Right-click the virtual LAN adapter and select **Properties**.



4. Conduct necessary settings for the virtual LAN adapter, and then click **Configure**.

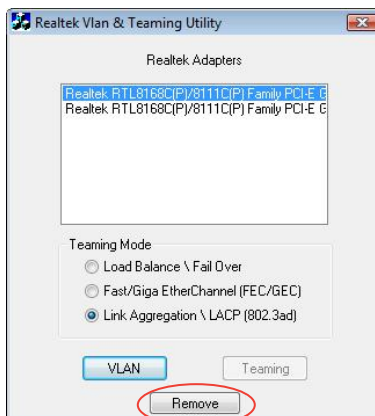


5. Click the **Advanced** tab in the **Realtek Virtual Miniport Driver for VLAN (NDIS 6.0) Properties** window and conduct necessary VLAN settings. Close all windows when finished.



To remove a virtual LAN adapter in Windows® Vista

1. Launch the Realtek VLAN & Teaming Utility.
2. Click **Remove** to remove the existing virtual LAN adapter.



4.4 RAID configurations

The motherboard comes with the Intel® ICH10R Southbridge controller that allows you to configure Serial ATA hard disk drives as RAID sets. The motherboard supports the following RAID configurations: RAID 0, RAID 1, RAID 10 and RAID 5.



- You must install Windows® XP Service Pack 2 or later versions before using Serial ATA hard disk drives. The Serial ATA RAID feature is available only if you are using Windows® XP SP2 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.

Intel® Matrix Storage. The Intel® Matrix Storage technology supported by the ICH10R chip allows you to create a RAID 0, RAID 1, RAID 5, and RAID 10* function to improve both system performance and data safety. You can also combine two RAID sets to get higher performance, capacity, or fault tolerance provided by the difference RAID function. For example, RAID 0 and RAID 1 set can be created by using only two identical hard disk drives.

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 **Main** menu > **Storage Configuration**, and then press <Enter>.
3. Set the **Configure SATA as** item to [RAID].
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® Matrix Storage Manager option ROM utility

To enter the Intel® Matrix Storage Manager option ROM utility

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

```
Intel(R) Matrix Storage Manager option ROM v8.0.0.1038 ICH10R wRAID5
Copyright(C) 2003-08 Intel Corporation. All Rights Reserved.

[ MAIN MENU ]
1. Create RAID Volume
2. Delete RAID Volume
3. Reset Disks to Non-RAID
4. Exit

[ DISK/VOLUME INFORMATION ]

RAID Volumes:
None defined.

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

[↑↓]-Select [ESC]-Exit [ENTER]-Select Menu
```

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



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

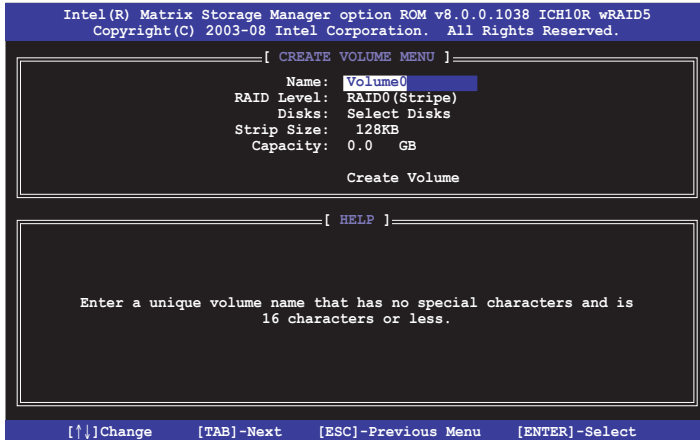


The utility supports maximum four hard disk drives for RAID configuration.

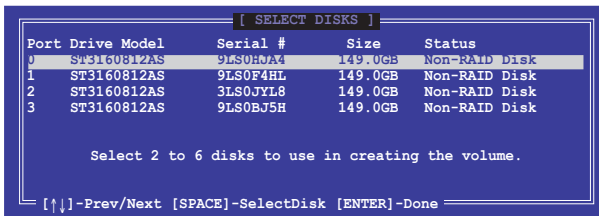
Creating a RAID volume

To create a RAID set

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



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



5. Use the up/down arrow key to select a drive, and then press <Space> to select. A small triangle marks the selected drive. Press <Enter> after completing your selection.
6. Use the up/down arrow key to select the stripe size for the RAID array (for RAID 0, 10 and 5 only), and then press <Enter>. The available stripe size values range from 4 KB to 128 KB. The following are typical values:
RAID 0: 128KB
RAID 10: 64KB
RAID 5: 64KB



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

7. When the **Capacity** item is selected, enter the RAID volume capacity that you want and press <Enter>. The default value indicates the maximum allowed capacity.
8. When the **Create Volume** item is selected, press <Enter>. The following warning message appears.



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

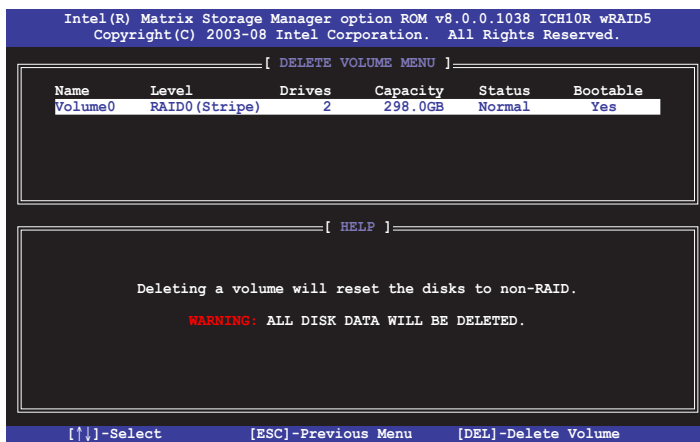
Deleting a RAID set



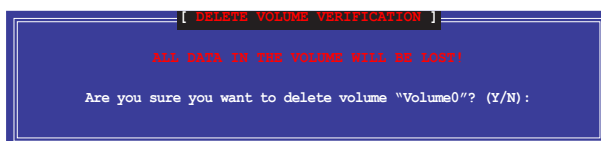
Take caution when deleting a RAID set. You will lose all data on the hard disk drives when you delete a RAID set.

To delete a RAID set

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



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

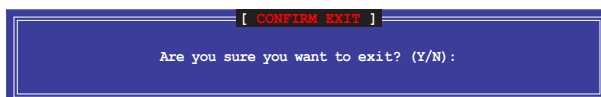


3. Press <Y> to delete the RAID set and return to the utility main menu, or press <N> to return to the **DELETE VOLUME** menu.

Exiting the Intel® Matrix Storage Manager

To exit the utility

1. From the utility main menu, select **4. 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.

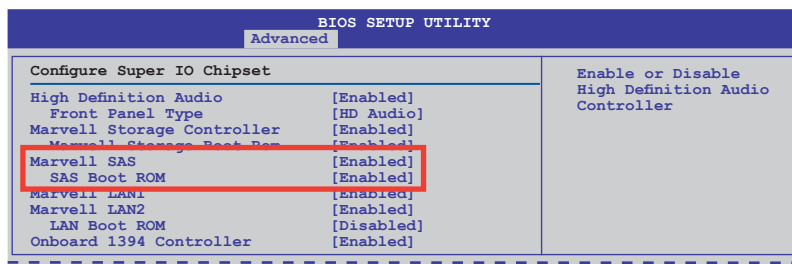
4.4.5 Marvell® SAS RAID configurations

The Marvell® SAS controller allows you to configure RAID 0 and 1 set on the SAS hard disk drives.

Setting the RAID item in BIOS

You must set the RAID item in the BIOS Setup before you can create a RAID set. To do this:

1. Install two internal SAS hard disk drives to the SAS connectors labeled **SAS1/2**.
2. Boot up your computer, and press during POST to enter the BIOS setup.
3. In the **Advanced** menu, go to **Onboard Devices Configuration**, and enable both **Marvell SAS** and **SAS Boot ROM**.
4. Press <F10> to save the changes and exit.



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

Marvell® RAID BIOS Configuration utility

To enter the Marvell® RAID BIOS setup utility

1. Boot up your computer.
2. During POST, press <Ctrl> + <M> to enter the utility main menu.

```
Marvell BIOS Setup (c) 2007 Marvell Technology Group Ltd.
[Selection]-----[Controller]-----[ Devices ]-----[ RAID ]-----
Adapter 1

VendorID:DeviceID:                11AB:6320
BIOS Version:                      2.1.0.09
PCI Slot:                          00
Adapter Serial Number:             FFFFFFFFFFFFFFFFFF
IRQ Number:                        0A
Port 0 SAS Address:                500E018000000000
Port 1 SAS Address:                5005018000000001
Port 2 SAS Address:                5005043011AB0000
Port 3 SAS Address:                5005043011AB0000

ENTER/SPACE:Select, ESC:Back/Exit
```

3. Press <Enter> and select a desired adapter for RAID configuration.

```
Marvell BIOS Setup (c) 2007 Marvell Technology Group Ltd.
[Selection]-----[Controller]-----[ Devices ]-----[ RAID ]-----
Select Adapter
Adapter 1

ENTER/SPACE:Select, ESC:Back/Exit
```

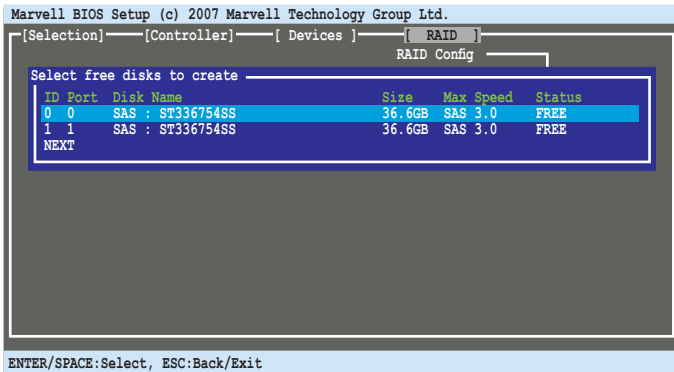
Creating a RAID 0 or RAID 1 set

To create a RAID set:

1. From the utility menu bar, select **RAID > Create array**.

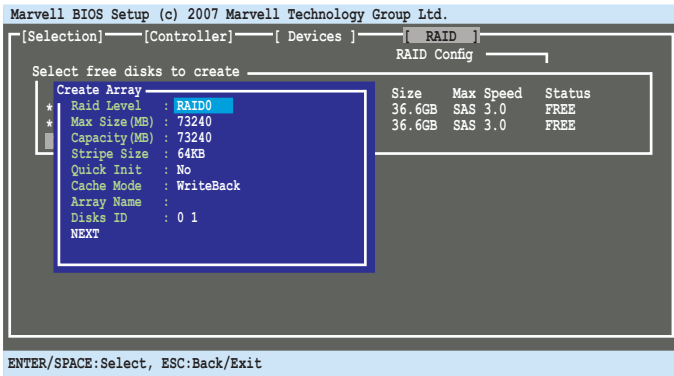


2. Press <Enter>. The screen shows the disks you can add to make up the RAID set. Use the arrow key to select a disk and press <Enter> or <Space> to include this disk in the array.

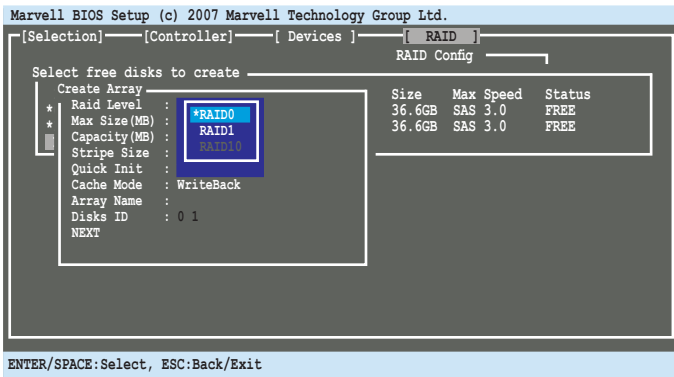


3. After you have selected the desired disks, select **NEXT** to create array.

4. The **Create Array** screen appears.

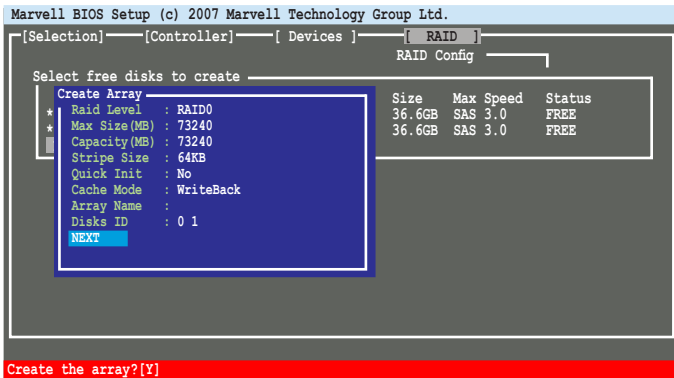


5. Use the arrow key to select the **RAID Level** item and press <Enter> to display the available RAID set. Select a RAID set and press <Enter>. After you have selected the desired RAID set, select **Next** to create array.

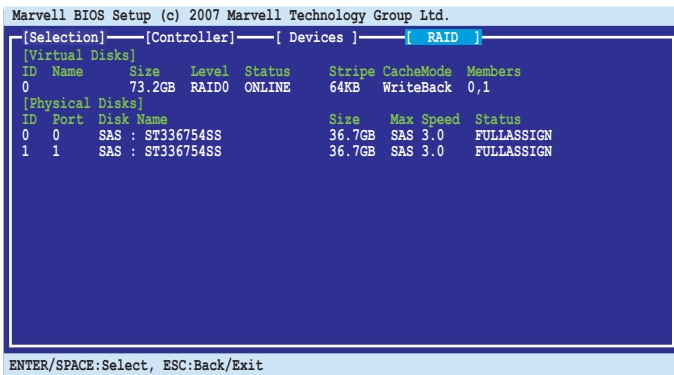


- The available RAID sets vary with the number of disks you select. The RAID sets that you are not allowed to create are grayed out.
- Except for the **RAID Level** item, we recommend you keep the default values for the other items in **Create Array** screen.

6. A confirmation screen appears. Press <Y> to confirm the array creation.



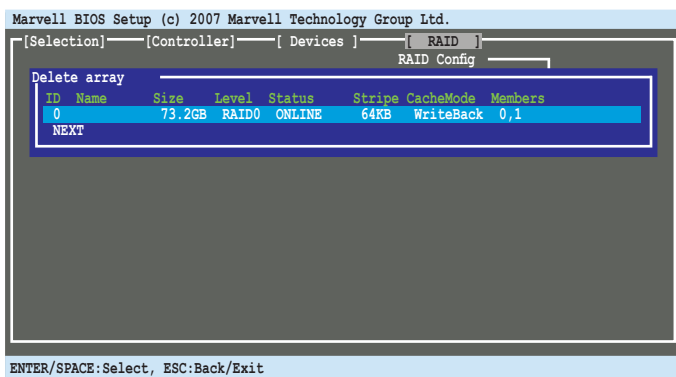
7. The newly created array appears in the RAID menu.



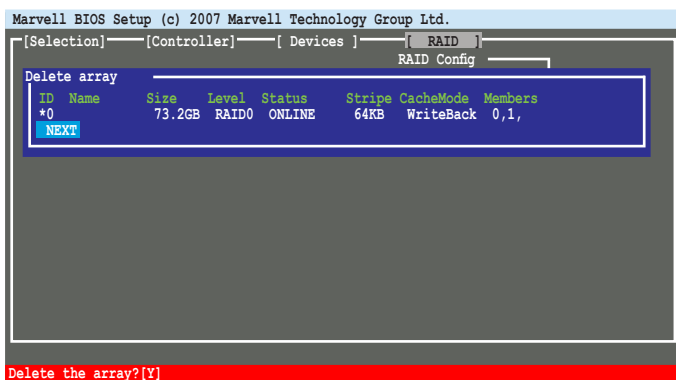
Deleting an array

To delete a RAID set

1. From the utility menu bar, select **RAID > Delete array**, and then press <Enter>. The **Delete array** screen appears.



2. Select a desired array to delete and select **NEXT**. Press <Y> after the confirmation screen appears.



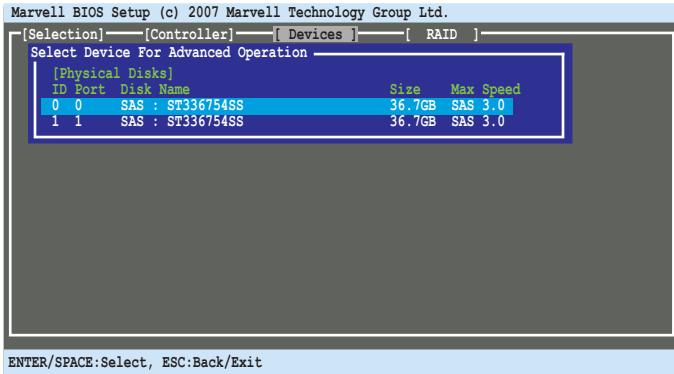
3. Press <Y> again to confirm and delete the selected array.



You cannot recover lost data if you delete an array. Make sure you back up important data before deleting an array.

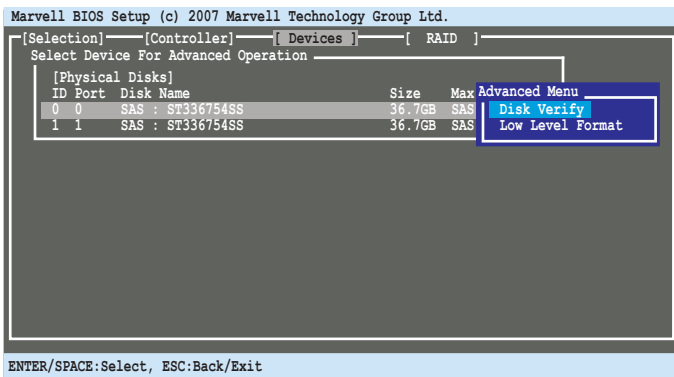
Advanced Operation

From the utility menu bar, select **Devices**, and then press <Enter>. The **Advanced Operation** screen appears. You can run **Disk Verify** and **Low Level Format** in the Advanced Operation screen.



To run Disk Verify

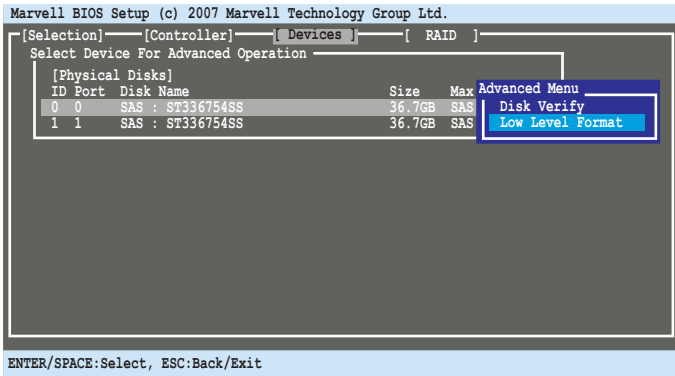
1. In the Advanced Operation screen, use the arrow key to select a disk and press <Enter> or <Space>. The **Advanced Menu** appears. Select **Disk Verify** and press <Enter>.



2. Press <Y> after the confirmation screen appears.
3. The utility verifies the selected disk. When completed, press <ESC> to return to the Advanced Operation screen.

To run Low Level Format

1. In the Advanced Operation screen, use the arrow key to select a disk and press <Enter> or <Space>. The **Advanced Menu** appears. Select **Low Level Format** and press <Enter>.



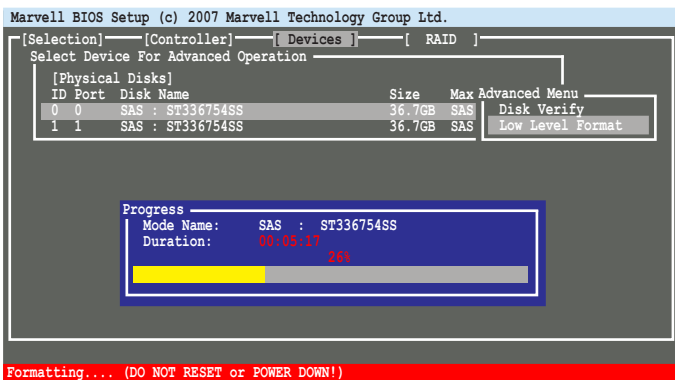
The Low Level Format feature supports SAS HDDs only.

2. Press <Y> after the confirmation screen appears.



You cannot recover lost data if you run low level format on the selected disk. Make sure you back up important data before running low level format.

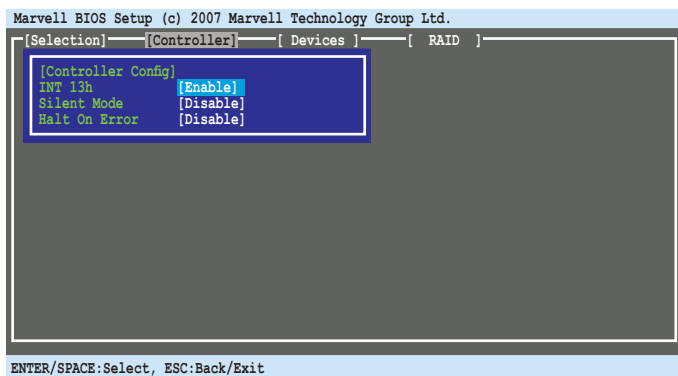
3. The utility runs low level format on the selected disk. DO NOT reset the computer or shut down the power during the operation.



4. When completed, press <ESC> to return to the Advanced Operation screen.

Controller Configuration

From the utility menu bar, select **Controller**, and then press <Enter>. The **Controller Config** screen appears and allows you to change controller settings.



INT 13h [Enable]

Allows you to enable or disable the Interrupt 13h support. Set this item to [Enable] if you want to use the device(s) connected to Marvell® SAS controller as boot device. Set this item to [Disable] if you want to use the device(s) connected to Marvell® 88SE6320 SAS controller as data device.

Configuration options: [Disable] [Enable]

Silent Mode [Disable]

Allows you to enable or disable the BIOS POST silent mode. When enabled, the information of the drives connected to Marvell® SAS controller will be hidden during system POST. Configuration options: [Disable] [Enable]

Halt On Error [Disable]

Allows you to enable or disable the Halt On Error function. When enabled, the BIOS POST will halt when an error (such as virtual drive status changes) occurs and require user's confirmation to continue.

Configuration options: [Disable] [Enable]

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 **4.5.3 Using a USB floppy disk drive.**

4.5.1 Creating a RAID driver disk without entering the OS

To create a RAID/SATA 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 <a> or to create a 32/64bit **Intel ICH10R RAID driver disk.**
7. Insert a formatted floppy disk into the floppy 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. Place the motherboard support DVD into the optical drive.
3. Go to the **Make disk** menu, and then click **Intel ICH10R 32/64 bit RAID Driver Disk** to create an Intel® ICH10R RAID driver disk.
4. Insert a floppy disk into the floppy disk drive.
5. 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 floppy disk drive.
3. When prompted to select the SCSI adapter to install, ensure that you select **Intel(R) SATA RAID Controller (Desktop ICH10R)**.
4. Follow the succeeding screen instructions to complete the installation.

To install the RAID driver in Windows® Vista

1. Insert the floppy disk with RAID driver into the floppy disk drive.
2. During the OS installation, select **Intel(R) SATA RAID Controller (Desktop ICH10R)**.
3. Follow the succeeding screen instructions to complete the installation.

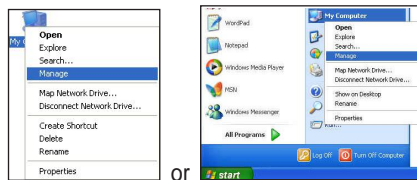
4.5.4 Using a USB floppy disk drive

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.

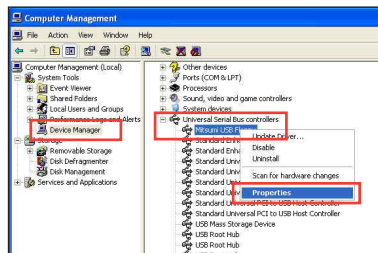
2. Right-click **My Computer** on the Windows® desktop or **start** menu, and then select **Manage** from the pop-up window.



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



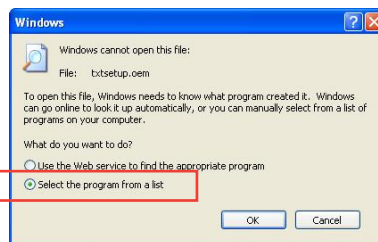
The name of the USB floppy disk drive varies with different vendors.



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_ICH10R]** and **[HardwareIds.scsi.iastor_ICH8RICH9RICH10RDO]** 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_ICH10R]
id = "PCI\VEN_8086&DEV_3A22&CC_0106", "iastor"
id = "USB\VID_03EE&PID_6901", "usbstor" #--Mitsumi

[HardwareIds.scsi.iastor_ICH8RICH9RICH10RDO]
id = "PCI\VEN_8086&DEV_2822&CC_0104", "iastor"
id = "USB\VID_03EE&PID_6901", "usbstor" #--Mitsumi
```



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® CrossFire™ and NVIDIA® SLI™ graphics cards.

5 Multiple GPU technology support

Chapter summary

5

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

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 2-31 for details.



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

5.1.2 Before you begin

For 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

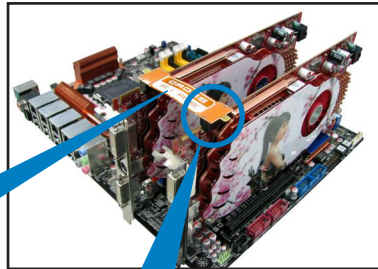
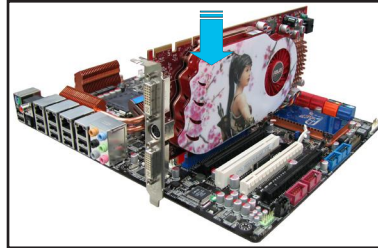
1. Close all current applications.
2. For Windows XP, go to **Control Panel > Add/Remove Programs**.
For Windows Vista, go to **Control Panel > Programs and Features**.
3. Select your current graphics card driver/s.
4. For Windows XP, select **Add/Remove**.
For Windows Vista, select **Uninstall**.
5.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

5.1.3 Installing CrossFireX graphics cards

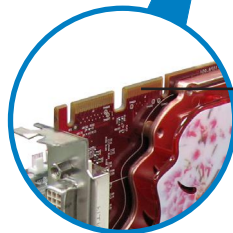


The following pictures are for reference only. The graphics cards and the motherboard layout may vary with models, but the installation steps remain the same.

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.

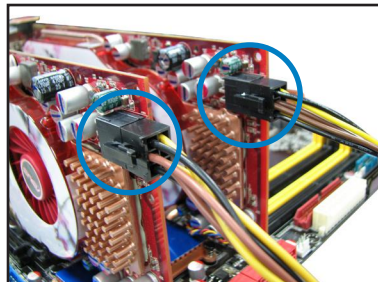


CrossFireX bridge



Goldfingers

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 (www.amd.com).

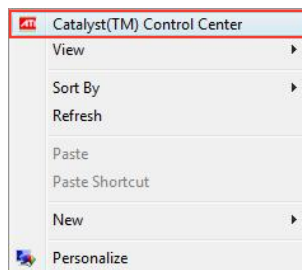
5.1.5 Enabling the ATI® CrossFireX™ technology

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

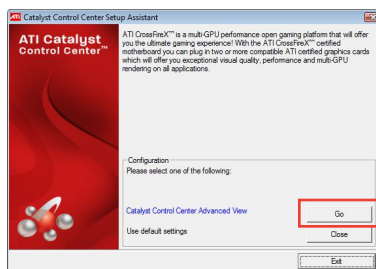
Launching the ATI Catalyst Control Center

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**.

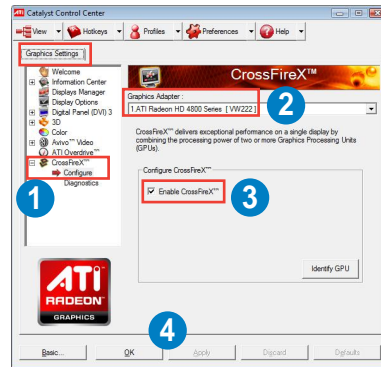


2. The **Catalyst Control Center Setup Assistant** appears when the system detects the existence of multi-graphics cards. Click **Go** to continue to the **Catalyst Control Center Advanced View** window.



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. See page 2-31 for details.



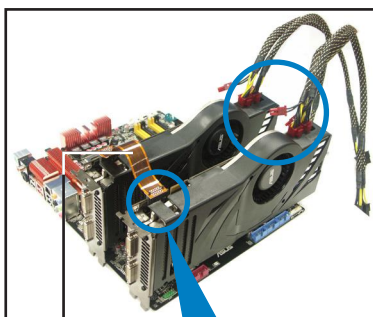
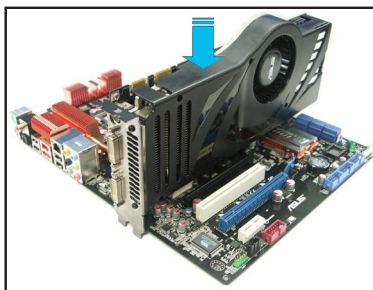
-
- We recommend that you install additional chassis fans for better thermal environment.
 - The NVIDIA Triple SLI technology is supported by Windows® Vista™ operating system only.
 - Visit the NVIDIA zone website (<http://www.nzone.com>) for the latest certified graphics card and supported 3D application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

5.2.2 Installing two SLI-ready graphics cards



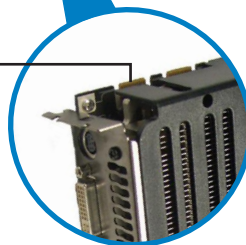
The following pictures are for reference only. The graphics cards and the motherboard layout may vary with models, but the installation steps remain the same.

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.



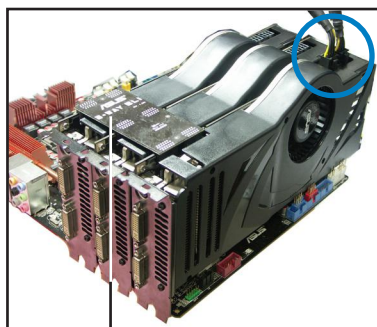
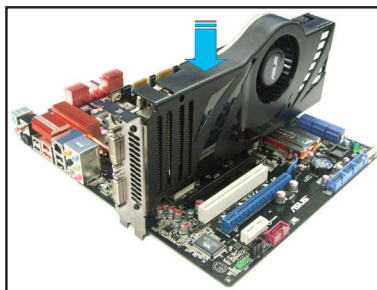
SLI bridge

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 (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

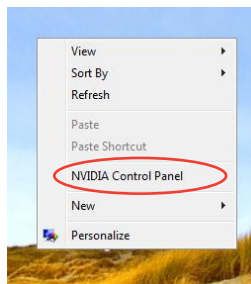
After installing your graphics cards and the device drivers, enable the SLI feature in NVIDIA® Control Panel under the Windows® Vista™ operating system.

Launching the NVIDIA Control Panel

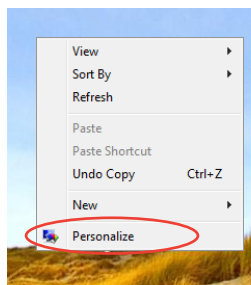
You can launch the NVIDIA Control Panel by the following two methods.

- A. Right click on the empty space of the Windows® desktop and select **NVIDIA Control Panel**.

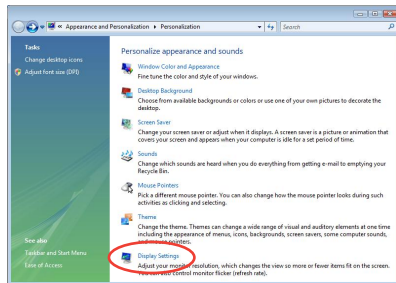
The NVIDIA Control Panel window appears (See Step B5 on page 5-10).



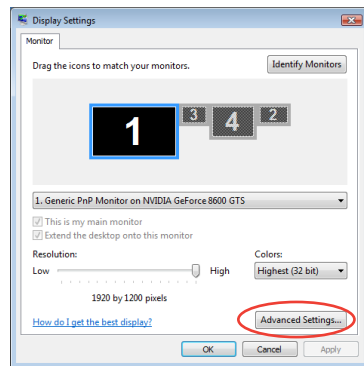
- B1. If you cannot see the NVIDIA Control Panel item in step (A), select **Personalize**.



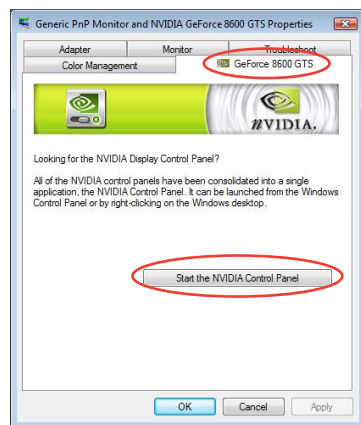
- B2. From the **Personalization** window, select **Display Settings**.



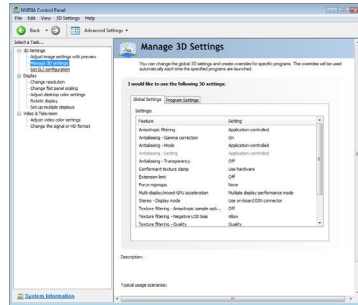
- B3. From the Display Settings dialog box, click **Advanced Settings**.



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

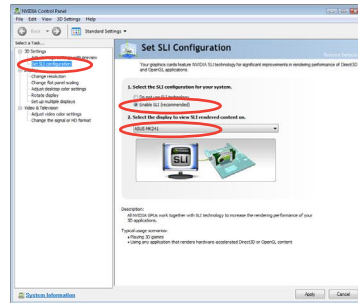


- B5. The NVIDIA Control Panel window appears.



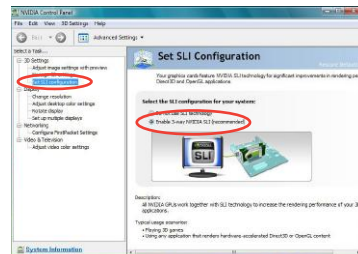
Enabling Dual SLI settings

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.

