Rampage II Extreme

Motherboard

E4268

Second Edition V2
October 2008

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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.

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 adpater 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.

- **Appendix: Debug code table**

  The Appendix lists the debug code table for the LCD Poster.

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:
	`afudos /i[filename]`
	`afudos /iExtremeII.ROM`

Rampage II Extreme specifications summary

CPU	LGA1366 socket for Intel® Core™ i7 Processor Extreme Edition / Core™ i7 Processor Supports Intel® Dynamic Speed Technology Supports Intel® Smart Cache * Refer to www.asus.com for Intel® CPU support list.
Chipset	Intel® X58 / ICH10R
System Bus	Up to 6.4GT/s; Intel® QuickPath Interconnect
Memory	Triple channel memory architecture 6 x DIMM, max. 12GB, DDR3 1800 (O.C.) / 1600 / 1333 / 1066 MHz, non-ECC, un-buffered memory Supports Intel® Extreme Memory Profile (XMP) * Refer to www.asus.com or this user manual for the Memory QVL (Qualified Vendors Lists).
Expansion Slots	3 x PCI Express 2.0 x16 slots (at x16/x8/x8 or dual x16 speed) 2 x PCI Express 2.0 x1 slots (PCIEX1_1 (black) is compatible with the audio slot) 1 x PCI slot
Multi-GPU Technology	Supports NVIDIA® 3-Way SLI™ Technology Supports ATI® CrossFireX™ Technology

Storage	**Intel® ICH10R Southbridge:**
	  - 6 x SATA 3.0 Gb/s ports
	  - Intel® Matrix Storage Technology supports RAID 0,1, 5, and 10
	
	JMicron® 363 controller:
	  - 1 x Ultra DMA 133/100/66/33 for up to 2 PATA devices
	  - 1 x External SATA 3.0 Gb/s port (SATA On-the-Go)
	  - 1 x SATA 3.0 Gb/s port

LAN	Dual Gigabit LAN controllers, both featuring AI NET 2 Supports Teaming Technology

High Definition Audio	**SupremeFX X-Fi Audio Card**
	  - ADI® AD2000B 8-channel High Definition Audio CODEC
	  - EAX® Advanced™ HD 4.0
	  - X-Fi CMSS®-3D
	  - X-Fi Crystalizer™
	  - Creative ALchemy
	  - Supports 1 x S/PDIF out header
	  - Supports Coaxial / Optical S/PDIF Out ports on rear

IEEE 1394	2 x IEEE 1394a ports (one at midboard; one at back panel)

(continued on the next page)

Rampage II Extreme specifications summary

USB	12 x USB 2.0 ports (6 ports at midboard; 6 ports at back panel)

ROG Exclusive Overclocking Features	**TweakIt**
	ProbeIt
	Extreme Engine with ML Cap
	  - 16-phase power design for CPU
	  - 3-phase QPI/DRAM power design
	  - 3-phase power design for Northbridge
	  - 3-phase power design for Memory
	  - ML Caps on CPU, NB, and memory respectively
	CPU Level Up
	iROG
	Extreme Tweaker
	BIOS Flashback
	Loadline Calibration
	Intelligent overclocking tools:
	  - ASUS TurboV
	  - ASUS O.C. Profile
	Overclocking Protection:
	  - COP EX (Component Overheat Protection -EX)
	  - Voltiminder LED
	  - ASUS C.P.R. (CPU Parameter Recall)

Other Special Features	External LCD Poster Onboard Switches: Power / Reset / Clr CMOS (at back panel) EL I/O Q-Fan Plus ROG BIOS Wallpaper ASUS EPU-6 Engine ASUS Fan Xpert ASUS Q-Connector ASUS EZ Flash 2 ASUS CrashFree BIOS 3 ASUS MyLogo 3™
BIOS Features	16 Mb AMI BIOS, PnP, DMI 2.0, WfM 2.0, SM BIOS 2.4, ACPI 2.0a, Multi-Language BIOS
Manageability	WOL by PME, WOR by PME, Chassis Intrusion, PXE
Back Panel I/O Ports	1 x PS/2 Keyboard port (purple) 1 x External SATA port 1 x IEEE1394a port 2 x LAN (RJ45) ports 6 x USB 2.0/1.1 ports 1 x Clr CMOS switch

Rampage II Extreme specifications summary

Internal I/O Connectors	3 x USB connectors support additional 6 USB ports 1 x Floppy disk drive connector 1 x IDE connector 6 x SATA connectors (Blue) 1 x SATA connector (Black) 1 x CPU Fan connector 3 x Chassis Fan connectors 1 x Power Fan connector 3 x Optional Fan connectors 8 x Probe connectors 3 x Thermal sensor connectors 1 x BIOS FlashBack boot up selection header 1 x ROG light connector 1 x IEEE1394a connector 1 x LCD Poster connector 1 x EL I/O Shield connector 1 x Chassis Intrusion connector 24-pin EATX Power connector 8-pin EATX 12V Power connector 1 x En/Dis-able Clr CMOS header 1 x System panel connector
Accessories	ProbeIt Cable 3-Way SLI™ Cable SLI™ Cable ASUS Optional Fan SupremeFX X-Fi Audio Card External LCD Poster 3 in 1 ASUS Q-Connector kit UltraDMA 133/100/66 cable Serial ATA signal cables Serial ATA power cables 2-port USB2.0 + IEEE 1394a module EL I/O Shield Thermal sensor cables Cable ties User's manual
Software	Support DVD: - Drivers and applications Sound Blaster X-Fi utility Futuremark® 3DMark® Vantage Advanced Edition Kaspersky® Anti-virus software ASUS PC Probe II ASUS Update ASUS AI Suite
Form Factor	ATX Form Factor, 12"x 10.6" (30.5 cm x 26.9 cm)

*Specifications are subject to change without notice.

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

Product introduction

Chapter summary

1

1.1   Welcome!

Thank you for buying an ROG Rampage II Extreme 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	ROG Rampage II Extreme
I/O module	2-port USB 2.0 + IEEE 1394a module
Cables	ProbeIt cable 3-Way SLI cable SLI cable Ultra DMA 133/100/66 cable Serial ATA signal cables Serial ATA power cables Thermal sensor cables
Accessories	SupremeFX X-Fi Audio Card External LCD Poster ASUS Optional Fan 3-in-1 ASUS Q-Connector Kit EL I/O Shield Cable ties
Application DVD	ROG 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

Republic of Gamers

The Republic of Gamers consists only the best of the best. We offer the best hardware engineering, the fastest performance, the most innovating ideas, and we welcome the best gamers to join in. In the Republic of Gamers, mercy rules are only for the weak, and bragging rights means everything. We believe in making statements and we excel in competitions. If your character matches our trait, then join the elite club, make your presence felt, in the Republic of Gamers.

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

This motherboard supports the latest Intel® Core™ i7 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 processor is one of the most powerful and energy efficient CPUs in the world. See page 2-9 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 memory support

The motherboard supports DDR3 memory that features data transfer rates of 1800 (O.C.) / 1600 / 1333 / 1066 MHz to meet the higher bandwidth requirements of the latest operation system, 3D graphics, multimedia, and Internet applications. The triple-channel DDR3 architecture triples the bandwidth of your system memory to boost system performance, eliminating bottlenecks with peak bandwidths of up to 43.2 GB/s. See page 2-15 for details.

SLI and CrossFireX on Demand

Fret no longer because with the ROG motherboard, you'll be able to run both multi-GPU setups. This motherboard features SLI and CrossFireX on Demand technology, supporting up to three graphics cards in a 3-Way SLI or CrossFireX configuration. Whichever path you take, you can be assured of jaw-dropping graphics at a level previously unseen.

PCIe 2.0

This motherboard supports the latest PCIe 2.0 device for twice the current speed and bandwidth. This enhances system performance while still providing backward compatibility to PCIe 1.0 devices. See page 2-24 for details.

Serial ATA 3.0 Gb/s technology and SATA-On-The-Go

This motherboard supports hard drives based on the Serial ATA (SATA) 3 Gb/s storage specification, delivering enhanced scalability and doubling the bus bandwidth for high-speed data retrieval and saves. The external SATA port provides smart setup and hot-plug functions. Easily backup photos, videos and other entertainment contents to external devices. See pages 2-29, 2-32 and 2-33 for details.

Dual Gigabit LAN

The integrated dual Gigabit LAN design allows a PC to serve as a network gateway for managing traffic between two separate networks. This capability ensures rapid transfer of data from WAN to LAN without any added arbitration or latency. See page 2-28 for details.

IEEE 1394a support

The IEEE 1394a interface provides high speed digital interface for audio/video appliances such as digital television, digital video camcorders, storage peripherals & other PC portable devices. See pages 2-28 and 2-34 for details.

High Definition Audio

Enjoy high-end sound quality on your PC! The onboard 8-channel HD audio (High Definition Audio, previously codenamed Azalia) CODEC enables high-quality 192KHz/24-bit audio output, jack-sensing feature, retasking functions, and multi-streaming technology that simultaneously sends different audio streams to different destinations. You can now talk to your partners on the headphones while playing multi-channel network games. See pages 2-29 for details.

100% Japan-made Conductive Polymer Capacitors

This motherboard uses all high-quality Japan-made conductive polymer capacitors onboard for durability, improved lifespan, and enhanced thermal capacity.

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/packaging to safeguard consumers' health while minimizing the impact on the environment.

1.3.2   ROG Intelligent Performance & Overclocking features

TweakIt

TweakIt is designed for control freaks. Following the success of the Extreme Tweaker overclocking feature, ASUS has engineered TweakIt to give users flexible overclocking control even when running benchmark programs! The joystick-like control puts every overclocking option in the user's fingertips, allowing the users performance optimization options during game play to gain the competitive edge. TweakIt brings a brand new dimension to the game of overclocking and benchmarking. See pages 2-43 and 2-44 for details.

ProbeIt

ProbeIt takes the guesswork out of locating the motherboard's measurement points, identifying them clearly in the form of eight sets of detection points so you'll know exactly where to get quick yet accurate readings using a multitester. See page 2-45 for details

Extreme Engine with ML Cap design

Overclocking is all about headroom and for this the ASUS ROG motherboard has the Extreme Engine–a next generation dynamic multi-phase power management system equipped with high performance Multilayer type Polymer Capacitors (ML Caps). Extreme Engine ensures a stable power supply during overvoltage by lowering Equivalent Series Resistance (ESR), keeping critical components such as the processor, system memory and the Northbridge reliable. This means you'll be able to push your spanking new Intel® Core™ i7 CPU to the limit, hitting benchmark scores that others only dream of.

iROG

iROG is a special IC which enables several ROG highlighted functions that give you full disposal of the motherboard at any stage! This design allows advanced user control and management to be processed at a hardware level. iROG greatly increases fun during overclocking for PC enthusiasts and it provides system maintenance and management with more control and efficiency.

BIOS Flashback

Overclocker's prayer to have BIOS flexibility is answered! With the new BIOS Flashback, PC enthusiasts can overclock with even more confidence. BIOS Flashback gives overclockers the ability to save two versions of the BIOS simultaneously. Very much like the "SaveGame" function, one BIOS can be used for the overclocking adventure, while the other BIOS is to be stored with any previous version. BIOS Flashback brings the ultimate convenience to overclockers! See pages 2-27 and 3-47 for details.

CPU Level Up

Ever wish that you could have a more expansive CPU? Upgrade your CPU at no additional cost with ROG's CPU Level Up! Simply choose a processor you want to OC to, and the motherboard will do the rest for you. See the new CPU speed and enjoy the performance instantly! Overclocking is never as easy as this. See pages 3-13 and 4-27 for details.

Extreme Tweaker

Extreme Tweaker is the one stop shop to fine-tune your system to optimal performance. No matter if you are looking for frequency adjustment, over-voltage options, or memory timing settings, they are all here! See page 3-12 for details.

Voltiminder LED

In the pursuit of extreme performance, overvoltage adjustment is critical but risky. Acting as the "red zone" of a tachometer, the Voltiminder LED displays the voltage status for CPU, NB, SB, and Memory in a intuitive color-coded fashion. The Voltiminder LED allows quick voltage monitoring for overclockers. See pages 2-2, 2-3 and 2-4 for details.

Component Overheat Protection-EX (COP EX)

The COP EX allows overclockers to increase chipset voltages without the worries of overheating. It can also be used to monitor and save an overheating GPU. The COP EX allows more freedom and less constraint for maximum performance achievement.

Loadline Calibration

Maintaining ample voltage support for the CPU is critical during overclocking. The Loadline calibration ensures stable and optimal CPU voltage under heavy loading. It helps overclockers enjoy the motherboard's ultimate OC capabilities and benchmark scores.

1.3.3   ROG unique features

SupremeFX X-Fi features

You may enjoy good quality sound from the thoughtful design of SupremeFX card on a hardware level. Activating X-Fi CMSS3D and Crystalizer will enable accurate virtual 3D surround sound and enhancement on sound quality experience. You will be able to experience realistic dynamic sound effects with games. See pages 2-37 and 4-12 for details.

External LCD Poster

The new LCD Poster now posts critical POST information in an ever friendly and flexible external display. When system malfunction occurs, the LCD Poster automatically detects device failure and translates the errors on the LCD during POST. Unlike other competing 2 digit displays, users do not need to read "gibberish" to find out what is wrong. See pages 2-43 and 2-48 for details.

Onboard Switches

With an easy press during overclocking, this exclusive onboard switch allows gamers to effortlessly fine-tune the performance without having to short the pins or moving jumpers. See page 2-42 for details.

EL I/O

Today's users demand more than good performance—they demand more heart touching services and user-friendly features. The motherboard comes with the EL I/O, an impressive design that increases convenience in connecting devices on the back I/O. The cool EL lights up your I/O panel under your desk, in the dark, or in a LAN Party. No more jamming devices into the wrong connectors when you are in the dark! See page 2-48 for details.

Q-Fan Plus technology

The Q-Fan function automatically detects temperature and adjusts fan speed accordingly to achieve quiet and efficient cooling. With Q-Fan Plus, special temperature sensor cable is provided to detect temperature on any device. When used with optional fans, you may activate Q-Fan function on up to 3 additional devices of your choice!

1.3.4   ASUS special features

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.

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 4-25 for details.

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, drives and system fan), the EPU automatically provides the most appropriate power usage via intelligent acceleration and overclocking, helping save power and money. See page 4-28 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 4-24 for details.

Optional Fan

The optional fan is specifically designed to provide sufficient airflow over the CPU power modules and chipset area when water-cooling or passive-cooling is utilized, ensuring effective heat dissipation for the entire system. See page 2-46 for details.

ASUS MyLogo 3

ASUS MyLogo 3 is a new feature present in the motherboard that allows you to personalize and add style to your system with customizable and animated boot logos. See page 4-9 for details.

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-Connector

The ASUS Q-Connector allows you to connect or disconnect chassis front panel cables in one easy step with one complete module. This unique adapter eliminates the trouble of plugging in one cable at a time, making connection quick and accurate. See page 2-41 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 3-45 for details.

ASUS EZ Flash 2

EZ Flash 2 is a user-friendly BIOS update utility. Simply launch this tool and update BIOS using a USB flash disk without entering the OS. You can update your BIOS in a few clicks without preparing an additional floppy diskette or using an OS-based flash utility. See pages 3-5 and 3-44 for details.

C.P.R. (CPU Parameter Recall)

When the system hangs due to overclocking failure, there is no need to open the system chassis to clear CMOS data. Simply reboot the system, and the BIOS automatically restores the CPU default settings for each parameter.

Due to the chipset behavior, AC power off is required before using C.P.R. function.

Chapter 1: Product Introduction

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 information

2

Chapter summary

2

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 LEDs

The motherboard comes with LEDs that indicate the voltage conditions of CPU, memory, northbridge, and southbridge. You may adjust the voltages in BIOS. There are also an LED for hard disk drive activity and an onboard switch for power status. For more information about voltage adjustment, refer to **3.3 Extreme Tweaker menu**.

1.   **CPU LED**

The CPU LED has three voltage displays: CPU Voltage, CPU PLL Voltage and QPI/DRAM Core voltage; you can select the voltage to display in BIOS. Refer to the illustration below for the location of the CPU LED and the table below for LED definition.

CPU_CRAZY
CPU_HIGH
CPU_NORMAL
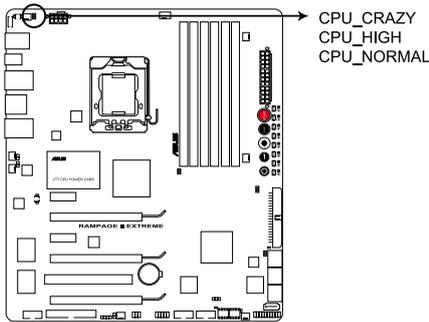
RAMPAGE II EXTREME CPU LED

	Normal (green)	High (yellow)	Crazy (red)
CPU Voltage	0.85000–1.5000	1.50625–1.59375	1.60000–
CPU PLL Voltage	1.81592–1.89542	1.90867–1.94842	1.96167–
QPI/DRAM Core Voltage	1.20000–1.39375	1.40000–1.65625	1.66250–

2. Northbridge/Southbridge LEDs

The northbridge and southbridge LEDs each have two different voltage displays. The northbridge LED displays either the IOH Voltage or the IOH PCIE Voltage. The southbridge LED shows either the ICH Voltage or the ICH PCIE Voltage. You can select the voltage to display in BIOS. Refer to the illustration below for the location of the northbridge/southbridge LEDs and the table below for LED definition.
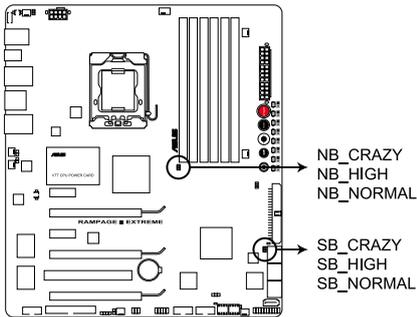
RAMPAGE II EXTREME North/South Bridge LED

	Normal (green)	High (yellow)	Crazy (red)
IOH Voltage	1.11341–1.39166	1.40491–1.64341	1.65666–
IOH PCIE Voltage	1.51106–1.69656	1.70981–1.84231	1.85556–
ICH Voltage	1.11341–1.59041	1.60366–1.84216	1.85541–
ICH PCIE Voltage	1.51106–1.61706	1.63031–1.80256	1.81581–

3. Memory LED

Refer to the illustration below for the location of the memory LED and the table below for LED definition.

DDR_CRAZY
DDR_HIGH
DDR_NORMAL
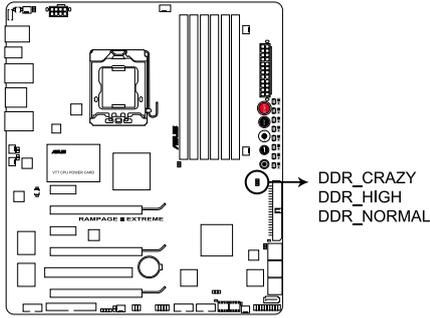
RAMPAGE II EXTREME DDR LED

	Normal (green)	High (yellow)	Crazy (red)
DRAM Bus Voltage	1.51106–1.72306	1.73631–2.31931	2.33256–

4. Hard Disk LED

The hard disk LED is designed to indicate the hard disk activity. It blinks when data is being written into or read from the hard disk drive. The LED does not light up when there is no hard disk drive connected to the motherboard or when the hard disk drive does not function.

HD_LED
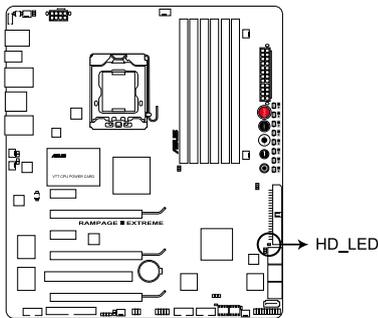
RAMPAGE II EXTREME Hard Disk LED

5.   **Power LED**

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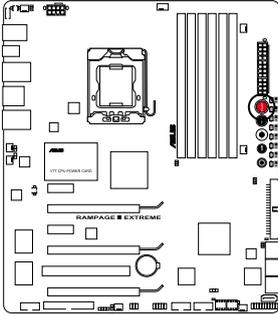
RAMPAGE II EXTREME Power on switch

When you turn on the ATX power supply, the **Power LED** flashes three times to indicate that the system is ready to boot. Wait till the flash stops before you press the power-on switch.

6.   **BIOS LED**

When the BIOS backup starts, the system will enter the soft-off state and the BIOS LED will blink to indicate that the backup is proceeding.
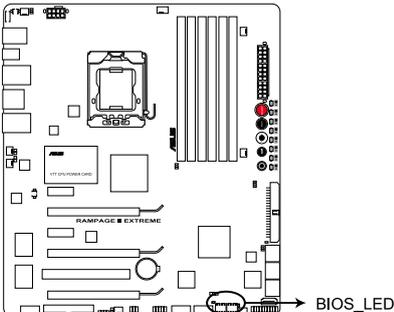
BIOS_LED

RAMPAGE II EXTREME BIOS LED

Refer to **3.8.4 BIOS Flashback** for further information.

2.2 Motherboard overview

2.2.1 Motherboard layout
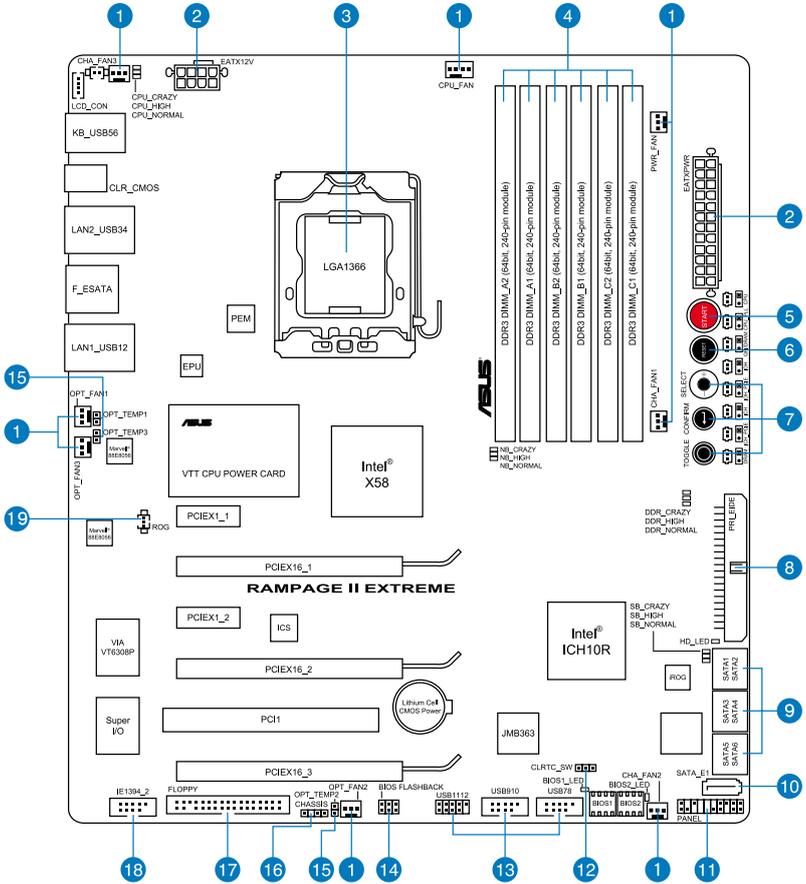
2.2.2 SupremeFX X-Fi audio card layout
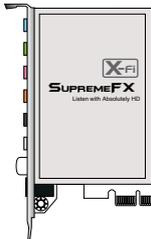
Refer to pages 2-29 and 2-37 for details about the audio jacks and connectors on this card.

2.2.3   Layout contents

Connectors/Jumpers/Switches/Slots	Page
1. CPU, chassis, power and optional fan connectors (4-pin CPU_FAN; 3-pin CHA_FAN1–3; 3-pin PWR_FAN; 3-pin OPT_FAN1–3)	2-35
2. ATX power connectors (24-pin EATXPWR, 8-pin EATX12V)	2-38
3. LGA1366 CPU Socket	2-10
4. DDR3 DIMM slots	2-15
5. Power-on switch	2-42
6. Reset switch	2-42
7. TOGGLE, CONFIRM, SELECT switches	2-43
8. IDE connector (40-1 pin PRI_EIDE)	2-31
9. ICH10R Serial ATA RAID connectors (7-pin SATA1–6 [blue])	2-32
10. Serial ATA connectors (7-pin SATA_E1 [black])	2-33
11. System panel connector (20-8 pin PANEL)	2-40
12. Clear RTC RAM (3-pin CLRTC_SW)	2-26
13. USB connectors (10-1 pin USB78; USB910; USB1112)	2-33
14. BIOS flash setting (6-pin BIOS_FLASHBACK)	2-27
15. Thermal sensor cable connectors (2-pin OPT_TEMP1–3)	2-36
16. Chassis intrusion connector (4-1 pin CHASSIS)	2-36
17. Floppy disk drive connector (34-1 pin FLOPPY)	2-30
18. IEEE 1394a port connector (10-1 pin IE1394_2)	2-34
19. ROG connector (3-pin ROG)	2-39

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

2.2.4   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.

2.2.5   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
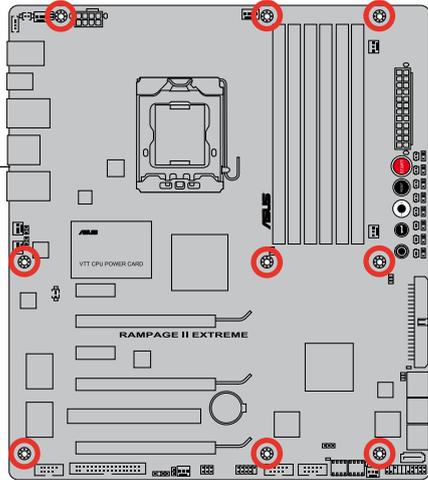
2.3 Central Processing Unit (CPU)

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.
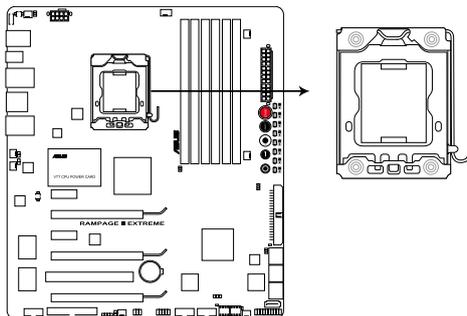
RAMPAGE II EXTREME CPU LGA1366 Socket

> 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.

Retention tab

A

B
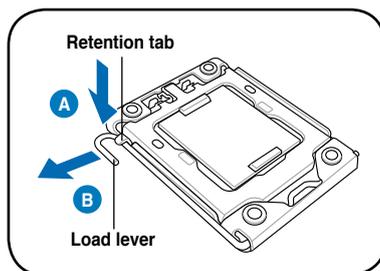
Load lever

3. Lift the load lever in the direction of the arrow to a 135º angle.

4. Lift the load plate with your thumb and forefinger to a 100º angle.

Load plate
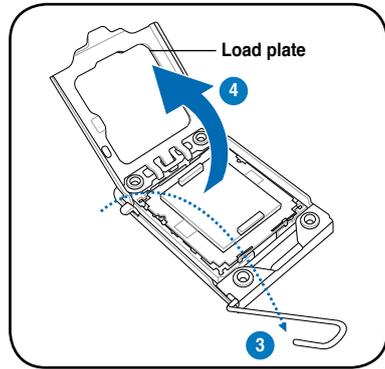
5. Remove the PnP cap from the CPU socket.

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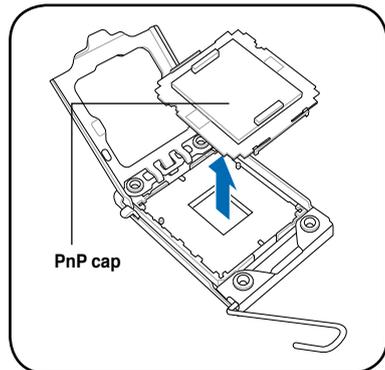
6. Position the CPU over the socket, making sure that the gold triangle is on the bottom-left corner of the socket, and then fit the socket alignment key into the CPU notch.

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!

Gold triangle mark

CPU notch

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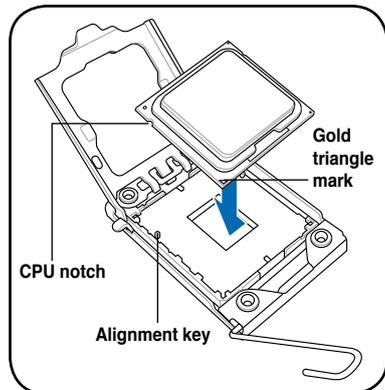
7. Apply several drops of thermal paste to the exposed area of the CPU that the heatsink will be in contact with, ensuring that it is spread in an even thin layer.

> 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.
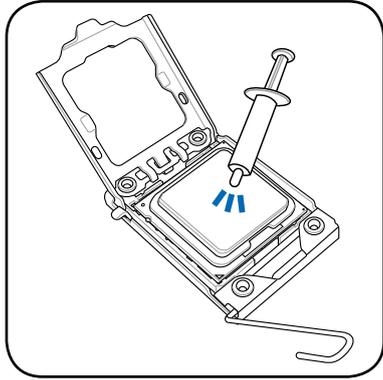
8. Close the load plate (A), and then push the load lever (B) until it snaps into the retention tab.
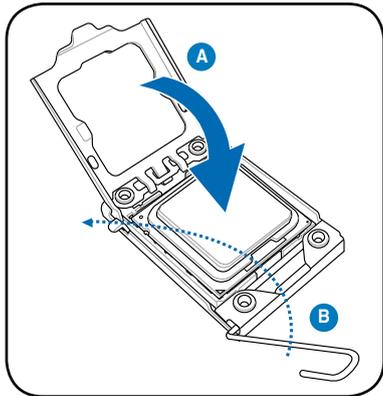
2.3.2   Installing the CPU heatsink and fan

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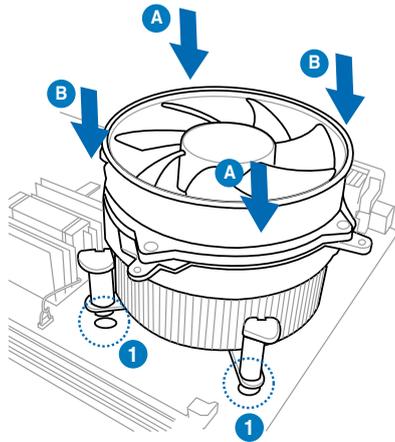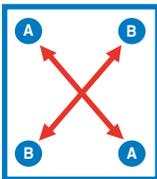
Orient the heatsink and fan assembly such that the CPU fan cable is closest to the CPU fan connector.

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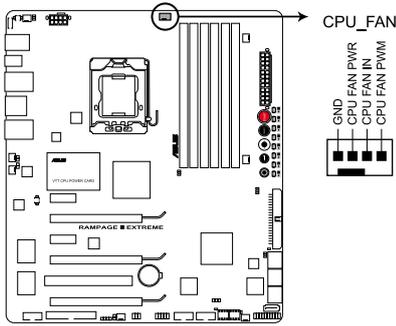
RAMPAGE II EXTREME CPU fan connector

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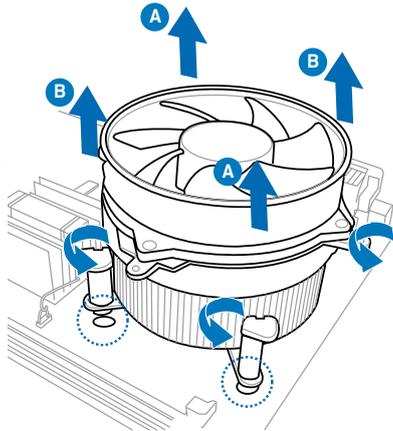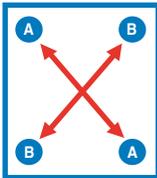
4. Carefully remove the heatsink and fan assembly from the motherboard.

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:
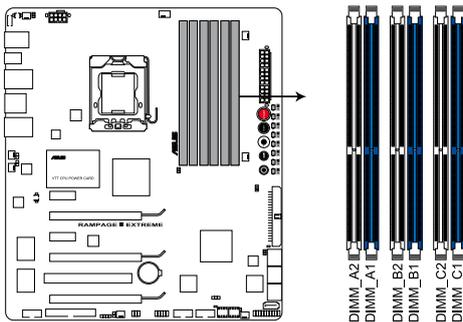
RAMPAGE II EXTREME 240-pin DDR3 DIMM sockets

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 and 2GB unbuffered non-ECC 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.

- • 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 install a 64-bit Windows OS when having 4GB or more memory installed on the motherboard.

- • This motherboard does not support memory modules made up of 128 Mb chips.

- • 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. To operate at the vendor-marked or at a higher frequency, see section **3.1 Extreme Tweaker menu** for manual memory frequency adjustment.

- • For system stability, use a more efficient memory cooling system to support a full memory load (6 DIMMs) or overclocking condition.

Rampage II Extreme Motherboard Qualified Vendors Lists (QVL) DDR3-2000 MHz capability

Vendor	Part No.	Size	SS/DS	Chip No.	CL	Chip Brand	DIMM socket support (Optional)	
							A*	B*
CORSAIR	Box P/N: TW3X2G2000DFNV (CM3X1G2000DFNV)	2048MB(Kit of 2)	DS	Heat-Sink Package	8-8-8-24	N/A		V
Crucial	BL12864BE2009.8SFB1(EPP)	1024MB	SS	Heat-Sink Package	9-9-9-28	N/A	V	V
Kingston	KHX16000D3K2/2GN(EPP)	2048MB (Kit of 2)	SS	Heat-Sink Package	N/A	N/A	V	V
OCZ	OCZ3FXT20002GK	2048MB (Kit of 2)	SS	Heat-Sink Package	8	N/A	V	V
OCZ	OCZ3P20002GK	2048MB (Kit of 2)	SS	Heat-Sink Package	9	N/A	V	

Rampage II Extreme Motherboard Qualified Vendors Lists (QVL) DDR3-1800 MHz capability

Vendor	Part No.	Size	SS/DS	Chip No.	CL	Chip Brand	DIMM socket support (Optional)	
							A*	B*
Apacer	BoxP/N:DH.02GAL.F7LK2 (78.0AGCB.BN0)	2048MB (Kit of 2)	SS	Heat-Sink Package	7-7-7-20	N/A	V	
CORSAIR	BoxP/N:TWIN3X2048-1800C7DF (CM3X1024-1800C7D)	2048MB (Kit of 2)	SS	Heat-Sink Package	7-7-7-20	N/A		
CORSAIR	CM3X1024-1800C7DIN(XMP)	1024MB	SS	Heat-Sink Package	7-7-7-20	N/A	V	V
CORSAIR	Box P/N:TW3X4G1800C8DF (CM3X2G1800C8D)	4096MB (Kit of 2)	DS	Heat-Sink Package	8-8-8-24	N/A	V	V
Kingston	KHX14400D3/1G	1024MB	SS	Heat-Sink Package	N/A	N/A	V	V
Kingston	KHX14400D3K2/2G	2048MB (Kit of 2)	SS	Heat-Sink Package	N/A	N/A	V	V
Kingston	KHX14400D3K2/2GN(EPP)	2048MB (Kit of 2)	SS	Heat-Sink Package	N/A	N/A		
Kingston	KHX14400D3K2/2GN(EPP)	2048MB (Kit of 2)	SS	Heat-Sink Package	N/A	N/A	V	V
OCZ	OCZ3P18002GK	1024MB	SS	Heat-Sink Package	N/A	N/A	V	V
OCZ	OCZ3P18004GK	4096MB (Kit of 2)	DS	Heat-Sink Package	8	N/A	V	V
Transcend	TX1800KLU-2GK	2048MB (Kit of 2)	SS	Heat-Sink Package	8	N/A	V	V

Rampage II Extreme Motherboard Qualified Vendors Lists (QVL) DDR3-1600 MHz capability

Vendor	Part No.	Size	SS/DS	Chip No.	CL	Chip Brand	DIMM socket support (Optional)	
							A*	B*
CORSAIR	Box P/N:TWIN3X2048-1600C7DHXIN (CM3X1024-1600C7DHXIN) (XMP)	2048MB (Kit of 2)	SS	Heat-Sink Package	7	N/A	V	V
CORSAIR	BoxP/N:TW3X4G1600C9DHXNV (CM3X2G1600C9DHXNV)	4096MB (Kit of 2)	DS	Heat-Sink Package	9-9-9-24	N/A	V	V
CORSAIR	BoxP/N:TWIN3X4096-1600C7DHXIN (CM3X2048-1600C7DHXIN)	4096MB (Kit of 2)	DS	Heat-Sink Package	N/A	N/A	V	V
Crucial	BL12864BA1608.8SFB(XMP)	1024MB	SS	Heat-Sink Package	N/A	PQI	V	V
G.SKILL	F3-12800CL7D-2GBHZ	2048MB (Kit of 2)	SS	Heat-Sink Package	7-7-7-18	N/A	V	V
G.SKILL	F3-12800CL9D-2GBNQ	2048MB (Kit of 2)	SS	Heat-Sink Package	9-9-9-24	N/A	V	V
G.SKILL	F3-12800CL7D-4GBPI	4096MB (Kit of 2)	DS	Heat-Sink Package	7-7-7-18	N/A	V	V
Kingston	KHX12800D3K2/4G	4096MB (Kit of 2)	SS	Heat-Sink Package	N/A	N/A	V	V
OCZ	OCZ3P16002GK	2048MB (Kit of 2)	SS	Heat-Sink Package	7	N/A	V	
OCZ	OCZ3P1600EB1G	1024MB	SS	Heat-Sink Package	N/A	N/A	V	
OCZ	OCZ3T1600XM2GK (XMP)	1024MB	SS	Heat-Sink Package	N/A	N/A	V	V
OCZ	OCZ3P1600EB4GK	4096MB (Kit of 2)	DS	Heat-Sink Package	776	N/A	V	V
OCZ	OCZ3RPR16004GK	4096MB (Kit of 2)	DS	Heat-Sink Package	7	N/A	V	
Aeneon	AXH760UD10-16H	1024MB	SS	Heat-Sink Package	9	N/A	V	V
Aeneon	AXH860UD20-16H	2048MB	DS	Heat-Sink Package	9	N/A	V	V
Patriot	PVS34G1600LLKN	4096MB (Kit of 2)	DS	Heat-Sink Package	7-7-7-20	N/A	V	V
PQI	MFADR401PA0102	2048MB	DS	K4B1G08460	9-9-9-24	SAMSUNG	V	
Team	BoxP/N:TXD32048M1600HC7DC (TXD31024M1600HC7)	2048MB (Kit of 2)	SS	Heat-Sink Package	7-7-7-21	N/A	V	V

Rampage II Extreme Motherboard Qualified Vendors Lists (QVL)
DDR3-1333 MHz capability

Vendor	Part No.	Size	SS/DS	Chip No.	CL	Chip Brand	DIMM socket support (Optional)			
							A*	B*	C*	D*
A-DATA	SC63I1B16	2048MB	DS	K4B1G0846D	9	SAMSUNG	V	V	V	V
CORSAIR	BoxP/N:TW3X4G1333C9DHX (CM3X2048-1333C9DHX)	4096MB (Kit of 2)	DS	Heat-Sink Package	9-9-9-24	N/A	V	V		
CORSAIR	BoxP/N:TWIN3X2048-1333C9 (CM3X1024-1333C9)	2048MB (Kit of 2)	DS	Heat-Sink Package	9-9-9-24	N/A	V	V	V	V
CORSAIR	CM3X1024-1333C9DHX	1024MB	DS	Heat-Sink Package	9	N/A	V	V	V	V
Crucial	CT12864BA1339.8SFB	1024MB	SS	D9GTS	9	MICRON	V	V	V	V
Crucial	CT25664BA1339.16SFD	2048MB	DS	D9JNM	9	MICRON	V	V	V	
ELPIDA	EBJ11UD8BAFA-DG-E	1024MB	DS	J5308BASE-DG-E	8	ELPIDA	V	V	V	
ELPIDA	EBJ11UD8BAFA-DJ-E	1024MB	DS	J5308BASE-DJ-E	9	ELPIDA	V	V		
G.SKILL	F3-10600CL7D-2GBPI	2048MB (Kit of 2)	SS	Heat-Sink Package	7-7-7-18	N/A	V	V	V	V
G.SKILL	F3-10600CL8D-2GBHK	2048MB (Kit of 2)	SS	Heat-Sink Package	8-8-8-21	N/A	V	V	V	V
G.SKILL	F3-10600CL9D-2GBPK	2048MB (Kit of 2)	SS	Heat-Sink Package	9-9-9-24	N/A	V	V	V	V
G.SKILL	F3-10600CL9D-2GBNQ	2048MB (Kit of 2)	DS	Heat-Sink Package	9-9-9-24	N/A	V	V	V	V
G.SKILL	F3-10666CL9D-4GBPK	4096MB (Kit of 2)	DS	Heat-Sink Package	9-9-9-24	N/A	V	V	V	V
KINGMAX	FLFD45F-B8EE9	1024MB	SS	J1108BASE-DJ-E	N/A	ELPIDA	V	V	V	V
Kingston	KVR1333D3N9/1G	1024MB	SS	J1108BASE-DJ-E	N/A	ELPIDA	V	V	V	V
Kingston	KVR1333D3N9/2G	2048MB	DS	J1108BASE-DJ-E	N/A	ELPIDA	V	V	V	V
MICRON	MT8JTF12864AY-1G4BYES	1024MB	SS	Z9HWR	9	MICRON	V			
MICRON	MT16JTF25664AY-1G4BYES	2048MB	DS	Z9HWR	9	MICRON	V	V	V	V
OCZ	OCZ3RPX1333EB2GK	1024MB	SS	Heat-Sink Package	6-5-5	N/A	V	V	V	
OCZ	OCZ3P13332GK	1024MB	DS	Heat-Sink Package	7-7-7-20	N/A	V			
OCZ	OCZ3P13334GK	4096MB (Kit of 2)	DS	Heat-Sink Package	7	N/A	V	V	V	V
Qimonda	IMSH1GU03A1F1C-13H	1024MB	SS	IDSH1G-03A1F1C-13H	N/A	N/A	V	V	V	V
Qimonda	IMSH2GU13A1F1C-13H	2048MB	DS	IDSH1G-03A1F1C-13H	N/A	N/A	V	V	V	V
SAMSUNG	M378B2873DZ1-CH9	1024MB	SS	K4B1G0846D	9	SAMSUNG	V	V	V	V
SAMSUNG	M391B2873DZ1-CH9	1024MB	SS	K4B1G0846D(ECC)	9	SAMSUNG	V	V	V	V
SAMSUNG	M378B5673DZ1-CH9	2048MB	DS	K4B1G0846D	9	SAMSUNG	V	V	V	V
SAMSUNG	M391B5673DZ1-CH9	2048MB	DS	K4B1G0846D(ECC)	9	SAMSUNG	V	V	V	V
Transcend	TS128MLK64V3U	1024MB	SS	K4B1G0846D	9	SAMSUNG	V	V	V	V
Transcend	TS256MLK64V3U	2048MB	DS	K4B1G0846D	9	SAMSUNG	V	V	V	V
Aeneon	AEH760UD00-13H	1024MB	DS	AEH93R13H	9	AENEON	V	V	V	
BUFFALO	FSX1333D3G-1G	1024MB	SS	Heat-Sink Package	7-7-7-20	N/A	V	V	V	V
BUFFALO	FSX1333D3G-2G	2048MB	DS	Heat-Sink Package	7-7-7-20	N/A	V	V	V	V
Patriot	PDC32G1333LLK	1024MB (Kit of 2)	SS	Heat-Sink Package	7	Patriot	V	V	V	V

Rampage II Extreme Motherboard Qualified Vendors Lists (QVL) DDR3-1066 MHz capability

Vendor	Part No.	Size	SS/DS	Chip No.	CL	Chip Brand	DIMM socket support (Optional)			
							A*	B*	C*	D*
CORSAIR	CM3X1024-1066C7	1024MB	DS	Heat-Sink Package	7	N/A	V	V	V	
Crucial	CT12864BA1067.8SFB	1024MB	SS	Z9HWQ	7	MICRON	V	V	V	V
Crucial	CT12864BA1067.8SFD	1024MB	SS	D9JNL	7	MICRON	V	V	V	V
Crucial	CT25664BA1067.16SFD	2048MB	DS	D9JNL	7	MICRON	V	V	V	V
ELPIDA	EBJ11RD8BAFA-AE-E	1024MB	DS	J5308BASE-AC-E(ECC)	7	ELPIDA	V	V	V	V
ELPIDA	EBJ11UD8BAFA-AG-E	1024MB	DS	J5308BASE-AC-E	8	ELPIDA	V	V	V	V
G.SKILL	F3-8500CL6D-2GBHK	2048MB (Kit of 2)	SS	Heat-Sink Package	6-6-6-15	N/A	V	V	V	V
Hynix	HMT112U6AFP8C-G7N0	1024MB	SS	H5TQ1G83AFPG7C	7	HYNIX	V	V	V	V
Hynix	HYMT112U64ZNF8-G7	1024MB	SS	HY5TQ1G831ZNFP-G7	7	HYNIX	V	V	V	
Hynix	HMT125U6AFP8C-G7N0	2048MB	DS	H5TQ1G83AFPG7C	7	HYNIX	V	V	V	V
Hynix	HYMT125U64ZNF8-G7	2048MB	DS	HY5TQ1G831ZNFP-G7	7	HYNIX	V	V	V	
Kingston	KVR1066D3N7/1G	1024MB	DS	J5308BASE-AC-E	7	ELPIDA	V	V	V	V
Kingston	KVR1066D3N7/2G	2048MB	DS	K4B1G0846C-ZCF8	N/A	N/A	V	V	V	V
MICRON	MT8JTF12864AY-1G1D1	1024MB	SS	7VD22	7	MICRON	V	V	V	V
MICRON	MT16JTF25664AY-1G1D1	2048MB	DS	7VD22	7	MICRON	V	V	V	V
Qimonda	IMSH1GU03A1F1C-10F	1024MB	SS	IDSH1G-03A1F1C-10F	7	QIMONDA	V	V	V	V
Qimonda	IMSH1GU03A1F1C-10G	1024MB	SS	IDSH1G-03A1F1C-10G	8	QIMONDA	V	V	V	V
Qimonda	IMSH1GU13A1F1C-10F	1024MB	DS	IDSH51-03A1F1C-10F	N/A	QIMONDA	V	V	V	V
Qimonda	IMSH2GU13A1F1C-10F	2048MB	DS	IDSH1G-03A1F1C-10F	7	QIMONDA	V	V	V	V
Qimonda	IMSH2GU13A1F1C-10G	2048MB	DS	IDSH1G-03A1F1C-10G	8	QIMONDA	V	V	V	V
Aeneon	AEH760UD00-10FA98X	1024MB	DS	AEH93R10F	7	AENEON	V	V	V	V
WINTEC	3DU3191A-10	1024MB	DS	IDSH51-03A1F1C-10F	7	QIMONDA	V	V	V	

Side(s): SS - Single-sided   DS - Double-sided
DIMM support:
- **A***: Supports two modules inserted into slots A1 and B1 as one pair of Dual-channel memory configuration.
- **B***: Supports three modules inserted into the blue slots as one set of Triple-channel memory configuration.
- **C***: Supports four modules inserted into the blue slots and the white slot A2 as one set of Triple-channel memory configuration.
- **D***: Supports six modules inserted into both the blue slots and the white slots as two sets of Triple-channel memory configuration.

Visit the ASUS website for the latest QVL.

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.

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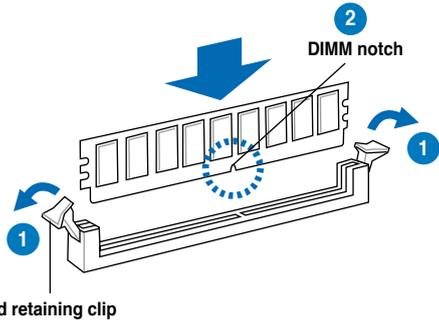
✍ A DIMM is keyed with a notch so that it fits in only one direction. DO NOT force a DIMM into a socket to avoid damaging the DIMM.

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

Locked Retaining Clip
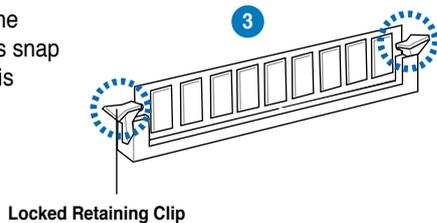
2.4.4   Removing a DIMM

Follow these steps to remove a DIMM.

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

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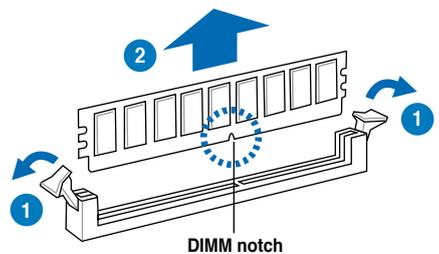
✍ Support the DIMM lightly with your fingers when pressing the retaining clips. The DIMM might get damaged when it flips out with extra force.

2.   Remove the DIMM from the socket.

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	–	Re-direct to IRQ#9
3	11	IRQ holder for PCI steering*
4	12	Communications port (COM1)*
5	13	IRQ holder for PCI steering*
6	14	Floppy disk controller
8	3	System CMOS/Real Time Clock
9	4	IRQ holder for PCI steering*
10	5	IRQ holder for PCI steering*
11	6	IRQ holder for PCI steering*
12	7	PS/2 compatible mouse port*
13	8	Numeric data processor
14	9	Onboard USB Controller
15	10	SATA Primary IDE (legacy mode)

* These IRQs are usually available for PCI devices.

IRQ assignments for this motherboard

	A	B	C	D	E	F	G	H
PCI slot 1	shared	–	–	–	–	–	–	–
LAN (8056)	shared	–	–	–	–	–	–	–
SATA (JMB363)	shared	–	–	–	–	–	–	–
LAN (8056)	–	shared	–	–	–	–	–	–
PCIe x16_1	shared	–	–	–	–	–	–	–
PCIe x16_2	shared	–	–	–	–	–	–	–
PCIe x16_3	–	–	shared	–	–	–	–	–
PCIe x1_1	–	shared	–	–	–	–	–	–
PCIe x1_2	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	–	–	–	–	–	–	–
IEEE 1394	–	–	–	shared	–	–	–	–

2.5.4   PCI slots

The PCI slots support cards such as a LAN card, SCSI card, USB card, and other cards that comply with PCI specifications. Refer to the figure below for the location of the slot.

2.5.5   PCI Express x1 slots

This motherboard supports PCI Express x1 network cards, SCSI cards and other cards that comply with the PCI Express specifications. Refer to the figure below for the location of the slots.

> •   Install the audio card prior to other compatible cards to the black PCIe x1 slot.
>
> •   Install a PCIe x1 device to a PCIe x1 slot prior to a PCIe x16 slot.

2.5.6   PCI Express 2.0 x16 slots

This motherboard has three 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.

PCI Express x 16_3 slot

Audio/PCI Express x1_1 slot   **PCI slot**

PCI Express x 16_1 slot   **PCI Express x16_2 slot**

PCI Express x1_2 slot
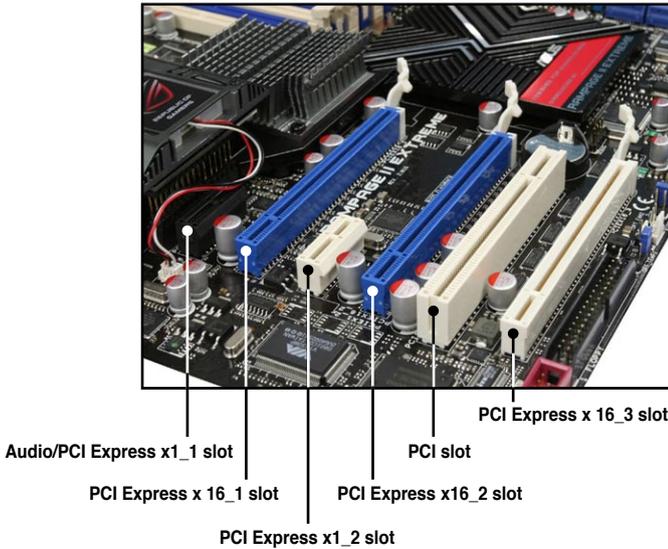
VGA configuration	PCI Express operating mode		
	PCIe x16_1	PCIe x16_2	PCIe x16_3
Single VGA/PCIe card	x16 (Recommend for single VGA)	x8 (PCIe card)	x8 (PCIe card)
Dual VGA/PCIe card	x16	x16	x1
Triple VGA/PCIe card	x16	x16	x1
	x16	x8	x8

- In single VGA card mode, use first the PCIe 2.0 x16_1 slot (blue) for a PCI Express x16 graphics card to get better performance.

- In CrossFireX™ mode, use the PCIe 2.0 x16_1 (blue) and PCIe 2.0 x16_2 (blue) slots for PCI Express x16 graphics cards to get better performance.

- Use the three PCIe 2.0 x16 slots for 3-Way CrossFireX™ mode.

- If you install a PCIe x16 graphics card on to the PCIe x16_1 slot, a PCIe device with a bandwidth faster than x8 link to the PCIe x16_2 slot, and a PCIe device with a bandwidth slower than x4 link to the PCIe x16_3 slot, the three PCIe x16 slots will work at x16, x16, x1 link as the default.

- If you install a PCIe x16 graphics card on to the PCIe x16_1 slot, a PCIe device with a bandwidth slower than x8 link to the PCIe x16_2 slot, and a PCIe device with a bandwidth faster than x4 link to the PCIe x16_3 slot, the three PCIe x16 slots will work at x16, x8, x8 link as the default.

- You may manually reassign the link width of PCIe x16_2 and PCIe x16_3 slots in BIOS settings. See page 3-27 for details.

- We recommend that you provide sufficient power when running CrossFireX™ or SLI™ mode. See page 2-38 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 2-35 for details.

2.6   Jumpers

1.   **Clear RTC RAM (3-pin CLRTC_SW)**

This jumper allows you to enable the **clr CMOS** switch on the back I/O. You can clear the CMOS memory and system setup parameters by erasing the CMOS RTC RAM data. The **clr CMOS** switch on the back I/O helps you easily clear the system setup information such as system passwords.

To erase the RTC RAM:

1.   Press down the clr CMOS switch on the back I/O.

2.   Hold down the <Del> key during the boot process and enter BIOS setup to re-enter data.

CLRTC_SW

Enable (Default)   Disable
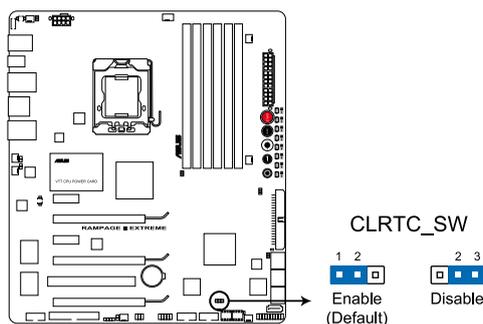
RAMPAGE II EXTREME Clear RTC RAM

clr CMOS switch behavior

System power state	G3*	S5*	S0 (DOS mode)	S0 (OS mode)	S1	S3	S4
Clearing CMOS	●	●	● **				

*G3: Power off without +5VSB power (AC power loss); S5: Power off with +5VSB power
**The system shuts dowm immediately.

- The **clr CMOS** switch will not function if the CLRTC_SW jumper is moved to the Disable position, but the shutdwon function in S0 mode (DOS mode) still works.

- Make sure to re-enter your previous BIOS settings after you clear the CMOS.

- You do not need to clear the RTC when the system hangs due to CPU overclocking. With the C.P.R. (CPU Parameter Recall) feature, shut down and reboot the system so the BIOS can automatically reset CPU parameter settings to default values. If the system hangs due to overclocking of memory timing or chipset voltage and the power button fails to function, pressing down the **clr CMOS** switch will shut down the system and clear CMOS simultaneously.

2. BIOS flash setting (6-pin BIOS_FLASHBACK)

Two sets of BIOS Flash ROM (BIOS 1 and BIOS 2) are present on this motherboard. This jumper allows you to select either BIOS as the one to boot, or back up or restore BIOS content from one ROM to the other.

Moving the jumper cap to **pins 1-2 (default)** allows you to enter **BIOS MENU** to select which BIOS to boot.

Moving the jumper cap to **pins 3-4** enables the system to boot from **BIOS 1**.

Moving the jumper cap to **pins 5-6** enables the system to boot from **BIOS 2**.

RAMPAGE II EXTREME BIOS Flashback setting
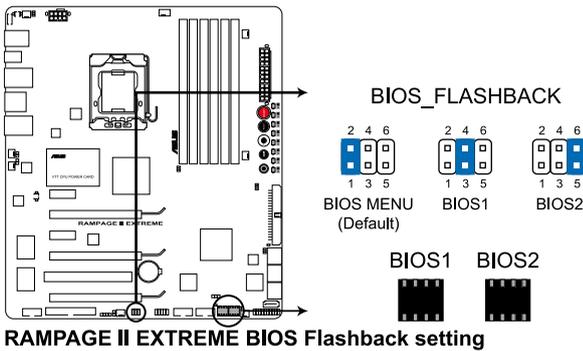
Refer to **3.7.3 BIOS Boot Priority** for further information.

2.7 Connectors

2.7.1 Rear panel connectors
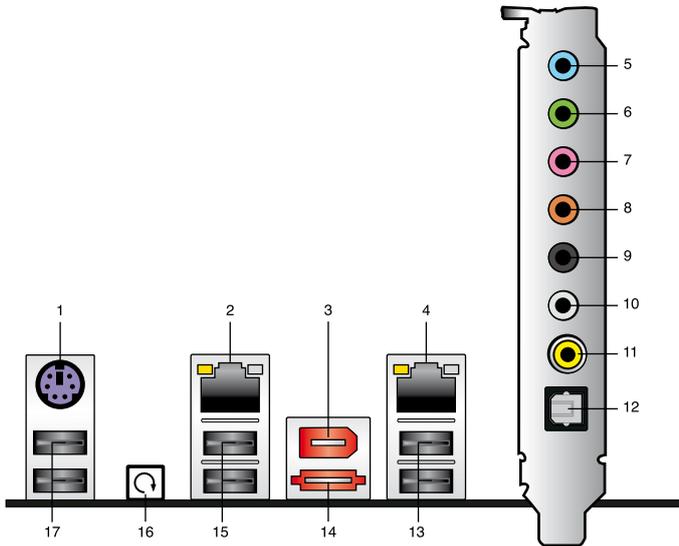
1. **PS/2 keyboard port (purple).** This port is for a PS/2 keyboard.

2. **LAN 2 (RJ-45) port.** This 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.

3. **IEEE 1394a port.** This 6-pin IEEE 1394a port provides high-speed connectivity for audio/video devices, storage peripherals, PCs, or portable devices.

4. **LAN 1 (RJ-45) port.** This 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.

LAN port LED indications

Activity/Link	Speed LED	Description
OFF	OFF	Soft-off Mode
YELLOW*	OFF	During Power ON/OFF
YELLOW*	ORANGE	100 Mbps connection
YELLOW*	GREEN	1 Gbps connection

* Blinking

ACTIVITY/   SPEED
LINK LED   LED

LAN port
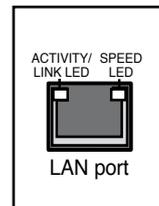
5. **Line In port (light blue).** This port connects the tape, CD, DVD player, or other audio sources.

6. **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.

7. **Microphone port (pink).** This port connects a microphone.

8. **Center/Subwoofer port (orange).** This port connects the center/subwoofer speakers.

9. **Rear Speaker Out port (black).** This port connects the rear speakers on a 4-channel, 6-channel, or 8-channel audio configuration.

10. **Side Speaker Out port (gray).** This port connects the side speakers in an 8-channel audio configuration.

> Refer to the audio configuration table on the next page 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 Ou	Rear Speaker Out
Gray	–	–	–	Side Speaker Out

11. **Coaxial S/PDIF Out port.** This port connects an external audio output device via a coaxial S/PDIF cable.

12. **Optical S/PDIF Out port.** This port connects an external audio output device via an optical S/PDIF cable.

13. **USB 2.0 ports 1 and 2.** These 4-pin Universal Serial Bus (USB) ports are available for connecting USB 2.0 devices.

14. **External SATA port**. This port connects to an external Serial ATA hard disk drive.

> DO NOT insert a SATA connector into this external SATA port.

15. **USB 2.0 ports 3 and 4.** These 4-pin Universal Serial Bus (USB) ports are available for connecting USB 2.0 devices.

16. **Clear CMOS switch.** Press the clear CMOS switch to clear setup information when the system hangs due to overclocking.

17. **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.   Floppy disk drive connector (34-1 pin FLOPPY)

This connector is for the provided floppy disk drive (FDD) signal cable. Insert one end of the cable to this connector, then connect the other end to the signal connector at the back of the floppy disk drive.

Pin 5 on the connector is removed to prevent incorrect cable connection when using a FDD cable with a covered Pin 5.

FLOPPY

PIN1

NOTE: Orient the red markings on the floppy ribbon cable to PIN 1.

RAMPAGE II EXTREME Floppy disk drive connector
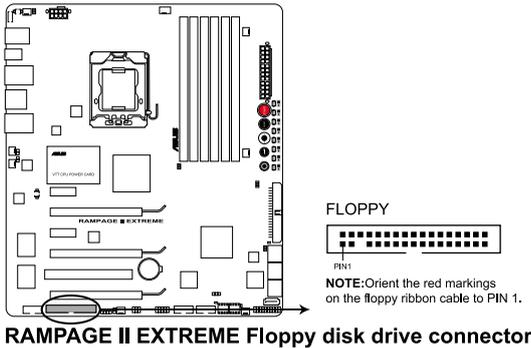
The floppy disk drive cable is purchased separately.

2. IDE connector (40-1 pin PRI_EIDE)

The onboard IDE connector is for the Ultra DMA 133/100/66 signal cable. There are three connectors on each Ultra DMA 133/100/66 signal cable: blue, black, and gray. Connect the blue connector to the motherboard's IDE connector, then select one of the following modes to configure your device.
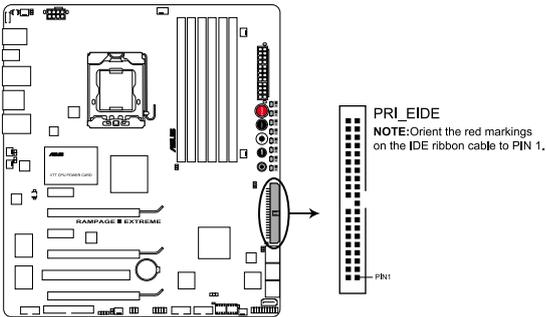
RAMPAGE II EXTREME EIDE connector

	Drive jumper setting	Mode of device(s)	Cable connector
Single device	Cable-Select or Master	-	Black
Two devices	Cable-Select	Master	Black
		Slave	Gray
	Master	Master	Black or gray
	Slave	Slave	

• Pin 20 on the IDE connector is removed to match the covered hole on the Ultra DMA cable connector. This prevents incorrect insertion when you connect the IDE cable.

• Use the 80-conductor IDE cable for Ultra DMA 133/100/66 IDE devices.

If any device jumper is set as "Cable-Select," make sure all other device jumpers have the same setting.

3. **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 controllers.

SATA1
GND
RSATA_TXP1
RSATA_TXN1
GND
RSATA_RXP1
RSATA_RXN1
GND

SATA2
GND
RSATA_TXP2
RSATA_TXN2
GND
RSATA_RXP2
RSATA_RXN2
GND

SATA3
GND
RSATA_TXP3
RSATA_TXN3
GND
RSATA_RXP3
RSATA_RXN3
GND

SATA4
GND
RSATA_TXP4
RSATA_TXN4
GND
RSATA_RXP4
RSATA_RXN4
GND

SATA5
GND
RSATA_TXP5
RSATA_TXN5
GND
RSATA_RXP5
RSATA_RXN5
GND

SATA6
GND
RSATA_TXP6
RSATA_TXN6
GND
RSATA_RXP6
RSATA_RXN6
GND

RAMPAGE II EXTREME SATA connectors (ICH10R®)

•   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 **3.4.6 Storage Configuration** for details.

•   Before creating a RAID set, refer to section **4.4.3 Intel RAID configurations** or the manual bundled in the motherboard support DVD.

•   You must install the Windows® XP Service Pack 1 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 or later version.

•   When using hot-plug and NCQ, set the **Configure SATA as** in the BIOS to [AHCI]. See section **3.4.6 Storage Configuration** for details.

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.

right angle side
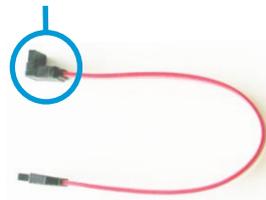
4. JMicron JMB363® Serial ATA connector (7-pin SATA_E1)

This connector is for a Serial ATA signal cable for an external Serial ATA hard disk drive.

SATA_E1

GND
RSATA_RXN1
RSATA_RXP1
GND
RSATA_TXN1
RSATA_TXP1
GND

RAMPAGE II EXTREME SATA connector
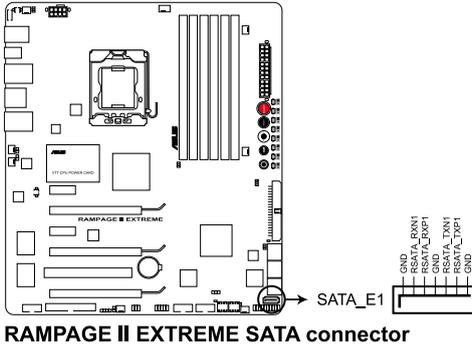
5. USB connectors (10-1 pin USB78; USB910; USB1112)

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.

USB1112   USB910   USB78

USB+5V
USB_P12-
USB_P12+
GND
NC

USB_P11-
USB_P11+
GND

USB+5V
USB_P10-
USB_P10+
GND
NC

USB+5V
USB_P9-
USB_P9+
GND

USB+5V
USB_P8-
USB_P8+
GND
NC

USB+5V
USB_P7-
USB_P7+
GND

PIN 1

RAMPAGE II EXTREME USB2.0 connectors
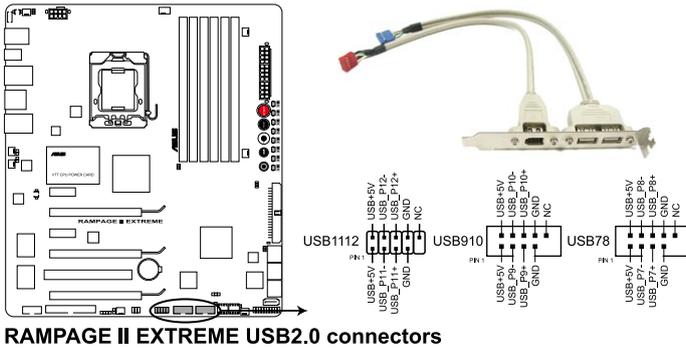
Never connect a 1394 cable to the USB connectors. Doing so will damage the motherboard!

You can connect the USB cable to ASUS Q-Connector (USB, blue) first, and then install the Q-Connector (USB) to the USB connector onboard.

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

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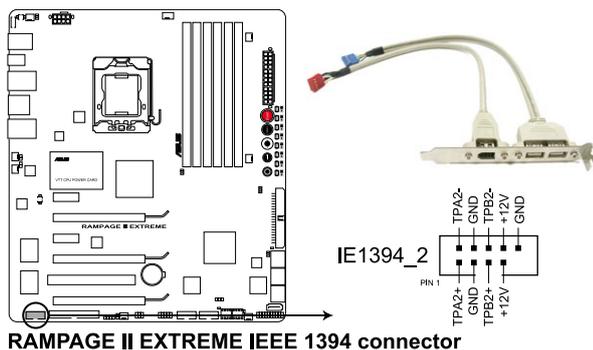
RAMPAGE II EXTREME IEEE 1394 connector

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

You can connect the 1394 cable to ASUS Q-Connector (1394, red) first, and then install the Q-Connector (1394) to the 1394 connector onboard.

7. **CPU, chassis, power and optional fan connectors (4-pin CPU_FAN, 3-pin CHA_FAN1-3, 3-pin PWR_FAN, 3-pin OPT_FAN1–3)**

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.

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!

RAMPAGE II EXTREME Fan connectors
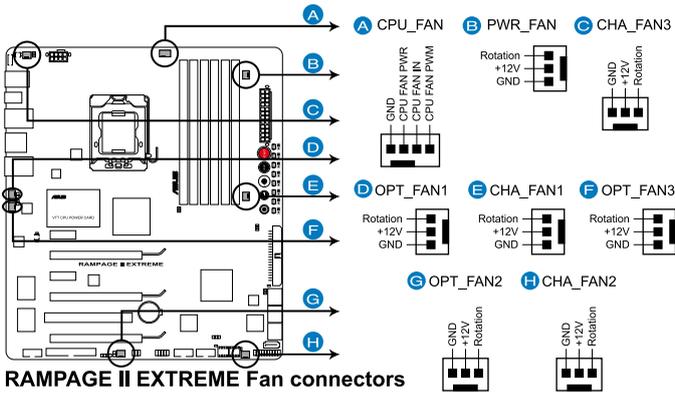
- Only the CPU_FAN, CHA_FAN1–3, and OPT_FAN1–3 connectors support the ASUS Fan Xpert feature.

- If you install two VGA cards, we recommend that you plug the chassis fan cable to the motherboard connector labled OPT_FAN1/2/3 for better thermal environment.

8. Thermal sensor cable connectors (2-pin OPT_TEMP1/2/3)

These connectors are for temperature monitoring. Connect the thermal sensor cables to these connectors and place the other ends to the devices which you want to monitor temperature. The optional fan1/2/3 can work with the temperature sensors for a better cooling effect.

RAMPAGE II EXTREME
Thermal sensor cable connectors
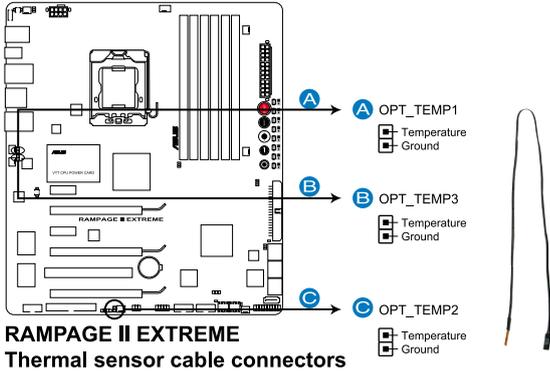
Enable **OPT FAN1/2/3 overheat protection** in BIOS if you connect thermal sensor cables to these connectors. Refer to page 3-36 for details.

9. 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.

RAMPAGE II EXTREME Chassis intrusion connector
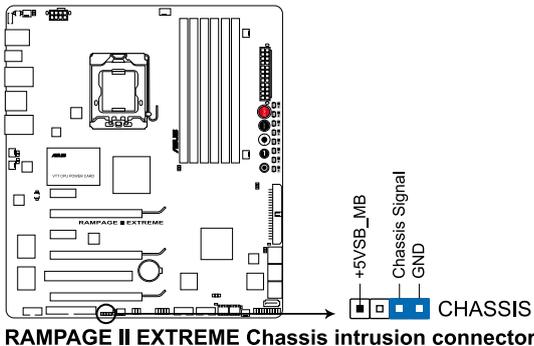
10. **Audio connectors**

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

Front panel audio connector: 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, make sure that the **Front Panel Support 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]. Refer to **3.5.3 Onboard Devices Configuration** for details.

Digital audio connector: This connector is for an additional Sony/Philips Digital Interface (S/PDIF) port(s).

Front view   Side view

Optical drive audio connector

Front panel audio connector

Digital audio connector
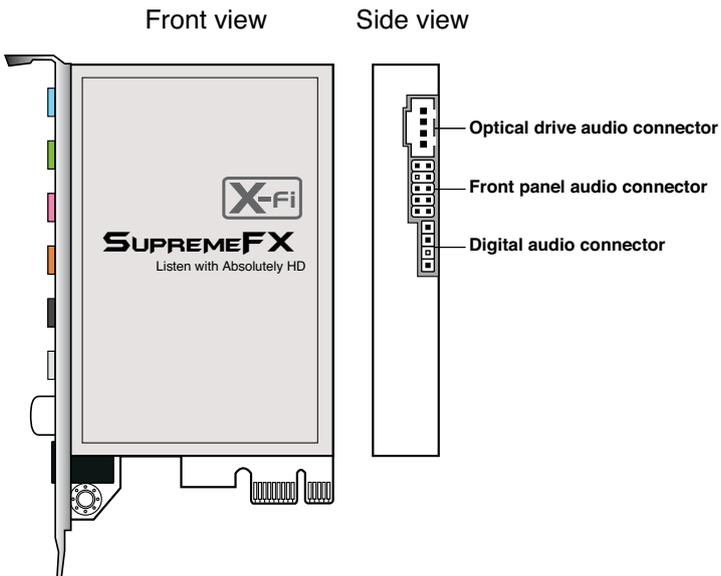
11. ATX power connectors (24-pin EATXPWR, 8-pin EATX12V)

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.
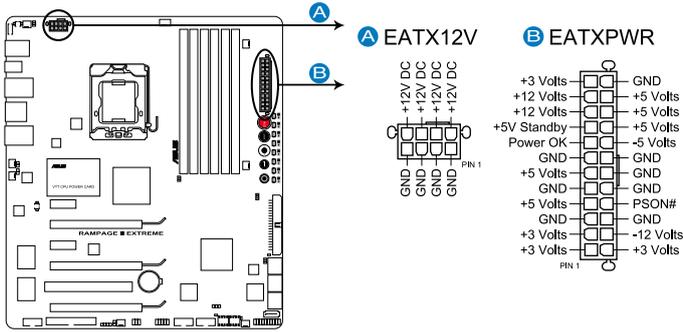
RAMPAGE II EXTREME ATX power connectors

- Make sure to remove the cap on the EATX12V connector before connecting an 8-pin EPS +12V power plug.

- Use only an 8-pin EPS +12V power plug for the EATX12V connector.

- 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 400 W.

- Do not forget to connect the 8-pin EATX12V 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 want to use two high-end PCI Express x16 cards, use a PSU with 500W to 600W power or above to ensure the system stability.

- 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.

12. ROG connector (3-pin ROG)

This connector is for the box labeled as Republic of Gamers on the heatpipe assembly. Connect the cable of the box to this connector, and the box lights up when the system is on.
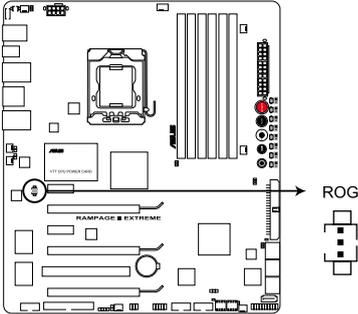
RAMPAGE II EXTREME ROG connector

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

This connector supports several chassis-mounted functions.
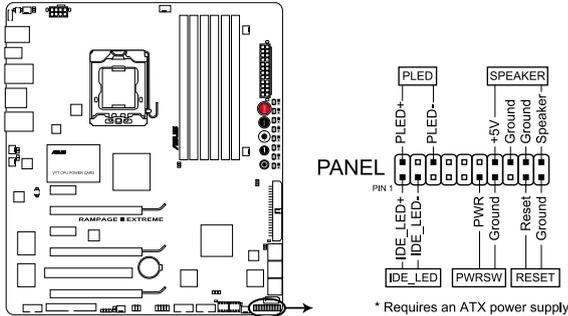
RAMPAGE II EXTREME System panel connector

* **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 of the front panel cables may differ from chassis made by different manufacturers.
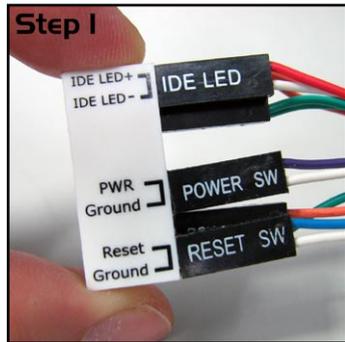
2. Install the ASUS Q-Connector to the system panel connector, making sure the orientation matches the labels on the motherboard.
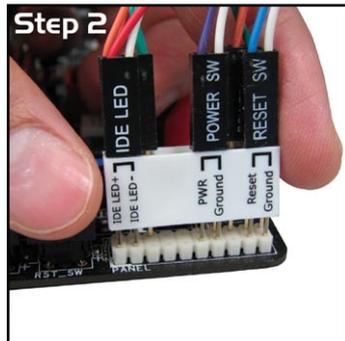
3. The front panel functions are now enabled. The figure shows the Q-Connector properly installed on the motherboard.
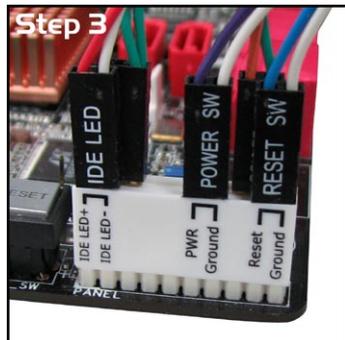
2.7.3 Onboard switches

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

1.   Power-on switch

Press the power-on switch to wake/power up the system.
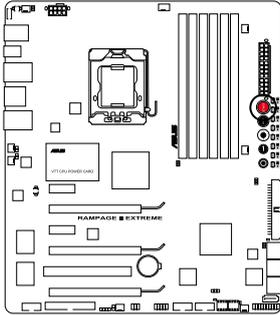
RAMPAGE II EXTREME Power on switch

2.   Reset switch

Press the reset switch to reboot the system.
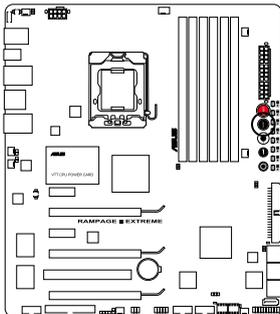
RAMPAGE II EXTREME Reset switch

2.7.4 TweakIt

TweakIt, along with the LCD Poster, allows you full control over system voltages and frequency to fulfill your overclocking desire during game play. You can also monitor hardware information or configure BIOS boot selection and BIOS backup. TweakIt consists of the TOGGLE button, the CONFIRM button, and the SELECT joystick:

- **TOGGLE:** Press to go back to the previous option.
- **CONFIRM:** Press to enter an option or confirm your settings.
- **SELECT:** Joystick left (previous; decrease) / right (next; increase) to select an option or adjust value.

Refer to the following illustration for their location.

RAMPAGE II EXTREME TOGGLE, CONFIRM, SELECT switches
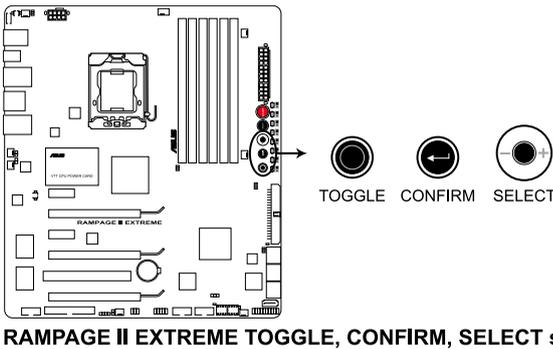
Using TweakIt

1. Connect the LCD Poster to the **LCD_CON** connector on the motherboard.

2. Turn on the system. After the power-on self tests (POST), the LCD Poster shows system time.

3. Press the **CONFIRM** button to enter TweakIt options and configure your own settings with **TOGGLE**, **CONFIRM**, and **SELECT**.

TweakIt options

The following table shows TweakIt options. For detailed voltage and frequency settings, refer to **3.3 Extreme Tweaker menu**. For BIOS boot selection and backup settings, refer to **3.7.3 BIOS Boot Priority** and **3.8.4 BIOS Flashback**.

Options			Usages and Notes
1 HWINFO	1 VOLT	0 ALL 1 VTTCPU 2 VTTDDR 3 NB 4 CPUPLL 5 SB1_5V 6 SB1_1V 7 DDR 8 CPU	Selecting "0 ALL" shows all the values in a continuous loop. These values are automatically detected and therefore are not configurable.
	2 TEMP	0 ALL 1 OPT_1 2 OPT_2 3 OPT_3 4 POWER 5 NB 6 SB 7 MB	
	3 FAN	0 ALL 1 CPUFAN 2 PWRFAN 3 OPT_1 4 OPT_2 5 OPT_3 6 CHA_1 7 CHA_2 8 CHA_3	
	4 FREQ		The value is shown in S0 state only.
2 DYNAOV	1 DDR 2 NB 3 VCORE 4 VTTCPU 5 CPUPLL 6 SB1_5V 7 SB1_1V		Move the **SELECT** joystick to adjust value and then press **CONFIRM**. These functions are available in S0 state only.
3 DYNAOC	FRQXXX		
4 BIOS	1 BOOT SEL	1 BIOS1 2 BIOS2	Select which BIOS to boot (available in S5 state only).

*S0: System in the normal working state
S5: System in the soft off state (power off with +5VSB power)

2.7.5   ProbeIt

The ROG ProbeIt feature provides a nice touch for your convenient and accurate OC settings. No time wasted fumbling around on the complicated motherboard layout, the clearly marked area gives you easier access to the measure points when a multitester is employed for more accurate measurements during your busy overclocking work.

Refer to the following illustration for ProbeIt location.
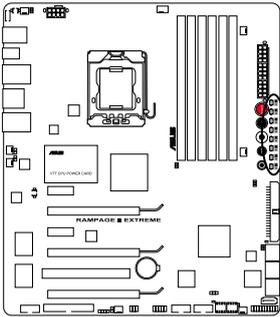
RAMPAGE II EXTREME ProbeIt

Using ProbeIt

You may connect the multitester to the motherboard as shown on Figure 1, or use the supplied ProbeIt cable to connect to the motherboard as shown on Figure 2.
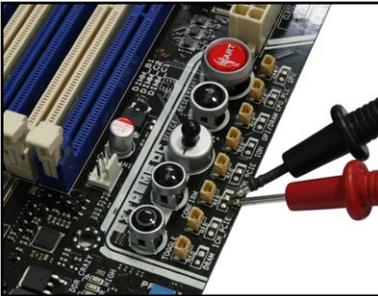
Figure 1
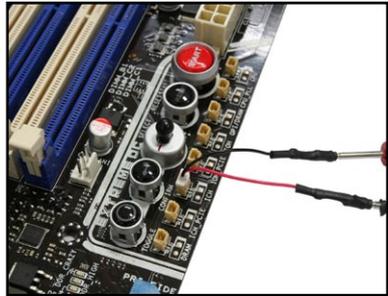
Figure 2

2.8 Installing accessories

2.8.1 Installing the optional fan

Install the optional fan only if you are using a passive cooler or a water cooler. Installing the optional fan with an active CPU cooler will interfere with the airflow and destabilize the system.

1. Position the fan above the pipe and heatsink assembly.

2. Fit the fan to the grooved edge of the heatsink.
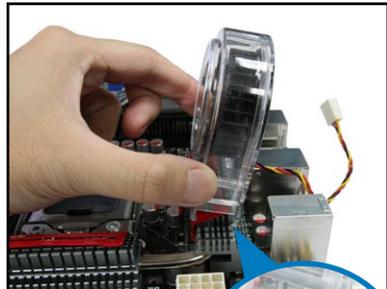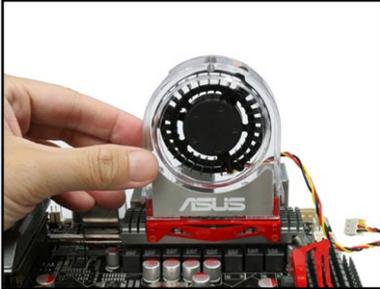
3. Carefully pull the fan until it snugly fits the heatsink, and then connect the fan cable.

4. The photo shows the fan installed on the motherboard.
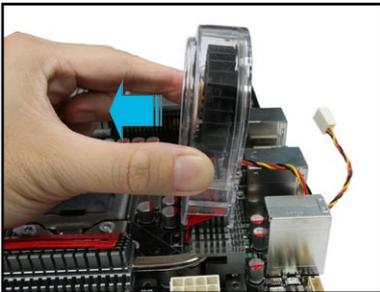
- Plug the optional fan cable to the CHA_FAN3 or OPT_FAN1/3 connector on the motherboard.
- Make sure the optional fan is installed correctly to prevent damage to the fan and motherboard components.

2.8.2   Installing the audio card

1. Take out the audio card from the package.

2. Locate the audio slot on the motherboard.

3. Align the card connector with the slot and press firmly until the card sits on the slot completely.

4. The photo below shows the audio card installed on the motherboard.

2.8.3   Installing EL I/O shield and LCD Poster

1.   Install the EL I/O shield to the chassis by snaping it in place from inside.

2.   Orient the motherboard and install it to the chassis. Make sure that the motherboard external ports fit the shield openings.

3.   Locate the **EL_CON** connector and connect the shield cable to the connector in a correct orientation.

4.   Thread the LCD Poster cable through the back I/O shield opening until the stopper fits the opening.
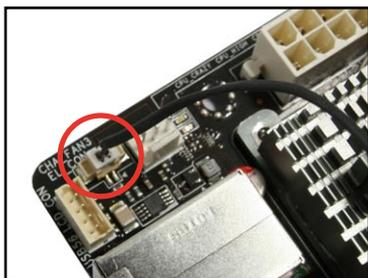
5.   Locate and connect the LCD Poster cable to the **LCD_CON** connector.

6.   Place the LCD Poster on the chassis or to wherever you like.
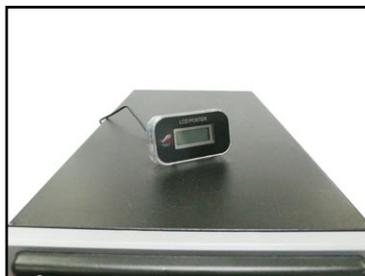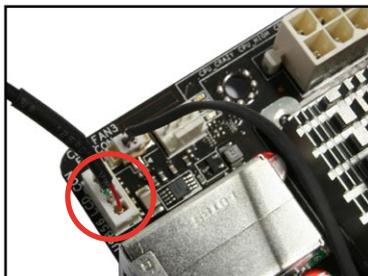
2.8.4   Installing the third party fusion block

This ROG motherboard has an open standard fitting specification, allowing third party vendor to design their branded "Fusion Block".

To install the third party fusion block:

1.   Remove the heatsink from the motherboard.
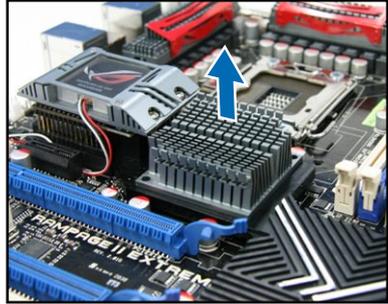
2.   Refer to the fusion block documentation to install the fusion block.
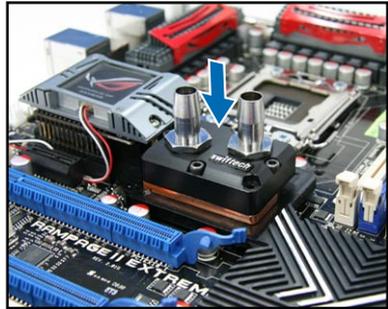
Qualified Vendors Lists (QVL)

Vendor	Model name	Website
Swiftech	MCW-NBMAX	http://www.swiftech.com/products/mcw-nbmax.asp

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

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 floppy disk or USB flash disk.)
3. **AFUDOS** (Updates the BIOS using a bootable floppy disk)
4. **ASUS CrashFree BIOS 3** (Updates the BIOS using a bootable floppy disk, USB flash disk or the motherboard support DVD 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 bootable floppy disk or USB flash disk in case you need to restore the BIOS in the future. Copy the original motherboard BIOS using the ASUS Update or AFUDOS utilities.

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, and
*   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. The Drivers menu appears.
2. Click the Utilities tab, then click Install ASUS Update VX.XX.XX.
3. The ASUS Update utility is copied to your system.

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

Updating the BIOS through the Internet

To update the BIOS through the Internet:

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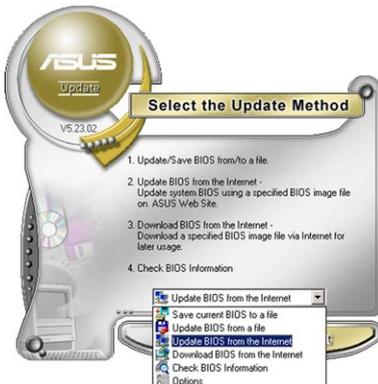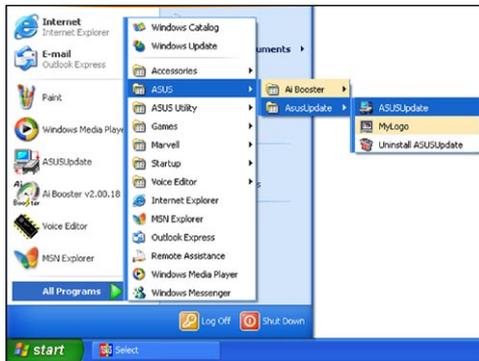
2. Select **Update BIOS** from the Internet option from the drop-down menu, then click **Next**.

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 screen 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.
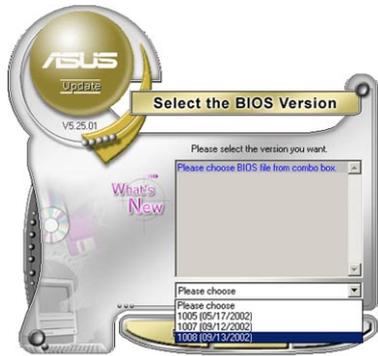
Updating the BIOS through a BIOS file

To update the BIOS through a BIOS file:

1. Launch the ASUS Update utility from the Windows® desktop by clicking **Start** > **Programs** > **ASUS** > **ASUSUpdate** > **ASUSUpdate**. The ASUS Update main window appears.

2. Select **Update BIOS** from a file option from the drop-down menu, then click **Next**.
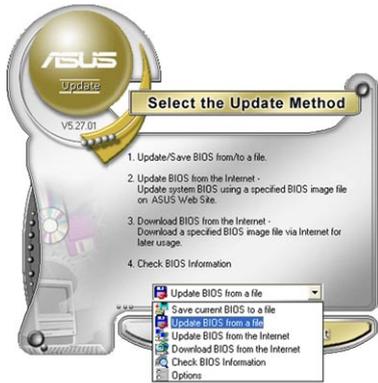
3. Locate the BIOS file from the Open window, then click **Open**.

4. Follow the screen instructions to complete the update process.
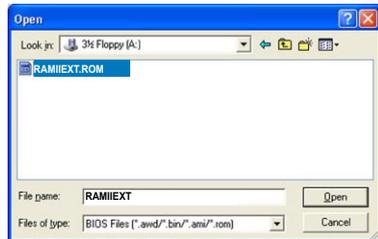
3.1.2 Creating a bootable floppy disk

1. Do either one of the following to create a bootable floppy disk.

    DOS environment

    a. Insert a 1.44MB floppy disk into the drive.
    b. At the DOS prompt, type *format* **A:/S** then press <Enter>.

    Windows® XP environment

    a. Insert a 1.44 MB floppy disk to the floppy disk drive.
    b. Click **Start** from the Windows® desktop, then select **My Computer**.
    c. Select the 3 1/2 Floppy Drive icon.
    d. Click File from the menu, then select **Format**. A **Format 3 1/2 Floppy Disk** window appears.
    e. Select **Create an MS-DOS startup disk** from the format options field, then click **Start**.

    Windows® Vista environment

    a. Insert a formatted, high density 1.44 MB floppy disk to the floppy disk drive.
    b. Click ![Windows start icon] from the Windows® desktop, then select **Computer**.
    c. Right-click **Floppy Disk Drive** then click **Format** to display the **Format 3 1/2 Floppy** dialog box .
    d. Select the **Create an MS-DOS startup disk** check box.
    e. Click **Start**.

2. Copy the original or the latest motherboard BIOS file to the bootable floppy disk.

3.1.3 ASUS EZ Flash 2 utility

The ASUS EZ Flash 2 feature allows you to update the BIOS without having to go through the long process of booting from a floppy disk and using a DOS-based utility. The EZ Flash 2 utility is built-in the BIOS chip so it is accessible by pressing <Alt> + <F2> during the Power-On Self Tests (POST).

To update the BIOS using EZ Flash 2

1. Visit the ASUS website (www.asus.com) to download the latest BIOS file for the motherboard.

2. Save the BIOS file to a floppy disk or a USB flash disk, then restart the system.

3. You can launch the EZ Flash 2 by two methods.

   (1) Insert the floppy disk / USB flash disk that contains the BIOS file to the floppy disk drive or the USB port.

   Press <Alt> + <F2> during POST to display the following.

```
              ASUSTek EZ Flash 2 BIOS ROM Utility V3.25
   FLASH TYPE: MXIC 25L1605A
        ┌─── Current ROM ───┐        ┌─── Update ROM ───┐
        │ BOARD: Rampage II Extreme │ BOARD: Unknown      │
        │ VER: 0405                 │ VER: Unknown        │
        │ DATE: 10/15/2008          │ DATE: Unknown       │
        └───────────────────┘        └──────────────────┘
   PATH: A:\
   ┌────────┐  ┌─────────────────────────────────────┐
   │ A:     │  │                                     │
   │        │  │                                     │
   │        │  │                                     │
   │        │  │                                     │
   │        │  │                                     │
   │        │  │                                     │
   └────────┘  └─────────────────────────────────────┘
   ┌─ Note ────────────────────────────────────────────┐
   │ [Enter] Select or Load    [Tab] Switch   [V] Drive Info │
   │ [Up/Down/Home/End] Move   [B] Backup     [Esc] Exit     │
   └────────────────────────────────────────────────────┘
```
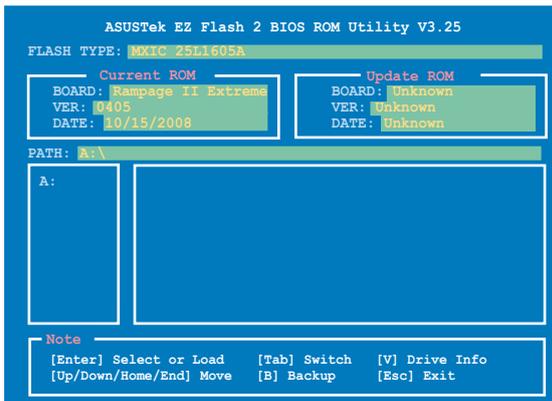
   (2) Enter BIOS setup program. Go to the **Tools** menu to select **EZ Flash2** and press <Enter> to enable it.

   You can switch between drives by pressing <Tab> before the correct file is found. Then press <Enter>.

4. When the correct BIOS file is 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 disk or a floppy disk with **FAT 32/16** format and single partition only.

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

3.1.4   AFUDOS utility

The AFUDOS utility allows you to update the BIOS file in DOS environment using a bootable floppy disk with the updated BIOS file. This utility also allows you to copy the current BIOS file that you can use as backup when the BIOS fails or gets corrupted during the updating process.

Copying the current BIOS

To copy the current BIOS file using the AFUDOS utility:

> • Make sure that the floppy disk is not write-protected and has at least 1024KB free space to save the file.
>
> • The succeeding BIOS screens are for reference only. The actual BIOS screen displays may not be same as shown.

1.   Copy the AFUDOS utility (afudos.exe) from the motherboard support DVD to the bootable floppy disk you created earlier.

2.   Boot the system in DOS mode, then at the prompt type:

    afudos /o[filename]

    where the [filename] is any user-assigned filename not more than eight alphanumeric characters for the main filename and three alphanumeric characters for the extension name.

```
A:\>afudos /oOLDBIOS1.rom
```

        Main filename   Extension name

3.   Press <Enter>. The utility copies the current BIOS file to the floppy disk.

```
A:\>afudos /oOLDBIOS1.rom
AMI Firmware Update Utility - Version 1.19(ASUS V2.07(03.11.24BB))
Copyright (C) 2002 American Megatrends, Inc. All rights reserved.
   Reading flash ..... done
   Write to file...... ok
A:\>
```

    The utility returns to the DOS prompt after copying the current BIOS file.

Updating the BIOS file

To update the BIOS file using the AFUDOS utility:

1.   Visit the ASUS website (www.asus.com) and download the latest BIOS file for the motherboard. Save the BIOS file to a bootable floppy disk.

Write the BIOS filename on a piece of paper. You need to type the exact BIOS filename at the DOS prompt.

2. Copy the AFUDOS utility (afudos.exe) from the motherboard support DVD to the bootable floppy disk you created earlier.

3. Boot the system in DOS mode, then at the prompt type:

   afudos /i[filename]

   where [filename] is the latest or the original BIOS file on the bootable floppy disk.

   ```
   A:\>afudos /iExtremeII.ROM
   ```

4. The utility verifies the file and starts updating the BIOS.

   ```
   A:\>afudos /iExtremeII.ROM
   AMI Firmware Update Utility - Version 1.19(ASUS V2.07(03.11.24BB))
   Copyright (C) 2002 American Megatrends, Inc. All rights reserved.

       WARNING!! Do not turn off power during flash BIOS
       Reading file ....... done
       Reading flash ...... done

       Advance Check ......
       Erasing flash ...... done
       Writing flash ...... 0x0008CC00 (9%)
   ```

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

5. The utility returns to the DOS prompt after the BIOS update process is completed. Reboot the system from the hard disk drive.

   ```
   A:\>afudos /iExtremeII.ROM
   AMI Firmware Update Utility - Version 1.19(ASUS V2.07(03.11.24BB))
   Copyright (C) 2002 American Megatrends, Inc. All rights reserved.

       WARNING!! Do not turn off power during flash BIOS
       Reading file ....... done
       Reading flash ...... done

       Advance Check ......
       Erasing flash ...... done
       Writing flash ...... done
       Verifying flash .... done

       Please restart your computer

   A:\>
   ```

3.1.5   ASUS CrashFree BIOS 3 utility

The ASUS CrashFree BIOS 3 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 update a corrupted BIOS file using the motherboard support DVD, the floppy disk, or the USB flash disk that contains the updated BIOS file.

Prepare the motherboard support DVD, the floppy disk or the USB flash disk containing the updated motherboard BIOS before using this utility.

Recovering the BIOS from the support DVD

To recover the BIOS from the support DVD:

1. Turn on the system.
2. Insert the motherboard support DVD to the optical drive.
3. The utility displays the following message and automatically checks the DVD for the BIOS file.

```
Bad BIOS checksum. Starting BIOS recovery...
Checking for floppy...
```

When found, the utility reads the BIOS file and starts flashing the corrupted BIOS file.

```
Bad BIOS checksum. Starting BIOS recovery...
Checking for floppy...
Floppy found!
Reading file "Extreme.ROM". Completed.
Start flashing...
```

4. Restart the system after the utility completes the updating process.

Recovering the BIOS from the USB flash disk

To recover the BIOS from the USB flash disk:

1. Insert the USB flash disk that contains BIOS file to the USB port.
2. Turn on the system.
3. The utility will automatically checks the devices for the BIOS file. When found, the utility reads the BIOS file and starts flashing the corrupted BIOS file.
4. Restart the system after the utility completes the updating process.

- Only the USB flash disk with FAT 32/16 format and single partition can support ASUS CrashFree BIOS 3. The device size should be smaller than 8GB.
- DO NOT shut down or reset the system while updating the BIOS! Doing so can cause system boot failure!

3.2   BIOS setup program

This motherboard supports two programmable firmware chips 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 <Del> during the Power-On Self-Test (POST) to enter the Setup utility; otherwise, POST continues with its test routines.

If you wish to enter Setup after POST, 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

Menu items   Menu bar   Configuration fields   General help

```
                              BIOS SETUP UTILITY
   Extreme Tweaker      Main    Advanced   Power     Boot    Tools    Exit

      System Time                [10:55:25]                 Use [ENTER], [TAB] or
      System Date                [Thu 10/16/2008]           [SHIFT-TAB] to select
      Legacy Diskette A          [1.44M, 3.5 in]            a field.
      Language                   [English]
                                                            Use [+] or [-] to
    ▶ SATA 1                     [Not Detected]             configure system Time.
    ▶ SATA 2                     [Not Detected]
    ▶ SATA 3                     [Not Detected]
    ▶ SATA 4                     [Not Detected]
    ▶ SATA 5                     [Not Detected]
    ▶ SATA 6                     [Not Detected]             ←→   Select Screen
                                                            ↑↓   Select Item
    ▶ Storage Configuration                                 +-   Change Field
    ▶ System Information                                    Tab  Select Field
                                                            F1   General Help
                                                            F10  Save and Exit
                                                            ESC  Exit

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```

Sub-menu items   Navigation keys

3.2.2   Menu bar

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

Extreme Tweaker	For changing the overclocking settings
Main	For changing the basic system configuration
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.

> Some of the navigation keys 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 iteam 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.

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.

Pop-up window

Scroll bar

3.2.9 General help

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

3.3   Extreme Tweaker menu

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

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

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

```
                         BIOS SETUP UTILITY
 Extreme Tweaker    Main     Advanced    Power    Boot    Tools    Exit
┌─────────────────────────────────────────────────┬──────────────────────┐
│ Configure System Performance Settings          ▲│ Warning: this function│
│                                                  │ belongs to overclocking,│
│ Target CPU Frequency: 3192MHz                    │ and it may cause      │
│ Target DRAM Frequency: 1333MHz                   │ instability.          │
│ CPU Level Up              [Auto]                 │ Select a CPU level,   │
│ Memory Level Up           [Auto]                 │ and the rest will be  │
│ Ai Overclock Tuner        [Auto]                 │ auto-adjusted. If you │
│ CPU Ratio Setting         [Auto]                 │ want to adjust more,  │
│                                                  │ set Ai Overclock Tuner│
│ ▶  CPU Configuration                             │ to Manual after you   │
│ DRAM Frequency            [Auto]                 │ select a CPU level.   │
│ UCLK Frequency            [Auto]                 │                       │
│ QPI Frequency             [Auto]                 │                       │
│                                                  │ ←→   Select Screen    │
│ ▶  DRAM Timing Control    [Auto]                 │ ↑↓   Select Item      │
│                                                  │ +-   Change Field     │
│ EPU II Phase Control      [Full Phase]           │ F1   General Help     │
│ Load-Line Calibration     [Auto]                 │ F10  Save and Exit    │
│ CPU Differential Amplitude [Auto]                │ ESC  Exit             │
│ *** Please key in numbers or select voltage! *** ▼│                      │
├─────────────────────────────────────────────────┴──────────────────────┤
│      v02.61 (C)Copyright 1985-2008, American Megatrends, Inc.           │
└─────────────────────────────────────────────────────────────────────────┘
```

Scroll down to see more items.

```
┌─────────────────────────────────────────────────┬──────────────────────┐
│ Extreme OV              [Disabled]              ┃│                       │
│ Current Voltage: 1.098V  1.812V  1.15V          ┃│                       │
│ CPU Temperature: 40.5˚C/104.5˚C                 ┃│                       │
│ CPU Voltage              [Auto]                 ┃│                       │
│ CPU PLL Voltage          [Auto]                 ┃│                       │
│ QPI/DRAM Core Voltage    [Auto]                 ┃│                       │
│ Current Voltage: 1.085V  1.508V  1.111V  1.508V ┃│                       │
│ NB/SB Temperature: 65˚C/149˚C  52˚C/125.5˚C     ┃│                       │
│ IOH Voltage              [Auto]                 ┃│                       │
│ IOH PCIE Voltage         [Auto]                 ┃│                       │
│ ICH Voltage              [Auto]                 ┃│                       │
│ ICH PCIE Voltage         [Auto]                 ┃│                       │
│ Current Voltage: 1.508V                         ┃│                       │
│ DRAM Bus Voltage         [Auto]                 ┃│                       │
│ ▶  DRAM REF Voltages                            ┃│                       │
│                                                 ┃│                       │
│ Read POST Code from LCD Poster/iROG Control Plus┃│                       │
│ Debug Mode               [String]              ┃│                       │
│ Keyboard TweakIt Control [Disabled]            ┃│                       │
│                                                 ┃│                       │
│ ******** Spread Spectrum and Clock Skew ********┃│                       │
│ CPU Spread Spectrum      [Auto]                ┃│                       │
│ PCIE Spread Spectrum     [Auto]                ┃│                       │
│ CPU Clock Skew           [Auto]                ┃│                       │
│ IOH Clock Skew           [Auto]                ▼│                       │
├─────────────────────────────────────────────────┴──────────────────────┤
│      v02.61 (C)Copyright 1985-2008, American Megatrends, Inc.           │
└─────────────────────────────────────────────────────────────────────────┘
```

3.3.1 Configure System Performance Settings

The configuration options may vary depending on your CPU/memory model.

CPU Level Up [Auto]

Allows you to select a CPU level, and the related parameters will be automatically adjusted according to the selected CPU level. If you want to manually configure the settings in detail, set **Ai Overclock Tuner** to [Manual] after selecting a CPU level. Configuration options: [Auto] [i7-crazy-3.60G] [i7-crazy-4.00G]

Memory Level Up [Auto]

Allows you to select a memory level, and the related parameters will be automatically adjusted according to the selected memory level. If you want to manually configure the settings in detail, set **Ai Overclock Tuner** to [Manual] after selecting a memory level.
Configuration options: [Auto] [DDR3-1600MHz] [DDR3-1800MHz]

You are allowed to select either a CPU level or a memory level at one time.

Ai Overclock Tuner [Auto]

Allows selection of CPU/memory overclocking options to achieve desired CPU/memory internal frequency. Select any of the preset overclocking configuration options:

Manual	Allows you to individually set overclocking parameters.
Auto	Loads the standard settings for the system.
X.M.P.	Loads the optimal settings for the system.
CPU Level Up	Allows you to select a CPU level, and the related parameters will be adjusted automatically.
Memory Level Up	Allows you to select a memory level, and the related parameters will be adjusted automatically.
ROG Memory Profile	Allows you to select a memory profile, and the related parameters will be adjusted automatically.

The following two items appear when you set **Ai Overclock Tuner** to [Manual].

OC From CPU Level Up [Auto]

After you select a CPU level and set **Ai Overclock Tuner** to [Manual], the related parameters will be adjusted accordingly.
Configuration options: [Auto] [i7-crazy-3.60G] [i7-crazy-4.00G]

OC From Memory Level Up [Auto]

After you select a memory level and set **Ai Overclock Tuner** to [Manual], the related parameters will be adjusted accordingly.
Configuration options: [Auto] [DDR3-1600MHz] [DDR3-1800MHz]

> The following item appears only when you set **Ai Overclock Tuner** to [X.M.P].

eXtreme Memory Profile [Disabled]
Allows you to select the memory profile during overclocking between [Profile #1] (high performance) and [Profile #2] (high frequency).
Configuration options: [Disabled] [Profile #1] [Profile #2]

> The following item appears only when you set **Ai Overclock Tuner** to [ROG Memory Profile].

R.O.G. Memory Profile [Speedy]
Allows you to select the memory profile mode supported by your memory module. Configuration options: [Speedy] [Flying] [Lightning]

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.

CPU Configuration

The items in this menu show the CPU-related information that the BIOS automatically detects. Refer to **section 3.5.1** for details.

> The following two items appear only when you set the **Ai Overclock Tuner** item to [Manual] 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. You can also type the desired value using the numeric keypad. The values range from 100 to 200.

DRAM Frequency [Auto]

Allows you to set the DDR3 operating frequency.
Configuration options: [Auto] [DDR3-800MHz] [DDR3-1066MHz] [DDR3-1333MHz]
[DDR3-1600MHz] [DDR3-1866MHz] [DDR3-2133MHz]

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

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

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.

QPI Frequency [Auto]

Allows you to set the QuickPath Interconnect (QPI) frequency.
Configuration options: [Auto] [4800MHz] [5866MHz] [6400MHz]

DRAM Timing Control

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 (These values are auto-detected)

DRAM CAS# Latency [Auto]
Configuration options: [Auto] [3 DRAM Clock] – [11 DRAM Clock]

DRAM RAS# to CAS# Delay [Auto]
Configuration options: [Auto] [3 DRAM Clock] – [10 DRAM Clock]

DRAM RAS# PRE Time [Auto]
Configuration options: [Auto] [3 DRAM Clock] – [10 DRAM Clock]

DRAM RAS# ACT Time [Auto]
Configuration options: [Auto] [3 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-66-0-0 (These values are auto-detected)

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: 6-6-13-9-9-9-7-6-4-7-7-4 (These values are auto-detected)

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]

EPU II Phase Control [Full Phase]

Configuration options: [Auto] [Normal] [Full Phase]

Loadline Calibration [Auto]

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

CPU Differential Amplitude [Auto]

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

Extreme OV [Disabled]

When set to [Enabled], you can choose high level voltage to overclock, but not guaranteed CPU life. Configuration options: [Disabled] [Enabled]

> The following nine (9) items are adjusted by typing the desired values using the numeric keypad and press the <Enter> key. You can also use the <+> and <-> keys to adjust the value. To restore the default setting, type [auto] using the keyboard and press the <Enter> key.

CPU Voltage [Auto]

Allows you to select the CPU VCore voltage. The text color in the configuration field corresponds to the onboard CPU LED color, both of which indicate voltage condition. When you set the **CPU LED Selection** item to [Vcore], the onboard CPU LED displays CPU VCore voltage condition. Refer to page 2-2 for CPU LED definition. The values range from 0.85000V to 2.50000V with a 0.00625V interval.

> The CPU voltage could be set only up to 1.8V when the **Extreme OV** item is set to [Disabled].

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

CPU PLL Voltage [Auto]

Allows you to select the CPU PLL voltage. The text color in the configuration field corresponds to the onboard CPU LED color, both of which indicate voltage condition. When you set the **CPU LED Selection** item to [CPU PLL], the onboard CPU LED displays CPU PLL voltage condition. Refer to page 2-2 for CPU LED definition. The values range from 1.81592V to 2.50000V with a 0.01325V interval.

QPI/DRAM Core Voltage [Auto]

Allows you to select the QPI/DRAM Core voltage. The text color in the configuration field corresponds to the onboard CPU LED color, both of which indicate voltage condition. When you set the **CPU LED Selection** item to [QPI/ DRAM Core], the onboard CPU LED displays QPI/DRAM Core voltage condition. Refer to page 2-2 for CPU LED definition. The values range from 1.20000V to 2.50000V with a 0.00625V interval.

> The QPI/DRAM Core voltage could be set only up to 1.8V when the **Extreme OV** item is set to [Disabled].

IOH Voltage [Auto]

Allows you to set the I/O Hub (IOH) voltage. The values range from 1.11341V to 2.19991V with a 0.01325V interval.

IOH PCIE Voltage [Auto]

Allows you to set the IOH PCIE voltage. The values range from 1.51106V to 2.78306V with a 0.01325V interval.

ICH Voltage [Auto]

Allows you to set the I/O Controller Hub (ICH) voltage. The values range from 1.11341V to 2.00116V with a 0.01325V interval.

ICH PCIE Voltage [Auto]

Allows you to set the ICH PCIE voltage. The values range from 1.51106V to 2.05431V with a 0.01325V interval.

DRAM Bus Voltage [Auto]

Allows you to set the DRAM voltage. The values range from 1.51106V to 2.50000V with a 0.01325V interval.

> • 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 below table for details.
>
> • The system may need better cooling system to work stably under high voltage settings.

	Blue	Yellow	Red
CPU Voltage	0.85000–1.5000	1.50625–1.59375	1.60000–
CPU PLL Voltage	1.81592–1.89542	1.90867–1.94842	1.96167–
QPI/DRAM Core Voltage	1.20000–1.39375	1.40000–1.65625	1.66250–
IOH Voltage	1.11341–1.39166	1.40491–1.64341	1.65666–
IOH PCIE Voltage	1.51106–1.69656	1.70981–1.84231	1.85556–
ICH Voltage	1.11341–1.59041	1.60366–1.84216	1.85541–
ICH PCIE Voltage	1.51106–1.61706	1.63031–1.80256	1.81581–
DRAM Bus Voltage	1.51106–1.72306	1.73631–2.31931	2.33256–

DRAM REF Voltage

The items in this menu allow you to set the DRAM Reference Voltage.

DRAM DATA REF Voltage on CHA/B/C [Auto]
Allows you to set the DRAM DATA Reference Voltage on Channel A/B/C.

DRAM CTRL REF Voltage on CHA/B/C [Auto]
Allows you to set the DRAM Control Reference Voltage on Channel A/B/C.

Debug Mode [String]

Allows you to select the debug mode.
Configuration options: [String] [Code]

Keyboard TweakIt Control [Disabled]

Allows you to enable or disable the keyboard TweakIt control.
Configuration options: [Disabled] [Enabled]

CPU Spread Spectrum [Auto]

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

PCIE Spread Spectrum [Auto]

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

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]

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 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.

```
                              BIOS SETUP UTILITY
 Extreme Tweaker    Main    Advanced    Power    Boot    Tools    Exit
┌─────────────────────────────────────────────────┬──────────────────────────┐
│  System Time             [10:55:25]              │ Use [ENTER], [TAB] or     │
│  System Date             [Thu 10/16/2008]        │ [SHIFT-TAB] to select     │
│  Legacy Diskette A       [1.44M, 3.5 in]         │ a field.                  │
│  Language                [English]               │                           │
│                                                  │ Use [+] or [-] to         │
│  ▶ SATA 1                [Not Detected]          │ configure system Time.    │
│  ▶ SATA 2                [Not Detected]          │                           │
│  ▶ SATA 3                [Not Detected]          │                           │
│  ▶ SATA 4                [Not Detected]          │                           │
│  ▶ SATA 5                [Not Detected]          │                           │
│  ▶ SATA 6                [Not Detected]          │    ←→   Select Screen     │
│                                                  │    ↑↓   Select Item       │
│  ▶ Storage Coniguration                          │    +-   Change Field      │
│  ▶ System Information                            │    Tab  Select Field      │
│                                                  │    F1   General Help      │
│                                                  │    F10  Save and Exit     │
│                                                  │    ESC  Exit              │
└─────────────────────────────────────────────────┴──────────────────────────┘
       v02.61 (C)Copyright 1985-2008, American Megatrends, Inc.
```

3.4.1 System Time [xx:xx:xx]

Allows you to set the system time.

3.4.2 System Date [Day xx/xx/xxxx]

Allows you to set the system date.

3.4.3 Legacy Diskette A [1.44M, 3.5 in.]

Sets the type of floppy drive installed.
Configuration options: [Disabled] [720K , 3.5 in.] [1.44M, 3.5 in.]

3.4.4 Language [English]

Allows you to choose the BIOS language version from the options.
Configuration options: [Chinese BIG5] [Chinese (GB)] [Japanese] [Français] [Deutsch] [English]

3.4.5 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.

```
                           BIOS SETUP UTILITY
                Main

   SATA 1                                        Select the type of
                                                 device connected to
   Device     :Not Detected                      the system.

   Type                       [Auto]
   LBA/Large Mode             [Auto]
   Block(Multi-Sector Transfer) [Auto]
   PIO Mode                   [Auto]
   DMA Mode                   [Auto]
   SMART Monitoring           [Auto]
   32Bit Data Transfer        [Enabled]

                                              ←→   Select Screen
                                              ↑↓   Select Item
                                              +-   Change Option
                                              F1   General Help
                                              F10  Save and Exit
                                              ESC  Exit

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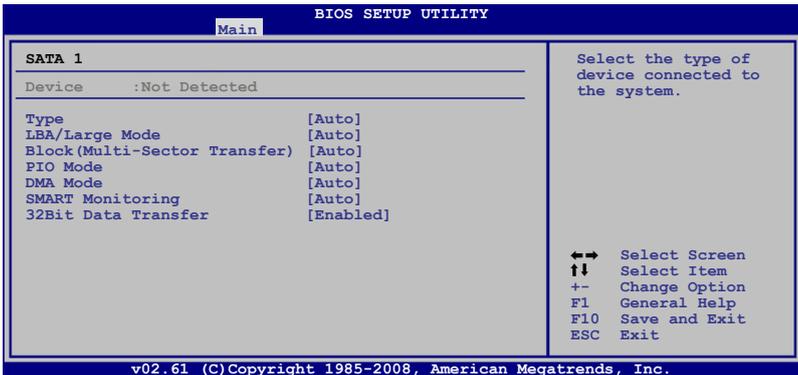
The BIOS automatically detects the values opposite the dimmed items (Device, Vendor, Size, LBA Mode, Block Mode, PIO Mode, Async DMA, Ultra DMA, and SMART monitoring). These values are not user-configurable. These items show [Auto] if no IDE device is installed in the system.

Type [Auto]

Selects the type of IDE drive. 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) [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]

Selects the PIO 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 Smart 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]

3.4.6   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.

```
                        BIOS SETUP UTILITY
              Main

   Storage Configuration
                                                              Options
   SATA Configuraton           [Enhanced]
    Configure SATA as          [IDE]                      Disabled
                                                          Compatible
   Hard Disk Write Protect     [Disabled]                 Enhanced
   SATA Detect Time Out (Sec)  [35]
```
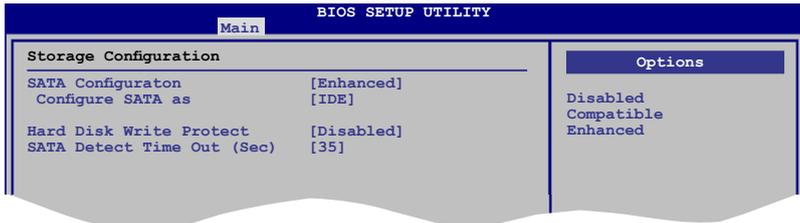
SATA Configuration [Enhanced]

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

> *Configure SATA as [IDE]*
> Sets the configuration for the Serial ATA connectors supported by the Southbridge chip.
>
> If you want to use the Serial ATA hard disk drives as Parallel ATA physical storage devices, keep the defaul 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 device is accessed through BIOS. Confiuration option: [Disabled] [Enabled]

SATA 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]

3.4.7   AHCI Configuration

This menu is for AHCI configuration. It appears only when you set the **Configure SATA as** item under **SATA Configuration** to [AHCI].

```
                            BIOS SETUP UTILITY
                    Main

    AHCI Settings                                    Some SATA CD/DVD in
                                                     AHCI mode need to
    AHCI CD/DVD Boot Time out          [35]          wait ready longer.

  ▶ SATA Port1 [Not Detected]
  ▶ SATA Port2 [Not Detected]
  ▶ SATA Port3 [Not Detected]
  ▶ SATA Port4 [Not Detected]
  ▶ SATA Port5 [Not Detected]
  ▶ SATA Port6 [Not Detected]
```
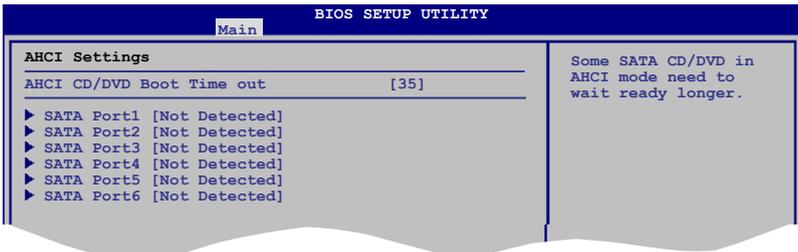
AHCI CD/DVD Boot Time out [35]

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

SATA Port1–6 [XXX]

Displays the auto-detected SATA devices.

```
                            BIOS SETUP UTILITY
                    Main

    SATAt Port1                                      Select the type of
                                                     devices connected to
    Device      :Not Detected                        the system.

    SATA Port1                    [Auto]
    SMART Monitoring              [Enabled]
```
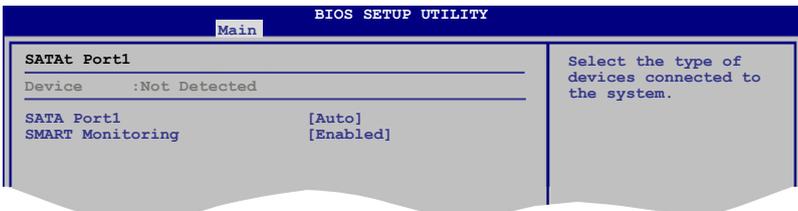
SATA Port1 [Auto]
Allows you to select the type of device connected to the system.
Configuration options: [Auto] [Not Installed]

SMART Monitoring [Enabled]
Enables or disables the Self-Monitoring, Analysis and Reporting Technology (SMART). Configuration options: [Disabled] [Enabled]

3.4.8   System Information

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

```
                              BIOS SETUP UTILITY
              Main

   BIOS Information
   Version   : 0405
   Build Date : 10/15/08

   Processor
   Type     : Genuine Intel(R) CPU @ 3.20GHz
   Speed    : 3200MHz

   System Memory
   Usable Size   : 504MB

   BIOS Status                                    ←→    Select Screen
   Now BIOS status   : BIOS1                      ↑↓    Select Item
   BIOS Boot Selection : Hardware                 F1    General Help
                                                  F10   Save and Exit
   BIOS Name                                      ESC   Exit
   BIOS1: Normal
   BIOS2: Performance

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```

BIOS Information

Displays the auto-detected BIOS information.

Processor

Displays the auto-detected CPU specification.

System Memory

Displays the auto-detected system memory.

BIOS Status

Displays which BIOS the system boots and the way BIOS bootup selection is made.

BIOS Name

Displays the description for BIOS1 and BIOS2.

3.5 Advanced menu

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

```
                         BIOS SETUP UTILITY
 Extreme Tweaker    Main    Advanced    Power    Boot    Tools    Exit
┌──────────────────────────────────────────┬──────────────────────────────┐
│                                            │ Set Chipset, DRAM,           │
│ ▶  CPU Configuration                       │ and Clock related            │
│ ▶  Chipset                                 │ parameters.                  │
│ ▶  Onboard Devices Configuration           │                              │
│ ▶  USB Configuration                       │                              │
│ ▶  PCIPnP                                   │                              │
│ ▶  LCD Poster and LED Control              │                              │
│ ▶  Other Configuration                     │                              │
│                                            │                              │
│                                            │   ←→    Select Screen        │
│                                            │   ↑↓    Select Item          │
│                                            │   Tab   Select Field         │
│                                            │   F1    General Help         │
│                                            │   F10   Save and Exit        │
│                                            │   ESC   Exit                 │
└──────────────────────────────────────────┴──────────────────────────────┘
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```

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.

```
                         BIOS SETUP UTILITY
                           Advanced
┌──────────────────────────────────────────┬──────────────────────────────┐
│ Configure advanced CPU settings            │ Sets the ratio between       │
│ Module Version:3F.11                       │ CPU Core Clock and the       │
│                                            │ FSB Frequency.               │
│ Manufacturer:Intel                         │ NOTE: If an invalid          │
│ Brand String:Genuine Intel(R) CPU @ 3.20GHz│ ratio is set in CMOS         │
│ Frequency   :3.20GHz                       │ then actual and              │
│ BCLK Speed  :133MHz                        │ setpoint values may          │
│ Cache L1    :128 KB                        │ differ.                      │
│ Cache L2    :1024 KB                       │                              │
│ Cache L3    :8192 KB                       │                              │
│ Ratio Status:Unlocked (Min:12, Max:63)     │                              │
│ Ratio Actual Value  :24                    │                              │
│ CPUID       :106A4                         │   ←→    Select Screen        │
│                                            │   ↑↓    Select Item          │
│ CPU Ratio Setting          [Auto]          │   +-    Change Option        │
│ C1E Support                [Enabled]       │   F1    General Help         │
│ Hardware Prefetcher        [Enabled]       │   F10   Save and Exit        │
│ Adjacent Cache Line Prefetch [Enabled]     │   ESC   Exit                 │
│ Intel(R) Virtualization Tech [Enabled]     │                              │
│ CPU TM function            [Enabled]       │                              │
└──────────────────────────────────────────┴──────────────────────────────┘
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```

Scroll down to display the following items:
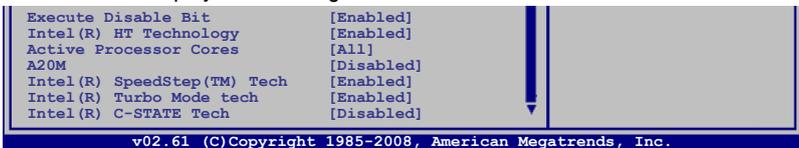
```
┌──────────────────────────────────────────┬──────────────────────────────┐
│ Execute Disable Bit        [Enabled]       │                              │
│ Intel(R) HT Technology     [Enabled]       │                              │
│ Active Processor Cores     [All]           │                              │
│ A20M                       [Disabled]      │                              │
│ Intel(R) SpeedStep(TM) Tech [Enabled]      │                              │
│ Intel(R) Turbo Mode tech   [Enabled]       │                              │
│ Intel(R) C-STATE Tech      [Disabled]      │                              │
└──────────────────────────────────────────┴──────────────────────────────┘
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```

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) C-STATE Tech [Disabled]

Allows you enable or disable the Intel® C-STATE Technology. When enabled, the CPU idle is set to C2/C3/C4. 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]. The selected option will programme into C State package limit register. 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.

```
                         BIOS SETUP UTILITY
                            Advanced

 Advanced Chipset Settings                        Configure North Bridge
                                                  features.
 WARNING: Setting wrong values in below sections
          may cause system to malfunction.
 ▶ North Bridge Configuration
 ▶ Intel VT-d Configuration
```

NorthBridge Chipset Configuration

```
                         BIOS SETUP UTILITY
                            Advanced

 NorthBridge Chipset Configuration                Select PCIE Slot#2
                                                  and PCIE Slot#3 Link
 Revision    :B2                                  Width x8 + x8 or
                                                  x16 + x1
 PCI Express Selector           [Auto]
```
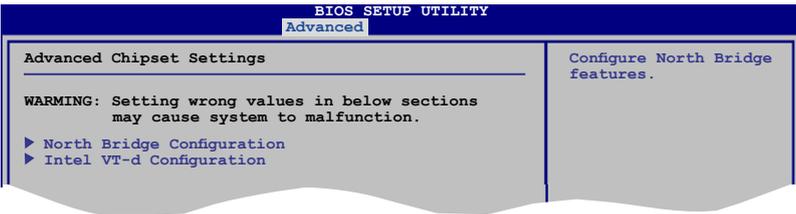
PCI Express Selector [Auto]
Allows you to decide the Link Width of the PCIe x16_2 slot and PCIe x16_3 slot. Configuration options: [Auto] [x8 x8 Mode] [x16 x1 Mode]

Intel VT-d Configuration

```
                         BIOS SETUP UTILITY
                            Advanced

 Intel VT-d Configuration                         Intel Virtualization
                                                  Technology for
 Intel VT-d                     [Disabled]        Directed I/O.
```

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

```
                          BIOS SETUP UTILITY
                    Advanced

      Onboard Device Configuration                        Enable or Disable
                                                          High Definition Audio
      Onboard Device                [Standard]            Controller

      High Definition Audio         [Enabled]
       Front Panel Type             [HD Audio]
      J-Micron eSATA/PATA Controller [Enabled]
       Controller Mode              [IDE]
      Marvell LAN1                  [Enabled]
      Marvell LAN2                  [Enabled]
       LAN Boot ROM                 [Disabled]
      Onboard 1394 Controller       [Enabled]
                                                          ←→    Select Screen
                                                          ↑↓    Select Item
                                                          +-    Change Option
                                                          F1    General Help
                                                          F10   Save and Exit
                                                          ESC   Exit

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```

Onboard Device [Standard]

Allows you to disable the onboard device controllers.
Configuration options: [Standard] [Disabled]

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]

J-Micron eSATA/PATA Controller [Enabled]

Allows you to enable or disable the onboard JMicron eSATA/PATA controller.
Configuration options: [Enabled] [Disabled]

> #### Controller Mode [IDE]
> This item appears only when you enable the previous item.
> Configuration options: [IDE] [AHCI]
>
> If you want to use the hard disk drive as a Parallel ATA physical storage
> device, keep the defaul setting [IDE].
>
> If you want the hard disk drive to use the Advanced Host Controller Interface
> (AHCI), set this item to [AHCI].

Marvell LAN1/2 [Enabled]

Allows you to enable or disable the onboard Marvell 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]

Onboard 1394 Controller [Enabled]

Allows you to enabled or disable the onboard IEEE 1394a controller.
Configuration options: [Enabled] [Disabled]

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.

```
                              BIOS SETUP UTILITY
                             Advanced

 USB Configuration                                            Options

 USB Devices Enabled:                                    Enabled
           None                                          Disabled

 USB Functions             [Enabled]
 USB 2.0 Controller        [Enabled]
 USB 2.0 Controller Mode   [HiSpeed]
 BIOS EHCI Hand-off        [Enabled]
 Legacy USB Support        [Auto]
```
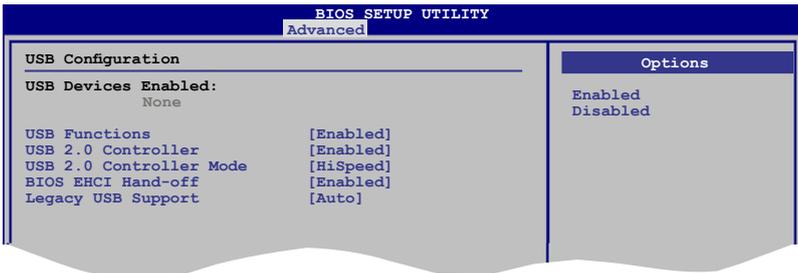
The **USB Devices Enabled** item shows the auto-detected values. If no USB
device is detected, the item shows None.

USB Functions [Enabled]

Allows you to enable or disable the USB functions. The following sub-items appear
when this item is set to [Enabled]. 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   PCI PnP

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

> ⚠ Take caution when changing the settings of the PCI PnP menu items. Incorrect field values can cause the system to malfunction.

```
                        BIOS SETUP UTILITY
                     Advanced
 ┌─────────────────────────────────────────────────────┬──────────────────────┐
   Advanced PCI/PnP Settings                              NO: lets the BIOS
                                                          configure all the
   WARNING: Setting wrong values in below sections        devices in the system.
            may cause system to malfunction.              YES: lets the
                                                          operating system
   Plug And Play O/S            [No]                       configure Plug and Play
                                                          (PnP) devices not
                                                          required for boot if
                                                          your system has a Plug
                                                          and Play operating
                                                          system.
```
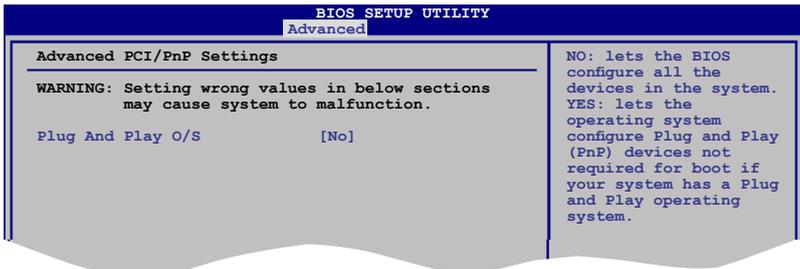
Plug And Play O/S [No]

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]

3.5.6   LCD Poster and LED Control

```
                           BIOS SETUP UTILITY
                         Advanced

  LCD Poster Backlight        [Turn Off]            Turn On/Turn Off LCD
  LCD Poster Backlight(S5)    [Turn Off]            Poster when system
  LCD Poster Mode             [HWM Information]      is working
   HWM Select Mode            [All Temperature]

  All LED Control             [Enabled]
  ROG Logo                    [Enabled]
  EL Light                    [Enabled]
  Voltiminder LED             [Enabled]
  CPU LED Selection           [CPU]
  NB LED Selection            [IOH]
  SB LED Selection            [ICH]
```
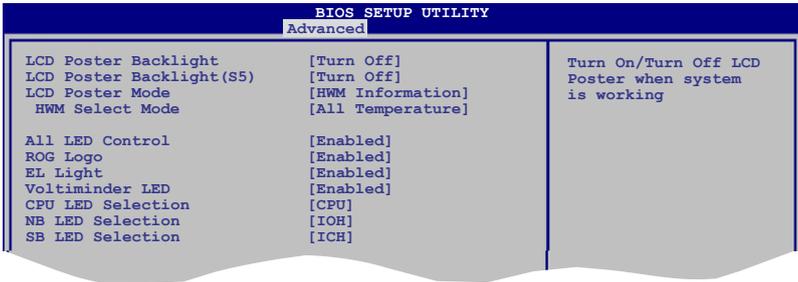
LCD Poster Backlight [Turn Off]

Allows you to turn on/off the LCD Poster backlight when the system is working.
Configuration options: [Turn On] [Turn Off]

LCD Poster Backlight (S5) [Turn Off]

Allows you to turn on/off the LCD Poster backlight when the system is in soft-off
state. Configuration options: [Turn On] [Turn Off]

LCD Poster Mode [HWM Information]

Allows the LCD Poster to display either hardware information or time.
Configuration options: [Current Time] [HWM Information]

> The following item becomes configurable when you set **LCD Poster Mode** to
> [HWM Information].

HWM Select Mode
Allows you to select which hardware information to display on the LCD
Poster. Configuration options: [All Voltage] [All Temperature] [All Fan Speed]

All LED Control [Enabled]

Allows you to enable or disable the onboard LEDs control.
Configuration options: [Enabled] [Disabled]

> The following items appear only when you set **All LED Control** to [Enabled].

ROG Logo [Enabled]

If this item is set to [Enabled], the box labeled as Republic of Gamers on the
heatpipe assembly lights up when the system is on.
Configuration options: [Enabled] [Disabled]

EL Light [Enabled]

If this item is set to [Enabled], the EL I/O shield connected to the **EL_CON** connector on the motherboard lights up when the system is on.
Configuration options: [Enabled] [Disabled]

Voltiminder LED [Enabled]

Allows you to enable or disable the onboard Voltiminder LED.
Configuration options: [Enabled] [Disabled]

The following items appear only when you set **Voltiminder LED** to [Enabled].

CPU LED Selection [CPU]

Allows you to switch the onboard CPU LED display between CPU voltage [CPU], CPU PLL voltage [CPU PLL] and QPI/DRAM Core voltage [QPI/DRAM Core].
Configuration options: [CPU] [CPU PLL] [QPI/DRAM Core]

NB LED Selection [IOH]

Allows you to switch the onboard northbridge LED display between I/O Hub voltage [IOH] and IOH PCIE voltage [IOH PCIE].
Configuration options: [IOH] [IOH PCIE]

SB LED Selection [ICH]

Allows you to switch the onboard southbridge LED display between I/O Controller Hub voltage [ICH] and ICH PCIE voltage [ICH PCIE].
Configuration options: [ICH] [ICH PCIE]

3.5.7   iROG Configuration

```
                              BIOS SETUP UTILITY
                           Advanced

      iROG Configuration                                   iROG CrashBIOS Rule
                                                           Keep: system will
      iROG ID_Number Information                           not change to the
      iROG   ID_Number:A2                                  other BIOS. You have
      iROG_1 ID_Number:36                                  to use BIOS file for
      iROG_2 ID_Number:17                                  Recovery.
                                                           Switch: system will
                                                           auto change to the
      iROG CrashBIOS Rule           [Switch]               other BIOS. You can
                                                           use BIOS Flashback
      iROG Timer Keeper             [Last State]           for backup
      Current Operation time:
                                                          ←→   Select Screen
      Total Operation time:                               ↑↓   Select Item
                                                          +-   Change Option
                                                          F1   General Help
                                                          F10  Save and Exit
                                                          ESC  Exit

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```

iROG CrashBIOS Rule [Switch]

When this item is set to [Switch], the system will automatically switch between
BIOS1 and BIOS2 so that you are allowed to use the BIOS Flashback function.
When this item is set to [Keep], the system will not switch between BIOS1 and
BIOS2, and therefore BIOS Flashback cannot work.
Configuration options: [Switch] [Keep]

iROG Timer Keeper [Last State]

Allows you to set the iROG Time Keeper operation mode.
Configuration options: [Last State] [Disabled] [Enabled]

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.

```
                              BIOS SETUP UTILITY
   Extreme Tweaker      Main      Advanced    Power    Boot    Tools    Exit
 ┌────────────────────────────────────────────────┬──────────────────────────┐
 │ Suspend Mode                 [Auto]             │ Select the ACPI state    │
 │ Repost Video on S3 Resume    [No]               │ used for System          │
 │ ACPI 2.0 Support             [Disabled]         │ Suspend.                 │
 │ ACPI APIC Support            [Enabled]          │                          │
 │                                                 │                          │
 │ ▶ APM Configuration                             │                          │
 │ ▶ Hardware Monitor                              │                          │
 │                                                 │                          │
 │                                                 │                          │
 │                                                 │  ←→   Select Screen      │
 │                                                 │  ↑↓   Select Item        │
 │                                                 │  +-   Change Option      │
 │                                                 │  F1   General Help       │
 │                                                 │  F10  Save and Exit      │
 │                                                 │  ESC  Exit               │
 └────────────────────────────────────────────────┴──────────────────────────┘
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```
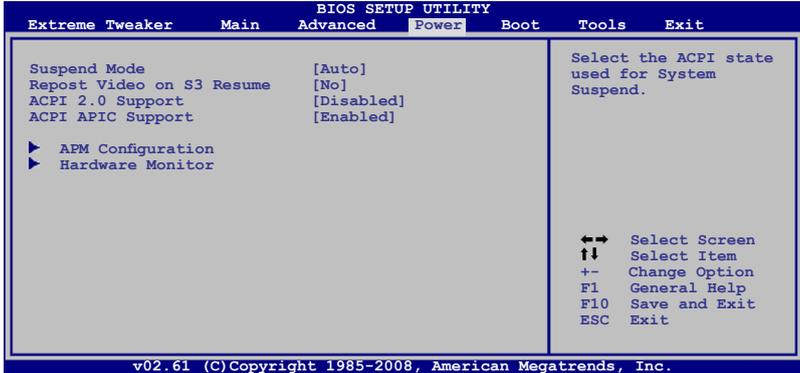
3.6.1 Suspend Mode [Auto]

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]

Specifies the Advanced Configuration and Power Interface (ACPI) version supported. 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

```
                          BIOS SETUP UTILITY
                            Power

   APM Configuration                               <Enter> to select
   _____         whether or not to
                                                     restart the system
   Restore on AC Power Loss      [Power Off]         after AC power loss.

   Power On By RTC Alarm         [Disabled]
   Power On By PCI Devices       [Disabled]
   Power On By PCIE Devices      [Disabled]
   Power On By PS/2 Keyboard     [Disabled]

                                                     ←→   Select Screen
                                                     ↑↓   Select Item
                                                     +-   Change Option
                                                     F1   General Help
                                                     F10  Save and Exit
                                                     ESC  Exit

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```

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 enable or disable the Power On by PS/2 keyboard function. This
feature requires an ATX power supply that provides at least 1A on the +5VSB lead.
Configuration options: [Disabled] [Enabled]

3.6.6   Hardware Monitor

```
                         BIOS SETUP UTILITY
                            Power

   Hardware Monitor                              Voltage Monitor

   ▶  Voltage Monitor
   ▶  Temperature Monitor
   ▶  Fan Speed Monitor
   ▶  Fan Speed Control
```
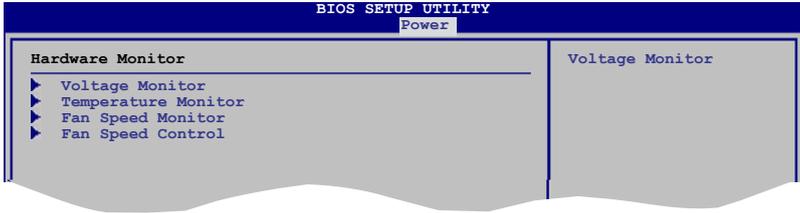
Voltage Monitor

CPU Voltage; CPU PLL Voltage; QPI/DRAM Core Voltage; IOH Voltage; IOH PCIE Voltage; ICH Voltage; ICH PCIE Voltage; DRAM Bus Voltage; 3.3V Voltage; 5V Voltage; 12V Voltage

The onboard hardware monitor automatically detects the voltage output through the onboard voltage regulators.

Temperature Monitor

CPU Temperature; MB Temperature; NB Temperature; SB Temperature; OPT FAN1/2/3 Temperature [xxxºC/xxxºF]

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

NB overheat protection; SB overheat protection [90ºC]

The system automatically shuts down when the northbridge or southbridge chipset is heated over the set temperature to protect it from damage. Configuration optitons: [Disabled] [70ºC] [80ºC] [90ºC] [100ºC]

OPT FAN1/2/3 overheat protection [90ºC]

Allows you to set the temperature over which the system automatically shuts down when any of the thermal sensor cables connected to the motherboard detects device overheat to protect the device from damage. Configuration options: [Disabled] [70ºC] [80ºC] [90ºC] [100ºC]

Fan Speed Monitor

CPU Fan, Chassis Fan1/2/3, POWER Fan, OPT Fan1/2/3 Speed [xxxxRPM] or [Ignored] / [N/A]

The onboard hardware monitor automatically detects and displays the CPU fan, chassis fan, power fan, and optional fan speed in rotations per minute (RPM). If any of the fans is not connected to the motherboard, the field shows [N/A]. These items are not user-configurable.

Fan Speed Control

```
                    BIOS SETUP UTILITY
                        Power

  Fan Speed Control                           CPU Q-Fan Control

  CPU Q-Fan Control            [Disabled]
  Chassis Q-Fan Control        [Disabled]

  PWRFan Control               [Disabled]
  OPTFan1 Control              [Disabled]
  OPTFan2 Control              [Disabled]
  OPTFan3 Control              [Disabled]


                                              ←→   Select Screen
                                              ↑↓   Select Item
                                              +-   Change Field
                                              F1   General Help
                                              F10  Save and Exit
                                              ESC  Exit

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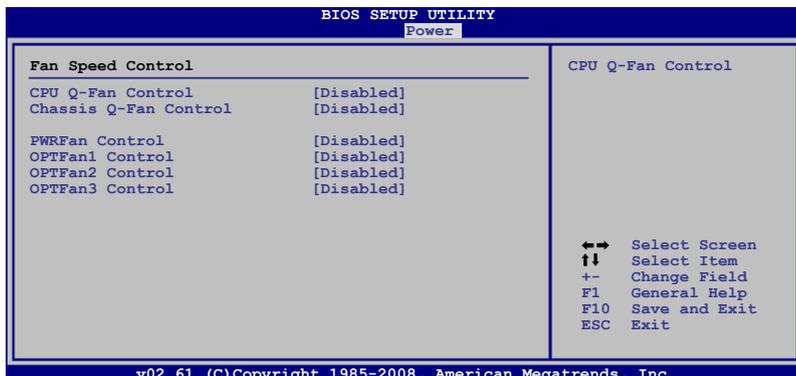
CPU Q-Fan Control [Disabled]
Allows you to enable or disable the CPU Q-fan control feature.
Configuration options: [Disabled] [Enabled]

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

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

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

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]

PWRFan Control [Disabled]
Allows you to select the power fan control mode. When this item is set to [Duty Mode], you can configure the **Power Fan Duty** item.
Configuration options: [Disabled] [Duty Mode]

PWRFan Duty [50%]
Allows you to set the fan duty cycle. This item appears when the **POWER FAN Control** item is set to [Duty Mode].
Configuration options: [40%] [50%] [60%] [70%] [80%] [90%]

OPTFan1/2/3 Control [Disabled]
Allows you to select the optional fan control mode. When this item is set to [Duty Mode], you can configure the **OPTFan1/2/3 Duty** item. If you set this item to [User Mode], you are allowed to configure the **OPTFan1/2/3 Low Speed Temp** and **OPTFan1/2/3 Full Speed Temp** item. Configuration options: [Disabled] [Duty Mode] [User Mode]

You need to connect the thermal sensor cables to the OPT_TEMP1/2/3 connectors to enable this function.

OPTFan1/2/3 Duty [50%]
Allows you to set the fan duty cycle. This item appears when the **OPTFan1/2/3 Control** item is set to [Duty Mode].
Configuration options: [40%] [50%] [60%] [70%] [80%] [90%]

OPTFan1/2/3 Low Speed Temp [25˚C]
Allows you to set the temperature at which the power fan rotates at low speed. This item appears when the **OPTFan1/2/3 Control** item is set to [User Mode].
Configuration options: [25˚C] [30˚C] [35˚C] [40˚C]

OPTFan1/2/3 Full Speed Temp [60˚C]
Allows you to set the temperature at which the power fan rotates at full speed. This item appears when the **OPTFan1/2/3 Control** item is set to [User Mode].
Configuration options: [60˚C] [70˚C] [80˚C] [90˚C]

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.

```
                          BIOS SETUP UTILITY
  Extreme Tweaker     Main    Advanced    Power    Boot    Tools    Exit
 ┌─────────────────────────────────────────────┬───────────────────────────┐
 │  Boot Settings                                │  Specifies the Boot       │
 │ ──────────────────────────────────────────── │  Device Priority          │
 │                                               │  sequence.                │
 │  ▶  Boot Device Priority                      │                           │
 │                                               │  A virtual floppy disk    │
 │  ▶  Boot Settings Configuration               │  drive (Floppy Drive B:)  │
 │  ▶  BIOS Boot Priority                        │  may appear when you set  │
 │  ▶  Security                                  │  the CD-ROM drive as the  │
 │                                               │  first boot device.       │
 │                                               │                           │
 │                                               │                           │
 │                                               │  ←→   Select Screen       │
 │                                               │  ↑↓   Select Item         │
 │                                               │  Enter Go to Sub Screen   │
 │                                               │  F1   General Help        │
 │                                               │  F10  Save and Exit       │
 │                                               │  ESC  Exit                │
 │                                               │                           │
 └───────────────────────────────────────────────────────────────────────── ┘
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```

3.7.1 Boot Device Priority

```
                          BIOS SETUP UTILITY
                                                Boot
 ┌─────────────────────────────────────────────┬───────────────────────────┐
 │  Boot Device Priority                         │  Specifies the boot       │
 │ ──────────────────────────────────────────── │  sequence from the        │
 │                                               │  availabe devices.        │
 │  1st Boot Device           [1st FLOPPY DRIVE] │                           │
 │  2nd Boot Device           [Hard Drive]       │  A device enclosed        │
 │  3rd Boot Device           [ATAPI CD-ROM]     │  in parenthesis has       │
 │                                               │  been disabled in         │
 │                                               │  the corresponding        │
 │                                               │  menu.                    │
 │                                               │                           │
 │                                               │                           │
 │                                               │  ←→   Select Screen       │
 │                                               │  ↑↓   Select Item         │
 │                                               │  +-   Change Option       │
 │                                               │  F1   General Help        │
 │                                               │  F10  Save and Exit       │
 │                                               │  ESC  Exit                │
 │                                               │                           │
 └───────────────────────────────────────────────────────────────────────── ┘
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```

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: [xxx Drive] [Disabled]

3.7.2   Boot Settings Configuration

```
                        BIOS SETUP UTILITY
                                          Boot

    Boot Settings Configuration                      Allows BIOS to skip
                                                     certain tests while
    Quick Boot              [Enabled]                booting. This will
    Full Screen Logo        [Enabled]                decrease the time
    AddOn ROM Display Mode   [Force BIOS]            needed to boot the
    Bootup Num-Lock          [On]                    system.
    Wait for 'F1' if Error  [Enabled]
    Hit 'DEL' Message Display [Enabled]


                                                   ←→    Select Screen
                                                   ↑↓    Select Item
                                                   +-    Change Option
                                                   F1    General Help
                                                   F10   Save and Exit
                                                   ESC   Exit

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```

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 MyLogo3™ 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   BIOS Boot Priority

- • This item appears only when you move the **BIOS_FLASHBACK** jumper cap to **pins 1-2: BIOS MENU**.
- • Refer to **2. BIOS flash setting (6-pin BIOS_FLASHBACK)** in **2.6 Jumpers** for further information.

```
                              BIOS SETUP UTILITY
                                              Boot

   Now BIOS status       : BIOS1                 BIOS1
   BIOS Boot Selection   : BIOS Menu

   BIOS Name
   BIOS1: Normal
   BIOS2: Performance

   Forced BIOS Boot from
    BIOS1
    BIOS2

                                                ←→    Select Screen
                                                ↑↓    Select Item
                                                Enter Go to Sub Screen
                                                F1    General Help
                                                F10   Save and Exit
                                                ESC   Exit

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```
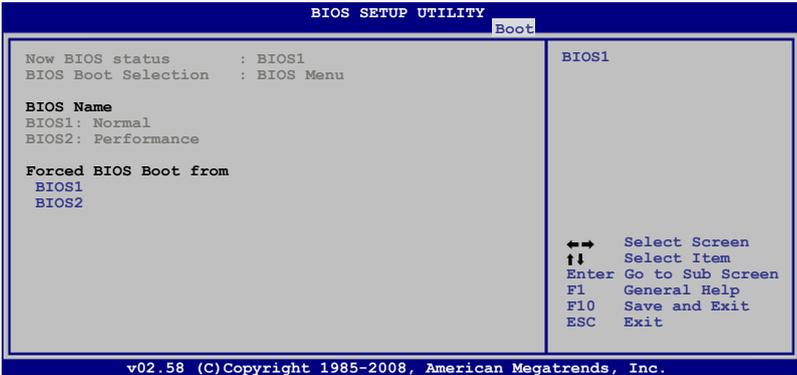
Now BIOS status

Shows "BIOS1" or "BIOS2" depending on from which BIOS the system boots.

BIOS Boot Selection

Shows "BIOS Menu" to indicate that you make BIOS bootup selection through BIOS menu rather than by moving the BIOS_FLASHBACK jumper cap.

BIOS Name

Shows the description for BIOS1 and BIOS2.

Forced BIOS Boot from

Allows you to select from which BIOS the system boots. Highlight [BIOS1] or [BIOS2] and press <Enter>, and the system will reboot.

3.7.4   Security

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

```
                          BIOS SETUP UTILITY
                                       Boot

   Security Settings                               <Enter> to change
                                                   password.
   Supervisor Password      :Not Installed         <Enter> again to
   User Password            :Not Installed          disabled password.

   Change Supervisor Password
   Change User Password



                                                   ←→    Select Screen
                                                   ↑↓    Select Item
                                                   Enter Change
                                                   F1    General Help
                                                   F10   Save and Exit
                                                   ESC   Exit

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```

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.

```
                          BIOS SETUP UTILITY
                                         Boot

   Security Settings                                  <Enter> to change
                                                      password.
   Supervisor Password      :Not Installed            <Enter> again to
   User Password            :Not Installed            disabled password.

   Change Supervisor Password
   User Access Level              [Full Access]
   Change User Password
   Clear User Password
   Password Check                 [Setup]
                                                      ←→    Select Screen
                                                      ↑↓    Select Item
                                                      Enter Change
                                                      F1    General Help
                                                      F10   Save and Exit
                                                      ESC   Exit

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```

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.

```
                            BIOS SETUP UTILITY
  Extreme Tweaker      Main     Advanced     Power     Boot     Tools     Exit
┌─────────────────────────────────────────────────┬────────────────────────────┐
│                                                   │ Press ENTER to run         │
│  ASUS EZ Flash 2                                  │ the utility to select      │
│ ▶ ASUS O.C. Profile                               │ and update BIOS.           │
│ ▶ AI NET 2                                        │ This utility doesn't       │
│ ▶ BIOS Flashback                                  │ support :                  │
│                                                   │ 1.NTFS format              │
│                                                   │                            │
│                                                   │                            │
│                                                   │                            │
│                                                   │ ←→     Select Screen       │
│                                                   │ ↑↓     Select Item         │
│                                                   │ +-     Change Field        │
│                                                   │ Enter  Go to Sub Screen    │
│                                                   │ F1     General Help        │
│                                                   │ F10    Save and Exit       │
│                                                   │ ESC    Exit                │
└─────────────────────────────────────────────────┴────────────────────────────┘
          v02.61 (C)Copyright 1985-2008, American Megatrends, Inc.
```
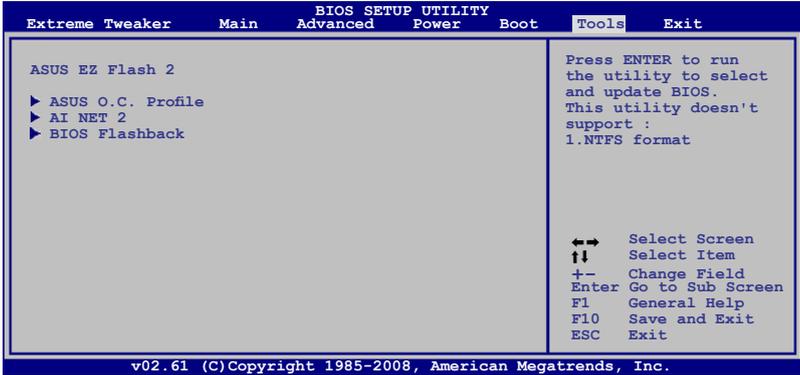
3.8.1 ASUS EZ Flash 2

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 see page 3-5, section 3.1.3 for details.

```
┌─────────────────────────────────────────────────────────────────┐
│              ASUSTek EZ Flash 2 BIOS ROM Utility V3.25            │
│  FLASH TYPE: MXIC 25L1605A                                        │
│    ┌─ Current ROM ──────────────┐   ┌─ Update ROM ──────────────┐│
│    │ BOARD: Rampage II Extreme   │   │ BOARD: Unknown            ││
│    │ VER: 0405                   │   │ VER: Unknown              ││
│    │ DATE: 10/15/2008            │   │ DATE: Unknown             ││
│    └─────────────────────────────┘   └───────────────────────────┘│
│  PATH: A:\                                                        │
│  ┌──────────┐ ┌─────────────────────────────────────────────────┐│
│  │ A:       │ │                                                 ││
│  │          │ │                                                 ││
│  │          │ │                                                 ││
│  │          │ │                                                 ││
│  │          │ │                                                 ││
│  │          │ │                                                 ││
│  └──────────┘ └─────────────────────────────────────────────────┘│
│  ┌─ Note ──────────────────────────────────────────────────────┐ │
│  │ [Enter] Select or Load    [Tab] Switch    [V] Drive Info    │ │
│  │ [Up/Down/Home/End] Move   [B] Backup       [Esc] Exit       │ │
│  └─────────────────────────────────────────────────────────────┘ │
└─────────────────────────────────────────────────────────────────┘
```
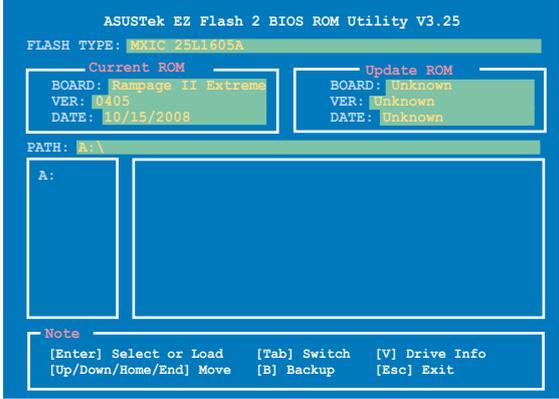
3.8.2 ASUS O.C. Profile

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

```
                        BIOS SETUP UTILITY
                                                  ┌──────────┐
                                                  │  Tools   │
 ┌──────────────────────────────────────────────┐┌──────────────────────────┐
 │ O.C. PROFILE Configuration                    ││ Typing your profile      │
 │ ────────────────────────────────────────────  ││ name, [0-9][a-z][A-Z]    │
 │ O.C. Profile 1 Status  :Not Installed         ││ are acceptable.          │
 │ O.C. Profile 2 Status  :Not Installed         ││                          │
 │ O.C. Profile 3 Status  :Not Installed         ││                          │
 │ O.C. Profile 4 Status  :Not Installed         ││                          │
 │ O.C. Profile 5 Status  :Not Installed         ││                          │
 │ O.C. Profile 6 Status  :Not Installed         ││                          │
 │ O.C. Profile 7 Status  :Not Installed         ││                          │
 │ O.C. Profile 8 Status  :Not Installed         ││                          │
 │                                               ││                          │
 │ Add Your CMOS Profile.                        ││ ←→    Select Screen      │
 │    Name:                [          ]          ││ ↑↓    Select Item        │
 │    Save To:             [Uninstalled]         ││ Enter Go to Sub Screen   │
 │ Load CMOS Profiles.                           ││ F1    General Help       │
 │    Load From:           [Blank]               ││ F10   Save and Exit      │
 │                                               ││ ESC   Exit               │
 │ Start O.C. Profile                            ││                          │
 └──────────────────────────────────────────────┘└──────────────────────────┘
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```

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.

Load CMOS Profiles

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.

```
            ASUSTek O.C. Profile Utility V1.25


    ┌─── Current CMOS ───────┐    ┌─── Restore CMOS ───────┐
    │ BOARD: Rampage II Extreme   │ BOARD:  Unknown        │
    │ VER:  0405             │    │ VER:   Unknown         │
    │ DATE: 10/15/08         │    │ DATE:  Unknown         │
    └────────────────────────┘    └────────────────────────┘
    PATH: A:\
    ┌──────┐  ┌────────────────────────────────────────────┐
    │ A:   │  │                                            │
    │      │  │                                            │
    │      │  │                                            │
    │      │  │                                            │
    │      │  │                                            │
    │      │  │                                            │
    │      │  │                                            │
    └──────┘  └────────────────────────────────────────────┘
    ┌─ Note ──────────────────────────────────────────────┐
    │ [Enter] Select or Load    [Tab] Switch    [V] Drive Info │
    │ [Up/Down/Home/End] Move   [B] Backup      [Esc] Exit     │
    └──────────────────────────────────────────────────────┘
```
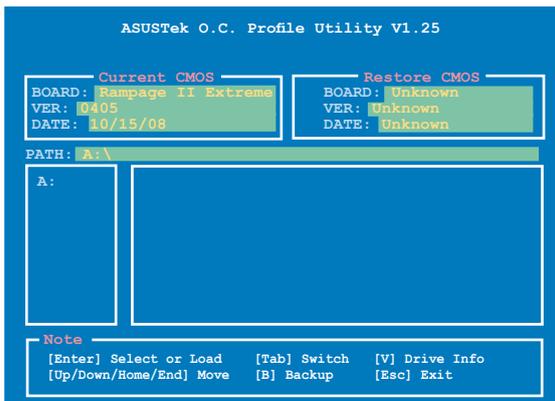
- • This function can support devices such as USB flash disk or floppy disk with FAT 32/16 format and single partition only.
- • DO NOT shut down or reset the system while updating the BIOS to prevent the system boot failure!

3.8.3 AI NET 2

```
                        BIOS SETUP UTILITY
                  Advanced

 Ai Net 2                                        Check Marvell LAN
 Pair    Status    Length                        cable during POST.



 Check Marvell LAN cable        [Disabled]


                                                 ←→   Select Screen
                                                 ↑↓   Select Item
                                                 +-   Change Field
                                                 Tab  Select Field
                                                 F1   General Help
                                                 F10  Save and Exit
                                                 ESC  Exit

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```
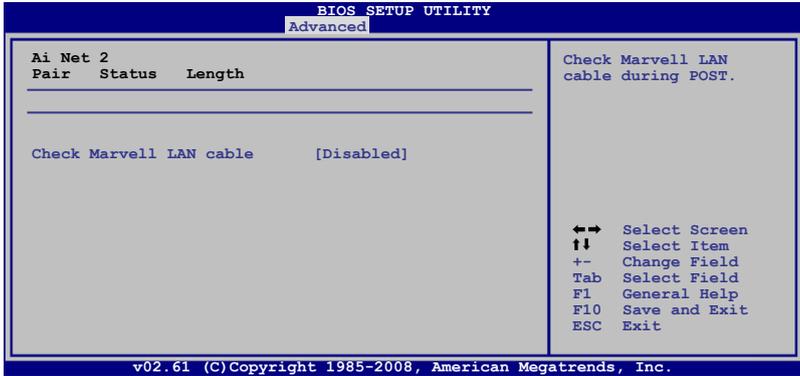
Check Marvell LAN Cable [Disabled]

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

3.8.4 BIOS Flashback

This menu allows you to back up or restore BIOS content from BIOS 1 to BIOS2, and vice versa.

```
                          BIOS SETUP UTILITY
                                                      Tools

    Now BIOS status      : BIOS1              BIOS1 to BIOS2
    BIOS Boot Selection  : Hardware           Only current operating
                                              BIOS can be mirrored.
    BIOS Name                                 System will enter
    BIOS1: Normal                             the soft-off state.
    BIOS2: Performance                        After BIOS backup is
                                              finished, system will
    BIOS Update                               auto power-on.
     BIOS1 to BIOS2
     BIOS2 to BIOS1

    BIOS Name                                 ←→    Select Screen
    BIOS Description Select:      [None]       ↑↓    Select Item
                                              Enter Go to Sub Screen
                                              F1    General Help
                                              F10   Save and Exit
                                              ESC   Exit

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```

To perform BIOS Flashback:

1.   Highlight [BIOS1 to BIOS2] or [BIOS2 to BIOS1] and press <Enter>.

    If **Now BIOS status** shows **BIOS1** (you are currently using BIOS1), then only
    the [BIOS1 to BIOS2] option is available, if **BIOS2**, then [BIOS2 to BIOS1].

2.   The system enters the soft-off state and the onboard **BIOS LED** will blink to
      indicate that the update is proceeding.

3.   When the update is complete, the system will restart automatically.

    Refer to **2. BIOS flash setting (6-pin BIOS_FLASHBACK)** in **2.6 Jumpers** for
    further information.

BIOS Description Select

Allows you to add description for BIOS1 and BIOS2 to identify the difference.
Configuration options: [None] [BIOS1] [BIOS2]

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.

```
                           BIOS SETUP UTILITY
   Main      Extreme Tweaker     Advanced     Power     Boot     Tools      Exit

   Exit Options                                              Exit system setup
                                                             after saving the
                                                             changes.
   Exit & Save Changes
   Exit & Discard Changes                                    F10 key can be used
   Discard Changes                                           for this operation.

   Load Setup Defaults


                                                             ←→    Select Screen
                                                             ↑↓    Select Item
                                                             Enter Go to Sub Screen
                                                             Tab   Select Field
                                                             F1    General Help
                                                             F10   Save and Exit
                                                             ESC   Exit

        v02.61 (C)Copyright 1985-2007, American Megatrends, Inc.
```

> 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 YES 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 YES 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 YES 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.

Software
support

4

Chapter summary

4

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 Windows® XP Service Pack 2 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 Drivers

Launches the ASUS InstAll driver installation wizard.

Intel Chipset Inf Update Program

Installs the Intel® chipset inf update program.

Marvell Yukon Gigabit Ethernet Driver

Installs the Marvell Yukon Gigabit Ethernet Driver.

SoundMAX ADI Audio Driver

Installs the SoundMAX® audio driver and application.

Sound Blaster X-Fi

Installs the Sound Blaster X-Fi driver and utility.

ASUS TweakIt

Installs the ASUS TweakIt driver and utility.

USB 2.0 Driver

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

JMicron JMB36X Controller Driver

Installs the JMicron® JMB36X controller driver.

4.2.3   Utilities menu

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

Click to display the next screen

Click to display the previous screen

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

Installs the ASUS AI Suite.

ASUS AI Direct Link

The ASUS AI Direct Link provides up to 70% transferring speed improvement when compared to traditional USB 2.0 and is the easiest and fastest way for users to enjoy large-sized data exchange of files such as movies, music, etc.

Marvell Yukon VCT Application

Installs the Marvell Yukon VCT applications.

Marvell Yukon NCU Application

Installs the Marvell Yukon NCU applications.

Adobe Reader 8

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

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.

Anti-Virus Utility

The anti-virus application scans, identifies, and removes computer viruses. View the online help for detailed information.

Corel MediaOne Starter

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

ASUS TurboV

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

Ulead Burn.Now

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

Ulead PhotoImpact 12 SE

Installs the Ulead PhotoImpact 12 SE software.

Winzip 11

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

CyberLink PowerBackup

Installs the CyberLink Powerbackup software.

ASUS EPU-Six Engine

Installs the ASUS EPU-Six Engine driver and utility.

4.2.4   Make disk menu

The Make disk menu contains items to create the Intel ICH10R driver disk.

Intel ICH10R 32/64 bit AHCI/RAID Driver

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

JMicron JMB36X 32/64 bit Driver

Allows you to create a JMicron® JMB36X controller driver disk for 32/64bit system.

4.2.5 Manual menu

The Manuals 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 Video menu

Click the Video tab to display a list of video clips. Click the video titles to watch ROG users' outstanding performances with ROG motherboards.

4.2.7 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.
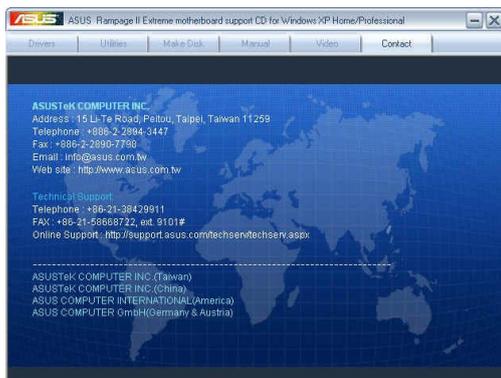
4.2.8 Other information

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.

Filelist

Displays the contents of the support DVD and a brief description of each in text format.
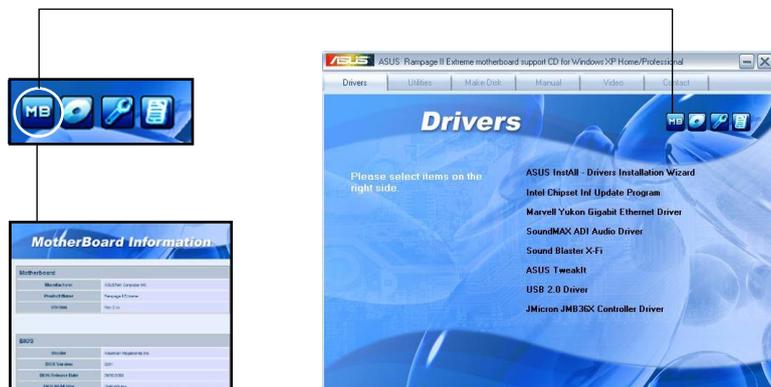
4.3 Software information

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 MyLogo3™

The ASUS MyLogo3™ 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 MyLogo3™ 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 MyLogo3™, 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 **3.1.4 AFUDOS utility**.
>
> • Make sure that the BIOS item Full Screen Logo is set to [Enabled] if you wish to use ASUS MyLogo3™. See section **3.7.2 Boot Settings Configuration**.
>
> • You can create your own boot logo image in GIF file formats.

To launch the ASUS MyLogo3™:

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, then click **Next**.
3. Check the option **Launch MyLogo** to replace system boot logo before flashing BIOS, then click **Next**.
4. Select **Update BIOS** from a file from the drop down menu, then click **Next**.
5. When prompted, locate the new BIOS file, then click **Next**. The ASUS MyLogo 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 sofware 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.
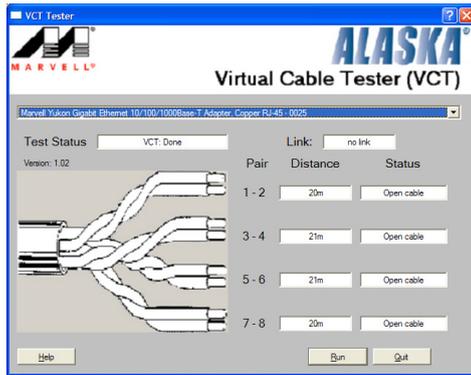
3. Click the **Run** button to perform a cable test.

- 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   Sound Blaster X-Fi audio utility

With the SupremeFX X-Fi audio card installed to the motherboard, you will be able to enjoy excellent audio quality and experience realistic sound effects through the ADI AD2000B audio codec and Sound Blaster X-Fi interface. Activating X-Fi's CMSS3D, Crystalizer, and EAX will deliver accurate virtual surround sound and enhanced audio dynamics, which amount to ultimate gaming experience.

To install Sound Blaster X-Fi:

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 click **SoundMAX ADI Audio Driver**.

3.   Follow the screen instructions to complete installation.

4.   Click the support DVD **Utilities** tab and click **Sound Blaster X-Fi**.

5.   Follow the screen instructions to complete installation.

> You need to install SoundMAX ADI Audio Driver to use Sound Blaster X-Fi audio utility.

If the Sound Blaster X-Fi audio utility is successfully installed, you will find the **Volume Panel** icon on the notification area.

Click the Volume Panel icon to display a list of Creative® media utilities that help you manage and play your media files. Click **Help** in each utility control panel to know more about them.

Double-click the Volume Panel icon to launch the Mixer control panel.

Click **Main Display** [Main Display] to go to the Main Panel.

Main Panel

The Main Panel displays all the features and functions your SupremeFX X-Fi audio card supports. Click each icon to configure the following settings (from left to right): Speakers and Headphone, EAX Effects, X-Fi CMSS-3D, X-Fi Crystalizer, Smart Volume Management, Graphic Equalizer, and Mixer.

Click each icon to configure further settings

Minimize

Exit

Help

Drag to adjust volume

Click to mute volume

Click to restore default settings
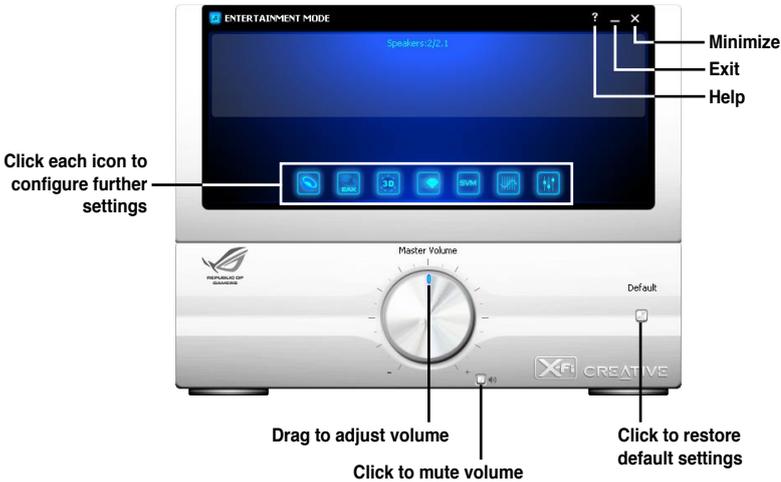
Speakers and Headphone Panel

This panel allows you to configure speakers/headphone settings including bass management and speaker volume. You can also test each speaker channel.

Click to select a speaker type

Click to adjust bass

Click to adjust volume of each speaker

Click to test speaker sound in turn

Click to test speaker noise in turn

EAX Effects Panel

This panel contains environment effects that you can select to obtain a sense of realism during interactive 3D games.

Click to enable EAX Effects

Drag to adjust effects amount
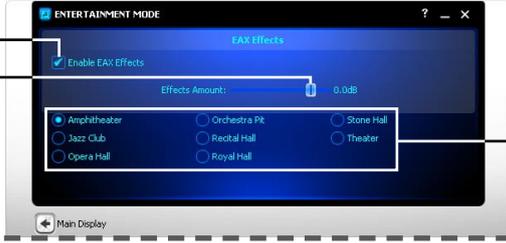
Click to select an environment

X-Fi CMSS-3D Panel

This panel allows you to configure 3D virtual surround effects.

Click to enable X-Fi 3D Virtual effects

Click to select an upmix mode (appears when using 4/4.1/5.1/7.1 Speakers)
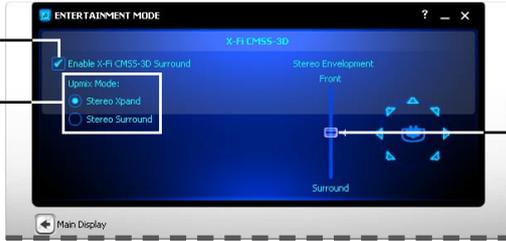
Drag to adjust effects

X-Fi Crystalizer Panel

Enable X-Fi Crystalizer to obtain more audio dynamics.

Click to enable X-Fi Crystalizer

Drag to adjust effects

Smart Volume Management Panel

Enable Smart Volume Management (SVM) to avoid large volume fluctuations.

Click to switch on/off SVM

Graphic Equalizer Panel

This panel allows you to customize equalizer settings or select an EQ presets.

Click to enable EQ

Drag to customize effects

Click to select an EQ preset

Click to save settings

EQ Acoustic
EQ Classical
EQ Country
EQ Dance
EQ Flat
EQ Jazz
EQ New Age
EQ Pop
EQ Rock
EQ Vocal

Mixer Panel

This panel allows you to select a recording device and adjust recording/playback devices volume.

Drag to adjust volume

Click to select a recording device

Click to adjust volume

Click to mute volume

4.3.4   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
CONFIG	Opens the Configuration window
(report icon)	Opens the Report window
DMI	Opens the Desktop Management Interface window
PCI	Opens the Peripheral Component Interconnect window
WMI	Opens the Windows Management Instrumentation window
USAGE	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.

Preferences

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.

Click to increase value

Click to decrease value

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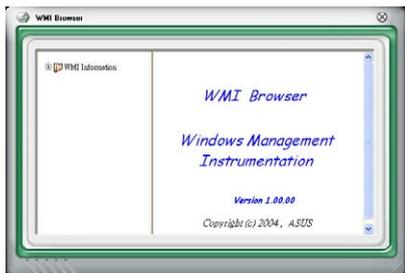
You can enlarge or reduce the browser size by dragging the bottom right corner of the browser.

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.
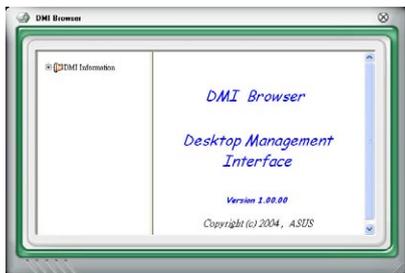
PCI browser

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.
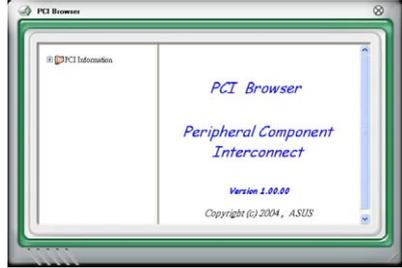
Usage

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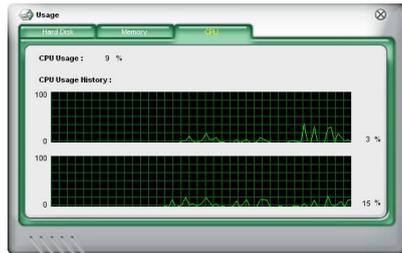
Hard disk drive space usage
The Hard Disk tab displays the
used and available hard disk
drive space. The left panel of the
tab lists all logical drives. Click
a hard disk drive to display the
information on the right panel.
The pie chart at the bottom of
the window represents the used
(blue) and the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

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.
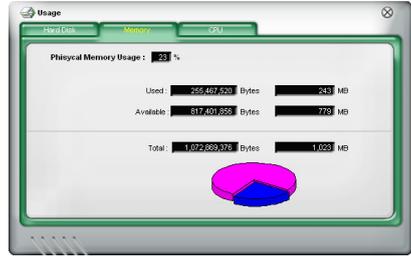
Configuring PC Probe II

Click <kbd>CONFIG</kbd> 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

4.3.5 ASUS AI Suite

ASUS AI Suite allows you to launch EPU-6 Engine, TurboV, Fan Xpert, CPU Level Up, and AI Nap 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, TurboV, Fan Xpert, CPU Level Up, or AI Nap icon to launch the utility, or click the Normal icon to restore the system to normal state.

Click to restore to normal

Click to launch AI Nap

Click to launch EPU-6 Engine

Click to launch CPU Level Up

Click to launch TurboV

Click to launch Fan Xpert
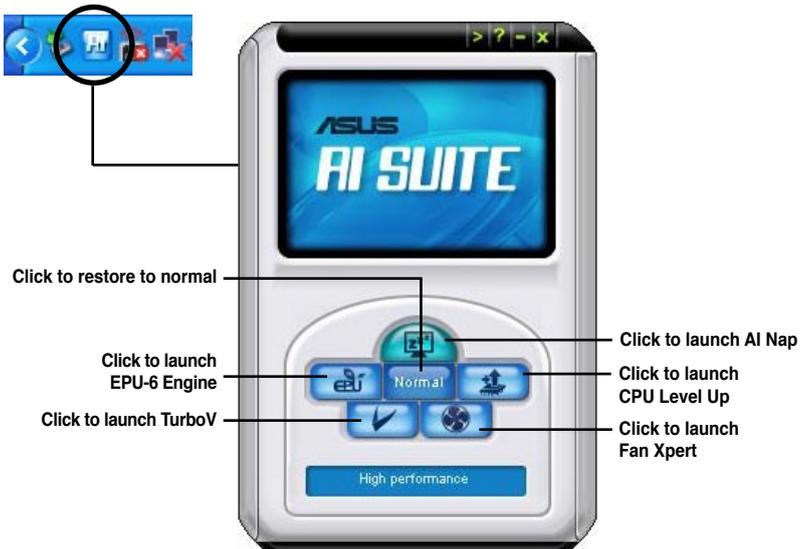
Other feature buttons

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

Displays the CPU/ system temperature, CPU/memory/PCIE voltage, and CPU/ chassis fan speed

Displays the FSB/CPU frequency
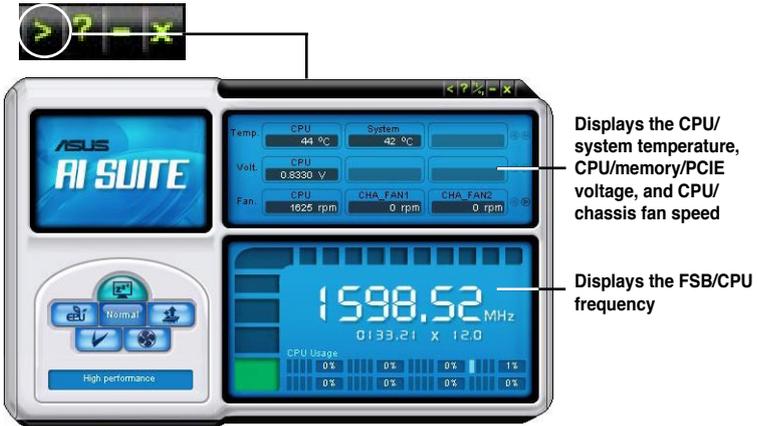
Click on right corner of the expanded window to switch the temperature from degrees Centigrade to degrees Fahrenheit.

4.3.6   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.
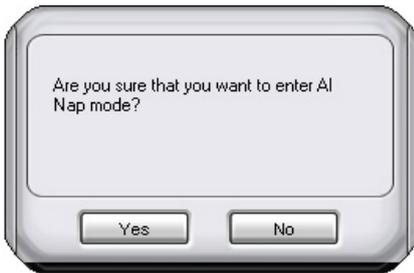
To exit AI Nap mode, press the system power or mouse button then click **Yes** on the confirmation screen.
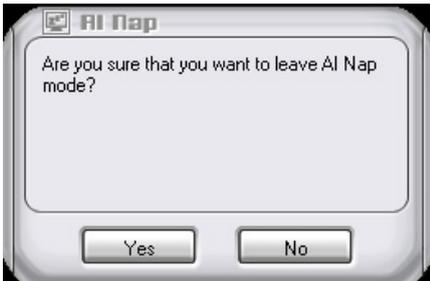
To switch the power button functions from AI Nap to shutting down, just right click the **AI Suite** icon on the OS taskbar, select **AI Nap** and click **Use power button**. Unclick the the item to switch the function back.

4.3.7 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**.

Click to open the Calibration wiondow

Dropdown list button

Click to display the dropdown list and select a fan profile mode

Click to display the current CPU temperature and the fan speed ratio

Click to save the setup

Click to cancel the Fan Xpert utility

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 70ºC.

- **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

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

4.3.8 CPU Level Up

The CPU Level Up allows you to overclock immediately with OC profile presets in WIndows® environment without the hassle of entering BIOS.

After installing AI Suite from the bundled Support DVD, launch the utility by double-clicking the AI Suite icon on the Windows® OS taskbar and click the CPU Level Up button on the AI Suite main window.

Click to select a CPU level

Click to apply the selected CPU level

Click to exit the utlity

4.3.9 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-Six 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

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

Exits the utility

Displays the system properties of each mode

Advanced settings for each mode (refer to the next page for further information)
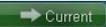
*•   Click **Current** to show the CO2 that has been reduced since you click the **Renew** button .
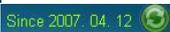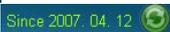
*•   Click Total to show the total CO2 that has been reduced since you launched 6 Engine.

Advanced settings menu

Click **Setting** (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.

Click to select a mode

Move the slider to adjust

Click the arrow to see more options

Restore default settings

Click to apply settings

Click to abort settings
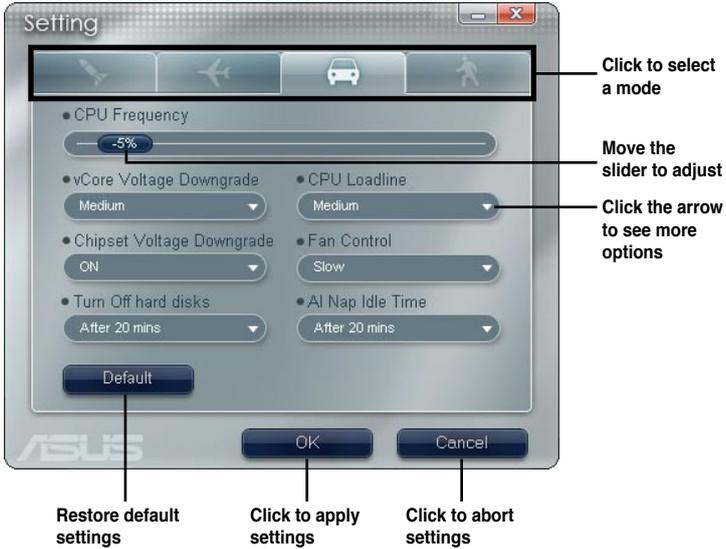
Configuration options in Advanced settings menu

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.
    - **Medium:** Downgrades voltage to the medium level.
    - **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.
    - **Medium:** Saves CPU power to the medium 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/Medium/High	Small/Medium/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/Medium/Heavy	Light/Medium/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 TweakIt function is disabled when 6-Engine is set to Auto Mode. To enable TweakIt function, set 6-Engine to other mode option. Or, you may click the TweakIt icon on the Windows® notification area and click **Unlock** to enable the TweakIt function.

Ensure that you've installed TweakIt driver from the bundled Support DVD.

4.3.10 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

Voltage Adjustment bars

Shows more settings

Default settings **Target settings**

Applies all changes immediately

Undoes all changes without applying

> ✎ **Overclocking tips:**
>
> • For advanced overclockability, adjust first the **Extreme 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 3-14 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 3-14 for details.

4.4   RAID configurations

The motherboard comes with the Intel® ICH10R Southbridge controller that supports RAID 0, RAID 1, RAID 10, and RAID 5 for six independent Serial ATA channels.

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.

> If you want to boot the system from a hard disk drive included in a created RAID set, copy first the RAID driver from the support DVD to a floppy disk before you install an operating system to the selected hard disk drive. Refer to section **4.5 Creating a RAID driver disk** for details.

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   Intel® RAID configurations

This motherboard supports RAID 0, RAID 1, RAID 5, RAID 10 and Intel® Matrix Storage configurations for Serial ATA hard disks drives through the Intel® ICH10R Southbridge chip.

Setting the RAID item in BIOS

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

1.   Enter the BIOS Setup during POST.
2.   Go to the **Main** menu, select **Storage Configuration**, then press <Enter>.
3.   Select the item **Configure SATA as**, then press <Enter> to display the configuration options.
4.   Select [RAID] from the **Configure SATA as** item options, then press <Enter>.
5.   Save your changes, then exit the BIOS Setup.

Refer to the system or the motherboard user guide for details on entering and navigating through the BIOS Setup.

Intel® Matrix Storage Manager option ROM utility

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

To enter the Intel® Matrix Storage Manager option ROM utility:

1.   Install all the Serial ATA hard disk drives.

2.   Turn on the system.

3.   During POST, press <Ctrl+I> to display the utility main menu.

```
    Intel(R) Matrix Storage Manager Option ROM v8.0.0.1027 ICH10R wRAID5
        Copyright(C) 2003-08 Intel Corporation. All Rights Reserved.
================================[ MAIN MENU ]================================
        1. Create RAID Volume              3. Reset Disks to Non-RAID
        2. Delete RAID Volume              4. Exit




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

 Physical Disks:
 Port Drive Model         Serial #              Size     Type/Status(Vol ID)
 0    XXXXXXXXXXX         XXXXXXXX              XX.XXGB   Non-RAID Disk
 1    XXXXXXXXXXX         XXXXXXXX              XX.XXGB   Non-RAID Disk
 2    XXXXXXXXXXX         XXXXXXXX              XX.XXGB   Non-RAID Disk
 3    XXXXXXXXXXX         XXXXXXXX              XX.XXGB   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.

Creating a RAID 0 set (striped)

To create a RAID 0 set:

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

```
        Intel(R) Matrix Storage Manager option ROM v8.0.0.1027 ICH10R wRAID5
           Copyright(C) 2003-08 Intel Corporation. All Rights Reserved.
    ═══════════════════════════[ CREATE VOLUME MENU ]═══════════════════════════

                        Name:    Volume0
                  RAID Level:    RAID0(Stripe)
                       Disks:    Select Disks
                  Strip Size:    128KB
                    Capacity:    XXX   GB


                              Create Volume



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


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




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

2. Enter a name for the RAID 0 set and press <Enter>.

3. When the RAID Level item is highlighted, press the up/down arrow key to select **RAID 0(Stripe)**, and then press <Enter>.

4. When the Disks item is highlighted, press <Enter> to select the hard disk drives to configure as RAID. The following screen appears.

```
    ═══════════════════════════[ SELECT DISKS ]═══════════════════════════

    Port Drive Model          Serial #          Size   Status
    0    XXXXXXXXXXXX         XXXXXXX           XX.XGB Non-RAID Disk
    1    XXXXXXXXXXXX         XXXXXXX           XX.XGB Non-RAID Disk
    2    XXXXXXXXXXXX         XXXXXXX           XX.XGB Non-RAID Disk
    3    XXXXXXXXXXXX         XXXXXXX           XX.XGB Non-RAID Disk


            Select 2 to 6 disks to use in creating the volume.
    ═══[↑↓]-Previous/Next  [SPACE]-SelectsDisk  [ENTER]-Done ═══
```
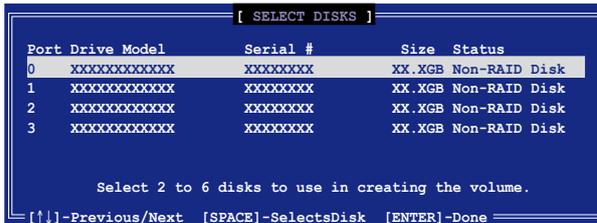
5. Use the up/down arrow key to highlight a drive, and then press <Space> to select. A small triangle marks the selected drive. Press <Enter> after completing your selection.

6.   Use the up/down arrow key to select the stripe size for the RAID 0 array, and then press <Enter>. The available stripe size values range from 4 KB to 128 KB. The default stripe size is 128 KB.

> 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.   Enter the RAID volume capacity that you want and press <Enter>. The default value indicates the maximum capacity allowed.

8.   Press <Enter> when the Create Volume item is highlighted. The following warning message appears.

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

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

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

Creating a RAID 1 set (mirrored)

To create a RAID 1 set:

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

```
        Intel(R) Matrix Storage Manager option ROM v8.0.0.1027 ICH10R wRAID5
            Copyright(C) 2003-08 Intel Corporation. All Rights Reserved.
    ═══════════════════════════[ CREATE VOLUME MENU ]═══════════════════════

                      Name:   Volume1
                RAID Level:   RAID1(Mirror)
                     Disks:   Select Disks
                Strip Size:   N/A
                  Capacity:   XXX    GB


                                 Create Volume


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



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




    ────────────────────────────────────────────────────────────────────────
        [↑↓]-Change     [TAB]-Next      [ESC]-Previous Menu     [Enter]-Select
```
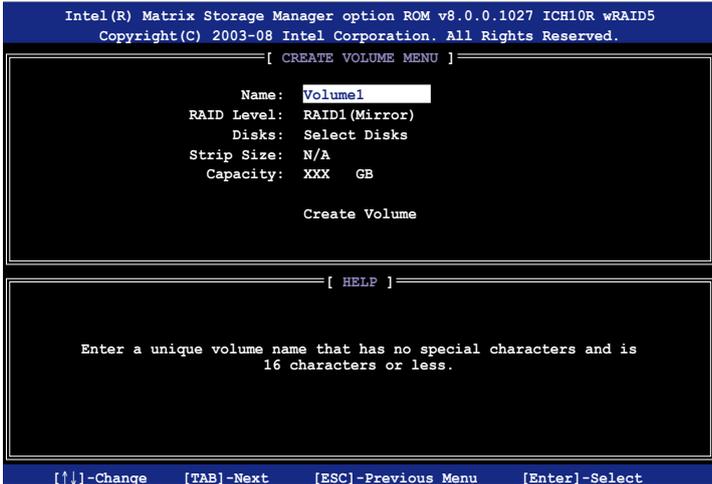
2.   Enter a name for the RAID 1 set and press <Enter>.

3.   When the RAID Level item is highlighted, press the up/down arrow key to
      select **RAID 1(Mirror)**, then press <Enter>.

4.   When the Capacity item is highlighted, enter the RAID volume capacity that
      you want, and then press <Enter>. The default value indicates the maximum
      capacity allowed.

5.   Press <Enter> when the Create Volume item is highlighted. The following
      warning message appears.

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

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

6.   Press <Y> to create the RAID volume and return to main menu or <N> to go
      back to Create Volume menu.

Creating a RAID 10 set (RAID 0+1)

To create a RAID 10 set:

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

```
        Intel(R) Matrix Storage Manager option ROM v8.0.0.1027 ICH10R wRAID5
            Copyright(C) 2003-08 Intel Corporation. All Rights Reserved.
    ═══════════════════════════[ CREATE VOLUME MENU ]═══════════════════════════

                        Name:  Volume10
                  RAID Level:  RAID10(RAID0+1)
                       Disks:  Select Disks
                  Strip Size:  64KB
                    Capacity:  XXX   GB

                               Create Volume


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



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




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

2. Enter a name for the RAID 10 set and press <Enter>.

3. When the RAID Level item is highlighted, press the up/down arrow key to
   select **RAID 10 (RAID 0+1)**, and then press <Enter>.

4. When the Stripe Size item is highlighted, press the up/down arrow key to
   select the stripe size for the RAID 10 array, and then press <Enter>. The
   available stripe size values range from 4 KB to 64 KB. The default stripe size
   is 64 KB.

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

5. Enter the RAID volume capacity that you want and press <Enter>. The default
   value indicates the maximum capacity allowed.

6.	Press <Enter> when the Create Volume item is highlighted. The following warning message appears.

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

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

7.	Press <Y> to create the RAID volume and return to the main menu or <N> to go back to the Create Volume menu.

Creating a RAID 5 set (parity)

To create a RAID 5 set:

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

```
        Intel(R) Matrix Storage Manager option ROM v8.0.0.1027 ICH10R wRAID5
           Copyright(C) 2003-08 Intel Corporation. All Rights Reserved.
========================[ CREATE VOLUME MENU ]========================

                   Name:    Volume5
             RAID Level:    RAID5(Parity)
                  Disks:    Select Disks
             Strip Size:    64KB
               Capacity:    XXX   GB

                           Create Volume


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



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




   [↑↓]-Change     [TAB]-Next     [ESC]-Previous Menu     [Enter]-Select
```
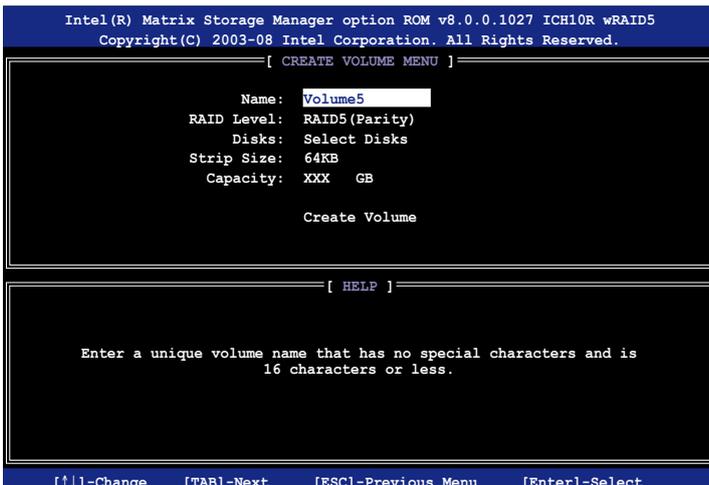
2.	Enter a name for the RAID 5 set and press <Enter>.
3.	When the RAID Level item is highlighted, press the up/down arrow key to select **RAID 5(Parity)**, and then press <Enter>.

4. The Disks item is highlighted, press <Enter> to select the hard disk drives to configure as RAID. The following screen appears.

```
┌──────────────────────[ SELECT DISKS ]──────────────────────┐
│                                                             │
│ Port Drive Model      Serial #        Size   Status         │
│ 0    XXXXXXXXXXXX     XXXXXXXX        XX.XGB Non-RAID Disk   │
│ 1    XXXXXXXXXXXX     XXXXXXXX        XX.XGB Non-RAID Disk   │
│ 2    XXXXXXXXXXXX     XXXXXXXX        XX.XGB Non-RAID Disk   │
│ 3    XXXXXXXXXXXX     XXXXXXXX        XX.XGB Non-RAID Disk   │
│                                                             │
│                                                             │
│        Select 3 to 6 disks to use in creating the volume.   │
│                                                             │
└─[↑↓]-Previous/Next   [SPACE]-SelectsDisk   [ENTER]-Done ────┘
```
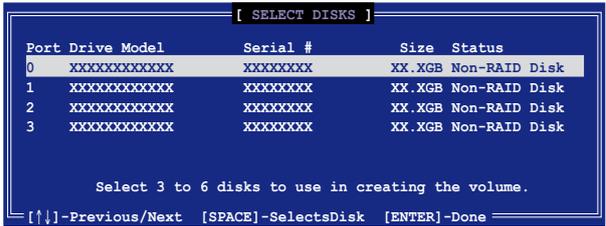
5. Use the up/down arrow key to highlight the drive you want to set, and then press <Space> to select. A small triangle marks the selected drive. Press <Enter> after completing your selection.

6. When the Stripe Size item is highlighted, press the up/down arrow key to select the stripe size for the RAID 5 array, and then press <Enter>. The available stripe size values range from 16 KB to 128 KB. The default stripe size is 64 KB.

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. Enter the RAID volume capacity that you want and then press <Enter>. The default value indicates the maximum allowed capacity.

8. Press <Enter> when the Create Volume item is highlighted. The following warning message appears.

```
┌─────────────────────────────────────────────────────────────┐
│                                                               │
│         WARNING: ALL DATA ON SELECTED DISKS WILL BE LOST.     │
│                                                               │
│     Are you sure you want to create this volume? (Y/N):       │
│                                                               │
└─────────────────────────────────────────────────────────────┘
```

9. Press <Y> to create the RAID volume and return to the main menu or <N> to go back to the Create Volume menu.

4.5 Creating a RAID driver disk

A floppy disk with the RAID driver is required when installing Windows® XP/Vista and later operating system on a hard disk drive that is included in a RAID set. For Windows Vista user, you can create a RAID driver disk with a floppy disk drive or a USB flash disk drive.

4.5.1 Creating a RAID driver disk without entering the OS

To create a RAID driver disk without entering the OS:

1. Boot your computer.
2. Press <Del> during POST to enter the BIOS setup utility.
3. Set the optical drive as the primary boot device.
4. Insert the support DVD into the optical drive.
5. Save changes and exit BIOS.
6. Press any key when the system prompts "Press any key to boot from the optical drive."
7. When the menu appears, press <1> to create a RAID driver disk.
8. Insert a formatted floppy disk into the floppy drive then press <Enter>.
9. Follow 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 or connect a USB flash disk if you are using Windows Vista OS.
5. Follow succeeding screen instructions to complete the process.

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

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> then insert the floppy disk with RAID driver into the floppy disk drive.
3.	When prompted to select the SCSI adapter to install, make sure 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/USB device with RAID driver into the floppy disk drive/ USB port.
2.	During the OS installation, select **Intel(R) SATA RAID Controller (Desktop ICH10R).**
3.	Follow the succeeding screen instructions to complete the installation.

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

Multiple GPU
technology support

5

Chapter summary

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 Dual CrossFireX mode, you should have two identical CrossFireX-ready graphics cards or one CrossFireX-ready dual-GPU graphics card that are ATI® certified.
- In Triple CrossFireX mode, you should have three identical CrossFireX-ready graphics cards 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 2-38 for details.

> - We recommend that you install additional chassis fans for better thermal environment.
> - The ATI Triple CrossFireX technology is supported by Windows® Vista™ operating system only.
> - 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 two CrossFireX graphics cards

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

1. Prepare two CrossFireX-ready graphics cards.

2. Insert the two graphics card into the PCIEX16 slots. If your motherboard has more than two PCIEX16 slots, refer to Chapter 2 in this user manual for the locations of the PCIEX16 slots recommended for multi-graphics card installation.

3. Ensure that the cards are properly seated on the slots.

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

CrossFireX bridge
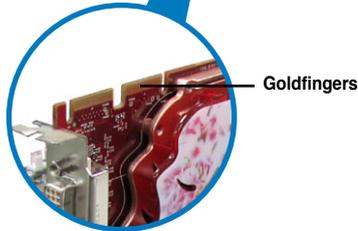
Goldfingers

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.
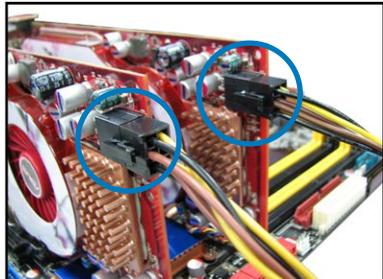
5.1.4   Installing three CrossFireX graphics cards

1.   Prepare three CrossFireX-ready graphics cards.

2.   Insert the three graphics card into the PCIEX16 slots. If your motherboard has more than three 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 two CrossFireX bridge connectors to the goldfingers on each graphics card. Ensure that the connectors are firmly in place.
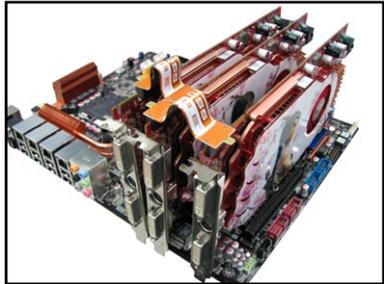
5.   Connect three independent auxiliary power sources from the power supply to the three graphics cards separately.

6.   Connect a VGA or a DVI cable to the graphics card.
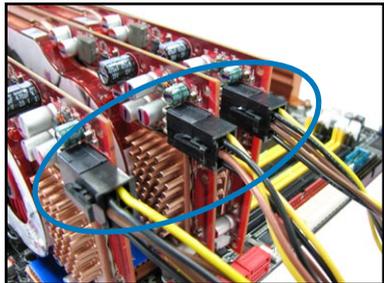
5.1.5 Installing the device drivers

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).

- If you are using a Triple CrossFireX system, ensure to install the ATI® Catalyst™ driver under Windows® Vista™. The ATI Triple CrossFireX technology is currently supported by Windows® Vista™ only.

5.1.6 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 **Cayalist Control Center**.
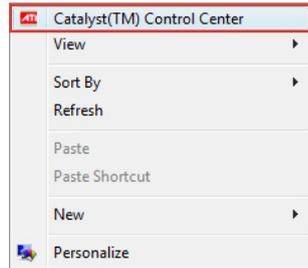
2. The **Catalyst Control Center Setup Assistant** appears when the system detects the existance of multi-graphics cards. Click **Go** to continue to the **Catalyst Control Center Advanced View** window.
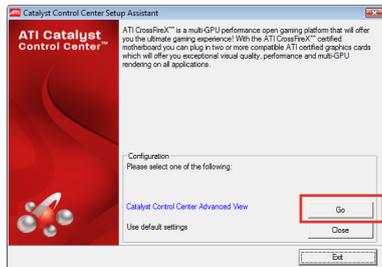
Enabling Dual CrossFireX settings

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.

Enabling Triple 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. From the list, select the appropriate GPU combination to apply the CrossFireX technology.

5. 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 2-38 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.
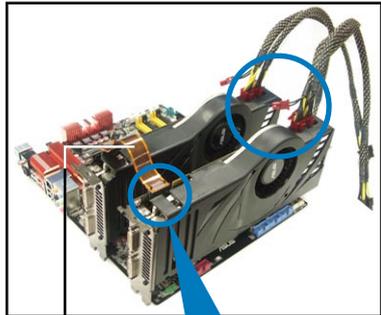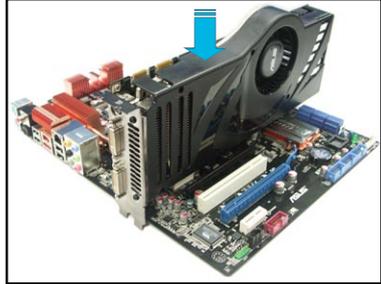
SLI bridge

Goldfingers
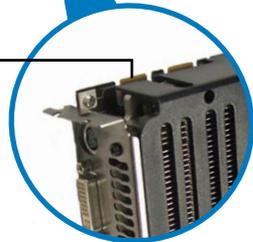
5.2.3   Installing three SLI-ready graphics cards

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.
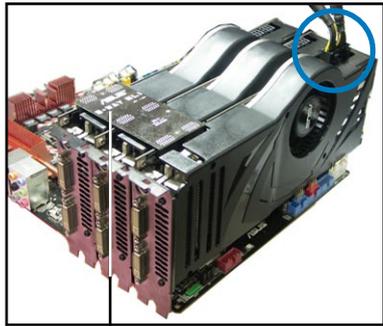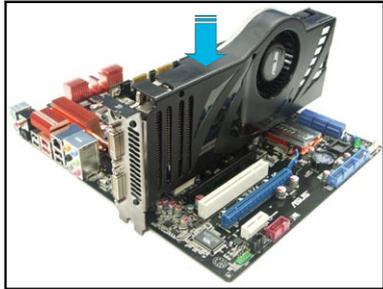
3-Way SLI bridge

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 5-13).

B1.   If you cannot see the NVIDIA Control Panel item in step (A), select **Personalize**.
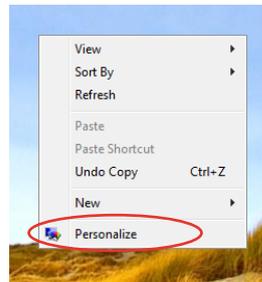
B2. From the **Personalization** window, select **Display Settings**.
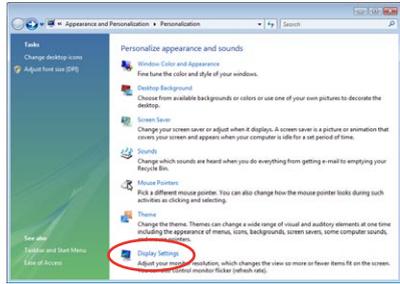
B3. From the Display Settings dialog box, click **Advanced Settings**.
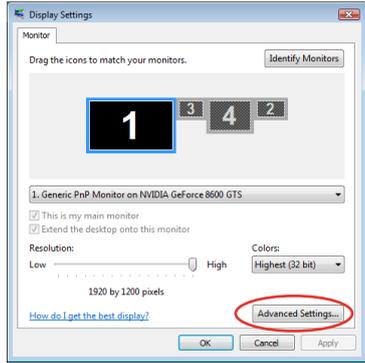
B4. Select the NVIDIA GeForce tab, and then click **Start the NVIDIA Control Panel**.
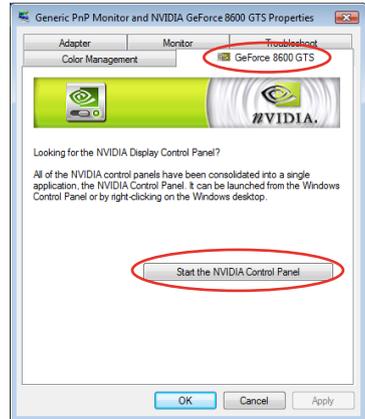
B5. The NVIDIA Control Panel window appears.
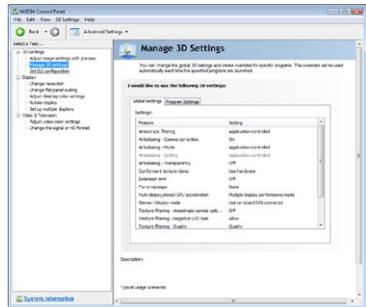
Enabling Dual SLI settings

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**.
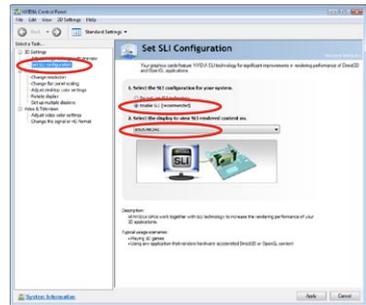
Enabling Triple SLI settings

1. From the NVIDIA Control Panel window, select **Set SLI Configuration**, and then click **Enable 3-way NVIDIA SLI**. When done, click **Apply**.
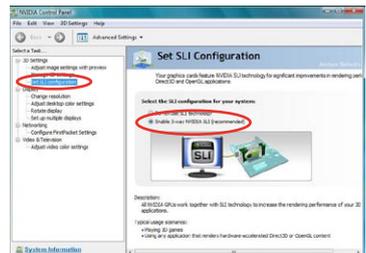
2. Select the **3D Settings** tab and enable the **Show SLI Visual Indicators** item.

    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.

The Appendix lists the debug code table
for the LCD Poster.

Debug code table

Chapter summary

A

Debug code table

Code	Description
CPU INIT	CPU Initiation
DET CPU	Test CMOS R/W functionality.
CHIPINIT	Early chipset initialization: -Disable shadow RAM -Disable L2 cache -Program basic chipset registers
DET DRAM	Detect memory -Auto-detection of DRAM size, type and ECC. -Auto-detection of L2 cache
DC FCODE	Expand compressed BIOS code to DRAM
EFSHADOW	Call chipset hook to copy BIOS back to E000 & F000 shadow RAM.
INIT IO	Initialize IO devices.
INIT HWM	Initialize Hardware Monitor.
CLR SCRN	1. Blank out screen 2. Clear CMOS error flag
INIT8042	1. Clear 8042 interface 2. Initialize 8042 self-test
ENABLEKB	1. Test special keyboard controller for Super I/O chips. 2. Enable keyboard interface.
DIS MS	1. Disable PS/2 mouse interface (optional). 2. Auto detect ports for keyboard & mouse followed by a port & interface swap (optional). 3. Reset keyboard for Super I/O chips.
R/W FSEG	Test F000h segment shadow to see whether it is R/W-able or not. If test fails, keep beeping the speaker.
DET FLASH	Auto detect flash type to load appropriate flash R/W codes into the run time area in F000 for ESCD & DMI support.
TESTCMOS	Use walking 1's algorithm to check out interface in CMOS circuitry. Also set real-time clock power status, and then check for override.
PRG CHIP	Program chipset default values into chipset.
INIT CLK	Initialize clock generator.
CHECKCPU	Detect CPU information including brand, type and CPU level (586 or 686).
INTRINIT	Initial interrupts vector table.
INITINT9	Initialize INT 09 buffer
CPUSPEED	1. Program CPU internal MTRR (Pentium class CPU) for 0-640K memory address. 2. Initialize the APIC for Pentium class CPU. 3. Program early chipset according to CMOS setup. Example: onboard IDE controller. 4. Measure CPU speed. 5. Invoke video BIOS.
VGA BIOS	Initialize VGA BIOS
TESTVRAM	1. Initialize multi-language 2. Put information on screen display, including BIOS logo, CPU type, CPU speed .
RESET KB	Reset keyboard.

Debug code table

Code	Description
8254TEST	Test 8254
8259MSK1	Test 8259 interrupt mask bits for channel 1.
8259MSK2	Test 8259 interrupt mask bits for channel 2.
8259TEST	Test 8259 functionality.
COUNTMEM	Calculate total memory by testing the last double word of each 64K page.
MP INIT	1. Program MTRR of M1 CPU 2. Initialize L2 cache for P6 class CPU & program CPU with proper cacheable range. 3. Initialize the APIC for P6 class CPU. 4. On MP platform, adjust the cacheable range to smaller one in case the cacheable ranges between each CPU are not identical.
USB INIT	Initialize USB
TEST MEM	Test all memory (clear all extended memory to 0)
SHOW MP	Display number of processors (multi-processor platform)
PNP LOGO	Display PnP logo
ONBD IO	Initialize Onboard IO devices.
EN SETUP	Okay to enter Setup utility.
MSINSTAL	Initialize PS/2 Mouse
CHK ACPI	Prepare memory size information for function call: INT 15h ax=E820h
EN CACHE	Turn on L2 cache
SET CHIP	Program chipset registers according to items described in Setup & Auto-configuration table.
AUTO CFG	Assign resources to devices.
INIT FDC	1. Initialize floppy controller 2. Set up floppy related fields in 40:hardware.
DET IDE	Detect & install all IDE devices: HDD, LS120, ZIP, CDROM.
COM/LPT	Detect serial ports & parallel ports.
DET FPU	Detect & install co-processor
CPU CHG	New CPU installed
EZ FLASH	Execute EZ Flash
CPR FAIL	CPR error
FAN FAIL	Fan error
UCODEERR	UCODE error
FLOPYERR	Floppy error
KB ERROR	Keyboard error
HD ERR	HDD error
CMOS ERR	CMOS error
MS ERROR	Mouse error
SMARTERR	HDD smart function error
HM ERROR	Hard monitor error
AINETERR	AI NET error
CASEOPEN	Case open

Debug code table

Code	Description
PASSWORD	Clear EPA or customization logo. 1. Call chipset power management hook. 2. Recover the text fond used by EPA logo (not for full screen logo) 3. If password is set, ask for password.
USB FINAL	Initialize PnP boot devices 1. USB final Initialization 2. NET PC: Build SYSID structure 3. Switch screen back to text mode 4. Set up ACPI table at top of memory. 5. Invoke ISA adapter ROMs 6. Assign IRQs to PCI devices 7. Initialize APM 8. Clear noise of IRQs.
INIT ROM	Initialize device option ROMs.
NUM LOCK	1. Program daylight saving 2. Update keyboard LED & typematic rate
UPDT DMI	1. Build MP table 2. Build & update ESCD 3. Set CMOS century to 20h or 19h 4. Load CMOS time into DOS timer tick 5. Build MSIRQ routing table.
INT 19H	Boot attempt (INT 19h)