M4A78-E

Motherboard

E4437

First Edition
January 2009

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Notices

Federal Communications Commission Statement

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

- This device may not cause harmful interference, and
- This device must accept any interference received including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with manufacturer's instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

The use of shielded cables for connection of the monitor to the graphics card is required to assure compliance with FCC regulations. Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

Canadian Department of Communications Statement

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

This class B digital apparatus complies with Canadian ICES-003.

Safety information

Electrical safety

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

Operation safety

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

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

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

About this guide

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

How this guide is organized

This guide contains the following parts:

- **Chapter 1: Product introduction**

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

- **Chapter 2: Hardware information**

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

- **Chapter 3: BIOS setup**

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

- **Chapter 4: Software support**

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

- **Chapter 5: ATI® CrossFireX™ support**

  This chapter describes the ATI® CrossFireX™ feature and shows the graphics card installation procedures.

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.
*Italic*s	Used to emphasize a word or a phrase.
<Key>	Keys enclosed in the less-than and greater-than sign means that you must press the enclosed key. Example: <Enter> means that you must press the Enter or Return key.
<Key1> + <Key2> + <Key3>	If you must press two or more keys simultaneously, the key names are linked with a plus sign (+). Example: <Ctrl> + <Alt> + <Del>
Command	Means that you must type the command exactly as shown, then supply the required item or value enclosed in brackets. Example: At the DOS prompt, type the command line: `afudos /iM4A78E.ROM`

M4A78-E specifications summary

CPU	Phenom™ X4 / Phenom™ X3 / Athlon™ X2 / Athlon™ / Sempron™ processors (socket AM2+/AM2) Compatible with Phenom™ II / Athlon™ X4 / Athlon™ X3 / Athlon™ X2 (AM3 CPU) Supports 45nm CPU AMD® Cool 'n' Quiet™ Technology
Chipset	AMD® 790GX / SB750
System bus	Up to 5200 MT/s; HyperTransport™ 3.0 interface for AM3 / AM2+ CPU 2000 / 1600 MT/s for AM2 CPU
Memory	4 x DIMM, max. 16 GB, DDR2 1066* / 800 / 667 MHz, ECC / non-ECC, un-buffered memory Dual-channel memory architecture * Due to AMD® CPU limitation, DDR2 1066 MHz is supported by AM2+ / AM3 CPU for one DIMM per channel only. Refer to www.asus.com for the memory QVL (Qualified Vendors Lists). ** Due to OS limitation, when installing total memory of 4 GB capacity or more, Windows® 32-bit operation system may only recognize less than 3 GB. Hence, a total installed memory of less than 3 GB is recommended.
VGA	Integrated ATI Radeon™ HD 3300 GPU - SidePort Memory—onboard 64MB DDR2 800 memory - Supports HDMI™ Technology with max. resolution up to 1920 x 1200 (1080P) - Supports Dual-link DVI with max. resolution up to 2560 x 1600 @ 60Hz - Supports D-Sub with max. resolution up to 2560 x 1440 @ 75Hz - Hybrid CrossFireX™ support - Dual independent displays support with HDMI/DVI and D-Sub - Supports Microsoft® DirectX 10, OpenGL 2.0, Shader Model 4.0 - Hardware Decode Acceleration for H.264, VC-1, and MPEG-2 - Maximum shared memory of 512MB
Expansion slots	2 x PCIe 2.0 x16 slots (Single x16 with VGA Switch Card or Dual x8)*, support ATI® CrossFireX™ technology 2 X PCIe x1 slots 2 x PCI 2.2 slots
Storage	1 x Ultra DMA 133 / 100 / 66 for up to 2 PATA devices 5 x SATA 3.0 Gb/s ports with RAID 0, 1, 5 and 10 1 x eSATA 3.0 Gb/s port
LAN	Atheros® L1E Gigabit LAN controller featuring AI NET 2
Audio	VIA® VT1708S 8-channel High Definition Audio CODEC - Supports Jack-Detection, Multi-Streaming, and Front Panel Jack-Retasking - Optical S/PDIF Out ports at back I/O - ASUS Noise Filtering
IEEE 1394	VIA® VT6315N controller supports 2 x IEEE 1394a ports (one at midboard; one at back panel)

(continued on the next page)

M4A78-E specifications summary

USB	12 x USB 2.0/1.1 ports (6 ports at midboard; 6 ports at back panel)
ASUS unique features	**ASUS Power Solutions:** - 8+1 Phase Power Design - ASUS Anti-Surge Protection **ASUS Green Design:** - ASUS EPU * ASUS EPU is supported by AM2+/AM3 CPU only. - ASUS AI Nap **Express Gate** **ASUS Quiet Thermal Solutions:** - ASUS Fanless Design: Feather Heatsink solution - ASUS Q-Fan 2 **ASUS EZ DIY** - ASUS Q-Connector - ASUS O.C. Profile - ASUS CrashFree BIOS 3 - ASUS EZ Flash 2
Special features	100% All High-quality conductive polymer capacitors! (5000hrs VRM, over 57 years operation lifespan at 65ºC) ASUS MyLogo 2™ AMD® OverDrive (AOD) support* * Advanced cooling system is required when advanced overclocking functions of AMD® OverDrive are enabled.
ASUS exclusive overclocking features	**Intelligent overclocking tools:** - AI Overclocking (intelligent CPU frequency tuner) - TurboV - Turbo Key **SFS (Stepless Frequency Selection):** - FSB tuning from 200 MHz up to 600 MHz at 1 MHz increment - PCIe frequency tuning from 100 MHz to 150 MHz at 1 MHz increment **Overclocking protection:** - ASUS C.P.R. (CPU Parameter Recall)
Back panel I/O ports	1 x PS/2 keyboard port (purple) 1 x S/PDIF Out port (optical) 1 x HDMI port 1 x DVI port 1 x D-Sub port 1 x External SATA port 1 x IEEE 1394a port 1 x LAN (RJ-45) port 6 x USB 2.0/1.1 ports 8-channel Audio I/O ports

(continued on the next page)

M4A78-E 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 1 x COM connector 5 x SATA connectors 1 x CPU Fan connector 2 x Chassis Fan connectors 1 x Power Fan connector 1 x IEEE1394a connector Front panel audio connector 1 x S/PDIF Out header Chassis Intrusion connector CD audio in 24-pin ATX Power connector System Panel (Q-Connector) 4-pin ATX 12V Power connector
BIOS features	8 Mb Flash ROM, AMI BIOS, PnP, DMI 2.0, WfM 2.0, SM BIOS 2.3, ACPI 2.0a
Manageability	WOL by PME, WOR by PME, WOR by Ring, PXE, Chassis Intrusion
Support DVD contents	Drivers Express Gate ASUS PC Probe II ASUS Update ASUS AI Suite AMD OverDrive (AOD) utility Anti-virus software (OEM version)
Form factor	ATX form factor: 12 in x 9.6 in (30.5 cm x 24.5 cm)

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

1.1 Welcome!

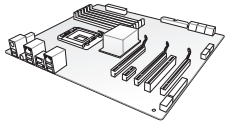
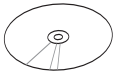
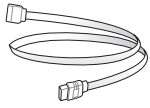
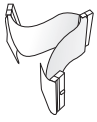
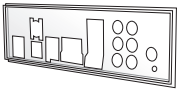
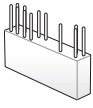
Thank you for buying an ASUS® M4A78-E motherboard!

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

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

1.2 Package contents

Check your motherboard package for the following items.

		
ASUS M4A78-E motherboard	**User guide**	**Support DVD**
		
4 x Serial ATA signal cables	**1 x VGA switch card**	**1 x Ultra DMA 133/ 100/66 cable**
		
1 x Back I/O shield	**1 x ASUS Q-Connector kit**	

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

1.3 Special features

1.3.1 Product highlights

AMD® Phenom™ X4 / Phenom™ X3 / Athlon™ X2 / Athlon™ / Sempron™ processors (socket AM2+/AM2)

This motherboard supports AMD® Socket AM2+ multi-core processors. It features dual-channel DDR2 1066 memory support, data transfer rate up to 5200MT/s via HyperTransport™ 3.0 based system bus, and AMD® Cool 'n' Quiet™ Technology.

AMD® Phenom™ II / Athlon™ X4 / Athlon™ X3 / Athlon™ X2 (AM3 CPU)

This motherboard supports AMD® AM3 multi-core processors with unique L3 cache and delivers better overclocking capabilities with less power consumption. It features dual-channel DDR2 1066 memory support and accelerates data transfer rate up to 5200MT/s via HyperTransport™ 3.0 based system bus. This motherboard also supports AMD® CPUs in the new 45nm manufacturing process.

AMD® 790GX + SB750 Chipset

AMD® 790GX+SB750 Chipset is designed to support up to 5200MT/s HyperTransport™ 3.0 (HT3.0) interface speed and PCI Express™ 2.0 x 16 graphics. It is optimized with AMD's latest AM3 and multi-core CPUs to provide excellent system performance and overclocking capabilities.

ATI Hybrid CrossFireX™ Technology

Boosted Performance with onboard GPU and discrete graphics card

ATI Hybrid CrossFireX™ technology is a unique hybrid multi-GPU technology. It takes your gaming experience to the next level boosting PC performance by enabling the chipset's integrated graphics processor and a discrete GPU to operate simultaneously with combined output for blisteringly-fast frame rates unleashing the graphics performance

Visit www.amd.com for the Hybrid CrossFireX selected GPUs.

Dual channel DDR2 1066 support

This motherboard supports DDR2 1066, which provides faster data transfer rate and more bandwidth to increase memory data transfer rate and computing efficiency. This enhances system performance in 3D graphics and other memory demanding applications.

Due to AM2+ / AM3 CPU limitation, only one DDR2 1066 is supported per channel. When four DDR2 1066 DIMMs are installed, all DIMMs run at 800MHz frequency by default for system stability.

ATI® CrossFireX™ Technology

ATI's CrossFireX™ boosts image quality along with rendering speed, eliminating the need to scale down screen resolution to get high quality images. CrossFireX™ allows higher antialiasing, anisotropic filtering, shading, and texture settings. Adjust your display configurations, experiment with the advanced 3D settings, and check the effects with a real-time 3D-rendered previews within ATI Catalyst™ Control Center.

HDMI support

Enjoy Full HD 1080p Multimedia Home-Theater Entertainment

High-Definition Multimedia Interface (HDMI) is a set of digital video standards that delivers multi-channel audio and uncompressed digital video for full HD 1080p visuals through a single cable. Supporting HDCP copy protection such as HD DVD and Blu-ray Discs, HDMI provides you with the highest-quality home theater experience.

HDMI/DVI/RGB Support

Flexible Graphics Alternatives

This motherboard supports multiple digital and analog display output interfaces - HDMI, DVI, and D-Sub. With such diversity of display outputs, you are able to choose and upgrade display devices freely.

1.3.2 ASUS unique features

ASUS Power Solutions

ASUS power solutions intelligently and automatically provide balanced computing power and energy consumption.

8+1 Phase Power Design

To fully unleash the next-generation AM3 CPU's potential, the ASUS M4 Series motherboards have adopted a brand new 8-phase VRM power design. It delivers high power efficiency and supreme overclocking ability. Furthermore, high quality power components can effectively lower system temperature to ensure longer component lifespan. This series also features an extra 1 phase power dedicated to integrated memory/HT controller.

ASUS Anti-Surge Protection

This special design prevents expensive devices and the motherboard from damage caused by power surges from switching power supply (PSU).

ASUS Green Design

This motherboard and its packaging comply with the European Union's Restriction on the use of Hazardous Substances (RoHS) to safeguard consumers' health while minimizing the impact of the environment.

ASUS EPU

The ASUS EPU (Energy Processing Unit) provides total system power management by detecting current PC loadings and intelligently moderating power usage for critical PC components in real-time–helping save power and money!

ASUS EPU is supported by AM2+/AM3 CPU only.

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.

Express Gate

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

The actual boot time is subject to hardware configurations and product models.

ASUS Quiet Thermal Solutions

ASUS Quiet Thermal solutions make the system more stable and enhance the overclocking capability.

Fanless Design—Stylish Heatsink Design

The streamline-shaped heatsink features 0-dB thermal solution that offers users a noiseless PC environment. Not only the beautifully curved fins upgrade the visual enjoyment for motherboard users, but also the special Streamline Airflow Guiding design lowers the temperature of the north bridge chipset through high efficient heat-exchange. Combined with usability and aesthetics, the ASUS streamline-shaped heat-sink will give users an extremely silent and cooling experience with the elegant appearance!

Q-Fan 2

ASUS Q-Fan 2 technology intelligently adjusts both CPU fan and chassis fan speeds according to system loading to ensure quiet, cool and efficient operation.

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

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

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.

ASUS EZ Flash 2

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

1.3.3 ASUS intelligent performance and overclocking features

TurboV

Feel the adrenaline rush of real-time OC—now a reality with the ASUS TurboV. This easy OC tool allows you to overclock without exiting or rebooting the OS; and its user-friendly interface makes overclock with just a few clicks away. Moreover, the ASUS OC profiles in TurboV provides the best O.C. settings in different scenarios.

Turbo Key

ASUS Turbo Key allows the user to turn the PC power button into a physical overclocking button. After the easy setup, Turbo Key can boost performances without interrupting ongoing work or games—with just one touch!

C.P.R. (CPU Parameter Recall)

The C.P.R. feature of the motherboard BIOS allows automatic re-setting to the BIOS default settings in case the system hangs due to overclocking. When the system hangs due to overclocking, C.P.R. eliminates the need to open the system chassis and clear the RTC data. Simply shut down and reboot the system, and the BIOS automatically restores the CPU default setting for each parameter.

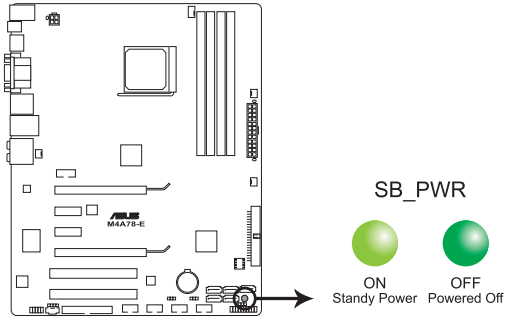
2.1 Before you proceed

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

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

Onboard LED

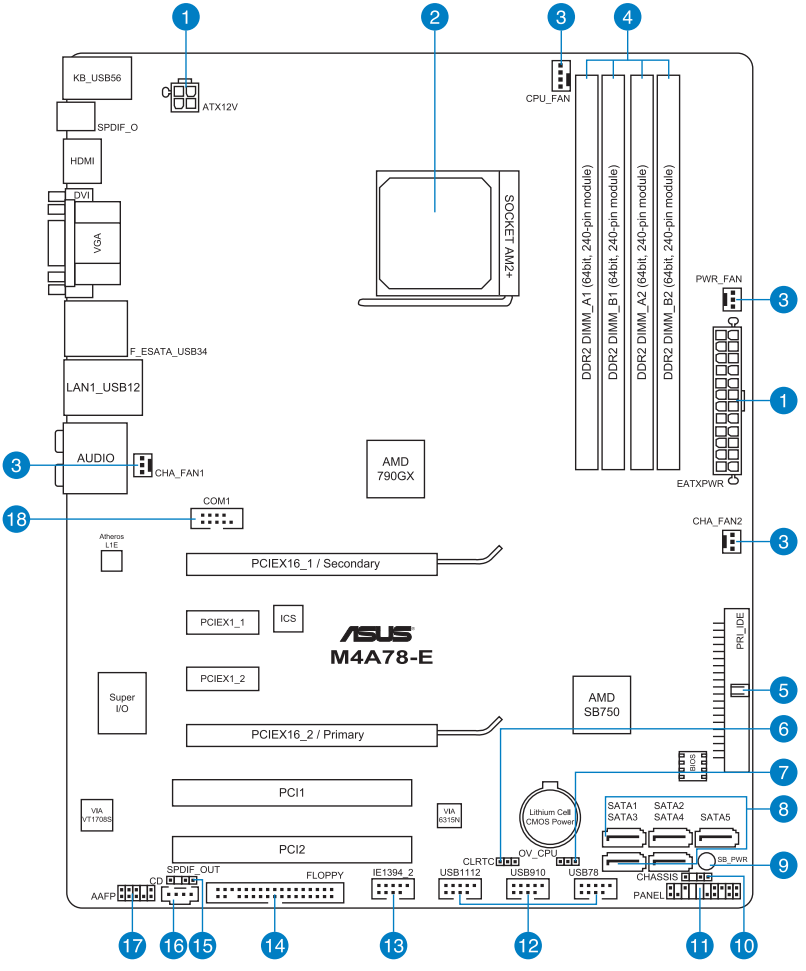
The motherboard comes with a standby power LED that lights up to indicate that the system is ON, in sleep mode, or in soft-off mode. This is a reminder that you should shut down the system and unplug the power cable before removing or plugging in any motherboard component. The illustration below shows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



M4A78-E Onboard LED

2.2 Motherboard overview

2.2.1 Motherboard layout



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

2.2.2 Layout contents

Connectors/Jumpers/Slots		Page
1.	ATX power connectors (24-pin EATXPWR, 4-pin EATX12V)	2-34
2.	AM2/AM2+ CPU socket	2-5
3.	CPU, chassis, and power fan connectors (4-pin CPU_FAN, 3-pin CHA_FAN1–2, 3-pin PWR_FAN)	2-32
4.	DDR2 DIMM slots	2-10
5.	IDE connector (40-1 pin PRI_IDE)	2-28
6.	Clear RTC RAM (3-pin CLRTC)	2-21
7.	CPU overvoltage setting (3-pin OV_CPU)	2-22
8.	AMD® SB750 Serial ATA connectors (7-pin SATA1–5)	2-29
9.	Standby Power LED	2-1
10.	Chassis intrusion connector (4-1 pin CHASSIS)	2-33
11.	System panel connector (20-8 pin PANEL)	2-36
12.	USB connectors (10-1 pin USB78, USB910, USB1112)	2-30
13.	IEEE 1394a port connector (10-1 pin IE1394_2)	2-31
14.	Floppy disk drive connector (34-1 pin FLOPPY)	2-27
15.	Digital audio connector (4-1 pin SPDIF_OUT)	2-27
16.	Optical drive audio connector (4-pin CD)	2-30
17.	Front panel audio connector (10-1 pin AAFP)	2-35
18.	Serial port connector (10-1 pin COM1)	2-31

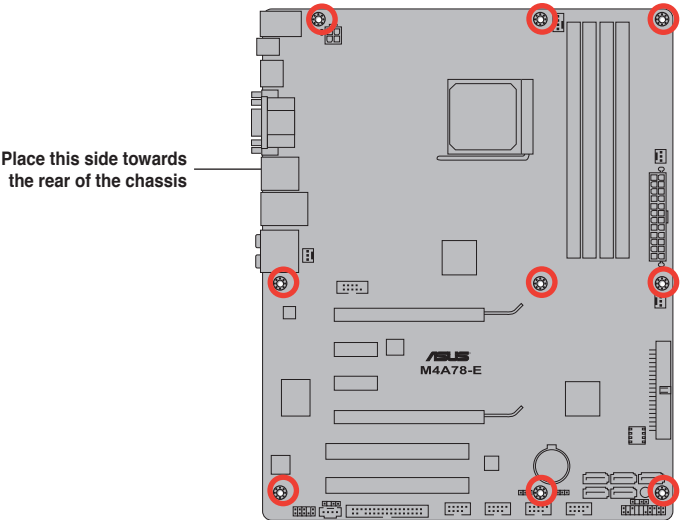
2.2.3 Placement direction

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

2.2.4 Screw holes

Place nine 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.



2.3 Central Processing Unit (CPU)

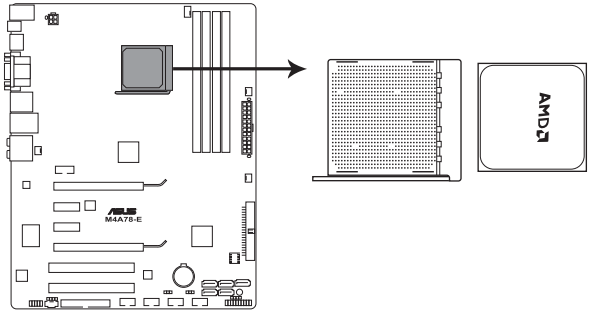
The motherboard comes with an AM2+/AM2 socket designed for Phenom™ X4 / Phenom™ X3 / Athlon™ X2 / Athlon™/ Sempron™ processors (socket AM2+/AM2). It is also compatible with AMD® Phenom™ II / Athlon™ X4 / Athlon™ X3 / Athlon™ X2 (AM3 CPU).

The CPU socket is not compatible with AMD® Opteron™ processors. Do not install an Opteron™ processor on this motherboard.

2.3.1 Installing the CPU

To install a CPU:

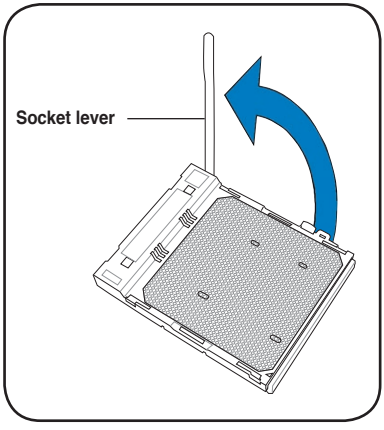
1. Locate the CPU socket on the motherboard.



M4A78-E CPU socket AM2+

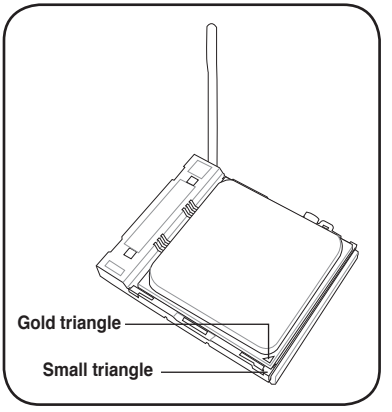
2. Unlock the socket by pressing the lever sideways, then lift it up to a 90º angle.

Ensure that the socket lever is lifted up to a 90º angle; otherwise, the CPU will not fit in completely.

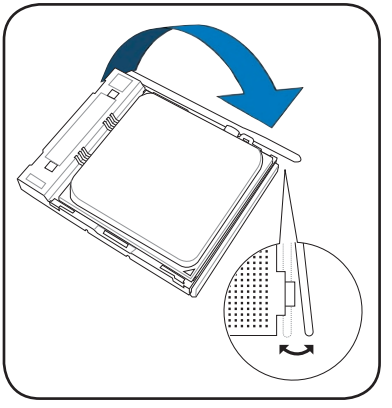


3. Position the CPU above the socket such that the CPU corner with the gold triangle matches the socket corner with a small triangle.

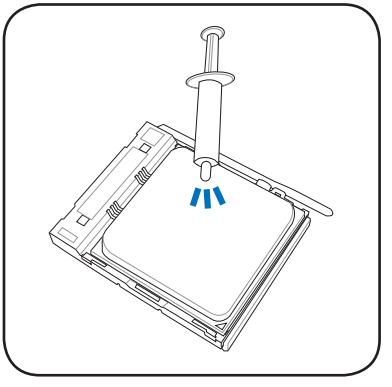
4. Carefully insert the CPU into the socket until it fits in place.



5. When the CPU is in place, push down the socket lever to secure the CPU. The lever clicks on the side tab to indicate that it is locked.



6. Apply some Thermal Interface Material 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 Interface Material is toxic and inedible. If it gets into your eyes or touches your skin, wash it off immediately, and seek professional medical help.

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

2.3.2 Installing the CPU heatsink and fan

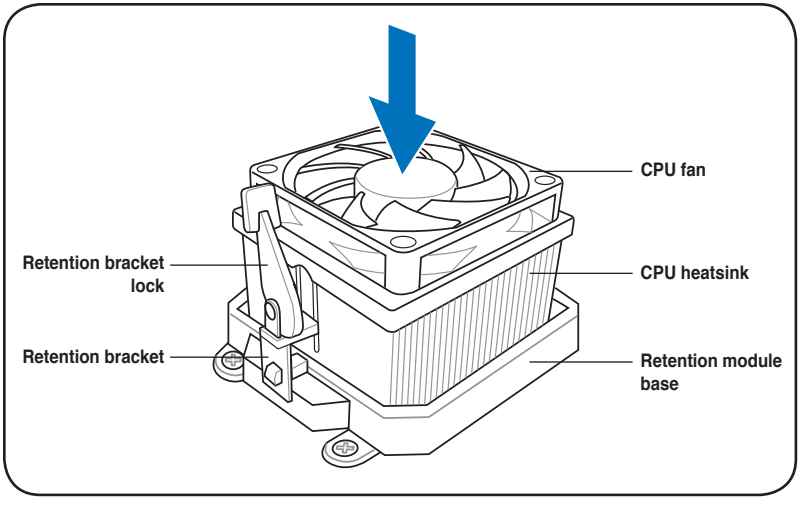
The AMD® AM3/AM2+/AM2 processor requires a specially designed heatsink and fan assembly to ensure optimum thermal condition and performance.

Ensure that you use only AMD-certified heatsink and fan assembly.

To install the CPU heatsink and fan:

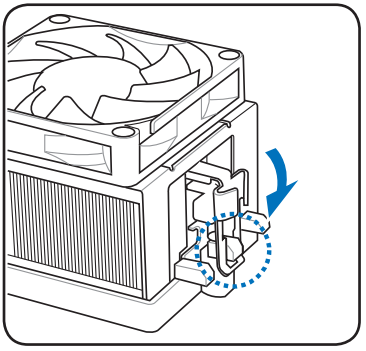
1. Place the heatsink on top of the installed CPU, ensuring that the heatsink fits properly on the retention module base.

- The retention module base is already installed on the motherboard upon purchase.
- You do not have to remove the retention module base when installing the CPU or installing other motherboard components.
- If you purchased a separate CPU heatsink and fan assembly, ensure that a Thermal Interface Material is properly applied to the CPU heatsink or CPU before you install the heatsink and fan assembly.

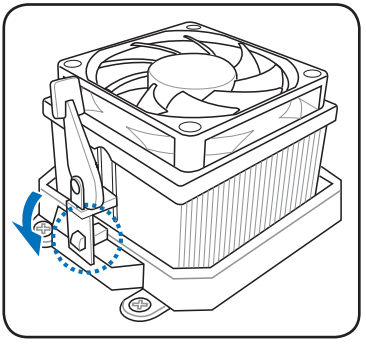


Your boxed CPU heatsink and fan assembly should come with installation instructions for the CPU, heatsink, and the retention mechanism. If the instructions in this section do not match the CPU documentation, follow the latter.

2. Attach one end of the retention bracket to the retention module base.

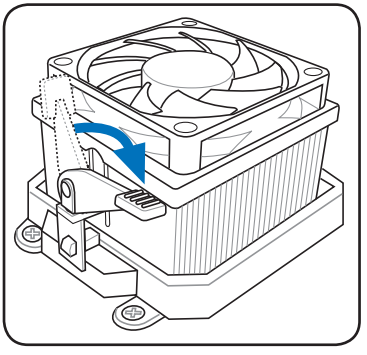


3. Align the other end of the retention bracket (near the retention bracket lock) to the retention module base. A clicking sound denotes that the retention bracket is in place.

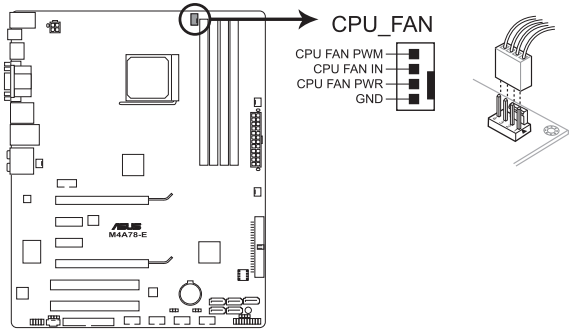


Ensure that the fan and heatsink assembly perfectly fits the retention mechanism module base, otherwise you cannot snap the retention bracket in place.

4. Push down the retention bracket lock on the retention mechanism to secure the heatsink and fan to the module base.



5. When the fan and heatsink assembly is in place, connect the CPU fan cable to the connector on the motherboard labeled CPU_FAN.



M4A78-E CPU fan connector

- Do not forget to connect the CPU fan connector! Hardware monitoring errors can occur if you fail to plug this connector.
- This connector is backward compatible with old 3-pin CPU fan.

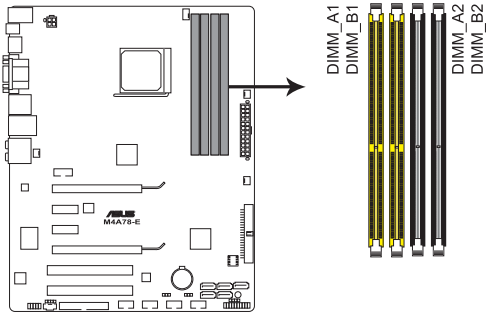
2.4 System memory

2.4.1 Overview

The motherboard comes with four Double Data Rate 2 (DDR2) Dual Inline Memory Modules (DIMM) sockets.

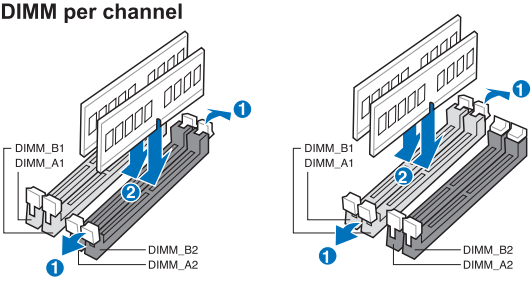
A DDR2 module has the same physical dimensions as a DDR DIMM but has a 240-pin footprint compared to the 184-pin DDR DIMM. DDR2 DIMMs are notched differently to prevent installation on a DDR DIMM socket.

The figure illustrates the location of the DDR2 DIMM sockets:

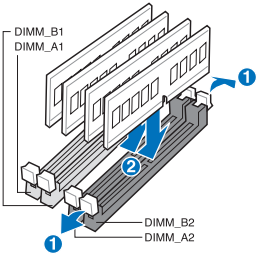


M4A78-E 240-pin DDR2 DIMM sockets

One DIMM per channel



Two DIMMs per channel



2.4.2 Memory configurations

You may install 512MB, 1GB, 2GB and 4GB unbuffered ECC and non-ECC DDR2 DIMMs into the DIMM sockets.

- You may install varying memory sizes in Channel A and Channel B. The system maps the total size of the lower-sized channel for the dual-channel configuration. Any excess memory from the higher-sized channel is then mapped for single-channel operation.
- Due to CPU limitation, DDR2 1066 MHz is supported by AM3/AM2+ CPU for one DIMM per channel only. For system stability, when four DIMMs are installed, all DIMMs run at DDR2 800 MHz as the default setting.
- We recommend that you install the memory modules from the yellow slots for better overclocking capability.
- Always install DIMMs with the same CAS latency. For optimum compatibility, it is recommended that you obtain memory modules from the same vendor.
- Due to the memory address limitation on 32-bit Windows OS, when you install 4GB or more memory on the motherboard, the actual usable memory for the OS can be about 3GB or less. For effective use of memory, we recommend that you do any of the following:
  - Use a maximum of 3GB system memory if you are using a 32-bit Windows OS.
  - Install a 64-bit Windows OS when you want to install 4GB or more on the motherboard.
- This motherboard does not support DIMMs made up of 256 megabit (Mb) chips or less.

- The default memory operation frequency is dependent on its Serial Presence Detect (SPD), which is the standard way of accessing information from a memory module. Under the default state, some memory modules for overclocking may operate at a lower frequency than the vendor-marked value. To operate at the vendor-marked or at a higher frequency, see section **3.6 Advanced menu** for manual memory frequency adjustment.
- For system stability, use a more efficient memory cooling system to support a full memory load (4 DIMMs) or overclocking condition.

M4A78-E Motherboard Qualified Vendors Lists (QVL)
DDR2-1066 MHz capability

Vendor	Part No.	Size	SS/ DS	Chip Brand	Chip NO.	Timing DIMM (BIOS)	Voltage	DIMM socket support (Optional)		
								A*	B*	C*
Apacer	BoxP/N:CH.02GAF.C0KK2 (78.0AG9S.9KF)	2GB (Kit of 2)	DS	N/A	Heat-Sink Package	5-5-5-15		•		•
Apacer	BoxP/N:CH.04GAF.F0KK2 (78.AAGAL.9KF)	4GB (Kit of 2)	DS	N/A	Heat-Sink Package	5-5-5-15		•	•	•
CORSAIR	BoxP/N:TWIN2X4096-8500C5DF (CM2X2048-8500C5D)(EPP)	4GB (Kit of 2)	DS	N/A	Heat-Sink Package	5-5-5-15	2.1		•	•
Crucial	BL12864AA106A.8FE5(EPP)	1GB	SS	N/A	Heat-Sink Package	5-5-5-15	2.0	•	•	•
Crucial	BL12864AA1065.16FD5(EPP)	1GB	DS	N/A	Heat-Sink Package	5		•	•	•
G.SKILL	F2-8500CL5S-1GBPK	1GB	DS	N/A	Heat-Sink Package	5-5-5-15	2.0-2.1	•	•	•
G.SKILL	F2-8500CL5D-2GBPK	2GB (Kit of 2)	DS	N/A	Heat-Sink Package	5-5-5-15	2.0-2.1	•	•	•
G.SKILL	F2-8500CL5D-4GBPK	4GB (Kit of 2)	DS	N/A	Heat-Sink Package	5-5-5-15	2.0-2.1			•
GEIL	GB22GB8500C5DC	2GB (Kit of 2)	SS	GEIL	GL2L128M88BA25AB	5-5-5-15	2.2-2.4	•	•	•
GEIL	GE22GB1066C5DC	2GB (Kit of 2)	SS	N/A	Heat-Sink Package	5-5-5-15	2.2-2.4	•	•	•
GEIL	GE24GB1066C5QC	4GB (Kit of 4)	SS	N/A	Heat-Sink Package	5-5-5-15	2.2-2.4	•	•	•
GEIL	GB24GB8500C5DC	4GB (Kit of 2)	DS	GEIL	GL2L128M88BA25AB	5-5-5-15	2.2-2.4	•	•	•
GEIL	GE24GB1066C5DC	4GB (Kit of 2)	DS	N/A	Heat-Sink Package	5-5-5-15	2.2-2.4			•
GEIL	GX24GB8500C5UDC	4GB (Kit of 2)	DS	N/A	Heat-Sink Package	5-5-5-15	2.2-2.4	•	•	•
GEIL	GB24GB8500C5QC	4GB (Kit of 4)	DS	GEIL	GL2L128M88BA25AB	5-5-5-15	2.2-2.4	•		•
Hynix	HYMP564U64FP8-G7	512MB	SS	HYNIX	HY5PS12821FFP-G7	7		•	•	•
Hynix	HYMP 512U64FP8-G7	1GB	DS	HYNIX	HY5PS12821FFP-G7	7-7-7-12		•	•	
KINGMAX	KLEE88F-B8KB5	2GB	DS	KINGMAX	KKB8FFBXF-CFP-18A					•
KINGSTON	KHX8500D2/ 512	512MB	SS		Heat-Sink Package			•		•
KINGSTON	KHX8500D2K2/1G	1GB (Kit of 2)	SS	N/A	Heat-Sink Package		2.2	•	•	•
KINGSTON	KHX8500D2K2/2G	2GB (Kit of 2)	DS	N/A	Heat-Sink Package		2.2	•		•
KINGSTON	KHX8500D2K2/2GN(EPP)	2GB (Kit of 2)	DS	N/A	Heat-Sink Package		2.2			•
MICRON	MT8HTF12864AY-1GAE1	1GB	SS	MICRON	D9JKH	7		•	•	•
MICRON	MT16HTF25664AY-1GAE1	2GB	DS	MICRON	D9JKH	7		•	•	•
OCZ	OCZ2N10662GK(EPP)	2GB (Kit of 2)	DS		Heat-Sink Package			•		•
OCZ	OCZ2N1066SR2GK(EPP)	2GB (Kit of 2)	DS	N/A	Heat-Sink Package	5	2.10	•	•	•
OCZ	OCZ2RPR10664GK	4GB (Kit of 2)	DS	N/A	Heat-Sink Package	5	2.2	•	•	•
SAMSUNG	M378T2953GZ3-CF8	1GB	DS	SAMSUNG	K4T51083QG	7		•		•
Transcend	TX1066QLU-2GK	2GB (Kit of 2)	SS	ELPIDA	Heat-Sink Package	5		•	•	•
Transcend	TX1066QLU-4GK	4GB (Kit of 2)	DS	N/A	Heat-Sink Package	5		•	•	•
Aeneon	BoxP/N:AXT760UD00-19D-K-2G (AXT760UD00-19D)	2GB (Kit of 2)	DS	N/A	Heat-Sink Package	5		•	•	
BUFFALO	FSX1066D2C-1G	1GB	DS	N/A	Heat-Sink Package	5-5-5-15 (800-5-5-5-15)		•		•
Kingbox	N/A	1GB	DS	MICRON	7YDI2		1.8	•	•	•
Mushkin	996535	2GB (Kit of 2)	DS	N/A	Heat-Sink Package	5-5-4-12		•		
Mushkin	996612	2GB (Kit of 2)	DS	N/A	Heat-Sink Package	5-5-5-15	2.1	•		
Mushkin	996619	4GB (Kit of 2)	DS	N/A	Heat-Sink Package	5-5-5-15	2.0-2.1	•	•	•
Team	BoxP/N:TXDD2048M1066HC5DC (TXDD1024M1066HC5)	2GB (Kit of 2)	DS	N/A	Heat-Sink Package	5-5-5-15	2.2-2.3	•	•	•
Team	BoxP/N:TXDD2048M1066HC5DC-D (TXDD1024M1066HC5-D)	2GB (Kit of 2)	DS	N/A	Heat-Sink Package	5-5-5-15	2.2-2.3	•		•
Team	BoxP/N:TXDD4096M1066HC5DC-D (TXDD2048M1066HC5-D)	4GB (Kit of 2)	DS	N/A	Heat-Sink Package	5-5-5-15	2.2-2.3			•

M4A78-E Motherboard Qualified Vendors Lists (QVL)
DDR2-800 MHz capability

Vendor	Part No.	Size	SS/ DS	Chip Brand	Chip NO.	Timing DIMM (BIOS)	Voltage	DIMM socket support (Optional)		
								A*	B*	C*
A-DATA	M2OAD6H3J4171Q1E52	2GB	DS	A-DATA	AD20908A8A-25EG			•	•	•
Apacer	78.91G9I.9K5	512MB	SS	APACER	AM4B5708JQJS8E	5		•	•	
Apacer	78.01GA0.9K5	1GB	SS	APACER	AM4B5808CQJS8E	5		•	•	•
Apacer	78.A1GA0.9K4	2GB	DS	APACER	AM4B5808CQJS8E	5		•	•	
CORSAIR	CM2X1024-6400C4	1GB	DS	N/A	Heat-Sink Package	4	1.9	•	•	
CORSAIR	BoxP/N:TWIN2X4096-6400C4DHX (CM2X2048-6400C4DHX)	4GB (Kit of 2)	DS	N/A	Heat-Sink Package	4-4-4-12	2.10	•	•	•
CORSAIR	BoxP/N:TWIN2X4096-6400C5 (CM2X2048-6400C5)	4GB (Kit of 2)	DS	N/A	Heat-Sink Package	5-5-5-18	1.80	•	•	•
CORSAIR	BoxP/N:TWIN2X4096-6400C5DHX (CM2X2048-6400C5DHX)	4GB (Kit of 2)	DS	N/A	Heat-Sink Package	5-5-5-18	1.80	•	•	•
Crucial	BL12864AA80A.8FE5(EPP)	1GB	SS	N/A	Heat-Sink Package	4-4-4-12	2.0	•	•	•
Crucial	BL12864AA804.16FD3	1GB	DS	N/A	Heat-Sink Package	4	2.2	•	•	
Crucial	BL12864AA804.16FD	1GB	DS	N/A	Heat-Sink Package	4	2.2	•	•	•
Crucial	BL12864AL804.16FD3	1GB	DS	N/A	Heat-Sink Package	4	2.2	•	•	•
Crucial	BL25664AA80A.16FE5(EPP)	2GB	DS	N/A	Heat-Sink Package	4-4-4-12	2.0	•	•	•
G.SKILL	F2-6400CL5D-1GBNQ	1GB (Kit of 2)	SS	N/A	Heat-Sink Package	5-5-5-15	1.8-2.0	•	•	•
G.SKILL	F2-6400CL4D-2GBPK	1GB	DS		Heat-Sink Package	4		•	•	•
G.SKILL	F2-6400CL5D-2GBNQ	1GB	DS		Heat-Sink Package	5		•	•	
G.SKILL	F2-6400PHU2-2GBNR	1GB	DS		Heat-Sink Package	5		•	•	•
G.SKILL	F2-6400CL4D-4GBPK	4GB (Kit of 2)	DS	N/A	Heat-Sink Package	4	2.0-2.1	•	•	•
G.SKILL	F2-6400CL5D-4GBPQ	4GB (Kit of 2)	DS	N/A	Heat-Sink Package	5	1.8-1.9	•	•	
G.SKILL	F2-6400CL6D-4GBMQ	4GB (Kit of 2)	DS	N/A	Heat-Sink Package	6	1.8-1.9	•	•	•
G.SKILL	F2-6400CL6D-8GBMQ	8GB (Kit of 2)	DS	N/A	Heat-Sink Package	6-6-6-18	1.8	•	•	•
GEIL	GB22GB6400C4DC	2GB (Kit of 2)	DS	GEIL	GL2L64M088BA30EB	4-4-4-12	2.0	•	•	•
GEIL	GB22GB6400C5DC	2GB (Kit of 2)	DS	GEIL	GL2L64M088BA30EB	5-5-5-15	1.8	•		
GEIL	GE22GB800C4DC	2GB (Kit of 2)	DS	N/A	Heat-Sink Package	4-4-4-12	2.0	•	•	•
GEIL	GE22GB800C5DC	2GB (Kit of 2)	DS	N/A	Heat-Sink Package	5-5-5-15	1.8	•	•	•
GEIL	GX22GB6400DC	2GB (Kit of 2)	DS	N/A	Heat-Sink Package	5-5-5-15	1.8	•		
GEIL	GX22GB6400UDC	2GB (Kit of 2)	DS	N/A	Heat-Sink Package	4-4-4-12	2.1	•	•	
GEIL	GX22GB6400C4USC	2GB	DS	N/A	Heat-Sink Package			•	•	•
GEIL	GX22GB6400LX	2GB	DS	N/A	Heat-Sink Package	5-5-5-15		•	•	•
GEIL	GB24GB6400C4DC	4GB (Kit of 2)	DS	GEIL	GL2L128M88BA25AB	4-4-4-12	2.0	•	•	•
GEIL	GB24GB6400C5DC	4GB (Kit of 2)	DS	GEIL	GL2L128M88BA25AB	5-5-5-15	1.8	•	•	•
GEIL	GB24GB6400C5QC	4GB (Kit of 2)	DS	GEIL	GL2L64M088BA30EB	5-5-5-15	1.8	•	•	
GEIL	GE24GB800C4DC	4GB (Kit of 2)	DS	N/A	Heat-Sink Package	4-4-4-12	2.0	•	•	•
GEIL	GE24GB800C5DC	4GB (Kit of 2)	DS	N/A	Heat-Sink Package	5-5-5-15	1.8	•	•	
GEIL	GX24GB6400DC	4GB (Kit of 2)	DS	N/A	Heat-Sink Package	5-5-5-15	1.8	•	•	•
GEIL	GE24GB800C4QC	4GB (Kit of 4)	DS	N/A	Heat-Sink Package	4-4-4-12	2.0	•	•	
GEIL	GE24GB800C5QC	4GB (Kit of 4)	DS	N/A	Heat-Sink Package	5-5-5-15	1.8	•		•
GEIL	GB28GB6400C4QC	8GB (Kit of 4)	DS	GEIL	GL2L128M88BA25AB	4-4-4-12	2.0	•	•	•
GEIL	GB28GB6400C5QC	8GB (Kit of 4)	DS	GEIL	GL2L128M88BA25AB	5-5-5-15	1.8	•	•	•
GEIL	GE28GB800C4QC	8GB (Kit of 4)	DS	N/A	Heat-Sink Package	4-4-4-12	2.0	•	•	•

M4A78-E Motherboard Qualified Vendors Lists (QVL) DDR2-800 MHz capability (continued)

Vendor	Part No.	Size	SS/ DS	Chip Brand	Chip NO.	Timing DIMM (BIOS)	Voltage	DIMM socket support (Optional)		
								A*	B*	C*
GEIL	GE28GB800C5QC	8GB (Kit of 4)	DS	N/A	Heat-Sink Package	5-5-5-15	1.8	•	•	•
Hynix	HYMP564U64CP8-S5	512MB	SS	HYNIX	HY5PS12821CFP-S5	5	1.8	•	•	•
Hynix	HYMP112U64CP8-S6	1GB	SS	HYNIX	HY5PS1G831CFP-S6	6		•	•	•
Hynix	HYMP 512U64CP8-S5	1GB	DS		HY5PS12821CFP-S5	5		•		
KINGMAX	KLDC28F-A8KI5	512MB	SS	KINGMAX	KKA8FEIBF-HJK-25A			•	•	•
KINGMAX	KLDD48F-A8KI5	1GB	DS	KINGMAX	KKA8FEIBF-HJK-25A			•	•	
KINGMAX	KLDE88F-B8KB5	2GB	DS	KINGMAX	KKB8FFBXF-CFA-25A			•	•	•
KINGSTON	KVR800D2N5/ 512	512MB	SS	ELPIDA	E5108AJBG-8E-E		1.8	•	•	•
KINGSTON	KVR800D2N6/ 512	512MB	SS	ELPIDA	E5108AJBG-8E-E		1.8	•	•	•
KINGSTON	KHX6400D2LLK2/1GN(EPP)	1GB (Kit of 2)	SS	N/A	Heat-Sink Package	4	2.0	•	•	•
KINGSTON	KHX6400D2LL/1G	1GB	DS	N/A	Heat-Sink Package	4	2.0	•		
KINGSTON	KVR800D2N5/1G	1GB	DS		V59C1 512804QBF25		1.8	•	•	•
KINGSTON	KVR800D2N6/1G	1GB	DS	ELPIDA	E5108AJBG-8E-E		1.8	•	•	
KINGSTON	KHX6400D2ULK2/2G	2GB (Kit of 2)	DS	N/A	Heat-Sink Package		2.3-2.35	•		
KINGSTON	KHX6400D2/2G	2GB	DS	N/A	Heat-Sink Package		2.0	•	•	•
KINGSTON	KVR800D2N5/2G	2GB	DS	ELPIDA	E1108ACBG-8E-E		1.8	•	•	•
KINGSTON	KVR800D2N6/4G	4GB	DS	ELPIDA	E2108ABSE-8G-E			•	•	•
NANYA	NT 512T64U88B0BY-25C	512MB	SS		NT5TU64M8BE-25C	5		•	•	•
NANYA	NT1GT64U8HB0BY-25C	1GB	DS		NT5TU64M8BE-25C	5		•	•	•
NANYA	NT1GT64U8HC0BY-25D	1GB	DS	NANYA	NT5TU64M8CE-25D			•	•	•
NANYA	NT2GT64U8HC0BY-AC	2GB	DS	NANYA	NT5TU128M8CE-AC	5		•	•	•
OCZ	OCZ2G8001G	1GB	DS	N/A	Heat-Sink Package	5	1.8	•	•	
OCZ	OCZ2T8002GK(EPP)	1GB	DS	N/A	Heat-Sink Package	5	1.8	•	•	•
OCZ	OCZ2P800R22GK	2GB (Kit of 2)	DS	N/A	Heat-Sink Package	4	1.8	•		
OCZ	OCZ2P8004GK	4GB (Kit of 2)	DS	N/A	Heat-Sink Package	5-4-4	1.8	•	•	•
OCZ	OCZ2G8008GK	8GB (Kit of 2)	DS	N/A	Heat-Sink Package	5	1.80	•	•	•
PSC	AL8E8F73C-8E1	2GB	DS	PSC	A3R1GE3CFF734MAA0E	5		•	•	•
Qimonda	HYS64T256020EU-25F-C2	2GB	DS	Qimonda	HYB18T1G800C2F-25F	5		•	•	•
Qimonda	HYS64T 512020EU-2.5-A	4GB	DS	Qimonda	HYB18T2G800AF-2.5	6		•	•	•
Qimonda	HYS64T 512020EU-25F-A	4GB	DS	Qimonda	HYB18T2G800AF-25F	5		•	•	•
SAMSUNG	M378T5663QZ3-CF7	2GB	DS	SAMSUNG	K4T1G084QQ(ECC)	6		•	•	•
SAMSUNG	M391T5663QZ3-CF7	2GB	DS	SAMSUNG	K4T1G084QQ	6		•	•	•
SAMSUNG	M378T5263AZ3-CF7	4GB	DS	SAMSUNG	K4T2G084QA-HCF7	6		•	•	•
Transcend	TS256MLQ64V8P	2GB	DS	ELPIDA	E1108ACBG-BE-E	6-6-6 (800-5-5-5-15)			•	•
Transcend	TS256MLQ72V8U	2GB	DS	ELPIDA	E1108ACBG-8E-E(ECC)	5		•	•	•
Aeneon	AET860UD00-25DC08X	2GB	DS	AENEON	AET03R25DC	5			•	•
Asint	SLY2128M8-JGE	1GB	SS	Asint	DDRII1208-GE				•	•
Asint	SLZ2128M8-JGE	2GB	DS	Asint	DDRII1208-GE			•	•	•

M4A78-E Motherboard Qualified Vendors Lists (QVL) DDR2-667 MHz capability

Vendor	Part No.	Size	SS/ DS	Chip Brand	Chip NO.	Timing DIMM (BIOS)	Voltage	DIMM socket support (Optional)		
								A*	B*	C*
Apacer	78.91G92.9K5	512MB	SS	APACER	AM4B5708JQJS7E	5		•	•	•
Apacer	78.01G9O.9K5	1GB	SS	APACER	AM4B5808CQJS7E	5		•	•	•
Apacer	78.A1G9O.9K4	2GB	DS	APACER	AM4B5808CQJS7E	5		•	•	
CORSAIR	VS 512MB667D2	512MB	SS	N/A	64M8CFEG	N/A	N/A		•	•
CORSAIR	VS1GB667D2	1GB	DS	N/A	64M8CFEG	N/A	N/A	•	•	•
Crucial	BL12864AA663.16FD2	1GB	DS	N/A	Heat-Sink Package	3	2.2	•		

M4A78-E Motherboard Qualified Vendors Lists (QVL)
DDR2-667 MHz capability (continued)

Vendor	Part No.	Size	SS/ DS	Chip Brand	Chip NO.	Timing DIMM (BIOS)	Voltage	DIMM socket support (Optional)		
								A*	B*	C*
Crucial	BL12864AA663.16FD	1GB	DS	N/A	Heat-Sink Package	3	2.2	•	•	
Crucial	BL12864AL664.16FD	1GB	DS	N/A	Heat-Sink Package	3	2.2	•	•	•
ELPIDA	EBE51UD8AEFA-6E-E	512MB	SS	ELPIDA	E5108AE-6E-E	5	1.7-1.9	•	•	•
G.SKILL	F2-5400PHU2-2GBNT	2GB (Kit of 2)	DS	G.Skill	D264M8GCF	5-5-5-15	1.8	•	•	•
G.SKILL	F2-5300CL5D-4GBMQ	4GB (Kit of 2)	DS	N/A	Heat-Sink Package	5-5-5-15	1.8-1.9	•	•	•
GEIL	GX21GB5300SX	1GB	DS	N/A	Heat-Sink Package			•	•	•
GEIL	GX22GB5300LX	2GB	DS	N/A	Heat-Sink Package	5-5-5-15		•		
Hynix	HYMP 512U64CP8-Y5	1GB	DS	HYNIX	HY5PS12821CFP-Y5	5	1.8	•	•	•
KINGSTON	KVR667D2N5/ 512	512MB	SS	KINGSTON	D6408TEBGGL3U	5	1.7-1.9	•	•	
KINGSTON	KVR667D2E5/1G	1GB	DS	ELPIDA	E5108AGBG-6E-E(ECC)		1.8	•	•	•
KINGSTON	KVR667D2N5/1G	1GB	DS	KINGSTON	E5108AGBG-6E-E		1.8	•	•	•
KINGSTON	KVR667D2N5/1G	1GB	DS	ELPIDA	E5108AJBG-8E-E		1.8	•		
KINGSTON	KVR667D2N5/1G	1GB	DS	HYNIX	HY5PS12821CFP-Y5		1.8	•	•	
KINGSTON	KVR667D2E5/2G	2GB	DS	MICRON	D9HNL(ECC)		1.8	•	•	
KINGSTON	KVR667D2N5/2G	2GB	DS	ELPIDA	E1108AB-6E-E		1.8	•		
KINGSTON	KVR667D2N5/2G	2GB	DS	HYNIX	HY5PS1G831CFP-Y5		1.8	•	•	
NANYA	NT 512T64U88B0BY-3C	512MB	SS	NANYA	NT5TU64M8BE-3C	5	1.8	•	•	•
NANYA	NT2GT64U8HB0JY-3C	2GB	DS		NT5TU128M8BJ-3C	5		•	•	
PSC	AL7E8E63J-6E1	1GB	DS	PSC	A3R12E3JFF719A9T02	5		•	•	•
Qimonda	HYS64T256020EU-3S-C2	2GB	DS	Qimonda	HYB18T1GB00C2F-3S	5				•
SAMSUNG	M378T6553EZS-CE6	512MB	SS	SAMSUNG	K4T51083QE	5		•	•	•
SAMSUNG	M378T2953EZ3-CE6	1GB	DS	SAMSUNG	K4T51083QE	5		•	•	•
SAMSUNG	M378T5263AZ3-CE6	4GB	DS	SAMSUNG	K4T2G084QA-HCE6	5		•	•	•
Super Talent	T6UA 512C5	512MB	SS	N/A	Heat-Sink Package	5	1.8	•	•	
Super Talent	T6UB1GC5	1GB	DS	N/A	Heat-Sink Package	5	1.8	•	•	•
TwinMOS	8D-23JK5M2ETP	512MB	SS	TwinMOS	TMM6208G8M30C	5	1.8	•	•	•
Aeneon	AET760UD00-30DB97X	1GB	DS	AENEON	AET93R30DB	5	1.8	•	•	•
Aeneon	AET860UD00-30D	2GB	DS	AENEON	AET02R30DC	5		•	•	•
Aeneon	AET860UD00-30DB08X	2GB	DS	AENEON	AET03F30DB	5		•	•	
Asint	SLX264M8-J6E	512MB	SS	Asint	DDRII6408-6E			•		
Asint	SLY2128M8-J6E	1GB	SS	Asint	DDRII1208-6E			•	•	•
CENTURY	26V2H8	512MB	SS	HYNIX	HY5PS12821CFP-Y5	5	1.85	•		•
CENTURY	26VOH8	1GB	DS	HYNIX	HY5PS12821CFP-Y5	5	1.85	•	•	•
Dynet	DNHM5U 512C8FE-A6	512MB	SS	Dynet	DN5HS82CFE-A6			•	•	•
Kingbox	N/A	1GB	SS	KINGBOX	EPD2128082200E-4			•	•	•
Kingbox	N/A	1GB	DS	KINGBOX	EPD264082200E-4		1.8	•	•	
Kingbox	N/A	1GB	DS	KINGBOX	EPD264082200N-4			•	•	•
MDT	M 512-667-8	512MB	SS	MDT	18D 51280D-30648	4	1.8	•	•	•
MDT	M924-667-16	1GB	DS		18D 51280D-30646E	4		•	•	
MDT	M924-667-16A	1GB	DS	MDT	18D 51200D-30646	4	1.8	•	•	•
Patriot	PSD2 51266781	512MB	SS	PATRIOT	PM64M8D2BU-3KC			•	•	•
Patriot	PSD21G6672	1GB	DS	PATRIOT	PM64M8D2BU-3PAC	5		•	•	•

SS - Single-sided DS - Double-sided
DIMM support:

- **A*:** Supports one module inserted in any slot as single-channel memory configuration.
- **B*:** Supports one pair of modules inserted into either the yellow slots or the black slots as one pair of dual-channel memory configuration.
- **C*:** Supports four modules inserted into both the yellow and black slots as two pairs of dual-channel memory configuration.

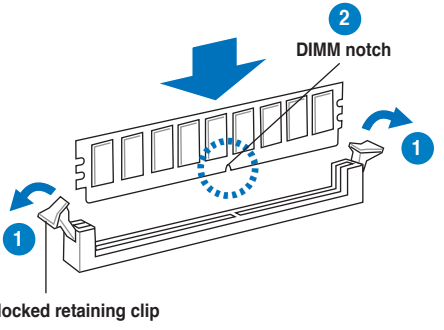
Visit the ASUS website at www.asus.com for the latest QVL.

2.4.3 Installing a DIMM

Ensure 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.

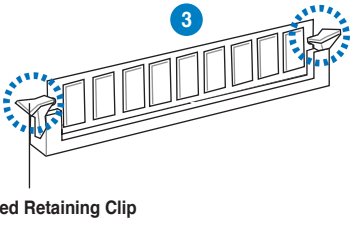
To install a DIMM:

1. Press the retaining clips outward to unlock a DIMM socket.
2. Align a DIMM on the socket such that the notch on the DIMM matches the break on the socket.



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

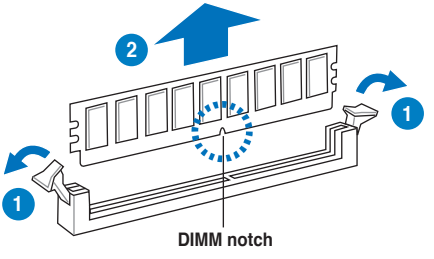
3. Firmly insert the DIMM into the socket until the retaining clips snap back in place and the DIMM is properly seated.



2.4.4 Removing a DIMM

To remove a DIMM:

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



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

2. Remove the DIMM from the socket.

2.5 Expansion slots

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

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

2.5.1 Installing an expansion card

To install an expansion card:

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

2.5.2 Configuring an expansion card

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

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

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

2.5.3 Interrupt assignments

Standard interrupt assignments

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

*** These IRQs are usually available for ISA or PCI devices.**

IRQ assignments for this motherboard

	A	B	C	D	E	F	G	H
PCIE x16_1	shared	shared	shared	shared	–	–	–	–
PCIE x16_2	shared	shared	shared	shared	–	–	–	–
USB controller 1	–	–	–	shared	–	–	–	–
USB controller 2	–	–	–	shared	–	–	–	–
USB controller 3	–	–	–	shared	–	–	–	–
USB controller 4	–	–	–	shared	–	–	–	–
USB 2.0 controller	–	–	–	shared	–	–	–	–
HD audio	shared	–	–	–	–	–	–	–
Onboard SATA	–	–	–	–		shared	–	–

2.5.4 PCI slots

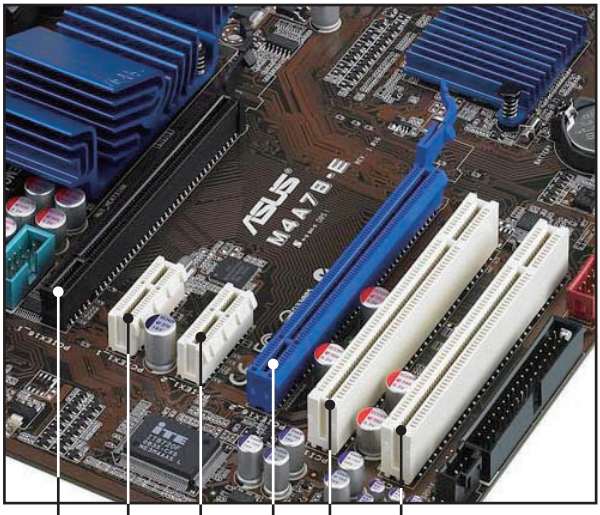
The PCI slots support cards such as a LAN card, SCSI card, USB card, and other cards that comply with PCI specifications. Refer to the figure below for the location of the slots.

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.

2.5.6 Two PCI Express x16 slots

This motherboard supports two ATI CrossFireX™ PCI Express x16 graphics cards that comply with the PCI Express specifications. Refer to the figure below for the location of the slots.



If you install two graphics cards, we recommend that you plug the rear chassis fan cable to the motherboard connector labeled CHA_FAN1 for better thermal environment. See page 2-32 for the connector location.

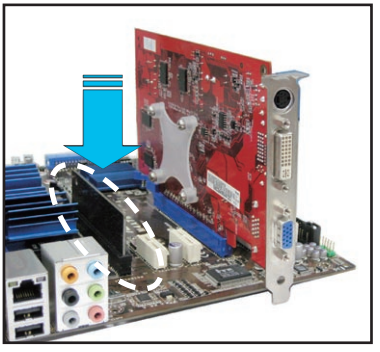
Chapter 2

2.6 ASUS VGA switch card

The ASUS VGA switch card allows the Blue PCIe_x16 slot to run at full x16 mode when only one graphics card is installed to the slot.

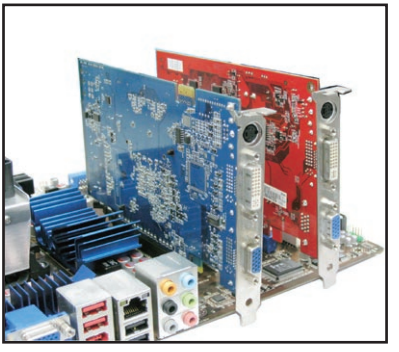
Installing one graphics card

When you install only one graphics card, ensure to install the VGA switch card to the Black PCIe x16 slot first and the graphics card on the Blue PCIe x16 slot.



Installing two graphics cards

When you install two graphics cards, remove the VGA switch card from the Black PCIe x16 slot. The two x16 PCIe slots will both run at x8 mode.

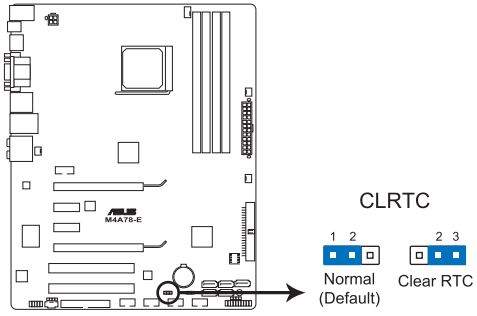


VGA configuration	PCI Express operating mode	
	PCIex16_2 (Blue)	PCIex16_1 (Black)
Single VGA/PCIe card	x16	VGA switch card installed
Dual VGA/PCIe card	x8	x8

2.7 Jumpers

1. Clear RTC RAM (3-pin CLRTC)

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



M4A78-E Clear RTC RAM

To erase the RTC RAM

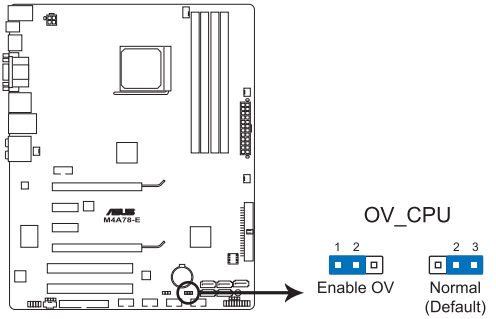
1. Turn OFF the computer and unplug the power cord.
2. Move the jumper cap from pins 1-2 (default) to pins 2-3. Keep the cap on pins 2-3 for about 5–10 seconds, then move the cap back to pins 1-2.
3. Plug the power cord and turn ON the computer.
4. Hold down the <Del> key during the boot process and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

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

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

2. CPU overvoltage setting (3-pin OV_CPU)

This jumper allows you to enable or disable the advanced CPU overvoltage setting in BIOS. Read the following information before you change the jumper setting. Set to pins 1-2 to activate the advanced CPU overvoltage feature.



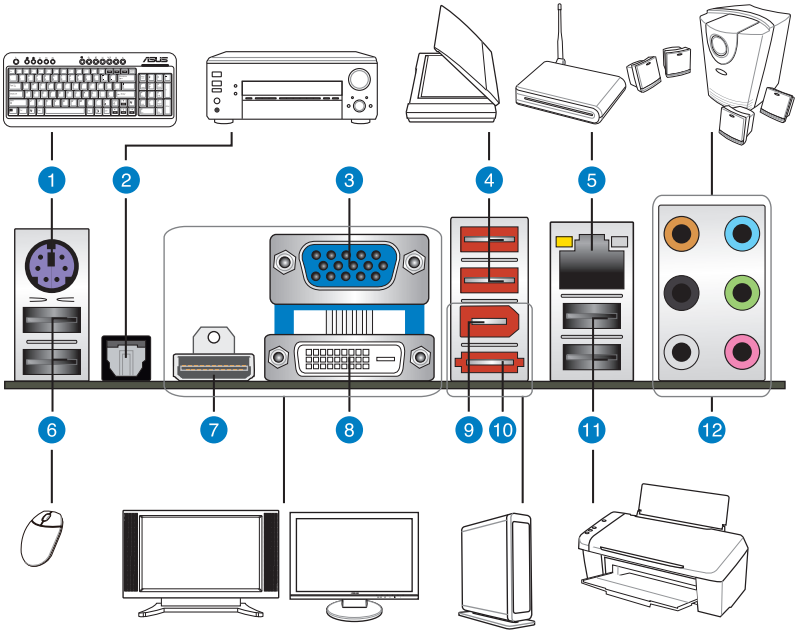
M4A78-E CPU overvoltage setting

OV_CPU	
Pins 2-3 (Default)	0.80V – 1.70V
Pins 1-2 (OV Enabled)	up to 1.90V

- Before you change the jumper setting for extra-high overvoltage ability, use the BIOS items introduced in **3.5 Ai Tweaker menu** first to adjust the desired CPU performance. Ensure that your system functions well under the highest BIOS voltage setting before you change the setting of this jumper.
- Refer to **3.5 Ai Tweaker menu** for more information about the CPU overvoltage setting.
- DO NOT set the OV_CPU jumper to pins 1-2 when you install a new CPU and have not booted for the first time. Doing so may cause the system to halt. For system failure due to the wrong setting of the OV_CPU jumper, shut down the computer and move the cap back to pins 2-3.
- The system may need a better cooling system (for example, a water-cooling system) to work stably under high voltage settings.

2.8 Connectors

2.8.1 Rear panel connectors

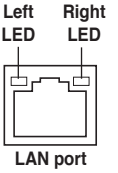


Rear panel connectors			
1.	PS/2 keyboard port (purple)	7.	HDMI out port
2.	Optical S/PDIF out port	8.	DVI out port
3.	VGA out port	9.	IEEE 1394a port
4.	USB 2.0 ports 3 and 4	10.	External SATA port
5.	LAN (RJ-45) port	11.	USB 2.0 ports 1 and 2
6.	USB 2.0 ports 5 and 6	12.	Audio I/O ports

* To use hot-plug, set the **OnChip SATA Type** in the BIOS settings to [AHCI] mode. See section **3.4.2 Storage Configuration** for details.

**** LAN port LED indications**

Status	Left LED	Right LED
OFF	OFF	OFF
10 Mbps connection	Orange (blinking during data activity)	OFF
100 Mbps connection	OFF	Orange (blinking during data activity)
1 Gbps connection	OFF	Green (blinking during data activity)

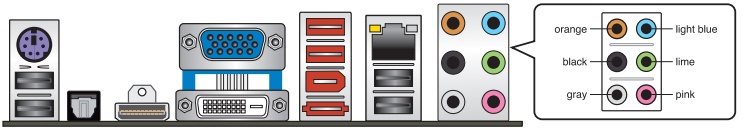


***** Audio 2, 4, 6, or 8-channel configuration**

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

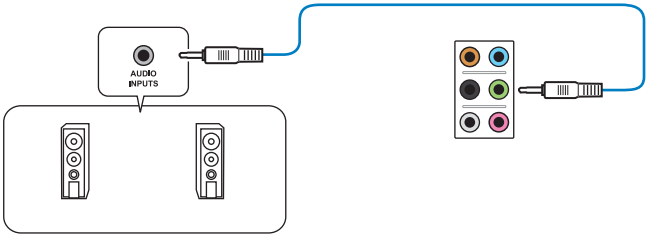
2.8.2 Audio I/O connections

Audio I/O ports

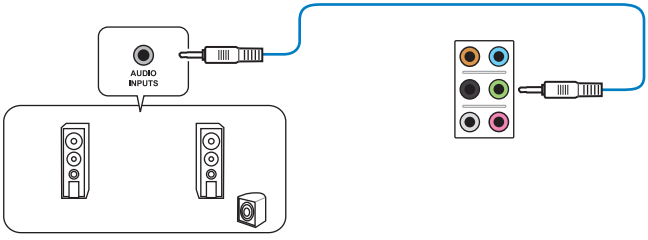


Connect to Headphone and Mic

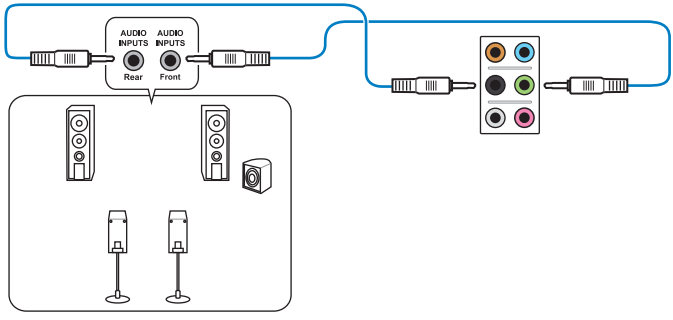
Connect to Stereo Speakers



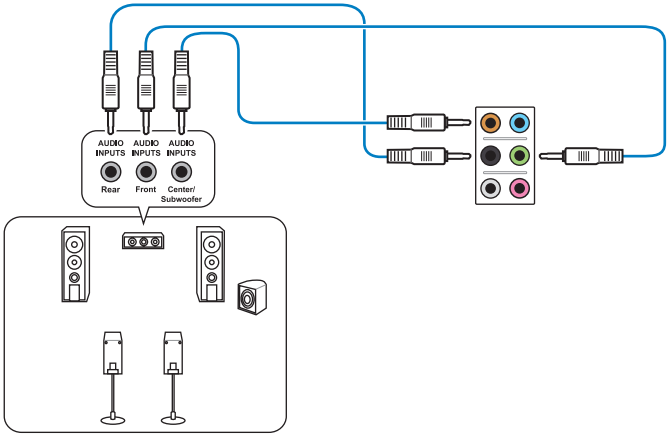
Connect to 2.1 channel Speakers



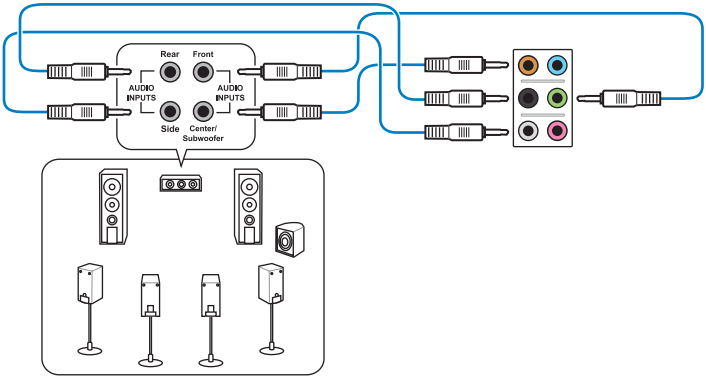
Connect to 4.1 channel Speakers



Connect to 5.1 channel Speakers



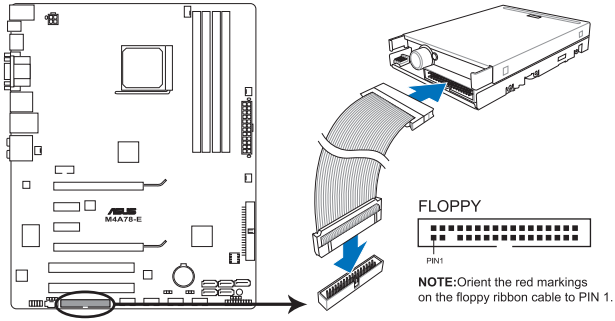
Connect to 7.1 channel Speakers



2.8.3 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.

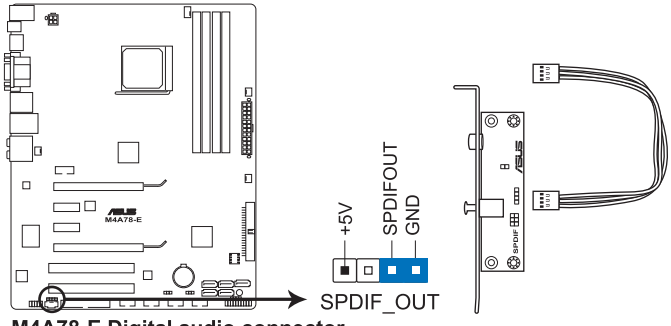


M4A78-E Floppy disk drive connector

- Pin 5 on the connector is removed to prevent incorrect cable connection when using an FDD cable with a covered Pin 5.
- The floppy disk drive cable is purchased separately.

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

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



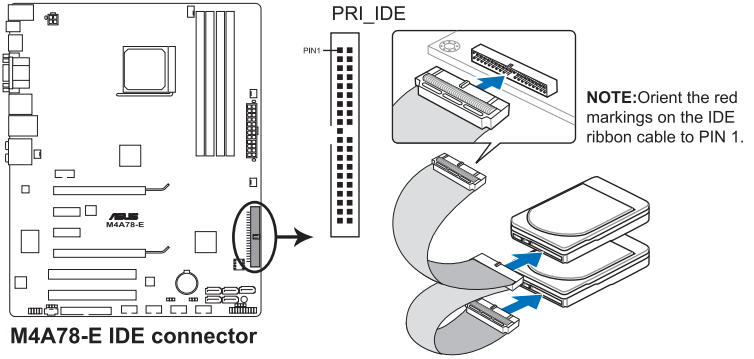
M4A78-E Digital audio connector

The S/PDIF module is purchased separately.

Chapter 2

3. IDE connector (40-1 pin PRI_IDE)

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.



M4A78-E IDE 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.

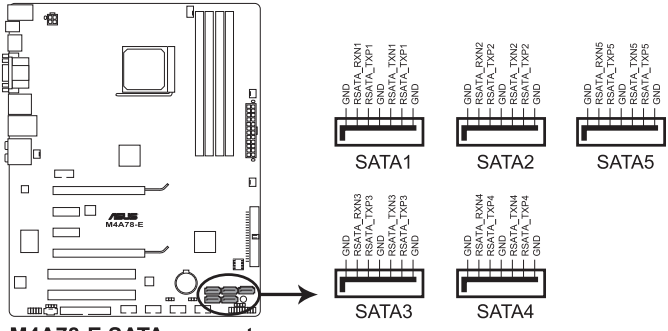
If any device jumper is set as "Cable-Select", ensure that all other device jumpers have the same setting.

4. AMD® SB750 Southbridge Serial ATA connectors (7-pin SATA1–5)

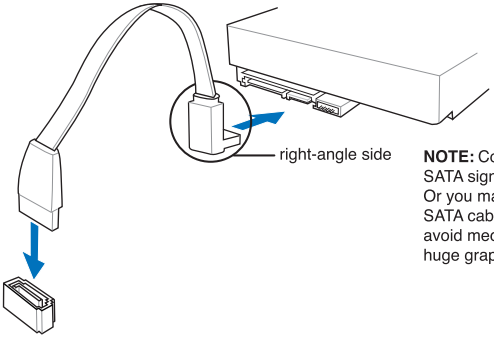
These connectors are for the Serial ATA signal cables for Serial ATA hard disk and optical disk drives.

If you install SATA hard disk drives to the SATA1–5 connectors, you can create a RAID 0, RAID 1, RAID 5, RAID 10 or JBOD configuration through the onboard AMD® SB750 controller.

These connectors are set to [IDE] by default. If you intend to create a Serial ATA RAID set using these connectors, set the Onchip SATA Type item in the BIOS to [RAID].



M4A78-E SATA connectors



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

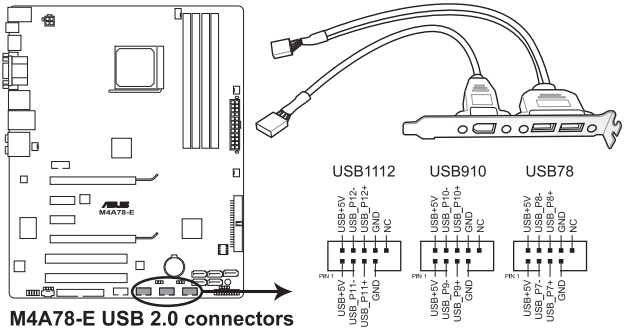
Important note on Serial ATA

Install Windows® XP Service Pack 1 or later version before using Serial ATA.

- For detailed instructions on how to configure RAID 0, RAID 1, RAID 5 and RAID 10, refer to the RAID manual in the support DVD.
- If you intend to create a Serial ATA RAID set using these connectors, set the **Onchip SATA Type** item in the BIOS to [RAID].

5. USB connectors (10-1 pin USB 78; 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.



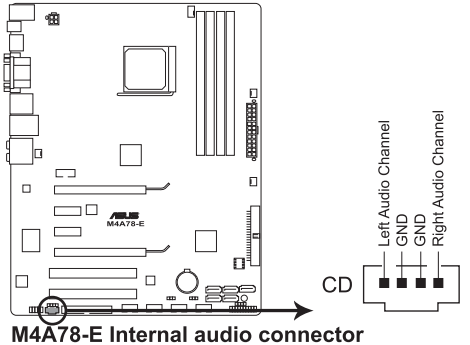
M4A78-E USB 2.0 connectors

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

You can connect the front panel USB cable to the ASUS Q-Connector (USB, blue) first, and then install the Q-Connector (USB) to the USB connector onboard if your chassis supports front panel USB ports.

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

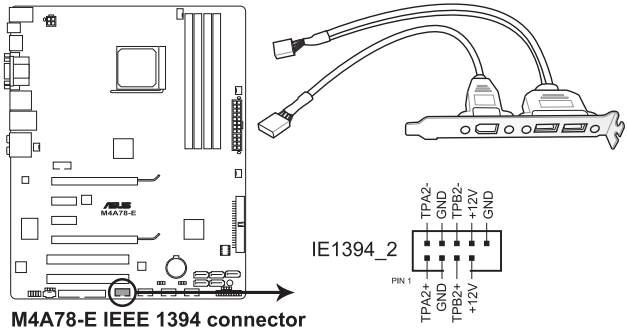
These connectors allow you to receive stereo audio input from sound sources such as a CD-ROM, TV tuner, or MPEG card.



M4A78-E Internal audio connector

7. 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.

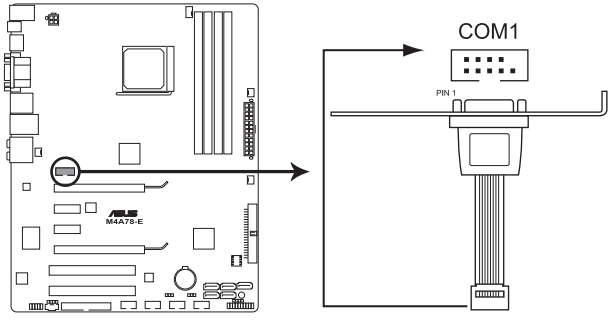


M4A78-E IEEE 1394 connector

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

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

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

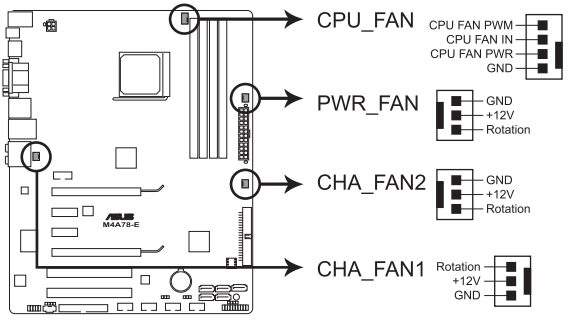


M4A78-E Serial port (COM1) connector

The COM module is purchased separately.

9. CPU, chassis, and power fan connectors (4-pin CPU_FAN; 3-pin CHA_FAN1–2; 3-pin PWR_FAN)

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



M4A78-E FAN connectors

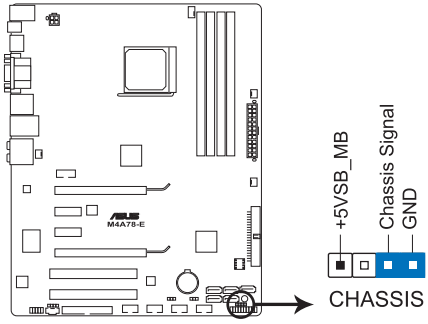
Do not forget to connect the fan cables to the fan connectors. Insufficient air flow inside the system may damage the motherboard components. These are not jumpers! Do not place jumper caps on the fan connectors!

- Only the CPU_FAN, CHA_FAN 1 and CHA_FAN 2 connectors support the ASUS Q-FAN 2 feature.
- If you install two VGA cards, we recommend that you plug the rear chassis fan cable to the motherboard connector labled CHA_FAN1 or CHA_FAN2 for better themal environment.

10. 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.

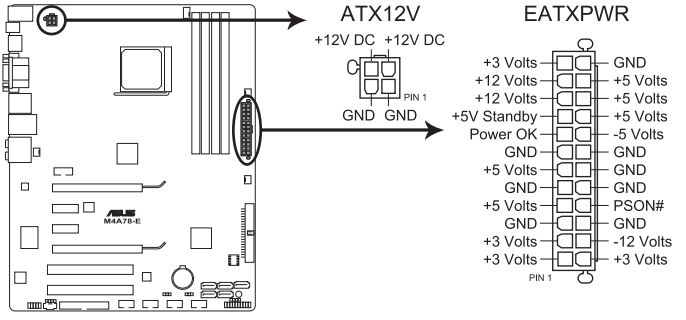
By default , the pin labeled “Chassis Signal” and “Ground” are shorted with a jumper cap. Remove the jumper caps only when you intend to use the chassis intrusion detection feature.



M4A78-E Chassis intrusion connector

11. ATX power connectors (24-pin EATXPWR; 4-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.

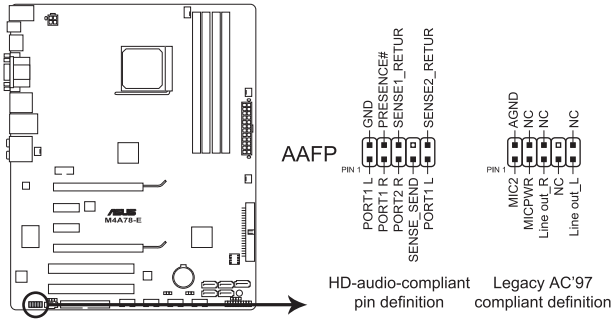


M4A78-E ATX power connectors

- For a fully configured system, we recommend that you use a power supply unit (PSU) that complies with ATX 12 V Specification 2.0 (or later version) and provides a minimum power of 600 W.
- Do not forget to connect the 4-pin EATX +12 V power plug. Otherwise, the system will not boot.
- We recommend that you use a PSU with higher power output when configuring a system with more power-consuming devices. The system may become unstable or may not boot up if the power is inadequate.
- If you 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.
- The ATX 12 V Specification 2.0-compliant (1000W) PSU has been tested to support the motherboard power requirements with the following configuration:
  CPU: AMD Phenom 9950
  Memory: 1024 MB DDR2 (x4)
  Graphics card: PCI Express x16 Radeon 4870 X2 (x2)
  Serial ATA device: SATA hard disk drive (x2)
  Optical drive: DVD-RW (x1)

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

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



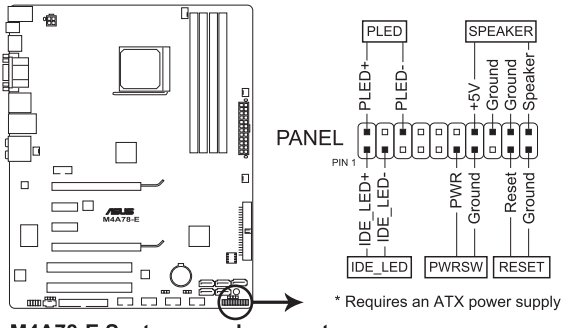
M4A78-E Analog front panel connector

- We recommend that you connect a high-definition front panel audio module to this connector to avail of the motherboard's high-definition audio capability.
- If you want to connect a high-definition front panel audio module to this connector, set the **Front Panel Type** item in the BIOS setup to **[HD];** if you want to connect an AC'97 front panel audio module to this connector, set the item to **[AC97]**. By default, this connector is set to **[HD]**.

Chapter 2

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

This connector supports several chassis-mounted functions.



M4A78-E 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)**

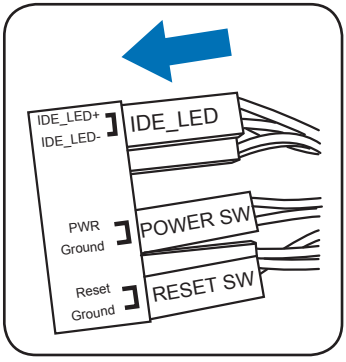
  This 2-pin connector is for the chassis-mounted reset button for system reboot without turning off the system power.

14. ASUS Q-Connector (system panel)

Use the ASUS Q-Connector to connect/disconnect the chassis front panel cables. Refer to the following instructions to install the ASUS Q-Connector.

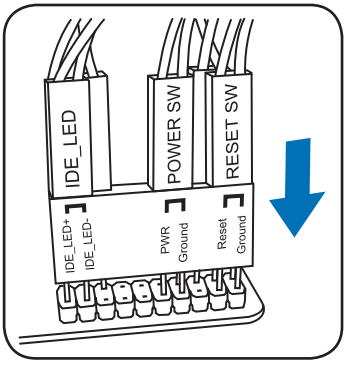
1. Connect the front panel cables to the ASUS Q-Connector.

   Refer to the labels on the Q-Connector to know the detailed pin definitions, and then match them to their respective front panel cable labels.

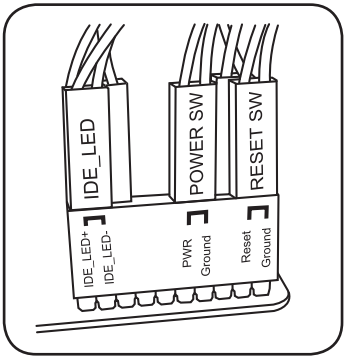


The labels on the front panel cables may vary depending on the chassis model.

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



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



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 the "green" standards or if it has a "power standby" feature, the monitor LED may light up or change from orange to green after the system LED turns on.

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

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

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

2.10 Turning off the computer

While the system is ON, pressing the power switch for less than four seconds puts the system on sleep mode or soft-off mode, depending on the BIOS setting. Pressing the power switch for more than four seconds lets the system enter the soft-off mode regardless of the BIOS setting. Refer to section **3.7 Power Menu** in Chapter 3 for details.

Chapter 3

3.1 Knowing BIOS

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

- An error message appears on the screen during the system bootup and requests you to run the BIOS Setup.
- You have installed a new system component that requires further BIOS settings or update.

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

3.2 Updating BIOS

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

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

The following utilities allow you to manage and update the motherboard BIOS setup program.

1. **ASUS Update:** Updates the BIOS in Windows® environment.
2. **ASUS EZ Flash 2:** Updates the BIOS using a floppy disk or USB flash disk.
3. **ASUS CrashFree BIOS 3:** Updates the BIOS using a bootable floppy 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 utility.

3.2.1 ASUS Update utility

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

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

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

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

Installing ASUS Update

To install ASUS Update:

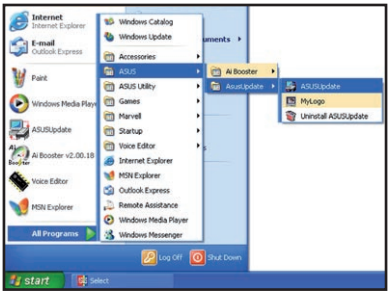
1. Place the support DVD in the optical drive.
2. From the Main menu, click the **Utilities** tab, then click **Install ASUS Update VX.XX.XX**.
3. The ASUS Update utility is copied to your system.

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

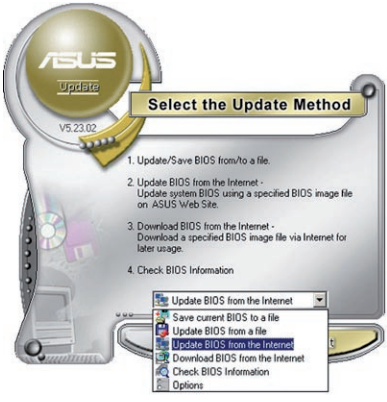
Updating the BIOS through the Internet

To update the BIOS through the Internet:

1. From the Windows® desktop, click **Start > Programs > ASUS > ASUSUpdate > ASUSUpdate.** The ASUS Update main window appears.



2. Select **Update BIOS from the Internet** from the drop-down menu, and then click **Next**.



Chapter 3

3. Select the ASUS FTP site nearest you to avoid network traffic, or click **Auto Select**. Click **Next**.

4. From the FTP site, select the BIOS version that you wish to download. Click **Next**.

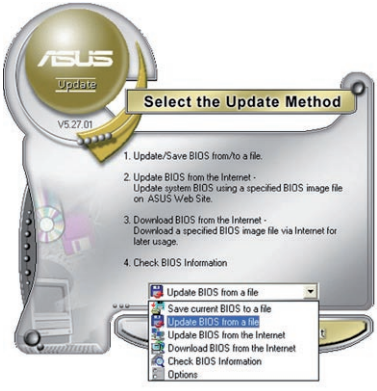
5. Follow the onscreen instructions to complete the update process.

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

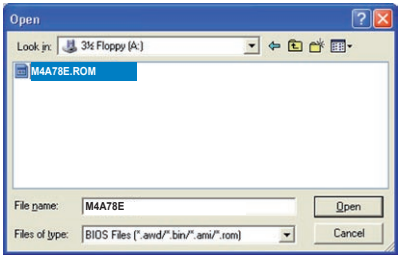
Updating the BIOS through a BIOS file

To update the BIOS through a BIOS file:

1. Fom the Windows® desktop, click **Start** > **Programs** > **ASUS** > **ASUSUpdate** > **ASUSUpdate**. The ASUS Update main window appears.
2. Select **Update BIOS from a file** from the dropdown menu, then click **Next**.



3. Locate the BIOS file from the Open window, then click **Open**.
4. Follow the onscreen instructions to complete the update process.



Ensure to load the BIOS default settings to ensure system compatibility and stability. Select the **Load Setup Defaults** item under the Exit menu. See section **3.10 Exit Menu** for details.

Chapter 3

3.2.2 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  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.

3.2.3 ASUS EZ Flash 2 utility

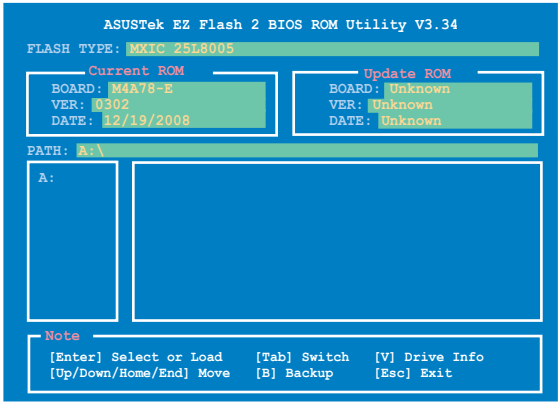
The ASUS EZ Flash 2 feature allows you to update the BIOS without having to use a bootable floppy disk or a DOS-based utility. The EZ Flash 2 utility is built-in the BIOS chip so it is accessible by pressing <Alt> + <F2> during the Power-On Self Tests (POST).

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

To update the BIOS using EZ Flash 2:

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

   Press **Tab** to switch between drives until the correct BIOS file is found.



2. 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!

Ensure to load the BIOS default settings to ensure system compatibility and stability. Select the **Load Setup Defaults** item under the Exit menu. See section **3.10 Exit Menu** for details.

Chapter 3

3.2.4 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 or a USB flash disk that contains the updated BIOS file.

- Prepare the motherboard support DVD or the USB flash disk containing the updated motherboard BIOS before using this utility.
- For the M4A78-E motherboard, this utility will not function when you use a PATA optical drive.
- Always connect the SATA cable to the SATA1 / SATA 2 connector; otherwise, the utility will not function.

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 "M4A78E.ROM". Completed.
Start flashing...
```

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

Recovering the BIOS from a USB flash disk

To recover the BIOS from a USB flash disk:

1. Insert a 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.

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

Ensure to load the BIOS default settings to ensure system compatibility and stability. Select the Load Setup Defaults item under the Exit menu. See section **3.10 Exit Menu** for details.

3.3 BIOS setup program

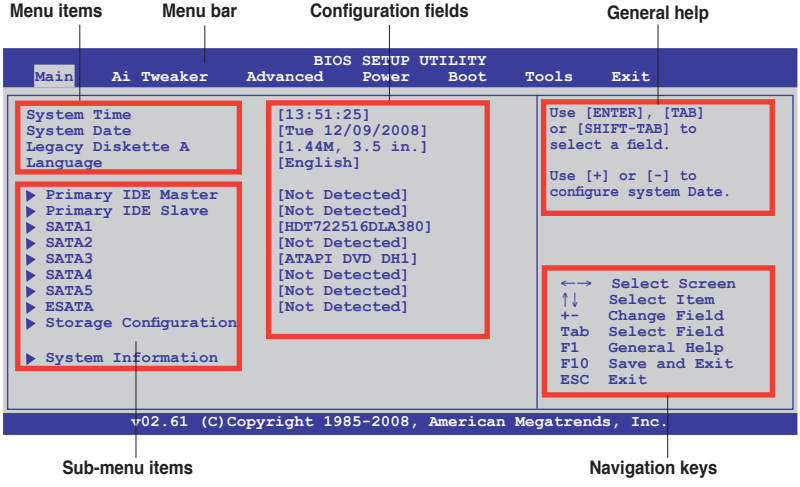
A BIOS Setup program is provided for BIOS item modification. When you start up the computer, the system provides you with the opportunity to run this program. Press <Del> during the Power-On Self-Test (POST) to enter the Setup utility. Otherwise, POST continues with its test routines.

If you wish to enter Setup after POST, 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 submenus and select from the available options using the navigation keys.

- The BIOS setup screens shown in this section are for reference purposes only, and may not exactly match what you see on your screen.
- If the system becomes unstable after changing any BIOS setting, load the default settings to ensure system compatibility and stability. Select the **Load Setup Defaults** item under the **Exit** menu. See section **3.10 Exit Menu** for details.
- If the system fails to boot after changing any BIOS setting, try to clear the CMOS and reset the motherboard to the default value. See section **2.7 Jumpers** for details.

3.3.1 BIOS menu screen



3.3.2 Menu bar

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

Main	For changing the basic system configuration
Ai Tweaker	For changing the overclocking settings
Advanced	For changing the advanced system settings
Power	For changing the advanced power management (APM) configuration
Boot	For changing the system boot configuration
Tools	For configuring options for special functions
Exit	For selecting the exit options and loading default settings

3.3.3 Navigation keys

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

The navigation keys may differ from one screen to another.

3.3.4 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.

3.3.5 Submenu items

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

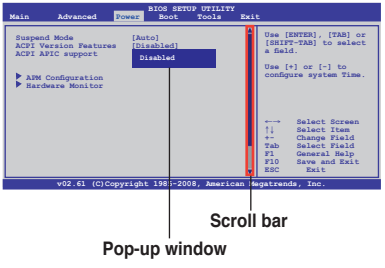
3.3.6 Configuration fields

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 **3.3.7 Pop-up window.**

3.3.7 Pop-up window

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



3.3.8 Scroll bar

A scroll bar appears on the right side of a menu screen when there are items that do not fit on the screen. Press the Up/Down arrow keys or <Page Up> / <Page Down> keys to display the other items on the screen.

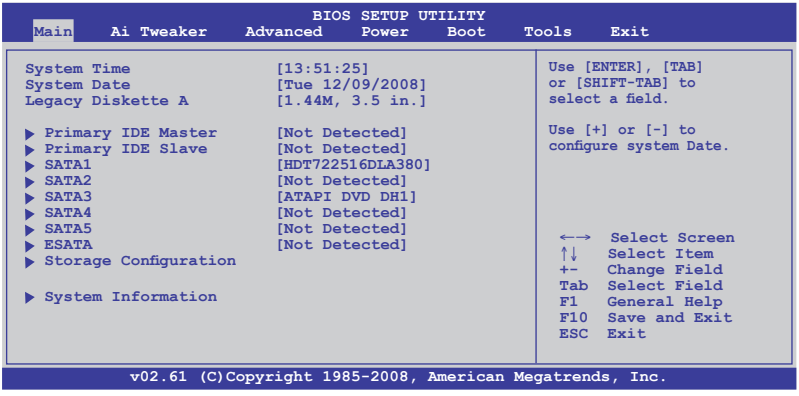
3.3.9 General help

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

3.4 Main menu

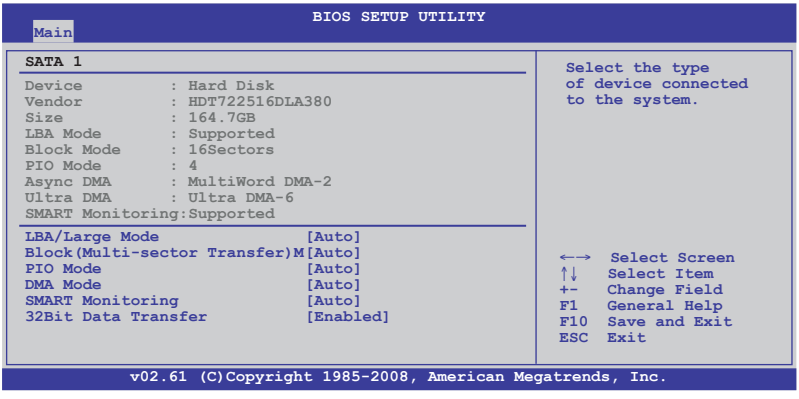
When you enter the BIOS Setup program, the Main menu screen appears, giving you an overview of the basic system information. You can set the system time and date, BIOS language, and the type of floppy drive installed.

Refer to **3.3.1 BIOS menu screen** for information on the menu screen items and how to navigate through them.



3.4.1 Primary IDE Master/Slave; SATA 1–5; ESATA

While entering Setup, the BIOS automatically detects the presence of IDE/SATA devices. There is a separate submenu for each IDE/SATA device. Select a device item then press <Enter> to display the SATA device information.



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

Type [Auto]

Allows you to select the type of IDE drive installed.

[Not Installed]	Select this option if no IDE drive is installed.
[Auto]	Allows automatic selection of the appropriate IDE device type.
[CDROM]	Select this option if you are specifically configuring a CD-ROM drive.
[ARMD]	Select [ARMD] (ATAPI Removable Media Device) if your device is either a ZIP, LS-120, or MO drive.

This item appears in **Primary IDE Master/Slave** and **ESATA** only.

LBA/Large Mode [Auto]

Enables or disables the LBA (Logical Block Addressing) mode.

[Auto]	Select [Auto] to enable the LBA mode (Logical Block Addressing mode) if the device supports this mode, and if the device was not previously formatted with LBA mode disabled.
[Disabled]	Disables this function.

Block (Multi-Sector Transfer) M [Auto]

Enables or disables data multi-sectors transfers.

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

PIO Mode [Auto]

[Auto]	Allows automatic selection of the PIO (Programmed input/output) modes, which correspond to different data transfer rates.
[0] [1] [2] [3] [4]	Set the PIO mode to Mode 0, 1, 2, 3, or 4.

DMA Mode [Auto]

DMA (Direct Memory Access) allows your computer to transfer data to and from the hardware devices installed with much less CPU overhead.

The DMA mode consists of SDMA (single-word DMA), MDMA (multi-word DMA), and UDMA (Ultra DMA). Setting to [Auto] allows automatic selection of the DMA mode.

SMART Monitoring [Auto]

[Auto]	Allows automatic selection of the S.M.A.R.T (Smart Monitoring, Analysis, and Reporting Technology).
[Enabled]	Enables the S.M.A.R.T feature.
[Disabled]	Disables the S.M.A.R.T feature.

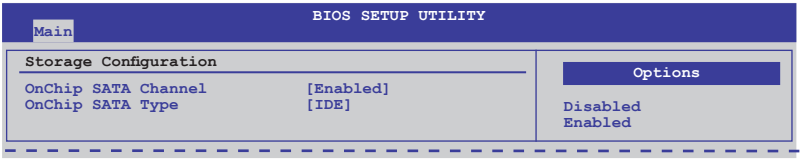
32Bit Data Transfer [Enabled]

[Enabled] Sets the IDE controller to combine two 16-bit reads from the hard disk into a single 32-bit double word transfer to the processor. This makes more efficient use of the PCI bus as fewer transactions are needed for the transfer of a particular amount of data.

[Disabled] Disables this function.

3.4.2 Storage Configuration

The Storage Configuration menu allows you to configure your storage devices. Select an item then press <Enter> to display the submenu.



OnChip SATA Channel [Enabled]

[Enabled] Enables the onboard channel SATA port.

[Disabled] Disables the onboard channel SATA port.

The following item appears only when you enable **Onchip SATA Channel**.

OnChip SATA Type [IDE]

Allows you to set the SATA configuration. This item appears only when you enable the OnChip SATA Channel item.

[IDE] Set to [IDE] when you want to use the Serial ATA hard disk drives as Parallel ATA physical storage devices.

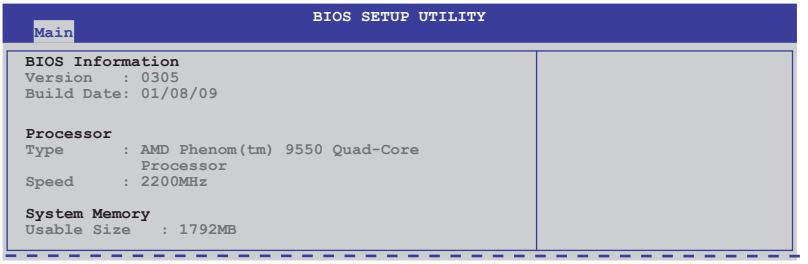
[RAID] Set to [RAID] when you want to create a RAID configuration from the SATA hard disk drives.

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

When this item is set to [AHCI], only SATA connectors 1–4 can be detected. Ensure that you've installed the AHCI driver, so that you could use SATA connectors 1–5 and E-SATA connector in AHCI mode under OS.

3.4.3 System Information

This menu gives you an overview of the general system specifications. The BIOS automatically detects the BIOS information, CPU specification, and system memory in this menu.

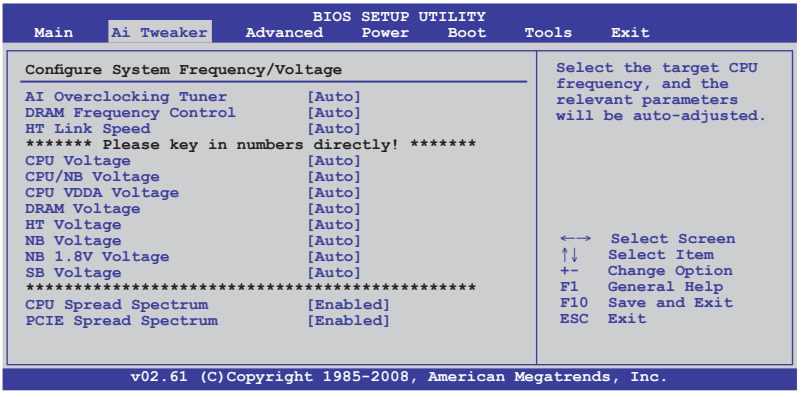


3.5 Ai Tweaker menu

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

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

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



3.5.1 AI Overclocking Tuner [Auto]

Allows you to select the CPU overclocking options to achieve the desired CPU internal frequency. Select any of these preset overclocking configuration options:

Manual	Allows you to individually set overclocking parameters.
Auto	Loads the optimal settings for the system.

Chapter 3

The following three items appear only when you set the **AI Overclocking Tuner** item to [Manual].

3.5.2 CPU Ratio [Auto]

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

3.5.3 CPU Bus Frequency [XXX]

Displays the frequency sent by the clock generator to the system bus and PCI bus. Use the <+> and <-> keys to adjust the FSB frequency. You can also key in the desired FSB frequency using the numeric keypad. The values range from 200 to 600.

3.5.4 PCIE Frequency [XXX]

Use the <+> and <-> keys to adjust the PCIE frequency. You can also key in the desired value using the numeric keypad. The values range from 100 to 150.

3.5.5 DRAM Frequency Control [Auto]

Allows you to select the DRAM frequency programming method.

[Auto] Allows the BIOS to set DRAM frequency automatically.

[Manual] Allows you to select the DRAM frequency from any of the standard values.

The following item appears only when you set the **DRAM Frequncy Control** item to [Manual].

DRAM Frequency [667MHz]

Allows you to set the DDR2 operating frequency.
Configuration options: [667MHz] [800MHz] [1066MHz]

The **DRAM Frequency** configuration options vary with the **CPU Bus Frequency** settings.

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

The following item appears only when you set the **AI Overclocking Tuner** item to [Manual].

3.5.6 CPU/NB Frequency [Auto]

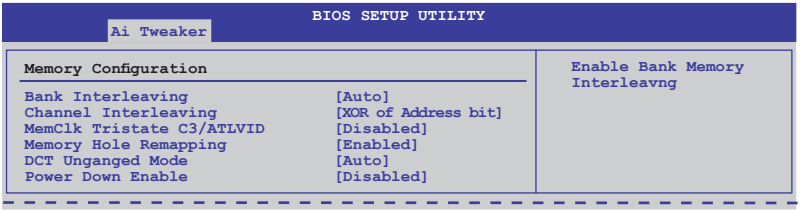
Allows you to select the CPU/NB frequency.
Configuration options: [Auto] [800MHz] [1000MHz] [1200MHz] [1400MHz] [1600MHz] [1800MHz]

3.5.7 HT Link Speed [Auto]

Allows you to select the HyperTransport link speed.
Configuration options: [Auto] [200MHz] [400MHz] [600MHz] [800MHz] [1 GHz] [1.2 GHz] [1.4 GHz] [1.6 GHz] [1.8 GHz]

The following two items appear only when you set the **AI Overclocking Tuner** item to [Manual].

3.5.8 Memory Configuration



Bank Interleaving [Auto]

Configuration options: [Disabled] [Auto]

Channel Interleaving [XOR of Address bit]

Configuration options: [Disabled] [Address bits 6] [Address bits 12] [XOR of Address bits [20:16, 6]] [XOR of Address bits [20:16, 9]]

MemClk Tristate C3/ATLVID [Disabled]

Configuration options: [Disabled] [Enabled]

Memory Hole Remapping [Enabled]

Configuration options: [Disabled] [Enabled]

DCT Unganged Mode [Auto]

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

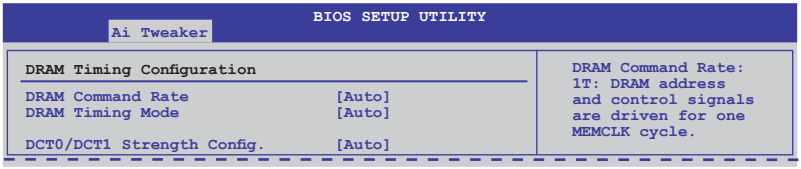
Power Down Enable [Disabled]

Enables or disables the DDR power down mode.
Configuration options: [Disabled] [Enabled]

Power Down Mode [Channel]

Allows you to set the DDR power down mode. This item appears only when you enable the previous item. Configuration options: [Channel] [Chip Select]

3.5.9 DRAM Timing Configuration



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

DRAM Command Rate [Auto]

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

DRAM Timing Mode [Auto]

Configuration options: [Auto] [Both]

The following sub-items appear only when you set the **DRAM Timing Mode** item to [Both].

TCL [7 CLK DH_Only]

Configuration options: [Auto] [3 CLK] [4 CLK] [5 CLK] [6 CLK] [7 CLK DH_Only]

TRCD [Auto]

Configuration options: [3 CLK] [4 CLK] [5 CLK] [6 CLK] [Auto]

TRP [Auto]

Configuration options: [3 CLK] [4 CLK] [5 CLK] [6 CLK] [Auto]

TRTP [Auto]

Specifies the read CAS# to precharge time.
Configuration options: [Auto] [2-4 CLK] [3-5 CLK]

TRAS [Auto]

Configuration options: [Auto] [5 CLK] [6 CLK] – [17 CLK] [18 CLK]

TRC [Auto]

Configuration options: [Auto]

TWR [Auto]

Configuration options: [Auto] [3 CLK] [4 CLK] [5 CLK] [6 CLK]

TRRD [Auto]

Configuration options: [2 CLK] [3 CLK] [4 CLK] [5 CLK] [Auto]

TWTR [Auto]

Specifies the write to read delay when accessing the same DIMM.
Configuration options: [1 CLK] [2 CLK] [3 CLK] [Auto]

TRFC0/TRFC1 [Auto]

Configuration options: [Auto] [75ns] [105ns] [127.5ns] [195ns] [327.5ns]

DCT0/DCT1 Strength Config. [Auto]

Configuration options: [Auto] [DCT 0] [DCT 1] [Both]

The following sub-items appear only when you set the **DCT0/DCT1 Strength Config.** item to [DCT 0] or [Both].

DCT0:CKE drive strength. [Auto]
Configuration options: [Auto] [1x] [1.25x] [1.5x] [2x]

DCT0:CS/ODT drive strength. [Auto]
Configuration options: [Auto] [1x] [1.25x] [1.5x] [2x]

DCT0:Address/Command drive strength. [Auto]
Configuration options: [Auto] [1x] [1.25x] [1.5x] [2x]

DCT0:MEMCLK drive strength. [Auto]
Configuration options: [Auto] [0.75x] [1x] [1.25x] [1.5x]

DCT0:Data drive strength. [Auto]
Configuration options: [Auto] [0.75x] [1x] [1.25x] [1.5x]

DCT0:DQS drive strength. [Auto]
Configuration options: [Auto] [0.75x] [1x] [1.25x] [1.5x]

DCT0:Processor on-die termination [Auto]
Configuration options: [Auto] [300 ohms +/- 20%] [150 ohms +/- 20%] [75 ohms +/- 20%]

The following sub-items appear only when you set the **DCT0/DCT1 Strength Config.** item to [DCT 1] or [Both].

DCT1:CKE drive strength. [Auto]
Configuration options: [Auto] [1x] [1.25x] [1.5x] [2x]

DCT1:CS/ODT drive strength. [Auto]
Configuration options: [Auto] [1x] [1.25x] [1.5x] [2x]

DCT1:Address/Command drive strength. [Auto]
Configuration options: [Auto] [1x] [1.25x] [1.5x] [2x]

DCT1:MEMCLK drive strength. [Auto]
Configuration options: [Auto] [0.75x] [1x] [1.25x] [1.5x]

DCT1:Data drive strength. [Auto]
Configuration options: [Auto] [0.75x] [1x] [1.25x] [1.5x]

DCT1:DQS drive strength. [Auto]
Configuration options: [Auto] [0.75x] [1x] [1.25x] [1.5x]

DCT1:Processor on-die termination [Auto]
Configuration options: [Auto] [300 ohms +/- 20%] [150 ohms +/- 20%] [75 ohms +/- 20%]

3.5.10 CPU Voltage [Auto]

Allows selection of the processor Voltage. Use the <+> and <-> keys to adjust the value with a 0.0125V interval.

3.5.11 CPU/NB Voltage [Auto]

Allows selection of the processor Voltage. Use the <+> and <-> keys to adjust the value with a 0.0125V interval.

- The maximum value varies depending on the **OV_CPU** jumper setting. See **2. CPU overvoltage setting** on page 2-22 for details.
- The supported voltage may vary by CPU models.

3.5.12 CPU VDDA Voltage [Auto]

Allows you to select the CPU VDDA voltage. The values range from 2.50V to 2.80V with a 0.10V interval.

3.5.13 DRAM Voltage [Auto]

Allows you to select the DDR2 reference voltage. The values range from 1.80V to 2.50V with a 0.02V interval.

3.5.14 HT Voltage [Auto]

Allows you to select the HyperTransport voltage. The values range from 1.20V to 1.50V with a 0.02V interval.

3.5.15 NB Voltage [Auto]

Allows you to select the Northbridge voltage. The values range from 1.30V to 1.60V with a 0.10V interval.

3.5.16 NB 1.8V Voltage [Auto]

Allows you to select the Northbridge 1.8V voltage. The values range from 1.80V to 2.00V with a 0.20V interval.

3.5.17 SB Voltage [Auto]

Allows you to select the Southbridge voltage. The values range from 1.20V to 1.35V with a 0.15V interval.

- Setting the above voltages to a high level may damage the CPU, memory module, and chipset permanently. Proceed with caution.
- The system may require a better cooling system to work stably under high voltage settings.

3.5.18 CPU Spread Spectrum [Enabled]

[Disabled] Enhances the CPU overclocking ability.

[Enabled] Sets to [Enabled] for EMI control.

3.5.19 PCIE Spread Spectrum [Enabled]

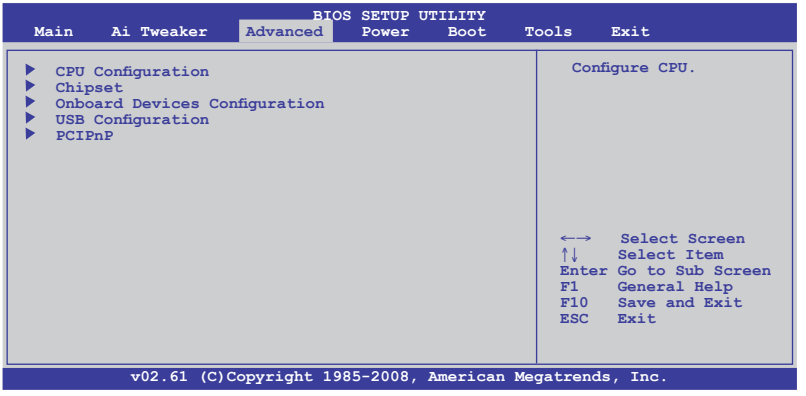
[Disabled] Enhances the PCIE overclocking ability.

[Enabled] Sets to [Enabled] for EMI control.

3.6 Advanced menu

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

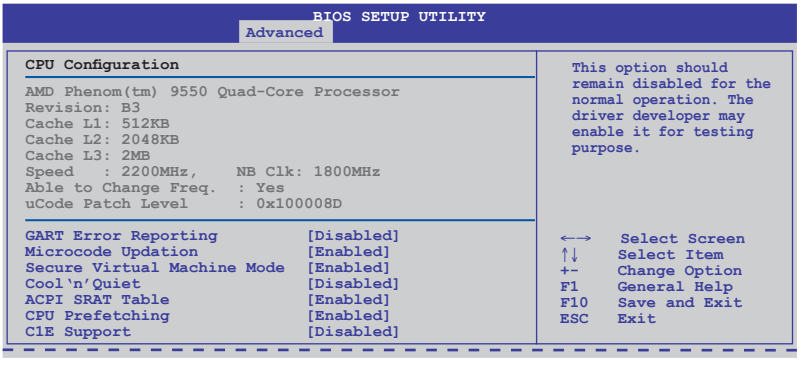
Be cautious when changing the settings of the Advanced menu items. Incorrect field values can cause the system to malfunction.



3.6.1 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.



GART Error Reporting [Disabled]

[Disabled] Disables the GART Error Reporting function.

[Enabled] Enables the GART Error Reporting function.

Microcode Updation [Enabled]

[Disabled] Disables the Microcode Updation function.

[Enabled] Allows the system to update the Microcode automatically, enhancing system performance.

Secure Virtual Machine Mode [Enabled]

[Disabled] Disables the AMD Secure Virtual Machine mode.

[Enabled] Enables the AMD Secure Virtual Machine mode.

Cool'n'Quiet [Disabled]

[Disabled] Disables the AMD Cool'n'Quiet function.

[Enabled] Enables the AMD Cool'n'Quiet function.

ACPI SRAT Table [Enabled]

[Disabled] Disables the building of ACPI SRAT Table.

[Enabled] Enables the building of ACPI SRAT Table.

CPU Prefetching [Enabled]

[Disabled] Disables the CPU prefetching.

[Enabled] Enables the CPU prefetching.

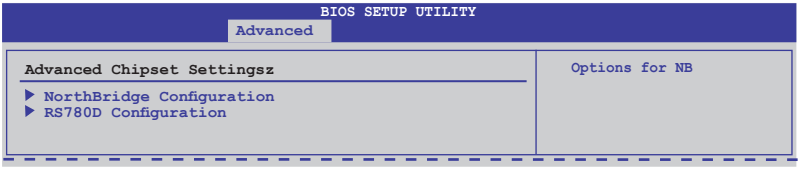
C1E Support [Disabled]

[Disabled] Disables the the Enhanced Halt State support.

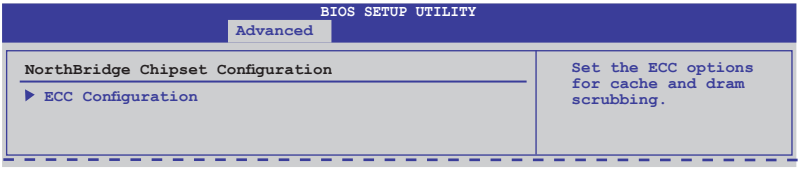
[Enabled] Enables the the Enhanced Halt State support.

3.6.2 Chipset

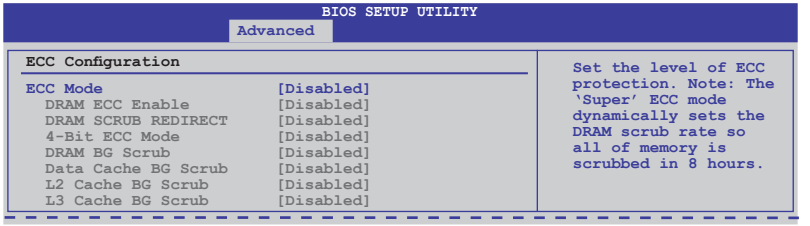
The Chipset menu allows you to change the advanced chipset settings. Select an item then press <Enter> to display the submenu.



North Bridge Chipset Configuration



ECC Configuration

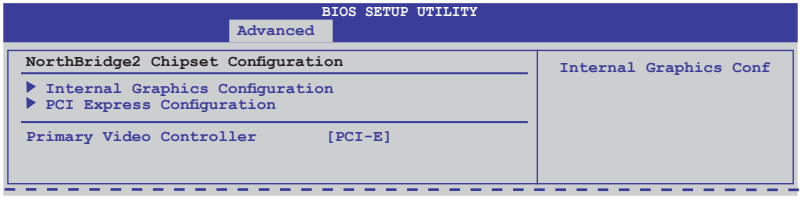


ECC Mode [Disabled]

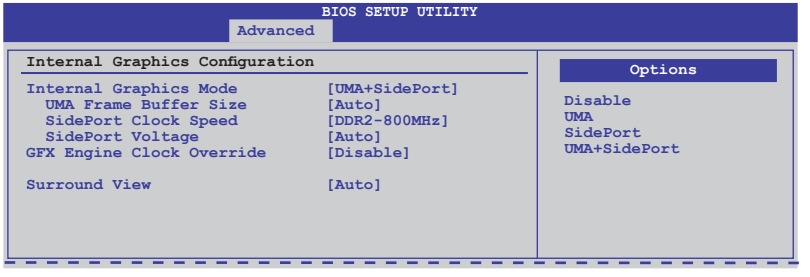
Disables or sets the DRAM ECC mode that allows the hardware to report and correct memory errors.

[Disabled]	Disables the DRAM ECC mode.
[Basic]	Set to [Basic] to adjust ECC mode automatically.
[Good]	Set to [Good] to adjust ECC mode automatically.
[Super]	Set to [Super] to adjust the **DRAM BG Scrub** sub-item manually.
[Max]	Set to [Max] to adjust ECC mode automatically.
[User]	Set to [User] to adjust all the subitems manually.

RS780D Configuration



Internal Graphics Configuration



Internal Graphics Mode [UMA+SidePort]

Configuration options: [Disable] [UMA] [SidePort] [UMA+SidePort]

UMA Frame Buffer Size [Auto]

Configuration options: [Auto] [32MB] [64MB] [128MB] [256MB] [512MB]

SidePort Clock Speed [DDR2-800MHz]

Configuration options: [DDR2-400MHz] [DDR2-533MHz] [DDR2-667MHz] [DDR2-800MHz] [DDR2-1066MHz] [DDR2-1333MHz]

SidePort Voltage [Auto]

Configuration options: [Auto] [1.80V] [1.90V]

GFX Engine Clock Override [Disable]

Allows you to enable or disable the GFX Engine Clock Override support.
Configuration options: [Disable] [Enable]

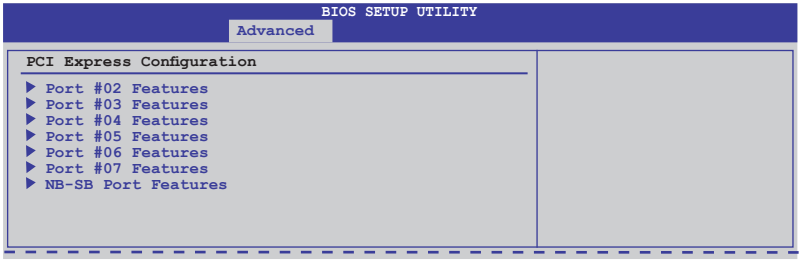
GFX Engine Clock [500]

This item appears only when you enable the GFX Engine Clock Override item.Use the <+> and <-> keys to change the value or type the desired value using the numeric keypad. The values range from 150 to 1500.

Surround View [Disabled]

If you set the PCI Express device as the primary display and enable this item, you may use the internal graphics as the secondary display.
Configuration options: [Disabled] [Enable]

PCI Express Configuration



Port #02/03 Features

Gen2 High Speed Mode [Auto]

Configuration options: [Auto] [Disabled] [Software Initiated] [Advertised RC]

Link ASPM [Disabled]

Configuration options: [Disabled] [L0s] [L1] [L0s & L1]

Link Width [Auto]

Configuration options: [Auto] [x1 Mode.] [x2] [x4] [x8 Mode.] [x16]

Slot Power Limit, W [75]

Use the <+> and <-> keys to change the value or type the desired value using the numeric keypad. The values range from 0 to 255.

Port #04/05/06/07 Features

Gen2 High Speed Mode [Disabled]

Configuration options: [Auto] [Disabled] [Software Initiated] [Advertised RC]

Link ASPM [Disabled]

Configuration options: [Disabled] [L0s] [L1] [L0s & L1]

NB-SB Port Features

NB-SB Link ASPM [Disabled]

Configuration options: [Disabled] [L1]

NP NB-SB VC1 Traffic Support [Disabled]

Configuration options: [Enabled] [Disabled]

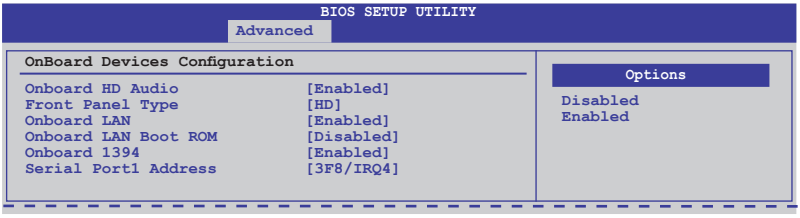
Link Width [Auto]

Configuration options: [Auto] [x1 Mode.] [x2] [x4]

Primary Video Controller [PCI-E]

Allows you to select which graphics controller to use as the primary boot device.
Configuration options: [PCI-E] [PCI] [Onboard]

3.6.3 Onboard Devices Configuration



Onboard HD Audio [Enabled]

[Disabled] Disables the controller.

[Enabled] Enables the High Definition Audio Controller.

The following item appears only when you set the **Onboard HD Audio** item to [Enabled].

Front Panel Type [HD]

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

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

Onboard LAN [Enabled]

[Enabled] Enables the onboard LAN controller.

[Disabled] Disables the onboard controller.

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

Onboard LAN Boot ROM [Disabled]

[Enabled] Enables the onboard LAN Boot ROM.

[Disabled] Disables the onboard LAN Boot ROM.

Onboard 1394 [Enabled]

[Enabled] Enables the onboard 1394 device support.

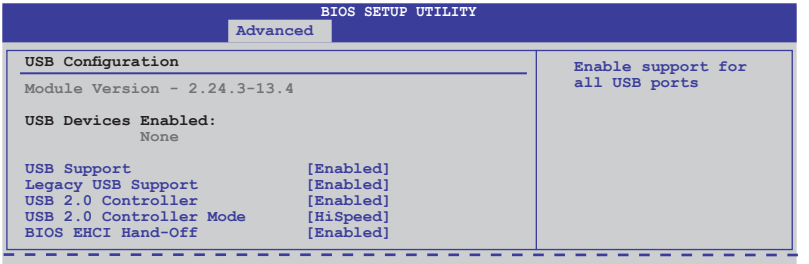
[Disabled] Disables the onboard 1394 device support.

Serial Port1 Address [3F8/IRQ4]

Allows you to select the Serial Port1 base address.
Configuration options: [Disabled] [3F8/IRQ4] [2F8/IRQ3] [3E8/IRQ4] [2E8/IRQ3]

3.6.4 USB Configuration

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



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

USB Support [Enabled]

[Enabled] Enables the USB Host Controllers.

[Disabled] Disables the controllers.

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

Legacy USB Support [Enabled]

[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.

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

[Disabled] Disables the function.

USB 2.0 Controller [Enabled]

[Enabled] Enables the USB 2.0 controller.

[Disabled] Disables the controller.

The following two items appear only when you set the **USB 2.0 Controller** item to [Enabled].

USB 2.0 Controller Mode [HiSpeed]

[FullSpeed] Sets the USB 2.0 controller mode to FullSpeed (12 Mbps).

[HiSpeed] Sets the USB 2.0 controller mode to HiSpeed (480 Mbps).

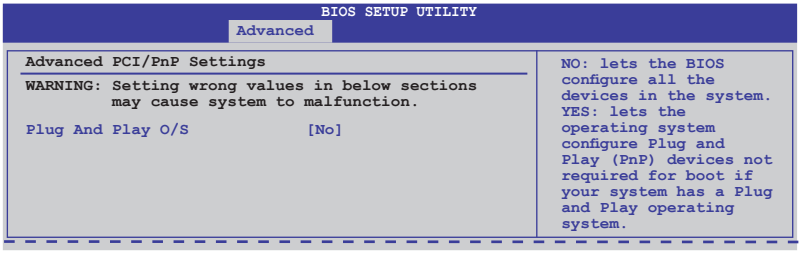
BIOS EHCI Hand-off [Enabled]

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

[Disabled] Disables the function.

3.6.5 PCIPnP

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



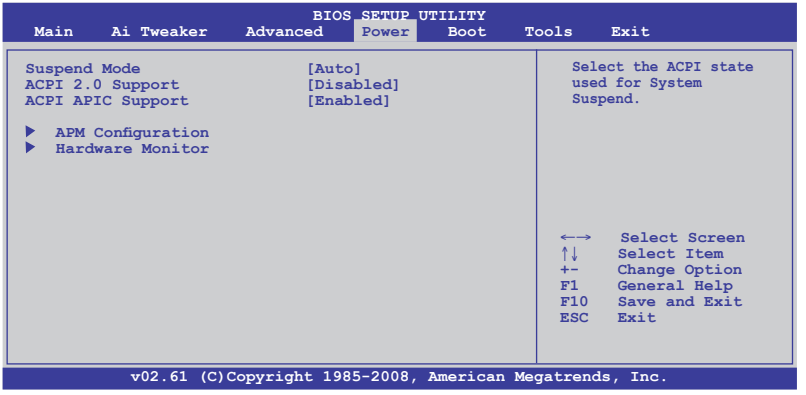
Plug And Play O/S [No]

[Yes] 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.

[No] When set to [No], BIOS configures all the devices in the system.

3.7 Power menu

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



3.7.1 Suspend Mode [Auto]

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

[S1 (POS) only] Sets the APCI suspend mode to S1/POS (Power On Suspend).

[S3 only] Sets the APCI suspend mode to S3/STR (Suspend To RAM).

[Auto] The system automatically configures the ACPI suspend mode.

3.7.2 ACPI 2.0 Support [Disabled]

[Disabled] When set to [Disabled], the system will not add additional tables as per ACPI 2.0 specifications.

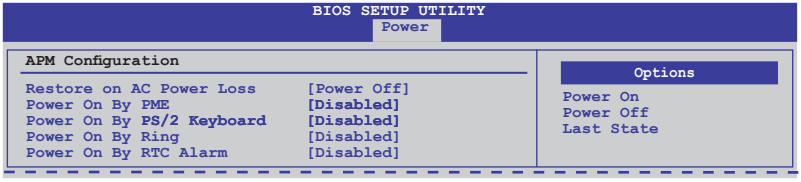
[Enabled] When set to [Enabled], the system adds additional tables as per ACPI 2.0 specifications.

3.7.3 ACPI APIC Support [Enabled]

[Disabled] When set to [Disabled], the system disable the Advanced Configuration and Power Interface (ACPI) support in the Advanced Programmable Interrupt Controller (APIC).

[Enabled] When set to [Enabled], the ACPI APIC table pointer is included in the RSDT pointer list.

3.7.4 APM Configuration



Restore On AC Power Loss [Power Off]

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

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

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

Power On By PME [Disabled]

[Disabled] Disables the PME to wake up from S5 by PCI/PCIE/onboard LAN devices.

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

Power On By PS/2 Keyboard [Disabled]

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

[Space Bar] Allows you to turn on the system by pressing the Space Bar key on the PS/2 keyboard. This feature requires an ATX power supply that provides at least 1A on the +5VSB lead.

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

[Ctrl-Esc] Allows you to turn on the system by pressing the Ctrl key and Esc key of the PS/2 keyboard. This feature requires an ATX power supply that provides at least 1A on the +5VSB lead.

Power On By Ring [Disabled]

[Disabled] The computer could not be powered up when the external modem receives a call while the computer is in Soft-off mode.

[Enabled] The computer could be powered up when the external modem receives a call while the computer is in Soft-off mode.

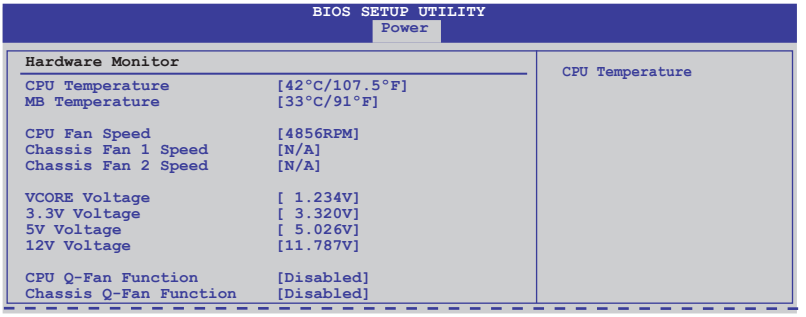
The computer cannot receive or transmit data until the computer and applications are fully running. Thus, connection cannot be made on the first try. Turning an external modem off and then back on while the computer is off causes an initialization string that turns the system power on.

Power On By RTC Alarm [Disabled]

[Disabled] Disables RTC to generate a wake event.

[Enabled] When set to [Enabled], the items **RTC Alarm Date/ RTC Alarm Time** will become user-configurable with set values.

3.7.5 Hardware Monitor



CPU/MB Temperature [xxx°C/xxx°F]

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

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

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

VCORE Voltage, 3.3V Voltage, 5V Voltage, 12V Voltage

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

CPU Q-Fan Function [Disabled]

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

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

The following two items appear only when you set **CPU Q-Fan Function** to [Enabled].

Select Fan Type: [PWR Fan]

[PWR Fan] Sets to [PWR Fan] when using a 4-pin CPU fan.

[DC Fan] Sets to [DC Fan] when using a 3-pin CPU fan.

Quiet CPU Fan Mode [Silent]

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

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

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

Chassis Q-Fan Function [Disabled]

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

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

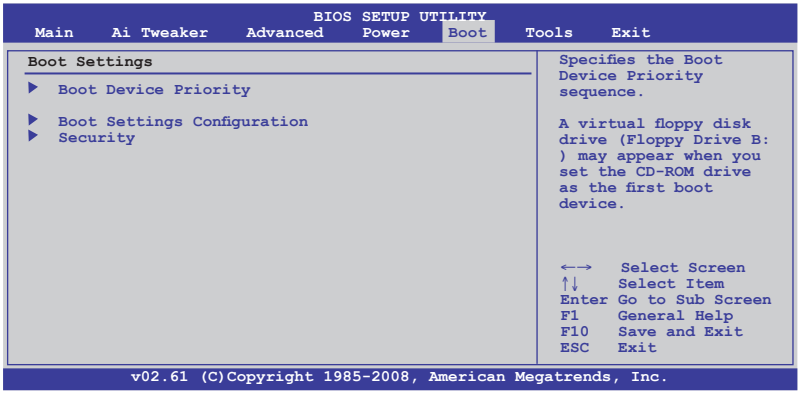
The following item appears only when you set **Chassis Q-Fan Function** to [Enabled].

Quiet Chassis Fan Mode [Silent]

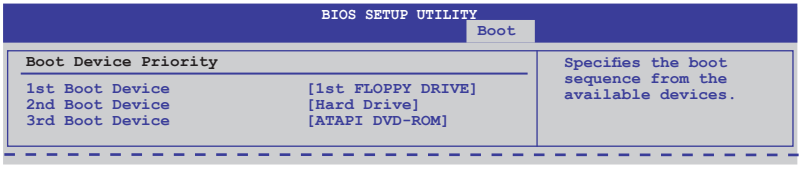
[Performance]	Sets to [Performance] to achieve maximum chassis fan speed.
[Optimal]	Sets to [Optimal] to make the chassis fan automatically adjust depending on the chassis temperature.
[Silent]	Sets to [Silent] to minimize fan speed for quiet chassis fan operation.

3.8 Boot menu

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



3.8.1 Boot Device Priority

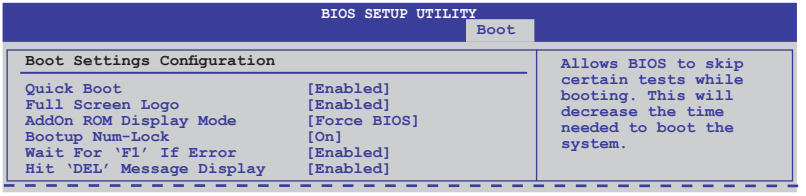


1st ~ xxth Boot Device [1st FlOPPY DRIVE]

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: [1st FlOPPY DRIVE] [Hard Drive] [ATAPI CD-ROM] [Disabled]

Chapter 3

3.8.2 Boot Settings Configuration



Quick Boot [Enabled]

[Disabled] When set to [Disabled], BIOS performs all the POST items.

[Enabled] When set to [Enabled], BIOS skips some power on self tests (POST) while booting to decrease the time needed to boot the system.

Full Screen Logo [Enabled]

[Enabled] Enables the full screen logo display feature.

[Disabled] Disables the full screen logo display feature.

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

AddOn ROM Display Mode [Force BIOS]

[Force BIOS] The third-party ROM messages will be forced to display during the boot sequence.

[Keep Current] The third-party ROM messages will be displayed only if the third-party manufacturer had set the add-on device to do so.

Bootup Num-Lock [On]

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

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

Wait For 'F1' If Error [Enabled]

[Disabled] Disables this function.

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

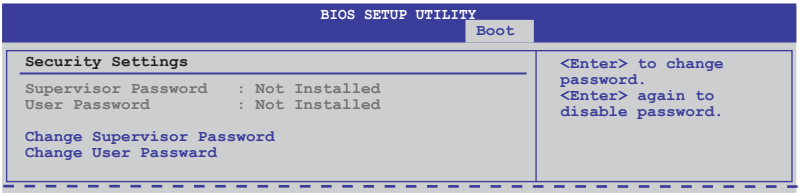
Hit 'DEL' Message Display [Enabled]

[Disabled] Disables this function.

[Enabled] The system displays the message "Press DEL to run Setup" during POST.

3.8.3 Security

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



Change Supervisor Password

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

To set a Supervisor Password:

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

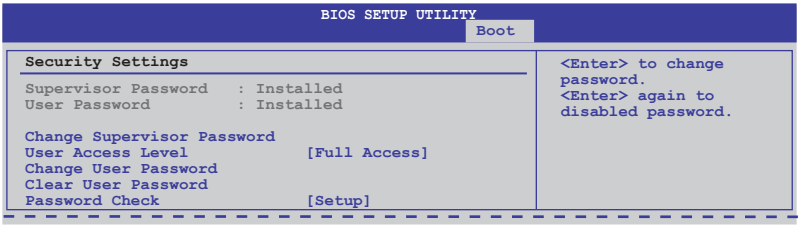
The message **Password Installed** appears after you successfully set your password.

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

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

If you forget your BIOS password, you can clear clear it by erasing the CMOS Real Time Clock (RTC) RAM. See section **2.7 Jumpers** for information on how to erase the RTC RAM.

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



User Access Level [Full Access]

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

[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

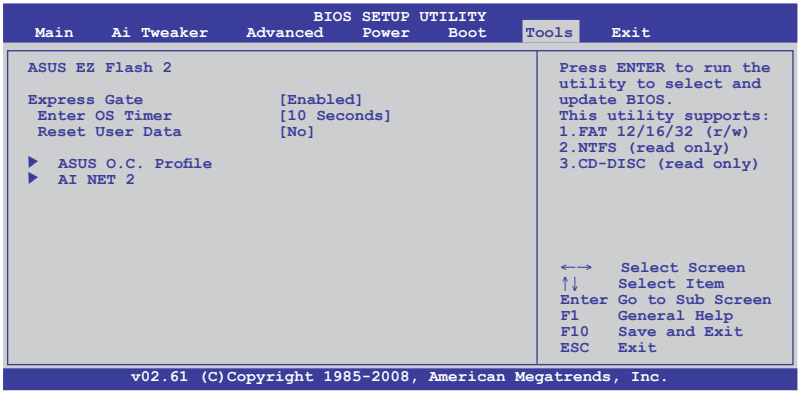
Select this item to clear the user password.

Password Check [Setup]

[Setup]	BIOS checks for user password when accessing the Setup utility.
[Always]	BIOS checks for user password both when accessing Setup and booting the system.

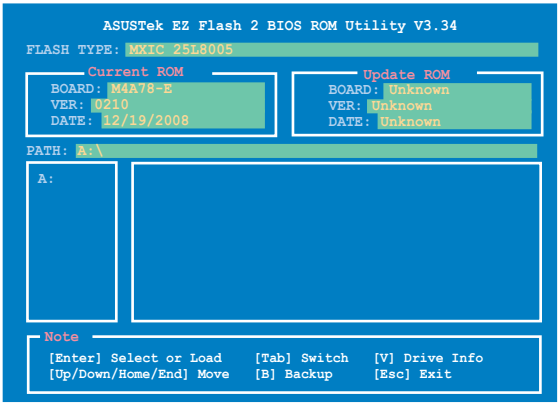
3.9 Tools menu

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



3.9.1 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. Check page 3-5, section 3.2.3 for details.



Chapter 3

3.9.2 Express Gate

Allows you to enable or disable the ASUS Express Gate feature. The ASUS Express Gate feature is a unique instant-on environment that provides quick access to the Internet browser and Skype. Configuration options: [Enabled] [Disabled]

Enter OS Timer [10 Seconds]

Sets countdown duration that the system waits at the Express Gate's first screen before starting Windows or other installed OS. Choose [Prompt User] to stay at the first screen of Express Gate for user action.
Configuration options: [Prompt User] [1 second] [3 seconds] [5 seconds] **[10 seconds]** [15 seconds] [20 seconds] [30 seconds]

Reset User Data [No]

Allows you to clear Express Gate's user data.

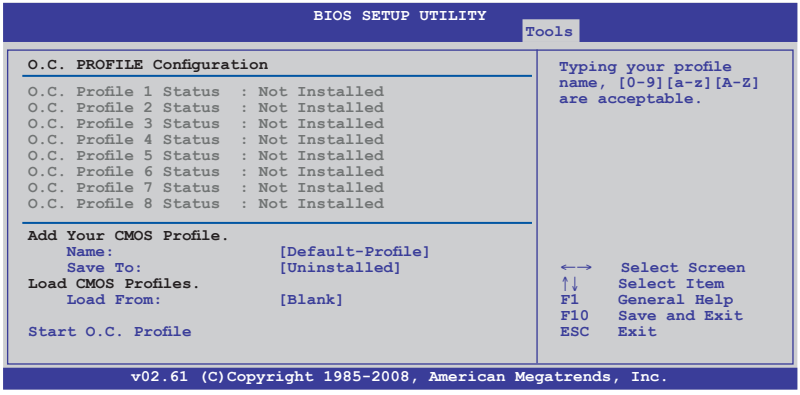
[Reset] When setting this item to [Reset], ensure that you save the setting to the BIOS so that the user data will be cleared the next time you enter the Express Gate. User data includes the Express Gate's settings as well as any personal information stored by the web browser such as bookmarks, cookies,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

[No] Set to [No] to disable the Reset User Data function when entering the Express Gate.

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

3.9.3 ASUS O.C. Profile

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



Add Your CMOS Profile

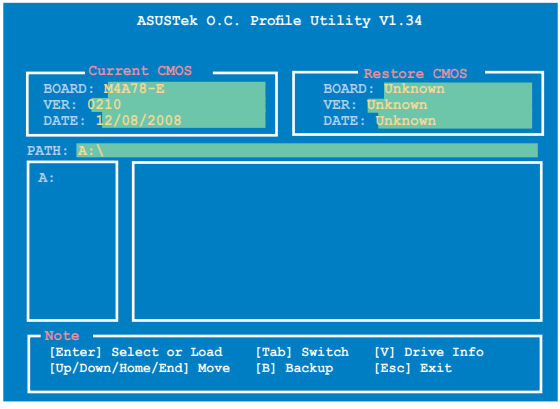
Allows you to save the current BIOS file to the BIOS Flash. In the Name sub-item, type your profile name and press <Enter>, and then choose a profile number to save your CMOS settings in the Save to sub-item.

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

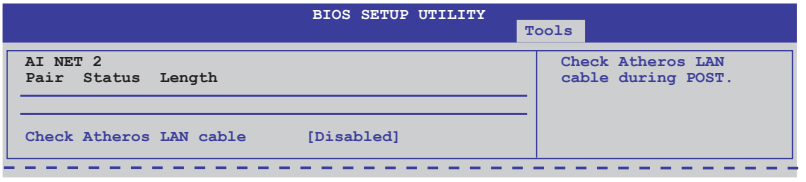
Allows you to run the utility to save and load CMOS. Press <Enter> to run the utility.



Chapter 3

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

3.9.4 AI NET 2



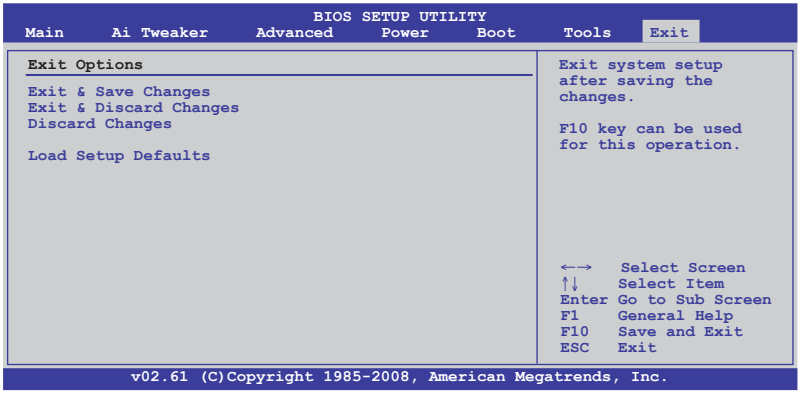
Check Atheros LAN Cable [Disabled]

[Disabled] BIOS will not check the Atheros LAN cable during the Power-On Self-Test (POST).

[Enabled] BIOS checks the Atheros LAN cable during the Power-On Self-Test (POST).

3.10 Exit menu

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



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

Exit & Save Changes

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

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

Exit & Discard Changes

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

Discard Changes

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

Load Setup Defaults

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

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.
- Ensure that you install the Windows® XP Service Pack 2 or later versions before installing the drivers for better compatibility and system stability.

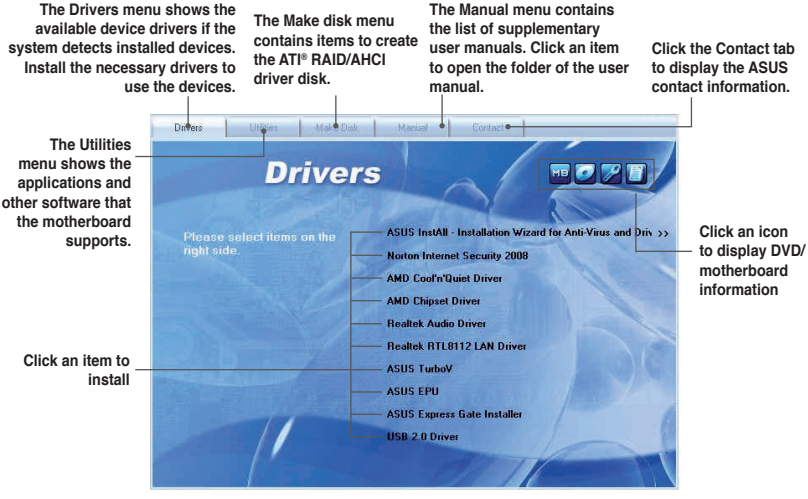
4.2 Support DVD information

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

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

4.2.1 Running the support DVD

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



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

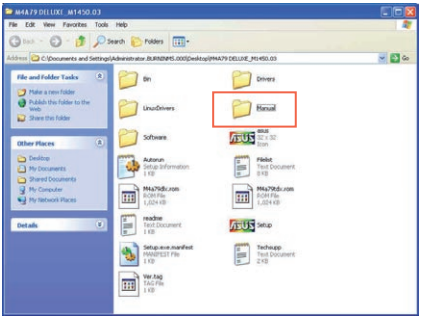
4.2.2 Obtaining the software manuals

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

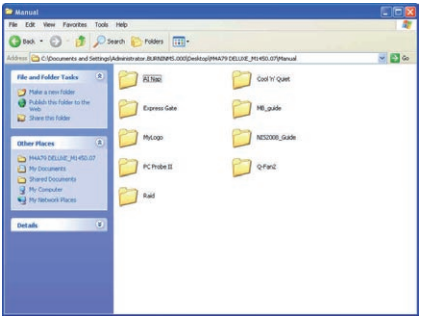
The software manual files are in Portable Document Format (PDF). Install the Adobe® Acrobat® Reader from the Utilities menu before opening the files.

1. Click the support DVD icon.

2. The support DVD contents are displayed in graphical format. Double-click the **Manual** folder.



3. Double-click the folder of your selected manual.



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

Chapter 4

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 Cool 'n' Quiet!™ Technology

The motherboard supports the AMD Cool 'n' Quiet!™ Technology that dynamically and automatically change the CPU speed, voltage, and amount of power depending on the task the CPU performs.

Enabling Cool 'n' Quiet!™ Technology

1. Turn on the system and enter BIOS by pressing the <Del> key during the Power On Self-Tests (POST).
2. Go to **Advanced > CPU Configuration > Cool 'n'Quiet** and set it to [Enabled]. See section **3.6 Advanced menu**.
3. Save your changes and exit BIOS Setup.
4. Reboot your computer and set your Power Option Properties depending on your operating system.

Launching the Cool 'n' Quiet!™ software

1. Install Cool 'n' Quiet!™ software from the motherboard support DVD.
2. Click **Start > All Programs > ASUS > Cool & Quiet > Cool & Quiet**.
3. The Cool 'n' Quiet!™ technology screen appears and displays the current CPU Frequency and CPU Voltage.

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

Chapter 4

4.3.2 Audio configurations

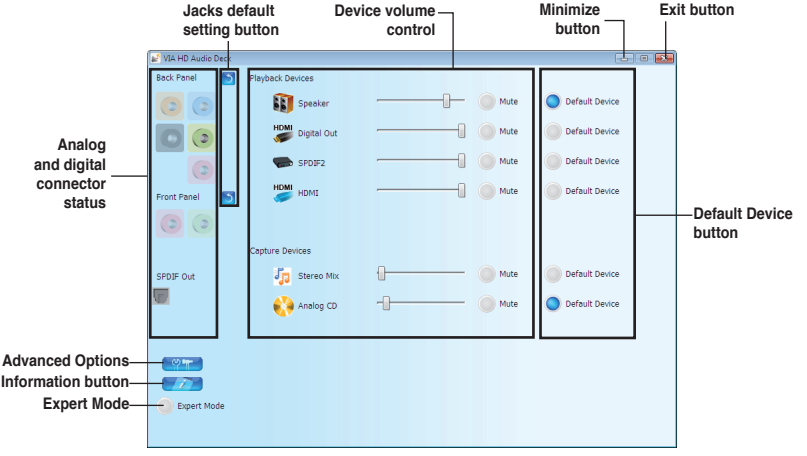
The VIA® High Definition Audio CODEC provides 8-channel audio capability to deliver the ultimate audio experience on your computer. The software provides Jack-Detection,Multi-Streaming, Front Panel Jack-Retasking and S/PDIF Out support.

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

If the VIA audio software is correctly installed, you will find the **VIA HD Audio Deck** icon on the taskbar. Double-click on the icon to display the VIA HD Audio Deck.

VIA HD Audio Deck

A. VIA HD Audio Deck for Windows® Vista™



B. VIA HD Audio Deck for Windows XP

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

Chapter 4

4.3.3 ASUS PC Probe II

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

Launching PC Probe II

1. Install PC Probe II from the motherboard support DVD.
2. Launch PC Probe II by clicking **Start > All Programs > ASUS > PC Probe II > PC Probe II v1.xx.xx**. The PC Probe II main window appears.
3. The PC Probe II icon appears in the Windows® notification area. Click this icon to close or restore the application.

PC Probe II main window

Button	Function
CONFIG	Opens the Configuration window
	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

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

4.3.4 ASUS Express Gate SSD / ASUS Express Gate

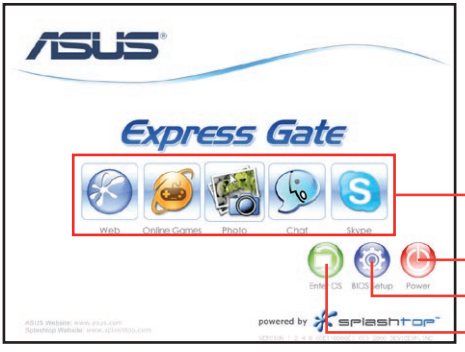
ASUS Express Gate SSD / ASUS Express Gate is an instant-on environment that gives you quick access to the Internet, Skype, and viewing your pictures. Within a few seconds of powering on your computer, you will be at the Express Gate SSD / Express Gate menu where you can start the web browser, Skype,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

Notices about ASUS Express Gate SSD / ASUS Express Gate

- ASUS Express Gate SSD / ASUS Expess Gate supports SATA devices in IDE mode only. See chapter 3 for BIOS setup details.
- ASUS Express Gate SSD / ASUS Express Gate supports SATA devices connected to **motherboard chipset-controlled onboard SATA ports** only. All onboard extended SATA ports and external SATA ports are NOT supported. See chapter 2 for the exact location of onboard SATA ports.
- Ensure to install ASUS Express Gate from the motherboard support DVD before use. ASUS Express Gate SSD requires no installation.
- ASUS Express Gate supports installation on SATA HDDs, USB HDDs and Flash drives. When installed on USB HDDs and Flash drives, connect the drives to the motherboard USB port before turning on the computer.
- The first screen of ASUS Express Gate SSD / ASUS Express Gate supports the screen resolution of 1024 x 768 only.

The First Screen

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



Click any of the application icons to enter Express Gate environment and launch the selected application

Turn off the computer

Enter the motherboard BIOS setup

Continue booting to existing OS when timer counts down to zero (0); click to immediately enter existing OS

Refer to the software manual in the support DVD or click in the Express Gate environment for detailed software instructions.

Chapter 4

4.3.5 ASUS AI Suite

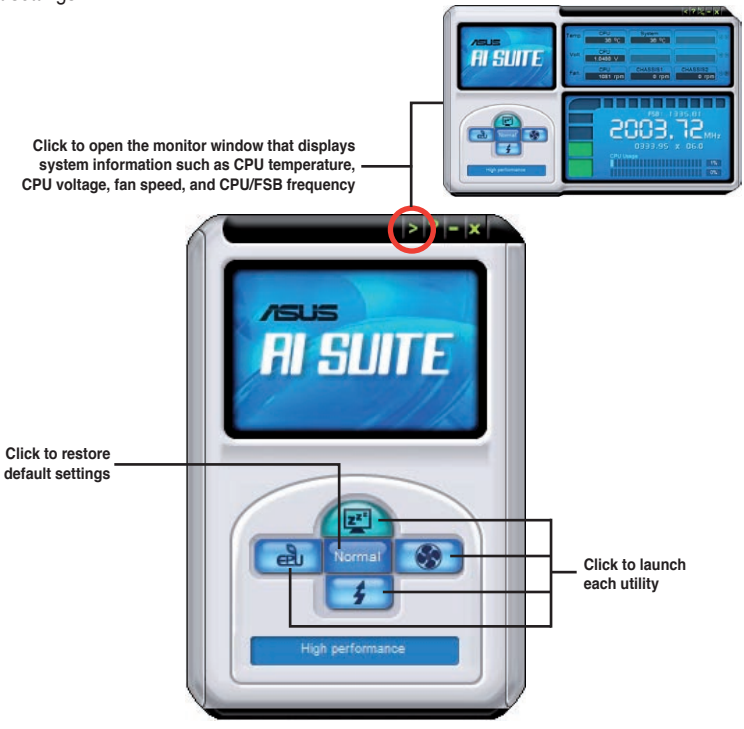
ASUS AI Suite allows you to launch several ASUS utilities easily.

Launching AI Suite

1. Install AI Suite from the motherboard support DVD.
2. Launch AI Suite by clicking **Start** > **All Programs** > **ASUS** > **AI Suite** > **AI Suite v1.xx.xx**. The AI Suite main window appears.
3. The AI Suite icon appears in the Windows® notification area. If you minimize the application main window, click this icon to restore the window.

Using AI Suite

Click each utility button to launch the utility, or click the **Normal** button to restore system default settings.



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

Chapter 4

4.3.6 ASUS EPU

ASUS EPU is an energy-efficient tool that provides you with a total system power-saving solution. It detects the current computer loading and intelligently adjusts the power in real-time. With auto phase switching for components, the EPU automatically provides the most appropriate power usage via intelligent acceleration and overclocking

ASUS EPU provides you with these modes to choose from:

- **Turbo Mode**
- **High Performance Mode**
- **Maximum Power Saving Mode**

When you select **Auto Mode** , the system shifts modes automatically according to the current system status. You can also configure advanced settings for each mode.

Launching EPU

After installing EPU from the motherboard support DVD, double-click the EPU tray icon to launch the program.

EPU main menu

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

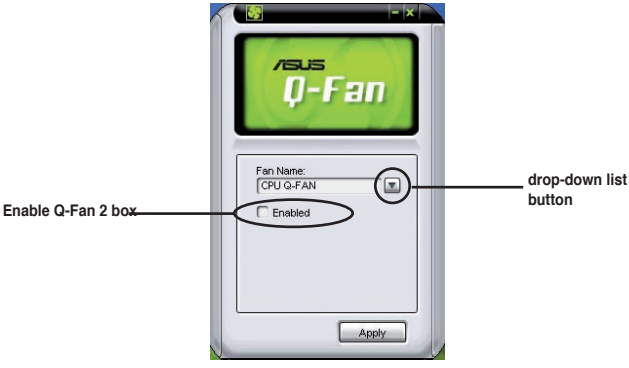
Chapter 4

4.3.7 ASUS Q-Fan 2

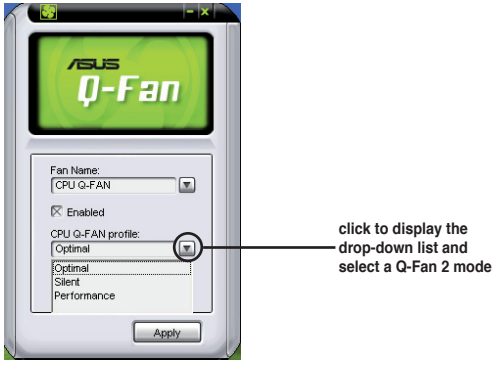
This ASUS Q-Fan 2 Control feature allows you to set the appropriate performance level of the CPU Q-Fan 2 or the Chassis Q-Fan 2 for more efficient system operation. After enabling the Q-Fan 2 function, the fans can be set to automatically adjust depending on the temperature, to decrease fan speed, or to achieve the maximum fan speed.

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 Q-Fan 2 button on the AI Suite maIn window.

Click the drop-down menu button and display the fan names. Select **CPU Q-Fan 2** or **CHASSIS Q-Fan 2**. Click the box of **Enable Q-Fan 2** to activate this function.



Profile list appears after clicking the **Enable Q-Fan 2** box. Click the drop-down list button and select a profile. **Optimal** mode makes the fans adjust speed with the temperature; **Silent** mode minimizes fan speed for quiet fan operation; **Performance** mode boosts the fan to achieve maximal fan speed for the best cooling effect.



Click **Apply** at the bottom to save the setup.

4.3.8 ASUS AI Nap

ASUS AI Nap 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.

Using ASUS AI Nap

1. After installing ASUS AI Suite from the motherboard support DVD, double-click the ASUS Q-Button icon in the Windows notification area to launch the Q-Button user interface.

2. Select **AI Nap**, then click **Apply** to enable AI Nap function.
3. Press the power button to enter AI Nap mode.

   Press the power button again to exit AI Nap mode.

4.3.9 ASUS TurboV

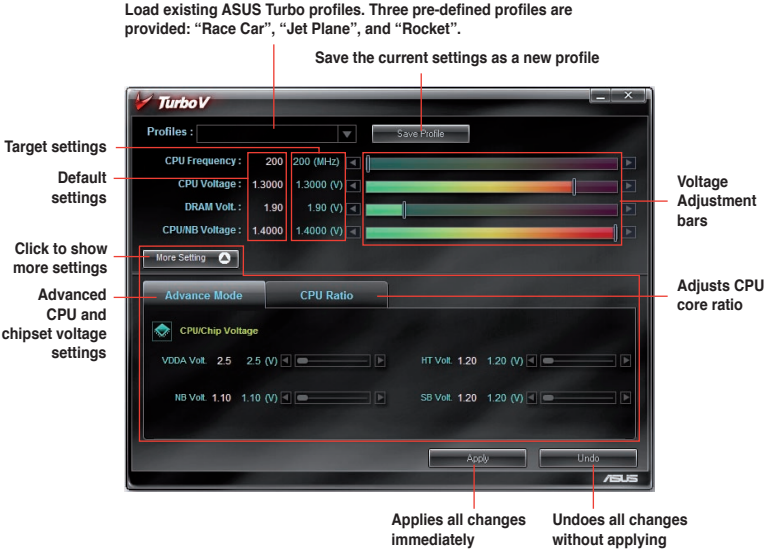
ASUS TurboV allows you to overclock the CPU frequency, CPU voltage, DRAM voltage, and CPU/NB voltage in WIndows® environment and takes effect in real-time without exiting and rebooting the OS.

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 to **High Performance** Mode while using ASUS TurboV.

Launching ASUS TurboV

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



- For advanced overclock ability, adjust first the BIOS items, and then proceed more detailed adjustments using TurboV.
- Refer to the software manual in the support DVD or visit the ASUS website at www.asus.com for detailed software configuration.

- Only AMD® Black Edition processors support the CPU Ratio function.
- Set the **CPU Ratio** item in BIOS to [Auto] before using the CPU Ratio function in TurboV. See your motherboard manual for details.

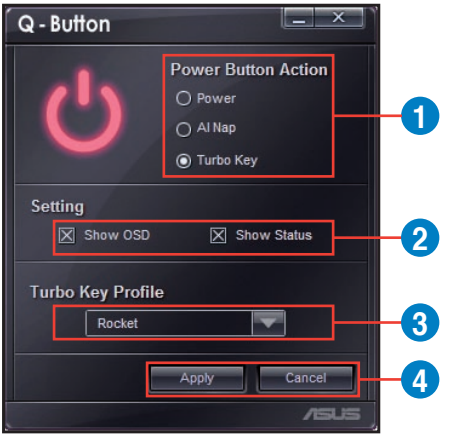
4.3.10 ASUS Turbo Key

ASUS Turbo Key allows the user to turn the PC power button into a physical overclocking button. After the easy setup, Turbo Key can boost performances without interrupting ongoing work or games—with just one touch!

Launching ASUS Turbo Key

1. Install ASUS AI Suite from the motherboard support DVD.
2. Restart your computer. ASUS Q-Button automatically starts after Windows start-up.
3. Double-click the ASUS Q-Button icon in the Windows notification area to launch the Q-Button user interface.

Configuring ASUS Turbo Key



1. Select your desired power button action. Select Power to keep the power button as a common switch. Select AI Nap to enter ASUS AI Nap mode after pressing the power button. Select Turbo Key to boost system performance after pressing the power button.
2. You can choose whether to show Q-Button OSD and status by clicking the check boxes in the Setting section.
3. You can decide the performance boost level by selecting Turbo Key Profile. You can also load personal profiles saved in the ASUS TurboV utility. The default is “Rocket Mode”. See your motherboard manual for ASUS TurboV configurations.
4. Click Apply for all settings to take effect.

Using ASUS Turbo Key

Press the power button on your computer chassis to use the Turbo Key function defined in the Q-Button user interface. Press the power button again to turn off the Turbo Key function.

Press and hold the power button for 4 seconds will turn off your computer.

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

4.4 RAID configurations

The motherboard comes with the AMD SB750 chipset that allows you to configure Serial ATA hard disk drives as RAID sets. The motherboard supports the following RAID configurations: RAID 0, RAID 1, RAID 5, and RAID 10.

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 0+1 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.

For Windows XP, If you want to boot the system from a hard disk drive included in a RAID set, first copy the RAID driver from the support DVD to a floppy disk before you install an operating system to a 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 Setting the RAID item in BIOS

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

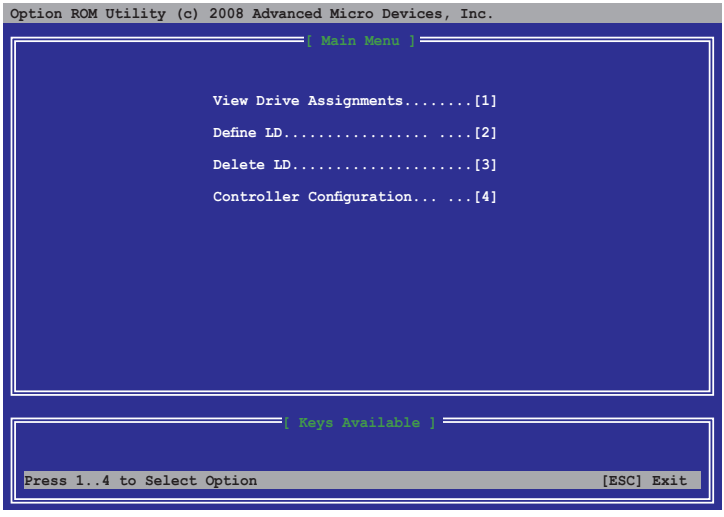
1. Enter the BIOS Setup during POST.
2. Go to the **Main** menu > **Storage Configuration**, and then press <Enter>.
3. Set the **OnChip SATA Type** item to [RAID].
4. Save your changes, and then exit the BIOS Setup.

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

4.4.4 AMD® Option ROM Utility®

To enter the AMD® Option ROM utility®

1. Boot up your computer.
2. Press <Ctrl> + <F> during POST to display the main menu of the utility.



The Main Menu above allows you to select an operation to perform. The Main Menu options include:

- **View Drive Assignments:** shows the status of the hard disk drives.
- **Define LD:** creates a RAID 0, RAID 1, RAID 5 or RAID 10 configuration.
- **Delete LD:** deletes a selected RAID set and partition.
- **Controller Configuration:** Shows the system resources configuration.

Press <1>, <2>, <3>, or <4> to enter the option you need; press <ESC> to exit the utility.

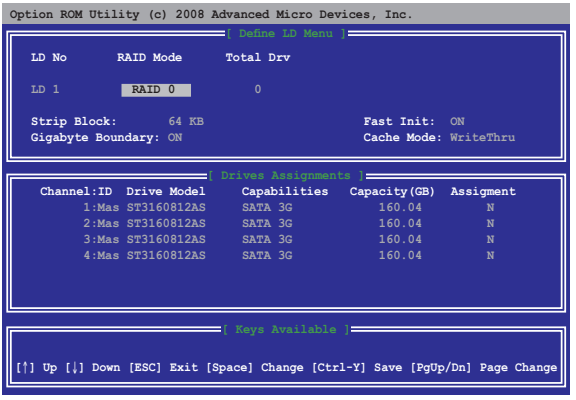
The RAID BIOS setup screens shown in this section are for reference only and may not exactly match the items on your screen.

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

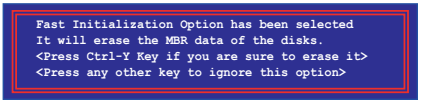
Creating a RAID

To create a RAID 0 set

1. In the Main Menu, press <2> to enter the **Define LD** function.
2. Press <Enter>, and the following screen appears.



3. Use the Up/Down arrow key to highlight the **LD1** item and press <Space> to select a RAID set you would like to create.
4. Move to the **Assignment** item by using the down arrow key and press <Space> to set **Y** to the drives you would like to include in the RAID set.
5. Press <Ctrl> + <Y> to save the setting. The utility prompts the following messages:

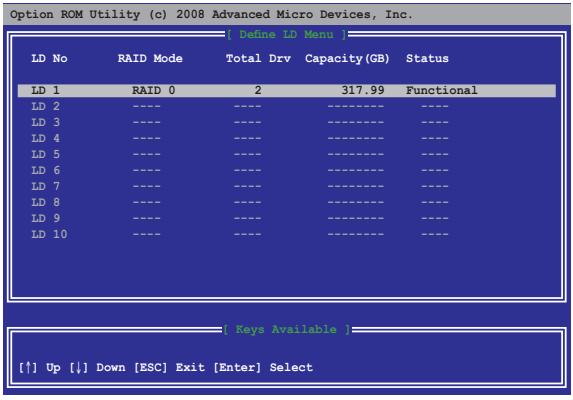


To continue, press <Ctrl> + <Y> to erase MBR and all data on the selected drives. To cancel, press any other key to ignore this option. The utility prompts the following messages:

Press <Ctrl> + <Y> to key in the desired capacity, or press any other key to use the maximum capacity.

6. The utility displays the following screen on the next page.

Chapter 4

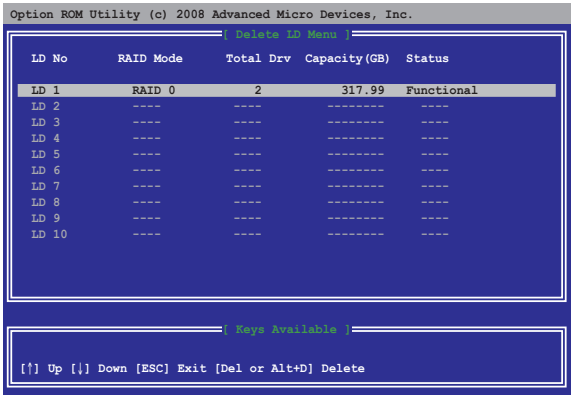


Deleting a RAID configuration

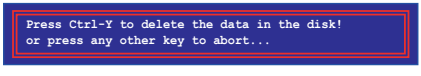
Take caution when deleting a RAID set. You will lose all data on the hard disk drives when you delete a RAID set.

To delete a RAID set

1. In the Main Menu, press <3> to enter the **Delete LD** function.
2. Select the RAID item you want to delete and press <Del> or <Alt> + <D>.



3. The utility prompts the following messages:



Press <Ctrl> + <Y> to delete the RAID set.

4.5 Creating a RAID driver disk

A floppy disk with the RAID driver is required when installing Windows® XP operating system on a hard disk drive that is included in a RAID set. For Windows® Vista operating system, use either a floppy disk or a USB device with the RAID driver.

4.5.1 Creating a RAID driver disk without entering the OS

To create a RAID/SATA driver disk without entering the OS:

1. Boot your computer.
2. Press <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 the succeeding screen instructions to complete the process.

4.5.2 Creating a RAID/SATA 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 **ATI RAID/AHCI 32/64bit WinXP/Vista Driver** to create a RAID driver disk.
4. Insert a floppy disk/USB device into the floppy disk drive/USB port.
5. Follow the succeeding screen instructions to complete the process.

Write-protect the floppy disk to avoid a 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, ensure that you select **SB 750**.
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 **SB 750**.
3. Follow the succeeding screen instructions to complete the installation.

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

- Prepare two identical CrossFireX-ready graphics cards or one CrossFireX-ready dual-GPU graphics card that are ATI® certified.
- Ensure that your graphics card driver supports the ATI CrossFireX technology. Download the latest driver from the AMD website at www.amd.com.
- Ensure that your power supply unit (PSU) can provide at least the minimum power required by your system. See page 2-34 for details.

Visit the ATI Game website at http://game.amd.com for the latest certified graphics card and the supported 3D application list.

5.1.2 Before you begin

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

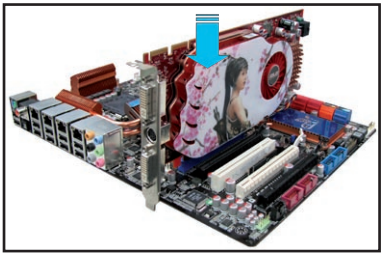
To uninstall all existing graphics card drivers:

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 drivers.
4. For Windows XP, select **Add/Remove**.
   For Windows Vista, select **Uninstall**.
5. Turn off your computer.

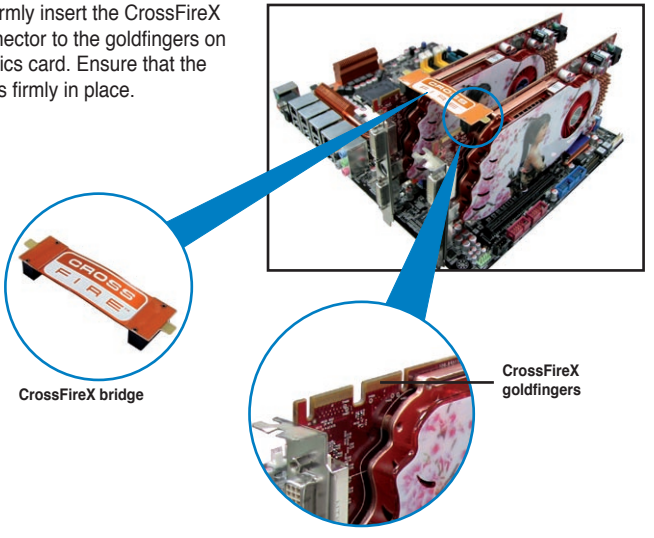
5.1.3 Installing CrossFireX™ graphics cards

- Ensure that your power supply unit (PSU) can provide at least the minimum power required by your system.
- We recommend that you install additional chassis fans for better thermal environment.
- Install only the identical CrossFireX-ready graphics cards that are ATI®-certified. Different types of graphics cards will not work together properly.
- The motherboard layout of this chapter is for reference purpose only and may not exactly match your motherboard.

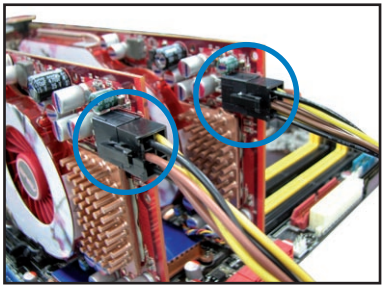
1. Prepare two CrossFireX-ready graphics cards.
2. Insert the two graphics card into the PCIEX16 slots. If your motherboard has more than two PCIEX16 slots, refer to its user manual for the locations of the PCIEX16 slots recommended for multi-graphics card installation.
3. Ensure that the cards are properly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



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



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



5.1.4 Installing the device drivers

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

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

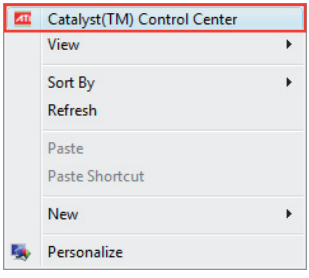
5.1.5 Enabling the ATI® CrossFireX™ technology

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

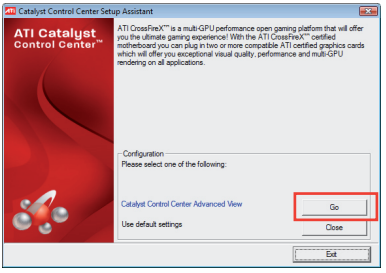
Launching the ATI Catalyst Control Center

To launch the ATI Catalyst Control Center

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

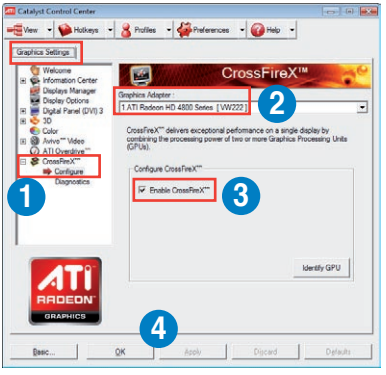


2. The **Catalyst Control Center Setup Assistant** appears when the system detects the existance of multi-graphics cards. Click **Go** to continue to the **Catalyst Control Center Advanced View** window.



Enabling CrossFireX technology

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



5.2 ATI® Hybrid CrossFireX™

The motherboard supports the ATI® Hybrid CrossFire™ technology that allows you to install multi-graphics processing units (GPU) CrossFireX cards.

5.2.1 System requirements

Before using ATI Hybrid CrossFireX, ensure that your system meets the following basic requirements:

- Operating System: Windows® Vista
- Memory capacity: Minimum 1GB
- CPU: AM2+
- On-board graphics card RAM: 256MB

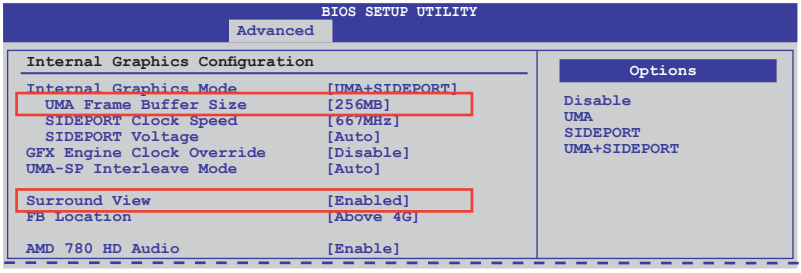
Visit the ATI Game website at http://game.amd.com for the latest certified graphics card and the supported 3D application list.

5.2.2 Before you proceed

Configure the BIOS settings for the graphics card to support ATI Hybrid CrossFireX.

To set Internal Graphics

1. Press <Del> during the Power-On-Self-Test (POST) to enter the BIOS Setup utility.
2. Select **Advanced > Chipset > RS780D Configuration > Internal Graphics Configuration**, set **UMA Frame Buffer Size** to [256M] or above, and set **Surround View** to [Enabled].



3. Press <F10> to save the changes and exit BIOS settings. Select **OK** to confirm.

5.2.3 Installing AMD Chipset Driver

To install the driver that supports Hybrid CrossFireX technology:

1. Insert the Support DVD that comes with your motherboard into the optical drive. The DVD automatically displays the Drivers menu if Autorun is enabled in your computer.

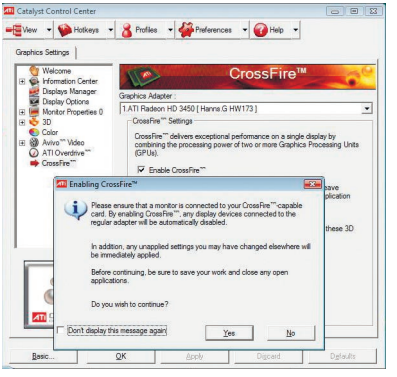
If Autorun is NOT enabled in your computer, browse the contents of the support DVD to locate the file ASSETUP.EXE from the BIN folder. Double-click the ASSETUP.EXE to run the DVD.

2. From the Drivers menu, click **AMD Chipset Driver** to install it. Follow the onscreen instructions to finish the installation.
3. Restart your computer after the installation is completed.
4. When the system restarts, wait for a few seconds for the driver to load automatically.

5.2.4 Using the ATI CATALYST® Control Center

Using an add-on graphics card

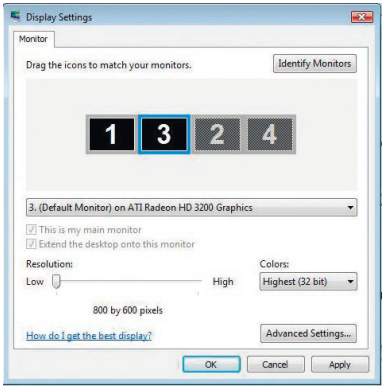
1. Install a graphics card onto your motherboard. Refer to the User Guide that comes with your graphics card for details.
2. Right-click on the Windows® desktop, then click **ATI CATALYST(R) Control Center** from the shortcut menu. The ATI CATALYST Control Center screen appears.
3. Click **Graphics Settings** > **CrossFire™**, then select the **Enable CrossFire™** check box. When a confirmation message pops up, click **Yes**. The screen blacks out for about one minute.
4. Click **OK**. The add-on graphics card is set to be the main monitor.



Using the onboard graphics card

1. Right-click on the Windows® desktop, and then click **ATI CATALYST(R) Control Center** from the shortcut menu. The ATI CATALYST Control Center screen appears.
2. Click **Graphics Settings > CrossFire™**, then clear the **Enable CrossFire™** check box. When a confirmation message pops up, click **Yes**. The screen blacks out for about one minute.
3. Click **OK**.

4. Right-click on the Windows® desktop, then click **Personalize** from the shortcut menu.
5. Click **Display Settings**. Select **[Default Monitor] on ATI Radeon HD 3200 Graphics**, then select the check boxes of **This is my main monitor** and **Extend the desktop onto this monitor**. Click **OK**, and then **Yes** from the confirmation window.
6. Restart the system. Right-click on the Windows® desktop, then click **ATI CATALYST(R) Control Center** from the shortcut menu. The ATI CATALYST Control Center screen appears.



7. Click **Graphics Settings** > **CrossFire™**, then select the **Enable CrossFire™** check box. When a coonfirmation pops up, click **Yes**. The screen blacks out for about one minute.
8. Click **OK**. The onboard graphics card is set to be the main monitor.

If you are using both an add-on and the on-board graphics cards at same time and want to set the onboard graphics card as your main monitor, follow the instructions on the next page.

1. Follow steps 1 to 3 on **Using the onboard graphics card**.
2. From the ATI CATALYST(R) Control Center screen, click **Display Manager** > **Graphics Adapter**. Select **ATI Radeon HD 3200 Graphics [Gabbs, G HW173]**. Click **OK**, and then **Yes** from the confirmation window.
3. Follow steps 6 to step 8 on **Using the onboard graphics card** to complete the process of setting up the onboard graphics card as your main monitor.