

**M4N98TD
EVO**

ASUS®

Motherboard

E5365

First Edition (V1)

February 2010

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Notices

Federal Communications Commission Statement

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

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

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

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



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

Canadian Department of Communications Statement

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

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

REACH

Complying with the REACH (Registration, Evaluation, Authorisation, and Restriction of Chemicals) regulatory framework, we published the chemical substances in our products at ASUS REACH website at <http://green.asus.com/english/REACH.htm>.



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



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

Safety information

Electrical safety

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

Operation safety

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

About this guide

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

How this guide is organized

This guide contains the following parts:

- **Chapter 1: Product introduction**
This chapter describes the features of the motherboard and the new technology it supports.
- **Chapter 2: Hardware information**
This chapter lists the hardware setup procedures that you have to perform when installing system components. It includes description of the switches, jumpers, and connectors on the motherboard.
- **Chapter 3: BIOS setup**
This chapter tells how to change system settings through the BIOS Setup menus. Detailed descriptions of the BIOS parameters are also provided.
- **Chapter 4: Software support**
This chapter describes the contents of the support DVD that comes with the motherboard package and the software.
- **Chapter 5: NVIDIA® SLI™ technology support**
This chapter describes the NVIDIA® SLI™ 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.

Italics

Used to emphasize a word or a phrase.

<Key>

Keys enclosed in the less-than and greater-than sign means that you must press the enclosed key.

Example: <Enter> means that you must press the Enter or Return key.

<Key1> + <Key2> + <Key3>

If you must press two or more keys simultaneously, the key names are linked with a plus sign (+).

Example: <Ctrl> + <Alt> +

M4N98TD EVO specifications summary

| | |
|--------------------------|--|
| CPU | AMD® Socket AM3; Phenom™ II / Athlon™ II / Sempron™ 100 Series Processors AMD® 140W CPU Support Supports 45nm CPU |
| Chipset | NVIDIA nForce® 980a SLI® Supports NVIDIA Clock Calibration (NVCC) function |
| System bus | Up to 5200 MT/s; HyperTransport™ 3.0 |
| Memory | 4 x DIMM, max. 16 GB, DDR3 2000(O.C.) / 1333 / 1066 MHz, ECC / non-ECC, un-buffered memory Dual-channel memory architecture * When you install a total memory of 4 GB capacity or more, Windows® 32-bit operating system may only recognize less than 3 GB. We recommend using a maximum of 3 GB system memory if you are using a Windows® 32-bit OS. ** Refer to www.asus.com or this user manual for the Memory QVL (Qualified Vendors Lists) |
| Multi-GPU support | Supports NVIDIA® SLI™ Technology (dual at x16) Supports NVIDIA® Hybrid SLI™ Technology |
| Expansion slots | 2 x PCI Express 2.0 x16 slots (dual @ x16) 2 X PCI Express x1 slots 2 x PCI 2.2 slots |
| Storage | NVIDIA nForce® 980a SLI® chipset - 1 x Ultra DMA 133 / 100 port - 5 x SATA 3.0 Gb/s ports (Legacy IDE operation is only supported on ports 1–4) - NVIDIA® MediaShield™ RAID supports RAID 0, 1, 0+1, 5, and JBOD - 1 x External SATA 3.0 Gb/s port (SATA On-the-Go) |
| LAN | Broadcom® B5071 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 - Coaxial / Optical S/PDIF Out ports at back I/O - ASUS Noise Filter |
| IEEE 1394 | VIA® VT6308P controller supports 2 x IEEE 1394a ports (one at midboard; one at back panel) |
| USB | 12 x USB 2.0 ports (6 ports at midboard; 6 ports at back panel) |

(continued on the next page)

M4N98TD EVO specifications summary

| | |
|---|--|
| ASUS unique features | <p>ASUS Exclusive Features</p> <ul style="list-style-type: none">- Core Unlocker- MemOK! <p>ASUS Power Solutions</p> <ul style="list-style-type: none">- ASUS 8+1 Phase Power Design- 100% Long-Life Solid Cap.- EPU <p>ASUS Quiet Thermal Solutions</p> <ul style="list-style-type: none">- ASUS Fanless Design: Heat pipe solution- Stack Cool 3+- Fan Xpert <p>ASUS Express Gate</p> <p>ASUS Crystal Sound</p> <ul style="list-style-type: none">- ASUS Noise Filter <p>ASUS EZ DIY</p> <ul style="list-style-type: none">- ASUS Q-Connector- ASUS O.C. Profile- ASUS CrashFree BIOS 3- ASUS EZ Flash 2- ASUS MyLogo 2™- Multi-language BIOS |
| ASUS exclusive overclocking features | <p>ASUS exclusive overclocking tools</p> <ul style="list-style-type: none">- ASUS TurboV- ASUS Turbo Key <p>Precision Tweaker 2:</p> <ul style="list-style-type: none">- vCore: Adjustable CPU voltage at 0.0125V increment- vHT Bus: Adjustable HT voltage at 0.02V increment- vDIMM: Adjustable DRAM voltage at 0.02V increment- vChipset: Adjustable NB voltage at 0.02V increment <p>SFS (Stepless Frequency Selection):</p> <ul style="list-style-type: none">- FSB tuning from 200MHz up to 600MHz at 1MHz increment- Memory tuning from 1066MHz up to 2000MHz- PCIe frequency tuning from 100MHz to 200MHz at 1MHz increment <p>Overclocking protection:</p> <ul style="list-style-type: none">- ASUS C.P.R. (CPU Parameter Recall) |
| Back panel I/O ports | <ul style="list-style-type: none">1 x PS/2 keyboard port (purple)1 x PS/2 mouse port (green)1 x Coaxial S/PDIF Out port1 x Optical S/PDIF Out port1 x External SATA port1 x IEEE 1394a port1 x LAN (RJ-45) port6 x USB 2.0/1.1 ports8-channel Audio I/O ports |

(continued on the next page)

M4N98TD EVO specifications summary

| | |
|--------------------------------|---|
| Internal I/O connectors | 3 x USB connectors support additional 6 USB ports 1 x IDE connector 1 x COM connector 5 x SATA 3.0 Gb/s connectors 1 x CPU Fan connector 2 x Chassis Fan connectors (1 x 4-pin, 1 x 3-pin) 1 x Power Fan connector 1 x IEEE1394a connector 1 x S/PDIF Out header 1 x MemOK! button 1 x Core Unlocker switch Front panel audio connector 24-pin ATX Power connector 8-pin ATX 12V Power connector System Panel (Q-Connector) |
| BIOS features | 8 Mb Flash ROM, AMI BIOS, SPI, PnP, DMI 2.0, WfM 2.0, SM BIOS 2.5, ACPI 2.0a, ASUS EZ Flash 2, ASUS CrashFree BIOS 3 |
| Manageability | WOL by PME, WOR by PME, WOR by Ring, PXE |
| Support DVD contents | Drivers ASUS Utilities ASUS Update Anti-virus software (OEM version) |
| Form factor | ATX form factor: 12 in x 9.6 in (30.5 cm x 24.4 cm) |

*Specifications are subject to change without notice.

A series of horizontal lines for writing, consisting of 30 evenly spaced lines.

Chapter 1

1.1 Welcome!

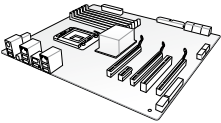
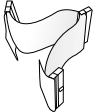
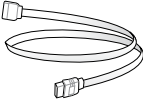


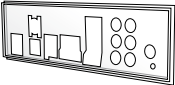


Thank you for buying an ASUS® M4N98TD EVO motherboard!

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 M4N98TD EVO motherboard | 1 x Ultra DMA 133/100 cable |
|  |  |
| 4 x Serial ATA cables | 1 x ASUS SLI™ bridge connector |
|  |  |
| 1 x 2-in-1 ASUS Q-Connector kit | 1 x I/O Shield |
|  |  |
| User guide | Support DVD |



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

1.3 Special features

1.3.1 Product highlights

AMD® Phenom™ II / Athlon™ II / Sempron™ 100 Series Processors (socket AM3)

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 DDR3 1333 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.

NVIDIA nForce® 980a SLI® chipset

NVIDIA nForce® 980a SLI® media and communication processors (MCPs) power the most feature-rich, high performance motherboards for AMD AM3 CPUs. The MCPs support the NVIDIA® Scalable Link Interface (SLI) technology that allows two graphics processing units (GPUs) in a single system. The NVIDIA nFORCE® 980a SLI® chipset also supports six Serial ATA 3.0 Gb/s devices, PCI Express x16 slots with NVIDIA® SLI™ support at dual x16 mode, and up to 12 USB 2.0 ports.

DDR3 2000(O.C.) support

This motherboard supports DDR3 2000(O.C.), 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.

NVIDIA® SLI® Technology support

NVIDIA SLI® (Scalable Link Interface) makes use of the PCI Express 2.0 bus architecture's increased bandwidth and features intelligent hardware and software that allows two GPUs to efficiently work together to deliver earth-shattering, scalable performance. For some applications, this translates into nearly double the performance!

NVIDIA® Hybrid SLI™

Hybrid SLI™ technology is a unique hybrid multi-GPU technology built upon NVIDIA. Hybrid SLI™ turbo-charges performance of NVIDIA discrete graphics cards when combined with this series motherboard GPUs. Hybrid SLI™ is independent on selected GeForce® GPUs. Refer to www.nvidia.com/hybridсли for more information.

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 M4N98TD EVO motherboard has 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.

100% Long-Life Solid Cap.

This motherboard uses all long-life capacitors onboard for durability, improved lifespan, and enhanced thermal capacity.

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! Refer to page 4-6 for details.

ASUS Quiet Thermal Solutions

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

ASUS Fanless Design—Heat pipe solution

The Heat Pipe design effectively directs the heat generated by the chipsets to the heatsink near the back IO ports, where it can be carried away by existing airflow from CPU fan. The purpose of the innovative heat pipe design on this motherboard is that the groundbreaking fanless design does not have lifetime problems as a chipset fan does. Furthermore, it provides options for users to install side-flow fan or passive cooler. The Heat Pipe design is the most reliable fanless thermal solution to date.



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

Up to 20°C (36°F) Cooler—Stack Cool 3+

Stack Cool 3+ is a fanless cooling solution offered exclusively by ASUS. It effectively and noiselessly transfers heat generated by the critical components to the other side of the specially designed PCB (printed circuit board) for effective heat dissipation—making temperatures cooler by up to 20°C.

Fan Xpert

ASUS Fan Xpert intelligently allows you to adjust both the CPU and chassis fan speeds according to different ambient temperatures caused by different climate conditions in different geographic regions and your PC's loading. The built-in variety of useful profiles offer flexible controls of fan speed to achieve a quiet and cool environment. Refer to page 4-5 for details.

ASUS Exclusive Features

Core Unlocker

ASUS Core Unlocker simplifies the activation of a latent AMD® CPU—with just a simple switch or hot key. Enjoy an instant performance boost by simply unlocking the extra cores, without performing complicated BIOS changes. Refer to page 2-21 for details.

MemOK!

Memory compatibility is among the top concerns during computer upgrades. Worry no more. MemOK! is the fastest memory booting solution today. This remarkable memory rescue tool requires nothing but a push of a button to patch memory issues and get your system up and running in no time. The technology is able to determine failsafe settings that can dramatically improve your system booting success. Refer to page 2-20 for details.

ASUS exclusive 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. Refer to page 4-10 for details.

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! Refer to page 4-11 for details.

Express Gate

Express Gate is an ASUS exclusive OS that provides you with quick access to the Internet and key applications before entering the Windows® OS. Refer to pages 3-30 and 4-7 for details.

ASUS EZ DIY

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

ASUS Q-Connector

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.

2.1 Before you proceed

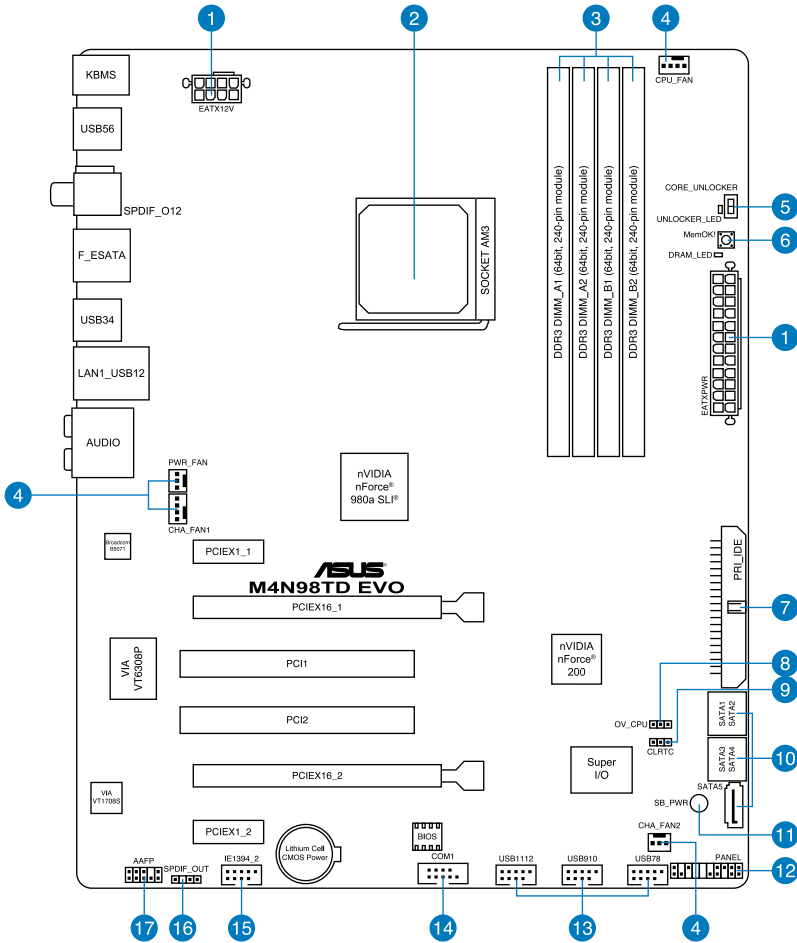
Take note of the following precautions before you install motherboard components or change any motherboard settings.



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

2.2 Motherboard overview

2.2.1 Motherboard layout



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

2.2.2 Layout contents

| Connectors/Jumpers/Slots | Page |
|--|------|
| 1. ATX power connectors (24-pin EATXPWR, 8-pin EATX12V) | 2-31 |
| 2. AM3 CPU socket | 2-5 |
| 3. DDR3 DIMM slots | 2-10 |
| 4. CPU, chassis, and power fan connectors (4-pin CPU_FAN, 4-pin CHA_FAN1, 3-pin CHA_FAN2, 3-pin PWR_FAN) | 2-30 |
| 5. Core Unlocker switch (CORE_UNLOCKER) | 2-21 |
| 6. MemOK! switch | 2-20 |
| 7. IDE connector (40-1 pin PRI_IDE) | 2-26 |
| 8. CPU overvoltage setting (3-pin OV_CPU) | 2-19 |
| 9. Clear RTC RAM (3-pin CLRTC) | 2-18 |
| 10. Serial ATA connectors (7-pin SATA1–5) | 2-27 |
| 11. Standby Power LED | 2-35 |
| 12. System panel connector (20-8 pin PANEL) | 2-33 |
| 13. USB connectors (10-1 pin USB78, USB910, USB1112) | 2-28 |
| 14. Serial port connector (10-1 pin COM1) | 2-29 |
| 15. IEEE 1394a port connector (10-1 pin IE1394_2) | 2-29 |
| 16. Digital audio connector (4-1 pin SPDIF_OUT) | 2-32 |
| 17. Front panel audio connector (10-1 pin AAFP) | 2-32 |

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.

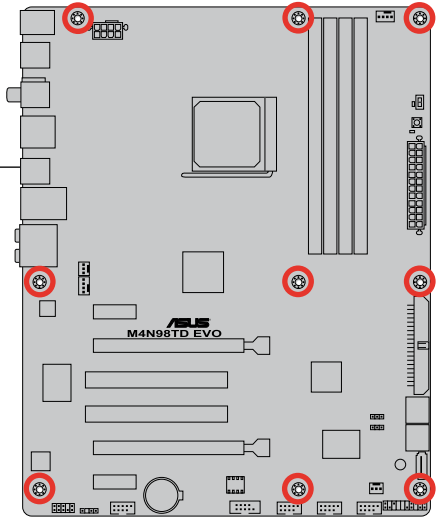
2.2.4 Screw holes

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.

Place this side towards the rear of the chassis



2.3 Central Processing Unit (CPU)

The motherboard comes with an AM3 socket designed for AMD® Phenom™ II / Athlon™ II / Sempron™ 100 Series Processors.



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

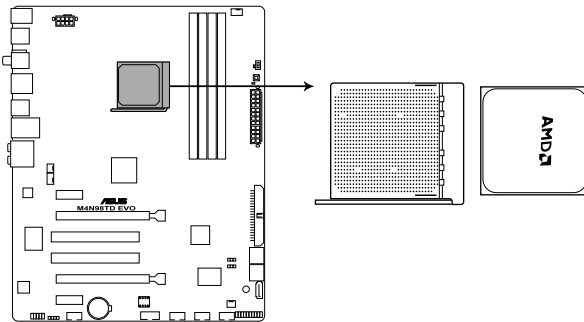


The AM3 socket has a different pinout from the 940-pin socket designed for the AMD Opteron processor. Ensure that you use a CPU designed for the AM3 socket. The CPU fits in only one correct orientation. DO NOT force the CPU into the socket to prevent bending the connectors on the socket and damaging the CPU!

2.3.1 Installing the CPU

To install a CPU:

1. Locate the CPU socket on the motherboard.

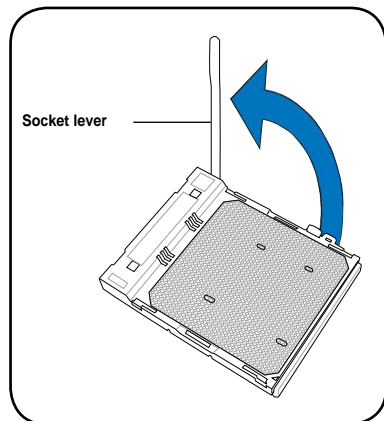


M4N98TD EVO CPU socket AM3

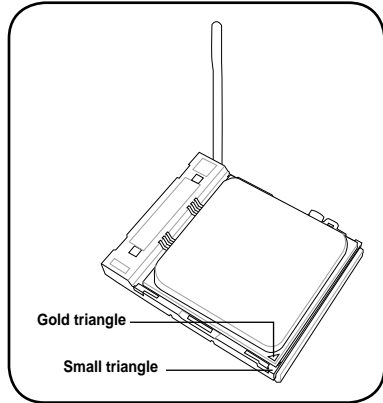
2. Unlock the socket by pressing the lever sideways, then lift it up to a 90° angle.



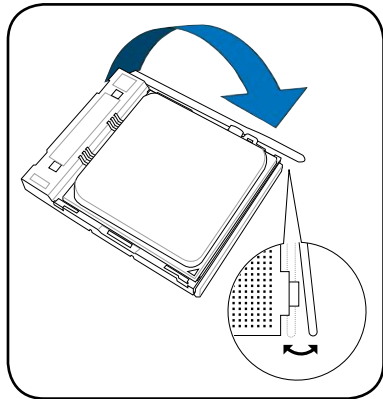
Ensure that the socket lever is lifted up to a 90° angle; otherwise, the CPU will not fit in completely.



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.



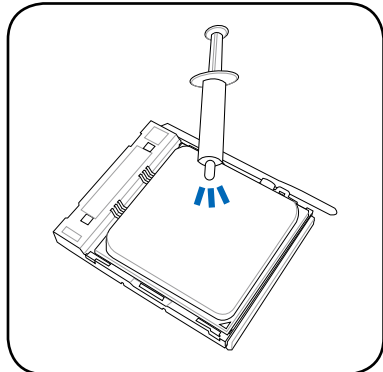
Some heatsinks come with pre-applied thermal paste. If so, skip this step.



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



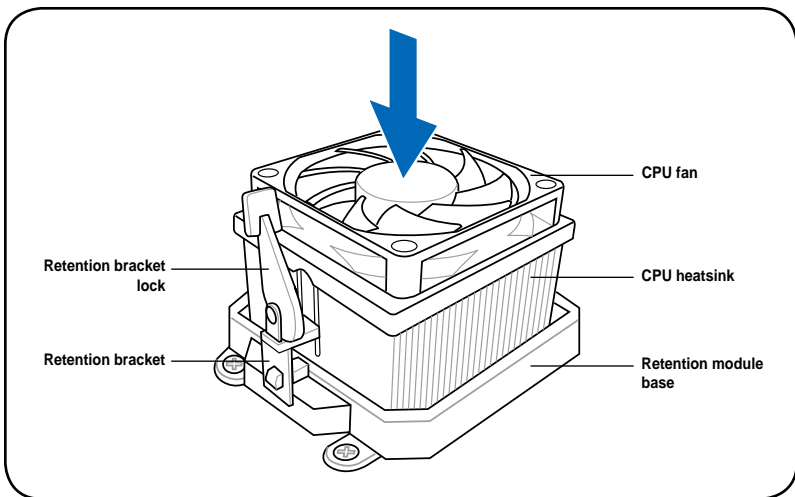
Ensure that you use only AMD-certified heatsink and fan assembly.

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.

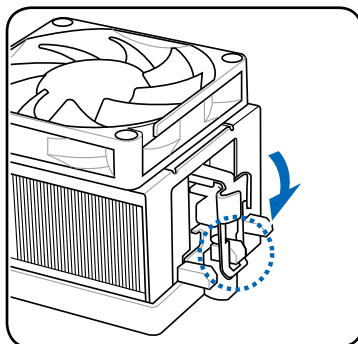


- The retention module base is already installed on the motherboard upon purchase.
- You do not have to remove the retention module base when installing the CPU or installing other motherboard components.
- If you purchased a separate CPU heatsink and fan assembly, ensure that a Thermal Interface Material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

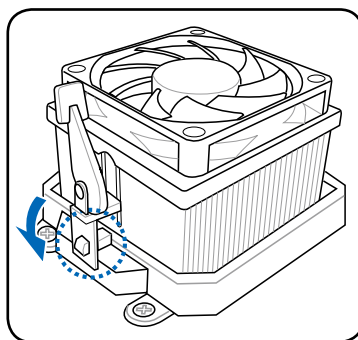
2. Attach one end of the retention bracket to the retention module base.



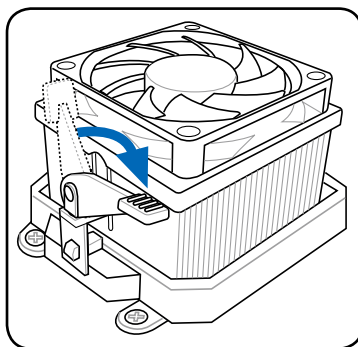
3. Align the other end of the retention bracket (near the retention bracket lock) to the retention module base. A clicking sound denotes that the retention bracket is in place.



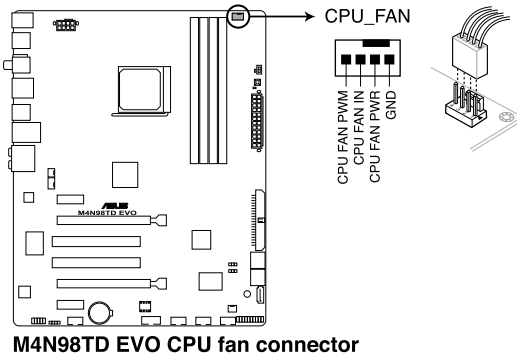
Ensure that the fan and heatsink assembly perfectly fits the retention mechanism module base, otherwise you cannot snap the retention bracket in place.



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.



- 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.

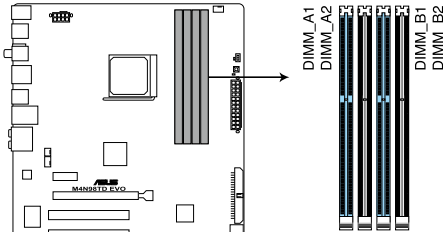
2.4 System memory

2.4.1 Overview

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

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

The figure illustrates the location of the DDR3 DIMM sockets:



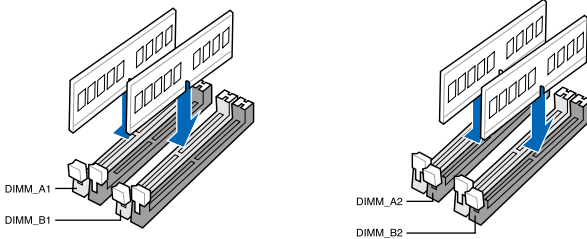
M4N98TD EVO 240-pin DDR3 DIMM sockets

Recommended memory configurations

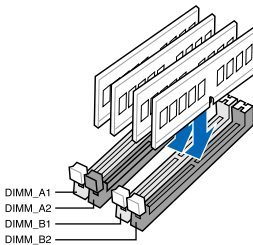
One DIMM:

You may install one memory module in any slot as a single-channel operation.

Two DIMMs (dual-channel operation):



Four DIMMs (dual-channel operation):



2.4.2 Memory configurations

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



- You may install varying memory sizes in Channel A and Channel B. The system maps the total size of the lower-sized channel for the dual-channel configuration. Any excess memory from the higher-sized channel is then mapped for single-channel operation.
- We recommend that you install the memory modules from the blue 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.For more details, refer to the Microsoft® support site at <http://support.microsoft.com/kb/929605/en-us>.
- This motherboard does not support DIMMs made up of 512Mb (64MB) chips or less (Memory chip capacity counts in Megabit, 8 Megabit/Mb = 1 Megabyte/MB).



- The default memory operation frequency is dependent on its Serial Presence Detect (SPD), which is the standard way of accessing information from a memory module. Under the default state, some memory modules for overclocking may operate at a lower frequency than the vendor-marked value. To operate at the vendor-marked or at a higher frequency, see section **3.5 Ai Tweaker menu** for manual memory frequency adjustment.
- For system stability, use a more efficient memory cooling system to support a full memory load (4 DIMMs) or overclocking condition.

M4N98TD EVO Motherboard Qualified Vendors Lists (QVL) DDR3-1600 MHz capability

| Vendor | Part No. | Size | SS/DS | Chip Brand | Chip NO. | Timing | Voltage | DIMM socket support (Optional) | | |
|--------------|--------------------------|---------------|-------|------------|----------|----------|-----------|--------------------------------|--------|--------|
| | | | | | | | | 1 DIMM | 2 DIMM | 4 DIMM |
| A-DATA | AD31600E001GMU | 3GB(3 x 1GB) | SS | - | - | 8-8-8-24 | 1.65-1.85 | * | * | * |
| A-DATA | AD31600F002GMU(XMP) | 6GB(3 x 2GB) | DS | - | - | 7-7-7-20 | 1.75-1.85 | * | * | * |
| CORSAIR | CMG4GX3M2A1600C6 | 4GB(2x 2GB) | DS | - | - | 6-6-6-18 | 1.65 | * | * | * |
| CORSAIR | CMD4GX3M2A1600C8(XMP) | 4GB(2 x 2GB) | DS | - | - | 8-8-8-24 | 1.65 | * | * | * |
| Crucial | BL12864BA1608.8SFB(XMP) | 1GB | SS | - | - | - | 1.8 | * | * | * |
| Crucial | BL25664BN1608.16FF(XMP) | 2GB | DS | - | - | 8-8-8-24 | 1.65 | * | * | * |
| G.SKILL | F3-12800CL9D-2GBNQ | 2GB(2 x 1GB) | SS | - | - | - | 1.6 | * | * | * |
| G.SKILL | F3-12800CL7D-4GBRHX(XMP) | 4GB(2 x 2GB) | DS | - | - | 7-7-7-24 | 1.65 | * | * | * |
| KINGMAX | FLGD45F-B8MF7(XMP) | 1GB | SS | - | - | - | - | * | * | * |
| KINGMAX | FLGE85F-B8MF7(XMP) | 2GB | DS | - | - | - | - | * | * | * |
| KINGSTON | KHX1600C9D3K3/12GX(XMP) | 12GB(3 x 4GB) | DS | - | - | - | 1.65 | * | * | * |
| KINGSTON | KHX1600C9D3K3/12GX(XMP) | 12GB(3 x 4GB) | DS | - | - | 9 | 1.65 | * | * | * |
| OCZ | OCZ3P1600LV3GK | 3GB(3 x 1GB) | SS | - | - | 7-7-7 | 1.65 | * | * | * |
| Super Talent | WP160UX4G8(XMP) | 4GB(2 x 2GB) | DS | - | - | 8 | - | * | * | * |
| Super Talent | WP160UX4G9(XMP) | 4GB(2 x 2GB) | DS | - | - | 9 | - | * | * | * |

M4N98TD EVO Motherboard Qualified Vendors Lists (QVL) DDR3-1333 MHz capability

| Vendor | Part No. | Size | SS/DS | Chip Brand | Chip NO. | Timing | Voltage | DIMM socket support (Optional) | | |
|--------------|--|--------------|-------|------------|--------------------|----------|-----------|--------------------------------|--------|--------|
| | | | | | | | | 1 DIMM | 2 DIMM | 4 DIMM |
| A-DATA | AD3133301GOU | 1GB | SS | A-DATA | AD30908C8D-15IG | - | - | * | * | * |
| A-DATA | AX3U1333P82G7-2P | 4GB(2 x 2GB) | DS | - | - | 7-7-7-20 | 1.65-1.85 | * | * | * |
| A-DATA | AD31333E002G0U | 6GB(3 x 2GB) | DS | - | - | 7-7-7-20 | 1.65-1.85 | * | * | * |
| A-DATA | AX3U1333P82G7-3P | 6GB(3 x 2GB) | DS | - | - | 7-7-7-20 | 1.65-1.85 | * | * | * |
| Apacer | 78.A1GC6.9L1 | 2GB | DS | Apacer | AM5D5808DEWSBG | 9 | - | * | * | * |
| CORSAIR | TR3X3G1333C9 (Ver2.1) | 3GB(3 x 1GB) | SS | - | - | 9-9-9-24 | 1.5 | * | * | * |
| CORSAIR | BoxP/N:TWIN3X2048-1333C9 (CM3X1024-1333C9)Ver1.1 | 2GB(2 x 1GB) | DS | - | - | 9-9-9-24 | 1.70 | * | * | * |
| Crucial | CT12864BA1339.8SFD | 1GB | SS | MICRON | MT8JF12864AY-1G4D1 | - | - | * | * | * |
| Crucial | CT25664BA1339.16SFD | 2GB | DS | MICRON | D9JNM | - | - | * | * | * |
| ELPIDA | EBJ10UE8BDF0-DJ-F | 1GB | SS | ELPIDA | J1108BDSE-DJ-F | - | - | * | * | * |
| ELPIDA | EBJ21UE8BDF0-DJ-F | 2GB | DS | ELPIDA | J1108BDSE-DJ-F | - | - | * | * | * |
| G.SKILL | F3-10600CL8D-2GBHK | 2GB(2 x 1GB) | SS | - | - | - | 1.65 | * | * | * |
| G.SKILL | F3-10666CL8D-4GBHK(XMP) | 4GB(2 x 2GB) | DS | - | - | 8-8-8-21 | 1.5-1.6 | * | * | * |
| G.SKILL | F3-10666CL8D-4GBRM(XMP) | 4GB(2 x 2GB) | DS | - | - | 8-8-8-21 | 1.5-1.6 | * | * | * |
| G.SKILL | F3-10666CL9T-6GBNQ | 6GB(3 x 2GB) | DS | - | - | 9-9-9-24 | 1.5 | * | * | * |
| GEIL | GG34GB1333C9DC | 4GB(2 x 2GB) | DS | GEIL | GL1L128M88BA12N | 9-9-9-24 | 1.3 | * | * | * |
| GEIL | GV34GB1333C7DC | 4GB(2 x 2GB) | DS | - | - | 7-7-7-24 | 1.5 | * | * | * |
| Hynix | HMT112U6BFR8C-H9 | 1GB | SS | Hynix | H5TQ1G83BFR | 9 | - | * | * | * |
| Hynix | HMT125U6BFR8C-H9 | 2GB | DS | Hynix | H5TQ1G83BFRH9C | 9 | - | * | * | * |
| KINGMAX | FLFD45F-B8K9 | 1GB | SS | KingMax | KFB8FNGBF-ANX-15A | - | - | * | * | * |
| KINGMAX | FLFE85F-B8K9 | 2GB | DS | KingMax | KFB8FNGBF-ANX-15A | - | - | * | * | * |
| KINGSTON | KVR1333D3N9/1G | 1G | SS | Kingston | D1288JELDPGD9U | - | 1.5 | * | * | * |
| KINGSTON | KVR1333D3N9/4G | 4GB | DS | SAMSUNG | K4B2G0846B-HCH9 | 9 | 1.5 | * | * | * |
| MICRON | MT8JTF12864AZ-1G4F1 | 1GB | SS | MICRON | 9FF22 D9KPT | 9 | - | * | * | * |
| MICRON | MT16JTF25664AZ-1G4F1 | 2GB | DS | MICRON | 9FF22 D9KPT | 9 | - | * | * | * |
| OCZ | OCZ3P1333LV3GK | 3GB(3 x 1GB) | SS | - | - | 7-7-7 | 1.65 | * | * | * |
| PSC | AL7F8G73D-DG1 | 1GB | SS | PSC | A3P1GF3DGF | - | - | * | * | * |
| PSC | AL8F8G73D-DG1 | 2GB | DS | PSC | A3P1GF3DGF | - | - | * | * | * |
| SAMSUNG | M378B2873EH1-CH9 | 1GB | SS | SAMSUNG | K4B1G0846E | - | - | * | * | * |
| SAMSUNG | M378B5673EH1-CH9 | 2GB | DS | SAMSUNG | K4B1G0846E | - | - | * | * | * |
| Super Talent | W1333UX2G8(XMP) | 2GB(2 x 1GB) | SS | - | - | 8 | 1.8 | * | * | * |

M4N98TD EVO Motherboard Qualified Vendors Lists (QVL) DDR3-1066 MHz capability (continued)

| Vendor | Part No. | Size | SS/DS | Chip Brand | Chip NO. | Timing | Voltage | DIMM socket support (Optional) | | |
|----------|----------------------|------|-------|------------|-----------------|--------|---------|--------------------------------|--------|--------|
| | | | | | | | | 1 DIMM | 2 DIMM | 4 DIMM |
| Crucial | CT12864BA1067.8FF | 1GB | SS | MICRON | D9KPT | 7 | - | • | • | • |
| Crucial | CT25664BA1067.16FF | 2GB | DS | MICRON | D9KPT | 7 | - | • | • | • |
| ELPIDA | EBJ10UE8EDF0-AE-F | 1GB | SS | ELPIDA | J1108EDSE-DJ-F | - | - | • | • | • |
| ELPIDA | EBJ21UE8EDF0-AE-F | 2GB | DS | ELPIDA | J1108EDSE-DJ-F | - | - | • | • | • |
| Hynix | HMT112U6AFP8C-G7N0 | 1GB | SS | HYNIX | H5TQ1G83AFPG7C | 7 | - | • | • | • |
| Hynix | HMT125U6AFP8C-G7N0 | 2GB | DS | HYNIX | H5TQ1G83AFPG7C | 7 | - | • | • | • |
| KINGSTON | KVR1066D3N7/2G | 2GB | DS | KINGSTON | D1288JEKAPGA7U | 7 | 1.5 | • | • | • |
| KINGSTON | KVR1066D3N7/2G | 2GB | DS | ELPIDA | J1108BABG-DJ-E | - | 1.5 | • | • | • |
| MICRON | MT8JTF12864AZ-1G1F1 | 1GB | SS | MICRON | 8ZF22 D9KPV | 7 | - | • | • | • |
| MICRON | MT16JTF25664AY-1G1D1 | 2GB | DS | MICRON | 7VD22 | 7 | - | • | • | • |
| SAMSUNG | M378B5273BH1-CF8 | 4GB | DS | SAMSUNG | K4B2G0846B-HCF8 | 8 | 1.5 | • | • | • |



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

DIMM support:

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



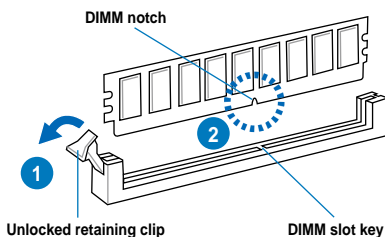
Visit the ASUS website for the latest QVL.

2.4.3 Installing a DIMM



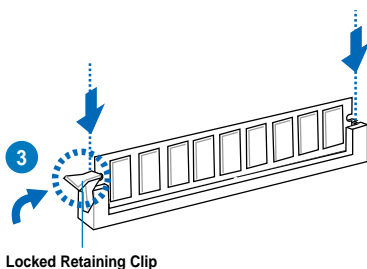
Ensure to unplug the power supply before adding or removing DIMMs or other system components. Failure to do so may cause severe damage to both the motherboard and the components.

1. Unlock a DIMM socket by pressing the retaining clip outward.
2. Align a DIMM on the socket such that the notch on the DIMM matches the DIMM slot key 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 in the wrong direction to avoid damaging the DIMM.

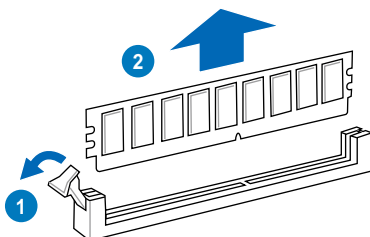
3. Hold the DIMM by both of its ends, then insert the DIMM vertically into the socket. Apply force to both ends of the DIMM simultaneously until the retaining clip snaps back into place, and the DIMM cannot be pushed in any further to ensure proper sitting of the DIMM.



Always insert the DIMM into the socket VERTICALLY to prevent DIMM notch damage.

2.4.4 Removing a DIMM

1. Press the retaining clip outward to unlock the DIMM.
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 | Reserved |
| 7 | 15 | Reserved |
| 8 | 3 | System CMOS/Real Time Clock |
| 9 | 4 | IRQ Holder for PCI Steering* |
| 10 | 5 | IRQ Holder for PCI Steering* |
| 11 | 6 | IRQ Holder for PCI Steering* |
| 12 | 7 | Reserved |
| 13 | 8 | Numeric Data Processor |
| 14 | 9 | Primary IDE Channel |

* 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 | – | – | – | – |
| PCIe x16_2 | – | – | shared | – | – | – | – | – |
| PCIe x1_1 | shared | – | – | – | – | – | – | – |
| PCIe x1_2 | – | shared | – | – | – | – | – | – |
| PCI_1 | – | – | – | – | shared | – | – | – |
| PCI_2 | – | – | – | – | – | shared | – | – |
| LAN | shared | – | – | – | – | – | – | – |
| Onboard SATA | – | – | – | shared | – | – | – | – |
| USB 2.0 Controller | – | – | shared | – | – | – | – | – |
| 1394 Controller | – | – | – | – | – | – | shared | – |
| HD Audio | shared | – | – | – | – | – | – | – |

2.5.4 PCI slots

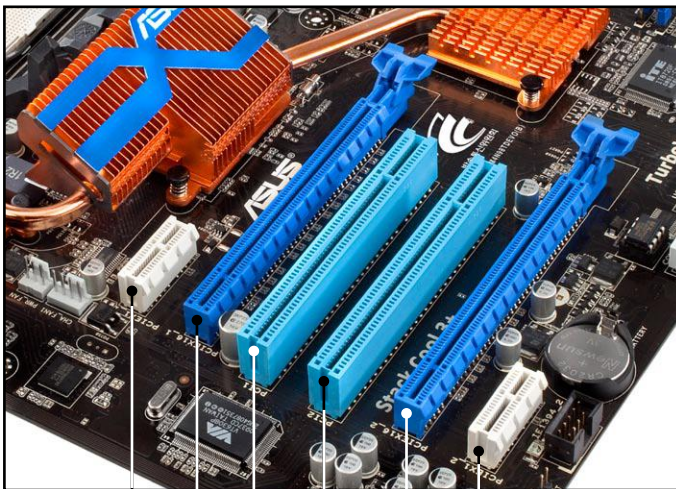
The PCI slots support cards such as a LAN card, SCSI card, USB card, and other cards that comply with PCI specifications. Refer to the figure below for the location of the slots.

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 PCI Express 2.0 x16 slots

This motherboard supports three NVIDIA PCI Express x16 graphics cards that comply with the PCI Express specifications. Refer to the figure below for the location of the slots.



PCI_Express x1_2 slot
 PCI Express 2.0 x16_2 slot (at x16 mode)
 PCI_2 slot
 PCI Express 2.0 x16_1 slot (at x16 mode)
 PCI_1 slot
 PCI Express x1_1 slot

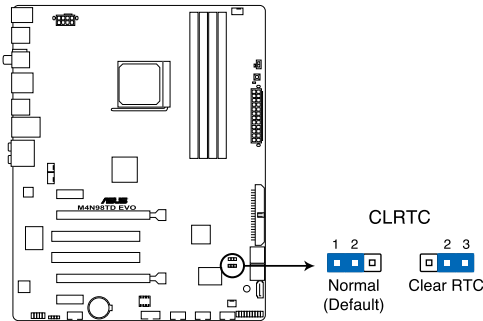


- We recommend that you provide sufficient power when running SLI™ mode. See page 2-31 for details.
- Connect a chassis fan to the motherboard connector labeled CHA_FAN1/2 when using multiple graphics cards for better thermal environment. See page 2-30 for details.

2.6 Jumpers

1. Clear RTC RAM (3-pin CLRRTC)

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.



M4N98TD EVO 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 key during the boot process and enter BIOS setup to re-enter data.



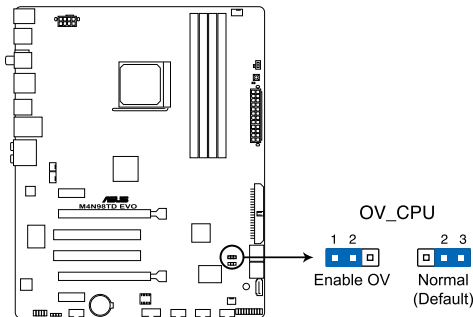
Except when clearing the RTC RAM, never remove the cap on CLRRTC jumper default position. Removing the cap will cause system boot failure!



- 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.



M4N98TD EVO CPU overvoltage setting

| OV_CPU | |
|-----------------------|---------------|
| Pins 2-3 (Default) | 0.80V – 1.55V |
| Pins 1-2 (OV Enabled) | up to 1.85V |



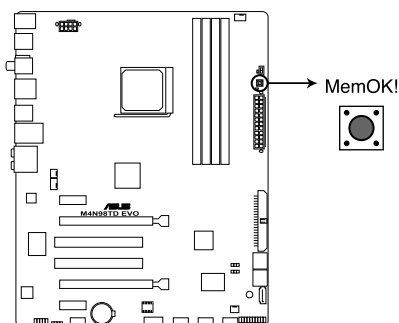
- Before you change the jumper setting for extra-high overvoltage ability, use the BIOS items introduced in **3.5 Ai Tweaker menu** first to adjust the desired CPU performance. Ensure that your system functions well under the highest BIOS voltage setting before you change the setting of this jumper.
- 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.

2.7 Onboard switches

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

1. MemOK! switch

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



M4N98TD EVO MemOK! switch



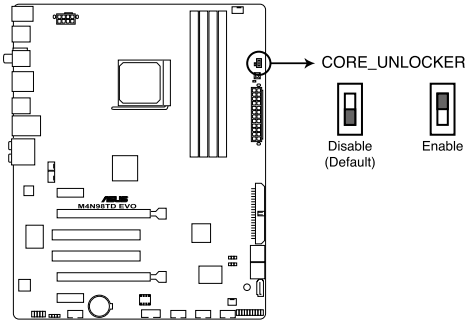
- Refer to section **2.9 Onboard LEDs** for the exact location of the DRAM_LED.
- The DRAM_LED also lights when the DIMM is not properly installed. Turn off the system and reinstall the DIMM before using the MemOK! function.
- The MemOK! switch does not function under Windows® OS environment.
- During the tuning process, the system loads and tests failsafe memory settings. It takes about 30 seconds for the system to test one set of failsafe settings. If the test fails, the system reboots and test the next set of failsafe settings. The blinking speed of the DRAM_LED increases, indicating different test processes.
- Due to memory tuning requirement, the system automatically reboots when each timing set is tested. If the installed DIMMs still fail to boot after the whole tuning process, the DRAM_LED lights continuously. Replace the DIMMs with ones recommended in the Memory QVL (Qualified Vendors Lists) in this user manual or on the ASUS website at www.asus.com.
- If you turn off the computer and replace DIMMs during the tuning process, the system continues memory tuning after turning on the computer. To stop memory tuning, turn off the computer and unplug the power cord for about 5–10 seconds.
- If your system fail to boot due to BIOS overclocking, press the MemOK! switch to boot and load BIOS default settings. A message will appear during POST reminding you that the BIOS has been restored to its default settings.
- We recommend that you download and update to the latest BIOS version from the ASUS website at www.asus.com after using the MemOK! function.

2. Core Unlocker switch

This switch allows you to unlock the extra cores of your CPU.



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



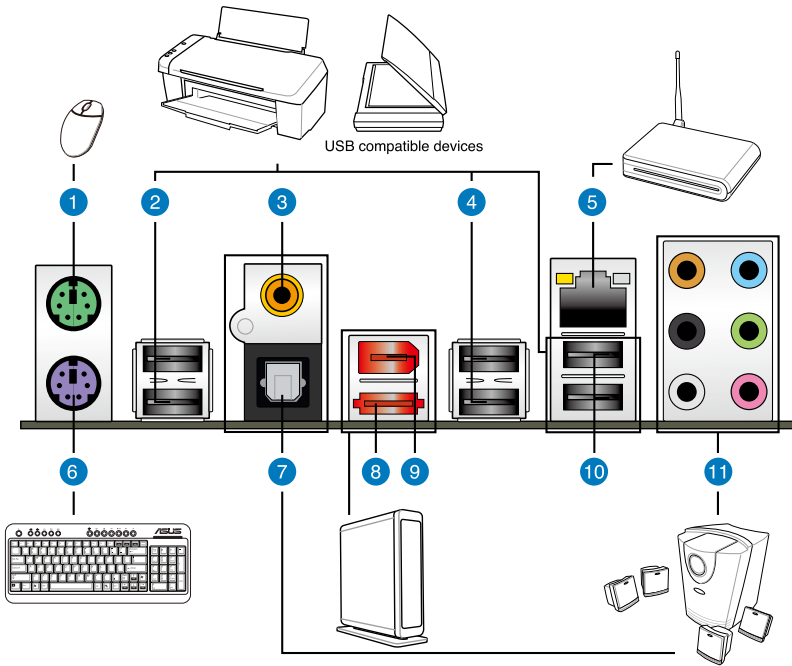
M4N98TD EVO CORE_UNLOCKER



- The **UNLOCKER_LED** near the Core Unlocker switch lights when the switch setting is turned to **Enable**. Refer to section **2.9 Onboard LEDs** for the exact location of the **UNLOCKER_LED** LED.
- If you clear the CMOS or load the BIOS setup defaults, the **NVIDIA Core Calibration** item in the BIOS menu follows the current setting of the Core Unlocker switch.
- You may also press <4> during the Power-On-Self-Test (POST) to activate the Core Unlocker function.
- The system will use the last setting you have made.

2.8 Connectors

2.8.1 Rear panel connectors



Rear panel connectors

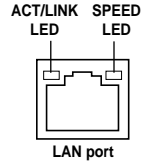
| | | | |
|----|-----------------------------|-----|-------------------------|
| 1. | PS/2 mouse port (green) | 7. | Optical S/PDIF out port |
| 2. | USB 2.0 ports 5 and 6 | 8. | External SATA port |
| 3. | Coaxial S/PDIF out port | 9. | IEEE 1394a port |
| 4. | USB 2.0 ports 3 and 4 | 10. | USB 2.0 ports 1 and 2 |
| 5. | LAN (RJ-45) port | 11. | Audio I/O ports |
| 6. | PS/2 keyboard port (purple) | | |



- DO NOT insert a different connector to the external SATA port.
- To enable external SATA port hot-plugging, set the **SATA Mode Select** item in the BIOS settings to [AHCI Mode], and then reboot the system. See section 3.4.2 Storage Configuration for details.
- Due to chipset limitation, port multipliers are not supported by the external SATA port.
- The external SATA port will be disabled if you set the **SATA Mode Select** item in the BIOS settings to [IDE Mode]. See section 3.4.2 Storage Configuration for details.

*** LAN port LED indications**

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

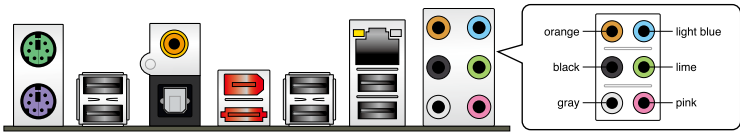


**** Audio 2, 4, 6, or 8-channel configuration**

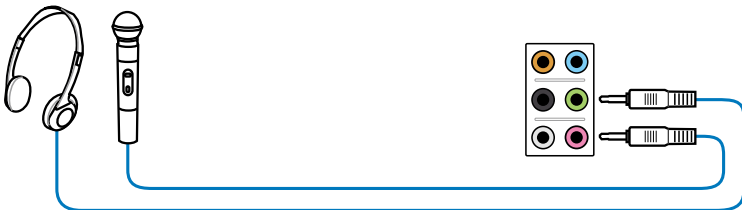
| Port | Headset 2-channel | 4-channel | 6-channel | 8-channel |
|------------|-------------------|-------------------|-------------------|-------------------|
| Light Blue | Line In | Line In | Line In | Line In |
| Lime | Line Out | Front Speaker Out | Front Speaker Out | Front Speaker Out |
| Pink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

2.8.2 Audio I/O connections

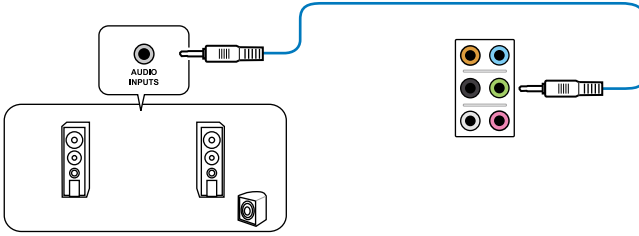
Audio I/O ports



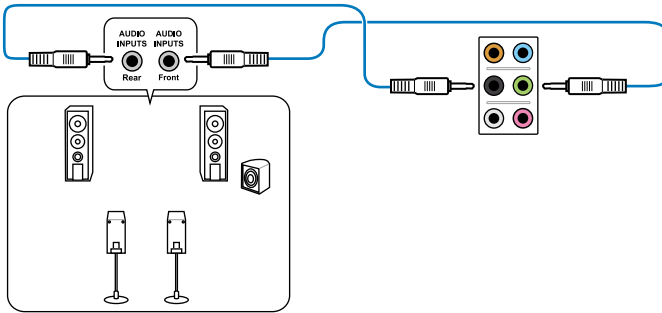
Connect to Headphone and Mic



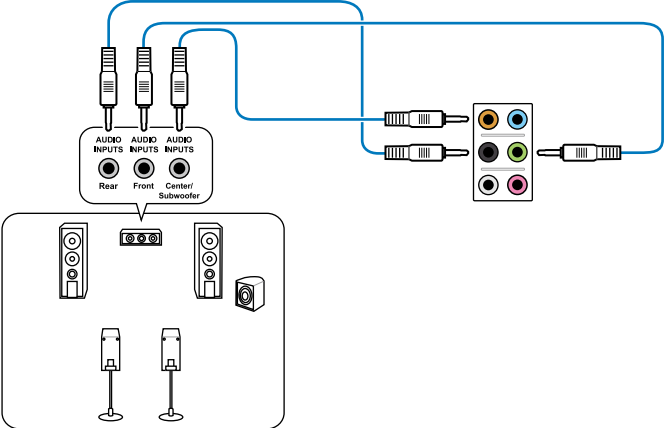
Connect to Stereo / 2.1-channel Speakers



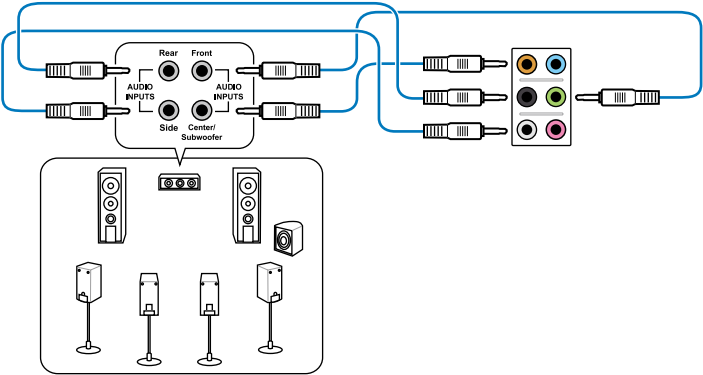
Connect to 4.1 channel Speakers



Connect to 5.1 channel Speakers



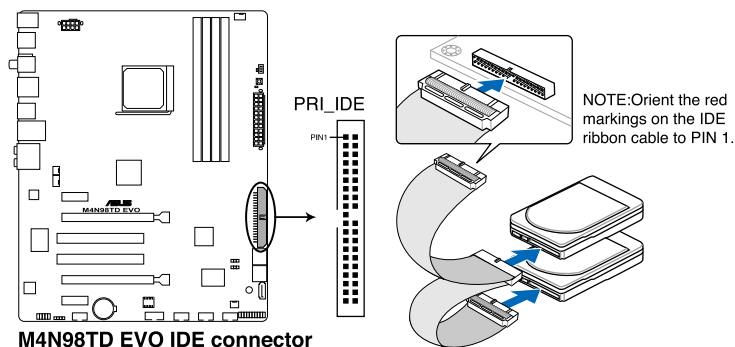
Connect to 7.1 channel Speakers



2.8.3 Internal connectors

1. IDE connector (40-1 pin PRI_IDE)

The onboard IDE connector is for the Ultra DMA 133/100 signal cable. There are three connectors on each Ultra DMA 133/100 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.



M4N98TD EVO 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 IDE devices.



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

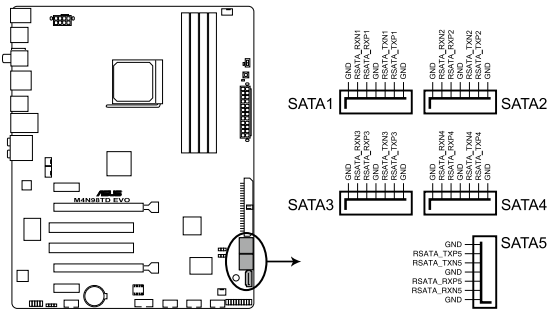
2. Serial ATA connectors (7-pin SATA1–5)

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

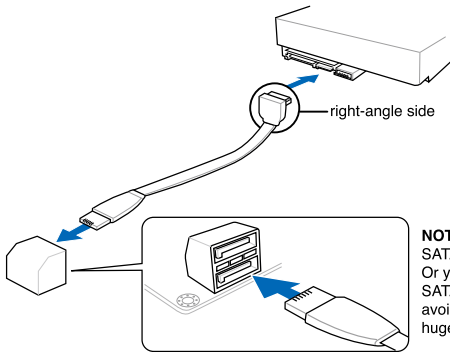
If you install SATA hard disk drives to the SATA1–5 connectors, you can create a RAID 0, 1, 0+1, 5, or JBOD configuration through the onboard nForce® 980a SLI controller.



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



M4N98TD EVO SATA connectors



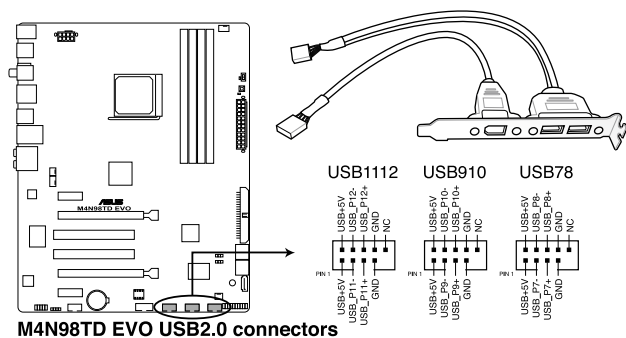
NOTE: Connect the right-angle side of SATA signal cable to SATA device. Or you may connect the right-angle side of SATA cable to the onboard SATA port to avoid mechanical conflict with huge graphics cards.



- The SATA 5 connector and external SATA port support AHCI mode and RAID mode only. Ensure to install the AHCI driver or RAID driver in the bundled support DVD before connecting devices to the connectors. Otherwise, the devices will not work.
- Due to chipset limitation, when you set any of the SATA ports to RAID mode, all SATA ports run at RAID mode simultaneously.
- You must install Windows® XP Service Pack 2 or later version before using Serial ATA hard disk drives. The Serial ATA RAID feature is available only if you are using Windows® XP SP2 or later version.
- Due to chipset limitation, port multipliers are not supported by the onboard SATA connectors and the external SATA port.

3. 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.



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



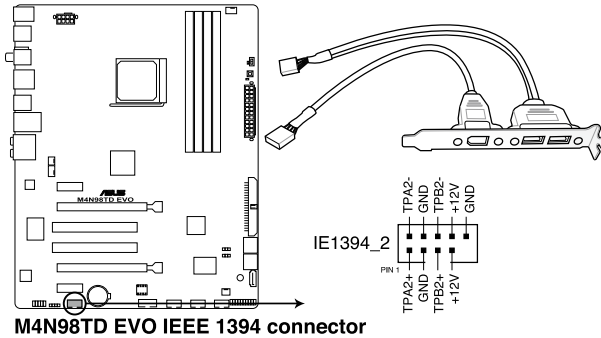
You can connect the front panel USB cable to the ASUS Q-Connector (USB, blue) first, and then install the Q-Connector (USB) to the USB connector onboard if your chassis supports front panel USB ports.



The USB module is purchased separately.

4. 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.



M4N98TD EVO IEEE 1394 connector



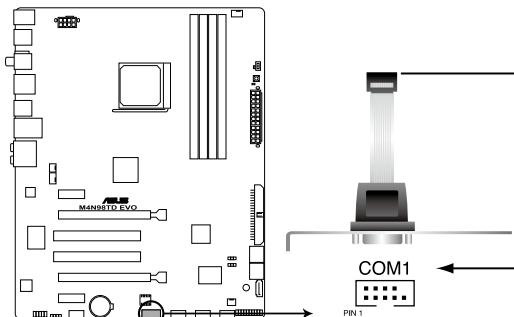
Never connect a USB cable to the IEEE 1394a connector. Doing so will damage the motherboard!



The IEEE 1394a module is purchased separately.

5. 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.



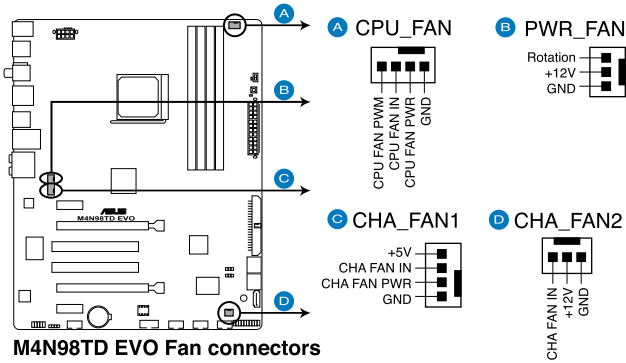
M4N98TD EVO Serial port (COM1) connector



The COM module is purchased separately.

6. CPU, chassis, and power fan connectors
(4-pin CPU_FAN; 4-pin CHA_FAN1; 3-pin CHA_FAN2; 3-pin PWR_FAN)

Connect the fan cables to the fan connectors on the motherboard, ensuring that the black wire of each cable matches the ground pin of the connector.



M4N98TD EVO Fan connectors



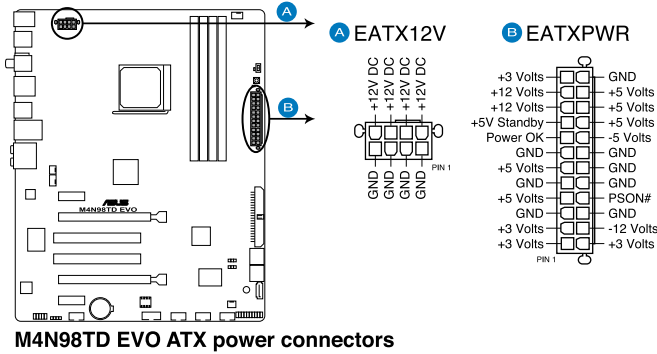
Do not forget to connect the fan cables to the fan connectors. Insufficient air flow inside the system may damage the motherboard components. These are not jumpers! Do not place jumper caps on the fan connectors!



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

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

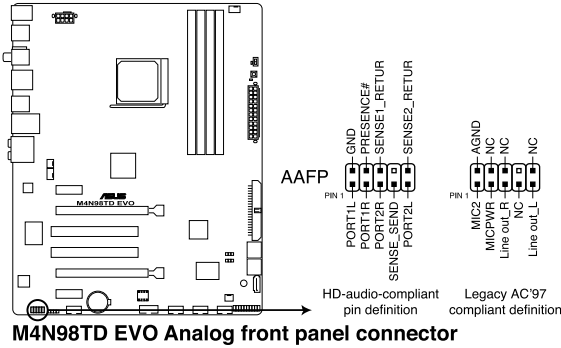
These connectors are for ATX power supply plugs. The power supply plugs are designed to fit these connectors in only one orientation. Find the proper orientation and push down firmly until the connectors completely fit.



- 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 600W.
- Do not forget to connect the 8-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.
- If you want to use two high-end PCI Express x16 cards, use a PSU with 1000W power or above to ensure the system stability.

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

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.



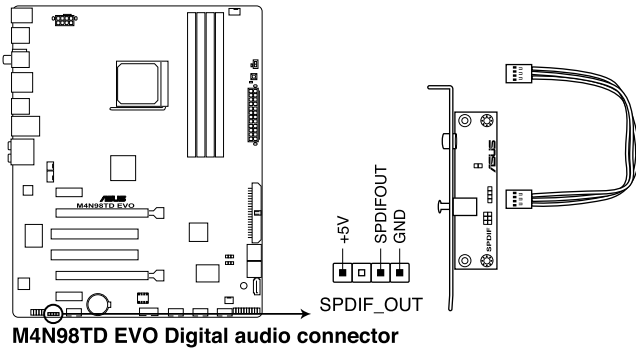
M4N98TD EVO Analog front panel connector



- 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 Audio]**; 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 Audio]**.

9. 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.



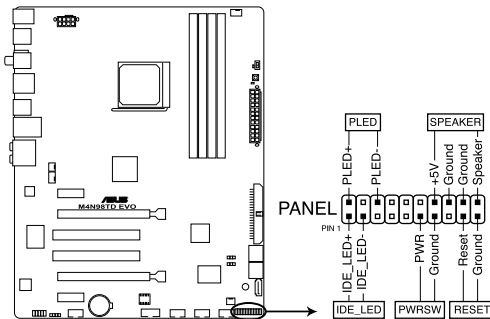
M4N98TD EVO Digital audio connector



The S/PDIF module is purchased separately.

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

This connector supports several chassis-mounted functions.



M4N98TD EVO System panel connector

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

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

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

This 2-pin connector is for the HDD Activity LED. Connect the HDD Activity LED cable to this connector. The IDE LED lights up or flashes when data is read from or written to the HDD.

- **System warning speaker (4-pin SPEAKER)**

This 4-pin connector is for the chassis-mounted system warning speaker. The speaker allows you to hear system beeps and warnings.

- **ATX power button/soft-off button (2-pin PWRSW)**

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

- **Reset button (2-pin RESET)**

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

2.8.4. ASUS Q-Connector (system panel)

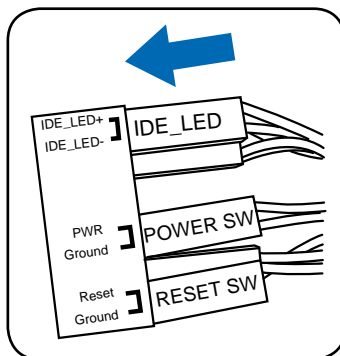
Use the ASUS Q-Connector to connect/disconnect the chassis front panel cables. Refer to the following instructions to install the ASUS Q-Connector.

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

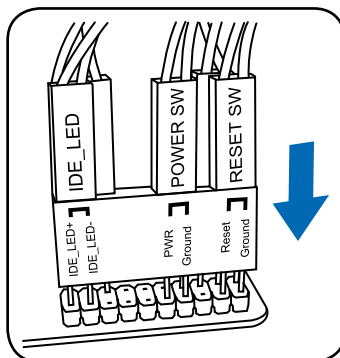
Refer to the labels on the Q-Connector to know the detailed pin definitions, and then match them to their respective front panel cable labels.



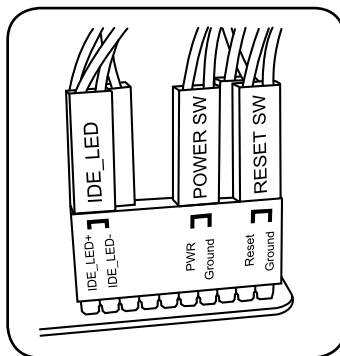
The labels on the front panel cables may vary depending on the chassis model.



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



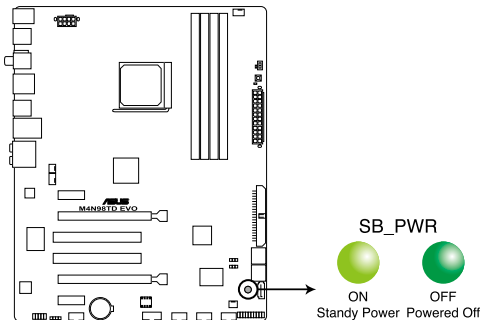
3. The front panel functions are now enabled. The figure shows the Q-Connector is properly installed on the motherboard.



2.9 Onboard LEDs

1. Standby Power LED

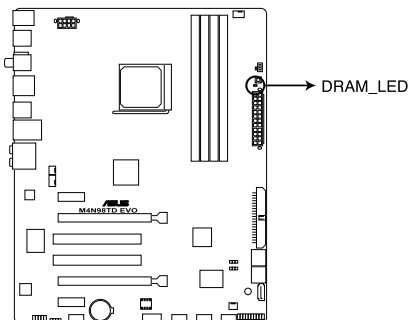
The motherboard comes with a standby power LED. The green LED lights up to indicate that the system is ON, in sleep mode, or in soft-off mode. This is a reminder that you should shut down the system and unplug the power cable before removing or plugging in any motherboard component. The illustration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



M4N98TD EVO Onboard LED

2. DRAM LED

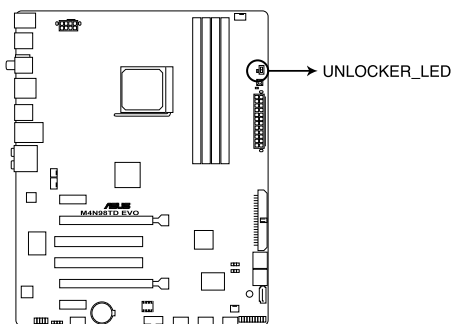
DRAM LED checks the DRAM in sequence during motherboard booting process. If an error is found, the LED next to the error device will continue lighting until the problem is solved. This user-friendly design provides an intuitive way to locate the root problem within a second.



M4N98TD EVO DRAM LED

3. Core Unlocker LED

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



M4N98TD EVO CORE_UNLOCKER LED



The Core Unlocker LED keeps on lighting even though the **NVIDIA Core Calibration** item in the BIOS menu is set to [Disabled].

2.10 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.

2.11 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.

3.1 Knowing BIOS

BIOS (Basic Input and Output System) stores system hardware settings such as storage device configuration, overlocking 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 in 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 utility:** Updates the BIOS in Windows® environment.
2. **ASUS EZ Flash 2 utility:** Updates the BIOS using a USB flash drive.
3. **ASUS CrashFree BIOS 3 utility:** Restores the BIOS using the motherboard support DVD or a USB flash drive when the BIOS file fails or gets corrupted.

Refer to the corresponding sections for details on these utilities.



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

3.2.1 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.

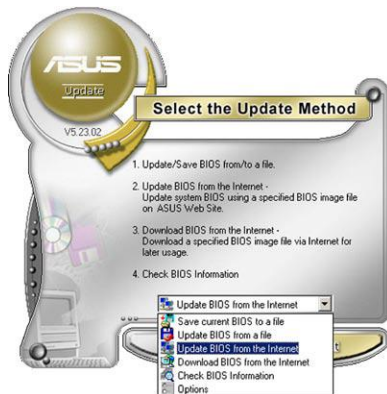
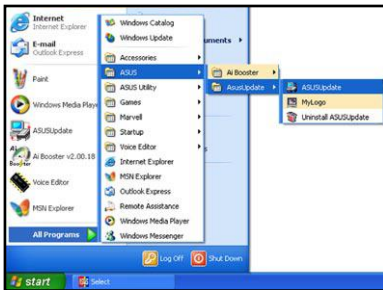


Quit all Windows® applications before you update the BIOS using this utility.

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**.



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



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



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

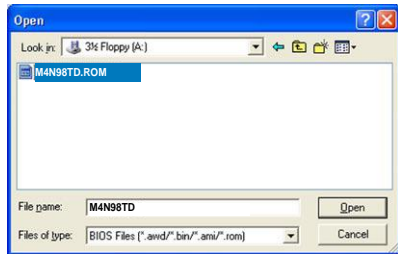
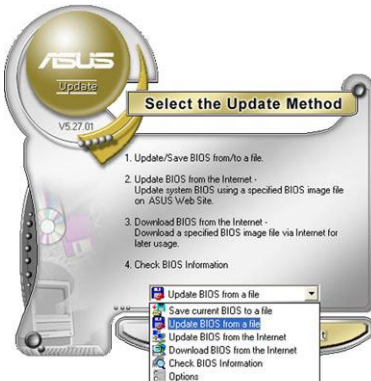


The ASUS Update utility is capable of updating itself through the Internet. Always update the utility to avail all its features.

Updating the BIOS through a BIOS file

To update the BIOS through a BIOS file:

1. From the Windows® desktop, click **Start > Programs > ASUS > 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.

3.2.2 ASUS EZ Flash 2 utility

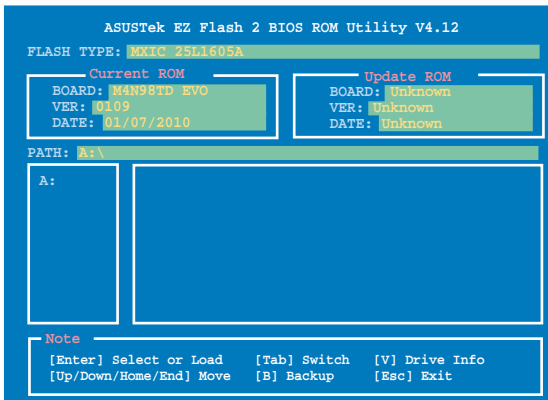
The ASUS EZ Flash 2 feature allows you to update the BIOS without having to use a bootable floppy disk or an OS-based utility.



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

To update the BIOS using EZ Flash 2:

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



2. Press <Tab> to switch between drives until the correct BIOS file is found. When 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 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.

3.2.3 ASUS CrashFree BIOS 3 utility

The ASUS CrashFree BIOS 3 utility is an auto recovery tool that allows you to restore the BIOS file when it fails or gets corrupted during the updating process. You can restore a corrupted BIOS file using the motherboard support DVD or a USB flash drive that contains the BIOS file.



The BIOS file in the motherboard support DVD may be older than the BIOS file published on the ASUS official website. If you want to use the newer BIOS file, download the file at support.asus.com and save it to a USB flash drive.

Recovering the BIOS

To recover the BIOS

1. Turn on the system.
2. Insert the motherboard support DVD to the optical drive, or the USB flash drive containing the BIOS file to the USB port.
3. The utility automatically checks the devices for the BIOS file. When found, the utility reads the BIOS file and starts flashing the corrupted BIOS file.
4. Turn off the system after the utility completes the updating process and power on again.
5. The system requires you to enter BIOS Setup to recover BIOS setting. To ensure system compatibility and stability, we recommend that you press <F2> to load default BIOS values.



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

3.3 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 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 2.6 **Jumpers** for details.

3.3.1 BIOS menu screen

The screenshot shows the BIOS Setup Utility menu. At the top is the menu bar with options: Main, Ai Tweaker, Advanced, Power, Boot, Tools, and Exit. The main area is divided into three sections: Menu items (left), Configuration fields (middle), and General help (right). The Menu items section lists System Time, System Date, Language, Primary IDE Master, Primary IDE Slave, SATA1, SATA2, SATA3, SATA4, Storage Configuration, and System Information. The Configuration fields section shows the current time [13:51:25], date [Fri 01/29/2010], language [English], and various IDE/SATA settings. The General help section provides instructions on how to navigate the menu using keys like [ENTER], [TAB], [SHIFT-TAB], [F1], [F10], and [ESC].

Submenu items

Navigation keys

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 item 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.

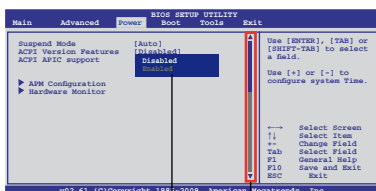
A configurable field is enclosed in brackets, and is highlighted when selected. To change the value of a field, select it then press <Enter> to display a list of options. Refer to **3.3.7 Pop-up window**.

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.



Pop-up window
Scroll bar

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. Select an item and press <Enter> to display the submenu.



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

| BIOS SETUP UTILITY | | |
|--|-------------------|---|
| Main | Ai Tweaker | Advanced Power Boot Tools Exit |
| System Time | [13:51:25] | Use [ENTER], [TAB] or [SHIFT-TAB] to select a field. |
| System Date | [Fri 01/29/2010] | |
| Language | [English] | Use [+] or [-] to configure system Date. ←→ Select Screen ↑↓ Select Item +- Change Field Tab Select Field F1 General Help F10 Save and Exit ESC Exit |
| ▶ Primary IDE Master | [Not Detected] | |
| ▶ Primary IDE Slave | [Not Detected] | |
| ▶ SATA1 | [HDT722516DLA380] | |
| ▶ SATA2 | [Not Detected] | |
| ▶ SATA3 | [ATAPI DVD DH1] | |
| ▶ SATA4 | [Not Detected] | |
| ▶ Storage Configuration | | |
| ▶ System Information | | |
| v02.61 (C)Copyright 1985-2009, American Megatrends, Inc. | | |

3.4.1 Primary IDE Master/Slave; SATA 1–4

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 and press <Enter> to display the device information.

| BIOS SETUP UTILITY | | |
|--|-------------------|---|
| Main | | |
| SATA 1 | | |
| Device | : Hard Disk | Select the type of device connected to the system. ←→ Select Screen ↑↓ Select Item +- Change Field F1 General Help F10 Save and Exit ESC Exit |
| Vendor | : HDT722516DLA380 | |
| Size | : 164.7GB | |
| LBA Mode | : Supported | |
| Block Mode | : 16Sectors | |
| PIO Mode | : 4 | |
| Async DMA | : MultiWord DMA-2 | |
| Ultra DMA | : Ultra DMA-6 | |
| SMART Monitoring:Supported | | |
| LBA/Large Mode | [Auto] | |
| Block(Multi-sector Transfer)M | [Auto] | |
| PIO Mode | [Auto] | |
| DMA Mode | [Auto] | |
| SMART Monitoring | [Auto] | |
| 32Bit Data Transfer | [Enabled] | |
| v02.61 (C)Copyright 1985-2009, American Megatrends, Inc. | | |

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 **Not Detected** if no device is installed in the system.

Type [Auto]

Allows you to select the type of device installed.

- [Not Installed] Select this option if no device is installed.
- [Auto] Allows automatic selection of the appropriate device type.
- [CDROM] Select this option if you are specifically configuring an optical disc 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** only.

LBA/Large Mode [Auto]

- [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]

- [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]

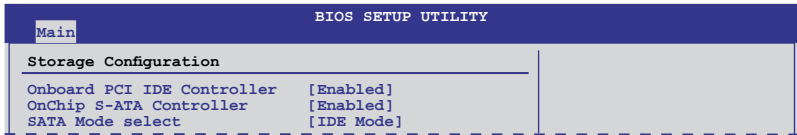
- [Auto] Allows automatic selection of the S.M.A.R.T (Smart Monitoring, Analysis, and Reporting Technology).
- [Enabled] Enables the S.M.A.R.T feature.
- [Disabled] Disables the S.M.A.R.T feature.

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.



Onboard PCI IDE Controller [Enabled]

- [Enabled] Enables the onboard IDE controller.
- [Disabled] Disables the onboard IDE controller.

OnChip S-ATA Controller [Enabled]

- [Enabled] Enables the onboard SATA controller.
- [Disabled] Disables the onboard SATA controller.

SATA Mode select [IDE Mode]

This item appears only when you enabled the **OnChip S-ATA Controller** item and allows you to select the SATA mode.

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



- When this item is set to [AHCI], the information of the SATA connectors can be seen only under the OS environment or during POST.
- For Windows® XP OS, you have to install the AHCI driver, so that you could use the SATA connectors in AHCI mode under the OS environment.

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

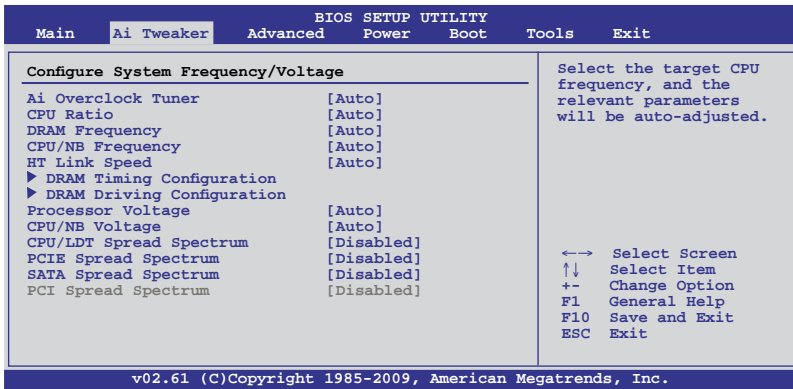
The Ai Tweaker menu items allow you to configure overclocking-related items.



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 Overclock Tuner [Auto]

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

| | |
|----------------|--|
| Manual | Allows you to individually set overclocking parameters. |
| Auto | Loads the optimal settings for the system. |
| D.O.C.P | Allows you to select a DRAM O.C. profile, and the related parameters will be adjusted automatically. |



The following two (2) items appear only when you set the **Ai Overclock Tuner** item to [Manual] and [D.O.C.P].

CPU Bus Frequency [200]

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

PCIE Frequency [100]

Use the <+> and <-> keys to adjust the PCIE frequency. You can also type the desired PCIE frequency using the numeric keypad. The values range from 100 to 200.

DRAM O.C. Profile [DDR3-1600MHz]

This item appears only when you set the **Ai Overclock Tuner** item to [D.O.C.P.] and allows you to select a DRAM O.C. profile, which applies different settings to DRAM frequency, DRAM timing and DRAM voltage. Configuration options: [DDR3-1600MHz] [DDR3-1800MHz] [DDR3-1866MHz] [DDR3-2000MHz]

Profile Info : xxxxMHz-x-x-x-xx

This item appears only when you set the **Ai Overclock Tuner** item to [D.O.C.P.] and displays the current DRAM profile information. The profile information varies according to the **DRAM O.C. Profile** you've selected.

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 DRAM Frequency [Auto]

Allows you to set the DDR3 operating frequency. The configuration options vary with the **CPU Bus Frequency** item settings.

3.5.4 CPU/NB Frequency [Auto]

Allows you to select the CPU/NB frequency. Configuration options: [Auto] [1000MHz] [1200MHz] [1400MHz] [1600MHz] [1800MHz] [2000MHz]

3.5.5 HT Link Speed [Auto]

Allows you to set the CPU-Chipset HyperTransport link speed.

Configuration options: [Auto] [200MHz] [400MHz] [600MHz] [800MHz] [1000MHz] [1200MHz] [1400MHz] [1600MHz] [1800MHz] [2000MHz]

3.5.6 DRAM Timing Configuration



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

DRAM CAS# Latency [Auto]

Configuration options: [Auto] [4 CLK] – [12 CLK]

DRAM RAS# to CAS# Delay [Auto]

Configuration options: [Auto] [5 CLK] – [12 CLK]

DRAM RAS# PRE Time [Auto]

Configuration options: [Auto] [5 CLK] – [12 CLK]

DRAM RAS# ACT Time [Auto]

Configuration options: [Auto] [15 CLK] – [30 CLK]

DRAM READ to PRE Time [Auto]

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

DRAM Row Cycle Time [Auto]

Configuration options: [Auto] [11 CLK] – [41 CLK]

DRAM WRITE Recovery Time [Auto]

Configuration options: [Auto] [5 CLK] [6 CLK] [7 CLK] [8 CLK] [10 CLK] [12 CLK]

DRAM RAS# to RAS# Delay [Auto]

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

DRAM READ to WRITE Delay [Auto]

Configuration options: [Auto] [3 CLK] – [17 CLK]

DRAM WRITE to READ Delay(DD) [Auto]

Configuration options: [Auto] [2 CLK] – [10 CLK]

DRAM WRITE to READ Delay(SD) [Auto]

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

DRAM WRITE to WRITE Timing [Auto]

Configuration options: [Auto] [3 CLK] – [10 CLK]

DRAM READ to READ Timing [Auto]

Configuration options: [Auto] [3 CLK] – [10 CLK]

DRAM REF Cycle Time [Auto]

Configuration options: [Auto] [90ns] [110ns] [160ns] [300ns] [350ns]

DRAM Refresh Rate [Auto]

Configuration options: [Auto] [Every 7.8ms] [Every 3.9ms]

DRAM Command Rate [Auto]

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

3.5.7 DRAM Driving Configuration



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

CKE drive strength [Auto]

Configuration options: [Auto] [1x] [1.25x] [1.5x] [2x]

CS/ODT drive strength [Auto]

Configuration options: [Auto] [1x] [1.25x] [1.5x] [2x]

ADDR/CMD drive strength [Auto]

Configuration options: [Auto] [1x] [1.25x] [1.5x] [2x]

MEMCLK drive strength [Auto]

Configuration options: [Auto] [0.75x] [1x] [1.25x] [1.5x]

Data drive strength [Auto]

Configuration options: [Auto] [0.75x] [1x] [1.25x] [1.5x]

DQS drive strength [Auto]

Configuration options: [Auto] [0.75x] [1x] [1.25x] [1.5x]

Processor ODT [Auto]

Configuration options: [Auto] [240 ohms +/- 20%] [120 ohms +/- 20%] [60 ohms +/- 20%]



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

3.5.8 Processor Voltage [Auto]

Allows you to adjust the CPU VCore voltage with a 0.0125V interval.

3.5.9 CPU/NB Voltage [Auto]

Allows you to adjust the CPU/NB voltage with a 0.0125V interval.

3.5.10 CPU VDDA Voltage [Auto]

This item appears only when you set the **Ai Overclock Tuner** item to [Manual] or [D.O.C.P], and allows you to set the CPU VDDA voltage. The values range from 2.50V to 2.80V with a 0.10V interval.

3.5.11 DRAM Voltage [Auto]

This item appears only when you set the **Ai Overclock Tuner** item to [Manual] or [D.O.C.P], and allows you to set the DRAM voltage. The values range from 1.80V to 2.50V with a 0.02V interval.

3.5.12 HT Voltage [Auto]

This item appears only when you set the **Ai Overclock Tuner** item to [Manual] or [D.O.C.P], and allows you to set the HyperTransport voltage. The values range from 1.20V to 1.50V with a 0.02V interval.

3.5.13 NB Voltage [Auto]

This item appears only when you set the **Ai Overclock Tuner** item to [Manual] or [D.O.C.P], and allows you to set the NorthBridge voltage. The values range from 1.10V to 1.40V with a 0.02V interval.

3.5.14 nForce200 Voltage [Auto]

This item appears only when you set the **Ai Overclock Tuner** item to [Manual] or [D.O.C.P], and allows you to set the nForce 200 chip voltage. The values range from 1.20V to 1.50V with a 0.02V interval.

3.5.15 CPU/LDT Spread Spectrum [Disabled]

[Disabled] Enhances the CPU overclocking ability.

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

3.5.16 PCIE Spread Spectrum [Disabled]

[Disabled] Enhances the PCIE overclocking ability.

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

3.5.17 SATA Spread Spectrum [Disabled]

Allows you to adjust the SATA spread spectrum setting.

Configuration options: [Disabled] [Linear Down]

3.5.18 PCI Spread Spectrum [Disabled]

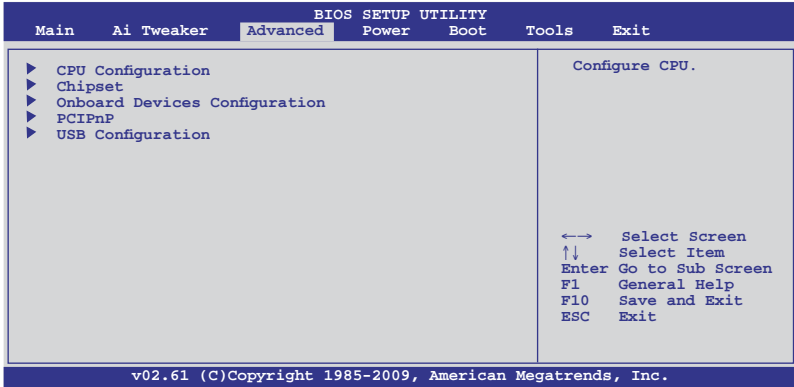
This item becomes user-configurable only when you set the **SATA Spread Spectrum** item to [Linear Down]. We recommend that you leave this item to its default setting for system stability. Configuration options: [Disabled] [Linear Down]

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.

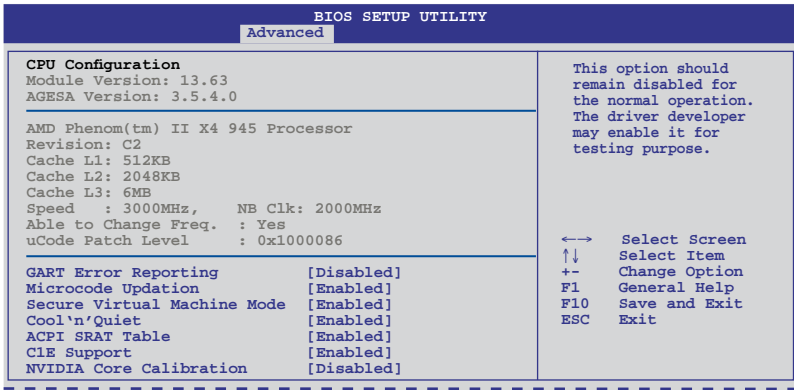


3.6.1 CPU Configuration

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 [Enabled]

[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.

C1E Support [Enabled]

[Disabled] Disables the the Enhanced Halt State support.

[Enabled] Enables the the Enhanced Halt State support.

NVIDIA Core Calibration [Disabled]

Allows you to select the CPU core overclocking for each or all CPU cores.

Configuration options: [Disabled] [Auto] [All Cores] [Per Core]

Unleashing Mode [Disabled]

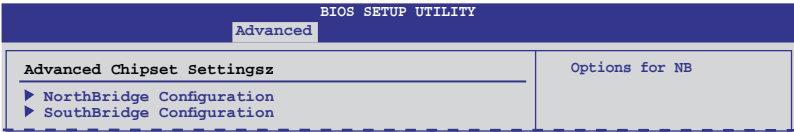
This item appears only when you set the **NVIDIA Core Calibration** item to [Auto], [Per Core] or [All Cores]. Enabling this item allows the system to get full computing of the processor.

Core 0/1/2/3 NVCC Percentage [xx%]

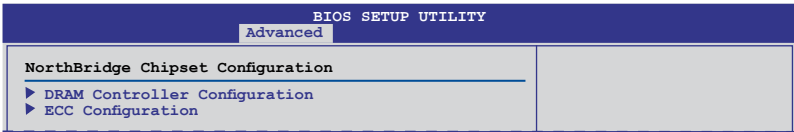
This item appears only when you set the **NVIDIA Core Calibration** item to [Per Core] or [All Cores]. Use the <+> and <-> keys to adjust the NVCC voltage for Core 0/1/2/3.

3.6.2 Chipset

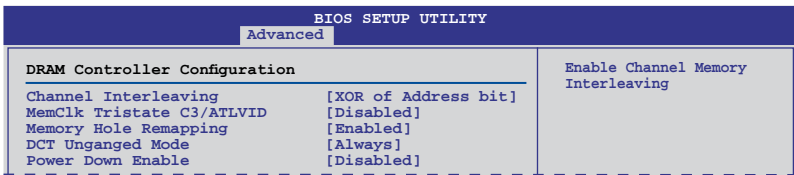
The Chipset menu allows you to change the advanced chipset settings. Select an item then press <Enter> to display the submenu.



NorthBridge Chipset Configuration



DRAM Controller Configuration



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 [Always]

Configuration options: [Auto] [Always]

Power Down Enable [Disabled]

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

Power Down Mode [Channel]

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

ECC Configuration

| BIOS SETUP UTILITY | | |
|---------------------|------------|---|
| Advanced | | |
| ECC Configuration | | |
| ECC Mode | [Disabled] | Set the level of ECC protection. Note: The 'Super' ECC mode dynamically sets the DRAM scrub rate so all of memory is scrubbed in 8 hours. |
| DRAM ECC Enable | [Disabled] | |
| DRAM SCRUB REDIRECT | [Disabled] | |
| 4-Bit ECC Mode | [Disabled] | |
| DRAM BG Scrub | [Disabled] | |
| Data Cache BG Scrub | [Disabled] | |
| L2 Cache BG Scrub | [Disabled] | |
| L3 Cache BG Scrub | [Disabled] | |

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.

SouthBridge Configuration

| BIOS SETUP UTILITY | | |
|------------------------------|-----------------------|---|
| Advanced | | |
| Advanced Chipset Settings | | |
| Hybrid SLI support | [Disabled] | 1 Memory have to over 2G size 2 At least 256 MB of frame buffer size 3 External VGA must support this feature |
| Hybrid SLI Frame buffer size | [Disabled] | |
| Primary Graphics Adapter | [PCIE VGA Card First] | |
| SouthBridge ACPI HPET TABLE | [Enabled] | |



The following two items become user-configurable only when a dGPU is detected. Ensure that your dGPU is properly installed.

Hybrid SLI support [Disabled]

Allows you to enable or disable the NVIDIA Hybrid SLI technology.

Configuration options: [Disabled] [Auto]

Hybrid SLI Frame buffer size [256MB]

This item becomes user-configurable when you set the **Hybrid SLI support** item to [Enabled] and allows you to set the frame buffer size for the onboard GPU.

Configuration options: [256MB] [512MB] [Disabled]

Primary Graphics Adapter [PCIE VGA Card First]

Allows you to select which graphics controller to use as the primary boot device.

Configuration options: [PCI VGA Card First] [PCIE VGA Card First]

SouthBridge ACPI HPET TABLE [Enabled]

Configuration options: [Disabled] [Enabled]

3.6.3 Onboard Devices Configuration

| BIOS SETUP UTILITY | | |
|-------------------------------|----------------|----------|
| Advanced | | |
| Onboard Devices Configuration | | Options |
| Onboard LAN | [Enabled] | Enabled |
| OnBoard LAN Boot ROM | [Disabled] | Disabled |
| Onboard 1394 | [Enabled] | |
| On-board AUDIO | [Enabled] | |
| Front Panel Select | [HD Audio] | |
| SPDIF Mode Setting | [SPDIF Output] | |
| Serial Port1 Address | [3F8/IRQ4] | |

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.

On-board AUDIO [Enabled]

[Disabled] Disables the controller.

[Enabled] Enables the High Definition Audio Controller.



The following items appear only when you set the **On-board AUDIO** item to [Enabled].

Front Panel Type [HD Audio]

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

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

SPDIF Mode Setting [SPDIF Output]

[HDMI Output] Outputs the digital audio signal through the HDMI port.

[SPDIF Output] Outputs the digital audio signal through the onboard SPDIF port.

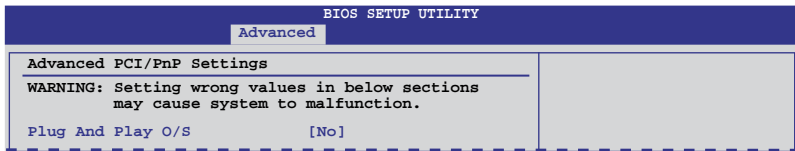
Serial Port1 Address [3F8/IRQ4]

Allows you to select the Serial Port1 base address.

Configuration options: [Disabled] [3F8/IRQ4] [2F8/IRQ3] [3E8/IRQ4] [2E8/IRQ3]

3.6.4 PCIPnP

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

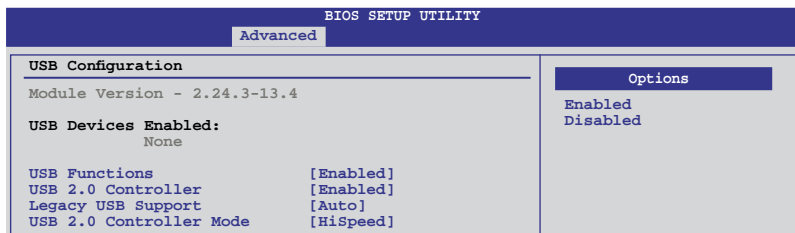


Plug And Play O/S [No]

- [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.

3.6.5 USB Configuration

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



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

USB Functions [Enabled]

- [Enabled] Enables the USB Host Controllers.
- [Disabled] Disables the controllers.



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

USB 2.0 Controller [Enabled]

- [Enabled] Enables the USB 2.0 controller.
- [Disabled] Disables the controller.

Legacy USB Support [Enabled]

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

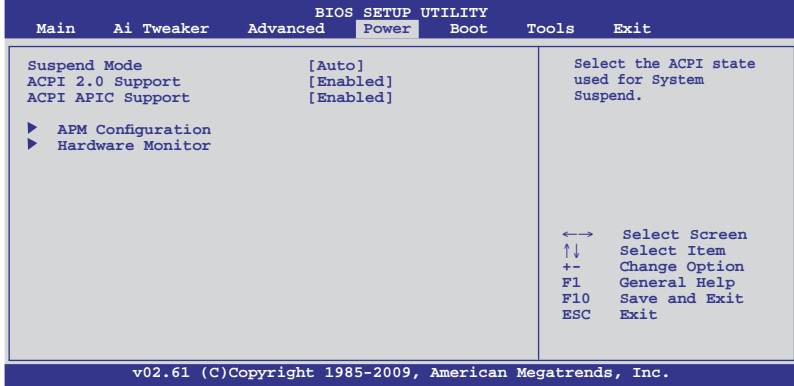
USB 2.0 Controller Mode [HiSpeed]

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

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

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 ACPI suspend mode to S1/POS (Power On Suspend).

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

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

3.7.2 ACPI 2.0 Support [Enabled]

[Disabled] The system will not add additional tables as per ACPI 2.0 specifications.

[Enabled] The system adds additional tables as per ACPI 2.0 specifications.

3.7.3 ACPI APIC Support [Enabled]

[Disabled] The system disables the Advanced Configuration and Power Interface (ACPI) support in the Advanced Programmable Interrupt Controller (APIC).

[Enabled] The ACPI APIC table pointer is included in the RSDT pointer list.

3.7.4 APM Configuration

| BIOS SETUP UTILITY | |
|-----------------------------|-------------|
| Power | |
| APM Configuration | |
| EuP Ready | [Enabled] |
| Restore on AC Power Loss | [Power Off] |
| Power On By PCI/PCIE Device | [Disabled] |
| Power on by External modems | [Disabled] |
| Power On By PS/2 Keyboard | [Disabled] |
| Power On By PS/2 Mouse | [Disabled] |
| Power On By RTC Alarm | [Disabled] |

EuP Ready [Enabled]

- [Disabled] Disables the Energy Using Products (EuP) Ready function.
- [Enabled] Allows BIOS to switch off some power at S5 state to get system ready for the EuP requirement. When set to [Enabled], power for WOL, WO_USB, audio and onboard LEDs will be switched off at S5 state.

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 PCI/PCIE Device [Disabled]

- [Disabled] Disallows the PCI/PCIE/onboard LAN devices to generate a wake even.
- [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 External modems [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 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.

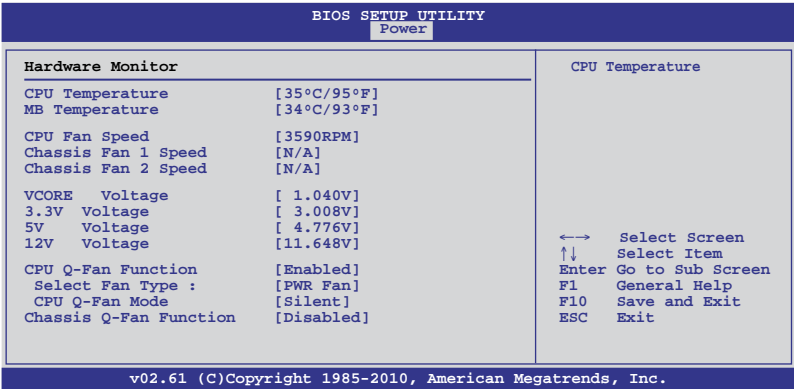
Power On By PS/2 Mouse [Disabled]

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

Power On By RTC Alarm [Disabled]

- [Disabled] Disables RTC to generate a wake event.
- [Enabled] When set to [Enabled], the items **RTC Alarm Date (Days)** and **System 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 [Enabled]

- [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.

CPU Q-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].

Chassis Q-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.

| BIOS SETUP UTILITY | | | | | | |
|--|------------|----------|-------|---|-------|------|
| Main | Ai Tweaker | Advanced | Power | Boot | Tools | Exit |
| Boot Settings | | | | Specifies the Boot Device Priority sequence. | | |
| ▶ Boot Device Priority | | | | A virtual floppy disk drive (Floppy Drive B:) may appear when you set the CD-ROM drive as the first boot device. | | |
| ▶ Boot Settings Configuration | | | | | | |
| ▶ Security | | | | | | |
| | | | | ←→ Select Screen ↑↓ Select Item Enter Go to Sub Screen F1 General Help F10 Save and Exit ESC Exit | | |
| v02.61 (C)Copyright 1985-2009, American Megatrends, Inc. | | | | | | |

3.8.1 Boot Device Priority

| BIOS SETUP UTILITY | | |
|-----------------------------|------------------|---|
| Boot | | |
| Boot Device Priority | | Specifies the boot sequence from the available devices. |
| 1st Boot Device | [Removable Dev.] | |
| 2nd Boot Device | [Hard Drive] | |
| 3rd Boot Device | [ATAPI CD-ROM] | |

1st ~ xxth Boot Device [Removable Dev.]

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

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

3.8.2 Boot Settings Configuration

| BIOS SETUP UTILITY | |
|------------------------------------|--------------|
| Boot | |
| Boot Settings Configuration | |
| Quick Boot | [Enabled] |
| Full Screen Logo | [Enabled] |
| AddOn ROM Display Mode | [Force BIOS] |
| Bootup Num-Lock | [On] |
| Wait For 'F1' If Error | [Enabled] |
| Hit 'DEL' Message Display | [Enabled] |

Allows BIOS to skip certain tests while booting. This will decrease the time needed to boot the system.

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.

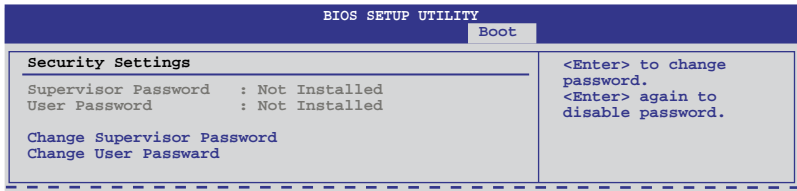
Hit 'DEL' Message Display [Enabled]

[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.

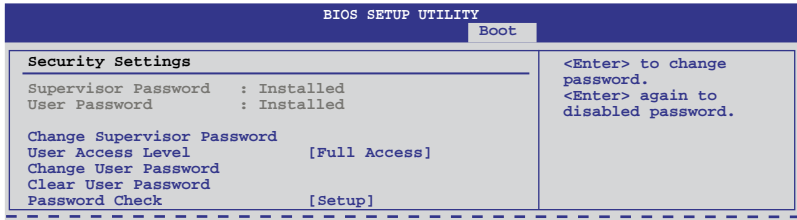
To change the supervisor password, follow the same steps as in setting a user password.

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 it by erasing the CMOS Real Time Clock (RTC) RAM. See section 2.6 **Jumpers** for information on how to erase the RTC RAM.

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



User Access Level [Full Access]

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

- [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

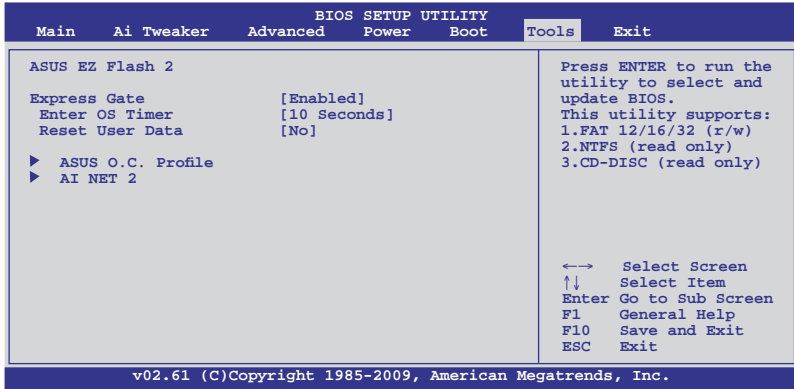
Select this item to clear the user password.

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.



For more details, refer to [section 3.2.2 ASUS EZ Flash 2 utility](#).

3.9.2 Express Gate [Auto]

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] [Auto]

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.

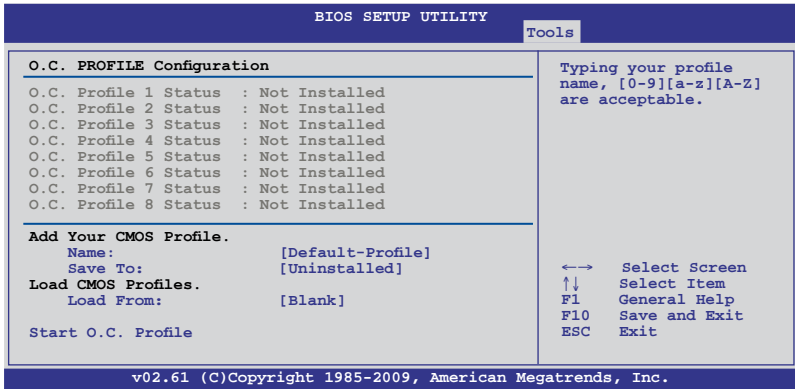
[No] Sets to [No] to disable the **Reset User Data** function when entering the Express Gate.



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

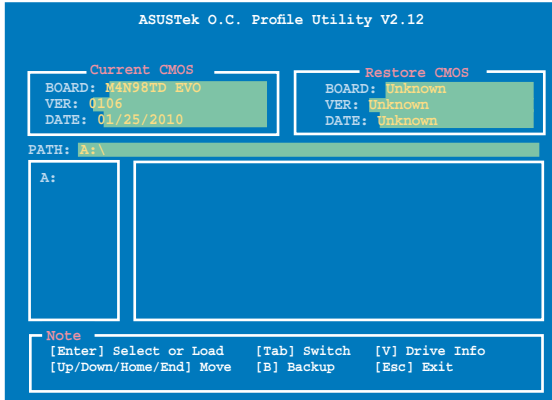
Allows you to save the current BIOS file to the BIOS Flash. In the Name sub-item, type your profile name and press <Enter>, and then choose a profile number to save your CMOS settings in the Save to sub-item.

Load CMOS Profiles

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

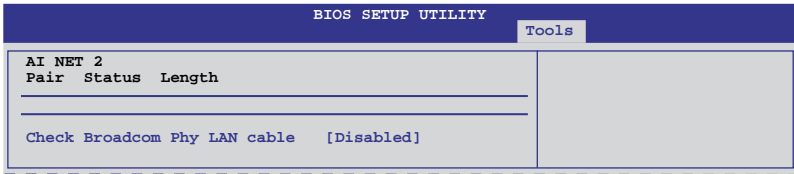
Start O.C. Profile

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



- This function can support devices such as a USB flash drive 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

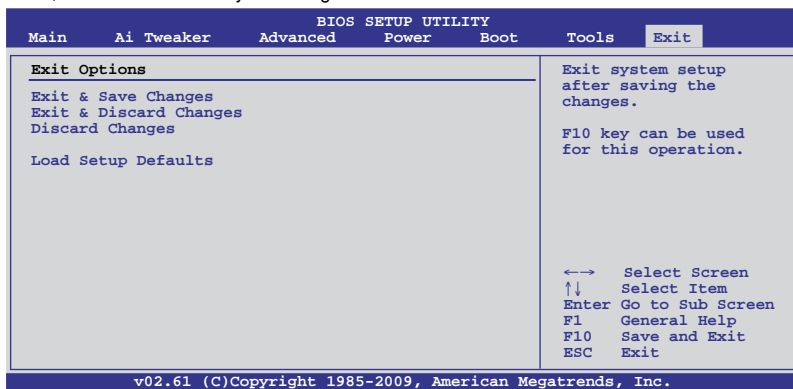


Check Broadcom Phy LAN Cable [Disabled]

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

Chapter 4

4.1 Installing an operating system

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



- Motherboard settings and hardware options vary. Use the setup procedures presented in this chapter for reference only. Refer to your OS documentation for detailed information.
- Ensure that you install the Windows® XP Service Pack 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 Highlights menu if Autorun is enabled in your computer. Click each menu tab and select the items you want to install.

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

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

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

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

Click the Highlights tab to display the software information

Click the Contact tab to display the ASUS contact information.

Click an item to install

Click an icon to display DVD/motherboard information

Click to obtain the corresponding software manuals



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

4.2.2 Obtaining the software manuals

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

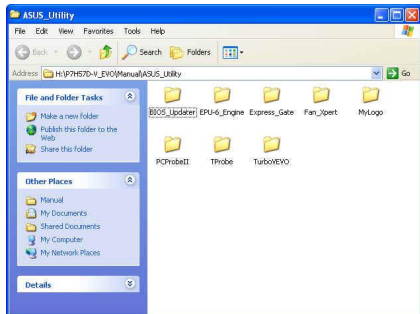


The software manual files are in Portable Document Format (PDF). Install the Adobe® Acrobat® Reader from the Utilities menu before opening the files.

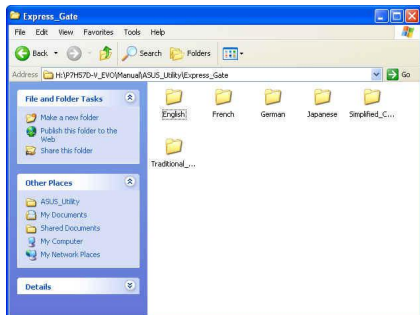
1. Click the **Manual** tab. Click **ASUS Motherboard Utility Guide** from the manual list on the left.



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



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



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

4.3 Software information

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

4.3.1 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 |
|--------|---|
| | Opens the Configuration window |
| | Opens the Report window |
| | Opens the Desktop Management Interface window |
| | Opens the Peripheral Component Interconnect window |
| | Opens the Windows Management Instrumentation window |
| | Opens the hard disk drive, memory, CPU usage window |
| | Shows/Hides the Preference section |
| | Minimizes the application |
| | Closes the application |




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

4.3.2 ASUS AI Suite

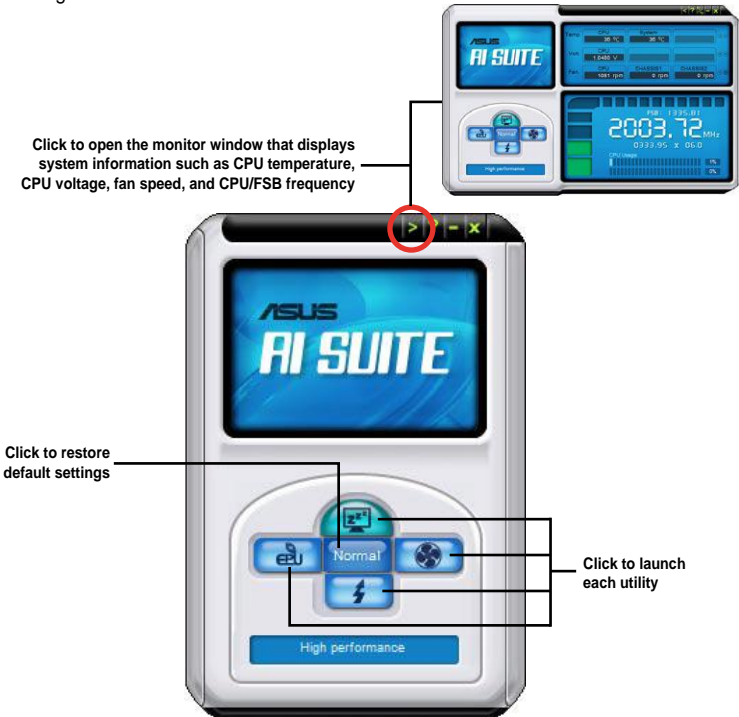
ASUS AI Suite allows you to launch several ASUS utilities easily.

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**. 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.

4.3.3 ASUS Fan Xpert

Asus Fan Xpert allows you to adjust both the CPU and chassis fan speeds according to different ambient temperatures and your PC's system loading. The various fan profiles offer flexible controls of fan speeds to achieve a quiet and cool system environment.

Launching Fan Xpert

After installing AI Suite from the motherboard support DVD, launch Fan Xpert by double-clicking the **AI Suite** tray icon and then clicking the **Fan Xpert** button  on the AI Suite main window.

Using Fan Xpert



Fan profiles


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

4.3.4 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.

4.3.5 ASUS Express Gate

ASUS Express Gate is an ASUS exclusive OS that provides you with quick access to the Internet and key applications before entering the Windows® OS.

Notices about ASUS Express Gate



- Install ASUS Express Gate from the motherboard support DVD before use.
- ASUS Express Gate does not support SATA devices in RAID mode. See chapter 3 for BIOS setup details.
- ASUS Express Gate does not support SATA 6Gb/s devices. Please visit <http://support.asus.com> for future Express Gate updates.
- ASUS Express Gate supports file uploading from ODD and USB drives and downloading to USB drives only.
- ASUS Express Gate supports installation on SATA HDDs, USB HDDs and Flash drives with at least 1.2GB of available disk space. When installed on USB HDDs or Flash drives, **connect the drive to the prior USB port** (for example, USB port 1) before turning on the computer to speed the boot-up time.
- ASUS Express Gate's display output varies with different monitors. Adjust the screen resolution from the Express Gate configuration Panel.
- Install at least 1GB system memory for better performance.

The Splash Screen

Express Gate's splash 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

Click to immediately enter existing OS, or it will automatically continue booting to existing OS when the timer above the Exit icon counts down to zero (0).



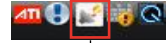
- The **Web Search** bar is available only when the system language of Express Gate is set to English (U.S.) or Russian, and the search provider is Yahoo!® for English and Yandex® for Russian.
- To enter the motherboard BIOS setup program, click **Exit** on the Express Gate splash screen, and then press the key during POST.
- Click  in the Express Gate environment for detailed software instructions.

4.3.6 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.

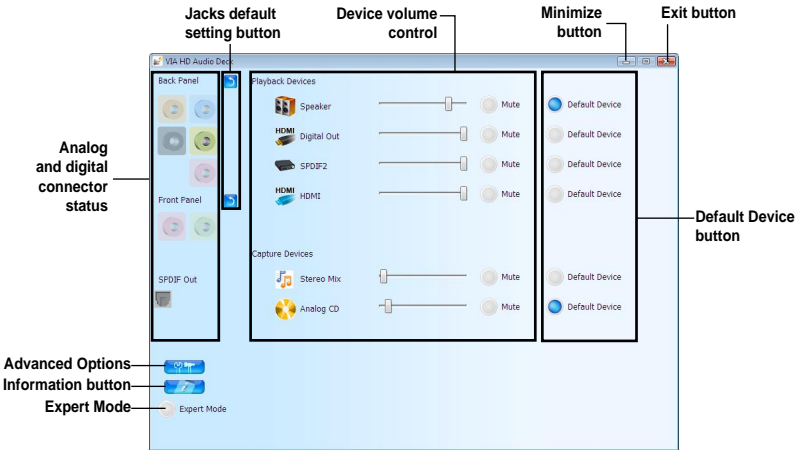
Follow the installation wizard to install the VIA® Audio Driver from the support CD/DVD that came with the motherboard package.

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™ / Windows® 7™



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.

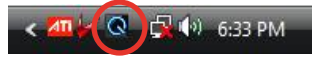


4.3.7 ASUS AI Nap

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.



4.3.8 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**.

Load existing ASUS Turbo profiles. Three pre-defined profiles are provided: "Race Car", "Jet Plane", and "Rocket".

Save the current settings as a new profile

Target settings - Points to the CPU Frequency and Voltage fields.

Default settings - Points to the CPU Voltage, DRAM Volt, and CPU/NB Voltage fields.

Click to show more settings - Points to the 'More Setting' button.

Advanced CPU and chipset voltage settings - Points to the 'Advance Mode' and 'CPU Ratio' tabs.

Voltage Adjustment bars - Points to the sliders for VDDA Volt, HT Volt, NB Volt, and SB Volt.

Adjusts CPU core ratio - Points to the 'CPU Ratio' tab.

Applies all changes immediately - Points to the 'Apply' button.

Undoes all changes without applying - Points to the 'Undo' button.



- 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 chapter 3 for details.

4.3.9 ASUS Turbo Key

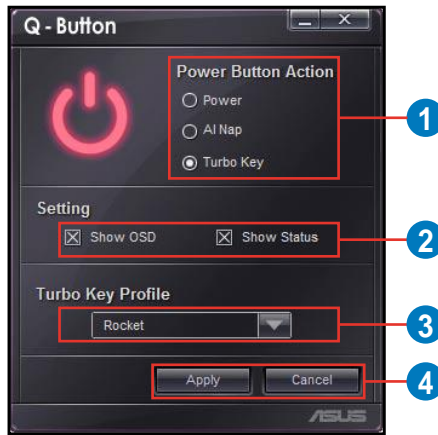
ASUS Turbo Key allows the user to turn the PC power button into a physical overclocking button. After the easy setup, Turbo Key can boost performances without interrupting ongoing work or games—with just one touch!

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 NVIDIA nForce® 980a SLI® 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 0+1, RAID 5, and JBOD.



- You must install Windows® XP Service Pack 2 or later versions before using Serial ATA hard disk drives. The Serial ATA RAID feature is available only if you are using Windows® XP SP2 or later versions.
- Due to Windows® XP / Vista limitation, a RAID array with the total capacity over 2TB cannot be set as a boot disk. A RAID array over 2TB can only be set as a data disk only.
- If you want to install a Windows® operating system to a hard disk drive included in a RAID set, you have to create a RAID driver disk and load the RAID driver during OS installation. Refer to section 4.5 **Creating a RAID driver disk** for details.

4.4.1 RAID definitions

RAID 0 (Data striping) optimizes two identical hard disk drives to read and write data in parallel, interleaved stacks. Two hard disks perform the same work as a single drive but at a sustained data transfer rate, double that of a single disk alone, thus improving data access and storage. Use of two new identical hard disk drives is required for this setup.

RAID 1 (Data mirroring) copies and maintains an identical image of data from one drive to a second drive. If one drive fails, the disk array management software directs all applications to the surviving drive as it contains a complete copy of the data in the other drive. This RAID configuration provides data protection and increases fault tolerance to the entire system. Use two new drives or use an existing drive and a new drive for this setup. The new drive must be of the same size or larger than the existing drive.

RAID 0+1 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.

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.

JBOD (Spanning) stands for Just a Bunch of Disks and refers to hard disk drives that are not yet configured as a RAID set. This configuration stores the same data redundantly on multiple disks that appear as a single disk on the operating system. Spanning does not deliver any advantage over using separate disks independently and does not provide fault tolerance or other RAID performance benefits.

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 **SATA Mode select** item to [RAID Mode].
4. Save your changes, and then exit the BIOS Setup.



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

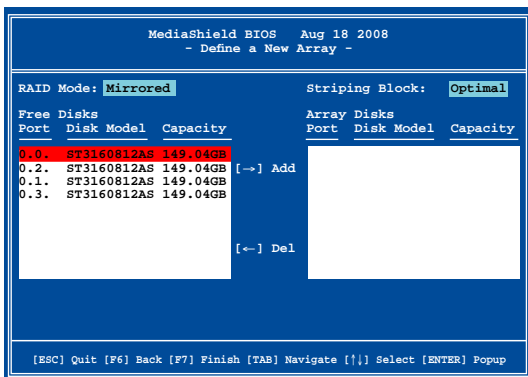


When set any of SATA ports to RAID mode, all SATA ports run at RAID mode together.

4.4.4 NVIDIA® MediaShield BIOS RAID configurations

To enter the NVIDIA® MediaShield BIOS RAID utility

1. Boot up your computer.
2. During POST, press <F10> to display the main menu of the utility.



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



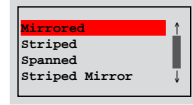
The RAID BIOS setup screens shown in this section are for reference only and may not exactly match the items on your screen.

Creating a RAID Volume

To create a RAID volume

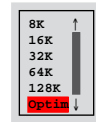
1. From the **Define a New Array** screen, use the <TAB> key to highlight the **RAID Mode** field, and then press <Enter>. The following sub-menu appears.

Use the up or down arrow keys to select a RAID mode, and then press <Enter>.



2. Press <TAB> to highlight the **Stripe Block** field, and then press <Enter>. The following sub-menu appears:

Use the up or down arrow keys to select the stripe size for your RAID array, and then press <Enter>. The available values range from 8 KB to 128 KB. The default selection is Optimal. The strip value should be chosen based on the planned drive usage.

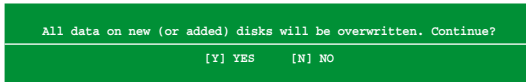


- 8 /16 KB - low disk usage
- 64 KB - typical disk usage
- 128 KB - performance disk usage



- For server systems, we recommend using a lower array block size. For multimedia computer systems used mainly for audio and video editing, we recommend a higher array block size for optimum performance.
- Stripe block size selection is not available for **Mirrored** or **Spanned** RAID arrays.

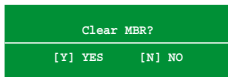
3. Press <TAB> to highlight the **Free Disks** field. Use the left or right arrow keys to assign the array disks.
4. Press <F7> to create RAID set. The following message box appears.



5. Press <Y> to clear the selected disks or <N> to proceed without clearing the disks. The following screen appears.

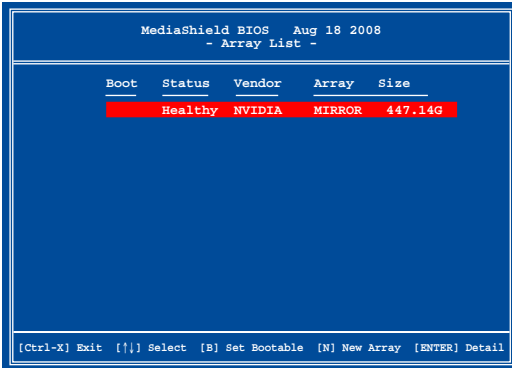


Take caution in using this option. All data on the RAID drives will be lost!



6. Press <Y> to clear the MBR.

The Array List screen appears, where you can review the RAID arrays that you have set up.



A new set of navigation keys is displayed on the bottom of the screen.

7. Press <Ctrl+X> to save settings and exit.

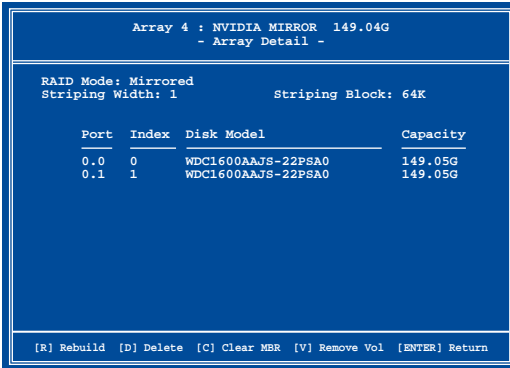
Deleting a RAID array



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

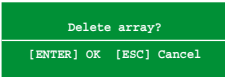
To delete a RAID array

1. From the **Array List** screen, use the up or down arrow keys to select a RAID array, and then press <Enter>. The RAID Array details appear.



A new set of navigation keys is displayed on the bottom of the screen.

2. Press <D> to delete a RAID array. The following confirmation message appears.



3. Press <Y> to delete array or press <N> to cancel.



Take caution in using this option. All data on the RAID drives will be lost!

4. If you deleted all existing arrays, the **Define a New Array** screen appears again.

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 or later operating systems, use either a USB flash drive with the RAID driver or the support DVD.



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

4.5.1 Creating a RAID driver disk without entering the OS

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

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

4.5.2 Creating a RAID driver disk in Windows®

To create a RAID driver disk in Windows®:

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



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

4.5.3 Installing the RAID driver during Windows® OS installation

To install the RAID driver for Windows® XP

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

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

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



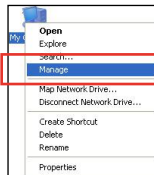
Before loading the RAID driver from a USB flash drive, you have to use another computer to copy the RAID driver from the support DVD to the USB flash drive.

4.5.4 Using a USB floppy disk drive

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

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

1. Using another computer, plug the USB floppy disk drive, and insert the floppy disk containing the RAID driver.
2. Right-click **My Computer** on the Windows® desktop or **start** menu, and then select **Manage** from the pop-up window.

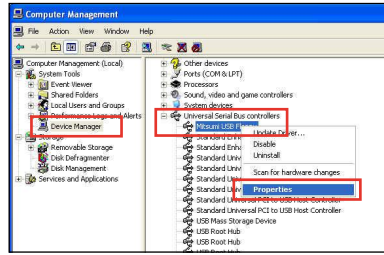


OR

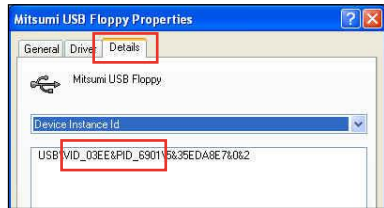
3. Select **Device Manager**. From the **Universal Serial Bus controllers**, right-click **xxxxxx USB Floppy**, and then select **Properties** from the pop-up window.



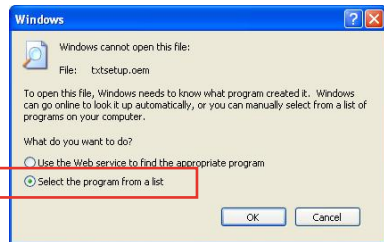
The name of the USB floppy disk drive varies with different vendors.



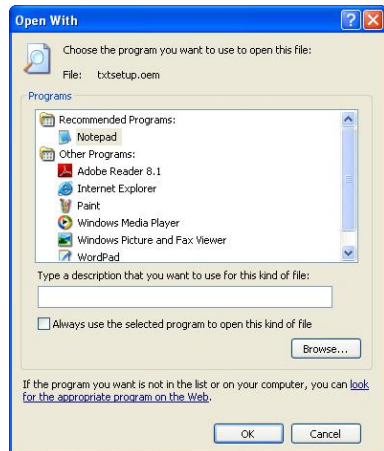
4. Click **Details** tab. The Vendor ID (VID) and Product ID (PID) are displayed.



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



7. Use Notepad to open the file.



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

```
[HardwareIds.scsi.RAIDCLASS]
id= "SCSI\NVIDIA_Raid_Disk_____", "nvr32"
id= "SCSI\NVIDIA_Raid_Disk_____", "nvr32"
id= "SCSI\NVIDIA_Raid_Disk_20_____", "nvr32"
id= "SCSI\NVIDIA_Raid_Disk_20_____", "nvr32"
id= "*_NVRAIDBUS", "nvr32"
id= "*_NVRAIDBUS", "nvr32"
id= "*_NVRAID20", "nvr32"
id= "USB\VID_03EE&PID_6901", "usbstor"

[HardwareIds.scsi.BUSDRV]
id= "PCI\VEN_10DE&DEV_0266", "nvgt"
id= "PCI\VEN_10DE&DEV_0267", "nvgt"
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id= "PCI\VEN_10DE&DEV_0ABC", "nvgt"
id= "PCI\VEN_10DE&DEV_0BC4", "nvgt"
id= "PCI\VEN_10DE&DEV_0BC5", "nvgt"
id= "USB\VID_03EE&PID_6901", "usbstor"
```



Add the same line to both sections.

The VID and PID vary with different vendors.

10. Save and exit the file.

5.1 NVIDIA® SLI™ technology

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

5.1.1 Requirements

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



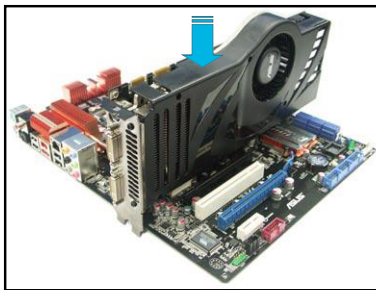
- We recommend that you install additional chassis fans for better thermal environment.
- Visit the NVIDIA zone website (<http://www.nzone.com>) for the latest certified graphics card and supported 3D application list.

5.1.2 Installing two SLI-ready graphics cards

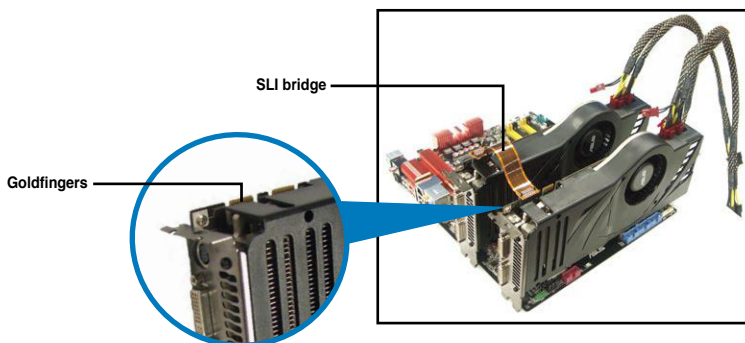


The following pictures are for reference only. The graphics cards and the motherboard layout may vary with models, but the installation steps remain the same.

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



4. Align and firmly insert the SLI bridge connector to the goldfingers on each graphics card. Ensure that the connector is firmly in place.
5. Connect two independent auxiliary power sources from the power supply to the two graphics cards separately.
6. Connect a VGA or a DVI cable to the graphics card.



5.1.3 Installing the device drivers

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



Ensure that your PCI Express graphics card driver supports the NVIDIA® SLI™ technology. Download the latest driver from the NVIDIA website (www.nvidia.com).

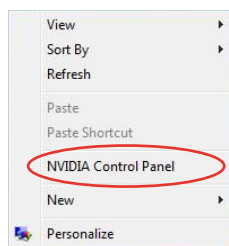
5.1.4 Enabling the NVIDIA® SLI™ technology

After installing your graphics cards and the device drivers, enable the SLI feature in NVIDIA® Control Panel under the Windows® Vista™ / 7 operating system.

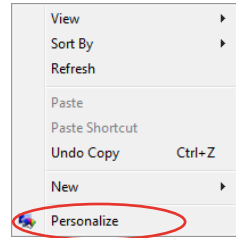
Launching the NVIDIA Control Panel

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

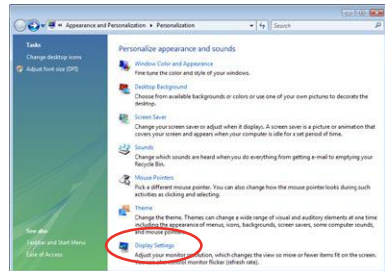
- A. Right click on the empty space of the Windows® desktop and select **NVIDIA Control Panel**.
The NVIDIA Control Panel window appears (See Step B5).



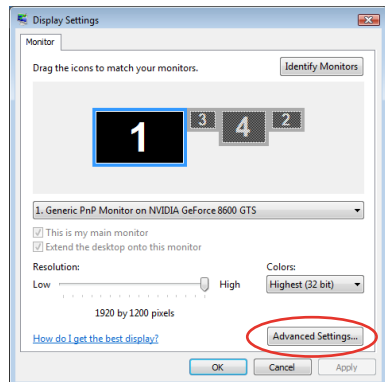
- B1. If you cannot see the NVIDIA Control Panel item in step (A), select **Personalize**.



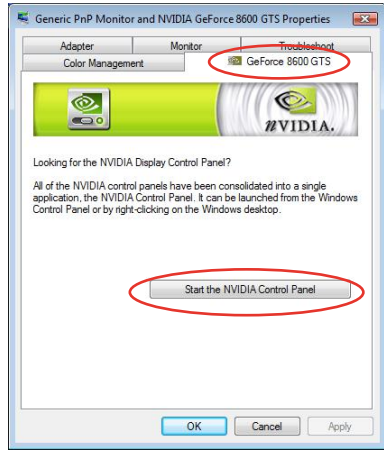
- B2. From the **Personalization** window, select **Display Settings**.



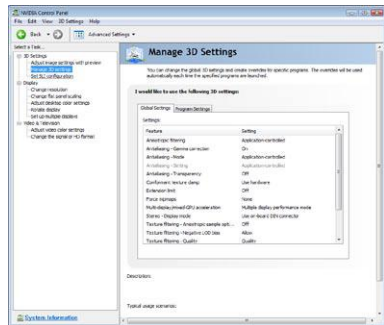
- B3. From the Display Settings dialog box, click **Advanced Settings**.



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

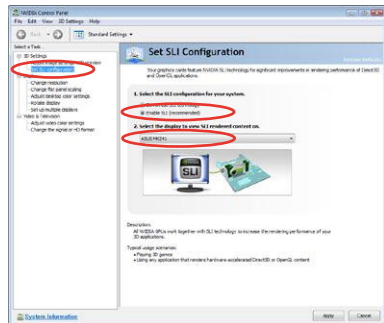


- B5. The NVIDIA Control Panel window appears.



Enabling SLI settings

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



5.2 NVIDIA® Hybrid SLI™ technology

The motherboard supports the NVIDIA® Hybrid SLI™ technology that includes two primary features: GeForce® Boost and HybridPower™. GeForce® Boost enhances the performance of NVIDIA discrete Graphics Process Units (dGPU) when they work with the onboard motherboard GPU (mGPU). HybridPower™ unleashes the graphics performance of the dGPU and enables low-power operation when the performance of the dGPU is not needed. You can switch from the dGPU(s) to the mGPU for a quiet, power-saving computer environment.



- Hybrid SLI technology is supported by Windows® Vista™ / 7 only.
- Hybrid SLI technology requires at least 2GB system memory to activate.
- GeForce Boost supports up to two displays simultaneously (both connected to either the mGPU or the dGPU).
- When two or more displays are connected to both the mGPU and the dGPU, the Hybrid SLI mode is disabled and the multi-display mode is enabled. In the multi-display mode, up to four displays can be connected (two displays driven by the mGPU and two displays by the dGPU).
- HybridPower requires displays to be connected to the mGPU. HybridPower cannot be enabled when displays are driven through the dGPU.
- HybridPower and GeForce Boost are supported by certain set of dGPUs. Go to www.nvidia.com/hybridSLI to learn the supported GPUs.

Enabling GeForce® Boost™



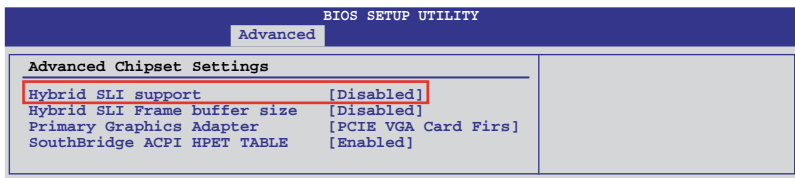
Before enabling GeForce Boost, ensure that you have installed a dGPU recommended for GeForce Boost on your motherboard.

GeForce Boost

1. Turn on the system and press during the Power-On Self-Test (POST) to enter the BIOS Setup Utility.
2. Go to **Advanced > Chipset > SouthBridge Configuration** and set the **Hybrid SLI support** item to [Auto]. See **section 3.6.2 Chipset** for details.



The **Hybrid SLI Support** item becomes user-configurable only when a dGPU is detected. Ensure that your dGPU is properly installed.



3. Save your changes and Exit Setup.
4. Place the motherboard support DVD into the optical drive, and go to the **Drivers** menu to install the **NVIDIA Chipset Driver Program**.
5. Restart the system.
6. If the driver is correctly installed, you will find the Hybrid SLI icon on the taskbar.

The Hybrid SLI icon indicates that the system is in Performance mode and that GeForce Boost is enabled. The onboard GPU will share the rendering load with the dGPU and boost the performance of the dGPU.





Visit www.asus.com for the latest chipset driver.

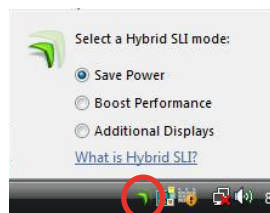


To enable HybridPower

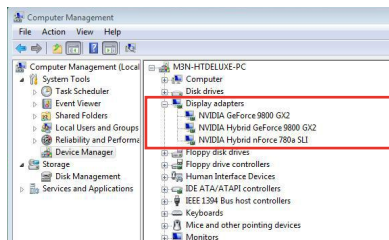
1. Follow Step 1 to 5 on the previous page to complete the hardware and driver installation.
2. If the driver is correctly installed, you will find the Hybrid SLI icon on the taskbar.

The Hybrid SLI icon indicates that the system is in Performance mode and that rendering is being done by the dGPU. The mGPU is being used only to drive the display.

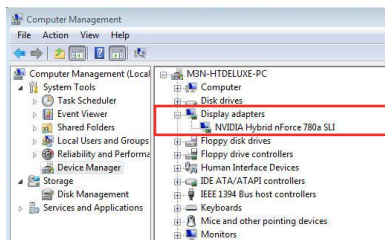
3. Click the Hybrid SLI icon and select **Save Power**.
4. The icon will change state (from  to ) to indicate that the system is in Power Saving mode, which means that the dGPU is turned off and the mGPU is both rendering and displaying.



5. When the Power Saving mode is enabled, the dGPU does not show in the Windows® Device Manager.



Power Saving mode is disabled.



When the Power Saving mode is enabled, the dGPU is turned off and does not appear in the Device Manager.

ASUS contact information

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Fax +886-2-2890-7798
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Online contact www.asus.de/sales

Technical Support

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

DECLARATION OF CONFORMITY
Per FCC Part 2 Section 2.1077(a)



Responsible Party Name: **Asus Computer International**

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

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

hereby declares that the product

Product Name : Mother board

Model Number : M4N98TD EVO

Conforms to the following specifications:

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

Supplementary Information:

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

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

Signature : Steve Chang
Date : **Feb. 05, 2010**

EC Declaration of Conformity



We, the undersigned,

| | |
|--------------------------------------|---|
| Manufacturer: | ASUSTEK COMPUTER INC. |
| Address, City: | No. 150, LI-TE RD., FEITOU, TAIPEI 112, TAIWAN R.O.C. |
| Country: | TAIWAN |
| Authorized representative in Europe: | ASUS COMPUTER GmbH |
| Address, City: | HARKORT STR. 21-23, 40890 RATINGEN |
| Country: | GERMANY |

declare the following apparatus:

| | |
|----------------|--------------|
| Product name : | Mother Board |
| Model name : | M4N98TD EVO |

conform with the essential requirements of the following directives:

| | |
|---|---|
| <input checked="" type="checkbox"/> 2004/1095/EC-EMC Directive | <input type="checkbox"/> EN 55024:1998+A1:2001+A2:2003 |
| <input checked="" type="checkbox"/> EN 61000-3-2:2006 | <input checked="" type="checkbox"/> EN 61000-3-3:1998+A1:2001+A2:2005 |
| <input type="checkbox"/> EN 55013:2001+A1:2003+A2:2006 | <input type="checkbox"/> EN 55020:2007 |

1989/5/EC-R & TTE Directive

| | |
|--|---|
| <input type="checkbox"/> EN 300 328 V1.7 (2006-05) | <input type="checkbox"/> EN 301 488-1 V1.8.1 (2008-04) |
| <input type="checkbox"/> EN 300 440-1 V1.4.1 (2008-05) | <input type="checkbox"/> EN 301 488-3 V1.4.1 (2002-08) |
| <input type="checkbox"/> EN 301 488-2 V1.4.1 (2002-08) | <input type="checkbox"/> EN 301 488-4 V1.4.1 (2002-08) |
| <input type="checkbox"/> EN 301 511 V9.0.2 (2002-03) | <input type="checkbox"/> EN 301 488-7 V1.3.1 (2005-11) |
| <input type="checkbox"/> EN 301 908-1 V3.2.1 (2007-05) | <input type="checkbox"/> EN 301 489-9 V1.4.1 (2007-11) |
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| <input type="checkbox"/> EN 301 908-3 V3.2.1 (2007-05) | <input type="checkbox"/> EN 301 489-24 V1.4.1 (2007-09) |
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| <input type="checkbox"/> EN 50371:2002 | <input type="checkbox"/> EN 302 326-3 V1.3.1 (2007-09) |
| <input type="checkbox"/> EN 62311:2008 | <input type="checkbox"/> EN 301 357-2 V1.3.1 (2006-05) |
| <input type="checkbox"/> EN 50385:2002 | |

2006/95/EC-LVD Directive

| | |
|--|--|
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|--|--|

CE marking



(EC conformity marking)

Position : **CEO**
Name : **Jerry Shen**

Jerry Shen

Signature : _____

Declaration Date: **Feb. 05, 2010**
Year to begin affixing CE marking: **2010**