M5A97

Motherboard

E6441

First Edition (V1)
May 2011

Offer to Provide Source Code of Certain Software

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15 Li Te Rd.,
Beitou, Taipei 112
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In your request please provide the name, model number and version, as stated in the About Box of the product for which you wish to obtain the corresponding source code and your contact details so that we can coordinate the terms and cost of shipment with you.

The source code will be distributed WITHOUT ANY WARRANTY and licensed under the same license as the corresponding binary/object code.

This offer is valid to anyone in receipt of this information.

ASUSTeK is eager to duly provide complete source code as required under various Free Open Source Software licenses. If however you encounter any problems in obtaining the full corresponding source code we would be much obliged if you give us a notification to the email address **gpl@asus.com**, stating the product and describing the problem (please do NOT send large attachments such as source code archives etc to this email address).

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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://csr.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: Multiple GPU technology support**

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

Where to find more information

Refer to the following sources for additional information and for product and software updates.

1. **ASUS websites**

   The ASUS website provides updated information on ASUS hardware and software products. Refer to the ASUS contact information.

2. **Optional documentation**

   Your product package may include optional documentation, such as warranty flyers, that may have been added by your dealer. These documents are not part of the standard package.

Conventions used in this guide

To ensure that you perform certain tasks properly, take note of the following symbols used throughout this manual.

DANGER/WARNING: Information to prevent injury to yourself when trying to complete a task.

CAUTION: Information to prevent damage to the components when trying to complete a task.

IMPORTANT: Instructions that you MUST follow to complete a task.

NOTE: Tips and additional information to help you complete a task.

Typography

Bold text	Indicates a menu or an item to select.
Italics	Used to emphasize a word or a phrase.
<Key>	Keys enclosed in the less-than and greater-than sign means that you must press the enclosed key. Example: <Enter> means that you must press the Enter or Return key.
<Key1> + <Key2> + <Key3>	If you must press two or more keys simultaneously, the key names are linked with a plus sign (+). Example: <Ctrl> + <Alt> + <Del>

M5A97 specifications summary

CPU	AMD® Socket AM3+ for AMD® FX™ series processors up to 8-core Compatible with AMD® Socket AM3 for AMD® Phenom™ II / Athlon™ II / Sempron™ 100 Series Processors AMD® 140W CPU Support AMD® Cool 'n' Quiet™ Technology Supports 32nm AM3+ CPU * Refer to www.asus.com for the AMD® CPU support list
Chipset	AMD® 970 / SB950
System bus	Up to 4800 MT/s HyperTransport™ 3.0
Memory	4 x DIMM, max. 32 GB, DDR3 2133 (O.C.) / 1866 / 1600 / 1333 / 1066 MHz, ECC / non-ECC, un-buffered memory Dual channel memory architecture * Due to CPU spec., AMD® 100 series CPUs support up to DDR3 1066MHz. With ASUS design, this motherboard can support up to DDR3 1333MHz. ** Refer to www.asus.com for the latest Memory QVL (Qualified Vendors List). *** When you install a total memory of 4GB or more, Windows® 32-bit operating system may only recognize less than 3GB. We recommend a maximum of 3GB system memory if you are using a Windows® 32-bit operating system.
Multi-GPU Support	Supports ATI® Quad-GPU CrossFireX™ Technology
Expansion slots	2 x PCI Express 2.0 x16 slots (Blue @x16 speed; Black @x4 speed) 2 x PCI Express 2.0 x1 slots 2 x PCI slots
Storage	**AMD® SB950 Chipset:** - 6 x SATA 6.0 Gb/s ports with RAID 0, 1, 5, and 10 support
LAN	Realtek® 8111E Gigabit LAN controller
Audio	Realtek® ALC887 8-channel High Definition Audio CODEC - Supports Jack-Detection, Multi-Streaming, and Front Panel Jack-Retasking - Optical S/PDIF Out port at back I/O - ASUS Noise Filter
USB	**AMD® SB950 Chipset:** - 12 x USB 2.0/1.1 ports (6 ports at midboard, 6 ports at the back panel) **ASMedia USB 3.0 controller:** - 2 x USB 3.0/2.0 ports at back panel (blue)

(continued on the next page)

M5A97 specifications summary

ASUS unique features	**ASUS Dual Intelligent Processors:** ASUS EPU - EPU ASUS TPU - Auto Tuning, TurboV **ASUS Power Design** - 4 + 2 Phase Power Design **ASUS Exclusive Features** - ASUS UEFI BISO EZ Mode featuring friendly graphics user interface - MemOK! - AI Suite II - Ai Charger+ **ASUS Quiet Thermal Solution** - ASUS Fanless Design: Heat sink solution - ASUS Fan Xpert **ASUS EZ DIY** - ASUS O.C. Profile - ASUS EZ Flash 2 - ASUS MyLogo 2™ - Precision Tweaker 2 - Multi-language BIOS **ASUS Q-Design** - ASUS Q-Slot
ASUS exclusive overclocking features	**Precision Tweaker 2** - vCore: Adjustable CPU voltage at 0.00625V increment - vDDNB: Adjustable CPU/NB voltage at 0.00625V increment - vNB: Adjustable NB voltage at 0.00625V increment - vNB HT bus: Adjustable HT voltage at 0.00625V increment - vDRAM bus: Adjustable DRAM voltage at 0.00625V increment - vSB: Adjustable SB voltage at 0.00500V increment **SFS (Stepless Frequency Selection)** - Internal Base Clock tuning from 100MHz up to 600MHz at 1MHz increment - PCI Express frequency tuning from 100MHz up to 150MHz at 1MHz increment **Overclocking protection** - ASUS C.P.R. (CPU Parameter Recall)
Back panel I/O ports	1 x PS/2 keyboard (Purple) 1 x PS/2 mouse (Green) 1 x Optical S/PDIF Output 1 x LAN (RJ45) port 6 x USB 2.0/1.1 ports 2 x USB 3.0/2.0 ports (blue) 8-channel audio I/O ports

(continued on the next page)

M5A97 specifications summary

Internal I/O connectors	3 x USB 2.0/1.1 connectors support additional 6 USB ports 1 x COM connector 6 x SATA 6.0 Gb/s connectors 1 x CPU fan connector (4-pin) 2 x Chassis fan connectors (2 x 4-pin) 1 x S/PDIF Out header 1 x MemOK! button 1 x Front panel audio connector 1 x System panel connector 1 x Power Fan connector (1 x 3-pin) 1 x Clear CMOS jumper 1 x 24-pin EATX Power connector 1 x 8-pin EATX 12V Power connector
BIOS features	32 Mb Flash ROM, UEFI BIOS, PnP, DMI 2.0, WfM 2.0, SM BIOS 2.5, ACPI 2.0a, Multi-language BIOS, ASUS EZ Flash 2
Manageability	WfM 2.0, DMI 2.0, WOL by PME, WOR by PME, PXE
Support DVD contents	Drivers ASUS utilities ASUS Update Anti-virus software (OEM version)
Accessories	2 x Serial ATA 6.0 Gb/s cables 1 x I/O Shield 1 x User Manual
Form factor	ATX form factor: 12 in. x 9 in. (30.5 cm x 22.9 cm)

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

1.1 Welcome!

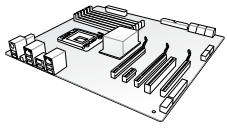
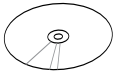
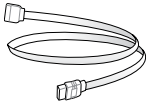
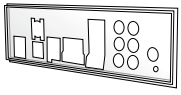
Thank you for buying an ASUS® M5A97 motherboard!

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 M5A97 motherboard	**User guide**	**Support DVD**
		
2 x Serial ATA 6.0 Gb/s cables	**1 x ASUS I/O Shield**	

- 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® FX™ / Phenom™ II / Athlon™ II / Sempron™ 100 series CPU support

This motherboard supports AMD® Socket AM3+ multi-core processors with unique L3 cache and delivers better overclocking capabilities with less power consumption. It features dual-channel DDR3 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 32nm manufacturing process.

AMD® 970 Chipset

AMD® 970 Chipset is designed to support up to 4800MT/s HyperTransport™ 3.0 (HT 3.0) interface speed and PCI Express™ 2.0 x16 graphics. It is optimized with AMD®'s latest AM3+ and multi-core CPUs to provide excellent system performance and overclocking capabilities.

DDR3 2133(O.C.)/1866/1600/1333/1066 support

This motherboard supports DDR3 memory that features data transfer rates of 2133(O.C.)/1866/1600/1333/1066 MHz to meet the higher bandwidth requirements of the latest 3D graphics, multimedia, and Internet applications. The dual-channel DDR3 architecture enlarges the bandwidth of your system memory to boost system performance.

AMD® SB950 Chipset

The AMD® SB950 Southbridge natively supports the next generation SATA 6.0 Gb/s data transfer rate and PCI Express 2.0 interface.

AMD Cool 'n' Quiet Technology

This motherboard supports the AMD Cool 'n' Quiet technology which monitors system operation and automatically adjusts CPU voltage and frequency for a cool and quiet operating environment.

True USB 3.0 Support

Experience ultra-fast data transfers at 4.8 Gb/s with USB 3.0–the latest connectivity standard. Built to connect easily with next-generation components and peripherals, USB 3.0 transfers data 10X faster and is also backward compatible with USB 2.0 components.

Serial ATA 6.0 Gb/s technology

The AMD® SB950 chipset natively supports the next generation SATA 6.0 Gb/s data transfer rate, enhances scalability, provides faster data retrieval, and doubles the bandwidth of the current bus systems.

ATI Quad-GPU CrossFireX™ Support

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

ErP ready

The motherboard is European Union´s Energy-related Products (ErP) ready, and ErP requires products to meet certain energy efficiency requirements in regards to energy consumptions. This is in line with ASUS vision of creating environment-friendly and energy-efficient products through product design and innovation to reduce carbon footprint of the product and thus mitigate environmental impacts.

1.3.2 DIP (Dual Intelligent Processors) - TPU (TurboV Processing Unit) & EPU (Energy Processing Unit)

TPU

Unleash your performance with AI Suite II utility. ASUS Auto tuning feature can intelligently optimize the system for fast, yet stable clock speeds, and the TurboV gives you the freedom to adjust CPU frequencies and ratios to optimize performance under varied system conditions.

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!

1.3.3 ASUS Innovative Design

MemOK!

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

1.3.4 ASUS unique features

ASUS Power Solutions

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

ASUS Quiet Thermal Solutions

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

Fan Xpert

ASUS Fan Xpert intelligently allows you to adjust the CPU fan speed 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.

Fanless Design: stylish heatsink solution

The stylish heatsink features a 0-dB thermal solution that offers users a noiseless PC environment. Not only the beautiful shape upgrades the visual enjoyment for motherboard users, but also the heatsink design lowers the temperature of the chipset and power phase area through high efficient heat-exchange. Combined with usability and aesthetics, the ASUS stylish heatsink will give users an extremely silent and cooling experience with the elegant appearance!

ASUS EZ DIY

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

ASUS UEFI BIOS (EZ Mode)

The new ASUS UEFI BIOS is an Unified Extensible Firmware Interface that offers a user-friendly interface that goes beyond traditional keyboard-only BIOS control to enable more flexible and convenient mouse input. Users can easily navigate the new UEFI BIOS with the same smoothness as their operating system. It natively supports hard drives larger than 2.2TB in 64-bit, with full storage space utilization, helping deliver far more exciting computing than traditional BIOS version. The exclusive EZ Mode displays frequently-accessed setup info. while the Advanced Mode is for experienced performance enthusiasts that demand far more intricate system settings.

ASUS EZ-Flash 2

ASUS EZ Flash 2 is a user-friendly utility that allows you to update the BIOS without using a bootable floppy disk or an OS-based utility.

ASUS MyLogo2™

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

ASUS O.C. Profile

The motherboard features the ASUS O.C. Profile that allows you to conveniently store or load multiple BIOS settings. The BIOS settings can be stored in the CMOS or a separate file, giving you the freedom to share and distribute your favorite settings.

Precision Tweaker 2

Allows you to fine-tune the VCore / VDDNB voltage in 0.00625V steps and DRAM voltage in 0.00625V steps to achieve the most precise setting for the ultimate overclocking configuration.

C.P.R. (CPU Parameter Recall)

The BIOS C.P.R. feature automatically restores the CPU default settings when the system hangs due to overclocking failure. C.P.R. eliminates the need to open the system chassis and clear the RTC data. Simply shut down and reboot the system, and the BIOS automatically restores the CPU parameters to their default settings.

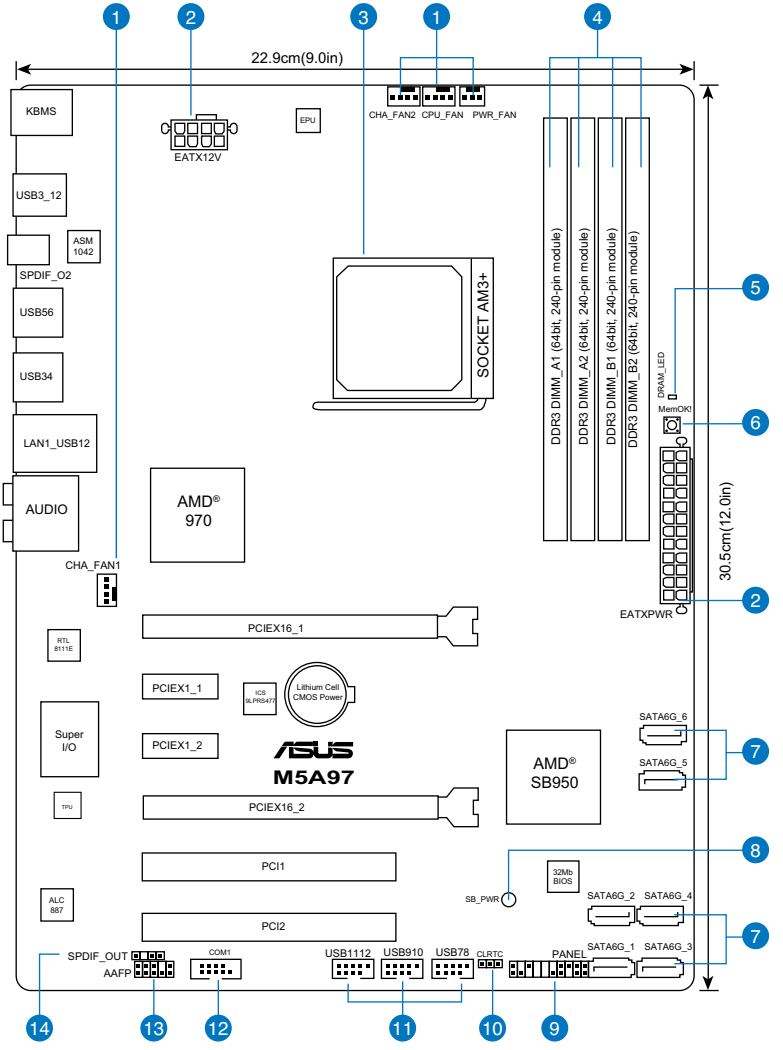
2.1 Before you proceed

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 **2.2.8 Connectors** for more information about rear panel connectors and internal connectors.

Layout contents

Connectors/Jumpers/Slots		Page
1.	CPU and chassis fan connectors (4-pin CPU_FAN, 4-pin CHA_FAN1/2, 3-pin PWR_FAN)	2-18
2.	ATX power connectors (24-pin EATXPWR, 8-pin EATX12V)	2-19
3.	AM3+ CPU Socket	2-4
4.	DDR3 DIMM slots	2-5
5.	DRAM LED (DRAM_LED)	2-15
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7.	AMD® SB950 Serial ATA 6.0 Gb/s connectors (7-pin SATA6G_1~6)	2-16
8.	Standby power LED (SB_PWR)	2-15
9.	System panel connector (20-8 pin PANEL)	2-20
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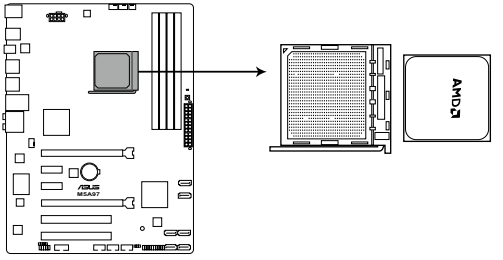
11.	USB connectors (10-1 pin USB78, USB910, USB1112)	2-17
12.	Serial port connector (10-1 pin COM1)	2-16
13.	Front panel audio connector (10-1 pin AAFP)	2-17
14.	Digital audio connector (4-1 pin SPDIF_OUT)	2-18

2.2.2 Central Processing Unit (CPU)

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

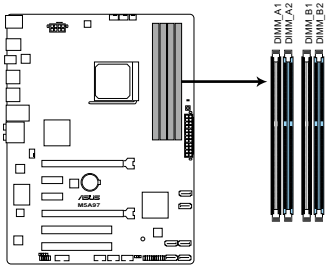


M5A97 CPU socket AM3+

2.2.3 System memory

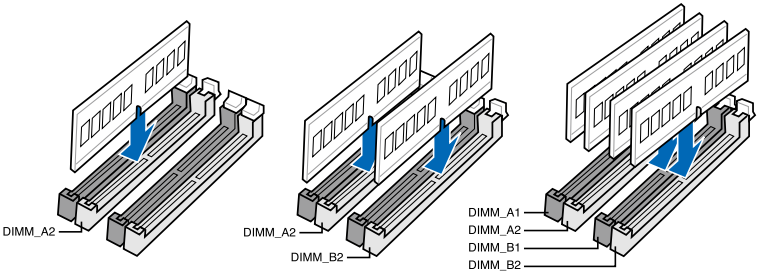
The motherboard comes with four Double Data Rate 3 (DDR3) Dual Inline Memory Modules (DIMM) sockets.

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



M5A97 240-pin DDR3 DIMM sockets

Recommended memory configurations



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, we recommend that you obtain memory modules from the same vendor.
- AMD® FX™ Series CPU on this motherboard supports up to DDR3 1866MHz as its standard memory frequency.
- Due to CPU spec., AMD® 100 series CPUs support up to DDR3 1066MHz. With ASUS design, this motherboard can support up to DDR3 1333MHz.
- When overclocking, some AMD CPU models may not support DDR3 1600 MHz or higher frequency DIMMs.
- Due to the memory address limitation on 32-bit Windows OS, when you install 4GB or more memory on the motherboard, the actual usable memory for the OS can be about 3GB or less. For effective use of memory, we recommend that you do any of the following:
  - Use a maximum of 3GB system memory if you are using a 32-bit Windows OS.
  - Install a 64-bit Windows OS when you want to install 4GB or more on the motherboard.
  For more details, refer to the Microsoft® support site at http://support.microsoft.com/kb/929605/en-us.
- This motherboard does not support DIMMs made up of 512Mb (64MB) chips or less (Memory chip capacity counts in Megabit, 8 Megabit/Mb = 1 Megabyte/MB).

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

Visit the ASUS website for the latest QVL.

M5A97 Motherboard Qualified Vendors Lists (QVL) DDR3 2000MHz capability for AMD AM3+ CPU

Vendors	Part No.	Size	SS/DS	Chip Brand	Chip NO.	Timing	Voltage	DIMM socket support (Optional)		
								1 DIMM	2 DIMM	4 DIMM
A-DATA	AX3U2000GC4G9B(XMP)	4GB	DS	-	-	9-11-9-27	1.55~1.75	•	•	•
CORSAIR	CMT6GX3M3A2000C8(XMP)	6GB (3x 2GB)	DS	-	-	8-9-8-24	1.65	•	•	
G.SKILL	F3-16000CL9T-6GBPS(XMP)	6GB(3 x 2GB)	DS	-	-	9-9-9-24	1.65	•	•	
G.SKILL	F3-16000CL7Q-8GBFLS(XMP)	8GB(4 x 2GB)	DS	-	-	7-9-7-24	1.65	•	•	•

M5A97 Motherboard Qualified Vendors Lists (QVL) DDR3 1866MHz capability for AMD AM3+ CPU

Vendors	Part No.	Size	SS/DS	Chip Brand	Chip NO.	Timing	Voltage	DIMM socket support (Optional)		
								1 DIMM	2 DIMM	4 DIMM
CORSAIR	CMZ8GX3M2A1866C9(XMP)	8GB (2x 4GB)	DS	-	-	9-10-9-27	1.5	•	•	•
KINGSTON	KHX1866C9D3T1K3/3GX(XMP)	3GB (3x 1GB)	SS	-	-	-	1.65	•	•	•
OCZ	OCZ3G1866LV4GK	4GB (2x 2GB)	DS	-	-	10-10-10	1.65	•	•	
Super Talent	W1866UX2G8(XMP)	2GB(2 x 1GB)	SS	-	-	8-8-8-24	-	•	•	•

M5A97 Motherboard Qualified Vendors Lists (QVL) DDR3 1800MHz capability for AMD AM3+ CPU

Vendors	Part No.	Size	SS/DS	Chip Brand	Chip NO.	Timing	Voltage	DIMM socket support (Optional)		
								1 DIMM	2 DIMM	4 DIMM
G.SKILL	F3-14400CL6D-4GBFLS(XMP)	4GB(2 x 2GB)	DS	-	-	6-8-6-24	1.65	•	•	•
KINGSTON	KHX1800C9D3T1K3/ 6GX(XMP)	6GB(3 x 2GB)	DS	-	-	-	1.65	•	•	•

M5A97 Motherboard Qualified Vendors Lists (QVL) DDR3 1600MHz capability for AMD AM3+ CPU

Vendors	Part No.	Size	SS/ DS	Chip Brand	Chip NO.	Timing	Voltage	DIMM socket support (Optional)	
								2 DIMM	4 DIMM
A-DATA	AX3U1600GC4G9(XMP)	4GB	DS	-	-	9-9-9-24	1.55~1.75	•	•
A-DATA	AX3U1600XC4G79(XMP)	4GB	DS	-	-	7-9-7-21	1.55~1.75	•	•
CORSAIR	CMZ8GX3M2A1600C8(XMP)	8GB (2x 4GB)	DS	-	-	8-8-8-24	1.5	•	•
CORSAIR	CMZ8GX3M2A1600C9(XMP)	8GB (2x 4GB)	DS	-	-	9-9-9-24	1.5	•	•
Crucial	BL12864BN1608.8FF(XMP)	2GB(2x 1GB)	SS	-	-	8-8-8-24	1.65	•	•
Crucial	BL25664BN1608.16FF(XMP)	2GB	DS	-	-	8-8-8-24	1.65	•	•
G.SKILL	F3-12800CL9D-8GBRL(XMP)	8GB (2x 4GB)	DS	-	-	9-9-9-24	1.5	•	•
G.SKILL	F3-12800CL8D-8GBECO(XMP)	8GB (2x4GB)	DS	-	-	8-8-8-24	1.35	•	•
KINGSTON	KHX1600C9D3K3/6GX(XMP)	6GB (3x 2GB)	DS	-	-	9	1.65	•	•
Kingston	KHX1600C9D3T1BK3/ 6GX(XMP)	6GB (3x 2GB)	DS	-	-	9	1.65	•	•

M5A97 Motherboard Qualified Vendors Lists (QVL) DDR3 2000MHz capability for AMD AM3 CPU

Vendors	Part No.	Size	SS/ DS	Chip Brand	Chip NO.	Timing	Voltage	DIMM socket support (Optional)		
								1 DIMM	2 DIMM	4 DIMM
A-DATA	AX3U2000GC4G9B(XMP)	4GB	DS	-	-	9-11-9-27	1.55~1.75	•		
CORSAIR	CMT6GX3M3A2000C8(XMP)	6GB (3x 2GB)	DS	-	-	8-9-8-24	1.65	•	•	
G.SKILL	F3-16000CL9T-6GBTD(XMP)	6GB(3 x 2GB)	DS	-	-	9-9-9-24	1.6	•		
G.SKILL	F3-16000CL7Q-8GBFLS(XMP)	8GB(4 x 2GB)	DS	-	-	7-9-7-24	1.65	•	•	
GEIL	GUP34GB2000C9DC(XMP)	4GB (2x 2GB)	DS	-	-	9-9-9-28	1.65	•	•	
KINGSTON	KHX2000C9AD3W1K2/4GX(XMP)	4GB (2x 2GB)	DS	-	-	9	1.65	•	•	
Transcend	TX2000KLN-8GK (388375)(XMP)	4GB	DS	-	-		1.6	•		
AEXEA	AXA3ES4GK2000LG28V(XMP)	4GB (2x 2GB)	DS	-	-	-	1.65	•	•	
Silicon Power	SP002GBLYU200S02(XMP)	2GB	DS	-	-	-	-	•	•	
Team	TXD32048M2000C9-L(XMP)	2GB	DS	Team	T3D1288 RT-20	9-9-9-24	1.6	•		

M5A97 Motherboard Qualified Vendors Lists (QVL) DDR3 1866MHz capability for AMD AM3 CPU

Vendors	Part No.	Size	SS/ DS	Chip Brand	Chip NO.	Timing	Voltage	DIMM socket support (Optional)		
								1 DIMM	2 DIMM	4 DIMM
G.SKILL	F3-15000CL9D-4GBTD(XMP)	4GB(2 x 2GB)	DS	-	-	9-9-9-24	1.65			•
G.SKILL	F3-14900CL9D-8GBSR(XMP)	8GB (2x 4GB)	DS	-	-	9-10-9-28	1.5	•	•	
KINGSTON	KHX1866C9D3T1K3/3GX(XMP)	3GB (3x 1GB)	SS	-	-	-	1.65	•	•	
KINGSTON	KHX1866C9D3T1K3/6GX(XMP)	6GB(3 x 2GB)	DS	-	-	9	1.65		•	
OCZ	OCZ3G1866LV4GK	4GB (2x 2GB)	DS	-	-	10-10-10	1.65	•	•	
OCZ	OCZ3RPR1866C9LV6GK	6GB(3 x 2GB)	DS	-	-	9-9-9	1.65	•		
Super Talent	W1866UX2G8(XMP)	2GB(2 x 1GB)	SS	-	-	8-8-8-24	-	•		
Team	TXD32048M1866C9(XMP)	2GB	DS	Team	T3D1288RT-16	9-9-9-24	1.65	•	•	•

M5A97 Motherboard Qualified Vendors Lists (QVL) DDR3 1800MHz capability for AMD AM3 CPU

Vendors	Part No.	Size	SS/ DS	Chip Brand	Chip NO.	Timing	Voltage	DIMM socket support (Optional)		
								1 DIMM	2 DIMM	4 DIMM
G.SKILL	F3-14400CL6D-4GBFLS(XMP)	4GB(2 x 2GB)	DS	-	-	6-8-6-24	1.65	•	•	
G.SKILL	F3-14400CL9D-4GBRL(XMP)	4GB(2 x 2GB)	DS	-	-	9-9-9-24	1.6	•	•	•
KINGSTON	KHX1800C9D3T1K3/6GX(XMP)	6GB(3 x 2GB)	DS	-	-	-	1.65	•	•	

M5A97 Motherboard Qualified Vendors Lists (QVL) DDR3 1600MHz capability for AMD AM3 CPU

Vendors	Part No.	Size	SS/ DS	Chip Brand	Chip NO.	Timing	Voltage	DIMM socket support (Optional)	
								2 DIMM	4 DIMM
A-DATA	AX3U1600GC4G9(XMP)	4GB	DS	-	-	9-9-9-24	1.55~1.75	•	•
A-DATA	AX3U1600XC4G79(XMP)	4GB	DS	-	-	7-9-7-21	1.55~1.75	•	•
CORSAIR	CMZ16GX3M4A1600C9(XMP)	16GB (4x 4GB)	DS	-	-	9-9-9-24	1.5	•	•
CORSAIR	CMP6GX3M3A1600C8(XMP)	6GB (3x 2GB)	DS	-	-	8-8-8-24	1.65	•	•
Crucial	BL12864BN1608.8FF(XMP)	2GB(2x 1GB)	SS	-	-	8-8-8-24	1.65	•	•
Crucial	BL25664BN1608.16FF(XMP)	2GB	DS	-	-	8-8-8-24	1.65	•	•
G.SKILL	F3-12800CL9D-4GBNQ(XMP)	4GB (2x 2GB)	DS	-	-	9-9-9-24	1.5	•	•
G.SKILL	F3-12800CL8D-8GBECO(XMP)	8GB (2x4GB)	DS	-	-	8-8-8-24	1.35	•	•
GEIL	GUP34GB1600C7DC(XMP)	4GB (2x 2GB)	DS	-	-	7-7-7-24	1.6	•	•
GEIL	GVP38GB1600C8QC(XMP)	8GB (4x 2GB)	DS	-	-	8-8-8-28	1.6	•	•
KINGMAX	FLGD45F-B8MF7(XMP)	1GB	SS	-	-		-	•	•
Kingston	KHX1600C9D3T1BK3/6GX(XMP)	6GB (3x 2GB)	DS	-	-	9	1.65	•	•
OCZ	OCZ3G16004GK	4GB (2x 2GB)	DS	-	-	8-8-8	1.7	•	
OCZ	OCZ3BE1600C8LV4GK	4GB(2x 2GB)	DS	-	-	8-8-8	1.65	•	•
Super Talent	WP160UX4G9(XMP)	4GB(2 x 2GB)	DS	-	-	9	-	•	•
Super Talent	WB160UX6G8(XMP)	6GB(3 x 2GB)	DS	-	-	8	-		•
AEXEA	AXA3PS2G1600S18V(XMP)	2GB	DS	-	-	-	1.65		•
Asint	SLZ3128M8-EGJ1D(XMP)	2GB	DS	Asint	3128M8-GJ1D	-	-	•	•
EK Memory	EKM324L28BP8-I16(XMP)	4GB(2x 2GB)	DS	-	-	9	-	•	•
EK Memory	EKM324L28BP8-I16(XMP)	4GB(2 x 2GB)	DS	-	-	9	-	•	•
Elixir	M2P2G64CB8HC9N-DG(XMP)	2GB	DS	-	-	-	-	•	•
GoodRam	GR1600D364L9/2G	2GB	DS	GoodRam	GF1008 KC-JN	-	-	•	•
KINGTIGER	KTG2G1600PG3(XMP)	2GB	DS	-	-	-	-	•	•
Mushkin	996805(XMP)	4GB (2x 2GB)	DS	-	-	6-8-6-24	1.65	•	•
Mushkin	998805(XMP)	6GB (3x 2GB)	DS	-	-	6-8-6-24	1.65		•
Patriot	PX7312G1600LLK(XMP)	12GB (3x 4GB)	DS	-	-	8-9-8-24	1.65		•
Patriot	PX538G1600LLK(XMP)	8GB (2x 4GB)	DS	-	-	8-9-8-24	1.65	•	•
Team	TXD32048M1600HC8-D(XMP)	2GB	DS	Team	T3D1288 RT-16	8-8-8-24	1.65	•	•

M5A97 Motherboard Qualified Vendors Lists (QVL) DDR3 1333MHz capability for AMD AM3 CPU

Vendors	Part No.	Size	SS/ DS	Chip Brand	Chip NO.	Timing	Voltage	DIMM socket support (Optional)	
								2 DIMM	4 DIMM
A-DATA	AXDU1333GC2G9(XMP)	2GB	SS	-	-	9-9-9-24	1.25~1.35	•	•
A-DATA	AD63I1C1624EV	4GB	DS	A-DATA	3CCA-1509A	-	-	•	•
Apacer	78.01GC6.9L0	1GB	SS	Apacer	AM5D5808DEJSBG	9	-	•	•
Apacer	78.B1GDE.9L10C	4GB	DS	Apacer	AM5D5908CEHSBG	9	-	•	•
CORSAIR	TW3X4G1333C9A	4GB (2x 2GB)	DS	-	-	9-9-9-24	1.5	•	•
CORSAIR	CMX8GX3M2A1333C9 (XMP)	8GB (2x 4GB)	DS	-	-	9-9-9-24	1.5	•	
Crucial	BL25664BN1337.16FF (XMP)	2GB	DS	-	-	7-7-7-24	1.65		•
Crucial	CT25664BA1339.16FF	2GB	DS	MICRON	D9KPT	9	-	•	•
ELPIDA	EBJ10UE8BDF0-DJ-F	1GB	SS	ELPIDA	J1108BDSE-DJ-F	-	-	•	•
ELPIDA	EBJ20UF8BCF0-DJ-F	2GB	SS	Elpida	J2108BCSE-DJ-F	-	-	•	•
G.SKILL	F3-10666CL8D-4GBHK (XMP)	4GB (2x 2GB)	DS	-	-	8-8-8-21	1.5	•	•
G.SKILL	F3-10666CL9D-8GBXL	8GB (2x 4GB)	DS	-	-	9-9-9-24	1.5	•	•
GEIL	GET316GB1333C9QC	16GB (4x 4GB)	DS	-	-	9-9-9-24	1.5	•	•
GEIL	GVP38GB1333C7QC	8GB (4x 2GB)	DS	-	-	7-7-7-24	1.5	•	•

Vendors	Part No.	Size	SS/ DS	Chip Brand	Chip NO.	Timing	Voltage	DIMM socket support (Optional)	
								2 DIMM	4 DIMM
Hynix	HMT325U6BFR8C-H9	2GB	SS	Hynix	H5TQ2G83BFR	-	-	•	•
Hynix	HMT351U6BFR8C-H9	4GB	DS	Hynix	H5TQ2G83BFR	-	-	•	•
KINGMAX	FLFE85F-C8KM9	2GB	SS	Kingmax	KFC8FNMXF-BXX-15A	-	-	•	•
KINGMAX	FLFF65F-C8KM9	4GB	DS	Kingmax	KFC8FNMXF-BXX-15A	-	-	•	•
Kingston	KHX1333C9D3UK2/4GX (XMP)	4GB (2x 2GB)	DS	-	-	9	1.25	•	•
KINGSTON	KVR1333D3N9K2/4G	4GB (2x 2GB)	DS	KINGSTON	D1288JEMFPGD9U	-	1.5	•	•
MICRON	MT8JTF25664AZ-1G4D1	2GB	SS	Micron	D9LGK	-	-	•	•
MICRON	MT16JTF51264AZ-1G4D1	4GB	DS	Micron	D9LGK	-	-	•	•
OCZ	OCZ3G1333LV4GK	4GB (2x 2GB)	DS	-	-	9-9-9	1.65	•	•
OCZ	OCZ3G1333LV8GK	8GB (2x 4GB)	DS	-	-	9-9-9	1.65		•
PSC	PC310600U-9-10-A0	1GB	SS	PSC	A3P1GF3FGF	-	-	•	•
PSC	PC310600U-9-10-B0	2GB	DS	PSC	A3P1GF3FGF	-	-	•	•
SAMSUNG	M378B5273DH0-CH9	4GB	DS	Samsung	K4B2G08460	-	-	•	•
SAMSUNG	M378B1G73AH0-CH9	8GB	DS	SAMSUNG	K4B4G0846A-HCH9	-	-	•	•
Transcend	TS256MLK64V3N (566577)	2GB	SS	Hynix	H5TQ2G83BFR	9	-	•	•
Transcend	TS512MLK64V3N (574831)	4GB	DS	Micron	D9LGK	9	-	•	•
ACTICA	ACT4GHU64B8H1333H	4GB	DS	Hynix	H5TQ2G83AFR	-	-		•
ACTICA	ACT4GHU72D8H1333H	4GB	DS	Hynix	H5TQ2G83AFR(ECC)	-	-	•	•
BUFFALO	D3U1333-2G	2GB	DS	Elpida	J1108BFBG-DJ-F		-	•	•
BUFFALO	D3U1333-4G	4GB	DS	NANYA	NT5CB256M8BN-CG		-	•	•
EK Memory	EKM324L28BP8-I13	4GB(2 x 2GB)	DS	-	-	9	-	•	•
Elixir	M2F2G64CB88D7N-CG	2GB	SS	Elixir	M2CB2G8BDN-CG	-	-	•	•
Elixir	M2F4G64CB8HD5N-CG	4GB	DS	Elixir	M2CB2G8BDN-CG	-	-	•	•
GoodRam	GR1333D364L9/2G	2GB	DS	Qimonda	IDSH1G-03A1F1C-13H	-	-	•	•
KINGTIGER	F10DA2T1680	2GB	DS	KINGTIGER	KTG1333PS1208NST -C9	-	-	•	•
KINGTIGER	KTG2G1333PG3	2GB	DS	-	-	-	-	•	•
Patriot	PSD32G13332	2GB	DS	Prtriot	PM128M8D3BU-15	9	-	•	•
Patriot	PGS34G1333LLKA	4GB(2 x 2GB)	DS	-	-	7-7-7-20	1.7	•	•
Silicon Power	SP001GBLTE133S01	1GB	SS	NANYA	NT5CB128M8AN-CG	-	-	•	•
Silicon Power	SP002GBLTE133S01	2GB	DS	NANYA	NT5CB128M8AN-CG	-	-	•	•
Team	TXD31024M1333C7 (XMP)	1GB	SS	Team	T3D1288LT-13	7-7-7-21	1.75	•	•
Team	TXD32048M1333C7-D (XMP)	2GB	DS	Team	T3D1288LT-13	7-7-7-21	1.5-1.6	•	•

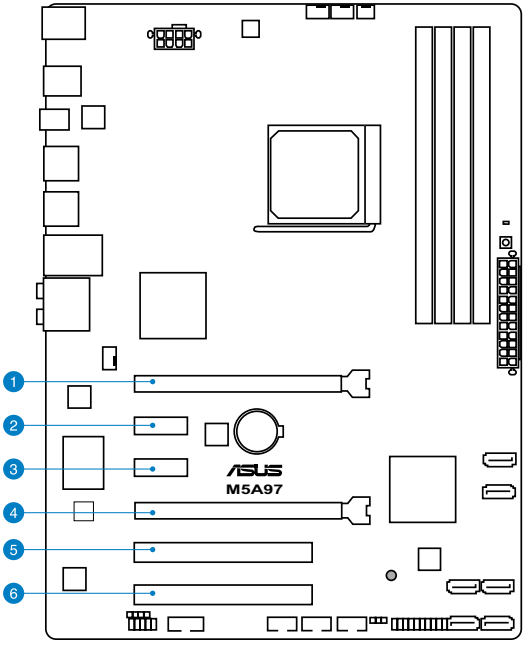
Side(s): SS - Single-sided DS - Double-sided
DIMM support:

- **1 DIMM:** Supports one (1) module inserted into any slot as Single-channel memory configuration. **We suggest that you install the module into A2 slot.**
- **2 DIMMs:** Supports two (2) modules inserted into either the blue slots or the black slots as one pair of Dual-channel memory configuration. **We suggest that you install the modules into slots A2 and B2 for better compatibility.**
- **4 DIMMs:** Supports four (4) modules inserted into both the blue and black slots as two pairs of Dual-channel memory configuration.

- When overclocking, some AMD CPU models may not support DDR3 1600 or higher frequency DIMMs.
- Visit the ASUS website for the latest QVL.

2.2.4 Expansion slots

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



Slot No.	Slot Description
1	PCIe 2.0 x16_1 slot [blue] (at x16 mode)
2	PCIe 2.0 x1_1 slot
3	PCIe 2.0 x1_2 slot
4	PCIe 2.0 x16_2 slot [black] (at x4 mode)
5	PCI slot 1
6	PCI slot 2

VGA configuration	PCI Express operating mode	
	PCIe 2.0 x16_1	PCIe 2.0 x16_2
Single VGA/PCIe card	x16 (Recommend for single VGA)	N/A
Dual VGA/PCIe card	x16	x4

- In single VGA card mode, use the PCIe 2.0 x16_1 slot (blue) for a PCI Express x16 graphics card to get better performance.
- In CrossFireX™ mode, use the PCIe 2.0 x16_1 and PCIe 2.0 x16_2 slots for PCI Express x16 graphics cards to get better performance.
- We recommend that you provide sufficient power when running CrossFireX™ mode.
- Connect a chassis fan to the motherboard connector labeled CHA_FAN1/2 when using multiple graphics cards for better thermal environment. See page 2-18 for details.

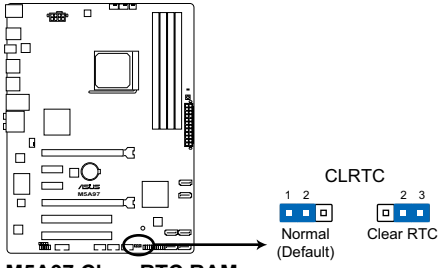
IRQ assignments for this motherboard

	A	B	C	D	E	F	G	H
PCIE x16_1	shared	–	–	–	–	–	–	–
PCIE x16_2	–	–	–	–	–	–	–	shared
PCIE x16_3	shared	–	–	–	–	–	–	–
PCIE x16_4	shared	–	–	–	–	–	–	–
PCI Slot1	–	–	–	–	shared	–	–	–
PCI Slot2	–	–	–	–	–	shared	–	–
Realtek 8111E (LAN)	–	–	–	–	shared	–	–	–
ASM USB3.0	–	–	shared	–	–	–	–	–
Onchip SATA Controller	–	–	–	shared	–	–	–	–
Onchip USB1	–	–	shared	–	–	–	–	–
Onchip USB2	–	–	shared	–	–	–	–	–
Onchip Azalia	shared	–	–	–	–	–	–	–

2.2.5 Jumper

Clear RTC RAM (3-pin CLRTC)

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



M5A97 Clear RTC RAM

To erase the RTC RAM

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

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

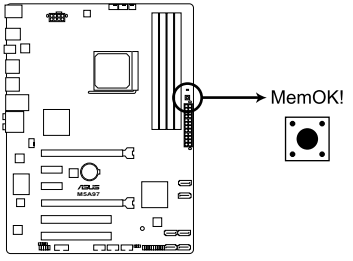
- If the steps above do not help, remove the onboard battery and move the jumper again to clear the CMOS RTC RAM data. After clearing the CMOS, reinstall the battery.
- You do not need to clear the RTC when the system hangs due to overclocking. For system failure due to overclocking, use the C.P.R. (CPU Parameter Recall) feature. Shut down and reboot the system so the BIOS can automatically reset parameter settings to default values.

2.2.6 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.



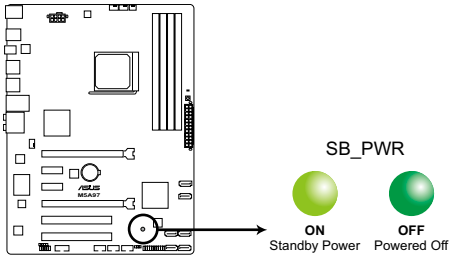
M5A97 MemOK! switch

- Refer to section **2.2.7 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.

2.2.7 Onboard LEDs

1. Standby Power LED

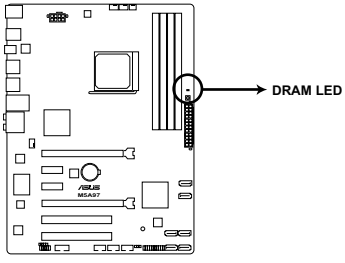
The motherboard comes with a standby power LED. The green LED lights up to indicate that the system is ON, in sleep mode, or in soft-off mode. This is a reminder that you should shut down the system and unplug the power cable before removing or plugging in any motherboard component. The illustration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



M5A97 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 intuitional way to locate the root problem within a second.



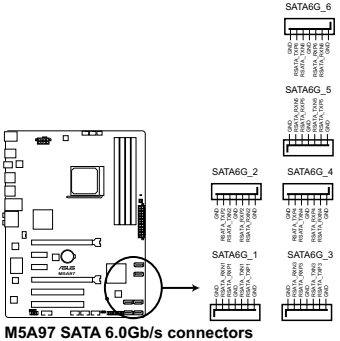
M5A97 DRAM LED

2.2.8 Internal connectors

1. AMD® SB950 Serial ATA Serial ATA 6.0 Gb/s connectors (7-pin SATA6G_1~6)

These connectors are for the Serial ATA 6.0 Gb/s signal cables for Serial ATA hard disk drives and optical disc drives.

If you installed Serial ATA hard disk drives, you can create a RAID 0, RAID 1, RAID 5, or RAID 10 configuration through the onboard AMD® SB950 controller.

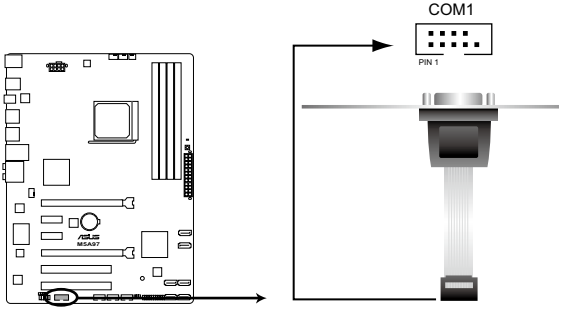


M5A97 SATA 6.0Gb/s connectors

- These connectors are set to [AHCI Mode] by default. If you intend to create a Serial ATA RAID set using these connectors, set the **SATA Mode** item in the BIOS to [RAID Mode]. Refer to section **3.5.3 SATA Configuration** for details.
- Before creating a RAID set, refer to section **4.4 RAID configurations** or the manual bundled in the motherboard support DVD.
- When using NCQ, set the **SATA Mode** in the BIOS to [AHCI Mode]. Refer to section **3.5.3 SATA Configuration** for details.
- You must install Windows® XP Service Pack 3 or later versions before using Serial ATA hard disk drives. The Serial ATA RAID feature is available only if you are using Windows® XP SP3 or later versions.

2. 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.

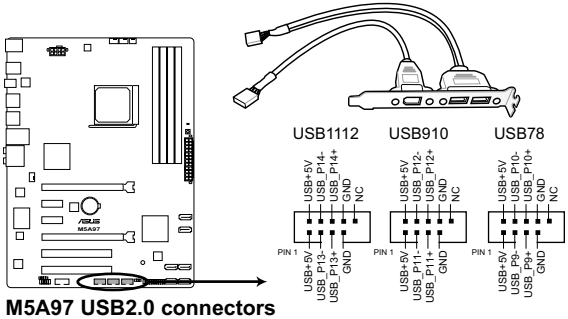


M5A97 Serial port (COM1) connector

The COM module is purchased separately.

3. USB 2.0 connectors (10-1 pin USB78; USB910; USB1112)

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



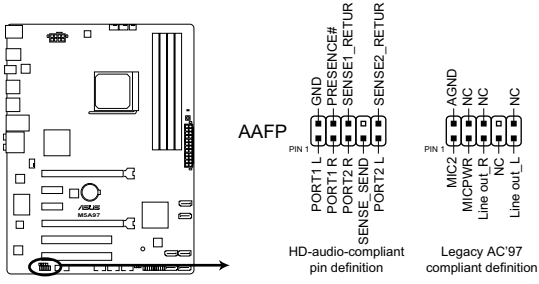
M5A97 USB2.0 connectors

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

The USB module cable is purchased separately.

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

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

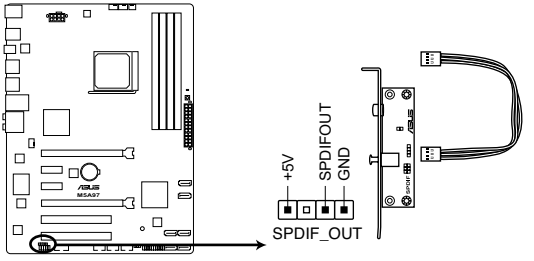


M5A97 Front panel audio connector

- 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 Select** 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 **[AC 97]**. By default, this connector is set to [HD]. Refer to **3.6.6 Onboard Devices Configuration** for details.

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

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

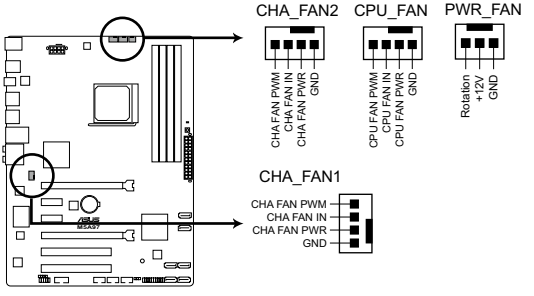


M5A97 Digital audio connector

The S/PDIF module is purchased separately.

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



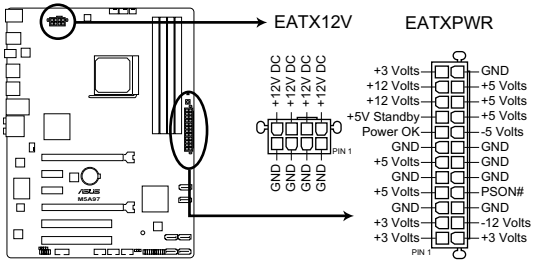
M5A97 fan connectors

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 1A (12 W) fan power.
- Only the 4-pin CPU_FAN, CHA_FAN1/2 connector supports the ASUS Fan Xpert feature.

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.

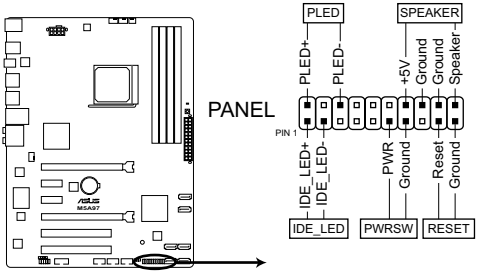


M5A97 ATX power connectors

- For a fully configured system, we recommend that you use a power supply unit (PSU) that complies with ATX 12 V Specification 2.0 (or later version) and provides a minimum power of 450 W.
- Do not forget to connect the 8-pin EATX12 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.

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

This connector supports several chassis-mounted functions.



M5A97 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)**

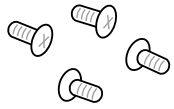
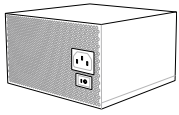
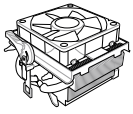
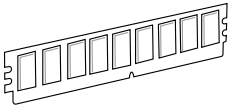
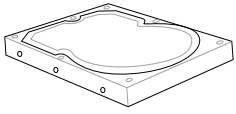
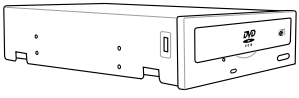
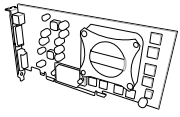
  This connector is for the system power button.

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

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

2.3 Building your computer system

2.3.1 Additional tools and components to build a PC system

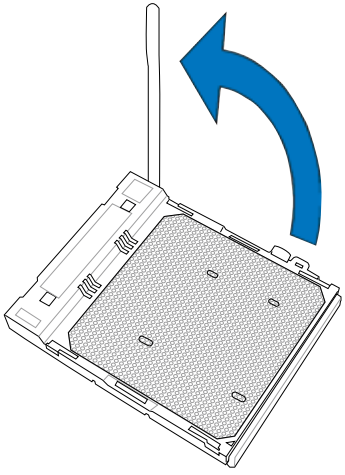
	
1 bag of screws	Philips (cross) screwdriver
	
PC chassis	Power supply unit
	
AMD AM3+ CPU	AMD AM3+ compatible CPU Fan
	
DIMM	SATA hard disk drive
	
SATA optical disc drive (optional)	Graphics card (optional)

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

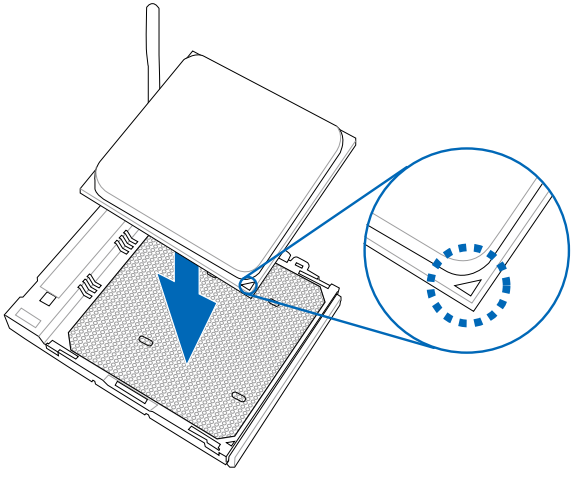
2.3.2 CPU installation

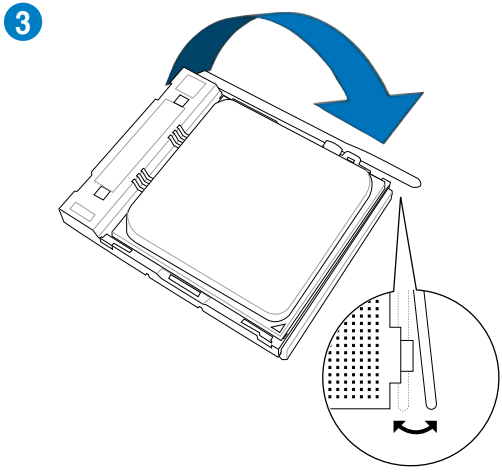
The AMD AM3+ socket is compatible with AMD AM3+ and AM3 processors. Ensure you use a CPU designed for the AM3+ socket. The CPU fits in only one correct orientation. DO NOT force the CPU into the socket to prevent bending the connectors on the socket and damaging the CPU!

1

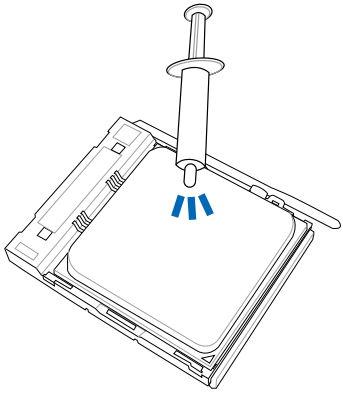


2





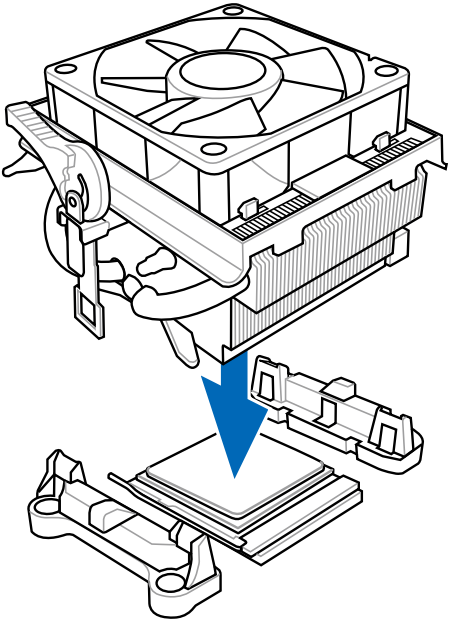
2.3.3 CPU heatsink and fan assembly installation



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

To install the CPU heatsink and fan assembly

1



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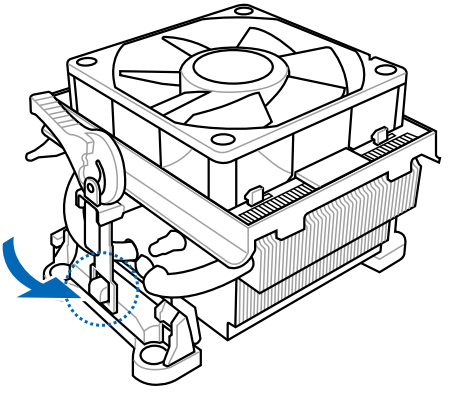

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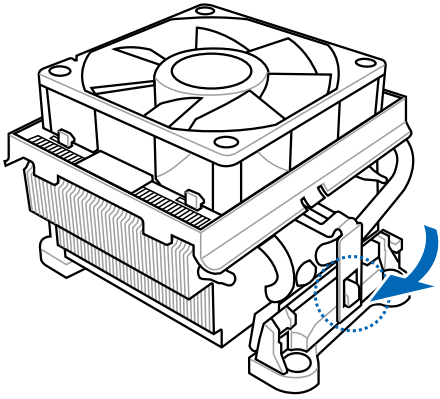
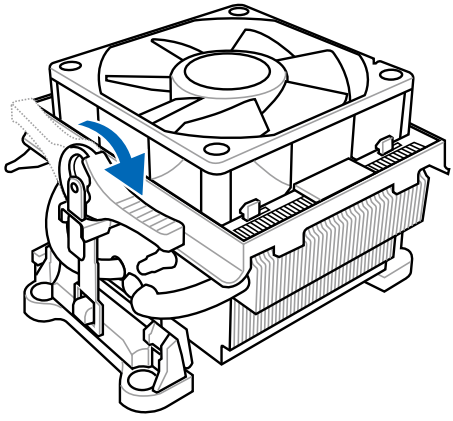
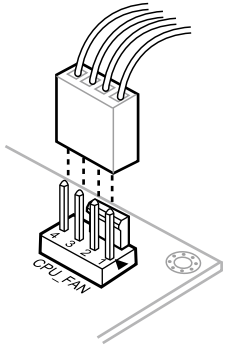


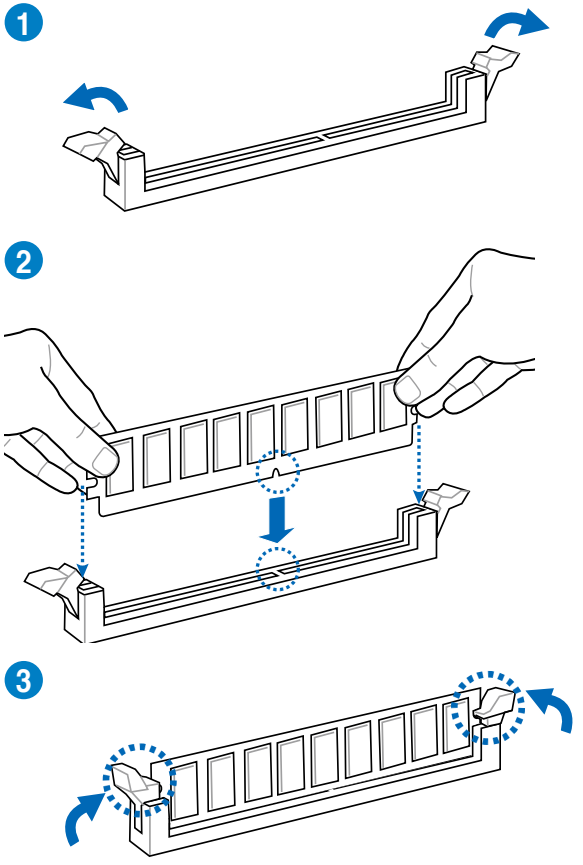
4



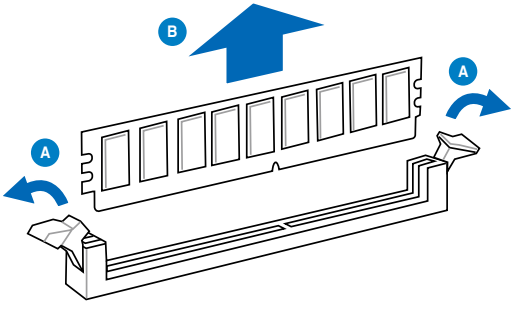
5



2.3.4 DIMM installation



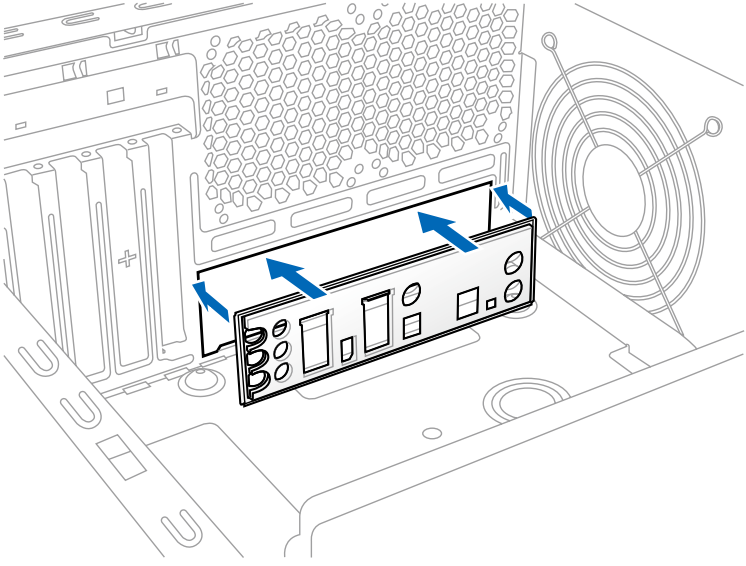
To remove a DIMM



2.3.5 Motherboard installation

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

1



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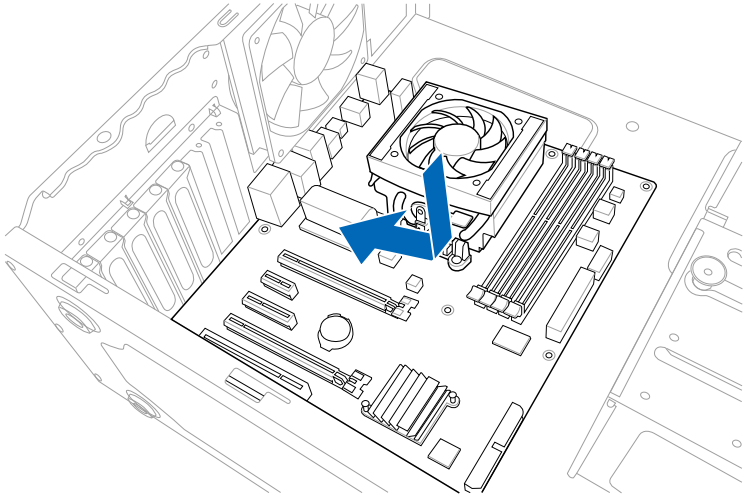
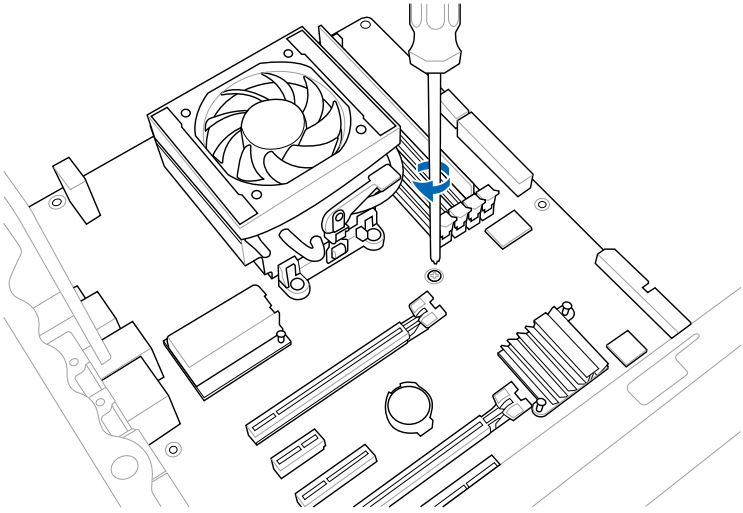
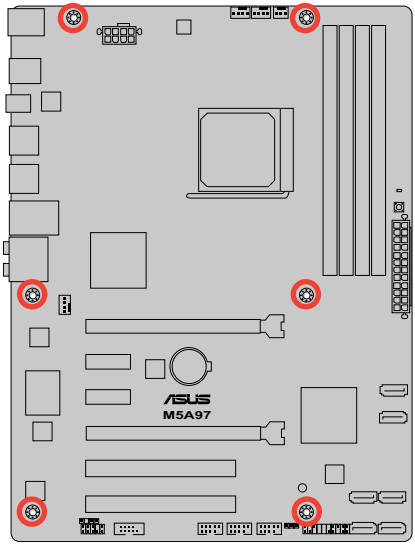


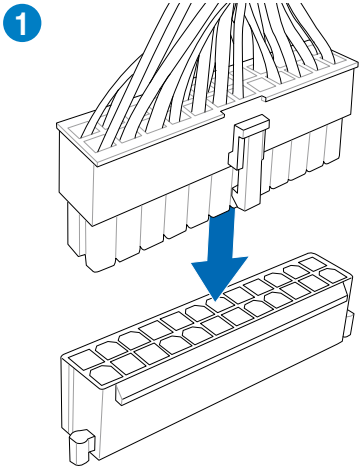
3

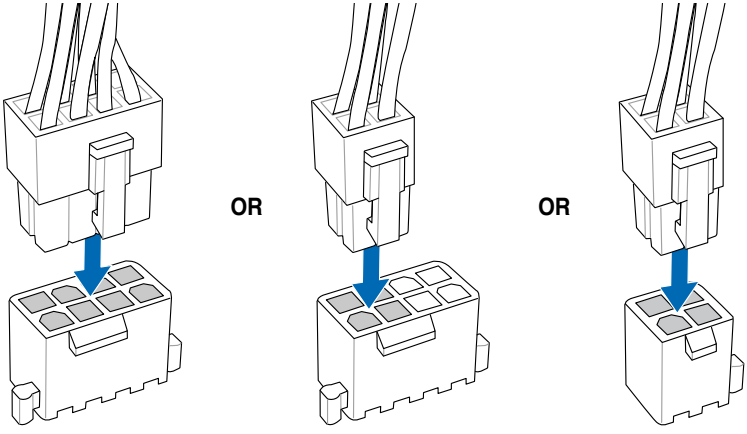




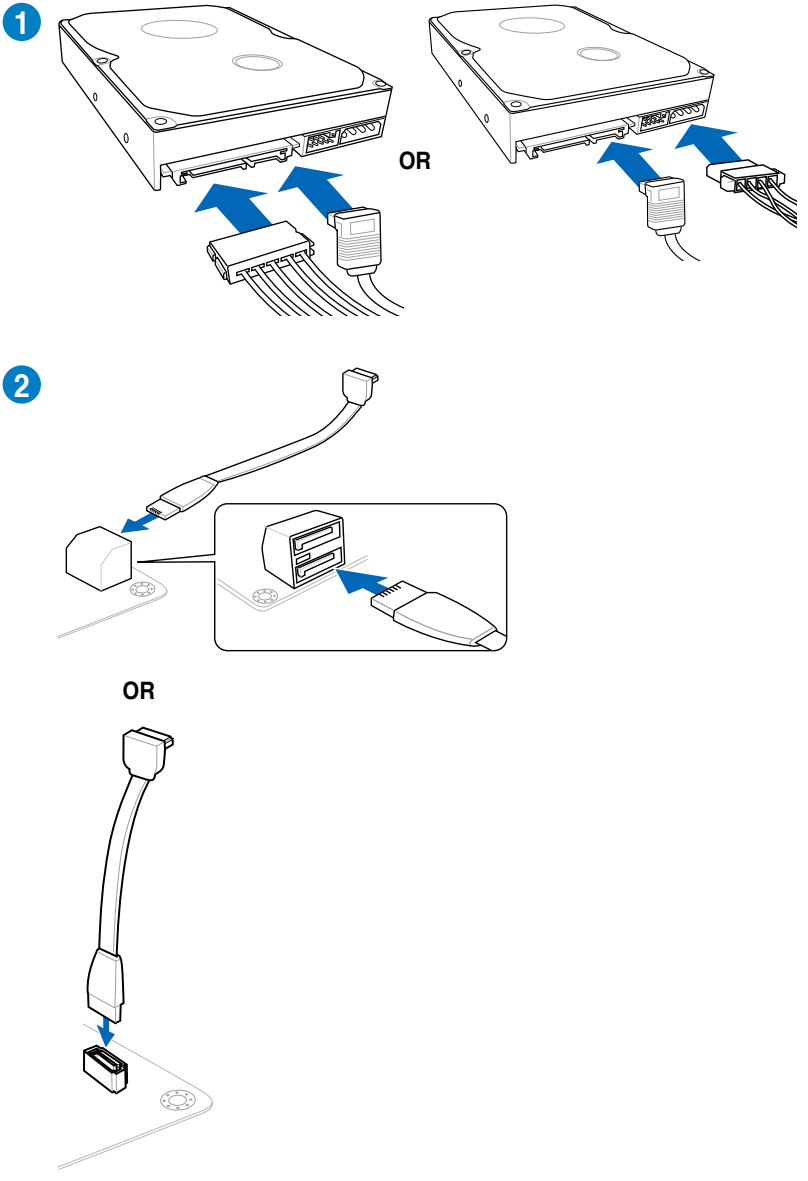
DO NOT overtighten the screws! Doing so can damage the motherboard.

2.3.6 ATX Power connection



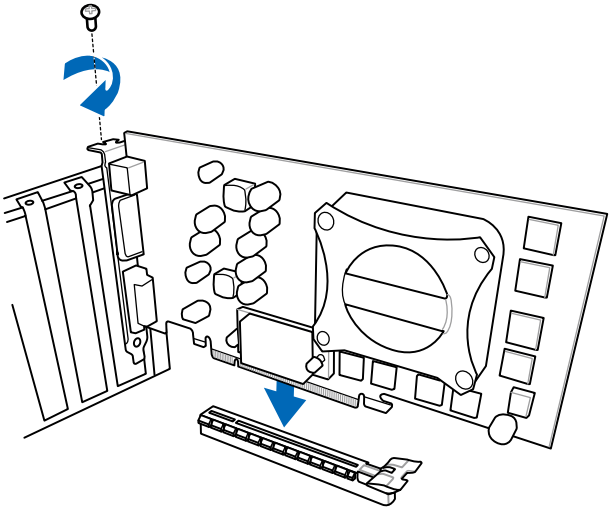


2.3.7 SATA device connection

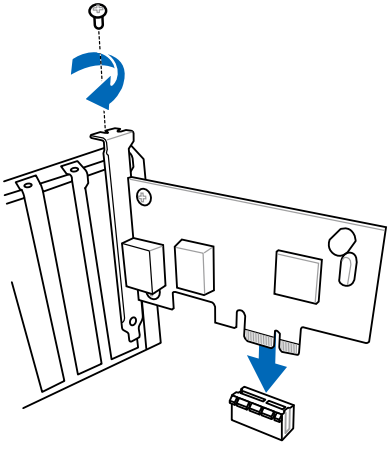


2.3.8 Expansion Card installation

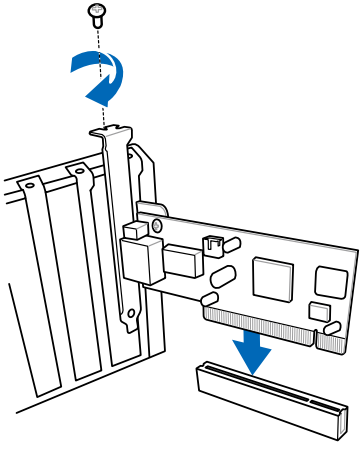
To install PCIe x16 cards



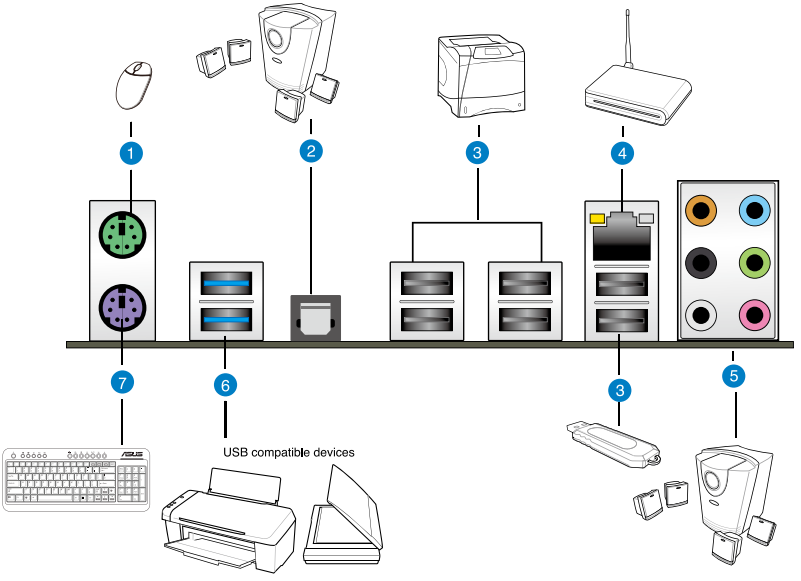
To install PCIe x1 cards



To install PCI cards



2.3.9 Rear panel connection



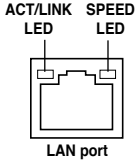
Rear panel connectors	
1. PS/2 Mouse port (green)	5. Audio** I/O ports
2. Optical S/PDIF Out port	6. USB 3.0 ports 1 and 2 (blue)
3. USB 2.0 ports 1 ~ 6	7. PS/2 Keyboard port (purple)
4. LAN* (RJ-45) port	

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

- Due to USB 3.0 controller limitation, USB 3.0 devices can only be used under Windows® OS environment and after the USB 3.0 driver installation.
- USB 3.0 devices can only be used as data storage only.
- We strongly recommend that you connect USB 3.0 devices to USB 3.0 ports for faster and better performance for your USB 3.0 devices.

* LAN port LED indications

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

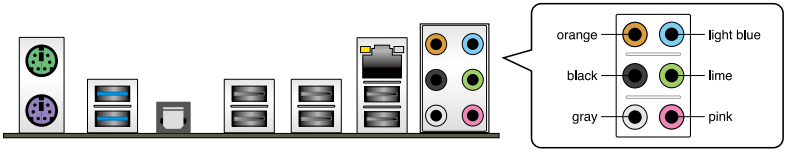


** Audio 2, 4, 6, or 8-channel configuration

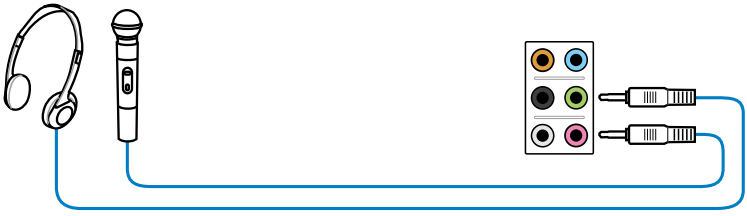
Port	Headset 2-channel	4-channel	6-channel	8-channel
Light Blue	Line In	Line In	Line In	Line In
Lime	Line Out	Front Speaker Out	Front Speaker Out	Front Speaker Out
Pink	Mic In	Mic In	Mic In	Mic In
Orange	–	–	Center/Subwoofer	Center/Subwoofer
Black	–	Rear Speaker Out	Rear Speaker Out	Rear Speaker Out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

2.3.10 Audio I/O connections

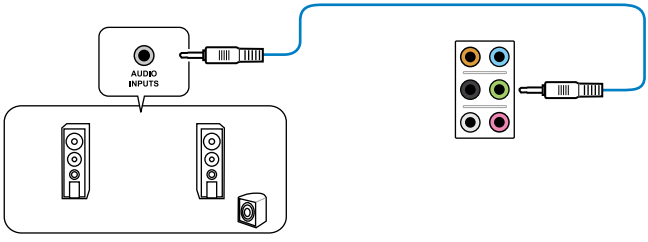
Audio I/O ports



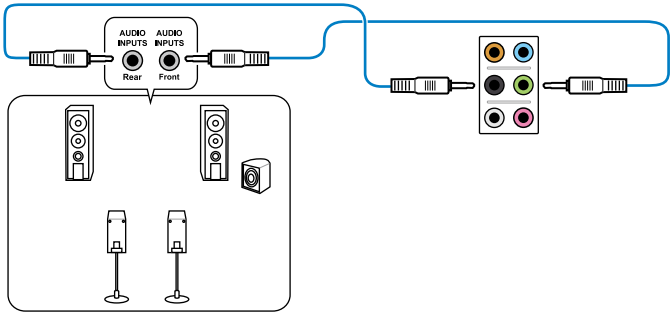
Connect to Headphone and Mic



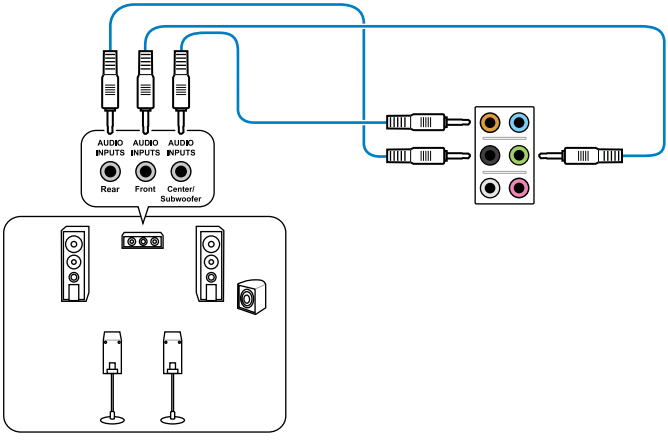
Connect to Stereo / 2.1-channel Speakers



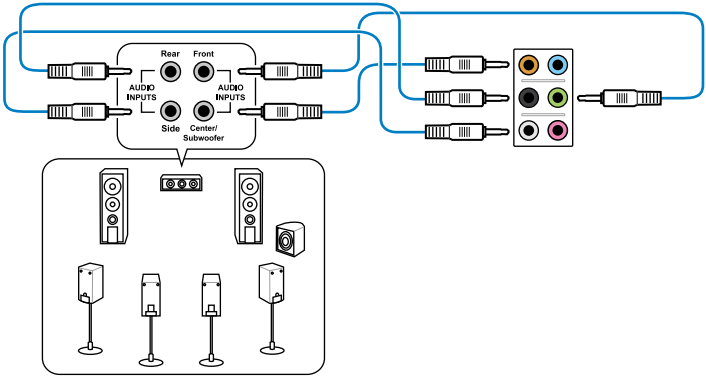
Connect to 4.1 channel Speakers



Connect to 5.1 channel Speakers



Connect to 7.1 channel Speakers



2.4 Starting up for the first time

1. After making all the connections, replace the system case cover.
2. Be sure that all switches are off.
3. Connect the power cord to the power connector at the back of the system chassis.
4. Connect the power cord to a power outlet that is equipped with a surge protector.
5. Turn on the devices in the following order:
   a. Monitor
   b. External SCSI devices (starting with the last device on the chain)
   c. System power
6. After applying power, the system power LED on the system front panel case lights up. For systems with ATX power supplies, the system LED lights up when you press the ATX power button. If your monitor complies with the “green” standards or if it has a “power standby” feature, the monitor LED may light up or change from orange to green after the system LED turns on.

   The system then runs the power-on self tests or POST. While the tests are running, the BIOS beeps (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.

2.5 Turning off the computer

While the system is ON, pressing the power switch for less than four seconds puts the system on sleep mode or soft-off mode, depending on the BIOS setting. Pressing the power switch for more than four seconds lets the system enter the soft-off mode regardless of the BIOS setting.

Chapter 3

3.1 Knowing BIOS

The new ASUS UEFI BIOS is an Unified Extensible Firmware Interface, offering a user-friendly interface that goes beyond traditional keyboard-only BIOS controls to enable more flexible and convenient mouse input. Users can easily navigate the new UEFI BIOS with the same smoothness as their operating system. The term "BIOS" in this user manual refers to "UEFI BIOS" unless otherwise specified.

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

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

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

3.2 BIOS setup program

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

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

- The BIOS setup screens shown in this section are for reference purposes only, and may not exactly match what you see on your screen.
- Ensure that a USB mouse is connected to your motherboard if you want to use the mouse to control the BIOS setup program.
- If the system becomes unstable after changing any BIOS setting, load the default settings to ensure system compatibility and stability. Select the **Load Optimized Defaults** item under the **Exit** menu. See section **3.9 Exit Menu** for details.
- If the system fails to boot after changing any BIOS setting, try to clear the CMOS and reset the motherboard to the default value. See section **2.2.5 Jumper** for information on how to erase the RTC RAM.

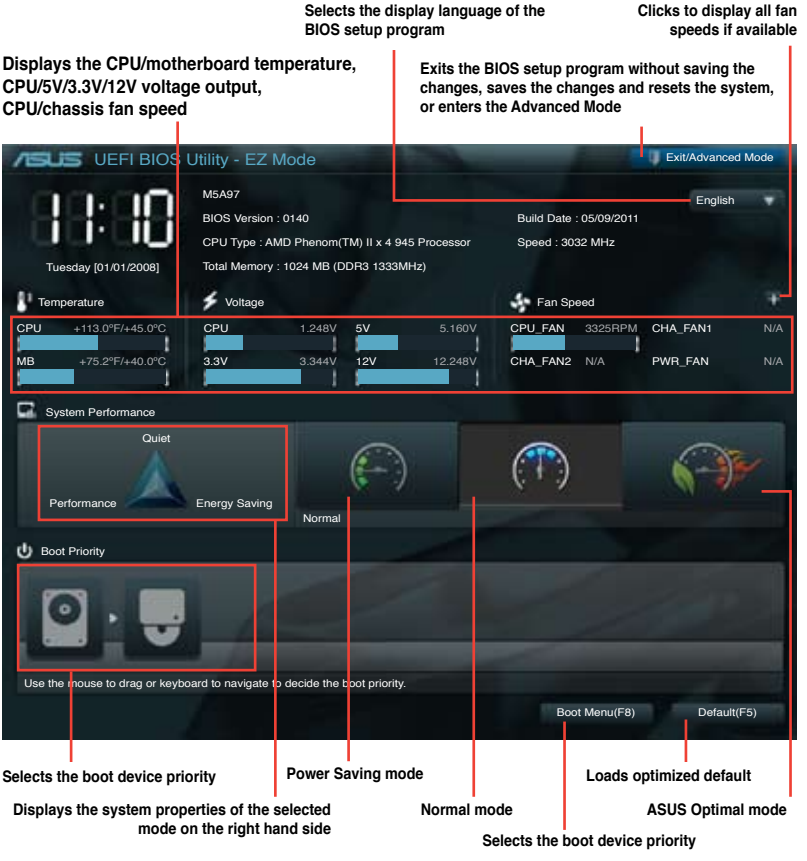
The BIOS setup program is designed to make it as easy to use as possible. Being a menu-driven program, it lets you scroll through the various submenus and select from the available options using a keyboard or a USB mouse.

The BIOS setup program can be used under two modes: **EZ Mode** and **Advanced Mode**. You can change modes from the **Exit** menu or from the **Exit/Advanced Mode** button in the **EZ Mode**/**Advanced Mode** screen.

3.2.1 EZ Mode

By default, the **EZ Mode** screen appears when you enter the BIOS setup program. The **EZ Mode** provides you an overview of the basic system information, and allows you to select the display language, system performance mode and boot device priority. To access the **Advanced Mode**, click **Exit/Advanced Mode**, then select **Advanced Mode**.

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

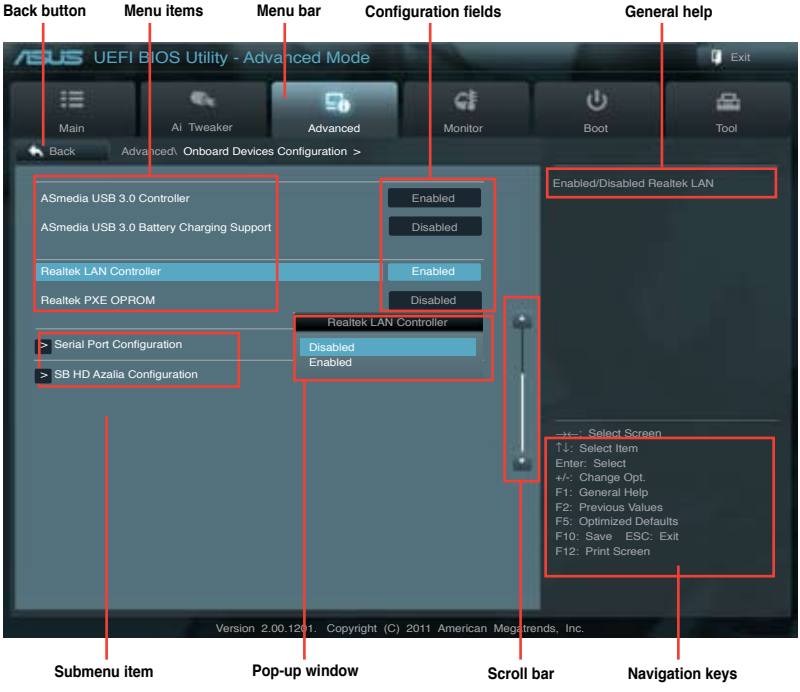


- The boot device options vary depending on the devices you installed to the system.
- The **Boot Menu (F8)** button is available only when the boot device is installed to the system.

3.2.2 Advanced Mode

The **Advanced Mode** provides advanced options for experienced end-users to configure the BIOS settings. The figure below shows an example of the **Advanced Mode**. Refer to the following sections for the detailed configurations.

To access the EZ Mode, click **Exit**, then select **ASUS EZ Mode**.



Menu bar

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

Main	For changing the basic system configuration
Ai Tweaker	For changing the overclocking settings
Advanced	For changing the advanced system settings
Monitor	For displaying the system temperature, power status, and changing the fan settings.
Boot	For changing the system boot configuration
Tool	For configuring options for special functions
Exit	For selecting the exit options and loading default settings

Menu items

The highlighted item on the menu bar displays the specific items for that menu. For example, selecting **Main** shows the Main menu items.

The other items (Ai Tweaker, Advanced, Monitor, Boot, Tool, and Exit) on the menu bar have their respective menu items.

Back button

This button appears when entering a submenu. Press <Esc> or use the USB mouse to click this button to return to the previous menu screen.

Submenu items

A greater than sign (>) before each item on any menu screen means that the item has a submenu. To display the submenu, select the item and press <Enter>.

Pop-up window

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

Scroll bar

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

Navigation keys

At the bottom right corner of the menu screen are the navigation keys for the BIOS setup program. Use the navigation keys to select items in the menu and change the settings.

General help

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

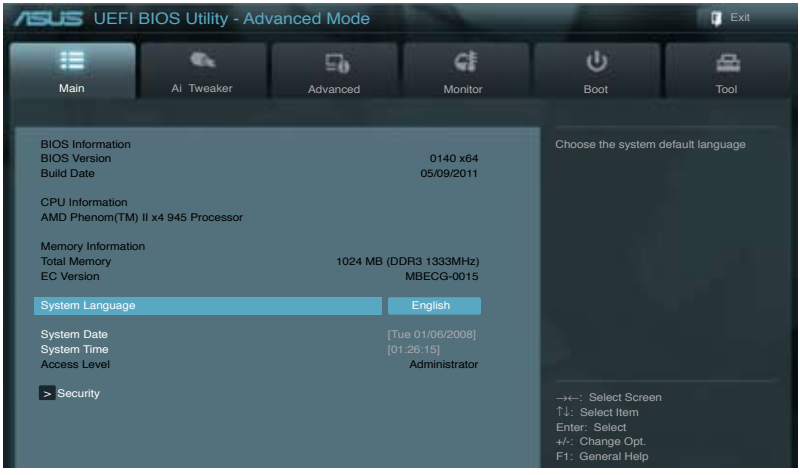
Configuration fields

These fields show the values for the menu items. If an item is user-configurable, you can change the value of the field opposite the item. You cannot select an item that is not user-configurable.

A configurable field is highlighted when selected. To change the value of a field, select it and press <Enter> to display a list of options.

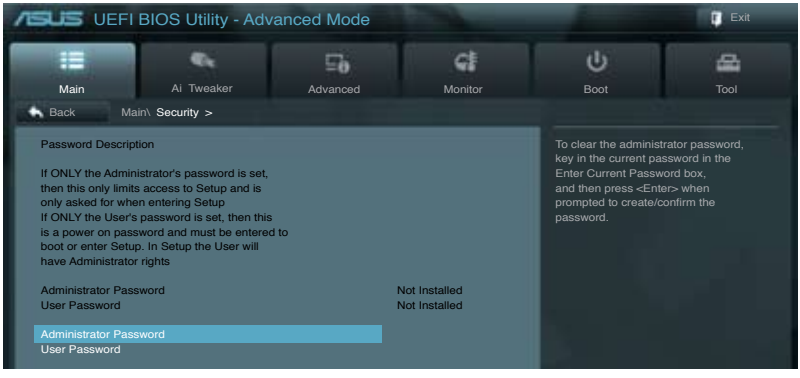
3.3 Main menu

The Main menu screen appears when you enter the Advanced Mode of the BIOS Setup program. The Main menu provides you an overview of the basic system information, and allows you to set the system date, time, language, and security settings.



Security

The Security menu items allow you to change the system security settings.



- If you have forgotten your BIOS password, erase the CMOS Real Time Clock (RTC) RAM to clear the BIOS password. See section **2.2.5 Jumpers** for information on how to erase the RTC RAM.
- The **Administrator** or **User Password** items on top of the screen show the default **Not Installed**. After you set a password, these items show **Installed**.

Administrator Password

If you have set an administrator password, we recommend that you enter the administrator password for accessing the system. Otherwise, you might be able to see or change only selected fields in the BIOS setup program.

To set an administrator password:

1. Select the **Administrator Password** item and press <Enter>.
2. From the **Create New Password** box, key in a password, then press <Enter>.
3. Confirm the password when prompted.

To change an administrator password:

1. Select the **Administrator Password** item and press <Enter>.
2. From the **Enter Current Password** box, key in the current password, then press <Enter>.
3. From the **Create New Password** box, key in a new password, then press <Enter>.
4. Confirm the password when prompted.

To clear the administrator password, follow the same steps as in changing an administrator password, but press <Enter> when prompted to create/confirm the password. After you clear the password, the **Administrator Password** item on top of the screen shows **Not Installed**.

User Password

If you have set a user password, you must enter the user password for accessing the system. The **User Password** item on top of the screen shows the default **Not Installed**. After you set a password, this item shows **Installed**.

To set a user password:

1. Select the **User Password** item and press <Enter>.
2. From the **Create New Password** box, key in a password, then press <Enter>.
3. Confirm the password when prompted.

To change a user password:

1. Select the **User Password** item and press <Enter>.
2. From the **Enter Current Password** box, key in the current password, then press <Enter>.
3. From the **Create New Password** box, key in a new password, then press <Enter>.
4. Confirm the password when prompted.

To clear the user password, follow the same steps as in changing a user password, but press <Enter> when prompted to create/confirm the password. After you clear the password, the **User Password** item on top of the screen shows **Not Installed**.

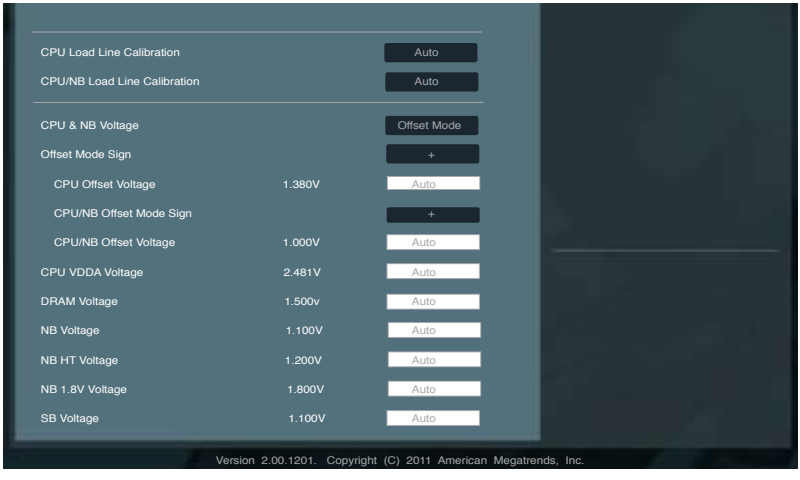
3.4 Ai Tweaker menu

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

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

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

Scroll down to display the following items:



Current CPU Speed : xxxxMHz

Displays the current CPU speed.

Target CPU Speed : xxxxMHz

Displays the target CPU speed.

Current Memory Frequency : xxxxMHz

Displays the current memory frequency.

Current NB Frequency : xxxxMHz

Displays the current NB frequency.

Current HT Link Speed : xxxxMHz

Displays the current HT Link speed.

Ai Overclock Tuner [Auto]

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

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

CPU Bus/PEG Frequency [XXX]

This item appears only when you set the **AI Overclock Tuner** item to [Manual] or [D.O.C.P.] and allows you to adjust the CPU and VGA frequency to enhance the system performance. Use the <+> and <-> keys to adjust the value. You can also key in the desired value using the numeric keypad. The values range from 100.0MHz to 600.0MHz.

PCIE Frequency [XXX]

This item appears only when you set the **AI Overclock Tuner** item to [Manual] or [D.O.C.P.] and allows you to adjust PCIE frequency to enhance the system performance. Use the <+> and <-> keys to adjust the value. You can also key in the desired value using the numeric keypad. The values range from 100.0MHz to 150.0MHz.

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] [DDR3-2133MHz] [DDR3-2200MHz] [DDR3-2400MHz]

OC Tuner [CANCEL]

OC Tuner utility automatically overclocks the frequency and voltage of the CPU and DRAM. Press <Enter> to start auto tuning. It takes around five minutes, and the system will reboot for several times until auto tuning is completed.Configuration options: [CANCEL] [OK]

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

CPU Ratio [Auto]

Allows user can manually adjust the maximum non-CPB mode CPU ratio. The value will be limit to CPU base or factory setting. Use the <+> and <-> keys to adjust the ratio. The valid value ranges vary according to your CPU model.

Memory Frequency [Auto]

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

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

CPU/NB Frequency [Auto]

Allows you to set the ratio between the NB (in CPU) Clock and the CPU Bus Frequency. Configuration options: [Auto] [1400MHz] [1600MHz] [1800MHz] [2000MHz]

HT Link Speed [Auto]

Allows you to select the HyperTransport link speed. Configuration options: [Auto] [800MHz] [1000MHz] [1200MHz] [1400MHz] [1600MHz] [1800MHz] [2000MHz]

CPU Spread Spectrum [Auto]

[Auto]	Automatic configuration.
[Disabled]	Enhances the BCLK overclocking ability.
[Enabled]	Sets to [Enabled] for EMI control.

PCIe Spread Spectrum [Auto]

[Auto]	Automatic configuration.
[Disabled]	Enhances the PCIE overclocking ability.
[Enabled]	Sets to [Enabled] for EMI control.

EPU Power Saving Mode [Disabled]

Allows you to enable or disable the EPU power saving mode. Configuration options: [Enabled] [Disabled]

EPU Setting [Auto]

This item appears only when you set the **EPU Power Saving Mode** to [Enabled] and allows you to select the power saving mode. Configurations options: [Auto] [Light Power Saving Mode] [Medium Power Saving Mode] [Max Power Saving Mode].

DRAM Timing Control

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

DRAM CAS# Latency [Auto]

You can key in the desired value using the numeric keypad. The values range from 4 to 12.

DRAM RAS# to CAS# Delay [Auto]

You can key in the desired value using the numeric keypad. The values range from 5 to 12.

DRAM RAS# PRE Time [Auto]

You can key in the desired value using the numeric keypad. The values range from 5 to 12.

DRAM RAS# ACT Time [Auto]

You can key in the desired value using the numeric keypad. The values range from 15 to 30.

DRAM READ to PRE Time [Auto]

You can key in the desired value using the numeric keypad. The values range from 4 to 7.

DRAM RAS# to RAS# Delay [Auto]

You can key in the desired value using the numeric keypad. The values range from 4 to 7.

DRAM WRITE to READ Delay [Auto]

You can key in the desired value using the numeric keypad. The values range from 4 to 7.

DRAM CAS# write Latency [Auto]

You can key in the desired value using the numeric keypad. The values range from 5 to 12.

DRAM WRITE Recovery Time [Auto]

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

DRAM REF Cycle Time [Auto]

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

DRAM Row Cycle Time [Auto]

You can key in the desired value using the numeric keypad. The values range from 11 to 42.

DRAM READ to WRITE Delay [Auto]

You can key in the desired value using the numeric keypad. The values range from 3 to 17.

DRAM WRITE to READ Delay(DD) [Auto]

You can key in the desired value using the numeric keypad. The values range from 2 to 10.

DRAM WRITE to WRITE Timing [Auto]

You can key in the desired value using the numeric keypad. The values range from 2 to 10.

DRAM READ to READ Timing [Auto]

You can key in the desired value using the numeric keypad. The values range from 2 to 10.

DRAM Refresh Rate [Auto]

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

DRAM Command Rate [Auto]

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

DRAM Driving Control

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

DCT0 Information:

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%]

DCT1 Information:

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 <+> / <-> keys to adjust the value. To restore the default setting, type [auto] using the keyboard and press the <Enter> key.

CPU Load-Line Calibration [Auto]

Allows you to select the CPU Load-Line mode.
Configuration options: [Auto] [Disabled] [Enabled]

CPU/NB Load-Line Calibration [Auto]

Allows you to select the CPU/NB Load-Line mode.
Configuration options: [Auto] [Disabled] [Enabled]

CPU & NB Voltage [Offset Mode]

Allows you to set the CPU & NB Voltage Mode. Different sub-items appear according to the **CPU & NB Voltage Mode** item setting. Configuration options: [Offset Mode] [Manual Mode]

Offset Mode Sign [+]

This item appears only when you set the **CPU & NB Voltage** item to [Offset Mode] and allows you to set the offset mode sign. Configuration options: [+] [-]

CPU Offset Voltage [Auto]

This item appears only when you set the **CPU & NB Voltage** item to [Offset Mode] and allows you to set the CPU Offset voltage. The values range from 0.006250V to 0.7V with a 0.006250V interval.

CPU/NB Offset Mode Sign [+]

This item appears only when you set the **CPU & NB Voltage** item to [Offset Mode] and allows you to set the offset mode sign. Configuration options: [+] [-]

CPU/NB Offset Voltage [Auto]

This item appears only when you set the **CPU & NB Voltage Mode** item to [Offset Mode] and allows you to set the CPU/NB Offset voltage. The values range from 0.00625V to 0.5V with a 0.00625V interval.

CPU Manual Voltage [Auto]

This item appears only when you set the **CPU & NB Voltage** item to [Manual Mode] and allows you to set a fixed CPU voltage.

CPU/NB Manual Voltage [Auto]

This item appears only when you set the **CPU & NB Voltage** item to [Manual Mode] and allows you to set a fixed CPU/NB voltage.

CPU VDDA Voltage [Auto]

Allows you to set the CPU VDDA voltage. The values range from 2.20V to 2.80V with a 0.00625V interval.

DRAM Voltage [Auto]

Allows you to set the DRAM voltage. The values range from 1.200000V to 2.500000V with a 0.006250V interval.

NB Voltage [Auto]

Allows you to set the Northbridge voltage. The values range from 1.100000V to 1.250000V with a 0.006250V interval.

NB HT Voltage [Auto]

Allows you to set the Northbridge HyperTransport voltage. The values range from 1.200000V to 1.400000V with a 0.006250V interval.

NB 1.8V Voltage [Auto]

Allows you to set the Northbridge 1.8V voltage. The values range from 1.800000V to 2.100000V with a 0.005000V interval.

SB Voltage [Auto]

Allows you to set the Southbridge voltage. The values range from 1.1000000V to 1.8000000V with a 0.005000V interval.

3.5 Advanced menu

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

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

3.5.1 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.

Cool'n'Quiet [Disabled]

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

[Disabled] Disables this function.

C1E Support [Disabled]

[Auto] Allows automatic selection of C1E support function.

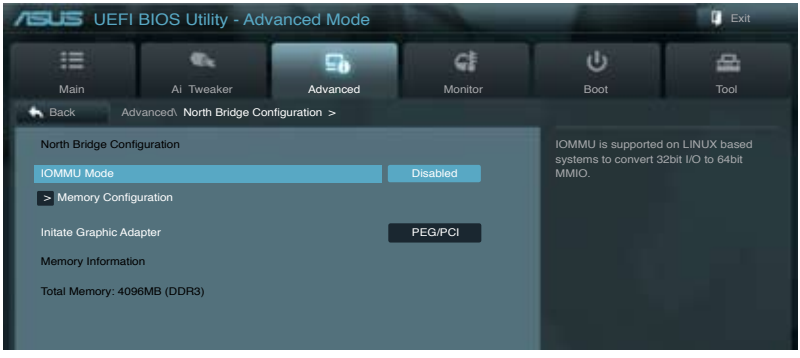
[Disabled] Disables this function.

SVM [Enabled]

[Enabled] Enables the AMD Secure Virtual Machine mode.

[Disabled] Disables this function.

3.5.2 North Bridge Configuration



IOMMU Mode [Disabled]

Allows you to disable the IOMMU mode or select 64MB. IOMMU is supported on Linux based systems to convert 32bit I/O to 64bit MMIO. Configuration options: [Disabled] [64MB]

Memory Configuration

Allows you to set the related memory configurations.

Bank Interleaving [Auto]

Allows you to enable the bank memory interleaving. Configuration options: [Auto] [Disabled]

Channel Interleaving [Auto]

Allows you to enable the channel memory interleaving. Configuration options: [Disabled] [Auto]

ECC Mode [Enabled]

Allows you to enable or disable the ECC mode. Configuration options: [Disabled] [Enabled]

Power Down Enable [Disabled]

Allows you to enable or disable the DDR power down mode. Configuration options: [Disabled] [Enabled]

Memory Hole Remapping [Enabled]

Allows you to enable or disable memory remapping around memory hole. Configuration options: [Disabled] [Enabled]

DCT Unganged Mode [Enabled]

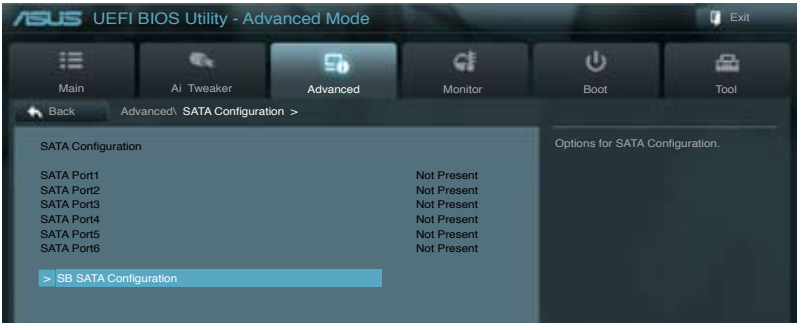
Allows you to select unganged mode or ganged mode. Configuration options: [Disabled] [Enabled]

Initiate Graphic Adapter [PEG/PCI]

Allows you to select the primary boot graphic controller. Configuration options: [PEG/PCI] [PCI/PEG]

3.5.3 SATA Configuration

While entering Setup, the BIOS automatically detects the presence of SATA devices. The SATA Port items show **Not Present** if no SATA device is installed to the corresponding SATA port.



SB SATA Configuration

Allows you to set SATA options.

OnChip SATA Channel [Enabled]

Allows you to enable or disable serial ATA. Configuration options: [Enabled] [Disabled]

SATA Port1 - Port4 [AHCI]

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

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

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

SATA Port5 - Port6 [AHCI]

Allows you to set the SATA port 1~4 mode. This item can only be configured as [IDE] when **SATA Port1 - Port4** is set to [IDE]. Configuration options: [AHCI] [IDE]

- When the **SATA Port1–Port 4** and the **SATA Port5–Port 6** items are set to [AHCI], the information of the SATA connectors 1–6 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 1–6 in AHCI mode under the OS environment.

If you use a SATA optical drive to run the Windows XP OS installation disk, we strongly recommend that you install the optical drive to the SATA connectors 5/6 and set them to [IDE] mode.

S.M.A.R.T. Status Check [Enabled]

[Enabled] Enables the S.M.A.R.T feature.

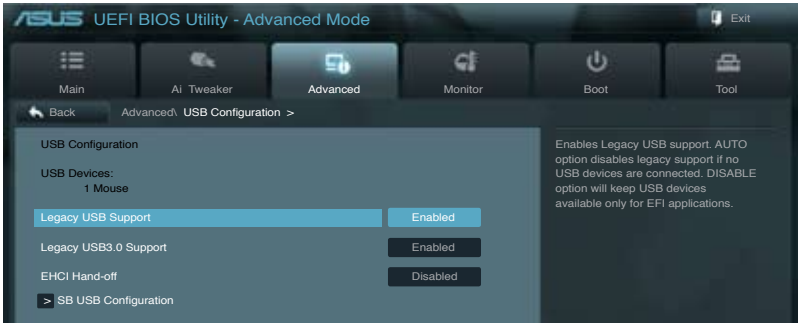
[Disabled] Disables the S.M.A.R.T feature.

SATA Hot Plug on Port1~6 [Disabled]

These items appear only when you set SATA Port1 - Port6 to [AHCI] and allow you to enable or disable the SATA port hot-plug support. Configuration options: [Enabled] [Disabled]

3.5.4 USB Configuration

The USB Configuration menu allows you to change the USB settings.



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

Legacy USB Support [Enabled]

[Auto] Allows the system to detect the presence of USB devices at startup. If detected, the USB controller legacy mode is enabled. If no USB device is detected, the legacy USB support is disabled.

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

[Disabled] Disables the function.

Legacy USB3.0 Support [Enabled]

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

[Disabled] Disables the function.

EHCI Hand-off [Disabled]

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

[Disabled] Disables the function.

SB USB Configuration

Allows you to set SB USB options.

OHCI HC (Bus 0 Dev 18 Fn 0) [Enabled]

Configuration options: [Enabled] [Disabled]

OHCI HC (Bus 0 Dev 19 Fn 0) [Enabled]

Configuration options: [Enabled] [Disabled]

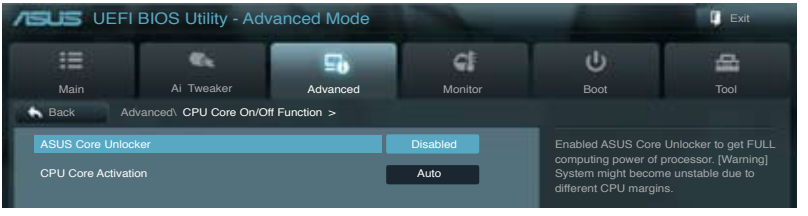
OHCI HC (Bus 0 Dev 22 Fn 0) [Enabled]

Configuration options: [Enabled] [Disabled]

OHCI HC (Bus 0 Dev 20 Fn 5) [Enabled]

Configuration options: [Enabled] [Disabled]

3.5.5 CPU Core On/Off Function



ASUS Core Unlocker [Disabled]

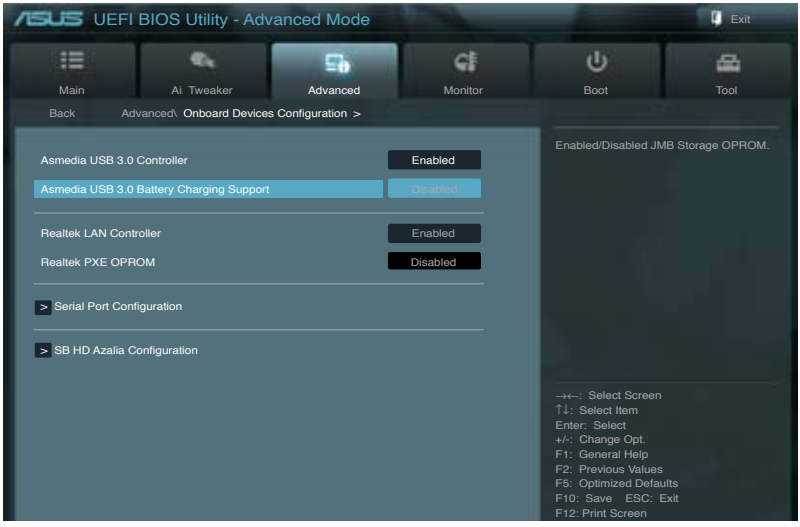
[Enabled] Enables the ASUS Core Unlocker to get the full computing power of the processor.

[Disabled] Disables this function.

CPU Core Activation [Auto]

This item lets user turn off core except core 1, user can turn off 2nd, 3rd, 4th, 5th, etc core manually. Configuration options: [Auto] [Manual]

3.5.6 Onboard Devices Configuration



Asmedia USB 3.0 Controller [Enabled]

[Enabled] Enables the Asmedia USB 3.0 controller.

[Disabled] Disables the controller.

Asmedia USB 3.0 Battery Charging Support [Enabled]

This item appears only when you set the **Asmedia USB 3.0 Controller** to [Enabled] and allows you to enable or disable the Asmedia USB 3.0 fast battery charging support for USB 3.0 devices complying with the BC 1.1 regulation. Configuration options: [Enabled] [Disabled]

Realtek LAN Controller [Enabled]

[Enabled] Enables the Realtek LAN controller.

[Disabled] Disables the function.

Realtek PXE OPROM [Disabled]

This item appears only when you set the **Realtek LAN Controller** to [Enabled] and allows you to enable or disable the Realtek PXE OptionROM of the Realtek LAN controller. Configuration options: [Enabled] [Disabled]

Serial Port Configuration

The sub-items in this menu allow you to set the serial port configuration.

Serial Port [Enabled]

Allows you to enable or disable the serial port (COM). Configuration options: [Enabled] [Disabled]

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

This item appears only when you set the **Serial Port** to [Enabled] and allows you to change settings. Configuration options: [IO=3F8h; IRQ=4] [IO=2F8h; IRQ=3] [IO=3E8h; IRQ=4] [IO=2E8h; IRQ=3]

SB HD Azalia Configuration

Allows you to change the HD Azalia configuration.

[Enabled] Enables the High Definition Audio Azalia device.

[Disabled] Disables the device.

The following two items appear only when you set the **HD Audio Azalia Device** item to [Enabled].

Azalia Front Panel [HD]

Allows you to set the Azalia front panel audio connector (AAFP) type to legacy AC'97 or high-definition audio depending on the audio standard that the front panel audio module supports.

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

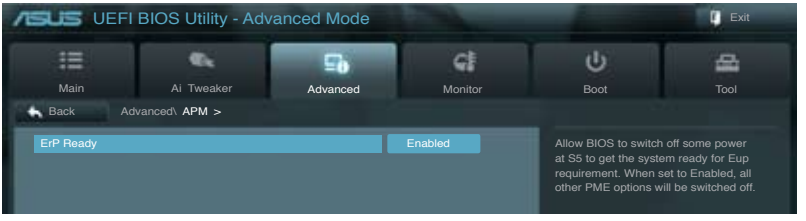
[AC97] Sets the front panel audio connector (AAFP) mode to legacy AC'97

SPDIF Out Type [SPDIF]

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

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

3.5.7 APM



ErP Ready [Enabled]

Allows the BIOS to switch off some power at S5 to get the system ready for ErP requirement. When this item is set to [Enabled], all other PME options will be switched off. Configuration options: [Enabled] [Disabled]

The following items appear only when you set the **ErP Ready** to [Disabled].

Restore 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 PS/2 Device [Disabled]

Allows you to use PS/2 device to turn on the system. This feature requires an ATX power supply that provides at least 1A on the +5VSB lead. Configuration options: [Disabled] [Enabled]

Power On By PME Device [Disabled]

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

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

Power On By Ring [Disabled]

[Disabled] Disables to power up the computer when the external modem receives a call while the computer is in Soft-off mode.

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

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

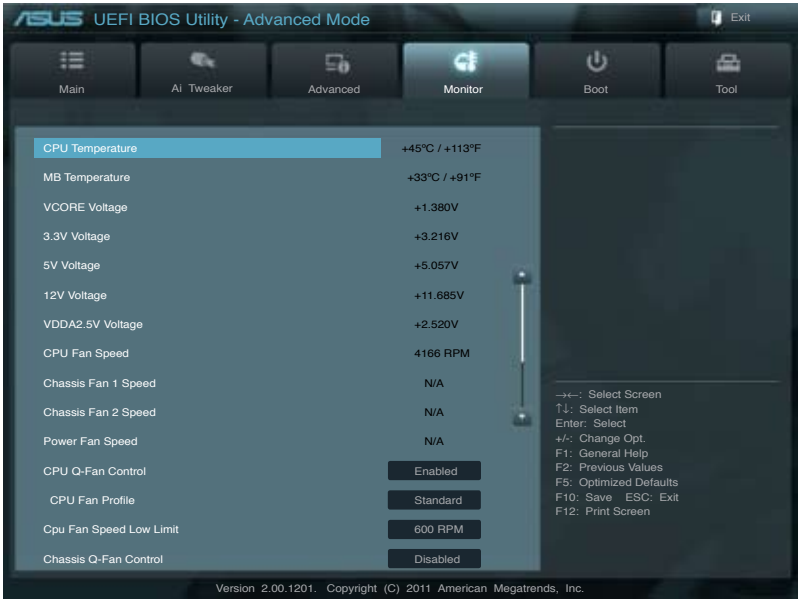
Power On By RTC [Disabled]

[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.

3.6 Monitor menu

The Monitor menu displays the system temperature/power status, and allows you to change the fan settings.



CPU Temperature / MB Temperature [xxxºC/xxxºF]

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

VCORE Voltage, 3.3V Voltage, 5V Voltage, 12V Voltage, VDDA2.5V Voltage

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

CPU Fan Speed [xxxx RPM] or [Ignore] / [N/A] Chassis Fan 1/2 Speed [xxxx RPM] or [Ignore] / [N/A] Power Fan Speed [xxxx RPM] or [Ignore] / [N/A]

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

CPU Q-Fan Control [Enabled]

Allows you to enable or disable the CPU Q-Fan control function.

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

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

CPU Fan Profile [Standard]

This item appears only when you enable the **CPU Q-Fan Control** feature and allows you to set the appropriate performance level of the CPU fan.

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

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

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

[Manual] Sets to [Manual] to assign detailed fan speed control parameters.

CPU Fan Speed Low Limit [600 RPM]

This item appears only when you enable the **CPU Q-Fan Control** feature and allows you to disable or set the CPU fan warning speed. Configuration options: [Ignore] [100 RPM] [200 RPM] [300 RPM] [400 RPM] [500 RPM] [600 RPM]

The following four items appear only when you set **CPU Fan Profile** to [Manual].

CPU Upper Temperature [70]

Use the <+> and <-> keys to adjust the upper limit of the CPU temperature. The values range from 20ºC to 75ºC.

CPU Lower Temperature [20]

Displays the lower limit of the CPU temperature.

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

Use the <+> and <-> keys to adjust the maximum CPU fan duty cycle. The values range from 20% to 100%. When the CPU temperature reaches the upper limit, the CPU fan will operate at the maximum duty cycle.

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

Set the minimum CPU fan duty cycle when CPU temperature is lower than the CPU Lower Temperature setting.

Chassis Q-Fan Control [Disabled]

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

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

Chassis Fan Speed Low Limit [600 RPM]

This item appears only when you enable the **Chassis Q-Fan Control** feature and allows you to disable or set the chassis fan warning speed. Configuration options: [Ignore] [100 RPM] [200 RPM] [300 RPM] [400 RPM] [500 RPM] [600 RPM]

Chassis Fan Profile [Standard]

This item appears only when you enable the **Chassis Q-Fan Control** feature and allows you to set the appropriate performance level of the chassis fan.

[Standard] Sets to [Standard] to make the chassis fan automatically adjust depending on the chassis temperature.

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

[Turbo] Sets to [Turbo] to achieve maximum chassis fan speed.

[Manual] Sets to [Manual] to assign detailed fan speed control parameters.

The following four items appear only when you set **Chassis Fan Profile** to [Manual].

Chassis Upper Temperature [70]

Use the <+> and <-> keys to adjust the upper limit of the CPU temperature. The values range from 40ºC to 90ºC.

Chassis Lower Temperature [40]

Displays the lower limit of the chassis temperature.

Chassis Fan Max. Duty Cycle(%) [60]

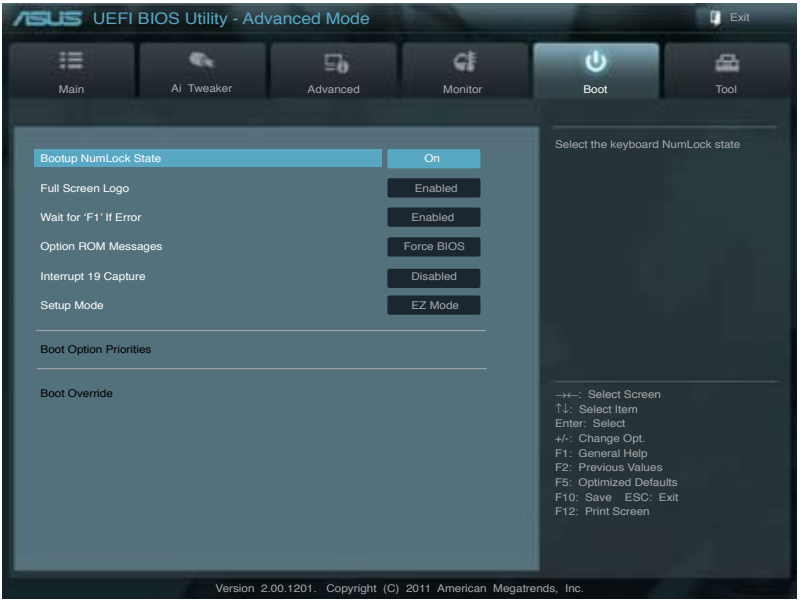
Use the <+> and <-> keys to adjust the maximum chassis fan duty cycle. The values range from 60% to 100%. When the chassis temperature reaches the upper limit, the chassis fan will operate at the maximum duty cycle.

Chassis Fan Min. Duty Cycle(%) [60]

Set the minimum chassis fan duty cycle when chassis temperature is lower than the chassis Lower Temperature setting.

3.7 Boot menu

The Boot menu items allow you to change the system boot options.



Bootup NumLock State [On]

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

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

Full Screen Logo [Enabled]

[Enabled] Enables the full screen logo display feature.

[Disabled] Disables the full screen logo display feature.

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

Wait For 'F1' If Error [Enabled]

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

[Disabled] Disables this function.

Option ROM Messages [Force BIOS]

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

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

Interrupt 19 Capture [Disabled]

[Enabled] Allows Option ROMs to trap interrupt 19 when this item is set to [Enabled].

[Disabled] Disables this function.

Setup Mode [EZ Mode]

[Advanced Mode] Sets Advanced Mode as the default screen for entering the BIOS setup program.

[EZ Mode] Sets EZ Mode as the default screen for entering the BIOS setup program.

Boot Option Priorities

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

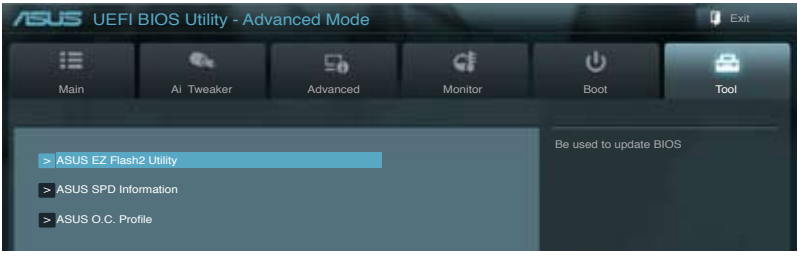
- To select the boot device during system startup, press <F8> when ASUS Logo appears.
- To access Windows OS in Safe Mode, do any of the following:
  - Press <F5> when ASUS Logo appears.
  - Press <F8> after POST.

Boot Override

These items displays the available devices. The number of device items that appears on the screen depends on the number of devices installed in the system. Click an item to start booting from the selected device.

3.8 Tools menu

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



3.8.1 ASUS EZ Flash 2

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

For more details,see section **3.10.2 ASUS EZ Flash 2**.

3.8.2 ASUS SPD Information

DIMM Slot # [Slot 1]

This item allows you to view the SPD information of the memory in each DIMM slot. Configuration options: [Slot 1] [Slot 2] [Slot 3] [Slot 4]

3.8.3 ASUS O.C. Profile

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

The **Setup Profile Status** items show **Not Installed** if no profile is created.

Lable

Allows you to input the label of setup profile.

Save to Profile

Allows you to save the current BIOS settings to the BIOS Flash, and create a profile. Key in a profile number from one to eight, press <Enter>, and then select **Yes**.

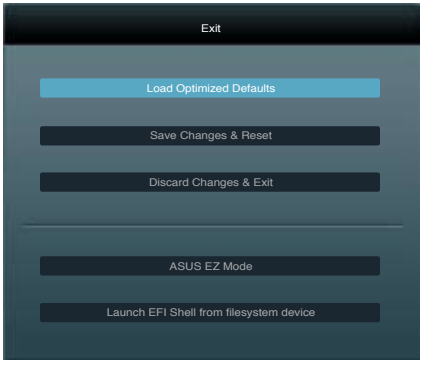
Load from Profile

Allows you to load the previous BIOS settings saved in the BIOS Flash. Key in the profile number that saved your CMOS settings, press <Enter>, and then select **Yes**.

- DO NOT shut down or reset the system while updating the BIOS to prevent the system boot failure!
- We recommend that you update the BIOS file only coming from the same memory/CPU configuration and BIOS version.

3.9 Exit menu

The Exit menu items allow you to load the optimal default values for the BIOS items, and save or discard your changes to the BIOS items. You can access the **EZ Mode** from the Exit menu.



Load Optimized Defaults

This option allows you to load the default values for each of the parameters on the Setup menus. When you select this option or if you press <F5>, a confirmation window appears. Select **Yes** to load the default values.

Save Changes & Reset

Once you are finished making your selections, choose this option from the Exit menu to ensure the values you selected are saved. When you select this option or if you press <F10>, a confirmation window appears. Select **Yes** to save changes and exit.

Discard Changes & Exit

This option allows you to exit the Setup program without saving your changes. When you select this option or if you press <Esc>, a confirmation window appears. Select **Yes** to discard changes and exit.

ASUS EZ Mode

This option allows you to enter the EZ Mode screen.

Launch EFI Shell from filesystem device

This option allows you to attempt to launch the EFI Shell application (shellx64.efi) from one of the available devices that have a filesystem.

3.10 Updating BIOS

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

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

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

1. **ASUS Update:** Updates the BIOS in Windows® environment.
2. **ASUS EZ Flash 2:** Updates the BIOS using a USB flash drive.
3. **ASUS BIOS Updater:** Updates and backups the BIOS in DOS environment using the motherboard support DVD and a USB flash drive.

Refer to the corresponding sections for details on these utilities.

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

3.10.1 ASUS Update utility

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

- 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).

Launching ASUS Update

After installing AI Suite II from the motherboard support DVD, launch ASUS Update by clicking **Update > ASUS Update** on the AI Suite II main menu bar.

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

Updating the BIOS through the Internet

To update the BIOS through the Internet:

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

2. Select the ASUS FTP site nearest you to avoid network traffic.

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

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

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

Updating the BIOS through a BIOS file

To update the BIOS through a BIOS file:

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

2. Click **Browse** to locate the BIOS file and then click **Next**.

3. You can decide whether to change the BIOS boot logo. Click **Yes** if you want to change the boot logo or **No** to continue.

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

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

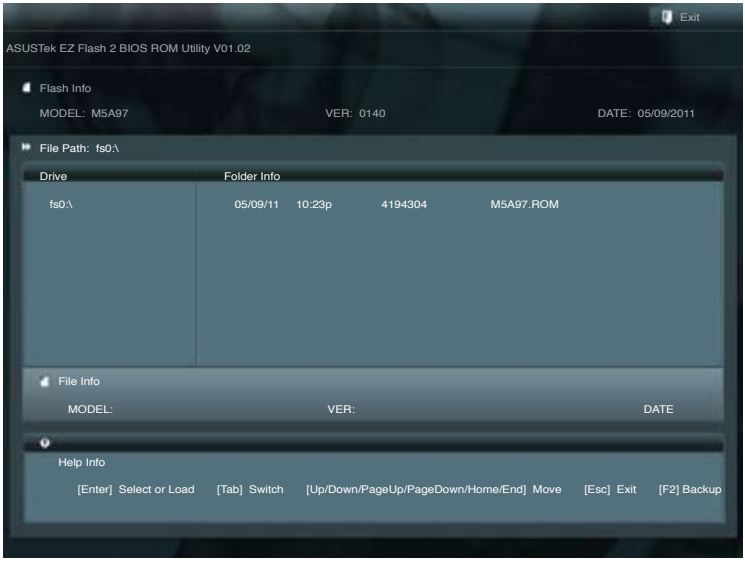
3.10.2 ASUS EZ Flash 2 utility

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.
2. Enter the Advanced Mode of the BIOS setup program. Go to the **Tool** menu to select **ASUS EZ Flash Utility** and press <Enter> to enable it.



3. Press <Tab> to switch to the **Drive** field.
4. Press the Up/Down arrow keys to find the USB flash disk that contains the latest BIOS, and then press <Enter>.
5. Press <Tab> to switch to the **Folder Info** field.
6. Press the Up/Down arrow keys to find the BIOS file, and then press <Enter> to perform the BIOS update process. Reboot the system when the update process is done.

- This function can support devices such as a USB flash disk with FAT 32/16 format and single partition only.
- DO NOT shut down or reset the system while updating the BIOS to prevent system boot failure!

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

3.10.3 ASUS BIOS Updater

The ASUS BIOS Updater allows you to update BIOS in DOS environment. This utility also allows you to copy the current BIOS file that you can use as a backup when the BIOS fails or gets corrupted during the updating process.

The succeeding utility screens are for reference only. The actual utility screen displays may not be same as shown.

Before updating BIOS

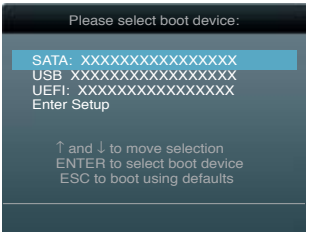
1. Prepare the motherboard support DVD and a USB flash drive in FAT32/16 format and single partition.
2. Download the latest BIOS file and BIOS Updater from the ASUS website at http://support.asus.com and save them on the USB flash drive.

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

3. Turn off the computer and disconnect all SATA hard disk drives (optional).

Booting the system in DOS environment

1. Insert the USB flash drive with the latest BIOS file and BIOS Updater to the USB port.
2. Boot your computer. When the ASUS Logo appears, press <F8> to show the **BIOS Boot Device Select Menu**. Insert the support DVD into the optical drive and select the optical drive as the boot device.



3. When the **Make Disk** menu appears, select the **FreeDOS command prompt** item by pressing the item number.
4. At the FreeDOS prompt, type `d:` and press <Enter> to switch the disk from Drive C (optical drive) to Drive D (USB flash drive).

```
Welcome to FreeDOS (http://www.freedos.org)!
C:\>d:
D:\>
```

Backing up the current BIOS

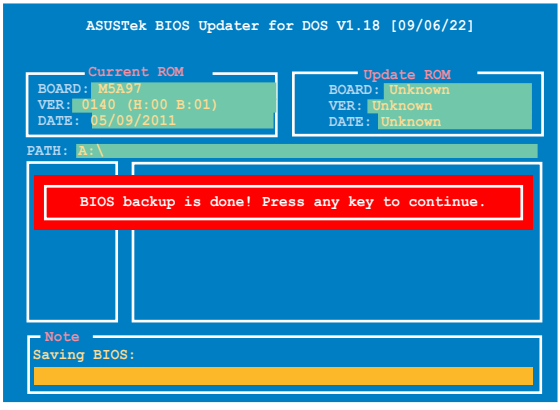
To backup the current BIOS file using the BIOS Updater

Ensure that the USB flash drive is not write-protected and has enough free space to save the file.

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

The [filename] is any user-assigned filename with no more than eight alphanumeric characters for the filename and three alphanumeric characters for the extension.

2. The BIOS Updater backup screen appears indicating the BIOS backup process. When BIOS backup is done, press any key to return to the DOS prompt.



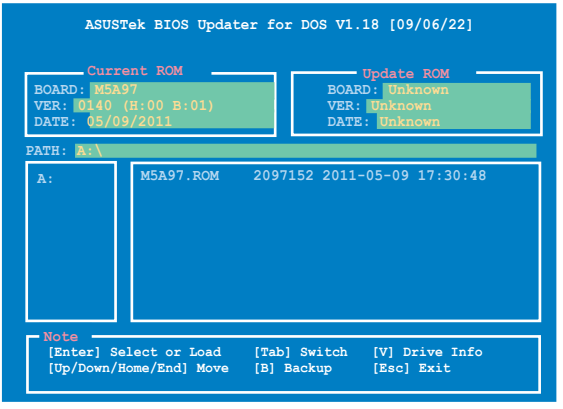
Updating the BIOS file

To update the BIOS file using BIOS Updater

1. At the FreeDOS prompt, type **`bupdater /pc /g`** and press <Enter>.

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

2. The BIOS Updater screen appears as below.



3. Press <Tab> to switch between screen fields and use the <Up/Down/Home/End> keys to select the BIOS file and press <Enter>. BIOS Updater checks the selected BIOS file and prompts you to confirm BIOS update.

4. Select **Yes** and press <Enter>. When BIOS update is done, press <ESC> to exit BIOS Updater. Restart your computer.

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

- For BIOS Updater version 1.04 or later, the utility automatically exits to the DOS prompt after updating BIOS.
- Ensure to load the BIOS default settings to ensure system compatibility and stability. Select the **Load Setup Defaults** item under the **Exit** BIOS menu. See Chaper 3 of your motherboard user manual for details.
- Ensure to connect all SATA hard disk drives after updating the BIOS file if you have disconnected them.

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 3 or later versions before installing the drivers for better compatibility and system stability.

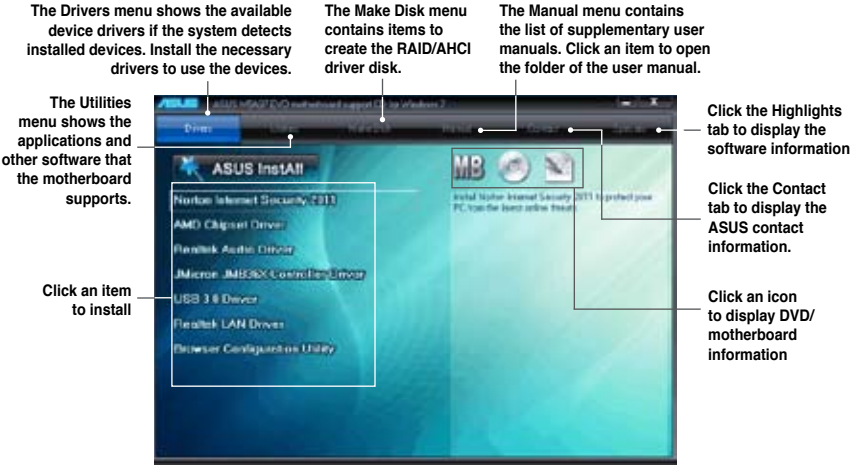
4.2 Support DVD information

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

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

4.2.1 Running the support DVD

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



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

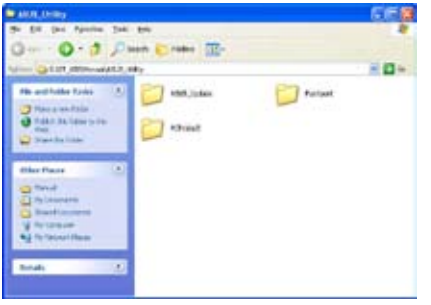
4.2.2 Obtaining the software manuals

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

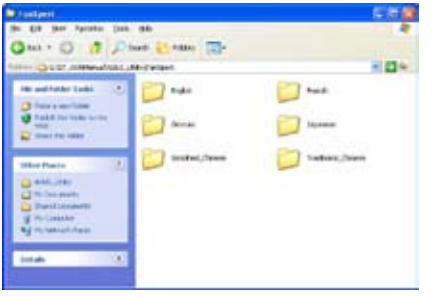
The software manual files are in Portable Document Format (PDF). Install the Adobe® Acrobat® Reader from the Utilities menu before opening the files.

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

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



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



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

4.3 Software information

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

4.3.1 AI Suite II

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

Installing AI Suite II

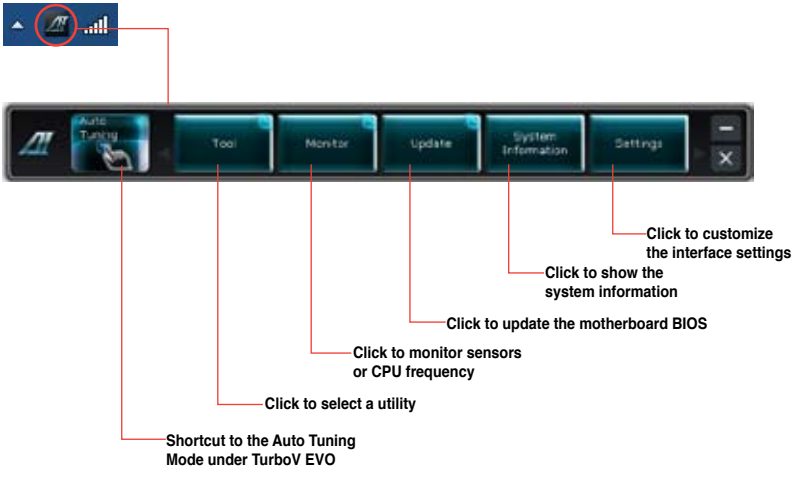
To install AI Suite II on your computer

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

Using AI Suite II

AI Suite II automatically starts when you enter the Windows® operating system (OS). The AI Suite II icon appears in the Windows® notification area. Click the icon to open the AI Suite II main menu bar.

Click each button to select and launch a utility, to monitor the system, to update the motherboard BIOS, to display the system information, and to customize the settings of AI Suite II.



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

4.3.2 TurboV EVO

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

TurboV

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

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

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

Using Advanced Mode

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

CPU Ratio

Allows you to manually adjust the CPU ratio.

1. Click **More Settings**, and then click the **CPU Ratio** tab.
2. Drag the adjustment bar upwards or downwards to the desired value.

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

Auto Tuning

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

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

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

Using Fast Tuning

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

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

Using Extreme Tuning

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

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

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

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

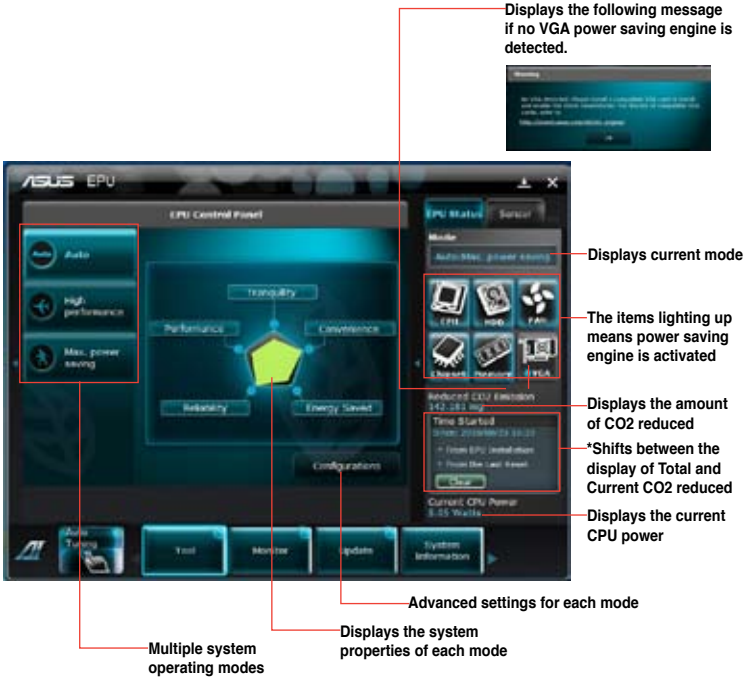
Chapter 4

4.3.3 EPU

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

Launching EPU

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



*• Select **From EPU Installation** to show the CO2 that has been reduced since you installed EPU.

*• Select **From the Last Reset** to show the total CO2 that has been reduced since you click the Clear button Clear.

4.3.4 FAN Xpert

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

Launching FAN Xpert

After installing AI Suite II from the motherboard support DVD, launch FAN Xpert by clicking **Tool > Fan Xpert** on the AI Suite II main menu bar.

Using FAN Xpert

Click **Fan Name** to select a fan and then click **Setting** to select a preset mode for your selected fan.

Fan setting

- **Disable**: disables the **Fan Xpert** function.
- **Standard**: adjusts fan speed in a moderate pattern.
- **Silent**: minimizes fan speed for quiet fan operation.
- **Turbo**: maximizes the fan speed for the best cooling effect.
- **User**: Allows you to configure the CPU fan profile under certain limitations.

4.3.5 Probe II

Probe II is a utility that monitors the computer's vital components, and detects and alerts you of any problem with these components. Probe II senses fan rotations, CPU temperature, and system voltages, among others. With this utility, you are assured that your computer is always at a healthy operating condition.

Launching Probe II

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

Configuring Probe II

Click the **Voltage/Temperature/Fan Speed** tabs to activate the sensors or to adjust the sensor threshold values. The **Preference** tab allows you to customize the time interval of sensor alerts, or change the temperature unit.

4.3.6 Ai Charger+

Battery Charging Version 1.1 (BC 1.1), a USB Implementers Forum (USB-IF) certified USB charging function, is designed to make USB charging faster than the standard USB devices. If your USB device supports the BC 1.1 function*, when you connect your USB device to your system, the system automatically detects your USB device and starts a fast USB charging. The charging speed may get 3 times faster than that of the standard USB devices**.

- * Check your USB device manufacturer if it fully supports the BC 1.1 function.
- ** The actual charging speed may vary with your USB device's conditions.
- Ensure to remove and reconnect your USB device after enabling or disabling Ai Charger+ to ensure normal charging function.

4.3.7 Audio configurations

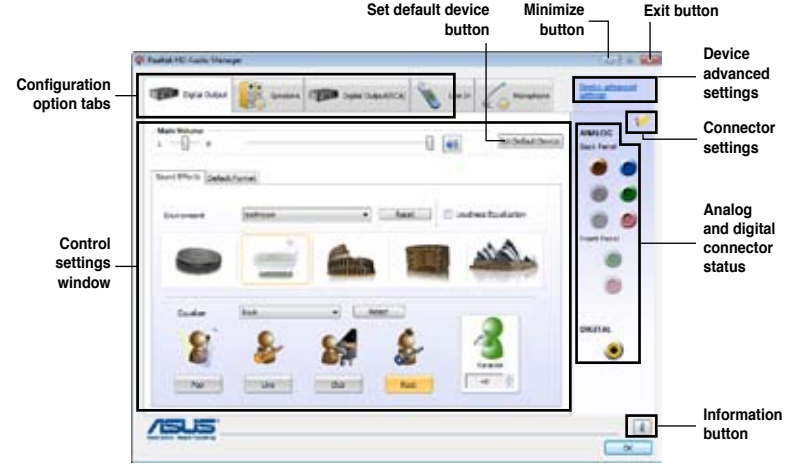
The Realtek® audio CODEC provides 8-channel audio capability to deliver the ultimate audio experience on your computer. The software provides Jack-Detection function, S/PDIF Out support, and interrupt capability. The CODEC also includes the Realtek® proprietary UAJ® (Universal Audio Jack) technology for all audio ports, eliminating cable connection errors and giving users plug and play convenience.

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

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

Realtek HD Audio Manager

A. Realtek HD Audio Manager for Windows® Vista™



B. Realtek HD Audio Manager for Windows XP

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

4.4 RAID configurations

The motherboard comes with the AMD® SB850 chipset that allows you to configure Serial ATA hard disk drives as RAID sets. The motherboard supports the following RAID configurations: RAID 0, RAID 1, RAID 5 and RAID 10.

- 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 / 7 limitation, a RAID array with the total capacity over 2TB cannot be set as a boot disk. A RAID array over 2TB can only be set as a data disk only.
- If you want to install a Windows® operating system to a hard disk drive included in a RAID set, you have to create a RAID driver disk and load the RAID driver during OS installation. Refer to section **4.5 Creating a RAID driver disk** for details.

4.4.1 RAID definitions

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

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

RAID 5 stripes both data and parity information across three or more hard disk drives. Among the advantages of RAID 5 configuration include better HDD performance, fault tolerance, and higher storage capacity. The RAID 5 configuration is best suited for transaction processing, relational database applications, enterprise resource planning, and other business systems. Use a minimum of three identical hard disk drives for this setup.

RAID 10 is data striping and data mirroring combined without parity (redundancy data) having to be calculated and written. With the RAID 10 configuration you get all the benefits of both RAID 0 and RAID 1 configurations. Use four new hard disk drives or use an existing drive and three new drives for this setup.

4.4.2 Installing Serial ATA hard disks

The motherboard supports Serial ATA hard disk drives. For optimal performance, install identical drives of the same model and capacity when creating a disk array.

To install the SATA hard disks for a RAID configuration:

1. Install the SATA hard disks into the drive bays.
2. Connect the SATA signal cables.
3. Connect a SATA power cable to the power connector on each drive.

4.4.3 Setting the RAID item in BIOS

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

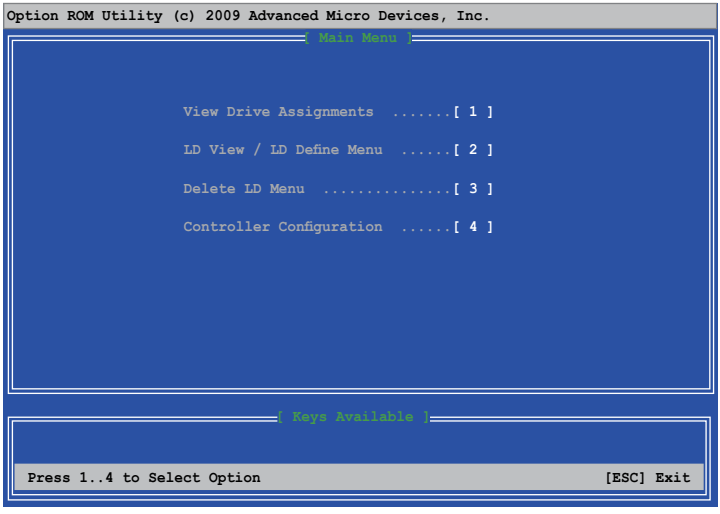
1. Enter the BIOS Setup during POST.
2. Go to UEFI **Advanced Mode** and go to the **Advanced menu** > **SATA Configuration** > **SB SATA Confituration**, and then press **<Enter>**.
3. Set the type of the SATA connectors to **[RAID]**.
4. Save your changes, and then exit the BIOS Setup.

See section **3.6.3 SATA Configuration** for details.

4.4.4 AMD® Option ROM Utility

To enter the AMD® Option ROM utility:

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



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

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

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

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

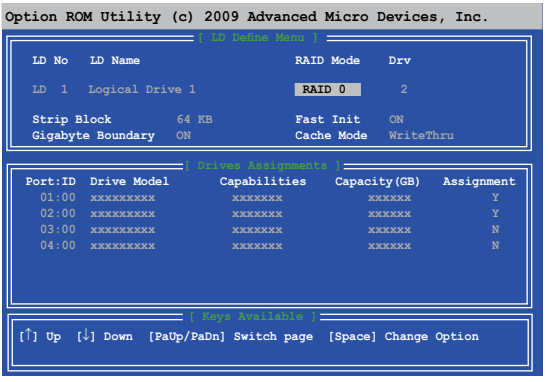
To create a RAID volume using more than four hard disk drives, ensure that the SATA connectors 5/6 are set to [RAID] mode.

Chapter 4

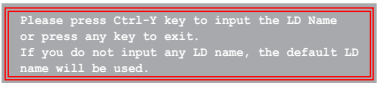
Creating a RAID volume

To create a RAID volume:

1. In the Main Menu, press <2> to enter the **LD View / LD Define Menu** function.
2. Press <Ctrl> + <C>, and the following screen appears.

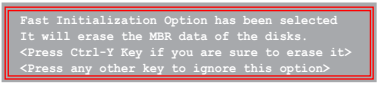


3. Move to the **RAID Mode** item and press <Space> to select a RAID mode to create.
4. Move to the **Assignment** item by using the down arrow key and set **Y** to select the hard disk drives you want to include in the RAID set.
5. Press <Ctrl> + <Y> to save the setting.
6. The utility prompts the following message. Press <Ctrl> + <Y> to input the LD name.



7. Eeter an LD name, and then press any key to continue.

8. Press <Ctrl> + <Y> to erase the MBR, or you may press any key to abort the settings.



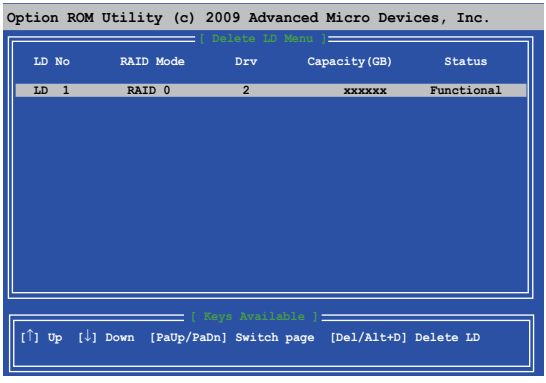
9. Press <Ctrl> + <Y> to enter the screen to modify the array capacity, or press any key to use the maximum capacity.

Deleting a RAID configuration

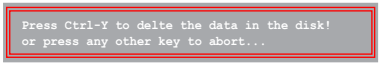
Take caution when deleting a RAID volume. You will lose all data on the hard disk drives when you delete a RAID volume.

To delete a RAID volume:

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



3. The utility prompts the following messages:

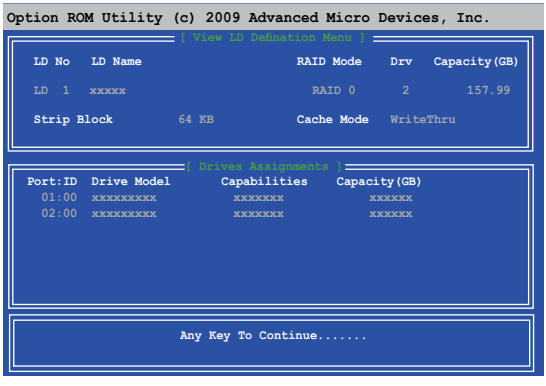


Press <Ctrl> + <Y> to delete the RAID volume.

Dispalying a RAID set information

To display a RAID set information:

1. In the Main Menu, press <2> to enter the “LD View / LD Define Menu” function.
2. Select a RAID item and press <Enter> to display its information.



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 driver disk without entering the OS

1. Boot your computer.
2. Press <Del> during POST to enter the BIOS setup utility.
3. Set the optical drive as the primary boot device.
4. Insert the support DVD into the optical drive.
5. Save changes and exit BIOS.
6. 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 **AMD AHCI/RAID 32/64bit xxxx 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

If you use a SATA optical drive to run the OS installation disk, we strongly recommend that you install the optical dirve to the SATA connectors 5/6 and set them to [IDE] mode.

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

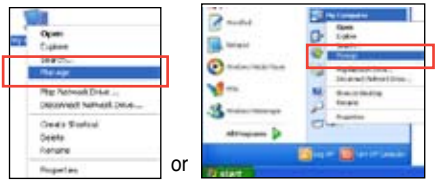
Before loading the RAID driver from a USB flash drive, you have to use another computer to copy the RAID driver from the support DVD to the USB flash drive.

4.5.4 Using a USB floppy disk drive

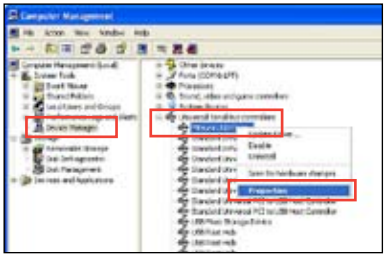
Due to OS limitation, Windows® XP may not recognize the USB floppy disk drive when you install the RAID driver from a floppy disk during the OS installation.

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

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

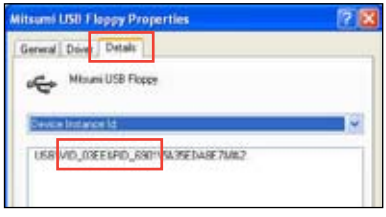


3. Select **Device Manager**. From the **Universal Serial Bus controllers**, right-click **xxxxxx USB Floppy**, and then select **Properties** from the pop-up window.



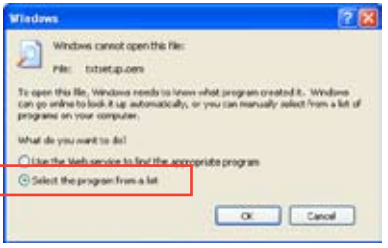
The name of the USB floppy disk drive varies with different vendors.

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



Chapter 4

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.Napa_i386_ahci8086]** and **[HardwareIds.SCSI.Napa_amd64_ahci]** 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.Napa_i386_ahci8086]
id= "PCI\VEN_1002&DEV_4392&CC_0104","ahcix86"
id= "PCI\VEN_1002&DEV_4391&CC_0106","ahcix86"
id= "PCI\VEN_1002&DEV_4393&CC_0104","ahcix86"
id= "USB\VID_03EE&PID_6901", "usbstor"

[HardwareIds.SCSI.Napa_amd64_ahci]
id= "PCI\VEN_1002&DEV_4392&CC_0104","ahcix64"
id= "PCI\VEN_1002&DEV_4391&CC_0106","ahcix64"
id= "PCI\VEN_1002&DEV_4393&CC_0104","ahcix64"
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 ATI® CrossFireX™ technology

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

5.1.1 Requirements

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

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

5.1.2 Before you begin

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

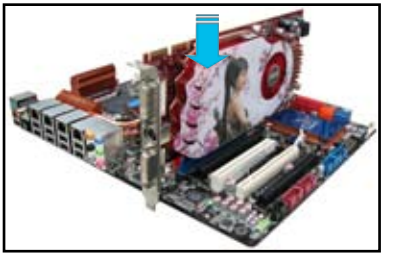
To uninstall existing graphics card drivers:

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

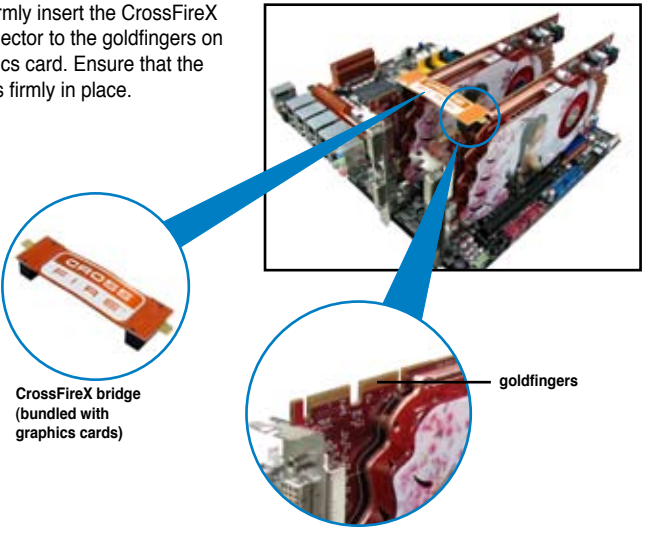
5.1.3 Installing two CrossFireX™ graphics cards

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

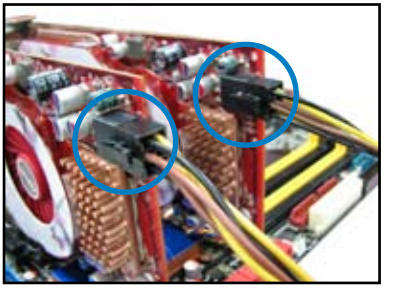
1. Prepare two CrossFireX-ready graphics cards.
2. Insert the two graphics card into the PCIEX16 slots. If your motherboard has more than two PCIEX16 slots, refer to Chapter 2 in this user manual for the locations of the PCIEX16 slots recommended for multi-graphics card installation.
3. Ensure that the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



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



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



5.1.4 Installing the device drivers

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

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

5.1.5 Enabling the ATI® CrossFireX™ technology

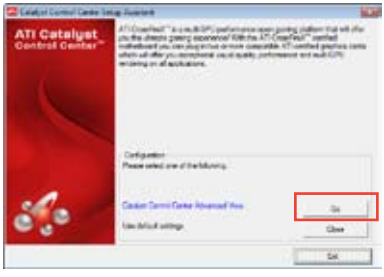
After installing your graphics cards and the device drivers, enable the CrossFireX™ feature through the ATI Catalyst™ Control Center in Windows environment.

Launching the ATI Catalyst Control Center

To launch the ATI Catalyst Control Center:

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

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



Enabling Dual CrossFireX technology

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

ASUS contact information

ASUSTeK COMPUTER INC.

Address	15 Li-Te Road, Peitou, Taipei, Taiwan 11259
Telephone	+886-2-2894-3447
Fax	+886-2-2890-7798
E-mail	info@asus.com.tw
Web site	www.asus.com.tw

Technical Support

Telephone	+86-21-38429911
Online support	support.asus.com

ASUS COMPUTER INTERNATIONAL (America)

Address	800 Corporate Way, Fremont, CA 94539, USA
Telephone	+1-510-739-3777
Fax	+1-510-608-4555
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Technical Support

Telephone	+1-812-282-2787
Support fax	+1-812-284-0883
Online support	support.asus.com

ASUS COMPUTER GmbH (Germany and Austria)

Address	Harkort Str. 21-23, D-40880 Ratingen, Germany
Fax	+49-2102-959911
Web site	www.asus.de
Online contact	www.asus.de/sales

Technical Support

Telephone (Component)	+49-1805-010923*
Telephone (System/Notebook/Eee/LCD)	+49-1805-010920*
Support Fax	+49-2102-9599-11
Online support	support.asus.com

*** EUR 0.14/minute from a German fixed landline; EUR 0.42/minute from a mobile phone.**

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 : Motherboard

Model Number : M5A97

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 :

Date : **May. 25, 2011**

Ver. 110101

EC Declaration of Conformity

We, the undersigned,

Manufacturer:	ASUSTek COMPUTER INC.
Address, City:	No. 150, LI-TE RD., PEITOU, TAIPEI 112, TAIWAN R.O.C.
Country:	TAIWAN
Authorized representative in Europe:	ASUS COMPUTER GmbH
Address, City:	HARKORT STR. 21-23, 40880 RATINGEN
Country:	GERMANY

declare the following apparatus:

Product name :	**Motherboard**
Model name :	**M5A97**

conform with the essential requirements of the following directives:

☒2004/108/EC-EMC Directive

☒ EN 55022:2006+A1:2007	☒ EN 55024:1998+A1:2001+A2:2003
☒ EN 61000-3-2:2006+A1:2009+A2:2009	☒ EN 61000-3-3:2008
☐ EN 55013:2001+A1:2003+A2:2006	☐ EN 55020:2007

☐1999/5/EC-R &TTE Directive

☐ EN 300 328 V1.7.1(2006-05)	☐ EN 301 489-1 V1.8.1(2008-04)
☐ EN 300 440-1 V1.4.1(2008-05)	☐ EN 301 489-3 V1.4.1(2002-08)
☐ EN 300 440-2 V1.2.1(2008-03)	☐ EN 301 489-4 V1.3.1(2002-08)
☐ EN 301 511 V9.0.2(2003-03)	☐ EN 301 489-7 V1.3.1(2005-11)
☐ EN 301 908-1 V3.2.1(2007-05)	☐ EN 301 489-9 V1.4.1(2007-11)
☐ EN 301 908-2 V3.2.1(2007-05)	☐ EN 301 489-17 V2.1.1(2009-05)
☐ EN 301 893 V1.4.1(2005-03)	☐ EN 301 489-24 V1.4.1(2007-09)
☐ EN 302 544-2 V1.1.1(2009-01)	☐ EN 302 326-2 V1.2.2(2007-06)
☐ EN 50360:2001	☐ EN 302 326-3 V1.3.1(2007-09)
☐ EN 50371:2002	☐ EN 301 357-2 V1.3.1(2006-05)
☐ EN 50385:2002	☐ EN 302 623 V1.1.1(2009-01)

☒2006/95/EC-LVD Directive

☐ EN 60950-1:2006	☐ EN 60065:2002+A1:2006+A11:2008
☒ EN 60950-1:2006+A11:2009	

☐2009/125/EC-ErP Directive

Regulation (EC) No. 1275/2008	Regulation (EC) No. 278/2009
☐ EN 62301:2005	☐ EN 62301:2005
Regulation (EC) No. 642/2009	
☐ EN 62301:2005	Ver. 110101

☒CE marking

(EC conformity marking)

Position : **CEO**

Name : **Jerry Shen**

Declaration Date: May. 25, 2011

Year to begin affixing CE marking:2011

Signature : _____