

P8H77-M

ASUS[®]

Motherboard

E7974

Third Edition (V3)
December 2012

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Safety information

Electrical safety

- To prevent electric shock hazard, disconnect the power cable from the electric 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 that 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: BIOS information**
This chapter tells how to change system settings through the BIOS Setup menus. Detailed descriptions of the BIOS parameters are also provided.

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.

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.

Typography

Bold text

Indicates a menu or an item to select.

Italics

Used to emphasize a word or a phrase.

<Key>

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

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

<Key1>+<Key2>+<Key3>

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

Example: <Ctrl>+<Alt>+<D>

P8H77-M specifications summary

CPU	<p>LGA1155 socket for Intel® Second/Third Generation Core™ i7 / Core™ i5 / Core™ i3, Pentium®, and Celeron® processors Supports 32nm and 22nm CPU Supports Intel® Turbo Boost Technology 2.0 * The Intel® Turbo Boost Technology 2.0 support depends on the CPU types. ** Refer to www.asus.com for Intel® CPU support list.</p>
Chipset	<p>Intel® H77 Express Chipset</p>
Memory	<p>Dual-channel memory architecture</p> <ul style="list-style-type: none"> - 4 x 240-pin DIMM sockets support unbuffered non-ECC DDR3 2200 (O.C.)*/2133 (O.C.)*/2000 (O.C.)*/1866 (O.C.)* /1600/1333/1066 MHz memory modules - Supports up to 32GB* system memory - Support Intel® Extreme Memory Profile (XMP) <p>* DDR3 1600 MHz and higher memory frequency is supported by Intel® third generation processors. ** Due to the CPU behavior, DDR3 2133/1866 MHz memory module will run at DDR3 2000/1800 MHz as default. *** The Max. 32GB memory capacity can be supported with DIMMs of 8GB (or above). ASUS will update QVL once the DIMMs are available on market. **** Refer to www.asus.com for the Memory QVL (Qualified Vendors Lists). ***** When you install a total memory of 4GB capacity 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.</p>
Expansion slots	<p>1 x PCI Express 3.0*/2.0 x16 slot [blue] (at x16 mode) 1 x PCI Express 2.0 x16 slot [black] (at x4 mode, compatible with PCIe x1, x2, and x4 devices) 1 x PCI Express 2.0 x1 slot 1 x PCI slot * Intel® Third Generation Core™ processors support PCIe 3.0.</p>
Graphics	<p>Integrated Graphics Processor - Intel® HD Graphics support Multi-VGA output support: HDMI, DVI, RGB port</p> <ul style="list-style-type: none"> - Supports HDMI with max.resolution 1920 x 1200 @60Hz - Supports DVI with max.resolution 1920 x 1200 @60Hz - Supports RGB with max.resolution 2048 x 1536 @75Hz <p>Supports Intel® Tru 3D/Quick Sync Video/Clear Video HD Technology/Insider™ Maximum shared memory of 1696 MB</p>
Multi-GPU support	<p>Supports AMD® Quad-CPU CrossFireX™ Technology Supports LucidLogix® Virtu MVP Technology* * LucidLogix® Virtu MVP supports Windows® 7.</p>

(continued on the next page)

P8H77-M specifications summary

Storage	<p>Intel® H77 Express Chipset:</p> <ul style="list-style-type: none"> - 2 x Serial ATA 6Gb/s connectors (gray) with RAID 0, 1, 5, 10 support - 4 x Serial ATA 3Gb/s connectors (blue) with RAID 0, 1, 5, 10 support - Supports Intel® Smart Response Technology, Intel® Rapid Start Technology, Intel® Smart Connect Technology* <p>* Supports Intel® Core processors under Windows® 7 operating system.</p>
LAN	Realtek® 8111F Gigabit LAN controller
Audio	<p>Realtek® ALC887 8-channel* High-Definition Audio CODEC</p> <ul style="list-style-type: none"> - Supports Jack-Detection, Multi-streaming, and Front Panel Jack-Retasking - Optical S/PDIF out ports at back I/O <p>* Use a chassis with HD audio module in the front panel to support an 8-channel audio output.</p>
USB	<p>Intel® H77 Express Chipset:</p> <ul style="list-style-type: none"> - Supports ASUS USB 3.0 Boost UASP Mode* - 2 x USB 3.0/2.0 ports at mid-board for front panel support - 2 x USB 3.0/2.0 ports at back panel (blue) - 10 x USB 2.0/1.1 ports (6 ports at mid-board, 4 ports at back panel) <p>* The USB 3.0 ports only support Windows® 7 or later versions. UASP standard only supports Windows® 8.</p>
ASUS Exclusive overlocking features	<p>Precision Tweaker 2:</p> <ul style="list-style-type: none"> - vCore: Adjustable CPU voltage at 0.005V increment - vCCSA: 191-step system agent voltage control - vDRAM Bus: 191-step memory voltage control - vPCH: 191-step chipset voltage control - iGPU: 127-step iGPU voltage control - vCPU_PLL: 1-step CPU & PCH PLL voltage control
Rear panel ports	<p>1 x PS/2 Keyboard/Mouse port 1 x Optical S/PDIF out port 1 x HDMI port 1 x DVI port 1 x RGB port 1 x LAN (RJ-45) port 2 x USB 3.0/2.0 ports 4 x USB 2.0/1.1 ports 3 x 8-channel Audio jacks</p>

(continued on the next page)

P8H77-M specifications summary

ASUS Special features	ASUS DIGI+VRM <ul style="list-style-type: none">- Digital Power Control: Digital Power Design for the CPU and iGPU- ASUS 4+1+1 Power Phase Design ASUS Protect 3.0 Technology <ul style="list-style-type: none">- ASUS EPU- Anti-Surge Protection- Low EMI Solution- 100% Solid Capacitors ASUS Exclusive Features <ul style="list-style-type: none">- Network iControl featuring instant network bandwidth for top network program in use.- USB 3.0 Boost featuring the latest USB 3.0 UASP standard- Disk Unlocker featuring 3TB+HDD support- GPU Boost- TurboV- AI Suite II- ASUS ESD- MemOK! ASUS Quiet Thermal Solution <ul style="list-style-type: none">- ASUS Fanless Design: Stylish Heatsink solution- ASUS Fan Xpert ASUS EZ DIY <ul style="list-style-type: none">- ASUS UEFI BIOS EZ Mode featuring user-friendly interface- ASUS CrashFree BIOS 3- ASUS EZ Flash 2- ASUS MyLogo 2
Internal connectors	1 x USB 3.0/2.0 connector supports additional 2 USB ports 3 x USB 2.0/1.1 connectors support additional 6 USB ports 2 x SATA 6.0 Gb/s connectors (gray) 4 x SATA 3.0 Gb/s connectors (blue) 1 x 4-pin CPU fan connector 1 x 3-pin Chassis fan connector 1 x Front panel audio connector 1 x S/PDIF Out connector 1 x 24-pin EATX Power connector 1 x 8-pin EATX 12V Power connector 1 x System panel connector 1 x MemOK! button 1 x Clear CMOS jumper 1 x COM connector 1 X LPT connector 1 x TPM connector

(continued on the next page)

P8H77-M specifications summary

BIOS features	64 Mb Flash ROM, UEFI BIOS, PnP, DMI v2.0, WfM2.0, SMBIOS v2.6, ACPI v2.0, Multi-language BIOS, ASUS EZ Flash 2, ASUS CrashFree BIOS 3, F12 PrintScreen, F3 Shortcut Function, and ASUS DRAM SPD (Serial Presence Detect) memory information
Manageability	WfM 2.0, DMI 2.0, WOL by PME, PXE
Accessories	2 x Serial ATA 6.0 Gb/s cables 1 x I/O shield 1 x User Manual 1 x Support DVD
Support DVD	Drivers ASUS Update ASUS Utilities Anti-virus software (OEM version)
Form factor	uATX form factor: 9.6 in x 9.6 in (24.5 cm x 24.5 cm)

* Specifications are subject to change without notice.

Chapter 1

Product introduction

1.1 Welcome!

Thank you for buying an ASUS® P8H77-M motherboard!

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

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

1.2 Package contents

Check your motherboard package for the following items.

Motherboard	ASUS P8H77-M motherboard
Cables	2 x Serial ATA 6.0Gb/s cables
Accessories	1 x I/O shield
Application DVD	ASUS motherboard support DVD
Documentation	User Manual



If any of the above items is damaged or missing, contact your retailer.

1.3 Special features

1.3.1 Product highlights

LGA1155 socket for Intel® 3rd/2nd Generation Core™ i7 / Core™ i5 / Core™ i3 / Pentium® / Celeron® Processors

This motherboard supports Intel® 3rd/2nd generation Core™ i7 / i5 / i3 / Pentium® / Celeron® processors in the LGA1155 package, with iGPU, memory and PCI Express controllers integrated to support onboard graphics output with dedicated chipsets, 2-channel (4 DIMMs) DDR3 memory and 16 PCI Express 3.0/2.0 lanes. This provides great graphics performance. Intel® 3rd / 2nd generation Core™ i7 / i5 / i3 / Pentium® / Celeron® processors are among the most powerful and energy efficient CPUs in the world.

Intel® H77 Express Chipset

The Intel® H77 Express Chipset is a single-chipset designed to support the 1155 socket Intel® 3rd / 2nd generation Core™ i7 / i5 / i3 / Pentium® / Celeron® processors. It provides improved performance by utilizing serial point-to-point links, allowing increased bandwidth and stability. Additionally, H77 chipset provides 4 USB 3.0 ports for 10 times faster data retrieval speed. Moreover, Intel® H77 Express Chipset can also enable iGPU function, letting users enjoy the latest Intel® integrated graphic performance.

Dual-Channel DDR3 2200(O.C.)* /2133(O.C.)* /2000(O.C.)* /1866(O.C.)* / 1600 / 1333 / 1066 MHz Support

The motherboard supports DDR3 memory that features data transfer rates of DDR3 2200(O.C.)* /2133(O.C.)* /2000(O.C.)* /1866(O.C.)* / 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.

* Due to the CPU behavior, DDR3 2133/1866MHz memory module will run at DDR3 2000/1800MHz frequency as default.

** DDR3 1600MHz and higher memory frequency is supported by Intel® 3rd generation processors.

PCI Express® 3.0

PCI Express® 3.0 (PCIe 3.0) is the latest PCI Express bus standard with improved encoding schemes that provide twice the performance of the current PCIe 2.0. The total bandwidth for a x16 link reaches a maximum of 32Gb/s, double the 16 Gb/s of PCIe 2.0 (in x16 mode). As such, PCIe 3.0 provides users an unprecedented data speeds, combined with the convenience and seamless transition offered by complete backward compatibility with PCIe 1.0 and PCIe 2.0 devices. PCIe 3.0 will become a must-have feature for users who wish to improve and optimize graphic performance, as well as have the latest technology available to them.

* PCI 3.0 speed is supported by Intel® 3rd generation Core™ processors.

S/PDIF out connector at the back I/O

This motherboard provides convenient connectivity to external home theater audio systems via the optical S/PDIF (SONY-PHILIPS Digital Interface) out connector at the back I/O. The

S/PDIF transfers digital audio without converting it to analog format and keeps the best signal quality.

Gigabit LAN solution

The onboard LAN controller is a highly integrated Gb LAN controller. It is enhanced with an ACPI management function to provide efficient power management for advanced operating systems.

8-channel high definition audio

The onboard 8-channel HD audio (High Definition Audio, previously codenamed Azalia) CODEC enables high-quality 192KHz/24-bit audio output and jack-detect feature that automatically detects and identifies what types of peripherals are plugged into the audio I/O jacks and notifies users of inappropriate connection, which means there will be no more confusion of Line-in, Line-out, and Mic jacks.

100% All High-quality Conductive Polymer Capacitors

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

Complete USB 3.0 Integration

ASUS facilitates the strategic USB 3.0 accessibility for both the front and rear panel – 4 USB 3.0 ports in total. Experience the latest plug & play connectivity at speeds up to 10 times faster than USB 2.0. P8H77-M affords greater convenience to high speed connectivity.

1.3.2 DIGI+ VRM Digital Power Design

All-new digital CPU power controls work perfectly together to match digital power signal (SVID) requests from the CPU, with ultra-fast sensing and response efficiently delivering precision power. Accurate delivery reduces waste, and provides more stable CPU Vcore voltages. Users can adjust CPU PWM voltages and frequencies for various overclocking scenarios, with accurate input through UEFI BIOS tuning or the exclusive ASUS interface. This proprietary design increases overclocking headroom to push performance to its full potential.

ASUS EPU

Energy Efficiency All Around

Tap into the world's first real-time PC power saving chip through a simple onboard switch or AI Suite II utility. Get total system-wide energy optimization by automatically detecting current PC loadings and intelligently moderating power consumption. This also reduces fan noise and extends component longevity.

1.3.3 ASUS Exclusive Features

USB 3.0 Boost

Faster USB 3.0 Transmission with UASP

New ASUS USB 3.0 Boost technology supports UASP (USB Attached SCSI Protocol), the latest USB 3.0 standard. With USB 3.0 Boost technology, a USB device's transmission speed is significantly increased up to 170%, adding to an already impressive fast USB 3.0 transfer speed. ASUS software automatically accelerates data speeds for compatible USB 3.0 peripherals without the need for any user interaction.

Network iControl

Real-time Network Bandwidth Control

With a single-click on/off button, the application currently in use has its data and network bandwidth prioritized over other programs. Moreover, you can prioritize your favorite software easily by configuring profiles through the intuitive user interface. Within the profile, programs can be pre-scheduled to run in a specific time period to avoid network congestion and long-waits on downloads. Auto PPPoE network connection provides a one-step setup for enhanced online convenience. Overall, it's an intuitive network bandwidth control center.

GPU Boost

Go to the Limit with iGPU Level Up!

GPU Boost accelerates the integrated GPU for extreme graphics performance. The user-friendly interface facilitates flexible frequency adjustments. It easily delivers stable system-level upgrades for every use.

MemOK!

Any Memory is A-OK!

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

AI Suite II

One-stop Access to Innovative ASUS Features

With its user-friendly interface, ASUS AI Suite II consolidates all the exclusive ASUS features into one simple to use software package. It allows you to supervise overclocking, energy management, fan speed control, and voltage and sensor readings. This all-in-one software offers diverse and ease to use functions, with no need to switch back and forth between different utilities.

ASUS TurboV

Easy, Real-Time O.C. Tunings

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

1.3.4 ASUS Quiet Thermal Solution

Fanless Design: stylish heatsink solution

The Wing Heatsink features a 0-dB thermal solution that offers users a noiseless PC environment. The beautifully curved fins not only upgrade the visual enjoyment for motherboard users, but also effectively cools down hot airflows generated by the PCH chipset. Combined with usability and aesthetics, the ASUS Wing Heatsink will give users an extremely silent and cooling experience with the elegant appearance!.

ASUS 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.

1.3.5 ASUS EZ DIY

ASUS UEFI BIOS (EZ Mode)

Flexible and Easy BIOS Interface

ASUS UEFI BIOS offers the first mouse-controlled graphical BIOS designed with selectable modes, providing a user-friendly interface that goes beyond the traditional keyboard-only controls. It also fully-utilizes 2.2TB and larger hard drives in 64-bit operating systems with native support.

ASUS exclusive interface

EZ Mode displays frequently-accessed info. Users can choose system performance settings, and drag and drop boot priorities. Advanced Mode for performance enthusiasts includes detailed DRAM settings via a dedicated memory info page for complete insight.

New upgrade! Quick and easy information for enhanced system control

- F12 BIOS snapshot hotkey for sharing UEFI information and troubleshooting
- New F3 Shortcut for most accessed information
- ASUS DRAM SPD (Serial Presence Detect) information for accessing memory information, detecting faulty DIMMs, and helping with difficult POST situations.

ASUS EZ-Flash 2

Simply update BIOS from a USB flash disk before entering the OS

EZ Flash 2 is a user-friendly BIOS update utility. Simply launch this tool and update BIOS from a USB flash disk before entering the OS. You can update your BIOS only in a few clicks without preparing an additional floppy diskette or using an OS-based flash utility.

1.3.6 Other special features

LucidLogix® Virtu MVP™

LucidLogix® Virtu MVP featuring HyperFormance™ Technology boosts your discrete graphics card up to 60% beyond its original performance. Designed for Intel® processor graphics and Windows® 7 PCs, it perfectly combines the performance of discrete graphics cards with fast computing iGPU. Also with the newly designed Virtual Sync, users can enjoy a smoother gaming experience by eliminating tearing artifacts. LucidLogix® Virtu MVP could also dynamically assign tasks to the best available graphics resource, based on power, performance and system load. This allows users to fully utilize 3x faster video conversion with Intel® Quick Sync Video 2.0 technology while retaining high-end 3D rendering and gaming performance, provided by both NVIDIA® and AMD graphic cards. When the discrete graphics card is not required, power consumption goes automatically down to near zero, making the system more environmentally-friendly. For users searching for perfection, LucidLogix Virtu MVP provides great graphical performance and the best flexibility and efficiency.

*LucidLogix® Virtu Universal MVP™ supports Windows® 7 operating system.

**Intel® Quick Sync Video feature is supported by 3rd/2nd generation Intel® Core™ processor family.

HDMI Support

Enjoy Full HD 1080p Multimedia Home-Theater Entertainment

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

ErP Ready

The motherboard is European Union's Energy-related Products (ErP) ready, and ErP requires products to meet certain energy efficiency requirement 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.

1.4 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.
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1.5 Motherboard overview

Before you install the motherboard, study the configuration of your chassis to ensure that the motherboard fits into it.



Ensure that you unplug the power cord before installing or removing the motherboard. Failure to do so can cause you physical injury and damage motherboard components.

1.5.1 Placement direction

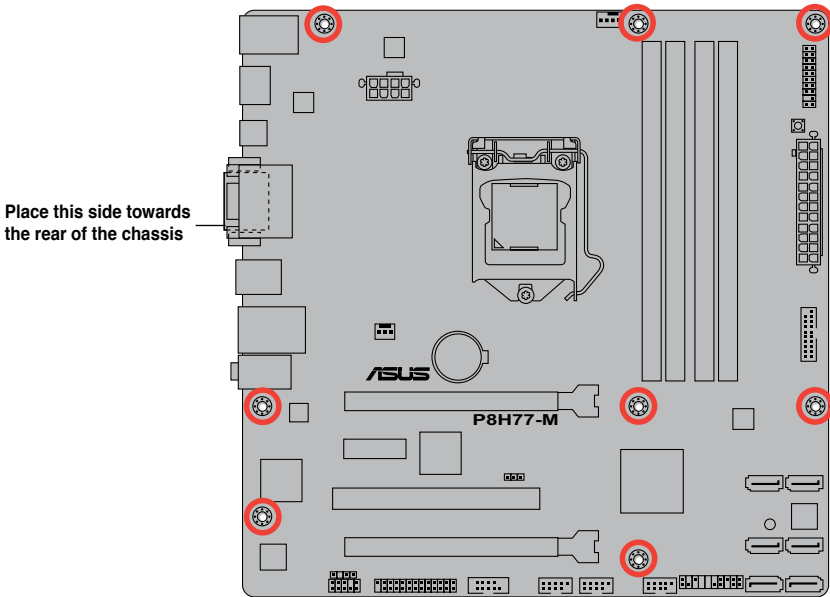
When installing the motherboard, ensure that you place it into the chassis in the correct orientation. The edge with external ports goes to the rear part of the chassis as indicated in the image below.

1.5.2 Screw holes

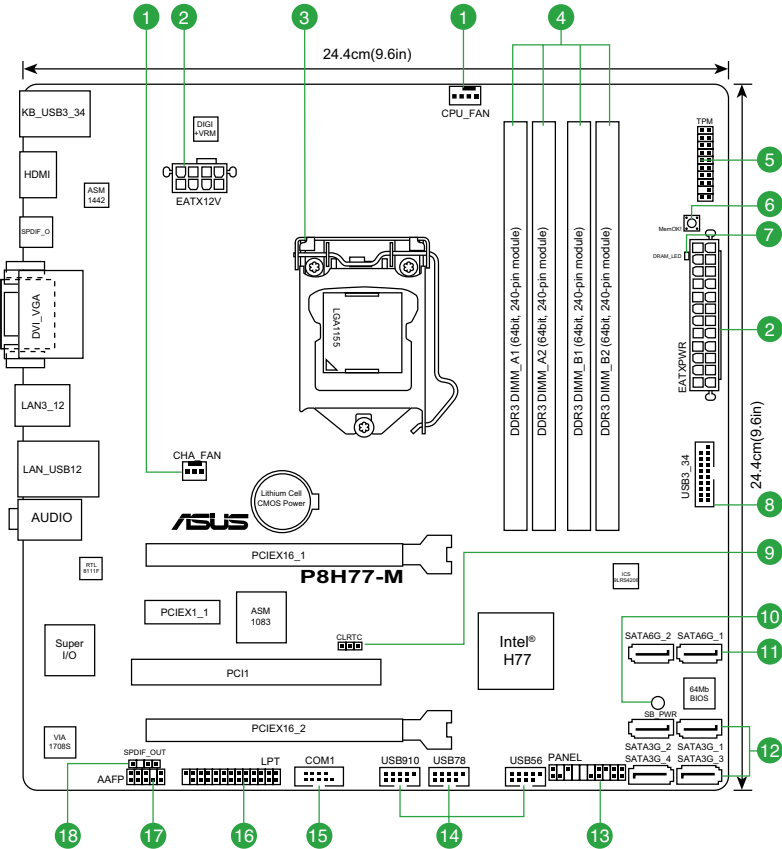
Place eight screws into the holes indicated by circles to secure the motherboard to the chassis.



Do not overtighten the screws! Doing so can damage the motherboard.



1.5.3 Motherboard layout



1.5.4 Layout contents

Connectors/Jumpers/Slots/LED	Page	Connectors/Jumpers/Slots/LED	Page
1. CPU and Chassis fan connectors (4-pin CPU_FAN, 3-pin CHA_FAN)	1-34	10. Standby Power LED (SB_PWR)	1-39
2. ATX power connectors (24-pin EATXPWR, 8-pin EATX12V)	1-35	11. Intel® H77 Serial ATA 6.0GB/s connectors (7-pin SATA6G_1~2 [gray])	1-30
3. Intel® CPU socket	1-10	12. Intel® H77 Serial ATA 3.0GB/s connectors (7-pin SATA3G_1~2 [blue])	1-31
4. DDR3 DIMM sockets	1-15	13. System panel connector (20-8 pin PANEL)	1-36
5. TPM connector (20-1 pin TPM)	1-37	14. USB 2.0 connectors (10-1 pin USB56, USB78, USB910)	1-32
6. MemOK! switch	1-38	15. Serial port connectors (10-1 pin COM1)	1-33
7. DRAM LED	1-39	16. LPT connector (26-1 pin LPT)	1-37
8. USB 3.0 connector (20-1 pin USB3_34)	1-32	17. Front panel audio connector (10-1 pin AAFFP)	1-29
9. Clear RTC RAM (3-pin CLRTC)	1-27	18. Digital audio connector (4-1 pin SPDIF_OUT)	1-33

1.6 Central Processing Unit (CPU)

The motherboard comes with a surface mount LGA1155 socket designed for the Intel® Second/Third Generation Core™ i7 / Core™ i5 / Core™ i3/ Pentium®/ Celeron® processors.



Unplug all power cables before installing the CPU.

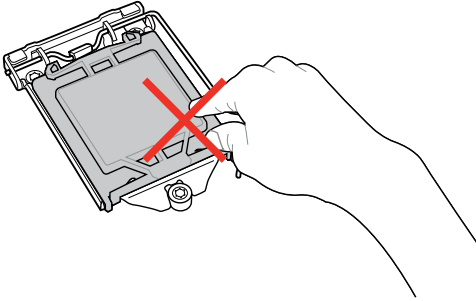


- Upon purchase of the motherboard, ensure that the PnP cap is on the socket and the socket contacts are not bent. Contact your retailer immediately if the PnP cap is missing, or if you see any damage to the PnP cap/socket contacts/motherboard components. ASUS will shoulder the cost of repair only if the damage is shipment/transit-related.
 - Keep the cap after installing the motherboard. ASUS will process Return Merchandise Authorization (RMA) requests only if the motherboard comes with the cap on the LGA1155 socket.
 - The product warranty does not cover damage to the socket contacts resulting from incorrect CPU installation/removal, or misplacement/loss/incorrect removal of the PnP cap.
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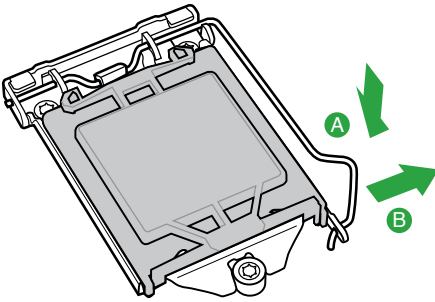
1.6.1 CPU installation



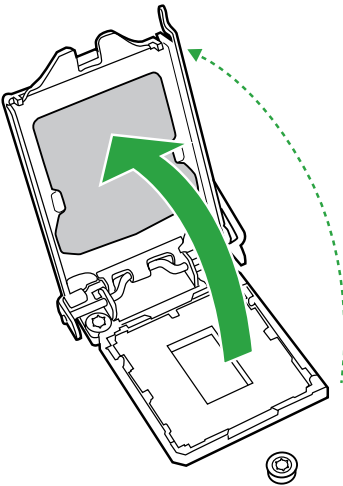
The LGA1156 CPU is incompatible with the LGA1155 socket. DO NOT install a LGA1156 CPU on the LGA1155 socket.

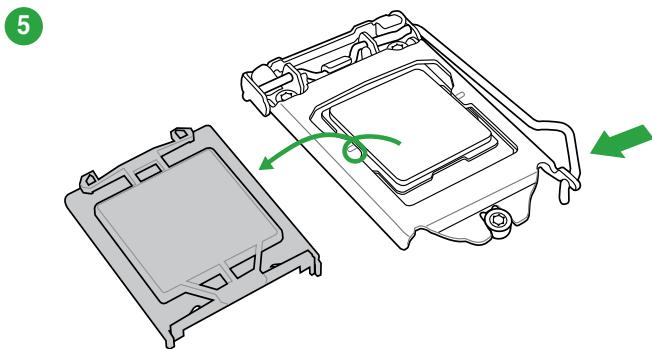
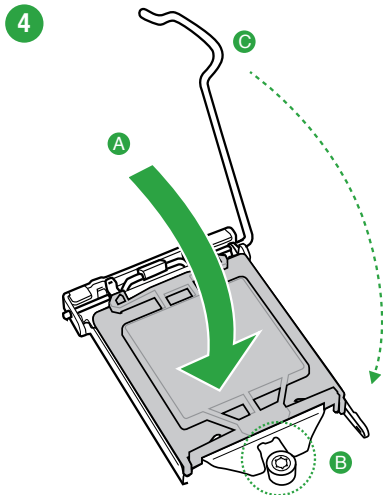
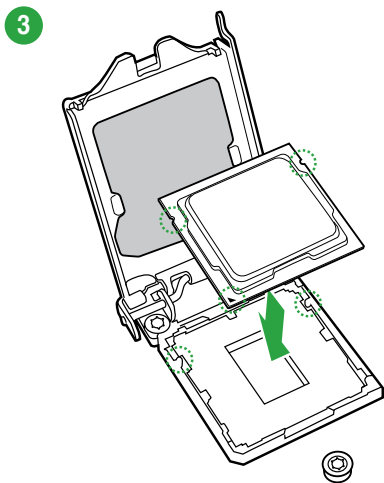


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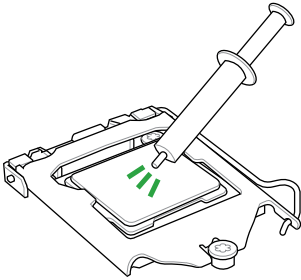


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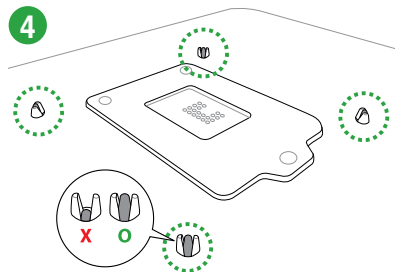
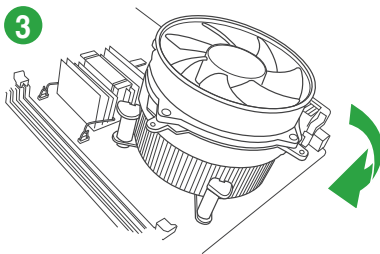
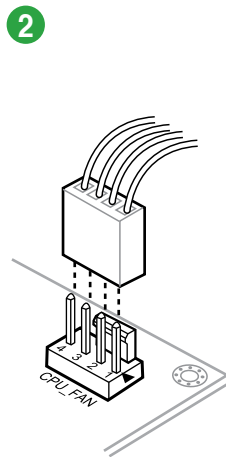
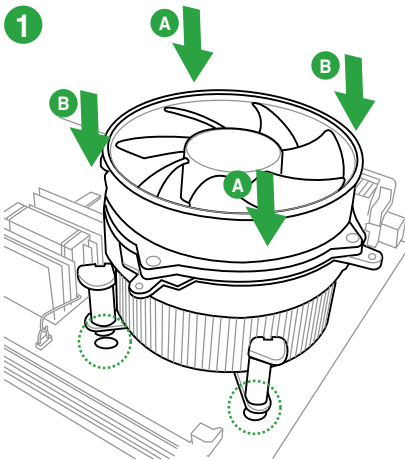


1.6.2 CPU heatsink and fan assembly installation

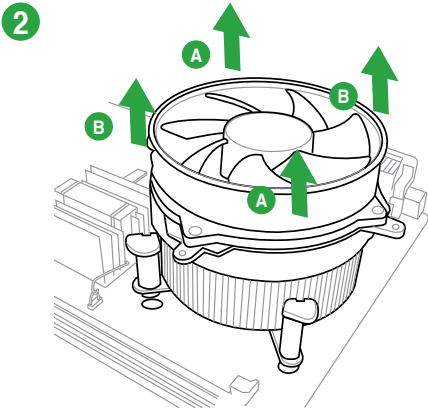
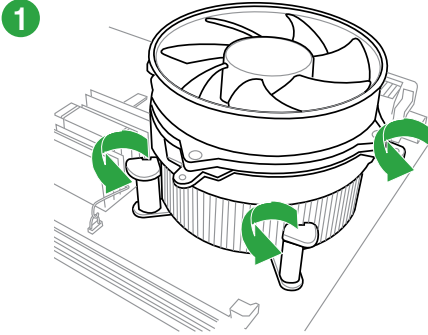


Apply the Thermal Interface Material to the CPU heatsink and CPU before you install the heatsink and fan if necessary.

To install the CPU heatsink and fan assembly



To uninstall the CPU heatsink and fan assembly



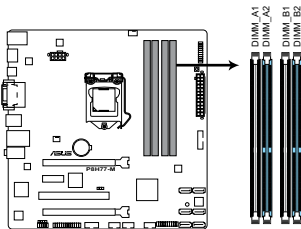
1.7 System memory

1.7.1 Overview

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

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

The figure illustrates the location of the DDR3 DIMM sockets:



Channel	Sockets
Channel A	DIMM_A1 and DIMM_A2
Channel B	DIMM_B1 and DIMM_B2

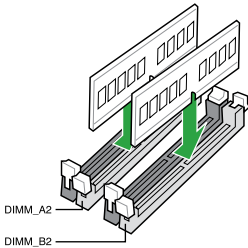
P8H77-M 240-pin DDR3 DIMM sockets

Recommended memory configurations

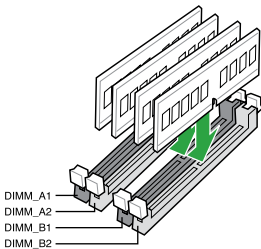
One DIMM:

We recommend you install one memory module in either of the blue slots (DIMM_A2 or DIMM_B2) to get better performance.

Two DIMMs (dual-channel operation):



Four DIMMs (dual-channel operation):



1.7.2 Memory configurations

You may install 1GB, 2GB, 4GB, and 8GB unbuffered non-ECC DDR3 DIMMs into the DIMM sockets.



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- 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.
 - According to Intel CPU specification, DIMM voltage below 1.65V is recommended to protect the CPU.
 - Always install DIMMs with the same CAS latency. For optimum compatibility, we recommend that you obtain memory modules from the same vendor.
 - Due to the memory address limitation on 32-bit Windows® OS, when you install 4GB or more memory on the motherboard, the actual usable memory for the OS can be about 3GB or less. For effective use of memory, we recommend that you do any of the following:
 - Use a maximum of 3GB system memory if you are using a 32-bit Windows® OS.
 - Install a 64-bit Windows® OS when you want to install 4GB or more on the motherboard.
 - This motherboard does not support DIMMs made up of 512Mb (64MB) chips or less.
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- 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 **2.4 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.
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- ASUS exclusively provides hyper DIMM support function.
 - Hyper DIMM support is subject to the physical characteristics of individual CPUs.
 - Visit the ASUS website at www.asus.com for the latest QVL.
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P8H77-M Motherboard Qualified Vendors List (QVL)

DDR3-2400MHz capability

Vendors	Part No.	Size	SS/ DS	Chip Brand	Chip NO.	Timing	Voltage	DIMM socket support (Optional)		
								1 DIMM	2 DIMMs	4 DIMMs
CORSAIR	CMGTX8(XMP)	8GB (2GBx4)	SS	-	-	10-12-10-27	1.65V	*	*	*
G.SKILL	F3-19200CL11Q-16GBZH(XMP)	16GB (4x4GB)	DS	-	-	11-11-11-31	1.65V	*	*	*
G.SKILL	F3-19200CL9D-4GBPIS(XMP)	4GB (2x2GB)	DS	-	-	9-11-9-28	1.65V	*	*	*
GEIL	GET34GB2400C9DC(XMP)	2GB	DS	-	-	9-11-9-27	1.65V	*	*	*
KINGMAX	FLLE88F-C8KKA HAIS(XMP)	2GB	SS	-	-	10-11-10-30	1.8V	*	*	*
Transcend	TX2400KLU-4GK(427652)(XMP)	4GB (2x2GB)	SS	-	-	-	1.65V	*	*	*
Transcend	TX2400KLU-4GK (381850)(XMP)	4GB (2x2GB)	SS	-	-	9	1.65V	*	*	*
Transcend	TX2400KLU-4GK(374243)(XMP)	4GB (2x2GB)	DS	-	-	9	1.65V	*	*	*
PATRIOT	PVV34G2400C9K(XMP)	4GB (2x2GB)	DS	-	-	9-11-9-27	1.65V	*	*	*

DDR3-2250MHz capability

Vendors	Part No.	Size	SS/ DS	Chip Brand	Chip NO.	Timing	Voltage	DIMM socket support (Optional)		
								1 DIMM	2 DIMMs	4 DIMMs
KINGMAX	KHX2250C9D3T1K2/4GX(XMP)	4GB (2x2GB)	DS	-	-	-	1.65V	*	*	*

DDR3-2200MHz capability

Vendors	Part No.	Size	SS/ DS	Chip Brand	Chip NO.	Timing	Voltage	DIMM socket support (Optional)		
								1 DIMM	2 DIMMs	4 DIMMs
G.SKILL	F3-17600CL8D-4GBPS(XMP)	4GB (2X2GB)	DS	-	-	8-8-8-24	1.65V	*	*	*
GEIL	GET34GB2200C9DC(XMP)	2GB	DS	-	-	9-10-9-28	1.65V	*	*	*
GEIL	GET38GB2200C9ADC(XMP)	4GB	DS	-	-	9-11-9-28	1.65V	*	*	*
KINGMAX	FLKE85F-B8KJAA-FEIS(XMP)	2GB	DS	-	-	-	-	*	*	*
KINGMAX	FLKE85F-B8KHA EEIH(XMP)	4GB (2X2GB)	DS	-	-	-	1.5V-1.7V	*	*	*
KINGMAX	FLKE85F-B8KJA FEIH(XMP)	4GB (2x2GB)	DS	-	-	-	1.5V-1.7V	*	*	*

DDR3-2133MHz capability

Vendors	Part No.	Size	SS/ DS	Chip Brand	Chip NO.	Timing	Voltage	DIMM socket support (Optional)		
								1 DIMM	2 DIMMs	4 DIMMs
A-DATA	AX3U2133GC2G9B-DG2(XMP)	2GB	SS	-	-	9-11-9-27	1.55-1.75V	*	*	*
CORSAIR	CMT16GX3M4X2133C9(XMP 1.3)	16GB (4x4GB)	DS	-	-	9-11-10-27	1.50V	*	*	*
CORSAIR	CMT4GX3M2A2133C9(XMP)	4GB (2x2GB)	DS	-	-	9-10-9-24	1.65V	*	*	*
CORSAIR	CMT4GX3M2B2133C9(XMP)	4GB (2GBx2)	DS	-	-	9-10-9-27	1.5V	*	*	*
G.SKILL	F3-17000CL9Q-16GBZH(XMP)	16GB (4GBx4)	DS	-	-	9-11-10-28	1.65V	*	*	*
GEIL	GE34GB2133C9DC(XMP)	2GB	DS	-	-	9-9-9-28	1.65V	*	*	*
GEIL	GU34GB2133C9DC(XMP)	4GB (2x2GB)	DS	-	-	9-9-9-28	1.65V	*	*	*
KINGSTON	KHX2133C9AD3T1K2/4GX(XMP)	4GB (2x2GB)	DS	-	-	-	1.65V	*	*	*
KINGSTON	KHX2133C9AD3X2K2/4GX(XMP)	4GB (2x2GB)	DS	-	-	9-11-9-27	1.65V	*	*	*
KINGSTON	KHX2133C9AD3T1K4/8GX(XMP)	8GB (4x2GB)	DS	-	-	9-11-9-27	1.65V	*	*	*
KINGSTON	KHX2133C9AD3T1FK4/8GX(XMP)	8GB (4x2GB)	DS	-	-	-	1.65V	*	*	*

DDR3-2000MHz capability

Vendors	Part No.	Size	SS/DS	Chip Brand	Chip NO.	Timing	Voltage	DIMM socket support (Optional)		
								1 DIMM	2 DIMMs	4 DIMMs
Apacer	78_AAGD5.9KD(XMP)	6GB (3x2GB)	DS	-	-	9-9-9-27	1.65V	*	*	*
CORSAIR	CMZ4GX3M2A2000C10(XMP)	4GB (2x2GB)	SS	-	-	10-10-10-27	1.50V	*	*	*
CORSAIR	CMT6GX3M3A2000C8(XMP)	6GB (3x2GB)	DS	-	-	8-9-8-24	1.65V	*	*	*
G.SKILL	F3-16000CL9D-4GBFLS(XMP)	4GB (2GBx2)	DS	-	-	9-9-9-24	1.65V	*	*	*
G.SKILL	F3-16000CL9D-4GBTD(XMP)	4GB (2GBx2)	DS	-	-	9-9-9-27	1.65V	*	*	*
G.SKILL	F3-16000CL6T-6GBPIS(XMP)	6GB (2x4GB)	DS	-	-	6-9-6-24	1.65V	*	*	*
GEIL	GUP34GB2000C9DC(XMP)	4GB (2x2GB)	DS	-	-	9-9-9-28	1.65V	*	*	*
KINGSTON	KHX2000C9AD3T1K2/4GX(XMP)	4GB (2x2GB)	DS	-	-	-	1.65V	*	*	*
KINGSTON	KHX2000C9AD3W1K2/4GX(XMP)	4GB (2x2GB)	DS	-	-	-	1.65V	*	*	*
KINGSTON	KHX2000C9AD3T1K2/4GX(XMP)	4GB (2x2GB)	DS	-	-	9	1.65V	*	*	*
KINGSTON	KHX2000C9AD3W1K3/6GX(XMP)	6GB (3x2GB)	DS	-	-	-	1.65V	*	*	*
KINGSTON	KHX2000C9AD3T1K3/6GX(XMP)	6GB (3x2GB)	DS	-	-	-	1.65V	*	*	*
Transcend	TX2000KLN-8GK(XMP)	8GB (2x4GB)	DS	-	-	-	1.6V	*	*	*
Asint	SLA302G08-ML2HB(XMP)	4GB	DS	HYNIX	H5TQ2G83BFR H9C	-	-	*	*	*
PATRIOT	PVT36G2000LLK	6GB (3x2GB)	DS	-	-	8-8-8-24	1.65V	*	*	*

DDR3-1866MHz capability

Vendors	Part No.	Size	SS/DS	Chip Brand	Chip NO.	Timing	Voltage	DIMM socket support (Optional)		
								1 DIMM	2 DIMMs	4 DIMMs
A-DATA	AX3U1866PB2G8-DP2(XMP)	2GB	DS	-	-	8-8-8-24	1.55V-1.75V	*	*	*
CORSAIR	CMT4GX3M2A1866C9(XMP)	4GB (2x2GB)	DS	-	-	9-9-9-24	1.65V	*	*	*
CORSAIR	CMT6GX3MA1866C9(XMP)	6GB (3x2GB)	DS	-	-	9-9-9-24	1.65V	*	*	*
CORSAIR	CMZ8GX3M2A1866C9(XMP)	8GB (2x4GB)	DS	-	-	9-10-9-27	1.50V	*	*	*
G.SKILL	F3-14900CL9Q-16GBZL(XMP)	16GB (4GBx4)	DS	-	-	9-10-9-28	1.5V	*	*	*
G.SKILL	F3-14900CL10Q2-64GBZLD(XMP)	64GB (8GBx8)	DS	-	-	10-11-10-30	1.5V	*	*	*
G.SKILL	F3-14900CL9D-8GBXL(XMP)	8GB (2x4GB)	DS	-	-	9-10-9-28	1.6V	*	*	*
G.SKILL	F3-14900CL9Q-8GBXL(XMP)	8GB (2GBx4)	DS	-	-	9-9-9-24	1.65V	*	*	*
KINGSTON	KHX1866C9D3T1K3/3GX(XMP)	3GB (3x1GB)	SS	-	-	-	1.65V	*	*	*
KINGSTON	KHX1866C9D3K4/16GX(XMP)	16GB (4GBx4)	DS	-	-	-	1.65V	*	*	*
KINGSTON	KHX1866C9D3T1K3/6GX(XMP)	6GB (3x2GB)	DS	-	-	-	1.65V	*	*	*
KINGSTON	KHX1866C11D3P1K2/8G	8GB (4GBx2)	DS	-	-	-	1.5V	*	*	*

DDR3-1600MHz capability

Vendors	Part No.	Size	SS/ DS	Chip Brand	Chip NO.	Timing	Voltage	DIMM socket support (Optional)			
								1 DIMM	2 DIMMs	4 DIMMs	
A-DATA	AM2U16BC2P1	2GB	SS	A-DATA	3CCD-1509A EL1126T	-	-	*	*	*	*
A-DATA	AD31600E001GM(O)U9K	3GB(3 x 1GB)	SS	-	-	8-8-8-24	1.65V-1.85V	*	*	*	*
A-DATA	AX3U1600XB2G79-2X(XMP)	4GB(2 x 2GB)	DS	-	-	7-9-7-21	1.55V-1.75V	*	*	*	*
A-DATA	AM2U16BC4P2	4GB	DS	A-DATA	3CCD-1509A EL1126T	-	-	*	*	*	*
A-DATA	AX3U1600GC4G9-2G(XMP)	8GB(2 x 4GB)	DS	-	-	9-9-9-24	1.55V-1.75V	*	*	*	*
A-DATA	AX3U1600XC4G79-2X(XMP)	8GB(2 x 4GB)	DS	-	-	7-9-7-21	1.55V-1.75V	*	*	*	*
CORSAIR	TR3X3G1600C8D(XMP)	3GB(3 x 1GB)	SS	-	-	8-8-8-24	1.65V	*	*	*	*
CORSAIR	CMD12GX3M6A1600C8(XMP)	12GB(6 x 2GB)	DS	-	-	8-8-8-24	1.65V	*	*	*	*
CORSAIR	CMP4GX3M2A1600C8(XMP)	4GB(2 x 2GB)	DS	-	-	8-8-8-24	1.65V	*	*	*	*
CORSAIR	CMP4GX3M2A1600C9(XMP)	4GB(2 x 2GB)	DS	-	-	9-9-9-24	1.65V	*	*	*	*
CORSAIR	CMP4GX3M2C1600C7(XMP)	4GB(2 x 2GB)	DS	-	-	7-8-7-20	1.65V	*	*	*	*
CORSAIR	CMX4GX3M2A1600C9(XMP)	4GB(2 x 2GB)	DS	-	-	9-9-9-24	1.65V	*	*	*	*
CORSAIR	CMX4GX3M2A1600C9(XMP)	4GB(2 x 2GB)	DS	-	-	9-9-9-24	1.65V	*	*	*	*
CORSAIR	TR3X6G1600C8 G(XMP)	6GB(3 x 2GB)	DS	-	-	8-8-8-24	1.65V	*	*	*	*
CORSAIR	TR3X6G1600C8D G(XMP)	6GB(3 x 2GB)	DS	-	-	8-8-8-24	1.65V	*	*	*	*
CORSAIR	TR3X6G1600C9 G(XMP)	6GB(3 x 2GB)	DS	-	-	9-9-9-24	1.65V	*	*	*	*
CORSAIR	CMP8GX3M2A1600C9(XMP)	8GB(2 x 4GB)	DS	-	-	9-9-9-24	1.65V	*	*	*	*
CORSAIR	CMZ8GX3M2A1600C7R(XMP)	8GB(2 x 4GB)	DS	-	-	7-8-7-20	1.50V	*	*	*	*
CORSAIR	CMX8GX3M4A1600C9(XMP)	8GB(4 x 2GB)	DS	-	-	9-9-9-24	1.65V	*	*	*	*
Crucial	BL25664BN1608.16FF(XMP)	6GB(3 x 2GB)	DS	-	-	-	-	*	*	*	*
G.SKILL	F3-12800CL9D-2GBNQ(XMP)	2GB(2 x 1GB)	SS	-	-	9-9-9-24	1.5V	*	*	*	*
G.SKILL	F3-12800CL7D-4GBRH(XMP)	4GB(2 x 2GB)	SS	-	-	7-7-7-24	1.6V	*	*	*	*
G.SKILL	F3-12800CL7D-4GBRM(XMP)	4GB(2 x 2GB)	DS	-	-	7-8-7-24	1.6V	*	*	*	*
G.SKILL	F3-12800CL8D-4GBRM(XMP)	4GB(2 x 2GB)	DS	-	-	8-8-8-24	1.60V	*	*	*	*
G.SKILL	F3-12800CL9D-4GBECO(XMP)	4GB(2 x 2GB)	DS	-	-	9-9-9-24	XMP 1.35V	*	*	*	*
G.SKILL	F3-12800CL9D-4GBRL(XMP)	4GB(2 x 2GB)	DS	-	-	9-9-9-24	1.5V	*	*	*	*
G.SKILL	F3-12800CL9T-6GBNQ(XMP)	6GB(3 x 2GB)	DS	-	-	9-9-9-24	1.5V-1.6V	*	*	*	*
G.SKILL	F3-12800CL7D-8GBRH(XMP)	8GB(2 x 4GB)	DS	-	-	7-8-7-24	1.6V	*	*	*	*
G.SKILL	F3-12800CL8D-8GBECO(XMP)	8GB(2 x 4GB)	DS	-	-	8-8-8-24	XMP 1.35V	*	*	*	*
G.SKILL	F3-12800CL9D-8GBRL(XMP)	8GB(2 x 4GB)	DS	-	-	9-9-9-24	1.5V	*	*	*	*
GEIL	GET316GB1600C9QC(XMP)	16GB(4 x 4GB)	DS	-	-	9-9-9-28	1.6V	*	*	*	*
GEIL	GV34GB1600C8DC(XMP)	2GB	DS	-	-	8-8-8-28	1.6V	*	*	*	*
KINGMAX	FLGD45F-B8MF7 MAEH(XMP)	1GB	SS	-	-	7	-	*	*	*	*
KINGMAX	FLGE85F-B8KJ9A FEIS(XMP)	2GB	DS	-	-	7	-	*	*	*	*
KINGMAX	FLGE85F-B8MF7 MEEH(XMP)	2GB	DS	-	-	7	-	*	*	*	*
KINGSTON	KHX1600C9D3P1K2/4G	4GB(2 x 2GB)	SS	-	-	-	1.5V	*	*	*	*
KINGSTON	KHX1600C9D3K3/12GX(XMP)	12GB(3 x 4GB)	DS	-	-	9-9-9-27	1.65V	*	*	*	*
KINGSTON	KHX1600C9D3T1BK3/ 12GX(XMP)	12GB(3 x 4GB)	DS	-	-	9-9-9-27	1.65V	*	*	*	*
KINGSTON	KHX1600C9D3K4/16GX(XMP)	16GB(4 x 4GB)	DS	-	-	-	1.65V	*	*	*	*
KINGSTON	KHX1600C9AD3/2G	2GB	DS	-	-	-	1.65V	*	*	*	*
KINGSTON	KVR1600D3N11/2G-ES	2GB	DS	KTC	D1288JPN PLD9U	11-11-11-28	1.35V-1.5V	*	*	*	*
KINGSTON	KHX1600C7D3K2/4GX(XMP)	4GB(2 x 2GB)	DS	-	-	-	1.65V	*	*	*	*
KINGSTON	KHX1600C8D3K2/4GX(XMP)	4GB(2 x 2GB)	DS	-	-	8	1.65V	*	*	*	*
KINGSTON	KHX1600C8D3T1K2/4GX(XMP)	4GB(2 x 2GB)	DS	-	-	8	1.65V	*	*	*	*
KINGSTON	KHX1600C9D3K2/4GX(XMP)	4GB(2 x 2GB)	DS	-	-	9	1.65V	*	*	*	*
KINGSTON	KHX1600C9D3LK2/4GX(XMP)	4GB(2 x 2GB)	DS	-	-	9	XMP 1.35V	*	*	*	*
KINGSTON	KHX1600C9D3X2K2/4GX(XMP)	4GB(2 x 2GB)	DS	-	-	9-9-9-27	1.65V	*	*	*	*
KINGSTON	KHX1600C9D3T1K3/6GX(XMP)	6GB(3x 2GB)	DS	-	-	-	1.65V	*	*	*	*
KINGSTON	KHX1600C9D3K3/6GX(XMP)	6GB(3 x 2GB)	DS	-	-	9	1.65V	*	*	*	*
KINGSTON	KHX1600C9D3T1BK3/ 6GX(XMP)	6GB(3 x 2GB)	DS	-	-	9-9-9-27	1.65V	*	*	*	*
KINGSTON	KHX1600C9D3K2/8GX(XMP)	8GB(2 x 4GB)	DS	-	-	9-9-9-27	1.65V	*	*	*	*

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DDR3-1600MHz capability

Vendors	Part No.	Size	SS/DS	Chip Brand	Chip NO.	Timing	Voltage	DIMM socket support (Optional)		
								1 DIMM	2 DIMMs	4 DIMMs
KINGSTON	KHX1600C9D3P1K2/8G	8GB(2 x 4GB)	DS	-	-	-	1.5V	*	*	*
Super Talent	WA160UX6G9	6GB(3 x 2GB)	DS	-	-	9	-	*	*	*
Transcend	JM1600KLN-8GK	8GB(2 x 4GB)	DS	Transcend	TK483PCW3	-	-	*	*	*
Asint	SLZ3128M8-EGJ1D(XMP)	2GB	DS	Asint	3128M8-GJ1D	9-9-9-24	1.6V	*	*	*
Asint	SLA302G08-EGG1C(XMP)	4GB	DS	Asint	302G08-GG1C	-	-	*	*	*
Asint	SLA302G08-EGJ1C(XMP)	4GB	DS	Asint	302G08-GJ1C	-	-	*	*	*
Elixir	M2P2G64C8B8HC9N-DG(XMP)	2GB	DS	-	-	-	-	*	*	*
Kingtiger	KTG2G1600PG3	2GB	DS	-	-	-	-	*	*	*
Mushkin	998659(XMP)	6GB(3 x 2GB)	DS	-	-	9-9-9-24	-	*	*	*
Mushkin	998659(XMP)	6GB(3 x 2GB)	DS	-	-	9-9-9-24	1.5~1.6V	*	*	*
PATRIOT	PGS34G1600LLKA	4GB(2 x 2GB)	DS	-	-	7-7-7-20	1.7V	*	*	*
SanMax	SMD-4G68HP-16KZ	4GB	DS	HYNIX	H5TQ2G83B FR PBC	-	-	*	*	*

DDR3-1333MHz capability

Vendors	Part No.	Size	SS/DS	Chip Brand	Chip NO.	Timing	Voltage	DIMM socket support (Optional)		
								1 DIMM	2 DIMMs	4 DIMMs
A-DATA	AD31333001GOU	1GB	SS	A-Data	AD30908C8D-151C E0906	-	-	*	*	*
A-DATA	AD3U1333C2G9	2GB	SS	A-DATA	3CCD-1509HNA1126L	-	-	*	*	*
A-DATA	AD6311B0823EV	2GB	SS	A-Data	3CCA-1509A	-	-	*	*	*
A-DATA	AM2U139C2P1	2GB	SS	ADATA	3CCD-1509A EL1127T	-	-	*	*	*
A-DATA	AX3U1333C2G9-BP	2GB	SS	-	-	-	-	*	*	*
A-DATA	AD31333G001GOU	3GB(3 x 1GB)	SS	-	-	8-8-8-24	1.65-1.85V	*	*	*
A-DATA	AXDU1333GC2G9-2G(XMP)	4GB(2 x 2GB)	SS	-	-	9-9-9-24	1.25V-1.35V (low voltage)	*	*	*
A-DATA	AD31333G002GMU	2GB	DS	-	-	8-8-8-24	1.65-1.85V	*	*	*
A-DATA	AD6311C1624EV	4GB	DS	A-Data	3CCA-1509A	-	-	*	*	*
A-DATA	AM2U139C4P2	4GB	DS	ADATA	3CCD-1509A EL1127T	-	-	*	*	*
A-DATA	SU3U1333W8G9-B	8GB	DS	ELPIDA	J4208BASE-DJ-F	-	-	*	*	*
Apacer	78.A1GC6.9L1	2GB	DS	Apacer	AM5D5808 EWSBG	-	-	*	*	*
Apacer	78.A1GC6.9L1	2GB	DS	Apacer	AM5D5808F EQSBG	9	-	*	*	*
Apacer	AU02GFA33C9NBGC	2GB	DS	Apacer	AM5D5808 APOSBG	-	-	*	*	*
Apacer	78.B1GDE.9L10C	4GB	DS	Apacer	AM5D5808 CEHSBG	-	-	*	*	*
CORSAIR	CM3X1024-1333C9	1GB	SS	-	-	9-9-9-24	1.60V	*	*	*
CORSAIR	TR3X3G1333C9 G	3GB(3 x 1GB)	SS	-	-	9-9-9-24	1.50V	*	*	*
CORSAIR	TR3X6G1333C9 G	6GB(3 x 2GB)	SS	-	-	9-9-9-24	1.50V	*	*	*
CORSAIR	CMD24GX3M6A1333C9(XMP)	24GB (6 x 4GB)	DS	-	-	9-9-9-24	1.60V	*	*	*
CORSAIR	TW3X4G1333C9D G	4GB(2 x 2GB)	DS	-	-	9-9-9-24	1.50V	*	*	*
CORSAIR	CM3X4GA1333C9N2	4GB	DS	CORSAIR	256MBDCJGE LC0401136	9-9-9-24	-	*	*	*
CORSAIR	CMX4GX3M1A1333C9	4GB	DS	-	-	9-9-9-24	1.50V	*	*	*
CORSAIR	CMD8GX3M4A1333C7	8GB(4 x 2GB)	DS	-	-	7-7-7-20	1.60V	*	*	*
Crucial	CT12864BA1339.8FF	1GB	SS	Micron	9FF22D9KPT	9	-	*	*	*
Crucial	CT25664BA1339.16FF	2GB	DS	Micron	9KF27D9KPT	9	-	*	*	*
Crucial	BL25664BN1337.16FF(XMP)	6GB(3 x 2GB)	DS	-	-	7-7-7-24	1.65V	*	*	*

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DDR3-1333MHz capability

Vendors	Part No.	Size	SS/DS	Chip Brand	Chip NO.	Timing	Voltage	DIMM socket support (Optional)			
								1 DIMM	2 DIMMs	4 DIMMs	
ELPIDA	EBJ10UE8EDF0-DJ-F	1GB	SS	ELPIDA	J1108EDSE-DJ-F	-	1.35V (low voltage)	*	*	*	*
ELPIDA	EBJ21UE8EDF0-DJ-F	2GB	DS	ELPIDA	J1108EDSE-DJ-F	-	1.35V (low voltage)	*	*	*	*
G.SKILL	F3-10600CL8D-2GBHK (XMP)	1GB	SS	G.SKILL	-	-	-	*	*	*	*
G.SKILL	F3-10600CL9D-2GBNQ	2GB(2 x 1GB)	SS	-	-	9-9-9-24	1.5V	*	*	*	*
G.SKILL	F3-10666CL7T-3GBPK (XMP)	3GB(3 x 1GB)	SS	-	-	7-7-7-18	1.5-1.6V	*	*	*	*
G.SKILL	F3-10666CL8D-4GBECO(XMP)	4GB(2 x 2GB)	DS	-	-	8-8-8-24	XMP 1.35V	*	*	*	*
G.SKILL	F3-10666CL7T-6GBPK (XMP)	6GB(3 x 2GB)	DS	-	-	7-7-7-18	1.5-1.6V	*	*	*	*
G.SKILL	F3-10666CL7D-8GBRH (XMP)	8GB(2 x 4GB)	DS	-	-	7-7-7-21	1.5V	*	*	*	*
GEIL	GV32GB1333C9DC	2GB(2 x 1GB)	DS	-	-	9-9-9-24	1.5V	*	*	*	*
GEIL	GG34GB1333C9DC	4GB(2 x 2GB)	DS	GEIL	GL1L128M88BA12N	9-9-9-24	1.3V (low voltage)	*	*	*	*
GEIL	GV34GB1333C9DC	4GB(2 x 2GB)	DS	-	-	9-9-9-24	1.5V	*	*	*	*
GEIL	GVP34GB1333C7DC	4GB(2 x 2GB)	DS	-	-	7-7-7-24	1.5V	*	*	*	*
Hynix	HMT112U6TFR8A-H9	1GB	SS	Hynix	H5TC1G83TFRH9A	-	1.35V (low voltage)	*	*	*	*
Hynix	HMT325U6BFR8C-H9	2GB	SS	Hynix	H5TQ2G83BFRH9C	-	-	*	*	*	*
Hynix	HMT125U6TFR8A-H9	2GB	DS	Hynix	H5TC1G83TFRH9A	-	1.35V (low voltage)	*	*	*	*
Hynix	HMT351U6BFR8C-H9	4GB	DS	Hynix	H5TQ2G83BFRH9C	-	-	*	*	*	*
KINGMAX	FLFD45F-B8KL9 NAES	1GB	SS	KINGMAX	KKB8FNWBFGNX-27A	-	-	*	*	*	*
KINGMAX	FLFE85F-C8KF9 CAES	2GB	SS	KINGMAX	KFC8FMFXF-DXX-15A	-	-	*	*	*	*
KINGMAX	FLFE85F-C8KL9 NAES	2GB	SS	KINGMAX	KFC8FNLFX-DXX-15A	-	-	*	*	*	*
KINGMAX	FLFE85F-C8KM9 NAES	2GB	SS	KINGMAX	KFC8FNMFX-BXX-15A	-	-	*	*	*	*
KINGMAX	FLFE85F-B8KL9 NEES	2GB	DS	KINGMAX	KKB8FNWBFGNX-26A	-	-	*	*	*	*
KINGMAX	FLFF65F-C8KL9 NEES	4GB	DS	KINGMAX	KFC8FNLFX-DXX-15A	-	-	*	*	*	*
KINGMAX	FLFF65F-C8KM9 NEES	4GB	DS	KINGMAX	KFC8FNMFX-BXX-15A	-	-	*	*	*	*
KINGSTON	KVR1333D3N9/1G (low profile)	1GB	SS	ELPIDA	J1108BDBG-DJ-F	9	1.5V	*	*	*	*
KINGSTON	KVR1333D3N9/2G (low profile)	2GB	SS	Hynix	H5TQ2G83AFRH9C	9	-	*	*	*	*
KINGSTON	KVR1333D3S8N9/2G	2GB	SS	Micron	IID77 D9LGK	-	1.5V	*	*	*	*
KINGSTON	KVR1333D3S8N 9/2G-SF (low profile)	2GB	SS	ELPIDA	J2108BCSE-DJ-F	-	1.5V	*	*	*	*
KINGSTON	KVR1333D3N9/2G (low profile)	2GB	DS	ELPIDA	J1108BFBG-DJ-F	9	1.5V	*	*	*	*
KINGSTON	KVR1333D3N9/2G	2GB	DS	KTC	D1288JPNPLD9U	9	1.5V	*	*	*	*
KINGSTON	KVR1333D3N9/2G	2GB	DS	ELPIDA	J1108BDSE-DJ-F	9	1.5V	*	*	*	*
KINGSTON	KVR1333D3N9/2G-SP (low profile)	2GB	DS	KTC	D1288JEMFNGD9U	-	1.5V	*	*	*	*
KINGSTON	KVR1333D3N9/2G-SP (low profile)	2GB	DS	KINGSTON	D1288JPSFPGD9U	-	1.5V	*	*	*	*
KINGSTON	KHX1333C7D3K2/4GX (XMP)	4GB(2 x 2GB)	DS	-	-	7	1.65V	*	*	*	*
KINGSTON	KHX1333C9D3UK2/4GX (XMP)	4GB(2 x 2GB)	DS	-	-	9	XMP 1.25V	*	*	*	*
KINGSTON	KVR1333D3N9/4G (low profile)	4GB	DS	ELPIDA	J2108BCSE-DJ-F	9	1.5V	*	*	*	*
KINGSTON	KVR1333D3N9/4G (low profile)	4GB	DS	ELPIDA	J2108BCSE-DJ-F	-	1.5V	*	*	*	*
KINGSTON	KVR1333D3N9/4G	4GB	DS	KTC	D2568JENCNGD9U	-	1.5V	*	*	*	*
KINGSTON	KVR1333D3N9/4G	4GB	DS	Hynix	H5TQ2G83AFR	-	-	*	*	*	*

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DDR3-1333MHz capability

Vendors	Part No.	Size	SS/ DS	Chip Brand	Chip NO.	Timing	Voltage	DIMM socket support (Optional)			
								1 DIMM	2 DIMMs	4 DIMMs	
KINGSTON	KVR1333D3N9/4G-SP (low profile)	4GB	DS	KINGSTON	D2568JENCPCGD9U	-	1.5V	*	*	*	*
Micron	MT4JTF12864AZ-1G4D1	1GB	SS	Micron	QJD12D9LGG	-	-	*	*	*	*
Micron	MT8JTF12864AZ-1G4F1	1GB	SS	Micron	9FF22D9KPT	9	-	*	*	*	*
Micron	MT8JTF25684AZ-1G4D1	2GB	SS	Micron	QJD12D9LGG	-	-	*	*	*	*
Micron	MT8JTF25684AZ-1G4M1	2GB	SS	MICRON	IJM22 D9PFJ	-	-	*	*	*	*
Micron	MT16JTF25684AZ-1G4F1	2GB	DS	Micron	9KF27D9KPT	9	-	*	*	*	*
Micron	MT16JTF51264AZ-1G4D1	4GB	DS	Micron	OLD22D9LGG	-	-	*	*	*	*
NANYA	NT4GC64B8HG0NF-CG	4GB	DS	NANYA	NT5CB256M8GN-CG	-	-	*	*	*	*
PSC	AL7F8G73F-DJ2	1GB	SS	PSC	A3P1GF3FGF	-	-	*	*	*	*
PSC	AL8F8G73F-DJ2	2GB	DS	PSC	A3P1GF3FGF	-	-	*	*	*	*
SAMSUNG	M378B2873FHS-CH9	1GB	SS	SAMSUNG	K4B1G0846F	-	-	*	*	*	*
SAMSUNG	M378B5773DH0-CH9	2GB	SS	SAMSUNG	K4B2G0846D	-	-	*	*	*	*
SAMSUNG	M378B5673FH0-CH9	2GB	DS	SAMSUNG	K4B1G0846F	-	-	*	*	*	*
SAMSUNG	M378B5273CH0-CH9	4GB	DS	SAMSUNG	K4B2G0846C	-	-	*	*	*	*
SAMSUNG	M378B1G73AH0-CH9	8GB	DS	SAMSUNG	K4B4G0846A-HCH9	-	-	*	*	*	*
Super Talent	W1333UA1GH	1GB	SS	Hynix	H5TQ1G83TFR	9	-	*	*	*	*
Super Talent	W1333UX2G8(XMP)	2GB(2x 1GB)	SS	-	-	8	-	*	*	*	*
Super Talent	W1333UB2GS	2GB	DS	SAMSUNG	K4B1G0846F	9	-	*	*	*	*
Super Talent	W1333UB4GS	4GB	DS	SAMSUNG	K4B2G0846C	-	-	*	*	*	*
Super Talent	W1333UX6GM	6GB(3x 2GB)	DS	Micron	0BF27D9KPT	9-9-9-24	1.5V	*	*	*	*
Transcend	JM1333KLN-2G	2GB	SS	Micron	0YD77D9LGG	-	-	*	*	*	*
Transcend	JM1333KLN-2G	2GB	SS	Hynix	H5TQ2G83BZRH9C	-	-	*	*	*	*
Transcend	TS256MLK64V3U	2GB	DS	Micron	9GF27D9KPT	-	-	*	*	*	*
Century	PC3-10600 DDR3- 1333 9-9-9	1GB	SS	NANYA	NT5CB128M8DN- CF	-	-	*	*	*	*
Elixir	M2F2G64CB88B7N-CG	2GB	SS	Elixir	N2CB2G80BN-CG	-	-	*	*	*	*
Elixir	M2F2G64CB88D7N-CG	2GB	SS	Elixir	N2CB2G80DN-CG	-	-	*	*	*	*
Elixir	M2F2G64CB88G7N-CG	2GB	SS	Elixir	N2CB2G80GN-CG	-	-	*	*	*	*
Elixir	M2F4G64CB88B5N-CG	4GB	DS	Elixir	N2CB2G80BN-CG	-	-	*	*	*	*
Elixir	M2F4G64CB88D5N-CG	4GB	DS	Elixir	N2CB2G80DN-CG	-	-	*	*	*	*
KINGSHARE	KSRPCD313332G	2GB	DS	PATRIOT	PM128M8D385-15	-	-	*	*	*	*
KINGSTEK	KSTD3PC-10600	2GB	SS	MICRON	PE911-125E	-	-	*	*	*	*
Kingtiger	2GB DIMM PC3-10666	2GB	DS	SAMSUNG	SEC 904 HCH9 K4B1G0846D	-	-	*	*	*	*
Kingtiger	KTG2G1333PG3	2GB	DS	-	-	-	-	*	*	*	*
MARKVISION	BMD32048M1333C9-1123	2GB	DS	MARKVISION	M3D1288P-13	-	-	*	*	*	*
MARKVISION	BMD34096M1333C9-1124	4GB	DS	MARKVISION	M3D2568E-13	-	-	*	*	*	*
PATRIOT	PSD31G13332H	1GB	DS	-	-	9	-	*	*	*	*
PATRIOT	PSD31G13332	1GB	DS	PATRIOT	PM64M8D38U-15	-	-	*	*	*	*
PATRIOT	PSD32G13332H	2GB	DS	-	-	-	-	*	*	*	*
PATRIOT	PG38G1333EL(XMP)	8GB	DS	-	-	9-9-9-24	1.5V	*	*	*	*
RAMAXEL	RMR1870ED48E8F-1333	2GB	DS	ELPIDA	J1108BDBG-DJ-F	-	-	*	*	*	*
RAMAXEL	RMR1870EC58E9F-1333	4GB	DS	ELPIDA	J2108BCSE-DJ-F	-	-	*	*	*	*
RIDATA	E304459CB1AG32CF	4GB	DS	RIDATA	N/A	9	-	*	*	*	*
SanMax	SM-D4G68H1P-13HZ	4GB	DS	HYNIX	H5TQ2G83BFR H9C	-	-	*	*	*	*
SILICON POWER	SP001GBLTU133S01	1GB	SS	NANYA	NT5CB128M8AN- CG	9	-	*	*	*	*
SILICON POWER	SP001GBLTU133S02	1GB	SS	Elixir	N2CB1680AN-C6	9	-	*	*	*	*
SILICON POWER	SP002GBLTU133S02	2GB	DS	Elixir	N2CB1680AN-C6	9	-	*	*	*	*
TAKEMS	TMS1GB364D081-107EY	1GB	SS	-	-	7-7-7-20	1.5V	*	*	*	*
TAKEMS	TMS1GB364D081-138EY	1GB	SS	-	-	8-8-8-24	1.5V	*	*	*	*
TAKEMS	TMS2GB364D081-107EY	2GB	DS	-	-	7-7-7-20	1.5V	*	*	*	*
TAKEMS	TMS2GB364D081-138EY	2GB	DS	-	-	8-8-8-24	1.5V	*	*	*	*
TAKEMS	TMS2GB364D082-138EW	2GB	DS	-	-	8-8-8-24	1.5V	*	*	*	*
UMAX	E41302GP0-73BDB	2GB	DS	UMAX	U2524D30TP-13	-	-	*	*	*	*
WINTEC	3WVS31333-2G-CNR	2GB	DS	AMPO	AM3420803-13H	-	-	*	*	*	*

DDR3-1066MHz capability

Vendors	Part No.	Size	SS/ DS	Chip Brand	Chip NO.	Timing	Voltage	DIMM socket support (Optional)		
								1 DIMM	2 DIMMs	4 DIMMs
Crucial	CT12864BA1067.8FF	1GB	SS	Micron	9GF22D9KPT	7	-	*	*	*
Crucial	CT25664BA1067.16FF	2GB	DS	Micron	9HF22D9KPT	7	-	*	*	*
ELPIDA	EBJ10UE8EDF0-AE-F	1GB	SS	ELPIDA	J1108EDSE-DJ-F	-	1.35V(low voltage)	*	*	*
ELPIDA	EBJ21UE8EDF0-AE-F	2GB	DS	ELPIDA	J1108EDSE-DJ-F	-	1.35V(low voltage)	*	*	*
KINGSTON	KVR1066D3N7/1G(low profile)	1GB	SS	ELPIDA	J1108BFSE-DJ-F	7	1.5V	*	*	*
KINGSTON	KVR1066D3N7/2G	2GB	DS	ELPIDA	J1108BDSE-DJ-F	7	1.5V	*	*	*
KINGSTON	KVR1066D3N7/4G	4GB	DS	Hynix	H5TQ2G83AFR	7	1.5V	*	*	*
Micron	MT8JTF12864AZ-1G1F1	1GB	SS	Micron	9GF22D9KPT	7	-	*	*	*
Micron	MT16JTF25664AZ-1G1F1	2GB	DS	Micron	9HF22D9KPT	7	-	*	*	*
Kingtiger	2GB DIMM PC3-8500	2GB	DS	Hynix	H5TQ1G83AFP G7C	-	-	*	*	*

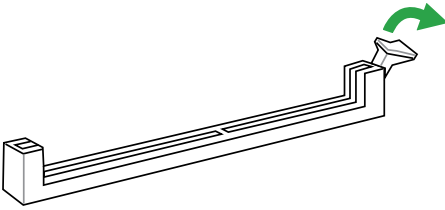


SS: Single-sided / DS: Double-sided DIMM support:

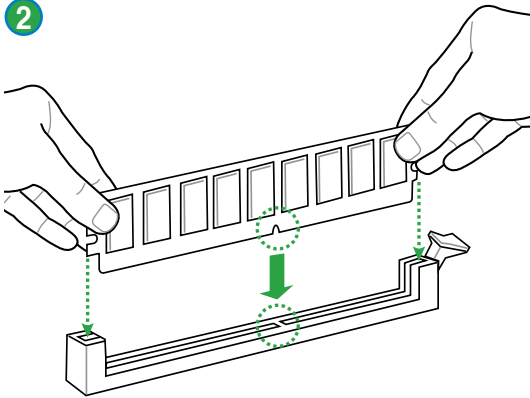
- **1 DIMM***: one (1) module inserted into any slot as single-channel memory configuration. We suggest that you install the module into A2 slot.
- **2 DIMMs***: two (2) modules inserted into either the blue slots or the black slots as one pair of dual-channel memory configuration. We suggest that you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

1.7.3 Installing a DIMM

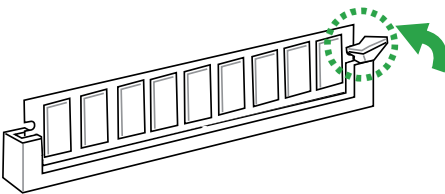
1



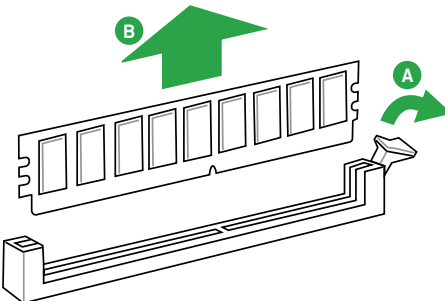
2



3



To remove a DIMM



1.8 Expansion slots

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



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

1.8.1 Installing an expansion card

To install an expansion card:

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

1.8.2 Configuring an expansion card

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

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



When using PCI cards on shared slots, ensure that the drivers support "Share IRQ" or that the cards do not need IRQ assignments. Otherwise, conflicts will arise between the two PCI groups, making the system unstable and the card inoperable.

1.8.3 PCI slot

The PCI slot supports cards such as a LAN card, SCSI card, USB card, and other cards that comply with PCI specifications.

1.8.4 PCI Express 2.0 x1 slot

This motherboard supports PCI Express 2.0 x1 network cards, SCSI cards, and other cards that comply with the PCI Express specifications.

1.8.5 PCI Express 2.0 x16 slots

This motherboard has two PCI Express 2.0 x16 slots that support PCI Express x16 2.0 graphic cards complying with the PCI Express specifications.

1.8.6 PCI Express 3.0 x16 slot

This motherboard has one PCE Express 3.0 x 16 slot that supports PCI Express 3.0 x 16 graphics cards complying with the PCI Express specifications.

VGA configuration	PCI Express operating mode	
	PCIe 3.0/2.0 x16_1	PCIe 2.0 x16_2
Single VGA/PCIe card	x16 (Recommended for single VGA card)	N/A
Dual VGA/PCIe card	x16	x4



- PCIe 3.0 support depends on CPU type and requires PCIe 3.0 VGA card.
- In single VGA card mode, use the PCIe 3.0/2.0 x16_1 slot (blue) for a PCI Express x16 graphics card to get better performance.
- In CrossFireX™ mode, use the PCIe 3.0/2.0 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_FAN when using multiple graphics cards for better thermal environment. See page 2-24 for details.

1.8.7 Interrupt assignments

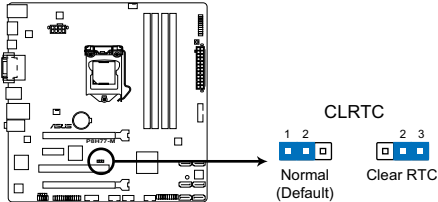
Standard interrupt assignments

	A	B	C	D	E	F	G	H
PClex16_1	shared	-	-	-	-	-	-	-
PClex16_2	shared	-	-	-	-	-	-	-
PClex1_1	-	-	shared	-	-	-	-	-
PCI_1	-	shared	-	-	-	-	-	-
LAN	shared	-	-	-	-	-	-	-
VGA	shared	-	-	-	-	-	-	-
USB 2.0 Controller1	-	-	-	-	-	-	-	shared
USB 2.0 Controller2	-	-	-	-	-	-	-	shared
XHCI Controller	shared	-	-	-	-	-	-	-
SATA Controller1	-	-	-	shared	-	-	-	-
SATA Controller2	-	-	-	shared	-	-	-	-
HD Audio	-	-	-	-	-	-	shared	-

1.9 Jumpers

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.



P8H77-M Clear RTC RAM

To erase the RTC RAM:

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



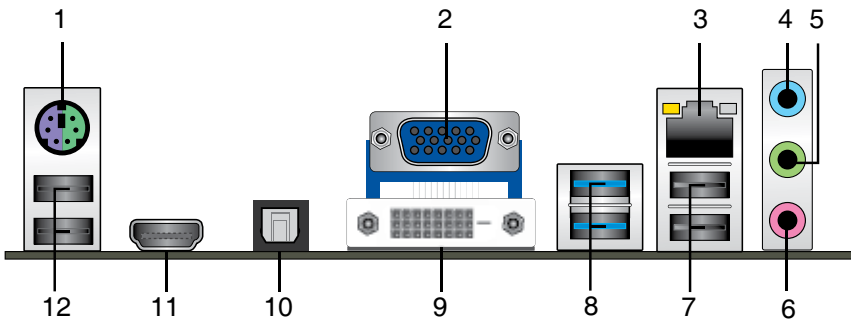
Except when clearing the RTC RAM, never remove the cap on CLRTC jumper default position. Removing the cap will cause system boot failure!



- 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 CPU Parameter Recall (C.P.R.) feature. Shut down and reboot the system, then the BIOS automatically resets parameter settings to default values.
-

1.10 Connectors

1.10.1 Rear panel connectors

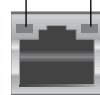


1. **PS/2 Keyboard/Mouse COMBO port.** This port is for a PS/2 keyboard/mouse.
2. **Video Graphics Adapter (VGA) port.** This 15-pin port is for a VGA monitor or other VGA-compatible devices.
3. **LAN (RJ-45) port.** This port allows Gigabit connection to a Local Area Network (LAN) through a network hub. Refer to the table on the next page for the LAN port LED indicators.

LAN port LED indications

ACT/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

ACT/LINK LED SPEED LED



LAN port

4. **Line In port (light blue).** This port connects to the tape, CD, DVD player, or other audio sources.
5. **Line Out port (lime).** This port connects to a headphone or a speaker. In the 4, 6, and 8-channel configurations, the function of this port becomes Front Speaker Out.
6. **Microphone port (pink).** This port connects to a microphone.



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

Audio 2, 4, or 6-channel configuration

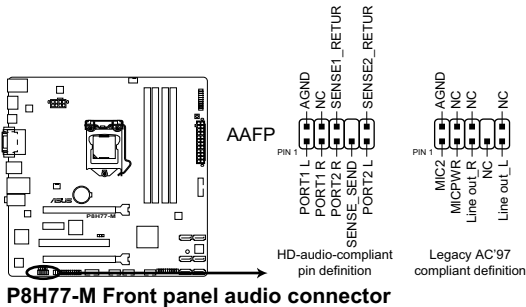
Port	Headset 2-channel	4-channel	6-channel
Light Blue	Line In	Rear Speaker Out	Rear Speaker Out
Lime	Line Out	Front Speaker Out	Front Speaker Out
Pink	Mic In	Mic In	Bass/Center

7. **USB 2.0 ports 1 and 2.** These two 4-pin Universal Serial Bus (USB) ports connect to USB 2.0/1.1 devices.
8. **USB 3.0 ports 1 and 2.** These two 4-pin Universal Serial Bus (USB) ports connect to USB 3.0 devices.
9. **DVI-D port.** This port is for any DVI-D compatible device. DVI-D cannot be converted to output RGB Signal to CRT and isn't compatible with DVI-I.
10. **Optical S/PDIF Out port.** This port connects an external audio output device via an optical S/PDIF cable.
11. **HDMI port.** This port is for a High-Definition Multimedia Interface (HDMI) connector, and is HDCP compliant allowing playback of HD DVD, Blu-Ray and other protected content.
12. **USB 2.0 ports 3 and 4.** These two 4-pin Universal Serial Bus (USB) ports connect to USB 2.0/1.1 devices.

1.10.2 Internal connectors

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

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

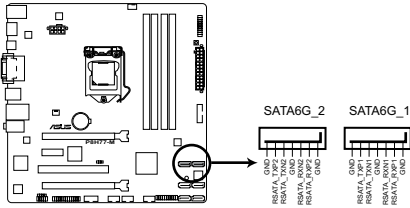


If you want to connect a high-definition front panel audio module to this connector, ensure that the **Front Panel Type** item in the BIOS is set to **[HD Audio]**. If you want to connect an AC97 front panel audio module to this connector, set the item to **[AC97]**. See section **2.5.6 Onboard Devices Configuration** for details.

2. Intel® H77 Serial ATA 6.0 Gb/s connectors (7-pin SATA6G_1~2 [gray])

These connectors connect to Serial ATA 6.0 Gb/s hard disk drives via Serial ATA 6.0 Gb/s signal cables.

If you installed Serial ATA hard disk drives, you can create a RAID 0, 1, 5, and 10 configuration with the Intel® Rapid Storage Technology through the onboard Intel® H77 chipset.



P8H77-M Intel® SATA 6.0Gb/s connectors

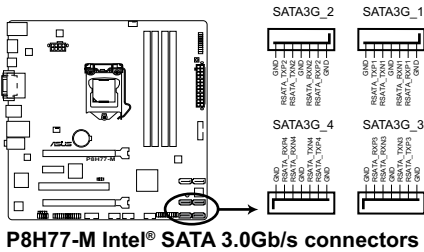


- These connectors are set to [AHCI] by default. If you intend to create a Serial ATA RAID set using these connectors, set the **SATA Mode Selection** item in the BIOS to [RAID]. Refer to section 3.5.3 **SATA Configuration** for details.
- Before creating a RAID set, refer to section 4.4 **RAID configurations** or the manual bundled in the motherboard support DVD.
- When using NCQ, set the **SATA Mode Selection** in the BIOS to [AHCI]. 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.

3. Intel® H77 Serial ATA 3.0 Gb/s connectors (7-pin SATA3G_1~2 [blue])

These connectors connect to Serial ATA 3.0 Gb/s hard disk drives and optical disc drives via Serial ATA 3.0 Gb/s signal cables.

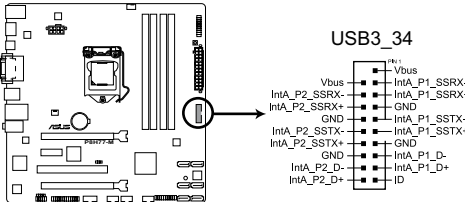
If you installed Serial ATA hard disk drives, you can create a RAID 0, 1, 5, and 10 configuration with the Intel® Rapid Storage Technology through the onboard Intel® H77 chipset.



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

4. USB 3.0 connector (20-1 pin USB3_34)

This connector is for the additional USB 3.0 ports, and complies with the USB 3.0 specification that supports up to 480 Mbps connection speed. If the USB 3.0 front panel cable is available from your system chassis, with this USB 3.0 connector, you can have a front panel USB 3.0 solution.



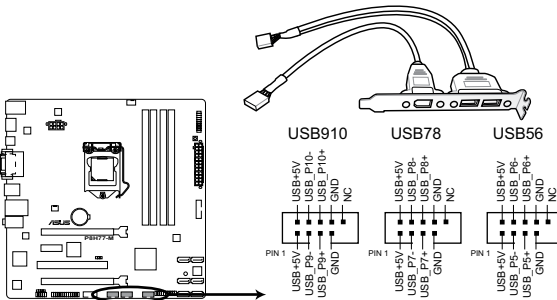
P8H77-M USB3.0 Front panel connector



The USB 3.0 module is purchased separately.

5. USB 2.0 connectors (10-1 pin USB56, USB78, USB910)

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 48 Mbps connection speed.



P8H77-M USB2.0 connector



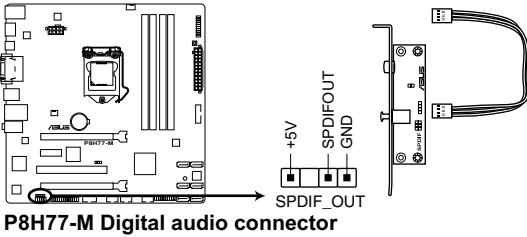
Never connect a 1394 cable to the USB connectors. Doing so will damage the motherboard!



The USB 2.0 module is purchased separately.

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

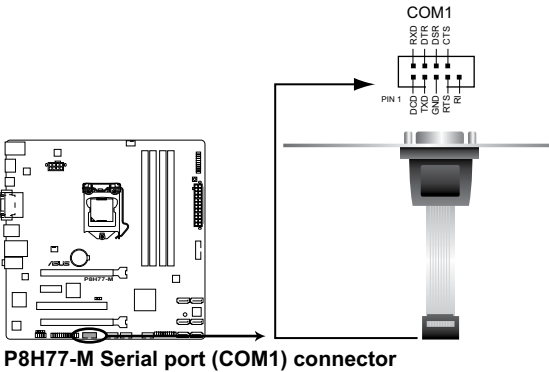
This connector is for an additional Sony/Philips Digital Interface (S/PDIF) port(s). Connect the S/PDIF Out module cable to this connector, then install the module to a slot opening at the back of the system chassis.



The S/PDIF module is purchased separately.

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

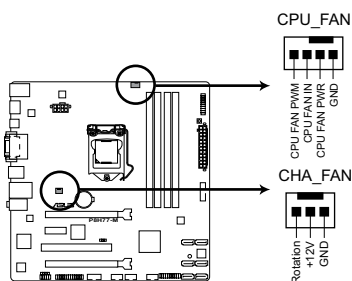
This connector is for a serial (COM) port. Connect the serial port module cable to this connector, then install the module to a slot opening at the back of the system chassis.



The COM module is purchased separately.

8. CPU and chassis fan connectors (4-pin CPU_FAN, 3-pin CHA_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.



P8H77-M fan connectors



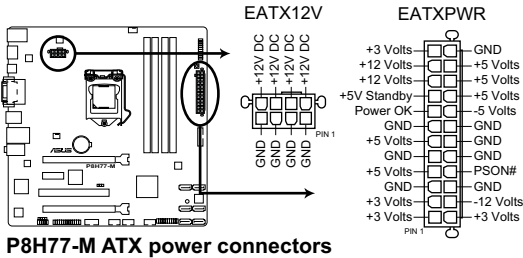
Do not forget to connect the fan cables to the fan connectors. Insufficient air flow inside the system may damage the motherboard components. These are not jumpers! Do not place jumper caps on the fan connectors!



- The CPU_FAN connector supports the CPU fan of maximum 1A (12 W) fan power.
 - Only the CPU_FAN connector supports the ASUS FAN Xpert feature.
 - If you install two VGA cards, we recommend that you plug the rear chassis fan cable to the motherboard connector labeled CHA_FAN for better thermal environment.
-

9. 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.



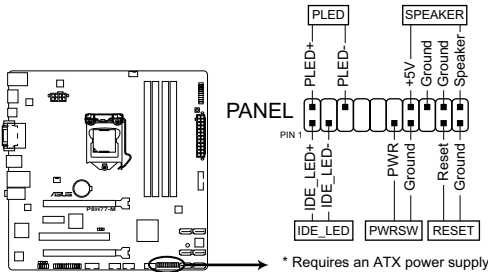
P8H77-M ATX power connectors



- 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 350 W.
- Do not forget to connect the 4-pin/8-pin EATX12 V power plug; otherwise, the system will not boot.
- Use of a PSU with a higher power output is recommended when configuring a system with more power-consuming devices. The system may become unstable or may not boot up if the power is inadequate.
- If you want to use two high-end PCI Express x16 cards, use a PSU with 1000W power or above to ensure the system stability.
- If you are uncertain about the minimum power supply requirement for your system, refer to the Recommended Power Supply Wattage Calculator at <http://support.asus.com/PowerSupplyCalculator/PSCalculator.aspx?SLanguage=en-us> for details.

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

This connector supports several chassis-mounted functions.



P8H77-M 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)**

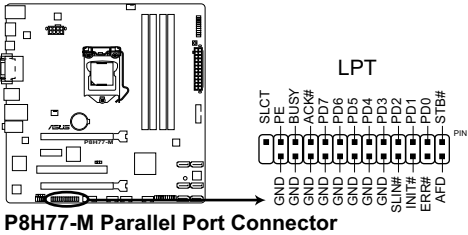
This connector is for the system power button.

- **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.

11. LPT connector (26-pin LPT)

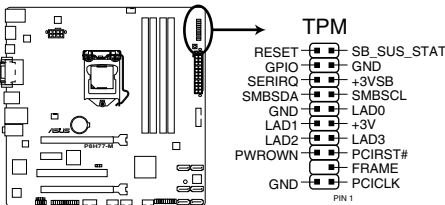
The LPT (Line Printing Terminal) connector supports devices such as a printer. LPT standardizes as IEEE 1284, which is the parallel port interface on IBM PC-compatible computers.



P8H77-M Parallel Port Connector

12. TPM connector (20-pin TPM)

This connector supports a Trusted Platform Module (TPM) system, which can securely store keys, digital certificates, passwords, and data. A TPM system also helps enhance network security, protects digital identities, and ensures platform integrity.



P8H77-M TPM Connector



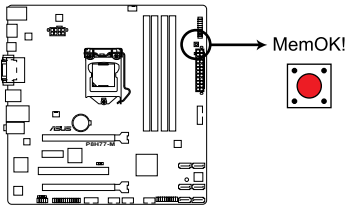
The TPM module is purchased separately.

1.11 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.

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.



P8H77-M MemOK! switch

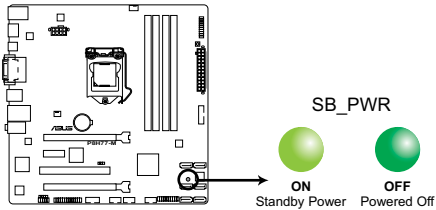


- Refer to section **1.12 Onboard LEDs** for the exact location of the DRAM_LED.
- The DRAM_LED also lights when the DIMM is not properly installed. Turn off the system and reinstall the DIMM before using the MemOK! function.
- The MemOK! switch does not function under Windows® OS environment.
- During 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.

1.12 Onboard LEDs

1. Standby Power LED

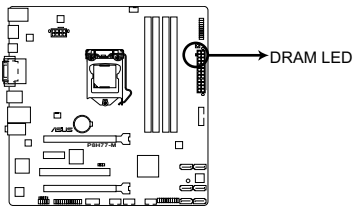
The motherboard comes with a standby power LED that lights up to indicate that the system is ON, in sleep mode, or in soft-off mode. This is a reminder that you should shut down the system and unplug the power cable before removing or plugging in any motherboard component. The illustration below shows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



P8H77-M 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.



P8H77-M DRAM LED

1.13 Software support

1.13.1 Installing an operating system

This motherboard supports Windows® XP / 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. Refer to your OS documentation for detailed information.
- Ensure that you install Windows® XP Service Pack 3 or later versions before installing the drivers for better compatibility and system stability.

1.13.2 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.

To run the Support DVD

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



The following screen is for reference only.



Click an icon to display Support DVD/motherboard information

Click an item to install



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

1.14 Introduction to Intel® 2012 Desktop responsiveness technologies

This document details the overview of the installation and configuration procedures of the Intel® 2012 Desktop responsiveness technologies.

Intel® 2012 Desktop responsiveness technologies feature the three technologies:

- Intel® Smart Response Technology
- Intel® Rapid Start Technology
- Intel® Smart Connect Technology

1.14.1 System Requirements for Intel® 2012 Desktop responsiveness technologies

In order for the system to run smoothly for the Intel® 2012 Desktop responsiveness, you must meet the following requirements:

1. CPU: Intel® 3rd/2nd generation Core Processor family
2. OS: Windows® 7 operating systems
3. SSD: One dedicated SSD (Solid State Disk) to support Intel® Smart Response and Intel® Rapid Start Technology is necessary.



Refer to the **SSD Capacity Requirements** table for the information of SSD size, partition capacity, and system memory requirements.

4. HDD: At least one HDD (Hard Disk Drive) for the system OS drive.
5. DRAM: To enable Intel® Rapid Start Technology, DRAM size smaller than 8GB is required.



Ensure to enable the acceleration of Intel® Smart Response Technology before creating the partition for the Intel® Rapid Start Technology.

SSD Capacity Requirements

SSD Partition Capacity Requirements		System DRAM		
		2GB	4GB	8GB
Intel® storage combinations	Intel® Rapid Start	2GB	4GB	8GB
	Intel® Smart Response	20GB	20GB	20GB
	Intel® Smart Response and Intel® Rapid Start	Separate 20GB and 2GB partition (SSD size > 22GB)	Separate 20GB and 4GB partition (SSD size > 24GB)	Separate 20GB and 8GB partition (SSD size > 28GB)
	Intel® Smart Response, Intel® Rapid Start, and Intel® Smart Connect	Separate 20GB and 2GB partition (SSD size > 22GB)	Separate 20GB and 4GB partition (SSD size > 24GB)	Separate 20GB and 8GB partition (SSD size > 28GB)



- The SSD used for Intel® Rapid Start and Intel® Smart Response is not allowed for creating RAID.
- Due to OS behavior, Intel® Rapid Start Technology works inefficiently with over 4G system memory under Windows® 7 32-bit operating system.
- Only Intel® internal SATA ports (gray and blue) support Intel® 2012 Desktop responsiveness technologies.
- The performance of Intel® Smart Response Technology and Intel® Rapid Storage Technology vary by the installed SSD.

1.14.2 Intel® Smart Response Technology

Intel® Smart Response Technology boosts overall system performance. It uses an installed fast SSD (min. 20GB available) as a cache for frequently accessed operations, speeding up hard drive/main memory interaction. Key benefits are expedited hard drive speeds, reduced load and wait times, and maximized storage utilization. Power consumption also goes down by reducing unnecessary hard drive spin.



Before applying Intel® Smart Response Technology, setting the SATA Mode BIOS item to [RAID mode] in BIOS setup is necessary. Refer to section 3.5.3 **SATA Configuration** for details

Installing Intel® Smart Response Technology

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 **Drivers** tab, then click **Intel® Rapid Storage Technology Driver** software.
3. Follow the onscreen instructions to complete the installation.

Using the Intel® Smart Response Technology

1. Click **Accelerate** to launch Smart Response Technology settings.
 2. a. Select the SSD you want to use to accelerate your storage system
 - b. Select the size allocated for SSD caching.
 - c. Select which HDD for caching.
 - d. **Enhanced mode:** WRITE THROUGH, write to SSD and HDD at the same time.
Maximized mode: WRITE BACK, write to SSD and write back to HDD in a later time.



3. Select **Disable Acceleration** to disable this function, and select **Change Mode** to switch acceleration mode to Enhanced/Maximized.



- To enable Intel® Smart Response Technology, you need at least one SSD (20GB) and a HDD, and only one SSD can be assigned for caching.
- If you want to restore the OS, go to **BIOS Option ROM > Acceleration Options** and remove the **Disks/Volume Acceleration** to disable Intel® Smart Response Technology. Refer to Chapter 4, section Installing Serial ATA hard disk for the entry of BIOS Option ROM.
- The maximum caching size on the SSD is 64GB. If it exceeds, the storage capacity left out for caching can still be identified by the system for normal storage.

1.14.3 Intel® Rapid Start Technology

Intel® Rapid Start Technology allows you to quickly resume your computer from sleeping mode. Saving your computer's system memory to the configured SSD provides a faster wake-up response time, but keeps the energy in a low profile.



- Before applying Intel® Rapid Start Technology, go to **Advanced Mode > Advanced > PCH Configuration** in BIOS item, and enable Intel® Rapid Start Technology.
- Ensure to follow the procedure **Creating a partition** precisely to enable the Intel Rapid Start function. Error message appears if you install the Intel® Rapid Start Utility before creating a partition.

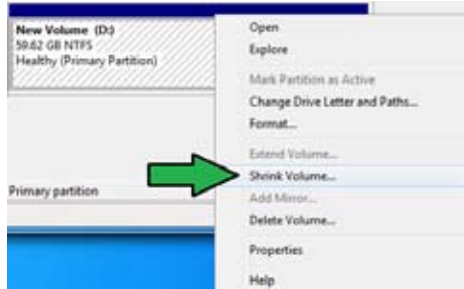
Creating a partition



- Ensure to backup your data before using the Microsoft partition tool. Incorrect partitioning process will result to data loss.
- Adjusting the DRAM to a high frequency will result to unstable system performance.

1. Go to Start, right-click **Computer > Manage > Disk Management**.
2. Select the SSD that you want to create the partition.

3. Right click the New Volume that you want to shrink from, and select Shrink Volume.



4. If your SSD is not initialized and unformatted:

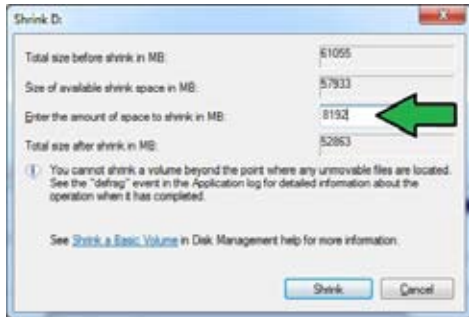
- a. Right click the disk that you want to create the partition, and select **Initialize**.
- b. Right click the unallocated volume, select **New Simple Volume**, and follow the remaining steps.



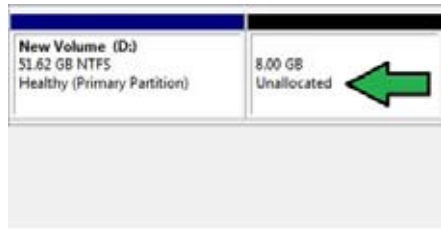
If your SSD is smaller than 64GB, and is set to **Full disk capacity** caching option for Intel® Smart Response, you can not see any volume in the Disk Management. Ensure to set your cache memory value of **18.6GB** in Intel® Smart Response to allow enough capacity for the Intel® Rapid Start partition.

5. Key in the required partition size, and must be equal to the system DRAM memory (1GB = 1024MB). Click **Shrink**.

Go to **Start > Control Panel > System and Security > System**, and check the DRAM size information.



The unallocated volume is allocated to the selected disk.



- To launch the disk partitioning tool, click **Start > Programs > Accessories > Command Prompt** tool.
- Type `diskpart` and press **Enter**.
- In the diskpart prompt, type `list disk` after DISKPART, and press **Enter**. Select the disk with the unallocated volume by typing `select disk x` (x = disk number), and press **Enter**.

```
DISKPART> list disk

Disk ###        Status             Size         Free          Dgn   Gpt
-----        -
Disk 0          Online              2794 GB     1824 KB
Disk 1          Online               59 GB        8 GB

DISKPART> select disk 1
Disk 1 is now the selected disk.
```



- The value "x" refers to a disk number where you created the unallocated partition.
- Refer to step 5 for details about the unallocated disk space in the SSD.

- Type `create partition primary`, and press **Enter**.

```
DISKPART> create partition primary
DiskPart succeeded in creating the specified partition.
DISKPART>
```

- After creating a primary partition, type `detail disk`, and press **Enter** to view the details of the partitioned disk.

```
DISKPART> detail disk
Disk #1: 516774
Type : RAW
Status : Online
Path : 0
Lectr : 1
S.M.A.R.T. : No
Logical Path : PCIROOT\PCI\PCI\0001\00000000
Logical Read-only State : No
Health Status : No
Partitioned Disk : No
File System : No
Hidden Sectors : No
Current Disk : No

Volume ### Ltr Label Fs Type Size Status Info
-----
Volume 2  S  New Volume NTFS Partition 55 GB Healthy
Volume 3  E  NTFS Partition 8 GB Healthy
```

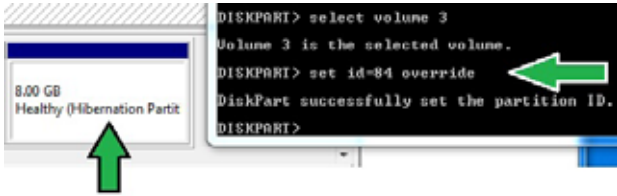
- Select the RAW volume which has the same size as the shrunk volume, type `select volume x` (x = number), and press **Enter** to store the Intel® Rapid Start partition.

```
DISKPART> select volume 3
Volume 3 is the selected volume.
DISKPART>
```



The value "x" refers to a disk number where you want to create the store partition.

12. Type `set id=84 override`, press **Enter**, and wait for the “shrinking process” until the Disk Management utility identifies a new partition called **Hibernation Partition**.



The **Hibernation Partition** does not appear when you choose “GPT (GUID Partition Table store type)”. Ensure the “Unallocated” disappears from the volume, and a new partition is identified.

13. Reboot the system after creating the partition.



The partition for Intel® Rapid Start Technology is incomplete if the computer is not rebooted, and this results to function failure of Intel® Rapid Start Technology.

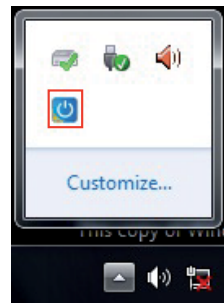
Enabling and disabling the Intel® Rapid Start Technology under the OS



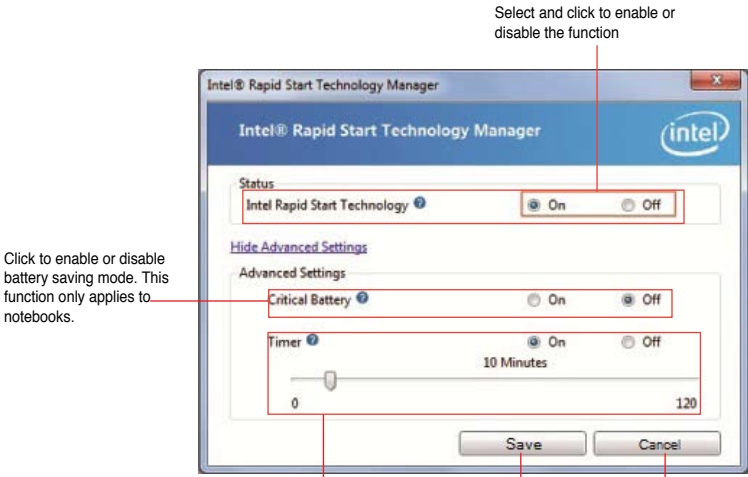
Install the Intel® Rapid Start Technology first from your support DVD in order to launch the Intel® Rapid Start Manager.

After creating the partition, launch the Intel® Rapid Start Manager to enable or disable the Intel® Rapid Start Technology.

1. Click the **Show hidden icons** arrow from the right side of the task bar, and click **Intel® Rapid Start Technology Manager** icon.



2. Tick **On** in the Status field to enable the function, and click **Save**.



Click to enable or disable battery saving mode. This function only applies to notebooks.

Select and click to enable or disable the function

Click to enable or disable the timer. When enabled, move the scroll bar to the desired time. When the system is idle for more than the time period you set, the system automatically goes into the Intel® Rapid Start mode. Default time is 10 minutes.

Click to save the settings made.

Click to cancel the settings made.

Recovering the partition

This procedure allows you to delete the Intel® Rapid Start Technology from your system, and recover the partition you made for the Intel Rapid® Start Technology installation.

1. Run the **Command Prompt** tool.
2. Type **diskpart** and press **Enter**.
3. At the diskpart prompt, type **list disk** after DISKPART, and press **Enter**.

```
DISKPART> list disk

```

Disk ###	Status	Size	Free	Dyn	Gpt
Disk 0	Online	2794 GB	1024 KB		*
Disk 1	Online	59 GB	0 B		

```
DISKPART>
```

4. Select the disk (SSD) where the Intel® Rapid Start Technology is installed for volume recovery, type **select disk x** (x = number), and press **Enter**.

```
DISKPART> select disk 1
Disk 1 is now the selected disk.
DISKPART>
```



The value "x" refers to a disk number where you want to delete the store partition.

- Type **list partition**, press **Enter**, and select the partition where the Intel® Rapid Start Technology is installed by typing **select partition x** (x = number), and press **Enter**.

```
DISKPART> list partition

Partition ###  Type                Size      Offset
-----
Partition 1    Primary              51 GB     1024 KB
Partition 2    OEM                  8 GB      51 GB

DISKPART> select partition 2
Partition 2 is now the selected partition.
DISKPART>
```

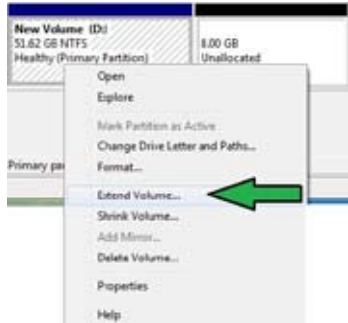


The value "x" refers to a disk number where you want to delete the store partition.

- Type **delete partition override**, and press **Enter**. The diskpart utility deletes the selected partition.

```
Partition 2 is now the selected partition.
DISKPART> delete partition override
DiskPart successfully deleted the selected partition.
DISKPART>
```

- In the desktop, click **Start**, right-click **Computer**, and click **Manage**.
- In the Computer Management window, click **Disk Management**, right click the shrunk new volume, and select **Extend Volume**.



- As the Extend Volume Wizard appears, click **Next**.



- Click **Next** after selecting the default selected disk.



- Extend volume setup is completed. Click **Finish** to recover the Intel® Rapid Start Technology partition.
- Reboot the system after deleting the partition.
- Go to **Start > Control Panel > Programs > Programs and Features >** to remove the Intel® Rapid Start Manager for the complete deletion of Intel® Rapid Start Technology.

1.14.4 Intel® Smart Connect Technology

The Intel® Smart Connect Technology is a feature that provides the latest content updates and energy efficiency to your computer's platform.

Once installed and activated, the Intel® Smart Connect Technology periodically wakes up the system from sleeping mode, performs user state gathering, and initiates re-entry to sleeping mode to wake-up after a set time interval.

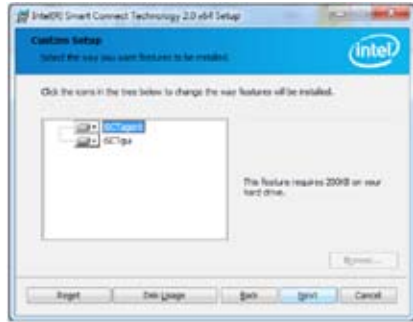


- Intel® Smart Connect Technology supports Windows® Live Mail, Microsoft Outlook, and Seismic applications.
- It is necessary to enable the items of the PCH Configuration in the BIOS before applying the Intel® Smart Connect Technology. Go to **Advanced Mode > Advanced > PCH Configuration**, and enable the Intel® Smart Connect Technology.

Installing the Intel® Smart Connect Technology

- Place the support DVD to the optical drive.
- Go to **Utilities**, and click **Intel® Smart Connect Technology**.
- As the setup wizard appears, click **Next** to begin the setup.
- Tick **I accept the terms in the License Agreement**, and click **Next**.

5. Select all and click **Next** for **Custom Setup**.



6. Click **Install** to proceed the installation.
7. Click **Yes** to restart your system, and for the newly installed Intel® Smart Connect Technology to take effect.

Using the Intel® Smart Connect Technology



- Before the system goes to sleep mode, ensure to keep your applications on the desktop, and enter the applications, passwords.
- Ensure that the internet is in connection when enabling the Intel® Smart Connect Technology.

1. Click **Start > All Programs > Intel > Intel® Smart Connect Technology**.
2. In the **Basic** tab, click **Enable Updating**. When enabled, the **Advanced** tab is available for advanced function settings.

The Advanced tab is activated when updating is enabled

Click to view version information and help topics

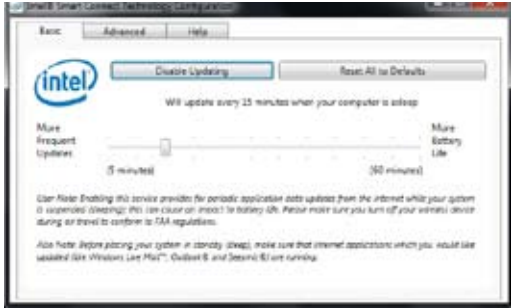
Click to configure the basic settings

Click to enable or disable the function

When updating is enabled, click to reset all settings to default.

When the scroll bar is activated, adjust the waking up time period for Internet data update.

- To disable the updating function, click **Disable Updating**. Clicking this button automatically disables the configuration in the **Advanced** tab. To reset to defaults, click **Reset All to Defaults**.



- In the **Advanced** tab, set up the schedule during low power usage time period for power saving. This setting only applies to the assigned time period.



- In the **Help** tab, click **About** to view the feature's version. Click **Topics** to learn more about the Intel® Smart Connect Technology and its configuration.

Chapter 2

BIOS information

2.1 Managing and updating your BIOS



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 utility.

2.1.1 ASUS Update utility

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



- ASUS Update requires an Internet connection either through a network or an Internet Service Provider (ISP).
 - This utility is available in the support DVD that comes with the motherboard package.
-

Installing ASUS Update

To install ASUS Update:

1. Place the support DVD in the optical drive. The **Specials** menu appears.
2. Click the **Utilities** tab, then click **AI Suite II**.
3. Follow the onscreen instructions to complete the installation.



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

Updating the BIOS

To update the BIOS:

1. From the Windows® desktop, click **Start > Programs > ASUS > AI Suite II > AI Suite II X.XX.XX** to launch the AI Suite II utility. The AI Suite II Quick Bar appears.
2. Click **Update** button from the Quick Bar, and then click **ASUS Update** from the popup menu. The **ASUS Update** main screen appears. From the list, select either of the following methods:
Updating from the Internet
 - a. Select **Update BIOS from the Internet**, then click **Next**.
 - b. Select the ASUS FTP site nearest you to avoid network traffic, then click **Next**.
 - c. From the FTP site, select the BIOS version that you wish to download then click **Next**.



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

Updating from a BIOS file

- a. Select **Update BIOS from file**, then click **Next**.
 - b. Locate the BIOS file from the **Open** window, then click **Open**.
3. Follow the onscreen instructions to complete the updating process.

2.1.2 ASUS EZ Flash 2

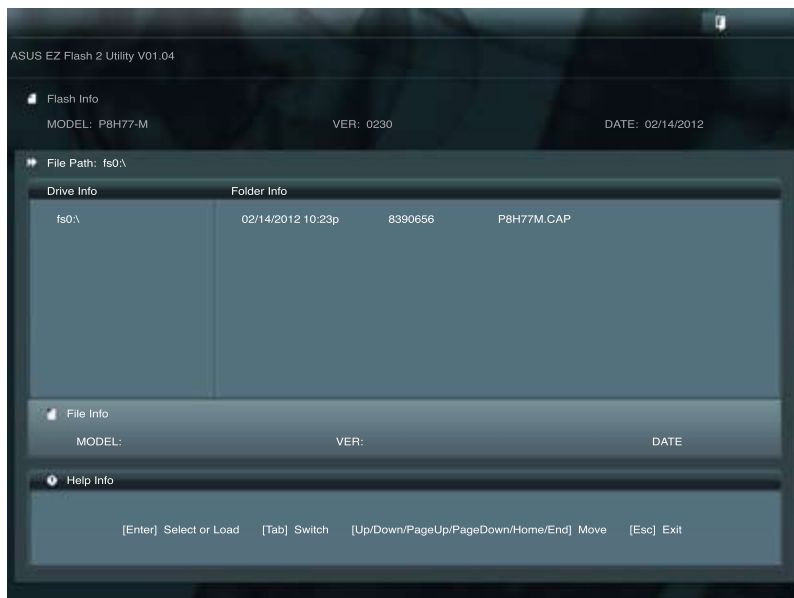
The ASUS EZ Flash 2 feature allows you to update the BIOS without using an OS-based utility.



Before you start using this utility, download the latest BIOS file 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 2 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 supports USB flash disks 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!
-

2.1.3 ASUS CrashFree BIOS 3 utility

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



-
- Before using this utility, rename the BIOS file in the removable device into **P8H77M.CAP**.
 - The BIOS file in the support DVD may not be the latest version. Download the latest BIOS file from the ASUS website at www.asus.com.
-

Recovering the BIOS

To recover the BIOS:

1. Turn on the system.
2. Insert the support DVD to the optical drive or the USB flash drive that contains the BIOS file to the USB port.
3. The utility automatically checks the devices for the BIOS file. When found, the utility reads the BIOS file and enters ASUS EZ Flash 2 utility automatically.
4. The system requires you to enter BIOS Setup to recover BIOS setting. To ensure system compatibility and stability, we recommend that you press <F5> to load default BIOS values.



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

2.1.4 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.

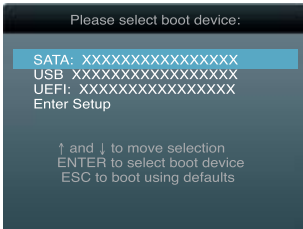


NTFS is not supported under DOS environment. Do not save the BIOS file and BIOS Updater to a hard disk drive or USB flash drive in NTFS format.

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).



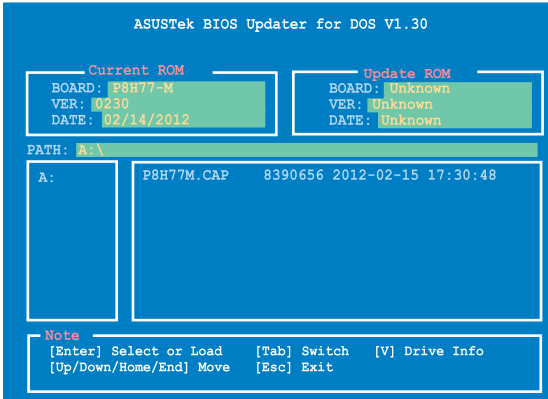
Updating the BIOS file

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 Optimized Defaults** item under the Exit menu. Refer to section **2.9 Exit menu** for details.
- Ensure to connect all SATA hard disk drives after updating the BIOS file if you have disconnected them.

2.2 BIOS setup program

Use the BIOS Setup program to update the BIOS or configure its parameters. The BIOS screens include navigation keys and brief online help to guide you in using the BIOS Setup program.

Entering BIOS Setup at startup

To enter BIOS Setup at startup:

- Press <Delete> during the Power-On Self Test (POST). If you do not press <Delete>, POST continues with its routines.

Entering BIOS Setup after POST

To enter BIOS Setup after POST:

- Press <Ctrl>+<Alt>+ simultaneously.
- Press the reset button on the system chassis.
- Press the power button to turn the system off then back on. Do this option only if you failed to enter BIOS Setup using the first two options.



Using the **power button**, **reset button**, or the <Ctrl>+<Alt>+ keys to force reset from a running operating system can cause damage to your data or system. We recommend to always shut down the system properly from the operating system.



- The BIOS setup screens shown in this section are for reference purposes only, and may not exactly match what you see on your screen.
 - Visit the ASUS website at www.asus.com to download the latest BIOS file for this motherboard.
 - 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 **2.9 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 **1.9 Jumpers** for information on how to erase the RTC RAM.
-

BIOS menu screen

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.

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** or press F7 hot key for the advanced BIOS settings.



The default screen for entering the BIOS setup program can be changed. Refer to the **Setup Mode** item in section 2.7 **Boot menu** for details.

Selects the display language of the BIOS setup program

Displays the CPU/motherboard temperature, CPU/5V/3.3V/12V voltage output, CPU/chassis fan speed

Exits the BIOS setup program without saving the changes, saves the changes and resets the system, or enters the Advanced Mode

Selects the Advanced mode functions

Selects the boot device priority

Displays the system properties of the selected mode on the right hand side

Displays the Advanced mode menus

Power Saving mode

Normal mode

ASUS Optimal mode

Loads optimized default

Selects the boot device priority



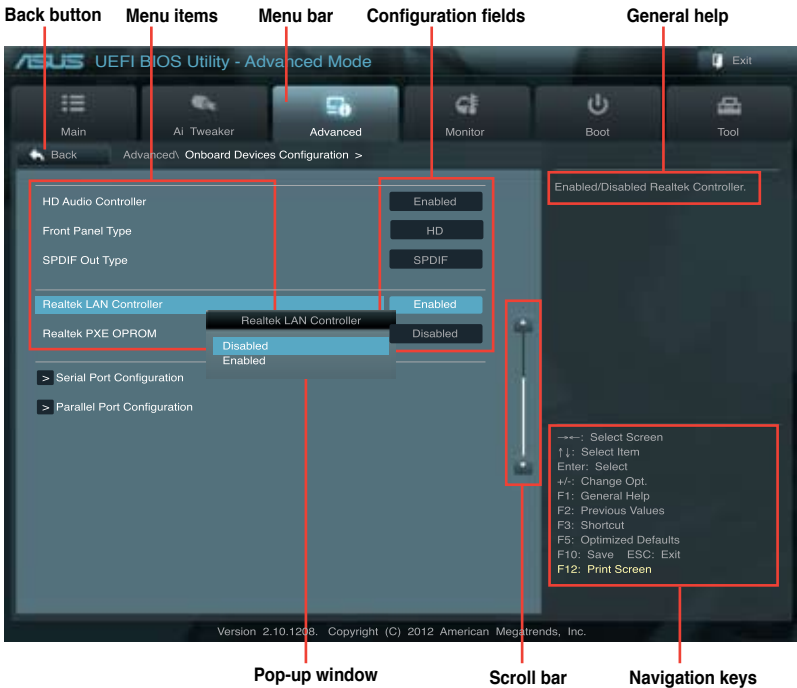
- The boot device options vary depending on the devices you installed to the system.
- The **Boot Menu(F8)** button is available only when the boot device is installed to the system.

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 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.

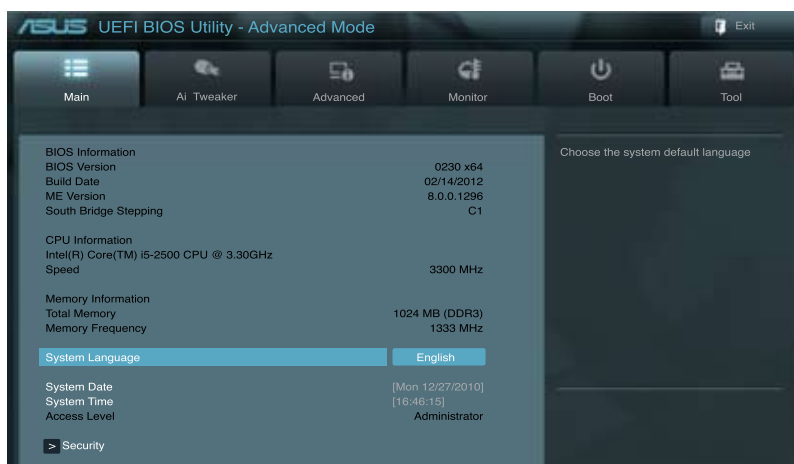
Configuration fields

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.

2.3 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.



2.3.1 System Language [English]

Allows you to choose the BIOS language version from the options. Configuration options: [English] [Français] [Deutsch] [简体中文] [繁體中文] [日本語] [Español] [□□□□□□□□]

2.3.2 System Date [Day xx/xx/xxxx]

Allows you to set the system date.

2.3.3 System Time [xx:xx:xx]

Allows you to set the system time.

2.3.4 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 1.9 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**.

2.4 Ai Tweaker menu

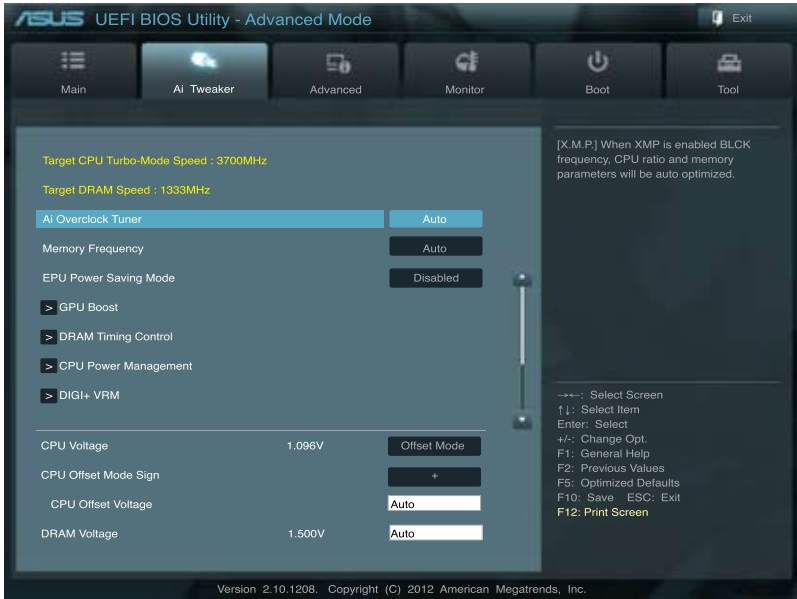
The Ai Tweaker menu items allow you to configure overclocking-related items.



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 section vary depending on the CPU and DIMM model you installed on the motherboard.



Scroll down to display the following items:



2.4.1 Ai Overclock Tuner [Auto]

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

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

BCLK/PEG Frequency [XXX]

Appears when you set the **Ai Overclock Tuner** item to **[Manual]** 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 80MHz to 300MHz.

2.4.2 Memory Frequency [Auto]

Allows you to set the memory operating frequency. Configuration options: [Auto] [DDR3-800MHz] [DDR3-1066MHz] [DDR3-1333MHz] [DDR3-1600MHz] [DDR3-1866MHz] [DDR3-2133MHz] [DDR3-2400MHz]



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

2.4.3 EPU Power Saving Mode [Disabled]

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

EPU Setting [Auto]

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

2.4.4 GPU Boost [OK]

- [OK] Select [OK] to automatically optimize the iGPU frequency.
- [Cancel] Select [Cancel] to use a fixed iGPU frequency.

2.4.5 DRAM Timing Control

The sub-items in this menu allow you to set the DRAM timing control features. Use the <+> and <-> keys to adjust the value. To restore the default setting, type [auto] using the keyboard and press <Enter>.



Changing the values in this menu may cause the system to become unstable! If this happens, revert to the default settings.

2.4.6 CPU Power Management

The sub-items in this menu allow you to set the CPU ratio and features.

CPU Ratio [Auto]

Allows you to manually adjust the maximum non-turbo CPU ratio. Use <+> and <-> keys or the numeric keypad to adjust the value. The valid value ranges vary according to your CPU model.

Enhanced Intel SpeedStep Technology [Enabled]

Allows you to enable or disable the Enhanced Intel® SpeedStep Technology (EIST).

[Disabled] Disables this function.

[Enabled] The operating system dynamically adjusts the processor voltage and core frequency which may result in decreased average consumption and decreased average heat production.

Turbo Mode [Enabled]

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

[Enabled] Allows processor cores to run faster than marked frequency in specific conditions.

[Disabled] Disables this function.



The following three items appear only when you set both the **Enhanced Intel SpeedStep Technology** and **Turbo Mode** items to [Enabled].

Long Duration Power Limit [Auto]

Allows you to limit the turbo ratio's long duration power.

Use the <+> and <-> keys to adjust the value.

Long Duration Maintained [Auto]

Allows you to maintain the turbo ratio's long duration power.

Use the <+> and <-> keys to adjust the value.

Short Duration Power Limit [Auto]

Allows you to limit the turbo ratio's long duration power.

Use the <+> and <-> keys to adjust the value.

Primary Plane Current Limit [Auto]

Maximum instantaneous current allowed at any given time for CPU cores

Use <+> and <-> key to adjust the value at 0.125A increment. .

Secondary Plane Current Limit [Auto]

Maximum instantaneous current allowed at any given time for Internal Graphics cores.

Use <+> and <-> key to adjust the value at 0.125A increment.

2.4.7 DIGI+ VRM

CPU Load-Line Calibration [Auto]

Load-line is defined by Intel VRM specifications, and affects CPU voltage. The CPU working voltage will decrease proportionally to CPU loading. Higher value gets a higher voltage, and a better overclocking performance, but increases the CPU and VRM thermal conditions.

This item allows you to adjust the voltage range from the following percentages to boost the system performance: 0% (Regular), 25% (Medium), 50% (High), 75% (Ultra High) and 100% (Extreme). Configuration options: [Auto] [Regular] [Medium] [High] [Ultra High] [Extreme]



The actual performance boost may vary depending on your CPU specification.

CPU Fixed Frequency [xxx]

Allows you to set a fixed CPU frequency. Use the <+> and <-> keys to adjust the value. The values range from 200k Hz to 350k Hz with a 50k Hz interval.

CPU Power Phase Control [Standard]

Allows you to control the power phase based on the CPU's demands. Configuration options: [Standard] [Optimized] [Extreme] [Manual Adjustment]



DO NOT remove the thermal module when switching to Extreme and Manual Mode. The thermal conditions should be monitored.

Manual Adjustment [Medium]

This item appears only when you set the previous item to [Manual Adjustment]. Select [Ultra Fast] for a faster response. The reaction time will be longer when [Regular] is selected. Configuration options: [Ultra Fast] [Fast] [Medium] [Regular]

CPU Power Duty Control [T.Probe]

DIGI + VRM Duty control adjusts the current and thermal conditions of every component's phase.

[T. Probe] Select to maintain the VRM thermal balance.

[Extreme] Select to maintain the current VRM balance.

CPU Current Capability [100%]

Allows you to configure the total power range, and extends the overclocking frequency range simultaneously. Configuration options: [100%] [110%] [120%]



Choose a higher value when overclocking, or under a high CPU loading for extra power support.



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

iGPU Load-line Calibration [Auto]

Load-line Calibration is defined by Intel VRM specifications and affects iGPU voltage. The iGPU working voltage will decrease proportionally to the integrated graphics loading. Higher load-line calibration would get higher voltage and better overclocking performance, but increase the CPU and VRM thermal. This item allows you to adjust the voltage range from the following percentages to boost the system performance: 0% (Regular), 50% (High) and 100% (Extreme). Configuration options: [Auto] [Regular] [High] [Extreme]

iGPU Current Capability [100%]

Allows you to set the iGPU Current Capability. Configuration options: [100%] [110%] [120%]



Do not remove the thermal module while changing the DIGI+ VRM related parameters. The thermal conditions should be monitored.



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

2.4.8 CPU Voltage [Offset Mode]

[Offset Mode] To offset the voltage by a positive or negative value.

[Manual Mode] Allows you to set a fixed CPU voltage.

CPU Offset Mode Sign [+]

This item appears only when you set the **CPU Voltage** item to [Offset Mode].

[+] To offset the voltage by a positive value.

[-] To offset the voltage by a negative value.

CPU Offset Voltage [Auto]

Allows you to set the CPU Offset voltage. The values range from 0.005V to 0.635V with a 0.005V interval.

CPU Manual Voltage [Auto]

This item appears only when you set the **CPU Voltage** item to [Manual Mode] and allows you to set a fixed CPU voltage. The values range from 0.800V to 1.990V with a 0.005V interval.



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

2.4.9 DRAM Voltage [Auto]

Allows you to set the DRAM voltage. The values range from 1.185V to 2.135V with a 0.005V interval.



According to Intel CPU specification, DIMMs with voltage requirement over 1.65V may damage the CPU permanently. We recommend you install the DIMMs with the voltage requirement below 1.65V.

2.4.10 VCCSA Voltage [Auto]

Allows you to set the VCCSA voltage. The values range from 0.610V to 1.560V with a 0.005V interval.

2.4.11 PCH Voltage [Auto]

Allows you to set the Platform Controller Hub voltage. The values range from 0.7350V to 1.6850V with a 0.005V interval.

2.4.12 CPU PLL Voltage [Auto]

Allows you to set the CPU and PCH PLL voltage. Configuration options: [Auto] [+0.10V]



-
- The values of the **CPU Offset Voltage**, **CPU Manual Voltage**, **DRAM Voltage**, **VCCSA Voltage**, and **PCH Voltage** items are labeled in different color, indicating the risk levels of high voltage settings.
 - The system may need better cooling system to work stably under high voltage settings.
-

2.5 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.



2.5.1 CPU Configuration

The items in this menu show the CPU-related information that the BIOS automatically detects.



The items shown in submenu may be different due to the CPU you installed.

Intel Adaptive Thermal Monitor [Enabled]

[Enabled] Enables the overheated CPU to throttle its clock speed to cool down.

[Disabled] Disables the CPU thermal monitor function.

Active Processor Cores [All]

Allows you to choose the number of CPU cores to activate in each processor package.

Configuration options: [All] [1] [2] [3]

Limit CPUID Maximum [Disabled]

[Enabled] Allows legacy operating systems to boot even without support for CPUs with extended CPUID functions.

[Disabled] Disables this function.

Execute Disable Bit [Enabled]

[Enabled] Enables the No-Execution Page Protection Technology.

[Disabled] Forces the XD feature flag to always return to zero (0).

Intel® Virtualization Technology [Disabled]

[Enabled] Allows a hardware platform to run multiple operating systems separately and simultaneously, enabling one system to virtually function as several systems.

[Disabled] Disables this function.

Hardware Prefetcher [Enabled]

[Enabled] Allows a hardware platform to run multiple operating systems separately and simultaneously, enabling one system to virtually function as several systems.

[Disabled] Disables this function.

Adjacent Cache Line Prefetch [Enabled]

[Enabled] Allows a hardware platform to perform adjacent cache line prefetching.

[Disabled] Disables this function.

CPU Power Management Configuration

CPU Ratio [Auto]

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

Enhanced Intel SpeedStep Technology [Enabled]

Allows you to enable or disable the Enhanced Intel® SpeedStep Technology (EIST).

[Disabled] The CPU runs at its default speed.

[Enabled] The operating system controls the CPU speed.

Turbo Mode [Enabled]

This item appears only when you set the **Enhanced Intel SpeedStep Technology** item to [Enabled] and allows you to enable or disable the Intel® Turbo Mode Technology.

[Enabled] Allows processor cores to run faster than marked frequency in specific condition.

[Disabled] Disables this function.

CPU C1E [Auto]

Enables or disables the C1E support function. This item should be enabled in order to enable the Enhanced Halt State. Configuration options: [Auto] [Enabled] [Disabled]

CPU C3 Report [Auto]

Allows you to disable or enable the CPU C3 report to OS. Configuration options: [Auto] [Enabled] [Disabled]

CPU C6 Report [Auto]

Allows you to disable or enable the CPU C6 report to OS. Configuration options: [Auto] [Enabled] [Disabled]

2.5.2 PCH Configuration

High Precision Timer [Enabled]

Allows you to enable or disable the High Precision Event Timer.

Configuration options: [Enabled] [Disabled]

Intel® Rapid Start Technology [Disabled]

Allows you to enable or disable the Intel(R) Rapid Start Technology.

Configuration options: [Enabled] [Disabled]

Intel® Smart Connect Technology [Disabled]

ISCT Configuration [Disabled]

Allows you to enable or disable the ISCT configuration. Configuration options: [Enabled] [Disabled]

2.5.3 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.

SATA Mode Selection [IDE]

Allows you to set the SATA configuration.

- [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.

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

S.M.A.R.T. (Self-Monitoring, Analysis and Reporting Technology) is a monitor system. When read/write of your hard disk errors occur, this feature allows the hard disk to report warning messages during the POST. Configuration options: [Enabled] [Disabled]

Hot Plug [Disabled]

This item only appears when you set the SATA Mode Selection item to [AHCI] or [RAID] and allows you to enable or disable the hot-plug support for each SATA port. Configuration options: [Enabled] [Disabled]

2.5.4 System Agent Configuration

Memory Remap Feature [Enabled]

- [Enabled] Allow you to enable remapping the memory above 4GB.
- [Disabled] Disables this function.

Graphics Configuration

Primary Display [Auto]

Allows you to decide which graphics controller to use as the primary boot device. Configuration options: [Auto] [iGPU] [PCIe] [PCI]

iGPU Memory [64M]

Allows you to select the amount of system memory allocated to DVMT 5.0 used by the iGPU. Configuration options: [32M] [64M] [96M] [128M] ~ [416M] [448M] [480M] [512M]

Render Standby [Enabled]

Allows you to enable the Intel Graphics Render Standby support to reduce the iGPU power use when idle. Configuration options: [Disabled] [Enabled]

iGPU Multi-Monitor [Enabled]

Allows you to enable the iGPU Multi-Monitor. For Lucid Virtu MVP function support, set this item to [Enabled] to empower both integrated and discrete graphics. iGPU shared system memory size is fixed in 64MB. Configuration options: [Disabled] [Enabled]

NB PCIe Configuration

Allows you to configure the NB PCI Express settings.

PCIEX16_1 Link Speed [Auto]

Allows you to configure the PCIe x16_1 speed. Configuration options: [Auto] [Gen1] [Gen2]

2.5.5 USB Configuration

The items in this menu allow you to change the USB-related features.



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

Legacy USB Support [Enabled]

- [Enabled] Enables the support for USB devices on legacy operating systems (OS).
- [Disabled] The USB devices can be used only for the BIOS setup program.
- [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.

Legacy USB3.0 Support [Enabled]

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

Intel xHCI Mode [Smart Auto]

Allows you to select an operation mode for the Intel xHCI controller. Configuration options: [Smart Auto] [Auto] [Enabled] [Disabled]

EHCI Hand-off [Disabled]

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

2.5.6 Onboard Devices Configuration

HD Audio Controller [Enabled]

- [Enabled] Enables the High Definition Audio Controller.
- [Disabled] Disables the controller.



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

Front Panel Type [HD]

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

[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.

Realtek LAN Controller [Enabled]

[Enabled] Enables the Realtek LAN controller.

[Disabled] Disables the controller.

Realtek PXE OPROM [Disabled]

This item appears only when you set the previous item to [Enabled] and allows you to enable or disable the 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]

Allows you to select the Serial Port base address. Configuration options: [IO=3F8h; IRQ=4] [IO=2F8h; IRQ=3] [IO=3E8h; IRQ=4] [IO=2E8h; IRQ=3]

Parallel Port Configuration

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

Parallel Port [Enabled]

Allows you to enable or disable the parallel port (LPT).

Configuration options: [Enabled] [Disabled]

Change Settings [Auto]

Allows you to select an optimal setting for Super I/O devices. Configuration options: [Auto]

[IO=378h; IRQ=5] [IO=378h; IRQ=5,6,7,9,10,11,12;] [IO=278h; IRQ=5,6,7,9,10,11,12;] [IO=3BCh; IRQ=5,6,7,9,10,11,12;]

Device Mode [STD Printer Mode]

Allows you to change the printer port mode. Configuration options: [STD Printer Mode] [SPP Mode] [EPP-1.9 and SPP Mode] [EPP-1.7 and SPP Mode] [ECP Mode] [ECP and EPP 1.9 Mode] [ECP and EPP 1.7 Mode]

2.5.7 APM

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 Keyboard [Disabled]

- [Disabled] Disables the Power On by a PS/2 keyboard.
- [Space Bar] Sets the Space Bar on the PS/2 keyboard to turn on the system.
- [Ctrl-Esc] Sets the Ctrl+Esc key on the PS/2 keyboard to turn on the system.
- [Power Key] Sets Power key on the PS/2 keyboard to turn on the system. This feature requires an ATX power supply that provides at least 1A on the +5VSB lead.

Power On By PCIE/PCI [Disabled]

- [Disabled] Disables the PCIE/PCI devices to generate a wake event.
- [Enabled] Enables the PCIE/PCI devices to generate a wake event.

Power On By Ring [Disabled]

- [Disabled] Disables Ring to generate a wake event.
- [Enabled] Enables Ring to generate a wake event.

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 **Hour/Minute/Second** will become user-configurable with set values.

2.5.8 Network Stack

Network Stack [Disable Link]

This item allows user to disable or enable the UEFI network stack. Configuration options: [Disable Link] [Enabled]

Ipv4 PXE Support [Enabled]

This item appears only when you set the Network Stack item to [Enabled]. When this item is disabled, the IPV4 PXE boot option will not be created. Configuration options: [Disable Link] [Enabled]

Ipv6 PXE Support [Enabled]

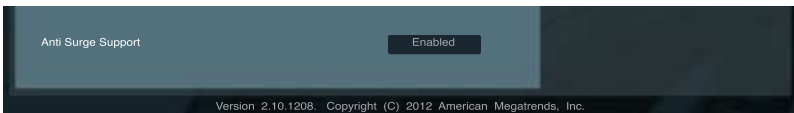
This item appears only when you set the Network Stack item to [Enabled]. When this item is disabled, the IPV6 PXE boot option will not be created. Configuration options: [Disable Link] [Enabled]

2.6 Monitor menu

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



Scroll down to display the following items:



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

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.

2.6.2 CPU / Chassis Fan Speed [xxxx RPM] or [Ignore] / [N/A]

The onboard hardware monitor automatically detects and displays the CPU and chassis 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.

2.6.3 CPU Voltage, 3.3V Voltage, 5V Voltage, 12V 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.

2.6.4 CPU Q-Fan Control [Enabled]

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

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

CPU Fan Speed Low Limit [200 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]

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.



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 20°C to 75°C.

CPU Fan Max. Duty Cycle(%) [100]

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 Lower Temperature [20]

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

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

Use the <+> and <-> keys to adjust the minimum CPU fan duty cycle. The values range from 0% to 100%. When the CPU temperature is under 40°C, the CPU fan will operate at the minimum duty cycle.

2.6.5 Chassis Fan Speed Low Limit [600 RPM]

Allows you to disable or set the chassis fan warning speed.

Configuration options: [Ignore] [200 RPM] [300 RPM] [400 RPM] [500 RPM] [600 RPM]

2.6.6 Anti Surge Support [Enabled]

This item allows you to enable or disable the Anti Surge function.

Configuration options: [Disabled] [Enabled]

2.7 Boot menu

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



2.7.1 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].

2.7.2 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.

Post Report [5 sec]

This item appears only when the Full Screen Logo item is set to [Disabled] and allows you to set the waiting time for the system to display the post report. Configuration options: [1 sec] [2 sec] [3 sec] [4 sec] [5 sec] [6 sec] [7 sec] [8 sec] [9 sec] [10 sec] [Until Press ESC]

2.7.3 Wait for 'F1' If Error [Enabled]

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

2.7.4 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.

2.7.5 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.

2.7.6 UEFI/Legacy Boot [Enabled both UEFI and Legacy]

[Enable both UEFI and Legacy] Enables both UEFI and Legacy boot.

[Disable UEFI] Enables the Legacy boot, and disables the UEFI boot.

[Disable Legacy] Enables the UEFI boot, and disables the Legacy boot.

2.7.7 PCI ROM Priority [Legacy ROM]

[Legacy ROM] Launch Legacy ROM

[EFI Compatible ROM] Launch UEFI Compatible ROM

2.7.8 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.



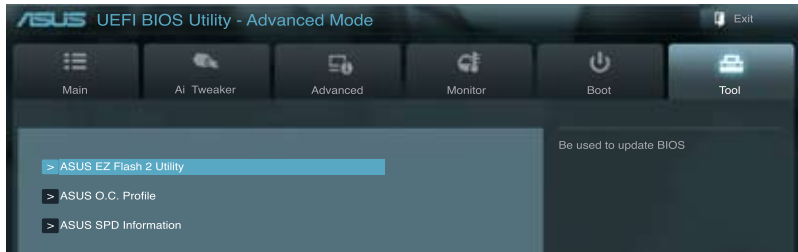
-
- To select the boot device during system startup, press <F8> when ASUS Logo appears.
 - To access Windows OS in Safe Mode, press <F8> after POST.
-

2.7.9 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.

2.8 Tools menu

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



2.8.1 ASUS EZ Flash 2 Utility

Allows you to run ASUS EZ Flash 2. Press [Enter] to launch the ASUS EZ Flash 2 screen.



For more details, see section [2.1.2 ASUS EZ Flash 2](#).

2.8.2 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.

Label

Allows you to input the label of the 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.
-

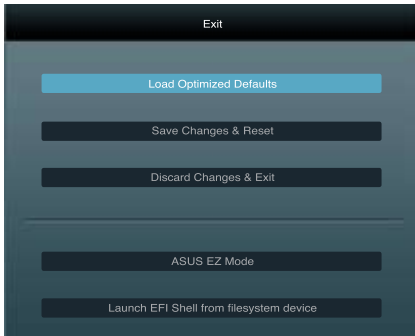
2.8.3 ASUS SPD Information

DIMM Slot # [DIMM_A1]

Displays the Serial Presence Detect (SPD) information of the DIMM module installed on the selected slot. Configuration options: [DIMM_A1] [DIMM_A2] [DIMM_B1] [DIMM_B2]

2.9 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.

Appendices

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.
- 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.

IC: Canadian Compliance Statement

Complies with the Canadian ICES-003 Class B specifications. This device complies with RSS 210 of Industry Canada. This Class B device meets all the requirements of the Canadian interference-causing equipment regulations.

This device complies with Industry Canada license exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil numérique de la Classe B est conforme à la norme NMB-003 du Canada.

Cet appareil numérique de la Classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Cet appareil est conforme aux normes CNR exemptes de licence d'Industrie Canada. Le fonctionnement est soumis aux deux conditions suivantes :

- (1) cet appareil ne doit pas provoquer d'interférences et
- (2) cet appareil doit accepter toute interférence, y compris celles susceptibles de provoquer un fonctionnement non souhaité de l'appareil.

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.

VCCI: Japan Compliance Statement

VCCI Class B Statement

情報処理装置等電波障害自主規制について

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスB情報技術装置です。この装置は家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。

取扱説明書に従って正しい取り扱いをして下さい。

KC: Korea Warning Statement

B급 기기 (가정용 방송통신기자재)

이 기기는 가정용(B급) 전자파적합기기로서 주로 가정에서 사용하는 것을 목적으로 하며, 모든 지역에서 사용할 수 있습니다.

*당해 무선설비는 전파혼신 가능성이 있으므로 인명안전과 관련된 서비스는 할 수 없습니다.

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.

ASUS Recycling/Takeback Services

ASUS recycling and takeback programs come from our commitment to the highest standards for protecting our environment. We believe in providing solutions for you to be able to responsibly recycle our products, batteries, other components as well as the packaging materials. Please go to <http://csr.asus.com/english/Takeback.htm> for the detailed recycling information in different regions.

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
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Web site	usa.asus.com

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 : P8H77-M

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 : Dec. 30, 2011

Ver: 110101

EC Declaration of Conformity



We, the undersigned,

Manufacturer: ASUS@K COMPUTER INC.
Address: 4F, No. 150, LITE Rd., PEITOU TAIPEI 112, TAIWAN
Country: TAIWAN
Authorized representative in Europe:
ASUS COMPUTER GmbH
Address: HARKORT STR. 21-23, 40889 RATINGSEN
Country: GERMANY

declare the following apparatus:

Product name : Motherboard
Model name : P8H77-M

conform with the essential requirements of the following directives:

- 2004/108/EC EMC Directive**
- EN 55022:2010
 - EN 61000-3-2:2006+A2:2009
 - EN 61000-3-3:2008
 - EN 55013:2007/AM1:2009/A2:2006
 - EN 55022:2007/A11:2011

- 1999/5/EC R&TTE Directive**
- EN 301 488-1 V1.5 (2006-01-08)
 - EN 301 488-3 V1.4 (2006-09-08)
 - EN 301 488-4 V1.4 (2006-09-08)
 - EN 301 488-5 V1.4 (2006-09-08)
 - EN 301 908-1 V5.2 (2001-11-05)
 - EN 301 908-2 V5.2 (2001-11-07)
 - EN 301 908-3 V1.1 (2009-01-01)
 - EN 302 542-2 V1.1 (2009-01-01)
 - EN 302 623 V1.1 (2009-01-01)
 - EN 302 623-2 V1.1 (2009-01-01)
 - EN 300 332-2 V1.5 (2010-04-02)
 - EN 55089:2001
 - EN 62211:2008

- 2002/95/EC RoHS Directive**
- EN 60950-1/A11:2009
 - EN 60950-1/A12:2011
 - EN 60065:2002 / A2:2010
 - EN 60065:2002 / A12:2011

- 2009/123/EC EPT Directive**
- Regulation (EC) No. 175/2008
 - Regulation (EC) No. 642/2009

- 2011/65/EU RoHS Directive**
- SCE marking**



(EC conformity marking)

Position : CEO
Name : Jerry Shen



Signature : _____

Declaration Date: Dec. 12, 2012
Year to begin affixing CE marking: 2012

Ver 121001