MSI
MICRO-STAR INTERNATIONAL

IA-945GC

MS-9828 (V1.X) Mainboard

G52-98281X1

Copyright Notice

Trademarks

Revision History

Revision	Revision History	Date
V1.0	First release	September 2008

Technical Support

If a problem arises with your system and no solution can be obtained from the user's manual, please contact your place of purchase or local distributor. Alternatively, please try the following help resources for further guidance.

- Visit the MSI website at ***http://global.msi.com.tw/index.php?func=service*** for FAQ, technical guide, BIOS updates, driver updates, and other information.
- Contact our technical staff at ***http://ocss.msi.com.tw***.

Safety Instructions

1. Always read the safety instructions carefully.
2. Keep this User's Manual for future reference.
3. Keep this equipment away from humidity.
4. Lay this equipment on a reliable flat surface before setting it up.
5. The openings on the enclosure are for air convection hence protects the equipment from overheating. DO NOT COVER THE OPENINGS.
6. Make sure the voltage of the power source and adjust properly 110/220V before connecting the equipment to the power inlet.
7. Place the power cord such a way that people can not step on it. Do not place anything over the power cord.
8. Always Unplug the Power Cord before inserting any add-on card or module.
9. All cautions and warnings on the equipment should be noted.
10. Never pour any liquid into the opening that could damage or cause electrical shock.
11. If any of the following situations arises, get the equipment checked by service personnel:
    - ▶ The power cord or plug is damaged.
    - ▶ Liquid has penetrated into the equipment.
    - ▶ The equipment has been exposed to moisture.
    - ▶ The equipment does not work well or you can not get it work according to User's Manual.
    - ▶ The equipment has dropped and damaged.
    - ▶ The equipment has obvious sign of breakage.
12. DO NOT LEAVE THIS EQUIPMENT IN AN ENVIRONMENT UNCONDITIONED, STORAGE TEMPERATURE ABOVE 60^0C (140^0F), IT MAY DAMAGE THE EQUIPMENT.

CAUTION: Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer.

警告使用者：

此為甲類資訊技術設備，於居住環境中使用時，可能會造成射頻擾動，在此情況下，使用者會被要求採取某些適當的對策

廢電池請回收

For better environmental protection, waste batteries should be collected separately for recycling or special disposal.

FCC-B Radio Frequency Interference Statement

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 the 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 measures listed below.

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

Notice 1
The changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Notice 2
Shielded interface cables and A.C. power cord, if any, must be used in order to comply with the emission limits.

VOIR LA NOTICE D'INSTALLATION AVANT DE RACCORDER AU RESEAU.

Micro-Star International
MS-9828

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.

WEEE (Waste Electrical and Electronic Equipment) Statement

ENGLISH

To protect the global environment and as an environmentalist, MSI must remind you that...

Under the European Union ("EU") Directive on Waste Electrical and Electronic Equipment, Directive 2002/96/EC, which takes effect on August 13, 2005, products of "electrical and electronic equipment" cannot be discarded as municipal waste anymore and manufacturers of covered electronic equipment will be obligated to take back such products at the end of their useful life. MSI will comply with the product take back requirements at the end of life of MSI-branded products that are sold into the EU. You can return these products to local collection points.

DEUTSCH

Hinweis von MSI zur Erhaltung und Schutz unserer Umwelt

Gemäß der Richtlinie 2002/96/EG über Elektro- und Elektronik-Altgeräte dürfen Elektro- und Elektronik-Altgeräte nicht mehr als kommunale Abfälle entsorgt werden. MSI hat europaweit verschiedene Sammel- und Recyclingunternehmen beauftragt, die in die Europäische Union in Verkehr gebrachten Produkte, am Ende seines Lebenszyklus zurückzunehmen. Bitte entsorgen Sie dieses Produkt zum gegebenen Zeitpunkt ausschliesslich an einer lokalen Altgerätesammelstelle in Ihrer Nähe.

FRANÇAIS

En tant qu'écologiste et afin de protéger l'environnement, MSI tient à rappeler ceci...

Au sujet de la directive européenne (EU) relative aux déchets des équipement électriques et électroniques, directive 2002/96/EC, prenant effet le 13 août 2005, que les produits électriques et électroniques ne peuvent être déposés dans les décharges ou tout simplement mis à la poubelle. Les fabricants de ces équipements seront obligés de récupérer certains produits en fin de vie. MSI prendra en compte cette exigence relative au retour des produits en fin de vie au sein de la communauté européenne. Par conséquent vous pouvez retourner localement ces matériels dans les points de collecte.

РУССКИЙ

Компания MSI предпринимает активные действия по защите окружающей среды, поэтому напоминаем вам, что....

В соответствии с директивой Европейского Союза (ЕС) по предотвращению загрязнения окружающей среды использованным электрическим и электронным оборудованием (директива WEEE 2002/96/EC), вступающей в силу 13 августа 2005 года, изделия, относящиеся к электрическому и электронному оборудованию, не могут рассматриваться как бытовой мусор, поэтому производители вышеперечисленного электронного оборудования обязаны принимать его для переработки по окончании срока службы. MSI обязуется соблюдать требования по приему продукции, проданной под маркой MSI на территории ЕС, в переработку по окончании срока службы. Вы можете вернуть эти изделия в специализированные пункты приема.

ESPAÑOL

MSI como empresa comprometida con la protección del medio ambiente, recomienda:

Bajo la directiva 2002/96/EC de la Unión Europea en materia de desechos y/o equipos electrónicos, con fecha de rigor desde el 13 de agosto de 2005, los productos clasificados como "eléctricos y equipos electrónicos" no pueden ser depositados en los contenedores habituales de su municipio, los fabricantes de equipos electrónicos, están obligados a hacerse cargo de dichos productos al termino de su período de vida. MSI estará comprometido con los términos de recogida de sus productos vendidos en la Unión Europea al final de su periodo de vida. Usted debe depositar estos productos en el punto limpio establecido por el ayuntamiento de su localidad o entregar a una empresa autorizada para la recogida de estos residuos.

NEDERLANDS

Om het milieu te beschermen, wil MSI u eraan herinneren dat....

De richtlijn van de Europese Unie (EU) met betrekking tot Vervuiling van Electrische en Electronische producten (2002/96/EC), die op 13 Augustus 2005 in zal gaan kunnen niet meer beschouwd worden als vervuiling.

Fabrikanten van dit soort producten worden verplicht om producten retour te nemen aan het eind van hun levenscyclus. MSI zal overeenkomstig de richtlijn handelen voor de producten die de merknaam MSI dragen en verkocht zijn in de EU. Deze goederen kunnen geretourneerd worden op lokale inzamelingspunten.

SRPSKI

Da bi zaštitili prirodnu sredinu, i kao preduzeće koje vodi računa o okolini i prirodnoj sredini, MSI mora da vas podesti da...

Po Direktivi Evropske unije ("EU") o odbačenoj ekektronskoj i električnoj opremi, Direktiva 2002/96/EC, koja stupa na snagu od 13. Avgusta 2005, proizvodi koji spadaju pod "elektronsku i električnu opremu" ne mogu više biti odbačeni kao običan otpad i proizvođači ove opreme biće prinuđeni da uzmu natrag ove proizvode na kraju njihovog uobičajenog veka trajanja. MSI će poštovati zahtev o preuzimanju ovakvih proizvoda kojima je istekao vek trajanja, koji imaju MSI oznaku i koji su prodati u EU. Ove proizvode možete vratiti na lokalnim mestima za prikupljanje.

POLSKI

Aby chronić nasze środowisko naturalne oraz jako firma dbająca o ekologię, MSI przypomina, że...

Zgodnie z Dyrektywą Unii Europejskiej ("UE") dotyczącą odpadów produktów elektrycznych i elektronicznych (Dyrektywa 2002/96/EC), która wchodzi w życie 13 sierpnia 2005, tzw. "produkty oraz wyposażenie elektryczne i elektroniczne " nie mogą być traktowane jako śmieci komunalne, tak więc producenci tych produktów będą zobowiązani do odbierania ich w momencie gdy produkt jest wycofywany z użycia. MSI wypełni wymagania UE, przyjmując produkty (sprzedawane na terenie Unii Europejskiej) wycofywane z użycia. Produkty MSI będzie można zwracać w wyznaczonych punktach zbiorczych.

TÜRKÇE

Çevreci özelliğiyle bilinen MSI dünyada çevreyi korumak için hatırlatır:
Avrupa Birliği (AB) Kararnamesi Elektrik ve Elektronik Malzeme Atığı, 2002/96/EC Kararnamesi altında 13 Ağustos 2005 tarihinden itibaren geçerli olmak üzere, elektrikli ve elektronik malzemeler diğer atıklar gibi çöpe atılamayacak ve bu elektonik cihazların üreticileri, cihazların kullanım süreleri bitttikten sonra ürünleri geri toplamakla yükümlü olacaktır. Avrupa Birliği'ne satılan MSI markalı ürünlerin kullanım süreleri bittiğinde MSI ürünlerin geri alınması isteği ile işbirliği içerisinde olacaktır. Ürünlerinizi yerel toplama noktalarına bırakabilirsiniz.

ČESKY

Záleží nám na ochraně životního prostředí - společnost MSI upozorňuje...
Podle směrnice Evropské unie ("EU") o likvidaci elektrických a elektronických výrobků 2002/96/EC platné od 13. srpna 2005 je zakázáno likvidovat "elektrické a elektronické výrobky" v běžném komunálním odpadu a výrobci elektronických výrobků, na které se tato směrnice vztahuje, budou povinni odebírat takové výrobky zpět po skončení jejich životnosti. Společnost MSI splní požadavky na odebírání výrobků značky MSI, prodávaných v zemích EU, po skončení jejich životnosti. Tyto výrobky můžete odevzdat v místních sběrnách.

MAGYAR

Annak érdekében, hogy környezetünket megvédjük, illetve környezetvédőként fellépve az MSI emlékezteti Önt, hogy ...
Az Európai Unió („EU") 2005. augusztus 13-án hatályba lépő, az elektromos és elektronikus berendezések hulladékairól szóló 2002/96/EK irányelve szerint az elektromos és elektronikus berendezések többé nem kezelhetőek lakossági hulladékként, és az ilyen elektronikus berendezések gyártói kötelessé válnak az ilyen termékek visszavételére azok hasznos élettartama végén. Az MSI betartja a termékvisszavétellel kapcsolatos követelményeket az MSI márkanév alatt az EU-n belül értékesített termékek esetében, azok élettartamának végén. Az ilyen termékeket a legközelebbi gyűjtőhelyre viheti.

ITALIANO

Per proteggere l'ambiente, MSI, da sempre amica della natura, ti ricorda che....
In base alla Direttiva dell'Unione Europea (EU) sullo Smaltimento dei Materiali Elettrici ed Elettronici, Direttiva 2002/96/EC in vigore dal 13 Agosto 2005, prodotti appartenenti alla categoria dei Materiali Elettrici ed Elettronici non possono più essere eliminati come rifiuti municipali: i produttori di detti materiali saranno obbligati a ritirare ogni prodotto alla fine del suo ciclo di vita. MSI si adeguerà a tale Direttiva ritirando tutti i prodotti marchiati MSI che sono stati venduti all'interno dell'Unione Europea alla fine del loro ciclo di vita. È possibile portare i prodotti nel più vicino punto di raccolta.

CONTENTS

Chapter 1
Product Overview

Thank you for choosing the IA-945GC (MS-9828 v1.X) mainboard from MSI.
Based on the innovative **Intel® 945GC** & **ICH7** controllers for optimal system efficiency, the IA-945GC accommodates the latest Intel® Core 2 Duo E4xxx/E2xxx & Celeron 4xx processor in Socket 775 and supports two DDR2 533/667 DIMM slots to provide the maximum of 4GB memory capacity.

In the entry-level and mid-range market segment, the IA-945GC can provide a high-performance solution for today's front-end and general purpose workstation, as well as in the future.

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Mainboard Specifications

Processor

- Intel Core 2 Duo E4xxx/E2xxx & Celeron 4xx processor in Socket 775
- 4-pin CPU fan pinheader with Smart Fan Speed Control

FSB

- 533/800MHz

Chipset

- Northbridge: Intel 945GC
- Southbridge: Intel ICH7

Memory

- Unbuffered ECC DDR2 533/667 SDRAM (4GB Max)
- 2 DDR2 DIMM slots (240-pin / 1.8V)

LAN

- Supports Gigabit Ethernet by Realtek RTL8111C

IDE

- 1 IDE port by Intel ICH7
- Supports Ultra DMA 66/100 mode
- Supports PIO, Bus Master operation mode

SATA

- 4 SATA II ports by Intel ICH7
- Supports storage and data transfers at up to 3Gb/s

Audio

- HDA Codec by Realtek ALC888 7.1 channel
- Compliant with Azalia 1.0 specs

Graphics

- Intel 945GC supports PCI-Express graphics (Intel GMA 950 Engine; up to 224MB can be allocated for GFX)

Connectors

► Back Panel

- 1 PS/2 mouse port
- 1 PS/2 keyboard port
- 1 parallel port
- 1 serial port
- 1 D-Sub VGA port
- 4 USB 2.0 ports
- 1 RJ-45 LAN jack
- 3 audio jacks

► Onboard Connectors

- 1 front panel audio pinheader
- 2 USB 2.0 pinheaders (4 ports)
- 1 serial port pinheader
- 1 SPI Flash ROM pinheader (for debugging)
- 1 S/PDIF-Out connector
- 1 CD-In connector
- 1 chassis intrusion switch pinheader
- 1 TPM pinheader

Slot

- 1 PCI Express x16 slot
- 2 32-bit/33MHz PCI slots

Form Factor

- Micro ATX: 9.6" x 7.5"

Mounting

- 6 mounting holes

Environmental

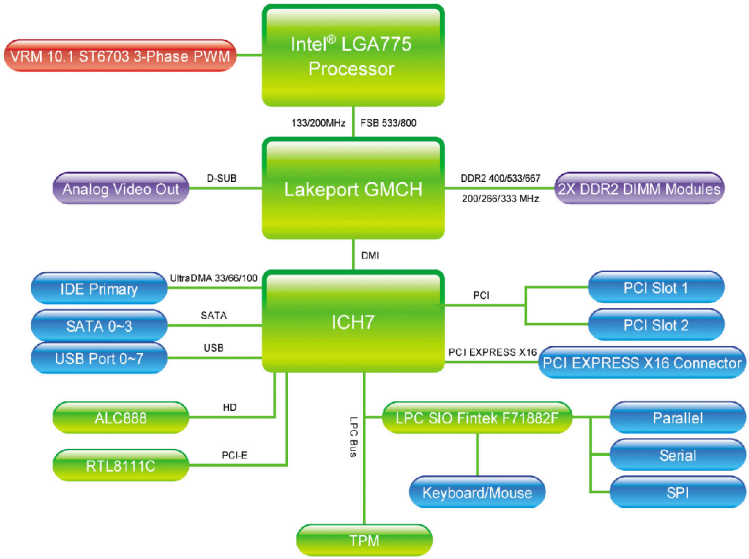
► Storage Environment

- Temperature: -20°C ~ 80°C
- Humidity: 5% ~ 90% non condensing

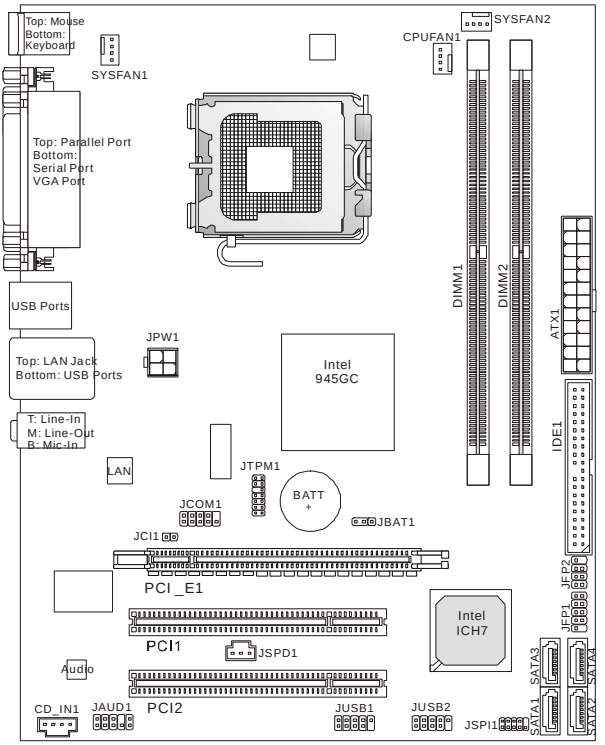
► Operation Environment

- Temperature: 0°C ~ 60°C
- Humidity: 5% ~ 90% non condensing

Block Diagram

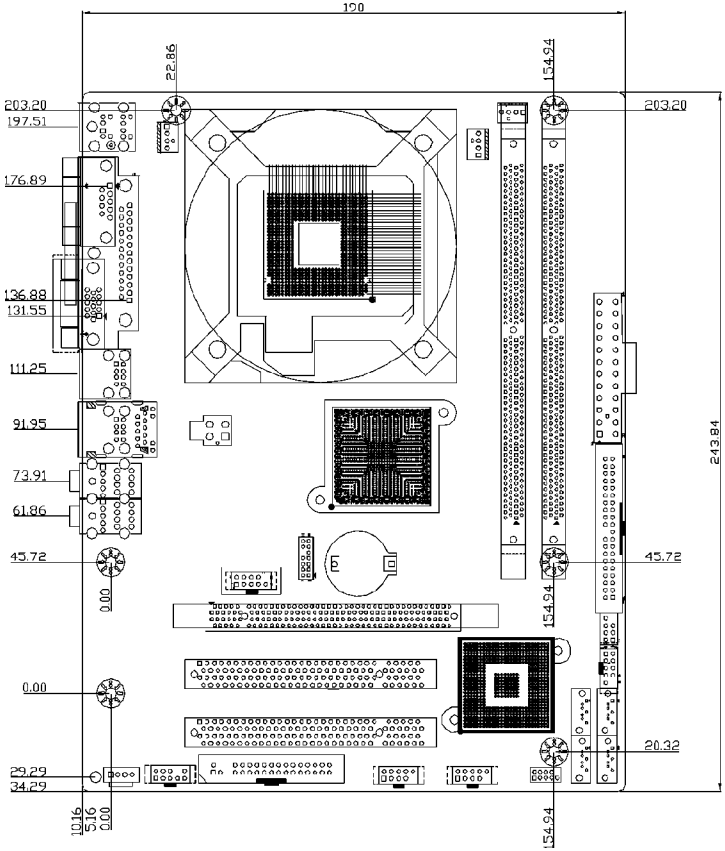


Mainboard Layout

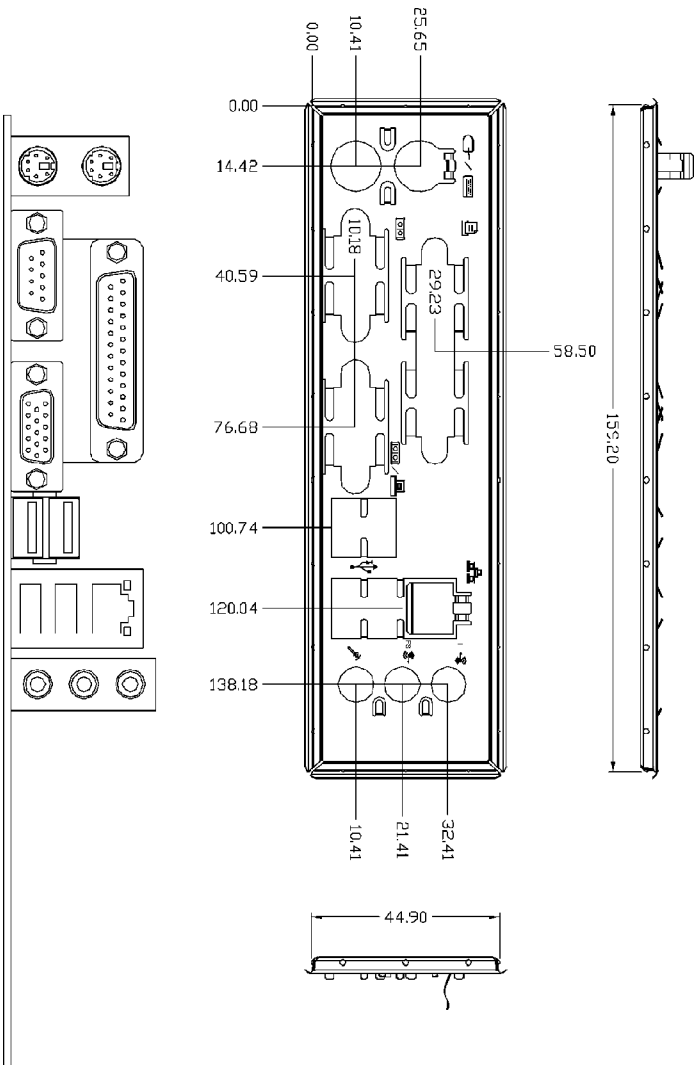


IA-945GC (MS-9828 v1.X) Micro ATX Mainboard

Board Dimension



Back Panel & I/O Shield Drawing



Power Consumption

COMPONENT	DESCRIPTION
CPU	Intel Genuine 2.4GHz
Memory	Corsair 1G DDR2-800 x2
Add-On VGA	NA
Hard Disk	Western 160G SATA HDD x1
Operating system	Microsoft Windows XP Professional SP2

	3.3V Input	5V Input	12V Input	5VSB	Total Watt
	Current (A)	Current (A)	Current (A)	Current (A)	Watt
Enter DOS (Stable)	1.2	3.5	2.3	0.024	49.18W
Enter BIOS (Stable)	1.2	3.3	2.3	0.026	48.19W
Idle	1.2	3.4	1.5	0.02	39.06 W
CPU Stress 100%	1.2	3.7	2.2	0.03	49.01W
Windows stress (3dMARK2006)	1.26	5.6	2.6	0.31	64.91W
Windows Desktop Standby S1 without LAN connected (stable)	1.2	3.5	1.4	0.038	38.45W
Windows Desktop Standby S3 without LAN connected (stable)	0	0	0	1	5W
Windows Desktop Hibernate S4 without LAN connected (stable)	0	0	0	0.9	4.5W
Windows Desktop Soft Off S5 without LAN connected (stable)	0	0	0	0.9	4.5W

Safety Compliance & MTBF

Certification	Standard number		Title of standard
CE	RFI	EN 55022: **2006**	Product family standard
		EN **2006**	Limits for harmonic current emission
		EN 1995+A1:2001+A2:2005	Limitation of voltage fluctuation and flicker in low-voltage supply system
	Immunity	EN 55024:1998+A1:2001+A2:2003	Product family standard
BSMI	CNS 13438 乙類(1995年6月版)		
C-Tick	AS/NZS CISPR 22:2006		
FCC	FCC CFR Title 47 Part 15 Subpart B: 2005 Class B		
	CISPR 22: 2006		
VCCI	VCCI V-3:2008 Class B		
	VCCI V-4:2008 Class B		

MTBF - Reliability Prediction

Calculation Model	Operation Temperature (°C)	Operation Environment	Duty Cycle	MTBF (hr.)
Telcordia Issue 1	40	GB, GC - Ground Benign, Controlled	4,674.523326	213,926

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Chapter 2
Hardware Setup

This chapter provides you with the information about hardware setup procedures. While doing the installation, be careful in holding the components and follow the installation procedures. For some components, if you install in the wrong orientation, the components will not work properly.

Use a grounded wrist strap before handling computer components. Static electricity may damage the components.

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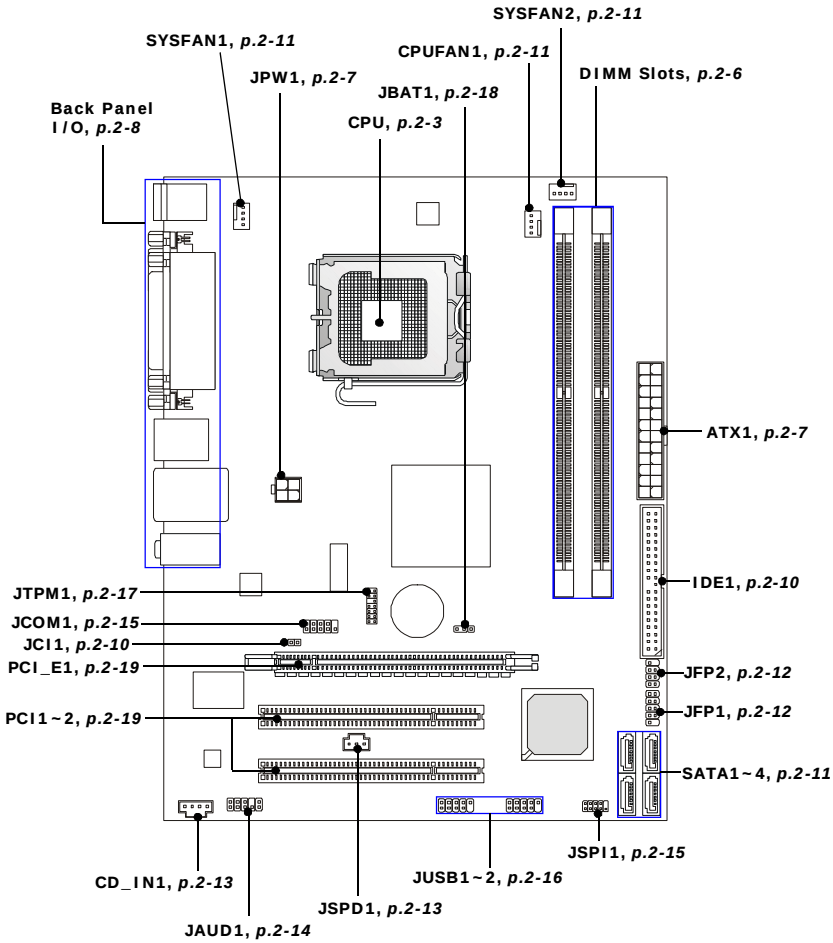
Quick Components Guide

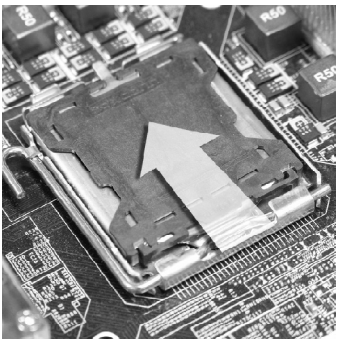


CPU (Central Processing Unit)

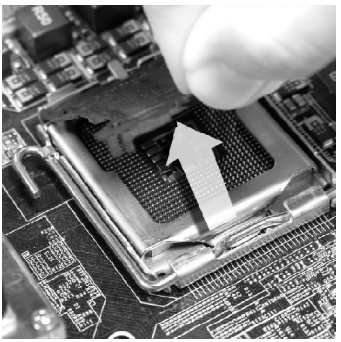
CPU & Cooler Installation

When you are installing the CPU, **make sure the CPU has a cooler attached on the top to prevent overheating.** Meanwhile, do not forget to apply some thermal paste on CPU before installing the heat sink/cooler fan for better heat dispersion. Follow the steps below to install the CPU & cooler correctly. Wrong installation will cause damage to your CPU & mainboard.

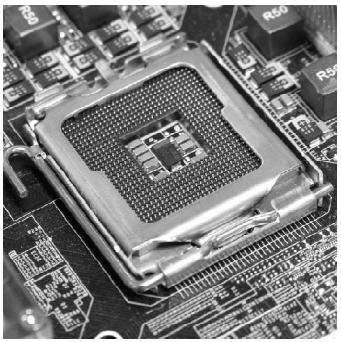
1. The CPU socket has a plastic cap on it to protect the contact from damage. Before you install the CPU, always cover it to protect the socket pin.



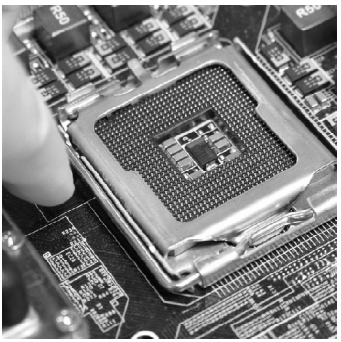
2. Remove the cap from lever hinge side (as the arrow shows).



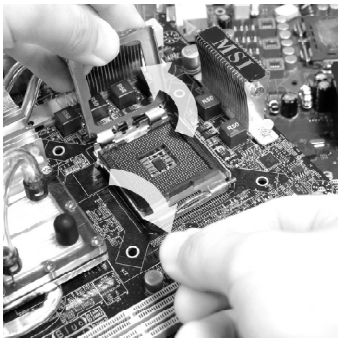
3. The pins of socket reveal.



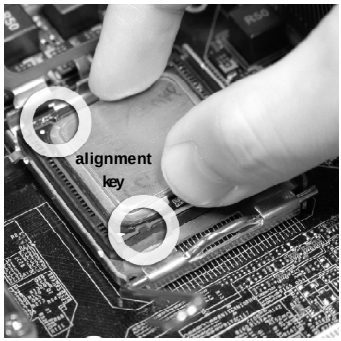
4. Open the load lever.



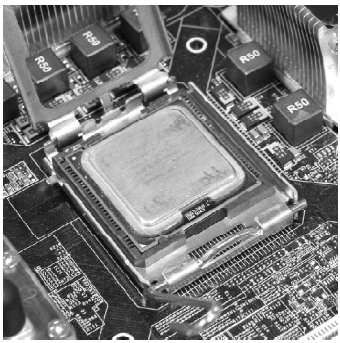
5. Lift the load lever up and open the load plate.



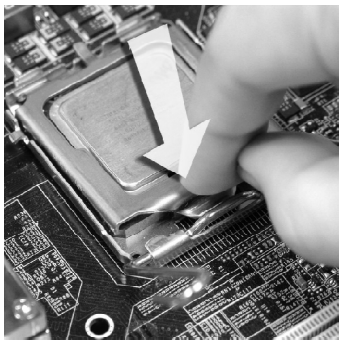
6. After confirming the CPU direction for correct mating, put down the CPU in the socket housing frame. Be sure to grasp on the edge of the CPU base. Note that the alignment keys are matched.



7. Visually inspect if the CPU is seated well into the socket. If not, take out the CPU with pure vertical motion and reinstall.



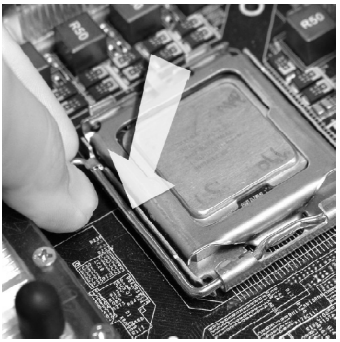
8. Cover the load plate onto the package.



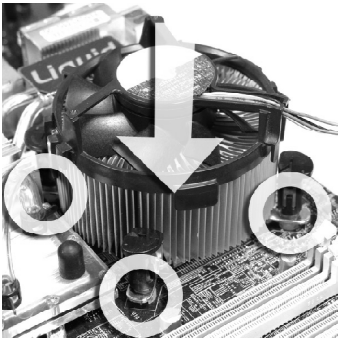
Important

1. Confirm if your CPU cooler is firmly installed before turning on your system.
2. Do not touch the CPU socket pins to avoid damage.
3. The availability of the CPU land side cover depends on your CPU packing.

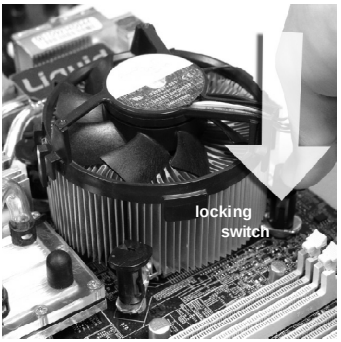
9. Press down the load lever lightly onto the load plate, and then secure the lever with the hook under retention tab.



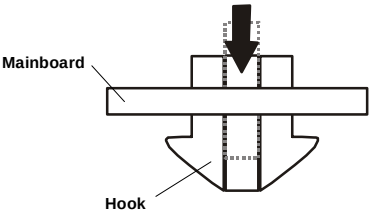
10. Align the holes on the mainboard with the heatsink. Push down the cooler until its four clips get wedged into the holes of the mainboard.



11. Press the four hooks down to fasten the cooler. Then rotate the locking switch (refer to the correct direction marked on it) to lock the hooks.



12. Turn over the mainboard to confirm that the clip-ends are correctly inserted.

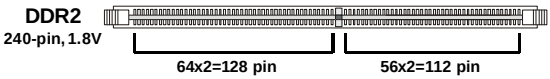


Important

1. Read the CPU status in BIOS (Chapter 3).
2. Whenever CPU is not installed, always protect your CPU socket pin with the plastic cap covered (shown in Figure 1) to avoid damage.
3. Mainboard photos shown in this section are for demonstration of the CPU/ cooler installation only. The appearance of your mainboard may vary depending on the model you purchase.

Memory

These DIMM slots are intended for system memory modules.



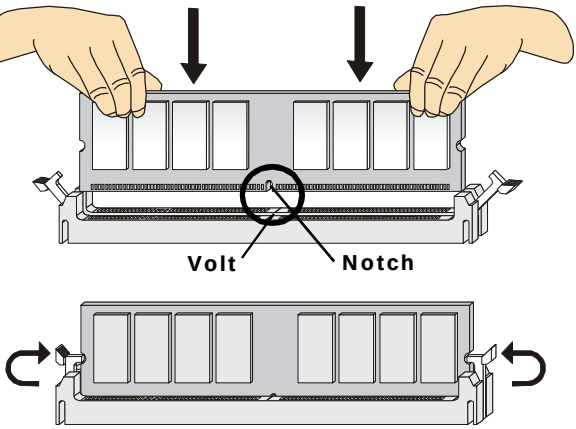
Installing Memory Modules

1. Locate the DIMM slots on the mainboard. Flip open the retaining clip at each side of the DIMM slot.
2. Align the notch on the DIMM with the key on the slot. Insert the DIMM vertically into the DIMM slot. Then push it in until the golden finger on the DIMM is deeply inserted in the DIMM slot. The retaining clip at each side of the DIMM slot will automatically close if the DIMM is properly seated.

Important

You can barely see the golden finger if the DIMM is properly inserted in the DIMM slot.

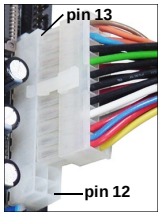
3. Manually check if the DIMM has been locked in place by the retaining clips at the sides.
4. Follow the same procedures to install more DIMMs if necessary.



Power Supply

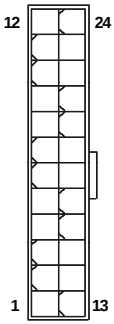
ATX 24-Pin Power Connector: ATX1

This connector allows you to connect an ATX 24-pin power supply. To connect the ATX 24-pin power supply, make sure the plug of the power supply is inserted in the proper orientation and the pins are aligned. Then push down the power supply firmly into the connector.



You may use the 20-pin ATX power supply as you like. If you'd like to use the 20-pin ATX power supply, please plug your power supply along with pin 1 & pin 13 (refer to the image at the right hand). There is also a foolproof design on pin 11, 12, 23 & 24 to avoid wrong installation.

ATX1

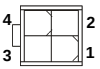


Pin Definition

PIN	SIGNAL	PIN	SIGNAL
1	+3.3V	13	+3.3V
2	+3.3V	14	-12V
3	GND	15	GND
4	+5V	16	PS-ON#
5	GND	17	GND
6	+5V	18	GND
7	GND	19	GND
8	PWROK	20	Res
9	5VSB	21	+5V
10	+12V	22	+5V
11	+12V	23	+5V
12	NC	24	GND

ATX 12V Power Connector: JPW1

This 12V power connector is used to provide power to the CPU.



JPW1

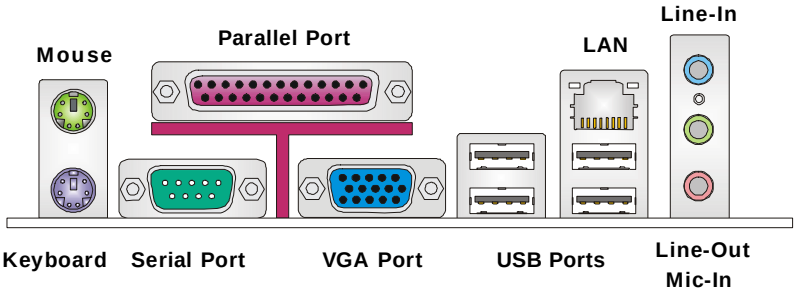
Pin Definition

PIN	SIGNAL
1	GND
2	GND
3	12V
4	12V

Important

1. *Make sure that all power connectors are connected to the power supply to ensure stable operation of the mainboard.*
2. *Power supply of 350 watts (and above) is highly recommended for system stability.*

Back Panel



▶ Mouse/Keyboard
The standard PS/2® mouse/keyboard DIN connector is for a PS/2® mouse/keyboard.

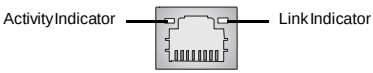
▶ Parallel Port
A parallel port is a standard printer port that supports Enhanced Parallel Port (EPP) and Extended Capabilities Parallel Port (ECP) mode.

▶ Serial Port
The serial port is a 16550A high speed communications port that sends/ receives 16 bytes FIFOs. You can attach a serial mouse or other serial devices directly to the connector.

▶ VGA Port
The DB15-pin female connector is provided for monitor.

▶ USB Port
The USB (Universal Serial Bus) port is for attaching USB devices such as keyboard, mouse, or other USB-compatible devices.

▶ LAN
The standard RJ-45 LAN jack is for connection to the Local Area Network (LAN). You can connect a network cable to it.



LED	Color	LED State	Condition
Left	Green	Off	LAN link is not established.
		On (steady state)	LAN link is established.
		On (brighter & pulsing)	The computer is communicating with another computer on the LAN.
Right	Green	Off	10 Mbit/sec data rate is selected.
		On	100 Mbit/sec data rate is selected.
	Orange	On	1000 Mbit/sec data rate is selected.

► Audio Ports

These audio connectors are used for audio devices. You can differentiate the color of the audio jacks for different audio sound effects.

- **Line-In (Blue)** - Line In, is used for external CD player, tapeplayer or other audio devices.
- **Line-Out (Green)** - Line Out, is a connector for speakers or headphones.
- **Mic (Pink)** - Mic, is a connector for microphones.

Connector

Chassis Intrusion Connector: JCI1

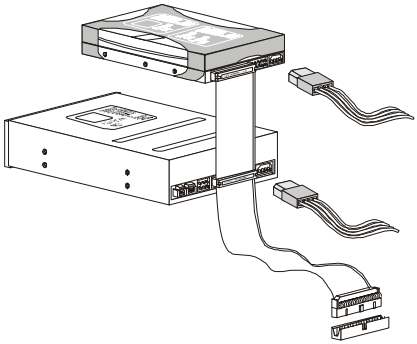
This connector connects to the chassis intrusion switch cable. If the chassis is opened, the chassis intrusion mechanism will be activated. The system will record this status and show a warning message on the screen. To clear the warning, you must enter the BIOS utility and clear the record.

JCI1

IDE Connector: IDE1

This connector supports IDE hard disk drives, optical disk drives and other IDE devices.

IDE1

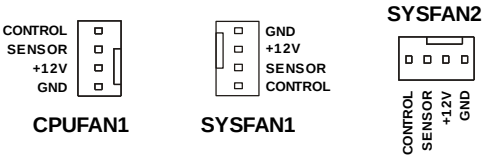


Important

If you install two IDE devices on the same cable, you must configure the drives separately to master / slave mode by setting jumpers. Refer to IDE device's documentation supplied by the vendors for jumper setting instructions.

Fan Power Connector: CPUFAN1, SYSFAN1, SYSFAN2

The fan power connectors support system cooling fan with +12V. When connecting the wire to the connectors, always note that the red wire is the positive and should be connected to the +12V; the black wire is Ground and should be connected to GND. If the mainboard has a System Hardware Monitor chipset onboard, you must use a specially designed fan with speed sensor to take advantage of the CPU fan control.

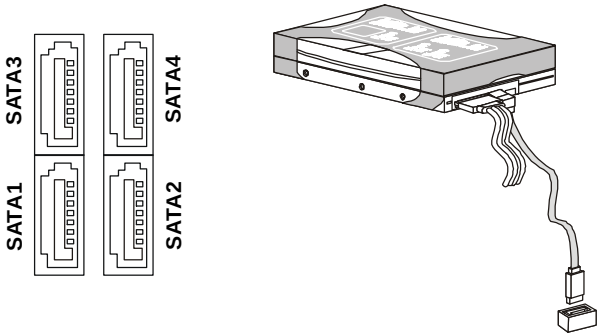


Important

Please refer to the recommended CPU fans at AMD® official website or consult the vendors for proper CPU cooling fan.

Serial ATA II Connector: SATA1 ~ SATA4

This connector is a high-speed Serial ATA II interface port. Each connector can connect to one Serial ATA II device.

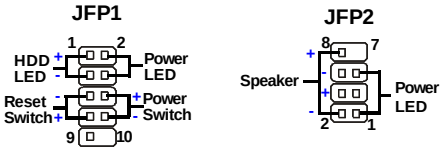


Important

Please do not fold the Serial ATA cable into 90-degree angle. Otherwise, data loss may occur during transmission.

Front Panel Connectors: JFP1, JFP2

These connectors are for electrical connection to the front panel switches and LEDs. The JFP1 is compliant with Intel® Front Panel I/O Connectivity Design Guide.



JFP1 Pin Definition

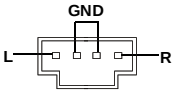
PIN	SIGNAL	DESCRIPTION
1	HD_LED +	Hard disk LED pull-up
2	FP PWR/SLP	MSG LED pull-up
3	HD_LED -	Hard disk active LED
4	FP PWR/SLP	MSG LED pull-up
5	RST_SW -	Reset Switch low reference pull-down to GND
6	PWR_SW +	Power Switch high reference pull-up
7	RST_SW +	Reset Switch high reference pull-up
8	PWR_SW -	Power Switch low reference pull-down to GND
9	RSVD_DNU	Reserved. Do not use.

JFP2 Pin Definition

PIN	SIGNAL	DESCRIPTION
1	GND	Ground
2	SPK-	Speaker-
3	SLED	Suspend LED
4	BUZ+	Buzzer+
5	PLED	Power LED
6	BUZ-	Buzzer-
7	NC	No connection
8	SPK+	Speaker+

CD-In Connector: CD_IN1

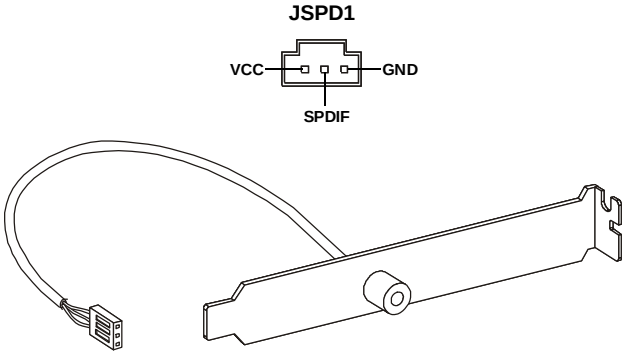
This connector is provided for external audio input.



CD_IN1

S/PDIF-Out Connector: JSPD1 (Optional)

This connector is used to connect S/PDIF (Sony & Philips Digital Interconnect Format) interface for digital audio transmission.



S/PDIF Bracket (Optional)

Front Panel Audio Connector: JAUD1

This connector allows you to connect the front panel audio and is compliant with Intel® Front Panel I/O Connectivity Design Guide.

JAUD1

HD Audio Pin Definition

PIN	SIGNAL	DESCRIPTION
1	MIC_L	Microphone - Left channel
2	GND	Ground
3	MIC_R	Microphone - Right channel
4	PRESENCE#	Active low signal-signals BIOS that a High Definition Audio dongle is connected to the analog header. PRESENCE# = 0 when a High Definition Audio dongle is connected
5	LINE out_R	Analog Port - Right channel
6	MIC_JD	Jack detection return from front panel microphone JACK1
7	Front_JD	Jack detection sense line from the High Definition Audio CODEC jack detection resistor network
8	NC	No control
9	LINE out_L	Analog Port - Left channel
10	LINEout_JD	Jack detection return from front panel JACK2

Serial Port Connector: JCOM1

This connector is a 16550A high speed communications port that sends/receives 16 bytes FIFOs. You can attach a serial device to it.

JCOM1

Pin Definition

PIN	SIGNAL	DESCRIPTION
1	DCD	Data Carry Detect
2	SIN	Serial In or Receive Data
3	SOUT	Serial Out or Transmit Data
4	DTR	Data Terminal Ready
5	GND	Ground
6	DSR	Data Set Ready
7	RTS	Request To Send
8	CTS	Clear To Send
9	NC	No Connection

SPI Flash ROM Connector: JSPI1

This connector is used to flash SPI flash ROM.

JSPI1

Pin Definition

Pin	Description	Pin	Description
1	VCC3_SB	2	VCC3_SB
3	SPI_MISO_F	4	SPI_MOSI_F
5	SPI_CS0_F#	6	SPI_CLK_F
7	GND	8	GND
9	SPI_HOLD#	10	NC

Front USB Connector: JUSB1, JUSB2

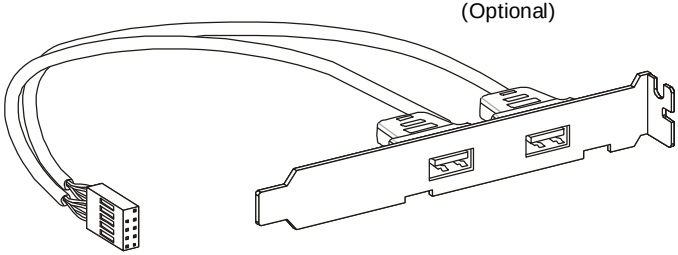
This connector, compliant with Intel® I/O Connectivity Design Guide, is ideal for connecting high-speed USB interface peripherals such as **USB HDD**, **digital cameras**, **MP3 players**, **printers**, **modems and the like**.

JUSB1/2

Pin Definition

PIN	SIGNAL	PIN	SIGNAL
1	VCC	2	VCC
3	USB0-	4	USB1-
5	USB0+	6	USB1+
7	GND	8	GND
9	Key (no pin)	10	USBOC

USB 2.0 Bracket
(Optional)

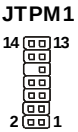


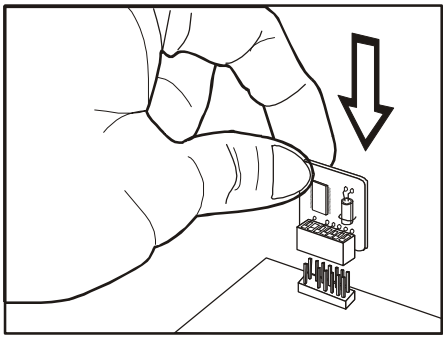
Important

Note that the pins of VCC and GND must be connected correctly to avoid possible damage.

TPM Connector: JTPM1 (Optional)

This connector connects to an optional TPM (Trusted Platform Module). Please refer to the TPM security platform manual for more details.





PIN	SIGNAL	DESCRIPTION	PIN	SIGNAL	DESCRIPTION
1	LCLK	LPC clock	2	3V dual/3V_STB	3V dual or 3V standby power
3	LRST#	LPC reset	4	VCC3	3.3V power
5	LAD0	LPC address & data pin0	6	SIRQ	Serial IRQ
7	LAD1	LPC address & data pin1	8	VCC5	5V power
9	LAD2	LPC address & data pin2	10	KEY	No pin
11	LAD3	LPC address & data pin3	12	GND	Ground
13	LFRAME#	LPC Frame	14	GND	Ground

Jumper

Clear CMOS Jumper: JBAT1

There is a CMOS RAM onboard that has a power supply from external battery to keep the data of system configuration. With the CMOS RAM, the system can automatically boot OS every time it is turned on. If you want to clear the system configuration, set this jumper to clear data.

Keep Data

Clear Data

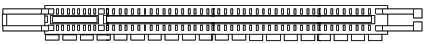
Important

You can clear CMOS by shorting 1-2 pin while the system is off. Then return to 2-3 pin position. Avoid clearing the CMOS while the system is on; it will damage the mainboard.

Slot

PCI (Peripheral Component Interconnect) Express Slot

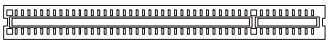
The PCI Express slot supports the PCI Express interface expansion card.
The PCI Express x16 slot supports up to 4.0 GB/s transfer rate.



PCI Express x16 Slot

PCI (Peripheral Component Interconnect) Slot

The PCI slot supports LAN card, SCSI card, USB card, and other add-on cards that comply with PCI specifications.



32-bit PCI Slot

Important

When adding or removing expansion cards, make sure that you unplug the power supply first. Meanwhile, read the documentation for the expansion card to configure any necessary hardware or software settings for the expansion card, such as jumpers, switches or BIOS configuration.

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Chapter 3
BIOS Setup

This chapter provides information on the BIOS Setup program and allows you to configure the system for optimum use.
You may need to run the Setup program when:

- An error message appears on the screen during the system booting up, and requests you to run SETUP.
- You want to change the default settings for customized features.

MSI
MICRO-STAR INTERNATIONAL

Entering Setup

Power on the computer and the system will start POST (Power On Self Test) process. When the message below appears on the screen, press <Del> key to enter Setup.

Press Del to enter SETUP

If the message disappears before you respond and you still wish to enter Setup, restart the system by turning it OFF and On or pressing the RESET button. You may also restart the system by simultaneously pressing <Ctrl>, <Alt>, and <Delete> keys.

Important

1. *The items under each BIOS category described in this chapter are under continuous update for better system performance. Therefore, the description may be slightly different from the latest BIOS and should be held for reference only.*
2. *Upon boot-up, the 1st line appearing after the memory count is the BIOS version. It is usually in the format:*

A9828IMS V1.0 081508 where:

1st digit refers to BIOS maker as A = AMI, W = AWARD, and P = PHOENIX.
2nd - 5th digit refers to the model number.
6th digit refers to the chipset as I = Intel, N = nVidia, and V = VIA.
7th - 8th digit refers to the customer as MS = all standard customers.
V1.0 refers to the BIOS version.
081508 refers to the date this BIOS was released.

Control Keys

<↑>	Move to the previous item
<↓>	Move to the next item
<←>	Move to the item in the left hand
<→>	Move to the item in the right hand
<Enter>	Select the item
<Esc>	Jumps to the Exit menu or returns to the main menu from a submenu
<+/PU>	Increase the numeric value or make changes
<-/PD>	Decrease the numeric value or make changes
<F6>	Load Optimized Defaults
<F7>	Load Fail-Safe Defaults
<F10>	Save configuration changes and exit setup

Getting Help

After entering the Setup menu, the first menu you will see is the Main Menu.

Main Menu

The main menu lists the setup functions you can make changes to. You can use the arrow keys (↑↓) to select the item. The on-line description of the highlighted setup function is displayed at the bottom of the screen.

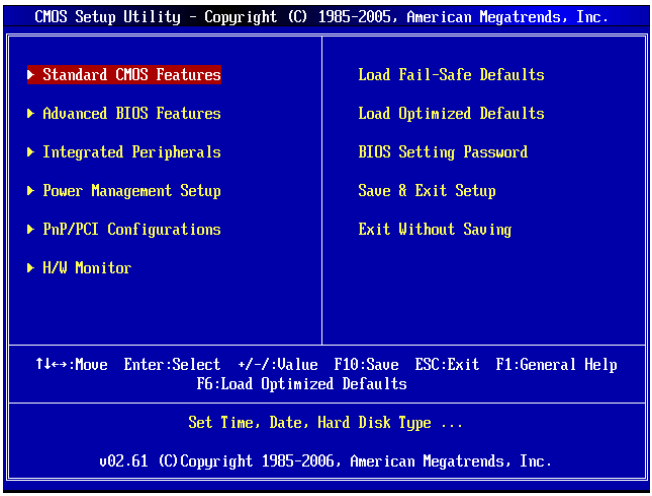
Sub-Menu

If you find a right pointer symbol (as shown in the right view) appears to the left of certain fields that means a sub-menu can be launched from this field. A sub-menu contains additional options for a field parameter. You can use arrow keys (↑↓) to highlight the field and press <Enter> to call up the sub-menu. Then you can use the control keys to enter values and move from field to field within a sub-menu. If you want to return to the main menu, just press the <Esc >.

General Help <F1>

The BIOS setup program provides a General Help screen. You can call up this screen from any menu by simply pressing <F1>. The Help screen lists the appropriate keys to use and the possible selections for the highlighted item. Press <Esc> to exit the Help screen.

The Main Menu



▶ Standard CMOS Features
Use this menu for basic system configurations, such as time, date etc.

▶ Advanced BIOS Features
Use this menu to setup the items of AMI® special enhanced features.

▶ Integrated Peripherals
Use this menu to specify your settings for integrated peripherals.

▶ Power Management Setup
Use this menu to specify your settings for power management.

▶ PnP/PCI Configurations
Use this menu to specify PnP/PCI settings.

▶ H/W Monitor
This entry shows your PC health status.

▶ Load Fail-Safe Defaults
Use this menu to load the default values set by the BIOS vendor for stable system performance.

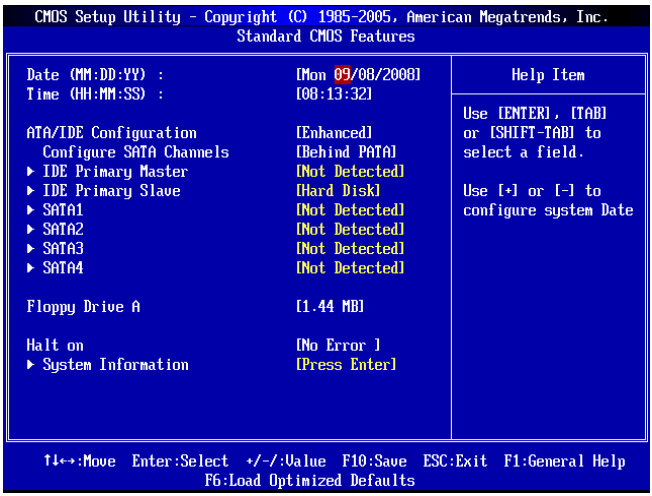
▶ Load Optimized Defaults
Use this menu to load the default values set by the mainboard manufacturer specifically for optimal performance of the mainboard.

▶ BIOS Setting Password
Use this menu to set the password for BIOS.

▶ Save & Exit Setup
Save changes to CMOS and exit setup.

▶ Exit Without Saving
Abandon all changes and exit setup.

Standard CMOS Features



▶ Date (MM:DD:YY)
This allows you to set the system to the date that you want (usually the current date). The format is <day> <month> <date> <year>.

day	Day of the week, from Sun to Sat, determined by BIOS. Read only.
month	The month from Jan. through Dec.
date	The date from 1 to 31 can be keyed by numeric function keys.
year	The year can be adjusted by users.

▶ Time (HH:MM:SS)
This allows you to set the system time that you want (usually the current time). The time format is <hour> <minute> <second>.

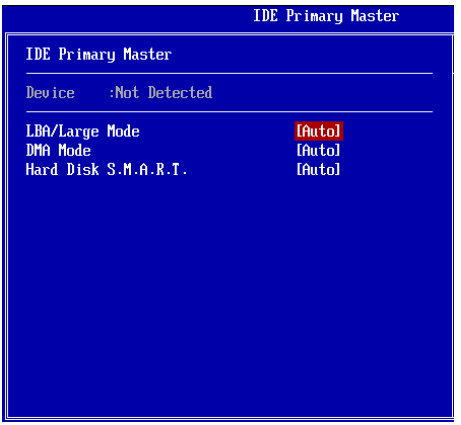
▶ ATA/IDE Configuration
This setting specifies the operation mode of the ATA/IDE device.

▶ Configure SATA Channels
This setting configures SATA channels.

▶ IDE Primary Master/Slave, SATA1/2/3/4

Important

*The **IDE Primary Master/Slave, SATA1/2/3/4** items appear when you connect hard disk drives to the IDE/SATA connectors on the mainboard.*



▶ Device, Vender, Size
These settings show the IDE/SATA device information. Read only.

▶ LBA/Large Mode
This setting allows you to enable or disable the LBA Mode. Setting to [Auto] enables LBA mode if the device supports it and has not been formatted with LBA mode disabled.

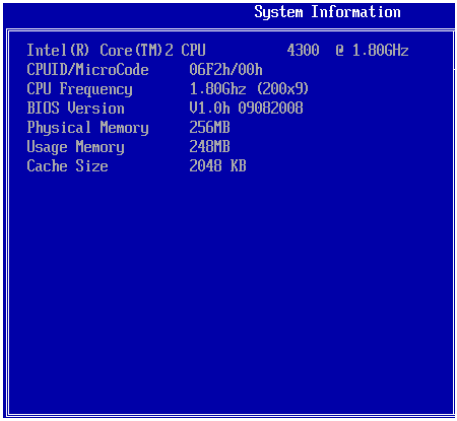
▶ DMA Mode
This setting specifies the DMA Mode.

▶ Hard Disk S.M.A.R.T.
This setting allows you to activate the S.M.A.R.T. (Self-Monitoring Analysis & Reporting Technology) capability for the hard disk drives. S.M.A.R.T is a utility that monitors your disk status to predict hard disk failure. This gives you an opportunity to move data from a hard disk that is going to fail to a safe place before the hard disk becomes off-line.

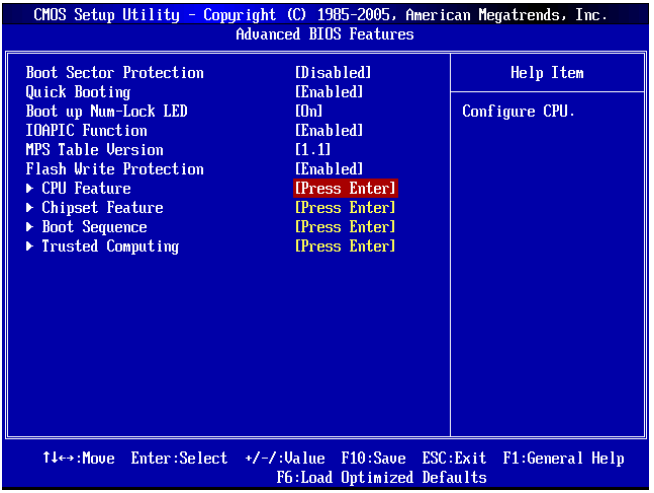
▶ Floppy Drive A
This setting allows you to set the type of floppy drives installed.

▶ Halt On
The setting determines whether the system will stop if an error is detected at boot. When the system stops for the errors preset, it will halt on for 15 seconds and then automatically resume its operation.

▶ System Information
These items show the CPU information, BIOS version and memory status of your system. Read only.



Advanced BIOS Features



▶ Boot Sector Protection
The item is to set the Virus Warning feature for IDE Hard Disk boot sector protection. If the function is enabled and any attempt to write data into this area is made, BIOS will display a warning message on screen and beep.

▶ Quick Booting
Setting the item to [Enabled] allows the system to boot within 5 seconds since it will skip some check items.

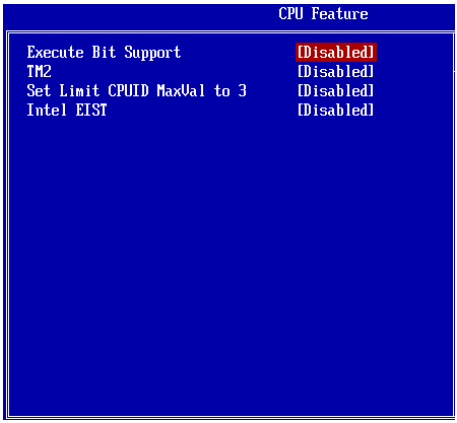
▶ Boot Up Num-Lock LED
This setting is to set the Num Lock status when the system is powered on. Setting to [On] will turn on the Num Lock key when the system is powered on. Setting to [Off] will allow users to use the arrow keys on the numeric keypad.

▶ IOAPIC Function
This field is used to enable or disable the APIC (Advanced Programmable Interrupt Controller). Due to compliance with PC2001 design guide, the system is able to run in APIC mode. Enabling APIC mode will expand available IRQ resources for the system.

▶ MPS Table Version
This field allows you to select which MPS (Multi-Processor Specification) version to be used for the operating system. You need to select the MPS version supported by your operating system. To find out which version to use, consult the vendor of your operating system.

▶ Flash Write Protection
This function protects the BIOS from accidental corruption by unauthorized users or computer viruses.

▶ CPU Feature



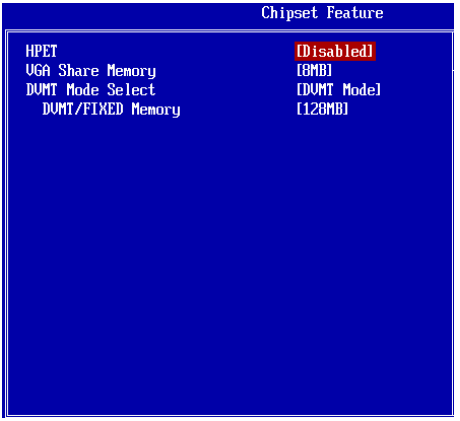
▶ Execute Bit Support
Intel's Execute Disable Bit functionality can prevent certain classes of malicious "buffer overflow" attacks when combined with a supporting operating system. This functionality allows the processor to classify areas in memory by where application code can execute and where it cannot. When a malicious worm attempts to insert code in the buffer, the processor disables code execution, preventing damage or worm propagation.

▶ TM2
Thermal Management throttles the processor back as it reaches its maximum operating temperature. Throttling reduces the number of processing cycles, thereby diminishing the heat dissipation of the CPU. This cools the unit. Once the CPU has reached a safe operating temperature, thermal throttling is automatically disabled, and normal full speed processing begins again.

▶ Set Limit CPUID MaxVal to 3
This setting sets Max CPUID extended function value to 3.

▶ Intel EIST
EIST (Enhanced Intel SpeedStep Technology) allows the system to dynamically adjust processor voltage and core frequency, which can result in decreased average power consumption and decreased average heat production.

▶ Chipset Feature



▶HPET

The High Precision Event Timer (HPET) was developed jointly by Intel and Microsoft to meet the timing requirements of multimedia and other time-sensitive applications. In addition to extending the capabilities and precision of a system, the HPET also improves system performance.

▶ VGA Share Memory

The system shares memory to the onboard VGA card. This setting controls the exact memory size shared to the VGA card.

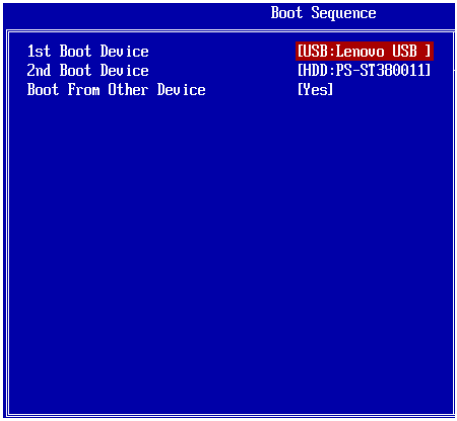
▶ DVMT Mode Select

Intel's Dynamic Video Memory Technology (DVMT) allows the system to dynamically allocate memory resources according to the demands of the system at any point in time. The key idea in DVMT is to improve the efficiency of the memory allocated to either system or graphics processor.
It is recommended that you set this BIOS feature to DVMT Mode for maximum performance. Setting it to DVMT Mode ensures that system memory is dynamically allocated for optimal balance between graphics and system performance.

▶ DVMT/FIXED Memory

When set to DVMT/FIXED Mode, the graphics driver will allocate a fixed amount of memory as dedicated graphics memory, as well as allow more system memory to be dynamically allocated between the graphics processor and the operating system.

▶ Boot Sequence



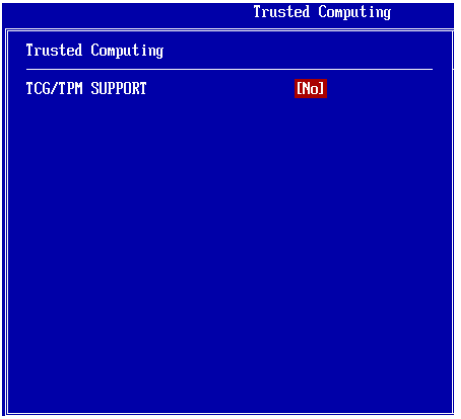
▶ 1st Boot Device, 2nd Boot Device

The items allow you to set the boot device where BIOS attempts to load the disk operating system.

▶ Boot From Other Device

Setting the option to [Yes] allows the system to try to boot from other device. if the system fails to boot from the 1st/2nd boot device.

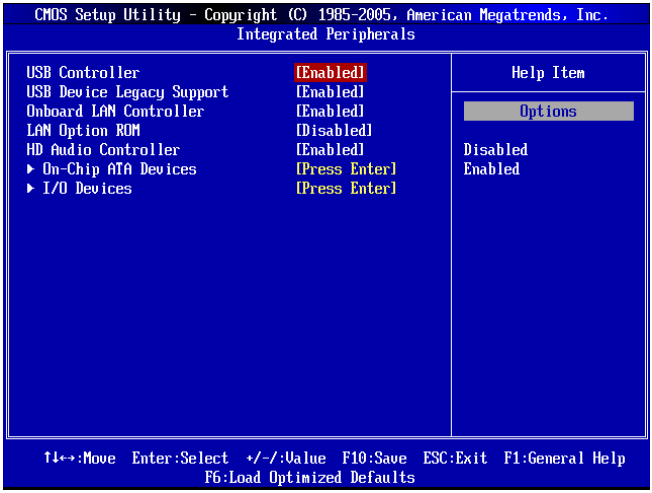
▶ Trusted Computing



▶ TCG/TPM Support

This setting controls the Trusted Platform Module (TPM) designed by the Trusted Computing Group (TCG). TPMs are special-purpose integrated circuits (ICs) built into a variety of platforms to enable strong user authentication and machine attestation—essential to prevent inappropriate access to confidential and sensitive information and to protect against *compromised networks.*

Integrated Peripherals



▶ USB Controller
This setting allows you to enable/disable the onboard USB 1.1/ 2.0 controller.

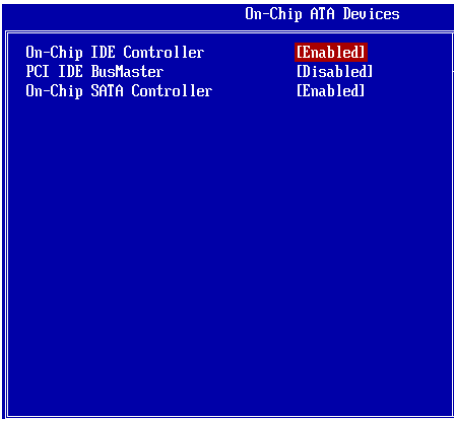
▶ USB Device Legacy Support
Set to [Enabled] if you need to use any USB 1.1/2.0 device in the operating system that does not support or have any USB 1.1/2.0 driver installed, such as DOS and SCO Unix. Set to [Disabled] only if you want to use any USB device other than the USB mouse.

▶ Onboard LAN Controller
This setting allows you to enable/disable the onboard LAN controller.

▶ LAN Option ROM
The items enable or disable the initialization of the onboard LAN Boot ROM during bootup. Selecting [Disabled] will speed up the boot process.

▶ HD Audio Controller
This setting controls the High Definition Audio interface.

▶ On-Chip ATA Devices



▶ On-Chip IDE Controller
This setting enables/disables the onchip IDE controller.

▶ PCI IDE BusMaster
Set this option to [Enabled] to specify that the IDE controller on the PCI local bus has bus mastering capability.

▶ On-Chip SATA Controller
This setting enables/disables the onchip SATA controller.

▶ I/O Devices

▶ COM Port 1, COM Port 2

These settings specify the base I/O port address and IRQ resource of the onboard serial ports.

▶ Parallel Port

This setting specifies the I/O port address of the onboard parallel port.

▶ Parallel Port Mode

This setting allows you to specify the operation mode of the parallel port.

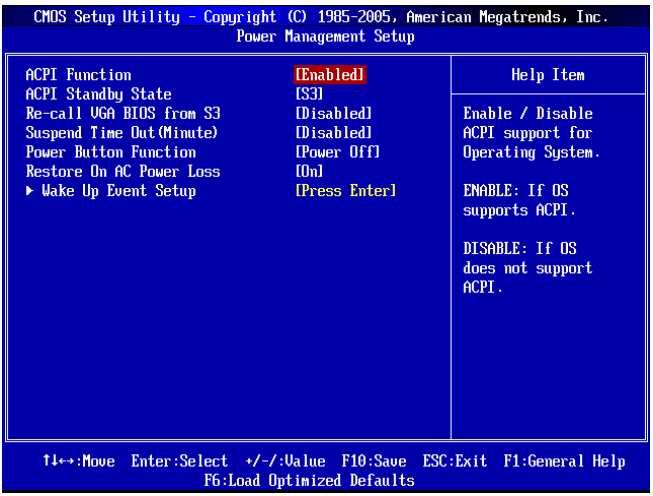
▶ Watch Dog

You can enable the system watch-dog timer, a hardware timer that generates either an NMI or a reset when the software that it monitors does not respond as expected each time the watch dog polls it.

▶ Watch Dog Timer

This setting specifies the Watch Dog Timer time out value.

Power Management Setup



Important

S3-related functions described in this section are available only when your BIOS supports S3 sleep mode.

▶ ACPI Function

This item is to activate the ACPI (Advanced Configuration and Power Management Interface) Function. If your operating system is ACPI-aware, such as Windows 98SE/ 2000/ME/ XP, select [Enabled].

▶ ACPI Standby State

This item specifies the power saving modes for ACPI function. If your operating system supports ACPI, such as Windows 2000/ XP, you can choose to enter the Standby mode in S1(POS) or S3(STR) fashion through the setting of this field.

▶ Recall VGA BIOS from S3

Selecting [Enabled] will make BIOS call VGA BIOS to initialize the VGA card when system wakes up (resume) from S3 state. The system resume time is shortened if you disable the function, but system will need AGP driver to initialize the card.

Therefore, if the AGP driver of the VGA card does not support the initialization feature, the display may work abnormally or not function after resuming from S3.

▶ Suspend Time Out (Minute)
After the selected period of system inactivity, the system automatically enters Suspend mode.

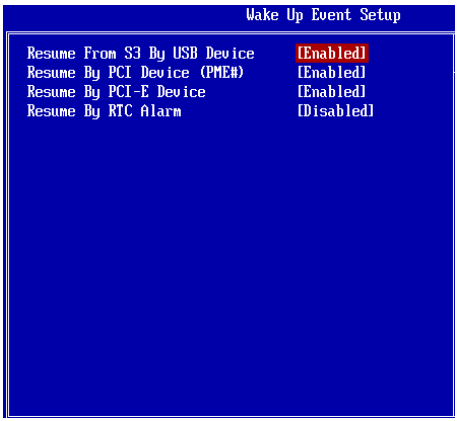
▶ Power Button Function
This feature sets the function of the power button. Settings are:

[Power On/Off]	The power button functions as normal power on/off button.
[Suspend]	When you press the power button, the computer enters the suspend/sleep mode, but if the button is pressed for more than four seconds, the computer is turned off.

▶ Restore On AC Power Loss
This item specifies whether your system will reboot after a power failure or interrupt occurs. Settings are:

[Off]	Always leaves the computer in the power off state.
[On]	Always leaves the computer in the power on state.
[Last State]	Restores the system to the status before power failure or interrupt occurred.

▶ Wake Up Event Setup



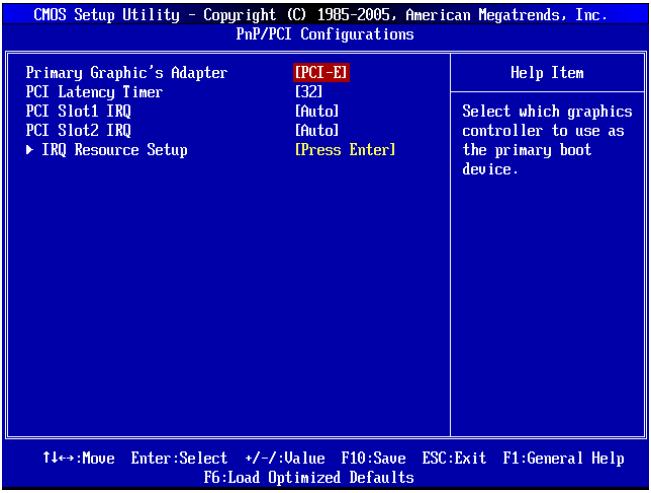
▶ Resume From S3 By USB Device
The item allows the activity of the USB device to wake up the system from S3 (Suspend to RAM) sleep state.

▶ Resume By PCI Device (PME#)
When set to [Enabled], the feature allows your system to be awakened from the power saving modes through any event on PME (Power Management Event).

▶ Resume By PCI-E Device
When set to [Enabled], the feature allows your system to be awakened from the power saving modes through any event on PCIE device.

▶ Resume By RTC Alarm
The field is used to enable or disable the feature of booting up the system on a scheduled time/date.

PnP/PCI Configurations

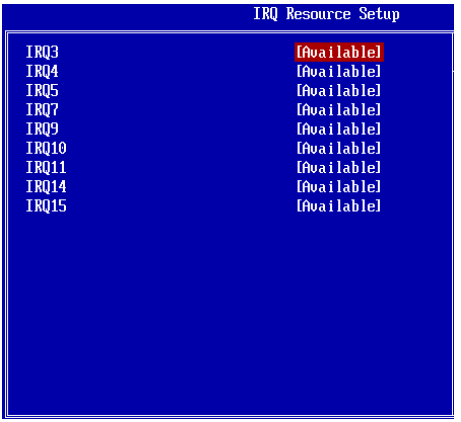


▶ Primary Graphic's Adapter
This setting specifies which graphic card is your primary graphics adapter.

▶ PCI Latency Timer
This item controls how long each PCI device can hold the bus before another takes over. When set to higher values, every PCI device can conduct transactions for a longer time and thus improve the effective PCI bandwidth. For better PCI performance, you should set the item to higher values.

▶ PCI Slot1 IRQ, PCI Slot2 IRQ
These settings specify the IRQ of the PCI slots.

▶ IRQ Resource Setup

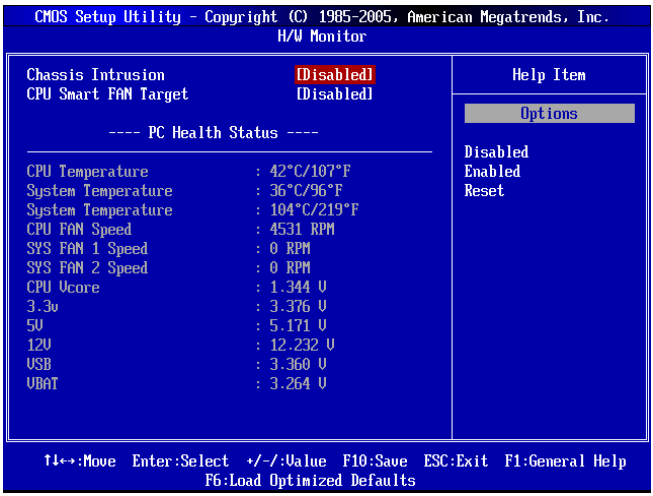


▶ IRQ 3/4/5/7/9/10/11/14/15

These items specify the bus where the specified IRQ line is used.

The settings determine if AMIBIOS should remove an IRQ from the pool of available IRQs passed to devices that are configurable by the system BIOS. The available IRQ pool is determined by reading the ESCD NVRAM. If more IRQs must be removed from the IRQ pool, the end user can use these settings to reserve the IRQ by assigning an [Reserved] setting to it. Onboard I/O is configured by AMIBIOS. All IRQs used by onboard I/O are configured as [Available]. If all IRQs are set to [Reserved], and IRQ 14/15 are allocated to the onboard PCI IDE, IRQ 9 will still be available for PCI and PnP devices.

H/W Monitor



▶ Chassis Intrusion

The field enables or disables the feature of recording the chassis intrusion status and issuing a warning message if the chassis is once opened. To clear the warning message, set the field to [Reset]. The setting of the field will automatically return to [Enabled] later.

▶ CPU Smart FAN Target

The mainboard provides the Smart Fan function which can control the CPU fan speed automatically depending on the current temperature to keep it within a specific range. You can select a fan target value here. If the current CPU fan temperature reaches to the target value, the smart fan function will be activated. It provides several sections to speed up for cooling down automatically.

▶ PC Health Status

These items display the current status of all of the monitored hardware devices/ components such as CPU voltage, temperatures and all fans' speeds.

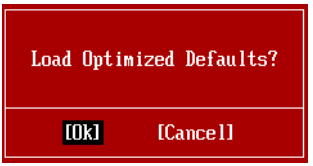
Load Fail-Safe / Optimized Defaults

The two options on the main menu allow users to restore all of the BIOS settings to the default Fail-Safe or Optimized values. The Optimized Defaults are the default values set by the mainboard manufacturer specifically for optimal performance of the mainboard. The Fail-Safe Defaults are the default values set by the BIOS vendor for stable system performance.

When you select Load Fail-Safe Defaults, a message as below appears:

Selecting Ok and pressing <Enter> loads the BIOS default values for the most stable, minimal system performance.

When you select Load Optimized Defaults, a message as below appears:



Selecting Ok and pressing <Enter> loads the default factory settings for optimal system performance.

BIOS Setting Password

When you select this function, a message as below will appear on the screen:

Type the password, up to six characters in length, and press <Enter>. The password typed now will replace any previously set password from CMOS memory. You will be prompted to confirm the password. Retype the password and press <Enter>. You may also press <Esc> to abort the selection and not enter a password.

To clear a set password, just press <Enter> when you are prompted to enter the password. A message will show up confirming the password will be disabled. Once the password is disabled, the system will boot and you can enter Setup without entering any password.

When a password has been set, you will be prompted to enter it every time you try to enter Setup. This prevents an unauthorized person from changing any part of your system configuration.

Chapter 4
System Resources

This chapter provides information on the following system resources:

MSI
MICRO-STAR INTERNATIONAL

Watch Dog Timer Setting

Software Code

```
SIO_IDX equ 4EH
SIO_DTAequ 4FH
Timer equ 10; reset after 10 seconds

1. Enter configuration mode
        Mov         dx, SIO_IDX
        mov         al, 87h
        out         dx, al
        out         dx, al

2. Set to LDN 07
        Mov         dx, SIO_IDX
        mov         al, 07h
        out         dx, al
        mov         dx, SIO_DTA
        mov         al, 07h
        out         dx, al

3. Set WatchDog Timer
        Mov         dx, SIO_IDX
        mov         al, 0f6h
        out         dx, al
        mov         dx, SIO_DTA
        mov         al, Timer
        out         dx, al

4. Exit configuration mode
        Mov         dx, SIO_IDX
        mov         al, 0AAh
        out         dx, al
```

AMI POST Code

Bootblock Recovery Code Checkpoints

The Bootblock recovery code gets control when the BIOS determines that a BIOS recovery needs to occur because the user has forced the update or the BIOS checksum is corrupt. The following table describes the type of checkpoints that may occur during the Bootblock recovery portion of the BIOS:

Checkpoint	Description
E0	Initialize the floppy controller in the super I/O. Some interrupt vectors are initialized. DMA controller is initialized. 8259 interrupt controller is initialized. L1 cache is enabled.
E9	Set up floppy controller and data. Attempt to read from floppy.
EA	Enable ATAPI hardware. Attempt to read from ARMD and ATAPI CDROM.
EB	Disable ATAPI hardware. Jump back to checkpoint E9.
EF	Read error occurred on media. Jump back to checkpoint EB.
E9 or EA	Determine information about root directory of recovery media.
F0	Search for pre-defined recovery file name in root directory.
F1	Recovery file not found.
F2	Start reading FAT table and analyze FAT to find the clusters occupied by the recovery file.
F3	Start reading the recovery file cluster by cluster.
F5	Disable L1 cache.
FA	Check the validity of the recovery file configuration to the current configuration of the flash part.
FB	Make flash write enabled through chipset and OEM specific method. Detect proper flash part. Verify that the found flash part size equals the recovery file size.
F4	The recovery file size does not equal the found flash part size.
FC	Erase the flash part.
FD	Program the flash part.
FF	The flash has been updated successfully. Make flash write disabled. Disable ATAPI hardware. Restore CPUID value back into register. Give control to F000 ROM at F000:FFF0h.

POST Code Checkpoints

The POST code checkpoints are the largest set of checkpoints during the BIOS pre-boot process. The following table describes the type of checkpoints that may occur during the POST portion of the BIOS:

Checkpoint	Description
03	Disable NMI, Parity, video for EGA, and DMA controllers. Initialize BIOS, POST, Runtime data area. Also initialize BIOS modules on POST entry and GPNV area. Initialized CMOS as mentioned in the Kernel Variable "wCMOSFlags."
04	Check CMOS diagnostic byte to determine if battery power is OK and CMOS checksum is OK. Verify CMOS checksum manually by reading storage area. If the CMOS checksum is bad, update CMOS with power-on default values and clear passwords. Initialize status register A. Initializes data variables that are based on CMOS setup questions. Initializes both the 8259 compatible PICs in the system
05	Initializes the interrupt controlling hardware (generally PIC) and interrupt vector table.
06	Do R/W test to CH-2 count reg. Initialize CH-0 as system timer. Install the POSTINT1Ch handler. Enable IRQ-0 in PIC for system timer interrupt. Traps INT1Ch vector to "POSTINT1ChHandlerBlock."
08	Initializes the CPU. The BAT test is being done on KBC. Program the keyboard controller command byte is being done after Auto detection of KB/MS using AMI KB-5.
0A	Initializes the 8042 compatible Key Board Controller.
0B	Detects the presence of PS/2 mouse.
0C	Detects the presence of Keyboard in KBC port.
0E	Testing and initialization of different Input Devices. Also, update the Kernel Variables. Traps the INT09h vector, so that the POST INT09h handler gets control for IRQ1. Uncompress all available language, BIOS logo, and Silent logo modules.

Checkpoint	Description
13	Early POST initialization of chipset registers.
24	Uncompress and initialize any platform specific BIOS modules.
30	Initialize System Management Interrupt.
2A	Initializes different devices through DIM. See *DIM Code Checkpoints* section of document for more information.
2C	Initializes different devices. Detects and initializes the video adapter installed in the system that have optional ROMs.
2E	Initializes all the output devices.
31	Allocate memory for ADM module and uncompress it. Give control to ADM module for initialization. Initialize language and font modules for ADM. Activate ADM module.
33	Initializes the silent boot module. Set the window for displaying text information.
37	Displaying sign-on message, CPU information, setup key message, and any OEM specific information.
38	Initializes different devices through DIM. See *DIM Code Checkpoints* section of document for more information.
39	Initializes DMAC-1 & DMAC-2.
3A	Initialize RTC date/time.
3B	Test for total memory installed in the system. Also, Check for DEL or ESC keys to limit memory test. Display total memory in the system.
3C	Mid POST initialization of chipset registers.
40	Detect different devices (Parallel ports, serial ports, and coprocessor in CPU, … etc.) successfully installed in the system and update the BDA, EBDA…etc.
50	Programming the memory hole or any kind of implementation that needs an adjustment in system RAM size if needed.
52	Updates CMOS memory size from memory found in memory test. Allocates memory for Extended BIOS Data Area from base memory.
60	Initializes NUM-LOCK status and programs the KBD typematic rate.
75	Initialize Int-13 and prepare for IPL detection.
78	Initializes IPL devices controlled by BIOS and option ROMs.
7A	Initializes remaining option ROMs.
7C	Generate and write contents of ESCD in NVRam.
84	Log errors encountered during POST.
85	Display errors to the user and gets the user response for error.
87	Execute BIOS setup if needed / requested.
8C	Late POST initialization of chipset registers.
8E	Program the peripheral parameters. Enable/Disable NMI as selected
90	Late POST initialization of system management interrupt.
A0	Check boot password if installed.
A1	Clean-up work needed before booting to OS.
A2	Takes care of runtime image preparation for different BIOS modules. Fill the free area in F000h segment with 0FFh.

	Initializes the Microsoft IRQ Routing Table. Prepares the runtime language module. Disables the system configuration display if needed.
A4	Initialize runtime language module.
A7	Displays the system configuration screen if enabled. Initialize the CPU's before boot, which includes the programming of the MTRR's.
A8	Prepare CPU for OS boot including final MTRR values.
A9	Wait for user input at config display if needed.
AA	Uninstall POST INT1Ch vector and INT09h vector. Deinitializes the ADM module.
AB	Prepare BBS for Int 19 boot.
AC	End of POST initialization of chipset registers.
B1	Save system context for ACPI.
00	Passes control to OS Loader (typically INT19h).

Resource List

ICH7 GPIO

PIN	GPIO	TYPE	MULTI	POWER	CONNECTION
AB18	0	I/O	Unmultiplexed#	3.3V	GPI0 (PULL HIGH)
C8	1	I/O	REQ5#	5V	PREQ#5
G8	2	I/OD	PIRQE#	5V	GPIO2 (PULL HIGH)
F7	3	I/OD	PIRQF#	5V	GPIO3 (PULL HIGH)
F8	4	I/OD	PIRQG#	5V	GPIO4 (PULL HIGH)
G7	5	I/OD	PIRQH#	5V	GPIO5 (PULL HIGH)
AC21	6	I/O	Unmultiplexed	3.3V	ATADET0
AC18	7	I/O	CLEAR CMOS	3.3V	GPIO7 (PULL HIGH)
E21	8	I/O	Unmultiplexed	3.3V	POWER LED SW
E20	9	I/O	Unmultiplexed	3.3V	GPIO9 (PULL HIGH)
A20	10	I/O	Unmultiplexed	3.3V	GPIO10 (PULL HIGH)
B23	11	I/O	SMBALERT#	3.3V	SMB_ALERT#
F19	12	I/O	Unmultiplexed	3.3V	SIO_PME#
E19	13	I/O	Unmultiplexed	3.3V	GPIO13 (PULL HIGH)
R4	14	I/O	Unmultiplexed	3.3V	GPIO14 (PULL HIGH)
E22	15	I/O	Unmultiplexed	3.3V	GPIO15 (PULL HIGH)
AC22	16	I/O	Unmultiplexed	3.3V	GPIO16(INTERNAL HI)
D8	17	I/O	GNT5#	3.3V	PGNT5#
AC20	18	I/O	Unmultiplexed	3.3V	NC
AH18	19	I/O	SATA_1GP	3.3V	PULL HIGH
AF21	20	I/O	Unmultiplexed	3.3V	NC
AF19	21	I/O	SATA_0GP	3.3V	PULL HIGH
A13	22	I/O	REQ4#	3.3V	PREQ#4
AA5	23	I/O	LDRQ_1#	3.3V	PULL HIGH 3.3V (Multifunction Pin)
R3	24	I/O	Unmultiplexed	3.3V	Unused
D20	25	I/O	Unmultiplexed	3.3V	Unused
A21	26	I/O	Unmultiplexed	3.3V	Unused (Multifunction Pin)
B21	27	I/O	Unmultiplexed	3.3V	Unused (Multifunction Pin)
E23	28	I/O	Unmultiplexed	3.3V	NC
C3	29	I/O	OC5#	3.3V	USB_OCP#2

PIN	GPIO	TYPE	MULTI	POWER	CONNECTION
A2	30	I/O	OC6#	3.3V	USB_OCP#3
B3	31	I/O	OC7#	3.3V	USB_OCP#3
AG18	32	I/O	Unmultiplexed	3.3V	NC
AC19	33	I/O	Unmultiplexed	3.3V	NC
U2	34	I/O	Unmultiplexed	3.3V	NC
AD21	35	I/O	SATACLKREQ#	3.3V	NC
AH19	36	I/O	SATA2GP	3.3V	PULL HIGH
AE19	37	I/O	SATA3GP	3.3V	PULL HIGH
AD20	38	I/O	Unmultiplexed	3.3V	GPIO38 (PULL DOWN)
AE20	39	I/O	Unmultiplexed	3.3V	GPIO39 (PULL HIGH)
A14	48	I/O	GNT4#	3.3V	PGNT4 (INTERNAL HI)
AG24	49	I/O	CPUPWRGD	3.3V	H_PWRGD

SIO GPIO

NAME	PIN	FUNCTION	TYPE	PWR
GP0	49	MCH_BSEL0	O12	VSB
GP1	50	MCH_BSEL1	O12	VSB
GP3	52	Unused(multifunction pin)	O12	VSB
GP4	53	Unused (multifunction pin)	O12	VSB
GP5	54	Unused (multifunction pin)	I/OOD12t	VSB
GP6	55	SKTOCC# (multifunction pin)	I/OOD12t	VSB
GP7	56	WDT#	OD12-5v	VSB
GP10	59	SPI_CLK (multifunction pin)	O12	VSB
GP11	60	SPI_CS0# (multifunction pin)	O12	VSB
GP12	61	MISO (multifunction pin)	INt 5 v	VSB
GP13	62	MOSI	O12	VSB
GP14	63	Unused (multifunction pin)	O12	VSB
GP15	64	LED_VSB	OD12	VSB
GP16	65	LED_VCC	OD12	VSB
GP17	66	Unused (multifunction pin)	I/OOD12t	VSB
GP20	74	PLTRST_BU1#	OD12	VSB
GP21	75	PLTRST_BU2#	O12	VSB
GP22	76	PLTRST_BU3#	O12	VSB
GP23	77	RSTCON# (multifunction pin)	OD12	VSB
GP24	78	ATX_PWR_OK	AIN	VSB
GP25	79	SIO_PME# (multifunction pin)	OD12-5v	VSB
GP26	80	PSIN	INts5v	VSB
GP27	81	PSOUT#	OD12	VSB
GP30	82	SLP_S3#	I/OOD12t	VSB
GP31	83	PSON#	OD12-5v	VSB
GP32	84	Unused(multifunction pin)	OD12	VSB
GP33	85	RSMRST#	OD12	VBAT
GP40	25	SYS_FAN2	INt s5v	VCC
GP41	26	SYS_FAN2_CTL	OD12-5v	VCC
GP42	27	Unused(multifunction pin)	I/OOD12t	VCC
GP43	28	Unused(multifunction pin)	I/OOD12t	VSB