MX4LR-GN
MX4GVR-GN

Online Manual

DOC. NO.: MX4LRGN-OL-E0302A

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Hardware Installation

Drivers & Utilities

AWARD BIOS Setup

Glossary

Troubleshooting & Technical Support

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What's in this manual

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Before You Start

This Online Manual will introduce to the user how this product is installed. All useful information will be described in later chapters. Please keep this manual carefully for future upgrades or system configuration changes. This Online Manual is saved in PDF format, we recommend using Adobe Acrobat Reader 5.0 for online viewing, it is included in Bonus CD disc or you can get free download from Adobe web site.

Although this Online Manual is optimized for screen viewing, it is still capable for hardcopy printing, you can print it by A4 paper size and set 2 pages per A4 sheet on your printer. To do so, choose **File > Page Setup** and follow the instruction of your printer driver.

Thanks for the help of saving our earth.

Overview

Thank you for choosing AOpen MX4LR-GN / MX4GVR-GN motherboard. The MX4LR-GN is Intel® Socket 478 motherboard (M/B) based on the ATX form factor featuring the Intel® 845GL chipset, and the MX4GVR-GN is based on Intel® 845GV chipset. As high performance chipset built in the M/B, the MX4LR-GN motherboard can support Intel® Socket 478 Pentium® 4 and 400 MHz Front Side Bus (FSB) clock, and the MX4GVR-GN supports 533 MHz FSB. According to different customer's requirements, the Intel 845GL / 845GV chipset memory interface supports DDR266 SDRAM devices with densities of 64, 128, 256, 512Mb DDR SDRAM DIMM modules and the maximum memory size can be up to 2 GB. The onboard IDE controller supports Ultra DMA 33/66/100 mode and the transfer rate up to 100MB/s.The MX4LR-GN / MX4GVR-GN integrates Intel® Extreme Graphics with revolutionary graphics architecture and proven reliability. Besides, the MX4LR-GN / MX4GVR-GN has an AC97 CODEC chipset onboard, providing high performance and magic surround stereo sound to let people enjoy working with it. Now, let's enjoy all features from AOpen MX4LR-GN / MX4GVR-GN motherboard.
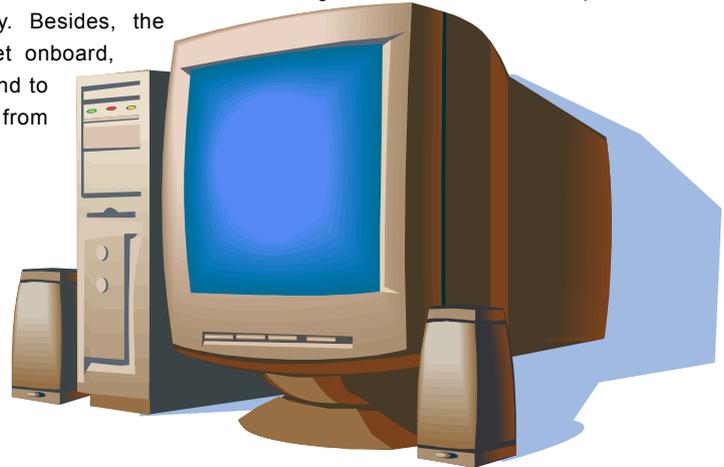
Feature Highlight

CPU

Supports Intel® Socket 478 Pentium® 4 1.4GHz~3.06GHz+ with 400MHz Front Side Bus (FSB)(MX4GVR-GN supports 533MHz FSB) designed for Socket 478 technology.

Chipset

With the Intel® 845GL / 845GV chipset, Intel delivers a discrete graphics solution with all the performance, innovative features and proven reliability of the Intel® 845GL / 845GV chipset. With its highly scalable design, the new 845GL / 845GV chipset offers an ideal Multiplexed Intel DVO Port for Intel® Pentium® 4 processor platforms. And the smart integration in the Intel 845GL / 845GV chipset's I/O Controller Hub (ICH4) features USB controllers supporting six USB 2.0 ports. With support for AC'97 audio and the ability to make the most of soft audio/modem technology, the Intel® 845GL / 845GV chipset delivers an ideal solution for innovative new form factors.

Expansion Slots

Provides three 32-bit/33MHz PCI. The PCI local bus throughput can be up to 132MB/s and all the three PCI slots are master slots with arbitration and decoding for all integrated functions and LPC bus.

Memory

Provides two 184-pin DDR SDRAM DIMM sockets that support up to 2GB of PC-266 compliant DDR SDRAM (Synchronous Dynamic Random Access Memory).You may install 64, 128, 256, 512Mb DDR SDRAM DIMM modules into each socket.

Ultra DMA 33/66/100 Bus Master IDE

Comes with an on-board PCI Bus Master IDE controller with two connectors that supports four IDE devices in two channels, supports Ultra DMA 33/66/100, PIO Modes 3 and 4 and Bus Master IDE DMA Mode 5, and supports Enhanced IDE devices.

On-board AC'97 Sound

MX4LR-GN / MX4GVR-GN use the AC97 sound chip. This on-board audio includes a complete audio recording and playback system.

1MHz Stepping Frequency Adjustment

Provides "1MHz Stepping Frequency Adjustment" function in the BIOS. This magic function allows you adjust FSB frequency from 100~255 by 1MHz stepping adjustment, and lets your system can get maximum performance.

Watch Dog ABS

Includes AOpen "Watch Dog ABS" function that can auto-reset default settings in 4.8 seconds when you fail to system overclocking.

Six USB 2.0 Ports

Provides four ports, one USB 2.0 connector for USB interface devices, such as mouse, keyboard, modem, scanner, etc.

Power Management/Plug and Play

Supports the power management function that confirms to the power-saving standards of the U.S. Environmental Protection Agency (EPA) Energy Star program. It also offers Plug-and-Play, which helps save users from configuration problems, thus making the system much user-friendlier.

Hardware Monitoring Management

Supports CPU or system fans status, temperature and voltage monitoring and alert, through the on-board hardware monitor module.

Enhanced ACPI

Fully implement the ACPI standard for Windows$^{®}$ 98/ME/2000/XP series compatibility, and supports Soft-Off, STR (Suspend to RAM, S3), STD (Suspend to Disk, S4) features.

Super Multi-I/O

Provides two high-speed UART compatible serial ports and one parallel port with EPP and ECP capabilities. UART can also be directed from COM1 to the Infrared Module for the wireless connections.

Quick Installation Procedure

This page gives you a quick procedure on how to install your system. Follow each step accordingly.

1. Installing CPU and Fan

2. Installing System Memory (DIMM)

3. Connecting Front Panel Cable

4. Connecting IDE and Floppy Cable

5. Connecting ATX Power Cable

6. Connecting Back Panel Cable

7. Power-on and Load BIOS Setup Default

8. Reboot

9. Installing Operating System (such as Windows XP)

10. Installing Driver and Utility

Motherboard Map

CD-IN Connector
AUX-IN Connector

Onboard AC'97 CODEC
Realtek RTL8101L LAN Chip
Front Audio Connector

Game Port Connector

32-bit PCI Expansion Slot x3

IrDA Connector

Case Open Connector
JP14 CMOS Clear Jumper
USB 2.0 Connector

SYSFAN3 Connector

Front Panel Connector

4Mbit Flash ROM BIOS

ATA 66/100 IDE Connector x2

PC99 Colored Back Panel

4-pin 12V. ATX Power Connector
JP28 Mouse/Keyboard Wakeup
Resettable Fuse
2200 μ F Low ESR Capacitors
COM2 Connector
SYSFAN2 Connector
FDD Connector
478-pin CPU socket with Voltage
and Frequency Auto-detection that
supports Intel® Pentium® 4
1.4~2.4GHz+ CPU

Intel 845GL chipset

CPUFan1 Connector

184-pin DIMMx2
supports DDR266 (Max. to 2GB)

ATX Power Connector

PS. Here we use MX4LR-GN motherboard as illustration.

Block Diagram

PC-266 DDR SDRAM
Up to 2GB

DIMM Socket x2

32-bit PCI Slot x3

Socket 478
Intel Pentium 4
CPU

400MHz /533MHz
System Bus

Intel
845GL MCH
845 GV GMCH

PCI Bus

ATA
33/66100

Primary
Channel

Secondary
Channel

IDE Drive x4

Intel ICH4

RealTek
AC97
CODEC

RealTek
RTL8101L

LAN connect Component

USB2.0
Connector x6

1st USB Port

2nd USB Port

3rd USB Port

Low Pin
Count
Super
I/O

4Mbit Flash EEPROM

Parallel Port

Serial Port x2

Floppy Disk Drive x2

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Hardware Installation

This chapter describes jumpers, connectors and hardware devices of this motherboard.

Note: Electrostatic discharge (ESD) can damage your processor, disk drives, expansion boards, and other components. Always observe the following precautions before you install a system component.

1. Do not remove a component from its protective packaging until you are ready to install it.

2. Wear a wrist ground strap and attach it to a metal part of the system unit before handling a component. If a wrist strap is not available, maintain contact with the system unit throughout any procedure requiring ESD protection.

About "Optional" and "Upgrade Optional"...

When you read this online manual and start to assemble your computer system, you may find some of functions are called "Optional", and some are called "Upgrade Optional". Though all AOpen motherboards include many amazing and powerful features, in some situations, these powerful features are not used to every user. Hence, we changed some key features as "Optional" for you to choose. Some optional functions that can be upgraded by users, we call them "Upgrade Optional". As for those optional functions that can't be upgraded by ourselves, we call them "Optional". If needed, you can contact our local distributors or resellers for purchasing "Upgrade Optional" components, and again you can visit AOpen official web site: www.aopen.com for more detail information.

JP14 Clear CMOS Data

You can clear CMOS to restore system default setting. To clear the CMOS, follow the procedure below.

1.   Turn off the system and unplug the AC power.

2.   Remove ATX power cable from connector PWR2.

3.   Locate JP14 and short pins 2-3 for a few seconds.

4.   Return JP14 to its normal setting by shorting pins 1 & pin2.

5.   Connect ATX power cable back to connector PWR2.

Pin 1

1   1
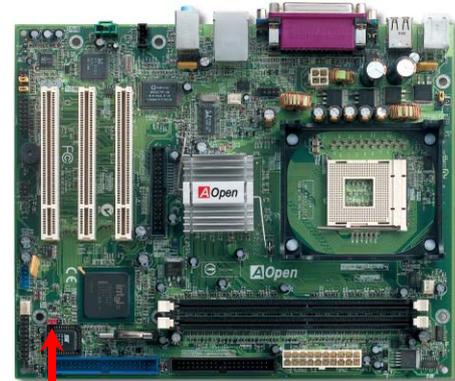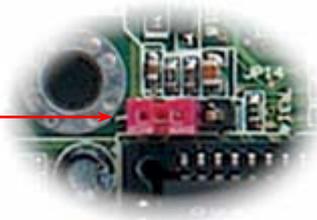
Normal   Clear
(default)   CMOS

Tip: When should I Clear CMOS?

1. Boot fail because of overclocking…

2. Forget password…

3. Troubleshooting…

CPU Installation

This motherboard supports Intel® Pentium 4 Socket 478 series CPU. Be careful of CPU orientation when you plug it into CPU socket.

1. Pull up the CPU socket lever and up to 90-degree angle.

2. Locate Pin 1 in the socket and look for a cut edge on the CPU upper interface. Match Pin 1 and cut edge, then insert the CPU into the socket.

CPU socket Lever

CPU pin 1 and cut edge
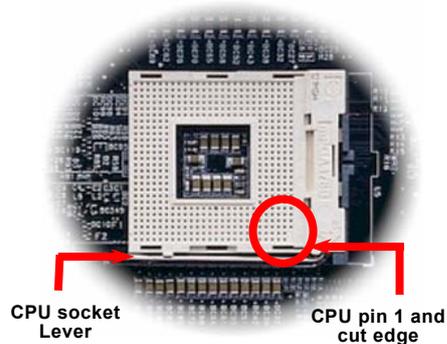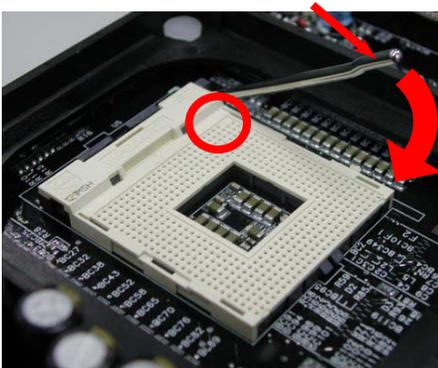
CPU cut edge

Note: These pictures are for example only, it may not exactly be the same motherboard.

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3. Press down the CPU socket lever and finish CPU installation.
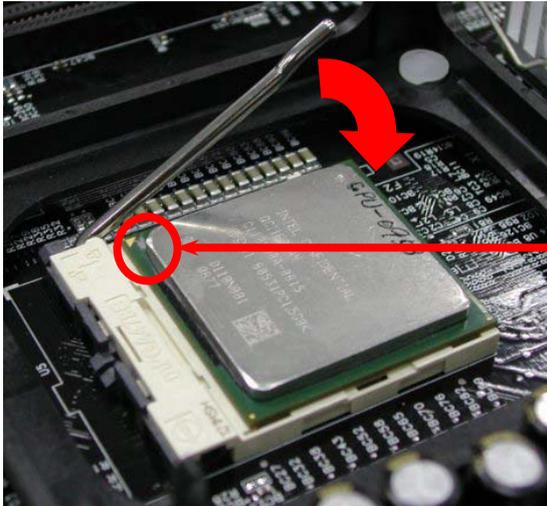
CPU cut edge

Note: If you do not match the CPU socket Pin 1 and CPU cut edge well, it may damage the CPU.

Note: This socket supports Micro-FC-PGA2 package CPU, which is the latest CPU package developed by Intel. Other forms of CPU package are impossible to be fitted in.

Note: This picture is for example only, it may not exactly be the same motherboard.

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CPU Fan Installation

This motherboard comes with a retention module attached on the CPU socket when shipped, we strongly recommend you to install AOpen special designed CPU Fan as shown below on the retention module for better heat dissipation. Please install the CPU Fan correctly as the following pictures shown.

1. Gently put the CPU Fan down on the retention module with clips aligning correctly to the four corners.
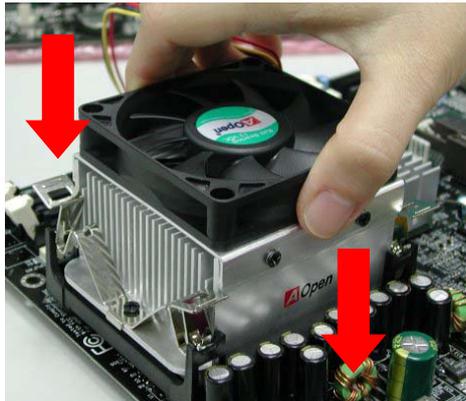
2. Pressing down the four clips with force one by one on the retention module.

Clip

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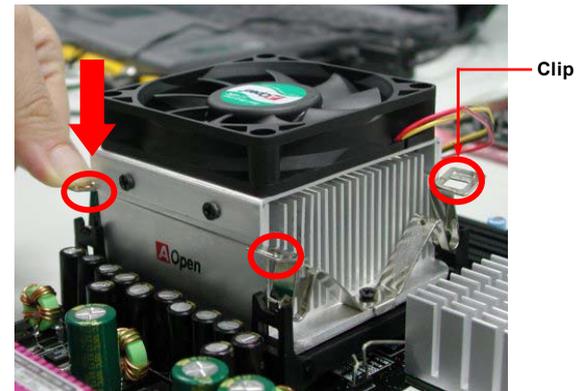
CPU Jumper-less Design

CPU VID signal and SMbus clock generator provide CPU voltage auto-detection and allows the user to set the CPU frequency through the BIOS setup, therefore no jumpers or switches are used. The disadvantages of the Pentium based jumper-less designs are eliminated. There will be no worry of wrong CPU voltage detection.

```
                           ┌─────────────┐        ┌─────────────┐
                           │Clock Generator│       │             │
  ┌─────────────┐          └─────────────┘        │    BIOS     │
  │             │ ◄──────────────                  │             │
  │Intel® Socket 478│                              │  Controlled │
  │             │ ◄────────────────────────────    │             │
  │Pentium 4 CPU│          CPU Freq. Ratio         │   Circuit   │
  └─────────────┘                                  │             │
      │     ▲                                       └─────────────┘
      ▼     │
 CPU VID signal  CPU voltage
  ┌─────────────┐
  │Power Regulator│
  └─────────────┘
```

(Automatically generates CPU voltage)
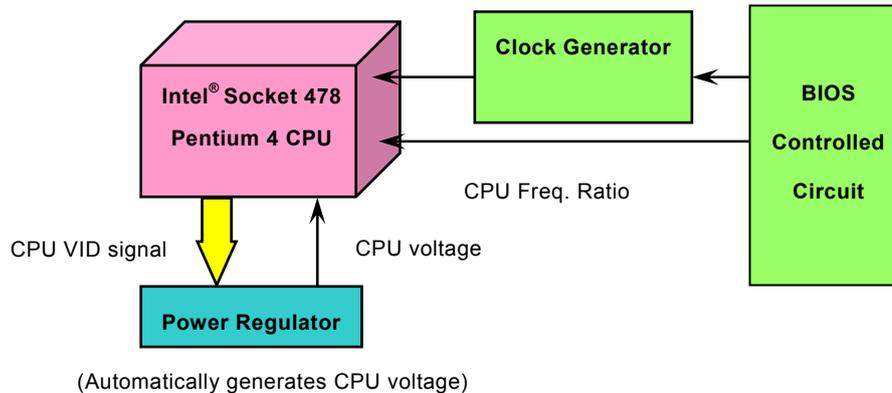
AOpen "Watch Dog ABS"

With this motherboard, AOpen provides a very special, useful feature for overclockers. When you power-on the system, the BIOS will check last system POST status. If it succeeded, the BIOS will enable "Watch Dog ABS" function immediately, and set the CPU FSB frequency by user's setting that stored in the BIOS. If system failed in BIOS POST, the "Watch Dog ABS" will reset the system to reboot in five seconds. Then, BIOS will detect the CPU's default frequency and POST again. With this special feature, you can easily overclock your system to get higher system performance, and without removing the cover of system housing to set the jumper to clear CMOS data when your system hanged.

Enable/Disable Signal
from BIOS

```
┌──────────────┐           ┌──────────────┐
│  AOpen       │           │    BIOS      │
│  Watch Dog   │           └──────────────┘
│  ABS         │              Reset Signal
└──────────────┘           ┌──────────────┐
  Countdown about          │Clock Generator│      CPU ID Signal
  5 seconds if fails       └──────────────┘
  in POST                  ┌──────────────┐
                           │    CPU       │
                           └──────────────┘
```
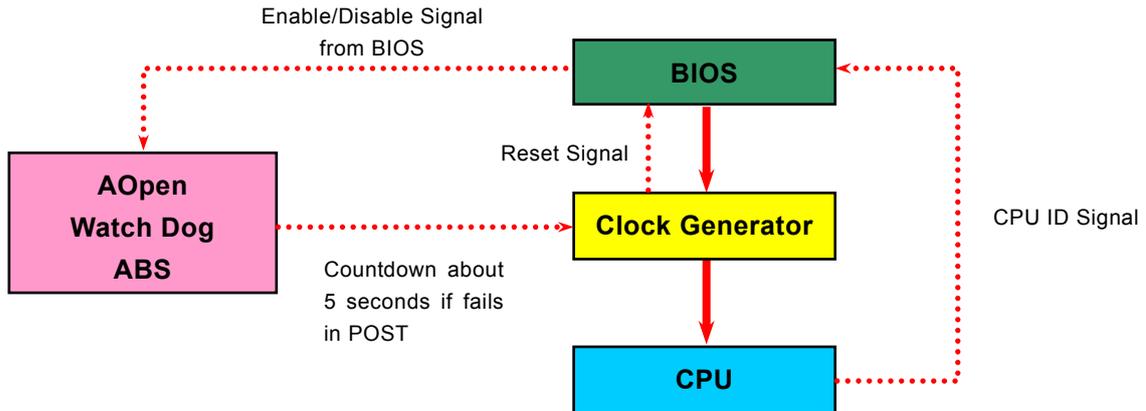
Setting CPU Frequency

BIOS Setup > Frequency/Voltage Control > CPU Clock Setting

This motherboard is CPU jumper-less design, you can set CPU frequency through the BIOS setup, and no jumpers or switches are needed.

CPU Ratio	8x, 9x, 10x,…22x, 23x, 24x
CPU FSB	100~255MHz

Home

Tip: If your system hangs or fails to boot because of overclocking, simply use <Home> key to restore the default setting or you can wait the AOpen "Watch Dog Timer" reset the system after five seconds and system will auto-detect hardware again.

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Core Frequency = CPU FSB Clock * CPU Ratio

PCI Clock = CPU FSB Clock / Clock Ratio

EV6 Bus Speed = CPU external bus clock x 2

Warning: Intel®845GL chipset supports maximum 400MHz (100MHz x 4) system bus and 66MHz AGP clock; Intel®845GV chipset supports maximum 533Hz (133MHz x 4) system bus and 66MHz AGP clock, higher clock setting may cause serious system damage.

Warning: To avoid possible CPU damage caused by overheating, an automatic shutdown of system had been especially designed on this motherboard. System would be automatically power off when this motherboard with implementation of THERMTRIP circuit detected a CPU temperature above 135 degree.

MX4LR-GN(100MHz x 4)				
CPU	CPU Core Frequency	FSB Clock	System Bus	Ratio
Celeron 1.7G	1700MHz	100MHz	400MHz	17x
Celeron 1.8G	1800MHz	100MHz	400MHz	18x
Celeron 2.0G	2000MHz	100MHz	400MHz	20x
Pentium 4 1.6G	1600MHz	100MHz	400MHz	16x
Pentium 4 1.7G	1700MHz	100MHz	400MHz	17x
Pentium 4 1.8G	1800MHz	100MHz	400MHz	18x
Pentium 4 1.9G	1900MHz	100MHz	400MHz	19x
Pentium 4 2.0G	2000MHz	100MHz	400MHz	20x
Pentium 4 2.2G	2200MHz	100MHz	400MHz	22x
Pentium 4 2.4G	2400MHz	100MHz	400MHz	24x
MX4GVR-GN(133MHz x 4)				
CPU	CPU Core Frequency	FSB Clock	System Bus	Ratio
Pentium 4 2.4G	2400MHz	133MHz	533MHz	18x
Pentium 4 2.53G	2530MHz	133MHz	533MHz	19x
Pentium 4 2.66G	2660MHz	133MHz	533MHz	20x
Pentium 4 2.80G	2800MHz	133MHz	533MHz	21x
Pentium 4 3.06G	3060MHz	133MHz	533MHz	23x

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CPU and System Fan Connector (with H/W Monitoring)

Plug in the CPU fan cable to the 3-pin **CPU FAN** connector. If you have chassis fan, you can also plug it on **System Fan** (FAN2) or **FAN3** (AUX Fan) connector.

GND
+12V
SENSOR
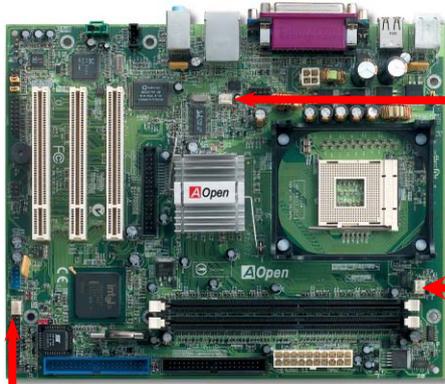
SYSFAN2 Connector

GND
+12V
SENSOR
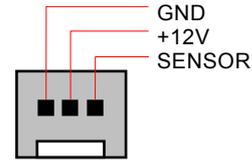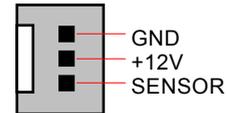
CPUFAN1 Connector

GND
+12V
SENSOR
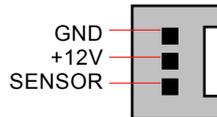
Note: Some CPU fans do not have sensor pin, so that cannot support hardware monitoring function.

SYSFAN3 Connector

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JP28 Keyboard/Mouse Wake-up Enable/Disable Jumper

This motherboard provides keyboard / mouse wake-up function. You can use JP28 to enable or disable this function, which could resume your system from suspend mode with keyboard or mouse installed. The factory default setting is set to "Disable"(1-2), and you may enable this function by setting the jumper to 2-3.
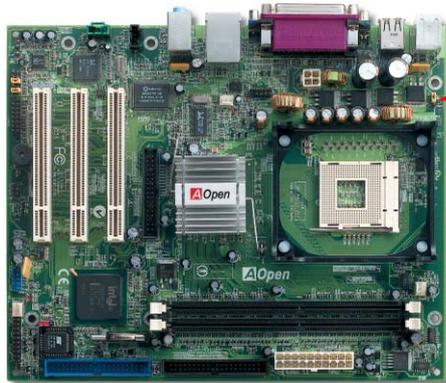
JP28
KB/Mouse Wake-up

1

Disable
(Default)

1

Enable

DIMM Sockets

This motherboard has two 184-pin DDR DIMM sockets that allow you to install PC266 memory up to 2GB. Both ECC and Non-ECC DDR SDRAM are supported, but you can't install them both on DIMM. Otherwise, it will cause serious damage on memory sockets or SDRAM module.

DIMM1

DIMM2
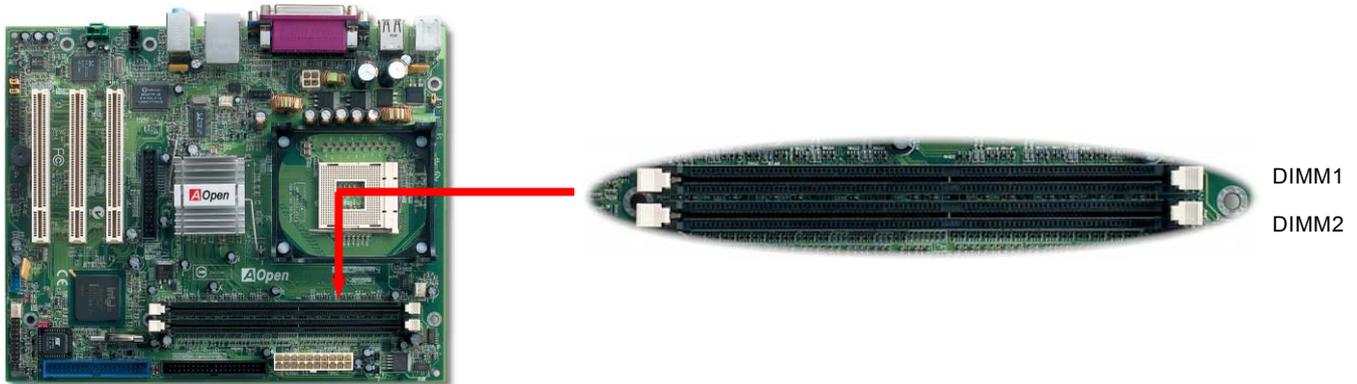
How to Install Memory Modules

Please follow the procedure as shown below to finish memory installation.

1. Make sure the DIMM module's pin face down and match the socket's size as depicted below.

40 pins   52 pins
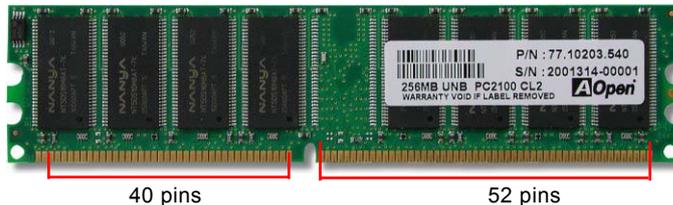
2. Insert the module straight down to the DIMM slot with both hands and press down firmly until the DIMM module is securely in place.

Tab ──→

Note: The tabs of the DIMM slot will close-up to hold the DIMM in place when the DIMM touches the slot's bottom.
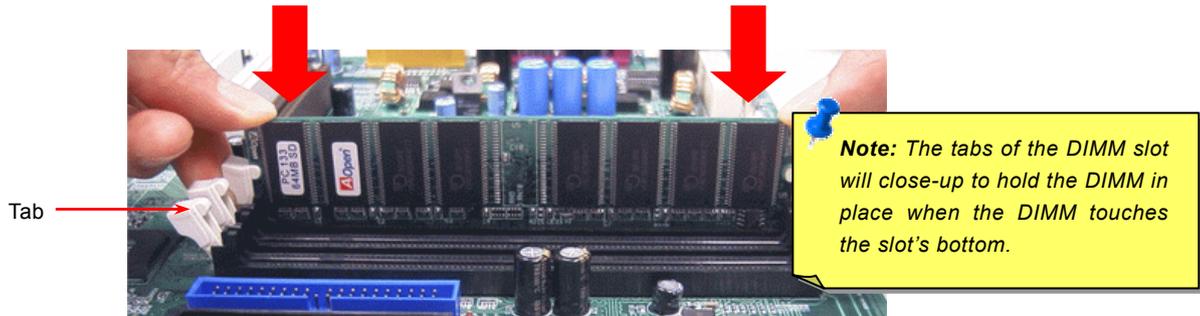
3. Repeat step 2 to finish additional DIMM modules installation.

Front Panel Connector
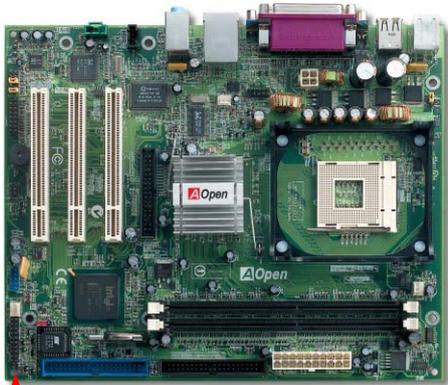
Attach the power LED, Keylock, speaker, power and reset switch connectors to the corresponding pins. If you enable "Suspend Mode" item in BIOS Setup, the ACPI & Power LED will keep flashing while the system is in suspend mode.

Locate the power switch cable from your ATX housing. It is 2-pin female connector from the housing front panel. Plug this connector to the soft-power switch connector marked **SPWR**.

Suspend Type	ACPI LED
Power on Suspend (S2) or Suspend to RAM (S3)	Flashing for every second
Suspend to Disk (S4)	The LED will be turned off

Pin 1 →

```
                                           1
                              NC   O O   5VSB
                  1           NC   O O   SPWR
              O O             +5V  O O   ACPI LED-
              O O    SPWR     IDE LED O O  GND
              O O             IDE LED O O  ACPILED
IDE LED →     O O    ACPI & PWR   +5V  O O   NC
              O O    LED          +5V  O O   ACPI_B
              O O    ACPI LED (BLUE)   GND  O O  GND
              O O                 NC   O O   RESET
Speaker →     O O    Reset        SPEAKER O O  GND
```

31
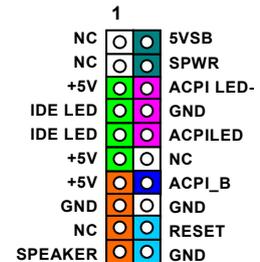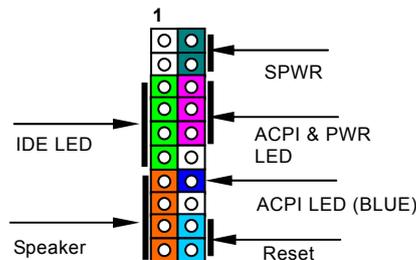
ATX Power Connector

This motherboard comes with a 20-pin and 4-pin ATX power connector. Make sure you plug in the right direction. We strongly recommend you to connect the 4-pin 12V ATX connector before connecting the 20-pin ATX power connector and use standard power supply specially designed for Pentium 4 system.
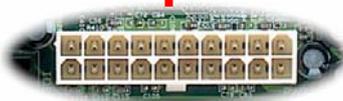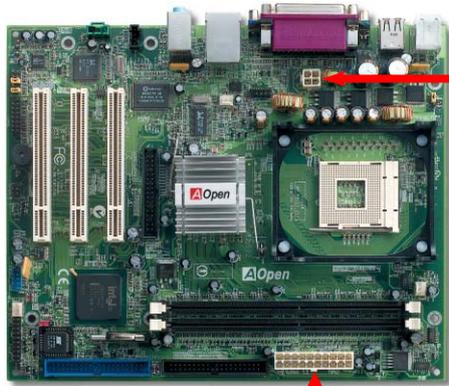
4-Pin 12V ATX Power Connector

20-Pin Power Connector
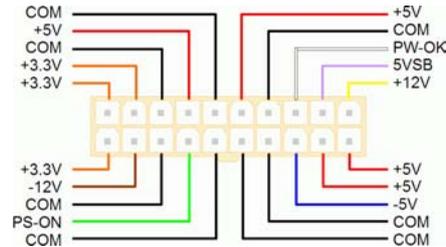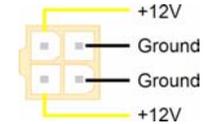
AC Power Auto Recovery

A traditional ATX system should remain at power off stage when AC power resumes from power failure. This design is inconvenient for a network server or workstation, without an UPS, that needs to keep power-on. This motherboard implements an AC Power Auto Recovery function to solve this problem.

IDE and Floppy Connector

Connect 34-pin floppy cable and 40-pin IDE cable to floppy connector FDC and IDE connector. The blue connector is IDE1 for clear identification. Be careful of the pin1 orientation. Wrong orientation may cause system damage.

FDD Connector

Pin 1

Secondary Slave (4th)

Secondary Master (3rd)

IDE 1 (Primary)

IDE 2 (Secondary)

Pin 1

ATA 33/66/100 IDE Connector

Primary Master (1st)

Primary Slave (2nd)
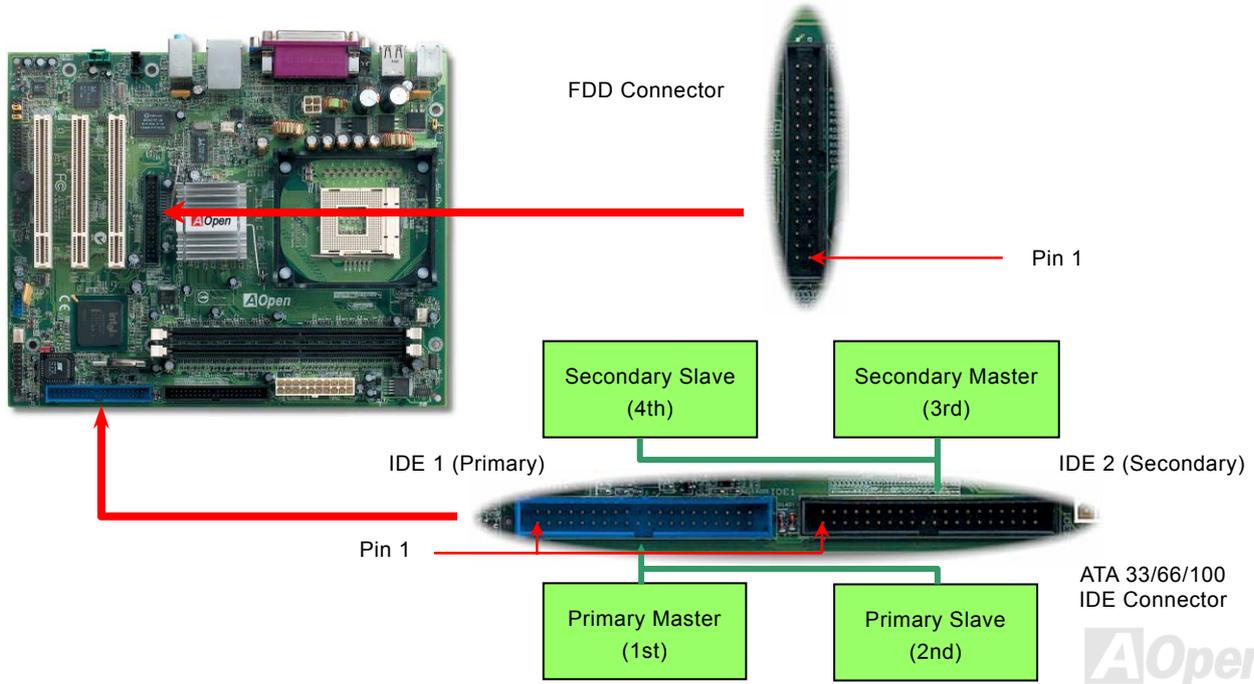
IDE1 is also known as the primary channel and IDE2 as the secondary channel. Each channel supports two IDE devices that make a total of four devices. In order to work together, the two devices on each channel must be set differently to **Master** and **Slave** mode. Either one can be the hard disk or the CDROM. The setting as master or slave mode depends on the jumper on your IDE device, so please refer to your hard disk and CDROM manual accordingly.

This motherboard supports ATA33, ATA66 or ATA100 IDE devices. Following table lists the transfer rate of IDE PIO and DMA modes. The IDE bus is 16-bit, which means every transfer is two bytes.

Mode	Clock Period	Clock Count	Cycle Time	Data Transfer Rate
PIO mode 0	30ns	20	600ns	(1/600ns) x 2byte = 3.3MB/s
PIO mode 1	30ns	13	383ns	(1/383ns) x 2byte = 5.2MB/s
PIO mode 2	30ns	8	240ns	(1/240ns) x 2byte = 8.3MB/s
PIO mode 3	30ns	6	180ns	(1/180ns) x 2byte = 11.1MB/s
PIO mode 4	30ns	4	120ns	(1/120ns) x 2byte = 16.6MB/s
DMA mode 0	30ns	16	480ns	(1/480ns) x 2byte = 4.16MB/s
DMA mode 1	30ns	5	150ns	(1/150ns) x 2byte = 13.3MB/s
DMA mode 2	30ns	4	120ns	(1/120ns) x 2byte = 16.6MB/s
ATA 33	30ns	4	120ns	(1/120ns) x 2byte x2 = 33MB/s
ATA 66	30ns	2	60ns	(1/60ns) x 2byte x2 = 66MB/s
ATA100	20ns	2	40ns	(1/40ns) x 2byte x2 = 100MB/s

Tip:

1. For better signal quality, it is recommended to set the far end side device to master mode and follow the suggested sequence to install your new device. Please refer to above diagram

*2. To achieve the best performance of Ultra DMA 66/100 hard disks, a special **80-wires IDE cable** for Ultra DMA 66/100 is required.*

Warning: *The specification of the IDE cable is a maximum of 46cm (18 inches); make sure your cable does not exceed this length.*

IrDA Connector

The IrDA connector can be configured to support wireless infrared module, with this module and application software such as Laplink or Windows 95 Direct Cable Connection, the user can transfer files to or from laptops, notebooks, PDA devices and printers. This connector supports HPSIR (115.2Kbps, 2 meters) and ASK-IR (56Kbps).

Install the infrared module onto the IrDA connector and enable the infrared function from BIOS Setup, UART Mode, make sure to have the correct orientation when you plug in the IrDA connector.

Pin 1

```
        1
NC   ○ □   KEY
+5V  ○ ○   GND
IR_TX ○ ○  IR_RX
```

IrDA Connector
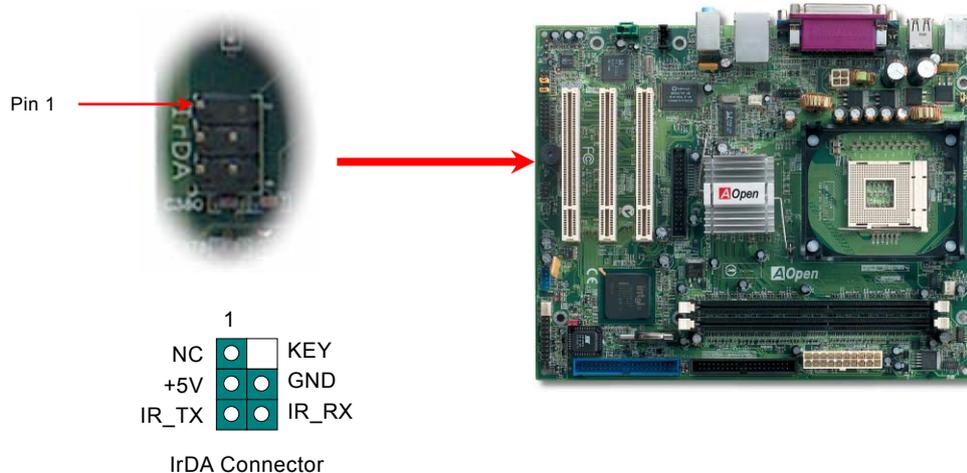
Color Coded Back Panel

The onboard I/O devices are PS/2 Keyboard, PS/2 Mouse, serial ports COM1 and VGA, Printer, USB, AC97 sound and game port. The view angle of drawing shown here is the back panel of the housing.
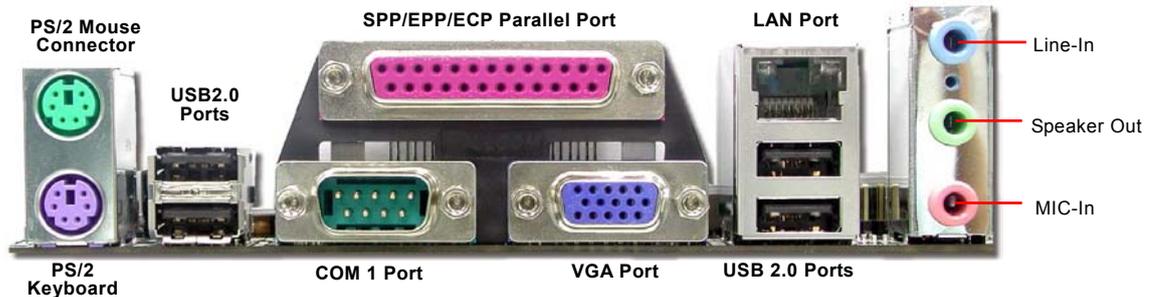
PS/2 Keyboard:	For standard keyboard, which use a PS/2 plug.
PS/2 Mouse:	For PC-Mouse, which use a PS/2 plug.
USB Port:	Available for connecting USB devices.
Parallel Port:	To connect with SPP/ECP/EPP printer.
COM1 Port:	To connect with pointing devices, modem or others serial devices.
VGA Connector:	To connect with PC monitor.
Speaker Out:	To External Speaker, Earphone or Amplifier.
Line-In:	Comes from the signal sources, such as CD/Tape player.
MIC-In:	From Microphone.
LAN Port:	Available for 10/100 LAN connection.

*A*Open

Support 10/100 Mbps LAN onboard

The South Bridge ICH4 includes a fast Ethernet controller on chip. On the strength of Realtek 8101L LAN controller on board, which is a highly-integrated Platform LAN Connect device, it provides 10/100M bps Ethernet for office and home use, the Ethernet RJ45 connector is located on top of USB connectors. The orange LED indicates the link mode, it lights when linking to network. The green LED indicates the transfer mode, and it lights when data is transferring. To enable or disable this function, you may simply adjust it through BIOS.
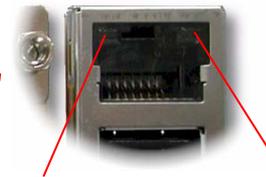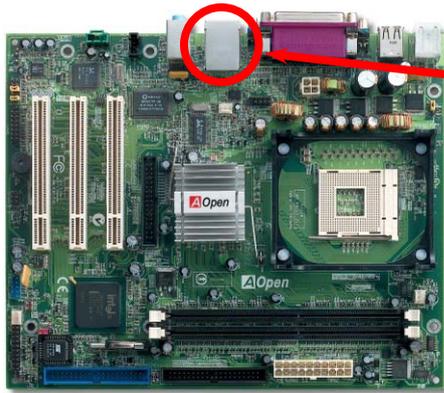
Green/Transfer   **Orange/Link**

COM2 Connector

This motherboard provides two serial ports. One of them is on back panel connector, and the other is on the upper left of board. With proper cable, you can connect it to the back panel of chassis.

Pin 1

GND
SOUT
DOD#

RI#
RTS#

1
2

DSR#
CTS#

SIN
DTR#

AOpen

NEW!
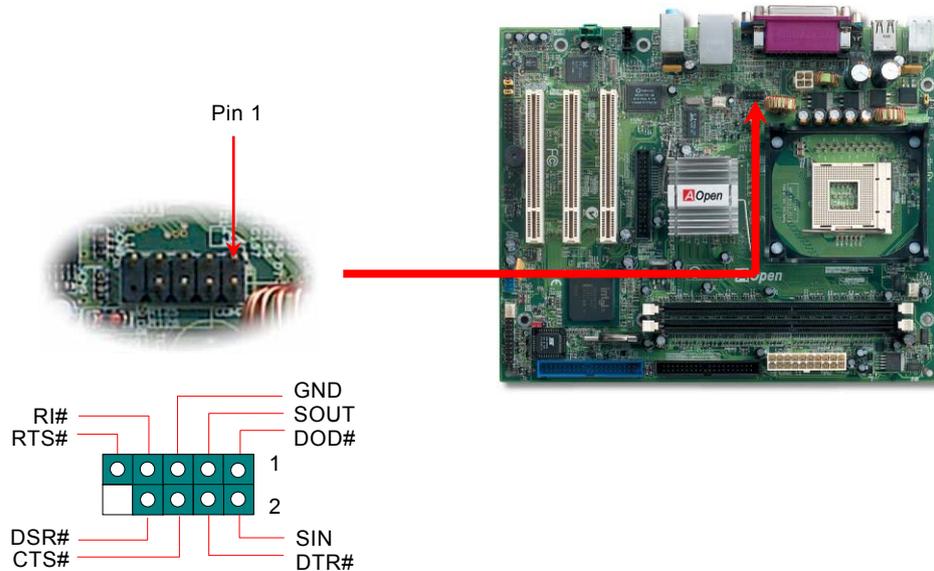
Support Front USB 2.0 Connector

This motherboard provides six USB 2.0 connectors to connect USB devices, such as mouse, keyboard, modem, printer, etc. There are four connectors on the back panel. You can use proper cables to connect the Front USB connector to USB modules or front panel of chassis.
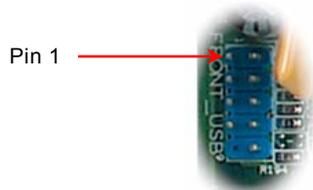
Pin 1 ──────▶

USB 2.0 Connector

```
              1
    +5V   ○ ○   +5V
   SBD2-  ○ ○   SBD3-
   SBD2+  ○ ○   SBD3+
    GND   ○ ○   GND
    KEY     ○   NC
```

USB 2.0 Connector
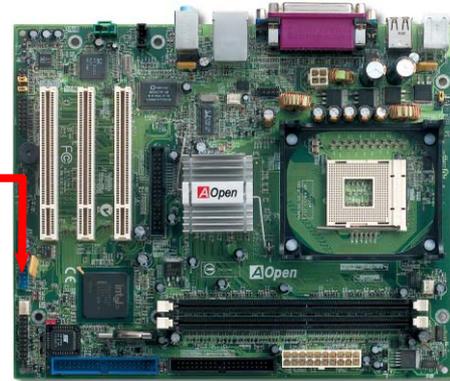
> **Note:** *Please note that if you would like to use USB devices (Example: keyboard, mouse etc.) under DOS environment, you must install driver comes with the devices to make it work.*

Case Open Connector

The "CASE OPEN" header provides chassis intrusion-monitoring function. To make this function works, you have to enable it in the system BIOS, connect this header to a sensor somewhere on the chassis. So, whenever the sensor is triggered by lights or the opening of the chassis, the system will send out beep sound to inform you. Please be informed that this useful function only applies to advanced chassis, you may purchase an extra sensor, attach it on your chassis, and make a good use of this function.

Sensor

GND

1

Pin 1
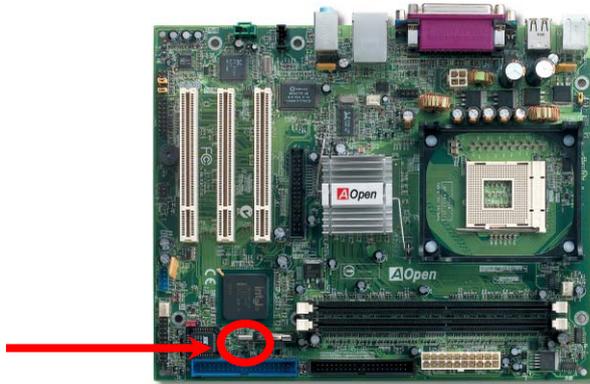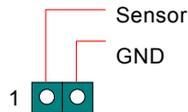
CD Audio Connector

This connector is used to connect CD Audio cable from CDROM or DVD drive to onboard sound.

R —

GND

GND

L

CD-IN Connector

AOpen
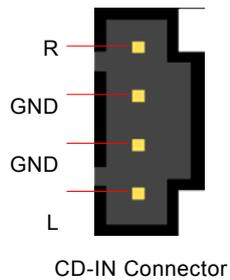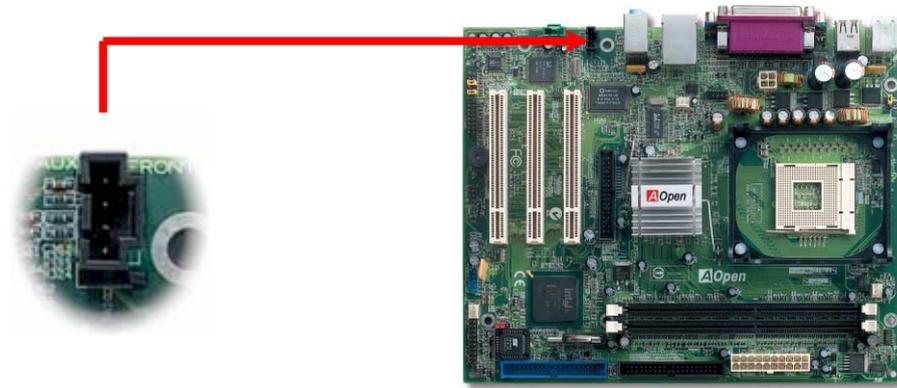
AUX-IN Connector

This connector is used to connect MPEG Audio cable from MPEG card to onboard sound.
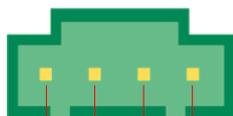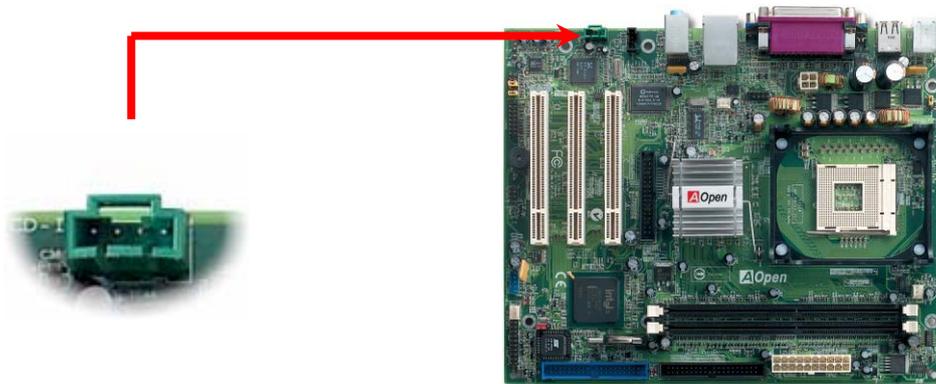
R   GNDGND   L

AUX-IN Connector

Front Audio Connector

If the housing has been designed with an audio port on the front panel, you'll be able to connect onboard audio to front panel through this connector. By the way, please remove 5-6 and 9-10 jumper caps from the Front Audio Connector before connecting the cable. Please do not remove these 5-6 and 9-10 yellow jumper caps if there's no audio port on the front panel.
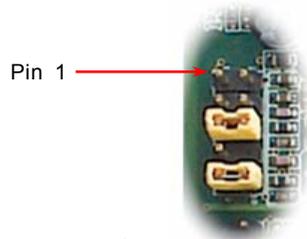
Pin 1

1

AUD_MIC	AUD_GND
AUD_MIC_BIAS	AUD_VCC
AUD_FPOUT_R	AUD_RET_R
NC	KEY
AUD_FPOUT_L	AUD_RET_L

Front Audio Connector
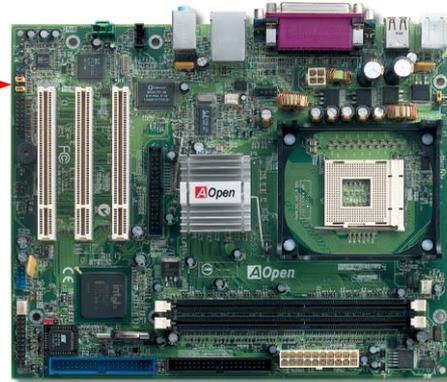
Note: *Please remove the jumper cap from the Front Panel Audio Connector before you connect the cable. Do not remove this yellow jumper cap if housing without an audio port on the front panel.*

AOpen

Battery-less and Long Life Design

This Motherboard implements Flash ROM and a special circuit that allows you to save your current CPU and CMOS Setup configurations without the need of a battery. The RTC (real time clock) can also keep running as long as the power cord is plugged. If you lose your CMOS data by accident, you can just reload the CMOS configurations from Flash ROM and the system will recover as usual.

ATX Stand-by Power   **Battery**

Auto Switch

RTC
(Real Time Clock)
00:00:00

Auto switching to ATX standby power as long as AC power line is plugged. This smart design increases battery life if you still plug battery on motherboard.

Flash ROM   **CMOS**

Backup by EEPROM
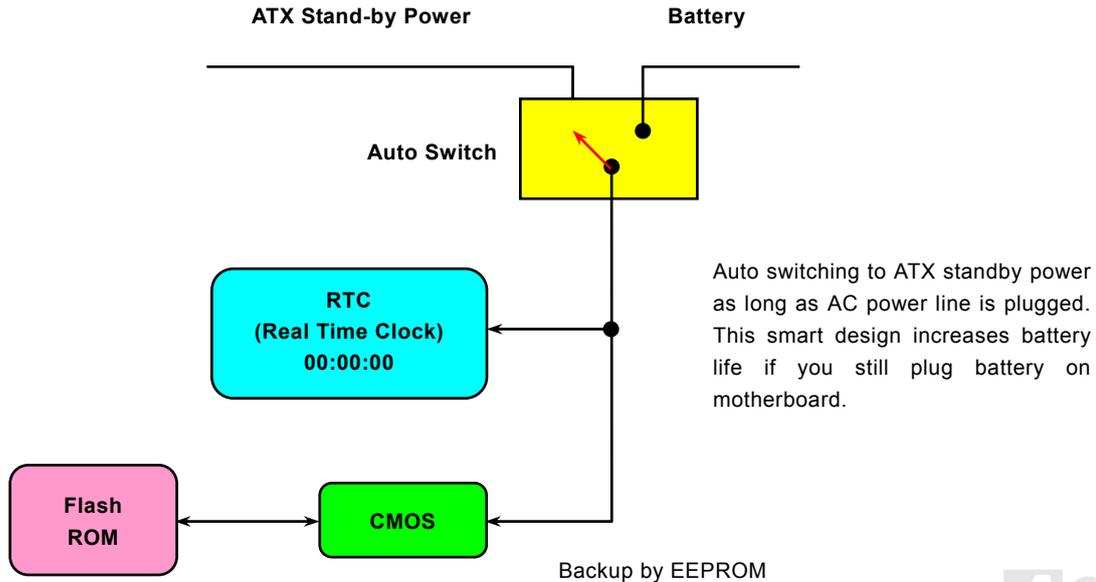
CPU Over-current Protection

Over Current Protection has been popularly implemented on ATX 3.3V/5V/12V switching power supply for a while. However, new generation CPU is able to use regulator of different voltages to transfer 12V to CPU voltage (for example, to 2.0V). This motherboard is with switching regulator onboard that supports CPU over-current protection, and it applies to 3.3V/5V/12V power supply for providing full line over-current protection.

```
                                    ┌──────────────────────────────────────►
                                    12V (Protected by power supply)

  ┌──────────────────────────┐
  │                          │      3.3V (Protected by power supply)
  │                          │─────────────────────────────────────────────►
  │  ATX Switching Power Supply │
  │                          │      5V (Protected by power supply)
  │                          │●────────────────────────────────────────────►
  └──────────────────────────┘│
                              │
                              │    ┌─────────────────────────────┐
                              ●───►│  Onboard Power Regulator    │         CPU Core Voltage
                                   │  (Over-Current Protection)  │────────►
                                   └─────────────────────────────┘
```
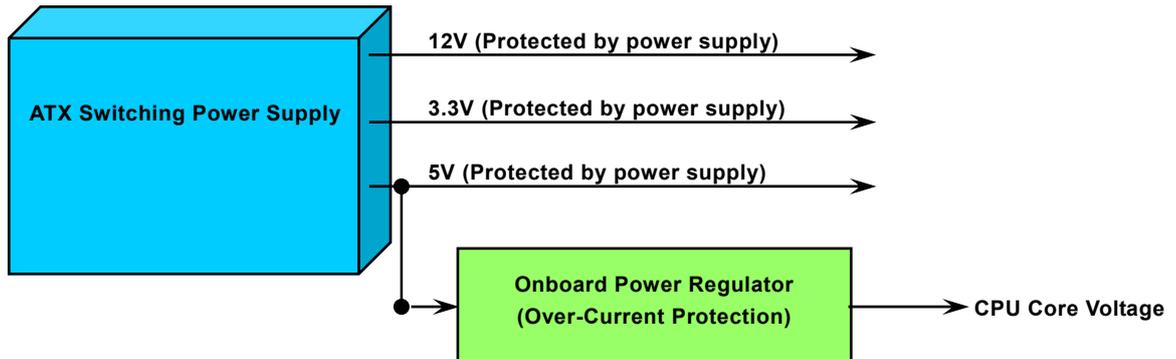
Note: *Although we have implemented protection circuit try to prevent any human operating mistake, there is still certain risk that CPU, memory, HDD, add-on cards installed on this motherboard may be damaged because of component failure, human operating error or unknown nature reason. **AOpen cannot guaranty the protection circuit will always work perfectly.***

Hardware Monitoring

This motherboard implements a hardware monitoring system. As you turn on your system, this smart design will continue to monitor your system's working voltage, fan status and CPU temperature. If any of these systems' status goes wrong, there will be an alarm through the chassis external speaker or buzzer of motherboard (if existed) to warn the user.

```
┌──────────┐
│   Fan    │ ──── Fan Speed ────────┐
└──────────┘                        │
                                    │     ┌───────────┐       ┌────────────────────┐
┌──────────┐     CPU Temperature    ├───▶│ Detection │  ──▶ │ AOpen H/W Monitoring │
│   CPU    │ ───────────────────────┤     │  Circuit  │       │       Utility        │
└──────────┘     CPU Voltage        │     └───────────┘       └────────────────────┘
                                    │
┌──────────┐                        │
│  Power   │ ──── System Voltage ───┘
└──────────┘
```
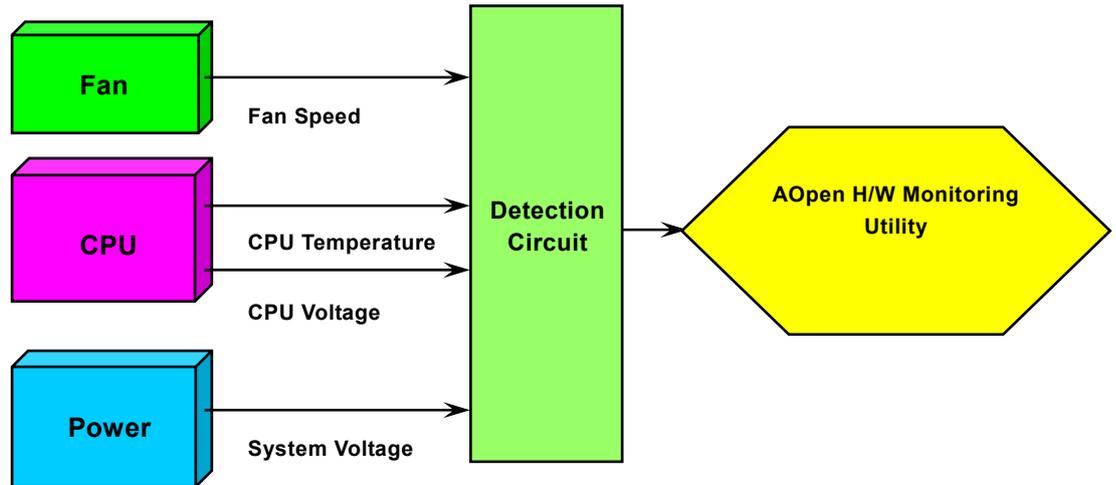
Resettable Fuse

Traditional motherboard has fuse for Keyboard and USB port to prevent over-current or shortage. These fuses are soldered onboard that when it is broken (function as protecting the motherboard), user still cannot replace it and the motherboard is still malfunctioning.

With expensive Resettable Fuse, the motherboard can be resumed back to normal function after the fuse had done its protection job.
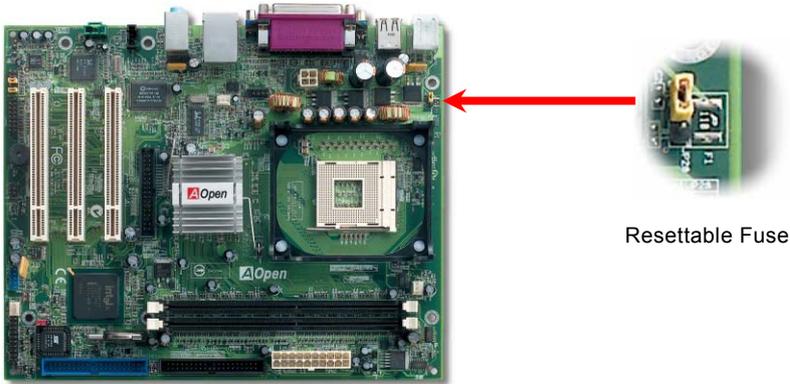
Resettable Fuse

2200 μF Low ESR Capacitor

The quality of low ESR capacitor (Low Equivalent Series Resistance) during high frequency operation is very important for the stability of CPU power. The idea of where to put these capacitors is another know-how that requires experience and detail calculation.

Not only that, MX4LR-GN / MX4GVR-GN   implements 2200 μF capacitors, which is much larger than normal capacitor (1000 and 1500 μf) and it provides better stability for CPU power.
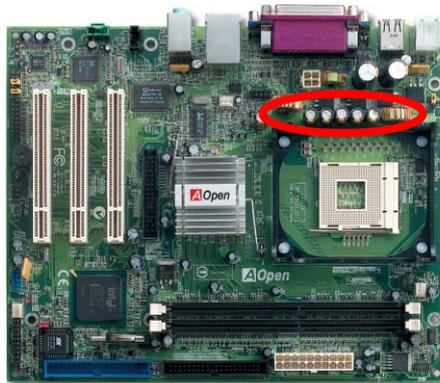
Layout (Frequency Isolation Wall)
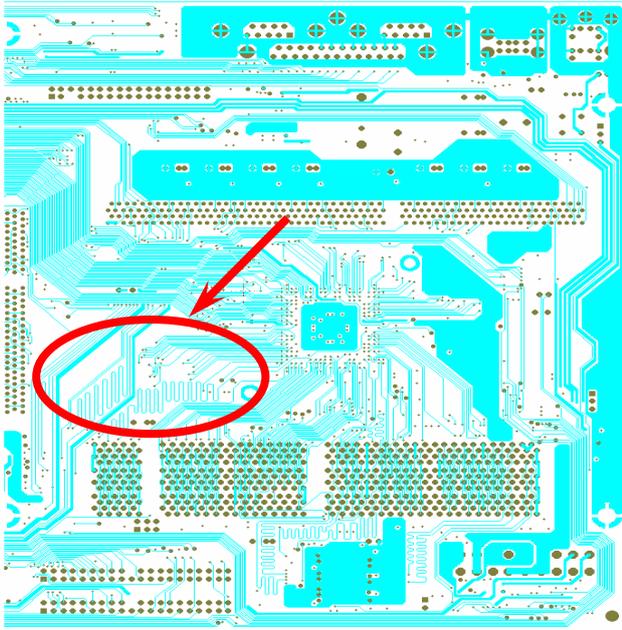
For high frequency operation, especially overclocking, layout is the most important factor to make sure chipset and CPU working in stable condition. The layout of this motherboard implements AOpen's unique design called " Frequency Isolation Wall". Separating each critical portion of motherboard into regions where each region operates in a same or similar frequency range to avoid cross talk and frequency interference between each region's operations and condition. The trace length and route must be calculated carefully. For example, the clock trace must be equal length (not necessarily as short as possible) so that clock skew will be controlled within few a pico second ($1/10^{12}$ Sec)

Note: This diagram for example only, it may not be exactly the same as this motherboard.

AOpen

Enlarged Aluminum Heatsink

Cool down CPU and Chipset is important for system reliability. Enlarged aluminum heat sink provides better heat consumption especially when you are trying to over clocking the CPU.
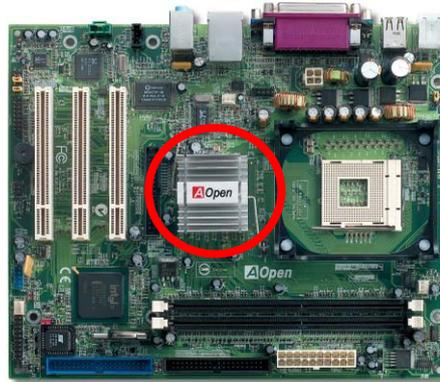
Wake On Modem / Wake On LAN / Wake On PCI Card

This motherboard implements special circuit to support Wake On Modem, Wake On LAN and Wake On PCI Card.

Green PC suspend mode does not really turn off the system power supply, it can be triggered by Modem, LAN or Other PCI Cards and resume back to active. If you have an external Modem card and want to use this wake-up feature, Please enable the "Wake On Modem" item. For an internal modem, LAN and other PCI cards, please enable the "Wake On PCI Card" item.

```
                Phoenix - AwardBIOS CMOS Setup Utility
                        Power Management Setup

     ACPI Suspend Type          S1                ▲        Item Help
   x Run VGABIOS if S3 Resume   Auto
     Power Management           User Define              Menu Level    ►
     Video Off Method           V/H SYNC+Blank
     Video Off In Suspend       Yes
     Suspend Type               CPU Sleep Mode
     MODEM Use IRQ              3
     Suspend Mode              Disabled
     HDD Power Down             Disabled
     Soft-Off by PWR-Button     Instant-Off
     CPU THRM Throttling        87.5%
     Wake On PCI Card           By OS
     Wake On Modem              Disabled
     USB KB Wake-Up From S3     Disabled
     Wake On RTC Timer          By OS
   x Date(of Month) Alarm       0
   x Time(hh:mm:ss) Alarm       0

      ** Reload Global Timer Events **               ▼

   ↑↓→←:Move  Enter:Select  +/-/PU/PD:Value  F10:Save  ESC:Exit  F1:General Help
         F2:Item Help F5:Previous Values F6:Setup Defaults F7:Turbo Defaults
```

Open JukeBox Player

Here we are pleased to provide you a brand-new powerful interface—Open JukeBox. Without any cost you can have your PC turn into a fashionable CD player! This latest Open JukeBox motherboard aims at helping you directly operate your CD player on the PC without any hassle of entering Windows operation system.
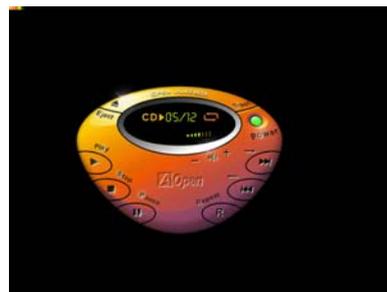
How Your Open JukeBox Works

The operation of Open JukeBox Player is the same as other CD players. By pressing specific keys on the keyboard you will find playing Open JukeBox Player couldn't be easier than the traditional CD Players. Below is the function description of respective buttons.

Power: Pressing **O**, to directly power off your computer with no hassle of entering Windows Operation System.
Boot: Pressing **B**, to intelligently boot to Windows Operation System for you.
 Play: Pressing **A,** to start playing CD music.
Stop: Pressing **S**, to stop the music playing.
Pause: Pressing **P**, to pause the music playing temporarily.
Eject: Pressing **E**, to eject CD tray for you to change CD disc.
Repeat: Like other CD Players, pressing **R**, to shift the repeat mode.
Volume +/-: Pressing **+** or **–** to adjust the volume of playing music.
 Rewind/Forward ← / →: Pressing **arrow keys**, to rewind or forward the music.

*Note: Though some of the latest version of Windows support "Digital Audio" through IDE bus. However, in order to use Open Jukebox player, which is driven under BIOS, it is a **MUST** to insert audio cable to CD-IN connector on the motherboard.*

Your Open JukeBox Settings in BIOS

There are three Open JukeBox settings in BIOS as follows.

Auto: The default setting is "**Auto**" with which the Open JukeBox will automatically check the CD player every time you power on. The Open JukeBox will automatically be launched when it detects a music CD in your CD player.

Press Insert Key: Choosing this setting will allow a reminder message popped up on the screen during BIOS POST. It reminds you of pressing "Ins" key on your keyboard to start Open JukeBox Player; otherwise the system will launch the Windows Operation System.

CD Player: Choosing this setting allows the system to launch Open JukeBox Player every time you power on. However, by pressing **B** on your keyboard the Windows Operation System will be launched.

Your Open JukeBox EzSkin

Except these powerful functions above, Open JukeBox Player is also equipped with another fancy feature for you to change its "skin". You can download as many skins as you want from AOpen Website, and changing them whenever you want by using this useful utility – **EzSkin** – which may also be downloaded from our website.

Even more, you may design your own skins with innovative idea and sharing them to users around the world by uploading to our website. For further technical information, we welcome you to visit our website at
http://english.aopen.com.tw/tech/download/skin

Vivid BIOS technology

NEW!

Have you been fed up with the conservative and immutable POST screen? Let's rule out the tradition idea that POST screen are stiff and frigid, and let AOpen show you the newly developed VividBIOS to experience the lively vivid colorful POST screen!

Unlike earlier graphic POST screen, which could occupy the whole screen and mask text information during POST, AOpen VividBIOS deals with graphics and texts separately, and makes them running simultaneously during POST. With this innovative design, VividBios now brings you a beautiful and sleek 256 colors screen without missing any important information shown on POST screen.

In addition, the limited space of BIOS ROM is another big issue. When all of the traditional BIOS can only show space-consuming and uncompressed Bitmap, AOpen has considerately tuned the BIOS to next generation, to recognize the smaller-sized GIF format and even dynamic-showing GIF animation.

Vivid BIOS shares the same fundamental technology with Open JukeBox CD Player, you may use the same EzSkin utility to

change your Vivid BIOS screen or to download your favorite Open JukeBox skin. If you see this little logo [Skin] shown beside your model name on the BIOS download page, http://english.aopen.com.tw/tech/download/skin, it is assured that your motherboard supports this innovative feature!

Driver and Utility

There are motherboard drivers and utilities included in AOpen Bonus CD disc. You don't need to install all of them in order to boot your system. But after you finish the hardware installation, you have to install your operation system first (such as Windows 2000/XP) before you can install any drivers or utilities. Please refer to your operation system's installation guide.

Auto-run Menu from Bonus CD Disc

You can use the auto-run menu of Bonus CD disc. Choose the utility and driver and select model name.
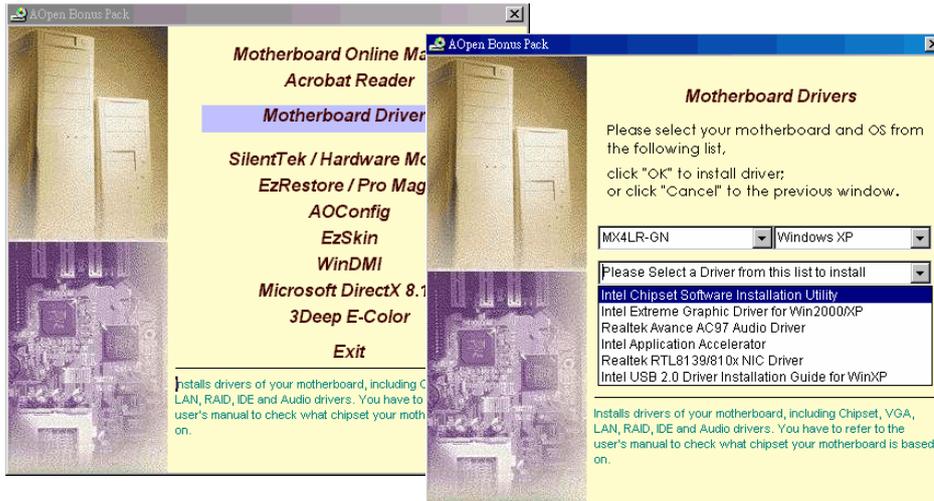
Installing Intel® Chipset Software Installation Utility

Windows 95/98 cannot recognize this chipset, because it was released before the Intel 845GL / 845GV chipset. You can install the Intel INF Update Utility from the Bonus Pack CD disc auto-run menu to eliminate the "?" marks.
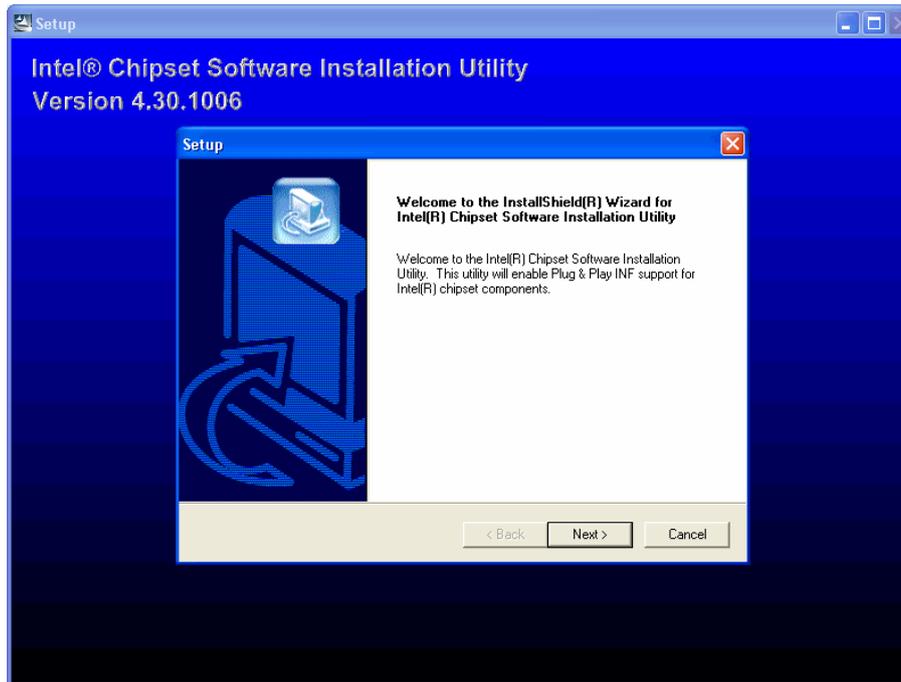
Intel VGA driver

You can install Intel VGA Driver to get the best graphics function of the chipset. You can find it in the AOpen Bonus Pack CD disc.
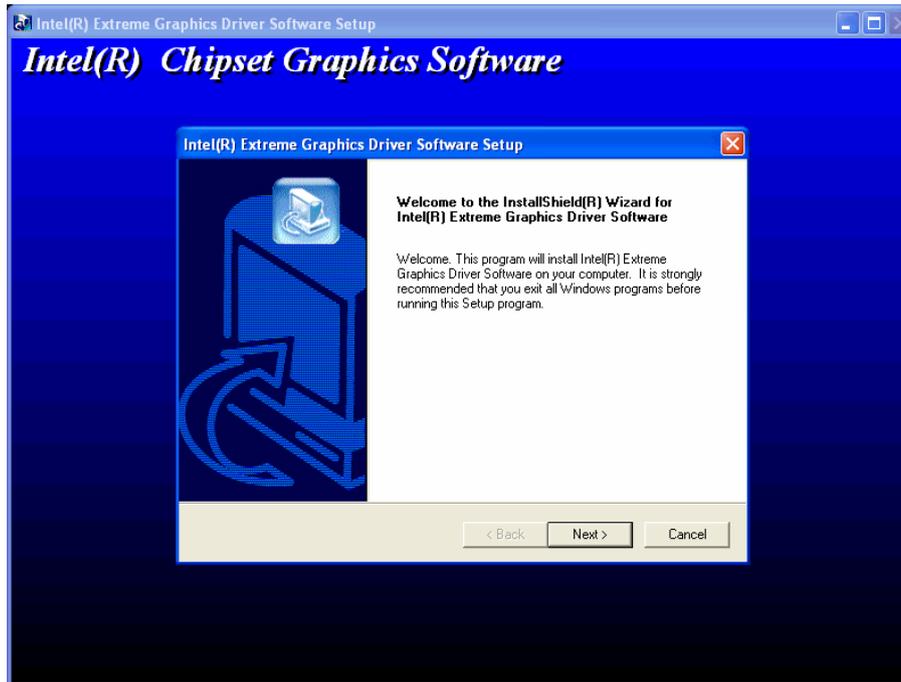
Installing Intel IAA Driver

You can install Intel IAA Driver to increase the performance of software applications and reduce PC boot times. You can find it in the AOpen Bonus Pack CD disc.
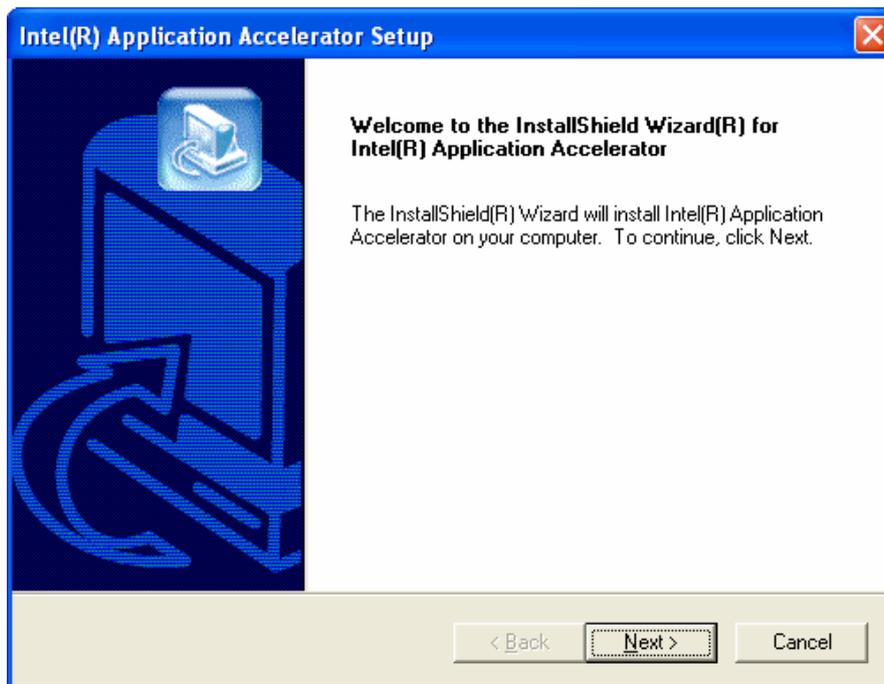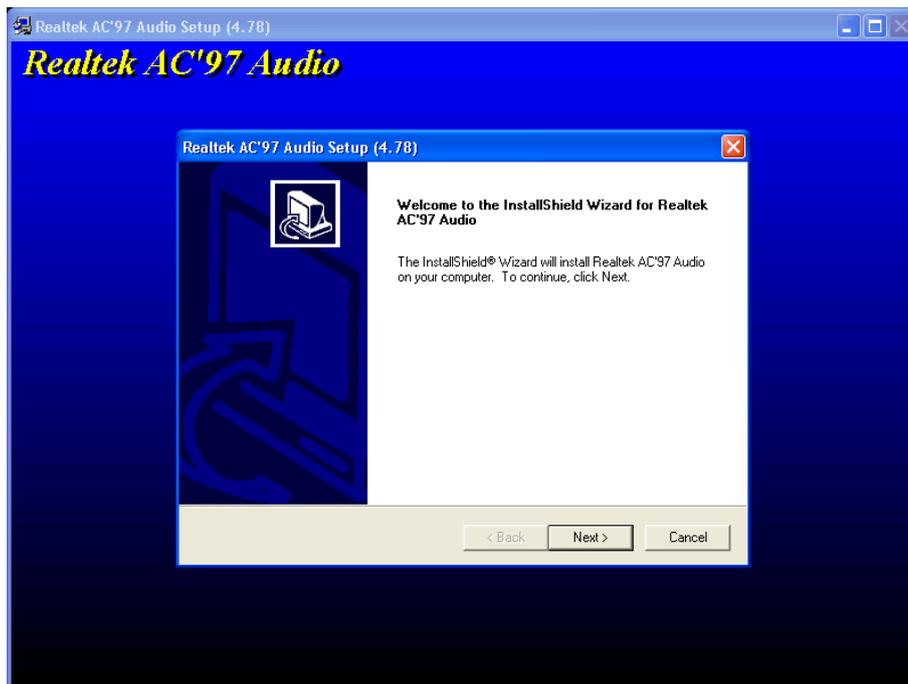
Installing LAN Driver

This motherboard integrates Realtek 10/100Mbps PCI LAN Chip. You can find LAN driver from the Bonus Pack CD disc auto-run menu.
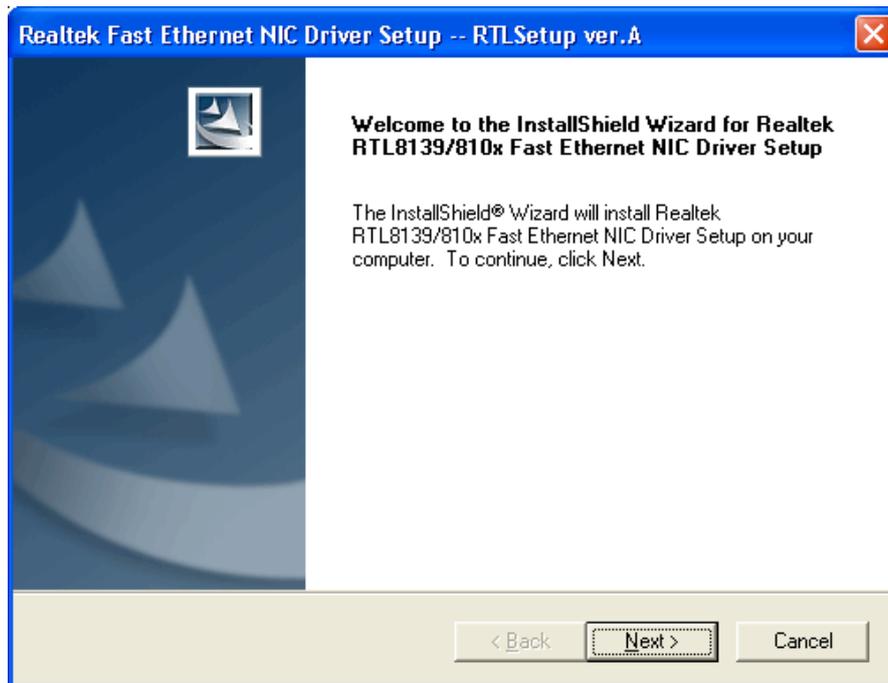
Installing Windows 95 (Golden version), Win95A, OSR2, Windows NT v4.0 driver for Realtek RTL8139 PCI Fast Ethernet adapter.

[Windows 95 (Golden version), Win95A and OSR2]

Installing driver procedure on Microsoft Windows 95:

----

1. Ask you to select which driver you want to install, select "Driver from disk provided by hardware manufacturer".

2. Specify the setup file pathname

[CD-ROM]:\Driver\LAN\RTL8100\Windows\95\WIN95A (for Windows 95 and Win95A) or
[CD-ROM]:\Driver\LAN\RTL8100\Windows\95\W95OSR2 (for Windows 95 OSR2).

3. Windows 95 will appear some messages to insert Windows 95 system disk to complete setup step.

4. Windows 95 will finish the other installation procedure automatically, then you restart the system.

[Windows NT 3.5, 3.51 & 4.0]

Installing driver procedure on Microsoft Windows NT:

When you are in Windows NT:

1. In the Main group of NT, select the "Control Panel" icon.

2. In the Control Panel window, choose the "Network" icon.

3. In the Network Settings dialog box, choose the "Add Adapter" button. The Add Network Adapter dialog box appears.

4. In the list of network cards, select "<other> Requires disk from manufacturer", and then press <Enter> button.

5. Enter drive and pathname

[CD-ROM]:\Driver\LAN\RTL8100\Windows\NT (for NT 4.0) which is the path where the setup file OEMSETUP.INF is located, and then choose the OK button.

6. The screen will appear "Select Line Speed" dialog box which is provide by RTL8139.SYS driver. The default value is "auto" so that the

RTL8139 PCI Fast Ethernet adapter and its driver RTL8139.SYS will auto-detect the line speed, 10 Mb or 100Mb, while the RTL8139.SYS is loading. The other values, "10" or "100", are only used when you want to forced RTL8139 PCI Fast Ethernet adapter to 10Mb or 100Mb.

7. The screen will appear "Input EthernetID" dialog box which is provided by RTL8139.SYS driver. This option is only required when you have more than one Realtek RTL8139 PCI Fast Ethernet adapters on this computer. Select "SKIP" if only one adapter is installed on this computer.

8. "Bus Location" display in next screen. Your machine contains more than one hardware bus, please select the Bus Type and Bus number on which your network adapter card is installed.

9. NT will then perform the binding process. If any additional network software options were installed, you may be prompted for specific information for these packages.

10. Restarting your system you will acquire network service.

NOTES:

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* Installing Multiple LAN Adapters:

Enter Windows NT and follow above setup procedure step 2,in the "Network Settings" dialog box, choose the "Configure.." button. The "Input Ethernet ID" dialog box appears and input adapter's Ethernet ID. Last step to select OK and close NETWORK SETUP. Select SKIP if only one adapter is installed on this computer.

Installing USB 2.0 Driver

This motherboard has six USB 2.0 ports. You can find USB driver from the Bonus Pack CD disc auto-run menu.
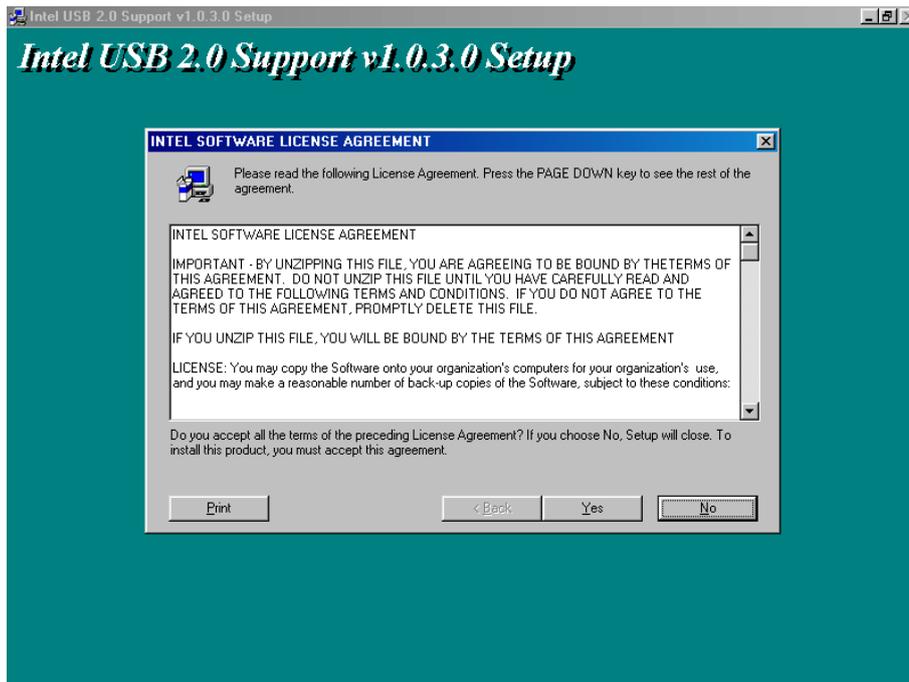
Windows 2000 Installation Guide

****

Installing Driver in Existing Windows 2000 System

****

After enabling the USB 2.0 controller and rebooting your system, Windows 2000 setup will show a "New Hardware Found" dialog box. Under Windows 2000, "Universal Serial Bus (USB) Controller" will be displayed.

1. Choose "Search for a suitable driver for my device (Recommended)". from the list, and then press "Enter".

2. Choose "Specify a location." and then press "Next"

3. Insert the Bonus CD in CD-ROM.

4. Type "[CD-ROM]:\Driver\Intel\USB2.0\Win2000" in the text box that appears. Press " OK ".

5. Click on "Next." A message informing you that Windows has found "Intel PCI to USB Enhanced Host Controller A1" should appear.

6. Click on "Next," and then on "Finish."

****

Confirming Windows 2000 Installation

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1. From Windows 2000, open the Control Panel from "My Computer" followed by the System icon.

2. Choose the "Hardware" tab, and then click the "Device Manager" tab.

3. Click the "+" in front of "Universal Serial Bus controllers". "Intel PCI to USB Enhanced Host Controller A1" should appear.

Windows XP Installation Guide

****

Installing Driver in Existing Windows XP System

****

After enabling the USB 2.0, Windows XP setup will show a "Found New Hardware" dialog box. Under Windows XP, "Universal Serial Bus (USB) Controller" will be displayed.

1. Click on "Next," and from the generated list box, choose "Install from a list or special location (Advanced)", click "Next"

2. Click on "Next," and from the generated choices, choose "Include this location in the search:"

3. Insert the Bonus CD in CD-ROM.

4. Type "[CD-ROM]:\Driver\Intel\USB2.0\WinXP" in the text box that appears.

5. Click on "Next." A message informing you that Windows XP has found "Intel PCI to USB Enhanced Host Controller A1" should appear.

6. When the New Hardware Wizard has finished installing the USB driver, click on "Finish"

****

Confirming Windows XP Installation

****

1.   Tools/Folder Options/View. Change below item:

2.   Enable "Display the full path in the title bat".

3.   Enable "Show Hidden files and folders".

4.   Disable "Hide extensions of known files types".

5.   Disable "Hide protected operating system files (Recommended)".

6.   Check USB driver version from My Computer, Local Disk C:, Show the content of this drive, Windows directory, Show the content of this drive, System32 directory, Show the content of this drive, Drivers directory, Show the content of this drive, View, details.

    1. USBEHCI.SYS - 3/20/2002.

    2. USBPORT.SYS - 8/17/2001.

    3. USBHUB.SYS   - 8/17/2001.

    So, new 3616 driver does not install complete. [Install by manual]

1. Disable Windows File Protection (WFP)

    1. Start button/run/Regedit.

    2. Set HKEY_LOCAL_MACHINE\Software\Microsoft\Windows NT\CurrentVersion\Winlogon\SFCDisable = 1

2. Copy all USB files from CD to HDD.

    1. Copy all test drivers to %windir%\driver cache\i386.

    2. Copy all test drivers to %windir%\system32\dllcache You need to copy file to this directory first. Otherwise,

       Windows XP will replace file from this directory to system32\drivers.

    3. Copy all test drivers to %windir%\system32\drivers.

3. Check USB driver version again.

    1. USBEHCI.SYS - 3/20/2002.

    2. USBPORT.SYS - 3/20/2001.

    3. USBHUB.SYS - 3/20/2001.

Test USB20 HDD with restart for 10 times. The USB 20 HDD can detection with any problem for all 10 times.

ACPI Suspend to Hard Drive

ACPI Suspend to Hard Drive is basically controlled by Windows operation system. It saves your current work (system status, memory and screen image) into hard disk, and then the system can be totally power off. Next time, when power is on, you can resume your original work directly from hard disk within few seconds without go through the Windows booting process and run your application again. If your memory is 64MB, normally, you need to reserve at least 64MB HDD space to save your memory image.

When go into Suspend:

System Image & Status → Save into → Hard Disk

When power-on next time:

System Image & Status ← Restore within seconds ← Hard Disk

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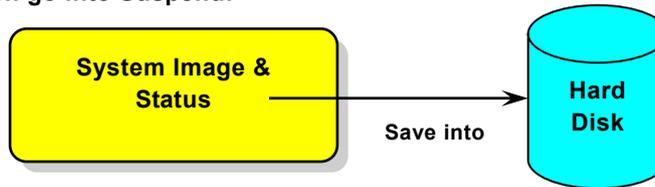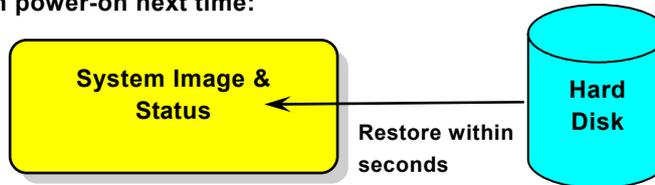
System Requirement

1.   **AOZVHDD.EXE 1.30b** or later.

2.   Delete **config.sys** and **autoexec.bat**.

Fresh installation of Windows 98 on a new system

1. Execute "**Setup.exe /p j**" to install Windows 98

2. After Windows 98's installation is complete, go to the Control Panel > Power Management.

   a. Set Power Schemes > System Standby to "Never".

   b. Click on "Hibernate" and select "Enable Hibernate Support" then "Apply".

   c. Click on the "Advanced" tab, you'll see "Hibernate" on "Power Buttons". Note that this option will only be seen after step b mentioned above has been completed; otherwise only "Standby" and "Shutdown" will be shown. Select "Hibernate" and "Apply".

3. Clean boot into DOS and run AOZVHDD utility.

   a. If you assign the whole disk to your Win 98 system (FAT 16 or FAT 32), please run "**aozvhdd /c /file**". Please remember sufficient free space has to be reserved in the disk, e.g. if you have 64 MB DRAM and 16 MB VGA card installed, the system needs at least 80 MB free space. The utility will locate the space automatically.

   b. If you assign an individual partition for Win 98, please run "**aozvhdd /c /partition**". Of course, the system needs to provide unformatted an empty partition.

4. Reboot system.

5. You've already implemented ACPI Suspend to-Hard Drive. Click "Start > Shut Down > Standby" then the screen will go off immediately. And 1 minute or so will be taken for the system to save what's in the memory to the hard drive; the larger the

memory size the longer this process will take

Changing from APM to ACPI (Windows 98 only)

1. Run "**Regedit.exe**"

    a. Go through the following path

        HKEY_LOCAL_MACHINE

            SOFTWARE

                MICROSOFT

                    WINDOWS

                        CURRENT VERSION

                          DETECT

    b. Select "ADD Binary" and name it as "**ACPIOPTION**".

    c. Right click and select Modify, add "01" after "0000" to make it "0000 01".

    d. Save changes.

2. Select "Add New Hardware" under Control Panel. Allow Windows 98 to detect new hardware. (It will find "**ACPI BIOS**" and remove "**Plug and Play BIOS**")

3. Reboot system.

4. Clean boot into DOS and run "AOZVHDD.EXE /C /File"

Changing from ACPI to APM

1. Run "**Regedit.exe**"

   a. Go through the following path

     HKEY_LOCAL_MACHINE

       SOFTWARE

         MICROSOFT

           WINDOWS

             CURRENT VERSION

               DETECT

                 ACPI OPTION

> *Tip: "02" means Windows 98 is ACPI acknowledged but the ACPI function is disabled.*

   b. Right click and select "Modify, change "01" to "02" to make it "0000 02".

   c. Save changes.

2. Select "Add New Hardware" under Control Panel. Allow Windows 98 to detect new hardware. (It will find "**Plug and Play BIOS**" and **remove "ACPI BIOS**")

3. Reboot system.

4. Run "Add New Hardware" again and it will find "Advanced Power Management Resource".

5. Click "OK"

> *Tip: Currently we found only ATI 3D Rage Pro AGP card would support ACPI suspend to disk. Please refer to AOpen web site for latest update*

ACPI Suspend to RAM (STR)

This motherboard supports ACPI Suspend to RAM function. With this function, you can resume your original work directly from DRAM without going through the Windows 98 booting process and run your application again. Suspend to DRAM saves your current work in the system memory, it is faster than Suspend to Hard Drive but requires power supplied to DRAM, while Suspend to Hard Drive requires no power.

When go into Suspend:

System Image & Status in the DRAM ← Other System Devices ✖ Power loss

Backup by 3.3V Power

When power-on next time:

System Image & Status in the DRAM ← Other System Devices ← Power back to work

Power back to work
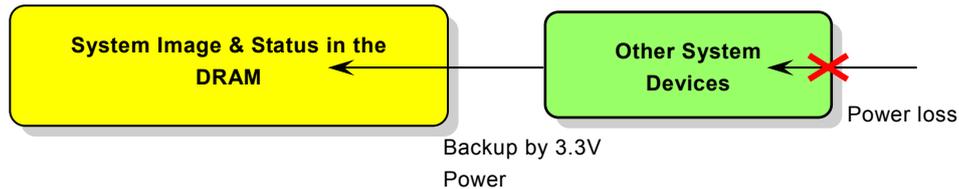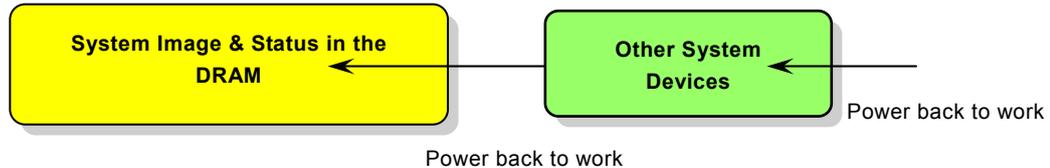
To implement ACPI Suspend to DRAM, please follow the procedures as below:

System Requirement

1.   An ACPI OS is required. Currently, except Windows 95 and Windows NT, all other Windows Systems support ACPI.

2.   The Intel® Chipset Software Installation Utility must have been installed properly.

Procedures

1.   Changed the following BIOS settings.

      BIOS Setup > Power Management Setup > ACPI Function: Enabled

      BIOS Setup > Power Management Setup > ACPI Suspend Type: S3.

2.   Go to Control Panel > Power Management. Set "Power Buttons" to "Standby".

3.   Press power button or standby button to wake up the system.

AWARD BIOS

System parameters can be modified by going into BIOS Setup menu, this menu allows you to configure the system parameters and save the configuration into the 128 bytes CMOS area, (normally in the RTC chip or in the main chipset).

The AwardBIOS™ that installed in the Flash ROM of the motherboard is a custom version of an industry standard BIOS. The BIOS provides critical low-level support for standard devices such as hard disk drives, serial and parallel ports.

Most BIOS setting of MX4LR-GN / MX4GVR-GN had been optimized by AOpen's R&D engineering team. But, the default setting of BIOS still can't fine-tune the chipset controlling entire system. Hence, the rest of this chapter is intended to guide you through the process of configuring your system using setup.

To enter to BIOS setup menu, press <Del> when POST (Power-On Self Test) screen is shown on your monitor.
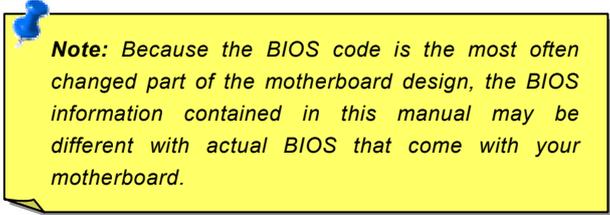
> **Note:** *Because the BIOS code is the most often changed part of the motherboard design, the BIOS information contained in this manual may be different with actual BIOS that come with your motherboard.*

How To Use Award™ BIOS Setup Program

Generally, you can use the arrow keys to highlight items that you want to choose, then press <Enter> key to select, and use the <Page Up> and <Page Down> key to change setting value. You also can press <F1> key for help and press <Esc> key to quit Award™ BIOS setup program. The following table provides details about how to use keyboard in the Award™ BIOS setup program. By the way, all products of AOpen also provides a special function in the BIOS setup, you can press <F3> key selecting preferred menu language to display.

Key	Description
Page Up or +	Changing setting to next value or increase the value.
Page Down or -	Changing setting to previous value or decrease value.
Enter	Select the item.
Esc	1. In main menu: Quit and don't save any change. 2. In sub menu: Exit current menu to main menu.
Up Arrow	Highlight previous item.
Down Arrow	Highlight next item.
Left Arrow	Move the light bar to left side of menu.
Right Arrow	Move the light bar to right side of menu.
F1	Get menu or item help description.
F5	Load previous setting value from CMOS.

Key	Description
F6	Load fail-save setting value from CMOS.
F7	Load turbo setting value from CMOS.
F10	Save changed setting and exit setup program.

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How To Enter BIOS Setup

After you finish the setting of jumpers and connect correct cables. Power on and enter the BIOS Setup, press <Del> during POST (Power-On Self Test). Choose "Load Setup Defaults" for recommended optimal performance.

Del

```
            Phoenix - AwardBIOS CMOS Setup Utility

  ► Standard CMOS Features          Load Setup Defaults
  ► Advanced BIOS Features          Load Turbo Defaults
  ► Advanced Chipset Features       Set Password
  ► Integrated Peripherals          Save & Exit Setup
  ► Power Management Setup          Exit Without Saving
  ► PnP/PCI Config                                  efaults
  ► HW Monitor        Load Setup Defaults (Y/N)? Y  efaults
  ► Frequency/Volt
              F9 : Menu in BIOS

  Esc : Quit                       ↑↓ → ←   : Select Item
  F10 : Save & Exit Setup

              Load Setup Defaults
```

Warning: *Please avoid of using "Load Turbo Defaults", unless you are sure your system components (CPU, DRAM, HDD, etc.) are good enough for turbo setting.*

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NEW!

BIOS Upgrade under Windows environment

With outstanding R&D ability of AOpen, we now bring you a whole new BIOS Flash wizard ---- EzWinFlash. With an eye to users convenience, EzWinFlash combines the BIOS binary code and flash module together, so the only thing you have to do is just clicking on the utility you downloaded from web and let it helps you complete the flash process automatically. EzWinFlash detects your motherboard and checks the BIOS version cleverly to prevent your system from any possible failure. Moreover, EzWinFlash has been taken into consideration to go with any windows platform you might be using, no matter if you're using Windows 95/98, 98SE/ME, NT4.0/2000, or even the latest Windows XP.

In the meanwhile, in order to provide a much more user-friendly operating environment, AOpen EzWinFlash is natively designed to have multi-language function to provide easier way for users' usage in changing BIOS setting.
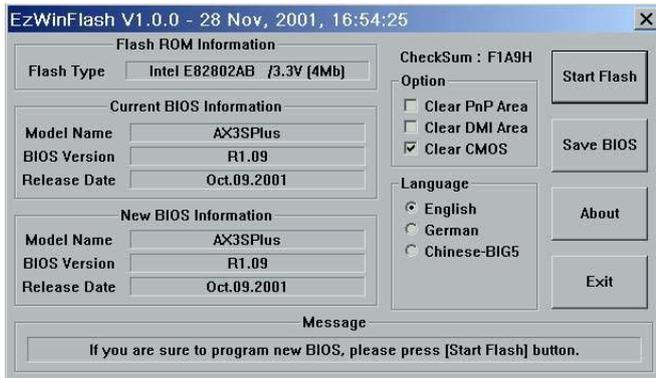
Caution: *By updating your motherboard, you are taking a risk of BIOS flash failure. If your motherboard is working stable, and there are no major bugs that had been fixed by a latter BIOS revision, we recommend that you DO NOT try to upgrade your BIOS.*

If you intent on upgrading, PLEASE BE SURE to get the right BIOS revision for the right motherboard model to avoid any possibility failure.

Note: The model name on this BIOS picture is for reference only. It may not be the exact model name.

You may accomplish BIOS upgrade procedure with EZWinFlash by the following steps, and it's STRONGLY RECOMMMANDED to close all the applications before you start the upgrading.

1. Download the new version of BIOS package zip file from AOpen official web site. (ex: http://www.aopen.com)

2. Unzip the download BIOS package (ex: WMX4LRGN102.ZIP) with WinZip (http://www.winzip.com) in Windows environment.

3. Save the unzipped files into a folder, for example, WMX4LR102.EXE & WMX4LR102.BIN.

4. Double click on the WMX4LRGN102.ZIP, EZWinFlash will detect the model name and BIOS version of your motherboard. If you had got the wrong BIOS, you will not be allowed to proceed with the flash steps.

5. You may select preferred language in the main menu, then click [Start Flash] to start the BIOS upgrade procedure.

6. EZWinFlash will complete all the process automatically, and a dialogue box will pop up to ask you to restart Windows. You may click [YES] to reboot Windows.

7. Press <Del> at POST to enter BIOS setup, choose "Load Setup Defaults", then "Save & Exit Setup". Done!

It is strongly recommended NOT to turn off the power or run any application during FLASH PROCESS.

Warning: The new BIOS upgrade will permanently replace your original BIOS's settings when flashing. You may need to reconfigure your BIOS setting so that your system can go

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Glossary

AC97 CODEC

Basically, AC97 CODEC is the standard structure of PCI sound card. As we know, computer is digital-based, but music is based on analog-based. Therefore, there must be a process to turn digital into analog during the last stage processing of sound in computer. Hence, the component on sound card that play this important task is what we called CODEC.

Audio CODEC 97 (briefly called AC97) is the specification regulated by Intel, and it's about the structure of audio conversion. The special place about CODEC is that it is separated from sound card (CODEC is an independent chipset). Therefore, PCI sound card could possess with 90db and do other application process as well. We called CODEC that meets this structure AC97 CODEC.

ACPI (Advanced Configuration & Power Interface)

ACPI is the power management specification of PC97 (1997). It intends to save more power by taking full control of power management to operating system and bypass BIOS. The chipset or super I/O chip needs to provide standard register interface to operating system (such as Windows 98). This is a bit similar as the PnP register interface. ACPI defines ATX momentary soft power switch to control the power state transition.

ACR (Advanced Communication Riser)

Building on the PC motherboard riser architecture, ACR slot is backward compatible with AMR but beyond the limitation of it. The ACR specification is designed to support modem, audio, Local Area Network (LAN) and Digital Subscriber Line (DSL).

AGP (Accelerated Graphic Port)

The main function of AGP simply put is to tell monitor what screen information had to be shown, a visual transmission device actually. With the rapid developing of AGP card, we can see that it had been developed from single colorful AGP card to 2D and 3D graphic. AGP supports only memory read/write operation and single-master single-slave one-to-one only. Though AGP and PCI share the same algorithm of 32-bit, its frequencies are 66MHz and 33MHz respectively. AGP interface had been developed from 2X to 8x.

1X AGP, data transfer rate is 66MHz x 4byte x 1 = 264MB/s
2X AGP, data transfer rate is 66MHz x 4byte x 2 = 528MB/s
4X AGP, data transfer rate is 66MHz x 4byte x 4 = 1056MB/s.
8X AGP, data transfer rate is 66MHz x 4byte x 8 = 2112MB/s.

AMR (Audio/Modem Riser)

The CODEC circuit of AC97 sound/modem solution can be put on motherboard or put on a riser card (AMR card) that connects to motherboard through AMR connector.

ATA (AT Attachment)

Before talking about ATA (AT Attachment), we must understand **DMA** (Direct Memory Access), which allows devices to skip the CPU devices and access memory directly. DMA specification could not only eliminate the workload of CPU, but also accelerate the transmission of data. DMA begins with a data transfer rate of 16.6MB/Sec, but afterward developed to new data rate of 33.3MB/Sec, which is twice the data rate and we called it **Ultra DMA**.   **ATA** details power and data signals between the drive and integrated drive controller and the computer's motherboard. Two drives (master and slave) are supported. The ATA specification allows the drive to connect directly to the ISA bus on the computer. ATA transfer rate then had been developed to 133MHz/Sec and would come out with fastest rate later (please refer to Serial ATA).

DMA, data transfer rate is 16.6MHz/s.

Ultra DMA, data transfer rate is 16.6MHz x 2 = 33MB/s.

ATA/66, data transfer rate is 16.6MHz x 4 = 66MB/s.

ATA/100, data transfer rate is 16.6MHz x 6 = 100MB/s.

ATA/133, data transfer rate is 16.6MHz x 8 = 133MB/s.

(ATA/133 uses both rising edge and falling edge as ATA/66 but clock cycle time is reduced to 30ns.)

BIOS (Basic Input/Output System)

BIOS, is a set of assembly routine/program that reside in EPROM or Flash ROM. BIOS controls Input/output devices and other hardware devices of motherboard. In general, to provide hardware independent portability, operation system and drivers is required to access BIOS without directly access hardware devices.

Bluetooth

Bluetooth is a wireless transferring technology that enables short-range wireless connections between desktop and laptop computers, personal digital assistants (PDAs), cellular phones, printers, scanners, digital cameras and even home appliances. The principle of Bluetooth (a chipset) is to transfer information and voices at the frequency of ISM Band. Every Bluetooth technology devices do come with a standard address for you to connect one-to-one or one-to-seven (to form a Pico-net), with transferring range up to 10 meters (100 meters to follow), using low power radio. Bluetooth do not only possess high transfer rate of 1MB/s, it also could be encrypted with pin code. With hopping rate of 1600 hops per second, it's difficult to be intercepted and are less interrupted by electromagnetic wave.

CNR (Communication and Networking Riser)

The CNR specification provides the PC industry the opportunity to deliver a flexible and cost reduced method of implementing LAN, home networking, DSL, USB, wireless, audio and modem subsystems widely used in today's "connected PCs". The CNR specification is an open industry specification and is supported by OEMs, IHV card manufacturers, silicon supplier and Microsoft.

DDR (Double Data Rate) RAM

DDR RAM utilizes the existing SDRAM (For ex, PC-100, PC-133) infrastructure and technology while doubling the nominal bandwidth available to systems in an easy to design and simple to adopt way. Based on FSB frequency, DDR RAM on the market are DDR200, DDR266 and DDR333 with more coming around soon.
DDR200, transfer bandwidth up to 200x64/8=1600MB/s (PC1600)
DDR266, transfer bandwidth up to 266x64/8=2100MB/s (PC2100)
DDR333, transfer bandwidth up to 333x64/8=2700MB/s (PC2700)
DDR400, transfer bandwidth up to 400x64/8=3200MB/s (PC3200)

ECC (Error Checking and Correction)

The ECC mode needs 8 ECC bits for 64-bit data. Each time memory is accessed; ECC bits are updated and checked by a special algorithm. The ECC algorithm has the ability to detect double-bit error and automatically correct single-bit error while parity mode can only detect single-bit error.

EEPROM (Electronic Erasable Programmable ROM)

Also known as E^2PROM. Both EEPROM and Flash ROM can be re-programmed by electronic signals, but the interface technology is different. Size of EEPROM is much smaller than flash ROM.

EPROM (Erasable Programmable ROM)

Traditional motherboard stores BIOS code in EPROM. EPROM can only be erased by ultra-violet (UV) light. If BIOS has to be upgraded, you need to remove EPROM from motherboard, clear by UV light, re-program, and then insert back.

EV6 Bus

EV6 Bus is the technology of Alpha processor from Digital Equipment Corporation. EV6 bus uses both rising and falling clock edge to transfer data, similar as DDR RAM or ATA/66 IDE bus.
EV6 Bus Speed = CPU external bus clock x 2.
200 MHz EV6 bus, 200MHz = 100 MHz external bus clock x 2

FCC DoC (Declaration of Conformity)

The DoC is component certification standard of FCC EMI regulations. This standard allows DIY component (such as motherboard) to apply DoC label separately without a shielding of housing.

FC-PGA (Flip Chip-Pin Grid Array)

FC means Flip Chip, FC-PGA is a package of Intel for Pentium III for 0.18μm process CPU, which can be plugged into SKT370 socket.

FC-PGA2 (Flip Chip-Pin Grid Array)

After FC-PGA, FC-PGA2 is the package for 0.13μm process CPU developed by Intel, which can be plugged into SKT423/478 socket as well.

Flash ROM

Flash ROM can be re-programmed by electronic signals. It is easier for BIOS to upgrade by a flash utility, but it is also easier to be infected by virus. Because of increase of new functions, BIOS size is increased from 64KB to 512KB (4M bit).

Hyper Threading

Hyper-Threading technology is an innovative design from Intel that enables multi-threaded software applications to process threads in parallel within each processor resulting in increased utilization of processor execution resources. As a result, an average improvement of ~40% in CPU resource utilization yields higher processing throughput.

IEEE 1394

IEEE 1394, which also called Firewire, is a serial data transfer protocol and interconnection system. The main feature of the Firewire that assures its adoption for the digital video and audio (A/V) consumer application is its low cost.   Fire wire interface is capable of supporting various high-end digital A/V applications, such as consumer A/V device control and signal routing, Digital Video (DV) editing, home networking, and more than 32 channels of digital mixing. Gone are those days of expensive video capture cards. Firewire allows for video capture from both newer DV camcorders with Firewire ports and older analog equipment using A/V to Firewire converters.

The advantages of the IEEE1394:

High data transfer rate – Start from 400 Mbps, (with 800/1600/3200 Mbps coming soon), which is about 30 times faster than USB 1.1.

Supports up to 63 devices (16 - daisy chained) with cable length up to about 4.5 m (14 feet).

Hot-pluggable (like USB). No need to turn of your device to connect or disconnect, and you don't need to reboot your PC. Also, it is a plug-and-play bus.

IEEE1394 is very easy to connect (Like USB1.1/2/0).

Parity Bit

The parity mode uses 1 parity bit for each byte, normally it is even parity mode, that is, each time the memory data is updated, parity bit will be adjusted to have even count "1" for each byte. When next time, if memory is read with odd number of "1", the parity error is occurred and this is called single bit error detection.

PCI (Peripheral Component Interface) Bus

Developed by Intel, Peripheral Component Interconnect (PCI) is a local bus standard. A bus is a channel used to transfer data to (input) and from (output) a computer and to or from a peripheral device. Most PCs have a PCI bus usually implemented at 32-bits providing a 33 MHz clock speed with a throughput rate of 133 MBps.

PDF Format

With PDF file, it is easy to do universal document exchange. Virtually any document may be converted in Portable Document Format (PDF). Contents in PDF documents are exactly the same as the original file, including fonts and graphics, and they can be distributed by e-mail or stored on the World Wide Web, an intranet, a file system, or a CD-ROM for other users to view on any platforms. You may download Acrobat Reader in order to read PDF file from its website (www.adobe.com).

PnP (Plug and Play)

Oversimplified, Plug-and-Play automatically tells the software (device drivers) where to find various pieces of hardware (devices) such as modems, network cards, sound cards, etc. Plug-and-Play's task is to match up physical devices with the software (device drivers) that operates them and to establish channels of communication between each physical device and its driver.

POST (Power-On Self Test)

The BIOS self-test procedure after power-on, sometimes, it is the first or the second screen shown on your monitor during system boot.

PSB (Processor System Bus) Clock

PSB Clock means the external bus clock of CPU.

CPU internal clock = CPU PSB Clock x CPU Clock Ratio

RDRAM (Rambus Dynamic Random Access Memory)

A DRAM technology developed by Rambus Corporation*, to achieve high speed of memory through the use of multiple channels in parallel by 16-bits. Basically, RDRAM uses new structure of Multibank, which is quite different from FPM, EDO, SDRAM. Using different memory module as well, RDRAM uses "RIMM" with transfer rate of 600/700/800MHz, providing bandwidth as high to 1.6GB.

RIMM (Rambus Inline Memory Module)

184-pin memory module that supports RDRAM memory technology. A RIMM memory module may contain up to maximum of 16 RDRAM devices.

SDRAM (Synchronous DRAM)

SDRAM is one of the DRAM technologies that allow DRAM to use the same clock as the CPU host bus (EDO and FPM are asynchronous and do not have clock signal). It is similar as PBSRAM to use burst mode transfer. SDRAM comes in 64-bit 168-pin DIMM and operates at 3.3V, and have been gradually replaced by DDR RAM.

SATA (Serial ATA)

The Serial ATA specification is designed to overcome speed limitations while enabling the storage interface to scale with the growing media rate demands of PC platforms. Serial ATA is to replace parallel ATA with the compatibility with existing operating systems and drivers, adding performance headroom for years to come. It is developed with data transfer rate of 150 Mbytes/second, and 300M/bs, 600M/bs to come. It reduces voltage and pins count requirements and can be implemented with thin and easy to route cables.

SMBus (System Management Bus)

SMBus is also called I^{2}C bus. It is a two-wire bus developed for component communication (especially for semiconductor IC). For example, set clock of clock generator for jumper-less motherboard. The data transfer rate of SMBus is only 100Kbit/s, it allows one host to communicate with CPU and many masters and slaves to send/receive message.

SPD (Serial Presence Detect)

SPD is a small ROM or EEPROM device resided on the DIMM or RIMM. SPD stores memory module information such as DRAM timing and chip parameters. SPD can be used by BIOS to decide best timing for this DIMM or RIMM.

USB 2.0 (Universal Serial Bus)

A Universal Serial Bus (USB) is an external bus (an interconnect) standard that supports data transfer rates of 12 Mbps. A single USB port can be used to connect up to 127 peripheral devices, such as mouse, modems and keyboards. Introduced in 1996, USB has completed replaced serial and parallel ports. It also supports plug-and-play installations and hot plugging Plug-and-play is the ability to add and remove devices to a computer while the computer is running and have the operating system automatically recognize the change. USB 2.0, which supports data transfer rates of 480 Mbps, has been widely used in motherboard these days.

VCM (Virtual Channel Memory)

NEC's Virtual Channel Memory (VCM) is a new DRAM core architecture that dramatically improves the memory system's ability to service multimedia requirements. VCM increases memory bus efficiency and performance of any DRAM technology by providing a set of fast static registers between the memory core and I/O pins. Using VCM technology results in reduced data access latency and reduced power consumption.

Wireless LAN – 802.11b

802.11 is a specification developed by IEEE and Wireless LAN technology, which is an interface between a wireless client and a base station or between two wireless clients.

802.11 family includes the following specifications and with more coming:

802.11 = 1 or 2 Mbps transmission in the 2.4 GHz band, using either frequency hopping spread spectrum (FHSS) or direct sequence spread spectrum (DSSS)).

802.11a = 54 Mbps in the 5GHz band, using orthogonal frequency division multiplexing)

802.11b (11 Mbps transmission in the 2.4 GHz band, using direct sequence spread spectrum (DSSS).

ZIP file

A compressed file format to reduce file size. To unzip file, run shareware PKUNZIP (http://www.pkware.com/) for DOS and other operating system or WINZIP (http://www.winzip.com/) for windows environment.

Troubleshooting

If you encounter any trouble to boot you system, follow the procedures accordingly to resolve the problem.

> **Start**
>
> Turn off the power and unplug the AC power cable, then remove all of the add-on cards and cables, including VGA, IDE, FDD, COM1, COM2 and printer.
>
> Make sure if all jumper settings are correct.
>
> Clear CMOS
>
> **Next**

Continue

Install the VGA card. Then connect your monitor and keyboard.

Turn on the power and check if the power supply and CPU fan work properly.

Yes

No

Next

The problem is probably caused by power supply or motherboard failure. Please contact your reseller or local distributor for repairing.

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```
                        ┌─────────────────┐
                        │    Continue     │
                        └─────────────────┘
                                 │
                                 ▼
                                         No        ┌──────────────────────────┐
              ◇ Check if there is display? ◇──────▶│ Perhaps your VGA card     │
                                                    │ or monitor is defective.  │
                    Yes                             └──────────────────────────┘
                                 │
                                 ▼
        ┌────────────────────────────────────────────────┐
        │ Press <Ctrl> and <Alt> key at the same time, hold │
        │ them and then press <Del> to reboot the system.   │
        └────────────────────────────────────────────────┘
                                 │
                                 ▼
                                         No        ┌──────────────────────────┐
              ◇ Check if the system        ◇──────▶│ It is very possible that your │
                     reboots?                       │ keyboard is defective.    │
                    Yes                             └──────────────────────────┘
                                 │
                                 ▼
                        ┌─────────────────┐
                        │      Next       │
                        └─────────────────┘
```

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```
                        ┌─────────────────────┐
                        │      Continue        │
                        └─────────────────────┘
                                  │
                                  ▼
         ┌───────────────────────────────────────────────────┐
         │ During system rebooting, press <Del> to enter BIOS │
         │        setup. Choose "Load Setup Default".          │
         └───────────────────────────────────────────────────┘
                                  │
                                  ▼
         ┌───────────────────────────────────────────────────┐
         │     Turn off the system and re-connect IDE cable.   │
         └───────────────────────────────────────────────────┘
                                  │
                                  ▼
```

Check if the system can reboot successfully?

No → The problem should be caused by the IDE cable or HDD itself.

Yes

Re-install the operating system such as Windows 98.

End

Technical Support

Dear Customer,

Thanks for choosing AOpen products. To provide the best and fastest service to our customer is our first priority. However, we receive numerous emails and phone-calls worldwide everyday, it is very hard for us to serve everyone on time. We recommend you follow the procedures below and seek help before contact us. With your help, we can then continue to provide the best quality service to more customers.

Thanks very much for your understanding!

AOpen Technical Supporting Team

1	**Online Manual:** To download manual, please log on and then select your preferred language. Under "Type" directory, choose "Manuals" to go to our manual database. You can also find the manual and EIG in AOpen Bonus Pack. *http://club.aopen.com.tw/downloads*
2	**Test Report:** We recommend you to choose board/card/device from the compatibility test reports for assembling your PC. It may prevent incompatibility problems. *http://english.aopen.com.tw/tech/report/default.htm*
3	**FAQ:** Here we list problems that users often encounter and FAQ (Frequently Asked Questions). You may be able to find a solution to your problem. *http://club.aopen.com.tw/faq/*
4	**Download Software:** After log on and having language selected, you may get the latest updated BIOS/utility and drivers you need under "Type" directory. In most case, newer versions of drivers and BIOS have solved earlier bugs or compatibility problems. *http://club.aopen.com.tw/downloads*

5 | **eForum:** AOpen eForum is provided to discuss our products with other users, in which your problem probably had been discussed before or will be answered. After log on, you may select your preferred language under "Multi-language".
http://club.aopen.com.tw/forum/

6 | **Contact Distributors/Resellers:** We sell our products through resellers and integrators. They should know your system configuration very well and should be able to solve your problem efficiently and provide important reference for you.

7 | **Contact Us**: Please prepare detail system configuration and error symptom before contacting us. The **part number**, **serial number** and **BIOS version** are also very helpful.

Part Number and Serial Number

The Part Number and Serial number are printed on bar code label. You can find this bar code label on the outside packing, or on component side of PCB. For example:

Part No.   Serial No.

P/N:91.88110.201   S/N:91949378KN73

9188110201 91949378KN73

P/N: 91.88110.201 is part number, **S/N: 91949378KN73** is serial number.

Model name and BIOS version

Model name and BIOS version can be found on upper left corner of first boot screen (POST screen). For example:
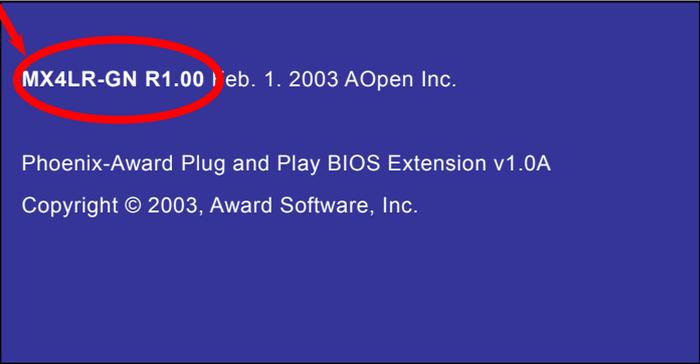
MX4LR-GN R1.00 Feb. 1. 2003 AOpen Inc.

Phoenix-Award Plug and Play BIOS Extension v1.0A

Copyright © 2003, Award Software, Inc.

MX4LR-GN is model name of motherboard, **R1.00** is BIOS version.

Product Registration

Thank you for choosing AOpen product. AOpen encourages you to spend few minutes in completing the following product registration. To register your product will ensure the high quality of services from AOpen. After the registration, you will:

- Have opportunities to play online slot machine and win a prize from AOpen by accumulating your bonuses for later prize exchange.

- Be upgraded to gold membership of Club AOpen program.

- Receive email notification about product safety alerts. Its purpose is to alert consumers quickly and conveniently when products contain technical issues.

- Receive email notification about latest product's announcements.

- Be able to personalize your AOpen web pages.

- Receive e-mail notification about latest BIOS/Driver/Software release information.

- Have opportunities to participate special product promotional programs.

- Enjoy higher service priority to receive technical assistance provided by AOpen specialists worldwide.

- Be able to join the discussions of web-based news groups.

AOpen makes sure that the information you provide is encrypted, so that it cannot be read or intercepted by other people or companies. Further, AOpen will not disclose any of information you submitted under any conditions. Please consult our online privacy policy for further information on our company policy.

Note: If registering products purchased from different dealers/retails and/or purchased on different dates, please submit a separate form for each product.

How to Contact Us

Please do not hesitate contact us if you have any problem about our products. Any opinion will be appreciated.

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