AX45F-4D Series

AX45F-4D AX45F-4DL
AX45F-4DN AX45F-4D Max

Online Manual

DOC. NO.:AX45F4DMAX-OL-E0309A

AOpen

What's in this manual

AOpen

AOpen

AOpen

AOpen

You Must Notice

Adobe, the Adobe logo, Acrobat is trademarks of Adobe Systems Incorporated.

AMD, the AMD logo, Athlon and Duron are trademarks of Advanced Micro Devices, Inc.

Intel, the Intel logo, Intel Celeron, Pentium II, Pentium III and Pentium 4 are trademarks of Intel Corporation.

Microsoft, Windows, and Windows logo are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.

All product and brand names used on this manual are used for identification purposes only and may be the registered trademarks of their respective owners.

All of the specifications and information contained in this manual are subject to change without notice. AOpen reserves the right to revise this publication and to make reasonable changes. AOpen assumes no responsibility for any errors or inaccuracies that may appear in this manual, including the products and software described in it.

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 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 AX45F-4D Series. AX45F-4D Series is Intel® Socket 478 motherboard (M/B) based on the ATX form factor featuring the SiS 655FX/964 chipsets. As high performance chipset built in the M/B, AX45F-4D Series supports Intel® Socket 478 Pentium® 4 1.6GHz~3.20GHz. It supports 400/533/800MHz Front Side Bus (FSB) clock and Hyper-Threading Technology that brings additional intelligence to systems. In the AGP performance, it has one AGP slot to support AGP 8X/4X mode and pipelined spilt-transaction long burst transfer up to 2112MB/sec. According to different customer's requirements, this M/B supports DDR266, DDR333 and DDR400 RAM up to 4GB maximum in Dual Channel mode. The onboard IDE controller supports Ultra DMA 66/100/133 mode and Serial ATA 150 MB/s (supports RAID 0 and RAID 1 functions). There are 5 PCI slots provided on this board, including one

Hercules PCI slot. A total of four USB 2.0 ports on the back panel and two headers on the board give you the best use of all USB devices with the fancy speed up to 480Mbps. More than that, on the strength of integrated Realtek LAN controller on board, which is a highly integrated Platform LAN Connect device, it provides 10/100/1000 Mbps Ethernet (for AX45F-4DN, it is 10/100 Mbps) for office and home use. Besides, AX45F-4D Series has S/PDIF connector and an AC'97 CODEC Realtek chipset onboard, providing high performance and magic surround stereo sound to let people enjoy working with it. Now, let's enjoy all features from AX45F-4D Series.
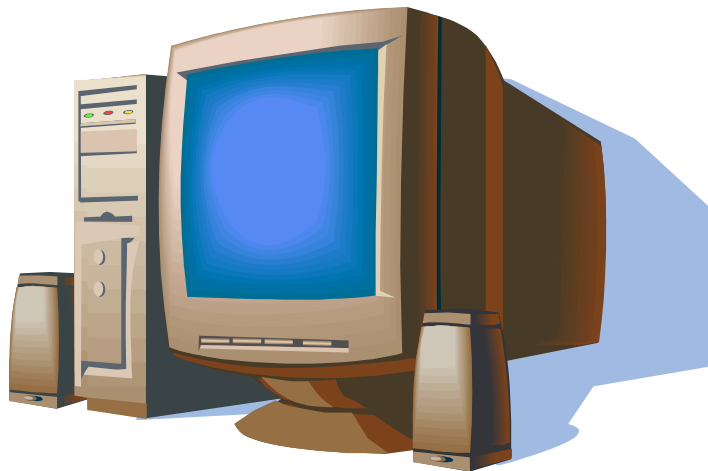
AX45F-4D Series Comparison Table

Following we list functions of all models.   "V" represents those functions that the model equips with and "X" represents functions that models don't have. Please always refer to this page to see the functions of your model.

Model	IDE Slots	SATA Slots	LAN	Diehard BIOS	Hercules PCI Slot	Dr. Voice II
AX45F-4D	2	2	X	X	X	X
AX45F-4DL	2	2	10/100/1000 Mbps	X	X	X
AX45F-4DN	2	2	10/100 Mbps	X	X	X
AX45F-4D Max	3	4	10/100/1000 Mbps	V	V	V

Feature Highlight

CPU

Supports Intel® Socket 478 Pentium® 4 1.6GHz~3.20GHz+ with 400/533/800MHz Front Side Bus (FSB) designed for Socket 478 technology. The AX45F-4D Series motherboard supports Intel Hyper-Threading Technology.

Chipset

The motherboard is equipped with SIS 655FX chipset. The SIS 655FX Host & Memory & AGP Controller integrates a high performance host interface for Intel Pentium 4 processor, a high performance memory controller, an AGP interface and SiS MuTIOL 1G Technology connecting with SiS964 MuTIOL 1G Media IO. The host interface plays the role of processor transactions' dispatcher. It dispatches transactions to Memory, I/O interface and AGP bus. Transactions to different destinations can be dispatched concurrently in order to maximum pipeline efficiency. The Memory controller supports DDR 400/333/266 RAM and the Suspend to RAM function by retaining the CKE# pins asserted in ACPI S3 state in which only AUX source deliver power. The AGP interface supports external AGP slot with AGP 4X/8X capability and Fast Write Transactions.

Memory

With SiS 655FX/964 chipset, this motherboard can support dual channel Double-Data-Rate (DDR) SDRAM. The dual channel mode allows chipsets to get data in 128 bit and zero wait state bursting between the RAM. The data transfer at 266/333/400MHz. The four slots of DDR SDRAM can be composed of an arbitrary mixture of 64, 128, 256, 512 MB or 1GB DDR SDRAM and maximum up to 4GB.

Expansion Slots

Including five 32-bit/33MHz PCI and one AGP 8X/4X slots (The PCI 5 is named Hercules which is reserved especially for high power-consuming PCI cards). The PCI local bus throughput can be up to 132MB/s. Of five PCI slots provided, all of them are master PCI slots with arbitration and decoding for all integrated functions and LPC bus. The AGP expansion slot is designed for a bus mastering AGP graphic card. The Accelerated Graphics Port (AGP) specification provides a new level of video display sophistication and speed. The AGP video cards support data transfer rate up to 2112MB/s.

AGP Protection Technology

With AGP Protection Technology implemented, this motherboard will automatically detect the voltage of AGP card and prevent your chipsets from being burnt out.

Hyper-Threading Technology

Support Hyper-Threading Technology which brings additional intelligence to systems so that multiple tasks received from the processor can be managed and prioritized more effectively.

Watch Dog ABS

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

1MHz Stepping CPU Frequency Adjustment

Provides "1MHz Stepping CPU Frequency Adjustment" function in the BIOS. This magic function allows you to adjust CPU FSB frequency from 100~248MHz by 1MHz stepping adjustment, and helps your system get maximum performance.

LAN Port (for AX45F-4DL, AX45F-4DN and AX45F-4D Max)

On the strength of Gigabit LAN controller (AX45F-4D Max and AX45F-4DL) or Realtek 10/100 Mbps LAN controller (AX45F-4DN) on board, this motherboard provides 10/100/1000 Mbps Ethernet (for AX45F-4DN, it is 10/100 Mbps) for office and home use. For AX45F-4D motherboard, it does not support LAN onboard.

Ultra DMA 66/100/133 Bus IDE

Comes with an on-board PCI Bus Master IDE controller with two connectors that support four IDE devices in two channels, supports Ultra DMA 66/100/133, PIO Modes 3 and 4 and Bus Master IDE DMA Mode 5, and supports Enhanced IDE devices. For AX45F-4D Max, there are three connectors and support six IDE devices in three channels.

Serial ATA

Integrated in SiS 964 chipset that contains independent DMA operation on two ports, the SATA controllers are completely software transparent with the IDE interface, while providing a lower pin count and higher performance and aiming to provide you an even faster transfer rate of 150 Mbytes/second. For AX45F-4D Max motherboards, there are 4 SATA connectors onboard including the other two ports provided by an extra Promise SATA controller.

On-board AC'97 Sound

AX45F-4D Series uses RealTek AC'97 CODEC Realtek ALC658 chip. This on-board audio includes a complete audio recording and playback system.

Eight USB 2.0 Ports

Provides four ports on the back panel and two USB 2.0 headers on the board, providing a total of eight USB 2.0 interface to connect devices such as mouse, keyboard, modem, scanner, etc.

S/PDIF Connector

S/PDIF (Sony/Philips Digital Interface) is the newest audio transfer file format, which provides impressive quality through optical fiber and allows you to enjoy digital audio instead of analog audio.

Power Management/Plug and Play

Supports the power management function which 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.

SilentTek

Combines "Hardware-Status Monitoring", "Overheat Warning" and "Fan Speed Control" with user-friendly interfaces to provide a perfect balance among noises, system performance and stability.

AOpen

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) and S5 features.

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. Setting CPU Frequency
9. Reboot
10. Installing Operating System (such as Windows XP)
11. Installing Driver and Utility

Motherboard Map

Realtek Gigabit LAN chip
(for AX45F-4D Max and AX45F-4DL)
Realtek 10/100 Mbps LAN chip
(for AX45F-4DN)

CD-IN Connector

AUX-IN Connector

Onboard AC'97 CODEC

S/PDIF Connector

JP2 Speaker output Jumper

JP15/JP16 Dr.Voice II
Language Selection Jumper
(only for AX45F-4D Max)

Front Audio Connector

32-bit PCI Expansion Slots x5
(Slot 5: Hercules PCI card that
supports high power-consuming
PCI cards,
only for AX45F-4D Max)

Case Open Connector

USB 2.0 Connectors x2

Die-hard BIOS x2
(only for AX45F-4D Max)

SATA Ports x 4
(for AX45F-4D, AX45F-4DL and
AX45F-4DN, Ports x2)

JP14 CMOS Clear Jumper

Game Port Connector

JP24/JP25 BIOS Rescue Jumper
(only for AX45F-4D Max)

IrDA Connector

SYSFAN2 Connector

Front Panel Connector

ATA 66/100/133 IDE Connectors x3
(for AX45F-4D, AX45F-4DL and
AX45F-4DN, Connectors x2)

FDD Connector

Colored Back Panel

JP28 Keyboard/Mouse
Wakeup Jumper

SYSFAN1 Connector

Low ESR Capacitors

4-pin 12V. ATX Power Connector

AGP Protection LED

AGP 8X Expansion Slot
supports 8X AGP Cards (2.1GB/s)

478-pin CPU socket with Voltage and
Frequency Auto-detection that supports
Intel® Pentium® 4 1.6~3.20GHz+ CPU

SiS 655FX/964 Chipset that
support 400/533/800MHz FSB,
DDR 266/333/400 and AGP 8X

CPUFAN Connector

184-pin DIMMsx4 support
Dual Channel DDR400/333/266
Max. To 4 GB

ATX Power Connector

AOpen AX45F-4D Max

AOpen

Block Diagram

DDR400/333/266 Dual Channel
RAM Up to 4GB

Hercules PCI Slot

PCI Bus

32-bit PCI Slots x5

DIMM Sockets x4

Serial ATA Ports x4

SATA 1

SATA 2

SATA 3

SATA 4

150MB/s

For AX45F-4D, AX45F-4DL
and AX45F-4DN, Ports x2

400/533/800MHz
System Bus

Socket 478
Intel Pentium 4
CPU

SiS
655FX
chipset

AGP bus

ATA
66/100/133

Primary
Channel

Secondary
Channel

Third
Channel

IDE Drives x6

AGP 8X Slot

SiS
964

RealTek
AC97
CODEC

For AX45F-4D, AX45F-4DL
and AX45F-4DN,
Connectors x2

Gigabit LAN Chip
(AX45F-4D Max
and AX45F-4DL)
Realtek
10/100Mbps
(AX45F-4DN)

LAN connect Component

USB Port

only AX45F-4D Max supports
Die-hard BIOS

USB Port

4Mbit Flash EEPROM

USB Ports x8

USB Port

Parallel Port

USB Port

Serial Ports x2

Floppy Disk Drive

Open

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.*

AOpen

About "User Upgrade Optional" and "Manufacture Upgrade Optional"...

When you read this online manual and start to assemble your computer system, you may notice that some of the functions are marked as "User Upgrade Optional" or "Manufacture Upgrade Optional". Although all of AOpen's motherboards have included many amazing and powerful features, sometimes not every user is familiar with these powerful features. As a result of this we define features that can be upgraded by users as "User Upgrade Optional". You can upgrade these functions by purchasing additional devices. As for functions that cannot be upgraded by users, we define them as "Manufacture Upgrade Optional". If need be, you can contact our local distributors or resellers to purchase "Manufacture Upgrade Optional" components, and again you are also welcome to visit our official website at english.aopen.com.tw for detail information.

EzColor NEW!

Breaking through traditional outlook of motherboard, AOpen now brings you a new fresh look of motherboard! – EzColor!

Fancy? You may think so, but actually it is a practical and useful feature for amateur or even power-users. Coming in specific color for specific connector and module, components on motherboard are now born with their respective colors. Users may now easily recognize what jumper or cable should match with specific jumper or cable by COLOR, without having the trouble of holding user guide in one hand and connecting jumpers with the other hand.

And what makes this feature so great is that, even the easy-to-get-confused front panel connector is differentiated now with different light colors!

Sky Blue: **AGP Slot**

Sand: **PCI Slot**

Navy Blue:
  PCI Slot 5

Flame Red:
**Both 4-pin and 12-pin
ATX connector**

Electric Blue
and Navy Blue:
  Memory Module

AOpen

Claret: **Serial ATA connector**

1

Power Switch

IDE LED — ACPI & Power LED

SPEAKER

RESET

Navy Blue: **IDE 1 Connector**

Black: **IDE 2 Connector**

Light Yellow: **IDE 3 Connector**
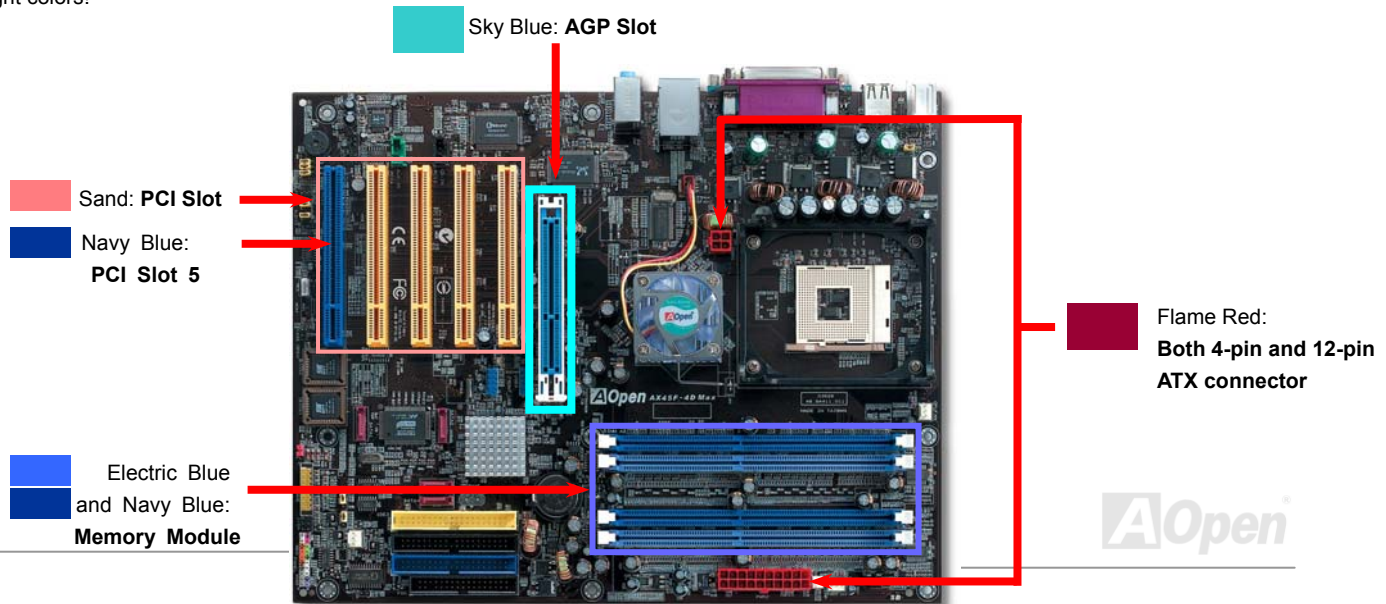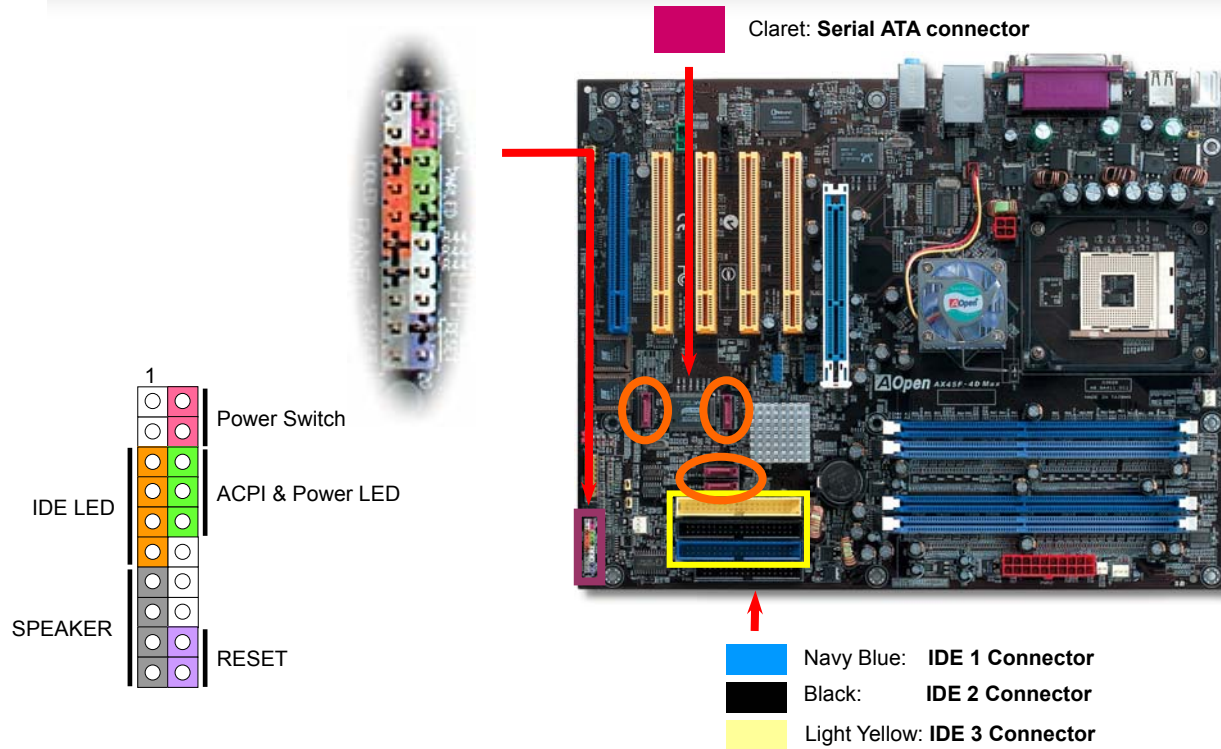
Note: Colors setting varies on different motherboards; the color setting here applies only to AX45F-4D Series Motherboards.

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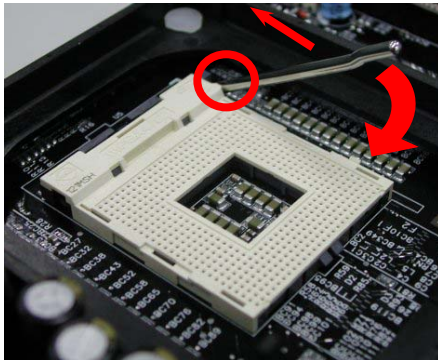
2. Locate Pin 1 in the socket and look for mark on the CPU upper interface. Match Pin 1 and cut edge, then insert the CPU into the socket.

CPU socket Lever

CPU pin 1 and cut edge
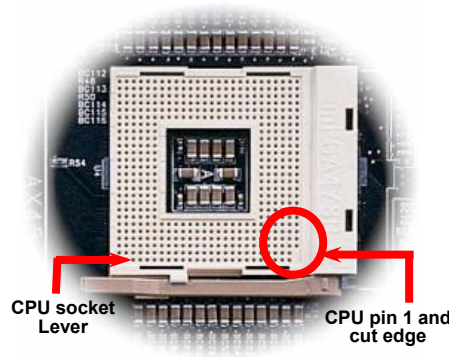
CPU cut edge

Note: Those pictures are for example only; they may not look the same with the motherboard you purchased.

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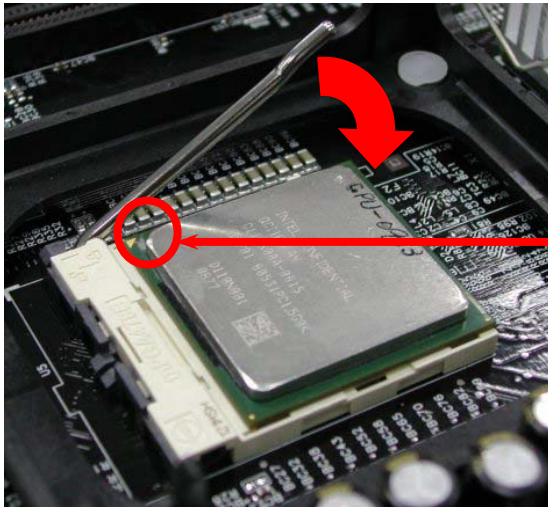
CPU cut edge

*Note: If you do not match the CPU
socket Pin 1 and CPU cut edge well, you
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 look the same with the motherboard you purchased.

AOpen

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
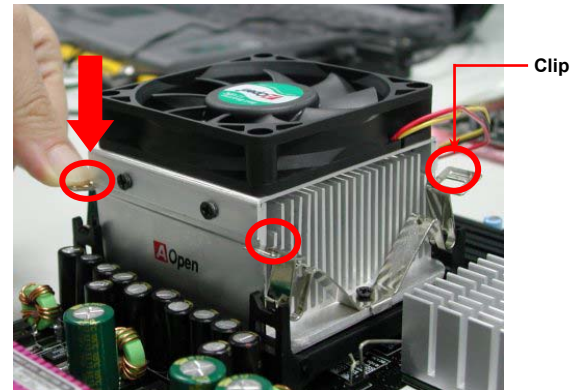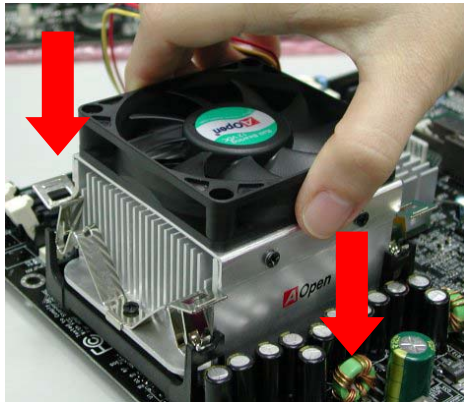
Note: The picture above may look different from the product you purchased.

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.

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

   (Automatically generates CPU voltage)
```

AOpen
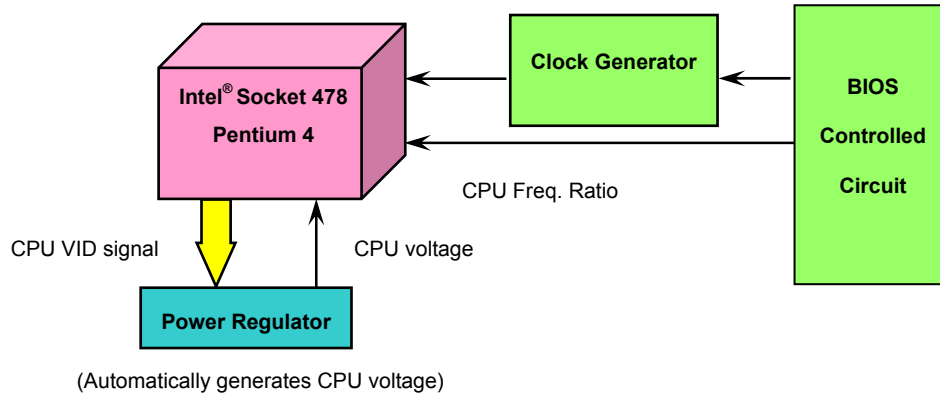
CPU Over-current Protection

The Over Current Protection is a popular implementation on ATX 3.3V/5V/12V switching power supply. However, the new generation CPU uses different voltage with a regulator to transfer 12V to CPU voltage (for example, 1.475V), and thus makes 5V over current protection useless. This motherboard is with switching regulator onboard supporting CPU over-current protection; in conjunction with 3.3V/5V/12V power supply provide the full line over-current protection.

```
                                    5V (Protected by power supply)     ────────►

┌──────────────────────┐           3.3V (Protected by power supply)   ────────►
│                      │
│ ATX Switching Power  │           12V (Protected by power supply)    ────────►
│      Supply          │
│                      │        ┌──────────────────────────────┐
│                      │        │   Onboard Power Regulator      │────► CPU Core Voltage
└──────────────────────┘        │   (Over-Current Protection)    │
                                └──────────────────────────────┘
```
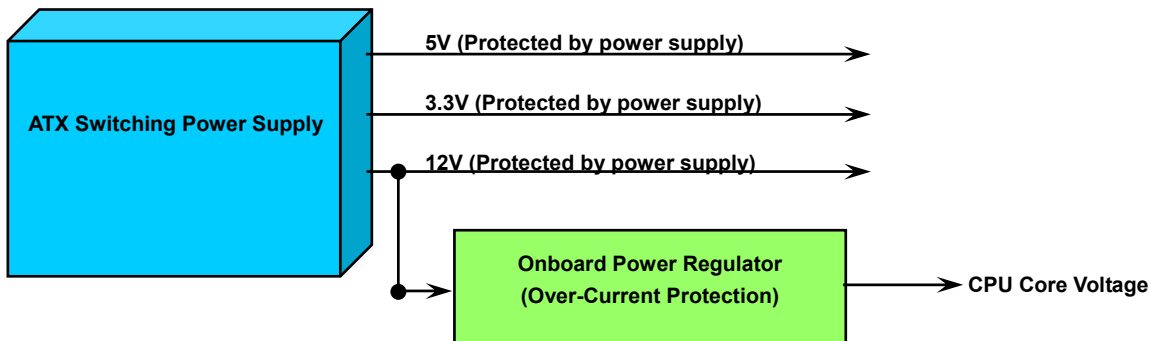
*Note: Although we have implemented protection circuit try to prevent any human operating mistake, there is still certain risk that CPU, memory, HDD, add-on cards installed on this motherboard may be damaged because of component failure, human operating error or unknown nature reason. **AOpen cannot guaranty the protection circuit will always work perfectly.***

AOpen

Battery-less and Long Life Design

This Motherboard implements a Flash ROM and a special circuit that provide you no batter power consumption of current CPU and CMOS Setup configurations. 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 switch 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
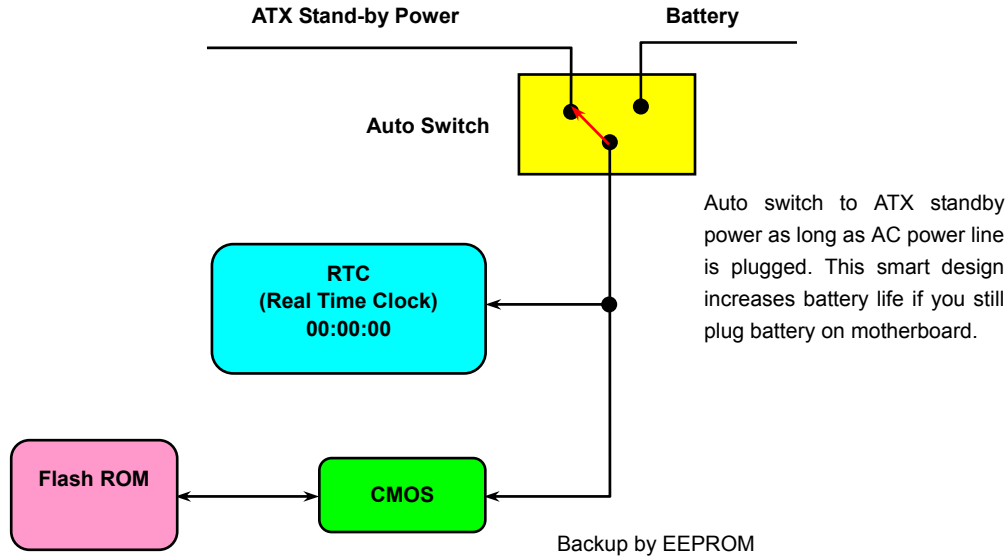
AOpen "Watch Dog ABS"

AOpen provides a special and useful feature on this motherboard 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 according to user's settings stored in the BIOS. If system failed in BIOS POST, the "Watch Dog Timer" 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 a higher system performance without removing the system housing and save the hassle from setting the jumper to clear CMOS data when system hangs.

Enable/Disable Signal from
BIOS

```
                                                    ┌──────────────────┐
                                                    │      BIOS        │
                                                    └──────────────────┘
                                          Reset Signal
┌──────────────────┐                                ┌──────────────────┐
│     AOpen        │                                │ Clock Generator  │         CPU ID Signal
│  Watch Dog ABS   │                                └──────────────────┘
└──────────────────┘    Countdown  about
                        5  seconds  if  fails        ┌──────────────────┐
                        in POST                      │      CPU         │
                                                    └──────────────────┘
```
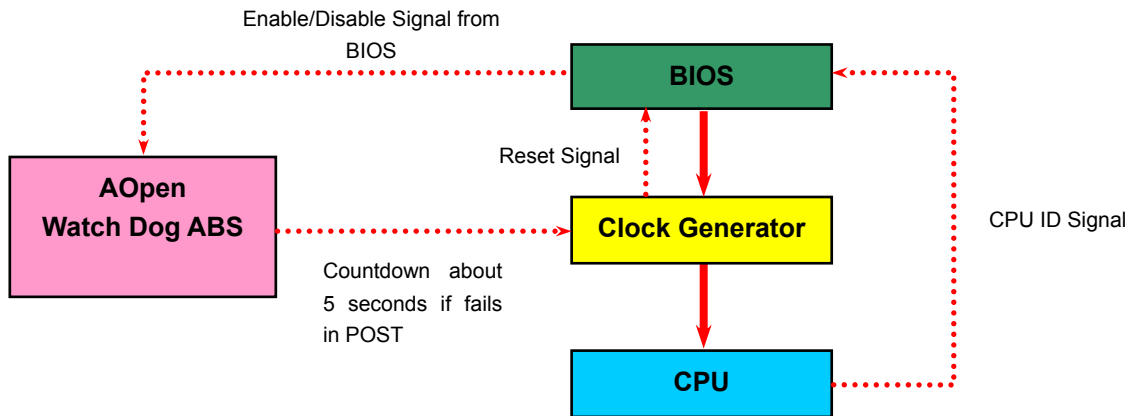
Full-range Adjustable CPU Core Voltage

This motherboard supports CPU VID function. The CPU core voltage will be automatically detected and the range is from 0.8375V to 1.6000V. It is not necessary to set CPU Core Voltage.

Setting CPU Frequency

BIOS Setup > Frequency/Voltage Control > CPU Bus Frequency

This motherboard is CPU jumper-less design, you can set CPU frequency in BIOS; no jumpers or switches are needed. The default setting is "table select mode". You can adjust the FSB from "CPU Host/RAM/PCI Clock" for overclocking.

Core Frequency = CPU FSB Clock * CPU Ratio

PCI Clock = CPU FSB Clock / Clock Ratio

AGP Clock = PCI Clock x 2

CPU Ratio	8x, 10x… 25x, 26x, 27x, 28x
CPU FSB (By BIOS table)	100-248MHz

AOpen

Northwood CPU	CPU Core Frequency	FSB Clock	System Bus	Ratio
Pentium 4 1.7G	1700MHz	133MHz	533MHz	13x
Pentium 4 1.8G	1800MHz	100MHz	400MHz	18x
Pentium 4 2.0G	2000MHz	100MHz	400MHz	20x
Pentium 4 2.2G	2200MHz	100MHz	400MHz	22x
Pentium 4 2.2G	2200MHz	133MHz	533MHz	16x
Pentium 4 2.26G	2260MHz	133MHz	533MHz	17x
Pentium 4 2.4G	2400MHz	100MHz	400MHz	24x
Pentium 4 2.4G	2400MHz	133MHz	533MHz	18x
Pentium 4 2.53G	2530MHz	133MHz	533MHz	19x
Pentium 4 2.6G	2600MHz	200MHz	800MHz	13x
Pentium 4 2.66G	2660MHz	133MHz	533MHz	20x
Pentium 4 2.8G	2800MHz	133MHz	533MHz	21x
Pentium 4 2.8G	2800MHz	200MHz	800MHz	14x
Pentium 4 3.06G	3066MHz	133MHz	533MHz	23x
Pentium 4 3.20G	3200MHz	200MHz	800MHz	16x

Note: With CPU speed changing rapidly, there might be fastest CPU on the market by the time you received this installation guide. This table is kindly for your references only.

Note: SiS 655FX/964 chipset only support Northwood processors (also support Celeron CPU with Northwood core). Northwood processors would detect the clock ratio automatically; you may not be able to adjust the clock ratio in BIOS manually.

*Warning: SiS 655FX/964 chipset supports maximum 800MHz (200MHz*4) system bus and 66MHz AGP clock; higher clock setting may cause serious system damage.*

AOpen

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

The fan Connectors are painted in white in EzColor. Please plug in the CPU fan cable to the 3-pin **CPUFAN** connector. If you have chassis fan, you can also plug it on **SYSFAN1** or **SYSFAN2** connector.

GND
+12V
SENSOR
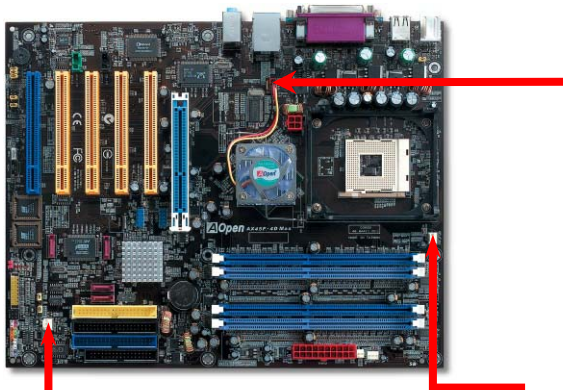
SYSFAN1 Connector

GND
+12V
SENSOR

CPUFAN Connector

GND
+12V
SENSOR
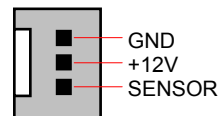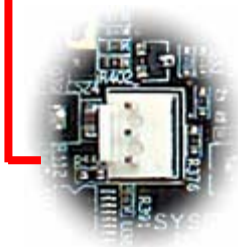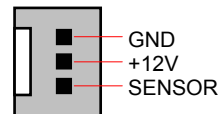
SYSFAN2 Connector
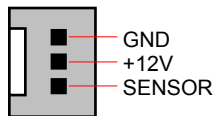
Note: Some CPU fans do not have sensor pin, so that they cannot support hardware monitoring function.

DIMM Sockets

The motherboard has four 184-pin DDR DIMM sockets that allow you to install 128-bit dual channel DDR400, DDR333 or DDR266 memory up to 4GB maximum. The DIMM sockets are painted in electric blue / navy blue and only support non-ECC DDR RAM. Please install suitable modules; otherwise serious damage may occur on memory sockets or you RAM modules. The RAM voltage for you to adjust is from 2.50V-2.85V.
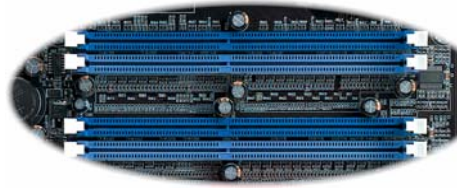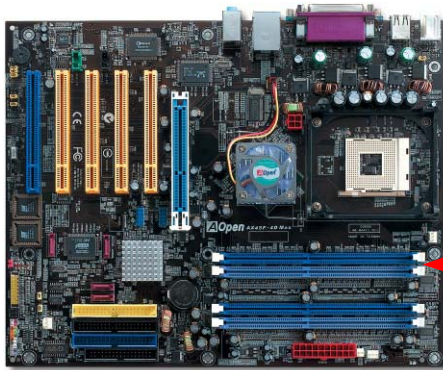
DIMMA1
DIMMA2

DIMMB1
DIMMB2

Warning: This motherboard supports DDR SDRAM. Please do not install the SDRAM on the DDR SDRAM sockets; otherwise it will cause serious damage on memory sockets or SDRAM module.

Note: To run dual channel speed, you have to use the same type memory modules installed on two DIMMs. If you install two different sized modules, the system can only run single channel mode and with the speed of that lower memory module.

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.
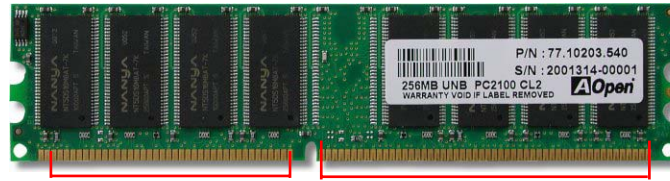
> **Note:** *Please pay attention to the Blue slots. To run dual channel speed, you should insert the RAM in the slot of DIMM A1 and DIMM B1 or DIMM A2 and DIMM B2.* ***Please don't use the different frequency DIMM on dual channel***

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

Key
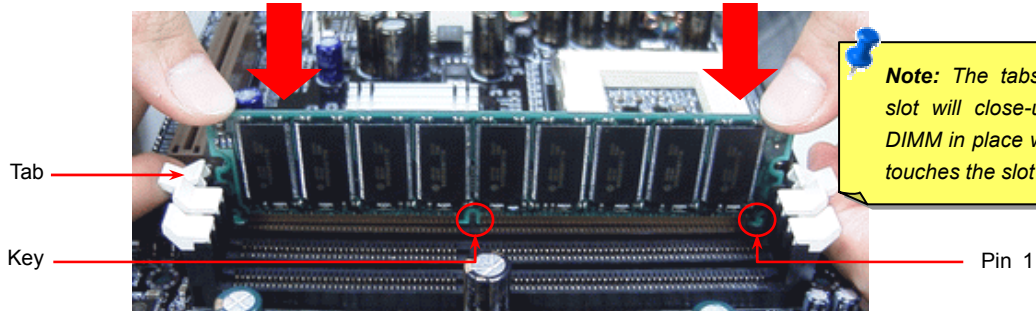
> **Note:** *The tabs of the DIMM slot will close-up to hold the DIMM in place when the DIMM touches the slot's bottom.*

Pin 1

3. Repeat step 2 to finish additional DIMM modules installation.

Note: These images are for example only; they may not be exactly the same as the motherboard you purchased.

*A*Open

Maximum the performance of Dual Channel

To get the highest performance of Dual Channel, the DIMM must meet the following conditions.

Matched DIMM configuration in each channel

● Same Density (128MB, 256MB, 512MB, etc.)   ● Same DRAM technology (128Mb, 256Mb, or 512Mb)

● Same DRAM bus width (x8 or x16)   ● Either single-sided or dual-sided

Matched in both Channel A and Channel B memory channels

● Populate symmetrical memory slots (Slot 0 or Slot 1)

Note: Memory interface speed will be set to the lowest speed of memory populated.

Table below shows DIMMs with same Organization and Density, but are non-matching as bus width, technology and/or external banks are different. **Mixing these DIMMs will put platform into single channel mode.**

Same Organization   Same Density   Different Bus Width Different Technology Same # of DRAM Banks

Organization	Density	Composition	Technology	External
16Mx64	128MB	16Mx8 *8 pcs	128MB	1
16Mx64	128MB	16Mx16 *4 pcs	256MB	1
32Mx64	256MB	16Mx8 *16 pcs	128MB	2
32Mx64	256MB	32Mx8 *8 pcs	256MB	1

Non-Matched 128MB DIMMs / **Non-Matched 256MB DIMMs**

Same Organization   Same Density   Same Bus Width Different Technology Different # of DRAM Banks

ATX Power Connector

This motherboard comes with a 20-pin and 4-pin ATX power connector in flame red. 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.
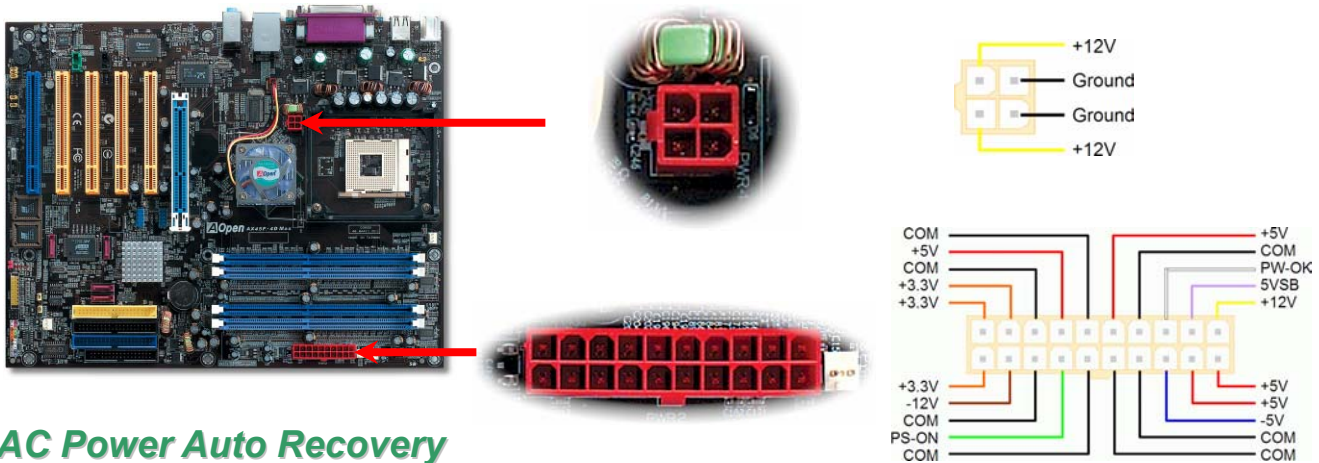
AC Power Auto Recovery

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 FDD and IDE connector. The IDE 1 connector is painted in navy blue; the IDE 3 connector is painted in light yellow; the IDE 2 connector and FDD connector are painted in Black. Be careful of the pin1 orientation. Wrong orientation may cause system damage.

IDE 1

IDE 2

IDE 3

Pin 1

ATA 66/100/133
IDE Connector

FDD Connector

Pin 1

AOpen
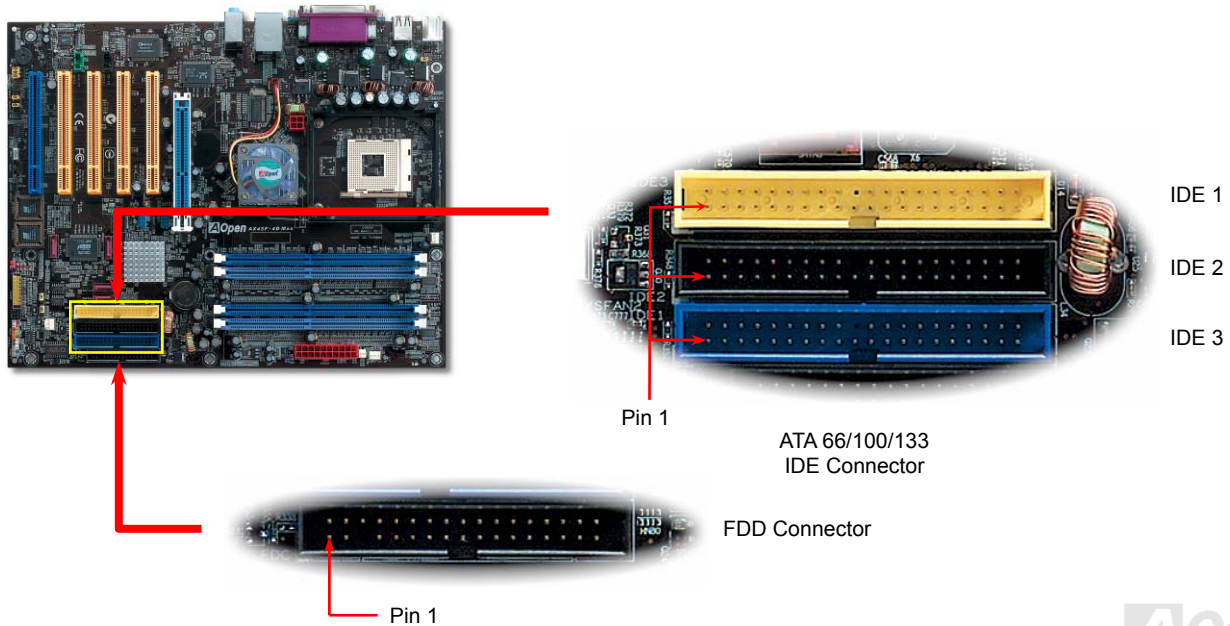
IDE1 is also known as the primary channel and IDE2、IDE3 as the secondary and third channel. Each channel supports two IDE devices that make a total of six devices. In order to work together, the two devices on each channel must be set differently to **Master** and **Slave** mode. Either one can be the 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.

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.

ATA133 Supported NEW!

This motherboard supports ATA66, ATA100 or ATA133 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.   As the hard drive industry introduces faster and higher capacity hard drives, the current Ultra ATA/100 interface causes a data bottleneck between the drive and the host computer. To avoid this problem, hard disk manufactures have introduced the new Ultra ATA-133 interface technology. Compared to traditional ATA/100, ATA/133 has up to 33 percent increase in interface speed with transfer rate of 133MB/s. ATA/133 performance is ideal for new operating systems, such as Window XP, that demand more storage space and faster data transfer rates from more responsive computing experiences.

To make good use of this new technology and enjoy its best performance, we recommend you to pair your system with a hard disk equipped with ATA/133 technology so that your system's need for speed on this motherboard can be satisfied.

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 66	30ns	2	60ns	(1/60ns) x 2byte x2 = 66MB/s
ATA 100	20ns	2	40ns	(1/40ns) x 2byte x2 = 100MB/s
ATA 133	15ns	2	30ns	(1/30ns) x 2byte x2= 133MB/s

AOpen

Serial ATA Supported NEW!

The traditional parallel ATA specification has defined the standard storage interface for PCs with its original speed of just 3 Mbytes/second since the protocol was introduced in the 1980s. And the latest generation of the interface, Ultra ATA-133, has been developed further with a burst data transfer rate of 133 Mbytes/second. However, while ATA has enjoyed an illustrious track record, the specification is now showing its age and imposes some serious design issues on today's developers, including a 5-volt signaling requirement, high pin count, and serious cabling headaches.

The Serial ATA specification is designed to overcome these design 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 reduces voltage and pins count requirements and can be implemented with thin and easy to route cables.

SATA
Port3

SATA
Port1

SATA
Port2
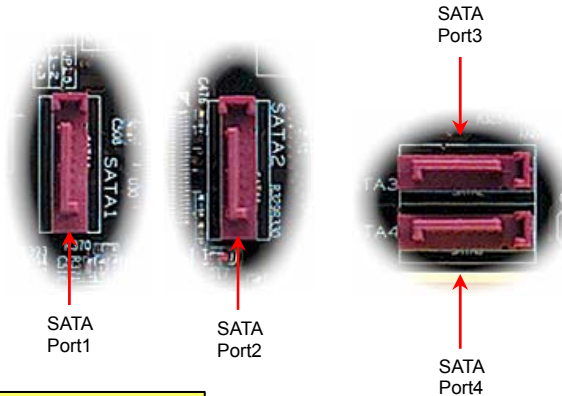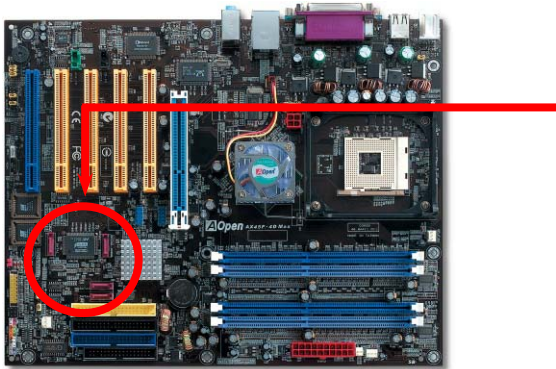
SATA
Port4

Note: Only AX45F-4D Max supports 4 SATA Ports; AX45F-4D / AX45F-4DL / AX45F-4DN support 2 SATA Ports.

AOpen

Connecting Serial ATA Disk

You will find the claret serial ATA connectors in motherboard easily. To connect a Serial ATA disk, you have to have a 7-pin serial ATA cable. Connect two ends of the serial ATA cable to the serial ATA header on the motherboard and the disk. Like every other traditional disk, you also have to connect a power cable.   Please be noted that it is a jumper free implement; you don't need to set jumpers to define a master or slave disk. When serial ATA hard disks are installed on serial ATA ports, the one connected on Port 0(SATA 1) will be set as the first boot device automatically. Please be noted that it doesn't support Hot-Plug in function.

Item	Parallel ATA	Serial ATA
Bandwidth	100/133 MB/Sec	150/300/600 MB/Sec
Volts	5V	250mV
Pins	40	7
Length Limitation	18 inch (45.72cm)	1 meter (100cm)
Cable	Wide	Thin
Ventilation	Bad	Good
Peer-to-Peer	No	Yes

Comparison between Parallel ATA and Serial ATA

Note: These images are for example only; they may not be exactly the same as the motherboard you purchased.

AOpen

Adjusting Your Hard Disk

Except its original 3 sets of parallel IDE, this motherboard does come with the support for the latest Serial ATA hard disk. If you are unable to find your newly installed Serial ATA hard disks on your operating system after you have had installed them on, the problem mainly lies in the BIOS setting. You may simply adjust BIOS settings to have them work properly.

After having properly installed your hard disks, you may directly get into the BIOS setting screen for adjustment. You may simply press "Integrated Peripherals → SiS OnChip PCI Device → Serial ATA Controller" to choose your preferable mode. If you have no intention of changing its setting, the default would be enabled.
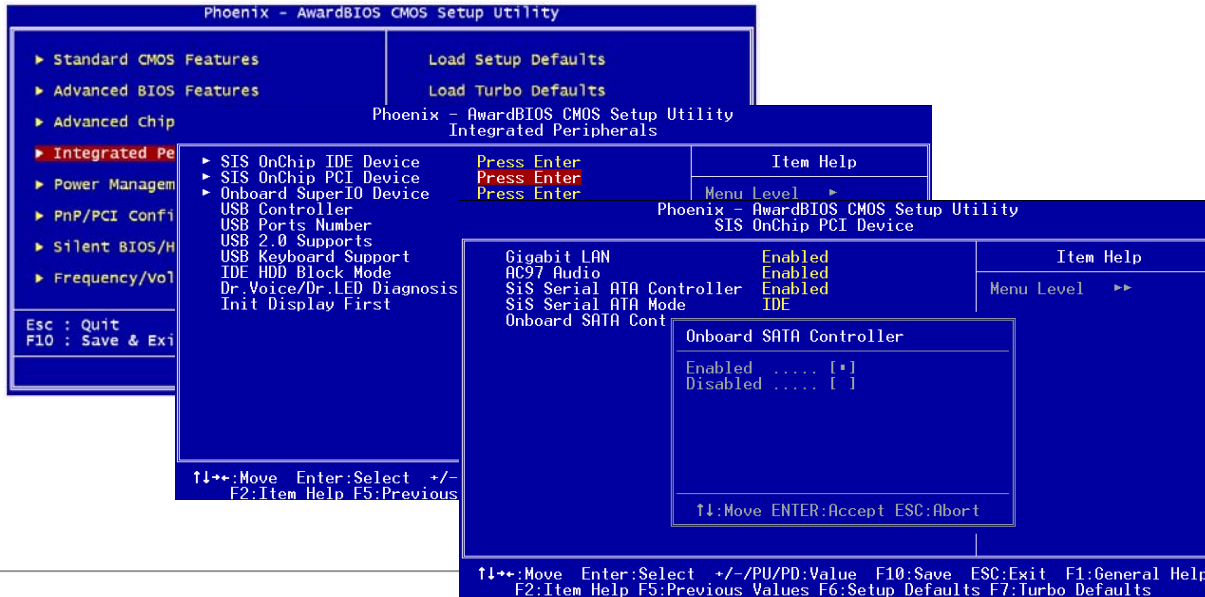
Support RAID 0 and RAID 1 NEW!

With SiS964 chipset onboard, this motherboard provides a cost-effective, high performance stripping (RAID 0) and mirroring (RAID 1) solution. With stripping, identical drives can read and write data in parallel to increase performance. Mirroring increase read performance through load balancing and elevator seeking while creating a complete backup of your files. When supporting RAID 0 or RAID 1, you should connect SATA hard driver disks to SATA Header 1and 2. You can set in SiS RAID BIOS Setting Utility which mode you want to support.
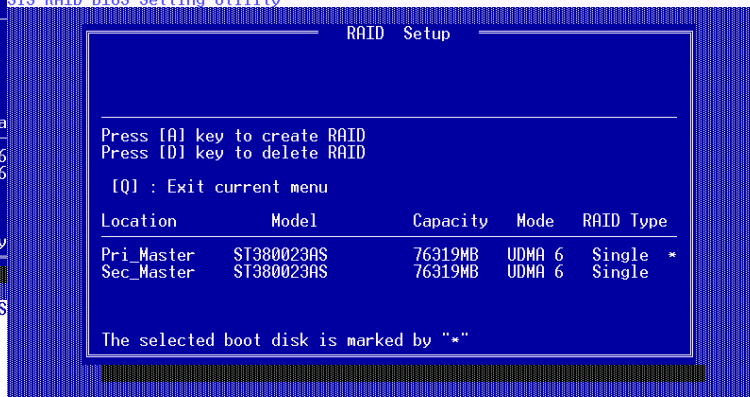
Front Panel Connector
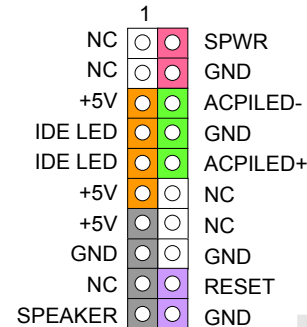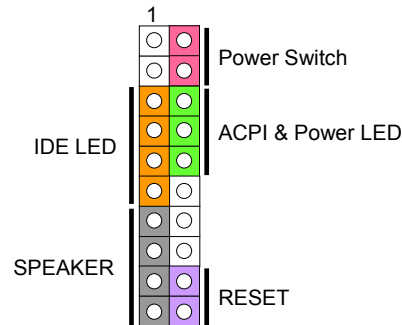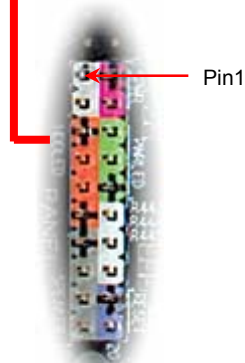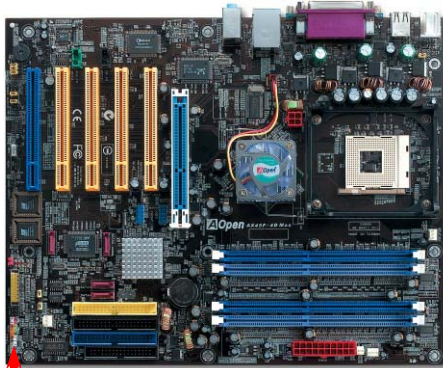
The pins of Front Panel Connector are painted in different colors with their respective functions. Please attach the power LED, speaker, power and reset switch connectors to the corresponding pins matched in same colors. If you enable "Suspend Mode" item in BIOS Setup, the ACPI & Power LED will keep flashing or high light 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 (S1) or Suspend to RAM (S3)	Flashing for every second
Suspend to Disk (S4)	The LED will be turned off

Pin1

Power Switch

IDE LED   ACPI & Power LED

SPEAKER

RESET

	1	
NC		SPWR
NC		GND
+5V		ACPILED-
IDE LED		GND
IDE LED		ACPILED+
+5V		NC
+5V		NC
GND		GND
NC		RESET
SPEAKER		GND

AOpen

AGP (Accelerated Graphic Port) 8X Expansion Slot

AX45F-4D Series provides an AGP 8X slot, a sky blue slot which has the latest AGP specification in motherboard. The AGP 8x calls for the bus to operate at the basic AGP 66-MHz clock frequency and the bandwidth are 2.1Gbytes/s. It is a great improvement on the performance of 3D graphic. AGP supports only memory read/write operation and single-master single-slave one-to-one only. AGP uses both rising and falling edge of the 66MHz clock, for 2X AGP, the data transfer rate is 66MHz x 4bytes x 2 = 528MB/s and AGP 4x mode, 66MHz x 4bytes x 4 = 1056MB/s. Now the transfer rate is 66MHz x 4bytes x 8 = 2112MB/s. You can adjust AGP voltage in BIOS within a range from 1.5V to 1.6V.

Warning: It is strongly recommended not to adjust voltage/clock of AGP/PCI when connecting any SATA service. It is because when the voltage/clock for AGP/PCI is adjusted, the clock for SATA couldn't keep 100MHz, and the system will be unstable.
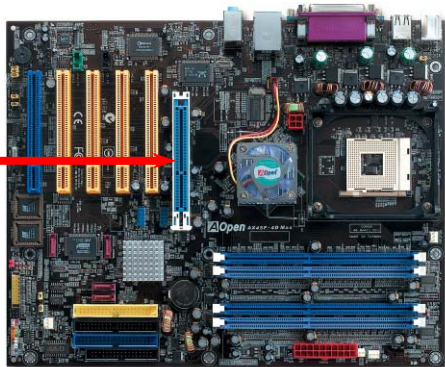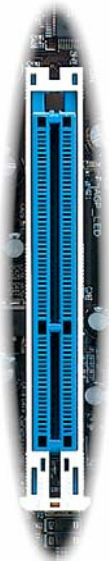
Warning: It is strongly recommended not to install a 3.3V AGP card, which is not supported by SiS 655FX / 964 chipset.

AGP Protection Technology and AGP LED

With the outstanding R&D ability of AOpen and its specially developed circuit, this motherboard implements a blend new technology to protect your motherboard from being damaged by over voltage of AGP card. When AGP Protection Technology is implemented, this motherboard will automatically detect the voltage of AGP card and prevent your chipsets from being burnt out. Please note that if you install a AGP card with 3.3V, which is not supported by SiS655FX/964 chipset, the AGP LED on the motherboard will light up to warn you the possible damage of the exceeding voltage. You may contact your AGP card vendor for further support.
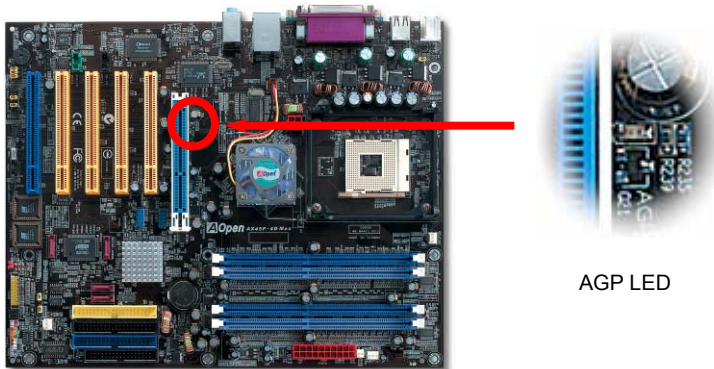
AGP LED

> **Warning:** It is strongly recommended not to install a 3.3V AGP card, which is not supported by SiS 655FX/964 chipset. When you do so, the AGP LED on the motherboard will light up to warn you the possible damage.

Hercules PCI Slot

NEW!

Spotted easily among other PCI slots onboard, this Hercules PCI slot comes in a special BLUE color to illustrate its uniqueness and usefulness.

As independent as Hercules is, it comes in a separate set of 3.3 volt power circuitry which supplies needed current and making it virtually free from the "loading issue" of traditional PCI slot. In addition, traces around this specially designed slot power delivery are upgraded in terms of their trace thickness, making its signals much more robust than their fellow PCI slots onboard.

When building machines with PCI cards which requires higher power, such as SCSI and RAID cards, the card installed on this slot will never be affected under heavy loading conditions such as all onboard PCI slots being fully populated. Hercules PCI keeps supplying you best performance and stability.

Last but not least, if your computer comes with an ordinary SPS (Switching Power Supply), Hercules PCI Slot demonstrates superior compatibility and reliability.
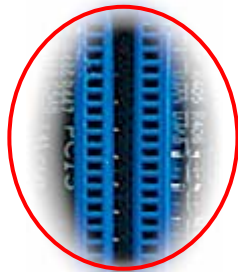
Independent 3.3 volt power circuitry

Hercules PCI slot
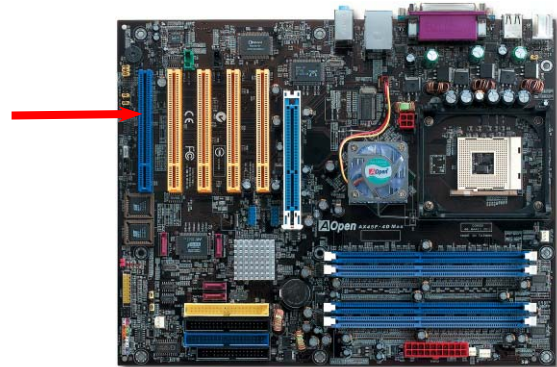
IrDA Connector

The IrDA connector can be configured to support wireless infrared module, with this module and application software such as Laplink or Windows 98 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

IrDA Connector

```
       1
NC  [ O |   ] KEY
+5V [ O | O ] GND
IR_TX[ O | O ] IR_RX
```
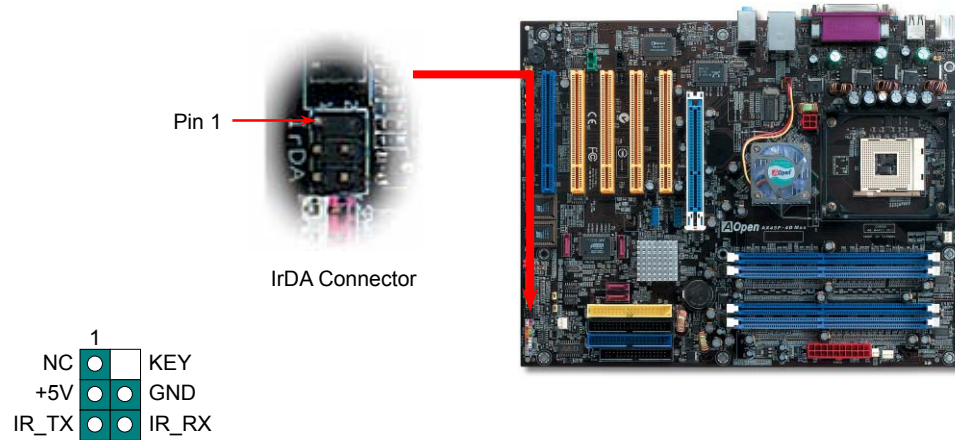
Support LAN onboard (for AX45-4DL, AX45-4DN and AX45F-4D Max)

On the strength of Gigabit LAN controller (AX45F-4D Max and AX45F-4DL) or Realtek 10/100Mbps LAN controller (AX45F-4DN) on board, this motherboard provides 10/100/1000 Mbps (for AX45F-4DN, it is 10/100 Mbps) Ethernet for office and home use. AX45F-4D motherboard does not support LAN onboard. The Ethernet RJ45 connector is located on top of USB connectors. The right hand side LED indicates link mode, it lights in orange whenever linking to network. The left hand side LED indicates the transfer mode and it lights in green when data is transferring in 100Mbps (never lights while in 10Mbps), but lights in orange when transferring in Gigabit's mode. To enable or disable this function, you may simply adjust it through BIOS.
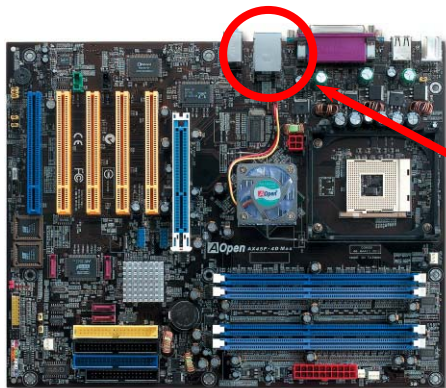
Transferring (Left)
Green 100Mbps
Orange Gigabit mode

Linking (Right)
Orange

Support USB 2.0 Ports NEW!

This motherboard provides eight USB 2.0 ports to connect USB devices such as mouse, keyboard, modem, printer, etc. There are two USB headers on the board for you to connect two USB devices and four other ports on the back panel. You can use proper cables to connect USB devices from back panel or connect the front USB connector to the front panel of chassis.

Compared to traditional USB 1.0/1.1 with the speed of 12Mbps, USB 2.0 has a fancy speed up to 480Mbps that is 40 times faster than the traditional one. Except for the speed increase, USB 2.0 supports old USB 1.0/1.1 software and peripherals, offering impressive and even better compatibility to customers. On this motherboard, all eight ports support USB 2.0 function.

Pin 1

Pin 1

```
       1
+5V   O O  +5V
SBD6- O O  SBD7-
SBD6+ O O  SBD7+
GND   O O  GND
KEY     O  NC
```

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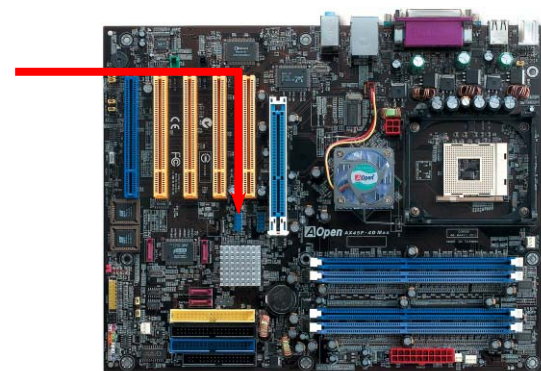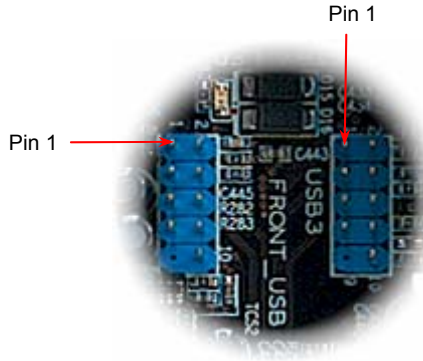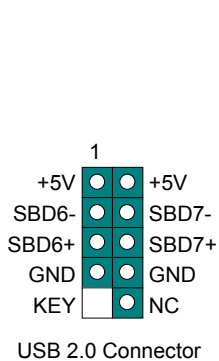
> *Note: Please note that if you would like to use USB devices (Example: keyboard, mouse etc.) under DOS environment, you must install driver that comes with the devices to make it work.*

Color Coded Back Panel

The onboard I/O devices are PS/2 Keyboard, PS/2 Mouse, RJ-45 LAN Connector, COM1, COM2 port, Printer, USB, AC'97 sound and game ports. The view angle of drawing shown here is from the back panel of the housing.
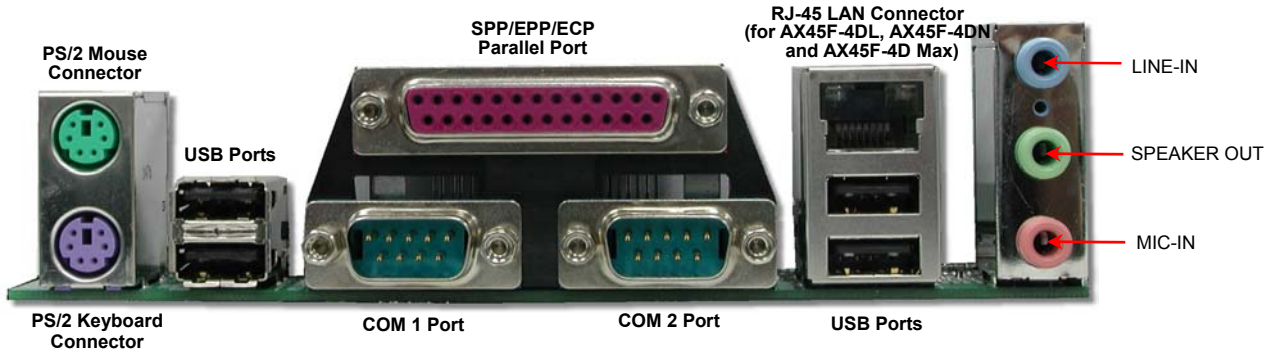
PS/2 Keyboard:	For standard keyboard, which use a PS/2 plug.
PS/2 Mouse:	For PC-Mouse, which use a PS/2 plug.
USB Port:	Available for connecting USB devices.
Parallel Port:	To connect with SPP/ECP/EPP printer.
COM1 Port:	To connect with pointing devices, modem or others serial devices.
COM2 Port:	To connect with pointing devices, modem or others serial devices.
RJ-45 LAN connector	To connect Ethernet for home or office use.
Speaker Out:	To External Speaker, Earphone or Amplifier.
Line-In:	Comes from the signal sources, such as CD/Tape player.
MIC-In:	From Microphone.

S/PDIF (Sony/Philips Digital Interface) Connector

S/PDIF (Sony/Philips Digital Interface) is a latest audio transfer file format that provides impressive quality through optical fiber and allows you to enjoy digital audio instead of analog. Normally there are two S/PDIF outputs as shown, one for RCA connector, the most common one used for consumer audio products, and the other for optical connector with a even better audio quality. Through a specific audio cable, you can connect the S/PDIF connector to a S/PDIF audio module bearing S/PDIF digital output. However, you must have a S/PDIF supported speaker with S/PDIF digital input to make the most of this function.

S/PDIF OUT

S/PDIF IN

S/PDIF OUT

S/PDIF IN
(Optical)

S/PDIF Cable

Pin 1
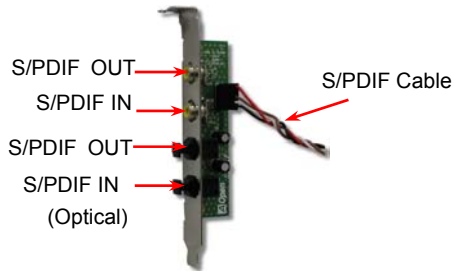
S/PDIF Module
(User Upgrade Optional)

S/PDIF Connector

1 +5V
   NC
   SPDIFOUT
   GND
5 SPDIFIN
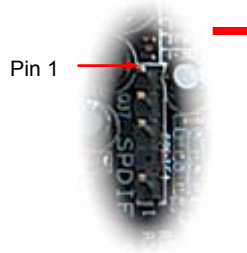
Super 5.1 Channel Audio Effect

This motherboard comes with an ALC658 CODEC, which supports high quality of 5.1 Channel audio effects, bringing you a brand new audio experience. On the strength of the innovative design of ALC658, you're able to use standard line-jacks for surround audio output without connecting any external module. To apply this function, you have to install the audio driver in the Bonus Pack CD as well as an audio application supporting 5.1 Channel. Picture bellow represents the standard location of all speakers in 5.1 Channel sound tracks. Please connect the plug of your front speakers to the green "Speaker out" port, rear speakers' plug to the blue "Line in" port and both of the center and subwoofer speakers to the red "MIC in" port.
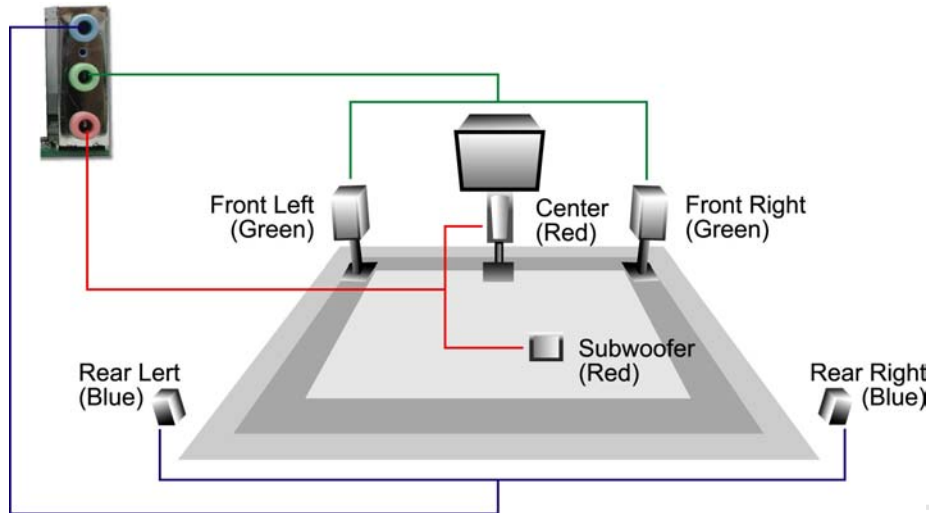
Front Audio Connector

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 the jumper cap from the Front Audio Connector before you connect the cable. Do not remove this yellow jumper cap if your housing doesn't have an audio port on the front panel.

Pin 1 →

Front Audio Connector

```
              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
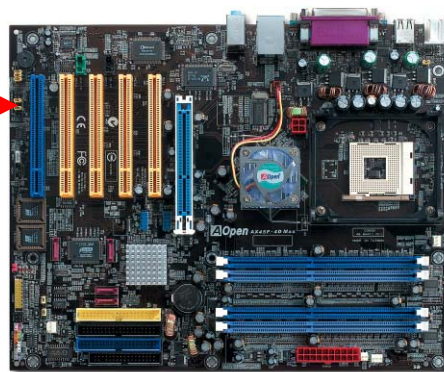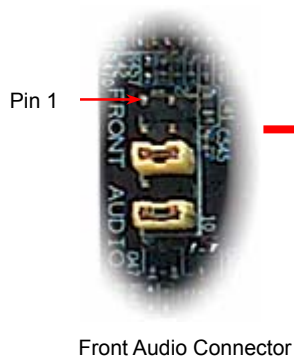
Note: Please remove the jumper cap from the front audio connector before you connect the cable. Do not remove this yellow jumper cap if your housing doesn't have an audio port on the front panel.

AOpen

Game Port Bracket Supported

This motherboard comes with a game port (Joystick-Midi) for you to connect any midi devices or joysticks. To use this function you have to have a joystick module and connect it with a game port cable to this port on the motherboard.

Joystick Module
(User Upgrade Optional)

Pin1 ——►
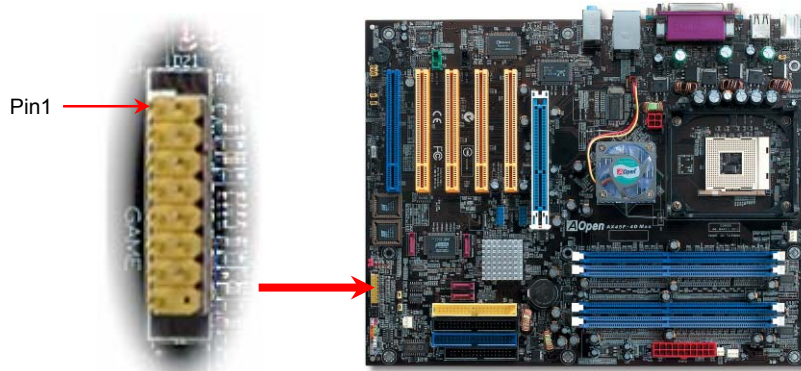
Game Port Connector

1

+5V	○ ○	+5V
JAB1	○ ○	JBB1
JACX	○ ○	JBCX
GND	○ ○	MIDI_TXD
GND	○ ○	JBCY
JACY	○ ○	JBB2
JAB2	○ ○	MIDI_RXD
+5V	○	KEY

AOpen

CD Audio Connector

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

R ——
GND ——
GND ——
L ——
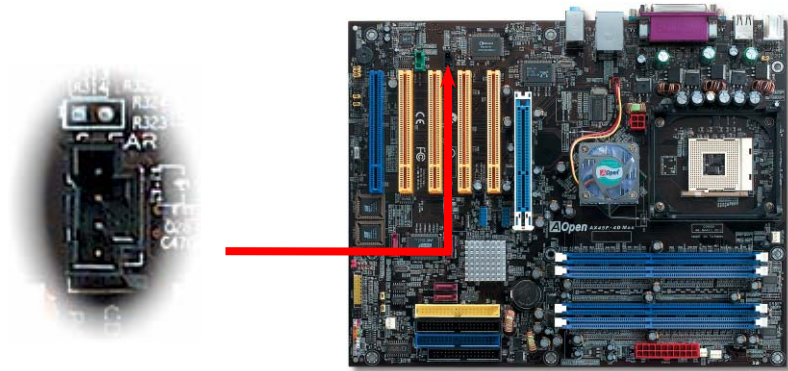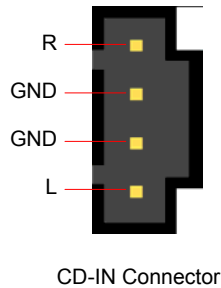
CD-IN Connector

> **Note:** *Though some of the latest versions 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 connect audio cable to CD-IN connector on the motherboard.*

AUX-IN Connector

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

R ——
GND ——
GND ——
L ——
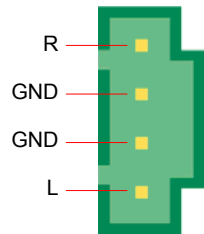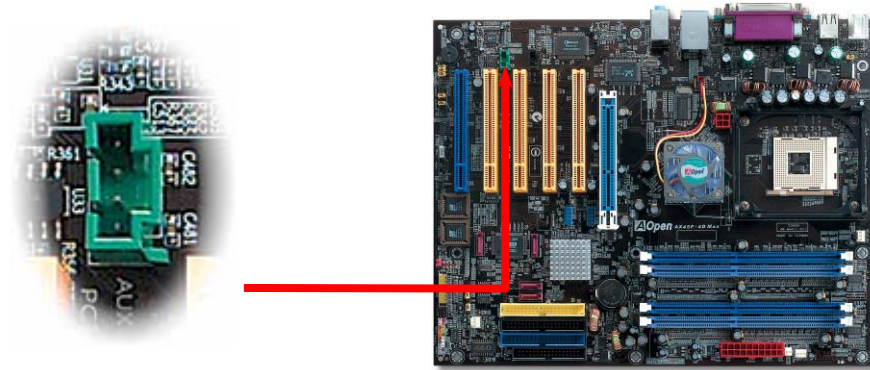
AUX-IN Connector

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 by the opening of the chassis, the system will beep 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.

Pin 1
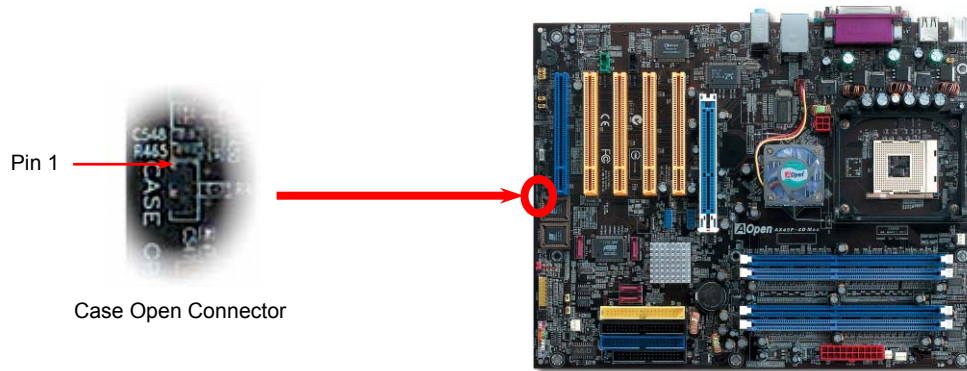
Case Open Connector

1
GND
Sensor

STBY LED (Standby LED)

STBY LED is AOpen's considerate design that aims at providing you friendly system information. The STBY LED will light up when power is provided to the motherboard. This is a convenient indication for you to check the system power status in many circumstances such as power on/off, stand-by mode and RAM power status during Suspend to RAM mode.
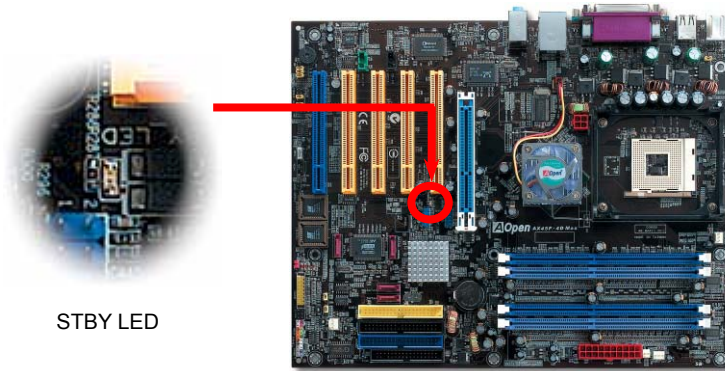
STBY LED

> **Warning:** Do not install or remove the DIMM module or others devices when the STBY LED lights on.

Fansink on North Bridge

In order to provide a better effect of cooling and make the chipset work more stable, we especially design a fansink on the north bridge. After locating the fansink on the north bridge, plug the connector to the header marked SYSFAN1 on the motherboard.
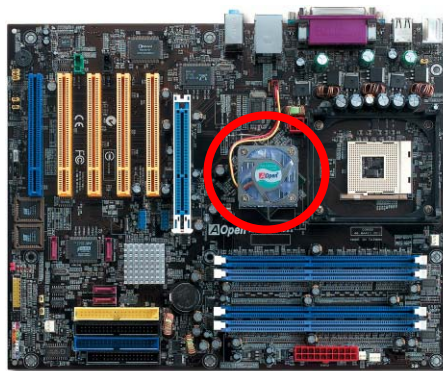
Low ESR Capacitor

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, AX45F-4D Series implements 3300 μF capacitors, which is much larger than normal capacitor (1000 & 1500 μF) and it provides better stability for CPU power.

*A*Open
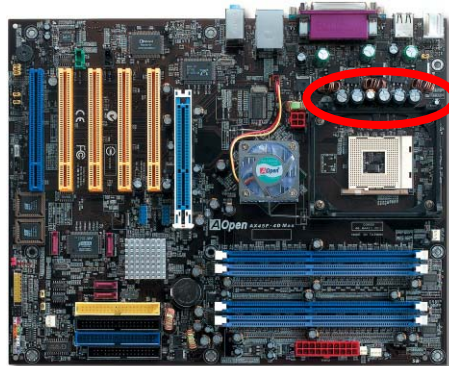
JP2 Speaker Output Jumper (only for AX45F-4D Max)

This motherboard comes with another considerate option that allows you to turn off the voice from buzzer and speaker. You can choose not to be bothered by the warning made from Dr. Voice II when it detects any error in operating system. You may also set JP2 to choose sending out voices from buzzer or speaker.

Pin1

1   1
Buzzer   Speaker
(Default)
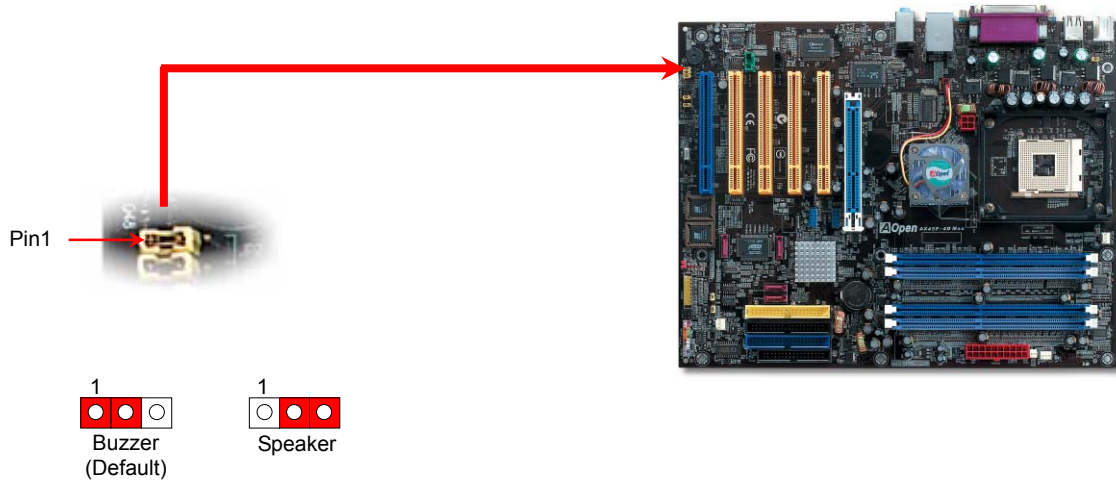
JP14 Clear CMOS Data

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 pin1 & pin2.

5.   Connect ATX power cable back to connector PWR2.

Pin 1

1 Normal
(default)
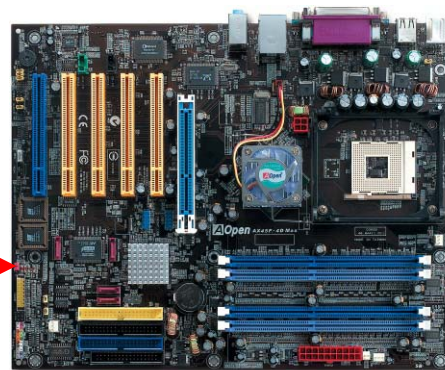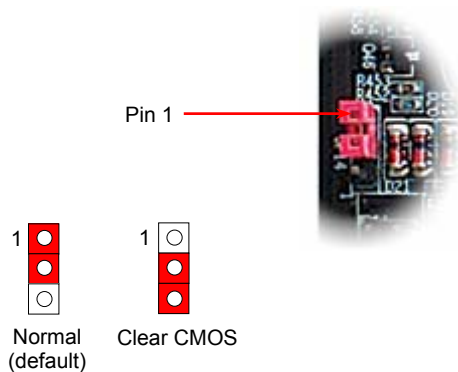
1 Clear CMOS

Tip: When should I Clear CMOS?

1. Boot fails because of overclocking…

2. Forget password…

3. Troubleshooting…

AOpen

JP15/JP16 Dr. Voice II Language Select Jumpers (only for AX45F-4D Max)

Dr. Voice II is a great feature which can identify the problems you may encounter in the operating system. It can clearly "**tell you**" whether the problem is caused from components or improper installation such as CPU, memory module, VGA, PCI add-on card, FDD, HDD or keyboard. Dr. Voice II provides four language versions: **English**, **German**, **Japanese** and **Chinese**. You can select your preferred language by **JP15** & **JP16** jumpers. Furthermore, you may also set JP2 to choose sending out voices from buzzer or speaker

JP2 Pin 1
JP16 Pin 1
JP15 Pin 1

Dr. Voice Language
Select Jumper

Pin 1

JP16

JP15

English
(Default)   Japanese   Chinese   German
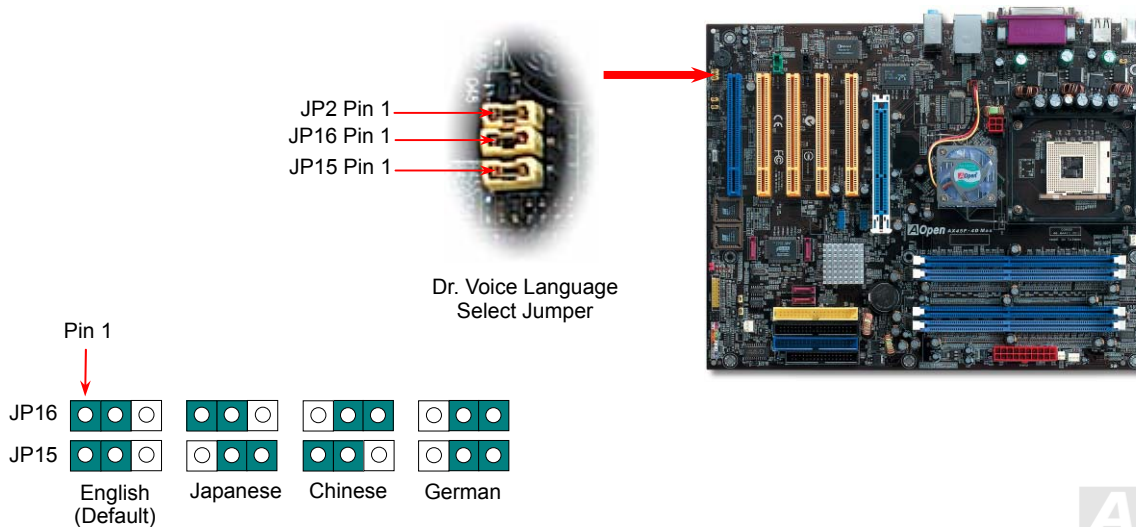
JP24 / JP25 BIOS Rescue Jumper (only for AX45F-4D Max)

Inherited DieHard BIOS, the steps of rescuing your crashed BIOS 1 back to life is the same. First step is to set JP24 to Pin2-3 to boot up the system with BIOS 2. After that, please set the JP24 back to Pin1-2, go to AOpen website to get your BIOS version suited for your motherboard, and have it downloaded. There are two kinds of ways to flash the BIOS 1; you may flash it under Window environment with EZWinflash or under DOS system. To flash under Window environment is easy; you may just download the BIOS version and implement it with EZWinflash. For Flashing BIOS under DOS system, please unzip the BIOS version after downloading from website, and execute it under DOS. These two versions of BIOS have been provided on our website for your downloading. DieHard BIOS II is further enhanced with data saving function. In addition to read-only ROM, DieHard BIOS II allows you to turn your second ROM into a Read-and-write ROM with larger space provided. You may download fancy skins from our website (http://download.aopen.com.tw/downloads) to apply them on JukeBox, JukeBox FM or VividBIOS by adjusting JP25 to Pin2-3 (No Protection).

Note: Please be noted that you will not be able to use the second BIOS ROM for boot-up after setting JP25 to Pin 2-3 for the purpose of saving skins of JukeBox, JukeBox FM or VividBIOS.

Pin1 — JP 24

Pin1 — JP 25

Boot from BIOS1 (default)   Boot from BIOS2

Protect BIOS2 (default)   Not protect BIOS2
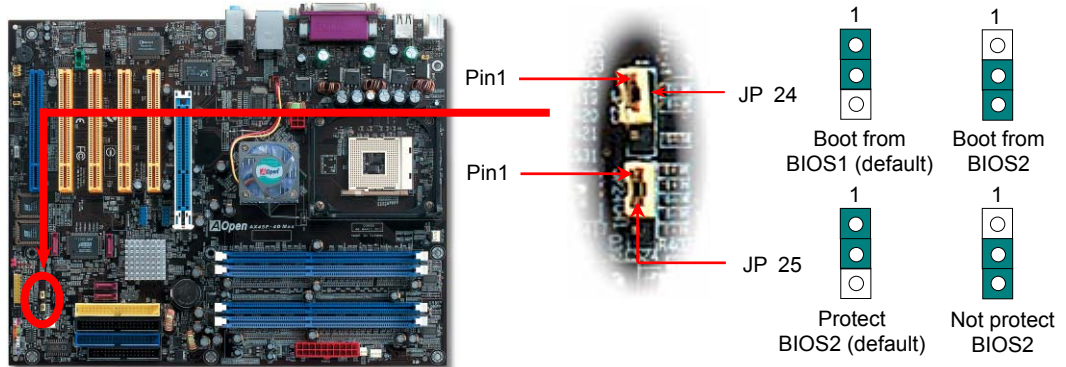
JP28 Keyboard/Mouse Wake-up Jumper

This motherboard provides PS2 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. The factory default setting is set to "Disable" (1-2), and you may enable this function by setting the jumper to 2-3.

Pin 1

1   1

Enable   Disable
                  (Default)
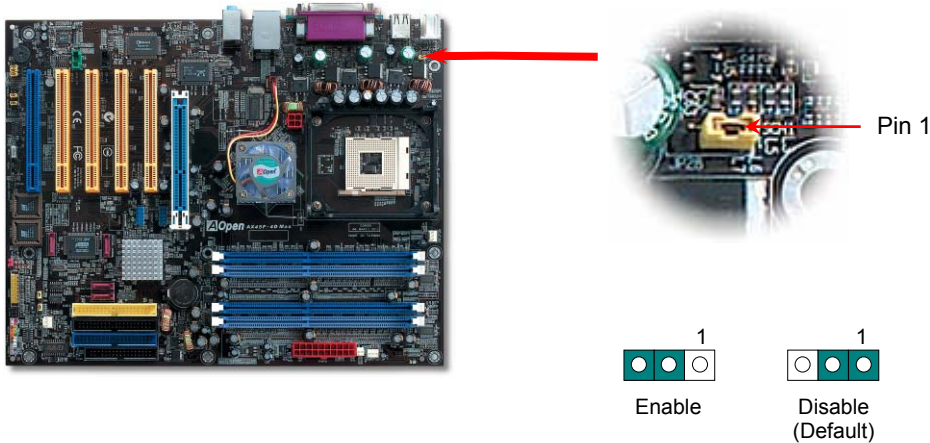
The noise is gone!! ---- SilentTek NEW!

As the clock of CPU keeps rocketing higher and higher, it inevitably brings higher heat and system temperature in a relative way. The way we deal with this heat problem, however, is to spare no effort to add one fan after another to protect our pampered system, expecting these fans could cool down our machine as much as they could.

But at the same time, we believe that same users are affected terribly by the irritating noises of these fans while working with their PC. As a matter of fact, we do not have to get our fans running at such a high speed in most cases; on the contrary, we discovered that having your fans running at appropriate time and speed not only reduces the noise, but also consumes the least power the system needs, so as to prevent over-wasting of energy resource.

```
            Phoenix - AwardBIOS CMOS Setup Utility
                        SilentTek Control

   CPUFAN1 Boot Speed        70% 3570 RPM          Item Help
   SYSFAN2 Boot Speed        70% ---- RPM
   SYSFAN3 Boot Speed        70% ---- RPM      Menu Level    ▶▶
   PWRFAN4 Boot Speed        70% None
   Fan Mode                  Full Speed        This is initial fan
 x CPUFAN1 Fixed Speed      100% 5100 RPM      speed when power-on.
 x SYSFAN2 Fixed Speed      100% ---- RPM      "50%" means half of
 x SYSFAN3 Fixed Speed      100% ---- RPM      full speed, "100%"
 x PWRFAN4 Fixed Speed      100% None          means full speed.
 x CPU Set Temp.            40° C
 x SYS Set Temp.            30° C              Note:
   CPUFAN1 OS Speed         100% 5100 RPM      During POST stage,
   SYSFAN2 OS Speed         100% ---- RPM      the fan will be
   SYSFAN3 OS Speed         100% ---- RPM      controlled by the mode
   PWRFAN4 OS Speed         100% None          you specified in the
                                               item "Fan Mode".
```

Today, AOpen Motherboard is honored to bring you a new overall solution, SilentTek, to make your system quiet. To collocate with hardware circuit, BIOS and the utility under Windows, SilentTek combined "Hardware-Status Monitoring", "Overheat Warning" and "Fan Speed Control" with user-friendly interfaces to provide you a perfect balance among noises, system performance and stability.

The first image you have here is the Voltage Status page. You can find current status of all voltages and set your expected margins of warning level.

In "Temp/Fan/Case" page, you may get aware of the current temperature of CPU and the heat inside chassis. Also, you can check if fans are running properly.
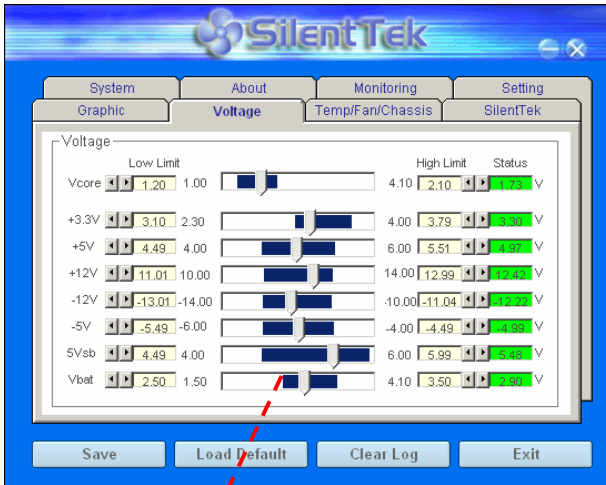
You may check your system voltage from the indicating bar here.
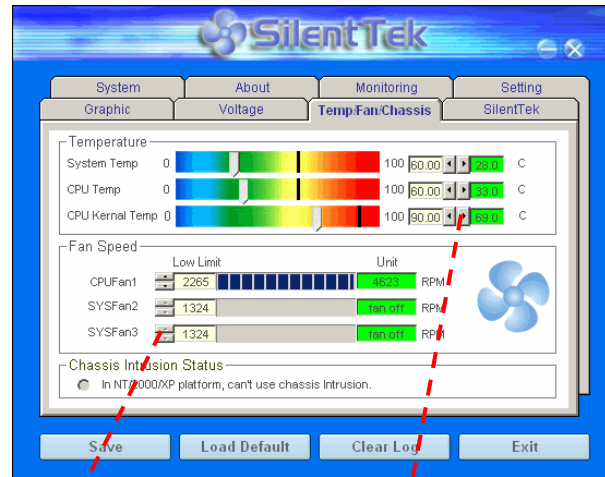
Of course, you may set your defaulted lowest margin for your fans and SilentTek would also pop up a message box to alarm you when the fan is rotating slower than this specified speed.

You may set the highest margin of your CPU and system temperature as default, and SilentTek would pop up a message box to alert you with alarm when the temperature goes beyond the specified margin.

The following page is surely the most important part of this utility. You may control the rotation speed of specific fans that you have got the options inside in this page.
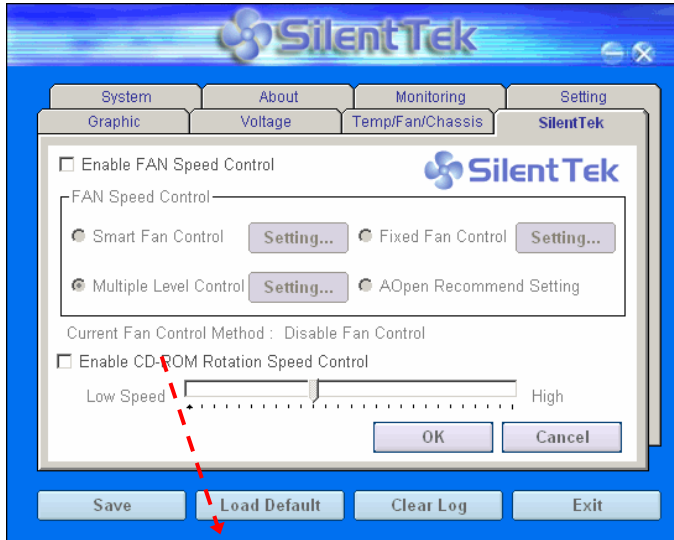
CD-ROM Rotation Speed Control: by enabling the CD-ROM Rotation Speed Control, you can adjust the rotation speed of your CD-ROM. When you set the speed to high level, the CD-ROM will work at its fastest speed and it will run at basic required speed while you set the value to low speed.

1. **Smart FAN Control**: This is the default setting of SilentTek and can be used for any branded computer housing. With a special algorithm developed by AOpen, the fan speed is automatically adjusted by the factors of CPU and ambient temperature. Ease-of-use and trouble free at your service.

2. **Fixed FAN Control**: Under this setting, a desired fan speed is set fixed when operating.

3. **Multiple Level Control**: This is the most versatile setting that allows you to set fan speed in relation to temperature. You may find that this setting fits you best.

4. **AOpen Recommend Setting**: This setting is designed specifically for AOpen housing. A series of lab tests were conducted under the real world scenario to determine optimum fan speed to reduce noise level within CPU working condition and temperature. Most of the time, the fan would remain still when CPU is not fully utilized.

Note: Due to hundreds different brands of fan on the market, inaccuracy may happen in some cases when you had your rotation speed adjusted. It is still under the criterion and please rest assured that it won't cause any problem to your system.

EzClock *NEW!*

Have you ever thought how great it would be if you can adjust the frequency setting on your motherboard under Windows environment and be a real master of your system? Everybody knows that the ratio and frequency setting are key factors to influence the system performance; however, it's absolutely not an easy task for an amateur to adjust the setting value. On most traditional motherboards, you

have to get into BIOS screen for the frequency and reboot the system again and again. But from now on, you don't surfer the boring stuffs anymore.

With brand-new and user-friendly EzClock that AOpen specially designs for his users, you can adjust those important values as you please and think of suitable. This tailor-made EzClock allows you to set the voltage and frequency of CPU, VGA, PCI and memory under Windows environment as well as in BIOS setting page; even better, those settings will be displayed real-time. Having this handy EzClock, you can monitor the system when you're fine-tuning the performance of your system. It provides you detailed and necessary information. Now let's take a look how it works on utility, BIOS and POST.

How You Adjust the Settings in EzClock Utility

In EzClock utility, you can adjust CPU Front Side Bus (FSB), the voltage and frequency of VGA, AGP, PCI and DRAM. Besides, the CPU related information such as CPU voltage, temperature and CPUFAN rotation speed will also be displayed on this utility.

CPU Color Bars:
The color bar will light on and show different colors as values change. On default values, it will show green.

On the left circle area shows Ratio, FSB and frequency information about CPU. When the values are set to factory default, the light on the top and bottom of the circle will show green and it will vary as you change these CPU settings.

CPU Ratio, FSB and frequency displaying area:
You can adjust CPU FSB here by entering preferred value.

On the right part of the panel is the section that you adjust the settings of VGA, AGP, PCI and memory. To adjust the voltage and clock frequency of those installments, you can press "-" or "+" on corresponding items. The color parts represent the situation of values. The higher value you set, the light on the color bar goes to right and turns red. After finishing those value settings, you can press "Apply" button on the upper right hand corner to save changes to CMOS.

VGA, AGP, PCI and DRAM Voltage / Clock Area:
Pressing "_" and "+" buttons, you can adjust the voltage and clock frequency values of onboard VGA, AGP, PCI and DRAM.
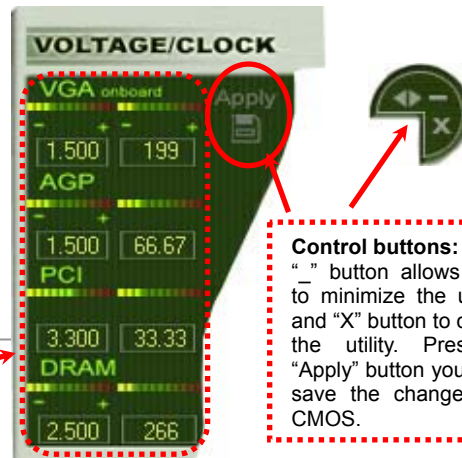
Control buttons:
"_" button allows you to minimize the utility and "X" button to close the utility. Pressing "Apply" button you can save the changes to CMOS.

On the bottom rectangular panel represents CPU fan speed, CPU voltage and CPU temperature. The three color bars on the right hand side will light on according to operation temperature. Please refer to the picture shown above.

CPU Color Bars:
The color bars will light on according to CPU operation temperature.

CPU Fan, Voltage and Temperature:
representing CPU fan speed, CPU voltage and CPU temperature in Celsius and Fahrenheit degrees.

How You Adjust the Settings in BIOS

Apart from EzClock utility, the voltage and frequency values of CPU, PCI and memory can also be adjusted on BIOS page. By pressing "+", "-", "PgUp" or "PgDn" keys, you can adjust the frequency values of CPU Bus, PCI Bus and DRAM.

Also, the same keys help you adjust the voltage of CPU and DDR settings. Some values may change while you adjust the settings. You can press "F10" to save the changes you've made.

Function Keys Description
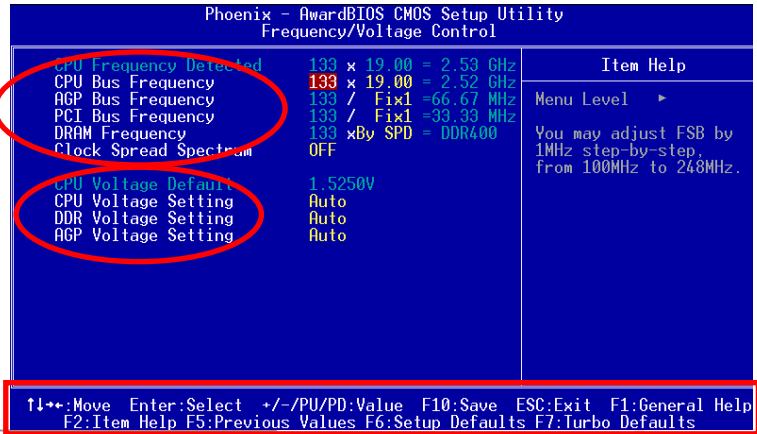
Note: The items provided by EzClock Utility vary in different motherboards. The unavailable function in your motherboard will present in grey.

```
Phoenix - AwardBIOS CMOS Setup Utility
         Frequency/Voltage Control
CPU Frequency Detected      133 x 19.00 = 2.53 GHz      Item Help
CPU Bus Frequency           133 x 19.00 = 2.52 GHz
AGP Bus Frequency           133 /  Fix1 =66.67 MHz    Menu Level    ►
PCI Bus Frequency           133 /  Fix1 =33.33 MHz
DRAM Frequency              133 xBy SPD = DDR400      You may adjust FSB by
Clock Spread Spectrum       OFF                       1MHz step-by-step,
                                                      from 100MHz to 248MHz.
CPU Voltage Default         1.5250V
CPU Voltage Setting         Auto
DDR Voltage Setting         Auto
AGP Voltage Setting         Auto



↑↓→←: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
```

How Your Boot Screen Looks Like

After you finish setting BIOS, these setting values will be displayed on the boot screen like the shown picture here.

Every time you boot your system, both default and current settings will pop up on the screen. Your personal settings that had been adjusted earlier will be highlighted; thus, you can have clear idea how your system functions and monitor your system more easily.

Current values of your system
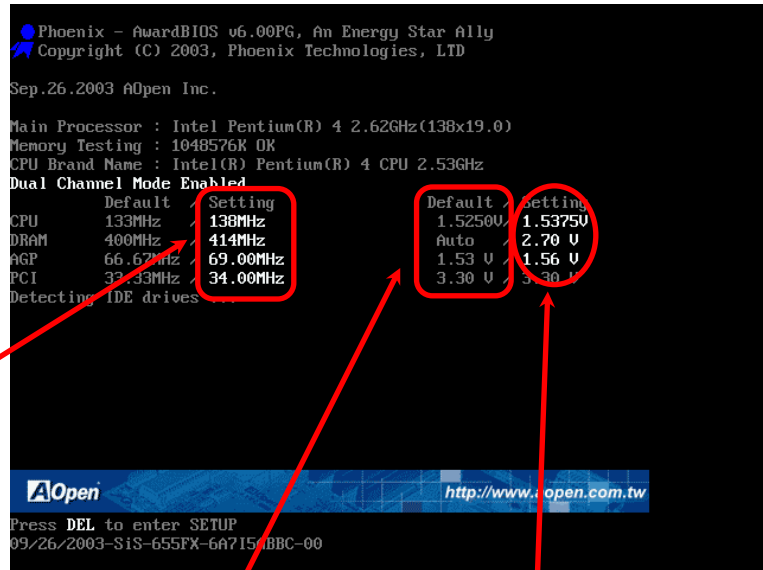
Default settings of this motherboard

The highlighted setting value you manually adjust

Hyper Threading Technology

What is 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.

How Hyper-Threading Works

A form of simultaneous multi-threading technology (SMT), Hyper-Threading technology allows multiple threads of software applications to be run simultaneously on one processor by duplicating the architectural state on each processor while the same processor execution resources is shared. The figure below represents how a Hyper-Threading based processor differentiates a traditional multiprocessor. The left-hand configuration shows a traditional multiprocessor system with two physical processors. Each processor has its own independent execution resources and architectural state. The right-hand configuration represents an Intel Hyper-Threading technology based processor. You can see that the architectural state for each processor is duplicated, while the execution resources is shared.

For multiprocessor-capable software applications, the Hyper-Threading based processor is considered two separate logical processors

on which the software applications can run without modification. Also, each logical processor responds to interrupts independently. The first logical processor can track one software thread, while the second logical processor tracks another software thread simultaneously. Because the two threads share the same execution resources, the second thread can use resources that would be otherwise idle if only one thread was executing. This results in an increased utilization of the execution resources within each physical processor.
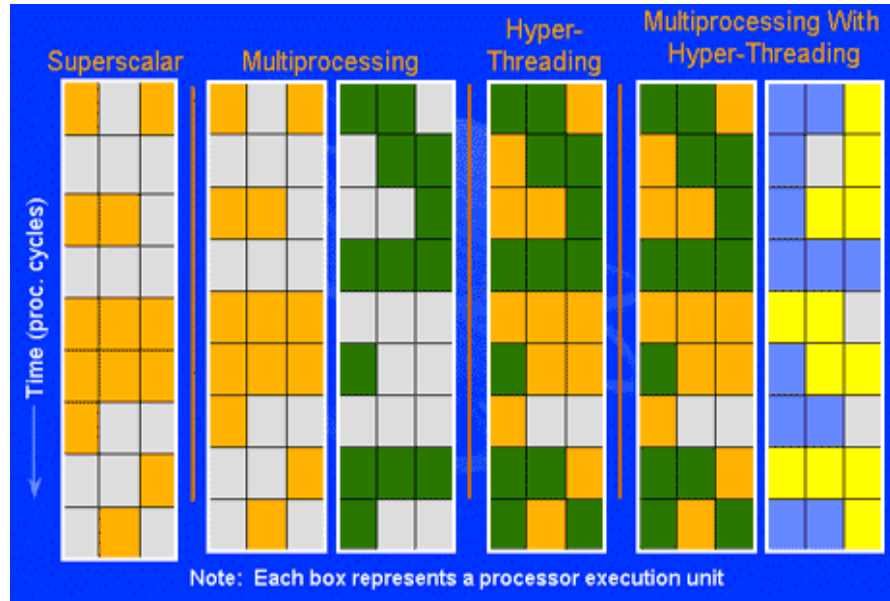
The figure below represents how Hyper-Threading saves time when it

works. With two logical processors available on every single physical processor, multi-threaded applications can now take advantage of thread-level parallelism on each physical processor for additional performance. As software applications continue to be optimized to take greater advantage of processor parallelism, Hyper-Threading technology provides an additional boost for newer capabilities and the growing needs of today's users.

AOConfig Utility NEW!

AOpen always dedicated to provide users a much friendly computer environment. We now bring you a comprehensive system detection utility. AOConfig is a Windows based utility with user-friendly interface that allows users to obtain information of the operation system and hardware such as motherboard, CPU, memory, PCI devices and IDE devices. The powerful utility also displays the version of BIOS and firmware for your convenience of maintenance.

Moreover, AOConfig allows users to save information in *.BMP or *.TXT format which users may collect the system information in detail and send them to AOpen directly for technical support or for further diagnose of system problems.
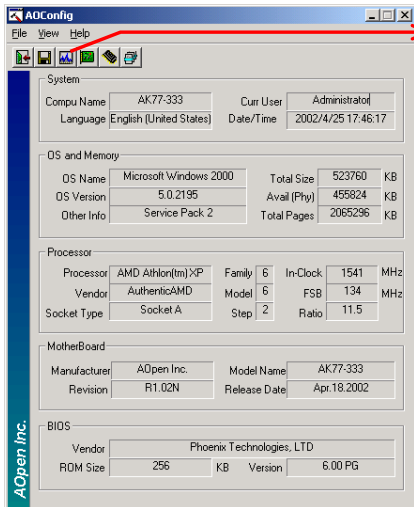
1. The system page shows the detailed information of the motherboard, operating system, processor, and BIOS version.

2. The PCI device page shows the configurations of all PCI devices installed in your motherboard.
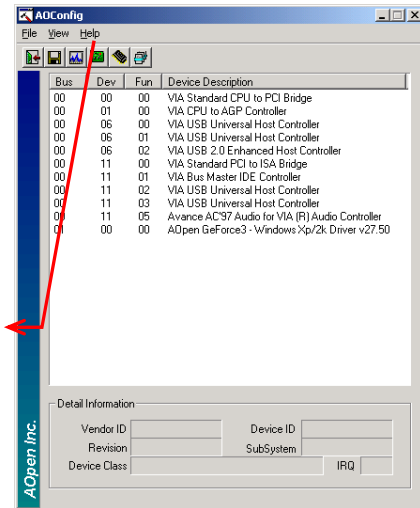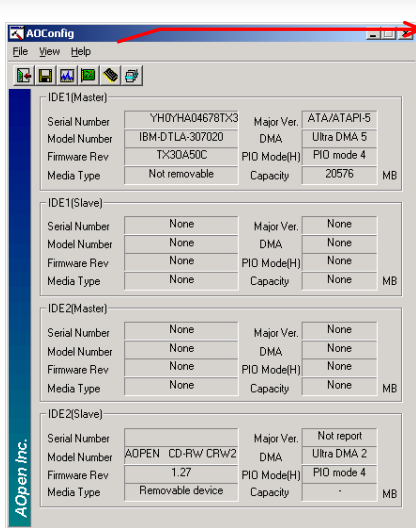
3. This page presents the IDE device information, such as serial number, manufacturer, firmware version, and capacity.

4. From this page, users can obtain the technical support information of AOpen. Moreover, detailed information could be saved in .bmp or .txt format.
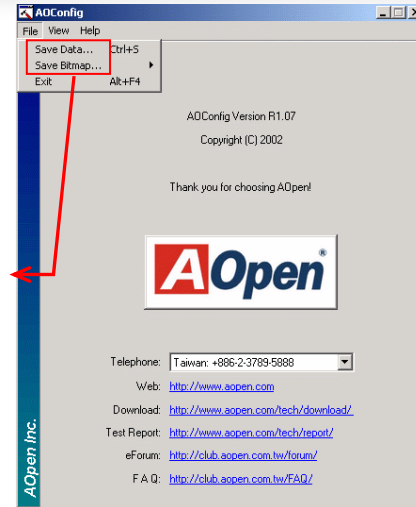
NOTE:

AOConfig can be used under Windows 98SE/ME, NT4.0/2000, or Windows XP. Please also note that AOConfig can only be operated in a system equipped with an AOpen motherboard. Before running AOConfig, all applications must be closed.

RAID Introduction

What's RAID?

Two major challenges facing the storage industry today are keeping pace with the increasing performance demands of computer systems by improving disk I/O throughput and providing data accessibility in the face of hard disk failures.

The idea of RAID (Redundant Array of Independent Disks) was first introduced by David A. Patterson, Garth Gibson and Randy H. Katz at the University California at Berkeley in 1988. RAID is a purpose of storing the same data in different places on multiple hard disks and improves storage subsystem performance. The advantage of RAID is to provide better throughput performance and/or data fault tolerance. Better performance is accomplished by sharing the workload in parallel among multiple physical hard drives. Fault-tolerance is achieved through data redundant operation where if one (or more) drive fails or has a sector failure, a mirrored copy of the data can be found on another drive(s).

A RAID appears to the operating system to be a single logical hard disk. The RAID controller manages how the data is stored and accessed across the physical and logical arrays. The RAID controller help users to ensure that the operating system only sees the logical drives and users do not need to worry about managing the complicated schema.

For optimal performance results, select identical hard drives to install in disk arrays. The drives' matched performance allows the array to function better as a single drive.

> *Warning:* The Serial ATA RAID function can be supported under **Windows XP** and **Windows .Net** environments.

What are the RAID levels?

Striping / Span (RAID 0)

RAID level 0, which is the fastest drive array you can have, is a performance-oriented disk mapping method. The data in this array gets written across a stripe or different disks for a faster transfer. This technique has striping but no redundancy of data. It offers the best performance but no fault-tolerance. Reads and writes sector of data interleaved between multiple drives. When any disk member fails, it affects the entire array. Performance is better than a single drive since the workload is balanced between the array members. This array type is for high performance systems. Identical drives are recommended for performance as well as data storage efficiency. The disk array data capacity is equal to the number of members times the smallest member capacity. For example, one 40GB and one 60GB drives will form an 80GB (40GBx2) disk array.

Logical Drive	Striping	Physical Disks
Block 1		Block 1
Block 2		Block 3
Block 3		Block 5
Block 4		Block 7
Block 6		Block 2
Block 7		Block 4
Block 8		Block 6
		Block 8

AOpen
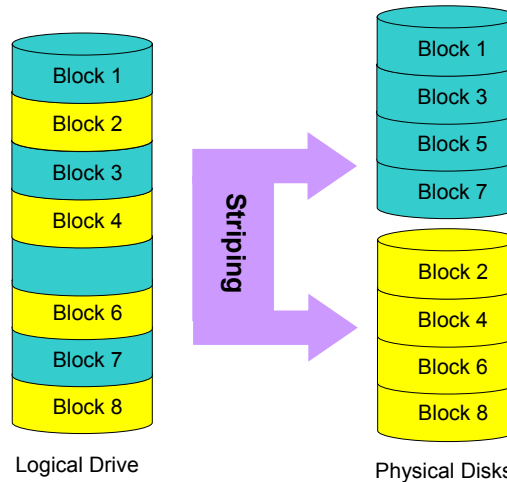
Mirroring (RAID 1)

RAID level 1 uses at least two duplicate hard drives and store the exact same blocks of information between them. This is the slowest form of fault tolerance because the data has to be replicated onto two disks at the same time. However, this is the simplest way to provide high reliability.

If one of the mirrored drives suffers a mechanical failure or does not respond, the remaining drive will continue to serve and provide correct data. If one drive has a physical sector error, the mirrored drive will continue to function.

Due to redundancy, the drive capacity of the array is half the total drive capacity. For example, two 40GB drives that have a combined capacity of 80GB would have 40GB of usable storage. With drives of different capacities, there may be unused capacity on the larger drive. RAID 1 increases cost as it takes twice as much hard drives to build our arrays.

Mirroring

Block 1
Block 2
Block 3
Block 4
Block 5
Block 6
Block 7
Block 8

Logical Drive

Block 1
Block 2
Block 3
Block 4
Block 5
Block 6
Block 7
Block 8

Block 1
Block 2
Block 3
Block 4
Block 5
Block 6
Block 7
Block 8

Physical Disks
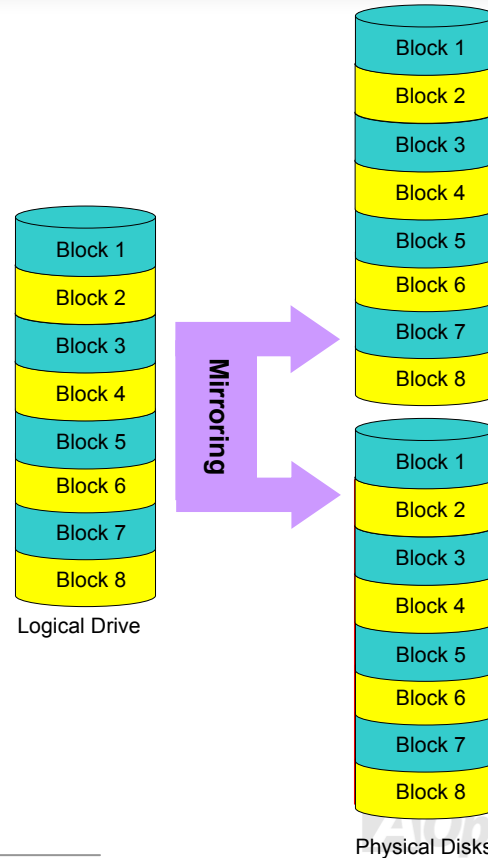
HDD Capacity of RAID Levels

Striping / Span (RAID 0)

Physical Disks   Physical Disks   **Logical Drive**
40 GB   40 GB   **80 GB**

Mirroring (RAID 1)

Physical Disks   Physical Disks   **Logical Drive**
40 GB   40 GB   **40 GB**
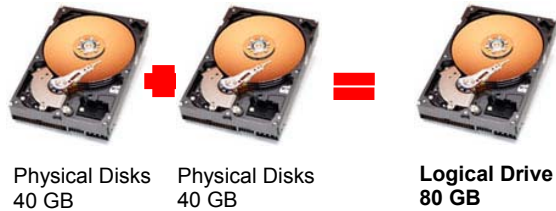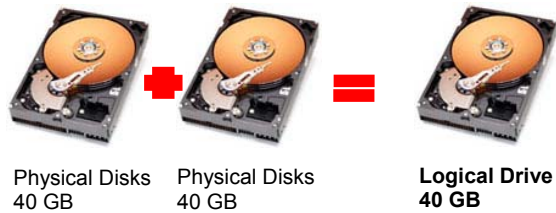
Serial ATA RAID for SiS964

With the latest chipsets implemented, SiS964 provides RAID 0 and RAID1 function for the Serial ATA hard disks. You may follow the steps shown below to setup your disk array.

Arouse RAID function in BIOS

After having properly installed your Serial ATA hard disks, you may directly get into the BIOS setting screen for adjustment. You may simply press "Integrated Peripherals → OnChip IDE Device → OnChip Serial ATA Mode" to choose RAID mode. Finally, do save the changes and exit BIOS setup screen.
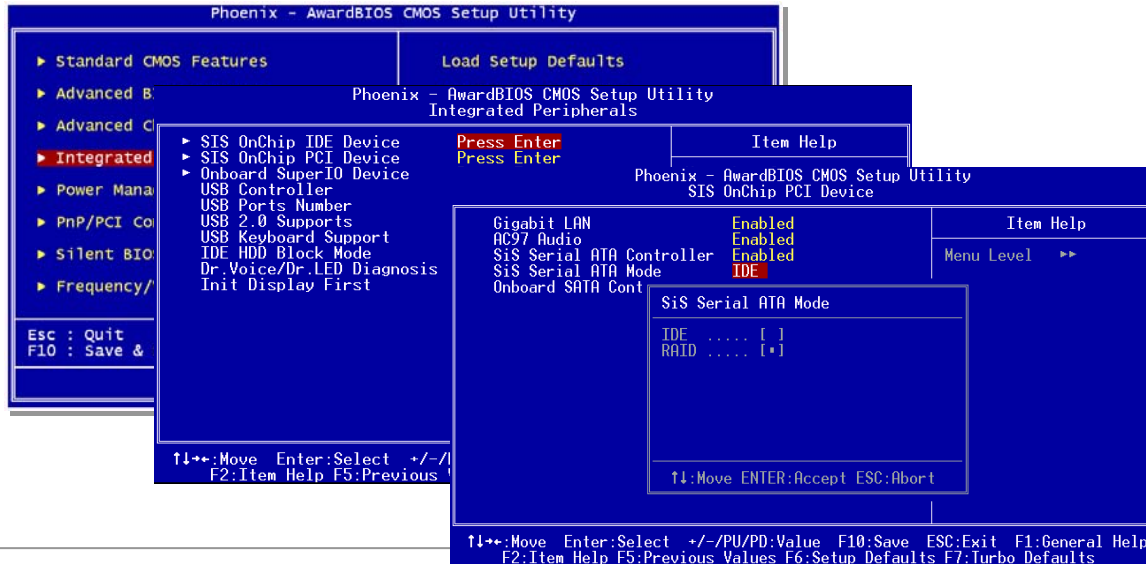
RAID Configuration Utility

In order to make sure your system can recognize and operate Serial ATA RAID device smoothly, we have to enter RAID Setting Utility to do some configuration. After finishing the BIOS setup and reboot, you will see [Press CTRL + S to enter RAID Setting Utility] about half way through the boot up. Please press these two buttons simultaneously. When you enter you will be presented with a screen as shown below:
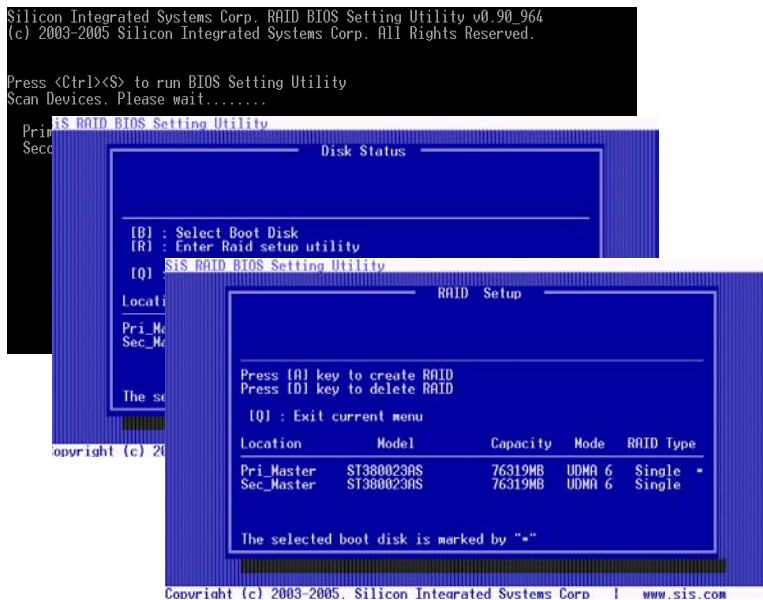
1. **Create RAID Mode:**

   This section allows users to choose the disk volume of RAID.

2. **Delete RAID Mode:**

   This section allows users to delete the volume of RAID. Please be noted that deleting a volume will destroy volume data and cause any member disks to become available as non-RAID disks.
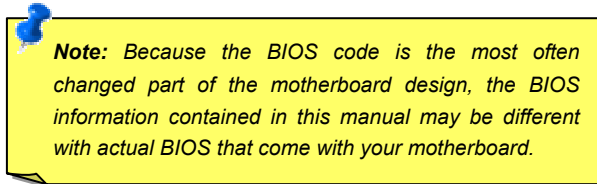
Phoenix-AWARD BIOS

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).

Phoenix-Award BIOS™ 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 settings of AX45F-4D Series have 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. Therefore, the rest of this chapter intends to guide you the process of configuring your system 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.*

AOpen

How to Use Phoenix-Award™ BIOS Setup Program

Generally, you can use 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 values. You can press <Esc> key to quit Phoenix-Award™ BIOS setup program. The following table provides details about how to use keyboard in the Phoenix-Award™ BIOS setup program. Alternatively, it's strongly recommended to install AOpen's newest WinBIOS Utility to get more detailed description, further powerful functions and advanced setting of BIOS.

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

AOpen

How To Enter BIOS Setup

After you finish jumper settings and connect correct cables, power on and enter the BIOS Setup. Press <Del> during POST (Power-On Self Test) and 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 Configurations          Load EEPROM Defaults
  ► Silent BIOS/HW Monitor          Save EEPROM Defaults
  ► Frequency/Voltage Control     ► Credits

  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.*

AOpen

BIOS Upgrade under Windows environment NEW!

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 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.
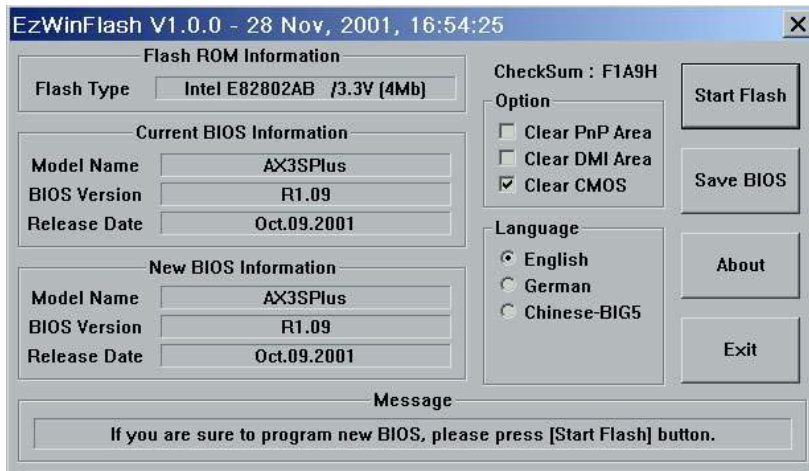
Caution: By updating your motherboard, you are taking a risk of BIOS flash failure. If your motherboard is working stable, and there are no major bugs that had been fixed by a latter BIOS revision, we recommend that you DO NOT try to upgrade your BIOS.

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

You may accomplish BIOS upgrade procedure with EzWinFlash by the following steps, and it's STRONGLY RECOMMENDED 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: W45F4DMAX102.ZIP) with WinZip (http://www.winzip.com) in Windows environment.

3. Save the unzipped files into a folder, for example, W45F4DMAX102.EXE & W45F4DMAX102.BIN.

4. Double click on the W45F4DMAX102.EXE; 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 back to work as normal.*
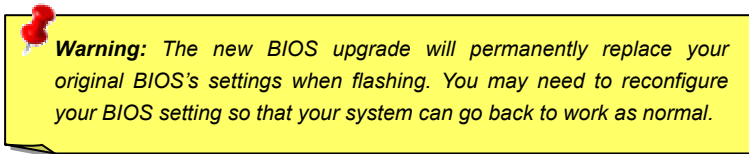
AOpen

WinBIOS Utility (only for AX45F-4D Max) NEW!

In the past, users have to keep punching the DEL key at a good timing during POST (Power-On-Self-Test) screen to get into the BIOS, which is inconvenient and clumsy. From now on, AOpen provides an easier way to configure your BIOS. WinBIOS is a customized utility for running exclusively on AOpen motherboards, which allows you to setup your BIOS under Windows environment. Designed with traditional-BIOS-alike interface, you may adjust BIOS parameter with clear descriptions for each item.

WinBIOS is natively designed with multi-language support. There are various widely-use languages provided on our website for your downloading, which also helps to prevent wrong settings caused by misunderstanding of the languages. The only thing you have to do is to visit our official website and download your respective language pack (of few KB size), then double-click on it to activate the support with your chosen language.
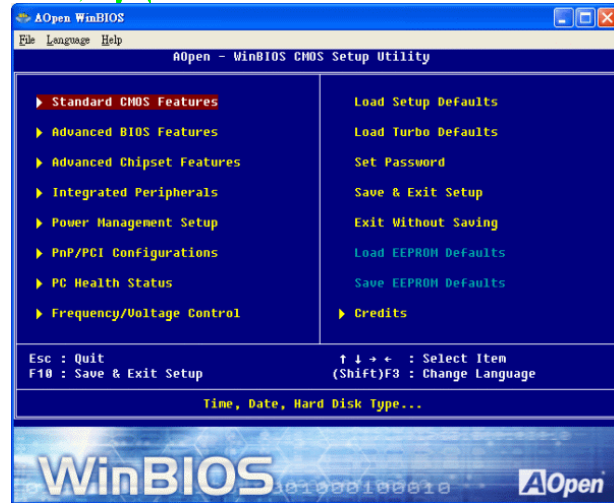
Moreover, with high scalability, either for newly bought motherboard or the latest BIOS version with new function, you don't have to re-install the whole program again and again. All you have to do is to grab the latest profile from our website, simply double-click on it as well to support the latest version of your BIOS. You don't have to spend any extra effort to have your motherboard supported by WinBIOS.

Function keys:

It's definitely easy to handle WinBIOS as if you're using traditional BIOS setting. Users can use the arrow keys such as ↑ ↓ ← → to move around the items in WinBIOS screen. And use PGUP PGDN, "+" or "-" to change the setting value if they are available. Press ESC to get back to the previous screen. Furthermore, the hotkeys shown in the table may help you and save your time. Some settings may not come into effect until you reboot your system.

Hotkey	Function Description
F1	Get help description.
F2	Item Help
F3	Changing menu language.
F5	Load previous setting
F6	Load setup default setting
F7	Load turbo setting
F10	Save changed setting and exit setup program.
F12	Full Screen / Normal Mode

Caution: **After updating your BIOS, please remember to update WinBIOS profile as well. If the upgraded BIOS version is newer than WinBIOS profile, WinBIOS will not be able to launch and a dialog box with error message will pop up. This verification is designed on purpose to protect your BIOS from damaged by wrong profile version.**

For the latest WinBIOS profile and language pack modules, you may find them from AOpen official web site as shown below:

(http://english.aopen.com.tw/tech/download/WinBIOS/default.htm)

Note: Due to BIOS versions are updated in an extremely fast speed, it's strongly recommended to download the latest BIOS version and WinBIOS profile from our website upon receipt of the motherboard.
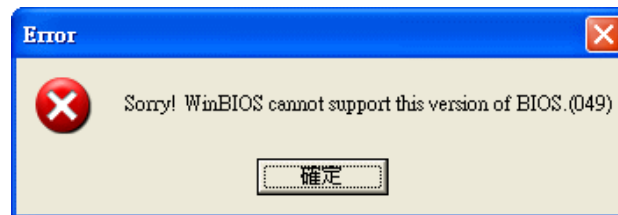
Open JukeBox Player (only for AX45F-4D Max) NEW!

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-Off Button

Boot to Operation System

Display Screen

Function Key

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.

```
        Phoenix - AwardBIOS CMOS Setup Utility
                Advanced BIOS Features

   Virus Warning            Disabled      ▲        Item Help
   CPU L1 & L2 Cache        Enabled
   Quick Power On Self Test Enabled           Menu Level    ▶
   First Boot Device        CDROM
   Second Boot Devic ┌─────────────────────────────┐
   Third Boot Device │ Enter AOpen CD Player        │
   Boot Other Device │                              │
   Swap Floppy Drive │ Auto          ..... [■]      │
   Boot Up Floppy Se │ Press Insert Key ..... [ ]   │
   Boot Up NumLock S │ CD Player     ..... [ ]      │
   Typematic Rate Se │                              │
 x Typematic Rate (C │                              │
 x Typematic Delay ( │                              │
   Security Option   │                              │
   APIC Mode         │                              │
   MPS Version Contr │                              │
   OS Select For DRA │ ↑↓:Move ENTER:Accept ESC:Abort│
   Enter Aopen CD Pl └─────────────────────────────┘
   Show Logo On Screen      Enabled       ▼

 ↑↓→←:Move  Enter:Select +/-/PU/PD:Value  F10:Save  ESC:Exit  F1:General Help
F2:Item Help F3:Language F5:Previous Values F6:Setup Defaults F7:Turbo Defaults
```

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.

AOpen

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 colourful 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 colours 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 favourite Open JukeBox skin. If you see this little logo 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 in AOpen Bonus CD. You don't need to install all of them to boot your system. But after you finish the hardware installation, you have to install your operation system first (such as Windows XP) before you install any drivers or utilities. Please refer to your operation system's installation guide.

Auto-run Menu from Bonus CD

You can use the auto-run menu of Bonus CD. Choose the utility and driver and select model name.
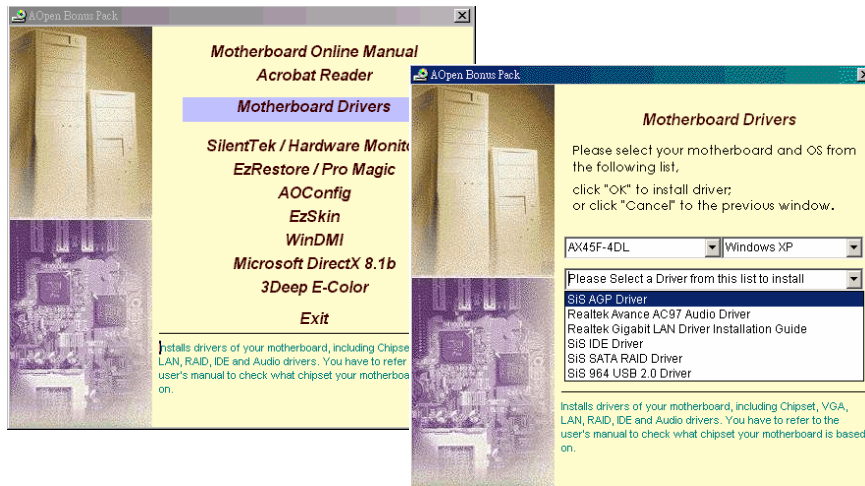
Installing AGP Driver

You can find AGP driver from the Bonus Pack CD auto-run menu.
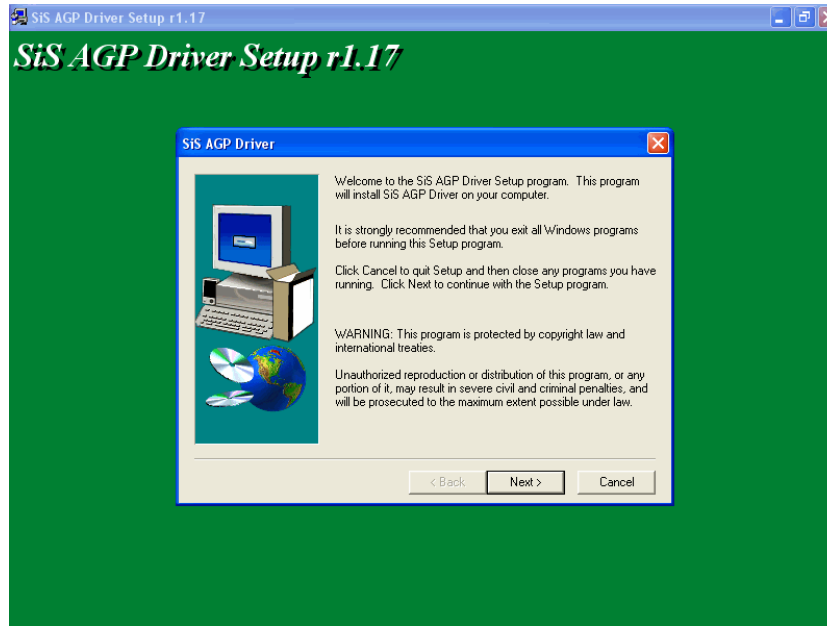
Installing Onboard Sound Driver

This motherboard comes with RealTek AC97 CODEC. This audio driver supports Windows 98SE and upper Windows OS; you can find the audio driver from the Bonus Pack CD auto-run menu.
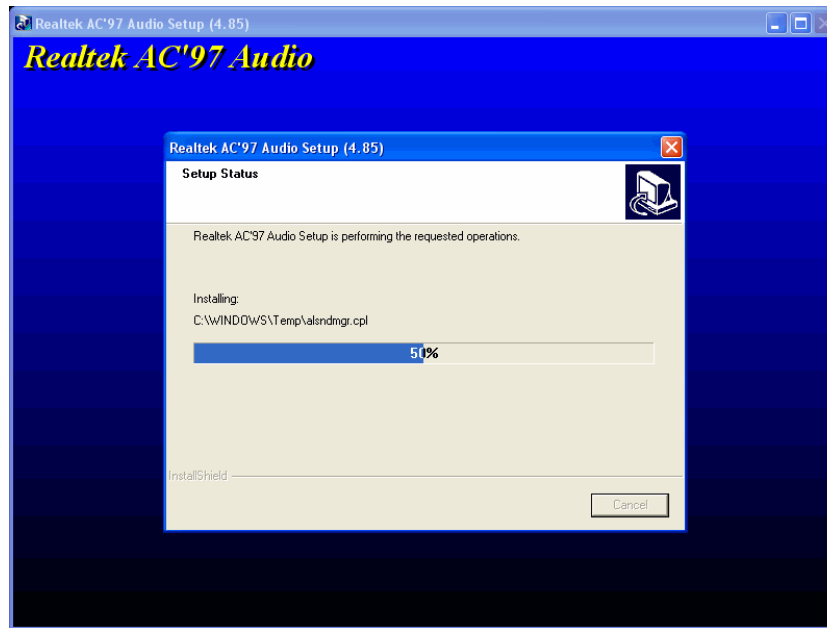
Installing Gigabit LAN Driver (for AX45F-4D Max and AX45F-4DL)

Install LAN Driver in Windows 98SE

1. Open the Device Manager and check if there is a "PCI Ethernet Controller" in "Other devices"

2. Insert the supplied "Bonus CD"

3. Double click "PCI Ethernet Controller"
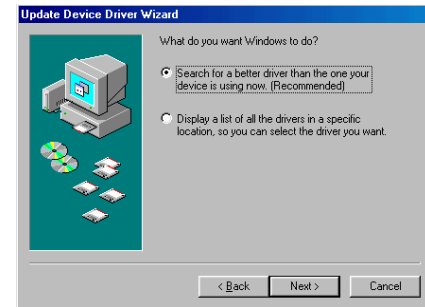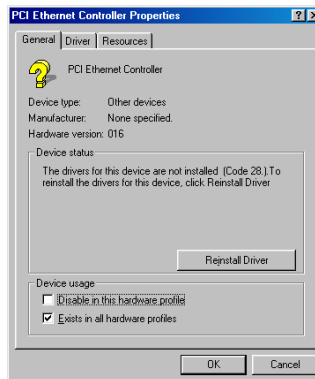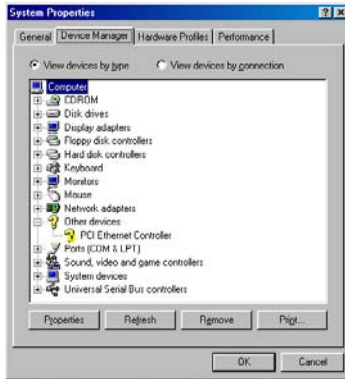
4. Click "Reinstall Driver" in the General Tab.

5. Select "Search for a better driver than the one your device is using now. (Recommended)"

6. Select "Specify a location", and type "G:\Driver\LAN\RTL8100S-32\Win98" in the text box that appears. Press "Next".

7. System will ask you to provide the file path for loading driver, please type "G:\Driver\LAN\RTL8100S-32\Win98" in the text box that appears. Press "OK".

8. System will ask you to insert "Windows 98 CD-ROM".
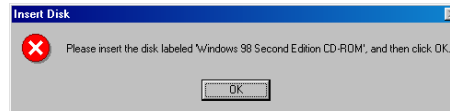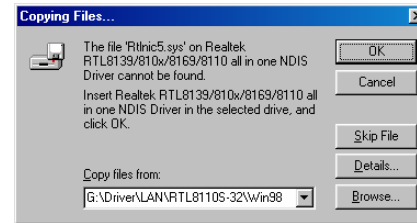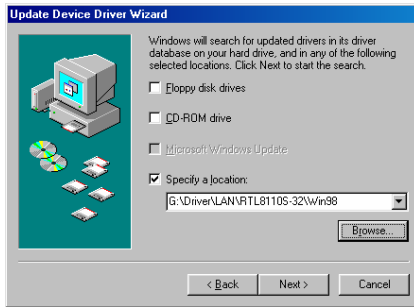
9.   Driver installed.

10.   Restart computer.

11.   Confirming Windows 98 Installation.
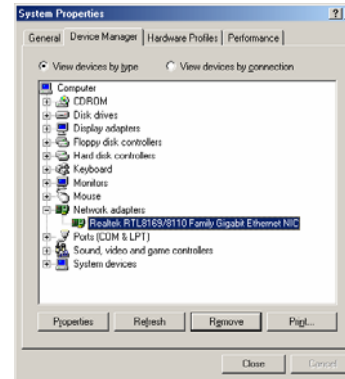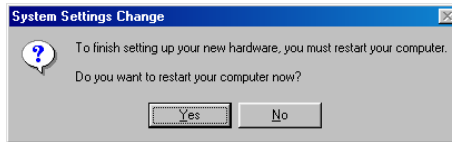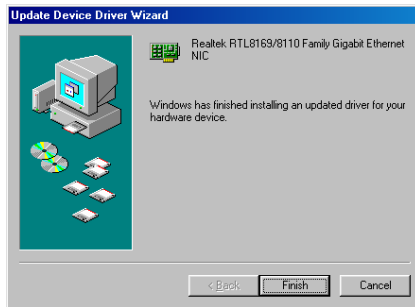
Install LAN Driver in Windows ME

1. Open the Device Manager and check if there is a "PCI Ethernet Controller" in "Other devices"

2. Insert the supplied "Bonus CD"

3. Double click "PCI Ethernet Controller"
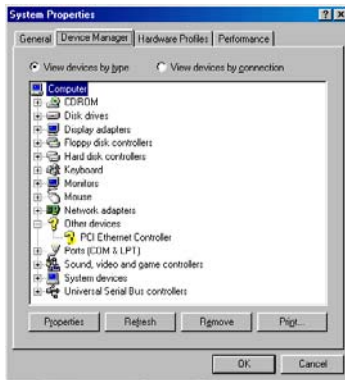
4. Click "Reinstall Driver" in the General Tab.

5. Select "Specify the location of the driver (Advanced)".

6. Choose "Search for a better driver than the one your device is using now. (Recommended)", then Select "Specify a location", and type "G:\Driver\LAN\RTL8100S-32\WinME" in the text box that appears. Press "Next".

7. Driver installed.

8. Restart computer.

9.   Confirming Windows ME Installation.
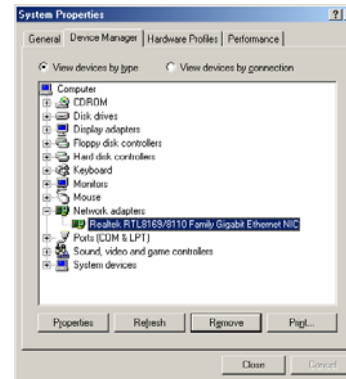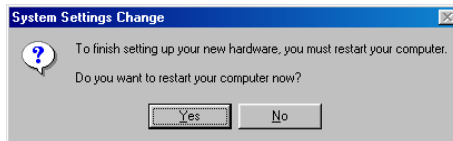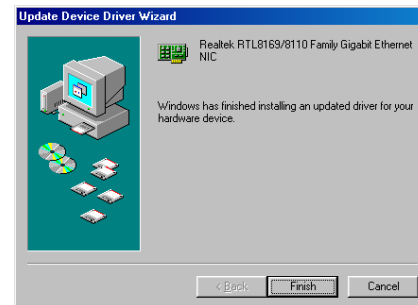
Install LAN Driver in Windows NT 4.0

1. In the Control Panel, double-click the Network icon. When the Network window opens, select the Adapters tab.

2. Click "Add" to install a new adapter. All previously installed drivers are listed under Network Adapters.

3. When the Select Network Adapter window opens, click "Have Disk"....

4. When prompted, insert the BONUS CD, type the path "G:\Driver\LAN\RTL8100S-32\Winnt4" to the driver, and click "OK".

5. With "Realtek RTL8169/8110 Family Gigabit Ethernet NIC" highlighted in the Select OEM Option window, click "OK".
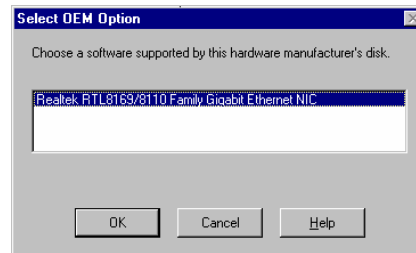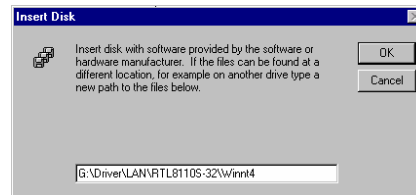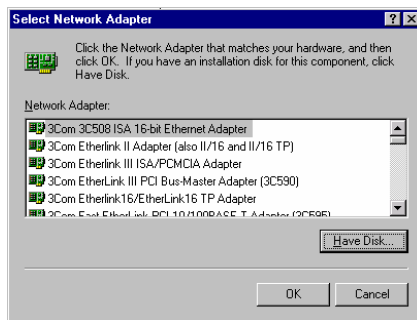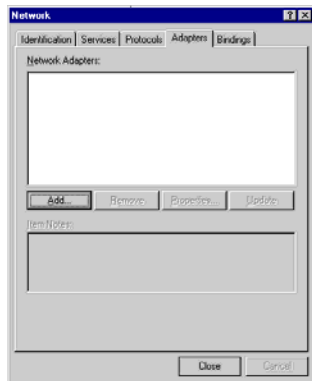
6.   Restart computer.

7.   Confirming Windows NT Installation
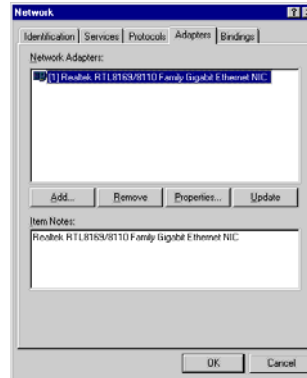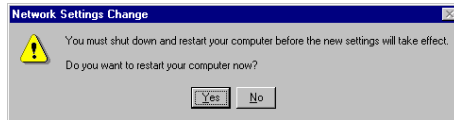
Install LAN Driver in Windows 2000

1.   Open the Device Manager and check if there is a "Ethernet Controller" in "Other devices"

2.   Insert the supplied "Bonus CD "

3.   Right click "Ethernet Controller ", and then select "Properties".

4.   Click "Reinstall Driver" in the General Tab.
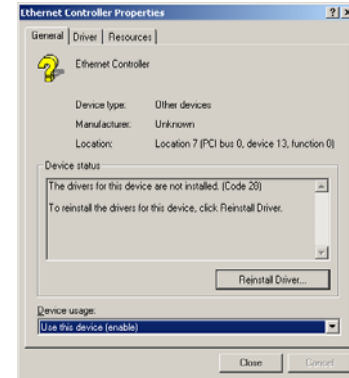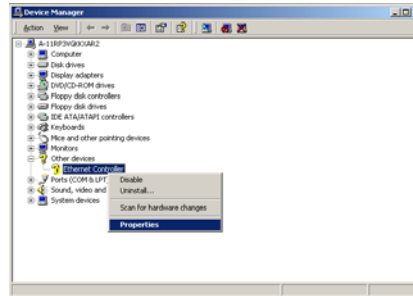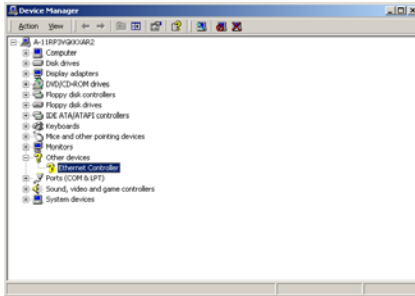
5.　　Select "Search for a suitable driver for my device (recommended)"

6.　　Select "Specify a location", and then click "Next".

7.　　Type "G:\Driver\LAN\RTL8100S-32\Win2000" in the text box that appears. Press "OK".

8.　　Driver installed.

9.　　Confirming Windows 2000 Installation.
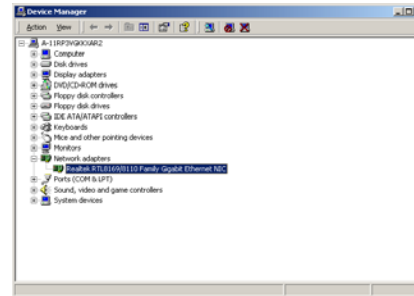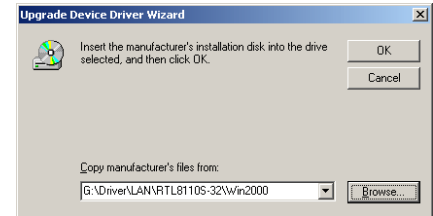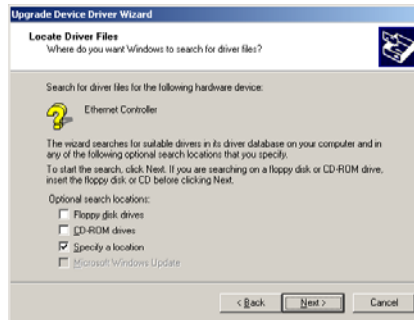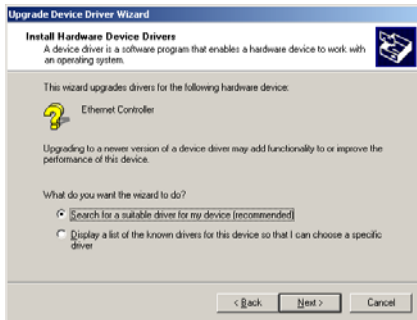
Install LAN Driver in Windows XP

1. Open the Device Manager and check if there is a "Ethernet Controller" in "Other devices"

2. Insert the supplied "Bonus CD "

3. Right click "Ethernet Controller ", and then select "Update Driver".

4. Select "Install from a list or specific location (Advanced)", and then click "Next".

5. Choose "Search for the best driver in these locations", and then select "Include this location in the search:". Type "G:\Driver\LAN\RTL8100S-32\WinXP" in the text box that appears. Press "Next ".

6. Driver installed.

7. Confirming Windows XP Installation

AOpen
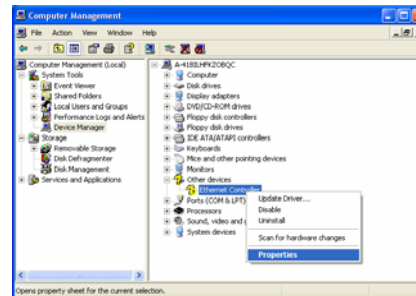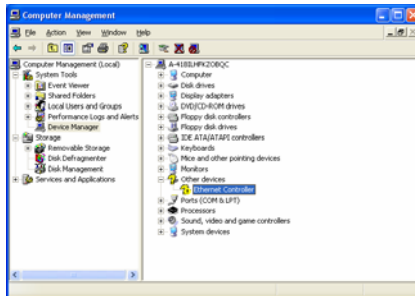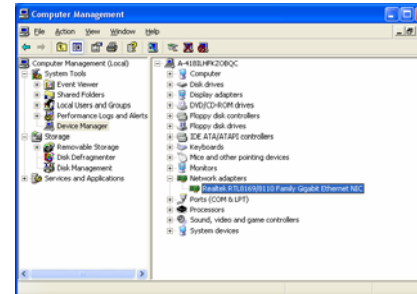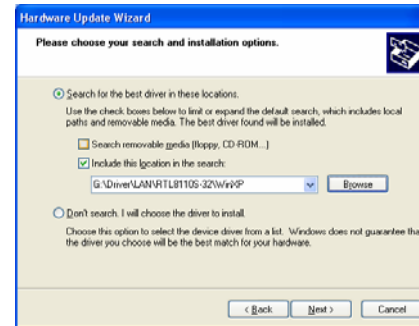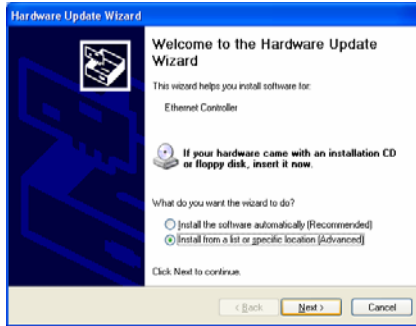
Installing Realtek 10/100 Mbps LAN Driver in Win98SE/2000/XP (for AX45F-4DN)

This motherboard integrates Realtek 10/100 Mbps Ethernet Chip. You can find this driver from the Bonus Pack CD auto-run menu.
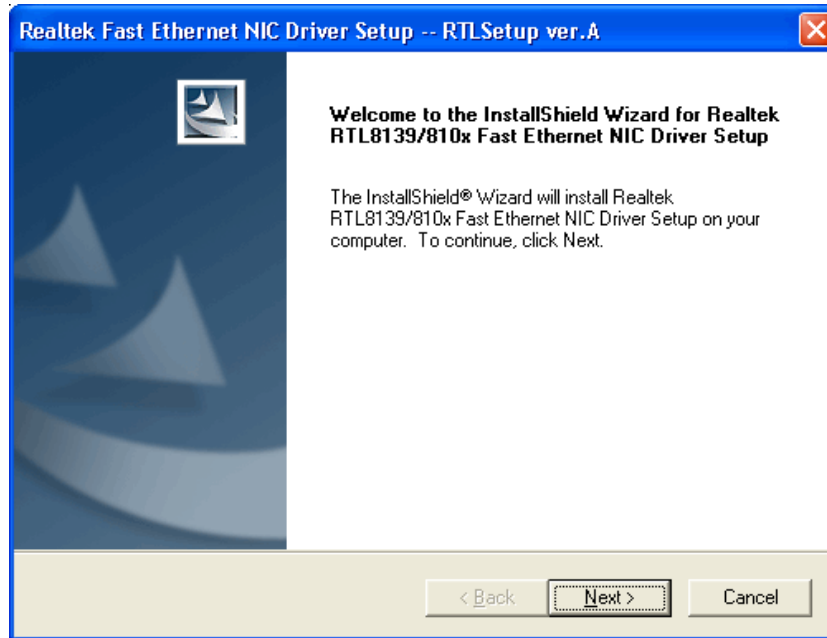
Install LAN Driver in Windows 95 (Golden version), Win95A and OSR2

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, and then you restart the system.

Install LAN Driver in 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 files OEMSETUP.INF is located, and then chooses the OK button.

6. The screen will appear "Select Line Speed" dialog box which is provided 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 Ethernet ID" 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.

AOpen

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:

----

* 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 is to select OK and close NETWORK SETUP. Select SKIP if only one adapter is installed on this computer.

Installing IDE Driver

To use IDE devices you have to install IDE driver from Bonus Pack CD.
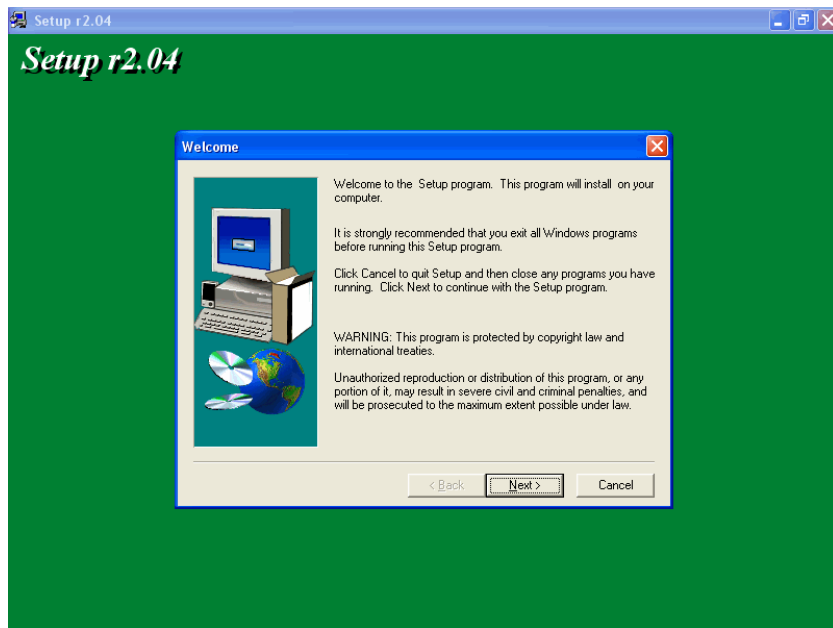
Installing SiS Serial ATA Raid Driver in Win 2000/XP

This motherboard support RAID 0 and RAID 1 function. You can find the driver from the Bonus Pack CD auto-run menu

Installing Promise Serial ATA Driver (only for AX45F-4D Max)

Windows 98 SE Installation Guide

****

Installing Drivers during Windows 98 SE Installation

****

The following details the installation of the Serial ATA drivers while installing Windows 98 SE (with the SATA controller is enabled already).

1. After enabling the Serial ATA controller and configuring the hard drive(s) partition and format your hard drive(s), if necessary.

2. Install Windows 98 SE normally.

3. After installation, go the "Start" menu and choose "Settings."

4. From the "Settings" menu, choose "Control Panel."

5. In the "Control Panel" window, double-click on the "System" icon.

6. In the "System" window, choose the "Device Manager" tab.

7. In the hierarchical display under "Other Devices" is a listing for "PCI Mass Storage Controller." Choose it and then press the "Properties" button.

8. Choose "Reinstall Driver," and then press "Next."

9. Choose "Search for a better driver than the one your device is using now (recommended)," then press "Next."

10. Insert the Promise SATA150 driver diskette into drive A.

11. Choose "Specify a Location," and then type "A:\"

      10a. Insert the "Bonus CD" in CD-ROM.

      11a. Choose "Specify a Location," and then type "[CD-ROM]:\Driver\Promise\SATA150\Driver\Win98-Me" in the text box.

12. Press the "Next" button. A message informing you that Windows has found "Win98-ME Promise SATA150 TX2plus(tm) IDE Controller" should appear.

13. Press "Next," then "Finish".

****

Confirming Driver Installation in Windows 98

****

To confirm that the driver has been properly loaded in Windows 98, perform the following steps:

1. Choose "Settings" from the "Start" menu.

2. Choose "Control Panel," and then double-click on the "System" icon.

3. Choose the "Device Manager" tab, and then click the "+" in front of "SCSI controllers.""Win98-ME Promise SATA150 TX2plus(tm) IDE Controller" should appear.

Windows ME Installation Guide

```
*********************************************************
```

Installing Drivers during Windows ME Installation

```
*********************************************************
```

The following details the installation of the Serial ATA drivers while installing Windows ME (with the Serial ATA controller is enabled already).

1. Install Windows Me fully.

2. After installation, go the "Start" menu and choose "Settings."

3. From the "Settings" menu, choose "Control Panel."

4. In the "Control Panel" window, double-click on the "System" icon.

5. In the "System" window, choose the "Device Manager" tab.

6. In the hierarchical display under "Other Devices" is a listing for "PCI Mass Storage Controller." Choose it and then press the "Properties" button.

7. Choose "Reinstall Driver," and then press "Next."

8. Choose "Specify the location of the driver (Advanced)," then press "Next".

9. Insert the Promise SATA150 driver diskette into drive A.

10. Choose "Specify a Location," and then type "A:\"

       9a. Insert the "Bonus CD" in CD-ROM.

       10a. Choose "Specify a Location," and then type "[CD-ROM]:\Driver\Promise\SATA150\Driver\Win98-Me" in the text box.

11. Press the "Next" button. A message informing you that Windows Me has found "Win98-ME Promise SATA150 TX2plus(tm) IDE Controller" should appear.

12. Press "Next," then "Finish".

****

Confirming Driver Installation in Windows ME

****

To confirm that the driver has been properly loaded in Windows ME, perform the following steps:

1. Choose "Settings" from the "Start" menu.

2. Choose "Control Panel," and then double-click on the "System" icon.

3. Choose the "Device Manager" tab, and then click the "+" in front of "SCSI & RAID controllers". "Win98-ME Promise SATT150 TX2plus(tm) IDE Controller" should appear.

Windows NT 4.x Installation Guide

****

Installing Drivers during New Windows NT 4.0 Installation

****

1. Start the system installation by booting from the Windows NT disk:

    a. Floppy install: boot the system with the Windows NT installation diskettes.

    b. Floppyless install: boot from floppy and type "WINNT /B". After files have been copied, the system will reboot. On the reboot, press the "F6" key when the message "Setup is inspecting your computer's hardware configuration 쁈" appears.

    c. CD-ROM disk install: boot from the CD-ROM disk and press the "F6" key when the message "Setup is inspecting your computer's hardware configuration" appears.

2. When the "Windows NT Setup" window is generated, press "S" to specify an Additional Device(s).

3. Use "◆" or "□" to select "Other" and press the "Enter" key.

4. Insert the driver diskette into drive A: and press the "Enter" key.

5. Choose "WinNT Promise SATA TX2plus (tm) IDE Controller" from the list that appears on screen, and then press the "Enter" key.

6. The Windows NT Setup screen will appear again saying, "Setup will load support for the following mass storage devices:" The list will include "WinNT Promise SATA TX2plus (tm) IDE Controller".

NOTE: If you need to specify any additional devices to be installed, do so at this time. Once all devices are specified, continue to the next step.

7. From the Windows NT Setup screen, press the Enter key. Setup will now load all device files and then continue the Windows NT installation.

AOpen

8. After a successful installation, the "SCSI Adapter Setup" box will show that the "WinNT Promise SATA TX2plus (tm) IDE Controller" driver has been installed.

****

Installing Drivers with Existing Windows NT 4.0

****

WARNING: If you wish to use your current bootable drive with the Windows NT4 operating system on the SATA150, perform the steps below while the boot drive is still attached to your existing onboard IDE controller. Do not attach any drives to your SATA150 until the steps below are complete.

1. Choose "Settings" from the "Start" menu.

2. Choose "Control Panel" from the "Settings" menu.

3. Double-click on the "SCSI Adapters" icon, which generates the "SCSI Adapters" dialog box.

4. Choose "Drivers," and then press "Add."

5. In the "Install Drivers" dialog box, press "Have Disk"

6. When the "Install from Disk" appears, insert the driver diskette into drive A, then choose "OK."

7. When the "Install Driver" dialog box appears, select "WinNT Promise SATA TX2plus (tm) IDE Controller" and then press "OK."

8. When the "Select SCSI Adapter Option" dialog box appears, press "Install."

9. After a successful installation, the "SCSI Adapter Setup" box will show that the "WinNT Promise SATA TX2plus (tm) IDE Controller" driver has been installed.

10. Power off your system, and then attach your hard drive(s) to the SATA150 controller.

AOpen

Windows 2000 Installation Guide

****

Installing Driver during New Windows 2000 Installation

****

1. Start the installation:

    a. Floppy Install: Boot the computer with the Windows 2000 installation diskettes.

    b. Floppyless Install: Boot from floppy and type "WINNT". After files have been copied, the system will reboot. On the reboot, press <F6> after the message "Setup is inspecting your computer's hardware configuration..." appears.

    c. CD-ROM Install: Boot from the CD-ROM. Press <F6> after the message "Press F6 if you need to install third party SCSI or RAID driver" appears.

2. When the "Windows 2000 Setup" window is generated, press "S" to Specify an Additional Device(s)

3. Insert the Promise SATA150 driver diskette into drive A: and press "Enter" key.

4. Use "◆" or "□" to choose "Win2000 Promise SATA TX2plus (tm) IDE Controller" from the list that appears on screen, and then press the "Enter" key.

5. The Windows 2000 Setup screen will appear again saying "Setup will load support for the following mass storage devices:" The list will include "Win2000 Promise SATA TX2plus (tm) IDE Controller".

NOTE: If you need to specify any additional devices to be installed, do so at this time. Once all devices are specified, continue to the next step.

AOpen

6. From the Windows 2000 Setup screen, press the Enter key. Setup will now load all device files and then continue the Windows 2000 installation.

****

Installing Driver in Existing Windows 2000 System

****

WARNING: If you will be moving the boot drive containing the existing Windows 2000 operating system to the SATA150 connector, the SATA150 driver MUST be loaded on to this hard drive while it is still attached to your existing hard drive controller. Do not attach this drive or any other hard drive to the SATA150 connector before completing this step.

After enabling the SATA150 IDE controller and rebooting your system, Windows 2000 setup will show a "New Hardware Found" dialog box. Under Windows 2000, "PCI Mass Storage 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. Choose "Mass Storage controller" and press "next" and next screen press "finish"

4. Insert the Promise SATA150 driver diskette into drive A.

5. Type "A:\" in the text box that appears. Press "OK ".

      4a. Insert the Bonus CD in CD-ROM.

AOpen

5a. Type "[CD-ROM]:\Driver\Promise\SATA150\Driver\Win2000" in the text box that appears. Press "OK ".

6. Click on "Next." A message informing you that Windows has found "Win2000 Promise SATA TX2plus (tm) IDE Controller" should appear.

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

****

Confirming Windows 2000 Installation

****

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 "SCSI controllers". "Win2000 Promise SATA TX2plus (tm) IDE Controller" should appear.

Windows XP Installation Guide

```
*************************************************************
```

Installing Driver during New Windows XP Installation

```
*************************************************************
```

1. Start the installation:

    a. Floppy Install: Boot the computer with the Windows XP installation diskettes.

    b. Floppyless Install: Boot from floppy and type "WINNT". After files have been copied, the system will reboot. On the reboot, press <F6> after the message "Setup is inspecting your computer's hardware configuration..." appears.

    c. CD-ROM Install: Boot from the CD-ROM. Press <F6> after the message "Press F6 if you need to install third party SCSI or RAID driver" appears.

2. When the "Windows XP Setup" window is generated, press "S" to Specify an Additional Device(s)

3. Insert the Promise SATA150 driver diskette into drive A: and press "Enter" key.

4. Use "◆" or "□" to choose "Win XP Promise SATA TX2plus (tm) IDE Controller" from the list that appears on screen, and then press the "Enter" key.

5. Press "S" to use the driver on the floppy disk, and then press "enter" to continue with installation. If you press "enter" to use "Windows default driver", you will encounter the following error message in the next phase of the installation: "Setup did not find any hard disk drives installed in your computer"

NOTE: Restart installation and then use option "S" to load driver from floppy disk.

6. The Windows XP Setup screen will appear again saying, "Setup will load support for the following mass storage devices:" The list will

include "Win XP Promise SATA TX2plus (tm) IDE Controller".

NOTE: If you need to specify any additional devices to be installed, do so at this time. Once all devices are specified, continue to the
next step.-

7. From the Windows XP Setup screen, press the Enter key. Setup will now load all device files and then continue the Windows XP
installation.

****

Installing Driver in Existing Windows XP System

****

WARNING: If you will be moving the boot drive containing the existing Windows XP operating system to the SATA150 connector, the
SATA150 driver MUST be loaded on to this hard drive while it is still attached to your existing hard drive controller. Do not
attach this drive or any other hard drive to the SATA150 controller before completing this step.

After enabling the SATA150, Windows XP setup will show a "Found New Hardware" dialog box. Under Windows XP, "Mass Storage
Controller" will be displayed.

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

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

3. Insert the Promise SATA150 driver diskette into drive A.

4. Type "A:\" in the text box that appears. Press "OK ".

      3a. Insert the Bonus CD in CD-ROM.

      4a. Type "[CD-ROM]:\Driver\Promise\SATA150\Driver\WinXP" in the text box that appears. Press "OK ".

5. Click on "Next." A message informing you that Windows XP has found "Win XP Promise SATA TX2plus (tm) IDE Controller" should appear.

6. When the New Hardware Wizard has finished installing the Promise SATA150 software, click on "Finish"

****

Confirming Windows XP Installation

****

1. From Windows XP, open the Control Panel from "My Computer".

2. Click on "Performance and maintenance".

3. Click on the "System" icon.

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

5. Click the "+" in front of "SCSI controllers". "Win XP Promise SATA TX2plus (tm) IDE Controller" should appear.

AOpen

Installing USB 2.0 Driver

This motherboard comes with USB 2.0. You can find the driver from the Bonus Pack CD auto-run menu.
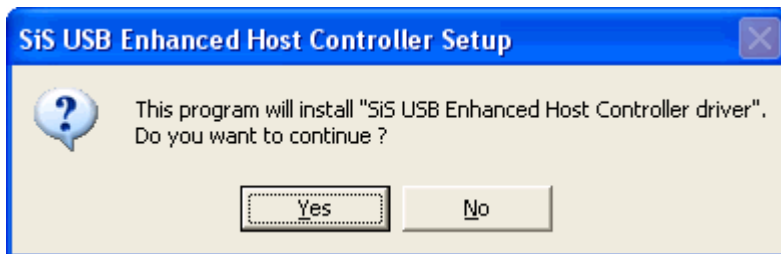
Glossary

AC'97 CODEC

Basically, AC'97 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 AC'97) 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 AC'97 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 AC'97 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.

*A*Open

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) SDRAM

DDR SDRAM 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 SDRAM 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 be 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 SDRAM 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 bits).

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 MB/sec.

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 SDRAM.

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 300MB/s, 600MB/s 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 families include 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, then plug the ATX power cord correctly (For P4 system, please also plug the 4pin (+12V) cord)

```
          ┌──────────────┐
          │    Next      │
          └──────────────┘
```

*A*Open

Continue

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

Yes   Turn on the power and check if the power supply and CPU fan work properly.   **No**

Next

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

AOpen

```
                        ┌─────────────────┐
                        │    Continue     │
                        └────────┬────────┘
                                 │
                                 ▼                      No
                        ╱╲                                      ┌──────────────────────┐
                       ╱  ╲                                     │ Perhaps your VGA card│
                      ╱    ╲  Check if there is display? ──────▶│ 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
                        ╱╲                                      ┌──────────────────────┐
                       ╱  ╲                                     │ It is very possible  │
                      ╱    ╲  Check if the system reboots? ────▶│ that your keyboard   │
                       ╲  ╱                                     │ is defective.        │
                        ╲╱                                      └──────────────────────┘
                     Yes │
                         ▼
                  ┌─────────────┐
                  │    Next     │
                  └─────────────┘
```

AOpen

```
                        ┌─────────────────┐
                        │    Continue      │
                        └────────┬─────────┘
                                 │
                                 ▼
      ┌──────────────────────────────────────────────────────┐
      │ During system rebooting, press <Del> to enter BIOS setup. │
      │            Choose "Load Setup Default".               │
      └──────────────────────────┬───────────────────────────┘
                                 │
                                 ▼
      ┌──────────────────────────────────────────────────────┐
      │       Turn off the system and re-connect IDE cable.   │
      └──────────────────────────┬───────────────────────────┘
                                 │
                                 ▼
                  ◇─────────────────────────◇      No      ┌────────────────────────┐
                 ⟨   Check if the system can   ⟩─────────▶│ The problem should be   │
                  ⟨    reboot successfully?   ⟩           │ caused by the IDE cable │
                   ◇───────────┬─────────────◇            │ or HDD itself.          │
                               │ Yes                      └────────────────────────┘
                               ▼
      ┌──────────────────────────────────────────────────────┐
      │  Re-install the operating system such as Windows XP.  │
      └──────────────────────────┬───────────────────────────┘
                                 │
                                 ▼
                        ┌─────────────────┐
                        │      End         │
                        └─────────────────┘
```

AOpen

✚ 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://download.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://download.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.

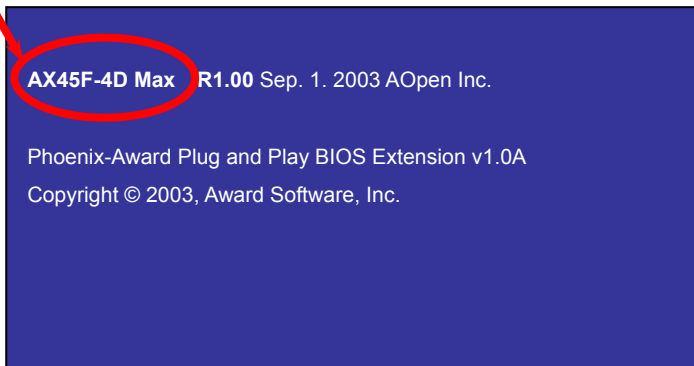## *Part Number and Serial Number*

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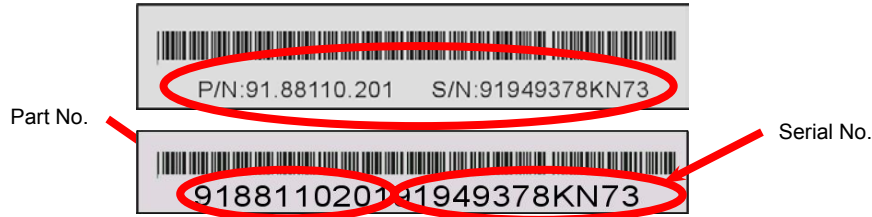
P/N: 91.88110.201 is part number, **S/N: 91949378KN73** is serial number.

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:

AX45F-4D Max   **R1.00** Sep. 1. 2003 AOpen Inc.

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

Copyright © 2003, Award Software, Inc.

AX45F-4D Max is model name of motherboard; **R1.00** is BIOS version.

AOpen

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.

Pacific Rim	Europe	America
AOpen Inc.	AOpen Computer b.v.	AOpen America Inc.
Tel: 886-2-3789-5888	Tel: 31-73-645-9516	Tel: 1-510-489-8928
Fax: 886-2-3789-5899	Email: Support@AOpen.NL	Fax: 1-510-489-1998

China	Germany	Japan
艾爾鵬國際貿易（上海）有限公司	AOpen Computer GmbH.	AOpen Japan Inc.
Tel: 86-21-6225-8622	Tel: 49-2131-1243-710	Tel: 81-048-290-1800
Fax: 86-21-6225-7926	Fax: 49-2131-1243-999	Fax: 81-048-290-1820

Web Site: *http://www.aopen.com.tw*

E-mail: Send us email by going through the contact form below.

English   *http://english.aopen.com.tw/tech/default.htm*

Japanese   *http://www.aopen.co.jp/tech/default.htm*

Chinese   *http://www.aopen.com.tw/tech/default.htm*

German   *http://www.aopencom.de/tech/default.htm*

Simplified Chinese   *http://www.aopen.com.cn/tech/default.htm*