AX4SG WLAN
Online Manual

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What's in this manual

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Before You Start

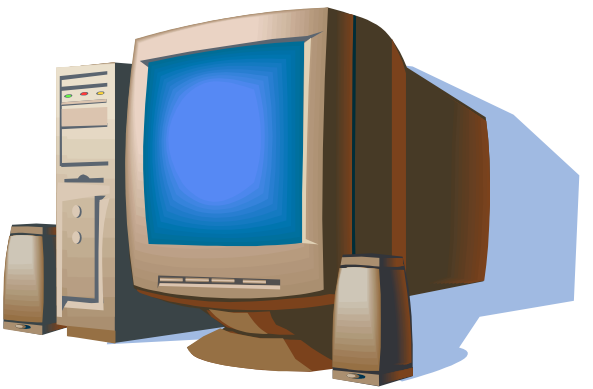
This Online Manual will introduce to the user how this product is installed. All useful information will be described in later chapters. Please keep this manual carefully for future upgrades or system configuration changes. This Online Manual is saved in PDF format, we recommend using Adobe Acrobat Reader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

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

Thanks for the help of saving our earth.

Overview

Thank you for choosing AOpen AX4SG WLAN motherboard. AX4SG WLAN is Intel® Socket 478 motherboard (M/B) based on the ATX form factor featuring the 865G chipsets. As high performance chipset built in the M/B, AX4SG WLAN motherboard supports Intel® Socket 478 Pentium® 4 1.6GHz~3.06GHz. It supports 400/533/800MHz Front Side Bus (FSB) clock and Hyper-Threading Technology which brings additional intelligence to system. 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.The slot also support ADD card. According to different customer's requirements, this motherboard supports DDR266, DDR333 and DDR400 DDR RAM up to 4GB maximum. The onboard IDE controller supports Ultra DMA 33/66/100 mode, Serial ATA 150 MB/s and IDE Raid 0 mode. There are 6 PCI slots provided on this board, in which the Hercules PCI supports high power-consuming PCI cards. A total of 6 USB 2.0 ports on the back panel and one connector (2 ports) 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 Broadcom Gigabit LAN controller on board, which is a highly integrated Platform LAN Connect devices, it provides Gigabits Ethernet for office and home use. In addition, this motherboard had been designed with MINI-PCI slot, which allows you to get online wireless and act as an access point with SoftAP utility invented by AOpen as well. Besides, AX4SG WLAN has S/PDIF connector and an AC97 CODEC RealTek ALC650 chipset onboard, providing high performance and magic surround stereo sound to let people enjoy working with it. Now, let's enjoy all features from AOpen AX4SG WLAN motherboard.



Feature Highlight

CPU

Supports Intel® Socket 478 Pentium® 4 (Northwood) 1.6GHz~3.06GHz+ with 400/533/800MHz Front Side Bus (FSB) designed for Socket 478 technology.

Chipset

Intel 865G is a Graphics Memory Controller Hub (GMCH) designed for use with the Pentium 4 processor with 512-KB L2 cache on 0.13 micron processor. It provides CPU, DDR, AGP, Hub, CSA Interfaces and integrated graphics with display interfaces. The CPU interface supports Pentium 4 processor subset of the Extended Mode of the Scalable Bus Protocol. The GMCH memory interface supports one up to four channels of DDR, and the AGP interface supports 0.8/1.5V signaling with 8X/4X data transfers and 8X/4X AGP Fast Writes. The integrated graphics controller provides 3D, 2D, and display capabilities while using a portion of system memory for graphics memory (UMA) to provide a cost effective, high performance graphics solution. The 865G platform supports the fifth generation I/O Controller Hub (ICH5R).

The ICH5R integrates an Ultra ATA 100 controller, two Serial ATA host controllers, one EHCI host controller and four UHCI host controllers supporting eight external USB 2.0 ports, LPC interface controller; flash BIOS interface controller, PCI interface controller, AC'97 digital controller, integrated LAN controller, an ASF controller and a hub interface for communication with the 865G GMCH.

Memory

With 865G chipset, this motherboard can support dual channel Double-Data-Rate (DDR) RAM. 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 RAM can be composed of an arbitrary mixture of 64, 128, 256, 512 MB or 1GB DDR RAM and maximum up to 4GB.

Expansion Slots

Including six 32-bit/33MHz PCI, in which PCI 6 is named as Hercules, which is reserved especially for high power-consuming PCI cards, and one AGP 8X/4X slots. The PCI local bus throughput can be up to 132MB/s. Of six PCI slots provided, all of them are master PCI slots with arbitration and decoding for all integrated functions and LPC bus. AX4SG WLAN motherboard includes one AGP expansion slot 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. Or you may have ADD card cabled to this AGP slot to provide high-speed digital connection for digital displays.

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

Hyper-Threading technology, 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.

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 100~250MHz by 1MHz stepping adjustment, and helps your system get maximum performance.

LAN Port

Broadcom Gigabit PCI LAN Chip, which is an highly-integrated Platform LAN Connect device, it provides Gigabits per second Ethernet for office and home use.

MINI-PCI Slot

Designed with MINI-PCI slot onboard, this motherboard allows you to insert wireless network card for wireless internet access. In addition to wireless network card slot, you may use it as the access point for network by simply using SoftAP utility included in our bonus CD.

Ultra DMA 33/66/100 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 33/66/100, PIO Modes 3 and 4 and Bus Master IDE DMA Mode 5, and supports Enhanced IDE devices.

Serial ATA

Integrated in ICH5R 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. The ICH5R SATA interface supports data transfer rates up to 150MB/s.In this motherboard the SATA interfaces support RAID 0 mode.

On-board AC'97 Sound

AX4SG WLAN uses RealTek AC97 CODEC RealTek ALC650 sound chip. This on-board audio includes a complete audio recording and playback system.

Eight USB 2.0 Ports

Provides six ports on the back panel and one USB 2.0 connector (2 ports) on the board, providing a total of eight USB 2.0 interface to connect devices such as mouse, keyboard, modem, scanner, etc.

DieHard BIOS II

Die-Hard BIOS technology is a very effective hardware protection method that doesn't involve any software or BIOS coding. Hence, it is 100% virus free. This motherboard comes with BIOS 1 and BIOS 2 (User Upgrade Optional) that allow you to rescue BIOS 1 with BIOS 2. Inherited its first generation, DieHard BIOS II allows you to download more skins for utility like JukeBox CD Player, JukeBox FM or VividBIOS to BIOS 2 by simply setting JP25 to pin2-3 mode.

Dr. Voice II

The Dr. Voice II can identify what kind of problems had occurred in the operating system. It provides four kinds language versions.

SilentTek II

Inherited the first generation of SilentTek with temperature monitoring, and many useful fan controlling functions, SilentTek II have been refined with several innovative functions, such as Smart Ear, Fan Diagnostic, Silent Power and Silent VGA.

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.

Enhanced ACPI

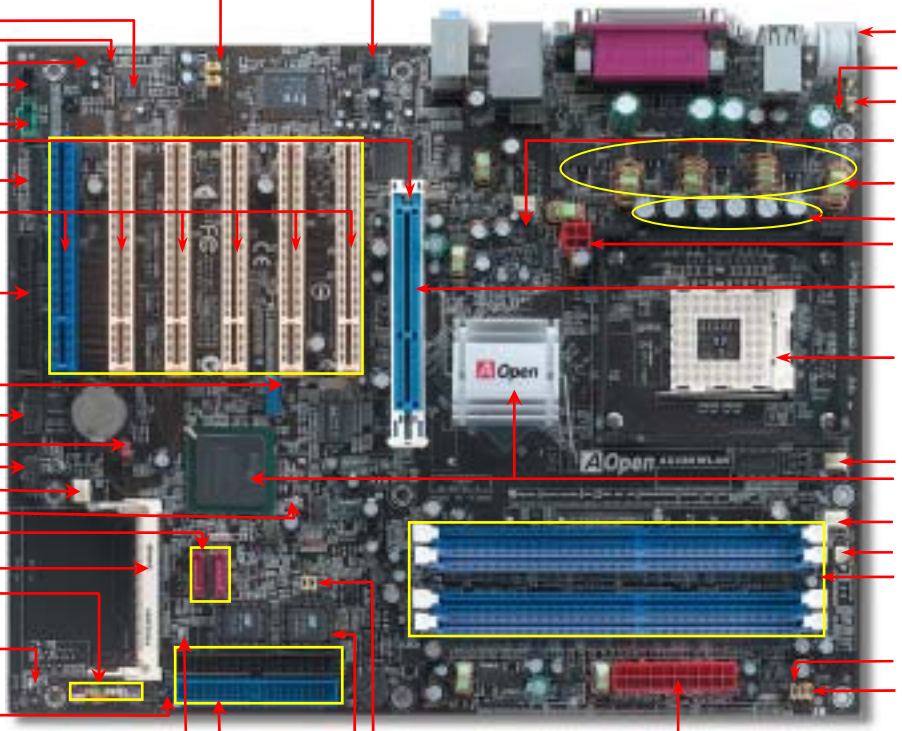
Fully implement the ACPI standard for Windows® 98/ME/2000/XP series compatibility, and supports Soft-Off, STR (Suspend to RAM, S3), STD (Suspend to Disk, S4) and S5 features.

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. Installing Driver and Utility

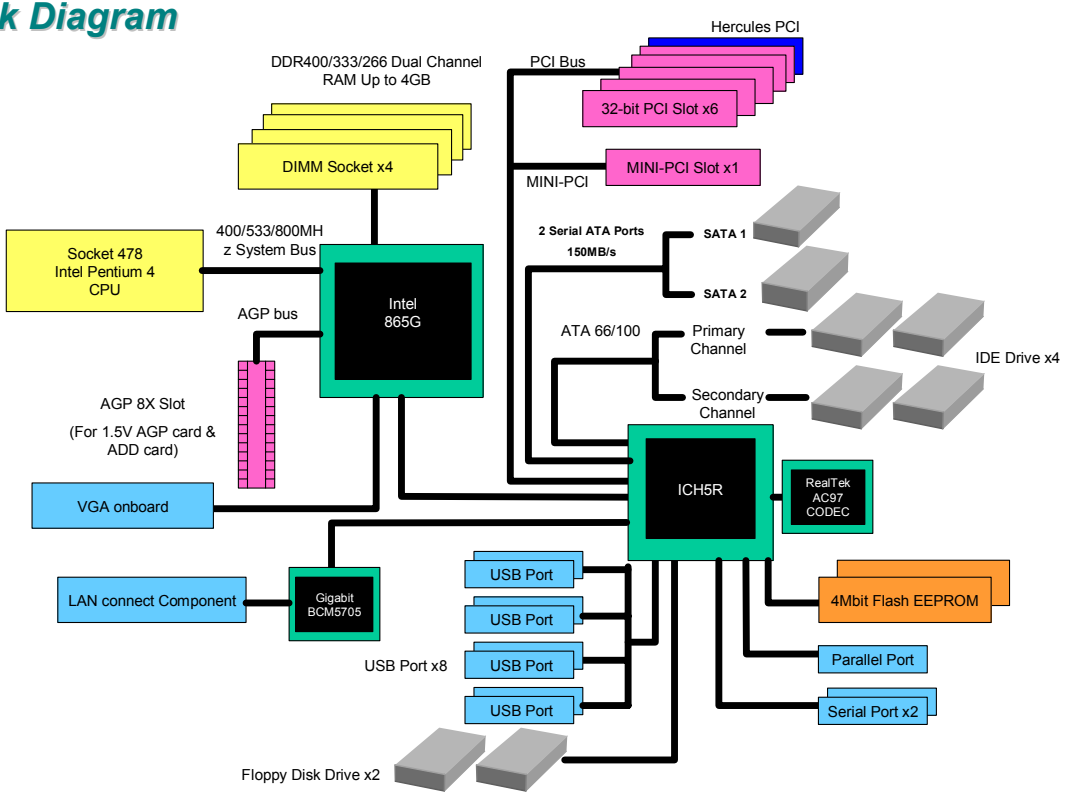
Motherboard Map



IrDA Connector
Front Audio Connector
AC'97 CODEC
Smart Ear Connector
S/PDIF Connector
CD-IN Connector
AUX-IN Connector
AGP LED
Game Port Connector
32-bit PCI Expansion Slot x6
(Slot 6: Hercules PCI card that supports high power-consuming PCI cards)
FDD Connector
USB 2.0 Connector
COM2 Connector
JP14 CMOS Clear Jumper
JukeBox FM Connector
SYSFAN3 Connector
BOOT LED
SATA Port x 2 (RAID 0)
MINI-PCI Slot
Front Panel Connector
STBY LED
Case Open Connector
LAN LED
ATA66/100 IDE Connector x2

Colored Back Panel
Resetable Fuse
JP28 Keyboard/Mouse Wakeup Jumper
SYSFAN2 Connector
V4 Power Engine
Low ESR Capacitors
4-pin 12V. ATX Power Connector
AGP 8x Expansion Slot (For 1.5V AGP card & ADD card
478-pin CPU socket (Northwood) with Voltage and Frequency Auto-detection that supports Intel® Pentium® 4 1.6~3.06GHz+ CPU
CPUFAN1 connector
865G Chipset that supports 400/533/800MHz FSB
PWR FAN4 Connector
PWR TEMP Connector
184-pin DIMMx4 support DDR400/333/266 DDR RAM maximum up to 4GB
JP2 Speaker Output Connector
JP15/JP16 Dr. Voice II Language Select Jumper
ATX Power Connector
JP24 & JP25 BIOS Rescue Jumper
Die-hard BIOS II
(Normal and Rescue ROM)

Block Diagram



Hardware Installation

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

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

1. *Do not remove a component from its protective packaging until you are ready to install it.*
2. *Wear a wrist ground strap and attach it to a metal part of the system unit before handling a component. If a wrist strap is not available, maintain contact with the system unit throughout any procedure requiring ESD protection.*

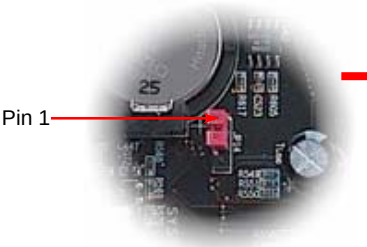
About “User Upgrade Optional” and “Manufacture Upgrade Optional”…

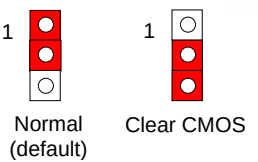
When you read this online manual and start to assemble your computer system, you may notice that some of the functions are marked as “User Upgrade Optional” or “Manufacture Upgrade Optional”. Although all of AOpen’s motherboards have included many amazing and powerful features, sometimes not every user 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.

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.





Tip: *When should I Clear CMOS?*

1. Boot fails because of overclocking…

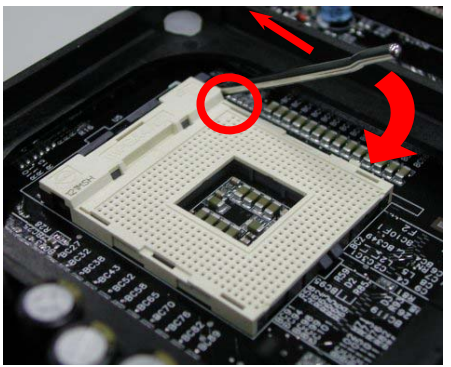
2. Forget password…

3. Troubleshooting…

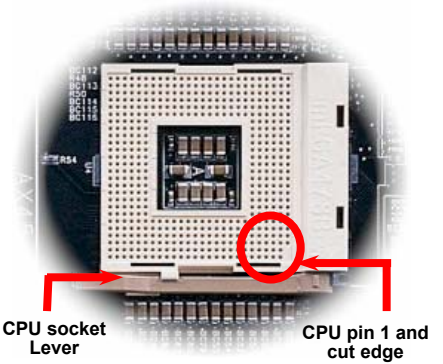
CPU Installation

This motherboard supports Intel® Pentium 4 Socket 478 series CPU (Northwood). 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.

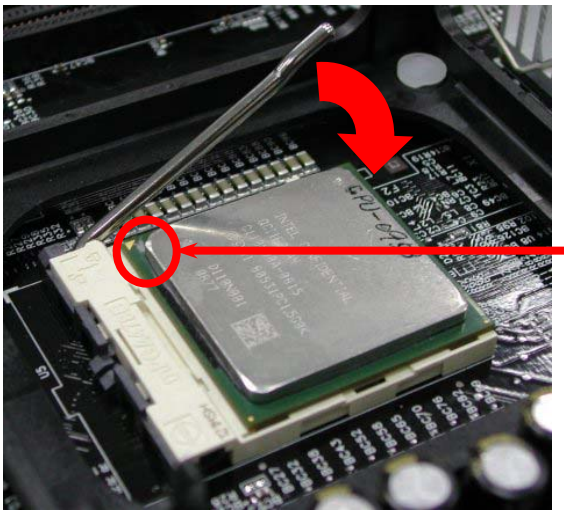


2. Locate Pin 1 in the socket and look for mark on the CPU upper interface. Match Pin 1 and cut edge, then insert the CPU into the socket.



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

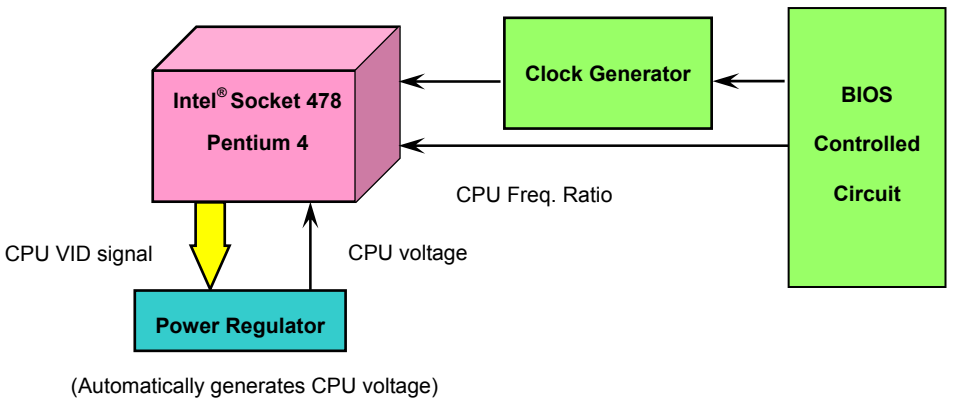
Note: *If you do not match the CPU socket Pin 1 and CPU cut edge well, you may damage the CPU.*

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.

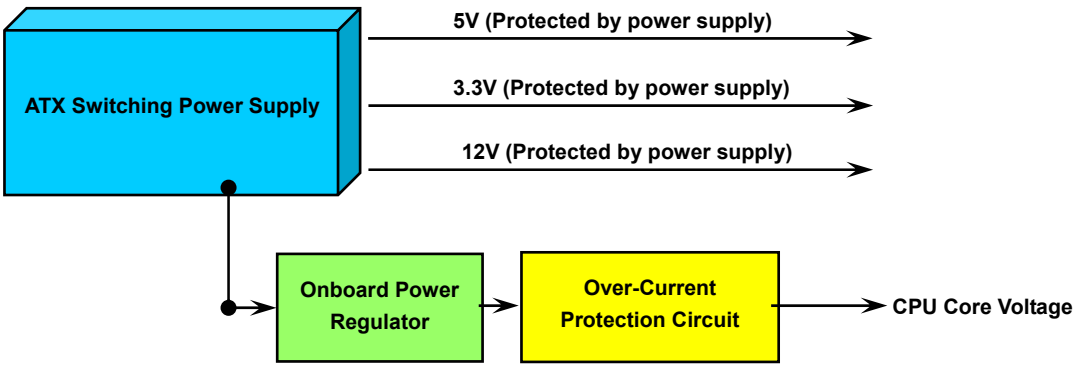
CPU Jumper-less Design

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.



CPU Over-current Protection

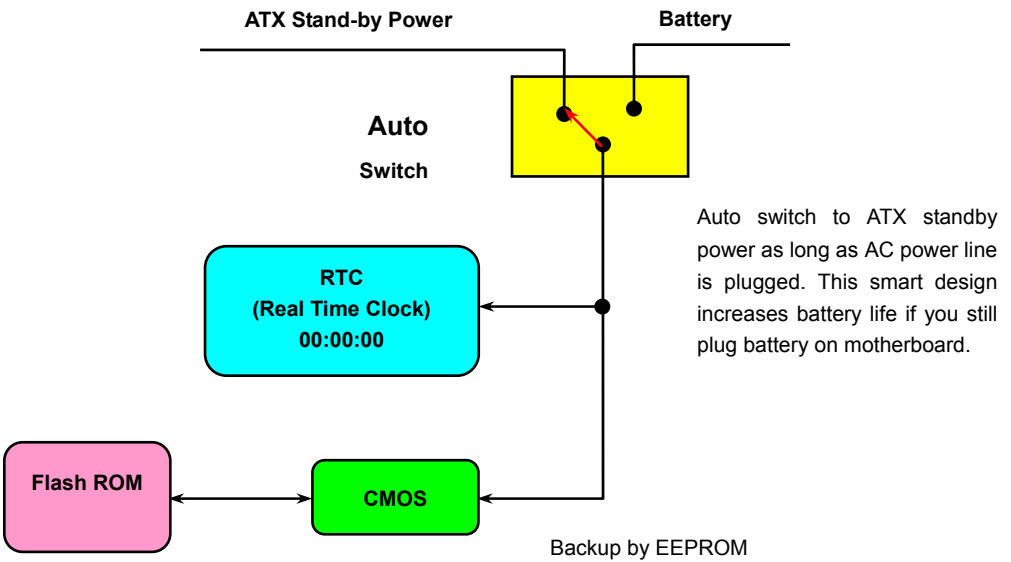
Over Current Protection has been popularly implemented on ATX 3.3V/5V/12V switching power supply for a while. However, new generation CPU is able to use regulator of different voltages to transfer 12V to CPU voltage (for example, to 2.0V). This motherboard is with switching regulator onboard that supports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



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.***

Battery-less and Long Life Design

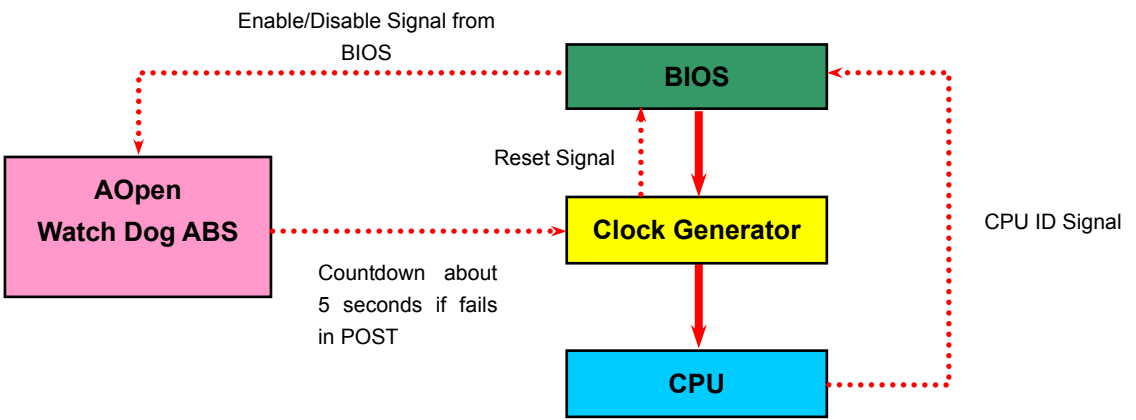
This Motherboard implements a Flash ROM and a special circuit that provide you no batter power consumption of current CPU and CMOS Setup configurations. The RTC (real time clock) can also keep running as long as the power cord is plugged. If you lose your CMOS data by accident, you can just reload the CMOS configurations from Flash ROM and the system will recover as usual.



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.

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.



Full-range Adjustable CPU Core Voltage

This function is dedicated to overclockers and supports Adjustable CPU Core Voltage from 1.10V to 1.85V. However, this motherboard can also automatically detect CPU VID signal and generates proper 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… 21x, 22x, 23x, 24x
CPU FSB (Adjustment manually)	FSB = 100MHz-250MHz by 1MHz Stepping CPU Overclocking

Northwood CPU	CPU Core Frequency	FSB Clock	System Bus	Ratio
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 3.0G	3000MHz	200MHz	800MHz	15x
Pentium 4 3.06G	3060MHz	133MHz	533MHz	23x

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: *Intel 865G chipset don't support Willamette or Celeron (0.18u) processors. Northwood processor would detect the clock ratio automatically, you may not be able to adjust the clock ratio in BIOS manually.*

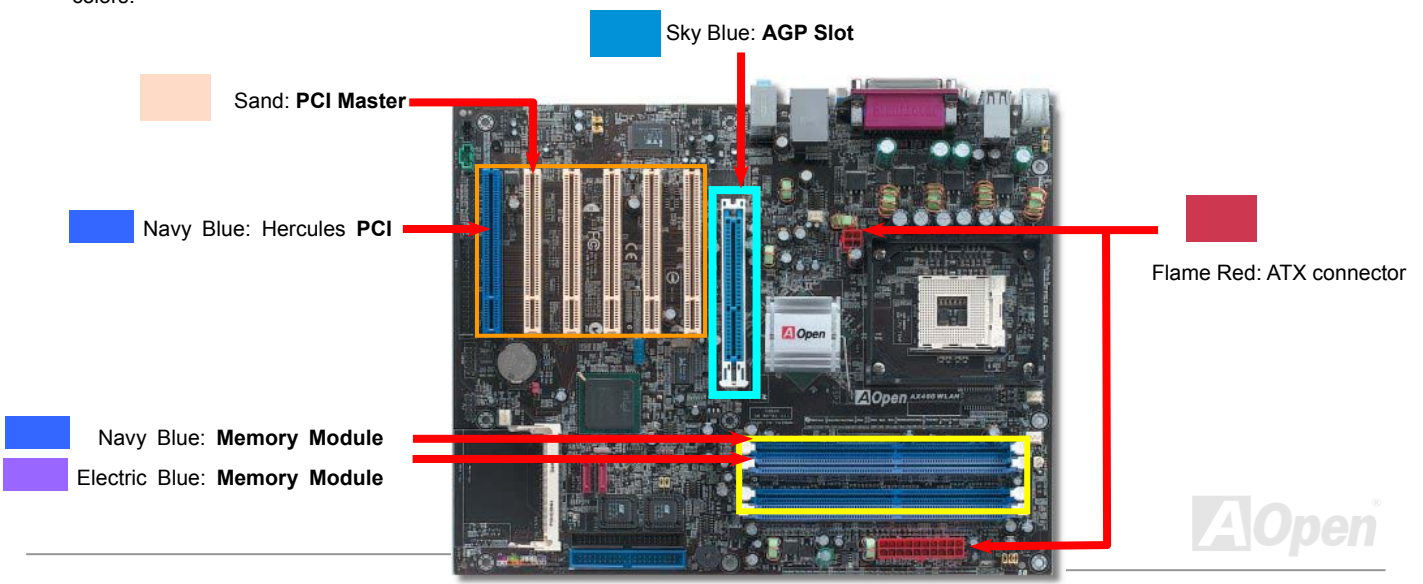
Warning: *Intel 865G chipset supports maximum 800MHz (200MHz*4) system bus and 66MHz AGP clock; higher clock setting may cause serious system damage.*

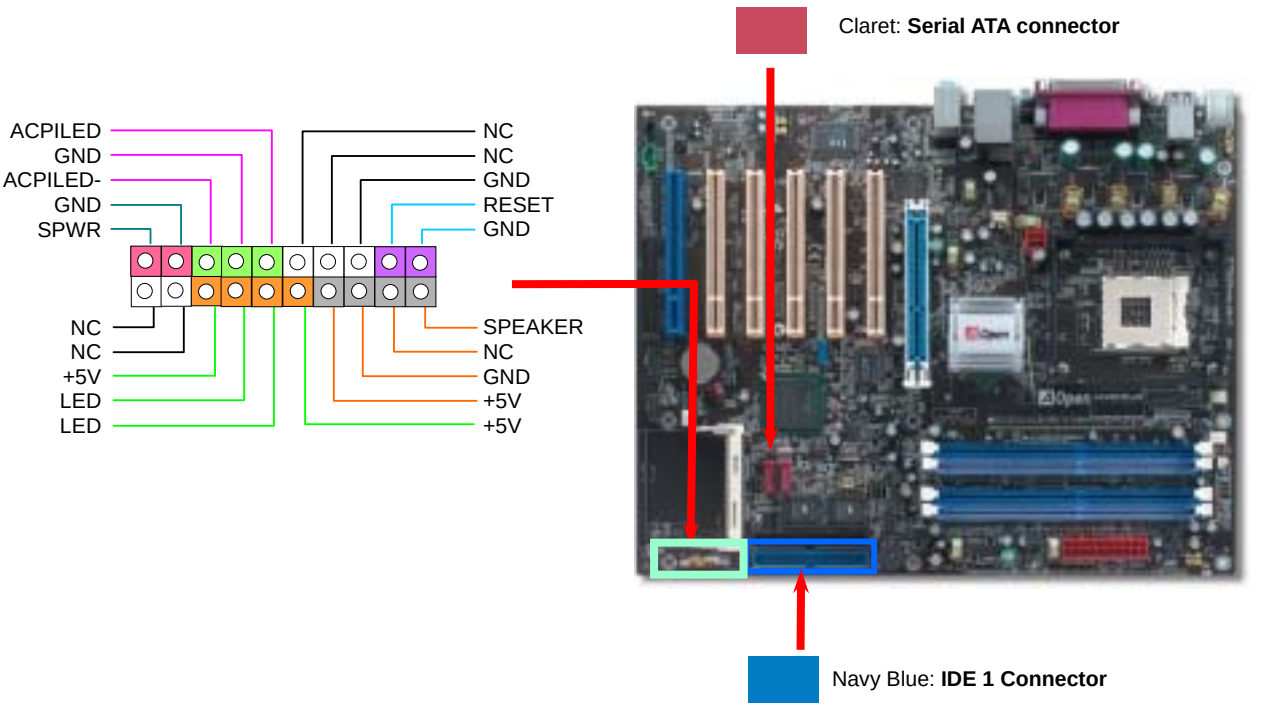
EzColor

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!

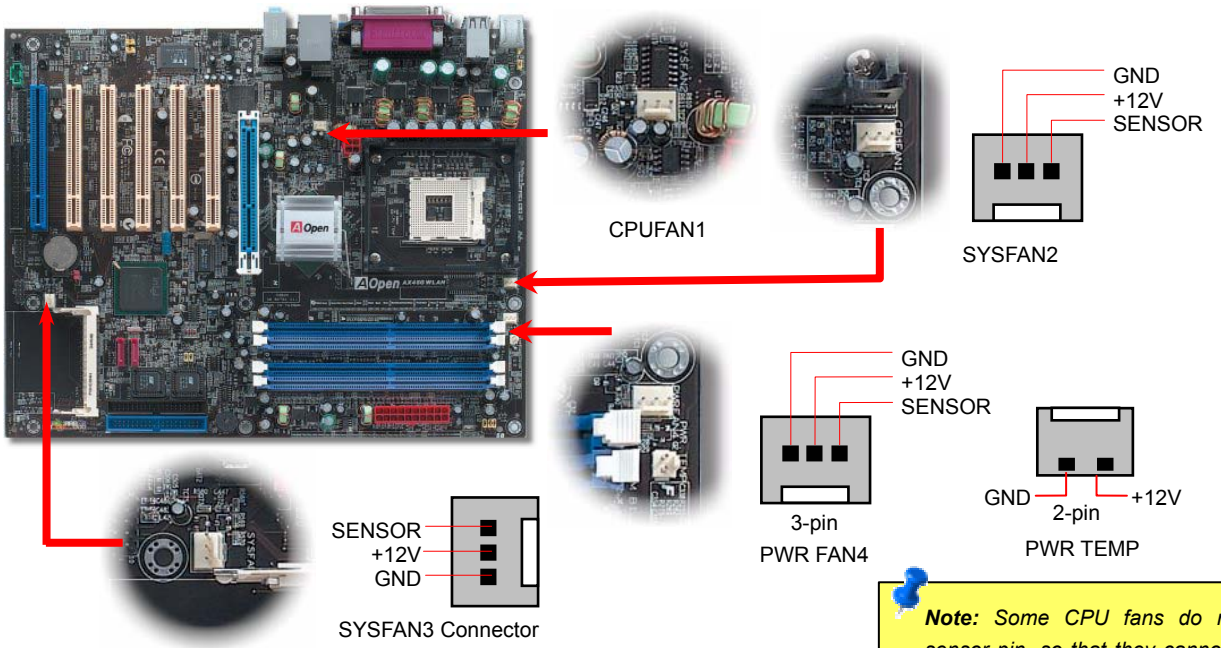




Note: Colors setting varies on different motherboards, the color setting here applies only to AX4SG WLAN.

Connecting CPU, System, Power Supply Fan Connectors

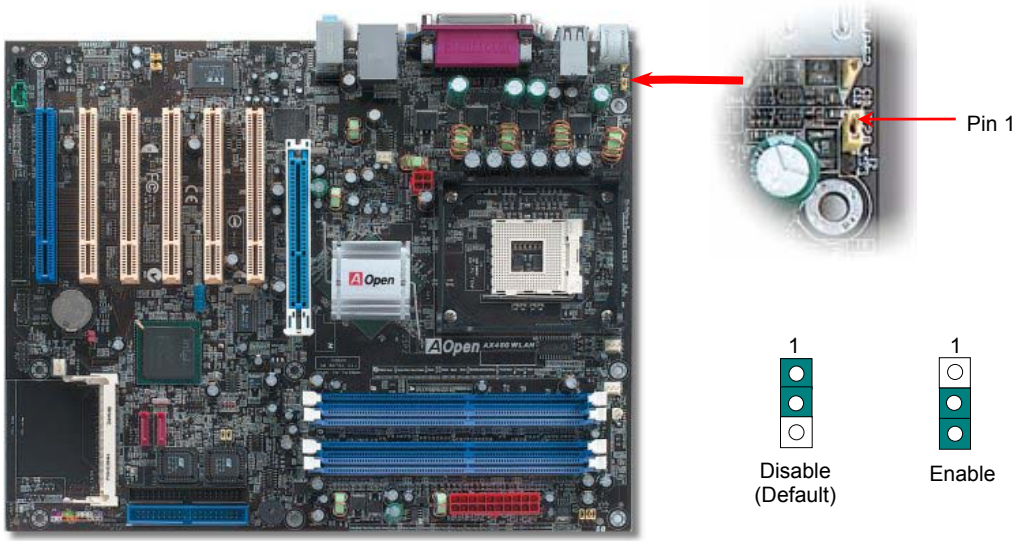
This motherboard comes **CPUFAN1, SYSFAN2** and **SYSFAN3** connectors, you may connect fans to them if necessary. In addition, this motherboard allows you to control **Power Supply Fan** with SilentTek II utility. Please remember to connect necessary power supply connectors to your power supply.



Note: *Some CPU fans do not have sensor pin, so that they cannot support hardware monitoring function.*

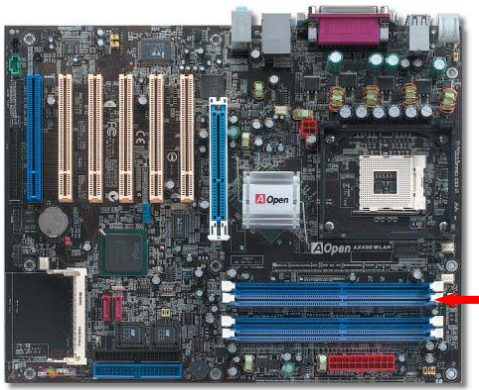
JP28 Keyboard/Mouse Wake-up Jumper

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.

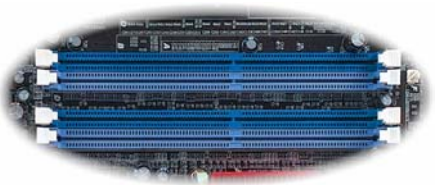


DIMM Sockets

This 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. Only non-ECC DDR RAM is supported. Please install suitable modules; otherwise serious damage may occur on memory sockets or you RAM modules. ***Please note that when you install DDR333 memory module and have your CPU FSB set at 800MHz, the memory can only run with the speed of DDR320. It is limitation of Intel.*** For other limitation of CPU types, please see the table below. You can also adjust memory voltage in BIOS within a rage from 2.55V, 2.6V (Default), 2.65V, 2.7V to 2.75V.



Item	DDR266	DDR333	DDR400
CPU FSB 400MHz	V	X	X
CPU FSB 533MHz	V	V	X
CPU FSB 800MHz	V	⊙	V



DIMMA1
DIMMB1

DIMMA2
DIMMB2

Warning: *This motherboard supports DDR RAM. Please do not install the SDRAM on the DDR RAM 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.*

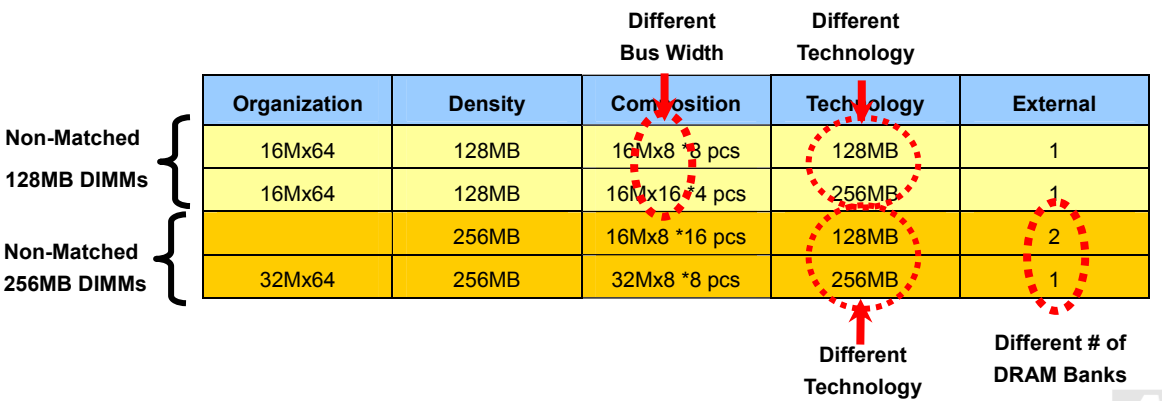
Maximum the performance of Dual Channel

Dual Channel memory configuration provides higher performance than single channel configuration. To get the highest performance of Dual Channel, the DIMM modules you're using must meet the following conditions:

- Same DRAM technology (128Mb, 256Mb, or 512Mb)
- Same Density (128MB, 256MB, 512MB, etc.)
- Same DRAM bus width (x8 or x16)
- Matched DIMM configuration in each channel
- Both either single-sided or dual-sided

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

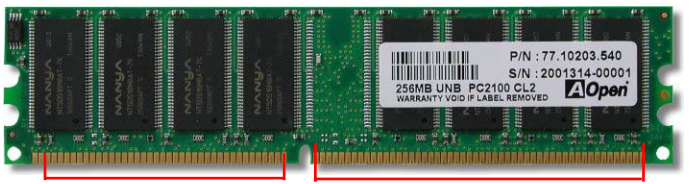
Optimize performance for dual channel is obtained with matched DIMM population. Table below shows DIMMs with same Organization and Density, but are non-matching as bus width, technology and/or external banks are different. **Mixing these DIMMs will put platform into single channel mode**.



How to Install Memory Modules

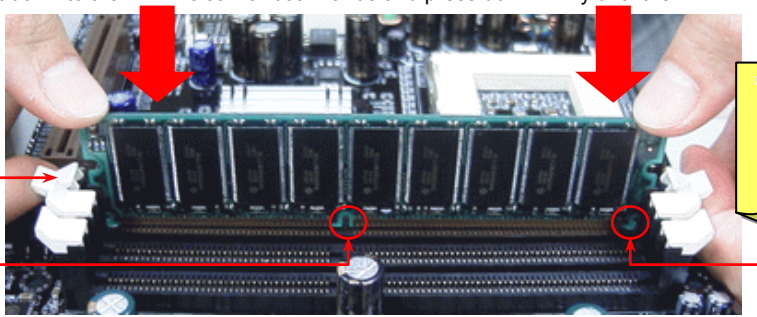
Please follow the procedure as shown below to finish memory installation.

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.***

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.



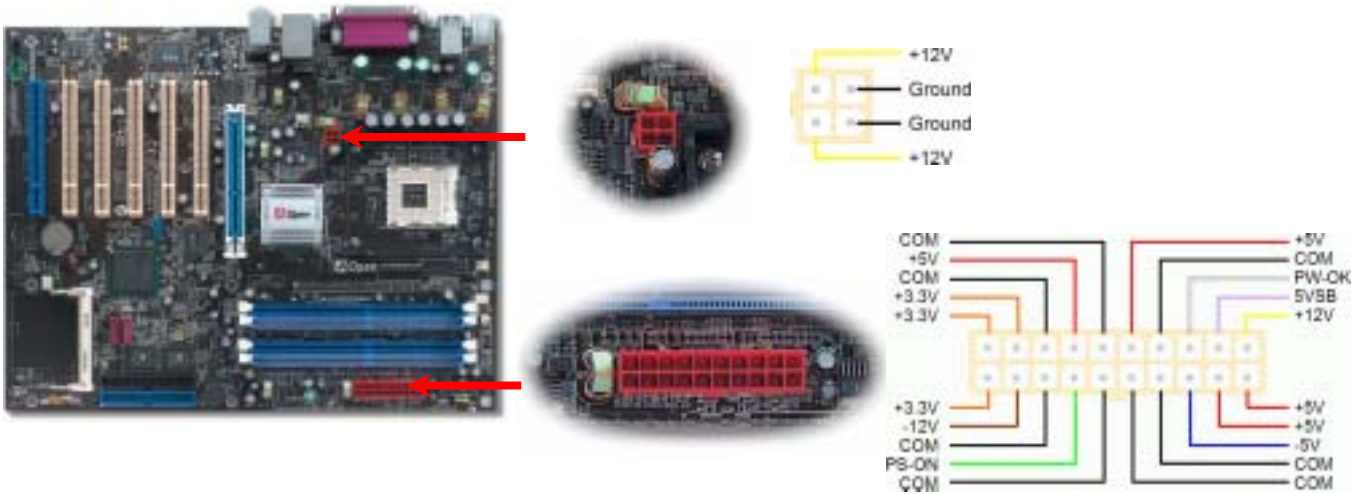
Note: *The tabs of the DIMM slot will close-up to hold the DIMM in place when the DIMM touches the slot's bottom.*

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

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

ATX Power Connector

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

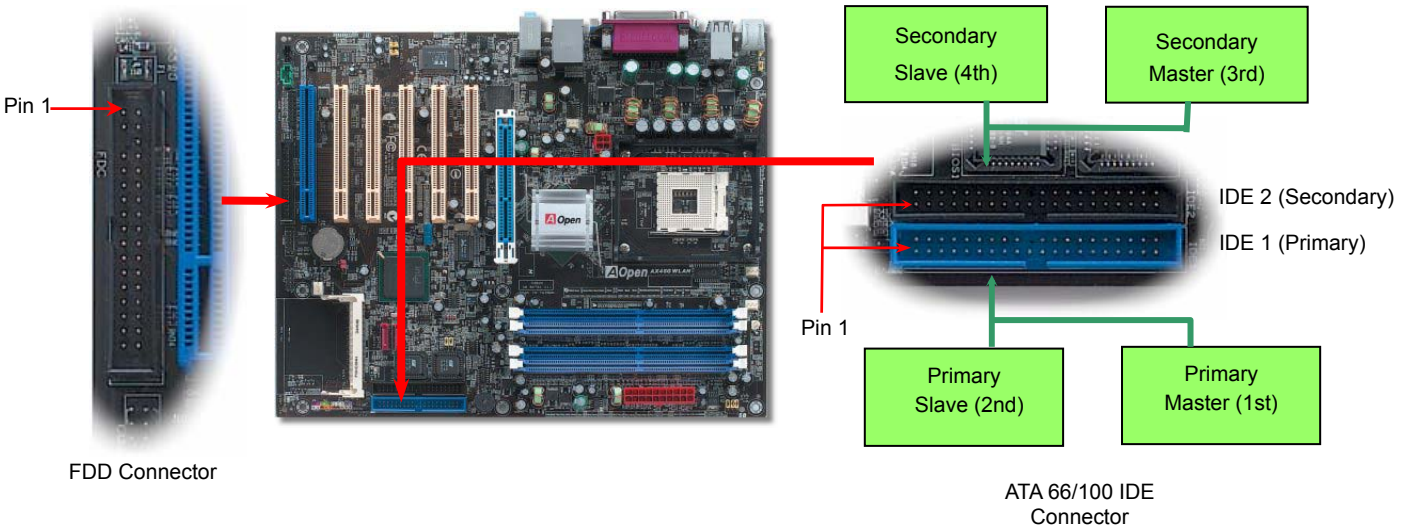


AC Power Auto Recovery

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. Be careful of the pin1 orientation. Wrong orientation may cause system damage.



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

Tip:

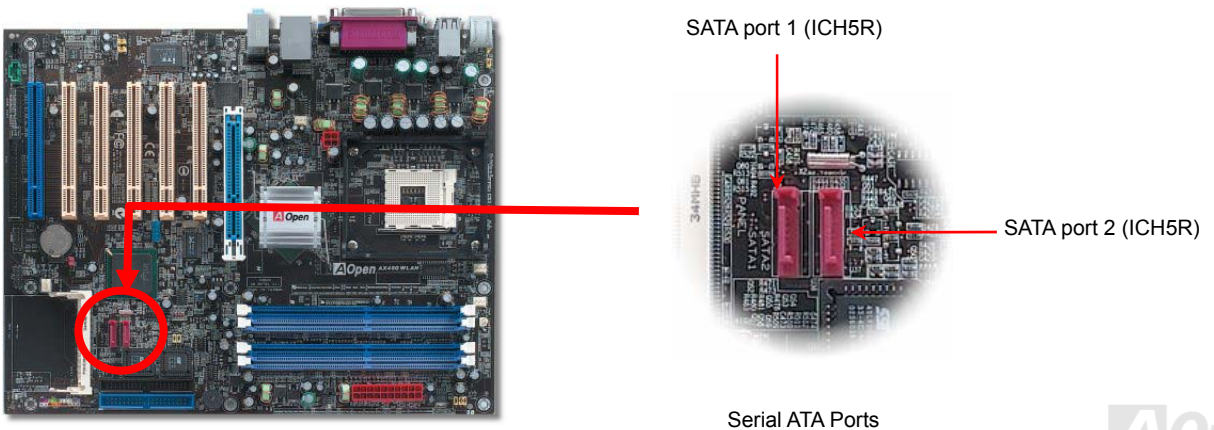
1. *For better signal quality, it is recommended to set the far end side device to master mode and follow the suggested sequence to install your new device. Please refer to above diagram*
2. *To achieve the best performance of Ultra DMA 66/100 hard disks, a special* ***80-wires IDE cable*** *for Ultra 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.*

Serial ATA Supported

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.



Serial ATA Ports

Connecting Serial ATA Disk

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.

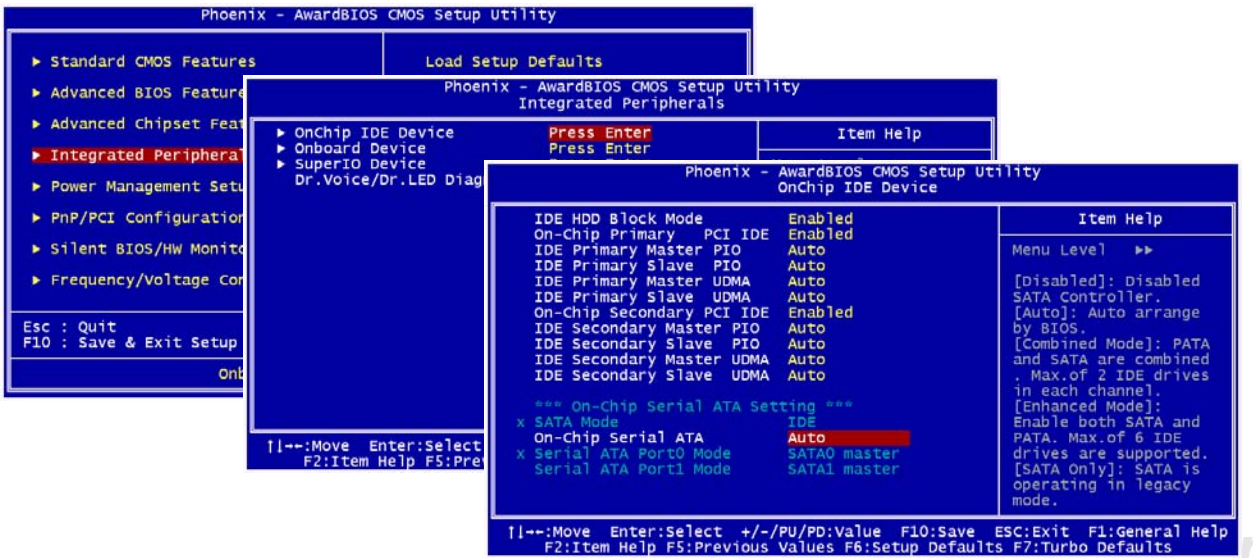
Item	Parallel ATA	Serial ATA
Bandwidth	100/133 MB/Sec	150/300/600 MB/Sec
Volts	5V	250mV
Pins	40	7
Length Limitation	18 inch (45.72cm)	1 meter (100cm)
Cable	Wide	Thin
Ventilation	Bad	Good
Peer-to-Peer	No	Yes

Comparison between Parallel ATA and Serial ATA

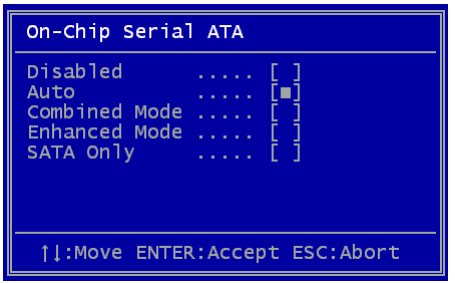
Adjusting Your Hard Disk

Except its original 2 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 → On-Chip IDE Device → On-Chip Serial ATA” to choose your preferable mode. If you have no intention of changing its setting, the default would be Auto.



If you intend to change the default setting, simply press **Enter** for a list of selection:



1. **Disabled**: You may choose this item if you're sure that only traditional IDE hard disks had been installed on your system. Disabling this item may also cancel the detection to Serial ATA hard disk during POST, which theoretically, could speed up your boot-up timing for a little bit; however, please remember to re-adjust the settings here if you intend to use Serial ATA hard disk later.
2. **Auto**: This is the default setting upon receipt of the motherboard. Basically, if your system functions properly, it's not necessary to change it. The system will automatically recognize the first hard disk on IDE1 as the first boot device.

Note: Please be informed that when you are using Windows98/ME with six hard disks fully installed, Auto mode is not able to function properly, it's just because Windows98/Me is not able to energize Enhanced Mode to detect all hard disks.

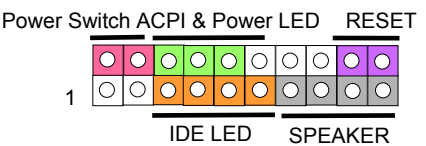
3. **Combined Mode:** If you have had installed traditional IDE hard disks and Serial ATA hard disks at the same time, then you may choose this Combined Mode. Under this mode, you may randomly choose either IDE hard disks or Serial ATA had disk as your first boot device. But please be aware that Serial ATA will exist with IDE in a mapping way, which also means it will occupy one of the IDE Channel and left you with one IDE Channel only.
4. **Enhanced Mode:** If you are using the latest operating system (say, Windows XP, Windows.NET Server), it is highly recommended to select Enhanced Mode. The system would be able to detect all six devices (traditional IDE x4, Serial ATA x 2) completely and functions perfectly under this mode. But please be noted that it is defaulted with using traditional IDE as the first boot device.
   Note: From our practical lab tests, we found no obvious problem or mistakes happened under Windows2000 operating system, but, however, it is not within the regulation recommended by Intel.
5. **SATA Only:** You may select this SATA Only mode if you have had installed Serial ATA hard disks only. It also allows you to select booting sequence from Port0 (SerialATA1) or Port1 (SerialATA2).

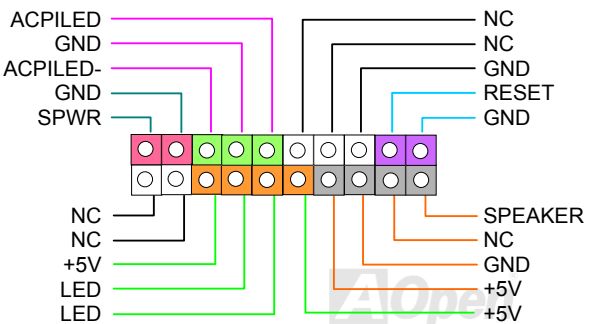
Front Panel Connector

Designed with different colors of pin headers aligning together, front panel is one of the most important components on your motherboard. With SPWR, ACPI & PWR LED, IDE LED, ACPI LED, Reset and Speaker pins included, it is very easy to mess up the right cables to the correct headers. However, with colorful **EzColor** designed on front panel, users can lay back and easily set up cables by color to color setting, inserting the right color of cables onto the right color of headers.

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



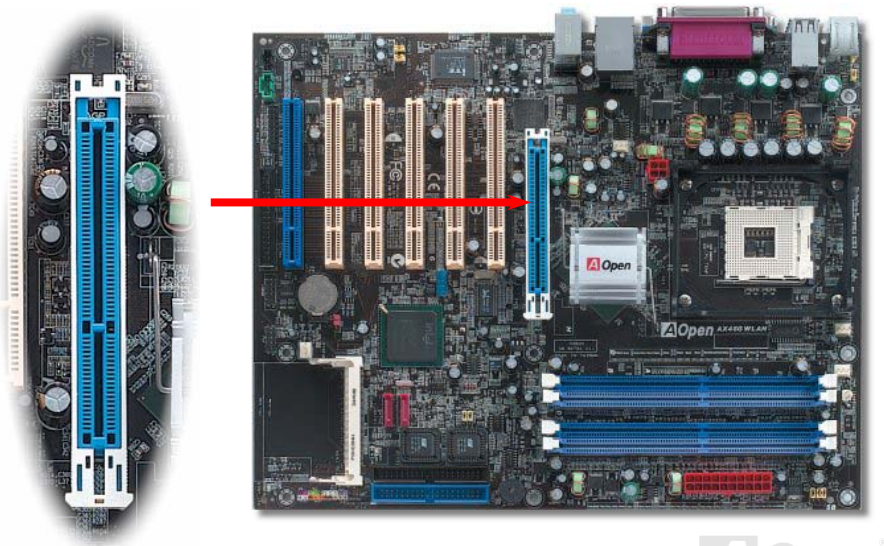


AGP (Accelerated Graphic Port) 8X Expansion Slot

NEW!

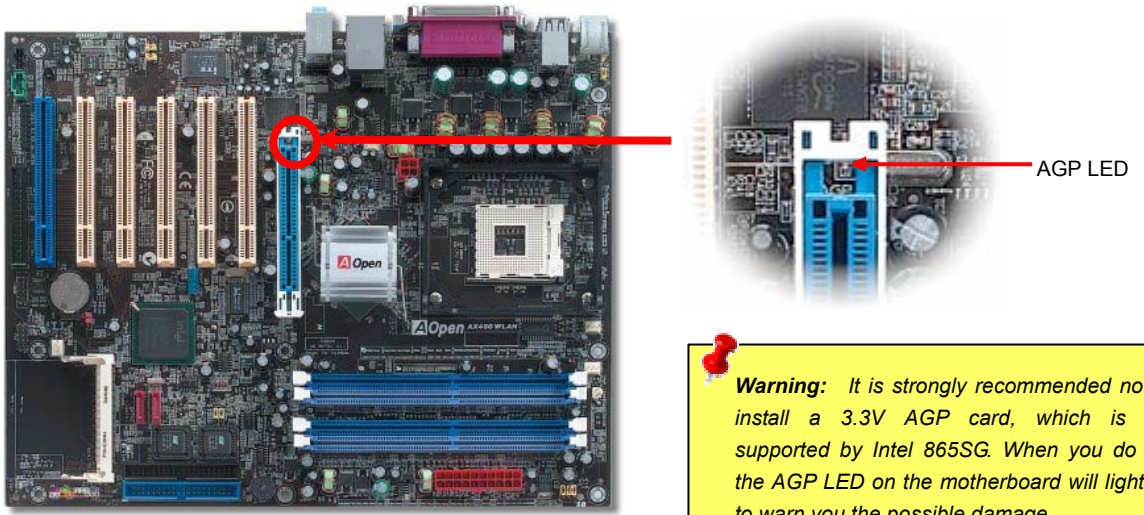
AX4SG WLAN provides an AGP 8x slot. The AGP 8X is a bus interface targeted for high-performance 3D graphic. AGP uses both rising and falling edge of the 66MHz clock, for 4X AGP, the data transfer rate is 66MHz x 4bytes x 4 = 1056MB/s. AGP is now moving to AGP 8x mode, which is 66MHz x 4bytes x 8 =2.1GB/s. This AGP slot could automatically become an AGP slot or a Multiplexed Intel DVO Output depending on what kind of cards inserted, like AGP, or ADD (AGP Digital Display) cards. With ADD card cabled to this slot, Multiplexed Intel DVO output could provide high-speed digital connection for digital displays or TV-OUT functionality. You can also adjust AGP voltage in BIOS within a rage from 1.5V, 1.53V (Default), 1.56V to 1.6V.

Warning: *It is strongly recommended not to adjust voltage/clock of AGP/PCI when connecting any SATA service, because the clock for SATA would not be able to maintain at 100MHz and that will might cause the instability of system.*



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-voltaging 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 Intel 865G 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.

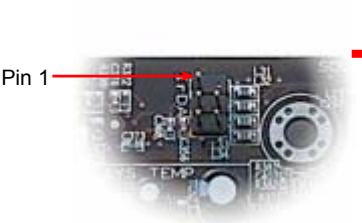


Warning: *It is strongly recommended not to install a 3.3V AGP card, which is not supported by Intel 865SG. When you do so, the AGP LED on the motherboard will light up to warn you the possible damage.*

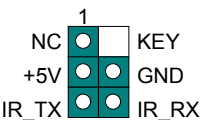
IrDA Connector

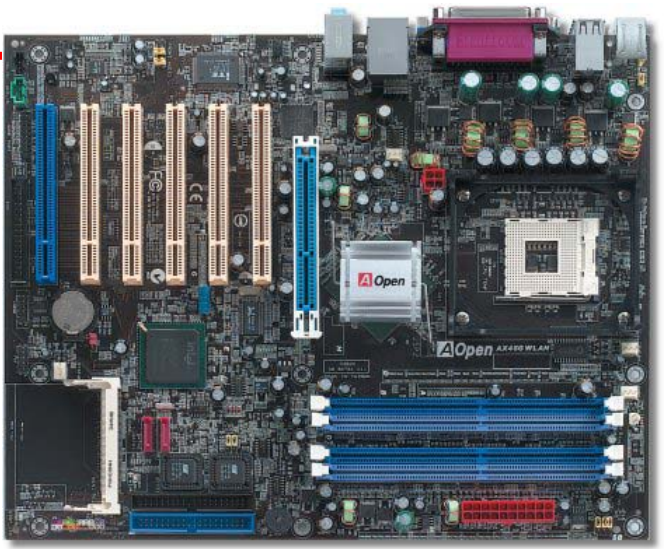
The IrDA connector can be configured to support wireless infrared module, with this module and application software such as Laplink or Windows 98 Direct Cable Connection, the user can transfer files to or from laptops, notebooks, PDA devices and printers. This connector supports HPSIR (115.2Kbps, 2 meters) 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.



IrDA Connector





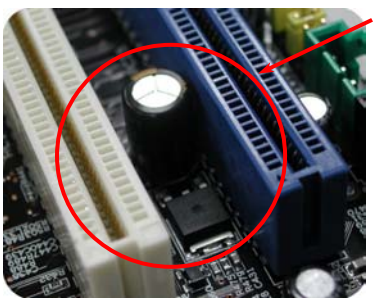
Hercules PCI Slot

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

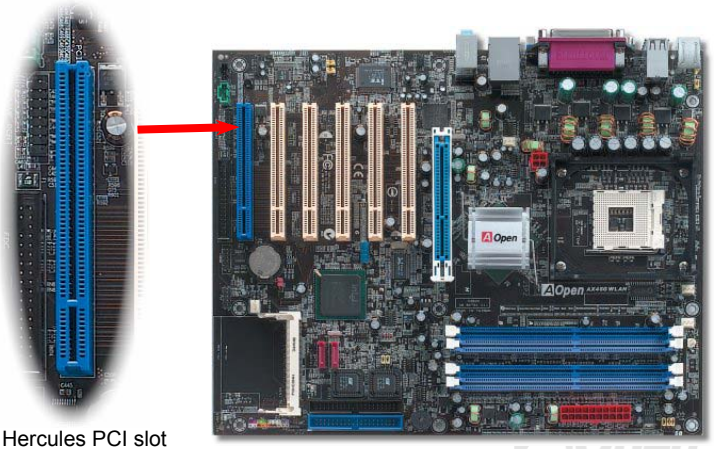
As independent as Hercules is, it comes in a separate set of 3.3 volt power circuitry which supplies needed current and making it virtually free from the “loading issue” of traditional PCI slot. In addition, traces around this specially designed slot power delivery are upgraded in terms of their trace 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

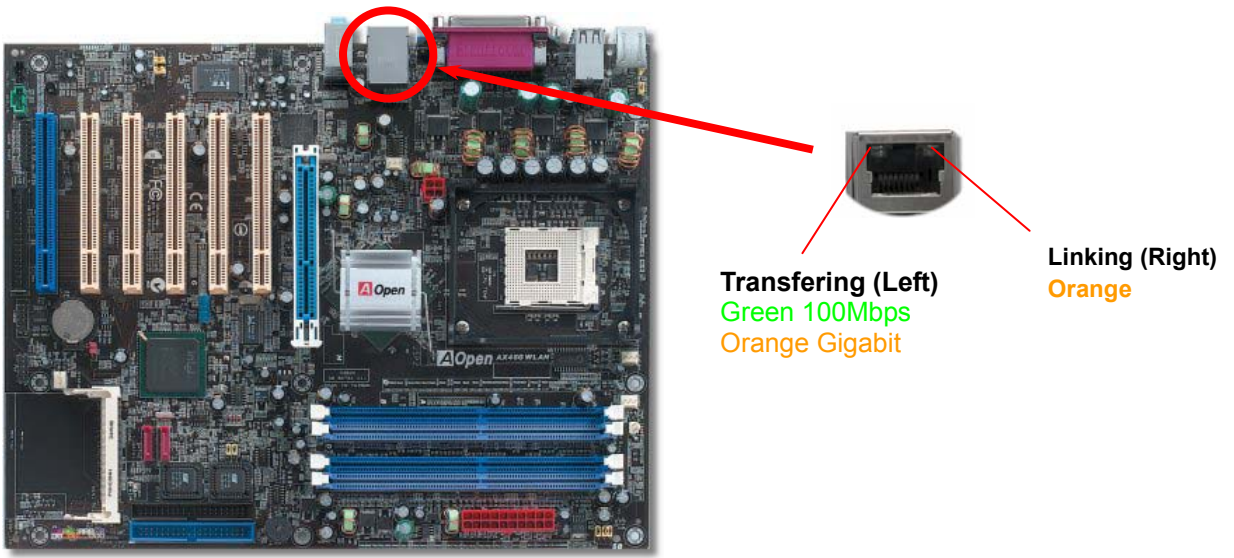


Hercules PCI slot

Support Gigabits LAN onboard

NEW!

On the strength of Broadcom Gigabit LAN controller on board, which is a highly-integrated Platform LAN Connect device, it provides Gigabits Ethernet for office and home use, the Ethernet RJ45 connector is located on top of USB connectors. The right-hand side LED indicates the link mode, it blinks in orange whenever linking to network. The left-hand side LED indicates the Connecting mode, and it lights in green when 100Mbps LAN is connected (never lights while 10Mbps is connected), but lights in orange when Gigabits LAN is connected. To enable or disable this function, you may simply adjust it through BIOS.

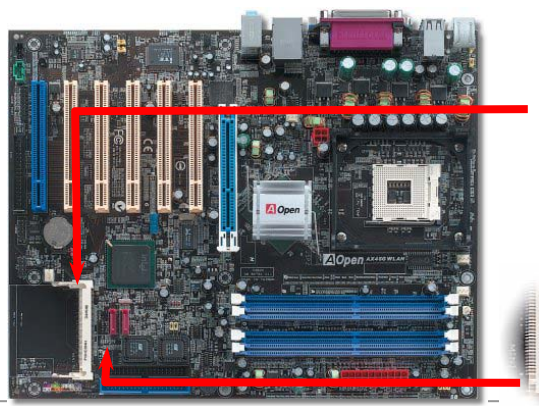


MINI-PCI

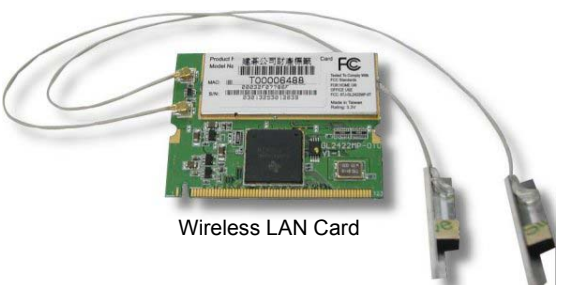
Originally, MINI-PCI, which s defined as a small form factor daughter card for 32-bit/33MHz PCI bus was designed for general notebook applications in order to expand Ethernet or wireless solutions in space-constrained systems. However, with increasingly people using wireless network card these days, Mini-PCI card can also be applied on PC system these days. With its convenient wireless accessing, AOpen decides to phase in Mini-PCI slot on this motherboard. Mini-PCI interface offers you the greatest flexibility and extendibility for any application.

AOpen Mini-PCI Wireless LAN Card with its light weight, small size and low power consumption is ideal fitted in your PC system. With 802.11b compliant, the data rate of AOpen-made WLAN card is able to support 11Mbps or even 22Mbps (802.11b+), while other WLAN card on the market may limited to 11Mbps only. It utilizes 2.4GHz Direct Sequence Spread Spectrum (DSSS) radio transmission technology and allows your AOpen motherboards with Mini-PCI slot easy to integrate wireless LAN feature.

In addition of being purely as an wireless network slot, it can be used an a individual access point for getting online as well. Simply plug in the card, start Soft AP, our special-designed application, then you may get online right on the spot.



MINI-PCI Slot



Wireless LAN Card

LAN LED
(Transferring = Blinking)

Note: *Before installing Mini Wireless LAN card, please must install the utility – **SoftAP** first. Otherwise, the system would not be able to recognize the device.*

SoftAP Utility

What is an AP (Access Point)?

Generally speaking, an access point is a wireless LAN transceiver that connects the wired network with wireless clients. The function of an access point is to transform data packets over a wired network into radio signals to be used on the wireless network and vice versa. Furthermore, the access points and wireless clients must both utilize the same wireless standard or protocol for communication.

AOpen SoftAP

AOpen is dedicated to providing users with a much friendlier computer environment and help users to save more money. We now bring you an innovative utility, the AOpen SoftAP, which can be managed via the user-friendly manager software as shown below.

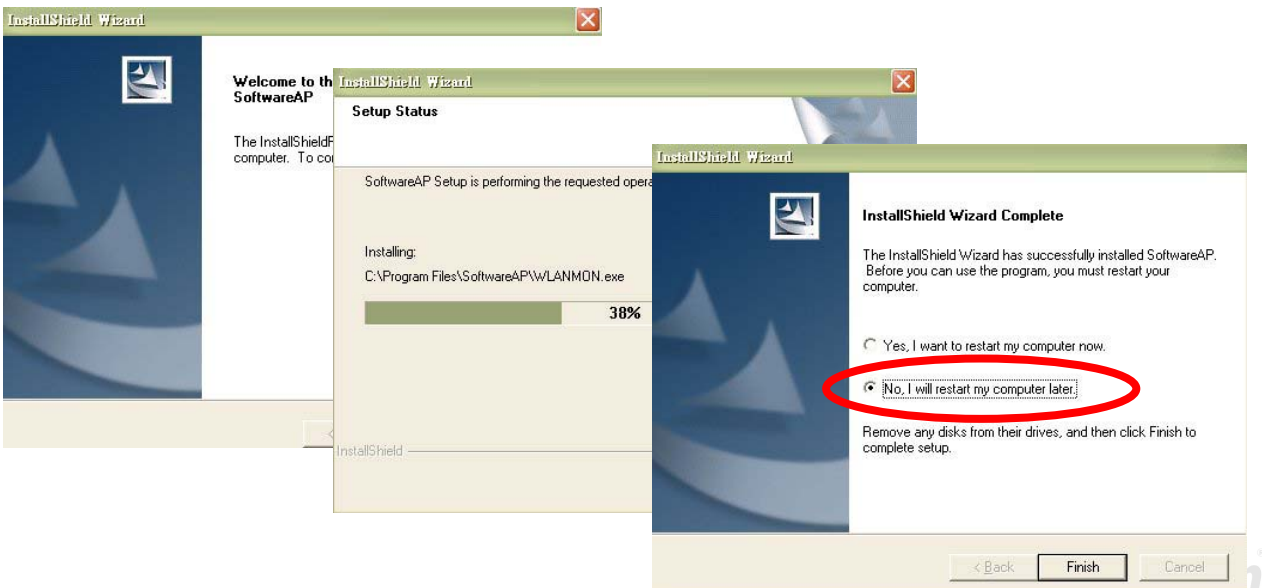
Let's say your AOpen motherboard is equipped with an AOpen Mini-PCI Wireless LAN Card, and want to share Internet with another notebook which already has a wireless LAN device in it. What are you supposed to do? Buy an expensive hardware access point? It will cost you at least 150 US dollars. You may just simply install AOpen SoftAP utility from the Driver CD come with AOpen Mini-PCI Wireless LAN Card, then you do not have to spend extra money to buy one. Of course, please make sure that the wireless LAN card in your notebook is IEEE 802.11b compatible.

NOTE: *AOpen SoftAP can be used in Windows 2000, or even the latest Windows XP. Please be informed that SoftAP can only be operated in a system equipped with an AOpen motherboard and AOpen Mini-PCI Wireless LAN Card. Meanwhile, all applications must be closed before starting install SoftAP.*

Setup Guide of SoftAP

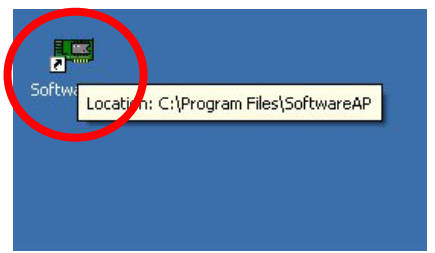
AOpen SoftAP is an utility to configure and monitor wireless LAN status under Windows environment, which not only provide you a free software access point, but allow user to configure settings manually. It is very easy to install AOpen SoftAP.

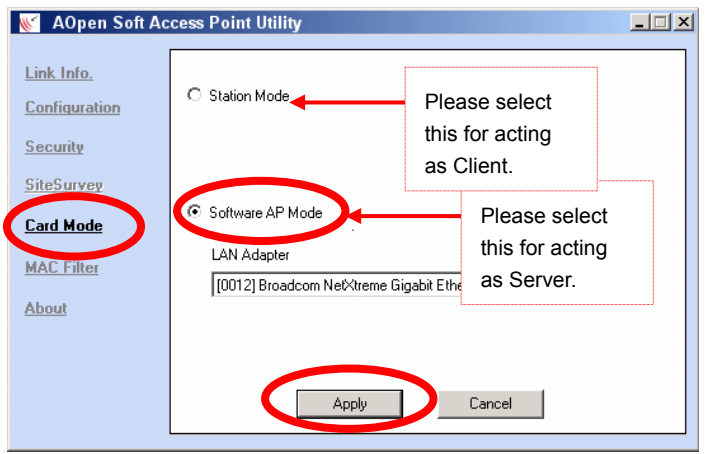
1. Before installing WLAN card on motherboard, it is a **MUST** to install utility in advance. Otherwise, the utility would not be able to detect the device installed previously. Press **next** for the utility to run accordingly.
2. After having executed utility, you will be prompted with an install complete window. Select "**No, I will restart my computer later**".



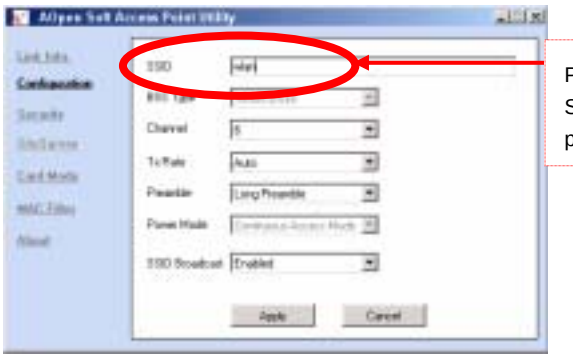
2. After that, please shut down your PC, install the WLAN card on your motherboard, and plug LAN cable to the RJ45 connector on back panel.
3. Restart the PC, and a new device will be detected. Install it.
4. Double click the SoftAP icon on the desktop. After that, please go to **Card Mode** page, select **SoftAP mode**, choose **broadcom NetXtreme Gigabit Ethernet,** and press **Apply** button。

   Note: If you want to set your WLAN as client，please select Station Mode。 And jump to Step 6.

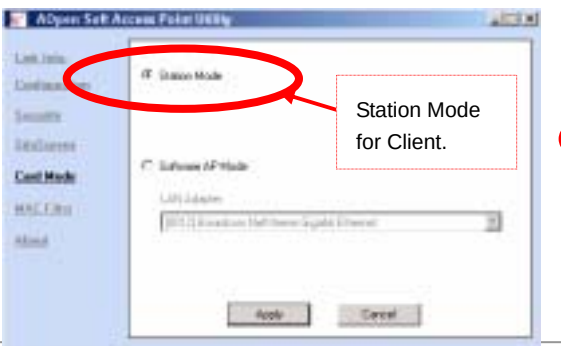


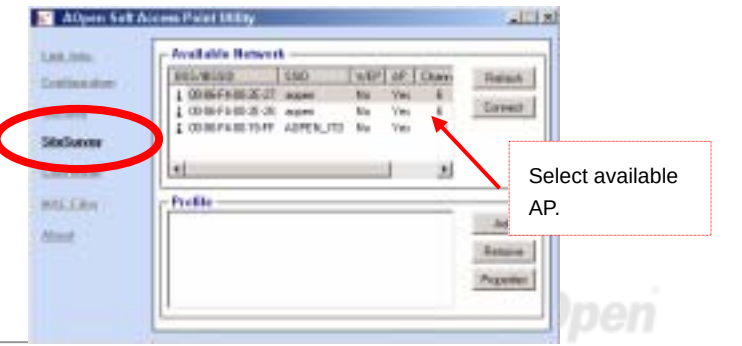


5. Select **Configuration** page, fill in any SSID name you wish, the channel is arbitrary (Here we use “wlan” as example). Before leaving this section, press **Apply**. After these above settings, it’s done! You will be able to use your motherboard as access point then.



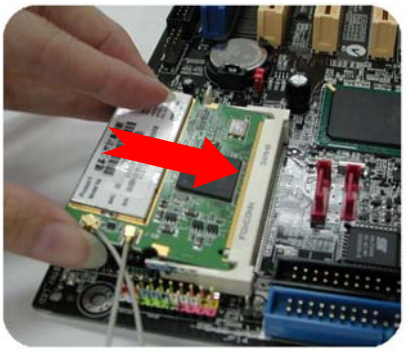
6. In case you want to have your WLAN to act as a Client, please select **Station Mode**. Go to **SiteSurvey** page, and select the available AP within your environment.



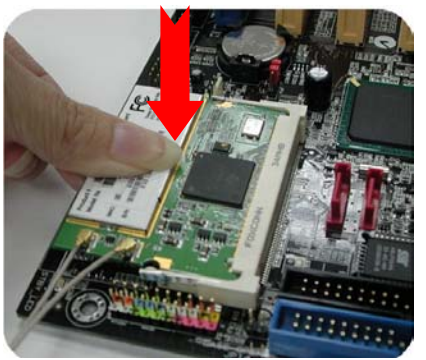


Easy installation of Mini-PCI slot and Wireless Card

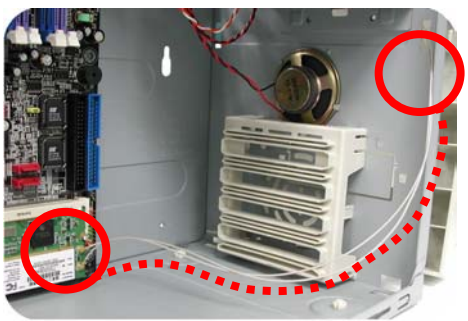
The installation of AOpen Mini-PCI Wireless LAN card can be easily accomplished by several steps.



1. Gently insert MINI wireless module into the MINI-PCI slot at 45 degree as picture shows.



2. Press the MINI Wireless module down till you heard “Clip” sound which proves it had been firmly inserted.



3. Pass the receiving end of the MINI Wireless module through the suitable hole you may find on the chassis for the best receiving location.

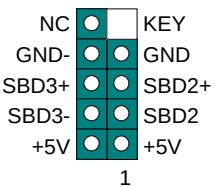
4. As you may find the receiving end must be attached within the chassis by angle of **90 degree** as shows.

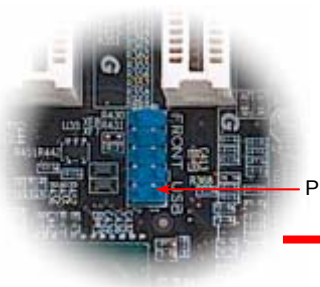
Support USB 2.0 Ports

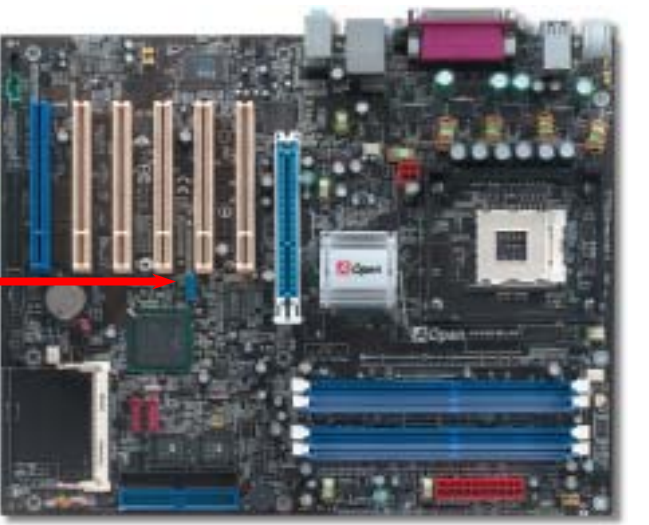
NEW!

This motherboard provides eight USB 2.0 ports to connect USB devices such as mouse, keyboard, modem, printer, etc. There is one USB connector on the board for you to connect two USB devices and six 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 which 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.



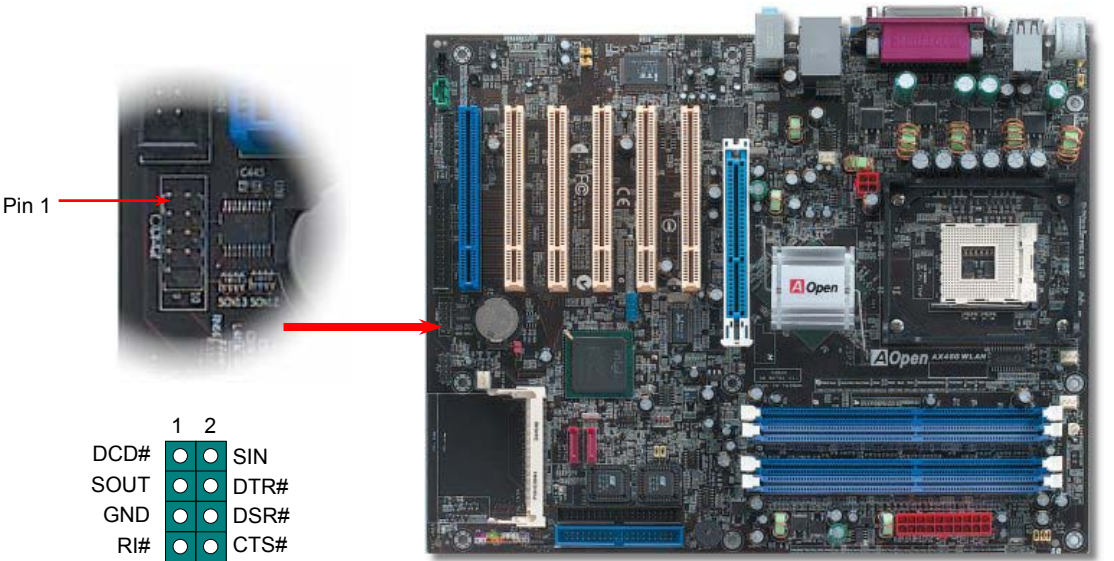




Note: *Please note that if you would like to use USB devices (Example: keyboard, mouse etc.) under DOS environment, you must install driver that comes with the devices to make it work.*

COM2 Connector

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

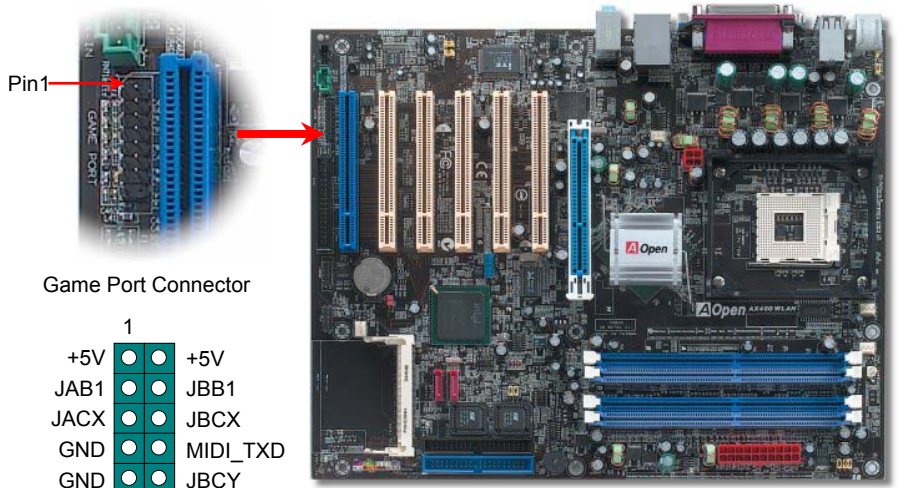


COM2 Connector

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)



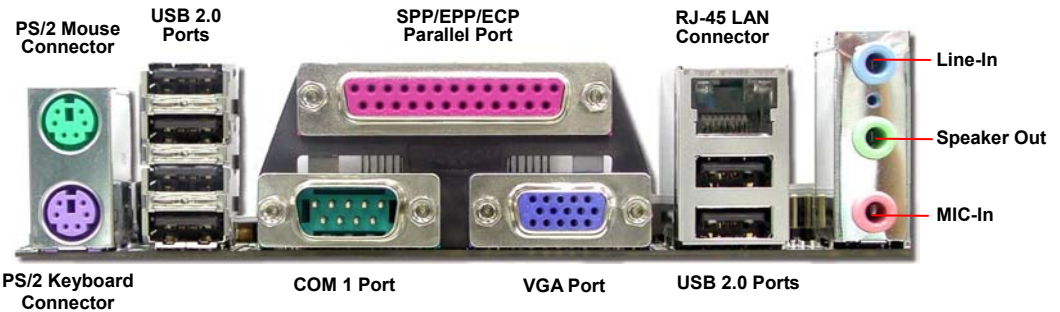
Game Port Connector

	1	
+5V		+5V
JAB1		JBB1
JACX		JBCX
GND		MIDI_TXD
GND		JBCY
JACY		JBB2
JAB2		MIDI_RXD
+5V		KEY

Note: This picture is for example only; it may not exactly look the same with the motherboard you purchased.

Color Coded Back Panel

The onboard I/O devices are PS/2 Keyboard, PS/2 Mouse, RJ-45 LAN Connector, COM1, VGA port, Printer, USB, AC97 sound and game ports. The view angle of drawing shown here is from the back panel of the housing.

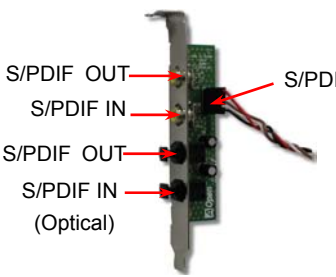


PS/2 Keyboard:	For standard keyboard, which use a PS/2 plug.
PS/2 Mouse:	For PC-Mouse, which use a PS/2 plug.
USB Port:	Available for connecting USB devices.
Parallel Port:	To connect with SPP/ECP/EPP printer.
COM1 Port:	To connect with pointing devices, modem or others serial devices.
RJ-45 LAN connector	To connect Ethernet for home or office use.
VGA Connector:	To connect with PC monitor.
Speaker Out:	To External Speaker, Earphone or Amplifier.
Line-In:	Comes from the signal sources, such as CD/Tape player.
MIC-In:	From Microphone.

S/PDIF (Sony/Philips Digital Interface) Connector

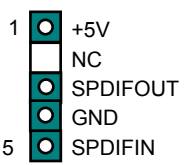
NEW!

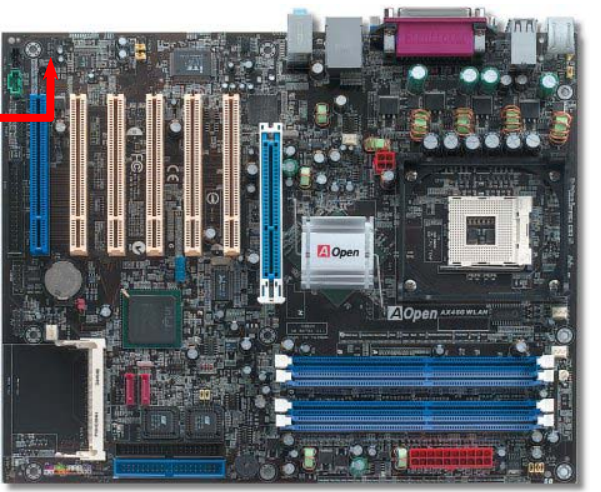
S/PDIF (Sony/Philips Digital Interface) is a latest audio transfer file format that provides impressive quality through optical fiber and allows you to enjoy digital audio instead of analog. Normally there are two S/PDIF outputs as shown, one for RCA connector, the most common one used for consumer audio 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 Module
(User Upgrade Optional)

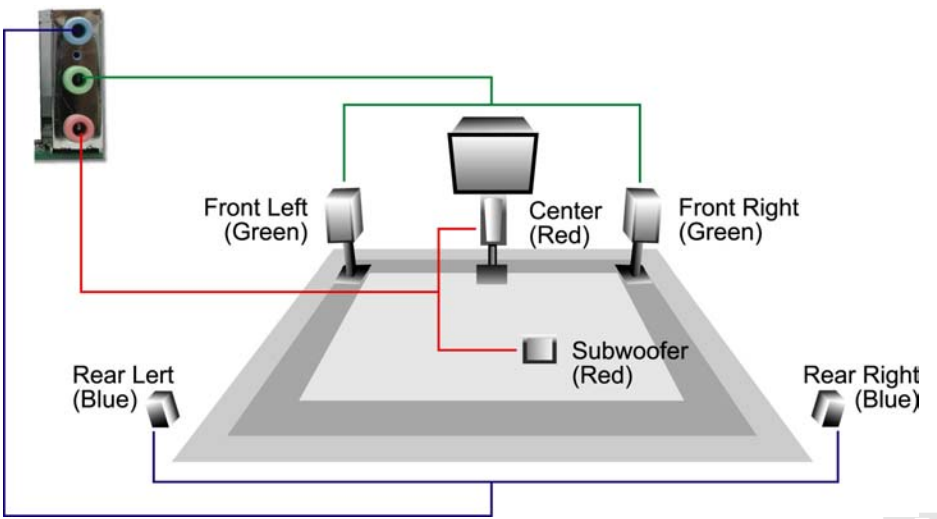
S/PDIF Connector





Super 5.1 Channel Audio Effect

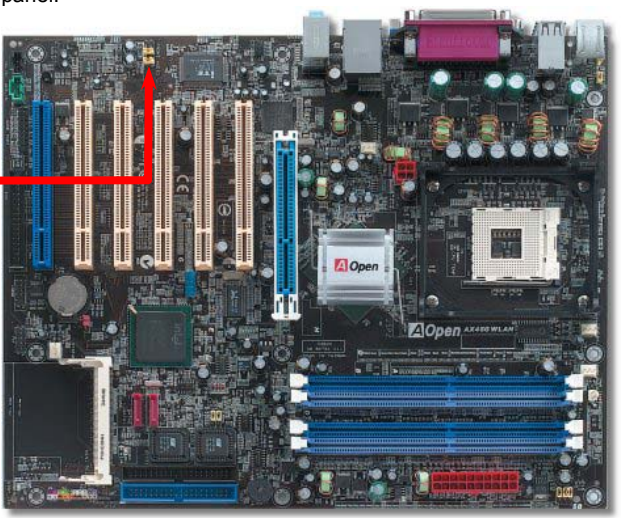
This motherboard comes with an ALC650E CODEC, which supports high quality of 5.1 Channel audio effects, bringing you a brand new audio experience. On the strength of the innovative design of ALC650, you're able to use standard line-jacks for surround audio output without connecting any external module. 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.

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

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.*

FM Radio Card (User Upgrade Optional)

Do you enjoy listening baseball live broadcast while playing your PC at the same time? Though you can connect to few designated broadcasting channels through some small broadcasting utilities on your PC, there's always some abominable problems such as the on and off listening quality, audience number limitation and the long hours of connecting to the broadcasting server. To solve the above said torments for our users, AOpen had integrated the FM frequency radio function into a little piece of expansion card, to allow you listening to exciting game broadcasting, without missing any good moments, even, taping down any exciting pitch for replaying. Additionally, you could even convert the .WAV file into .MP3 file, to preserve its original sounds into compressed file for long term keeping, setting 10 of your favorite frequency as fixed channel for click and play, which is very convenient. To be more considerate for our users, you may use JukeBox FM, integrated in our BIOS, to listening to radio without entering operating system after installing this FM Radio Expansion card. It's never been easier with FM Radio!

Installing FM Radio Card:

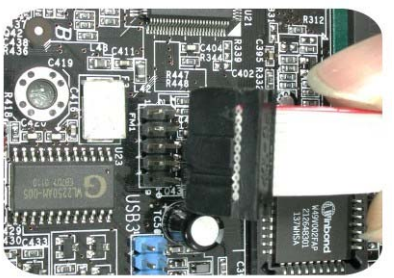
Please unplug your power cord before processing the following steps.

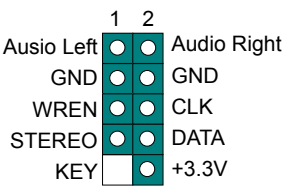
1. Unpacking your FM Radio Card out from the box

FM Radio Card

(User Upgrade Optional)

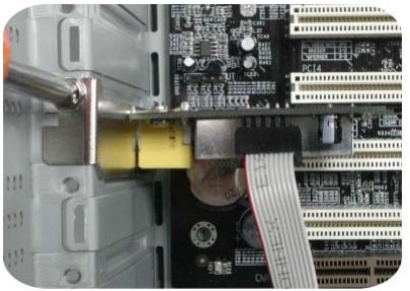
2. To connect the signal cable to FM header onboard





FM Connector

3. To connect the FM Radio Card onto the chassis.



4. To connect antenna connector to expansion card port.

5. Stretch the antenna out and have it secured firmly.

Tip :

Please use the audio antenna that comes along with this expansion card to get the best receiving quality.

Setting the position of your PC at different places and angles would have had different receiving quality. Please adjust the angle of your antenna for best receiving by yourself, and try to stretch it out as wide as possible.

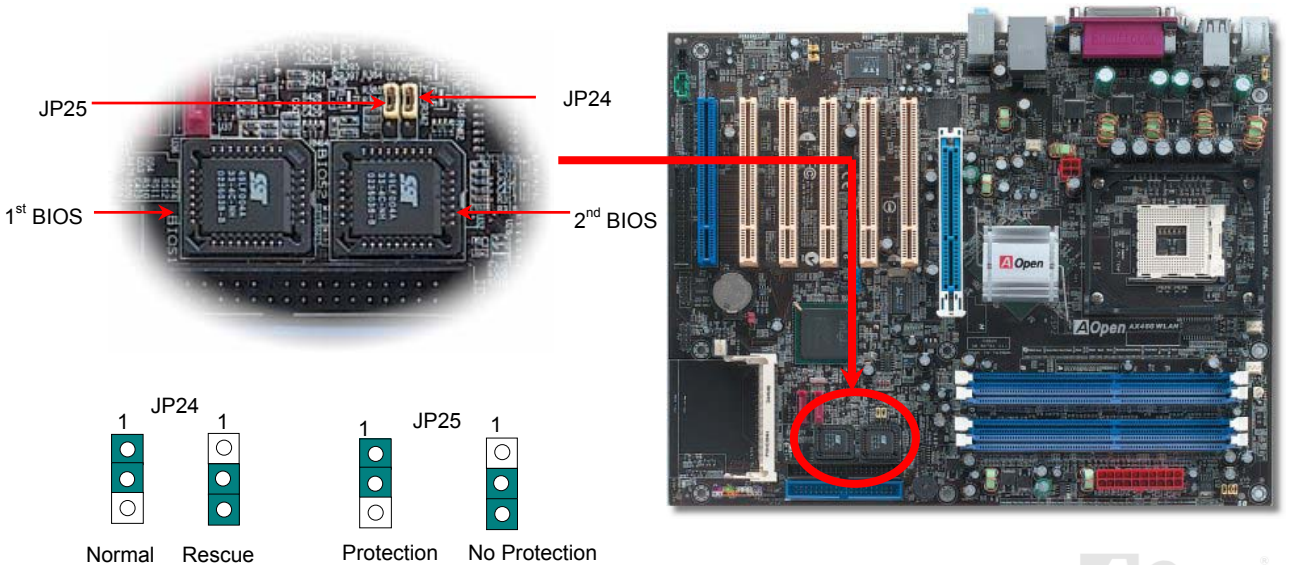
General speaking, it would be better to receive frequency with antenna located beside windows.

Installing FM Radio software:

After necessary hardware had been installed, you may power and reboot the system. Please run the AOpen Bonus Pack CD after entering Window system. An installation program will prompt up automatically on the screen, please select FM Radio for starting installation. Please refer to the FM Radio User Manual enclosed in the package for detailed illustration.

DieHard BIOS II

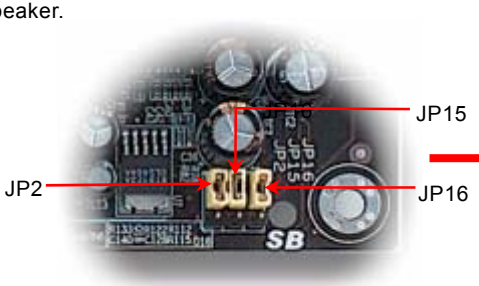
Inherited DieHard BIOS, which allows you to boot up the system with 2nd BIOS ROM by setting JP24 to pin 2-3, and re-flash BIOS 1 by setting JP24 to pin 1-2, DieHard BIOS II are enhanced with data saving function. In addition to read-only ROM, DieHard BIOS II allows you to turn your second ROM into an Read-and-write ROM. You may download fancy skins from our website to apply it on JukeBox, VividBIOS or JukeBox FM by adjusting JP25 to Pin2-3. This motherboard comes with one BIOS ROM; you may contact our local distributors or resellers for purchasing an extra BIOS ROM. Please visit our website at english.aopen.com.tw for details.



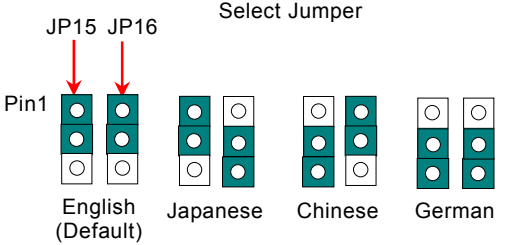
JP15/JP16 Dr. Voice Language Select Jumpers

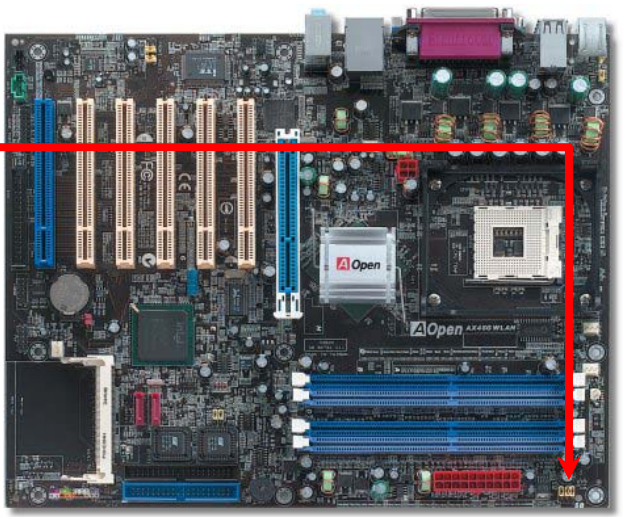
NEW!

Dr. Voice is a great feature of AX4SG WLAN, 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 provides four language versions: **English**, **German**, **Japanese** and **Chinese**. You can select your preferred language by **JP15** & **JP16** jumpers. However, you may also set JP2 to choose making out voices from buzzer or speaker.



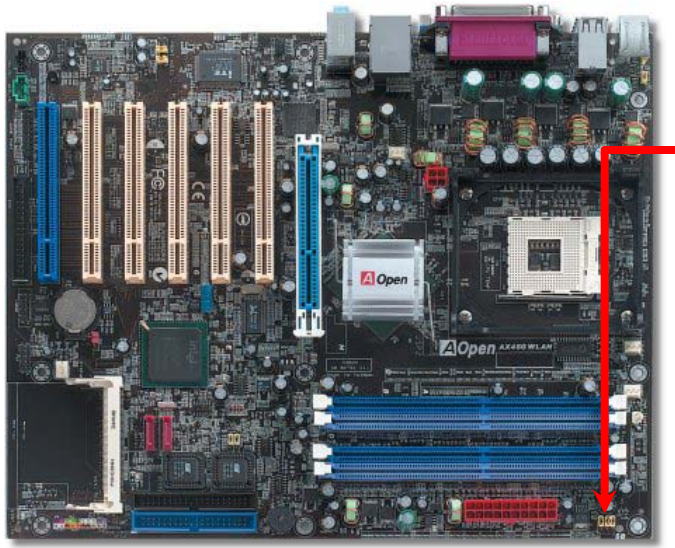
Dr. Voice Language Select Jumper

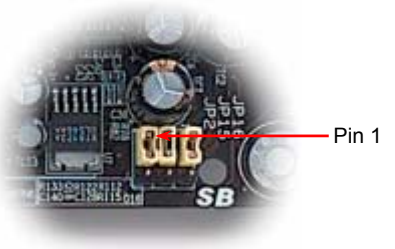




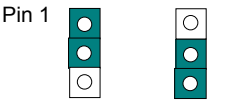
JP2 Dr.Voice Speaker/Buzzer Output Jumper

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





JP2 Dr.Voice Speaker/Buzzer Output

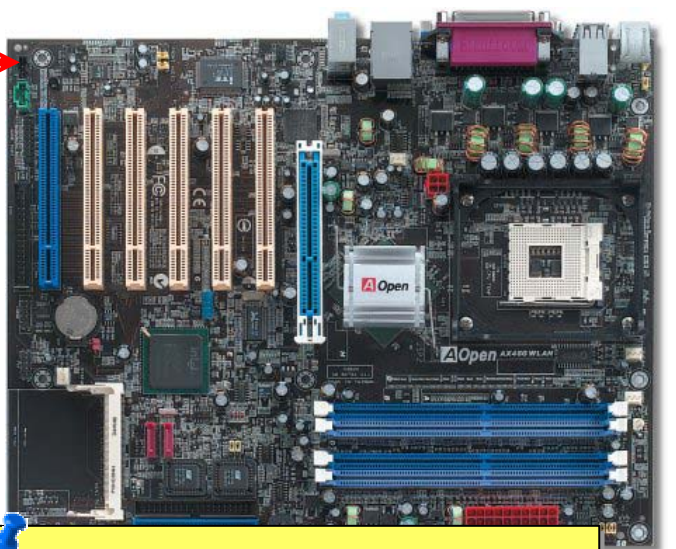


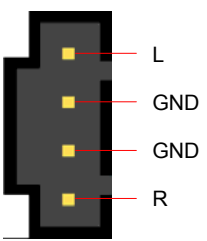
Buzzer (Default)

Speaker

CD Audio Connector

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



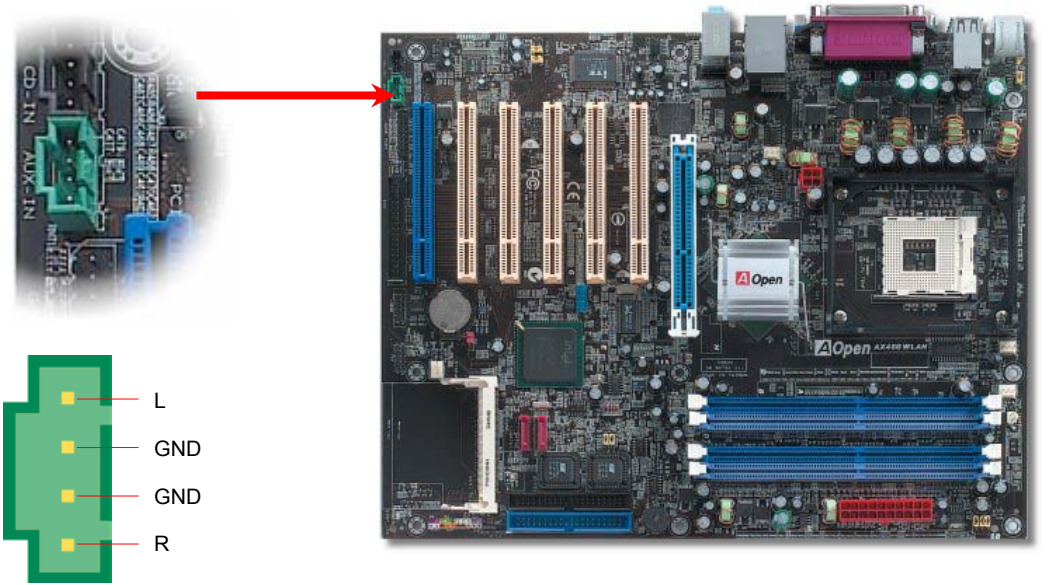


CD-IN Connector

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

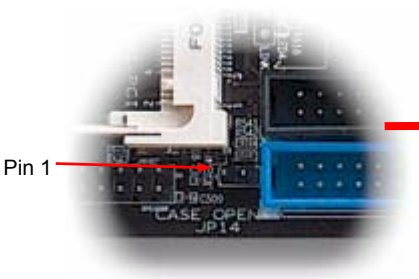
This connector is used to connect MPEG Audio cable from MPEG card to onboard sound.



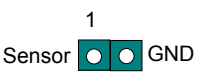
AUX-IN Connector

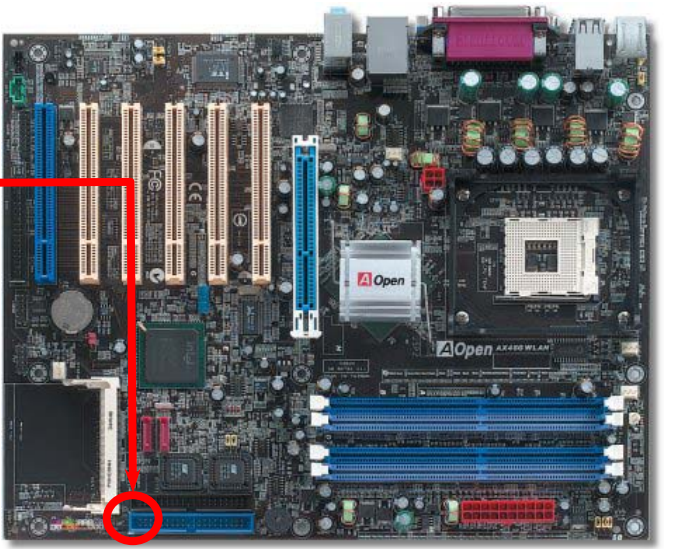
Case Open Connector

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.



Case Open Connector

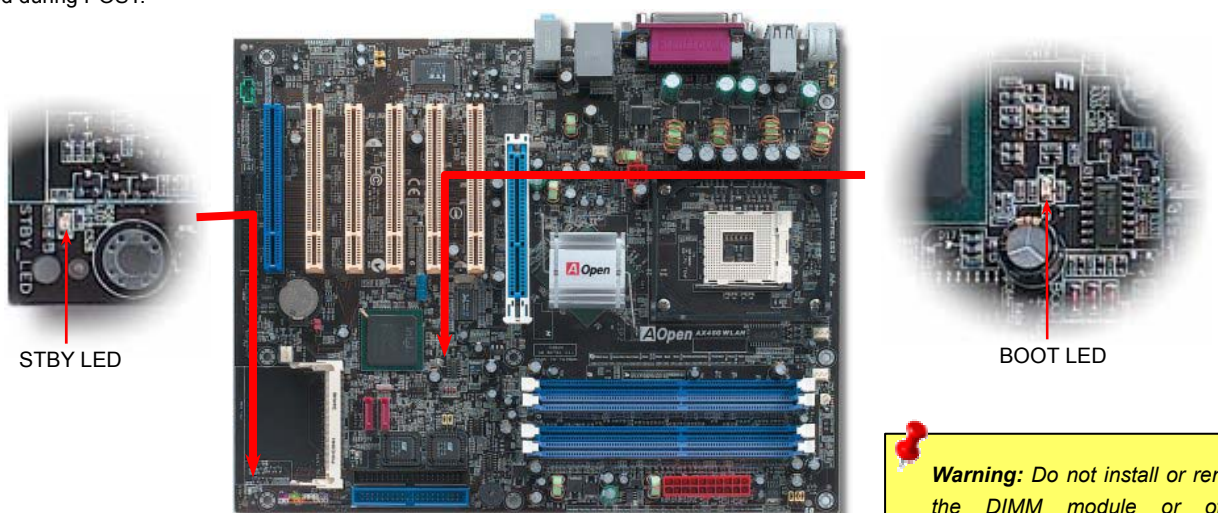




STBY LED and BOOT LED

Both STBY LED and BOOT LED are AOpen's considerate designs that aim 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.

BOOT LED will keep blinking when you power the system on and when your system is under POST (Power-On Self Test). After POST diagnoses everything alright and finishes the booting, the LED will stay on otherwise it will remain flashing to warn you that mistakes have occurred during POST.

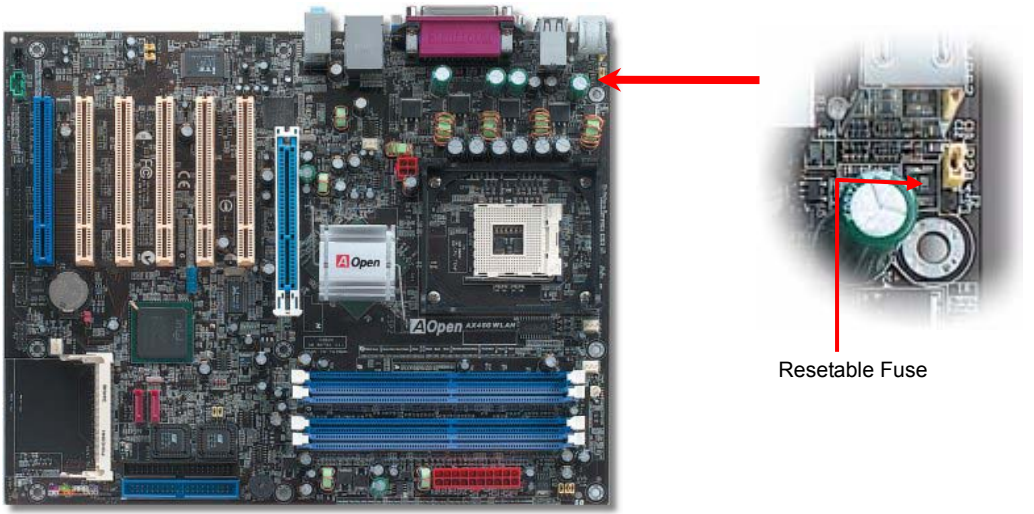


Warning: *Do not install or remove the DIMM module or others devices when the STBY LED lights on.*

Resetable Fuse

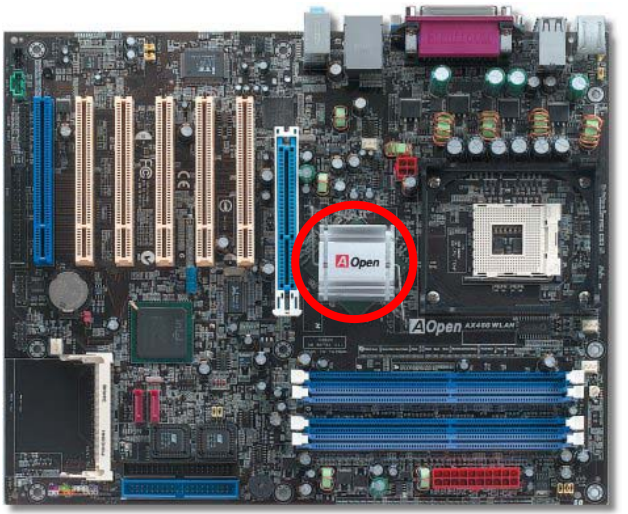
Traditional motherboard uses fuses to prevent Keyboard and USB port from over-current or shortage. These fuses are soldered onboard that when it is broken (function to protect motherboard), user cannot replace them and result in malfunction of motherboard.

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



Enlarged Aluminum Heatsink

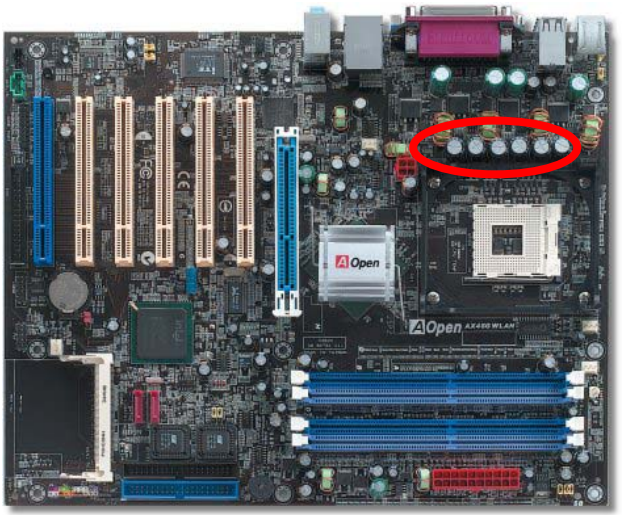
Cool down CPU and Chipset are important for system reliability. Enlarged aluminum heat sink provides better heat consumption especially when you are trying to over-clock the CPU.



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, AX4SG WLAN implements 3300 μF capacitors, which is much larger than normal capacitor (1000 & 1500 μF) and it provides better stability for CPU power.

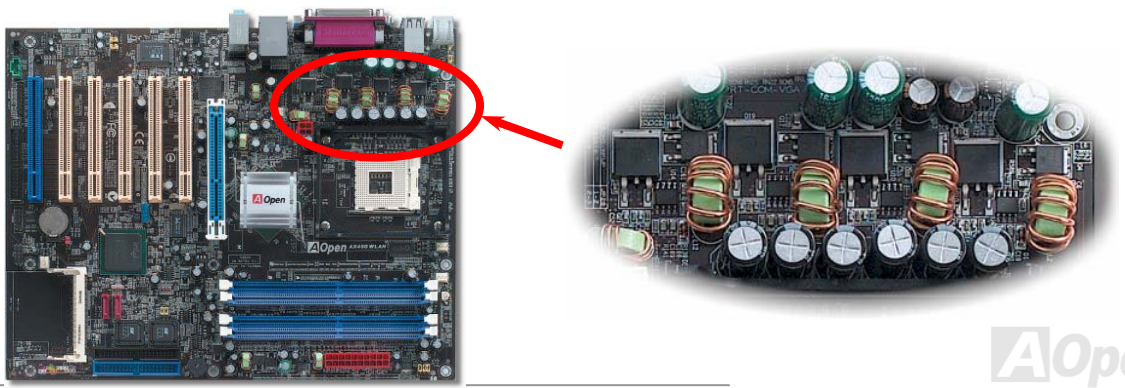


V4 Power Engine

While the market are flooded with low quality, cost-down power materials on motherboard by treacherous manufacturers that subsequently cause the stability of your system, unknown system crashing, overheating of your motherboard, we, AOpen have decided to maintain our long-lasting reputation of refined manufacturer by keep providing solid materials on our products.

As if V6 engine gives more horsepower to your car driving on the road, so as motherboard needed to have stronger and more robust power to protect your system. Adopted 4 parelelled PWM (Pulse Width Modulation) controller channels in 4-phase form, this motherboard provide optimized power density, transient response and thermal performance for satisfying the increasing high CPU temperature. And one thing for sure, 4-phase PWM controller would definitely be better for 3-phase PWM controller as the same theory of 3000c.c car would certainly be better than 2000c.c car. Therefore, It is a must for motherboard these days to get prepared with stronger, more stable power.

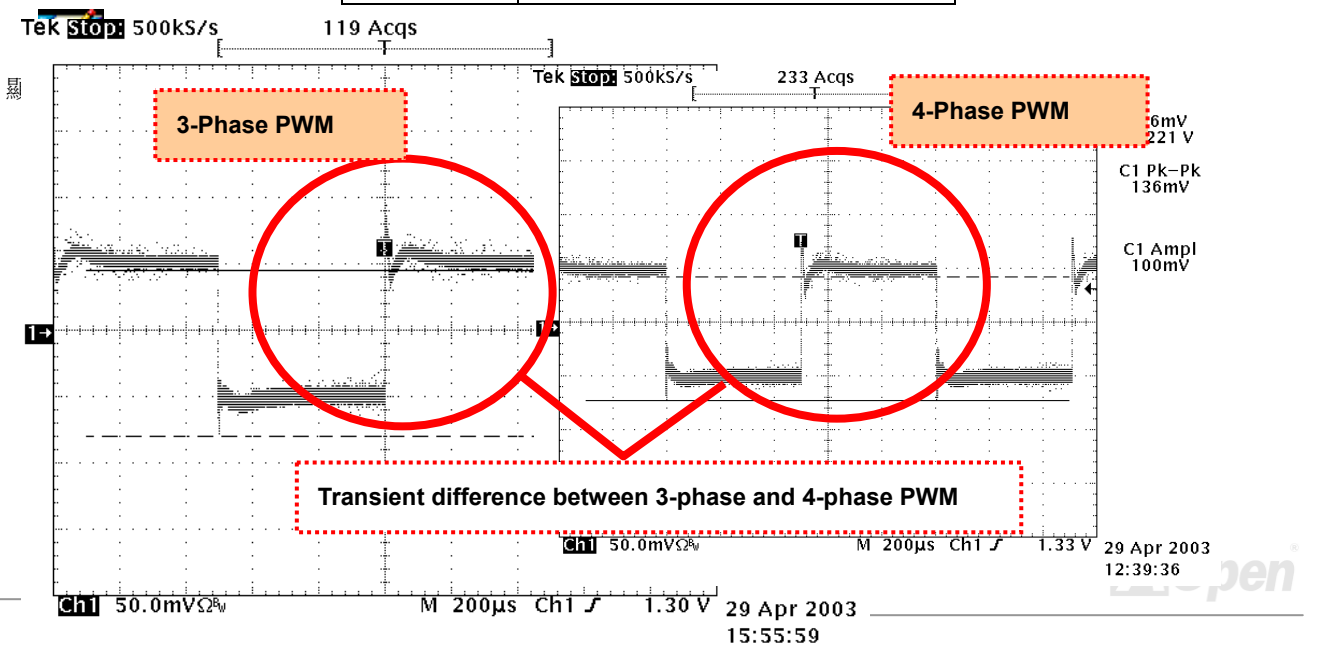
If we take 60W power consumption shared by 3-phase PWM controller for example, testings shows that it transmits higher temperature to its surrounding components and thus increasing the temperature of motherbaord, which is very frustrating for CPU overclocking or for system stability concern at high loading. However, with 4-phase PWM controller implemented, voltage are averagely shared in 4-phase PWM controller and transmit less temperature onto the board and thus cool down motherboard temperature, so as to protect your system.



Comprison Transient of 3-phase and 4-phase PWM

As test report shows, while most of the motherboards on the market are powered by 3-phase PWM controller, this motherboard does comes with 4-phase PWM controller providing stronger power, and could lower down the temperature of mothereboard from 30℃ to 15℃.

4-phase	Vcore tolerance of **- 116 mv**
3-phase	Vcore tolerance of **- 126 mv**

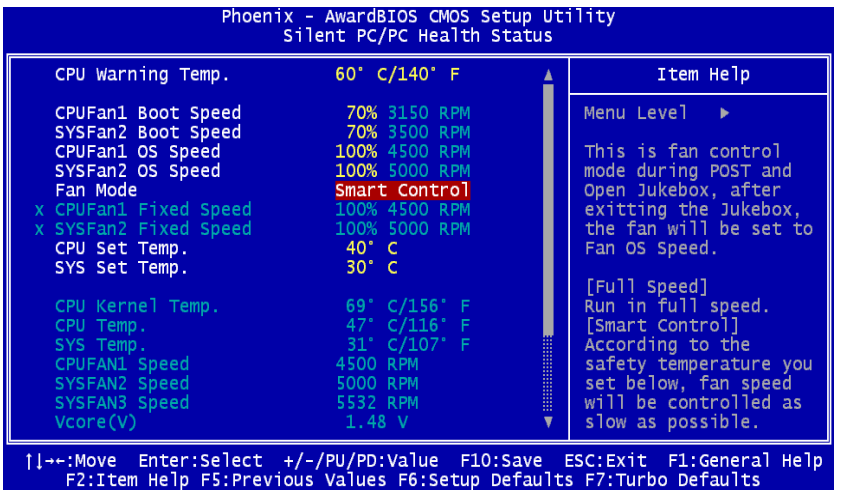


The noise is gone!! ---- SilentTek

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.

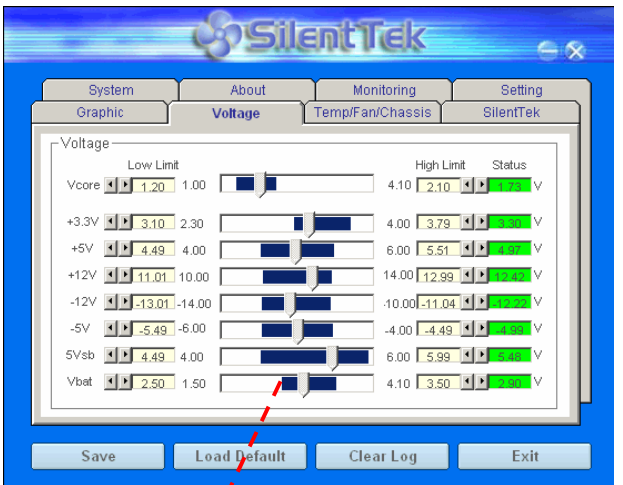
But at the same time, we believe that same users are affected terribly by the irritating noises of these fans while working with their PC. As a matter of fact, we do not have to get our fans running at such a high speed in most cases; on the contrary, we discovered that having your fans running at appropriate 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.

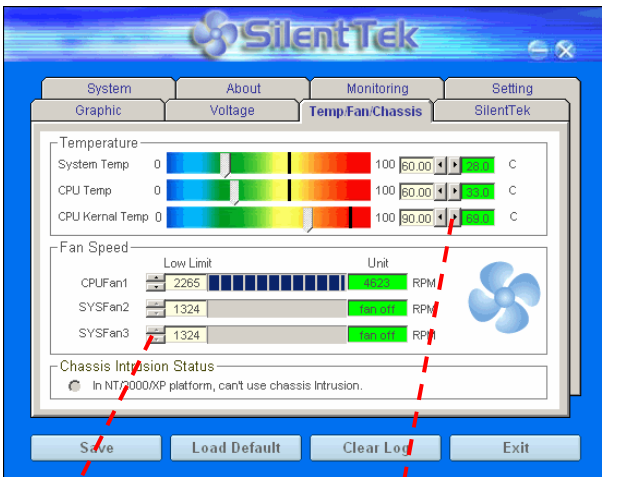


Today, AOpen Motherboard is honored to bring you a new overall solution, SilentTek, to make your system quiet. To collocate with hardware circuit, BIOS and the utility under Windows, SilentTek combined “Hardware-Status Monitoring”, “Overheat Warning” and “Fan Speed Control” with user-friendly interfaces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



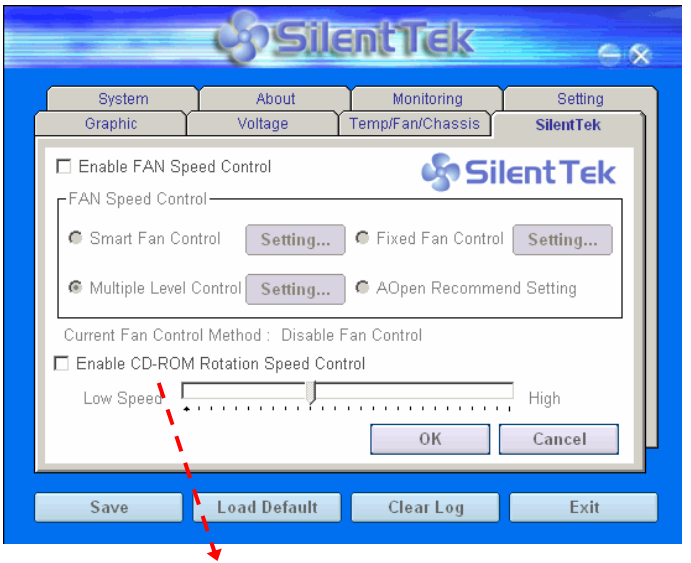


You may check your system voltage from the indicating bar here.

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.



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.

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.

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

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 have to 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 realtime. 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

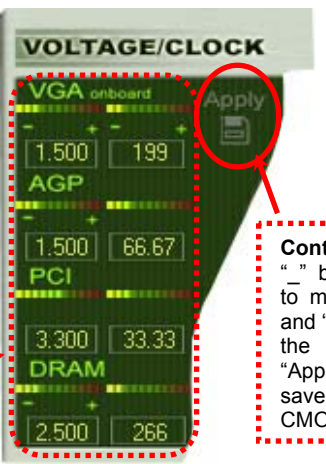
In EzClock utility, you can adjust CPU Front Side Bus (FSB), the voltage and frequency of VGA, AGP, PCI and DRAM. Besides, the CPU related information such as CPU voltage, temperature and CPUFAN rotation speed will also be displayed on this utility.

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 "S" 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.

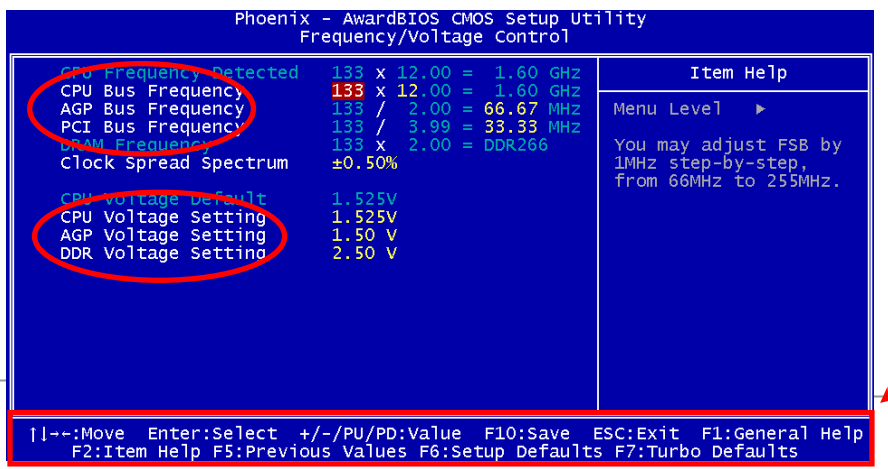
On the bottom rectangular panel represents CPU fan speed, CPU voltage and CPU temperature. The three color bars on the right hand side will light on according to operation temperature. Please refer to the picture shown above.

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.



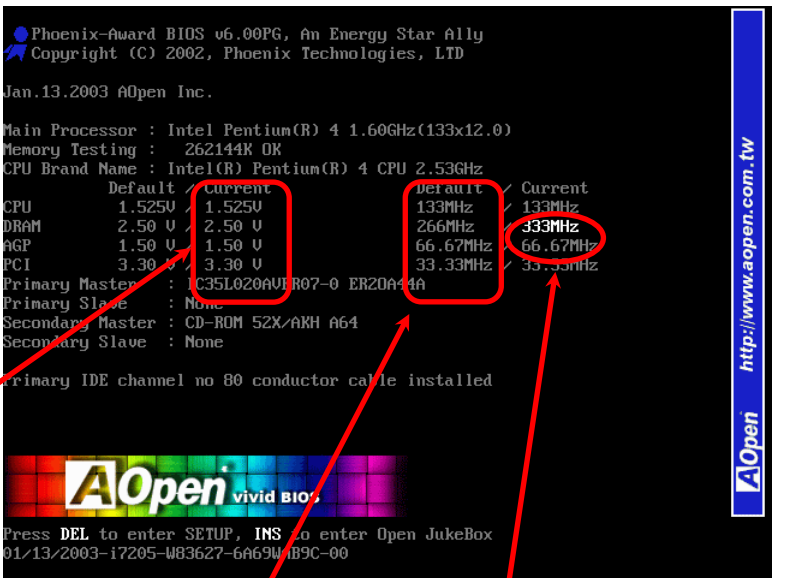
Also, the same keys help you adjust the voltage of CPU and DDR settings. Some values may change while you adjust the settings. You can press "F10" to save the changes you've made.

Function Keys Description

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.



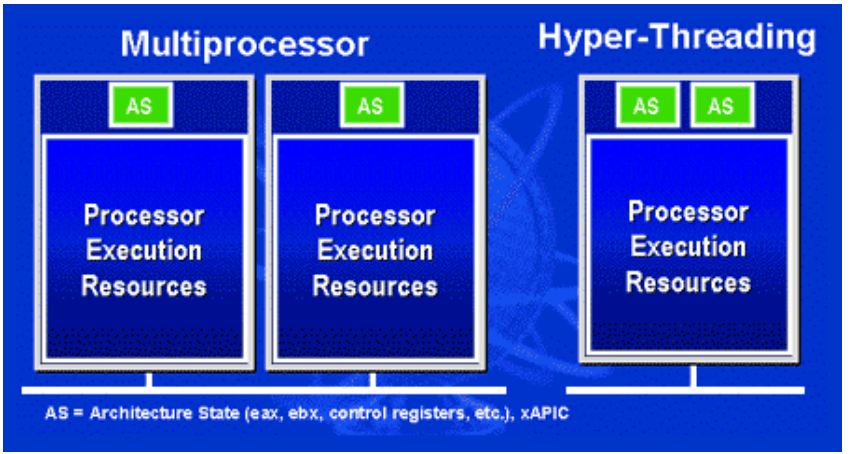
Hyper Threading Technology

What is Hyper-Threading?

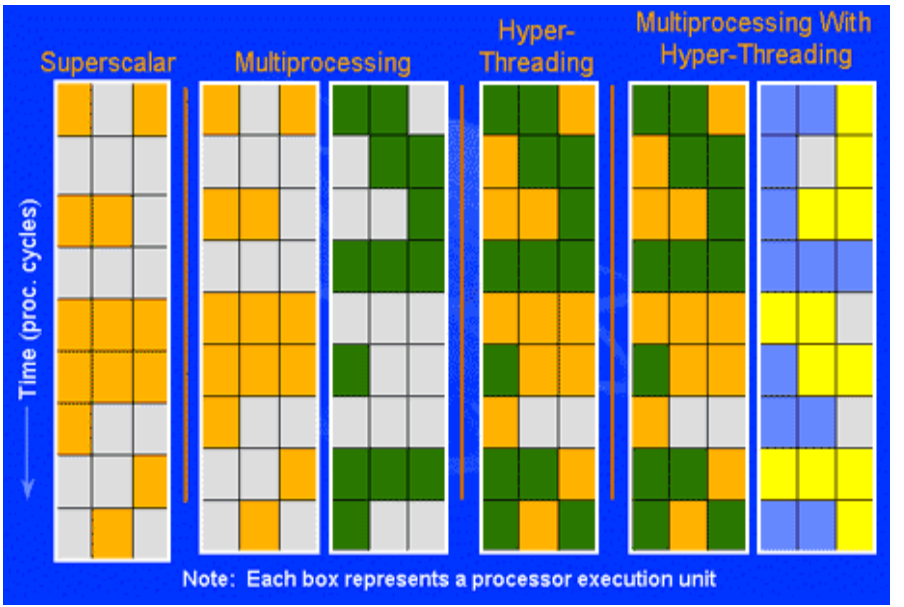
Hyper-Threading technology is an innovative design from Intel that enables multi-threaded software applications to process threads in parallel within each processor resulting in increased utilization of processor execution resources. As a result, an average improvement of ~40% in CPU resource utilization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



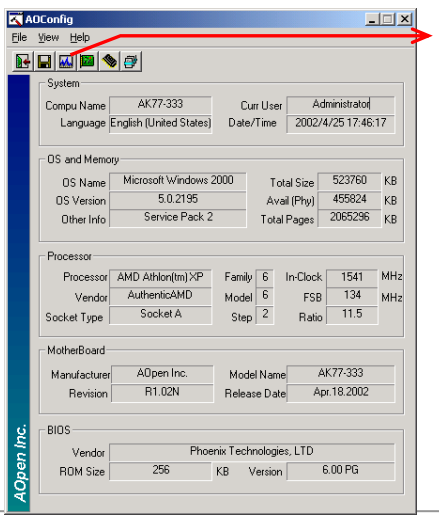
The figure below represents how Hyper-Threading saves time when it works. With two logical processors available on every single physical processor, multi-threaded applications can now take advantage of thread-level parallelism on each physical processor for additional performance. As software applications 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!

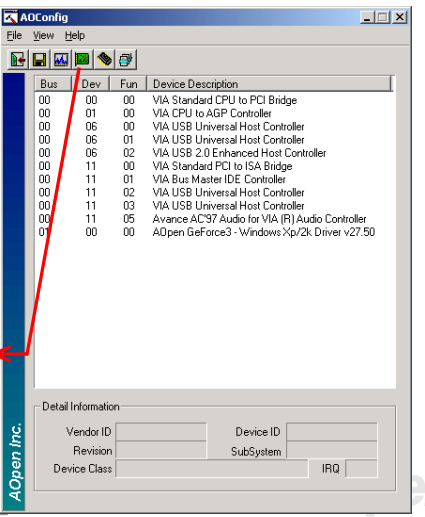
AOpen always dedicated to provide users a much friendly computer environment. We now bring you a comprehensive system detection utility. AOConfig is a Windows based utility with user-friendly interface that allows users to obtain information of the operation system and hardware such as motherboard, CPU,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

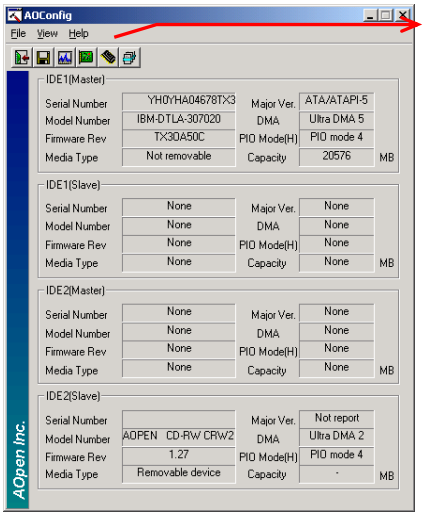
Moreover, AOConfig allows users to save information in *.BMP or *.TXT format which users may collect the system information in detail and send them to AOpen directly for technical support or for further diagnose of system problems.



1. The system page shows the detailed information of the motherboard, operating system, processor, and BIOS version.

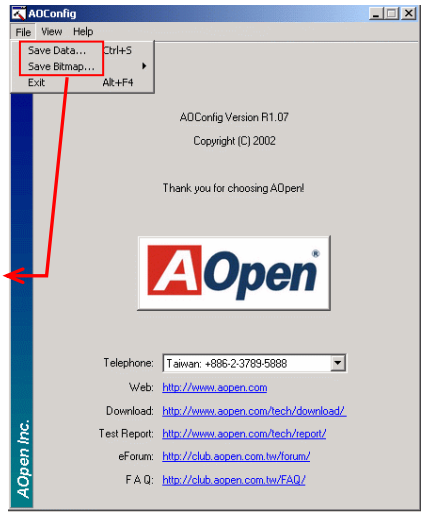
2. The PCI device page shows the configurations of all PCI devices installed in your motherboard.





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.

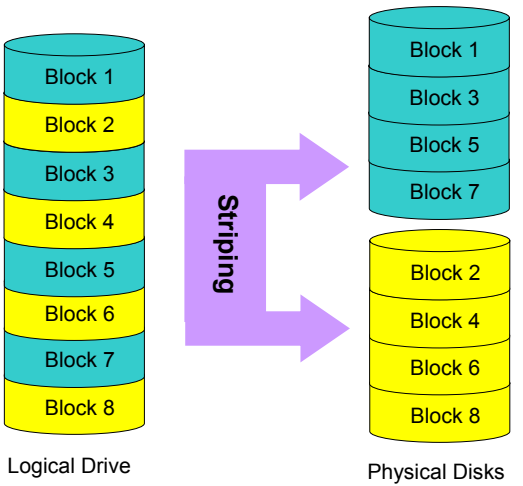
For optimal performance results, select identical hard drives to install in disk arrays. The drives' matched performance allows the array to function better as a single drive.

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.

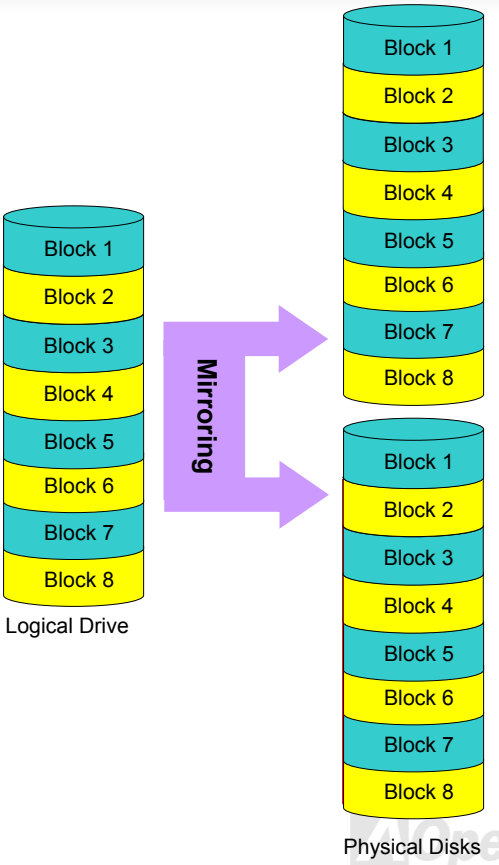


Mirroring (RAID 1)

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.

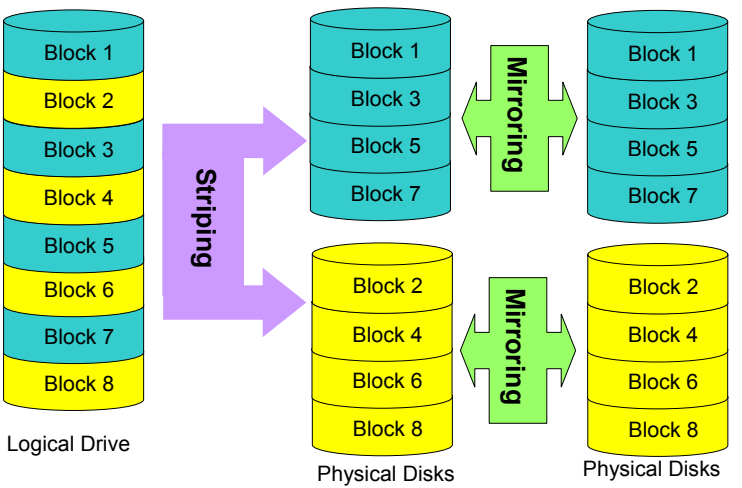
If one of the mirrored drives suffers a mechanical failure or does not respond, the remaining drive will continue to serve and provide correct data. If one drive has a physical sector error, the mirrored drive will continue to function.

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.



Striping with Mirroring (RAID 0+1)

As the name would suggest, RAID 0+1 is striping and mirroring combined. This RAID combines the best of both RAID 0 and RAID 1. It takes a Disk stripe using two disks, and mirrors it to another set of disks for fault tolerance. Data is stripped across several disks, each disk has partner with exactly the same data on it. You get the benefits of fast data access as in RAID 0, with the fault tolerance of RAID 1. This configuration provides optimal speed and reliability. You need double the number of disks as a RAID 0, half for each side of the mirror. At least 4 hard disks are needed while performing RAID 0+1. There is other RAID configurations in addition to those described here, but these are the types most commonly used in the industry.

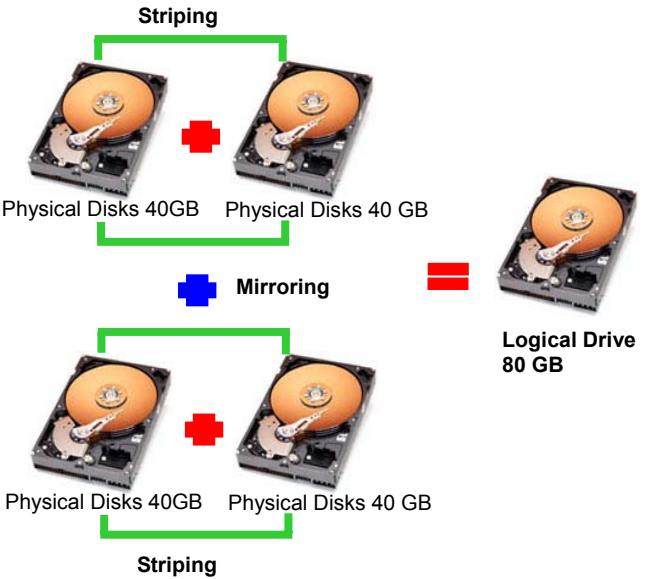


HDD Capacity of RAID Levels

Striping / Span (RAID 0)

Mirroring (RAID 1)

Striping with Mirroring (RAID 0 +1)

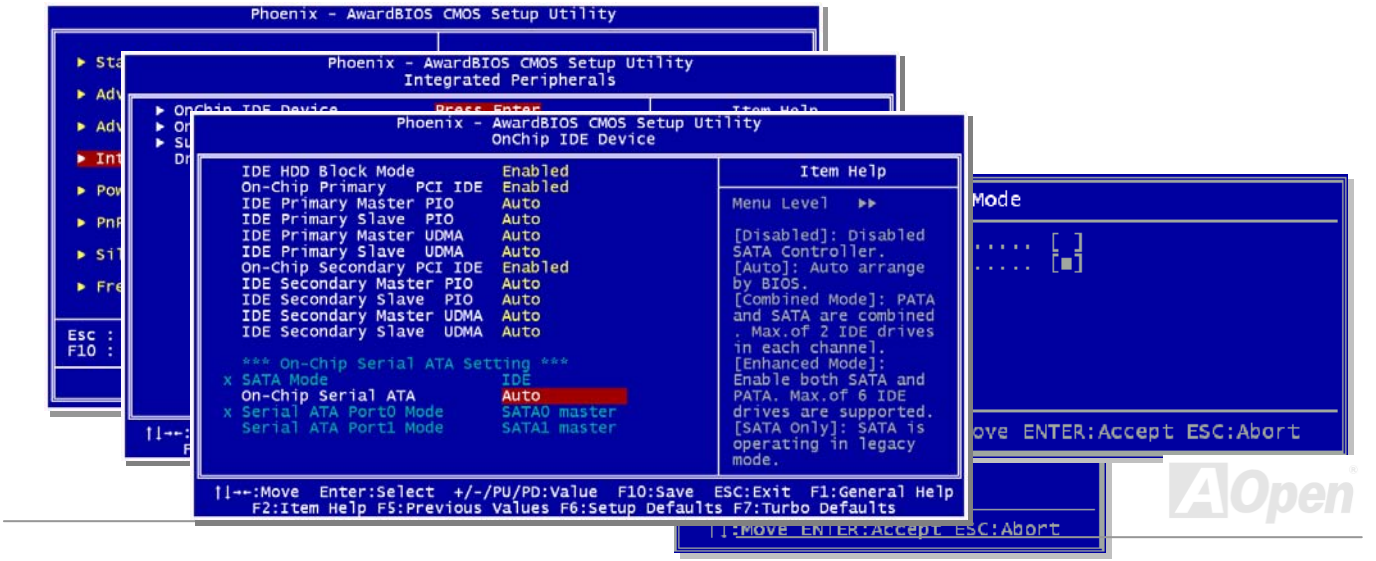


Serial ATA RAID for Intel ICH5R

With the latest chipsets implemented, Intel ICH5R provides RAID 0 function for the Serial ATA hard disks. You may follow the steps shown below to setup your disk array.

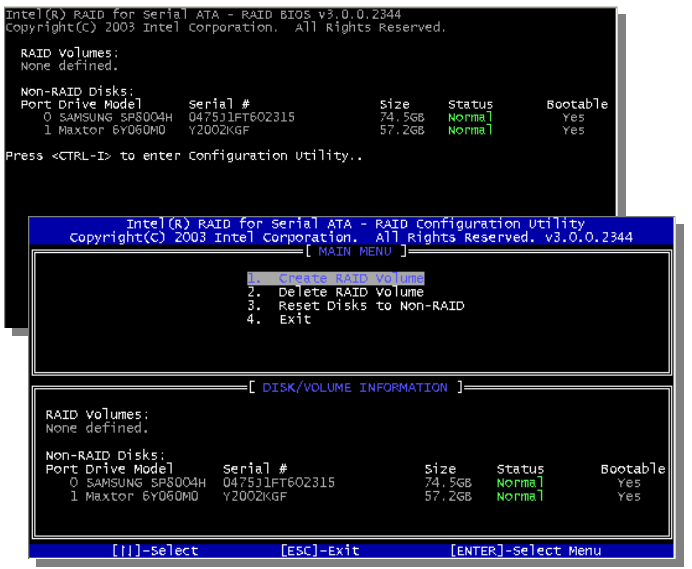
Arouse RAID function in BIOS

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 → On-Chip IDE Device → On-Chip Serial ATA” to choose Enhanced mode. In order to utilize Serial ATA function, please select RAID in SATA 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 Configuration Utility to do some configuration. After finishing the BIOS setup and reboot, you will see [Press CTRL + I to enter configuration 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 Volume:**

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

2. **Delete RAID Volume:**

   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.

3. **Reset Disks to Non-RAID:**

   Users can remove any internal RAID structures from all RAID disks, including disks with working volume. Select “Yes” will cause all data on any disk to be lost.

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 AX4SG WLAN 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.*

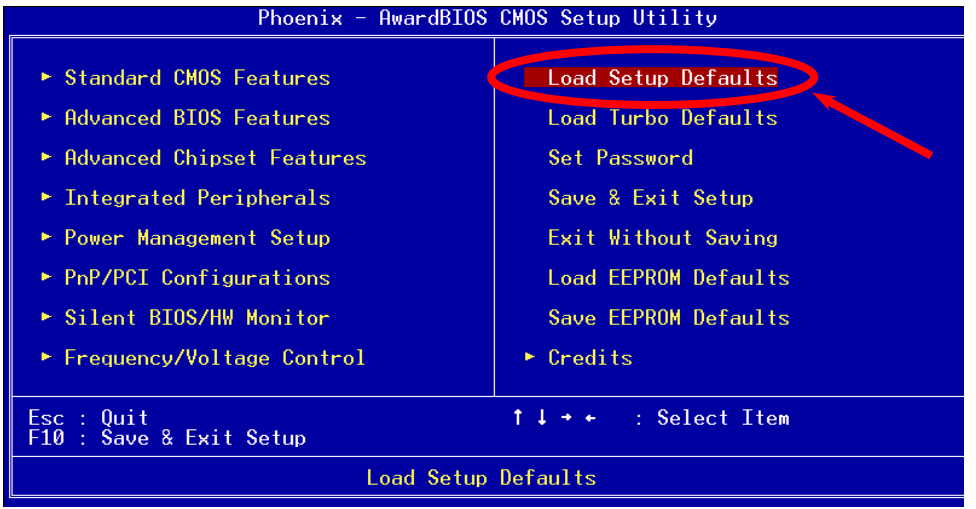
How To Use Phoenix-Award™ BIOS Setup Program

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.

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.

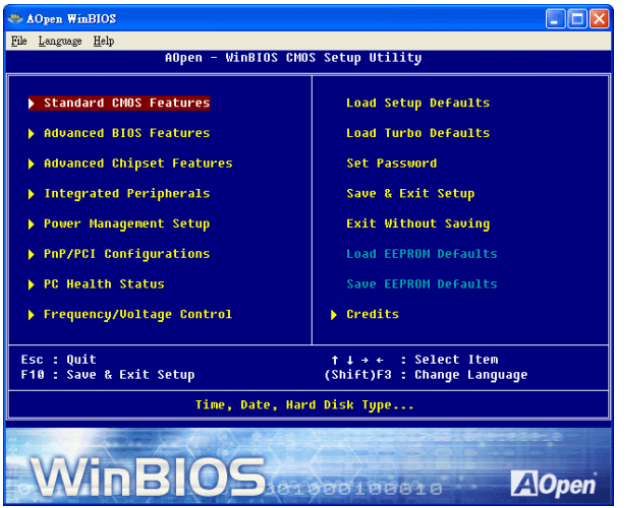


Warning: *Please avoid of using "Load Turbo Defaults", unless you are sure your system components (CPU, DRAM, HDD, etc.) are good enough for turbo setting.*

WinBIOS Utility

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.

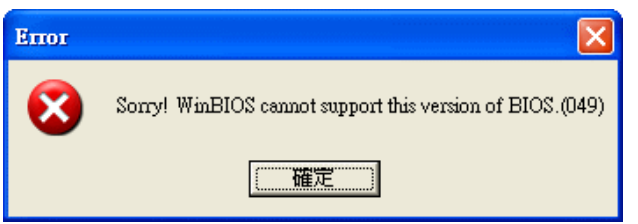
Moreover, with high scalability, either for newly bought motherboard or the latest BIOS version with new function, you don't have to re-install the whole program again and again. All you have to do is to grab the latest profile from our website, simply double-click on it as well to support the latest 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.

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: WAX4SGWLAN102.ZIP) with WinZip (http://www.winzip.com) in Windows environment.
3. Save the unzipped files into a folder, for example, WAX4SGWLAN102.EXE & WAX4SGWLAN102.BIN.
4. Double click on the WAX4SGWLAN102.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.*

Vivid BIOS technology

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 

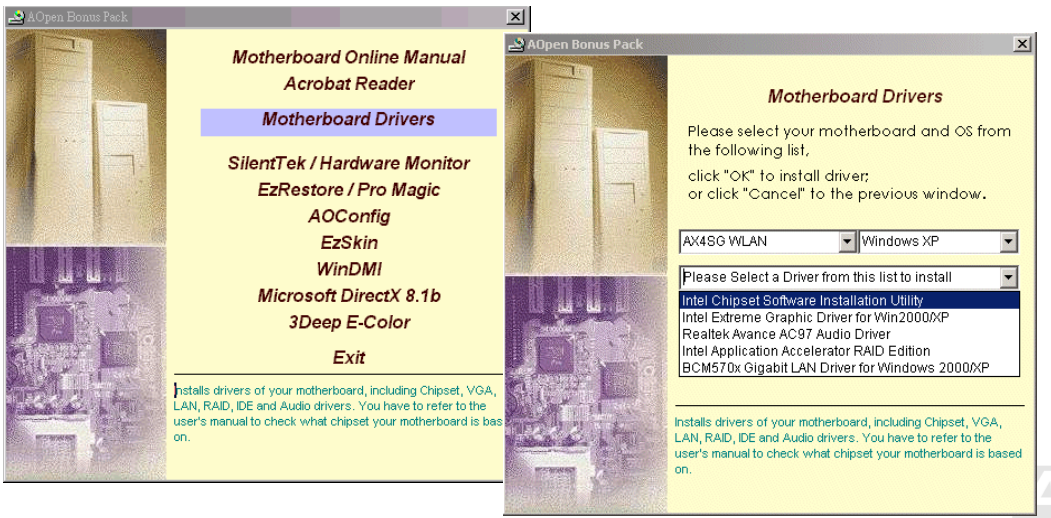
shown beside your model name on the BIOS download page, download.aopen.com.tw/downloads it is assured that your motherboard supports this innovative feature!

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.

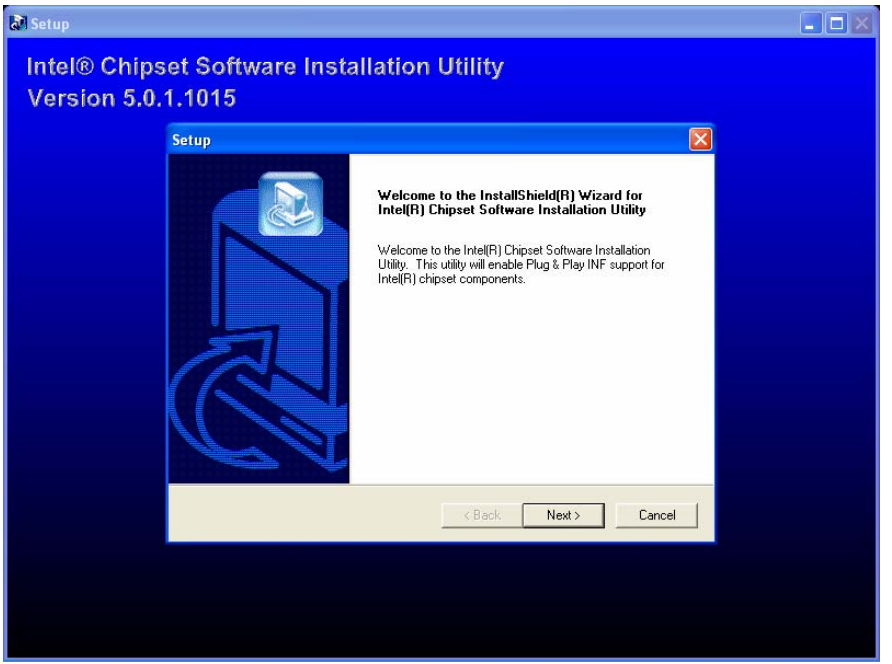
Auto-run Menu from Bonus CD

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



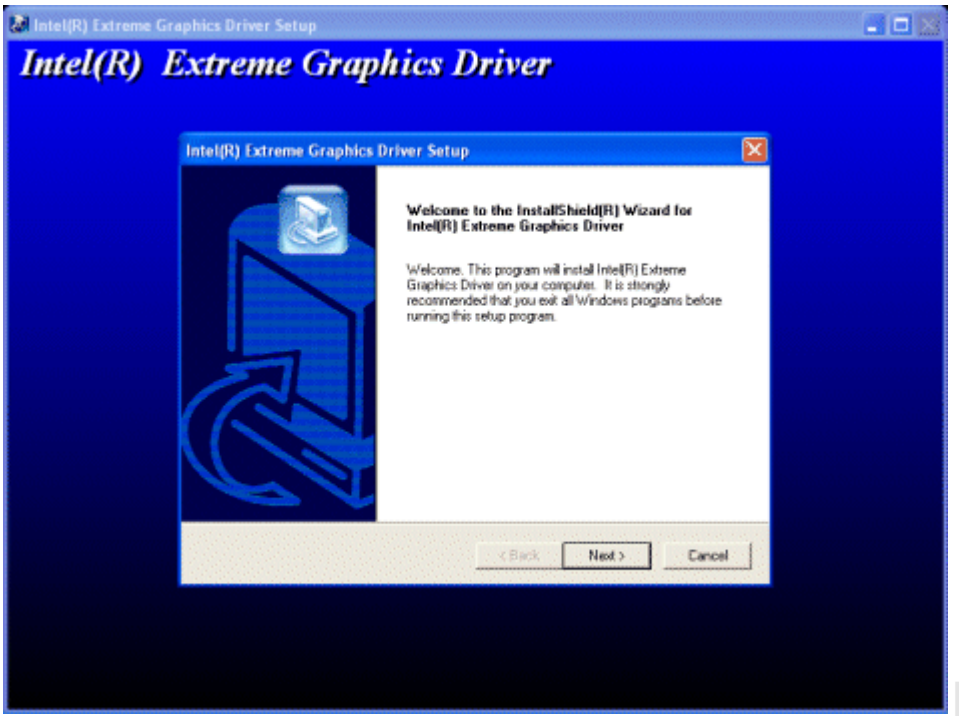
Installing Intel® Chipset Software Installation Utility

The Intel® Chipset Software Installation Utility should be installed onto the target system and the Windows * INF files outline the operating system how the chipset components will be configured. It is recommended that the Intel® Chipset Software Installation utility be installed onto the target system prior to the installation of other drivers.



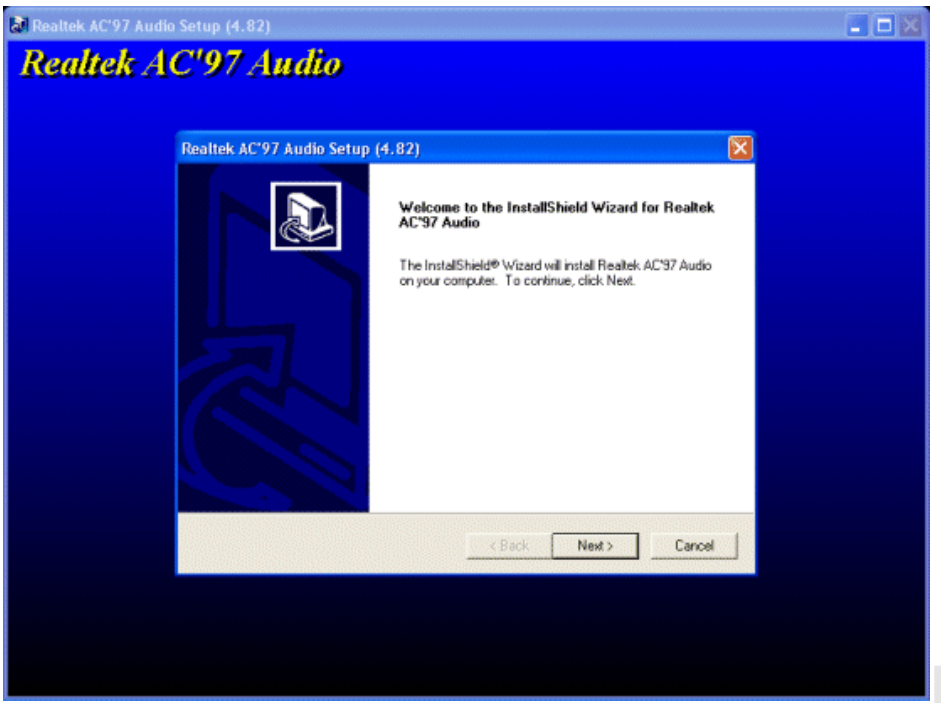
Installing Intel Extreme Graphic Driver

You can install Intel Extreme graphic driver to get the best graphics function of the chipset. You can find it in the Bonus Pack CD disc.



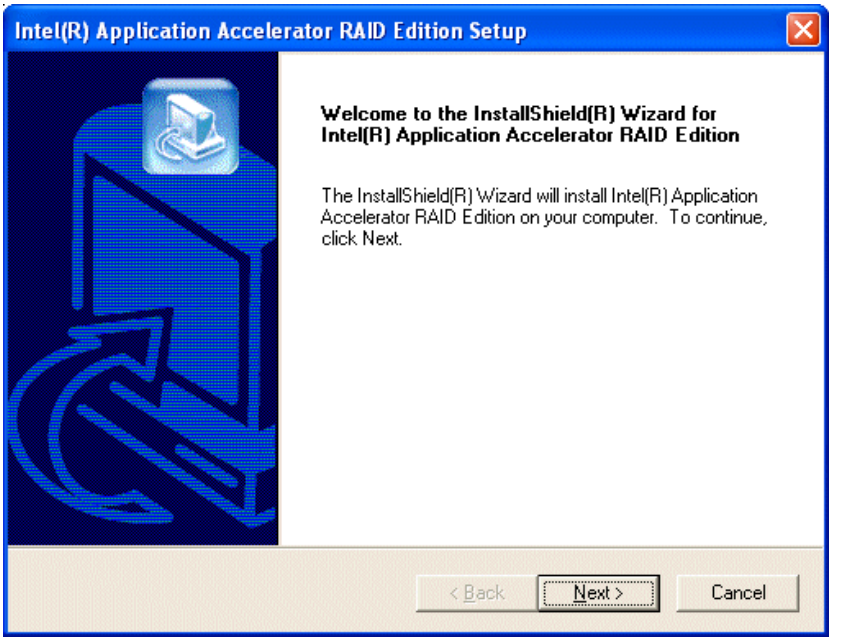
Installing Onboard Sound Driver

This motherboard comes with 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.



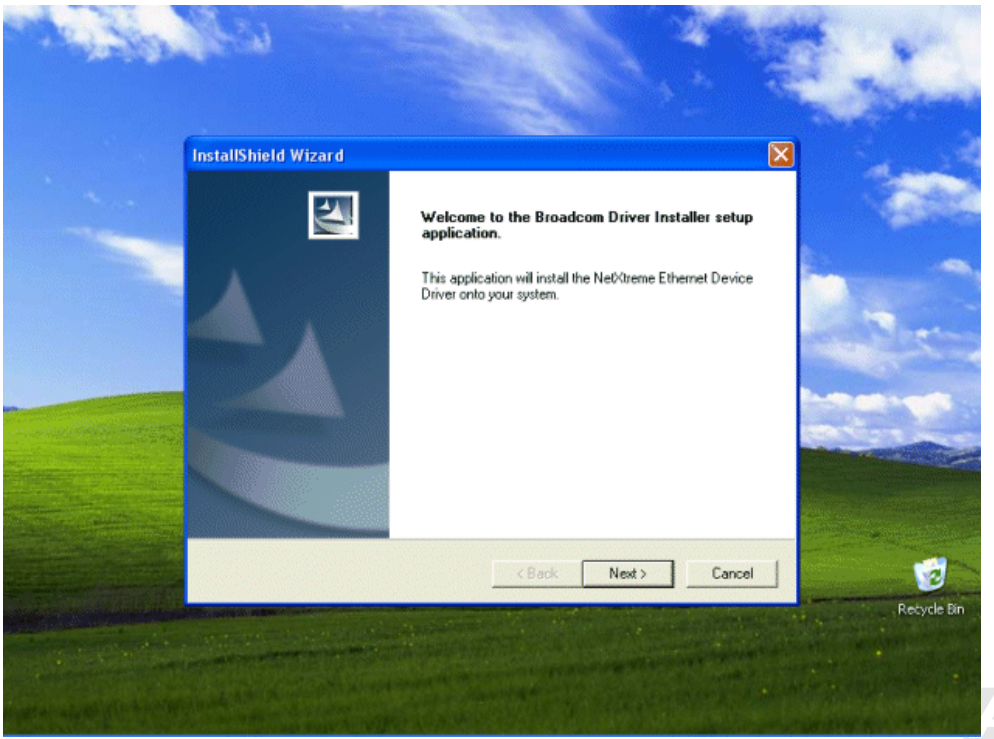
Installing Intel Application Accelerator RAID Edition Driver in Windows XP

You can install Intel IAA RAID Edition Driver to increase the performance of software applications and reduce PC boot times. The IAA RAID Edition is designed to provide functionality for the Intel ICH5R SATA RAID Controller. This product is available for use on Pentium (R) 4 processor-based systems with an ICH5R I/O Controller Hub and running Microsoft Windows XP. Software installation is flexible and fully automated for Windows XP. You can find it in the AOpen Bonus Pack.



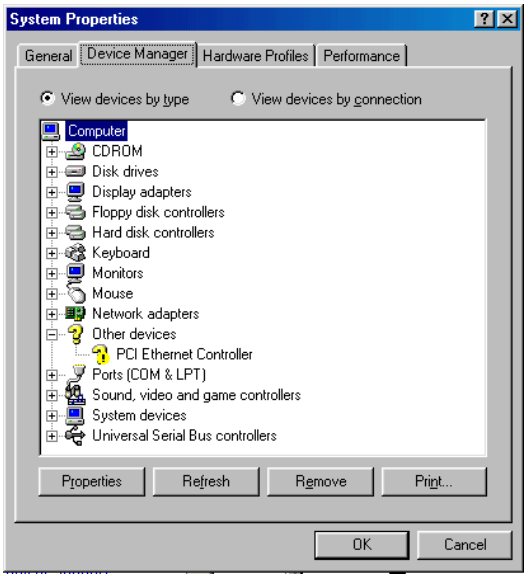
Installing LAN Driver in Windows 2000/XP

This motherboard integrates BCM5705 Gigabit Ethernet Chip. You can find this driver from the Bonus Pack CD auto-run menu.

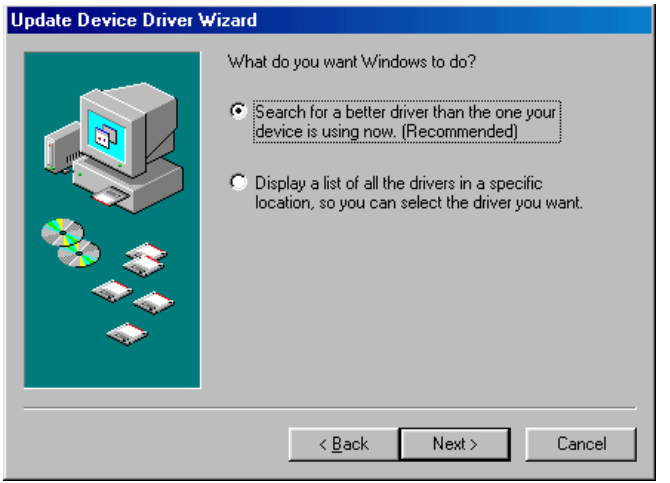


Install LAN Driver in Windows 98SE/ME

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

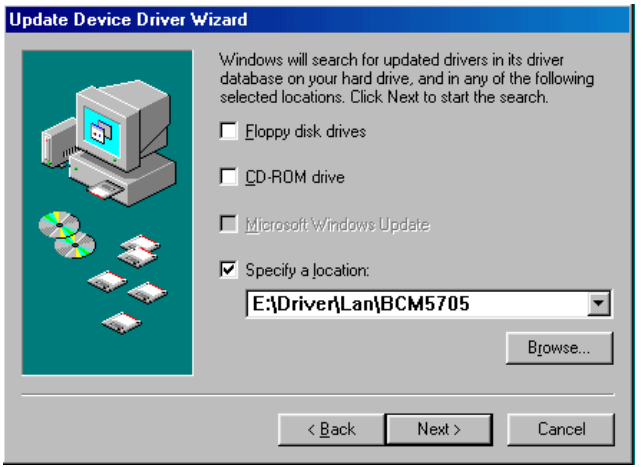


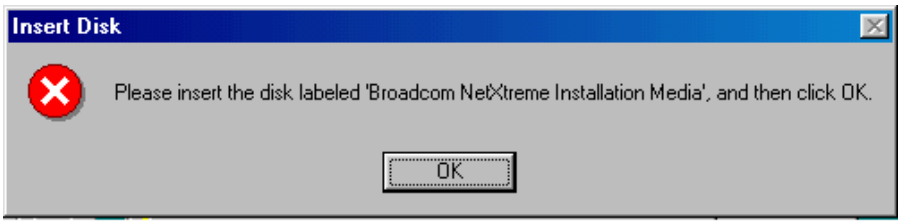
2. Insert the supplied "Bonus CD "
3. Click "PCI Ethernet Controller "-> " Driver " -> "Update Driver" and Select "Install the software automatically (Recommended) " And then Click "Next".



4. When prompted, insert the media to be searched into your CD-ROM drive, type the path to the driver, and select OK.
Example: e:\Driver\Lan\BCM5705\Win98MENT
Where "e:\Driver\Lan\BCM5705\Win98MENT" is the designation of the driver on your system.

5. In the Driver Files Search Results window, verify that the correct path to the driver software is shown, then click **Next**.
6. Then OS will request to insert the Bonus CD into CD-ROM Drive.



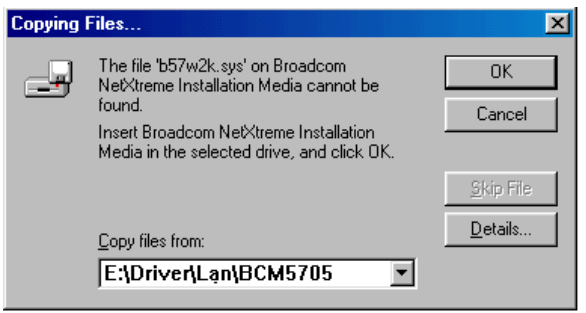


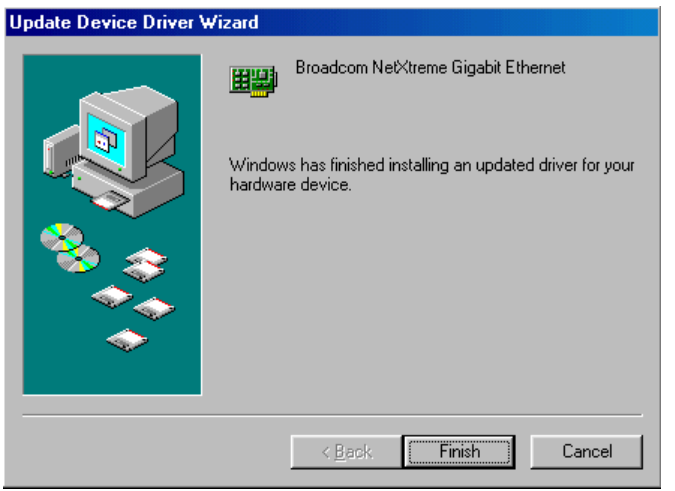
7. Type the path of the BroadCom Ethernet driver and select " OK "

Example: e:\Driver\Lan\BCM5705\Win98MENT

Where "e:\Driver\Lan\BCM5705\Win98MENT" is the designation of the " b57w2k.sys " on your Bonus CD.

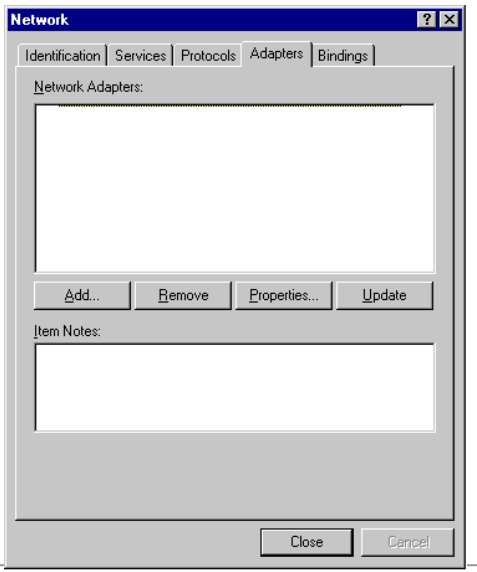
8. BroadCom Ethernet driver installation finish.

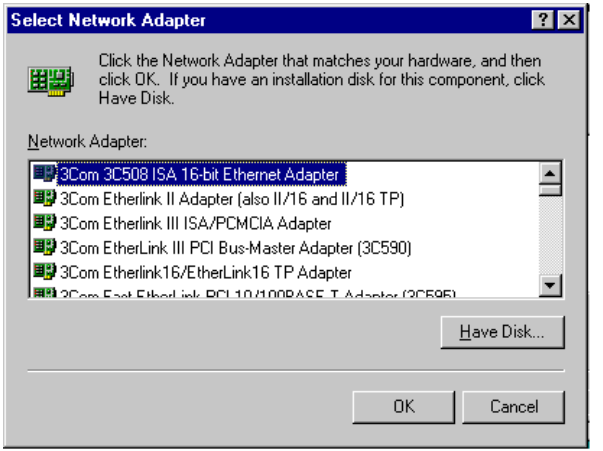




Install LAN Driver in Windows NT 4.0

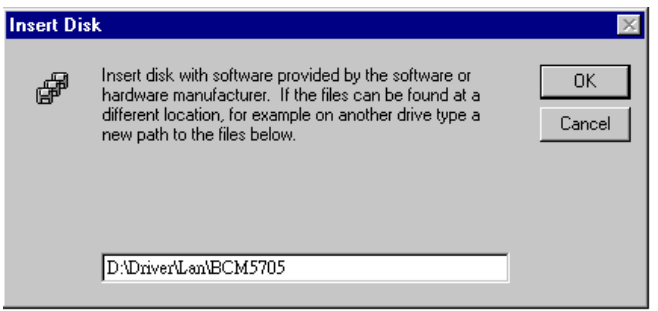
1. Verify that the Windows NT system is upgraded with Service Pack 4 or later.
2. Start your Windows NT system and log in. You must have System Administrator privileges to install the driver software.
3. Open the Control Panel.
4. In the Control Panel, double-click the Network icon.
5. When the Network window opens, select the Adapters tab
6. Click "Add" to install a new adapter. All previously installed drivers are listed under Network Adapters

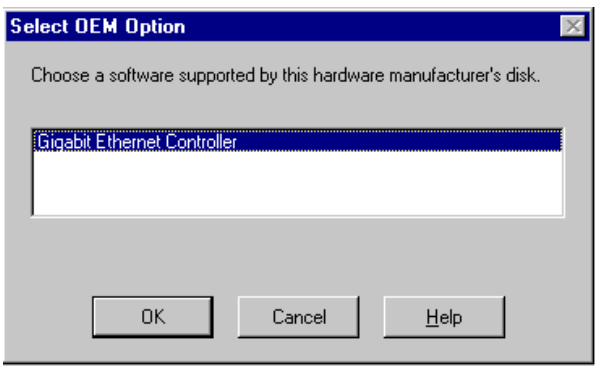




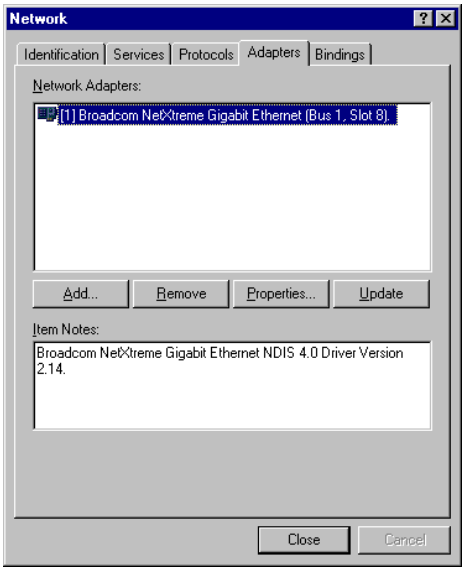
7. When the Select Network Adapter window opens, click **"Have Disk"**....
8. When prompted, insert the driver installation media, or choose a location to install the driver from. Type the path to the driver, and click **"OK"**.

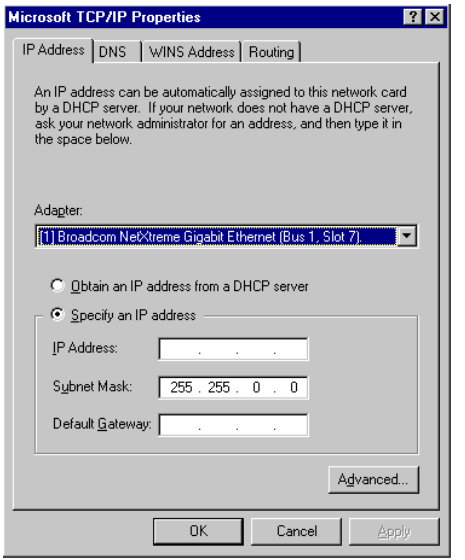
   For example, to install the adapter driver software for Windows NT, type ***D:*\Driver\Lan\BCM5705** in the Insert Disk location box (where is the designation of the LAN driver on Bonus CD)
9. With "Gigabit Ethernet Controller" highlighted in the Select OEM Option window, click **"OK"**.





10. The adapter files are installed, and then the Network window is displayed showing the newly installed adapter
11. Click **"Close"**, then the Microsoft TCP/IP Properties window appears.
12. Configure the TCP/IP protocol and click "OK". When prompted to restart your computer, click "Yes".





Installing USB 2.0 Driver

* Windows 2000 Installation Guide

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Installing Drivers During Windows 2000 Installation

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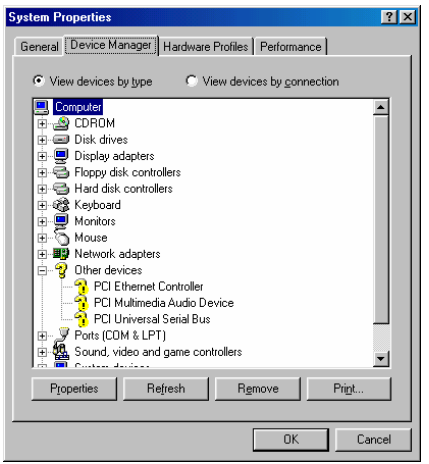
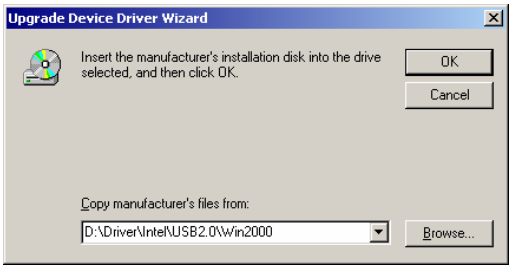
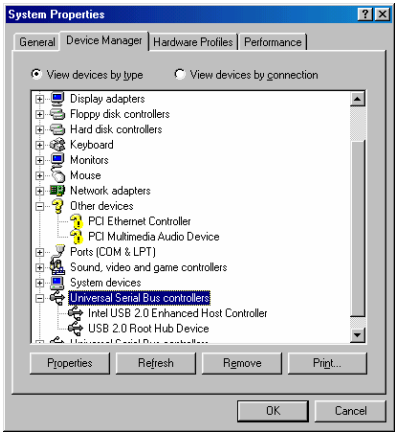
The following details the installation of the USB 2.0 driver while installing Windows 2000 (with the USB 2.0 controller is enabled already).

1. After enabling the USB 2.0 controller, install Windows 2000 normally.
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 "Hardware" tab.
6. Press the "Device Manager..." button in the "Hardware" window.
7. In the hierarchical display under "Other Devices" is a listing for "Universal Serial Bus (USB) Controller". Choose it and then press the mouse right button and click "Properties".
8. Choose the "Driver" tab in the "Properties" window, choose "Update Driver," and then press "Next."
9. Choose "Search for a suitable driver for my device (Recommended)". from the list, and then press "Enter".
10. Choose "Specify a location." and then press "Next"
11. Insert the Bonus CD in CD-ROM.

12. Type "[CD-ROM]:\Driver\Intel\USB2.0\Win2000" in the text box that appears. Press " OK ".
13. Click on "Next." A message informing you that Windows has found "Intel PCI to USB Enhanced Host Controller - ICH5" should appear.
14. Click on "Next," and then on "Finish."







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Installing Driver in Existing Windows 2000 System

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

1. Choose "Search for a suitable driver for my device (Recommended)". from the list, and then press "Enter".
2. Choose "Specify a location." and then press "Next"
3. Insert the Bonus CD in CD-ROM.
4. Type "[CD-ROM]:\Driver\Intel\USB2.0\Win2000" in the text box that appears. Press " OK ".
5. Click on "Next." A message informing you that Windows has found "Intel PCI to USB Enhanced Host Controller - ICH5" should appear.
6. Click on "Next," and then on "Finish."

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Confirming Windows 2000 Installation

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1. From Windows 2000, open the Control Panel from "My Computer" followed by the System icon.
2. Choose the "Hardware" tab, and then click the "Device Manager" tab.
3. Click the "+" in front of "Universal Serial Bus controllers". "Intel PCI to USB Enhanced Host Controller - ICH5" should appear.

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Installing Drivers During Windows 98/ME Installation

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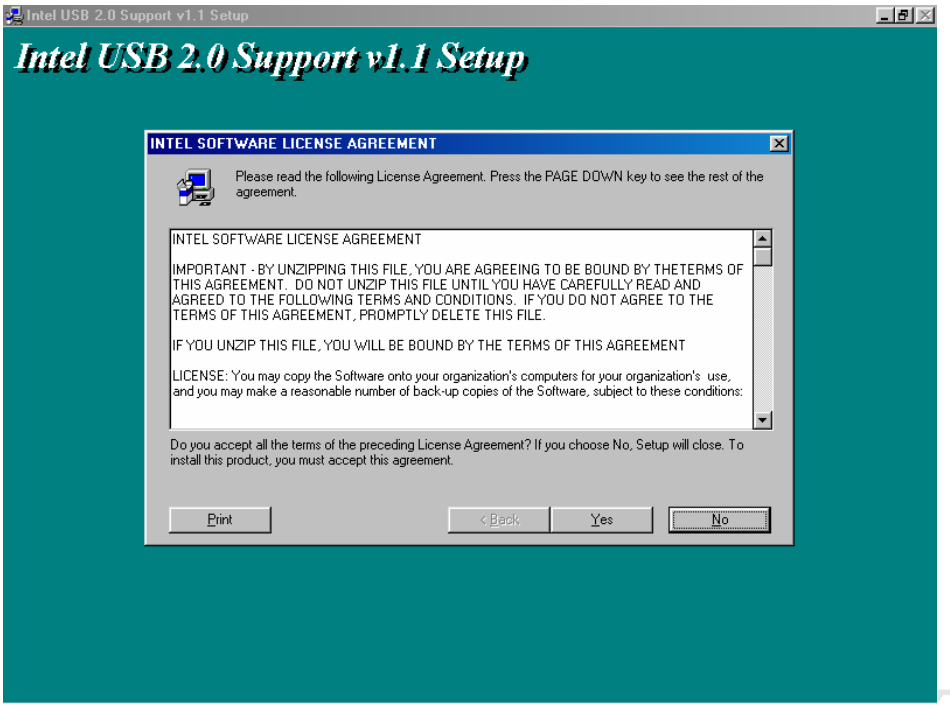


Glossary

AC97 CODEC

Basically, AC97 CODEC is the standard structure of PCI sound card. As we know, computer is digital-based, but music is based on analog-based. Therefore, there must be a process to turn digital into analog during the last stage processing of sound in computer. Hence, the component on sound card that play this important task is what we called CODEC.
Audio CODEC 97 (briefly called AC97) is the specification regulated by Intel, and it's about the structure of audio conversion. The special place about CODEC is that it is separated from sound card (CODEC is an independent chipset). Therefore, PCI sound card could possess with 90db and do other application process as well. We called CODEC that meets this structure AC97 CODEC.

ACPI (Advanced Configuration & Power Interface)

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

ACR (Advanced Communication Riser)

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

AGP (Accelerated Graphic Port)

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

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

AMR (Audio/Modem Riser)

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

ATA (AT Attachment)

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

DMA, data transfer rate is 16.6MHz/s
Ultra DMA, data transfer rate is 16.6MHz x 2 = 33MB/s.
ATA/66, data transfer rate is 16.6MHz x 4 = 66MB/s.
ATA/100, data transfer rate is 16.6MHz x 6 = 100MB/s.
ATA/133, data transfer rate is 16.6MHz x 8 = 133MB/s.
(ATA/133 uses both rising edge and falling edge as ATA/66 but clock cycle time is reduced to 30ns.)

BIOS (Basic Input/Output System)

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

Bluetooth

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

CNR (Communication and Networking Riser)

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

DDR (Double Data Rate) RAM

DDR RAM utilizes the existing SDRAM (For ex, PC-100, PC-133) infrastructure and technology while doubling the nominal bandwidth available to systems in an easy to design and simple to adopt way. Based on FSB frequency, DDR RAM on the market are DDR200, DDR266 and DDR333 with more coming around soon.

DDR200, transfer bandwidth up to 200x64/8=1600MB/s (PC1600)
DDR266, transfer bandwidth up to 266x64/8=2100MB/s (PC2100)
DDR333, transfer bandwidth up to 333x64/8=2700MB/s (PC2700)
DDR400, transfer bandwidth up to 400x64/8=3200MB/s (PC3200)

ECC (Error Checking and Correction)

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

EEPROM (Electronic Erasable Programmable ROM)

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

EPROM (Erasable Programmable ROM)

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

EV6 Bus

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

FCC DoC (Declaration of Conformity)

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

FC-PGA (Flip Chip-Pin Grid Array)

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

FC-PGA2 (Flip Chip-Pin Grid Array)

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

Flash ROM

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

Hyper Threading

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

IEEE 1394

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

The advantages of the IEEE1394:

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

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

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

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

Parity Bit

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

PCI (Peripheral Component Interface) Bus

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

PDF Format

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

PnP (Plug and Play)

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

POST (Power-On Self Test)

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

PSB (Processor System Bus) Clock

PSB Clock means the external bus clock of CPU.
CPU internal clock = CPU PSB Clock x CPU Clock Ratio

RDRAM (Rambus Dynamic Random Access Memory)

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

RIMM (Rambus Inline Memory Module)

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

SDRAM (Synchronous DRAM)

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

SATA (Serial ATA)

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

SMBus (System Management Bus)

SMBus is also called I^2C 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

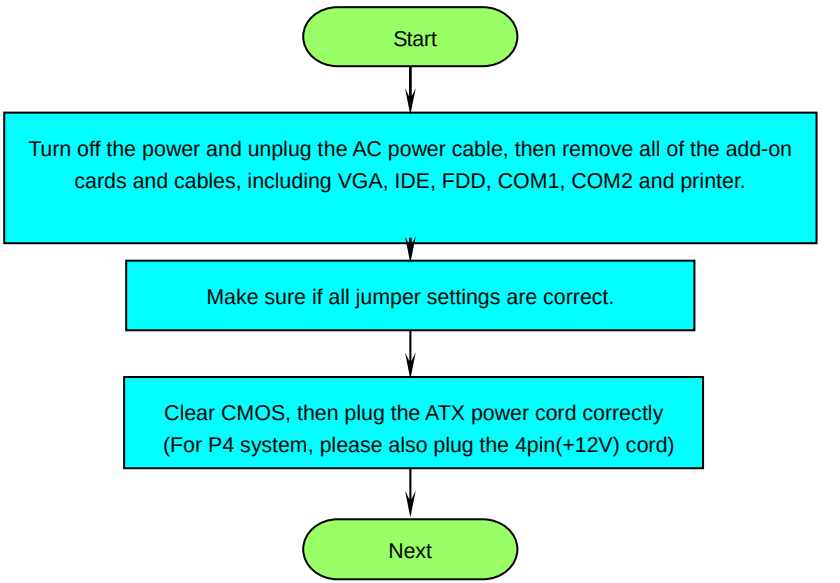
802.11 is a specification developed by IEEE and Wireless LAN technology, which is an interface between a wireless client and a base station or between two wireless clients.
802.11 families include the following specifications and with more coming:
802.11 = 1 or 2 Mbps transmission in the 2.4 GHz band, 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).

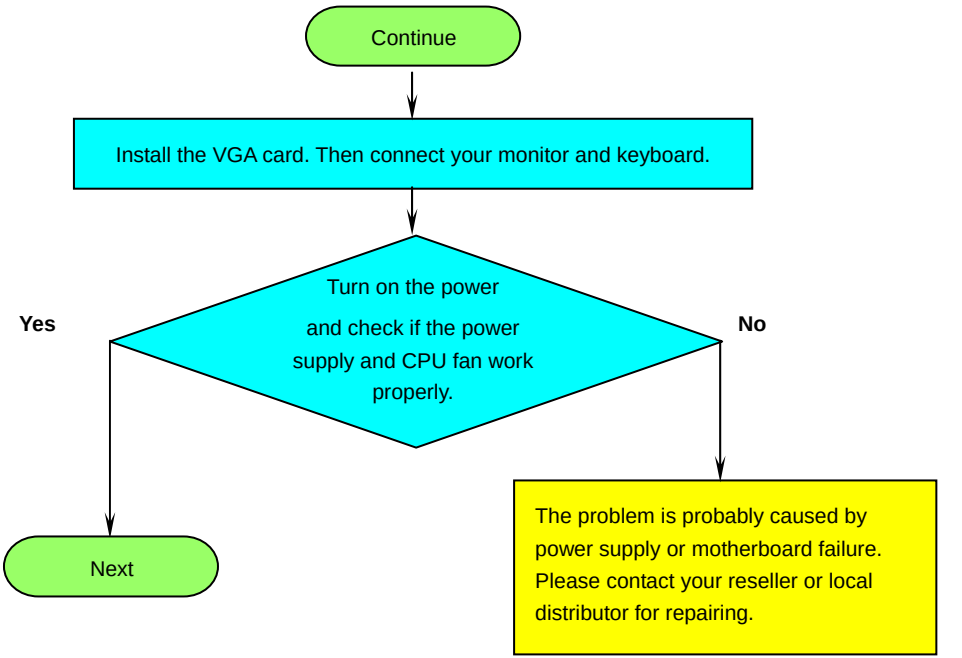
ZIP file

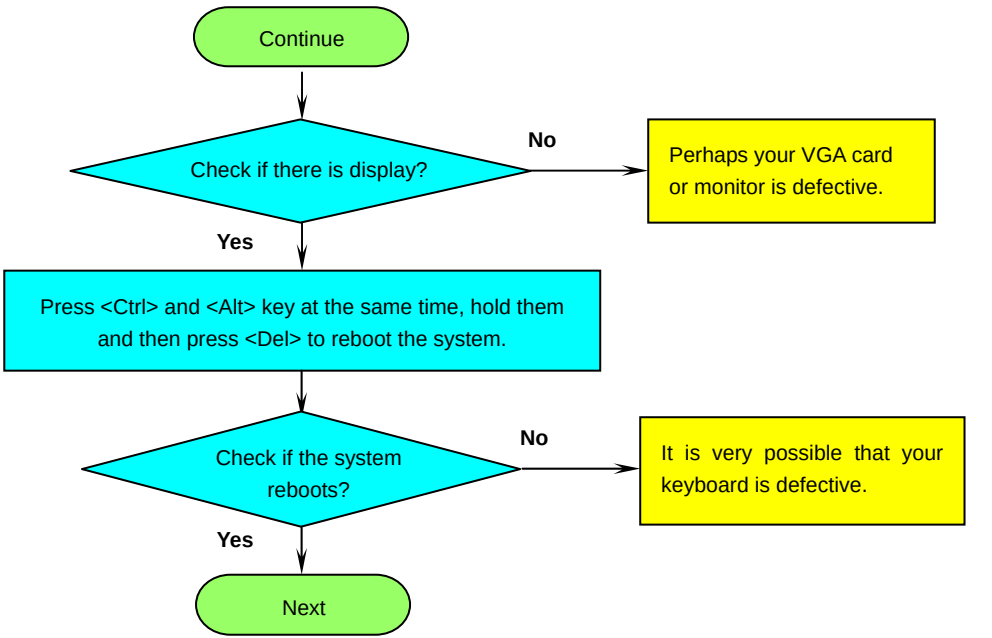
A compressed file format to reduce file size. To unzip file, run shareware PKUNZIP (http://www.pkware.com/) for DOS and other operating system or WINZIP (http://www.winzip.com/) for windows environment.

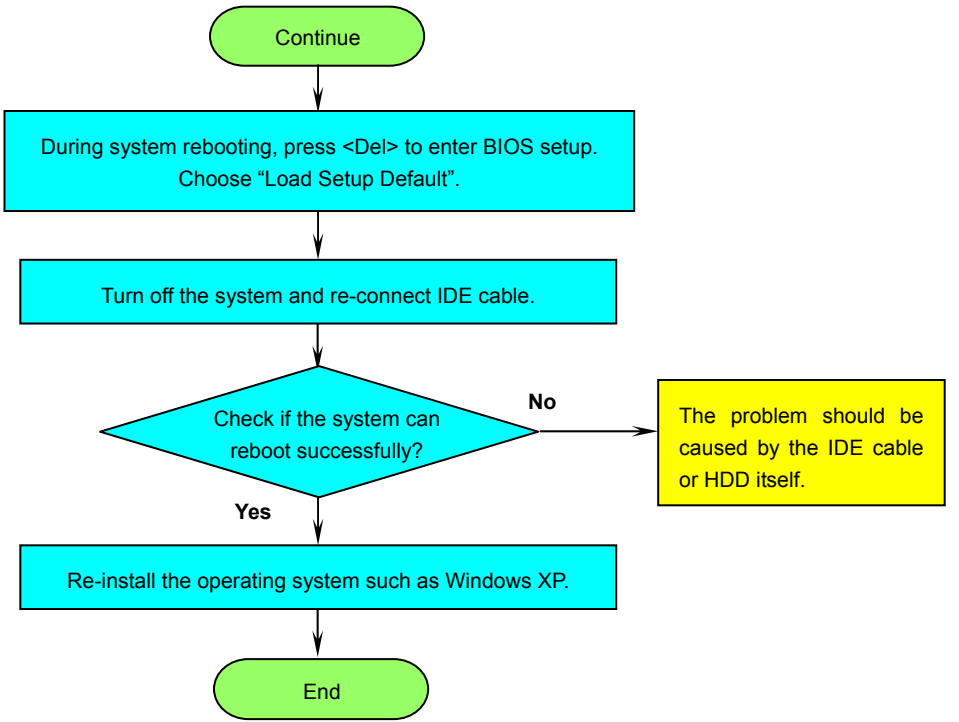
Troubleshooting

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




Continue
Install the VGA card. Then connect your monitor and keyboard.
Turn on the power and check if the power supply and CPU fan work properly.
Yes
No
Next
The problem is probably caused by power supply or motherboard failure. Please contact your reseller or local distributor for repairing.


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


Continue
During system rebooting, press <Del> to enter BIOS setup.
Choose “Load Setup Default”.
Turn off the system and re-connect IDE cable.
Check if the system can reboot successfully?
No
The problem should be caused by the IDE cable or HDD itself.
Yes
Re-install the operating system such as Windows XP.
End

Technical Support

Dear Customer,

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

Thanks very much for your understanding!

AOpen Technical Supporting Team

1. **Online Manual:** To download manual, please log on and then select your preferred language. Under “Type” directory, choose “Manuals” to go to our manual database. You can also find the manual and EIG in AOpen Bonus Pack.
   http://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

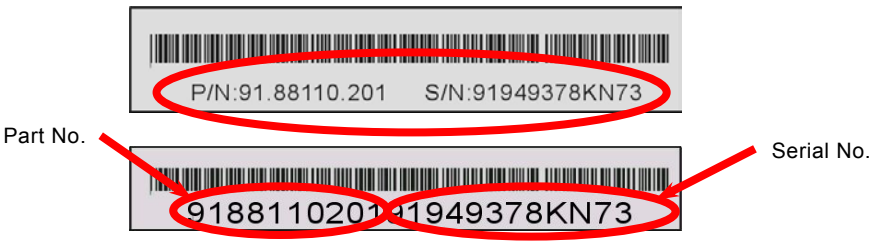
Contact Distributors/Resellers: We sell our products through resellers and integrators. They should know your system configuration very well and should be able to solve your problem efficiently and provide important reference for you.

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

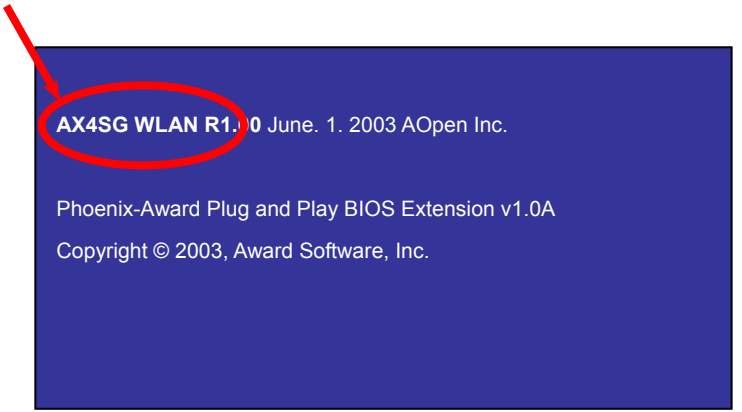
The Part Number and Serial number are printed on bar code label. You can find this bar code label on the outside packing, or on component side of PCB. For example:



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:



AX4SG WLAN is model name of motherboard, **R1.00** is BIOS version.

Product Registration

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

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- 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.*

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