
Chapter 1

Overview

The MX6E PLUS is a Pentium II based system board that utilizes Intel **82440EX** chipset on **Micro ATX** PCI/ISA platform. This chipset is designed for Pentium II CPU, and supports new architectures such as high speed **AGP** graphic port, **SDRAM**, **Ultra DMA/33**, **Bus master IDE** and **USB** port. It has **three Dual in-line Memory Module (DIMM)** that allow to mix 3V EDO and SDRAM memory and expand up to a maximum of **256MB**. Also, this motherboard uses **2M bit Flash ROM BIOS** to reserve for future new functions. In addition, MX6E PLUS also implements many special features.

Jumper-less Design Pentium II VID signal and SMBus clock generator provide CPU voltage auto-detection and allows user to set CPU frequency through CMOS setup, no jumper or switch is needed. The correct CPU information is saved into EEPROM, with these technologies, the disadvantages of Pentium base jumper-less design are eliminated. There will be no worry of wrong CPU voltage detection and no need to re-open the housing if CMOS battery loss. The only jumper left is to clear CMOS, which is a safety hook if you forget the password.

Battery-less Motherboard MX6E PLUS implements EEPROM and special circuit (patent applied) that allows you to save your current CPU and CMOS Setup configurations without the need of battery. The RTC (real time clock) can also keep running as long as power cord is plugged. If you lose your CMOS data by accident, you can just reload the CMOS configurations from EEPROM and the system will recover as usual.

Suspend To Hard Drive "Immediately" turns on system and goes back to the original screen before power down. You can resume your original work directly from hard disk without go through the Win95 booting process and run your application again. Suspend to Hard Drive saves your current work (system status, memory image) into hard disk. Note that you have to use VESA compatible PCI VGA, Sound Blaster compatible sound card with APM driver, for Suspend to Hard Drive to work properly.

Zero Voltage Modem Wake Up In conjunction with ATX soft power On/Off, it is possible to have system totally power off and wakeup to automatically

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answer a phone call such as answering machine or to send/receive fax. The most important break through is not only external box modem but also internal modem card can be used to support Modem Wake Up. The MX6E PLUS and MP56 internal modem card implement special circuit (patent applied) to make sure the modem card work properly without any power.

LAN Wake Up This feature is very similar as Modem Wake Up, but it is through local area network. To use LAN Wake Up function, you must have a network card that supports this feature and also need to install a network management software, such as ADM.

RTC Wake Up Timer The Wake Up Timer is more like an alarm, which wakes up and power on your system at a pre-defined time for specific application. It can be set to wake up everyday or on specific date within a month. The date/time accurate is second.

High Efficient Synchronous Switching Regulator Most of the current switching designs are Asynchronous mode, which from the technical point of view, still consumes very high power as well as heat. MX6E PLUS implements high efficient synchronous switching design that the temperature of MOS FET is far less than Schottky diode of Asynchronous design.

Over Current Protection Circuit The Over Current Protection was very popular implemented on the Baby AT or ATX 3.3V/5V/12V switching power supply. But unfortunately, the new generation Pentium II CPU uses different voltage that have regulator to transfer 5V to CPU voltage (for example, 2.8V), and make 5V over current protection useless. MX6E PLUS with switching regulator onboard support CPU over current protection, in conjunction with 3.3V/5V/12V power supply provide the full line over current protection.

CPU and Housing Fan Monitoring MX6E PLUS has one more "fan monitoring" function to prevent system overheat. There are two fan connectors, one is for CPU and the other can be an extra housing fan. The system will report and alarm fan malfunction though utility software such as Hardware Monitor utility (Small Icon for Hardware Monitoring).

CPU Thermal Protection MX6E PLUS has a special thermal detection circuit to have warning through application software when the temperature is higher than a predefined value.

System Voltage Monitoring Further more, MX6E PLUS implements a voltage monitoring system, As you turn on your system, this smart design will continue to monitor your system working voltage. If any of the system voltage is over the component's standard. There will be alarm though utility software such as Hardware Monitor utility (Small Icon for Hardware Monitoring) for a warning to user.

Full-range CPU core voltage This motherboard supports the CPU core voltage from 1.3V to 3.5V, that can be applied to various CPU type in future.

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FCC DoC certificate MX6E PLUS has passed FCC DoC test. The radiation is very low, you can use any kind of housing.

Powerful utility softwares supported AOpen Bonus Pack bundled CD contains many useful utilities, such as ADM (Advanced Desktop Manager), AOchip, Hardware Monitor utility, Suspend to Hard Drive utility, and BIOS flash utility.

Multi-language BIOS This breakthrough will help you set BIOS items without the language barrier.



Note: *This motherboard is battery-less, that means the RTC (real time clock) can keep running without battery as long as the power cord is plugged. But in case of power failure or the power cord unplugged, you need to reset date and time from "Standard CMOS Setup" section of BIOS Setup. For more information, please see "Chapter 3 BIOS Setup".*

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1.1 Specifications

Form Factor	ATX
Board Size	244 mm x 218 mm
CPU	Intel Pentium II Processor
System Memory	3V EDO or SDRAM, 168-pin DIMM x3, maximum 256MB.
Chipset	Intel 82440EX AGPset
Expansion Slots	ISA x2, PCI x2 and AGP x1
Serial Port	Two serial ports UART 16C550 compatible, and the 3rd UART for IR function.
Parallel Port	One parallel port supports standard parallel port (SPP), enhanced parallel port (EPP) or extended capabilities port (ECP).
Floppy Interface	Floppy interface supports 3.5 inches drives with 720KB, 1.44MB or 2.88MB format or 5.25 inches drives with 360KB, 1.2MB format
IDE Interface	Dual-channel IDE interface support maximum 4 IDE hard disks or CDROM, mode 4 , bus master hard disk drives and Ultra DMA/33 mode hard drives are also supported.
USB Interface	Two USB ports supported by USB bracket, the BIOS also supports USB driver to simulate legacy keyboard.
PS/2 Mouse	Mini-Din PS/2 mouse connector onboard.
Keyboard	Mini-Din PS/2 keyboard connector onboard.
RTC and Battery	RTC within Intel PIIX4E chipset. Lithium (CR-2032) battery is an option, no battery is needed if power cord is plugged.
BIOS	AWARD Plug-and-Play, 2M bit Flash ROM BIOS. Multi-language versions supported.

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Suspend to Hard Drive	Supported by BIOS, save your work to hard disk and resume within a very short time. VESA compatible VGA and Sound Blaster compatible sound card required.
Zero Voltage Modem Wake Up	Special circuit (patent applied) to support modem ring wake up by external box modem or internal AOpen F56/MP56 modem card.
LAN Wake Up	By using a network card that supports this feature and a network management software (such as ADM), you can wake up a system through a local area network.
RTC Wake Up Timer	Program the date/time to wake up your system.
Synchronous Switching Regulator	High efficient synchronous switching regulator.
Over-current Protection	CPU core voltage over-current protection to prevent any accident short circuit.
CPU Thermal Protection	Warning when CPU temperature is overheat. Option for OEM to have sensor at CPU heatsink.
Fan Monitoring	Two 3-pin fan connectors, warning when CPU or housing fan is malfunction.
System Voltage Monitoring	Warning when system voltage (5V,12V,3.3V and CPU core) are abnormal

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1.2 Suspend to Hard Drive

Suspend to Hard Drive saves your current work (system status, memory and screen image) into hard disk, and then the system can be totally power off. Next time, when power is on, you can resume your original work directly from hard disk within few second without go through the Win95 booting process and run your application again. If your memory is 16MB, normally, you need to reserve at least 16MB HDD space to save your memory image. Note that you have to use VESA compatible PCI VGA (AOpen PV70/PT70), Sound Blaster compatible sound card and sound driver that supports APM (AOpen AW32/AW35) for Suspend to Hard Drive to work properly. Of course, we recommend to use AOpen products for best compatibility.

To use Suspend to Hard Drive:

1. Go into BIOS setup, Power Management à Suspend Mode Option, select "Suspend to Disk".
2. Go into BIOS setup, PNP/PCI Configuration à PnP OS Installed, select "No". This can give BIOS the capability to allocate system resources for Suspend to Hard Drive.
3. Bootup your system into DOS command prompt. If you are Win'95 user, Please restart your Windows 95 under "Command Prompt" by pressing "F8" while system shows "Windows 95 Starting ...". Choose "Safe Mode Command Prompt Only" from selection so that system will start in DOS command prompt.
4. Copy AOZVHDD.EXE to the root directory of your C: drive.
5. **Option 1: Use /file switch (applied to FAT16 file system):**

Please use following command to create a hidden file in the root directory of your hard disk for Suspend to Hard Drive to save the system status and memory image.

```
C:>AOZVHDD /c /file
```

Please make sure that you have enough continuous HDD space for creating this hidden file. For example, if you have 32MB of system memory and 4MB of VGA memory, you need at least 36MB (32MB + 4MB) of continuous HDD space. If AOZVHDD failed to allocate the HDD space, you may run "DEFRAG" Utility or "Disk Defragmenter" which come with MS-DOS or Win'95 to free HDD space.

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Option2: Use /partition switch (applied to FAT16/FAT32 file system):

To create a separate partition for Suspend to Hard Drive, please make sure you have reserved a free partition. We suggest you reserve the free partition which space is appropriate for your future memory expansion. For example, if you have 32MB of system memory and 4MB of VGA memory currently, but you plan to upgrade system memory to 64MB in the near future, then you may reserve a 68MB (64MB+4MB) space by using a disk utility (such as fdisk). Next, use following command to create a suspend partition:

```
C:>AOZVHDD /c /partition
```

If there is no extra free partition and you don't want your data lost, please do not use this partition method.

6. After creating above partition or hidden file, please reboot your system.
7. Push suspend switch (momentary mode) or use Win95 Suspend icon to force system goes into Suspend to Hard Drive mode and then turn system power off by power switch of your power supply.
8. Next time when you turn on your system, it will resume to your original work automatically.



Warning: Note that Intel Bus Master and Ultra DMA/33 IDE driver are not fully compatible with Suspend to Hard Drive function, installing these drivers may cause the system unstable. Under this situation, please uninstall the drivers.

Warning: This function does not support SCSI hard disks.

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Tip: The following VGA cards have been tested & recognized as VESA compatible VGA device.

AOpen PV90 (Trident 9680)
AOpen PT60 (S3 Virge/BIOS R1.00-01)
AOpen PV60 (S3 Tiro64V+)
AOpen PT70 (S3 Virge/DX)
ProLink Trident GD-5440
ProLink Cirrus GD-5430
ProLink Cirrus GD-5446
ATI Mach 64 GX
ATI 3D RAGE II
Diamond Stealth64D (S3 868)
Diamond Stealth64V (S3 968)
KuoWei ET-6000.
ATI 3D RAGE PRO 2x (AGP)
PLOTTECH 3D IMAGE 9850 (AGP)
CARDEX S3 Virge/GX (AGP)



Tip: The following sound cards have been tested OK for Suspend to Hard Drive.

AOpen AW32
AOpen AW35
AOpen MP32
Creative SB 16 Value PnP
Creative SB AWE32 PnP
ESS 1868 PnP

If your sound card can not work after resume from Suspend to Hard Drive, check your sound card vendor see if there is driver to support APM, and install it again.

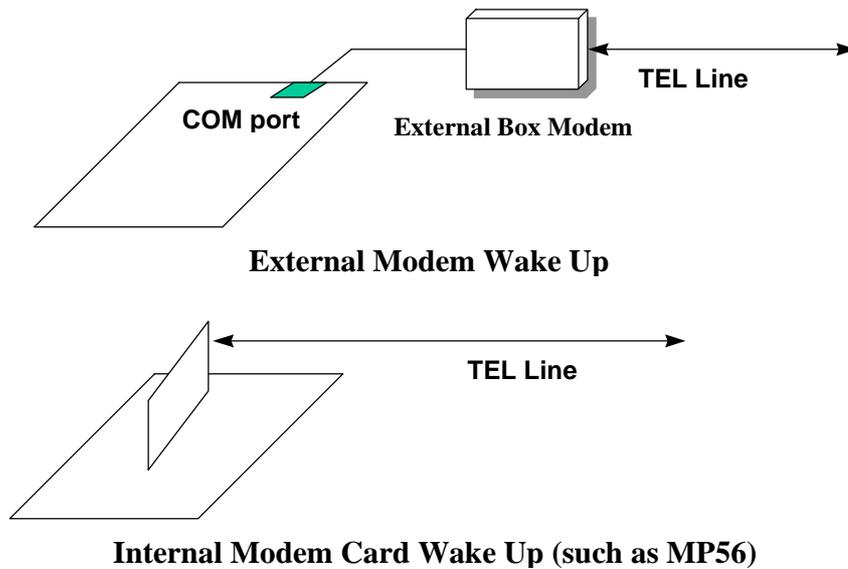


Note: The USB function has not been tested for Suspend to Hard Drive. If you find any unstable problem, please go into BIOS, Integrated Peripherals à USB Legacy Support. Disable the USB Legacy function.

1.3 Zero Voltage Modem Wake Up

The Modem Wake Up discussed here is to wakeup from true power off (identified by fan of power supply is off), This motherboard still supports traditional green PC suspend mode but it is not discussed here.

With the help ATX soft power On/Off, it is possible to have system totally power off (The traditional suspend mode of power management function does not really turn off the system power supply), and wakeup to automatically answer a phone call such as answering machine or to send/receive fax. You may identify the true power off by checking fan of your power supply. Both external box modem and internal modem card can be used to support Modem Wake Up, but if you use external modem, you have to keep the box modem always power-on. AOpen MX6E PLUS and internal modem card implement special circuit (patent applied) and make sure the modem card works properly without any power. We recommend you choose AOpen modem card (MP56) for Modem Wake Up applications.



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For Internal Modem Card (AOpen MP56):

1. Go into BIOS setup , Power Management à Modem Wake Up, select Enable.
2. Setup your application, put into Windows 95 StartUp or use Suspend to Hard Drive function.
3. Turn system power off by soft power switch.
4. Connect 4-pin Modem Ring-On cable from MP56 RING connector to MX6E PLUS connector WKUP.
5. Connect telephone line to MP56. You are now ready to use Modem Ring-On.

For External Box Modem:

1. Go into BIOS setup, Power Management à Modem Wake Up, select Enable.
2. Setup your application, put into Windows 95 StartUp or use Suspend to Hard Drive function.
3. Turn system power off by soft power switch.
4. Connect RS232 cable of external box Modem to COM1 or COM2.
5. Connect telephone line to external box Modem. Turn on Modem power (you must keep Modem power always on). You are now ready to use Modem Ring



Tip: External modem wake up signal is detected through COM1 or COM2. Internal modem card wake up signal is detected through cable from connector RING (on modem card) to WKUP (on mainboard).

Tip: You can combine Suspend to Hard Drive, Modem Wake Up and the software Aception for the best solution of answering machine or to send/receive fax.

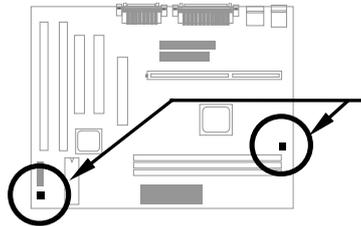


Note: If you use external modem, the power of external modem must be kept on to receive signal from telephone line. Internal modem card has no such limitation.

1.4 System Voltage Monitoring

This motherboard implements a voltage monitoring system. As you turn on your system, this smart design will continue to monitor your system working voltage. If any of the system voltage is over the component's standard. There will be alarm through application software such as Hardware Monitor utility for a warning to user. System voltage monitoring function monitors CPU core voltage. It is automatically implemented by BIOS and Hardware Monitor utility (the file name is like aohw100.exe, where 100 means the version number), no hardware installation is needed.

1.5 Fan Monitoring



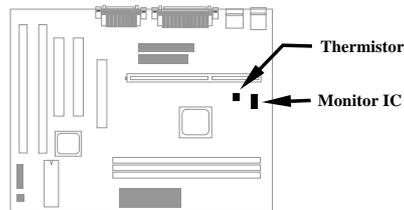
There are two fan connectors, one is for CPU, the other can be a housing fan. The fan monitoring function is implemented by connecting fan to 3-pin fan connector **CPUFAN** or **FAN** and installing Hardware Monitor utility.



Note: You need 3-pin fan that supports *SENSE* signal for fan monitoring function to work properly.

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1.6 CPU Thermal Protection



This mainboard implements special thermal protection circuits. When temperature is higher than a predefined value, there will be warning through application software such as Hardware Monitor utility to notify user. It is automatically implemented by BIOS and Hardware Monitor utility, no hardware installation is needed.

For OEM customer who needs more accurate temperature, MX6E PLUS reserves an option to use special CPU heatsink with thermal sensor on it. The CPU thermal sensor should be connected to **CN1**.

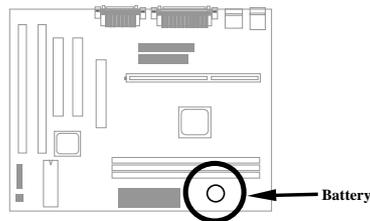
1.7 Multi-language BIOS

For giving AOpen's worldwide users the best support, AOpen software team made every effort to overcome all difficulties and successfully develop a method to provide multi-language BIOS.

You may download and reflash a specified BIOS version from AOpen 's web site (For example, Chinese). After entering BIOS Setup, you can switch to another language by pressing F9. Then pressing F9 again will let you return to English screen.

This breakthrough will help you set BIOS items without the language barrier.

1.8 Battery-less Design



To preserve the earth, AOpen MX6E PLUS implements the world first battery-less motherboard design. There is no need to have battery for RTC (real time clock) and CMOS Setup as long as the power cable is plugged. In case of the AC power is shutdown or power cord is removed by accident, the CMOS Setup and system configuration can be restored from EEPROM, only the system clock needed to be re-set to current date/time.

For the convenience of end user, MX6E PLUS still shipped with one Lithium (CR-2032) battery. If you prefer to use battery, you can still Insert it into battery socket. The RTC will still keep running even power cord is removed.