

K8AE-LM (OPAL)

ASUS[®]

Motherboard

E2331

**First Edition V1
November 2005**

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K8AE-LM specifications summary

CPU	Socket 754 for AMD Athlon™ 64 and AMD Sempron™ CPUs Supports AMD 64 architecture that enables simultaneous 32-bit and 64-bit computing
Chipset	Northbridge: ATI RS482 Southbridge: ATI IXP400
Front Side Bus	1.6GT/s
Memory	Single channel memory architecture 1 x 184-pin DDR DIMM socket support up to 1GB unbuffered 400/333 MHz DDR SDRAM Memory
Expansion slots	1 x PCI slot
Storage	ATI IXP400 Southbridge supports: 1 x Ultra DMA 33/66/100 IDE port 2 x Ultra DMA 150 Serial ATA ports with hot-swap function
High Definition Audio	Realtek® ALC658C 5.1-channel CODEC 1 x Coaxial S/PDIF out port
LAN	Realtek® RTL8101L series and support 10/100Mbps MAC/PHY on PCI Bus
IEEE 1394	Agere FW322 with 2 ports PHY
PC health monitoring	ASUS A8000 for CPU/Chassis/System fan control, fan speed control and CPU/MB temperature monitoring
BIOS features	4 MB LPC EEPROM HP BIOS with enhanced ACPI, DMI, Green, and PnP Features Plus
Form factor	Mini-ITX form factor: 170 mm x 170 mm
Rear panel	PS/2 KB & PS/2 Mouse VGA connector 2 x USB + 1 x RJ-45 LAN connector 2 x USB + 1 x IEEE1394 connector 1 x SPDIF OUT 3 PORT Audio Jet 1 x TV-Out (RCA) 1 x TV-Out (S-Vedio)(Optical)

(continued on the next page)

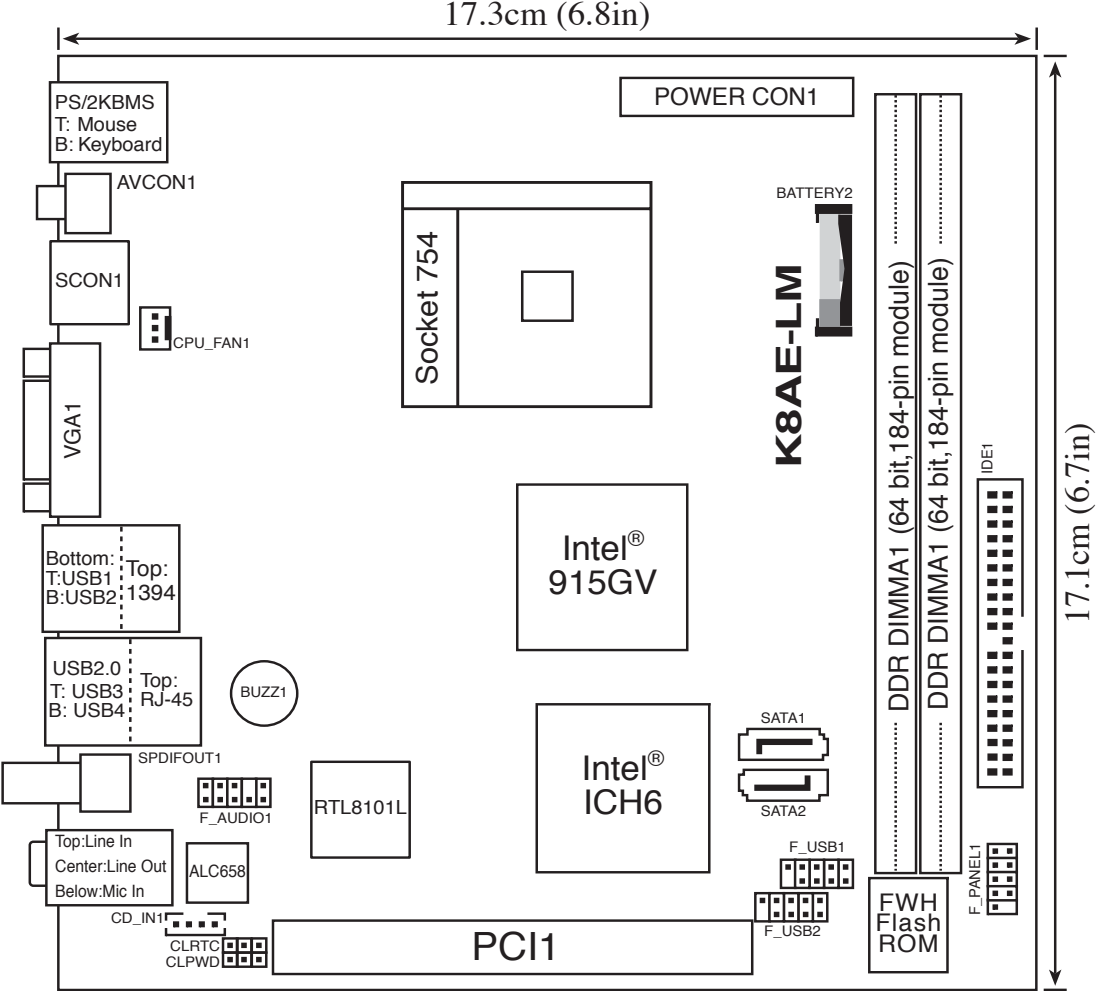
K8AE-LM specifications summary

Internal connectors

- 1 x IDE connector
- 1 x mini 24-pin ATX power connector
- 2 x Serial ATA connectors
- 2 x USB 2.0 connectors support for four additional USB 2.0 ports
- 1 x CPU fan connector
- 1 x CD in connector
- 1 x Front panel audio connector
- 1 x System panel connector

** Specifications are subject to change without notice*

1. Motherboard layout

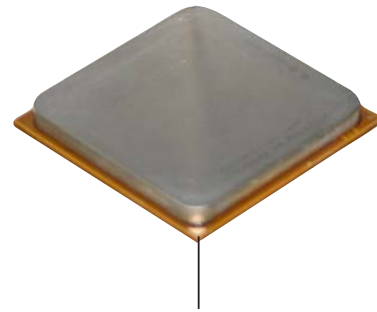


2. Central Processing Unit (CPU)

2.1 Overview

The motherboard comes with a surface mount 754-pin Zero Insertion Force (ZIF) socket designed for the AMD Athlon™ 64/AMD Sempron™ processor.

Take note of the marked corner (with gold triangle) on the CPU. This mark should match a specific corner on the socket to ensure correct installation.

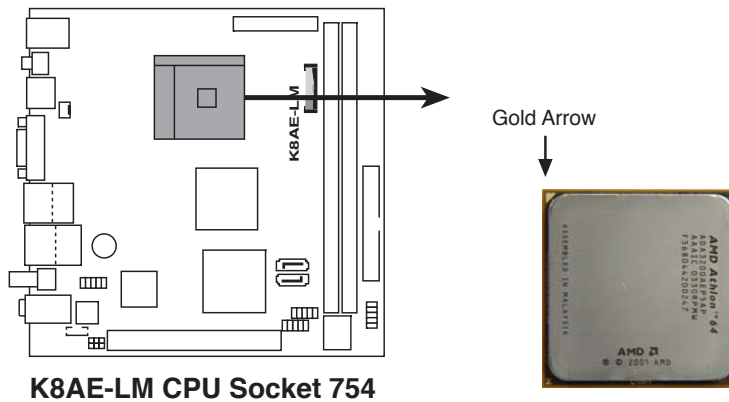


Gold triangle

2.2 Installing the CPU

To install a CPU:

1. Locate the CPU socket on the motherboard.

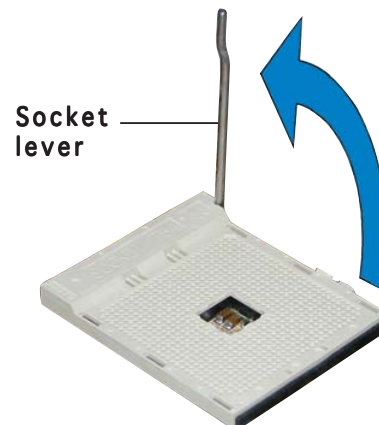


Before installing the CPU, make sure that the socket box is facing towards you and the load lever is on your left.

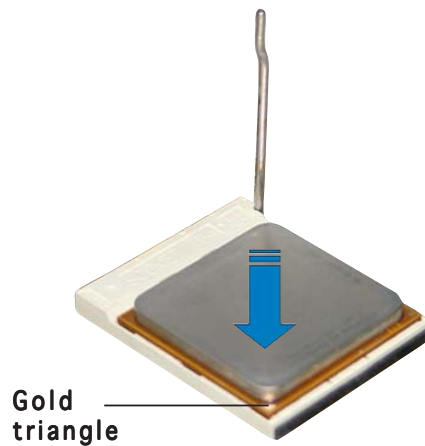
2. Unlock the socket by pressing the lever sideways, then lift it up to a 90°-100° angle.



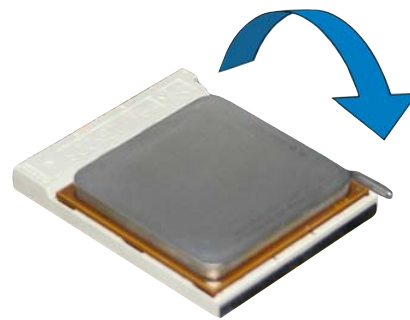
Make sure that the socket lever is lifted up to 90°-100° angle; otherwise the CPU does not fit in completely.



3. Position the CPU above the socket such that the CPU corner with the gold triangle matches the socket corner with a small triangle.
4. Carefully insert the CPU into the socket until it fits in place.



5. When the CPU is in place, push down the socket lever to secure the CPU. The lever clicks on the side tab to indicate that it is locked.

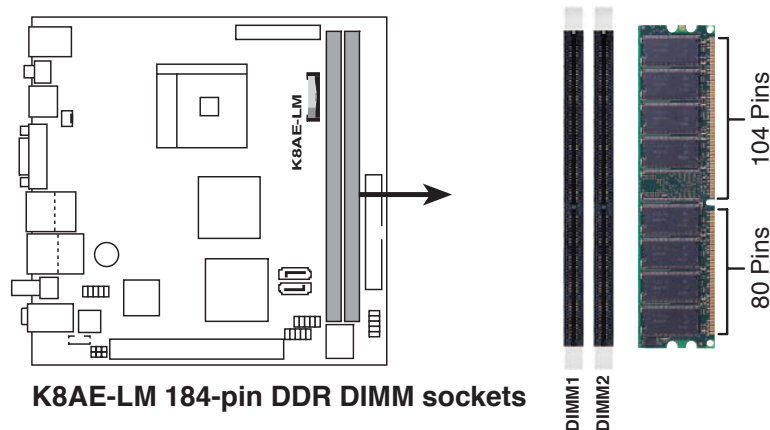


6. Refer to the succeeding section for details.
7. Connect the CPU fan cable to the CPU_FAN connector on the motherboard.

3. System memory

The motherboard comes with four Double Data Rate (DDR) Dual Inline Memory Module (DIMM) sockets.

The following figure illustrates the location of the DDR DIMM sockets.



3.1 Memory configurations

You may install 128 MB, 256 MB, 512 MB, and 1 GB DDR SDRAM DIMMs into the DIMM sockets using the memory configurations in this section.

Important notes on memory configurations



- Installing DDR DIMMs other than the recommended configurations may cause memory sizing error or system boot failure. Use any of the recommended configurations on the next page.
- Install only **identical** (the same type and size) DDR DIMM pairs using the recommended configurations.
- Make sure that the memory frequency matches the CPU FSB (Front Side Bus). Refer to the Memory frequency/CPU FSB synchronization table on the next page.
- This motherboard does not support double-sided 16-bit DDR DIMMs.
- Do not create a three-DIMM configuration in dual-channel mode. The third DIMM is ignored in the dual-channel operation.

Recommended memory configurations

Sockets			
Mode		DIMM1	DIMM2
Single-channel	(1)	Installed	—
	(2)	—	Installed

* Use only identical DDR DIMM pairs.

Memory frequency/CPU FSB synchronization

CPU FSB	DDR DIMM Type	Memory Frequency
800 MHz	PC3200	400 MHz
533 MHz	PC3200/PC2700	400/333 MHz

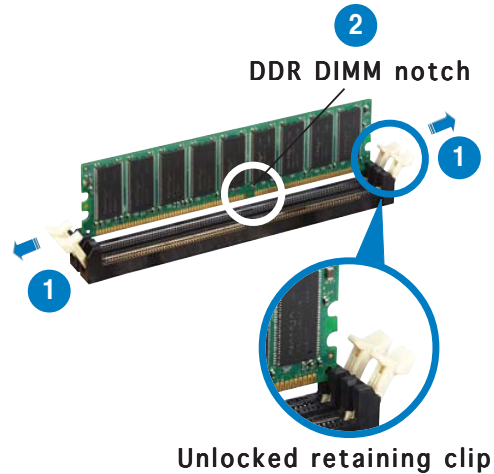
3.2 Installing a DDR DIMM



Make sure to unplug the power supply before adding or removing DIMMs or other system components. Failure to do so may cause severe damage to both the motherboard and the components.

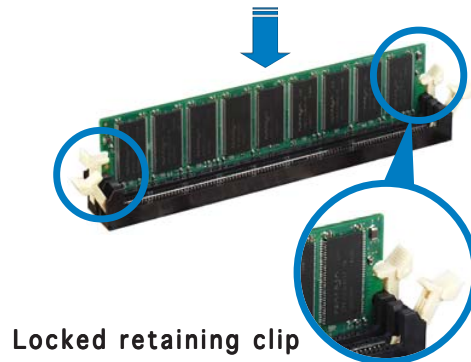
To install a DIMM:

1. Unlock a DIMM socket by pressing the retaining clips outward.
2. Align a DIMM on the socket such that the notch on the DIMM matches the break on the socket.



A DDR DIMM is keyed with a notch so that it fits in only one direction. DO NOT force a DIMM into a socket to avoid damaging the DIMM.

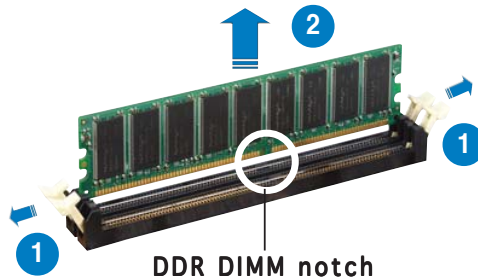
3. Firmly insert the DIMM into the socket until the retaining clips snap back in place and the DIMM is properly seated.



3.3 Removing a DDR DIMM

To remove a DIMM:

1. Simultaneously press the retaining clips outward to unlock the DIMM.



Support the DIMM lightly with your fingers when pressing the retaining clips. The DIMM might get damaged when it flips out with extra force.

2. Remove the DIMM from the socket.

4. Expansion slots

The motherboard has one PCI slot.

To install and configure an expansion card:

1. Install an expansion card following the instructions that came with the chassis.
2. Turn on the system and change the necessary BIOS settings, if any.
3. Assign an IRQ to the card. Refer to the tables below.
4. Install the drivers and/or software applications for the expansion card according to the card documentation.

Standard interrupt assignments

IRQ	Standard Function
0	System Timer
2	Programmable Interrupt Controller
3	AHPC IRQ Holder for PCI IRQ Steering
3	Intel® 82801FB/FBM PCI Express Root Port - 2660
3	Intel® 82801FB/FBM USB Universal Host Controller - 265B
3	Intel® 915G Graphics Controller 0
5	AHPC IRQ Holder for PCI IRQ Steering
5	AHPC IRQ Holder for PCI IRQ Steering
5	Intel® 82801FB/FBM PCI Express Root Port - 2662
5	Intel® 82801FB/FBM USB Universal Host Controller - 2658
5	Intel® 82801FB/FBM USB2 Enhanced Host Controller - 265C
8	System CMOS/Real Time Clock
9	SCI IRQ Used by ACPI Bus
10	AHPC IRQ Holder for PCI IRQ Steering
10	AHPC IRQ Holder for PCI IRQ Steering
10	VIA OHCI Compliant IEEE 1394 Host Controller
10	Intel® 82801FB/FBM PCI Express Root Port - 2666
10	Intel® 82801FB/FBM Ultra ATA Storage Controllers - 2659
11	AHPC IRQ Holder for PCI IRQ Steering
11	Intel® 82801FB/FBM PCI Express Root Port - 2664
11	Intel® 82801FB/FBM USB Universal Host Controller - 265A
12	Microsoft® Port Mouse
13	Numeric Data Processor
14	Intel® 82801FB/FBM Ultra ATA Storage Controllers - 266F
14	Intel® 82801FB Ultra ATA Storage Controllers - 2652

IRQ assignments for this motherboard

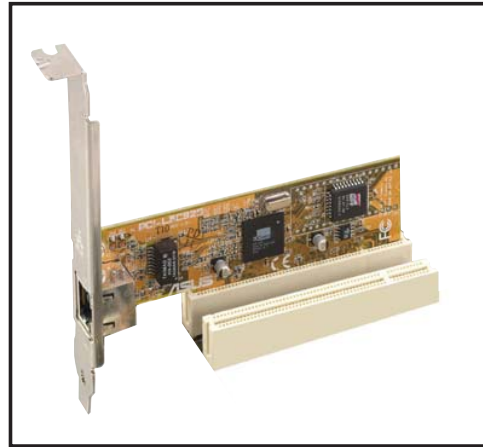
	A	B	C	D	E	F
PCI slot 1	—	—	—	used	—	—



When using PCI cards on shared slots, ensure that the drivers support “Share IRQ” or that the cards do not need IRQ assignments; otherwise, conflicts will arise between the two PCI groups, making the system unstable and the card inoperable.

4.1 PCI slot

There is one 32-bit PCI slot on this motherboard. The slot supports PCI cards such as a LAN card, SCSI card, USB card, and other cards that comply with PCI specifications.



5. Jumpers

5.1 Clear RTC RAM (3-pin CLRRTC)

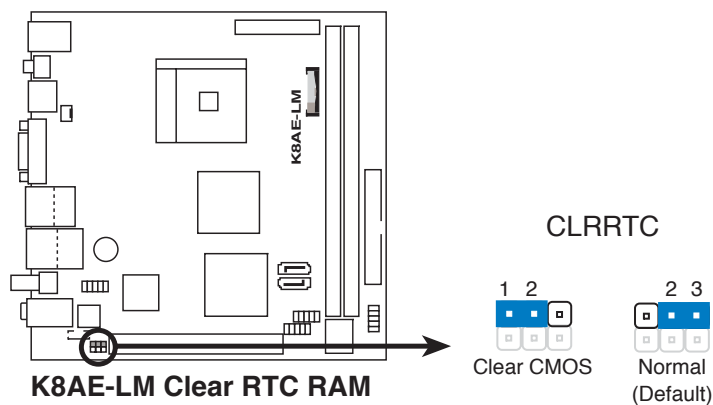
This jumper allows you to clear the Real Time Clock (RTC) RAM in CMOS. You can clear the CMOS memory of date, time, and system setup parameters by erasing the CMOS RTC RAM data. The onboard button cell battery powers the RAM data in CMOS, which include system setup information such as system passwords.

To erase the RTC RAM:

1. Turn OFF the computer and unplug the power cord.
2. Remove the onboard battery.
3. Move the jumper cap from pins 2-3 (Normal) to pins 1-2 (Clear CMOS). Keep the cap on pins 1-2 for about 5~10 seconds, then move the cap back to pins 2-3.
4. Reinstall the battery.
5. Plug the power cord and turn ON the computer.
6. Hold down the <F1> key during the boot process and enter BIOS setup to re-enter data.



Except when clearing the RTC RAM, never remove the cap from the default position. Removing the cap will cause system boot failure!

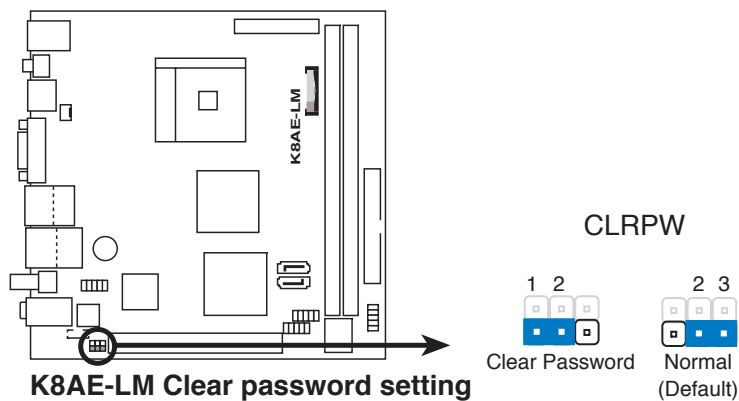


5.2 Clear password (3-pin CLRPW)

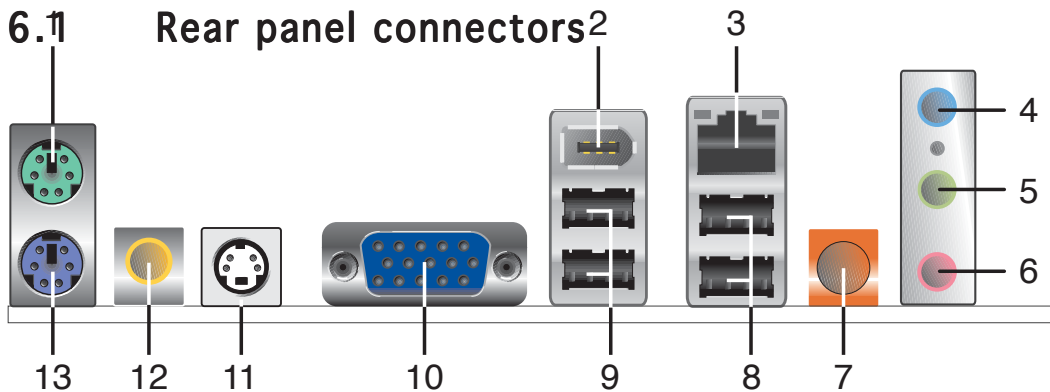
This jumper allows you to clear the password if you forgot your password.

To erase the password:

1. Turn OFF the computer and unplug the power cord.
2. Move the jumper cap from pins 2-3 (Normal) to pins 1-2 (Clear Password).
3. Plug the power cord and turn ON the computer.
4. After the computer boots up, turn OFF the computer.
5. Move the jumper cap from pins 1-2 to pins 2-3.
6. Hold down the <F1> key during the boot process and enter BIOS setup to verify that the password has been cleared.



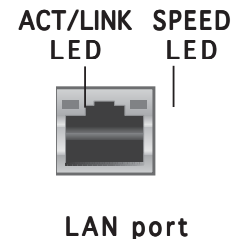
6. Connectors



1. **PS/2 mouse port.** This green 6-pin connector is for a PS/2 mouse.
2. **IEEE 1394 port.** This 6-pin IEEE 1394 port provides high-speed connectivity for audio/video devices, storage peripherals, PCs, or portable devices.
3. **LAN (RJ-45) port.** This port allows Gigabit connection to a Local Area Network (LAN) through a network hub. Refer to the table below for the LAN port LED indications.

LAN port LED indications

ACT/LINK LED		SPEED LED	
Status	Description	Status	Description
OFF	No link	GREEN	10 Mbps connection
YELLOW	Linked	GREEN	100 Mbps connection
BLINKING	Data activity	GREEN	1 Gbps connection



4. **Line In port.** This Line In (light blue) port connects a tape player or other audio sources.
5. **Line Out port.** This Line Out (lime) port connects a headphone or a speaker. In 4-channel, 6-channel and 8-channel mode, the function of this jack becomes Front Speaker Out.
6. **Microphone port.** This Mic (pink) port connects a microphone.

Audio 2, 4, or 6-channel configuration

Port	Headset 2-channel	4-channel	6-channel
Light Blue	Line In	Rear Speaker Out	Rear Speaker Out
Lime	Line Out	Front Speaker Out	Front Speaker Out
Pink	Mic In	Mic In	Bass/Center

≠

7. **S/PDIF coaxial out port.** This port connects to external audio output devices with coaxial cable connectors.
8. **USB 2.0 ports 3 and 4.** These 4-pin Universal Serial Bus (USB) ports are available for connecting USB 2.0 devices.
9. **USB 2.0 ports 1 and 2.** These 4-pin Universal Serial Bus (USB) ports are available for connecting USB 2.0 devices.
10. **VGA port.** This port is for a VGA monitor or other VGa-compatible devices.
11. **TV-Out (S-Video).** This port connects a television or VCR via an S-Video cable.
12. **TV-Out (RCA).** This port connects a television or VCR via an RCA cable.
13. **PS/2 keyboard port.** This purple connector is for a PS/2 keyboard.

6.2 Internal connectors

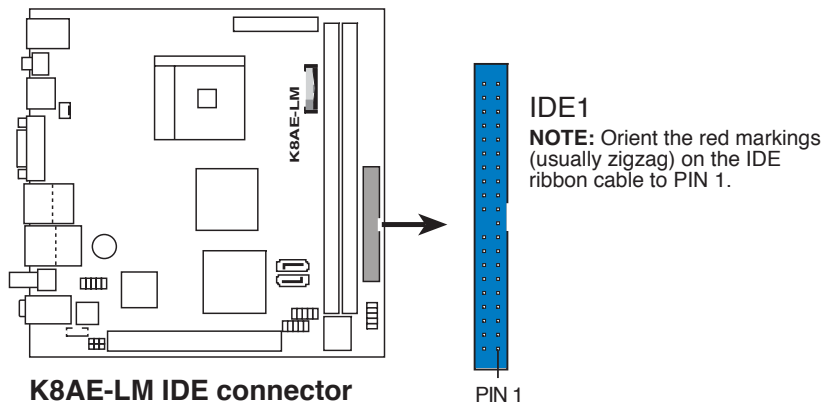
This section describes and illustrates the internal connectors on the motherboard.

1. IDE connector (40-1 pin IDE1)

This connector is for an Ultra DMA 100/66 signal cable. The Ultra DMA 100/66 signal cable has three connectors: a blue connector for the primary IDE connector on the motherboard, a black connector for an Ultra DMA 100/66 IDE slave device (optical drive/hard disk drive), and a gray connector for an Ultra DMA 100/66 IDE master device (hard disk drive). If you install two hard disk drives, you must configure the second drive as a slave device by setting its jumper accordingly. Refer to the hard disk documentation for the jumper settings.



- Pin 20 on the IDE connector is removed to match the covered hole on the Ultra DMA cable connector. This prevents incorrect insertion when you connect the IDE cable.
- Use the 80-conductor IDE cable for Ultra DMA 100/66 IDE devices.

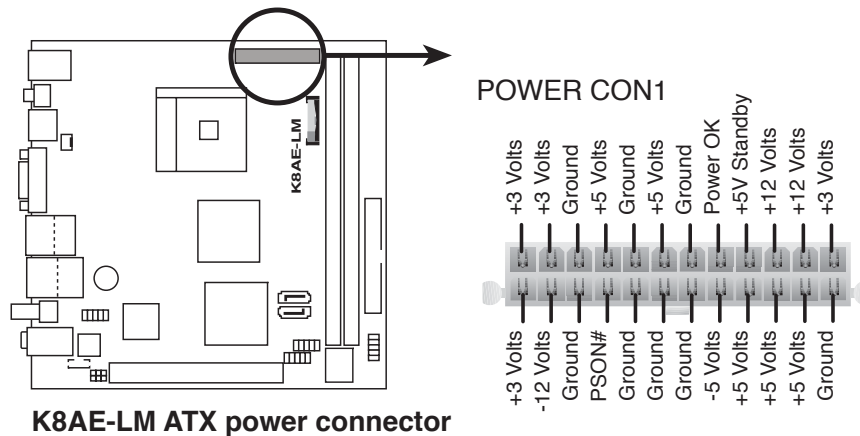


2. ATX power connectors (24-pin POWER CON1)

These connectors are for an ATX power supply. The plugs from the power supply are designed to fit these connectors in only one orientation. Find the proper orientation and push down firmly until the connectors completely fit.



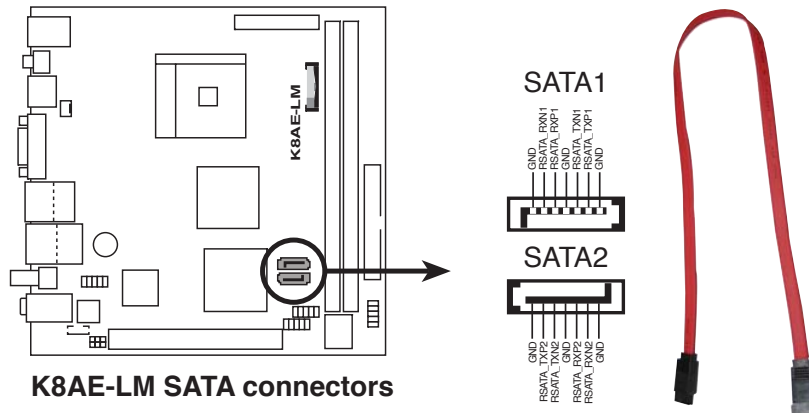
- Make sure that your ATX 12V power supply can provide 8A on the +12V lead and at least 1A on the +5-volt standby lead (+5VSB). The minimum recommended wattage is 230 W, or 300 W for a fully configured system. The system can become unstable and might experience difficulty powering up if the power supply is inadequate.
- You must install a PSU with a higher power rating if you intend to install additional devices.



K8AE-LM ATX power connector

3. Serial ATA connectors (7-pin SATA1 [black], SATA2 [white])

These connectors are for the Serial ATA signal cables for Serial ATA hard disk drives..



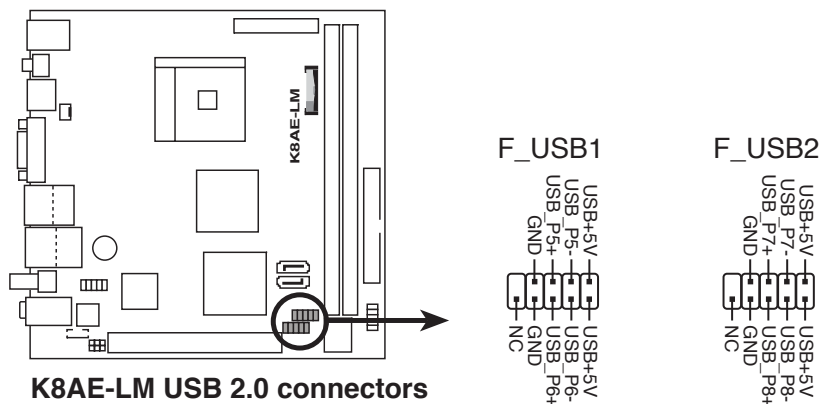
K8AE-LM SATA connectors



You must install Windows® 2000 Service Pack 4 or the Windows® XP Service Pack 1 before using a Serial ATA hard disk drive.

4. USB connectors (10-1 pin F_USB1, F_USB2)

These connectors are for USB 2.0 ports. Connect the USB/GAME module cable to any of these connectors, then install the module to a slot opening at the back of the system chassis. These USB connectors comply with USB 2.0 specification that supports up to 480 Mbps connection speed.



K8AE-LM USB 2.0 connectors



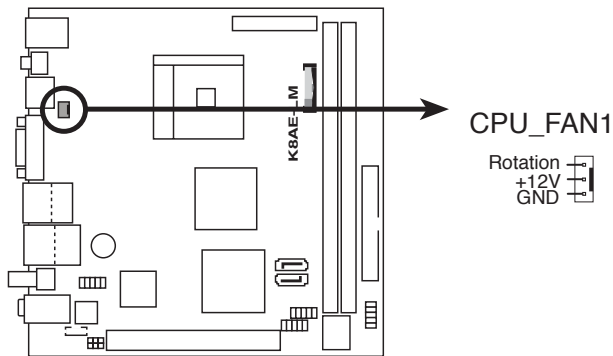
Never connect a **1394 cable** to the USB connectors. Doing so will damage the motherboard!

5. CPU Fan connector (3-pin CPU_FAN1)

The fan connector supports a cooling fan of 350 mA ~ 2000 mA (24 W max.) or a total of 1 A ~ 3.48 A (41.76 W max.) at +12V. Connect the fan cable to the fan connect on the motherboard, making sure that the black wire of each cable matches the ground pin of the connector.



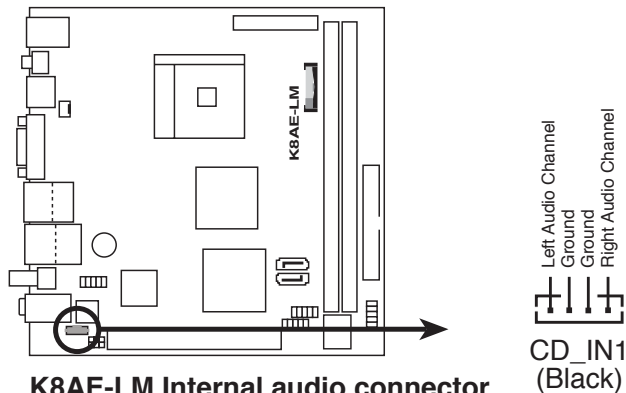
Do not forget to connect the fan cable to the fan connector. Insufficient air flow inside the system may damage the motherboard components. This is not a jumper! Do not place jumper cap on the fan connector!



K8AE-LM CPU fan connector

6. Internal audio connector (4-pin CD_IN1)

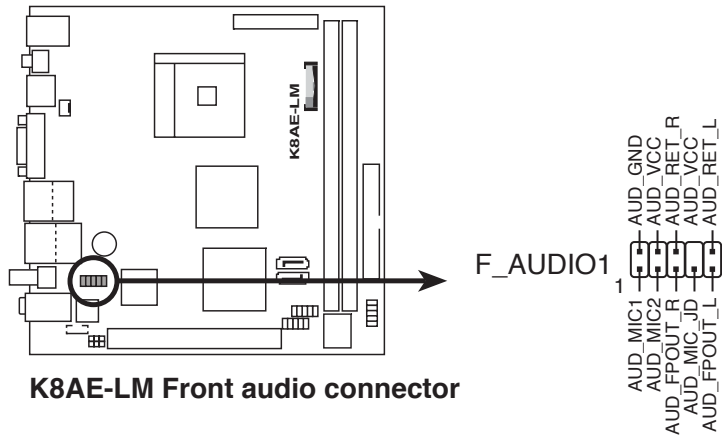
This connector allows you to receive stereo audio input from sound sources such as a CD-ROM, TV tuner, or MPEG card.



K8AE-LM Internal audio connector

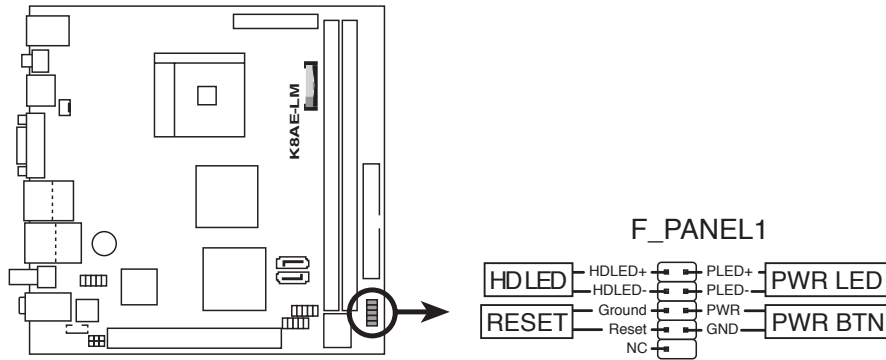
7. Front panel audio connector (10-1 pin F_AUDIO1)

This connector is for a chassis-mounted front panel audio I/O module that supports AC'97 audio standard.



8. System panel connector (10-1 pin F_PANEL1)

This connector supports several chassis-mounted functions.



K8AE-LM System panel connector

- **System power LED**
This connector is for the system power LED. Connect the chassis power LED cable to this connector. The system power LED lights up when you turn on the system power, and blinks when the system is in sleep mode.
- **Hard disk drive activity LED**
This connector is for the HDD Activity LED. Connect the HDD Activity LED cable to this connector. The IDE LED lights up or flashes when data is read from or written to the HDD.
- **ATX power button/soft-off button**
This connector is for the system power button. Pressing the power button turns the system on or puts the system in sleep or soft-off mode depending on the BIOS settings. Pressing the power switch for more than four seconds while the system is ON turns the system OFF.
- **Reset button**
This connector is for the chassis-mounted reset button for system reboot without turning off the system power.