



CERTIFICATE

The TÜV CERT Certification Body
for QM Systems of RWTÜV Systems GmbH

hereby certifies in accordance with TÜV CERT
procedure that

**ELITEGROUP COMPUTER SYSTEMS CO., LTD.
ECS MANUFACTURING (SHENZHEN) CO., LTD.
ELITE TECHNOLOGY (SHENZHEN) CO., LTD.**

2F, No. 240, Sec. 1, Nei Hu Road, Taipei, Taiwan 114
No. 22, Alley 38, Lane 91, Sec. 1, Nei Hu Road, Taipei, Taiwan 114
No. 20 & No. 26, Free Trade Zone, Shatoujiao, Shenzhen City, Guangdong Province, China

has established and applies a quality system for

**Design, Manufacturing and Sales of Mainboards,
Personal Computers, Notebooks and Peripheral Cards**

An audit was performed, Report No. 2.5-1585/2000

Proof has been furnished that the requirements according to
ISO 9001 : 2000 / EN ISO 9001 : 2000 / JIS Q 9001 : 2000 / ANSI/ASQC Q9001 : 2000

are fulfilled. The certificate is valid until 27 January 2007

Certificate Registration No. 04100 2000 1325

The company has been certified since 2000



Essen, 04.03.2004




The TÜV CERT Certification Body for QM Systems
of RWTÜV Systems GmbH



ISO14001 CERTIFICATE

Certificate No.: 061-04-EI-0065-R1-L

We hereby certify that

ECS MANUFACTURING (SHANZHEN) CO., LTD.

by reason of its

Environmental Management System

has been awarded this certificate for
compliance with the standard

ISO14001:1996

The Environmental Management System

applies in the following area:

ECS MANUFACTURING (SHANZHEN) CO., LTD.

located at No. 20 & 26 (except 1F, 2F), Free Trade Zone,

Shatuojiang, Shenzhen City, Guangdong Province, P. R. China.

is engaged in manufacturing of Mother Board and Peripheral Card,
and interrelated managerial activities.

Date of issue: 28th Sept. 2004

Date of expiry: 27th Sept. 2007

Signed by:



SHENZHEN SOUTHERN CERTIFICATION CO., LTD.

Preface

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Version 1.0

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Federal Communications Commission (FCC)

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and the receiver
- Connect the equipment onto an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

Shielded interconnect cables and a shielded AC power cable must be employed with this equipment to ensure compliance with the pertinent RF emission limits governing this device. Changes or modifications not expressly approved by the system's manufacturer could void the user's authority to operate the equipment.

Declaration of Conformity

This device complies with part 15 of the FCC rules. Operation is subject to the following conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received, including interference that may cause undesired operation

Canadian Department of Communications

This class B digital apparatus meets all requirements of the Canadian Interference-causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

About the Manual

The manual consists of the following:

Chapter 1

Introducing the Motherboard

Describes features of the motherboard.

Go to  page 1

Chapter 2

Installing the Motherboard

Describes installation of motherboard components.

Go to  page 7

Chapter 3

Using BIOS

Provides information on using the BIOS Setup Utility.

Go to  page 27

Chapter 4

Using the Motherboard Software

Describes the motherboard software

Go to  page 47

Chapter 5

ATI CrossFire™ Technology Support

Describes the ATI CrossFire™ Technology.

Go to  page 51

Preface

TABLE OF CONTENTS

Preface	i
Chapter 1	1
Introducing the Motherboard	1
Introduction.....	1
Feature.....	2
Motherboard Components.....	4
Chapter 2	7
Installing the Motherboard	7
Safety Precautions.....	7
Choosing a Computer Case.....	7
Installing the Motherboard in a Case.....	7
Checking Jumper Settings.....	8
<i>Setting Jumpers.....</i>	8
<i>Checking Jumper Settings.....</i>	9
<i>Jumper Settings.....</i>	9
Connecting Case Components.....	10
<i>Front Panel Header.....</i>	12
Installing Hardware.....	13
<i>Installing the Processor.....</i>	13
<i>Installing Memory Modules.....</i>	15
<i>Installing a Hard Disk Drive/CD-ROM/SATA Hard Drive.....</i>	17
<i>Installing a Floppy Diskette Drive.....</i>	19
<i>Installing Add-on Cards.....</i>	20
<i>Connecting Optional Devices.....</i>	22
Connecting I/O Devices.....	25
Chapter 3	27
Using BIOS	27
About the Setup Utility.....	27
<i>The Standard Configuration.....</i>	27
<i>Entering the Setup Utility.....</i>	27
<i>Updating the BIOS.....</i>	29
Using BIOS.....	29
<i>Standard CMOS Features.....</i>	30
<i>Advanced BIOS Features.....</i>	32
<i>Advanced Chipset Features.....</i>	34

<i>Integrated Peripherals</i>	37
<i>Power Management Setup</i>	40
<i>PNP/PCI Configurations</i>	42
<i>PC Health Status</i>	43
<i>Frequency/Voltage Control</i>	44
<i>Load Performance</i>	45
<i>Load Optimized Defaults</i>	45
<i>Set Supervisor/User Password</i>	45
<i>Save & Exit Setup</i>	46
<i>Exit Without Saving</i>	46

Chapter 4 **47**

Using the Motherboard Software **47**

About the Software CD-ROM.....	47
Auto-installing under Windows 2000/XP.....	47
<i>Running Setup</i>	48
Manual Installation.....	50
Utility Software Reference.....	50

Chapter 5 **51**

ATI CrossFire™ Technology Support **51**

Requirements.....	51
Installing a single graphics card.....	51
Installing CrossFire™ graphics cards.....	52
BIOS Setup.....	54
Installing the device drivers.....	55
Using the Catalyst™ Control Center.....	55
<i>Launching the Catalyst™ Control C</i>	55
The Catalyst™ Control Center Dialog Box.....	56
<i>View</i>	56
<i>To enable CrossFire^T</i>	56

Multi-Language Translation

Chapter 1

Introducing the Motherboard

Introduction

Thank you for choosing this motherboard. This motherboard is a high performance, enhanced function motherboard that supports Socket 939 AMD Sempron/Athlon 64/Athlon 64 FX/Athlon 64 X2 CPUs for high-end business or personal desktop markets.

The motherboard incorporates the RD480 Northbridge (NB) and SB450 Southbridge (SB) chipsets. The Northbridge on this motherboard supports the HyperTransport (HT) interface speeds up to 2000MT/s data rate. It supports four DDR Sockets with up to maximum memory size of 4 GB. Two PCI Express x16 slots, intended for Graphics Interface, are fully compliant to the PCI Express Base Specification revision 1.0a.

The SB450 Southbridge on this motherboard supports two PCI slots which are PCI 2.3 compliant. It implements an EHCI compliant interface that provides 480Mb/s bandwidth for eight USB 2.0 ports (rear panel x 4, header x 4). Two onboard IDE connectors supports 4 IDE devices in UDMA 133/100/66/33 modes. The Southbridge integrates a Serial ATA host controller that is SATA v1.0 compliant, supporting four SATA ports with maximum transfer rate up to 1.5 Gb/s each.

The motherboard is equipped with advanced full set of I/O ports in the rear panel, including PS/2 mouse and keyboard connectors, COM1, four USB ports, one optional LAN port, and audio jacks for microphone, line-in and line-out.

Feature

Processor

The motherboard uses an 939-pin socket that carries the following features:

- Accommodates AMD Sempron/Athlon 64/Athlon 64 FX/Athlon 64 X2 processors
- Supports up to 2000MT/s HyperTransport™ (HT) interface speeds

HyperTransport™ Technology is a point-to-point link between two devices, it enables integrated circuits to exchange information at much higher speeds than currently available interconnect technologies.

Chipset

The RD480 Northbridge (NB) and SB450 Southbridge (SB) chipsets are based on an innovative and scalable architecture with proven reliability and performance.

- | | |
|-------------------|---|
| RD480 (NB) | <ul style="list-style-type: none"> • 1 x 2 (expandable to x 4) A-Link Express interface (PCI Express 1.0a compliant) for connection to the ATI IXP • Supports one PCI Express x16 for Graphics Interface, fully compliant to the PCI Express Base Specification revision 1.0a. • Supports Single chip solution in 0.13 micron, 1.0-1.2v CMOS technology |
| SB450 (SB) | <ul style="list-style-type: none"> • 2/4-lane A-Link Express interface (PCI Express 1.0a compliant) to RADEON IGP's • Compliant with PCI 2.3 specification, up to 7 bus master devices supported • Four Serial ATA devices supported, compliant with Serial ATA 1.0 specification • Integrated USB 2.0 Host Controller supporting up to eight USB 2.0 ports • Integrated IDE controller supports Ultra DMA 133/100/66/33 modes |

Memory

- DDR 400/333/266 DDR SDRAM with Dual Channel supported
- Accommodates four unbuffered DIMMs, up to 4 GB maximum memory size

Onboard LAN (Optional)

This motherboard may support either of the following LAN feature:

- | |
|---|
| <ul style="list-style-type: none"> • Supports 100/10 Mb/s N-Way Auto negotiation operation • Half/Full duplex capability • Supports Wake-On-LAN(WOL) function and remote wake-up |
| <ul style="list-style-type: none"> • Integrate 10/100/1000 transceiver • Supports PCI v2.3, 32-bit, 33/66MHz • Supports fully with IEEE802.3, IEEE802.3u and IEEE802.3ab |

1394 FireWire (Optional)

- Fully compliant with provisions of IEEE Std 1394-1995 for a high-performance serial bus and IEEE Std 1394a-2000
- Two IEEE Std 1394a-2000 fully compliant cable ports at 100/200/400 Mb/s

Introducing the Motherboard

Audio

This motherboard may support either of the following Audio feature:

- | |
|--|
| <ul style="list-style-type: none"> • Compliant with the AC'97 v2.3 CODEC • Supports 6-channel audio CODEC designed for PC multimedia systems • Provides three analog line-level stereo inputs with 5-bit volume control: Line-in, CD, AUX • Meets Microsoft WHQL/WLP 2.0 audio requirements |
| <ul style="list-style-type: none"> • Compliant with Intel High Definition Audio, supporting 8-channel DACs with 95dB S/N ratio • Compabilities: 192/96/48/44.1 KHz with 24/20/16 bits • Power support: Digital: 3.3V; Analog: 3.3V/5.0V • All analog jacks are stereo input and output re-tasking for analog plug & play • Meets Microsoft WHQL/WLP 2.0 audio requirements • Direct Sound 3D™ compatible • Dolby Digital Encoder output for consumer electronic application |

Expansion Options

The motherboard comes with the following expansion options:

- Two PCI Express x16 for Graphic Interfaces
- Two PCI Express x1 slots
- Two 32-bit PCI v2.3 compliant slots
- Two 40-pin IDE connectors supporting up to 4 IDE devices
- One floppy disk drive interface
- Four 7-pin SATA connectors

The motherboard supports UltraDMA bus mastering with transfer rates of 133/100/66/33 MB/s.

Integrated I/O

The motherboard has a full set of I/O ports and connectors:

- Two PS/2 ports for mouse and keyboard
- One parallel port with cable
- One serial port
- Four USB ports
- One LAN port (optional)
- Audio jacks for microphone, line-in and 8-ch High Definition Audio output

BIOS Firmware

This motherboard uses AWARD BIOS that enables users to configure many system features including the following:

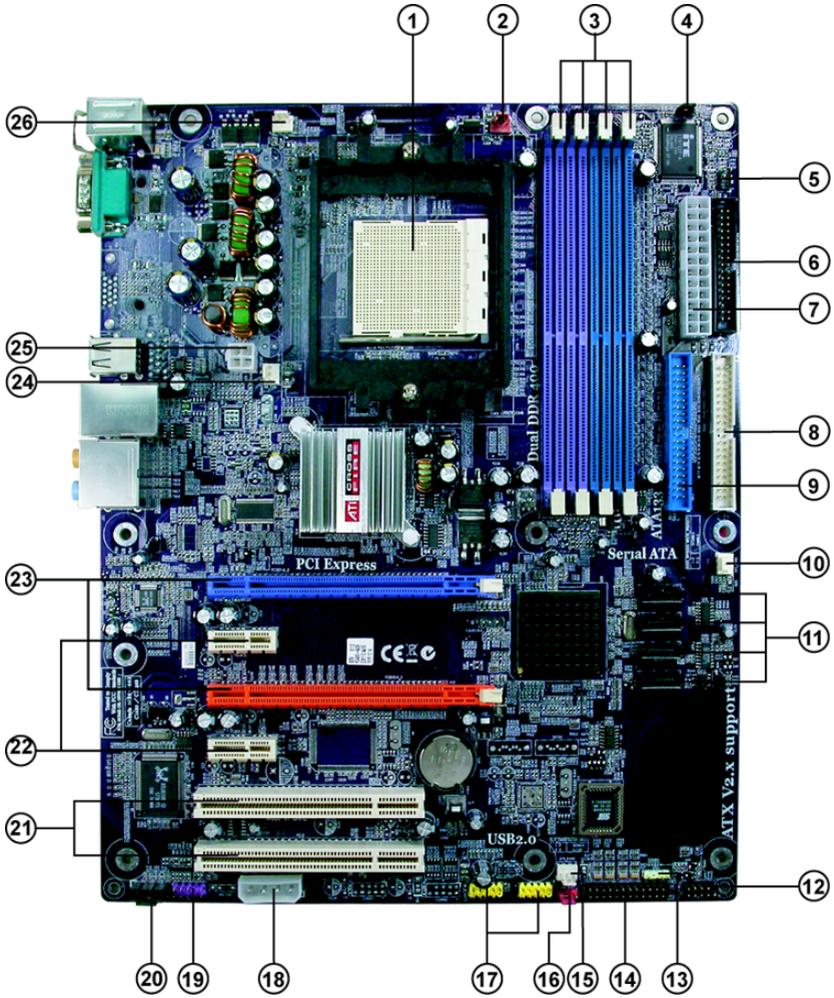
- Power management
- Wake-up alarms
- CPU parameters
- CPU and memory timing

The firmware can also be used to set parameters for different processor clock speeds.



Some hardware specifications and software items are subject to change with out prior notice.

Motherboard Components



Introducing the Motherboard

Table of Motherboard Components

LABEL	COMPONENT
1 CPU Socket	Socket 939 for AMD K8 processor
2 CPU_FAN	CPU cooling fan connector
3 DIMM1~2	184-pin DDR SDRAM slots
4 BIOS_WP	BIOS protection jumper
5 IR1	Infrared header
6 FDD	Floppy diskette drive connector
7 ATX_POWER	Standard 24-pin ATX power connector
8 IDE2	Secondary IDE channel
9 IDE1	Primary IDE channel
10 SYS_FAN1	System cooling fan connector
11 SATA1~4	Serial ATA connectors
12 PANEL1	Front panel switch/LED header
13 SPK1	Speaker header
14 LPT1	Parallel Port header
15 SYS_FAN3	System cooling fan connector
16 CLR_CMOS	Clear CMOS jumper
17 USB3-4	Front Panel USB headers
18 ATX4P1	Auxiliary power connector for graphics cards
19 AUDIO1	Front panel audio header
20 CD_IN	Analog audio input connector
21 PCI1~2	32-bit add-on card slots
22 PCIE1~2	PCI Express x1 slots
23 PCIE16_1~2	PCI Express x16 graphics card slots
24 NB_FAN	Northbridge cooling fan connector
25 ATX12V	4-pin +12V power connector
26 SYS_FAN2	System cooling fan connector

^{“*”} stands for optional components.

This concludes Chapter 1. The next chapter explains how to install the motherboard.

Memo

Chapter 2

Installing the Motherboard

Safety Precautions

- Follow these safety precautions when installing the motherboard
- Wear a grounding strap attached to a grounded device to avoid damage from static electricity
- Discharge static electricity by touching the metal case of a safely grounded object before working on the motherboard
- Leave components in the static-proof bags they came in
- Hold all circuit boards by the edges. Do not bend circuit boards

Choosing a Computer Case

There are many types of computer cases on the market. The motherboard complies with the specifications for the ATX system case. First, some features on the motherboard are implemented by cabling connectors on the motherboard to indicators and switches on the system case. Make sure that your case supports all the features required. Secondly, this motherboard supports one or two floppy diskette drives and four enhanced IDE drives. Make sure that your case has sufficient power and space for all drives that you intend to install.

Most cases have a choice of I/O templates in the rear panel. Make sure that the I/O template in the case matches the I/O ports installed on the rear edge of the motherboard.

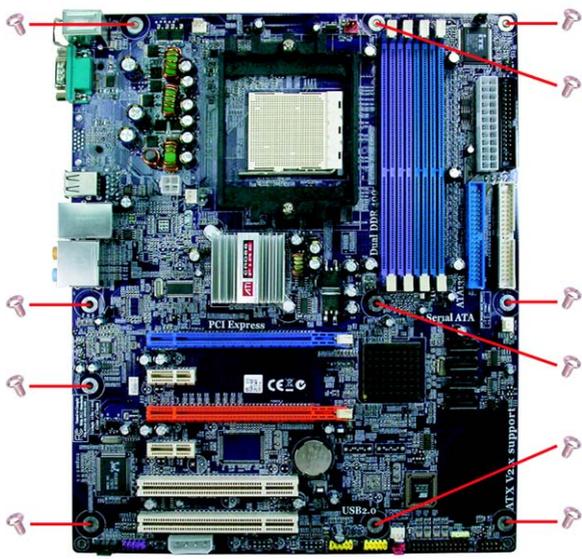
This motherboard carries an ATX form factor of 305 x 244 mm. Choose a case that accommodates this form factor.

Installing the Motherboard in a Case

Refer to the following illustration and instructions for installing the motherboard in a case.

Most system cases have mounting brackets installed in the case, which correspond the holes in the motherboard. Place the motherboard over the mounting brackets and secure the motherboard onto the mounting brackets with screws.

Ensure that your case has an I/O template that supports the I/O ports and expansion slots on your motherboard.



Do not over-tighten the screws as this can stress the motherboard.

Checking Jumper Settings

This section explains how to set jumpers for correct configuration of the motherboard.

Setting Jumpers

Use the motherboard jumpers to set system configuration options. Jumpers with more than one pin are numbered. When setting the jumpers, ensure that the jumper caps are placed on the correct pins.

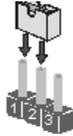
The illustrations show a 2-pin jumper. When the jumper cap is placed on both pins, the jumper is SHORT. If you remove the jumper cap, or place the jumper cap on just one pin, the jumper is OPEN.



SHORT



OPEN



This illustration shows a 3-pin jumper. Pins 1 and 2 are SHORT

Checking Jumper Settings

The following illustration shows the location of the motherboard jumpers. Pin 1 is labeled.



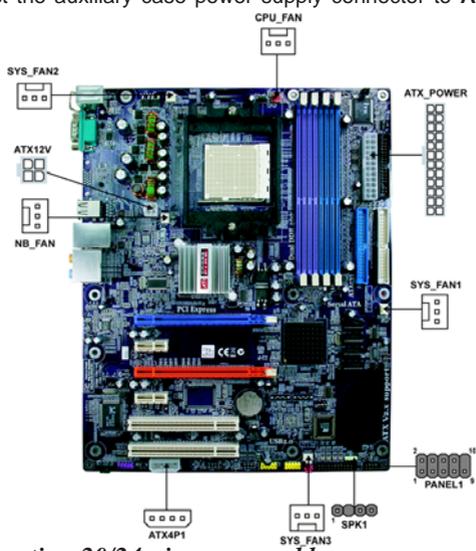
Jumper Settings

Jumper	Type	Description	Setting (default)	
CLR_CMOS	3-pin	CLEAR CMOS	1-2: NORMAL 2-3: CLEAR Before clearing the CMOS, make sure to turn off the system.	CLR_CMOS  1
BIOS_WP	3-pin	BIOS WRITE PROTECT	1-2: DISABLE 2-3: ENABLE	BIOS_WP  1

Connecting Case Components

After you have installed the motherboard into a case, you can begin connecting the motherboard components. Refer to the following:

- 1 Connect the CPU cooling fan cable to **CPU_FAN**.
- 2 Connect the system cooling fan connector to **SYS_FAN1~SYS_FAN3**.
- 3 Connect the Northbridge cooling fan connector to **NB_FAN**.
- 4 Connect the case switches and indicator LEDs to the **PANEL1**.
- 5 Connect the case speaker cable to **SPK1**.
- 5 Connect the standard power supply connector to **ATX_POWER**.
- 6 Connect the auxiliary case power supply connector to **ATX12V**.



Connecting 20/24-pin power cable

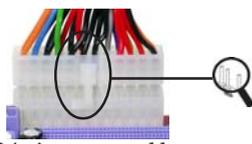


Users please note that the 20-pin and 24-pin power cables can both be connected to the ATX_POWER connector. With the 20-pin power cable, just align the 20-pin power cable with the pin 1 of the ATX_POWER connector. However, using 20-pin power cable may cause the system to become unbootable or unstable because of insufficient electricity. A minimum power of 300W is recommended for a fully-configured system.



20-pin power cable

With ATX v1.x power supply, users please note that when installing 20-pin power cable, the latches of power cable clings to the left side of the ATX_POWER connector latch, just as the picture shows.



24-pin power cable

With ATX v2.x power supply, users please note that when installing 24-pin power cable, the latches of power cable clings to the right side of the ATX_POWER connector latch.

CPU_FAN/SYS_FAN1~3/NB_FAN: FAN Power Connectors

Pin	Signal Name	Function
1	GND	System Ground
2	+12V	Power +12V
3	Sense	Sensor

ATX12V: ATX 12V Power Connector

Pin	Signal Name
1	Ground
2	Ground
3	+12V
4	+12V

ATX_POWER: ATX 24-pin Power Connector

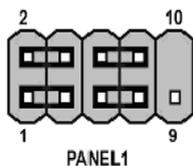
Pin	Signal Name	Pin	Signal Name
1	+3.3V	13	+3.3V
2	+3.3V	14	-12V
3	Ground	15	GND
4	+5V	16	PS_ON
5	Ground	17	GND
6	+5V	18	GND
7	Ground	19	GND
8	PWRGD	20	-5V
9	+5VSB	21	+5V
10	+12V	22	+5V
11	+12V	23	+5V
12	+3.3V	24	GND

SPK1: Internal Speaker Header

Pin	Signal Name
1	VCC
2	NC
3	Ground
4	Signal

Front Panel Header

The front panel header (PANEL1) provides a standard set of switch and LED headers commonly found on ATX or Micro ATX cases. Refer to the table below for information:



Pin	Signal	Function	Pin	Signal	Function
1	HD_LED_P	Hard disk LED(+)	2	FP PWR/SLP	*MSG LED(+)
3	HD_LED_N	Hard disk LED(-)	4	FP PWR/SLP	*MSG LED(-)
5	RST_SW_N	Reset Switch(-)	6	PWR_SW_P	Power Switch(+)
7	RST_SW_P	Reset Switch(+)	8	PWR_SW_N	Power Switch(-)
9	RSVD	Reserved	10	Key	No pin

* MSG LED (dual color or single color)

Hard Drive Activity LED

Connecting pins 1 and 3 to a front panel mounted LED provides visual indication that data is being read from or written to the hard drive. For the LED to function properly, an IDE drive should be connected to the onboard IDE interface. The LED will also show activity for devices connected to the SATA (hard drive activity LED) connector.

Power/Sleep/Message waiting LED

Connecting pins 2 and 4 to a single or dual-color, front panel mounted LED provides power on/off, sleep, and message waiting indication.

Reset Switch

Supporting the reset function requires connecting pin 5 and 7 to a momentary-contact switch that is normally open. When the switch is closed, the board resets and runs POST.

Power Switch

Supporting the power on/off function requires connecting pins 6 and 8 to a momentary-contact switch that is normally open. The switch should maintain contact for at least 50 ms to signal the power supply to switch on or off. The time requirement is due to internal debounce circuitry. After receiving a power on/off signal, at least two seconds elapses before the power supply recognizes another on/off signal.

Installing Hardware

Installing the Processor



Caution: When installing a CPU heatsink and cooling fan make sure that you DO NOT scratch the motherboard or any of the surface-mount resistors with the clip of the cooling fan. If the clip of the cooling fan scrapes across the motherboard, you may cause serious damage to the motherboard or its components.

On most motherboards, there are small surface-mount resistors near the processor socket, which may be damaged if the cooling fan is carelessly installed.

Avoid using cooling fans with sharp edges on the fan casing and the clips. Also, install the cooling fan in a well-lit work area so that you can clearly see the motherboard and processor socket.

Before installing the Processor

This motherboard automatically determines the CPU clock frequency and system bus frequency for the processor. You may be able to change these settings by making changes to jumpers on the motherboard, or changing the settings in the system Setup Utility. We strongly recommend that you do not over-clock processors or other components to run faster than their rated speed.



Warning: Over-clocking components can adversely affect the reliability of the system and introduce errors into your system. Over-clocking can permanently damage the motherboard by generating excess heat in components that are run beyond the rated limits.

This motherboard has a Socket 939 processor socket. When choosing a processor, consider the performance requirements of the system. Performance is based on the processor design, the clock speed and system bus frequency of the processor, and the quantity of internal cache memory and external cache memory.

CPU Installation Procedure

The following illustration shows CPU installation components.

- 1 Install your CPU. Pull up the lever away from the socket and lift up to 90-degree angle.
- 2 Locate the CPU cut edge (the corner with the pin hold noticeably missing). Align and insert the CPU correctly.
- 3 Press the lever down and apply thermal grease on top of the CPU.
- 4 Put the CPU Fan down on the retention module and snap the four retention legs of the cooling fan into place.
- 5 Flip the levers over to lock the heat sink in place and connect the CPU cooling Fan power cable to the CPUFAN connector. This completes the installation.



To achieve better airflow rates and heat dissipation, we suggest that you use a high quality fan with 4800 rpm at least. CPU fan and heatsink installation procedures may vary with the type of CPU fan/heatsink supplied. The form and size of fan/heatsink may also vary.

Installing Memory Modules

This motherboard accommodates four memory modules. It can support four 184-pin unbuffered DIMM, DDR 400/333/266. The maximum memory capacity is 4GB.

DDR SDRAM memory module table

Memory module	Memory Bus
<i>DDR 266</i>	<i>133MHz</i>
<i>DDR 333</i>	<i>166MHz</i>
<i>DDR 400</i>	<i>200MHz</i>

You must install at least one module in any of the two slots. Each module can be installed with 256MB to 1GB of memory. **Based on Dual DDR structure, when only one DDR SDRAM DIMM is available, please insert it to DIMM1 slot, rather than DIMM2 slot, in case that the system may not boot.**



Do not remove any memory module from its antistatic packaging until you are ready to install it on the motherboard. Handle the modules only by their edges. Do not touch the components or metal parts. Always wear a grounding strap when you handle the modules.

Installation Procedure

Refer to the following to install the memory modules.

- 1 This motherboard supports unbuffered DDR SDRAM .
- 2 Push the latches on each side of the DIMM slot down.
- 3 Align the memory module with the slot. The DIMM slots are keyed with notches and the DIMMs are keyed with cutouts so that they can only be installed correctly.
- 4 Check that the cutouts on the DIMM module edge connector match the notches in the DIMM slot.
- 5 Install the DIMM module into the slot and press it firmly down until it seats correctly. The slot latches are levered upwards and latch on to the edges of the DIMM.
- 6 Install any remaining DIMM modules.



Table A: Unbuffered DIMM Support for 939-pin

Data Bus	Chip Selects				Maximum DRAM Speed	
	MEMCS_1L_L*	MEMCS_1H_L*	MEMCS_2L_L*	MEMCS_2H_L*	1T	2T
64-bits	Single rank	N/A	N/A	N/A	DDR400	DDR400
	Double rank	N/A	N/A	N/A	DDR400	DDR400
	N/A	N/A	Single rank	N/A	DDR400	DDR400
	N/A	N/A	Double rank	N/A	DDR400	DDR400
	Single rank	N/A	Single rank	N/A	DDR333	DDR400
	Single rank	N/A	Double rank	N/A	DDR200	DDR400
	Double rank	N/A	Single rank	N/A	DDR200	DDR400
128-bits	Single rank	Single rank	N/A	N/A	DDR400	DDR400
	Double rank	Double rank	N/A	N/A	DDR400	DDR400
	N/A	N/A	Single rank	Single rank	DDR400	DDR400
	N/A	N/A	Double rank	Double rank	DDR400	DDR400
	Single rank	Single rank	Single rank	Single rank	DDR333	DDR400
	Single rank	Single rank	Double rank	Double rank	DDR200	DDR400
	Double rank	Double rank	Single rank	Single rank	DDR200	DDR400
	Double rank	Double rank	Double rank	Double rank	DDR200	DDR333

Note for “*”: Memory types must be set to values consistent with system hardware.

Table B: DDR(memory module) QVL (Qualified Vendor List)

The following DDR400 memory modules have been tested and qualified for use with this motherboard.

Size	Vendor	Module Name
128MB	Infineon	HYS64D16301GU-5-B
	NANYA	NT128D64SH4B1G-5
	NANYA	NT128D64SH4B1G-5T
256MB	Infineon	HYS64D32300GU-5-B
	Infineon	HYS64D32300HU-5-C
	Micron	MT8VDDT3264AG-40BC4
	NANYA	NT256D64S88B1G-5T
	Ramaxel	HYB25D256800CE-5C
	SAMSUNG	M368L3223DTM-CC4
512MB	Apacer	V58C2256804SAT5
	Apacer	HYB25D256800BT-5B
	Infineon	HYS64D64320HU-5-C
	NANYA	NT1GD64S8HB0G-5T
1GB	NANYA	NT512D64S8HB1G-5T

Installing a Hard Disk Drive/CD-ROM/SATA Hard Drive

This section describes how to install IDE devices such as a hard disk drive and a CD-ROM drive.

About IDE Devices

Your motherboard has two IDE channel interfaces (IDE1 & IDE2). Two IDE ribbon cables supporting four IDE devices is bundled with the motherboard.



You must orient the cable connector so that the pin1 (color) edge of the cable corresponds to the pin 1 of the I/O port connector.

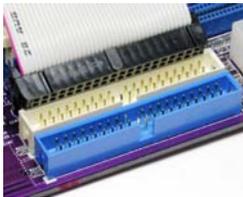
IDE1: Primary IDE Connector

The first hard drive should always be connected to IDE1.



IDE2: Secondary IDE Connector

The second drive on this controller must be set to slave mode. The configuration is the same as IDE1.



IDE devices enclose jumpers or switches used to set the IDE device as MASTER or SLAVE. Refer to the IDE device user's manual. Installing two IDE devices on one cable, ensure that one device is set to MASTER and the other device is set to SLAVE. The documentation of your IDE device explains how to do this.

About SATA Connectors

This motherboard features four SATA connectors supporting a total of four drives. SATA , or Serial ATA (Advanced Technology Attachment) is the standard interface for the IDE hard drives which are currently used in most PCs. These connectors are well designed and will only fit in one orientation. Locate the SATA connectors on the motherboard and follow the illustration below to install the SATA hard drives.

Installing Serial ATA Hard Drives

To install the Serial ATA (SATA) hard drives, use the SATA cable that supports the Serial ATA protocol. This SATA cable comes with an SATA power cable. You can connect either end of the SATA cable to the SATA hard drive or the connector on the motherboard.



SATA cable (optional)



SATA power cable (optional)

Refer to the illustration below for proper installation:

- 1 Attach either cable end to the connector on the motherboard.
- 2 Attach the other cable end to the SATA hard drive.
- 3 Attach the SATA power cable to the SATA hard drive and connect the other end to the power supply.



This motherboard does not support the “Hot-Plug” function.

Installing a Floppy Diskette Drive

The motherboard has a floppy diskette drive (FDD) interface and ships with a diskette drive ribbon cable that supports one or two floppy diskette drives. You can install a 5.25-inch drive and a 3.5-inch drive with various capacities. The floppy diskette drive cable has one type of connector for a 5.25-inch drive and another type of connector for a 3.5-inch drive.



You must orient the cable connector so that the pin 1 (color) edge of the cable corresponds to the pin 1 of the I/O port connector.

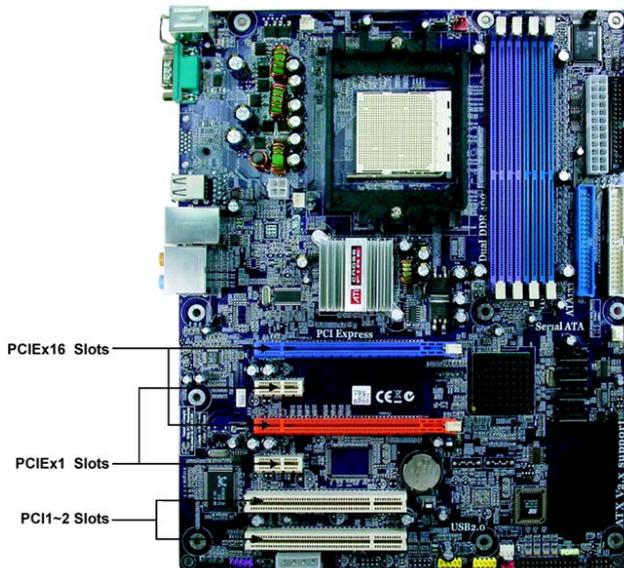
FDD: Floppy Disk Connector

This connector supports the provided floppy drive ribbon cable. After connecting the single end to the onboard floppy connector, connect the remaining plugs on the other end to the floppy drives correspondingly.



Installing Add-on Cards

The slots on this motherboard are designed to hold expansion cards and connect them to the system bus. Expansion slots are a means of adding or enhancing the motherboard's features and capabilities. With these efficient facilities, you can increase the motherboard's capabilities by adding hardware that performs tasks that are not part of the basic system.



PCIEx16 Slot The two PCI Express x16 slots are used to install an external PCI Express graphics card that is fully compliant to the PCI Express Base Specification revision 1.0a.

PCIEx1 Slot The two PCI Express x1 slots are used to install an external PCI Express graphics card that is fully compliant to the PCI Express Base Specification revision 1.0a.

PCI 1~2 Slots This motherboard is equipped with two standard PCI slots. PCI stands for Peripheral Component Interconnect and is a bus standard for expansion cards, which for the most part, is a supplement of the older ISA bus standard. The PCI slots on this board are PCI v2.3 compliant.



Before installing an add-on card, check the documentation for the card carefully. If the card is not Plug and Play, you may have to manually configure the card before installation.

Follow these instructions to install an add-on card:

- 1 Open the chassis and then remove the slot bracket from the case where you will be installing the expansion cards.
- 2 Install your graphics card in the proper slot by pressing the card firmly into the slot.
- 3 Drive in the screw to secure the slot bracket of the expansion card.
- 4 Replace your computer's chassis cover.
- 5 Power on the computer, if necessary, set up BIOS utility of expansion card from BIOS.
- 6 Install related driver to complete the installation.



Installing one graphics card



Installing two graphics cards

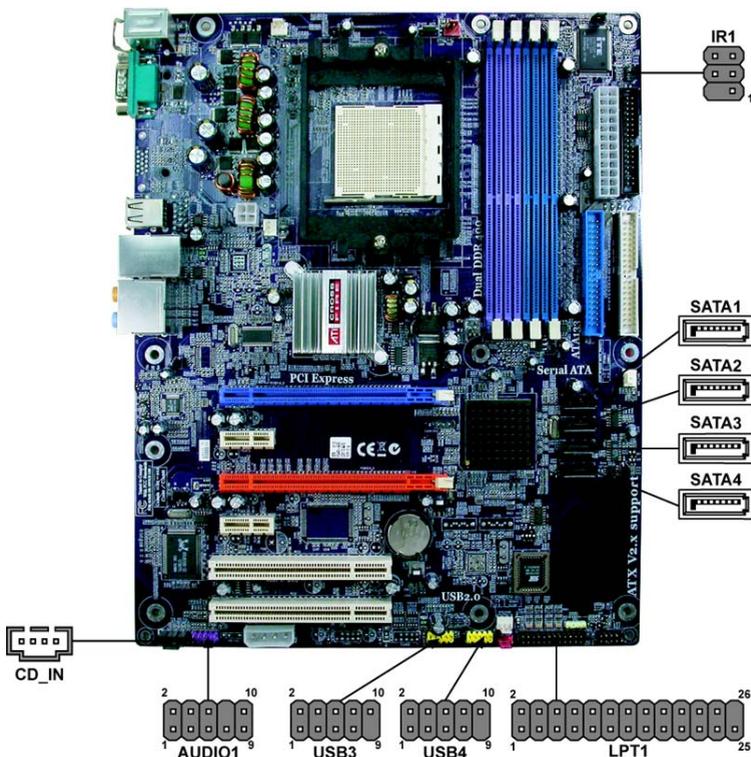


With one PCI Express Graphics card, install it into PCIEX16_1 slot, and insert the “SHUNT CARD” into the PCIEX16_2 slot. With two PCI Express Graphics cards, set them up onto PCIEX16_1 and PCIEX16_2 slots, and then plug in the external cable to unite the multi-GPU for CrossFire™ mode.

Please go to Chapter 5 to see detail information for CrossFire™ technology.

Connecting Optional Devices

Refer to the following for information on connecting the motherboard's optional devices:



USB3/4: Front Panel USB header

The motherboard has four USB ports installed on the rear edge I/O port array. Additionally, there are two USB headers onboard. Use the auxiliary USB headers to connect the front-mounted ports to the motherboard.

Pin	Signal Name	Function
1	USBPWR	Front Panel USB Power
2	USBPWR	Front Panel USB Power
3	USB_FP_P0-	USB Port 0 Negative Signal
4	USB_FP_P1-	USB Port 1 Negative Signal
5	USB_FP_P0+	USB Port 0 Positive Signal
6	USB_FP_P1+	USB Port 1 Positive Signal
7	GND	Ground
8	GND	Ground
9	Key	No pin
10	USB_FP_OC0	Overcurrent signal

AUDIO1: Front Panel Audio header

This header allows the user to install auxiliary front-oriented microphone and line-out ports for easier access.

Pin	Signal Name	Function
1	AUD_MIC	Front Panel Microphone input signal
2	AUD_GND	Ground used by Analog Audio Circuits
3	AUD_MIC_BIAS	Microphone Power
4	AUD_VCC	Filtered +5V used by Analog Audio Circuits
5	AUD_F_R	Right Channel audio signal to Front Panel
6	AUD_RET_R	Right Channel Audio signal to Return from Front Panel
7	REVD	Reserved
8	Key	No Pin
9	AUD_F_L	Left Channel Audio signal to Front Panel
10	AUD_RET_L	Left Channel Audio signal to Return from Front Panel

SATA1/2/3/4: Serial ATA connectors

These connectors are used to support the new Serial ATA devices for the highest data transfer rates (1.5 Gb/s), simpler disk drive cabling and easier PC assembly. It eliminates limitations of the current Parallel ATA interface. But maintains register compatibility and software compatibility with Parallel ATA.

Pin	Signal Name	Pin	Signal Name
1	Ground	2	TX+
3	TX-	4	Ground
5	RX-	6	RX+
7	Ground	-	-

IR1: Infrared port

The motherboard supports an Infrared (IR1) data port. Infrared ports allow the wireless exchange of information between your computer and similarly equipped devices such as printers, laptops, Personal Digital Assistants (PDAs), and other computers.

Pin	Signal Name	Function
1	Not Assigned	Not assigned
2	Key	No pin
3	+5V	IR Power
4	GND	Ground
5	IRTX	IrDA serial output
6	IRTX	IrDA serial input

CD_IN: Analog audio input header

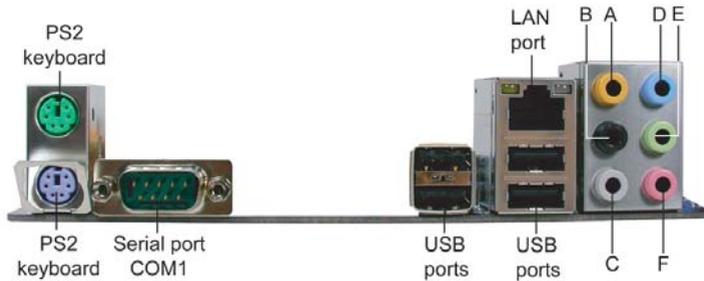
Pin	Signal Name	Function
1	CDL	Left CD-in signal
2	CDG	CD-in ground
3	CDG	CD-in ground
4	CDR	Right CD-in signal

LPT: Parallel Port Header

Pin	Signal Name	Function	Pin	Signal Name	Function
1	STB	Strobe	2	PPD0	Data 0
3	PPD1	Data 1	4	PPD2	Data 2
5	PPD3	Data 3	6	PPD4	Data 4
7	PPD5	Data 5	8	PPD6	Data 6
9	PPD7	Data 7	10	ACK	Acknowledge
11	BUSY	Busy	12	PE	Paper End
13	SLCT	Select	14	AFD	Auto Feed
15	ERROR	Error	16	INIT	Initialize
17	SLIN	Select In	18	GND	Chassis Ground
19	GND	Chassis Ground	20	GND	Chassis Ground
21	GND	Chassis Ground	22	GND	Chassis Ground
23	GND	Chassis Ground	24	GND	Chassis Ground
25	GND	Chassis Ground	26	NC	Not connected

Connecting I/O Devices

The backplane of the motherboard has the following I/O ports:



PS2 Mouse Use the upper PS/2 port to connect a PS/2 pointing device.

PS2 Keyboard Use the lower PS/2 port to connect a PS/2 keyboard.

Serial Port (COM1) Use the COM port to connect serial devices such as mice or fax/modems. COM1 is identified by the system as COM1/3.

LAN Port (optional) Connect an RJ-45 jack to the LAN port to connect your computer to the Network.

USB Ports Use the USB ports to connect USB devices.

Audio Ports Use the audio jacks to connect audio devices. The D port is for stereo line-in signal, while the F port is for microphone in signal. This motherboard supports 8-channel audio devices that correspond to the A, B, C, and E port respectively. In addition, all of the 3 ports, B, C, and E provide users with both right & left channels individually. Users please refer to the following note for specific port function definition.



A: Center & Woofers	D: Line-in
B: Back Surround	E: Front Out
C: Side Surround	F: Mic_in Rear

The above port definition can be changed to audio input or audio output by changing the driver utility setting.

This concludes Chapter 2. The next chapter covers the BIOS.

Memo

Chapter 3

Using BIOS

About the Setup Utility

The computer uses the latest Award BIOS with support for Windows Plug and Play. The CMOS chip on the motherboard contains the ROM setup instructions for configuring the motherboard BIOS.

The BIOS (Basic Input and Output System) Setup Utility displays the system's configuration status and provides you with options to set system parameters. The parameters are stored in battery-backed-up CMOS RAM that saves this information when the power is turned off. When the system is turned back on, the system is configured with the values you stored in CMOS.

The BIOS Setup Utility enables you to configure:

- Hard drives, diskette drives and peripherals
- Video display type and display options
- Password protection from unauthorized use
- Power Management features

The settings made in the Setup Utility affect how the computer performs. Before using the Setup Utility, ensure that you understand the Setup Utility options.

This chapter provides explanations for Setup Utility options.

The Standard Configuration

A standard configuration has already been set in the Setup Utility. However, we recommend that you read this chapter in case you need to make any changes in the future.

This Setup Utility should be used:

- when changing the system configuration
- when a configuration error is detected and you are prompted to make changes to the Setup Utility
- when trying to resolve IRQ conflicts
- when making changes to the Power Management configuration
- when changing the password or making other changes to the Security Setup

Entering the Setup Utility

When you power on the system, BIOS enters the Power-On Self Test (POST) routines. POST is a series of built-in diagnostics performed by the BIOS. After the POST routines are completed, the following message appears:

Updating the BIOS

You can download and install updated BIOS for this motherboard from the manufacturer's Web site. New BIOS provides support for new peripherals, improvements in performance, or fixes for known bugs. Install new BIOS as follows:

- 1 If your motherboard has a BIOS protection jumper, change the setting to allow BIOS flashing.
- 2 If your motherboard has an item called Firmware Write Protect in Advanced BIOS features, disable it. (Firmware Write Protect prevents BIOS from being overwritten.)
- 3 Create a bootable system disk. (Refer to Windows online help for information on creating a bootable system disk.)
- 4 Download the Flash Utility and new BIOS file from the manufacturer's Web site. Copy these files to the system diskette you created in Step 3.
- 5 Turn off your computer and insert the system diskette in your computer's diskette drive. (You might need to run the Setup Utility and change the boot priority items on the Advanced BIOS Features Setup page, to force your computer to boot from the floppy diskette drive first.)
- 6 At the A:\ prompt, type the Flash Utility program name and press <Enter>.
- 7 Type the filename of the new BIOS in the "File Name to Program" text box. Follow the onscreen directions to update the motherboard BIOS.
- 8 When the installation is complete, remove the floppy diskette from the diskette drive and restart your computer. If your motherboard has a Flash BIOS jumper, reset the jumper to protect the newly installed BIOS from being overwritten.

Using BIOS

When you start the Setup Utility, the main menu appears. The main menu of the Setup Utility displays a list of the options that are available. A highlight indicates which option is currently selected. Use the cursor arrow keys to move the highlight to other options. When an option is highlighted, execute the option by pressing <Enter>.

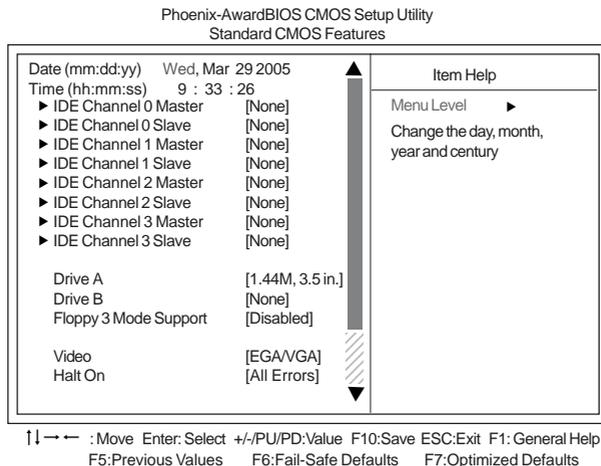
Some options lead to pop-up dialog boxes that prompt you to verify that you wish to execute that option. Other options lead to dialog boxes that prompt you for information.

Some options (marked with a triangle ►) lead to submenus that enable you to change the values for the option. Use the cursor arrow keys to scroll through the items in the submenu.

In this manual, default values are enclosed in parenthesis. Submenu items are denoted by a triangle ►.

Standard CMOS Features

This option displays basic information about your system.



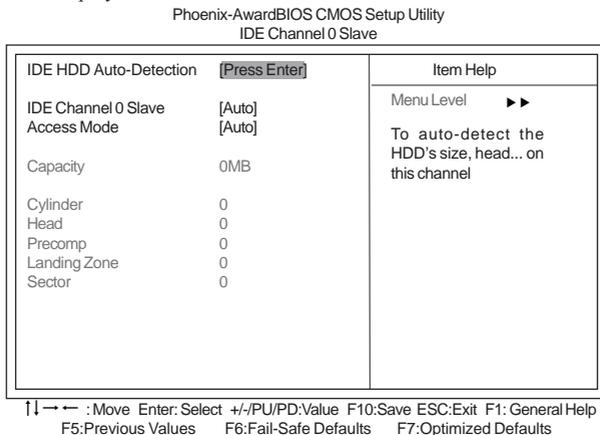
Date and Time

The Date and Time items show the current date and time on the computer. If you are running a Windows OS, these items are automatically updated whenever you make changes to the Windows Date and Time Properties utility.

▶ IDE Devices (None)

Your computer has two IDE channels (Primary and Secondary) and each channel can be installed with one or two devices (Master and Slave). Use these items to configure each device on the IDE channel.

Press <Enter> to display the IDE submenu:



IDE HDD Auto-Detection

Press <Enter> while this item is highlighted to prompt the Setup Utility to automatically detect and configure an IDE device on the IDE channel.



If you are setting up a new hard disk drive that supports LBA mode, more than one line will appear in the parameter box. Choose the line that lists LBA for an LBA drive.

IDE Channel 0/1 Master/Slave IDE/Extended IDE Drives (Auto)

Leave this item at Auto to enable the system to automatically detect and configure IDE devices on the channel. If it fails to find a device, change the value to Manual and then manually configure the drive by entering the characteristics of the drive in the items described below. Please note that if you choose IDE Channel 2/3 Master, the item may change to Extended IDE Drive.



Before attempting to configure a hard disk drive, ensure that you have the configuration information supplied by the manufacturer of your hard drive. Incorrect settings can result in your system not recognizing the installed hard disk.

Access Mode (Auto)

This item defines ways that can be used to access IDE hard disks such as LBA (Large Block Addressing). Leave this value at Auto and the system will automatically decide the fastest way to access the hard disk drive. If you choose IDE Channel 2/3 Master, the item only have Large and Auto.

Press <Esc> to return to the Standard CMOS Features page.

Drive A/Drive B (1.44M, 3.5 in./None)

These items define the characteristics of any diskette drive attached to the system. You can connect one or two diskette drives.

Floppy 3 Mode Support (Disabled)

Floppy 3 mode refers to a 3.5-inch diskette with a capacity of 1.2 MB. Floppy 3 mode is sometimes used in Japan.

Video (EGA/VGA)

This item defines the video mode of the system. This motherboard has a built-in VGA graphics system; you must leave this item at the default value.

Halt On (All Errors)

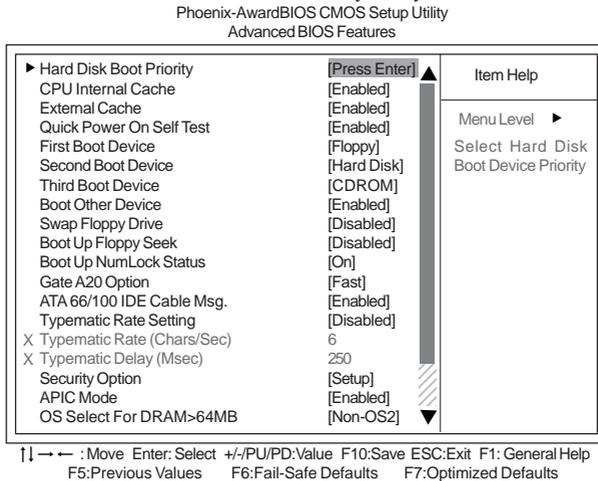
This item defines the operation of the system POST (Power On Self Test) routine. You can use this item to select which types of errors in the POST are sufficient to halt the system.

Base Memory, Extended Memory, and Total Memory

These items are automatically detected by the system at start up time. These are display-only fields. You cannot make changes to these fields.

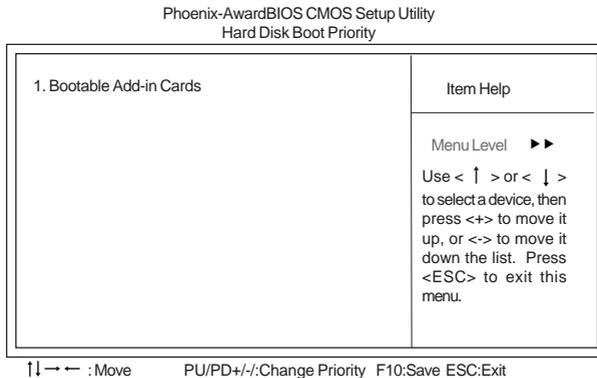
Advanced BIOS Features

This option defines advanced information about your system.



▶ Hard Disk Boot Priority (Press Enter)

Scroll to this item and press <Enter> to view the following screen:



CPU Internal Cache (Enabled)

All processors that can be installed in this motherboard use internal level 1 (L1) cache memory to improve performance. Leave this item at the default value for better performance.

External Cache (Enabled)

Most processors that can be installed in this system use external level 2 (L2) cache memory to improve performance. Leave this item at the default value for better performance.

Quick Power On Self Test (Enabled)

Enable this item to shorten the power on testing (POST) and have your system start up faster. You might like to enable this item after you are confident that your system hardware is operating smoothly.

First/Second/Third Boot Device (Floppy/Hard Disk/CDROM)

Use these three items to select the priority and order of the devices that your system searches for an operating system at start-up time.

Boot Other Device (Enabled)

When enabled, the system searches all other possible locations for an operating system if it fails to find one in the devices specified under the First, Second, and Third boot devices.

Swap Floppy Drive (Disabled)

If you have two floppy diskette drives in your system, this item allows you to swap the assigned drive letters so that drive A becomes drive B, and drive B becomes drive A.

Boot Up Floppy Seek (Disabled)

If this item is enabled, it checks the size of the floppy disk drives at start-up time. You don't need to enable this item unless you have a legacy diskette drive with 360K capacity.

Boot Up NumLock Status (On)

This item defines if the keyboard Num Lock key is active when your system is started.

Gate A20 Option (Fast)

This item defines how the system handles legacy software that was written for an earlier generation of processors. Leave this item at the default value.

ATA 66/100 IDE Cable Msg. (Enabled)

This item enables or disables the display of the ATA 66/100 Cable MSG.

Typematic Rate Setting (Disabled)

If this item is enabled, you can use the following two items to set the typematic rate and the typematic delay settings for your keyboard.

- **Typematic Rate (Chars/Sec):** Use this item to define how many characters per second are generated by a held-down key.
- **Typematic Delay (Msec):** Use this item to define how many milliseconds must elapse before a held-down key begins generating repeat characters.

Security Option (Setup)

If you have installed password protection, this item defines if the password is required at system start up, or if it is only required when a user tries to enter the Setup Utility.

APIC Mode (Enabled)

This item allows you to enable or disable the APIC (Advanced Programmable Interrupt Controller) mode. APIC provides symmetric multi-processing (SMP) for systems, allowing support for up to 60 processors.

OS Select For DRAM > 64 MB (Non-OS2)

This item is only required if you have installed more than 64 MB of memory and you are running the OS/2 operating system. Otherwise, leave this item at the default.

HDD S.M.A.R.T Capability (Disabled)

The S.M.A.R.T. (Self-Monitoring, Analysis, and Reporting Technology) system is a diagnostics technology that monitors and predicts device performance. S.M.A.R.T. software resides on both the disk drive and the host computer.

The disk drive software monitors the internal performance of the motors, media, heads and electronics of the drive. The host software monitors the overall reliability status of the drive. If a device failure is predicted, the host software, through the Client WORKS S.M.A.R.T applet, warns the user of the impending condition and advises appropriate action to protect the data.

Full Screen Logo Show (Enabled)

When enabled, this will show a full screen company logo on the boot up screen. Select disabled when you want to show POST messages during boot up.

Small Logo (EPA) Show (Disabled)

Enables or disables the display of the EPA logo during boot.

Advanced Chipset Features

These items define critical timing parameters of the motherboard. You should leave the items on this page at their default values unless you are very familiar with the technical specifications of your system hardware. If you change the values incorrectly, you may introduce fatal errors or recurring instability into your system.

Phoenix-AwardBIOS CMOS Setup Utility		
Advanced Chipset Features		
▶ DRAM Configuration	[Press Enter]	Item Help
▶ LDT & PCI Bus Control	[Press Enter]	Menu Level ▶
PCIE GFX Core Payload Size	[64 Bytes]	DRAM timing and control
PCIE GPP Core Payload Size	[64 Bytes]	
Dual Slot Configuration	[Disabled]	
GFX0 Link Width	[x16]	
GFX1 Link Width	x8	
GFX Multi Function Mode	[Disabled]	
AGP Aperture Size	[128MB]	
GFX Clock Mode	[Sync]	
X Async GFX Clock	200MHz	
X Async GFX Clock Source	14.318MHz OSC	
X MCLK Spread Spectrum	Disabled	
Dual-Mode Interleaving	[Disabled]	
Dynamic CKE	[Enabled]	
System BIOS Cacheable	[Disabled]	

↑↓ ← → : Move Enter: Select +/-/PU/PD: Value F10: Save ESC: Exit F1: General Help
F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

▶DRAM Configuration(Press Enter)

Scroll to this item and press <Enter> to view the following screen:

Phoenix-AwardBIOS CMOS Setup Utility		
DRAM Configuration		
Timing Mode	[Auto]	Item Help
X Memclock index value (MHz)	200Mhz	Menu Level ▶▶
X CAS# latency (Tcl)	2.5	
X Min RAS# active time (Tras)	8T	
X RAS# to CAS# delay (Trcd)	4T	
X Row precharge Time (Trp)	4T	
X Row to Row delay (Trrd)	2T	
X Row cycle time (Trc)	12T	
X Row refresh cyc time (Trfc)	24T	
User Config mode	[Auto]	
X 1T/2T Memory Timing	2T	
X Read Preamble value	6ns	
X Async Latency value	6ns	

↑↓ ← → : Move Enter: Select +/-/PU/PD: Value F10: Save ESC: Exit F1: General Help
F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

Timing Mode (Auto)

This item allows you to set up the DRAM timing manually or automatically.

- **Memclock index value (Mhz) (200MHz):** When DDR Timing Setting by is set to Manual, use this item to set the DRAM frequency.
- **CAS# latency (Tcl) (2.5):** This item determines the operation of SDRAM memory CAS (column address strobe). It is recommended that you leave this item at the default value. The 2T setting requires faster memory that specifically supports this mode.
- **Min RAS# to active time (Tras) (8T):** This item determines the time RAS takes to read from and write to a memory cell.
- **RAS to CAS Delay (Trcd) (4T):** This is the amount of time a CAS is performed after a RAS. The lower the better, but some DRAM does not support low figures.
- **Row precharge Time (Trrd) (2T):** This item specifies the Row precharge to Active or Auto-Refresh of the same bank.
- **Row to Row delay (Trrd) (2T):** This item specifies the active-to-active delay of different banks.
- **Row cycle time (Trc) (12T):** This item determines the minimum number of clock cycles a memory row takes to complete a full cycle, from row activation up to the precharging of the active row.
- **Row refresh cyc time (Trfc) (24T):** Auto-refreshactive to RAS#-active or RAS# auto-refresh.

User Config mode (Auto)

This item has the capacity to automatically detect all of the following fields default values. This item is set to [Auto] by default. When setting to [Manual], the following items are adjustable.

- **1T/2T Memory Timing (2T):** This item controls the SDRAM command rate.
- **Read Preamble value (6ns):** This item allows you to set Read Preamble value from 2ns, to 9.5ns, and it is specified in units of 0.5ns.
- **Async Latency value (6ns):** This item allows you to set Async Latency value from 2ns to 11ns, and it is specified in units of 1 ns.

Press <Esc> to return to the Advanced Chipset Features page.

►LDT & PCI Bus Control (Press Enter)

Scroll to this item and press <Enter> to view the following screen:

Phoenix-AwardBIOS CMOS Setup Utility
LDT & PCI Bus Control

LDT Configuration	[Enabled]	Item Help
Upstream LDT Bus Width	[16 bit]	
Downstream LDT Bus Width	[16 bit]	
LDT Bus Frequency	[Auto]	Menu Level ►►
PCIE Reset Delay	[Disabled]	

↑↓ → ← : Move Enter: Select +/-/PU/PD: Value F10: Save ESC: Exit F1: General Help
F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

LDT Configuration (Enabled)

This item enables or disables the LDT configuration.

Upstream LDT Bus Width (16 bit)

This item allows users to manually adjust the upstream LDT bus width to be 8 bit or 16 bit.

Downstream LDT Bus Width (16 bit)

This item allows users to manually adjust the downstream LDT bus width to be 8 bit or 16 bit.

LDT Bus Frequency (Auto)

This item allows users to manually adjust the LDT Bus Frequency.

PCIe Reset Delay (Disabled)

This item enables or disables the PCIe reset delay.

Press <Esc> to return to the Advanced Chipset Features page.

PCIe GFX Core Payload Size (64 Bytes)

This item allows users to manually adjust the PCIe GFX Core Payload Size.

PCIe GPP Core Payload Size (64 Bytes)

This item allows users to manually adjust the PCIe GPP Core Payload Size.

Dual Slot Configuration (Disabled)

This item allows users to enable or disable the Dual Slot Configuration.

GFX0/1 Link Width (x16/x8)

This item allows users to manually set the GFX Link Width.

GFX Multi Function Mode (Disabled)

This item allows users to enable or disable the GFX Multi Function Mode.

AGP Aperture Size (128MB)

This item allows users to manually adjust the AGP aperture size, from 32MB to 2GB.

GFX Clock Mode (Sync)

This item allows users to set the GFX Clock Mode to be Sync or Async. When this item is set to Sync, the following 3 item is activated

- **Async GFX Clock (200MHz):** This item allows users to manually adjust the GFX clock, from 200MHz to 350MHz.
- **Async GFX Clock Source (14.318MHz OSC):** This item allows users to set the GFX Clock Source, either to be 14.318MHz OSC or 100MHz PCIe.
- **MCLK Spread Spectrum (Disabled):** This item allows users to enable or disable the MCLK spread spectrum function.

Dual-Mode Interleaving (Disabled)

This item allows users to enable or disable the Dual-Mode interleaving function.

Dynamic CKE (Enabled)

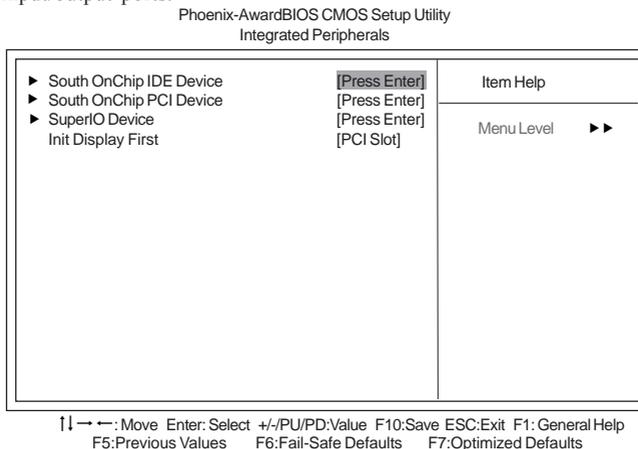
This item allows users to enable or disable the Dynamic CKE function.

System BIOS Cacheable (Disabled)

This feature is only valid when the system BIOS is shadowed. It enables or disables the caching of the system BIOS ROM at F0000h-FFFFFh via the L2 cache. This greatly speeds up accesses to the system BIOS.

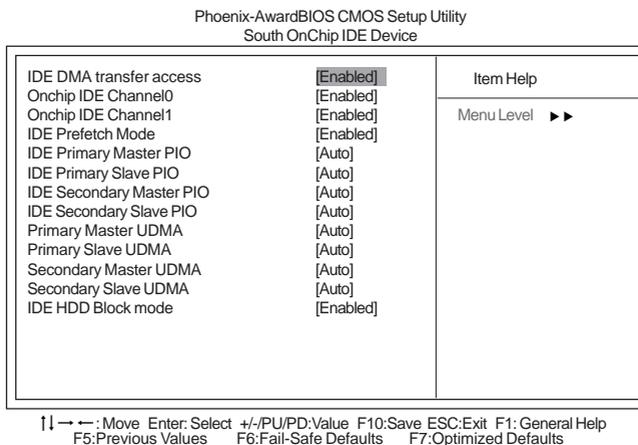
Integrated Peripherals

These options display items that define the operation of peripheral components on the system's input/output ports.



▶ South OnChip IDE Device (Press Enter)

Scroll to this item and press <Enter> to view the following screen:



IDE DMA transfer access (Enabled)

This item allows you to enable the transfer access of the IDE DMA then burst onto the PCI bus and nonburstable transactions do not.

OnChip IDE Channel0/1 (Enabled)

Use this item to enable or disable the PCI IDE channels that are integrated on the motherboard.

IDE Prefetch Mode (Enabled)

The onboard IDE drive interface supports IDE prefetching, for faster drive access. If you install a primary and secondary add-on interface, set this field to Disable if the interface does not support prefetching.

IDE Primary/Secondary Master/Slave PIO (Auto)

Each IDE channel supports a master device and a slave device. These four items let you assign the kind of PIO (Programmed Input/Output) was used by the IDE devices. Choose Auto to let the system auto detect which PIO mode is best, or select a PIO mode from 0-4.

Primary/Secondary Master/Slave UDMA (Auto)

Each IDE channel supports a master device and a slave device. This motherboard supports UltraDMA technology, which provides faster access to IDE devices. If you install a device that supports UltraDMA, change the appropriate item on this list to Auto. You may have to install the UltraDMA driver supplied with this motherboard in order to use an UltraDMA device.

IDE HDD Block Mode (Enabled)

Enable this field if your IDE hard drive supports block mode. Block mode enables BIOS to automatically detect the optimal number of block read and writes per sector that the drive can support. It also improves the speed of access to IDE devices.

Press <Esc> to return to the Integrated Peripherals page.

► South OnChip PCI Device (Press Enter)

Scroll to this item and press <Enter> to view the following screen:

Phoenix-Award BIOS CMOS Setup Utility
South OnChip PCI Device

Onboard Azalia Audio	[Auto]	Item Help
Onboard PCI LAN	[Enabled]	
Onboard Lan Boot ROM	[Disabled]	
Onboard SATA Controller	[Both]	Menu Level ►►
Onboard SATA Type	[IDE Mode]	
USB 2.0 Supports	[Enabled]	
USB Controller	[Enabled]	
X USB Legacy Support	[Enabled]	
X USB Mouse Support	[Enabled]	

↑↓ ← → : Move Enter: Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5:Previous Values F6:Fail-Safe Defaults F7:Optimized Defaults

Onboard Azalia AUDIO (Auto)

This option allows you to control the onboard Azalia audio. Disable this item if you are going to install a PCI audio add-on card.

Onboard PCI LAN (Enabled)

This option allows you to control the onboard LAN device.

Onboard LAN Boot ROM (Disabled)

Use this item to enable and disable the booting from the onboard LAN or a network add-in card with a remote boot ROM installed.

Onboard SATA Controller (Both)

This item allows you to manually specify the onboard Serial ATA controller.

Onboard SATA Type (IDE Mode)

This item allows you to manually specify the onboard Serial ATA Type.

USB 2.0 Supports (Enabled)

Enable this item if your system supports USB 2.0.

USB Controller (Enabled)

This item enables or disables the USB controller. Leave this at the default “Enabled” if you want to connect USB devices to your computer.

- **USB Legacy Support (Enabled):** Use this item to enable or disable support for legacy USB devices. Setting to Auto allows the system to detect the presence of USB devices at startup. If detected, the USB controller legacy mode is enabled. If no USB device is detected, the legacy USB support is disabled.
- **USB Mouse Support (Enabled):** Enable this item if you plan to use a mouse connected through the USB port in a legacy operating system (such as DOS) that does not support Plug and Play.

Press <Esc> to return to the Advanced Chipset Features page.

► Onboard SuperIO Device (Press Enter)

Scroll to this item and press <Enter> to view the following screen:

Phoenix-AwardBIOS CMOS Setup Utility
Onboard SuperIO Device

Onboard FDC Controller	[Enabled]	Item Help
Onboard Serial Port 1	[3F8/IRQ4]	Menu Level ▶▶
UART Port	[2F8/IRQ3]	
UART Mode Select	[IrDA]	
X UR2 Duplex Mode	Full	
Onboard Parallel Port	[378/IRQ7]	
Parallel Port Mode	[ECP]	
ECP Mode Use DMA	[3]	

↑↓ ← → : Move Enter: Select +/-/PU/PD: Value F10: Save ESC: Exit F1: General Help
F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

Onboard FDC Controller (Enabled)

This option enables the onboard floppy disk drive controller.

Onboard Serial Port 1(3F8/IRQ4)

This option is used to assign the I/O address and interrupt request (IRQ) for onboard serial port 1 (COM1).

UART Port (2F8/IRQ3)

This item allows users to assign the resources for the UART port device.

UART Mode Select (IrDA)

This field is available if the Onboard Serial Port 2 field is set to any option but Disabled. UART Mode Select enables you to select the infrared communication protocol-Normal (default), IrDA, or ASKIR.

- **UR2 Duplex Mode (Full):** This field is available when UART Mode is set to either ASKIR or IrDA. This item enables you to determine the infrared function of the onboard infrared chip. The options are Full and Half (default). Full-duplex means that you can transmit and send information simultaneously. Half-duplex is the transmission of data in both directions, but only one direction at a time.

Onboard Parallel Port (378/IRQ7)

This option is used to assign the I/O address and interrupt request (IRQ) for the onboard parallel port.

Parallel Port Mode (ECP)

Enables you to set the data transfer protocol for your parallel port. There are four options: SPP (Standard Parallel Port), EPP (Enhanced Parallel Port), ECP (Extended Capabilities Port) and ECP+EPP.

ECP Mode Use DMA (3)

When the onboard parallel port is set to ECP mode, the parallel port can use DMA 3 or DMA 1.

Press <Esc> to return to the Integrated Peripherals page.

Init Display First (PCI Slot)

Use this item to specify whether your graphics adapter is installed in one of the PCI slots or is integrated on the motherboard.

Power Management Setup

This option lets you control system power management. The system has various power-saving modes including powering down the hard disk, turning off the video, suspending to RAM, and software power down that allows the system to be automatically resumed by certain events.

Phoenix-AwardBIOS CMOS Setup Utility
Power Management Setup

HDD Power Down	[Disabled]	Item Help
Video Off Option	[Suspend--> Off]	Menu Level ▶
Video Off Method	[DPMS Support]	
MODEM Use IRQ	[3]	
Soft-Off by PWRBTN	[Instant-Off]	
PWRON After Pwr-Fail	[Off]	
▶ Resume Event Control	[Press Enter]	

↑↓ → ← : Move Enter: Select +/-/PU/PD: Value F10: Save ESC: Exit F1: General Help
F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

HDD Power Down (Disabled)

The IDE hard drive will spin down if it is not accessed within a specified length of time. Options are from 1 Min to 15 Min and Disable.

Video Off Option (Suspend—> Off)

This option defines if the video is powered down when the system is put into suspend mode.

Video Off Method (DPMS Support)

This item defines how the video is powered down to save power. This item is set to DPMS (Display Power Management Software) by default.

MODEM Use IRQ (3)

If you want an incoming call on a modem to automatically resume the system from a power-saving mode, use this item to specify the interrupt request line (IRQ) that is used by the modem. You might have to connect the fax/modem to the motherboard Wake On Modem connector for this feature to work.

Soft-Off by PWRBTN (Instant Off)

Under ACPI (Advanced Configuration and Power management Interface) you can create a software power down. In a software power down, the system can be resumed by Wake Up Alarms. This item lets you install a software power down that is controlled by the power button on your system. If the item is set to Instant-Off, then the power button causes a software power down. If the item is set to Delay 4 Sec. then you have to hold the power button down for four seconds to cause a software power down.

PWRON After PWR-Fail (Off)

This item enables your computer to automatically restart or return to its operating status.

►Resume Event Control (Press Enter)

Scroll to this item and press <Enter> to view the following screen:

Phoenix-AwardBIOS CMOS Setup Utility
Resume Event Control

RTC Alarm Resume		[Disabled]	Item Help
X	Date (of Month) Alarm	0	Menu Level ►►
X	Time (hh:mm:ss) Alarm	0 0 0	

↑↓←→ : Move Enter: Select +/-/PU/PD:Value F10:Save ESC:Exit F1: General Help
F5:Previous Values F6:Fail-Safe Defaults F7:Optimized Defaults

RTC Alarm Resume (Disabled)

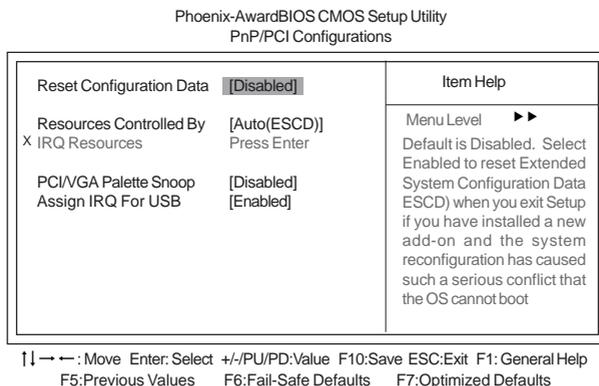
When set to Enabled, additional fields become available and you can set the date (day of the month), hour, minute and second to turn on your system. When set to 0 (zero) for the day of the month, the alarm will power on your system every day at the specified time.

- **Date of Month:** Use this item to define the date of month when using the RTC alarm to resume the system.
- **Resume Time:** Use this item to define the time when using the RTC alarm to resume the system.

Press <Esc> to return to Power Management page.

PNP/PCI Configurations

These options configure how PnP (Plug and Play) and PCI expansion cards operate in your system. Both the the ISA and PCI buses on the motherboard use system IRQs (Interrupt ReQuests) and DMAs (Direct Memory Access). You must set up the IRQ and DMA assignments correctly through the PnP/PCI Configurations Setup utility for the motherboard to work properly. Selecting PnP/PCI Configurations on the main program screen displays this menu:



Reset Configuration Data (Disabled)

If you enable this item and restart the system, any Plug and Play configuration data stored in the BIOS Setup is cleared from memory.

Resources Controlled By (Auto(ESCD))

You should leave this item at the default Auto (ESCD). Under this setting, the system dynamically allocates resources to Plug and Play devices as they are required.

If you cannot get a legacy ISA (Industry Standard Architecture) expansion card to work properly, you might be able to solve the problem by changing this item to Manual, and then opening up the IRQ Resources submenu.

- **IRQ Resources [Press Enter]:** In the IRQ Resources submenu, if you assign an IRQ to Legacy ISA, then that Interrupt Request Line is reserved for a legacy ISA expansion card. Press <Esc> to close the IRQ Resources submenu.

In the Memory Resources submenu, use the first item Reserved memory Base to set the start address of the memory you want to reserve for the ISA expansion card. Use the second item Reserved Memory Length to set the amount of reserved memory. Press <Esc> to close the Memory Resources submenu.

PCI/VGA Palette Snoop (Disabled)

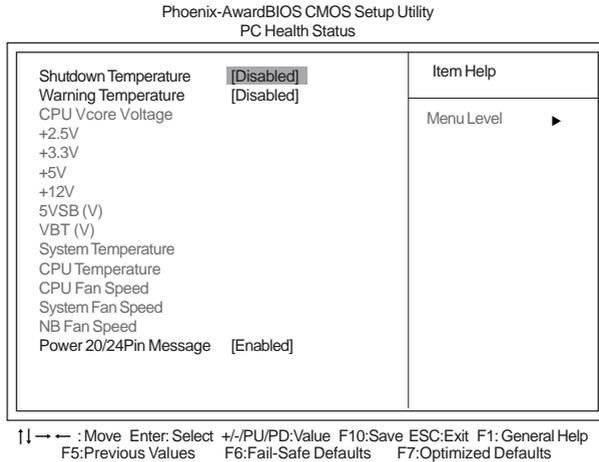
This item is designed to overcome problems that can be caused by some non-standard VGA cards. This board includes a built-in VGA system that does not require palette snooping so you must leave this item disabled.

Assign IRQ For USB (Enabled)

Names the interrupt request (IRQ) line assigned to the USB on your system. Activity of the selected IRQ always awakens the system.

PC Health Status

On motherboards that support hardware monitoring, this item lets you monitor the parameters for critical voltages, temperatures and fan speeds.



Shutdown Temperature (Disabled)

Enables you to set the maximum temperature the system can reach before powering down.

Warning Temperature (Disabled)

This item allows users to manually set the warning temperature of the system.

System Component Characteristics

These fields provide you with information about the systems current operating status. You cannot make changes to these fields.

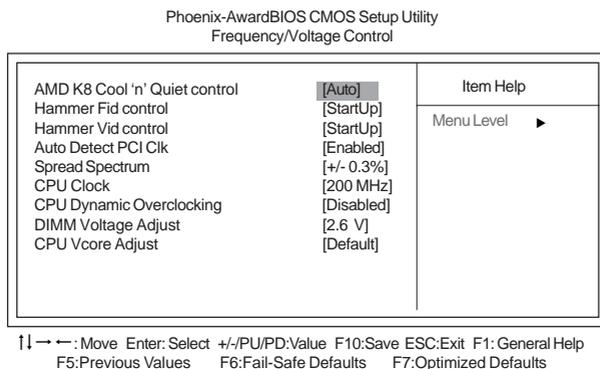
- CPU Vcore Voltage
- System Temperature
- CPU Temperature
- CPU Fan Speed
- System Fan Speed
- NB Fan Speed

Power 20/24Pin Message (Enabled)

This item allows users to enable or disable the 20/24pin power cable indication message.

Frequency/Voltage Control

This item enables you to set the clock speed and system bus for your system. The clock speed and system bus are determined by the kind of processor you have installed in your system.



AMD K8 Cool 'n' Quiet control (Auto)

This item helps the system to lower the frequency when CPU idles. When the frequency decreases, the temperature will drop automatically as well.

Hammer FID Control (StartUp)

This item allows users to adjust the CPU frequency; the range will be varied according to different CPUs. We strongly recommend you leave this item at its default value.

Hammer VID Control (StartUp)

This item allows users to adjust the CPU voltage. We strongly recommend you leave this item at its default value.

Auto Detect PCI Clk (Enabled)

When this item is enabled, BIOS will disable the clock signal of free PCI slots.

Spread Spectrum (+/- 0.3%)

If you enable spread spectrum, it can significantly reduce the EMI (Electro-Magnetic Interference) generated by the system.

CPU Clock (200 MHz)

This item allows users to manually adjust the CPU clock.

CPU Dynamic Overclocking (Disabled)

This item allows users to enable or disable the CPU Dynamic Overclocking function.

DIMM Voltage Adjust (2.6V)

Use this item to manually adjust the DIMM voltage, from.

CPU Vcore Adjust (Default)

This item allows users to manually adjust the CPU Vcore value. Users are recommended to keep it at its default value.

Load Performance

If you select this item and press Enter a dialog box will appear. If you select [OK], and then Enter, the Setup Utility loads a set of performance default values. These default settings are quite demanding and your system might not function properly if you are using slower CPU, memory, or other low-performance components.



Warning: To load Performance settings may make your system become unstable or unbootable. When loading the Performance Defaults fails, users can choose “either” step below to return the motherboard to its default BIOS:

1. *Reset the system and enter the CMOS setup to reset the CPU frequency.*
2. *Power on the system and press “Insert” key. The system will bypass the previous BIOS setting and automatically reload the default BIOS. (This procedure is BIOS setup only!)*
3. *Locate the “Clear CMOS” jumper and proceed with the “Clear CMOS” to recover the default BIOS setting. Please refer to Chapter 2 (page 9) complete the clear CMOS action. (This procedure requires opening the chassis!)*

Load Optimized Defaults

This option opens a dialog box that lets you install optimized defaults for all appropriate items in the Setup Utility. Press <Y> and then <Enter> to install the defaults. Press <N> and then <Enter> to not install the defaults. The optimized defaults place demands on the system that may be greater than the performance level of the components, such as the CPU and the memory. You can cause fatal errors or instability if you install the optimized defaults when your hardware does not support them. If you only want to install setup defaults for a specific option, select and display that option, and then press <F7>.



Users please use the factory BIOS default setting of “Load optimized Defaults” when install Operation System onto your system.

Set Supervisor/User Password

When this function is selected, the following message appears at the center of the screen to assist you in creating a password.

ENTER PASSWORD

Type the password, up to eight characters, and press <Enter>. The password typed now will clear any previously entered password from CMOS memory. You will be asked to confirm the password. Type the password again and press <Enter>. You may also press <Esc> to abort the selection.

To disable password, just press <Enter> when you are prompted to enter password. A message will confirm the password being disabled. Once the password is disabled, the system will boot and you can enter BIOS Setup freely.

PASSWORD DISABLED

If you have selected “**System**” in “Security Option” of “BIOS Features Setup” menu, you will be prompted for the password every time the system reboots or any time you try to enter BIOS Setup.

If you have selected “**Setup**” at “Security Option” from “BIOS Features Setup” menu, you will be prompted for the password only when you enter BIOS Setup. Supervisor Password has higher priority than User Password. You can use Supervisor Password when booting the system or entering BIOS Setup to modify all settings. Also you can use User Password when booting the system or entering BIOS Setup but can not modify any setting if Supervisor Password is enabled.

Save & Exit Setup

Highlight this item and press <Enter> to save the changes that you have made in the Setup Utility and exit the Setup Utility. When the Save and Exit dialog box appears, press <Y> to save and exit, or press <N> to return to the main menu.

Exit Without Saving

Highlight this item and press <Enter> to discard any changes that you have made in the Setup Utility and exit the Setup Utility. When the Exit Without Saving dialog box appears, press <Y> to discard changes and exit, or press <N> to return to the main menu.



If you have made settings that you do not want to save, use the “Exit Without Saving” item and press <Y> to discard any changes you have made.

This concludes Chapter 3. Refer to the next chapter for information on the software supplied with the motherboard.

Chapter 4

Using the Motherboard Software

About the Software CD-ROM

The support software CD-ROM that is included in the motherboard package contains all the drivers and utility programs needed to properly run the bundled products. Below you can find a brief description of each software program, and the location for your motherboard version. More information on some programs is available in a README file, located in the same directory as the software. Before installing any software, always inspect the folder for files named README.TXT, INSTALL.TXT, or something similar. These files may contain important information that is not included in this manual.



The Intel High Definition audio functionality unexpectedly quits working in Windows Server 2003 Service Pack 1 or Windows XP Professional x64 Edition. Users need to download and install the update packages from the Microsoft Download Center “before” installing HD audio driver bundled in the driver CD. Please log on to <http://support.microsoft.com/default.aspx?scid=kb:en-us:901105#appliesto> for more information.

Auto-installing under Windows 2000/XP

The Auto-install CD-ROM makes it easy for you to install the drivers and software for your motherboard.



If the Auto-install CD-ROM does not work on your system, you can still install drivers through the file manager for your OS (for example, Windows Explorer). Refer to the Utility Folder Installation Notes later in this chapter.

The support software CD-ROM disc loads automatically under Windows 2000/XP. When you insert the CD-ROM disc in the CD-ROM drive, the autorun feature will automatically bring up the install screen. The screen has three buttons on it, Setup, Browse CD and Exit.



If the opening screen does not appear; double-click the file “setup.exe” in the root directory.

Setup Tab

Setup	Click the Setup button to run the software installation program. Select from the menu which software you want to install.
Browse CD	<p>The Browse CD button is the standard Windows command that allows you to open Windows Explorer and show the contents of the support CD.</p> <p>Before installing the software from Windows Explorer, look for a file named README.TXT, INSTALL.TXT or something similar. This file may contain important information to help you install the software correctly.</p> <p>Some software is installed in separate folders for different operating systems, such as DOS, WIN NT, or WIN98/95. Always go to the correct folder for the kind of OS you are using.</p> <p>In install the software, execute a file named SETUP.EXE or INSTALL.EXE by double-clicking the file and then following the instructions on the screen.</p>
Exit	The EXIT button closes the Auto Setup window.

Application Tab

Lists the software utilities that are available on the CD.

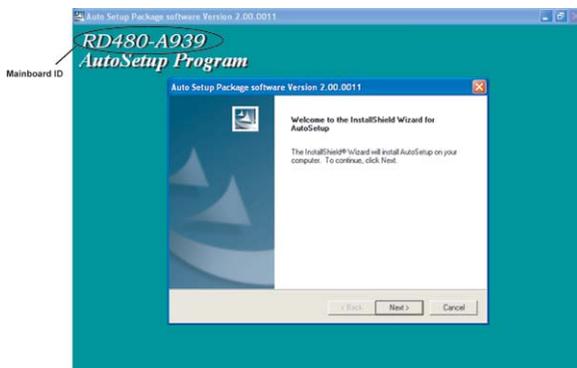
Read Me Tab

Displays the path for all software and drivers available on the CD.

Running Setup

Follow these instructions to install device drivers and software for the motherboard:

1. Click **Setup**. The installation program begins:



The following screens are examples only. The screens and driver lists will be different according to the motherboard you are installing.

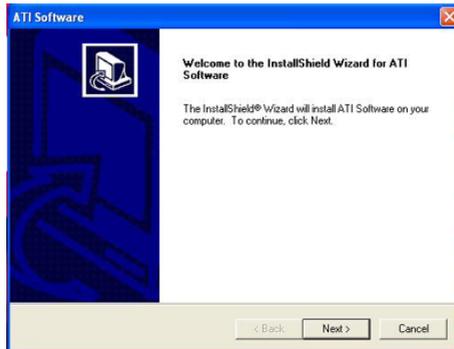
The motherboard identification is located in the upper left-hand corner.

Using the Motherboard Software

2. Click **Next**. The following screen appears:



3. Check the box next to the items you want to install. The default options are recommended.
4. Click **Next** run the Installation Wizard. An item installation screen appears:



5. Follow the instructions on the screen to install the items.

Drivers and software are automatically installed in sequence. Follow the onscreen instructions, confirm commands and allow the computer to restart a few times to complete the installation.

Manual Installation

Insert the CD in the CD-ROM drive and locate the PATH.DOC file in the root directory. This file contains the information needed to locate the drivers for your motherboard.

Look for the chipset and motherboard model; then browse to the directory and path to begin installing the drivers. Most drivers have a setup program (SETUP.EXE) that automatically detects your operating system before installation. Other drivers have the setup program located in the operating system subfolder.

If the driver you want to install does not have a setup program, browse to the operating system subfolder and locate the readme text file (README.TXT or README.DOC) for information on installing the driver or software for your operating system.

Utility Software Reference

All the utility software available from this page is Windows compliant. They are provided only for the convenience of the customer. The following software is furnished under license and may only be used or copied in accordance with the terms of the license.



These software(s) are subject to change at anytime without prior notice. Please refer to the support CD for available software.

AMI/AWARD Flash Utility

This utility lets you erase the system BIOS stored on a Flash Memory chip on the motherboard, and lets you copy an updated version of the BIOS to the chip. Proceed with caution when using this program. If you erase the current BIOS and fail to write a new BIOS, or write a new BIOS that is incorrect, your system will malfunction. Refer to Chapter 3, *Using BIOS* for more information.

WinFlash Utility

The WinFlash utility is a Windows version of the DOS BIOS flash writer utility. The utility enables you to flash the system BIOS stored on a Flash Memory chip on the motherboard while in a Windows environment. This utility is currently available for WINXP\2000. To install the WinFlash utility, run AFUWIN.EXE (AMI) or WINFLASH.EXE(Award) from the following directory: \UTILITY\WINFLASH AMI or Award.

This concludes Chapter 4.

Chapter 5

ATI CrossFire™ Technology Support

This motherboard supports the ATI CrossFire™ Technology that allows you to install multi-graphics processing units (GPU) graphics cards. Follow the installation procedures in this section.

Requirements

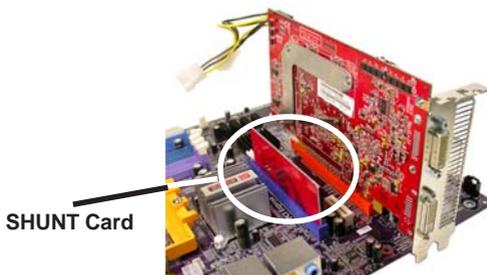
- 1 You should have a CrossFire Ready motherboard, a CrossFire Edition graphics card and a CrossFire ready graphics card.
- 2 Visit the ECS website (www.ecs.com.tw) for a list of qualified CrossFire ready graphics card for this motherboard.
- 3 Make sure that your graphics card driver supports the ATI CrossFire™ technology. Download the latest driver from the ATI website (www.ati.com).
- 4 Make sure that your power supply unit (PSU) can provide at least the minimum power required by your system.

Installing a single graphics card

1. Install a PCI Express x16 graphics card on the **PCIEX16_1** slot.



2. Install the SHUNT card onto the **PCIEX16_2** slot; otherwise, the card will run at x8 speed only.



3. Connect one end of the external cable to the graphics card.
4. Connect the loose end to the corresponding port on your monitor.
5. Connect an auxiliary power source from the power supply to the graphics card.

ATI CrossFire™ Technology Support

Installing CrossFire™ graphics cards



Before installing a CrossFire™ system, refer to the user guide that comes with the ATI CrossFire™ Edition graphics card.

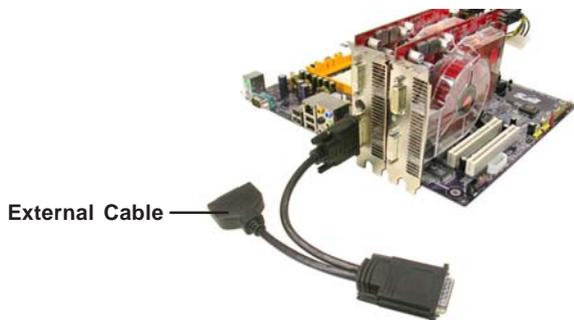
1. Prepare one CrossFire™ Edition graphics card and one CrossFire™ ready graphics card.



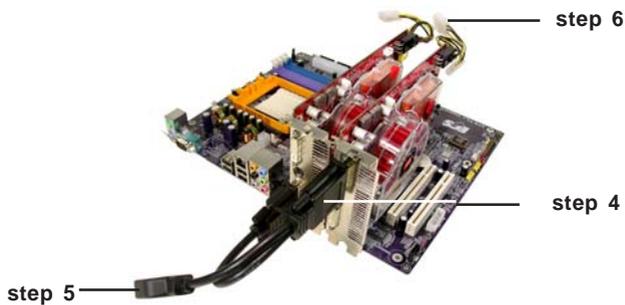
2. Insert the CrossFire™ ready graphics card into the **PCIEX16_2** slot, and the CrossFire™ Edition graphics card into the **PCIEX16_1** slot. Make sure that the card is properly seated on the slot.



3. Connect an external cable to the CrossFire™ ready graphics card installed on the **PCIEX16_2** slot.



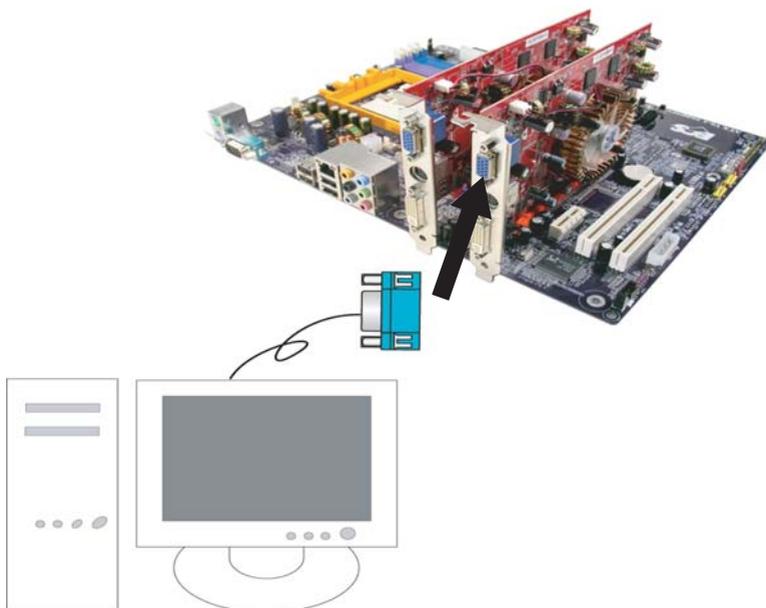
4. Connect the other end of the external cable to the CrossFire™ Edition graphics card installed on **PCIEX16_1** slot.



5. Connect the loose end of the external cable to the corresponding port on your monitor.
6. Connect an auxiliary power source from the power supply to the graphics cards.

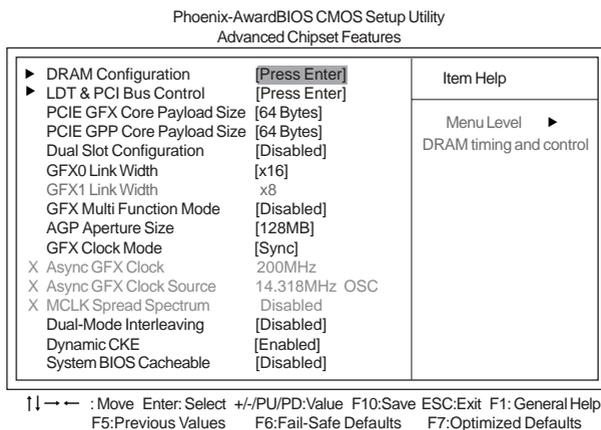


Users can also install any two ATI CrossFire™ X1000 series graphics cards to activate the ATI CrossFire™ Technology. The monitor cable must be connected to the graphics card installed in “PCIEX16_1” slot, as the following picture shows.



BIOS Setup

1. Boot up your computer, and press during POST the enter the BIOS setup.
2. Go to Advanced Chipset Features.
3. Set Dual Slot Configuration to [Disabled] if you install one graphics card, and the item GFX0 Link Width will show [X16].
4. Set Dual-slot configuration item to [Enabled] if you install two CrossFire™ -enabled graphics cards, and the item GFX0 Link Width will show [X8].



Make sure to set the Dual Slot Configuration to [Disabled] before you change CrossFire™ mode to single-card mode, in order to remove the dual-card function.

Installing the device drivers

Refer to the documentation that comes with your graphics card package to install the device drivers.



1. The ATI CrossFire™ technology supports only the following operating systems:
 - Windows® XP 32-bit (Home or Professional) with Service Pack 2 (SP2)
 - Windows® XP Professional 64-bit Edition
2. Make sure that your graphics card driver supports the ATI CrossFire™ Technology. Download the latest driver from the ATI website (www.ati.com).

Using the Catalyst™ Control Center

The Catalyst™ Control Center allows you to access display features of the ATI hardware and software you installed. Use this application to adjust your graphics settings, enable/disable connected devices, and change your desktop orientation.

Launching the Catalyst™ Control Center

- Double-click the Catalyst™ Control Center icon on your desktop shortcut.



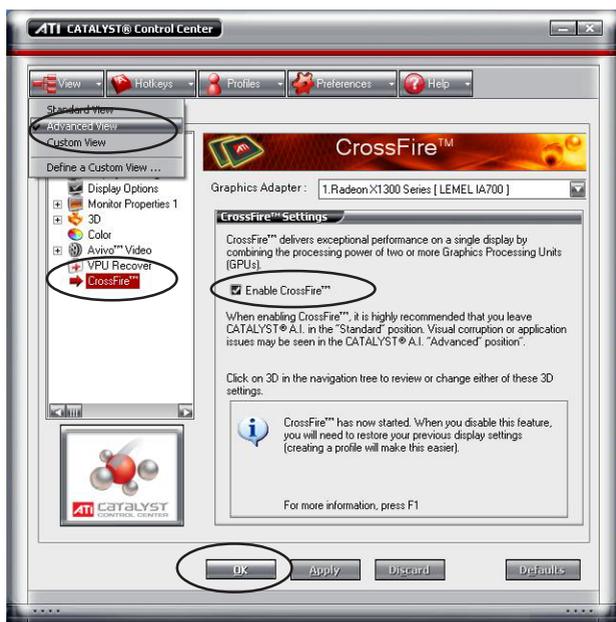
The Catalyst™ Control Center Dialog Box

View

The Catalyst™ Control Center provides two views; one is Standard view for beginners, the other is Advance view for advanced users to access and configure the complete features of the software.

To enable CrossFire™:

- Set the view to **Advance**.
- Click the CrossFire™ item in Graphics Settings.
- In the CrossFire™ Setting dialog, tick the box opposite Enable CrossFire™.
- Click **OK** to effect the setting.



- Set to Advance view to enable the CrossFire™ function.
- Make sure that the Dual-slot configuration item in the BIOS is set to [Enabled] if you want to enable the CrossFire™ function.

Caractéristiques

Processeur

Cette carte mère utilise un socket de 939broches présentant les caractéristiques suivantes

- Peut recevoir les processeurs AMD Sempron/Athlon64/Athlon 64 FX/Athlon64 X2
- Prend en charge des vitesses d'interface HyperTransport™ (HT) allant jusqu'à 2000MT/s

La Technologie HyperTransport™ est une liaison point à point entre deux matériels, elle permet à des circuits intégrés d'échanger des informations à des vitesses bien plus élevées que ne le permettent les technologies à interconnexions actuellement disponibles.

Chipset

Les chipsets RD480 Northbridge (NB) et SB450 Southbridge (SB) sont basés sur une architecture novatrice et dimensionnable avec une fiabilité et des performances prouvées.

- RD480 (NB)**
- 1 x2 (extensible à x4) interface A-Link Express (conforme PCI Express 1.0a) pour connexion à la ATI IXP
 - Prend en charge un PCI Express x16 pour Interface Graphique, entièrement conforme à la Spécification de Base PCI Express révision 1.0a.
 - Prend en charge la solution à simple puce dans la technologie CMOS 0,13 micron, 1,0-1,2v
- SB450 (SB)**
- Interface 2/4-lane A-Link Express (conforme PCI Express 1.0a) à RADEON IGPs
 - Conforme aux spécifications PCI 2.3, jusqu'à 7 périphériques maîtrise de bus pris en charge
 - Quatre périphériques Serial ATA pris en charge, conforme aux spécifications Serial ATA 1.0
 - Contrôleur d'Hôte USB 2.0 intégré prenant en charge jusqu'à huit ports USB 2.0
 - Contrôleur IDE intégré prenant en charge les modes Ultra DMA 133/100/66/33

Mémoire

- SDRAM DDR 400/333/266 DDR avec double canal pris en charge
- Peut recevoir quatre DIMM sans tampon, taille mémoire maximum de 4 Go

LAN interne (optionnel)

Cette carte mère prend en charge les chipsets LAN suivants :

- | |
|---|
| <ul style="list-style-type: none"> • Supporte le fonctionnement en Auto-négociation N-Way en 100/10Mb/s • Prend en charge la capacité half/full duplex • Prend en charge la fonction Wake-On-LAN (WOL) (réveil par appel réseau) et le réveil à distance |
| <ul style="list-style-type: none"> • Emetteur-récepteur 10/100/1000 intégré • Prend en charge PCI v2.3, 32 bits, 33/66-MHz • Prise en charge totale de IEEE802.3, IEEE802.3u et IEEE802.3ab |

1394a FireWire (Optionnel)

- Entièrement conforme avec provisions de IEEE Std 1394-1995 pour les bus série de hautes performances et IEEE Std 1394a-2000
- Deux ports de câble entièrement conforme IEEE Std 1394a-2000 à 100/200/400 Mb/s

Audio

Cette carte mère prend en charge les chipsets Audio suivants :

- | |
|--|
| <ul style="list-style-type: none"> • Conforme au CODEC AC'97 v2.3 • Prend en charge le CODEC audio 6 canaux destiné aux systèmes multi-média PC • Offre trois entrées stéréo de niveau de ligne analogique avec contrôle de volume 5 bits: Ligne d'entrée, CD, AUX • Conforme aux exigences audio de Microsoft WHQL/WLP 2.0 |
| <ul style="list-style-type: none"> • Conforme à l'audio haute définition d'Intel, prenant en charge les DAC à 8 canaux avec rapport S/B de 95dB • Compatibilités: 192/96/48/44.1 KHz avec 24/20/16 bits • Support d'alimentation : Numérique : 3,3V; Analogique : 3,3V/5,0V • Toutes les prises analogiques sont des entrées et sorties stéréo avec réattribution des tâches pour plug & play analogique • Conforme aux exigences audio de Microsoft WHQL/WLP 2.0 • Compatible Direct Sound 3D™ • Sortie de codeur Dolby Digital pour application électronique consommateur |

Options d'extension

La carte mère est livrée avec les options d'extensions suivantes:

- Deux PCI Express x16 pour Interface Graphique
- Deux logements PCI Express x1
- Deux emplacements PCI v2.3 bits
- Deux connecteurs IDE de 40 broches prenant en charge jusqu'à quatre périphériques IDE
- Une interface de lecteur de disquette
- Quatre connecteurs SATA à 7 broches

La carte mère prenant en charge la maîtrise de bus UltraDMA avec vitesses de transfert de 133/100/66/33 Mo/s.

E/S intégrées

La carte mère possède un jeu complet de ports d'E/S et de connecteurs:

- Deux ports PS/2 pour souris et clavier
- Un port parallèle avec câble
- Un port série
- Quatre ports USB
- Un port LAN (optionnel)
- Prises audio pour entrée microphone, ligne d'entrée et sortie Audio 8 canaux

Microprogramme BIOS

La carte mère utilise Award BIOS qui permet aux utilisateurs de configurer de nombreuses caractéristiques du système comprenant les suivantes:

- Gestion de l'alimentation
- Alarmes de réveil
- Paramètres de CPU
- Synchronisation du CPU et de la mémoire

Le microprogramme peut aussi être utilisé pour définir les paramètres pour les vitesses d'horloges de différents processeurs.



Certaines spécifications matérielles et éléments de logiciels peuvent être modifiés sans avertissement.

Feature

Prozessor

Dieses Motherboard verwendet einen 939-Pin Socket mit den folgenden Eigenschaften:

- Nimmt AMD Sempron/Athlon64/Athlon 64 FX/Athlon64 X2 Prozessoren auf
- Unterstützt bis zu 2000MT/s HyperTransport™(HT) Interface-Geschwindigkeiten

HyperTransport™ Technologie ist ein Punkt-zu-Punkt Link zwischen zwei Geräten. Es ermöglicht integrierten Schaltkreisen einen Informationsaustausch mit wesentlich höherer Geschwindigkeit als bei gängigen Interconnect-Technologien.

Chipsatz

Die RD480 Northbridge (NB) und SB450 Southbridge (SB) Chipsätze basieren auf einer innovativen und skalierbaren Architektur mit bewiesener Zuverlässigkeit und Leistung.

- RD480(NB)**
- 1 x2 (auf x4 erweiterbar) A-Link Express Interface (entspricht PCI Express 1.0a) für die Verbindung zu ATI IXP
 - Unterstützt eine PCI Express x16 Grafik-Interface, mit vollständiger Entsprechung zur PCI Express Base Spezifikation Revision 1.0a.
 - Unterstützt Single-Chip-Lösung in 0,13 Mikron, 1.0-1.2v CMOS-Technologie

- SB450 (NB)**
- 2/4-Lane A-Link Express Interface (entspricht PCI Express 1.0a) zu RADEON IGPs
 - Entspricht PCI 2.3 Spezifikation, es werden bis zu 7 Busmaster-Geräte unterstützt
 - Unterstützung für vier Serial ATA-Geräte, entspricht Serial ATA 1.0 Spezifikation
 - Integrierter USB 2.0 Host-Controller unterstützt bis zu acht USB 2.0 Ports
 - Integrierter IDE-Controller unterstützt Ultra DMA 133/100/66/33 Modi

Speicher

- Unterstützung für DDR 400/333/266 DDR SDRAM mit Dualkanal
- Nimmt vier ungepufferte DIMMs auf; die maximale Speichergröße beträgt bis zu 4 GB

Integriertes LAN (optional)

Dieses Motherboard kann einen der folgenden LAN-Chipsätze unterstützen:

<ul style="list-style-type: none"> • Unterstützt den Betrieb bei 100/10Mb/s N-Way Auto-Negotiation • Unterstützt Halb-/Voll duplex • Unterstützt Wake-On-LAN-Funktion und Remote-Wake-up
<ul style="list-style-type: none"> • Enthält 10/100/1000 Transceiver • Unterstützung von PCI v2.3, 32-Bit, 33/66-MHz • Vollständige Unterstützung für IEEE802.3, IEEE802.3u und IEEE802.3ab

1394a FireWire (Optional)

- Vollständige Entsprechung zu den Vorschriften des IEEE Std 1394-1995 für den Hochleistungs-Serial-Bus und IEEE Std 1394a-2000
- Zwei vollständig IEEE Std 1394a-2000 konforme Kabelports bei 100/200/400 MB/s

Audio

Dieses Motherboard kann einen der folgenden Audio-Chipsätze unterstützen:

- | |
|--|
| <ul style="list-style-type: none">• Entspricht dem AC'97 v2.3 CODEC• Unterstützt 6-Kanal Audio CODEC, entwickelt für Multimedia PC-Systeme• Stellt drei analoge Line-Level Stereoeingänge mit 5-bit Lautstärkeregelung zur Verfügung: Line-in, CD, AUX• Entspricht den Microsoft WHQL/WLP 2.0 Audio-Anforderungen |
| <ul style="list-style-type: none">• Entspricht Intel High Definition Audio, unterstützt 8-Kanal DACs mit 95dB S/N Ratio• Kompatibilität: 192/96/48/44.1 KHz mit 24/20/16 Bits• Stromversorgung: Digital: 3.3V; Analog: 3.3V/5.0V• Alle analogen Buchsen mit Stereo-Input und Output-Retasking für analoges Plug & Play• Erfüllt Audioanforderungen für Microsoft WHQL/WLP 2.0• Kompatibel mit Direct Sound 3D™• Dolby Digital Encoder-Output für Unterhaltungselektronik |

Erweiterungsoptionen

Das Motherboard bietet die folgenden Erweiterungsoptionen:

- Zwei PCI-Express x16 für eine Grafikschnittstelle
- Zwei PCI Express x1 Slots
- Zwei 32-bit PCI v2.3-Steckplätze
- Zwei 40-Pin IDE Stecker, vier IDE-Kanäle unterstützen
- Ein Steckplatz für ein Diskettenlaufwerk
- Vier 7-Pin SATA-Stecker

Das Motherboard unterstützt UltraDMA Bus Mastering mit einer Übertragungsrate von 133/100/66/33 MB/Sek.

Integrierte I/O-Schnittstellen

Das Motherboard verfügt über einen kompletten Satz von I/O-Schnittstellen und Anschlüssen:

- Zwei PS/2-Schnittstellen für Tastatur und Maus
- Ein paralleler Anschluss mit Kabel
- Eine serielle Anschluss
- Vier VGA- Anschluss
- Eine LAN-Anschluss (optional)
- Audiobuchsen für Mikrofon-in, Line-in und 8-Kanal Audioausgabe

BIOS Firmware

Dieses Motherboard setzt das AWARD BIOS ein, mit dem der Anwender viele Systemeigenschaften selbst konfigurieren kann, einschließlich der folgenden:

- Energieverwaltung
- Wake-up Alarm
- CPU-Parameter
- CPU- und Speichertiming

Mit der Firmware können auch Parameter für verschiedene Prozessortaktgeschwindigkeiten eingestellt werden.



Einige Hardware- und Software-Spezifikationen können jederzeit und ohne vorherige Ankündigung geändert werden.

Caratteristiche

Processore

La scheda madre utilizza una presa a Socket 939 pin che supporta le seguenti caratteristiche:

- Compatibilità con processori AMD Sempron/Athlon64/Athlon 64 FX/ Athlon64 X2
- Supporto di velocità di interfaccia HyperTransport™ (HT) fino a 2000 MT/s

La tecnologia HyperTransport™ consente il collegamento point-to-point fra due dispositivi e quindi un trasferimento di informazioni tra circuiti integrati molto più veloce di quanto sia possibile con le attuali tecnologie di interconnessione.

Chipset

I chipset RD480 Northbridge (NB) e SB450 Southbridge (SB) sono basati su un'innovativa architettura scalabile e offrono collaudata affidabilità e prestazioni comprovate.

- RD480 (NB)**
- 1 interfaccia Express A-Link x2 (espandibile a x4), conforme a PCI Express 1.0a, per collegamenti a ATI IXP
 - Supporto di una PCI Express x16 per interfaccia grafica con conformità completa alla revisione 1.0a della specifica PCI Express Base
 - Supporto di soluzione Single chip in 0,13 micron, tecnologia 1.0-1.2v CMOS

- SB450 (SB)**
- Interfaccia A-Link Express a 2/4 vie (conforme a PCI Express 1.0a) ai protocolli IGP RADEON
 - Conforme alla specifica PCI 2.2 a 33 MHz, con supporto di fino a 7 periferiche master bus
 - Supporto di quattro periferiche ATA seriali, conforme alla specifica Serial ATA 1.0
 - Controller host USB 2.0 integrato con supporto di fino a otto porte USB 2.0
 - Controller IDE integrato con supporto di modalità Ultra DMA 133/100/66/33

Memoria

- Supporto di SDRAM DDR 400/333/266 con Dual Channel
- Compatibile con quattro DIMM senza buffer con una capacità massima di memoria di 4 GB

LAN integrata (opzionale)

La scheda madre offre supporto per uno dei seguenti chipset LAN:

- | |
|---|
| <ul style="list-style-type: none"> • Supporto di NWay Auto-negotiation a 100/10 Mb/s • Supporto di funzionalità half/full duplex • Supporto di funzionalità Wake-On-LAN e riattivazione remota del sistema |
| <ul style="list-style-type: none"> • Transceiver 10/100/1000 integrato • Supporta PCI v2.3, 32-bit, 33/66-MHz • Supporto completo degli standard IEEE802.3, IEEE802.3u e IEEE802.3ab |

FireWire 1394a (Opzionale)

- Conformità completa a disposizioni IEEE Std 1394-1995 per bus seriale a elevate prestazioni e IEEE Std 1394a-2000
- Due porte cable a 100/200/400 Mb/s conformi a IEEE Std 1394a-2000

Audio

La scheda madre offre supporto per i seguenti chipset audio

- | |
|---|
| <ul style="list-style-type: none"> • Conforme alla specifica AC'97 v2.3 CODEC • Supporto di CODEC audio a 6 canali per sistemi PC multimediali • Tre ingressi analogici stereo lineari con controllo volume a 5 bit: Line-In, CD, AUX • Conforme ai requisiti audio di WHQL e WLP 2.0 di Microsoft |
| <ul style="list-style-type: none"> • Conforme con Intel High Definition Audio e supporto di DAC a 8 canali con rapporto S/N di 95 dB • Compatibili: 192/96/48/44.1 KHz a 24/20/16 bit • Supporto alimentazione: Digitale: 3,3V; Analogico: 3,3 V / 5,0 V • Tutti i jack analogici offrono ingresso e uscita stereo con riassegnazione a plug & play analogico • Conforme ai requisiti per audio di WHQL e WLP 2 di Microsoft • Compatibile con Direct Sound 3D™ • Uscita Dolby Digital Encoder per apparecchiature elettroniche di largo consumo |

Opzioni di espansione

La scheda madre è dotata delle seguenti opzioni di espansione:

- Due PCI Express x16 per interfaccia grafica
- Due slot PCI Express x1
- Due slot PCI v2.3 a 32 bit
- Due connettori 40pin IDE per il supporto di fino a quattro dispositivi IDE
- Un'interfaccia per unità disco floppy
- Quattro connettori SATA a 7 pin

La scheda madre supporta bus master UltraDMA con tasso di trasferimento di 133/100/66/33 MB/s.

I/O integrati

La scheda madre offre una serie completa di porte e connettori I/O:

- Due porte PS/2 per mouse e tastiera
- Una porta parallela con cavo
- Una porta seriale
- Quattro porte USB
- Una porta LAN (opzionale)
- Prese jack audio per ingresso microfonico, line-in e uscita Audio a 8 canali

Firmware BIOS

La scheda madre si avvale del BIOS AWARD che consente la configurazione personalizzata di molte funzionalità del sistema, tra cui:

- Gestione dell'alimentazione
- Allarmi di attivazione
- Parametri CPU
- Sincronizzazione di CPU e memoria

Il firmware consente inoltre di impostare i parametri per diverse velocità di clock del processore.



Alcune specifiche hardware e voci di software possono essere modificate senza preavviso.

Característica

Procesador

Esta placa principal usa un zócalo de 939-pin que lleva las sigtes. características:

- Acomoda procesadores AMD Sempron/Athlon64/Athlon 64 FX/Athlon64 X2
- Soporta hasta las velocidades de interfaz 2000MT/s HyperTransport™ (HT)

La Tecnología HyperTransport™ es un vínculo punto a punto entre dos dispositivos, habilita circuitos integrados para intercambiar la información en velocidades más rápidas que las tecnologías de interconexión disponibles actualmente.

Chipset

El chipset RD480 Northbridge (NB) y SB450 Southbridge (SB) se basan de una arquitectura innovadora y escalable con fiabilidad y rendimiento comprobados.

- RD480 (NB)**
- 1 interfaz x2 (expansible a x4) A-Link Express (conformidad PCI Express 1.0a) para conectar al ATI IXP
 - Soporta un PCI Express x16 para la Interfaz de Gráficas, conformidad completa a la revisión de la Especificación Base de PCI Express 1.0a.
 - Soporta la solución de chip singular en la tecnología CMOS de 0.13 micron, 1.0-1.2v
- SB450 (SB)**
- Interfaz 2/4-lane A-Link Express (conformidad PCI Express 1.0a) a los RADEON IGP's
 - Conformidad con la especificación PCI 2.3, hasta dispositivos másters de bus 7 soportados
 - Cuatro dispositivos Serial ATA soportados, conformidad con la especificación Serial ATA 1.0
 - Controlador Anfitrión USB 2.0 integrado que soporta hasta ocho puertos USB 2.0
 - Controlador IDE integrado que soporta los modos Ultra DMA 133/100/66/33

Memoria

- DDR 400/333/266 DDR SDRAM con soporte de Canal Dual
- Acomoda cuatro DIMMs sin buffer, hasta 4 GB de tamaño de memoria máximo

LAN Abordo (optativo)

Esta placa principal puede soportar uno de los sigtes. chipset LAN:

<ul style="list-style-type: none"> • Soporta operación de Autonegociación N-Way de 100/10Mb/s • Soporta capacidad duplex medio/completo • Soporta la función Wake-On-LAN y despertar remoto
<ul style="list-style-type: none"> • Transceptor 10/100/1000 integrado • Soporta PCI v2.3, 32-bit, 33/66-MHz • Soporte total de IEEE802.3, IEEE802.3u y IEEE802.3ab

1394a FireWire (optativo)

- Conformidad total con las provisiones de IEEE Std 1394-1995 para un bus serial de alto rendimiento y IEEE Std 1394a-2000
- Dos puertos de cable con conformidad total de IEEE Std 1394a-2000 en 100/200/400 Mb/s

Audio

Esta placa principal puede soportar cualquiera de los sigtes. chipset de Audio:

- | |
|--|
| <ul style="list-style-type: none">• Conforme con el CODEC AC'97 v2.3• Soporta CODEC de audio de 6 canales diseñados para los sistemas multimedia• Provee tres entradas en estéreo a nivel de línea análogicas con control de volumen de 5-bit: Line-in, CD, AUX• Satisface los requisitos de audio de Microsoft WHQL/WLP 2.0 |
| <ul style="list-style-type: none">• Conforme con el Audio de Alta Definición de Intel, que soporta DACs de 8 canales con proporción 95dB S/N• Compatibilidades: 192/96/48/44.1 KHz con 24/20/16 bits• Soporte de suministro: Digital: 3.3V; Analógico: 3.3V/5.0V• Todas las clavijas analógicas son de retoma de entrada y salida de estéreo para el plug & play analógico• Obedece a los requisitos de audio de Microsoft WHQL/WLP 2.0.• Compatible con Direct Sound 3D™• Salida de Decondificador Dolby Digital para la aplicación de electrónicos de consumidores |

Opciones de Expansión

La placa principal viene con las sigtes. opciones de expansión:

- Dos PCI Express x16 para la Interfaz de Gráficas
- Dos ranuras PCI Express x1
- Dos ranuras conforme con 32-bit PCI v2.3
- Dos conectores 40-pin IDE que soporta hasta cuatro dispositivos
- Una interfaz de la unidad de disco floppy
- Cuatro conectores SATA de 7-pin

La placa principal soporta el mastering de bus UltraDMA con índices de transferencia de 133/100/66/33 MB/s.

I/O Integrado

La placa principal tiene un juego completo de puertos y conectores I/O:

- Dos puertos PS/2 para ratón y teclado
- Un puerto paralelo con cable
- Un puerto serial
- Cuatro puertos USB
- Un puerto LAN (optativo)
- Clavijas de audios para la microphone in (entrada de micrófono), line-in (entrada de línea) y salida de audio de 8-canales

BIOS Firmware

La placa principal usa AWARD BIOS que habilita usuarios para configurar muchas características de sistema que incluyen las sigtes:

- Administración de Alimentación
- Alarmas para despertar
- Parámetros de CPU
- Cronometraje de CPU y de memoria

También se lo puede usar el firmware para configurar los parámetros para diferentes velocidades de reloj de procesador.



Algunas especificaciones de hardware e ítems de software son sujetos a cambio sin aviso previo.

Multi-Language Translation

Características

Processador

Esta motherboard usa uma ficha de 939 pin que possui as seguintes características:

- Acomoda processadores AMD Sempron/Athlon64/Athlon 64 FX/Athlon64 X2
- Suporta velocidades de interface de HyperTransport™ (HT) até 2000MT/s

Tecnologia de HyperTransport™ Té um link ponto-a-ponto entre dois dispositivos, permite circuitos integrados para trocar informação a velocidades muito mais elevadas que as disponíveis actualmente em tecnologias de interconexão.

Conjunto de Chips

O conjunto de chips RD480 Northbridge (NB) e SB450 Southbridge (SB) é baseado numa arquitectura inovadora e escalável com fiabilidade e performance provadas.

RD480 (NB)

- 1 x2 (expansível para x4) interface A-Link Express (compatível com PCI Express 1.0a) para ligação ao ATI IXP
- Suporta um PCI Express x16 para Interface de Gráficos, cumpre totalmente com a revisão 1.0a. da Especificação de Base de PCI Express.
- Suporta solução de chip único em 0.13 micron, tecnologia 1.0-1.2v CMOS

SB450 (SB)

- Interface 2/4-lane A-Link Express (compatível com PCI Express 1.0a) para RADEON IGPs
- Cumpre com a especificação 2.3 PCI, suporta até 7 dispositivos bus mestre
- Suporta quatro dispositivos ATA de Série, cumprindo com a especificação 1.0 ATA de Série
- Controlador Host 2.0 USB Integrado suportando até oito portas USB 2.0
- Controlador IDE integrado que suporta modos Ultra DMA 133/100/66/33

Memória

- DDR 400/333/266 DDR SDRAM com suporte de Bicanal
- Acomoda quatro DIMMs sem buffers, com até 4 GB de limite de memória máxima

Onboard LAN (opcional)

Esta motherboard poderá suportar qualquer um dos seguintes conjuntos de chips LAN:

- | |
|---|
| <ul style="list-style-type: none">• Suporta operação de Auto-negociação N-Way 100/10Mb/s• Suporta capacidade de duplex pela metade/ou na totalidade• Suporta função LAN de Despertar e despertar remoto |
| <ul style="list-style-type: none">• Transreceptor integrado 10/100/1000• Suporta PCI v2.3, 32-bit, 33/66-MHz• Suporta na totalidade IEEE802.3, IEEE802.3u e IEEE802.3ab |

1394a FireWire (opcional)

- compatível com provisões de IEEE Std 1394-1995 para um bus de série de elevada performance e IEEE Std 1394a-2000
- Duas portas para cabo totalmente compatíveis com IEEE Std 1394a-2000 a 100/200/400 Mb/s

Áudio

Esta motherboard pode suportar qualquer um dos seguintes conjuntos de chips Áudio.

- | |
|--|
| <ul style="list-style-type: none">• Compatível com AC'97 v2.3 CODEC• Suporta CODEC áudio com 6 canais concebido para sistemas multimédia para PC• Fornece três entradas estéreo nível de linha analógicas com controlo de volume de 5 bits: Line-in, CD, AUX• Cumpre com os requisitos áudio WHQL/WLP 2.0 da Microsoft audio |
| <ul style="list-style-type: none">• Compatível com Alta Definição Áudio da Intel, suportando DACs com 8 canais com rácio 95dB S/N• Compatibilidades: 192/96/48/44.1 KHz com 24/20/16 bits• Suporte de alimentação: Digital: 3.3V; Analógico: 3.3V/5.0V• Todas as fichas analógicas são entradas estéreo e redistribuição de saídas para ligar & reproduzir analógico• Cumpre com os requisitos áudio WHQL/WLP 2.0 da Microsoft.• Compatível com Direct Sound 3D™• Saída Descodificador Digital Dolby para aplicação electrónica de consumo |

Opções de Expansão

A motherboard é fornecida com as seguintes opções de expansão:

- Duas PCI Express x16 para Interface de Gráficos
- Duas ranhuras 1 x PCI Express
- Duas ranhuras compatíveis com PCI v2.3 de 32 bits
- Duas conectores IDE 40 pinos, que suportam até quatro dispositivos IDE
- Um interface com drive de disco flexível
- Quatro conectores SATA de 7 pin

A motherboard suporta um domínio bus UltraDMA bus com taxas de Transferência de 133/100/66/33 MB/s.

I/O Integrado

A motherboard possui um conjunto completo de portas I/O e conectores:

- Duas portas PS/2 para rato e teclado
- Uma porta paralela com cabo
- Uma porta de série
- Quatro portas USB
- Uma porta LAN (opcional)
- Fichas áudio para entrada de microfone, entrada e saída de Áudio 8-ch

Microprogramação BIOS

Esta motherboard usa AWARD BIOS que permitem aos utilizadores configurar muitas características do sistema incluindo as seguintes:

- Gestão de corrente
- Alarmes de despertar
- Parâmetros CPU
- Temporização de memória e CPU

A microprogramação poderá ser também usada para estabelecer parâmetros para diferentes velocidades de relógio do processador.



Algumas especificações de hardware e itens de software poderão ser sujeitos a alterações sem aviso prévio.

Multi-Language Translation

機能

プロセッサ

このマザーボードには、次の機能を持った939ピンソケットが一つあります：

- AMD Sempron/Athlon64/Athlon 64 FX/Athlon64 X2 プロセッサの搭載に対応
- 転送率が最大2000MT/秒までの HyperTransport™ (HT) インターフェースを採用

HyperTransport™技術とは、二つのデバイスで1対1 (point-to-point) で接続する技術であり、従来のインターコネクト技術に比較して、集積回路同士の情報交換を高速化します。

チップセット

RD480 Northbridge (NB) と SB450 Southbridge (SB) チップセットは、実証された信頼性と性能を持つ革新的で拡張性のあるアーキテクチャに基づいています。

- RD480 (NB)**
- 1つの x2 (x4に拡張可能) A-Link Express インターフェース (PCI Express 1.0a に対応) でATI IXPに接続
 - グラフィックインターフェースとなる PCI Express x16 インターフェースを搭載し、それでPCI Express Base Specification revision 1.0aに完全対応
 - 0.13ミクロンの1.0-1.2v CMOS 技術導入のシングルチップソリューションをサポート
- SB450 (SB)**
- 2/4-レインのA-Link Express インターフェース (PCI Express 1.0a に準拠) でRADEON IGPIに対応
 - PCI 2.3 規格に対応し、最大7つまでのマスター装置の取り付けを可能に
 - 4つまでのSerial ATA 装置をサポートし、Serial ATA 1.0 規格に対応
 - 内蔵のUSB 2.0 ホストコントローラで最大8つまでのUSB 2.0ポートをサポート
 - 内蔵のIDEコントローラでUltra DMA 133/100/66/33の諸モードをサポート

メモリ

- テュアルチャネルのDDR 400/333/266 DDR SDRAMを採用
- 搭載されている4つの非バッファードDIMMで最大4 GBまでのメモリーの取り付けを可能に

オンボードLAN (オプション)

当マザーボードは次のLANチップセットのいずれかを搭載しております：

- | |
|---|
| <ul style="list-style-type: none">• 100/10Mb/s N-way自動ネゴシエーション操作をサポート• 半/全二重の機能をサポート• Wake-On-LAN (WOL) と遠隔wake-up機能をサポート |
|---|

- | |
|---|
| <ul style="list-style-type: none">• 10/100/1000 トランシーバーを搭載済み• PCI v2.3, 32-bit, 33/66-MHzへの対応• IEEE802.3, IEEE802.3u, およびIEEE802.3abに完全対応 |
|---|

1394a Fire Wire (オプション)

- “IEEE Std 1394-1995 for a high-performance serial bus and IEEE Std 1394a-2000”の基準に完全対応
- IEEE Std 1394a-2000 完全対応の2つのポートのそれぞれが100/200/400Mb/秒の転送率を実現

Multi-Language Translation

オーディオ

本マザーボードは次のオーディオチップセットの何れかをサポートします：

<ul style="list-style-type: none">AC'97 2.3 CODEC規格に準拠PCマルチメディアシステムの6チャンネルオーディオCODECをサポート5ビット音声コントロール可能なアナログラインレベルのステレオ入力が3つ：ラインイン、CD、およびAUXMicrosoft WHQL/WLP 2.0 オーディオ要求に適合
<ul style="list-style-type: none">Intel High Definition Audio規格に準拠することで、95dB S/N率の8チャンネル DACをサポート互換性：24/20/16 ビットでの192/96/48/44.1 KHz電源サポート：デジタルの場合は 3.3V、アナログの場合は3.3V/5.0Vすべてのアナログ端子は、ステレオ入出力re-tasking機能によるアナログ plug & playが可能Microsoft WHQL/WLP 2.0 オーディオ規格に準拠Direct Sound 3D™ に対応電化製品向けのDolby Digital Encoder出力機能を搭載

拡張オプション

本マザーボードでは、次の拡張機能が利用できます。

- グラフィック用のPCI Express x16 インターフェース が2つ
- PCI Express x1 スロットが2つ
- 32ビットPCI v2.3 互換性スロット が2つ
- 40ピンIDEロープロファイルヘッダー(4つのIDEチャンネルをサポート)が2つ
- フロッピーディスクドライブインターフェイス が1つ
- 7ピンSATAコネクタ が4つ

このマザーボードは、133/100/66/33MB/秒の転送速度でのUltra DMAバスマスタリングをサポートします。

統合の入出力ポート

マザーボードには、次のI/Oポートやコネクタを揃えています。

- マウスとキーボード用のPS/2ポート が2つ
- ケーブル付きのバラレルポート が1つ
- シリアルポートが1つ
- USBポートが4つ
- LANポート が1つ(オプション)
- マイクロホン入力、ライン入力、および8-chのオーディオ出力の諸オーディオジャックを搭載済み

BIOSファームウェア

本マザーボードはAWARD BIOSを採用し、次の機能を含む多様なシステムの構成をサポートします。

- 電源管理
- ウェークアップアラーム
- CPUパラメータ
- CPUとメモリとのタイミング

さらに、所定のパラメータを設定することによって、プロセッサのクロック速度を変更することもできます。



一部のハードウェア仕様とソフトウェアアイテムは、予告なしに変更することがあります。

Multi-Language Translation

특성

프로세서

본 마더보드는 다음과 같은 특성을 지닌 939 핀 소켓을 사용합니다:

- AMD 샘프론/애슬론64/애슬론 64 FX/애슬론64 X2 프로세서 사용
- HyperTransport™ (HT) 인터페이스 속도 최대 2000MT/s 지원

HyperTransport™ 기술은 두 장치간의 point-to-point 링크로, 집적 회로가 기존의 상호 연결 기술 보다 더 빠른 속도로 정보를 교환할 수 있다.

칩셋

RD480 Northbridge (NB) 및 SB450 Southbridge (SB) 칩셋은 혁신적이고 범위성을 지닌 아키텍처를 기반으로 인정된 신뢰성과 성능을 지닌다.

RD480 (NB)

- ATI IXP 연결을 위한 1 x2 (x4 확장 가능) A-Link Express 인터페이스 (PCI Express 1.0a 부합)
- 그래픽 인터페이스로 1 개의 PCI Express x16 지원, PCI Express Base 사양 1.0a 부합.
- 0.13 micron, 1.0-1.2v CMOS 테크놀로지의 싱글 칩 솔루션 지원

SB450 (SB)

- RADEON IGP의 용 2/4-lane A-Link Express 인터페이스 (PCI Express 1.0a 부합)
- PCI 2.3 사양 부합, 최대 7 개의 버스 마스터 장치 지원
- 4 개의 시리얼 ATA 장치 지원, 시리얼 ATA 1.0 사양 부합
- 최대 8 개의 USB 2.0 포트를 지원하는 통합 USB 2.0 호스트 컨트롤러
- UltraDMA 133/100/66/33 모드를 지원하는 통합 IDE 컨트롤러

메모리

- DDR 400/333/266 DDR SDRAM, 듀얼 채널 지원
- 4 개의 unbuffered DIMMs, 최대 메모리 크기 4 GB

보드 내장 LAN (선택 사항)

본 마더보드는 다음과 같은 LAN 칩셋을 지원합니다:

<ul style="list-style-type: none">• 100/10Mb/s N-Way Auto-negotiation 작업 지원• Half/full 듀플렉스 지원• Wake-On-LAN(WOL) 기능 및 원격 wake-up 지원
<ul style="list-style-type: none">• 통합 10/100/1000 트랜시버• PCI v2.3, 32-bit, 33/66-MHz 지원• IEEE802.3, IEEE802.3u 및 IEEE802.3ab 지원

1394a 파이어 와이어(선택 사항)

- 고성능 시리얼 버스를 위한 IEEE Std 1394-1995 및 IEEE Std 1394a-2000 부합
- 100/200/400 Mb/s 속도로 케이블 포트에 부합하는 2 개의 IEEE Std 1394a-2000

오디오

본 마더보드는 다음의 오디오 칩셋을 지원합니다.

<ul style="list-style-type: none"> AC'97 v2.3 코덱 호환 PC 멀티미디어 시스템을 위해 디자인 된 6 채널 오디오 코덱 지원 5 비트 볼륨 컨트롤의 아날로그 라인 레벨 스테레오 입력 3개 : Line-in, CD, AUX 마이크로소프트 WHQL/WLP 2.0 오디오 요구 조건 부합
<ul style="list-style-type: none"> 95dB S/N 비율로 8 채널 DAC를 지원하는 HD 오디오 부합 호환성: 24/20/16 비트의 192/96/48/44.1 KHz 전원 지원: 디지털: 3.3V; 아날로그: 3.3V/5.0V 모든 아날로그 잭은 스테레오 입력 및 출력, 아날로그 플러그 앤 플레이를 위한 re-tasking. 마이크로소프트 WHQL/WLP 2.0 오디오 요구에 부합 Direct Sound 3D™ 호환 소비자 전기 어플리케이션을 위한 돌비 디지털 인코더 출력

확장 옵션

본 마더보드의 확장 옵션은 다음과 같다:

- 그래픽 인터페이스를 위한 PCI 익스프레스 x16 2 개
- PCI Express 1개 x 슬롯 2 개
- 32 비트 PCI v2.3 호환 슬롯 2 개
- 최대 4개의 IDE 장치를 지원하는 40핀IDE 커넥터 2 개
- 플로피 디스크 드라이브 인터페이스 1 개
- 7 핀 SATA 커넥터 4 개

마더보드는 전송 속도 133/100/66/33 MB/s의 UltraDMA 버스 마스터링을 지원한다.

통합 I/O

본 마더보드는 풀 셋트의 I/O 포트 및 커넥터가 있다:

- 마우스 및 키보드용 PS/2 포트 2 개
- 패러럴 포트 1 개, 케이블
- 시리얼 포트 1 개
- USB 포트 4 개
- LAN 포트 1 개 (선택 사항)
- 마이크론 입력, 라인 입력 및 8 채널 오디오 출력 용 오디오 잭

BIOS 펌웨어

본 마더보드는 다음과 같은 시스템 특성을 구성할 수 있는 Award BIOS 를 사용한다:

- 전원 관리
- Wake-up 알람
- CPU 파라미터
- CPU 및 메모리 타이밍

펌웨어로 다른 프로세서 클럭 속도의 파라미터를 설정할 수도 있다.



몇 하드웨어 사양 및 소프트웨어 아이템은 사전 통보 없이 변경될 수 있습니다.

功能

處理器

本主機板設置有一個939針插座，該插座具有如下功能：

- 可安裝AMD Sempron/Athlon64/Athlon 64 FX/Athlon64 X2 處理器
- 支援高達2000MT/秒的HyperTransport™ (HT)介面傳輸速率

HyperTransport™技術為以點對點方式連接兩台設備的技術，藉此，積體電路間能夠以高於現有各種內部連接技術(interconnect technology)技術的速度來交換資訊。

晶片組

RD480 北橋(NB)及SB450 南橋(SB)晶片組在研發設計上採用了創新且具擴充性之架構，具備優良的可靠性及性能。

- RD480 (NB)**
- 1個 2倍速 (可擴充至4倍速) A-Link Express介面 (PCI Express 1.0a 相容) 以連接ATI IXP
 - 支援1個繪圖介面用之PCI Express x16，完全符合PCI Express Base規格修訂版1.0a
 - 支援有關0.13微米1.0-1.2v CMOS技術之單晶片解決方案

- SB450 (SB)**
- 以2/4通道之A-Link Express 介面 (相容於PCI Express 1.0a) 連接RADEON IGP
 - 符合PCI 2.3 規格，支援高達7匯流排主控裝置
 - 支援4個Serial ATA裝置，符合Serial ATA 1.0 規格
 - 整合有USB 2.0主控器，可支援至8個USB 2.0埠
 - 整合有IDE 控制器，可支援 Ultra DMA 133/100/66/33模式

記憶體

- 採用雙通道DDR 400/333/266 DDR SDRAM
- 設有4個非緩衝DIMM，最多可安裝4 GB記憶體

內建區域網路 (選購)

本主機板搭載有如下其中一種LAN晶片組：

- | |
|--|
| <ul style="list-style-type: none">• 支援 100/10Mb/s N-way 自動協調作業• 支援半/全雙工功能• 支援區域網路喚醒(Wake-On-LAN)及遠端喚醒功能 |
| <ul style="list-style-type: none">• 整合有10/100/1000 收發器• 支援PCI v2.3, 32位元, 33/66-MHz• 完全支援IEEE802.3、IEEE802.3u 及IEEE802.3ab |

1394a Fire Wire (選購)

- 完全支援"IEEE Std 1394-1995 for a high-performance serial bus 及 IEEE Std 1394a-2000" 規格
- 2個IEEE Std 1394a-2000連接埠，傳輸速率達100/200/400 Mb/秒

音頻

本主機板支援如下音訊晶片組的其中之一：

<ul style="list-style-type: none">• 相容於AC' 97 2.3 規格• 支援為個人電腦多媒體系統設計的6聲道音訊CODEC功能• 提供具有5位元音量控制功能的3種類比線級立體音效輸入：Lin-in、CD、及AUX• 符合Microsoft WHQL/WLP 2.0 音訊規格
<ul style="list-style-type: none">• 相容於Intel High Definition Audio規格，可支援95dB S/N 比的 8聲道DAC• 相容性：24/20/16位元下之192/96/48/44.1 KHz• 電源支援：3.3V(數位時)，3.3V/5.0V(類比時)• 所有類比插頭均具類比隨插即用的立體環場音訊輸入及輸出的重組態(re-tasking)功能• 符合Microsoft WHQL/WLP 2.0 音訊規格• Direct Sound 3D™ 相容• 支援家用電子產品之杜比數位編碼核心輸出功能

擴充選項

本主機板包括下列擴充選項：

- 2 個繪圖卡用PCI Express x16 介面
- 2 個PCI Express x1 槽
- 2 個32位元PCIv2.3插槽
- 2 個40針 IDE 接頭，支援 4個 IDE 裝置
- 1 個軟碟機介面
- 4 個7針SATA插頭

本主機板支援傳輸率133/100/66/33 MB/秒下的Ultra DMA 匯流排主控功能。

整合 I/O

主機板具有一組齊全的 I/O 連接埠及連接頭：

- 2 個 PS/2 埠，供滑鼠與鍵盤使用
- 1 個附連接線的平行埠
- 1 個串列埠
- 4 個USB埠
- 1 個區域網路埠(選購)
- 麥克風輸入、線級輸入、及8聲道音訊輸出等用之音訊插孔

BIOS 韌體

本主機板使用AWARD BIOS，使用者可以組態設定許多系統功能，包括如下：

- 電源管理
- 喚醒警鈴
- CPU參數
- CPU及記憶體的時脈定時

此外，也可藉由參數的設定，調整處理器的時脈速度。



部份硬體規格和軟體內容可能會在未經通知的情況下更動，敬請見諒。

功能

处理器

主板使用使用一个 939-pin 插座，此插座具有以下特点：

- 支持 AMD Sempron/Athlon64/Athlon 64 FX/Athlon64 X2 处理器
- 支持 2000MT/s HyperTransport™ (HT) 接口速度

HyperTransport™ 技术是一种在两台设备间进行点到点连接的技术，它可以让集成电路使用比当前互连技术更高的速度进行信息交换。

芯片组

RD480 北桥 (NB) 和 SB450 南桥 (SB) 芯片组是基于一种新型的、可扩展的架构，能提供已经证明的可靠性和高性能。

- RD480 (NB)**
- 1 x2 (可扩展到 x4) A-Link Express 接口 (符合 PCI Express 1.0a 标准) 用于连接到 ATI IXP
 - 支持 1 个 PCI Express x16 用于图形接口，完全符合 PCI Express Base 规格 1.0a。
 - 支持 0.13 微米单芯片解决方案，1.0-1.2v CMOS 技术

- SB450 (SB)**
- 到 RADEON IGP 的 2/4-lane A-Link Express 接口 (符合 PCI Express 1.0a 标准)
 - 符合 PCI 2.3 规格，最多支持 7 个总线设备
 - 支持 4 个串行 ATA 设备，符合串行 ATA 1.0 规格
 - 集成 USB 2.0 主控器，最多支持 8 个 USB 2.0 端口
 - 集成 IDE 控制器，支持 Ultra DMA 133/100/66/33 模式

内存

- DDR 400/333/266 DDR SDRAM 双通道支持
- 支持 4 个非缓冲 DIMM，内存最大支持 4 GB

Onboard LAN (可选)

此主板支持以下任何一种 LAN 芯片组：

- | |
|--|
| <ul style="list-style-type: none">• 支持 100/10Mb/s N 路自协商工作• 支持半双工/全双工工作• 支持 LAN 唤醒 (WOL) 功能和远程唤醒功能 |
| <ul style="list-style-type: none">• 集成 10/100/1000 收发器• 支持 PCI v2.3, 32-位, 33/66-MHz• 完全支持 IEEE 802.3、IEEE802.3u 和 IEEE802.3ab |

1394a 火线 (可选)

- 完全符合用于高性能串行总线的 IEEE Std 1394-1995 和 IEEE Std 1394a-2000
- 2 个符合 IEEE Std 1394a-2000 标准的电缆端口，传输速率可达 100/200/400 Mb/s

音频（可选）

此主板支持以下任何一种音频芯片组

<ul style="list-style-type: none">• 兼容AC' 97 v2.3 CODEC• 支持为PC多媒体系统设计的 6 声道音频编解码器• 提供 3 路带 5 位音量控制的模拟线路电平立体声输入：线入、CD 和 AUX• 符合 Direct Sound 3D™ 规格
<ul style="list-style-type: none">• 符合高精度音频规格，支持 8 通道 DAC，95dB 信噪比• 兼容性：192/96/48/44.1 KHz，24/20/16 位• 电源支持：数字：3.3V；模拟：3.3V/5.0V• 所有模拟插孔为立体声输入和输出并重新指定为模拟即插即用• 符合 Microsoft WHQL/WLP 2.0 音频要求• 符合 Direct Sound 3D™ 规格• 用于消费类电子应用的杜比数字编码器

扩展选项

此主板提供如下扩展选项：

- 2 个 用于图形接口的 PCI Express x16
- 2 个 PCI Express x1 插槽
- 2 个 32 位 PCI v2.3 扩展槽
- 2 个 40-pin IDE 接口，可支持 4 个 IDE 设备
- 1 个 软驱接口
- 4 个 7-pin SATA 接口

主板支持 Ultra DMA 总线控制，传输速率可达 133/100/66/33MB/s。

集成 I/O

此主板具有完整的 I/O 端口和插孔：

- 2 个 用于连接鼠标和键盘的 PS/2 端口
- 1 个 带电缆的并口
- 1 个 串口
- 4 个 USB 端口
- 1 个 LAN 端口（可选）
- 用于麦克风入、线入和 8 声道音频输出的音频插孔

BIOS

此主板使用 AWARD BIOS，可以让用户自己配置以下系统功能：

- 电源管理
- 唤醒报警
- CPU 参数
- CPU 和记忆定时

还可用于设置不同处理器时钟速度的参数。



某些硬件规格和软件项目若有更改恕不另行通知。

Характеристики

Процессор

Плата использует сокет 939-pin и обладает следующими характеристиками:

- Размещает процессоры AMD Sempron/Athlon64/Athlon 64 FX/Athlon64 X2
- Поддерживает технологию 2000MT/s HyperTransport™ (HT)

Технология HyperTransport™ обеспечивает связь двух устройств по протоколу point-to-point, позволяя гораздо более быстрый обмен информацией между интегральными микросхемами, чем тот, который обеспечивается существующими технологиями.

Чипсет

Чипсеты RD480 «Северный мост» (Northbridge, NB) и SB450 «Южный мост» (Southbridge, SB) построены с использованием инновационной масштабируемой архитектуры, обеспечивающей высокую надежность и производительность.

RD480 (NB)

- Один разъем A-Link Express x2 (с возможностью расширения до x4) (совместимый с PCI Express 1.0a) для подключения ATI IXP
- Поддерживает одну шину PCI Express x16 для графического интерфейса, полностью совместима со спецификацией PCI Express Base 1.0a.
- Поддерживает одночипную технологию 0.13 микрон, 1.0-1.2v CMOS

SB450 (SB)

- Интерфейс 2/4-lane A-Link Express (совместимость с PCI Express 1.0a) для RADEON IGP
- Совместимость со спецификацией PCI 2.3, поддержка до 7 устройств типа master
- Поддержка четырех устройств Serial ATA, совместимость со спецификацией Serial ATA 1.0
- Встроенный контроллер хоста USB 2.0 с поддержкой до восьми портов USB 2.0
- Встроенный контроллер IDE с поддержкой режимов Ultra DMA 133/100/66/33

Память

- DDR 400/333/266 DDR SDRAM с поддержкой двухканального режима
- Размещает четыре модуля небуферизуемой памяти DIMM с максимальным объемом памяти до 4 ГБ

Встроенный сетевой адаптер LAN (опционально)

Встроенный сетевой адаптер LAN обладает следующими характеристиками:

- | |
|--|
| <ul style="list-style-type: none">• Поддерживает автоматическое определение скорости и режима соединения 100/10Mb/s• Поддержка режимов Half и Full Duplex• Поддерживает функции Wake-On-LAN и remote wake-up |
| <ul style="list-style-type: none">• Интегрированный трансивер 10/100/1000• Поддержка PCI v2.3, 32-бит, 33/66-МГц• Поддерживает IEEE802.3, IEEE802.3u и IEEE802.3ab |

1394 Fire Wire(опционально)

- Полная совместимость с требованиями стандарта IEEE Std 1394-1995 для скоростных серийных шин и стандарта IEEE Std 1394a-2000
- Два кабельных порта, совместимых с IEEE Std 1394a-2000, со скоростью передачи 100/200/400М бит/с

Аудио

Эта материнская плата может обслуживать любую из следующих аудио чипсетов:

<ul style="list-style-type: none">• Совместимость с CODEC AC'97 v2.3• Поддерживает 6-канальный аудио CODEC для мультимедиальных компьютерных систем• Обеспечивает три аналоговых стереовхода с 5-битной регуляцией громкости: Line-in, CD, AUX• Соответствие требованиям для аудио Microsoft WHQL/WLP 2.0
<ul style="list-style-type: none">• Совместимость с аудио-технологией Intel High Definition, поддержка 8-канального DAC с соотношением сигнал/шум 95дБ• Совместимость с 192/96/48/44.1 КГц для 24/20/16 бит• Электропитание: цифровое: 3.3V; аналоговое: 3.3V/5.0V• Все аналоговые гнезда аудио имеют стереовход и выхода и пригодны для аналогового plug & play• Соответствует нормам звуковых карт Microsoft WHQL/WLP 2.0• Совместимость с Direct Sound 3D™• Декодер цифрового выхода Dolby совместим с домашней электроникой

Возможности расширения

Существуют следующие опции расширения данной материнской платы:

- Два разъема для карты графики PCI Express x16
- Два слота PCI Express x1
- Два 32-битных слота PCI v2.3
- Два разъема 40-штырьковый IDE с поддержкой до четырех устройств IDE
- Один разъем для накопителя на гибких дисках
- Четыре разъема 7-pin SATA

Плата поддерживает технологию захвата управления шиной UltraDMA bus mastering со скоростью передачи данных 133/100/66/33 МБ/сек.

Интегрированный вход/выход

Плата снабжена полным набором портов входа/выхода и разъемов:

- Два порта PS/2 для подключения мыши и клавиатуры
- Один параллельный порт с кабелем
- Один серийный порт
- Четыре порта USB
- Один порт LAN (опционально)
- Гнезда аудио для микрофона, входа и 8-канального выхода

BIOS

Плата работает под AWARD BIOS, который позволяет пользователю конфигурировать различные характеристики системы:

- Управление питанием
- Сигналы пробуждения системы
- Параметры CPU
- Время доступа для CPU и памяти

BIOS допускает также установку параметров для различных частот процессора.



Некоторые параметры платы и характеристики ее программного обеспечения могут быть изменены без предварительного уведомления.

Cechy

Procesor

Ta płyta główna zaopatrzona jest w podstawkę dla procesorów z 939 nóżkami i charakteryzuje się następującymi cechami:

- Obsługuje procesory firmy AMD typu Sempron/Athlon64/Athlon 64 FX/Athlon64 X2
- Obsługuje złącze HyperTransport™ (HT) z szybkością do 2000MT/s

Technologia HiperTransportu™ jest protokołem komunikacji między dwoma urządzeniami, który umożliwia układom zcalonym wymieniać informacje z dużo większymi szybkościami niż dotychczas stosowane technologie wzajemnych połączeń.

Chipset

Mostek północny (NB) RD480 i mostek południowy (SB) SB450 chipsetu oparty jest na nowatorskiej i skalowalnej architekturze o sprawdzonej niezawodności i funkcjonalności.

RD480 (NB)

- 1 złącze x2 (rozszerzalne do x4) A-Link Express (zgodne ze standardem PCI Express 1.0a) służące do podłączenia ATI IXP
- Obsługuje jedno graficzne złącze PCI Express x16, w pełni zgodne ze standardem PCI Express Base w wersji 1.0a.
- Obsługuje pojedyncze układy wykonane w technologii CMOS 0.13 mikrona, 1.0-1.2v

SB450 (SB)

- Interfejs 2/4-lane A-Link Express (zgodny z PCI Express w wersji 1.0a) dla RADEON IGP
- Zgodne ze standardem PCI w wersji 2.3 obsługujące do 7 urządzeń bus master
- Obsługująca cztery urządzenia Serial ATA, zgodne ze standardem Serial ATA wersja 1.0
- Zintegrowany kontroler USB 2.0 obsługujący do do ośmiu gniazd USB 2.0
- Zintegrowany kontroler IDE obsługujący tryby pracy Ultra DMA 133/100/66/33

Pamięć

- DDR 400/333/266 DDR SDRAM z obsługą dwu kanałów
- Przystosowana do obsługi cztery banków niebuforowanej pamięci DIMM o pojemności do 4 GB.

Zintegrowana obsługa sieci LAN (opcjonalnie)

Zintegrowana obsługa sieci LAN posiada następujące właściwości:

- | |
|---|
| <ul style="list-style-type: none">• Obsługuje N-drożne automatycznie ustalone operacje z szybkościami 100/10Mb/s• Zdolność Half/Full duplex• Obsługuje funkcję Wake-On-LAN i zdalnie sterowane wake-up (uruchamianie komputera) |
| <ul style="list-style-type: none">• Zintegrowany terminal nadawczo-odbiorczy 10/100/1000• Obsługuje 32 bitowe PCI w wersji 2.3 o częstotliwościach 33/66-MHz• Całkowicie zgodny z IEEE802.3, IEEE802.3u and IEEE802.3ab |

1394a FireWire (opcjonalnie)

- W pełni zgodna z zabezpieczeniem standardu IEEE 1394-1995 dla wysokiej wydajności szyny szeregowej oraz standardu IEEE 1394a-2000
- Dwa złącza całkowicie zgodne ze standardem IEEE 1394a-2000 o szybkości przesyłania 100/200/400 Mb/s

Audio

Ta płyta główna może obsługiwać dowolny z następujących chipsetów audio:

<ul style="list-style-type: none">• Zgodny z CODEC AC'97 w wersji 2.3• Obsługuje 6 kanałów audio CODEC dla komputerowych systemów multimedialnych• Zapewnia trzy wejściowe, analogowe linie stereo z 5 bitową regulacją głośności: Line-in, CD, AUX• Spełnia wymagania stawiane audio przez firmę Microsoft w systemie WHQL/WLP 2.0
<ul style="list-style-type: none">• Zgodny z protokołem Intel High Definition Audio, obsługuje 8 kanałowe DAC ze stosunkiem sygnał/szum równym 95dB• Zgodność: 192/96/48/44.1 KHz z 24/20/16 bitami• Zapewnia zasilanie: 3,3 V cyfrowe; 3.3 V/5.0 V analogowe• Wszystkie analogowe gniazda wejściowe i wyjściowe typu jack są stereofoniczne i przystosowane do analogowego plug & play• Spełnia wymagania audio według standardu Microsoft WHQL/WLP w wersji 2.0• Zgodny z Direct Sound 3D™• Dekoder cyfrowego wyjścia Dolby pozwalający na współpracę z domową elektroniką

Możliwości rozbudowy

Płyta główna wyposażona jest w następujące gniazda:

- Dwa gniazda PCI Express x16 dla karty graficznej
- Dwa gniazda typu PCI Express x1
- Dwa 32-bitowych gniazda zgodnych z PCI w wersji 2.3
- Dwa 40-nóżkowe złącza IDE mogące obsłużyć do czterech urządzeń IDE
- Jedno złącze obsługujące stacje dyskiety
- Cztery 7-nóżkowe złącza SATA

Płyta główna obsługuje szynę UltraDMA z szybkością transferu 133/100/66/33 MB/s.

Zintegrowane We/Wy

Płyta główna wyposażona jest w pełny zestaw gniazd i złączy We/Wy:

- Dwa gniazda PS/2 dla myszy i klawiatury
- Jeden port równoległy z obsługującym go przewodem
- Jedno gniazdo szeregowo
- Cztery gniazda USB
- Jedno gniazdo LAN (opcjonalnie)
- Gniazda audio typu jack wejście dla mikrofonu, gniazdo wejściowe i wyjściowe audio, 8 kanałów.

Firmowy BIOS

Płyta główna wyposażona jest w BIOS firmy AWARD, który pozwala użytkownikowi konfigurować wiele cech systemu włączając w to następujące właściwości:

- Zarządzanie poborem mocy
- Alarmy typu Wake-up
- Parametry pracy procesora
- Ustalenia szybkości pracy procesora i pamięci

BIOS może być używany do ustalania parametrów wpływających na szybkości pracy zegara procesora.



Niektóre parametry dotyczące płyty i jej oprogramowania mogą ulec zmianie bez uprzedniego powiadomienia.

Multi-Language Translation

Vlastnosti

Processor

Tato základní deska využívá 939kolíkovou patici, která se vyznačuje následujícími vlastnostmi:

- Podpora procesorů AMD Sempron/Athlon64/Athlon 64 FX/Athlon64 X2
- Podpora rychlostí rozhraní HyperTransport™ (HT) až 2000 MT/s

Technologie HyperTransport™ je přímým spojením mezi dvěma zařízeními, umožňující integrovaným obvodům výměnu informací vyššími rychlostmi, než jaké nabízejí současné technologie.

Čipová sada

Čipy northbridge (NB) RD480 a southbridge (SB) SB450 jsou založeny na inovativní a škálovatelné architektuře s ověřenou spolehlivostí a výkonností.

- RD480 (NB)**
- 1 x2 (rozšířitelné až na x4) rozhraní A-Link Express (splňuje požadavky standardu PCI Express 1.0a) pro připojení k ATI IXP
 - Podpora jednoho rozhraní PCI Express x16 pro grafiku, zcela splňující základní požadavky standardu PCI Express, revize 1.0a.
 - Podpora řešení v jediném čipu s technologií 0,13 mikronů, 1,0–1,2 V CMOS
- SB450 (NB)**
- 2/4kanálové rozhraní A-Link Express (splňuje požadavky standardu PCI Express 1.0a) pro RADEON IGP
 - Splňuje požadavky standardu PCI 2.3 s podporou až 7 hlavních kanálů
 - Podpora čtyř sériových rozhraní ATA, splňuje požadavky standardu Serial ATA 1.0
 - Integrované hostitelské řadiče USB 2.0 podporující až osm portů
 - Integrovaný řadič IDE podporující Ultra ATA s režimy 133/100/66/33

Paměť

- Paměti DDR 400/333/266 DDR SDRAM s dvoukanálovým přenosem
- Podpora čtyř modulů DIMM bez vyrovnávací paměti s maximální kapacitou 4 GB

Vestavění síťové rozhraní LAN (volitelně)

Vestavěné síťové rozhraní LAN nabízí následující možnosti:

- | |
|---|
| <ul style="list-style-type: none">• Podpora 100/10Mb/s N–cestného automatického přepínání provozu• Poloviční a plný duplex• Podpora funkce Wake-On-LAN(WOL) a aktivace na dálku |
| <ul style="list-style-type: none">• Integrovaný transceiver 10/100/1000• Podpora rozhraní PCI v2.3, 32bitové, 33/66 MHz• Plná podpora IEEE802.3, IEEE802.3u a IEEE802.3ab |

1394a FireWire (volitelné)

- Plná podpora standardu IEEE 1394–1995 pro vysokovýkonnou sériovou sběrnici a IEEE standard 1394a–2000
- Dva kabelové porty podle standardu IEEE 1394a–2000 s rychlostí až 100/200/400 Mb/s

Zvuk

Tato základní deska může podporovat některou z následujících zvukových čipových sad:

- | |
|--|
| <ul style="list-style-type: none">• Kodek AC'97 v2.3 splňující požadavky standardu• Podpora 6kanálového zvukového kodeku určeného pro multimediální PC systémy• Nabízí tři analogové linkové stereo vstupy s 5bitovým řízení hlasitosti: LINE-IN, CD, AUX• Splňuje požadavky pro audio zařízení Microsoft WHQL/WLP 2.0 |
| <ul style="list-style-type: none">• Splňuje požadavky standardu Hi-Fi audiokodeku Intel, s podporou 8kanálového D/A převodníku s odstupem šumu od zvuku 95 dB• Kompatibilita: 192/96/48/44,1 kHz s 24/20/16bitovým vzorkováním• Napájení: Digitální: 3,3 V; Analogové: 3,3 V / 5,0 V• Všechny analogové vstupní a výstupní konektory jsou stereo, plug & play• Splňuje požadavky pro audio zařízení Microsoft WHQL/WLP 2.0• Kompatibilita s Direct Sound 3D™• Výstup enkodéru Dolby Digital pro použití ve spojení se spotřební elektronikou |

Možnosti rozšíření

Základní deska je dodávána s následujícími možnostmi rozšíření

- Dvě patice PCI Express x16 pro grafickou kartu
- Dvě patice PCI Express x1
- Dvě 32bitové patice PCI v2.3
- Dva 40kolíkový konektor IDE podporující až čtyři zařízení IDE
- Jedno rozraní pro disketovou mechaniku
- Čtyři 7kolíkové konektor SATA

Základní deska podporuje sběrnici Ultra DMA s přenosovými rychlostmi 133/100/66/33 MB/s.

Integrovaný vstup/výstup

Základní deska je vybavena kompletní sadou vstupních portů a konektorů I/O:

- Dva porty PS/2 pro myš a klávesnici
- Jeden paralelní port s kabelem
- Jeden sériový port
- Čtyři USB porty
- Jeden port LAN (volitelně)
- Zvukové konektory pro mikrofon, zvukový vstup a 8kanálový zvukový výstup

Firmware BIOS

Základní deska využívá BIOS formy AWARD, který uživateli umožňuje nakonfigurovat mnoho systémových parametrů, včetně následujících:

- Řízení spotřeby
- Alarmy při spouštění systému
- Parametry CPU
- Časování CPU a paměti

Firmware může být rovněž použit k nastavení parametrů pro různé taktovací frekvence procesoru.



Některé technické parametry hardware a software se mohou měnit bez předchozího upozornění.

Multi-Language Translation

Caracteristici

Procesorul

Această placă de bază utilizează un soclu 939, având următoarele caracteristici:

- Funcționează cu procesoare AMD Sempron/Athlon64/Athlon 64 FX/Athlon64 X2
- Suportă interfețe HyperTransport™ (HT) cu viteze de până la 2000 MT/s

Tehnologia HyperTransport™ este o legătură punct-la-punct între două aparate, care permite viteze mult mai mari de schimb al informațiilor între circuitele integrate, decât cel asigurat de tehnologiile de interconectare actuale.

Setul de chipuri

Seturile de chipuri RD480 Northbridge (NB) și SB450 Southbridge (SB) se bazează pe o arhitectură inovatoare și scalabilă, care s-a impus deja prin fiabilitate și performanță.

RD480 (NB)

- O interfață x2 (extensibil la x4) A-Link Express (compatibilă cu PCI Express 1.0a) pentru conectare la ATI IXP
- Suportă o interfață grafică PCI Express x16, pe deplin compatibil cu specificația de bază PCI Express, versiunea 1.0a.
- Suportă soluția cu un singur cip pentru tehnologia CMOS pe 0,13 microni, la 1,0–1,2 V

SB450 (SB)

- Interfață A-Link Express cu 2/4 magistrale (compatibilă cu PCI Express 1.0a) pentru IGP-uri RADEON
- Compatibilă cu specificația PCI 2.3, suportând până la 7 unități bus master
- Suportă patru unități Serial ATA, compatibilă cu specificația Serial ATA 1.0
- Controler gazdă USB 2.0, suportând până la opt porturi USB 2.0
- Controler IDE integrat care suportă modulele Ultra DMA 133/100/66/33

Memoria

- Suport DDR 400/333/266 DDR SDRAM cu canal dual
- Funcționează cu patru module fără zonă tampon DIMM, cu capacitate maximă de 4 GB

Onboard LAN (opțional)

Onboard LAN are următoarele caracteristici:

- | |
|--|
| <ul style="list-style-type: none">• Suportă operații de autonegociere N-way de 100/10 Mb/s• Posibilitate semi-duplex și duplex complet• Suportă funcția Wake-On-LAN și trezirea de la distanță |
| <ul style="list-style-type: none">• Unitate de emisie/recepție 10/100/1000 integrat• Suportă PCI, versiunea 2.3, de 32 biți, la 33/66 MHz• Compatibilitate deplină cu IEEE802.3, IEEE802.3u și IEEE802.3ab |

1394a Fire Wire (opțional)

- Compatibil deplin cu prevederile standardului IEEE 1394-1995, oferind un bus serial de înaltă performanță și compatibilitate cu standardul IEEE 1394a-2000
- Două porturi de cablu compatibile deplin cu standardul IEEE 1394a-2000, la viteza de 100/200/400 Mb/s

Multi-Language Translation

Audio

Audio are următoarele caracteristici:

<ul style="list-style-type: none">• Corespunde cu AC'97 v2.3 CODEC• Suportă CODEC cu șase canale audio destinate sistemelor multimedia ale calculatoarelor• Oferă trei intrări audio analoge stereo, cu un control al volumului sonor de 5 biți: Intrare audio, CD, AUX• Corespunde cerințelor audio Microsoft WHQL/WLP 2.0
<ul style="list-style-type: none">• Compatibilitate cu specificația Intel High Definition Audio, suportând DAC pe 8 canale cu raport sunet/paraziți de 95 dB• Compatibil cu: 192/96/48/44,1 kHz, la 24/20/16 biți• Sursă de alimentare: digitală: 3,3 V; analoagă: 3,3 V / 5,0 V• Toate mufele analoge sunt cu redistribuire intrare și ieșire stereo pentru configurare automată analoagă• Corespunde cerințelor audio Microsoft WHQL/WLP 2.0• Compatibil cu Direct Sound 3D™• Ieșire codificator Dolby Digital pentru aparate electronice de larg consum

Opțiuni de extindere

Placa de bază este dotată următoarele posibilități de extindere:

- Două PCI Express de 16x pentru interfața grafică
- Două sloturi PCI Express x1
- Două sloturi de 32 biți compatibile PCI, versiunea 2.3
- Două conecitoare IDE 40 cu care suport cel mult 4 instrumente IDE
- O interfață pentru unitate floppy
- Patru conecitoare SATA 7

Placa de bază suportă bus mastering UltraDMA cu viteze de transfer de 133/100/66/33 MB/s

I/O integrată

Placa de bază este dotată cu un set complet de porturi și conecitoare I/O:

- Două porturi PS/2, pentru mouse și tastatură
- Un port paralel cu cable
- Un port serial
- Patru porturi USB
- Un port LAN (opțional)
- Mufe audio pentru microfon, intrare audio și ieșire audio cu 8 canale

Firmware BIOS

Placa de bază utilizează AWARD BIOS, care permite utilizatorului să configureze mai mulți parametri ai sistemului, cum ar fi:

- Gestionarea energiei
- Alarmer de trezire
- Parametri CPU
- Temporizare CPU și memorie

Acest firmware poate fi utilizat și pentru a seta parametrii diferitelor frecvențe de comandă ale procesorului.



Anumite specificații hardware și elemente de software pot fi modificate fără înștiințare prealabilă.

Спецификация

Процесор

Тази дънна платка използва 939-pin сокет със следните спецификации:

- Поддръжка на процесори AMD Sempron/Athlon64/Athlon 64 FX/Athlon64 X2
- Поддръжка на технологията HyperTransport™ (HT) със скорост до 2000MT/s

Технологията HyperTransport™ е връзка точка-до-точка (point-to-point) между две устройства, която предоставя възможност интегрираните вериги да обменят информация на много по-висока скорост от досегашно съществуващите технологии.

Чипсет

Чипсетът със северен мост RD480 (NB) и южен мост SB450 (SB) е изграден на базата на оригинална архитектура с възможност за надстройка с доказана надеждност и производителност.

RD480 (NB)

- Интерфейс A-Link Express x2 с възможност за разширение до x4 (съвместим с PCI Express 1.0a) за връзка към ATI IXP
- Графичен интерфейс PCI Express x16 напълно съвместим със спецификацията PCI Express Base 1.0a.
- Поддръжка на CMOS технология на един чип 0.13 микрона, 1.0-1.2v

S450 (SB)

- 2/4-канален интерфейс A-Link Express (съвместим с PCI Express 1.0a) за връзка към RADEON IGP
- Съвместимост със спецификацията PCI 2.3 с поддръжка на до 7 bus master устройства
- Поддръжка на четири устройства Serial ATA, съвместимо със спецификацията Serial ATA 1.0
- Интегриран контролер USB 2.0 с поддръжка до осем порта USB 2.0
- Интегриран IDE контролер Ultra DMA 133/100/66/33

Памет

- Поддръжка на двуканална памет DDR 400/333/266 DDR SDRAM
- Поддръжка на четири небуферирани слота DIMM с общ максимален капацитет 4 GB

Интегриран мрежов контролер (опция)

Спецификация на интегрирания мрежов контролер:

- | |
|--|
| <ul style="list-style-type: none">• поддръжка на 100/10Mb/s, N-Way Auto-negotiation operation• Режим: Half/Full duplex• поддръжка на функция за "събуждане" Wake-On-LAN и дистанционен wake-up |
| <ul style="list-style-type: none">• Интегриран 10/100/1000 контролер• поддръжка на PCI v2.3, 32-bit, 33/66-MHz• Пълна поддръжка на стандартите IEEE802.3, IEEE802.3u и IEEE802.3ab |

1394a FireWire контролер (опция)

- Пълна съвместимост със стандартите IEEE 1394 -1995 за високоскоростна серийна шина и IEEE 1394a -2000
- Два кабелни порта (100/200/400Mb/s) напълно съвместими със стандарта IEEE 1394a-2000

Multi-Language Translation

Аудио

Тази дънна платка може да поддържа един от следните видове аудио чипсети

<ul style="list-style-type: none">• Аудио Кодек съвместим с AC'97 v2.3• Поддръжка на 6-канален аудио кодек за мултимедийни компютърни системи• Три аналогови линейни стерео входа с 5-битов контрол на силата на звука: Line-in, CD, AUX• Съответствие с изискванията на Microsoft WHQL/WLP 2.0
<ul style="list-style-type: none">• Съвместимост с Intel High Definition Audio с поддръжка на 8-канален звук със съотношение звук/шум 95dB• съвместимост с: 192/96/48/44.1 KHz на 24/20/16 bits• Захранване: цифрово: 3.3V; аналогово: 3.3V/5.0V• Всички аналогови жакове са едновременно и входове и изходи в зависимост от използването им и поддържат режим plug & play• Съответствие с изискванията на Microsoft WHQL/WLP 2.0• Съвместимост с Direct Sound 3D™• Изход Dolby Digital за връзка с домашна аудио техника

Възможности за разширяване

Дънната платка има следните разширителни възможности:

- Два слота PCI Express x16 за графичен интерфейс
- Два слота PCI Express x1
- Два слота 32-bit PCI v2.3
- Два колектора 40-pin IDE с поддръжка на четири IDE устройства
- един конектор за флопидисково устройство
- четири 7-щифтови SATA конекторас

Дънната платка поддържа шина UltraDMA 133/100/66/33 MB/s

Интегриран Вход/Изход контролер

Дънната платка има пълен набор от I/O портове и конектори:

- два PS/2 порта за мишка и клавиатура
- един паралелен порт с кабел
- един сериен порт
- четири USB порта
- един LAN порт (опция)
- Аудио гнезда за микрофон, линеен вход и 8-канален аудио изход

BIOS Firmware

Дънната платка използва AWARD BIOS с възможност за различни системни настройки, включително

- управление на захранването
- Wake-up аларми
- параметри на процесора
- синхронизиране на процесора и паметта

настройка на скоростта на часовника на процесора



Хардуерните и софтуерни спецификации и параметри могат да бъдат изменени без предупреждение.

Multi-Language Translation

Jellemző

Processzor

Ez az alaplap 939 tús foglalattal rendelkezik, amelynek jellemzői:

- AMD Sempron/Athlon64/Athlon 64 FX/Athlon64 X2 processzorokkal működik
- Maximum 2000 MT/s HyperTransport™ (HT) sebességű interfészt támogat

A HyperTransport™ technológia egy ponttól pontig való kapcsolat két készülék között, és segítségével az integrált áramkörök közötti információcsere sebessége sokkal nagyobb, mint a jelenleg rendelkezésre álló összekapcsolási technológiák esetében.

Lapkakészlet

A RD480 Northbridge (NB) és SB450 Southbridge (SB) lapkakészletek egy új és méretezhető, nagy megbízhatóságú és teljesítőképességű architektúrára épülnek.

- RD480 (NB)**
- Egy 2-szeres (4-szeresre bővíthető) A-Link Express interfész (PCI Express 1.0a kompatibilis) az ATI IXP kapcsolására
 - Egy 16-szoros PCI Express a grafikus interfész számára, amely teljesen kompatibilis a PCI Express alapspecifikáció 1.0a változatával.
 - Egylapkás megoldást is támogat 0,13 mikronos, 1,0-1,2 V-os CMOS technológiával

- SB450 (SB)**
- 2/4 sávú A-Link Express (PCI Express 1.0a kompatibilitású) interfész a RADEON IGP-khez
 - A PCI 2.3-as specifikációjával kompatibilis, akár 7 bus master eszközt támogat
 - Négy soros ATA eszközt támogat, kompatibilis a soros ATA 1.0 specifikációjával
 - Beépített USB 2.0 gazda vezérlő, legtöbb nyolc USB 2.0 portot támogat
 - Beépített IDE vezérlő, amely az Ultra DMA 133/100/66/33 módokat támogatja

Memória

- DDR 400/333/266 DDR SDRAM, duál csatorna támogatásával
- Négy puffer nélküli DIMM, maximum 4 GB-os memóriakapacitással

Alaplapon levő LAN (választható)

Az alaplapon levő LAN jellemzői:

<ul style="list-style-type: none">• 100/10Mb/s N-Way automatikus beállítással• Fél-/teljes duplex• Támogatja a Wake-On-LAN(WOL) funkciót és a távoli ébresztést
<ul style="list-style-type: none">• Integrált 10/100/1000 adó-vevő• Támogatja a 32 bites, 33/66 MHz-es PCI 2.3-as változatát• Teljesen megfelel az IEEE802.3, IEEE802.3u és IEEE802.3ab szabványoknak

1394a FireWire (opcionális)

- Teljesen kompatibilis az IEEE 1394-1995 szabvány előírásaival, csúcsteljesítményű soros busszal, és megfelel az IEEE 1394a-2000 szabványnak
- Két, az IEEE 1394a-2000 szabvánnyal teljesen kompatibilis kábelportok, 100/200/400 Mb/s sebességen

Audio

Az alaplapon levő Audio jellemzői:

<ul style="list-style-type: none">• Megfelel az AC'97 v2.3 CODEC-nek• A számítógép multimédiás rendszereinek szánt hat csatornás audio CODEC-et támogat• Három analóg sztereo bemenetet biztosít 5 bites hangerő vezérléssel: bemenet, CD, AUX• Megfelel a Microsoft WHQL/WLP 2.0 audio követelményeinek
<ul style="list-style-type: none">• Kompatibilis az Intel High Definition Audio előírásokkal, 8 csatornás DAC támogatásával, 95 dB jel-zaj aránnyal• Kompatibilitás: 192/96/48/44,1 KHz, 24/20/16 biten• Tápforrás: digitális: 3,3 V; analóg: 3,3 V / 5,0V• Az összes analóg csatlakozó sztereo bemenetű és kimenetű analóg azonnali felismerés támogatására• Megfelel a Microsoft WHQL/WLP 2.0 audio követelményeinek• Kompatibilis a Direct Sound 3D™ technológiával• Dolby Digital kódoló kimenet fogyasztói elektronikai cikkekhez

Bővítési lehetőségek

Az alaplap a következő bővítési lehetőségekkel rendelkezik:

- Két 16-szeres PCI Express a grafikus interfész számára
- Két 1-szeres PCI Express foglalat
- Két 32 bites, a PCI 2.3-as változatával kompatibilis foglalat
- Két 40 tűs IDE csatlakozó négy IDE eszköz támogatására
- Egy hajlékonylemez meghajtó interfész
- Négy 7 tűs SATA csatlakozó

Az alaplap támogatja az UltraDMA bus mastering megoldást, 133/100/66/33 MB/s sebességen

Beépített I/O

Az alaplapot az I/O portok és csatlakozók teljes készletével szerelték fel:

- Két PS/2 port az egér és a billentyűzet számára
- Egy párhuzamos port kábellel
- Egy soros port
- Négy USB port
- Egy LAN port (választható)
- Audio csatlakozók mikrofon bemenethez, audio bemenethez és 8 csatornás audio kimenethez

BIOS Firmware

Az alaplapon levő AWARD BIOS segítségével a felhasználó a rendszer sok paraméterét állíthatja be, például:

- Energiagazdálkodás
- Ébresztési riasztások
- CPU paraméterek
- CPU és memória időzítés

A firmware segítségével a processzor órajel-frekvenciáinak paramétereit is beállíthatják.



Bizonyos hardverjellemzők és szoftverelemek előzetes bejelentés nélkül módosulhatnak.