AR-B1794

Socket 478 Pentium 4
ATI RS300M Mini ITX

USER'S MANUAL

Version 1.0

Acknowledgments

Table of Contents

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Introduction

Product Description

The AR-B1794 Pentium 4 Mini ITX board incorporates the ATI RS300M chipset and supports 478-pin Intel Pentium 4 processors of 2GHz and up to 3.2GHz+ with FSB 800MHz/533MHz/400MHz. AR-B1794 supports the Pentium 4 processor with 256-KB L2 cache, Pentium 4 processor with 512-KB L2 cache on 0.13 micron process.

The I/O functions are on AR-B1794 integrated onto the IXP150. It supports the integrated graphics processor (IGP) on the IGP9180. The IGP has 3D, 2D, and video capabilities. The system memory size can be up to 1GB, using the single DDR socket on board. Four USB ports are supported with the USB 1.1/2.0 standard.

AR-B1794 supports TV out and LVDS with the use of the ATI RS300M integrated graphics device that accepts two digital graphics input data streams. One data stream outputs through an LVDS transmitter to an LCD panel, while the other data stream is encoded for NTSC or PAL TV and outputs through a 10-bit high speed DAC. The TV encoder device encodes a graphics signal up to 1024x768 resolution and outputs the video signals according to NTSC or PAL standards. The LVDS function supports 18 bit single and dual channel LCD panels.
The board does not support 24-bit single and dual channel LCD panels.

The AR-B1794 Mini ITX SBC supports CRT VGA interface as well as TV out and LVDS interface. Realtek LAN 8100BL supports Ethernet functionality (10/100Mb). The board also has AC97 6CH audio, 4 COM ports, UDMA 100, 4 USB ports, two serial ATA ports, watchdog timer and a PCI slot for expandability. Dimensions of the board are 170mm x 170mm.

This board represents the perfect choice for those who want superior performance for POS, kiosk, ATM, Web payphone, medical and other embedded applications.

Checklist

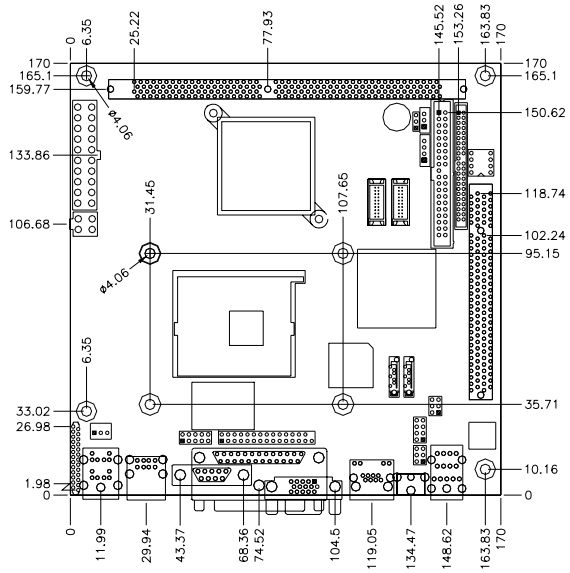
Your AR-B1794 package should include the items listed below.

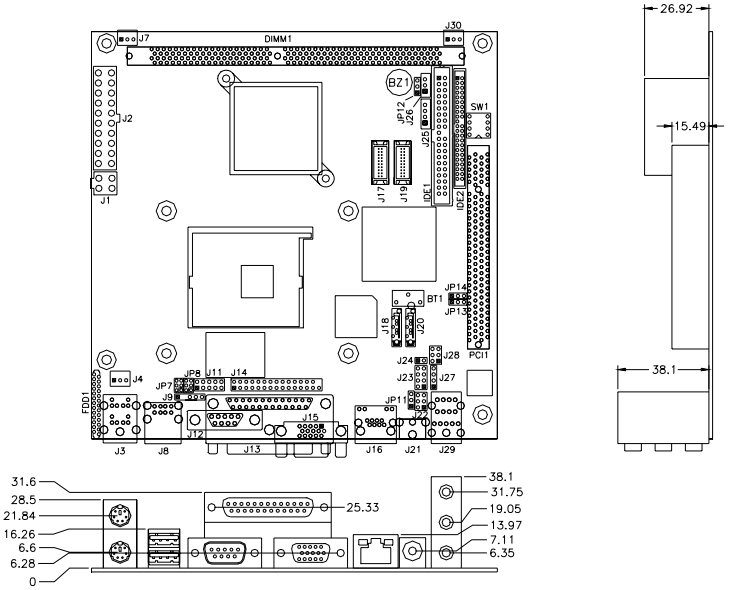
- The AR-B1794 P4 Mini ITX board
- This User's Manual
- 1 CD containing chipset drivers and flash memory utility
- Optional cables such as:
  - 1 slim FDD Ribbon Cable
  - 2 IDE Ribbon Cables (40-pin & 44-pin)
  - 1 COM Port Cable
  - Serial ATA Cable

Specifications

Product Name	AR-B1794
Form Factor	Mini ITX
CPU Type	Socket 478 (Intel Pentium 4 / Celeron)
CPU Voltage	0.8375V~1.6V (VRD10)
System Speed	2.0AG~3.2GHz
CPU Operating Frequency	400/533/800MHz
Green /APM	APM1.2
CPU Socket	Socket 478
Chipset	ATI RS300M Chipset NB: Mobility IGP9180 868 PIN BGA SB: IXP150 457 PIN BGA
BIOS	Award BIOS, with ACPI Function
Cache	128K/256K/512K Level 2 (CPU integrated)
VGA	Mobility IGP9180 embedded, AGP 4X,CRT, TV-out, LVDS
LAN	Realtek RTL8100 10/100Mb LAN controller
Audio	IXP150 built-in sound controller + AC97 Codec ALC655 AC3 5.1 CH. (Line-out, Line-in, Mic)
Memory type	1 x DDR, 2.5V, DDR266/333/400 SDRAM(without ECC Function) DIMM Module, Max. capacity - 1GB
LPC I/O	1. First I/O : Winbond 83627HF: IrDAx1 Parallel x1, COM1(RS-232), COM2(RS-232), FDC 1.44MB (Slim type), Hardware monitor (3 thermal inputs, 8 voltage monitor inputs, VID0-4 , 1 chassis open detection ,3 fan headers) 2. Secondary I/O: Fintek F81216 support COM3,4 (RS-232)
Keyboard Controller	Winbond 83627HF built-in
Local bus IDE	IXP150 built-in, IDE1 40-pin pitch 2.54mm (Ultra DMA 33/66/100), IDE2 44-pin pitch 2.0mm
Serial ATA	SiI3512, 2 ports
Digital I/O	4 in, 4 out
On board D-type connector	PS/2 Keyboard/Mouse, VGA(CRT), COM1, Printer, USBx2, RJ-45, Line-out , Line-in, Mic, TV-out
Power Connector	ATX 12V
PCI Slot	1 slot (support 2 bus master)
USB	4 ports, USB 2.0
IrDA (Infrared Ray)	Pin header, allows infrared wireless communication.
Watchdog Timer	Yes (256 segments, 0,1,2…255. sec/min)
System Voltages	+5V, +12V, -12V, 5VSB-5V, 3.3V
Board Size	170 x170mm

Board Dimensions





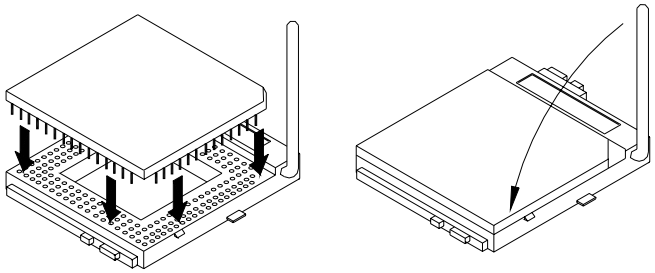
Installations

This section provides information on how to use the jumpers and connectors on the AR-B1794 in order to set up a workable system. The topics covered are:

Installing the CPU

The AR-B1794 embedded board supports a Socket 478 processor socket for Intel Pentium 4 processors.

The Socket 478 processor socket comes with a lever to secure the processor. Raise this lever to about a 90° angle to allow the insertion of the processor. Place the processor into the socket by making sure the notch on the corner of the CPU corresponds with the notch on the inside of the socket. Once the processor has slide into the socket, return the lever to the lock position. Refer to the figures below.



After you have installed the processor into the socket, check if the jumpers for the CPU type and speed are correct.

***NOTE**: Ensure that the CPU heat sink and the CPU top surface are in total contact to avoid CPU overheating problem that would cause your system to hang or be unstable.*

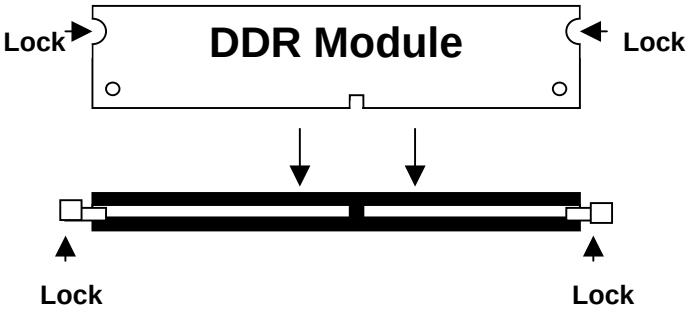
Installing the Memory

The AR-B1794 embedded board supports one DDR memory sockets for a maximum total memory of 1GB in DDR memory type. The memory module capacities supported are 128MB, 256MB, 512MB and 1GB. The following table lists the supported DDR DIMM configurations. ATI RS300M supports configurations defined in the JEDEC DDR DIMM specification only. Non-JEDEC standard DIMMs such as double-sided x16 DDR SDRAM DIMMs are not supported.

Installing and Removing Memory Modules

To install the DDR modules, locate the memory slot on the embedded board and perform the following steps:

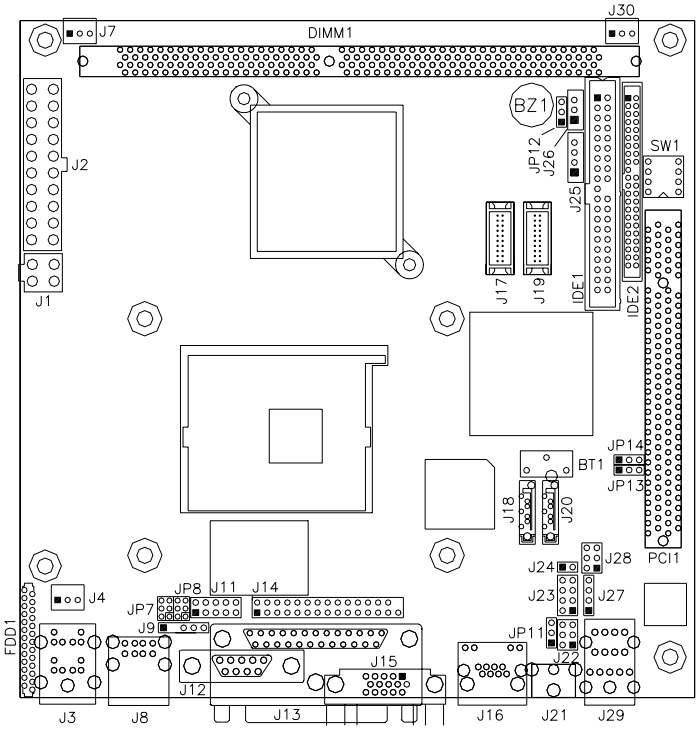
1. Hold the DDR module so that the key of the DDR module align with those on the memory slot.
2. Gently push the DDR module in an upright position until the clips of the slot close to hold the DDR module in place when the DDR module touches the bottom of the slot.
3. To remove the DDR module, press the clips with both hands.



Setting the Jumpers

Jumpers are used on AR-B1794 to select various settings and features according to your needs and applications. Contact your supplier if you have doubts about the best configuration for your needs. The following lists the connectors on AR-B1794 and their respective functions.

Jumper Locations on AR-B1794



Configuring the CPU Frequency

The AR-B1794 embedded board does not provide DIP switches to configure the processor speed (CPU frequency).

J24: RTL8100BL LAN Enable/Disable

J24	10/100Mb LAN
	Enable
	Disable

JP12: LVDS Panel Power Select

JP12	LVDS Panel Power
	3.3V (default)
	5V

JP13: Clear CMOS Contents

Use JP13 to clear the CMOS contents. *Note that the ATX-power connector should be disconnected from the board before clearing CMOS.*

JP13	Setting	Function
	Pin 1-2 Short/Closed	Normal
	Pin 2-3 Short/Closed	Clear CMOS

JP8: COM3 RS232 +5V / +12V Power Setting

Pin #	Signal Name	JP8	Signal Name	Pin #
1	RI		+12V	2
3	RI (Default)		RI (Default)	4
5	RI		+5V	6

COM3 Settings: Pin 1-2 short = +12V, Pin 5-6 short = +5V, Pin 3-4 Standard COM Port

JP7: COM4 RS232 +5V / +12V Power Setting

Pin #	Signal Name	JP7	Signal Name	Pin #
1	RI		+12V	2
3	RI (Default)		RI (Default)	4
5	RI		+5V	6

COM4 Settings: Pin 1-2 short = +12V, Pin 6-5 short = +5V, Pin 3-4 Standard COM Port

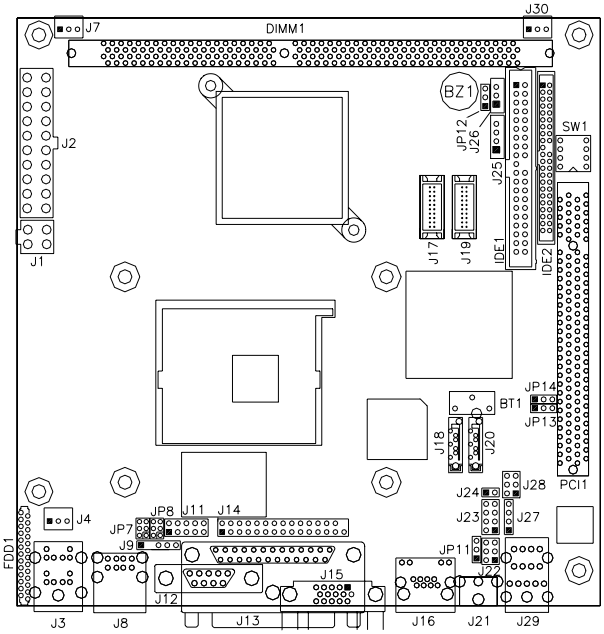
SW1: LVDS Resolution Setting

SW1	1	2	3	4
800x600	OFF	ON	ON	ON
1024x768	ON	OFF	ON	ON
1280x1024	OFF	OFF	ON	ON
1400x1050	ON	ON	OFF	ON

Connectors on AR-B1794

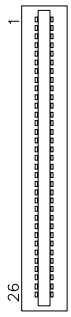
The connectors on AR-B1794 allows you to connect external devices such as keyboard, floppy disk drives, hard disk drives, printers, etc. The following table lists the connectors on AR-B1794 and their respective functions.

Connector Locations on AR-B1794



FDD1: Floppy Drive Connector

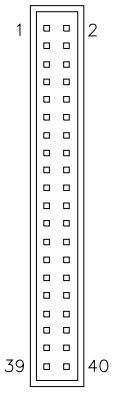
FDD1is a slim 26-pin connector and will support up to 2.88MB FDD.



Signal Name	Pin #	Pin #	Signal Name
VCC	1	2	INDEX
VCC	3	4	DRV_SEL
VCC	5	6	DSK_CH
NC	7	8	NC
NC	9	10	MOTOR
DINST	11	12	DIR
NC	13	14	STEP
GND	15	16	WDATA
GND	17	18	WGATE
GND	19	20	TRACK
NC	21	22	WPROT
GND	23	24	RDATA
GND	25	26	SIDE

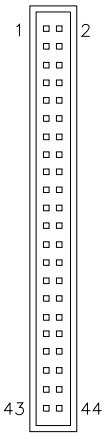
IDE1, IDE2: EIDE Connectors

IDE1: Primary IDE Connector



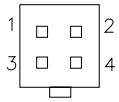
Signal Name	Pin #	Pin #	Signal Name
Reset IDE	1	2	Ground
Host data 7	3	4	Host data 8
Host data 6	5	6	Host data 9
Host data 5	7	8	Host data 10
Host data 4	9	10	Host data 11
Host data 3	11	12	Host data 12
Host data 2	13	14	Host data 13
Host data 1	15	16	Host data 14
Host data 0	17	18	Host data 15
Ground	19	20	Protect pin
DRQ0	21	22	Ground
Host IOW	23	24	Ground
Host IOR	25	26	Ground
IOCHRDY	27	28	Host ALE
DACK0	29	30	Ground
IRQ14	31	32	No connect
Address 1	33	34	No connect
Address 0	35	36	Address 2
Chip select 0	37	38	Chip select 1
Activity	39	40	Ground

IDE2: Secondary IDE Connector



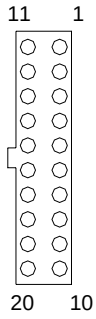
Signal Name	Pin #	Pin #	Signal Name
Reset IDE	1	2	Ground
Host data 7	3	4	Host data 8
Host data 6	5	6	Host data 9
Host data 5	7	8	Host data 10
Host data 4	9	10	Host data 11
Host data 3	11	12	Host data 12
Host data 2	13	14	Host data 13
Host data 1	15	16	Host data 14
Host data 0	17	18	Host data 15
Ground	19	20	Key
DRQ0	21	22	Ground
Host IOW	23	24	Ground
Host IOR	25	26	Ground
IOCHRDY	27	28	Host ALE
DACK0	29	30	Ground
IRQ14	31	32	No connect
Address 1	33	34	No connect
Address 0	35	36	Address 2
Chip select 0	37	38	Chip select 1
Activity	39	40	Ground
Vcc	41	42	Vcc
Ground	43	44	N.C.

J1: ATX 12V/+12V Power Connector



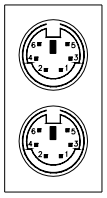
Pin #	Signal Name
1	Ground
2	Ground
3	+12V
4	+12V

J2: ATX Power Supply Connector



Signal Name	Pin #	Pin #	Signal Name
3.3V	11	1	3.3V
-12V	12	2	3.3V
Ground	13	3	Ground
PS-ON	14	4	+5V
Ground	15	5	Ground
Ground	16	6	+5V
Ground	17	7	Ground
-5V	18	8	Power good
+5V	19	9	5VSB
+5V	20	10	+12V

J3: PS/2 Keyboard and PS/2 Mouse Connectors



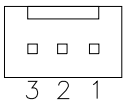
PS/2 Mouse

PS/2 Keyboard

Signal Name	Keyboard	Mouse	Signal Name
Keyboard data	1	1	Mouse data
N.C.	2	2	N.C.
GND	3	3	GND
5V	4	4	5V
Keyboard clock	5	5	Mouse clock
N.C.	6	6	N.C.

J4: CPU Fan Power Connector

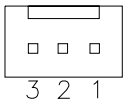
J4 is a 3-pin header for the CPU fan. The fan must be a 12V fan.



Pin #	Signal Name
1	Ground
2	+12V
3	Rotation detection

J7, J30: System Fan Power Connector

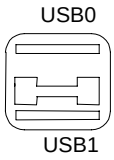
J7 and J30 are 3-pin headers for system fans. The fan must be a 12V (500mA) fan.



Pin #	Signal Name
1	Ground
2	+12V
3	Rotation detection

J8: USB Connector (USB1/USB2)

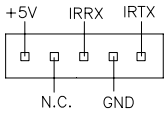
J8 is a stacked USB port.



Pin #	Signal Name
1	Vcc
2	USB-
3	USB+
4	Ground

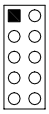
J9: IrDA Connector

J9 is used for an optional IrDA connector for wireless communication.



Pin #	Signal Name
1	+5V
2	No connect
3	Ir RX
4	Ground
5	Ir TX

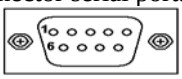
J11: Digital 4-in 4-out I/O Connector



Signal Name	Pin	Pin	Signal Name
Ground	1	2	Vcc
Out3	3	4	Out1
Out2	5	6	Out0
IN3	7	8	IN1
IN2	9	10	IN0

J12: COM1 Serial Port

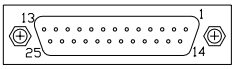
J12 (COM1) is a DB-9 connector serial port.



Signal Name	Pin #	Pin #	Signal Name
DCD, Data carrier detect	1	6	DSR, Data set ready
RXD, Receive data	2	7	RTS, Request to send
TXD, Transmit data	3	8	CTS, Clear to send
DTR, Data terminal ready	4	9	RI, Ring indicator
GND, ground	5	10	Not Used

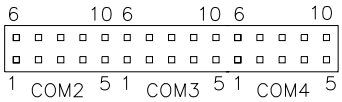
J13: Parallel Port Connector

J13 is a DB-25 external. The following table describes the pin-out assignments of this connector.



Signal Name	Pin #	Pin #	Signal Name
Line printer strobe	1	14	AutoFeed
PD0, parallel data 0	2	15	Error
PD1, parallel data 1	3	16	Initialize
PD2, parallel data 2	4	17	Select
PD3, parallel data 3	5	18	Ground
PD4, parallel data 4	6	19	Ground
PD5, parallel data 5	7	20	Ground
PD6, parallel data 6	8	21	Ground
PD7, parallel data 7	9	22	Ground
ACK, acknowledge	10	23	Ground
Busy	11	24	Ground
Paper empty	12	25	Ground
Select	13	N/A	N/A

J14: Serial Ports



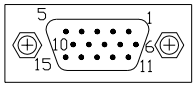
Pin #	Signal Name (RS-232)
1	DCD, Data carrier detect
2	RXD, Receive data
3	TXD, Transmit data
4	DTR, Data terminal ready
5	Ground
6	DSR, Data set ready
7	RTS, Request to send
8	CTS, Clear to send
9	RI, Ring indicator
10	No Connect.

JP14: Power LED Connector

Pin #	Signal Name
1	Vcc
2	NC
3	PLED

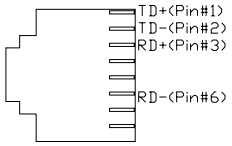
J15: VGA CRT connector

J15 is a DB-15 VGA connector. The following table shows the pin-out assignments of this connector.



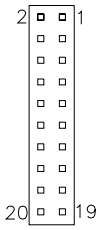
Signal Name	Pin #	Pin #	Signal Name
Red	1	2	Green
Blue	3	4	N.C.
GND	5	6	GND
GND	7	8	GND
N.C.	9	10	GND
N.C.	11	12	N.C.
HSYNC	13	14	VSYNC
NC	15		

J16: RJ45 Connector



J17, J19: LVDS Connectors (1st channel, 2nd channel)

The LVDS connectors are composed of the first channel (J17) and second channel (J19) to support 18-bit or 36-bit.



Signal Name	Pin #	Pin #	**Signal Name**
TX0-	2	1	TX0+
Ground	4	3	Ground
TX1-	6	5	TX1+
5V/3.3V	8	7	Ground
TX3-	10	9	TX3+
TX2-	12	11	TX2+
Ground	14	13	Ground
TXC-	16	15	TXC+
5V/3.3V	18	17	ENABKL
+12V	20	19	+12V

J18, J20: Serial ATA (SATA) Connectors

The SATA connectors support serial ATA 150. Each connector can only use one serial ATA hard disk. J18 is port 1 and J20 is port 2.

J21, JP11: TV out Connector (RCA Jack/J21 and 3-pin Header/JP11)

Pin #	**Signal Name**
1	Y
2	Ground
3	C

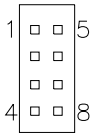
J22: External Audio Connector

J22 is a 6-pin header that is used to connect to the optional audio cable card that integrates jacks for Line Out and Mic.

Signal Name	Pin #	Pin #	Signal Name
LINEOUT_R	1	2	LINEOUT_L
Ground	3	4	Ground
MIC 1	5	6	MIC 2

J23: USB Connector (USB3/USB4)

The following table shows the pin outs of the USB pin headers connectors (USB 2.0 compliant).



Signal Name	Pin	Pin	Signal Name
Vcc	1	5	Ground
USB0-	2	6	USB1+
USB0+	3	7	USB1-
Ground	4	8	Vcc

J25: Panel Inverter Power Connector

Pin #	Signal Name
1	+12V (1A)
2	Ground
3	LCDVDD
4	ENABKL

J26: Panel Inverter Power Connector

Pin #	Signal Name
1	+12V (1A)
2	NC
3	Ground

J27: CD-In Audio Connector

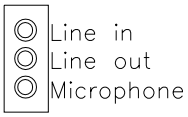
Pin #	Signal Name
1	CD Audio R
2	Ground
3	Ground
4	CD Audio L

J28: System Function Connector

Signal Name	Pin	Pin	Signal Name
5VSB	1	2	PS_ON
5V	3	4	HDD Active
Ground	5	7	Reset

ATX power on switch: Pins 1-2
HDD LED: Pins 3-4
Reset switch: Pins 5-6

J29: Line Out, Line In, Mic Connector



Watchdog Timer Configuration

The WDT is used to generate a variety of output signals after a user programmable count. The WDT is suitable for use in the prevention of system lock-up, such as when software becomes trapped in a deadlock. Under these sort of circumstances, the timer will count to zero and the selected outputs will be driven. Under normal circumstance, the user will restart the WDT at regular intervals before the timer counts to zero.

SAMPLE CODE:
This code and information is provided "as is" without warranty of any kind, either expressed or implied, including but not limited to the implied warranties of merchantability and/or fitness for a particular purpose.

```
;[]=============================================
; Name  : Enable_And_Set_Watchdog
; IN    : AL - 1sec ~ 255sec
; OUT   : None
;[]=============================================
Enable_And_Set_Watchdog   Proc    Near
          push    ax              ;save time interval
          call Unlock_Chip

          mov cl, 2Bh
          call Read_Reg
          and al, NOT 10h
          call Write_Reg          ;set GP24 as WDTO

          mov cl, 07h
          mov al, 08h
          call Write_Reg          ;switch to LD8
```

```
        mov cl, 0F5h
        call Read_Reg
        and al, NOT 08h
        call Write_Reg      ;set count mode as second

        pop ax
        mov cl, 0F6h
        call Write_Reg      ;set watchdog timer

        mov al, 01h
        mov cl, 30h
        call Write_Reg      ;watchdog enabled

        call Lock_Chip
        ret
Enable_And_Set_Watchdog  Endp
;[]=============================================
; Name  : Disable_Watchdog
; IN    : None
; OUT   : None
;[]=============================================
Disable_Watchdog  Proc    Near
        call Unlock_Chip

        mov cl, 07h
        mov al, 08h
        call Write_Reg      ;switch to LD8

        xor  al, al
        mov cl, 0F6h
        call Write_Reg      ;clear watchdog timer

        xor  al, al
        mov cl, 30h
        call Write_Reg      ;watchdog disabled

        call Lock_Chip
        ret
Disable_Watchdog  Endp
;[]=============================================
```

```
; Name   : Unlock_Chip
; IN : None
; OUT    : None
;[]=============================================
Unlock_Chip      Proc      Near
          Mov dx, 4Eh
          mov al, 87h
          out  dx, al
          out  dx, al
          ret
Unlock_Chip      Endp
;[]=============================================
; Name   : Lock_Chip
; IN : None
; OUT    : None
;[]=============================================
Unlock_Chip      Proc      Near
          mov dx, 4Eh
          mov al, 0AAh
          out  dx, al
          ret
Unlock_Chip      Endp
;[]=============================================
; Name   : Write_Reg
; IN : CL - register index
;       AL - Value to write
; OUT    : None
;[]=============================================
Write_Reg    Proc      Near
          push      ax
          mov dx, 4Eh
          mov al,cl
          out  dx,al
          pop ax
          inc  dx
          out  dx,al
          ret
Write_Reg    Endp
;[]=============================================
```

```
; Name   : Read_Reg
; IN : CL - register index
; OUT    : AL - Value to read
;[]=============================================
==
Read_Reg     Proc       Near
             Mov al, cl
             mov dx, 4Eh
             out  dx, al
             inc  dx
             in    al, dx
             ret
Read_Reg     Endp
;[]=============================================
```

Digital I/O Sample Code

Filename: W627hf.h

```
//=====================================================================
//
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR
// PURPOSE.
//
//=====================================================================
#ifndef __W627HF_H
#define __W627HF_H                  1
//=====================================================================
#define W627_IOBASE                 0x4E
//=====================================================================
#define     W627HF_INDEX_PORT       (W627_IOBASE+0)
#define     W627HF_DATA_PORT        (W627_IOBASE+1)
//=====================================================================
#define     W627HF_REG_LD           0x07
//=====================================================================
#define W627HF_UNLOCK               0x87
#define     W627HF_LOCK             0xAA
//=====================================================================
void Set_W627HF_LD( unsigned char);
void Set_W627HF_Reg( unsigned char, unsigned char);
unsigned char Get_W627HF_Reg( unsigned char);
//=====================================================================
#endif      //__W627HF_H
```

```
Filename: W627hf.cpp
//=====================================================================
//
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR
// PURPOSE.
//
//=====================================================================
#include "W627HF.H"
#include <dos.h>
//=====================================================================
void Unlock_W627HF (void);
void Lock_W627HF (void);
//=====================================================================
void Unlock_W627HF (void)
{
        outportb(W627HF_INDEX_PORT, W627HF_UNLOCK);
        outportb(W627HF_INDEX_PORT, W627HF_UNLOCK);
}
//=====================================================================
void Lock_W627HF (void)
{
        outportb(W627HF_INDEX_PORT, W627HF_LOCK);
}
//=====================================================================
void Set_W627HF_LD( unsigned char LD)
{
        Unlock_W627HF();
        outportb(W627HF_INDEX_PORT, W627HF_REG_LD);
        outportb(W627HF_DATA_PORT, LD);
        Lock_W627HF();
}
//=====================================================================
void Set_W627HF_Reg( unsigned char REG, unsigned char DATA)
{
        Unlock_W627HF();
        outportb(W627HF_INDEX_PORT, REG);
        outportb(W627HF_DATA_PORT, DATA);
        Lock_W627HF();
}
//=====================================================================
unsigned char Get_W627HF_Reg( unsigned char REG)
{
        unsigned char Result;
        Unlock_W627HF();
        outportb(W627HF_INDEX_PORT, REG);
        Result = inportb(W627HF_DATA_PORT);
        Lock_W627HF();
        return Result;
}
//=====================================================================
```

File of the Main.cpp

```
//=========================================================================
//
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR
// PURPOSE.
//
//=========================================================================
#include <dos.h>
#include <conio.h>
#include <stdio.h>
#include <stdlib.h>
#include "W627HF.H"
//=========================================================================
void ClrKbBuf(void);
int main (int argc, char *argv[]);
//=========================================================================
int main (int argc, char *argv[])
{
	unsigned char ucDO = 0;					//data for digital output
	unsigned char ucDI;					//data for digital input
	unsigned char ucBuf;

	Set_W627HF_LD( 0x07);					//switch to logic device 7

	Set_W627HF_Reg(0xF1, 0x00);				//clear
	ucDI = Get_W627HF_Reg(0xF1) & 0x0F;

	ClrKbBuf();
	while(1)
	{
		ucDO++;
		Set_W627HF_Reg(0xF1, ((ucDO & 0x0F) << 4));
		ucBuf = Get_W627HF_Reg(0xF1) & 0x0F;
		if (ucBuf != ucDI)
		{
			ucDI = ucBuf;
			printf("Digital I/O Input Changed. Current Data is 0x%X\n",ucDI);
		}
		if (kbhit())
		{
			getch();
			break;
		}
		delay(500);
	}
	return 0;
}
//=========================================================================
void ClrKbBuf(void)
{
	while(kbhit())
	{	getch();	}
}
//-------------------------------------------------------------------------
```

This page is intentionally left blank.

BIOS Setup

This chapter describes the different settings available in the Award BIOS that comes with the motherboard. The topics covered in this chapter are as follows:

BIOS Introduction

The Award BIOS (Basic Input/Output System) installed in your computer system's ROM supports Intel Pentium 4 processors. The BIOS provides critical low-level support for a standard device such as disk drives, serial ports and parallel ports. It also adds virus and password protection as well as special support for detailed fine-tuning of the chipset controlling the entire system.

BIOS Setup

The Award BIOS provides a Setup utility program for specifying the system configurations and settings. The BIOS ROM of the system stores the Setup utility. When you turn on the computer, the Award BIOS is immediately activated. Pressing the <Del> key immediately allows you to enter the Setup utility. If you are a little bit late pressing the <Del> key, POST (Power On Self Test) will continue with its test routines, thus preventing you from invoking the Setup. If you still wish to enter Setup, restart the system by pressing the "Reset" button or simultaneously pressing the <Ctrl>, <Alt> and <Delete> keys. You can also restart by turning the system Off and back On again. The following message will appear on the screen:

```
Press  <DEL>  to  Enter  Setup
```

In general, you press the arrow keys to highlight items, <Enter> to select, the <PgUp> and <PgDn> keys to change entries, <F1> for help and <Esc> to quit.

When you enter the Setup utility, the Main Menu screen will appear on the screen. The Main Menu allows you to select from various setup functions and exit choices.

Phoenix - Award WorkstationBIOS CMOS Setup Utility

Standard CMOS Features	Frequency/Voltage Control
Advanced BIOS Features	Load Fail-Safe Defaults
Advanced Chipset Features	Load Optimized Defaults
Integrated Peripherals	Set Supervisor Password
Power Management Setup	Set User Password
PnP/PCI Configurations	Save & Exit Setup
PC Health Status	Exit Without Saving
ESC : Quit	↑ ↓ → ← : Select Item
F10 : Save & Exit Setup	
Time, Date, Hard Disk Type…	

The section below the setup items of the Main Menu displays the control keys for this menu. At the bottom of the Main Menu just below the control keys section, there is another section, which displays information on the currently highlighted item in the list.

***Note**: If the system cannot boot after making and saving system changes with Setup, the Award BIOS supports an override to the CMOS settings that resets your system to its default.*

***Warning:** It is strongly recommended that you avoid making any changes to the chipset defaults. These defaults have been carefully chosen by both Award and your system manufacturer to provide the absolute maximum performance and reliability. Changing the defaults could cause the system to become unstable and crash in some cases.*

Standard CMOS Setup

"Standard CMOS Setup" choice allows you to record some basic hardware configurations in your computer system and set the system clock and error handling. If the motherboard is already installed in a working system, you will not need to select this option. You will need to run the Standard CMOS option, however, if you change your system hardware configurations, the onboard battery fails, or the configuration stored in the CMOS memory was lost or damaged.

Phoenix - Award WorkstationBIOS CMOS Setup Utility
Standard CMOS Features

		Item Help
Date (mm:dd:yy)	Wed, Feb 18 2004	
Time (hh:mm:ss)	00 : 00 : 00	Menu Level
IDE Primary Master		Change the day, month,
IDE Primary Slave		Year and century
IDE Secondary Master	None	
IDE Secondary Slave		
Drive A	1.44M, 3.5 in.	
Video	EGA/VGA	
Halt On	All Errors	
Base Memory	640K	
Extended Memory	129024K	
Total Memory	130048K	

At the bottom of the menu are the control keys for use on this menu. If you need any help in each item field, you can press the <F1> key. It will display the relevant information to help you. The memory display at the lower right-hand side of the menu is read-only. It will adjust automatically according to the memory changed. The following describes each item of this menu.

Date

The date format is:

Day : **Sun to Sat**
Month : **1 to 12**
Date : **1 to 31**
Year : **1994 to 2079**

To set the date, highlight the "Date" field and use the PageUp/ PageDown or +/- keys to set the current time.

Time

The time format is: **Hour : 00 to 23**
Minute : 00 to 59
Second : 00 to 59

To set the time, highlight the "Time" field and use the <PgUp>/ <PgDn> or +/- keys to set the current time.

IDE Primary HDDs / IDE Secondary HDDs

The onboard PCI IDE connectors provide Primary and Secondary channels for connecting up to four IDE hard disks or other IDE devices. Each channel can support up to two hard disks; the first is the "Master" and the second is the "Slave".

Press <Enter> to configure the hard disk. The selections include Auto, Manual, and None. Select 'Manual' to define the drive information manually. You will be asked to enter the following items.

CYLS :	Number of cylinders
HEAD :	Number of read/write heads
PRECOMP :	Write precompensation
LANDZ :	Landing zone
SECTOR :	Number of sectors

The Access Mode selections are as follows:

Auto	
Normal	(HD < 528MB)
Large	(for MS-DOS only)
LBA	(HD > 528MB and supports Logical Block Addressing)

Drive A

These fields identify the types of floppy disk drive that has been installed in the computer. The available specifications are:

360KB	1.2MB	720KB	1.44MB	2.88MB
5.25 in.	5.25 in.	3.5 in.	3.5 in.	3.5 in.

Video

This field selects the type of video display card installed in your system. You can choose the following video display cards:

EGA/VGA	For EGA, VGA, SEGA, SVGA or PGA monitor adapters. (default)
CGA 40	Power up in 40 column mode.
CGA 80	Power up in 80 column mode.
MONO	For Hercules or MDA adapters.

Halt On

This field determines whether or not the system will halt if an error is detected during power up.

No errors	The system boot will not be halted for any error that may be detected.
All errors	Whenever the BIOS detects a non-fatal error, the system will stop and you will be prompted.
All, But Keyboard	The system boot will not be halted for a keyboard error; it will stop for all other errors
All, But Diskette	The system boot will not be halted for a disk error; it will stop for all other errors.
All, But Disk/Key	The system boot will not be halted for a keyboard or disk error; it will stop for all others.

Advanced BIOS Features

This section allows you to configure and improve your system and allows you to set up some system features according to your preference.

Phoenix - Award WorkstationBIOS CMOS Setup Utility
Advanced BIOS Features

		ITEM HELP
Virus Warning	Disabled	Menu Level
CPU L1 & L2 Cache	Enabled	
Quick Power On Self Test	Enabled	
First Boot Device	Floppy	
Second Boot Device	HDD-0	
Third Boot Device	CDROM	
Boot Other Device	Enabled	
Boot Up Floppy Seek	Disabled	
Boot Up Numlock Status	On	
Gate A20 Option	Fast	
Typematic Rate Setting	Disabled	
Typematic Rate (chars/Sec)	6	
Typematic Delay (Msec)	250	
Security Option	Setup	
APIC Mode	Enabled	
MPS Version Control for OS	1.4	
OS Select For DRAM>64MB	Non-OS2	
HDD S.M.A.R.T. Capabitility	Disabled	

Virus Warning

This item protects the boot sector and partition table of your hard disk against accidental modifications. If an attempt is made, the BIOS will halt the system and display a warning message. If this occurs, you can either allow the operation to continue or run an anti-virus program to locate and remove the problem.

CPU L1/L2 Cache

Cache memory is additional memory that is much faster than conventional DRAM (system memory). CPUs from 486-type on up contain internal cache memory, and most, but not all, modern PCs have additional (external) cache memory. When the CPU requests data, the system transfers the requested data from the main DRAM into cache memory, for even faster access by the CPU. These items allow you to enable (speed up memory access) or disable the cache function. By default, these items are ***Enabled***.

Quick Power On Self Test
When enabled, this field speeds up the Power On Self Test (POST) after the system is turned on. If it is set to *Enabled*, BIOS will skip some items.

First/Second/Third Boot Device
These fields determine the drive that the system searches first for an operating system. The options available include *Floppy*, *LS/ZIP*, *HDD-0*, *SCSI*, *CDROM*, *HDD-1*, *HDD-2*, *HDD-3*, *LAN* and *Disable*.

Boot Other Device
These fields allow the system to search for an operating system from other devices other than the ones selected in the First/Second/Third Boot Device.

Boot Up Floppy Seek
This feature controls whether the BIOS checks for a floppy drive while booting up. If it cannot detect one (either due to improper configuration or its absence), it will flash an error message.

Boot Up NumLock Status
This allows you to activate the NumLock function after you power up the system.

Gate A20 Option
This field allows you to select how Gate A20 is worked. Gate A20 is a device used to address memory above 1 MB.

Typematic Rate Setting
When disabled, continually holding down a key on your keyboard will generate only one instance. When enabled, you can set the two typematic controls listed next. By default, this field is set to ***Disabled.***

Typematic Rate (Chars/Sec)
When the typematic rate is enabled, the system registers repeated keystrokes speeds. Settings are from 6 to 30 characters per second.

Typematic Delay (Msec)

When the typematic rate is enabled, this item allows you to set the time interval for displaying the first and second characters. By default, this item is set to ***250msec.***

Security Option

This field allows you to limit access to the System and Setup. The default value is ***Setup***. When you select *System*, the system prompts for the User Password every time you boot up. When you select *Setup*, the system always boots up and prompts for the Supervisor Password only when the Setup utility is called up.

APIC Mode

APIC stands for Advanced Programmable Interrupt Controller. The default setting is ***Enabled***.

MPS Version Control for OS

This option is specifies the MPS (Multiprocessor Specification) version for your operating system. MPS version 1.4 added extended configuration tables to improve support for multiple PCI bus configurations and improve future expandability. The default setting is ***1.4***.

OS Select for DRAM > 64MB

This option allows the system to access greater than 64MB of DRAM memory when used with OS/2 that depends on certain BIOS calls to access memory. The default setting is ***Non-OS/2***.

HDD S.M.A.R.T. Capability

This field enables or disables the SMART feature of the hard disk.

Advanced Chipset Features

This Setup menu controls the configuration of the chipset.

Phoenix - Award WorkstationBIOS CMOS Setup Utility
Advanced Chipset Features

		ITEM HELP
Memory Frequency For	Auto	Menu Level
AGP Aperture Size	64MB	
UMA Frame Buffer Size	64MB	
Video Display Devices	Auto	
Tv Standard	NTSC	
Memory Hole	Disabled	
Current FSB Frequency		
Current DRAM Frequency		
System BIOS Cacheable	Enabled	
Memory Timing Parameter	Auto	
AUTO CAS Latency		
AUTO TRCD		
AUTO TRP		
AUTO TRAS		
MANUAL CAS Latency	1 Clock	
MANUAL TRCD	1 Clock	
MANUAL TRP	1 Clock	
MANUAL TRAS	1 Clock	
Onboard SATA chip mode	SATA mode	

Memory Frequency For

This field sets the frequency of the DRAM memory installed. The default setting is ***Auto***.

AGP Aperture Size

The field sets aperture size of the graphics. The aperture is a portion of the PCI memory address range dedicated for graphics memory address space. Host cycles that hit the aperture range are forwarded to the AGP without any translation. The default setting is ***64MB***.

UMA Frame Buffer Size

By default, the UMA Frame Buffer Size is ***64MB***. This memory is shared with the system memory.

Video Display Devices

This field determines the display output device where the system boots. The options are Auto, CRT and TV.

TV Standard

This field sets the TV Standard as NTSC, PAL, SECAM or can be set off. The default setting is ***Off***.

Memory Hole
In order to improve performance, certain space in memory can be reserved for ISA cards. This memory must be mapped into the memory space below 16 MB. The choices are ***Enabled*** and ***Disabled***.

Current FSB Frequency
This field indicates the current FSB frequency.

Current DRAM Frequency
This field indicates the current DRAM frequency.

System BIOS Cacheable
The setting of *Enabled* allows caching of the system BIOS ROM at F000h-FFFFFh, resulting in better system performance. However, if any program writes to this memory area, a system error may result.

Memory Timing Parameter
This field sets the CAS Latency, TRCD, TRP and TRAS. The default setting it ***Auto***.

Onboard SATA chip mode
This field determines the behavior of Serial ATA. The default setting is SATA mode. Choosing RAID mode enables Serial ATA drives to work as RAID 0,1.

Integrated Peripherals

This section sets configurations for your hard disk and other integrated peripherals.

Phoenix - Award WorkstationBIOS CMOS Setup Utility
Integrated Peripherals

South OnChip IDE Device	Press Enter	ITEM HELP
South OnChip PCI Device	Press Enter	Menu Level
Init Display First	PCI Slot	
USB 2.0 Controller	Disabled	
OnChip USB Controller	Enabled	
OnChip USB KBC Controller	Disabled	
IDE HDD Block Mode	Enabled	
POWER ON Function	BUTTON ONLY	
Onboard FDC Controller	Enabled	
Onboard Serial Port 1	3F8/IRQ4	
Onboard Serial Port 2	2F8/IRQ3	
UART Mode Select	Normal	
RxD, TxD Active	Hi, Lo	
IR Transmission Delay	Enabled	
UR2 Duplex Mode	Half	
Use IR Pins	On	
Onboard Parallel Port	378/IRQ7	
Parallel Port Mode	SPP	
EPP Mode Select	EPP1.7	
ECP Mode Use DMA	3	
PWRON After PWR-Fail	Off	
Onboard Serial Port 3	3E8H	
Serial Port 3 Use IRQ	IRQ11	
Onboard Serial Port 4	2E8H	
Serial Port 4 Use IRQ	IRQ10	

South OnChip IDE Device

This field allows the activating of the IDE channels supported by the on board chipset. Each channel can be activated separately.

South OnChip PCI Device

This field allows the activating of the PCI devices supported by the chipset.

Init Display First

This field allows the system to initialize first the VGA card on chip or the display on the PCI Slot. By default, the *PCI Slot* VGA is initialized first.

USB 2.0 Controller

The options for this field are *Enabled* and *Disabled*. By default, this field is set to ***Disabled***. In order to use USB 2.0, necessary OS drivers must be installed first.

OnChip USB KBC Controller
The options for this field (USB keyboard) are *Enabled* and *Disabled*. By default, this field is set to ***Disabled***.

IDE HDD Block Mode
This field allows your hard disk controller to use the fast block mode to transfer data to and from your hard disk drive.

Power On Function
This field sets how the system can be powered on from a system off state. The default setting is ***Button Only***.

Onboard FDC Controller
Select *Enabled* if your system has a floppy disk controller (FDC) installed on the motherboard and you wish to use it.

Onboard Serial/Parallel Port
These fields allow you to select the onboard serial and parallel ports and their addresses. The default values for these ports are:

Serial Port 1	3F8H/IRQ4
Serial Port 2	2F8H/IRQ3
Serial Port 3	3E8H/IRQ11
Serial Port 4	2E8H/IRQ10
Parallel Port	378H/IRQ7

UART Mode Select
This field determines the UART 2 mode in your computer. The default value is ***Normal***. Other options include *IrDA* and *ASKIR*.

Parallel Port Mode
This field allows you to determine parallel port mode function.

SPP	Standard Printer Port
EPP	Enhanced Parallel Port
ECP	Extended Capabilities Port

PWRON After PWR-Fail
This field sets the system power status whether on or off when power returns from a power failure situation. The default setting is ***Off***.

Power Management Setup

The Power Management Setup allows you to save energy of your system effectively.

Phoenix - Award WorkstationBIOS CMOS Setup Utility
Power Management Setup

		ITEM HELP
ACPI Function	Enabled	Menu Level
ACPI Suspend Type	S1 (POS)	
Power Management Option	User Define	
HDD Power Down	Disabled	
Video Off Option	Suspend -> Off	
Video Off Method	V/H SYNC+Blank	
Modem Use IRQ	3	
Soft-Off by PWR-BTTN	Instant-Off	
RTC Alarm Resume	Disabled	
Date (of Month) Alarm	0	
Time (hh:mm:ss) Alarm	0 : 0 : 0	

ACPI Function

Enable this function to support ACPI (Advance Configuration and Power Interface).

ACPI Suspend Type

This field sets the ACPI Suspend Type. The default setting is ***S1***.

Power Management

This field allows you to select the type of power saving management modes. There are four selections for Power Management.

Min. Power Saving	Minimum power management
Max. Power Saving	Maximum power management.
User Define	Each of the ranges is from 1 min. to 1hr. Except for HDD Power Down which ranges from 1 min. to 15 min.

HDD Power Down

When enabled, and after the set time of system inactivity, the hard disk drive will be powered down while all other devices remain active.

Video Off Option

This field sets the video off option. By default, video goes into suspend state and then Off.

Video Off Method

This field defines the Video Off features. There are three options.

V/H SYNC + Blank	Default setting, blank the screen and turn off vertical and horizontal scanning.
DPMS	Allows BIOS to control the video display.
Blank Screen	Writes blanks to the video buffer.

Soft-Off by PWRBTN

This field defines the power-off mode when using an ATX power supply. The *Instant Off* mode allows powering off immediately upon pressing the power button. In the *Delay 4 Sec* mode, the system powers off when the power button is pressed for more than four seconds or enters the suspend mode when pressed for less than 4 seconds.

RTC Alarm Resume

This field enables or disables the resumption of the system operation. When enabled, the user is allowed to set the *Date* and *Time*.

PNP/PCI Configurations

This option configures the PCI bus system. All PCI bus systems on the system use INT#, thus all installed PCI cards must be set to this value.

Phoenix - Award WorkstationBIOS CMOS Setup Utility
PnP/PCI Configurations

Reset Configuration Data	Disabled	ITEM HELP
		Menu Level
Resources Controlled By	Auto (ESCD)	
IRQ Resources	Press Enter	Default is Disabled. Select Enabled to reset Extended System Configuration Data (ESCD) when you exit Setup if you have installed a new add-on and the system reconfiguration has caused such a serious conflict that the OS cannot boot
PCI/VGA Palette Snoop	Disabled	
Assign IRQ for VGA	Enabled	
Assign IRQ for USB	Enabled	
PCI Latency Time(CLK)	64	

Reset Configuration Data

This field allows you to determine whether to reset the configuration data or not. The default value is ***Disabled.***

Resources Controlled by

This PnP BIOS can configure all of the boot and compatible devices automatically with the use of a use a PnP operating system such as Windows 95.

PCI/VGA Palette Snoop

Some non-standard VGA display cards may not show colors properly. This field allows you to set whether or not MPEG ISA/VESA VGA cards can work with PCI/VGA. When this field is enabled, a PCI/VGA can work with an MPEG ISA/VESA VGA card. When this field is disabled, a PCI/VGA cannot work with an MPEG ISA/VESA card.

Assign IRQ for VGA

This field enables the assigning of an IRQ for VGA.

Assign IRQ for USB

This field enables the assigning of an IRQ for USB.

PCI Latency Timer

This field sets the PCI latency clock. By default, the setting is ***64***.

PC Health Status

This section shows the parameters in determining the PC Health Status. These parameters include temperatures, fan speeds and voltages.

Phoenix - Award WorkstationBIOS CMOS Setup Utility
PC Health Status

		ITEM HELP
CPU Warning Temperature	75°C/167°F	
Current System Temp.	39°C/102°F	
Current CPU Temp.	32°C/89°F	
Current Chassis Temp.	32°C/89°F	
CPU FAN Speed	0 RPM	
System FAN Speed	4166 RPM	
Chassis FAN Speed	0 RPM	
Vcore (V)	1.63V	
VCC3(V)	3.37V	
+5(V)	5.05V	
+12(V)	12.09V	
-12(V)	(-)12.03V	
VBAT(V)	3.21V	
5VSB(V)	5.05V	
Shutdown Temperature	Disabled	
CPU Fan Failure Warning	Disabled	
Sys. Fan Failure Warning	Disabled	
Aux. Fan Failure Warning	Disabled	

CPU Warning Temperature

This field allows the user to set the temperature so that when the temperature is reached, the system sounds a warning. This function can help prevent damage to the system that is caused by overheating.

Temperatures/Fan Speeds/Voltages

These fields are the parameters of the hardware monitoring function feature of the motherboard. The values are read-only values as monitored by the system and show the PC health status.

Shutdown Temperature

This field allows the user to set the temperature by which the system automatically shuts down once the threshold temperature is reached. This function can help prevent damage to the system that is caused by overheating.

Fan Failure Warning

This field allows the user to set the Fan warning so that when the CPU(Fan3)/Sys.(Fan1)/Aux.(Fan2) is stop running, the system sounds a warning, this function can help user to prevent damage the system that is caused by Fan stop running.

Frequency/Voltage Control

This section shows the user how to configure the processor frequency.

Phoenix - Award WorkstationBIOS CMOS Setup Utility
Frequency/Voltage Control

Spread Spectrum	Disable	ITEM HELP
		Menu Level

Spread Spectrum

This field sets the value of the spread spectrum. The default setting is ***Disabled***. This field is for CE testing use only.

Load Fail-Safe Defaults

This option allows you to load the troubleshooting default values permanently stored in the BIOS ROM. These default settings are non-optimal and disable all high-performance features.

Load Optimized Defaults

This option allows you to load the default values to your system configuration. These default settings are optimal and enable all high performance features.

Set Supervisor/User Password

These two options set the system password. Supervisor Password sets a password that will be used to protect the system and Setup utility. User Password sets a password that will be used exclusively on the system. To specify a password, highlight the type you want and press <Enter>. The Enter Password: message prompts on the screen. Type the password, up to eight characters in length, and press <Enter>. The system confirms your password by asking you to type it again. After setting a password, the screen automatically returns to the main screen.

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

Save & Exit Setup

This option allows you to determine whether or not to accept the modifications. If you type “Y”, you will quit the setup utility and save all changes into the CMOS memory. If you type “N”, you will return to Setup utility.

Exit Without Saving

Select this option to exit the Setup utility without saving the changes you have made in this session. Typing “Y” will quit the Setup utility without saving the modifications. Typing “N” will return you to Setup utility.

Drivers Installation

This section describes the installation procedures for software and drivers under the Windows 98, Windows NT 4.0 and Windows 2000. The software and drivers are included with the motherboard. If you find the items missing, please contact the vendor where you made the purchase. The contents of this section include the following:

IMPORTANT NOTE:
Please also install Serial ATA and RAID drivers with the included floppy disks.

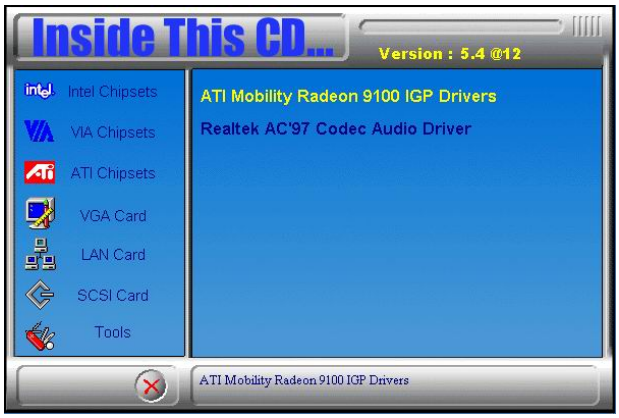
After installing your Windows operating system (Windows 98/98SE/ME/2000/XP), you must install first the Chipset Software Installation Utility before proceeding with the drivers installation.

ATI Chipset Software Installation Utility

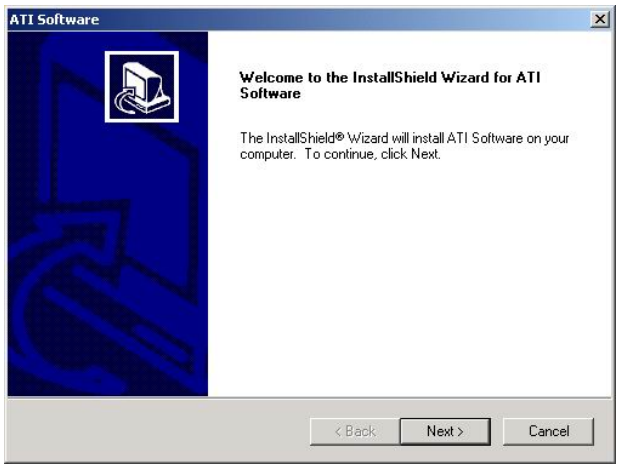
The ATI Software Installation Utility, to be installed first before the software drivers, will enable Plug & Play INF support for ATI components. Follow the instructions below to complete the installation under Windows 98/98SE/ME/2000/XP.

1. Insert the CD that comes with the motherboard and the screen below would appear. Click ATI RS300M Chipset Drivers.

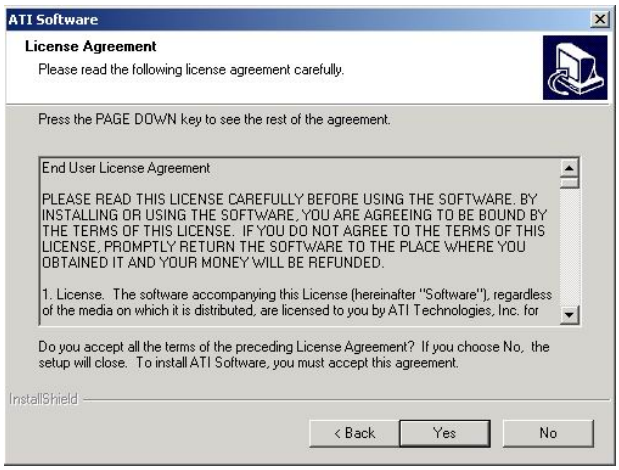
2. Click ATI Mobility Radeon 9100 IGP Drivers.



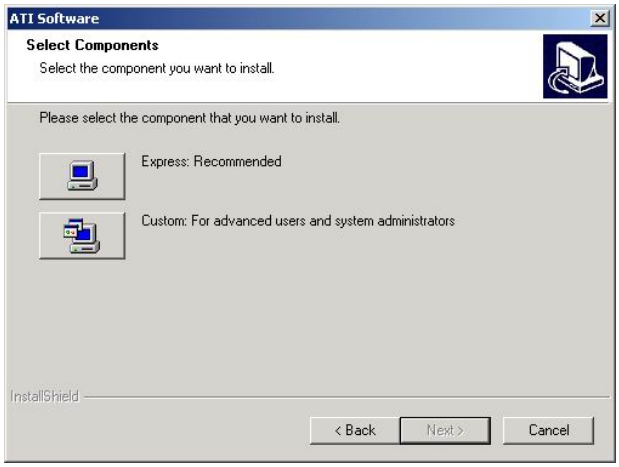
3. When the Welcome screen appears, click Next to continue.



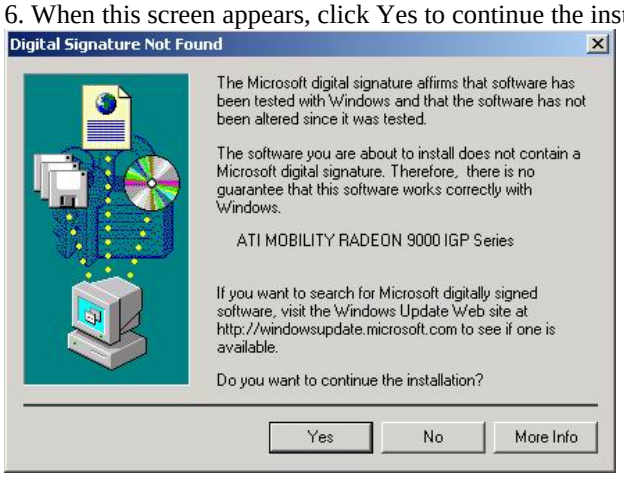
4. Click Yes to accept the software license agreement and proceed with the installation process.



5. On Select Components screen, click Express to continue the installation.



6. When this screen appears, click Yes to continue the installation.

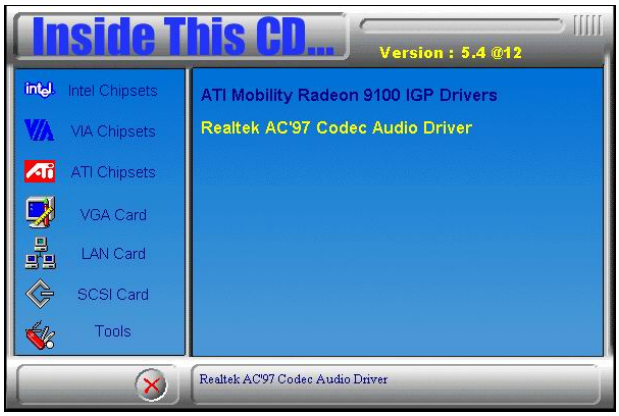


7. The Setup process is now complete. Click Finish to restart the computer and for changes to take effect. When the computer has restarted, the system will be able to find some devices. Restart your computer when prompted.

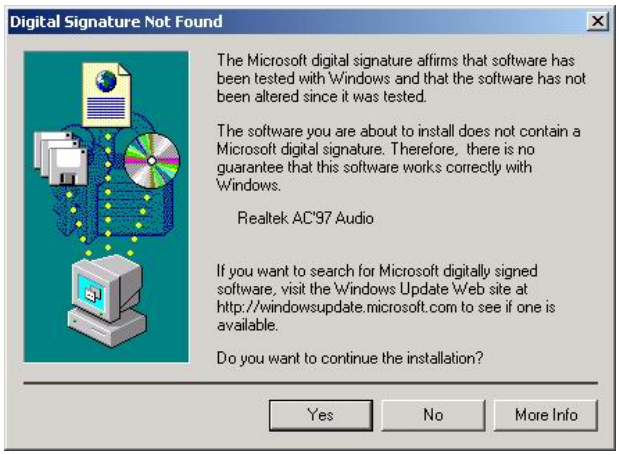
Realtek AC97 Codec Audio Driver Installation

Follow the steps below to install the Realtek AC97 Codec Audio Drivers.

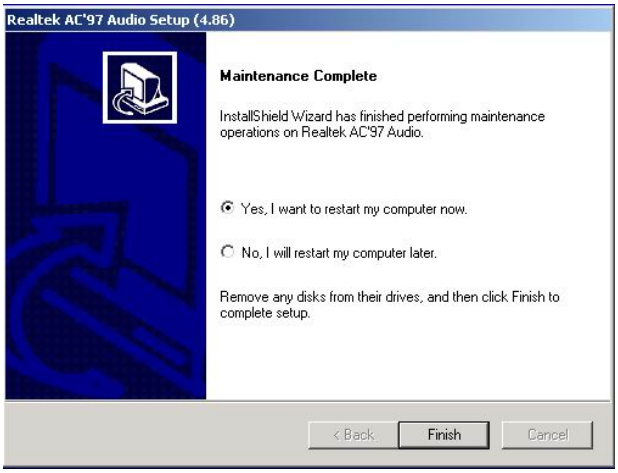
1. Insert the CD that comes with the CPU card and the screen below would appear. Click Intel Chipsets. Click Realtek AC97 Codec Audio Drivers to start the drivers installation.



2. Click Yes to continue the installation.



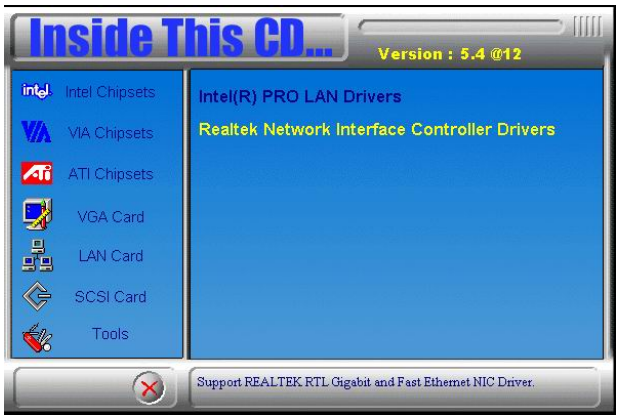
3. Click Finish to restart the computer and for changes to take effect.



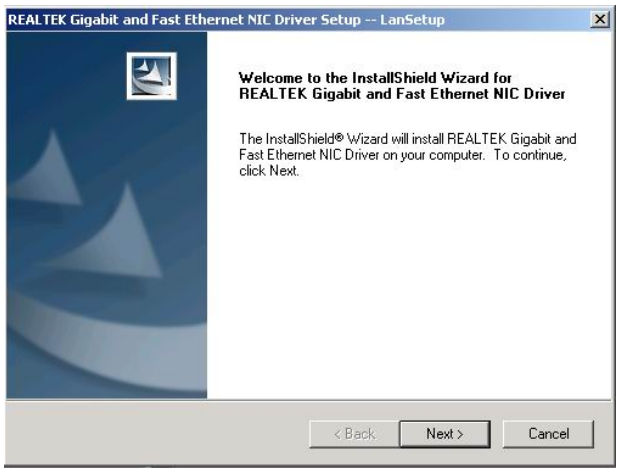
Realtek RTL8100 LAN Drivers Installation

Follow the steps below to start installing the Realtek LAN drivers.

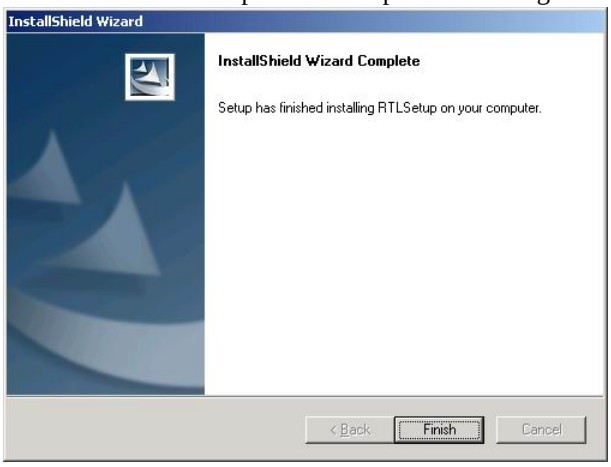
1. Insert the CD that comes with the CPU. In the initial screen, click on LAN Card on the left side. Then, select Realtek Network Interface Controller Drivers.



2. When the Welcome screen appears, click Next to start the drivers instalation.



3. Click Finish to complete the setup and for changes to take effect.



Appendix

A. I/O Port Address Map

Each peripheral device in the system is assigned a set of I/O port addresses which also becomes the identity of the device. The following table lists the I/O port addresses used.

Address	Device Description
000h - 01Fh	DMA Controller #1
020h - 03Fh	Interrupt Controller #1
040h - 05Fh	Timer
060h - 06Fh	Keyboard Controller
070h - 07Fh	Real Time Clock, NMI
080h - 09Fh	DMA Page Register
0A0h - 0BFh	Interrupt Controller #2
0C0h - 0DFh	DMA Controller #2
0F0h	Clear Math Coprocessor Busy Signal
0F1h	Reset Math Coprocessor
1F0h - 1F7h	IDE Interface
278 - 27F	Parallel Port #2(LPT2)
2F8h - 2FFh	Serial Port #2(COM2)
2B0 - 2DF	Graphics adapter Controller
378h - 3FFh	Parallel Port #1(LPT1)
360 - 36F	Network Ports
3B0 - 3BF	Monochrome & Printer adapter
3C0 - 3CF	EGA adapter
3D0 - 3DF	CGA adapter
3F0h - 3F7h	Floppy Disk Controller
3F8h - 3FFh	Serial Port #1(COM1)

B. Interrupt Request Lines (IRQ)

Peripheral devices use interrupt request lines to notify CPU for the service required. The following table shows the IRQ used by the devices on board.

Level	Function
IRQ0	System Timer Output
IRQ1	Keyboard
IRQ2	Interrupt Cascade
IRQ3	Serial Port #2
IRQ4	Serial Port #1
IRQ5	Reserved
IRQ6	Floppy Disk Controller
IRQ7	Parallel Port #1
IRQ8	Real Time Clock
IRQ9	Reserved
IRQ10	Reserved
IRQ11	Reserved
IRQ12	PS/2 Mouse
IRQ13	80287
IRQ14	Primary IDE
IRQ15	Secondary IDE