WAFER-C400EV

User Manual

Version 1.0

**Low Power Intel Mobile CPU
with SVGA, LAN, USB2.0, PC-104, SBC**

March 10, 2004

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Chapter 1   Introduction

WAFER-C400EV is designed for network applications. It supports the full functions of an AT/ATX-compatible industrial computer on a single board. The WAFER-C400EV is equipped with a low-power consumption and high performance Intel Mobile processor on board. It also contains an SDRAM SODIMM socket that support up to 512MB memory.

The WAFER-C400EV provides two Ethernet interfaces, one FDD interface, one EIDE interface, one audio interface, one Compact Flash Type II, one parallel port, one RS-232 serial port, one RS-232 / RS-422 / RS-485 header, one 2x25-pin LCD header, one PC-104, two USB 2.0 ports, one 5-pin IR header, and one 6-pin header of PS/2 keyboard/mouse interface. The built-in SVGA/LCD display controller supports both the CRT and LCD display simultaneously. It offers the resolutions of LCD screen up to 1024 x 768 @ 60HZ, and CRT resolutions up to 1600 x 1280 @ 64K colors. The Flash ROM contains both the system BIOS and the VGA BIOS. Reprogramming the Flash ROM could do the modification, in case of necessary.

1.1   Specifications

- **CPU**   Embedded Intel® Ultra Low Voltage Celeron 400MHz

- **System Memory:** One 144-pin SODIMM socket support up to 512 MB SDRAM

- **BIOS:** AMI 256 KB Flash memory

- **Display Controller:** VIA 8601T

  - ➢ Support 24-bit TFT LCD panel resolution up to 1024x768 @ 60Hz
  - ➢ Support non-interlaced CRT monitors resolutions up to 1600x1280 @ 16bit colors

- **IDE Interface:** Supports two ATA100 IDE hard drives

- **Compact Flash Disk:** Runs in true IDE mode that is compatible with an IDE disk drive. It can be used with a passive adapter in a Type II socket.

- **FDD Interface:** Supports up to two floppy disk drives, 5.25″ 360KB and 1.2MB and/or 3.5″ 720KB, 1.44MB, and 2.88MB

- **Serial Ports:** Two RS-232 ports which COM2 can support RS-422/485

- **Parallel Port:** One parallel port supports SPP/EPP/ECP mode

- **Audio Connector:** One 2x8-pin header supports Line-in, Line-out, Speaker-out, Mic-in.

- **Digital IO:** Supports four digital-in, and four digital-out

- **IrDA:** Supports Serial Infrared (SIR) or Amplitude Shift Keyed IR (ASKIR) interface

- **PS/2 Mouse/Keyboard Connector:** A 6-pin header connector supports PS/2 keyboard and PS/2 mouse.

- **USB Interface:** Two USB ports, USB 2.0 compliant

- **Watchdog Timer:** Can be set by 1-255 seconds period. Reset or NMI will be generated when CPU does not periodically trigger the timer

- **10/100Mbps Ethernet Controller:** Two IEEE802.3 10/100M BASE-T standard Dual auto-sensing interface to 10MBps or 100MBps networks. On board RJ-45 connectors are provided for easy connection.

- **PC-104 Interface**: Supports ISA functions

- **E2Key:** A non-volatile 1Kbit EEPROM is provided to retain application critical read/write data

- **Power Supply:** +5V: 3A typical, +12V: 0.1A

- **Operating Temperature:** 0-60

- **Dimension:** 5.9″ L x 4.2″ W   145mmx102mm

1.2   Package Contents

Before any installation, please check if the following materials are included in the package:

- One WAFER-C400EV all-in-one single board computer
- One compact disk for utility and drivers
- One 2.5" IDE flat cable (44-pin 2.0mm pitch to 40-pin 2.54mm pitch)
- One floppy cable (for 3.5" FDD only)
- One serial port cable (RS-422/485/232)
- One standard D-25 connector for parallel cable
- One 6-pin header connector for keyboard and mouse
- One audio cable

If any of these items are missing or damaged, contact your distributor or sales representative immediately.

Chapter 2   Installation

This chapter gives instructions about how to set up the WAFER-C400EV hardware, including directions of setting jumpers and connecting peripherals, switches and indicators. Before installation, please pay attention to the unpacking precautions on the following page for safety.

2.1   Block Diagram & Board Layout
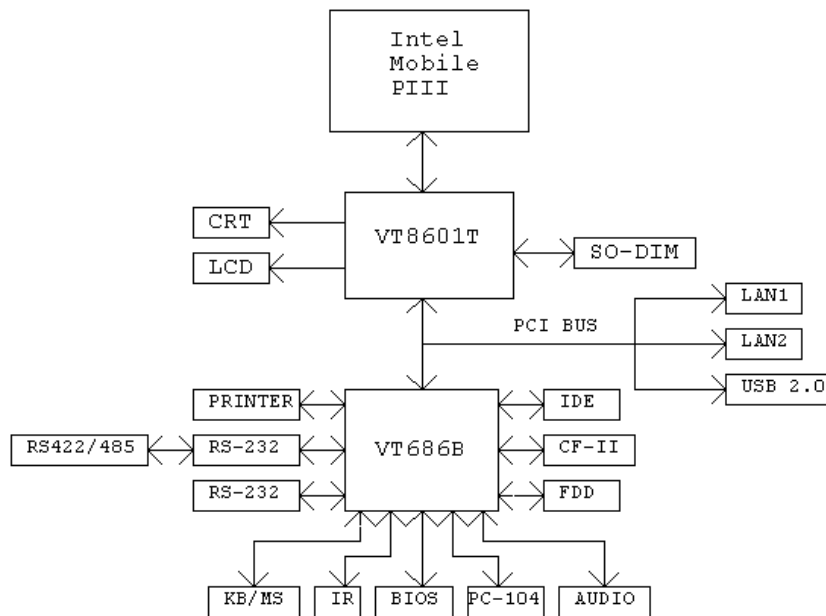
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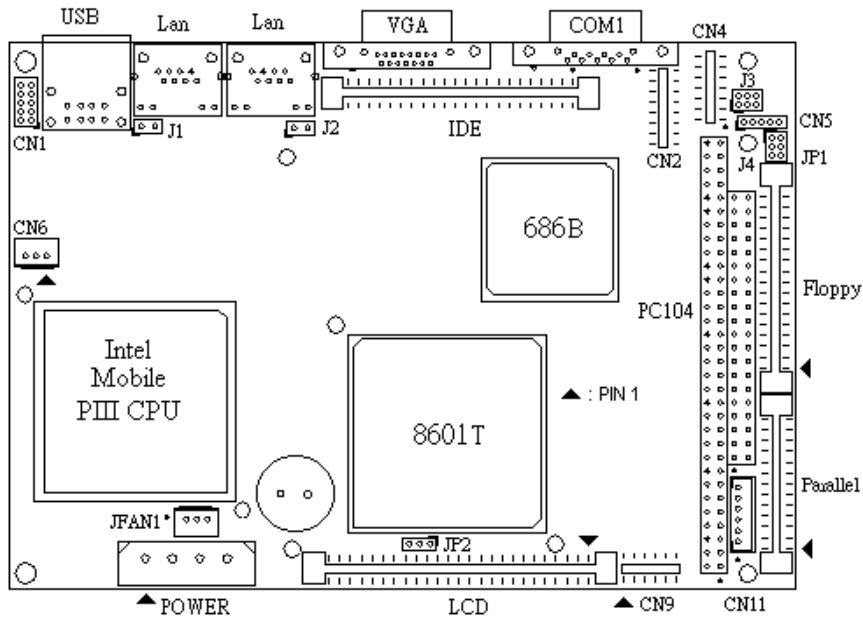
- **BOARD DIMENSION – SIDE VIEW**
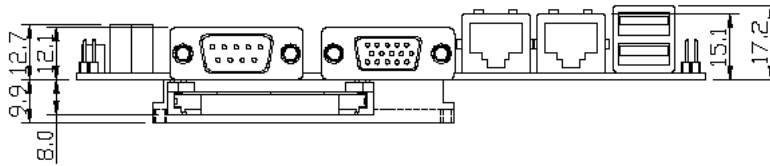
- **BOARD DIMENSION**
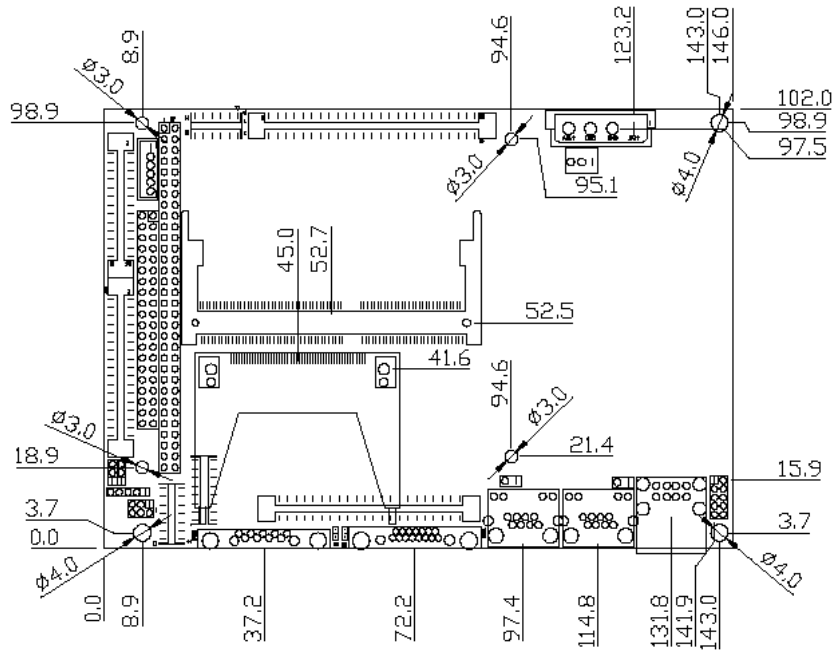
2.2　Unpacking Precautions

Some components of WAFER-C400EV SBC are very sensitive to static electric charges and can be damaged by a sudden rush of power. To protect it from unintended damage, be sure to note these precautions:

1.　Ground yourself to remove any static charge before touching the WAFER-C400EV SBC. You can do it by using a grounded wrist strap at all times or by frequently touching any conducting materials that is connected to the ground.
2.　Handle WAFER-C400EV SBC by its edges. Don't touch IC chips, leads or circuitry if not necessary.
3.　Do not plug any connector or jumper while the power is on.

2.3　System Memory DRAM

There is one 144-pin SO-DIMM socket to accept 3.3V non-buffered SDRAM. The max Memory size is 512MB.

2.4　Watch-Dog Timer Setting

Reading port 443H enables the Watchdog Timer. It should be triggered before the time-out period ends, otherwise it will assume the program operation is abnormal and will issue a reset signal to start again. Reading port 043/843H disables the Watchdog Timer. Please refer to Appendix A for detailed information.

2.5　Clear CMOS Setup

If the user needs to clear the CMOS setup (for example, the user forgot the password, then the setup should be cleared and the password should be re-set). The user should short the JP1 about 3 seconds, and then open it again. Opening JP1 can set the system back to normal operation mode.

● **JP1: Clear CMOS Setup (Reserve Function)**

JP1	DESCRIPTION
1-2	Normal Operation
2-3	Clear CMOS Setup

2.6   LCD VCC Voltage Selector

The LCD interface connector JP2 can provide 5V or 3.3V power supply by selecting the JP2 to meet the different LCD requirement.

● **JP2: LCD VCC Voltage Selector**

JP2	DESCRIPTION
1-2	5V
2-3	3.3V

2.7   System Panel Connectors (CN9)

● Pin 1-3 System power LED connector

● Pin 5-7 ATX power on button

● Pin 9-11 IDE active LED connector

● Pin 2-8 External speaker connector

● Pin 10-12 System reset connector

PIN	DESCRIPTION	PIN	DESCRIPTION
1	VCC	2	SPEAK
3	GND	4	NC
5	GND	6	NC
7	PS_ON	8	VCC
9	VCC	10	RESET
11	HD-LED	12	GND

Chapter 3   Connection

This chapter describes how to connect peripherals, switches and indicators to the WAFER-C400EV board.

3.1 Floppy Disk Drive Connector (FDD1)

WAFER-C400EV board is equipped with a 34-pin daisy-chain driver connecting cable.

● **FDD1: FDC CONNECTOR**

PIN	DESCRIPTION	PIN	DESCRIPTION
1	GROUND	2	REDUCE WRITE
3	GROUND	4	N/C
5	GROUND	6	N/C
7	GROUND	8	INDEX#
9	GROUND	10	MOTOR ENABLE A#
11	GROUND	12	DRIVE SELECT B#
13	GROUND	14	DRIVE SELECT A#
15	GROUND	16	MOTOR ENABLE B#
17	GROUND	18	DIRECTION#
19	GROUND	20	STEP#
21	GROUND	22	WRITE DATA#
23	GROUND	24	WRITE GATE#
25	GROUND	26	TRACK 0#
27	GROUND	28	WRITE PROTECT#
29	GROUND	30	READ DATA#
31	GROUND	32	SIDE 1 SELECT#
33	GROUND	34	DISK CHANGE#

3.2 3.2 PCI E-IDE Disk Drive Connector (IDE1)

For IDE HDD connection, the WAFER-C400EV was designed with one 2.0mm connector (IDE1), which could be converted to two 2.54mm standard IDE connectors via proprietary cable. Using this cable the user can attach two IDE hard disk drives to the WAFER-C400EV.

- **IDE1: 44-pin Primary Mini-pitched IDE Interface Connector**
- **IDE1: Primary IDE Interface Connector**

PIN	DESCRIPTION	PIN	DESCRIPTION
1	RESET#	2	GROUND
3	DATA 7	4	DATA 8
5	DATA 6	6	DATA 9
7	DATA 5	8	DATA 10
9	DATA 4	10	DATA 11
11	DATA 3	12	DATA 12
13	DATA 2	14	DATA 13
15	DATA 1	16	DATA 14
17	DATA 0	18	DATA 15
19	GROUND	20	N/C
21	IDE DRQ	22	GROUND
23	IOW#	24	GROUND
25	IOR#	26	GROUND
27	IDE CHRDY	28	GROUND
29	IDE DACK	30	GROUND–DEFAULT
31	INTERRUPT	32	N/C
33	SA1	34	N/C
35	SA0	36	SA2
37	HDC CS0#	38	HDC CS1#
39	HDD ACTIVE#	40	GROUND
41	VCC	42	VCC
43	GROUND	44	N/C

3.3 Compact Flash Connector(CN12)

You can attach one Compact Flash Disk to CN12 that occupies the secondary IDE channel. The CN12 supports both the TYPE II and TYPE I module.

● **CN12: Compact Flash Connector (Secondary IDE)**

PIN	DESCRIPTION	PIN	DESCRIPTION
1	GROUND	26	VCC-IN CHECK1
2	DATA 3	27	DATA 11
3	DATA 4	28	DATA 12
4	DATA 5	29	DATA 13
5	DATA 6	30	DATA 14
6	DATA 7	31	DATA 15
7	HDC_CS0#	32	HDC_CS1
8	N/C	33	N/C
9	GROUND	34	IOR#
10	N/C	35	IOW#
11	N/C	36	N/C
12	N/C	37	INTERRUPT
13	VCC_COM	38	VCC_COM
14	N/C	39	CSEL
15	N/C	40	N/C
16	N/C	41	HDD_RESET
17	N/C	42	IORDY
18	SA2	43	N/C
19	SA1	44	VCC_COM
20	SA0	45	HDD_ACTIVE#
21	DATA 0	46	N/C
22	DATA 1	47	DATA 8
23	DATA 2	48	DATA 9
24	N/C	49	DATA 10
25	VCC-IN CHECK2	50	GROUND

3.4 Parallel Port (CN10)

This port is usually connected to a printer. The WAFER-C400EV includes an on-board parallel port (CN10), accessed through a 26-pin flat-cable connector.

- **CN10: Parallel Port Connector**

PIN	DESCRIPTION	PIN	DESCRIPTION
1	STROBE#	2	DATA 0
3	DATA 1	4	DATA 2
5	DATA 3	6	DATA 4
7	DATA 5	8	DATA 6
9	DATA 7	10	ACKNOWLEDGE
11	BUSY	12	PAPER EMPTY
13	PRINTER SELECT	14	AUTO FORM FEED #
15	ERROR#	16	INITIALIZE
17	PRINTER SELECT LN#	18	GROUND
19	GROUND	20	GROUND
21	GROUND	22	GROUND
23	GROUND	24	N/C
25	GROUND	26	

3.5 Serial Posts (Com1,CN4)

The WAFER-C400EV offers two high speed NS-16C-550 compatible UARTS with Read/Receive 16 byte FIFO serial ports, and supports RS-422/485 mode from CN4 Pin11~14 by setting J4 connector. These ports let you connect to serial devices or a communication network. The J3 header also provides a 1A-fuesd +5V or +12V power out from CN4 pin 8. One 9-pin D-SUB connector and one 14-pin header are also provided. The detailed pin assignment of the connectors is specified as following tables:

- **COM1: Serial Port1 Connector (9-pin D-SUB)**

PIN	DESCRIPTION	PIN	DESCRIPTION
1	DCD	2	RX
3	TX	4	DTR
5	GND	6	DSR
7	RTS	8	CTS
9	RI		

- **CN4: Serial Port2 Connector (14-pin 2.0mm Header)**

PIN	DESCRIPTION	PIN	DESCRIPTION
1	DCD	2	DSR
3	RX	4	RTS
5	TX	6	CTS
7	DTR	8	RI
9	GND	10	N/C
11	TX+	12	TX-
13	RX+	14	RX-

- **J3: Com1 Pin 9 selector (2X3-pin 2.0mm Header)**

PIN	DESCRIPTION	PIN	DESCRIPTION
1	VCC	2	RI (To I/O Buffer)
3	Connect to J3 Pin6	4	RI (To Com1)
5	+12V	6	Connect to J3 Pin9

Applications:

- ✓ For normal operation, connect Pin2-4
- ✓ For VCC supply from CN4 Pin8, connect Pin1-3 and Pin4-6
- ✓ For +12V supply from CN4 Pin8, connect Pin3-5 and Pin4-6

- **J4: RS-232/RS-422/485 Selector (3-pin 2.0mm Header)**

- ✓ Pin 1-2 RS-232
- ✓ Pin 2-3 RS-422/RS-485

3.6 Keyboard & PS/2 Mouse Connector (CN11)

A 6-pin header connector (CN11) is located on the mounting bracket for easy connection to a keyboard and PS/2 mouse. The card comes with a Y split PS/2 cable for keyboard and mouse connection.

● **CN11: 2.0mm header Keyboard & Mouse Connector**

PIN	DESCRIPTION
1	+5V
2	MOUSE DATA
3	MOUSE CLOCK
4	KEYBOARD DATA
5	KEYBOARD CLOCK
6	GROUND

3.7 USB Port Connector (USB1)

The WAFER-C400EV provides two USB 2.0 interfaces, which give the completed plug and play, for up to 127 external devices.

● **USB1: Internal USB Connector**

PIN	DESCRIPTION	PIN	DESCRIPTION
1	USBVCC1	1	USBVCC2
2	D1F+	2	D2F+
3	D1F-	3	D2F-
4	USBGND1	4	USBGND2

3.8 IrDA Infrared Interface Port (CN5)

The WAFER-C400EV has a built-in IrDA port which supports Serial Infrared (SIR) or Amplitude Shift Keyed IR (ASKIR) interface. To use the IrDA port, the system has to be set to SIR or ASKIR model in the BIOS's Peripheral.

● **CN5: 1X5 2.0mm IrDA connector**

PIN	DESCRIPTION
1	VCC
2	NC
3	IRRX
4	GROUND
5	IR-TX

3.9 VGA Connector (VGA1)

The WAFER-C400EV has a built-in 15-pin VGA connector accepting the CRT monitor.

- **VGA1: 15-pin D-Sub Connector**

PIN	DESCRIPTION	PIN	DESCRIPTION
1	RED	9	NC
2	GREEN	10	GROUND
3	BLUE	11	NC
4	NC	12	DDCDAT
5	GROUND	13	HSYNC
6	GROUND	14	VSYNC
7	GROUND	15	DDCCLK
8	GROUND		

3.10 LAN RJ45 Connector (P1,P2)

The WAFER-C400EV has two built-in RJ-45 LAN connectors for 10/100Mbps Ethernet connection.

- **P1,P2: LAN RJ-45 Connector**

PIN	DESCRIPTION	PIN	DESCRIPTION
1	TX+	6	N/C
2	TX-	7	RX-
3	RX+	8	N/C
4	N/C	9	N/C

- **J1 : Lan1 link indicator (2-pin 2.54mm Header)**

PIN	DESCRIPTION
1	3VSB
2	Active

- **J2 : Lan2 link indicator (2-pin 2.54mm Header)**

PIN	DESCRIPTION
1	3VSB
2	Active

3.11 LCD Interface Connector (CN8)

The WAFER-C400EV provides a 2x25-pin connector for the LCD flat panel interface.

The TTL signal connecting interfaces locate on CN8.The display options need to be setup manually from BIOS. The BIOS "**Integrated Peripheral**" Setup will allow you to choose display resolution either 640x480 or 800x600 or 1024x768.

● **CN8: LCD Interface Connector – support up to 24 bit LCD. For better display quality, the length of LCD cable should be shorter than 35 cm.**

PIN	DESCRIPTION	PIN	DESCRIPTION
1	NC	2	NC
3	NC	4	NC
5	NC	6	NC
7	NC	8	NC
9	NC	10	NC
11	NC	12	NC
13	NC	14	RED5
15	RED7	16	RED6
17	RED0	18	RED4
19	RED1	20	RED2
21	RED3	22	GREEN6
23	GREEN5	24	GREEN4
25	GREEN7	26	GREEN3
27	BLUE7	28	GREEN2
29	LCD POWER	30	LCD POWER
31	GREEN1	32	GREEN0
33	BLUE4	34	BLUE6
35	BLUE3	36	BLUE5
37	BLUE2	38	BLUE1
39	DE	40	BLUE0
41	SFCLK	42	ENPBLT
43	ENPVDD	44	FLM
45	ENPVEE	46	LP
47	GND	48	GND
49	+12V	50	+12V

3.12   External Power Connector (CN7)

The WAFER-C400EV has an on-board external power connector CN7. You can connect power directly to the CPU board.

- **CN7: External Power Connector**

PIN	DESCRIPTION
1	+5V
2	GROUND
3	GROUND
4	+12V

3.13   ATX Power connector (CN6)

- **CN6: ATX Power connector**

PIN	DESCRIPTION
1	5VSB
2	PSON
3	GND

3.14 PC/104 Connection Bus (J5, J6)

The WAFER-C400EV PC/104 expansion bus let you attach any kind of PC/104 modules. The PC/104 bus has already become the industrial embedded PC bus standard, so you can easily install over thousands of PC/104 modules from hundreds of vendors in the world. There are two PC/104 connectors on this board: PC/104-64 and PC/104-40.

- **J5: PC/104-64 Connector**

PIN	DESCRIPTION	PIN	DESCRIPTION
1	IOCHCK#	33	GND
2	SD7	34	IRSTDRV
3	SD6	35	VCC
4	SD5	36	IRQ9
5	SD4	37	-5V
6	SD3	38	DRQ2
7	SD2	39	-12V
8	SD1	40	ZWS
9	SD0	41	+12V
10	IOCHRDY	42	GND
11	AEN	43	SMEMW#
12	LA19	44	SMEMR#
13	LA18	45	IOW#
14	LA17	46	IOR#
15	SA16	47	DACK3#
16	SA15	48	DRQ3
17	SA14	49	DACK1#
18	SA13	50	DRQ1
19	SA12	51	REFRESH#
20	SA11	52	SYSCLK
21	SA10	53	IRQ7
22	SA9	54	N/C
23	SA8	55	IRQ5
24	SA7	56	IRQ4
25	SA6	57	IRQ3
26	SA5	58	DACK2
27	SA4	59	TC
28	SA3	60	BALE
29	SA2	61	VCC
30	SA1	62	OSC
31	SA0	63	GND
32	GND	64	GND

- **J6: PC/104-40 Connector**

PIN	DESCRIPTION	PIN	DESCRIPTION
1	GND	21	GND
2	MCS16#	22	SBHE#
3	IOCS16#	23	LA23
4	IRQ10	24	LA22
5	IRQ11	25	LA21
6	IRQ12	26	LA20
7	IRQ15	27	LA19
8	IRQ14	28	LA18
9	DACK0#	29	LA17
10	DRQ0	30	MEMR#
11	DACK5#	31	MEMW#
12	DRQ5	32	SD8
13	DACK6#	33	SD9
14	DRQ6	34	SD10
15	DACK7#	35	SD11
16	DRQ7	36	SD12
17	VCC	37	SD13
18	MASTER#	38	SD14
19	GND	39	SD15
20	GND	40	GND

3.15 4-BIT GPIO Connector (CN1)

- **CN1: 4 BIT GPIO Connector**

PIN	DESCRIPTION	PIN	DESCRIPTION
1	GND	2	VCC
3	GPI0	4	GPO0
5	GPI1	6	GPO1
7	GPI2	8	GPO2
9	GPI3	10	GPO3

3.16 Fan Connector (JFAN1)

PIN	DESCRIPTION
1	Fan Speed Detect
2	+12V
3	GND

3.17 Audio Connector (CN2)

PIN	DESCRIPTION	PIN	DESCRIPTION
1	Speaker out R	2	GND
3	Speaker out L	4	GND
5	Line out L	6	Line out R
7	GND	8	GND
9	Line in L	10	Line in R
11	GND	12	GND
13	GND	14	GND
15	MIC in	16	GND

Chapter 4   AMI BIOS Setup

4.1   Introduction

This chapter discusses AMI's setup program built into the ROM BIOS. The setup program allows users to modify the basic system configuration. This special information is then stored in battery-backed RAM so that it retains the setup information when the power is turned off.

4.2   Starting Setup

The AMI BIOS is immediately activated when you first boot up the computer. The BIOS reads the system information contained in the CMOS and begins the process of checking out the system and then configures it. When it finishes, the BIOS will seek an operating system on one of the disks and then launch and pass the control over to the operating system.

While the BIOS is in charge, the Setup program can be activated in one of the following ways:

1. By pressing <Del> immediately after switching the system on, or
2. By pressing the <Del>key when the following message appears briefly at the bottom of the screen during the POST.

<div align="center">

Press DEL to enter SETUP.

</div>

If the message disappears before you respond and you still wish to enter Setup, press the "RESET" button on the chassis or turn the power off then turn it back on to restart the system then you can try again. You may also restart by simultaneously pressing <Ctrl>, <Alt>, and <Delete> keys. If you do not press the keys at the correct moment and the system does not boot, an error message will be displayed and you will again be asked to...

<div align="center">

PRESS F1 TO ENTER SETUP OR PRESS F2 TO CONTINUE

</div>

4.3   Using Setup

In general, use the arrow keys to highlight options, press <Enter> to select, use the PageUp and PageDown keys to change entries, press <F1> for help and press <Esc> to quit.   The following table provides more detail about how to navigate in the Setup program.

Up arrow	Move to previous option
Down arrow	Move to next option
Left arrow	Move to the option in the left column
Right arrow	Move to the option in the right column
Esc key	Main Menu -- Quit and not save changes into CMOS Status Page Setup Menu and Option Page Setup Menu -- Exit current page and return to Main Menu
PgUp key	Increase the numeric value or make changes
PgDn key	Decrease the numeric value or make changes
+ key	Increase the numeric value or make changes
- key	Decrease the numeric value or make changes
F1 key	General help, only for Status Page Setup Menu and Option Page Setup Menu
F2 /F3 key	Change color from total 16 colors. F2 to select color forward, (Shift) F2 to select color backward
F4 key	Reserved
F5 key	Reserved
F6 key	Reserved
F7 key	Reserved
F8 key	Reserved
F9 key	Reserved
F10 key	Save all the CMOS changes, only for Main Menu

4.4   Getting Help

Press F1 to pop up a small help window that describes the appropriate keys to use and the possible selections for the highlighted item.   To exit the Help Window press <Esc> or the **F1** key again.

If, after making and saving system changes with Setup, you discover that your computer is no longer able to boot, the AMI BIOS supports an override to the CMOS settings which can reset your system to its defaults.

The best advice is to alter only the settings which you thoroughly understand.   To this end, we strongly recommend not to make any changes to the chipset defaults. These defaults have been carefully chosen by both AMI and the system manufacturer to provide the optimum performance and reliability.   Even a seemingly little change to the chipset setup may shut the system down and need the override program to reset it.

4.5   Main Menu

Once you enter the AMIBIOS™ CMOS Setup Utility, the Main Menu will appear on the screen.   The Main Menu allows you to select from several setup functions and two exit choices.   Use the arrow keys to select among the option and press <Enter> to accept and enter the sub-menu.

Note that a brief description of each highlighted selection appears at the bottom of the screen.

The main menu includes the following main setup categories.   Recall that some systems may not include all entries.

● **Standard CMOS Setup**

   Use this menu for basic system configuration.

● **Advanced CMOS Setup**

   Use this menu to set the Advanced Features available on your system.

● **Advanced Chipset Setup**

   Use this menu to change the values in the chipset registers and optimize the system's performance.

● **Power Management Setup**

   When Disabled, SMI will not be initialized, and complete power management functionality is removed unless this option is set to Enabled.

● **PCI / Plug and Play Setup**

   This entry appears if your system supports PnP / PCI.

● **Peripheral Setup**

   Use this menu to specify your settings for integrated peripherals.

● **Hardware Monitor Setup**

   Use this menu to monitor your hardware.

- **Auto-detect Hard Disks**

  Use this menu to specify your settings for hard disks control.

- **Change Supervisor Password**

  Use this menu to set User and Supervisor Passwords.

- **Auto Configuration with Optimal Settings**

  Use this menu to load the BIOS factory settings for optimal system performance. While AMI has been designed the custom BIOS to optimize performance, the factory has the right to change these defaults to meet its needs.

- **Auto Configuration with Fail-Safe Settings**

  Use this menu to load the BIOS default values for the safe and stable system performance.

- **Save Settings and Exit**

  Save CMOS value changes to CMOS and exit setup.

- **Exit Without Saving**

  Abandon all CMOS value changes and exit setup.

4.6   Standard CMOS Setup

The options in Standard CMOS Setup Menu are divided into 10 categories.   Each category includes none, one or more than one setup options.   Use the arrow keys to highlight the option and then use the <PgUp> or <PgDn> keys to select the value you want for each option.

```
                    AMIBIOS SETUP - STANDARD CMOS SETUP
              (C)2001 American Megatrends, Inc. All Rights Reserved

 Date (mm/dd/yyyy): Wed Oct 23,2002                    Base Memory: 0 KB
 Time (hh/mm/ss) : 15:21:49                            Extd Memory: 0 MB

 Floppy Drive A:    1.44 MB 3½
 Floppy Drive B:    Not Installed
                                                      LBA  Blk  PIO  32Bit
              Type         Size    Cyln  Head WPcom Sec Mode Mode Mode Mode
 Pri Master: Auto                                                      On
 Pri Slave : Auto                                                      On
 Sec Master: Auto                                                      On
 Sec Slave : Auto                                                      On

 Boot Sector Virus Protection    Disabled

 Month:  Jan - Dec                                    ESC:Exit  ↑↓:Sel
  Day:   01 - 31                                      PgUp/PgDn:Modify
  Year: 1980 - 2099                                   F2/F3:Color
```

● **Main Menu Selections**

Item	Options	Description
Date	MM DD YYYY	Set the system date.
Time	HH : MM : SS	Set the system time
IDE Primary Master	Options are in its sub menu (Described in Table 3)	Press <Enter> to enter the sub menu for more options
IDE Primary Slave	Options are in its sub menu (Described in Table 3)	Press <Enter> to enter the sub menu for more options
IDE Secondary	Options are in its sub menu (Described in Table 3)	Press <Enter> to enter the sub menu for more options
IDE Secondary	Options are in its sub menu (Described in Table 3)	Press <Enter> to enter the sub menu for more options
Drive A Drive B	None 360K, 5.25 in 1.2M, 5.25 in 720K, 3.5 in 1.44M, 3.5 in 2.88M, 3.5 in	Select the type of floppy disk drive installed in the system
Halt On	All Errors No Errors All, but Keyboard All, but Diskette All, but Disk/Key	Select the status in which you want the BIOS to stop the POST processes and notify you
Base Memory	N/A	Displays the amount of conventional memory detected during boot up
Extended Memory	N/A	Displays the amount of extended memory detected during boot up

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4.7　Advanced CMOS Setup

This section allows you to configure your system for basic operation.　You have the opportunity to select the system's default speed, boot-up sequence, keyboard operation, shadowing and security.

```
              AMIBIOS SETUP - ADVANCED CMOS SETUP
           (C)2001 American Megatrends, Inc. All Rights Reserved
Quick Boot                        Enabled     Available Options:
1st Boot Device                   Floppy        Disabled
2nd Boot Device                   IDE-0       ► Enabled
3rd Boot Device                   CDROM
Try Other Boot Devices            Yes
Boot From Lan                     Disabled
S.M.A.R.T. for Hard Disks         Disabled
BootUp Num-Lock                   On
Floppy Drive Swap                 Disabled
Floppy Drive Seek                 Disabled
PS/2 Mouse Support                Enabled
System Keyboard                   Absent
Primary Display                   VGA/EGA
Password Check                    Setup
Boot To OS/2                      No
Wait For 'F1' If Error            Enabled
Hit 'DEL' Message Display         Enabled
CPU MicroCode Updation            Enabled
L1 Cache                          Enabled
L2 Cache                          Enabled
System BIOS Cacheable             Enabled
C000,32k Shadow                   Cached
C800,16k Shadow                   Disabled
CC00,16k Shadow                   Disabled
D000,16k Shadow                   Disabled
D400,16k Shadow                   Disabled      ESC:Exit  ↑↓:Sel
D800,16k Shadow                   Disabled      PgUp/PgDn:Modify
DC00,16k Shadow                   Disabled      F1:Help F2/F3:Color
```

- **Quick Boot**

  When this option is set to enable, DRAM testing function will be disable.

- **1st /2nd /3rd Boot Device**

  This option sets the type of device for the first boot drives that the AMIBIOS attempts to boot from after AMIBIOS POST completes. The settings are Disabled, IDE-0, IDE-1, IDE-2, IDE-3, Floppy, ARMD-FDD, ARMD-HDD, CDROM, SCSI.

- **Try Other Boot Devices**

  The options are Yes or No. Set this setting to Yes to instruct AMIBIOS to attempt to boot from any other drive in the system if it cannot find a boot drive among the drives specified in the 1st Boot Device, 2nd Boot Device, 3rd Boot Device, 4th Boot Device options.

- **Boot From LAN**

  When setting Enable, bios will load LAN's Boot Rom and try to boot the system from LAN.

- **S.M.A.R.T. for Hard Disks**

  S.M.A.R.T. stands for Self-Monitoring, Analysis and Reporting Technology. This setting can help BIOS to warn the user of the possible device failure and let the user back up the device before actual failure happens. The options are Disabled, Enabled.

- **Boot Up Num-Lock**

  If the user wants the Num-Lock function to be turned on during the boot-up period so that the user can use the key pad on the keyboard right after the system starts,   please select ON to do so. Otherwise, select OFF.

- **Floppy Drive Swap**

  This setting decides whether drives A: and B: can be swapped or not. The options are Enabled or Disabled.

- **Floppy Drive Seek**

  This setting is whether to enable floppy drives A: to perform a Seek operation at system boot process. The options are Enabled or Disabled.

- **PS/2 Mouse Support**

  When this setting is enabled, BIOS support a PS/2- type mouse.

- **System Keyboard**

  This won't be specified if a keyboard is attached to the computer. Otherwise, when there's no keyboard detected and an error message is displayed, this setting can be marked as needed. This setting permits you to configure workstation with no keyboard. The options are Absent, Present.

- **Primary Display**

  This setting is to configure the type of monitor attached to the computer. The settings are Monochrome, Color 40x25,Color 80x25,VGA/PGA/EGA ,or Not Install.

- **Password Check**

  This option enables the password check option every time the system boots or the end user runs Setup. If always is chosen a user password prompt appears every time the computer is tuned on. If setup is chosen, the password prompt appears if BIOS is executed.

- **Boot To OS/2**

  Set this option to YES if running OS/2 operating system and using more than 64MB of system memory on the motherboard. The options are YES or NO.

- **Wait For 'F1' If Error**

  If this setting is enabled, AMIBIOS waits for the end user to press <F1> before continuing. If this option is disabled, AMIBIOS continues the boot process without waiting for <F1> to be pressed. The options are Disabled or Enabled.

- **Hit 'DEL' Message Display**

  Disabling this setting prevents "Hit <DEL> if you want to run Setup" from appearing when the system boots. The options are Disabled or Enabled.

- **CPU MicroCode Update**

  When setting Enable, Bios will load CPU Microcode.

- **L1 Cache**

  The setting enabled or disabled the L1 cache memory in the processor.

- **L2 Cache**

  The setting enables L2 cache memory. If Enabled is selected, L2 cache memory is enabled. If disabled is select, L2 cache memory is disabled.

- **System BIOS Cacheable**

  When this setting is set to enabled, the System ROM area from F0000-FFFFF is copied (shadowed) to RAM for faster execution.

- **C000, 32k Shadow**

  This setting is about the contents inside the Video ROM area form C000-C7FFF, which influences the speed of execution.

  Disabled: The contents of the video ROM are not copied to RAM.

  Cached: The contents of the video ROM area from C0000h - C7FFFh are copied from ROM to RAM and can be written to or read from cache memory.

  Enabled: The contents of the video ROM area from C0000h - C7FFFh are copied (shadowed) from ROM to RAM for faster execution.

- **C800, 16k Shadow**

  These settings enable shadowing of the contents of the ROM area named in the option title. The options are Enable Disable, Cached. The ROM area that is not used by ISA adapter cards will be allocated to PCI adapter cards.000, 32k Shadow.

- **CC00, 16k Shadow**

  These settings enable shadowing of the contents of the ROM area named in the setting title. The settings are Enable Disable, Cached. The ROM area that is not used by ISA adapter cards will be allocated to PCI adapter cards.800, 16k Shadow.

- **D000, 16k Shadow**

  These settings enable shadowing of the contents of the ROM area named in the setting title. The options are Enable, Disable, and Cached. The ROM area that is not used by ISA adapter cards will be allocated to PCI adapter cards.C00, 16k Shadow.

- **D400, 16k Shadow**

  These settings enable shadowing of the contents of the ROM area named in the setting title. The options are Enable, Disable, and Cached. The ROM area that is not used by ISA adapter cards will be allocated to PCI adapter cards.000, 16k Shadow.

- **D800,16k Shadow**

  These settings enable shadowing of the contents of the ROM area named in the setting title. The options are Enable, Disable, and Cached. The ROM area that is not used by ISA adapter cards will be allocated to PCI adapter cards.400, 16k Shadow.

- **DC00, 16k Shadow**

  These settings enable shadowing of the contents of the ROM area named in the setting title. The options are Enable, Disable, and Cached. ISA adapter cards will be allocated to PCI adapter cards.800, 16k Shadow.

4.8   Advanced Chipset Setup

This section allows you to configure the system based on the specific features of the installed chipset.   This chipset manages bus speeds and access to system memory resources, such as DRAM and the external cache.   It also coordinates communications between the conventional ISA bus and the PCI bus.   It must be stated that these items should never need to be altered.   The default settings have been chosen because they provide the best operating conditions for your system.

```
            AMIBIOS SETUP - ADVANCED CHIPSET SETUP
      (C)2001 American Megatrends, Inc. All Rights Reserved

******** DRAM Timing ********              Available Options:
Configure SDRAM Timing by SPD   Disabled   ▶ Disabled
  DRAM Frequency                133Mhz       Enabled
  SDRAM CAS# Latency            3

Memory Hole                     Disabled
AGP Fast Write                  Disabled
AGP Aperture Size               64MB
USB Controller                  All USB Port
USB Device Legacy Support       Disabled
Port 64/60 Emulation            Disabled




                                           ESC:Exit  ↑↓:Sel
                                           PgUp/PgDn:Modify
                                           F1:Help F2/F3:Color
```

- **Configure SDRAM Timing by SPD**

    When setting Enable, bios will use the data from DIMM's SPD to setup the DRAM timing. Disable the setting, bios will use default setting.

- **DRAM Frequency**

    This setting is setting Memory working frequency, 66/100/133 MHz.

- **SDRAM CAS# Latency**

    This setting is setting Memory CAS latency

- **AGP Aperture Size**

    This is about the size of AGP aperture. The aperture is a portion of the PCI Memory addresses space. Host cycles that hit the aperture range are forwarded to the AGP without any translation

- **USB Controller**

    Select enable if your system contains a USB controller and you have USB Peripherals. Otherwise, select disable.
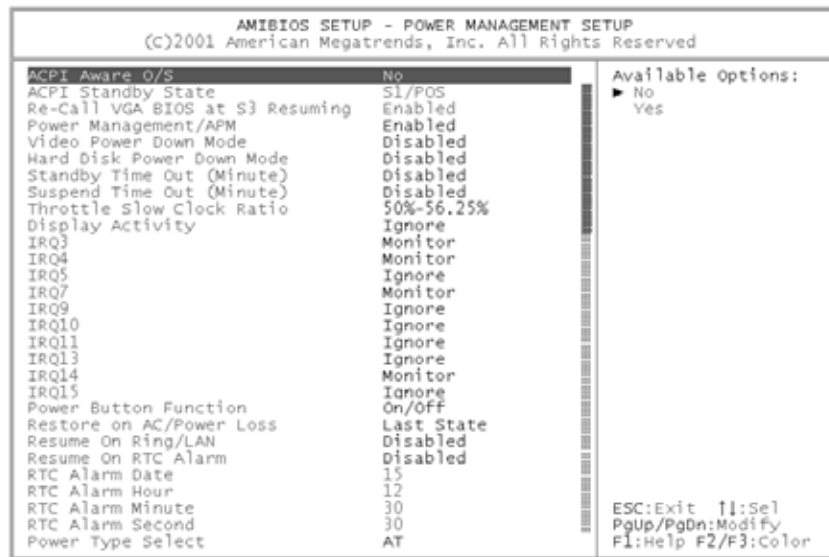
- **USB Device Legacy Support**

    Enable or Disable the USB device legacy support.

- **Port 64/60 Emulation**

    Enable or Disable the USB KB/MS legacy support.

4.9   Power Management Setup

```
              AMIBIOS SETUP - POWER MANAGEMENT SETUP
        (C)2001 American Megatrends, Inc. All Rights Reserved
ACPI Aware O/S                        No          Available Options:
ACPI Standby State                    S1/POS      ► No
Re-Call VGA BIOS at S3 Resuming       Enabled        Yes
Power Management/APM                  Enabled
Video Power Down Mode                 Disabled
Hard Disk Power Down Mode             Disabled
Standby Time Out (Minute)             Disabled
Suspend Time Out (Minute)             Disabled
Throttle Slow Clock Ratio             50%-56.25%
Display Activity                      Ignore
IRQ3                                  Monitor
IRQ4                                  Monitor
IRQ5                                  Ignore
IRQ7                                  Monitor
IRQ9                                  Ignore
IRQ10                                 Ignore
IRQ11                                 Ignore
IRQ13                                 Ignore
IRQ14                                 Monitor
IRQ15                                 Ignore
Power Button Function                 On/Off
Restore on AC/Power Loss              Last State
Resume On Ring/LAN                    Disabled
Resume On RTC Alarm                   Disabled
RTC Alarm Date                        15
RTC Alarm Hour                        12          ESC:Exit  ↑↓:Sel
RTC Alarm Minute                      30          PgUp/PgDn:Modify
RTC Alarm Second                      30          F1:Help F2/F3:Color
Power Type Select                     AT
```

● **ACPI Aware O/S**

This feature is the switch of ACPI function.   Configuration options : [No] [Yes]

● **ACPI Standby State**

This feature is the switch of STR (S3) or POS (S1) function.   Configuration options: [S3/STR] [S1/POS]

● **Re-Call VGA BIOS at S3 Resuming**

Enable or Disable system load the VGA bios after S3 state.

● **Power Management/APM**

When Disabled, SMI will not be initialized, and the complete power management functionality is removed unless this option is set to Enabled.

● **Video Power Down Mode**
   Hard Disk Power Down Mode
   Standby Time Out (Minute)
   Suspend Time Out (Minute)
   If no activity occurs during this time period, the BIOS will place the system into the suspended low power state.

● **Throttle Slow Clock Ratio**
   Display Activity
   IRQ3 ,4 ,5 ,7 , 9, 10, 11, 13, 14, 15
   The factory defaults assigned IRQ3, 4, 7, and 14 to the Monitor. When other external devices using the same IRQ numbers as of the Monitor start, the Monitor will be waked up from the power saving state by these devices.

   The user can assign the other IRQ numbers available here to the Monitor. Just highlight the IRQ number and set the value to Monitor.

- **Resume on Ring/LAN**

  Allows the user to decide to resume the system from Soft Off state by either LAN or Modem Ring.
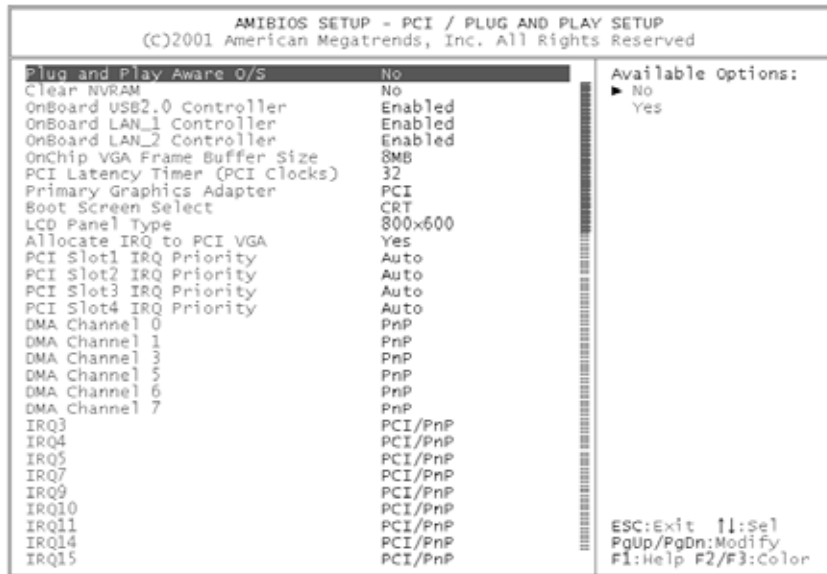
- **Resume On RTC Alarm**

  When this setting is enabled, the system will wakeup from soft off mode according to the time you set.

- **Power Type Select**

  This setting allows the user to choose the power type for AT or ATX.

4.10 PCI / Plug and Play Setup


```
              AMIBIOS SETUP - PCI / PLUG AND PLAY SETUP
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Plug and Play Aware O/S        No          Available Options:
Clear NVRAM                    No          ▶ No
OnBoard USB2.0 Controller      Enabled       Yes
OnBoard LAN_1 Controller       Enabled
OnBoard LAN_2 Controller       Enabled
OnChip VGA Frame Buffer Size   8MB
PCI Latency Timer (PCI Clocks) 32
Primary Graphics Adapter       PCI
Boot Screen Select             CRT
LCD Panel Type                 800x600
Allocate IRQ to PCI VGA        Yes
PCI Slot1 IRQ Priority         Auto
PCI Slot2 IRQ Priority         Auto
PCI Slot3 IRQ Priority         Auto
PCI Slot4 IRQ Priority         Auto
DMA Channel 0                  PnP
DMA Channel 1                  PnP
DMA Channel 3                  PnP
DMA Channel 5                  PnP
DMA Channel 6                  PnP
DMA Channel 7                  PnP
IRQ3                           PCI/PnP
IRQ4                           PCI/PnP
IRQ5                           PCI/PnP
IRQ7                           PCI/PnP
IRQ9                           PCI/PnP
IRQ10                          PCI/PnP
IRQ11                          PCI/PnP     ESC:Exit  ↑↓:Sel
IRQ14                          PCI/PnP     PgUp/PgDn:Modify
IRQ15                          PCI/PnP     F1:Help F2/F3:Color
```

● **Plug and Play Aware O/S**

If enabled, BIOS will configure only PnP ISA boot devices(i.e. all PnP ISA cards which has boot flag set). And PnP aware OS will configure all other devices. If disabled, BIOS will configure all devices.

● **Clear NVRAM**

When set to Yes, system can clear NVRAM automatically. The options are No, Yes.

● **Onboard USB2.0 controller**

Select to enable or disable the controller.

● **Onboard Lan1 controller**

Select to enable or disable the controller.

● **Onboard Lan2 controller**

Select to enable or disable the controller.

● **On Chip VGA Frame Buffer Size**

This is for selecting frame buffer size (2~32MB) for VGA.

● **PCI Latency Timer (PCI Clocks)**

This setting specifies the latency timings (in PCI clocks) for PCI devices installed in the PCI expansion slots. The options are 32, 64, 96, 128, 160, 192, 224, or 248.

● **Primary Graphics Adapter**
  Boot Screen Select
  This setting is to specify Boot Screen. .Select Both will Boot from CRT and LCD Both.

- **LCD Panel Type**

  This setting is to choose LCD Panel Type
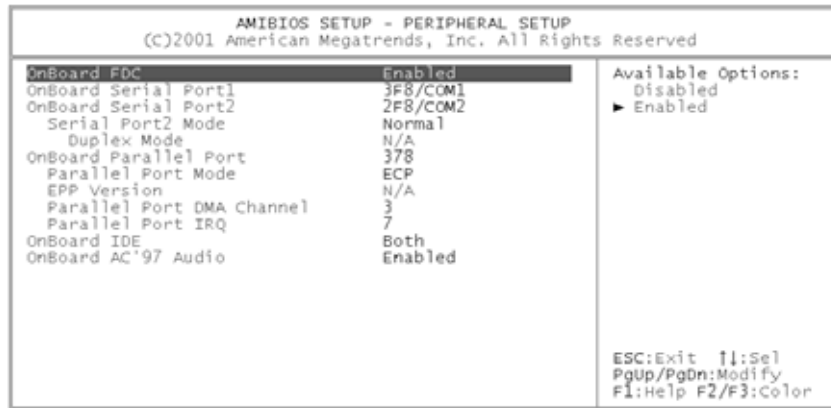
- **Allocate IRQ to PCI VGA**

  Choose Yes to allocate an IRQ to the VGA device on the PCI bus. The other option is No.

- **PCI Slot1 / Slot2 / Slot3 / Slot4 IRQ Priority**

  The setting specifies the IRQ priority for PCI device installed in the PCI expansion slot. The options are Auto, (IRQ) 3, 4, 5, 7, 9, 10, and 11, in priority order.

4.11 Peripheral Setup

The Peripheral Setup allows the user to configure the system to the most effectively power saving mode while operating in a consistent manner with your own style of computer use.

```
              AMIBIOS SETUP - PERIPHERAL SETUP
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 OnBoard FDC                    Enabled         Available Options:
 OnBoard Serial Port1           3F8/COM1           Disabled
 OnBoard Serial Port2           2F8/COM2        ► Enabled
   Serial Port2 Mode            Normal
     Duplex Mode                N/A
 OnBoard Parallel Port          378
   Parallel Port Mode           ECP
   EPP Version                  N/A
   Parallel Port DMA Channel    3
   Parallel Port IRQ            7
 OnBoard IDE                    Both
 OnBoard AC'97 Audio            Enabled




                                               ESC:Exit  ↑↓:Sel
                                               PgUp/PgDn:Modify
                                               F1:Help F2/F3:Color
```

- ● **Onboard FDC**
  Onboard Serial Port 1/Port 2

  This setting specifies the base I/O port address of serial port 1.The option are Auto (AMIBIOS automatically determines the correct base I/O port address) , Disabled, 3F8h, 2F8h, 2E8h, or 3E8h.

- ● **Onboard Parallel Port**

  This setting specifies the base I/O port address of parallel port on the motherboard. The options are Disabled, 378h, 278h, or 3BCh.

- ● **Parallel Port Mode**

  This setting specifies the parallel port mode. The options are Normal, Bi-Dir, EPP, ECP.

  Normal: The normal parallel port mode is used.

  Bi-Dir :   To support bidirectional transfers on the parallel port.

  EPP: The parallel port can be used with devices that adhere to the Enhanced Parallel Port(EPP) specification. EPP uses the existing parallel port signals to provide asymmetric bidirectional data transfer driven by the host device.

  ECP: The parallel port can be used with devices that adhere to the Extended Capabilities Port (ECP) specification. ECP uses the DMA protocol to achieve data transfer rates up to 2.5 Megabits per second. ECP provides symmetric bi-directional communication.

- **EPP Version**

  EPP data or address read cycle 1.9 or 1.7

- **Parallel Port IRQ**

  This setting specifies the IRQ used by the parallel port. The options are Auto, (IRQ)5, (IRQ)7.

- **Parallel Port DMA Channel**

  This setting is available only if the setting for the Parallel Port Mode option is ECP. This setting makes the DMA channel used by the parallel port. The options are DMA Channel 0, 1, or 3.

- **On Board AC'97 Audio**

  Enable or Disable AC'97 Audio Function.

4.12 Hardware Monitor Setup

```
              AMIBIOS SETUP - HARDWARE MONITOR SETUP
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 -=≡ System Hardware Monitor ≡=-
   System Temperature            37°C/98°F
      CPU Temperature            43°C/109°F
      CPU Fan Speed              0 RPM
   Vcore                         1.087 V
   + 2.500v                      2.675 V
   + 3.300v                      3.507 V
   + 5.000v                      5.045 V
   +12.000v                      12.465 V



                                           ESC:Exit  ↑↓:Sel
                                           PgUp/PgDn:Modify
                                           F1:Help F2/F3:Color
```

4.13 Change Supervisor Password

You can set passwords for either supervisor or user password, or for both of them. The differences between them are:

● **Supervisor Password:**
It's used to enter and change the settings of the setup menus.

● **User Password:**
It's used to only access the setup menus, but can't change anything of it. When you select this option, the following message will appear at the center of the screen to assist you in creating a password.

● **ENTER PASSWORD:**
Type the password, up to eight characters in length, and press <Enter>. The password typed now will clear any previously existing password within CMOS memory. You will be prompted to confirm the password. Type the password again and press <Enter>. You may also press <Esc> to abort the selection and not to enter a password.
To disable a password, just press <Enter> when you are prompted to enter the password. A message which ask you to confirm the password will be disabled. Once the password is disabled, the system will boot and you can enter Setup freely.

● **PASSWORD DISABLED.**
When a password has been enabled, you will be prompted to enter it every time you try to enter Setup. This prevents an unauthorized user from changing any bit of your system configuration.
Additionally, when a password is enabled, you can also require the BIOS to request a password every time the system is booting. This would prevent unauthorized uses of your computer.
The user can determine whether the password is needed for entering BIOS Setup Program or other Security options (see Section 4.5). Once the Password has been set, The user will be prompted to enter the password at the beginning of booting and at the entry to Setup Menu.

Appendix A Watchdog Timer

The Watchdog Timer is a device to ensure that standalone systems can always recover from catastrophic conditions that cause the CPU to crash. This condition may have occurred by external EMI or a software bug. When the CPU stops working normally, hardware on the board will perform hardware reset (cold boot) to bring the system back to a known state.

Three I/O ports control the Watchdog Timer:

443	Write	Set Watchdog Time period
443 (hex)	Read	Enable the refresh the Watchdog Timer
043/843 (hex)	Read	Disable the Watchdog Timer

Prior to enable the Watchdog Timer, user has to define Timer first.   The output data is a value of time interval and the range of the value is from 01(hex) to FF (hex) and time interval 1 sec to 255 sec.

DATA	TIME INTERVAL
01	1 sec
02	2 sec
03	3 sec
04	4 sec
- -	- -
FF	255 sec

This will enable and activate the countdown timer which eventually time out and reset the CPU to ensure that this reset condition does not occur; the Watch-Dog Timer must be periodically refreshed by reading the same I/O port 043/843H and 443H. This must be done within the time out period that is selected by software, please refer to the example program.

A tolerance of at least 5% must be maintained to avoid unknown routines within the operating system (DOS), such as disk I/O that can be very time consuming. Therefore if the time-out period has been set to 10 seconds, the I/O port 443H must be read within 7 seconds.

Note: When exiting a program it is necessary to disable the Watchdog Timer, otherwise the system will reset.

Example Assembly Program:
TIMER_PORT = 443H
TIMER_START = 443H
TIMER_STOP = 843H

```
;;INITIAL TIME PERIOD COUNTER
MOV DX, TIME_PORT
MOV AL,8:     ;;8 SECONDS
OUT DX,AL

;;ADD YOUR APPLICATION HERE
MOV DX, TIMER_START
IN AL, DX.      ;;START COUNTER

;ADD YOUR APPLICATION HERE
W_LOOP:
MOV DX, TIMER_STOP
IN AL, DX
MOV DX, TIMER_START
IN AL, DX.        ; RESTART COUNTER

; ADD YOUR APPLICATION HERE
CMP EXIT_AP, 0
JNE W_LOOP
MOV DX, TIMER_STOP
IN AL, DX
;;EXIT AP
```

Appendix B Digital I/O

One characteristic of digital circuit is its fast response to high or low signal. This kind of response is highly needed for harsh and critical industrial operating environment. That's why we design 4-bit digital inputs and 4-bit digital outputs on the WAFER-C400EV.

Digital Input and Output, generally, are control signals. You can use these signals to control external devices that needs On/Off circuit or TTL devices. You can read or write data to the selected address to enable the function of digital IO.

A BIOS function call (INT 15H) is used to control the Watchdog Timer:

- **INT 15H:**

AH – 6FH
Sub-function:
AL – 8 : Set the Digital port is INPUT
AL   : Digital I/O input value

Example Program:

MOV	AX, 6F08H	; setting the Digital port is input
INT	15H	;

- **AL low byte = value**

AH – 6FH
Sub-function:
AL – 9 : Set the Digital port is OUTPUT
BL   : Digital I/O output value

Example program:

MOV	AX, 6F09H	; setting the Digital port is output
MOV	BL, 09H	; Digital value is 09H
INT	15H	; Digital Output is 1001b

Appendix C I/O Address Map

- **C.1 System I/O Address Map**

I/O ADDRESS MAP	DESCRIPTION
000-00F	DMA controller #1
020-021	Interrupt controller # 1, master
022-023	Chipset address
040-043	System timer
060-060	Standard 101/102 keyboard controller
061-061	System speaker
064-064	Standard 101/102 keyboard controller
070-07F	Real time clock, NMI controller
080-0BF	DMA page register
0A0-0BF	Interrupt Controller # 2
0C0-0DF	DMA Controller # 2
0F0-0F0	Clear math coprocessor busy
0F1-0F1	Reset math coprocessor
0F8-0FF	Math coprocessor
1F0-1F7	BUS master PCI IDE controller
278-27F	Reserved
2F8-2FF	Serial Port 2
378-37F	Parallel Printer Port 1
3B0-3DF	Graphic Adapter
3F0-3F7	Floppy Disk Controller
3F8-3FF	Serial Port 1
443	Watch dog timer enable
043/843	Watch dog timer disable

- **C.2 DMA Channel Assignments**

CHANNEL	FUNCTION
0	Available
1	Available
2	Standard floppy disk controller
3	Parallel port*
4	Cascade for DMA controller 1
5	Available
6	Available
7	Available

* parallel port DMA default setting: DMA 3

parallel port DMA select: DMA 1 or 3

- **C.3 Interrupt Assignments**

INTERRUPT #	INTERRUPT SOURCE
NMI	Parity error detected
IRQ 0	System timer
IRQ 1	Keyboard
IRQ 2	Interrupt from controller 2 (cascade)
IRQ 3	Serial communication port 2
IRQ 4	Serial communication port 1
IRQ 5	Available
IRQ 6	Standard floppy disk controller
IRQ 7	Parallel port (print port)
IRQ 8	Real-time clock
IRQ 9	Available
IRQ 10	Available
IRQ 11	Available
IRQ 12	PS/2 mouse
IRQ 13	Numeric data processor
IRQ 14	Fixed primary IDE controller
IRQ 15	Fixed secondary IDE controller

Ethernet IRQ is automatically set by the system.

- **C.4 1st MB Memory Map**

ADDRESS	DESCRIPTION
F000h-FFFFh	System BIOS
EF00h-EFFFh	Expansion ROM*
C800h-EEFFh	Unused
C000h-C7FFh	VGA BIOS*
B000h-BFFFh	VGA DRAM
A000h-AFFFh	VGA DRAM
0000h-9FFFh	Base memory

* Default setting