

# **WAFER-E669E2V**

Low Power VIA EDEN ESP  
with SVGA, LAN, USB2.0, PC-104, SBC  
PCB Version 1.1

## **User Manual**

Version 1.1

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# Chapter 1 Introduction

WAFER-E669E2V is designed for network applications. It supports the full functions of an AT/ATX-compatible industrial computer on a single board. The WAFER-E669E2V is equipped with a low-power consumption and high performance VIA Eden processor on board. It also contains an SDRAM SODIMM socket that support up to 512MB memory.

The WAFER-E669E2V 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

- **VIA Eden ESP 32-Bit x86 Processor:**  
Supports Intel MMX instruction set extension for the acceleration of multimedia applications and AMD 3DNOW! Instructions for turbo charging games, photo processing and media applications.
  - Two 64 KB 4-way L1 caches
  - 64-KB Level 2 victim cache
  - Bus speeds up to 133MHz
  - Extremely low power dissipation for fanless operation
- **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 Realtek RTL8100B or Intel 82551 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(4.75V to 5.25V ) @3A ( typical ) +12V @ 40mA
- **Operating Temperature:** -20-60 ( -4-140 )
- **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:

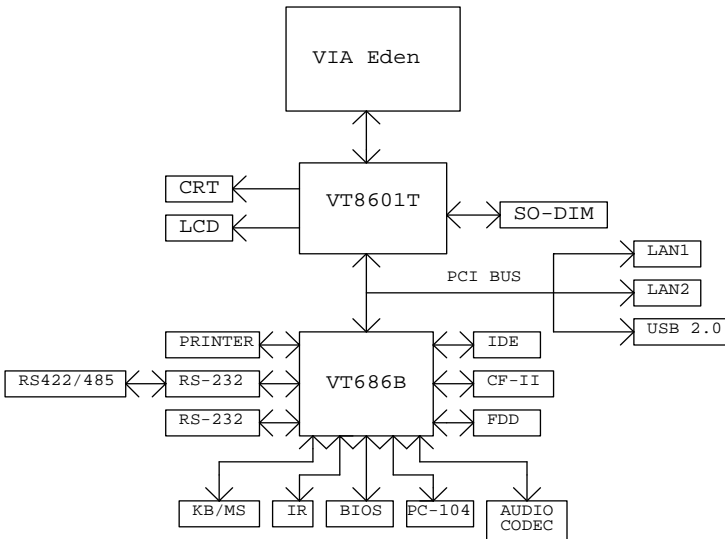
- One WAFER-E669E2V all-in-one single board computer
- One compact disk for utility and drivers
- One 2.5" IDE flat cable (44-pin 2.0mm pitch to 40-pin 2.54mm pitch)
- One floppy cable (for 3.5" FDD only)
- One serial port cable (RS-422/485/232)
- One standard D-25 connector for parallel cable
- One 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.

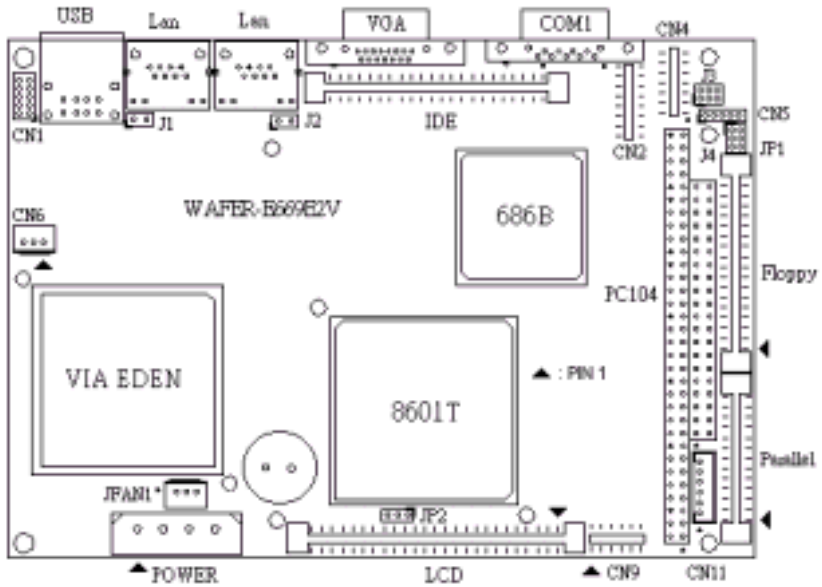
# Chapter 2 Installation

This chapter gives instructions about how to set up the WAFER-E669E2V 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.

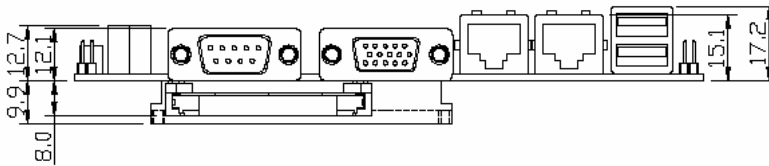
## 2.1 WAFER-E669E2V Block Diagram & Board Layout



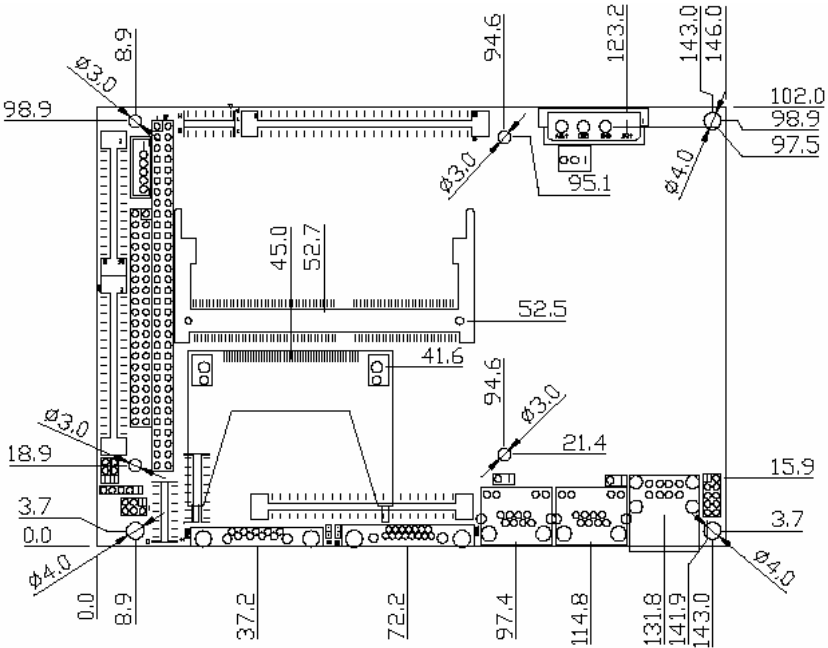
**BLOCK DIAGRAM**



**BOARD LAYOUT**



**BOARD DIMENSION – SIDE VIEW**



**BOARD DIMENSION**

## 2.2 Unpacking Precautions

Some components of WAFER-E669E2V 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:

Ground yourself to remove any static charge before touching the WAFER-E669E2V 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.

Handle WAFER-E669E2V SBC by its edges. Don't touch IC chips, leads or circuitry if not necessary.

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 close 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 NO. | DESCRIPTI ON | PIN NO. | 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         |

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

# Chapter 3 Connection

This chapter describes how to connect peripherals, switches and indicators to the WAFER-E669E2V board.

## 3.1 Floppy Disk Drive Connector (FDD1)

WAFER-E669E2V board is equipped with a 34-pin daisy-chain driver connecting cable.

### FDD1: FDC CONNECTOR

| PIN NO. | DESCRIPTION | PIN NO. | 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 PCI E-IDE Disk Drive Connector (IDE1)

For IDE HDD connection, the WAFER-E669E2V 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-E669E2V.

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

- IDE1: Primary IDE Interface Connector

| PIN NO. | DESCRIPTION | PIN NO. | 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 NO. | DESCRIPTION | PIN NO. | 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-E669E2V includes an on-board parallel port (CN10), accessed through a 26-pin flat-cable connector.

- CN10: Parallel Port Connector

| PIN NO. | DESCRIPTION        | PIN NO. | 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-E669E2V 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 NO. | DESCRIPTION | PIN NO. | 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 NO. | DESCRIPTION | PIN NO. | 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 NO. | DESCRIPTION        | PIN NO. | 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 NO. | 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-E669E2V provides two USB 2.0 interfaces, which give the completed plug and play, for up to 127 external devices.

- USB1: Internal USB Connector

| PIN NO. | DESCRIPTION | PIN NO. | 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-E669E2V 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 NO. | DESCRIPTION |
|---------|-------------|
| 1       | VCC         |
| 2       | NC          |
| 3       | IRRX        |
| 4       | GROUND      |
| 5       | IR-TX       |

### 3.9 VGA Connector (VGA1)

The WAFER-E669E2V has a built-in 15-pin VGA connector accepting the CRT monitor.

- VGA1: 15-pin D-Sub Connector

| PIN NO. | DESCRIPTION | PIN NO. | 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-E669E2V has two built-in RJ-45 LAN connectors for 10/100Mbps Ethernet connection.

- P1,P2: LAN RJ-45 Connector

| PIN NO. | DESCRIPTI ON | PIN NO. | DESCRIPTIO N |
|---------|--------------|---------|--------------|
| 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 NO. | DESCRIPTION |
|---------|-------------|
| 1       | 3VSB        |
| 2       | Active      |

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

| PIN NO. | DESCRIPTION |
|---------|-------------|
| 1       | 3VSB        |
| 2       | Active      |

### 3.11 LCD Interface Connector (CN8)

The WAFER-E669E2V 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 NO. | Description | PIN NO. | 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-E669E2V has an on-board external power connector CN7. You can connect power directly to the CPU board.

- CN7: External Power Connector

| PIN NO. | DESCRIPTION |
|---------|-------------|
| 1       | +5V         |
| 2       | GROUND      |
| 3       | GROUND      |
| 4       | +12V        |

### 3.13 ATX Power connector (CN6)

- CN6: ATX Power connector

| PIN NO. | DESCRIPTION |
|---------|-------------|
| 1       | 5VSB        |
| 2       | PSON        |
| 3       | GND         |

### 3.14 PC/104 Connection Bus (J5, J6)

The WAFER-E669E2V 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 NO. | Description | PIN NO. | Description |
|---------|-------------|---------|-------------|
| 1       | IOCHCK#     | 33      | GND         |
| 2       | SD7         | 34      | IRSTDRV     |
| 3       | SD6         | 35      | VCC         |
| 4       | SD5         | 36      | IRQ9        |

|    |         |    |          |
|----|---------|----|----------|
| 5  | SD4     | 37 | -5V      |
| 6  | SD3     | 38 | DRO2     |
| 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 | DRO3     |
| 17 | SA14    | 49 | DACK1#   |
| 18 | SA13    | 50 | DRO1     |
| 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

| <b>PIN NO.</b> | <b>Description</b> | <b>PIN NO.</b> | <b>Description</b> |
|----------------|--------------------|----------------|--------------------|
| 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 NO. | DESCRIPTION | PIN NO. | 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 NO. | DESCRIPTION      |
|---------|------------------|
| 1       | Fan Speed Detect |
| 2       | +12V             |
| 3       | GND              |

### 3.17 Audio Connector (CN2)

| <b>PIN NO.</b> | <b>DESCRIPTION</b> | <b>PIN NO.</b> | <b>DESCRIPTION</b> |
|----------------|--------------------|----------------|--------------------|
| 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.

### **Press DEL to enter SETUP.**

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...

## **PRESS F1 TO ENTER SETUP OR PRESS F2 TO CONTINUE**

### **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<br>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.

## **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 01/23/2002          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 P20 32Bit
                                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
Day: 01 - 31
Year: 1980 - 2099

ESC:Exit  F1:Sel
PgUp/PgDn:Modify
F2/F3:Color

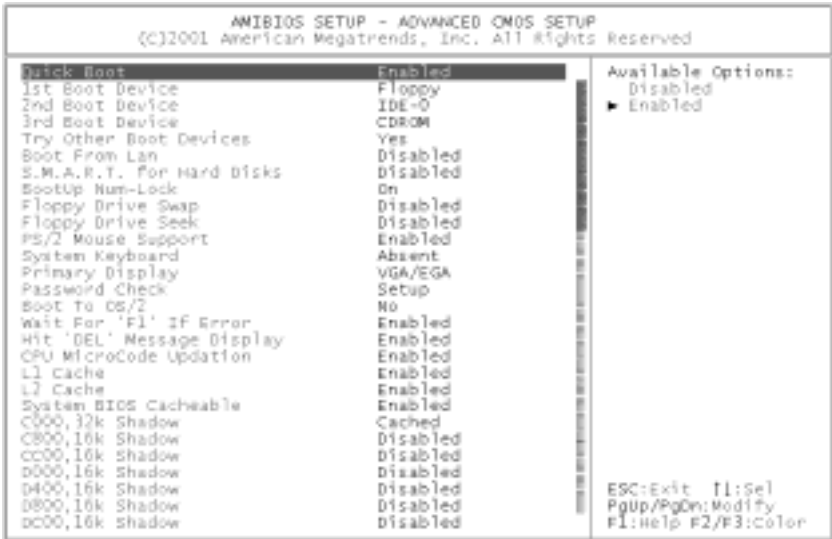
```

### Main Menu Selections

| Item              | Options   | Description  |
|-------------------|---|--|
| Date              | MM DD YYYY  | Set the system date.                                 |
| Time              | HH : MM : SS  | Set the system time                                  |
| IDE Primary       | Options are in its sub menu<br>(described in Table 3) | Press <Enter> to enter the sub menu for more options |
| IDE Primary Slave | Options are in its sub menu<br>(described in Table 3) | Press <Enter> to enter the sub menu for more options |
| IDE Secondary     | Options are in its sub menu<br>(described in Table 3) | Press <Enter> to enter the sub menu for more options |
| IDE Secondary     | Options are in its sub menu<br>(described in Table 3) | Press <Enter> to enter the sub menu for more options |
| Drive A           | None  | Select the type of                                   |

|                    |  |  |
|--------------------|--|--|
| Drive B            | 360K, 5.25 in<br>1.2M, 5.25 in<br>720K, 3.5 in<br>1.44M, 3.5 in<br>2.88M, 3.5 in       | floppy disk drive<br>installed in the system   |
| Halt On            | All Errors<br>No Errors<br>All, but Keyboard<br>All, but Diskette<br>All, but Disk/Key | Select the status in<br>which you want the<br>BIOS to stop the POST<br>processes and notify<br>you |
| Base Memory        | N/A  | Displays the amount<br>of conventional<br>memory detected<br>during boot up                        |
| Extended<br>Memory | N/A  | Displays the amount<br>of extended memory<br>detected during boot<br>up                            |

## 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.*

### 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-FFFFFF 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.

## 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.

### 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.

## Power Management Setup



### 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.

## PCI / Plug and Play Setup



### 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**

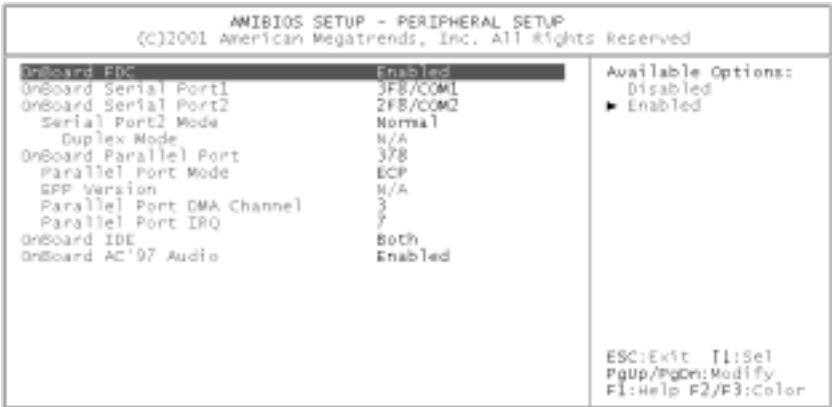
This setting is to choose LCD Panel Type

## 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.



## 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.

## **Onboard FDC**

### **Onboard Serial Port 1/Port 2**

This setting specifies the base I/O port address of serial port 1. The options 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 bidirectional 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.

## Hardware Monitor Setup

| AMIBIOS SETUP - HARDWARE MONITOR SETUP                     |            |
|--|------------|
| (C)2001 American Megatrends, Inc. All Rights Reserved      |            |
| -== 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 F1:Set<br>PgUp/PgDn:Modify<br>F1:Help F2/F3:Color |            |

## 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<br>(hex)      | Read  | Enable the refresh the Watchdog<br>Timer |
| 043/84<br>3 (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.

| <b>Data</b> | <b>Time Interval</b> |
|-------------|----------------------|
| 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 NOVA-7820.

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 :

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

## Example program:

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

**AL low byte = value**

|  |
|--|
| <b>AH – 6FH</b>  |
| <u>Sub-function:</u><br><b>AL – 9</b> : Set the Digital port is OUTPUT<br><b>BL</b> : 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 automatic set by the system

#### C.4 1<sup>st</sup> MB memory map

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

\* Default setting