



IEI Technology Corp .



MODEL: WAFER-MARK

3.5" SBC with VIA MARK 533MHz/800MHz CPU on-board
with SATA, Audio, VGA/ LVDS/ TTL and Dual LAN

User Manual

Rev. 1.12 October 2007



Revision

Date	Version	Changes
2007.09	1.12	1. Changed to new format. 2. Notified that JP3 is an optional jumper.
2006.07	1.10	Changed connector pinouts and jumper setting in Chapter 3 and Chapter 4.
2005.11	1.0	Initial Release

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Manual Conventions



WARNING!

Warnings appear where overlooked details may cause damage to the equipment or result in personal injury. Warnings should be taken seriously. Warnings are easy to recognize. The word “warning” is written as “**WARNING**,” both capitalized and bold and is followed by text. The text is the warning message. A warning message is shown below:



WARNING:

This is an example of a warning message. Failure to adhere to warning messages may result in permanent damage to the WAFER-MARK or personal injury to the user. Please take warning messages seriously.



CAUTION!

Cautionary messages should also be heeded to help reduce the chance of losing data or damaging the WAFER-MARK. Cautions are easy to recognize. The word “caution” is written as “**CAUTION**,” both capitalized and bold and is followed. The italicized text is the cautionary message. A caution message is shown below:

WAFER-MARK 3.5" Embedded SBC



CAUTION:

This is an example of a caution message. Failure to adhere to cautions messages may result in permanent damage to the WAFER-MARK. Please take caution messages seriously.



NOTE:

These messages inform the reader of essential but non-critical information. These messages should be read carefully as any directions or instructions contained therein can help avoid making mistakes. Notes are easy to recognize. The word “note” is written as “**NOTE**,” both capitalized and bold and is followed by text. The text is the cautionary message. A note message is shown below:



NOTE:

This is an example of a note message. Notes should always be read. Notes contain critical information about the WAFER-MARK. Please take note messages seriously.

Packing List

**NOTE:**

If any of the components listed in the checklist below are missing, please do not proceed with the installation. Contact the IEI reseller or vendor you purchased the WAFER-MARK from or contact an IEI sales representative directly. To contact an IEI sales representative, please send an email to sales@iei.com.tw.

The items listed below should all be included in the WAFER-MARK package.

- 1 x WAFER-MARK single board computer
- 1 x Audio cable
- 1 x IDE flat cable 44p/44p
- 1 x Keyboard/Mouse Y cable
- 2 x SATA cable
- 1 x SATA power cable
- 1 x Dual port serial port cable
- 1 x Mini jumper pack
- 1 x Utility CD
- 1 x QIG (quick installation guide)

Images of the above items are shown in **Chapter 3**.

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Glossary

AC '97	Audio Codec 97	LCD	Liquid Crystal Display
ACPI	Advanced Configuration and Power Interface	LPT	Parallel Port Connector
APM	Advanced Power Management	LVDS	Low Voltage Differential Signaling
ARMD	ATAPI Removable Media Device	MAC	Media Access Controller
ASKIR	Shift Keyed Infrared	OS	Operating System
ATA	Advanced Technology Attachments	PCI	Peripheral Connect Interface
BIOS	Basic Input/Output System	PIO	Programmed Input Output
CFII	Compact Flash Type 2	PnP	Plug and Play
CMOS	Complementary Metal Oxide Semiconductor	POST	Power On Self Test
CPU	Central Processing Unit	RAM	Random Access Memory
Codec	Compressor/Decompressor	SATA	Serial ATA
COM	Serial Port	S.M.A.R.T	Self Monitoring Analysis and Reporting Technology
DAC	Digital to Analog Converter	SPD	Serial Presence Detect
DDR	Double Data Rate	S/PDI	Sony/Philips Digital Interface
DIMM	Dual Inline Memory Module	SDRAM	Synchronous Dynamic Random Access Memory
DIO	Digital Input/Output	SIR	Serial Infrared
DMA	Direct Memory Access	UART	Universal Asynchronous Receiver-transmitter
EIDE	Enhanced IDE	USB	Universal Serial Bus
EIST	Enhanced Intel SpeedStep Technology	VGA	Video Graphics Adapter
FFIO	Flexible File Input/Output		
FIFO	First In/First Out		
FSB	Front Side Bus		
IrDA	Infrared Data Association		
HDD	Hard Disk Drive		
IDE	Integrated Data Electronics		
I/O	Input/Output		
L1 Cache	Level 1 Cache		
L2 Cache	Level 2 Cache		



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Chapter

1

Introduction

1.1 WAFER-MARK Overview



Figure 1-1: WAFER-MARK Embedded SBC

The WAFER-MARK is a highly integrated embedded computer specifically optimized for multimedia applications requiring minimum installation space. The WAFER-MARK supports a full range of functionality for an AT/ATX-compatible industrial computer in a space-saving 3.5" profile. The WAFER-MARK is equipped with a low-power consumption and high performance VIA processor on board. It also contains an SDRAM SO-DIMM socket that supports up to 512MB memory in size.

1.1.1 WAFER-MARK Board Variations

Four IEI WAFER-MARK models are available. The models are listed in **Table 1-1**.

WAFER-MARK	CPU	Clock Speed	IDE Flash Module and OS
-533-R11	VIA Mark	533MHz	No
-800-R11	VIA Mark	800MHz	No
-WINXPE	VIA Mark	533MHz/800MHz	IFM 512MB with Windows XPE image
-WINCE050	VIA Mark	533MHz/800MHz	IFM 32MB with Windows CE 5.0 image

Table 1-1: WAFER-MARK Board Variations

WAFER-MARK 3.5" Embedded SBC

1.1.2 WAFER-MARK Applications

The WAFER-MARK is designed for applications in the following areas:

- Kiosks and Point of Sales
- Restaurants
- Human Machine Interface (HMI) applications
- Marine, GPS and transportation applications
- Financial, retail and kiosk applications

1.1.3 WAFER-MARK Benefits

Some of the WAFER-MARK benefits include:

- Reduced hardware costs
- Reduced software costs
- Reduced maintenance costs
- Client crash prevention
- Central resource control
- Security protection

1.1.4 WAFER-MARK Features

Some of the WAFER-MARK features are listed below:

- 3.5" form factor
- RoHS compliant
- VIA Mark 533MHz/800MHz processor installed
- Dual-independent display functionality
- Low power consumption
- Two high performance 10/100 megabit Ethernet controllers on-board
- Two SATA channels with transfer rates up to 150MB/s on-board
- Four USB 1.1 devices on-board
- Integrated audio

1.2 WAFER-MARK Overview

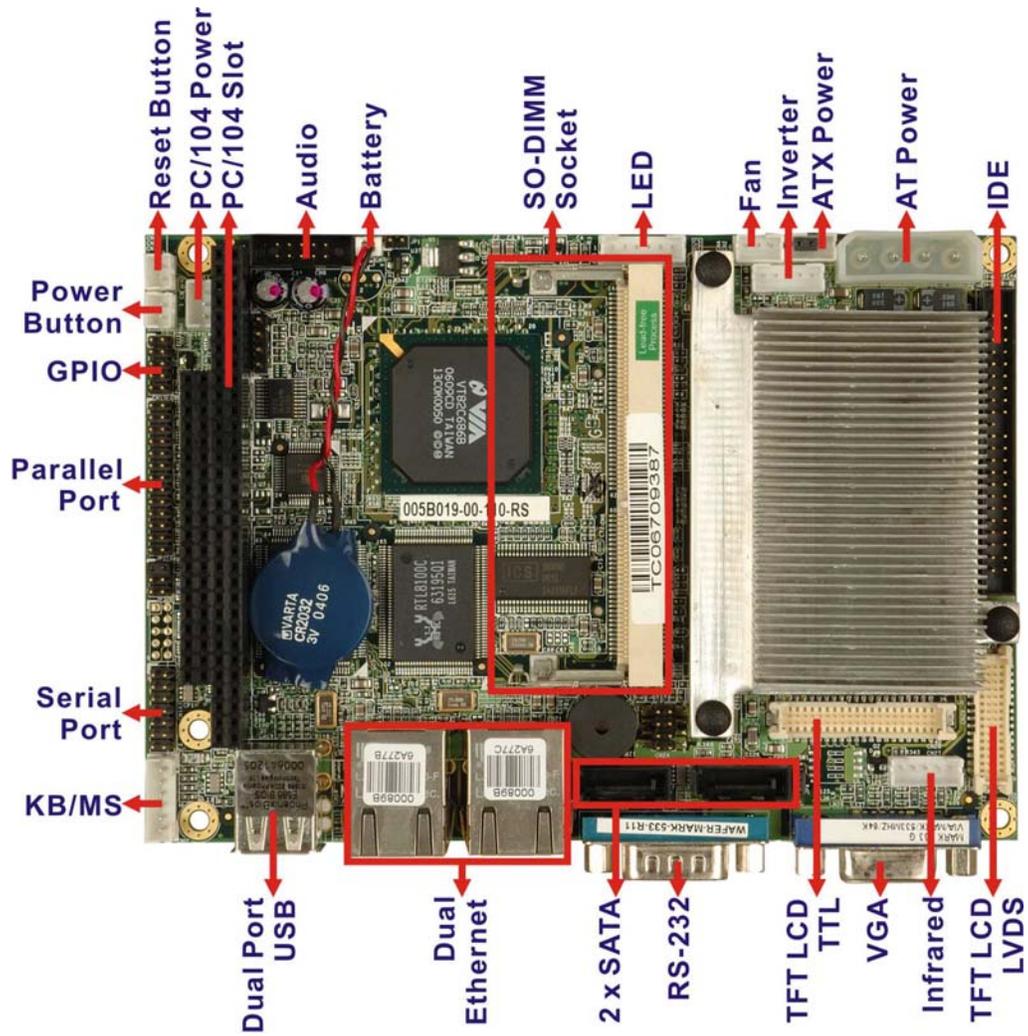


Figure 1-2: WAFER-MARK Overview

WAFER-MARK 3.5" Embedded SBC

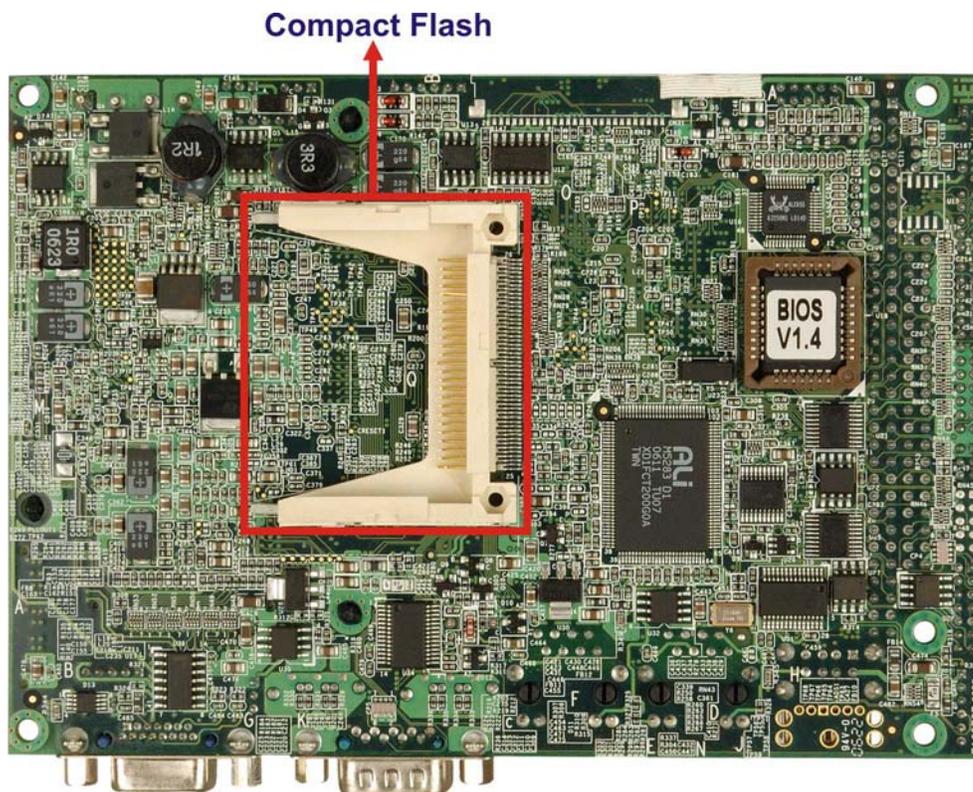


Figure 1-3: WAFER-MARK Solder Side Overview

1.2.1 WAFER-MARK Connectors

The WAFER-MARK has the following connectors on-board:

- 1 x AT power connector
- 1 x ATX power supply enable connector
- 1 x Audio connector
- 1 x Audio CD in connector
- 1 x Backlight inverter connector
- 1 x Battery connector
- 1 x Compact Flash (CF) connector
- 1 x Fan connector
- 1 x FDD connector (optional)
- 1 x GPIO connector
- 1 x IDE Interface connector
- 1 x Infrared Interface connector

- 1 x Keyboard/Mouse connector
- 1 x LED connector
- 1 x Parallel port connector
- 1 x PC/104 slot
- 1 x PC/104 power connector
- 1 x Power button connector
- 1 x Reset button connector
- 2 x SATA connectors
- 1 x Serial port connector
- 1 x SO-DIMM socket
- 1 x TFT LCD LVDS connector
- 1 x TFT LCD TTL connector
- 1 x USB connector

The WAFER-MARK has the following connectors on the board rear panel:

- 2 x Ethernet connectors
- 2 x USB connectors
- 1 x Keyboard/Mouse connector (optional)
- 1 x Serial port connector
- 1 x VGA connector

The WAFER-MARK has the following on-board jumpers:

- Clear CMOS
- Serial port select
- COM1/2 Pin 9 Setting (optional)
- LCD voltage select

1.2.2 Technical Specifications

WAFER-MARK technical specifications are listed in **Table 1-2**. Detailed descriptions of each specification can be found in **Chapter 2**.

WAFER-MARK 3.5" Embedded SBC

Specification	WAFER-MARK
Form Factor	3.5" form factor
CPU	Embedded VIA Mark CoreFusion Low Voltage processor at 533MHz/800MHz
Southbridge	VIA VT82C686B
Display	VGA integrated in VIA Mark 24-bit TTL 18-bit dual channel LVDS
Memory	Supports one 512MB DDR PC100/133MHz 144-pin SO-DIMM SDRAM module
BIOS	Award BIOS
Super I/O	VT82C686B
SSD	One CompactFlash® (CF) Type II slot
Audio	AC'97 Codec Realtek ALC655
LAN	10/100 Base-T dual RTL8100C Ethernet chipsets
COM	Two RS-232 or One RS-232 and one RS-422/RS-485
USB2.0	Four USB 1.1 devices supported
IDE	One 44-pin IDE connects to two Ultra ATA33/66/100 devices
Watchdog Timer	Software programmable 1-255 sec. by supper I/O
Digital I/O	One GPIO connector
Expansion	One PC/104 slot
Power Supply	+5V only, AT/ATX power support
Temperature	0°C - 60°C

Humidity (operating)	5%~95% non-condensing
Dimensions	146mm x 102mm
Weight (GW/NW)	700g/260g

Table 1-2: Technical Specifications

Chapter

2

Detailed Specifications

2.1 Overview

This chapter describes the specifications and on-board features of the WAFER-MARK in detail.

2.2 Dimensions

2.2.1 Board Dimensions

The dimensions of the board are listed below:

- **Length:** 146mm
- **Width:** 102mm

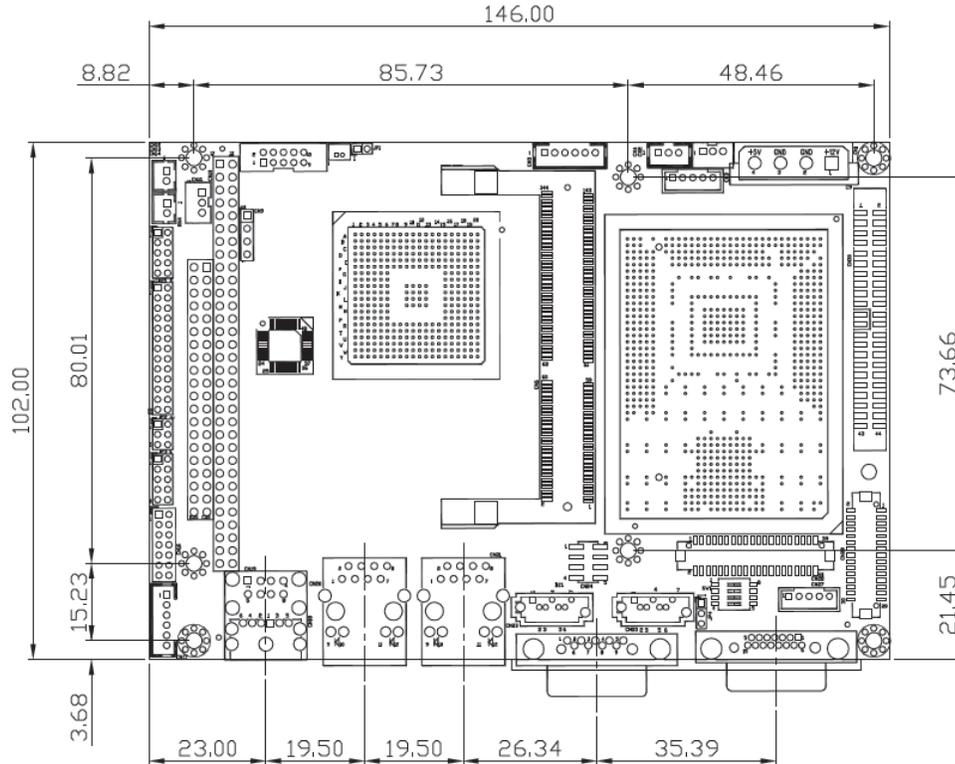


Figure 2-1: WAFER-MARK Dimensions (mm)

2.2.2 External Interface Panel Dimensions

External peripheral interface connector panel dimensions are shown in **Figure 2-2**.

WAFER-MARK 3.5" Embedded SBC

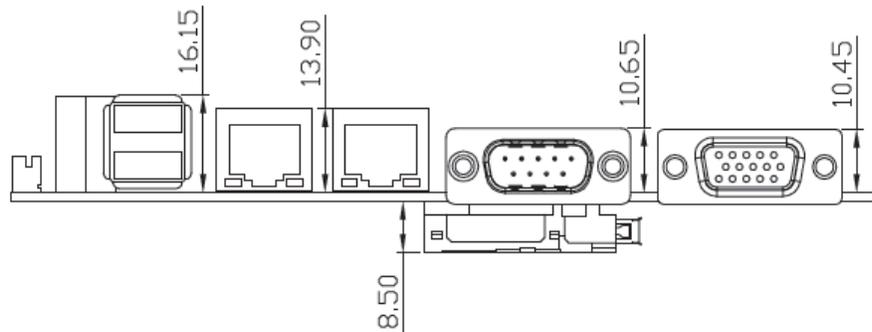


Figure 2-2: External Interface Panel Dimensions (mm)

2.3 Data Flow

The WAFER-MARK motherboard comes with a VIA Mark CPU and a VIA VT82C686B Southbridge. **Figure 2-3** shows the data flow between the system chipset, the CPU and other components installed on the motherboard.

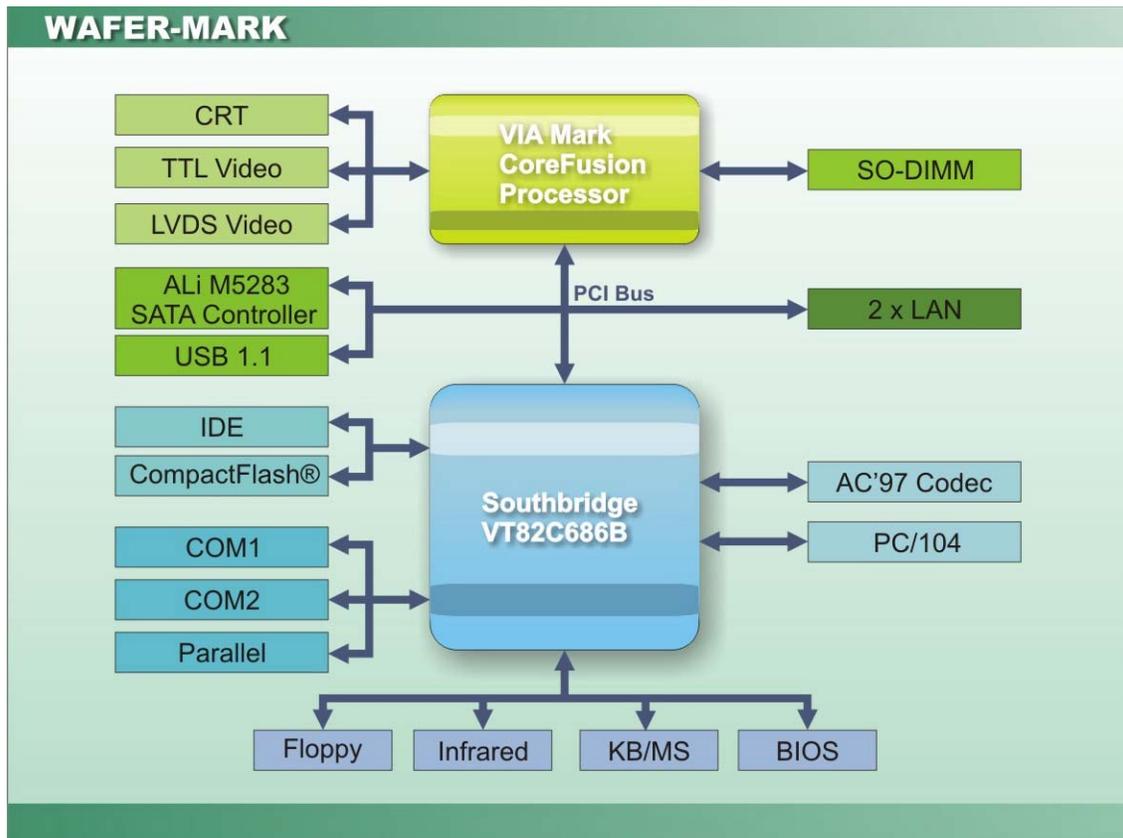


Figure 2-3: Data Flow Block Diagram

2.4 CPU Support

The WAFER-MARK series motherboards all come with a preinstalled 500MHz or 800MHz VIA Mark CPU.

2.4.1 VIA MARK Overview

The specifications for the VIA Mark CPU are listed below

- 533MHz or 800MHz CPU frequency
- 133MHz processor front side frequency
- 6W or 8W maximum thermal design power
- 0.13u process technology
- HSBGA design package
- MMX, SSE and 3DNow 3D instruction sets
- RNG and AES built in security features
- 133MHz SDR memory support
- S3 Graphics ProSavage4 integrated graphics
- Integrated LVDS transmitter
- Dual independent display supported
- ISA support

2.4.2 VIA MARK Memory Support

The VIA Mark CoreFusion processor supports a single PC100MHz or PC133MHz SDRAM SO-DIMM module with a maximum memory of 512MB.

2.4.3 VIA MARK Integration

The VIA Mark CoreFusion processor comes with rich x86 integration and combines the VIA 'Nehemiah' processor core architecture with a feature rich Northbridge in a single package. The VIA Mark CoreFusion processor offers full legacy support, advanced integrated graphics, a military-grade hardware security engine and unparalleled connectivity.

2.4.4 VIA MARK S3 Graphics ProSavage4 Graphics Core

The VIA Mark CoreFusion has the following graphics and display support.

- Integrated S3 Graphics ProSavage4 Graphics Core
 - Integrated with CPU with 2D/3D/Video controllers
 - Optimized Shared Memory Architecture (SMA)
 - Full internal AGP 4x performance
 - Significant internal architecture upgrades from original S3 ProSavage4 standalone product
 - 8/16/32MB frame buffer using system memory
 - Works with VIA VT82C686A/B PCI-to-ISA Southbridge for advanced power management.
- Dual independent display support
- An integrated LVDS/DVI transmitter
- A video capture port
- Display resolutions of up to 1600 x 1200 pixels.

2.4.5 VIA MARK VIA PadLock Security Engine

The VIA PadLock Security Engine embedded on the VIA Mark CoreFusion processor platform integrates an AES cipher engine and a quantum based random number generator to help protect stored and exchanged data. Please visit the VIA website for more information (<http://www.via.com.tw/en/initiatives/padlock/index.jsp>).

2.5 System Chipset

The WAFER-MARK series motherboards all have a preinstalled VIA VT82C686B chipset.

The system chipset features are listed below.

- Integrated AC'97 audio
- Integrated MC'97 modem
- Integrated Super I/O
- Hardware monitoring capabilities
- USB 1.1 controller

2.5.1 VIA VT82C686B ATA-6 Controller

The single WAFER-MARK IDE connector supports two ATA-6 HDDs. An ATA-6 (Ultra ATA/100) compliant IDE controller on the VIA VT82C686B has a maximum transfer rate of 100MB/s. ATA-6 includes advancements in error checking and ATA-6 drives are compatible with future interface additions.

The onboard ATA-6 controller is able to support the following IDE HDDs:

- **Ultra ATA/100**, with data transfer rates up to 100MB/s
- **Ultra ATA/66**, with data transfer rates up to 66MB/s
- **Ultra ATA/33**, with data transfer rates up to 33MB/s

Specification	Ultra ATA/100	Ultra ATA/66	Ultra ATA/33
IDE devices	2	2	2
PIO Mode	0 – 4	0 – 4	0 – 4
PIO Max Transfer Rate	16.6 MB/s	16.6 MB/s	16.6 MB/s
DMA/UDMA designation	UDMA 3 - 4	UDMA 3 – 4	UDMA 2
DMA/UDMA Max Transfer	100MB/s	66MB/s	33MB/s
Controller Interface	5V	5V	5V

Table 2-1: Supported HDD Specifications

2.5.2 VIA VT82C686B Flash Interface

The WAFER-MARK CompactFlash socket supports standard CF Type I and CF Type II cards. The chipset flash interface is multiplexed with an IDE interface and can be connected to an array of industry standard NAND Flash or NOR Flash devices.

2.5.3 VIA VT82C686B Audio Codec 97 (AC'97) Controller

The AC'97 specification v2.3 compliant controller on the chipset is interfaced to a 16-bit full-duplex AC'97 2.3 RealTek ALC655 codec. The ALC655 is then connected to a 10-pin audio connector to which an audio kit can easily be connected. The codec meets performance requirements for audio on PC99/2001 systems. Some of the codec features are listed below.

- Meets Microsoft WHQL/WLP 2.0 audio requirements
- 16-bit Stereo full-duplex CODEC with 48KHz sampling rate
- Complies with AC'97 2.3 specifications
 - Front-Out, Surround-Out, MIC-In and LINE-In Jack Sensing
 - 14.318MHz -> 24.576MHz PLL to eliminate crystal
 - 12.288MHz BITCLK input
 - Interrupt capability
- Three analog line-level stereo inputs with 5-bit volume control, LINE_IN, CD, AUX
- High-quality differential CD input
- Two analog line-level mono inputs: PCBEEP, PHONE-IN
- Two software selectable MIC inputs
- Dedicated Front-MIC input for front panel applications (software selectable)
- Boost preamplifier for MIC input
- LINE input shared with surround output; MIC input shared with Center and LFE output
- Built-in 50mW/20ohm amplifier for both Front-out and Surround-Out
- External Amplifier Power Down (EAPD) capability
- Power management and enhanced power saving features
- Supports Power-Off CD function
- Adjustable VREFOUT control
- Supports 48KHz S/PDIF output, complying with AC'97 Rev 2.3 specifications
- Supports 32K/44.1K/48KHz S/PDIF input
- Power support: Digital: 3.3V; Analog: 3.3V/5V
- Standard 48-pin LQFP package
- EAX™ 1.0 & 2.0 compatible
- Direct Sound 3D™ compatible

- A3D™ compatible
- I3DL2 compatible
- HRTF 3D positional audio
- Sensaura™ 3DPA enhancement (optional)
- 10-band software equalizer
- Voice cancellation and key shifting in Karaoke mode
- AVRack® Media Player
- Configuration Panel for improved user convenience

2.5.4 VIA VT82C686B USB Controller

Four internal USB ports on the WAFER-MARK board are interfaced via the PCI bus to the VIA VT82C686B chipset USB 1.1 controller. Four USB 1.1 devices can be connected simultaneously to the WAFER-MARK.

2.5.5 VIA VT82C686B Serial Communications

Two high-speed UART RS-232 serial port connectors, one internal and one external, are connected to the system chipset integrated Super I/O on the chipset. The specifications for the serial ports are listed below.

- 16C550 UART with 16-byte FIFO buffer
- 115.2Kbps transmission rate

2.5.6 VIA VT82C686B Infrared Interface

A single TX/RX infrared (IrDA) interface connector is connected to the system chipset integrated Super I/O on the chipset. The following the IrDA interfaces are supported.

- Serial Infrared (SIR)
- Shift Keyed Infrared (ASKIR)

2.5.7 VIA VT82C686B Parallel Port Communications

One internal parallel port connector on the WAFER-MARK board is connected to the VIA VT82C686B through the integrated Super I/O. The parallel port is bi-directional and supports the following parallel port modes:

- SPP
- EPP
- ECP

2.5.8 VIA VT82C686B Keyboard and Mouse

An internal keyboard/mouse connector and an external PS/2 keyboard connector are both connected to the VIA VT82C686B chipset through the integrated Super I/O. A PS/2 keyboard/mouse Y-cable is shipped with the WAFER-MARK and is connected to the internal keyboard/mouse connector. For more details refer to **Chapter 3** and **Chapter 5**.

2.5.9 VIA VT82C686B Real Time Clock

The system chipset has a battery backed up 256-byte real-time clock (RTC) with CMOS RAM.

2.5.10 BIOS

The BIOS flash memory chip on the WAFER-MARK has a licensed copy of AWARD BIOS loaded onto it. The BIOS flash memory chip is connected to the VIA VT82C686B system chipset. The flash BIOS features are listed below:

- SMIBIOS (DMI) compliant
- Console redirection function support
- PXE (Pre-Boot Execution Environment) support
- USB booting support

2.6 PCI Bus

2.6.1 Overview

The PCI bus provides a PCI interface between the VIA Mark and the VIA VT82C686B. The PCI bus also provides a communication interface between the USB connectors and the USB 1.1 controller on the VIA VT82C686B. The SATA drives and the single RJ-45 Ethernet connector are also interfaced to the VIA Mark and VIA VT82C686B through the PCI bus. Some of the features of the PCI bus are listed below:

- 33MHz Revision 2.3 is implemented
- Up to six external bus masters are supported
- Maximum throughput: 133MB/sec
- Master devices: Maximum of six with three implemented
- One PCI REQ/GNT pair can be given higher arbitration priority
- 44-bit addressing using the DAC protocol supported

2.6.2 10/100M Ethernet

A highly integrated and cost-effective single-chip, fast RealTek RTL8100C 10/100Mbps Ethernet controller is interfaced through first the PCI bus to the CPU and system chipset. The RealTek RTL8100C controller provides 10Mbps or 100Mbps Ethernet connectivity to the WAFER-MARK. Some of the features of the RealTek RTL8100C are listed below.

- 10Mbps and 100Mbps operation
- Supports 10Mbps and 100Mbps N-way auto-negotiation
- Supports 25MHz Crystal or 25MHz OSC as the internal clock source
- Complies with PC99/PC2001 standards
- Supports ACPI power management
- Provides PCI bus master data transfer
- Provides PCI memory space or I/O space mapped data transfer
- Supports PCI clock speed of 16.75MHz-40MHz
- Advanced power saving mode
- Supports Wake-on-LAN and remote wake-up
- Half/Full duplex capability

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- Supports Full Duplex Flow Control (IEEE 802.3x)
- Provides interface to 93C46 EEPROM to store resource configuration and ID parameters
- Provides PCI clock run pin
- Provides LED pins for network operation status indication
- 2.5/3.3V power supply with 5V tolerant I/Os

2.6.3 SATA Drive Controller

An ALi M5283 SATA drive controller is connected to two SATA drive connectors and interfaced to the system through the PCI bus. The ALi M5283 SATA drive controller has the following features:

- SATA specification revision 1.0 compliant
- PCI specification revision 2.2 compliant
- PCI Bus Power Management Specification revision 1.1 compliant
- Two independent channels to connect up to two SATA hard drive
- Up to 1.5Gb/s SATA data transfer rate
- Built-in 256 byte FIFO for each SATA port ensures fast read/write operations
- 32bit wide, 66MHz PCI bus supported

2.7 Environmental and Power Specifications

2.7.1 System Monitoring

The WAFER-MARK is capable of self-monitoring various aspects of its operating status including:

- Different component voltages including the CPU, chipset, and battery
- RPM of cooling fans
- CPU and system temperatures (by the corresponding embedded sensors)

2.7.2 Operating Temperature and Temperature Control

The maximum and minimum operating temperatures for the WAFER-MARK are listed below.

- Minimum Operating Temperature: 0°C (32°F)
- Maximum Operating Temperature: 60°C (140°F)

The system is shipped with a preinstalled heat sink. When running the system do not remove the heat sink. If the heat sink is changed, make sure thermal paste is placed on the bottom of the heat sink to facilitate improved heat convection from the CPU surface to the heat sink.

2.7.3 Power Consumption

Table 2-2 shows the power consumption parameters for a WAFER-MARK with a 533MHz CPU onboard and 800MHz CPU onboard.

CPU Speed	Onboard Memory	Voltage	Current
VIA MARK 800MHz	128MB PC133	+5V	2.75A
VIA MARK 533MHz	128MB PC133	+5V	2.58A

Table 2-2: Power Consumption

Chapter

3

Unpacking

3.1 Anti-static Precautions



WARNING:

Failure to take ESD precautions during the installation of the WAFER-MARK may result in permanent damage to the WAFER-MARK and severe injury to the user.

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the WAFER-MARK. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the WAFER-MARK, or any other electrical component is handled, the following anti-static precautions are strictly adhered to.

- **Wear an anti-static wristband:** Wearing a simple anti-static wristband can help to prevent ESD from damaging the board.
- **Self-grounding:** Before handling the board touch any grounded conducting material. During the time the board is handled, frequently touch any conducting materials that are connected to the ground.
- **Use an anti-static pad:** When configuring the WAFER-MARK, place it on an anti-static pad. This reduces the possibility of ESD damaging the WAFER-MARK.
- **Only handle the edges of the PCB:** When handling the PCB, hold the PCB by the edges.

3.2 Unpacking

3.2.1 Unpacking Precautions

When the WAFER-MARK is unpacked, please do the following:

- Follow the anti-static precautions outlined in **Section 3.1**.
- Make sure the packing box is facing upwards so the WAFER-MARK does not fall out of the box.
- Make sure all the components shown in **Section 3.3** are present.

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3.3 Unpacking Checklist



NOTE:

If some of the components listed in the checklist below are missing, please do not proceed with the installation. Contact the IEI reseller or vendor you purchased the WAFER-MARK from or contact an IEI sales representative directly. To contact an IEI sales representative, please send an email to sales@iei.com.tw.

3.3.1 Package Contents

The WAFER-MARK is shipped with the following components:

Quantity	Item	Image
1	WAFER-MARK single board computer	
1	Audio cable (P/N: 32000-072100-RS)	
1	IDE cable (P/N: 32200-000009-RS)	
1	Keyboard/Mouse Y cable (P/N: 32000-023800-RS)	
2	SATA cable (P/N: 32000-062800-RS)	
1	SATA power cable (P/N: 32100-088600-RS)	

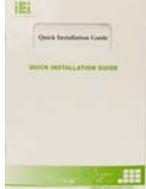
1	Dual ports serial port cable (P/N: 32200-026500-RS)	
1	Mini jumper Pack (P/N: 33100-000079-RS)	
1	Quick Installation Guide	
1	Utility CD	

Table 3-1: Package List Contents

3.3.2 Optional Components

The following optional components are available from IEI.

Item and Part Number	Image
ATX power adapter cable (P/N: 32100-052100)	
LPT cable (P/N: 32200-015100)	

Table 3-2: Optional Components

Chapter

4

Connector Pinouts

4.1 Peripheral Interface Connectors

Section 4.1.2 shows peripheral interface connector locations. Section 4.1.2 lists all the peripheral interface connectors seen in Section 4.1.2.

4.1.1 WAFER-MARK Layout

Figure 4-1 shows the on-board peripheral connectors, rear panel peripheral connectors and on-board jumpers.

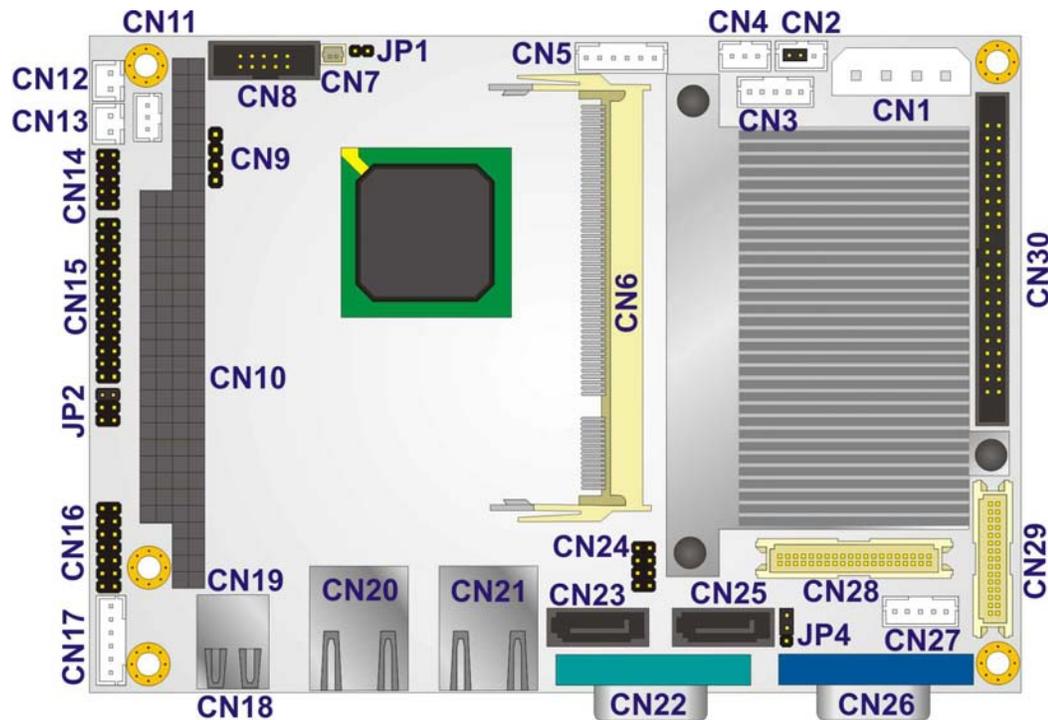


Figure 4-1: Connector and Jumper Locations

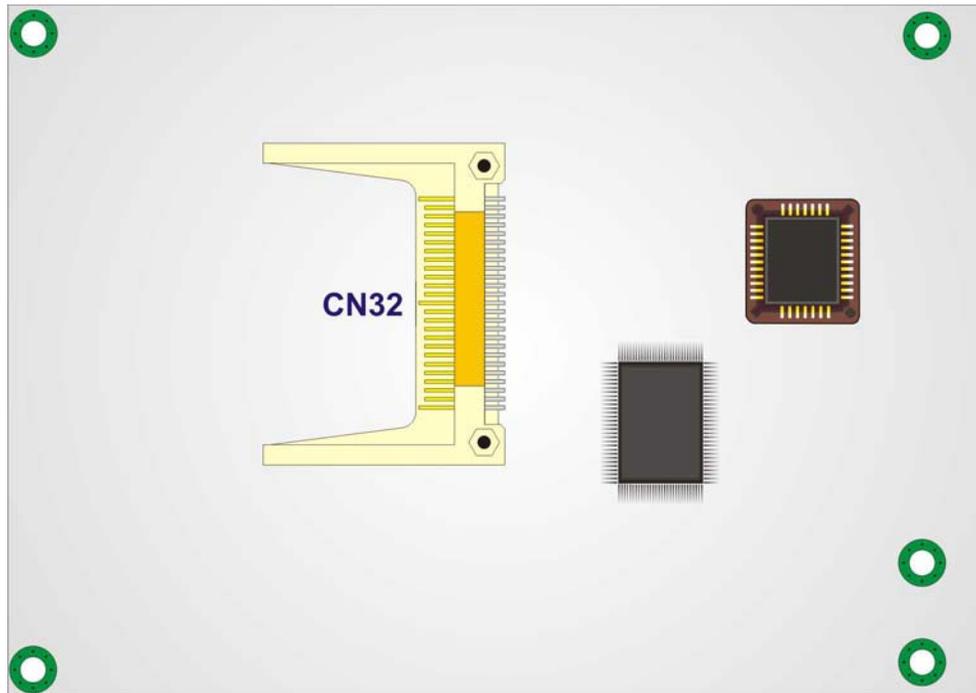


Figure 4-2: Connector and Jumper Locations (Solder Side)

4.1.2 Peripheral Interface Connectors

Table 4-1 shows a list of the peripheral interface connectors on the WAFER-MARK. Detailed descriptions of these connectors can be found below.

Connector	Type	Label
AT power connector	4-pin wafer connector	CN1
ATX power supply enable connector	3-pin wafer connector	CN2
Audio connector	10-pin box header	CN8
Audio CD in connector	4-pin header	CN9
Backlight inverter connector	5-pin wafer connector	CN3
Battery connector	2-pin wafer connector	CN7
Compact Flash (CF) connector	50-pin slot	CN32

Fan connector	3-pin wafer connector	CN4
FDD connector (optional)	26-pin connector	CN31
GPIO connector	10-pin header	CN14
IDE Interface connector	44-pin box header	CN30
Infrared Interface connector	5-pin wafer connector	CN27
Keyboard/Mouse connector	6-pin wafer connector	CN17
LED connector	6-pin wafer connector	CN5
Parallel port connector	26-pin header	CN15
PC/104 slot	104-pin slot	CN10
PC/104 power connector	3-pin wafer connector	CN11
Power button connector	2-pin wafer connector	CN13
Reset button connector	2-pin wafer connector	CN12
SATA connector	7-pin connector	CN23
SATA connector	7-pin connector	CN25
Serial port connector	14-pin header	CN16
SO-DIMM socket	144-pin socket	CN6
TFT LCD LVDS connector	30-pin crimp connector	CN29
TFT LCD TTL connector	40-pin crimp connector	CN28
USB connector	8-pin header	CN24

Table 4-1: Peripheral Interface Connectors

4.1.3 External Interface Panel Connectors

Table 4-2 lists the rear panel connectors on the WAFER-MARK. Detailed descriptions of these connectors can be found in **Section 4.3**.

Connector	Type	Label
Ethernet connector	RJ-45	CN20
Ethernet connector	RJ-45	CN21
Keyboard/Mouse connector	PS/2	CN18
RS-232 serial port connector	9-pin male	CN22
Dual port USB port	USB port	CN19
VGA port connector	15-pin female	CN26

Table 4-2: Rear Panel Connectors

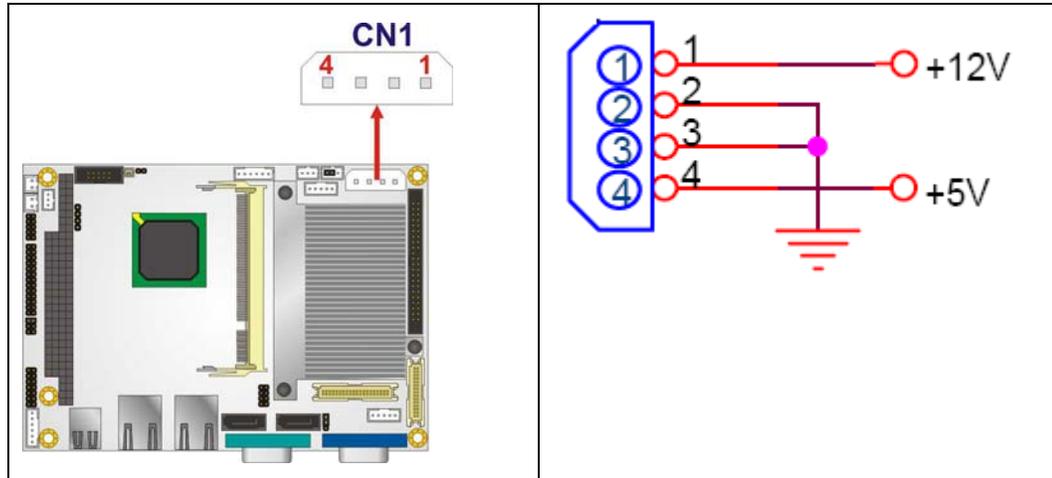
4.2 Internal Peripheral Connectors

Internal peripheral connectors are found on the motherboard and are only accessible when the motherboard is outside of the chassis. This section has complete descriptions of all the internal, peripheral connectors on the WAFER-MARK.

4.2.1 AT Power Connector

- CN Label:** CN1
- CN Type:** 4-pin AT power connector (1x4)
- CN Location:** See **Figure 4-3**
- CN Pinouts:** See **Table 4-3**

The 4-pin AT power connector is connected to an AT power supply.


Figure 4-3: AT Power Connector Location

PIN NO.	DESCRIPTION
1	+ 12V
2	GND
3	GND
4	+5V

Table 4-3: AT Power Connector Pinouts

4.2.2 ATX Power Supply Enable Connector

- CN Label:** CN2
- CN Type:** 3-pin wafer (1x3)
- CN Location:** See **Figure 4-4**
- CN Pinouts:** See **Table 4-4**

A jumper cap is installed on pin 1 and pin 2 as factory default (pin1=+5VSB; pin2=+5V). If the WAFER-MARK is connected to an AT power, let the jumper stay on pin 1 and pin 2. If connected to an ATX power source, remove the jumper cap.

If an ATX power supply is used, use an ATX-to-4P power cable to connect the AT power connector (CN1) and ATX power supply enable connector (CN2). Also connect a power

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on/off switch to the power button connector (CN13). Please refer to **Section 5.6.4** for more details. Note that the ATX power supply should provide a 10mA load on the 5V source standby lead for this function to take effect.

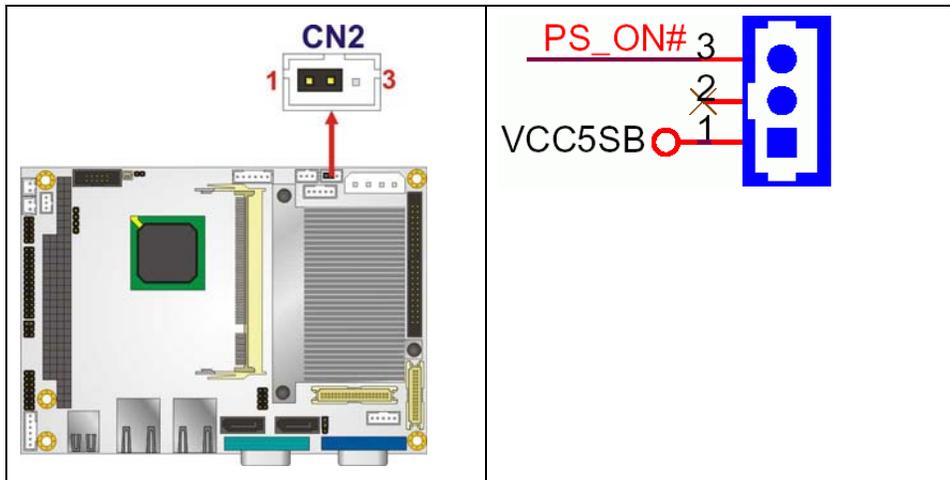


Figure 4-4: ATX Power Supply Enable Connector Location

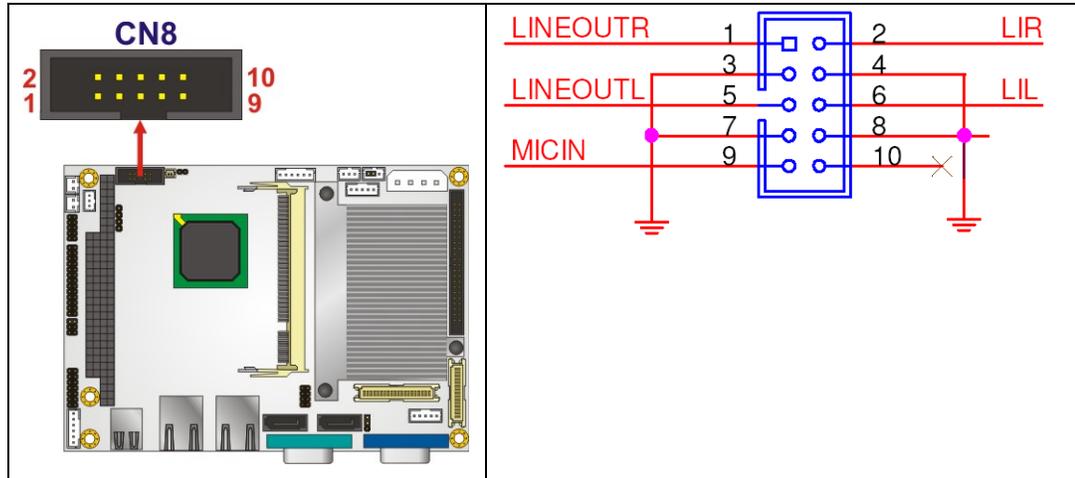
PIN NO.	DESCRIPTION
1	+5VSB
2	NC
3	PS-ON

Table 4-4: ATX Power Supply Enable Connector Pinouts

4.2.3 Audio Connector

- CN Label:** CN8
- CN Type:** 10-pin box header
- CN Location:** See **Figure 4-5**
- CN Pinouts:** See **Table 4-5**

The 10-pin audio connector is connected to external audio devices including speakers and microphones for the input and output of audio signals to and from the system.


Figure 4-5: Audio Connector Pinouts (10-pin)

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	Line out R	2	Line in R
3	GND	4	GND
5	Line out L	6	Line in L
7	GND	8	GND
9	MIC in	10	NC

Table 4-5: Audio Connector Pinouts (10-pin)

4.2.4 Audio CD In Connector

- CN Label:** CN9
- CN Type:** 4-pin header
- CN Location:** See **Figure 4-6**
- CN Pinouts:** See **Table 4-6**

The 4-pin audio CD in connector is connected to an external audio CD device for the input and output of audio signals from a CD player to the system.

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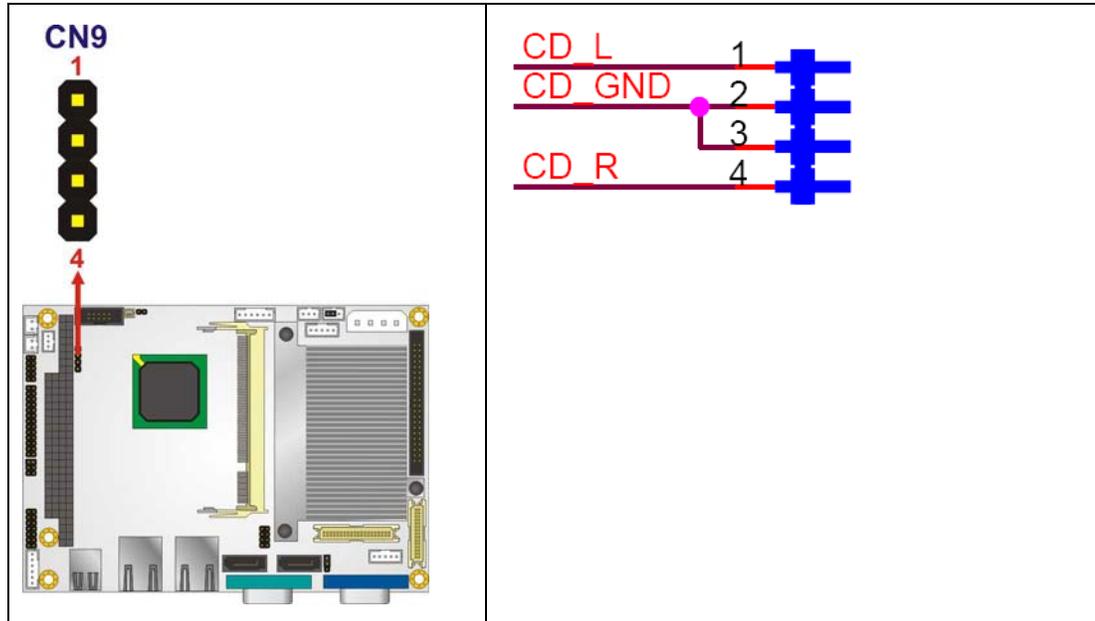


Figure 4-6: Audio CD In Connector Pinouts (4-pin)

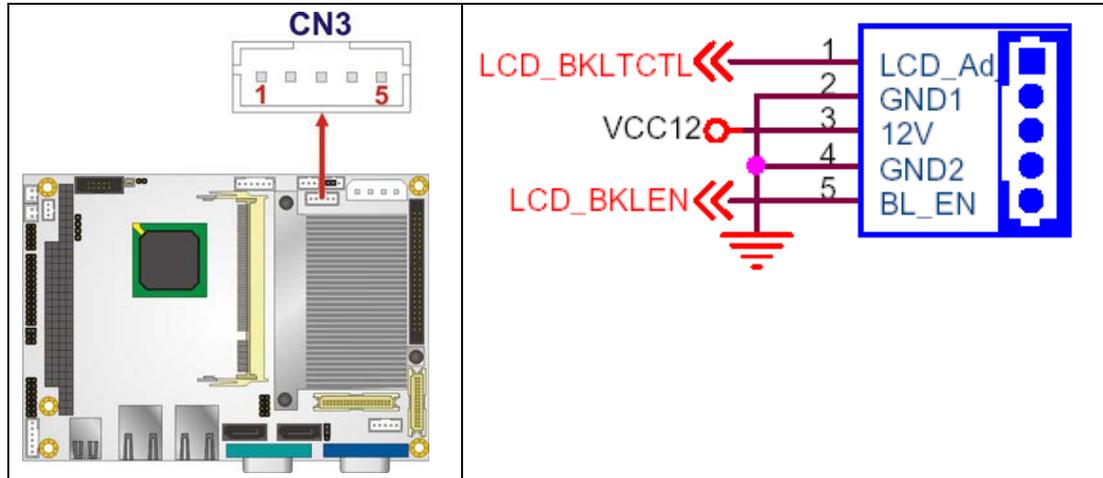
PIN NO.	DESCRIPTION
1	CD Signal (Left)
2	Ground
3	Ground
4	CD Signal (Right)

Table 4-6: Audio CD In Connector Pinouts

4.2.5 Backlight Inverter Connector

- CN Label:** CN3
- CN Type:** 5-pin wafer (1x5)
- CN Location:** See Figure 4-7
- CN Pinouts:** See Table 4-7

The backlight inverter connector provides the backlight on the LCD display connected to the WAFER-MARK with +12V of power.


Figure 4-7: Panel Backlight Connector Pinout Locations

PIN NO.	DESCRIPTION
1	LCD_Adj [GND (Fixed mode): Maximum Brightness]
2	GROUND
3	+12V
4	GROUND
5	BACKLIGHT ENABLE

Table 4-7: Panel Backlight Connector Pinouts

4.2.6 Battery Connector

- CN Label:** CN7
- CN Type:** 2-pin wafer (1x2)
- CN Location:** See **Figure 4-8**
- CN Pinouts:** See **Table 4-8**

The battery connector is connected to a backup battery. The battery connector is also used to reset the CMOS memory if the incorrect BIOS settings have been made and the system cannot boot up.

WAFER-MARK 3.5" Embedded SBC

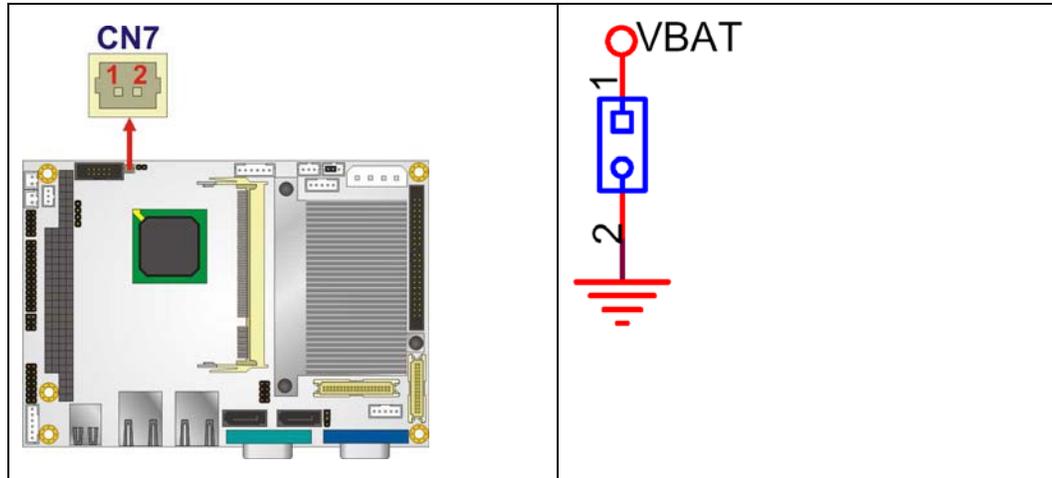


Figure 4-8: Battery Connector Location

PIN NO.	DESCRIPTION
1	Battery+
2	Ground

Table 4-8: Battery Connector Pinouts

4.2.7 Compact Flash Socket

CN Label: CN32 (solder side)

CN Type: 50-pin slot (2x25)

CN Location: See **Figure 4-9**

CN Pinouts: See **Table 4-9**

A CF Type I or Type II memory card is inserted to the CF socket on the solder side of the WAFER-MARK.

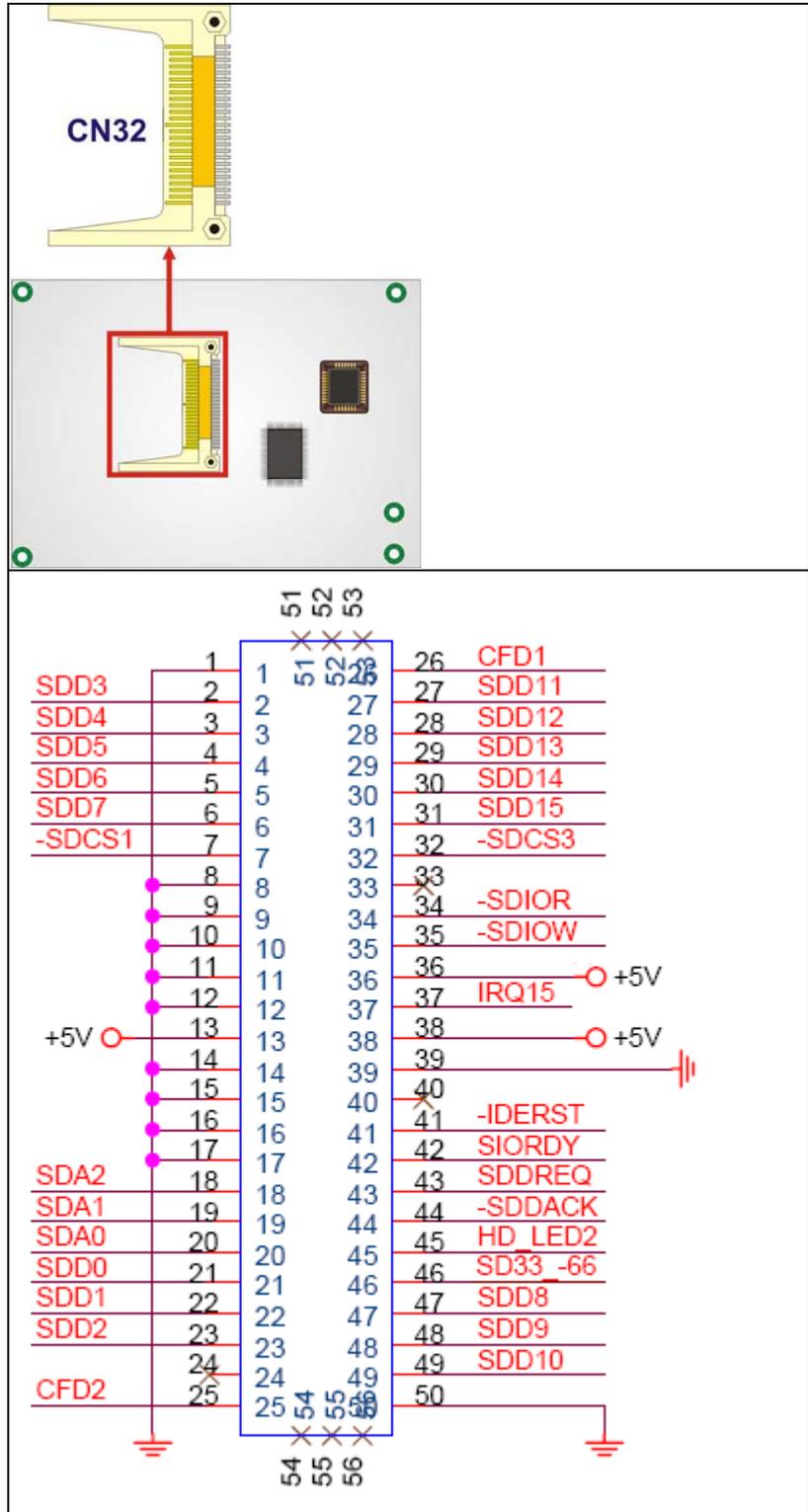


Figure 4-9: CF Card Socket Location

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PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GROUND	26	CFD2
2	SDD3	27	SDD11
3	SDD4	28	SDD12
4	SDD5	29	SDD13
5	SDD6	30	SDD14
6	SDD7	31	SDD15
7	SDCS1#	32	SDCS3#
8	GROUND	33	N/C
9	GROUND	34	SDIOR#
10	GROUND	35	SDIOW#
11	GROUND	36	VCC
12	GROUND	37	IRQ15
13	VCC	38	VCC
14	GROUND	39	MASTER/SLAVE
15	GROUND	40	N/C
16	GROUND	41	RESET#
17	GROUND	42	SIORDY
18	SDA2	43	SDDREQ
19	SDA1	44	SDDACK#
20	SDA0	45	HD_LED2
21	SDD0	46	PDIAG#
22	SDD1	47	SDD8
23	SDD2	48	SDD9
24	N/C	49	SDD10
25	CFD1	50	GROUND

Table 4-9: CF Card Socket Pinouts

4.2.8 Fan Connector

CN Label: CN4

CN Type: 3-pin wafer (1x3)

CN Location: See **Figure 4-10**

CN Pinouts: See **Table 4-10**

The cooling fan connector provides a 5V, 500mA current to a system cooling fan. The connector has a "rotation" pin to get rotation signals from fans and notify the system so the system BIOS can recognize the fan speed. Please note that only specified fans can issue the rotation signals.

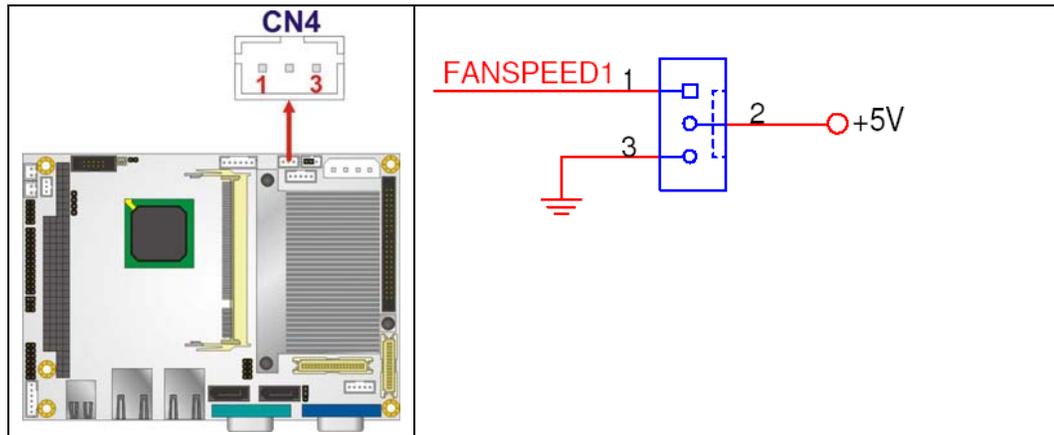


Figure 4-10: +5V Fan Connector Location

PIN NO.	DESCRIPTION
1	Rotation Signal
2	+5V
3	GND

Table 4-10: +5V Fan Connector Pinouts

4.2.9 Floppy Disk Connector (Optional)

CN Label: CN31 (solder side)

CN Type: 26-pin connector (1 x 26)

CN Location: See **Figure 4-11**

CN Pinouts: See **Table 4-11**

WAFER-MARK 3.5" Embedded SBC

The floppy disk connector is connected to a floppy disk drive.

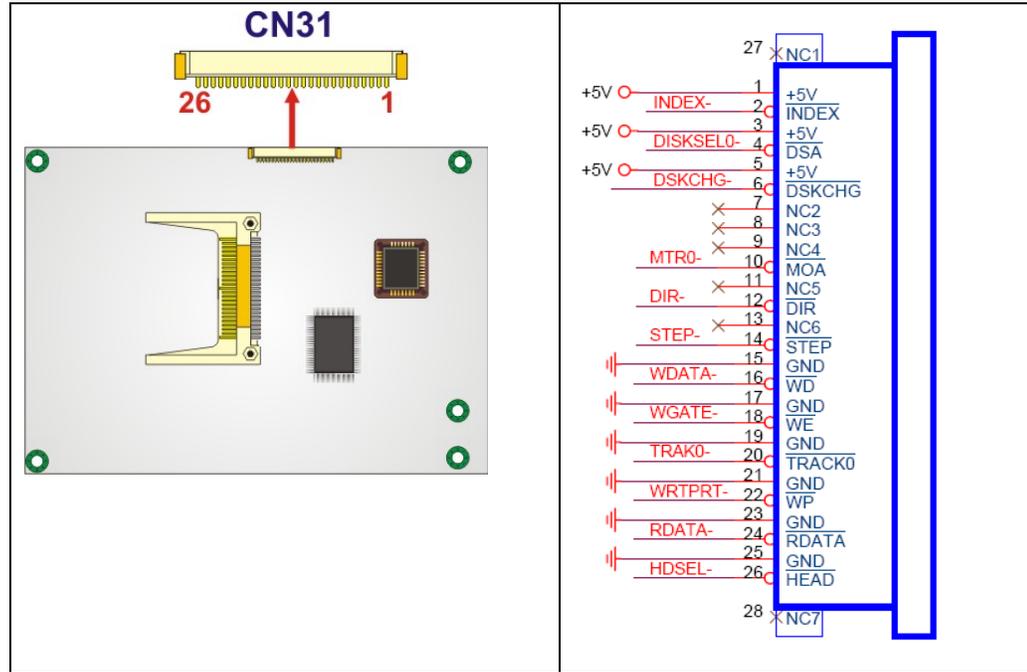


Figure 4-11: 26-Pin FDD Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	+5V	2	INDEX-
3	+5V	4	DISKSELO-
5	+5V	6	DSKCHG-
7	N/C	8	N/C
9	N/C	10	MTR0-
11	N/C	12	DIR-
13	N/C	14	STEP-
15	GROUND	16	WDATA-
17	GROUND	18	WGATE-
19	GROUND	20	TRAK0-
21	GROUND	22	WRTprt-
23	GROUND	24	RDATA-
25	GROUND	26	HDSEL-

Table 4-11: 26-pin FDD Connector Pinouts

4.2.10 GPIO Connector

- CN Label:** CN14
- CN Type:** 10-pin header (2x5)
- CN Location:** See **Figure 4-12**
- CN Pinouts:** See **Table 4-12**

The GPIO connector can be connected to external I/O control devices including sensors, lights, alarms and switches.

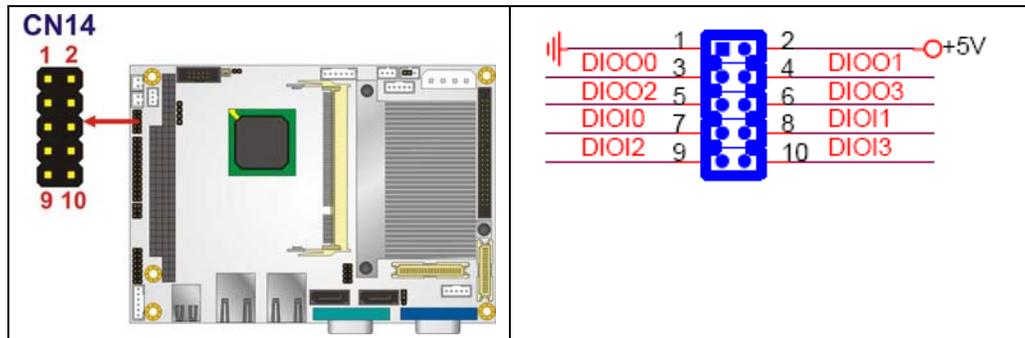


Figure 4-12: GPIO Connector Pinout Locations

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GROUND	2	+5V
3	OUTPUT1	4	OUTPUT2
5	OUTPUT3	6	OUTPUT4
7	INPUT1	8	INPUT2
9	INPUT3	10	INPUT4

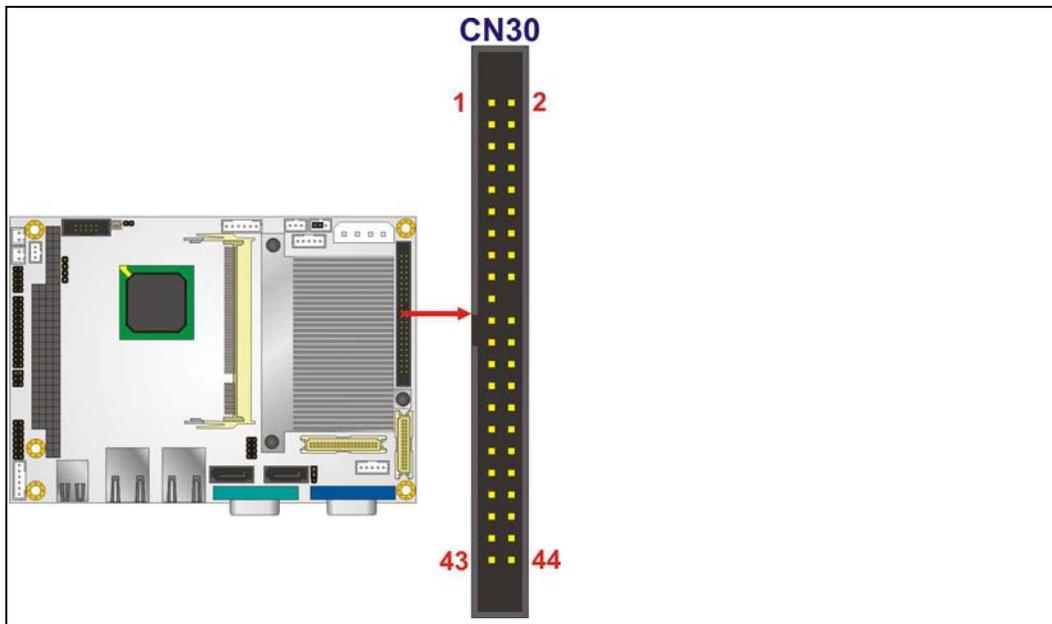
Table 4-12: GPIO Connector Pinouts

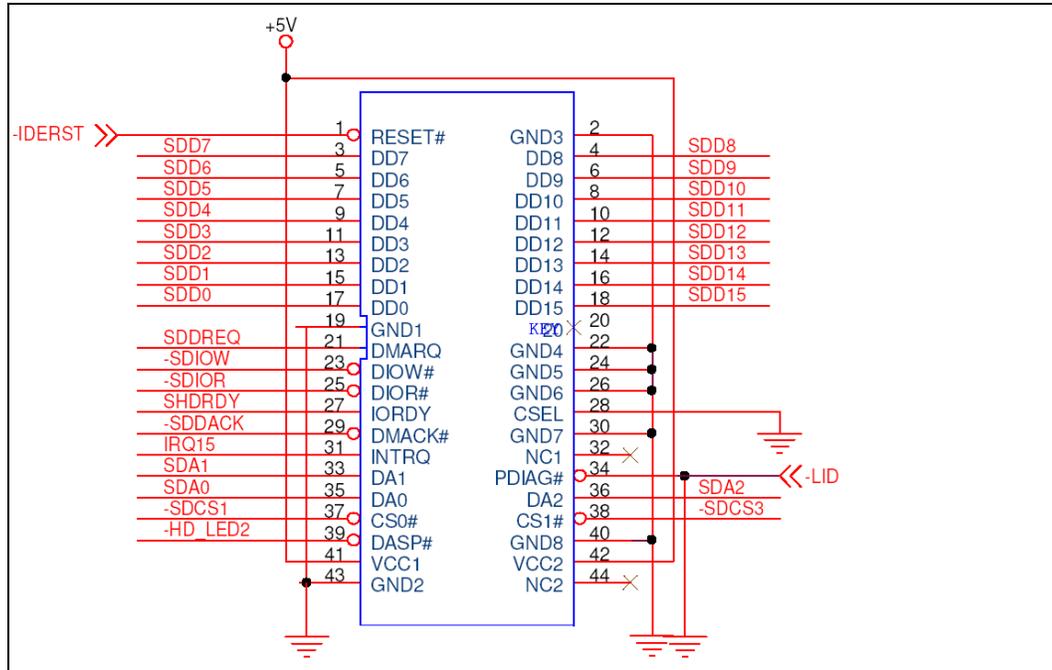
WAFER-MARK 3.5" Embedded SBC

4.2.11 IDE Connector

- CN Label:** CN30
- CN Type:** 44-pin box header (2x22)
- CN Location:** See **Figure 4-13**
- CN Pinouts:** See **Table 4-13**

One 44-pin IDE device connector on the WAFER-MARK supports connectivity to two hard disk drives.




Figure 4-13: Secondary IDE Device Connector Locations

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	DRQ	22	GROUND
23	IOW#	24	GROUND
25	IOR#	26	GROUND
27	CHRDY	28	(PULL LOW TO GND)
29	DACK#	30	GROUND
31	INTERRUPT	32	N/C

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33	SA1	34	N/C
35	SA0	36	SA2
37	HDC CS1#	38	HDC CS3#
39	HDD ACTIVE#	40	GROUND
41	VCC	42	VCC
43	GROUND	44	N/C

Table 4-13: Secondary IDE Connector Pinouts

4.2.12 Infrared Interface Connector

- CN Label:** CN27
- CN Type:** 5-pin wafer (1x5)
- CN Location:** See **Figure 4-14**
- CN Pinouts:** See **Table 4-14**

The infrared interface connector supports both Serial Infrared (SIR) and Amplitude Shift Key Infrared (ASKIR) interfaces.

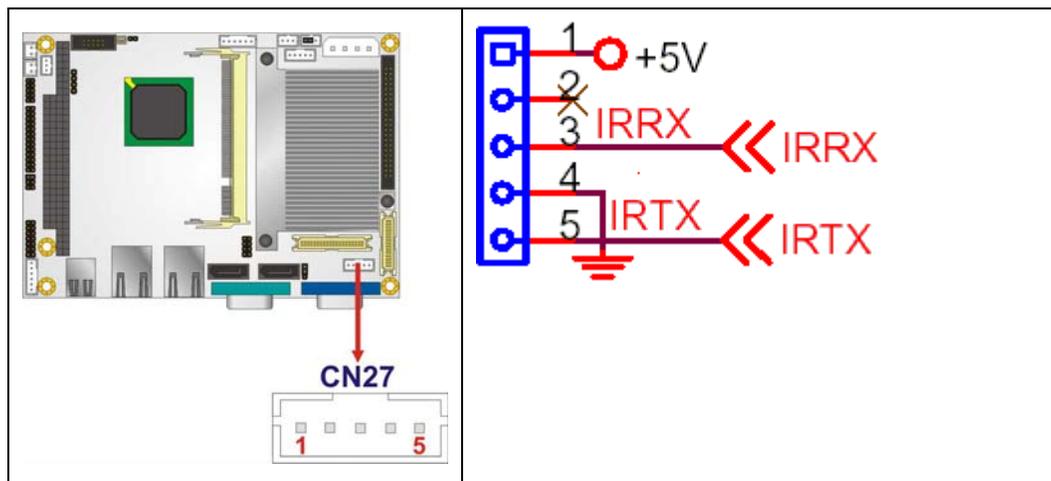


Figure 4-14: Infrared Connector Pinout Locations

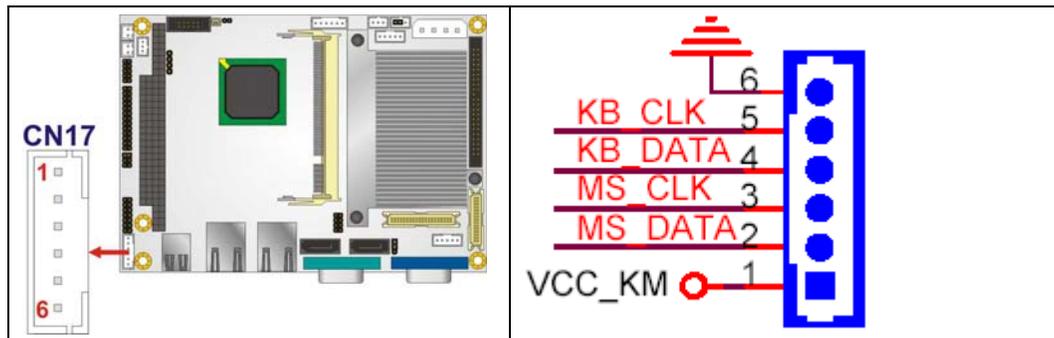
PIN NO.	DESCRIPTION
1	VCC
2	NC
3	IR-RX
4	GND
5	IR-TX

Table 4-14: Infrared Connector Pinouts

4.2.13 Keyboard/Mouse Connector

- CN Label:** CN17
- CN Type:** 6-pin wafer (1x6)
- CN Location:** See **Figure 4-15**
- CN Pinouts:** See **Table 4-15**

The keyboard and mouse connector can be connected to a standard PS/2 cable or PS/2 Y-cable to add keyboard and mouse functionality to the system.


Figure 4-15: Keyboard/Mouse Connector Location

PIN NO.	DESCRIPTION
1	+5V
2	MS DATA
3	MS CLK
4	KB DATA

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5	KB CLK
6	GROUND

Table 4-15: Keyboard/Mouse Connector Pinouts

4.2.14 LED Connector

CN Label: CN5

CN Type: 6-pin wafer (1x6)

CN Location: See Figure 4-16

CN Pinouts: See Table 4-16

The LED connector connects to an HDD indicator LED and a power LED on the system chassis to inform the user about HDD activity and the power on/off status of the system.

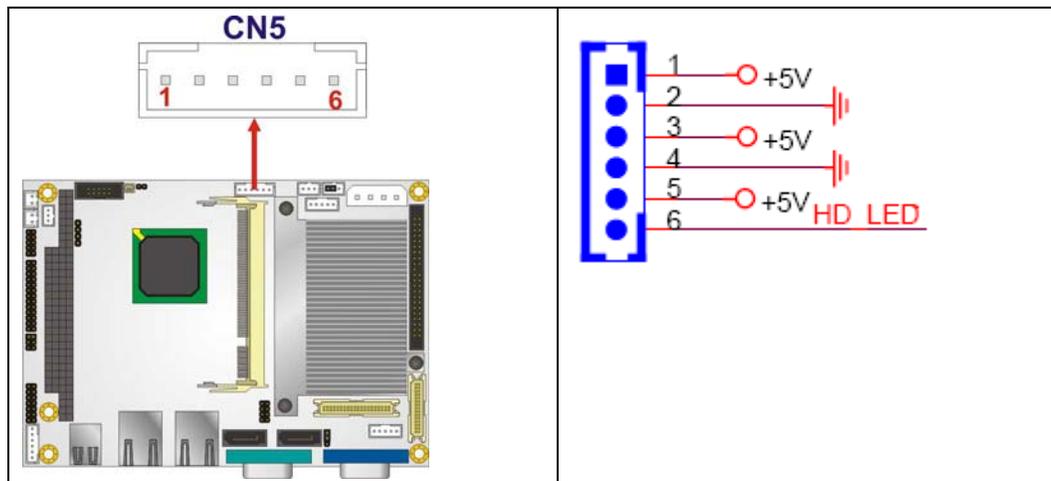


Figure 4-16: LED Connector Locations

PIN NO.	DESCRIPTION
1	+5V (VCC)
2	GROUND
3	LED+ (VCC)
4	LED- (GROUND)
5	IDE_LED+ (VCC)

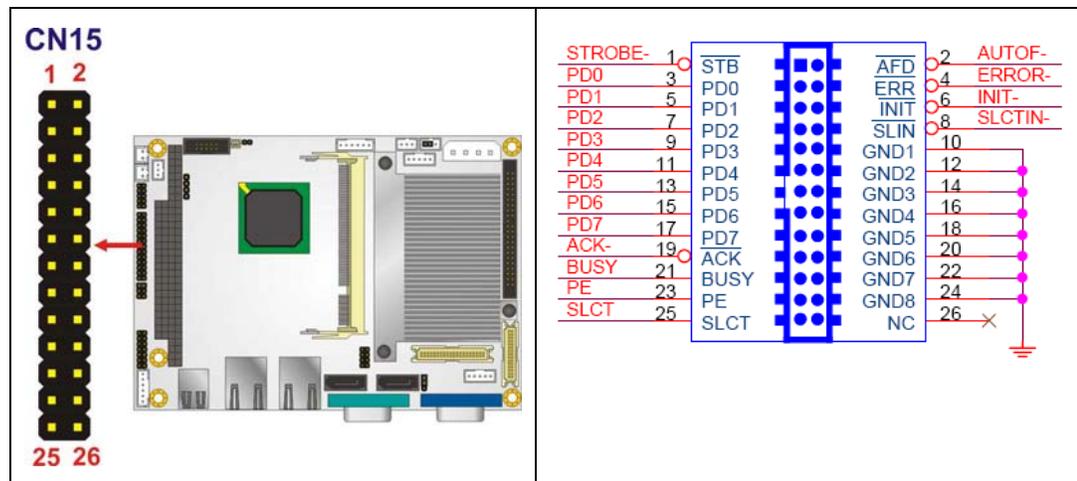
6	IDE _ LED-
---	------------

Table 4-16: LED Connector Pinouts

4.2.15 Parallel Port Connector

- CN Label:** CN15
- CN Type:** 26-pin header
- CN Location:** See **Figure 4-17**
- CN Pinouts:** See **Table 4-17**

The 26-pin parallel port connector connects to a parallel port connector interface or some other parallel port device such as a printer.


Figure 4-17: Parallel Port Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	STROBE#	2	AUTO FORM FEED #
3	DATA 0	4	ERROR#
5	DATA 1	6	INITIALIZE
7	DATA 2	8	PRINTER SELECT LN#
9	DATA 3	10	GROUND
11	DATA 4	12	GROUND

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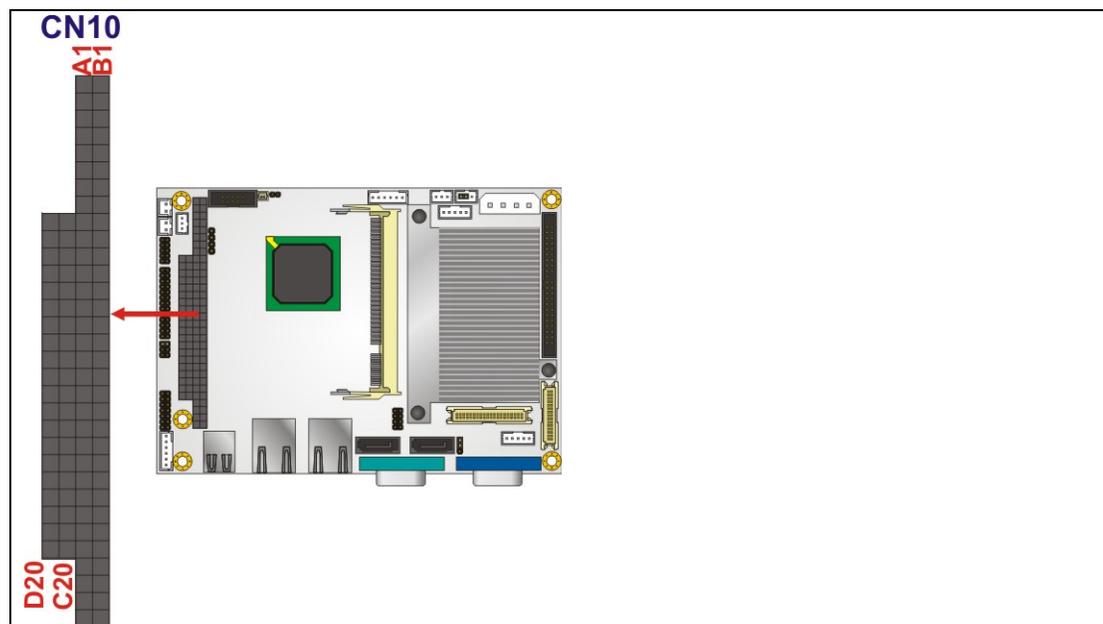
13	DATA 5	14	GROUND
15	DATA 6	16	GROUND
17	DATA 7	18	GROUND
19	ACKNOWLEDGE	20	GROUND
21	BUSY	22	GROUND
23	PAPER EMPTY	24	GROUND
25	PRINTER SELECT	26	N/C

Table 4-17: Parallel Port Connector Pinouts

4.2.16 PC/104 Slot

- CN Label:** CN10
- CN Type:** 104-pin PC/104 slot
- CN Location:** See **Figure 4-18**
- CN Pinouts:** See **Table 4-18**

The PC/104 slot enables a PC/104 compatible expansion module to be connected to the board.



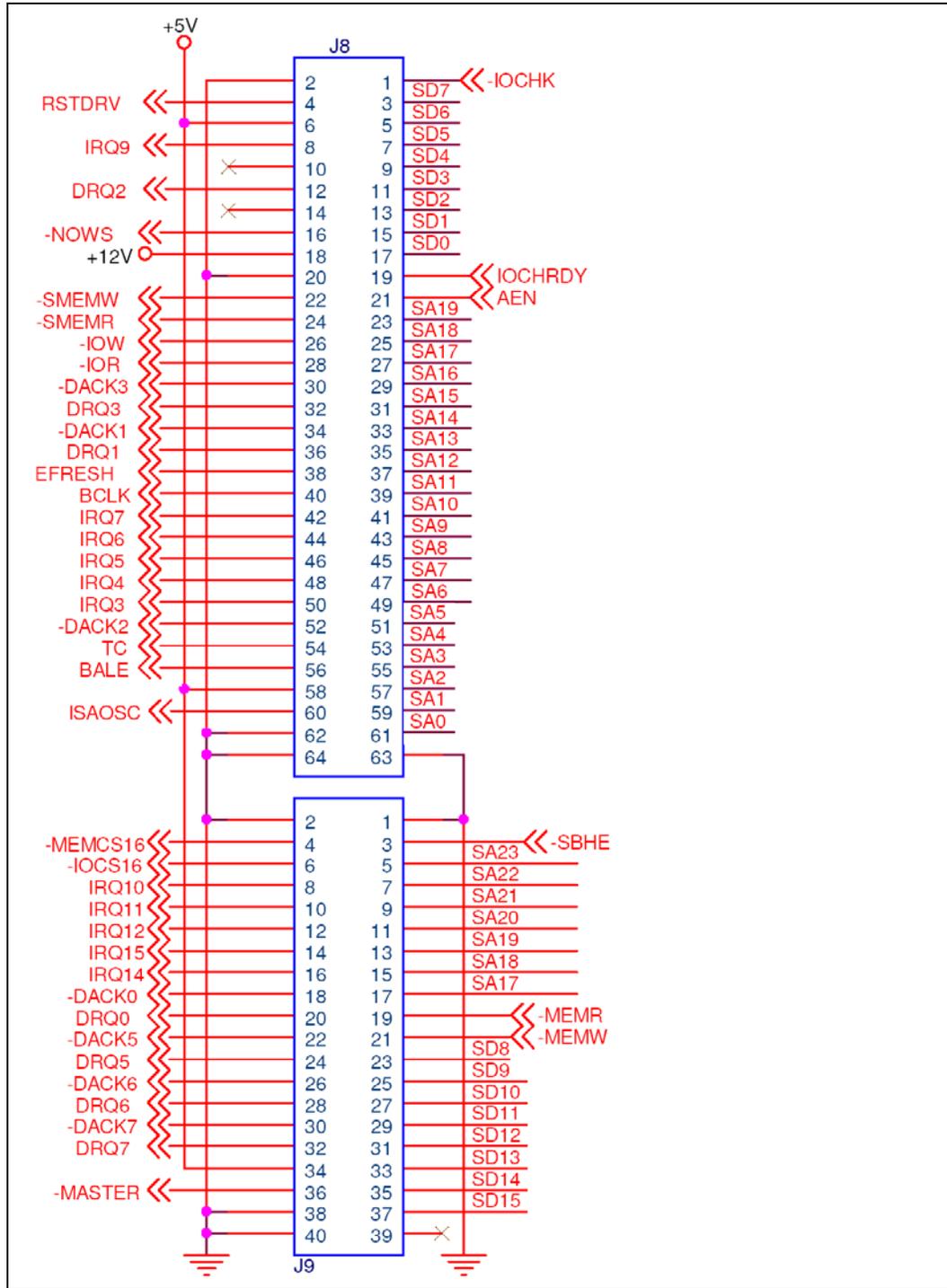


Figure 4-18: PC/104 Slot Location

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Pin No.	Column A	Column B	Column C	Column D
1	IOCHK-	GROUND	GROUND	GROUND
2	SD7	RSTDRV	SBHE-	MCS16-
3	SD6	+5V	SA23	IOCS16-
4	SD5	IRQ9	SA22	IRQ10
5	SD4	-5V	SA21	IRQ11
6	SD3	DREQ2	SA20	IRQ12
7	SD2	-12V	SA19	IRQ15
8	SD1	ZWS-	SA18	IRQ14
9	SD0	+12V	SA17	DACK0-
10	IOCHRDY	GROUND	MEMR-	DREQ0
11	AEN	SMEMW-	MEMW-	DACK5-
12	SA19	SMEMR-	SD8	DRREQ5
13	SA18	IOW-	SD9	DACK6-
14	SA17	IOR-	SD10	DREQ6
15	SA16	DACK3-	SD11	DACK7-
16	SA15	DREQ3	SD12	DREQ7
17	SA14	DACK1-	SD13	+5V
18	SA13	DREQ1	SD14	MASTER-
19	SA12	REFRESH-	SD15	GROUND
20	SA11	ISACLK	NC	GROUND
21	SA10	IRQ7		
22	SA9	IRQ6		
23	SA8	IRQ5		
24	SA7	IRQ4		
25	SA6	IRQ3		
26	SA5	DACK2-		
27	SA4	TC		
28	SA3	BALE		
29	SA2	+5V		

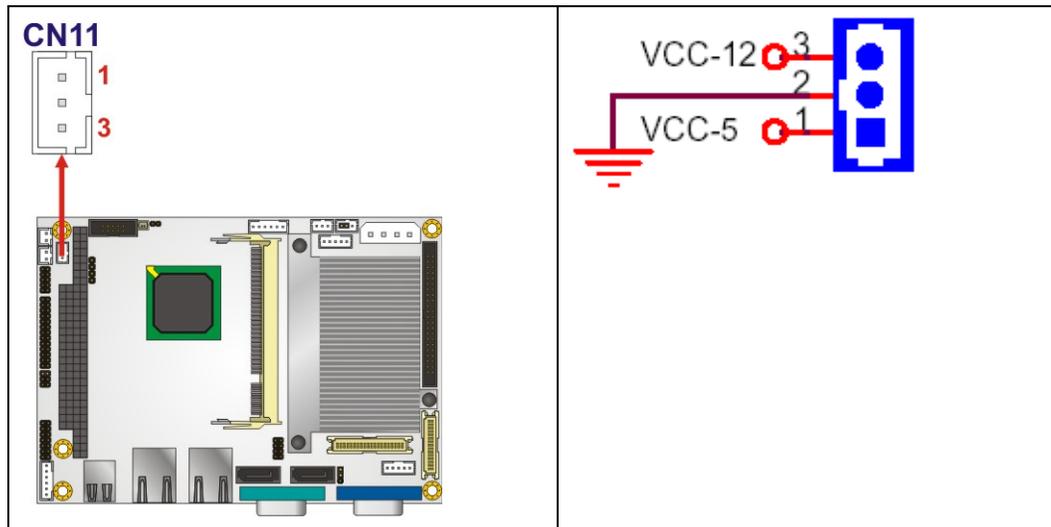
30	SA1	ISA_OSC		
31	SA0	GROUND		
32	GROUND	GROUND		

Table 4-18: PC/104 Slot Connector Pinouts

4.2.17 PC/104 Power Input Connector

- CN Label:** CN11
- CN Type:** 3-pin wafer (1x3)
- CN Location:** See **Figure 4-19**
- CN Pinouts:** See **Table 4-19**

The PC/104 power input connector provides power to the PC/104 expansion module installed on the PC/104 slot.


Figure 4-19: PC/104 Power Input Connector Pinouts

PIN NO.	DESCRIPTION
1	-5V
2	GND
3	-12V

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Table 4-19: PC/104 Power Input Connector Pinouts

4.2.18 Power Button Connector

CN Label:	CN13
CN Type:	2-pin wafer (1x2)
CN Location:	See Figure 4-20
CN Pinouts:	See Table 4-20

The power button connector is connected to a power switch on the system chassis to enable users to turn the system on and off.

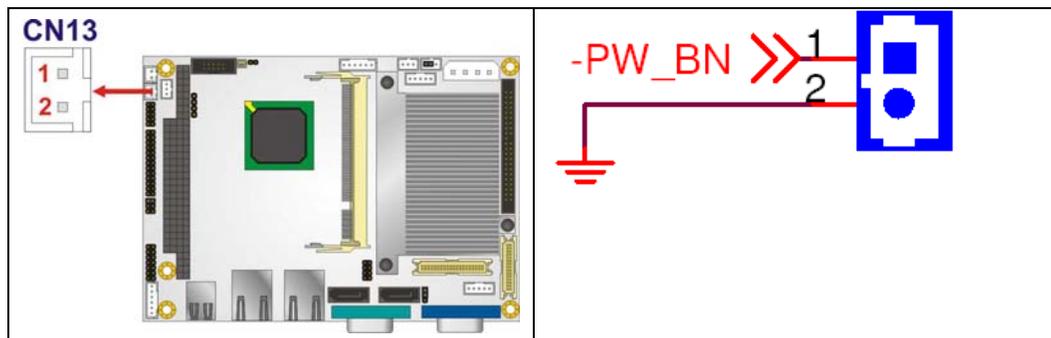


Figure 4-20: Power Button Connector Location

PIN NO.	DESCRIPTION
1	Power Button
2	GND

Table 4-20: Power Button Connector Pinouts

4.2.19 Reset Button Connector

CN Label:	CN12
CN Type:	2-pin wafer (1x2)
CN Location:	See Figure 4-21

CN Pinouts: See **Table 4-21**

The reset button connector is connected to a reset switch on the system chassis to enable users to reboot the system when the system is turned on.

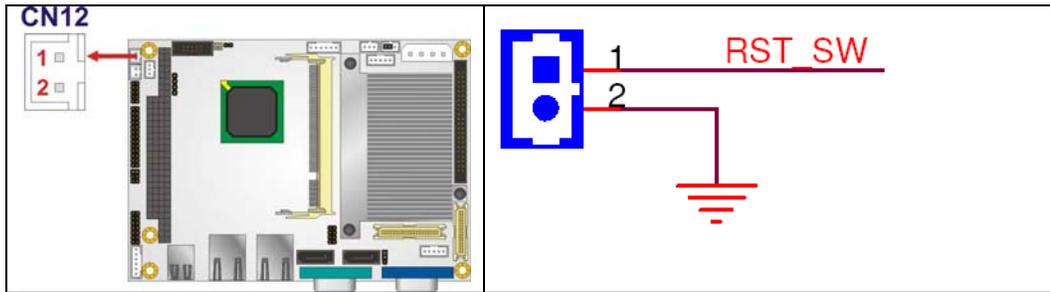


Figure 4-21: Reset Button Connector Locations

PIN NO.	DESCRIPTION
1	Reset Button
2	GND

Table 4-21: Reset Button Connector Pinouts

4.2.20 SATA Drive Connectors

CN Label: **CN23** and **CN25**

CN Type: 7-pin SATA drive connectors

CN Location: See **Figure 4-22**

CN Pinouts: See **Table 4-22**

The two SATA drive connectors are each connected to a first generation SATA drive. First generation SATA drives transfer data at speeds as high as 150Mb/s. The SATA drives can be configured in a RAID configuration.

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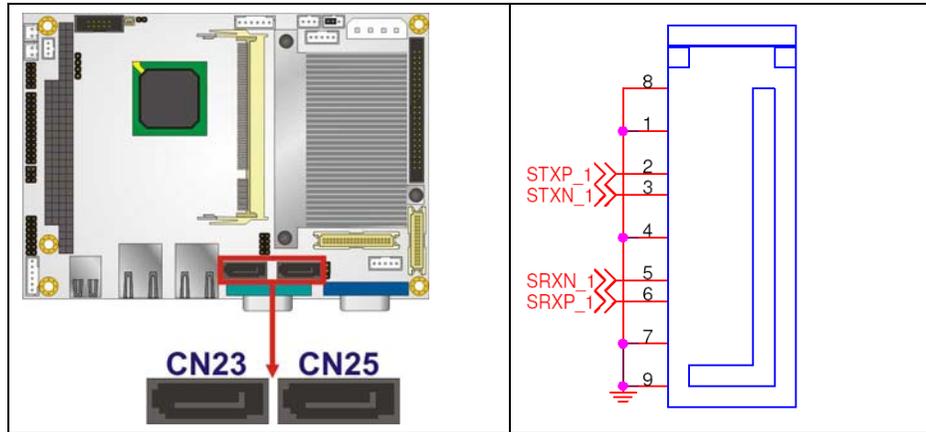


Figure 4-22: SATA Drive Connector Locations

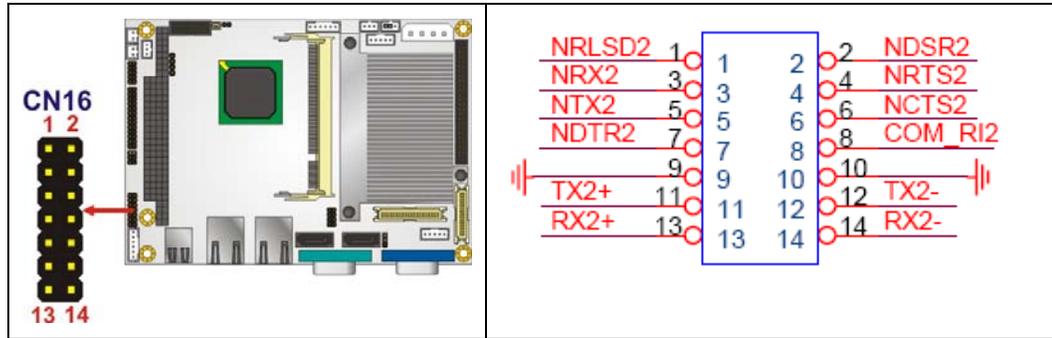
PIN NO.	DESCRIPTION
1	GND
2	TX+
3	TX-
4	GND
5	RX-
6	RX+
7	GND

Table 4-22: SATA Drive Connector Pinouts

4.2.21 Serial Port Connector (RS-422/485)

- CN Label:** CN16
- CN Type:** 14-pin header (2x20)
- CN Location:** See Figure 4-23
- CN Pinouts:** See Table 4-23

The 14-pin serial port connector connects to the COM 2 serial communications channels. COM 2 is a multi function channel. In default mode COM 2 is an RS-232 serial communication channel but, with the COM 2 function select jumper, can be configured as either an RS-422 or RS-485 serial communications channel.


Figure 4-23: Serial Port Connector Pinout Locations

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	DCD	2	DSR
3	RXD	4	RTS
5	TXD	6	CTS
7	DTR	8	RI
9	GND	10	GND
11	TX+	12	TX-
13	RX+	14	RX-

Table 4-23: Serial Port Connector Pinouts

4.2.22 TFT LCD LVDS Connector

CN Label: CN29

CN Type: 30-pin crimp (2x15)

CN Location: See **Figure 4-24**

CN Pinouts: See **Table 4-24**

The 30-pin TFT LCD LVDS can be connected to a TFT LCD screen directly.

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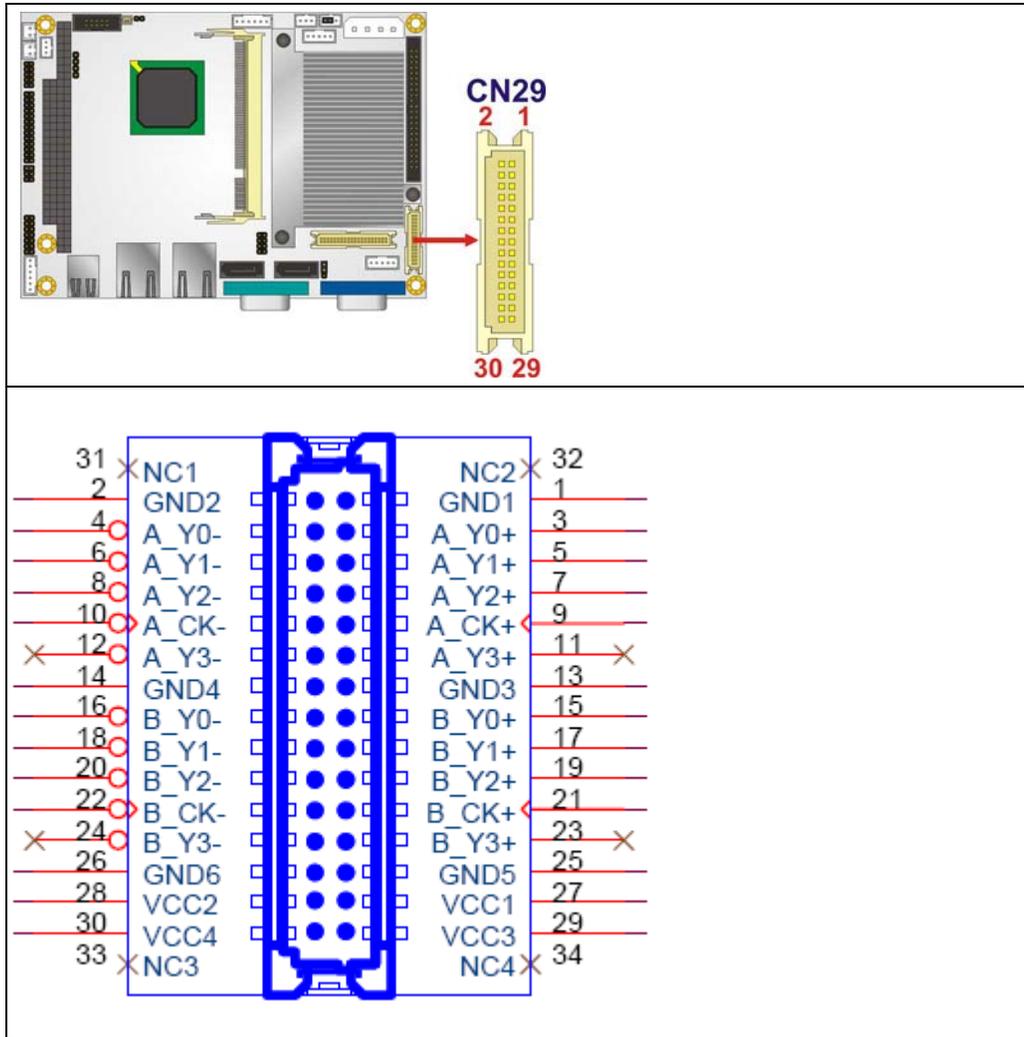


Figure 4-24: TFT LCD LVDS Connector Pinout Locations

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GROUND	2	GROUND
3	LVDSA_Y0+	4	LVDSA_Y0-
5	LVDSA_Y1+	6	LVDSA_Y1-
7	LVDSA_Y2+	8	LVDSA_Y2-
9	LVDSA_CLK+	10	LVDSA_CLK-
11	N/C	12	N/C
13	GROUND	14	GROUND
15	LVDSB_Y0+	16	LVDSB_Y0-
17	LVDSB_Y1+	18	LVDSB_Y1-

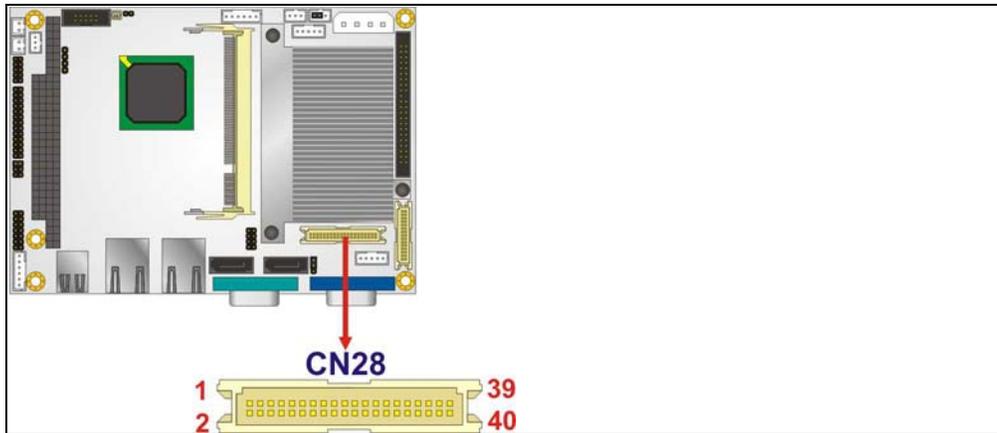
19	LVDSB_Y2+	20	LVDSB_Y2-
21	LVDSB_CLK+	22	LVDSB_CLK-
23	N/C	24	N/C
25	GROUND	26	GROUND
27	VCC_LVDS	28	VCC_LVDS
29	VCC_LVDS	30	VCC_LVDS

Table 4-24: TFT LCD LVDS Port Connector Pinouts

4.2.23 TFT LCD TTL Connector

- CN Label:** CN28
- CN Type:** 40-pin crimp (2x20)
- CN Location:** See **Figure 4-25**
- CN Pinouts:** See **Table 4-25**

The TFT LCD LVDS can be connected to a TFT LCD screen directly.



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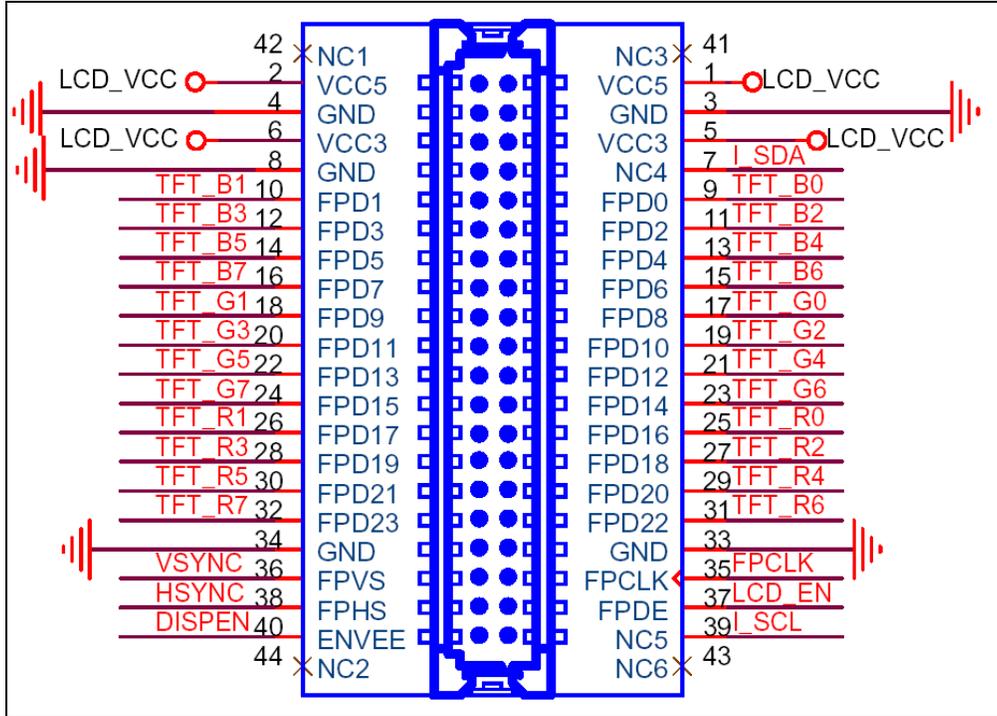


Figure 4-25: TFT LCD TTL Connector Pinout Locations

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	VCC_FP	2	VCC_FP
3	GROUND	4	GROUND
5	VCC_FP	6	VCC_FP
7	N/C	8	GROUND
9	B0	10	B1
11	B2	12	B3
13	B4	14	B5
15	B6	16	B7
17	G0	18	G1
19	G2	20	G3
21	G4	22	G5
23	G6	24	G7
25	R0	26	R1
26	R2	28	R3
29	R4	30	R5

31	R6	32	R7
33	GROUND	34	GROUND
35	FPCLK	36	FPVS
37	FPDE	38	FPHS
39	N/C	40	ENVEE

Table 4-25: TFT LCD TTL Port Connector Pinouts

4.2.24 USB Connector (Internal)

- CN Label:** CN24
- CN Type:** 8-pin header (2x4)
- CN Location:** See **Figure 4-26**
- CN Pinouts:** See **Table 4-26**

The 2x4 USB pin connectors each provide connectivity to two USB 1.1 ports. Each USB connector can support two USB devices. Additional external USB ports are found on the rear panel. The USB ports are used for I/O bus expansion.

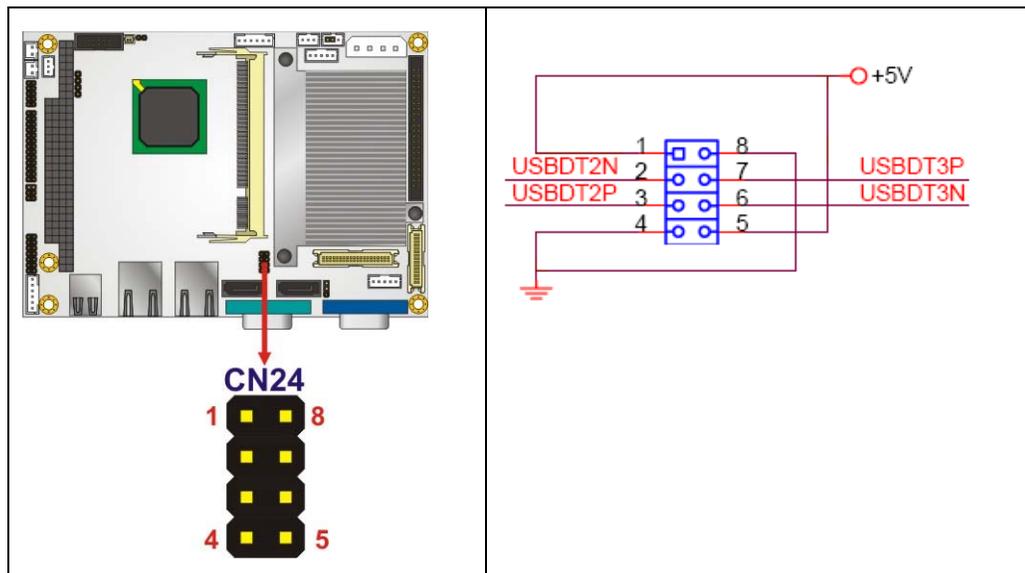


Figure 4-26: USB Connector Pinout Locations

WAFER-MARK 3.5" Embedded SBC

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	VCC	8	GROUND
2	DATA2-	7	DATA3+
3	DATA2+	6	DATA3-
4	GROUND	5	VCC

Table 4-26: USB Port Connector Pinouts

4.3 External Peripheral Interface Connectors

4.3.1 External Peripheral Interface Connector Overview

The WAFER-MARK external peripheral interface connectors are listed below and shown in **Figure 4-27**:

- 2 x RJ-45 Ethernet connectors
- 1 x Keyboard/Mouse connector
- 1 x Serial communications port
- 2 x USB ports
- 1 x VGA port

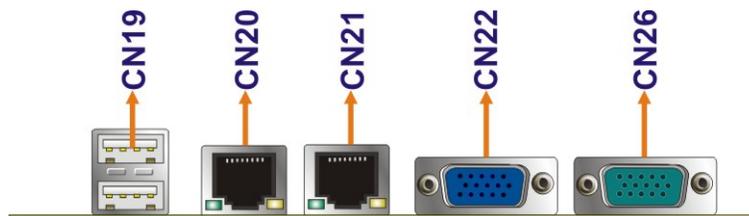


Figure 4-27: WAFER-MARK On-board External Interface Connectors

4.3.2 RJ-45 Ethernet Connector

- CN Label:** CN20, CN21
- CN Type:** RJ-45
- CN Location:** See **Figure 4-27**
- CN Pinouts:** See **Table 4-27**

The RJ-45 Ethernet connector on the WAFER-MARK provides connectivity to a 10/100 megabits Ethernet connection between the WAFER-MARK and a Local Area Network (LAN) through a network hub.

PIN	DESCRIPTION	PIN	DESCRIPTION
1	TX+	8	N/C
2	GROUND	9	ACT_LED-
3	TX-	10	ACT_LED+
4	RX+	11	LINK_LED -
5	GROUND	12	LINK_LED+
6	RX-	13	GROUND
7	N/C	14	GROUND

Table 4-27: RJ-45 Ethernet Connector Pinouts

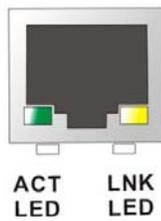


Figure 4-28: J7 Connector

The RJ-45 Ethernet connector has two status LEDs, one green and one yellow. The green LED indicates activity on the port and the yellow LED indicates the port is linked.

ACTIVITY LED		LINK LED	
Status	Description	Status	Description
GREEN	Activity	YELLOW	ON: Linked

Table 4-28: LAN Connector LEDs

4.3.3 Keyboard/Mouse Connector (Optional)

CN Label: CN18

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CN Type: PS/2

CN Pinouts: See **Figure 4-29** and **Table 4-29**

The WAFER-MARK keyboard and mouse connector is a standard PS/2 connector.

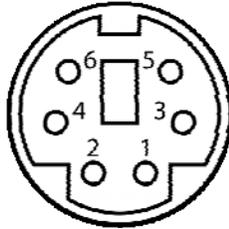


Figure 4-29: PS/2 Pinout and Configuration

PIN	DESCRIPTION
1	KB DATA
2	MS DATA
3	GND
4	+5V
5	KB CLOCK
6	MS CLOCK

Table 4-29: Keyboard Connector Pinouts

4.3.4 Serial Port Connector (COM 1)

CN Label: CN22

CN Type: DB-9 connector

CN Location: See **Figure 4-27**

CN Pinouts: See **Table 4-30** and **Figure 4-30**

The 9-pin DB-9 COM 1 serial port connector is connected to RS-232 serial communications devices.

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	DCD1	2	RXD1
3	TXD1	4	DTR1
5	GND	6	DSR1
7	RTS1	8	CTS1
9	COM_RI 1		

Table 4-30: RS-232 Serial Port (COM 1) Pinouts

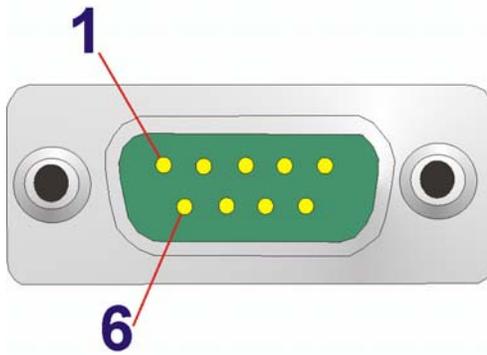


Figure 4-30: COM1 Pinout Locations

4.3.5 USB Combo Port

- CN Label:** CN19
- CN Type:** USB Combo port
- CN Location:** See **Figure 4-27**
- CN Pinouts:** See **Table 4-31**

The two USB combo ports provide connectivity to USB devices. The USB ports support USB 1.1.

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	VCC	5	VCC

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2	DATA0-	6	DATA1-
3	DATA0+	7	DATA1+
4	GROUND	8	GROUND

Table 4-31: USB Connector Pinouts

4.3.6 VGA Connector

CN Label: CN26

CN Type: DB15

CN Location: See **Figure 4-27**

CN Pinouts: See **Figure 4-31** and **Table 4-32**

The standard 15-pin female DB15 VGA connector connects to a CRT or LCD monitor directly.

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

Table 4-32: VGA Connector Pinouts

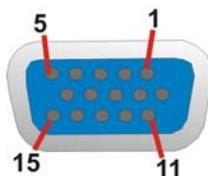


Figure 4-31: VGA Connector



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Chapter

5

Installation

5.1 Anti-static Precautions



WARNING:

Failure to take ESD precautions during the installation of the WAFER-MARK may result in permanent damage to the WAFER-MARK and severe injury to the user.

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the WAFER-MARK. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the WAFER-MARK, or any other electrical component is handled, the following anti-static precautions are strictly adhered to.

- ***Wear an anti-static wristband:*** Wearing a simple anti-static wristband can help to prevent ESD from damaging the board.
- ***Self-grounding:*** Before handling the board touch any grounded conducting material. During the time the board is handled, frequently touch any conducting materials that are connected to the ground.
- ***Use an anti-static pad:*** When configuring the WAFER-MARK, place it on an anti-static pad. This reduces the possibility of ESD damaging the WAFER-MARK.
- ***Only handle the edges of the PCB:*** When handling the PCB, hold the PCB by the edges.

5.2 Installation Considerations



NOTE:

The following installation notices and installation considerations should be read and understood before the WAFER-MARK is installed. All installation notices pertaining to the installation of the WAFER-MARK should be strictly adhered to. Failing to adhere to these precautions may lead to severe damage of the WAFER-MARK and injury to the person installing the motherboard.

5.2.1 Installation Notices



WARNING:

The installation instructions described in this manual should be carefully followed in order to prevent damage to the WAFER-MARK, WAFER-MARK components and injury to the user.

Before and during the installation please DO the following:

- **Read the user manual:**
 - The user manual provides a complete description of the WAFER-MARK installation instructions and configuration options.
- **Wear an electrostatic discharge cuff (ESD):**
 - Electronic components are easily damaged by ESD. Wearing an ESD cuff removes ESD from the body and helps prevent ESD damage.
- **Place the WAFER-MARK on an antistatic pad:**
 - When installing or configuring the motherboard, place it on an antistatic pad. This helps to prevent potential ESD damage.
- **Turn all power to the WAFER-MARK off:**

- When working with the WAFER-MARK, make sure that it is disconnected from all power supplies and that no electricity is being fed into the system.

Before and during the installation of the WAFER-MARK DO NOT:

- Remove any of the stickers on the PCB board. These stickers are required for warranty validation.
- Use the product before verifying all the cables and power connectors are properly connected.
- Allow screws to come in contact with the PCB circuit, connector pins, or its components.

5.2.2 Installation Checklist

The following checklist is provided to ensure the WAFER-MARK is properly installed.

- All the items in the packing list are present (see **Chapter 4**)
- A compatible memory module is properly inserted into the slot (see **Chapter 2**)
- The CF Type I or CF Type II card is properly installed into the CF socket
- The jumpers have been properly configured
- The WAFER-MARK is installed into a chassis with adequate ventilation
- The correct power supply is being used
- The following devices are properly connected
 - Audio cable
 - Power supply
 - Serial port cables
 - SATA drives
 - Keyboard/Mouse cable
- The following external peripheral devices are properly connected to the chassis:
 - LAN device
 - VGA screen
 - RS-232 serial communications device
 - USB devices

5.3 SO-DIMM Installation and CF Card Installation

5.3.1 SO-DIMM Installation



WARNING:

Using an incorrectly specified SO-DIMM may cause permanent damage to the WAFER-MARK. Please make sure the purchased SO-DIMM complies with the memory specifications of the WAFER-MARK. SO-DIMM specifications compliant with the WAFER-MARK are listed in **Chapter 2**.

To install a SO-DIMM into a SO-DIMM socket, please follow the steps below and refer **Figure 5-1**.

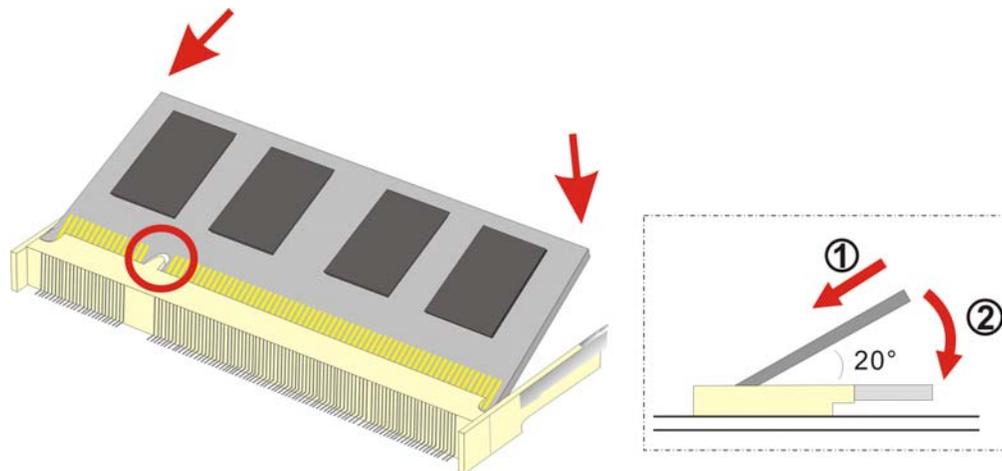


Figure 5-1: SO-DIMM Installation

Step 1: **Locate the SO-DIMM socket.** Place the WAFER-MARK on an anti-static pad with the solder side facing up.

Step 2: **Align the SO-DIMM with the socket.** The SO-DIMM must be oriented in such a way that the notch in the middle of the SO-DIMM must be aligned with the plastic bridge in the socket.

- Step 3: Insert the SO-DIMM.** Push the SO-DIMM chip into the socket at an angle. (See **Figure 5-1**)
- Step 4: Open the SO-DIMM socket arms.** Gently pull the arms of the SO-DIMM socket out and push the rear of the SO-DIMM down. (See **Figure 5-1**)
- Step 5: Secure the SO-DIMM.** Release the arms on the SO-DIMM socket. They clip into place and secure the SO-DIMM in the socket.

5.3.2 CF Card Installation



NOTE:

The WAFER-MARK can support both CF Type I cards and CF Type II cards. For the complete specifications of the supported CF cards please refer to **Chapter 2**.

To install the a CF card (Type 1 or Type 2) onto the WAFER-MARK, please follow the steps below:

- Step 1: Locate the CF card socket.** Place the WAFER-MARK on an anti-static pad with the solder side facing up. Locate the CF card.
- Step 2: Align the CF card.** Make sure the CF card is properly aligned with the CF socket.
- Step 3: Insert the CF card.** Gently insert the CF card into the socket making sure the socket pins are properly inserted into the socket. See **Figure 5-2**.

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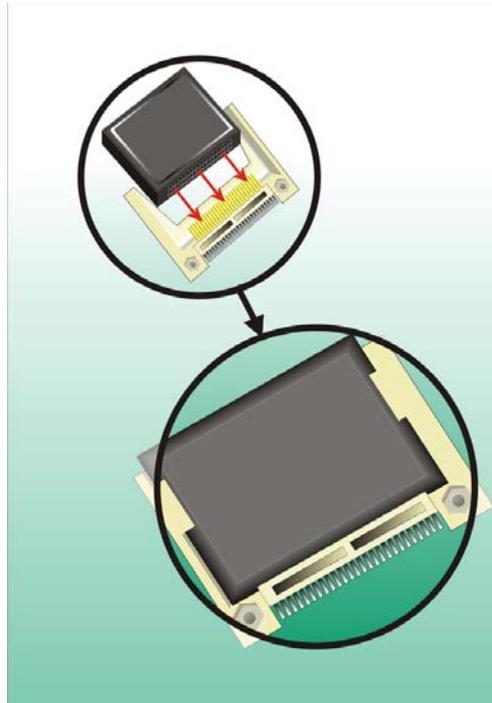


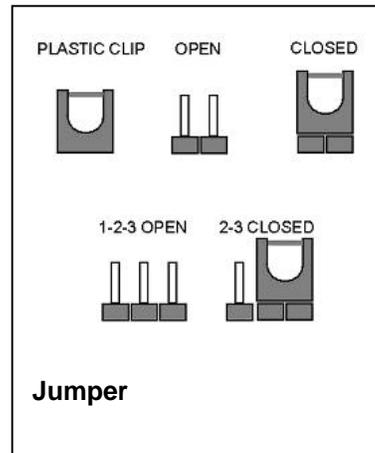
Figure 5-2: CF Card Installation

5.4 Jumper Settings



NOTE:

A jumper is a metal bridge that is used to close an electrical circuit. It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To CLOSE/SHORT a jumper means connecting the pins of the jumper with the plastic clip and to OPEN a jumper means removing the plastic clip from a jumper.



Before the WAFER-MARK is installed in the system, the jumpers must be set in accordance with the desired configuration. The jumpers on the WAFER-MARK are listed in **Table 5-1**.

Description	Label	Type
Clear CMOS	JP1	2-pin header
Serial port select	JP2	6-pin header
COM1/2 Pin 9 Setting (optional)	JP3	5-pin header
LCD voltage select	JP4	3-pin header

Table 5-1: Jumpers

5.4.1 Clear CMOS Jumper

Jumper Label:	JP1
Jumper Type:	2-pin header
Jumper Settings:	See Table 5-2
Jumper Location:	See Figure 5-3

If the WAFER-MARK fails to boot due to improper BIOS settings, the CMOS can be cleared using the battery connector. Disconnect the battery from the connector for a few seconds then reconnect the battery. The CMOS should be cleared.

If the “CMOS Settings Wrong” message is displayed during the boot up process, the fault may be corrected by pressing the F1 to enter the CMOS Setup menu. Do one of the following:

- Enter the correct CMOS setting
- Load Optimal Defaults
- Load Failsafe Defaults.

After having done one of the above, save the changes and exit the CMOS Setup menu.

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The clear CMOS jumper settings are shown in **Table 5-2**.

Clear CMOS	Description	
Open	Keep CMOS Setup	Default
Short	Clear CMOS Setup	

Table 5-2: Clear CMOS Jumper Settings

The location of the clear CMOS jumper is shown in **Figure 5-3** below.

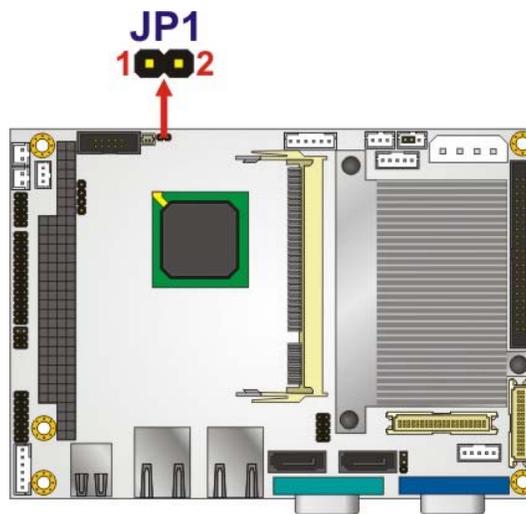


Figure 5-3: Clear CMOS Jumper

5.4.2 COM 2 Function Select Jumper

Jumper Label:	JP2
Jumper Type:	6-pin header
Jumper Settings:	See Table 5-3
Jumper Location:	See Figure 5-4

The COM 2 Function Select jumper sets the communication protocol used by the second serial communications port (COM 2) as RS-232, RS-422 or RS-485. The COM 2 Function Select settings are shown in **Table 5-3**.

COM 2 Function Select	Description	
Short 1-2	RS-232	Default
Short 3-4	RS-422	
Short 5-6	RS-485	

Table 5-3: COM 2 Function Select Jumper Settings

The COM 2 Function Select jumper location is shown in **Figure 5-4**.

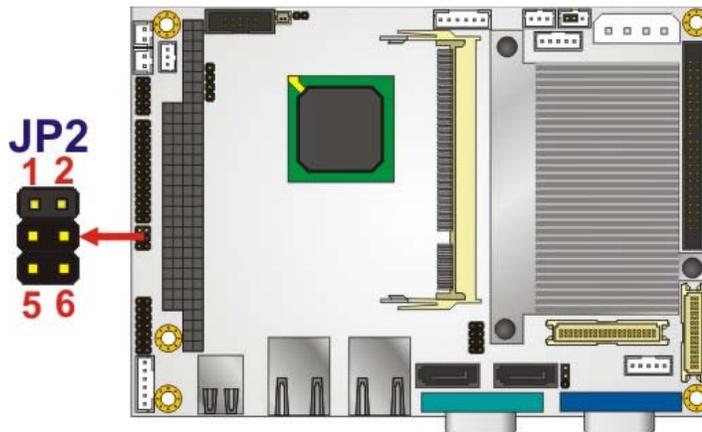


Figure 5-4: COM 2 Function Select Jumper Location

5.4.3 LCD Voltage Selection



WARNING:

Permanent damage to the screen and WAFER-MARK may occur if the wrong voltage is selected with this jumper. Please refer to the user guide that came with the monitor to select the correct voltage.

- Jumper Label:** JP4
- Jumper Type:** 3-pin header
- Jumper Settings:** See Table 5-4

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Jumper Location: See Figure 5-5

The LCD Voltage Selection jumper allows the LCD screen voltage to be set. The LCD Voltage Selection jumper settings are shown in **Table 5-4**.

LCD Voltage Select	Description	
Short 1-2	+3.3V LVDS	Default
Short 2-3	+5V LVDS	

Table 5-4: LCD Voltage Selection Jumper Settings

The LCD Voltage Selection jumper location. is shown in **Figure 5-5**.

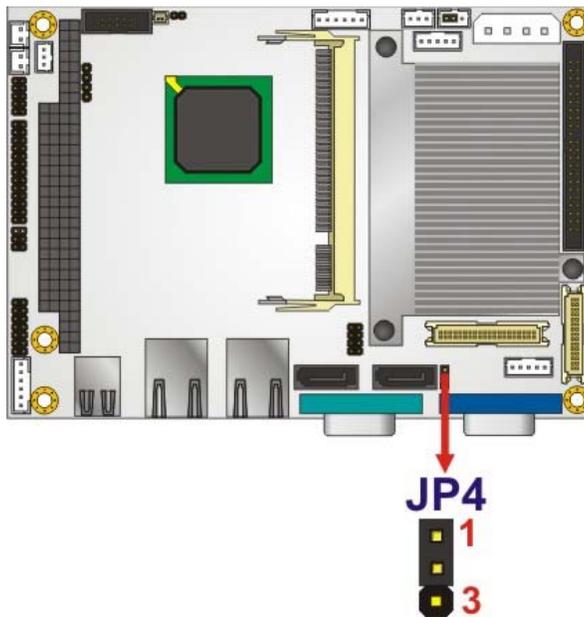


Figure 5-5: LCD Voltage Selection Jumper Location

5.4.4 COM 1/2 Pin 9 Setting Jumper (Optional)

Jumper Label: JP3

Jumper Type: 10-pin header

Jumper Settings: See Table 5-5

Jumper Location: See Figure 5-6

The COM 1/2 Pin 9 Setting jumper configures pin 9 on COM 1 (CN22) and COM 2 (CN16) as either a +5V, +12V power source or as a ring-in (RI) line. The COM 1/2 Pin 9 Setting jumper selection options are shown in **Table 5-5**.

COM 1/2 RI Pin	Description	
Short 1 – 3	COM 1 RI Pin use +12V	
Short 3 – 5	COM 1 RI Pin use +5V	
Short 7 – 9	COM 1 RI Pin use RI	Default
Short 2 – 4	COM 2 RI Pin use +12V	
Short 4 – 6	COM 2 RI Pin use +5V	
Short 8 – 10	COM 2 RI Pin use RI	Default

Table 5-5: COM 1/2 Pin 9 Setting Jumper Settings

The COM 1/2 Pin 9 Setting jumper location is shown in **Figure 5-6** below.

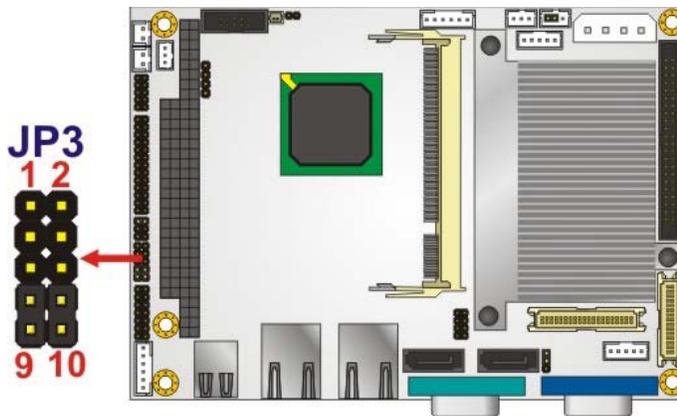


Figure 5-6: COM 1/2 Pin 9 Setting Jumper Location

5.5 Chassis Installation

5.5.1 Airflow



WARNING:

Airflow is critical to the cooling of the CPU and other onboard components. The chassis in which the WAFER-MARK must have air vents to allow cool air to move into the system and hot air to move out.

The WAFER-MARK must be installed in a chassis with ventilation holes on the sides allowing airflow to travel through the heat sink surface. In a system with an individual power supply unit, the cooling fan of a power supply can also help generate airflow through the board surface.

5.5.2 Motherboard Installation

To install the WAFER-MARK motherboard into the chassis please refer to the reference material that came with the chassis.

5.6 Internal Peripheral Device Connections

5.6.1 Peripheral Device Cables

The cables listed in **Table 5-6** are shipped with the WAFER-MARK.

Quantity	Type
1	ATA 44p/44p flat cable
1	Audio cable
1	Dual port COM port cable
1	Keyboard/Mouse Y cable
2	SATA cable

1	SATA power cable
---	------------------

Table 5-6: IEI Provided Cables

5.6.2 Audio Kit Installation

The Audio Kit that came with the WAFER-MARK connects to the 10-pin audio connector on the WAFER-MARK. The audio kit consists of three audio jacks. One audio jack, Mic In, connects to a microphone. The remaining two audio jacks, Line-In and Line-Out, connect to two speakers. To install the audio kit, please refer to the steps below:

Step 1: **Locate the audio connector.** The location of the 10-pin audio connector is shown in **Chapter 3**.

Step 2: **Align pin 1.** Align pin 1 on the onboard connector with pin 1 on the audio kit connector. Pin 1 on the audio kit connector is indicated with a white dot. See **Figure 5-7**.

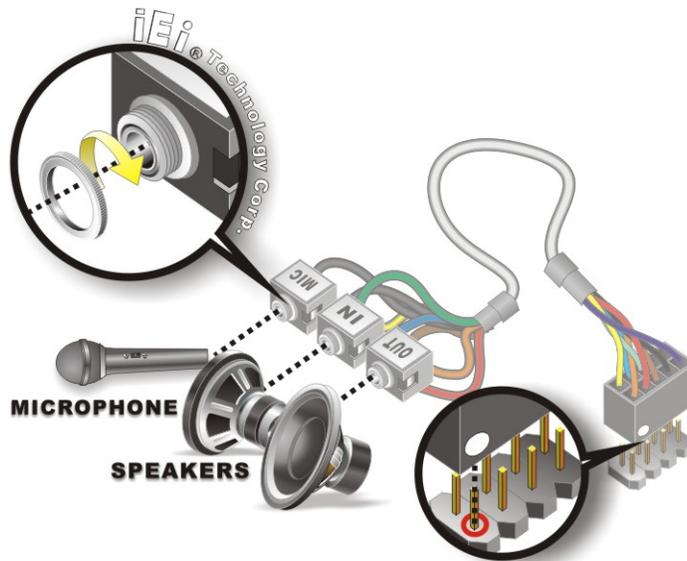


Figure 5-7: Audio Kit Cable Connection

Step 3: **Connect the audio devices.** Connect one speaker to the line-in audio jack, one speaker to the line-out audio jack and a microphone to the mic-in audio jack.

5.6.3 ATA Flat Cable Connection

The IDE flat cable connects to the WAFER-MARK to one or two IDE devices. To connect an IDE HDD to the WAFER-MARK please follow the instructions below.

Step 1: Locate the IDE connector. The location/s of the IDE device connector/s is/are shown in **Chapter 3**.

Step 2: Insert the connector. Connect the IDE cable connector to the onboard connector. See **Figure 5-8**. A key on the front of the cable connector ensures it can only be inserted in one direction.

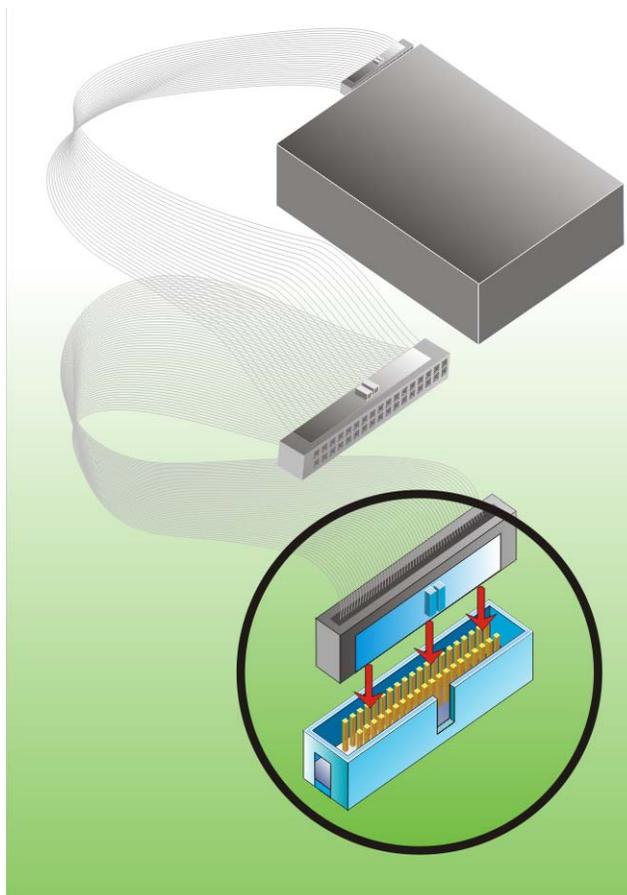


Figure 5-8: IDE Cable Connection

Step 3: **Connect the cable to an IDE device.** Connect the two connectors on the other side of the cable to one or two IDE devices. Make sure that pin 1 on the cable corresponds to pin 1 on the connector

5.6.4 ATX Power Connection

Follow the instructions below to connect the WAFER-MARK to an ATX power supply.



WARNING:

Disconnect the power supply power cord from its AC power source to prevent a sudden power surge to the WAFER-MARK.

Step 1: **Connect an ATX power button switch** to the power button connector (CN13) on the motherboard.

Step 2: **Locate the Power Adapter Cable.** The power adapter cable is shown in the packing list in **Chapter 3**.

Step 3: **Connect the Power Adapter Cable to the AT Power Connector.** Connect the 4-pin (1x4) Molex type power adapter cable connector to the AT power connector (CN1) on the motherboard. See **Figure 5-9**.

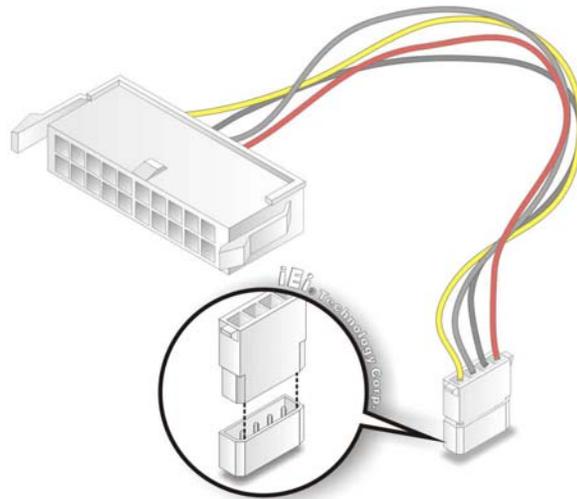


Figure 5-9: Power Cable to Motherboard Connection

Step 4: Connect ATX Power Adapter Cable to Power Supply. Connect the 20-pin ATX power adapter cable to an ATX power supply. See **Figure 5-10**.

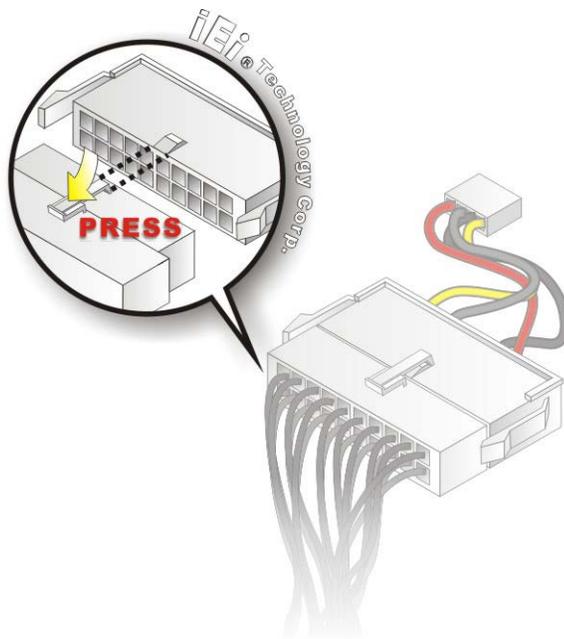


Figure 5-10: Connect ATX Power Adapter Cable to Power Supply

Step 5: Connect ATX Power Cable to Motherboard. Connect the 3-pin ATX power connector to the ATX power connector (CN2) on the motherboard. See **Figure**

5-11.

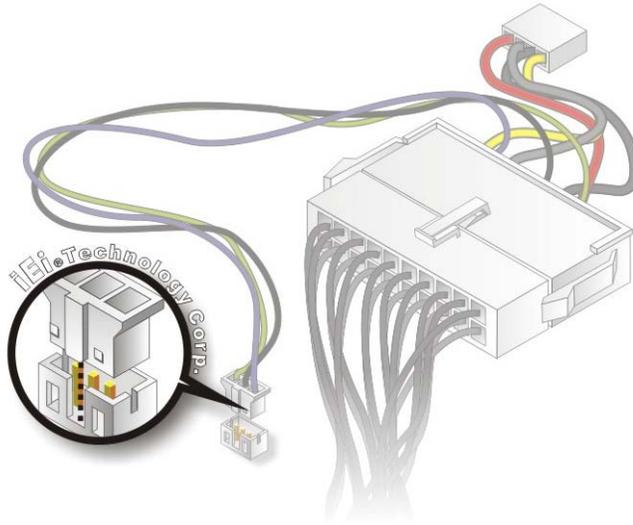


Figure 5-11: Connect ATX Power Cable to Motherboard

Step 6: To turn on the system press the power button once. To turn off the power supply press the power button for about 4 seconds.

5.6.5 Dual RS-232 Cable Connection

The dual RS-232 cable consists of two connectors attached to two independent cables. Each cable is then attached to a D-sub 9-pin male connector. To install the dual RS-232 cable, please follow the steps below.

Step 1: Locate the connectors. The locations of the RS-232 connectors are shown in **Chapter 3**.

Step 2: Insert the cable connectors. Insert one connector into each serial port box headers. See **Figure 5-12**. A key on the front of the cable connectors ensures the connector can only be installed in one direction.

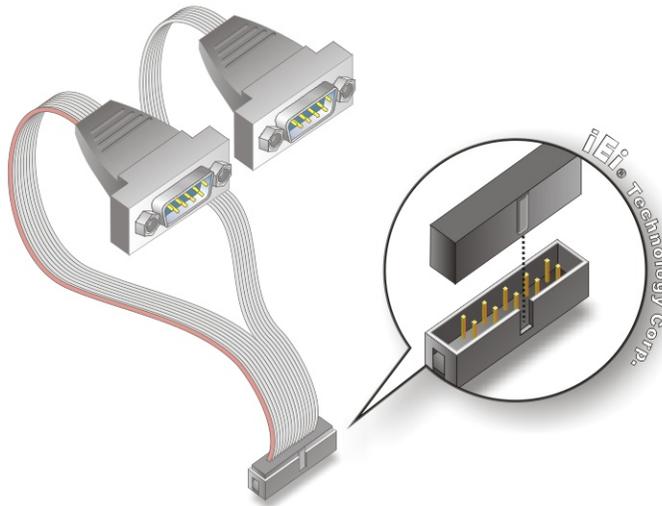


Figure 5-12: Dual RS-232 Cable Installation

- Step 3: Secure the connectors.** Both single RS-232 connectors have two retention screws that must be secured to a chassis or bracket.
- Step 4: Connect the serial device.** Once the single RS-232 connectors are connected to a chassis or bracket, a serial communications device can be connected to the system.

5.6.6 Keyboard/Mouse Y-cable Connector

The WAFER-MARK is shipped with a keyboard/mouse Y-cable connector. The keyboard/mouse Y-cable connector connects to a keyboard/mouse connector on the WAFER-MARK and branches into two cables that are each connected to a PS/2 connector, one for a mouse and one for a keyboard. To connect the keyboard/mouse Y-cable connector please follow the steps below.

- Step 1: Locate the connector.** The location of the keyboard/mouse Y-cable connector is shown in **Chapter 3**.
- Step 2: Align the connectors.** Correctly align pin 1 on the cable connector with pin 1 on the WAFER-MARK keyboard/mouse connector. See **Figure 5-13**.

Step 3: Insert the cable connectors Once the cable connector is properly aligned with the keyboard/mouse connector on the WAFER-MARK, connect the cable connector to the onboard connectors. See **Figure 5-13**.

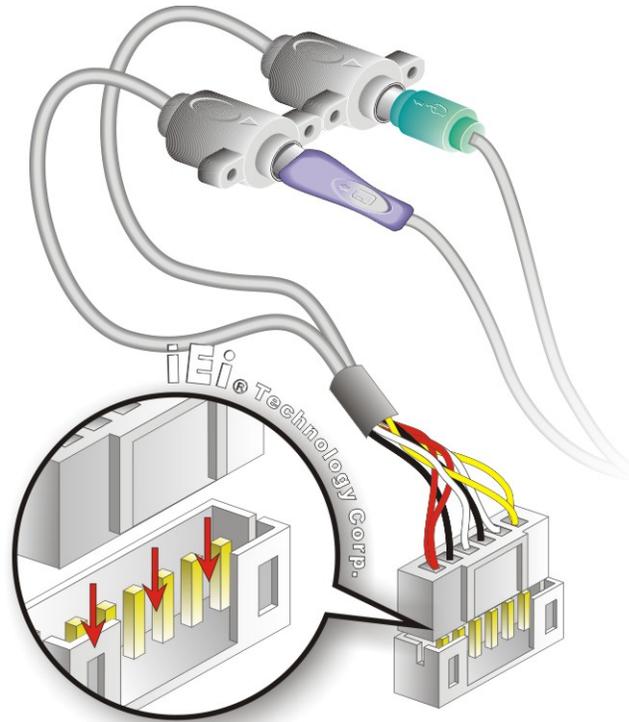


Figure 5-13: Keyboard/mouse Y-cable Connection

Step 4: Attach PS/2 connectors to the chassis. The keyboard/mouse Y-cable connector is connected to two PS/2 connectors. To secure the PS/2 connectors to the chassis please refer to the installation instructions that came with the chassis.

Step 5: Connect the keyboard and mouse. Once the PS/2 connectors are connected to the chassis, a keyboard and mouse can each be connected to one of the PS/2 connectors. The keyboard PS/2 connector and mouse PS/2 connector are both marked. Please make sure the keyboard and mouse are connected to the correct PS/2 connector.

5.6.7 SATA Drive Connection

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The WAFER-MARK is shipped with two SATA drive cables and one SATA drive power cable. To connect the SATA drives to the connectors, please follow the steps below.

Step 1: Locate the connectors. The locations of the SATA drive connectors are shown in **Chapter 3**.

Step 2: Insert the cable connector. Press the clip on the connector at the end of the SATA cable and insert the cable connector into the onboard SATA drive connector. See **Figure 5-14**.

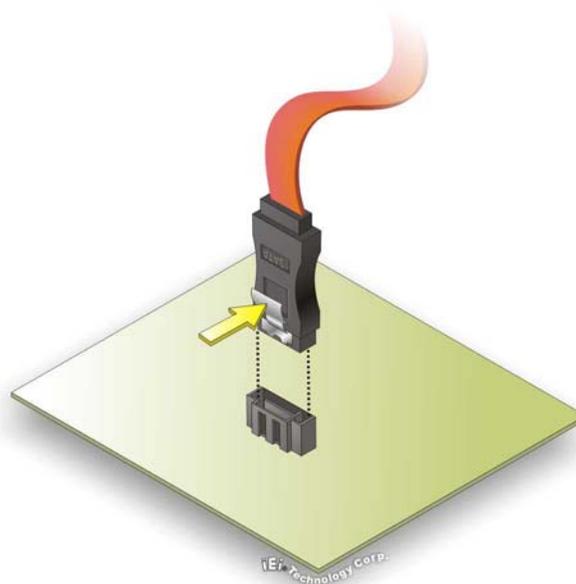


Figure 5-14: SATA Drive Cable Connection

Step 3: Connect the cable to the SATA disk. Connect the connector on the other end of the cable to the connector at the back of the SATA drive. See **Figure 5-15**.

Step 4: Connect the SATA power cable. Connect the SATA power connector to the back of the SATA drive. See **Figure 5-15**.

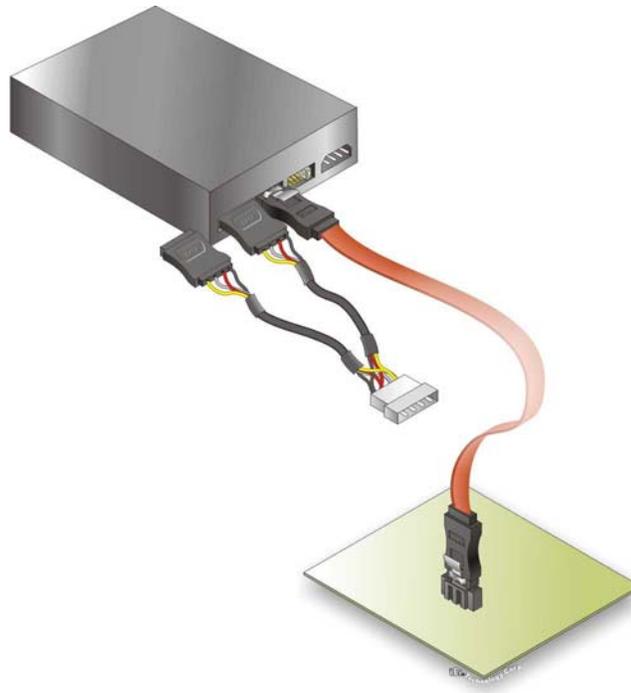


Figure 5-15: SATA Power Drive Connection

5.7 External Peripheral Interface Connection

The following external peripheral devices can be connected to the external peripheral interface connectors.

- Serial port devices
- USB devices
- VGA monitors
- RJ-45 Ethernet cable connectors

To install these devices, connect the corresponding cable connector from the actual device to the corresponding WAFER-MARK external peripheral interface connector making sure the pins are properly aligned.

5.7.1 LAN Connection

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There are two external RJ-45 LAN connectors. The RJ-45 connectors enable connection to an external network. To connect a LAN cable with an RJ-45 connector, please follow the instructions below.

Step 1: Locate the RJ-45 connectors. The locations of the USB connectors are shown in **Chapter 4**.

Step 2: Align the connectors. Align the RJ-45 connector on the LAN cable with one of the RJ-45 connectors on the WAFER-MARK. See **Figure 5-16**.

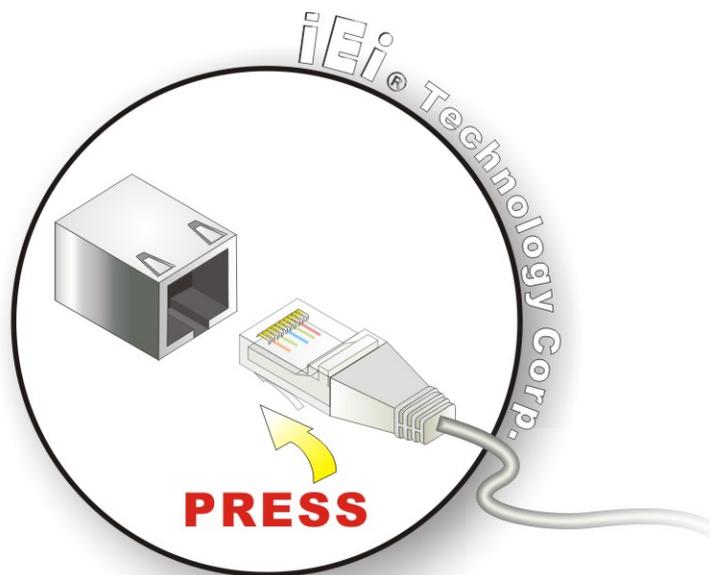


Figure 5-16: LAN Connection

Step 3: Insert the LAN cable RJ-45 connector. Once aligned, gently insert the LAN cable RJ-45 connector into the onboard RJ-45 connector.

5.7.2 Serial Device Connection

The WAFER-MARK has a single female DB-9 connector on the external peripheral interface panel for a serial device. Follow the steps below to connect a serial device to the WAFER-MARK.

Step 1: Locate the DB-9 connector. The location of the DB-9 connector is shown in

Chapter 3.

Step 2: **Insert the serial connector.** Insert the DB-9 connector of a serial device into the DB-9 connector on the external peripheral interface. See **Figure 5-17**.

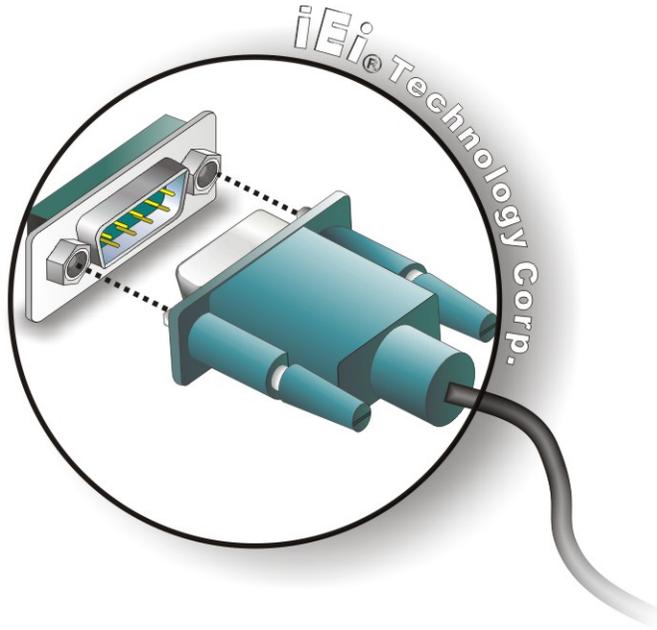


Figure 5-17: Serial Device Connector

Step 3: **Secure the connector.** Secure the serial device connector to the external interface by tightening the two retention screws on either side of the connector.

5.7.3 USB Connection

The external USB Series "A" receptacle connectors provide easier and quicker access to external USB devices. Follow the steps below to connect USB devices to the WAFER-MARK.

Step 1: **Locate the USB Series "A" receptacle connectors.** The location of the USB Series "A" receptacle connectors are shown in **Chapter 3**.

Step 2: **Insert a USB Series "A" plug.** Insert the USB Series "A" plug of a device into

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the USB Series "A" receptacle on the external peripheral interface. See Figure 5-18.

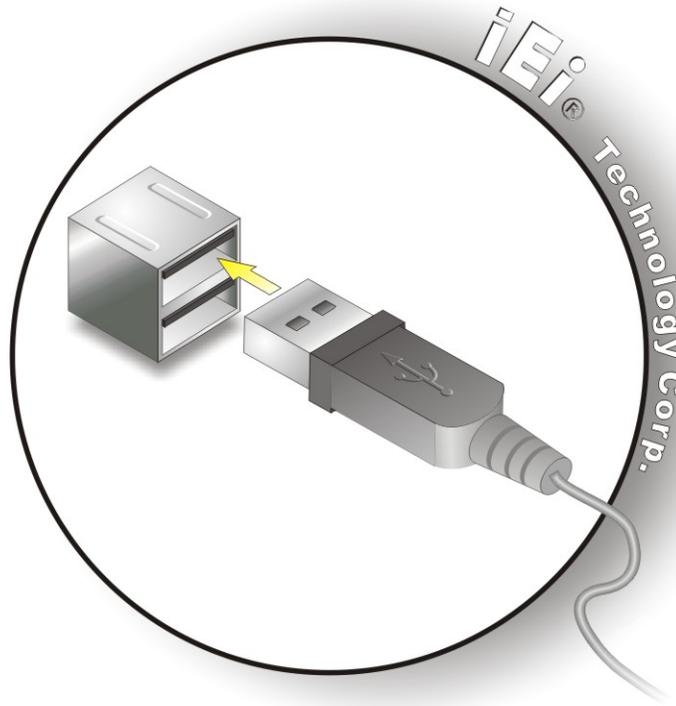


Figure 5-18: USB Connector

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Chapter

6

AWARD BIOS

6.1 Introduction

A licensed copy of Phoenix Award BIOS is preprogrammed into the ROM BIOS. The BIOS setup program allows users to modify the basic system configuration. This chapter describes how to access the BIOS setup program and the configuration options that may be changed.

6.1.1 Starting Setup

The Phoenix Award BIOS is activated when the computer is turned on. The setup program can be activated in one of two ways.

1. Press the **DELETE** key as soon as the system is turned on or
2. Press the **DELETE** key when the “**Press Del to enter SETUP**” message appears on the screen.

If the message disappears, restart the computer and try again.

6.1.2 Using Setup

Use the arrow keys to highlight items, press **ENTER** to select, use the **PAGEUP** and **PAGEDOWN** keys to change entries, press **F1** for help and press **Esc** to quit. Navigation keys are shown below.

Key	Function
Up arrow	Move to the item above
Down arrow	Move to the item below
Left arrow	Move to the item on the left hand side
Right arrow	Move to the item on the right hand side
+ /Page up	Increase the numeric value or make changes
- /Page down	Decrease the numeric value or make changes
Esc	Main Menu – Quit and do not save changes into CMOS Status Page Setup Menu and Option Page Setup Menu -- Exit current page and return to Main Menu
F1	General help, only for Status Page Setup Menu and Option Page Setup Menu

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F2	Item help
F5	Previous values for the page menu items
F6	Fail-safe defaults for the current page menu items
F7	Optimized defaults for the current page menu items
F9	Menu in BIOS
F10	Save changes and Exit BIOS

Table 6-1: BIOS Navigation Keys

6.1.3 Getting Help

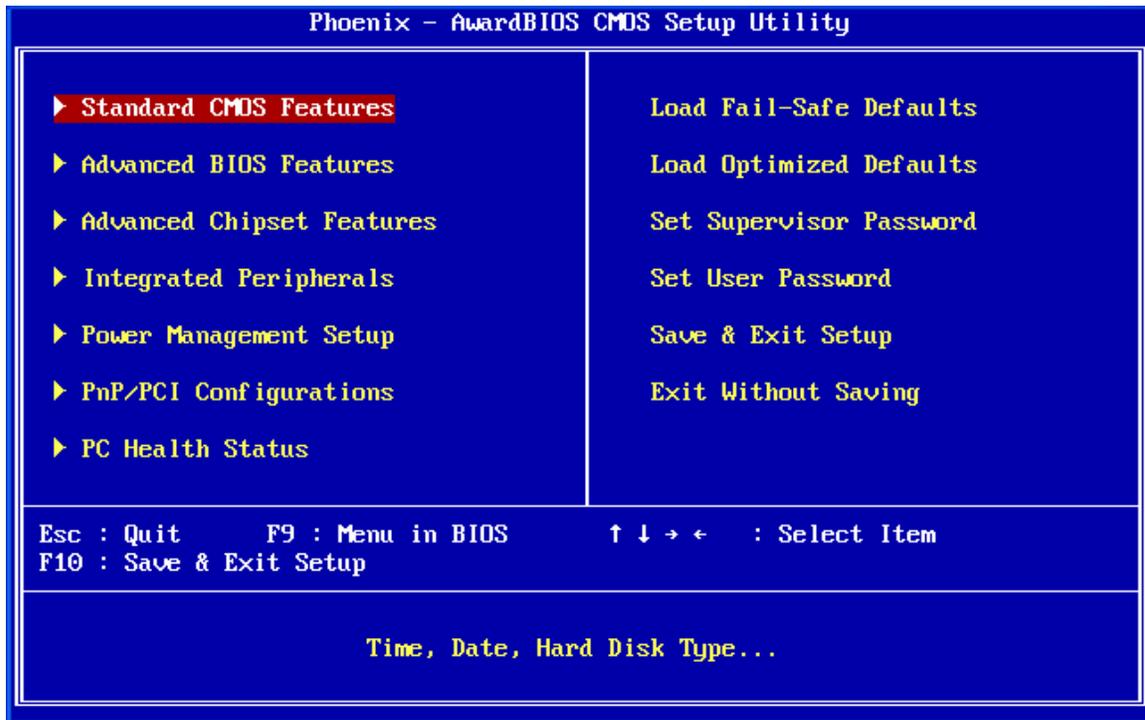
When **F1** is pressed a small help window describing the appropriate keys to use and the possible selections for the highlighted item appears. To exit the Help Window press **Esc** or the **F1** key again.

6.1.4 Unable to Reboot After Configuration Changes

If the system cannot be booted after changes are made, restore the CMOS defaults. The CPU card should come with a restore CMOS settings jumper. Refer to **Section 5.4.1** for more information.

6.1.5 Main BIOS Menu

Once the BIOS opens, the main menu (**BIOS Menu 1**) appears.



BIOS Menu 1: Award BIOS CMOS Setup Utility



NOTE:

The following sections will completely describe the menus listed below and the configuration options available to users.

The following menu options are seen in **BIOS Menu 1**.

- **Standard CMOS Features:** Changes the basic system configuration.
- **Advanced BIOS Features:** Changes the advanced system settings.
- **Advanced Chipset Features:** Changes the chipset configuration features.
- **Integrated Peripherals:** Changes the settings for integrated peripherals.
- **Power Management Setup:** Configures power saving options.
- **PnP/PCI Configurations:** Changes the advanced PCI/PnP settings.
- **PC Health Status:** Monitors essential system parameters.

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The following user configurable options are also available in **BIOS Menu 1**:

→ **Load Fail-Safe Defaults**

Use the **Load Fail-Safe Defaults** option to load failsafe default values for each BIOS parameter in the setup menus. Press **F6** for this operation on any page.

→ **Load Optimized Defaults**

Use the **Load Optimized Defaults** option to load optimal default values for each BIOS parameter in the setup menus. Press **F7** for this operation on any page.

→ **Set Supervisor Password**

Use the **Set Supervisor Password** option to set the supervisor password. By default, no supervisor password is set. To install a supervisor password, select this field and enter the password. After this option is selected, a red dialogue box appears with "**Enter Password:**". Type the password and press **ENTER**. Retype the original password into the "**Confirm Password:**" dialogue box and press **ENTER**. To disable the password, simply press **ENTER** in the "**Enter Password:**" dialogue box, then press any key in the "**Password Disabled !!!**" dialogue box.

→ **Set User Password**

Use the **Set User Password** option to set the user password. By default no user password is set. To install a user password, select this field and enter the password. After this option is selected, a red dialogue box appears with "**Enter Password:**". Type the password and press **ENTER**. Retype the original password into the "**Confirm Password:**" dialogue box and press **ENTER**. To disable the password, simply press **ENTER** in the "**Enter Password:**" dialogue box, then press any key in the "**Password Disabled !!!**" dialogue box.

→ **Save & Exit Setup**

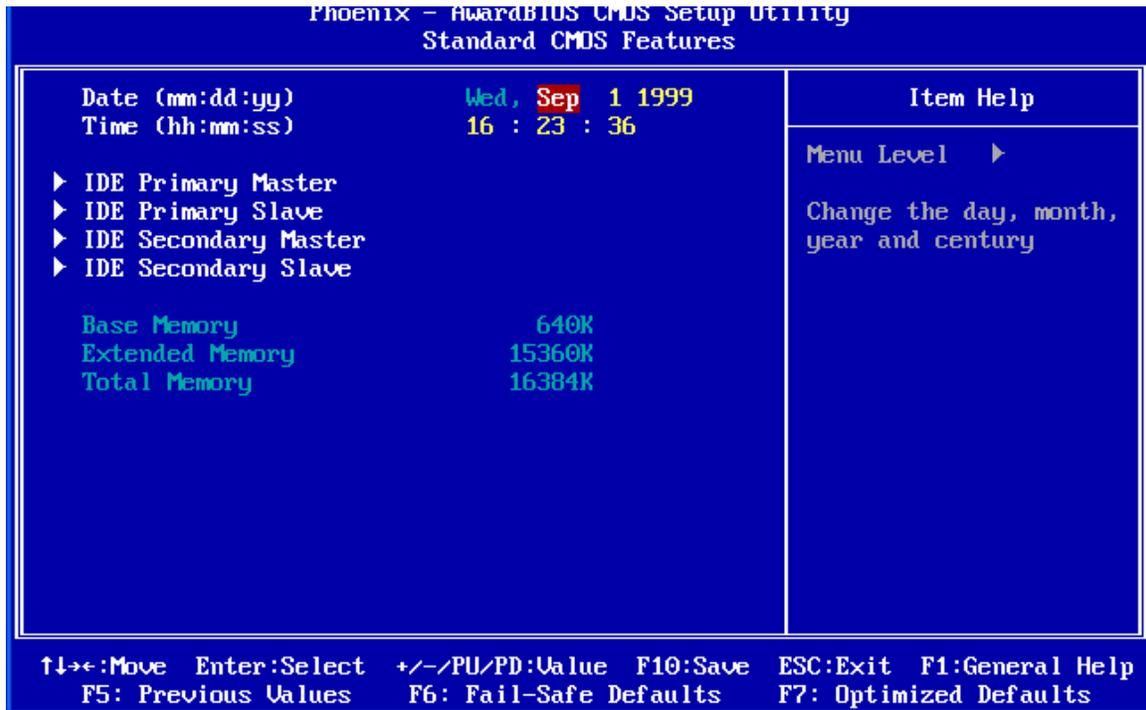
Use the **Save & Exit Setup** option to save any configuration changes made and exit the BIOS menus.

→ **Exit Without Saving**

Use the **Exit Without Saving** option to exit the BIOS menus without saving any configuration changes.

6.2 Standard CMOS Features

Use the **Standard CMOS Features** BIOS menu (**BIOS Menu 2**) to set basic BIOS configuration options.



BIOS Menu 2: Standard CMOS Features

→ **Date [Day mm:dd:yyyy]**

Use the **Date** option to set the system date.

→ **Time [hh/mm/ss]**

Use the **Time** option to set the system time.

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→ IDE Master and IDE Slave

When entering setup, BIOS auto detects the presence of IDE devices. The **Standard CMOS Features** menu shows the status of the auto detected IDE devices. The following IDE devices are detected and shown in the **Standard CMOS Features** menu:

- IDE Primary Master
- IDE Primary Slave
- IDE Secondary Master
- IDE Secondary Slave

IDE device configurations are changed or set in the IDE Configuration menu. If an IDE device is detected, and one of the above listed two BIOS configuration options is selected, the IDE configuration options shown in **Section 6.2.1** appear.

→ Base Memory:

The **Base Memory** is NOT user configurable. The POST determines the amount of base (or conventional) memory installed in the system. The value of the base memory is typically 512K for systems with 512K memory installed, or 640K for systems with 640K or more memory installed.

→ Extended Memory

The **Extended Memory** is NOT user configurable. The BIOS determines how much extended memory is present during the POST. This is the amount of memory above 1MB located in the memory address map of the CPU.

→ Total Memory

The **Total Memory** is NOT user configurable.

6.2.1 IDE Primary Master/Slave

Use the IDE Primary Master/Slave menu to set or change the master/slave IDE configurations.

→ **IDE HDD Auto-Detection [Press Enter]**

Use the **IDE HDD Auto-Detection** option to enable BIOS to automatically detect the IDE settings. Select **IDE HDD Auto-Detection** and press **ENTER**. BIOS automatically detects the HDD type. Do not set this option manually.

→ **IDE Primary Master [Auto]**

Use the **IDE Primary Master** option to activate or deactivate the following drive channels:

- Channel 0 Master
- Channel 0 Slave
- Channel 1 Master
- Channel 0 Slave

→ **None** If no drives are connected to the IDE channel select this option. Once set, this IDE channel becomes inaccessible and any drives attached to it are undetected.

→ **Auto** **DEFAULT** Setting this option allows the device to be automatically detected by the BIOS.

→ **Manual** Selecting this option allows manual configuration of the device on the IDE channel in BIOS.

→ **Access Mode [Auto]**

The **Access Mode** option can only be configured if the BIOS configuration option is set to either **Manual** or **Auto**. Use the **Access Mode** option to determine the hard disk BIOS translation modes. Most systems now use hard drives with large capacities and therefore either the LBA translation mode or auto mode should be selected.

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- **CHS** Select this mode if the HDD capacity is less than 504MB.
- **LBA** Select this mode if the HDD capacity is more than 8.4GB.
- **Large** This mode is an extended ECHS mode and while it supports HDDs larger than 504MB, it is not recommended.
- **Auto** **DEFAULT** If you are unsure of what access mode to set, select this option.

→ **Capacity**

The **Capacity** specification indicates the storage capacity of the HDD installed in the system.

→ **Cylinder**

The **Cylinder** specification indicates how many cylinders (tracks) are on the HDD installed in the system.

→ **Head**

The **Head** specification indicates how many logical heads are on the HDD installed in the system.

→ **Precomp**

The **Precomp** specification indicates on what track the write precompensation begins.

→ **Landing Zone**

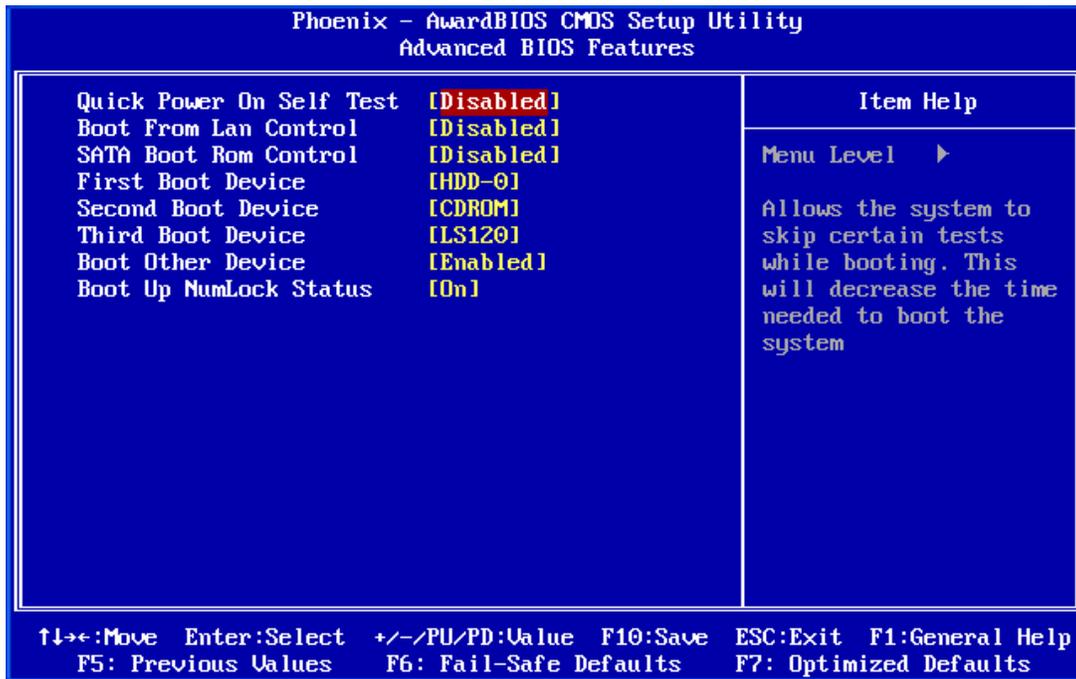
The **Landing Zone** specification indicates where the disk head will park itself after the system powers off.

➔ **Sector**

The **Sector** specification indicates how many logical sectors the HDD has been divided into.

6.3 Advanced BIOS Features

Use the **Advanced BIOS Features** menu (**BIOS Menu 3**) to configure the CPU and peripheral device configuration options.



BIOS Menu 3: Advanced BIOS Features

➔ **Quick Power On Self Test [Disabled]**

Use the **Quick Power On Self Test** option to speed up the POST after the computer is turned on. If enabled, BIOS shortens or skips some POST check items.

- ➔ **Disabled** **DEFAULT** Normal POST occurs after the computer is turned on.
- ➔ **Enabled** Quick POST occurs after the computer is turned on.

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→ Boot From LAN Control [Disabled]

Use the **BOOT From LAN Control** option to enable the system to be booted from a remote system.

- **Disabled** **DEFAULT** The system cannot be booted from a remote system through the LAN.
- **Enabled** The system can be booted from a remote system through the LAN.

→ SATA Boot Rom Control [Disabled]

Use the **SATA Boot Rom Control** option to configure SATA IDE use in DOS mode.

- **Disabled** **DEFAULT** Disables SATA IDE use in DOS mode.
- **Enabled** Enables SATA IDE use in DOS mode.

→ Boot Device

Use the **Boot Device** options to select the order of the devices the system boots from. There are three boot device configuration options:

- **First Boot Device** [Default: HDD-0]
- **Second Boot Device** [Default: CDROM]
- **Third Boot Device** [Default: LS120]

Using the default values, the system first looks for a HDD to boot from. If it cannot find an HDD, it boots from a CD-ROM. If both The HDD and the CD-ROM are unavailable, the system boots from a LS120 drive.

Boot Device configuration options are:

- LS120
- HDD-0
- SCSI

- CDROM
- HDD-1
- HDD-2
- HDD-3
- ZIP100
- USB-FDD
- USB-ZIP
- USB-CDROM
- USB-HDD
- LAN
- Disabled

→ **Boot Other Device [Enabled]**

Use the **Boot Other Device** option to determine whether the system uses a second or third boot device if the first boot device is not found.

- **Disabled** The system does not look for second and third boot devices if the first one is not found.
- **Enabled** **DEFAULT** The system looks for second and third boot devices if the first one is not found.

→ **Boot Up Numlock Status [On]**

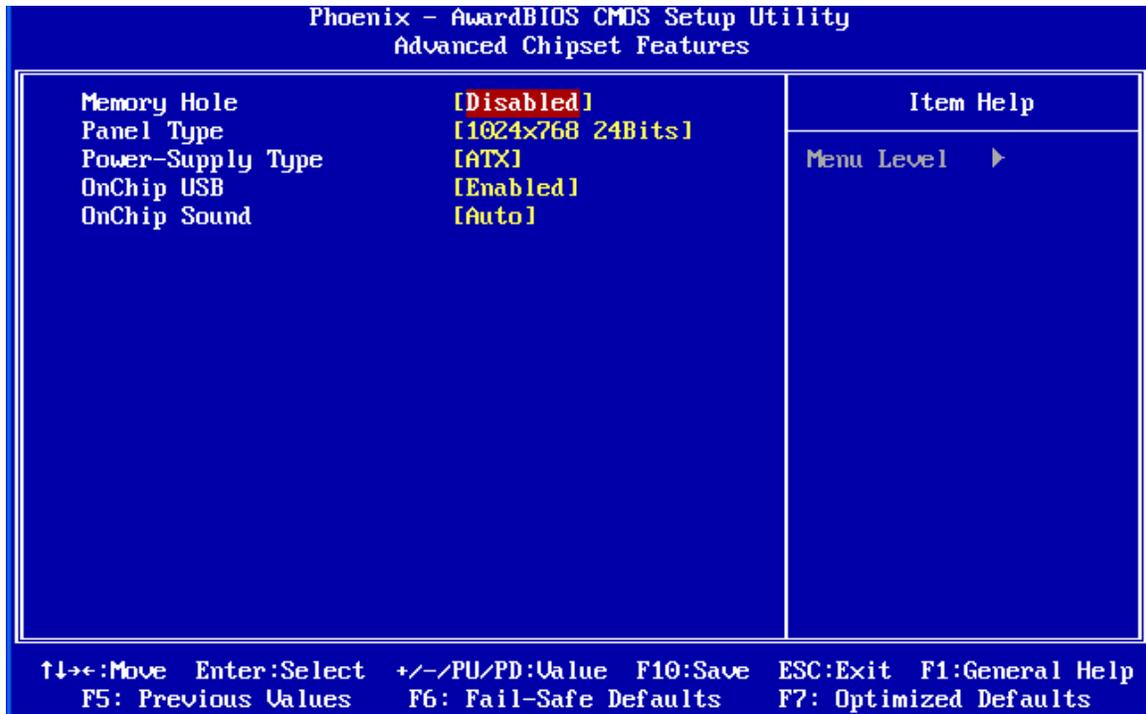
Use the **Boot Up Numlock Status** option to specify the default state of the numeric keypad.

- **Off** The keys on the keypad are not activated.
- **On** **DEFAULT** Activates the keys on the keypad.

6.4 Advanced Chipset Features

Use the Advanced Chipset Features menu (**BIOS Menu 4**) to change chipset configuration options.

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BIOS Menu 4: Advanced Chipset Features

→ Memory Hole [Disabled]

Use the **Memory Hole** option to reserve memory space between 15MB and 16MB for ISA expansion cards that require a specified area of memory to work properly. If an older ISA expansion card is used, please refer to the documentation that came with the card to see if it is necessary to reserve the space.

→ **Disabled** **DEFAULT** Memory is not reserved for ISA expansion cards

→ **15M -16M** Memory space between 15MB and 16MB is reserved for ISA expansion cards

→ Panel Type [1024 x 768 24Bits]

Use the **Panel Type** option to specify the type of panel connected to the system. Configuration options are below:

- 640 x 480 TFT

- 1024 x 768 2ch LVDS
- 1024 x 768 36Bits
- 800 x 600 DSTN
- 1024 x 768 1ch LVDS
- 800 x 600 18Bits
- 1024 x 768 24Bits **DEFAULT**

→ Power Supply Type [ATX]

Use the **Power Supply Type** option to specify whether an AT or ATX power supply is connected to the system.

- **AT** An AT power supply is used.
- **ATX** **DEFAULT** An ATX power supply is used.

→ OnChip USB [Enabled]

Use the **OnChip USB** option to enable or disable the chipset USB controller.

- **Disabled** Chipset USB controller disabled
- **Enabled** **DEFAULT** Chipset USB controller enabled

→ OnChip Sound [Auto]

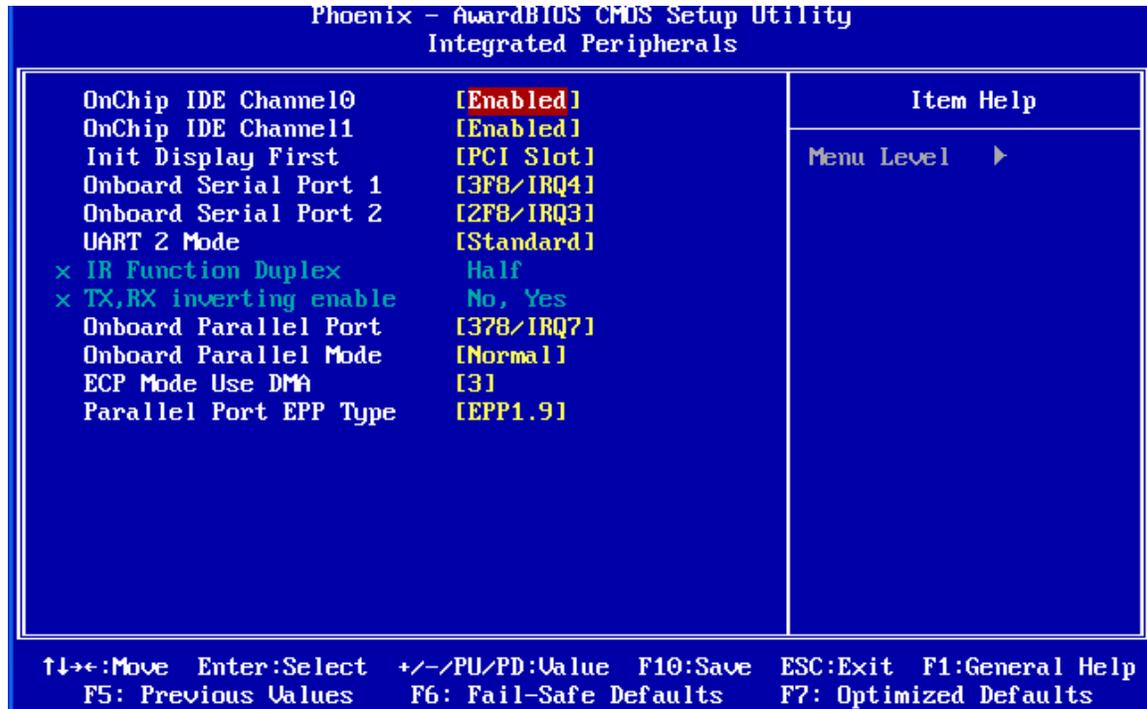
Use the **OnChip Sound** option to enable or disable the chipset codec.

- **Auto** **DEFAULT** The chipset codec is automatically detected by BIOS.
- **Disabled** The chipset codec is disabled.

6.5 Integrated Peripherals

Use the Integrated Peripherals menu (**BIOS Menu 5**) to change the configuration options for the attached peripheral devices.

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BIOS Menu 5: Integrated Peripherals

→ On-Chip IDE Channel 0/1 [Enabled]

Use the **On-Chip IDE Channel 0/1** option to specify if the system uses the integrated primary IDE channel or not.

- **Disabled** The primary IDE channel is not used.
- **Enabled** **DEFAULT** The primary IDE channel is used.

→ Init Display First [PCI Slot]

Use the **Init Display First** option to select the primary display device.

- **PCI Slot** **DEFAULT** The display connected to the PCI slot is the primary display
- **AGP** The AGP display is the primary display

→ Onboard Serial Port 1 [3F8/IRQ4]

Use the **Onboard Serial Port 1** option to select the I/O address and IRQ for the onboard serial port 1. The serial port can be disabled or the I/O address and the IRQ can be automatically selected by the BIOS. The **Onboard Serial Port 1** options are:

- Disabled
- 3F8/IRQ4 **DEFAULT**
- 2F8/IRQ3
- 3E8/IRQ4
- 2E8/IRQ3

→ Onboard Serial Port 2 [2F8/IRQ3]

Use the **Onboard Serial Port 2** option to select the I/O address and IRQ for the onboard serial port 2. The serial port can be disabled or the I/O address and the IRQ can be automatically selected by the BIOS. The **Onboard Serial Port 2** options are:

- Disabled
- 3F8/IRQ4
- 2F8/IRQ3 **DEFAULT**
- 3E8/IRQ4
- 2E8/IRQ3

→ UART 2 Mode [Standard]

Use the **UART 2 Mode** to select the UART mode for the system.

- Standard** **DEFAULT** RS-232C serial port
- HPSIR** IrDA-compliant serial infrared port
- ASKIR** Amplitude shift keyed infrared port

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→ x IR Function Duplex [Half]

The **IR Function Duplex** option can only be configured if the **UART 2 Mode** is set to HPSIR or ASKIR. Use the **IR Function Duplex** option to enable bi-directional communication between the system infrared port and the external device.

- **Full** Bi-directional communication between system infrared port and the external compliant devices occurs.
- **Half** **DEFAULT** Communication between the system infrared port and the external compliant devices occurs is a single direction at a time only.

→ x TX, RX Inverting enable [No, Yes]

The **TX, RX Inverting enable** option can only be configured if the **UART 2 Mode** is set to HPSIR or ASKIR. Use the **TX, RX Inverting enable** option to invert the transmitted and received signals. The table below lists the configuration options.

BIOS Option	TX (Transmitted)	RX (Received)	Default
No, No	Not inverted	Not Inverted	(Default)
No, Yes	Not Inverted	Inverted	
Yes, No	Inverted	Not Inverted	
Yes, Yes	Inverted	Inverted	

→ Onboard Parallel Port [378/IRQ7]

Use the **Onboard Parallel Port** option to specify a logical LPT port address and corresponding interrupt for the physical parallel port. The **Onboard Parallel Port** options are:

- Disabled
- 3BC/IRQ7
- 378/IRQ7 **DEFAULT**
- 278/IRQ5

→ **Parallel Port Mode [Normal]**

Use the **Parallel Port Mode** option to select parallel port operation mode.

→ **Normal** **DEFAULT**

→ **EPP** The parallel port operates in the enhanced parallel port mode (EPP). The EPP mode supports bi-directional communication between the system and the parallel port device and the transmission rates between the two are much faster than the SPP mode.

→ **ECP** The parallel port operates in the extended capabilities port (ECP) mode. The ECP mode supports bi-directional communication between the system and the parallel port device and the transmission rates between the two are much faster than the SPP mode.

→ **ECP+EPP** The parallel port is compatible with both ECP and EPP devices.

→ **x ECP Mode Use DMA [3]**

The **ECP Mode Use DMA** option can only be configured if the **Onboard Parallel Mode** is set to ECP or ECP/EPP. Use the **ECP Mode Use DMA** option to specify the DMA channel the parallel port must use in the ECP mode.

→ **1** The parallel port uses DMA Channel 1 in ECP mode.

→ **3** **DEFAULT** The parallel port uses DMA Channel 3 in ECP mode.

→ **x Parallel Port EPP Type [EPP1.9]**

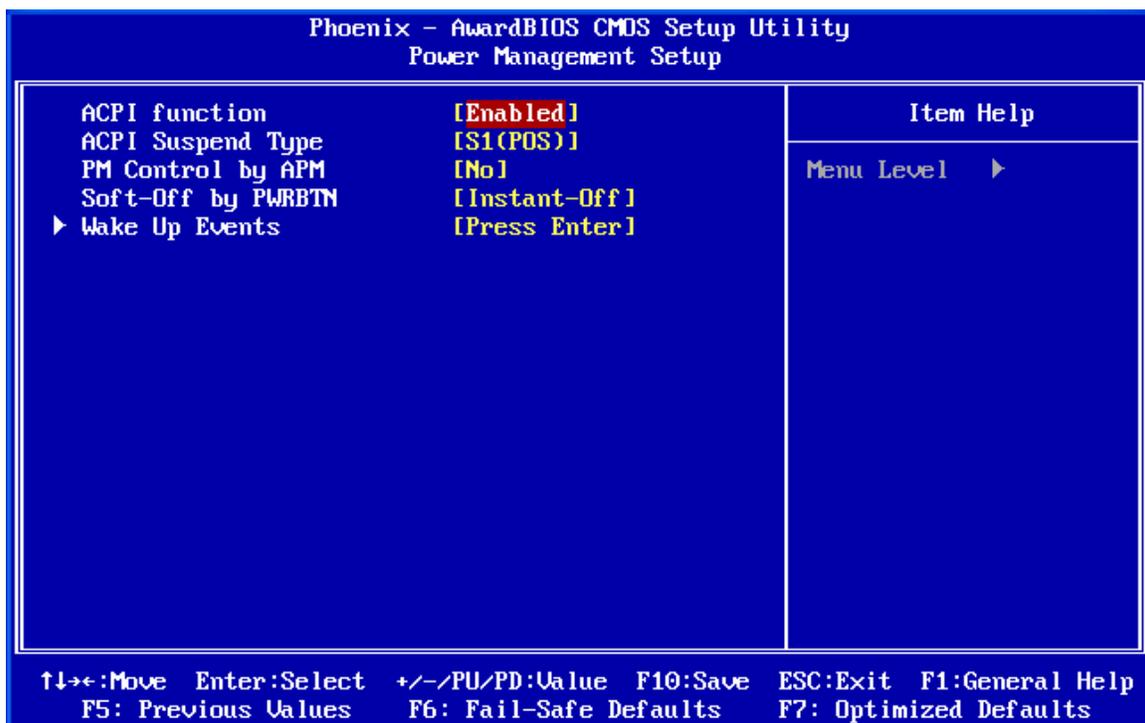
The **Parallel Port EPP Type** option can only be configured if the **Onboard Parallel Mode** is set to EPP or ECP/EPP. Use the **Parallel Port EPP Type** option to select the parallel port mode standard for the parallel port.

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- ➔ **EPP1.9** **DEFAULT** EPP 1.9 is selected as the EPP standard.
- ➔ **EPP1.7** EPP 1.7 is selected as the EPP standard.

6.6 Power Management Setup

Use the **Power Management Setup** menu (**BIOS Menu 6**) to set the BIOS power management and saving features.



BIOS Menu 6: Power Management Setup

➔ **ACPI Function [Enabled]**

Use the **ACPI Function** to enable the ACPI (Advanced Configuration and Power Interface) function.

- Disabled** ACPI function disabled.
- Enabled** **DEFAULT** ACPI function enabled.

→ **ACPI Suspend Type [S1(POS)]**

Use the **ACPI Suspend Type** BIOS option to specify the sleep state the system enters when not being used.

- **S1 (POS) DEFAULT** System appears off. The CPU is stopped; RAM is refreshed; the system is running in a low power mode.

→ **PM Control by APM [Yes]**

Use the **PM Control by APM** option to set the power management type used by the system.

- **No** Advanced power management (APM) is de-activated
- **Yes DEFAULT** Advanced power management (APM) is activated

→ **Soft-Off by PWR-BTTN [Instant-Off]**

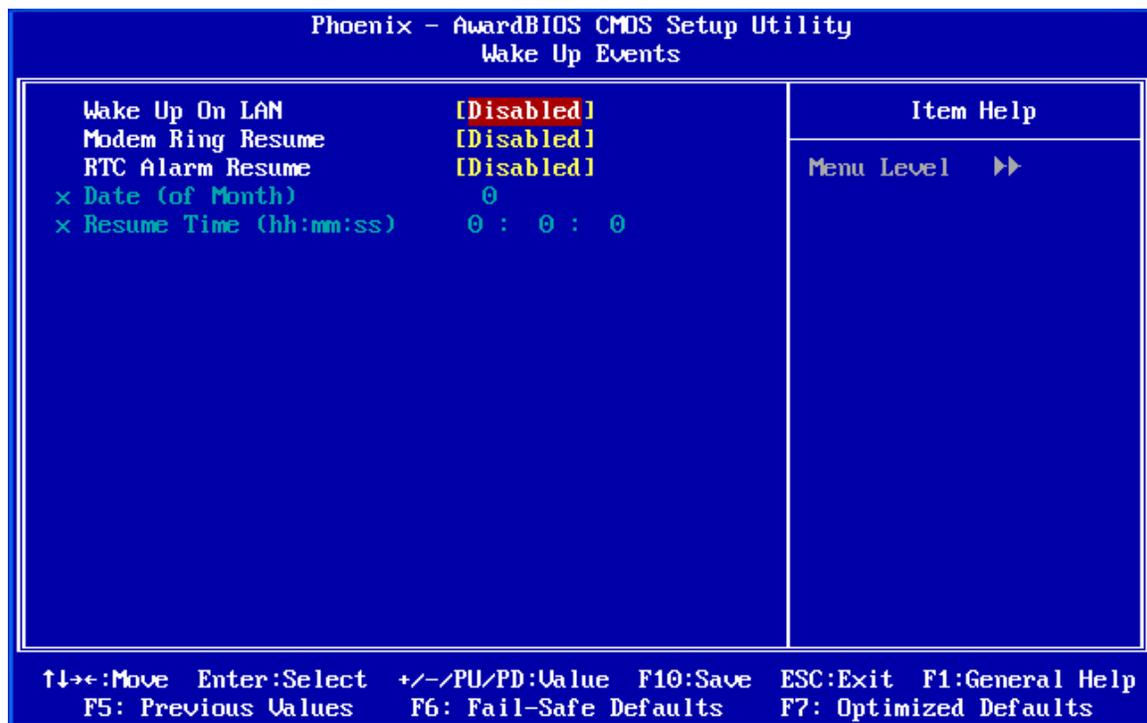
Use the **Soft-Off by PWR-BTTN** option to enabled the system to enter a very low-power-usage state when the power button is pressed.

- **Delay 4-sec** To shutdown the system the power button must be held down longer than four seconds otherwise the system enters a low power usage state.
- **Instant-Off DEFAULT** When the power button is pressed, the system is immediately shutdown.

6.6.1 Wake Up Events

Use the **Wake Up Events** menu (**BIOS Menu 7**) to specify what components can rouse the system from a suspend or doze state when there is activity on the components.

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BIOS Menu 7: Wake Up Events

→ Wake Up On LAN [Disabled]

Use the **Wake Up On LAN** option to enable activity on the LAN to rouse the system from a suspend or doze state.

- **Disabled** **DEFAULT** Wake event not generated by LAN activity
- **Enabled** Wake event generated by LAN activity

→ Modem Ring Resume [Disabled]

Use the **Modem Ring Resume** option to enable activity on the modem to rouse the system from a suspend or doze state.

- **Disabled** **DEFAULT** Wake event not generated by modem activity
- **Enabled** Wake event generated by modem activity

→ **RTC Alarm Resume [Disabled]**

Use the **RTC Alarm Resume** option to specify when the computer is roused from a suspended state.

→ **Disabled** **DEFAULT** The real time clock (RTC) cannot generate a wake event

→ **Enabled** If selected, the following appears with values that can be selected:

→ **Date (of Month)**

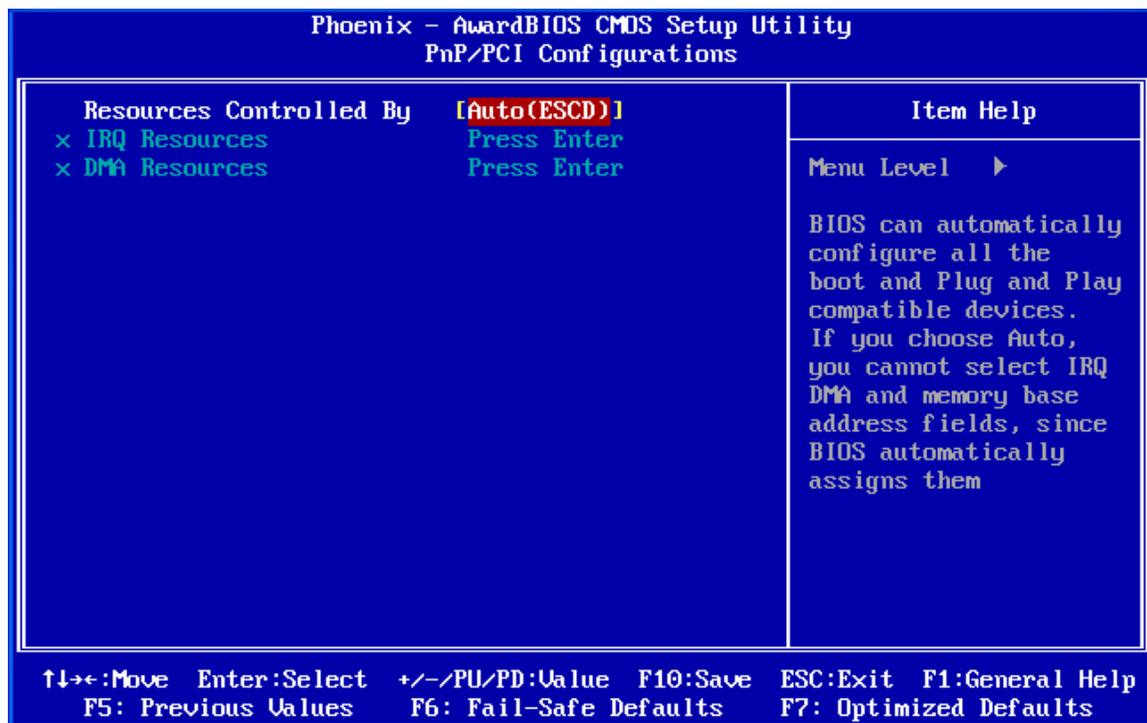
→ **Resume Time (hh:mm:ss)**

After setting the alarm, the computer will turn itself on from a suspend state when the alarm goes off.

6.7 PnP/PCI Configurations

Use the PnP/PCI Configurations menu (**BIOS Menu 8**) to set the plug and play, and PCI options.

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BIOS Menu 8: PnP/PCI Configurations

→ Resources Controlled By [Auto (ESCD)]

Use the **Resources Controlled By** option to either manually configure all the boot and plug and play devices, or allow BIOS to configure these devices automatically. If BIOS is allowed to configure the devices automatically IRQs, DMA and memory base address fields cannot be set manually.

- **Auto(ESCD)** DEFAULT BIOS automatically configures plug and play devices as well as boot devices.
- **Manual** Manually configure the plug and play devices and any other boot devices.

→ x IRQ Resources [Press Enter]

The **IRQ Resources** option can only be selected if the **Resources Controlled By** option is set to Manual. The **IRQ Resources** menu has the following options:

- IRQ-9 assigned to
- IRQ-10 assigned to
- IRQ-11 assigned to
- IRQ-12 assigned to
- IRQ-13 assigned to
- IRQ-14 assigned to
- IRQ-15 assigned to

The above options all have the following default options.

- ➔ **PCI/ISA PnP** **DEFAULT** The IRQ is assigned to PCI/ISA PNP for devices compliant with the Plug and Play standard whether designed for PCI or ISA bus architecture.
- ➔ **Legacy ISA** The IRQ is assigned to legacy ISA for devices compliant with the original PC AT bus specification.

➔ **x DMA Resources [Press Enter]**

The **DMA Resources** menu can only be accessed if the **Resources Controlled By** option is set to Manual. The **DMA Resources** menu has the following options:

- DMA-0 assigned to
- DMA-1 assigned to
- DMA-3 assigned to
- DMA-5 assigned to
- DMA-6 assigned to
- DMA-7 assigned to

The above options all have the following default options.

- ➔ **PCI/ISA PnP** **DEFAULT** The IRQ is assigned to PCI/ISA PNP for devices compliant with the Plug and Play standard whether designed for PCI or ISA bus architecture.

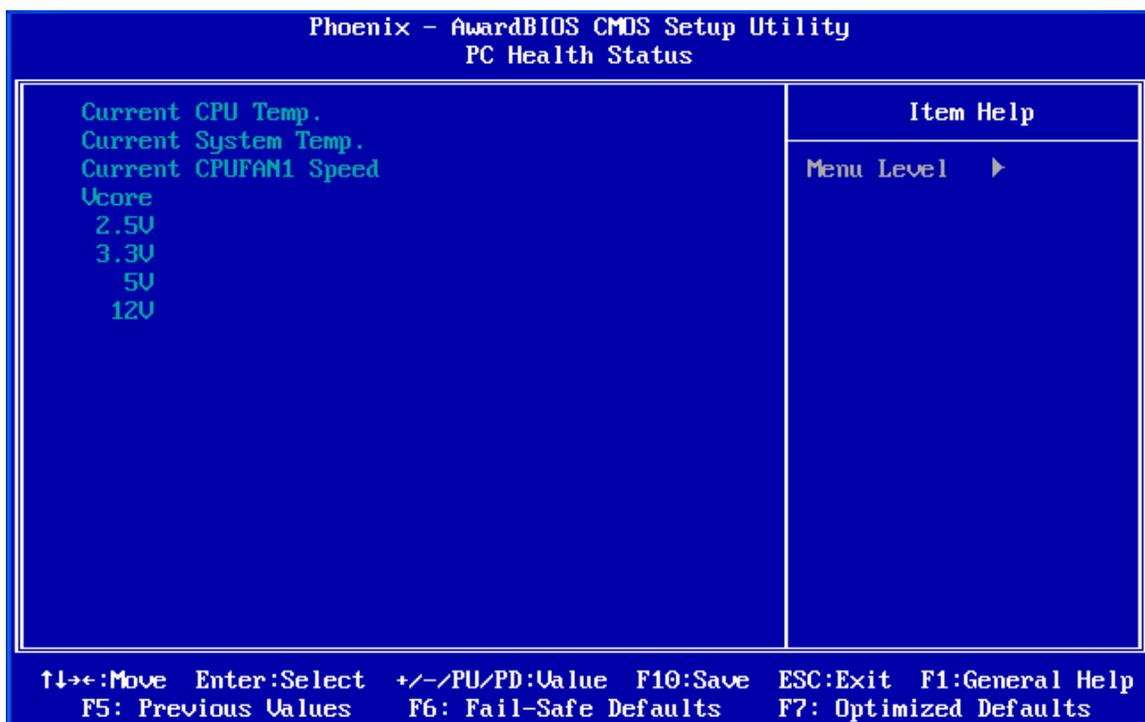
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→ Legacy ISA

The IRQ is assigned to legacy ISA for devices compliant with the original PC AT bus specification.

6.8 PC Health Status

The **PC Health Status** menu (**BIOS Menu 9**) has no user configurable options, but shows system operating parameters that are essential to the stable operation of the system.



BIOS Menu 9: PC Health Status

The following system parameters are monitored by the **PC Health Status** menu.

→ System Temperature

The following temperatures are monitored:

- CPU Temperature
- System Temperature

→ Voltages

The following voltages are monitored:

- CPU Vcore
- VccMem
- +2.5 V
- +3.3 V
- +5 V
- +12 V

→ Fan Speeds

The following fan speeds are monitored:

- CPU Fan Speed

Chapter

7

Software Drivers

7.1 Available Software Drivers

**NOTE:**

The content of the CD may vary throughout the life cycle of the product and is subject to change without prior notice. Visit the IEI website or contact technical support for the latest updates.

The WAFER-MARK motherboard has four software drivers:

- VIA 4 in 1 Chipset Driver Installation (VIA Service Pack v4.3)
- RealTek Audio Driver
- RealTek LAN Driver
- The ALi RAID driver is fully described in **Appendix F**.

All four drivers can be found on the CD that came with the motherboard. To install the drivers please follow the instructions in the sections below.

7.2 VIA 4 in 1 Chipset Driver Installation (VIA Service Pack v4.3)

To install the chipset driver, please follow the steps below:

Step 1: Insert the CD into the system that contains the WAFER-MARK board.

Step 2: Open the “**WAFER-MARK**” folder. Open the “**4in1 Extreme**” subfolder. (See

Figure 7-1)



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Figure 7-1: Access the 4in1_Extreme Folder

Step 3: Click the Setup utility icon shown in **Figure 7-2**.



Figure 7-2: Setup Utility Icon

Step 4: The installation program begins to initialize. After the initialization process a welcome screen shown in **Figure 7-3** appears. Click "NEXT" to continue.



Figure 7-3: VIA Chipset Driver Installation Welcome Screen

Step 5: The “Readme” in **Figure 7-4** appears. Click “NEXT” to continue.



Figure 7-4: Readme Information

Step 6: Select “Normal Installation” or “Quick Installation.” (See **Figure 7-5**) Click “NEXT” to continue.

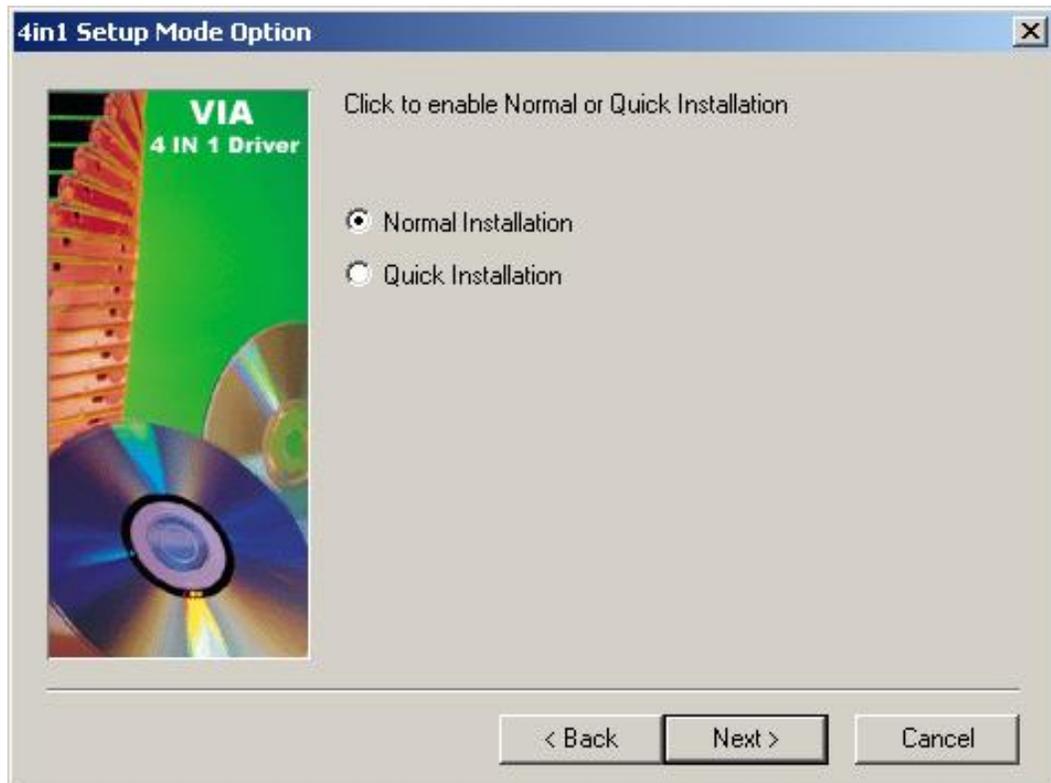


Figure 7-5: VIA Chipset Driver Installation Type

Step 7: Select the setup components (see **Figure 7-6**) that must be installed in the system. There are setup components:

- VIA PCI IDE Bus Driver
- AGP Driver (AGP3.0 Supported)
- VIA INF Driver 1.70A

Click **"NEXT"** to continue the installation.

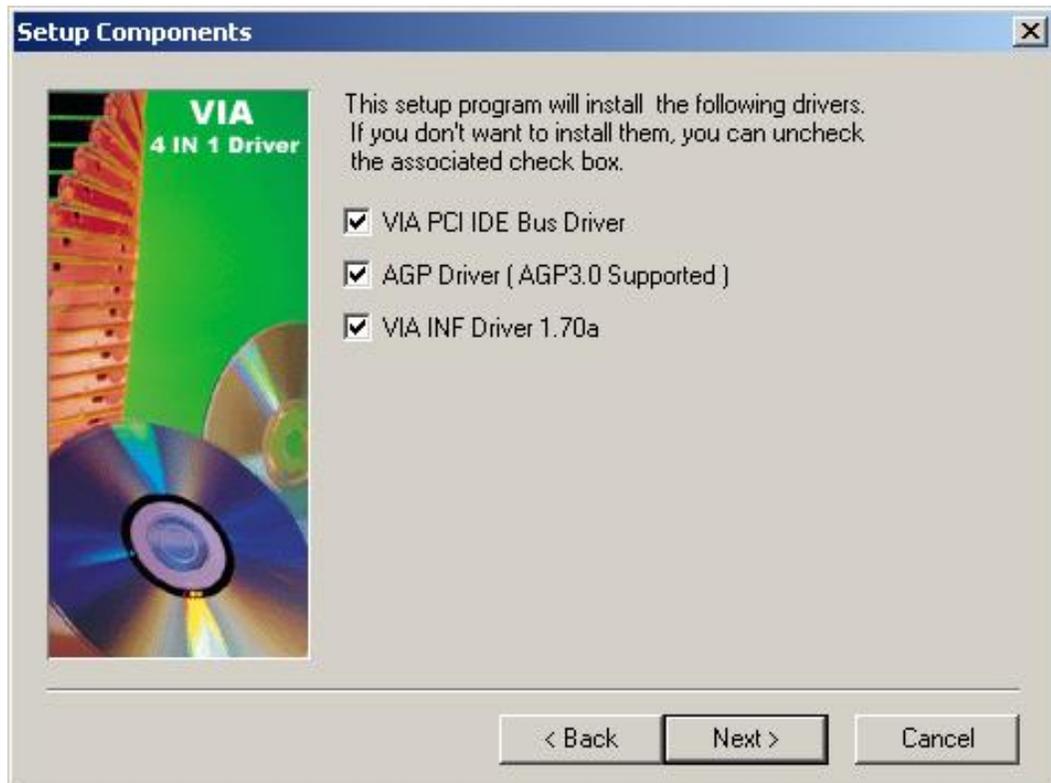


Figure 7-6: Driver Selection

Step 8: The setup then prompts the user (see **Figure 7-7**) if the VIA PCI IDE Bus Driver must be installed on the system. Select install or uninstall. Click "**NEXT**" to continue.

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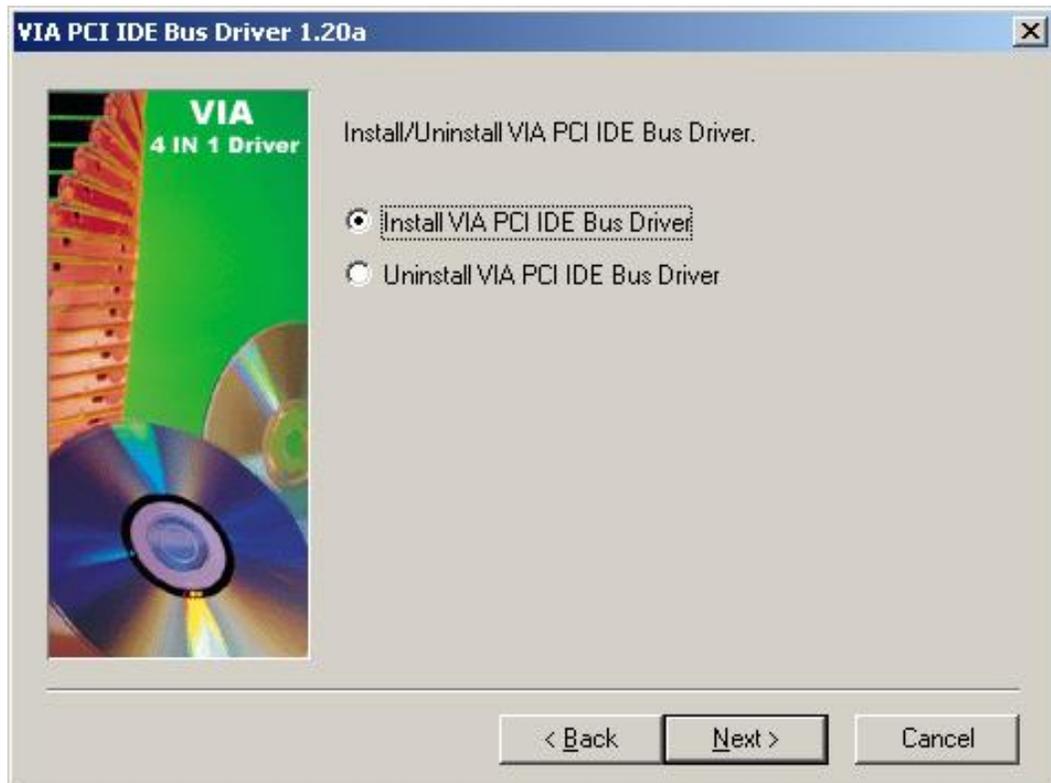


Figure 7-7: VIA PCI IDE Bus Driver Selection

Step 9: The setup then prompts the user (see **Figure 7-8**) if the AGP driver must be installed on the system. Select install or uninstall. Click "**NEXT**" to continue.

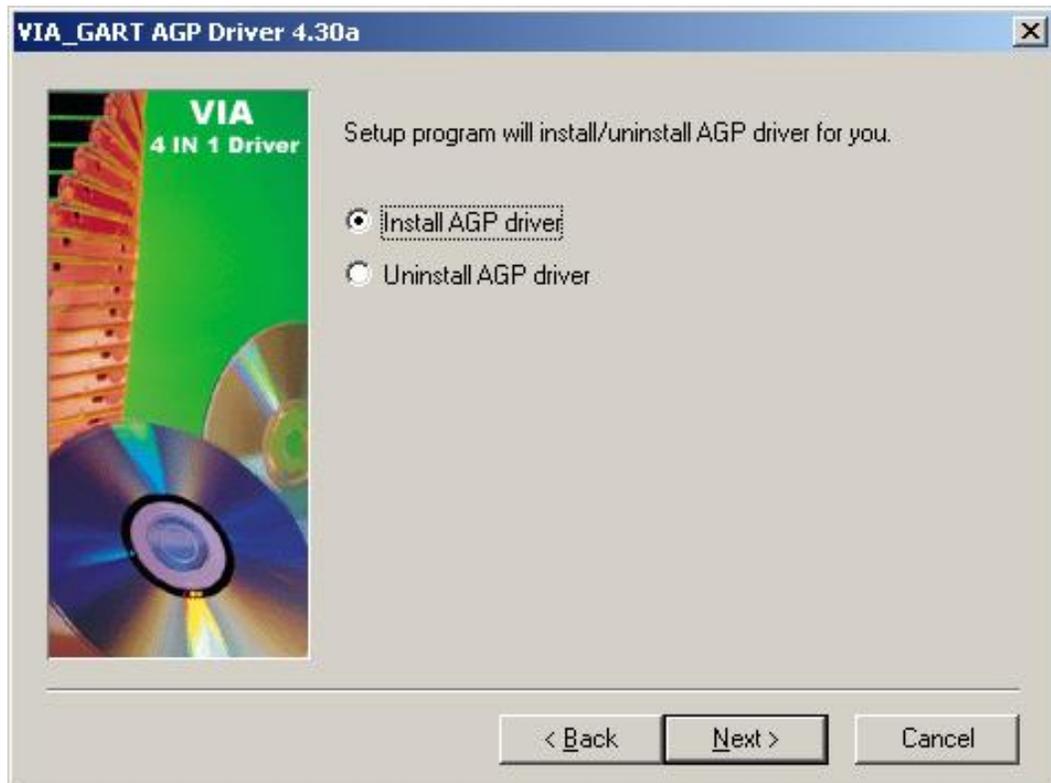


Figure 7-8: AGP Driver Selection

Step 10: The drivers are then installed onto the system. After the installation is complete the user is prompted to restart the computer now or later. (See **Figure 7-9**)
Select when the computer must be restarted. Click **“OK”** to exit the installation program.

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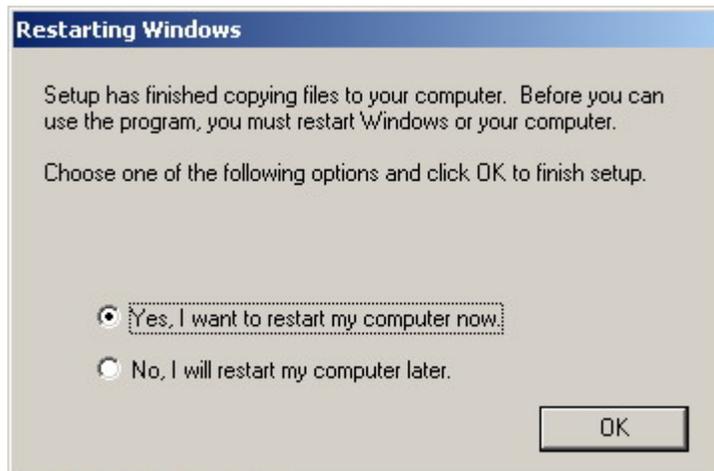


Figure 7-9: Restart the Computer

7.3 RealTek Audio Driver Installation

To install the RealTek AC'97 Audio driver, please follow the steps below:

Step 1: Insert the CD into the system that contains the WAFER-MARK board.

Step 2: Open the "WAFER-MARK" folder. Open the "Audio" subfolder. (See **Figure 7-10**)



Figure 7-10: Access the Audio Driver Folder

Step 3: Click the Setup utility icon shown in **Figure 7-11**.



Figure 7-11: Setup Utility Icon

Step 4: The install shield wizard for the audio driver starts. See **Figure 7-12**.

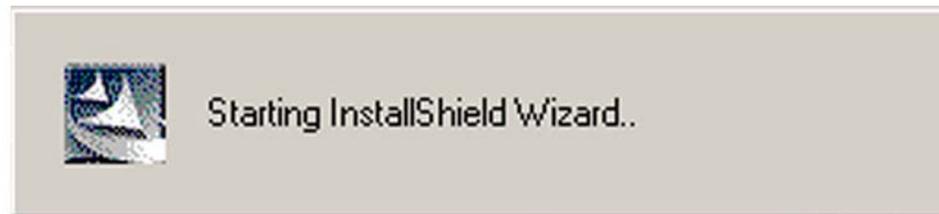


Figure 7-12: Audio Driver Install Shield Wizard Starting

Step 5: The RealTek Audio Setup prepares the install shield to guide you through the rest of the setup process. See **Figure 7-13**.

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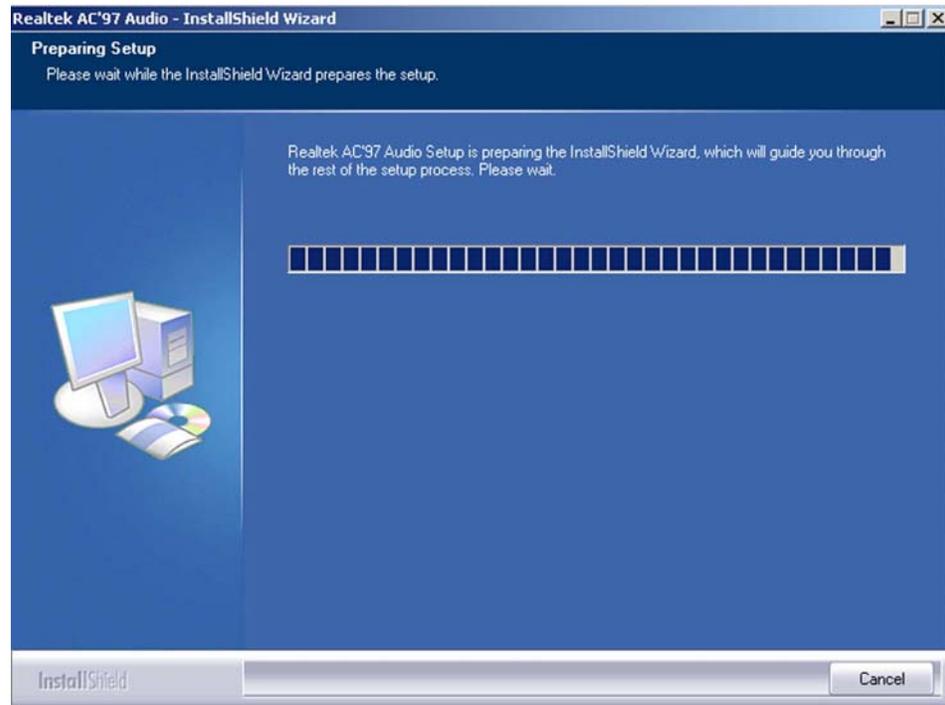


Figure 7-13: Audio Driver Setup Preparation

- Step 6:** The welcome screen shown in **Figure 7-14** appears. Click the “**NEXT**” button to continue the installation. The install shield starts to configure the new software as shown in **Figure 7-15**.

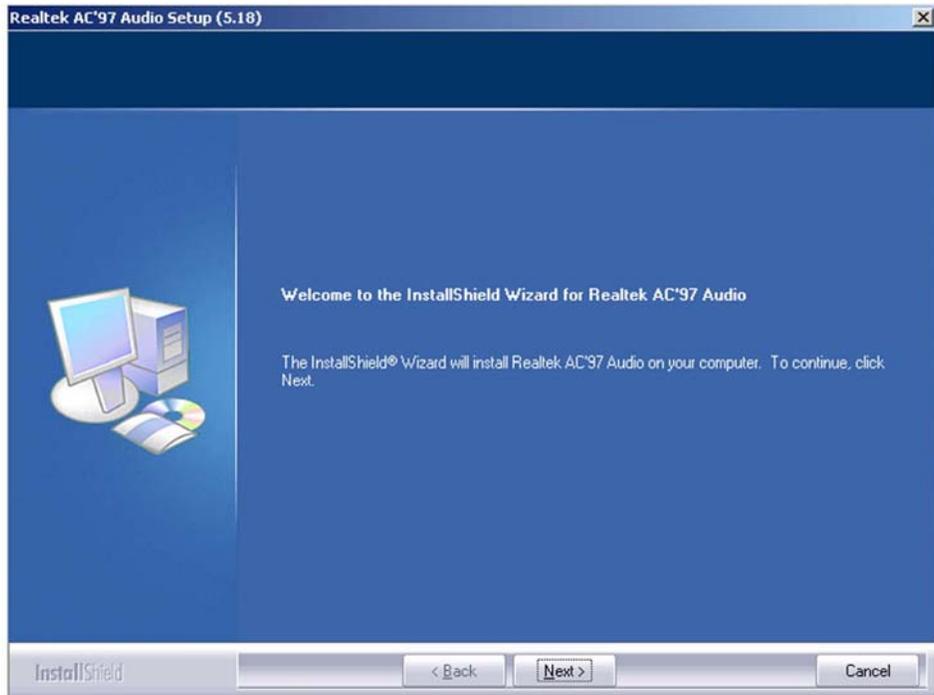


Figure 7-14: Audio Driver Welcome Screen

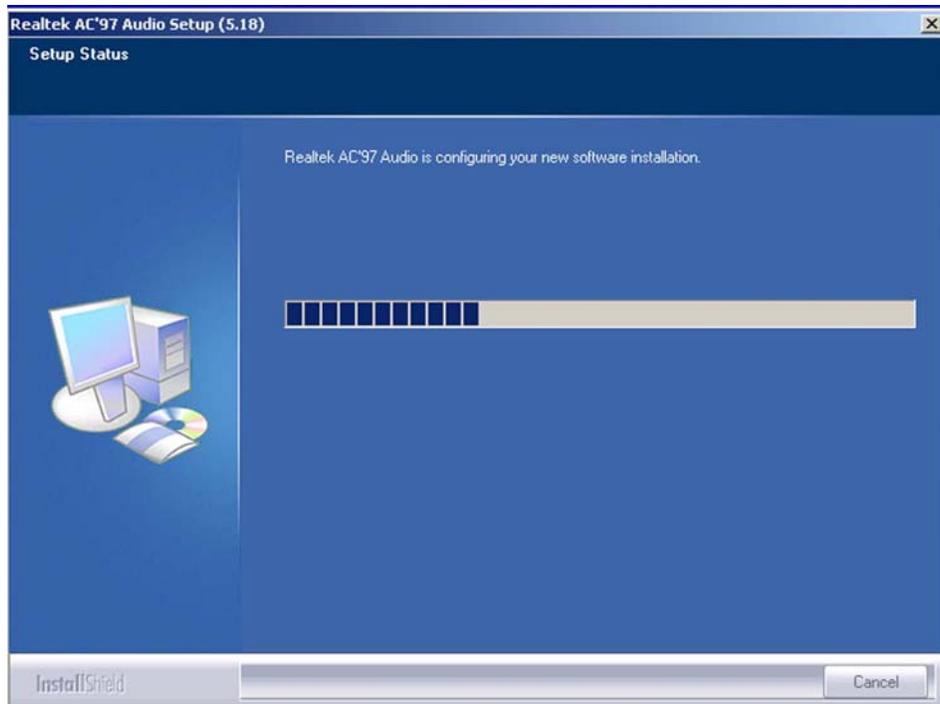


Figure 7-15: Audio Driver Software Configuration

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Step 7: The “Digital Signal Not Found” screen shown in **Figure 7-16** appears. Click “YES” to continue the installation.

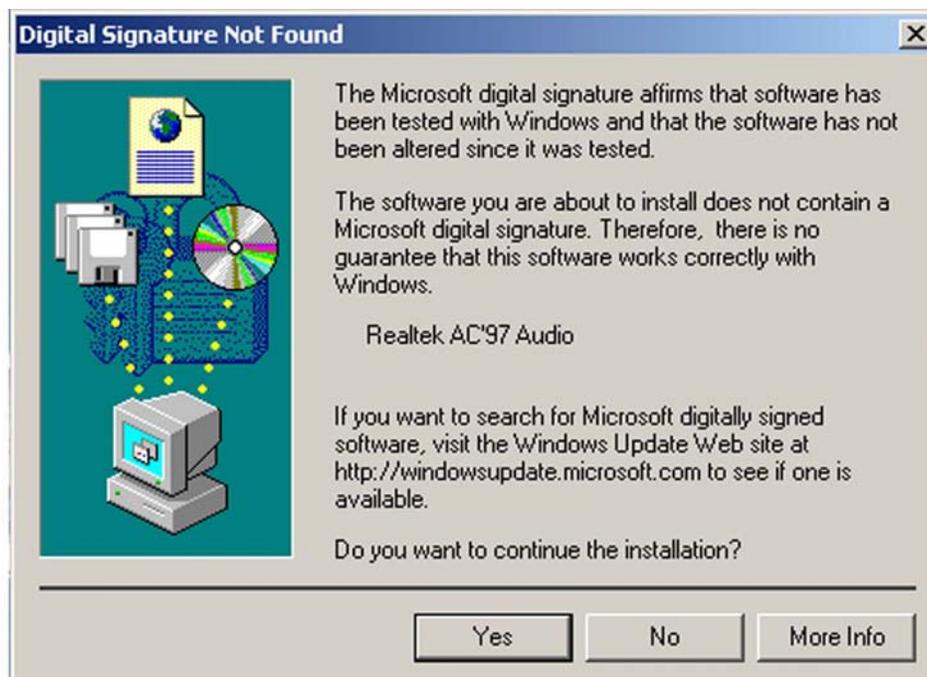


Figure 7-16: Audio Driver Digital Signal

Step 8: The installation of the driver begins. See **Figure 7-17**.

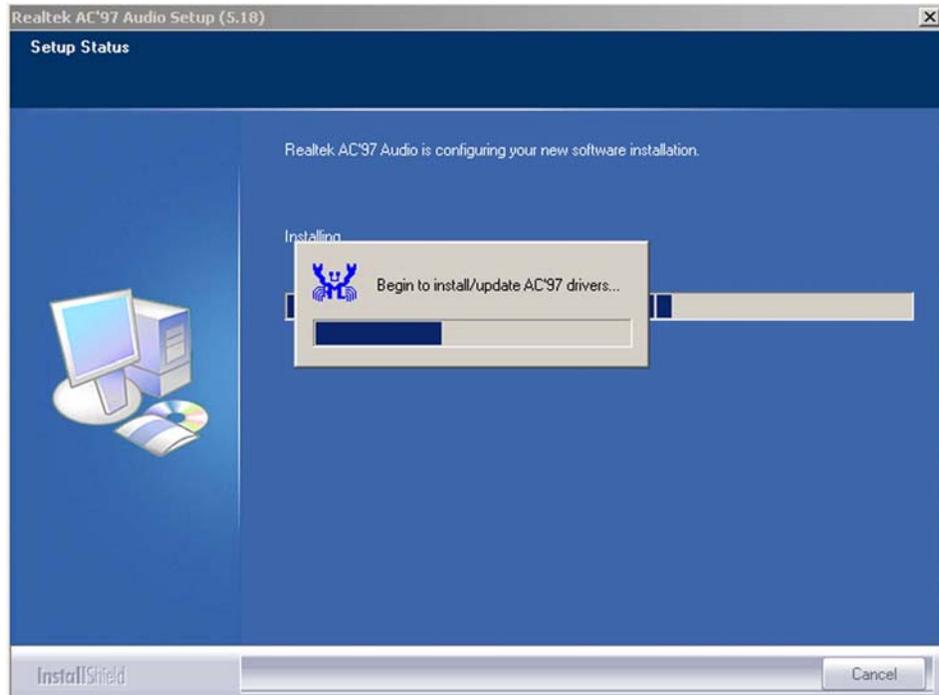


Figure 7-17: Audio Driver Installation Begins

Step 9: After the driver installation process is complete, a confirmation screen shown in **Figure 7-18** appears.

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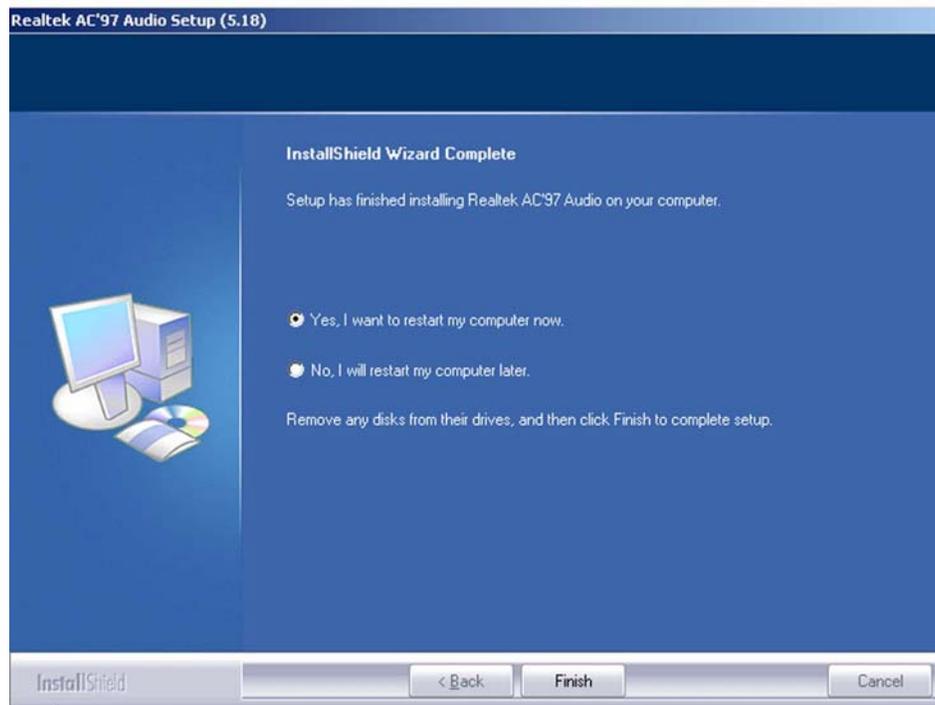


Figure 7-18: Audio Driver Installation Complete

Step 10: Select when the system should be restarted, now or later. (see **Figure 7-18**)

Step 11: Click “FINISH” to complete the installation.

7.3.1 LAN Driver Installation

To install the LAN driver, follow the steps below:

Step 1: Insert the CD into the system that contains the WAFER-MARK board.

Step 2: Open the “WAFER-MARK” folder. Open the “LAN” subfolder. (See **Figure 7-19**)

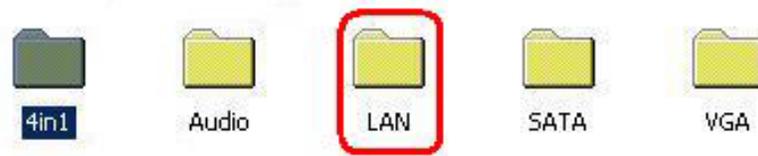


Figure 7-19: Access the LAN Driver Folder

Step 3: Click the Setup utility icon shown in **Figure 7-20**.



Figure 7-20: Setup Utility Icon

Step 4: Once the **Setup** icon is double clicked, a **Welcome** screen shown in **Figure 7-21** appears.

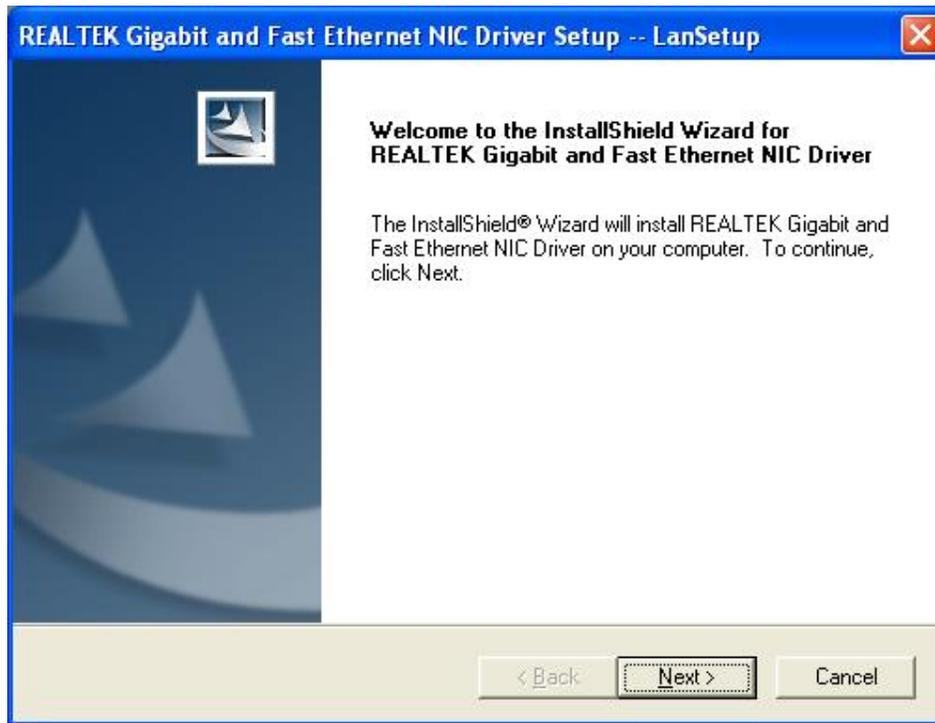


Figure 7-21: LAN Driver Welcome Screen

Step 5: To continue installing click "**Next.**" The driver is installed and a confirmation screen at the end of the installation appears. (See **Figure 7-22**)

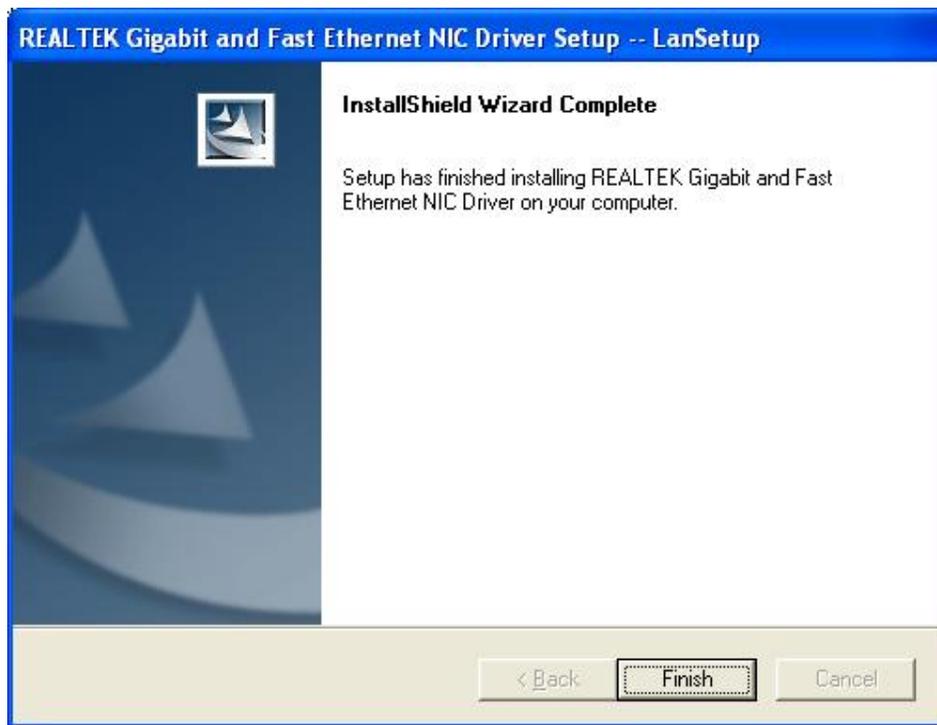


Figure 7-22: LAN Driver Installation Complete

Step 6: Click "Finish" to complete the installation.

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Appendix

A

BIOS Options

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Appendix

B

GPIO Connection

B.1 DIO Interface Introduction

The DIO connector on the WAFER-MARK is interfaced to GIO ports on the VIA VT82C686B Super I/O chipset. The DIO has both 4-bit digital inputs and 4-bit digital outputs. The digital inputs and digital outputs are generally control signals that control the on/off circuit of external devices or TTL devices. Data can be read or written to the selected address to enable the DIO functions.



NOTE:

For further information, please refer to the VIA datasheet for the VIA VT82C686B chipset.

B.2 DIO Connector Pinouts

The following table describes how the DIO connector pins are connected to the Super I/O GPIO port 1.

Pin No	Description	Super I/O Pin	Super I/O Pin Description
1	Ground	N/A	N/A
2	VCC	N/A	N/A
3	Output 0	GP14	General purpose I/O port 1 bit 4.
4	Output 1	GP15	General purpose I/O port 1 bit 5.
5	Output 2	GP16	General purpose I/O port 1 bit 6.
6	Output 3	GP17	General purpose I/O port 1 bit 7.
7	Input 0	GP10	General purpose I/O port 1 bit 0.
8	Input 1	GP11	General purpose I/O port 1 bit 1
9	Input 2	GP12	General purpose I/O port 1 bit 2
10	Input 3	GP13	General purpose I/O port 1 bit 3

B.3 Assembly Language Samples

B.3.1 Enable the DIO Input Function

The BIOS interrupt call INT 15H controls the digital I/O. An assembly program to enable digital I/O input functions is listed below.

MOV	AX, 6F08H	Sets the digital port as input
INT	15H	Initiates the INT 15H BIOS call

B.3.2 Enable the DIO Output Function

The BIOS interrupt call INT 15H controls the digital I/O. An assembly program to enable digital I/O output functions is listed below.

MOV	AX, 6F09H	Sets the digital port as output
MOV	BL, 09H	
INT	15H	Initiates the INT 15H BIOS call

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Appendix

C

Watchdog Timer



NOTE:

The following discussion applies to DOS environment. IEI support is contacted or the IEI website visited for specific drivers for more sophisticated operating systems, e.g., Windows and Linux.

The Watchdog Timer is provided 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 correctly, Watchdog Timer either performs a hardware reset (cold boot) or a Non-Maskable Interrupt (NMI) to bring the system back to a known state.

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

INT 15H:

AH – 6FH Sub-function:	
AL – 2:	Sets the Watchdog Timer's period.
BL:	Time-out value (Its unit-second is dependent on the item "Watchdog Timer unit select" in CMOS setup).

Table C-1: AH-6FH Sub-function

Call sub-function 2 to set the time-out period of Watchdog Timer first. If the time-out value is not zero, the Watchdog Timer starts counting down. While the timer value reaches zero, the system resets. To ensure that this reset condition does not occur, calling sub-function 2 must periodically refresh the Watchdog Timer. However, the Watchdog timer is disabled if the time-out value is set to zero.

A tolerance of at least 10% must be maintained to avoid unknown routines within the operating system (DOS), such as disk I/O that can be very time-consuming.



NOTE:

When exiting a program it is necessary to disable the Watchdog Timer, otherwise the system resets.

Example program:

```
; INITIAL TIMER PERIOD COUNTER
```

```
;
```

```
W_LOOP:
```

```

MOV    AX, 6F02H    ;setting the time-out value
MOV    BL, 30      ;time-out value is 48 seconds
INT    15H

```

```
;
```

```
; ADD THE APPLICATION PROGRAM HERE
```

```
;
```

```

CMP    EXIT_AP, 1    ;is the application over?
JNE    W_LOOP      ;No, restart the application

```

```

MOV    AX, 6F02H    ;disable Watchdog Timer
MOV    BL, 0        ;
INT    15H

```

```
;
```

```
; EXIT ;
```

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Appendix

D

Address Mapping

D.1 Address Map

I/O address Range	Description
000-01F	DMA Controller
020-021	Interrupt Controller
040-043	System time
060-06F	Keyboard Controller
070-07F	System CMOS/Real time Clock
080-09F	DMA Controller
0A0-0A1	Interrupt Controller
0C0-0DF	DMA Controller
0F0-0FF	Numeric data processor
1F0-1F7	Primary IDE Channel
2F8-2FF	Serial Port 2 (COM2)
378-37F	Parallel Printer Port 1 (LPT1)
3B0-3BB	VIA Graphics Controller
3C0-3DF	VIA Graphics Controller
3F6-3F6	Primary IDE Channel
3F8-3FF	Serial Port 1 (COM1)

Table D-1: IO Address Map

D.2 1st MB Memory Address Map

Memory address	Description
00000-9FFFF	System memory
A0000-BFFFF	VGA buffer
F0000-FFFFFF	System BIOS
1000000-	Extend BIOS

Table D-2: 1st MB Memory Address Map

D.3 IRQ Mapping Table

IRQ0	System Timer	IRQ8	RTC clock
IRQ1	Keyboard	IRQ9	ACPI
IRQ2	Available	IRQ10	LAN
IRQ3	COM2	IRQ11	LAN/USB2.0/SATA
IRQ4	COM1	IRQ12	PS/2 mouse
IRQ5	SMBus Controller	IRQ13	FPU
IRQ6	FDC	IRQ14	Primary IDE
IRQ7	Parallel Port	IRQ15	Secondary IDE

Table D-3: IRQ Mapping Table

D.4 DMA Channel Assignments

Channel	Function
0	Available
1	Available
3	Available
4	Cascade for DMA controller 1
5	Available
6	Available
7	Available

Table D-4: IRQ Mapping Table

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Appendix

E

External AC'97 Audio CODEC

E.1 Introduction

The motherboard comes with an on-board Realtek ALC655 CODEC. Realtek ALC655 is a 16-bit, full duplex AC'97 Rev. 2.3 compatible audio CODEC with a sampling rate of 48KHz.

E.1.1 Accessing the AC'97 CODEC

The CODEC is accessed through a connector on the WAFER-MARK motherboard. Connect the audio kit to the connector.

E.1.2 Driver Installation

The driver installation has been described in **Chapter 7**.

After rebooting the sound effect configuration utility appears in the Windows Control Panel (see **Figure E-1**). If the peripheral speakers are properly connected, sound effects should be heard.

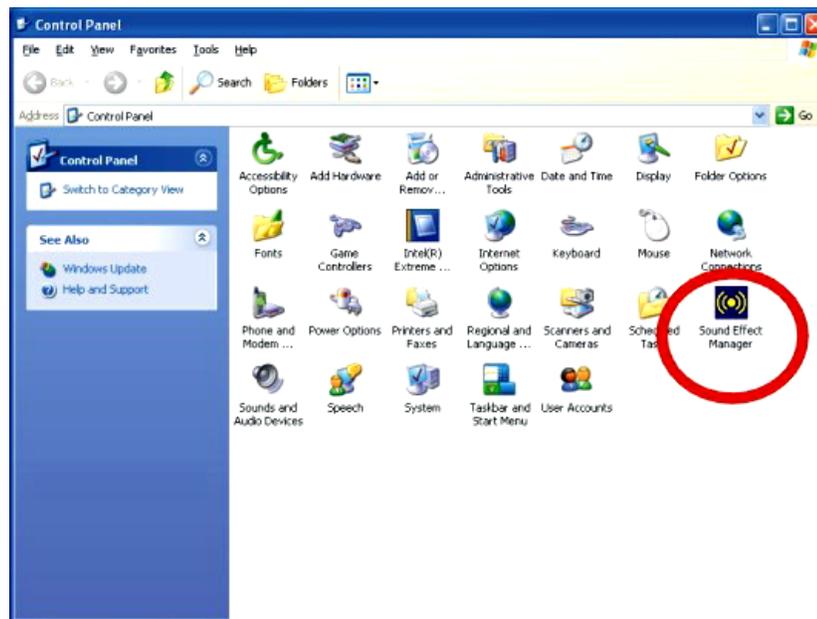


Figure E-1: Sound Effect Manager Control Panel

E.2 Sound Effect Configuration

E.2.1 Accessing the Sound Effects Manager

To access the **Sound Effects Manager**, please do the following:

Step 1: Install the audio CODEC driver.

Step 2: Click either:

- The Sound Effect Manager icon in the Notification Area of the system task bar (see **Figure E-2**), or
- The Sound Effect Manager icon in the Control Panel (**Figure E-3**).



Figure E-2: Sound Effect Manager Icon [Task Bar]

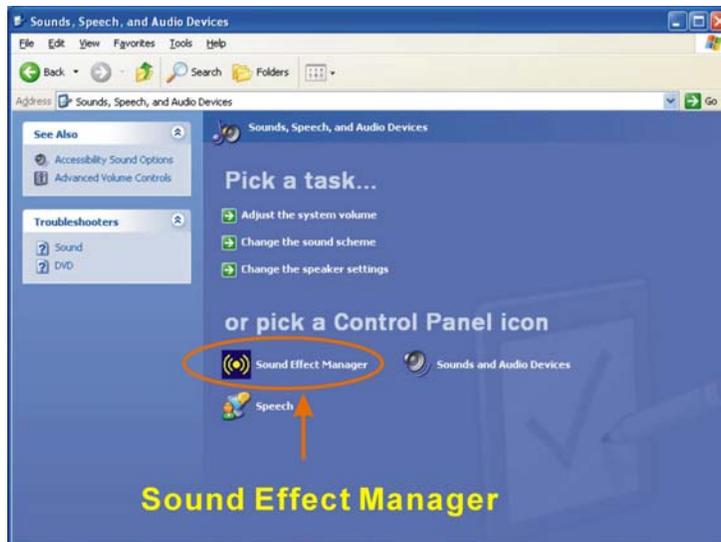


Figure E-3: Sound Effect Manager Icon [Control Panel]

Step 3: The sound effect manager appears.

**NOTE:**

The Sound Effect Manager shown above is for the RealTek ALC655 audio CODEC. Different CODECs may have different sound manager appearances.

The following section describes the different configuration options in the Sound Effect Manager.

E.2.2 Sound Effect Manager Configuration Options

The **Sound Effects Manager** enables configuration of the items listed below. To configure these items click the corresponding menu tab in the **Sound Effects Manager** in **Figure E-3**.

**NOTE:**

The **Karaoke Mode** is configured in the **Sound Effect** menu. To access Karaoke configuration settings, click on the **Sound Effect** menu tab.

- Sound Effect
- Karaoke Mode
- Equalizer
- Speaker Configuration
- Speaker Test
- S/PDIF-In
- S/PDIF-Out
- Connector Sensing
- HRTF Demo

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- Microphone Effect
 - General
-



NOTE:

Not all RealTek **Sound Effect Managers** have all the above listed options. The Sound Effect Manager loaded onto the system may only have some of the options listed above.

Below is a brief description of the available configuration options in the **Sound Effects Manager**.

- **Sound Effect:**- Select a sound effect from the 23 listed options in the drop down menu. Selected sound effect properties can be edited. To edit the sound effect click "EDIT."
- **Karaoke Mode:**- The **Karaoke Mode** is accessed in the Sound Effect window. The **Voice Cancellation** disables the vocal part of the music being played. The **Key adjustment** up or down arrow icons enables users to define a key that fits a certain vocal range.
- **Equalizer Selection:**- Preset equalizer settings enable easy audio range settings. Ten frequency bands can be configured.
- **Speaker Configuration:**- Multi-channel speaker settings are configured in this menu. Configurable options include:
 - Headphone
 - Channel mode for stereo speaker output
 - Channel mode for 4 speaker output
 - Channel mode for 5.1 speaker output
 - Synchronize the phonejack switch with speakers settings
- **Speaker Test:**- Each speaker connected to the system is tested individually to see if the 4-channel or 6-channel audio operates properly.

- **S/PDIF-In & S/PDIF-Out**:- These functions are currently not supported.
- **Connector Sensing**:- Realtek ALC655 detects if an audio device is plugged into the wrong connector. If an incorrect device is plugged in a warning message appears.
- **HRTF Demo**:- Adjust HRTF (Head Related Transfer Functions) 3D positional audio here before running 3D applications.
- **Microphone Effect**:- Microphone noise suppression is enabled in this menu.
- **General**:- General information about the installed AC'97 audio configuration utility is listed here.

Appendix

F

RAID Setup

F.1 Introduction

The ALi M5283 SATA RAID chipset can control parallel ATA (PATA) and serial ATA (SATA) disks. The ALi controller supports PATA UDMA transfer mode up to mode 6 and SATA 1 disk drives. The ALi M5283 also has a cost-effective RAID functionality that can increase the data read/write speed and provide protection to data by distributing mirrored duplicates of data onto two disk drives (RAID 1).



CAUTION:

A configured RAID volume (which may consist of multiple hard drives) appears to an operating system as a contingent storage space. The operating system will not be able to distinguish the physical disk drives contained in a RAID configuration.

F.1.1 Precautions

One key benefit a RAID configuration brings is that a single hard drive can fail within a RAID array without damaging data. With RAID1 array, a failed drive can be replaced and the RAID configuration restored.



WARNING:

Irrecoverable data loss occurs if a working drive is removed when trying to remove a failed drive. It is strongly recommended to mark the physical connections of all SATA disk drives. Drive locations can be identified by attaching stickers to the drive bays. If a drive member of a RAID array should fail, the failed drive can then be correctly identified.

**CAUTION:**

Do not accidentally disconnect the SATA drive cables. Carefully route the cables within the chassis to avoid system down time.

F.2 Features and Benefits

- Supports RAID levels 0, 1, and JBOD
- Supports connectivity to two disk drives
- Supported Operating Systems include: Windows 98/Me, Windows 2000 and Windows XP
- Windows-based software for RAID management

F.3 Accessing the ALi RAID Utility

To access the **Ali RAID Utility**, please follow the steps below:

Step 4: Connect SATA drives to the system. Connect two SATA drives to the system. Make sure the drives have the same capacity, are the same type and have the same speed.

**NOTE:**

Make sure the SATA drives are EXACTLY the same when they are configured in a RAID configuration (JBOD, RAID 0 or RAID 1). If they are not the same size, disk drive capacity is sacrificed and overall performance affected.

Step 5: Enable SATA drives in BIOS. Start the computer and access the **Phoenix Award BIOS** setup program. Next, open the **Advanced BIOS Features** menu. Enable the **SATA BOOT ROM Control BIOS** option. (See **Chapter 6, Section**

6.3)

- Step 6: Save and Exit BIOS.** After the **SATA BOOT ROM Control BIOS** option is enabled, save and exit the BIOS.
- Step 7: Reboot the system.** Reboot the system after saving and exiting the BIOS.
- Step 8: Press Ctrl-A.** When the screen in **Figure F-1** appears press Ctrl-A to enter the ALi RAID BIOS setup program.

```
ALi RAID BIOS V1.XX
(c) ALi Corporation 2005, All Rights Reserved.
Identifying IDE drives...

Channel 1 Master: None
Channel 1 Slave: None
Channel 2 Master: [Drive Brand Name] [Drive ID number] SATA 1 [Drive Capacity]
Channel 3 Master: [Drive Brand Name] [Drive ID number] SATA 1 [Drive Capacity]

Press Ctrl-A to enter ALi RAID BIOS setup utility
```

Figure F-1: Accessing ALi RAID BIOS Utility

- Step 9: Delete RAID settings and partitions.** The **RAID BIOS Setup Utility** in **Figure F-2** appears. Before configuring the array select the **"Delete All RAID Setting & Partition"**.

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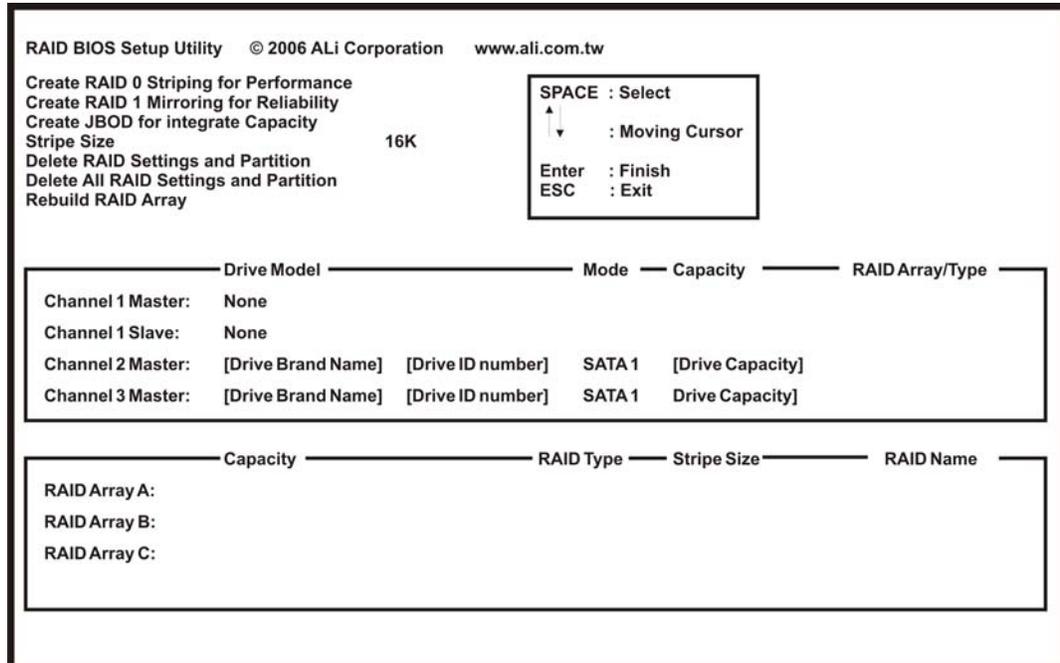


Figure F-2: RAID BIOS Setup Utility

Step 10: Configure the RAID settings. Use the RAID BIOS Setup Utility in Figure F-2 to configure the RAID array. Brief descriptions are given below.

Step 11: Install the OS. After the RAID array has been configured (see below) install the OS. To do this, please refer to the documentation that came with the OS.

F.4 RAID Options:

F.4.1 Create RAID 0 Striping for Performance



WARNING:

All data previously stored on the member drives of a RAID configuration **are destroyed** during the RAID initialization process. If “used” drives are used to create a RAID array, make sure the data has been moved or backed up before creating a RAID array out of the disk

drives.

Step 1: Select “Create RAID 0 Striping for Performance”. Use the arrow keys to highlight **Create RAID0 Striping for Performance** and press **ENTER**. A flashing ‘S’ appears on the **Drive Menu** where the member drives to be included in the RAID 0 array can be chosen.

Step 2: Select **RAID array drive members**. Use the space bar to select members of the RAID array. The flashing cursor changes to a lower case ‘s’ once any of the connected disk drives has been selected. Follow the same method to select another member drive.

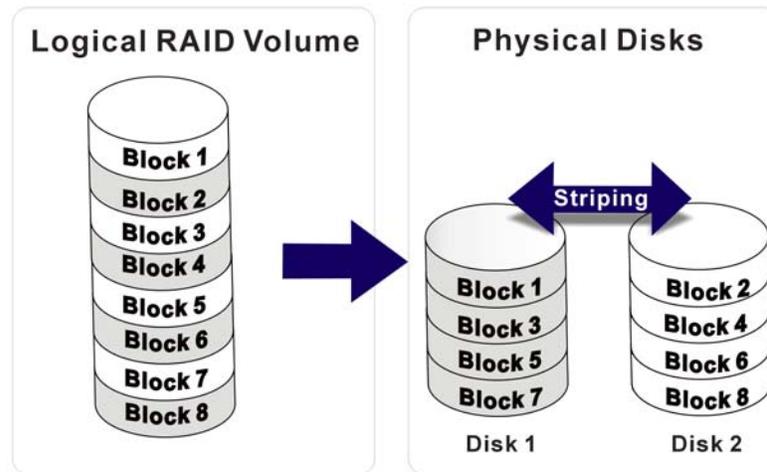
Step 3: **Confirm**. The **Create RAID0(Y/N)** confirm box appears. Press **Y**.

Step 4: **Name the array**. Enter a nickname for the created array. Upper and lower case alphabetic, numeric, space, and underscore characters are all applicable for naming an array.



NOTE:

1. To reduce the chance of losing data, ALi imposes certain limitations on the RAID configuration options. PATA drives connected on the same IDE channel cannot be selected as the members of a RAID 0 array. Avoid mixing PATA and SATA disk drives in a RAID 0 array.
 2. Always use disk drives of the same capacity to create a RAID array. The excessive capacity of a larger disk drive cannot be utilized because data stripes are equally distributed across all members of a RAID array.
-



F.4.2 Create RAID 1 Mirroring for Reliability



WARNING:

All data previously stored on the member drives of a RAID configuration **is destroyed** during the RAID initialization process. If “used” drives are used to create a RAID array, make sure the data has been moved or backed up before creating a RAID array out of the disk drives.

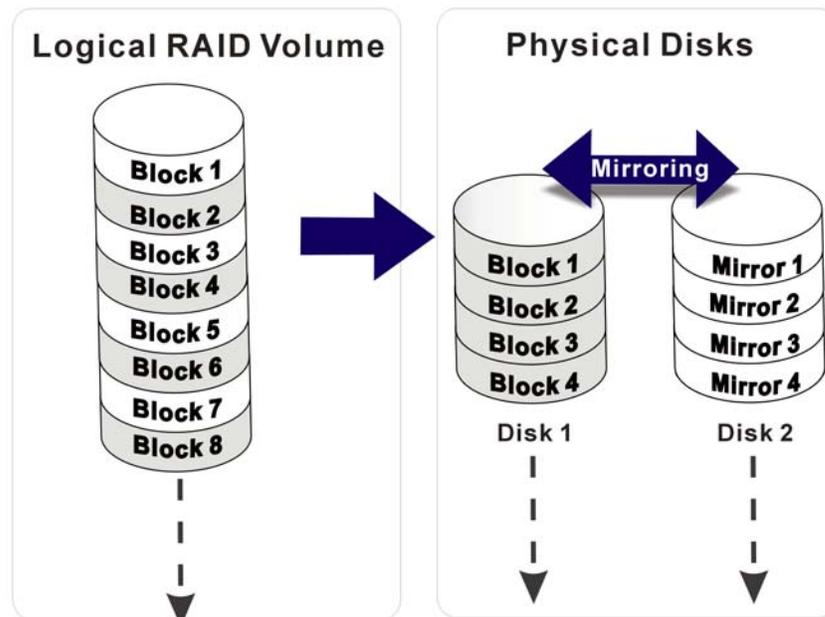
- Step 1:** Select “Create RAID 1 Striping for Reliability”. Use the arrow keys to highlight **Create RAID 1 Striping for Reliability** and press **ENTER**. A flashing ‘S’ appears on the **Drive Menu** where the member drives to be included in the RAID 0 array can be chosen.
- Step 2:** Select RAID array drive members. Use the space bar to select members of the RAID array. The flashing cursor changes to a lower case ‘s’ once any of the connected disk drives has been selected. Follow the same method to select another member drive.

- Step 3: Confirm.** The **Create RAID0(Y/N)** confirm box appears. Press **Y**.
- Step 4: Name the array.** Enter a nickname for the created array. Upper and lower case alphabetic, numeric, space, and underscore characters are all applicable for naming an array
- Step 5: View the array.** A prompt appears to proceed with drive copy. The **Source** and **Destination** drives are indicated as "M" and "m" in the **Drive Menu**.

**NOTE:**

To reduce the chance of losing data, ALi imposes certain limitations on the RAID configuration options. PATA drives connected on the same IDE channel cannot be selected as the members of a RAID 1 array. Avoid mixing PATA and SATA disk drives in a RAID 1 array.

Always use disk drives of the same capacity to create a RAID array. The excessive capacity of a larger disk drive cannot be utilized because data stripes are equally distributed across all members of a RAID array.



F.4.3 Create JBOD for Integrated Capacity

JBOD is defined as “Just a Bunch of Drives.” JBOD provides neither performance gains nor data redundancy.



WARNING:

All data previously stored on the member drives of a RAID configuration **is destroyed** during the RAID initialization process. If “used” drives are used to create a RAID array, make sure the data has been moved or backed up before creating a RAID array out of the disk drives.

Step 1: Select “Create JBOD for Integrated Capacity”. Use the arrow keys to highlight **Create JBOD for Integrated Capacity** and press **ENTER**. A flashing ‘J’ appears on the **Drive Menu** where the member drives to be included in the JBOD array

can be chosen.

Step 2: Select RAID array drive members. Use the space bar to select members of the RAID array. The flashing cursor changes to a lower case 's' once any of the connected disk drives has been selected. Follow the same method to select another member drive.

Step 3: Confirm. The **Create RAID 0 (Y/N)** confirm box appears. Press **Y**.

Step 4: Name the array. Enter a nickname for the created array. Upper and lower case alphabetic, numeric, space, and underscore characters are all applicable for naming an array



NOTE:

To reduce the chance of losing data, ALi imposes certain limitations on the RAID configuration options. Parallel-ATA drives connected on the same IDE channel cannot be selected as the members of a RAID1 array. Avoid mixing Parallel-ATA and Serial-ATA disk drives in a RAID1 array.

F.4.4 Stripe Size

Changing the stripe size effects RAID 0 arrays. Configurable options are:

- 64K (default)
- 32K
- 16K
- 8K
- 4K

Select a small stripe size if the I/Os to the hard drives are small and occur randomly. Choose a larger stripe size if the I/Os are mostly large and come in sequential orders, e.g.,

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A/V playback and editing applications. The default value should be appropriate for most applications.

F.4.5 Delete RAID Setting & Partition



WARNING:

If a RAID configuration is deleted, all data previously stored on the member drives of the RAID configuration will also be deleted.

Step 1: Delete a RAID setting. Use the arrow keys to highlight **Delete RAID Setting & Partition** and press **ENTER**. A flashing 'E' appears at the **Drive Menu** where the member drives to be removed can be chosen.

Step 2: Confirm Delete. The **Data on RAID drives will be erased (Y/N)** confirm box appears. Press **Y**.

F.4.6 Delete All RAID Setting & Partition



WARNING:

If a RAID configuration is deleted, all data previously stored on the member drives of the RAID configuration will also be deleted.

Step 1: Delete RAID Settings. Use the arrow keys to highlight **Delete All RAID Setting & Partition** and press **ENTER**.

Step 2: Confirm delete. The **Data on RAID drives will be erased (Y/N)** confirm box appears. Press **Y**.

F.4.7 Rebuild RAID Array

The **Rebuild RAID Array** option can rebuild a RAID array if a member of a RAID configuration should fail. Neither RAID 0 nor JBOD provides data redundancy. The **Rebuild RAID Array** option only applies to RAID1 arrays and is applicable when a member of a RAID1 configuration has failed.

Step 1: Select Rebuild Array. Use the arrow keys to highlight **Rebuild RAID Array** and press **ENTER**. A flashing 'R' appears in the list of existing arrays. The source and destination drives will be displayed.

Step 2: Confirm rebuild array. Press **Y** to begin the rebuild process.



NOTE:

A status bar will indicate the rebuild progress. Rebuild consumes considerable system resources and the time required for rebuilding a RAID array may vary depending on the size of stored data, disk drive capacity, and drive performance.

F.4.8 Select Boot Drive

Step 1: Select the Boot Drive. Use the arrow keys to highlight **Select Boot Drive** and press **ENTER**. A flashing 'A' appears at the **Drive Menu** where the boot drive can be chosen.

Step 2: Press ENTER. Press **ENTER** or the space bar to finish the configuration.

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