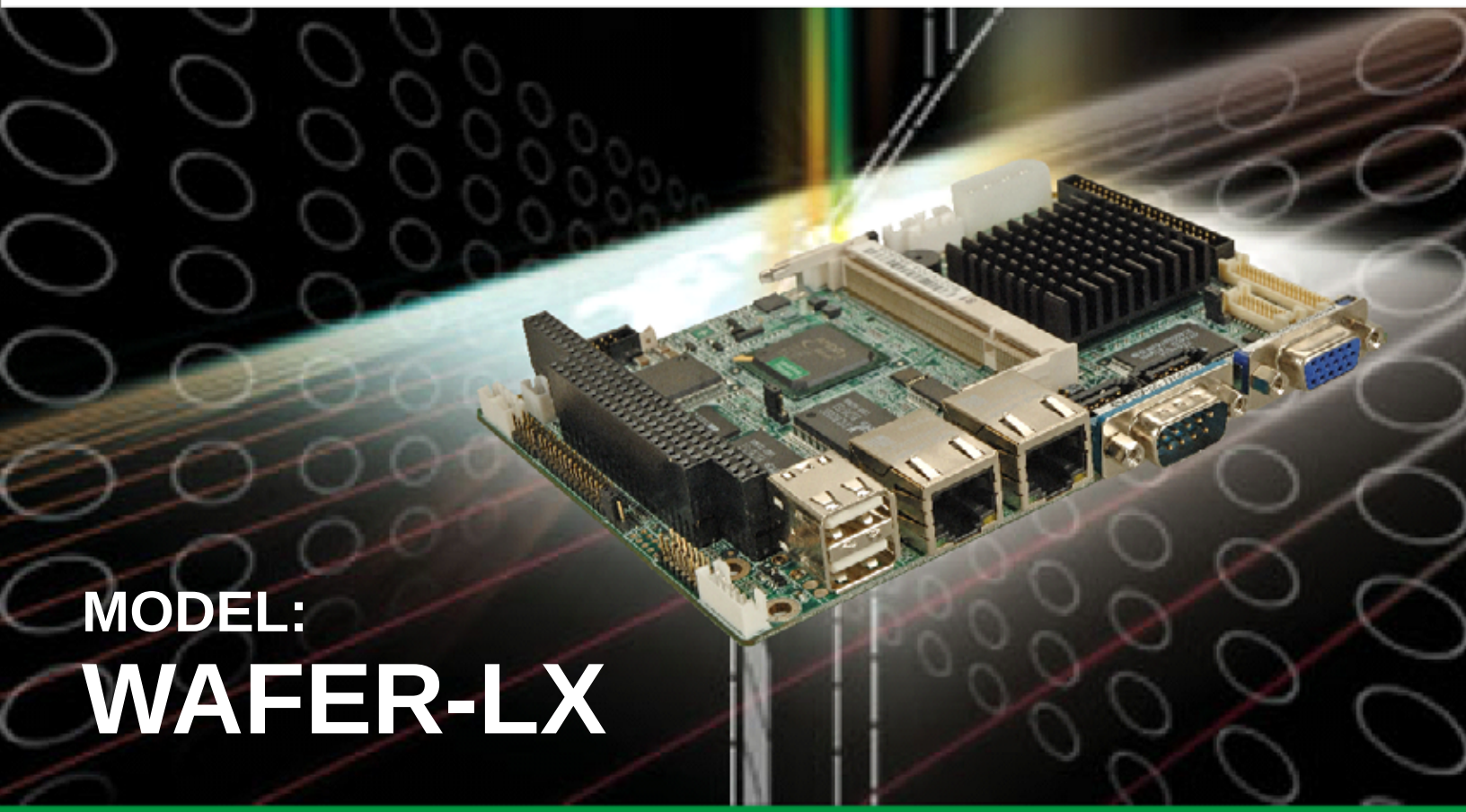
IEI Technology Corp.



MODEL:

WAFER-LX

3.5" Low Power AMD Geode-LX 800 Motherboard
CRT, LCD/LVDS, Dual LAN and SATA

User Manual

Rev. 1.22 – 24 February, 2009

RoHS Lead Free

Revision

Date	Version	Changes
24 February, 2009	1.22	Corrected fan voltage label
16 December, 2008	1.21	Corrected pin labels for ATX power
31 July, 2008	1.20	IDE master/slave jumper information added Updated manual template
31 December, 2006	1.10	Sec. 2.4 modified
30 September, 2006	1.00	Initial release

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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-LX 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-LX package.

- 1x WAFER-LX800 single board computer
- 1 x Mini jumper pack
- 1 x IDE flat cable 44P/44P
- 2 x SATA cables
- 1 x SATA power cable
- 1 x Audio cable
- 1 x KB/MS cable
- 1 x USB cable
- 1 x RS-232 cable
- 1x Utility CD
- 1x Quick Installation Guide

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

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Chapter

1

Introduction

1.1 Overview

The 3.5” WAFER-LX AMD LX-800 low power single board computer (SBC) is fully equipped with advanced multi-mode I/Os. The WAFER-LX is designed for system manufacturers, integrators, and VARs that want performance, reliability, and quality at a reasonable price.

1.1.1 Models

The WAFER-LX series has five models:

- WAFER-LX-800-R12
- WAFER-LX-WINXPE
- WAFER-LX-CENET050
- WAFER-LX-CLIENT-XPE
- WAFER-LX-CLIENT-CENET050

The specifications for the four models are show in **Table 1-1**.

WAFER-LX-	800-R12	WINXPE	CENET050	CLIENT-XPE	CLIENT-CENET050
AMD LX-800 CPU	Yes	Yes	Yes	Yes	Yes
SO-DIMM Memory*	No	Yes	Yes	Yes	Yes
CRT	Yes	Yes	Yes	Yes	Yes
LCD/LVDS	Yes	Yes	Yes	Yes	Yes
Dual LAN	Yes	Yes	Yes	Yes	Yes
SATA	Yes	Yes	No driver	Yes	No driver
Audio	Yes	Yes	Yes	Yes	Yes
IFM	No	512 MB	32 MB	512 MB	64 MB
WinXPE Image	No	Yes	No	Yes	No
WinCE Image	No	No	Yes	No	Yes
Thin Client Package	No	No	No	Yes	Yes

Table 1-1: WAFER-LX Model Specifications

* The preinstalled memory is a 256 MB DDR SO-DIMM memory module.

1.1.2 Applications

The WAFER-LX 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 Benefits

Some of the WAFER-LX benefits include:

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

1.1.4 Features

Some of the WAFER-LX features are listed below:

- 3.5” form factor
- RoHS compliant
- AMD LX-800 processor installed
- Dual-independent display functionality
- Low power consumption (6 Watts)
- Two high performance 10/100 megabit Ethernet controllers on-board
- Two SATA channels with transfer rates up to 150 MB/s on-board
- Four USB 2.0 devices on-board
- Integrated audio

1.1.5 Connectors

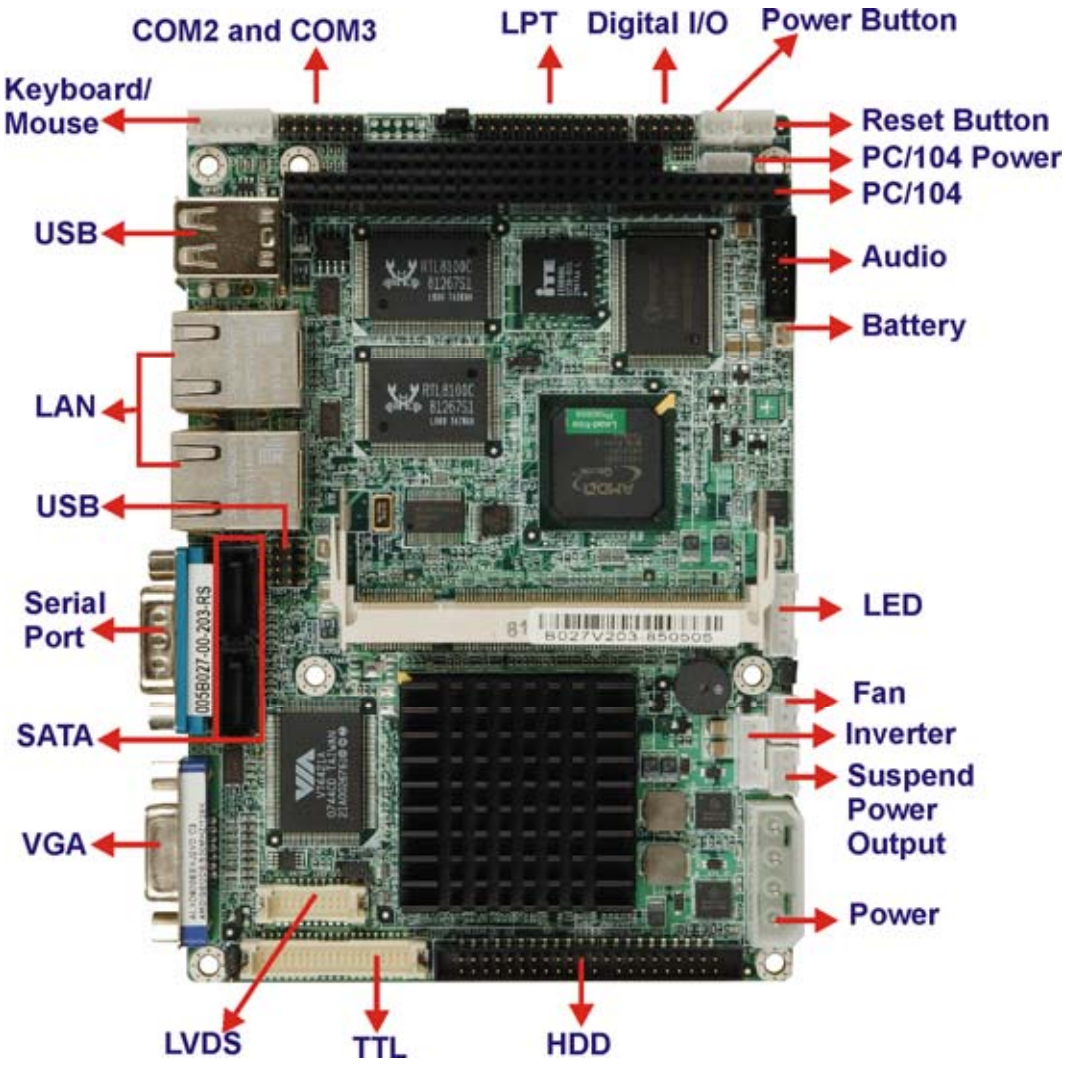


Figure 1-1: WAFER-LX Overview

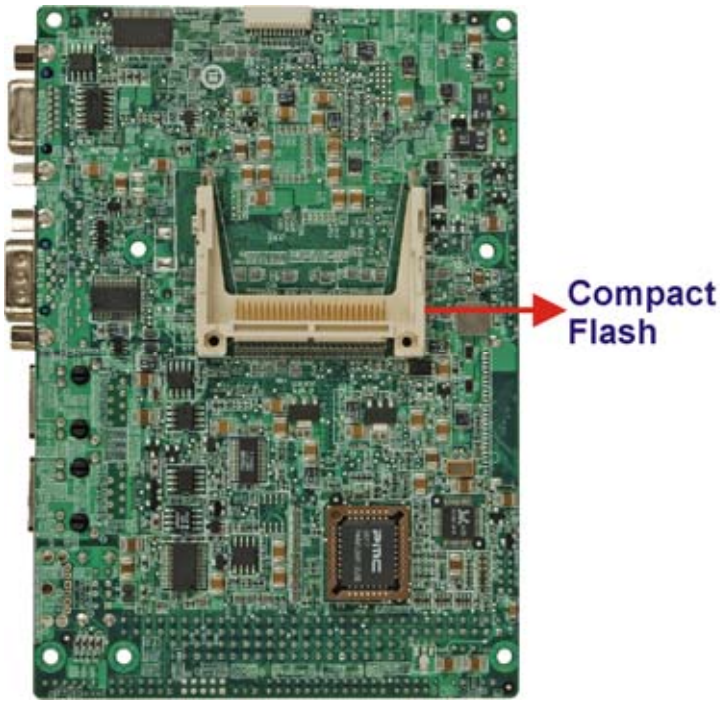


Figure 1-2: WAFER-LX Solder Side Overview

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

- 1 x AT power connector
- 1 x ATX power function connector
- 1 x Audio connector
- 1 x Battery connector
- 1 x Compact Flash (CF) connector (solder side)
- 1 x External LED connector
- 1 x Fan connector
- 1 x Floppy disk drive connector (slim type, optional)
- 1 x General purpose input/output (GPIO) connector
- 1 x IDE Interface connectors (44-pin)
- 1 x Inverter power connector
- 1 x Keyboard/mouse connector
- 1 x Parallel port connector
- 1 x PC/104 slot
- 1 x PC/104 power connector

- 1 x Reset button connector
- 1 x RS-232/422/485 serial port connector
- 2 x SATA connectors
- 1 x Suspend power input connector
- 1 x TFT LCD LVDS interface connector
- 1 x TFT LCD TFT interface connector
- 1 x USB connector
- 1 x SO-DIMM socket

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

- 2 x Ethernet connectors
- 1 x Dual USB connector
- 1 x Serial port connector
- 1 x VGA connector

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

- AT power select jumper
- COM3 function select jumper

1.1.6 Technical Specifications

WAFER-LX technical specifications are listed in **Table 1-2**.

Specification	WAFER-LX
Form Factor	3.5” form factor
CPU	AMD Geode™ LX 800 500 MHz
Southbridge Chipset	AMD Geode™ CS5536
Display	CRT integrated in AMD Geode™ LX800
TTL/LVDS	18-bit single channel TFT LCD
Memory	Supports one 1 GB DDR 333/400 200-pin SO-DIMM SDRAM module
BIOS	Award BIOS

Specification	WAFER-LX
SSD	CompactFlash®
Super I/O	W83627EHG
Audio	AC'97 Codec Realtek ALC203
LAN	10/100 Base-T dual RTL8100C
COM	Two RS-232 One RS-422/485
USB2.0	Four USB 1.1 or USB 2.0 devices supported
IDE	One 44-pin IDE connects to two Ultra ATA33/66/100 devices
Floppy	One floppy disk drive connector
Parallel Port	One LPT port connector
SATA	Two SATA connectors with transfer rates up to 150 Mb/sec
KB/MS	One on-board keyboard/mouse connector
Watchdog Timer	Software programmable 1-255 sec. by supper I/O
Digital I/O	One GPIO connector
Fan connector	One CPU fan connector
Expansion	One PC/104 slot
Power Supply	+5 V ± 5% AT/ATX power support (12 V only necessary for LCD power)
Temperature	0ºC - 60ºC
Humidity (operating)	5%~95% non-condensing
Dimensions	145 mm x 102 mm
Weight (GW/NW)	670g/230g

Table 1-2: Technical Specifications

1.2 Operating System Packages

1.2.1 Windows XPE SP2 (350 MB image size stored in a 512 MB CF card)

1. Advance Set Top Box: The package includes the components required to create the advanced Set-Top Box (ASTB). The package provides the functionality of the basic set-top box and also supports DVD playback, DVR, Web browsing, networking, universal serial bus (USB), terminal services, and Windows Media Player.
2. Internet Explorer.
3. Net Framework 1.1.
4. EWF (Enhanced Write Filter).
5. CMD - Windows Command Processor.
6. Device Manager and Task Manager.
7. Video / audio and other board chipset drivers.
8. PS/2 keyboard / mouse drivers.
9. IDE Compact Flash/HDD/Flash Disk/CD-ROM support

1.2.2 Windows CE 5.0 (around 22 MB, CF must > 32 MB)

1. Enterprise Web Pad (provides the starting point for a range of Web Pad-based devices.)
2. IE 6.0, Media Player, Excel Viewer, Image Viewer, PDF viewer, PowerPoint viewer, Word viewer, and WordPad.
3. Support hive-based registry.
4. SIP (Software-based Input Panel): SIP for Large Screens.
5. Microsoft Foundation Classes (MFC).
6. NET Compact Framework 2.0.
7. Standard SDK for Windows CE.
8. Transaction-Safe FAT File System (TFAT).
9. PCL Printer Driver.
10. Devices drivers: IDE, CF card, CD-ROM, USB host, USB keyboard/mouse/storage, Ethernet, and serial ports.

Chapter

2

Detailed Specifications

2.1 Overview

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

2.2 Dimensions

2.2.1 Board Dimensions

The dimensions of the board are listed below:

- **Length**: 146.06 mm
- **Width**: 102 mm

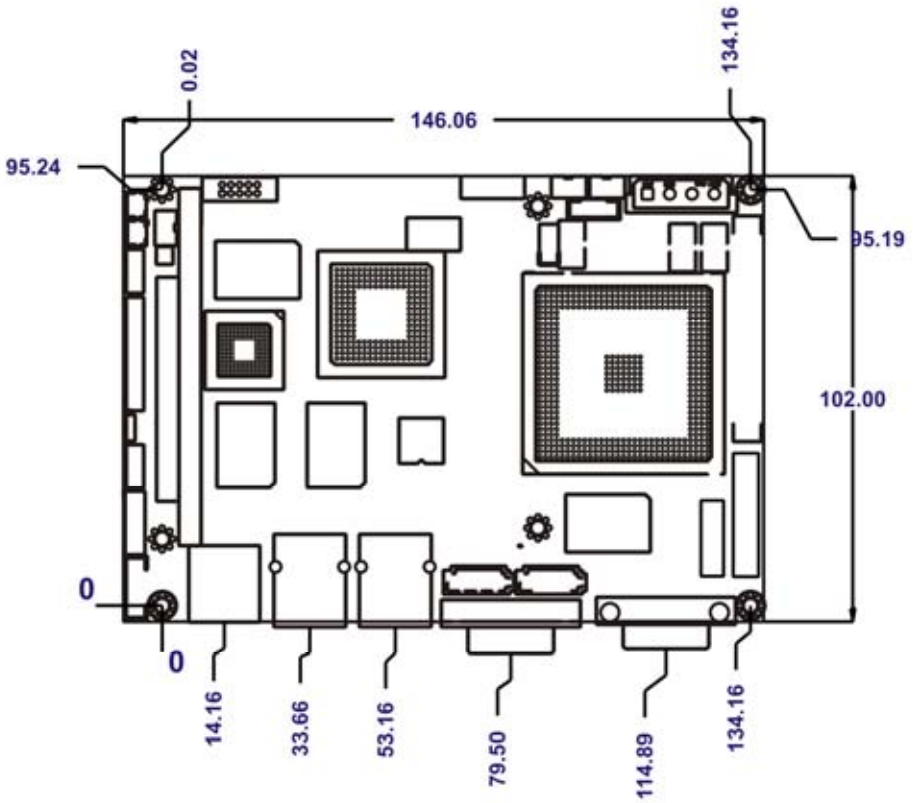


Figure 2-1: WAFER-LX Dimensions (mm)

2.2.2 External Interface Panel Dimensions

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

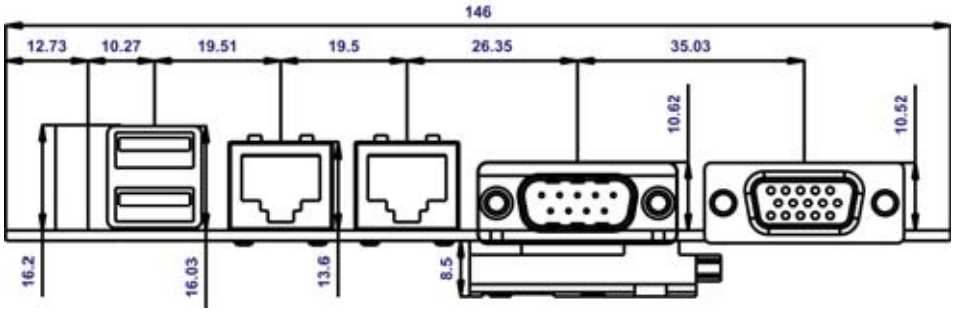


Figure 2-2: External Interface Panel Dimensions (mm)

2.3 Data Flow

Figure 2-3 shows the data flow between the two on-board chipsets and other components installed on the motherboard and described in the following sections of this chapter.

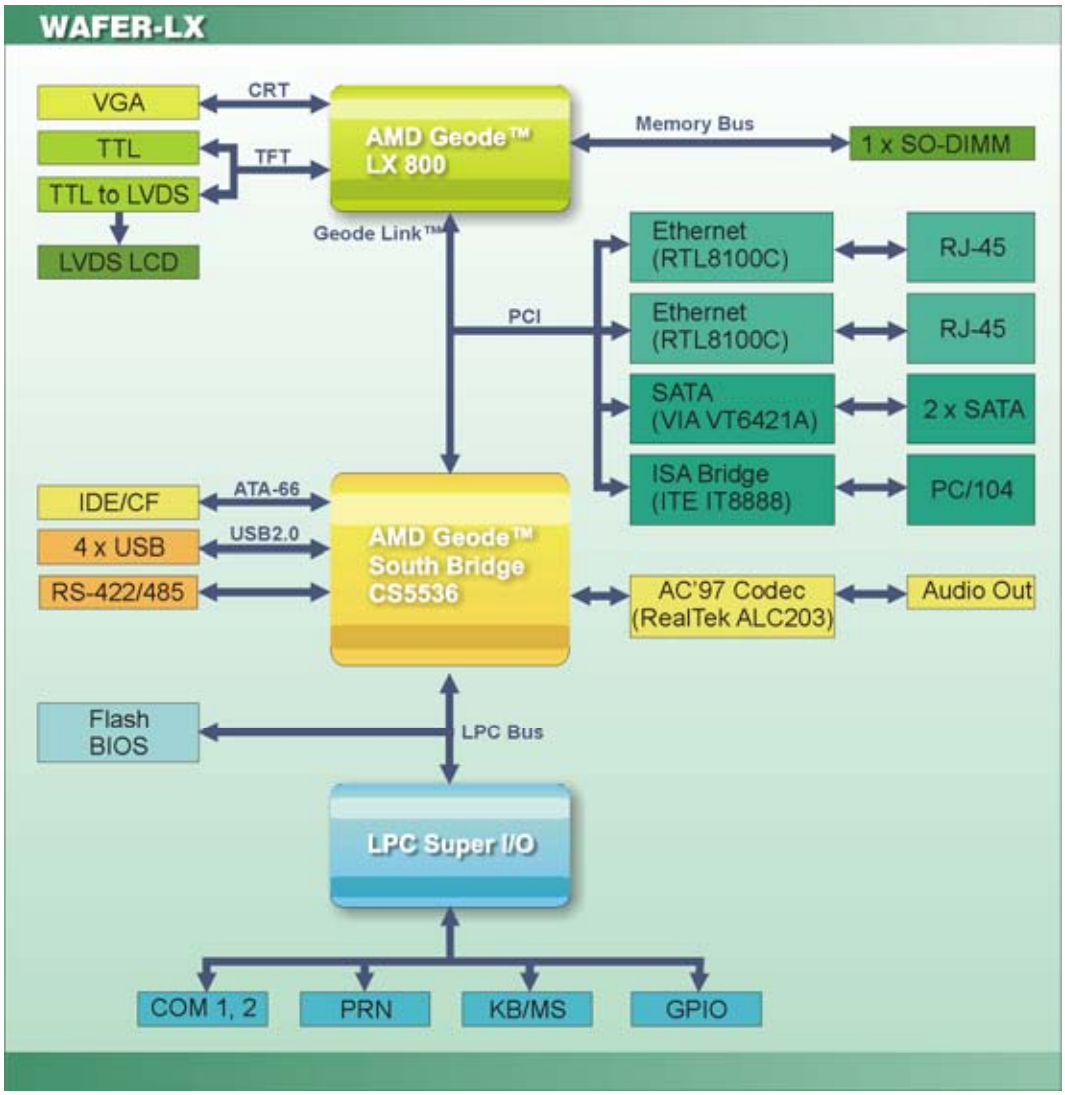


Figure 2-3: Data Flow Block Diagram

2.4 AMD Geode™ LX 800 CPU

The WAFER-LX series motherboards all come with a preinstalled AMD Geode™ LX 800 500 MHz CPU.

2.4.1 Specifications

The specifications for the 500 MHz AMD Geode™ LX 800 are listed below

- x86/x87-compatible core
- Processor frequency up to 500 MHz
- 64K I/64K D L1 cache and 128K L2 cache
- Split I/D cache/TLB (Translation Look-Aside Buffer)
- 64-bit DDR Memory interface up to 400 MHz (LX 800), up to 333 MHz (LX 700)
- Integrated FPU that supports the Intel MMX® and AMD 3DNow!™ Technology instruction sets
- 9 GB/s internal GeodeLink™ Interface Unit (GLIU)
- Security Block
  - 128-bit AES (CBC/ECB)
  - True Random Number Generator
- High-resolution CRT and TFT outputs (simultaneous operation)
  - Support for High Definition (HD) and Standard Definition (SD) standards
  - Support 1920x1440 in CRT mode and 1600x1200 in TFT mode
- VESA 1.1 and 2.0 VIP/VDA support
- 0.13 micron process
- 481-terminal PBGA (Plastic Ball Grid Array) with internal heatspreader

2.4.2 Power Management

The power management for the 500 MHz AMD Geode™ LX 800 is listed below:

- 1.8 W Typical (3.9 W TDP) @ 500 MHz
- GeodeLink active hardware power management
- Hardware support for standard ACPI software power management
- I/O companion SUSP#/SUSPA# power controls
- Lower power I/O

- Wakeup on SMI/INTR

2.5 System Chipset

The WAFER-LX series motherboards all have a preinstalled AMD Geode™ CS5536 system chipset. The system chipset features are listed below.

- **GeodeLink™ Interface Unit**
  - 64-bit, 66 MHz operation
  - PCI VSM (Virtual System Module) that makes the interface transparent to applications software and BIOS
  - Programmable routing descriptors, use and activity monitors, and SSMI (Synchronous System Management Interrupt)
- **ATA-6 Controller**
  - 100 MB/s IDE Controller in UDMA mode per the ATA-6 specification
  - 5 V interface
- **Flash Interface**
  - Multiplexed with IDE interface Connects to an array of industry standard NAND Flash and/or NOR Flash
- **USB Controller**
  - 4 USB ports
  - Supports both USB 1.1 and USB 2.0
- **Audio Codec 97 (AC97) Controller**
  - AC97 specification v2.3 compliant interface to multiple audio codecs: Serial In, Serial Out, Sync Out, Bit Clock In
  - Legacy “PC Beep” support
- **Diverse Device**
  - 82xx Legacy Devices
  - IR Communication Port
  - System Management Bus (SMB) Controller
  - LPC (Low Pin Count) Port
  - General Purpose I/Os (GPIOs)
  - 8 Multi-Function General Purpose Timers (MFGPTs)
  - Real-Time Clock (RTC) with CMOS RAM
  - Power Management Controller
  - ACPI v2.0 compliant

2.6 Graphics Support

The Geode LX processor's Graphics Processor is a BitBLT/vector engine that supports pattern generation, source expansion, pattern/source transparency, 256 ternary raster operations, alpha blenders to support alpha- BLTs, incorporated BLT FIFOs, a GeodeLink interface and the ability to throttle BLTs according to video timing. New features added to the Graphics Processor include:

- Command buffer interface
- Hardware accelerated rotation BLTs
- Color depth conversion
- Paletized color
- Full 8x8 color pattern buffer
- Separate base addresses for all channels
- Monochrome inversion

Table 2-1 lists a complete list of Geode LX graphics features. For more details, please refer to the AMD website or the Geode LX series data book available from AMD.

Feature	AMD Geode™ LX Processor
Color Depth	8, 16, 32 bpp (A) RGB 4 and 8-bit indexed
ROPs	256 (2-src, dest and pattern)
BLT Buffers	FIFOs in Graphics Processor
BLT Splitting	Managed by hardware
Video Synchronized BLT/Vector	Throttle by VBLANK
Bresenham Lines	Yes
Patterned (stippled) Lines	Yes
Screen to Screen BLT	Yes
Screen to Screen BLT with mono expansion	Yes
Memory to Screen BLT	Yes (throttled rep movs writes)
Accelerated Text	No
Pattern Size (Mono)	8x8 pixels
Pattern Size (Color)	8x8 pixels
Monochrome Pattern	Yes (with inversion)
Dithered Pattern (4 color)	No

Feature	AMD Geode™ LX Processor
Color Pattern	8, 16, 32 bpp
Transparent Pattern	Monochrome
Solid Fill	Yes
Pattern Fill	Yes
Transparent Source	Monochrome
Color Key Source Transparency	Y with mask
Variable Source Stride	Yes
Variable Destination Stride	Yes
Destination Write Bursting	Yes
Selectable BLT Direction	Vertical and Horizontal
Alpha BLT	Yes (constant α, α/pix, or sep. α channel)
VGA Support	Decodes VGA Register
Pipeline Depth	Unlimited
Accelerated Rotation BLT	8, 16, 32 bpp
Color Depth Conversion	5:6:5, 1:5:5:5, 4:4:4:4, 8:8:8:8

Table 2-1: Geode LX Graphics Features

2.7 Memory Support

The WAFER-LX has one 200-pin DDR SO-DIMM SDRAM socket that supports one 333 MHz or 400 MHz DDR SO-DIMM memory module with a maximum capacity of 1.0 GB.

2.8 PCI Bus Interface Support

The PCI bridge on the WAFER-LX has the following features:

- 33 MHz Revision 2.2 is implemented
- Maximum throughput: 133 MB/s
- PCI and GLIU interface control
- Read and write FIFOs
- PCI

2.9 Ethernet Controller Specifications

2.9.1 Overview

The Realtek RTL8100C(L) is a highly integrated and cost-effective single-chip Fast Ethernet controller. It is enhanced with an ACPI (Advanced Configuration Power Interface) management function for PCI in order to provide efficient power management for advanced operating systems with OSPM (Operating System Directed Power Management).

The RTL8100C(L) also supports remote wake-up (including AMD Magic Packet™ and Microsoft® Wake-up frame) to increase cost-efficiency in network maintenance and management. It is an ideal solution for notebook/motherboard-embedded network designs.

2.9.2 Features

- Integrates Fast Ethernet MAC, physical chip, and transceiver onto a single chip
- 10 Mb/s and 100 Mb/s operation
- Supports 10 Mb/s and 100 Mb/s N-way auto-negotiation
- Supports 25 MHz Crystal or 25 MHz 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 16.75 MHz-40 MHz
- Advanced power saving mode
- Supports Wake-on-LAN and remote wake-up (AMD Magic Packet™, Link Change, and Microsoft® Wake-up frame)
- Half/Full duplex capability
- 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

- 2.5/3.3 V power supply with 5 V tolerant I/Os

2.10 Drive Interfaces

The WAFER-LX can support the following drive interfaces.

- 2 x SATA drives
- 2 x IDE devices
- 1 x FDD (slim type, optional)
- 1 x CF I or CF II card

2.10.1 SATA Drives

The WAFER-LX supports two, first generation SATA drives with transfer rates of up to 150 Mb/s

2.10.2 IDE HDD Interfaces

The WAFER-LX system chipset IDE controller supports up to two HDDs with the following specifications:

- Supports PIO IDE transfers up to 16 MB/s
- Supports the following Ultra ATA devices:
  - **Ultra ATA/100**, with data transfer rates up to 100 MB/s
  - **Ultra ATA/66**, with data transfer rates up to 66 MB/s
  - **Ultra ATA/33**, with data transfer rates up to 33 MB/s

2.10.3 Floppy Disk Drive (FDD)

The WAFER-LX supports a single FDD. The following FDD formats are compatible with the board.

- 5.25”: 360 KB and 1.2 MB
- 3.5”: 720 KB, 1.44 MB and 2.88 MB

2.10.4 Compact Flash Support

A standard CF I or CF II card can be inserted into the compact flash slot on the solder side of the WAFER-LX PCB.

2.11 Serial Ports

The WAFER-LX has two high-speed UART serial ports, configured as COM1 and COM2. The serial ports have the following specifications.

- 16C550 UART with 16-byte FIFO buffer
- 115.2 Kb/s transmission rate

COM2 can be configured as RS-232, RS-422 or RS-485.

2.12 Real Time Clock

256-byte battery backed CMOS RAM

2.13 System Monitoring

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

- CPU, chipset, and battery voltage, +3.3 V, +5 V, and +12 V
- RPM of cooling fans
- CPU and board temperatures (by the corresponding embedded sensors)

2.14 USB Interfaces

The WAFER-LX has four USB interfaces, two internal (on one pin header connector) and two external. The USB interfaces support USB 2.0.

2.15 BIOS

The WAFER-LX uses a licensed copy of AWARD BIOS. The features of the flash BIOS used are listed below:

- SMIBIOS (DMI) compliant
- Console redirection function support
- PXE (**P**re-Boot E**x**ecution **E**nvironment) support
- USB booting support

2.16 Operating Temperature and Temperature Control

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

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

A cooling fan and heat sink must be installed on the CPU. Thermal paste must be smeared on the lower side of the heat sink before it is mounted on the CPU. Heat sinks are also mounted on the Northbridge and Southbridge chipsets to ensure the operating temperature of these chips remain low.

2.17 Audio Codec

The WAFER-LX has an integrated RealTek ALC203 codec. The RealTek ALC203 is a 20-bit DAC and 18-bit ADC full-duplex AC'97 2.3 compatible stereo audio CODEC designed for PC multimedia systems, including host/soft audio, and AMR/CNR based designs. The codec meets performance requirements for audio on PC99/2001 systems

- Single chip with high S/N ratio (>100 dB)
- Meets performance requirements for audio on PC2001 systems
- Meets Microsoft WHQL/WLP 2.0 audio requirements
- 20-bit DAC and 18-bit ADC resolution
- 18-bit Stereo full-duplex CODEC with independent and variable sampling rate
- Complies with AC'97 2.3 specifications
  - LINE/HP-OUT, MIC-IN and LINE-IN sensing
  - 14.318 MHz -> 24.576 MHz PLL saves crystal
  - 12.288 MHz BITCLK input can be consumed
  - Integrated PCBEEP generator to save buzzer
  - Interrupt capability
  - Page registers and Analog Plug & Play
- Support of S/PDIF out is fully compliant with AC'97 rev2.3 specifications
- 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 input: PCBEEP, PHONE-IN
- Supports double sampling rate (96 KHz) of DVD audio playback

- Two software selectable MIC inputs
- +6/12/20/30dB boost preamplifier for MIC input
- Stereo output with 6-bit volume control
- Mono output with 5-bit volume control
- Headphone output with 50mW/20Ohm amplifier
- 3D Stereo Enhancement
- Multiple CODEC extension capability
- External Amplifier Power Down (EAPD) capability
- Power management and enhanced power saving features
- Stereo MIC record for AEC/BF application
- DC Voltage volume control
- Auxiliary power to support Power Off CD
- Adjustable VREFOUT control
- 2 GPIO pins with smart GPIO volume control
- 2 Universal Audio Jacks (UAJ)® for front panel
- Supports 32K/44.1K/48K/96 KHz S/PDIF output
- Supports 32K/44.1K/48 KHz S/PDIF input
- Power support: Digital: 3.3 V; Analog: 3.3 V/5 V
- Standard 48-Pin LQFP Package
- EAX™ 1.0 & 2.0 compatible
- Direct Sound 3D™ compatible
- A3D™ compatible
- I3DL2 compatible
- HRTF 3D Positional Audio
- Sensaura™ 3D Enhancement (optional)
- 10 Bands of Software Equalizer
- Voice Cancellation and Key Shifting in Karaoke mode
- AVRack® Media Player

2.18 Power Consumption

Table 2-2 shows the power consumption parameters for the WAFER-LX when an AMD Geode LX 800 processor is running with one 1 GB DDR400 memory module and running 3D Mark.

Voltage	Current
+5 V	1.53 A

Table 2-2: Power Consumption

2.19 Packaged Contents and Optional Accessory Items

2.19.1 Package Contents

The WAFER-LX is shipped with the following components.

- 1x WAFER-LX800 single board computer
- 1 x Mini jumper pack
- 1 x IDE flat cable 44P/44P
- 2 x SATA cables
- 1 x SATA power cable
- 1 x Audio cable
- 1 x KB/MS cable
- 1 x USB cable
- 1 x RS-232 cable
- 1 x Utility CD
- 1 x Quick Installation Guide

2.19.2 Optional Accessory Items

The items shown in the list below are optional accessory items are purchased separately.

- LPT cable

Chapter

3

Unpacking

3.1 Anti-static Precautions

WARNING:

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

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the WAFER-LX. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the WAFER-LX, 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-LX, place it on an antic-static pad. This reduces the possibility of ESD damaging the WAFER-LX.
- ***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-LX 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-LX does not fall out of the box.
- Make sure all the components shown in **Section** 3.3 are present.

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-LX 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-LX is shipped with the following components:

Quantity	Item and Part Number	Image
1	WAFER-LX	
1	HDD cable (**P/N**: 32200-000009-RS)	
1	KB/MS PS/2 Y-cable (**P/N**: 32000-023800-RS)	
1	Audio cable (**P/N:** 32000-072100-RS)	
2	SATA cables (**P/N**: 32000-062800-RS)	

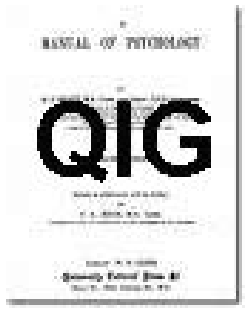
Quantity	Item and Part Number	Image
1	SATA power cable (**P/N**: 32100-088600-RS)	
1	RS-232/422/485 cable (**P/N**: 32200-026500-RS)	
1	USB Cable (**P/N**: 32000-070300-RS)	
1	Mini jumper Pack (**P/N**: 33100-000033-RS)	
1	Quick Installation Guide (**P/N**: 51000-022027-RS)	
1	Utility CD (**P/N**: IEI-7B000-000098-RS)	

Table 3-1: Package List Contents

Chapter

4

Connectors and Jumpers

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-LX Layout

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

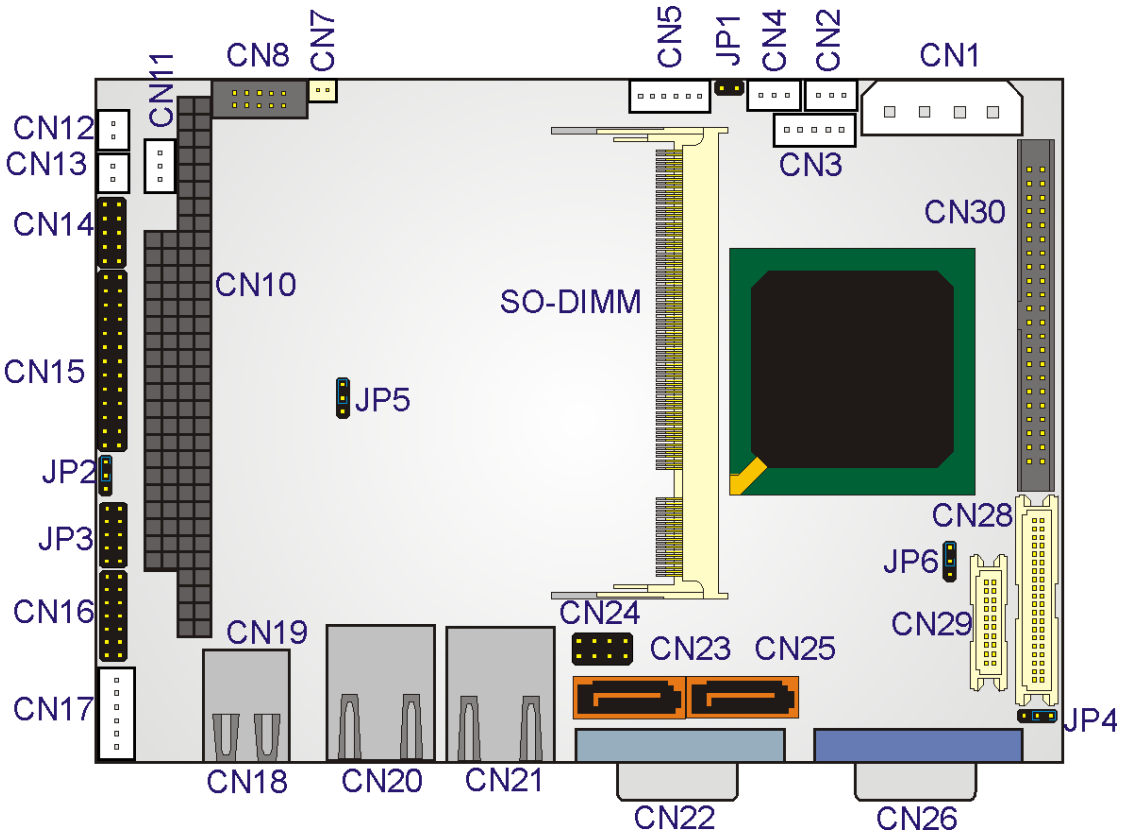


Figure 4-1: Connector and Jumper Locations

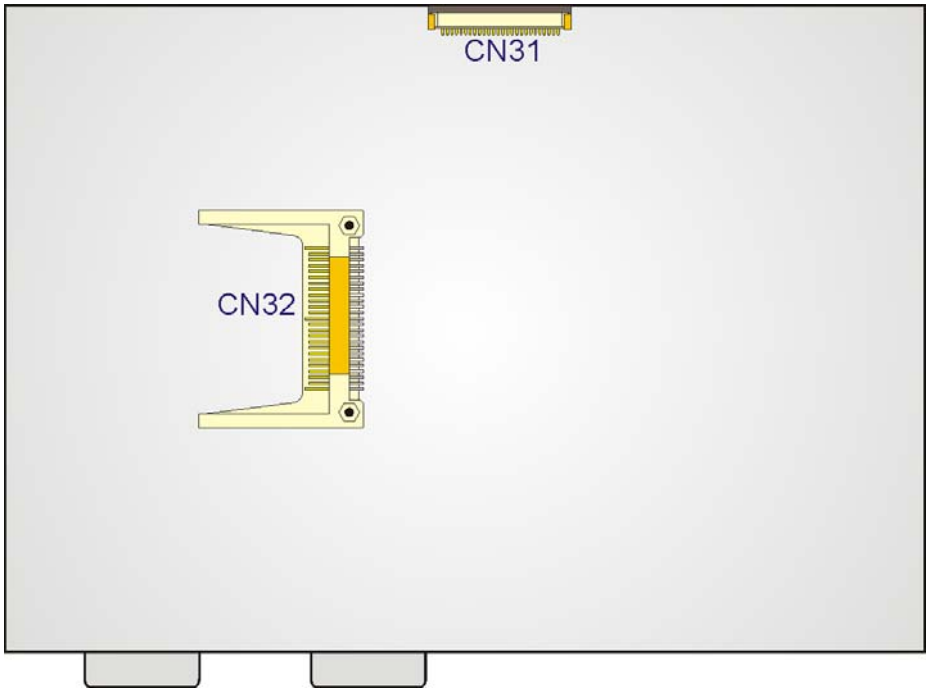


Figure 4-2: Connector and Jumper Locations (Solder Side)

4.1.2 Peripheral Interface Connectors

Table 4-1 shows a list of the peripheral interface connectors on the WAFER-LX. Detailed descriptions of these connectors can be found in **Section 4.2** on **page 31**.

Connector	Type	Label
AT power connector	4-pin header	CN1
ATX power function connector	3-pin header	CN2
ATX power button connector	2-pin header	CN13
Audio connector	10-pin header	CN8
Battery connector	2-pin header	CN7
Compact Flash (CF) connector	50-pin header	CN32
Fan connector	3-pin header	CN4
Floppy Disk connector	26-pin header	CN31
GPIO connector	10-pin header	CN14

Connector	Type	Label
IDE Interface connector	44-pin header	CN30
Inverter power connector	5-pin header	CN3
Keyboard/Mouse connector	6-pin header	CN17
LED connector	6-pin header	CN5
Parallel port connector	26-pin header	CN15
PC/104 power input connector	3-pin header	CN11
PC/104 slot	104-pin slot	CN10
Reset button connector	2-pin header	CN12
RS-232/422/485 serial port connector	14-pin header	CN16
SATA drive connector (150 MB/s)	7-pin SATA connector	CN23
SATA drive connector (150 MB/s)	7-pin SATA connector	CN25
TFTLCD LVDS connector	20-pin header	CN29
TFT LCD TTL connector	40-pin header	CN28
USB connector (USB 1.1 and USB 2.0)	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-LX. Detailed descriptions of these connectors can be found in **Section 4.3** on **page 57**.

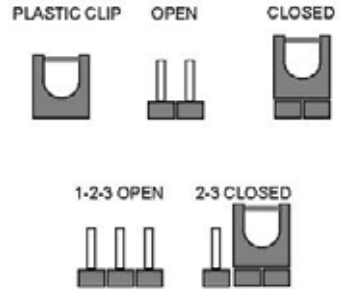
Connector	Type	Label
Ethernet connector	RJ-45	CN20
Ethernet connector	RJ-45	CN21
RS-232 serial port connector	9-pin male	CN22
USB port	USB port	CN19
VGA port connector	15-pin female	CN26

Table 4-2: Rear Panel Connectors

4.1.4 On-board Jumpers

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.



Jumper

Table 4-3 lists the on-board jumpers. Detailed descriptions of these jumpers can be found in **Section 5.5** on page **69**.

Description	Label	Type
AT power select	JP1	2-pin header
COM3 mode setup	JP2	3-pin header
COM1 and COM2 pin 9 setup (Optional jumper)	JP3	10-pin header
LCD voltage selection	JP4	3-pin header
CompactFlash® master/slave setup	JP5	3-pin header
LCD type selection	JP6	3-pin header
Clear CMOS	CN7	2-pin header

Table 4-3: On-board Jumpers

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-LX.

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 4-4**

The AT power connector is connected to an AT power source that powers the system.

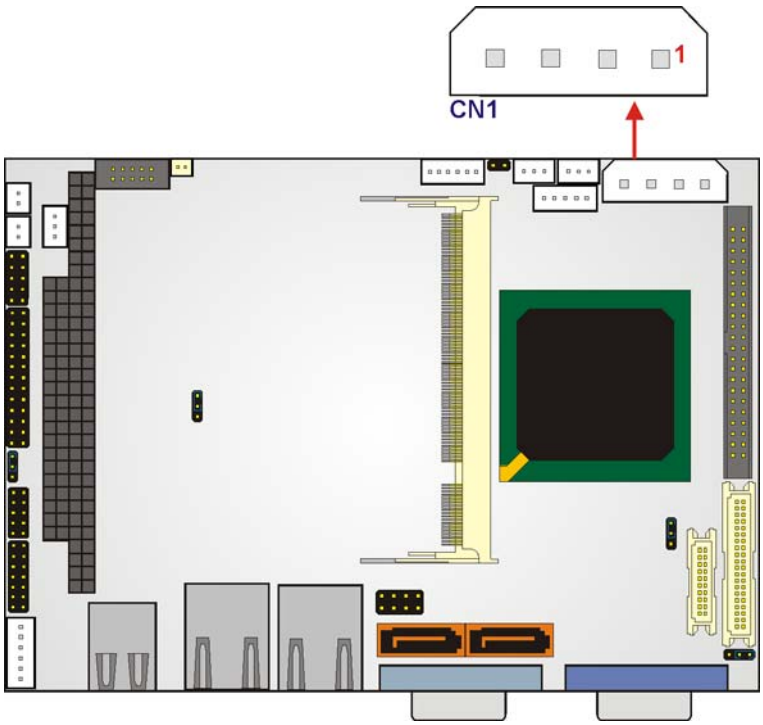


Figure 4-3: AT Power Connector Location

PIN NO.	DESCRIPTION
1	+12 V
2	GND

PIN NO.	DESCRIPTION
3	GND
4	+5 V

Table 4-4: AT Power Connector Pinouts

4.2.2 ATX Power Connector

CN Label: **CN2**

CN Type: 3-pin header (1x3)

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

CN Pinouts: See **Table 4-5**

The ATX Power connector (CN2) connects an ATX or AT power supply connector.

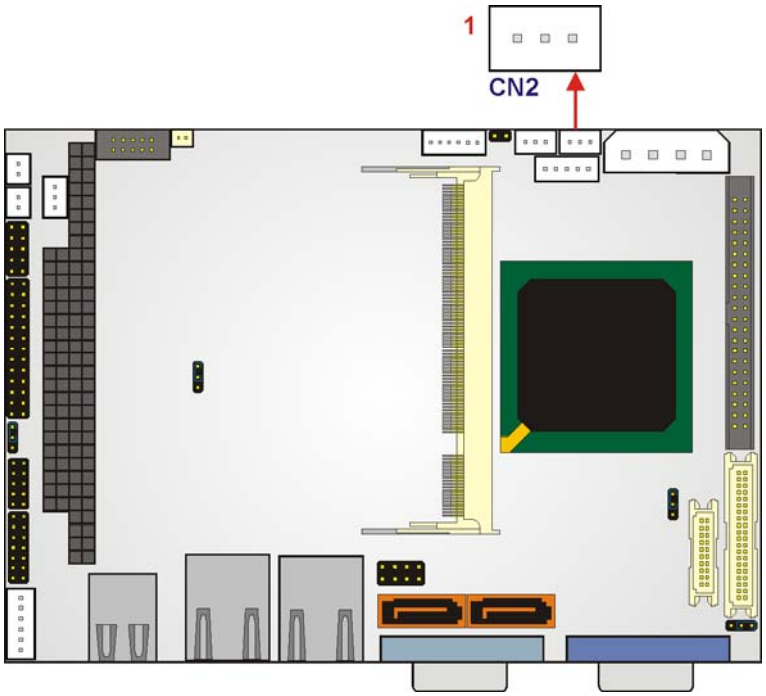


Figure 4-4: ATX Power Connector Location

PIN NO.	DESCRIPTION
1	+5 V_SB
2	NC (v1.10)

PIN NO.	DESCRIPTION
3	PS_ON

Table 4-5: ATX Power Connector Pinouts

4.2.3 ATX Power Button Connector

CN Label: **CN13**

CN Type: 1-pin header (1x2)

CN Location: See **Figure 4-5**

CN Pinouts: See **Table 4-6**

The ATX power button connector to a power switch installed on the system chassis.

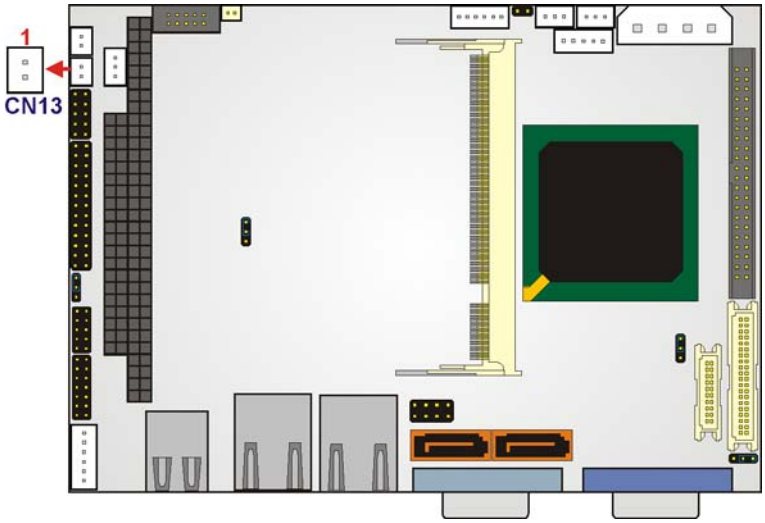


Figure 4-5: ATX Power Button Connector

PIN NO.	DESCRIPTION
1	PWRBTN#
2	GND

Table 4-6: ATX Power Button Connector Pinouts

4.2.4 Audio Connector

CN Label: **CN8**

CN Type: 10-pin header (2x5)

CN Location: See **Figure 4-6**

CN Pinouts: See **Table 4-7**

The audio connector is connected to an on-board codec. An external audio connector kit can be connected to the connector to provide sound input and output.

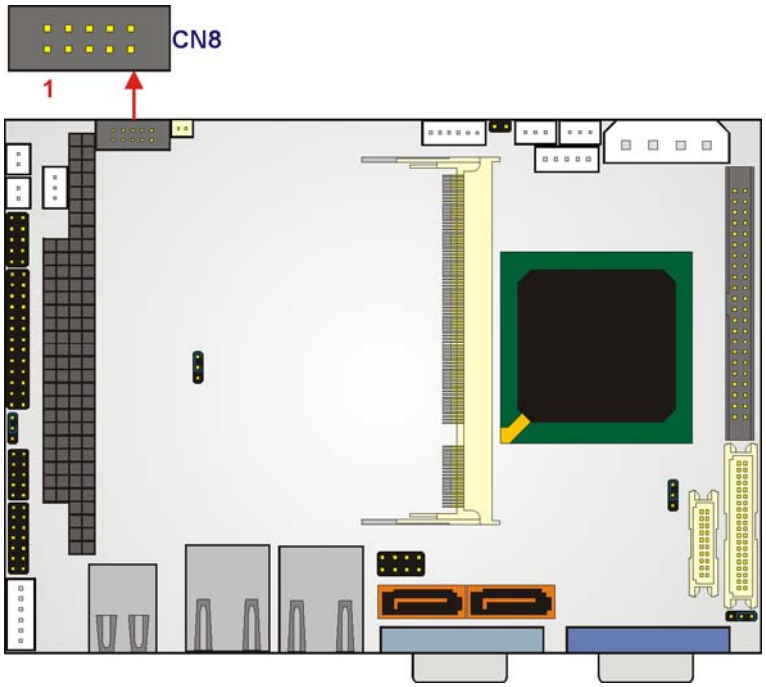


Figure 4-6: Audio Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	Line Out Right	2	Line In Right
3	GND	4	GND
5	Line Out Left	6	Line In Left
7	GND	8	GND
9	MIC In	10	N/C

Table 4-7: Audio Connector Pinouts

4.2.5 Battery Connector

CN Label:	**CN7**
CN Type:	2-pin header (1x2)
CN Location:	See **Figure 4-7**
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.

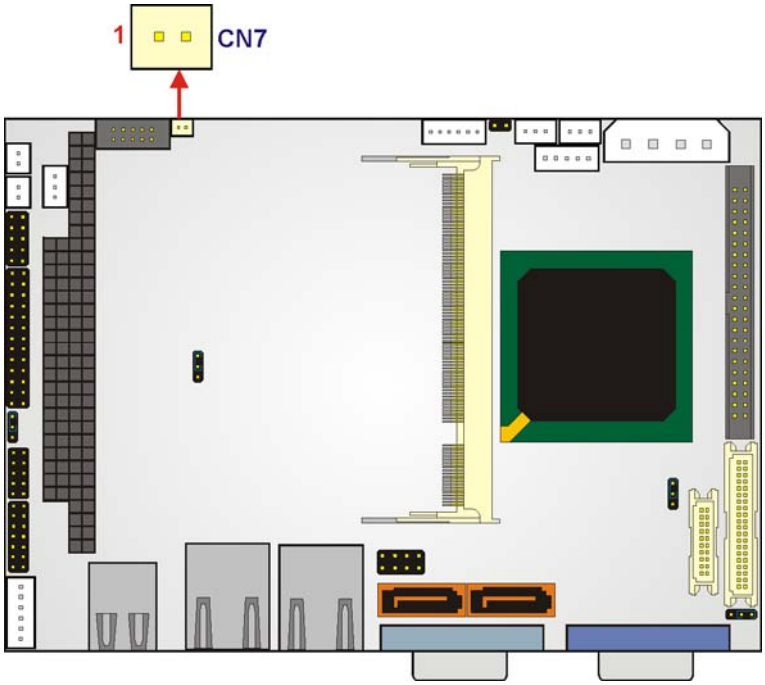


Figure 4-7: Battery Connector Location

PIN NO.	DESCRIPTION
1	Battery+
2	Ground

Table 4-8: Battery Connector Pinouts

4.2.6 Compact Flash Connector

CN Label: **CN32 (solder side)**

CN Type: 50-pin header (2x25)

CN Location: See **Figure 4-8**

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

A compact flash memory module is inserted to the Compact Flash 2 connector (J2). Jumper 2 (JP2) configures the compact flash drive as either a slave or master device.

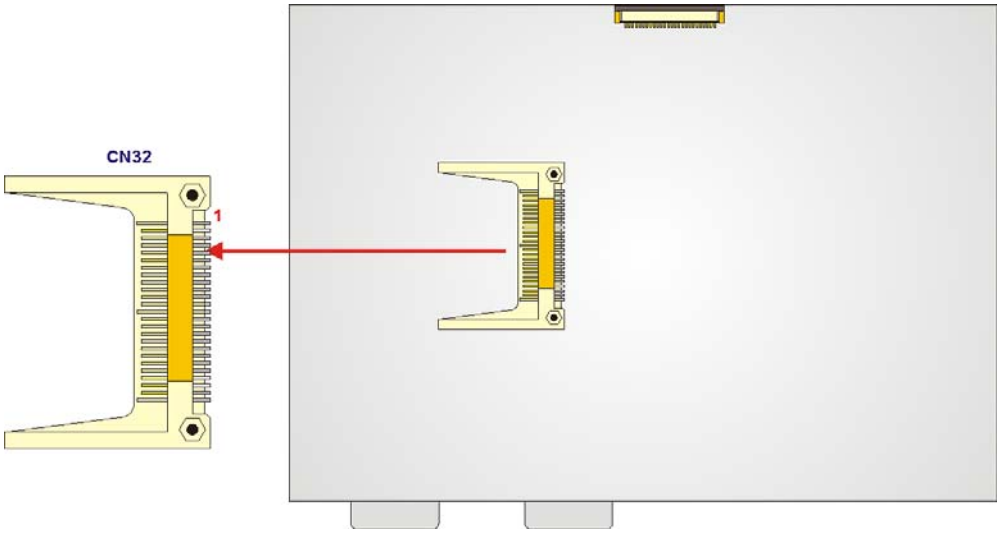


Figure 4-8: Compact Flash Connector Location (Solder Side)

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GROUND	26	VCC-IN CHECK1
2	DATA 3	27	DATA 11
3	DATA 4	28	DATA 12
4	DATA 5	29	DATA 13
5	DATA 6	30	DATA 14
6	DATA 7	31	DATA 15
7	HDC_CS0#	32	HDC_CS1
8	N/C	33	N/C
9	GROUND	34	IOR#
10	N/C	35	IOW#

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
11	N/C	36	VCC_COM
12	N/C	37	IRQ15
13	VCC_COM	38	VCC_COM
14	N/C	39	CSEL
15	N/C	40	N/C
16	N/C	41	HDD_RESET
17	N/C	42	IORDY
18	SA2	43	SDREQ
19	SA1	44	SDACK#
20	SA0	45	HDD_ACTIVE#
21	DATA 0	46	66DET
22	DATA 1	47	DATA 8
23	DATA 2	48	DATA 9
24	N/C	49	DATA 10
25	VCC-IN CHECK2	50	GROUND

Table 4-9: Compact Flash Connector Pinouts

4.2.7 Fan Connector

CN Label: **CN4**

CN Type: 3-pin header

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

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

The cooling fan connector provides a 12 V, 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.

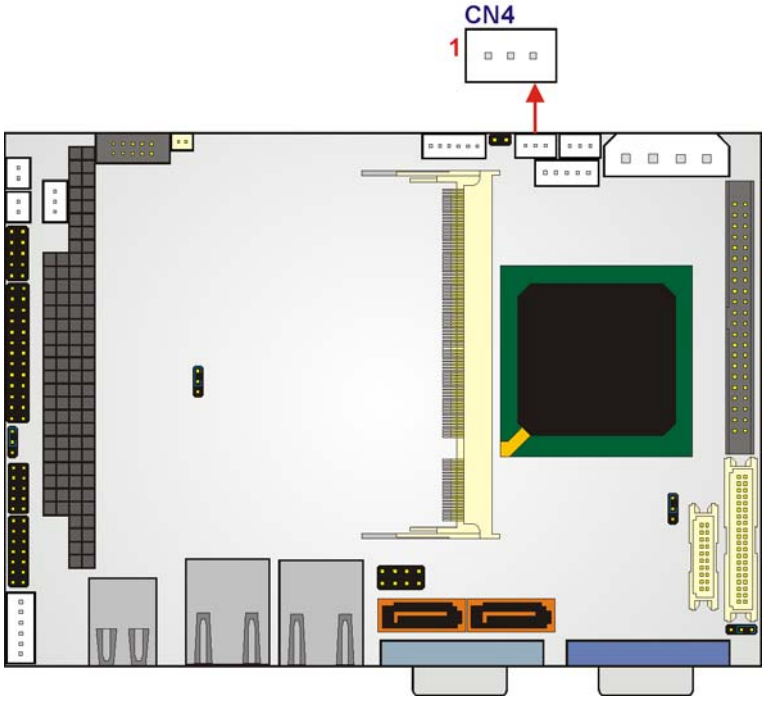


Figure 4-9: Fan Connector Location

PIN NO.	DESCRIPTION
1	CPUFAN_OUT
2	+12 V
3	GND

Table 4-10: Fan Connector Pinouts

4.2.8 Floppy Disk Connector (Slim Type, Optional)

CN Label: **CN31 (solder side)**

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

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

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

The floppy disk connector (FDD1) is connected to a floppy disk drive.

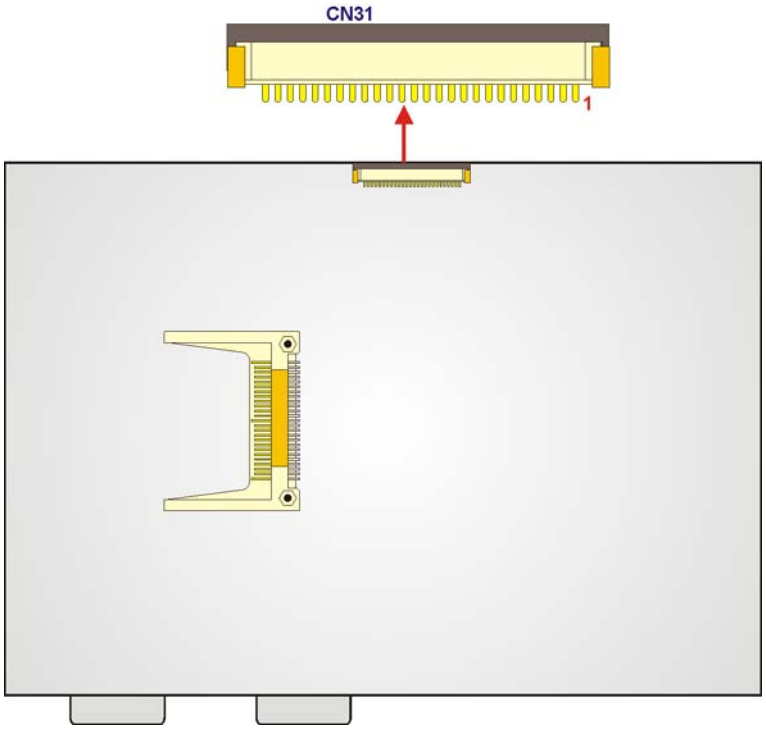


Figure 4-10: FDD Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	+5 V	14	STEP#
2	INDEX#	15	GND
3	+5 V	16	WDATA#
4	DSA#	17	GND
5	+5 V	18	WGATE#
6	DSKCHG#	19	GND
7	NC	20	TRACK0#
8	NC	21	GND
9	NC	22	WP#
10	MOTO0#	23	GND
11	NC	24	RDATA#
12	DIR#	25	GND
13	NC	26	HEAD#

Table 4-11: FDD Connector Pinouts

4.2.9 GPIO Connector

CN Label:	**CN14**
CN Type:	10-pin header (2x5)
CN Location:	See **Figure 4-11**
CN Pinouts:	See **Table 4-12**

The General Purpose Input Output (GPIO) connector can be connected to external I/O control devices including sensors, lights, alarms and switches.

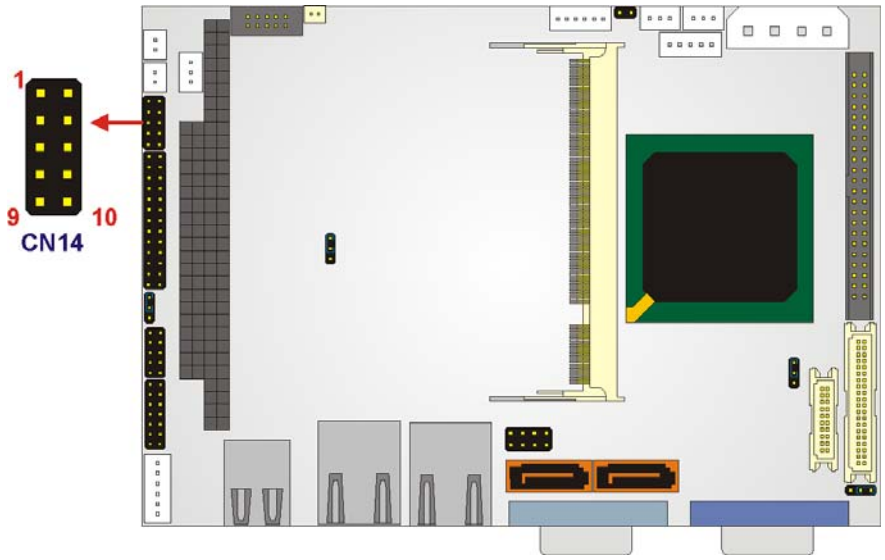


Figure 4-11: GPIO Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GND	2	5 V
3	GPO0	4	GPO1
5	GPO2	6	GPO3
7	GPI0	8	GPI1
9	GPI2	10	GPI3

Table 4-12: GPIO Connector Pinouts

4.2.10 IDE Connector

CN Label:	**CN30**
CN Type:	44pin header (2x22)
CN Location:	See **Figure 4-12**
CN Pinouts:	See **Table 4-13**

One 44-pin IDE device connector on the WAFER-LX motherboard supports connectivity to Ultra ATA/33/66/100 IDE devices with data transfer rates up to 100 MB/s.

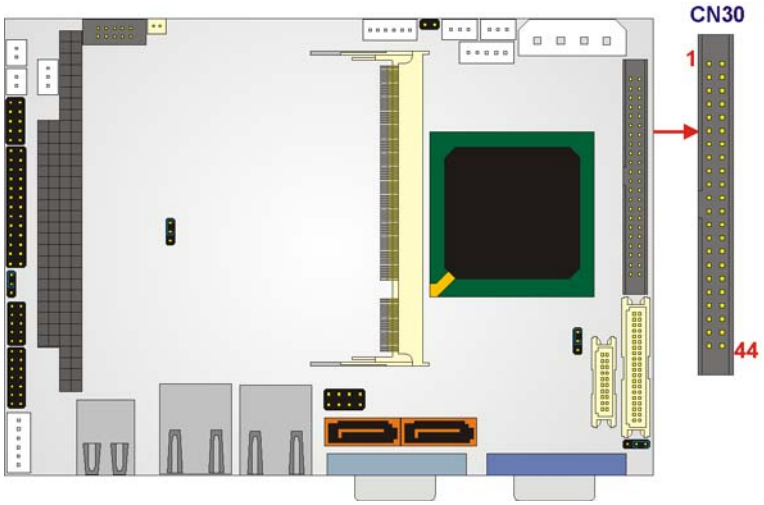


Figure 4-12: IDE Device Connector Locations

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

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
21	IDE DRQ	22	GROUND
23	IOW#	24	GROUND
25	IOR#	26	GROUND
27	IDE CHRDY	28	GROUND
29	IDE DACK	30	GROUND–DEFAULT
31	INTERRUPT	32	N/C
33	SA1	34	N/C
35	SA0	36	SA2
37	HDC CS0#	38	HDC CS1#
39	HDD ACTIVE#	40	GROUND
41	VCC	42	VCC
43	GROUND	44	N/C

Table 4-13: Secondary IDE Connector Pinouts

4.2.11 Inverter Power Connector

CN Label: **CN3**

CN Type: 5-pin header (1x5)

CN Location: See **Figure 4-13**

CN Pinouts: See **Table 4-14**

The inverter connector is connected to the LCD backlight.

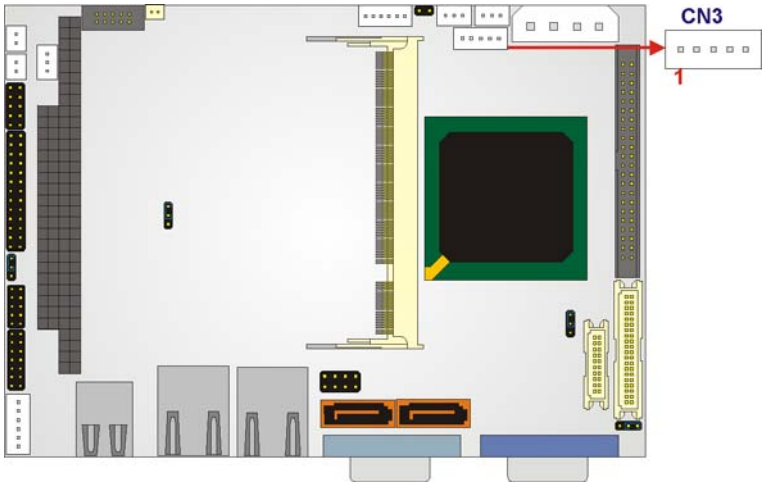


Figure 4-13: Inverter Connector Locations

PIN NO.	DESCRIPTION
1	ADJ (Def: GND)
2	GND
3	12 V
4	GND
5	BL_EN

Table 4-14: Inverter Power Connector Pinouts

4.2.12 Keyboard/Mouse Connector

CN Label: **CN17**

CN Type: 6-pin header (1x6)

CN Location: See **Figure 4-14**

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.

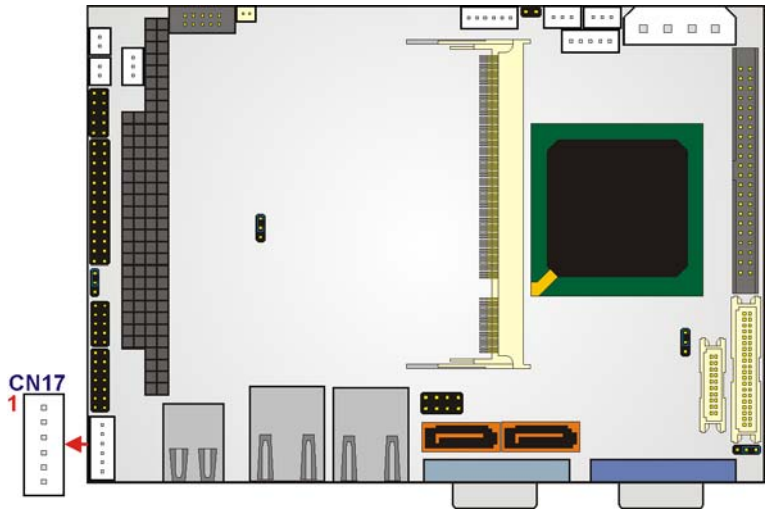


Figure 4-14: Keyboard/Mouse Connector Location

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

Table 4-15: Keyboard/Mouse Connector Pinouts

4.2.13 LED Connector

CN Label: **CN5**

CN Type: 6-pin header (1x6)

CN Location: See **Figure 4-15**

CN Pinouts: See **Table 4-16**

The LED connector (CN5) 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.

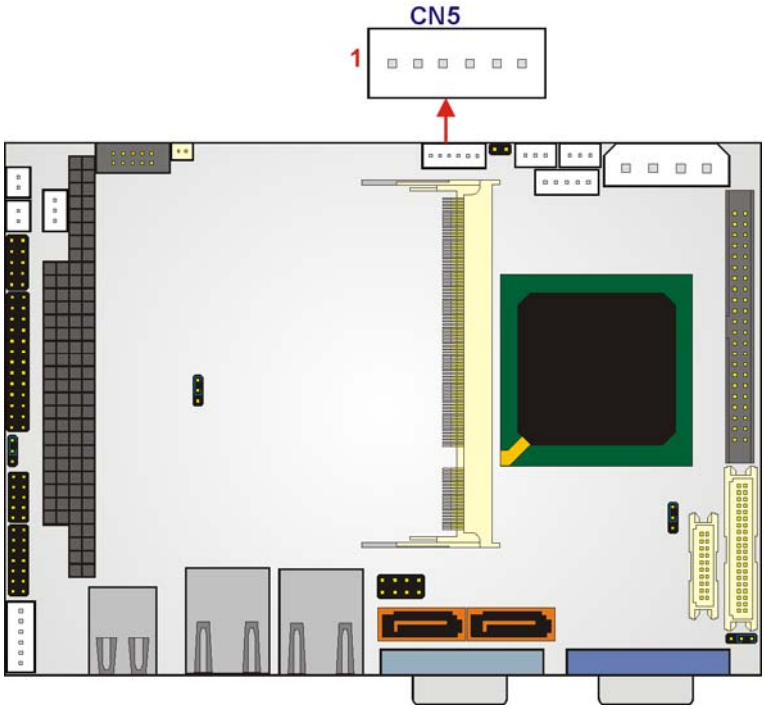


Figure 4-15: LED Connector Locations

PIN NO.	DESCRIPTION
1	+5 V
2	GND
3	Power LED+
4	Power LED-
5	HDD LED+
6	HDD LED-

Table 4-16: LED Connector Pinouts

4.2.14 Print Port Connector

CN Label: **CN15**

CN Type: 26-pin header (2 x 13)

CN Location: See **Figure 4-16**

CN Pinouts: See **Table 4-17**

The WAFER-LX has one print port connector that can be connected directly to a printer.

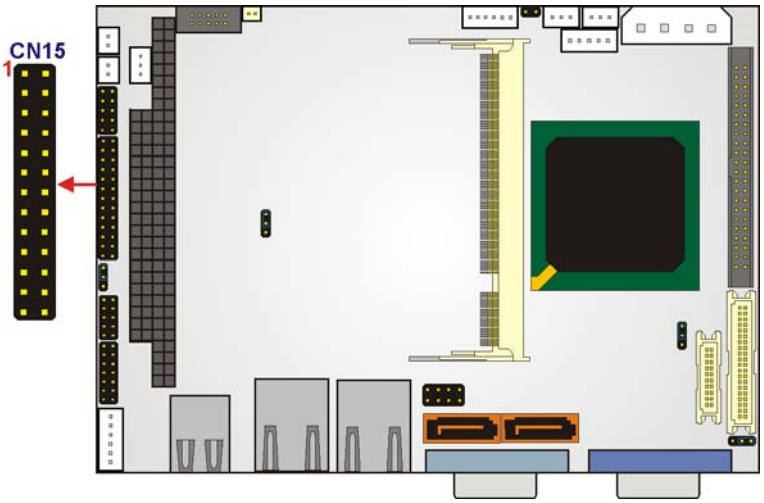


Figure 4-16:Print Port Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	STB#	2	AFD#
3	PD0	4	ERR#
5	PD1	6	INIT#
7	PD2	8	SLIN#
9	PD3	10	GND
11	PD4	12	GND
13	PD5	14	GND
15	PD6	16	GND
17	PD7	18	GND
19	ACK#	20	GND
21	BUSY	22	GND
23	PE	24	GND
25	SLCT	26	N/C

Table 4-17: Parallel Port Connector Pinouts

4.2.15 PC/104 Power Input Connector

CN Label: **CN11**

CN Type: 3-pin header (1x3)

CN Location: See **Figure 4-17**

CN Pinouts: See **Table 4-18**

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

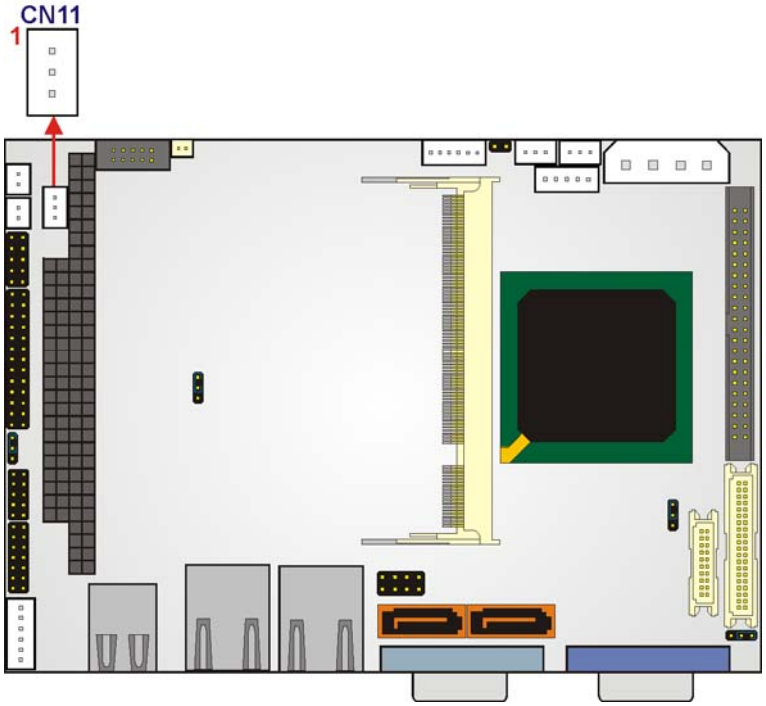


Figure 4-17: PC/104 Power Input Connector Pinouts

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

Table 4-18: PC/104 Power Input 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 4-19**

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

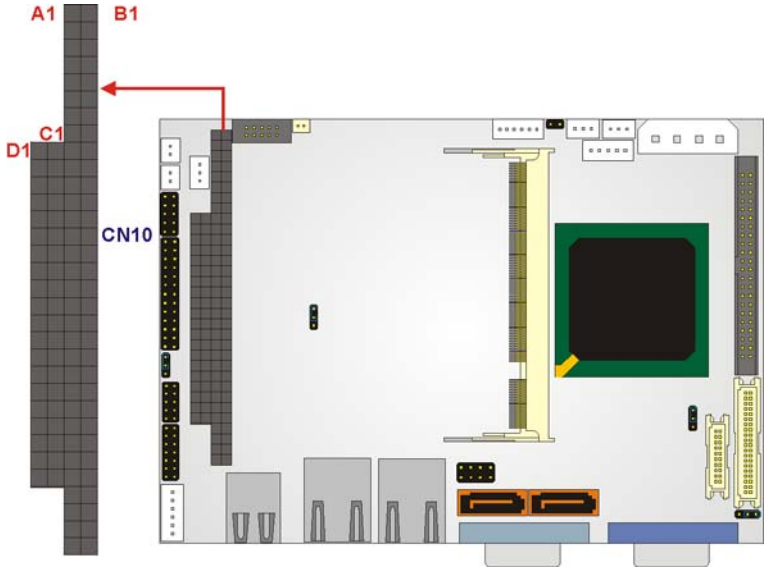


Figure 4-18: PC/104 Slot Location

Pin No.	Column A	Column B	Column C	Column D
1	IOCHK-	GROUND	GROUND	GROUND
2	SD7	RSTDRV	SBHE-	MCS16-
3	SD6	+5 V	SA23	IOCS16-
4	SD5	IRQ9	SA22	IRQ10
5	SD4	-5 V	SA21	IRQ11
6	SD3	DREQ2	SA20	IRQ12
7	SD2	-12 V	SA19	IRQ15
8	SD1	ZWS-	SA18	IRQ14
9	SD0	+12 V	SA17	DACK0-
10	IOCHRDY	GROUND	MEMR-	DREQ0
11	AEN	SMEMW-	MEMW-	DACK5-
12	SA19	SMEMR-	SD8	DRREQ5
13	SA18	IOW-	SD9	DACK6-

Pin No.	Column A	Column B	Column C	Column D
14	SA17	IOR-	SD10	DREQ6
15	SA16	DACK3-	SD11	DACK7-
16	SA15	DREQ3	SD12	DREQ7
17	SA14	DACK1-	SD13	+5 V
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	+5 V		
30	SA1	ISA_OSC		
31	SA0	GROUND		
32	GROUND	GROUND		

Table 4-19: PC/104 Slot Connector Pinouts

4.2.17 Reset Button Connector

CN Label: **CN12**

CN Type: 2-pin header (1x2)

CN Location: See **Figure 4-19**

CN Pinouts: See **Table 4-20**

The reset button connector is connected to the reset button on the external chassis.

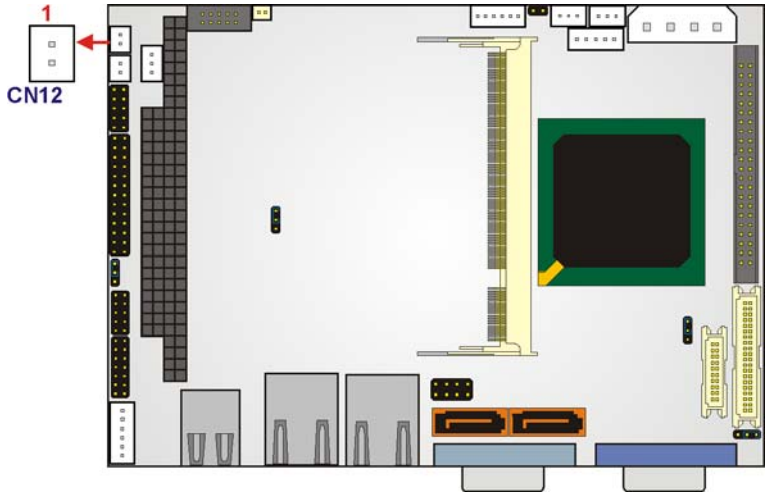


Figure 4-19: Reset Button Connector Locations

PIN NO.	DESCRIPTION
1	Reset+
2	Ground

Table 4-20: Reset Button Connector Pinouts

4.2.18 RS-232/422/485 Cable Connectors

CN Label: **CN16**

CN Type: 14-pin header (2x7)

CN Location: See **Figure 4-20**

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

The COM2/COM3 serial port combination connectors connect to RS-232 serial port devices. The COM2 port is located on pin 1 to pin 10 and the COM3 is located on pin 11 to pin 14 of CN16.

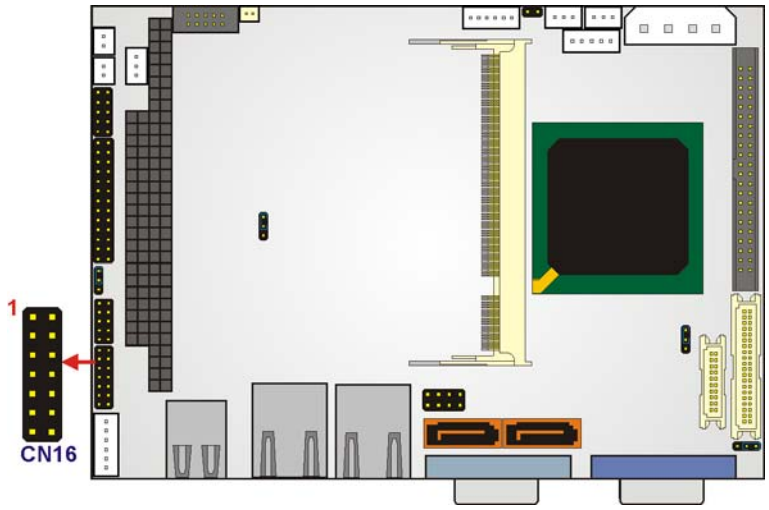


Figure 4-20: RS-232 Serial Port Connector Locations

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	DCD#	2	DSR#
3	RXD	4	RTS#
5	TXD	6	CTS#
7	DTR#	8	RI#/Vout
9	GND	10	GND
11	TxD485+	12	TxD485-
13	RxD485+	14	RxD485-

Table 4-21: RS-232/422/485 Serial Port Connector Pinouts

4.2.19 SATA Drive Connectors

CN Label: **CN23 and CN25**

CN Type: 7-pin SATA drive connectors

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

CN Pinouts: See **Table 4-25**

The two SATA drive connectors are connected to two first generation SATA drives. First generation SATA drives transfer data at speeds as high as 150 MB/s.

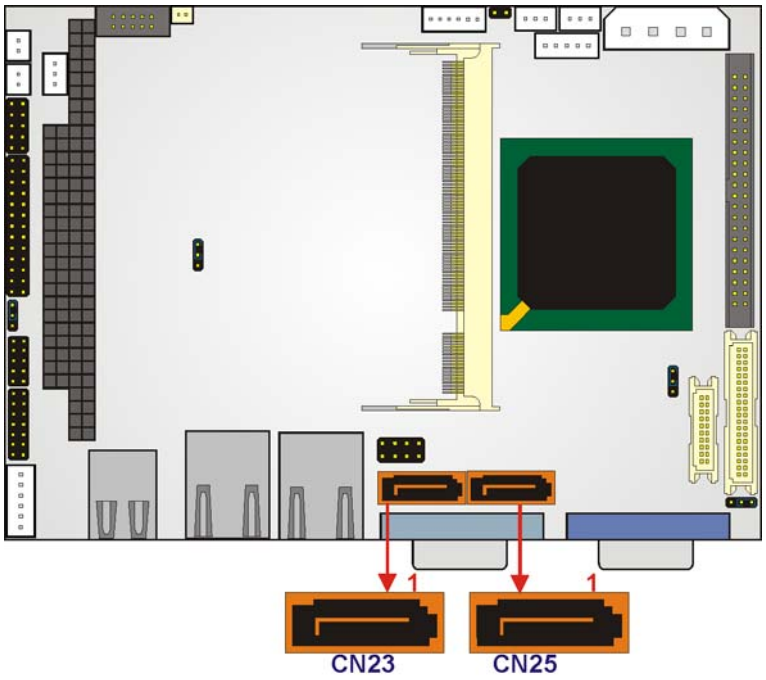


Figure 4-21: SATA Drive Connector Locations

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

Table 4-22: SATA Drive Connector Pinouts

4.2.20 TFT LCD LVDS Connector

CN Label: **CN29**

CN Type: 20-pin header (2x10)

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

CN Pinouts: See **Table 4-23**

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

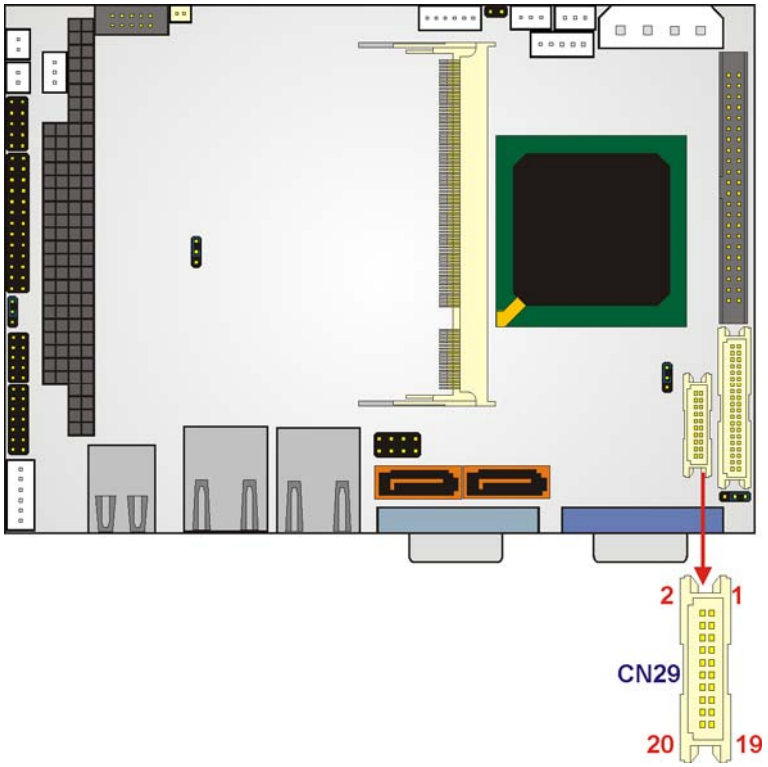


Figure 4-22: TFT LCD LVDS Connector Pinout Locations

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GND	2	GND
3	D0+	4	D0-
5	D1+	6	D1-
7	D2+	8	D2-
9	CLK+	10	CLK-
11	NC	12	NC
13	GND	14	GND
15	NC	16	NC
17	LCD_Vcc	18	LCD_Vcc
19	LCD_Vcc	20	LCD_Vcc

Table 4-23: TFT LCD LVDS Port Connector Pinouts

4.2.21 TFT LCD TTL Connector

CN Label: **CN28**

CN Type: 40-pin header (2x20)

CN Location: See **Figure 4-23**

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

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

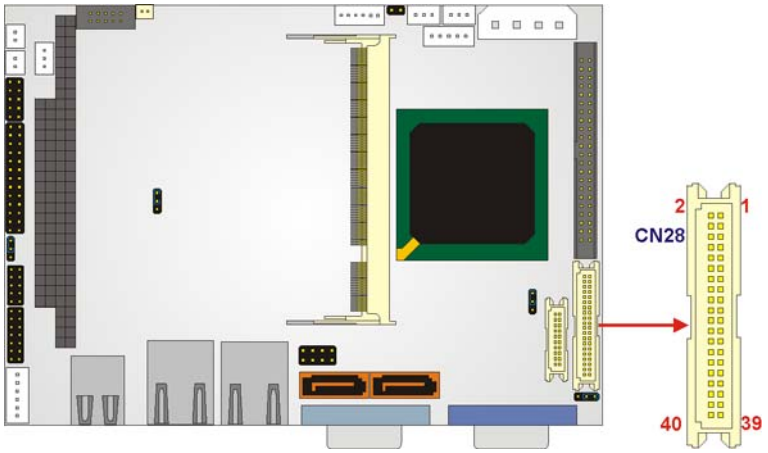


Figure 4-23: TFT LCD TTL Connector Pinout Locations

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	LCD_Vcc	2	LCD_Vcc
3	GND	4	GND
5	LCD_Vcc	6	LCD_Vcc
7	NC	8	GND
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

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
25	R0	26	R1
26	R2	28	R3
29	R4	30	R5
31	R6	32	R7
33	GND	34	GND
35	CLK	36	VSYNC
37	LCD_EN	38	HSYNC
39	NC	40	DISP_EN

Table 4-24: TFT LCD TTL Port Connector Pinouts

4.2.22 Internal USB Connectors

CN Label: **CN24**

CN Type: 8-pin header (2x4)

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

CN Pinouts: See **Table 4-25**

The 2x4 USB pin connector provides connectivity to two USB 2.0 devices. The USB ports are used for I/O bus expansion.

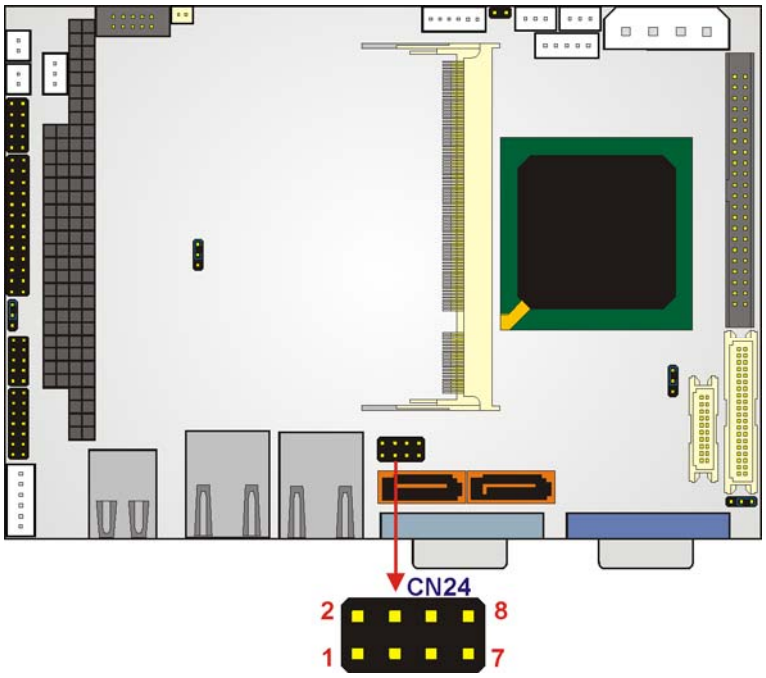


Figure 4-24: USB Connector Pinout Locations

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	VCC_USB	2	GND
3	DATA3-	4	DATA4+
5	DATA3+	6	DATA4-
7	GND	8	VCC_USB

Table 4-25: USB Port Connector Pinouts

4.3 External Interface Connectors

4.3.1 External Interface Connector Overview

Figure 4-25 shows the WAFER-LX motherboard external interface connectors. The WAFER-LX on-board external interface connectors are listed below and shown in **Figure 4-25**:

- 1 x USB combo port
- 2 x Ethernet connector
- 1 x Serial communications port
- 1 x VGA port

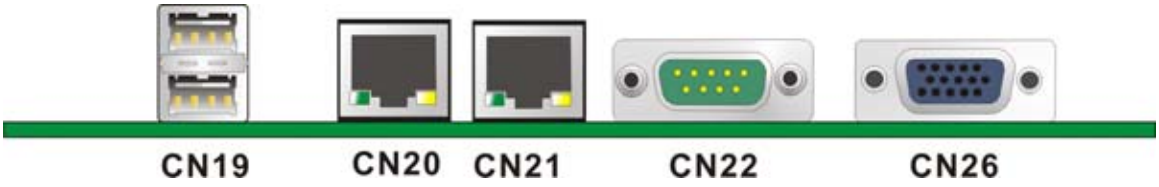


Figure 4-25: WAFER-LX On-board External Interface Connectors

4.3.2 USB Combo Port

CN Label: **CN19**

CN Type: USB Combo port

CN Location: See **Figure 4-25**

CN Pinouts: See **Table 4-26**

The USB combo port provides connectivity to additional USB devices through an adapter cable. Various adapters may come with USB ports on a slot bracket or ports that can be attached to D-SUB openings on a chassis. USB devices connect directly to the USB connectors on the rear panel.

PIN	DESCRIPTION	PIN	DESCRIPTION
1	VCC_USB	5	VCC_USB
2	DATA1-	6	DATA2-
3	DATA1+	7	DATA2+
4	GND	8	GND

Table 4-26: CN19 Connector Pinouts

4.3.3 Ethernet Connector

CN Label: **CN20 and CN 21**

CN Type: RJ-45

CN Location: See **Figure 4-25**

CN Pinouts: See **Table 4-27**

A 10/100 Megabit connection can be made between the Ethernet connector and a Local Area Network (LAN) through a network hub.

PIN	DESCRIPTION	PIN	DESCRIPTION
1	TX+	2	TX-
3	RX+	4	NC
5	NC	6	RX-
7	NC	8	NC

Table 4-27: J7 Connector Pinouts

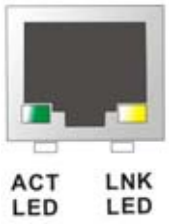


Figure 4-26: J7 Connector

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.

SPEED LED		LINK LED	
Status	**Description**	**Status**	**Description**
GREEN	ON: 100 MB OFF: 10 MB	YELLOW	ON: Linked Flashing: Activity

Table 4-28: J7 Connector LEDs

4.3.4 Serial Communications COM 1 and COM2 Connector

CN Label: **CN22**

CN Type: RS-232 serial connector

CN Location: See **Figure 4-25**

CN Pinouts: See **Table 4-29** and **Figure 4-27**

The RS-232 serial connector provides serial connection in the RS-232 mode.

PIN	DESCRIPTION	PIN	DESCRIPTION
1	DCD1	2	RXD1

PIN	DESCRIPTION	PIN	DESCRIPTION
3	TXD1	4	DTR1
5	GND	6	DSR1
7	RTS1	8	CTS1
9	COM_RI1		

Table 4-29: COM1 Pinouts

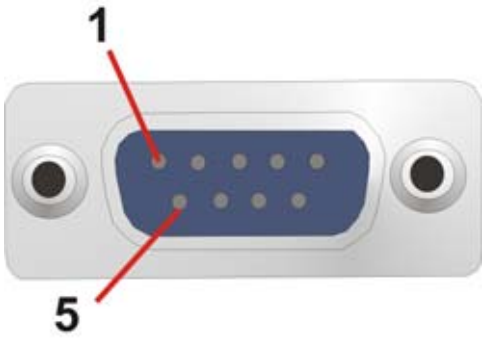


Figure 4-27: COM1 Pinout Locations

4.3.5 VGA Connector

CN Label: **CN26**

CN Type: See VGA Connector

CN Location: See **Figure 4-25**

CN Pinouts: See **Figure 4-28** and **Table 4-30**

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

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

PIN	DESCRIPTION	PIN	DESCRIPTION	PIN	DESCRIPTION
5	GROUND	10	GROUND	15	DDCCLK

Table 4-30: VGA1 Connector Pinouts

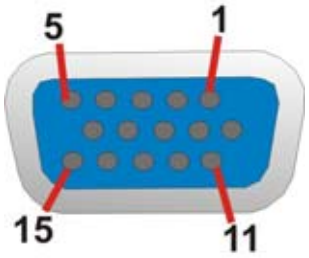


Figure 4-28: VGA1 Connector

Chapter

5

Installation and Configuration

5.1 Anti-static Precautions

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

- ***Wear an anti-static wrist band***: - Wearing a simple anti-static wrist band 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.

5.2 Installation Considerations

NOTE:

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

5.2.1 Installation Notices

Before and during the installation of the WAFER-LX, please **do** the following:

- Read the user manual:
  - The user manual provides a complete description of the WAFER-LX, 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 motherboard on an antistatic pad:

- When installing or configuring the motherboard, place it on an antistatic pad. This helps to prevent potential ESD damage.

- Turn off all power to the WAFER-LX:
  - When working with the motherboard, 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-LX **DO NOT** do the following:

- **DO NOT** remove any of the stickers on the PCB board. These stickers are required for warranty validation.
- **DO NOT** use the product before verifying all the cables and power connectors are properly connected.
- **DO NOT** allow screws to come in contact with the PCB circuit, connector pins, or its components.

5.3 Unpacking

NOTE:

If any of the items listed below are missing when the WAFER-LX is unpacked, do not proceed with the installation and contact the WAFER-LX reseller or vendor.

5.3.1 Unpacking Precautions

Before installing the WAFER-LX, unpack the motherboard. Some components on WAFER-LX are very sensitive to static electricity and can be damaged by a sudden rush of power. To protect it from being damaged, follow these precautions:

- The user should ground them self to remove any static charge before touching the WAFER-LX. To do so wear a grounded wrist strap at all times or frequently touch any conducting materials that is connected to the ground.
- Handle the WAFER-LX by its edges. Do not touch the IC chips, leads or circuitry if not necessary.

Do not place a PCB on top of an anti-static bag. Only the inside of the bag is safe from static discharge.

5.3.2 Checklist

When unpacking the WAFER-LX, please make sure that the package contains the following items.

- 1x WAFER-LX800 single board computer
- 1 x Mini jumper pack
- 1 x IDE flat cable 44P/44P
- 2 x SATA cables
- 1 x SATA power cable
- 1 x Audio cable
- 1 x KB/MS cable
- 1 x USB cable
- 1 x RS-232 cable
- 1 x Utility CD
- 1 x Quick Installation Guide

If one or more of these items are missing, please contact the reseller or vendor the WAFER-LX was purchased from and do not proceed any further with the installation.

5.4 Installation Procedure

WARNING!

Never run the motherboard without an appropriate heatsink and cooler that can be ordered from IEI Technology or purchased separately.

Be sure to use the CPU 12 V power connector (CN10007) for the CPU power.

WARNING!

Please note that the installation instructions described in this manual should be carefully followed in order to avoid damage to the motherboard components and injury to the user.

WARNING!

When installing electronic components onto the motherboard always take the anti-static precautions listed above in order to prevent ESD damage to the motherboard and other electronic components like the CPU and DIMM modules

The following components must be installed onto the motherboard or connected to the motherboard during the installation process.

NOTE:

Some WAFER-LX models already have preinstalled CPUs. If the motherboard has a preinstalled CPU then the following section on CPU installation can be skipped.

- DIMM modules
- Peripheral device connection

5.4.1 DIMM Module Installation

5.4.1.1 Purchasing the Memory Module

When purchasing SO-DIMM modules, the following considerations should be taken into account:

- The SO-DIMM socket can support a memory chip with a maximum size of 1 GB

- The SO-DIMM socket supports SDRAM DIMM speeds of 333 MHz and 400 MHz

5.4.1.2 DIMM Module Installation

The WAFER-LX motherboard has two DDR SDRAM DIMM sockets. To install the DIMM modules, follow the instructions below.

Step 1: Locate the SO-DIMM module connector.

Step 2: Push the SO-DIMM chip into the socket at an angle. (See **Figure 5-1**)

Step 3: Gently pull the arms of the SO-DIMM socket out and push the rear of the SO-DIMM module down. (See **Figure 5-1**)

Step 4: Release the arms on the SO-DIMM socket. They clip into place and secure the SO-DIMM module in the socket.

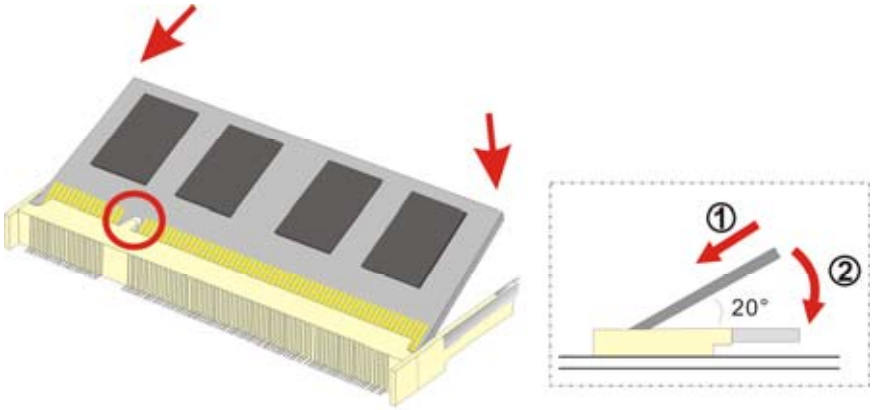


Figure 5-1: SO-DIMM Module Installation

5.4.2 Peripheral Device Connection

Cables provided by IEI that connect peripheral devices to the motherboard are listed in **Table 5-1**. Cables not included in the kit must be separately purchased.

Quantity	Type
1	Audio cable
1	IDE flat cable 44P/44P

Quantity	Type
2	SATA cables
1	SATA power cable
1	RS-232 cable
1	USB cable

Table 5-1: IEI Provided Cables

5.4.2.1 IDE Disk Drive Connector (IDE1)

The cable used to connect the motherboard to the IDE HDD is a standard 44-pin ATA 66/100 flat cable. To connect an IDE HDD to the motherboard, follow the instructions below.

Step 1: Find the ATA 66/100 flat cable in the kit that came with the motherboard.

Step 2: Connect one end of the cable to the PIDE1 connector on the motherboard. A keyed pin on the IDE connectors prevents it from being connected incorrectly.

Step 3: Locate the red wire on the other side of the cable that corresponds to the pin 1 connector.

Step 4: Connect the other side of the cable to the HDD making sure that the pin 1 cable corresponds to pin 1 on the connector.

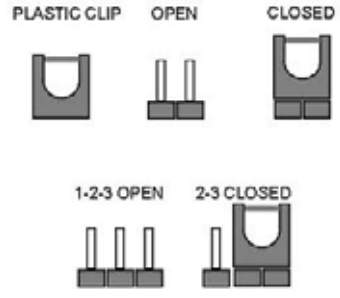
NOTE:

When two EIDE disk drives are connected together, back-end jumpers on the drives must be used to configure one drive as a master and the other as a slave.

5.5 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.



Jumper

Before the WAFER-LX is installed in the system, the jumpers must be set in accordance with the desired configuration. The WAFER-LX motherboard has six on-board jumpers. The jumpers are described in **Table 5-2** and shown in **Figure 5-2**.

Description	Label	Type
AT power select	JP1	2-pin header
COM3 mode setup	JP2	3-pin header
COM1 and COM2 pin 9 setup (Optional jumper)	JP3	10-pin header
LCD voltage selection	JP4	3-pin header
CompactFlash® master/slave setup	JP5	3-pin header
LCD type selection	JP6	3-pin header
Clear CMOS	CN7	2-pin header

Table 5-2: Jumpers

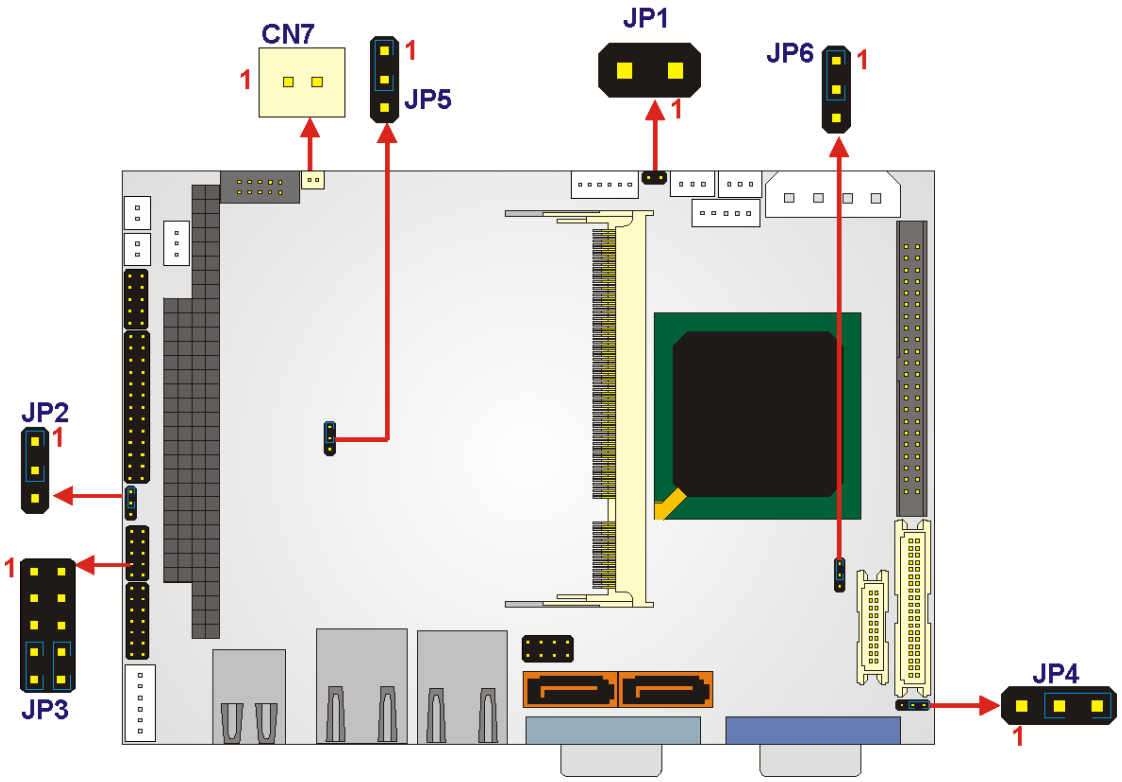


Figure 5-2: Jumper Locations

5.5.1 AT Power Select Jumper Settings

Jumper Label: **JP1**

Jumper Type: 2-pin header

Jumper Settings: See **Table 5-3**

Jumper Location: See **Figure 5-2**

The AT/ATX Power Mode Select jumper specifies the systems power mode. Jumper settings are shown in **Table 5-3**.

AT Power Select	Description	
Short	Use AT power	Default
Open	Use ATX power	

Table 5-3: AT Power Select Jumper Settings

5.5.2 COM3 Setup Jumper Settings

Jumper Label: **JP2**

Jumper Type: 3-pin header

Jumper Settings: See **Table 5-4**

Jumper Location: See **Figure 5-2**

This jumper settings sets the COM3 serial port as RS-422 or RS-485.

COM3 Setup	Description	
1-2	RS-422	Default
2-3	RS-485	

Table 5-4: COM3 Setup Jumper Settings

5.5.3 COM1 and COM2 Pin 9 Setup (Optional Jumper)

Jumper Label: **JP3**

Jumper Type: 10-pin header

Jumper Settings: See **Table 5-5** and **Table 5-6**

Jumper Location: See **Figure 5-2**

Pin 9 on COM1 and COM2 can be configured as RI or to supply 5 V or 12 V of power.

COM1 Setup	Description	
1-3	12 V	
3-5 or 5-7	5 V	
7-9	RI	Default

Table 5-5: COM1 Pin 9 Setup

COM2 Setup	Description	
2-4	12 V	
4-6 or 6-8	5 V	
8-10	RI	Default

Table 5-6: COM2 Pin 9 Setup

5.5.4 LCD Voltage

Jumper Label: **JP4**

Jumper Type: 3-pin header

Jumper Settings: See **Table 5-7**

Jumper Location: See **Figure 5-2**

This jumper settings sets the voltage of the power supplied to the LCD panel.

LCD Voltage Setup	Description	
1-2	3.3 V	Default
2-3	5 V	

Table 5-7: COM3 Setup Jumper Settings

5.5.5 CompactFlash® Master/Slave Setup

Jumper Label: **JP5**

Jumper Type: 3-pin header

Jumper Settings: See **Table 5-8**

Jumper Location: See **Figure 5-2**

This jumper sets the CompactFlash® as either the IDE master or slave.

CompactFlash® Setup	Description	
1-2	IDE Slave	Default

CompactFlash® Setup	Description	
2-3	IDE Master	

Table 5-8: CompactFlash® Master/Slave Setup

5.5.6 TFT LCD Type

Jumper Label: **JP6**

Jumper Type: 3-pin header

Jumper Settings: See **Table 5-9**

Jumper Location: See **Figure 5-2**

This jumper setting specifies the type of TFT LCD panel installed on the system.

TFT LCD Type	Description	
1-2	FPCLK	Default
2-3	#FPCLK	

Table 5-9: TFT LCD Type

5.5.7 Clear CMOS Jumper

NOTE:

The battery connector (CN7) is used as the clear CMOS jumper on the WAFER-LX.

Jumper Label: **CN7**

Jumper Type: 2-pin header

Jumper Settings: See **Table 5-10**

Jumper Location: See **Figure 5-2**

If the WAFER-LX fails to boot due to improper BIOS settings, use this connector to clear the CMOS data and reset the system BIOS information. To do this, disconnect CN7 and

keep it disconnected for at least five seconds. After five seconds has elapsed, reinsert the connector.

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.

Clear CMOS	DESCRIPTION
Closed	Keep CMOS Setup
Open	Clear CMOS Setup

Table 5-10: Clear CMOS Jumper Settings

5.6 Chassis Installation

After the CPU, the cooling kit, and the DIMM modules have been installed and after the internal peripheral connectors have been connected to the peripheral devices and the jumpers have been configure, the motherboard can be mounted into chassis.

To mount the motherboard into a chassis please refer to the chassis user guide that came with the product.

5.7 Rear Panel Connectors

5.7.1 LCD Panel Connection

The conventional CRT monitor connector, VGA1, is a 15-pin, female D-SUB connector. Pin assignments can be seen in that can be connected to external monitors.

5.7.2 Ethernet Connection

The rear panel RJ-45 connectors can be connected to an external LAN and communicate with data transfer rates up to 1 Gb/s.

5.7.3 USB Connection

The rear panel USB connectors provide easier and quicker access to external USB devices. The rear panel USB connector is a standard connector and can easily be connected to other USB devices.

5.7.4 Keyboard and Mouse Connection

A PS/2 keyboard and a PS/2 mouse can be connected to the appropriate PS/2 connector on the rear panel.

Chapter

6

BIOS Setup

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
F2	Item help

Key	Function
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

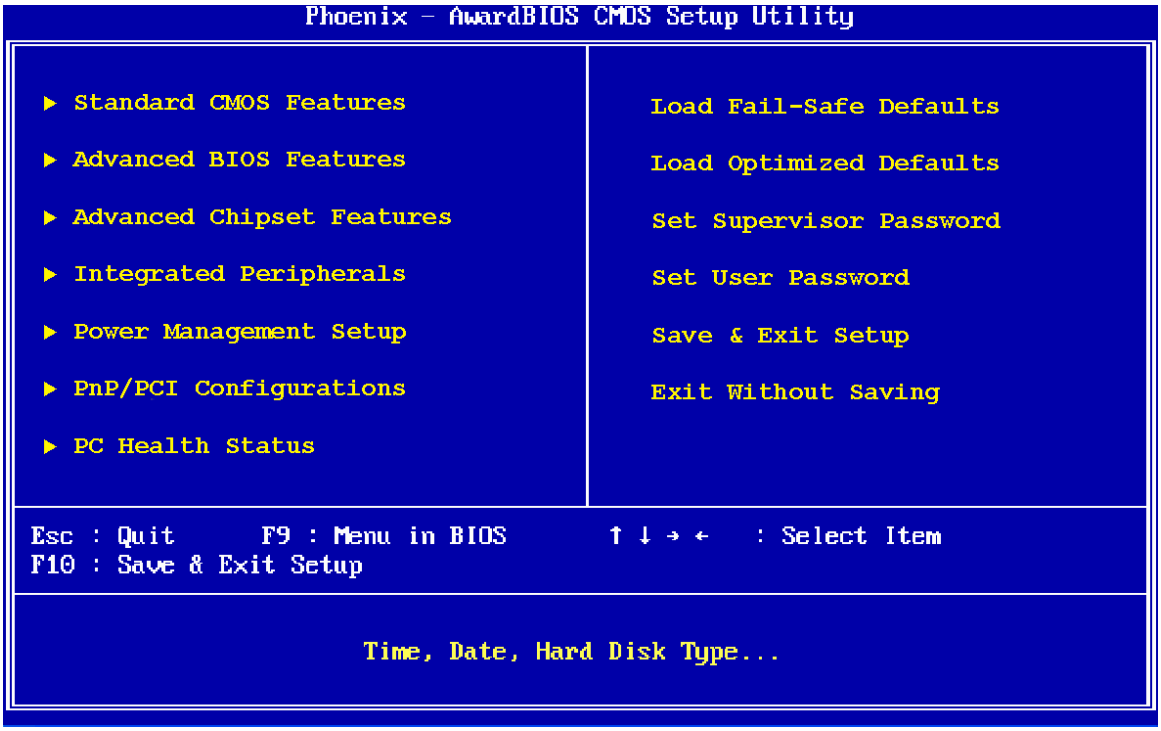
When **F1** is pressed a small help window describing the appropriate keys to use and the possible selections for the highlighted item appears. To exit the Help Window press **Esc** or the **F1** key again.

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.

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.

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**

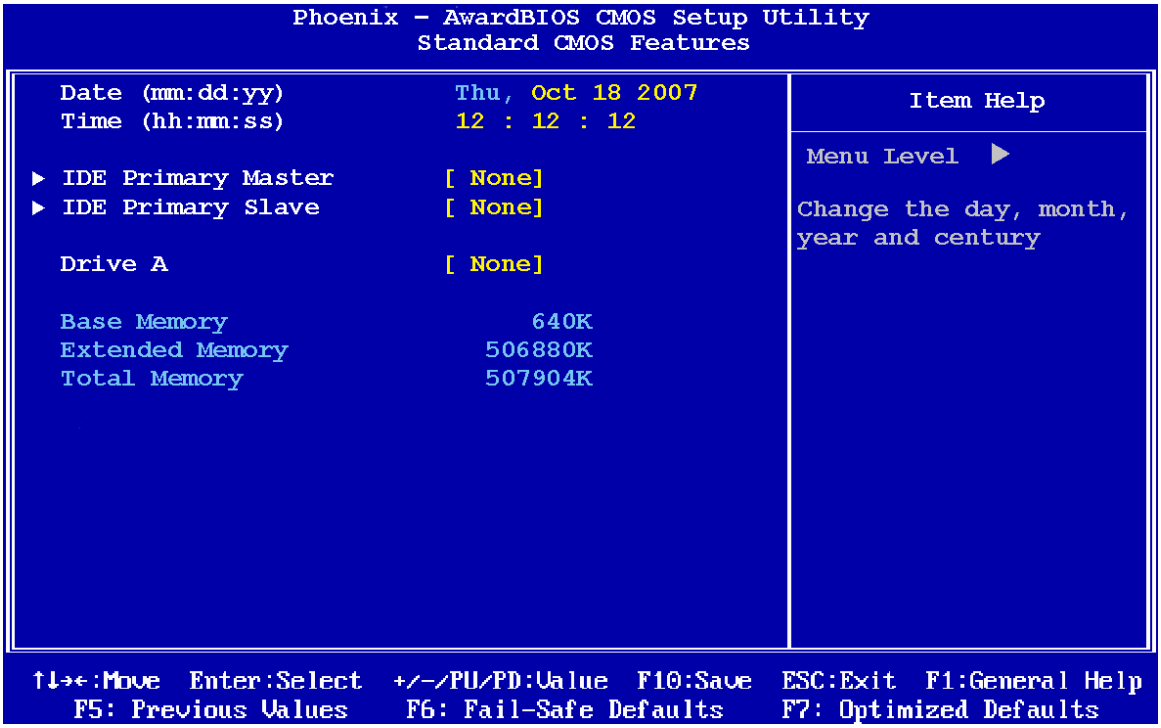
Use the **Save & Exit Setup** option to save any configuration changes made and exit the BIOS menus.

➔ **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.

➔ **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 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.

➔ **Drive A [None]**

Use the **Drive A/B** configuration to specify the floppy drive type installed in the system. The floppy drive configuration options are:

- None
- 360K, 5.25 in.
- 1.2M, 5.25 in.
- 720K, 3.5 in.
- 1.44M, 3.5in (Default)
- 2.88M, 3.5 in.

➔ **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 1 MB 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.

➔ **CHS**		Select this mode if the HDD capacity is less than 504 MB.
➔ **LBA**		Select this mode if the HDD capacity is more than 8.4 GB.
➔ **Large**		This mode is an extended ECHS mode and while it supports HDDs larger than 504 MB, 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**

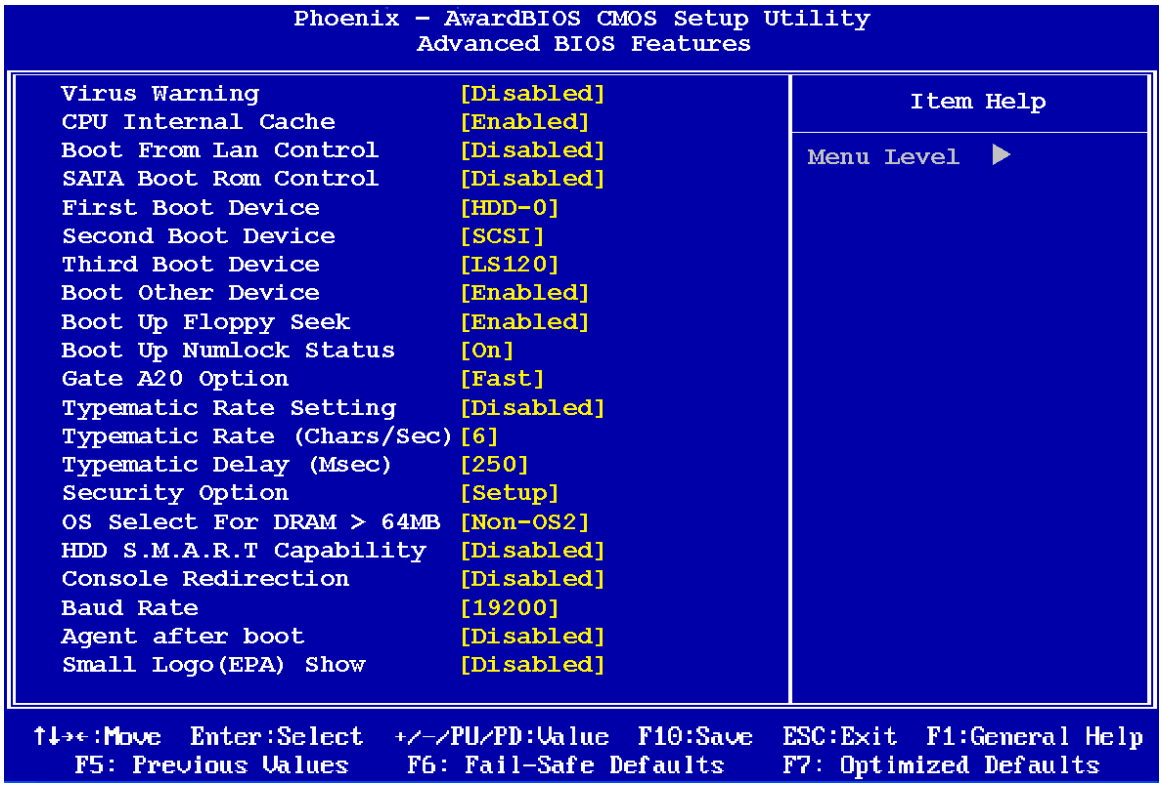
The **Landing Zone** specification indicates where the disk head will park itself after the system powers off.

➔ **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

➔ **Virus Warning [Disabled]**

NOTE:

Many disk diagnostic programs can cause the above warning message to appear when the program attempts to access the boot sector table. If you are running such a program, it is recommended that the virus protection function be disabled beforehand.

Use the **Virus Warning** option to enable BIOS to monitor the boot sector and partition table of the HDD for any attempted modification. If a modification attempt is made, the BIOS halts the system and an error message appears. If necessary, an anti-virus program can then be run to locate and remove the virus before any damage is done.

➔ **Enabled**		Activates automatically when the system boots up causing a warning message to appear when anything attempts to access the boot sector or HDD partition table.
➔ **Disabled**	**DEFAULT**	No warning message appears when there is an attempt to access the boot sector or HDD partition table.

➔ **CPU Internal Cache [Enabled]**

Use the **CPU Internal Cache** option to enable or disable the internal CPU cache.

➔ **Disabled**		The internal CPU cache is disabled.
➔ **Enabled**	**DEFAULT**	The internal CPU cache is enabled.

➔ **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: SCSI]

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 SCSI drive.

Boot Device configuration options are:

- Floppy
- 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 Floppy Seek [Disabled]**

Use the **Boot Up Floppy Seek** option to enable the BIOS to determine if the floppy disk drive installed has 40 or 80 tracks during the POST. 360K FDDs have 40 tracks while 760K, 1.2M and 1.44M FDDs all have 80 tracks.

➔ **Disabled** **DEFAULT** BIOS does not search for the type of FDD drive by track number. Note that there is no warning message if the drive installed is 360K.

➔ **Enabled** BIOS searches for a FDD to determine if it has 40 or 80 tracks. Note that BIOS cannot tell the difference between 720K, 1.2M or 1.44M drives as they all have 80 tracks.

➔ **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.

➔ **Gate A20 Option [Fast]**

Use the **Gate A20 Option** option to set if the keyboard controller or the chipset controls the Gate A20 switching.

➔ **Normal**		The keyboard controller does the switching.
➔ **Fast**	**DEFAULT**	The chipset does the switching.

➔ **Typematic Rate Setting [Disabled]**

Use the **Typematic Rate Setting** configuration option to specify if only one character is allowed to appear on the screen if a key is continuously held down. When this option is enabled, the BIOS reports as before, but it then waits a moment, and, if the key is still held down, it begins to report that the key has been pressed repeatedly. This feature accelerates cursor movement with the arrow keys.

➔ **Disabled**	**DEFAULT**	Disables the typematic rate.
➔ **Enabled**		Enables the typematic rate.

➔ **Typematic Rate (Chars/sec) [6]**

The **Typematic Rate** option can only be configured if the **Typematic Rate Setting** is enabled. Use the **Typematic Rate** option to specify the rate keys are accelerated.

➔ **6**	**DEFAULT**	6 characters per second
➔ **8**		8 characters per second
➔ **10**		10 characters per second
➔ **12**		12 characters per second
➔ **15**		15 characters per second
➔ **20**		20 characters per second
➔ **24**		24 characters per second
➔ **30**		30 characters per second

➔ **Typematic Delay (Msec) [250]**

The **Typematic Rate** option can only be configured if the **Typematic Rate Setting** is enabled. Use the **Typematic Delay** option to specify the delay time between when a key is first pressed and when the acceleration begins.

➔ **250**	**DEFAULT**	250 milliseconds
➔ **500**		500 milliseconds
➔ **750**		750 milliseconds
➔ **1000**		1000 milliseconds

➔ **Security Option [Setup]**

Use the **Security Option** to limit access to both the system and Setup, or just Setup.

➔ **Setup**	**DEFAULT**	The system does not boot and access to Setup is denied if the correct password is not entered at the prompt.
➔ **System**		The system boots, but access to Setup is denied if the correct password is not entered at the prompt.

NOTE:

To disable security, select the password setting in the Main Menu. When asked to enter a password, don't type anything, press **ENTER** and the security is disabled. Once the security is disabled, the system boots and Setup can be accessed.

➔ **OS Select For DRAM > 64 MB [Non-OS2]**

Use the **OS Select For DRAM > 64 MB** option to specify the operating system.

➔ **Enabled**		Specifies the operating system used as OS/2.
➔ **Disabled**	**DEFAULT**	Select this option when not using the OS/2 operating system.

➔ **HDD S.M.A.R.T [Disabled]**

Use the **S.M.A.R.T** option to enable S.M.A.R.T (Self-Monitoring, Analysis, and Reporting Technology) on the drive connected to SATA drive connector n.

➔ **Enabled**	**DEFAULT**	S.M.A.R.T is enabled on the drive connected to SATA drive connector n on the system
➔ **Disabled**		S.M.A.R.T is disabled on the drive connected to SATA drive connector n on the system

➔ **Console Redirection [Disabled]**

The **Console Redirection** BIOS option set the options for allowing the computer to be controlled over the COM port instead of through the keyboard.

➔ **Enabled**		Attempt to redirect the console via the COM port
➔ **Disabled**	**DEFAULT**	Only attempt to redirect the console when there is no keyboard installed

➔ **Baud Rate [19200]**

The **Serial Port Mode** designates baud rate through which the console redirection is made. The following configuration options are available

- 9600
- 19200 **DEFAULT**
- 38400
- 57600
- 115200

NOTE:

Identical baud settings at the host and slave are required

➔ **Agent after boot [Disabled]**

Use the **Agent after boot** option to keep the console redirection agent active after the computer has booted up.

➔ **Disabled**	**DEFAULT**	The agent is disabled after the operating system has booted up
➔ **Enabled**		The agent remains active after the operating system has loaded

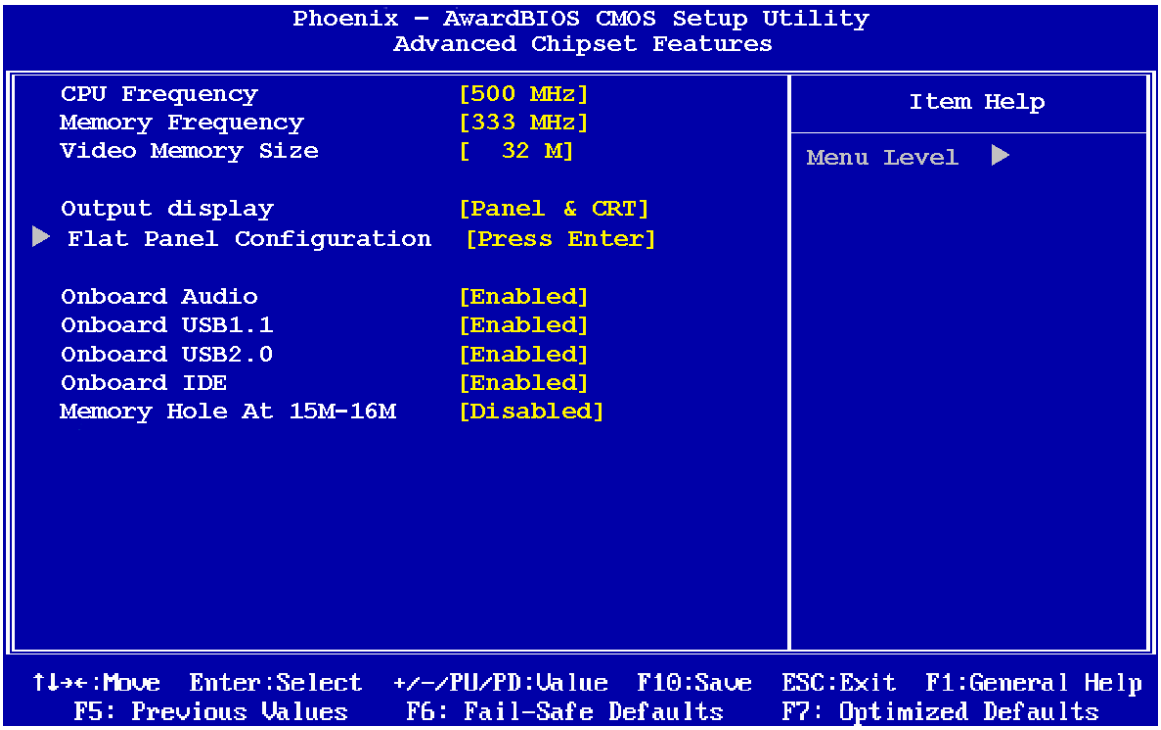
➔ **Small Logo (EPA) Show [Disabled]**

Use the **Small Logo (EPA) Show** option to specify if the Environmental Protection Agency (EPA) logo appears during the system boot-up process. If enabled, the boot up process may be delayed.

➔ **Disabled**	**DEFAULT**	EPA logo does not appear during boot up.
➔ **Enabled**		EPA logo appears during boot up.

6.4 Advanced Chipset Features

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



BIOS Menu 4: Advanced Chipset Features

➔ **CPU Frequency [500 MHz]**

Use the **CPU Frequency** option to set the CPU frequency. The **CPU Frequency** options are:

- Auto
- 200 MHz
- 333 MHz
- 400 MHz
- 433 MHz
- 500 MHz (Default)

➔ **Memory Frequency [333 MHz]**

Use the **Memory Frequency** option to set the frequency of the installed DRAM modules. The **Memory Frequency** options are:

- 200 MHz
- 266 MHz
- 333 MHz (Default)
- 400 MHz

➔ **Video Memory Size [8M]**

Use the **Video Memory Size** option to determine how much memory is allocated to the video graphics device. The **Video Memory Size** options are:

- None
- 8M (Default)
- 16M
- 32M
- 64M
- 128M
- 254M

➔ **Output Display [Panel & CRT]**

Use the **Output Display** configuration to specify the display devices the system is connected to. The **Output Display** options are:

- Flat Panel
- CRT
- Panel & CRT (Default)

➔ **Flat Panel Configuration [Press Enter]**

Use the Flat Panel Configuration option to open the Flat Panel Configuration menu. The Flat Panel Configuration options are shown in **Section** .

➔ **OnBoard Audio [Enabled]**

Use the **OnBoard Audio** option to enable or disable the onboard codec.

➔ **Disabled**		The onboard codec is disabled.
➔ **Enabled**	**DEFAULT**	The onboard codec is detected and enabled.

➔ **Onboard USB1.1 [Enabled]**

The **Onboard USB1.1** BIOS option enables or disables the onboard USB1.1 controller. If disabled, USB1.1 devices cannot be used on the system.

➔ **Disabled**		USB 1.1 interface is disabled and cannot be used.
➔ **Enabled**	**DEFAULT**	USB 1.1 interface is enabled and can be used.

➔ **Onboard USB2.0 [Enabled]**

The **Onboard USB2.0** BIOS option enables or disables the onboard USB2.0 controller. If disabled, USB2.0 devices cannot be used on the system.

➔ **Disabled**		USB 2.0 interface is disabled and cannot be used.
➔ **Enabled**	**DEFAULT**	USB 2.0 interface is enabled and can be used.

➔ **Onboard IDE [Enabled]**

Use the **Onboard IDE** 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.

➔ **Memory Hole At 15M – 16M [Disabled]**

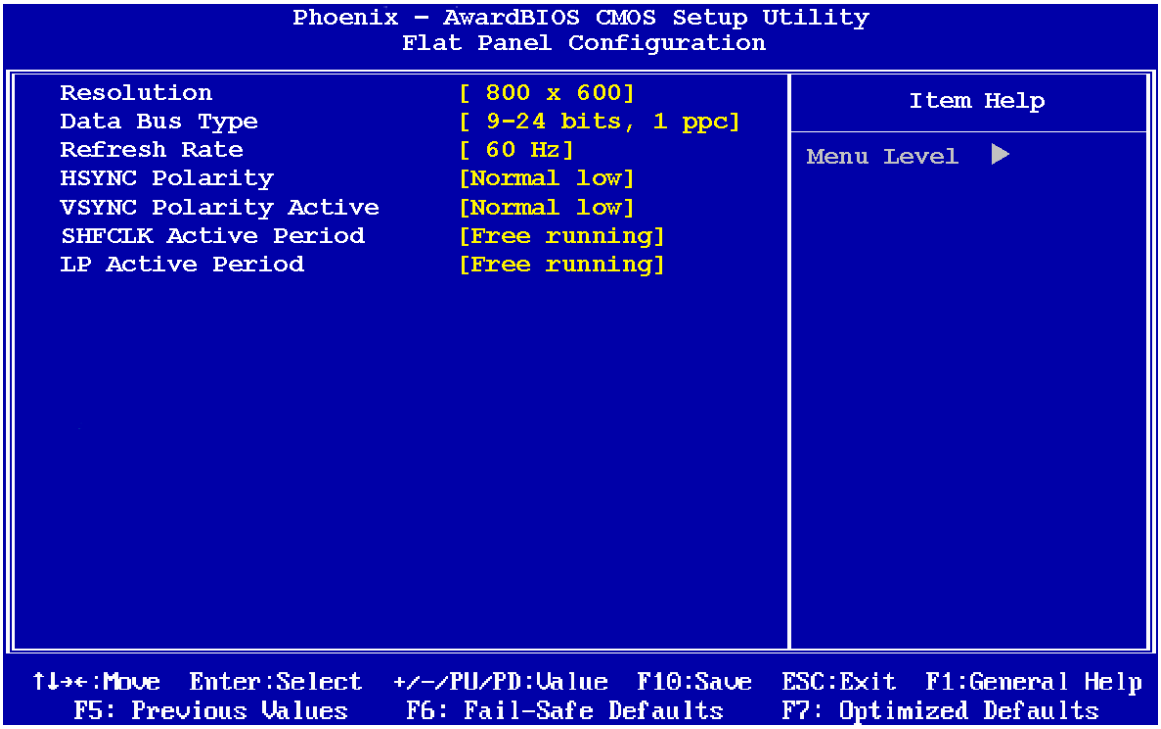
The **Memory Hole At 15M – 16M** reserves the memory space between 15 MB and 16 MB for ISA expansion cards that require a specified area of memory to work properly. If an older ISA expansion card is used, please refer to the documentation that came with the card to see if it is necessary to reserve the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

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

➔ **Enabled** Memory is reserved for ISA expansion cards

6.4.1 Flat Panel Configuration

Use the **Flat Panel Configuration** menu (**BIOS Menu 5**) to set the configuration settings for the flat panel screen connected to the system.



BIOS Menu 5: Flat Panel Configuration

➔ **Resolution [800 x 600]**

The **Resolution** option can only be configured if the **Flat Panel Type** option is not set to **Auto**. Use the **Resolution** option to set the resolution of the flat panel screen connected to the system. The **Resolution** options are:

- 320 x 240
- 640 x 480
- 800 x 600 (Default)

- 1024 x 768
- 1152 x 864
- 1280 x 1024
- 1600 x 1200

➔ **Data Bus Type [9 – 24 bits, 1 ppc]**

The **Data Bus Type** option can only be configured if the **Flat Panel Type** option is not set to **Auto**. Use the **Data Bus Type** option to set the bus type and the data bus width used to transfer data between the system and the flat panel screen connected to the system. The **Data Bus Type** options are:

- 9-24 bits, 1 ppc (Default)
- 18, 24 bits, 2 ppc

➔ **Refresh Rate [60Hz]**

The **Refresh Rate** option can only be configured if the **Flat Panel Type** option is not set to **Auto**. Use the **Refresh Rate** option to set the screen refresh rate required by the panel connected to the system. Check the documentation that came with the panel before setting this option. The **Refresh Rate** options are:

- 60Hz (Default)
- 70Hz
- 72Hz
- 75Hz
- 85Hz
- 90Hz
- 100Hz

➔ **HSYNC Polarity [High]**

The **HSYNC Polarity** option can only be configured if the **Flat Panel Type** option is not set to **Auto**. Use the **HSYNC Polarity** option to set the polarity of the HSYNC signal to the panel. The **HSYNC Polarity** options are:

- High
- Low (Default)

➔ **VSYNC Polarity Active [Low]**

The **VGSYNC Polarity Active** option can only be configured if the **Flat Panel Type** option is not set to **Auto**. Use the **VGSYNC Polarity Active** option to set the polarity of the VSYNC signal to the panel. The **VGSYNC Polarity Active** options are:

- High
- Low (Default)

➔ **SHFCLK Active Period [Free Running]**

Use the **SHFCLK Active Period** option to set the SHFCLK. The **SHFCLK Active Period** options are:

- Active Only
- Free running (Default)

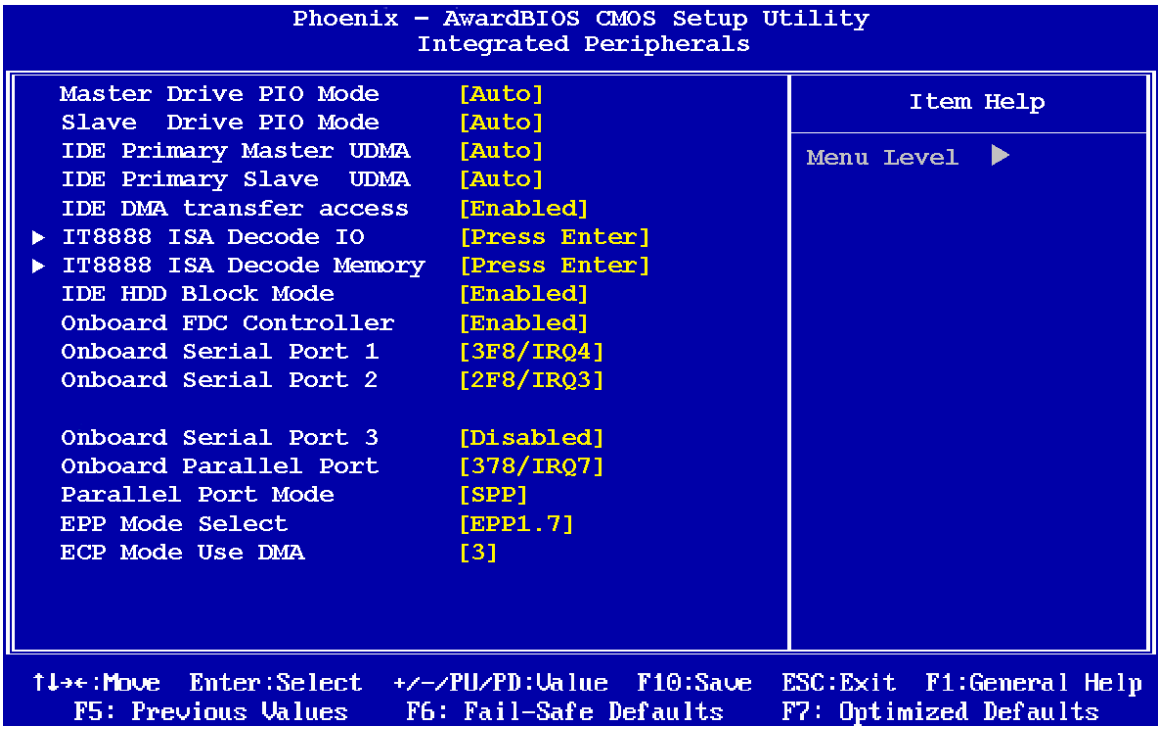
➔ **LP Active Period [Free Running]**

Use the **LP Active Period** option to set the LDE/MOD signal to the panel. The **LP Active Period** options are:

- Active Only
- Free running (Default)

6.5 Integrated Peripherals

Use the Integrated Peripherals menu (BIOS Menu 6) to change the configuration options for the attached peripheral devices.



BIOS Menu 6: Integrated Peripherals

➔ **On-Chip IDE Channel 1 [Enabled]**

Use the **On-Chip IDE Channel 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.

➔ **Drive PIO Mode [Auto]**

Use the **Drive PIO Mode** options below to select the Programmed Input/Output (PIO) mode for the following HDDs:

- Master Drive PIO Mode
- Slave Drive PIO Mode

➔ **Auto** **DEFAULT** The computer selects the correct mode.

➔ **Mode 0** PIO mode 0 selected with a maximum transfer rate of 3.3 MB/s.

➔ **Mode 1** PIO mode 1 selected with a maximum transfer rate of 5.2 MB/s.

➔ **Mode 2** PIO mode 2 selected with a maximum transfer rate of 8.3 MB/s.

➔ **Mode 3** PIO mode 3 selected with a maximum transfer rate of 11.1 MB/s.

➔ **Mode 4** PIO mode 4 selected with a maximum transfer rate of 16.6 MB/s.

➔ **Mode 5** PIO mode 5 selected with a maximum transfer rate of 22.2 MB/s.

➔ **IDE UDMA [Auto]**

Use the **IDE UDMA** option below to select the Ultra DMA (UDMA) mode for the following HDDs:

- IDE Primary Master UDMA
- IDE Primary Slave UDMA

➔ **Auto** **DEFAULT** The computer selects the correct UDMA.

➔ **Disabled** The UDMA for the HDD device is disabled.

➔ **IT8888 ISA Decode IO**

Use the IT8888 ISA Decode IO menu (**BIOS Menu 7**) to set the IO memory range for the onboard ISA. See **Section 0**.

➔ **IT8888 ISA Decode Memory**

Use the **IT8888 ISA Decode Memory** (**BIOS Menu 8**) to set the resources for the onboard ISA bus. See **Section 6.5.2**.

➔ **IDE HDD Block Mode [Enabled]**

If the drive connected to the system supports block mode, use the **IDE HDD Block Mode** option to enable the system to detect the optimal number of block read/writes per sector the system IDE drive can support. Block mode is also called block transfer, multiple commands, or multiple sector read/write.

➔ **Disabled**		Block mode is not supported.
➔ **Enabled**	**DEFAULT**	Block mode is supported.

➔ **Onboard FDC Controller [Disabled]**

Use the **Onboard FDC Controller** option to enable or disable the onboard floppy controller. If the system is not connected to a floppy disk or uses an adapter for the FDD, this option can be disabled.

➔ **Disabled**	**DEFAULT**	The FDD controller is disabled.
➔ **Enabled**		The FDD controller is enabled.

➔ **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
- Auto

➔ **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
- Auto

➔ **Onboard Serial Port 3 [Disabled]**

Use the **Onboard Serial Port 3** 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 3** options are:

- Disabled (Default)
- 3F8/IRQ4
- 2F8/IRQ3
- 3E8/IRQ4
- 2E8/IRQ3
- Auto

➔ **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
- 378/IRQ7 (Default)
- 278/IRQ5
- 3BC/IRQ7

➔ **Parallel Port Mode [SPP]**

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

- ➔ **SPP** **DEFAULT** The parallel port operates in the standard parallel port (SPP) mode. This parallel port mode works with most parallel port devices but is slow.
- ➔ **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.
- ➔ **Normal**

➔ **EPP Mode Select [EPP1.7]**

The **EPP Mode Select** option is only available if the **Parallel Port Mode** option is set to EPP mode. Use the **EPP Mode Select** option to select the parallel port mode standard for the parallel port.

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

➔ **ECP Mode Use DMA [1]**

The **ECP Mode Use DMA** option is only available if the **Parallel Port Mode** option is set to ECP mode. Use the **ECP Mode Use DMA** option to specify the DMA channel the parallel port must use in the ECP mode.

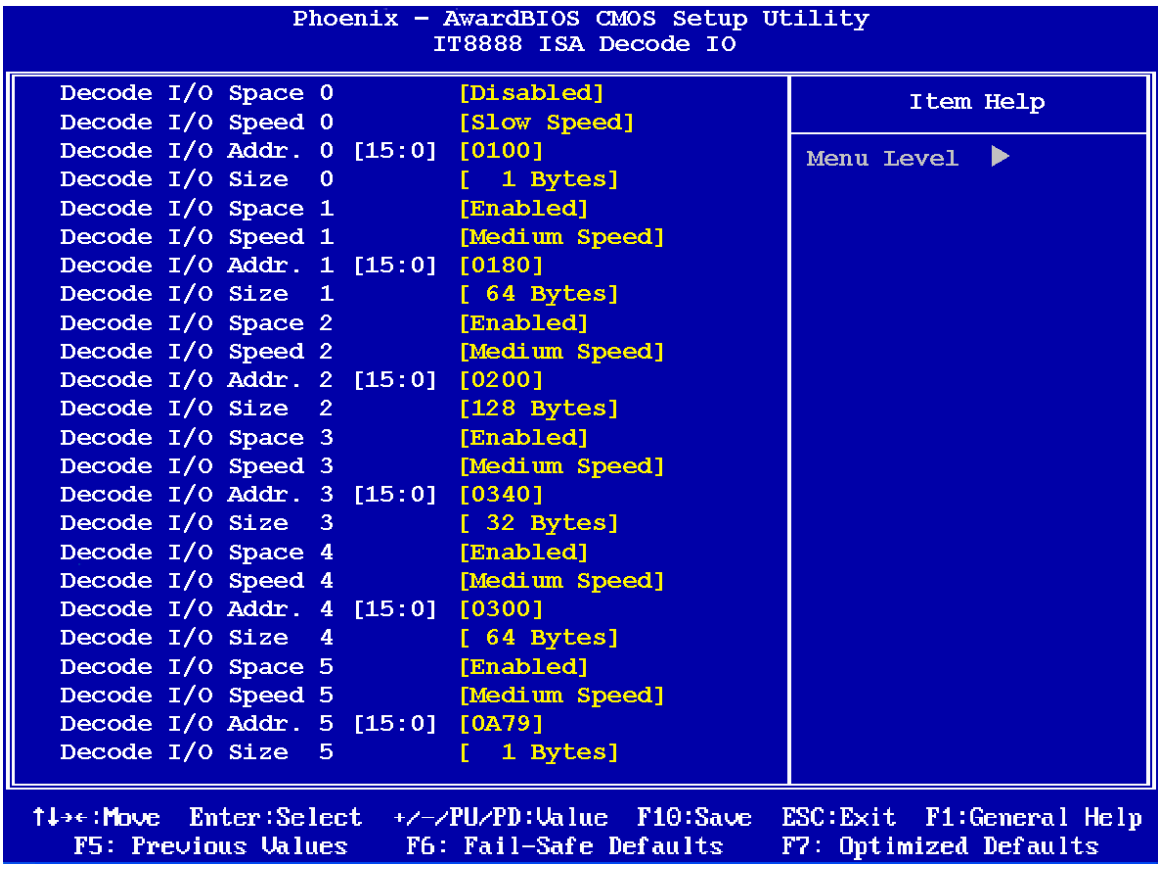
- ➔ **1** The parallel port uses DMA Channel 1 in ECP mode.
- ➔ **3** **DEFAULT** The parallel port uses DMA Channel 3 in ECP mode.

6.5.1 IT8888 ISA Decode IO

NOTE:

Five PCI-104 devices can be stacked onto the WAFER-LX motherboard. If these devices are stacked onto the board, the ISA bus space should be enabled. If no PCI-104 devices are being used, disable all the buses. Disabling these buses frees up system resources that can be allocated to other system applications.

Use the IT8888 ISA Decode IO menu (**BIOS Menu 7** to set the IO memory range for the onboard ISA.



BIOS Menu 7: IT8888 ISA Decode IO

The IT8888 ISA Decode IO menu has the following common options:

- Decode I/O Space N
- Decode I/O Speed N
- Decode I/O Addr. N [15:0]
- Decode I/O Size N

Where N is an integer in the set [1, 2, 3, 4, 5] and represents a set for the PCI-104 devices that are attached to the system.

➔ **Decode IO Space N [Enabled]**

Use the **Decode IO Space N** option to allocate system resources to the ISA bridge and to enable the Nth PCI-104 to function correctly.

➔ **Disabled**		The Nth IO set is disabled and the system resources are reallocated to other applications.
➔ **Enabled**	**DEFAULT**	The Nth IO set is enabled and dedicated system resources are allocated to the Nth ISA bus.

➔ **Decode IO Speed N [Fast Speed]**

Use the **Decode IO Speed N** option to specify the speed of the Nth ISA bus. The following options are available:

- Fast Speed
- Middle Speed
- Slow Speed
- Subtractive Speed

➔ **Decode IO Address N 0:15 [xx]**

Use the **Decode IO Address N 0:15** option to allocate an address to the ISA bus. The address may range from **0001** to **FFFF**.

➔ **Decode IO Size N [Fast Speed]**

Use the **Decode IO Size N** option to specify the size of the ISA bus. The following options are available:

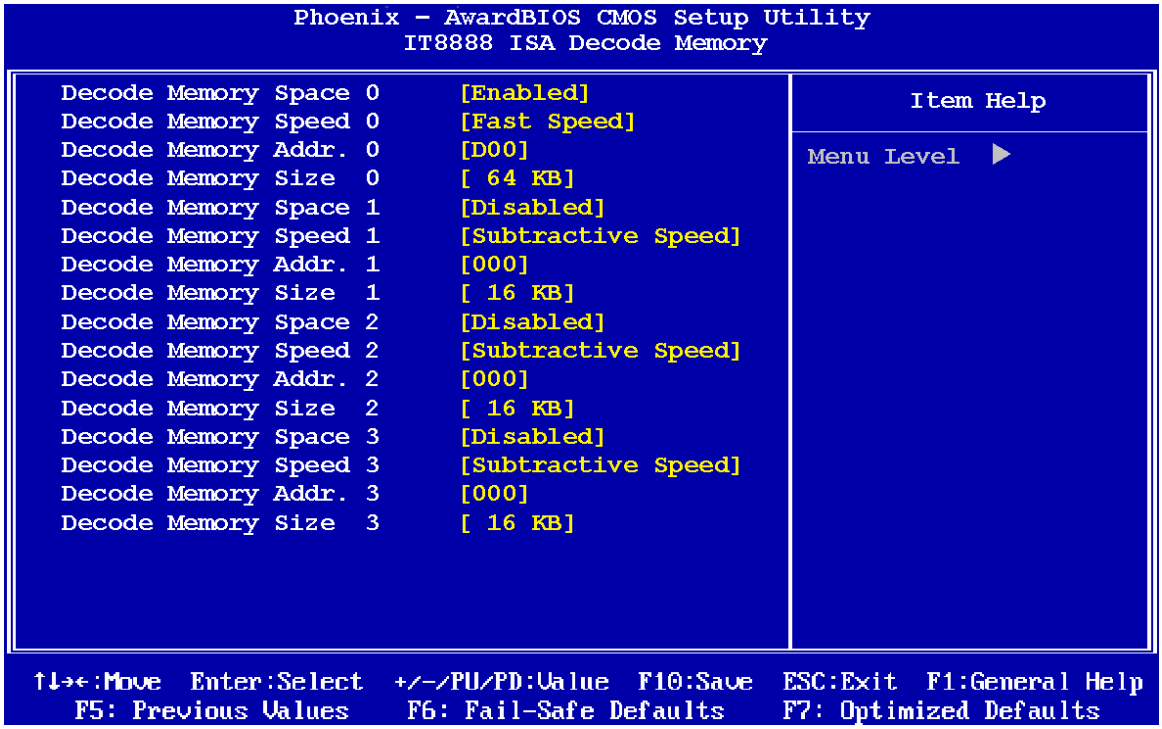
- 1 Byte
- 2 Bytes
- 4 Bytes
- 8 Bytes
- 16 Bytes
- 32 Bytes
- 64 Bytes
- 128 Bytes

6.5.2 IT8888 ISA Decode Memory

NOTE:

Five PCI-104 devices can be stacked onto the WAFER-LX motherboard. If these devices are stacked onto the board, the ISA memory should be enabled. If no PCI-104 devices are being used, disable all the memory allocations for these buses. Disabling the memory allocations frees up system resources that can be allocated to other system applications.

Use the IT8888 ISA Decode Memory (**BIOS Menu 8**) to set the resources for the onboard ISA bus.



BIOS Menu 8: IT8888 ISA Decode Memory

The IT8888 ISA Decode IO menu has the following common options:

- Decode Memory Space N
- Decode Memory Speed N
- Decode Memory Addr. N [15:0]
- Decode Memory Size N

Where N is an integer in the set [1, 2, 3, 4, 5] and represents a memory set for the PCI-104 devices that are attached to the system.

➔ **Decode Memory Space N [Enabled]**

Use the **Decode IO Memory N** option to allocate memory resources to the ISA bridge and to enable the PCI-104 to function correctly.

➔ **Disabled** The Nth memory set is disabled and the system memory resources are reallocated to other applications.

➔ **Enabled** **DEFAULT** The Nth memory set is enabled and dedicated system memory resources are allocated to the ISA bus.

➔ **Decode Memory Speed N [Fast Speed]**

Use the **Decode Memory Speed N** option to specify the memory speed of the ISA bus. The following options are available:

- Fast Speed
- Middle Speed
- Slow Speed
- Subtractive Speed

➔ **Decode Memory Address N [xx]**

Use the **Decode Memory Address N** option to allocate an address to the memory of the ISA bus. The address may range from **0001** to **FFFF**.

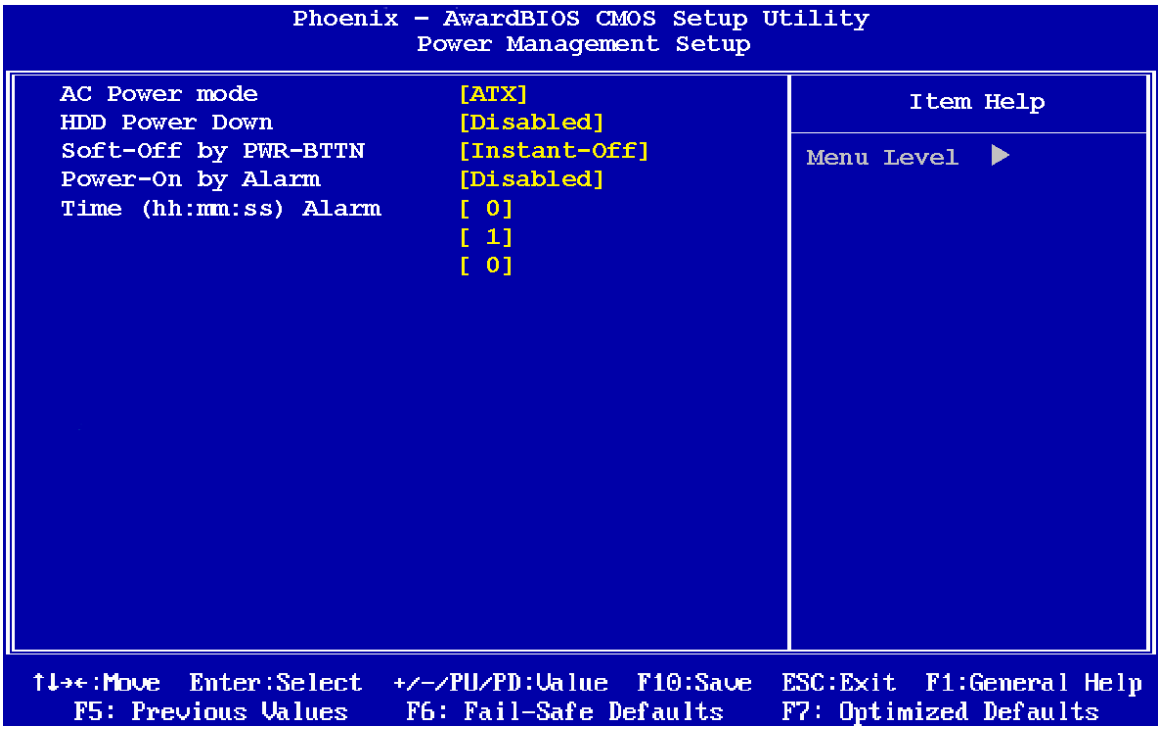
➔ **Decode Memory Size N [xx]**

Use the Decode Memory **Size N** option to specify the memory size of the ISA bus. The following options are available:

- 16 KB
- 32 KB
- 64 KB
- 128 KB
- 256 KB
- 512 KB
- 1 MB
- 2 MB

6.6 Power Management Setup

Use the **Power Management Setup** menu (BIOS Menu 1) to set the BIOS power management and saving features.



BIOS Menu 9: Power Management Setup

➔ AC Power Mode [ATX]

Use the **AC Power Mode** BIOS option to to select the power supply that is connected to the system.

➔ **AT**		An AT power supply is connected to the system
➔ **ATX**	**DEFAULT**	An ATX power supply is connected to the system

➔ HDD Power Down [Disabled]

The HDD Power Down option specifies the period of hard drive inactivity before entering a power saving state.

- Disabled **Default**
- 1 Min
- 2 Min
- 3 Min
- 4 Min
- 5 Min
- 6 Min
- 7 Min
- 8 Min
- 9 Min
- 10 Min
- 11 Min
- 12 Min
- 13 Min
- 14 Min
- 15 Min

➔ **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.

➔ **Instant-Off** **DEFAULT** When the power button is pressed, the system is immediately shutdown.

➔ **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.

➔ **Power-On by Alarm [Disabled]**

Use the **Power-On by Alarm** option to specify when the computer is roused from a suspended state by the system alarm.

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

➔ **Enabled**

The system alarm will turn the system on when the alarm goes off. If this option is enabled the following values can be selected:

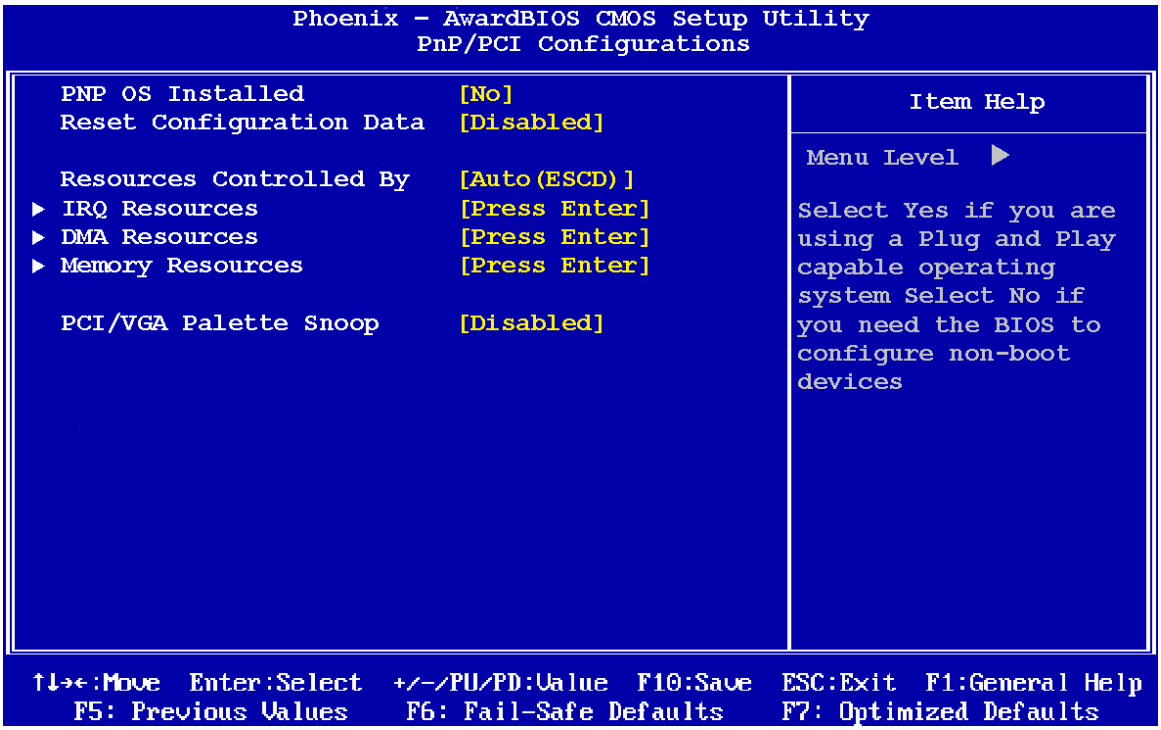
hours

minutes

seconds

6.7 PnP/PCI Configurations

Use the PnP/PCI Configurations menu (**BIOS Menu 10**) to set the plug and play, and PCI options.



BIOS Menu 10: PnP/PCI Configurations

➔ **PNP OS Installed [No]**

The **PNP OS Installed** option determines whether the Plug and Play devices connected to the system are configured by the operating system or the BIOS.

➔ **No** **DEFAULT** If the operating system does not meet the Plug and Play specifications, BIOS configures all the devices in the system.

➔ **Yes** Set this option if the system is running Plug and Play aware operating systems. The operating system changes the interrupt, I/O, and DMA settings.

➔ **Reset Configuration Data [Disabled]**

Use the **Reset Configuration Data** option to reset the Extended System Configuration Data (ESCD) when exiting setup if booting problems occur after a new add-on is installed.

➔ **Disabled** **DEFAULT** ESCD will not be reconfigured

➔ **Enabled** ESCD will be reconfigured after you exit setup

➔ **Resources Controlled By [Auto (ESCD)]**

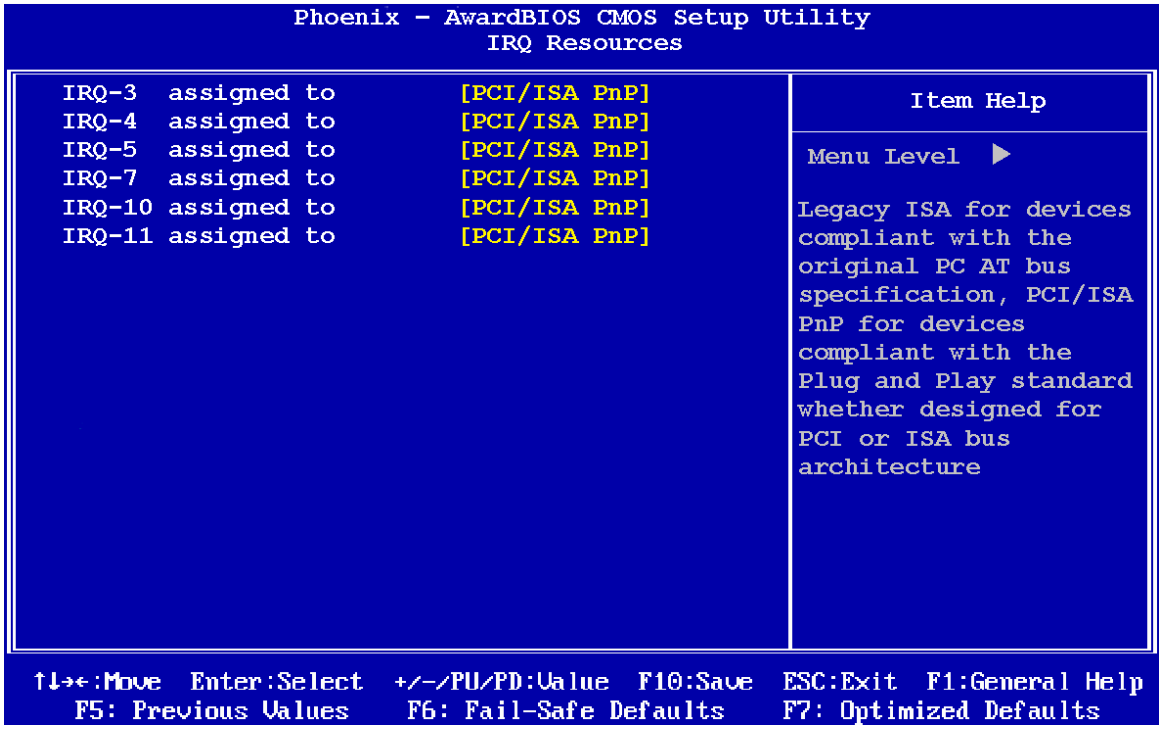
Use the **Resources Controlled By** option to either manually configure all the boot and plug and play devices, or allow BIOS to configure these devices automatically. If BIOS is allowed to configure the devices automatically IRQs, DMA and memory base address fields cannot be set manually.

➔ **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 (**BIOS Menu 11**) can only be selected if the Resources Controlled By option is set to Manual.



BIOS Menu 11: IRQ Resources

The **IRQ Resources** menu has the following options:

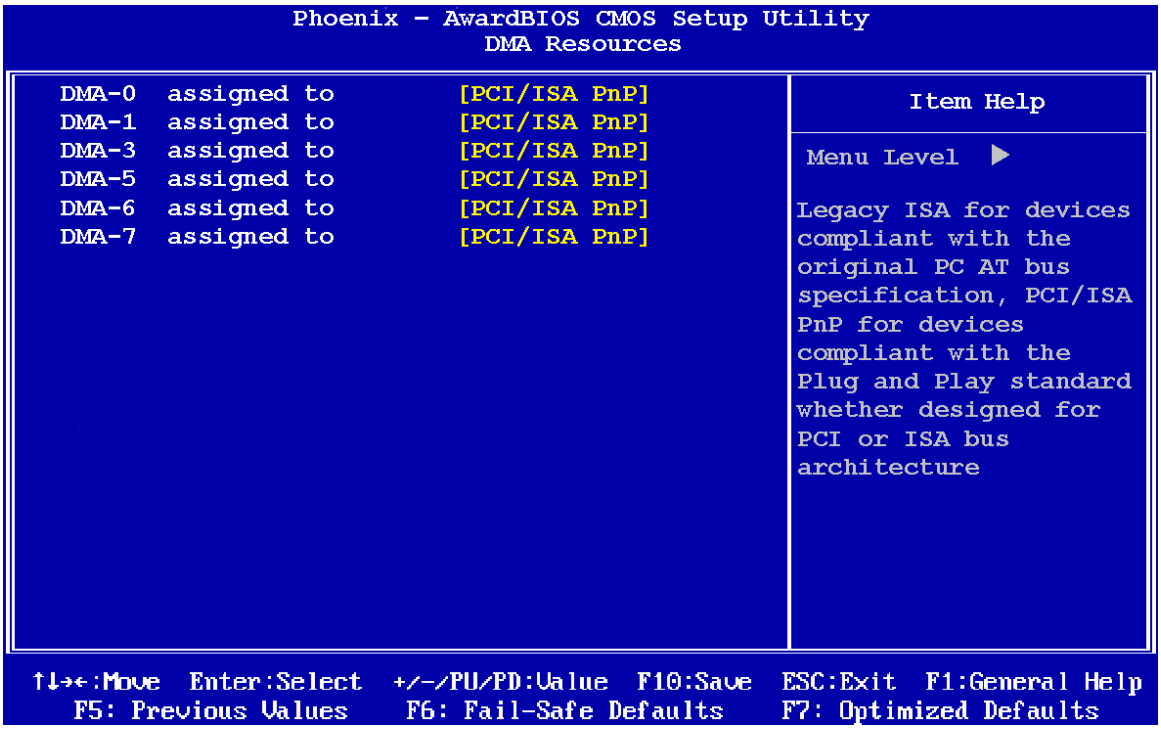
- IRQ-3 assigned to
- IRQ-4 assigned to
- IRQ-5 assigned to
- IRQ-7 assigned to
- IRQ-10 assigned to
- IRQ-11 assigned to

The above options all have the following default options.

➔ **PCI/ISA PnP**	**DEFAULT**	PCI or ISA cards designed according to the Plug and Play standard can be used
➔ **Legacy ISA**		Only an ISA card compliant with the original AT bus specification can be installed

➔ **x DMA Resources [Press Enter]**

The DMA Resources option (**BIOS Menu 12**) can only be selected if the Resources Controlled By option is set to Manual.



BIOS Menu 12: DMA Resources

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

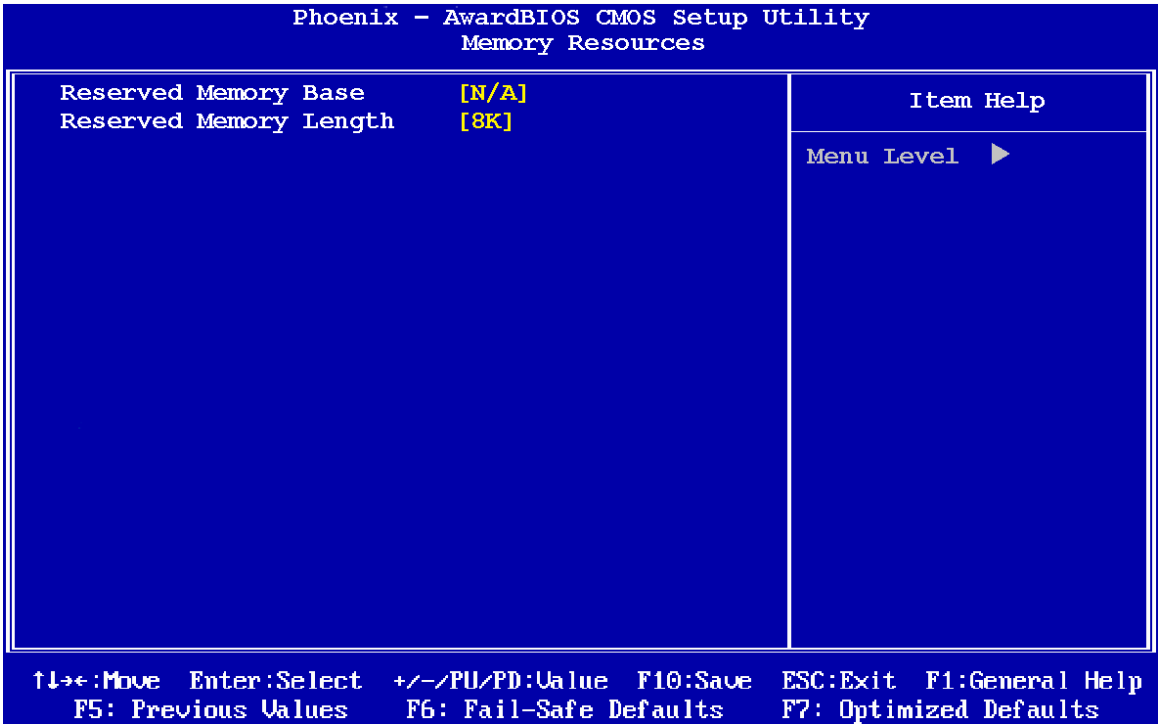
The above options all have the following default options.

➔ **PCI/ISA PnP** **DEFAULT** PCI or ISA cards designed according to the Plug and Play standard can be used

➔ **Legacy ISA** Only an ISA card compliant with the original AT bus specification can be installed

➔ **x Memory Resources [Press Enter]**

The Memory Resources menu (**BIOS Menu 13**) can only be accessed if the Resources Controlled By option is set to Manual. Use Memory Resources to select a base address and the length for the memory area used by a peripheral that requires high memory.



BIOS Menu 13: Memory Resources

The menu has two configurable options:

- Reserved Memory Base
- Reserved Memory Length

➔ **Reserved Memory Base [N/A]**

The **Reserved Memory Base** option specifies the base address for the peripheral device. The **Reserved Memory Base** options are:

- N/A (Default)
- C800
- CC00
- D000
- D400
- D800
- DC00

➔ **x Reserved Memory Length [8K]**

The **Reserved Memory Length** option can only be accessed if the **Reserved Memory Base** option is not set to **N/A**. The **Reserved Memory Length** specifies the amount of memory reserved for the peripheral device. The **Reserved Memory Length** options:

- 8K (Default)
- 16K
- 32K
- 64K

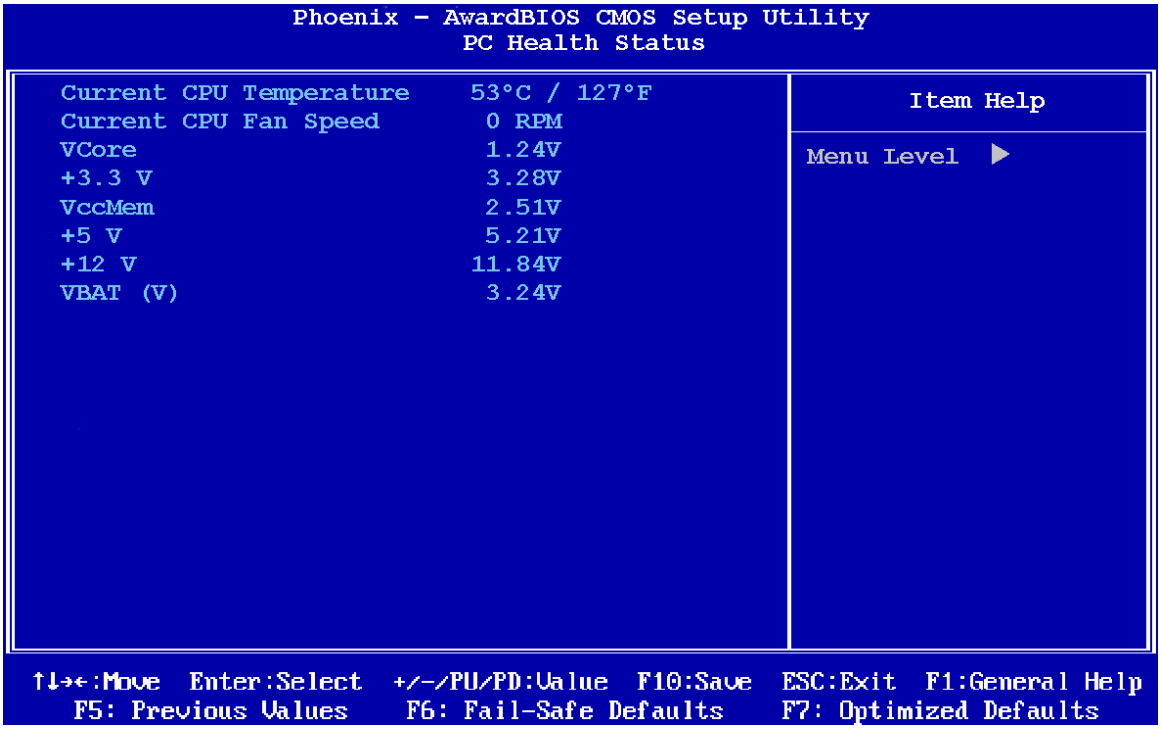
➔ **PCI/VGA Palette Snoop [Disabled]**

Use the **PCI/VGA Palette Snoop** option to enable the system to determine whether or not some special VGA cards, high-end hardware MPEG decoders and other similar devices are allowed to look at the VGA palette on the video card so these devices can determine what colors are in use. This option is needed *very* rarely and should be left "Disabled" unless a video device specifically requires the setting to be enabled upon installation.

➔ **Disabled**	**DEFAULT**	Does not allow the graphics devices to examine the VGA palette on the graphics card.
➔ **Enabled**		Allows the graphics devices to examine the VGA palette on the graphics card.

6.8 PC Health Status

The **PC Health Status** menu (**BIOS Menu 14**) has no user configurable options, but shows system operating parameters that are essential to the stable operation of the system.



BIOS Menu 14: PC Health Status

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

➔ **System Temperature**

The following temperatures are monitored:

- Current CPU Temperature

➔ **System Fan**

The following system fans are monitored:

- Current CPU Fan Speed

➔ **Voltages**

The following voltages are monitored:

- Vcore
- +3.3 V
- VccMem
- +5 V
- +12 V
- VBAT(V)

Chapter

7

RAID Setup

7.1 VIA® RAID Utility

The WAFER-LX has a VIA® VT6421 SATA controller chip onboard. The SATA RAID controller allows the two SATA ports to be setup as

- Two individual drives
- A RAID 0 striped array for performance
- A RAID 1 mirrored array for data security
- A JBOD array to allow both disks to be accessed as a single large disk

For maintenance after the initial setup, please use the operating system software RAID software utility.

7.2 Accessing The RAID Utility

During the boot process, the message below shows. Press the TAB key to enter the RAID utility.

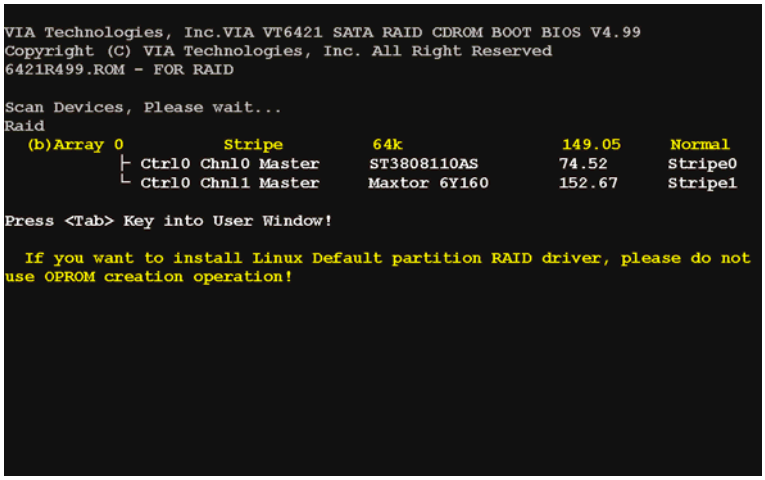


Figure 7-1: RAID Utility

7.3 Creating a RAID Array

The steps for creating a RAID 0, RAID 1 and JBOD array are similar. To create a RAID array, follow the steps below.

Step 1: The RAID setup utility main screen appears. Select the “Create Array” option from the list and press Enter.

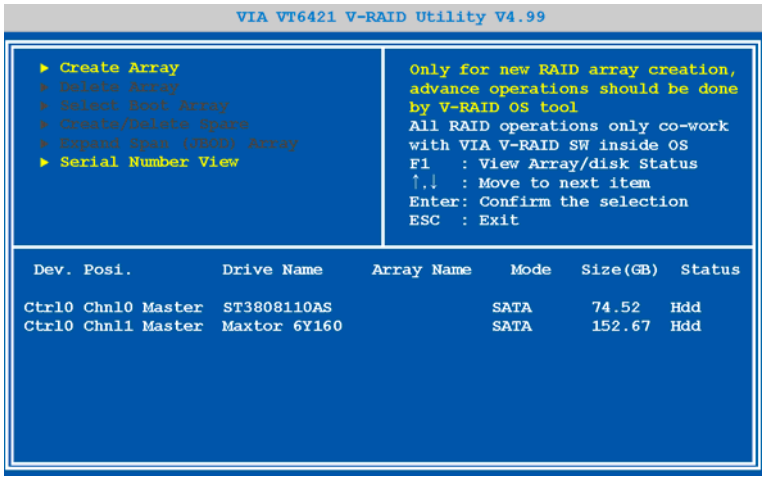


Figure 7-2: RAID Setup Main Screen

Step 2: Select the second option “Array Mode…” and press Enter to select the type of RAID array to setup.

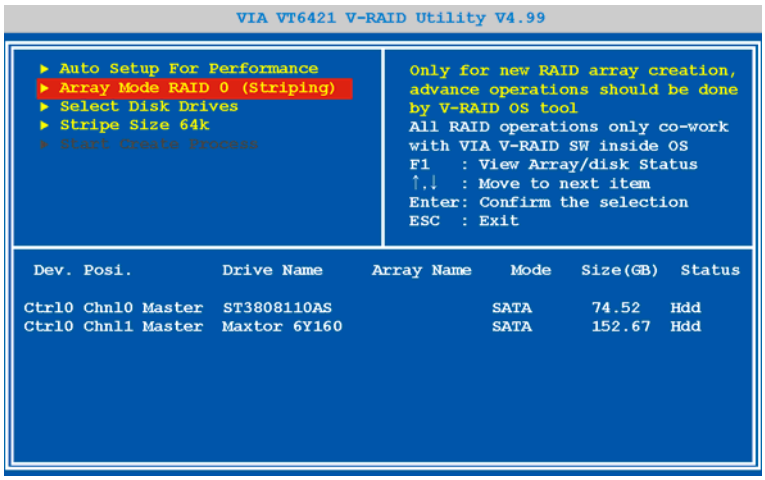


Figure 7-3: Create Array

Step 3: Select the RAID type from the list that appears. Press Enter to select.

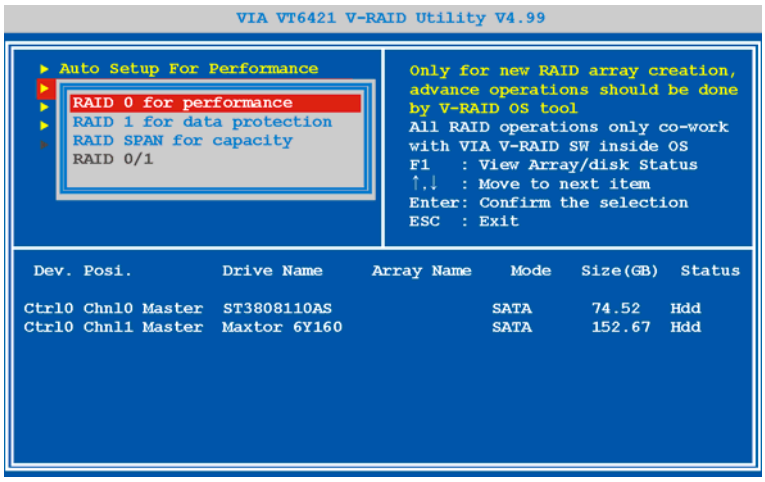


Figure 7-4: RAID Type

Step 4: Proceed with either the “Automatic Setup” or “Manual Setup”.

7.3.1 Automatic Setup

Step 1: The automatic setup uses default settings to setup the RAID array. This is the recommended method. Select “Auto Setup For…” and press Enter.

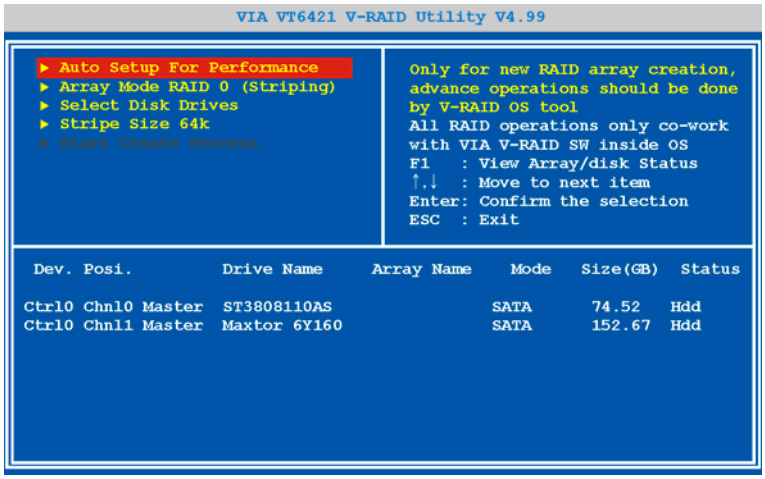


Figure 7-5: Automatic Setup

Step 2: All data on the hard disks is destroyed when the RAID array is setup. Press Y to setup the array, or N to go back.

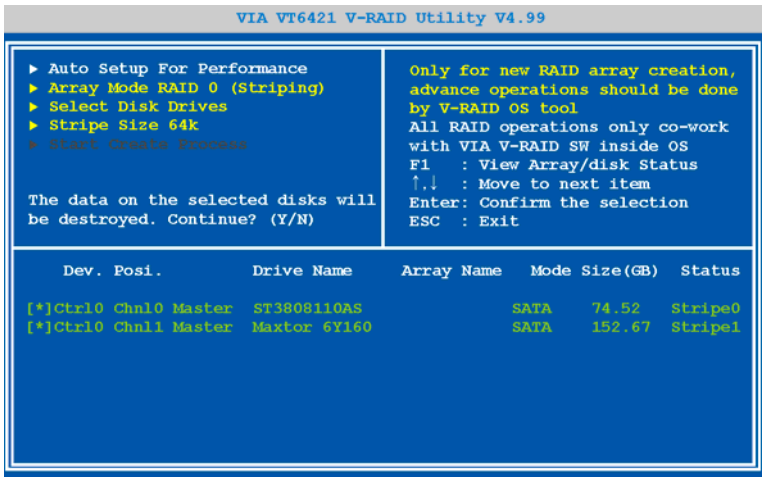


Figure 7-6: Confirm Data Deletion

Step 3: The RAID array is created. The details of the new array are shown in the bottom half of the screen.

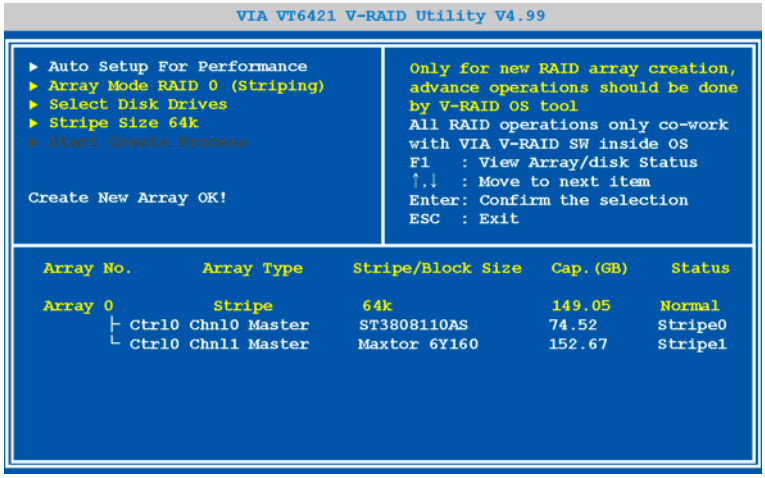


Figure 7-7: RAID Array Setup Complete

7.3.2 Manual Setup

Step 1: Select “Select Disk Drives” and press Enter

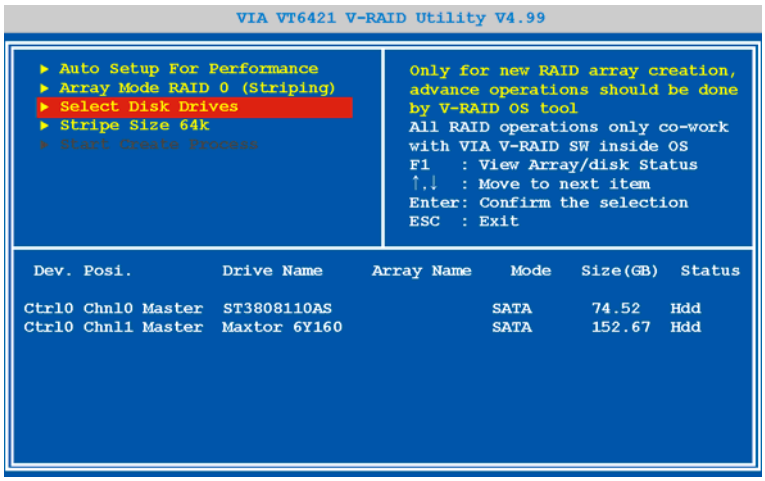


Figure 7-8: Select Drives

Step 2: Select the drive to be the “Source” or “Stripe0” and press Enter.

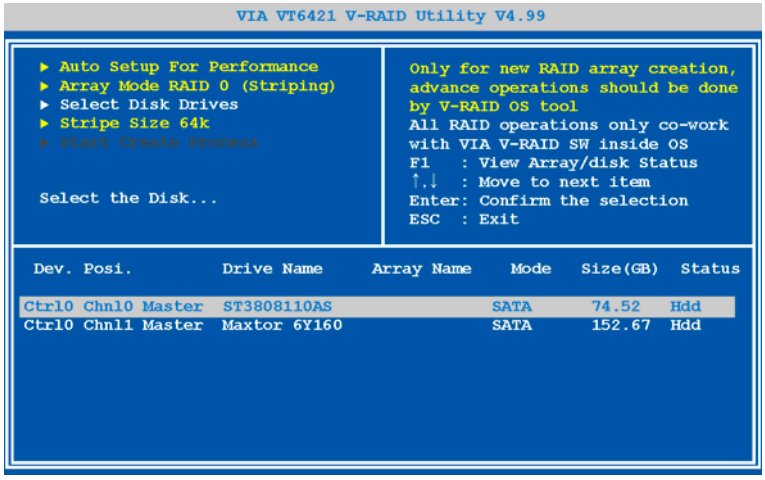


Figure 7-9: Select First Drive

Step 3: The “Source” or “Stripe0” drive is shown in green text with a [*] at the beginning.

Step 4: Select the drive to be the “Mirror” or “Stripe1” and press Enter.

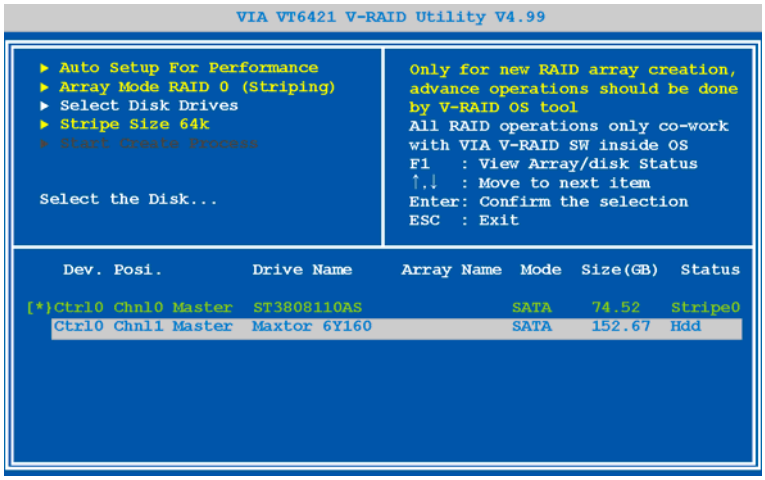


Figure 7-10: Select Second Drive

Step 5: The “Mirror” or “Stripe1” drive is now also shown in green text with a [*] at the beginning.

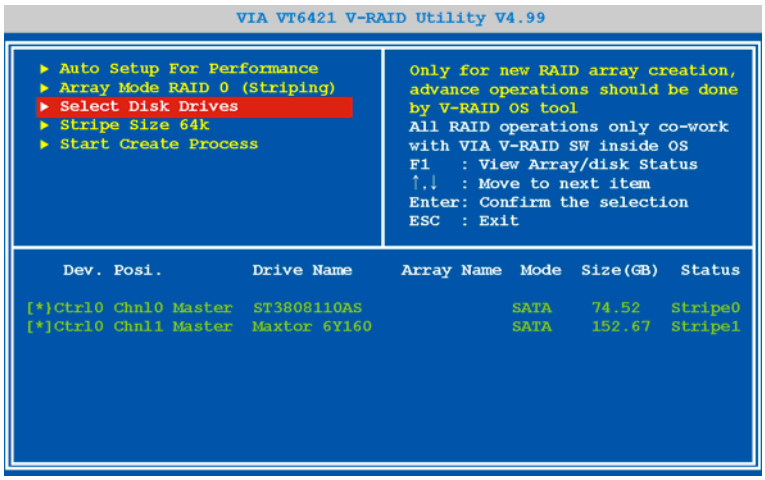


Figure 7-11: Disk Drives Selected

Step 6: Select the “Stripe Size” option and press Enter.

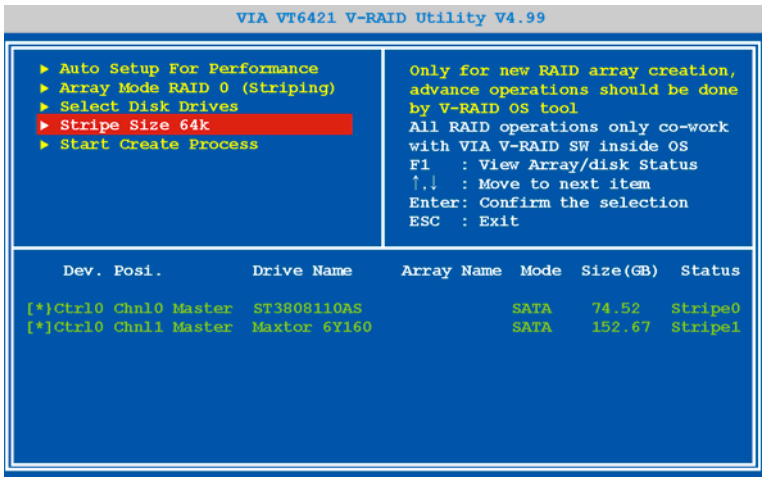


Figure 7-12: Stripe Size

Step 7: Select the stripe size from the popup list and press Enter.

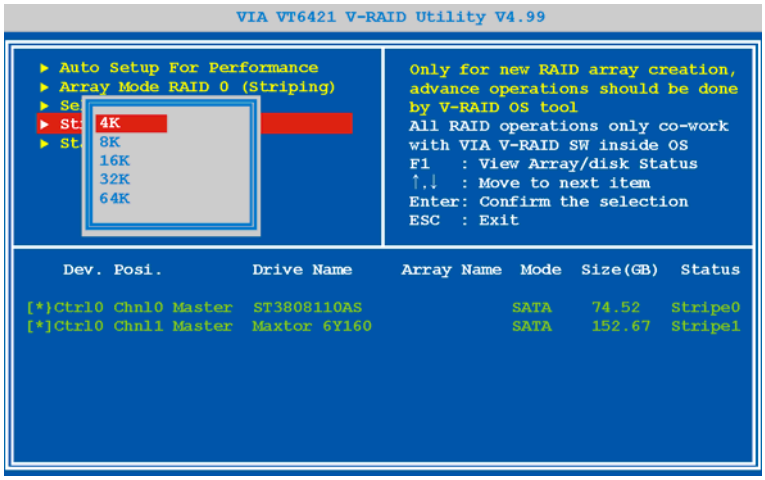


Figure 7-13: Select Stripe Size

Step 8: Select “Start Create Process” and press Enter to create the RAID array.

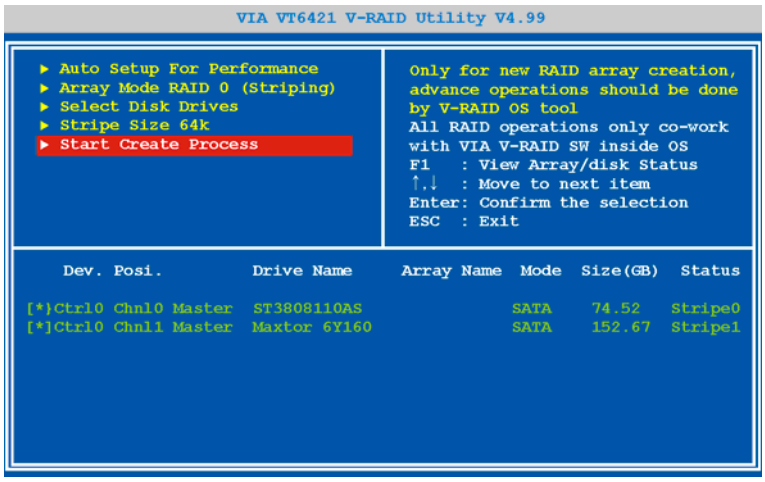


Figure 7-14: Start RAID Creation

Step 9: Press Y create the RAID array, or N to go back.

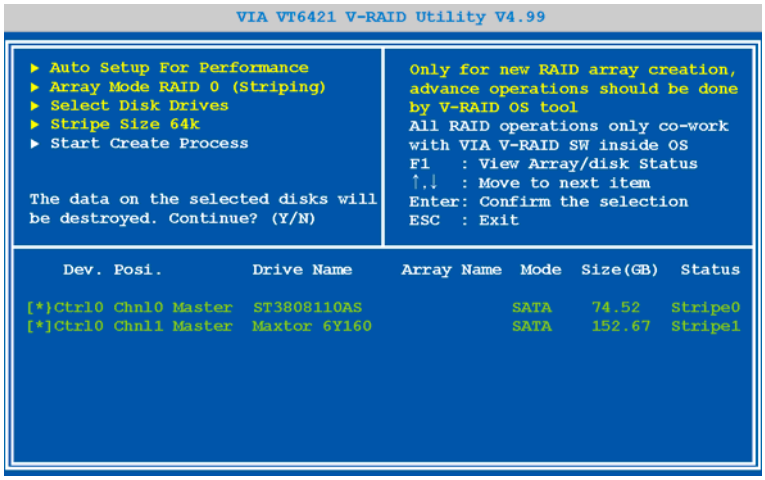


Figure 7-15: Confirm RAID Creation

Step 10: The display message confirms that the array has been created. Details of the newly created array are shown in the bottom half of the screen.

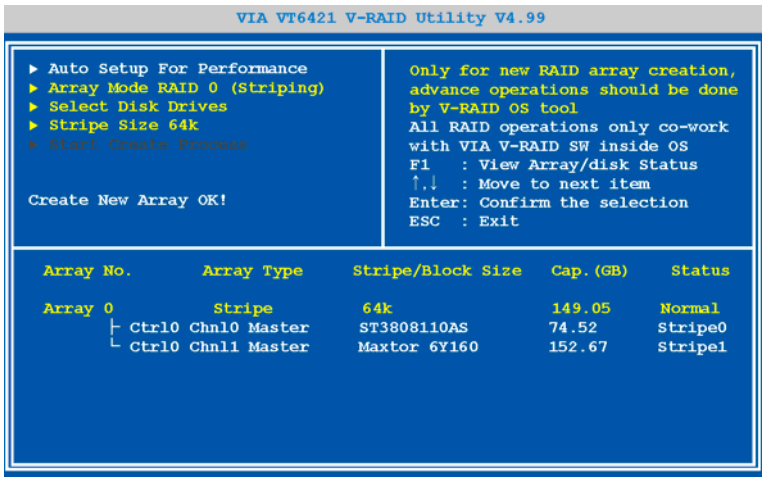


Figure 7-16: RAID Array Created

7.4 Delete a RAID Array

Deleting a RAID array deletes all the data on the hard disks in the array. Save and backup all information from the RAID array before deleting the array. To delete a RAID array, follow the steps below.

Step 1: Select “Delete Array” and press Enter.

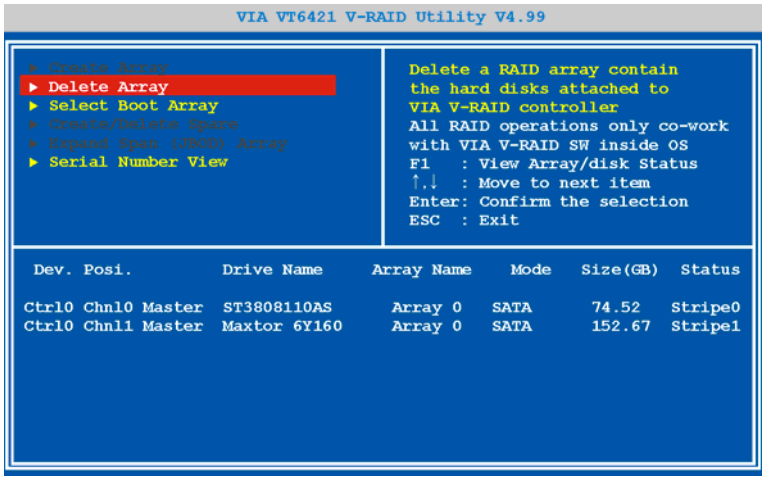


Figure 7-17: Delete RAID Array

Step 2: Select the array to delete.

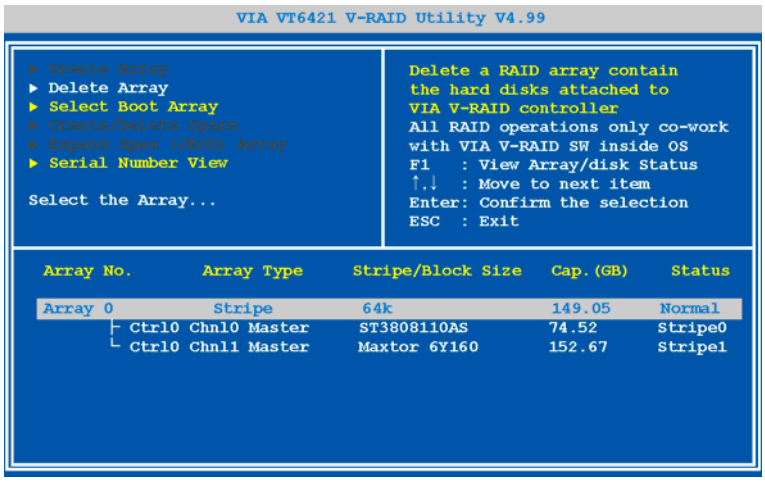


Figure 7-18: Select Array to Delete

Step 3: Press Y to delete the array, or N to go back.

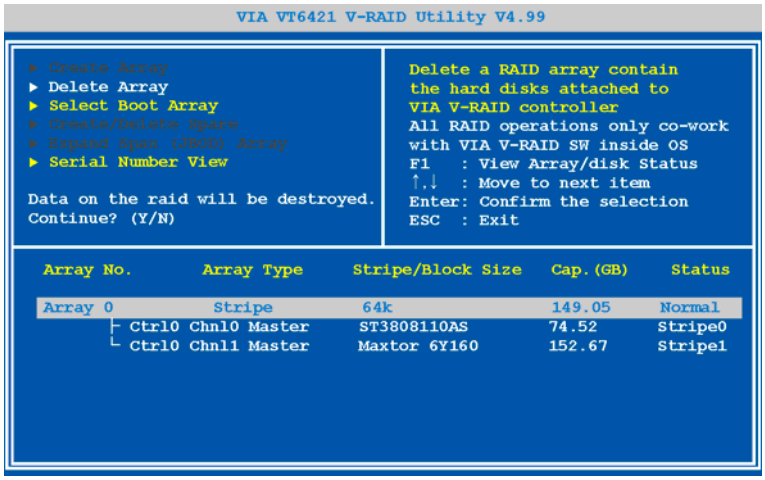


Figure 7-19: Confirm Array Deletion

Step 4: The display message confirms that the array has been deleted.

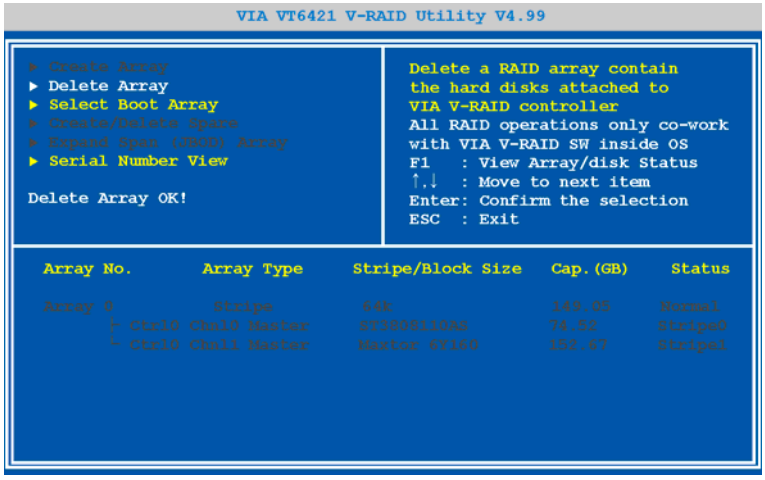


Figure 7-20: Array Deleted

7.5 Selecting a Boot Array

To allow an operating system to be installed on the RAID array so that the system can boot from the array, the array must be set as a “Boot Array”.

Step 1: Select the “Select Boot Array” option and press Enter.

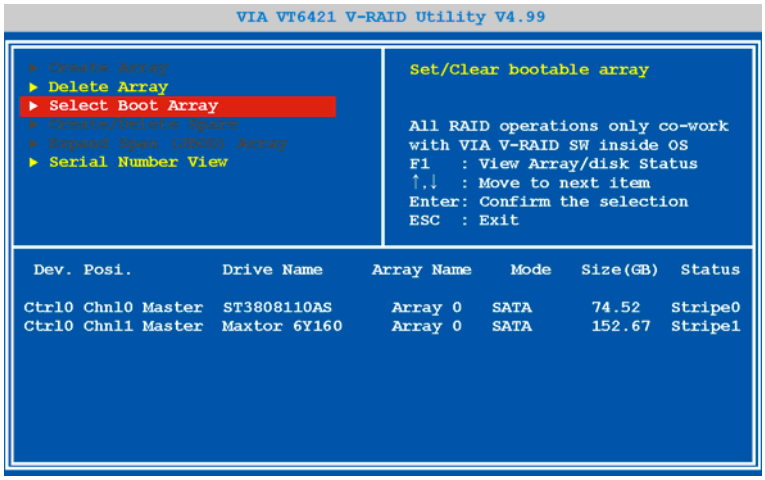


Figure 7-21: Select Boot Array

Step 2: Select the array to set as a boot array.

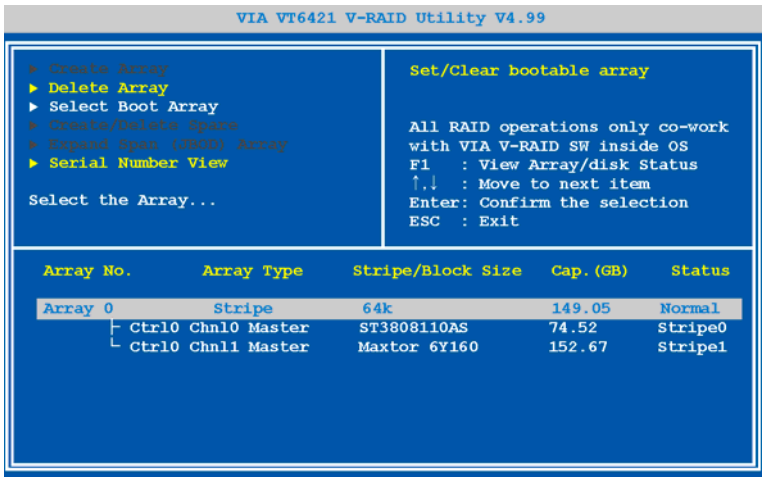


Figure 7-22: Select Boot Array

Step 3: Press Enter to set the array as a boot array. A (b) appears before the array name to indicate that the array is now a bootable array.

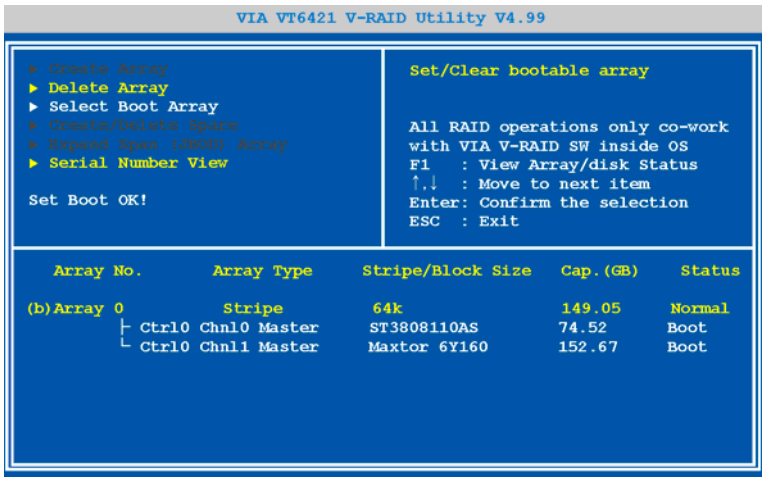


Figure 7-23: Set Array as Boot Array

7.6 Viewing Disk Drive Serial Numbers

Viewing the disk drive serial numbers helps to determine which disk is being selected when the array consists of two disks of the same type.

Step 1: Select the “Serial Number View” option and press Enter.

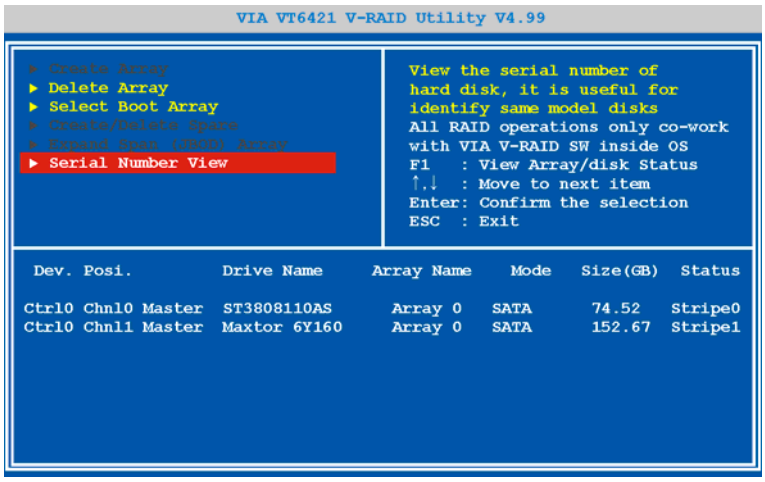


Figure 7-24: Serial Number View

Step 2: Select the drive to view it’s serial number at the bottom of the screen.

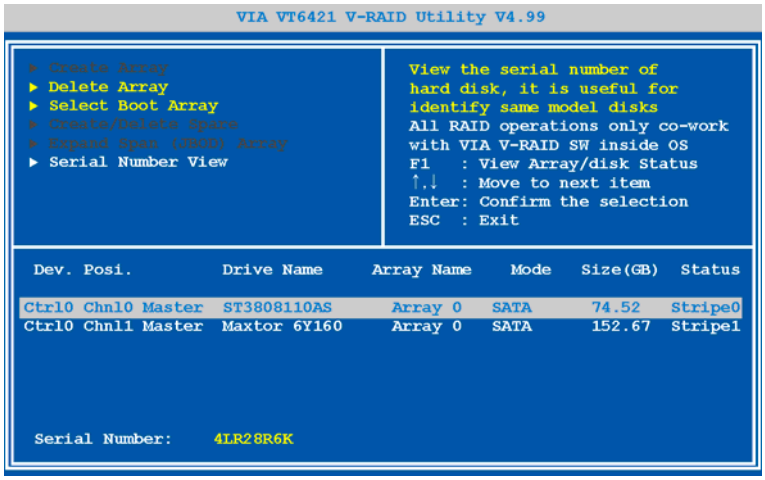


Figure 7-25: Serial Number

7.7 Exiting The RAID Utility

To exit the RAID utility, press ESC. Press Y to exit or N to go back.

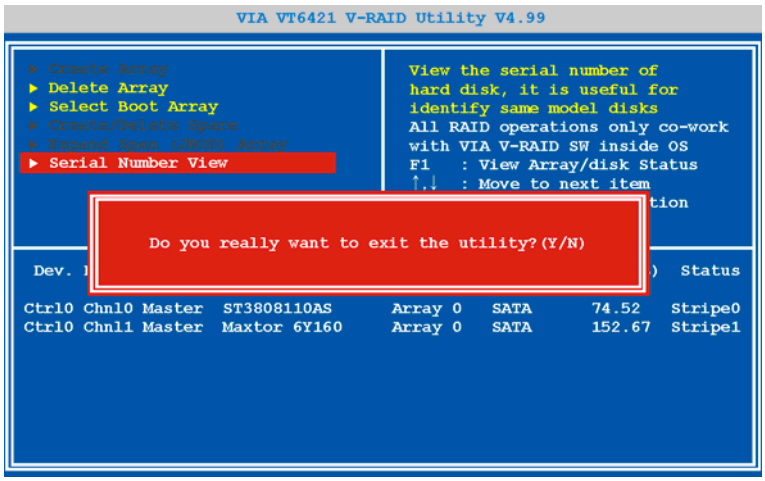


Figure 7-26: Exit RAID Utility

Chapter

8

Software Drivers

8.1 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. You may visit the IEI website or contact technical support for the latest updates.

There are five software drivers for the WAFER-LX motherboard installed in the subsystem:

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

Insert the CD into the system that contains the WAFER-LX CPU card.

NOTE:

If your system does not run the "autorun" program when the CD is inserted, click the **Start** button, select **Run**, then type **X:\autorun.exe** (replace **X** with the actual drive letter for your CD-ROM) to access the **IEI Driver CD** main menu.

Step 1: From the AMD LX/GX Driver CD main menu (**Figure 8-1**), click WAFER-LX.

Figure 8-1: AMD LX/GX CD Main Menu

Step 2: A window appears listing the drivers available for installation (**Figure 8-2**).

Figure 8-2: AMD LX/GX CD Driver Menu

Step 3: Select any item from the list to view more information on the driver installation, or select Manual to navigate to the WAFER-LX user manual.

The following sections fully describe the driver installation procedures for the WAFER-LX CPU card.

8.2 Device Driver Menu

Most of the drivers need to installed through the “Device Driver” window. Follow the steps below to open the “Device Driver” window.

Step 1: Click the “Start” button. Click “Control Panel”.

Figure 8-3: Start Menu

Step 2: Double-click the “System” icon.

Figure 8-4: Control Panel

Step 3: Click the “Hardware” tab. Click **DEVICE MANAGER**.

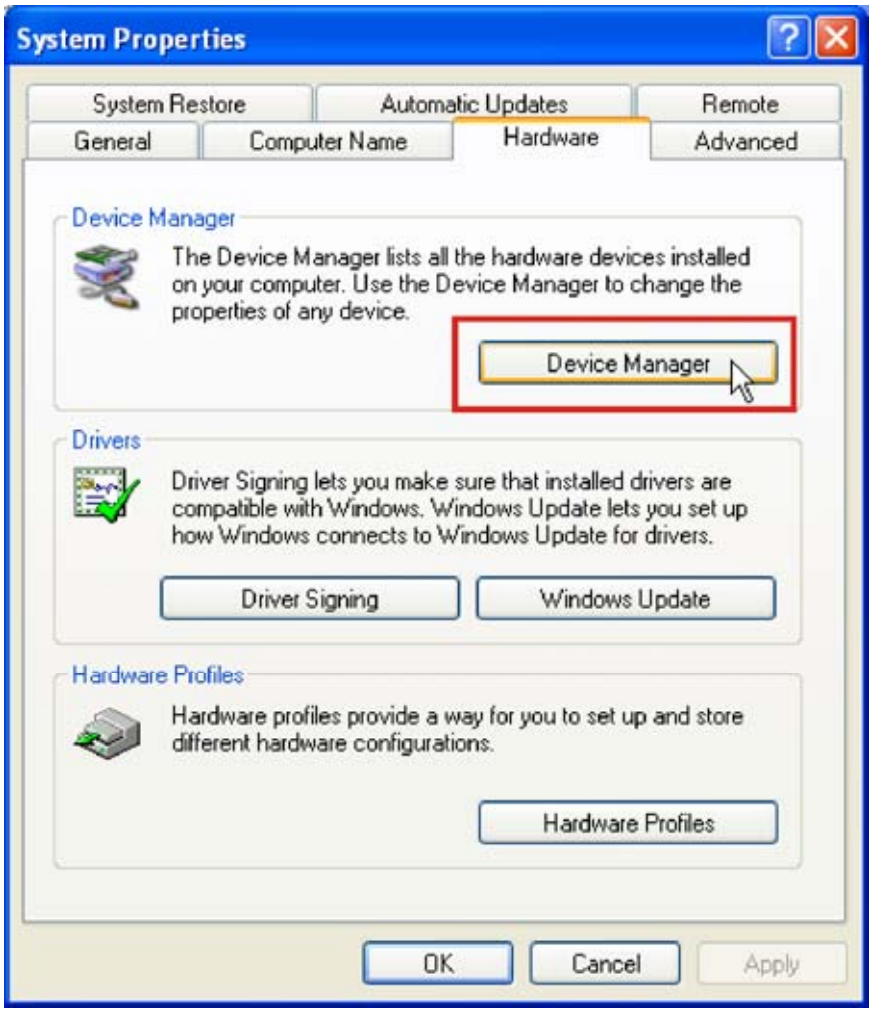


Figure 8-5: System

Step 4: The “Device Manager” window opens.

8.3 VGA Driver

To install the VGA driver please follow the steps below.

Step 1: Open the "**Device Manager**" (**Section** 8.2 on page 137)

Step 2: Right-click on the "**Video Controller (VGA Compatible)**" item and click "**Update Driver…**" (this driver option might be located under "Other Devices").

Figure 8-6: Device Manager

Step 3: The Hardware Update Wizard appears. Click the "**No, not this time**" option.

Click NEXT to continue.

Figure 8-7: Hardware Update Wizard

Step 4: Click the "**Install from a list or specific location**". Click **NEXT** to continue.

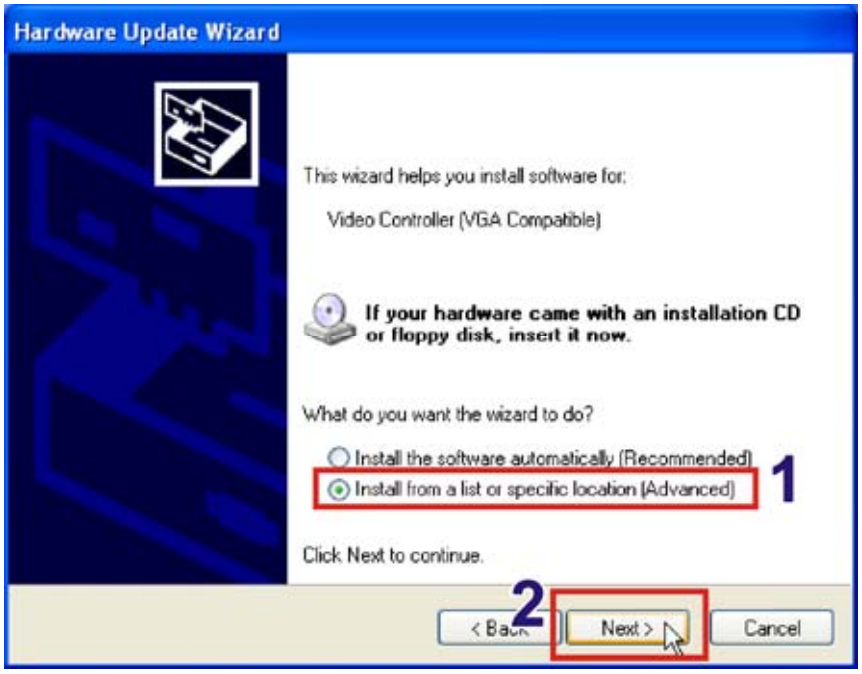


Figure 8-8: Installation Location

Step 5: Click "**Don't search. I will choose the driver to install**". Click NEXT to continue.

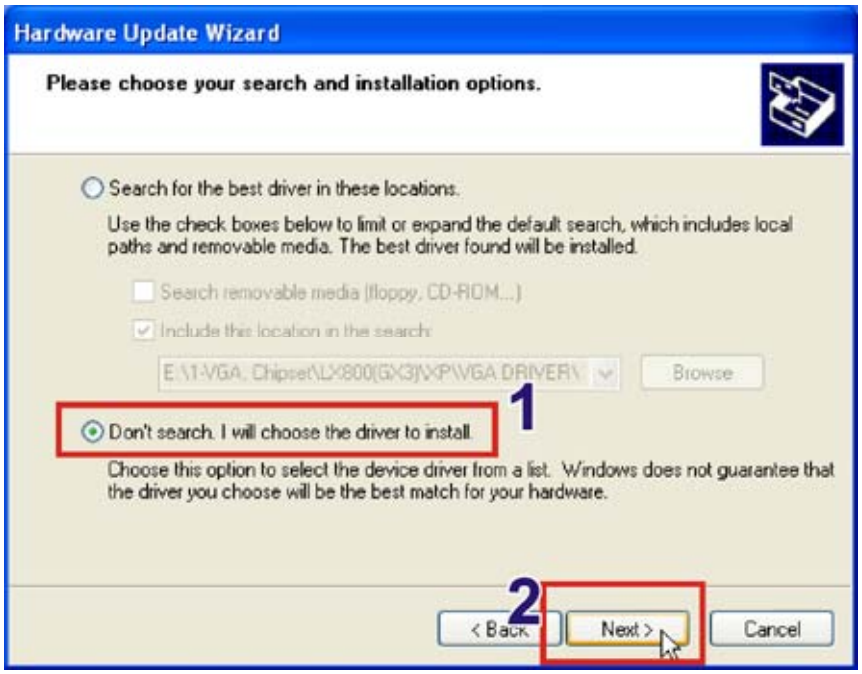


Figure 8-9: Driver Location

Step 6: Click **HAVE DISK** to choose the driver from a specific location.

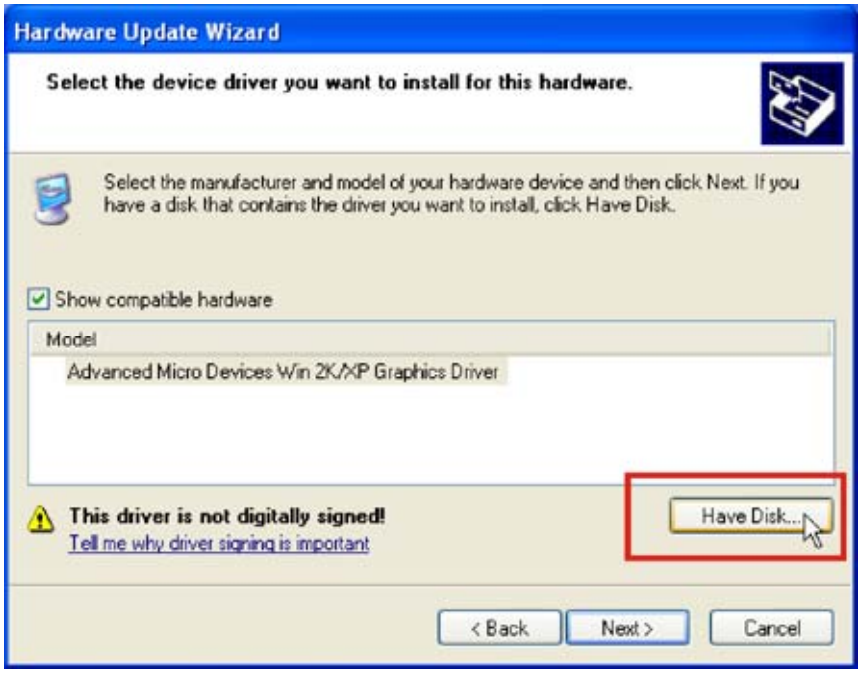


Figure 8-10: Have Disk

Step 7: Click **BROWSE** to choose the driver location.

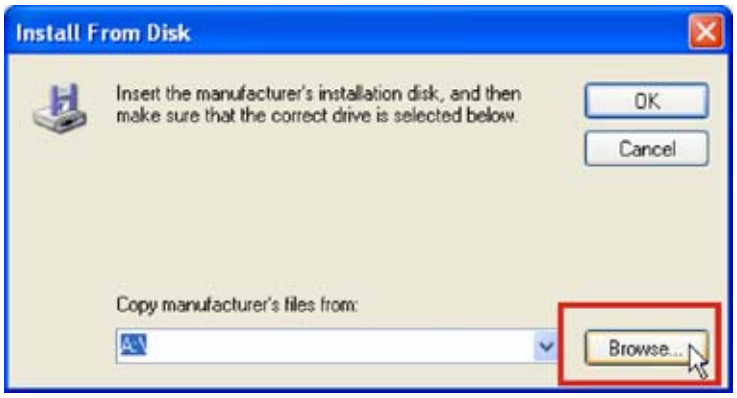


Figure 8-11: Browse For Driver Location

Step 8: Browse to the directory with the graphics driver.

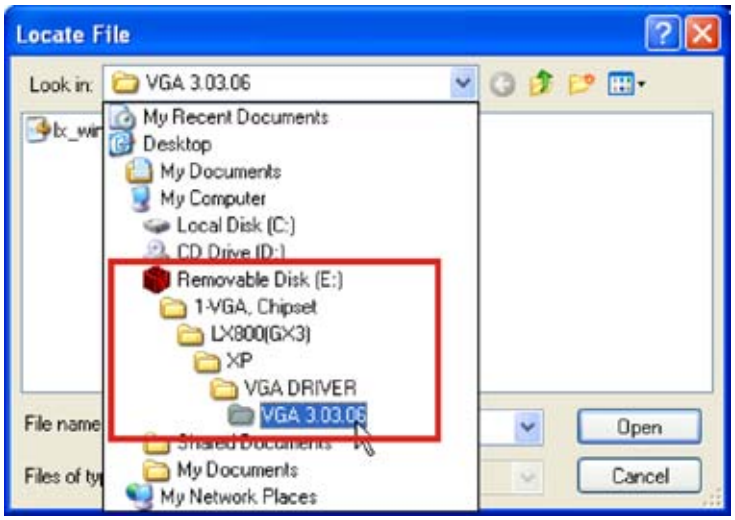


Figure 8-12: Graphics Driver Directory

Step 9: Click on the driver file. Click **OPEN** to use this file and continue.

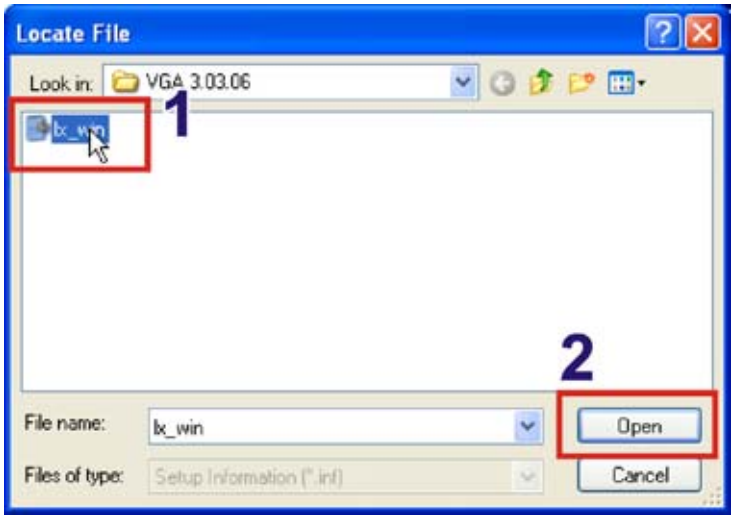


Figure 8-13: Select Driver File

Step 10: Click **OK** to continue.

Figure 8-14: Install From Disk

Step 11: Click on the driver that appears. Click **NEXT** to continue.

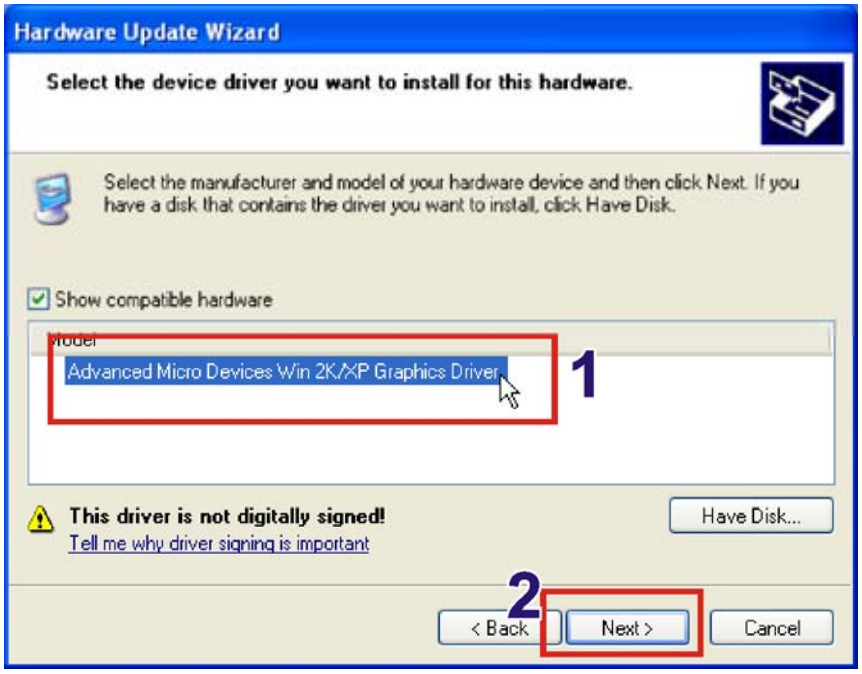


Figure 8-15: Select The Driver

Step 12: The Windows logo testing warning window appears. Click **CONTINUE ANYWAY** to continue.

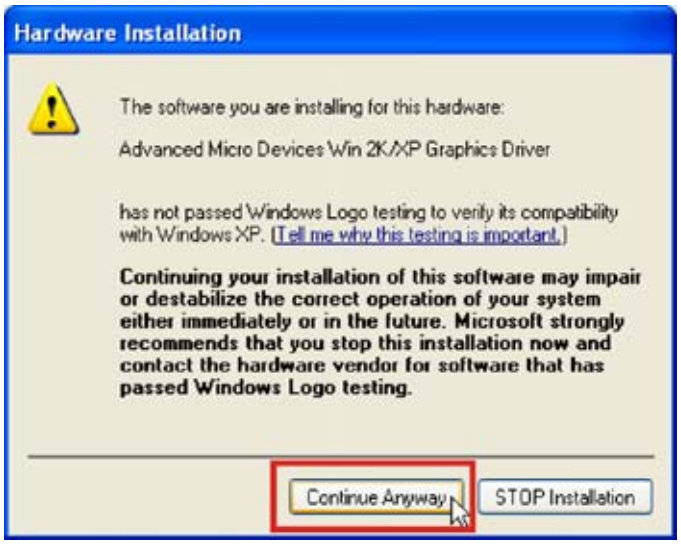


Figure 8-16: Windows Logo Testing

Step 13: Click **FINISH** to exit the hardware installation wizard.

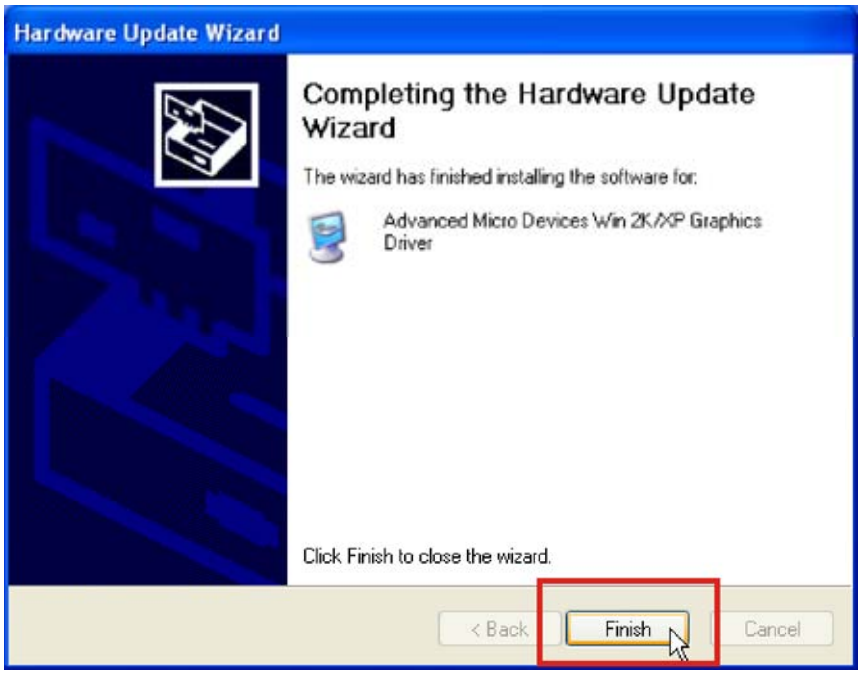


Figure 8-17: Installation Complete

8.4 Audio Driver

To install the audio driver please follow the steps below.

Step 1: Open the "**Device Manager**" (**Section** 8.2 on page 137)

Step 2: Right-click on the "**Multimedia Audio Controller**" item and click "**Update Driver…**"

Figure 8-18: Device Manager

Step 3: The Hardware Update Wizard appears. Click the "**No, not this time**" option. Click NEXT to continue.

Figure 8-19: Hardware Update Wizard

Step 4: Click the "**Install from a list or specific location**". Click **NEXT** to continue.

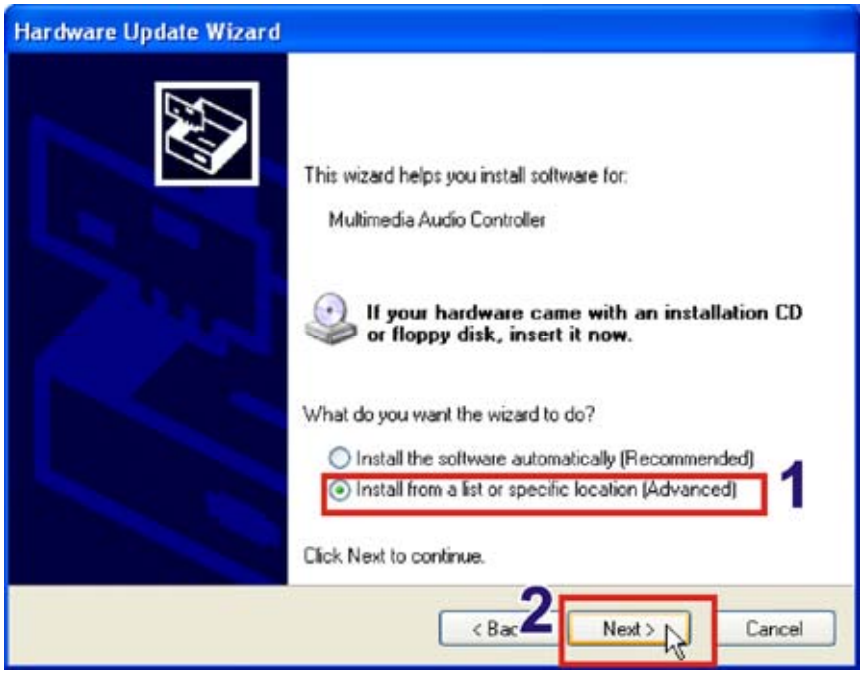


Figure 8-20: Installation Location

Step 5: Click "**Don't search. I will choose the driver to install**". Click NEXT to continue.

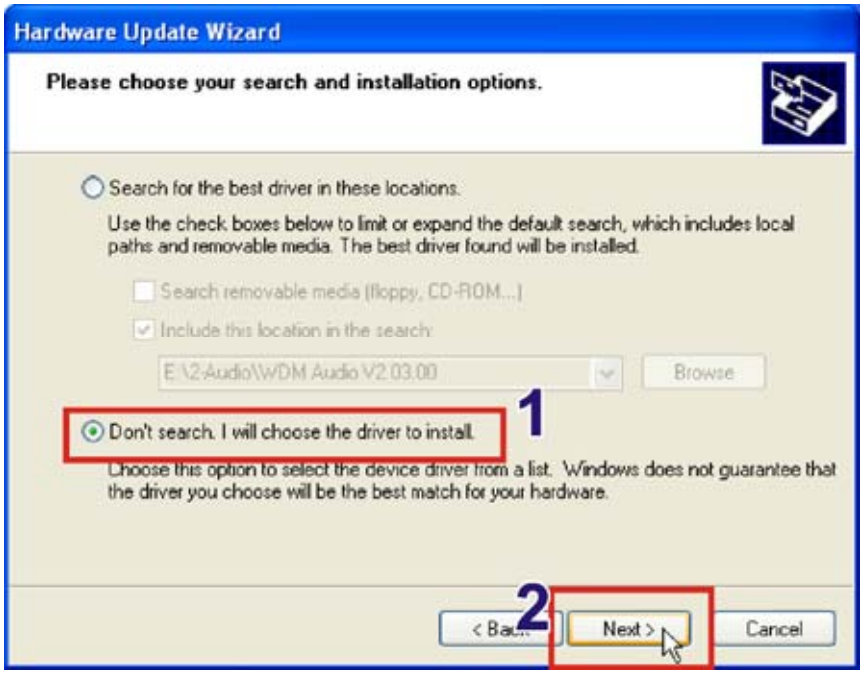


Figure 8-21: Driver Location

Step 6: Click the "**Sound, video and gamer controllers**" option. Click **NEXT** to continue

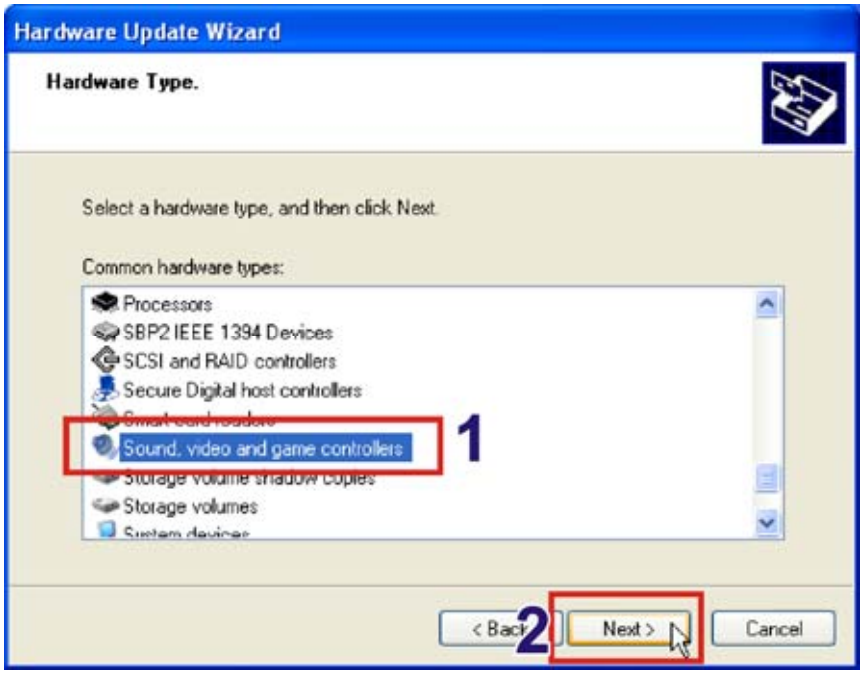


Figure 8-22: Have Disk

Step 7: Click **HAVE DISK** to choose the driver from a specific location.

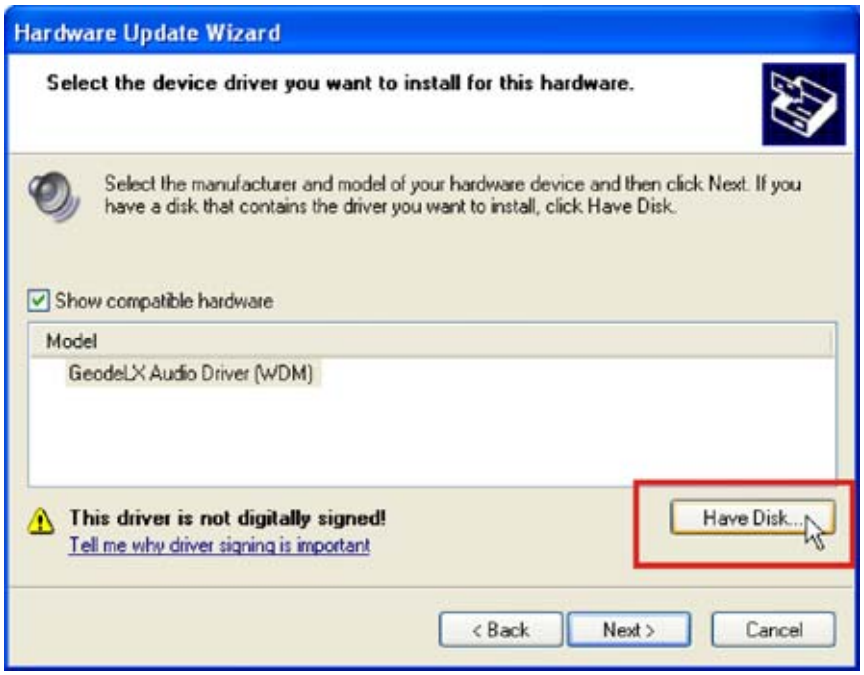


Figure 8-23: Have Disk

Step 8: Click **BROWSE** to choose the driver location.

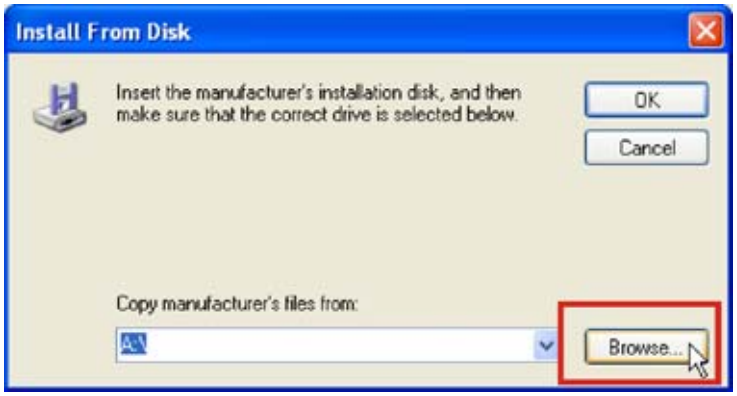


Figure 8-24: Browse For Driver Location

Step 9: Browse to the directory with the graphics driver.

Figure 8-25: Graphics Driver Directory

Step 10: Click on the driver file. Click **OPEN** to use this file and continue.

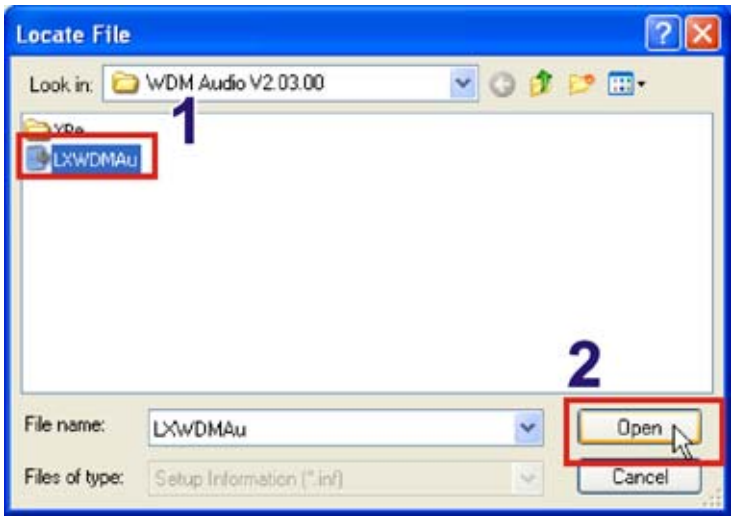


Figure 8-26: Select Driver File

Step 11: Click **OK** to continue.

Figure 8-27: Install From Disk

Step 12: Click on the driver that appears. Click **NEXT** to continue.

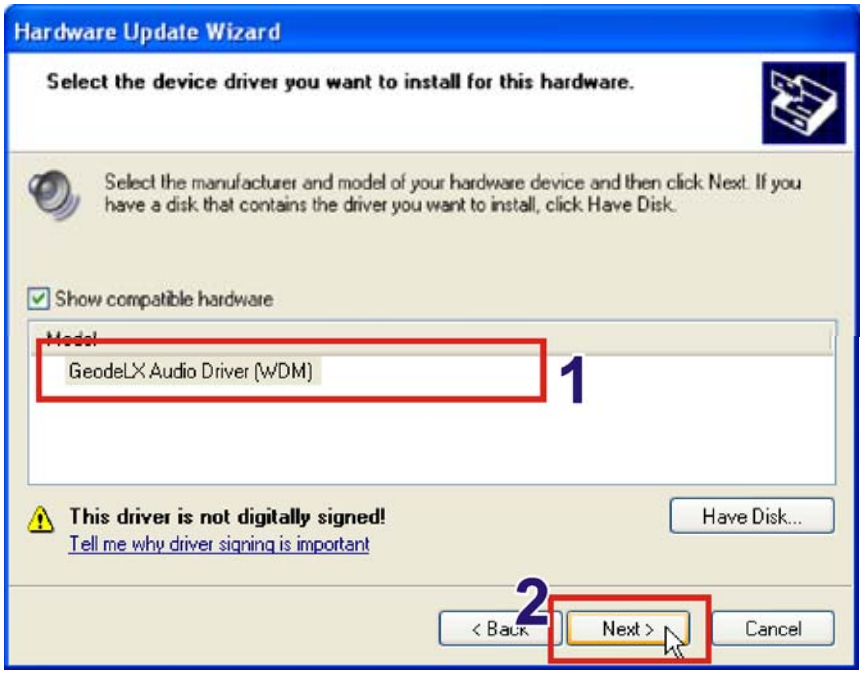


Figure 8-28: Select The Driver

Step 13: The Windows logo testing warning window appears. Click **CONTINUE ANYWAY** to continue.

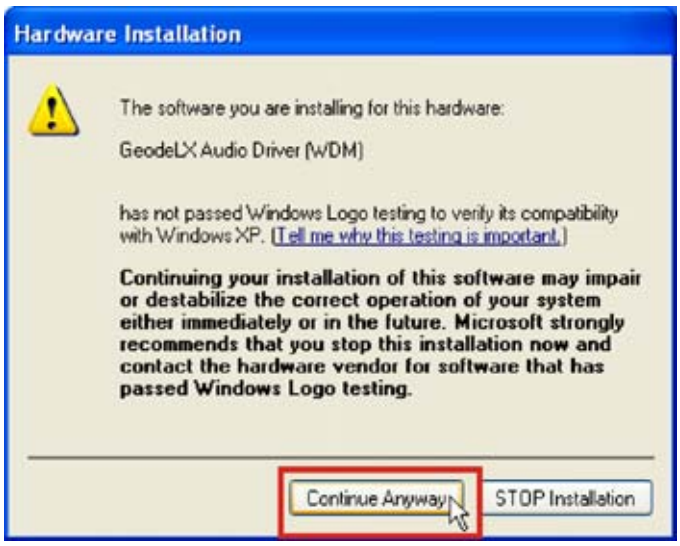


Figure 8-29: Windows Logo Testing

Step 14: Click **FINISH** to exit the hardware installation wizard.

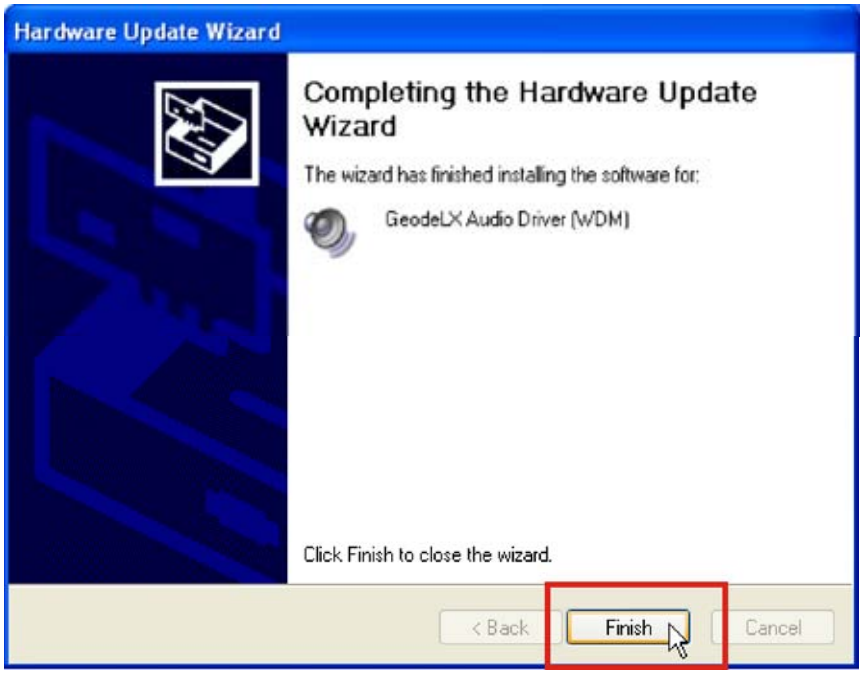


Figure 8-30: Installation Complete

8.5 LAN Driver

To install the LAN driver, please follow the steps below.

Step 1: Open the "**Device Manager**" (**Section** 8.2 on page 137)

Step 2: Right-click on the "**Realtek RTL8139 Family PCI Fast Ethernet NIC**" item and click "**Update Driver…**"

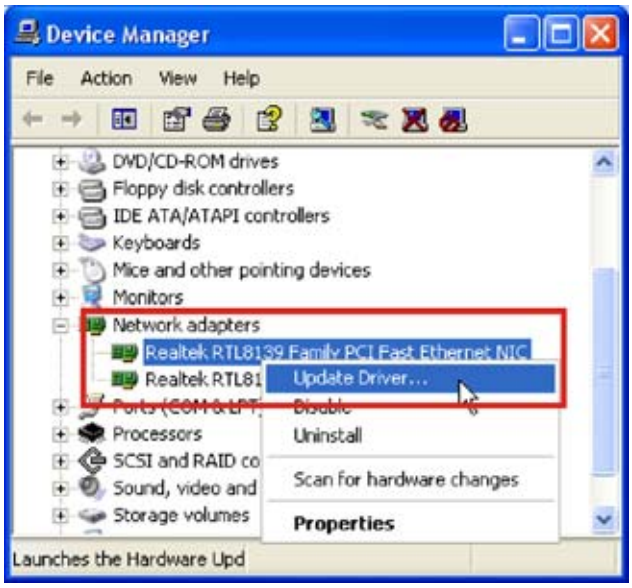


Figure 8-31: Device Manager

Step 3: The Hardware Update Wizard appears. Click the "**No, not this time**" option.

Click NEXT to continue.

Figure 8-32: Hardware Update Wizard

Step 4: Click the "**Install from a list or specific location**". Click **NEXT** to continue.

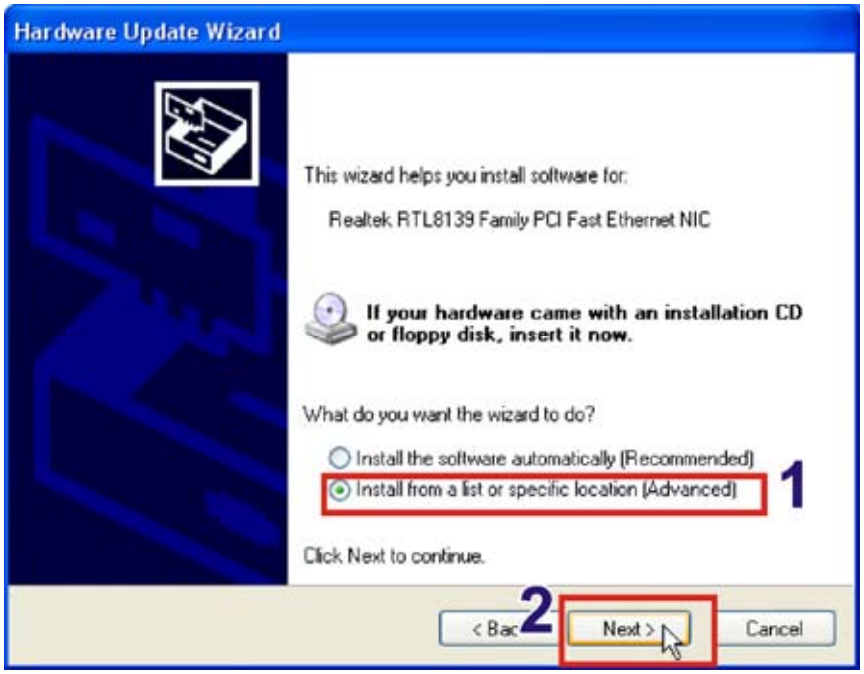


Figure 8-33: Installation Location

Step 5: Click **HAVE DISK** to choose the driver from a specific location.

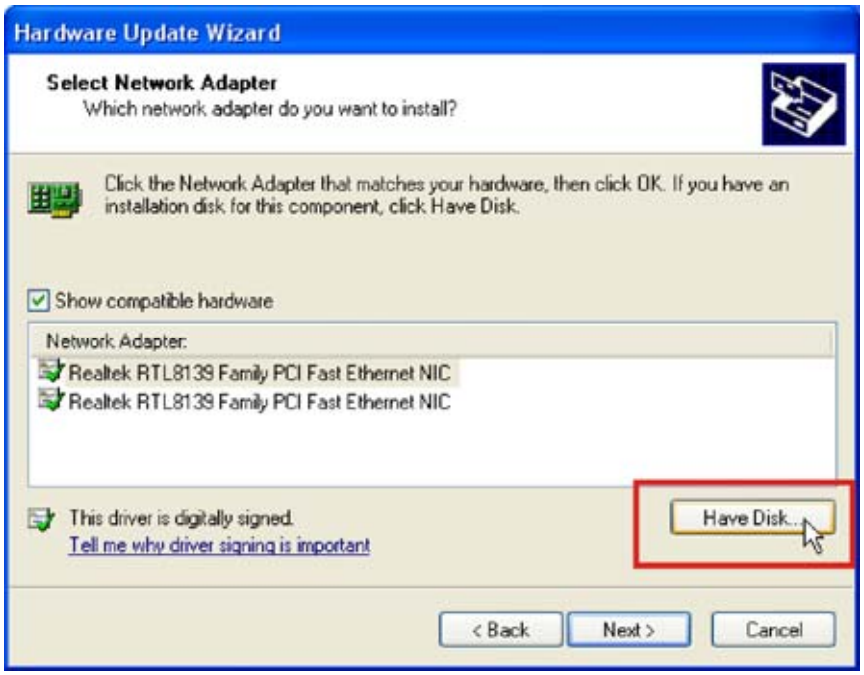


Figure 8-34: Have Disk

Step 6: Click **BROWSE** to choose the driver location.

Figure 8-35: Browse For Driver Location

Step 7: Browse to the directory with the graphics driver.

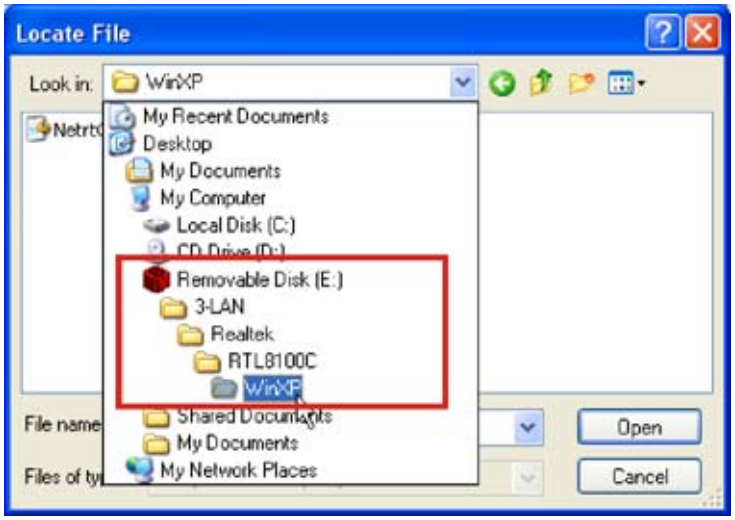


Figure 8-36: Graphics Driver Directory

Step 8: Click on the driver file. Click **OPEN** to use this file and continue.

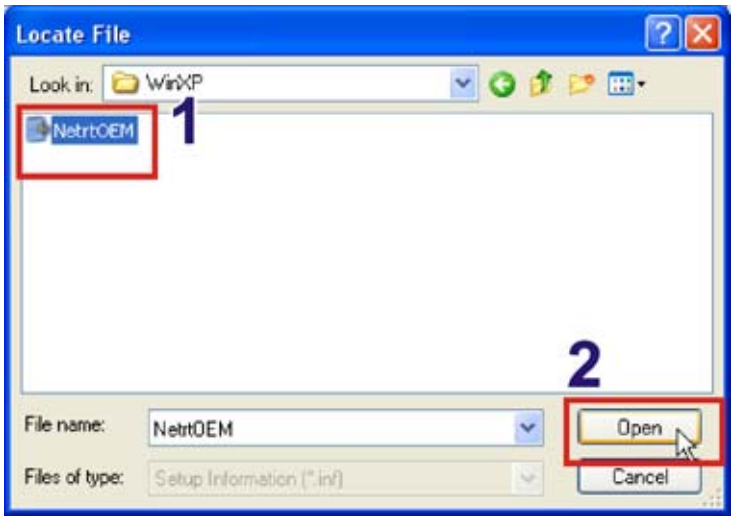


Figure 8-37: Select Driver File

Step 9: Click **OK** to continue.

Figure 8-38: Install From Disk

Step 10: Click on the driver that appears. Click **NEXT** to continue.

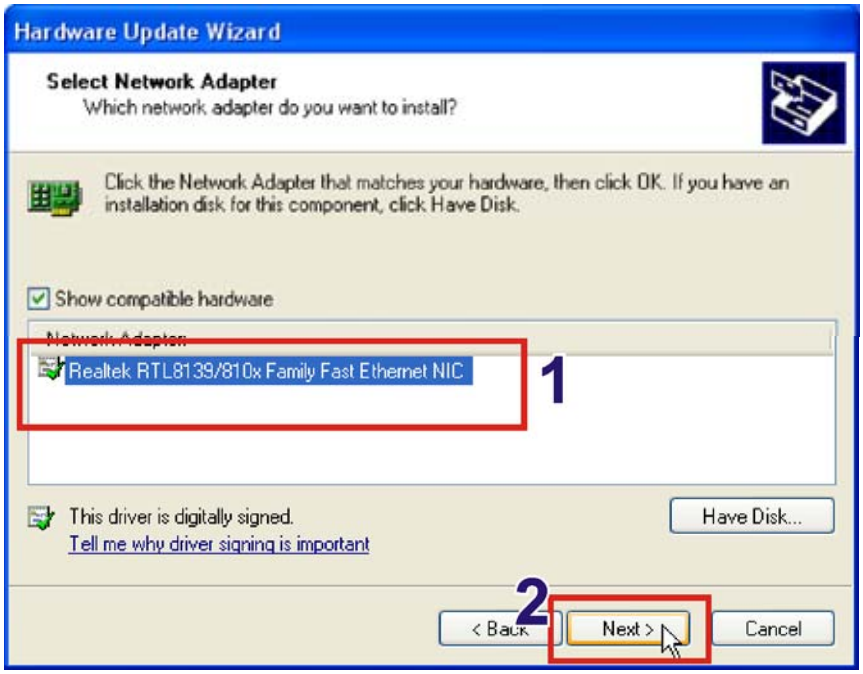


Figure 8-39: Select The Driver

Step 11: Click **FINISH** to exit the hardware installation wizard.

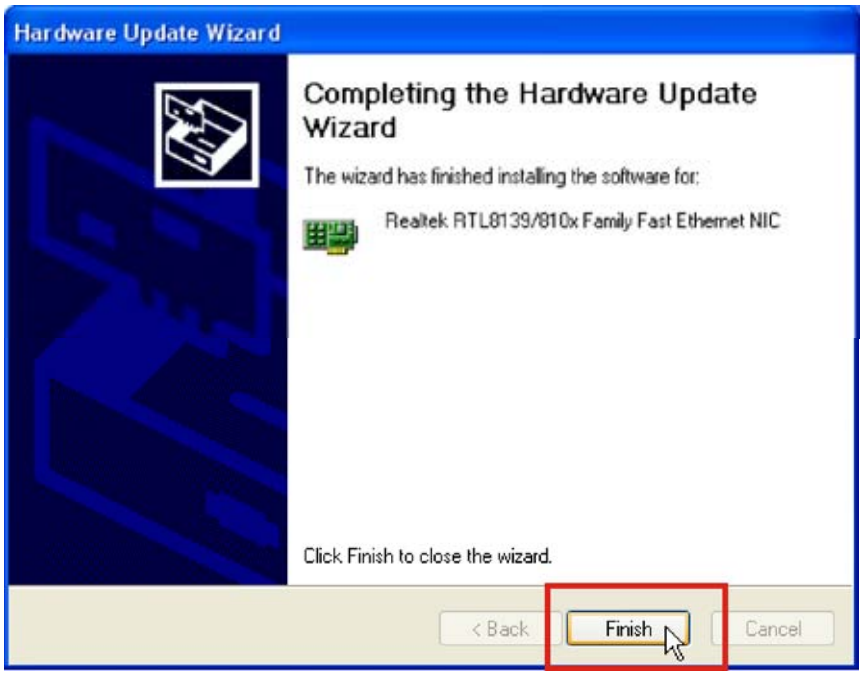


Figure 8-40: Installation Complete

8.6 SATA/RAID Driver

To install the VIA® SATA/RAID driver, please follow the steps below.

Step 1: Click **SATA** from the **WAFER-LX** menu (**Figure 8-1)** to open a window to the **X:\4-SATA** folder (where **X:** is the system CD drive) folder on the driver CD.

Step 2: Browse to **X:\4-SATA\VIA VT6421\V-RAID** and double-click the **Setup** program icon (**Figure 8-41**).

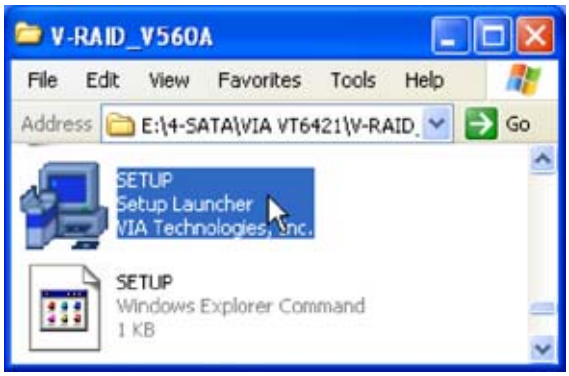


Figure 8-41: Locate the Setup Program Icon

Step 3: The **Install Shield Wizard** (**Figure 8-42**) is prepared to guide the user through the rest of the process.

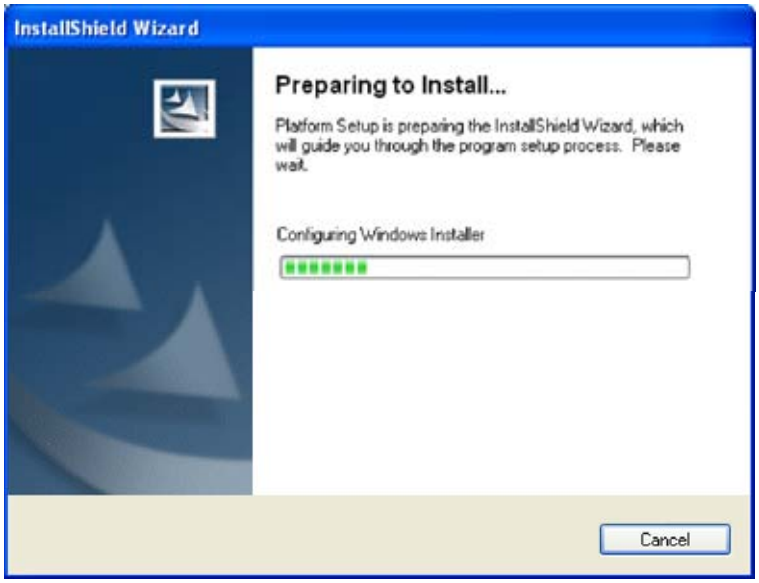


Figure 8-42: Preparing Setup Screen

Step 4: Once initialized, the **Install Wizard** welcome screen appears (**Figure 8-43**). Click **NEXT** to continue the installation or **CANCEL** to stop the installation.

Figure 8-43: Install Wizard Welcome Screen

Step 5: The **VIA® Software License Agreement** appears. Choose "I Agree" and click NEXT to continue.

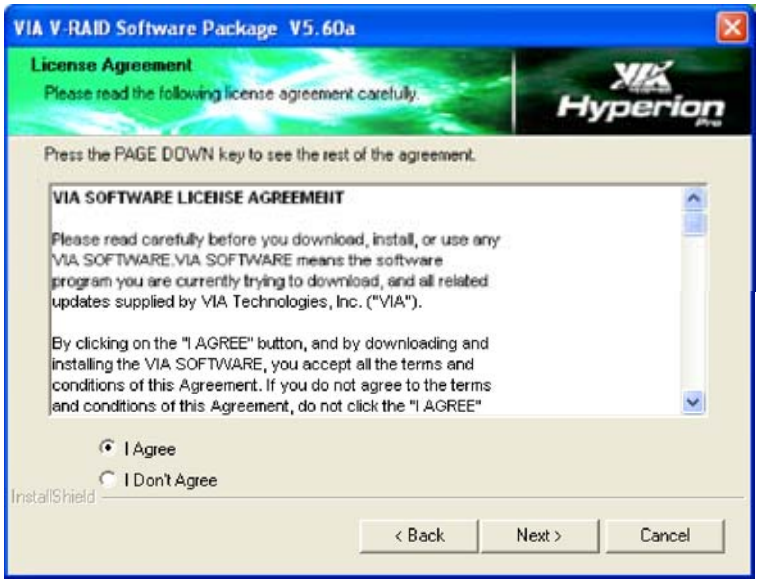


Figure 8-44: Software License Agreement

Step 6: Choose both the "VIA® V-RAID Driver Package" and "VIA® V-RAID Config Utility" for installation. Click NEXT to continue (**Figure 8-45**)

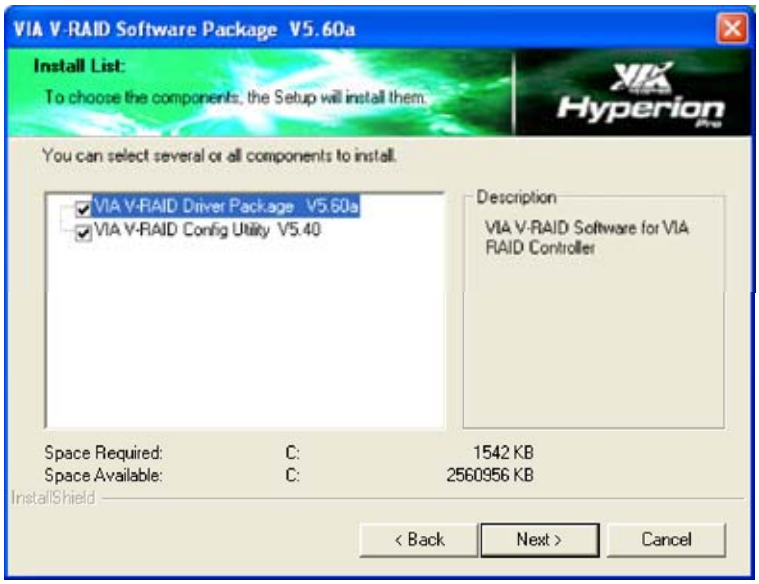


Figure 8-45: Select Driver Packages

Step 7: Review the items to be installed and click **NEXT** to begin the installation process (**Figure 8-46**).

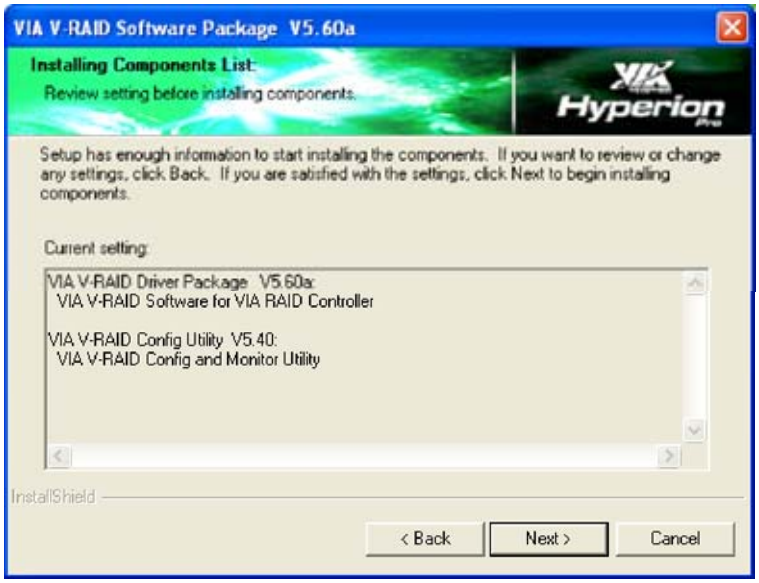


Figure 8-46: Review Installation Items

Step 8: Once the installation is complete the status of the install is shown on the screen in **Figure 8-47**. Click **NEXT** to continue.

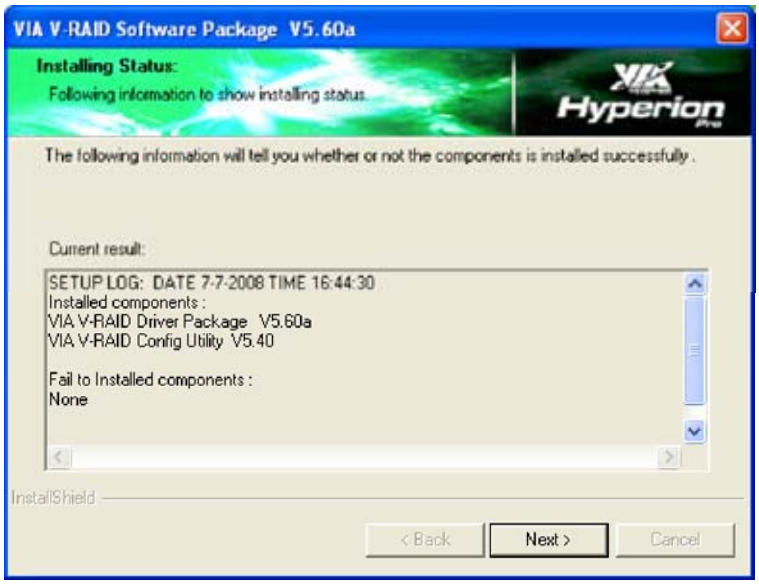


Figure 8-47: Installation Status

Step 9: Once the installation is complete, the **Install Wizard Complete** screen appears (**Figure 8-48**). Save any work or documents, and close any programs being used. Click **FINISH** to complete the installation and restart the computer.

Figure 8-48: InstallShield Wizard Complete Screen

8.7 ISA Driver

To install the IT8888 ISA Bridge driver please follow the steps below:

Step 10: Open the "**Device Manager**" (**Section** 8.2 on page 137)

Step 11: Right-click on the "**Other PCI Bridge Device**" item and click "**Update Driver…**" (this driver option might be located under "Other Devices").

Figure 8-49: Device Manager

Step 12: The Hardware Update Wizard appears. Click the "**No, not this time**" option.

Click **NEXT** to continue.

Figure 8-50: Hardware Update Wizard

Step 13: Click the "**Install from a list or specific location**". Click **NEXT** to continue.

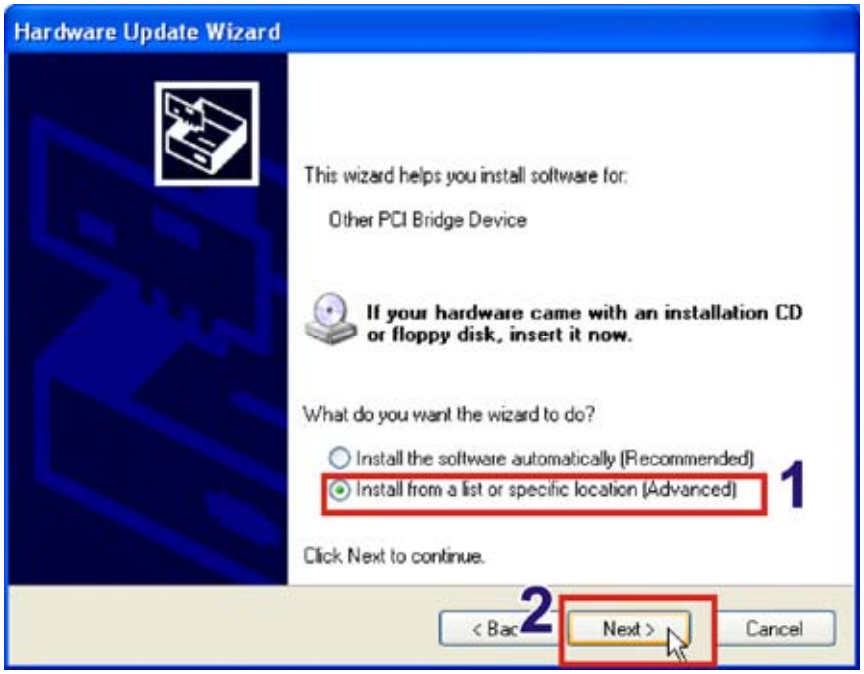


Figure 8-51: Installation Location

Step 14: Click "**Don't search. I will choose the driver to install**". Click NEXT to continue.

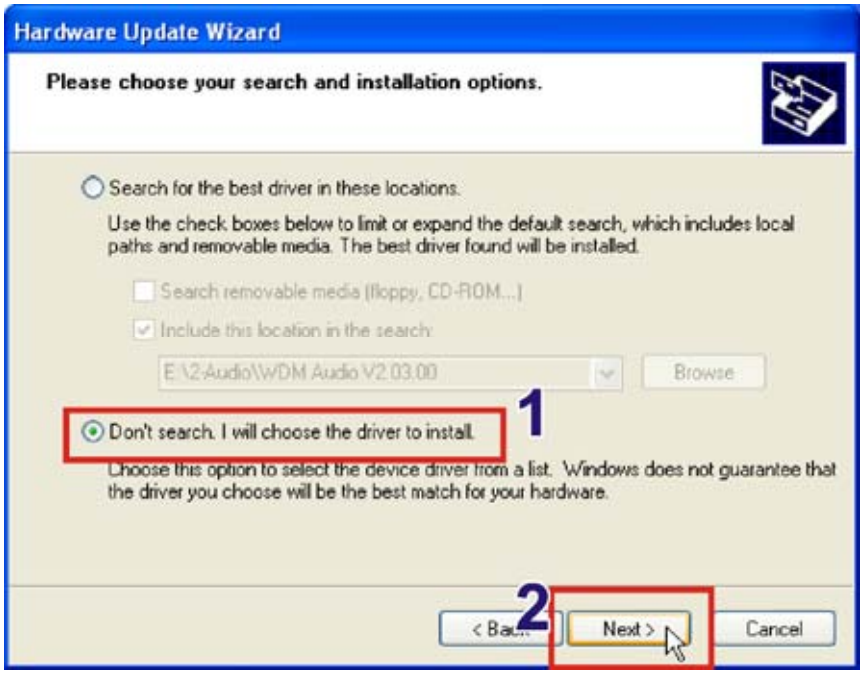


Figure 8-52: Driver Location

Step 15: Click **HAVE DISK** to choose the driver from a specific location.

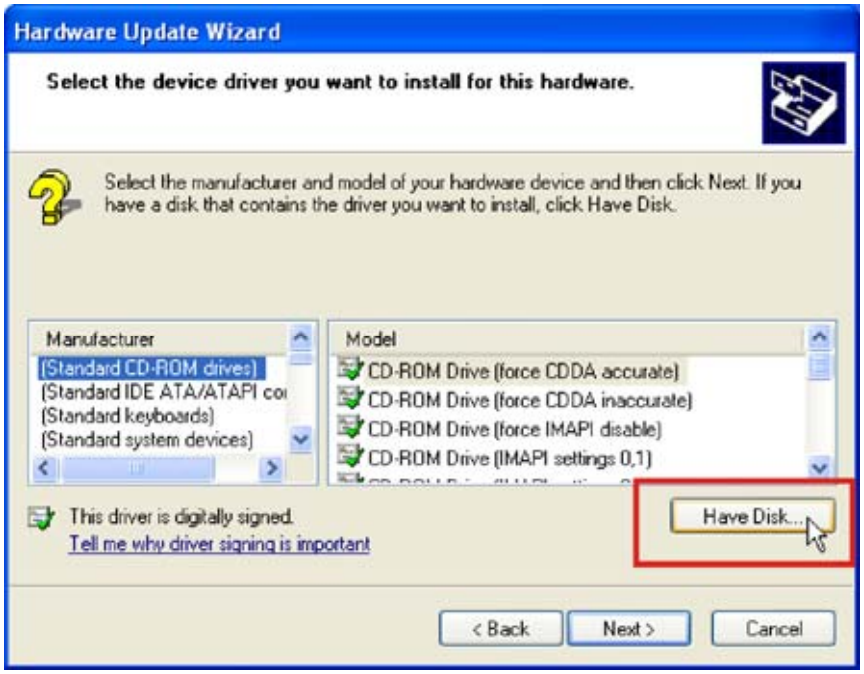


Figure 8-53: Have Disk

Step 16: Click **BROWSE** to choose the driver location.

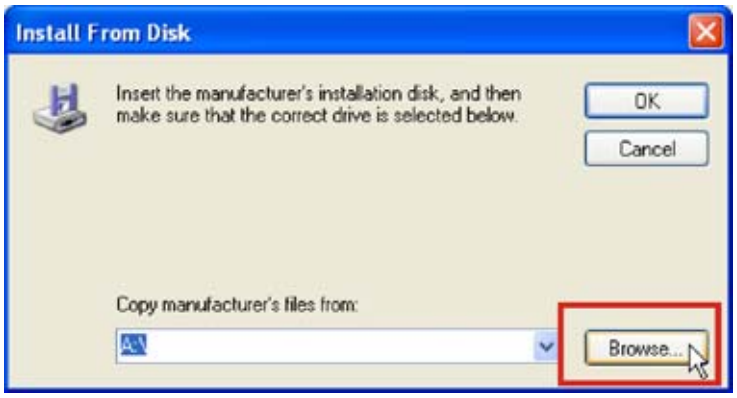


Figure 8-54: Browse For Driver Location

Step 17: Browse to the directory with the graphics driver.

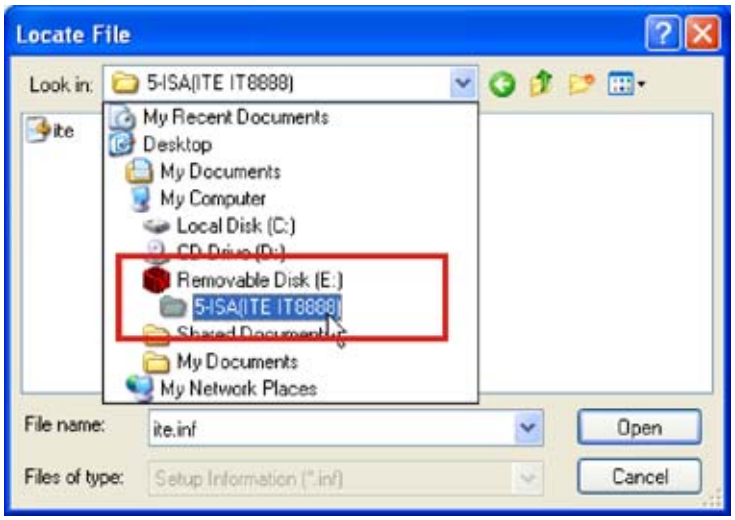


Figure 8-55: Graphics Driver Directory

Step 18: Click on the driver file. Click **OPEN** to use this file and continue.

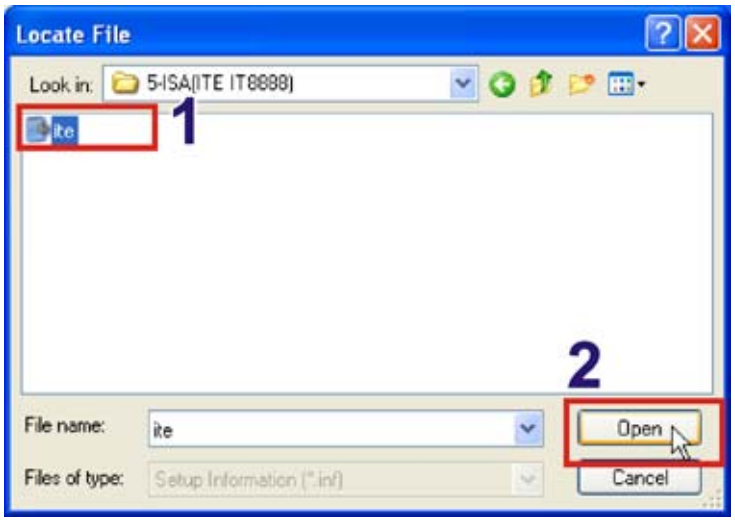


Figure 8-56: Select Driver File

Step 19: Click **OK** to continue.

Figure 8-57: Install From Disk

Step 20: Click on the driver that appears. Click **NEXT** to continue.

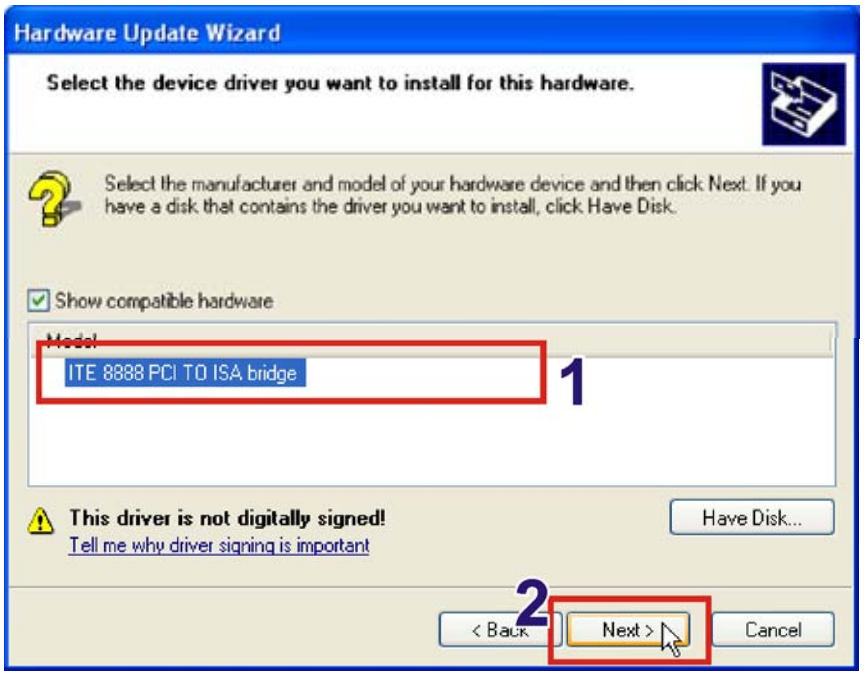


Figure 8-58: Select The Driver

Step 21: Click **FINISH** to exit the hardware installation wizard.

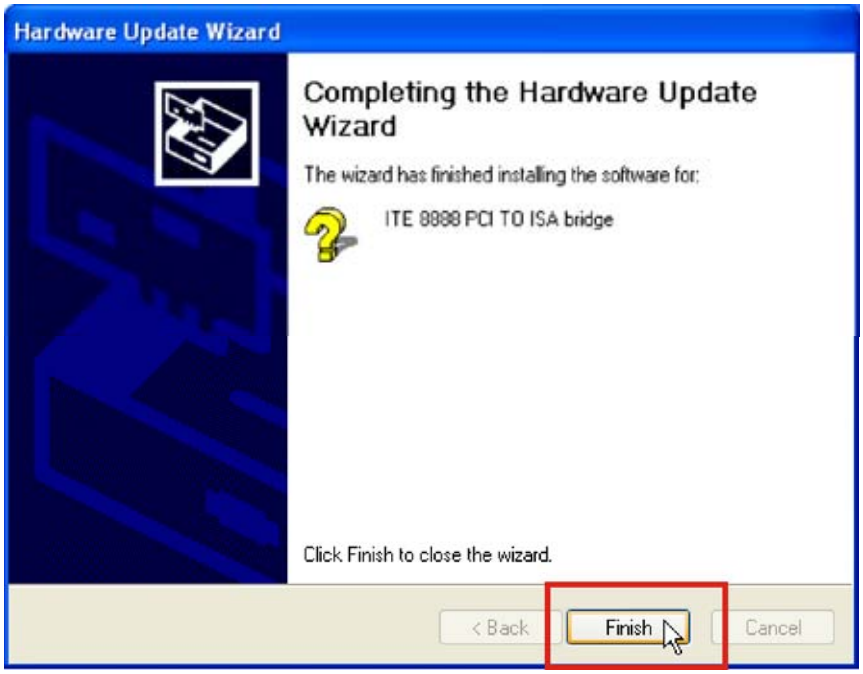


Figure 8-59: Installation Complete

Appendix

A

BIOS Options

Below is a list of BIOS configuration options in the BIOS chapter.

Appendix

B

Terminology

AC '97	Audio Codec 97 (AC'97) refers to a codec standard developed by Intel® in 1997.
ACPI	Advanced Configuration and Power Interface (ACPI) is an OS-directed configuration, power management, and thermal management interface.
AHCI	Advanced Host Controller Interface (AHCI) is a SATA Host controller register-level interface.
ATA	The Advanced Technology Attachment (ATA) interface connects storage devices including hard disks and CD-ROM drives to a computer.
ARMD	An ATAPI Removable Media Device (ARMD) is any ATAPI device that supports removable media, besides CD and DVD drives.
ASKIR	Amplitude Shift Keyed Infrared (ASKIR) is a form of modulation that represents a digital signal by varying the amplitude ("volume") of the signal. A low amplitude signal represents a binary 0, while a high amplitude signal represents a binary 1.
BIOS	The Basic Input/Output System (BIOS) is firmware that is first run when the computer is turned on and can be configured by the end user
CODEC	The Compressor-Decompressor (CODEC) encodes and decodes digital audio data on the system.
CompactFlash®	CompactFlash® is a solid-state storage device. CompactFlash® devices use flash memory in a standard size enclosure. Type II is thicker than Type I, but a Type II slot can support both types.
CMOS	Complimentary metal-oxide-conductor is an integrated circuit used in chips like static RAM and microprocessors.
COM	COM refers to serial ports. Serial ports offer serial communication to expansion devices. The serial port on a personal computer is usually a male DB-9 connector.
DAC	The Digital-to-Analog Converter (DAC) converts digital signals to analog signals.
DDR	Double Data Rate refers to a data bus transferring data on both the rising and falling edges of the clock signal.

DMA	Direct Memory Access (DMA) enables some peripheral devices to bypass the system processor and communicate directly with the system memory.
DIMM	Dual Inline Memory Modules are a type of RAM that offer a 64-bit data bus and have separate electrical contacts on each side of the module.
DIO	The digital inputs and digital outputs are general 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.
EHCI	The Enhanced Host Controller Interface (EHCI) specification is a register-level interface description for USB 2.0 Host Controllers.
EIDE	Enhanced IDE (EIDE) is a newer IDE interface standard that has data transfer rates between 4.0 MB/s and 16.6 MB/s.
EIST	Enhanced Intel® SpeedStep Technology (EIST) allows users to modify the power consumption levels and processor performance through application software. The application software changes the bus-to-core frequency ratio and the processor core voltage.
FSB	The Front Side Bus (FSB) is the bi-directional communication channel between the processor and the Northbridge chipset.
GbE	Gigabit Ethernet (GbE) is an Ethernet version that transfers data at 1.0 Gb/s and complies with the IEEE 802.3-2005 standard.
GPIO	General purpose input
HDD	Hard disk drive (HDD) is a type of magnetic, non-volatile computer storage device that stores digitally encoded data.
ICH	The Input/Ouput Controll Hub (ICH) is an Intel® Southbridge chipset.
IrDA	Infrared Data Association (IrDA) specify infrared data transmission protocols used to enable electronic devices to wirelessly communicate with each other.
L1 Cache	The Level 1 Cache (L1 Cache) is a small memory cache built into the system processor.
L2 Cache	The Level 2 Cache (L2 Cache) is an external processor memory cache.

LCD	Liquid crystal display (LCD) is a flat, low-power display device that consists of two polarizing plates with a liquid crystal panel in between.
LVDS	Low-voltage differential signaling (LVDS) is a dual-wire, high-speed differential electrical signaling system commonly used to connect LCD displays to a computer.
POST	The Power-on Self Test (POST) is the pre-boot actions the system performs when the system is turned-on.
RAM	Random Access Memory (RAM) is volatile memory that loses data when power is lost. RAM has very fast data transfer rates compared to other storage like hard drives.
SATA	Serial ATA (SATA) is a serial communications bus designed for data transfers between storage devices and the computer chipsets. The SATA bus has transfer speeds up to 1.5 Gb/s and the SATA II bus has data transfer speeds of up to 3.0 Gb/s.
S.M.A.R.T	Self Monitoring Analysis and Reporting Technology (S.M.A.R.T) refers to automatic status checking technology implemented on hard disk drives.
UART	Universal Asynchronous Receiver-transmitter (UART) is responsible for asynchronous communications on the system and manages the system's serial communication (COM) ports.
UHCI	The Universal Host Controller Interface (UHCI) specification is a register-level interface description for USB 1.1 Host Controllers.
USB	The Universal Serial Bus (USB) is an external bus standard for interfacing devices. USB 1.1 supports 12 Mb/s data transfer rates and USB 2.0 supports 480 Mb/s data transfer rates.
VGA	The Video Graphics Array (VGA) is a graphics display system developed by IBM.

Appendix

C

Digital I/O Interface

C.1 Introduction

The DIO connector on the WAFER-LX is interfaced to GPIO ports on the 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 datasheet for the Super I/O chipset.

C.2 DIO Connector Pinouts

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

Pin	Description	Super I/O Pin	Super I/O Pin Description
1	Ground	N/A	N/A
2	VCC	N/A	N/A
3	Output 3	GP27	General purpose I/O port 2 bit 7.
4	Output 2	GP26	General purpose I/O port 2 bit 6.
5	Output 1	GP25	General purpose I/O port 2 bit 5.
6	Output 0	GP24	General purpose I/O port 2 bit 4.
7	Input 3	GP23	General purpose I/O port 2 bit 3.
8	Input 2	GP22	General purpose I/O port 2 bit 2
9	Input 1	GP21	General purpose I/O port 2 bit 1
10	Input 0	GP20	General purpose I/O port 2 bit 0

C.3 Assembly Language Samples

C.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
```

C.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
```

Appendix

D

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 EMIs 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 D-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. When 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 ;
```

Appendix

E

Address Mapping

E.1 IO 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
0 A0-0 A1	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	SiS661CX Graphics Controller
3C0-3DF	SiS661CX Graphics Controller
3F6-3F6	Primary IDE Channel
3F7-3F7	Standard floppy disk controller
3F8-3FF	Serial Port 1 (COM1)

Table E-1: IO Address Map

E.2 1st MB Memory Address Map

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

Table E-2: 1st MB Memory Address Map

E.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	Available	IRQ15	Secondary IDE

Table E-3: IRQ Mapping Table

E.4 DMA Channel Assignments

Channel	Function
0	Available
1	Available
2	Floppy disk (8-bit transfer)
3	Available
4	Cascade for DMA controller 1
5	Available
6	Available
7	Available

Table E-4: IRQ Mapping Table

Appendix

F

Compatibility

NOTE:

The compatible items described here have been tested by the IEI R&D team and found to be compatible with the WAFER-LX

F.1 Compatible Operating Systems

The following operating systems have been successfully run on the WAFER-LX.

- MS-DOS 6.22
- Microsoft Windows XP (32-bit)
- Microsoft Windows 2000
- Red Hat 9.0

F.2 Compatible Processors

The following Intel® Socket 478 processors have been successfully tested on the WAFER-LX

CPU	FSB	Frequency	L2 Cache
Intel® Pentium 4	800 MHz	3.2GHz	1 MB

F.3 Compatible Memory Modules

NOTE:

The memory modules listed below have been tested on the WAFER-LX other memory modules that comply with the specifications may also work on the WAFER-LX but have not been tested.

The following memory modules have been successfully tested on the WAFER-LX.

Manufacturer	Model No.	Capacity	Speed	Type
Kingston	KVR400X64C3 A	512 MB	400 MHz	DDR

Appendix

G

Hazardous Materials Disclosure

G.1 Hazardous Materials Disclosure Table for IPB Products Certified as RoHS Compliant Under 2002/95/EC Without Mercury

The details provided in this appendix are to ensure that the product is compliant with the Peoples Republic of China (China) RoHS standards. The table below acknowledges the presences of small quantities of certain materials in the product, and is applicable to China RoHS only.

A label will be placed on each product to indicate the estimated “Environmentally Friendly Use Period” (EFUP). This is an estimate of the number of years that these substances would “not leak out or undergo abrupt change.” This product may contain replaceable sub-assemblies/components which have a shorter EFUP such as batteries and lamps. These components will be separately marked.

Please refer to the table on the next page.

Part Name	Toxic or Hazardous Substances and Elements					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (CR(VI))	Polybrominated Biphenyls (PBB)	Polybrominated Diphenyl Ethers (PBDE)
Housing	X	O	O	O	O	X
Display	X	O	O	O	O	X
Printed Circuit Board	X	O	O	O	O	X
Metal Fasteners	X	O	O	O	O	O
Cable Assembly	X	O	O	O	O	X
Fan Assembly	X	O	O	O	O	X
Power Supply Assemblies	X	O	O	O	O	X
Battery	O	O	O	O	O	O

O: This toxic or hazardous substance is contained in all of the homogeneous materials for the part is below the limit requirement in SJ/T11363-2006

X: This toxic or hazardous substance is contained in at least one of the homogeneous materials for this part is above the limit requirement in SJ/T11363-2006

此附件旨在确保本产品符合中国 RoHS 标准。以下表格标示此产品中某有毒物质的含量符合中国 RoHS 标准规定的限量要求。

本产品上会附有"环境友好使用期限"的标签，此期限是估算这些物质"不会有泄漏或突变"的年限。本产品可能包含有较短的环境友好使用期限的可替换元件，像是电池或灯管，这些元件将会单独标示出来。

部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (CR(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
壳体	X	O	O	O	O	X
显示	X	O	O	O	O	X
印刷电路板	X	O	O	O	O	X
金属螺帽	X	O	O	O	O	O
电缆组装	X	O	O	O	O	X
风扇组装	X	O	O	O	O	X
电力供应组装	X	O	O	O	O	X
电池	O	O	O	O	O	O
O: 表示该有毒有害物质在该部件所有物质材料中的含量均在 SJ/T11363-2006 标准规定的限量要求以下。 X: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T11363-2006 标准规定的限量要求。						

Appendix

H

RAID Levels

RAID allows multiple disks to be connected in an array. A RAID array allows extra capabilities like increased speed and performance, or increased data protection and security. A RAID array is viewed as a single disk by the computer and the operating system. Details of the different RAID levels are outlined in the sections below.

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.

NOTE:

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.

H.1 RAID 0

RAID 0, or striping, spreads data evenly over the disks in the RAID array. One block of data is written to the first disk, then one block of data is written to the second disk, and so on. The same applies for data reads.

RAID 0 offers faster performance than a single disk setup. Read and write performance is increased. RAID 0 is not as secure as a single disk, and the failure of just one disk in the array results in failure of the whole array.

The logical RAID volume below shows the disk drive that the operating system would see. The physical disks show the disks that are contained in the RAID volume.

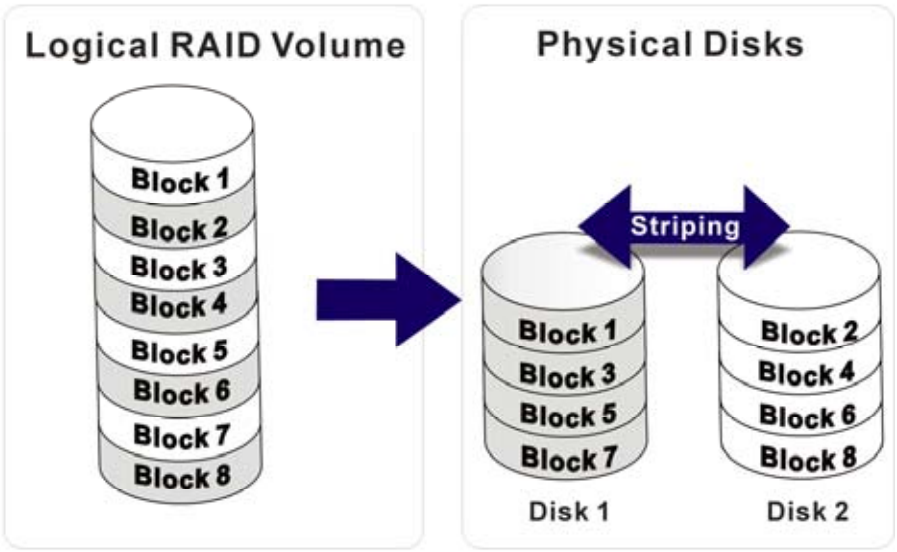


Figure H-1: RAID 0

H.2 RAID 1

RAID 1, or mirroring, places the exact same data on all disks in the RAID array. One block of data is written to the first disk, the same block of data is written to the second disk, and so on. When data is read, it can be read from either disk in the array.

RAID 1 offers more data security than a single disk setup. Read and write performance is the same as a single disk. RAID 1 is more secure than a single disk as a failed disk can be removed from the array, and the information restored from the remaining working drives.

The logical RAID volume below shows the disk drive that the operating system would see. The physical disks show the disks that are contained in the RAID volume.

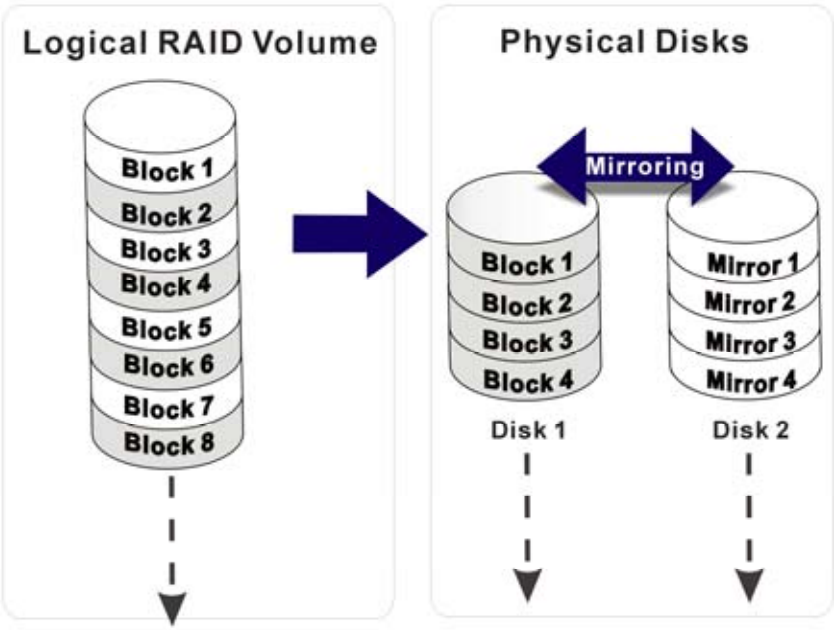


Figure H-2: RAID 1

H.3 JBOD

JBOD, sometimes called concatenation, strings physical hard disks together to create one larger logical disk. Blocks of data are written to the first disk until it is finished and then the blocks are written to the second drive, and so on.

JBOD offers no extra security and no extra performance. It is useful for combining smaller disks into a single large logical disk. There is no redundancy, but the failure of one disk usually only results in the failure of the data on that disk.

The logical RAID volume below shows the disk drive that the operating system would see. The physical disks show the disks that are contained in the RAID volume.

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