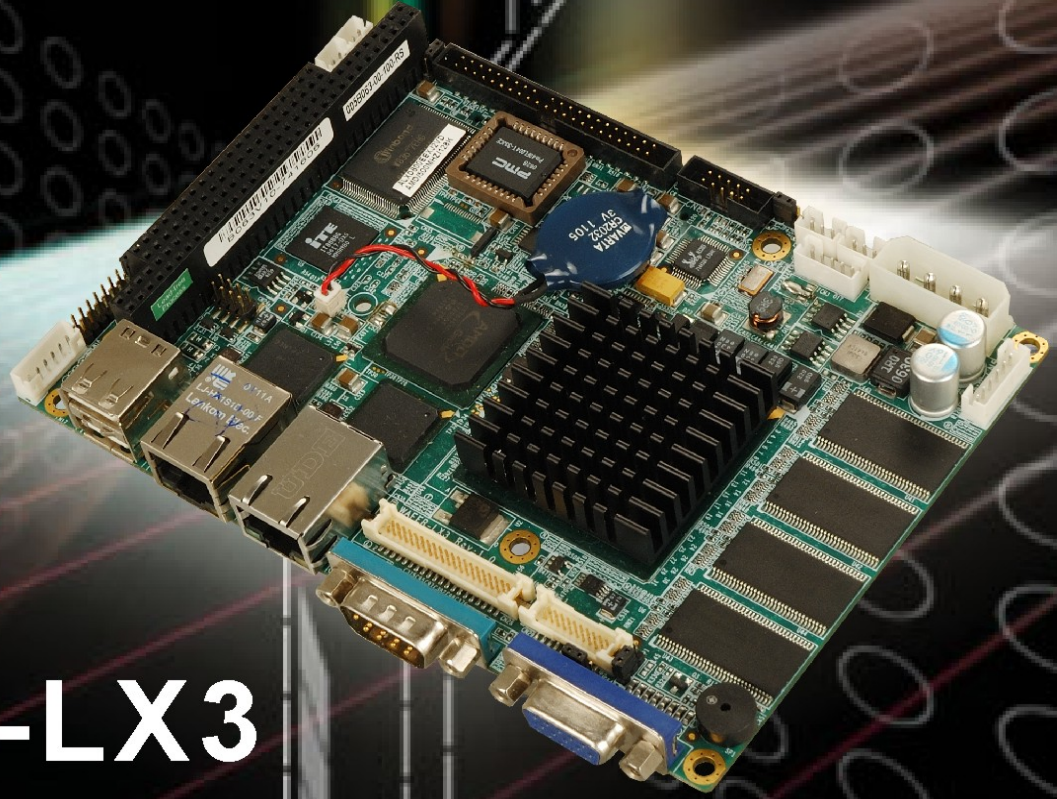




IEI Technology Corp .



**MODEL:
WAFER-LX3**

3.5" AMD Geode™ LX 800 Motherboard with VGA, LVDS and TTL monitor capability. Dual LAN, USB 2.0, Audio and onboard memory.

User Manual

Rev. 1.00 OCTOBER 2007



Revision

Date	Version	Changes
2007-08-30	1.00	Initial release

Manual Conventions

 **WARNING!**

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

 **WARNING:**

This is an example of a warning message. Failure to adhere to warning messages may result in permanent damage to the WAFER-LX3 or personal injury to the user. Please take warning messages seriously.

 **CAUTION!**

Cautionary messages should also be heeded to help reduce the chance of losing data or damaging the WAFER-LX3. Cautions are easy to recognize. The word “caution” is written as “**CAUTION**,” both capitalized and bold and is followed. The italicized text is the cautionary message. A caution message is shown below:

**CAUTION:**

This is an example of a caution message. Failure to adhere to cautions messages may result in permanent damage to the WAFER-LX3. Please take caution messages seriously.

**NOTE:**

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

**NOTE:**

This is an example of a note message. Notes should always be read. Notes contain critical information about the WAFER-LX3. Please take note messages seriously.

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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-LX3 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-LX3 package.

- 1 x WAFER-LX3 single board computer
- 1 x IDE 44p/44p flat cable
- 1 x RS-232/422/485 cable
- 1 x Keyboard and mouse Y-cable
- 1 x Audio cable
- 1 x USB cable
- 1 x Mini jumper pack
- 1 x Utility CD
- 1 x QIG (quick installation guide)

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

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Chapter

1

Introduction

1.1 Overview

1.1.1 WAFER-LX3 Introduction

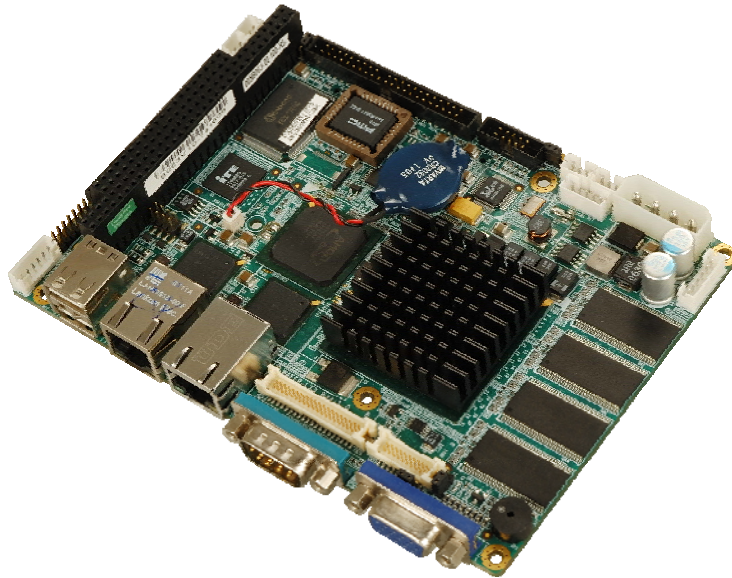


Figure 1-1: WAFER-LX3 3.5" Motherboard

The WAFER-LX3 3.5" motherboard (**Figure 1-1**) is an AMD Geode™ LX 800 processor platform that comes in both commercial and industrial grade models. Industrial grade models are able to operate in extreme environmental conditions and in operational environments with wide ranging ambient temperatures.

Support for VGA, LVDS and TTL displays provides diversified display functionalities. Each WAFER-LX3 has either 256 MB (standard) or 512 MB (optional) DDR memory preinstalled on the system. Two 10/100 Mbps Intel® 82551ER Ethernet controllers ensure secure network connectivity.

A compatible PC/104 ISA expansion card is easily connected to the system through an integrated PC/104 slot. Four USB 2.0 connectors provides additional expansion options to the system ensuring a variety of USB 2.0 devices can be connected to the WAFER-LX3.

WAFER-LX3 3.5" Motherboard

1.1.2 WAFER-LX3 Models

There are two WAFER-LX3 models. These models are listed below.

- **WAFER-LX3-800 (board revision 1.0):** Operates in a normal range of ambient temperatures between 0°C ~ +60°C
- **WAFER-LX3-800W (board revision 1.0):** Operates in a wide range of ambient temperatures between -20°C ~ +80°C
- **WAFER-LX3-800 (board revision 2.0):** Operates in a normal range of ambient temperatures between 0°C ~ +60°C
- **WAFER-LX3-800W (board revision 2.0):** Operates in a wide range of ambient temperatures between -20°C ~ +85°C

The two models are distinguished by the preinstalled heat sinks as shown in **Figure 1-2**.

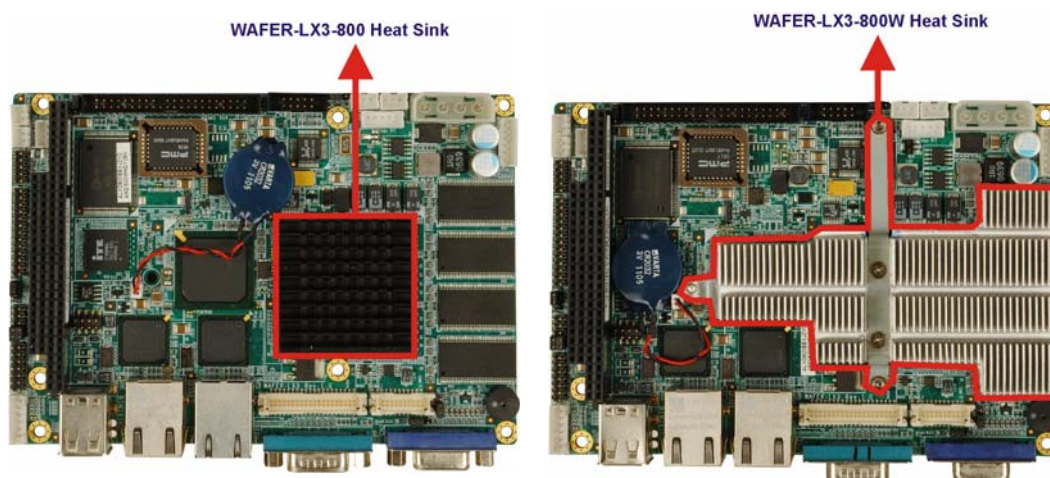


Figure 1-2: WAFER-LX3-800 and WAFER-LX3-800W Heat Sinks

1.1.3 WAFER-LX3 Features

Some of the WAFER-LX3 features are listed below.

- 3.5" form factor
- Integrated 500 MHz AMD Geode™ LX 800 CPU

- Onboard 128 MB (standard) or 256 MB (optional) DDR memory
- Multiple display options including
 - VGA
 - 24-bit TTL
 - 18-bit LVDS display interface
- Multiple serial port connectors including:
 - Two RS-232 serial port connectors
 - One RS-422/485 serial port connector
- Operates in a wide range of ambient temperatures:
 - **WAFER-LX3-800 (board revision 1.0):** 0°C ~ +60°C
 - **WAFER-LX3-800W (board revision 1.0):** -20°C ~ +80°C
 - **WAFER-LX3-800 (board revision 2.0):** 0°C ~ +60°C
 - **WAFER-LX3-800W (board revision 2.0):** -20°C ~ +85°C

1.2 WAFER-LX3 Overview

1.2.1 WAFER-LX3 Overview Photo

The WAFER-LX3 has a wide variety of peripheral interface connectors. **Figure 1-3** is a labeled photo of the peripheral interface connectors on the front side of the WAFER-LX3.

WAFER-LX3 3.5" Motherboard

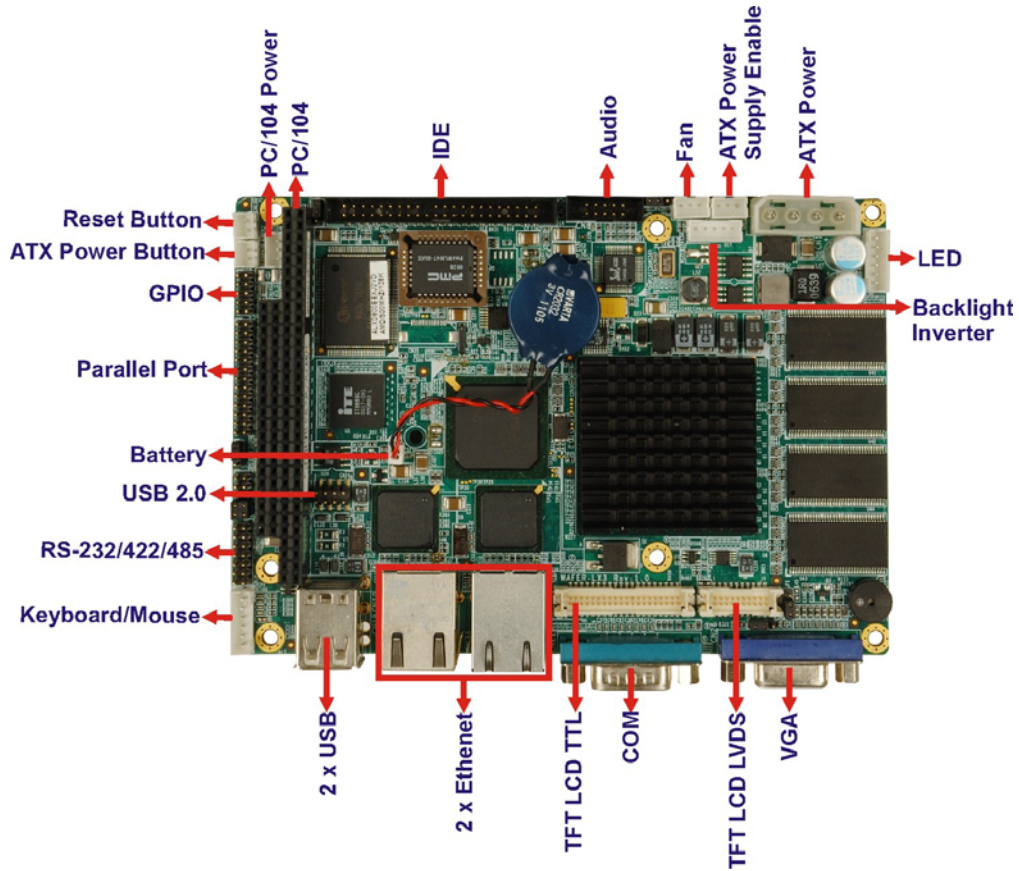


Figure 1-3: WAFER-LX3 Overview [Front View]

Figure 1-4 is a labeled photo of the peripheral interface connectors on the solder side of the WAFER-LX3.

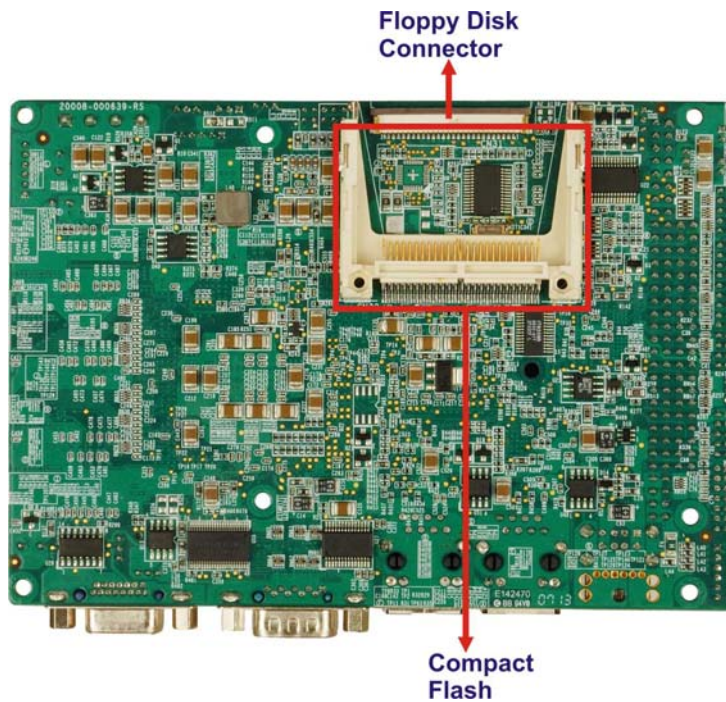


Figure 1-4: WAFER-LX3 Overview [Solder Side]

1.2.2 WAFER-LX3 Peripheral Connectors and Jumpers

The WAFER-LX3 has the following connectors on-board:

- 1 x ATX power connector
- 1 x Audio connector
- 1 x Backlight inverter connector
- 1 x Battery connector
- 1 x CF Card socket (solder side)
- 1 x Fan connectors
- 1 x FDD connector
- 1 x Front panel connector
- 1 x General purpose input/output (GPIO) connector
- 1 x IDE connector
- 1 x Keyboard/mouse connector
- 1 x LVDS LCD connector
- 1 x Parallel port (LPT) connector
- 1 x PC/104 slot

WAFER-LX3 3.5" Motherboard

- 1 x Power button connector
- 1 x Power input (–5V/-12V) connector
- 1 x RS-232/RS-422/485 serial port connector
- 1 x Suspend power input connector
- 1 x System reset button connector
- 1 x TTL LCD connector
- 1 x USB 2.0 connector

The WAFER-LX3 has the following external peripheral interface connectors on the board rear panel.

- 2 x RJ-45 Ethernet connectors
- 1 x RS-232 serial port connector
- 2 x USB 2.0 connectors
- 1 x VGA connector

The WAFER-LX3 has the following on-board jumpers:

- AT/ATX power mode select jumper
- CF Card mode select jumper
- COM1 and COM2 serial RI port and voltage selection jumper
- LCD panel shift clock setting jumper
- LCD panel voltage select jumper
- RS-422/485 mode select jumper

1.2.3 Technical Specifications

WAFER-LX3 technical specifications are listed in **Table 1-1**. See **Chapter 2** for details.

Specification	WAFER-LX3
Form Factor	3.5"
System CPU	AMD Geode™ LX 800
CPU Clock Speed	500 MHz
System Chipset	AMD Geode™ CS5536 companion device

Memory	256 MB DDR onboard (standard) 512 MB DDR onboard (optional)
Display	Analog VGA display through external DB-15 connector 24-bit TTL through 40-pin crimp connector 18-bit single channel LVDS through 20-pin crimp connector
BIOS	Award BIOS label
Audio	AC'97 RealTek ALC203 codec
LAN	Dual Intel® 82551 10/100 Mbps Ethernet controllers
COM	One RS-232 serial ports One RS-232/RS-422/485 serial port
USB2.0	Four USB 2.0 devices supported: <ul style="list-style-type: none"> ■ Two by one onboard pin-header ■ Two by external connectors
Hard Disk Drives	One 44-pin IDE connector
Parallel Port	One 26-pin LPT connector
Expansion	One PC/104 slot
Digital I/O	One 8-bit digital I/O, 4-bit input/4-bit output
Super I/O	Winbond W83627EHG
SSD	CF Card Type II
Watchdog Timer	Software programmable supports 1 sec. ~ 255 sec. system reset.
Power Supply	AT and ATX support
Power Consumption	5V @ 1.34A (AMD Geode™ LX 800 CPU with 256 MB DDR memory)

WAFER-LX3 3.5" Motherboard

Ambient Temperature	WAFER-LX3-800 (board revision 1): 0°C ~ +60°C WAFER-LX3-800W (board revision 1): -20°C ~ +80°C WAFER-LX3-800 (board revision 2): 0°C ~ +60°C WAFER-LX3-800W (board revision 2): -20°C ~ +85°C
Humidity	5% ~ 95% non-condensing
Dimensions (W x L)	145.99 mm x 102.00 mm
Weight (GW/NW)	600g/160g

Table 1-1: Technical Specifications



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Chapter

2

Detailed Specifications

2.1 Dimensions

2.1.1 Board Dimensions

The dimensions of the board are listed below:

- **Length:** 102.00mm
- **Width:** 145.99mm

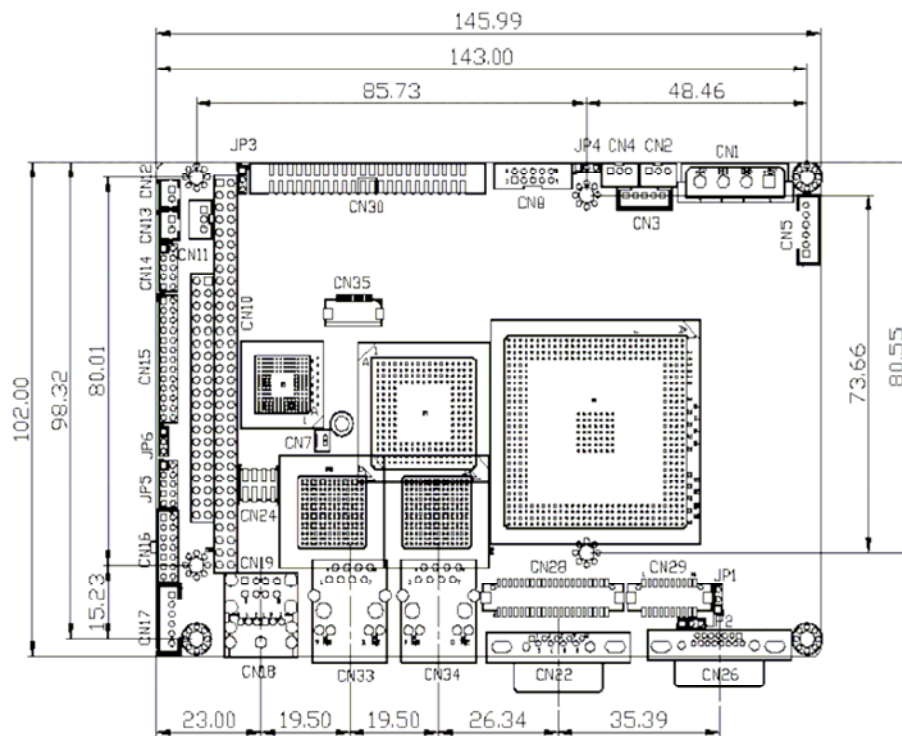


Figure 2-1: WAFER-LX3 Dimensions (mm)

2.1.2 External Interface Panel Dimensions

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

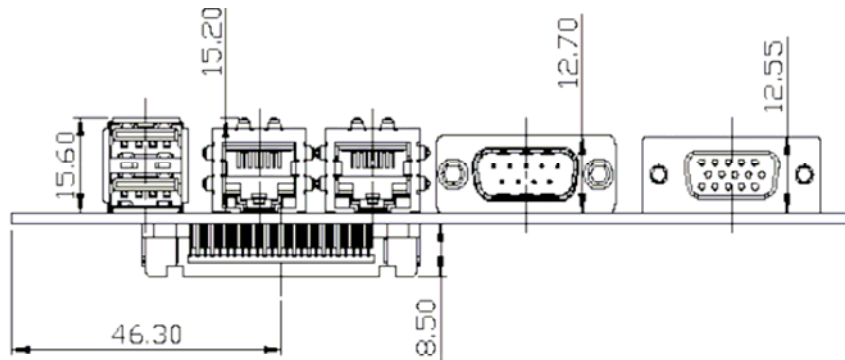


Figure 2-2: External Interface Panel Dimensions (mm)

2.2 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.

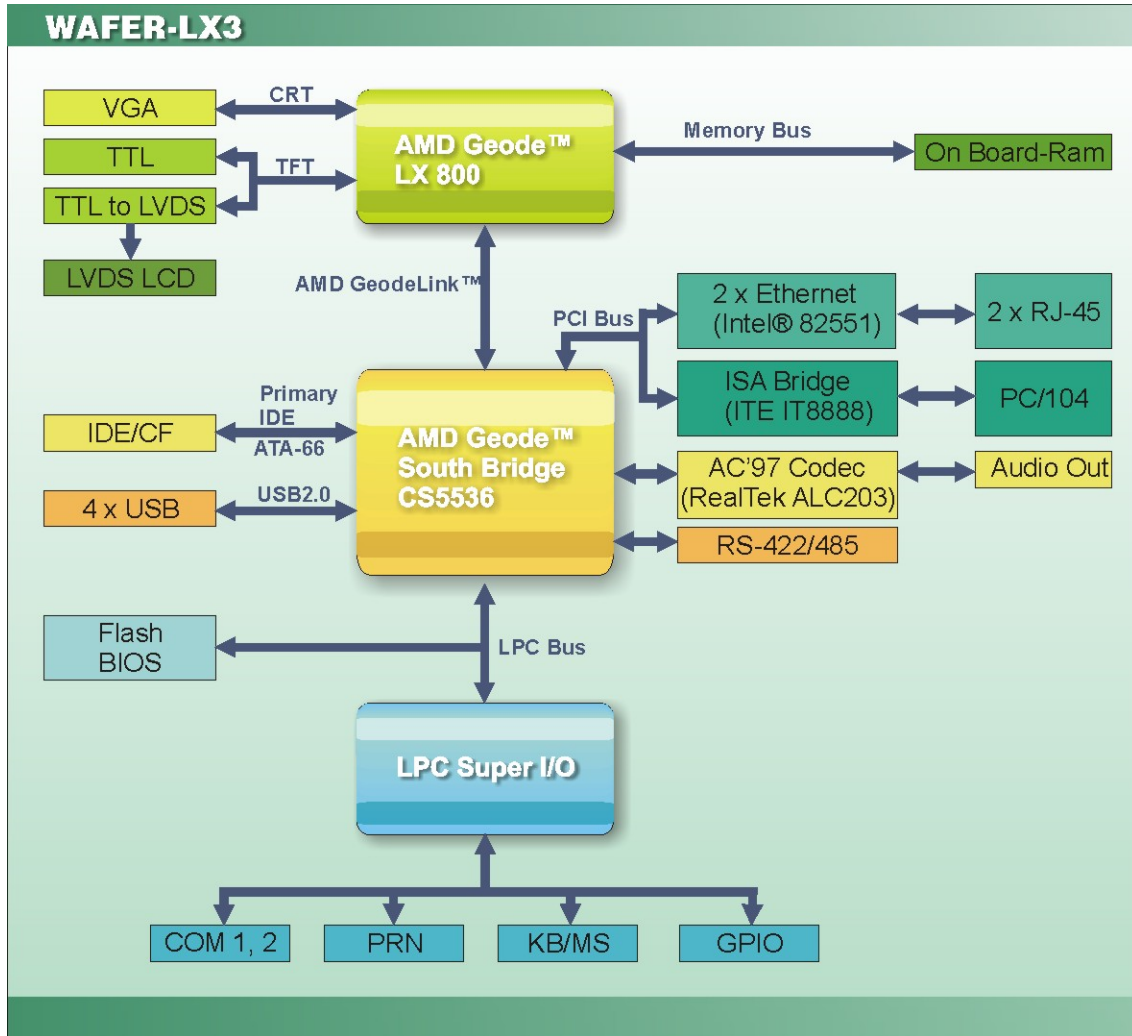


Figure 2-3: Data Flow Block Diagram

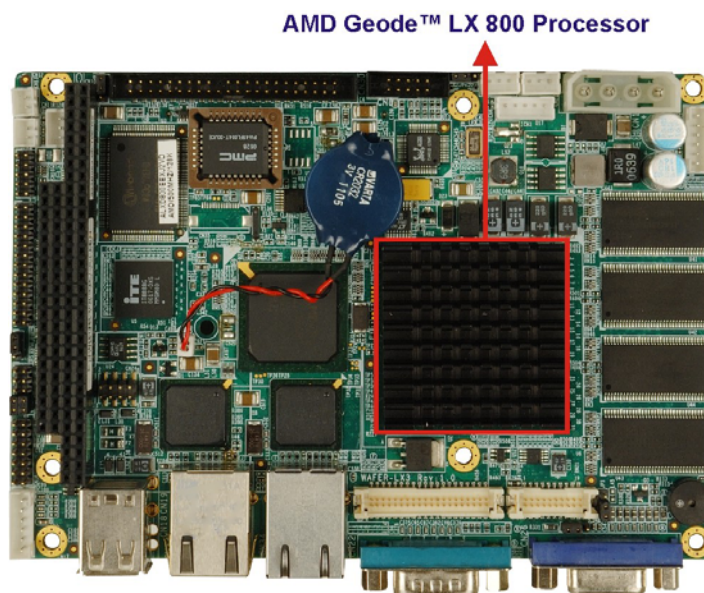
WAFER-LX3 3.5" Motherboard

2.3 CPU Support

The WAFER-LX3 motherboards all have a 500 MHz AMD® Geode™ LX 800 processor preinstalled.

2.3.1 AMD® Geode™ LX 800 500MHz Overview

An AMD® Geode™ LX 800 processor is preinstalled on the WAFER-LX3 show in **Figure 2-4**.



The specifications for the 500MHz 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)
- 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

2.3.2 AMD® Geode™ LX 800 Memory Support

The AMD® Geode™ LX 800 DDR memory bus on the WAFER-LX3 is interfaced to four preinstalled Hynix DDR memory chipsets with a combined memory of 256 MB (standard) or 512 MB (optional) and 133 MHz clock speeds.

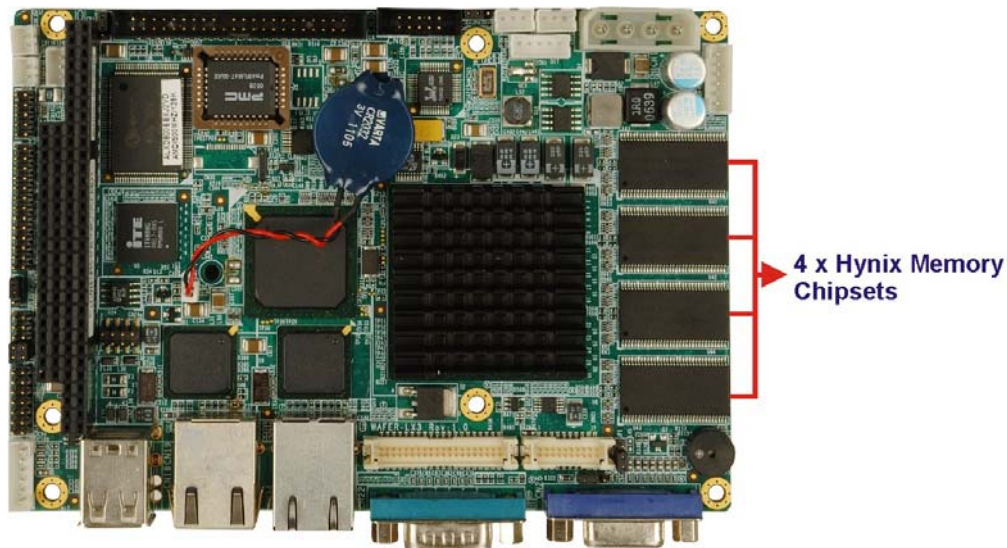


Figure 2-5: Four Memory Chipsets

All the Hynix memory modules operate with a 3.3 V current. Some of the features of the Hynix memory modules are listed below:

- Standard SDRAM Protocol
- Internal 4bank operation
- Power Supply Voltage : VDD = 3.3V, VDDQ = 3.3V
- All device pins are compatible with LVTTTL interface
- Low Voltage interface to reduce I/O power
- 8,192 Refresh cycles / 64ms
- Programmable CAS latency of 2 or 3
- Programmable Burst Length and Burst Type
 - 1, 2, 4, 8 or full page for Sequential Burst

WAFER-LX3 3.5" Motherboard

- - 1, 2, 4 or 8 for Interleave Burst
- 0°C ~ 70°C Operation
- Package Type : 54_Pin TSOPII
- Lead Free

2.3.3 AMD[®] Geode[™] LX 800 500MHz Display Support

The AMD[®] Geode[™] LX 800 supports both CRT and TFT in a dual display mode. The following display specifications.

- Supported Standards
 - High Definition (HD)
 - Standard Definition (SD)
- Supported Resolution
 - 1920x1440 in CRT mode
 - 1600x1200 in TFT mode
- VESA 1.1 and 2.0 VIP/VDA support

A CRT is connected to a female DB-15 connector and a TFT flat panel display is connected to the board through a 40-pin crimp connector. These interface connectors are shown in **Figure 2-6** below.

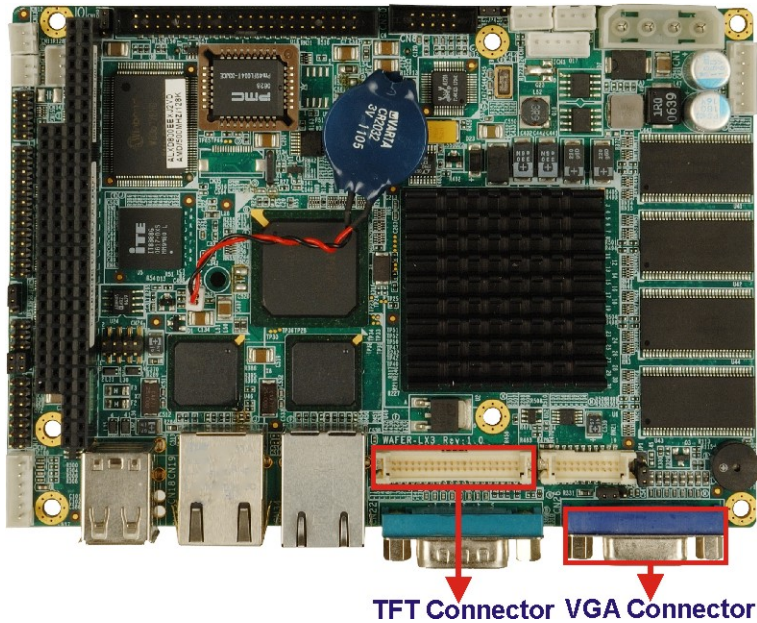


Figure 2-6: TFT and VGA Connector

2.3.4 LVDS Interface

The TTL signals from the AMD Geode™ LX 800 processor are multiplexed to a Flatlink™ LVDS transmitter on the solder side of the WAFER-LX3. The LVDS transmitter is connected to a 20-pin crimp connector, which in turn can be connected to an LVDS display. The LVDS connector and transmitter are shown in **Figure 2-7**.

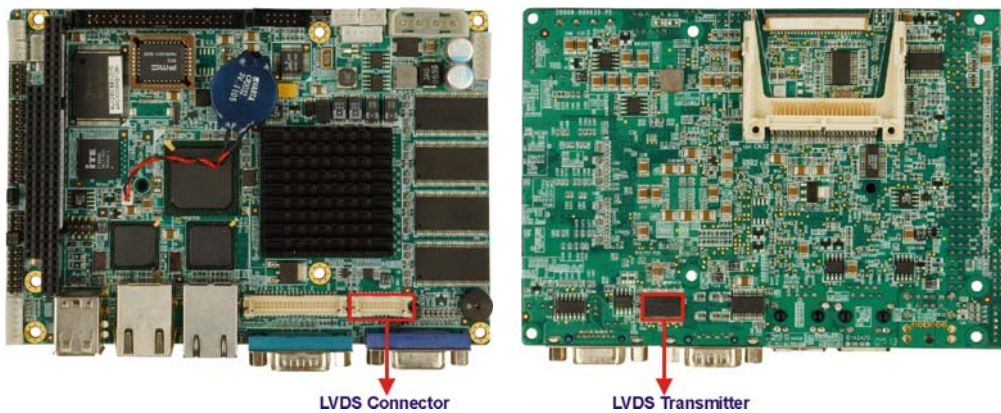


Figure 2-7: LVDS Connector and Transmitter

WAFER-LX3 3.5" Motherboard

Some of the features of the Flatlink™ LVDS transmitter are listed below:

- 21:3 data channel compression at up to 196 million bytes per second throughput
- Suited for SVGA, XGA, or SXGA data transmission from controller to display with very low EMI
- 21 data channels plus clock in low-voltage TTL inputs and three data channels plus clock out low-voltage differential signaling (LVDS) Outputs

2.3.5 AMD® Geode™ LX 800 500MHz Graphics processor

The AMD® Geode™ LX 800 BitBLT/vector engine graphics processor 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: Geode LX Graphics Features 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
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

2.3.6 AMD® Geode™ LX 800 500MHz Power Management

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

- 1.8W Typical (3.9W TDP) @ 500MHz
- GeodeLink active hardware power management
- Hardware support for standard ACPI software power management

WAFER-LX3 3.5" Motherboard

- I/O companion SUSP#/SUSPA# power controls
- Lower power I/O
- Wakeup on SMI/INTR

2.3.7 GeodeLink™ Interface Unit

A proprietary GeodeLink™ interface connects the AMD Geode™ LX 800 to the AMD Geode™ CS5536 system chipset. Some of the features of the GeodeLink™ interface are listed below.

- 64-bit, 66MHz 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)

2.4 AMD® Geode™ CS5536 System Chipset

The WAFER-LX3 series motherboards all have a preinstalled AMD® Geode™ CS5536 system chipset. The system chipset features are listed below.

- 82xx Legacy Devices
- System Management Bus (SMB) Controller
- 8 Multi-Function General Purpose Timers (MFGPTs)
- Power Management Controller
- ACPI v2.0 compliant

2.4.1 AMD® Geode™ CS5536 ATA-6 Controller

The single 44-pin WAFER-LX3 IDE connector supports two ATA-6 HDDs. An ATA-6 (Ultra ATA/100) compliant IDE controller on the AMD® Geode™ CS5536 has a maximum transfer rate of 100MB/s. ATA-6 includes advancements in error checking and ATA-6 drives are compatible with future interface additions. The IDE connector is shown in **Figure 2-8** below.

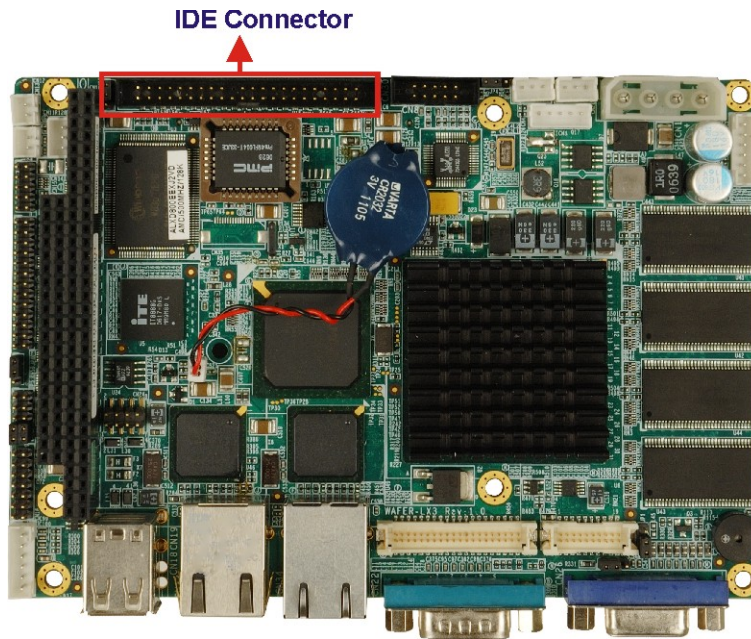


Figure 2-8: IDE Connector

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

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

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

Table 2-2: Supported HDD Specifications

WAFER-LX3 3.5" Motherboard

2.4.2 AMD® Geode™ CS5536 Audio Codec 97 (AC'97) Controller

The AC'97 specification v2.3 compliant controller on the chipset is interfaced to a 20-bit DAC and 18-bit ADC full-duplex AC'97 2.3 stereo RealTek ALC203 codec. The ALC203 is then connected to a 10-pin audio connector to which an audio kit can easily be connected. The codec meets performance requirements for audio on PC99/2001 systems. The audio connector and codec are shown in **Figure 2-9** below.

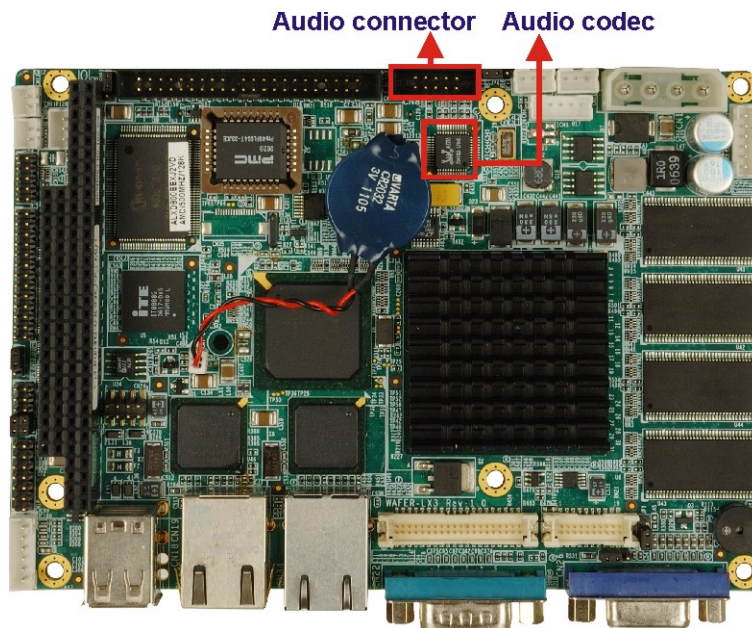


Figure 2-9: Audio Connector and Codec

Some of the codec features are listed below.

- 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
 - 14.318MHz -> 24.576MHz PLL saves crystal
 - 12.288MHz 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 (96KHz) 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/96KHz S/PDIF output
- Supports 32K/44.1K/48KHz S/PDIF input
- Power support: Digital: 3.3V; Analog: 3.3V/5V
- Standard 48-Pin LQFP Package
- EAX™ 1.0 & 2.0 compatible
- Direct Sound 3D™ compatible
- A3D™ compatible
- I3DL2 compatible
- HRTF 3D Positional Audio
- Sensaura™ 3D Enhancement (optional)
- 10 Bands of Software Equalizer
- Voice Cancellation and Key Shifting in Karaoke mode
- AVRack® Media Player

WAFER-LX3 3.5" Motherboard

2.4.3 AMD® Geode™ CS5536 Flash Interface

The WAFER-LX3 CompactFlash® socket supports standard CF Type I and CF Type II cards. The chipset flash interface is multiplexed with an IDE interface and can be connected to an array of industry standard NAND Flash or NOR Flash devices. The CF Card socket is located on the solder side of the WAFER-LX3.

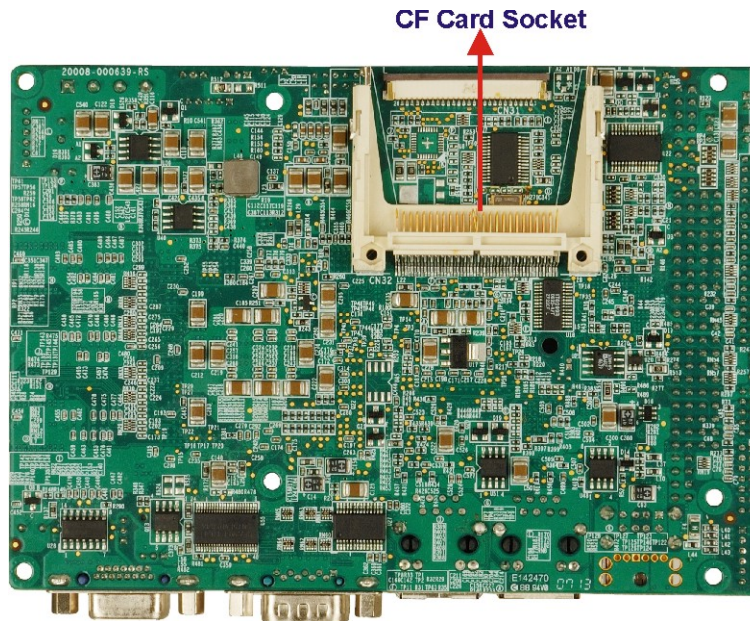


Figure 2-10: CF Card Socket

2.4.4 AMD® Geode™ CS5536 USB Controller

Two external USB ports and two USB ports on an onboard pin-header on the WAFER-LX3 are interfaced to the chipset USB controller. Four USB 1.1 or USB 2.0 devices can be connected simultaneously to the WAFER-LX3. The chipset USB controller has the following specifications:

- 4 USB ports
- USB 1.1 and USB 2.0 compliant
- 4 host ports

The WAFER-LX3 USB connectors are shown in **Figure 2-11**.

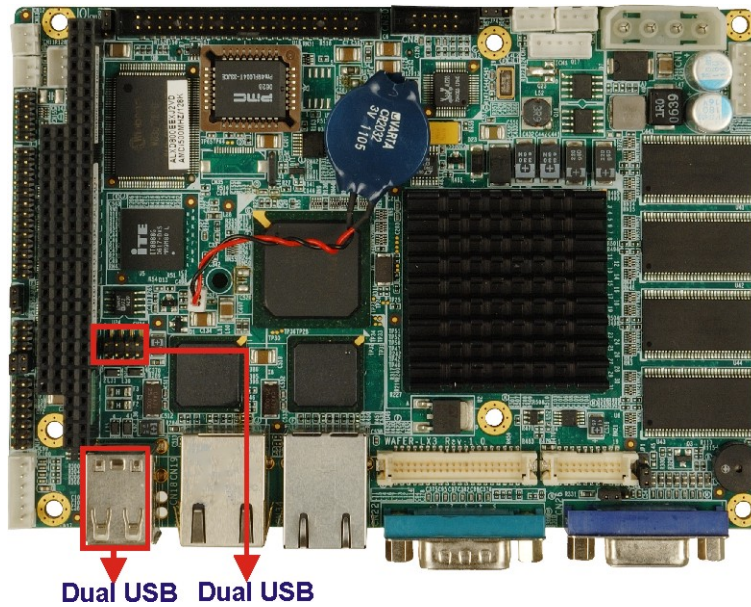


Figure 2-11: USB Connectors

2.4.5 AMD® Geode™ CS5536 Real Time Clock

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

2.5 GeodeLink™ PCI Bridge

2.5.1 Overview

The GeodeLink™ PCI Bridge (GLPCI) module provides a PCI interface for GeodeLink Interface Unit-based designs. The GLPCI module is composed of six major blocks:

- GeodeLink Interface
- FIFO/Synchronization
- Transaction Forwarding
- PCI Bus Interface
- PCI Arbiter

The GeodeLink and PCI Bus Interface blocks provide adaptation to the respective buses. The Transaction Forwarding block provides bridging logic. Some of the features of the GeodeLink™ PCI Bridge are listed below:

WAFER-LX3 3.5" Motherboard

- PCI Version 2.2 compliance
- 32-bit, 66 MHz PCI bus operation
- Target support for fast back-to-back transactions
- Arbiter support for three external PCI bus masters
- Write gathering and write posting for in-bound write requests
- Virtual PCI header support
- Delayed transactions for in-bound read requests
- Zero wait state operation within a PCI burst
- Dynamic clock stop/start support for GLIU and PCI clock domains (this is not CLKRUN support)
- Capable of handling out of bound transactions immediately after reset

2.5.2 PCI Bridge Components

The PCI bus on the WAFER-LX3 is connected to the following components:

- 2 x Intel® 82551ER PCI Ethernet controllers
- 1 x ITE IT8888G PCI to ISA bridge

2.5.3 Intel® 82551ER PCI Ethernet Controller

Two Intel® 82551ER PCI Ethernet 10/100BASE-T Ethernet LAN controllers are interfaced to the AMD Geode™ CS5536 through the PCI bus. The Ethernet controllers are then both connected to an RJ-45 connector that can be accessed externally. The Intel® 82551ER controllers and the RJ-45 connectors are shown in **Figure 2-12**.

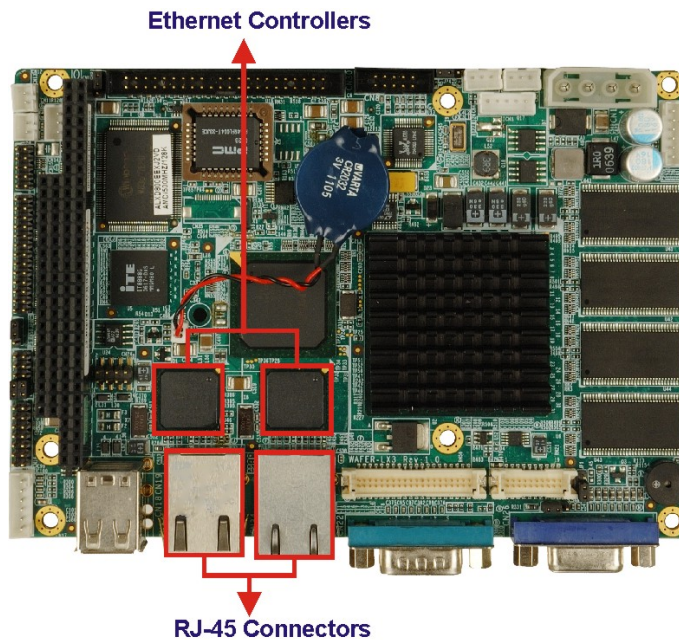


Figure 2-12: Ethernet Controller

Some the features of the Intel® 82551ER are listed below:

- 100BASE-TX and 10BASE-T
- Less than 0.5W typical power consumption
- Scatter-gather bus mastering capabilities enable high-speed transfers over the PCI bus
- Wake on LAN (WoL) without software configuration
- Address Resolution Protocol (ARP) and flexible frame filtering
- Complies with Advanced Configuration and Power Interface specifications
- Offloads TCP, UDP, and IP checksums from PC processor
- Early-receive interrupt processes receive data concurrently
- 3.3V device

WAFER-LX3 3.5" Motherboard

2.5.4 PCI to ISA Bridge

An ITE IT8888G PCI to ISA bridge single function device connects the onboard WAFER-LX3 ISA bus PC/104 connector and the GPIO connector to the GeodeLink™ PCI bridge. The PCI-to-ISA bridge is shown in **Figure 2-13**.

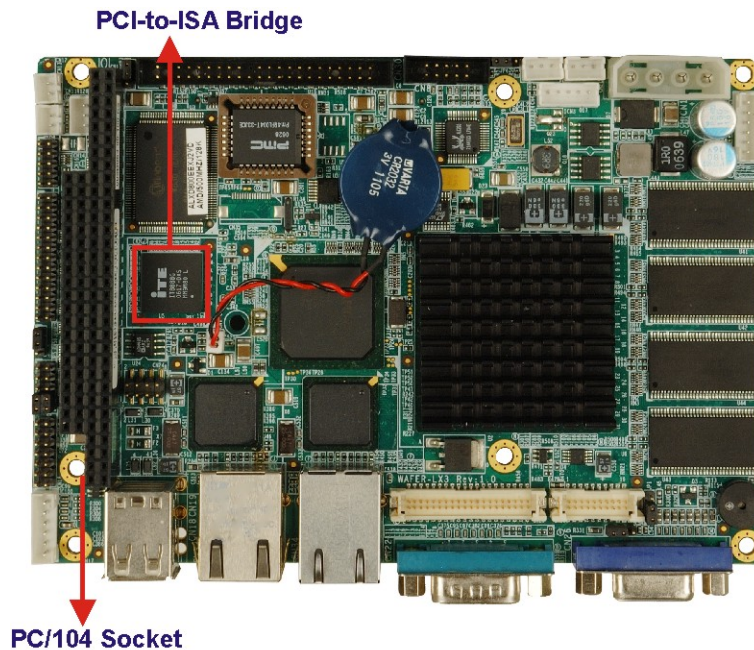


Figure 2-13: PCI-to-ISA Bridge

The IT8888G has a PCI specification v2.1 compliant 32-bit PCI bus interface and supports both PCI Bus master and slave. The PCI interface supports both programmable positive and full subtractive decoding schemes. Some of the features of the IT8888G PCI to ISA bridge are listed below.

- PCI Interface
- Programmable PCI Address Decoders
- PC/PCI DMA Controller
- Distributed DMA Controller
- ISA Interface
- SM Bus
- 1 analog line-level mono output: MONO_OUT

- Power-on Serial Bus Configuration
- Serial IRQ
- Versatile power-on strapping options
- Supports NOGO function
- Single 33 MHz Clock Input
- +3.3V PCI I/F with +5V tolerant I/O buffers
- +5V ISA I/F and core Power Supply

2.6 LPC Bus Components

2.6.1 LPC Bus Overview

The LPC bus is connected to components listed below:

- BIOS chipset
- Super I/O chipset

2.6.2 BIOS Chipset

The BIOS chipset has a licensed copy of AMI BIOS installed on the chipset. Some of the BIOS features are listed below:

- Award Flash BIOS
- SMIBIOS (DMI) compliant
- Console redirection function support
- PXE (Pre-boot Execution Environment) support
- USB booting support

The BIOS chipset is shown in **Figure 2-14** below.

WAFER-LX3 3.5" Motherboard

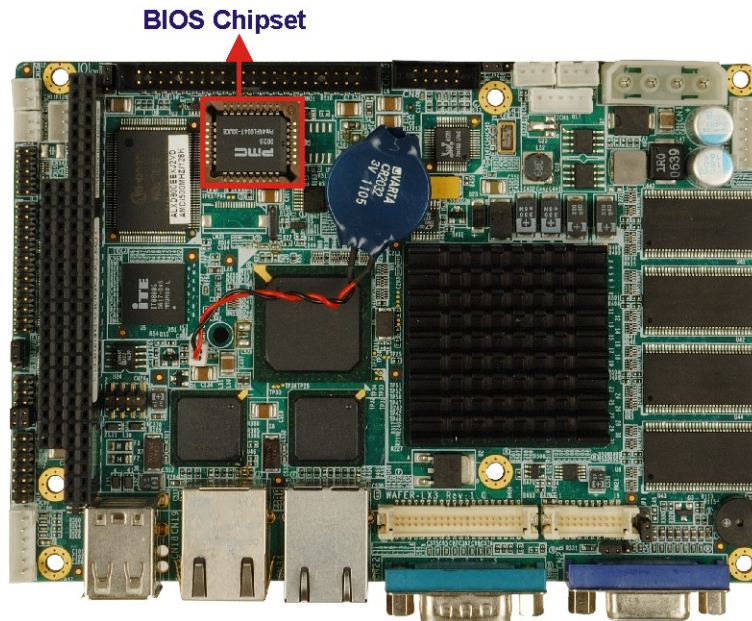


Figure 2-14: BIOS Chipset

2.6.3 Winbond W83627EHG Super I/O chipset

The Winbond W83627EHG Super I/O chipset is connected to the AMD Geode™ CS5536 companion device through the LPC bus. The Winbond W83627EHG is an LPC interface-based Super I/O device that comes with Environment Controller integration, floppy disk controller, and UART controller. Some of the features of the Winbond W83697HG chipset are listed below:

- LPC Spec. 1.01 compliant
- LDRQ# (LPC DMA) and SERIRQ (serial IRQ) supported
- Hardware monitor functions integrated
- Microsoft PC98/PC99 Hardware Design Guide compliant
- ACPI DPM (Device Power Management) supported

Some of the Super I/O features are described in more detail below. The super I/O chipset is shown in **Figure 2-15**.

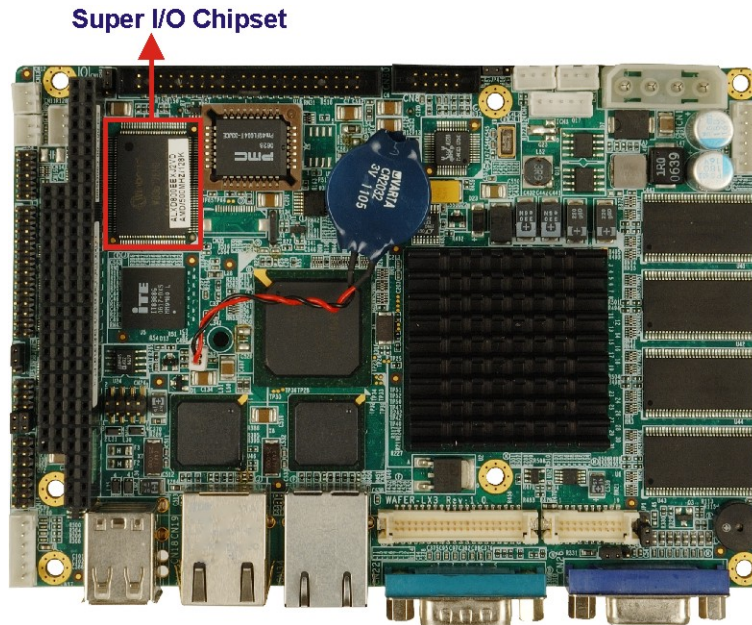


Figure 2-15: Super I/O Chipset

2.6.3.1 Super I/O LPC Interface

The LPC interface on the Super I/O complies with the Intel® Low Pin Count Specification Rev. 1.01. The LPC interface supports both LDRQ# and SERIRQ protocols as well as PCI PME# interfaces.

2.6.3.2 Super I/O Hardware Monitor Functions

The Super I/O Hardware Monitor monitors internal voltages, system temperature and the cooling fan speed. All the monitored environmental parameters can be read from the BIOS Hardware Health Configuration menu.

2.6.3.3 Super I/O UART Controller

There are two high-speed 16550 compatible UART controllers integrated onto the Super I/O chipset. Both controllers have 16-byte send/receive FIFO. Some of the features of the UART controllers are listed below:

- MIDI compatible
- Fully programmable serial-interface characteristics:

WAFER-LX3 3.5" Motherboard

- 5, 6, 7, or 8-bit characters
- Even, odd or no parity bit generation/detection
- 1, 1.5 or 2 stop bits generation
- Internal diagnostic capabilities:
 - Loop-back control for communications link fault isolation
 - Break, parity, overrun, framing error stimulation
- Programmable baud generator allows division of 1.8461 MHz and 24 MHz by 1 to ($2^{16} - 1$)
- Maximum baud rate up to 921 kbps for 14.769 MHz and 1.5 Mbps for 24 MHz

2.6.3.4 Super I/O Parallel Port

The Super I/O parallel port (LPT) is compatible with the following LPT specifications.

- IBM parallel port compatible
- PS/2 compatible bi-directional parallel port
- Enhanced Parallel Port (EPP) mode supported. Compatible with IEEE 1284 specifications
- Extended Parallel Port (EPP) mode supported. Compatible with IEEE 1284 specifications
- Enhanced printer port back-drive current protection

The parallel port controller is connected to an external DB-26 LPT connector.

2.6.3.5 Super I/O Floppy Disk Drive (FDD) Controller

The Super I/O FDD controller is compatible with the following specifications.

- IBM PC AT disk drive compatible
- Variable write pre-compensation with track selectable capability
- Vertical recording format supported
- DMA logic enabled
- 16-byte data FIFOs
- Overrun and under run conditions detected
- Built-in address mark detection circuitry to simplify the read electronics
- FDD anti-virus functions with software write protect and FDD write enable signal

- Supports 3.5-inch or 5.25-inch FDD
- Compatible with industry standard 82077
- Supported capacities:
 - 360K
 - 720K
 - 1.2M
 - 1.44M
 - 2.88M
- Supported transfer rates
 - 250Kbps
 - 300Kbps
 - 500Kbps
 - 1Mbps
 - 2Mbps
- 3-mode FDD and Win95/98 driver supported

The FDD controller is interfaced to a FDD connected to the backplane through the board-to-board connectors.

2.6.3.6 Super I/O Keyboard and Mouse Controller

The Super I/O keyboard and mouse controller is compatible with the following specifications.

- 8042 compatible
- Asynchronous access to two data registers and one status register
- Compatible with 8042 software
- PS/2 mouse supported
- Port 92 supported
- Interrupt and polling modes supported
- Fast Gate A20 and Hardware Keyboard Reset
- 8-bit timer/counter

The keyboard and mouse controller controller is interfaced to a keyboard and mouse connected to the backplane through the board-to-board connectors.

WAFER-LX3 3.5" Motherboard

2.6.3.7 Super I/O GPIO Ports

The Super I/O has 22 programmable GPIO ports.

2.6.3.8 Super I/O Fan Speed and Fan Control

The super I/O can both monitor and control the fan speed. The super I/O is interfaced to the fan on the backplane through the board-to-board connectors.

2.7 Environmental and Power Specifications

2.7.1 Operating Temperature and Temperature Control

The maximum and minimum operating temperatures for the WAFER-LX3 are listed below.

- **WAFER-LX3-800 (board revision 1):** Operates in a normal range of ambient temperatures between 0°C ~ +60°C
- **WAFER-LX3-800W (board revision 1):** Operates in a wide range of ambient temperatures between -20°C ~ +80°C
- **WAFER-LX3-800 (board revision 2):** Operates in a normal range of ambient temperatures between 0°C ~ +60°C
- **WAFER-LX3-800W (board revision 2):** Operates in a wide range of ambient temperatures between -20°C ~ +85°C

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.

2.7.2 Power Consumption

Table 2-3 shows the power consumption parameters for the WAFER-LX3 running with an AMD Geode™ LX 800 CPU with 256 MB of onboard memory.

Voltage	Current
+5.0V	1.34A

Table 2-3: Power Consumption

Chapter

3

Unpacking

3.1 Anti-static Precautions



WARNING:

Failure to take ESD precautions during the installation of the WAFER-LX3 may result in permanent damage to the WAFER-LX3 and severe injury to the user.

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the WAFER-LX3. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the WAFER-LX3, 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-LX3, place it on an anti-static pad. This reduces the possibility of ESD damaging the WAFER-LX3.
- ***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-LX3 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-LX3 does not fall out of the box.
- Make sure all the components shown in Section 3.3 are present.

WAFER-LX3 3.5" Motherboard

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-LX3 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-LX3 is shipped with the following components:

Quantity	Item and Part Number	Image
1	WAFER-LX3-800	
1	IDE 44p/44p flat cable (P/N: 32200-000009-RS)	
1	Dual RS-232/422/485 cable (P/N:32200-026500-RS)	
1	KB/MS PS/2 Y-cable (P/N: 32000-023800-RS)	






4	Dual USB cable (wo bracket) (P/N: 32000-070300-RS)	
1	Audio cable (P/N: 32000-072100-RS)	
1	Mini jumper pack (2.0mm) (P/N:33100-000033-RS)	
1	Quick Installation Guide	
1	Utility CD	

Table 3-1: Package List Contents

WAFER-LX3 3.5" Motherboard

3.4 Optional Items



<p>WAFER-LX3-800W</p>	
<p>WAFER-LX3-CE060</p> <p>Windows CE 6.0 image and board support package (BSP) software CD, Licensed sticker (without CPU board)</p>	
<p>WAFER-LX3-CE050</p> <p>Windows CE 5.0 image and board support package (BSP) software CD, Licensed sticker (without CPU board)</p>	
<p>WAFER-LX3-XPE</p> <p>Windows XP Embedded image and board support package (BSP) software CD, Licensed sticker (without CPU board)</p>	
<p>LPT cable (wo bracket)</p> <p>(P/N: 32200-015100-RS)</p>	

Table 3-2: Package List Contents



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Chapter

4

Connector Pinouts

4.1 Peripheral Interface Connectors

Section 0 shows peripheral interface connector locations. Section 0 lists all the peripheral interface connectors seen in Section 0.

4.1.1 WAFER-LX3 Layout

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

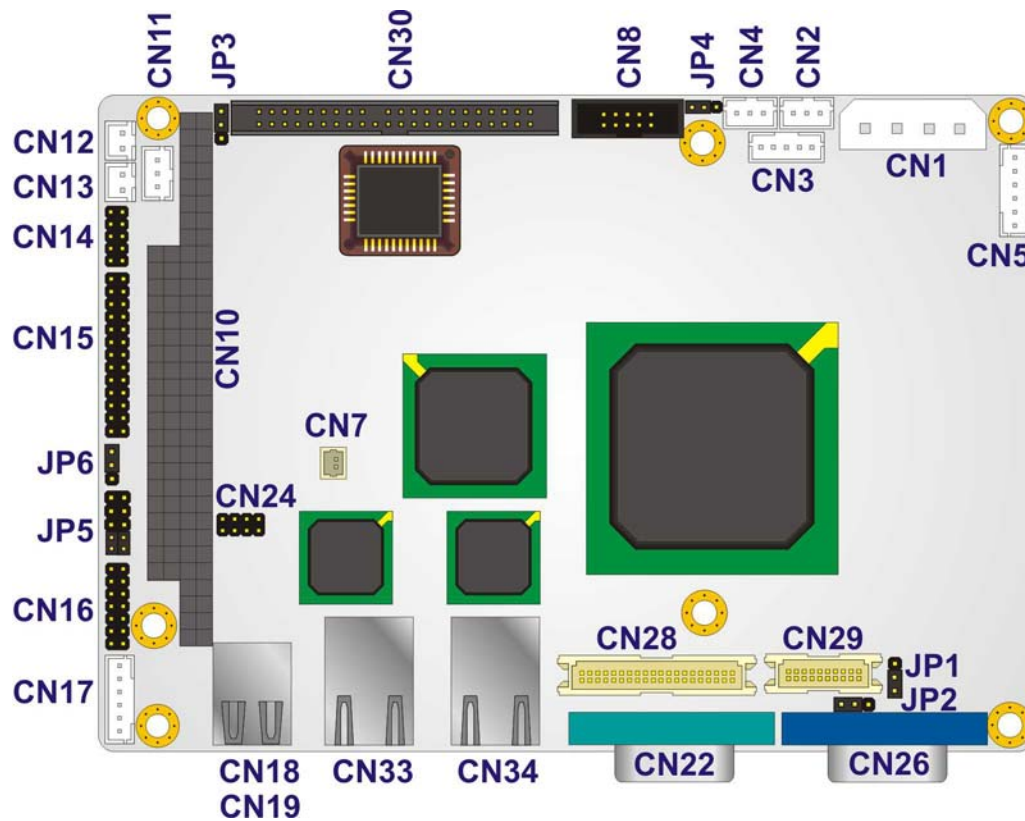


Figure 4-1: Connector and Jumper Locations

WAFER-LX3 3.5" Motherboard

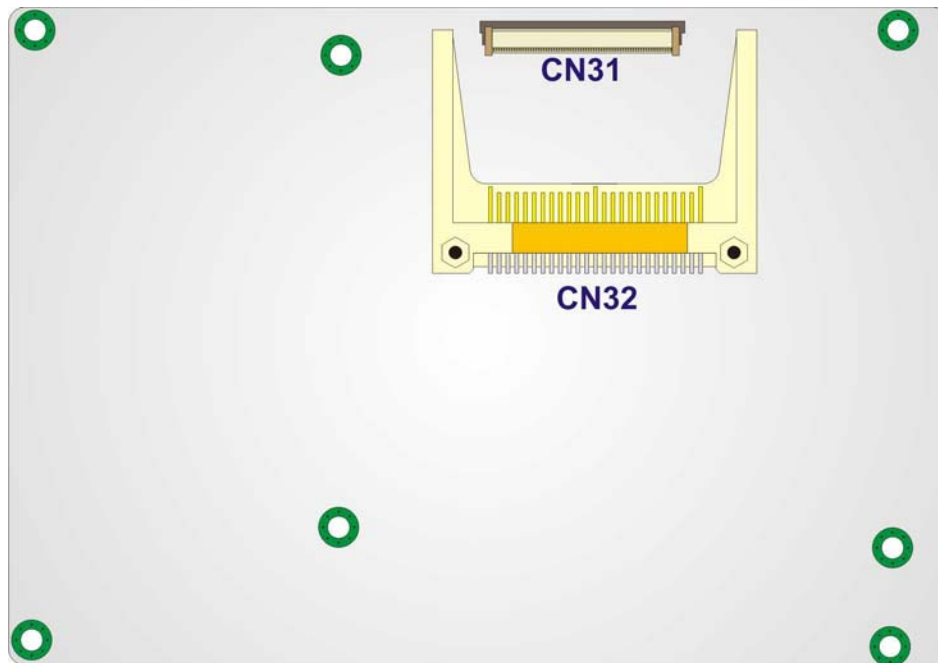


Figure 4-2: Connector and Jumper Locations (Solder Side)

4.1.2 Peripheral Interface Connectors

Table 4-1 shows a list of the peripheral interface connectors on the WAFER-LX3. Detailed descriptions of these connectors can be found below.

Connector	Type	Label
ATX power button connector	2-pin wafer	CN13
ATX power connector	4-pin ATX connector	CN1
Audio connector	10-pin box-header	CN8
ATX power supply enable connector	3-pin wafer	CN2
Backlight inverter connector	5-pin wafer	CN3
Battery connector	2-pin wafer	CN7
CF card connector	50-pin CF card slot	CN32
Fan connector	3-pin wafer	CN4

FDD connector	26-pin slim type	CN31
GPIO connector	10-pin header	CN14
HDD connector	44-pin box-header	CN30
Keyboard and mouse connector	6-pin header	CN17
LED connector	6-pin wafer	CN5
LVDS connector	20-pin crimp	CN29
Parallel port connector	26-pin header	CN15
PC/104 slot	104-pin PC/104 slot	CN10
PC/104 power input connector	3-pin wafer	CN11
Reset button connector	2-pin wafer	CN12
RS-232/422/485 serial port connector	14-pin header	CN16
TTL LCD connector	40-pin crimp	CN28
USB port connector	8-pin header	CN24

Table 4-1: Peripheral Interface Connectors

4.1.3 External Interface Panel Connectors

Table 4-2 lists the rear panel connectors on the WAFER-LX3. Detailed descriptions of these connectors can be found in **Section 4.2.17** on **page 69**.

Connector	Type	Label
Ethernet connector	RJ-45	CN33
Ethernet connector	RJ-45	CN34
RS-232 serial port connector	Male DB-9	CN22
USB connector	USB port	CN18
USB connector	USB port	CN19

WAFER-LX3 3.5" Motherboard

VGA connector	Female DB-15	CN26
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Table 4-2: Rear Panel Connectors

4.2 Internal Peripheral Connectors

Internal peripheral connectors are found on the motherboard and are only accessible when the motherboard is outside of the chassis. This section has complete descriptions of all the internal, peripheral connectors on the WAFER-LX3.

4.2.1 ATX Power Button Connector

- CN Label:** CN13
- CN Type:** 2-pin wafer (1x2)
- CN Location:** See **Figure 4-3**
- CN Pinouts:** See **Table 4-3**

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

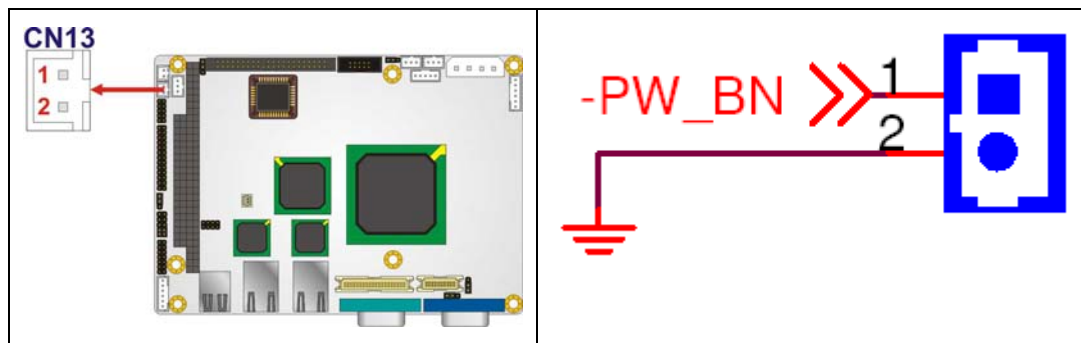


Figure 4-3: ATX Power Button Connector Location

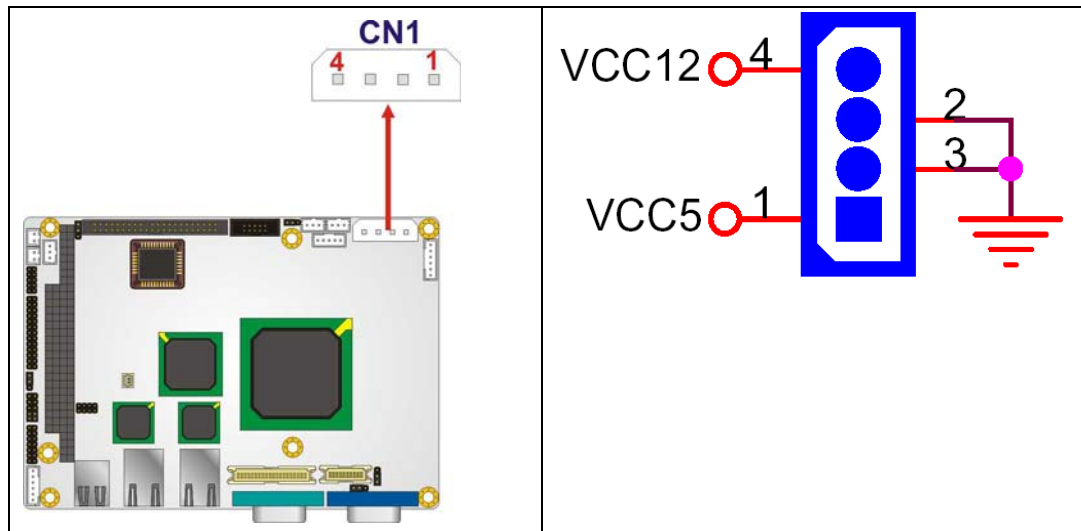
PIN NO.	DESCRIPTION
1	Power Switch
2	GND

Table 4-3: ATX Power Button Connector Pinouts

4.2.2 ATX Power Input Connector

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

The 4-pin ATX power input connector is connected to an ATX or AT power supply, which provides power to the system. If an ATX power supply is used, the ATX power supply enable connector (see below) and the ATX power button connector should both be connected. The AT/ATX mode select jumper should also be configured in ATX mode (see **Chapter 5**)


Figure 4-4: Main Power Input Connector Location

WAFER-LX3 3.5" Motherboard

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

Table 4-4: Main Power Input Connector Pinouts

4.2.3 ATX Power Supply Enable Connector

- CN Label:** CN2
- CN Type:** 3-pin wafer (1x3)
- CN Location:** See **Figure 4-5**
- CN Pinouts:** See **Table 4-5**

The ATX power supply enable connector enables the WAFER-LX3 to be connected to an ATX power supply. In default mode, the WAFER-LX3 can only use an AT power supply. To enable an ATX power supply the AT Power Select jumper must also be configured. Please refer to **Chapter 5** for more details.

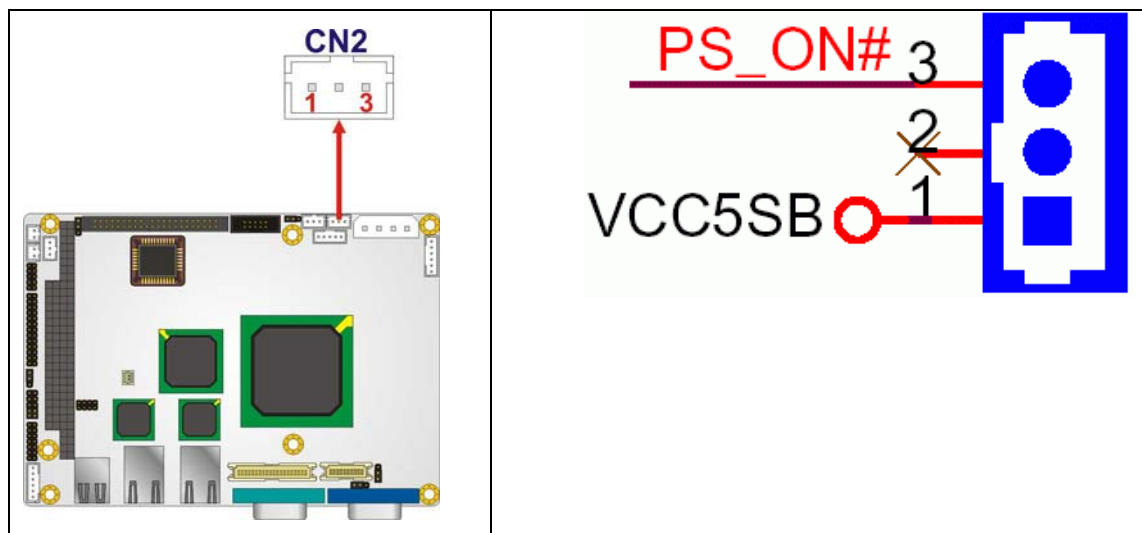


Figure 4-5: ATX Power Supply Enable Connector Location

PIN NO.	DESCRIPTION
1	+5VSB
2	NC
3	PSON#

Table 4-5: ATX Power Supply Enable Connector Pinouts

4.2.4 Audio Connector (10-pin)

- CN Label:** CN8
- CN Type:** 10-pin box-header
- CN Location:** See **Figure 4-6**
- CN Pinouts:** See **Table 4-6**

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

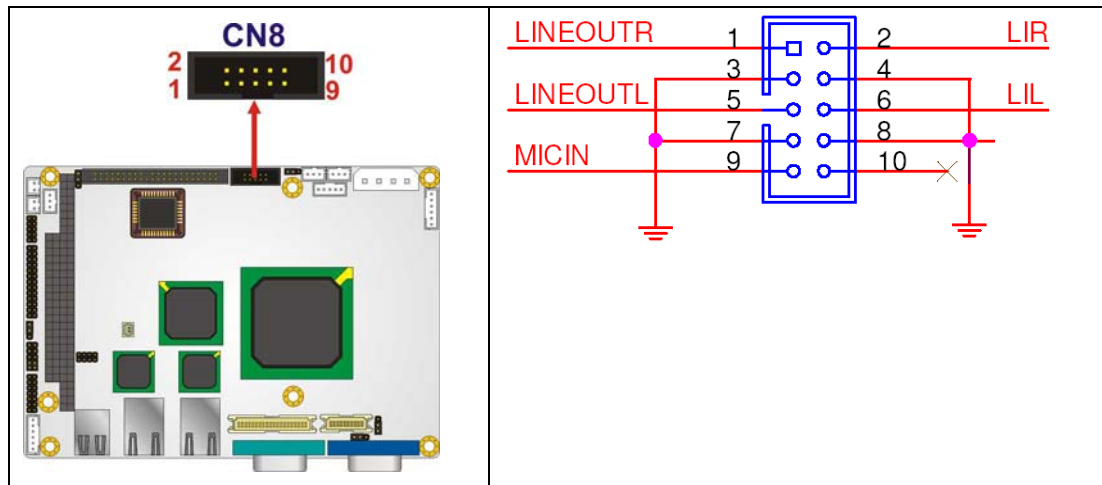


Figure 4-6: Audio Connector Pinouts (10-pin)

WAFER-LX3 3.5" Motherboard

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

Table 4-6: Audio Connector Pinouts (10-pin)

4.2.5 Backlight Inverter Connector

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

The backlight inverter connector provides the backlight on the LCD display connected to the WAFER-LX3 with +12V of power.

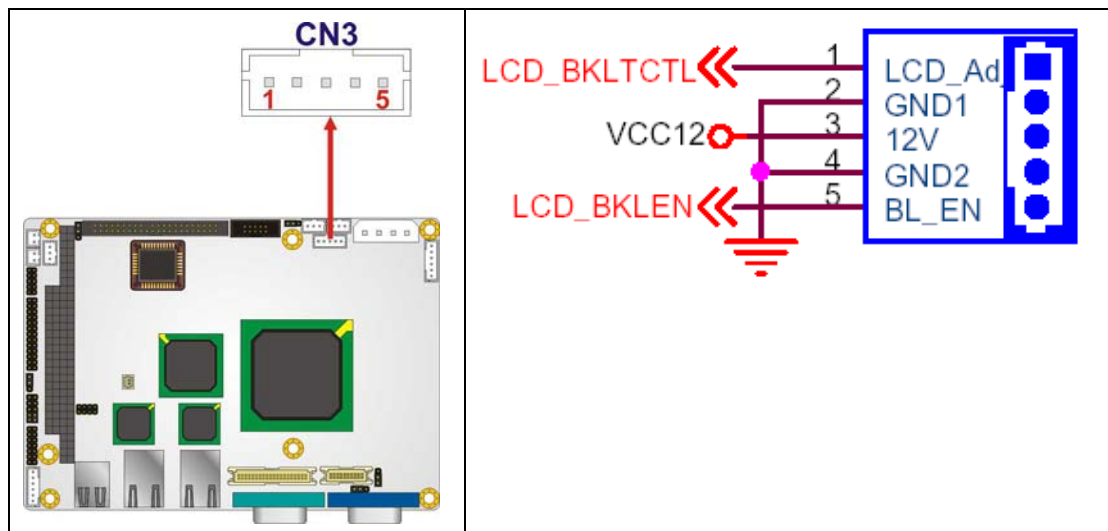


Figure 4-7: Panel Backlight Connector Pinout Locations

PIN NO.	DESCRIPTION
1	LCD_Adj
2	GROUND
3	+12V
4	GROUND
5	BACKLIGHT ENABLE

Table 4-7: Panel Backlight Connector Pinouts

4.2.6 Battery Connector

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

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

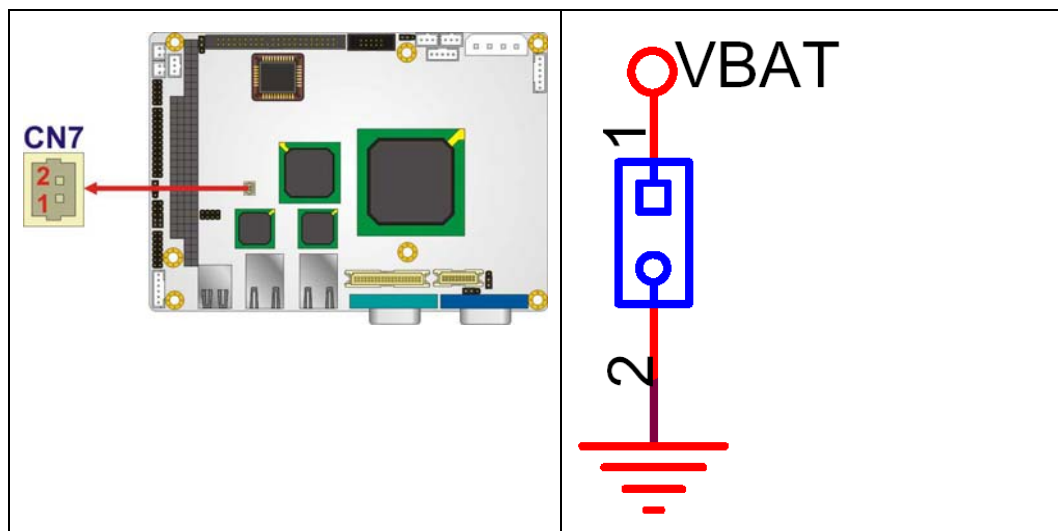


Figure 4-8: Battery Connector Location

WAFER-LX3 3.5" Motherboard

PIN NO.	DESCRIPTION
1	Battery+
2	Ground

Table 4-8: Battery Connector Pinouts

4.2.7 CompactFlash® Socket

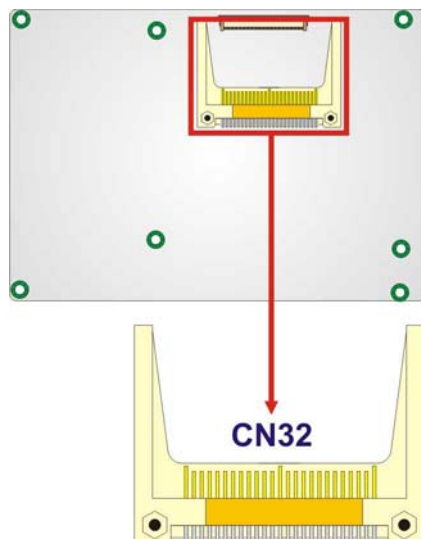
CN Label: CN32 (solder side)

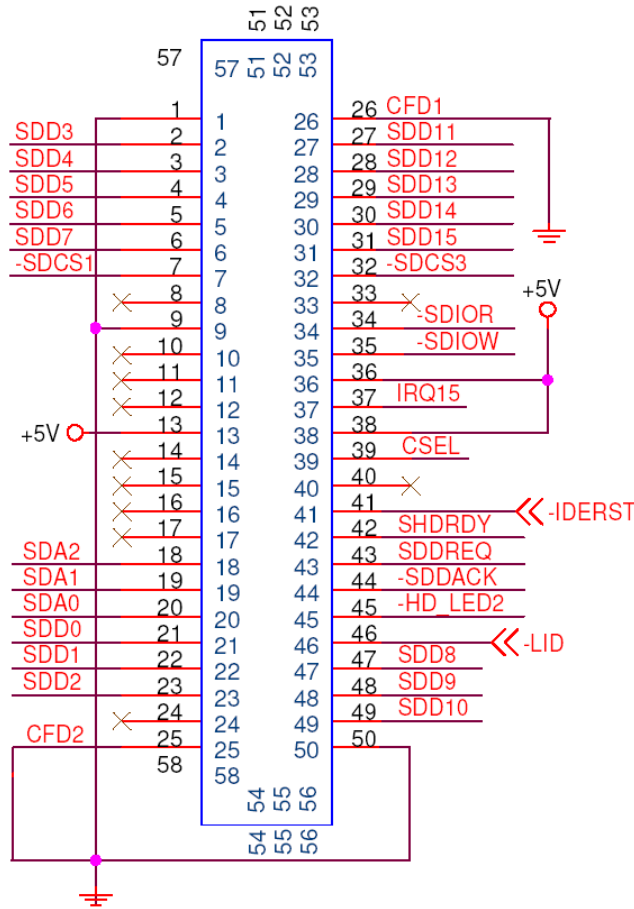
CN Type: 50-pin header (2x25)

CN Location: See Figure 4-9

CN Pinouts: See Table 4-9

A CF Type I or Type II memory card is inserted to the CF socket on the solder side of the WAFER-LX3.




Figure 4-9: CF Card Socket Location

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#

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10	N/C	35	IOW#
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: CF Card Socket Pinouts

4.2.8 Fan Connector (+5V, 3-pin)

- CN Label:** CN4
- CN Type:** 3-pin wafer
- CN Location:** See **Figure 4-10**
- CN Pinouts:** See **Table 4-10**

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

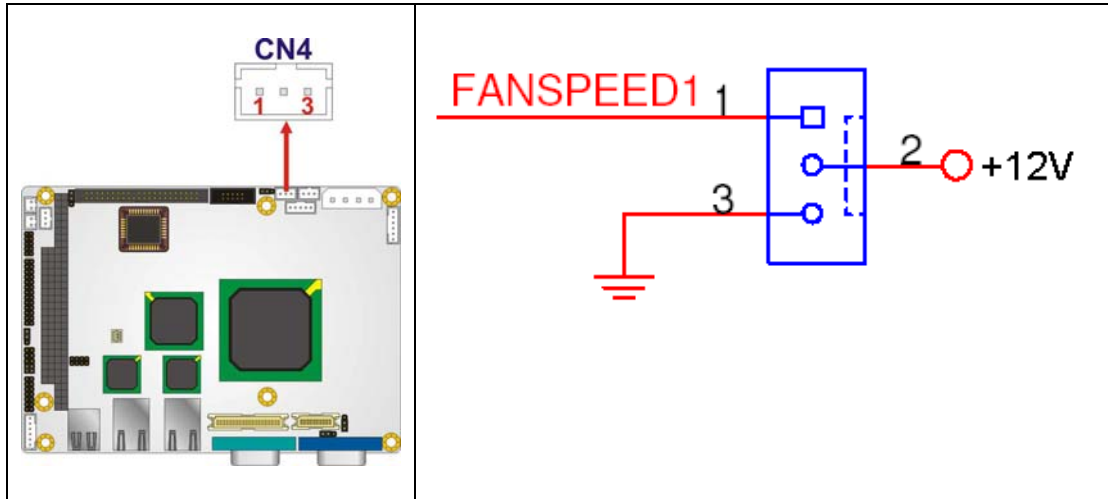


Figure 4-10: +5V Fan Connector Location

PIN NO.	DESCRIPTION
1	Fan Speed Detect
2	+12V
3	GND

Table 4-10: +5V Fan Connector Pinouts

4.2.9 Floppy Disk Connector (26-pin)

- CN Label:** CN31 (solder side)
- CN Type:** 26-pin slim-type (1 x 26)
- CN Location:** See Figure 4-11
- CN Pinouts:** See Table 4-11

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

WAFER-LX3 3.5" Motherboard

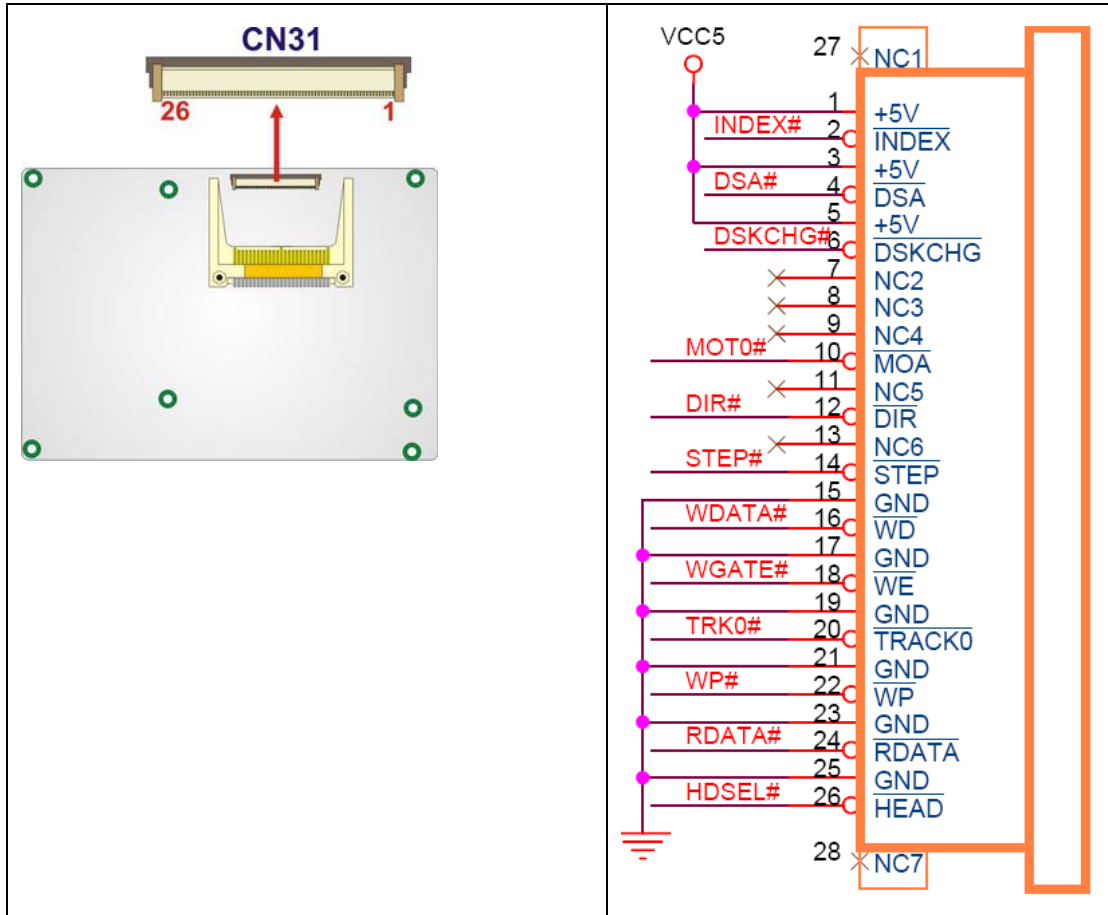


Figure 4-11: 26-Pin FDD Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	+5V	14	STEP#
2	INDEX#	15	GND
3	+5V	16	WDATA#
4	DSA#	17	GND
5	+5V	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#

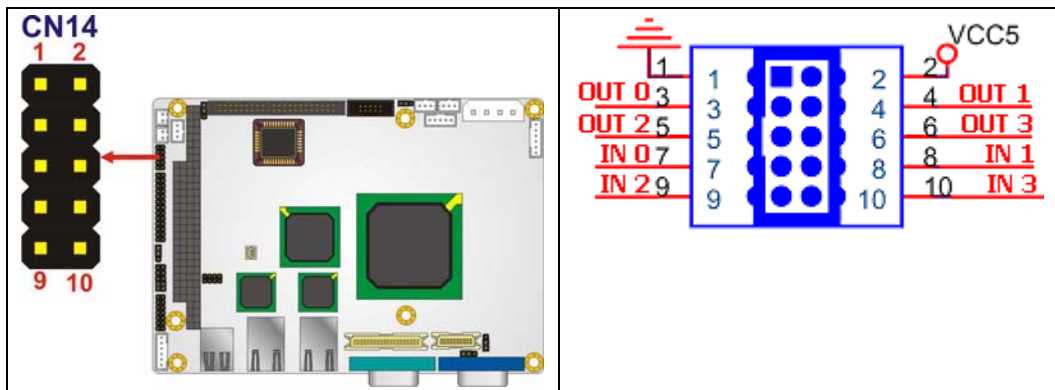
12	DIR#	25	GND
13	NC	26	HEAD#

Table 4-11: 26-pin FDD Connector Pinouts

4.2.10 GPIO Connector

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

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


Figure 4-12: GPIO Connector Pinout Locations

WAFER-LX3 3.5" Motherboard

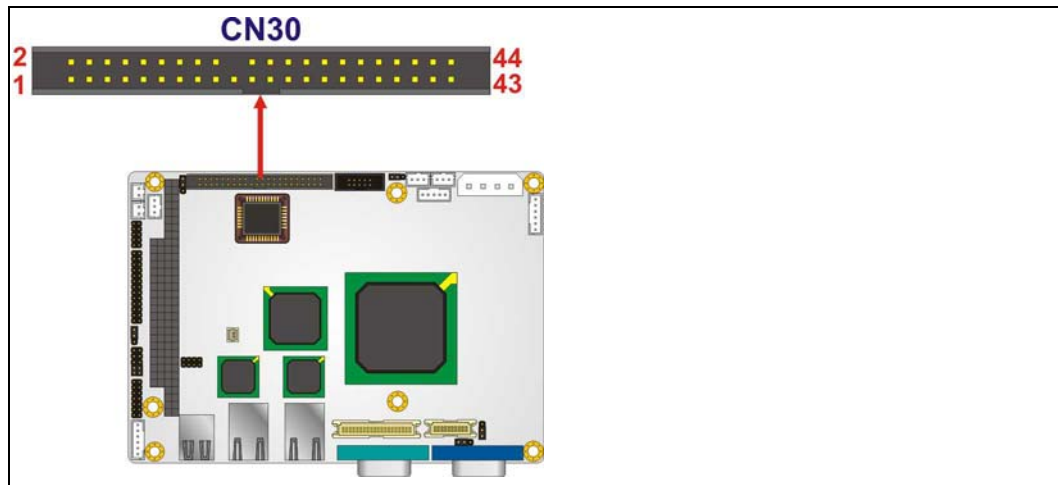
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GND	2	VCC5
3	OUT 0	4	OUT 1
5	OUT 2	6	OUT 3
7	IN 0	8	IN 0
9	IN 1	10	IN 3

Table 4-12: GPIO Connector Pinouts

4.2.11 HDD Connector(44-pin)

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

One 44-pin IDE device connector on the WAFER-LX3 supports connectivity to two hard disk drives.



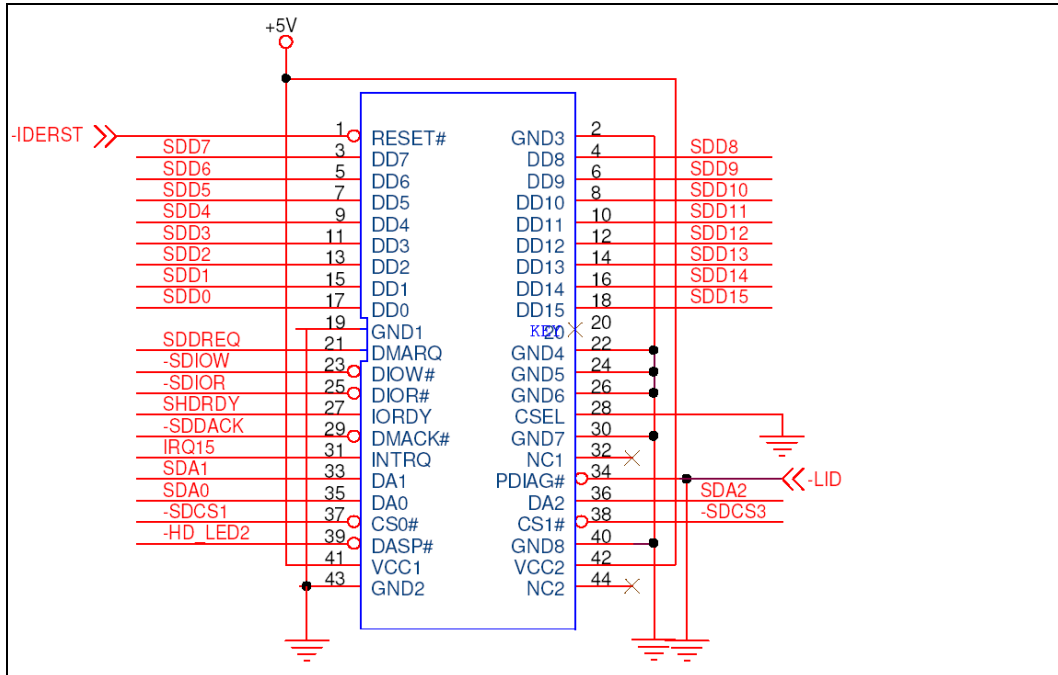


Figure 4-13: Secondary IDE Device Connector Locations

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	RESET#	2	GROUND
3	DATA 7	4	DATA 8
5	DATA 6	6	DATA 9
7	DATA 5	8	DATA 10
9	DATA 4	10	DATA 11
11	DATA 3	12	DATA 12
13	DATA 2	14	DATA 13
15	DATA 1	16	DATA 14
17	DATA 0	18	DATA 15
19	GROUND	20	N/C
21	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

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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

4.2.12 Keyboard/Mouse Connector

- CN Label:** CN17
- CN Type:** 6-pin header (1x6)
- CN Location:** See **Figure 4-14**
- CN Pinouts:** See **Table 4-14**

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.

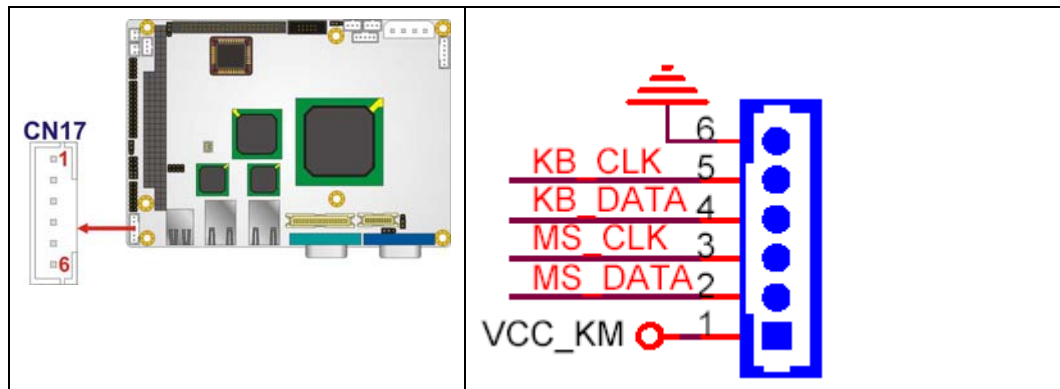


Figure 4-14: Keyboard/Mouse Connector Location

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

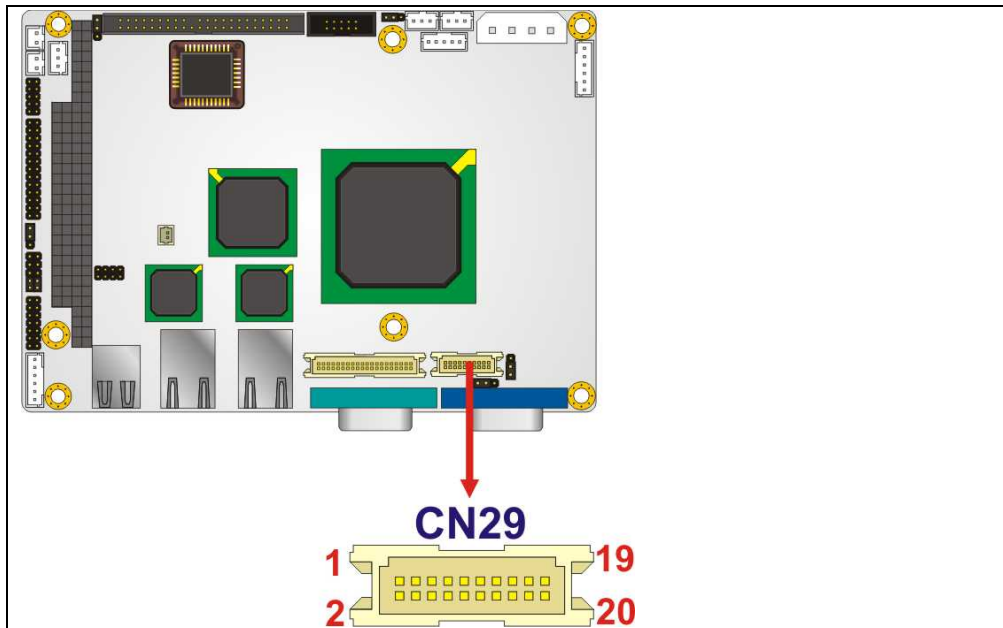
4	KB DATA
5	KB CLK
6	GROUND

Table 4-14: Keyboard/Mouse Connector Pinouts

4.2.13 LCD LVDS Connector

- CN Label:** CN29
- CN Type:** 20-pin crimp (2x10)
- CN Location:** See **Figure 4-15**
- CN Pinouts:** See **Table 4-15**

The 20-pin LCD LVDS can be connected to a single-channel LCD screen.



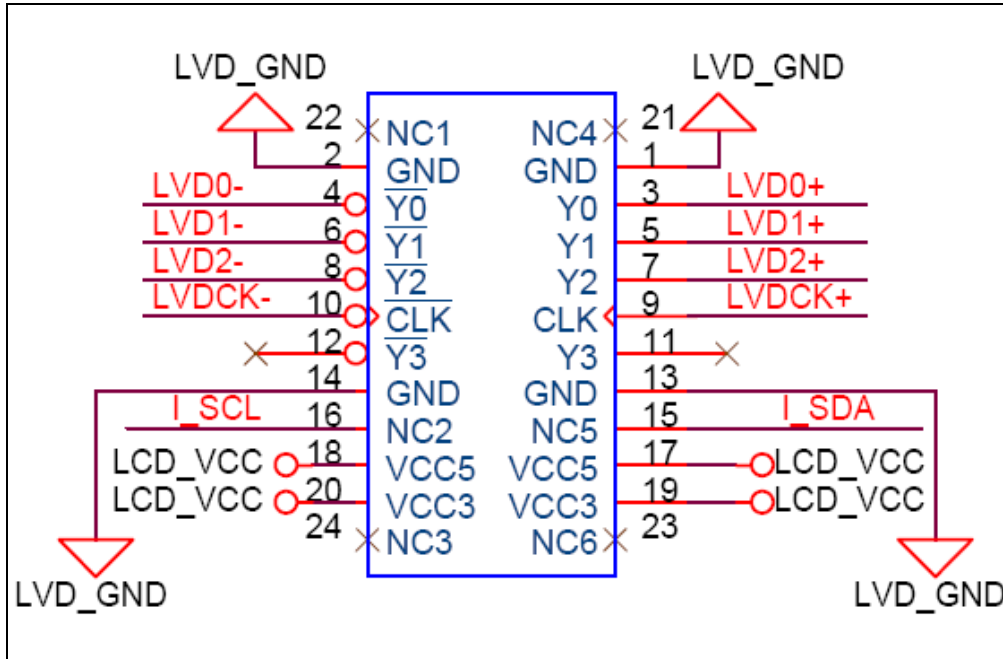


Figure 4-15: TFT LCD LVDS Connector Pinout Locations

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	MB_SCL/I_SCL	16	SMB_SDA/I_SDA
17	LCD_Vcc	18	LCD_Vcc
19	LCD_Vcc	20	LCD_Vcc

Table 4-15: LCD LVDS Port Connector Pinouts

4.2.14 LED Connector

CN Label: CN5

CN Type: 6-pin wafer (1x6)

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

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

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

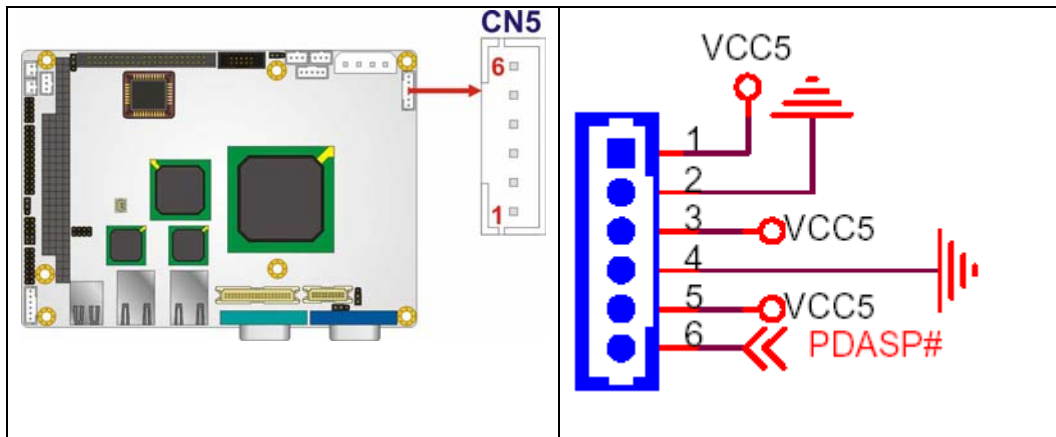


Figure 4-16: LED Connector Locations

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

Table 4-16: LED Connector Pinouts

4.2.15 Print Connector

CN Label: CN15

CN Type: 26-pin box header

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

WAFER-LX3 3.5" Motherboard

CN Pinouts: See Table 4-17

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

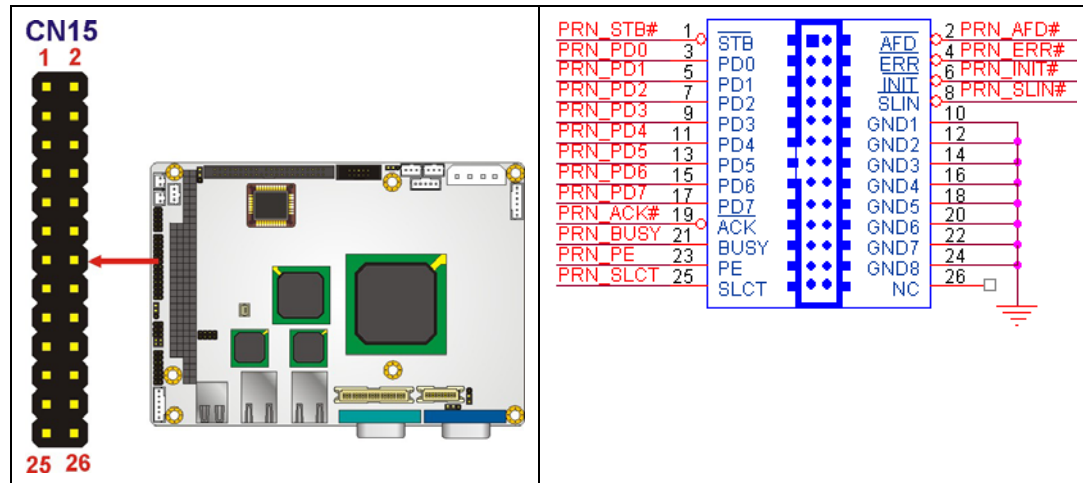


Figure 4-17: Parallel Port Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	STROBE#	2	AUTO FORM FEED #
3	DATA 0	4	ERROR#
5	DATA 1	6	INITIALIZE
7	DATA 2	8	PRINTER SELECT LN#
9	DATA 3	10	GROUND
11	DATA 4	12	GROUND
13	DATA 5	14	GROUND
15	DATA 6	16	GROUND
17	DATA 7	18	GROUND
19	ACKNOWLEDGE	20	GROUND

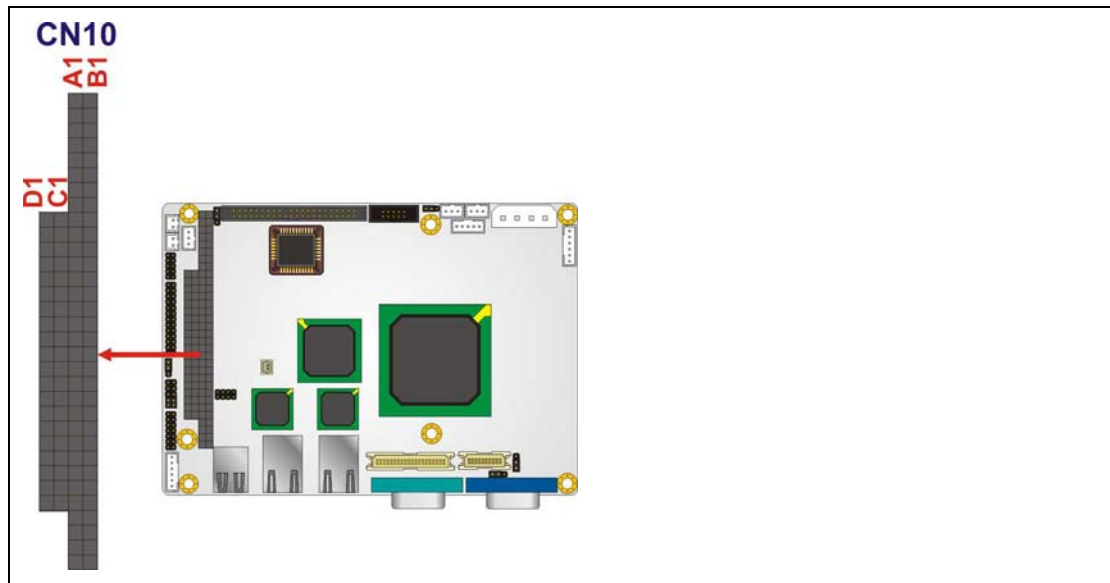
21	BUSY	22	GROUND
23	PAPER EMPTY	24	GROUND
25	PRINTER SELECT	26	N/C

Table 4-17: Parallel Port Connector Pinouts

4.2.16 PC/104 Slot

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

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



WAFER-LX3 3.5" Motherboard

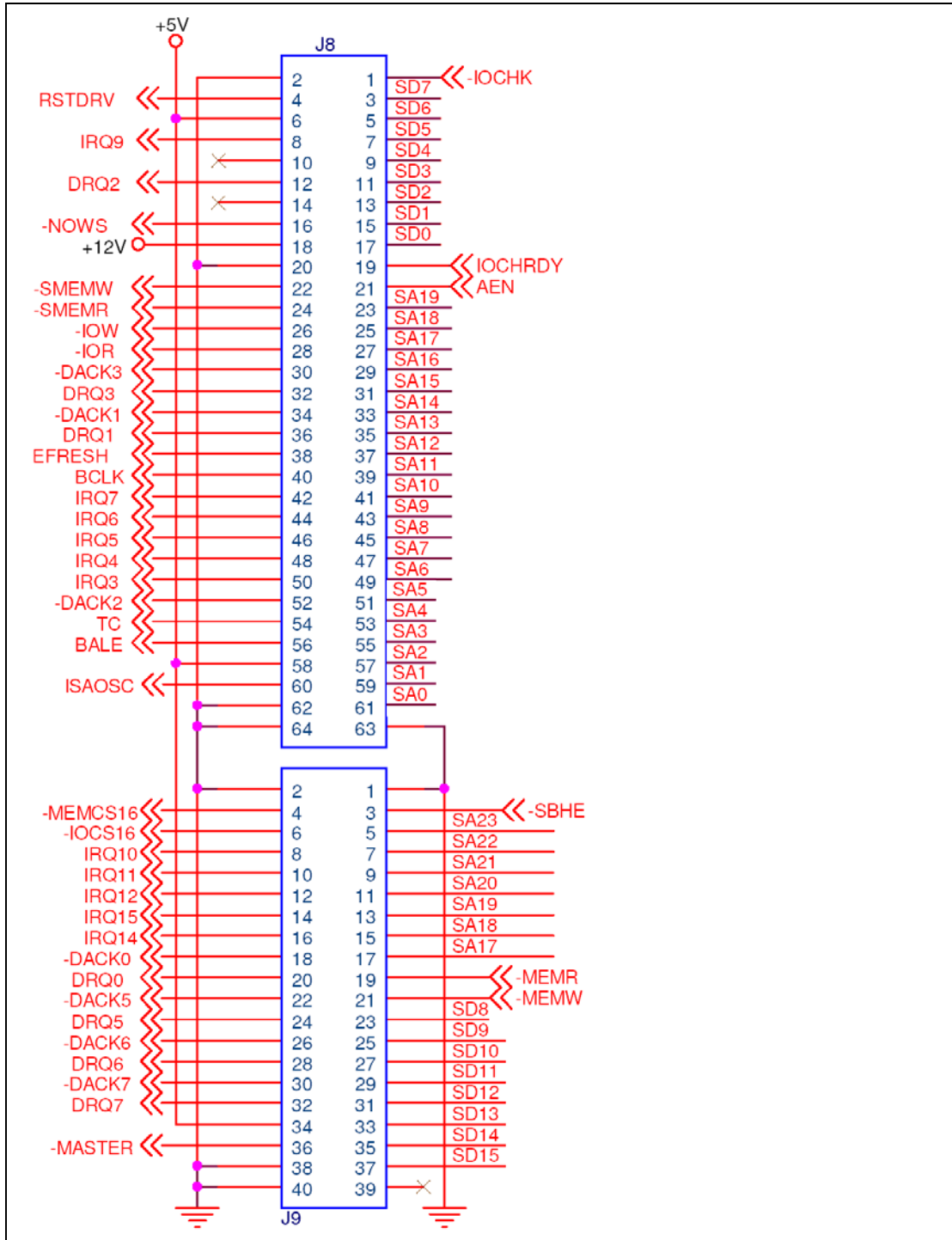


Figure 4-18: PC/104 Slot Location

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

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30	SA1	ISA_OSC		
31	SA0	GROUND		
32	GROUND	GROUND		

Table 4-18: PC/104 Slot Connector Pinouts

4.2.17 PC/104 Power Input Connector

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

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

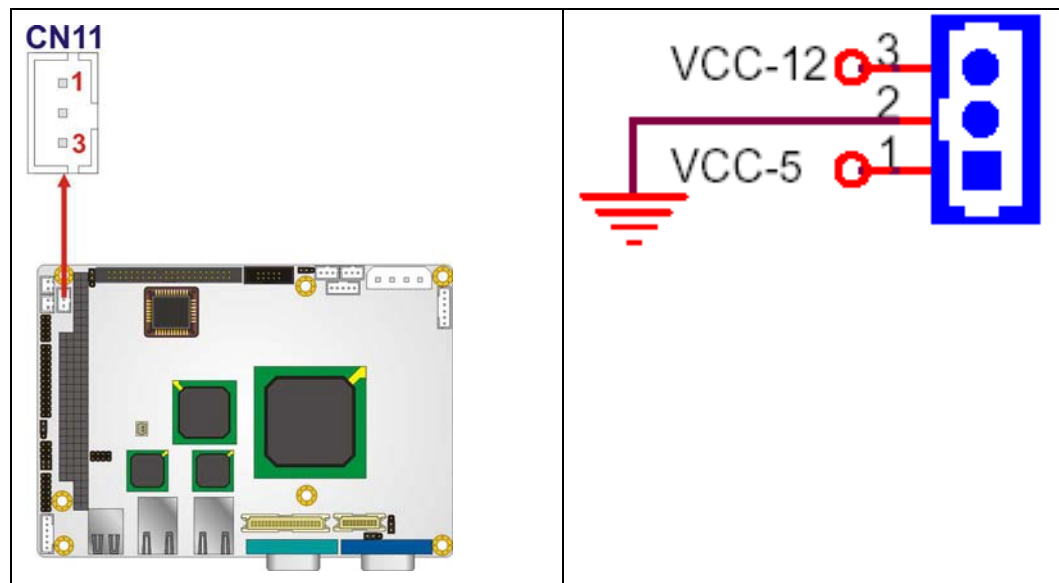


Figure 4-19: PC/104 Power Input Connector Pinouts

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

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

4.2.18 Reset Button Connector

- CN Label:** CN12
- CN Type:** 2-pin wafer (1x2)
- CN Location:** See **Figure 4-20**
- CN Pinouts:** See **Table 4-20**

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

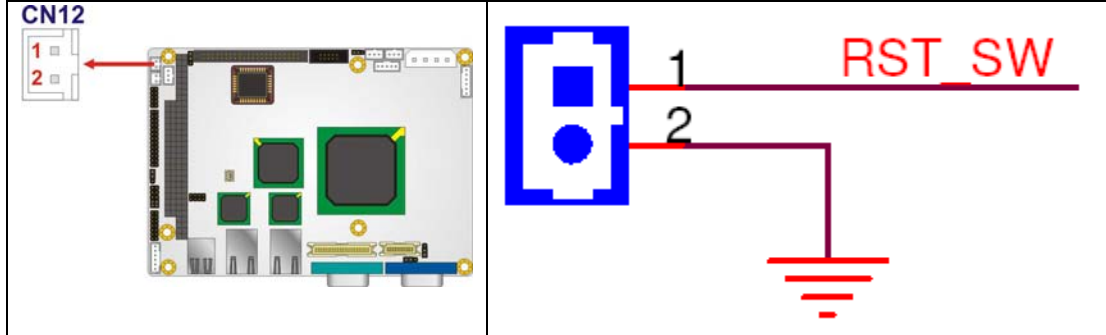


Figure 4-20: Reset Button Connector Locations

PIN NO.	DESCRIPTION
1	Reset Switch
2	GND

Table 4-20: Reset Button Connector Pinouts

WAFER-LX3 3.5" Motherboard

4.2.19 Serial Port Connector (COM 2)(RS-232, RS-422 or RS-485)

- CN Label:** CN16
- CN Type:** 14-pin header (2x7)
- CN Location:** See **Figure 4-21**
- CN Pinouts:** See **Table 4-21**

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

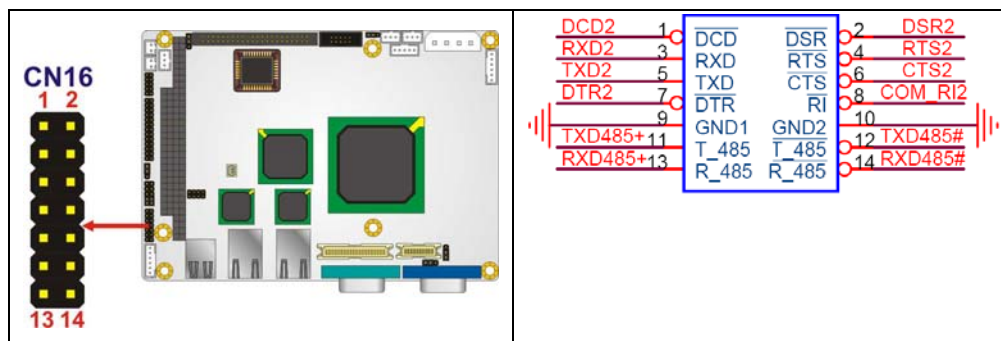


Figure 4-21: RS-232/422/485 Serial Port Connector Location

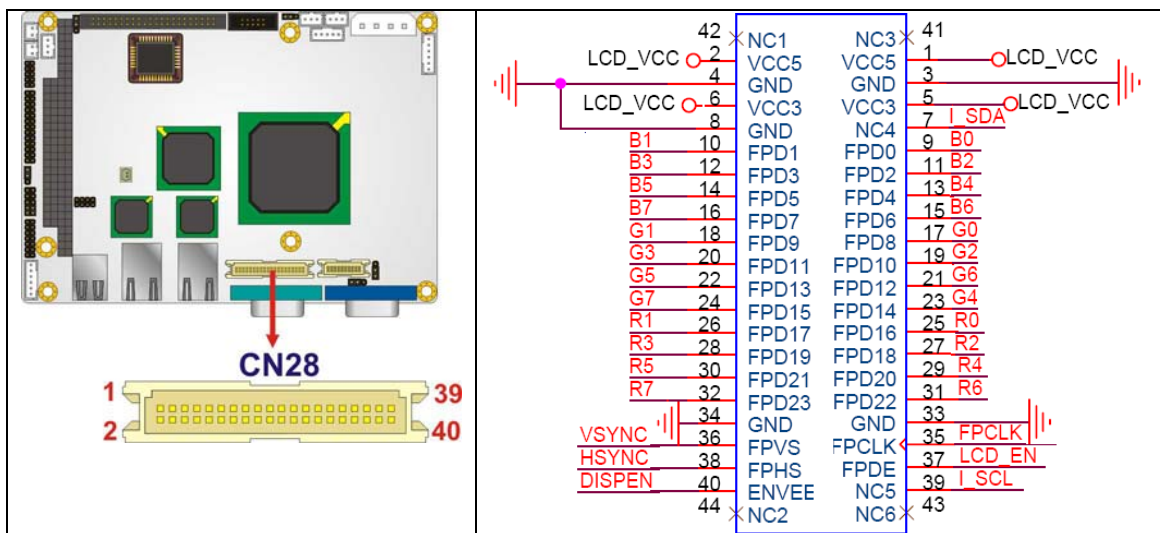
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	DCD	2	NDSR2
3	RXD	4	NRTS2
5	TXD	6	NCTS2
7	DTR	8	NRI2
9	GND	10	GND
11	TXD85+	12	TXD485#
13	RXD85+	14	RXD485#

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

4.2.20 TFT LCD Connector

- CN Label:** CN28
- CN Type:** 40-pin crimp (2x20)
- CN Location:** See **Figure 4-22**
- CN Pinouts:** See **Table 4-22**

The 40-pin TFT LCD connector can be connected to an LCD panel directly.


Figure 4-22: TFT LCD Connector Pinout Locations

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PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	VCC_FP	2	VCC_FP
3	GROUND	4	GROUND
5	VCC_FP	6	VCC_FP
7	I_SDA	8	GROUND
9	B0	10	B1
11	B2	12	B3
13	B4	14	B5
15	B6	16	B7
17	G0	18	G1
19	G2	20	G3
21	G4	22	G5
23	G6	24	G7
25	R0	26	R1
27	R2	28	R3
29	R4	30	R5
31	R6	32	R7
33	GROUND	34	GROUND
35	FPCLK	36	FPVS
37	FPDEN	38	FPHS
39	I_SCL	40	ENVEE

Table 4-22: TFT LCD Port Connector Pinouts

4.2.21 USB Connector (Internal)

- CN Label:** CN24
- CN Type:** 8-pin header (2x4)
- CN Location:** See **Figure 4-23**
- CN Pinouts:** See **Table 4-23**

The 2x4 USB pin connector provides connectivity to two USB 1.1 or two USB 2.0 ports. The USB connector supports two USB devices. Additional external USB ports are found on the rear panel. The USB ports are used for I/O bus expansion.

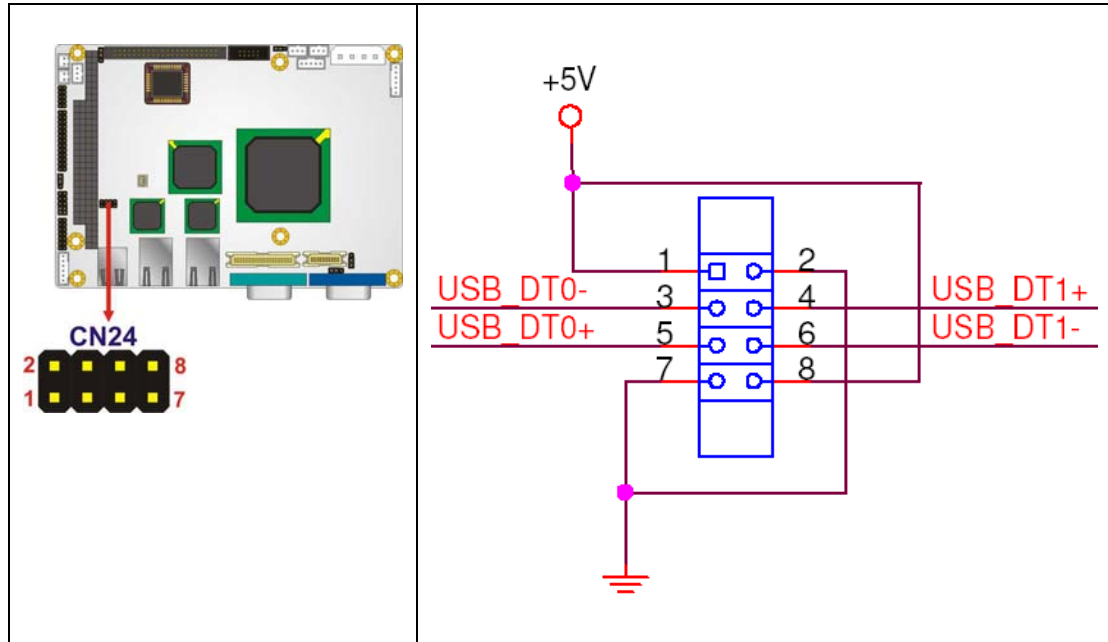


Figure 4-23: USB Connector Pinout Locations

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	VCC	2	GND
3	DATAN-	4	DATA1M-
5	DATAN+	6	DATAM+
7	GND	8	VCC

Table 4-23: USB Port Connector Pinouts

4.3 External Peripheral Interface Connector Panel

Figure 4-24 shows the WAFER-LX3 external peripheral interface connector (EPIC) panel.

The WAFER-LX3 EPIC panel consists of the following:

- 2 x RJ-45 Ethernet connectors
- 1 x DB-9 RS-232 serial port connector
- 2 x USB connectors

WAFER-LX3 3.5" Motherboard

- 1 x VGA connector

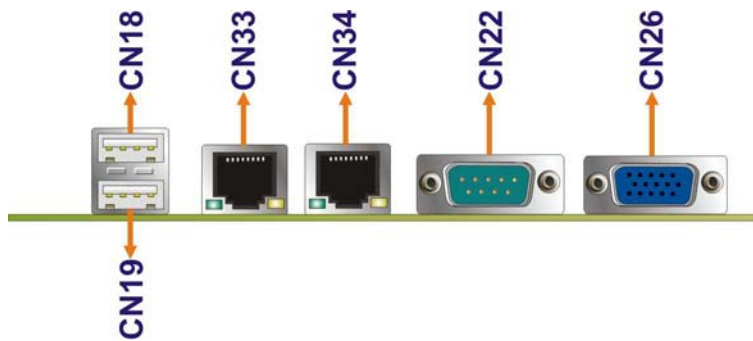


Figure 4-24: WAFER-LX3 External Peripheral Interface Connector

4.3.1 LAN Connectors

CN Label: CN33 and CN34

CN Type: RJ-45

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

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

The WAFER-LX3 is equipped with two built-in RJ-45 Ethernet controllers. The controllers can connect to the LAN through two RJ-45 LAN connectors. There are two LEDs on the connector indicating the status of LAN. The pin assignments are listed in the following table:

PIN	DESCRIPTION	PIN	DESCRIPTION
1	TXA+	5	TXC-
2	TXA-	6	TXB-
3	TXB+	7	TXD+
4	TXC+	8	TXD-

Table 4-24: LAN Pinouts

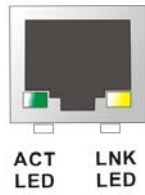


Figure 4-25: RJ-45 Ethernet Connector

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. See **Table 4-25**.

STATUS	DESCRIPTION	STATUS	DESCRIPTION
Green	Activity	YELLOW	Linked

Table 4-25: RJ-45 Ethernet Connector LEDs

4.3.2 Serial Port Connectors (COM1, COM3 and COM4)

- CN Label:** CN22
- CN Type:** DB-9 connectors
- CN Location:** See **Figure 4-24** (see 2)
- CN Pinouts:** See **Table 4-26** and **Figure 4-26**

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

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PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	DCD	6	DSR
2	RX	7	RTS
3	TX	8	CTS
4	DTR	9	RI
5	GND		

Table 4-26: RS-232 Serial Port (COM 1) Pinouts

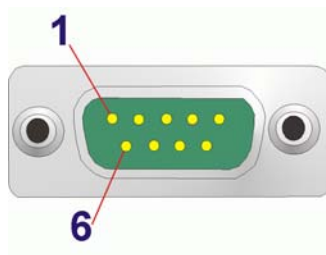


Figure 4-26: COM1 Pinout Locations

4.3.3 USB Connector

CN Label: CN18 and CN19

CN Type: USB port

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

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

The WAFER-LX3 has four external USB 2.0 ports. The ports connect to both USB 2.0 and USB 1.1 devices.

PIN NO.	DESCRIPTION
1	GND
2	USB_P
4	USB_N
4	USB_5V

Table 4-27: USB Port Pinouts

4.3.4 VGA Connector

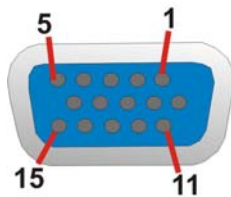
CN Label: CN26

CN Type: 15-pin Female

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

CN Pinouts: See **Figure 4-27** and **Table 4-28**

The WAFER-LX3 has a single 15-pin female connector for connectivity to standard display devices.


Figure 4-27: VGA Connector

PIN	DESCRIPTION	PIN	DESCRIPTION
1	RED	2	GREEN
3	BLUE	4	NC
5	GND	6	GND
7	GND	8	GND
9	VCC / NC	10	GND
11	NC	12	DDC DAT

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PIN	DESCRIPTION	PIN	DESCRIPTION
13	HSYNC	14	VSYNC
15	DDCCLK		

Table 4-28: VGA Connector Pinouts



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Chapter

5

Installation

5.1 Anti-static Precautions



WARNING:

Failure to take ESD precautions during the installation of the WAFER-LX3 may result in permanent damage to the WAFER-LX3 and severe injury to the user.

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the WAFER-LX3. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the WAFER-LX3, 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-LX3, place it on an anti-static pad. This reduces the possibility of ESD damaging the WAFER-LX3.
- ***Only handle the edges of the PCB:-:*** When handling the PCB, hold the PCB by the edges.

5.2 Installation Considerations



NOTE:

The following installation notices and installation considerations should be read and understood before the WAFER-LX3 is installed. All installation notices pertaining to the installation of the WAFER-LX3 should be strictly adhered to. Failing to adhere to these precautions may lead to severe damage of the WAFER-LX3 and injury to the person installing the motherboard.

5.2.1 Installation Notices



WARNING:

The installation instructions described in this manual should be carefully followed in order to prevent damage to the WAFER-LX3, WAFER-LX3 components and injury to the user.

Before and during the installation please **DO** the following:

- Read the user manual:
 - The user manual provides a complete description of the WAFER-LX3 installation instructions and configuration options.
- Wear an electrostatic discharge cuff (ESD):
 - Electronic components are easily damaged by ESD. Wearing an ESD cuff removes ESD from the body and helps prevent ESD damage.
- Place the WAFER-LX3 on an antistatic pad:
 - When installing or configuring the motherboard, place it on an antistatic pad. This helps to prevent potential ESD damage.
- Turn all power to the WAFER-LX3 off:

- When working with the WAFER-LX3, 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-LX3 **DO NOT:**

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

5.2.2 Installation Checklist

The following checklist is provided to ensure the WAFER-LX3 is properly installed.

- All the items in the packing list are present
- The CPU is installed
- The CPU cooling kit is properly installed
- A compatible memory module is properly inserted into the slot
- The CF Type I or CF Type II card is properly installed into the CF socket
- The jumpers have been properly configured
- The WAFER-LX3 is inserted into a chassis with adequate ventilation
- The correct power supply is being used
- The following devices are properly connected
 - Keyboard and mouse cable
 - Audio kit
 - Power supply
 - USB cable
 - Serial port cable
- The following external peripheral devices are properly connected to the chassis:
 - VGA screen
 - USB devices
 - LAN

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5.3 Unpacking

5.3.1 Unpacking Precautions

When the WAFER-LX3 is unpacked, please do the following:

- Follow the anti-static precautions outlined in Section 5.1.
- Make sure the packing box is facing upwards so the WAFER-LX3 does not fall out of the box.
- Make sure all the components in the checklist shown in **Chapter 3** are present.



NOTE:

If some of the components listed in the checklist in **Chapter 3** are missing, please do not proceed with the installation. Contact the IEI reseller or vendor you purchased the WAFER-LX3 from or contact an IEI sales representative directly. To contact an IEI sales representative, please send an email to sales@iei.com.tw.

5.3.2 CF Card Installation



NOTE:

The WAFER-LX3 can support both CF Type I cards and CF Type II cards. For the complete specifications of the supported CF cards please refer to **Chapter 2**.

To install the a CF card (Type 1 or Type 2) onto the WAFER-LX3, please follow the steps below:

- Step 1:** **Locate the CF card socket.** Place the WAFER-LX3 on an anti-static pad with the solder side facing up. Locate the CF card.

Step 2: Align the CF card. Make sure the CF card is properly aligned with the CF socket.

Step 3: Insert the CF card. Gently insert the CF card into the socket making sure the socket pins are properly inserted into the socket. See **Figure 5-1**.

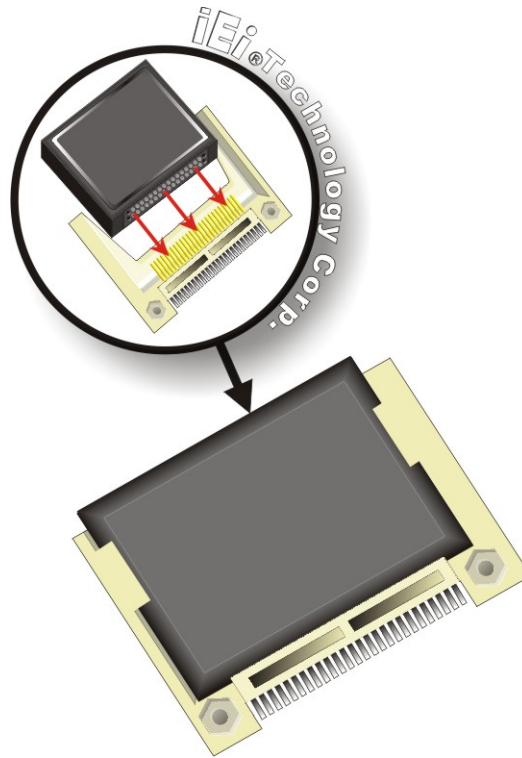


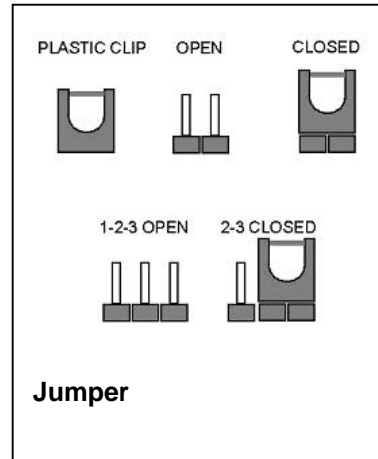
Figure 5-1: CF Card Installation

5.4 Jumper Settings



NOTE:

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



Before the WAFER-LX3 is installed in the system, the jumpers must be set in accordance with the desired configuration. The jumpers on the WAFER-LX3 are listed in **Table 5-1**.

Description	Label	Type
AT/ATX Power Mode Select	JP3	3-pin header
Compact Flash Mode Select	JP4	3-pin header
Clear CMOS connector	CN7	2-pin wafer
COM1 & COM2 RI and Voltage Selection	JP1	10-pin header
LCD Panel Shift Clock Setting	JP1	3-pin header
LCD Panel Voltage Select	JP2	3-pin header
RS-422/485 Mode Select	JP6	3-pin header

Table 5-1: Jumpers

5.4.1 AT Power Select Jumper Settings

- Jumper Label:** JP3
- Jumper Type:** 3-pin header
- Jumper Settings:** See Table 5-2
- Jumper Location:** See Figure 5-2

The AT Power Select jumper specifies the systems power mode as AT or ATX. AT Power Select jumper settings are shown in Table 5-2.

AT Power Select	Description	
Short 1-2	Use AT power	Default
Short 2-3	Use ATX power	

Table 5-2: AT Power Select Jumper Settings

The location of the AT Power Select jumper is shown in Figure 5-2 below.

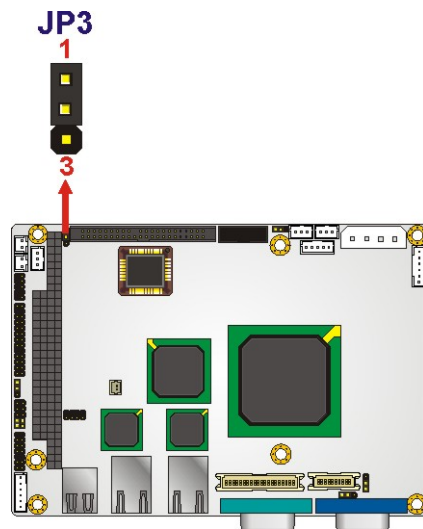


Figure 5-2: AT Power Select Jumper Location

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5.4.2 CF Card Setup

Jumper Label:	JP4
Jumper Type:	3-pin header
Jumper Settings:	See Table 5-3
Jumper Location:	See Figure 5-3

The CF Card Setup jumper sets the CF Type I card or CF Type II cards as either the slave device or the master device. CF Card Setup jumper settings are shown in **Table 5-3**.

CF Card Setup	Description	
Short 1-2	Master	
Short 2-3	Slave	Default

Table 5-3: CF Card Setup Jumper Settings

The CF Card Setup jumper location is shown in **Figure 5-3**.

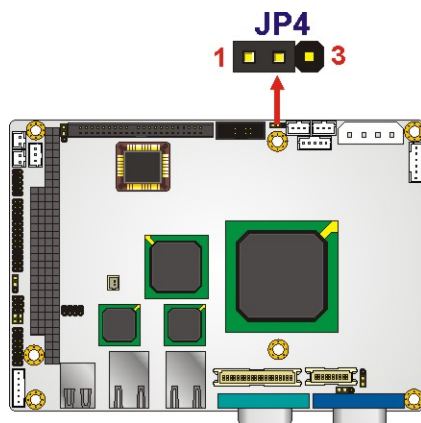


Figure 5-3: CF Card Setup Jumper Location

5.4.3 Clear CMOS Jumper

Jumper Label:	CN7
Jumper Type:	2-pin wafer

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

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

If the WAFER-LX3 fails to boot due to improper BIOS settings, the CMOS can be cleared using the battery connector. Disconnect the battery from the connector for a few seconds then reconnect the battery. The CMOS should be cleared.

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

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

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

The clear CMOS jumper settings are shown in **Table 5-4**.

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

Table 5-4: CN7 Clear CMOS Jumper Settings

The location of the clear CMOS jumper is shown in **Figure 5-4** below.

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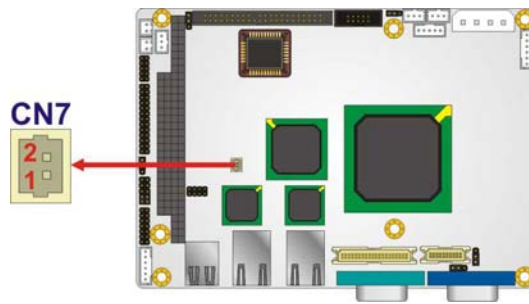


Figure 5-4: Clear CMOS Jumper

5.4.4 COM 1/2 Pin 9 Setting Jumper

Jumper Label:	JP5
Jumper Type:	10-pin header
Jumper Settings:	See Table 5-5
Jumper Location:	See Figure 5-5

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

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

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

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

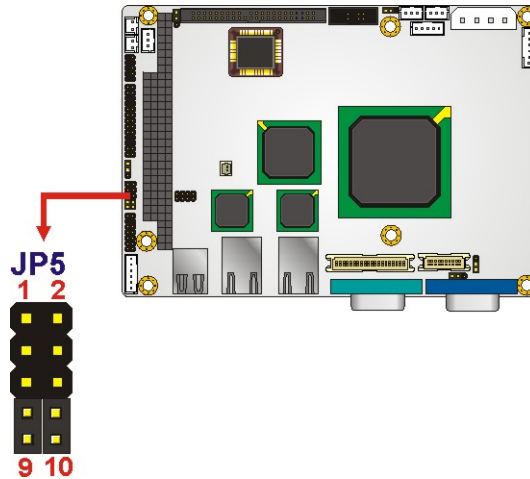


Figure 5-5: COM 1/2 Pin 9 Setting Jumper Location

5.4.5 LCD Panel Shift Clock Setting



WARNING:

Permanent damage to the screen and WAFER-LX3 may occur if the wrong polarity is set with this jumper. Please refer to the user guide that came with the monitor to select the correct polarity.

Jumper Label:	JP1
Jumper Type:	3-pin header
Jumper Settings:	See Table 5-6
Jumper Location:	See Figure 5-6

The **LCD Panel Shift Clock Setting** jumper allows the polarity of the LCD screen clock to be set. The **LCD Panel Shift Clock Setting** jumper settings are shown in **Table 5-6**.

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AT Power Select	Description	
Short 1-2	Positive polarity (normal)	Default
Short 2-3	Negative polarity (invert)	

Table 5-6: LCD Panel Shift Clock Setting

The LCD Voltage Selection jumper location. is shown in **Figure 5-7**.

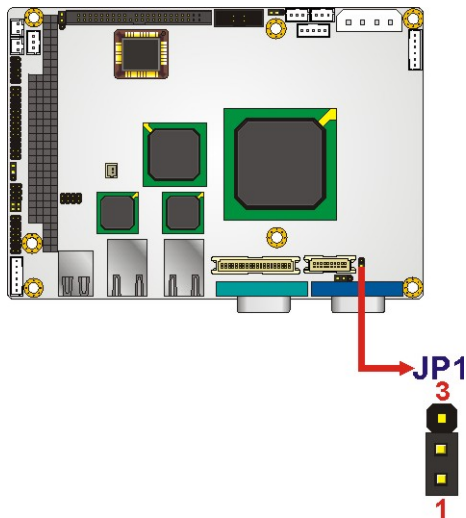


Figure 5-6: LCD Panel Shift Clock Setting Jumper Location

5.4.6 LCD Voltage Selection



WARNING:

Permanent damage to the screen and WAFER-LX3 may occur if the wrong voltage is selected with this jumper. Please refer to the user guide that came with the monitor to select the correct voltage.

Jumper Label:	JP2
Jumper Type:	3-pin header
Jumper Settings:	See Table 5-7

Jumper Location: See **Figure 5-7**

The **LCD Voltage Selection** jumper allows the LCD screen voltage to be set. The **LCD Voltage Selection** jumper settings are shown in **Table 5-7**.

AT Power Select	Description	
Short 1-2	+3.3V LVDS	Default
Short 2-3	+5V LVDS	

Table 5-7: LCD Voltage Selection Jumper Settings

The LCD Voltage Selection jumper location. is shown in **Figure 5-7**.

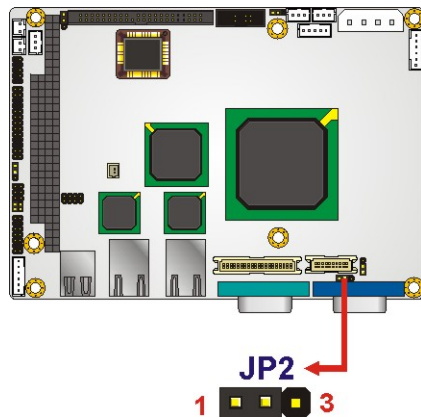


Figure 5-7: LCD Voltage Selection Jumper Location

5.4.7 RS-422/485 Serial Port Select Jumper

Jumper Label: JP2

Jumper Type: 3-pin header

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

Jumper Location: See **Figure 5-8**

The RS-422/485 Serial Port Select jumper configures the serial port connector as an RS-422 serial port or as an RS-485 serial port. The RS-422/485 Serial Port Select jumper selection options are shown in **Table 5-8**.

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AT Power Select	Description	
Short 1 – 2	RS-422	Default
Short 3 – 4	RS-485	

Table 5-8: Serial Port Mode Select Jumper Settings

The RS-422/485 Serial Port Select jumper location is shown in **Figure 5-8** below.

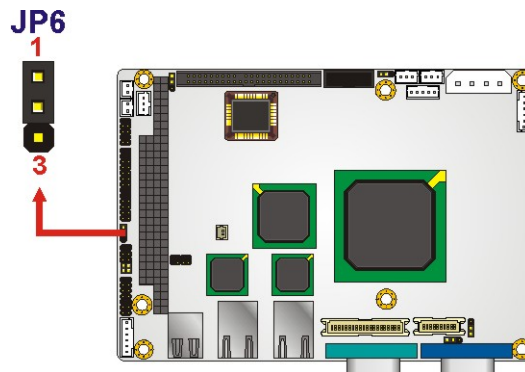


Figure 5-8: Serial Port Mode Select Jumper Pinout Locations

5.5 Chassis Installation

5.5.1 Airflow



WARNING:

Airflow is critical to the cooling of the CPU and other onboard components. The chassis in which the WAFER-LX3 must have air vents to allow cool air to move into the system and hot air to move out.

The WAFER-LX3 must be installed in a chassis with ventilation holes on the sides allowing airflow to travel through the heat sink surface. In a system with an individual power supply unit, the cooling fan of a power supply can also help generate airflow through the board surface.


NOTE:

IEI has a wide range of backplanes available. Please contact your WAFER-LX3 vendor, reseller or an IEI sales representative at sales@iei.com.tw or visit the IEI website (<http://www.ieworld.com.tw>) to find out more about the available chassis.

5.6 Internal Peripheral Device Connections

5.6.1 Peripheral Device Cables

The cables listed in **Table 5-9** are shipped with the WAFER-LX3.

Quantity	Type
1	Audio cable
1	IDE flat cable
1	RS-232/422/485 cable
1	PS/2 Y-cable
1	USB cable

Table 5-9: IEI Provided Cables

For more details about the items listed above, please refer to **Chapter 3**. Installation of the accessories listed above are described in detail below.

5.6.2 ATA Flat Cable Connection

The ATA 66/100 flat cable connects to the WAFER-LX3 to one or two IDE devices. To connect an IDE HDD to the WAFER-LX3 please follow the instructions below.

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

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Step 2: Insert the connector. Connect the IDE cable connector to the onboard connector. See **Figure 5-9**. A key on the front of the cable connector ensures it can only be inserted in one direction.

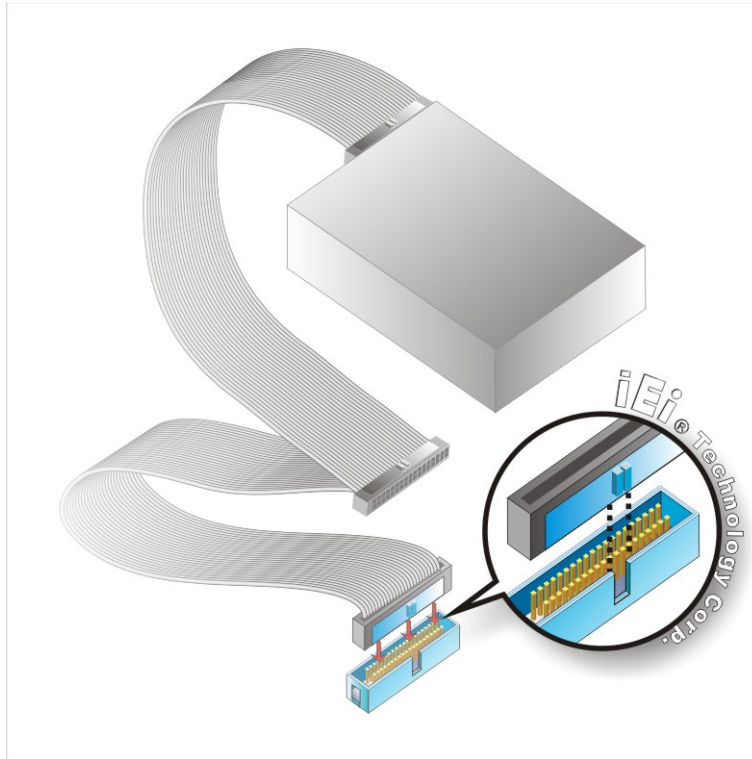


Figure 5-9: IDE Cable Connection

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

5.6.3 Keyboard/Mouse Y-cable Connector

The WAFER-LX3 is shipped with a keyboard/mouse Y-cable connector. The keyboard/mouse Y-cable connector connects to a keyboard/mouse connector on the WAFER-LX3 and branches into two cables that are each connected to a PS/2 connector, one for a mouse and one for a keyboard. To connect the keyboard/mouse Y-cable connector please follow the steps below.

- Step 1:** **Locate the connector.** The location of the keyboard/mouse Y-cable connector is shown in **Chapter 3**.
- Step 2:** **Align the connectors.** Correctly align pin 1 on the cable connector with pin 1 on the WAFER-LX3 keyboard/mouse connector. See **Figure 5-10**.
- Step 3:** **Insert the cable connectors** Once the cable connector is properly aligned with the keyboard/mouse connector on the WAFER-LX3, connect the cable connector to the onboard connectors. See **Figure 5-10**.

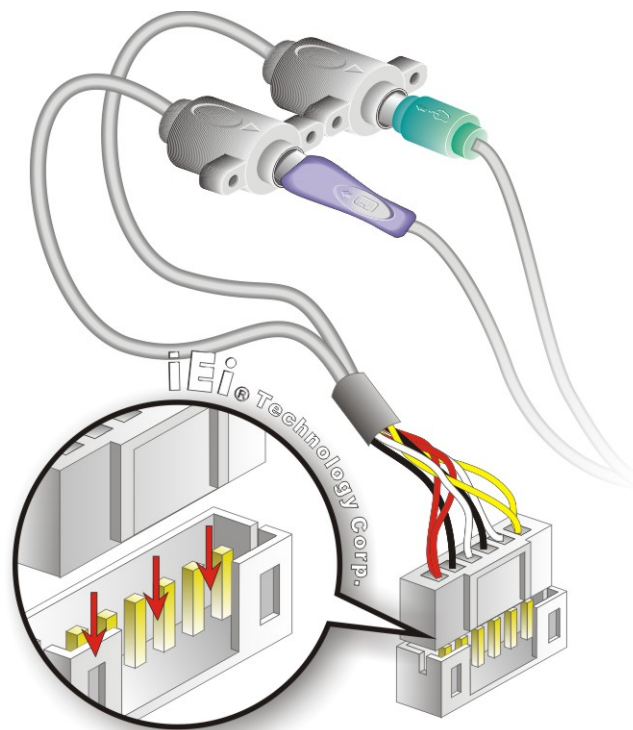


Figure 5-10: Keyboard/mouse Y-cable Connection

- Step 4:** **Attach PS/2 connectors to the chassis.** The keyboard/mouse Y-cable connector is connected to two PS/2 connectors. To secure the PS/2 connectors to the chassis please refer to the installation instructions that came with the chassis.
- Step 5:** **Connect the keyboard and mouse.** Once the PS/2 connectors are connected to the chassis, a keyboard and mouse can each be connected to one of the

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PS/2 connectors. The keyboard PS/2 connector and mouse PS/2 connector are both marked. Please make sure the keyboard and mouse are connected to the correct PS/2 connector.

5.6.4 Parallel Port Cable without Bracket

The optional parallel port (LPT) cable respectively connects the onboard LPT 26-pin box header to an external LPT device (like a printer). The cable comprises a 26-pin female header, to be connected to the onboard LPT box-header, on one side and on the other side a standard external LPT connector. To connect the LPT cable, please follow the steps below.

Step 1: Locate the connector. The LPT connector location is shown in **Chapter 4**.

Step 2: Align the connectors. Correctly align pin 1 on the cable connector with pin 1 on the PCIE-9452 LPT box-header connector. See **Figure 5-11**.

Step 3: Insert the cable connectors Once the cable connector is properly aligned with the 26-pin box-header connector on the PCIE-9452, connect the cable connector to the onboard connector. See **Figure 5-11**.

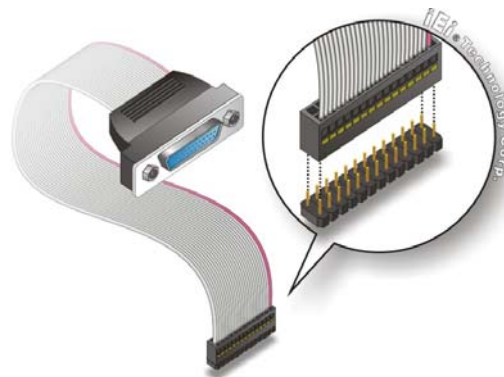


Figure 5-11: LPT Cable Connection

Step 4: Attach the LPT connector to the chassis. To secure the LPT interface connector to the chassis please refer to the installation instructions that came with the chassis.

Step 5: Connect LPT device. Once the LPT interface connector is connected to the chassis, the LPT device can be connected to the LPT interface connector. See

Figure 5-12

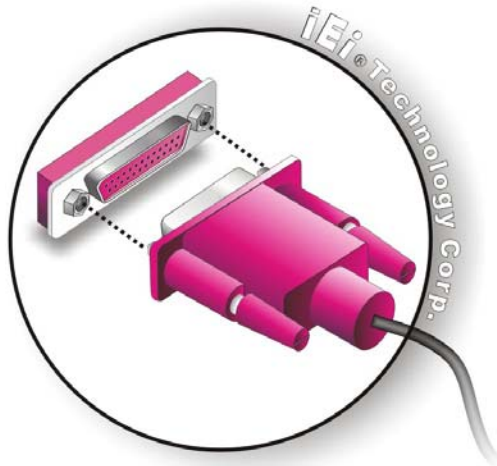


Figure 5-12: Connect the LPT Device

5.6.5 Dual RS-232 Cable Connection (w/o bracket)

The dual RS-232/422/485 cable consists of two connectors attached to two independent cables. Each cable is then attached to a D-sub 9-pin male connector. One DB-9 connector is reserved for RS-232 connectivity, the other DB-9 connector is reserved for RS-422/485 connectivity depending on the jumper settings. To install the dual RS-232/422/485 cable, please follow the steps below.

Step 1: Locate the connectors. The locations of the RS-232/422/485 connectors are shown in **Chapter 3**.

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

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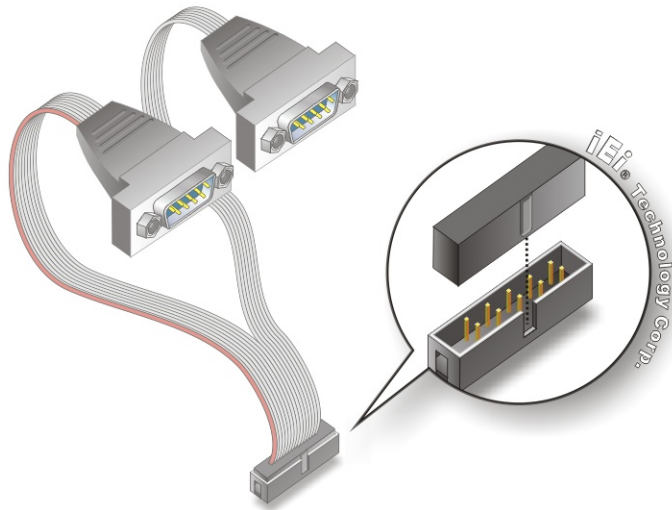


Figure 5-13: Dual RS-232 Cable Installation

Step 3: Secure the connectors. Both the RS-232 and RS-422/485 connectors have two retention screws that must be secured to a chassis or bracket.

Step 4: Connect the serial device. Once the DB-9 connectors are connected to a chassis or bracket, a serial communications device can be connected to the system.

5.6.6 USB Cable (Dual Port without Bracket)

The WAFER-LX3 is shipped with a dual port USB 2.0 cable. To connect the USB cable connector, please follow the steps below.

Step 1: Locate the connectors. The locations of the USB connectors are shown in Chapter 3.



WARNING:

If the USB pins are not properly aligned, the USB device can burn out.

Step 2: **Align the connectors.** The cable has two connectors. Correctly align pin 1 on each cable connector with pin 1 on the WAFER-LX3 USB connector.

Step 3: **Insert the cable connectors.** Once the cable connectors are properly aligned with the USB connectors on the WAFER-LX3, connect the cable connectors to the onboard connectors. See **Figure 5-14**.

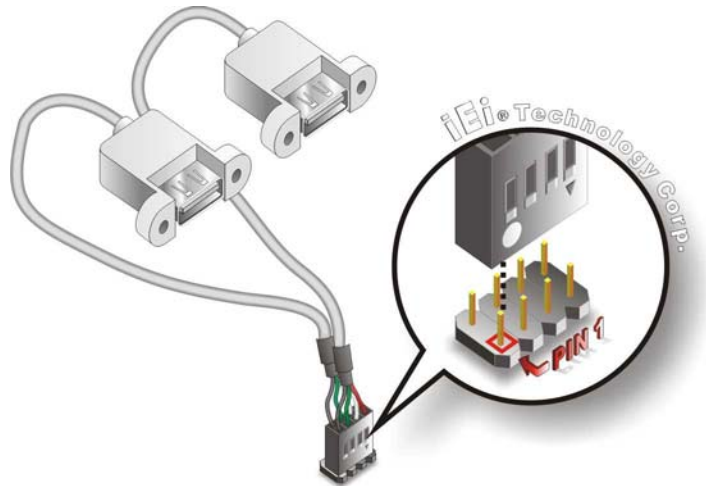


Figure 5-14: Dual USB Cable Connection

Step 4: **Attach the USB connectors to the chassis.** The USB 2.0 connectors each of two retention screw holes. To secure the connectors to the chassis please refer to the installation instructions that came with the chassis.

5.7 External Peripheral Interface Connection

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

- RJ-45 Ethernet cable connectors
- USB device cable connectors
- VGA device cable connectors

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To install these devices, connect the corresponding cable connector from the actual device to the corresponding WAFER-LX3 external peripheral interface connector making sure the pins are properly aligned.

5.7.1 LAN Connection (Single Connector)

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

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

Step 2: Align the connectors. Align the RJ-45 connector on the LAN cable with one of the RJ-45 connectors on the WAFER-LX3. See **Figure 5-15**.

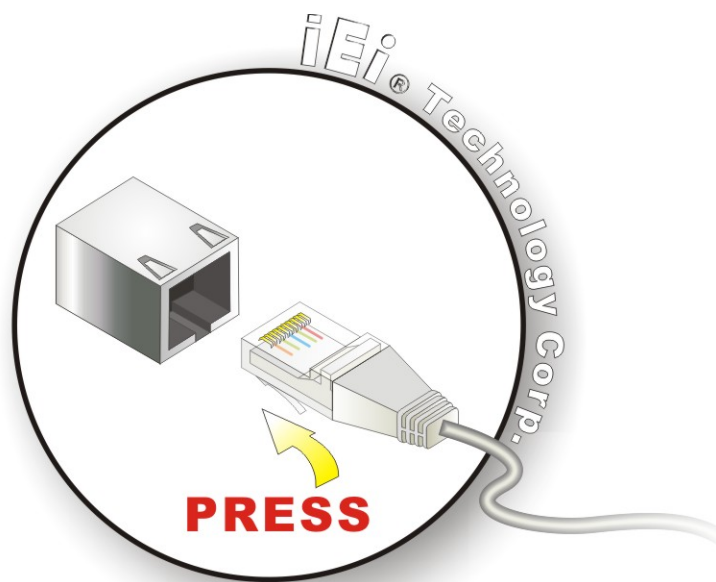


Figure 5-15: LAN Connection

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

5.7.2 Serial Device Connection

The WAFER-LX3 has a single female DB-9 connector on the external peripheral interface panel for a serial device. Follow the steps below to connect a serial device to the WAFER-LX3.

Step 1: **Locate the DB-9 connector.** The location of the DB-9 connector is shown in Chapter 3.

Step 2: **Insert the serial connector.** Insert the DB-9 connector of a serial device into the DB-9 connector on the external peripheral interface. See **Figure 5-16**.

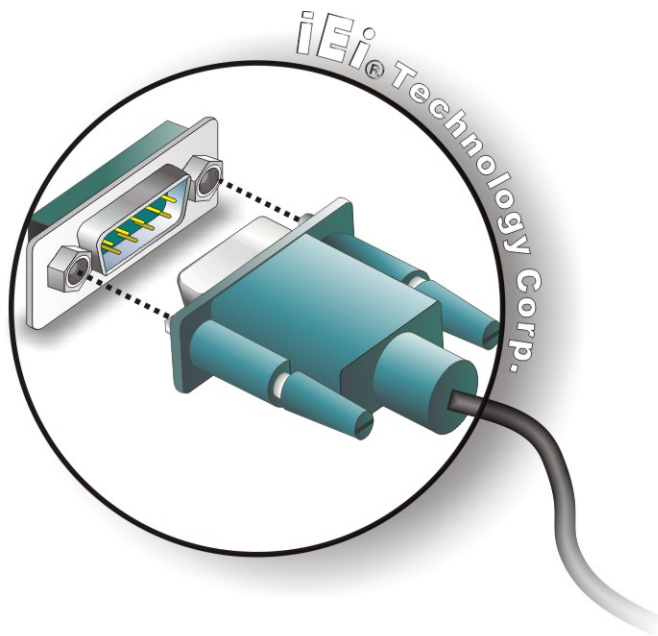


Figure 5-16: Serial Device Connector

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

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5.7.3 USB Device Connection (Single Connector)

There are two external USB 2.0 connectors. Both connectors are perpendicular to the WAFER-LX3. To connect a USB 2.0 or USB 1.1 device, please follow the instructions below.

Step 1: Located the USB connectors. The locations of the USB connectors are shown in **Chapter 4**.

Step 2: Align the connectors. Align the USB device connector with one of the connectors on the WAFER-LX3. See **Figure 5-17**.

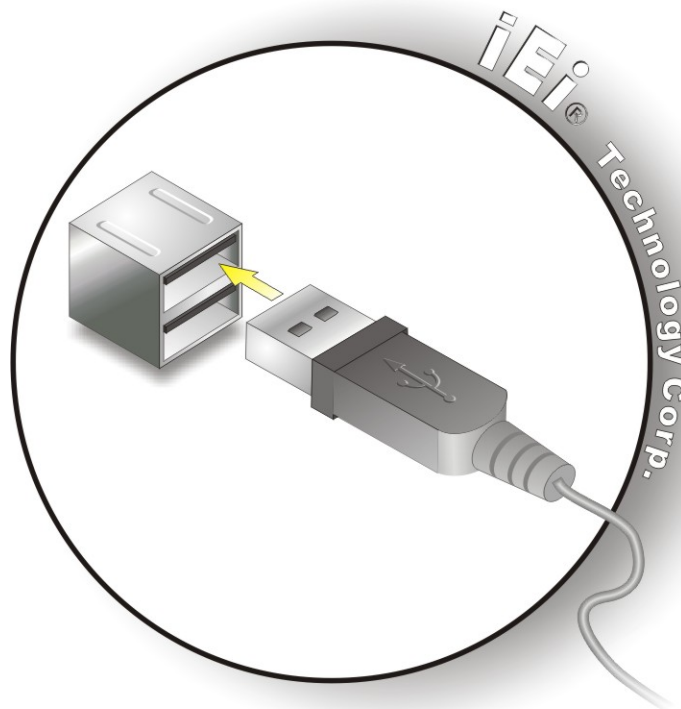


Figure 5-17: USB Device Connection

Step 3: Insert the device connector. Once aligned, gently insert the USB device connector into the onboard connector.

5.7.4 VGA Monitor Connection

The WAFER-LX3 has a single female DB-15 connector on the external peripheral interface panel. The DB-15 connector is connected to a CRT or VGA monitor. To connect a monitor to the WAFER-LX3, please follow the instructions below.

- Step 1: Locate the female DB-15 connector.** The location of the female DB-15 connector is shown in **Chapter 3**.
- Step 2: Align the VGA connector.** Align the male DB-15 connector on the VGA screen cable with the female DB-15 connector on the external peripheral interface.
- Step 3: Insert the VGA connector** Once the connectors are properly aligned with the insert the male connector from the VGA screen into the female connector on the WAFER-LX3. See **Figure 5-18**.

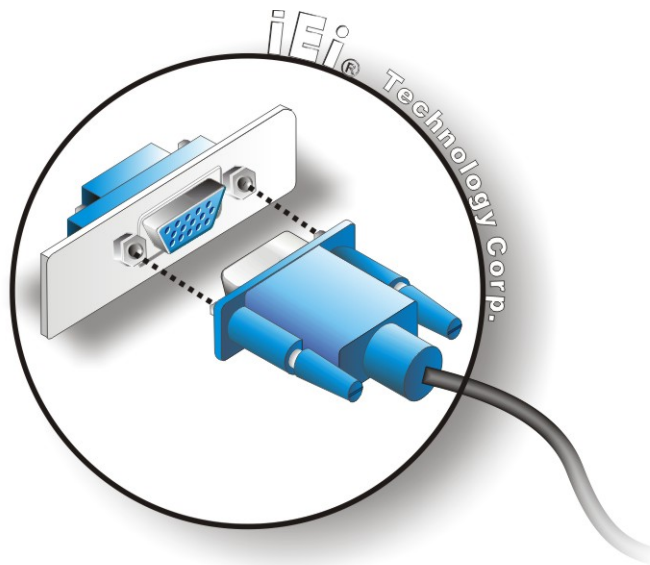


Figure 5-18: VGA Connector

- Step 4: Secure the connector.** Secure the DB-15 VGA connector from the VGA monitor to the external interface by tightening the two retention screws on either side of the connector.

Chapter

6

BIOS Screens

6.1 Introduction

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

6.1.1 Starting Setup

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

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

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

6.1.2 Using Setup

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

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

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

Table 6-1: BIOS Navigation Keys

6.1.3 Getting Help

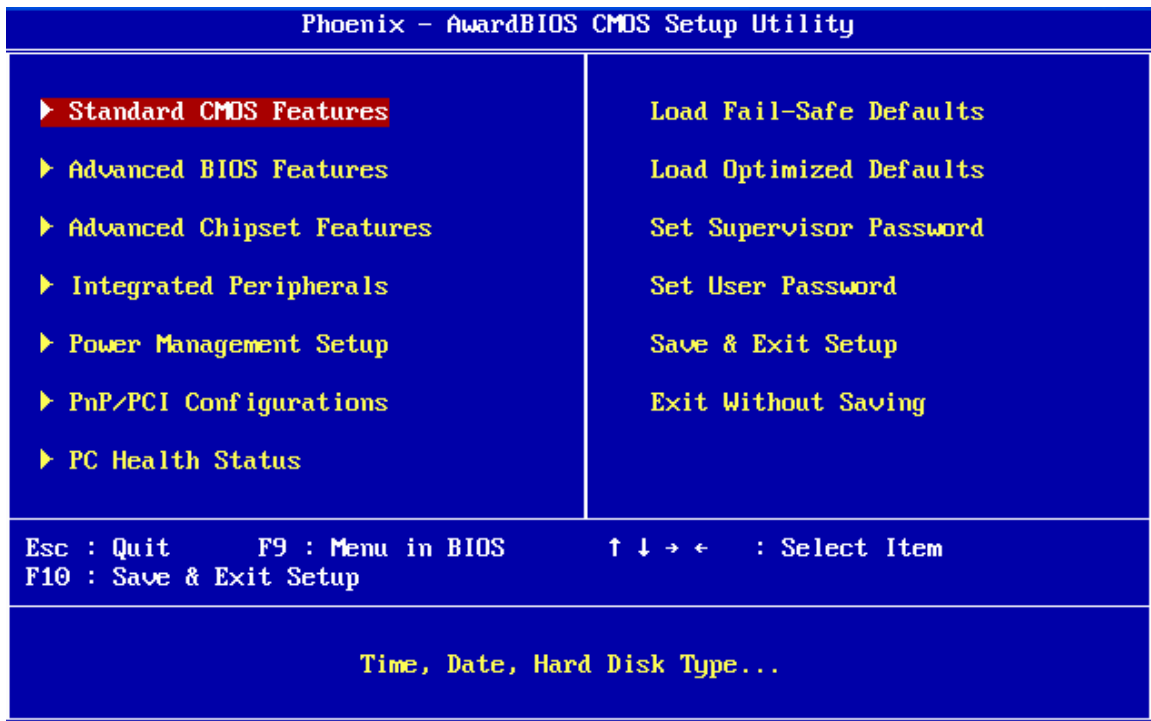
When **F1** is pressed a small help window describing the appropriate keys to use and the possible selections for the highlighted item appears. To exit the Help Window press **Esc** or the **F1** key again.

6.1.4 Unable to Reboot After Configuration Changes

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

6.1.5 Main BIOS Menu

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


BIOS Menu 1: Award BIOS CMOS Setup Utility

NOTE:

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

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

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

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

→ **Load Fail-Safe Defaults**

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

→ **Load Optimized Defaults**

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

→ **Set Supervisor Password**

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

→ **Set User Password**

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

→ **Save & Exit Setup**

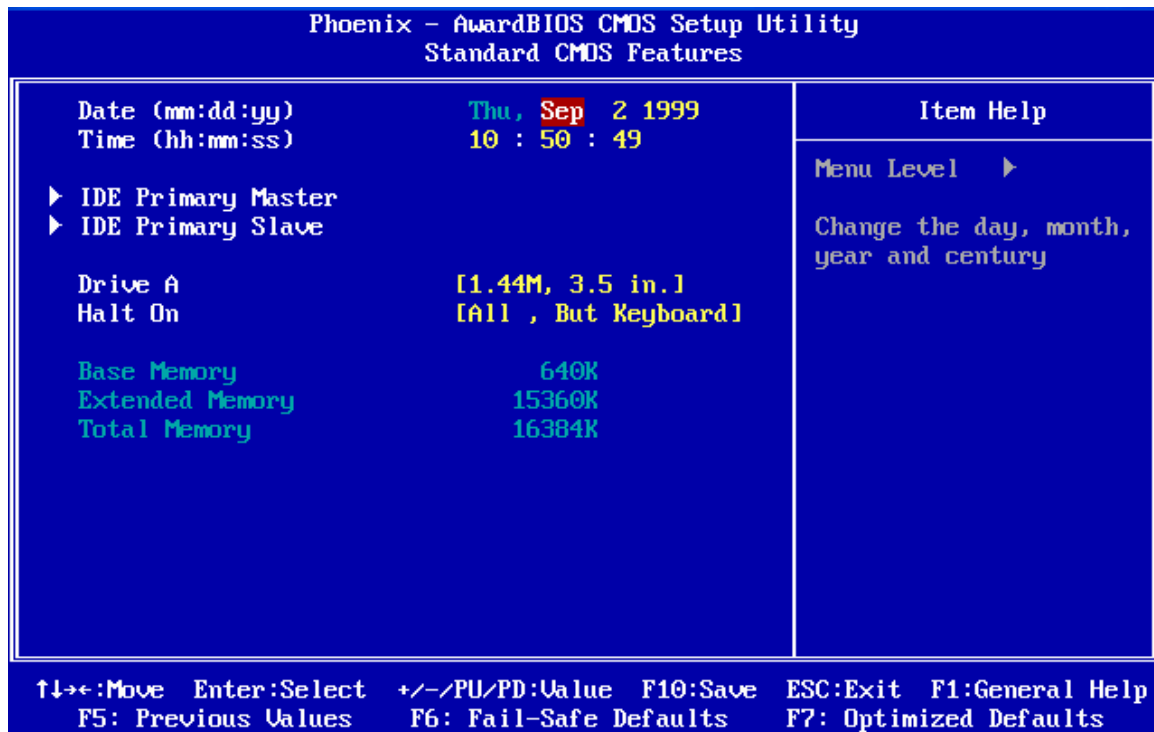
Use the **Save & Exit Setup** option to save any configuration changes made and exit the BIOS menus.

→ **Exit Without Saving**

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

6.2 Standard CMOS Features

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



BIOS Menu 2: Standard CMOS Features

→ **Date [Day mm:dd:yyyy]**

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

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→ 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 Secondary Master
- IDE Secondary Slave

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

→ Drive A [None]

Use the **Drive A** 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.

→ Halt On [All, But Keyboard]

Use the **Halt On** option to specify what errors detected during the power up process stop the system.

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- **All Errors** Whenever BIOS detects a non-fatal error the system is stopped and the user prompted.
- **No Errors** The system boot is not stopped for any errors that may be detected.
- **All, But Keyboard** (Default) The system boot does not stop for a keyboard error; it stops for all other errors.
- **All, But Diskette** The system boot does not stop for a disk error; it stops for all other errors.
- **All, But Disk/Key** The system boot does not stop for a keyboard or a disk error; it stops for all other errors.

→ Base Memory:

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

→ Extended Memory

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

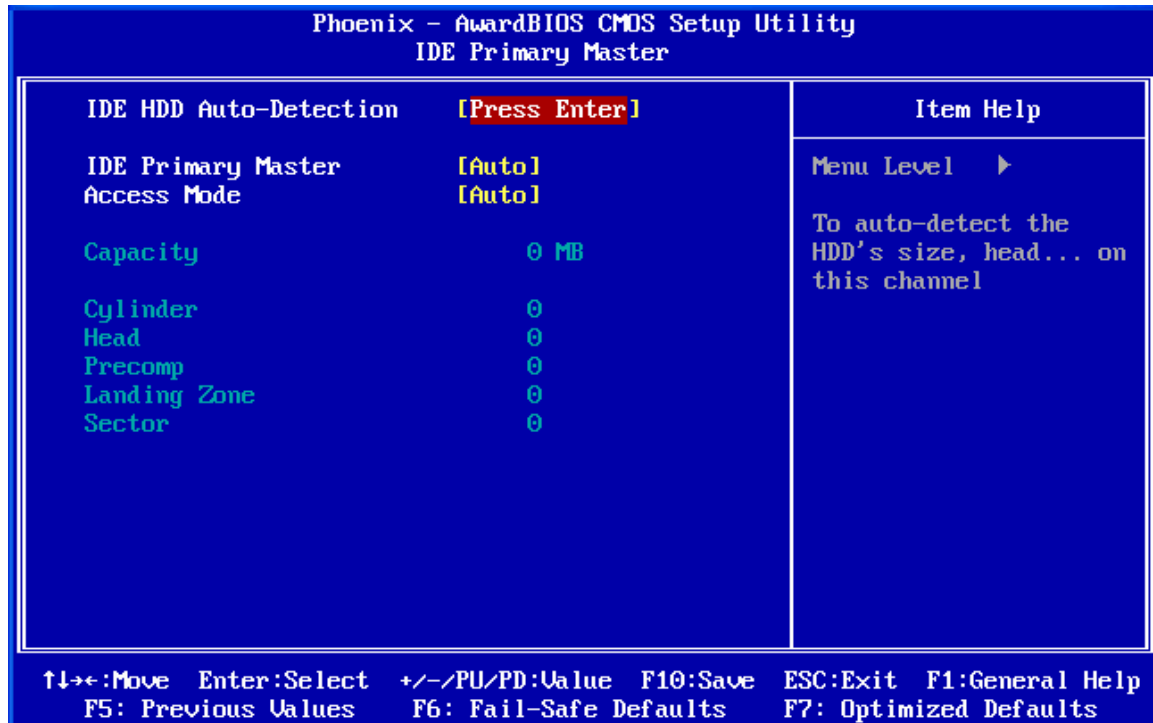
→ Total Memory

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

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6.2.1 IDE Primary Master/Slave

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



BIOS Menu 3: IDE Primary Master/Slave menu

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

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→ 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

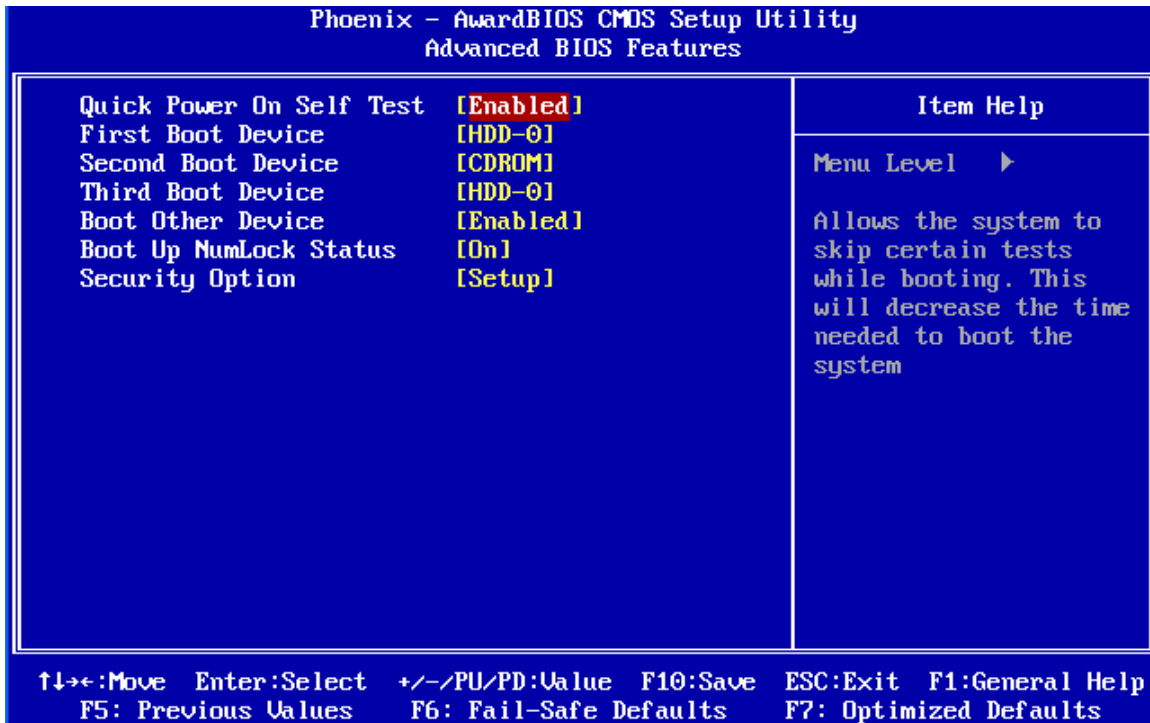
The **Landing Zone** specification indicates where the disk head will park itself after the system powers off.

→ 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 4**) to configure the CPU and peripheral device configuration options.



BIOS Menu 4: Advanced BIOS Features

→ Quick Power On Self Test [Enabled]

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

- Disabled Normal POST occurs after the computer is turned on.
- Enabled (Default) Quick POST occurs after the computer is turned on.

→ 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:

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- First Boot Device [Default: HDD-0]
- Second Boot Device [Default: disabled]
- Third Boot Device [Default: disabled]

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:

- LS120
- HDD-0
- SCSI
- CDROM
- HDD-1
- HDD-2
- HDD-3
- ZIP100
- USB-FDD
- USB-ZIP
- USB-CDROM
- USB-HDD
- LAN
- Disabled

→ **Boot Other Device [Enabled]**

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

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

→ Boot Up Numlock Status [On]

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

- Off** The keys on the keypad are not activated.
- On** (Default) Activates the keys on the keypad.

→ 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.

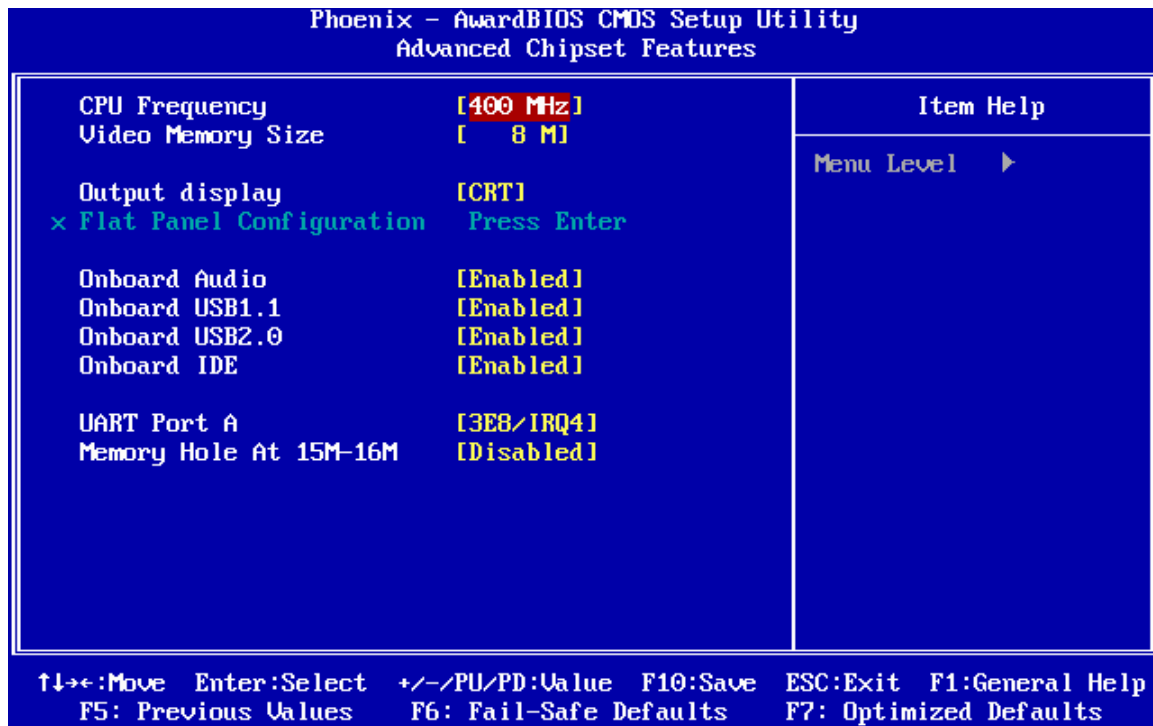
**NOTE:**

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.

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6.4 Advanced Chipset Features

Use the Advanced Chipset Features menu (**BIOS Menu 5**) to change chipset configuration options.



BIOS Menu 5: Advanced Chipset Features

→ CPU Frequency [500MHz]

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

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

→ 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:

- Disable
- 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 0.

→ 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.

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→ OnBoard USB 1.1 [Enabled]

Use the **OnBoard USB 1.1** option to enable or disable the USB 1.1 controller.

- **Disabled** The USB 1.1 controller is disabled.
- **Enabled** (Default) The onboard USB 1.1 controller is detected and enabled.

→ OnBoard USB 2.0 [Enabled]

Use the **OnBoard USB 2.0** option to enable or disable the USB 2.0 controller.

- **Disabled** The USB 2.0 controller is disabled.
- **Enabled** (Default) The onboard USB 2.0 controller is detected and enabled.

→ OnBoard IDE [Enabled]

Use the **OnBoard IDE** option to enable or disable the IDE controller.

- **Disabled** The IDE controller is disabled.
- **Enabled** (Default) The onboard IDE controller is detected and enabled.

→ UART Port A [Disabled]

Use the **UART Port A** option to select the I/O address and IRQ for the UART port A. The **UART Port A** options are:

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

→ Memory Hole At 15M – 16M [Disabled]

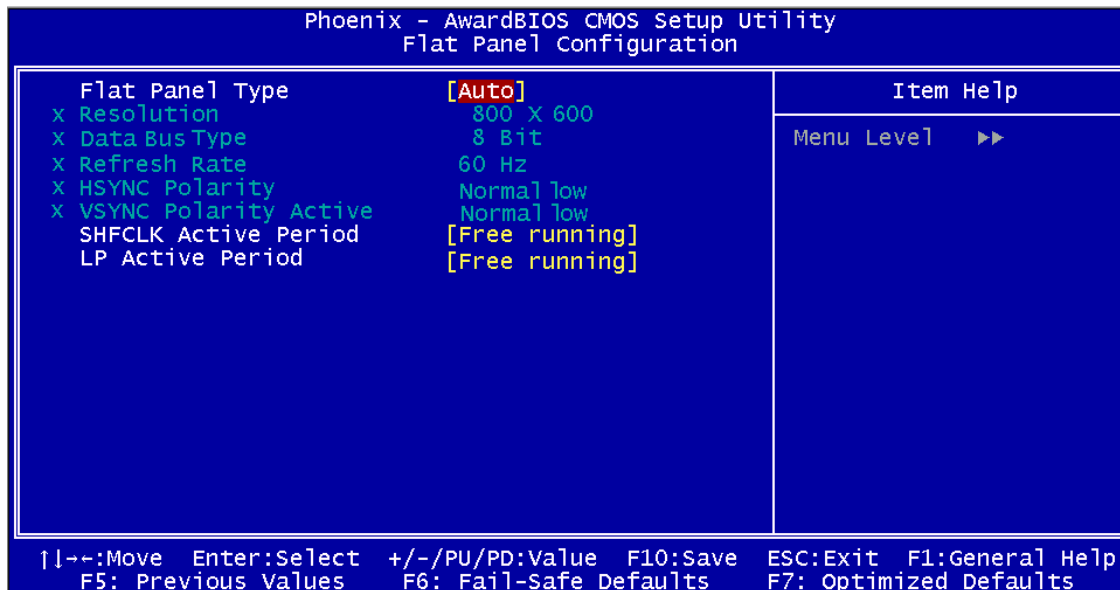
Use the **Memory Hole At 15M – 16M** option to reserve memory space between 15MB and 16MB for ISA expansion cards that require a specified area of memory to work

properly. If an older ISA expansion card is used, please refer to the documentation that came with the card to see if it is necessary to reserve the space.

- ➔ **Disabled** (DEFAULT) Memory is not reserved for ISA expansion cards
- ➔ **Enabled** Memory is reserved for ISA expansion cards

6.4.1 Flat Panel Configuration

Use the **Flat Panel Configuration** menu (**BIOS Menu 6**) to set the configuration settings for the flat panel screen connected to the system.



BIOS Menu 6: Flat Panel Configuration

➔ Flat Panel Type [Auto]

Use the **Flat Panel Type** option to specify the type of flat panel screen connected to the system.

- ➔ **TFT** Specifies the system is connected to a TFT display.
- ➔ **LVDS** Specifies the system is connected to an LVDS display.

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→ **Auto** (DEFAULT) The system detects the display type and the display settings.

→ Resolution [640 x 480]

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 [8 Bit]

The **Data Bus Type** option specifies both the **Bus Width** and the data type.

- 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 [Low]

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:

- Normal High
- Normal 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:

- Normal High
- Normal 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]

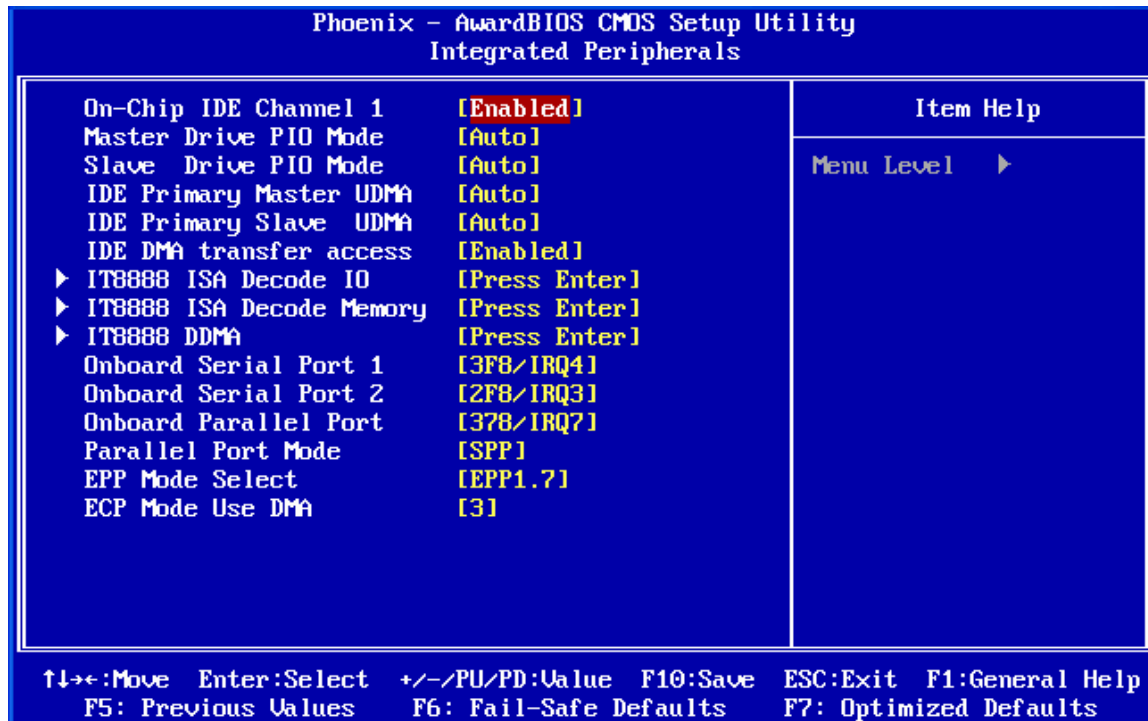
Use the **LP Active Period** option to set the LDE/MOD signal to the panel. The **LP Active Period** options are:

- Active Only
- Free running (DEFAULT)

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6.5 Integrated Peripherals

Use the Integrated Peripherals menu (**BIOS Menu 7**) to change the configuration options for the attached peripheral devices.



BIOS Menu 7: 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 3.3MBps.
- ➔ **Mode 1** PIO mode 1 selected with a maximum transfer rate of 5.2MBps.
- ➔ **Mode 2** PIO mode 2 selected with a maximum transfer rate of 8.3MBps.
- ➔ **Mode 3** PIO mode 3 selected with a maximum transfer rate of 11.1MBps.
- ➔ **Mode 4** PIO mode 4 selected with a maximum transfer rate of 16.6MBps.

➔ **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.

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→ IDE DMA transfer access [Enabled]

Use the **IDE DMA transfer access** option to enable or disable DMA support for IDE devices connected to the system.

→ **Disabled** All IDE drive DMA transfers are disabled. The IDE drives use PIO mode transfers.

→ **Enabled** (Default) All IDE drive DMA transfers are enabled.

→ IT8888 ISA Decode IO

Use the IT8888 ISA Decode IO menu (**BIOS Menu 8**) to set the IO memory range for the onboard ISA. See **Section 天**.

→ IT8888 ISA Decode Memory

Use the **IT8888 ISA Decode Memory** (**BIOS Menu 9**) to set the resources for the onboard ISA bus. See **Section 6.5.2**.

→ 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

→ Parallel Port IRQ [IRQ7]

The **Parallel Port Address** BIOS option assigns the parallel port interrupt address. The following address options are available.

- | | | |
|-------------------|----------------|--|
| → Disabled | | Parallel port is disabled |
| → 378/IRQ5 | DEFAULT | Parallel Port I/O port address is 378
Parallel port interrupt address is IRQ5 |
| → 278/IRQ5 | | Parallel Port I/O port address is 278
Parallel port interrupt address is IRQ5 |
| → 3BC/IRQ7 | | Parallel Port I/O port address is 3BC
Parallel port interrupt address is IRQ7 |

→ Parallel Port Mode [Normal]

The Parallel Port Mode selection selects the mode the parallel port operates in.

- | | |
|-----------------|---|
| → Normal | The normal parallel port mode is the standard mode for parallel port operation. |
|-----------------|---|

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- **SPP** **DEFAULT** The parallel port operates in the standard parallel port mode (EPP)

- **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 Normal 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 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 Normal mode

The parallel port becomes compatible with EPP devices described above

- **x 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.

→ **x ECP Mode Use DMA [3]**

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-LX3 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 8**) to set the IO memory range for the onboard ISA.

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```

Phoenix - AwardBIOS CMOS Setup Utility
IT8888 ISA Decode IO

Decode I/O Space 0      [Enabled]
Decode I/O Speed 0      [Fast Speed]
Decode I/O Addr. 0 [15:0] [0100]
Decode I/O Size 0       [ 64 Bytes]
Decode I/O Space 1      [Enabled]
Decode I/O Speed 1      [Fast Speed]
Decode I/O Addr. 1 [15:0] [0180]
Decode I/O Size 1       [ 64 Bytes]
Decode I/O Space 2      [Enabled]
Decode I/O Speed 2      [Fast Speed]
Decode I/O Addr. 2 [15:0] [03E0]
Decode I/O Size 2       [ 2 Bytes]
Decode I/O Space 3      [Enabled]
Decode I/O Speed 3      [Fast Speed]
Decode I/O Addr. 3 [15:0] [0440]
Decode I/O Size 3       [ 2 Bytes]
Decode I/O Space 4      [Disabled]
x Decode I/O Speed 4      Fast Speed
x Decode I/O Addr. 4 [15:0] FFFF

Item Help
Menu Level  ►►

↑|←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults
  
```

BIOS Menu 8: 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] 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

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6.5.2 IT8888 ISA Decode Memory



NOTE:

Five PCI-104 devices can be stacked onto the WAFER-LX3 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 9)** to set the resources for the onboard ISA bus.

```

Phoenix - AwardBIOS CMOS Setup Utility
IT8888 ISA Decode Memory

Decode Memory Space 0      [Enabled]
Decode Memory Speed 0      [Fast Speed]
Decode Memory Addr. 0      [D00]
Decode Memory Size 0       [ 64 KB]
Decode Memory Space 1      [Disabled]
x Decode Memory Speed 1     Subtractive Speed
x Decode Memory Addr. 1     000
x Decode Memory Size 1     16 KB
Decode Memory Space 2      [Disabled]
x Decode Memory Speed 2     Subtractive Speed
x Decode Memory Addr. 2     000
x Decode Memory Size 2     16 KB
Decode Memory Space 3      [Disabled]
x Decode Memory Speed 3     Subtractive Speed
x Decode Memory Addr. 3     000
x Decode Memory Size 3     16 KB

Item Help
Menu Level  >>

↓↑←→:Move  Enter:Select  +/-/PU/PD:Value  F10:Save  ESC:Exit  F1:General Help
F5: Previous Values  F6: Fail-Safe Defaults  F7: Optimized Defaults
  
```

BIOS Menu 9: 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**.

WAFER-LX3 3.5" Motherboard

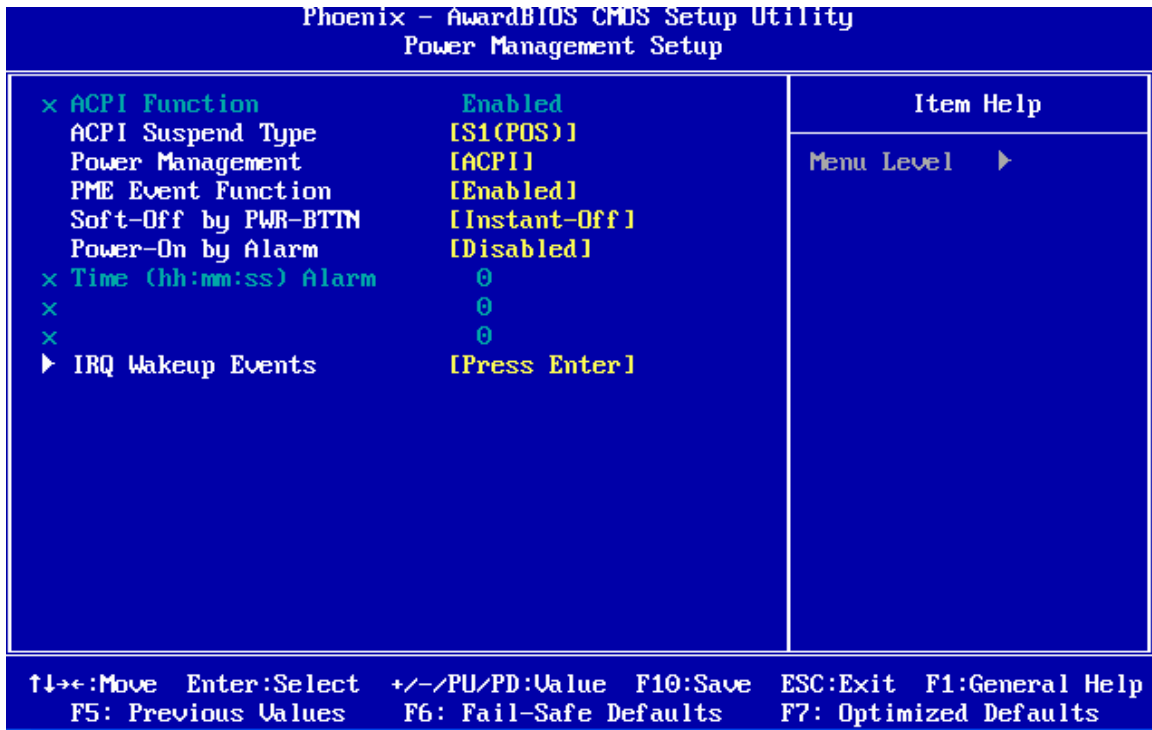
→ Decode Memory Size N [xx]

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 10**) to set the BIOS power management and saving features.



BIOS Menu 10: Power Management Setup

→ ACPI Function [Disabled]

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

Disabled ACPI function disabled.

Enabled (Default) ACPI function enabled.

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→ ACPI Suspend Type [S1(POS)]

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

- **S1 (POS)** (Default) System appears off. The CPU is stopped; RAM is refreshed; the system is running in a low power mode.
- **S3 (STR)** System appears off. The CPU has no power; RAM is in slow refresh; the power supply is in a reduced power mode.

→ Power Management [ACPI]

Use the **Power Management** option to set the power management type used by the system.

- **APM** Advanced power management (APM) is activated
- **ACPI** (Default) Advanced Configuration and Power Interface (ACPI) is activated.

→ PME Event Function

The PME Event Function option enables or disables the PME Event function

- **Disabled** PME Event Function disabled
- **Enabled** (Default) PME Event Function enabled

→ 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** to set the time when the system should automatically be turned on.

- **Disabled** (Default) The real time clock (RTC) cannot generate a wake event.
- **Enabled** If selected, the tune (**hh:mm:ss**) options can be set to specify the exact time the system is roused.

→ **IRQ Wakeup Events [Press Enter]**

Use the **IRQ Wakeup Events** option to specify which activity on which peripheral component will wake up the system. When this item is selected, press enter and the following BIOS screen appears.

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Phoenix - AwardBIOS CMOS Setup Utility		
IRQ Wakeup Events :		
		Item Help
IRQ1 (KeyBoard)	[ON]	
IRQ3 (COM 2)	[OFF]	
IRQ4 (COM 1)	[OFF]	
IRQ5 (LPT 2)	[OFF]	
IRQ6 (Floppy Disk)	[OFF]	
IRQ7 (LPT 1)	[OFF]	
IRQ8 (RTC Alarm)	[OFF]	
IRQ9 (IRQ2 Redir)	[OFF]	
IRQ10 (Reserved)	[OFF]	
IRQ11 (Reserved)	[OFF]	
IRQ12 (PS/2 Mouse)	[OFF]	
IRQ13 (Coprocesor)	[OFF]	
IRQ14 (Hard Disk)	[OFF]	
IRQ15 (Reserved)	[OFF]	

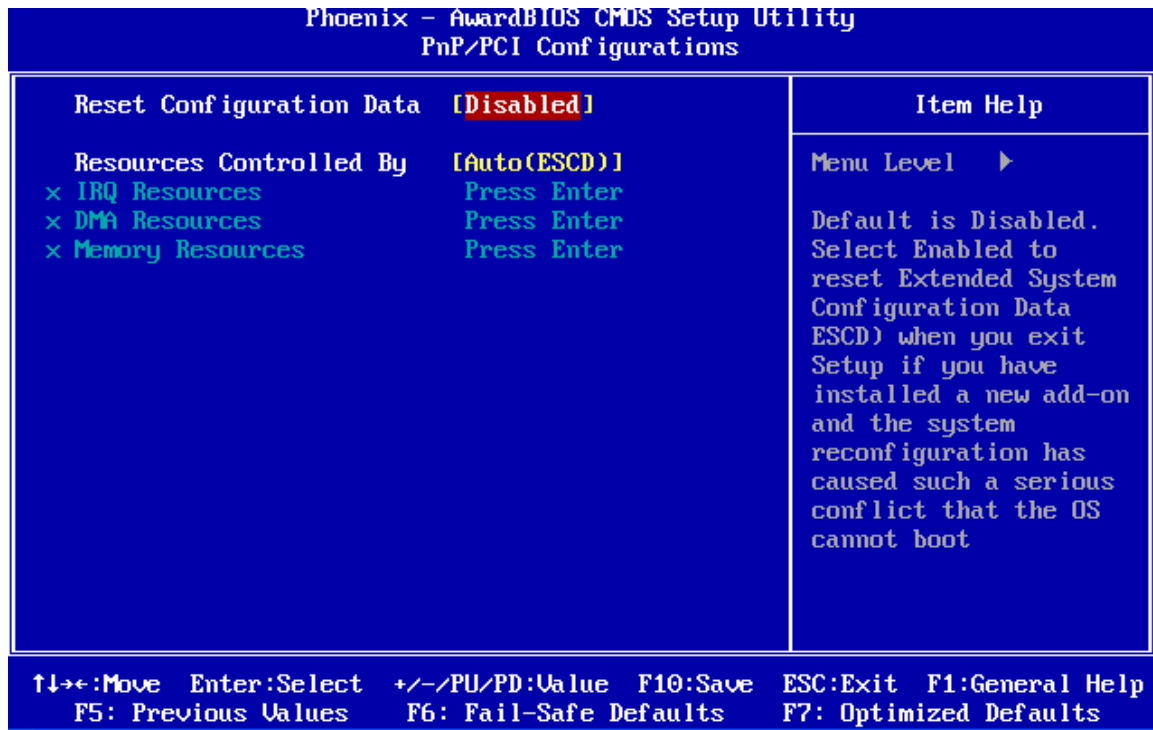
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
 F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

BIOS Menu 11: IRQ Wakeup Events

Select which component will be able to wakeup the system.

6.7 PnP/PCI Configurations

Use the PnP/PCI Configurations menu (**BIOS Menu 12**) to set the plug and play, and PCI options.


BIOS Menu 12: PnP/PCI Configurations
→ 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.

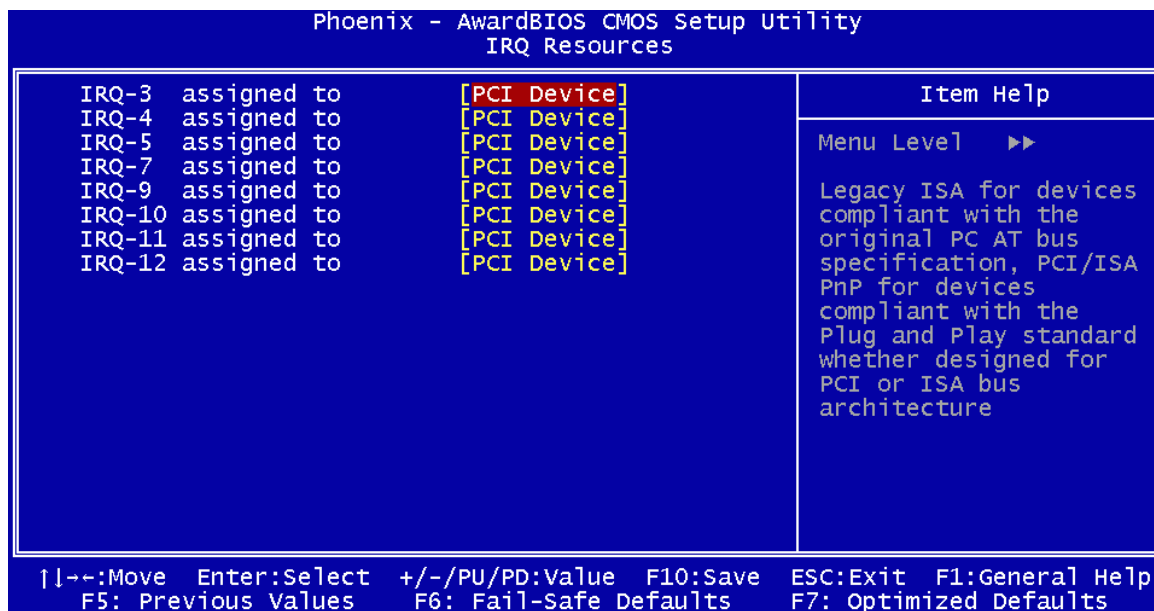
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➔ **Auto(ESCD)** (Default) BIOS automatically configures plug and play devices as well as boot devices.

➔ **Manual** Manually configure the plug and play devices and any other boot devices.

➔ x **IRQ Resources [Press Enter]**

The IRQ Resources option (**BIOS Menu 13**) can only be selected if the Resources Controlled By option is set to Manual.



BIOS Menu 13: 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-9 assigned to
- IRQ-10 assigned to
- IRQ-11 assigned to

- IRQ-12 assigned to

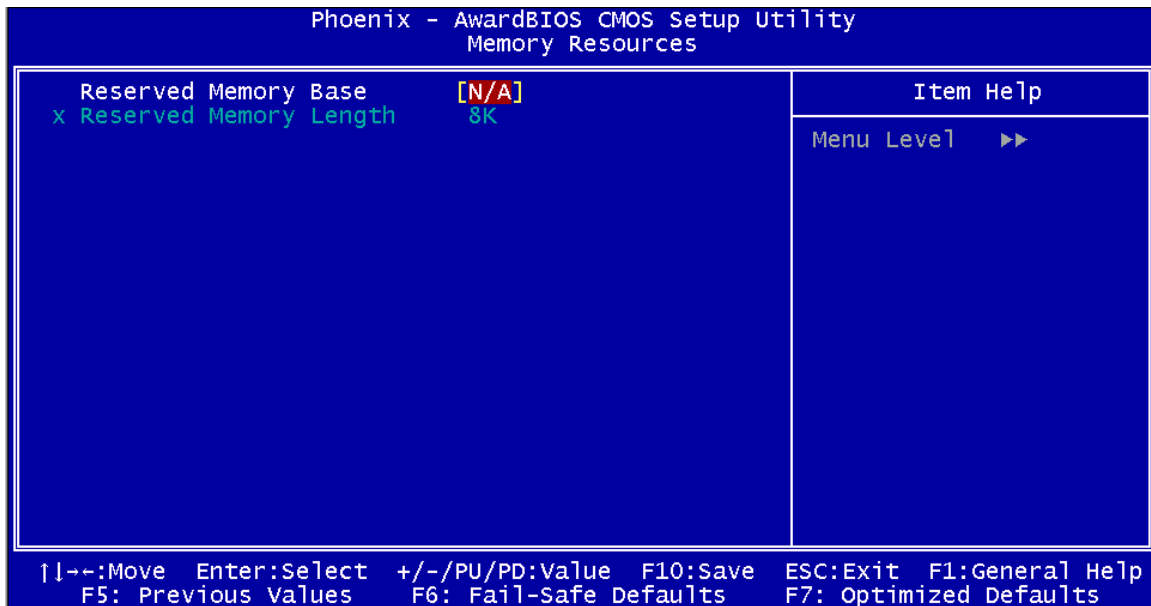
The above options all have the following default options.

➔ **PCI Device** (Default) The IRQ is assigned to legacy ISA for devices compliant with the original PC AT bus specification, PCI/ISA PNP for devices compliant with the Plug and Play standard whether designed for PCI or ISA bus architecture.

➔ **Reserved** The IRQ is reserved by BIOS.

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

The Memory Resources menu (**BIOS Menu 14**) 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 14: Memory Resources

The menu has two configurable options:

- Reserved Memory Base

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- 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

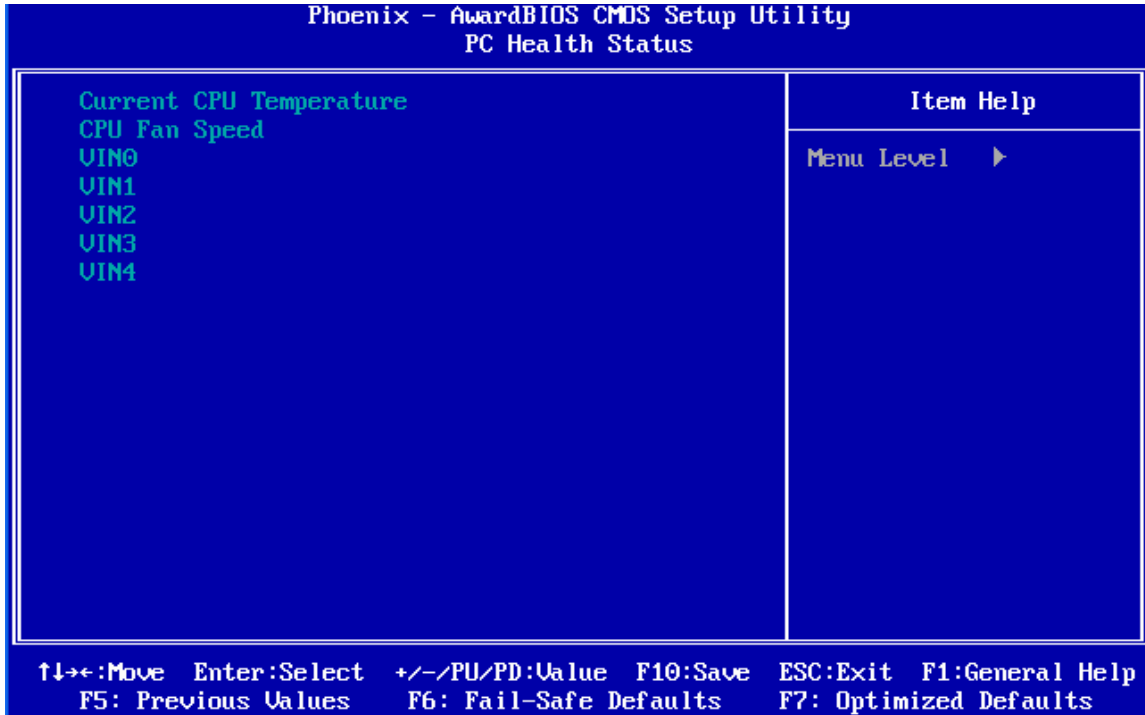
→ x Reserved Memory Length [8K]

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

6.8 PC Health Status

The **PC Health Status** menu (**BIOS Menu 15**) has no user configurable options, but shows system operating parameters that are essential to the stable operation of the system.


BIOS Menu 15: PC Health Status

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

→ System Temperature

The following temperatures are monitored:

- CPU Temperature

→ Voltages

The following voltages are monitored:

- VIN0
- VIN1
- VIN2
- VIN3
- VIN4

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→ Fan Speeds

The following fan speeds are monitored:

- CPU Fan Speed



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Chapter

7

Software Drivers

7.1 Available Software Drivers



NOTE:

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

The WAFER-LX3 CPU module has six software drivers:

- LAN driver
- Entertainment Encryption/Decryption driver
- Audio driver
- VGA driver
- IT8888 driver

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

7.2 Open the Device Manager in Windows

To install the drivers, please access the **WINDOWS DEVICE MANAGER**. To do this, follow the instructions below.

Step 1: Insert the CD into a CD drive of the system that contains the WAFER-LX3.

Step 2: Open **WINDOWS CONTROL PANEL**. (See **Figure 7-1**)

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Figure 7-1: Access Windows Control Panel

Step 3: The Window in **Figure 7-2** appears.

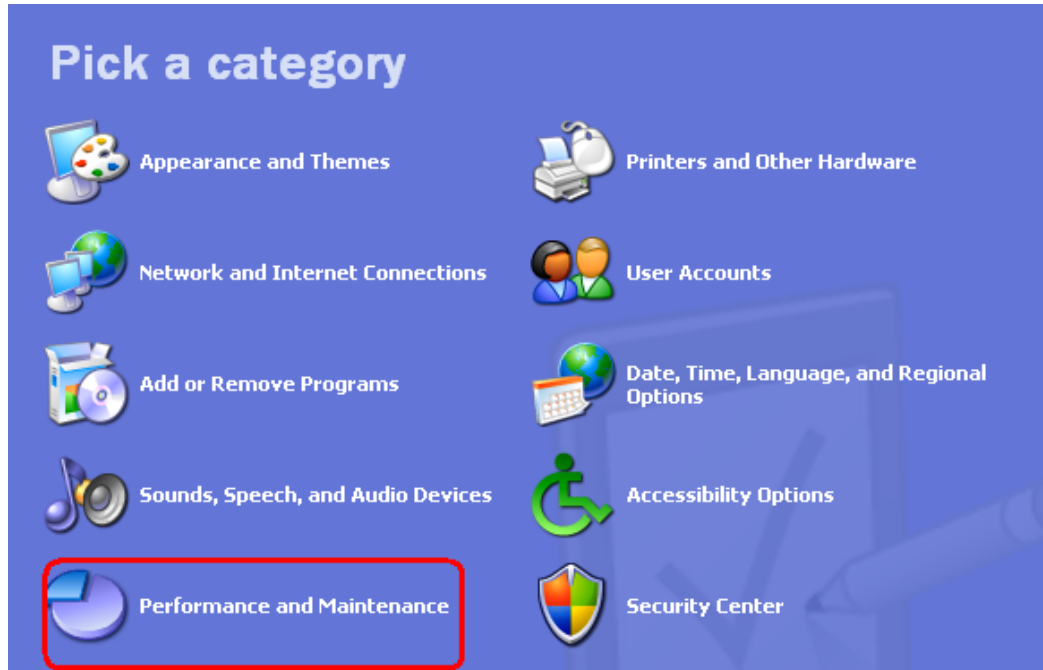


Figure 7-2: Performance and Maintenance

Step 4: Double click the **PERFORMANCE AND MAINTENANCE** option in **Figure 7-2**.

Step 5: The screen in **Figure 7-3** appears.

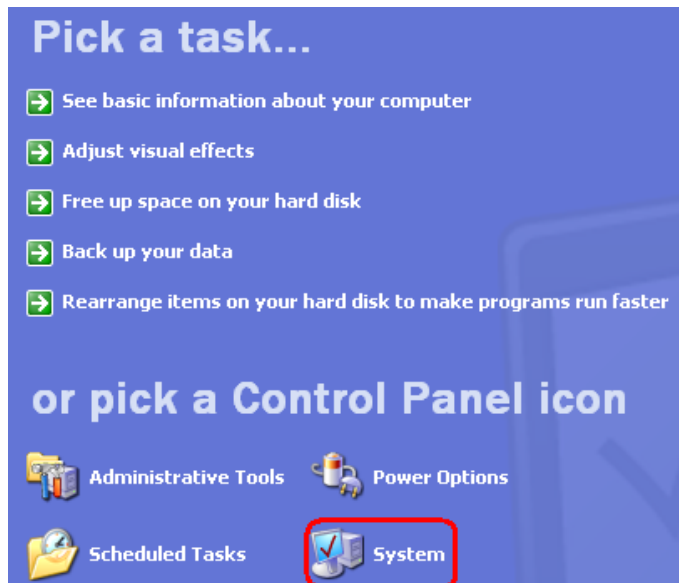


Figure 7-3: Access the System

Step 6: Double click the **SYSTEM** option in **Figure 7-3**.

WAFER-LX3 3.5" Motherboard

Step 7: The **SYSTEM PROPERTIES** screen in **Figure 7-4** appears.

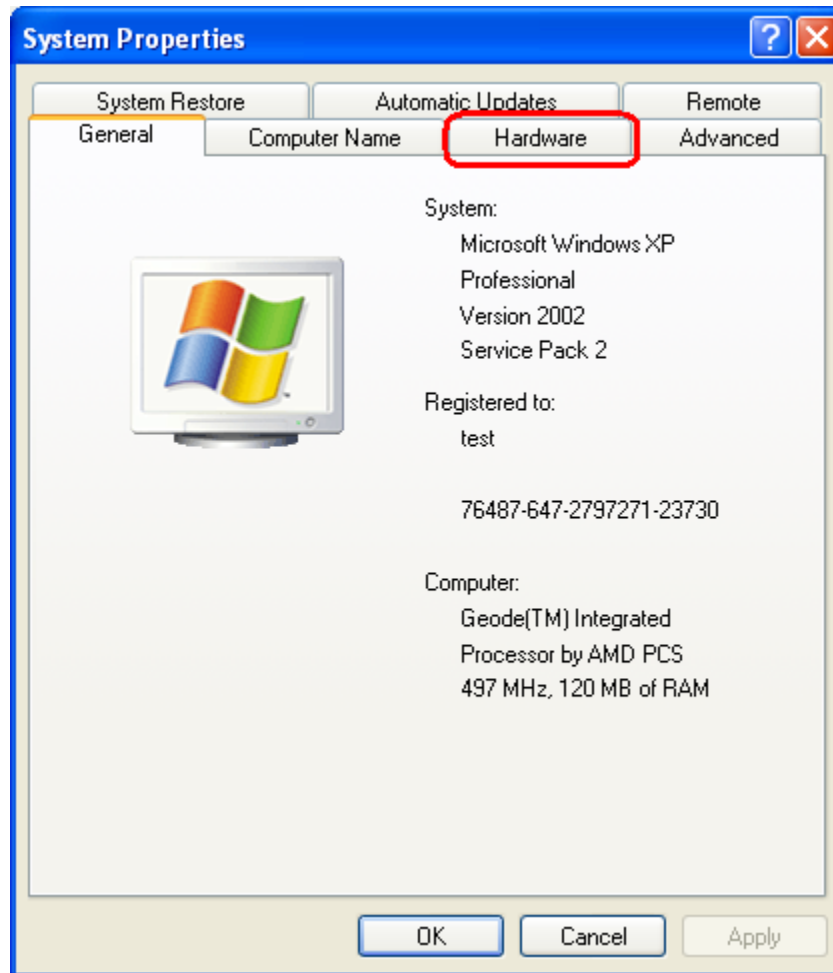


Figure 7-4: System Properties

Step 8: Double click the **HARDWARE** tab in the **Systems Property** window **Figure 7-4**.

Step 9: The screen in **Figure 7-5** appears.

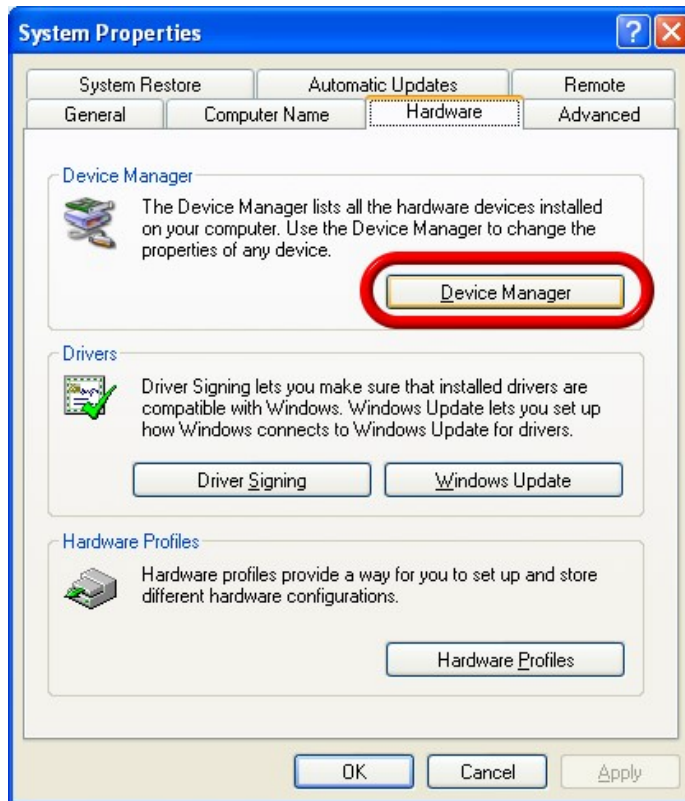


Figure 7-5: Open Device Manager

Step 10: Double click the **DEVICE MANAGER** tab in **Figure 7-5**.

Step 11: The **Device Manager** screen in **Figure 7-6** appears.

WAFER-LX3 3.5" Motherboard

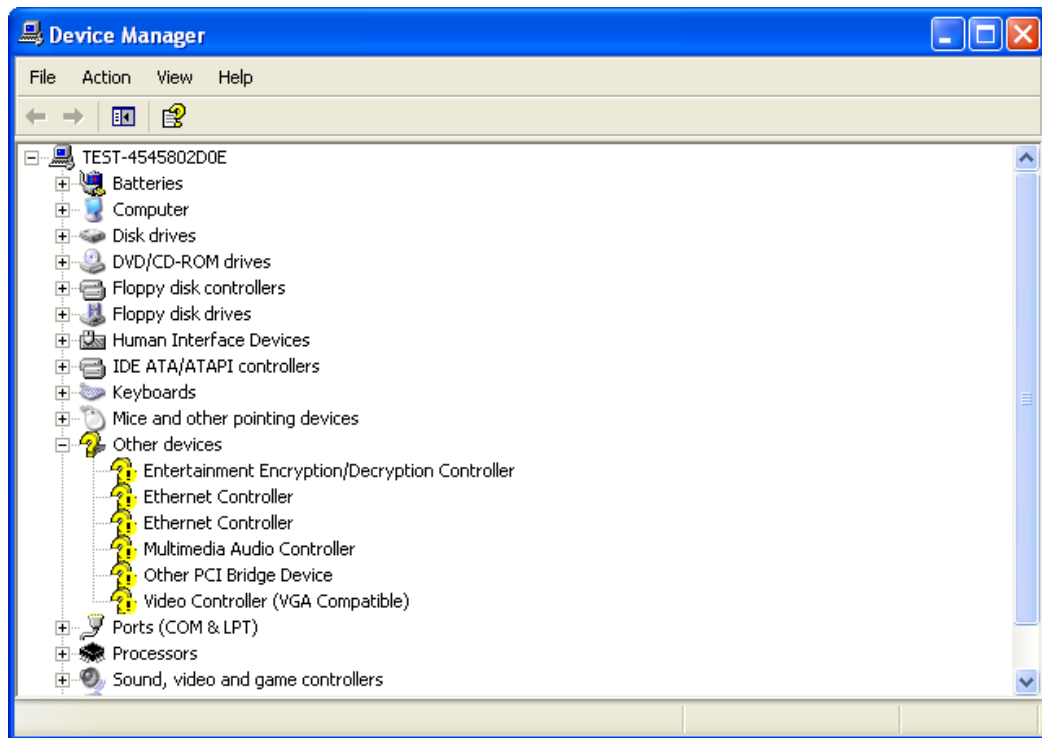


Figure 7-6: Device Manager

7.3 VGA Driver Installation

To install the VGA driver, please follow the instructions below.

Step 1: Open the **DEVICE MANAGER**. See **Section 7.2**.

Step 2: Right-click the **VGA CONTROLLER (VGA COMPATIBLE)** option listed under **OTHER DEVICES** in **Figure 7-7**.

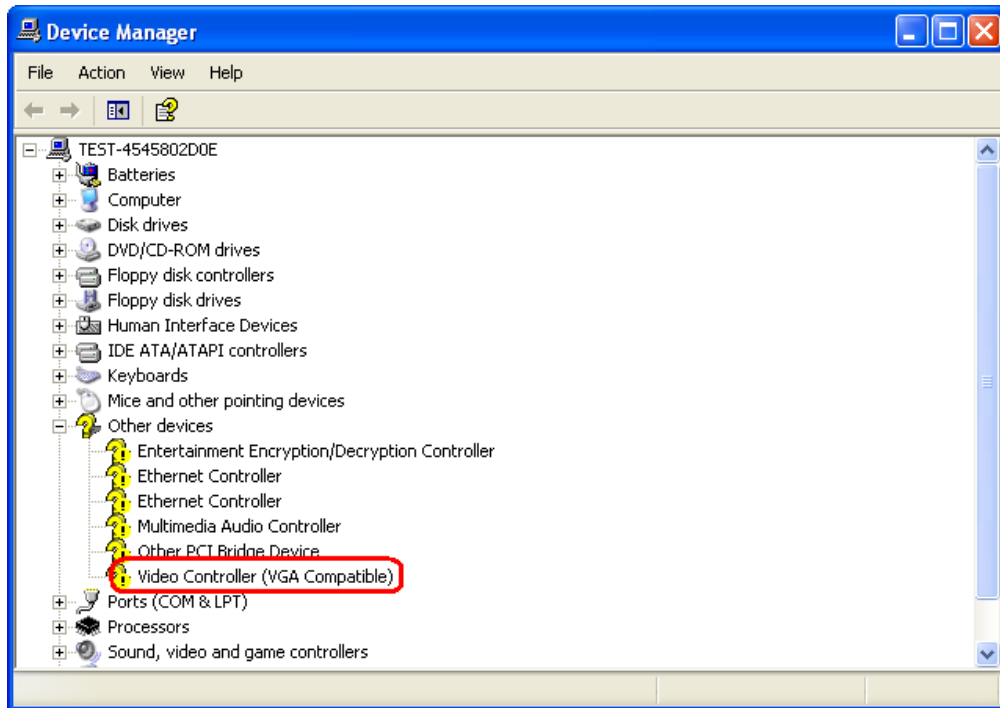


Figure 7-7: Video Controller (Device Manager)

Step 3: The small window in Figure 7-8 appears.

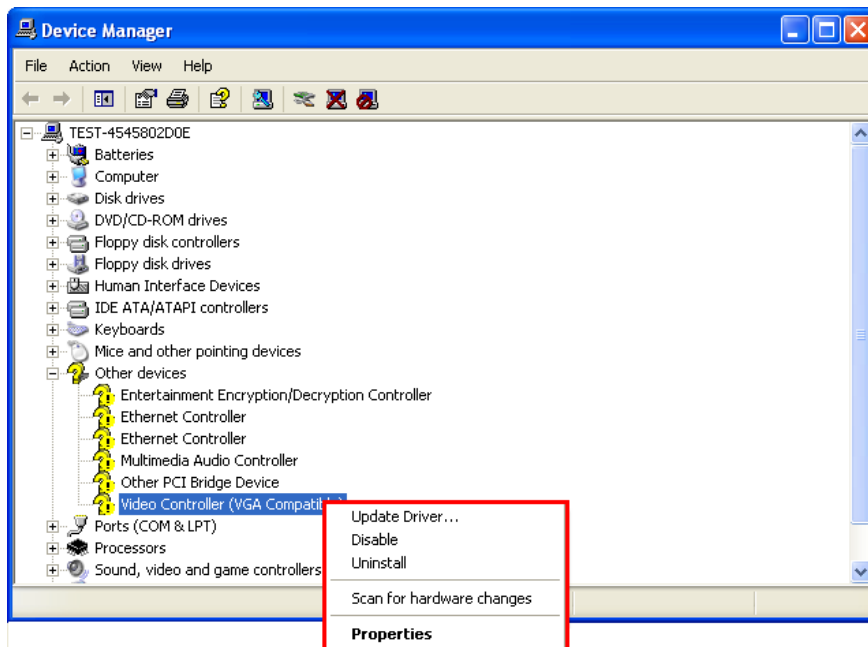


Figure 7-8: Update Driver Selection

WAFER-LX3 3.5" Motherboard

Step 4: Select the **UPDATE DRIVER** option in the small window shown in **Figure 7-8**.

Step 5: The **HARDWARE UPDATE WIZARD** in **Figure 7-9** appears.



Figure 7-9: Hardware Update Wizard

Step 6: Make sure the driver CD is in the disk.

Step 7: Select **NO, NOT THIS TIME** in **Figure 7-9** and click **NEXT**.

Step 8: The screen in **Figure 7-10** appears.

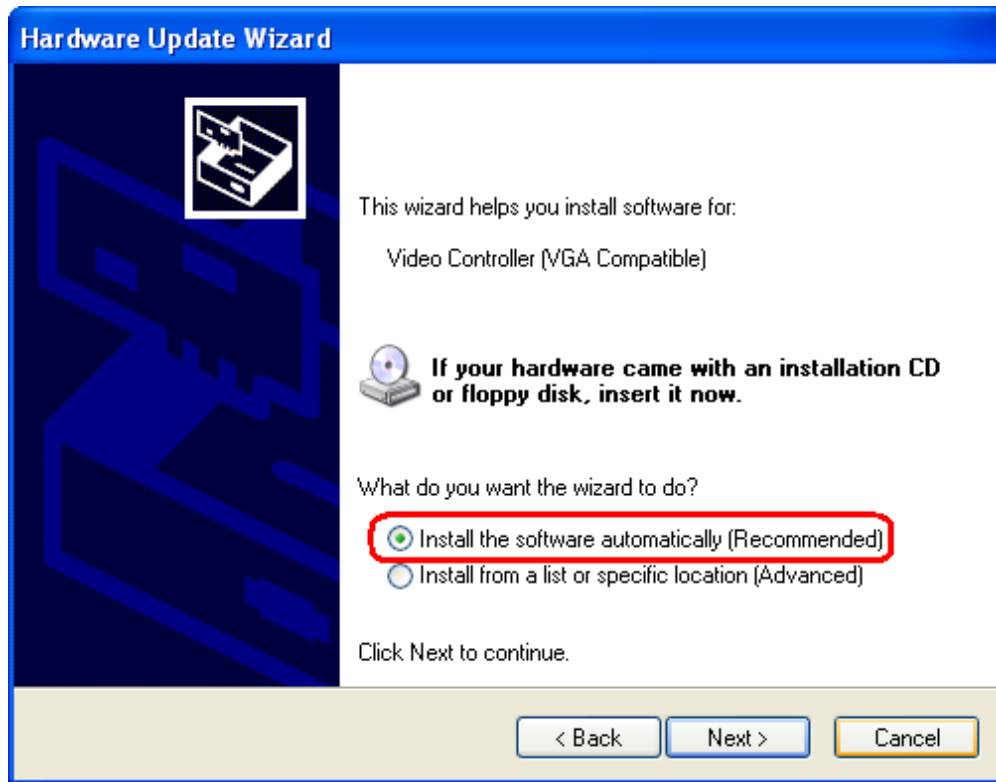


Figure 7-10: VGA Driver Installation Start

Step 9: Select the recommended option in **Figure 7-10**.

Step 10: The Wizard then searches for the driver. See **Figure 7-11**.

WAFER-LX3 3.5" Motherboard

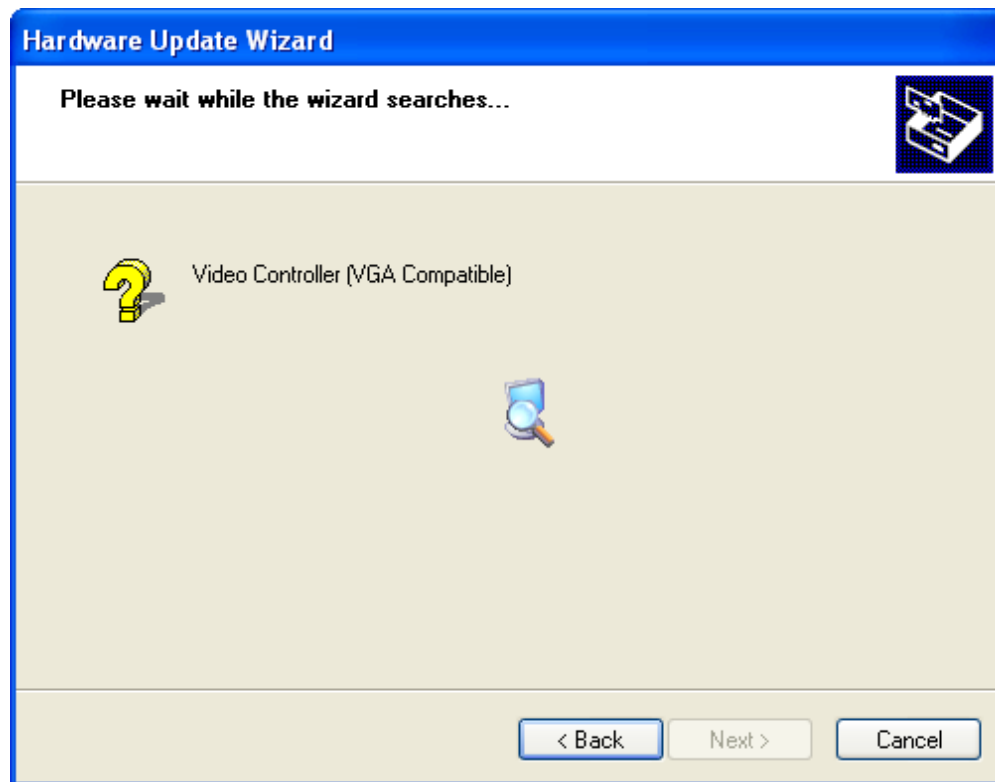


Figure 7-11: Wizard Search

Step 11: The warning screen in Figure 7-12 appears.

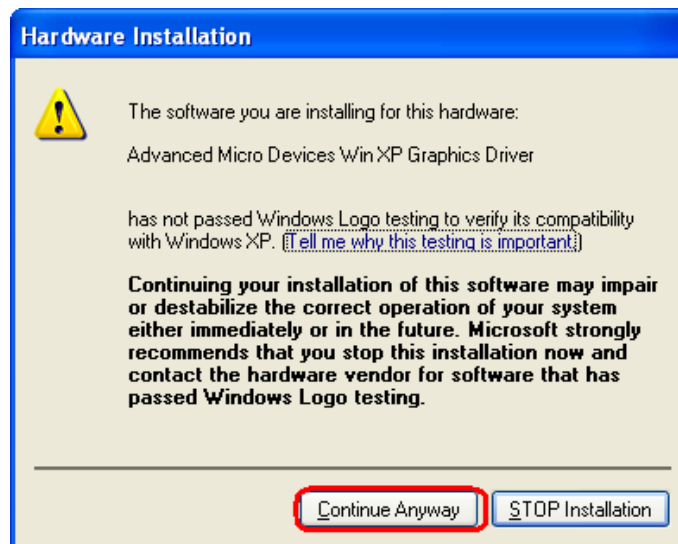


Figure 7-12: Wizard Warning Screen

Step 12: Click the **Continue Anyway** tab.

Step 13: The Wizard updates the driver. See **Figure 7-13**.



CAUTION:

When the VGA driver is installed the system first sets a system restore point and backs up old files. This may take some time. Be patient and wait for the installation procedure to be completed.

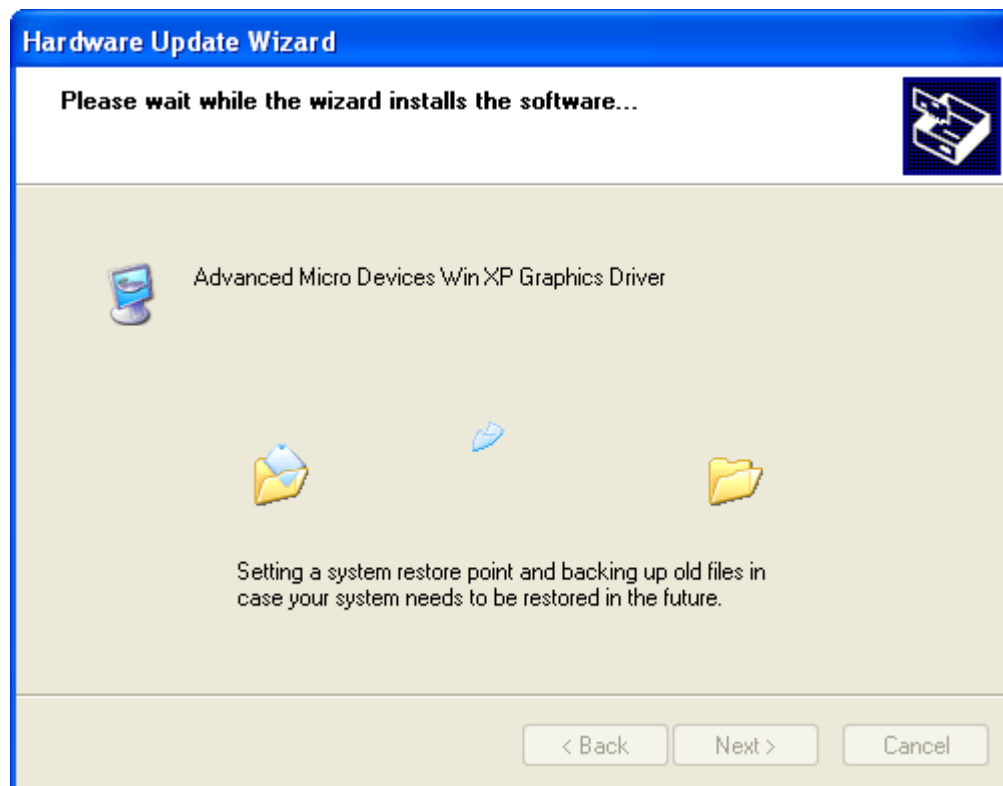


Figure 7-13: VGA Driver Installation

Step 14: When the driver is installed, the screen in **Figure 7-14** appears.

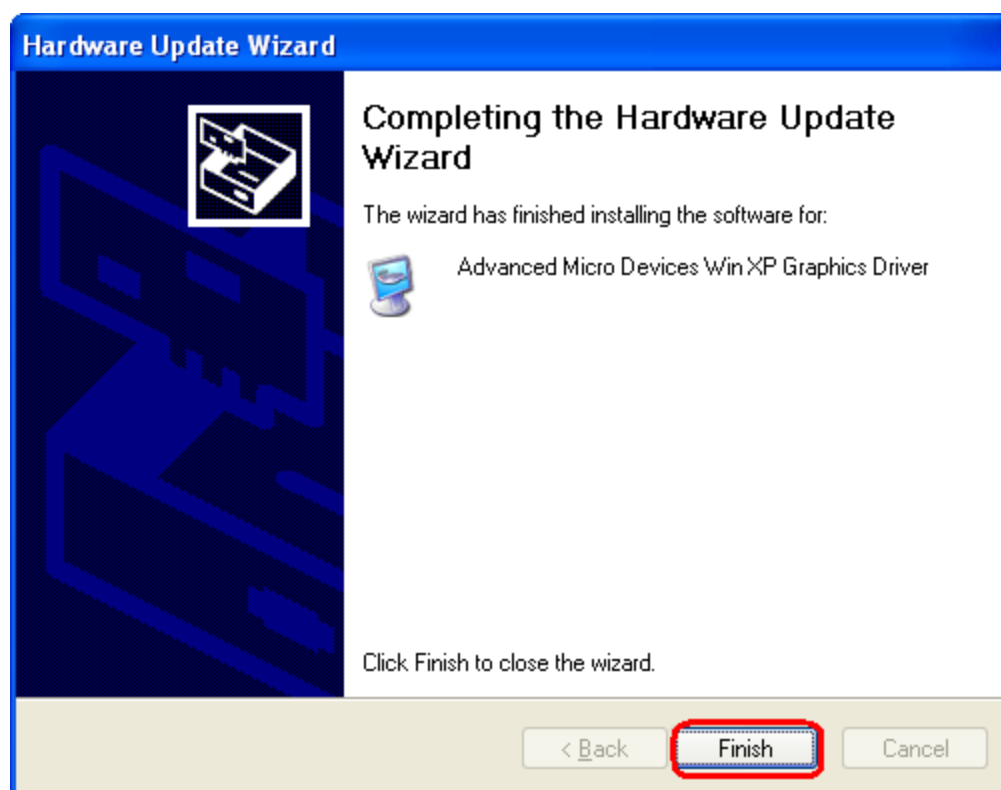


Figure 7-14: VGA Driver Installation Complete

Step 15: Click the Finish tab in to complete the **Figure 7-14** installation.

Step 16: The Device Manager refreshes and the Graphics Driver can be seen in the Display adapters option. See **Figure 7-15**.

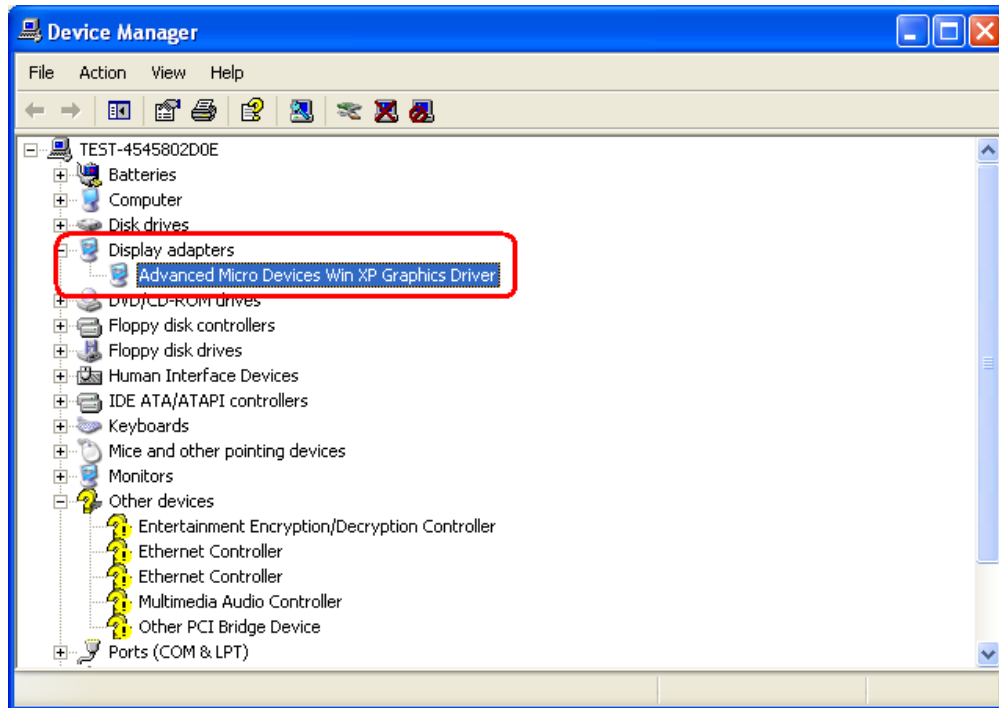


Figure 7-15: Device Manager Update

7.4 Audio Driver Installation

To install the Audio driver, please follow the instructions below.

Step 1: Open the **DEVICE MANAGER**. See **Section 7.2**.

Step 2: Right-click the **MULTIMEDIA AUDIO CONTROLLER** option listed under **OTHER DEVICES** in **Figure 7-16**.

WAFER-LX3 3.5" Motherboard

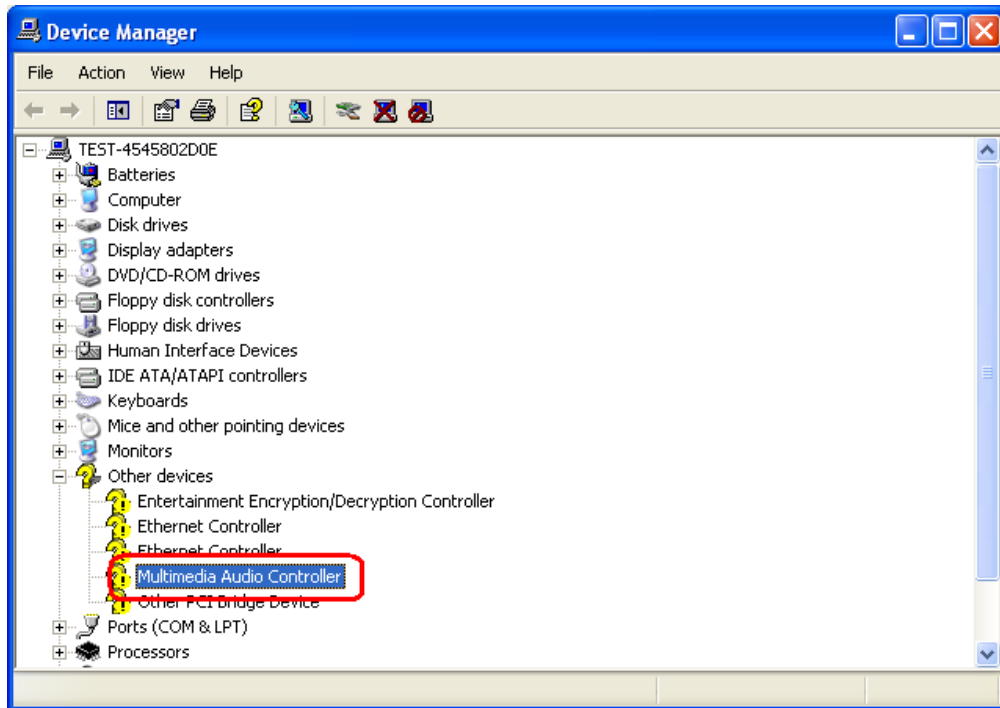


Figure 7-16: Audio Controller (Device Manager)

Step 3: The small window in **Figure 7-17** appears.

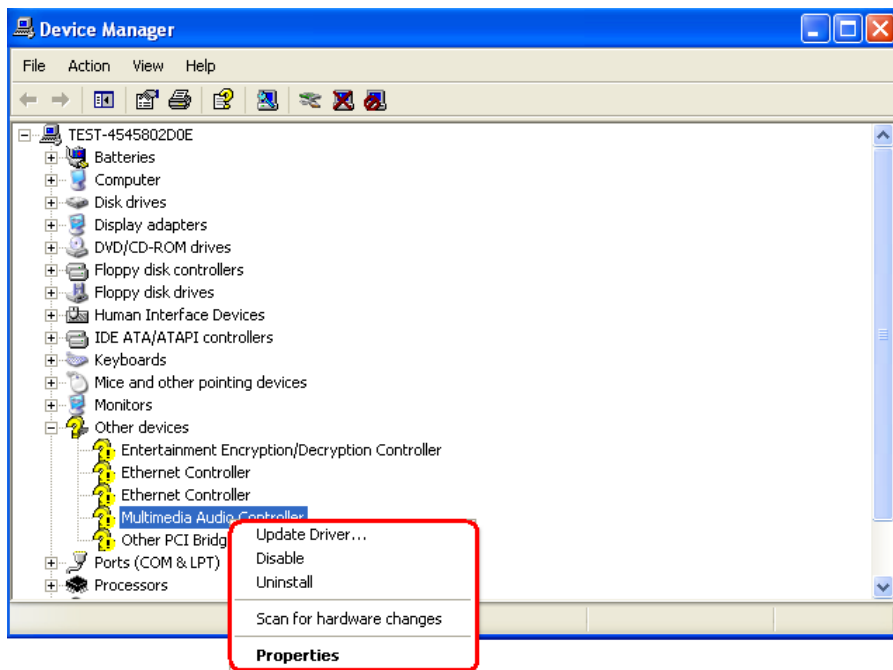


Figure 7-17: Update Audio Driver Selection

Step 4: Select the **UPDATE DRIVER** option in the small window shown in **Figure 7-17**.

Step 5: The **HARDWARE UPDATE WIZARD** in **Figure 7-18** appears.

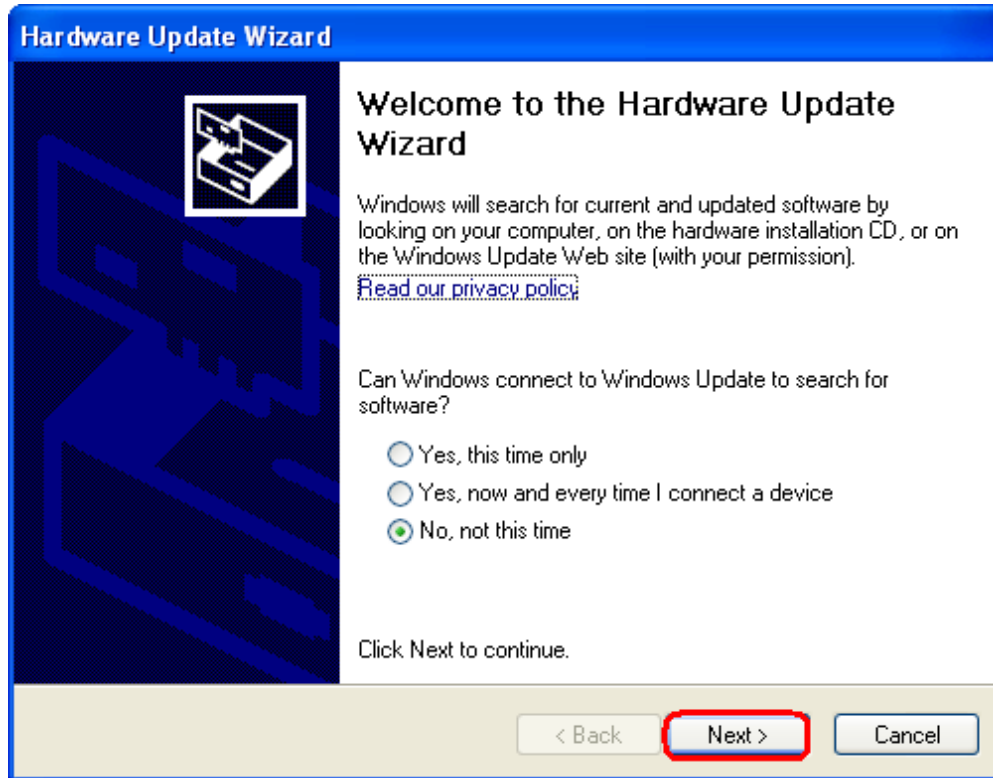


Figure 7-18: Hardware Update Wizard

Step 6: Make sure the driver CD is in the disk.

Step 7: Select **NO, NOT THIS TIME** in **Figure 7-18** and click **NEXT**.

Step 8: The screen in **Figure 7-19** appears.

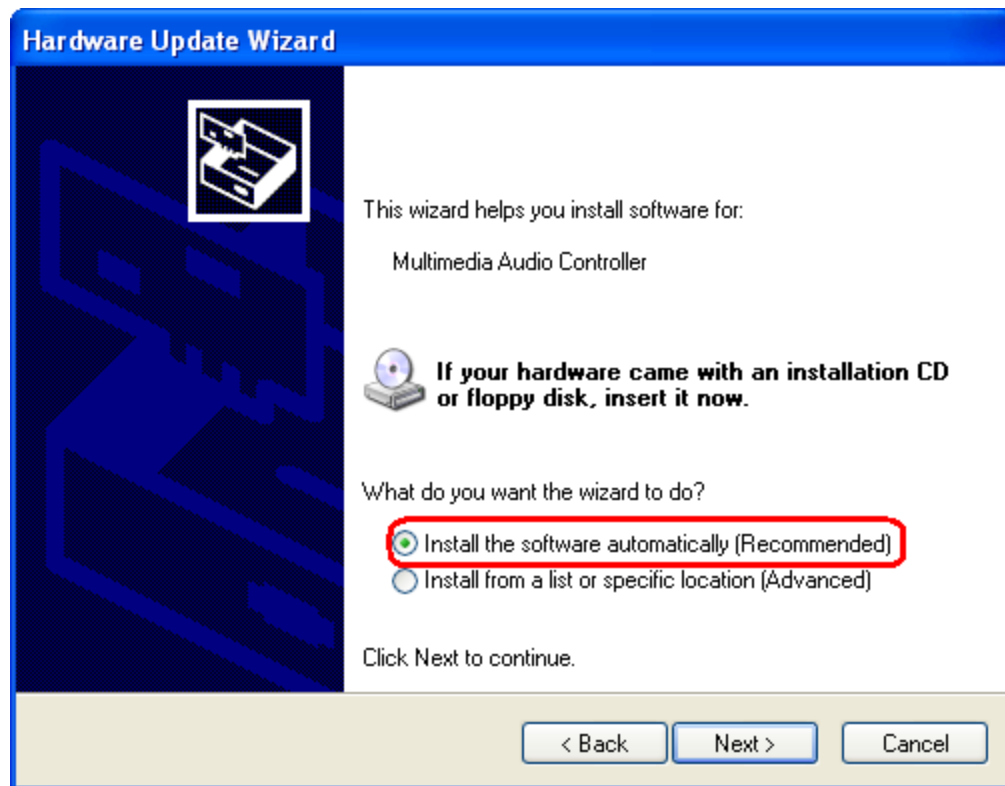


Figure 7-19: Audio Driver Installation Start

Step 9: Select the recommended option in **Figure 7-19**.

Step 10: The Wizard then searches for the driver. See **Figure 7-20**.

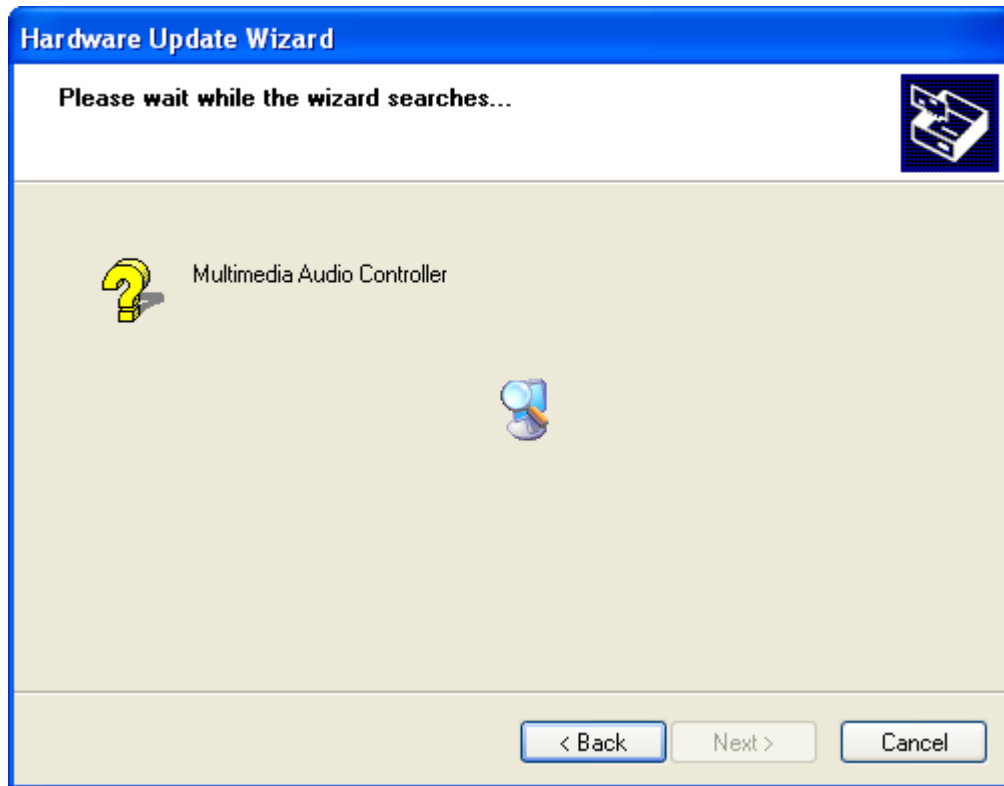


Figure 7-20: Wizard Search

Step 11: The warning screen in Figure 7-21 appears.



Figure 7-21: Wizard Warning Screen

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Step 12: Click the **Continue Anyway** tab.

Step 13: The Wizard updates the driver. See **Figure 7-22**.



CAUTION:

When the Audio driver is installed the system first sets a system restore point and backs up old files. This may take some time. Be patient and wait for the installation procedure to be completed.

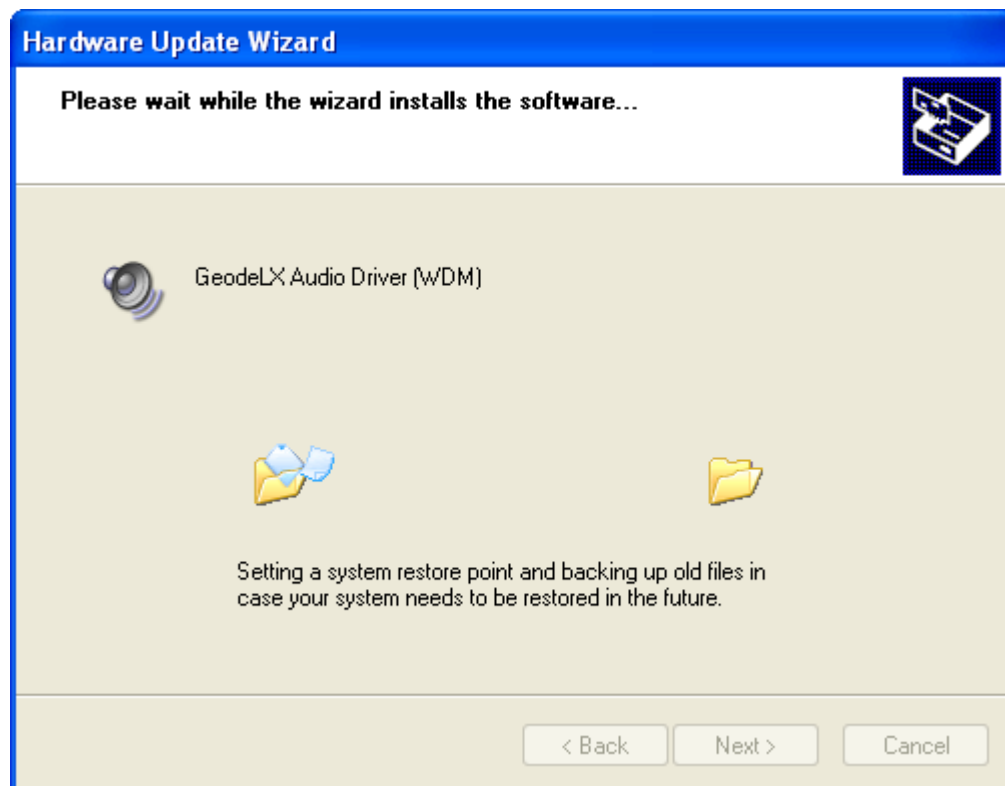


Figure 7-22: Audio Driver Installation

Step 14: When the driver is installed, the screen in **Figure 7-23** appears.

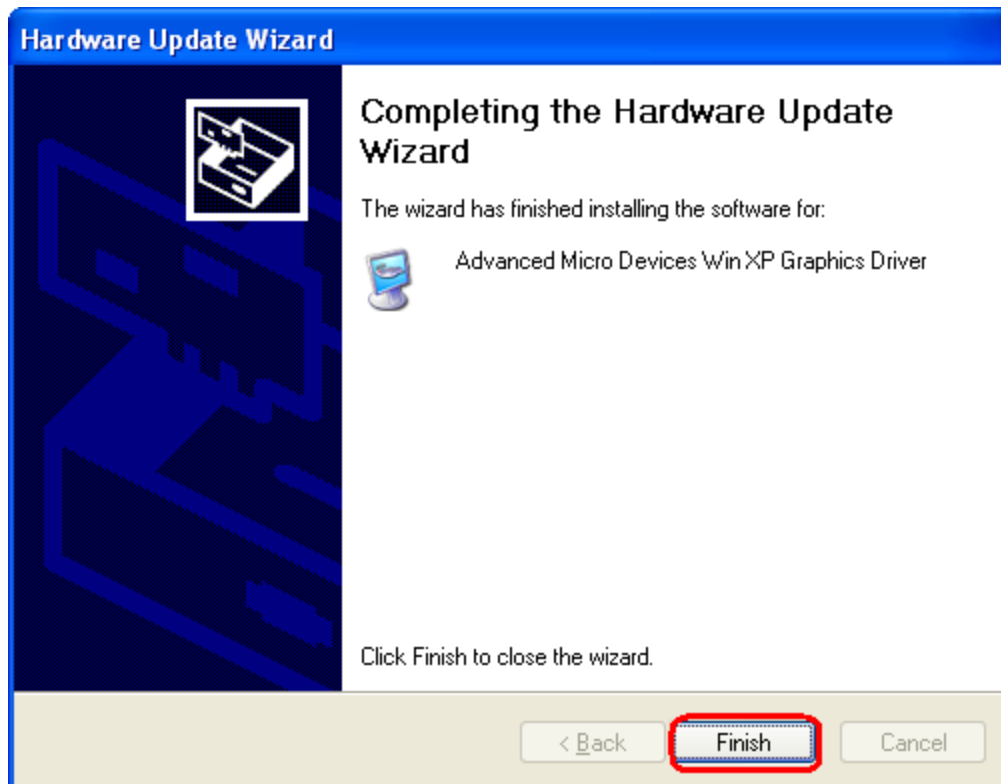


Figure 7-23: Audio Driver Installation Complete

Step 15: Click the Finish tab in to complete the **Figure 7-23** installation.

Step 16: The Device Manager refreshes and the Audio Driver can be seen in the Sound, Video and Game Controllers option. See **Figure 7-24**.

WAFER-LX3 3.5" Motherboard

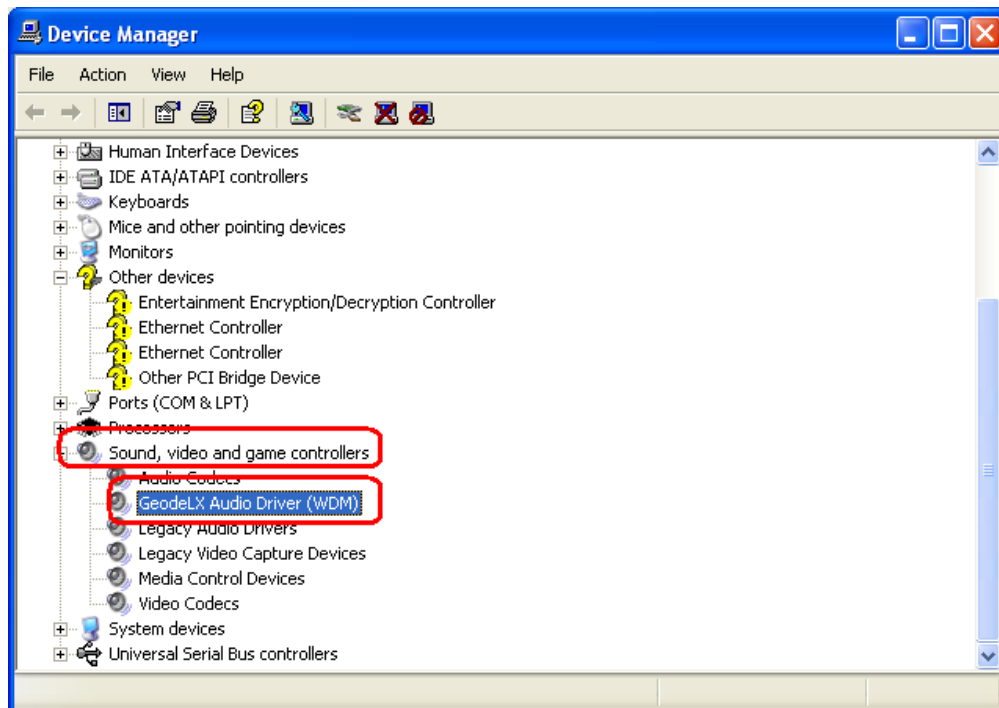


Figure 7-24: Device Manager Update

7.5 Ethernet Driver Installation

To install the Ethernet driver, please follow the instructions below.

Step 1: Open the **DEVICE MANAGER**. See **Section 7.2**.

Step 2: Right-click the **ETHERNET CONTROLLER** option listed under **OTHER DEVICES** in **Figure 7-25**.

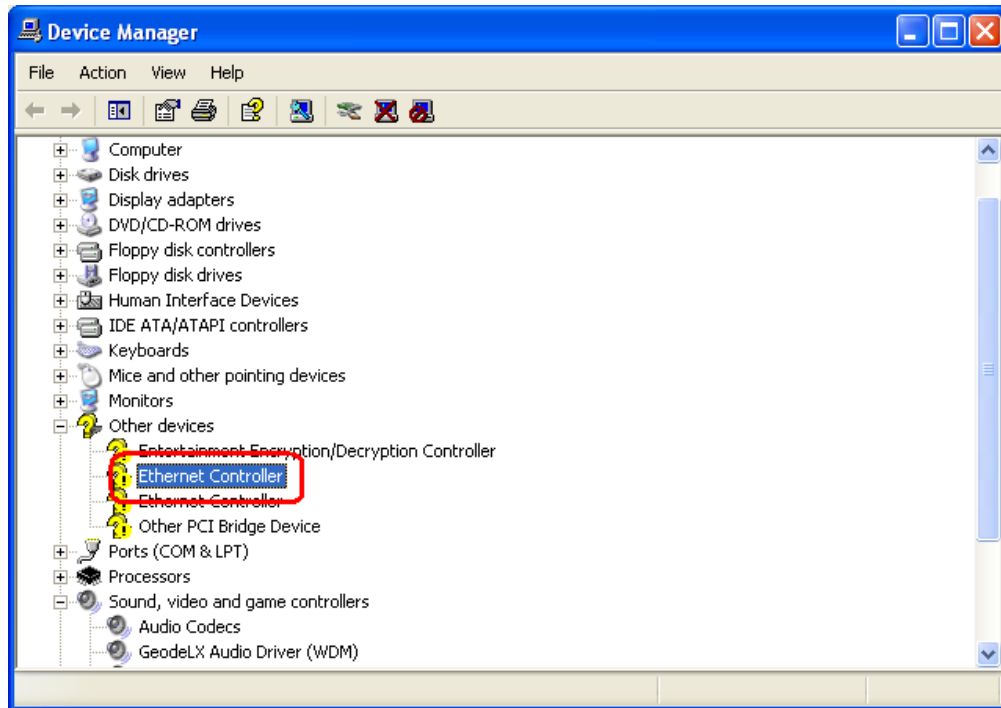


Figure 7-25: Ethernet Controller (Device Manager)

Step 3: The small window in **Figure 7-26** appears.

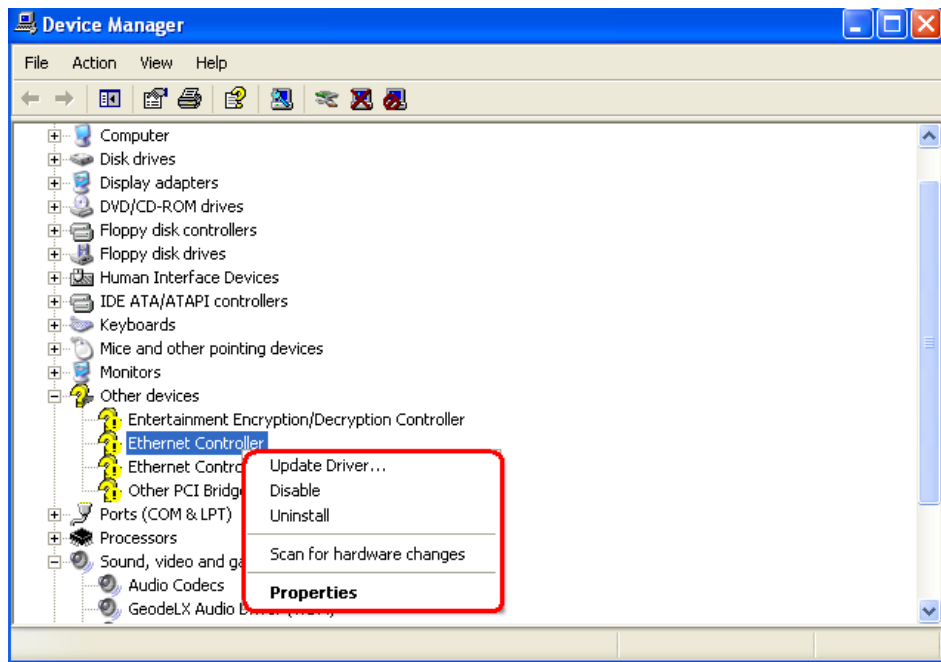


Figure 7-26: Update Ethernet Driver Selection

WAFER-LX3 3.5" Motherboard

Step 4: Select the **UPDATE DRIVER** option in the small window shown in **Figure 7-26**.

Step 5: The **HARDWARE UPDATE WIZARD** in **Figure 7-27** appears.



Figure 7-27: Hardware Update Wizard

Step 6: Make sure the driver CD is in the disk.

Step 7: Select **NO, NOT THIS TIME** in **Figure 7-27** and click **NEXT**.

Step 8: The screen in **Figure 7-28** appears.

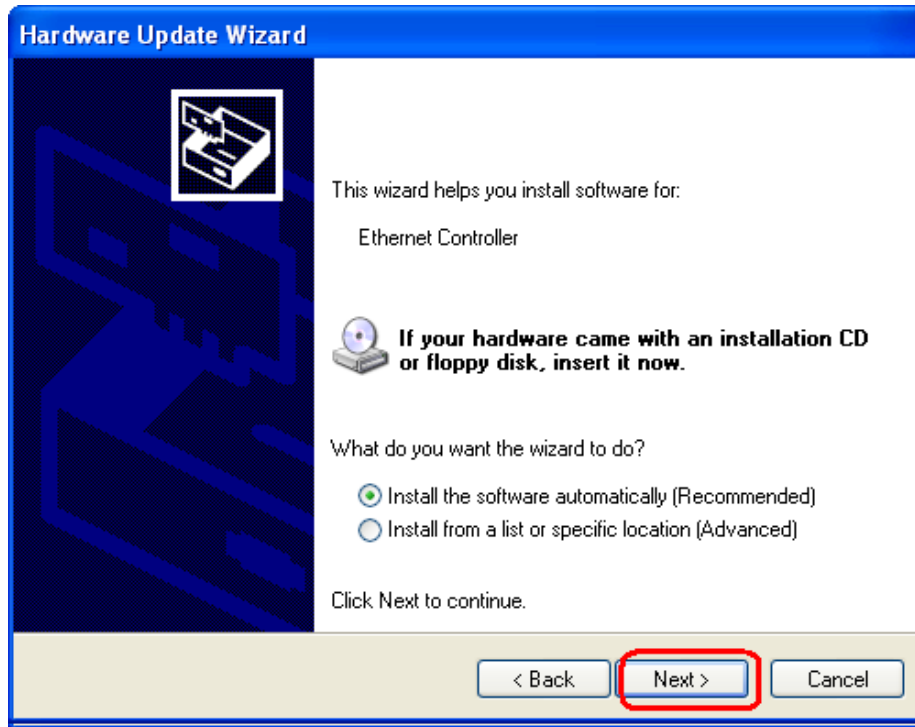


Figure 7-28: Ethernet Driver Installation Start

Step 9: Select the recommended option in **Figure 7-28**.

Step 10: The Wizard then searches for the driver. See **Figure 7-29**.

WAFER-LX3 3.5" Motherboard

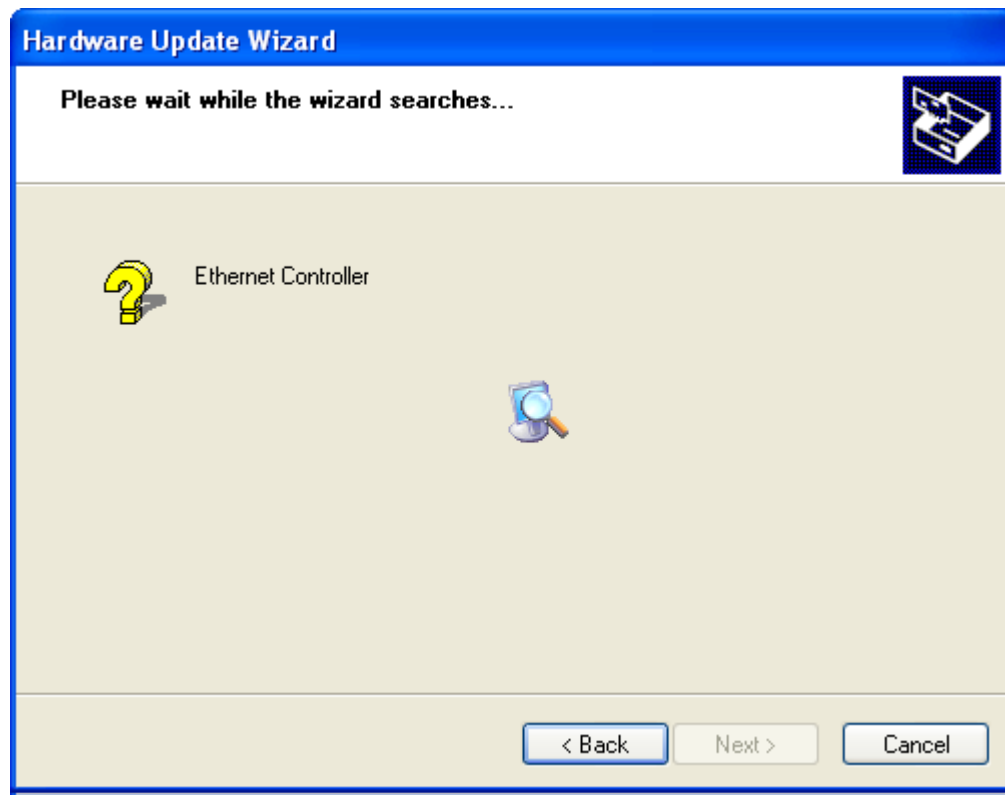


Figure 7-29: Wizard Search

Step 11: The warning screen in **Figure 7-30** appears.



Figure 7-30: Wizard Warning Screen

Step 12: Click the **Continue Anyway** tab.

Step 13: The Wizard updates the driver. See **Figure 7-31**.



CAUTION:

When the Ethernet driver is installed the system first sets a system restore point and backs up old files. This may take some time. Be patient and wait for the installation procedure to be completed.

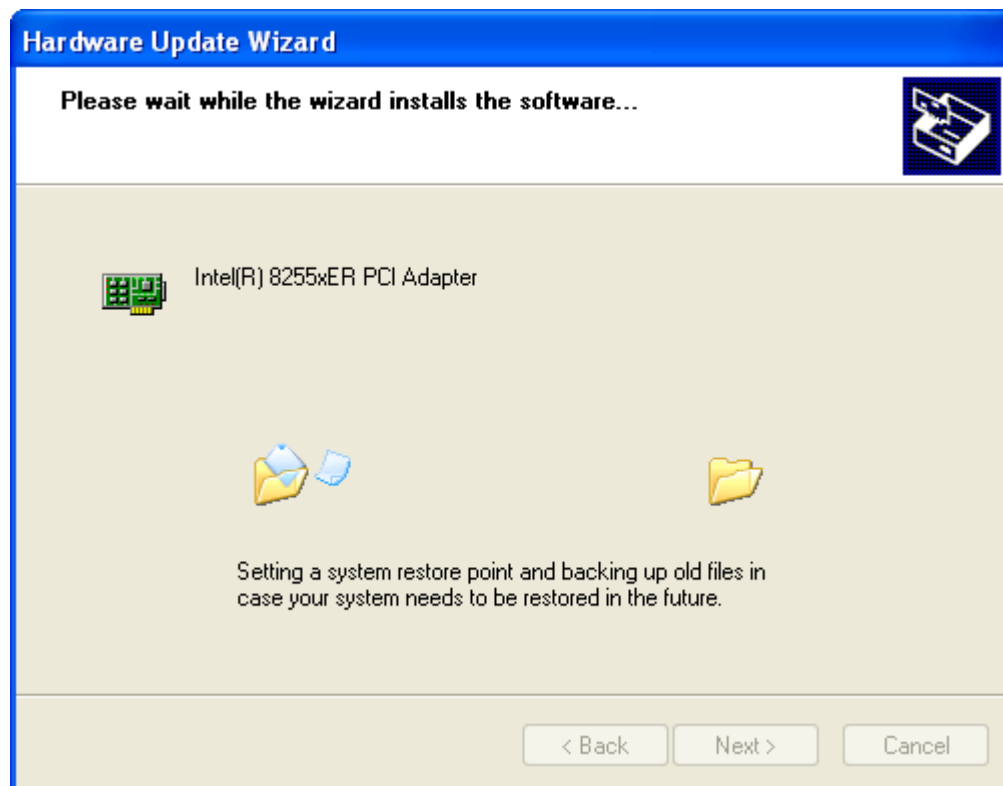


Figure 7-31: Ethernet Driver Installation

Step 14: When the driver is installed, the screen in **Figure 7-32** appears.

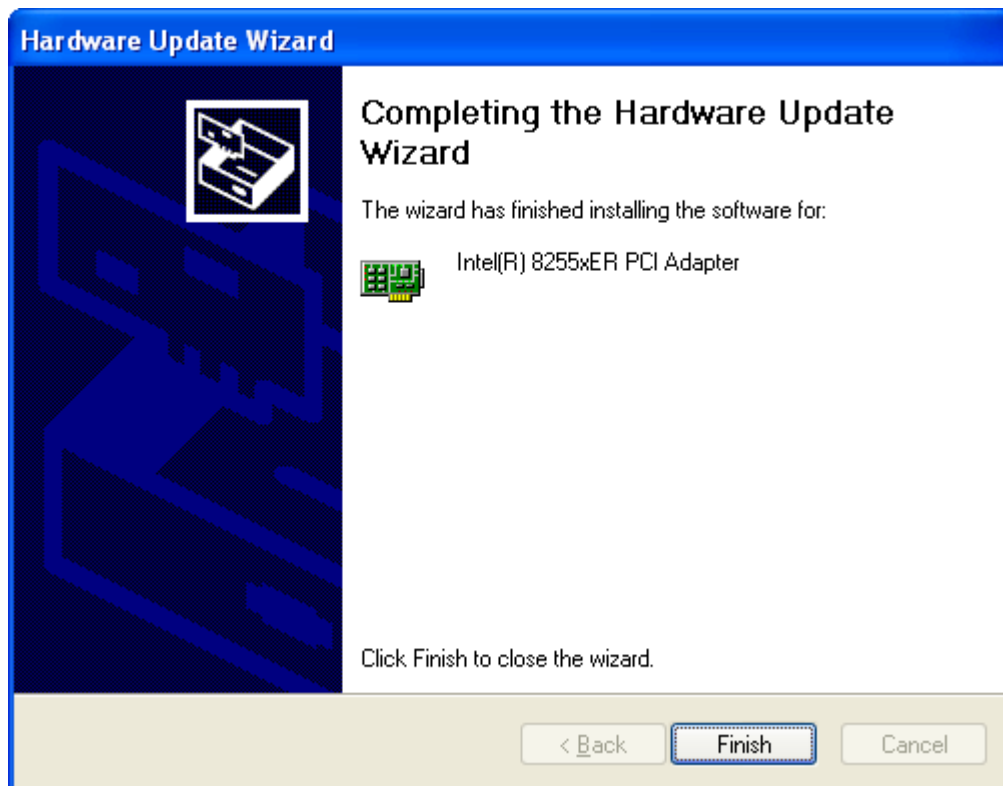


Figure 7-32: Ethernet Driver Installation Complete

Step 15: Click the Finish tab in to complete the **Figure 7-32** installation.

Step 16: The Device Manager refreshes and the Ethernet Driver can be seen in the Network Adapters option. See **Figure 7-33**.

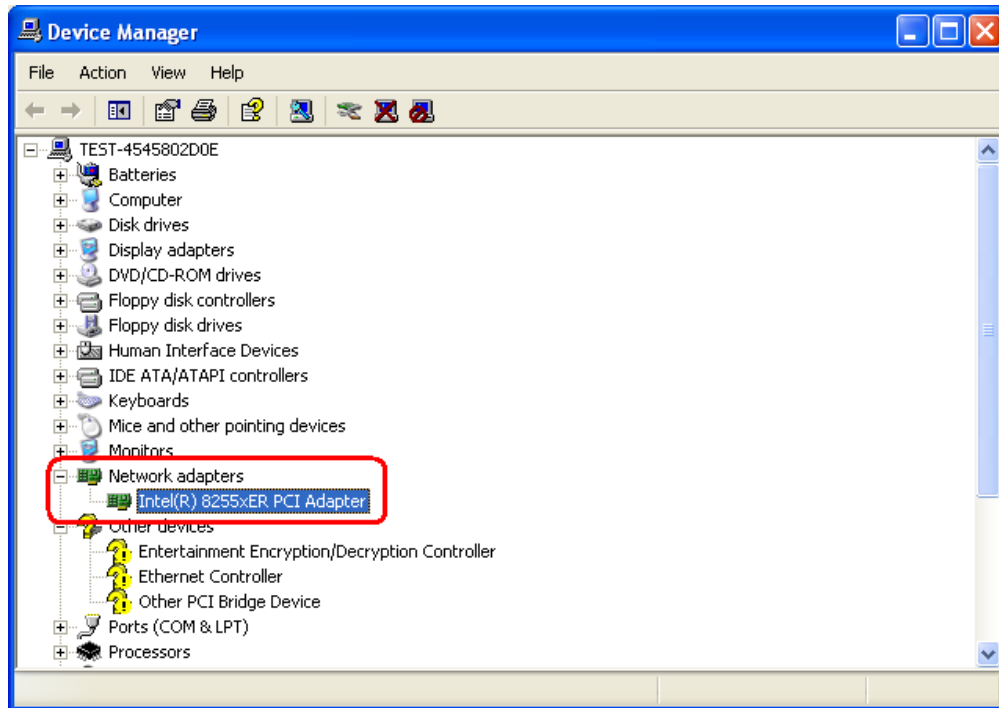


Figure 7-33: Device Manager Update

7.6 Entertainment Encryption/Decryption Controller

To install the Entertainment Encryption/Decryption Controller driver, please follow the instructions below.

- Step 1:** Open the **DEVICE MANAGER**. See **Section 7.2**.
- Step 2:** Right-click the **ENTERTAINMENT ENCRYPTION/DECRYPTION CONTROLLER** option listed under **OTHER DEVICES** in **Figure 7-34**.

WAFER-LX3 3.5" Motherboard

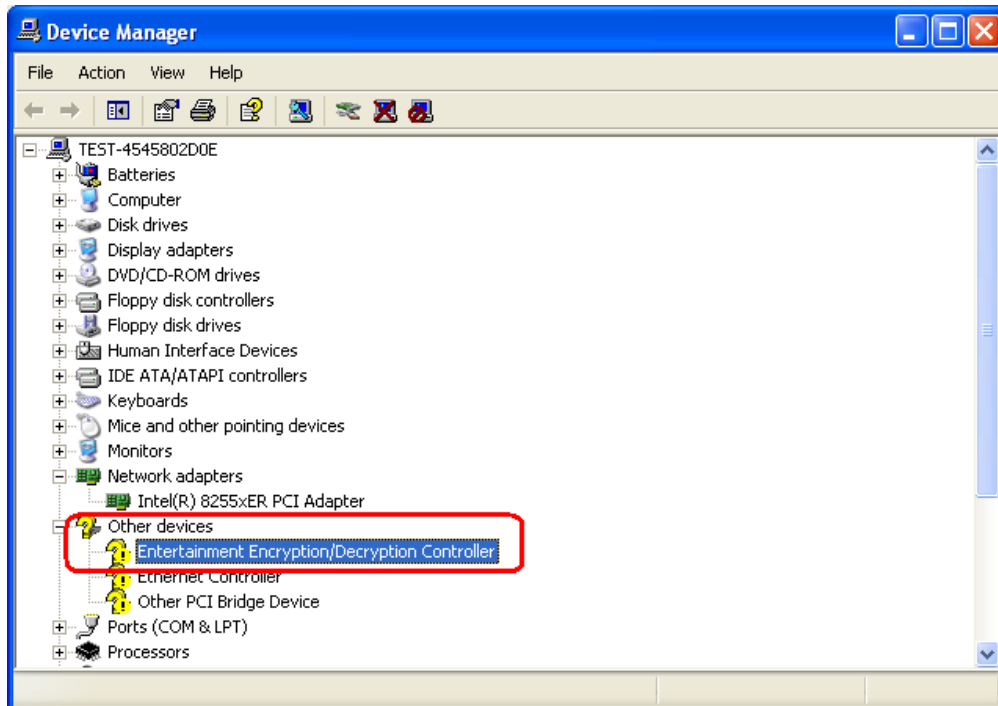


Figure 7-34: Entertainment Encryption/Decryption Controller (Device Manager)

Step 3: The small window in **Figure 7-35** appears.

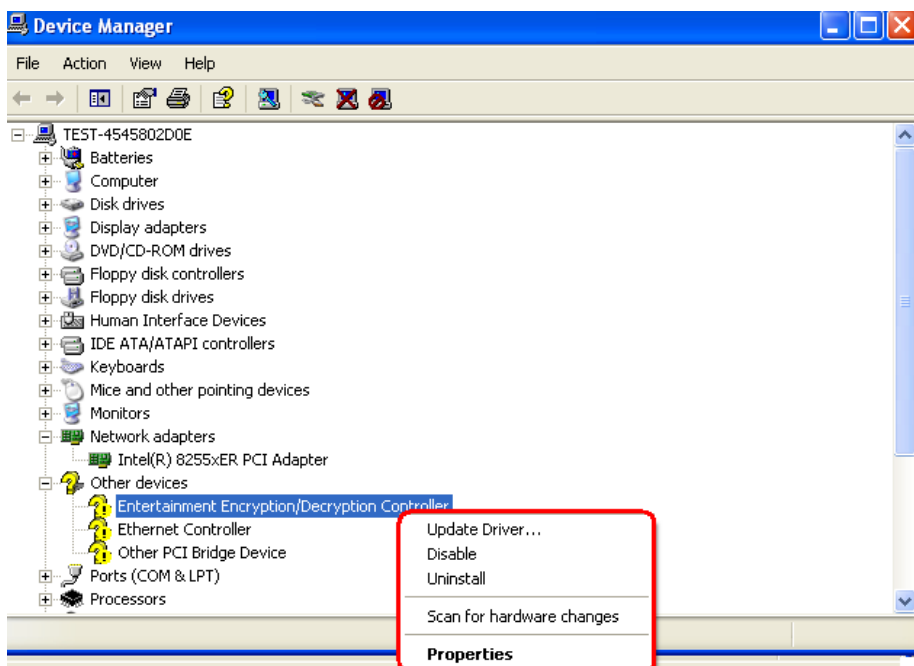


Figure 7-35: Update Entertainment Encryption/Decryption Controller Driver Selection

Step 4: Select the **UPDATE DRIVER** option in the small window shown in **Figure 7-35**.

Step 5: The **HARDWARE UPDATE WIZARD** in **Figure 7-36** appears.



Figure 7-36: Hardware Update Wizard

Step 6: Make sure the driver CD is in the disk.

Step 7: Select **NO, NOT THIS TIME** in **Figure 7-36** and click **NEXT**.

Step 8: The screen in **Figure 7-37** appears.

WAFER-LX3 3.5" Motherboard

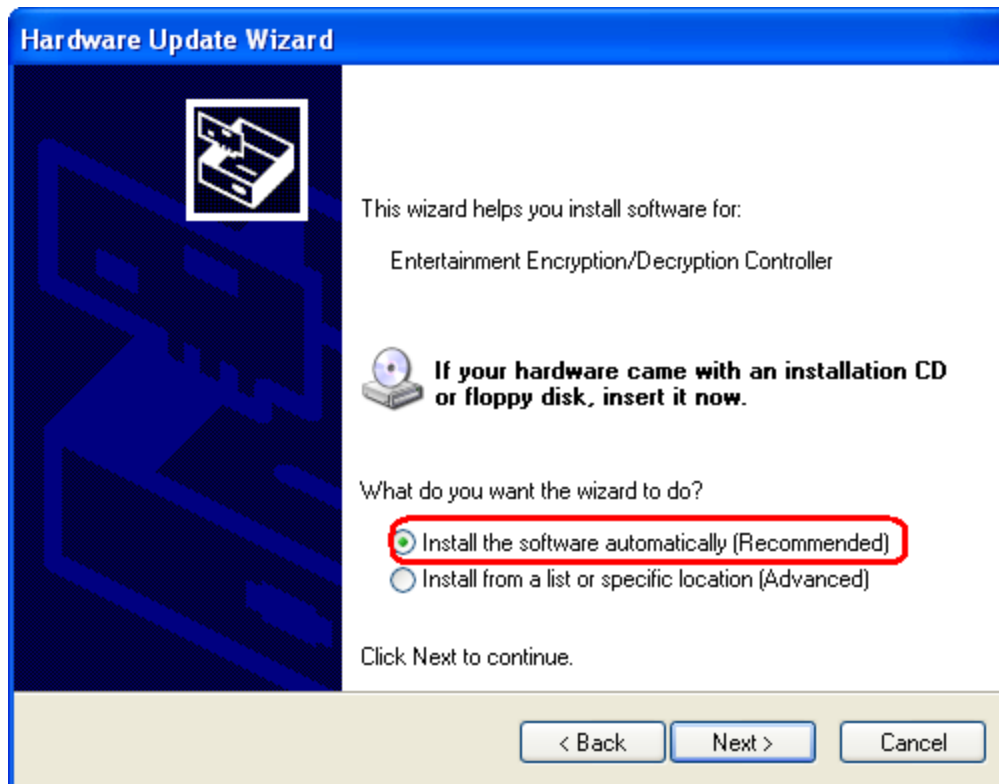


Figure 7-37: Entertainment Encryption/Decryption Controller Driver Installation Start

Step 9: Select the recommended option in **Figure 7-37**.

Step 10: The Wizard then searches for the driver. See **Figure 7-38**.

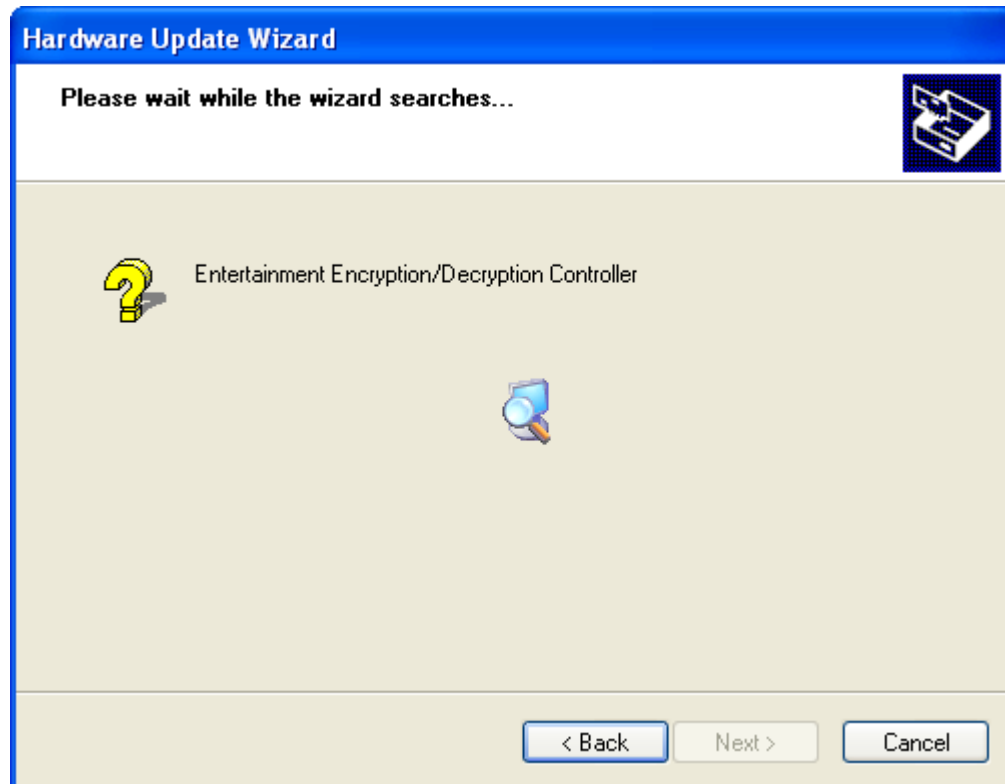


Figure 7-38: Wizard Search

Step 11: The Wizard updates the driver. See **Figure 7-39**.



CAUTION:

When the driver is installed the system first sets a system restore point and backs up old files. This may take some time. Be patient and wait for the installation procedure to be completed.

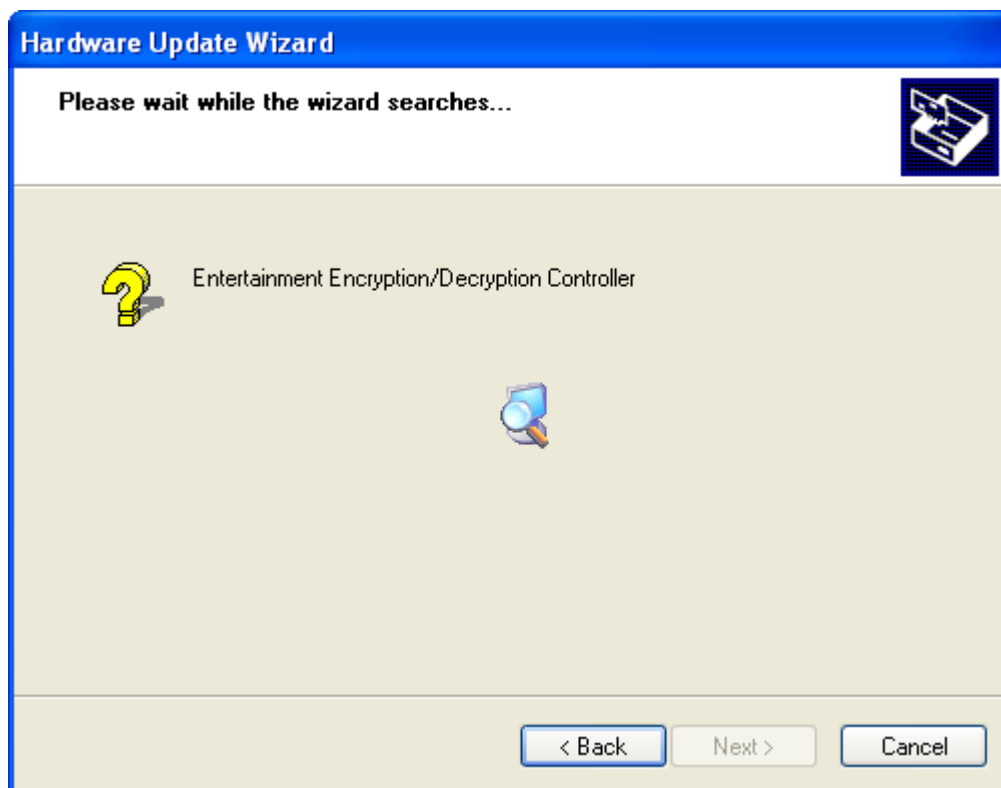


Figure 7-39: Entertainment Encryption/Decryption Controller Driver Installation

Step 12: When the driver is installed, the screen in **Figure 7-40** appears.

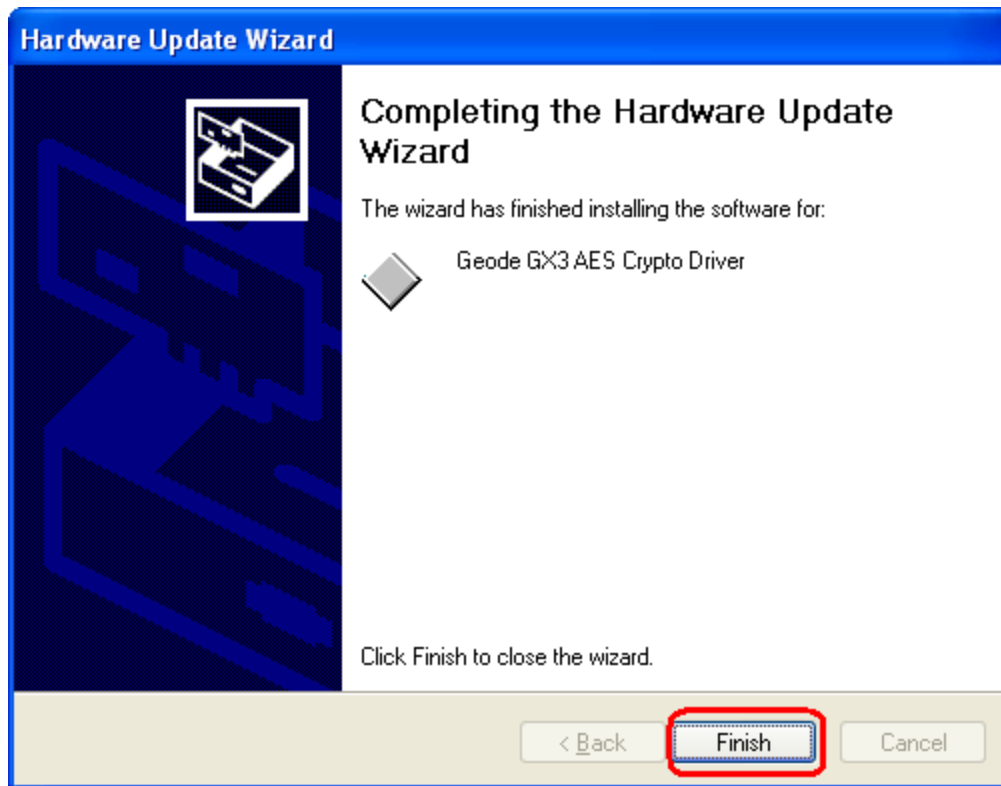


Figure 7-40: Entertainment Encryption/Decryption Controller Driver Installation Complete

Step 13: Click the Finish tab in to complete the **Figure 7-40** installation.

Step 14: The Device Manager refreshes and the Entertainment Encryption/Decryption Controller Driver can be seen in the Crypto Devices option. See **Figure 7-41**.

WAFER-LX3 3.5" Motherboard

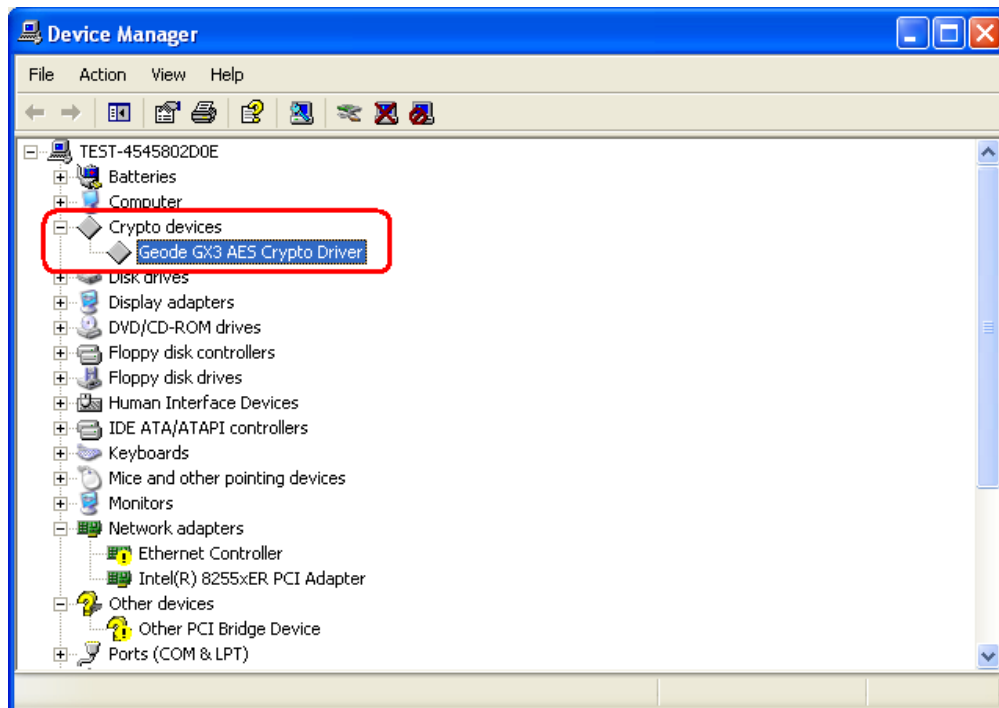


Figure 7-41: Device Manager Update

7.7 Other PCI Bridge Device Controller

To install the PCI bridge driver, please follow the instructions below.

- Step 1:** Open the **DEVICE MANAGER**. See **Section 7.2**.
- Step 2:** Right-click the **OTHER PCI BRIDGE DEVICE CONTROLLER** option listed under **OTHER DEVICES** in **Figure 7-42**.

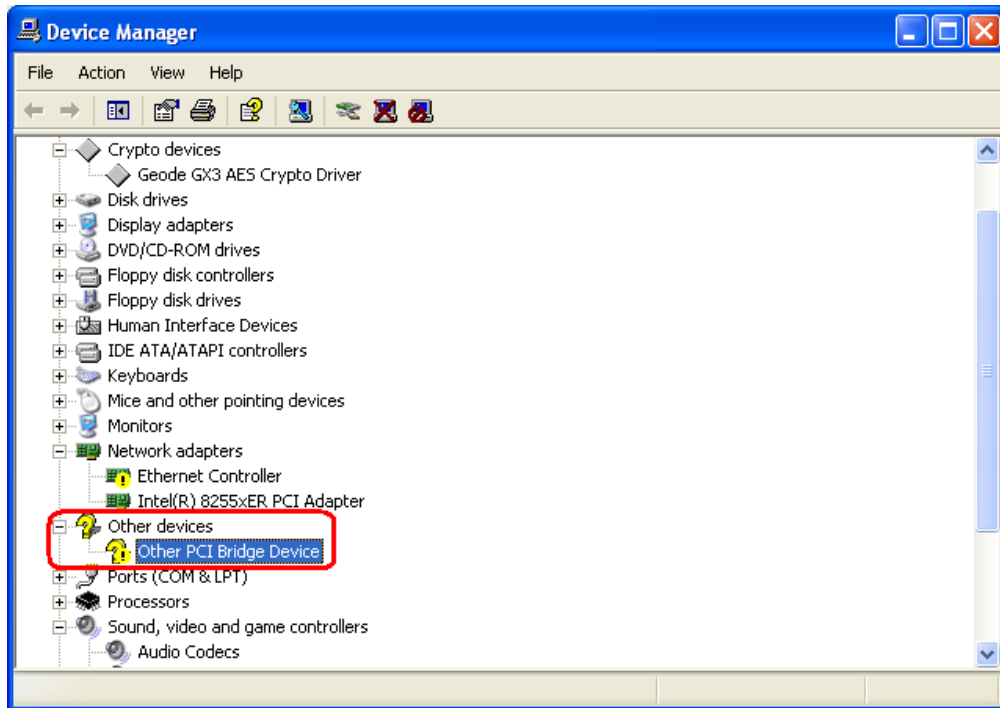


Figure 7-42: Other PCI Bridge Device Controller (Device Manager)

Step 3: The small window in Figure 7-43 appears.

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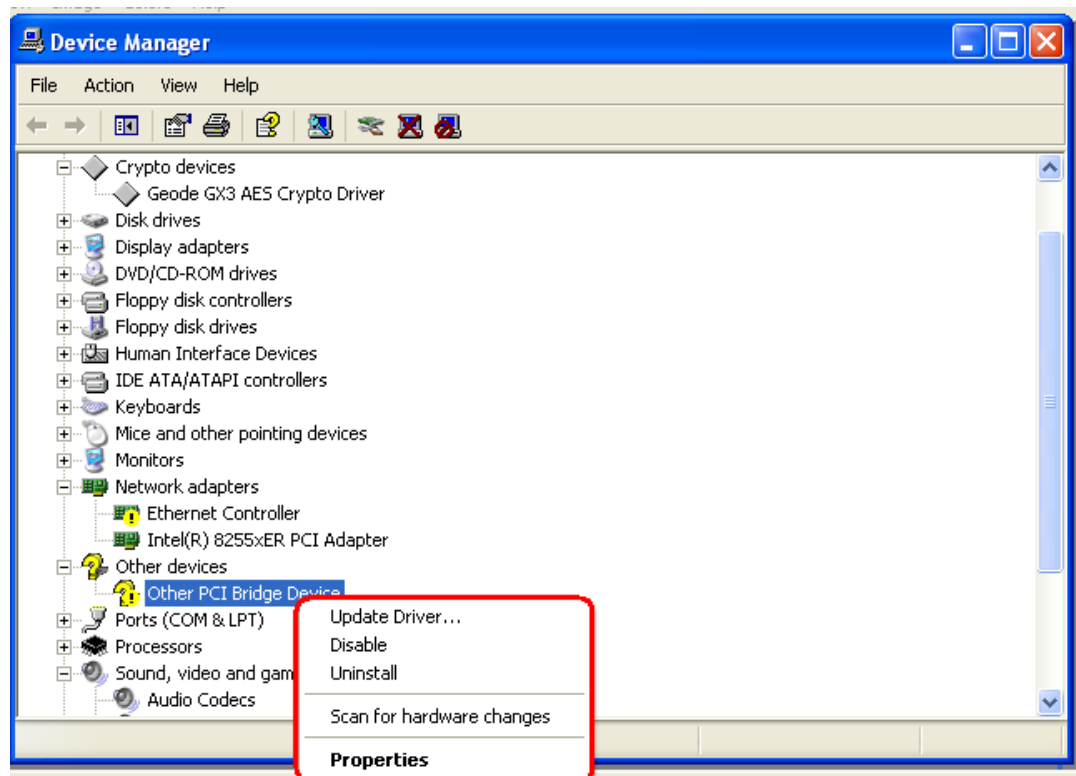


Figure 7-43: Other PCI Bridge Device Controller Driver Selection

Step 4: Select the **UPDATE DRIVER** option in the small window shown in Figure 7-43.

Step 5: The **HARDWARE UPDATE WIZARD** in Figure 7-44 appears.



Figure 7-44: Hardware Update Wizard

- Step 6:** Make sure the driver CD is in the disk.
- Step 7:** Select **NO, NOT THIS TIME** in **Figure 7-44** and click **NEXT**.
- Step 8:** The screen in **Figure 7-45** appears.

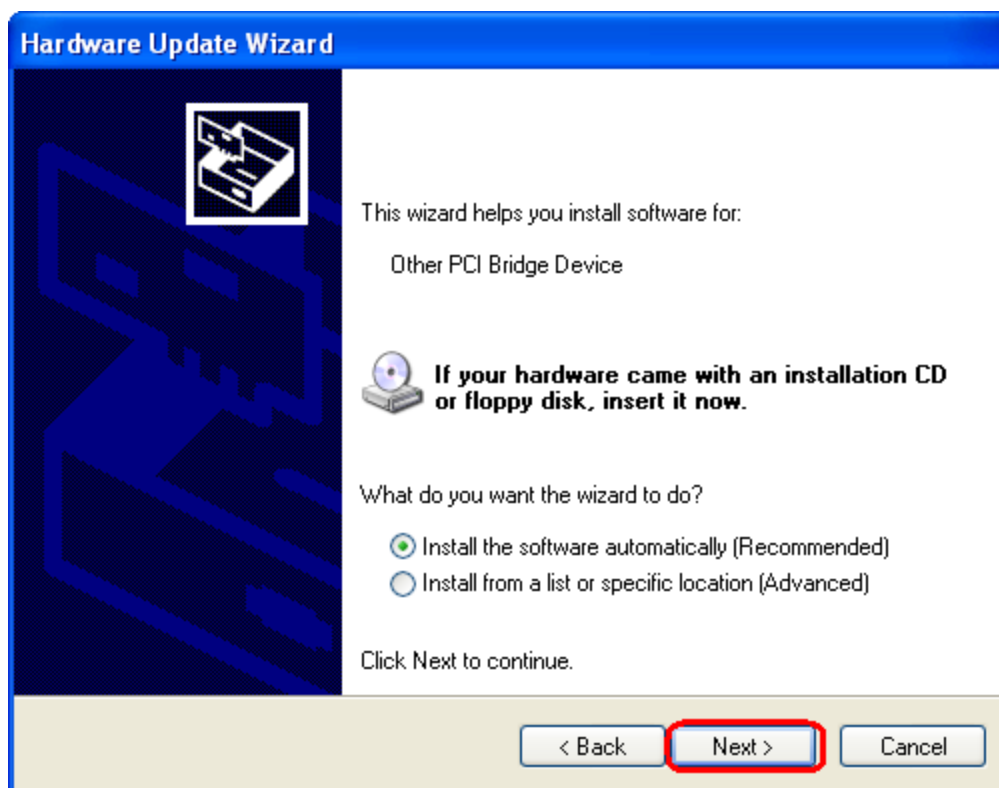


Figure 7-45: Other PCI Bridge Device Controller Driver Installation Start

Step 9: Select the recommended option in **Figure 7-45**.

Step 10: The Wizard then searches for the driver. See **Figure 7-46**.

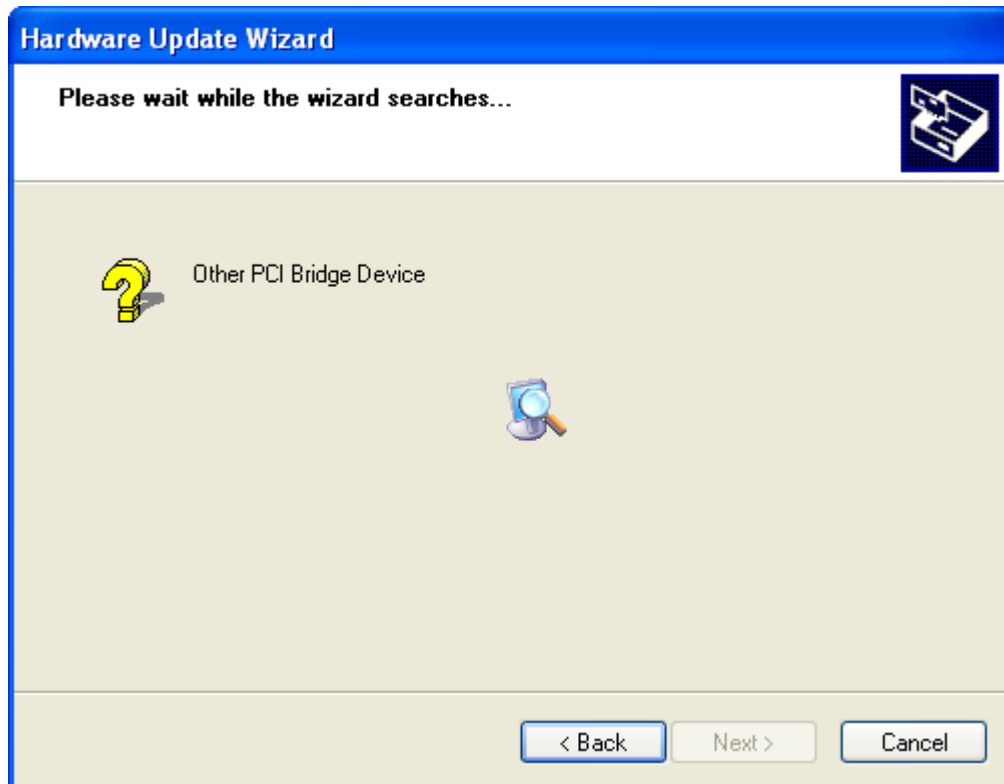


Figure 7-46: Wizard Search

Step 11: The Wizard updates the driver.



CAUTION:

When the driver is installed the system first sets a system restore point and backs up old files. This may take some time. Be patient and wait for the installation procedure to be completed.

Step 12: When the driver is installed, the screen in **Figure 7-47** appears.

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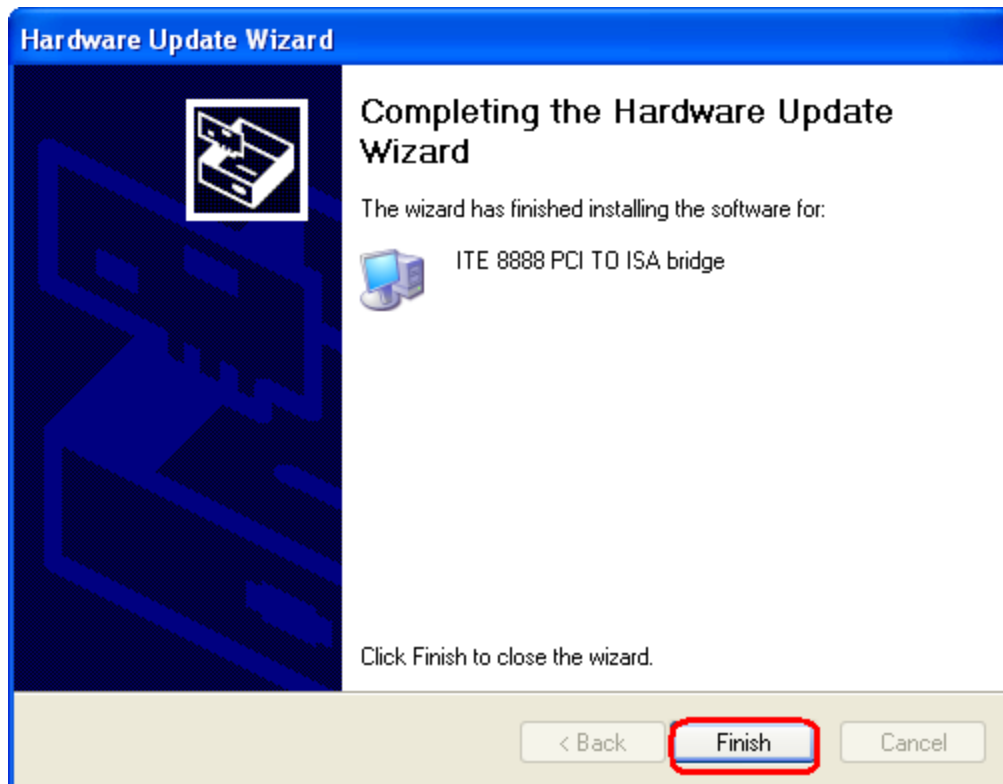


Figure 7-47: Other PCI Bridge Device Controller Driver Installation Complete

Step 13: Click the Finish tab in to complete the **Figure 7-47** installation.

Step 14: The Device Manager refreshes and the PCI Driver can be seen in the System Devices option. See **Figure 7-48**.

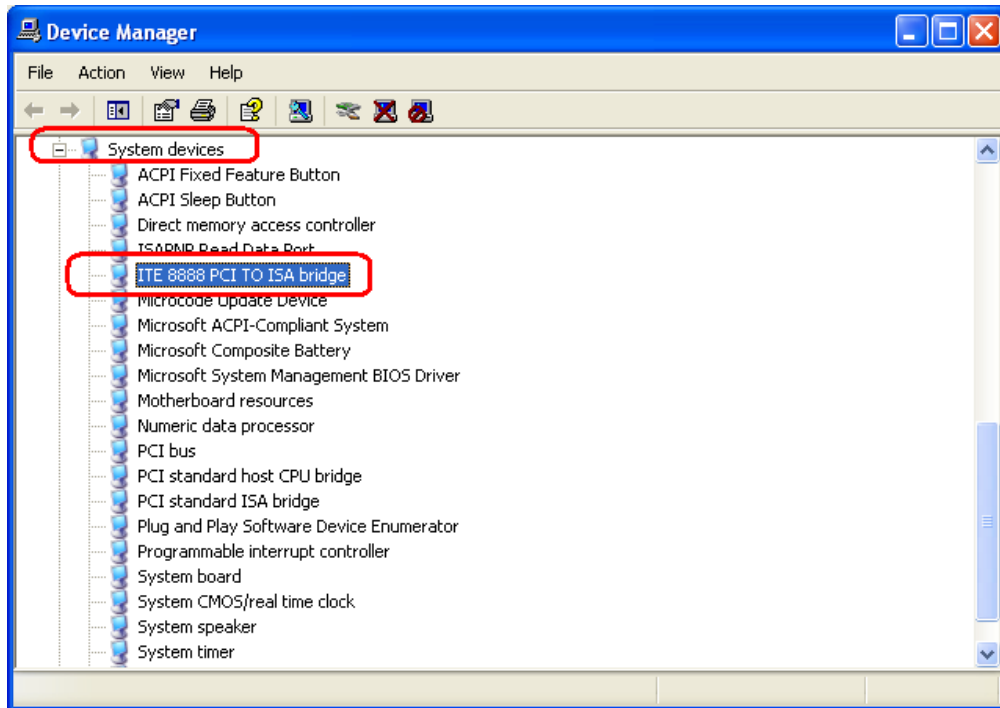


Figure 7-48: Device Manager Update

Appendix

A

BIOS Options

→	Load Fail-Safe Defaults	111
→	Load Optimized Defaults	111
→	Set Supervisor Password	111
→	Set User Password	111
→	Save & Exit Setup	111
→	Exit Without Saving	112
→	Date [Day mm:dd:yyyy].....	112
→	Time [hh/mm/ss]	113
→	IDE Master and IDE Slave	113
→	Drive A [None].....	113
→	Halt On [All, But Keyboard]	113
→	Base Memory:	114
→	Extended Memory	114
→	Total Memory	114
→	IDE HDD Auto-Detection [Press Enter]	115
→	IDE Primary Master [Auto]	115
→	Access Mode [Auto]	116
→	Capacity	117
→	Cylinder	117
→	Head	117
→	Precomp	117
→	Landing Zone	117
→	Sector.....	117
→	Quick Power On Self Test [Enabled]	118
→	Boot Device	118
→	Boot Other Device [Enabled].....	119
→	Boot Up Numlock Status [On]	120
→	Security Option [Setup]	120
→	CPU Frequency [500MHz]	121
→	Video Memory Size [8M]	122
→	Output Display [Panel & CRT]	122

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→ Flat Panel Configuration [Press Enter]	122
→ OnBoard Audio [Enabled].....	122
→ OnBoard USB 1.1 [Enabled]	123
→ OnBoard USB 2.0 [Enabled]	123
→ OnBoard IDE [Enabled].....	123
→ UART Port A [Disabled]	123
→ Memory Hole At 15M – 16M [Disabled].....	123
→ Flat Panel Type [Auto].....	124
→ Resolution [640 x 480].....	125
→ Data Bus Type [8 Bit]	125
→ Refresh Rate [60Hz].....	125
→ HSYNC Polarity [Low]	126
→ VSYNC Polarity Active [Low].....	126
→ SHFCLK Active Period [Free Running]	126
→ LP Active Period [Free Running]	126
→ On-Chip IDE Channel 1 [Enabled].....	127
→ Drive PIO Mode [Auto]	127
→ IDE UDMA [Auto]	128
→ IDE DMA transfer access [Enabled]	129
→ IT8888 ISA Decode IO.....	129
→ IT8888 ISA Decode Memory.....	129
→ Onboard Serial Port 1 [3F8/IRQ4].....	129
→ Onboard Serial Port 2 [2F8/IRQ3].....	130
→ Parallel Port IRQ [IRQ7]	130
→ Parallel Port Mode [Normal]	130
→ x EPP Mode Select [EPP1.7].....	131
→ x ECP Mode Use DMA [3].....	132
→ Decode IO Space N [Enabled]	133
→ Decode IO Speed N [Fast Speed].....	134
→ Decode IO Address N 0:15 [xx]	134
→ Decode IO Size N [Fast Speed]	134
→ Decode Memory Space N [Enabled]	136

→	Decode Memory Speed N [Fast Speed].....	136
→	Decode Memory Address N [xx]	136
→	Decode Memory Size N [xx].....	137
→	ACPI Function [Disabled]	138
→	ACPI Suspend Type [S1(POS)].....	139
→	Power Management [ACPI].....	139
→	PME Event Function	139
→	Soft-Off by PWR-BTTN [Instant-Off]	139
→	Power-On by Alarm [Disabled].....	140
→	IRQ Wakeup Events [Press Enter]	140
→	Reset Configuration Data [Disabled].....	142
→	Resources Controlled By [Auto (ESCD)]	142
→	x IRQ Resources [Press Enter]	143
→	x Memory Resources [Press Enter].....	144
→	Reserved Memory Base [N/A]	145
→	x Reserved Memory Length [8K].....	145
→	System Temperature	146
→	Voltages.....	146
→	Fan Speeds.....	147

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.
ATA	The Advanced Technology Attachment (ATA) interface connects storage devices including hard disks and CD-ROM drives to a computer.
APM	The Advanced Power Management (APM) application program interface (API) enables the inclusion of power management in the BIOS.
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

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memory.

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 MBps and 16.6 MBps.
FSB	The Front Side Bus (FSB) is the bi-directional communication channel between the processor and the Northbridge chipset.
HDD	Hard disk drive (HDD) is a type of magnetic, non-volatile computer storage device that stores digitally encoded data.
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.
MAC	The Media Access Control (MAC) protocol enables several terminals or network nodes to communicate in a LAN, or other multipoint networks.
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 Gbps and the SATA II bus has data transfer speeds of up to 3.0 Gbps.
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 12Mbps data transfer rates, while USB 2.0 supports 480Mbps data transfer rates.
VGA	The Video Graphics Array (VGA) is a graphics display system developed by IBM.

Appendix

C

DIO Interface

C.1 DIO Interface Introduction

The DIO connector on the WAFER-LX3 is interfaced to GIO ports on the iTE Super I/O chipset. The DIO has both 8-bit digital inputs and 8-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 iTE 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	GND	N/A	N/A
2	+5V	N/A	N/A
3	Output 0	124 (GP14)	General purpose I/O port 1 bit 4
4	Output 1	123 (GP15)	General purpose I/O port 1 bit 5
5	Output 2	122 (GP16)	General purpose I/O port 1 bit 6
6	Output 3	121 (GP17)	General purpose I/O port 1 bit 7
7	Input 0	128 (GP10)	General purpose I/O port 1 bit 0
8	Input 1	127 (GP11)	General purpose I/O port 1 bit 1
9	Input 2	126 (GP12)	General purpose I/O port 1 bit 2
10	Input 3	125 (GP13)	General purpose I/O port 1 bit 3

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



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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 EMI or a software bug. When the CPU stops working correctly, Watchdog Timer either performs a hardware reset (cold boot) or a Non-Maskable Interrupt (NMI) to bring the system back to a known state.

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

INT 15H:

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

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

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



NOTE:

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

Example program:

```
; INITIAL TIMER PERIOD COUNTER
```

```
;
```

```
W_LOOP:
```

```

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

```

```
;
```

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

```
;
```

```

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

```

```

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

```

```
;
```

```
; EXIT ;
```



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Appendix

E

Address Mapping

E.1 Address Map

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



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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-LX3

F.1 Compatible Operating Systems

The following operating systems have been successfully run on the WAFER-LX3.

- MS-DOS 6.22
- Microsoft Windows 2000 (Service Pack 4)
- Microsoft Windows XP Professional (Service Pack 2)
- Microsoft Windows Vista Business (32-bit)
- Mandriva Linux 2007
- Fedora Core 7
-

Appendix

G

Hazardous Materials Disclosure

G.1 Hazardous Material 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.

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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	○	○	○	○	X
显示	X	○	○	○	○	X
印刷电路板	X	○	○	○	○	X
金属螺帽	X	○	○	○	○	○
电缆组装	X	○	○	○	○	X
风扇组装	X	○	○	○	○	X
电力供应组装	X	○	○	○	○	X
电池	○	○	○	○	○	○

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

Audio Codec Configuration

H.1 Introduction

The motherboard comes with an onboard Realtek ALC203 CODEC. The ALC203 is a 16-bit, full-duplex AC'97 Rev. 2.3 compatible six-channel audio CODEC that provides three pairs of stereo outputs with 5-bit volume control, a mono output, and multiple stereo and mono inputs, along with flexible mixing, gain, and mute functions.

H.1.1 Accessing the AC'97 CODEC

The CODEC is accessed through the phone jacks on the rear panel of the motherboard.

The phone jacks include:

- LINE IN
- LINE OUT
- MIC IN

H.1.2 Driver Installation

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

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

WAFER-LX3 3.5" Motherboard

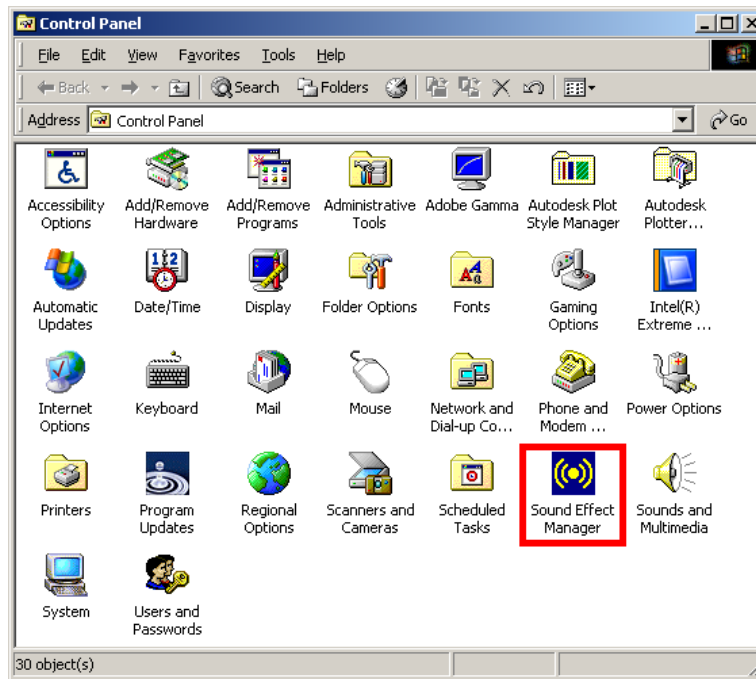


Figure H-1: Control Panel Sound Effect Manager

H.2 Sound Effect Configuration

H.2.1 Accessing the Sound Effects Manager

Follow the steps below to access the **Sound Effect Manager**.

Step 1: Install the ALC203 audio CODEC driver (see **Chapter 7**).

Step 2: Click the **Sound Effect Manager** icon in the system task bar (**Figure H-2**).



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

Step 3: The sound effect manager appears (**Figure H-3**).

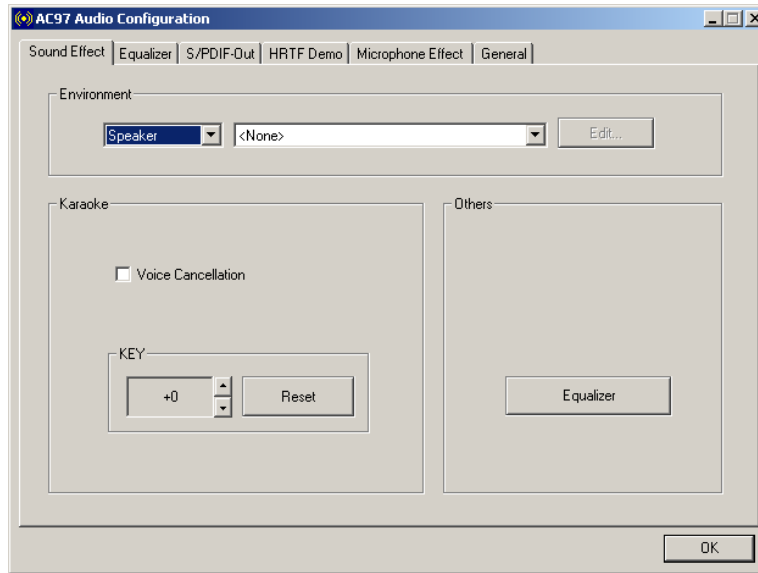


Figure H-3: Sound Effects Manager (ALC203)



NOTE:

The Sound Effect Manager shown in **Figure H-3** is for the RealTek ALC203 audio CODEC. Different CODECs may have different sound manager appearances.

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

H.2.2 Sound Effect Manager Configuration Options

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

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NOTE:

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

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



NOTE:

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

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

- **Sound Effect** - Select a sound effect from the 23 listed options in the drop down menu. Selected sound effect properties can be edited. Click **EDIT** to edit the sound effect.
- **Karaoke Mode** - **Karaoke Mode** is accessed in the Sound Effect tab. The **Voice Cancellation** disables the vocal part of the music being played. The

Key adjustment up or down arrow icons enable users to define a key that fits a certain vocal range.

- **Equalizer Selection** - Preset equalizer settings enable easy audio range settings. Ten frequency bands can be configured.
- **Speaker Configuration** - Multi-channel speaker settings are configured in this menu. Configurable options include:
 - Headphone
 - Channel mode for stereo speaker output
 - Channel mode for 4 speaker output
 - Channel mode for 5.1 speaker output
 - Synchronize the phonejack switch with speakers settings
- **Speaker Test** - Each speaker connected to the system is tested individually to see if the 4-channel or 6-channel audio operates properly.
- **S/PDIF-In & S/PDIF-Out** - S/PDIF is used to transmit digital and analog audio signals with either a 48 or 44.1kHz sample rate.
- **HRTF Demo** - Adjust HRTF (Head Related Transfer Functions) 3D positional audio before running 3D applications.
- **Microphone Effect** - Microphone noise suppression is enabled in this menu.
- **General** - General information about the installed AC'97 audio configuration utility is listed here.

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