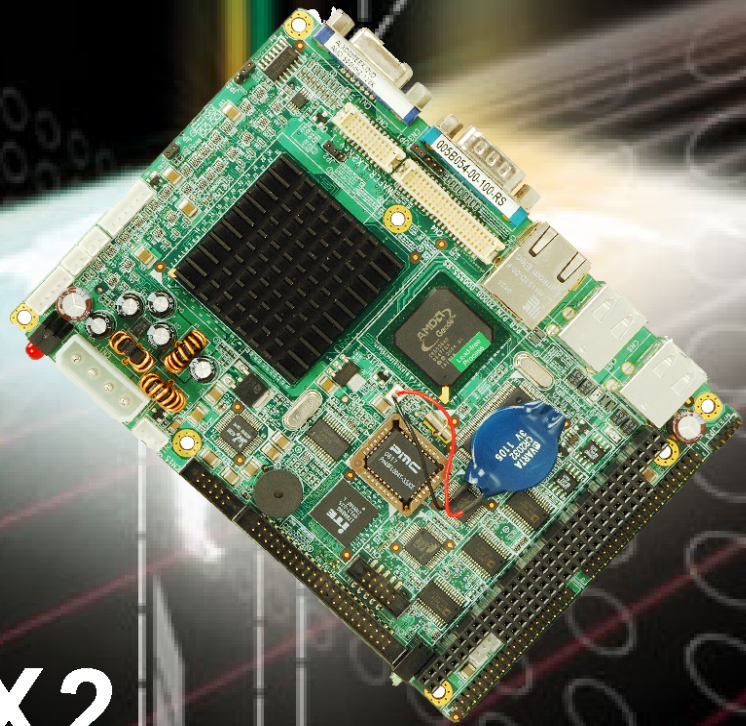




IEI Technology Corp .



**MODEL:  
WAFER-LX2**

**AMD Geode LX800 3.5" Single Board Computer  
Eight serial ports, Audio, PC/104 Expansion  
Supports CompactFlash and IDE**

# User Manual

Rev. 1.01 September 2007



# Revision

Date	Version	Changes
2007-08-15	1.01	Released as WAFER-LX2_UMN_v1.101 <ul style="list-style-type: none"><li>• Corrected Section 5.6.4: Four Serial Port Connector Cable installation</li><li>• Added "Appendix G: HAZARDOUS MATERIALS DISCLOSURE"</li></ul>
2006-11-15	1.0	Initial release (Released as WAFER-LX2_UMN_v1.0)

# 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-LX2 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-LX2. 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-LX2. 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-LX2. Please take note messages seriously.

---

# Copyright

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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-LX2 from or contact an IEI sales representative directly. To contact an IEI sales representative, please send an email to [sales@iei.com.tw](mailto:sales@iei.com.tw).

The items listed below should all be included in the WAFER-LX2 package.

- 1 x WAFER-LX2 single board computer
- 1 x Audio cable
- 1 x IDE flat cable 44p/44p
- 2 x 4 COM port cable 1 x Mini jumper pack
- 1 x Utility CD
- 1 x QIG (quick installation guide)

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

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# Glossary

AC '97	Audio Codec 97	IDE	Integrated Data Electronics
ACPI	Advanced Configuration and Power Interface	I/O	Input/Output
APM	Advanced Power Management	ICH4	I/O Controller Hub 4
ARMD	ATAPI Removable Media Device	L1 Cache	Level 1 Cache
ASKIR	Shift Keyed Infrared	L2 Cache	Level 2 Cache
ATA	Advanced Technology Attachments	LCD	Liquid Crystal Display
BIOS	Basic Input/Output System	LPT	Parallel Port Connector
CFII	Compact Flash Type 2	LVDS	Low Voltage Differential Signaling
CMOS	Complementary Metal Oxide Semiconductor	MAC	Media Access Controller
CPU	Central Processing Unit	OS	Operating System
Codec	Compressor/Decompressor	PCI	Peripheral Connect Interface
COM	Serial Port	PIO	Programmed Input Output
DAC	Digital to Analog Converter	PnP	Plug and Play
DDR	Double Data Rate	POST	Power On Self Test
DIMM	Dual Inline Memory Module	RAM	Random Access Memory
DIO	Digital Input/Output	SATA	Serial ATA
DMA	Direct Memory Access	S.M.A.R.T	Self Monitoring Analysis and Reporting Technology
EIDE	Enhanced IDE	SPD	Serial Presence Detect
EIST	Enhanced Intel SpeedStep Technology	S/PDI	Sony/Philips Digital Interface
FFIO	Flexible File Input/Output	SDRAM	Synchronous Dynamic Random Access Memory
FIFO	First In/First Out	SIR	Serial Infrared
FSB	Front Side Bus	UART	Universal Asynchronous Receiver-transmitter
IrDA	Infrared Data Association	USB	Universal Serial Bus
HDD	Hard Disk Drive	VGA	Video Graphics Adapter

Chapter

1

# Introduction

---

## 1.1 WAFER-LX2 Overview

The 3.5" WAFER-LX2 AMD Geode LX800 low power single board computer (SBC) is fully equipped with advanced multi-mode I/Os. The WAFER-LX2 has eight serial ports and a PC/104 for expansion and increased connectivity. The WAFER-LX2 is designed for system manufacturers, integrators, and VARs that want performance, reliability, and quality at a reasonable price.

### 1.1.1 WAFER-LX2 Applications

The WAFER-LX2 is designed for applications in the following areas:

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

### 1.1.2 WAFER-LX2 Benefits

Some of the WAFER-LX2 benefits include:

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

### 1.1.3 WAFER-LX2 Features

Some of the WAFER-LX2 features are listed below:

- 3.5" form factor
- RoHS compliant
- AMD LX-800 processor installed
- Dual-independent display functionality

## WAFER-LX2 3.5" Embedded SBC

- Low power consumption (6 Watts)
- Two high performance 10/100 megabit Ethernet controllers on-board
- Two SATA channels with transfer rates up to 150MB/s on-board
- Four USB 2.0 devices on-board
- Integrated audio

### 1.2 WAFER-LX2 Overview

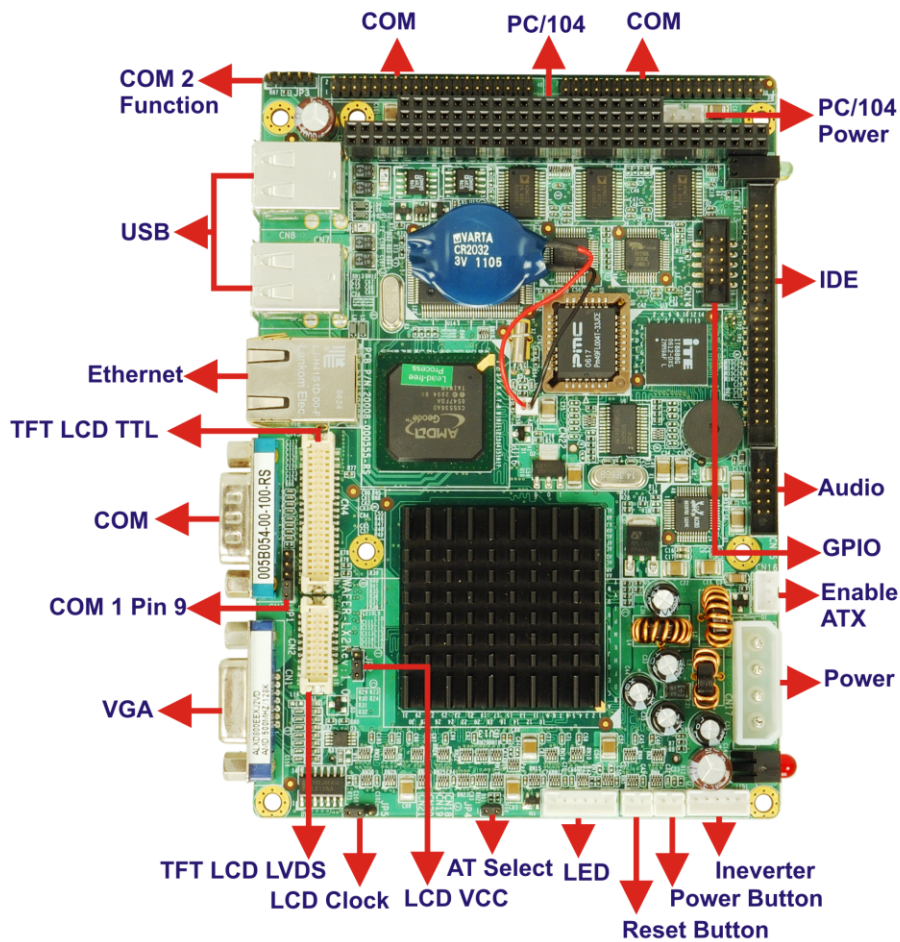
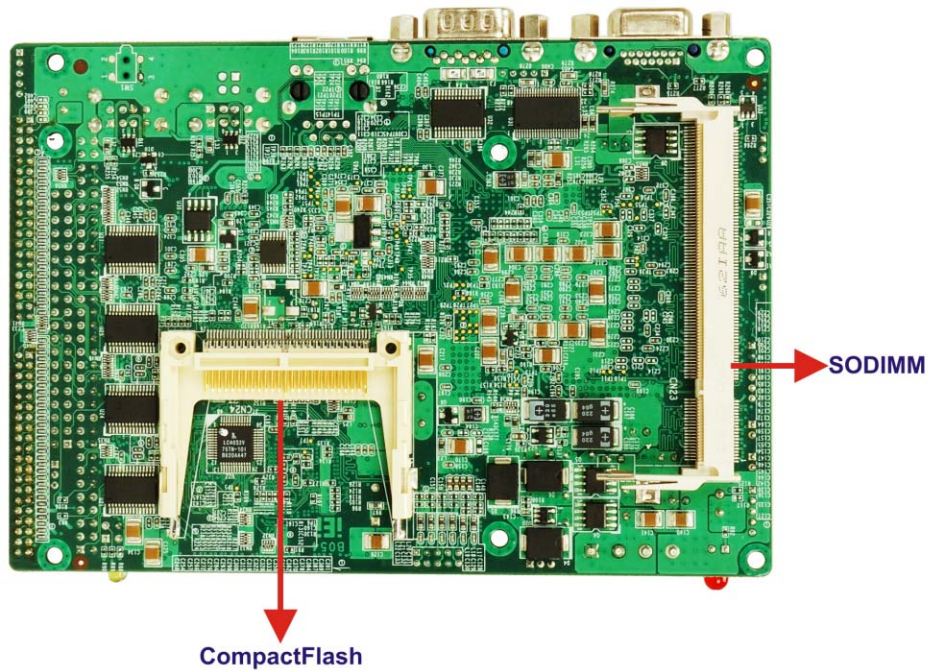


Figure 1-1: WAFER-LX2 Overview



**Figure 1-2: WAFER-LX2 Solder Side Overview**

### 1.2.1 WAFER-LX2 Connectors

The WAFER-LX2 has the following connectors on-board:

- 1 x AT power connector
- 1 x ATX power function connector
- 1 x Audio connector
- 1 x Battery connector
- 1 x Compact Flash (CF) connector (solder side)
- 1 x External LED connector
- 1 x Fan connector
- 1 x General purpose input/output (GPIO) connector
- 1 x IDE Interface connectors (44-pin)
- 1 x Inverter power connector
- 1 x Parallel port connector
- 1 x PC/104 slot
- 1 x PC/104 power connector
- 1 x Reset button connector

## WAFER-LX2 3.5" Embedded SBC

- 2 x Serial port connectors
- 1 x Suspend power input connector
- 1 x TFT LCD LVDS interface connector
- 1 x TFT LCD TFT interface connector
- 1 x SO-DIMM socket

The WAFER-LX2 has the following connectors on the board rear panel:

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

The WAFER-LX2 has the following on-board jumpers:

- COM-1 pin-9 signal select
- LCD Vcc select
- COM-2 function select
- AT Power select
- LCD clock select

### 1.2.2 Technical Specifications

WAFER-LX2 technical specifications are listed in **Table 1-1**. Detailed descriptions of each specification can be found in **Chapter 2**.

Specification	WAFER-LX2
Form Factor	3.5" form factor
CPU	AMD® Geode™ LX800 500Mhz
Southbridge Chipset	AMD® Geode™ CS5536
Display	CRT integrated in AMD® Geode™ LX800
TTL/LVDS	24-bit TTL or 18-bit single channel LVDS

<b>Memory</b>	Supports one 1GB DDR 333/400 200-pin SO-DIMM SDRAM module
<b>BIOS</b>	Award BIOS
<b>SSD</b>	Compact Flash (CF)
<b>Audio</b>	AC'97 Codec Realtek ALC203
<b>LAN</b>	10/100 Base-T dual RTL8100C
<b>COM</b>	Eight RS-232 or Seven RS-232 and one RS-422/RS-485
<b>USB2.0</b>	Four USB 1.1 or USB 2.0 devices supported
<b>IDE</b>	One 44-pin IDE connects to two Ultra ATA33/66/100 devices
<b>Watchdog Timer</b>	Software programmable 1-255 sec. by supper I/O
<b>Digital I/O</b>	One GPIO connector
<b>Expansion</b>	One PC/104 slot
<b>Power Supply</b>	+5V $\pm$ 5% AT/ATX power support
<b>Temperature</b>	0°C - 60°C
<b>Humidity (operating)</b>	5%~95% non-condensing
<b>Dimensions</b>	145mm x 102mm
<b>Weight (GW/NW)</b>	670g/230g

**Table 1-1: Technical Specifications**



Chapter

2

# Detailed Specifications

---

## 2.1 Overview

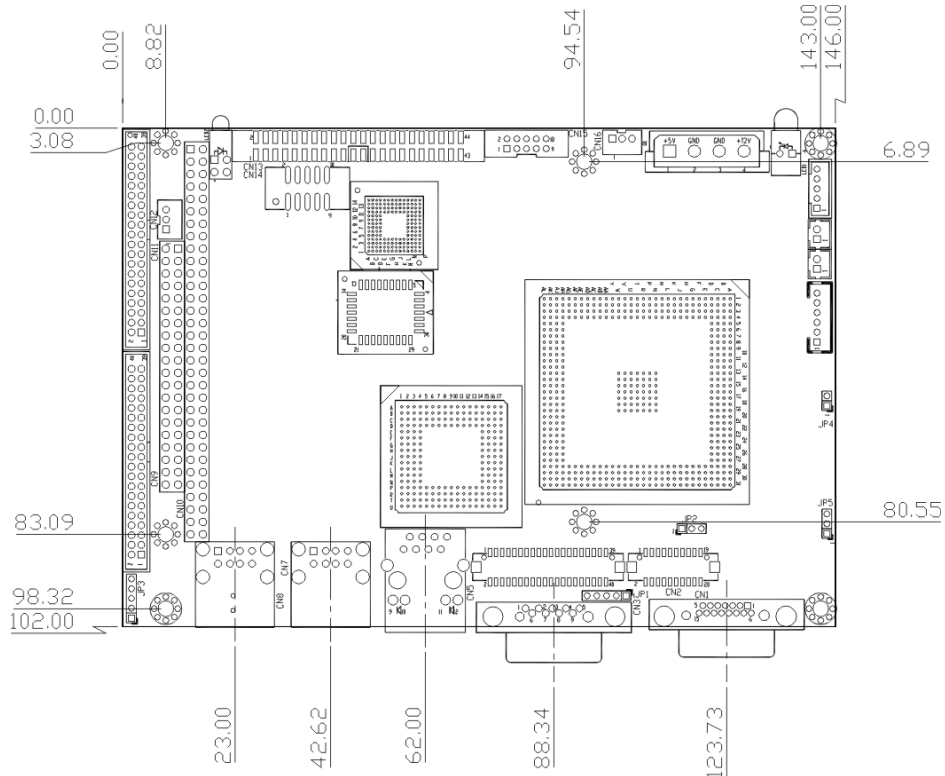
This chapter describes the specifications and on-board features of the WAFER-LX2 in detail.

## 2.2 Dimensions

### 2.2.1 Board Dimensions

The dimensions of the board are listed below:

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

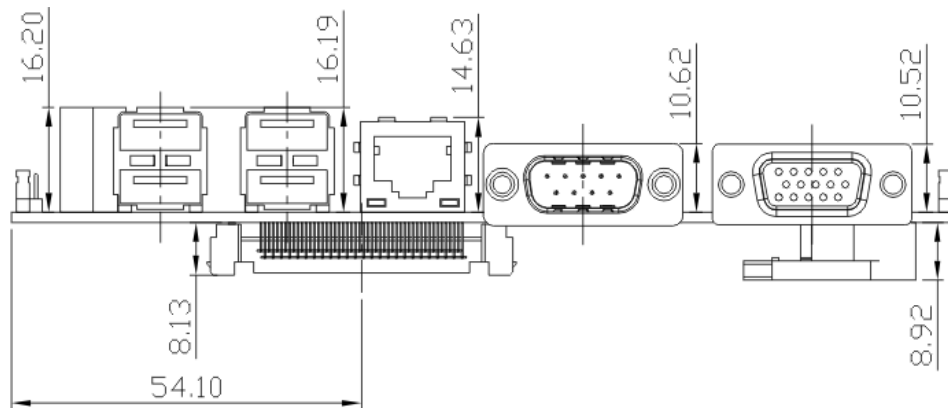


**Figure 2-1: WAFER-LX2 Dimensions (mm)**

### 2.2.2 External Interface Panel Dimensions

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

## WAFER-LX2 3.5" Embedded SBC



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

### 2.3 Data Flow

The WAFER-LX2 motherboard comes with an AMD® Geode™ LX800 CPU and an AMD® Geode™ CS5536 linked together by the GeodeLink™ Interface Unit. **Figure 2-3** shows the data flow between the system chipset, the CPU and other components installed on the motherboard.

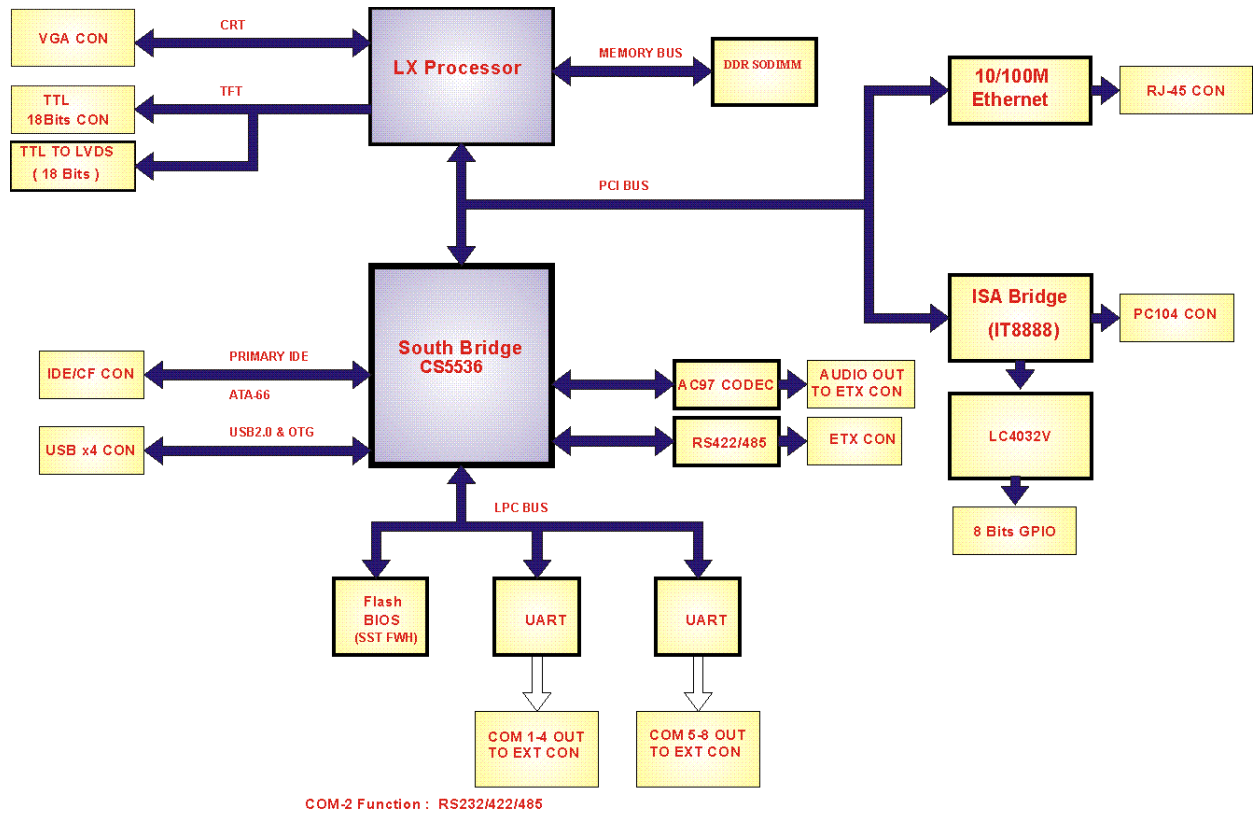


Figure 2-3: Data Flow Block Diagram

## 2.4 CPU Support

The WAFER-LX2 series motherboards all come with a preinstalled AMD® Geode™ LX 800 500MHz CPU.

### 2.4.1 AMD® Geode™ LX 800 500MHz Overview

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)

## WAFER-LX2 3.5" Embedded SBC

- Security Block
  - 128-bit AES (CBC/ECB)
- True Random Number Generator

### 2.4.2 AMD® Geode™ LX 800 Memory Support

The AMD® Geode™ LX 800 supports 64-bit DDR memory modules with frequencies up to 400MHz. The WAFER-LX2 has one 200-pin DDR SO-DIMM SDRAM socket that supports one 64-bit 333 MHz or 400MHz DDR SO-DIMM memory module with a maximum capacity of 1GB.

### 2.4.3 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

### 2.4.4 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.

<b>Feature</b>	<b>AMD Geode™ LX Processor</b>
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

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Alpha BLT	Yes (constant $\alpha$ , $\alpha$ /pix, or sep. $\alpha$ 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**

### 2.4.5 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
- I/O companion SUSP#/SUSPA# power controls
- Lower power I/O
- Wakeup on SMI/INTR

## 2.5 System Chipset

The WAFER-LX2 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

### 2.5.1 GeodeLink™ Interface Unit

- 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)

### 2.5.2 AMD® Geode™ CS5536 ATA-6 Controller

The single WAFER-LX2 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 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/100
<b>IDE devices</b>	2	2	2
<b>PIO Mode</b>	0 – 4	0 – 4	0 – 4
<b>PIO Max Transfer Rate</b>	16.6 MB/s	16.6 MB/s	16.6 MB/s
<b>DMA/UDMA designation</b>	UDMA 3 - 4	UDMA 3 – 4	UDMA 2
<b>DMA/UDMA Max Transfer</b>	100MB/s	66MB/s	33MB/s
<b>Controller Interface</b>	5V	5V	5V

**Table 2-2: Supported HDD Specifications**

### 2.5.3 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. Some of the codec features are listed below.

- Meets Microsoft WHQL/WLP 2.0 audio requirements
- 20-bit DAC and 18-bit ADC resolution



## WAFER-LX2 3.5" Embedded SBC

- 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

#### 2.5.4 AMD® Geode™ CS5536 Flash Interface

The WAFER-LX2 CompactFlash socket supports standard CF Type I and CF Type II cards. The chipset flash interface is multiplexed with an IDE interface and can be connected to an array of industry standard NAND Flash or NOR Flash devices.

#### 2.5.5 AMD® Geode™ CS5536 USB Controller

Four external USB ports on the WAFER-LX2 board are interfaced to the chipset USB controller. Four USB 1.1 or USB 2.0 devices can be connected simultaneously to the WAFER-LX2. The chipset USB controller has the following specifications:

- 4 USB ports
- USB 1.1 and USB 2.0 compliant
- 3 host ports
- 1 host/device

#### 2.5.6 AMD® Geode™ CS5536 Serial Communications

Eight high-speed UART serial port connectors, seven RS-232 and one that can be configured as RS-232, RS-422 or RS-485, are connected to the system chipset low pin count (LPC) port via the LPC bus. The specifications for the serial ports are listed below.

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

### 2.5.7 AMD® Geode™ CS5536 Real Time Clock

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

### 2.5.8 BIOS

The BIOS flash memory chip on the WAFER-LX2 has a licensed copy of AWARD BIOS loaded onto it. The BIOS flash memory chip is connected to the chipset via the LPC bus.

The flash BIOS features are listed below:

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

## 2.6 GeodeLink™ PCI Bridge

### 2.6.1 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:

- 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

### 2.6.2 10/100M Ethernet

A highly integrated and cost-effective single-chip, fast RealTek RTL8100C 10/100M Ethernet controller is interfaced through first the PCI bus and then through the GeodeLink™ PCI Bridge to the CPU and system chipset. The RealTek RTL8100C controller provides 10Mbps or 100Mbps Ethernet connectivity to the WAFER-LX2. Some of the features of the RealTek RTL8100C are listed below.

- 10Mbps and 100Mbps operation
- Supports 10Mbps and 100Mbps N-way auto-negotiation
- Supports 25MHz Crystal or 25MHz OSC as the internal clock source
- Complies with PC99/PC2001 standards
- Supports ACPI power management
- Provides PCI bus master data transfer
- Provides PCI memory space or I/O space mapped data transfer
- Supports PCI clock speed of 16.75MHz-40MHz
- Advanced power saving mode
- Supports Wake-on-LAN and remote wake-up (AMD Magic Packet™, Link Change, and Microsoft® Wake-up frame)
- Half/Full duplex capability
- Supports Full Duplex Flow Control (IEEE 802.3x)
- Provides interface to 93C46 EEPROM to store resource configuration and ID parameters
- Provides PCI clock run pin
- Provides LED pins for network operation status indication
- 2.5/3.3V power supply with 5V tolerant I/Os

### 2.6.3 PCI to ISA Bridge

An ITE IT8888G PCI to ISA bridge single function device connects the onboard WAFER-LX2 ISA bus PC/104 connector and the GPIO connector to the GeodeLink™ PCI 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

## 2.7 Environmental and Power Specifications

### 2.7.1 System Monitoring

The WAFER-LX2 is capable of self-monitoring various aspects of its operating status including:

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

## 2.7.2 Operating Temperature and Temperature Control

The maximum and minimum operating temperatures for the WAFER-LX2 are listed below.

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

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

## 2.7.3 Power Consumption

**Table 2-3** shows the power consumption parameters for the WAFER-LX2 when an AMD Geode LX 800 processor is running with one 512MB DDR333 memory module.

Voltage	Current
+5V	1.33A

**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-LX2 may result in permanent damage to the WAFER-LX2 and severe injury to the user.

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Electrostatic discharge (ESD) can cause serious damage to electronic components, including the WAFER-LX2. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the WAFER-LX2, 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-LX2, place it on an anti-static pad. This reduces the possibility of ESD damaging the WAFER-LX2.
- **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-LX2 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-LX2 does not fall out of the box.
- Make sure all the components shown in **Section 3.3** are present.



### 3.3 Unpacking Checklist





**NOTE:**

If some of the components listed in the checklist below are missing, please do not proceed with the installation. Contact the IEI reseller or vendor you purchased the WAFER-LX2 from or contact an IEI sales representative directly. To contact an IEI sales representative, please send an email to [sales@iei.com.tw](mailto:sales@iei.com.tw).

#### 3.3.1 Package Contents

The WAFER-LX2 is shipped with the following components:

Quantity	Item	Image
1	WAFER-LX2	
1	Audio Cable	

1	IDE cable	
2	4 COM Port Cable	
1	mini jumper Pack	
1	Quick Installation Guide	
1	Utility CD	

**Table 3-1: Package List Contents**

Chapter

4

# Connector Pinouts

---

## 4.1 Peripheral Interface Connectors

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

### 4.1.1 WAFER-LX2 Layout

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

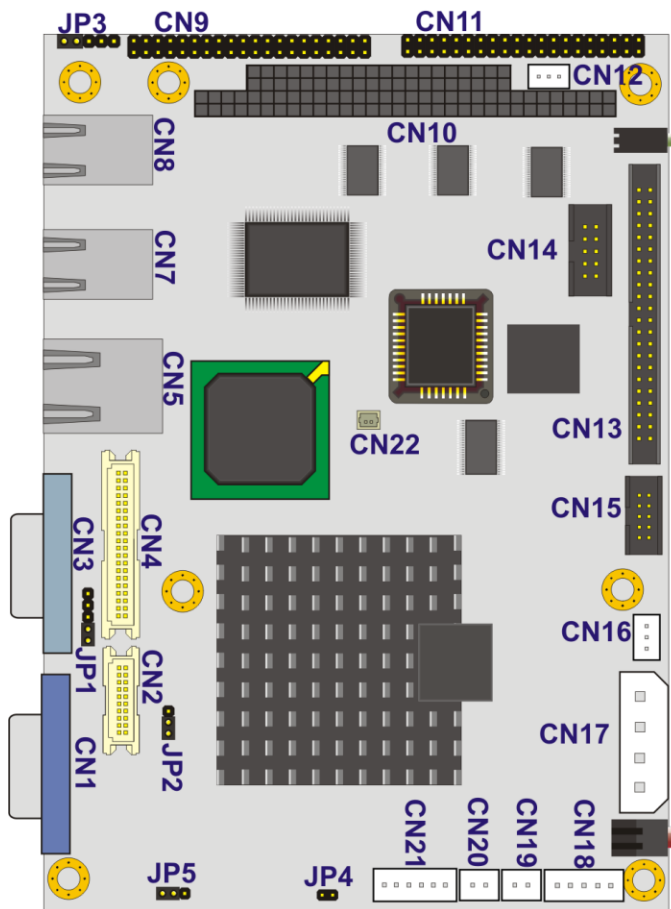


Figure 4-1: Connector and Jumper Locations

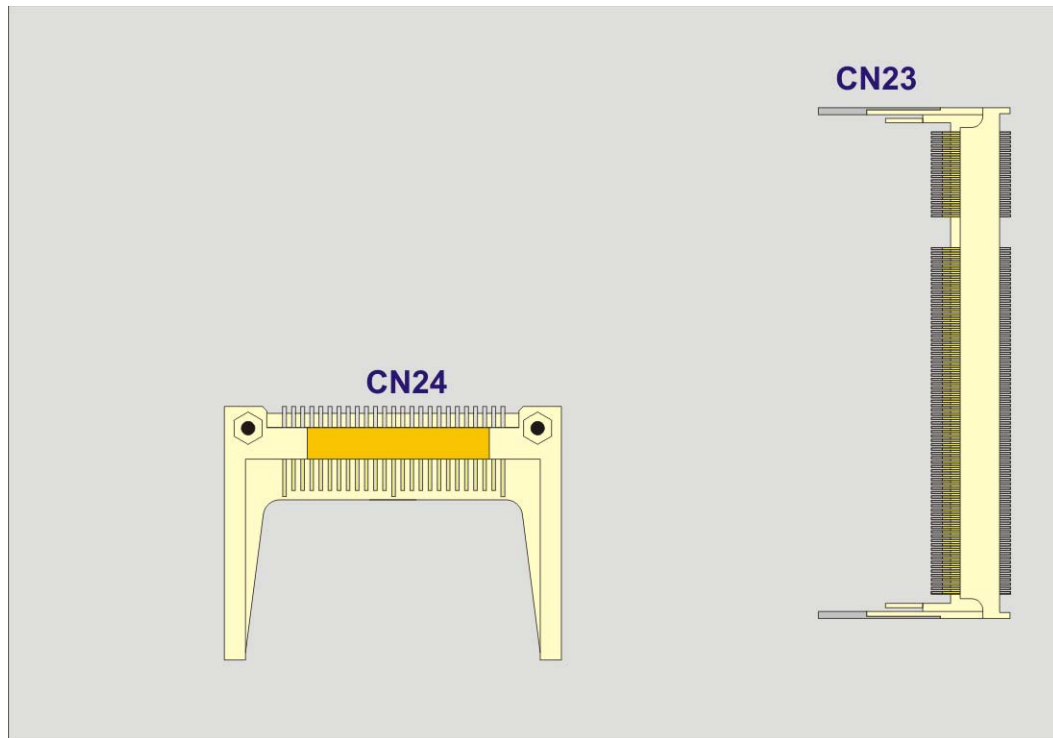


Figure 4-2: Connector and Jumper Locations (Solder Side)

#### 4.1.2 Peripheral Interface Connectors

Table 4-1 shows a list of the peripheral interface connectors on the WAFER-LX2. Detailed descriptions of these connectors can be found below.

Connector	Type	Label
AT power connector	4-pin header	CN17
ATX enable connector	3-pin header	CN16
Power button connector	2-pin header	CN19
Audio connector	10-pin header	CN15
Battery connector	2-pin header	CN22
Compact Flash (CF) connector	50-pin header	CN24

GPIO connector	10-pin header	CN14
IDE Interface connector	44-pin header	CN13
Inverter power connector	5-pin header	CN18
LED connector	6-pin header	CN21
PC/104 power input connector	3-pin header	CN10
PC/104 slot	104-pin slot	CN12
Reset button connector	2-pin header	CN20
Serial port connector (COM 2 – COM 4)	40-pin header	CN9
Serial port connector (COM 5 – COM 8)	40-pin header	CN11
TFTLCD LVDS connector	20-pin header	CN2
TFT LCD TTL connector	40-pin header	CN4

**Table 4-1: Peripheral Interface Connectors**

### 4.1.3 External Interface Panel Connectors

Table 4-2 lists the rear panel connectors on the WAFER-LX2. Detailed descriptions of these connectors can be found in **Section 4.3** on **page 54**.

Connector	Type	Label
Ethernet connector	RJ-45	CN5
RS-232 serial port connector	9-pin male	CN3
USB port	USB port	CN7
USB port	USB port	CN8
VGA port connector	15-pin female	CN1

**Table 4-2: Rear Panel Connectors**

## WAFER-LX2 3.5" Embedded SBC

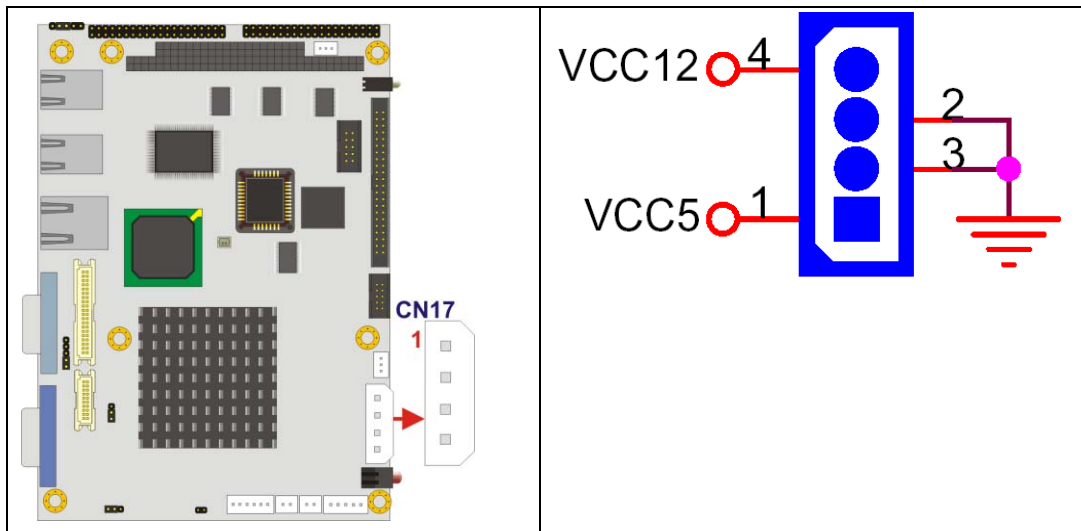
### 4.2 Internal Peripheral Connectors

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-LX2.

#### 4.2.1 AT Power Connector

<b>CN Label:</b>	<b>CN17</b>
<b>CN Type:</b>	4-pin AT power connector (1x4)
<b>CN Location:</b>	See <b>Figure 4-3</b>
<b>CN Pinouts:</b>	See <b>Table 4-3</b>

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



**Figure 4-3: AT Power Connector Location**

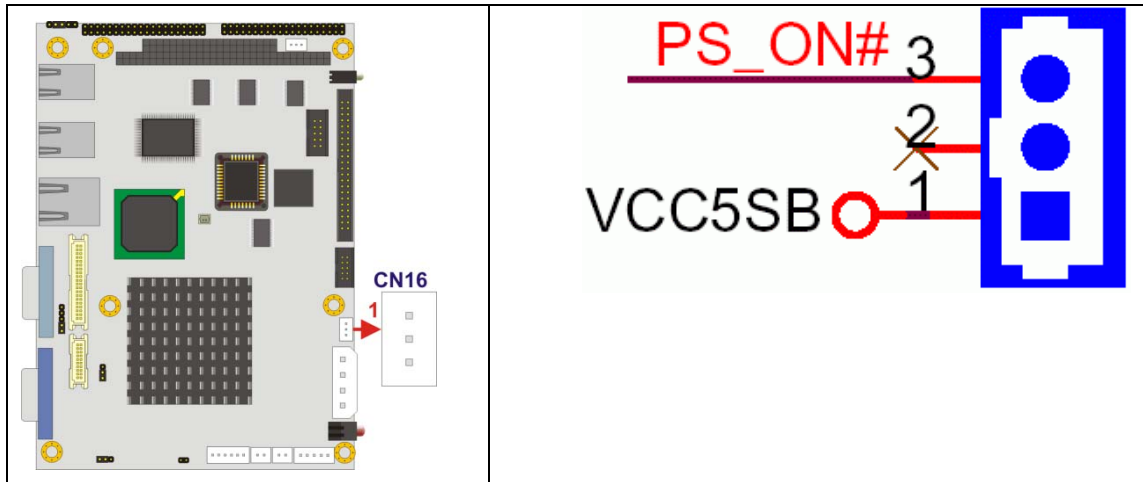
PIN NO.	DESCRIPTION
1	+5V
2	GND
3	GND
4	+12V

**Table 4-3: AT Power Connector Pinouts**

#### 4.2.2 ATX Power Supply Enable Connector

- CN Label:** CN16
- CN Type:** 3-pin wafer (1x3)
- CN Location:** See **Figure 4-4**
- CN Pinouts:** See **Table 4-4**

The ATX power supply enable connector enables the WAFER-LX2 to be connected to an ATX power supply. In default mode, the WAFER-LX2 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 3 for more details.



**Figure 4-4: ATX Power Supply Enable Connector Location**



## WAFER-LX2 3.5" Embedded SBC

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

Table 4-4: ATX Power Supply Enable Connector Pinouts

### 4.2.3 Audio Connector (10-pin)

<b>CN Label:</b>	<b>CN15</b>
<b>CN Type:</b>	10-pin header
<b>CN Location:</b>	See <b>Figure 4-5</b>
<b>CN Pinouts:</b>	See <b>Table 4-5</b>

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

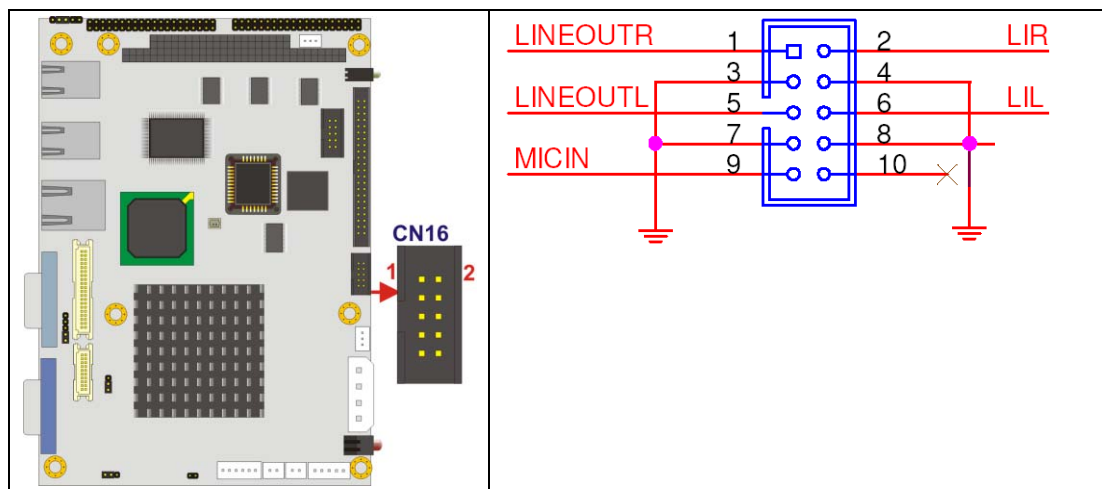


Figure 4-5: Audio Connector Pinouts (10-pin)

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	Line out R	2	Line in R
3	GND	4	GND

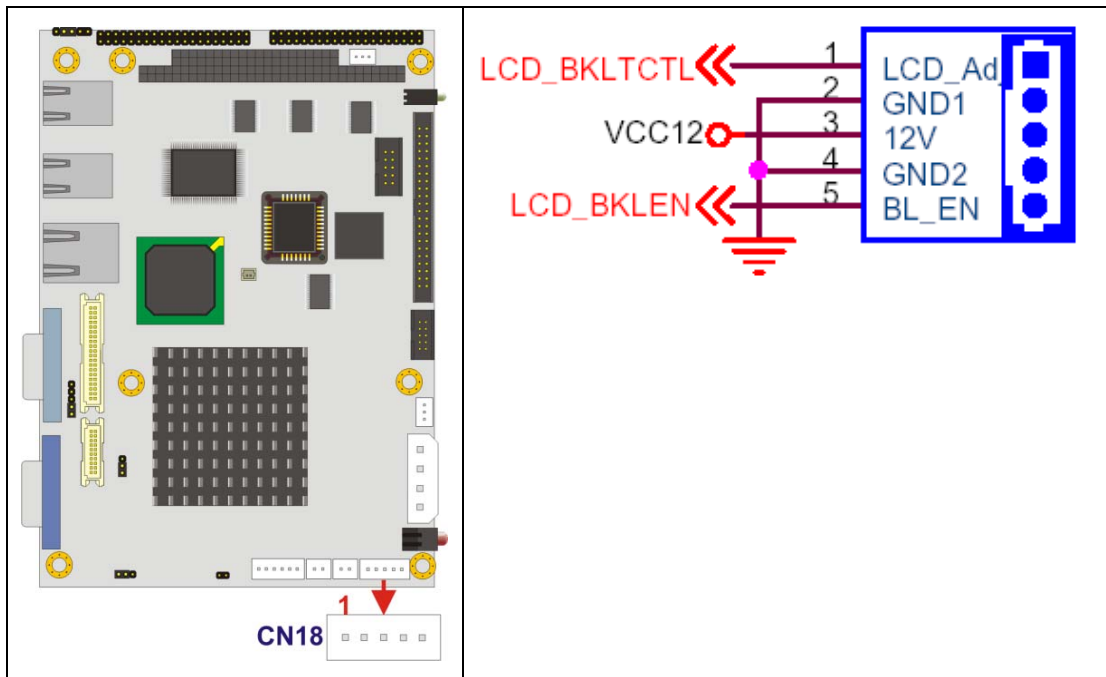
5	Line out L	6	Line in L
7	GND	8	GND
9	MIC in	10	NC

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

#### 4.2.4 Backlight Inverter Connector

- CN Label:** CN18
- CN Type:** 5-pin wafer (1x5)
- CN Location:** See **Figure 4-6**
- CN Pinouts:** See **Table 4-6**

The backlight inverter connector provides the backlight on the LCD display connected to the WAFER-LX2 with +12V of power.



**Figure 4-6: Panel Backlight Connector Pinout Locations**

# WAFER-LX2 3.5" Embedded SBC

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

Table 4-6: Panel Backlight Connector Pinouts

## 4.2.5 Battery Connector

- CN Label:** CN22
- CN Type:** 2-pin wafer (1x2)
- CN Location:** See Figure 4-7
- CN Pinouts:** See Table 4-7

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

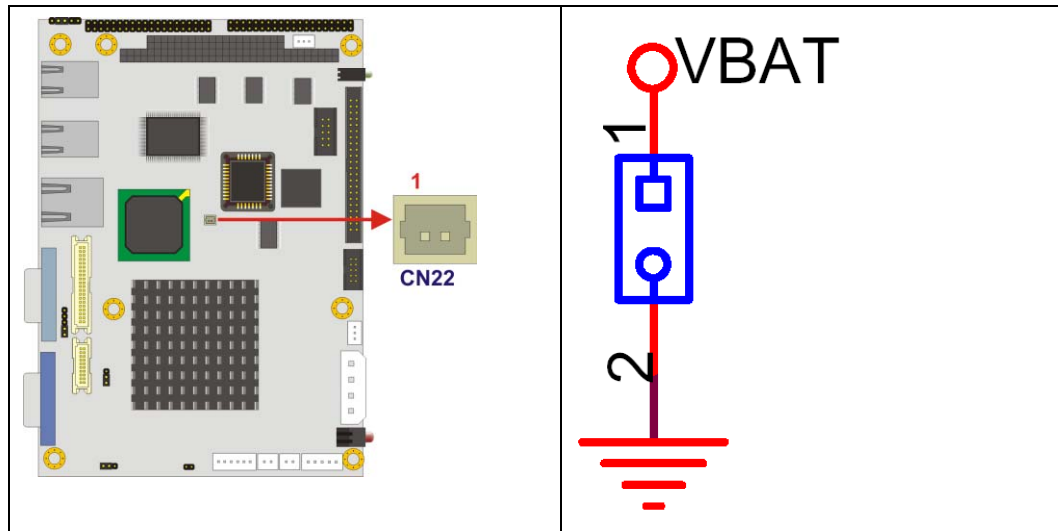


Figure 4-7: Battery Connector Location

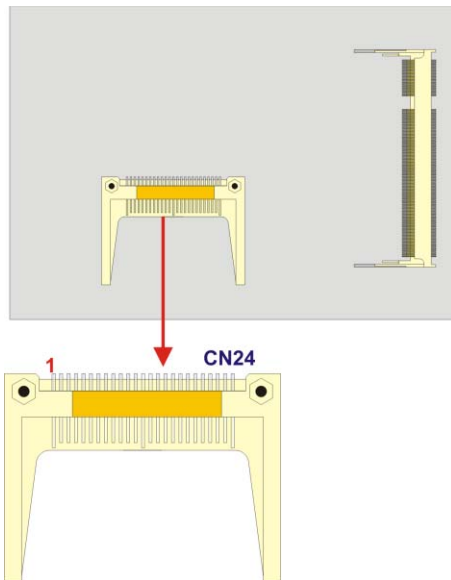
PIN NO.	DESCRIPTION
1	Battery+
2	Ground

**Table 4-7: Battery Connector Pinouts**

#### 4.2.6 Compact Flash Socket

- CN Label:** CN24 (solder side)
- CN Type:** 50-pin header (2x25)
- CN Location:** See **Figure 4-8**
- CN Pinouts:** See **Table 4-8**

A CF Type I or Type II memory card is inserted to the CF socket on the solder side of the WAFER-LX2.



# WAFER-LX2 3.5" Embedded SBC

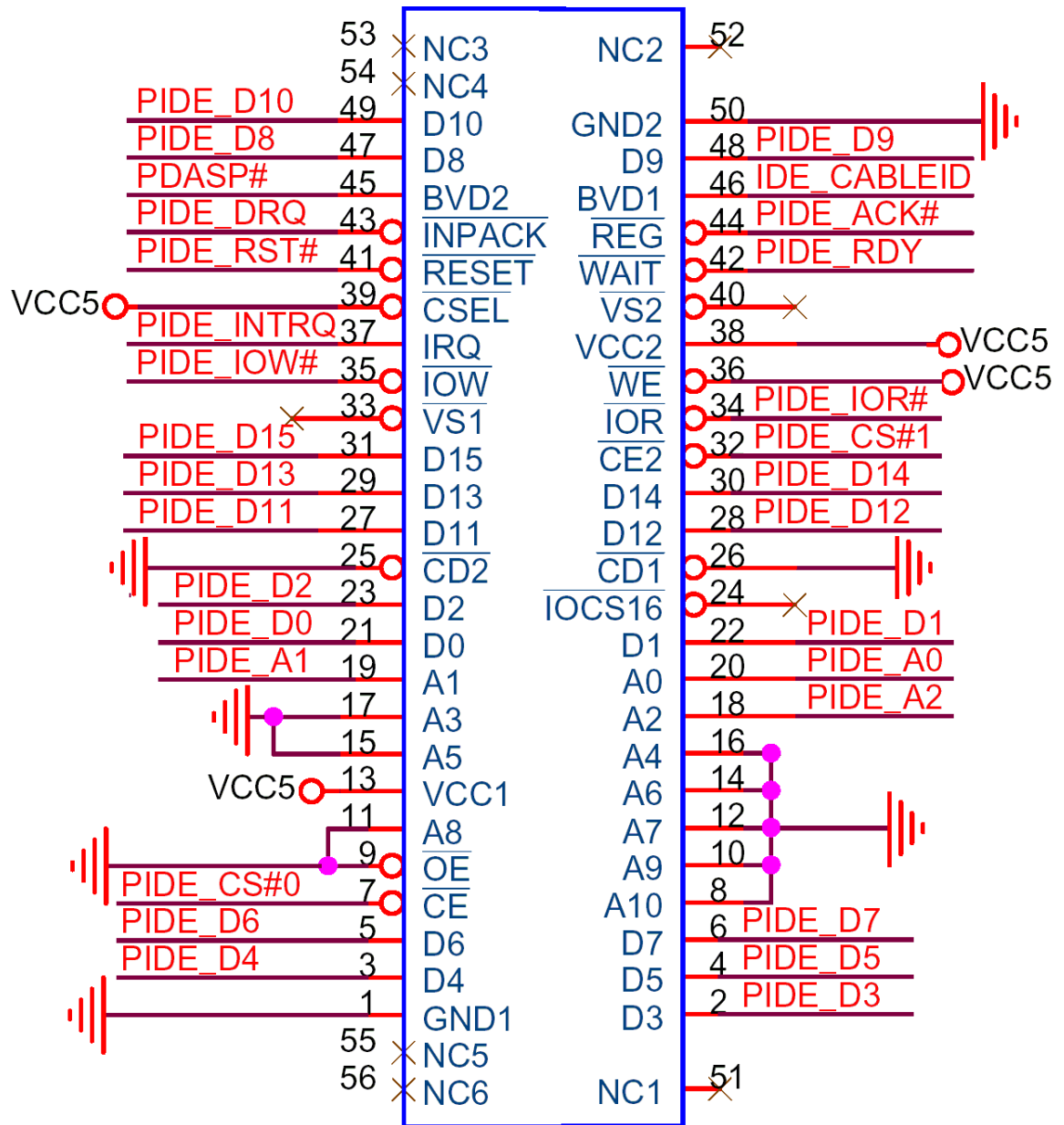


Figure 4-8: CF Card Socket Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
49	PIDE_D10	50	Ground
47	PIDE_D8	48	PIDE_D9
45	PDASP#	46	IDE_CABLEID
43	PIDE_DRQ	44	PIDE_ACK#

41	PIDE_RST#	42	PIDE_RDY
39	VCC5	40	N/C
37	PIDE_INTRO	38	VCC5
35	PIDE_IOW#	36	VCC5
33	N/C	34	PIDE_IOR#
31	PIDE_D15	32	PIDE_CS#1
29	PIDE_13	30	PIDE_D14
27	PIDE_D11	28	PIDE_D12
25	Ground	26	Ground
23	PIDE_D2	24	N/C
21	PIDE_D0	22	PIDE_D1
19	PIDE_A1	20	PIDE_A0
17	Ground	18	PIDE_A2
15	Ground	16	Ground
13	VCC5	14	Ground
11	Ground	12	Ground
9	Ground	10	Ground
7	PIDE_CS#0	8	Ground
5	PIDE_D6	6	PIDE_D7
3	PIDE_D4	4	PIDE_D5
1	Ground 1	2	PIDE_D3

**Table 4-8: CF Card Socket Pinouts**

#### 4.2.7 GPIO Connector

- CN Label:** CN14
- CN Type:** 10-pin header (2x5)
- CN Location:** See **Figure 4-9**
- CN Pinouts:** See **Table 4-9**

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

## WAFER-LX2 3.5" Embedded SBC

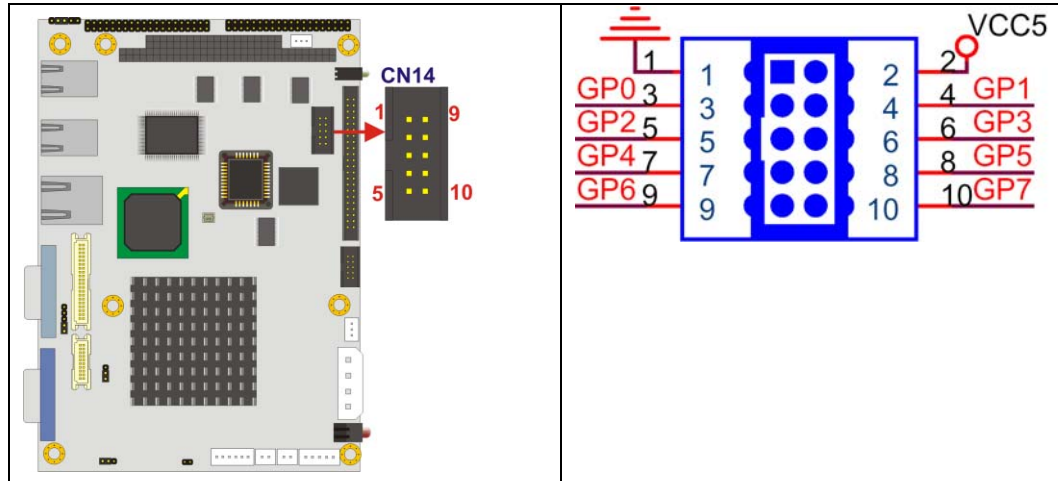


Figure 4-9: GPIO Connector Pinout Locations

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GND	2	+5V
3	GP0	4	GP1
5	GP2	6	GP3
7	GP4	8	GP5
9	GP6	10	GP7

Table 4-9: GPIO Connector Pinouts

### 4.2.8 IDE Connector(44-pin)

- CN Label:** CN13
- CN Type:** 44-pin header (2x22)
- CN Location:** See Figure 4-10
- CN Pinouts:** See Table 4-10

One 44-pin IDE device connector on the WAFER-LX2 supports connectivity to two hard disk drives.

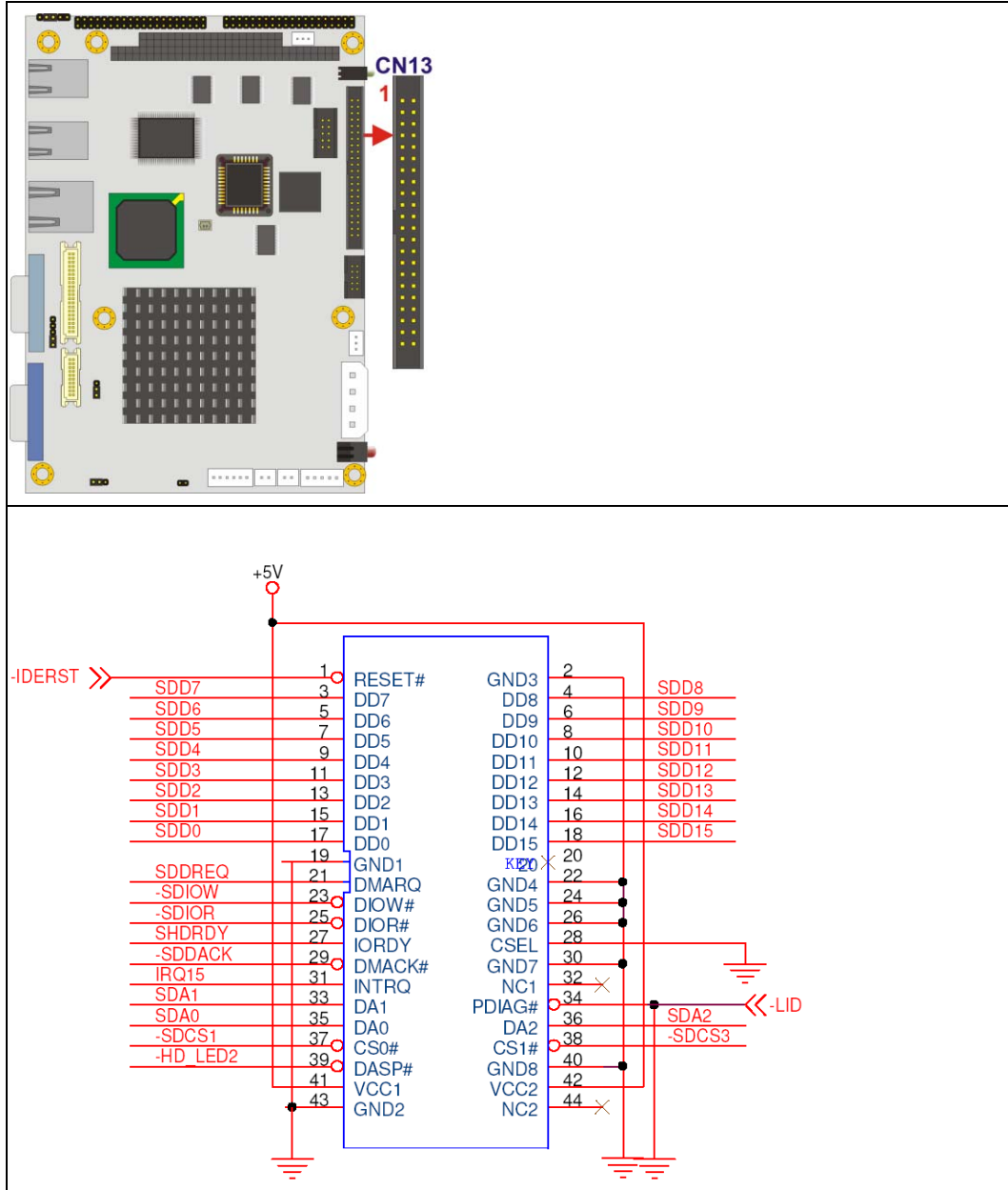


Figure 4-10: Secondary IDE Device Connector Locations

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



## WAFER-LX2 3.5" Embedded SBC

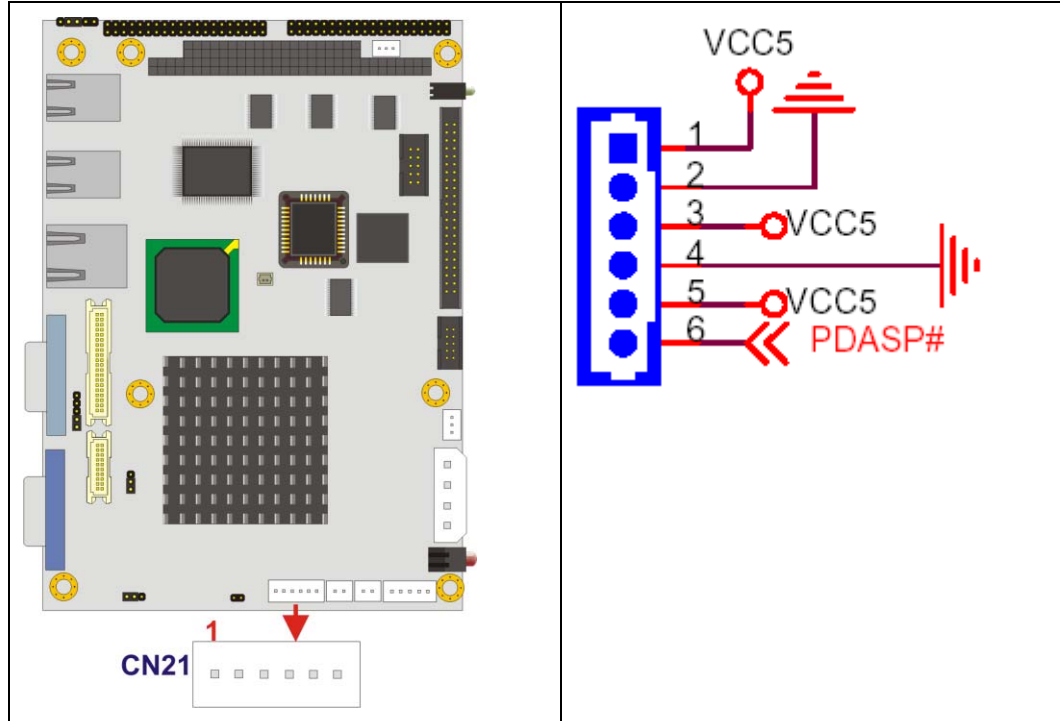
9	DATA 4	10	DATA 11
11	DATA 3	12	DATA 12
13	DATA 2	14	DATA 13
15	DATA 1	16	DATA 14
17	DATA 0	18	DATA 15
19	GROUND	20	N/C
21	IDE DRQ	22	GROUND
23	IOW#	24	GROUND
25	IOR#	26	GROUND
27	IDE CHRDY	28	GROUND
29	IDE DACK	30	GROUND-DEFAULT
31	INTERRUPT	32	N/C
33	SA1	34	N/C
35	SA0	36	SA2
37	HDC CS0#	38	HDC CS1#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

**Table 4-10: Secondary IDE Connector Pinouts**

### 4.2.9 LED Connector

- CN Label:** CN21
- CN Type:** 6-pin wafer (1x6)
- CN Location:** See **Figure 4-11**
- CN Pinouts:** See **Table 4-11**

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 4-11: LED Connector Locations**

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

**Table 4-11: LED Connector Pinouts**

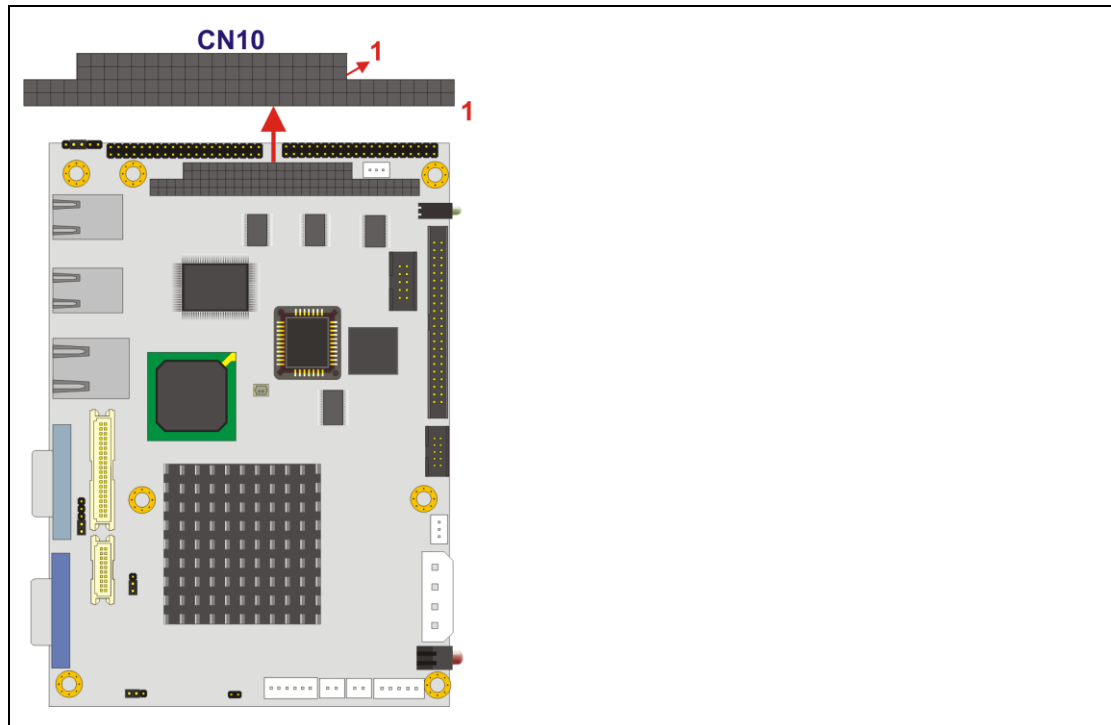
**4.2.10 PC/104 Slot**

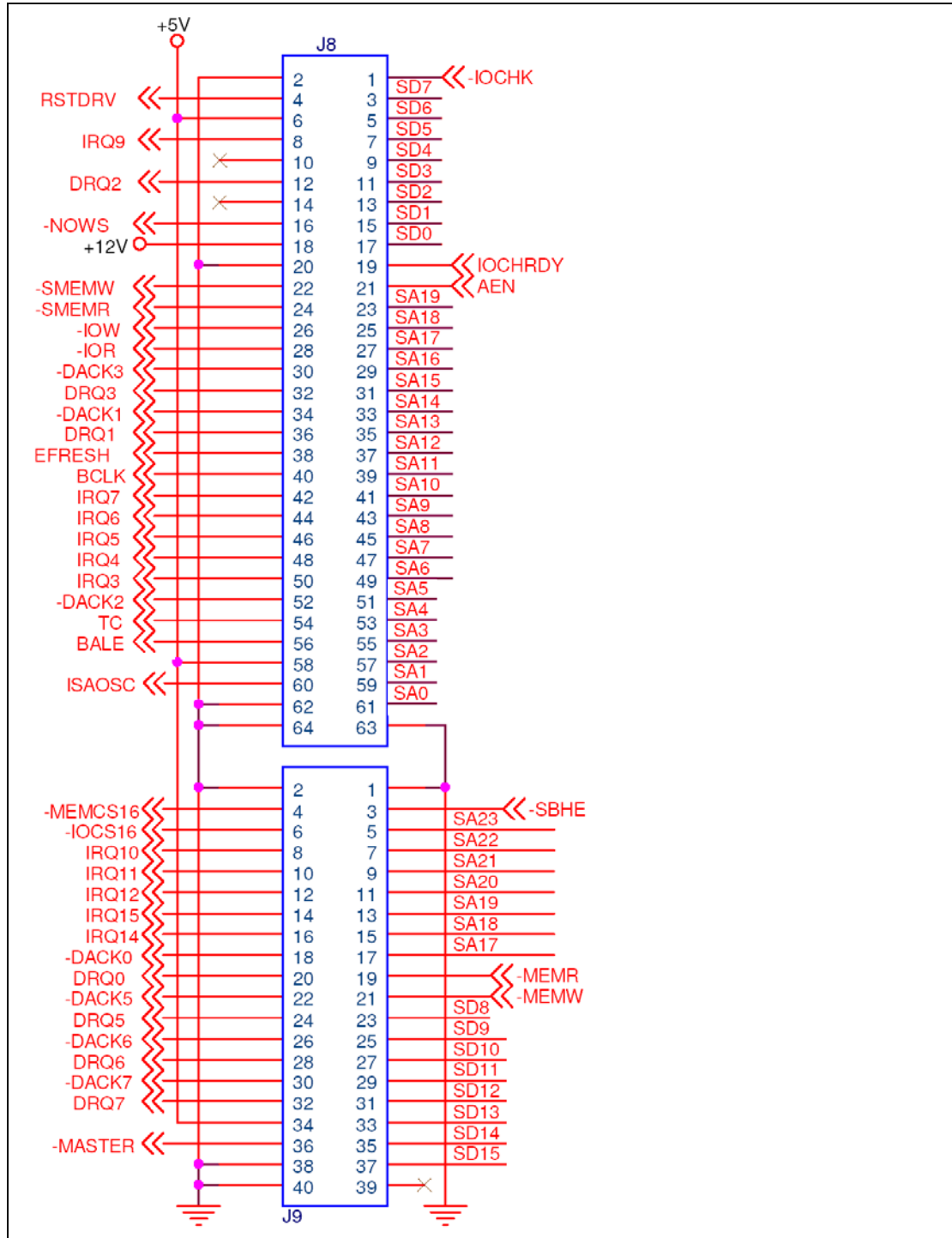
- CN Label:** CN10
- CN Type:** 104-pin PC/104 slot
- CN Location:** See **Figure 4-12**

## WAFER-LX2 3.5" Embedded SBC

**CN Pinouts:** See Table 4-12

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





**Figure 4-12: PC/104 Slot Location**

## WAFER-LX2 3.5" Embedded SBC

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

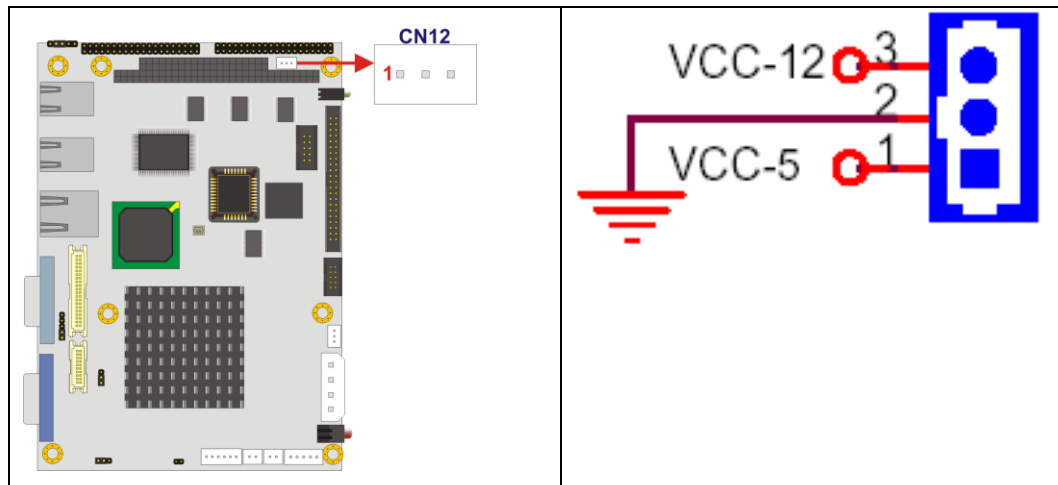
30	SA1	ISA_OSC		
31	SA0	GROUND		
32	GROUND	GROUND		

**Table 4-12: PC/104 Slot Connector Pinouts**

#### 4.2.11 PC/104 Power Input Connector

- CN Label:** CN12
- CN Type:** 3-pin wafer (1x3)
- CN Location:** See **Figure 4-13**
- CN Pinouts:** See **Table 4-13**

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


**Figure 4-13: PC/104 Power Input Connector Pinouts**

## WAFER-LX2 3.5" Embedded SBC

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

Table 4-13: PC/104 Power Input Connector Pinouts

### 4.2.12 Power Button Connector

- CN Label:** CN19
- CN Type:** 2-pin wafer (1x2)
- CN Location:** See **Figure 4-14**
- CN Pinouts:** See **Table 4-14**

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

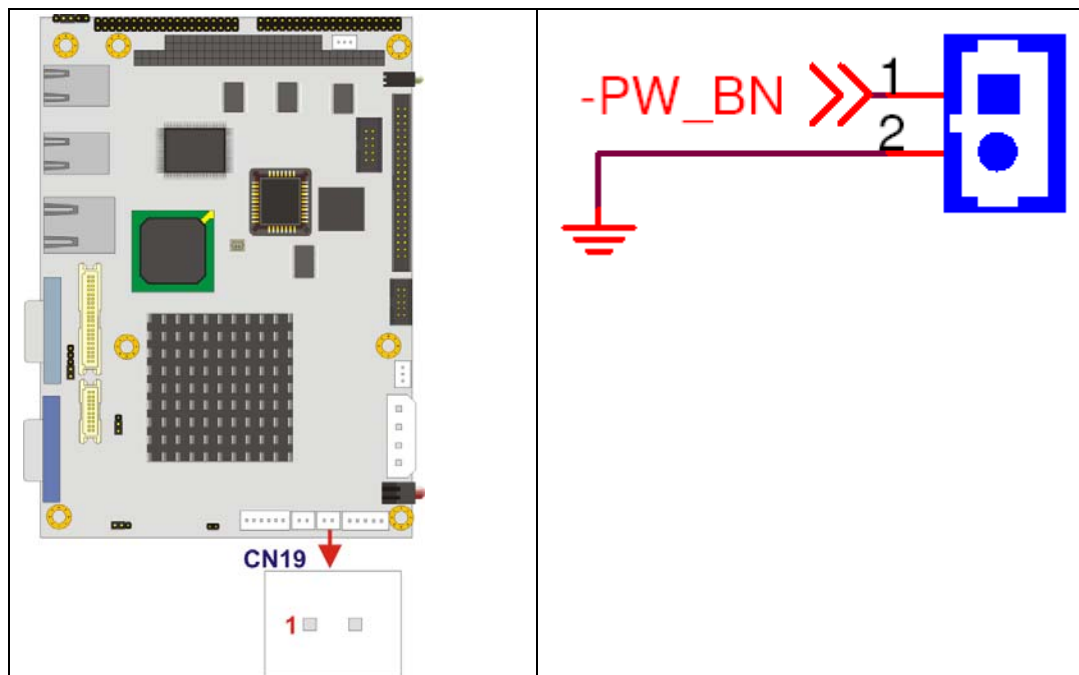


Figure 4-14: Power Button Connector Location

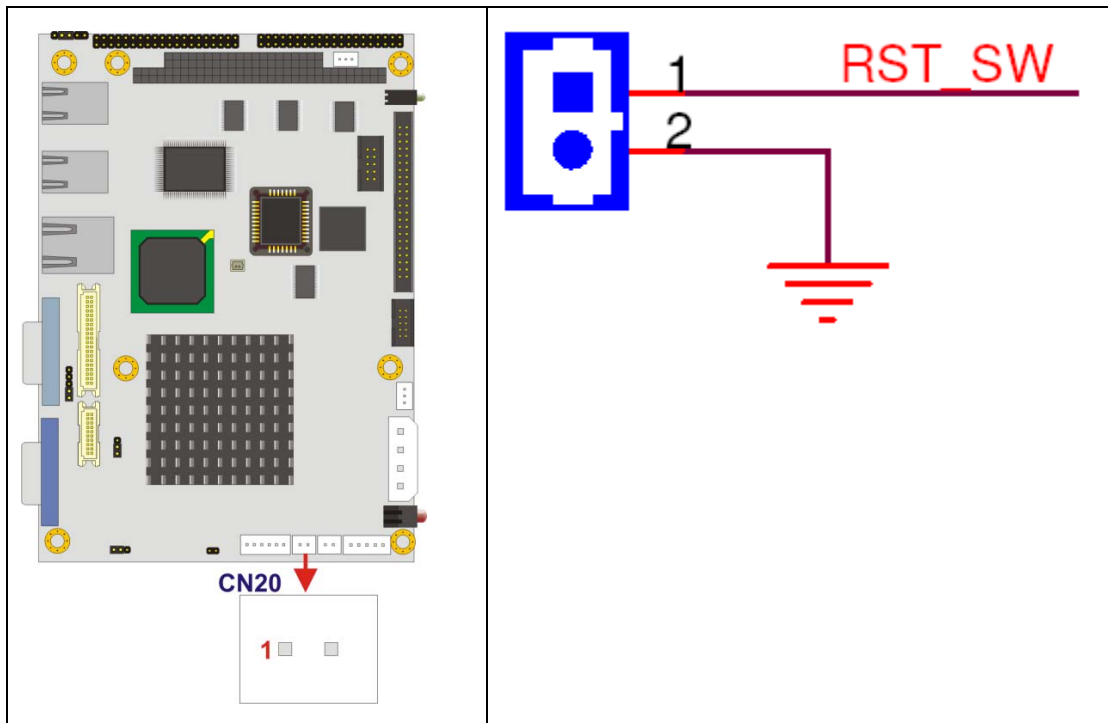
PIN NO.	DESCRIPTION
1	Power Switch
2	GND

**Table 4-14: Power Button Connector Pinouts**

### 4.2.13 Reset Button Connector

- CN Label:** CN20
- CN Type:** 2-pin wafer (1x2)
- CN Location:** See **Figure 4-15**
- CN Pinouts:** See **Table 4-15**

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 4-15: Reset Button Connector Locations**



## WAFER-LX2 3.5" Embedded SBC

PIN NO.	DESCRIPTION
1	Reset Switch
2	GND

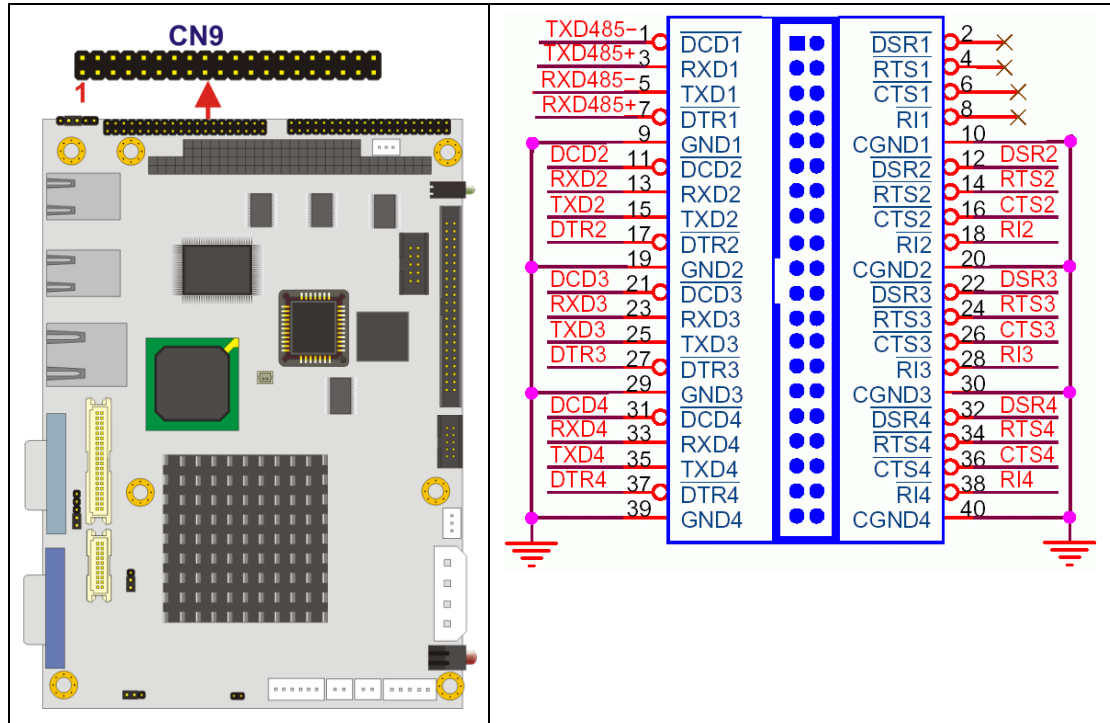
**Table 4-15: Reset Button Connector Pinouts**

### 4.2.14 Serial Port Connector (COM 2, COM 3 and COM 4)

- CN Label:** CN9
- CN Type:** 40-pin header (2x20)
- CN Location:** See **Figure 4-16**
- CN Pinouts:** See **Table 4-16**

The 40-pin serial port connector contains the following three serial ports, COM 2, COM 3 and COM 4. COM 3 and COM 4 are RS-232 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. The serial port locations are specified below.

- COM 2 is located on pin 1 to pin 20
- COM 3 is located on pin 21 to pin 30
- COM 4 is located on pin 31 to pin 40


**Figure 4-16: COM 2 to COM 4 Connector Pinout Locations**

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	TXD485-	2	N/C
3	TXD485+	4	N/C
5	RXD485+	6	N/C
7	RXD485-	8	N/C
9	GND	10	GND
11	DCD2	12	DSR2
13	RXD2	14	RTS2
15	TXD2	16	CTS2
17	DTR2	18	RI 2
19	GND	20	GND
21	DCD3	22	DSR3
23	RXD3	24	RTS3
25	TXD3	26	CTS3
27	DTR3	28	RI 3
29	GND	30	GND

## WAFER-LX2 3.5" Embedded SBC

31	DCD4	32	DSR4
33	RXD4	34	RTS4
35	TXD4	36	CTS4
37	DTR4	38	RI 4
39	GND	40	GND

**Table 4-16: COM 2 to COM 4 Connector Pinouts**

### 4.2.15 Serial Port Connector (COM 5, COM 6, COM 7 and COM 8)

- CN Label:** CN11
- CN Type:** 40-pin header (2x20)
- CN Location:** See **Figure 4-16**
- CN Pinouts:** See **Table 4-16**

The 40-pin serial port connector contains the following four serial ports, COM 5, COM 6, COM 7 and COM 8. All four serial ports are RS-232 serial communications channels. The serial port locations are specified below.

- COM 5 is located on pin 1 to pin 10
- COM 6 is located on pin 11 to pin 20
- COM 7 is located on pin 21 to pin 30
- COM 8 is located on pin 31 to pin 40

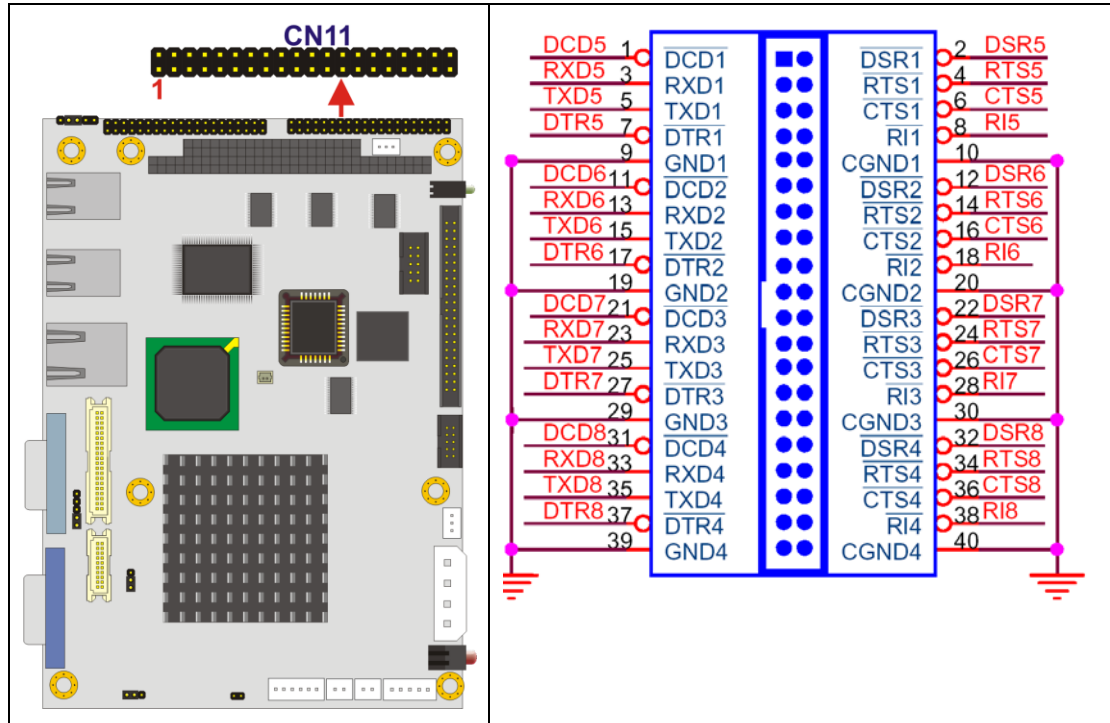


Figure 4-17: COM 5 to COM 8 Connector Pinout Locations

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	DCD5	2	DSR5
3	RXD5	4	RTS5
5	TXD5	6	CTS5
7	DTR5	8	RI5
9	GND	10	GND
11	DCD6	12	DSR6
13	RXD6	14	RTS6
15	TXD6	16	CTS6
17	DTR6	18	RI6
19	GND	20	GND
21	DCD7	22	DSR7
23	RXD7	24	RTS7
25	TXD7	26	CTS7
27	DTR7	28	RI7
29	GND	30	GND

## WAFER-LX2 3.5" Embedded SBC

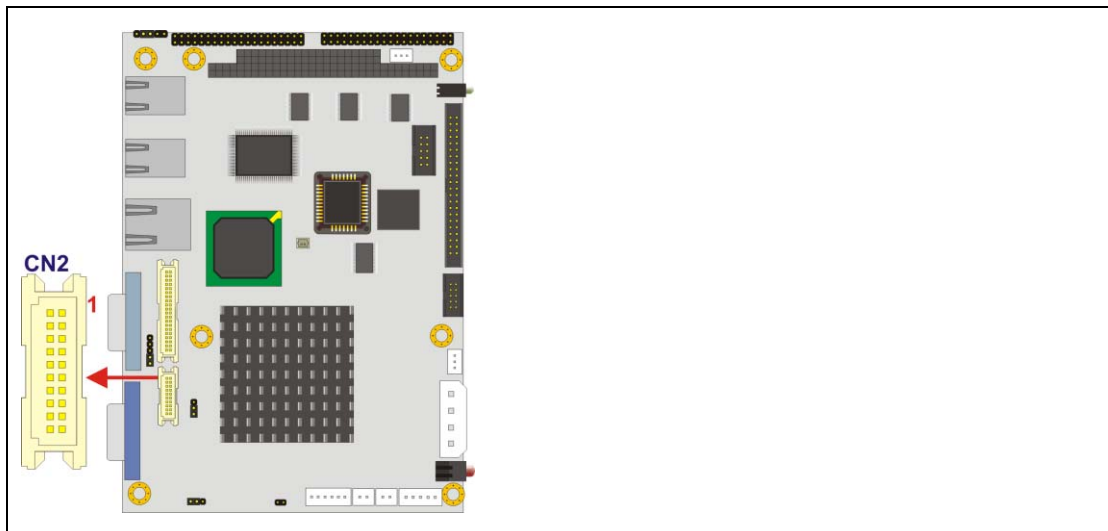
31	DCD8	32	DSR8
33	RXD8	34	RTS8
35	TXD8	36	CTS8
37	DTR8	38	RI8
39	GND	40	GND

Table 4-17: COM 5 to COM 8 Connector Pinouts

### 4.2.16 TFT LCD LVDS Connector

- CN Label:** CN2
- CN Type:** 20-pin crimp (2x10)
- CN Location:** See **Figure 4-18**
- CN Pinouts:** See **Table 4-18**

The 20-pin TFT LCD LVDS can be connected to a TFT LCD screen directly.



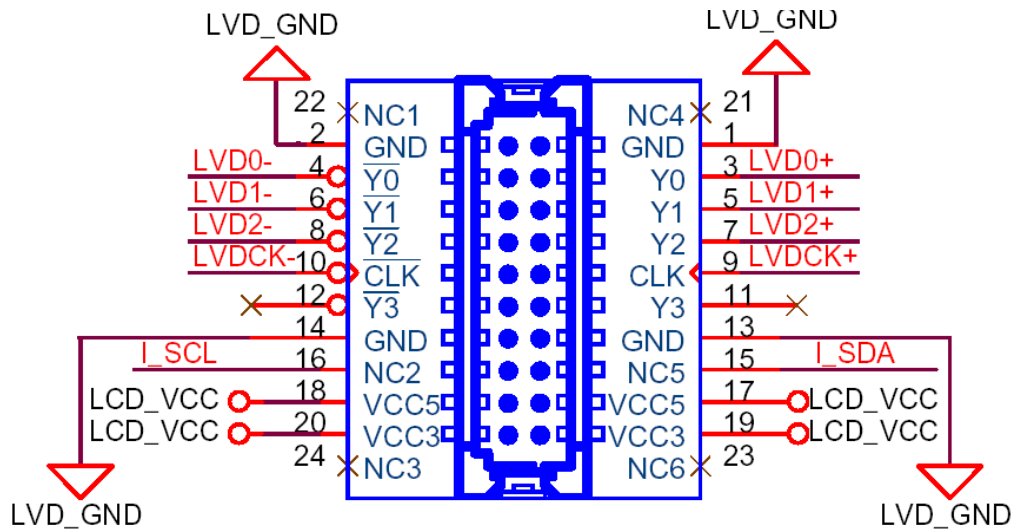


Figure 4-18: TFT LCD LVDS Connector Pinout Locations

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	SDATA	16	SCLK
17	LCD_Vcc	18	LCD_Vcc
19	LCD_Vcc	20	LCD_Vcc

Table 4-18: TFT LCD LVDS Port Connector Pinouts

#### 4.2.17 TFT LCD TTL Connector

- CN Label: CN4
- CN Type: 40-pin crimp (2x20)
- CN Location: See Figure 4-19

# WAFER-LX2 3.5" Embedded SBC

CN Pinouts: See Table 4-19

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

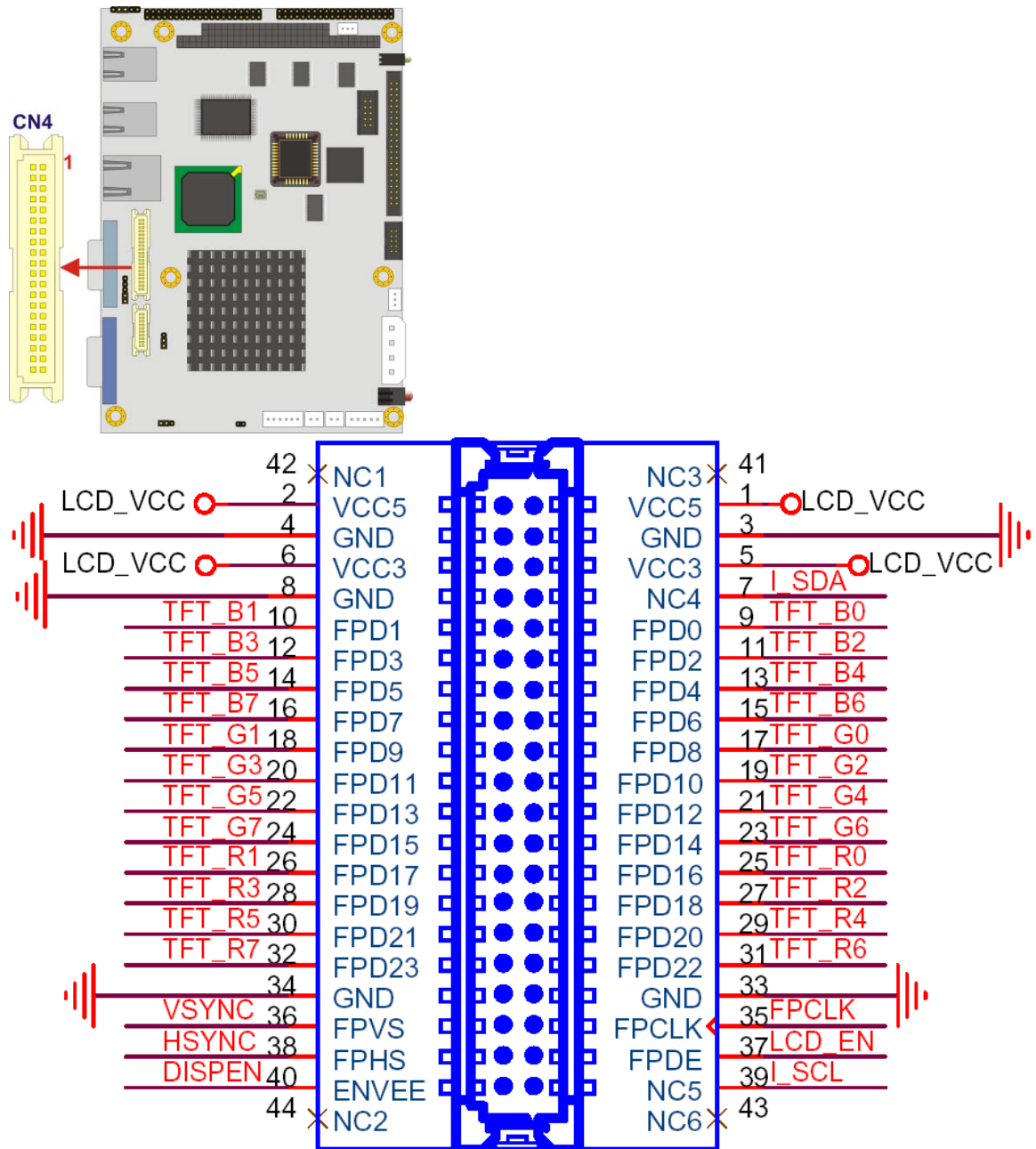


Figure 4-19: TFT LCD TTL Connector Pinout Locations

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	LCD_Vcc	2	LCD_Vcc
3	GND	4	GND
5	LCD_Vcc	6	LCD_Vcc
7	SDA	8	GND
9	B0	10	B1
11	B2	12	B3
13	B4	14	B5
15	B6	16	B7
17	G0	18	G1
19	G2	20	G3
21	G4	22	G5
23	G6	24	G7
25	R0	26	R1
26	R2	28	R3
29	R4	30	R5
31	R6	32	R7
33	GND	34	GND
35	CLK	36	VSYNC
37	LCD_EN	38	HSYNC
39	SCL	40	DISP_EN

**Table 4-19: TFT LCD TTL Port Connector Pinouts**

## 4.3 External Peripheral Interface Connectors

### 4.3.1 External Peripheral Interface Connector Overview

The WAFER-LX2 external peripheral interface connectors are listed below and shown in Figure 4-20:

- 1 x RJ-45 Ethernet connector
- 1 x Serial communications port
- 2 x USB combo port
- 1 x VGA port



## WAFER-LX2 3.5" Embedded SBC

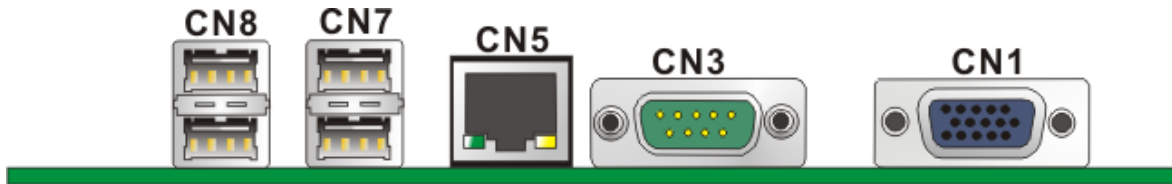


Figure 4-20: WAFER-LX2 On-board External Interface Connectors

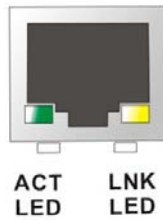
### 4.3.2 RJ-45 Ethernet Connector

<b>CN Label:</b>	<b>CN5</b>
<b>CN Type:</b>	RJ-45
<b>CN Location:</b>	See Figure 4-20
<b>CN Pinouts:</b>	See Table 4-20

The RJ-45 Ethernet connector on the WAFER-LX2 provides connectivity to a 10/100 megabit Ethernet connection between the WAFER-LX2 and a Local Area Network (LAN) through a network hub.

PIN NO.	DESCRIPTION
1	TX+
2	N/C
3	TX-
4	RX+
5	N/C
6	RX-
7	N/C
8	N/C

Table 4-20: RJ-45 Ethernet Connector Pinouts



**Figure 4-21: J7 Connector**

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

SPEED LED		LINK LED	
Status	Description	Status	Description
<b>GREEN</b>	ON: 100MB OFF: 10MB	<b>YELLOW</b>	ON: Linked Flashing: Activity

**Table 4-21: J7 Connector LEDs**

### 4.3.3 Serial Port Connector (COM 1)

- CN Label:** CN3
- CN Type:** DB-9 connector
- CN Location:** See **Figure 4-20**
- CN Pinouts:** See **Table 4-22** and **Figure 4-22**

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

## WAFER-LX2 3.5" Embedded SBC

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

Table 4-22: RS-232 Serial Port (COM 1) Pinouts

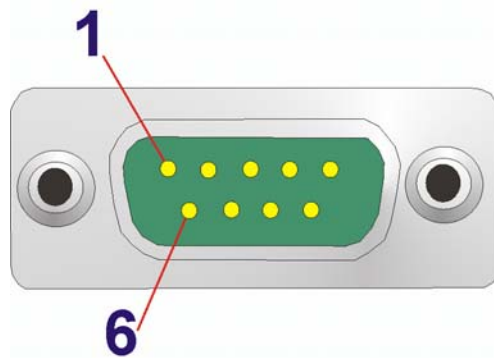


Figure 4-22: COM1 Pinout Locations

### 4.3.4 USB Combo Port

- CN Label:** CN7 and CN8
- CN Type:** USB Combo port
- CN Location:** See Figure 4-20
- CN Pinouts:** See Table 4-23

The two USB combo ports provide connectivity to USB devices. The USB port support both USB 1.1 and USB 2.0.

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	VCC_USB	2	DATA1-
3	DATA1+	4	GND
5	VCC_USB	6	DATA2-

7	DATA2+	8	GND
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**Table 4-23: USB Connector Pinouts**

### 4.3.5 VGA Connector

**CN Label:** CN1

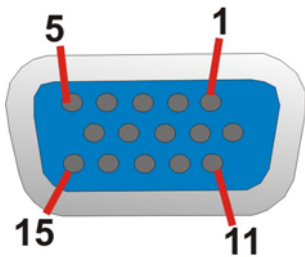
**CN Type:** DB15

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

**CN Pinouts:** See **Figure 4-23** and **Table 4-24**

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

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

**Table 4-24: VGA Connector Pinouts**

**Figure 4-23: VGA Connector**

Chapter

5

# Installation

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## 5.1 Anti-static Precautions

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### WARNING:

Failure to take ESD precautions during the installation of the WAFER-LX2 may result in permanent damage to the WAFER-LX2 and severe injury to the user.

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Electrostatic discharge (ESD) can cause serious damage to electronic components, including the WAFER-LX2. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the WAFER-LX2, 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-LX2, place it on an anti-static pad. This reduces the possibility of ESD damaging the WAFER-LX2.
- **Only handle the edges of the PCB:-** When handling the PCB, hold the PCB by the edges.

## 5.2 Installation Considerations

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### NOTE:

The following installation notices and installation considerations should be read and understood before the WAFER-LX2 is installed. All installation notices pertaining to the installation of the WAFER-LX2 should be strictly adhered to. Failing to adhere to these precautions may lead to severe damage of the WAFER-LX2 and injury to the person installing the motherboard.

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### 5.2.1 Installation Notices

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### WARNING:

The installation instructions described in this manual should be carefully followed in order to prevent damage to the WAFER-LX2, WAFER-LX2 components and injury to the user.

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Before and during the installation please DO the following:

- **Read the user manual:**
  - The user manual provides a complete description of the WAFER-LX2 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-LX2 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-LX2 off:**

- When working with the WAFER-LX2, 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-LX2 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-LX2 is properly installed.

- All the items in the packing list are present (see **Chapter 4**)
- A compatible memory module is properly inserted into the slot (see **Chapter 2**)
- The CF Type I or CF Type II card is properly installed into the CF socket
- The jumpers have been properly configured
- The WAFER-LX2 is installed into a chassis with adequate ventilation
- The correct power supply is being used
- The following devices are properly connected
  - Audio kit
  - Power supply
  - Serial port cables
- The following external peripheral devices are properly connected to the chassis:
  - VGA screen
  - RS-232 serial communications device
  - USB devices



## 5.3 SODIMM Installation and CF Card Installation

### 5.3.1 SODIMM Installation



#### WARNING:

Using an incorrectly specified SODIMM may cause permanent damage to the WAFER-LX2. Please make sure the purchased SODIMM complies with the memory specifications of the WAFER-LX2. SODIMM specifications compliant with the WAFER-LX2 are listed in Chapter 2.

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

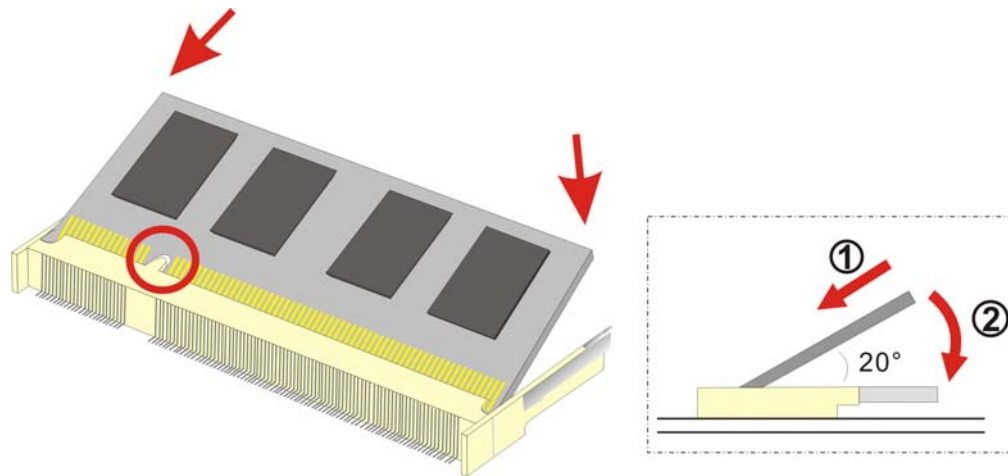


Figure 5-1: SODIMM Installation

- Step 1:** **Locate the SODIMM socket.** Place the WAFER-LX2 on an anti-static pad with the solder side facing up.
- Step 2:** **Align the SODIMM with the socket.** The SODIMM must be oriented in such a way that the notch in the middle of the SODIMM must be aligned with the plastic bridge in the socket.

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

### 5.3.2 CF Card Installation

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Note:

The WAFER-LX2 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.

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To install the a CF card (Type 1 or Type 2) onto the WAFER-LX2, please follow the steps below:

- Step 1:** Locate the **CF card socket**. Place the WAFER-LX2 on an anti-static pad with the solder side facing up. Locate the CF card.
- Step 2:** Align the **CF card**. Make sure the CF card is properly aligned with the CF socket.
- Step 3:** Insert the **CF card**. Gently insert the CF card into the socket making sure the socket pins are properly inserted into the socket. See **Figure 5-2**.

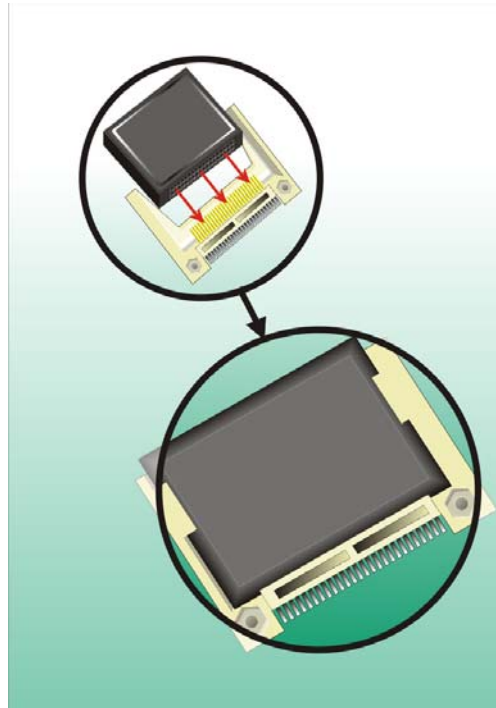


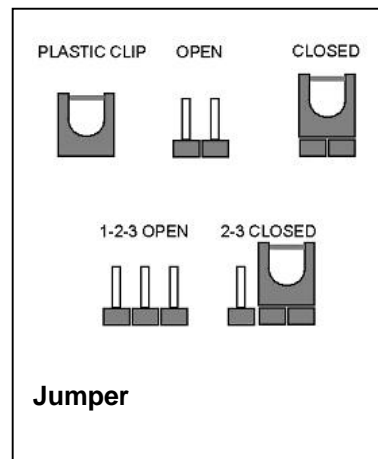
Figure 5-2: CF Card Installation

## 5.4 Jumper Settings



### NOTE:

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



Before the WAFER-LX2 is installed in the system, the jumpers must be set in accordance with the desired configuration. The jumpers on the WAFER-LX2 are listed in Table 5-1.

Description	Label	Type
AT power select	JP4	2-pin header
COM 1 Pin 9 setting	JP1	5-pin header
COM 2 function select	JP3	5-pin header
LCD voltage select	JP2	3-pin header
LCD clock select	JP5	3-pin header

**Table 5-1: Jumpers**

### 5.4.1 AT Power Select Jumper Settings

- Jumper Label:** JP4
- Jumper Type:** 2-pin header
- Jumper Settings:** See **Table 5-2**
- Jumper Location:** See **Figure 5-3**

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**. If the AT power is used and the system is connected to an ATX power supply, the system will automatically turn on.

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

**Table 5-2: AT Power Select Jumper Settings**

The location of the AT Power Select jumper is shown in **Figure 5-3** below.

## WAFER-LX2 3.5" Embedded SBC

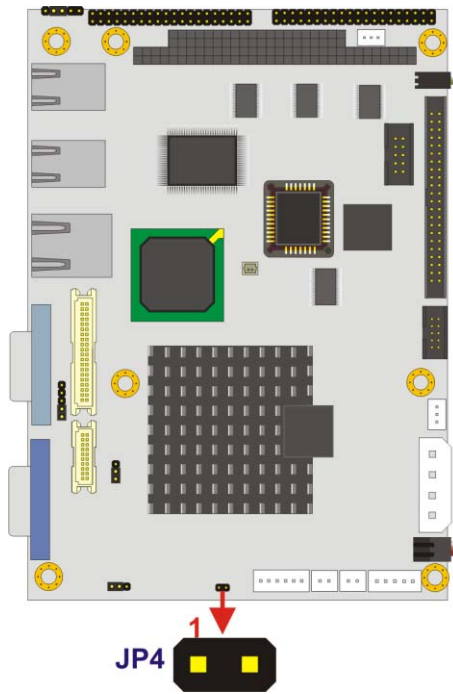


Figure 5-3: AT Power Select Jumper Location

### 5.4.2 Clear CMOS Jumper

<b>Jumper Label:</b>	<b>CN22</b>
<b>Jumper Type:</b>	2-pin header
<b>Jumper Settings:</b>	See <b>Table 5-3</b>
<b>Jumper Location:</b>	See <b>Figure 5-4</b>

If the WAFER-LX2 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.

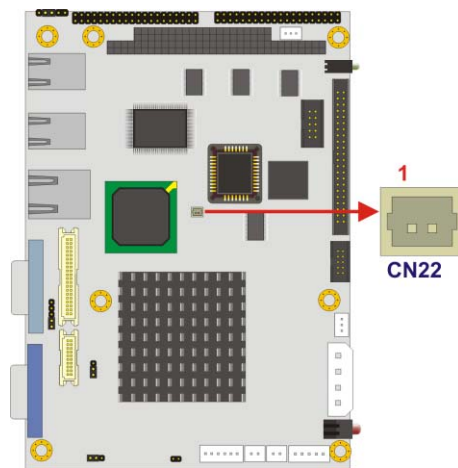
After having done one of the above, save the changes and exit the CMOS Setup menu.

The clear CMOS jumper settings are shown in **Table 5-3**.

AT Power Select	Description	
Short	Keep CMOS Setup	Default
Open	Clear CMOS Setup	

**Table 5-3: CN22 Clear CMOS Jumper Settings**

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



**Figure 5-4: CN22 Clear CMOS Jumper**

### 5.4.3 COM 1 Pin 9 Setting Jumper

- Jumper Label:** JP1
- Jumper Type:** 5-pin header
- Jumper Settings:** See **Table 5-4**
- Jumper Location:** See **Figure 5-5**

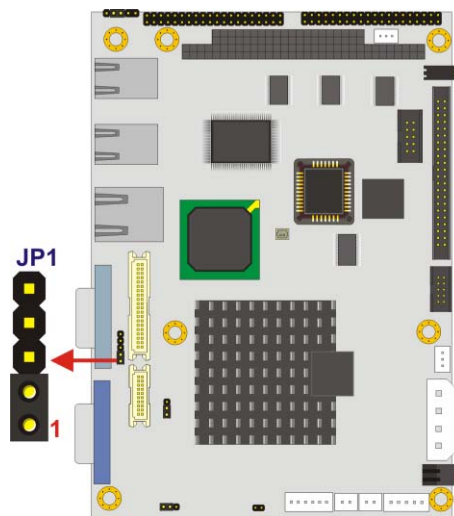
## WAFER-LX2 3.5" Embedded SBC

The COM 1 Pin 9 Setting jumper configures pin 9 on COM 1 as either a +5V, +12V power source or as a ring-in (RI) line. The COM 1 Pin 9 Setting jumper selection options are shown in **Table 5-4**.

COM 1 RI Pin	Description	
Short 1 – 2	COM 1 RI Pin use RI	Default
Short 2 – 3	COM 1 RI Pin use +5V	
Short 3 – 4	COM 1 RI Pin use +5V	
Short 4 – 5	COM 2 RI Pin use +12V	

**Table 5-4: COM 1 Pin 9 Setting Jumper Settings**

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



**Figure 5-5: COM 1 Pin 9 Setting Jumper Location**

### 5.4.4 COM 2 Function Select Jumper

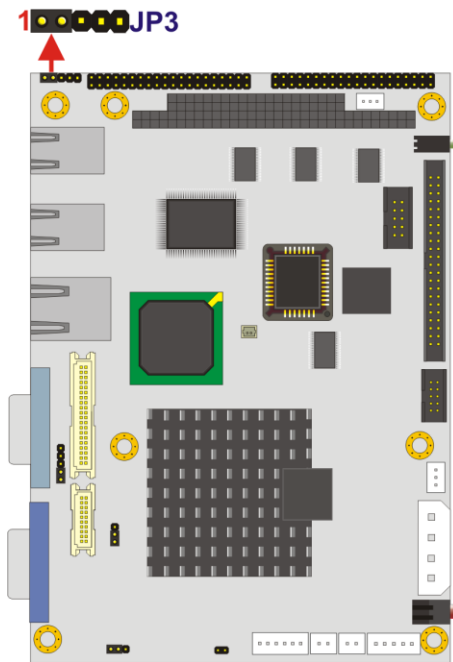
<b>Jumper Label:</b>	<b>JP3</b>
<b>Jumper Type:</b>	3-pin header
<b>Jumper Settings:</b>	See <b>Table 5-7</b>
<b>Jumper Location:</b>	See <b>Figure 5-8</b>

The COM 2 Function Select jumper sets the communication protocol used by the second serial communications port (COM 2) as RS-232, RS-422 or RS-485. The COM 2 Function Select settings are shown in **Table 5-7**.

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

**Table 5-5: COM 2 Function Select Jumper Settings**

The COM 2 Function Select jumper location is shown in **Figure 5-8**.



**Figure 5-6: COM 2 Function Select Jumper Location**



### 5.4.5 LCD Voltage Selection



**WARNING:**

Permanent damage to the screen and WAFER-LX2 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 5-6**
- 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 5-6.

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

**Table 5-6: LCD Voltage Selection Jumper Settings**

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

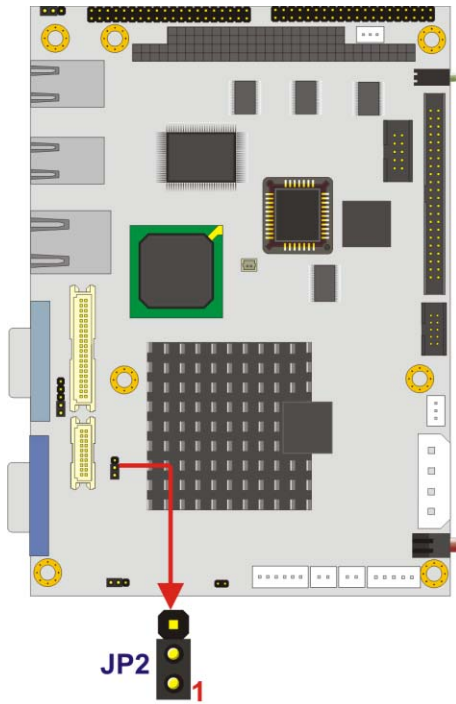


Figure 5-7: LCD Voltage Selection Jumper Location

#### 5.4.6 LCD Clock Select Jumper

- Jumper Label: JP5
- Jumper Type: 3-pin header
- Jumper Settings: See Table 5-7
- Jumper Location: See Figure 5-8

The LCD Clock Select jumper enables the LCD clock to be inverted. The LCD Clock Select settings are shown in Table 5-7.

LCD Clock Select	Description	
Short 1-2	Normal LCD Clock	Default
Short 2-3	Inverted LCD Clock	

Table 5-7: LCD Clock Select Jumper Settings

The LCD Clock Select jumper location is shown in Figure 5-8.

## WAFER-LX2 3.5" Embedded SBC

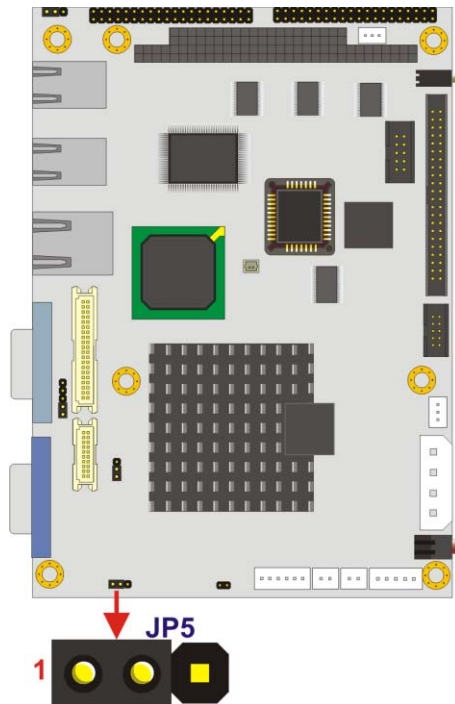


Figure 5-8: LCD Clock Select Jumper Select Jumper Location

## 5.5 Chassis Installation

### 5.5.1 Airflow



#### **WARNING:**

Airflow is critical to the cooling of the CPU and other onboard components. The chassis in which the WAFER-LX2 must have air vents to allow cool air to move into the system and hot air to move out.

The WAFER-LX2 must be installed in a chassis with ventilation holes on the sides allowing airflow to travel through the heat sink surface. In a system with an individual power supply unit, the cooling fan of a power supply can also help generate airflow through the board surface.

## 5.5.2 Motherboard Installation

To install the WAFER-LX2 motherboard into the chassis please refer to the reference material that came with the chassis.

## 5.6 Internal Peripheral Device Connections

### 5.6.1 Peripheral Device Cables

The cables listed in Table 5-8 are shipped with the WAFER-LX2.

Quantity	Type
1	ATA 66/100 flat cable
1	Audio cable
2	Four COM port cable

**Table 5-8: IEI Provided Cables**

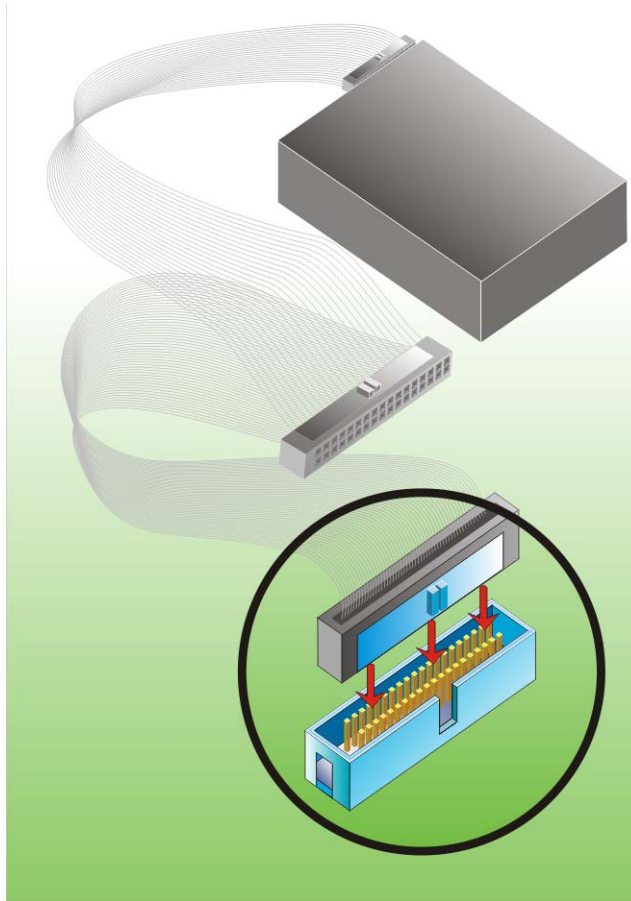
### 5.6.2 ATA Flat Cable Connection

The ATA 66/100 flat cable connects to the WAFER-LX2 to one or two IDE devices. To connect an IDE HDD to the WAFER-LX2 please follow the instructions below.

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

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

## WAFER-LX2 3.5" Embedded SBC



**Figure 5-9: IDE Cable Connection**

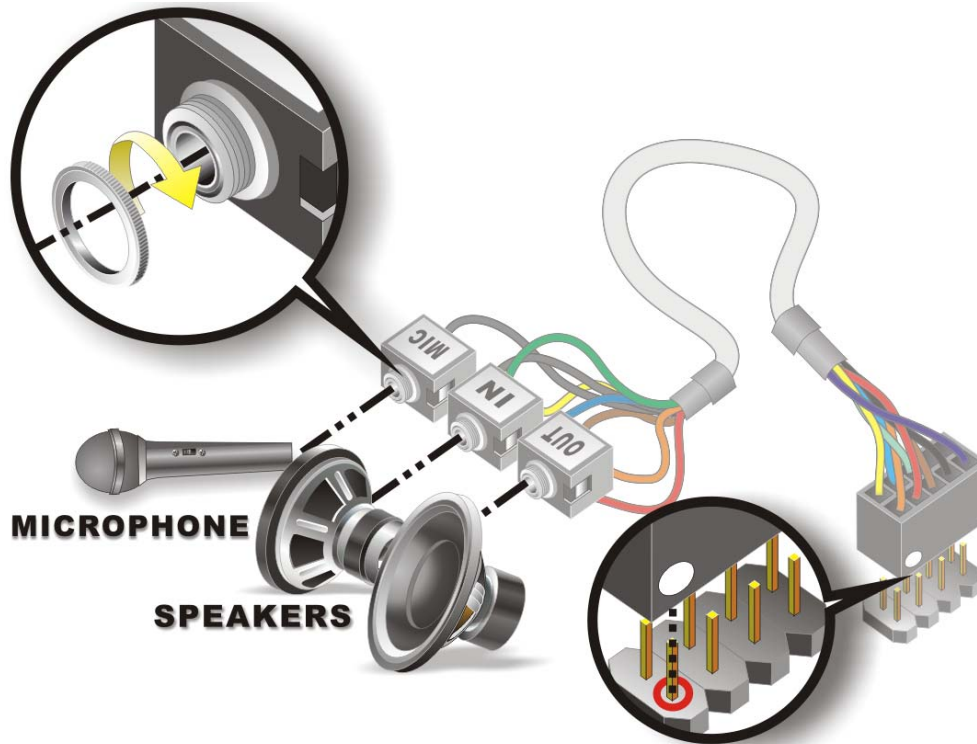
**Step 3:** **Connect the cable to an IDE device.** Connect the two connectors on the other side of the cable to one or two IDE devices. Make sure that pin 1 on the cable corresponds to pin 1 on the connector

### 5.6.3 Audio Kit Installation

The Audio Kit that came with the WAFER-LX2 connects to the 10-pin audio connector on the WAFER-LX2. The audio kit consists of three audio jacks. One audio jack, Mic In, connects to a microphone. The remaining two audio jacks, Line-In and Line-Out, connect to two speakers. To install the audio kit, please refer to the steps below:

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

**Step 2:** **Align pin 1.** Align pin 1 on the onboard connector with pin 1 on the audio kit connector. Pin 1 on the audio kit connector is indicated with a white dot. See **Figure 5-10.**



**Figure 5-10: IDE Cable Connection**

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

#### 5.6.4 Four Serial Port Connector Cable

The WAFER-LX2 is shipped with two four serial port connector cables. The four serial port connector cable connects four serial port connectors on the cable to the 40 pin serial port connectors on the WAFER-LX2. To connect the four serial port connector cable please follow the steps below.

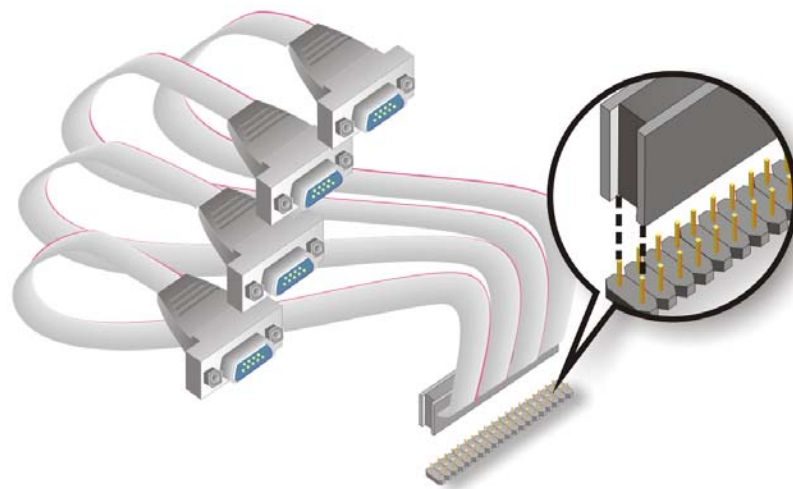
**Step 1:** **Locate the serial port connector.** The location of the 40-pin serial port

## WAFER-LX2 3.5" Embedded SBC

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-LX2 serial port COM connector. See **Figure 5-11**.

**Step 3: Insert the cable connectors** Once the cable connector is properly aligned with the serial port COM connector on the WAFER-LX2, connect the cable connector to the onboard connectors. See **Figure 5-11**.



**Figure 5-11: Four Serial Port Connector Cable Connection**

**Step 4: Attach DB-9 serial port connectors to the chassis.** The four DB-9 serial port connectors can be inserted into four preformed holes in the chassis. Once inserted the DB-9 connectors should be secured to the chassis with the retention screws.

## 5.7 External Peripheral Interface Connection

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



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

To install these devices, connect the corresponding cable connector from the actual device to the corresponding WAFER-LX2 external peripheral interface connector making sure the pins are properly aligned.



Chapter

6

# AWARD BIOS

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## 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

## WAFER-LX2 3.5" Embedded SBC

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

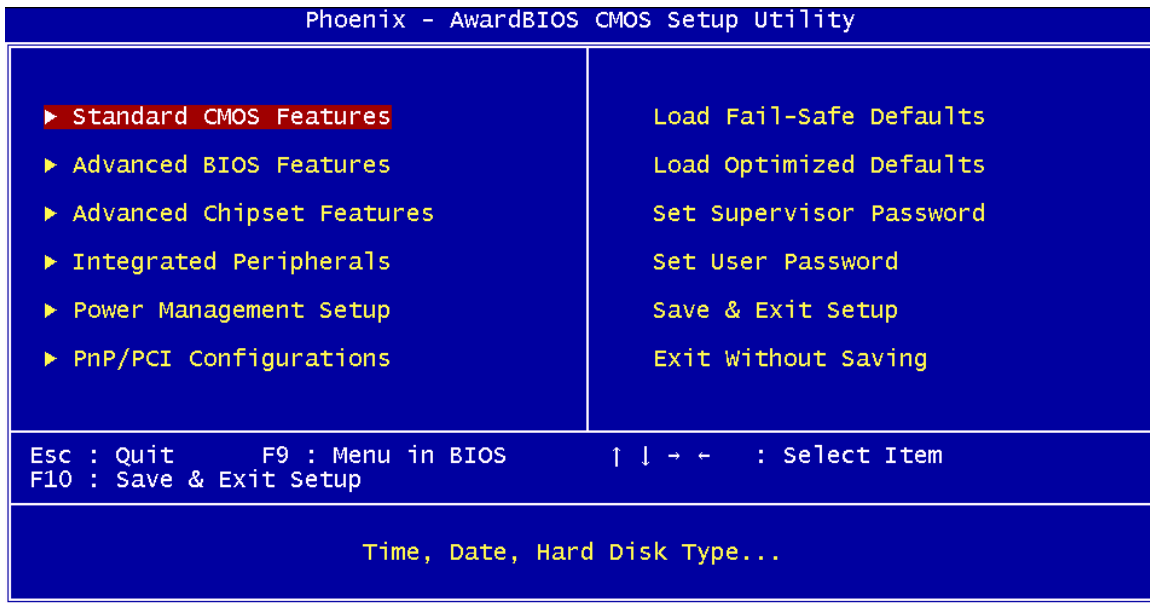
When **F1** is pressed a small help window describing the appropriate keys to use and the possible selections for the highlighted item appears. To exit the Help Window press **Esc** or the **F1** key again.

### 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.

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

## WAFER-LX2 3.5" Embedded SBC

### → Load Fail-Safe Defaults

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

### → Load Optimized Defaults

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

### → Set Supervisor Password

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

### → Set User Password

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

### → Save & Exit Setup

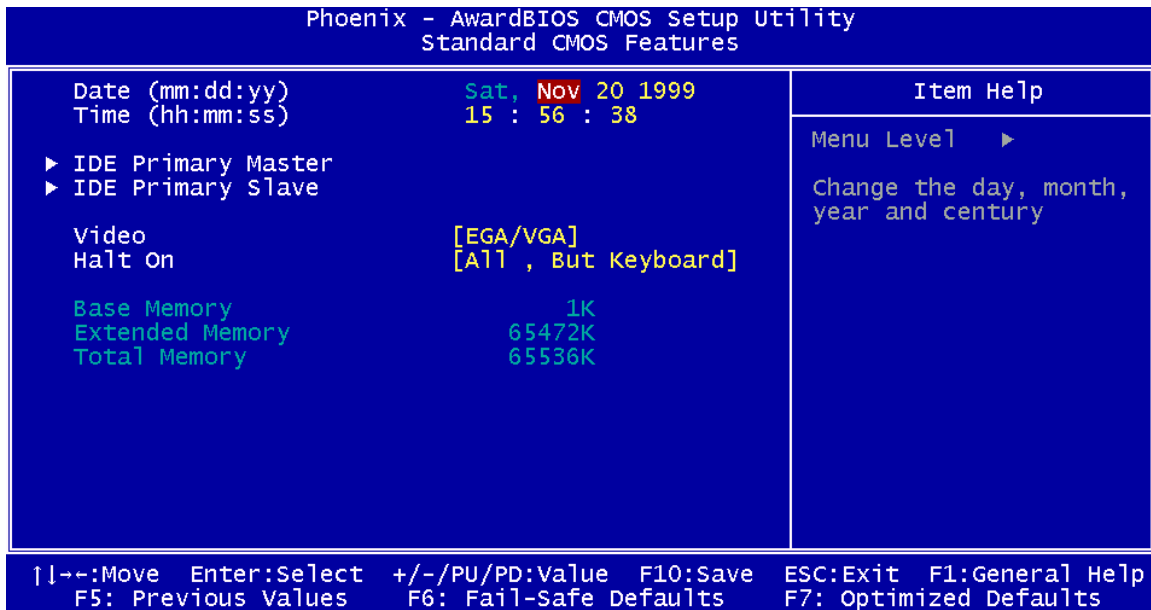
Use the **Save & Exit Setup** option to save any configuration changes made and exit the BIOS menus.

➔ **Exit Without Saving**

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

## 6.2 Standard CMOS Features

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



### BIOS Menu 2: Standard CMOS Features

➔ **Date [Day mm:dd:yyyy]**

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

➔ **Time [hh/mm/ss]**

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

## WAFER-LX2 3.5" Embedded SBC

### → 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.

### → Halt On [All, But Keyboard]

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

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

### 6.2.1 IDE Primary Master/Slave

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

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

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

→ **IDE Primary Master [Auto]**

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

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



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- **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.

### → 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.

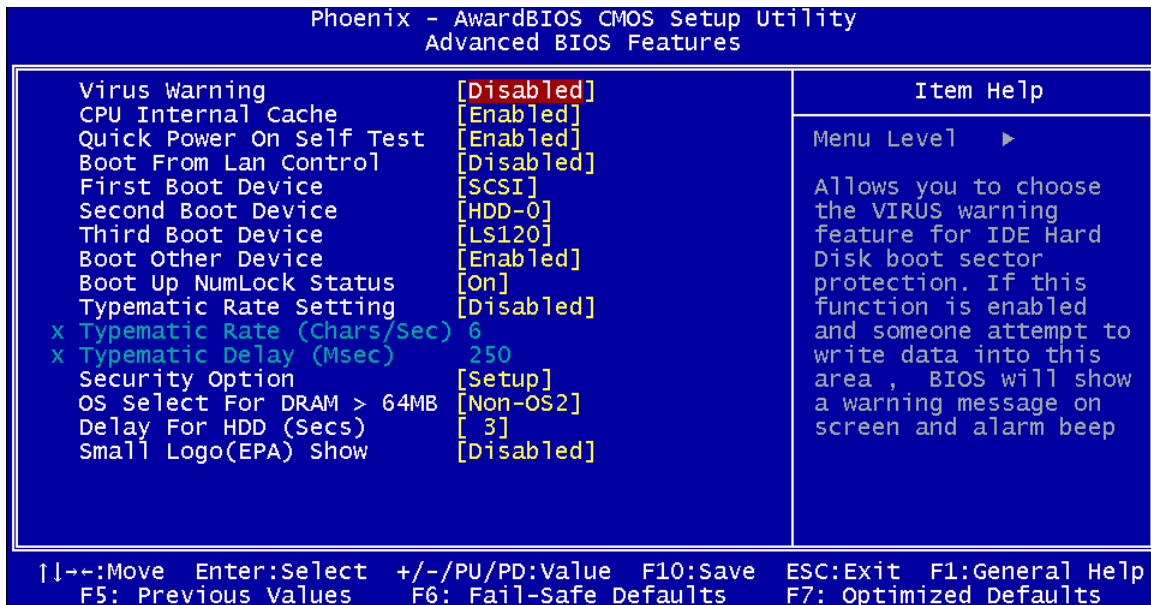
**→ Sector**

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

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### 6.3 Advanced BIOS Features

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



#### BIOS Menu 3: Advanced BIOS Features

##### → Virus Warning [Disabled]



#### NOTE:

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

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

→ **Enabled** Activates automatically when the system boots up causing a warning message to appear when anything attempts to access the boot sector or HDD partition table.

→ **Disabled** (Default) No warning message appears when there is an attempt to access the boot sector or HDD partition table.

→ **CPU Internal Cache [Enabled]**

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

→ **Disabled** The internal CPU cache is disabled.

→ **Enabled** (Default) The internal CPU cache is enabled.

→ **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 From LAN Control [Disabled]**

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

→ **Disabled** (Default) The system cannot be booted from a remote system through the LAN.

→ **Enabled** The system can be booted from a remote system through the LAN.

## WAFER-LX2 3.5" Embedded SBC

### → Boot Device

Use the **Boot Device** options to select the order of the devices the system boots from.

There are three boot device configuration options:

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

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

Boot Device configuration options are:

- 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.

#### → **Gate A20 Option [Fast]**

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

- **Normal** The keyboard controller does the switching.
- **Fast** (Default) The chipset does the switching.

#### → **Typematic Rate Setting [Disabled]**

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

- **Disabled** (Default) Disables the typematic rate.
- **Enabled** Enables the typematic rate.

#### → **Typematic Rate (Chars/sec) [6]**

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

- 6 (Default) 6 characters per second
- 8 8 characters per second
- 10 10 characters per second
- 12 12 characters per second
- 15 15 characters per second
- 20 20 characters per second
- 24 24 characters per second
- 30 30 characters per second

### → **Typematic Delay (Msec) [250]**

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

- 250 (Default) 250 milliseconds
- 500 500 milliseconds
- 750 750 milliseconds
- 1000 1000 milliseconds

### → **Security Option [Setup]**

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

- **Setup** (Default) The system does not boot and access to Setup is denied if the correct password is not entered at the prompt.

- **System**                      The system boots, but access to Setup is denied if the correct password is not entered at the prompt.

**NOTE:**

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

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

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

- **Enabled**                      Specifies the operating system used as OS/2.
- **Disabled** (Default)        Select this option when not using the OS/2 operating system.

→ **Video BIOS Shadow [Enabled]**

Use the **Video Bios Shadow** option to enable video BIOS to be copied to RAM.

- **Disabled**                      Video BIOS is not copied to RAM.
- **Enabled** (Default)        Video BIOS is copied to RAM.

→ **Delay for HDD (secs) [3]**

Use the **Delay for HDD** option to specify the period of time the system should wait before the HDD is identified. If selected, the user is asked to enter a number between 0 and 15. The number specified is the number of seconds the system waits before the HDD is identified.



## WAFER-LX2 3.5" Embedded SBC

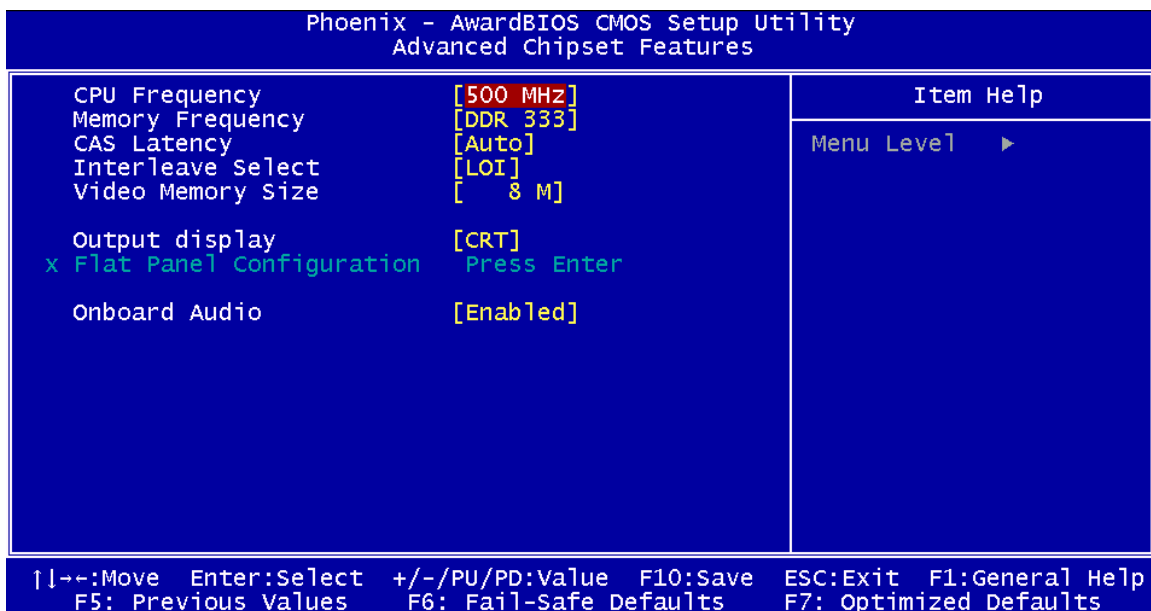
### → Small Logo (EPA) Show [Disabled]

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

- **Disabled** (Default) EPA logo does not appear during boot up.
- **Enabled** EPA logo appears during boot up.

## 6.4 Advanced Chipset Features

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



### BIOS Menu 4: Advanced Chipset Features

#### → CPU Frequency [500MHz]

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

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

→ **Memory Frequency [333MHz]**

Use the **Memory Frequency** option to set the frequency of the installed DRAM modules.

The **Memory Frequency** options are:

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

→ **CAS Latency [Auto]**

Use the **CAS Latency Time** option to set the Column Address Strobe (CAS) delay time.

The **CAS Latency Time** options are:

- Auto (Default)
- 1.5 nanoseconds
- 2.0 nanoseconds
- 2.5 nanoseconds
- 3.0 nanoseconds
- 3.5 nanoseconds

→ **Interleave Select [LOI]**

Use the **Interleave Select** option to specify how the cache memory is interleaved.

- **LOI** (Default) Low order interleaving (LOI) of memory occurs.
- **HOI** High order interleaving (HOI) of memory occurs.

## WAFER-LX2 3.5" Embedded SBC

### → Video Memory Size [8M]

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

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

### → Output Display [Panel & CRT]

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

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

### → Flat Panel Configuration [Press Enter]

Use the Flat Panel Configuration option to open the Flat Panel Configuration menu. The Flat Panel Configuration options are shown in Section 6.4.1.

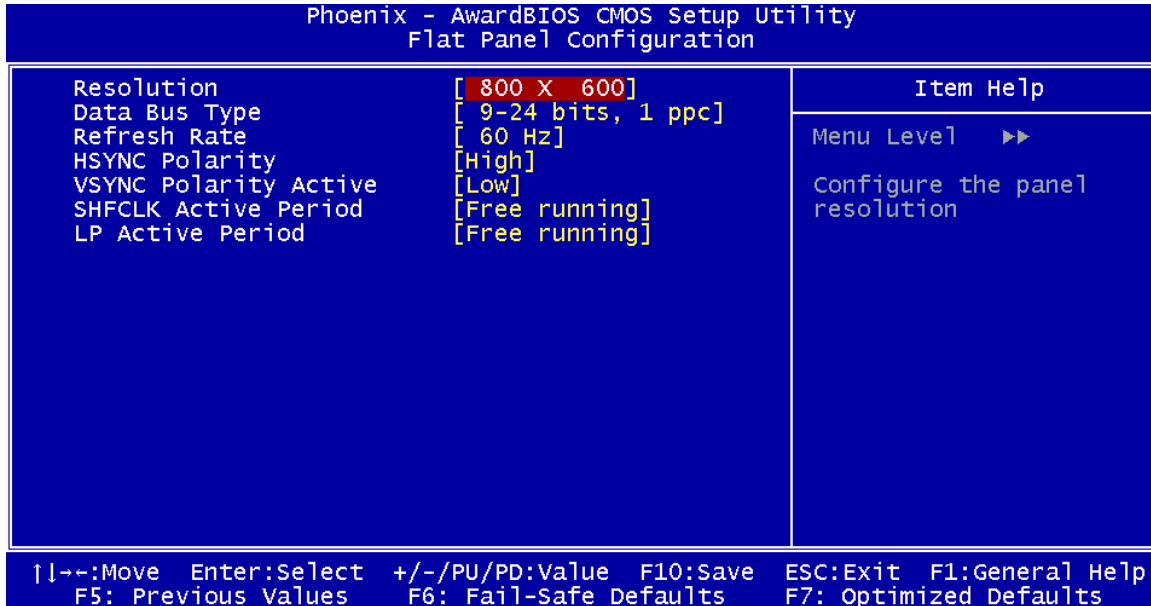
### → OnBoard Audio [Enabled]

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.

## 6.4.1 Flat Panel Configuration

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



#### BIOS Menu 5: Flat Panel Configuration

##### → Resolution [800 x 600]

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

- 320 x 240
- 640 x 480
- 800 x 600 (Default)
- 1024 x 768
- 1152 x 864
- 1280 x 1024
- 1600 x 1200

##### → Data Bus Type [9 – 24 bits, 1 ppc]

## WAFER-LX2 3.5" Embedded SBC

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

**Data Bus Type** options are:

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

### → Refresh Rate [60Hz]

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

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

### → HSYNC Polarity [High]

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

- High
- Low (Default)

### → VSYNC Polarity Active [Low]

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

- High
- Low (Default)

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

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

- Active Only
- Free running (Default)

→ **LP Active Period [Free Running]**

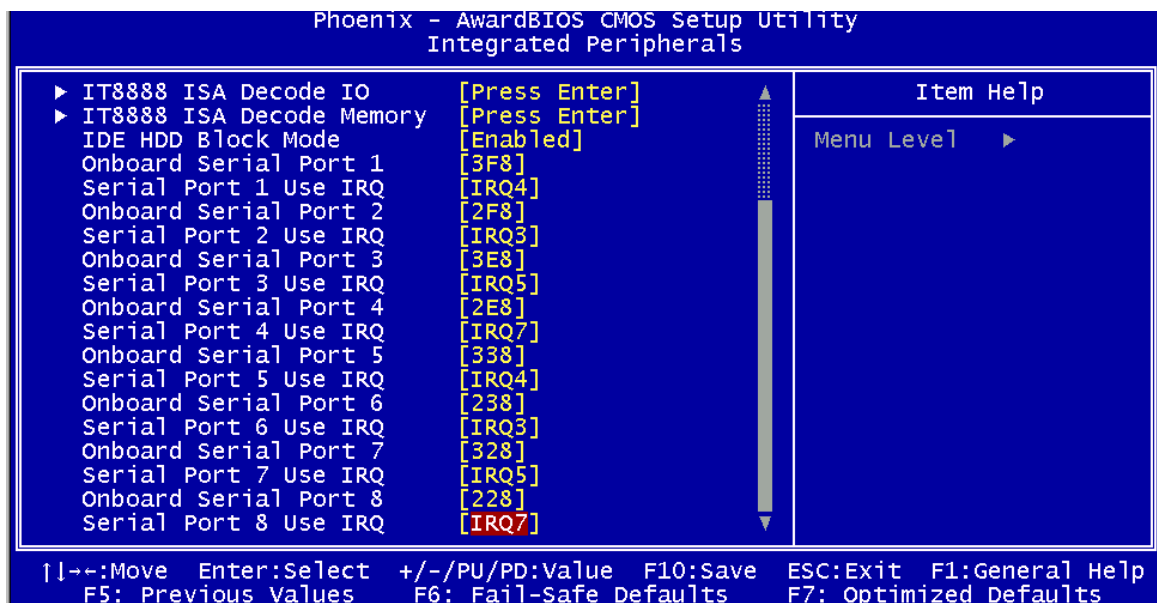
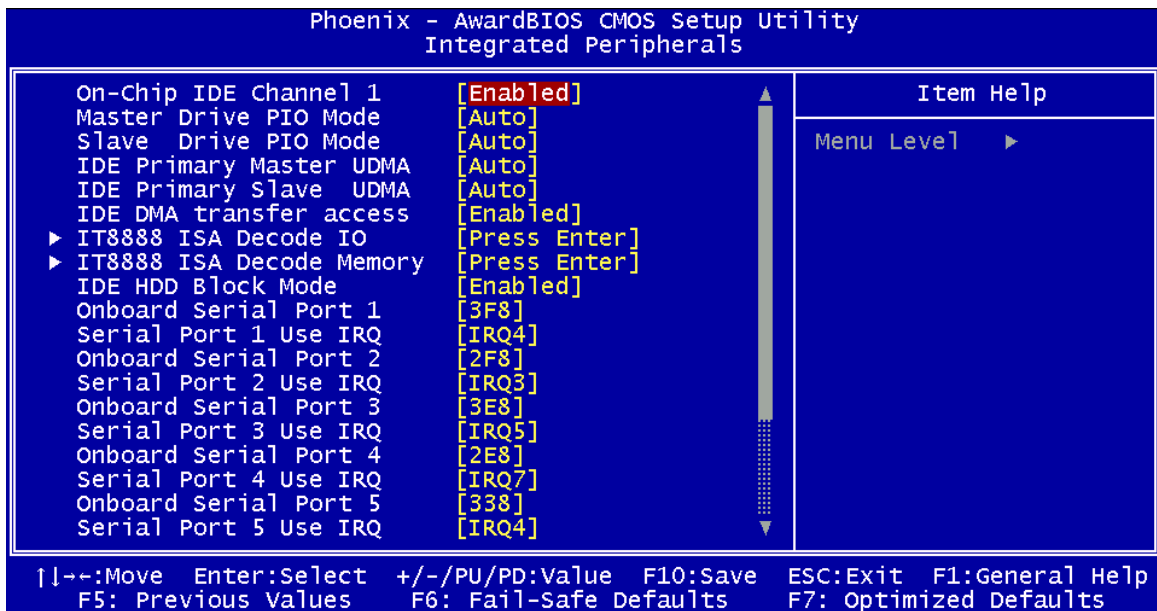
Use the **LP Active Period** option to set the LDE/MOD signal to the panel. The **LP Active Period** options are:

- Active Only
- Free running (Default)

## 6.5 Integrated Peripherals

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

## WAFER-LX2 3.5" Embedded SBC



### BIOS Menu 6: Integrated Peripherals

#### ➔ On-Chip IDE Channel 1 [Enabled]

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

#### ➔ Disabled

The primary IDE channel is not used.

→ **Enabled** (Default) The primary IDE channel is used.

→ **Drive PIO Mode [Auto]**

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

- Master Drive PIO Mode
- Slave Drive PIO Mode

→ **Auto** (Default) The computer selects the correct mode.

→ **Mode 0** PIO mode 0 selected with a maximum transfer rate of 3.3MBps.

→ **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.

→ **Mode 5** PIO mode 5 selected with a maximum transfer rate of 22.2MBps.

→ **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.



## WAFER-LX2 3.5" Embedded SBC

### → 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 7**) to set the IO memory range for the onboard ISA. See **Section 6.5.1**.

### → IT8888 ISA Decode Memory

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

### → IDE HDD Block Mode [Enabled]

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

→ **Disabled** Block mode is not supported.

→ **Enabled** (Default) Block mode is supported.

### → Onboard Serial Port N

Use the **Onboard Serial Port N** option to select the I/O address for the N<sup>th</sup> onboard serial port. The I/O address for the following onboard serial ports can be set.

- Disabled

- Onboard Serial Port 1
- Onboard Serial Port 2
- Onboard Serial Port 3
- Onboard Serial Port 4
- Onboard Serial Port 5
- Onboard Serial Port 6
- Onboard Serial Port 7
- Onboard Serial Port 8

→ **Serial Port N Use IRQ**

Use the **Serial Port N Use IRQ** option to select the IRQ for the N<sup>th</sup> onboard serial port. The IRQ for the following serial ports can be used:

- Serial Port 1 Use
- Serial Port 2 Use
- Serial Port 3 Use
- Serial Port 4 Use
- Serial Port 5 Use
- Serial Port 6 Use
- Serial Port 7 Use
- Serial Port 8 Use

### 6.5.1 IT8888 ISA Decode IO

---



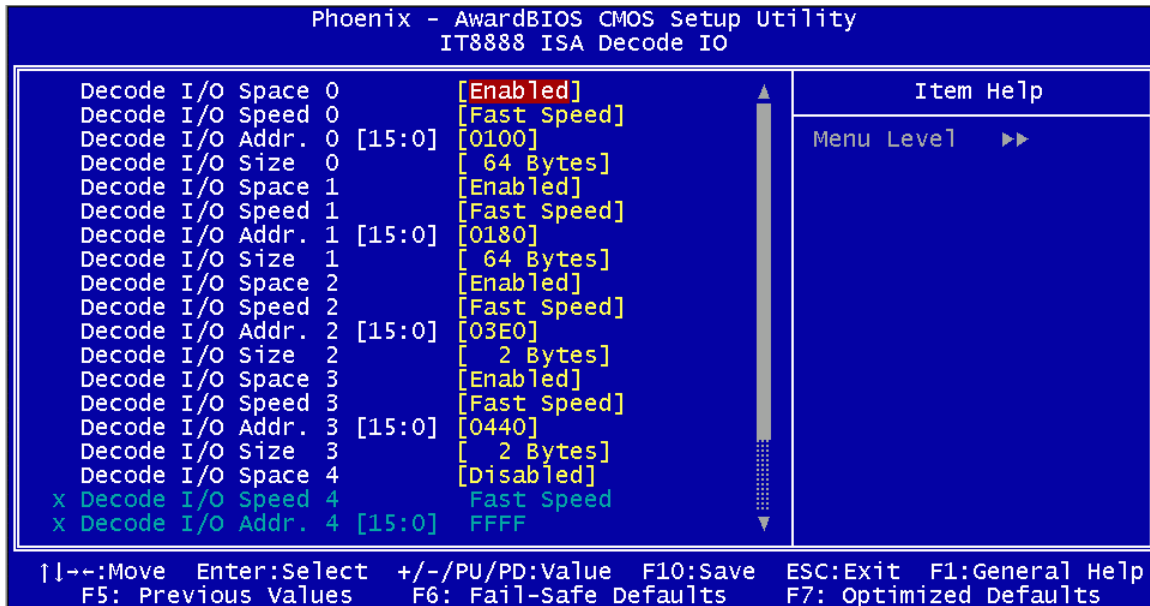
**NOTE:**

Five PCI-104 devices can be stacked onto the WAFER-LX2 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.

---

## WAFER-LX2 3.5" Embedded SBC

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



### BIOS Menu 7: IT8888 ISA Decode IO

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

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

Where N is an integer in the set [1, 2, 3, 4] 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

## WAFER-LX2 3.5" Embedded SBC

### 6.5.2 IT8888 ISA Decode Memory



#### NOTE:

Five PCI-104 devices can be stacked onto the WAFER-LX2 motherboard. If these devices are stacked onto the board, the ISA memory should be enabled. If no PCI-104 devices are being used, disable all the memory allocations for these buses. Disabling the memory allocations frees up system resources that can be allocated to other system applications.

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

```

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 8: IT8888 ISA Decode Memory

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

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

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

➔ **Decode Memory Space N [Enabled]**

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

- ➔ **Disabled**                      The Nth memory set is disabled and the system memory resources are reallocated to other applications.
- ➔ **Enabled**      (Default)      The Nth memory set is enabled and dedicated system memory resources are allocated to the ISA bus.

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

Use the **Decode Memory Speed N** option to specify the memory speed of the ISA bus.

The following options are available:

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

➔ **Decode Memory Address N [xx]**

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

## WAFER-LX2 3.5" Embedded SBC

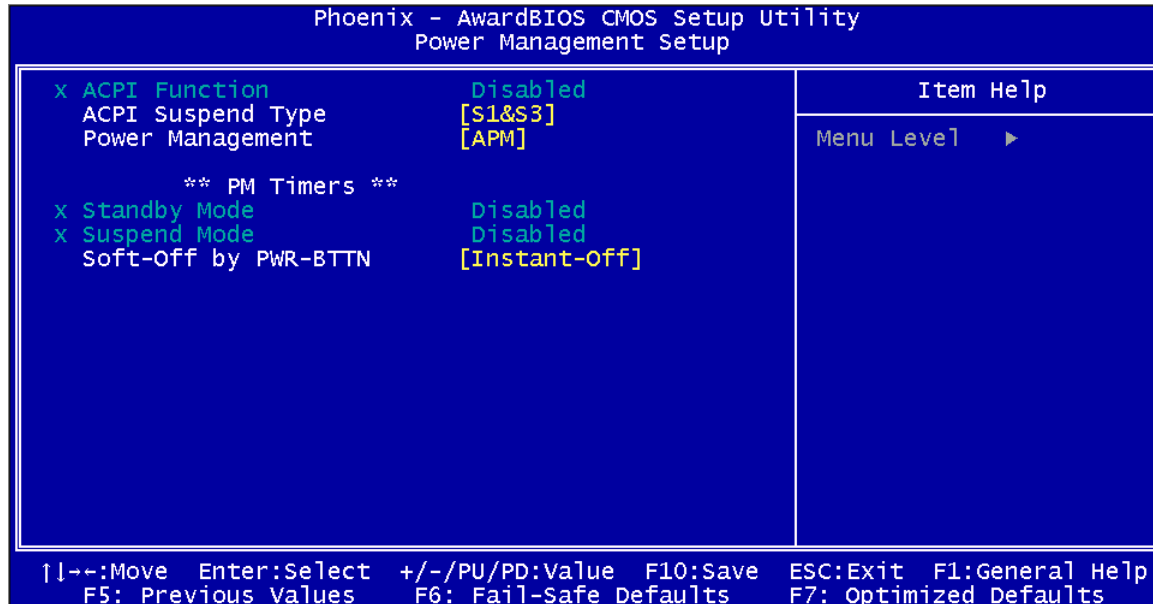
### → Decode Memory Size N [xx]

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 9) to set the BIOS power management and saving features.



### BIOS Menu 9: 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.

#### → **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.

→ **S1 & S3** Both suspend modes are implemented

#### → **Power Management [ACPI]**

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

→ **Disabled** All power management options are turned off. The only user configurable options are the power button and alarm settings.

→ **Legacy** Standby and suspend modes can be set.

→ **APM** (Default) Advanced power management (APM) is activated

**ACPI** Advanced Configuration and Power Interface (ACPI) is activated.



## WAFER-LX2 3.5" Embedded SBC

### → x Standby Mode [Disabled]

The **Standby Mode** option can only be selected if the **Power Management** option is set to Legacy. The **Standby Mode** specifies the amount of time the system can be inactive before the system enters standby mode. The **Standby Mode** options are:

- Disabled (Default)
- 1 Sec
- 5 Sec
- 10 Sec
- 15 Sec
- 30 Sec
- 45 Sec
- 1 Min
- 5 Min
- 10 Min
- 15 Min
- 30 Min
- 45 Min
- 60 Min
- 90 Min
- 120 Min

### → x Suspend Mode [Disabled]

The **Suspend Mode** option can only be selected if the **Power Management** option is set to Legacy. The **Suspend Mode** specifies the amount of time the system can be inactive before the system enters suspend mode. The **Suspend Mode** options are:

- Disabled (Default)
- 1 Sec
- 5 Sec
- 10 Sec
- 15 Sec
- 30 Sec
- 45 Sec

- 1 Min
- 5 Min
- 10 Min
- 15 Min
- 30 Min
- 45 Min
- 60 Min
- 90 Min
- 120 Min

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

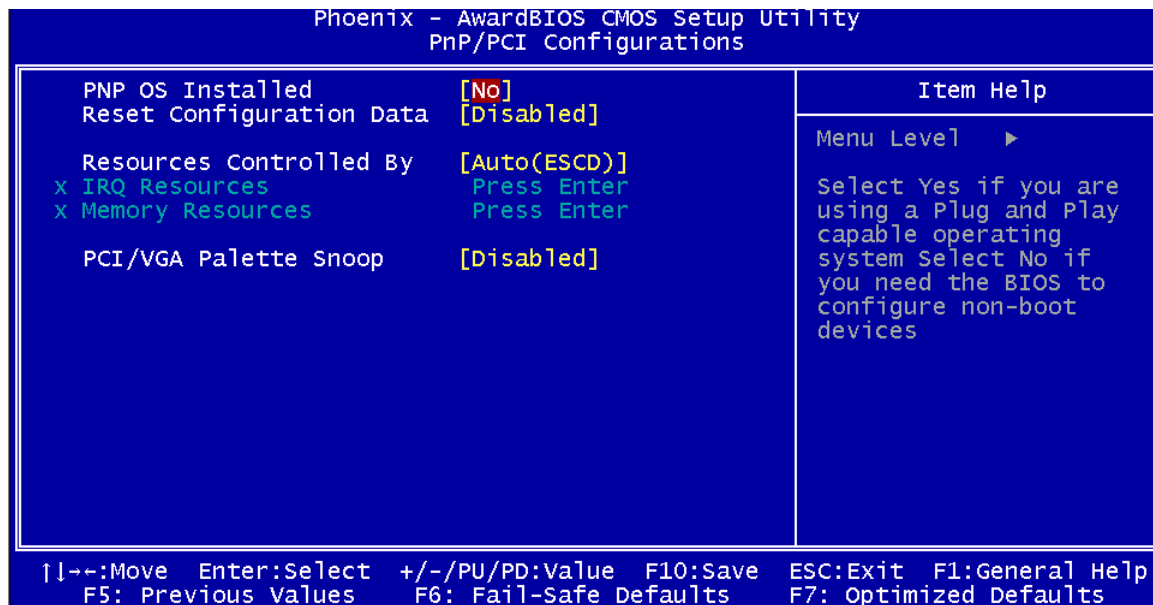
Use the **Soft-Off by PWR-BTTN** option to enabled the system to enter a very low-power-usage state when the power button is pressed.

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

## 6.7 PnP/PCI Configurations

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

## WAFER-LX2 3.5" Embedded SBC



### BIOS Menu 10: PnP/PCI Configurations

#### → PNP OS Installed [No]

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

- **No** (Default) If the operating system does not meet the Plug and Play specifications, BIOS configures all the devices in the system.
- **Yes** Set this option if the system is running Plug and Play aware operating systems. The operating system changes the interrupt, I/O, and DMA settings.

#### → Reset Configuration Data [Disabled]

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

- **Disabled** (Default) ESCD will not be reconfigured
- **Enabled** ESCD will be reconfigured after you exit setup

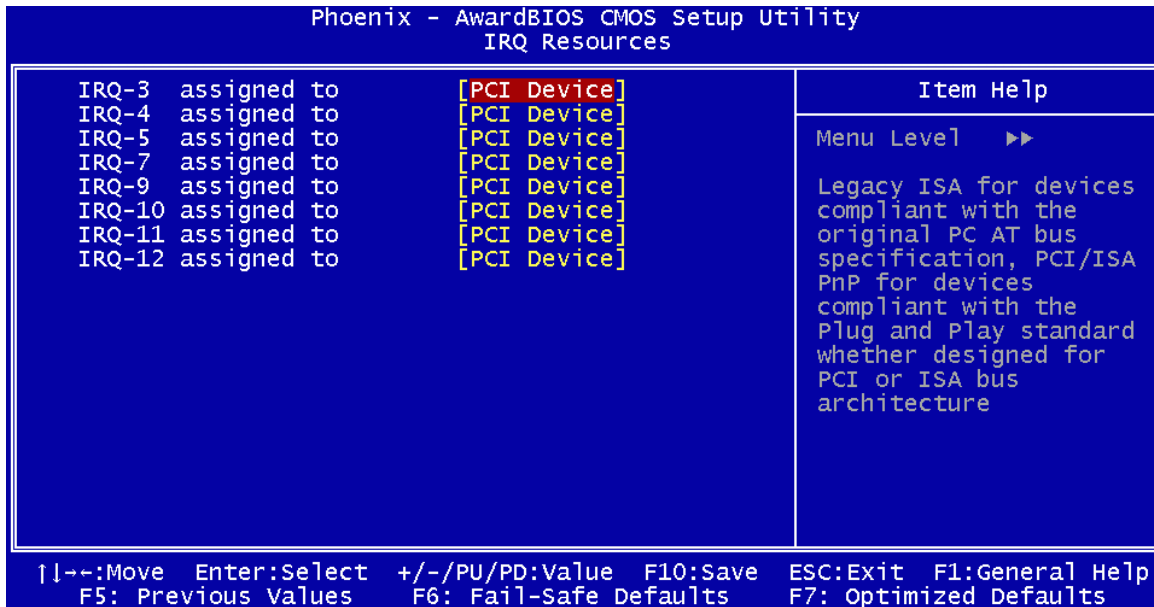
➔ **Resources Controlled By [Auto (ESCD)]**

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

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

➔ **x IRQ Resources [Press Enter]**

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



**BIOS Menu 11: IRQ Resources**

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

- IRQ-3 assigned to

## WAFER-LX2 3.5" Embedded SBC

- 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

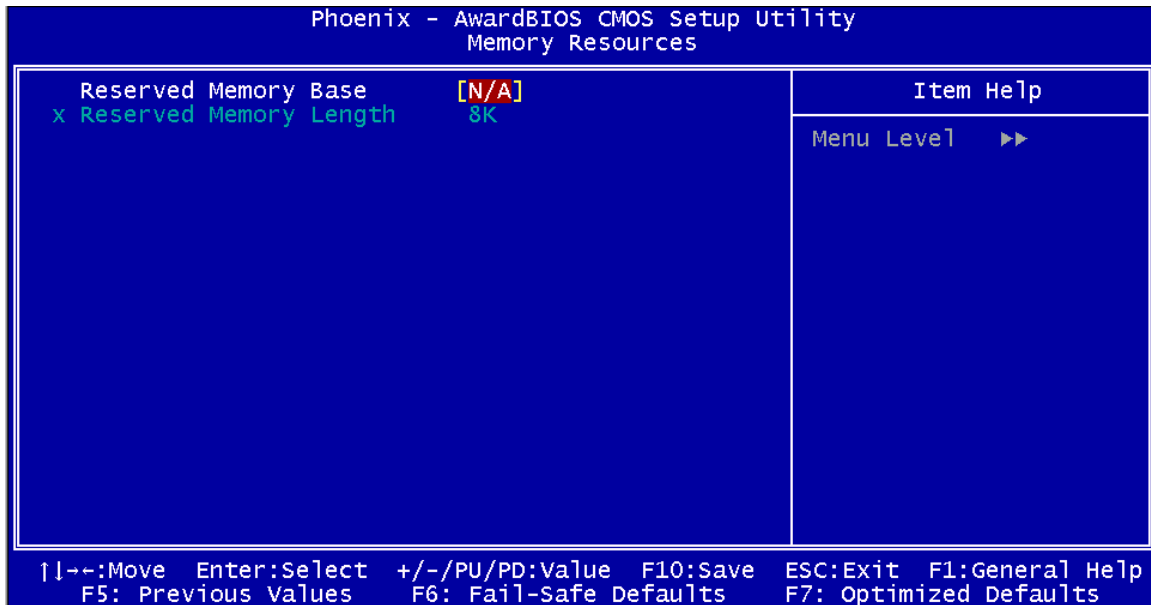
The above options all have the following default options.

→ **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 12) 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 12: Memory Resources

The menu has two configurable options:

- Reserved Memory Base
- Reserved Memory Length

#### → Reserved Memory Base [N/A]

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

The **Reserved Memory Base** options are:

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

## WAFER-LX2 3.5" Embedded SBC

### → x Reserved Memory Length [8K]

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

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

### → PCI/VGA Palette Snoop [Disabled]

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

- **Disabled** (Default) Does not allow the graphics devices to examine the VGA palette on the graphics card.
- **Enabled** Allows the graphics devices to examine the VGA palette on the graphics card.



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Chapter

7

# Software Drivers

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

---

There are five software drivers for the WAFER-LX2 motherboard installed in the subsystem:

- VGA Driver
- Audio Driver
- LAN Driver
- ISA Driver

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

Insert the CD into the system that contains the WAFER-LX2 CPU card.

---



### NOTE:

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

---

## WAFER-LX2 3.5" Embedded SBC

**Step 1:** From the AMD LX/GX Driver CD main menu (**Figure 7-1**), click **WAFER-LX2**.



**Figure 7-1:** AMD LX/GX CD Main Menu

**Step 2:** A window appears listing the drivers available for installation (**Figure 7-2**).



Figure 7-2: AMD LX/GX CD Driver Menu

**Step 3:** Select any item from the list to view more information on the driver installation, or select Manual to navigate to the WAFER-LX2 user manual.

The following sections fully describe the driver installation procedures for the WAFER-LX2 CPU card.

## 7.2 VGA Driver

To install the VGA driver please follow the steps below.

**Step 1:** Open **Windows Control Panel** (Figure 7-3).

## WAFER-LX2 3.5" Embedded SBC

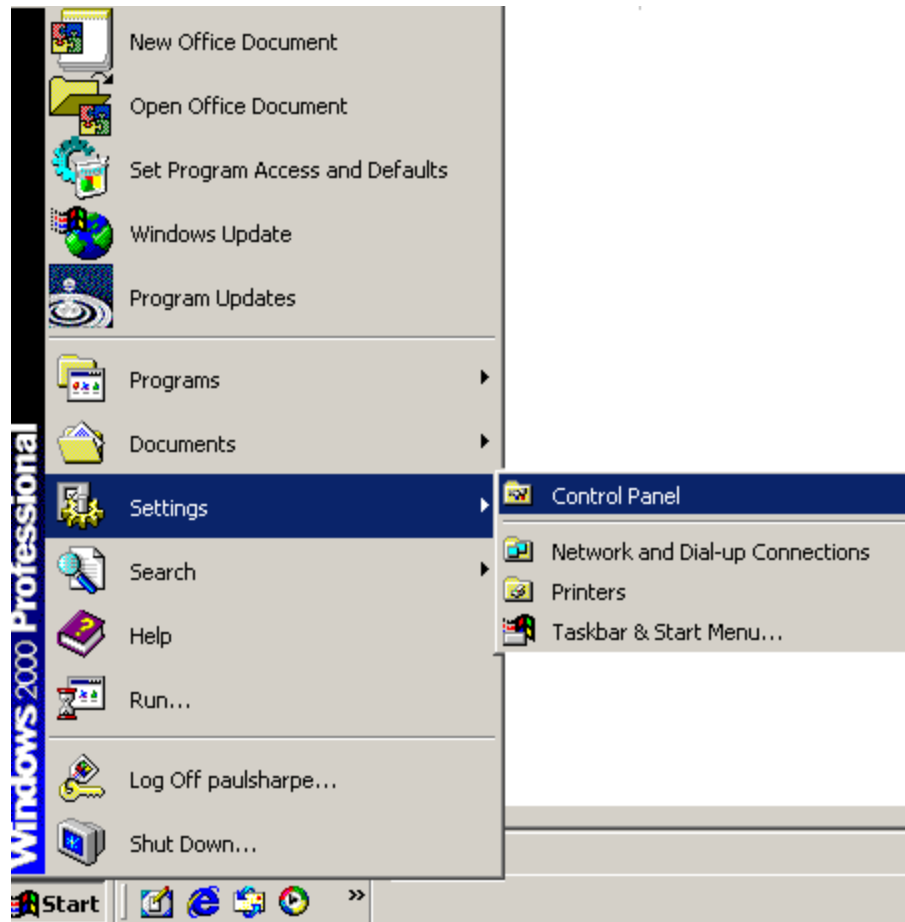


Figure 7-3: Access Windows Control Panel

**Step 2:** Double click the **System** icon (Figure 7-4).

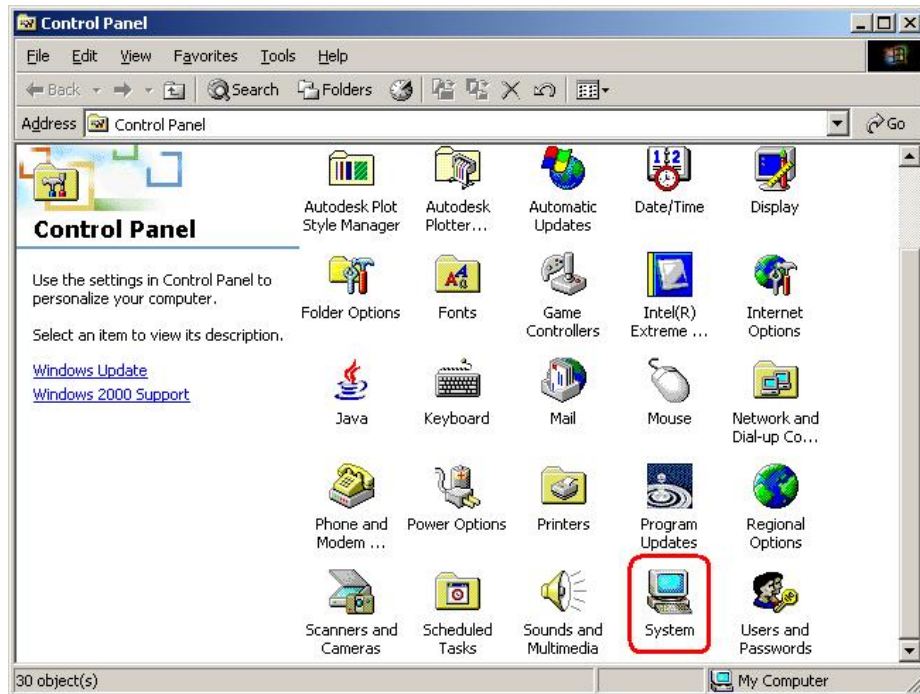
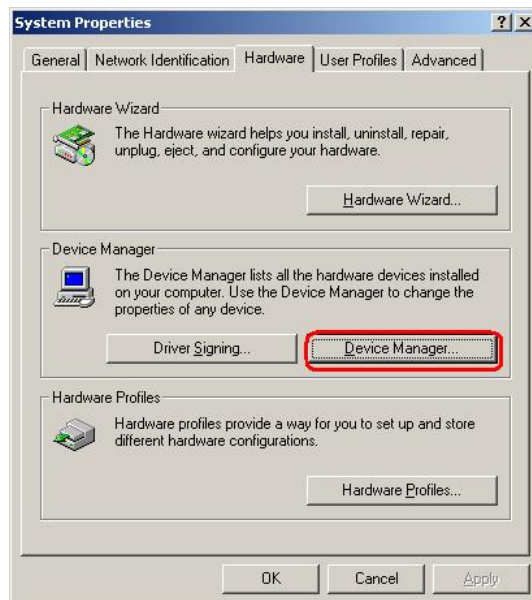


Figure 7-4: Double Click the System Icon

**Step 3:** Double click the **Device Manager** tab (Figure 7-5).

## WAFER-LX2 3.5" Embedded SBC



**Figure 7-5: Double Click the Device Manager Tab**

**Step 4:** A list of system hardware devices appears (Figure 7-6).

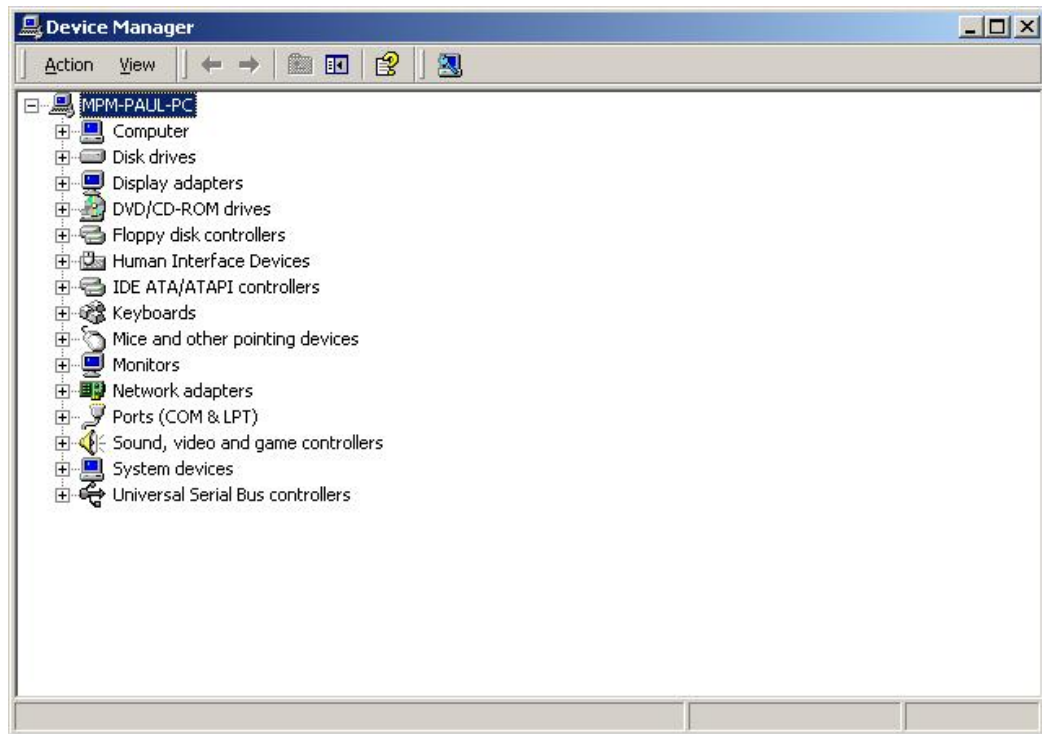


Figure 7-6: Device Manager List

**Step 5:** Expand the **Display Adapters** category (Figure 7-7). Right click the adapter and select **Properties**.



**NOTE:**

If the **Display Adapters** category is not available, navigate to **X:\VGA\IX800\XP\VGA 2.01.05** (where **X:\** is the system CD drive) and read the **ReleaseNotes.txt** file for further information on installing the VGA driver.



## WAFER-LX2 3.5" Embedded SBC

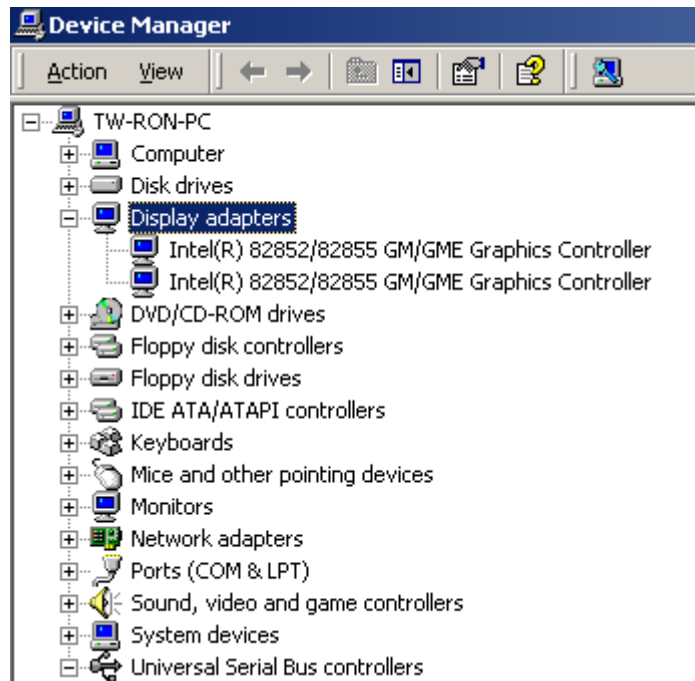


Figure 7-7: Expand the Display Adapters Category

**Step 6:** From the **Driver** tab of the **Properties** window, click **Update Driver** (Figure 7-8) or, click **Reinstall Driver** if **Update Driver** is not seen.

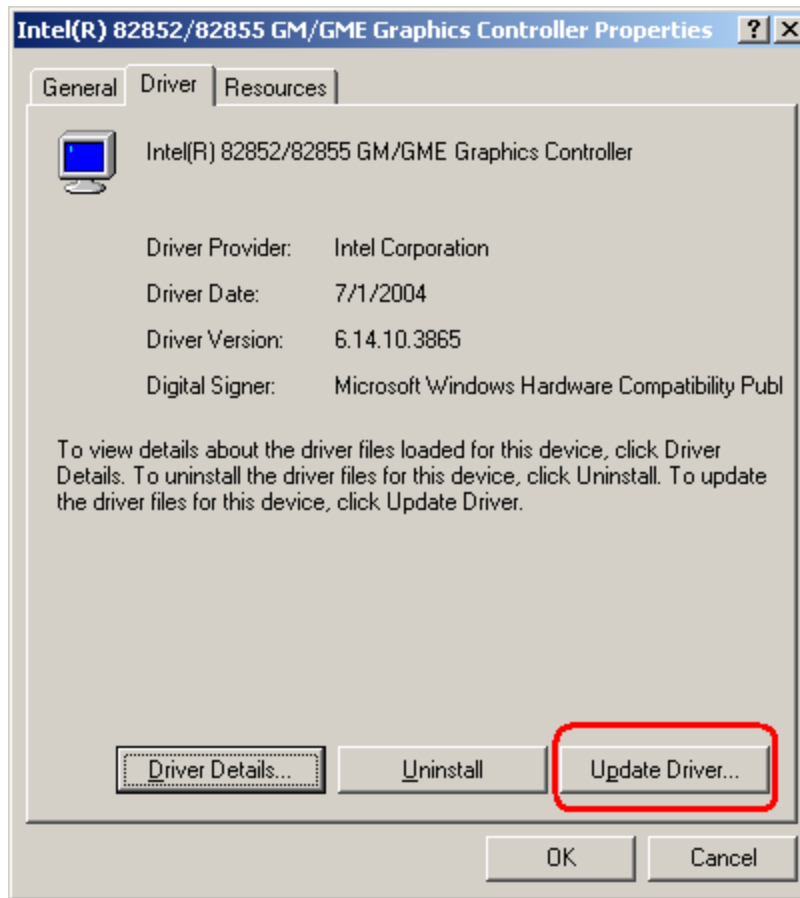


Figure 7-8: Update Driver

**Step 7:** The **Upgrade Device Driver Wizard** appears (Figure 7-9). Click **NEXT** to continue.



Figure 7-9: Upgrade Device Driver Wizard

**Step 8:** The **Install Hardware Device Driver** screen appears (Figure 7-10). Select the **Search for a suitable driver for my device** radio button and click **NEXT** to continue.



Figure 7-10: Search for Suitable Driver

- Step 9:** Select **Specify a Location** in the **Locate Driver Files** window (Figure 7-11).  
Click **NEXT** to continue.

## WAFER-LX2 3.5" Embedded SBC



Figure 7-11: Locate Driver Files

**Step 10:** Click **Browse** and navigate to the **X:\AMD\LX800XP\VGA 2.01.05** directory, where “X:” is the system CD drive (Figure 7-12).

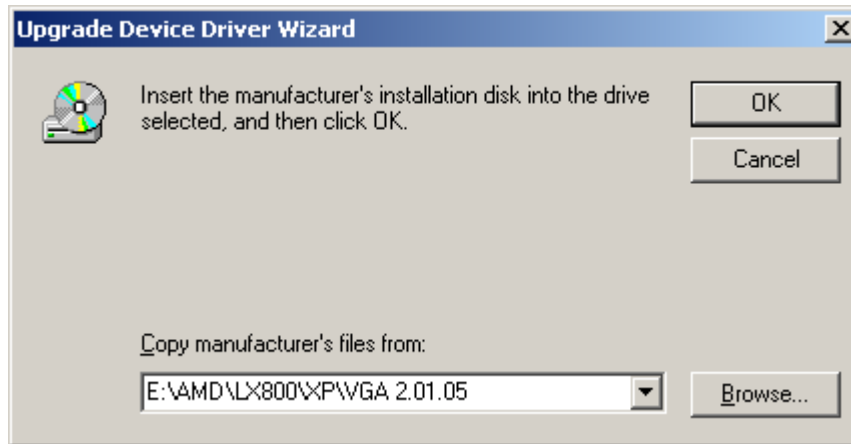


Figure 7-12: Location Browsing Window

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

**Step 12:** A driver files location menu window appears. Click **NEXT** to continue. The driver is installed.

### 7.3 Audio Driver Installation

To install the audio driver please follow the steps below.

**Step 1:** Open **Windows Control Panel** (Figure 7-13).

# WAFER-LX2 3.5" Embedded SBC

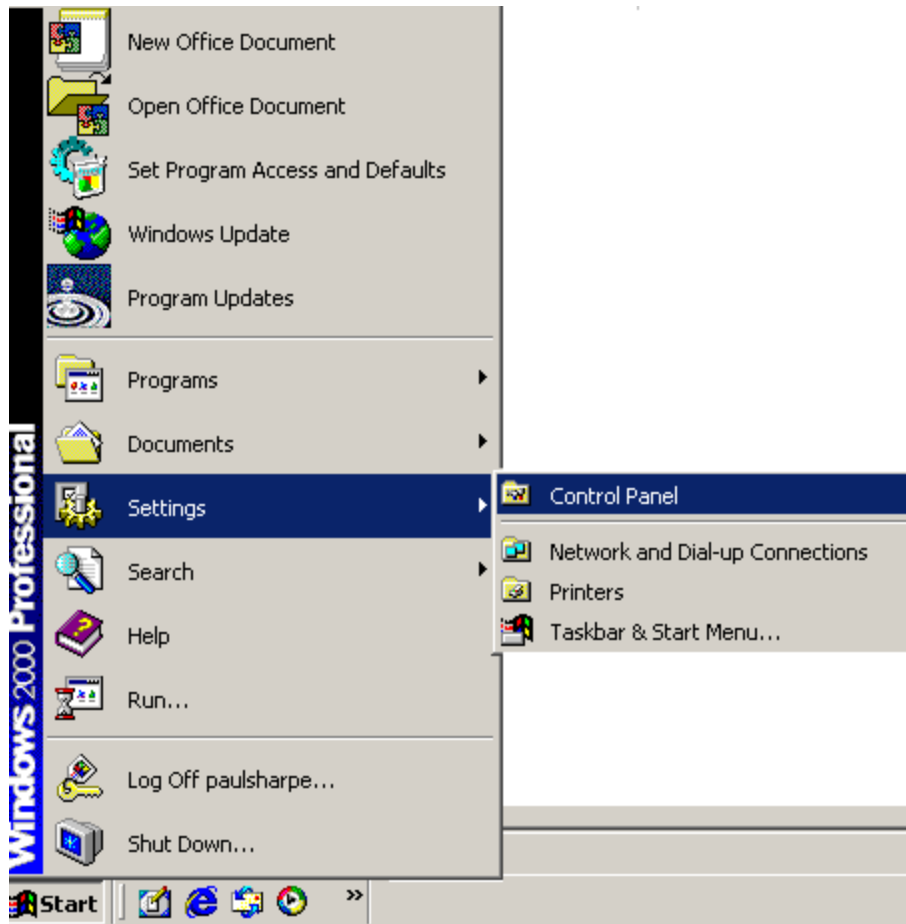


Figure 7-13: Access Windows Control Panel

**Step 2:** Double click the **System** icon (Figure 7-14).

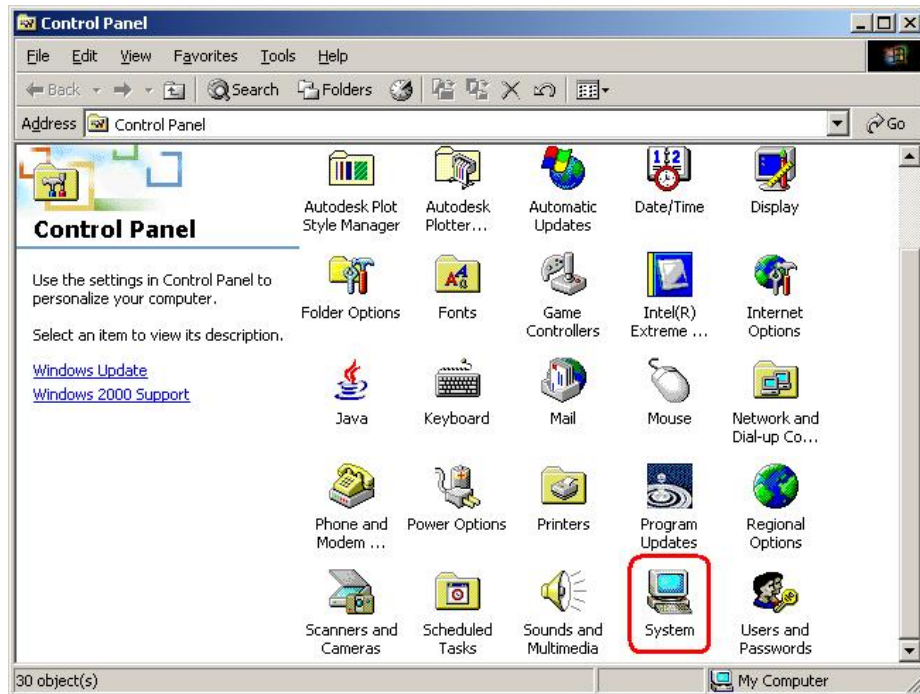
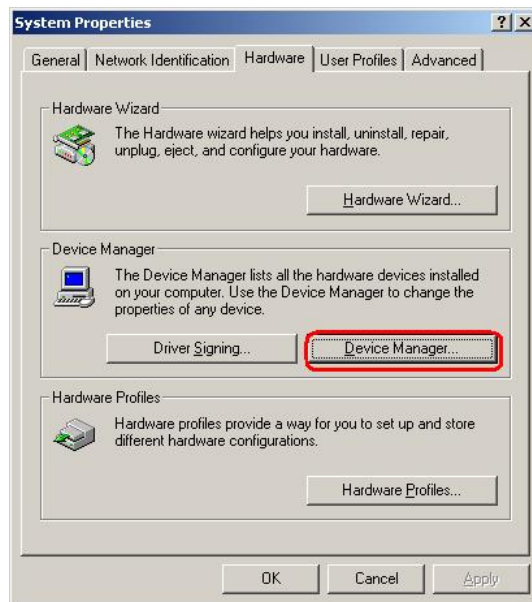


Figure 7-14: Double Click the System Icon

**Step 3:** Double click the **Device Manager** tab (Figure 7-15).

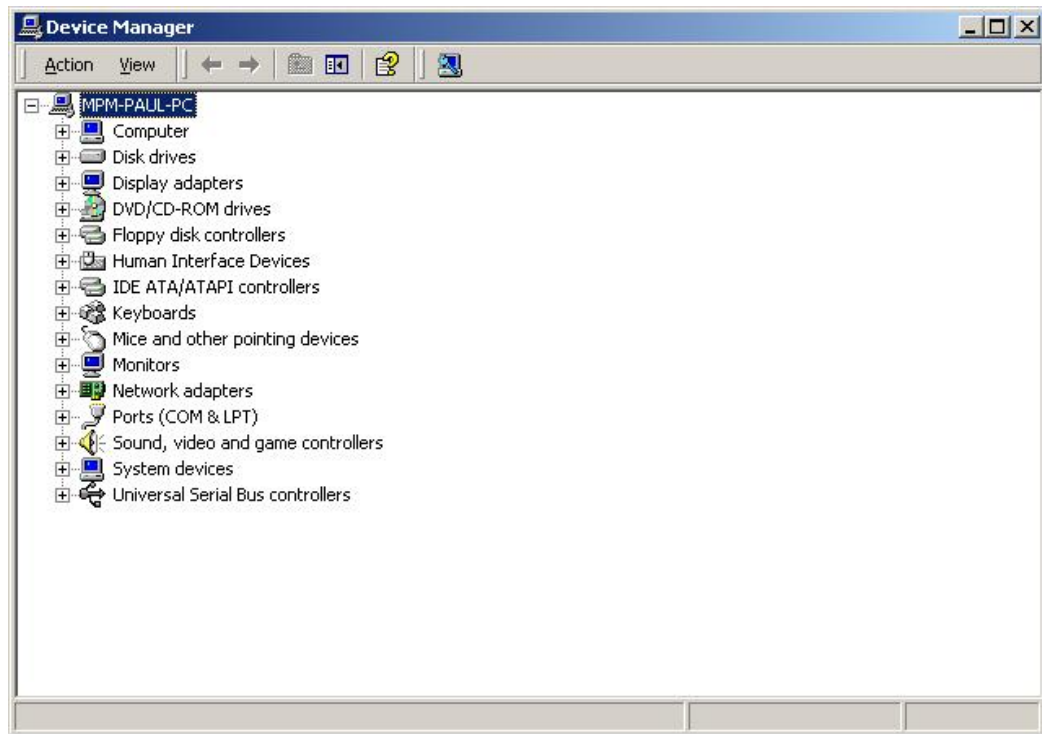


## WAFER-LX2 3.5" Embedded SBC



**Figure 7-15: Double Click the Device Manager Tab**

**Step 4:** A list of system hardware devices appears (Figure 7-16).



**Figure 7-16: Device Manager List**

**Step 5:** Double click the listed device that has question marks next to it. (This means Windows does not recognize the device).

**Step 6:** The **Device Driver Wizard** appears (**Figure 7-17**). Click **NEXT** to continue.



Figure 7-17: Search for Suitable Driver

**Step 7:** Select "Specify a Location" in the **Locate Driver Files** window (Figure 7-18).

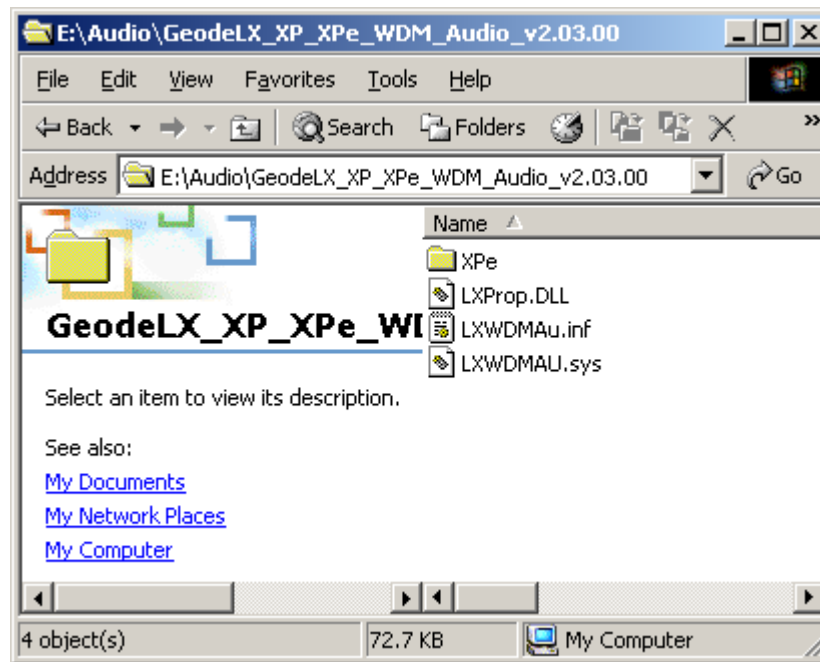
Click **NEXT** to continue.



**Figure 7-18: Locate Driver Files**

**Step 8:** Select “X:\Audio\GeodeLX\_XP\_XPe\_WDM\_Audio\_v2.03.00” directory in the location browsing window, where “X:\” is the system CD drive (**Figure 7-19**).

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**Figure 7-19: Location Browsing Window**

**Step 9:** Click **OK** to continue. A driver files location menu window appears. Select the **LXWDMAu.inf** file and click **OPEN** to continue. The driver is installed.

## 7.4 LAN Driver

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

**Step 1:** Click **LAN** from the **AMD LX/GX CD Driver Menu** to open a window to the **X:\LAN\Realtek** (where **X:\** is the system CD drive) folder on the driver CD.

**Step 2:** Open the **RTL8100C** folder.

**Step 3:** Locate the **Setup** program icon (**Figure 7-20**).

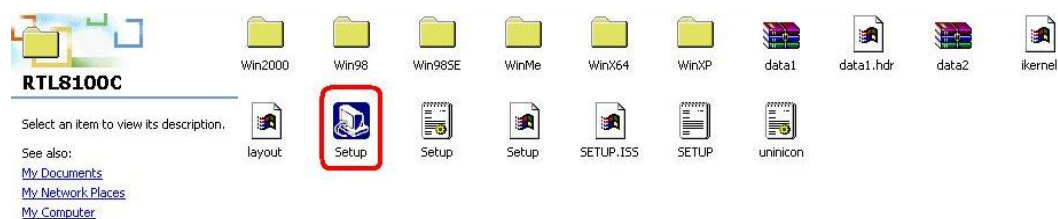


Figure 7-20: Locate the Setup Program Icon

**Step 4:** Double click the **Setup** program icon in **Figure 7-20**.

**Step 5:** The **Install Shield Wizard** is prepared to guide the user through the rest of the process (**Figure 7-21**).

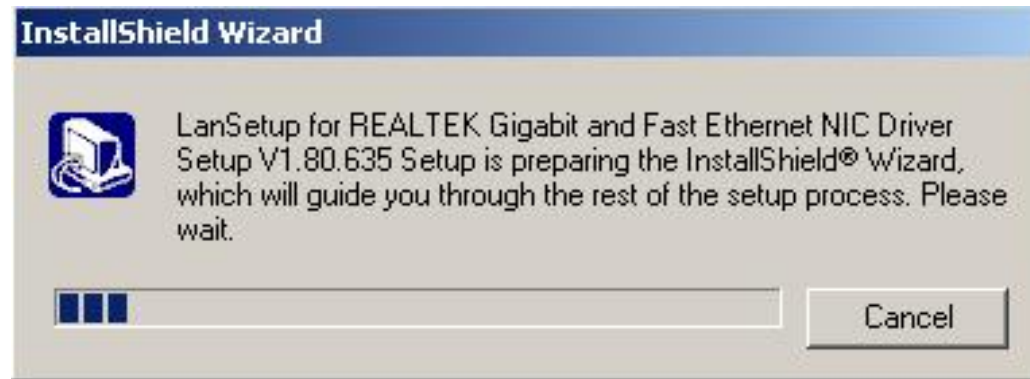


Figure 7-21: Preparing Setup Screen

**Step 6:** Once initialized, the **Install Wizard** welcome screen appears (**Figure 7-22**).

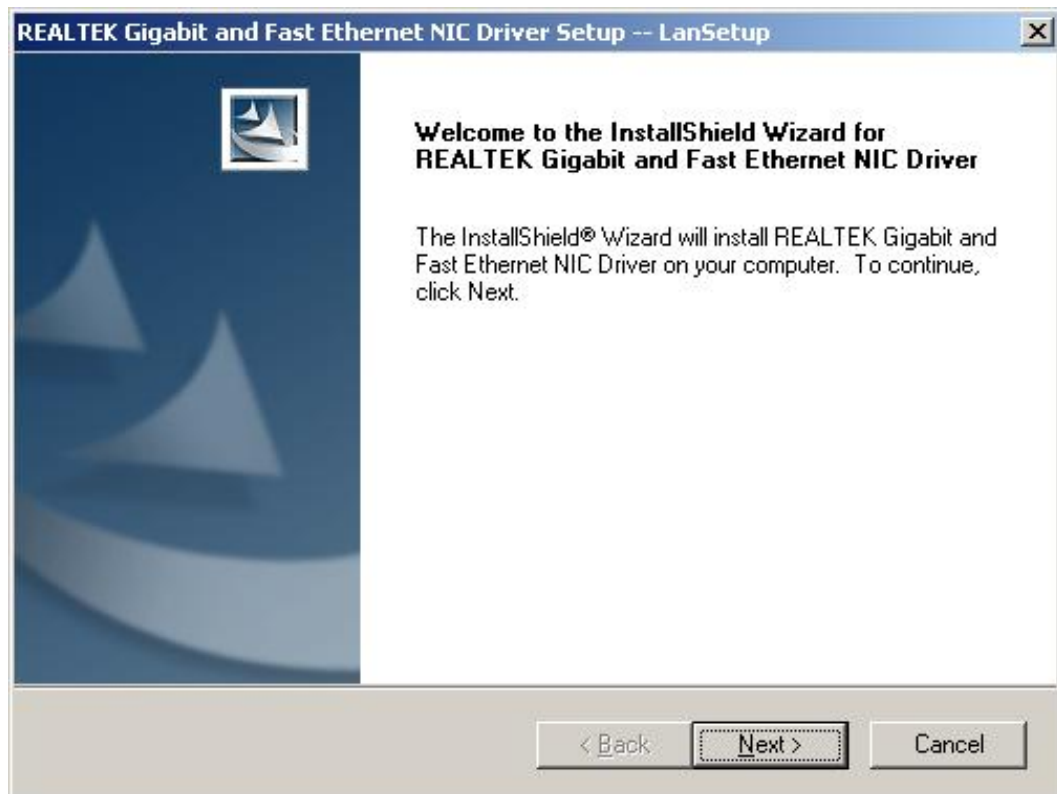
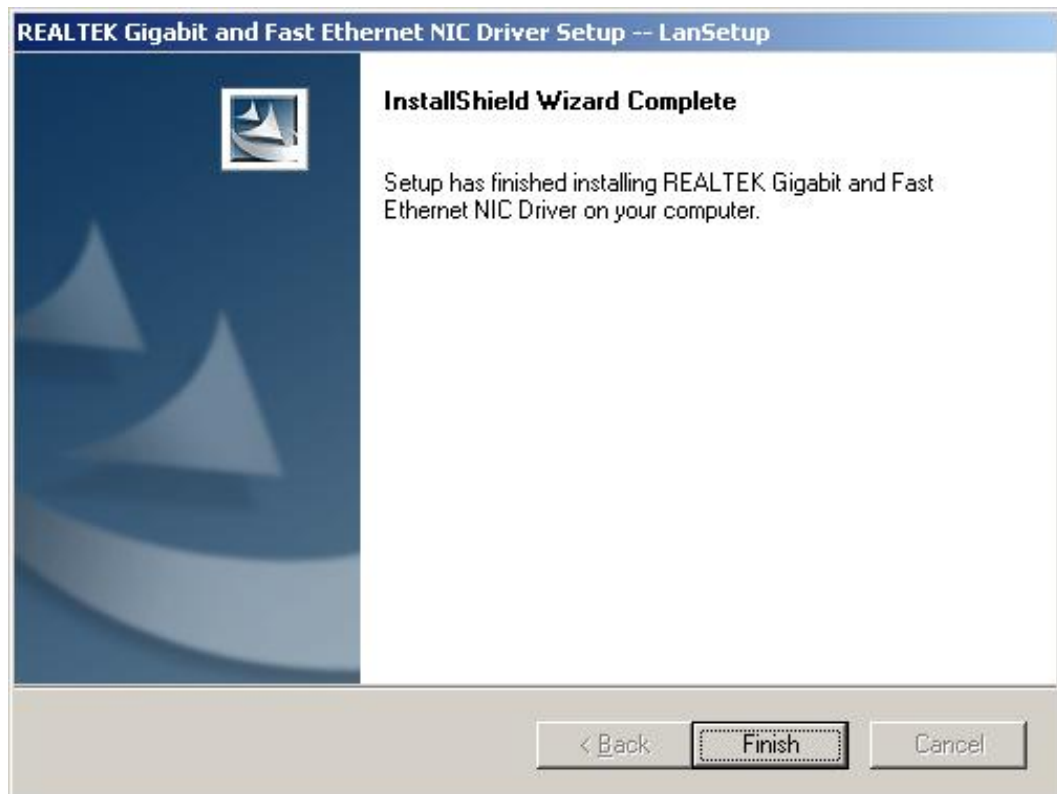


Figure 7-22: Install Wizard Welcome Screen

**Step 7:** Click **NEXT** to continue the installation or **CANCEL** to stop the installation.

**Step 8:** The **Install Wizard** starts to install the LAN driver.

**Step 9:** Once the installation is complete, the **InstallShield Wizard Complete** screen appears (**Figure 7-23**).



**Figure 7-23: Installing Screen**

**Step 10:** Click **FINISH** to complete the installation and exit the **Install Shield Wizard**.

**Step 11:** Once the installation process is complete, the computer may be restarted immediately or later. Select the preferred option and click **FINISH** to complete the installation process and exit the **Install Shield Wizard** (Figure 7-24).





Figure 7-24: Restart the Computer

## 7.5 ISA Driver

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

**Step 1:** Open **Windows Control Panel** (Figure 7-25).

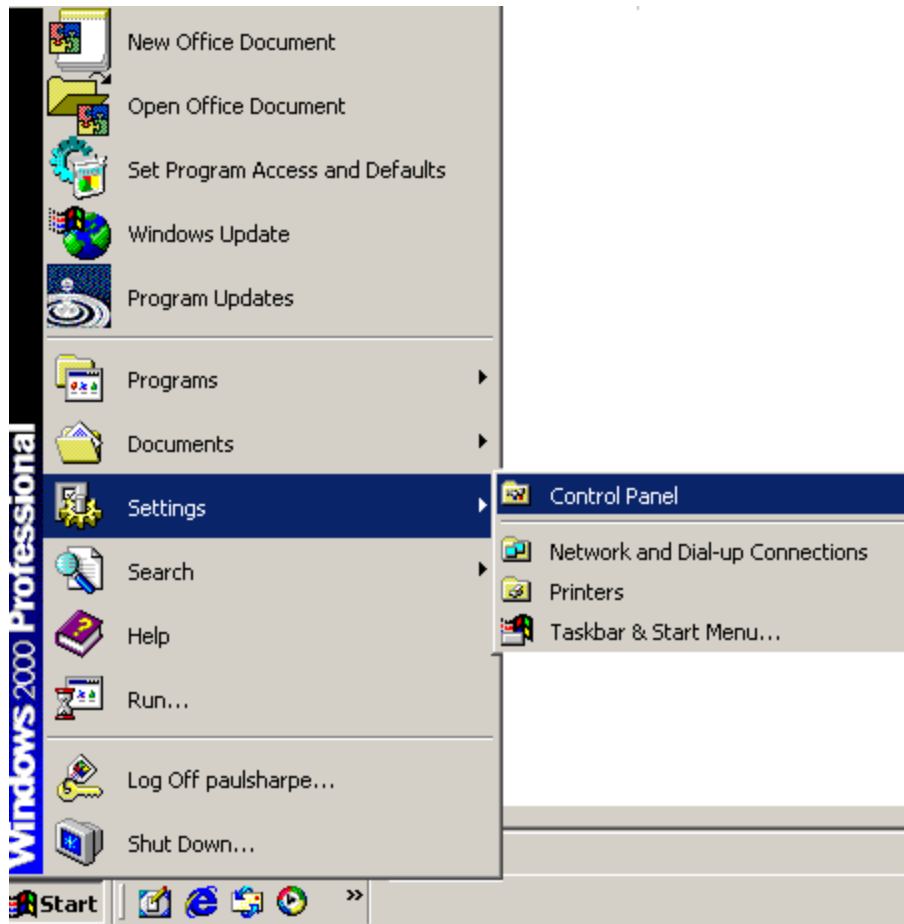


Figure 7-25: Access Windows Control Panel

**Step 2:** Double click the **System** icon (Figure 7-26).

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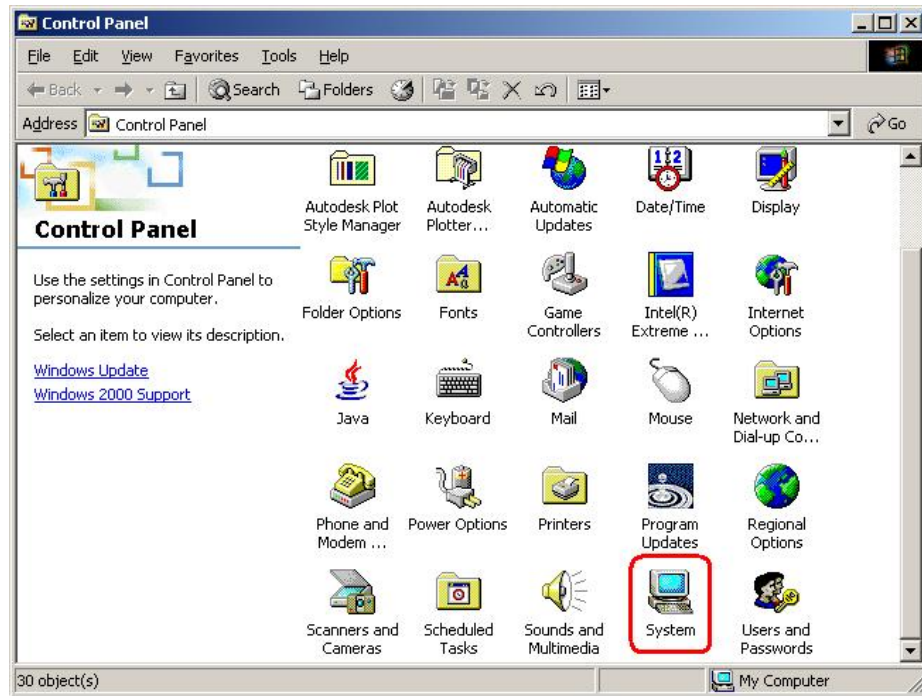
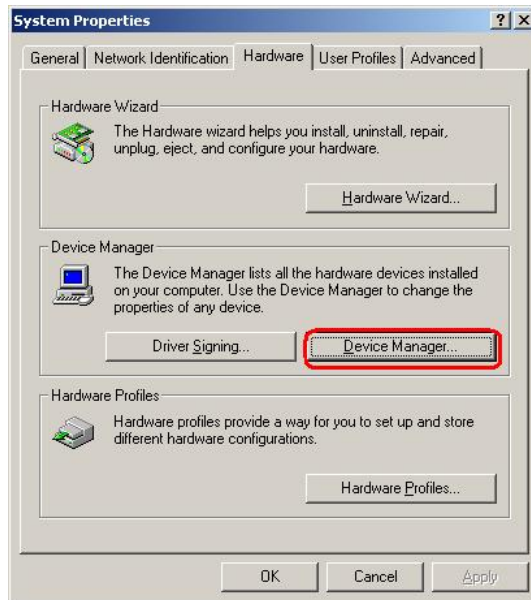


Figure 7-26: Double Click the System Icon

**Step 3:** Double click the **Device Manager** tab (Figure 7-27).



**Figure 7-27: Double Click the Device Manager Tab**

**Step 4:** A list of system hardware devices appears (Figure 7-28).

## WAFER-LX2 3.5" Embedded SBC

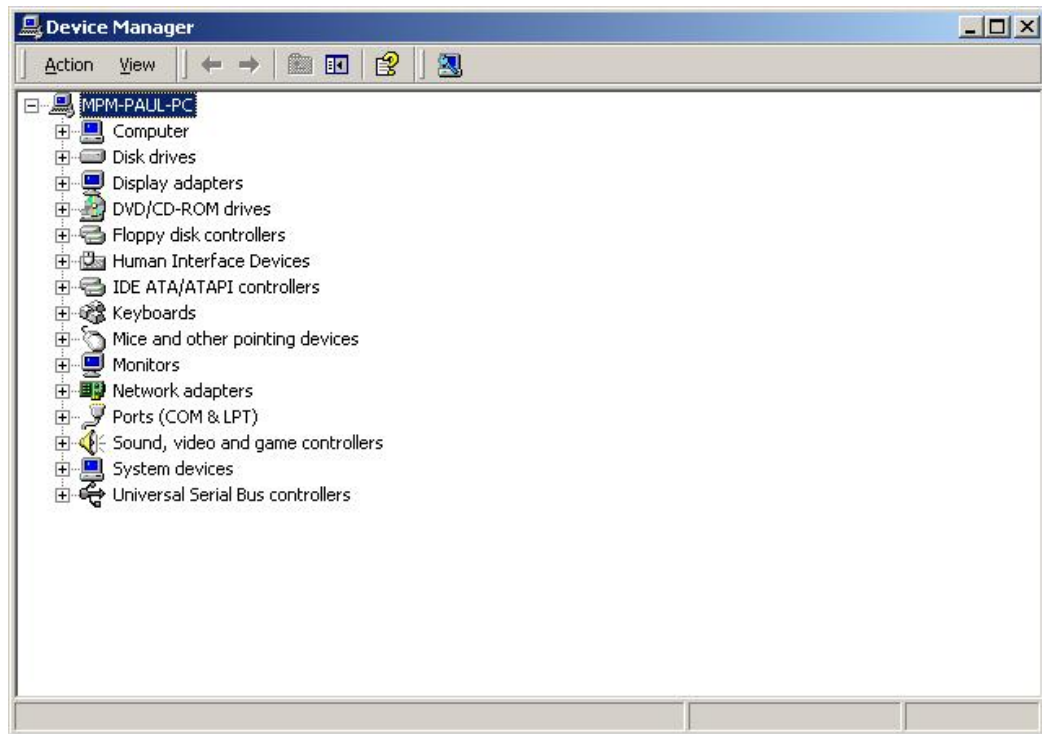


Figure 7-28: Device Manager List

- Step 5:** Double click the listed device that has question marks next to it. (This means Windows does not recognize the device).
- Step 6:** The **Device Driver Wizard** appears (Figure 7-29). Click **NEXT** to continue.



Figure 7-29: Search for Suitable Driver

- Step 7:** Select “Specify a Location” in the **Locate Driver Files** window (Figure 7-30).  
Click **NEXT** to continue.

## WAFER-LX2 3.5" Embedded SBC



Figure 7-30: Locate Driver Files

**Step 8:** Select "X:\IT8888" directory in the location browsing window, where "X:\\" is the system CD drive (Figure 7-31).

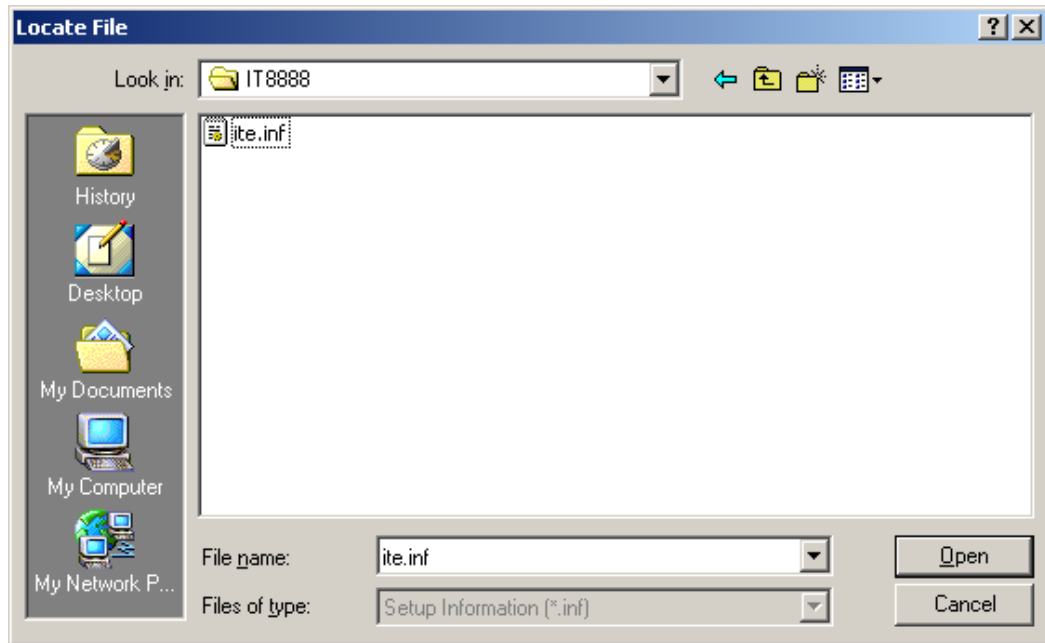


Figure 7-31: Location Browsing Window

**Step 9:** Click **OK** to continue. A driver files location menu window appears. Select the **ite.inf** file and click **OPEN** to continue. The driver is installed.



Appendix

A

# BIOS Options

---

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Appendix

**B**

# GPIO Connection

---

## **B.1 GPIO Settings and Default Values**

### **B.1.1 GPIO Settings**

Two addresses (320h and 321h) on the LVC chipset are reserved to control the GPIO connector.

- Port 320h stores the data that is inputted to or outputted from the specified pin on the GPIO connector.
- Port 321h is the input/output setting register for each pin on the GPIO connector. If a pin outputs data, the corresponding bit is set to "0." If a pin inputs data, the corresponding bit is set to "1." The table below outlines the status of each GPIO pin.

Bit Number	Corresponding GPIO pin	GPIO N Status	
		Bit N = 0	Bit N = 1
Bit 0	GPIO 0	Output	Input
Bit 1	GPIO 1	Output	Input
Bit 2	GPIO 2	Output	Input
Bit 3	GPIO 3	Output	Input
Bit 4	GPIO 4	Output	Input
Bit 5	GPIO 5	Output	Input
Bit 6	GPIO 6	Output	Input
Bit 7	GPIO 7	Output	Input

### **B.1.2 Default Settings**

The default settings for all the bits (Bit 0 to Bit 7) for both Port 320h and Port 321h are 00h.

Bit Number	Port 320h	Port 321h
Bit 0	00h	00h
Bit 1	00h	00h
Bit 2	00h	00h
Bit 3	00h	00h

Bit 4	00h	00h
Bit 5	00h	00h
Bit 6	00h	00h
Bit 7	00h	00h

## B.2 Assembly Language Samples

### B.2.1 GPIO Initialization Procedure

The following instruction set initializes one pin on the GPIO connector.

<b>MOV</b>	<b>DX, 320h</b>	Moves 320h into the DX data register for one of the GPIO pins
<b>MOV</b>	<b>AL, XXh</b>	Moves the user defined output value XXh into the low bit accumulator register AL
<b>OUT</b>	<b>DX, AL</b>	The content of the low bit accumulator register AL is transmitted to the address stored in the DX data register

The following instruction set initializes the input/output setting register for one pin on the GPIO connector to specify whether that pin inputs or outputs data.

<b>MOV</b>	<b>DX, 321h</b>	Moves 320h into the DX data register for one of the GPIO pins
<b>MOV</b>	<b>AL, YYh</b>	Moves the user defined output value YYh into the low bit accumulator register AL. If YY is specified as 0, the pin is an output pin. If YY is specified as 1, the pin is an input pin.
<b>OUT</b>	<b>DX, AL</b>	The content of the low bit accumulator register AL is transmitted to the address stored in the DX data register

### B.2.2 General Purpose Output Procedure

The following instruction set is for a GPO procedure for one pin on the GPIO connector.



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<b>MOV</b>	<b>DX, 320h</b>	Moves 320h into the DX data register for one of the GPIO pins
<b>MOV</b>	<b>AL, ZZh</b>	Moves the user defined output data ZZh into the low bit accumulator register AL
<b>OUT</b>	<b>DX, AL</b>	The output data in the low bit accumulator register AL is transmitted out from the address stored in the DX data register

### B.2.3 General Purpose Input Procedure

The following instruction set is for a GPI procedure for one pin on the GPIO connector.

<b>MOV</b>	<b>DX, 320h</b>	Moves 320h into the DX data register for one of the GPIO pins
<b>IN</b>	<b>AL, DX</b>	The input data in the low bit accumulator register AL is transmitted to the address stored in the DX data register



Appendix

C

# Watchdog Timer

---



**NOTE:**

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

The Watchdog Timer is provided to ensure that standalone systems can always recover from catastrophic conditions that cause the CPU to crash. This condition may have occurred by external EMI or a software bug. When the CPU stops working correctly, Watchdog Timer either performs a hardware reset (cold boot) or a Non-Maskable Interrupt (NMI) to bring the system back to a known state.

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

**INT 15H:**

<b>AH – 6FH Sub-function:</b>	
AL – 2:	Sets the Watchdog Timer’s period.
BL:	Time-out value (Its unit-second is dependent on the item “Watchdog Timer unit select” in CMOS setup).

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

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

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



**NOTE:**

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

**Example program:**

**; INITIAL TIMER PERIOD COUNTER**

;

W\_LOOP:

```

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

```

;

**; ADD THE APPLICATION PROGRAM HERE**

;

```

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

```

```

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

```

;

**; EXIT ;**

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Appendix

D

# Address Mapping

---

### D.1 Address Map

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

**Table D-1: IO Address Map**

### D.2 1st MB Memory Address Map

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

**Table D-2: 1<sup>st</sup> MB Memory Address Map**

### D.3 IRQ Mapping Table

<b>IRQ0</b>	<b>System Timer</b>	<b>IRQ8</b>	<b>RTC clock</b>
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 D-3: IRQ Mapping Table**

### D.4 DMA Channel Assignments

<b>Channel</b>	<b>Function</b>
0	Available
1	Available
3	Available
4	Cascade for DMA controller 1
5	Available
6	Available
7	Available

**Table D-4: IRQ Mapping Table**



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Appendix

E

# External AC'97 Audio CODEC

---

## WAFER-LX2 3.5" Embedded SBC

### E.1 Introduction

The motherboard comes with an on-board Realtek ALC203 CODEC. Realtek ALC203 is a 16-bit, full duplex AC'97 Rev. 2.3 compatible audio CODEC with a sampling rate of 48KHz.

#### E.1.1 Accessing the AC'97 CODEC

The CODEC is accessed through a connector on the WAFER-LX2 motherboard. Connect the audio kit to the connector.

#### E.1.2 Driver Installation

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

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

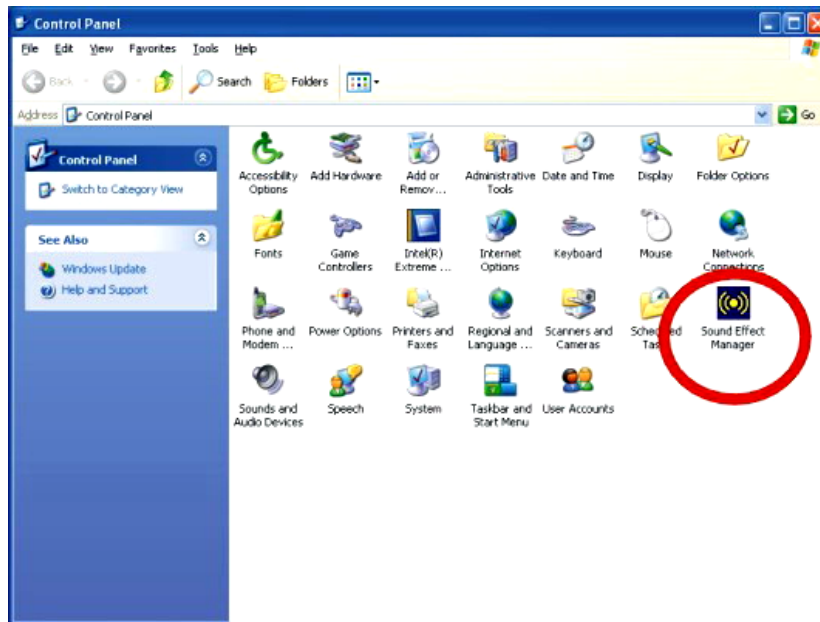


Figure E-1: Sound Effect Manager Control Panel

### E.2 Sound Effect Configuration

#### E.2.1 Accessing the Sound Effects Manager

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

**Step 1:** Install the audio CODEC driver.

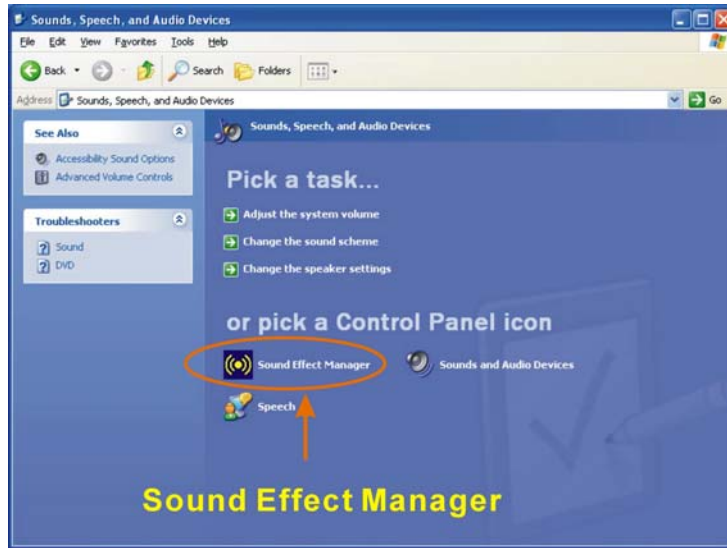
**Step 2:** Click either:

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

**Sound Effect Manager**



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



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

**Step 3:** The sound effect manager appears.

**NOTE:**

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

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

### E.2.2 Sound Effect Manager Configuration Options

The **Sound Effects Manager** enables configuration of the items listed below. To configure these items click the corresponding menu tab in the **Sound Effects Manager** in Error! Reference source not found..

**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. To edit the sound effect click "EDIT."
- **Karaoke Mode:**- The **Karaoke Mode** is accessed in the Sound Effect window. The **Voice Cancellation** disables the vocal part of the music being played. The **Key adjustment** up or down arrow icons enables users to define a key that fits a certain vocal range.
- **Equalizer Selection:**- Preset equalizer settings enable easy audio range settings. Ten frequency bands can be configured.
- **Speaker Configuration:**- Multi-channel speaker settings are configured in this menu. Configurable options include:
  - Headphone
  - Channel mode for stereo speaker output
  - Channel mode for 4 speaker output
  - Channel mode for 5.1 speaker output
  - Synchronize the phonejack switch with speakers settings
- **Speaker Test:**- Each speaker connected to the system is tested individually to see if the 4-channel or 6-channel audio operates properly.
- **S/PDIF-In & S/PDIF-Out:**- These functions are currently not supported.

## WAFER-LX2 3.5" Embedded SBC

- **Connector Sensing**:- Realtek ALC655 detects if an audio device is plugged into the wrong connector. If an incorrect device is plugged in a warning message appears.
- **HRTF Demo**:- Adjust HRTF (Head Related Transfer Functions) 3D positional audio here before running 3D applications.
- **Microphone Effect**:- Microphone noise suppression is enabled in this menu.
- **General**:- General information about the installed AC'97 audio configuration utility is listed here.

Appendix

**F**

# Hazardous Materials Disclosure

---



### **F.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.

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

## WAFER-LX2 3.5" Embedded SBC

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	○	○	○	○	○	○

○: 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。

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