integration with integrity

3312610 User's Manual

ETX CPU Module

Version 1.0

Revision

Date	Version	Changes
2008-03	1.00	Initial release

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 **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 3312610 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 3312610. 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 3312610. 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 3312610. Please take note messages seriously.

Packing List

NOTE:

If any of the components listed in the checklist below are missing, please do not proceed with the installation. Contact the GAI reseller or vendor you purchased the 3312610 from or contact an GAI sales representative directly.

The items listed below should all be included in the 3312610 package.

- 1 x 3312610 single board computer
- 1 x Heat spreader
- 1 x Heat sink
- 1 x Utility CD
- 1 x QIG (quick installation guide)

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

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Introduction

1.1 3312610 Overview

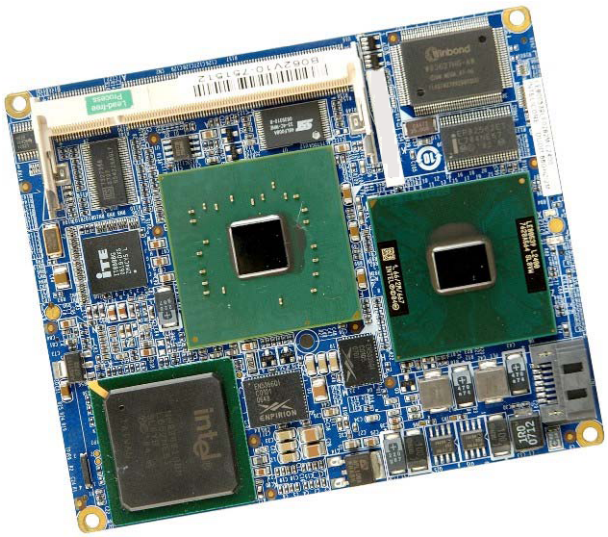

Figure 1-1: 3312610 ETX Embedded Module

The ETX (Embedded Technology eXtended) form factor 3312610 embedded module is fully equipped with an Intel® Core™2 Duo/Celeron® M CPU and with advanced multi-mode I/Os. The 3312610 embedded module is designed for flexible integration by system developers into customized platform devices.

1.1.1 Model Variations

There are three 3312610 models. They are listed below.

	CPU	L2 Cache	FSB	Processor #
3312610-L7400	1.5 GHz Intel® Core™2 Duo	4 MB	667 MHz	L7400
3312610-CM423	1.06 GHz Intel® Celeron® M	1 MB	533 MHz	423

Table 1-1: Model Variations

1.1.2 3312610 Applications

The 3312610 is designed for being embedded in customized baseboards for flexible applications.

1.1.3 3312610 Benefits

Some of the 3312610 embedded platform benefits include:

- Low power, high performance
- Easy integration into customized baseboards
- Easy upgrading
- Easy maintenance
- Easy design compatibility
- Low cost product development

1.1.4 3312610 Features

Some of the 3312610 features are listed below:

- Complies with ETX form factor
- Complies with RoHS
- Embedded Intel® Core™2 Duo or Intel® Celeron M CPU
- Supports one DDR2 SDRAM SO-DIMM (system max. 2 GB)
- Supports VGA, 18-bit dual-channel LVDS
- Comes with one SATA connector
- Comes with one SDVO connector
- Support for four USB 2.0 devices
- Support for two RS-232 devices
- Support for four PCI cards

1.2 3312610 Overview

An overview of the 3312610 embedded module can be seen in **Figure 1-2** and **Figure 1-3**.

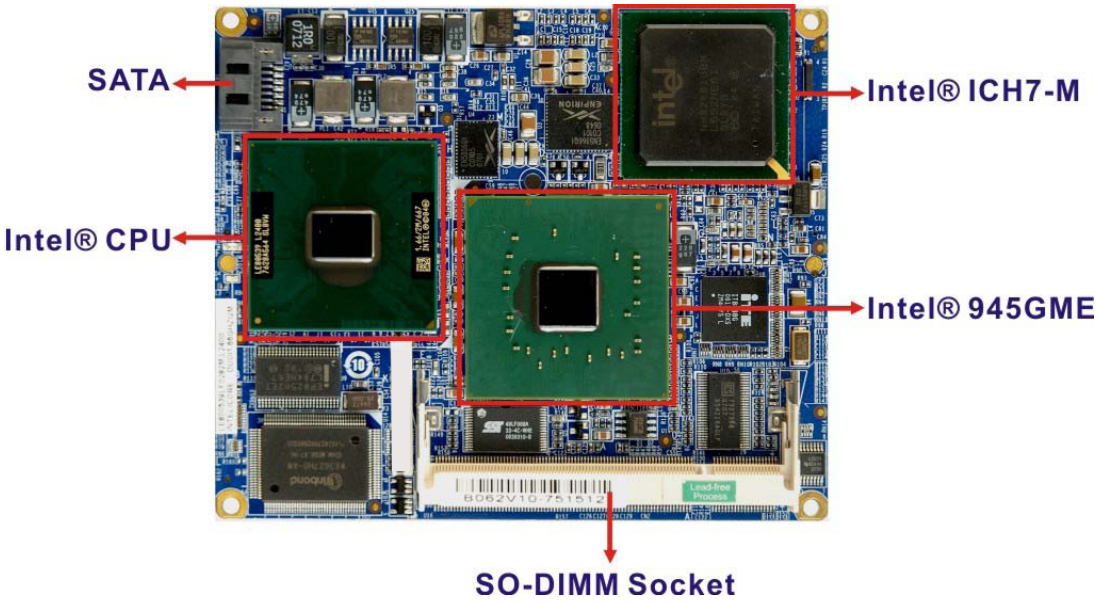

Figure 1-2: 3312610 Overview (Front Side)

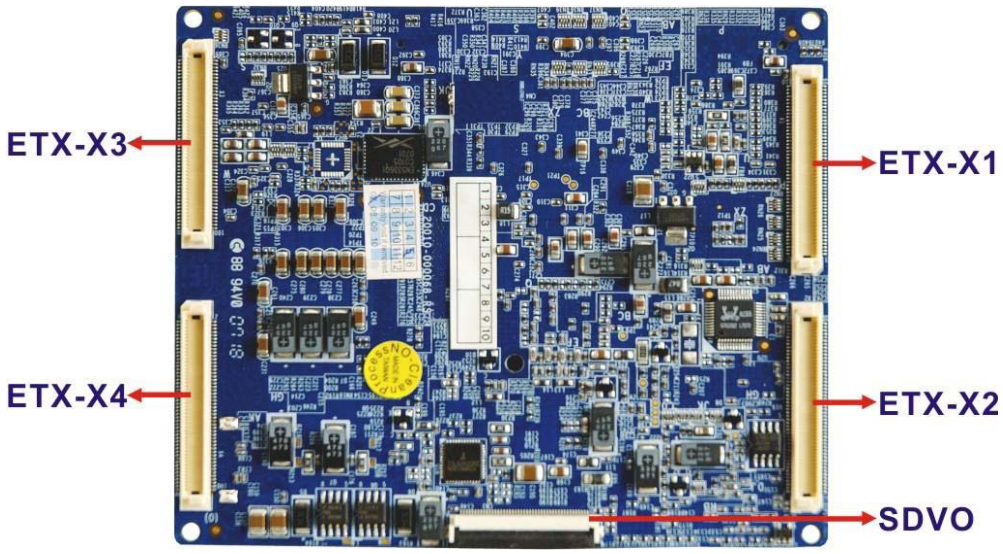

Figure 1-3: 3312610 Overview (Reverse Side)

1.2.1 3312610 Connectors

The 3312610 has the following interface connectors on-board:

- 1 x ETX-X1 connector (reverse side)
- 1 x ETX-X2 connector (reverse side)
- 1 x ETX-X3 connector (reverse side)
- 1 x ETX-X4 connector (reverse side)
- 1 x SATA connector (front side)
- 1 x SO-DIMM socket (front side)

1.2.2 3312610 IO Interface Support

The 3312610 embedded module supports the following IO interfaces on the baseboard:

- 2 x RS-232
- 4 x USB 2.0
- 1 x LPT/FDD
- 1 x KB/MS
- 1 x IDE
- 1 x IR
- 1 x CF Type II

1.2.3 Technical Specifications

3312610 technical specifications are listed in **Table 1-2**. Detailed descriptions of each specification can be found in **Chapter 2**.

SPECIFICATION	3312610-L7400	3312610-CM423
CPUs Supported	1.5 GHz Intel® Core™2 Duo L7400 with a 667 MHz FSB	1.06 GHz Intel® Celeron® M 423 with a 533 MHz FSB
Cache Memory	4 MB L2 cache	1 MB L2 cache
System Chipset	Intel® 945GME	
I/O Controller	ICH7-M	

Memory	One 200-pin 667/533/400 MHz DDR2 SDRAM SO-DIMM (system max. 2GB)	
Super IO	Winbond W83627HG	
Display	CRT integrated in Intel® 945GME	
LVDS	18-bit dual channel LVDS integrated in Intel® 945GME	
HDD Interface	One IDE channel supports two Ultra ATA 100/66/33 devices	
Power Support	5 V only, AT/ATX power supported	
Power Consumption	+5 V @ 3.81 A (1.5 GHz Intel® Core™2 Duo L7400 with a 512 MB 667 MHz DDR2 SO-DIMM)	
Watchdog Timer	Software programmable supports 1~255 sec. system reset	
I/O Interfaces	2 x RS-232 4 x USB 2 .0 1 x LPT/FDD 1 x IR	1 x KB/MS 1 x IDE 1 x CF Type II 1 x SATA (on-board)
Expansion	4 x PCI 1 x ISA	
Ethernet	10/100 Mbps Intel® 82562ET Ethernet controller	
BIOS	AMI	
Dimensions	95 mm x 114 mm	
Weight	GW: 850 g; NW: 290 g	
Operating Temperature	Minimum: 0°C (32°F) Maximum: 60°C (140°F)	
Audio Interfaces	AC'97 Codec Realtek ALC655	

Table 1-2: Technical Specifications

Chapter

2

Detailed Specifications

2.1 Overview

This chapter describes the specifications and on-board features of the 3312610 in detail.

2.2 Dimensions

2.2.1 Board Dimensions

The dimensions of the board are listed below:

- **Length**: 95.01mm
- **Width**: 114mm

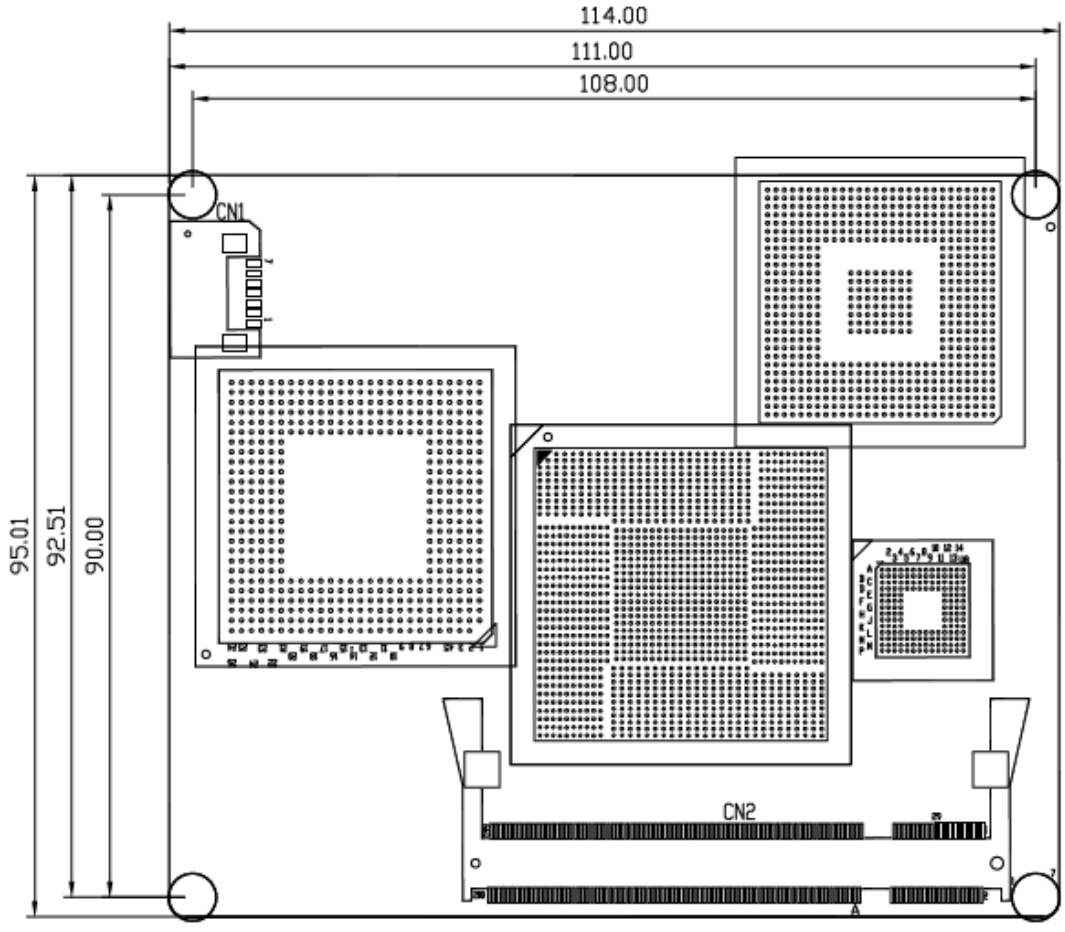

Figure 2-1: 3312610 Dimensions (mm)

2.3 Data Flow

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

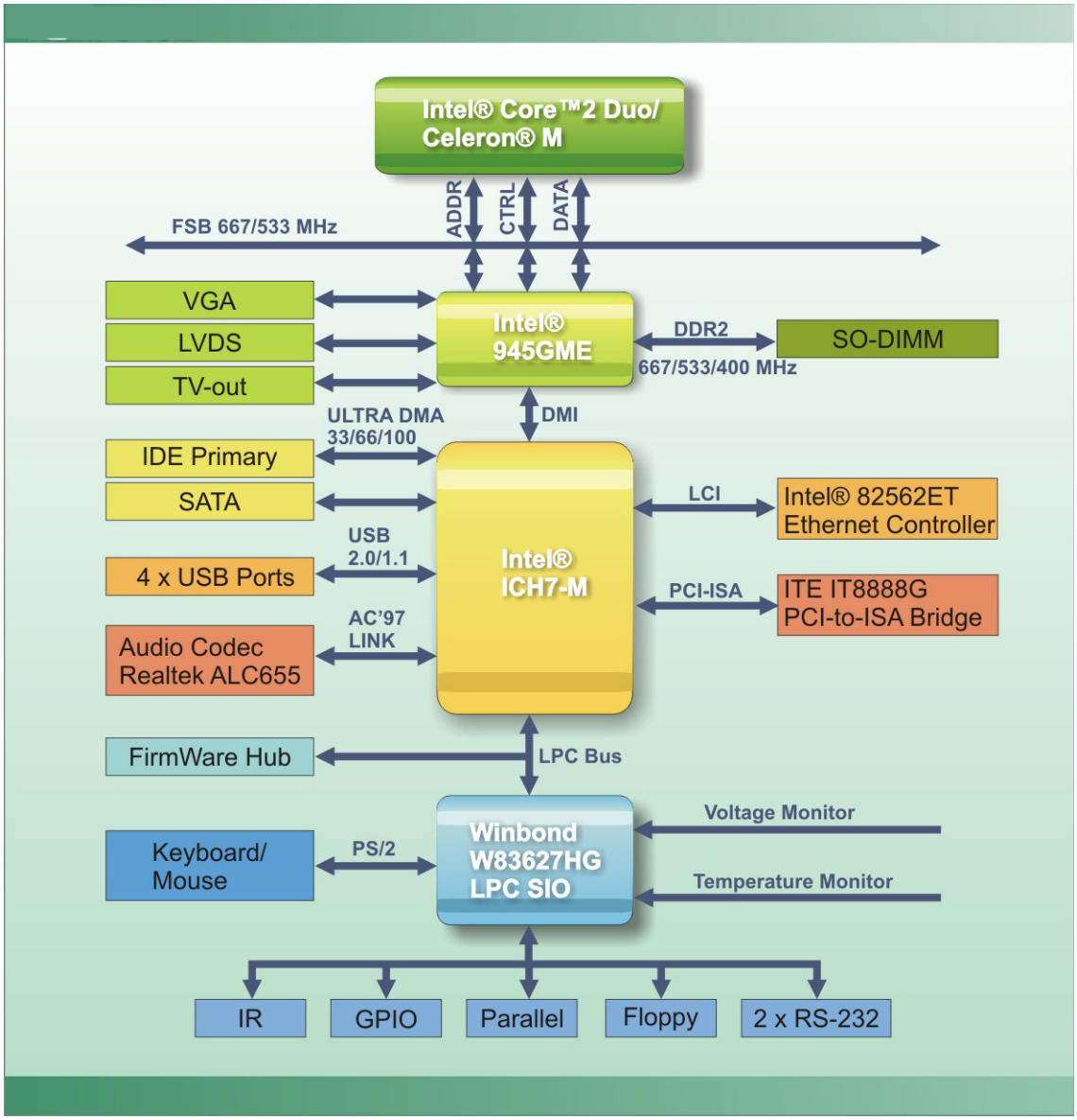

Figure 2-2: Data Flow Block Diagram

2.4 Compatible Processors

2.4.1 Compatible Processor Overview

The 3312610 supports the following processors:

- 3312610-L7400: Intel® Core™2 Duo processor
- 3312610-CM423: Intel® Celeron® M processor

All the above processors communicate with the Intel® 945GME Northbridge chipset through a 667 MHz or 533 MHz front side bus (FSB). The processor specifications are listed in **Table 2-1**.

Family	CPU Speed	Processor #	Bus Speed	Mfg Tech	Cache Size
Core™2 Duo	1.50 GHz	L7400	667 MHz	65 nm	4 MB L2
Celeron® M	1.06 GHz	423	533 MHz	65 nm	1 MB L2

Table 2-1: Supported Processors

2.5 Intel® 945GME Chipset Graphics Memory Controller Hub

2.5.1 Intel® 945GME Overview

The Intel® 945GME Northbridge chipset has the Generation 3.5 Intel Integrated Graphics Engine and the Intel® Graphics Media Accelerator 950 (Intel® GMA 950). The integrated graphics and memory controller hub (GMCH) facilitates the flow of information primarily between the following four interfaces:

- Front Side Bus (FSB)
- System Memory Interface
- Graphics Interface
- Direct Media Interface (DMI)

2.5.2 Intel® 945GME Memory Support

WARNING:

Only DDR2 memory module can be installed on the 3312610. Do not install DDR memory modules. If a DDR memory module is installed on the 3312610, the 3312610 may be irreparably damaged.

The Intel® 945GME Northbridge chipset on the 3312610 supports one 200-pin DDR2 SO-DIMM with the following features:

- One 200-pin SO-DIMM
- DDR2 only (**DO NOT** install a DDR SO-DIMM)
- Single-channel or dual-channel
- Capacities of 256 MB, 512 MB, 1 GB or 2 GB
- Transfer speeds of 400 MHz, 533 MHz or 667 MHz
- 64-bit wide per channel

The memory socket is shown in **Figure 2-3**.

Figure 2-3: 200-pin DDR2 SO-DIMM Socket

2.5.3 Intel® 945GME Integrated Graphics

The Intel® 945GME Northbridge chipset has an Intel® Gen. 3.5 integrated graphics engine that supports the following display devices:

- Analog CRT
- LVDS
- TV-Out

2.5.3.1 Intel® 945GME Analog CRT Support

The Intel® 945GME internal graphics engine, with an integrated 400 MHz RAMDAC and hot plug CRT support, supports analog CRT monitors up to QXGA. A DB-15 VGA connector on the baseboard is interfaced to the Intel® 945GME graphics engine.

2.5.3.2 Intel® 945GME LVDS Support

The Intel® 945GME internal graphics engine supports LVDS displays with the following features:

- Up to UXGA monitors with a maximum resolution of 1600 x 1200
- 18-bit 25 MHz to 112 MHz single-channel or dual-channel LVDS screens
- CPIS 1.5 compliant LVDS screens

2.5.3.3 Intel® 945GME TV Out Support

The Intel® 945GME internal graphics engine has the following TV output features:

- Three integrated 10-bit DACs
- Overscaling
- NTSC and PAL formats supported
- Supports RCA or S-VIDEO connectivity
- Supports HDTV with the following resolutions:
  - 480p
  - 720p
  - 1080i
  - 1080p

2.5.4 Intel® 945GME Direct Media Interface (DMI)

Intel® 945GME Northbridge GMCH is connected to the Intel® ICH7-M Southbridge Chipset through the chip-to-chip Direct Media Interface (DMI). Features of the Intel® 945GME DMI are listed below:

- 2GB/s (1GB/s in each direction) bus speed
- 32-bit downstream address

2.6 Intel® ICH7-M Southbridge Chipset

2.6.1 Intel® ICH7-M Overview

The Intel® ICH7-M Southbridge chipset is connected to the Intel® 945GME Northbridge GMCH through the chip-to-chip Direct Media Interface (DMI). Some of the features of the Intel® ICH7-M are listed below.

- Complies with PCI Express Base Specification, Revision 1.0a
- Complies with PCI Local Bus Specification, Revision 2.3 and supports 33MHz PCI operations
- Supports ACPI Power Management Logic
- Contains:
  - Enhanced DMA controller
  - Interrupt controller
  - Timer functions
- Integrated SATA host controller with DMA operations interfaced to one SATA connector on the 3312610
- Integrated IDE controller supports Ultra ATA 100/66/33
- Supports the four USB 2.0 devices on the baseboard with four UHCI controllers and one EHCI controller
- Complies with System Management Bus (SMBus) Specification, Version 2.0
- Supports Audio Codec ’97 (AC’97) Revision 2.3
- Contains Low Pin Count (LPC) interface
- Supports Firmware Hub (FWH) interface
- Serial peripheral interface support

2.6.2 Intel® ICH7-M Audio Codec ’97 Controller

The 3312610 has an integrated Realtek ALC655 codec. The ALC655 codec is a 16-bit, full-duplex AC'97 Rev. 2.3 compatible six-channel audio codec designed for PC multimedia systems, including host/soft audio and AMR/CNR-based designs. The codec is shown in **Figure 2-4**.

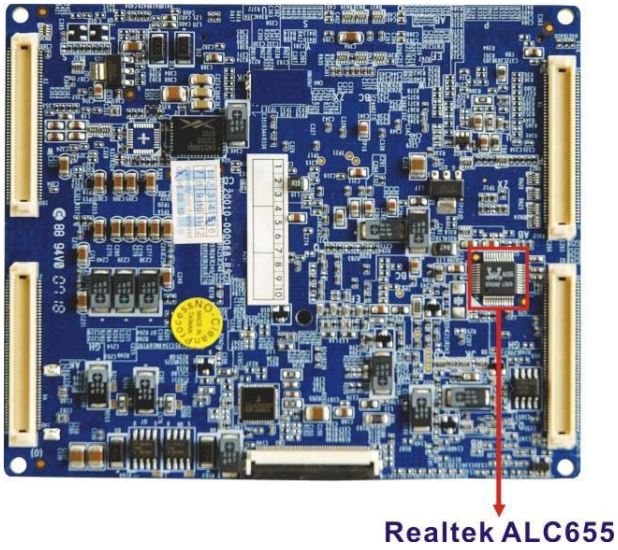

Figure 2-4:Realtek ALC655 Codec

Some of the features of the codec are listed below.

- Meets performance requirements for audio on PC99/2001 systems
- 16-bit Stereo full-duplex CODEC with 48KHz sampling rate
- Compliant with AC'97 Rev 2.3 specifications
- Front-Out, Surround-Out, MIC-In and LINE-In Jack Sensing
- 14.318MHz -> 24.576MHz PLL to eliminate crystal
- 12.288MHz BITCLK input
- Integrated PCBEEP generator to save buzzer
- Interrupt capability
- Three analog line-level stereo inputs with 5-bit volume control, LINE_IN, CD, AUX
- 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

2.6.3 Intel® ICH7-M Ethernet Connection

An integrated PHY on the Intel® ICH7-M Southbridge is interfaced to an Intel® 82562ET 10 Mbps or 100 Mbps Ethernet controller through the LCI bus. The Intel® 82562ET controller is then connected to the RJ-45 connector on the baseboard through the board-to-board connectors. See **Figure 2-5**.

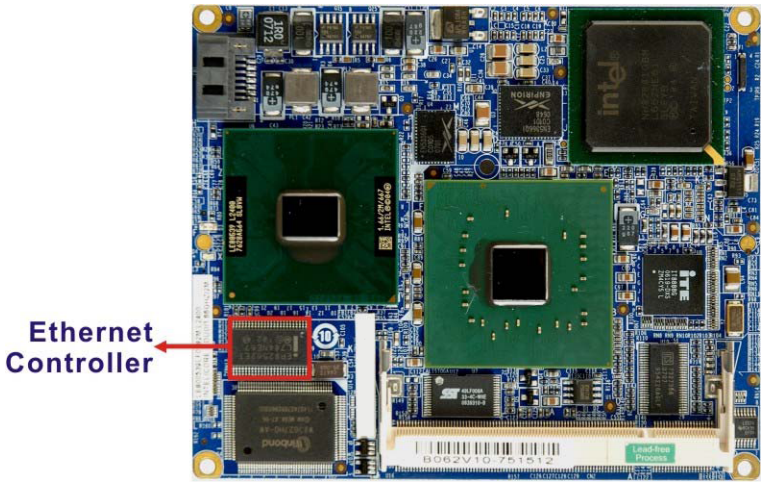

Figure 2-5: 10 Mbps or 100 Mbps LAN Controller Chipset

2.6.4 Intel® ICH7-M IDE Interface

The integrated IDE interface on the ICH7-M Southbridge supports two IDE hard disks and ATAPI devices through the 40-pin IDE connector on the baseboard. PIO IDE transfers up to 16 MB/s and Ultra ATA transfers of 100 MB/s. The integrated IDE interface is able to support the following IDE HDDs:

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

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

Table 2-2: Supported HDD Specifications

2.6.5 Intel® ICH7-M Low Pin Count (LPC) Interface

The ICH7-M LPC interface complies with the LPC 1.1 specifications. The LPC bus from the ICH7-M is connected to the following components:

- BIOS chipset
- Super I/O chipset

2.6.6 Intel® ICH7-M PCI Interface

The PCI interface on the ICH7-M is compliant with the PCI Revision 2.3 implementation. Some of the features of the PCI interface are listed below.

- PCI Revision 2.3 compliant

- 33 MHz
- 5V tolerant PCI signals (except PME#)
- Integrated PCI arbiter supports up to seven PCI bus masters

2.6.7 Intel® ICH7-M Real Time Clock

256 bytes of battery backed RAM is provided by the Motorola MC146818A real time clock (RTC) integrated into the ICH7-M. The RTC operates on a 3V battery and 32.768KHz crystal. The RTC keeps track of the time and stores system data even when the system is turned off.

2.6.8 Intel® ICH7-M SATA Controller

The integrated SATA controller on the ICH7-M Southbridge supports one SATA drive on the 3312610 with independent DMA operations. SATA controller specifications are listed below.

- Supports one SATA drive
- Supports 1.5 Gb/s data transfer speeds
- Supports Serial ATA Specification, Revision 1.0a

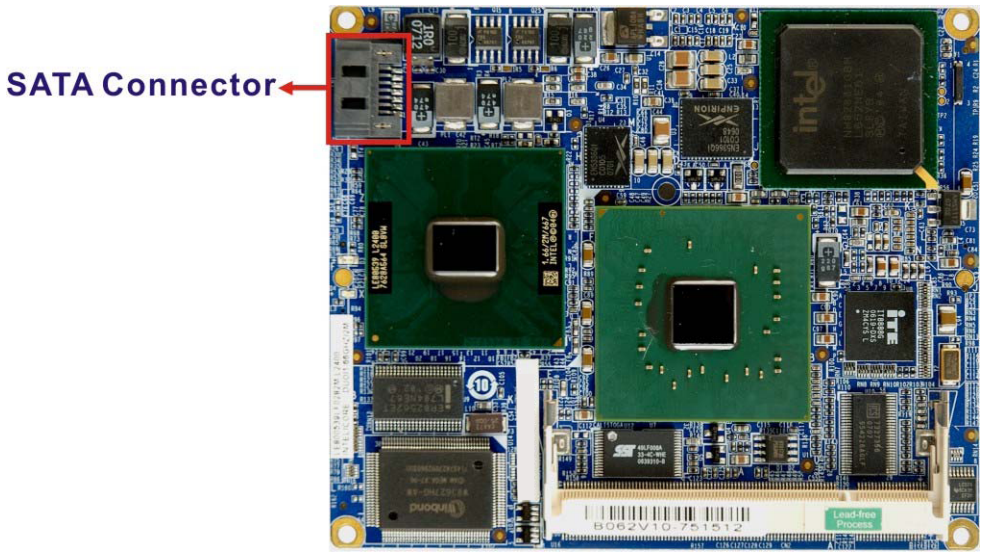

Figure 2-6: SATA Connector

2.6.9 Intel® ICH7-M USB Controller

Up to four high-speed, full-speed or low-speed USB devices are supported by the ICH7-M on the 3312610. High-speed USB 2.0, with data transfers of up to 480MB/s, is enabled with the ICH7-M integrated Enhanced Host Controller Interface (EHCI) compliant host controller. USB full-speed and low-speed signaling is supported by the ICH7-M integrated Universal Host Controller Interface (UHCI) controllers.

The four USB ports implemented on the 3312610 are connected to two internal connectors on the 1008070 baseboard.

2.7 LPC Bus Components

2.7.1 LPC Bus Overview

The LPC bus is connected to components listed below:

- BIOS chipset
- Super I/O chipset

2.7.2 BIOS Chipset

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

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

The BIOS chipset is shown in **Figure 2-7** below.

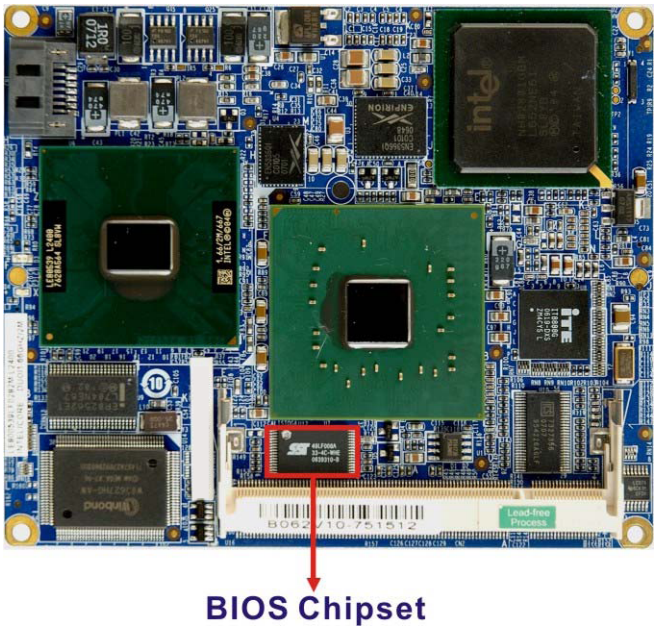

Figure 2-7: BIOS Chipset

2.7.3 Super I/O chipset

The Winbond W83627HG Super I/O chipset is connected to the ICH7-M Southbridge through the LPC bus.

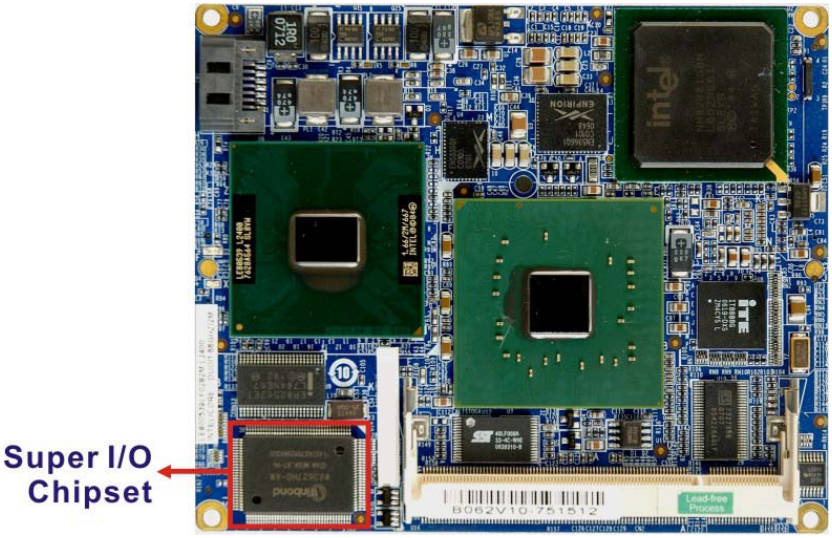

Figure 2-8: Super I/O Chipset

The Winbond W83627HG is an LPC interface-based Super I/O device that comes with Environment Controller integration, floppy disk controller, UART controller and IR controller. Some of the features of the Winbond W83697HG chipset are listed below:

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

Some of the Super I/O features are described in more detail below:

2.7.3.1 Super I/O LPC Interface

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

2.7.3.2 Super I/O Infrared

The onboard Super I/O supports the following infrared specifications:

- IrDA version 1.0 SIR protocol with a maximum baud rate up to 115.2Kbps

The IR controller on the super I/O is interfaced through an IR pin-header on a baseboard.

2.7.3.3 Super I/O Hardware Monitor Functions

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

2.7.3.4 Super I/O Parallel Port

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

- IBM parallel port compatible
- PS/2 compatible bi-directional parallel port

- Enhanced Parallel Port (EPP) mode supported. Compatible with IEEE 1284 specifications
- Extended Parallel Port (EPP) mode supported. Compatible with IEEE 1284 specifications
- Enhanced printer port back-drive current protection

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

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

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

- IBM PC AT disk drive compatible
- Variable write pre-compensation with track selectable capability
- Vertical recording format supported
- DMA logic enabled
- 16-byte data FIFOs
- Overrun and under run conditions detected
- Built-in address mark detection circuitry to simplify the read electronics
- FDD anti-virus functions with software write protect and FDD write enable signal
- Supports 3.5-inch or 5.25-inch FDD
- Compatible with industry standard 82077
- Supported capacities:
  - 360K
  - 720K
  - 1.2M
  - 1.44M
  - 2.88M
- Supported transfer rates
  - 250Kbps
  - 300Kbps
  - 500Kbps
  - 1Mbps
  - 2Mbps

- 3-mode FDD supported

The FDD controller is interfaced to a FDD connector on the baseboard through the board-to-board connectors.

2.7.3.6 Super I/O Keyboard and Mouse Controller

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

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

The keyboard and mouse controller is interfaced to a keyboard and mouse connected to the connector on a baseboard.

2.8 PCI Bus Components

2.8.1 PCI Bus Overview

The PCI bus is connected to the component listed below:

- ITE IT8888G PCI-to-ISA bridge

The PCI bus complies with PCI Local Bus Specification, Revision 2.2 and supports 33MHz PCI operations.

2.8.1.1 ITE IT8888G PCI-to-ISA Bridge

An ITE IT8888G PCI to ISA bridge single function device enables legacy ISA card expansion on the baseboard. The PCI to ISA bridge is shown in **Figure 2-9**.

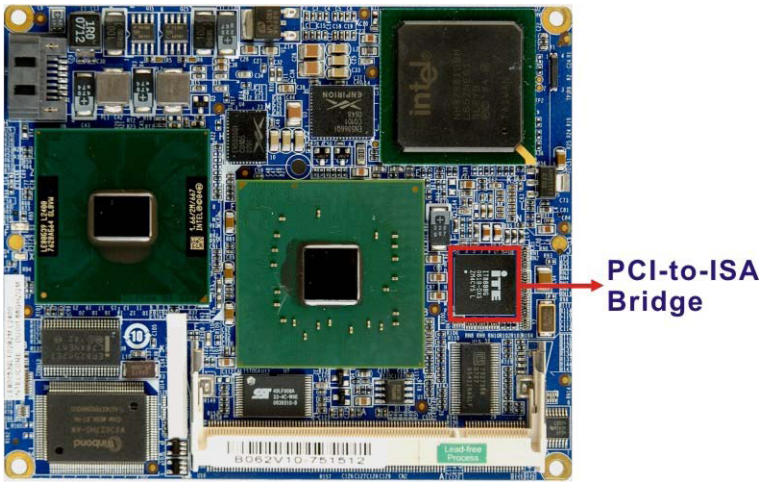

Figure 2-9: PCI-to-ISA Bridge

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

- PCI Interface
- Programmable PCI Address Decoders
- PC/PCI DMA Controller
- Distributed DMA Controller
- ISA Interface
- SM Bus
- 1 analog line-level mono output: MONO_OUT
- Power-on Serial Bus Configuration
- Serial IRQ
- Versatile power-on strapping options
- Supports NOGO function
- Single 33 MHz Clock Input
- +3.3V PCI I/F with +5V tolerant I/O buffers
- +5V ISA I/F and core Power Supply

2.9 Environmental and Power Specifications

2.9.1 System Monitoring

Two thermal inputs on the 3312610 Super I/O Enhanced Hardware Monitor monitor the following temperatures:

- System temperature
- CPU temperature

Five voltage inputs on the 3312610 Super I/O Enhanced Hardware Monitor monitor the following voltages:

- CPU
- Memory
- +3.3Vin
- +5.0Vin
- +5VSB

2.9.2 Operating Temperature and Temperature Control

The maximum and minimum operating temperatures for the 3312610 are listed below.

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

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

2.9.3 Power Consumption

Table 2-3 shows the power consumption parameters for the 3312610 running with a 1.5GHz Intel® Core™2 Duo L7400 processor and with a 512 MB, 667 MHz DDR2 SO-DIMM.

Voltage	Current
+5 V	3.81 A

Table 2-3: Power Consumption

2.10 1008070 Compatible Baseboard

The GAI 1008070 compatible baseboard can be separately purchased from GAI. The

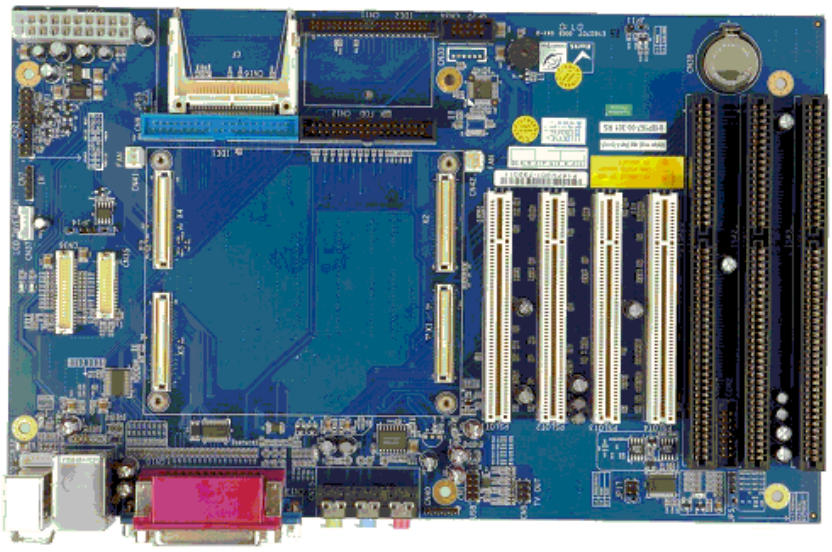

Figure 2-10: 1008070 Compatible Baseboard

Some of the features of the 1008070 are listed below:

- **Display Interfaces**:
  - 1 x 30-pin 48-bit DFP for LVDS
  - 1 x 40-pin connector for 24-bit TTL
- **Expansion Interfaces**:
  - 4 x PCI slots
  - 3 x ISA slots
- **External Peripheral Interface Connectors**:
  - 3 x Audio jacks
  - 2 x PS/2 connectors (one for mouse, one for keyboard)
  - 1 x RJ-45 Ethernet connector

- 2 x USB 2.0 port connectors
- 1 x male DB-9 COM connector
- 1 x female DB-15 VGA connector
- 1 x female DB-26 LPT connector

- **Onboard interface connectors**:
  - 2 x IDE connectors (one 40-pin box-header, one 44-pin box-connector) (3312610 only supports one 40-pin IDE connector)
  - 1 x FDD connector (26-pin box-header connector)
  - 1 x Digital I/O connector (10-pin header, 4-bits input/4-bits output)
  - 1 x Infrared connector (5-pin header)
  - 1 x CF Type I/II socket
  - 1 x ATX connector

For more information about the 1008070 compatible baseboard or customized baseboard options, please contact an GAI sales representative at 1-800-833-8999

Chapter

3

Unpacking

3.1 Anti-static Precautions

WARNING:

Failure to take ESD precautions during the installation of the 3312610 may result in permanent damage to the 3312610 and severe injury to the user.

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the 3312610. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the 3312610, 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 3312610, place it on an antic-static pad. This reduces the possibility of ESD damaging the 3312610.
- ***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 3312610 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 3312610 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 GAI reseller or vendor you purchased the 3312610 from or contact an GAI sales representative directly.

3.3.1 Package Contents

The 3312610 is shipped with the following components:

Quantity	Item and Part Number	Image
1	3312610	
1	Heat spreader	
1	Heat sink (for 3312610-CM423 only)	
1	Heat sink with fan (for 3312610-L7400 only)	

1	Quick installation guide	
1	Utility CD	

Table 3-1: Package List Contents

Chapter

4

Connector Pinouts

4.1 Board-to-Board Interface Connectors

Section 4.1.1 shows board-to-board interface connector locations. **Section 4.1.2** lists all the peripheral interface connectors seen in **Section 4.1.2**.

4.1.1 3312610 Layout

Figure 4-1 shows the on-board board-to-board connectors.

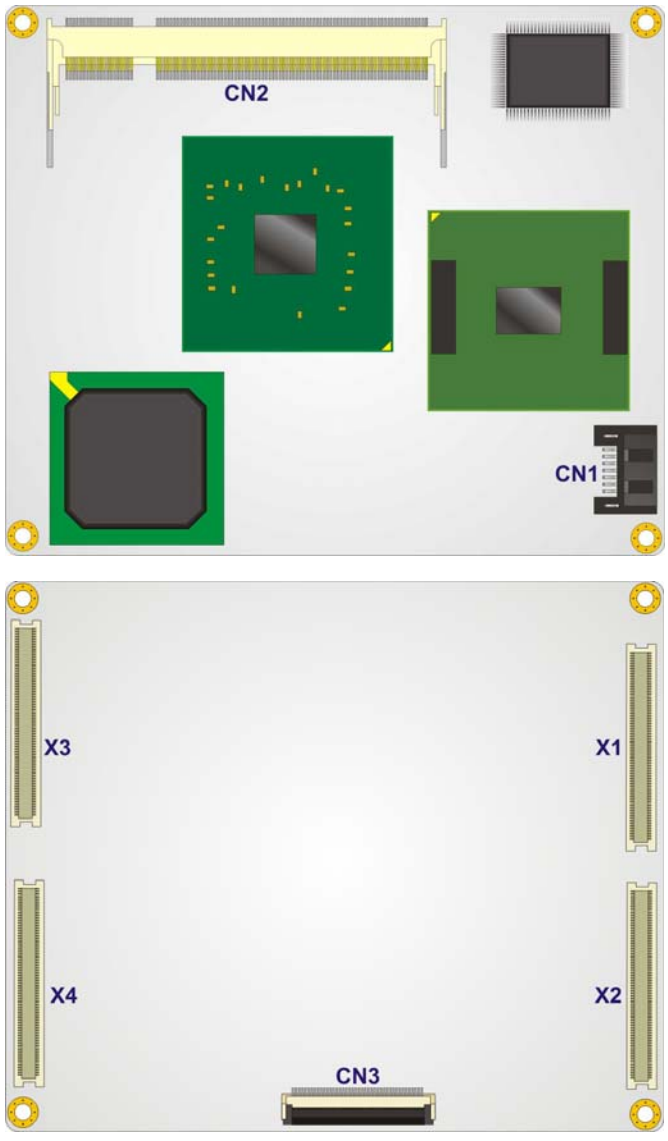

Figure 4-1: 3312610 Layout (Front side on the top, solder side on the bottom)

4.1.2 Board-to-Board Interface Connectors

Table 4-1 shows a list of the board-to-board interface connectors on the 3312610. Detailed descriptions of these connectors can be found below.

Connector	Type	Label
ETX-X1 connector	100-pin ETX connector	X1
ETX-X2 connector	100-pin ETX connector	X2
ETX-X3 connector	100-pin ETX connector	X3
ETX-X4 connector	100-pin ETX connector	X4
SATA connector	7-pin SATA connector	CN1
SDVO connector	45-pin connector	CN3

Table 4-1: Peripheral Interface Connectors

4.2 Board-to-Board Peripheral Connectors

Board-to-board connectors are found on the ETX module and are only accessible when the ETX module is outside of the chassis. This section has complete descriptions of all the internal, peripheral connectors on the 3312610.

4.2.1 ETX-X1 Connector

CN Label: **X1**

CN Type: 100-pin ETX connector

CN Location: See **Figure 4-2**

CN Pinouts: See **Table 4-2**

The standard ETX-X1 connector locations and pinouts are shown below.

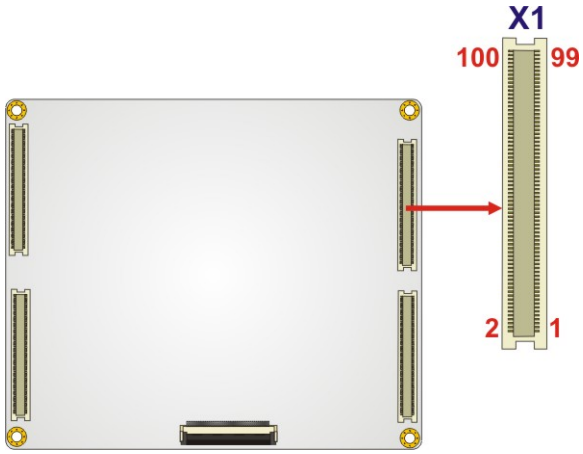

Figure 4-2: ETX-X1 Connector Pinouts

Pin	Description	Pin	Description	Pin	Description	Pin	Description
1	GND	2	GND	51	VCC5	52	VCC5
3	PCICLK2	4	PCICLK3	53	PAR	54	SERR#
5	GND	6	GND	55	PERR#	56	NC
7	PCICLK0	8	PCICLK1	57	PME#	58	USBP2N
9	PREQ3#	10	PGNT3#	59	PLOCK#	60	DEVSEL#
11	PGNT2#	12	VCC3	61	TRDY#	62	USBP3N
13	PREQ2#	14	GNT1#	63	IRDY#	64	STOP#
15	PREQ1#	16	VCC3	65	FRAME#	66	USBP2P
17	PGNT0#	18	NC	67	GND	68	GND
19	VCC5	20	VCC5	69	AD16	70	CBE2#
21	SERIRQ	22	PREQ0#	71	AD17	72	USBP3P
23	AD0	24	VCC3	73	AD19	74	AD18
25	AD1	26	AD2	75	AD20	76	USBP0N
27	AD4	28	AD3	77	AD22	78	AD21
29	AD6	30	AD5	79	AD23	80	USBP1N
31	C_BE0#	32	AD7	81	AD24	82	CBE3#
33	AD8	34	AD9	83	VCC5	84	VCC5
35	GND	36	GND	85	AD25	86	AD26

37	AD10	38	LINEIN_L	87	AD28	88	USBP0P
39	AD11	40	MICIN	89	AD27	90	AD29
41	AD12	42	LINE_R	91	AD30	92	USBP1P
43	AD13	44	VCC5_AUDIO	93	ICH_PCIRST#	94	AD31
45	AD14	46	LINE_OUTL	95	PIRQ#C	96	PIRQ#D
47	AD15	48	AUDIO_GND	97	PIRQ#A	98	PIRQ#B
49	C_BE1#	50	LINE_OUTR	99	GND	100	GND

Table 4-2: ETX-X1 Connector Pinouts

4.2.2 ETX-X2 Connector

CN Label: **X2**

CN Type: 100-pin ETX connector

CN Location: See **Figure 4-3**

CN Pinouts: See **Table 4-3**

The standard ETX-X2 connector locations and pinouts are shown below.

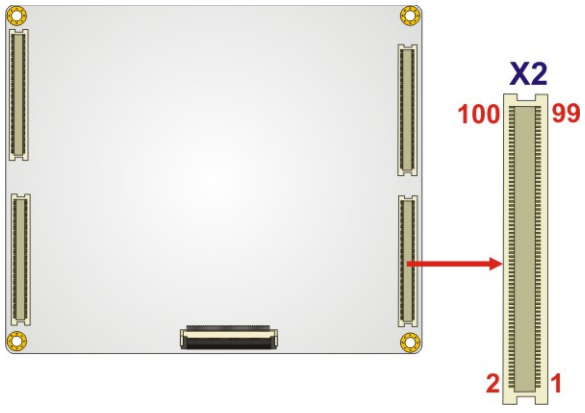

Figure 4-3: ETX-X2 Pinout Locations

Pin	Description	Pin	Description	Pin	Description	Pin	Description
1	GND	2	GND	51	VCC5	52	VCC5
3	SD14	4	SD15	53	SA6	54	IRQ5
5	SD13	6	MASTER#	55	SA7	56	IRQ6
7	SD12	8	DREQ7	57	SA8	58	IRQ7
9	SD11	10	DACK7#	59	SA9	60	ISACLK
11	SD10	12	DREQ6	61	SA10	62	REFRESH#
13	SD9	14	DACK6#	63	SA11	64	DREQ1
15	SD8	16	DREQ5	65	SA12	66	DACK1#
17	MEMW#	18	DACK5#	67	GND	68	GND
19	MEMR#	20	DREQ0	69	SA13	70	DREQ3
21	SA17	22	DACK0#	71	SA14	72	DACK3#
23	SA18	24	IRQ14	73	SA15	74	IOR#
25	SA19	26	IRQ15	75	SA16	76	IOW#
27	LA20	28	IRQ12	77	SA18	78	SA17
29	LA21	30	IRQ11	79	SA19	80	SMEMR#
31	LA22	32	IRQ10	81	IOCHRDY	82	AEN
33	LA23	34	IOCS16#	83	VCC5	84	VCC5
35	GND	36	GND	85	SD0	86	SMEMW#
37	SBHE#	38	MCS16-	87	SD2	88	SD1
39	SA0	40	OSCISA	89	SD3	90	NOWS#
41	SA1	42	BALE	91	DREQ2	92	SD4
43	SA1	44	TC	93	SD5	94	IRQ9
45	SA3	46	DACK2#	95	SD6	96	SD7
47	SA4	48	IRQ3	97	IOCHCK#	98	RSTDRV
49	SA5	50	IRQ4	99	GND	100	GND

Table 4-3: ETX-X2 Connector Pinouts

4.2.3 ETX-X3 Connector

CN Label: **X3**

CN Type: 100-pin ETX connector

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

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

The standard ETX-X3 connector locations and pinouts are shown below.

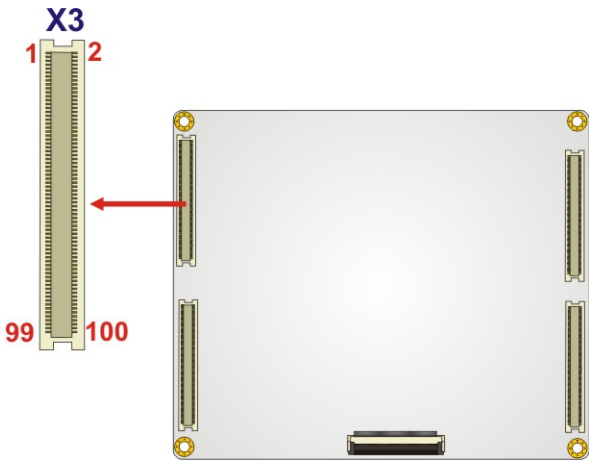

Figure 4-4: ETX-X3 Pinout Locations

Pin	Description	Pin	Description	Pin	Description	Pin	Description
1	GND	2	GND	51	LPT/FLPY#	52	NC
3	CRT_RED	4	CRT_BLUE	53	VCC5	54	GND
5	H_SYNC	6	CRT_GREEN	55	STROBE#	56	ALF#
7	V_SYNC	8	DDCA_CLK	57	RESERVED	58	PD7
9	N/C	10	DDCA_DATA	59	IR_RX	60	ERROR#
11	LVDS_CLKB#	12	LVDS_DBN3	61	IR_TX	62	PD6
13	LVDS_ CLKB#	14	LVDS_DBP3	63	RXD1	64	PAR_IN#
15	GND	16	GND	65	GND	66	GND
17	LVDS_DBP1	18	LVDS_DBP2	67	RTS#1	68	PD5

19	LVDS_DBN1	20	LVDS_DBN2	69	DTR#1	70	SLCTIN#
21	GND	22	GND	71	DCD#1	72	PD4
23	LVDS_DAN3	24	LVDS_DBP0	73	DSR#1	74	PD3
25	LVDS_DAP3	26	LVDS_DBN0	75	CTS#1	76	PD2
27	GND	28	GND	77	TXD1	78	PD1
29	LVDS_DAN2	30	LVDS_CLKA	79	RI#1	80	PD0
31	LVDS_DAP2	32	LVDS_CLKA#	81	VCC5	82	VCC5
33	GND	34	GND	83	RXD0	84	ACK#
35	LVDS_DAP0	36	LVDS_DAP1	85	RTS#0	86	BUSY
37	LVDS_DAN0	38	LVDS_DAN1	87	DTR#0	88	PE
39	VCC5	40	VCC5	89	DCD#0	90	SLCT
41	L_DDC_DATA	42	N/C	91	DSR#0	92	MCLK
43	L_DDC_CLK	44	LCD_BKLEN	93	CTS#0	94	MDAT
45	N/C	46	LCD_EN	95	TXD0	96	KCLK
47	TVBLUE_CVBS	48	TVGREEN_Y	97	RI#0	98	KDAT
49	N/C	50	TVRED_C	99	GND	100	GND

Table 4-4: ETX-X3 Connector Pinouts

4.2.4 ETX-X4 Connector

CN Label: **X4**

CN Type: 100-pin ETX connector

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

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

The standard ETX-X4 connector locations and pinouts are shown below.

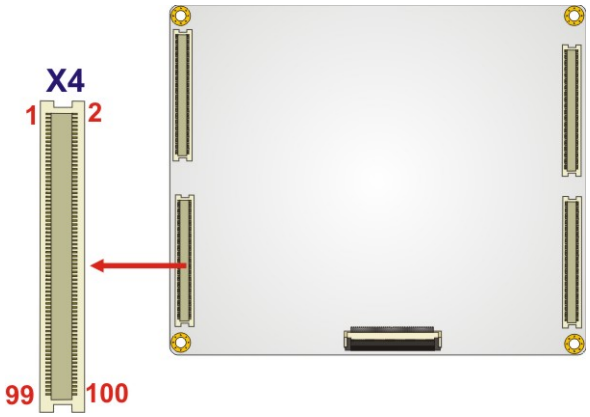

Figure 4-5: ETX-X4 Connector Pinout Locations

Pin	Description	Pin	Description	Pin	Description	Pin	Description
1	GND	2	GND	51	NC	52	PDIOR#
3	VCC5SBY	4	HW_RST	53	NC	54	PDIOW#
5	PS_ON	6	ICH_SPEAKER	55	NC	56	PDREQ
7	BWRTN	8	RTCBAT	57	NC	58	PDD15
9	NC	10	LILED#	59	NC	60	PDD0
11	WDTO#	12	ACTLED#	61	NC	62	PDD14
13	NC	14	SPLED#	63	NC	64	PDD1
15	NC	16	I2CLK	65	GND	66	GND
17	VCC5	18	VCC5	67	NC	68	PDD13
19	USB_OC#0	20	NC	69	NC	70	PDD2
21	ETX_SMI#	22	I2DAT	71	NC	72	PDD12
23	SMBCLK	24	SMBDATA	73	NC	74	PDD3
25	NC	26	SMBALERT#	75	NC	76	PDD11
27	NC	28	N/C	77	NC	78	PDD4
29	NC	30	PDCS#3	79	NC	80	PDD10
31	NC	32	PDCS#1	81	VCC5	82	VCC5
33	GND	34	GND	83	NC	84	PDD5
35	NC	36	PDA2	85	NC	86	PDD9
37	NC	38	PDA0	87	NC	88	PDD6

39	NC	40	PDA1	89	ICH_RI#	90	IDE_PATADET
41	PM_BATLOW	42	NC	91	RX-	92	PDD8
43	NC	44	IRQ14	93	RX+	94	NC
45	NC	46	PDDACK#	95	TX-	96	PDD7
47	NC	48	PIORDY	97	TX+	98	PCIRST#
49	VCC5	50	VCC5	99	GND	100	GND

Table 4-5: ETX-X4 Connector Pinouts

4.2.5 SATA Drive Connector

CN Label: **CN1**

CN Type: 7-pin SATA drive connector

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

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

The SATA drive connector is connected to a first generation SATA drive. First generation SATA drives transfer data at speeds as high as 150Mb/s.

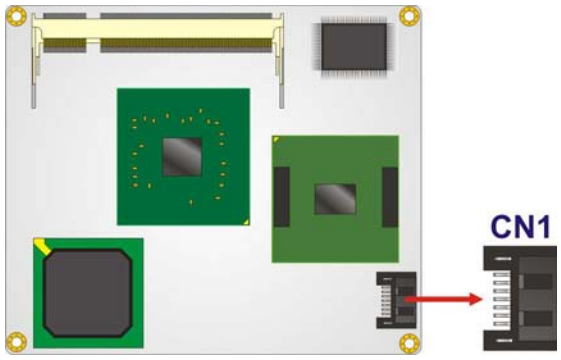

Figure 4-6: SATA Drive Connector Locations

PIN NO.	DESCRIPTION
1	GND
2	TX+
3	TX-

4	GND
5	RX-
6	RX+
7	GND

Table 4-6: SATA Drive Connector Pinouts

4.2.6 SDVO Connector

CN Label: **CN3**

CN Type: 45-pin crimp (1x45)

CN Location: See **Figure 4-7**

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

The 45-pin SDVO (Serial Digital Video Out) connector supports additional video signaling interfaces.

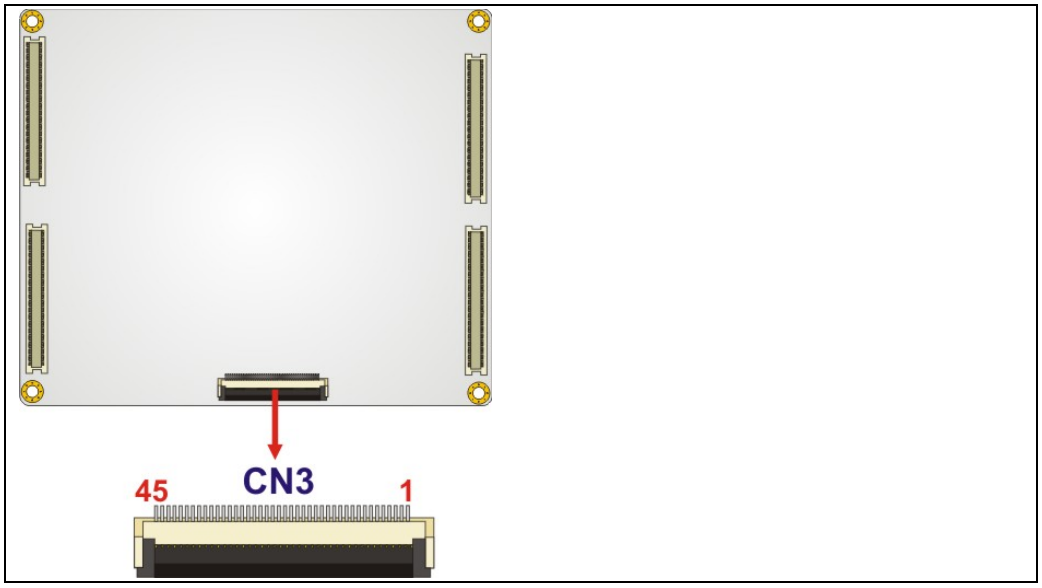

Figure 4-7: SDVO Connector Pinout Locations

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GROUND	24	SDVOC_RED
2	SDVOC_CLK#	25	GROUND
3	SDVOC_CLK	26	SDVOB_BLUE#
4	GROUND	27	SDVOB_BLUE
5	SDVOC_GREEN#	28	GROUND
6	SDVOC_GREEN	29	SDVOB_RED#
7	GROUND	30	SDVOB_RED
8	SDVOB_CLK#	31	GROUND
9	SDVOB_ CLK	32	SDVO_FLDSTALL#
10	GROUND	33	SDVO_FLDSTALL
11	SDVOB_GREEN#	34	GROUND
12	SDVOB_GREEN	35	SDVO_TVCLKIN#
13	GROUND	36	SDVO_TVCLKIN
14	SDVOC_INT#	37	GROUND
15	SDVOC_INT	38	SDVO_CLK
16	GROUND	39	SDVO_DATA
17	SDVOB_INT#	40	PCIRST#1
18	SDVOB_INT	41	VCC5
19	GROUND	42	VCC5
20	SDVOC_BLUE#	43	VCC5
21	SDVOC_BLUE	44	NC
22	GROUND	45	NC
23	SDVOC_RED#		

Table 4-7: SDVO Connector Pinouts

Chapter

5

Installation

5.1 Installation Considerations

 **NOTE:**

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

5.1.1 Installation Notices

Before and during the installation of the 3312610, please do the following:

- Read the user manual
  - The user manual provides a complete description of the 3312610, 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.
- Turn off all power to the 3312610
  - When working with the CPU module, 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 3312610 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 Unpacking

NOTE:

If any of the items listed below are missing when the 3312610 is unpacked, do not proceed with the installation and contact the 3312610 reseller or vendor.

5.2.1 Unpacking Precautions

Before installing the 3312610, unpack the CPU module. Some components on 3312610 are very sensitive to static electricity and can be damaged by a sudden rush of power. To protect it from being damaged, follow these precautions:

- The user should ground them self to remove any static charge before touching the 3312610. To do so wear a grounded wrist strap at all times or frequently touch any conducting materials that is connected to the ground.
- Handle the 3312610 by its edges. Do not touch the IC chips, leads or circuitry if not necessary.

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

5.2.2 Checklist

When unpacking the 3312610, please make sure that the package contains the following items.

- 1 x 3312610 CPU module
- 1 x Heat spreader
- 1 x Heat sink
- 1 x Utility CD

- 1 x QIG

If one or more of these items are missing, please contact the reseller or vendor the 3312610 was purchased from and do not proceed any further with the installation.

5.3 3312610 Embedded Module Installation

WARNING!

Never run the embedded module without an appropriate heat sink.

WARNING!

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

WARNING!

When installing electronic components onto the embedded module or installing the embedded module onto the baseboard, always take anti-static precautions in order to prevent ESD damage to the CPU module and other electronic components like the CPU and SO-DIMM module.

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

NOTE:

The 3312610 embedded module already has a preinstalled Intel® CPU.

- SO-DIMM module
- Mount the embedded module onto a baseboard
- Install the heat sink

5.3.1 SO-DIMM Installation

WARNING:

Using incorrectly specified SO-DIMM may cause permanently damage the 3312610. Please make sure the purchased SO-DIMM complies with the memory specifications of the 3312610. SO-DIMM specifications compliant with the 3312610 are listed in **Chapter 2**.

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

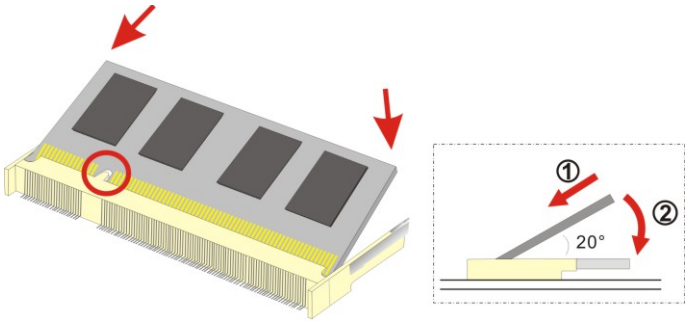

Figure 5-1: SO-DIMM Installation

Step 1: **Locate the SO-DIMM socket**. Place the 3312610 on an anti-static pad.

Step 2: **Align the SO-DIMM with the socket**. The SO-DIMM must be oriented in such a

way that the notch in the middle of the SO-DIMM must be aligned with the plastic bridge in the socket.

Step 3: Insert the SO-DIMM. Push the SO-DIMM chip into the socket at an angle. (See **Figure 5-1**)

Step 4: **Open the SO-DIMM socket arms**. Gently pull the arms of the SO-DIMM socket out and push the rear of the SO-DIMM down. (See **Figure 5-1**)

Step 5: **Secure the SO-DIMM**. Release the arms on the SO-DIMM socket. They clip into place and secure the SO-DIMM in the socket.

5.3.2 Mounting the 3312610 Embedded Module

The 3312610 embedded module has four standard ETX connectors on the reverse side. To install the 3312610 please refer to and follow the installation instructions below:

Step 1: **Align the ETX connectors**. Align the ETX connectors (ETX-X1, ETX-X2, ETX-X3 and ETX-X4) with the corresponding connectors on a compatible baseboard. **:**

Step 1: **Gently insert the connectors**. Gently push the embedded module down to ensure the connectors are properly connected.

Step 3: **Align the heat sink.** Align the heat sink with the 3312610 making sure that the three onboard chipsets are in proper contact with the heat sink. Also make sure the retention screw holes on the corners of the heat sink are properly aligned

with the corresponding holes on the ETX module and baseboard.

Step 4: **Insert retention screws.** Insert four retention screws through the heat sink and 3312610 to secure them to the baseboard.

5.3.3 SATA Drive Connection

The 3312610 is shipped with two SATA drive cables and one SATA drive power cable. To connect the SATA drives to the connectors, please follow the steps below.

Step 5: **Locate the connectors**. The locations of the SATA drive connectors are shown in **Chapter 3**.

Step 6: **Insert the cable connector**. Press the clip on the connector at the end of the SATA cable and insert the cable connector into the on-board SATA drive connector. See **Figure 5-2**.

Step 7: **Connect the cable to the SATA disk**. Connect the connector on the other end of the cable to the connector at the back of the SATA drive. See **Figure 5-2**.

Step 8: **Connect the SATA power cable**. Connect the SATA power connector to the back of the SATA drive. See **Figure 5-2**.

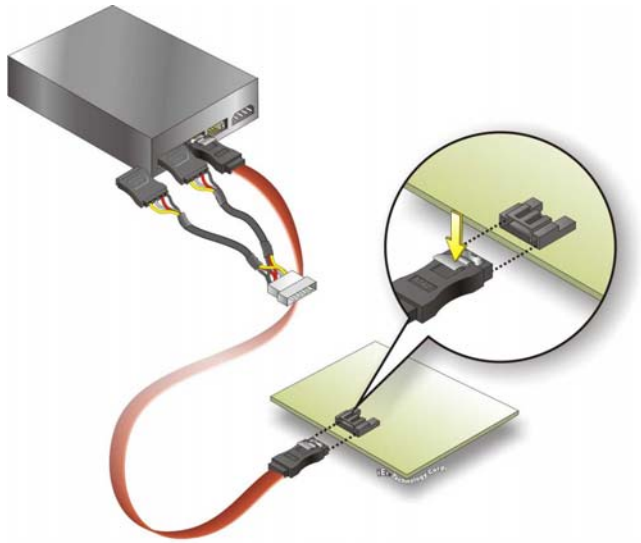

Figure 5-2: SATA Power Drive Connection

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Appendix

A

Terminology

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

	expansion devices. The serial port on a personal computer is usually a male DB-9 connector.
DAC	The Digital-to-Analog Converter (DAC) converts digital signals to analog signals.
DDR	Double Data Rate refers to a data bus transferring data on both the rising and falling edges of the clock signal.
DMA	Direct Memory Access (DMA) enables some peripheral devices to bypass the system processor and communicate directly with the system memory.
DIMM	Dual Inline Memory Modules are a type of RAM that offer a 64-bit data bus and have separate electrical contacts on each side of the module.
DIO	The digital inputs and digital outputs are general control signals that control the on/off circuit of external devices or TTL devices. Data can be read or written to the selected address to enable the DIO functions.
EHCI	The Enhanced Host Controller Interface (EHCI) specification is a register-level interface description for USB 2.0 Host Controllers.
EIDE	Enhanced IDE (EIDE) is a newer IDE interface standard that has data transfer rates between 4.0 MBps and 16.6 MBps.
FSB	The Front Side Bus (FSB) is the bi-directional communication channel between the processor and the Northbridge chipset.
GPIO	General purpose input
HDD	Hard disk drive (HDD) is a type of magnetic, non-volatile computer storage device that stores digitally encoded data.
ICH	The Input/Ouput Controll Hub (ICH) is an Intel® Southbridge chipset.
IrDA	Infrared Data Association (IrDA) specify infrared data transmission protocols used to enable electronic devices to wirelessly communicate

	with each other.
L1 Cache	The Level 1 Cache (L1 Cache) is a small memory cache built into the system processor.
L2 Cache	The Level 2 Cache (L2 Cache) is an external processor memory cache.
LCD	Liquid crystal display (LCD) is a flat, low-power display device that consists of two polarizing plates with a liquid crystal panel in between.
LVDS	Low-voltage differential signaling (LVDS) is a dual-wire, high-speed differential electrical signaling system commonly used to connect LCD displays to a computer.
MAC	The Media Access Control (MAC) protocol enables several terminals or network nodes to communicate in a LAN, or other multipoint networks.
QVGA	Quarter Video Graphics Array (QVGA) refers to a display with a resolution of 320 x 240 pixels.
RAM	Random Access Memory (RAM) is volatile memory that loses data when power is lost. RAM has very fast data transfer rates compared to other storage like hard drives.
SATA	Serial ATA (SATA) is a serial communications bus designed for data transfers between storage devices and the computer chipsets. The SATA bus has transfer speeds up to 1.5 Gbps and the SATA II bus has data transfer speeds of up to 3.0 Gbps.
S.M.A.R.T	Self Monitoring Analysis and Reporting Technology (S.M.A.R.T) refers to automatic status checking technology implemented on hard disk drives.
UART	Universal Asynchronous Receiver-transmitter (UART) is responsible for asynchronous communications on the system and manages the system's serial communication (COM) ports.
UHCI	The Universal Host Controller Interface (UHCI) specification is a register-level interface description for USB 1.1 Host Controllers.

USB	The Universal Serial Bus (USB) is an external bus standard for interfacing devices. USB 1.1 supports 12Mbps data transfer rates, while USB 2.0 supports 480Mbps data transfer rates.
VGA	The Video Graphics Array (VGA) is a graphics display system developed by IBM.

Appendix

B

Watchdog Timer

NOTE:

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

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

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

INT 15H:

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

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

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

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

NOTE:

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

Example program:

```
; INITIAL TIMER PERIOD COUNTER
;
W_LOOP:

        MOV     AX, 6F02H       ;setting the time-out value
        MOV     BL, 30          ;time-out value is 48 seconds
        INT      15H
 ;
; ADD THE APPLICATION PROGRAM HERE
;
        CMP      EXIT_AP, 1     ;is the application over?
        JNE      W_LOOP         ;No, restart the application

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

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Appendix

C

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	Graphics Controller
3C0-3DF	Graphics Controller
3F6-3F6	Primary IDE Channel
3F7-3F7	Standard floppy disk controller
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-FFFFF	System BIOS
1000000-	Extend BIOS

Table D-2: 1st MB Memory Address Map

D.3 IRQ Mapping Table

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

Table D-3: IRQ Mapping Table

D.4 DMA Channel Assignments

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

Table D-4: IRQ Mapping Table

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Appendix

D

Compatibility

 **NOTE:**

The compatible items described here have been tested by the GAI R&D team and found to be compatible with the 3312610.

E.1 Compatible Operating Systems

The following operating systems have been successfully run on the 3312610.

- Microsoft Windows Vista (32-bit)
- Microsoft Windows Vista (64-bit)
- Microsoft Windows XP with SP2
- Microsoft Windows 2000 with SP4
- Fedora Core 7

E.2 Compatible Memory Modules

 **NOTE:**

The memory modules listed below have been tested on the 3312610 other memory modules that comply with the specifications may also work on the 3312610 but have not been tested.

The following memory modules have been successfully tested on the 3312610.

Manufacturer	Chip Model No.	Capacity	Speed
A-DATA	AD29608A8A-3EG	512 MB	667 MHz
Apacer	AM485708H0JS5D	512 MB	533 MHz
Kingston	HY5PS12821C FP-Y5	512 MB	533 MHz
Kingston	D6408TEBGGL3U	512 MB	667 MHz

Kingston	HY5PS12821B FP-Y5	1 GB	667 MHz
Kingston	D9HNL	2 GB	667MHz
Transcend	E5108AG-5C-E	512 MB	533 MHz
Transcend	A3R12E3GEF652BLC14	512 MB	667 MHz
Transcend	D9HNP	2 GB	800 MHz

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Appendix

E

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

Appendix

F

External AC'97 Audio CODEC

G.1 Introduction

The motherboard comes with an onboard Realtek ALC655 CODEC. The ALC655 is a 16-bit, full-duplex AC'97 Rev. 2.3 compatible six-channel audio CODEC that provides three pairs of stereo outputs with 5-bit volume control, a mono output, and multiple stereo and mono inputs, along with flexible mixing, gain, and mute functions.

G.1.1 Accessing the AC'97 CODEC

The CODEC is accessed through the phone jacks on the baseboard. The phone jacks include:

- LINE IN
- LINE OUT
- MIC IN

G.1.2 Driver Installation

The driver installation has been described in **Section** Error! Reference source not found..

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

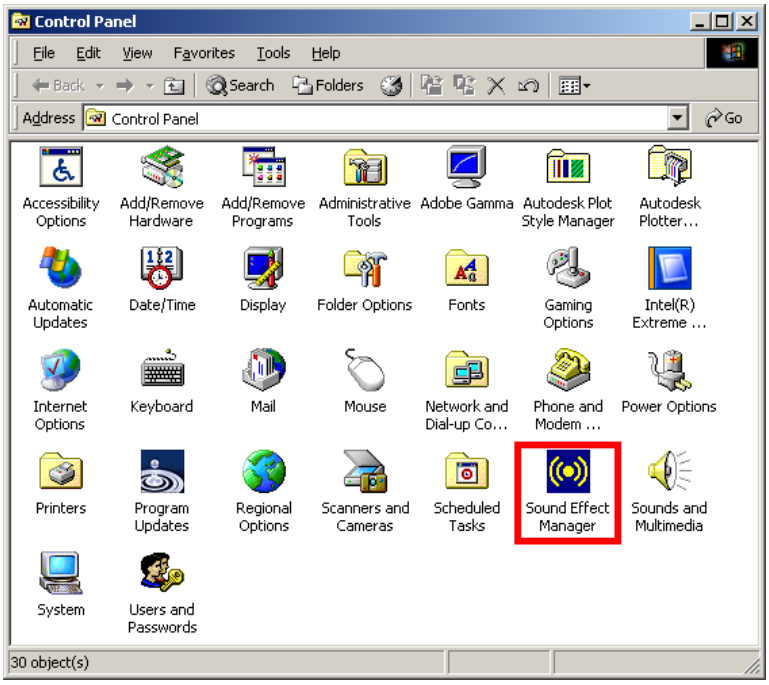

Figure G-1: Control Panel Sound Effect Manager

G.2 Sound Effect Configuration

G.2.1 Accessing the Sound Effects Manager

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

Step 1: Install the ALC655 audio codec driver (see **Section** Error! Reference source not found.).

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

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

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

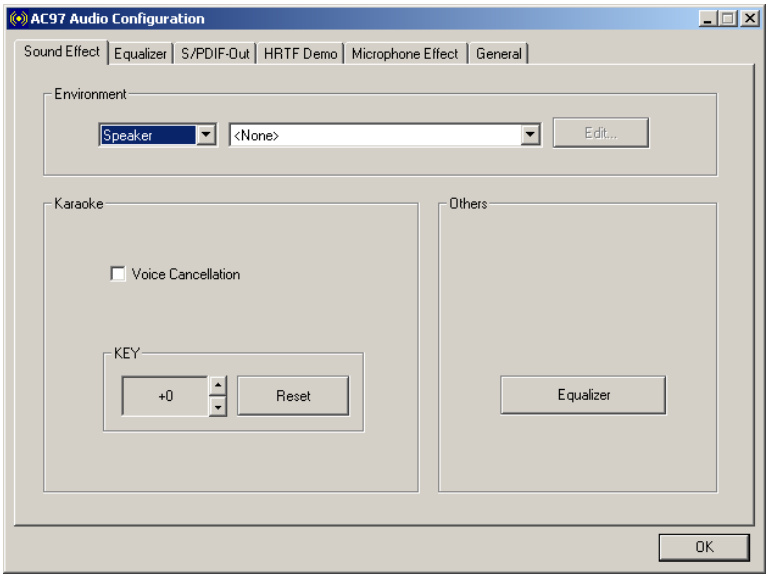

Figure G-3: Sound Effects Manager (ALC655)

NOTE:

The Sound Effect Manager shown in Figure G-3 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.

G.2.2 Sound Effect Manager Configuration Options

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

NOTE:

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

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

NOTE:

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

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

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

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

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

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