integration with integrity

User's Manual

Single Board Computer 3307920

Version 1.0, December 2006

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Glossary

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

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Chapter

1

Introduction

1.1 3307920 CPU Card Overview

The PCISA form factor 3307920 is fully equipped with advanced multi-mode I/Os. The 3307920 is designed for system manufacturers, integrators, and VARs that want performance, reliability, and quality at a reasonable price.

1.1.1 3307920 Models

The 3307920 series has two models:

- 3307920 500 MHz
- 3307920 800 MHz

The specifications for the two models are shown in **Table 1-1**.

3307920	533 MHz	800 MHz
CPU Speed	533MHz	800MHz
128 MB PC133MHz onboard memory	YES	YES
CRT/TFT/LVDS	YES	YES
Dual LAN	YES	YES
Audio	YES	YES
Dual SATA-150	YES	YES

Table 1-1: 3307920 Model Specifications

1.1.2 3307920 Benefits

Some of the 3307920 benefits include:

- High performance, cost-effective, energy efficient
- Flexible display options
- Multiple storage option integration including
  - 40-pin IFM or 3.5” HDD
  - 34-pin floppy disk drive (FDD) support
  - IDE channel CFII socket for embedded OS
  - Dual SATA ports with ALI M5283 RAID 0 and RAID 1 support

1.1.3 3307920 Features

Some of the 3307920 features are listed below:

- Complies with PCISA form factor
- Complies with RoHS
- Contains an embedded VIA Mark CoreFusion™ processor
- Contains onboard 128MB PC133MHz memory
- Supports a 168-pin PC100/133MHz SDRAM DIMM with a maximum capacity of 512MB
- Supports CRT, 24-bit TFT/18-bit LVDS displays
- Supports IDE, dual LAN, five USB 1.1 devices, and two RS-232 serial port connectors
- Supports two SATA channels with transfer rates up to 150Mb/s

1.2 3307920 Overview

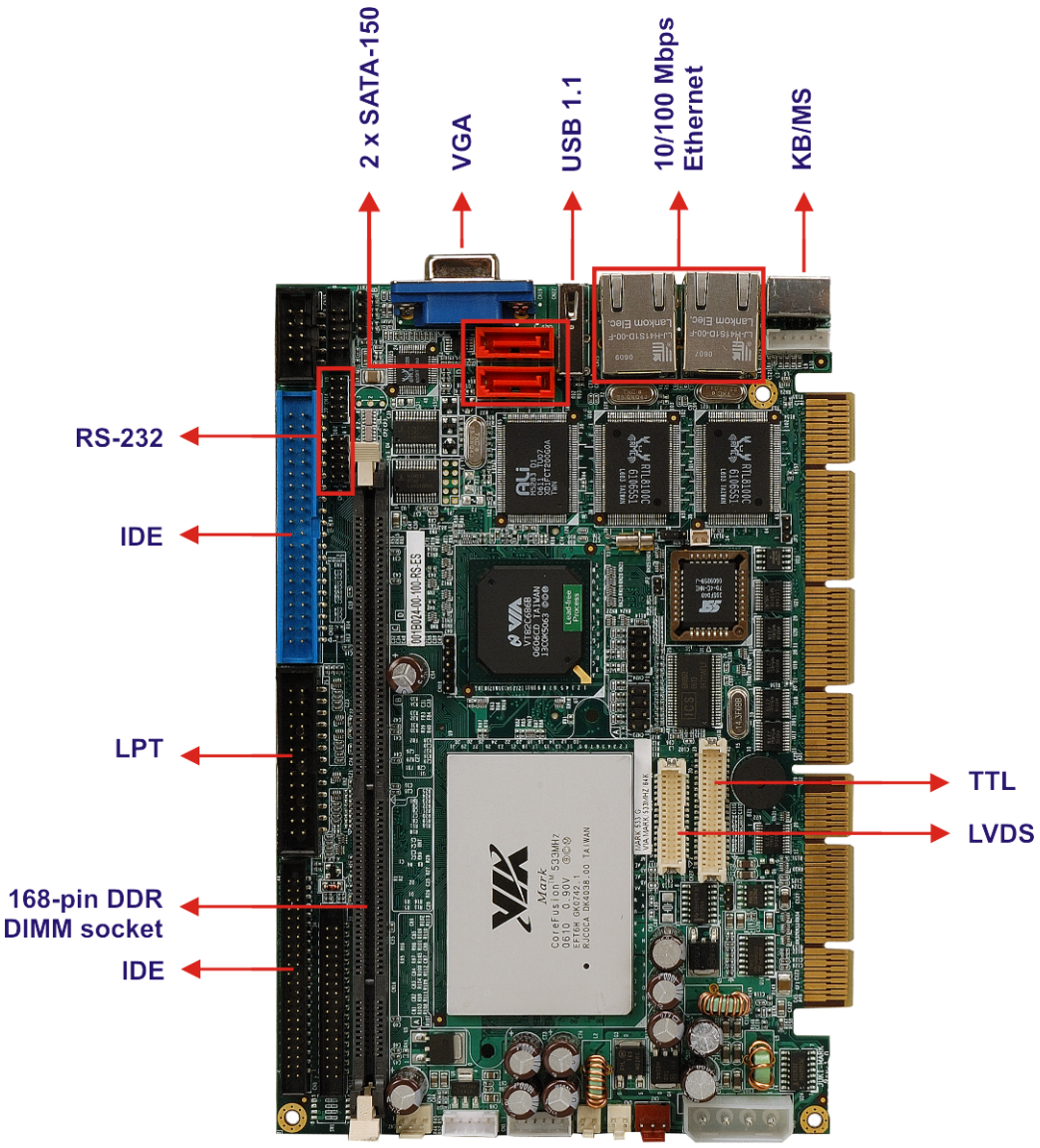

Figure 1-1: 3307920 Overview

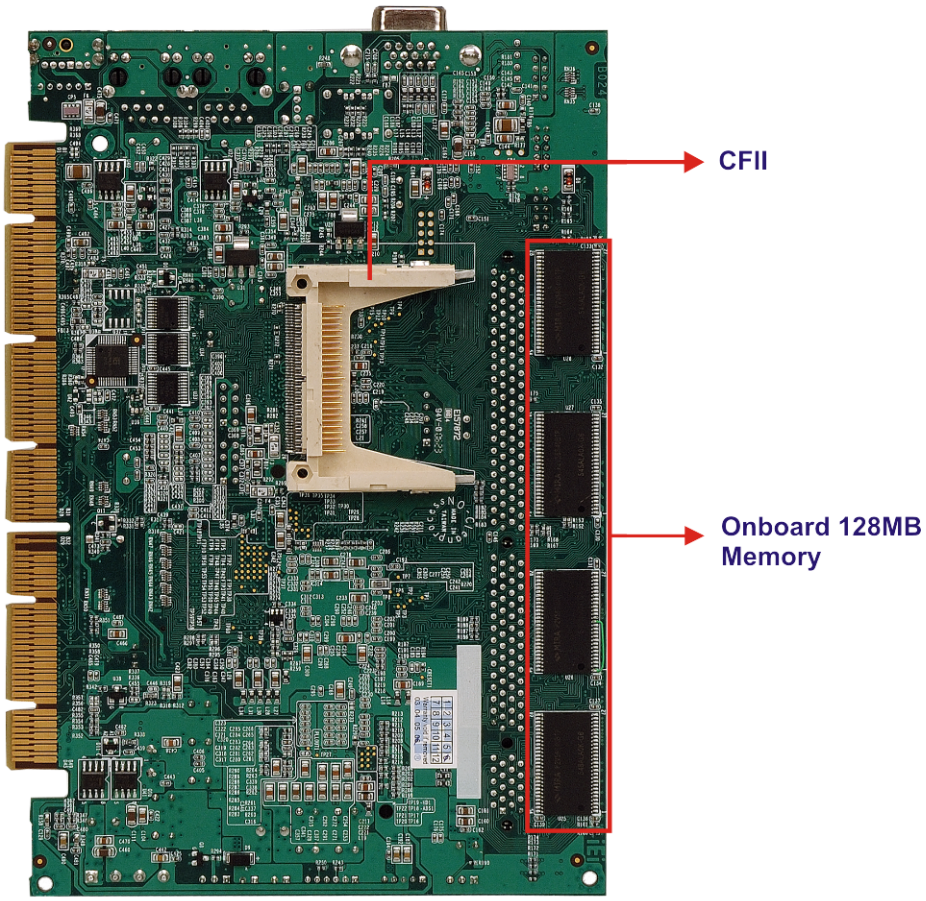

Figure 1-2: 3307920 Overview (Solder Side)

1.2.1 3307920 Connectors

The 3307920 has the following connectors onboard:

- 1 x 4-pin AT/ATX power connector
- 1 x 168-pin DDR DIMM socket
- 1 x Audio CD In connector
- 1 x Audio connector
- 1 x Battery connector
- 1 x Compact Flash® card socket
- 1 x CPU fan connector
- 1 x Digital I/O connector
- 1 x External LED connector
- 1 x Floppy connector
- 2 x IDE interface connectors (1 x 40-pin and 1 x 44-pin)
- 1 x Inverter connector
- 1 x Infrared connector
- 1 x Keyboard / mouse connector
- 1 x LCD LVDS interface connector (dual-channel)
- 1 x LCD TTL interface connector
- 1 x Parallel port connector
- 1 x PS-ON connector
- 1 x Power button switch
- 1 x Reset button switch
- 2 x RS-232 serial port connectors
- 2 x Serial ATA connectors
- 2 x USB 1.1 connectors

The 3307920 has the following external peripheral interface connectors:

- 2 x Ethernet connectors
- 1 x PS/2 keyboard/mouse connector
- 1 x USB 1.1 connector
- 1 x VGA connector

The 3307920 has the following onboard jumpers:

- CF card function setup
- Clear CMOS
- Flat panel power select
- PCI VIO voltage select

The location of these connectors on the CPU card can be seen in **Figure 1-1**. These connectors are fully described in **Chapter 3**.

1.2.2 Technical Specifications

3307920 technical specifications are listed in **Table 1-2**. Detailed descriptions of each specification can be found in **Chapter 2**.

SPECIFICATION	DESCRIPTION
CPUs Supported	VIA MARK 533/800 MHz
FSB	133 MHz
North Bridge Chipset	VIA MARK
South Bridge Chipset	VIA VT82C686B
Memory	128MB PC133/MHz onboard memory One 168-pin PC133/100MHz SDRAM DIMM up to 512 MB Supports 640MB maximum memory
Digital I/O	4 input / 4output by super I/O
Super I/O	VIA VT82C686B
Display	CRT / 24-bit TFT / dual channel 18-bit LVDS integrated in VIA MARK
Power Support	AT/ATX power support

SPECIFICATION	DESCRIPTION
Power Consumption	+5V @ 2.52A (VIA Mark 533MHz / PC133MHz 512MB) +5V @ 2.94A (VIA Mark 800MHz / PC133MHz 512MB) 3D Mark
Watchdog Timer	Software programmable 1~255 sec. system reset
IrDA	One integrated IrDA connector supports either a Serial Infrared (SIR) or an Amplitude Shift Keyed IR (ASKIR) interface
IDE Interface	Two IDE channels support four Ultra ATA 100/66/33 devices
Serial ATA (SATA)	Two SATA channels with 150Mb/s transfer rates Supports RAID 0, 1 with ALI M5283
Floppy Disk Drive (FDD)	Supports one FDD
SSD	Compact Flash® (CF) II
USB Interfaces	Supports four USB 1.1 devices
Serial Ports	Two RS-232 COM ports
Audio Interface	Realtek ALC655 with AC 97 codec
Ethernet	Dual Realtek 10/100 Base-T RTL8100C
BIOS	AWARD
Physical Dimensions	185mm x 127.6mm
Operating Temperature	Minimum: 0ºC (32°F) - Maximum: 60°C (140°F)
Operating Humidity	Minimum: 5% - Maximum: 95% non-condensing
Weight	GW: 1.0Kg

Table 1-2: Technical Specifications

Chapter

2

Detailed Specifications

2.1 Overview

This chapter describes the specifications and onboard features of the 3307920 CPU card in detail.

2.2 Compatible GAI Backplanes

The 3307920 CPU card is compatible with all GAI PCI backplanes. For more information on these backplanes, please visit the GAI website or contact your CPU card reseller or vendor.

2.3 Board Dimensions

The dimensions of the board are listed below:

- **Length**: 185mm
- **Width**: 127.6mm

2.4 CPU Support

The 3307920 has a preinstalled 800MHz or 533MHz, ultra low voltage (ULV) VIA® MARK processor. The VIA Mark CoreFusion™ processor platform offers power efficiency, native x86 performance and advanced hardware based security combined with legacy support. Based on the 'Nehemiah' core and 0.13u process technology, the VIA Mark CoreFusion™ processor platform is scalable to 800MHz with a maximum TDP of just 8 watts facilitating silent, fanless designs.

Some of the VIA MARK features are listed below:

- **Rich Integration:-** Combining the VIA 'Nehemiah' processor core architecture with a feature rich Northbridge in a single package, the VIA Mark CoreFusion™ processor platform has rich x86 integration, offers full legacy support advanced integrated graphics, a military-grade hardware security engine and unparalleled connectivity.
- **S3 Graphics Unichrome Pro Graphics Core:-** Integrating the S3 Graphics ProSavage4 graphics core, the VIA Mark CoreFusion™ processor platform boasts dual independent display support, an integrated LVDS/DVI transmitter, a video capture port and display resolutions of up to 1600 x 1200 pixels.

- **VIA PadLock Security Engine**:- Utilizing the advanced native security feature set of the VIA 'Nehemiah' processor core architecture named the VIA PadLock Security Engine, the VIA Mark CoreFusion™ processor platform offers developers a real-time military-grade security engine that integrates a AES cipher engine and quantum based random number generator to help protect data exchanged and stored.

2.5 VIA VT82C686B System Chipset

The system chipset is the VIA VT82C686B. For more information on the VIA VT82C686B, refer to the VIA website.

2.6 Data Flow

Figure 2-1 shows the data flow between the system chipset, the CPU and other I/O interfaces that can connect to the 3307920 CPU card.

Figure 2-1: Data Flow Block Diagram

2.7 LCD and Flat Panel Display Support

Mark CoreFusion™ processor supports a wide variety of DSTN or TFT panels through a 36-bit CMOS interface. This includes support for VGA, SVGA, XGA, and SXGA+ TFT color panels with 9-bit, 12-bit, 18-bit (both 1 pixel/clock and 2 pixels/clock), and 24-bit CMOS interfaces. Enhanced STN hardware with 256 gray scale support and advanced frame rate control to provide up to 16.7 million colors. In addition, the integrated 2-channel LVDS interface can support 18-bit color panels. All resolutions are supported up to SXGA+ (1400x1050). The integrated ZV-Port allows display of video from an external source.

2.7.1 High Screen Resolution Display Support

Table 2-1 shows the CRT and panel screen resolutions supported by the VIA Mark CoreFusion™ processor.

	SYSTEM MEMORY FRAME BUFFER SIZE	
RESOLUTIONS SUPPORTED	**8 MB**	**16/32 MB**
640x480x8/16/32	✓	✓
800x600x8/16/32	✓	✓
1024x768x8/16/32	✓	✓
1280x1024x8	✓	✓
1280x1024x16	✓	✓
1280x1024x32	✓	✓
1600x1200x8	✓	✓
1600x1200x16	✓	✓

	SYSTEM MEMORY FRAME BUFFER SIZE	
RESOLUTIONS SUPPORTED	**8 MB**	**16/32 MB**
1600x1200x32		✓
1920x1440x8		✓
1920x1440x16		✓

Table 2-1: CRT and Panel Screen Resolutions Supported

2.8 Memory Support

The 3307920 features onboard 128MB PC133MHz memory and a 168-pin SDRAM DIMM socket that supports PC100 / 133MHz memory up to 512MB.

2.9 PCI Bus Interface Support

The PCI bus on the 3307920 has the following features:

- PCI 2.2 compliant, 32-bit 3.3V PCI interface with 5V tolerant inputs
- Supports up to five PCI masters
- PCI to system memory data streaming support
- Delay transaction from PCI master accessing DRAM
- Symmetric arbitration between Host/PCI bus for optimized system performance

2.10 Ethernet

2.10.1 Ethernet Controller Overview

The RTL8100C is enhanced with an ACPI (Advanced Configuration Power Interface) management function for PCI in order to provide efficient power management for advanced operating systems with OSPM (Operating System Directed Power Management). The RTL8100C also supports remote wake-up (including AMD Magic Packet™ and Microsoft® Wake-up frame) to increase cost-efficiency in network maintenance and management.

2.10.2 Ethernet Controller Features

The Realtek RTL8100C Ethernet controller features are listed below.

- 128-pin PQFP/LQFP (PQFP package pin-to-pin compatible with Realtek RTL8110S-32 Single-Chip Gigabit Ethernet Controller)
- Supports PCI/mini-PCI interfaces
- Integrates Fast Ethernet MAC, physical chip, and transceiver onto a single chip
- 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
- 0.25μm CMOS process

2.11 Drive Interfaces

The 3307920 can support the following drive interfaces.

- 2 x SATA drives
- 4 x IDE devices
- 1 x FDD
- 1 x Compact Flash (CF) card

2.11.1 SATA Drives

The 3307920 supports two first generation SATA drives with transfer rates of up to 150Mb/s.

2.11.2 IDE HDD Interfaces

The 3307920 system chipset IDE controller supports up to four HDDs with the following specifications:

- Supports PIO IDE transfers up to 16MB/s
- Supports the following Ultra ATA devices:
  - **Ultra ATA/133**, with data transfer rates up to 133MB/s
  - **Ultra ATA/100**, with data transfer rates up to 100MB/s

2.11.3 Floppy Disk Drive (FDD)

The3307920 supports a single FDD. The following FDD formats are compatible with the board.

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

2.11.4 Compact Flash

Standard CF-II cards can be inserted into the compact flash slot on the solder side of the 3307920 PCB.

2.12 Serial Ports

The 3307920 has two high-speed UART serial ports, configured as CN13 and CN14. Both ports can be configured as RS-232. The serial ports have the following specifications.

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

2.13 Audio Codec

2.13.1 Audio Codec Overview

The 3307920 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.

2.13.2 Audo Codec Features

Some of the features of the REALTEK ALC655 CODEC are listed below.

- Meets performance requirements for audio on PC99/2001 systems
- Meets Microsoft WHQL/WLP 2.0 audio requirements
- 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
- High-quality differential CD input
- Two analog line-level mono inputs: PCBEEP, PHONE-IN
- Two software selectable MIC inputs
- Dedicated Front-MIC input for front panel applications (software selectable)
- Boost preamplifier for MIC input

- LINE input shared with surround output; MIC input shared with Center and LFE output
- Built-in 50mW/20ohm amplifier for both Front-out and Surround-Out
- External Amplifier Power Down (EAPD) capability
- Power management and enhanced power saving features
- Supports Power-Off CD function
- Adjustable VREFOUT control
- Supports 48KHz S/PDIF output, complying with AC'97 Rev 2.3 specifications
- Supports 32K/44.1K/48KHz S/PDIF input
- Power support: Digital: 3.3V; Analog: 3.3V/5V
- Standard 48-pin LQFP package
- EAX™ 1.0 & 2.0 compatible
- Direct Sound 3D™ compatible
- A3D™ compatible
- I3DL2 compatible
- HRTF 3D positional audio
- 10-band software equalizer
- Voice cancellation and key shifting in Karaoke mode
- AVRack® Media Player
- Configuration Panel for improved user convenience

2.14 Real Time Clock

256-byte battery backed CMOS RAM

2.15 System Monitoring

The 3307920 CPU card is capable of self-monitoring various aspects of its operating status including:

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

2.16 BIOS

The 3307920 uses a licensed copy of Phoenix Award BIOS. The features of the flash BIOS used are listed below:

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

2.17 Infrared Data Association (IrDA) Interface

The 3307920 IrDA supports the following interfaces:

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

2.18 USB Interfaces

The 3307920 has one external USB interface and two internal USB connectors. The board supports a total of five USB devices. The USB interfaces support USB 1.1.

2.19 Operating Temperature and Temperature Control

The maximum and minimum operating temperatures for the 3307920 CPU card are listed below.

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

A cooling heat sink is installed on the CPU. Thermal paste is smeared on the lower side of the heat sink before it is mounted on the CPU.

2.20 Power Consumption

Table 2-2 shows the power consumption parameters for the 3307920 for the VIA Mark 800MHz when 512MB of PC133MHz SDRAM is installed in the system.

Voltage	Current
+5V	2.52A

Table 2-2: Power Consumption for VIA Mark 800 MHz

Table 2-2 shows the power consumption parameters for the 3307920 for the VIA Mark 533MHz when 512MB of PC133MHz SDRAM is installed in the system.

Voltage	Current
+5V	2.94A

Table 2-3: Power Consumption for VIA Mark 533 MHz

2.21 Packaged Contents and Optional Accessory Items

2.21.1 Package Contents

When you unpack the 3307920 CPU card, you should find the following components.

- 1 x 3307920 single board computer
- 1 x ATA66/100 HDD cable
- 2 x SATA cable
- 1 x SATA Power cable
- 1 x KB/MS Y cable
- 1 x RS232 cable
- 1 x Audio cable
- 1 x Mini jumper pack
- 1 x Utility CD
- 1 x QIG (quick installation guide)

2.21.2 Optional Accessory Items

The following are optional accessory items purchased separately.

- FDD cable
- LPT cable

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Chapter

3

Connectors and Jumpers

3.1 Peripheral Interface Connectors

Section 3.1.1 shows peripheral interface connector locations. **Section 3.1.2** lists all the peripheral interface connectors seen in **Section 3.1.1**.

3.1.1 3307920 Layout

Figure 3-1 shows the on-board peripheral connectors and on-board jumpers.

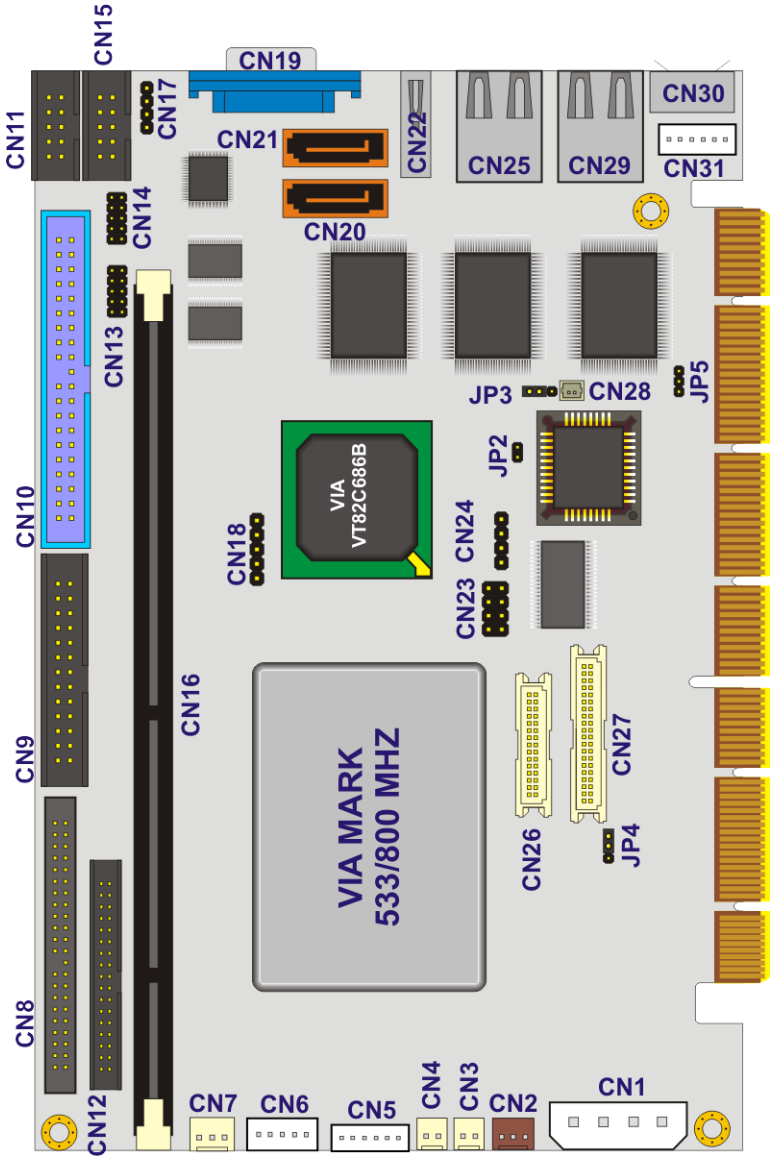


Figure 3-1: Connector and Jumper Locations

3.1.2 Peripheral Interface Connectors

Table 3-1 shows a list of the peripheral interface connectors on the 3307920. Detailed descriptions of these connectors can be found in **Section 3.2.**

Connector	Type	Label
Audio CD In connector	4-pin header	CN17
Audio connector (Line out, Line in & MIC in)	10-pin box header	CN15
Battery connector	2-pin wafer connector	CN28
Compact Flash connector (solder side)	50-pin header	CN32
CPU Fan connector	3-pin wafer connector	CN7
Digital I/O connector	10-pin box header	CN11
DIMM socket	168-pin DIMM socket	CN16
External LED connector	6-pin wafer connector	CN5
Floppy connector	34-pin box header	CN12
Inverter connector	5-pin wafer connector	CN6
IrDA connector	5-pin header	CN18
Keyboard/Mouse connector	6-pin wafer connector	CN31
LVDS LCD connector	30-pin crimp connector	CN26
Parallel Port connector	26-pin box header	CN9
Power button switch	2-pin wafer connector	CN3
Power connector	4-pin wafer connector	CN1
Primary IDE connector	40-pin box header	CN10
PS-ON connector	3-pin wafer connector	CN2
Reset button switch	2-pin wafer connector	CN4

Connector	Type	Label
RS-232 COM1 serial port connector	10-pin header	CN13
RS-232 COM2 serial port connector	10-pin header	CN14
Secondary IDE connector	44-pin box header	CN8
Serial ATA connector	7-pin SATA connector	CN20
Serial ATA connector	7-pin SATA connector	CN21
TFT LCD connector	40-pin crimp connector	CN27
USB 1.1 connector	8-pin header	CN23
USB 1.1 connector	4-pin header	CN24

Table 3-1: Peripheral Interface Connectors

3.1.3 External Peripheral Interface Connectors

Table 3-2 lists the external peripheral interface connectors on the 3307920. Detailed descriptions of these connectors can be found in **Section 3.3.**

Connector	Type	Label
Ethernet connector	RJ-45 connector	CN25
Ethernet connector	RJ-45 connector	CN29
Keyboard/mouse connector	MINI-DIN connector	CN30
USB connector	USB 2.0 connector	CN22
VGA connector	HD-D-sub 15 female connector	CN19

Table 3-2: External Peripheral Interface Connectors

3.1.4 On-board Jumpers

Table 3-3 lists the on-board jumpers. Detailed descriptions of these jumpers can be found in **Section 4.6**.

Description	Label	Type
CF card function setup	JP2	2-pin header
Clear CMOS	JP3	3-pin header
Flat panel power select	JP4	3-pin header
PCI VIO voltage select	JP5	3-pin header

Table 3-3: On-board Jumpers

3.2 Internal Peripheral Connectors

Internal peripheral connectors are found on the CPU card and are only accessible when the CPU card is outside of the chassis. This section has complete descriptions of all the internal peripheral connectors on the 3307920.

3.2.1 Audio CD In Connector

CN Label: **CN17**

CN Type: 4-pin header

CN Location: See **Figure 3-2**

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

The AC'97 codec supports several audio functions. The audio CD in connector facilitates "CD in" audio connections.

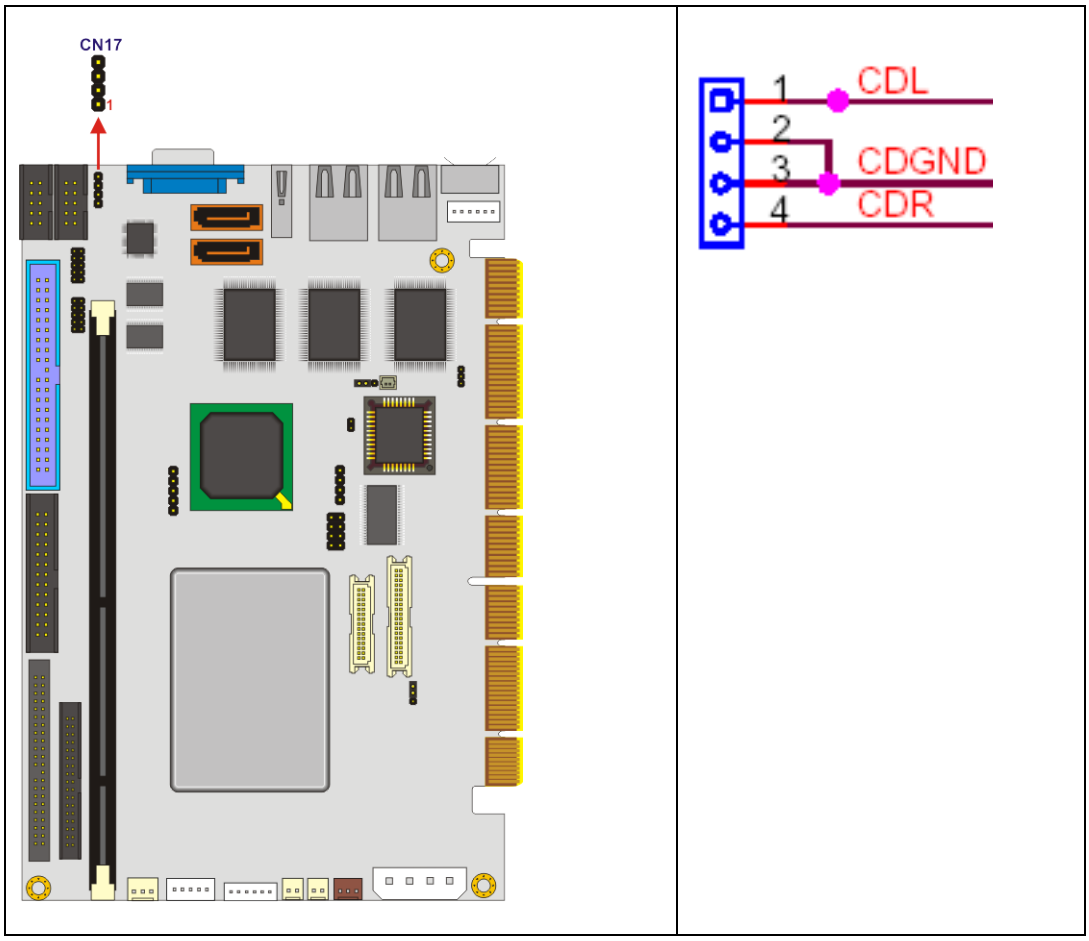


Figure 3-2: Audio CD In Connector Location

PIN NO.	DESCRIPTION
1	CD SIGNAL (Left)
2	GROUND
3	GROUND
4	CD SIGNAL (Right)

Table 3-4: Audio CD In Connector Pinouts

3.2.2 Audio Connector (Line out, Line in & MIC in)

CN Label: **CN15**

CN Type: 10-pin box header

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

CN Pinouts: See **Table 3-5**

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

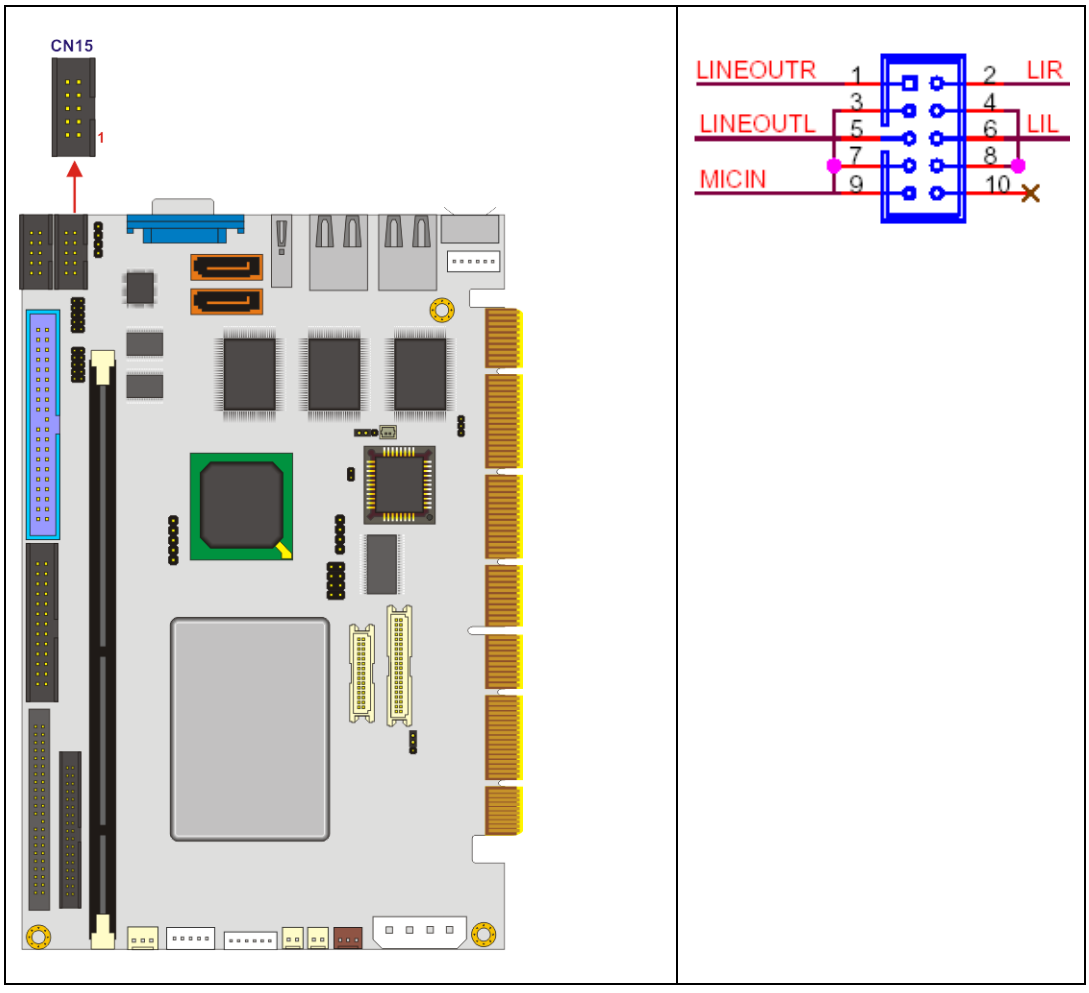


Figure 3-3: Audio Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	Line Out (Right)	2	Line In (Right)
3	GROUND	4	GROUND
5	Line Out (Left)	6	Line In (Left)
7	GROUND	8	GROUND
9	MIC In	10	NC

Table 3-5: Audio Connector Pinouts

3.2.3 Battery Connector

CN Label: **CN28**

CN Type: 2-pin wafer connector

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

CN Pinouts: See **Table 3-6**

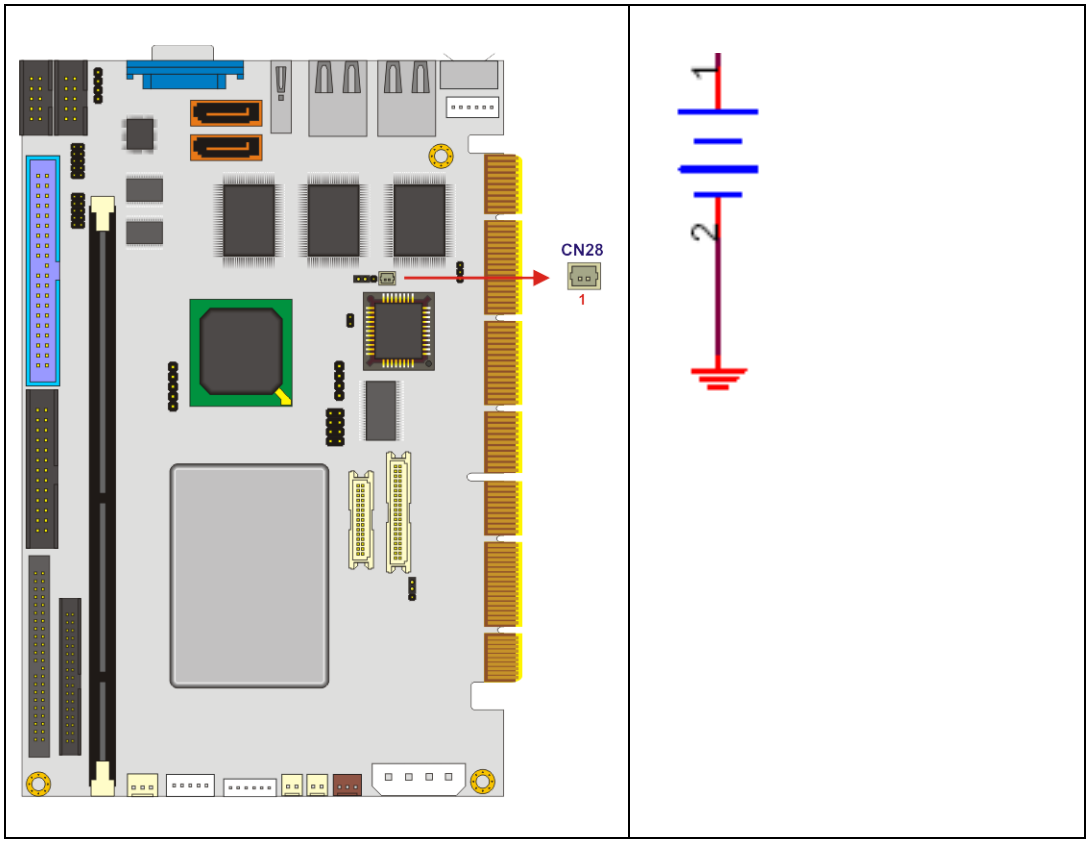


Figure 3-4: Battery Connector Location

PIN NO.	DESCRIPTION
1	Battery+
2	Battery-

Table 3-6: Battery Connector Pinouts

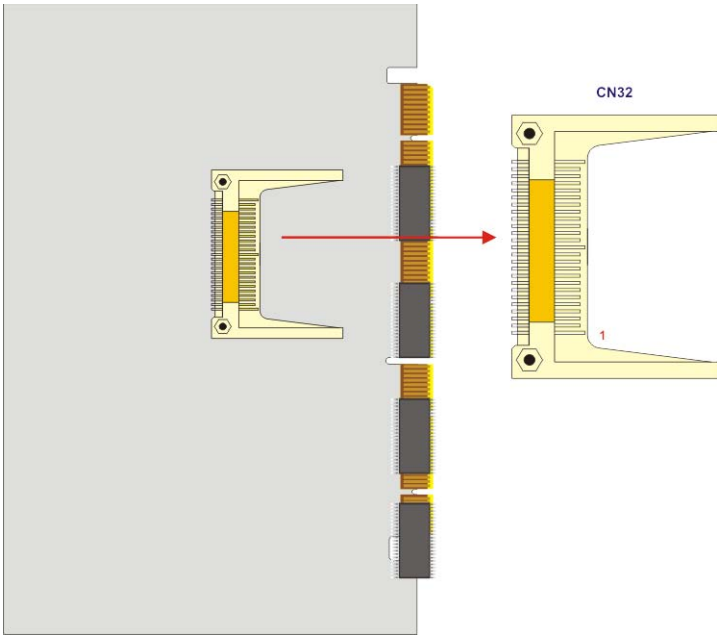
3.2.4 Compact Flash® Connector

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

CN Type: 50-pin header

CN Location: See **Figure 3-5**

CN Pinouts: See **Table 3-7**



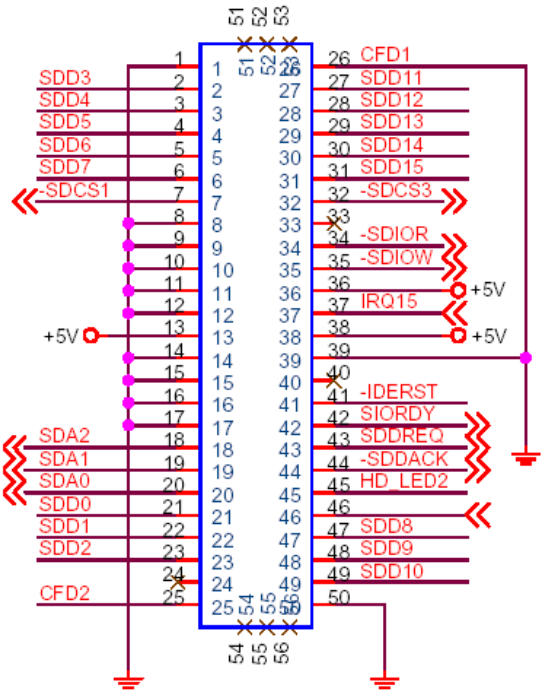


Figure 3-5: Compact Flash® Connector Location

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

Table 3-7: Compact Flash® Connector Pinouts

3.2.5 CPU Fan Connector

CN Label: **CN7**

CN Type: 3-pin wafer

CN Location: See **Figure 3-6**

CN Pinouts: See **Table 3-8**

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

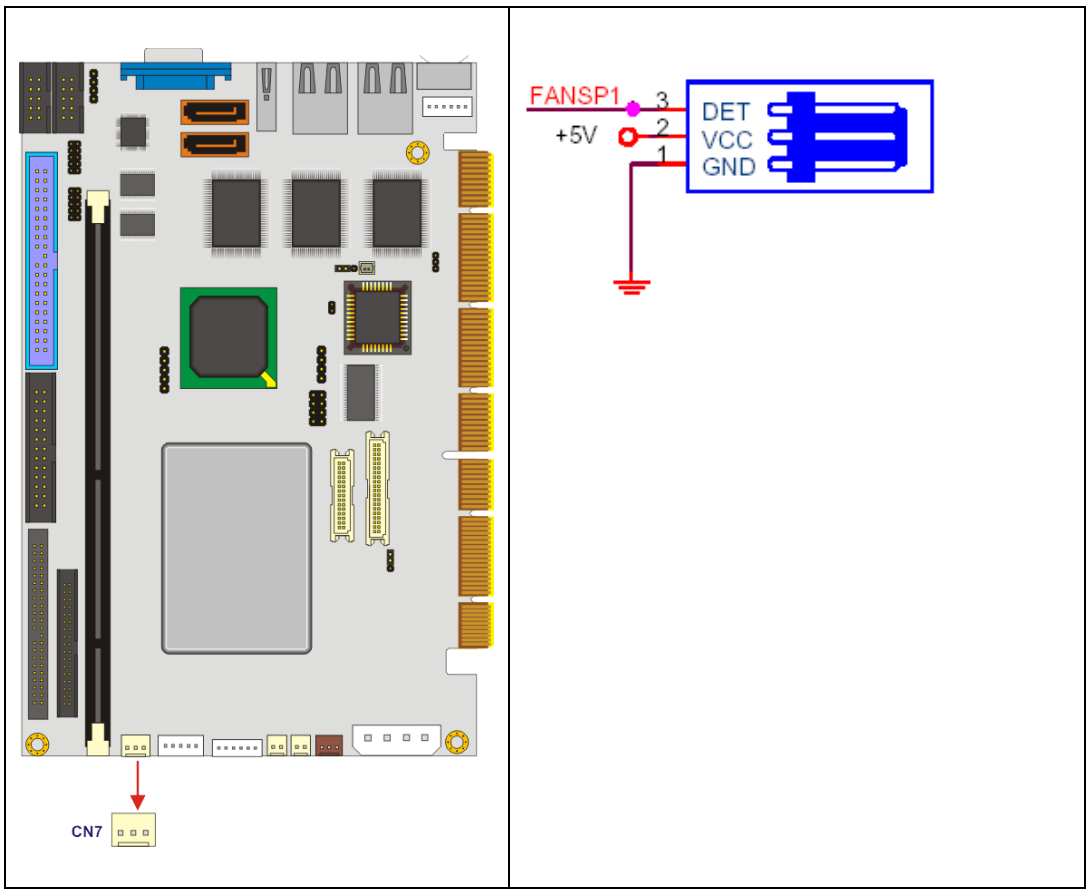


Figure 3-6: CPU Fan Connector Location

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

Table 3-8: CPU Fan Connector Pinouts

3.2.6 Digital Input/Output (DIO) Connector

CN Label: CN11

CN Type: 10-pin header

CN Location: See **Figure 3-7**

CN Pinouts: See **Table 3-9**

The digital IO port of 3307920 is 5V CMOS level. Internal pull-up exists on the output.

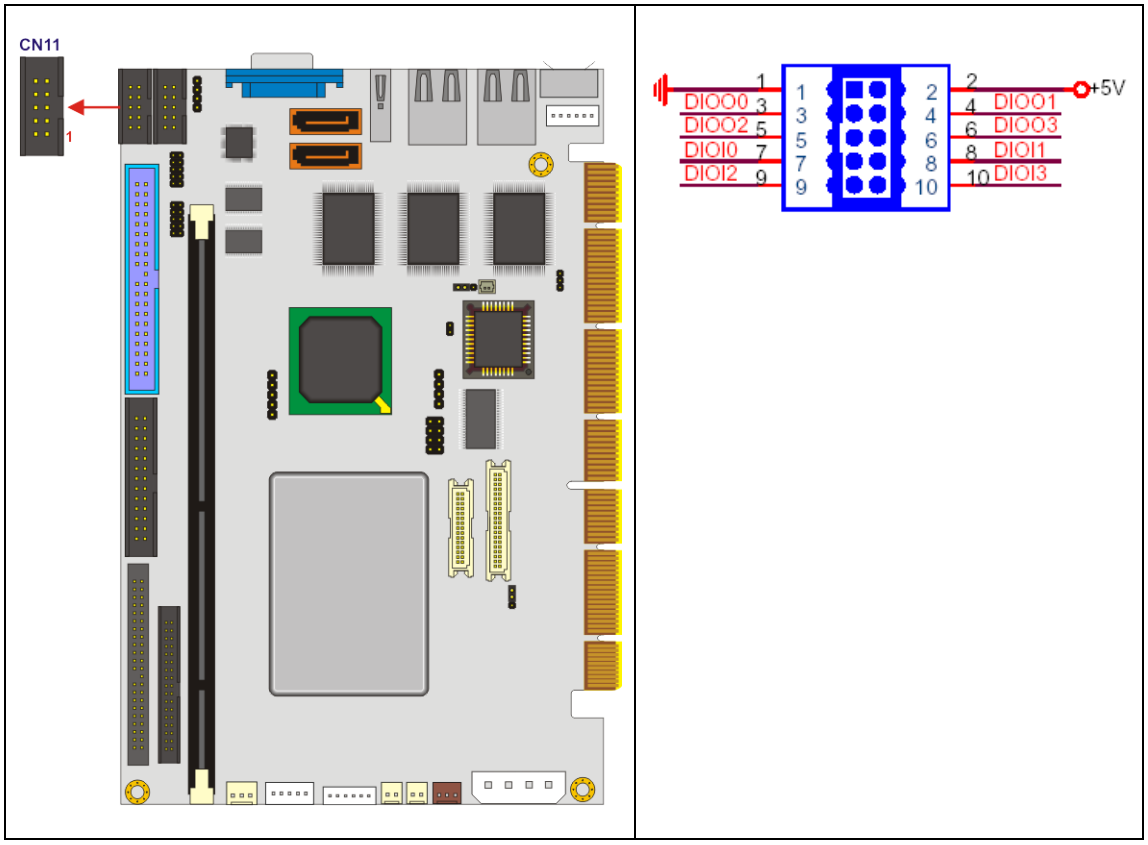


Figure 3-7: Digital I/O Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GROUND	2	+5V
3	OUTPUT 0	4	OUTPUT 1
5	OUTPUT 2	6	OUTPUT 3
7	INPUT 0	8	INPUT 1
9	INPUT 2	10	INPUT 3

Table 3-9: Digital I/O Connector Pinouts

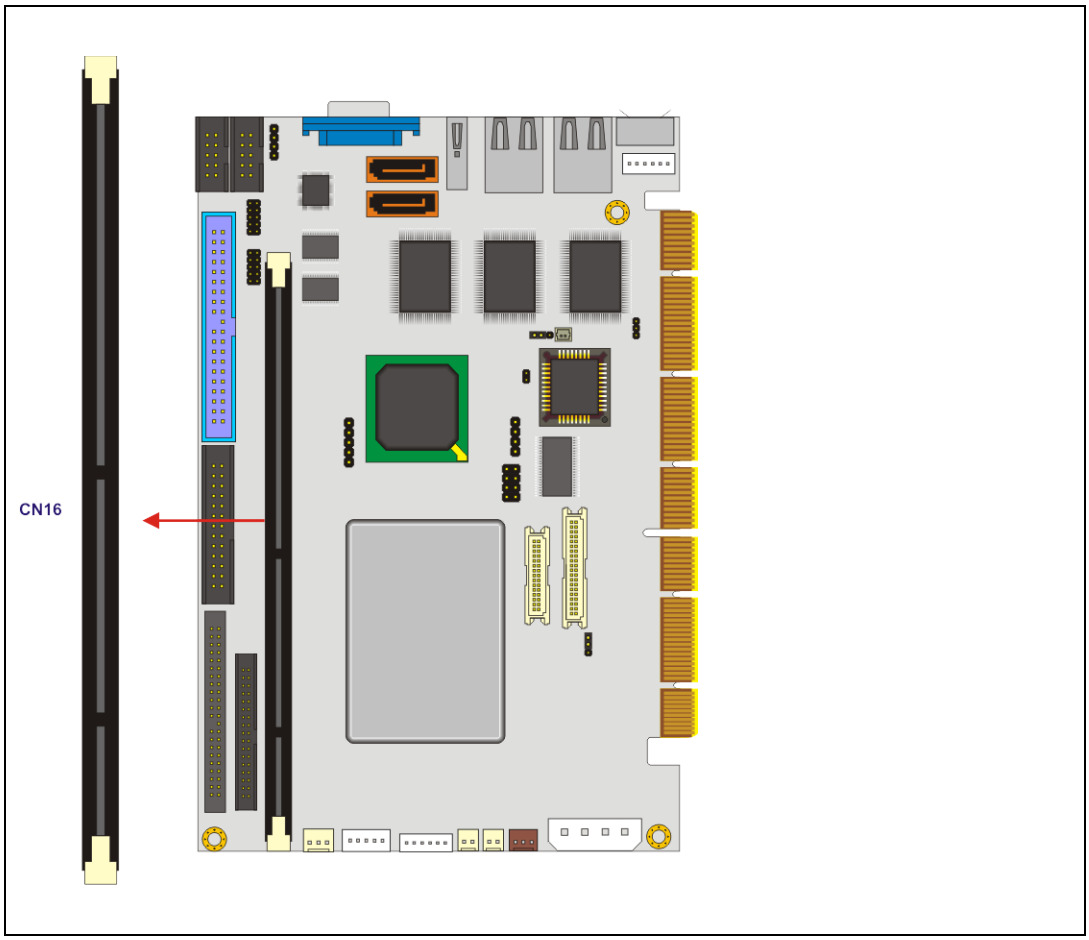
3.2.7 DIMM socket

CN Label: **CN16**

CN Type: 168-pin DIMM socket

CN Location: See **Figure 3-8**

3307920 has a 168-pin DIMM socket that supports 3.3V non-buffered PC100/133MHz SDRAM up to 512MB.



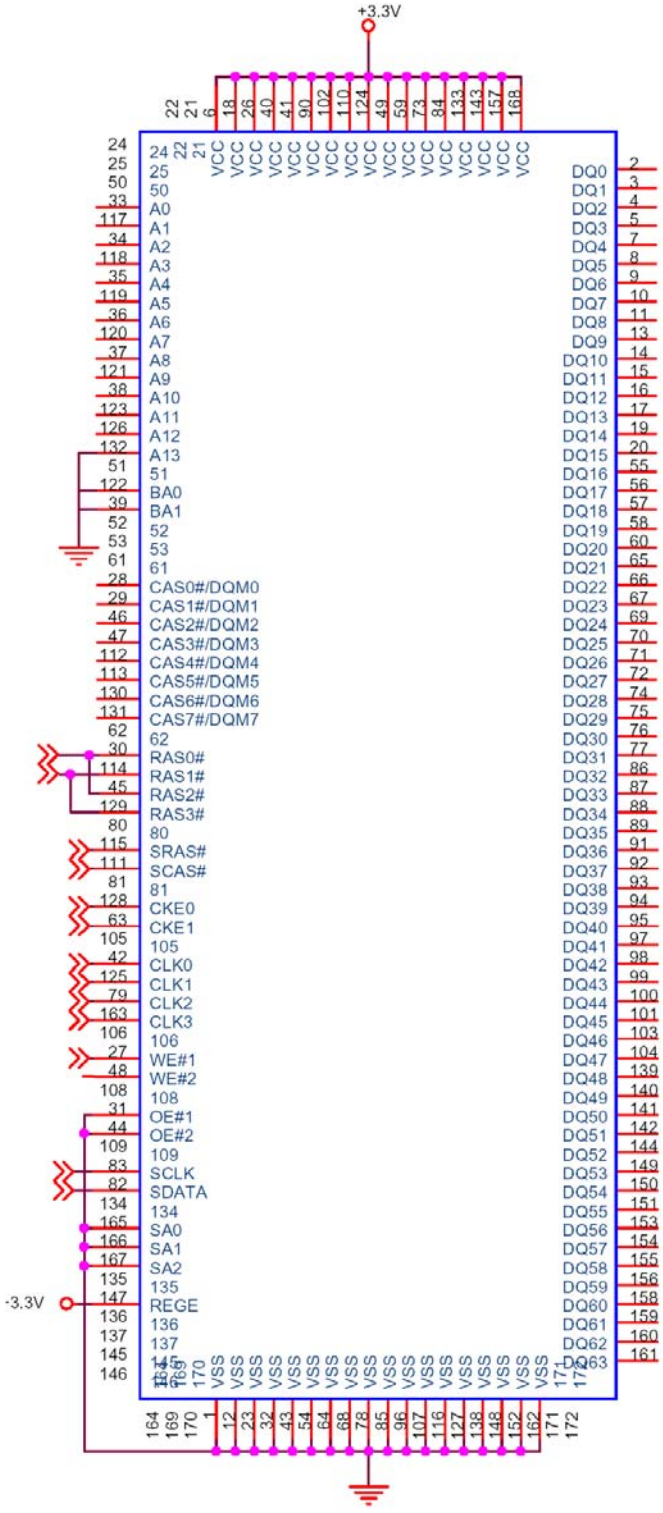


Figure 3-8: DIMM Socket Location

3.2.8 External LED Connector

CN Label: **CN5**

CN Type: 6-pin wafer connector

CN Location: See **Figure 3-9**

CN Pinouts: See **Table 3-10**

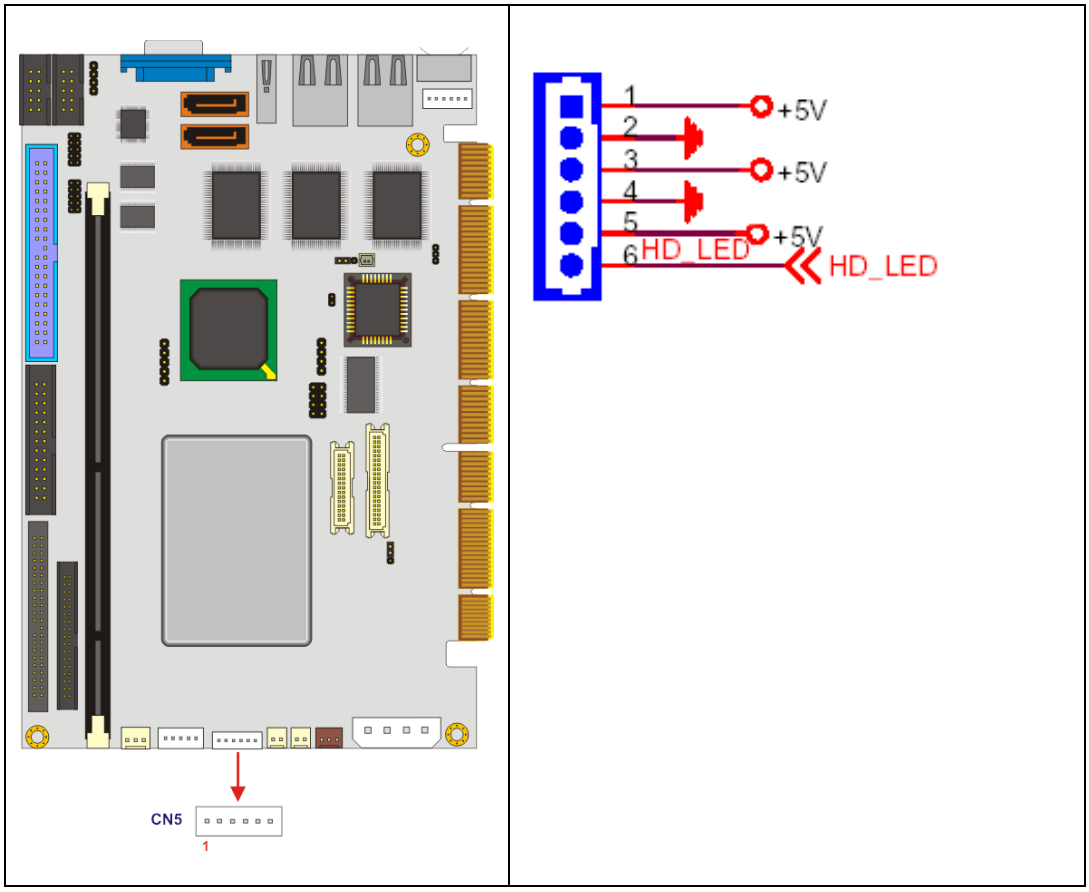


Figure 3-9: External LED Connector Location

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

Table 3-10: External LED Connector Pinouts

3.2.9 Floppy Disk Connector

CN Label: **CN12**

CN Type: 34-pin box header

CN Location: See **Figure 3-10**

CN Pinouts: See **Table 3-11**

The floppy disk connector connects to a floppy disk drive.

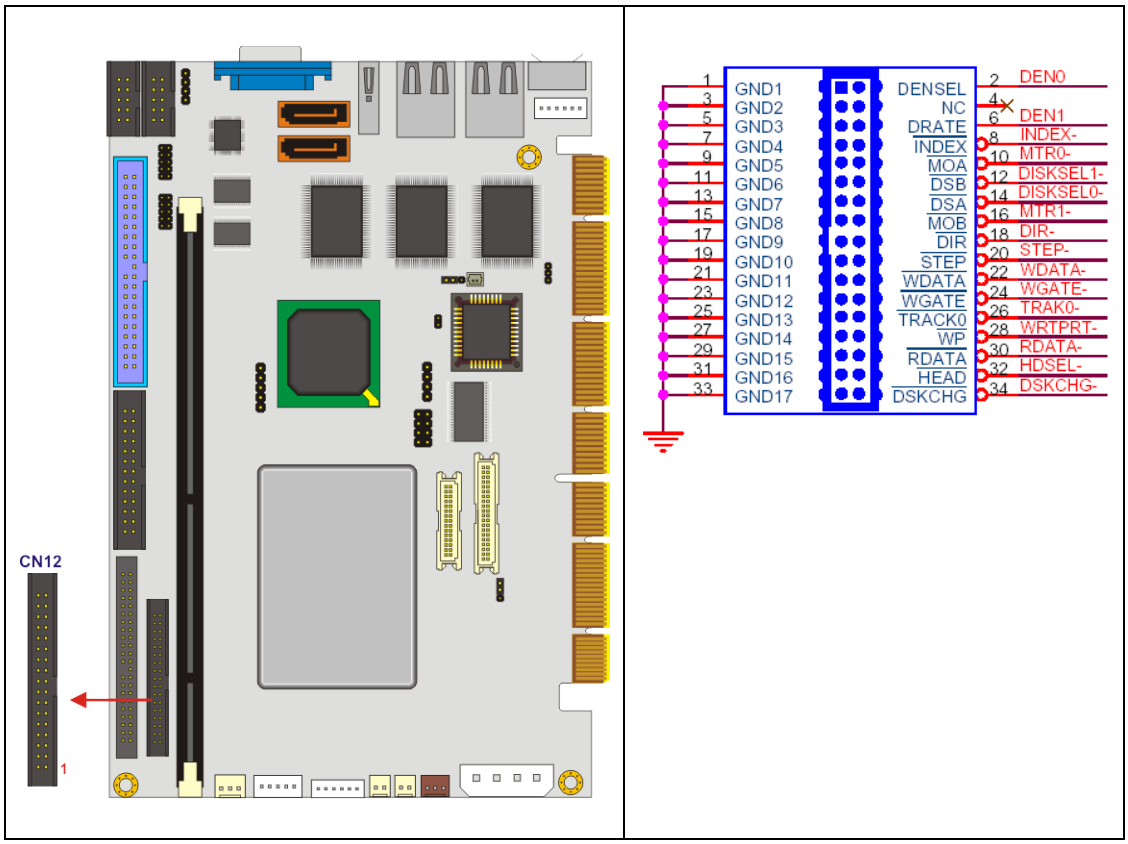


Figure 3-10: 34-pin FDD Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GROUND	2	DEN0
3	GROUND	4	N/C
5	GROUND	6	DEN1
7	GROUND	8	INDEX-
9	GROUND	10	MTR0-
11	GROUND	12	DISKSEL1-
13	GROUND	14	DISKSEL0-
15	GROUND	16	MTR1-
17	GROUND	18	DIR-
19	GROUND	20	STEP-
21	GROUND	22	WDATA-
23	GROUND	24	WGATE-
25	GROUND	26	TRAK0-

27	GROUND	28	WRTPRT-
29	GROUND	30	RDATA-
31	GROUND	32	HDSEL-
33	GROUND	34	DSKCHG-

Table 3-11: 34-pin FDD Connector Pinouts

3.2.10 IDE Connector (Primary)

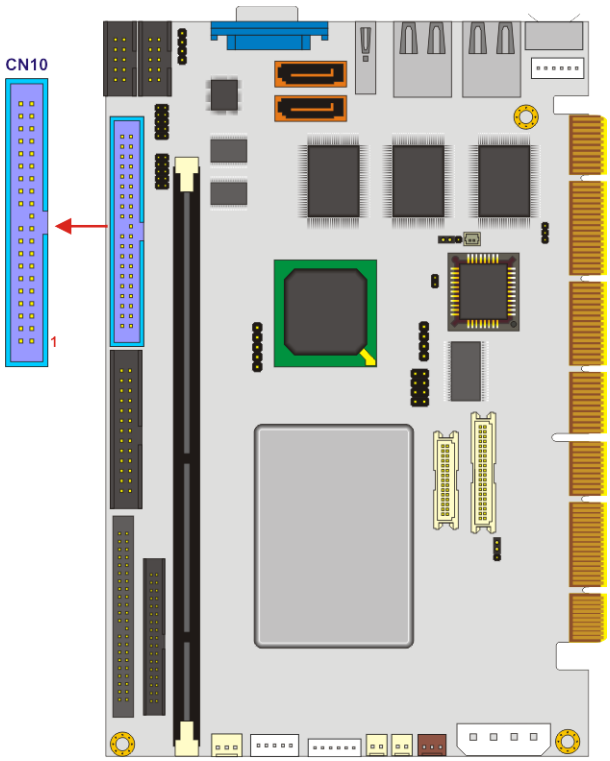
CN Label: **CN10**

CN Type: 40-pin box header

CN Location: See **Figure 3-11**

CN Pinouts: See **Table 3-12**

One 40-pin primary IDE device connector on the 3307920 CPU card supports connectivity to Ultra ATA/133 IDE devices with data transfer rates up to 133MB/s.



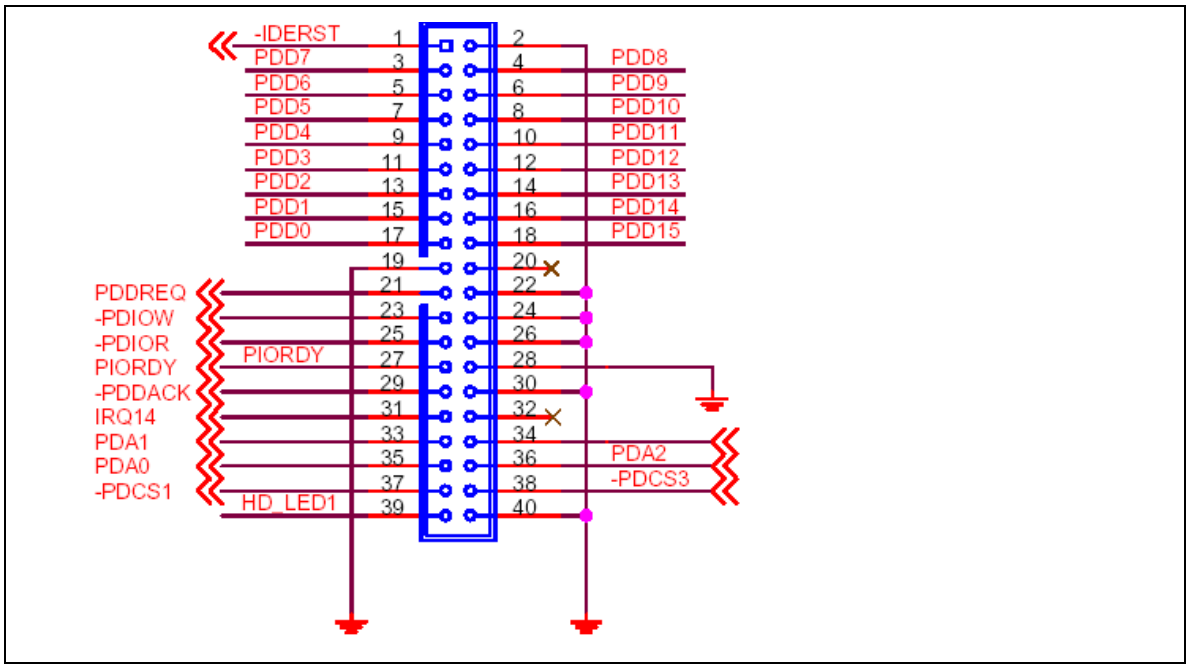


Figure 3-11: Primary IDE Device Connector Location

PIN	DESCRIPTION	PIN	DESCRIPTION
1	-IDERST	2	GROUND
3	PDD7	4	PDD8
5	PDD6	6	PDD9
7	PDD5	8	PDD10
9	PDD4	10	PDD11
11	PDD3	12	PDD12
13	PDD2	14	PDD13
15	PDD1	16	PDD14
17	PDD0	18	PDD15
19	GROUND	20	N/C
21	PDDREQ	22	GROUND
23	-PDIOW	24	GROUND
25	-PDIOR	26	GROUND
27	PIORDY	28	(PULL LOW TO GND)
29	-PDDACK	30	GROUND
31	IRQ14	32	N/C
33	PDA1	34	PD33_-36

35	PDA0	36	PDA2
37	-PDCS1	38	-PDCS3
39	HD_LED1	40	GROUND

Table 3-12: Primary IDE Connector Pinouts

3.2.11 IDE Connector (Secondary)

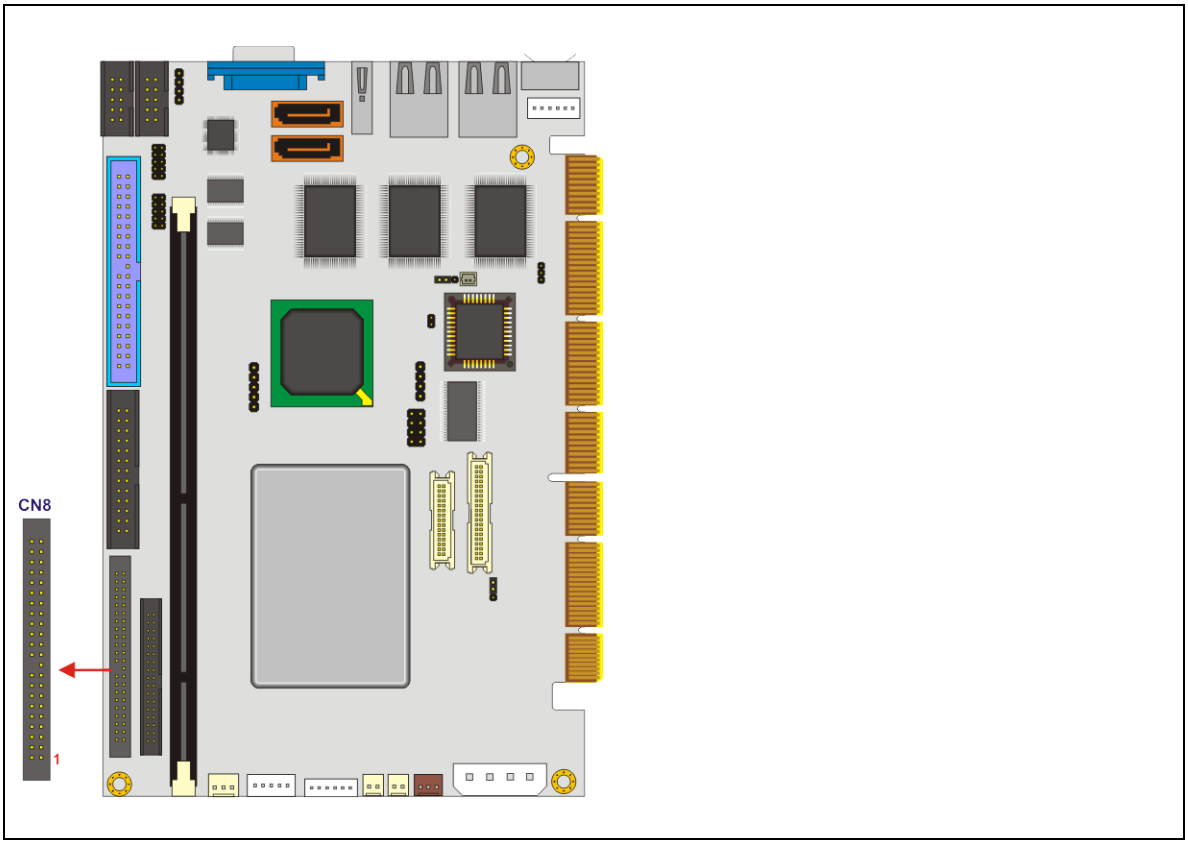
CN Label: **CN8**

CN Type: 44-pin box header

CN Location: See **Figure 3-12**

CN Pinouts: See **Table 3-13**

One 44-pin secondary IDE device connector on the 3307920 CPU card supports connectivity to Ultra ATA/133 IDE devices with data transfer rates up to 133MB/s.



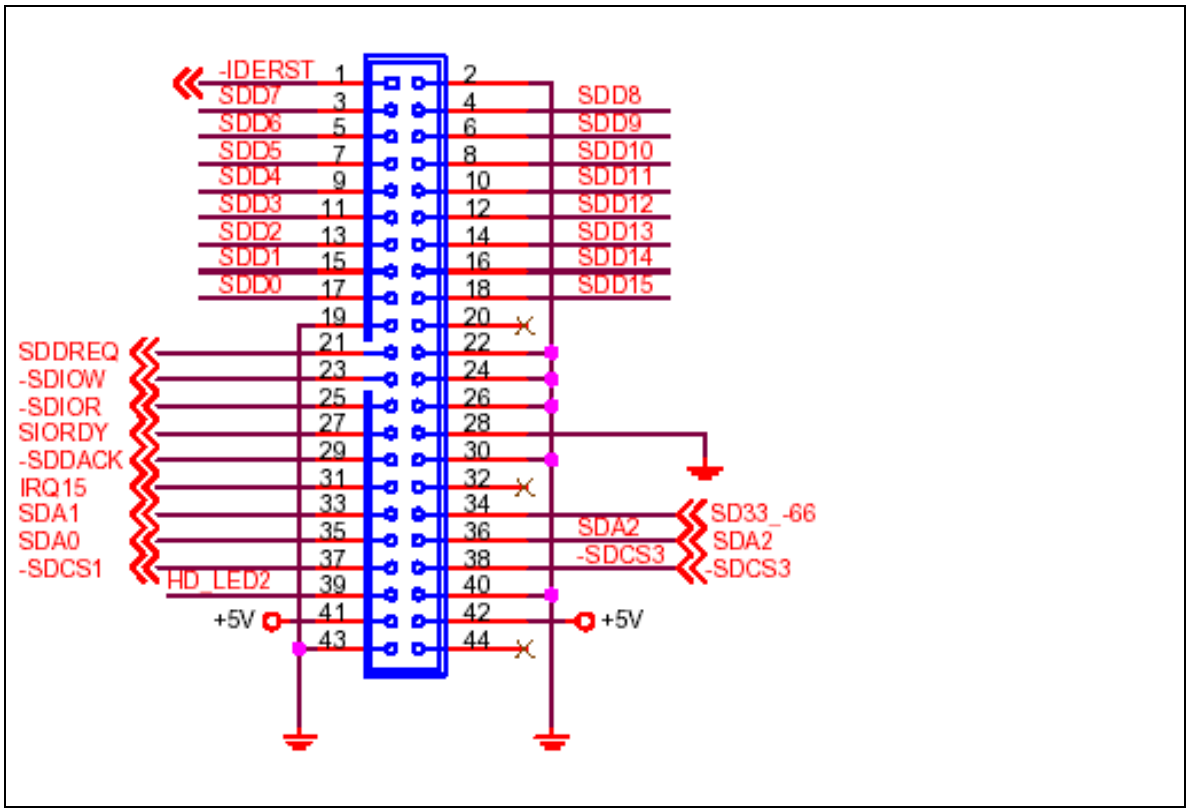


Figure 3-12: Secondary IDE Device Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	RESET#	2	GROUND
3	DATA 7	4	DATA 8
5	DATA 6	6	DATA 9
7	DATA 5	8	DATA 10
9	DATA 4	10	DATA 11
11	DATA 3	12	DATA 12
13	DATA 2	14	DATA 13
15	DATA 1	16	DATA 14
17	DATA 0	18	DATA 15
19	GROUND	20	N/C
21	DRQ	22	GROUND
23	IOW#	24	GROUND
25	IOR#	26	GROUND
27	CHRDY	28	(PULL LOW TO GND)

29	DACK#	30	GROUND
31	INTERRUPT	32	N/C
33	SA1	34	N/C
35	SA0	36	SA2
37	HDC CS1#	38	HDC CS3#
39	HDD ACTIVE#	40	GROUND
41	+5V	42	+5V
43	GROUND	44	N/C

Table 3-13: Secondary IDE Connector Pinouts

3.2.12 Inverter Connector

CN Label: **CN6**

CN Type: 5-pin wafer connector

CN Location: See **Figure 3-13**

CN Pinouts: See **Table 3-14**

The inverter connector is connected to the LCD backlight.

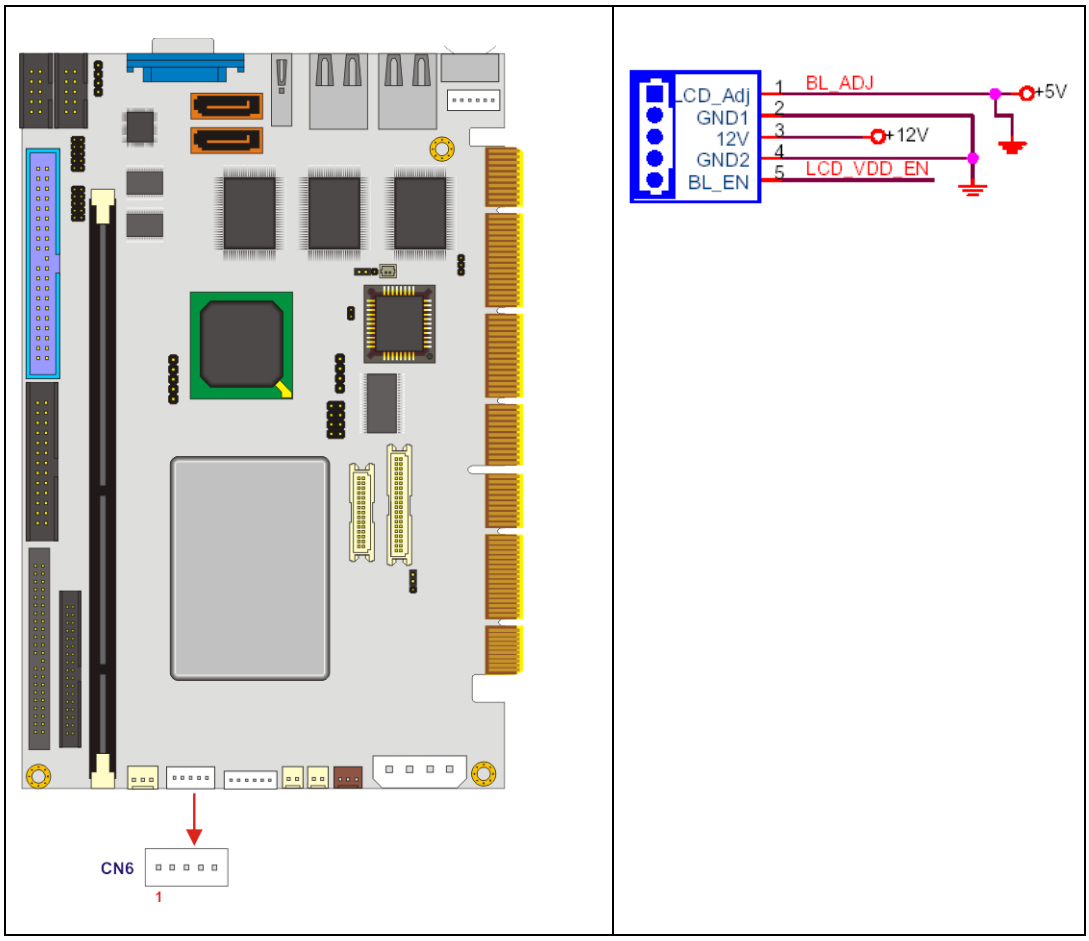


Figure 3-13: Inverter Connector Location

PIN NO.	DESCRIPTION
1	Ground
2	Ground
3	+12V
4	Ground
5	LCD Enable

Table 3-14: Inverter Connector Pinouts

3.2.13 IrDA Interface Connector

CN Label: CN18

CN Type: 5-pin header

CN Location: See **Figure 3-14**

CN Pinouts: See **Table 3-15**

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

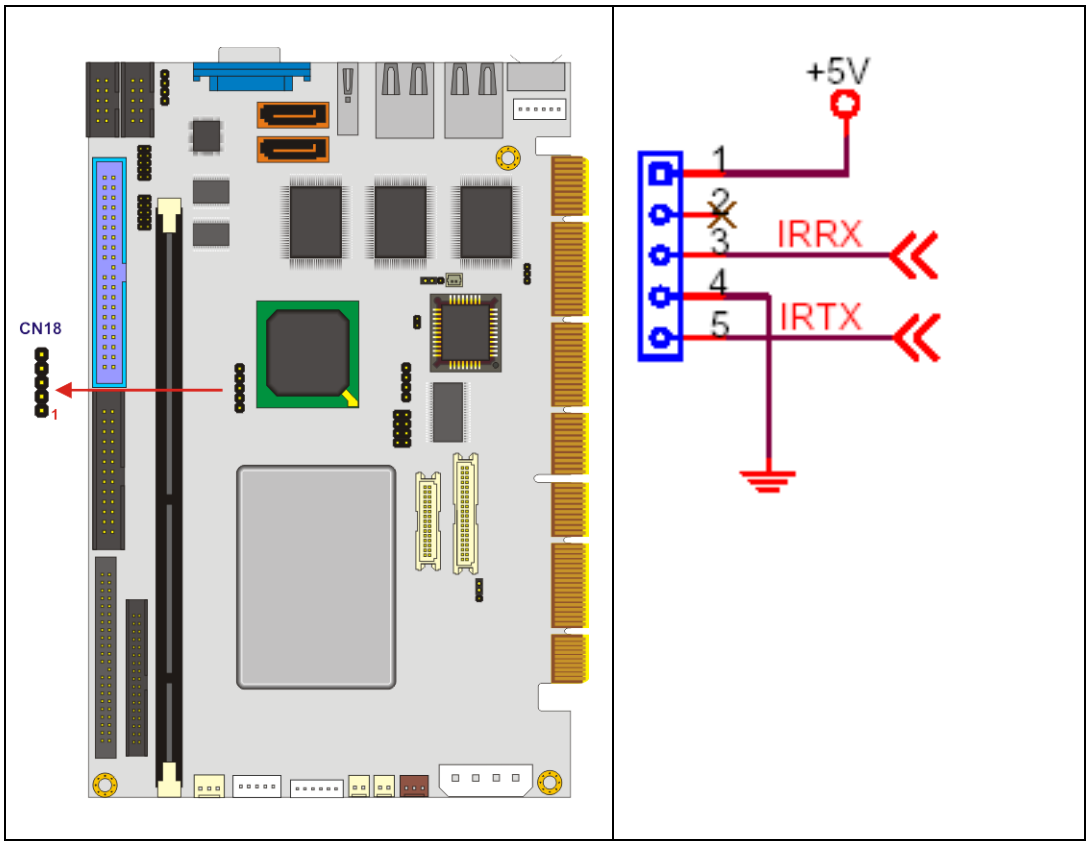


Figure 3-14: IrDA Connector Location

PIN NO.	DESCRIPTION
1	VCC
2	N/C
3	IR-RX
4	Ground
5	IR-TX

Table 3-15: IrDA Connector Pinouts

3.2.14 Keyboard/Mouse Connector

CN Label: **CN31**

CN Type: 6-pin wafer connector

CN Location: See **Figure 3-15**

CN Pinouts: See **Table 3-17**

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

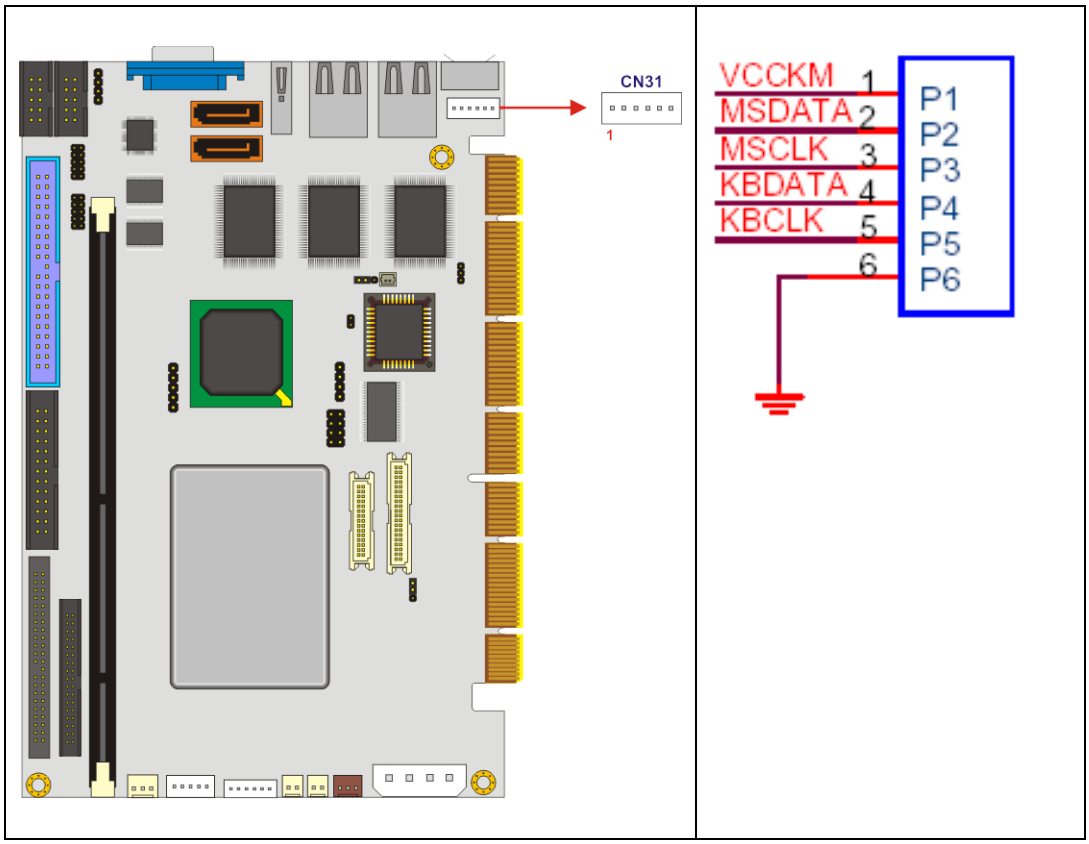


Figure 3-15: Keyboard/Mouse Connector Location

PIN NO.	DESCRIPTION
1	+5V
2	MOUSE DATA
3	MOUSE CLOCK
4	KEYBOARD DATA
5	KEYBOARD CLOCK
6	GROUND

Table 3-16: Keyboard/Mouse Connector Pinouts

3.2.15 LVDS LCD Connector

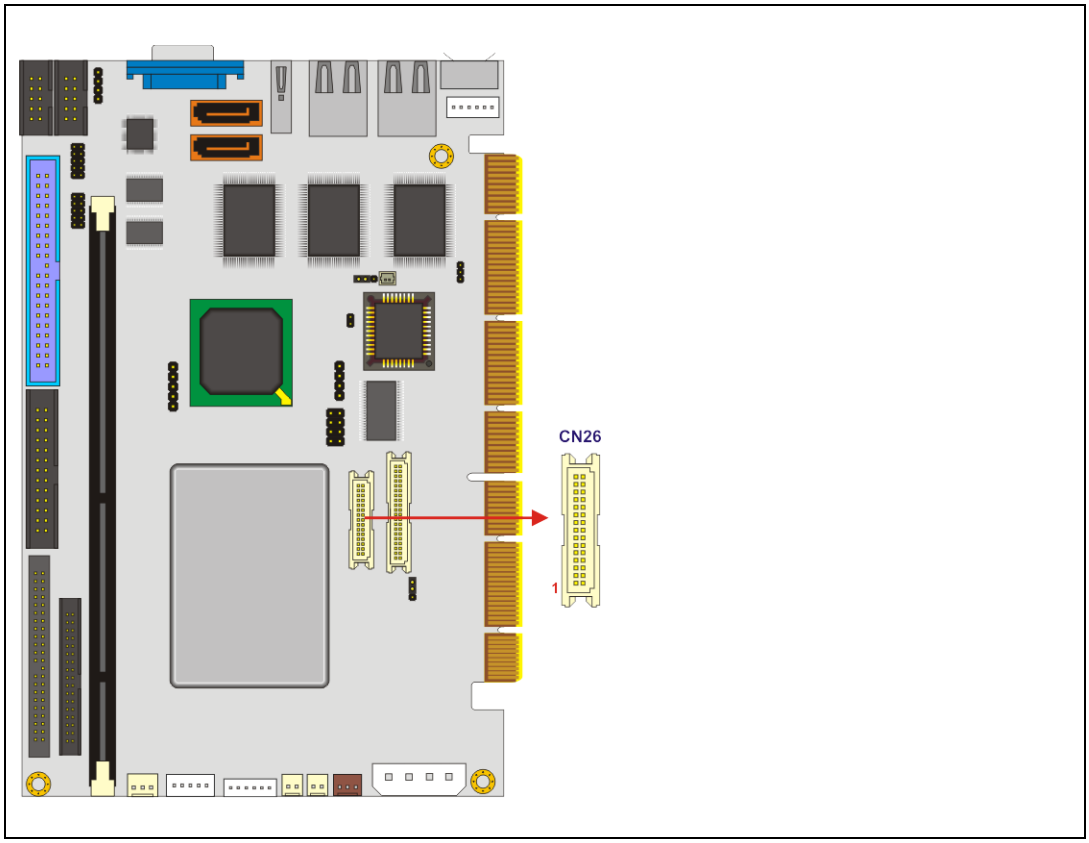
CN Label: **CN26**

CN Type: 30-pin crimp connector

CN Location: See **Figure 3-16**

CN Pinouts: See **Table 3-17**

This connector is connected to a TFT LCD LVDS display device.



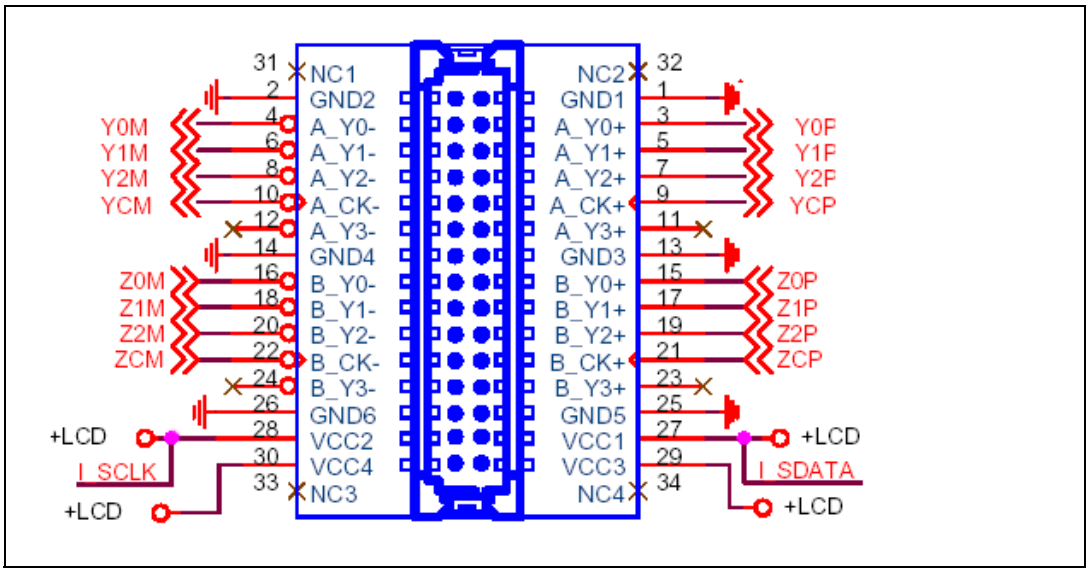


Figure 3-16: LVDS LCD Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GROUND	2	GROUND
3	LVDSA_Y0+	4	LVDSA_Y0-
5	LVDSA_Y1+	6	LVDSA_Y1-
7	LVDSA_Y2+	8	LVDSA_Y2-
9	LVDSA_CLK+	10	LVDSA_CLK-
11	N/C	12	N/C
13	GROUND	14	GROUND
15	LVDSB_Y0+	16	LVDSB_Y0-
17	LVDSB_Y1+	18	LVDSB_Y1-
19	LVDSB_Y2+	20	LVDSB_Y2-
21	LVDSB_CLK+	22	LVDSB_CLK-
23	N/C	24	N/C
25	GROUND	26	GROUND
27	VCC_LVDS	28	VCC_LVDS
29	VCC_LVDS	30	VCC_LVDS

Table 3-17: LVDS LCD Connector Pinouts

3.2.16 Parallel Port Connector

CN Label: **CN9**

CN Type: 26-pin box header

CN Location: See **Figure 3-17**

CN Pinouts: See **Table 3-18**

The 26-pin box header can be connected to a parallel port connector interface or some other parallel port device such as a printer.

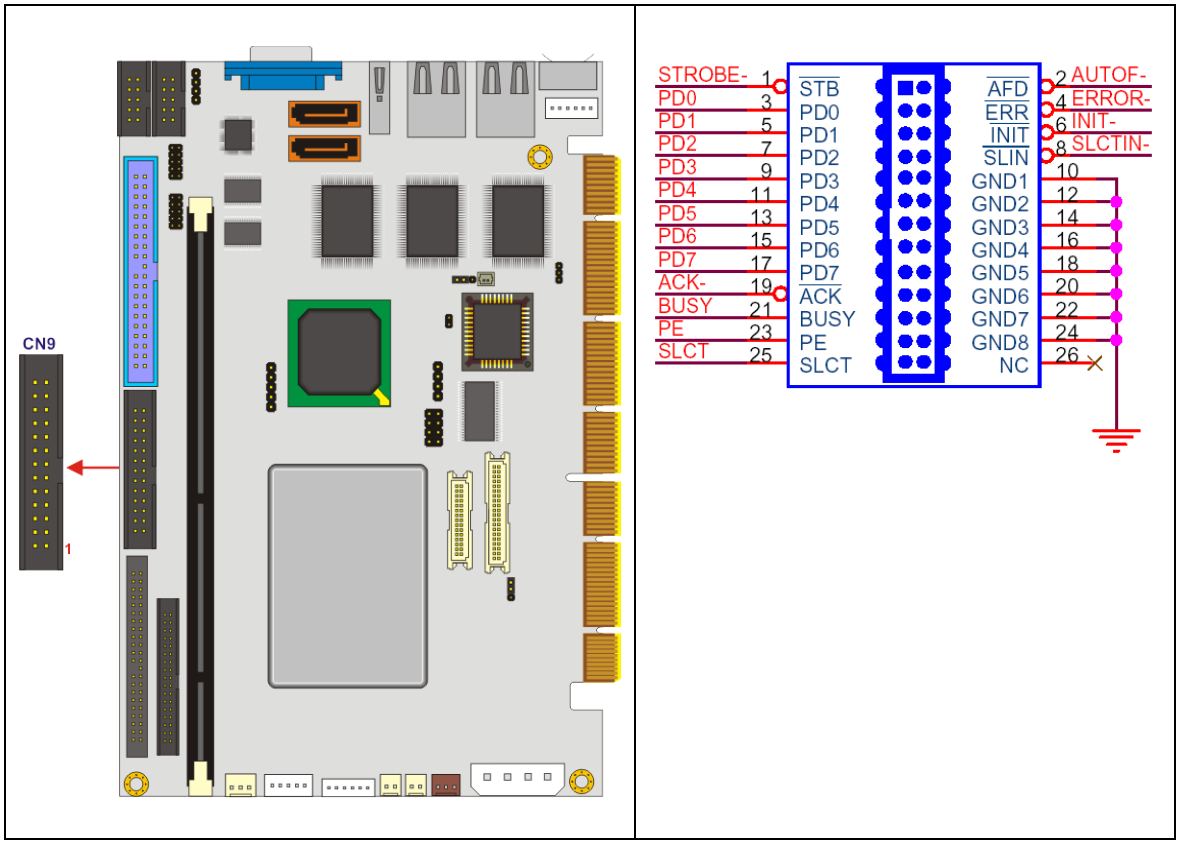


Figure 3-17: Parallel Port Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	STROBE#	2	AUTO FORM FEED #
3	DATA 0	4	ERROR#
5	DATA 1	6	INITIALIZE

7	DATA 2	8	PRINTER SELECT LN#
9	DATA 3	10	GROUND
11	DATA 4	12	GROUND
13	DATA 5	14	GROUND
15	DATA 6	16	GROUND
17	DATA 7	18	GROUND
19	ACKNOWLEDGE	20	GROUND
21	BUSY	22	GROUND
23	PAPER EMPTY	24	GROUND
25	PRINTER SELECT	26	N/C

Table 3-18: Parallel Port Connector Pinouts

3.2.17 Power Button Connector

CN Label: **CN3**

CN Type: 2-pin wafer connector

CN Location: See **Figure 3-18**

CN Pinouts: See **Table 3-19**

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

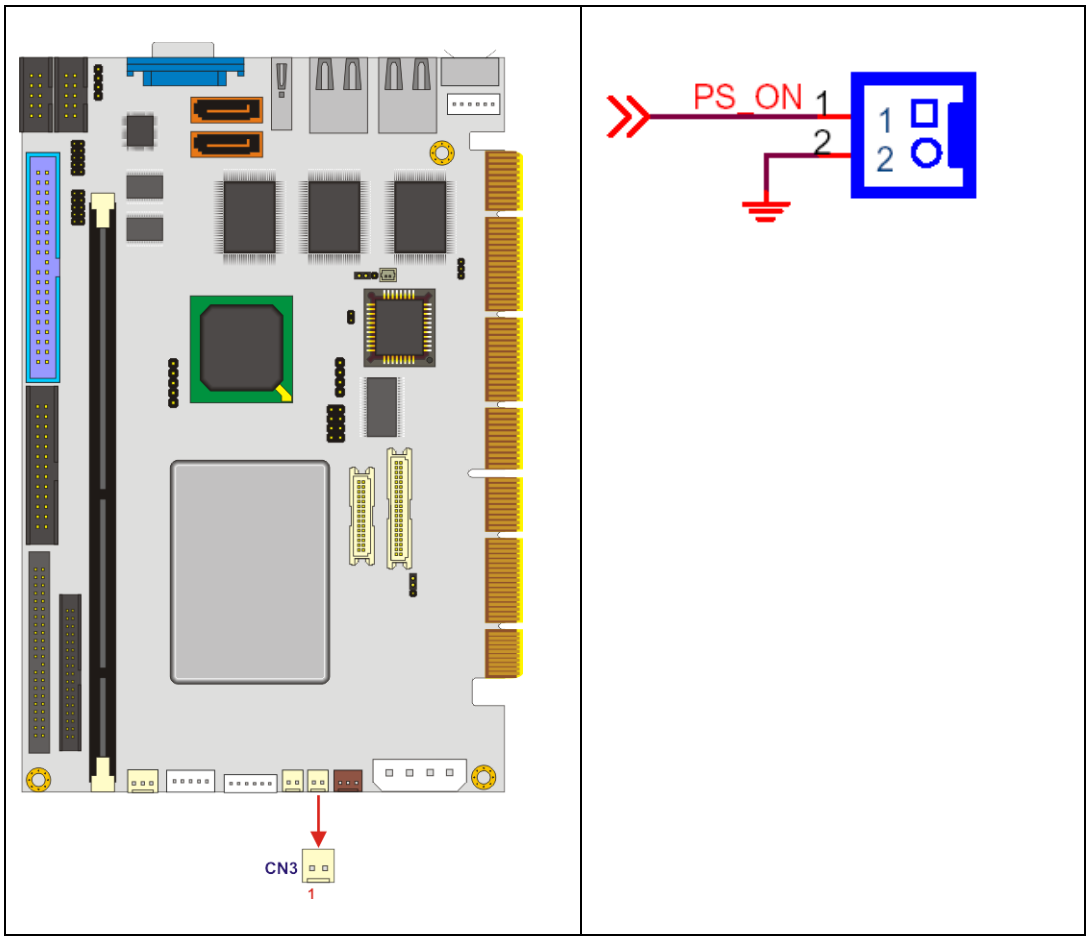


Figure 3-18: Power Button Connector Location

PIN NO.	DESCRIPTION
1	PWR-BTN
2	Ground

Table 3-19: Power Button Connector Pinouts

3.2.18 Power Connector

CN Label: **CN1**

CN Type: 4-pin wafer connector

CN Location: See **Figure 3-19**

CN Pinouts: See **Table 3-20**

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

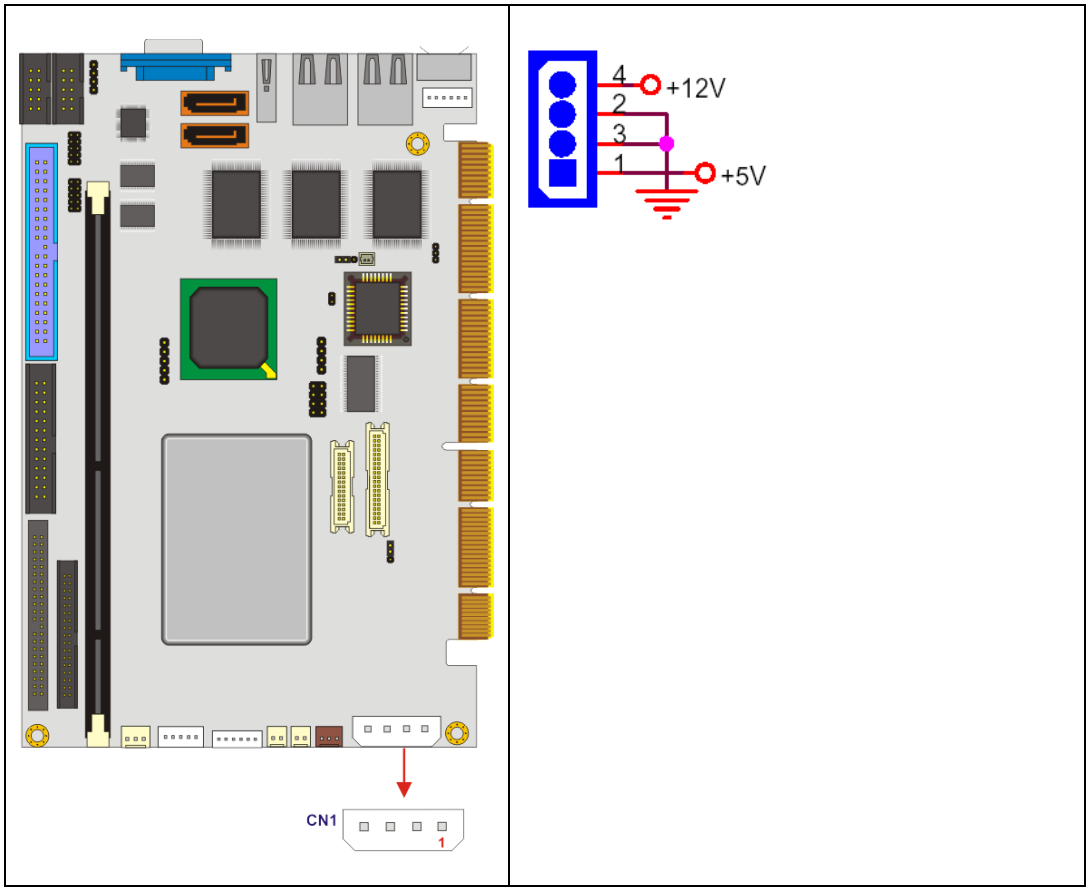


Figure 3-19: Power Connector Location

PIN NO.	DESCRIPTION
1	+5v
2	Ground
3	Ground
4	+12v

Table 3-20: Power Connector Pinouts

PIN	DESCRIPTION	PIN	DESCRIPTION
1	-IDERST	2	GROUND
3	PDD7	4	PDD8
5	PDD6	6	PDD9
7	PDD5	8	PDD10
9	PDD4	10	PDD11
11	PDD3	12	PDD12
13	PDD2	14	PDD13
15	PDD1	16	PDD14
17	PDD0	18	PDD15
19	GROUND	20	N/C
21	PDDREQ	22	GROUND
23	-PDIOW	24	GROUND
25	-PDIOR	26	GROUND
27	PIORDY	28	(PULL LOW TO GND)
29	-PDDACK	30	GROUND
31	IRQ14	32	N/C
33	PDA1	34	PD33_-36
35	PDA0	36	PDA2
37	-PDCS1	38	-PDCS3
39	HD_LED1	40	GROUND

Table 3-21: Primary IDE Connector Pinouts

3.2.19 PS-ON Connector

CN Label: **CN2**

CN Type: 3-pin wafer connector

CN Location: See **Figure 3-20**

CN Pinouts: See **Table 3-22**

The PS-ON connector connects to an ATX power supply.

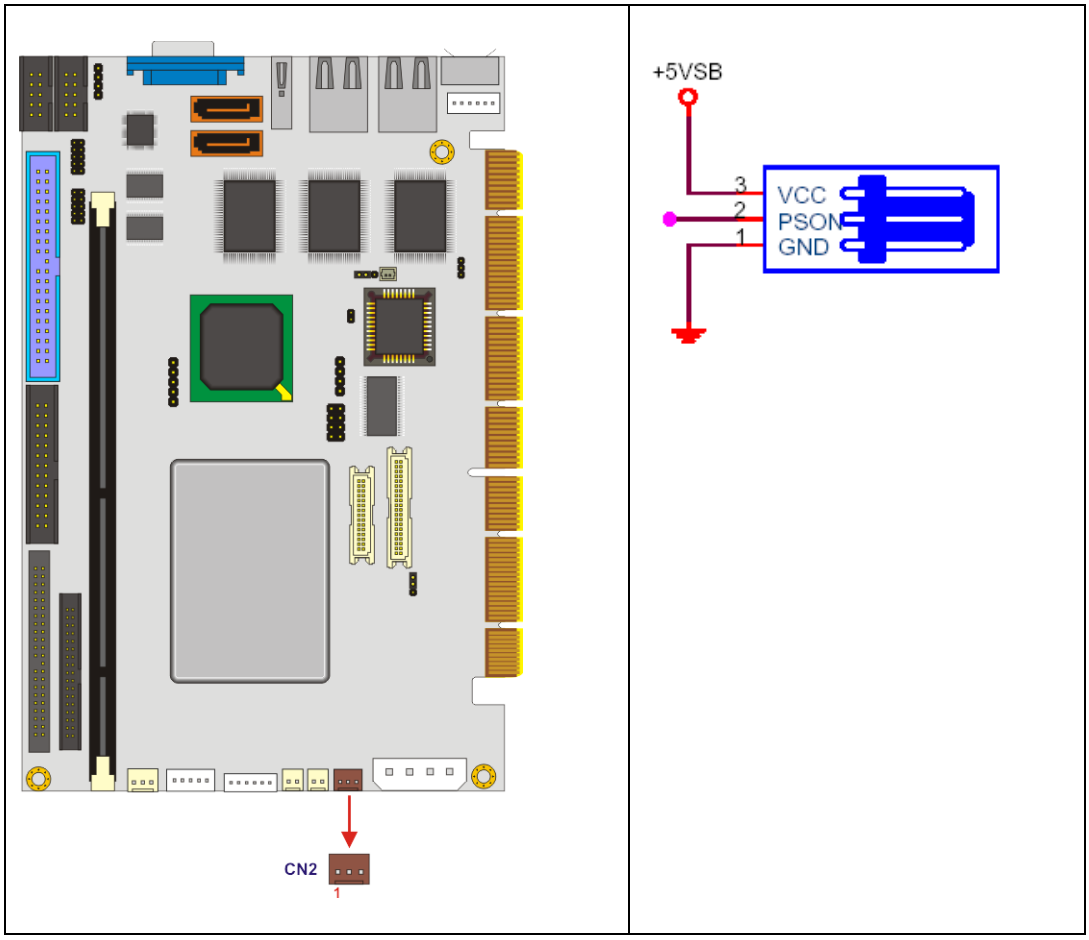


Figure 3-20: PS-ON Signal Connector Location

PIN NO.	DESCRIPTION
1	Ground
2	PS-ON
3	+5V Standby

Table 3-22: PS-ON Signal Connector Pinouts

3.2.20 Reset Button Connector

CN Label: **CN4**

CN Type: 2-pin wafer connector

CN Location: See **Figure 3-21**

CN Pinouts: See **Table 3-23**

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

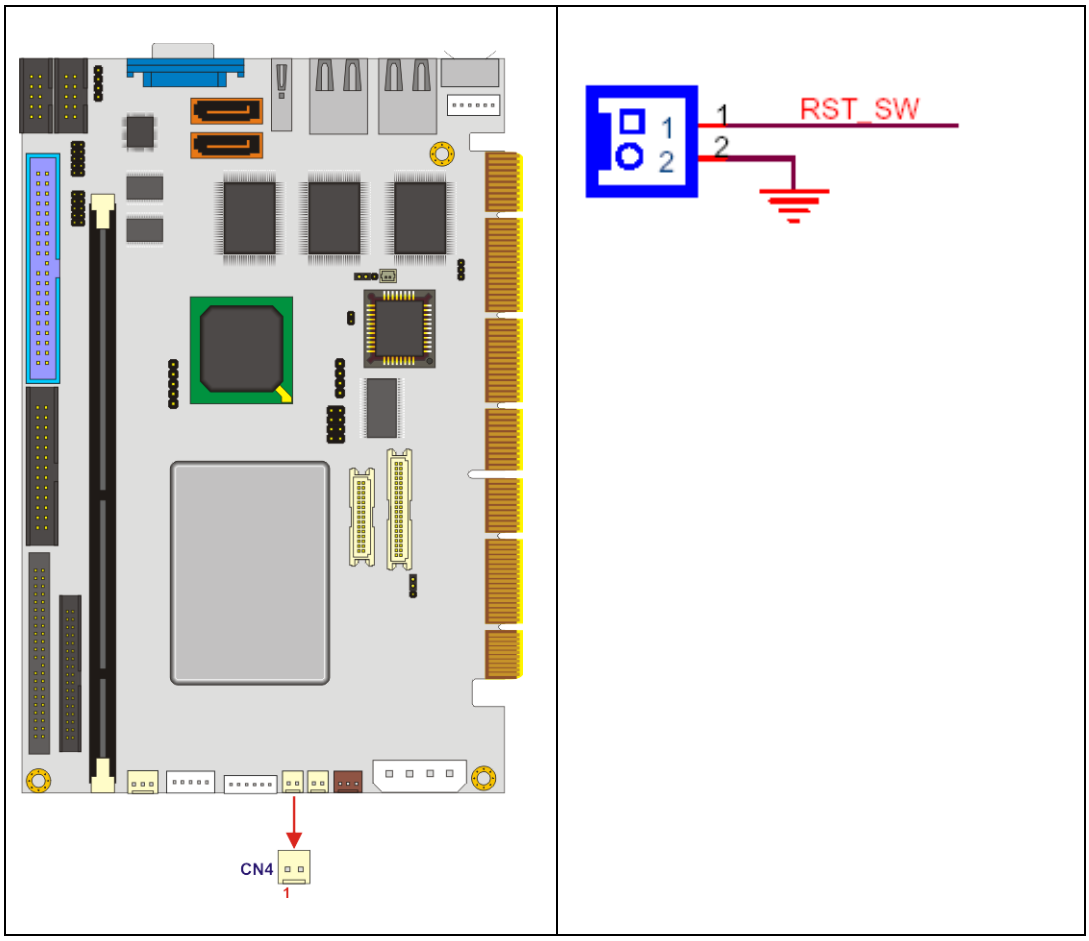


Figure 3-21: Reset Button Connector Location

PIN NO.	DESCRIPTION
1	RST_BTN
2	Ground

Table 3-23: Reset Button Connector Pinouts

3.2.21 RS-232 Serial Port (COM1 & COM2) Connectors

CN Label: **CN13 and CN14**

CN Type: 10-pin header

CN Location: See **Figure 3-22**

CN Pinouts: See **Table 3-24**

The serial port connectors connect to RS-232 serial port devices.

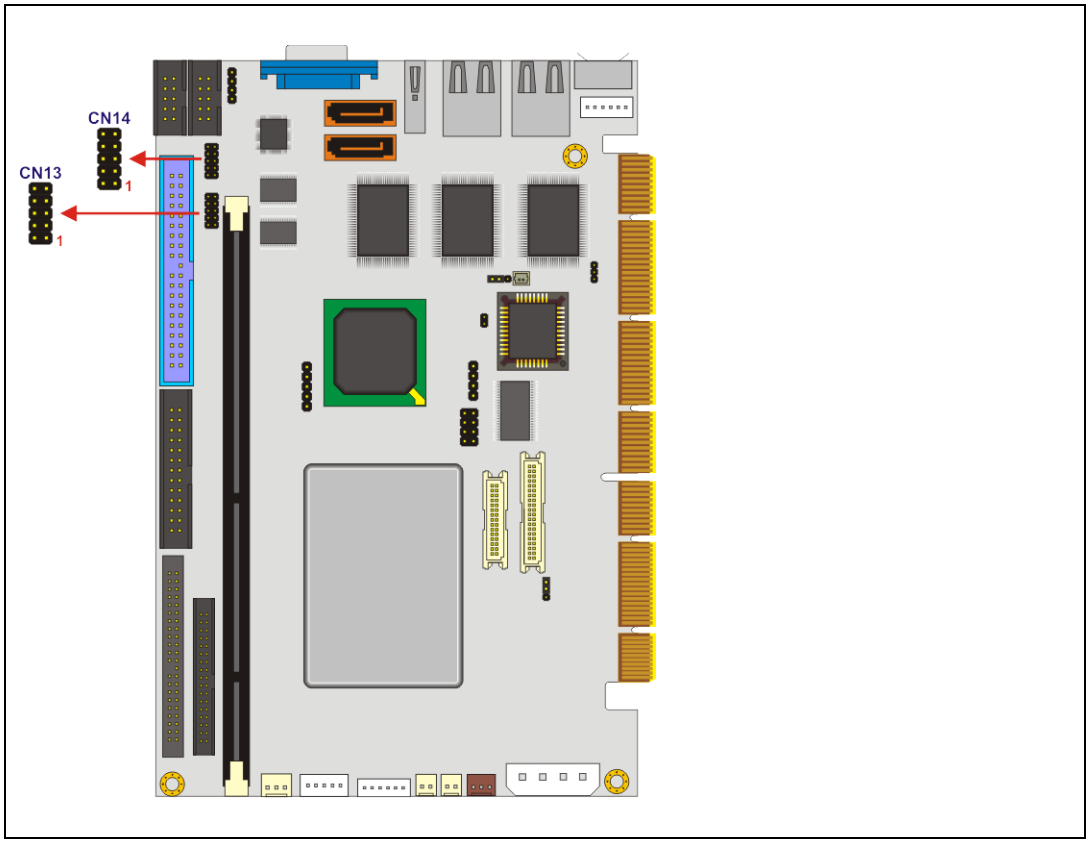


Figure 3-22: RS-232 Serial Port Connectors Location

PIN	DESCRIPTION	PIN	DESCRIPTION
1	DATA CARRIER DETECT (DCD)	2	DATA SET READY (DSR)
3	RECEIVE DATA (RXD)	4	REQUEST TO SEND (RTS)
5	TRANSMIT DATA (TXD)	6	CLEAR TO SEND (CTS)
7	DATA TERMINAL READY (DTR)	8	RING INDICATOR (RI)
9	GROUND (GND)	10	GROUND (GND)

Table 3-24: RS-232 Serial Port Connectors Pinouts

3.2.22 Serial ATA Drive Connectors

CN Label: **CN20 and CN21**

CN Type: 7-pin SATA drive connector

CN Location: See **Figure 3-23**

CN Pinouts: See **Table 3-25**

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

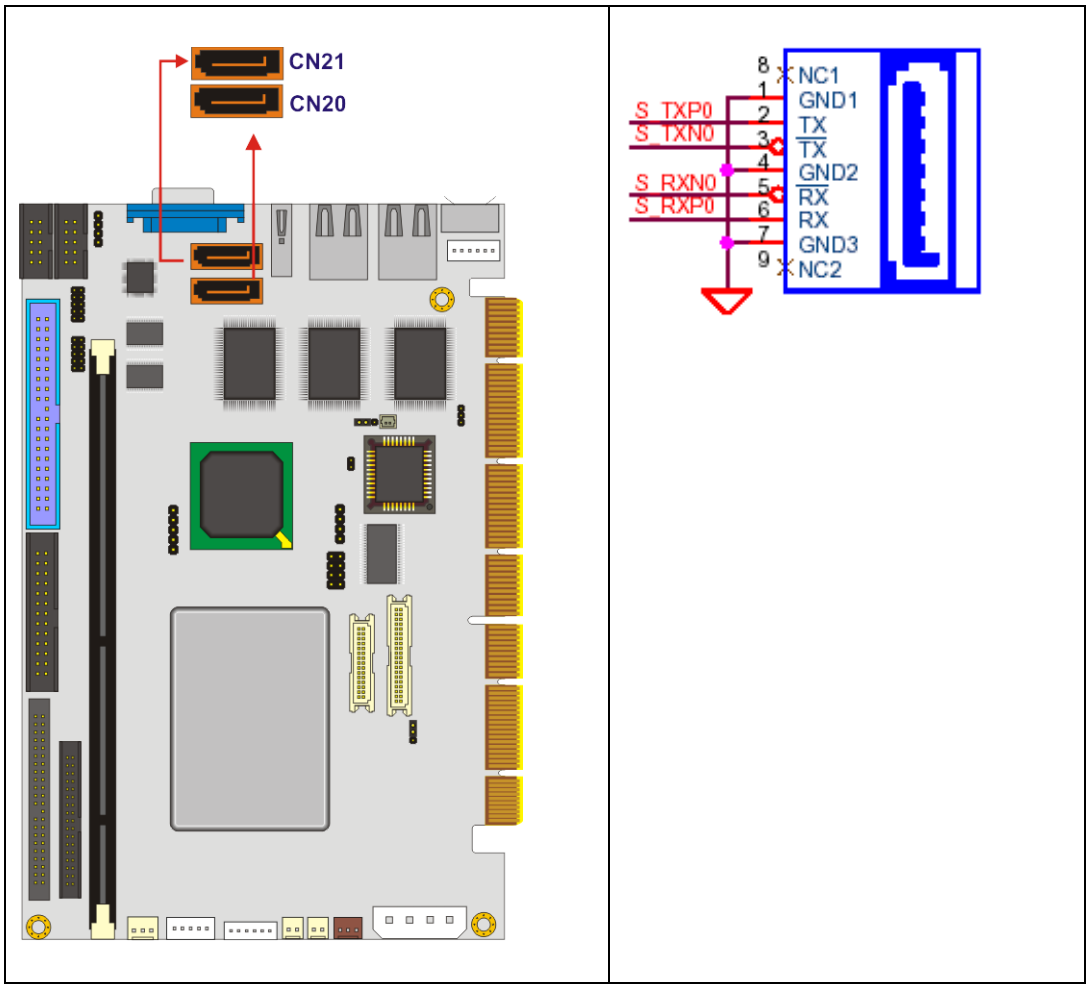


Figure 3-23: SATA Drive Connector Locations

PIN NO.	DESCRIPTION
1	GND
2	S_TXP
3	S_TXN
4	GND
5	S_RXN
6	S_RXP
7	GND

Table 3-25: SATA Drive Connector Pinouts

3.2.23 TFT LCD Connector

CN Label: **CN27**

CN Type: 40-pin crimp connector

CN Location: See **Figure 3-24**

CN Pinouts: See **Table 3-26**

This connector is connected to a TFT LCD TTL display device.

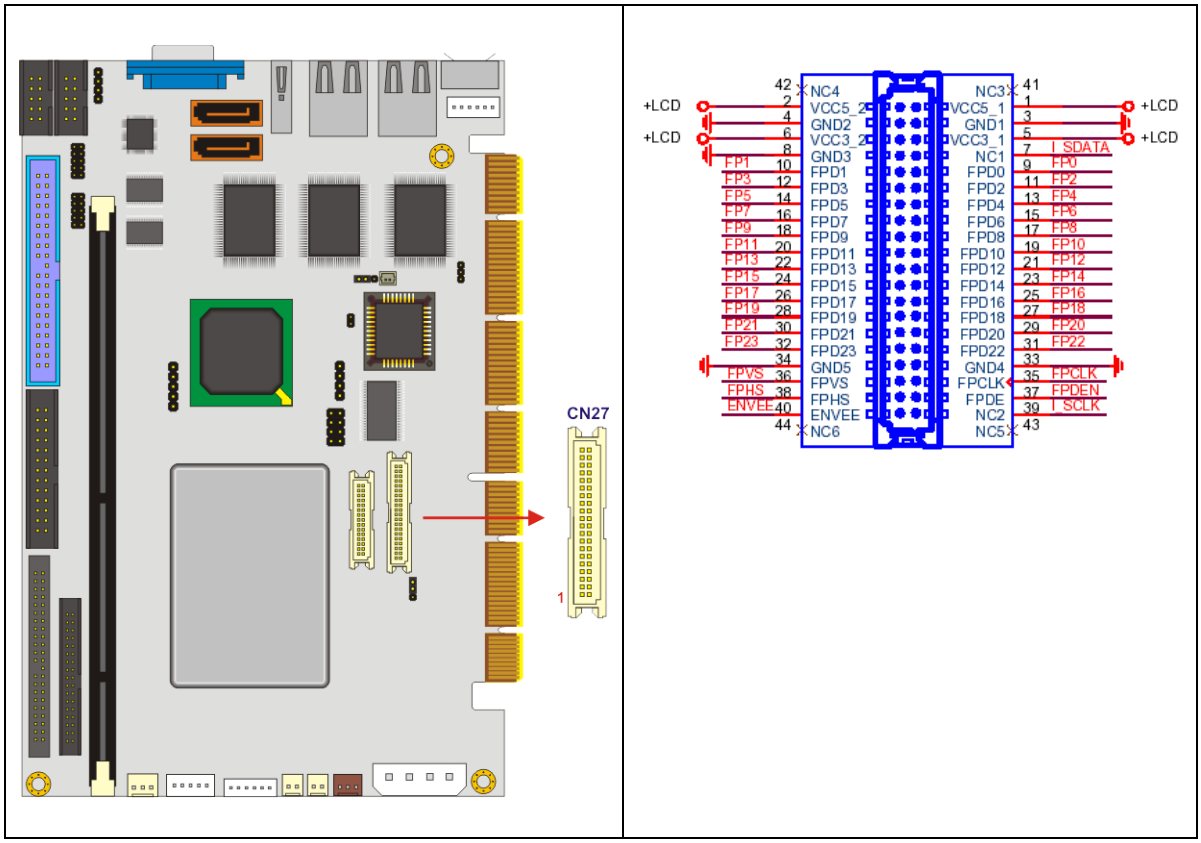


Figure 3-24: TFT LCD TTL Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	VCC_FP	2	VCC_FP
3	GROUND	4	GROUND
5	VCC_FP	6	VCC_FP
7	I2CDATA	8	GROUND
9	FPD0	10	FPD1
11	FPD2	12	FPD3
13	FPD4	14	FPD5
15	FPD6	16	FPD7
17	FPD8	18	FPD9
19	FPD10	20	FPD11
21	FPD12	22	FPD13
23	FPD14	24	FPD15
25	FPD16	26	FPD17
27	FPD18	28	FPD19
29	FPD20	30	FPD21
31	FPD22	32	FPD23
33	GROUND	34	GROUND
35	FPCLK	36	FPVS
37	FPDEN	38	FPHS
39	12CCLK	40	ENVEE

Table 3-26: TFT LCD TTL Connector Pinouts

3.2.24 USB Connectors (8-pin and 4-pin)

CN Label: **CN23 and CN24**

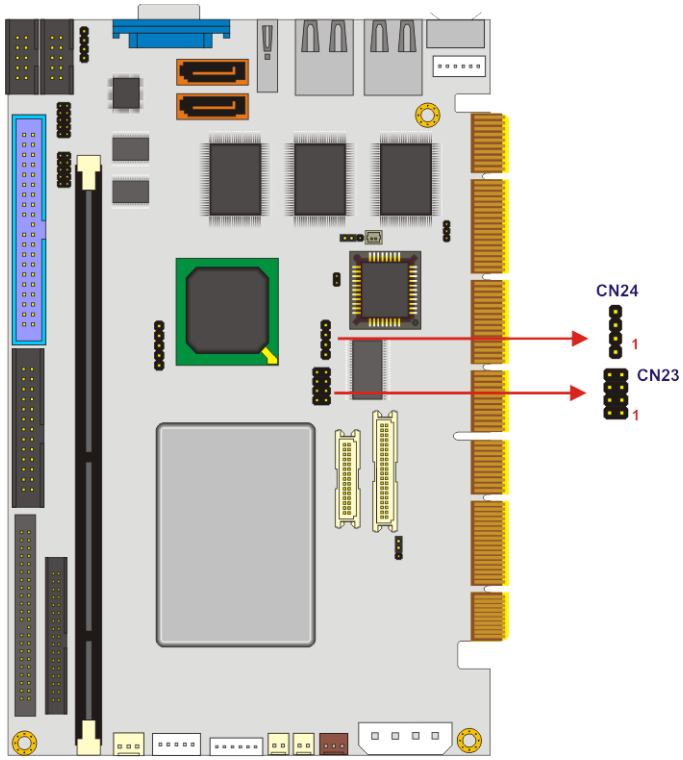
CN Type: 8-pin and 4-pin header

CN Location: See **Figure 3-25**

CN Pinouts: See **Table 3-27** for CN23 pinouts

See **Table 3-28**for CN24 pinouts

The 8-pin and 4-pin USB connectors provide connectivity to USB 1.1 ports. The 8-pin USB connector can support two USB devices. The 4-pin USB connector can support one USB device. An additional USB port is found on the rear panel. The USB ports are used for I/O bus expansion.



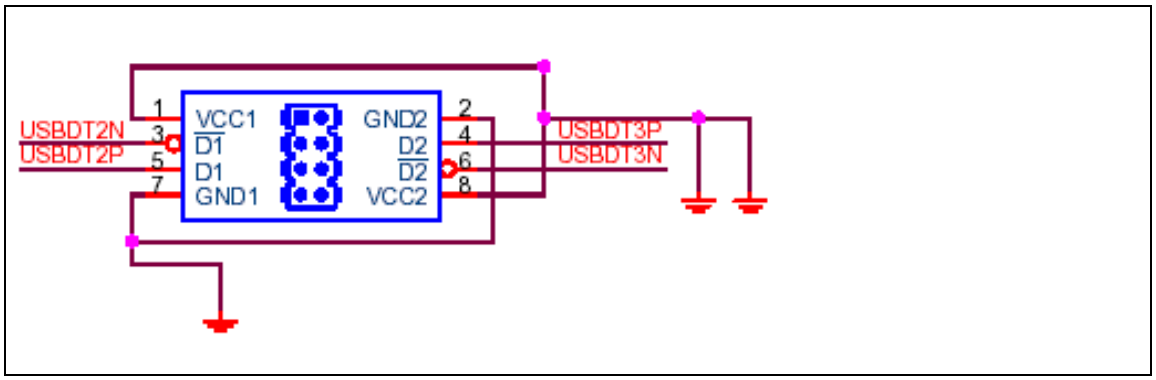


Figure 3-25: 8-pin USB Connector Location

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

Table 3-27: CN23 USB Port Connector Pinouts

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

Table 3-28: CN24 USB Port Connector Pinouts

3.3 External Peripheral Interface Connector Panel

Figure 3-26 shows the 3307920 external peripheral interface connector panel. The peripheral connectors are connected to external devices when the 3307920 is installed in a chassis. The peripheral connectors on the panel are:

- 1 x PS/2 keyboard and mouse mini-DIN connector
- 2 x RJ-45 GbE connectors
- 1 x USB connector
- 1 x VGA connector

NOTE:

Figure 3-26 shows the 3307920 external peripheral interface connector panel with a standard HD-D-sub-15 female VGA connector (labeled number 4).

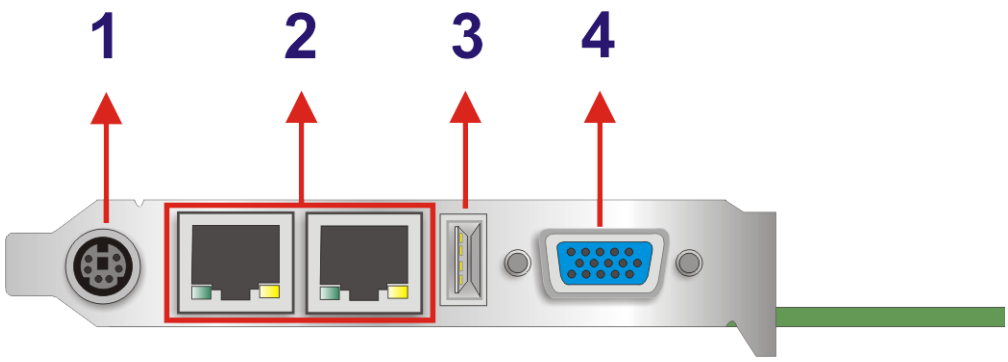


Figure 3-26: External Peripheral Interface Connector Panel

3.3.1 LAN Connectors

CN Label: **CN25 and CN29**

CN Type: RJ-45

CN Location: See **Figure 3-26** (labeled number 2)

CN Pinouts: See **Table 3-29**

The 3307920 is equipped with two built-in GbE Ethernet controllers. The controllers can connect to the LAN through two RJ-45 LAN connectors. There are two LEDs on the connector indicating the status of LAN. The pin assignments are listed in the following table:

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	TX+	8	N/C
2	GROUND	9	ACT_LED-
3	TX-	10	ACT_LED+
4	RX+	11	LINK_LED -
5	GROUNG	12	LINK_LED+
6	RX-	13	GROUND
7	N/C	14	GROUND

Table 3-29: LAN Pinouts

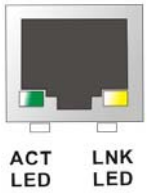


Figure 3-27: RJ-45 Ethernet Connector

The RJ-45 Ethernet connector has two status LEDs, one green and one yellow. The green LED indicates activity on the port and the yellow LED indicates the port is linked. See **Table 3-30**.

STATUS	DESCRIPTION	STATUS	DESCRIPTION
GREEN	Activity	YELLOW	Linked

Table 3-30: RJ-45 Ethernet Connector LEDs

3.3.2 Mini-DIN 6 PS/2 Connector

CN Label: **CN30**

CN Type: Mini-DIN 6 PS/2

CN Location: See **Figure 3-26** (labeled number 1)

CN Pinouts: See **Table 3-31**

The 3307920 CPU card has a mini-DIN 6 PS/2 connector on the mounting bracket for easy connection to a PS/2 keyboard or PS/2 mouse. The card comes with a cable to convert the mini-DIN 6 PS/2 into two mini-DIN 6 PS/2 connectors for keyboard and mouse connection.

Figure 3-28: Mini-DIN 6 PS/2 Connector

PIN NO.	DESCRIPTION
1	KEYBOARD DATA
2	MOUSE DATA
3	GROUND
4	+5V
5	KEYBOARD CLOCK
6	MOUSE CLOCK

Table 3-31: Mini-DIN 6 PS/2 Connector

3.3.3 USB Connector

CN Label: **CN22**

CN Type: USB port

CN Location: See **Figure 3-26** (labeled number 3)

CN Pinouts: See **Table 3-32**

The 3307920 has a one rear panel USB port. This port connects to USB 1.1 devices.

PIN NO.	DESCRIPTION
1	VCC
2	DATA1-
3	DATA1+
4	GROUND

Table 3-32: USB Port Pinouts

3.3.4 VGA connector

CN Label: **CN19**

CN Type: HD-D-sub 15 female connector

CN Location: See **Figure 3-26** (labeled number 4)

CN Pinouts: See **Table 3-33**

A 15-pin VGA connector connects to standard displays.

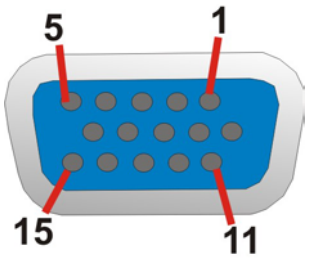


Figure 3-29: VGA Connector

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	RED	2	GREEN
3	BLUE	4	N/C
5	GROUND	6	GROUND
7	GROUND	8	GROUND
9	N/C	10	GROUND
11	N/C	12	DDC DAT
13	HSYNC	14	VSYNC
15	DDCCLK		

Table 3-33: VGA Connector Pinouts

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Chapter

4

Installation

4.1 Anti-static Precautions

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the 3307920. (Dry climates are especially susceptible to ESD.) It is therefore critical that whenever the 3307920 (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 wrist band can help to prevent ESD from damaging the board.
- *Self-grounding*: - Before handling the board touch any grounded conducting material. During the time the board is handled, frequently touch any conducting materials that are connected to the ground.

4.2 Installation Considerations

NOTE:

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

4.2.1 Installation Notices

Before and during the installation of the 3307920 CPU card, **do** the following:

- Read the user manual
  - The user manual provides a complete description of the 3307920 CPU card, 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 user's body and helps to prevent ESD damage.

- Place the CPU card on an antistatic pad
  - When the CPU card is installed and configured, place it on an antistatic pad. This helps to prevent potential ESD damage.

- Turn off all power to the 3307920 CPU card
  - When working with the CPU card, 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 3307920 CPU card **DO NOT:**

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

4.3 Unpacking

NOTE:

If any of the items listed below are missing when the 3307920 is unpacked, do not proceed with the installation. Contact the reseller or vendor the CPU card was purchased from.

4.3.1 Unpacking Precautions

Some components on 3307920 are very sensitive to static electricity and can be damaged by a sudden rush of power. To protect it from being damaged during the unpacking process, follow these precautions:

- Users should ground themselves to remove any static charge before touching the 3307920. To ground themselves, users can wear a grounded wrist strap at all times or frequently touching any conducting materials that is connected to the ground.
- Handle the 3307920 by its edges. Do not touch the IC chips, leads or circuitry unnecessarily.

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

4.3.2 Checklist

When 3307920 is unpacked make sure the package contains the following items.

- 1 x 3307920 single board computer
- 1 x ATA66/100 HDD cable
- 2 x SATA cable
- 1 x SATA Power cable
- 1 x KB/MS Y cable
- 1 x RS232 cable
- 1 x Audio cable
- 1 x Mini jumper pack
- 1 x Utility CD
- 1 x QIG (quick installation guide)

If one or more of these items are missing, contact the reseller or vendor 3307920 was purchased from and do not proceed any further with the installation.

4.4 3307920 CPU Card Installation

WARNING!

Note that the installation instructions described in this manual should be carefully followed in order to avoid damage to the 3307920 components and injury to the user.

WARNING!

When installing electronic components onto the 3307920 always take anti-static precautions in order to prevent ESD damage to the 3307920 and other electronic components like the CPU and DIMM modules.

4.4.1 Preinstalled Component

The component listed below is preinstalled on the 3307920.

- CPU

4.4.2 Components to Install

To install the 3307920, the following components must be installed or connected to the 3307920:

- DIMM module
- Peripheral devices

4.4.3 DIMM Module Installation

4.4.3.1 Purchasing the Memory Module

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

- The DIMM module can support a 168-pin PC100/133 MHz SDRAM with a maximum size of 512MB
- The DIMM can be either single-sided or dual-sided.

4.4.3.2 DIMM Module Installation

The 3307920 CPU card has one DDR SDRAM DIMM socket. To install a DIMM module, follow the instructions below and refer to **Figure 4-1**.

Step 1: Make sure the two handles of the DIMM socket are in the "open" position, leaning outward (**Figure 4-1**).

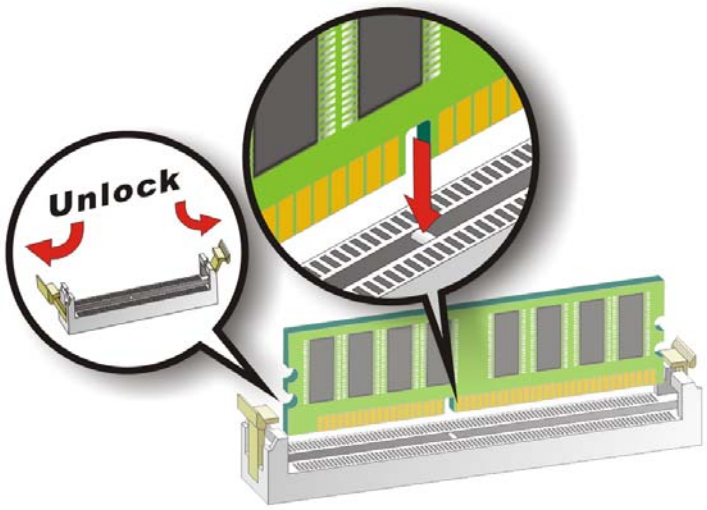


Figure 4-1: Installing the DIMM Module

Step 2: Slowly slide the DIMM module along the plastic guides on both ends of the socket. Press the DIMM module down into the socket until it clicks into position and the two handles have automatically locked the memory module into place.

Step 3: To remove the memory module, push both handles outward, and the memory module is ejected by the mechanism in the socket.

4.5 Peripheral Device Connection

Cables provided by GAI that connect peripheral devices to the board are listed in **Table 4-1**. Cables not included in the kit must be separately purchased.

Quantity	Type
1	ATA 66/100 HDD cable
1	Audio cable
1	RS-232 cable
1	KB/MS Y cable
2	SATA cables
1	SATA power cable

Table 4-1: GAI Provided Cables

4.5.1 IDE Disk Drive Connectors

The cable used to connect the CPU board to the IDE HDD is a standard 44-pin or 40-pin ATA flat cable. To connect an IDE HDD to the motherboard, follow the instructions below. 44-pin IDE cable connection is illustrated in Figure 4-2 and 40-pin cable connection is illustrated in Figure 4-3.

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

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

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

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

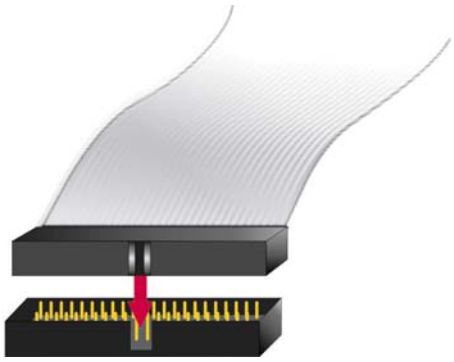


Figure 4-2: Connection of 44-Pin IDE Connector

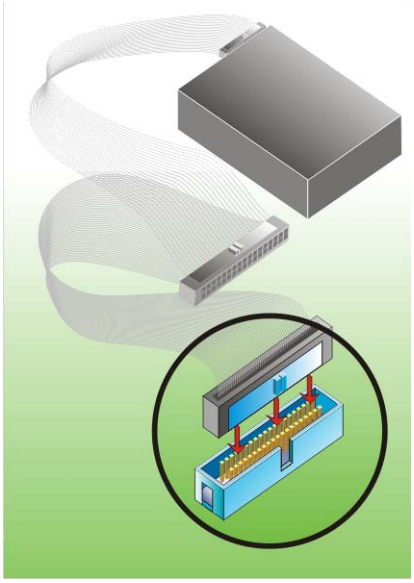


Figure 4-3: Connection of 40-Pin IDE Connector

NOTE:

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

4.5.2 COM1-COM2 RS-232 Serial Port Installation

The cable used to connect the CPU card to an RS-232 serial port is a 10-pin header to male D-sub 9 connector. To connect an RS-232 serial port to the CPU card, follow the instructions below.

Step 1: Find the RS-232 cable in the kit that came with the CPU card.

Step 2: Connect the 10-pin connector end of the cables to the COM1 /COM2 box headers on the CPU card. Be sure to align the red wire on the connector to pin 1 on the box header.

Step 3: Connect the other end of the cables to standard female D-sub 9 connectors.

4.5.3 LCD Backlight Installation

To connect an LCD backlight (inverter) to the CPU card, follow the instruction below.

Step 1: Connect the 5-pin connector end of the LCD backlight cable to the CN6 header on the CPU card. A keyed pin on the connector prevents it from being connected incorrectly.

4.5.4 Power Connection

To connect the CPU card to a power supply, follow the instruction below.

Step 1: Connect a 4-pin AT/ATX power connector from a power supply to the CN1 power connector on the CPU card.

4.5.5 TFT LVDS LCD Installation

To connect a TFT LVDS LCD to the CPU card, follow the instructions below.

Step 1: Connect the 20-pin connector end of a TTL LCD cable to the CN26 miniature crimping connector on the CPU card. A keyed pin on the connector prevents it from being connected incorrectly.

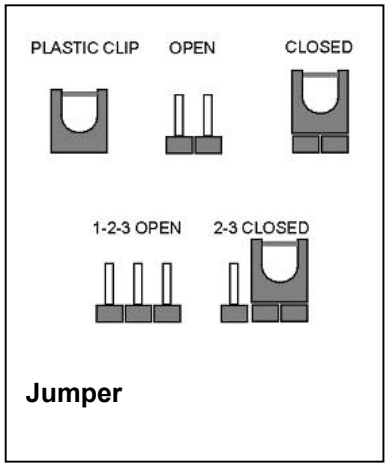
4.5.6 TFT TTL LCD Installation

To connect a TFT TTL LCD to the CPU card, follow the instructions below.

Step 1: Connect the 40-pin connector end of a TFT TTL LCD cable to the CN27 miniature crimping connector on the CPU card. A keyed pin on the connector prevents it from being connected incorrectly.

4.6 Jumper Settings

NOTE:



Jumper

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 3307920 is installed in the system, the jumpers must be set in accordance with the desired configuration. The 3307920 CPU card has four on-board jumpers.

Description	Label	Type
CF card function setup	JP2	2-pin header
Clear CMOS	JP3	3-pin header
Flat panel power select	JP4	3-pin header
PCI VIO voltage select	JP5	3-pin header

Figure 4-4 shows the 3307920 jumper locations.

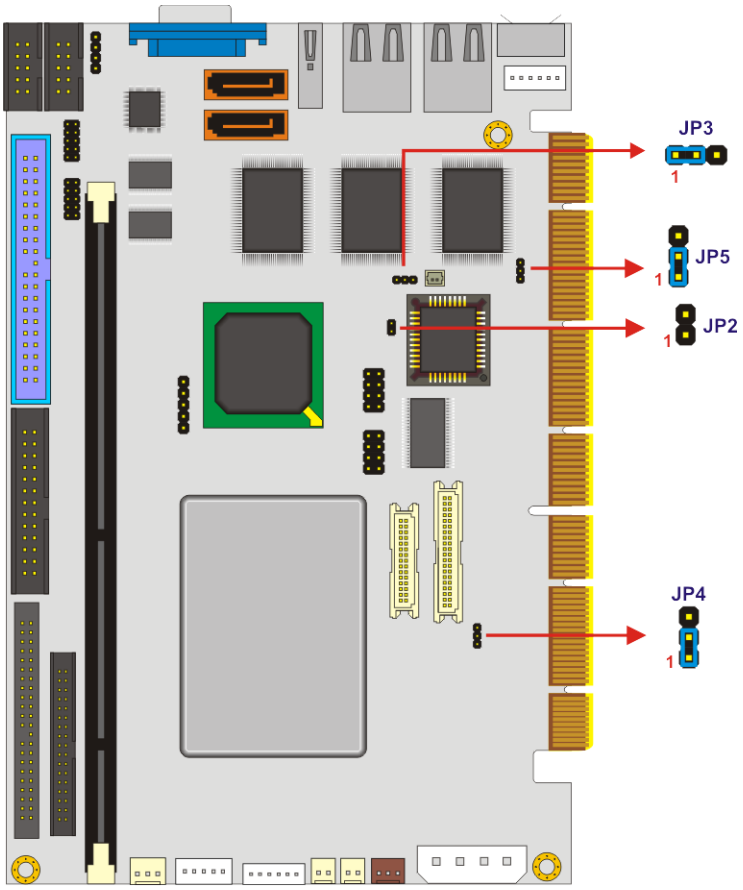


Figure 4-4: Jumper Locations

4.6.1 CF Card Function Setup Jumper

Jumper Label: **JP2**

Jumper Type: 2-pin header

Jumper Settings: See **Table 4-2**

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

The CF Card Setup jumper sets the compact flash card as either the slave device or the master device.

JP5	Description
Open 1 – 2 (Default)	Slave (Normal Operation)
Short 1 - 2	Master

Table 4-2: CF Card Function Setup Jumper Settings

4.6.2 Clear CMOS Jumper

Jumper Label: **JP3**

Jumper Type: 3 pin header

Jumper Settings: See **Table 4-3**

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

If the 3307920 fails to boot due to improper BIOS settings, use this jumper to clear the CMOS data and reset the system BIOS information. To do this, use the jumper cap to close pins 2 and 3 for a few seconds then reinstall the jumper clip back to pins 1 and 2.

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

JP3	Description
Short 1 – 2 (Default)	Keep CMOS Setup (Normal Operation)
Short 2 - 3	Clear CMOS Setup

Table 4-3: Clear CMOS Jumper Settings

4.6.3 Flat Panel Power Select

WARNING!

Making the wrong setting on this jumper may cause irreparable damage to both the CPU card and the LCD screen connected to the on-board connector.

Jumper Label: **JP4**

Jumper Type: 3-pin header

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

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

This jumper allows the user to set the voltage for the LCD panel. Before setting this jumper refer to the LCD panel user guide to determine the required voltage. After the required voltage is known, make the necessary jumper setting in accordance with the settings shown in **Table 4-4**.

JP4	Description
1 – 2 (Default)	+3.3V
2 - 3	+5V

Table 4-4: Flat Panel Select Jumper Settings

4.6.4 PCI VIO Voltage Select Jumper

Jumper Label: **JP5**

Jumper Type: 3-pin header

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

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

Use the JP5 jumper to select the voltage of the PCI connector.

JP5	Description
1 - 2 (Default)	+5V
2 – 3	+3.3V

Table 4-5: PCI VIO Voltage Jumper Settings

4.7 Installing a Compact Flash® Card

A Compact Flash® Type 2 (CFII) card slot is located on the solder side of the CPU card. When appropriately formatted, a CFII card can serve as a bootable hard drive in applications where installation space is limited. The CFII card occupies a secondary IDE channel. Configuration options can be found through the BIOS configuration utility.

To install a CFII card, follow the instructions below.

Step 1: Turn the 3307920 over so that the CFII card socket is facing up.

Step 2: Carefully insert the CFII card into the socket.

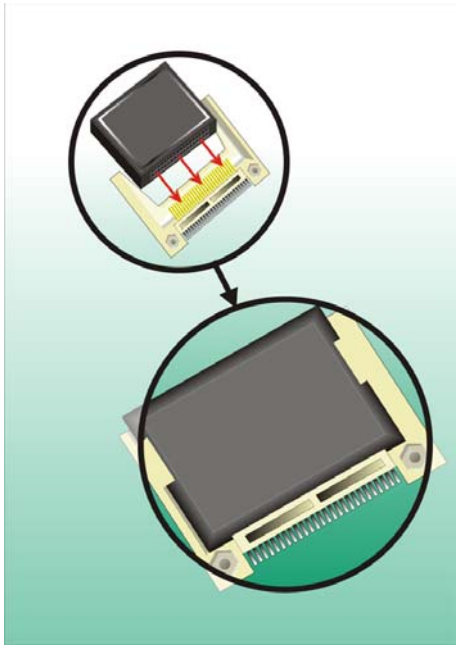


Figure 4-5: CompactFlash® Card Installation

4.8 Inserting the CPU Card

After the DIMM module has been installed and after the internal peripheral connectors have been connected to the peripheral devices and the jumpers have been configured, the 3307920 can be inserted onto a PCISA slot on the backplane.

To insert the CPU card to a backplane, follow the instructions below.

Step 1: Align the PCISA connector on the CPU card with the corresponding PCISA slot on the backplane.

Step 2: Gently push the CPU down to ensure the connectors are properly connected.

4.9 Rear Panel Connectors

4.9.1 Keyboard and Mouse Connection

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

4.9.2 Ethernet Connection

The rear panel RJ-45 connectors can be connected to an external LAN and communicate with data transfer rates up to 10Mbps and 100Mbps.

4.9.3 USB Connection

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

4.9.4 VGA Port Installation

The cable used to connect the motherboard to a VGA port is a 10-pin header to female HD-D-sub 15 connector. To connect a VGA port to the motherboard, follow the instructions below.

Step 1: Connect a standard male HD-D-sub 15 connector end to the VGA connector on the rear panel.

Step 2: Connect the other end to a display device.

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Appendix

A

Watchdog Timer

NOTE:

The following discussion applies to DOS environment.

Contact GAI support or visit the GAI website 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 B-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

B

Address Mapping

B.1 IO Address Map

I/O address Range	Description
000-01F	DMA Controller
020-021	Interrupt Controller
040-043	System time
060-06F	Keyboard Controller
070-07F	System CMOS/Real time Clock
080-09F	DMA Controller
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	VT82C686B Graphics Controller
3C0-3DF	VT82C686B Graphics Controller
3F6-3F6	Primary IDE Channel
3F7-3F7	Standard floppy disk controller
3F8-3FF	Serial Port 1 (COM1)

Table B-1: IO Address Map

B.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 B-2: 1st MB Memory Address Map

B.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 B-3: IRQ Mapping Table

B.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 B-4: IRQ Mapping Table

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Appendix

C

External AC'97 Audio CODEC

C.1 Introduction

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

C.1.1 Accessing the AC'97 CODEC

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

3. A LINE input shared with surround output
4. A MIC input shared with Center and LFE output
5. A LINE output
6. A MIC input line.

C.1.2 Driver Installation

The driver installation has been described in **Chapter 6**.

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

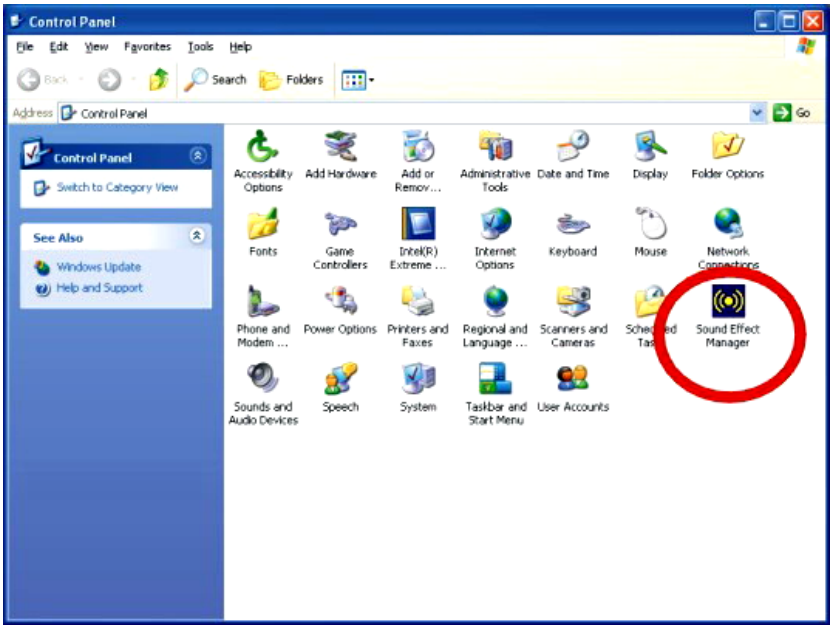

Figure C-1: Sound Effect Manager con

C.2 Sound Effect Configuration

C.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 C-2**), or
- The Sound Effect Manager icon in the Control Panel (**Figure C-3**).

○

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

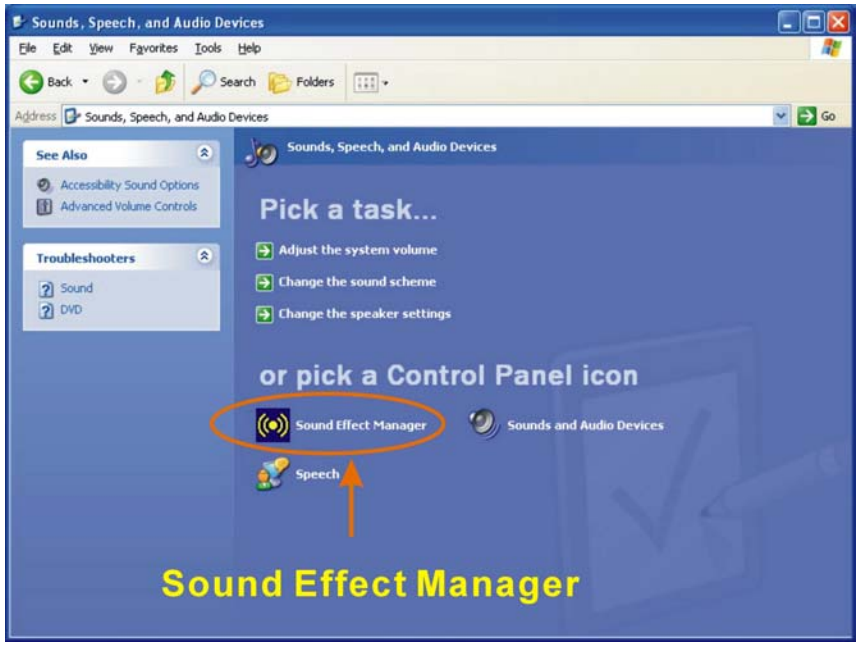

Figure C-3: Sound Effect Manager Icon [Control Panel]

Step 3: The sound effect manager appears. (See **Figure C-4**)

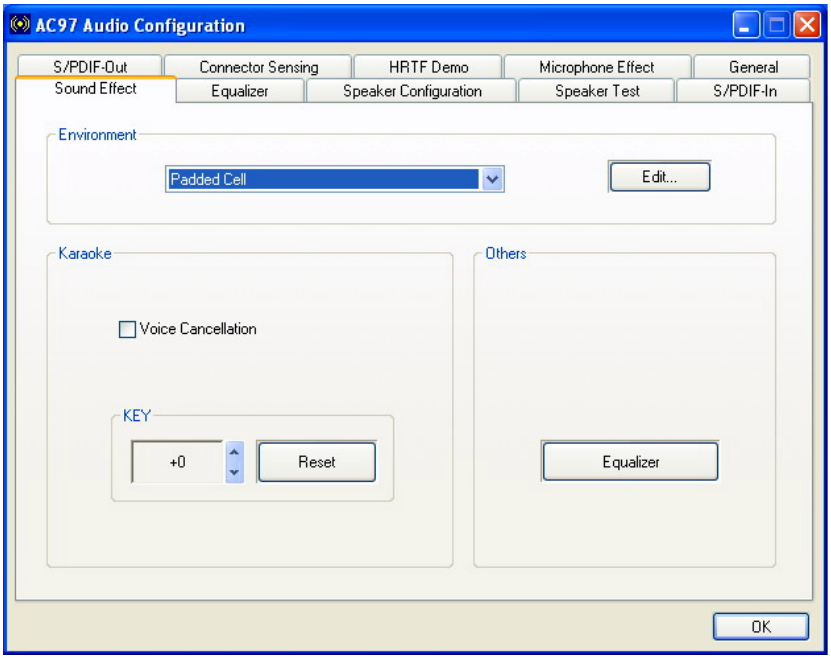

Figure C-4: Sound Effects Manager (ALC655)

NOTE:

The Sound Effect Manager shown in **Figure C-4** 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.

C.2.2 Sound Effect Manager Configuration Options

The **Sound Effects Manager** enables configuration of the items listed below. To configure these items click the corresponding menu tab in the **Sound Effects Manager** in **Figure C-4**

.

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.
- ***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.

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Appendix

E

RAID Setup

E.1 Introduction

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

CAUTION:

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

E.1.1 Precautions

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

WARNING!

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

CAUTION:

Do not accidentally disconnect the SATA drive cables.

Carefully route the cables within the chassis to avoid system down time.

E.2 Features and Benefits

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

E.3 Accessing the ALi RAID Utility

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

Step 1: **Connect SATA drives to the system**. Connect two SATA drives to the system. Make sure the drives have the same capacity, are the same type, and have the same speed.

NOTE:

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

Step 2: **Enable SATA drives in BIOS**. Start the computer and access the **Award BIOS** setup program. Next, open the **Advanced** menu. Enable the **SATA ROM Support BIOS** option (see **Section 5.3**).

Step 3: **Save and Exit BIOS**. After the **SATA ROM Support BIOS** option is enabled, save and exit the **BIOS**.

Step 4: **Reboot the system**. Reboot the system after saving and exiting the **BIOS**.

Step 5: **Press Ctrl-A**. When the screen in **Figure E-1** appears press **Ctrl-A** to enter the **ALi RAID BIOS** setup program.

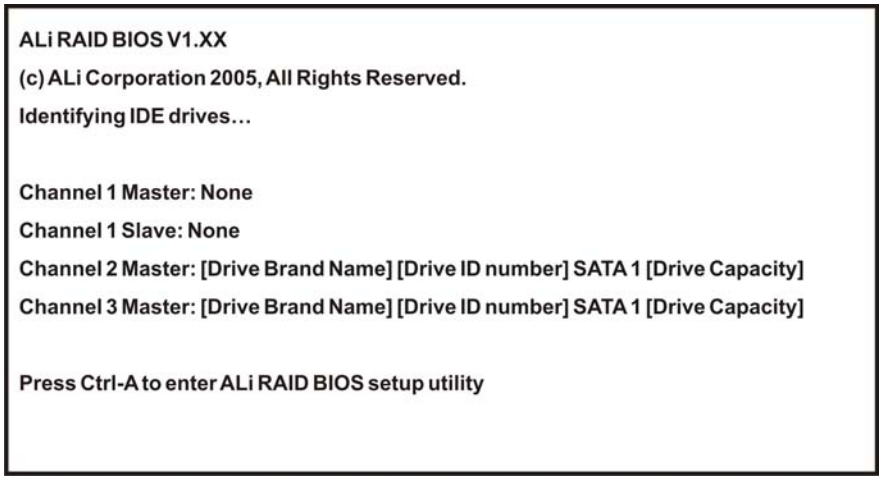


Figure E-1: Accessing ALi RAID BIOS Utility

Step 6: **Delete RAID settings and partitions**. The **RAID BIOS Setup Utility** in **Figure E-2** appears. Before configuring the array select the "**Delete All RAID Setting & Partition**".

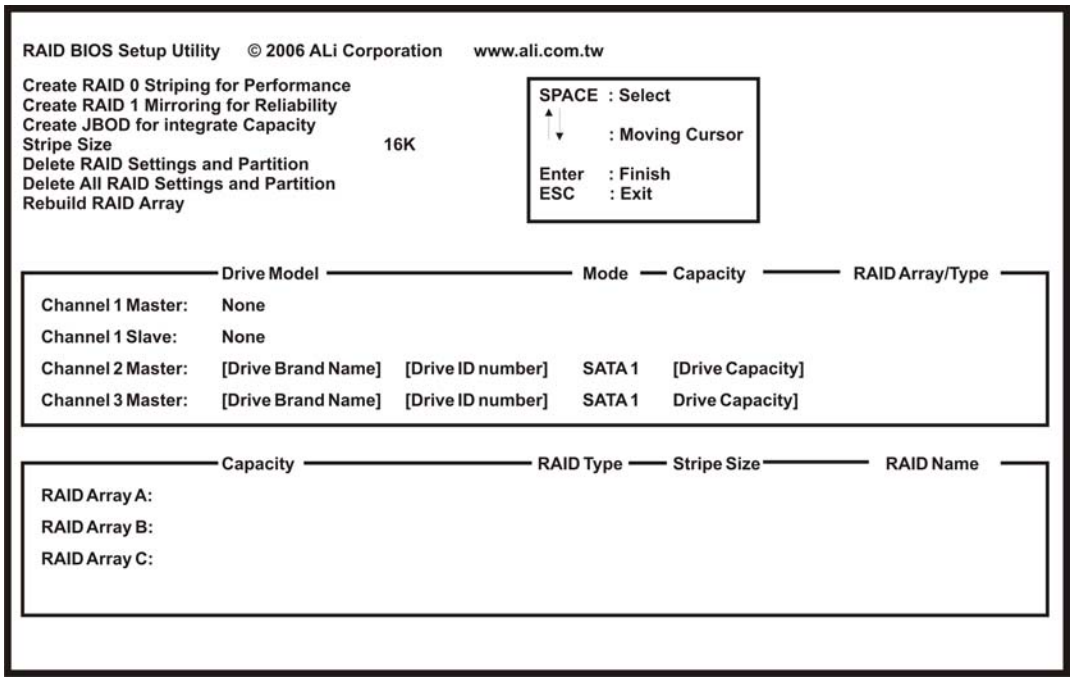


Figure E-2: RAID BIOS Setup Utility

Step 7: **Configure the RAID settings**. Use the RAID BIOS Setup Utility in **Figure E-2** to configure the RAID array. Brief descriptions are given below.

Step 8: **Install the OS**. After the RAID array has been configured (see below) install the OS. To do this, refer to the documentation that came with the OS.

E.4 RAID Options

E.4.1 Create RAID 0 Striping for Performance

WARNING!

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

Step 1: **Select** “**Create RAID 0 Striping for Performance”**. Use the arrow keys to

highlight **Create RAID0 Striping for Performance** and press **ENTER**. A flashing 'S' appears on the **Drive Menu** where the member drives to be included in the RAID 0 array can be chosen.

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

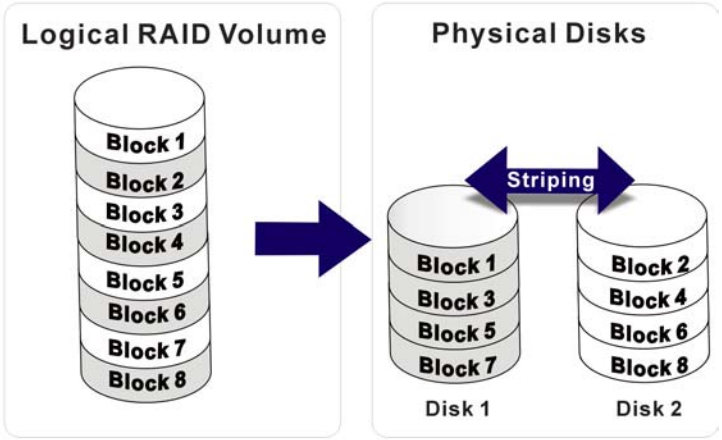
Step 3: **Confirm**. The **Create RAID0(Y/N)** confirm box appears. Press **Y**.

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

NOTE:

1. To reduce the chance of losing data, ALi imposes certain limitations on the RAID configuration options. PATA drives connected on the same IDE channel cannot be selected as the members of a RAID 0 array. Avoid mixing PATA and SATA disk drives in a RAID 0 array.

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



E.4.2 Create RAID 1 Mirroring for Reliability

WARNING!

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

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

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

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

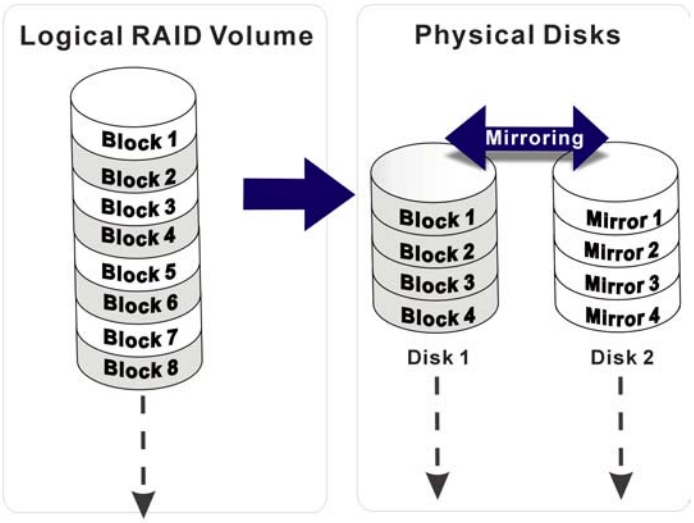
Step 4: **Name the array**. Enter a nickname for the created array. Upper and lower case alphabetic, numeric, space, and underscore characters are all applicable for naming an array

Step 5: **View the array**. A prompt appears to proceed with drive copy. The **Source** and **Destination** drives are indicated as "M" and "m" in the **Drive Menu**.

NOTE:

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

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



E.4.3 Create JBOD for Integrated Capacity

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

WARNING!

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

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

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

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

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

NOTE:

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

E.4.4 Stripe Size

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

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

Select a small stripe size if the I/Os to the hard drives are small and occur randomly. Choose a larger stripe size if the I/Os are mostly large and come in sequential orders, e.g., A/V playback and editing applications. The default value should be appropriate for most applications.

E.4.5 Delete RAID Setting & Partition

WARNING!

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

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

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

E.4.6 Delete All RAID Setting & Partition

WARNING!

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

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

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

E.4.7 Rebuild RAID Array

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

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

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

NOTE:

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

E.4.8 Select Boot Drive

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

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

Any advice or comments about our products and service, or anything we can help you with please don't hesitate to contact with us. We will do our best to support your products, projects and business.

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