



integration with integrity

User's Manual

Single Board Computer 3308160

Version 1.0, January 2008

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# Manual Conventions

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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 3308160 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 3308160. 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 3308160.

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 3308160. Please take note messages seriously.

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# Packing List

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## 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 3308160 from or contact an GAI sales representative directly.

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The items listed below should all be included in the 3308160 package.

- 1 x 3308160 single board computer
- 1 x IDE cable
- 3 x SATA power cables
- 6 x SATA cables
- 1 x Dual RS-232 cable
- 1 x USB cable
- 1 x Mini jumper pack
- 1 x Utility CD
- 1 x QIG (quick installation guide)

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

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Chapter

1

# Introduction

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### 1.1 Overview



**Figure 1-1: 3308160 PICMG 1.3 CPU Card**

The 3308160 PICMG 1.3 form factor CPU card is an AMD Socket AM2 CPU processor platform with an integrated NVIDIA MCP55PRO system chipset. The 3308160 is coupled with the specially designed backplanes to provide access to up to 28 PCI Express (PCIe) lanes.

Two 2.0 GB DDR2 SDRAM DIMMs support a maximum of 4.0 GB DDR2 system memory. Six SATA II drives with 3.0 Gbps data transmission rates one IDE interface and one provide flexible storage options. Ten USB 2.0 interfaces and four PCI expansion lanes (interfaced to the backplane) provide further expansion options. Dual gigabit Ethernet (GbE) controllers facilitate external Internet connectivity. An XGI Volari™ PCI graphics controller supports analog CRT display output and connectivity to standard CRT monitors through an external VGA connector.

#### 1.1.1 3308160 Expansion Options

##### 1.1.1.1 PCI Express (PCIe) Expansion

There are 28 PCIe x1 lanes on the 3308160. Of these, 20 PCIe x1 lanes are interfaced to the GAI 1108190 & 1108200 backplane through the PICMG 1.3 form factor edge connectors on the bottom of the CPU card. The remaining eight PCIe x1 lanes are interfaced to the

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## 3308160 PICMG 1.3 CPU Card

interfaced to the 1108190 & 1108200 backplane through a PCIe x8 connector on the CPU card to a corresponding PCIe x8 connector on the backplane.

### 1.1.1.2 PCI Expansion

An additional four PCI lanes are interfaced to the backplane through the standard PCI edge connectors on the bottom of the 3308160 CPU card.

### 1.1.1.3 USB 2.0 Expansion

Ten USB 2.0 interfaces are also available. Six of the USB 2.0 interfaces are implemented directly on the SBC (four internal and two external) and the remaining four USB 2.0 interfaces are connected to the backplane through the edge connectors.

## 1.1.2 3308160 Features

Some of the 3308160 features are listed below.

- Supports the following AMD Socket AM2 processors:
  - Opteron™
  - Athlon™ 64 X2
  - Athlon™ 64
  - Sempron™
- Supports two 240-pin 2.0 GB (max.) 533 MHz, 667 MHz or 800 MHz DDR2 SDRAM DIMM (system max. 4.0 GB)
- Six SATA II drives with data transfer rates of 3.0 Gbps supported
- Two Ultra ATA 133, Ultra ATA 100, Ultra ATA 66 or Ultra ATA 33 IDE HDDs supported
- Ten USB 2.0 devices supported (six on-board and four on the backplane)
- Dual GbE Ethernet connectors
- PICMG 1.3 form factor
- RoHS compliant
- Supports ATX power supplies

### 1.2 3308160 Overview

#### 1.2.1 3308160 Overview Photo

The 3308160 has a wide variety of peripheral interface connectors. **Figure 1-2** is a labeled photo of the peripheral interface connectors on the 3308160.

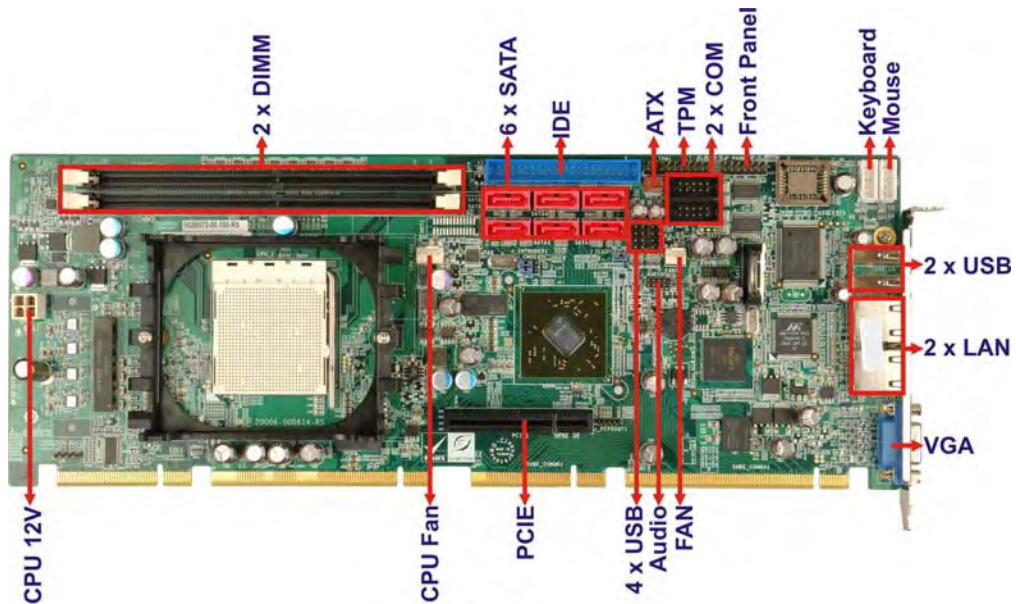


Figure 1-2: 3308160 Overview [Front View]

#### 1.2.2 3308160 Peripheral Connectors and Jumpers

The 3308160 has the following connectors on-board:

- 1 x Audio connector
- 1 x ATX power supply enable connector
- 1 x Fan connector
- 1 x Front panel connector
- 1 x IDE disk drive connector
- 1 x Keyboard connector
- 1 x Mouse connector
- 2 x RS-232 serial port connectors
- 6 x Serial ATA II (SATA II) drive connectors
- 1 x TPM connector

## 3308160 PICMG 1.3 CPU Card

- 2 x USB 2.0 connectors (each connect to two USB2.0 devices)s

The 3308160 has the following external peripheral interface connectors on the board rear panel.

- 2 x Ethernet connectors
- 2 x USB2.0 port connectors
- 1 x VGA connector

The 3308160 has the following on-board jumpers:

- Clear CMOS

### 1.2.3 Technical Specifications

3308160 technical specifications are listed in **Table 1-1**. See **Chapter 2** for details.

Specification	3308160
Form Factor	PICMG 1.3
System CPU	AMD Socket AM2 Opteron™ AMD Socket AM2 Athlon™ 64 x2 AMD Socket AM2 Athlon™ 64 AMD Socket AM2 Sempron™
HyperTransport™ Technology	HyperTransport™ interfaces supported
System Chipset	NVIDIA MCP55Pro
Memory	Two 240-pin 2.0 GB (max.) 800 MHz, 667 MHz or 533 MHz dual-channel DDR2 SDRAM DIMM supported (system max. 4.0 GB)
Super I/O	Winbond W83627EHG
BIOS	AMI BIOS label 1MB SPI EEPROM
Display	CRT output via XGI Volari™ Z9s PCI graphics controller

## 3308160 PICMG 1.3 CPU Card

<b>Audio</b>	HD audio				
<b>LAN</b>	Dual Marvell 88E1121 GbE controller				
<b>COM</b>	Two RS-232 serial ports				
<b>USB2.0</b>	Ten USB 2.0 devices supported, six on-board and four on the backplane				
<b>IDE</b>	One 40-pin IDE connector connects to two Ultra ATA/33, Ultra ATA/66, Ultra ATA/100 or Ultra ATA /133 devices				
<b>SATA</b>	Six 3.0 Gbps SATA II drives supported				
<b>Keyboard/mouse</b>	Two keyboard/mouse wafer connectors				
<b>Expansion</b>	Twenty-eight PCIe lanes Four PCI lanes				
<b>Watchdog Timer</b>	Software programmable 1-255 sec. by super I/O				
<b>Power Supply</b>	ATX power				
<b>Power Consumption</b>	<b>3.3 V</b>	<b>5 V</b>	<b>5 Vsb</b>	<b>12 V</b>	<b>Vcore</b>
	4.83 A	2.53 A	0.45 A	0.2 A	4.98 A
	Running 3DMarkR 2001 SE with an AMD Sempron™ 3600+ processor and one 1.0 GB 667 MHz DDR2 DIMM				
<b>Temperature</b>	0°C – 60°C (32°F - 140°F)				
<b>Humidity (operating)</b>	5%~95% non-condensing				
<b>Dimensions (LxW)</b>	338.58 mm x 126.39 mm				
<b>Weight (GW)</b>	1.2 kg				

**Table 1-1: Technical Specifications**

Chapter

2

# Detailed Specifications

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## 2.1 Dimensions

### 2.1.1 Board Dimensions

The dimensions of the board are listed below:

- Length: 338.58 mm
- Width: 126.39 mm

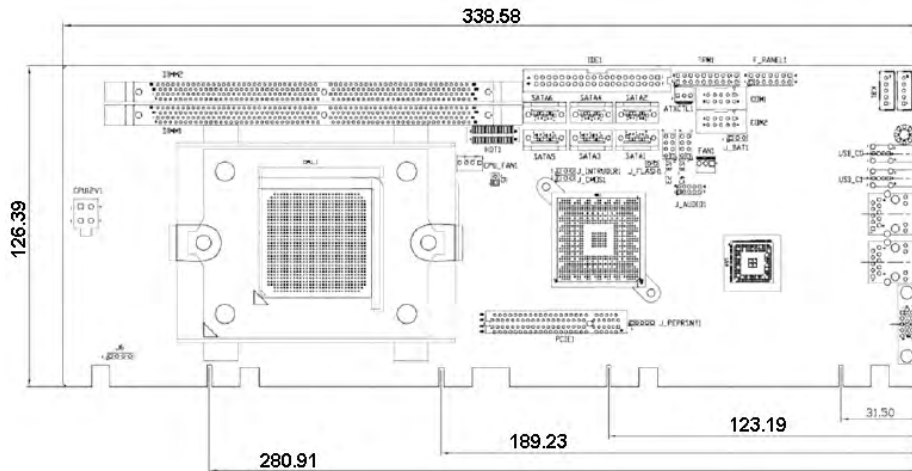
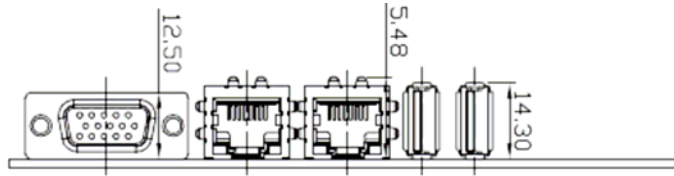


Figure 2-1: 3308160 Dimensions (mm)

### **2.1.2 External Interface Panel Dimensions**

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



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

## **2.2 Data Flow**

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



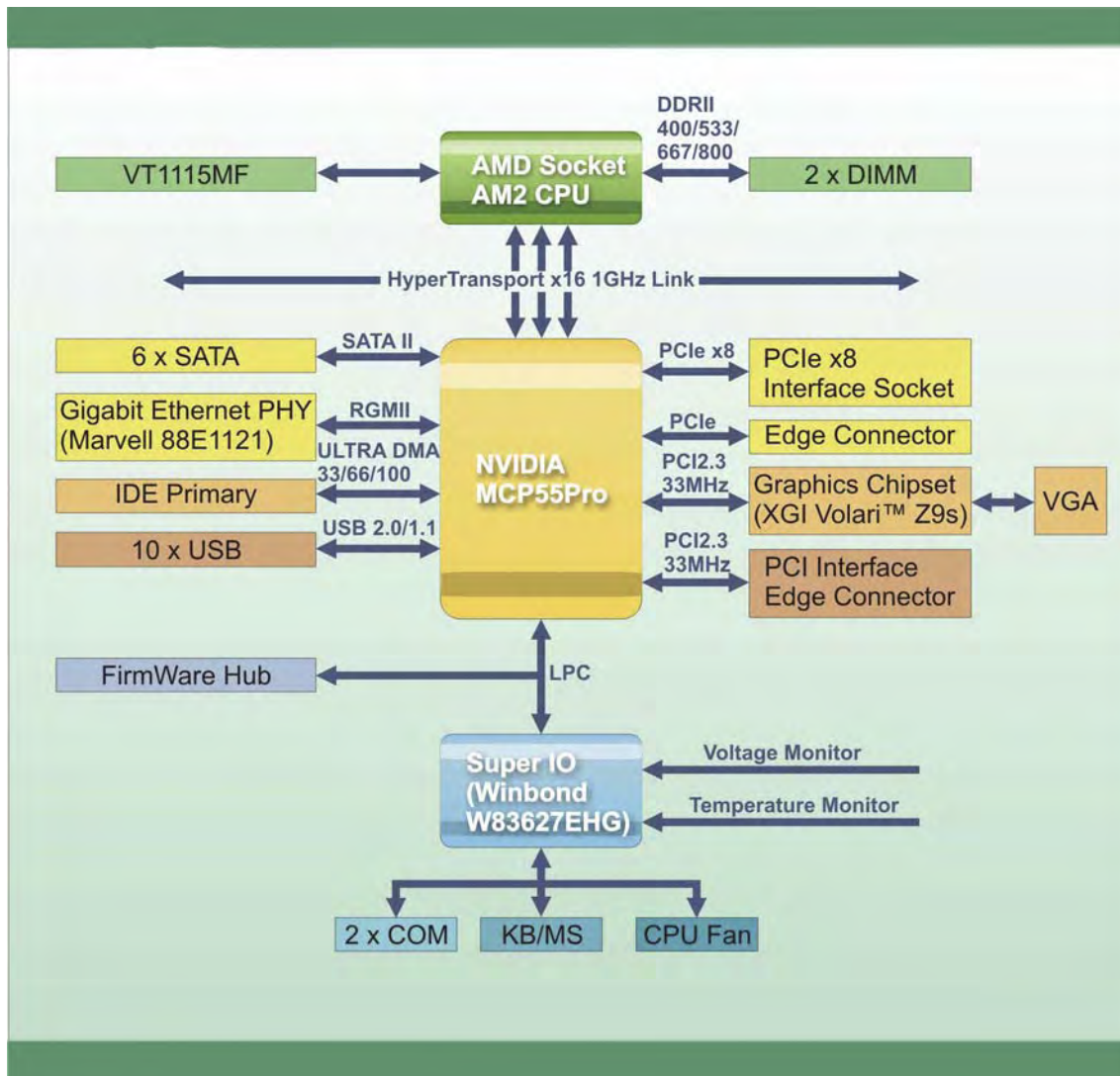


Figure 2-3: Data Flow Block Diagram

## 2.3 Compatible Processors

### 2.3.1 Supported Processors

The 3308160 supports the following AMD Socket S1 processors

- AMD Socket AM2 Opteron™
- AMD Socket AM2 Athlon™ 64 x2
- AMD Socket AM2 Athlon™ 64
- AMD Socket AM2 Sempron™

### 2.3.2 Processor Features

All the processors listed in the previous section support the following features:

- Compatible with existing 32-bit code base
  - Including support for SSE, SSE2, SSE3\*, MMX™, 3DNow!™ technology and legacy x86 instructions
  - Runs existing operating systems and drivers
  - Local APIC on-chip
- AMD64 technology
  - AMD64 technology instruction set extensions
  - 64-bit integer registers, 48-bit virtual addresses, 40-bit physical addresses
  - Eight additional 64-bit integer registers (16 total)
  - Eight additional 128-bit SSE registers (16 total)
- Machine check architecture
  - Includes hardware scrubbing of major ECC protected arrays

### 2.3.3 L1 and L2 Cache

The L1 cache on all the processors has the following features

- 64 KB two-way associative ECC protected L1 data cache
  - Two 64-bit operations per cycle, 3-cycle latency
- 64 KB two-way associative parity-protected L1 Instruction Cache

The L2 cache sizes for the processors are listed below:

Processor	L2 Cache Size
AMD Opteron™ (dual-core)	1024 KB per core
AMD Athlon™ 64 X2 (dual-core)	1024 KB or 512 KB per core
AMD Athlon™ 64 (single-core)	1024 KB, 512 KB or 256 KB
AMD Sempron™	256 KB or 128 KB

Table 2-1: Technical Specifications

### 2.3.4 DDR2 Memory Controller

All processors supported by the 3308160 CPU card have their own DDR2 memory controller. The DDR2 controller has the following features:

- Low-latency, high-bandwidth
- Supports up to two un-buffered DDR2 DIMM
- Each DIMM has a maximum capacity of 2GB
- Supports 800 MHz, 667 MHz, 533 MHz or 400 MHz DDR2 DIMM

The DDR2 controller on the processor is interfaced to two SO-DIMM sockets on the 3308160.

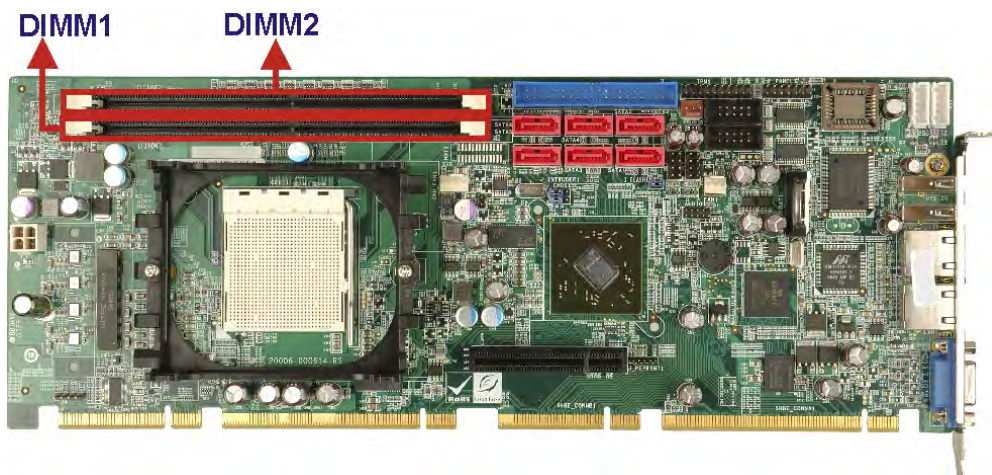


Figure 2-4: DIMM Sockets

### 2.3.5 Processor Power Management

The supported processors have the following power management features:

- Multiple low-power states
- System Management Mode (SMM)
- ACPI compliant, including support for processor performance states

The AMD Athlon™ 64 X2 additionally supports the power management features below.

- AMD PowerNow!™ technology is designed to dynamically switch between

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## 3308160 PICMG 1.3 CPU Card

multiple low-power states based on application performance requirements.

### 2.3.6 HyperTransport™ Technology

All the processors have one 16-bit link supporting speeds up to 800 MHz (1600 MTps) or 3.2 GBps in each direction. The HyperTransport™ Technology link is connected to the NVIDIA MCP55Pro system chipset described below and shown in **Figure 2-5**.

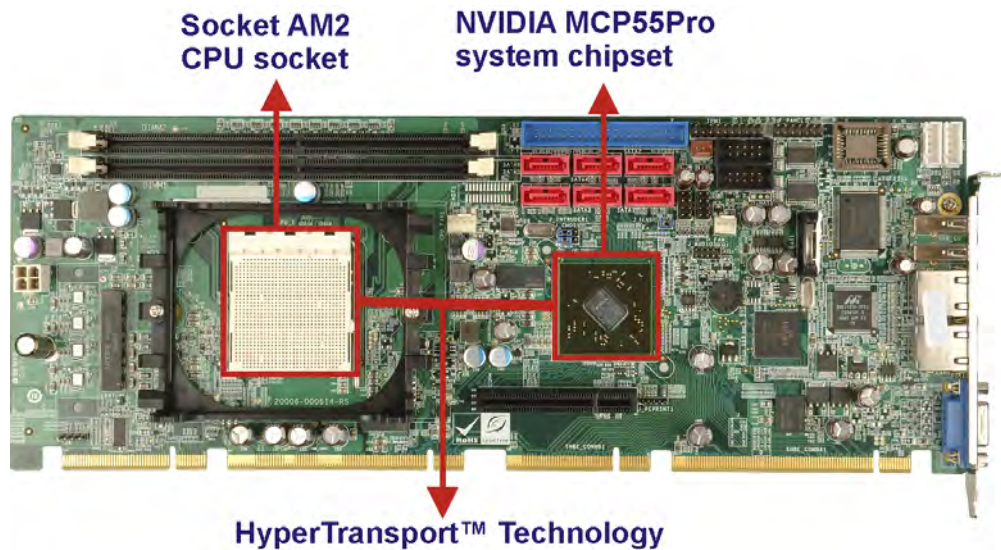


Figure 2-5: HyperTransport™ Technology Link

## 2.4 NVIDIA MCP55Pro

### 2.4.1 HyperTransport™ Link

A 1.0 GHz HyperTransport™ x16 bus interfaces the NVIDIA MCP55Pro to the AMD Socket AM2 processor (see **Figure 2-5**) installed on the 3308160. Some of the features of the HyperTransport™ link are listed below:

- High-speed, differential, low voltage interface
- Total bandwidth up to 1.0 GHz for a total bandwidth of 8.0 GBps
- Supports coherent and non-coherent data types
- Supports isochronous and non-isochronous data channels
- Supports real-time link reconnect/disconnect
- Generates Sync Flood on detection of uncorrectable errors in the system

- Clock spread spectrum capability

### 2.4.2 PCI Express Interface

#### 2.4.2.1 PCIe Express Overview

The NVIDIA MCP55Pro PCIe bus is compliant with the PCI Express 1.1a Specifications. The PCIe bus supports 2.5 GHz data transfers with a total transmission rate of 2.5 Gbps per direction per lane. There are a total of 28 PCIe lanes that can be configured in the following way

- x16, x8, x1, x1, x1, x1
- x16, x8, x4
- x16, x8, x4, x2, x2
- x8, x8, x4, x4, x4
- x8, x8, x8, x4
- x8, x4, x4, x4, x4, x4

Twenty PCIe lanes are interfaced to the backplane through the standard PCIe x16 and PCIe x4 edge connector on the bottom of the board. The remaining eight lanes are interfaced from a PCIe x8 slot connector on the 3308160 to a corresponding PCIe x8 slot connector on the backplane with a specially designed separately purchased PCIe cable.

#### 2.4.2.2 PCIe x16 Expansion

The PICMG 1.3 form factor specification requires that 16 PCIe lanes are interfaced to the backplane through a standard edge connector on the bottom of the CPU card. The 3308160 PCIe x16 edge connector is shown in **Figure 2-6** below.

## 3308160 PICMG 1.3 CPU Card

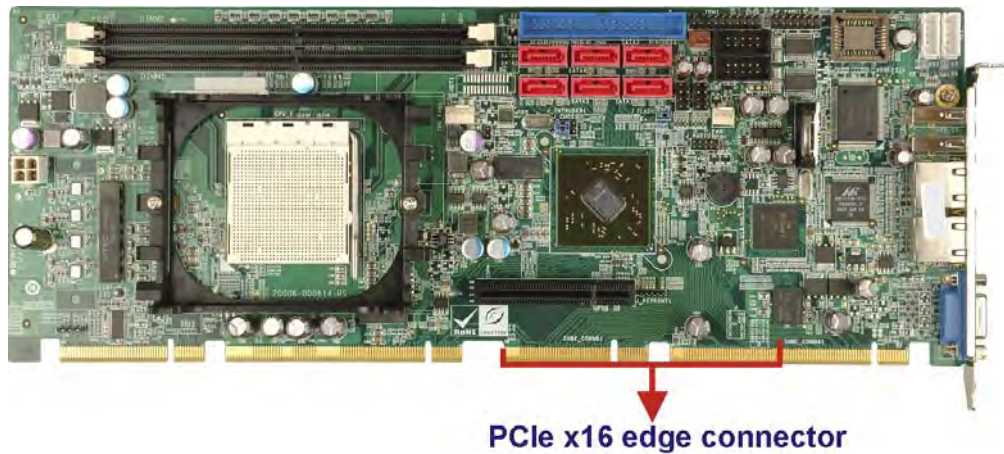


Figure 2-6: PCIe x16 Edge Connector

### 2.4.2.3 PCIe x1 Edge Connector

The PICMG 1.3 form factor specification requires that four PCIe x1 lanes are interfaced to the backplane through a standard edge connector on the bottom of the CPU card. The 3308160 PCIe x1 edge connector is shown in **Figure 2-7** below.

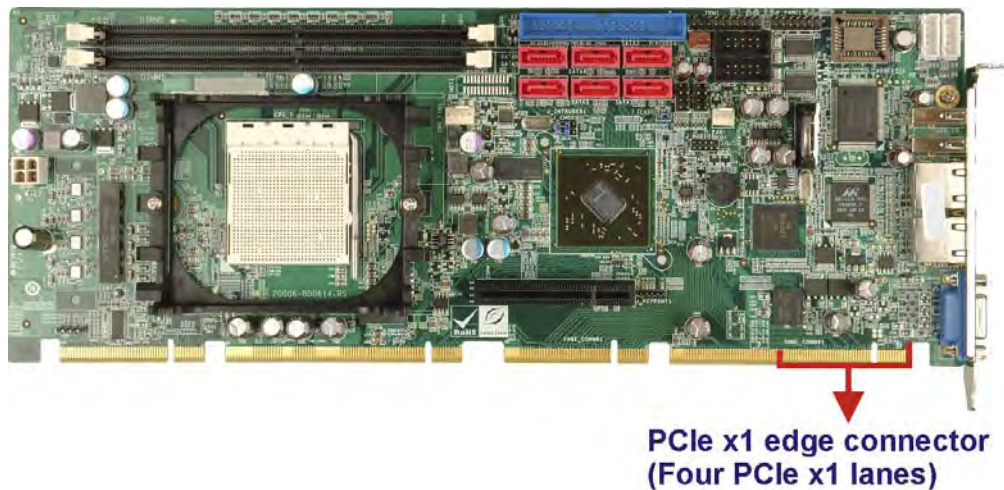


Figure 2-7: PCIe x1 Edge Connector

### 2.4.2.4 PCIe x8 Expansion Connector

The remaining eight PCIe x1 lanes from the NVIDIA MCP55Pro system chipset are interfaced to an on-board PCIe x8 expansion connector. A PCIe x8 board-to-board

---

## 3308160 PICMG 1.3 CPU Card

connector interface is used to connect the PCIe x8 on the 3308160 CPU card to a corresponding PCIe x8 expansion connector on the backplane. The PCIe x8 expansion connector is shown in below.

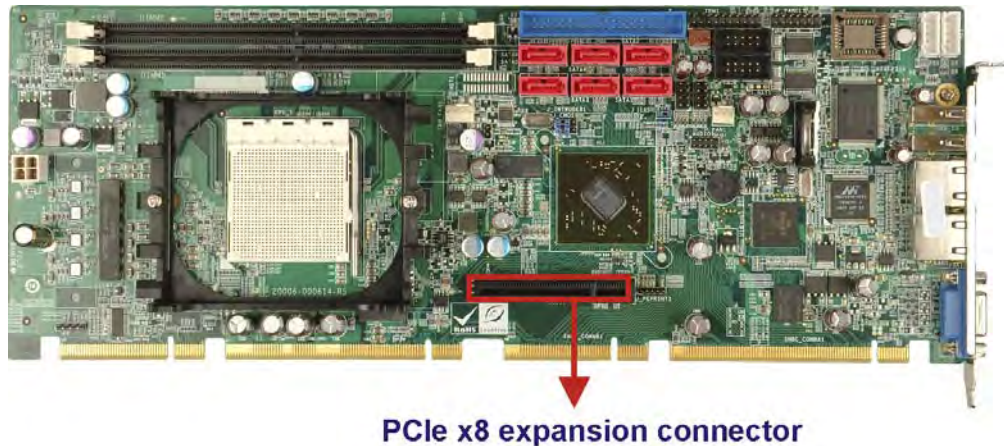


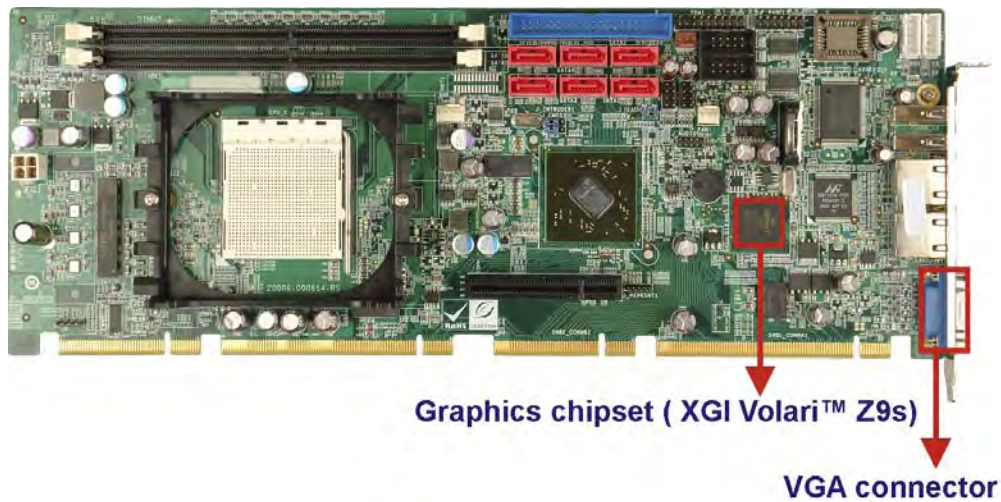
Figure 2-8: PCIe x8 Expansion Connector

### 2.4.3 XGI Volari™ Z9s Graphics Chipset

#### 2.4.3.1 Graphics Chipset Overview

An ultra low power XGI Volari™ Z9s graphics chipset capable of providing VGA display output up to 1600x1200 is interfaced through one of the five PCI lanes to the NVIDIA MCP55Pro. The XGI Volari™ Z9s is then connected to an external DB-15 VGA connector. The graphics controller and the VGA connector are shown in **Figure 2-9**.

## 3308160 PICMG 1.3 CPU Card



**Figure 2-9: Graphics Controller and VGA Connector**

### 2.4.3.2 Resolution, Color and Frame Rate

The XGI Volari™ Z9s chipsets supports monitors with the following resolutions, colors and frame rates.

- 230 MHz pixel clock supported
- VESA standard super high resolution graphics modes supported:
  - 640 x 480 16/256/32K/64K/16M colors 160 Hz NI
  - 800 x 600 16/256/32K/64K/16M colors 160 Hz NI
  - 1024 x 768 256/32K/64K/16M colors 120 Hz NI
  - 1280 x 1024 256/32K/64K/16M colors 85 Hz NI
  - 1600 x 1200 256/32K/64K/16M colors 70 Hz NI
- Low resolution modes

### 2.4.3.3 High Performance 2D Accelerator

The XGI Volari™ Z9s chipsets has a sophisticated 2D accelerator with the following features.

- Built-in hardware command queue
- Built-in Direct Draw Accelerator
- Built-in GDI 2000 Accelerator
- Built-in an 1T pipelined 64-bit BITBLT graphics engine with the following



functions:

- 256 raster operations
- Rectangle fill
- Color expansion
- Enhanced color expansion
- Line-drawing with styled pattern
- Built-in bytes pattern registers
- Built-in 8x8 mask registers
- Rectangle clipping
- Transparent BitBlit with source and destination keys
- Source data in command queue Bitblt
- Supports memory-mapped, zero wait-state, burst engine write
- Built-in 64x64x2 bit-mapped mono hardware cursor
- Maximum 256MB frame buffer with linear addressing
- Built-in source read-buffer to minimize engine wait-state
- Built-in destination read-buffer to minimize engine wait-state

### 2.4.4 IDE Interface Controller

The IDE controller on the NVIDIA MCP55Pro is interfaced to a single 40-pin IDE connector on the 3308160 and connects to two HDD. The IDE controller specifications are listed below.

- 5V-tolerant interface with support for two devices (master and slave)
- Industry-standard PCI bus master IDE (BM-IDE) register set compliant with Microsoft BM-IDE drivers
- Supports Ultra DMA modes 6–0 (UltraDMA-133/100/66/33)
- Supports standard PIO modes 4-0
- Supports standard DMA modes 2-0
- Supports scatter-gather function

### 2.4.5 Intel® ICH6M IDE Interface

The integrated IDE interface on the ICH6M southbridge supports two IDE hard disks and ATAPI devices. PIO IDE transfers up to 16MB/s and Ultra ATA transfers of 100MB/s. The integrated IDE interface is able to support the following IDE HDDs:

## 3308160 PICMG 1.3 CPU Card

- Ultra ATA/133, with data transfer rates up to 133 MBps
- Ultra ATA/100, with data transfer rates up to 100 MBps
- Ultra ATA/66, with data transfer rates up to 66 MBps
- Ultra ATA/33, with data transfer rates up to 33 MBps

Specification	Ultra ATA/133	Ultra ATA/100	Ultra ATA/66	Ultra ATA/33
IDE devices	2	2	2	2
PIO Mode	0 – 4	0 – 4	0 – 4	0 – 4
PIO Max Transfer Rate	16.6 MBps	16.6 MBps	16.6 MBps	16.6 MBps
DMA/UDMA designation	UDMA 6	UDMA 3 - 4	UDMA 3 – 4	UDMA 2
DMA/UDMA Max Transfer	133 MBps	100 MBps	66 MBps	33 MBps
Controller Interface	5 V	5 V	5 V	5 V

Table 2-2: Supported HDD Specifications

The IDE connector is shown in **Figure 2-10** below.

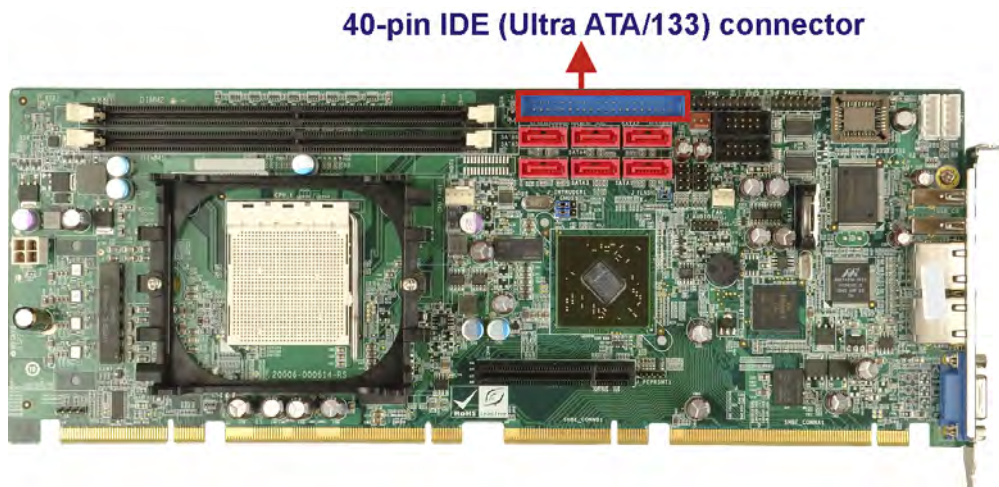


Figure 2-10: 40-pin IDE Connector

### 2.4.6 PCI Host Bus Controller

The NVIDIA MCP55Pro supports five PCI lanes. The PCI bus is compliant with the PCI Revision 2.3 implementation. Some of the features of the PCI interface are listed below.

## 3308160 PICMG 1.3 CPU Card

- PCI rev. 2.3 specifications
- 5.0 V tolerant
- Supports five external PCI slots at 33 MHz
  - PCI REQ/GNT pairs support
  - Five bus master arbitrations supported
- PCI master and slave interfaces
- Master-initiated and slave-initiated terminations supported
- Bidirectional write posting support for concurrency
- Flexible routing of all PCI interrupts
- PCI bus errors such as data parity, command parity, and target aborts can be programmed to generate Sync Flood on the HyperTransport interface
- Supports read ahead—memory read line (MRL) and memory read multiple (MRM)
- Clock spread spectrum capability

Four of the five PCI bus lanes are interfaced to the backplane through an edge connector on the bottom of the CPU card. The fifth PCI connector is interfaced to a PCI graphics controller (see above).

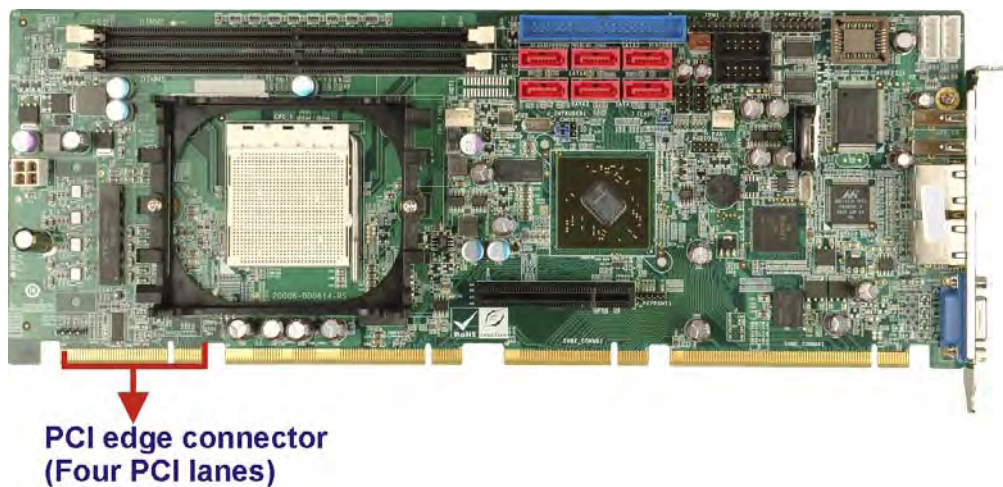


Figure 2-11: PCI Bus Edge Connector

### 2.4.7 SATA Controllers

Six 3.0 Gbps SATA II drives are supported by three independent SATA controllers. The SATA II controllers have the following features:

- Compliant with ATA/ATAPI-7 Volume 3
- Supports Native Command Queueing (NCQ)
- Supports Tagged Command Queueing (TCQ)
- High speed, low voltage, low pin count
- 3.0 Gbps transmissions in both directions
- Supports power-down capabilities
- Supports Serial ATA ATAPI devices
- Hot plug support
- Clock spread spectrum capability

The six SATA II controllers are shown in below:

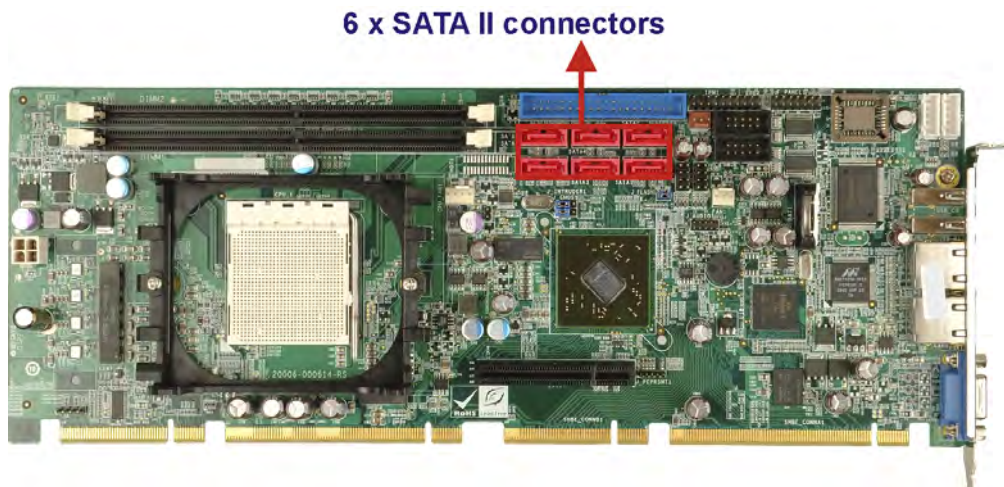


Figure 2-12: SATA II Connectors

### 2.4.8 USB Controllers

The NVIDIA MCP55Pro system chipset on the 3308160 supports up to ten high-speed, full-speed or low-speed USB devices. High-speed USB 2.0, with data transfers of up to 480 MBps and is enabled on the NVIDIA MCP55Pro by the integrated

## 3308160 PICMG 1.3 CPU Card

Enhanced Host Controller Interface (EHCI) compliant host controller. USB full-speed and low-speed signaling are enabled with the integrated Universal Host Controller Interface (UHCI) controllers.

Six of the ten USB ports are implemented on the 3308160 CPU card. The remaining four USB ports can be implemented on the backplane. The USB controller supports the following:

- USB 2.0 Enhanced Host Controller Interface (EHCI) and USB 1.1
- Open Host Controller Interface (OHCI) controllers (supports up to ten ports)
- Supports transfer rates at high speed (480 Mb/s), full speed (12 Mb/s), and low speed (1.2 Mb/s)
- High-speed devices default to EHCI
- Full speed and low speed devices automatically delegated to OHCI
- Allows USB concurrency
- Five over-current protection inputs
- Can be configured in any grouping

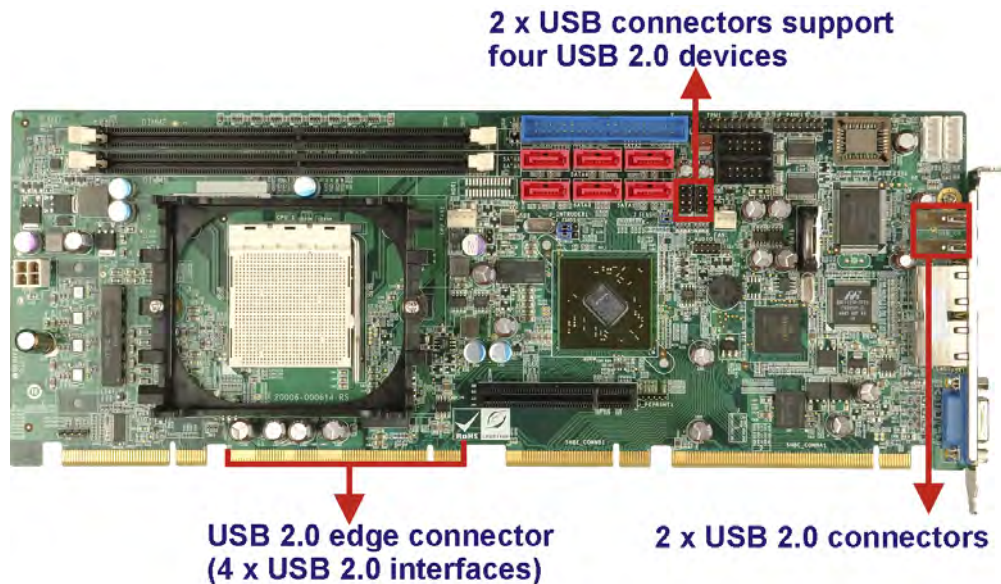


Figure 2-13: USB Connectors and USB Edge Connector

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## 3308160 PICMG 1.3 CPU Card

### 2.4.9 Gigabit Ethernet Connector

A media access controller (MAC) on the NVIDIA chipset is interfaced to a Marvell 88E1121 PHY through a Reduced Gigabit Media Independent Interface (RGMII). The Marvell 88E1121 PHY is a GbE controller and is interfaced to two external LAN connectors. The LAN connectors and the Marvell 88E1121 PHY are shown in **Figure 2-14**.



**Figure 2-14: LAN Connectivity**

### 2.4.10 LPC Bus

The NVIDIA MCP55Pro LPC bus is LPC revision 1.0 compatible and comes with the following specifications.

- Low Pin Count 1.0 compatible interface
- Integrated LPC bridge
- Subtractive decode
- LPC DMA mastering and supports two LPC DMA masters
- Serial interrupt protocol support
- Ability to disable LPC bridge when multiple MCP55Pro processors are present on the board

The LPC bus components are described in **Section 2.5** below.

### 2.4.11 SMBus Controller

The NVIDIA MCP55Pro has dual SMBus 2.0 Interfaces that have the following specifications.

- Supports System Management Bus (SMBus) host and slave
- Supports Address Resolution Protocol (ARP)
- Supports embedded controller (EC)

### 2.4.12 Interrupt Controller

The interrupt controller has the following features:

- Dual 8259 Programmable Interrupt Controllers (PICs) supports 15 interrupts (Interrupts generated by the PICs become output signals when MCP55Pro is configured as a slave device)
- 82093-compatible I/O Advanced Programmable Interrupt Controller (APIC) supports 24 interrupts
- PCI interrupt routing and masking
- Independent edge/level triggered interrupts
- Interrupt sharing for all internal devices

### 2.4.13 DMA Controller

The DMA controller has the following features.

- Dual 8237 supports seven independently programmable channels
- Standard page registers allow 24-bit addressing
- 8254 programmable interval timer counter based on 14.31818 MHz clock
- MC146818A/DS12887-compatible RTC with 512-byte battery backed-up RAM

### 2.4.14 HD Audio

The 3308160 on-board audio connector can connect to an optional audio kit through an on-board audio connector. The codec on the optional audio kit is connected to the NVIDIA MCP55Pro audio controller through the High Definition audio. Supported HD Audio features are listed below:

- High Definition Audio Specification 1.0 compliant
- Supports eight independent streams, four input and four output
- Supports up to 16 channels per stream
- Supports both 44.1 kHz and 48 kHz sample formats
- Supports streams with sample rates up to 192 kHz
- Supports streams with sample widths up to 32 bits
- High Definition Audio link supports up to three audio or modem codecs in any combination
- Compliant with Microsoft's Universal Audio Architecture (UAA) initiative
- Standard interface supported by Microsoft in-the-box audio drivers
- Independent DMA controllers for each stream
- All DMA controllers support 64-bit addressing and scatter-gather functionality

### 2.4.15 Timer and RTC (Real Time Clock)

The NVIDIA MCP55Pro system chipset supports the following:

- 8254 programmable interval timer counter based on 14.31818 MHz clock
- MC146818A/DS12887 compatible RTC with 512-byte battery backed-up RAM

## 2.5 LPC Bus Components

### 2.5.1 LPC Bus Overview

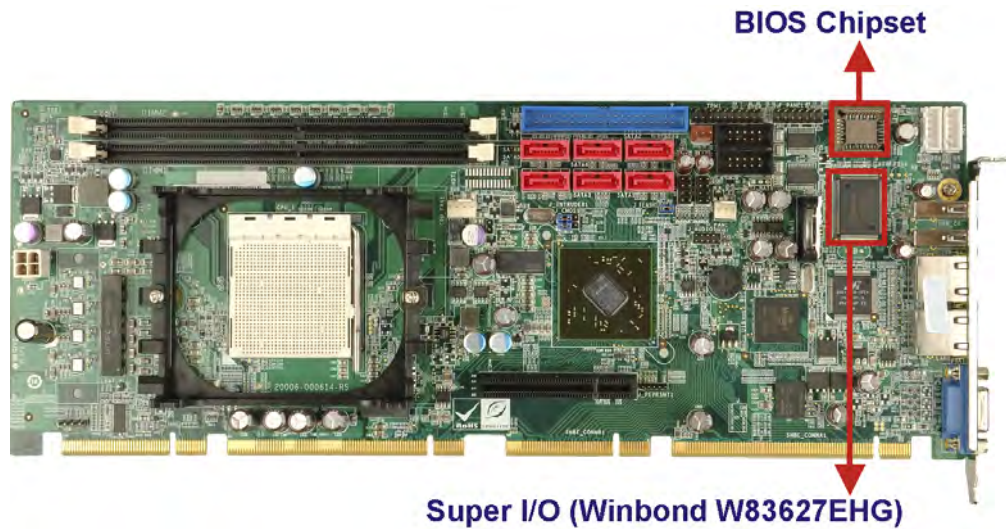
The LPC bus is connected to components listed below:

- BIOS chipset
- Super I/O chipset



---

## 3308160 PICMG 1.3 CPU Card



**Figure 2-15: LPC BUS Components**

### 2.5.2 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

### 2.5.3 Winbond W83627EHG Super I/O chipset

The Winbond W83627EHG Super I/O chipset is connected to the MCP55Pro system chipset through the LPC bus.

The Winbond W83627EHG is an LPC interface-based Super I/O device that comes with Environment Controller integration, floppy disk controller, 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

---

## 3308160 PICMG 1.3 CPU Card

- Hardware monitor functions integrated
- Microsoft PC2000/PC2001 Hardware Design Guide compliant
- ACPI DPM (Device Power Management) supported

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

### 2.5.3.1 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.

### 2.5.3.2 Super I/O UART Controller

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

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

### 2.5.3.3 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.

### 2.5.3.4 Super I/O Keyboard and Mouse Controller

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

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

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

### 2.5.3.5 Super I/O Fan Speed and Fan Control

The super I/O can both monitor and control the fan speed. The super I/O is interfaced to the fan on the backplane through the board-to-board connectors. These settings can be controlled by settings in the BIOS. See **Section 6.3.4.1: SMART FAN Control Configuration**.

## 2.6 Environmental and Power Specifications

### 2.6.1 System Monitoring

Three thermal inputs on the 3308160 Super I/O Enhanced Hardware Monitor monitor the following temperatures:

- CPU temperature
- System temperature

Five voltage inputs on the 3308160 Super I/O Enhanced Hardware Monitor monitors the following voltages:

---

## 3308160 PICMG 1.3 CPU Card

- Vcore
- DDR2
- DDR2\_IO
- +5.0 V
- +12 V
- 3VSB
- VBA

The 3308160 Super I/O Enhanced Hardware Monitor also monitors the following fan speeds:

- System Fan speed

The values for the above environmental parameters are all recorded in the BIOS Hardware Health Configuration menu. The system fan speeds can also be controlled in the BIOS.

### 2.6.2 Operating Temperature and Temperature Control

The maximum and minimum operating temperatures for the 3308160 are listed below.

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

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

### 2.6.3 Power Consumption

**Table 2-3** shows the power consumption parameters for the 3308160 running 3D Mark® 2001 SE with a AMD Sempron™ 3600+ processor and one 1 GB 667 MHz DDR2 SDRAM DIMM.

Voltage	Current
3.3 V	4.83 A
5.0 V	2.53 A
5.0 VSB	0.45 A
12.0 V	0.2 A
Vcore	5.98 A

**Table 2-3: Power Consumption**

## 2.7 Expansion Options

### 2.7.1 Expansion Options Overview

A number of compatible GAI Technology Corp. PICMG 1.3 backplanes and chassis can be used to develop and expanded system. These backplanes and chassis are listed below.

### 2.7.2 GAI Expansion PICMG 1.3 Backplanes

The backplanes listed in **Table 2-4** are compatible with the 3308160 and can be used to develop highly integrated industrial applications. All of the backplanes listed below have 24-pin ATX connector and a 4-pin ATX connector. For more information about these backplanes please consult the GAI sales.

### 2.7.3 GAI Chassis

GAI chassis available for 3308160 system development are listed in Table 2-5. For more information about these chassis please contact Global American, Inc.



All the PCIe x16 slots in the **Table 2-4** only have PCIe x8 signals transmitted to them and **NOT** PCIe x16 signals.

---

## 3308160 PICMG 1.3 CPU Card

Model	Total Slots	System	Expansion Slots					System Type
			PCIe			PCI-X	PCI	
			x16	x4	x1			
1108160	4	One	2	1	-	-	-	Single
1108170	6	One	-	5	-	-	-	Single
1108180	9	One	2	3	-	-	3	Single
1108190	9	One	2	2	-	2	2	Single
1108200	14	One	1	-	12	-	-	Single

Table 2-4: Compatible GAI PICMG 1.3 Backplanes

### 2.7.3 GAI Chassis

GAI chassis available for 3308160 system development are listed in **Table 2-5**. For more information about these chassis please contact your [Global American, Inc.](#)

Model	Slot SBC	Mounting	Max Slot	Backplanes
1401422	Full-size	Wall	6	1108160 1108170
1404540	Full-size	Wall	6	1108160 1108170
1401412	Full-size	Wall	10	1108180 1108190
1407660	Full-size	Wall	6	1108160 1108170

Table 2-5: Compatible GAI Chassis

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Chapter

**3**

# Unpacking

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## 3.1 Anti-static Precautions

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### WARNING:

Failure to take ESD precautions during the installation of the 3308160 may result in permanent damage to the 3308160 and severe injury to the user.

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Electrostatic discharge (ESD) can cause serious damage to electronic components, including the 3308160. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the 3308160, 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 3308160, place it on an anti-static pad. This reduces the possibility of ESD damaging the 3308160.
- **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 3308160 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 3308160 does not fall out of the box.
- Make sure all the components shown in **Section 3.3** are present.

### 3.3 Unpacking Checklist

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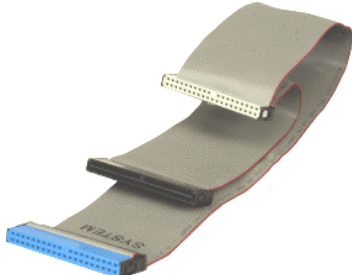

#### NOTE:

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 3308160 from or contact an GAI sales representative directly.

---




#### 3.3.1 Package Contents

The 3308160 is shipped with the following components:

Quantity	Item and Part Number	Image
1	3308160	
1	ATA 66/100 flat cable	
1	Dual RS-232 cable	

---

## 3308160 PICMG 1.3 CPU Card

6	SATA cables	
3	SATA power cables	
1	Mini jumper Pack	
1	Quick Installation Guide	
1	Utility CD	
1	USB cable (P/N:1207793)	

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

## 3308160 PICMG 1.3 CPU Card

### 3.4 Optional Items

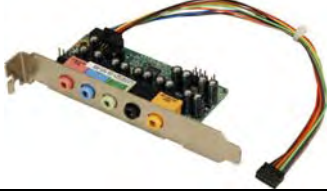


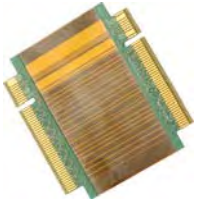



Audio kit (P/N: 1007760)	 A small green printed circuit board (PCB) with various electronic components, including resistors and capacitors. It has several colored jacks (red, green, blue, yellow) and a multi-colored ribbon cable attached to one end.
CPU cooler (P/N: 2107702)	 A black CPU cooler with a square fan on top and a metal heat sink base. It has four mounting brackets on the sides.
CPU cooler	 A smaller black CPU cooler with a square fan and a metal heat sink base, similar in design to the previous one but more compact.
PCIe x8 board-to-board connector	 A gold-plated PCIe x8 board-to-board connector. It consists of a green PCB with a gold-plated edge connector on one side and a multi-pin connector on the other.
PS2 cable for KB and MS	 A small white plastic component with a multi-pin connector on one side and a PS2 cable on the other.
Winbond TPM module (P/N: 1007810)	 A green printed circuit board (PCB) with a black integrated circuit (IC) in the center. It has several pins along the bottom edge.
Infineon TPM module (P/N: 1007790)	 A green printed circuit board (PCB) with a black integrated circuit (IC) in the center. It has several pins along the bottom edge, similar to the Winbond module.

Table 3-2: Package List Contents

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Chapter

4

# Connector Pinouts

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## 4.1 Peripheral Interface Connectors

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

### 4.1.1 3308160 Layout

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

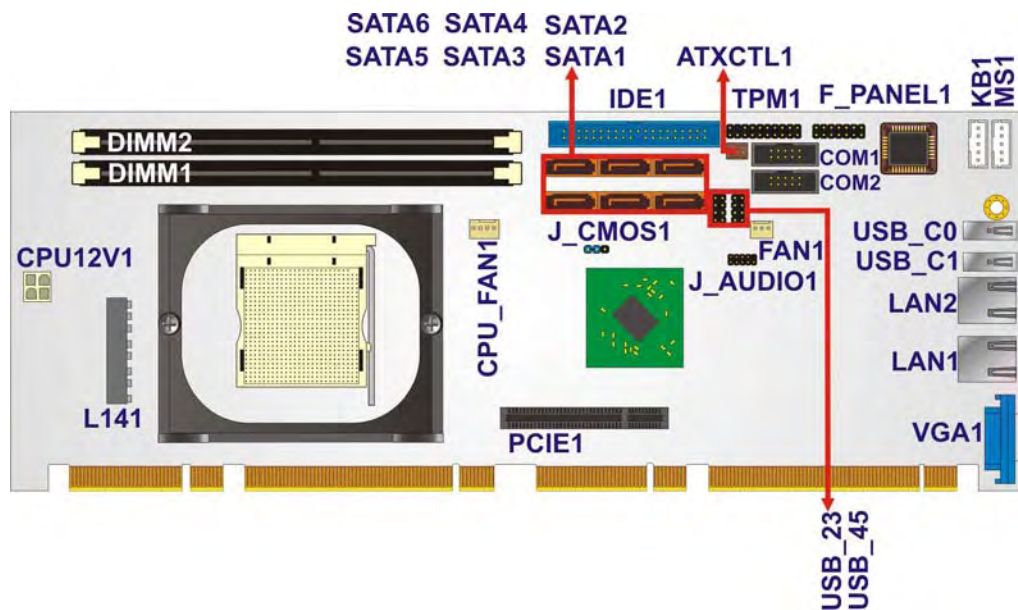


Figure 4-1: Connector and Jumper Locations

### 4.1.2 Peripheral Interface Connectors

Table 4-1 shows a list of the peripheral interface connectors on the 3308160.

Detailed descriptions of these connectors can be found below.

Connector	Type	Label
ATX power supply enable connector	3-pin wafer	ATXCTL1
Audio connector	10-pin header	J_AUDIO1
Cooling fan connector, CPU	4-pin wafer	CPU_FAN1
Front panel connector	10-pin header	F_PANEL1

## 3308160 PICMG 1.3 CPU Card

IDE Interface connector	40-pin box header	IDE1
Keyboard connector	5-pin wafer	KB1
Mouse connector	5-pin wafer	MS1
Serial ATA drive connector	7-pin SATA	SATA1
Serial ATA drive connector	7-pin SATA	SATA2
Serial ATA drive connector	7-pin SATA	SATA3
Serial ATA drive connector	7-pin SATA	SATA4
Serial ATA drive connector	7-pin SATA	SATA5
Serial ATA drive connector	7-pin SATA	SATA6
Serial port connector (COM1)	10-pin box header	COM1
Serial port connector (COM2)	10-pin box header	COM2
TPM connector	20-pin header	TPM1
USB connectors	8-pin header	USB23
USB connectors	8-pin header	USB45

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

### 4.1.3 External Interface Panel Connectors

**Table 4-2** lists the rear panel connectors on the 3308160. Detailed descriptions of these connectors can be found in **Section 4.3** on **page 58**.

Connector	Type	Label
Ethernet connector	RJ-45	LAN1
Ethernet connector	RJ-45	LAN2
USB port connector	USB port	USB_C0
USB port connector	USB port	USB_C1
VGA connector	DB-15 (female)	VGA1

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



## **4.2 Internal Peripheral Connectors**

Internal peripheral connectors are found on the motherboard and are only accessible when the motherboard is outside of the chassis. This section has complete descriptions of all the internal, peripheral connectors on the 3308160.

### **4.2.1 ATX Power Supply Enable Connector**

<b>CN Label:</b>	ATXCTL1
<b>CN Type:</b>	3-pin wafer (1x3)
<b>CN Location:</b>	See <b>Figure 4-2</b>
<b>CN Pinouts:</b>	See <b>Table 4-3</b>

The ATX power supply enable connector enables the 3308160 to be connected to an ATX power supply. In default mode, the 3308160 can only use an AT power supply.

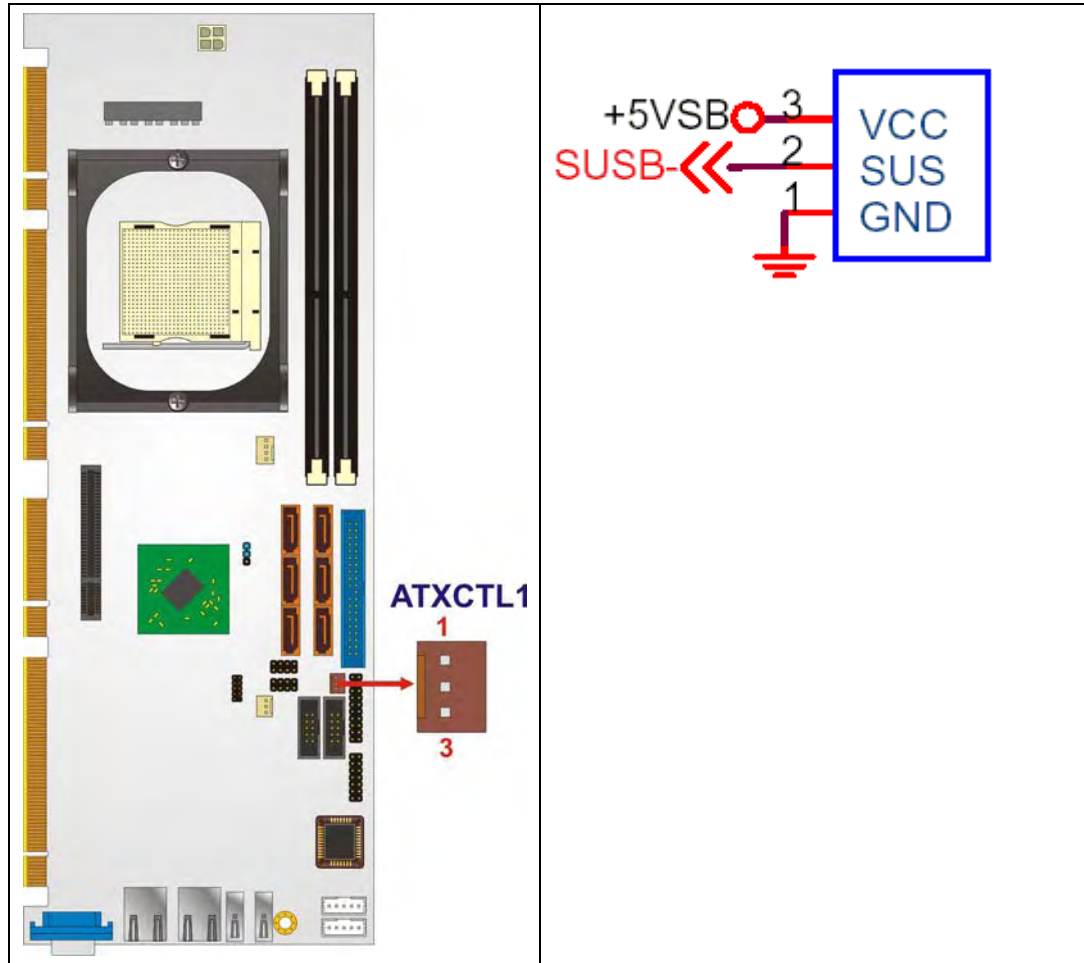


Figure 4-2: ATX Power Supply Enable Connector Location

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

Table 4-3: ATX Power Supply Enable Connector Pinouts

#### 4.2.2 Audio Connector

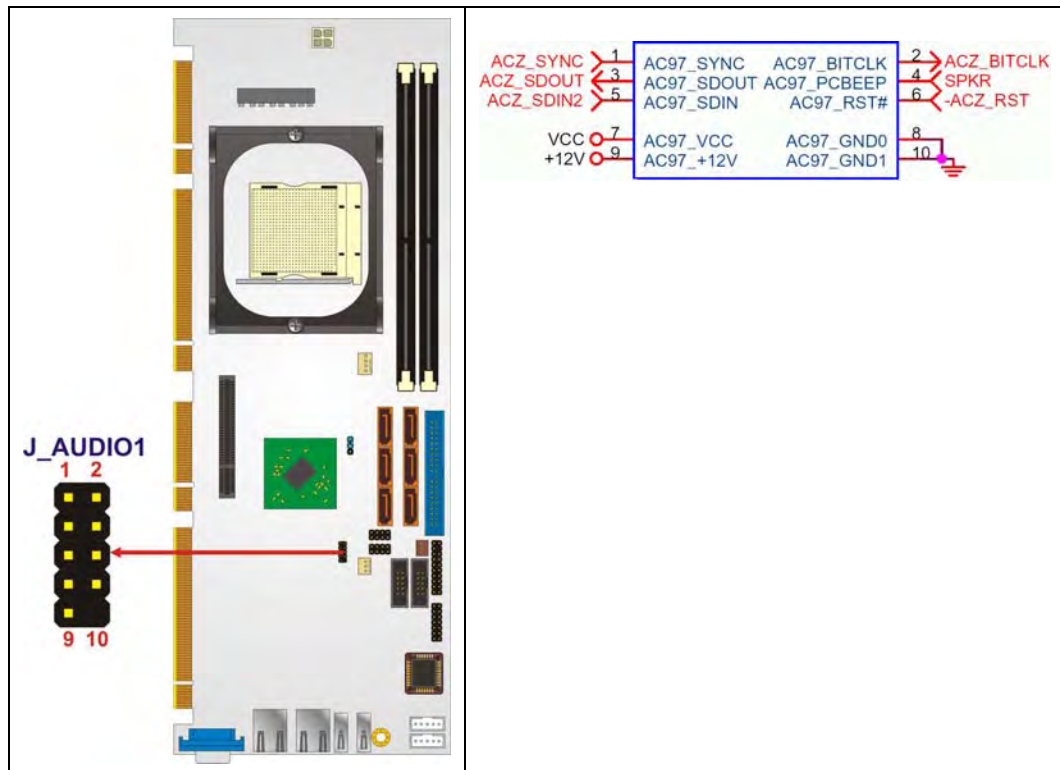
CN Label: J\_AUDIO1  
 CN Type: 10-pin header (2x5)

## 3308160 PICMG 1.3 CPU Card

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

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

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



**Figure 4-3: Audio Connector Location (9-pin)**

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	SYNC	2	BITCLK
3	SDOUT	4	PCBEEP
5	SDIN	6	RST#
7	VCC	8	GND
9	+12V	10	GND

**Table 4-4: Audio Connector Pinouts**

## 3308160 PICMG 1.3 CPU Card

### 4.2.3 Cooling Fan Connector (+12V, 4-pin)

<b>CN Label:</b>	CPU_FAN1
<b>CN Type:</b>	3-pin header
<b>CN Location:</b>	See <b>Figure 4-4</b>
<b>CN Pinouts:</b>	See <b>Table 4-5</b>

The cooling fan connector provides a 12V, 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.

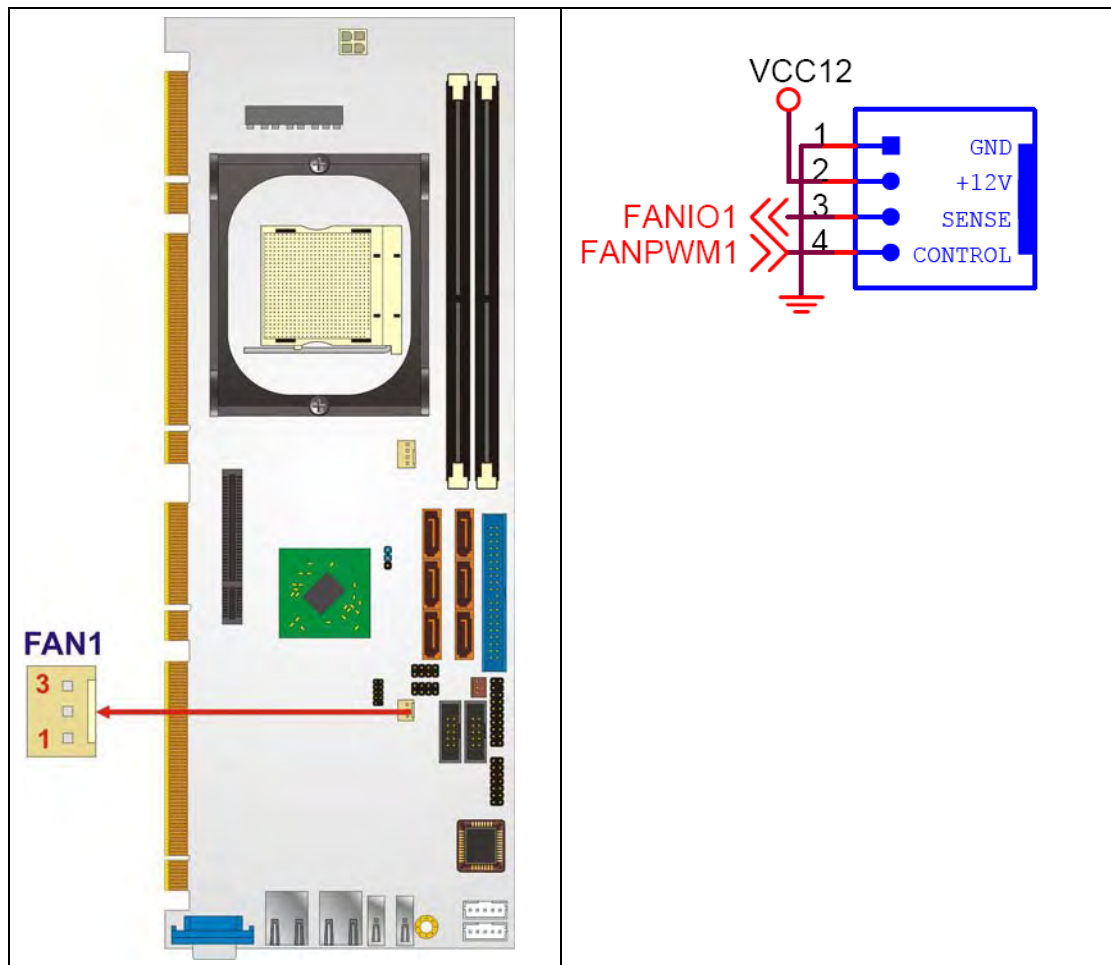


Figure 4-4: +12V Fan Connector Location

PIN NO.	DESCRIPTION
1	GND
2	+12VCC
3	Rotation Signal
4	Control

**Table 4-5: +12V Fan Connector Pinouts**

### 4.2.4 Front Panel Connector (14-pin)

<b>CN Label:</b>	F_PANEL1
<b>CN Type:</b>	12-pin header (2x6)
<b>CN Location:</b>	See <b>Figure 4-5</b>
<b>CN Pinouts:</b>	See <b>Table 4-6</b>

The front panel connector connects to external switches and indicators to monitor and controls the motherboard. These indicators and switches include:

- Power LED
- Speaker
- Power button
- Reset
- HDD LED

## 3308160 PICMG 1.3 CPU Card

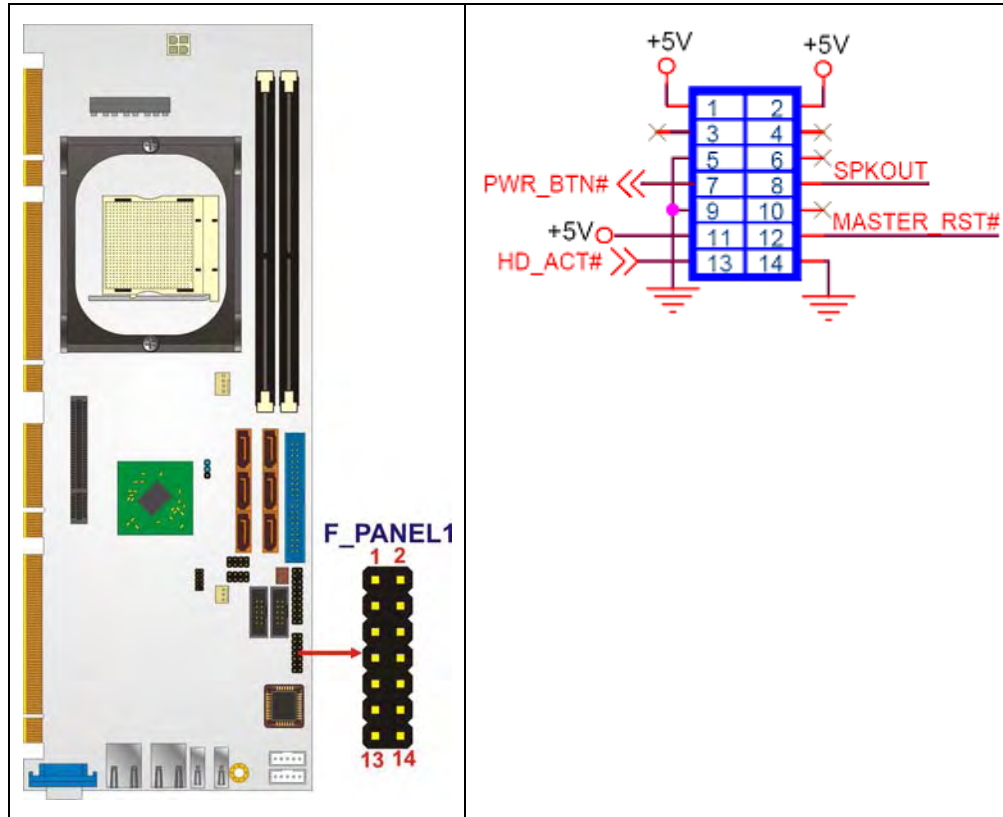


Figure 4-5: Front Panel Connector Pinout Locations (14-pin)

FUNCTION	PIN	DESCRIPTION	FUNCTION	PIN	DESCRIPTION
Power LED	1	VCC	Speaker	2	VCC
	3	N/C		4	N/C
	5	GND		6	N/C
Power Button	7	PWRBTSW+		8	SPEAKER
	9	PWRBTSW-	Reset	10	N/C
HDD LED	11	VCC		12	RESET-
	13	IDE LED-		14	GND

Table 4-6: Front Panel Connector Pinouts (14-pin)

## 4.2.5 IDE Connector (40-pin)

- CN Label:** IDE1
- CN Type:** 40-pin header (2x20)
- CN Location:** See Figure 4-6
- CN Pinouts:** See Table 4-7

One 40-pin IDE device connector on the 3308160 supports connectivity to two hard disk drives.

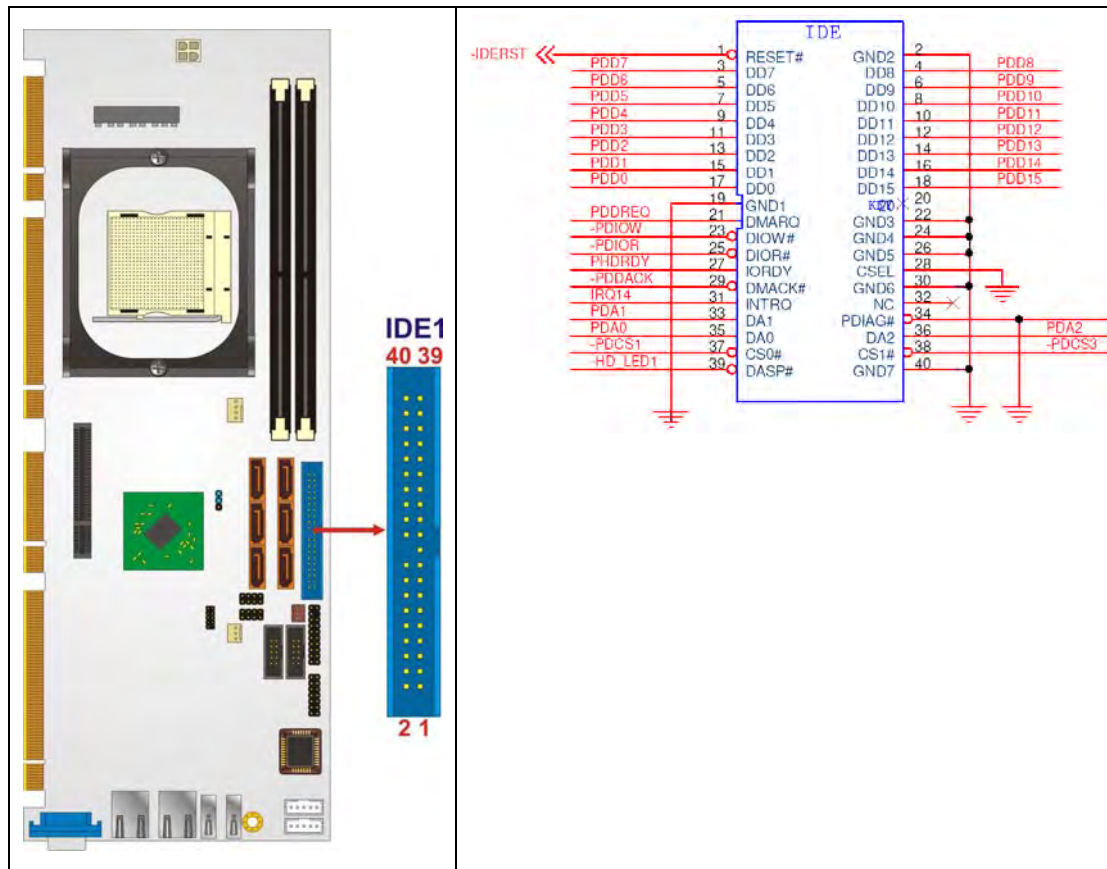


Figure 4-6: IDE Device Connector Locations

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	RESET#	2	GROUND
3	DATA 7	4	DATA 8
5	DATA 6	6	DATA 9
7	DATA 5	8	DATA 10
9	DATA 4	10	DATA 11
11	DATA 3	12	DATA 12
13	DATA 2	14	DATA 13
15	DATA 1	16	DATA 14
17	DATA 0	18	DATA 15
19	GROUND	20	N/C
21	IDE DRQ	22	GROUND
23	IOW#	24	GROUND
25	IOR#	26	GROUND
27	IDE CHRDY	28	GROUND
29	IDE DACK	30	GROUND-DEFAULT
31	INTERRUPT	32	N/C
33	SA1	34	N/C
35	SA0	36	SA2
37	HDC CS0#	38	HDC CS1#
39	HDD ACTIVE#	40	GROUND

Table 4-7: IDE Connector Pinouts

### 4.2.6 Keyboard Connector

CN Label:	KB1
CN Type:	5-pin header (1x5)
CN Location:	See Figure 4-7
CN Pinouts:	See Table 4-8



## 3308160 PICMG 1.3 CPU Card

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

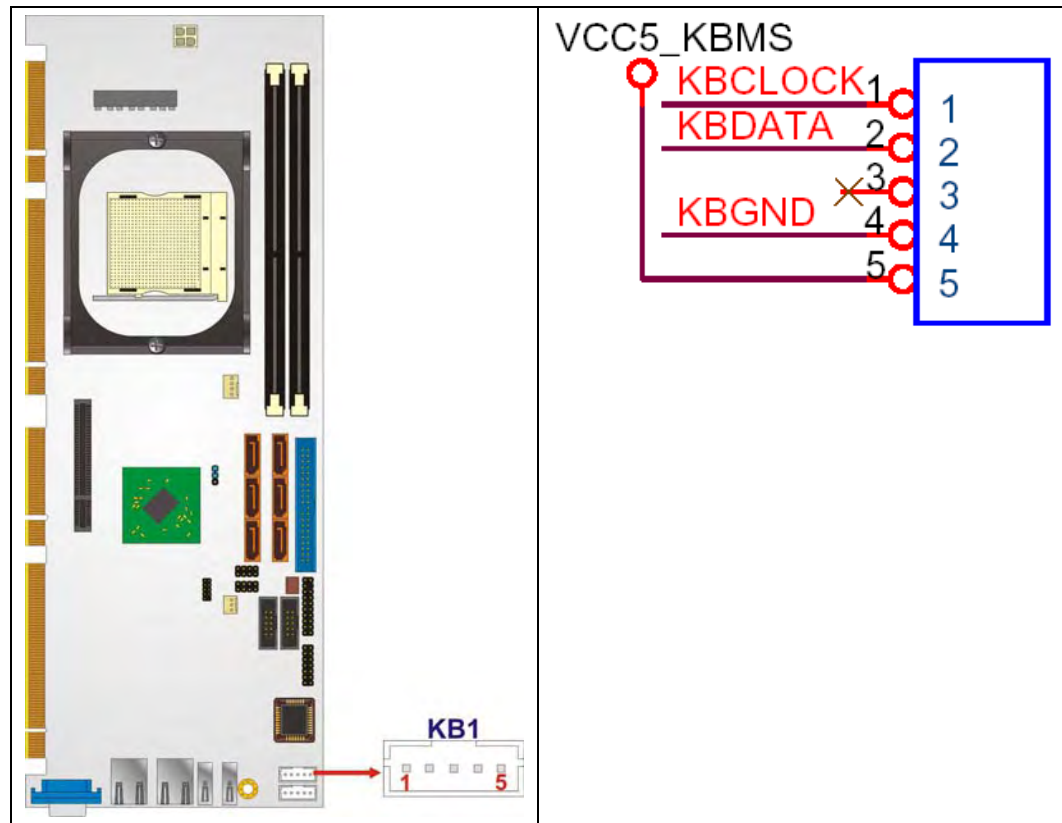


Figure 4-7: Keyboard Connector Location

PIN NO.	DESCRIPTION
1	KEYBOARD CLOCK
2	KEYBOARD DATA
3	N/C
4	GROUND
5	VCC

Table 4-8: Keyboard Connector Pinouts

### 4.2.7 Mouse Connector

CN Label: MS1

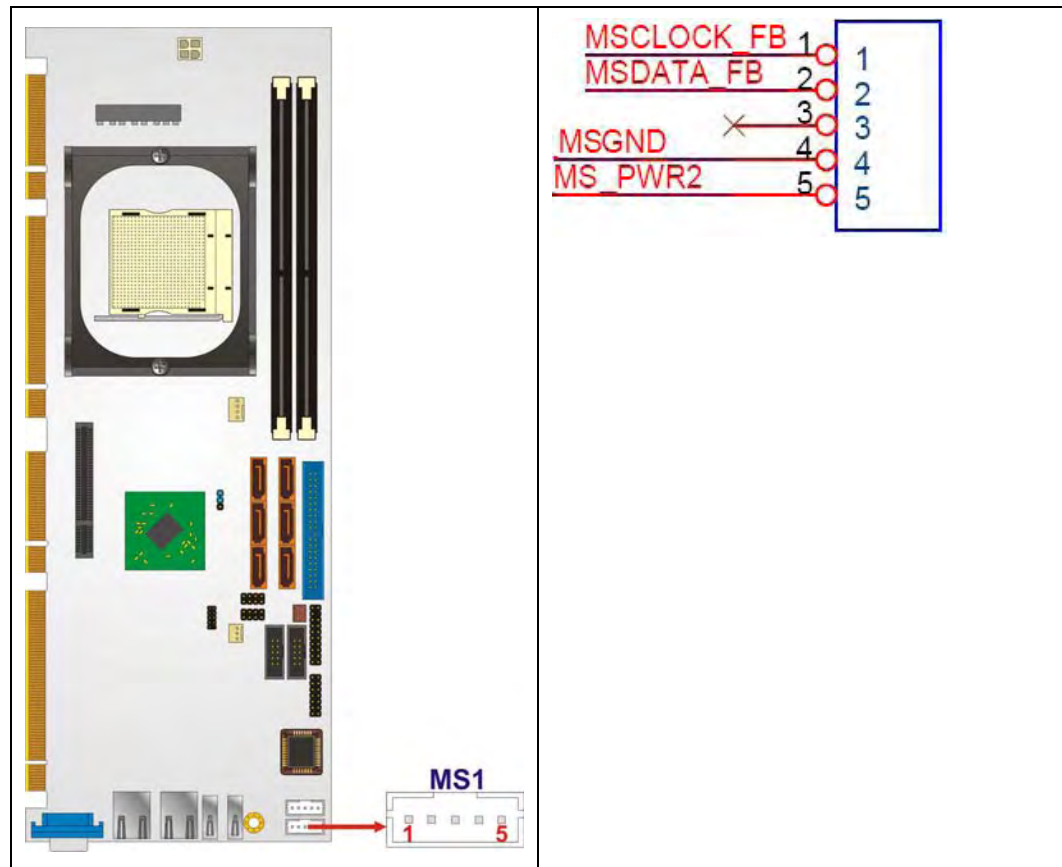
CN Type: 5-pin header (1x5)

## 3308160 PICMG 1.3 CPU Card

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

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

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



**Figure 4-8: Mouse Connector Location**

PIN NO.	DESCRIPTION
1	MOUSE CLOCK
2	MOUSE DATA
3	N/C
4	GROUND
5	VCC

**Table 4-9: Mouse Connector Pinouts**

### 4.2.8 SATA Drive Connectors

- CN Label:** SATA1, SATA2, SATA3, SATA4, SATA5 and SATA6
- CN Type:** 7-pin SATA drive connectors
- CN Location:** See Figure 4-9
- CN Pinouts:** See Table 4-10

The two SATA drive connectors are each connected to a first generation SATA drive. First generation SATA drives transfer data at speeds as high as 150Mb/s. The SATA drives can be configured in a RAID configuration.

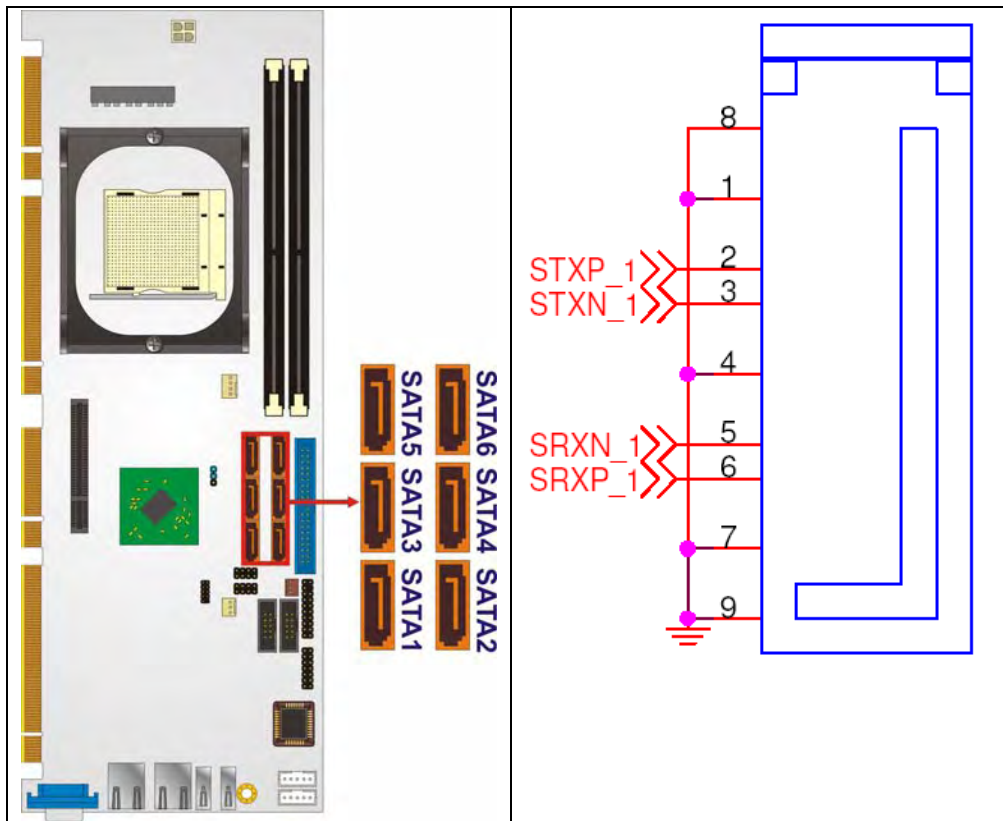


Figure 4-9: SATA Drive Connector Locations

PIN NO.	DESCRIPTION
1	GND
2	TX+

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## 3308160 PICMG 1.3 CPU Card

3	TX-
4	GND
5	RX-
6	RX+
7	GND

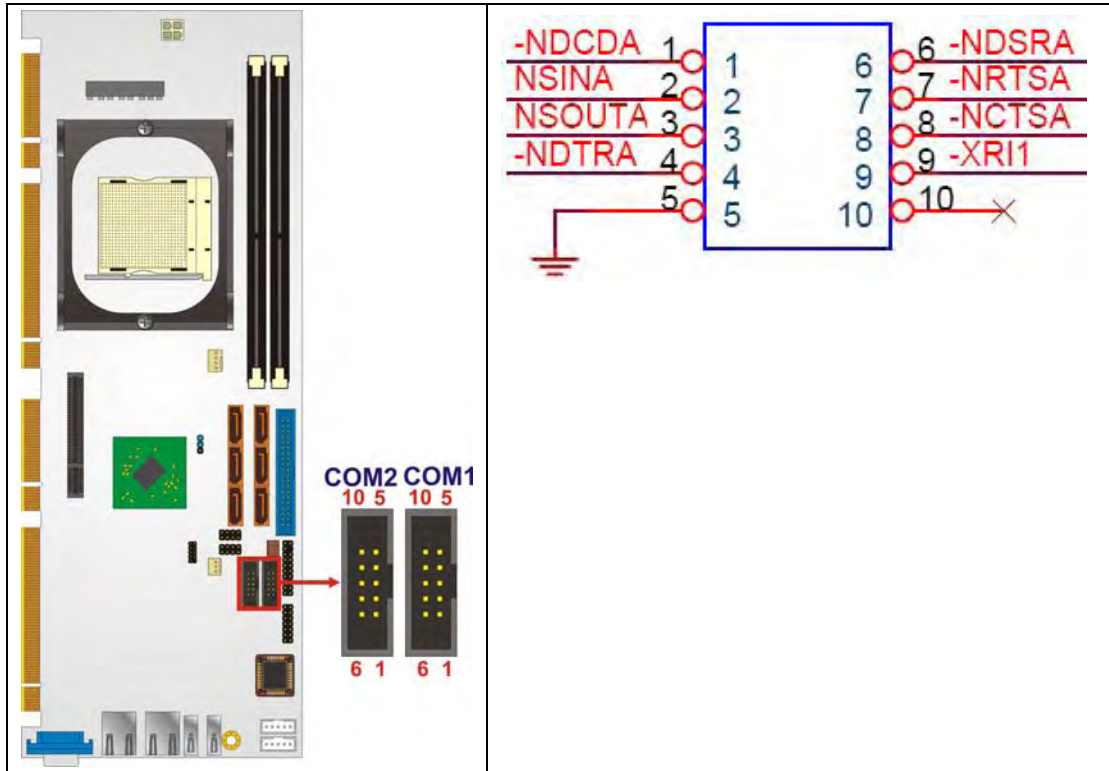
**Table 4-10: SATA Drive Connector Pinouts**

### 4.2.9 Serial Port Connector (COM1, COM 2)

<b>CN Label:</b>	COM1 and COM2
<b>CN Type:</b>	10-pin header (2x5)
<b>CN Location:</b>	See <b>Figure 4-10</b>
<b>CN Pinouts:</b>	See <b>Table 4-11</b>

The 10-pin serial port connector provides a second RS-232 serial communications channel. The COM 2 serial port connector can be connected to external RS-232 serial port devices.

## 3308160 PICMG 1.3 CPU Card



**Figure 4-10: Serial Connector Pinout Locations**

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	Data Carrier Direct (DCD)	2	Receive Data (RXD)
3	Transmit Data (TXD)	4	Data Terminal Ready (DTR)
5	Ground (GND)	6	Data Set Ready (DSR)
7	Request To Send (RTS)	8	Clear to Send (CTS)
9	Ring Indicator (RI)	10	N/C

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

### 4.2.10 Trusted Platform Module (TPM) Connector

- CN Label:** TPM1
- CN Type:** 40-pin header (2x20)
- CN Location:** See **Figure 4-11**
- CN Pinouts:** See **Table 4-12**

## 3308160 PICMG 1.3 CPU Card

The Trusted Platform Module (TPM) connector secures the system on bootup. An optional TPM (see packing list in **Chapter 3**) can be connected to the TPM connector.

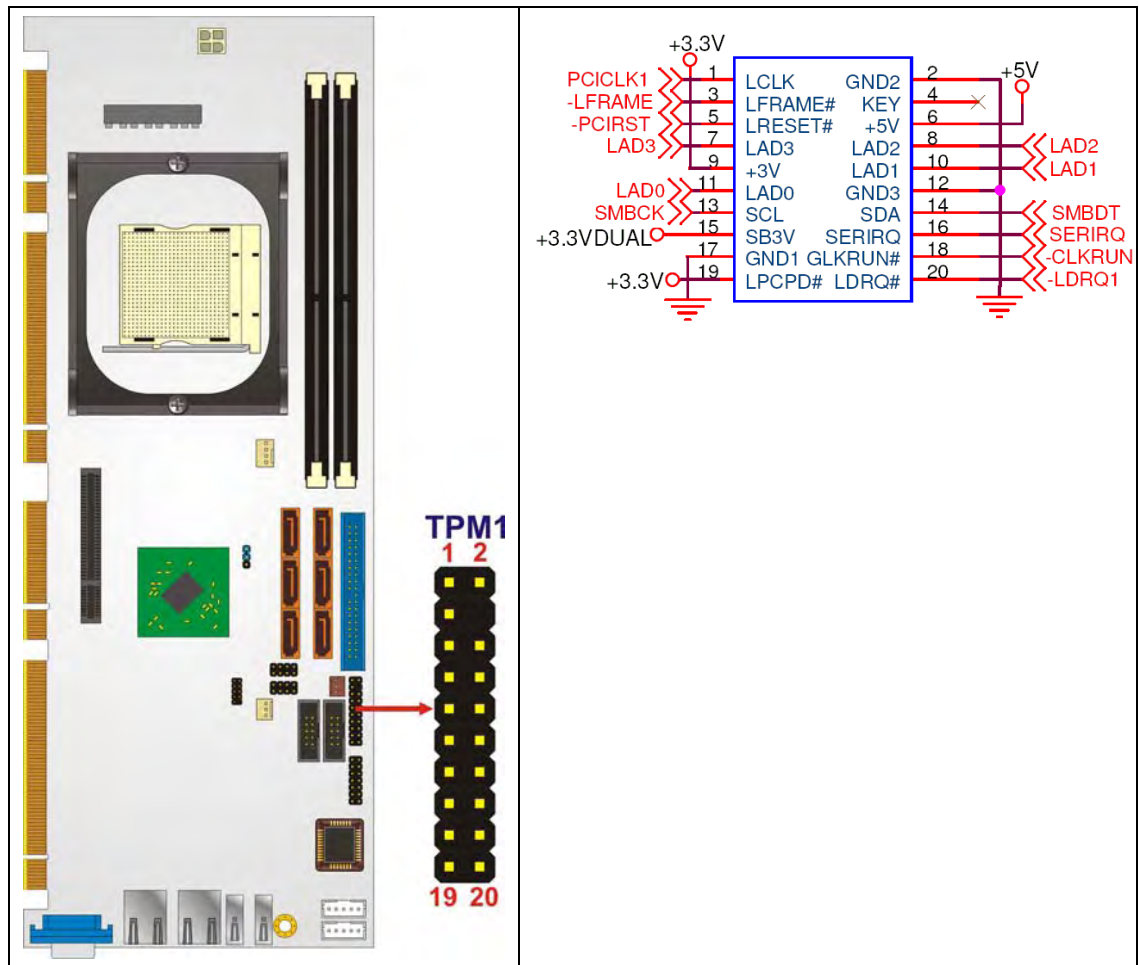


Figure 4-11: TPM Connector Pinout Locations

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	LCLK	2	GND2
3	LFRAME#	4	KEY
5	LRESET#	6	+5V
7	LAD3	8	LAD2
9	+3V	10	LAD1
11	LAD0	12	GND3
13	SCL	14	SDA

15	SB3V	16	SERIRQ
17	GND1	18	GLKRUN#
19	LPCPD#	20	LDRQ#

**Table 4-12: TPM Connector Pinouts**

### 4.2.11 USB Connectors (Internal)

**CN Label:** USB23 and USB45

**CN Type:** 8-pin header (2x4)

**CN Location:** See **Figure 4-12**

**CN Pinouts:** See **Table 4-13**

The 2x4 USB pin connectors each provide connectivity to two USB 1.1 or two USB 2.0 ports. Each USB connector can support two USB devices.. Additional external USB ports are found on the rear panel. The USB ports are used for I/O bus expansion.

## 3308160 PICMG 1.3 CPU Card

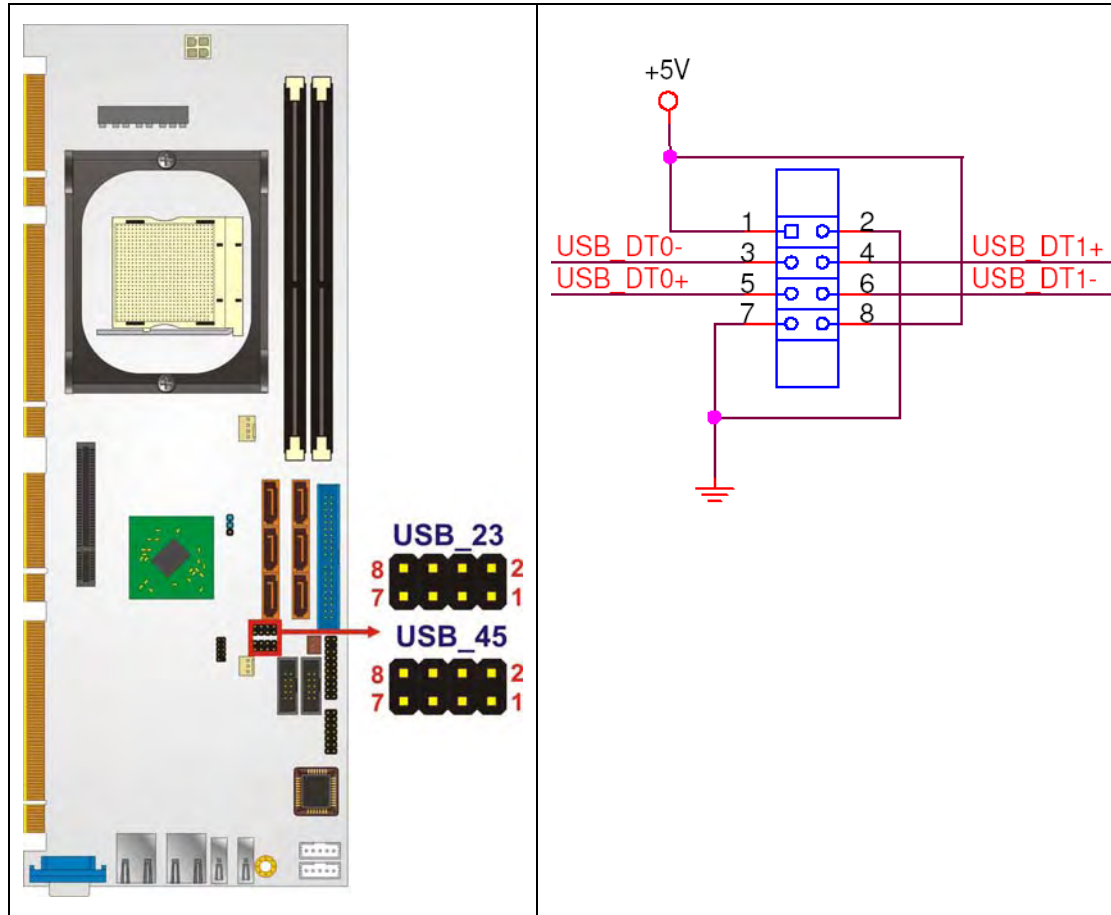


Figure 4-12: USB Connector Pinout Locations

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

Table 4-13: USB Port Connector Pinouts



### 4.3 External Peripheral Interface Connector Panel

Figure 4-13 shows the 3308160 external peripheral interface connector (EPIC) panel. The 3308160 EPIC panel consists of the following:

- 2 x RJ-45 LAN connectors
- 2 x USB connectors
- 1 x VGA connector

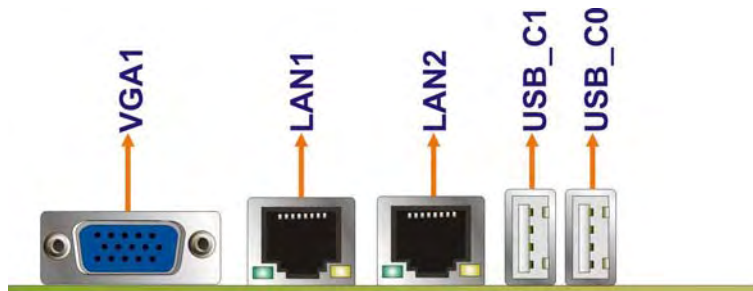


Figure 4-13: 3308160 External Peripheral Interface Connector

#### 4.3.1 LAN Connectors

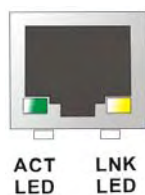
<b>CN Label:</b>	LAN1 and LAN2
<b>CN Type:</b>	RJ-45
<b>CN Location:</b>	See <b>Figure 4-13</b>
<b>CN Pinouts:</b>	See <b>Table 4-14</b>

The 3308160 is equipped with two built-in RJ-45 Ethernet controllers. The controllers can connect to the LAN through two RJ-45 LAN connectors. There are two LEDs on the connector indicating the status of LAN. The pin assignments are listed in the following table:

## 3308160 PICMG 1.3 CPU Card

PIN	DESCRIPTION	PIN	DESCRIPTION
1	MDIA3-	5	MDIA1+
2	MDIA3+	6	MDIA2+-
3.	MDIA2-	7	MDIA0-
4.	MDIA1-	8	MDIA0+

**Table 4-14: LAN Pinouts**



**Figure 4-14: RJ-45 Ethernet Connector**

The RJ-45 Ethernet connector has two status LEDs, one green and one yellow. The green LED indicates activity on the port and the yellow LED indicates the port is linked. See **Table 4-15**.

STATUS	DESCRIPTION	STATUS	DESCRIPTION
ORANGE	10/100 LAN	YELLOW	Linked
GREEN	GbE LAN		

**Table 4-15: RJ-45 Ethernet Connector LEDs**

### 4.3.2 USB Connector

<b>CN Label:</b>	USB_C0 and USB_C1
<b>CN Type:</b>	USB port
<b>CN Location:</b>	See <b>Figure 4-13</b>
<b>CN Pinouts:</b>	See <b>Table 4-16</b>

The 3308160 has four external USB 2.0 ports. The ports connect to both USB 2.0 and USB 1.1 devices.

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	USBV3L 5V	2	GND
3	USBP4N	4	USBP5P
5	USBP4P	6	USBP5N
7	GND	8	USBV3L 5V

Table 4-16: USB Port Pinouts

### 4.3.3 VGA Connector

- CN Label:** VGA1
- CN Type:** 15-pin Female
- CN Location:** See **Figure 4-13**
- CN Pinouts:** See Figure 4-15 and Table 4-17

The 3308160 has a single 15-pin female connector for connectivity to standard display devices.

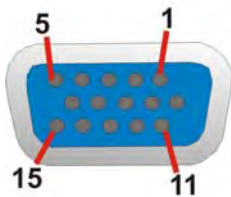


Figure 4-15: VGA Connector

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

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## 3308160 PICMG 1.3 CPU Card

PIN	DESCRIPTION	PIN	DESCRIPTION
13	HSYNC	14	VSYNC
15	DDCCLK		

Table 4-17: VGA Connector Pinouts

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Chapter

5

# Installation

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## 5.1 Anti-static Precautions

---



### WARNING:

Failure to take ESD precautions during the installation of the 3308160 may result in permanent damage to the 3308160 and severe injury to the user.

---

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the 3308160. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the 3308160, 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 3308160, place it on an anti-static pad. This reduces the possibility of ESD damaging the 3308160.
- **Only handle the edges of the PCB:-:** When handling the PCB, hold the PCB by the edges.

---

### 5.2 Installation Considerations

---



#### NOTE:

The following installation notices and installation considerations should be read and understood before the 3308160 is installed. All installation notices pertaining to the installation of the 3308160 should be strictly adhered to. Failing to adhere to these precautions may lead to severe damage of the 3308160 and injury to the person installing the motherboard.

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#### 5.2.1 Installation Notices

---



#### WARNING:

The installation instructions described in this manual should be carefully followed in order to prevent damage to the 3308160, 3308160 components and injury to the user.

---

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

- Read the user manual:
  - The user manual provides a complete description of the 3308160 installation instructions and configuration options.
- Wear an electrostatic discharge cuff (ESD):
  - Electronic components are easily damaged by ESD. Wearing an ESD cuff removes ESD from the body and helps prevent ESD damage.
- Place the 3308160 on an antistatic pad:
  - When installing or configuring the motherboard, place it on an antistatic pad. This helps to prevent potential ESD damage.
- Turn all power to the 3308160 off:



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## 3308160 PICMG 1.3 CPU Card

- When working with the 3308160, 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 3308160 **DO NOT**:

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

### 5.2.2 Installation Checklist

The following checklist is provided to ensure the 3308160 is properly installed.

- All the items in the packing list are present
- The CPU is installed
- The CPU cooling kit is properly installed
- A compatible memory module is properly inserted into the slot
- The jumpers have been properly configured
- The 3308160 is inserted into a chassis with adequate ventilation
- The correct power supply is being used
- The following devices are properly connected
  - Primary and secondary IDE device
  - SATA drives
  - Keyboard and mouse cable
  - Audio kit
  - Power supply
  - USB cable
  - Serial port cable
- The following external peripheral devices are properly connected to the chassis:
  - VGA screen
  - LAN

---

## 3308160 PICMG 1.3 CPU Card

- USB devices

### 5.3 Unpacking

#### 5.3.1 Unpacking Precautions

When the 3308160 is unpacked, please do the following:

- Follow the anti-static precautions outlined in **Section 5.1**.
- Make sure the packing box is facing upwards so the 3308160 does not fall out of the box.
- Make sure all the components in the checklist shown in **Chapter 3** are present.



#### NOTE:

If some of the components listed in the checklist in **Chapter 3** are missing, please do not proceed with the installation. Contact the GAI reseller or vendor you purchased the 3308160 from or contact an GAI sales representative directly.

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## 5.4 CPU, CPU Cooling Kit and DIMM Installation

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### **WARNING:**

A CPU should never be turned on without the specified cooling kit being installed. If the cooling kit (heat sink and fan) is not properly installed and the system turned on, permanent damage to the CPU, 3308160 and other electronic components attached to the system may be incurred. Running a CPU without a cooling kit may also result in injury to the user.

---

The CPU, CPU cooling kit and DIMM are the most critical components of the 3308160. If one of these components is not installed the 3308160 cannot run.

### 5.4.1 Socket AM2 CPU Installation

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### **WARNING:**

CPUs are expensive and sensitive components. When installing the CPU please be careful not to damage it in anyway. Make sure the CPU is installed properly and ensure the correct cooling kit is properly installed.

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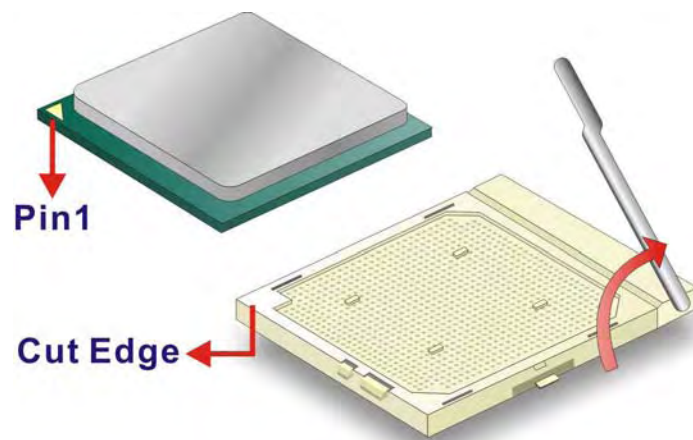
To install a socket AM2 CPU onto the 3308160, follow the steps below:



### WARNING:

When handling the CPU, only hold it on the sides. DO NOT touch the pins at the bottom of the CPU.

- Step 1:** Inspect the CPU socket. Make sure there are no bent pins and make sure the socket contacts are free of foreign material. If any debris is found, remove it with compressed air.
- Step 2:** Open the CPU socket lever. Disengage the load lever by moving the lever slightly outward to clear the retention tab. Rotate the load lever to a fully open position. See Figure 5-1.
- Step 3:** Orientate the CPU properly. Make sure the IHS (Integrated Heat Sink) side is facing upward. See Figure 5-1.
- Step 4:** Correctly position the CPU. Match the Pin 1 mark with the cut edge on the CPU socket. See Figure 5-1.

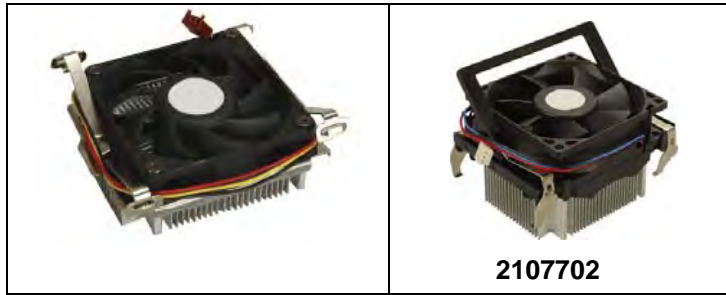


**Figure 5-1: Install the CPU**

- Step 5:** Insert the CPU. Gently insert the CPU into the socket. If the CPU pins are properly aligned, the CPU should slide into the CPU socket smoothly

**Step 6:** Close the CPU socket. Re-engage the load lever by pushing it back to its original position. Secure the load lever under the retention tab on the side of CPU socket.

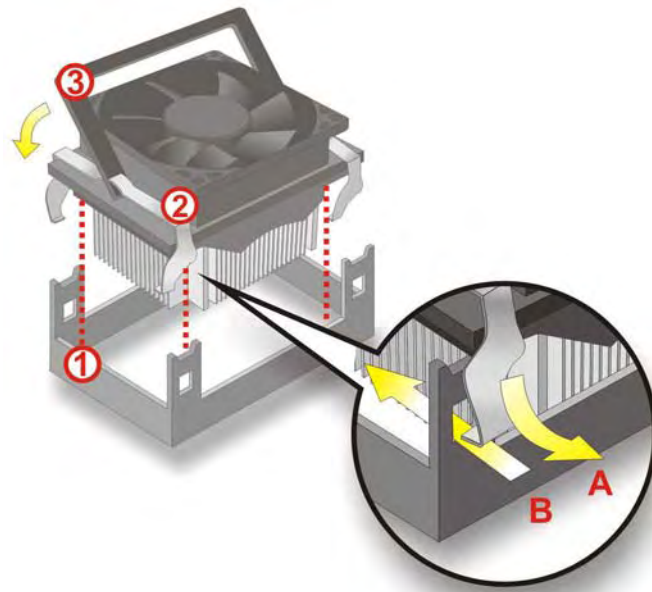
### 5.4.2 Socket AM2 Cooling Kit Installation



**Figure 5-2: GAI Cooling Kit**

An GAI AMD Socket AM2 CPU cooling kit (**Figure 5-2**) can be purchased separately. The cooling kit comprises a CPU heat sink and a cooling fan. To install the cooling kit, please follow the steps below.

- Step 1:** Spread a proper amount of thermal paste onto the bottom of the cooling fan heat sink. The thermal paste between the CPU and the heat sink is important for optimum heat dissipation.
- Step 2:** Properly orient the cooling kit. Be sure the cooling kit is properly oriented before installing the cooling kit into the preinstalled cooling kit bracket.
- Step 3:** Install the cooling kit into the preinstalled cooling kit bracket. See Figure 5-3.
- Step 4:** Attach the levered mounting clips. Slip the four levered mounting clips into the clip holes on the cooling kit bracket. See Figure 5-3.
- Step 5:** Secure the cooling kit in place. Gently push the plastic mounting clip down to lock the cooling kit. See Figure 5-3.



**Figure 5-3: Install the CPU cooler**

**Step 6:** Connect the fan cable. Connect the cooling kit fan cable to the fan connector on the CPU card. Carefully route the cable and avoid heat generating chips and fan blades.

### 5.4.3 DIMM Installation

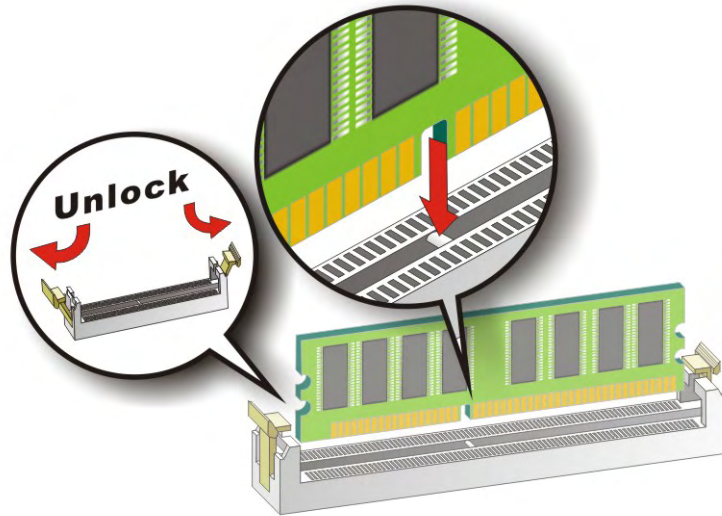


**WARNING:**

Using incorrectly specified DIMM may cause permanently damage the 3308160. Please make sure the purchased DIMM complies with the memory specifications of the 3308160. DIMM specifications compliant with the 3308160 are listed in **Chapter 2**.

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To install a DIMM into a DIMM socket, please follow the steps below and refer to **Figure 5-4**.



**Figure 5-4: Installing a DIMM**

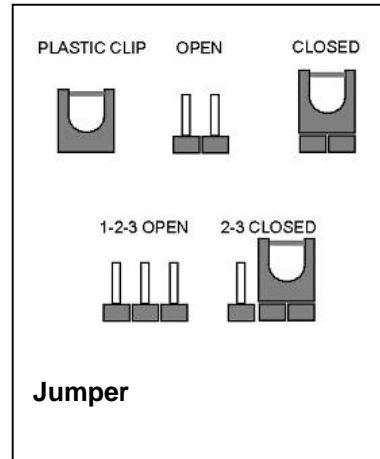
- Step 1:** Open the DIMM socket handles. The DIMM socket has two handles that secure the DIMM into the socket. Before the DIMM can be inserted into the socket, the handles must be opened. See **Figure 5-4**.
- Step 2:** Align the DIMM with the socket. The DIMM must be oriented in such a way that the notch in the middle of the DIMM must be aligned with the plastic bridge in the socket. See **Figure 5-4**.
- Step 3:** Insert the DIMM. Once properly aligned, the DIMM can be inserted into the socket. As the DIMM is inserted, the white handles on the side of the socket will close automatically and secure the DIMM to the socket. See **Figure 5-4**.
- Step 4:** Removing a DIMM. To remove a DIMM, push both handles outward. The memory module is ejected by a mechanism in the socket.

## 5.5 Jumper Settings



### NOTE:

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



Before the 3308160 is installed in the system, the jumpers must be set in accordance with the desired configuration. The jumpers on the 3308160 are listed in **Table 5-1**.

Description	Label	Type
Clear CMOS	J_CMOS1	3-pin header

**Table 5-1: Jumpers**

### 5.5.1 Clear CMOS Jumper

<b>Jumper Label:</b>	J_CMOS1
<b>Jumper Type:</b>	3-pin header
<b>Jumper Settings:</b>	See <b>Table 5-2</b>
<b>Jumper Location:</b>	See <b>Figure 5-5</b>

If the 3308160 fails to boot due to improper BIOS settings, the clear CMOS jumper clears the CMOS data and resets the system BIOS information. To do this, use the



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## 3308160 PICMG 1.3 CPU Card

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.

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

The clear CMOS jumper settings are shown in **Table 5-2**.

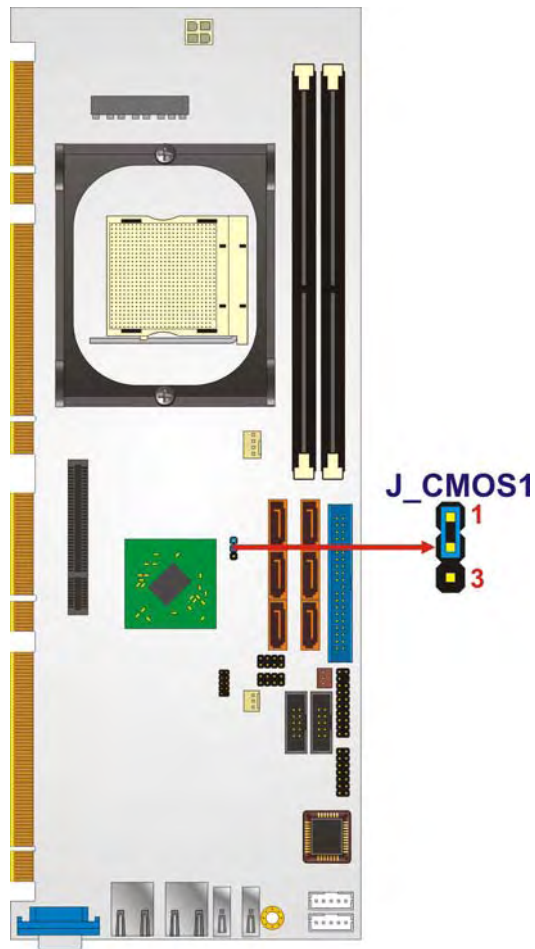
Jumper Select	Description	
Short 1 - 2	Keep CMOS Setup	Default
Short 2 - 3	Clear CMOS Setup	

**Table 5-2: Clear CMOS Jumper Settings**

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

---

## 3308160 PICMG 1.3 CPU Card



**Step 1:** Figure 5-5: Clear CMOS Jumper

## 5.6 Chassis Installation

### 5.6.1 Airflow



#### **WARNING:**

Airflow is critical to the cooling of the CPU and other on-board components. The chassis in which the 3308160 must have air vents to allow cool air to move into the system and hot air to move out.

---

---

## 3308160 PICMG 1.3 CPU Card

The 3308160 must be installed in a chassis with ventilation holes on the sides allowing airflow to travel through the heat sink surface. In a system with an individual power supply unit, the cooling fan of a power supply can also help generate airflow through the board surface.



### NOTE:

GAI has a wide range of backplanes available. Please contact your 3308160 vendor, reseller or an GAI sales representative, to find out more about the available chassis.

---

### 5.6.2 Backplane Installation

Before the 3308160 can be installed into the chassis, a backplane must first be installed. Please refer to the installation instructions that came with the backplane and the chassis to see how to install the backplane into the chassis.

---

### 5.6.3 CPU Card Installation

To install the 3308160 CPU card onto the backplane, carefully align the CPU card interface connectors with the corresponding socket on the backplane. To do this, please refer to the reference material that came with the backplane. Next, secure the CPU card to the chassis. To do this, please refer to the reference material that came with the chassis.

### 5.7 Internal Peripheral Device Connections

#### 5.7.1 Peripheral Device Cables

The cables listed in **Table 5-3** are shipped with the 3308160.

Quantity	Type
1	ATA 66/100 flat cable
1	Dual RS-232 cable
6	SATA drive cables
3	SATA drive power cables
1	USB cable

**Table 5-3: GAI Provided Cables**

Separately purchased optional GAI items that can be installed are listed below:

- Audio kit
- Keyboard and mouse cable with bracket

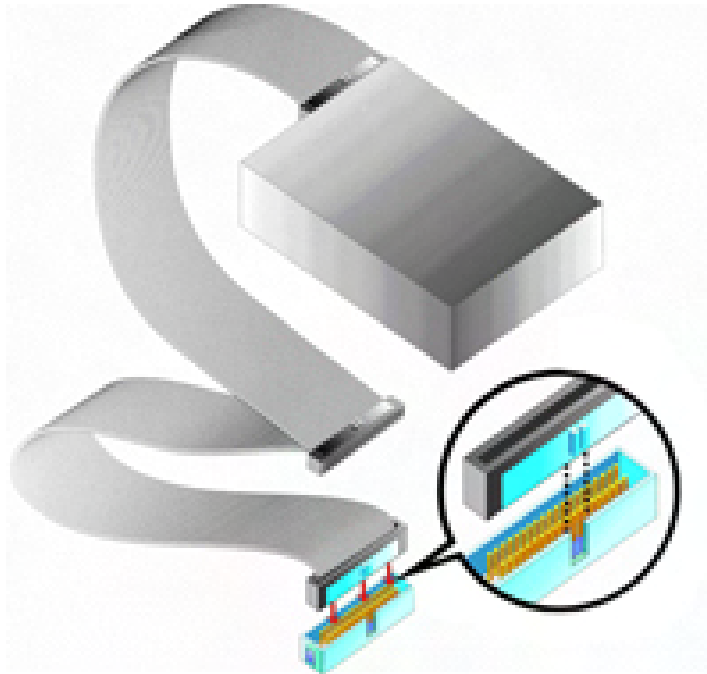
For more details about the items listed above, please refer to **Chapter 3**. Installation instructions of the accessories listed above are described in detail below.

#### 5.7.2 ATA Flat Cable Connection

The ATA 66/100 flat cable connects to the 3308160 to one or two IDE devices. To connect an IDE HDD to the 3308160 please follow the instructions below.

**Step 2:** Locate the IDE connector. The location/s of the IDE device connector/s is/are shown in Chapter 3.

**Step 3:** Insert the connector. Connect the IDE cable connector to the on-board connector. See **Figure 5-6**. A key on the front of the cable connector ensures it can only be inserted in one direction.



**Step 4:** Figure 5-6: IDE Cable Connection

**Step 5:** Connect the cable to an IDE device. Connect the two connectors on the other side of the cable to one or two IDE devices. Make sure that pin 1 on the cable corresponds to pin 1 on the connector

### 5.7.3 Audio Kit Installation

An optional audio kit that is separately ordered connects to the 9-pin audio connector on the 3308160. The audio kit consists of five audio jacks. One audio jack, Mic In, connects to a microphone. The remaining four audio jacks, Front-In, Front-Out, Rear-Out and subwoofer connect to four speakers including a subwoofer. To install the audio kit, please refer to the steps below:

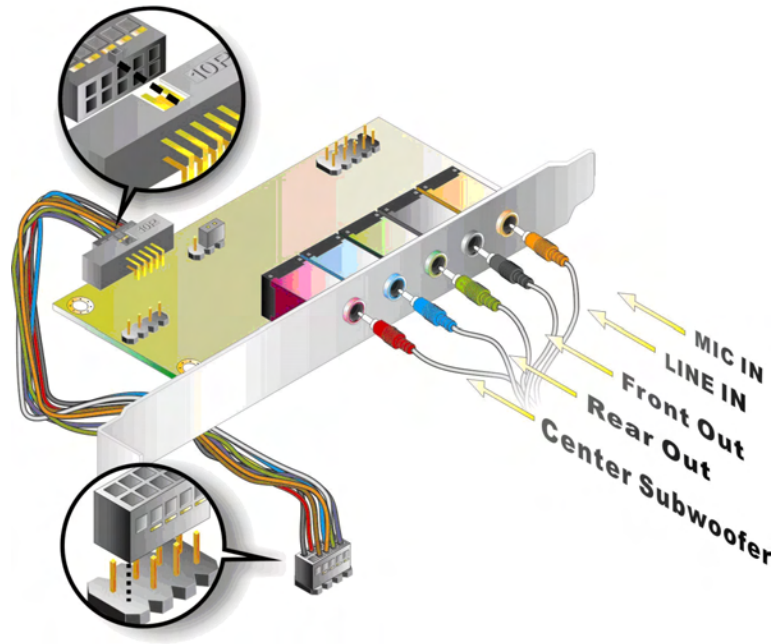
**Step 1:** Locate the audio connector. The location of the 10-pin audio connector is shown in Chapter 3.

**Step 2:** Align pin 1. Align pin 1 on the on-board connector with pin 1 on the audio kit

---

## 3308160 PICMG 1.3 CPU Card

connector. Pin 1 on the audio kit connector is indicated with a white dot. See **Figure 5-7**.



**Step 3:** Figure 5-7: Audio Kit Connection

**Step 4:** Connect the audio devices. Connect the speakers and the subwoofer to the appropriate audio jack shown in **Figure 5-7**.

### 5.7.4 Keyboard and Mouse PS/2 Cable with Bracket

The 3308160 can be shipped with an optional keyboard and mouse PS/2 cable with bracket. The keyboard and mouse PS/2 cable with bracket comprises of two PS/2 connectors installed on a bracket. Each PS/2 connector is connected via a cable to two separate female 5-pin wafer connectors. The female 5-pin wafer connectors are connected to the corresponding on-board keyboard and mouse connector. To connect the optional keyboard and mouse PS/2 cable with bracket please follow the steps below.

**Step 1:** Locate the connectors. The locations of the keyboard connector and the mouse connector are shown in Chapter 3.

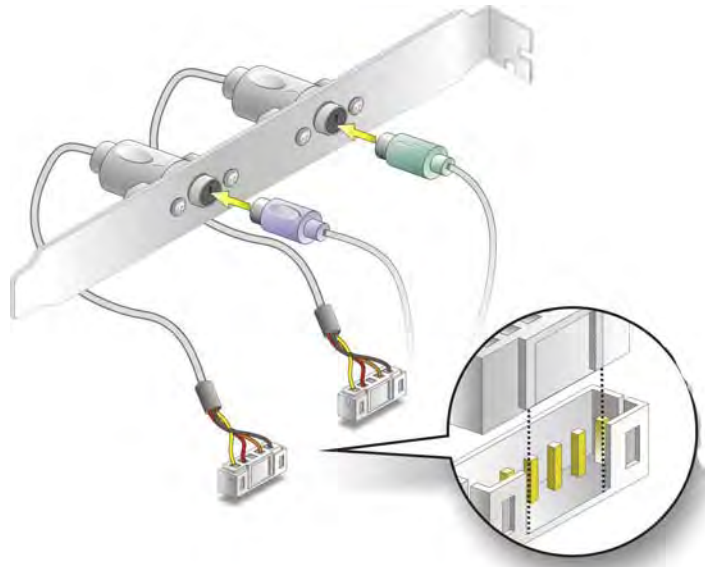
**Step 2:** Align the connectors. Correctly align pin 1 on the PS/2 keyboard (mouse) cable

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## 3308160 PICMG 1.3 CPU Card

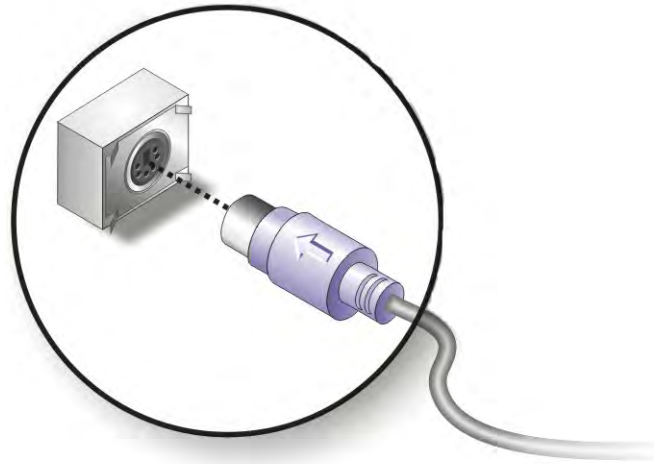
connector with pin 1 on the 3308160 keyboard (mouse) connector. See Figure 5-8.

- Step 3:** Insert the cable connectors. Once the keyboard (mouse) cable connector is properly aligned with the keyboard (mouse) connector on the 3308160, connect the cable connector to the on-board connector. See Figure 5-8.



**Figure 5-8: Keyboard and Mouse PS/2 Cable with Bracket**

- Step 4:** Connect the bracket to the chassis. The bracket has a retention screw hole at the top. Properly insert the bracket into the chassis and secure the bracket to the chassis with a retention screw passing through the retention screw hole. Please see the chassis installation instructions for more details.
- Step 5:** Connect the keyboard and mouse. Once the PS/2 connectors are connected to the chassis, a keyboard and mouse can each be connected to one of the PS/2 connectors. See Figure 5-8. The keyboard PS/2 connector and mouse PS/2 connector are both marked. Please make sure the keyboard and mouse are connected to the correct PS/2 connector.



**Figure 5-9: PS/2 Connector**

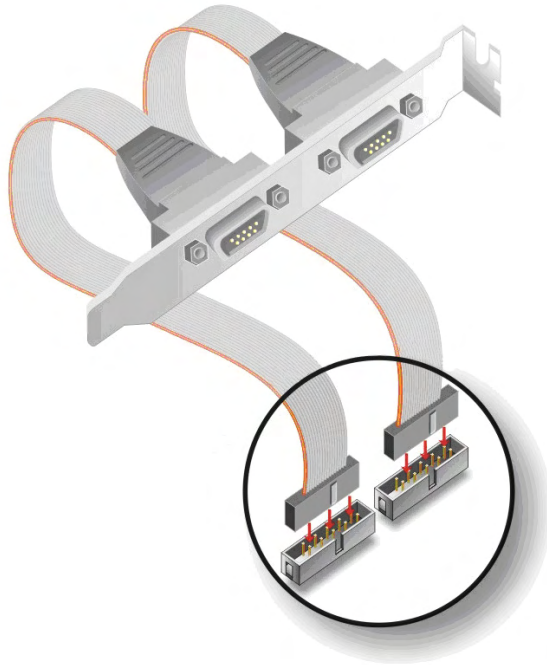
### 5.7.5 Dual RS-232 Cable Connection

The dual RS-232 cable consists of two connectors attached to two independent cables. Each cable is then attached to a D-sub 9 male connector that is mounted onto a bracket. To install the dual RS-232 cable, please follow the steps below.

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

**Step 2:** Insert the cable connectors. Insert one connector into each serial port box headers. See **Figure 5-10**. A key on the front of the cable connectors ensures the connector can only be installed in one direction.





**Figure 5-10: Dual RS-232 Cable Installation**

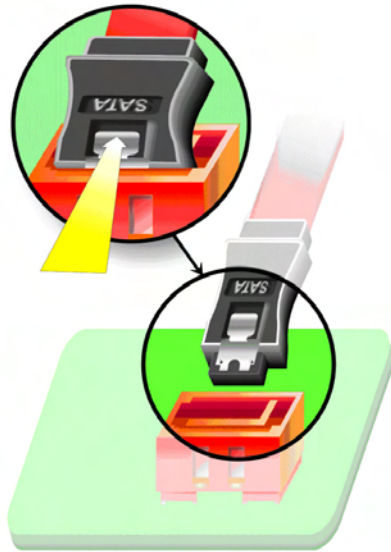
**Step 3:** Secure the bracket. The dual RS-232 connector has two D-sub 9 male connectors secured on a bracket. To secure the bracket to the chassis please refer to the reference material that came with the chassis.

### 5.7.6 SATA Drive Connection

The 3308160 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 1:** Locate the connectors. The locations of the SATA drive connectors are shown in Chapter 3.

**Step 2:** 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 5-11**.



**Figure 5-11: SATA Drive Cable Connection**

**Step 3:** 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 5-12**.

**Step 4:** Connect the SATA power cable. Connect the SATA power connector to the back of the SATA drive. See **Figure 5-12**.



**Figure 5-12: SATA Power Drive Connection**

### 5.7.7 USB Cable (Dual Port)

The 3308160 is shipped with a dual port USB 2.0 cable. To connect the USB cable connector, please follow the steps below.

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



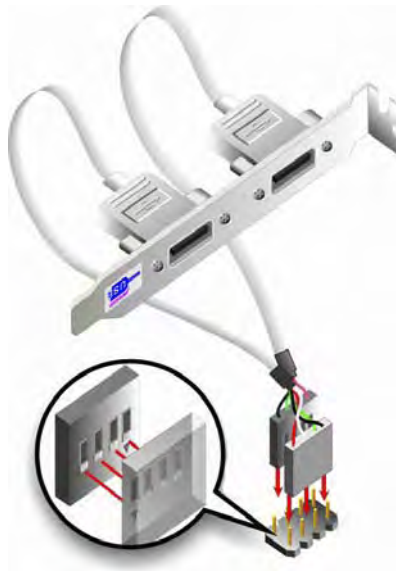
#### **WARNING:**

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

---

**Step 2:** Align the connectors. The cable has two connectors. Correctly align pin 1 on each cable connector with pin 1 on the 3308160 USB connector.

**Step 3:** Insert the cable connectors. Once the cable connectors are properly aligned with the USB connectors on the 3308160, connect the cable connectors to the on-board connectors. See **Figure 5-13**.



**Figure 5-13: Dual USB Cable Connection**

**Step 4:** Attach the bracket to the chassis. The USB 2.0 connectors are attached to a

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## 3308160 PICMG 1.3 CPU Card

bracket. To secure the bracket to the chassis please refer to the installation instructions that came with the chassis.

### 5.8 External Peripheral Interface Connection

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

- RJ-45 Ethernet cable connectors
- USB devices
- VGA connector

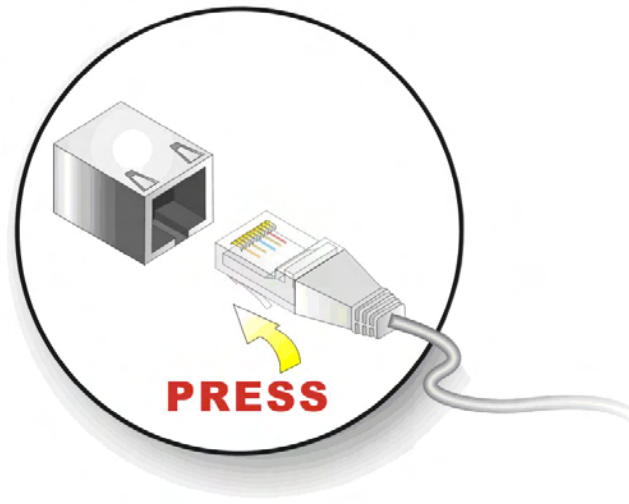
To install these devices, connect the corresponding cable connector from the actual device to the corresponding 3308160 external peripheral interface connector making sure the pins are properly aligned.

#### 5.8.1 LAN Connection (Single Connector)

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

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

**Step 2:** Align the connectors. Align the RJ-45 connector on the LAN cable with one of the RJ-45 connectors on the 3308160. See **Figure 5-14**.



**Figure 5-14: LAN Connection**

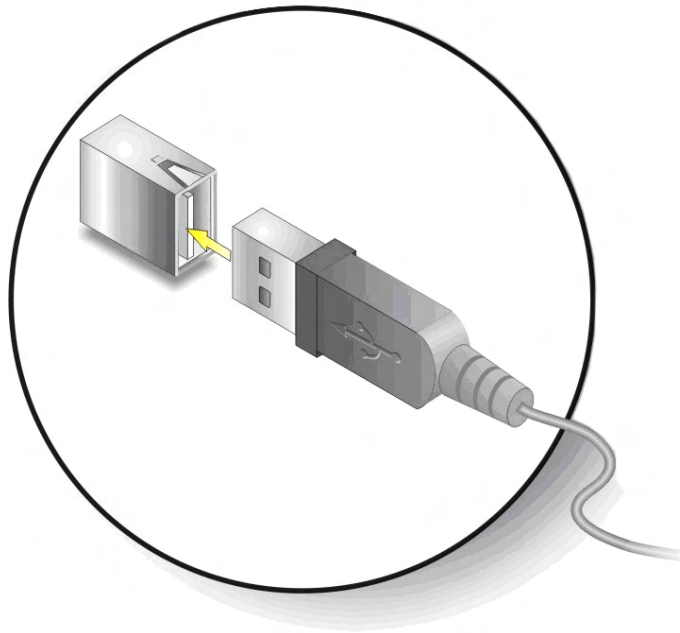
**Step 3:** Insert the LAN cable RJ-45 connector. Once aligned, gently insert the LAN cable RJ-45 connector into the on-board RJ-45 connector.

### 5.8.2 USB Device Connection (Single Connector)

There are two external USB 2.0 connectors. Both connectors are perpendicular to the 3308160. To connect a USB 2.0 or USB 1.1 device, please follow the instructions below.

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

**Step 2:** Align the connectors. Align the USB device connector with one of the connectors on the 3308160. See Figure 5-15.



**Figure 5-15: USB Device Connection**

**Step 3:** Insert the device connector. Once aligned, gently insert the USB device connector into the on-board connector.

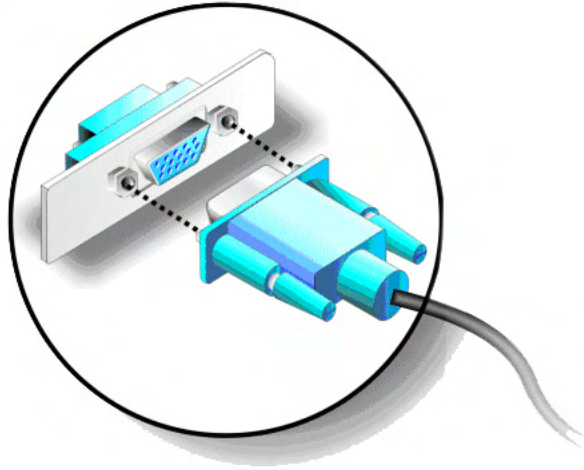
### 5.8.3 VGA Monitor Connection

The 3308160 has a single female DB-15 connector on the external peripheral interface panel. The DB-15 connector is connected to a CRT or VGA monitor. To connect a monitor to the 3308160, please follow the instructions below.

**Step 1:** Locate the female DB-15 connector. The location of the female DB-15 connector is shown in Chapter 3.

**Step 2:** Align the VGA connector. Align the male DB-15 connector on the VGA screen cable with the female DB-15 connector on the external peripheral interface.

**Step 3:** Insert the VGA connector. Once the connectors are properly aligned with the insert the male connector from the VGA screen into the female connector on the 3308160. See **Figure 5-16**.



**Figure 5-16: VGA Connector**

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

## 5.9 Connecting the 3308160 to the Backplane

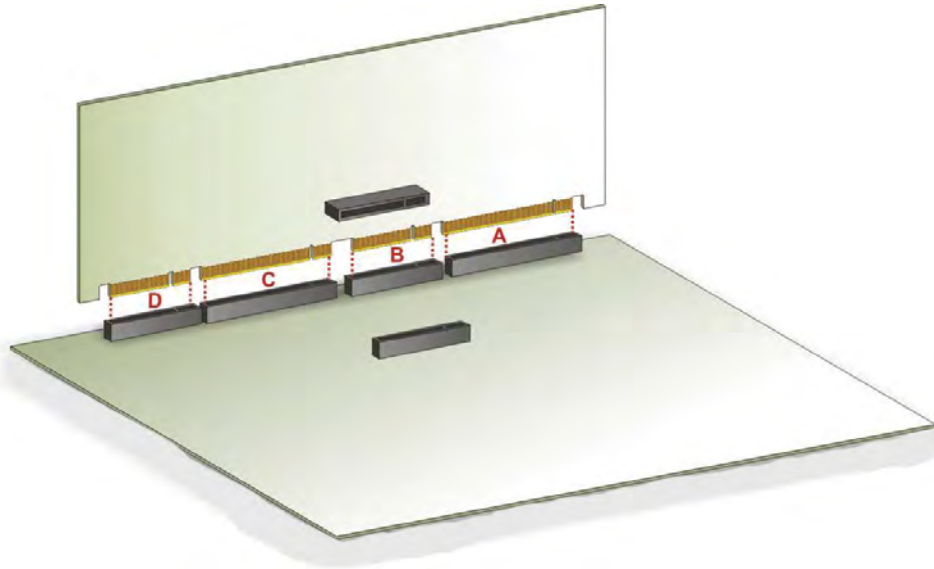
### 5.9.1 Installing the 3308160 onto the Backplane

The 3308160 is a PICMG 1.3 form factor CPU card. To install the 3308160 onto the backplane, please follow the instructions below.

**Step 1:** Align the edge connectors. Align the four edge connectors (labeled A, B, C and D in **Figure 5-17**) on the 3308160 with the corresponding connectors on the PICMG 1.3 backplane. See **Figure 5-17**.

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## 3308160 PICMG 1.3 CPU Card



**Figure 5-17: 3308160 Installation**

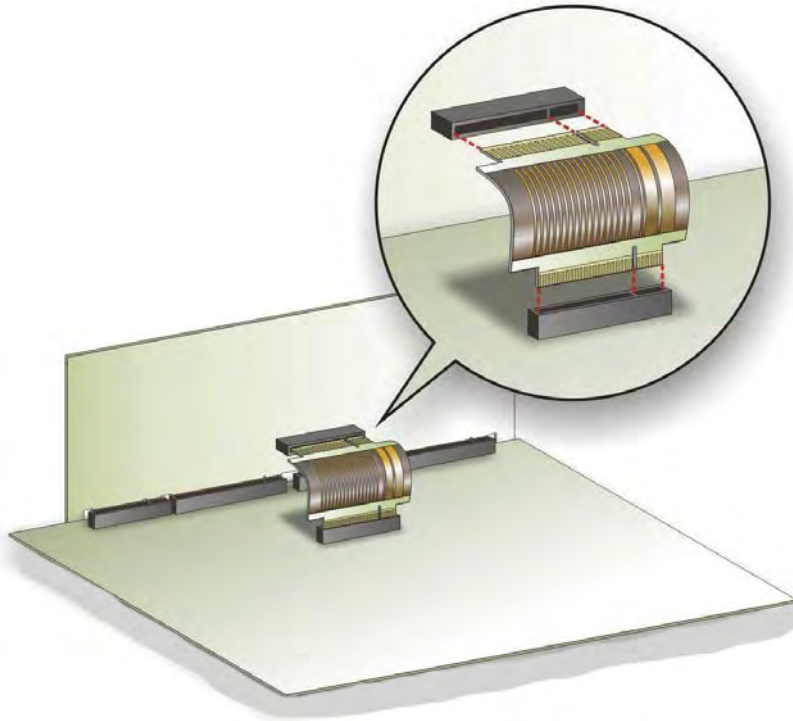
**Step 2:** Insert the connectors. Gently push the CPU card onto the connectors making sure the CPU card edge connectors are securely inserted into the corresponding backplane connectors.

### 5.9.2 Connecting the PCIe x8 Connector to the Backplane

If an GAI PICMG 1.3 server grade backplane is being used that supports more than 20 PCIe lanes, the PCIe x8 connector on the 3308160 must be connected to the corresponding connector on the backplane using an optional PCIe x8 board-to-board connector. To do this, please follow the instructions below:

- Step 1:** Install the CPU card onto a compatible backplane. Make sure the 3308160 is properly installed onto a compatible backplane. See the previous section.
- Step 2:** Connect the PCIe x8 connector to the backplane. Connect one side of the PCIe x8 board-to-board connector to the PCIe x8 connector on the 3308160 CPU card. Connect the other side of the PCIe x8 board-to-board connector to the corresponding PCIe x8 connector on the backplane.





**Figure 5-18: PCIe x8 Board-to-Board Connector Installation**

**Step 3:** Secure the PCIe x8 board-to-board connector. Make sure the connection to both connectors is secure.

Chapter

6

# RAID Setup

---

## **6.1 Introduction**

The SATA RAID can control serial ATA (SATA) disks. The SATA RAID is 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 or more disk drives.



### **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.

---

## **6.2 Precautions**

In a RAID system if a single hard drive fails within a RAID array, the 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.

---

## 6.3 Features and Benefits

- Supports RAID levels 0, 1, 10, RAID 5 and JBOD
- Supports connectivity to two or more disk drives
- Windows-based software for RAID management

## 6.4 Setting up the RAID

To install the RAID controller using Windows or a later OS, please follow the steps below.

**Step 1: Connect SATA drives to the system.** Connect at least 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.

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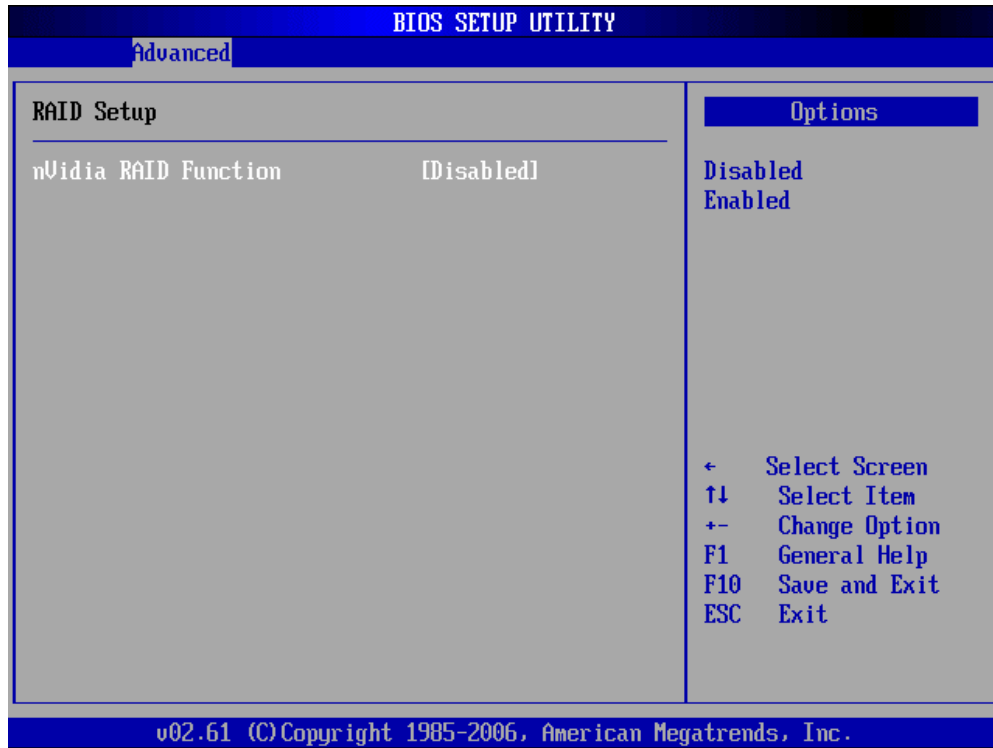
**Step 2:** Turn on the system and access the BIOS.

**Step 3:** Access the Advanced menu option (Section 6.3).

**Step 4:** Access the IDE Configuration sub-menu (Section 6.3.2)

**Step 5:** Select the **nVidia RAID Setup** option.

**Step 6:** The menu in **Figure 6-1** appears



**Figure 6-1: NVIDIA RAID Setup**

**Step 7:** Enable the NVIDIA RAID function in the menu shown in **Figure 6-1**.

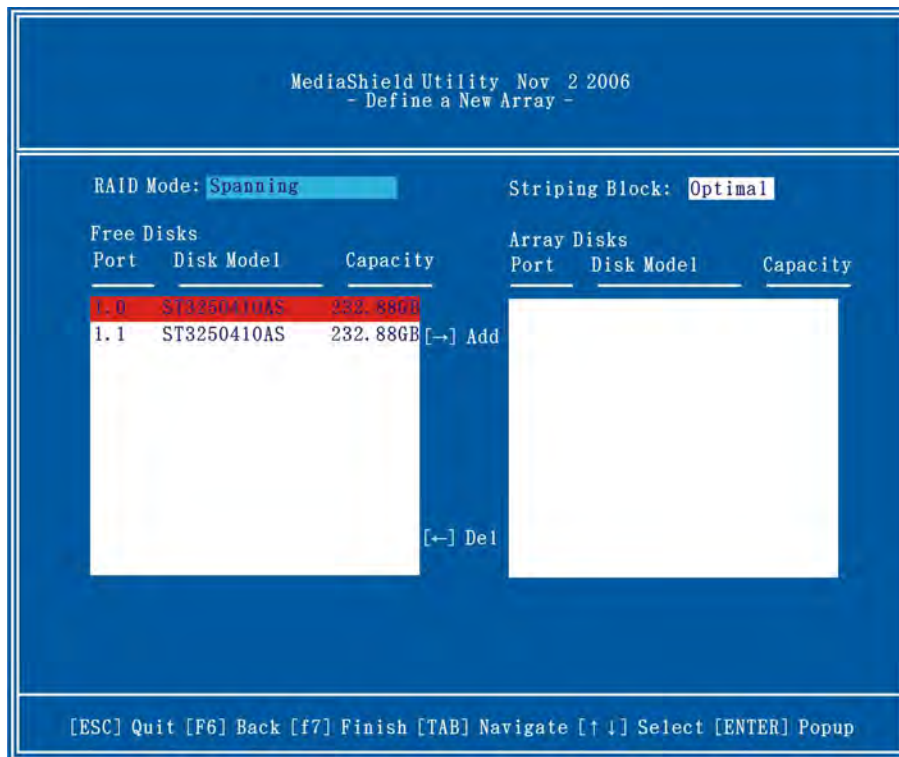
**Step 8:** Save the changes and Exit the BIOS Setup Utility.

**Step 9:** Restart the computer.

**Step 10:** Push the “**F10**” key when the system reboots.

**Step 11:** The RAID setup utility program appears.

## 3308160 PICMG 1.3 CPU Card



**Figure 6-2: RAID Setup Utility**

**Step 12:** Locate the RAID Mode setting.

**Step 13:** Select the RAID configuration type:

- Mirroring
- Striping
- Striping and mirroring
- Spanning
- RAID 5

**Step 14:** Locate the “Free Disks” sector of the screen.

**Step 15:** From the list of free disks, select the disks that are being used in the RAID array.

**Step 16:** To select a disk, move the cursor onto the disk name and then hit the right arrow button (→). The disk name is then shifted to the “Array Disks” sector of the screen.

**Step 17:** Once all the disks are selected, press “F7” to finish.

## **6.5 RAID Tool Access**

To understand how to use the RAID tool please access the RAID HTML help file from the CD drive that came with the system. Insert the CD into the system and access the “**raid\_tool.html**” file from following directory:

- [CD Drive]:\5-SATA RAID\VIA\_RAID\_V530C\RaidTool\Utility

Appendix

A

# Terminology

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## 3308160 PICMG 1.3 CPU Card

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.
AMD64	AMD64 is the name for the 64-bit instruction set on AMD architecture. AMD64 supports Intel's x86 instruction architecture and is almost identical to Intel's x86-64 architecture.
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.
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.
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.
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

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## 3308160 PICMG 1.3 CPU Card

	bus and have separate electrical contacts on each side of the module.
EHCI	The Enhanced Host Controller Interface (EHCI) specification is a register-level interface description for USB 2.0 Host Controllers.
FSB	The Front Side Bus (FSB) is the bi-directional communication channel between the processor and the Northbridge chipset.
GbE	Gigabit Ethernet (GbE) is an Ethernet version that transfers data at 1.0 Gbps and complies with the IEEE 802.3-2005 standard.
HDD	Hard disk drive (HDD) is a type of magnetic, non-volatile computer storage device that stores digitally encoded data.
HyperTransport™ Bus	The HyperTransport™ bus, which uses HyperTransport™ technology, interfaces an AMD CPU with the Northbridge. HyperTransport™ technology provides a high-speed, low latency, point-to-point link between the CPU and the Northbridge.
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.
MAC	The Media Access Control (MAC) protocol enables several terminals or network nodes to communicate in a LAN, or other multipoint networks.
PCIe	PCI Express (PCIe) is a communications bus that uses dual data lines for full-duplex (two-way) serial (point-to-point) communications between the SBC components and/or expansion cards and the SBC chipsets. Each line has a 2.5 Gbps data transmission rate and a 250 MBps sustained data transfer rate.
POST	The Power-on Self Test (POST) is the pre-boot actions the system performs when the system is turned-on.
RAID	Redundant Array of Inexpensive Disks (RAID) refers to redundantly backing up data on multiple disks to ensure that if one disk fails, the data is not lost and can be restored from the remaining disks in the array.
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

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## 3308160 PICMG 1.3 CPU Card

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

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### 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.

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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

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## C.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 C-1: IO Address Map

## C.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 C-2: 1<sup>st</sup> MB Memory Address Map

### C.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 C-3: IRQ Mapping Table

### C.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 C-4: IRQ Mapping Table

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Appendix

D

# Compatibility

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### NOTE:

The compatible items described here have been tested by the GAI R&D team and found to be compatible with the 3308160

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## D.1 Compatible Operating Systems

The following operating systems have been successfully run on the 3308160.

- Windows XP with Service Pack 2
- Windows 2000 with Service Pack 4
- Microsoft Windows Vista Business (32-bit)
- Microsoft Windows Vista Business (64-bit)
- Fedora Core 7

## D.2 Compatible Processors

The following Socket AM2 processors have been successfully tested on the 3308160

CPU	Model Number	Frequency	Bus Speed	L2 Cache
AMD Opteron™	1214 HE	2.2 GHz	1,000 MHz	2 MB
AMD Opteron™	1210	1.8 GHz	1,000 MHz	2 MB
AMD Athlon™64 X2	+5600	2.8 GHz	1,000 MHz	2 MB
AMD Athlon™64	+3800	2.4 GHz	1,000 MHz	512 KB
AMD Sempron™	+3600	2.0 GHz	800 MHz	256 KB

## D.3 Compatible Memory Modules

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**NOTE:**

The memory modules listed below have been tested on the 3308160 other memory modules that comply with the specifications may also work on the 3308160 but have not been tested.

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The following memory modules have been successfully tested on the 3308160

Manufacturer	Model No.	Capacity	Speed
A-DATA	M2OAD5G3H3160L1C59	512 MB	667 MHz
CORSAIR	VS512 MB533D2	512 MB	533 MHz
DSL	512 MB DDRII 533 MHz	512 MB	533 MHz
KingBOX	512 MB533 MHz	512 MB	533 MHz
Kingston	KVR667D2N5/512	512 MB	667MHz
Transcend	1GB DDR2 667	1 GB	667 MHz
Transcend	2GB DDR2 800	2 GB	800 MHz
TwinMOS	8D25JK-TT	512 MB	800 MHz
UMAX	RMUMX 512DDR800C	512 MB	800 MHz
UNIGEN	UG64T6400L8DU-5AL	512 MB	533 MHz
UNIGEN	UG64T6400L8DU-8AK	512 MB	800 MHz
Winchip	1GB DDR2 800MHz	1 GB	800 MHz

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Appendix

**E**

# Hazardous Materials Disclosure

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## **E.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.

## 3308160 PICMG 1.3 CPU Card

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
<p>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</p> <p>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</p>						

Appendix

**F**

# RAID Levels

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## F.1 Introduction

The SATA disks can be configured in a RAID array. RAID array setup is described in **Chapter 6**. The RAID array can be in one of the following configurations or levels:

- RAID 0
- RAID 1
- RAID 10
- RAID 5
- JBOD

These levels are described below:

### F.1.1 RAID 0 or Disk Striping

RAID 0 is a disk striping method. Data is striped across two or more disks. RAID 0 does not provide any redundant storage. When one of the drives fails, the data cannot be restored. Disk striping enables faster access to the disk sectors and faster reads and writers to and from the system.

### F.1.2 RAID 1 or Disk Mirroring

RAID 1 is a disk mirroring method. Data on a first drive is copied exactly as is to a second drive. If one of the drives fails then data is backed up on the second drive and no information is lost. Although read and write speeds do increase, overall storage capacity is halved. That is, if two 50 GB drives are mirrored together, the total storage capacity is 100 GB. However, since one 50 GB drive is a mirror of the other 50 GB drive, only 50 GB of data can be stored on the system.

For disk mirroring two, four or six disks are required.

### F.1.3 RAID 10 or Disk Mirroring and Striping

RAID 10 combines disk mirroring and striping. First data is mirrored on two drives (drive 1 and drive 2) and then the mirrored data is striped across two other drives (drive 3 and

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## **3308160 PICMG 1.3 CPU Card**

drive 4). Although the read-write speeds are improved, the system still only has half of the actual storage capacity.

### **F.1.4 RAID 5**

RAID 5 uses distributed parity blocks on different drives to enable the system to rebuild lost data if one of the disks crashes. The parity block is a binary representation of that data stored on the equivalent sectors of the other disks in the array. If one of the disks crashes then the disk can be rebuilt using binary techniques.

### **F.1.5 JBOD**

JBOD is not technically a raid level but joins multiple drives into a single logical drive. Two or more drives are strung together and appear to the system as a single drive rather than as multiple drives.

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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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