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User's Manual

Mini - ITX Motherboard 2807760

Version 1.0.1, July 2007

Packing List

NOTE:

If any of the components listed in the checklist below are missing, please do not proceed with the installation. Contact the Global American reseller or vendor you purchased the 2807760 motherboard from or contact a Global American sales representative directly. To contact a Global American sales representative, please send an email to salesinfo@globalamericaninc.com.

The items listed below should all be included in the 2807760 motherboard package.

- 1 x 2807760 single board computer
- 1 x Mini jumper pack
- 1 x ATA66/100 IDE flat cable (P/N: 32200-008800-RS)
- 2 x SATA cable (P/N: 32000-062800-RS)
- 1 x SATA power cable (P/N: 32100-088600-RS)
- 1 x RS-232 cable (P/N: 32200-000049-RS)
- 1 x I/O shielding
- 1 x Utility CD
- 1 x QIG (Quick Installation Guide)

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

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Glossary

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

Chapter

1

Introduction

1.1 2807760 Overview

The 2807760 motherboard is an Intel® Core™2 Extreme/Core™2 Quad/Core™2 Duo/Pentium® D/Celeron® D CPU platform with an Intel® Q965 Chipset and Intel® I/O Controller Hub 8 (ICH8). The 2807760 has a maximum front side bus (FSB) frequency of 1066MHz, supports up to 4GB of dual channel 800MHz DDR2 DIMM RAM and comes with VGA, USB 2.0, PS/2 keyboard/mouse and COM port interfaces as well as four Broadcom BCM5787M PCIe GbE chipsets. The 2807760 supports up to six USB 2.0 devices, two IDE hard disk drives, Infrared Data Association (IrDA) communications and expansion is via a PCIe x16 interface.

1.1.1 2807760 Applications

The 2807760 is designed for applications in the following areas:

- Industrial and hard environment PC applications
- Human Machine Interface (HMI) applications
- Communication and network monitoring applications
- Marine, GPS and transportation applications
- Financial, retail and kiosk applications
- Medical applications

1.1.2 2807760 Benefits

Some of the 2807760 benefits include:

- Dual-core Intel® processor support
- DDR2 memory technology support
  - Dual-channel DDR2 memory technology at 800MHz
  - Up to 10.7GB/s of peak memory bandwidth
- SATA II with 3.0Gb/s transfer rate
- Four PCIe GbE enhance high performance in network
- Multiple storage option integration including
  - 40 Pin IFM or 3.5”HDD
  - Two SATA II ports support

- Supports PCI Express x16 high-performance graphic card

1.1.3 2807760 Features

Some of the 2807760 features are listed below:

- Complies with RoHS
- Supports Intel® Core™2 Extreme / Core™2 Quad / Core™2 Duo / Pentium® D / Celeron® D CPUs
- Supports a maximum front side bus (FSB) speed up to 1066MHz
- Supports up to 4GB of 533MHz, 667MHz or 800MHz of DDR2 memory
- Comes with four high performance gigabit Ethernet (GbE) controllers
- Supports two SATA channels with transfer rates up to 3.0Gb/s
- Supports six USB 2.0 devices

1.2 2807760 Board Overview

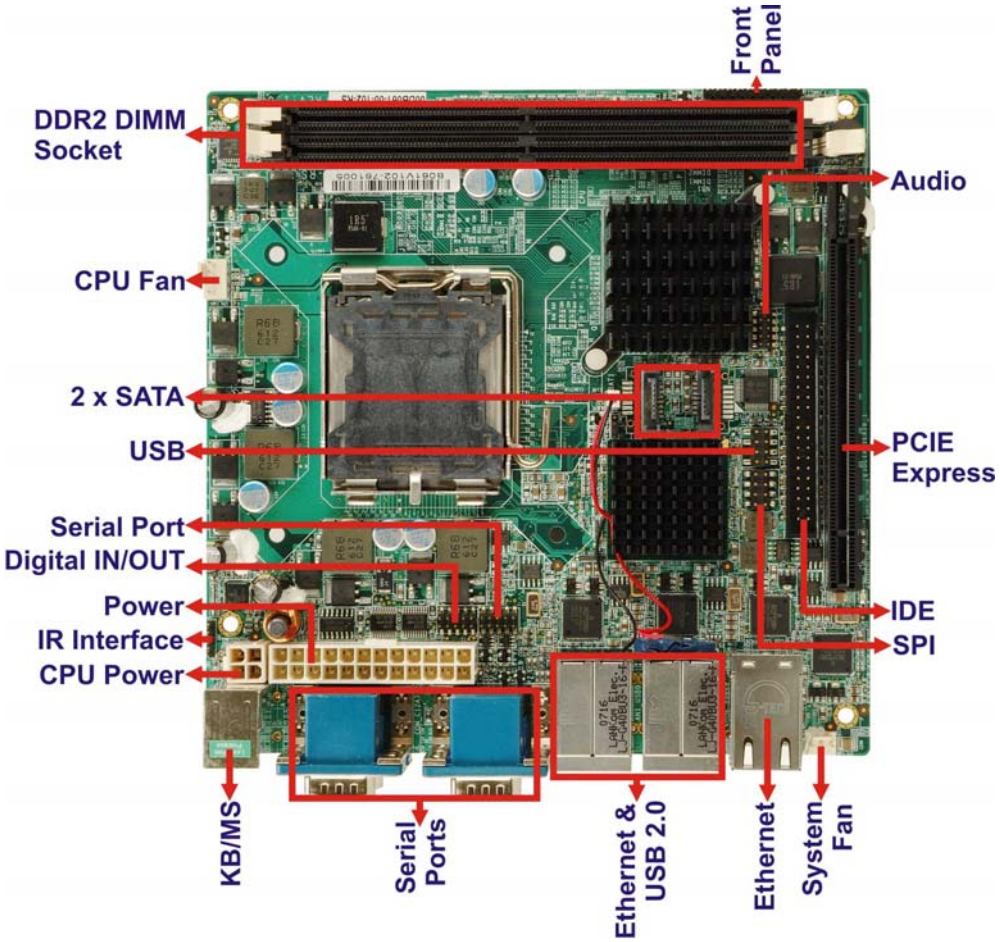

Figure 1-1: 2807760 Board Overview

1.2.1 2807760 Connectors

The 2807760 has the following connectors on-board:

- 1 x Audio connector
- 1 x CPU 12V power connector
- 2 x DDR2 DIMM sockets
- 2 x Fan connectors
- 1 x Front panel connector
- 1 x Digital Input/Output connector
- 1 x IDE Interface connector
- 1 x IR interface connector
- 1 x PCI Express x16 slot
- 1 x Power connector
- 1 x Serial port connector
- 2 x SATA II connectors
- 2 x USB connectors

The 2807760 has the following connectors on the board rear panel:

- 1 x CRT connector
- 4 x Ethernet connectors
- 2 x Keyboard/Mouse connectors
- 3 x Serial port connectors
- 4 x USB 2.0 ports

The 2807760 has the following on-board jumper:

- Clear CMOS

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

1.2.2 Technical Specifications

2807760 technical specifications are listed in **Table 1-1**. Detailed descriptions of each specification can be found in **Chapter 2 Detailed Specifications**.

SPECIFICATION	
CPUs Supported	Intel® Core™2 Extreme / Core™2 Quad / Core™2 Duo / Pentium® D / Celeron® D FSB 533/800/1066MHz
Chipset	Intel® Q965 Express Chipset: -Intel® 82Q965 Graphics and Memory Controller Hub GMCH) -Intel® ICH8 I/O Controller Hub (ICH)
I/O Controller	ICH8
Graphics Support	Intel® Graphics Media Accelerator 3000
Display	CRT
Memory	Dual channel DDR2 533/667/800MHz memory modules (Max. 4GB)
PCI Bus Interface	33MHz, Revision 2.3
Serial ATA (SATA)	Two SATA II connectors with 3.0Gb/s transfer rates
HDD Interface	One IDE channel support two Ultra ATA 100 devices
USB Interfaces	Six USB 2.0 connectors supported
Serial Ports	Four COM ports
Extension	One PCIe x16 graphic port
Super I/O	iTE IT8712F
IrDA	One IrDA connector
Digital I/O	4 input / 4 output by super I/O
Audio	7.1 channel HD audio kit with Realtek ALC883 codec supports

	dual audio streams
Ethernet	Four Broadcom BCM5787 for PCI Express GbE chipsets
BIOS	AMI BIOS Label
Power	ATX power
Physical Dimensions	170mm x 170mm (width x length)
Weight (GW/NW)	1000g/400g
Operating Temperature	Minimum: 0ºC (32°F) Maximum: 60°C (140°F)

Table 1-1: Technical Specifications

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Chapter

2

Detailed Specifications

2.1 Overview

This chapter describes the specifications and on-board features of the 2807760 in detail.

2.2 Dimensions

2.2.1 Board Dimensions

The dimensions of the board are listed below:

- Length: 170mm
- Width: 170mm

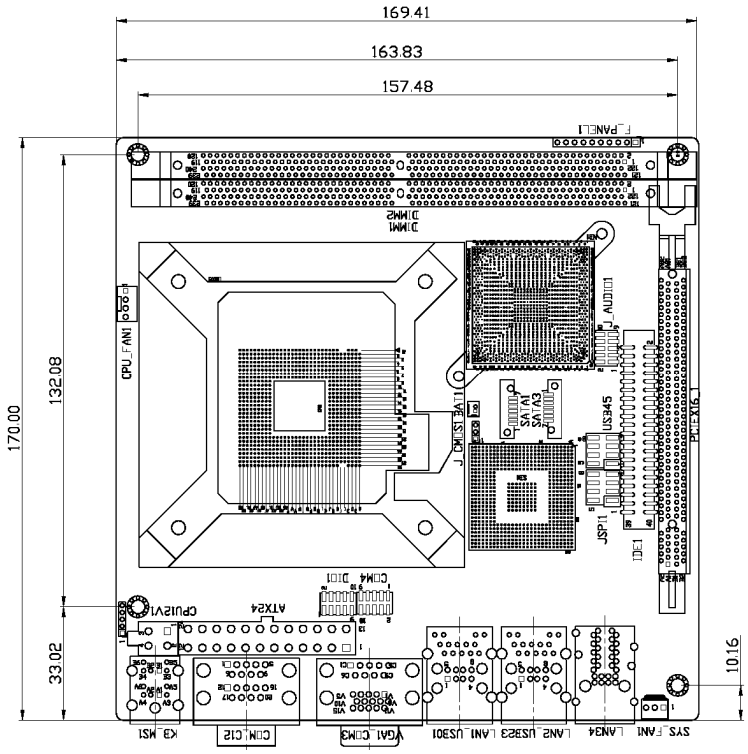

Figure 2-1: 2807760 Dimensions (mm)

2.2.2 External Interface Panel Dimensions

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

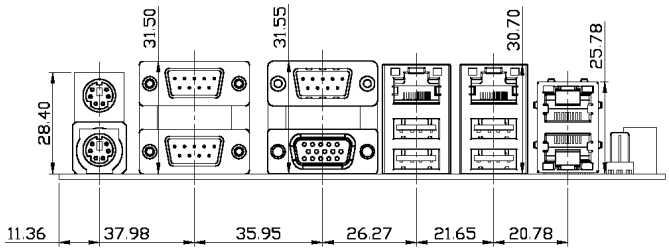

Figure 2-2: External Interface Panel Dimensions (mm)

2.3 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.

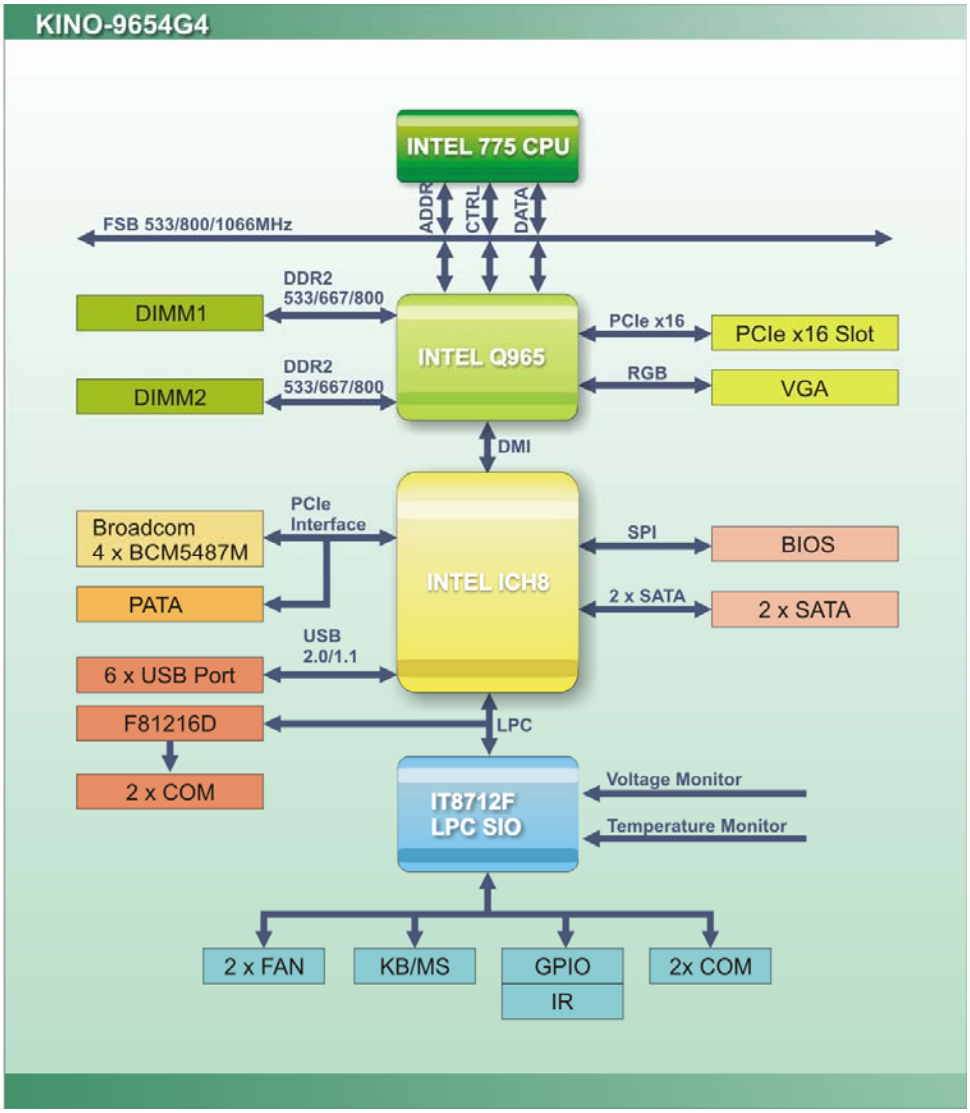

Figure 2-3: Data Flow Block Diagram

2.4 Compatible Processors

The 2807760 supports the following LGA775 processors:

- Intel® Core™2 Extreme
- Intel® Core™2 Quad
- Intel® Core™2 Duo
- Intel® Pentium® D
- Intel® Celeron® D

All of the above processors are interfaced with an Intel® Q965 northbridge chipset through the front side bus (FSB). Features of the supported processors are listed in sections below.

2.4.1 Intel® Core™2 Extreme Features

Intel® Core™2 Extreme features include:

- Four processing cores
- Up to 8MB of shared L2 cache
- Up to 1066 MHz FSB
- Enhanced Intel Speedstep® Technology
- Supports Intel® Virtualization Technology
- Supports Intel® 64
- Supports Execute Disable Bit capability

2.4.2 Intel® Core™2 Quad Features

Intel® Core™2 Quad features include:

- Four processing cores
- Up to 8MB of shared L2 cache
- Up to 1066 MHz FSB
- Intel® Wide Dynamic Execution
- Intel® Intelligent Power Capability
- Intel® Smart Memory Access
- Intel® Advanced Smart Cache
- Intel® Advanced Digital Media Boost

2.4.3 Intel® Core™2 Duo Features

Intel® Core™2 Duo features include:

- Two processing cores
- Up to 8MB of shared L2 cache
- Up to 1066 MHz FSB
- Intel® Wide Dynamic Execution
- Intel® Intelligent Power Capability Intel® Smart Memory Access
- Intel® Advanced Smart Cache
- Intel® Advanced Digital Media Boost

2.4.4 Intel® Pentium® D Features

Intel® Pentium® D features include:

- Dual core processing improves performance and multimedia management
- Intel® Visualization Technology
- Dual 2MB level 2 cache
- 800MHz FSB
- Execute Disable Bit
- Intel® Extended Memory 64 Technology
- Enhanced Intel SpeedStep® Technology
- Streaming SIMD solutions

2.4.5 Intel® Celeron® D Features

Intel® Celeron® D features include:

- Intel® Extended Memory 64 Technology
- 512KB Level 2 cache
- 533MHz FSB
- Execute Disable Bit
- Streaming SIMD solutions

2.5 Intel® Q965 Northbridge Chipset

2.5.1 Intel® Q965 Overview

The Intel® Q965 (G)MCH supports LGA775 processors. The (G)MCH supports a FSB frequency of 533 MHz, 800 MHz or 1066 MHz. Some of the features of the Intel® Q965 (G)MCH Include:

- Support for the following processors.
  - Intel® Core™2 Extreme
  - Intel® Core™2 Quad
  - Intel® Core™2 Duo
  - Intel® Pentium® D
  - Intel® Celeron® D
- Supports Hyper-Threading Technology (HT Technology)
- Supports FSB Dynamic Bus Inversion (DBI)
- Supports 36-bit host bus addressing, allowing the processor to access the entire
- 64 GB of the (G)MCH's memory address space
- Has a 12-deep In-Order Queue to support up to twelve outstanding pipelined address requests on the host bus
- Has a 1-deep Defer Queue
- Uses GTL+ bus driver with integrated GTL termination resistors
- Supports a Cache Line Size of 64 bytes

2.5.2 Intel® Q965 Memory Support

WARNING:

Only DDR2 memory module can be installed on the 2807760. Do not install DDR memory modules. If a DDR memory module is installed on the 2807760, the 2807760 may be irreparably damaged.

The Intel® Q965 supports up to two 2GB DDR2 DIMMs with the following specifications:

- Only un-buffered DIMMs supported
- DDR2 only
- Maximum supported bandwidth (assuming DDR2 800 MHz):
  - ***Single-channel***: 6.4 GB/s
  - ***Dual-channel asymmetric mode***: 6.4 GB/s
  - ***Dual-channel interleaved mode***: 12.8 GB/s
- Capacities of 256MB, 512MB, 1GB or 2GB
- Transfer speeds of 533MHz, 667MHz or 800MHz

The memory sockets are shown in **Figure 2-4**.

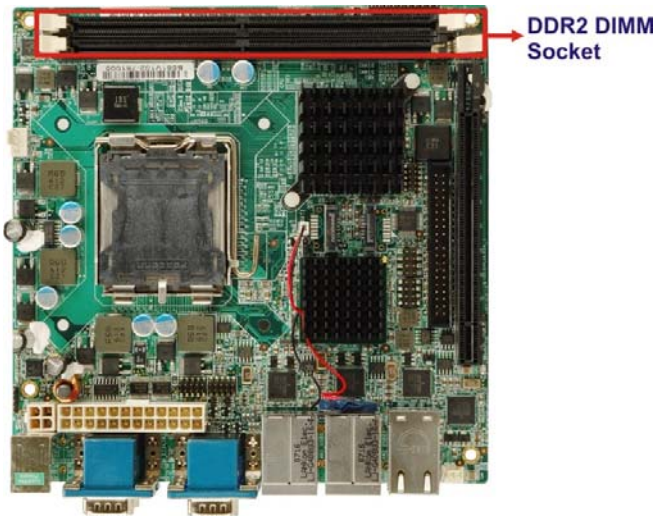

Figure 2-4: 240-pin DIMM Socket

2.5.2.1 Intel® Q965 Analog CRT Support

A DB-15 VGA connector on the external peripheral interface connector panel is interfaced to the Intel® Q965 graphics engine. The Intel® Q965 internal graphics engine, with an 400MHz integrated 24-bit RAMDAC. Some of the graphics features are listed below.

- Analog Display Support
- 400 MHz Integrated 24-bit RAMDAC
- Up to 2048x1536 @ 75 Hz refresh

- Hardware Color Cursor Support
- DDC2B Compliant Interface

2.5.3 Intel® Q965 PCIe x16

2.5.3.1 PCIe x16 Bus Overview

The Intel® Q965 northbridge has on 16-lane PCIe port that is intended for an external PCIe graphics card. The PCIe x16 graphics card is installed on a PCIe x16 socket on the 2807760 shown in **Figure 2-5**.

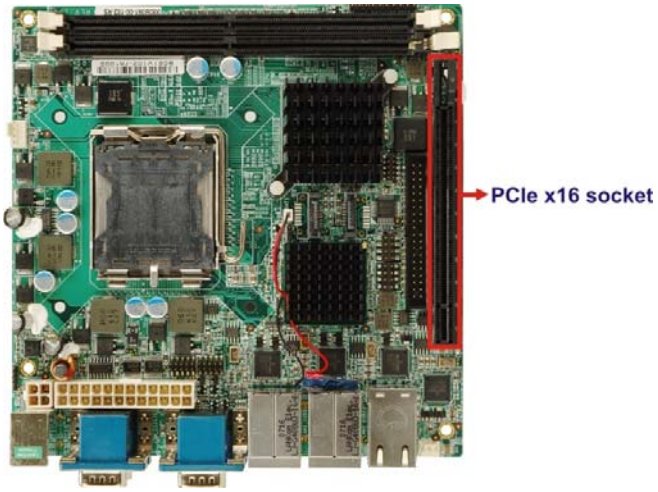

Figure 2-5: PCIe x16 Socket

2.5.3.2 PCIe x16 Bus Specifications

The PCIe port is compliant with the PCI Express Base Specification revision 1.1. The PCIe x16 port operates at a frequency of 2.5 Gb/s on each lane while employing 8b/10b encoding; the port supports a maximum theoretical bandwidth of 40 Gb/s in each direction. Some of the features are listed below.

- One, 16-lane PCIe port intended for graphics attach, compatible to the PCI Express Base Specification revision 1.1a.
- PCI Express frequency of 1.25 GHz resulting in 2.5 Gb/s each direction
- Raw bit-rate on the data pins of 2.5 Gb/s results in a real bandwidth per pair of

250 MB/s given the 8b/10b encoding used to transmit data across this interface

- Maximum theoretical realized bandwidth on the interface of 4 GB/s in each direction simultaneously, for an aggregate of 8 GB/s when x16.
- PCI Express Graphics Extended Configuration Space. The first 256 bytes of configuration space alias directly to the PCI Compatibility configuration space. The remaining portion of the fixed 4-KB block of memory-mapped space above that (starting at 100h) is known as extended configuration space.
- PCI Express Enhanced Addressing Mechanism. Accessing the device configuration pace in a flat memory mapped fashion.
- Automatic discovery, negotiation, and training of link out of reset
- Supports traditional PCI style traffic (asynchronous snooped, PCI ordering)
- Supports traditional AGP style traffic (asynchronous non-snooped, PCI Express relaxed ordering)
- Hierarchical PCI-compliant configuration mechanism for downstream devices (i.e., normal PCI 2.3 Configuration space as a PCI-to-PCI bridge)

2.5.4 Intel® Q965 Direct Media Interface (DMI)

Intel® Q965 northbridge GMCH is connected to the Intel® ICH8 Southbridge Chipset through the chip-to-chip Direct Media Interface (DMI). Features of the Intel® Q965 DMI are listed below:

- chip-to-chip connection interface to Intel ICH8
- 2GB/s (1GB/s in each direction) bus speed
- 32-bit downstream address
- 100 MHz reference clock (shared with PCI Express Graphics Attach)
- APIC and MSI interrupt messaging support
- Message Signaled Interrupt (MSI) messages
- SMI, SCI and SERR error indication
- DMA, floppy drive, and LPC bus master

2.6 Intel® ICH8 Southbridge Chipset

2.6.1 Intel® ICH8 Overview

The Intel® ICH8 southbridge chipset is connected to the Intel® Q965 northbridge GMCH through the chip-to-chip Direct Media Interface (DMI). Some of the features of the Intel® ICH8 are listed below.

- Complies with PCI Express Base Specification, Revision 1.1
- Complies with PCI Local Bus Specification, Revision 2.3 and supports 33MHz PCI operations
- Supports ACPI Power Management Logic
- Contains:
  - Enhanced DMA controller
  - Interrupt controller
  - Timer functions
- Integrated SATA host controller with DMA operation
- Supports the USB 2.0 devices on the 2807760
- Integrated 10/100/1000 GbE MAC with System Defense
- Complies with System Management Bus (SMBus) Specification, Version 2.0
- Supports Intel High Definition Audio
- Low Pin Count (LPC) interface
- Firmware Hub (FWH) interface support
- Serial Peripheral Interface (SPI) support

2.6.2 Intel® High Definition Audio

The 2807760 onboard audio connector can connect to an optional audio kit. The codec on the optional audio kit is connected to the ICH8 controller through the Intel® High Definition Audio serial link. The DMA engines in the controller move samples of digitally encoded data between system memory and the audio kit codec.

2.6.3 Intel® ICH8 PCIe Ports

The 2807760 Intel® ICH8 southbridge PCIe bus is connected to four Broadcom BCM5787M PCIe Gigabit Ethernet (GbE) controllers.

2.6.4 Intel® ICH8 Low Pin Count (LPC) Interface

The ICH8 LPC interface complies with the LPC 1.1 specifications. The LPC bus from the ICH8 is connected to the following components:

- BIOS chipset
- Super I/O chipset

2.6.5 Intel® ICH8 Real Time Clock

256 bytes of battery backed RAM is provided by the Motorola MC146818A real time clock (RTC) integrated into the ICH8. The RTC operates on a 3V battery and 32.768KHz crystal. The RTC keeps track of the time and stores system data even when the system is turned off.

2.6.6 Intel® ICH8 SATA Controller

The integrated SATA controllers on the ICH8 southbridge support two SATA II drives on the 2807760. SATA controller specifications are listed below.

- Supports two SATA drives
- Supports 3Gb/s data transfer speeds
- Supports Serial ATA 1.0 Specification, Revision 1.0

2.6.7 Intel® ICH8 USB Controller

Up to six high-speed, full-speed or low-speed USB devices are supported by the ICH8 on the 2807760. High-speed USB 2.0, with data transfers of up to 480MB/s, is enabled with the ICH8 integrated Enhanced Host Controller Interface (EHCI) compliant host controller. USB full-speed and low-speed signaling is supported by the ICH8 integrated Universal Host Controller Interface (UHCI) controllers.

2.7 Intel® ICH8 PCIe Bus Components

2.7.1 PCIe Gigabit Ethernet (GbE) Controller

The 2807760 Intel® ICH8 southbridge PCIe bus is connected to four Broadcom BCM5787M PCIe Gigabit Ethernet (GbE) controllers. The Broadcom BCM5787M controllers are then connected to four RJ-45 Ethernet connector enabling the 2807760 to be connected to an external network.

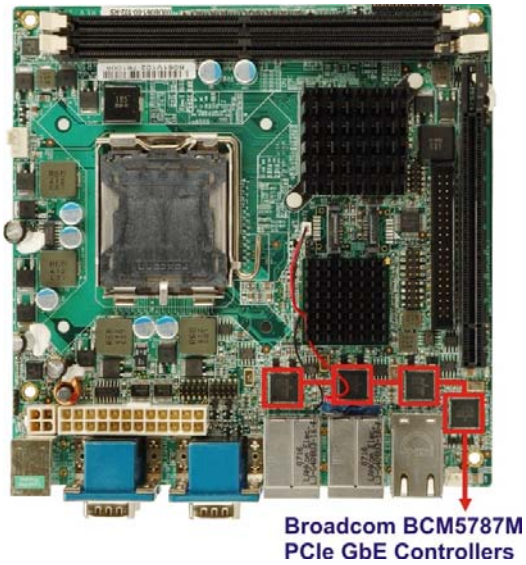

Figure 2-6: Ethernet Controllers

The Broadcom BCM5787M is a 10/100/1000BASE-T Ethernet LAN controller. The BCM5787M combines a triple-speed IEEE 802.3 compliant Media Access Controller

(MAC) with a triple-speed Ethernet transceiver, a PCIe bus interface, and an on-chip buffer memory. Some of the BCM5787 controller features are listed below:

- Integrated 10/100/1000BASE-T transceiver
- Automatic MDI crossover function
- PCIe v1.0a
- 10/100/1000BASE-T full/half-duplex MAC
- Wake on LAN support meeting the ACPI requirements
- Statistics for SNMP MIB II, Ethernet-like MIB, and Ethernet MIB (802.3z, clause 30)
- Serial EEPROM or serial flash support

2.8 LPC Bus Components

2.8.1 LPC Bus Overview

The LPC bus is connected to components listed below:

- BIOS chipset
- Super I/O chipset

2.8.2 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

2.8.3 Super I/O chipset

The iTE IT8712F Super I/O chipset is connected to the ICH8 southbridge through the LPC bus. The iTE IT8712F is an LPC interface-based Super I/O device that comes with

Environment Controller integration. Some of the features of the iTE IT8712F chipset are listed below:

- PC98/99/2001, ACPI and LANDesk Compliant
- Enhanced Hardware Monitor
- Fan Speed Controller
- Single +5V Power Supply
- Two 16C550 UARTs for serial port control
- Keyboard Controller
- Watchdog Timer
- Serial IRQ Support
- Vbat & Vcch Support
- Single +5V Power Supply

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

2.8.3.1 Super I/O LPC Interface

The LPC interface on the Super I/O complies with the Intel® Low Pin Count Specification Rev. 1.0. The LPC interface supports both LDRQ# and SERIRQ protocols as well as PCI PME# interfaces.

2.8.3.2 Super I/O 16C550 UARTs

The onboard Super I/O has two integrated 16C550 UARTs that can support the following:

- Two standard serial ports (COM1 and COM2)
- IrDa 1.0 and ASKIR protocols

Another two chipsets connected to the LPC bus provided connectivity to another two serial port connectors (COM3 and COM4).

2.8.3.3 Super I/O Enhanced Hardware Monitor

The Super I/O Enhanced Hardware Monitor monitors three thermal inputs, VBAT internally, and eight voltage monitor inputs. These hardware parameters are reported in the BIOS and can be read from the BIOS Hardware Health Configuration menu.

2.8.3.4 Super I/O Fan Speed Controller

The Super I/O fan speed controller enables the system to monitor the speed of the fan. One of the pins on the fan connector is reserved for fan speed detection and interfaced to the fan speed controller on the Super I/O. The fan speed is then reported in the BIOS.

2.8.3.5 Super I/O Keyboard Controller

The Super I/O keyboard controller can execute the 8042 instruction set. Some of the keyboard controller features are listed below:

- The 8042 instruction is compatible with a PS/2 keyboard and PS/2 mouse
- Gate A20 and Keyboard reset output
- Supports multiple keyboard power on events
- Supports mouse double-click and/or mouse move power on events

2.9 Environmental and Power Specifications

2.9.1 System Monitoring

Three thermal inputs on the 2807760 Super I/O Enhanced Hardware Monitor monitor the following temperatures:

- System temperature
- Power temperature
- CPU temperature

Eight voltage inputs on the 2807760 Super I/O Enhanced Hardware Monitor monitor the following voltages:

- CPU Core
- DDR2 1.8V
- +3.30V
- +5.00V
- +12.0V
- FSB 1.2V
- +1.5V

- +1.25V
- VBAT

The 2807760 Super I/O Enhanced Hardware Monitor also monitors the following voltages internally:

- VBAT

The 2807760 Super I/O Enhanced Hardware Monitor also monitors the following fan speeds:

- CPU Fan speed

The values for the above environmental parameters are all recorded in the BIOS Hardware Health Configuration menu.

2.9.2 Operating Temperature and Temperature Control

The maximum and minimum operating temperatures for the 2807760 are listed below.

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

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

2.9.3 Power Consumption

Table 2-1 shows the power consumption parameters for the 2807760 running with a 2.66GHz 1066MHz FSB Intel® Core® 2 Extreme QX6700 processor with 1GB of 800MHz DDR2 memory.

Voltage	Current

+3.3V	5.15A
+5V	6.62A
+12V	7.56A

Table 2-1: Power Consumption

Chapter

3

Unpacking

3.1 Anti-static Precautions

 **WARNING**:

Failure to take ESD precautions during the installation of the 2807760 may result in permanent damage to the 2807760 and severe injury to the user.

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the 2807760. Dry climates are especially susceptible to ESD. It is critical that the following anti-static precautions are strictly adhered to whenever handling the 2807760 or any other electrical component.

- ***Wear an anti-static wristband*** - Wearing a simple anti-static wristband can help to prevent ESD from damaging the 2807760.
- ***Self-grounding*** - Touch a grounded conducting material before handling and periodically while handling the 2807760.
- ***Use an anti-static pad*** - When configuring the 2807760, place it on an antic-static pad to reduce the possibility of ESD damage.
- ***Only handle the edges of the 2807760*** - When handling the 2807760, hold it by its edges.

3.2 Unpacking

3.2.1 Unpacking Precautions

When the 2807760 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 2807760 does not fall out of the box.
- Make sure all the components shown in **Section 3.3** are present.

3.3 Unpacking Checklist

NOTE:

If any components listed in the checklist below are missing, do not proceed with the installation. Contact the Global American reseller or vendor the 2807760 was purchased from or contact a Global American sales representative directly by sending an email to salesinfo@globalamericaninc.com.

3.3.1 Package Contents

The 2807760 is shipped with the following components:

Quantity	Item and Part Number	Image
1	2807760 motherboard	
1	IDE flat cable	
2	SATA cable	
1	SATA power cable	
1	RS-232 adapter cable	

Quantity	Item and Part Number	Image
1	I/O shielding	
1	Mini jumper pack	
1	Quick Installation Guide	
1	Utility CD	

Table 3-1: Package List Contents

3.3.2 Optional Components

The following optional components are available from GLOBAL AMERICAN.

Item and Part Number	Image
CPU cooling kit (P/N: 2107695)	
Dual USB cable (P/N: 1207743)	
7.1 channel HD audio kit with Realtek ACL883 (P/N: 1007760)	
PCIe x16 VGA output SDVO card (P/N: 3907690)	
PCIe x16 DVI output SDVO card (P/N: 3907680)	

Table 3-2: Optional Components

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Chapter

4

Connectors and Jumpers

4.1 Peripheral Interface Connectors

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

4.1.1 2807760 Layout

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

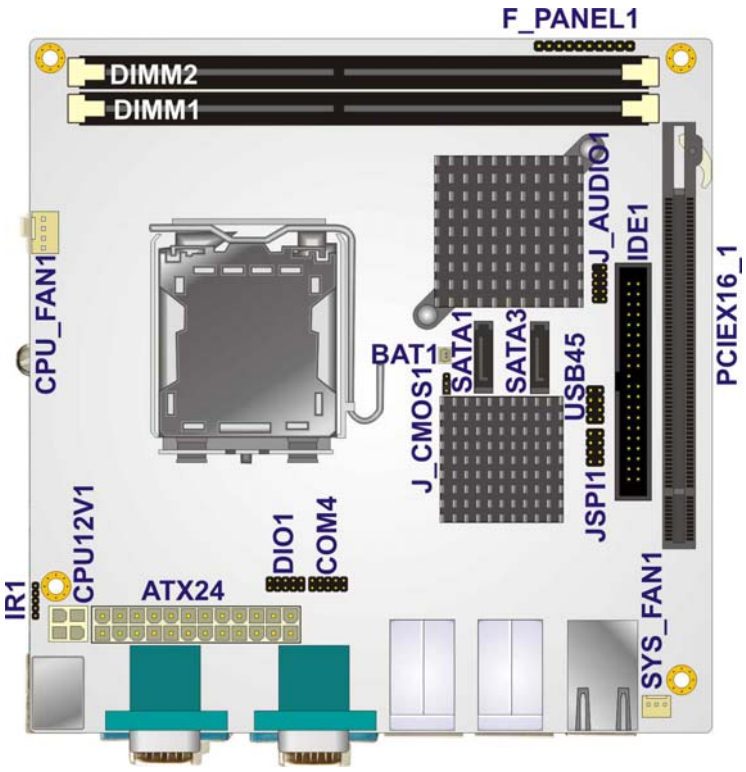

Figure 4-1: Connector and Jumper Locations

4.1.2 Peripheral Interface Connectors

Table 4-1 shows a list of the peripheral interface connectors on the 2807760. Detailed descriptions of these connectors can be found in **Section 4.2**.

Connector	Type	Label
Audio connector	10-pin header	J_AUDIO1
CPU power connector	4-pin connector	CPU12V1
DDR2 DIMM socket	240-pin slot	DIMM1
DDR2 DIMM socket	240-pin slot	DIMM2
Fan connector (CPU)	4-pin wafer connector	CPU_FAN1
Fan connector (System)	3-pin wafer connector	SYS_FAN1
Front panel connector	10-pin header	F_PANEL1
Digital Input/Output connector	10-pin header	DIO1
IDE Interface connector	40-pin box header	PIDE1
IR Interface connector	5-pin header	IR1
PCI Express x16 socket	PCI Express x16 slot	PCIEX16_1
Power connector	24-pin connector	ATX24
Serial port connector	10-pin header	COM4
SPI connector	8-pin header	JSPI1
SATA drive connector (1)	7-pin SATA connector	SATA1
SATA drive connector (2)	7-pin SATA connector	SATA3
USB connector	8-pin header	USB45

Table 4-1: Peripheral Interface Connectors

4.1.3 Rear Panel Connectors

Table 4-2 lists the rear panel connectors on the 2807760. Detailed descriptions of these connectors can be found in **Section 4.3**.

Connector	Type	Label
Ethernet connector (1)	RJ-45 connector	LAN1_USB01A
Ethernet connector (2)	RJ-45 connector	LAN2_USB23A
Ethernet connectors (dual)	RJ-45 connector	LAN34
Keyboard/Mouse connector	6-pin mini din connector	KB_MS1
Serial port connector (dual)	DB-9 male connector	COM_C12
Serial port connector	DB-9 male connector	VGA1_COM3A
VGA connector	15-pin female connector	VGA1_COM3B
USB 2.0 ports (dual)	USB port connector	LAN1_USB01B
USB 2.0 ports (dual)	USB port connector	LAN2_USB23B

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 2807760.

4.2.1 Audio Connector (10-pin)

CN Label: **J_AUDIO1**

CN Type: 10-pin header

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

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

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.

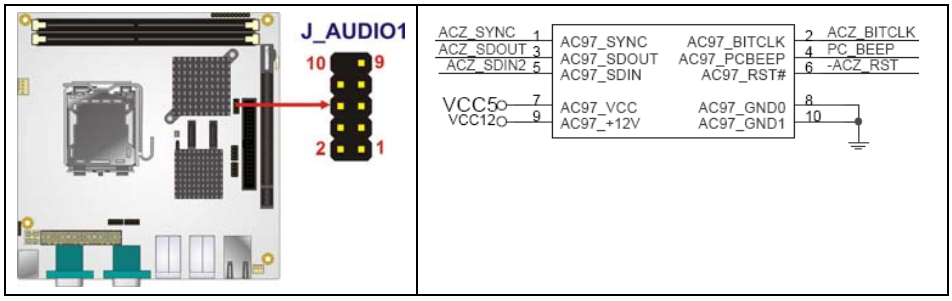

Figure 4-2: Audio Connector Pinouts

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	HDA_SYNC	2	HDA_BITCLK
3	HDA_SDOUT	4	HDA _PCBEEP
5	HDA_SDIN	6	HDA _RST#
7	+5V	8	HDA _GND
9	+12V	10	HDA _GND

Table 4-3: Audio Connector Pinouts

4.2.2 CPU 12V Power Connector

CN Label: **CPU12V1**

CN Type: 4-pin headers (1x4)

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

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

The connector supports the 12V power supply.

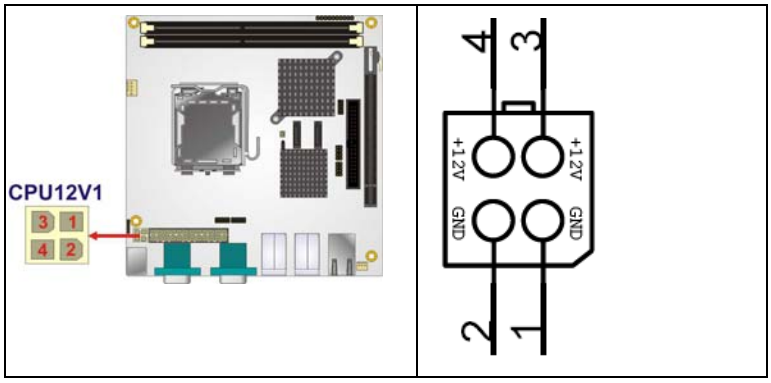

Figure 4-3: CPU 12V Power Connector Location

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

Table 4-4: CPU 12V Power Connector Pinouts

4.2.3 Fan Connectors

CN Label: **CPU_FAN1** and **SYS_FAN1**

CN Type: 4-pin header and 3-pin header

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

CN Pinouts: See **Table 4-5** and **Table 4-6**

The cooling fan connectors on the 2807760 provide a 12V, 500mA current to a CPU cooling fan and a system cooling fan. All cooling fans have linear fan speed controlled by BIOS.

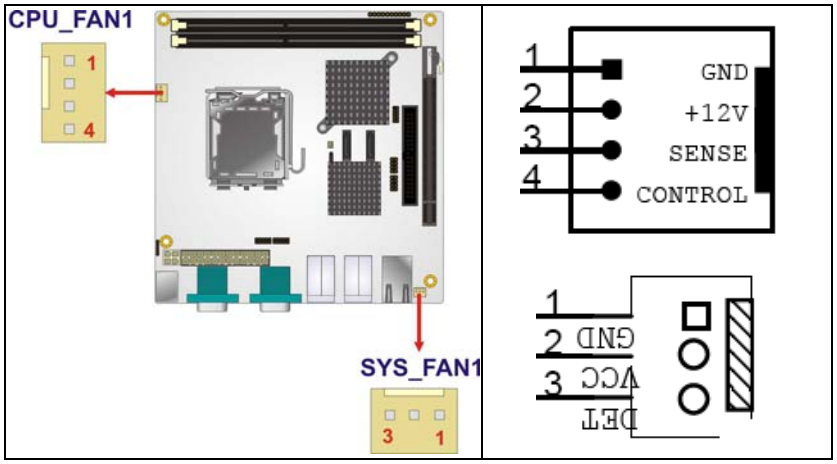

Figure 4-4: Fan Connector Locations

PIN NO.	DESCRIPTION
1	Ground
2	+12V
3	Rotation Signal
4	Control

Table 4-5: CPU Fan Connector Pinouts

PIN NO.	DESCRIPTION
1	Ground
2	+12V
3	Rotation Signal

Table 4-6: System Fan Connector Pinouts

4.2.4 Front Panel Connector

CN Label: **F_PANEL1**

CN Type: 14-pin header (2x7)

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

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

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

- Power
- ATX Power button
- Reset button
- HDD

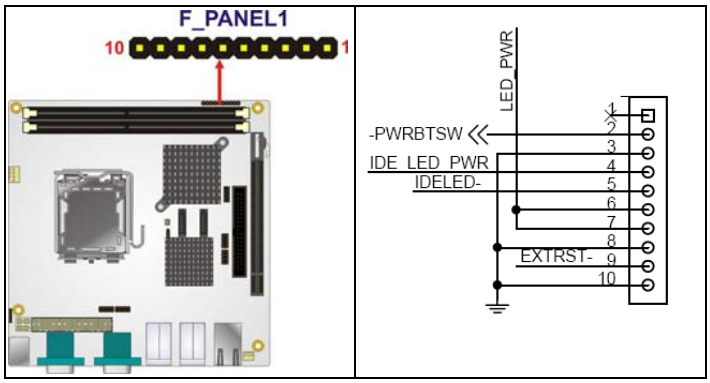

Figure 4-5: Front Panel Connector Location

FUNCTION	PIN	DESCRIPTION
	1	NC
Power Button	2	PWR_BTN+
	3	PWR_BTN-
HDD LED	4	HDD_LED+
	5	HDD_LED-
Power LED	6	PWR_LED+
	7	PWR_LED+
	8	PWR_LED-
Reset	9	RESET+
	10	RESET-

Table 4-7: Front Panel Connector Pinouts

4.2.5 Digital Input/Output Connector

CN Label: **DIO1**

CN Type: 10-pin header (2x5)

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

CN Pinouts: See **Table 4-8**

The DIO connector is managed through a Super I/O chip. The DIO connector pins are user programmable. The digital IO port of 2807760 is 5V CMOS level.

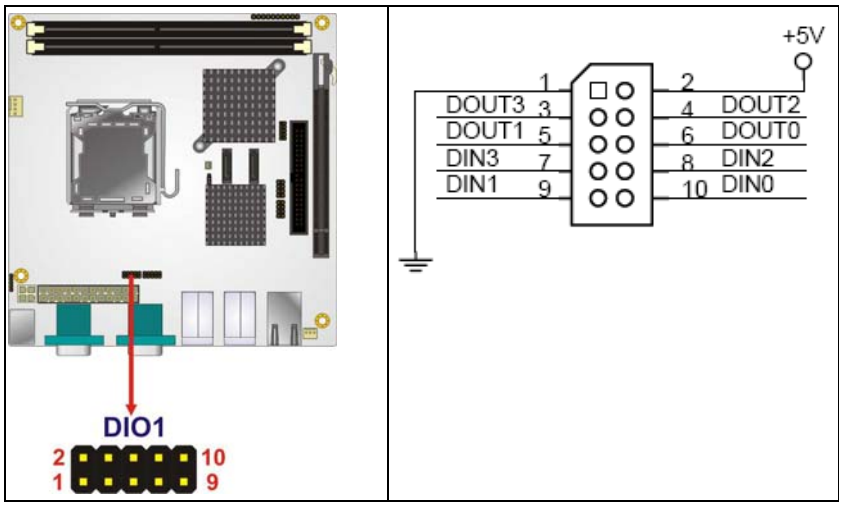

Figure 4-6: Digital I/O Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	Ground	2	VCC
3	Output 3	4	Output 2
5	Output 1	6	Output 0
7	Input 3	8	Input 2
9	Input 1	10	Input 0

Table 4-8: Digital I/O Connector Pinouts

4.2.6 IDE Connector

CN Label: **PIDE1**

CN Type: 40-pin header (2x20)

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

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

One primary 40-pin IDE device connector on the 2807760 motherboard supports connectivity to ATA 100 IDE devices with data transfer rates up to 100MB/s.

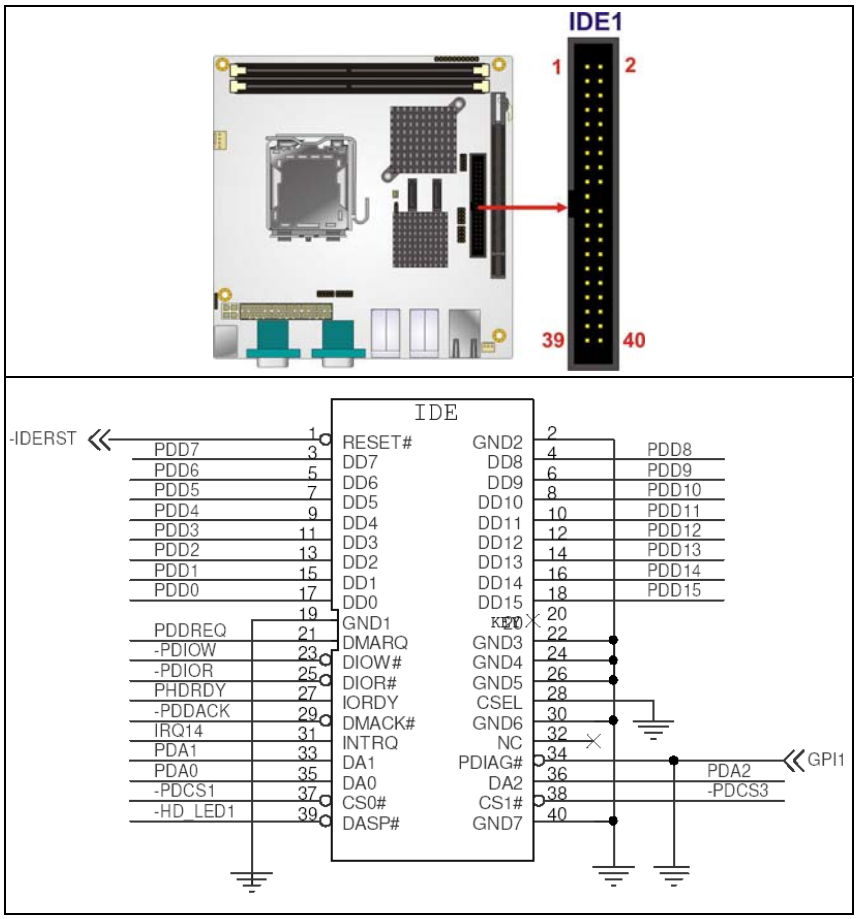

Figure 4-7: IDE Device Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	RESET#	2	GROUND
3	DATA 7	4	DATA 8
5	DATA 6	6	DATA 9
7	DATA 5	8	DATA 10
9	DATA 4	10	DATA 11
11	DATA 3	12	DATA 12
13	DATA 2	14	DATA 13
15	DATA 1	16	DATA 14
17	DATA 0	18	DATA 15
19	GROUND	20	N/C
21	DRQ	22	GROUND
23	IOW#	24	GROUND
25	IOR#	26	GROUND
27	CHRDY	28	REV. PULL LOW
29	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 4-9: IDE Connector Pinouts

4.2.7 IR Interface Connector

CN Label: **IR1**

CN Type: 5-pin header (1x5)

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

CN Pinouts: See **Table 4-10**

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

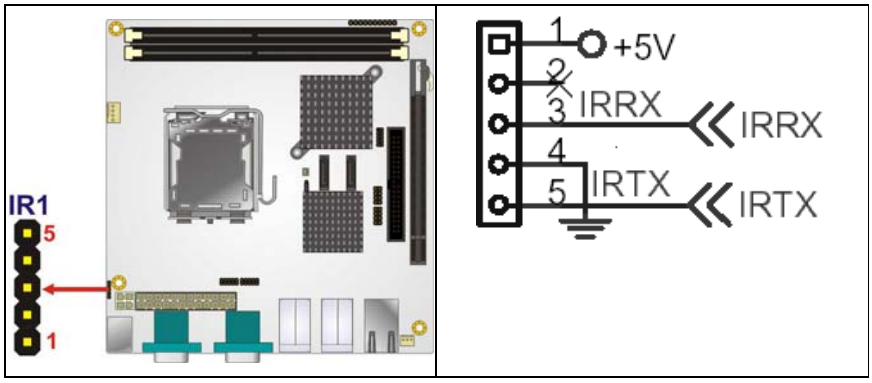

Figure 4-8: IR Connector Location

PIN NO.	DESCRIPTION
1	VCC
2	NC
3	IR-RX
4	Ground
5	IR-TX

Table 4-10: IR Connector Pinouts

4.2.8 PCI Express x16 Slot

CN Label: **PCIEX16_1**

CN Type: 164-pin PCIe x16 slot

CN Location: See **Figure 4-9**

CN Pinouts: See **Table 4-11** (Side A) **Table 4-12** (Side B)

PCIe x16 expansion devices can be inserted into the PCIe x16 slot.

Figure 4-9: PCI Express x16 Slot Location

PIN	NAME	PIN	NAME	PIN	NAME	PIN	NAME
A1	Name	A22	HSIn(1)	A43	HSIp(6)	A64	HSIp(11)
A2	PRSNT#1	A23	GND	A44	HSIn(6)	A65	HSIn(11)
A3	+12v	A24	GND	A45	GND	A66	GND
A4	+12v	A25	HSIp(2)	A46	GND	A67	GND
A5	GND	A26	HSIn(2)	A47	HSIp(7)	A68	HSIp(12)
A6	JTAG2	A27	GND	A48	HSIn(7)	A69	HSIn(12)
A7	JTAG3	A28	GND	A49	GND	A70	GND
A8	JTAG4	A29	HSIp(3)	A50	RSVD	A71	GND
A9	JTAG5	A30	HSIn(3)	A51	GND	A72	HSIp(13)
A10	+3.3v	A31	GND	A52	HSIp(8)	A73	HSIn(13)
A11	+3.3v	A32	RSVD	A53	HSIn(8)	A74	GND
A12	PWRGD	A33	RSVD	A54	GND	A75	GND
A13	GND	A34	GND	A55	GND	A76	HSIp(14)
A14	REFCLK+	A35	HSIp(4)	A56	HSIp(9)	A77	HSIn(14)
A15	REFCLK-	A36	HSIn(4)	A57	HSIn(9)	A78	GND
A16	GND	A37	GND	A58	GND	A79	GND
A17	HSIp(0)	A38	GND	A59	GND	A80	HSIp(15)

A18	HSIn(0)	A39	HSIp(5)	A60	HSIp(10)	A81	HSIn(15)
A19	GND	A40	HSIn(5)	A61	HSIn(10)	A82	GND
A20	RSVD	A41	GND	A62	GND		
A21	GND	A42	GND	A63	GND		

Table 4-11: PCIe x16 Side A Pinouts

PIN	NAME	PIN	NAME	PIN	NAME	PIN	NAME
B1	+12v	B22	GND	B43	GND	B64	GND
B2	+12v	B23	HSOp(2)	B44	GND	B65	GND
B3	RSVD	B24	HSOn(2)	B45	HSOp(7)	B66	HSOp(12)
B4	GND	B25	GND	B46	HSOn(7)	B67	HSOn(12)
B5	SMCLK	B26	GND	B47	GND	B68	GND
B6	SMDAT	B27	HSOp(3)	B48	PRSNT#2	B69	GND
B7	GND	B28	HSOn(3)	B49	GND	B70	HSOp(13)
B8	+3.3v	B29	GND	B50	HSOp(8)	B71	HSOn(13)
B9	JTAG1	B30	RSVD	B51	HSOn(8)	B72	GND
B10	3.3Vaux	B31	PRSNT#2	B52	GND	B73	GND
B11	WAKE#	B32	GND	B53	GND	B74	HSOp(14)
B12	RSVD	B33	HSOp(4)	B54	HSOp(9)	B75	HSOn(14)
B13	GND	B34	HSOn(4)	B55	HSOn(9)	B76	GND
B14	HSOp(0)	B35	GND	B56	GND	B77	GND
B15	HSOn(0)	B36	GND	B57	GND	B78	HSOp(15)
B16	GND	B37	HSOp(5)	B58	HSOp(10)	B79	HSOn(15)
B17	PRSNT#2	B38	HSOn(5)	B59	HSOn(10)	B80	GND
B18	GND	B39	GND	B60	GND	B81	PRSNT#2
B19	HSOp(1)	B40	GND	B61	GND	B82	RSVD#2
B20	HSOn(1)	B41	HSOp(6)	B62	HSOp(11)		
B21	GND	B42	HSOn(6)	B63	HSOn(11)		

Table 4-12: PCIe x16 Side B Pinouts

4.2.9 ATX Power Connector

CN Label: **ATX24**

CN Type: 24-pin connector

CN Location: See **Figure 4-10**

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

This 24-pin power connector supports the ATX power supply.

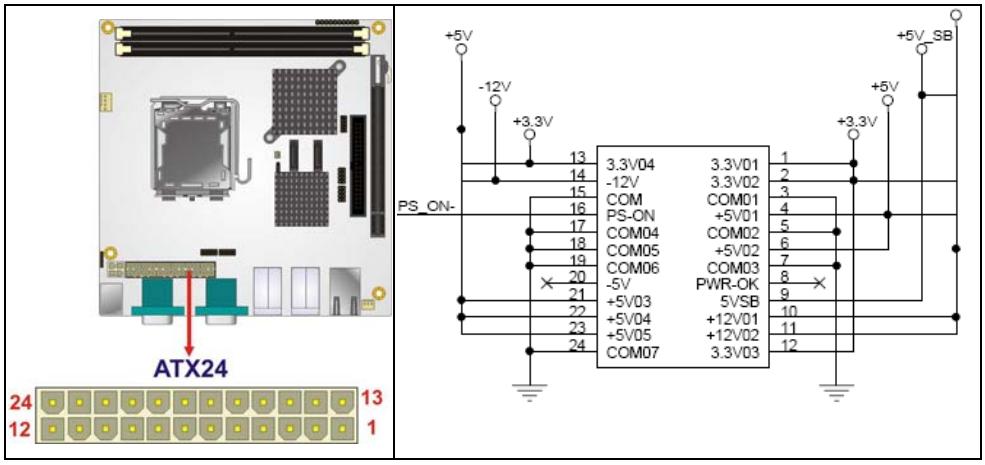

Figure 4-10: Power Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	+3.3V	13	+3.3V
2	+3.3V	14	-12V
3	GROUND	15	GROUND
4	+5V	16	PS_ON#
5	GROUND	17	GROUND
6	+5V	18	GROUND
7	GROUND	19	GROUND
8	PWR_OK	20	-5V
9	+5VSB	21	+5V

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
10	+12V	22	+5V
11	+12V	23	+5V
12	+3.3V	24	GROUND

Table 4-13: Power Connector Pinouts

4.2.10 Serial Port Connector

CN Label: **COM4**

CN Type: 10-pin header (2x5)

CN Location: See **Figure 4-11**

CN Pinouts: See **Table 4-14**

The serial ports connectors connect to RS-232 serial port device.

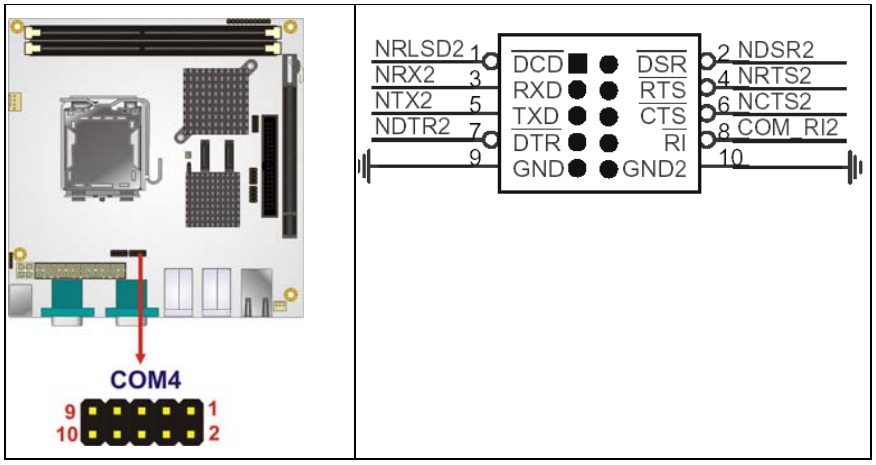

Figure 4-11: Serial Port Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	DCD1	2	DSR1
3	RXD1	4	RTS1
5	TXD1	6	CTS1

7	DTR1	8	RI1
9	GROUND	10	NC

Table 4-14: Serial Port Connector Pinouts

4.2.11 SATA Drive Connectors

CN Label: **SATA1** and **SATA3**

CN Type: 1x7 pin SATA drive connectors

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

CN Pinouts: See **Table 4-15**

The two SATA drive connectors are connected to two SATA II drives. SATA II drives transfer data at speeds as high as 3.0Gb/s.

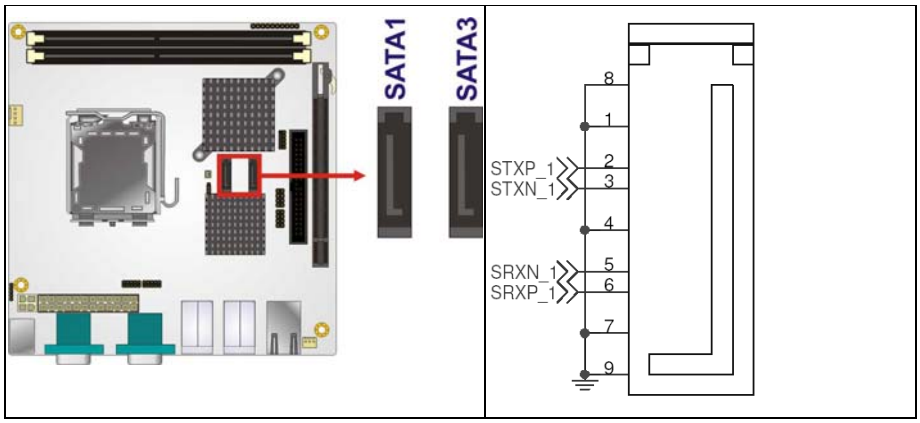

Figure 4-12: SATA Drive Connector Locations

PIN NO.	DESCRIPTION
1	GND
2	TXP
3	TXN
4	GND
5	RXN

6	RXP
7	GND

Table 4-15: SATA Drive Connector Pinouts

4.2.12 SPI Connector

CN Label: **JSPI1**

CN Type: 8-pin header (2x4)

CN Location: See **Figure 4-14**

CN Pinouts: See **Table 4-17**

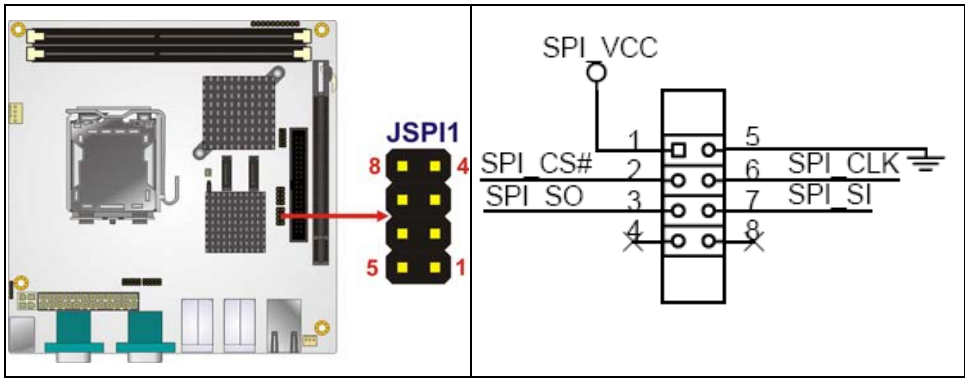

Figure 4-13: SPI Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	SPI_VCC (+3.3V)	5	GND
2	SPI_CS#	6	SPI_CLK
3	SPI_SO	7	SPI_SI
4	NC	8	NC

Table 4-16: SPI Connector Pinouts

4.2.13 Internal USB Connector

CN Label: **USB45**

CN Type: 8-pin header (2x4)

CN Location: See **Figure 4-14**

CN Pinouts: See **Table 4-17**

One 2x4 pin connector provides connectivity to two USB 2.0 ports. The USB ports are used for I/O bus expansion.

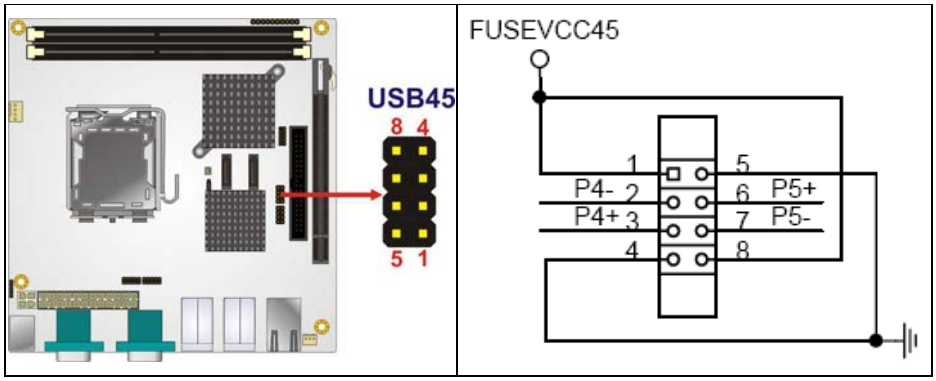

Figure 4-14: Internal USB Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	USB Power	5	GND
2	DATA-	6	DATA+
3	DATA+	7	DATA-
4	GND	8	USB Power

Table 4-17: USB45 Pinouts

4.3 External Interface Connectors

The peripheral connectors on the back panel are connected to devices externally when the 2807760 is installed in a chassis. The peripheral connectors on the rear panel are:

- 1 x CRT connector
- 4 x RJ-45 Ethernet connectors
- 2 x Keyboard/mouse connectors
- 3 x Serial port connectors
- 4 x USB 2.0 connectors

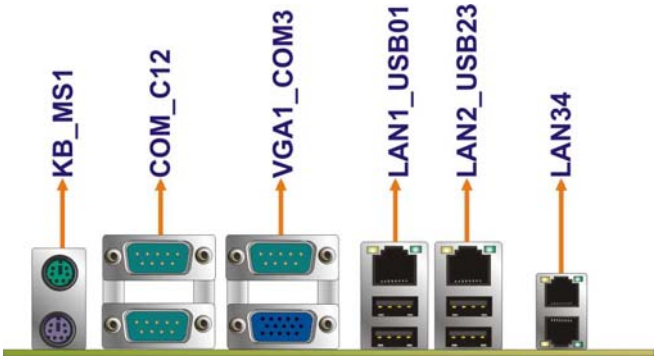

Figure 4-15: 2807760 External Interface Connectors

4.3.1 CRT Connector

CN Label:	**VGA1_COM3B**
CN Type:	15-pin female connector
CN Location:	See **Figure 4-15**
CN Pinouts:	See **Table 4-18**

The standard 15-pin VGA connector connects to a CRT or LCD display monitor.

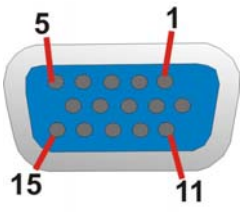

Figure 4-16: VGA Connector

PIN NO.	DESCRIPTION	PIN NO.	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
13	HSYNC	14	VSYNC
15	DDCCLK		

Table 4-18: VGA Connector Pinouts

4.3.2 Ethernet Connectors

CN Label: **LAN1_USB01A**, **LAN2_USB23A** and **LAN34**

CN Type: RJ-45

CN Location: See **Figure 4-15**

CN Pinouts: See **Table 4-19**

The 2807760 is equipped with four built-in GbE Ethernet controllers. The controllers can connect to the LAN through four RJ-45 LAN connectors. There are two LEDs on the connector indicating the status of LAN. The pin assignments are listed in the following table:

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

Table 4-19: Ethernet Connector Pinouts

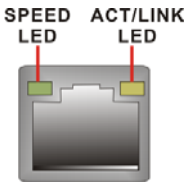

Figure 4-17: RJ-45 Ethernet Connector

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 4-20**.

SPEED LED		ACT/LINK LED	
STATUS	DESCRIPTION	STATUS	DESCRIPTION
GREEN	10/100Mbps connection	YELLOW	Linked
ORANGE	1Gbps connection	BLINKING	Data Activity

Table 4-20: RJ-45 Ethernet Connector LEDs

4.3.3 Keyboard/Mouse Connector

CN Label: **KB_MS1**

CN Type: PS/2 connector

CN Location: See **Figure 4-15**

CN Pinouts: See **Table 4-21**

The 2807760 keyboard and mouse connectors are standard PS/2 connectors.

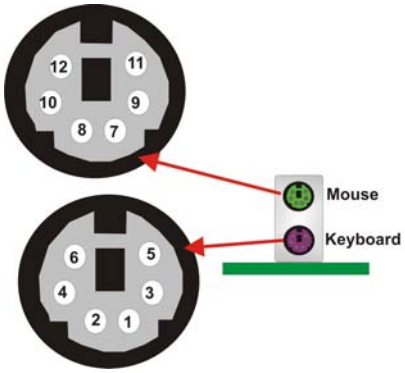

Figure 4-18: PS/2 Pinouts

PIN	DESCRIPTION	PIN	DESCRIPTION
1	KB DATA	7	MS DATA
2	NC	8	NC
3	GROUND	9	GROUND
4	KB VCC	10	MS VCC
5	KB CLOCK	11	MS CLOCK
6	NC	12	NC

Table 4-21: PS/2 Connector Pinouts

4.3.4 Serial Port Connectors

CN Label: **COM_C12** and **VGA_COM3A**

CN Type: DB-9

CN Location: See **Figure 4-15**

CN Pinouts: See **Table 4-22**

The serial ports can be connected to a serial communications device directly.

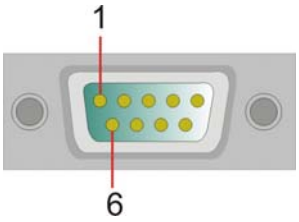

Figure 4-19: External Serial Port Connector

PIN	Description
1	DATA CARRIER DETECT (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)

Table 4-22: External Serial Port Pinouts

4.3.5 USB Connectors

CN Label: **LAN1_USB01B** and **LAN2_USB23B**

CN Type: USB port

CN Location: See **Figure 4-15**

CN Pinouts: See **Table 4-23**

USB devices can be connected directly to the USB connectors on the rear panel.

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

Table 4-23: External USB Connector Pinouts

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Chapter

5

Installation and Configuration

5.1 Anti-static Precautions

WARNING:

Failure to take ESD precautions during the installation of the 2807760 may result in permanent damage to the 2807760 and severe injury to the user.

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the 2807760. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the 2807760, 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 2807760, place it on an antic-static pad. This reduces the possibility of ESD damage.
- ***Only handle the edges of the PCB***: When handling the PCB, hold it by its edges.

5.2 Installation Considerations

NOTE:

The following installation notices and installation considerations should be read and understood before the 2807760 is installed. All installation notices pertaining to the installation of the 2807760 should be strictly adhered to. Failing to adhere to these precautions may lead to severe damage of the 2807760 and injury to the person installing the motherboard.

5.2.1 Installation Notices

WARNING:

The installation instructions described in this manual should be carefully followed in order to prevent damage to the 2807760 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 2807760 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 2807760 on an antistatic pad**:
  - When installing or configuring the motherboard, place it on an antistatic pad. This helps to prevent potential ESD damage.
- **Turn off all power to the 2807760**:

- When working with the 2807760, 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 2807760 **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 2807760 is properly installed.

- All the items in the packing list are present (see **Chapter 3**)
- A CPU is installed
- A CPU cooling kit is properly installed
- Compatible memory modules are properly inserted into the memory slots
- The 2807760 is installed into a chassis with adequate ventilation
- The correct power supply is being used
- The following devices (if applicable) are properly connected
  - IDE devices
  - SATA drives
  - System front panel connector
  - Power supply
  - USB cable
  - Serial port cable
  - Keyboard/mouse cable
  - COM port cables
  - CPU/System fan cable
- The following external peripheral devices (if applicable) are properly connected to the chassis:
  - VGA screen
  - Keyboard

- Mouse
- RS-232 serial communications device
- USB devices
- LAN

5.3 CPU, CPU Cooling Kit and DIMM Installation

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 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 2807760. If any of these components is not installed, the 2807760 cannot operate.

5.3.1.1 LGA 775 CPU Installation

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 that a heat sink and CPU cooling fan are properly installed before the 2807760 is run.

If a heat sink and cooling fan are not properly installed both the CPU and the board may be damaged.

The LGA775 socket is shown in **Figure 5-1**.

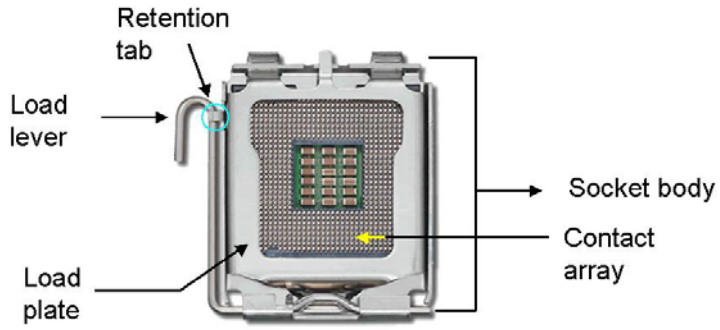

Figure 5-1: Intel LGA775 Socket

WARNING:

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

To install Socket LGA775 CPU onto the 2807760, follow the steps below:

Step 1: **Remove the protective cover.** Remove the black protective cover by prying it off the load plate. To remove the protective cover, locate the "**REMOVE**" sign and use the fingernail to pry the protective cover off. (See **Figure 5-2**)

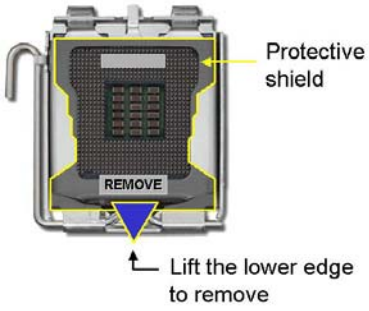

Figure 5-2: Remove the CPU Socket Protective Shield

Step 2: **Open the socket**. Disengage the load lever by pressing the lever down and slightly outward to clear the retention tab. Rotate the load lever to a fully open position. Then rotate the load plate towards the opposite direction. (See **Figure 5-3**)

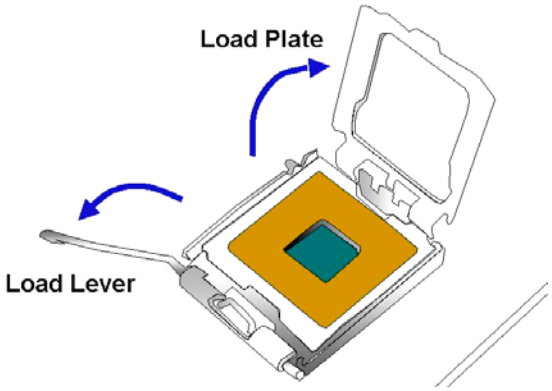

Figure 5-3: Open the CPU Socket Load Plate

Step 3: **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 4: **Orientate the CPU properly**. Make sure the IHS (Integrated Heat Sink) side is facing upward.

Step 5: **Correctly position the CPU.** Match the Pin 1 mark with the cut edge on

the CPU socket.

Step 6: **Align the CPU pins.** Locate pin 1 and the two orientation notches on the CPU. Carefully match the two orientation notches on the CPU with the socket alignment keys.

Step 7: **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. See **Figure 5-4**.

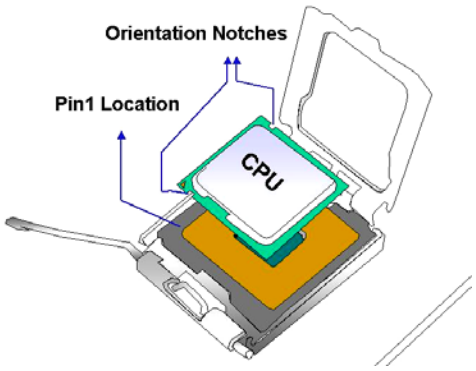

Figure 5-4: Insert the Socket LGA775 CPU

Step 8: **Close the CPU socket.** Close the load plate and 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.

Step 9: **Connect the CPU power connector.** Connect the CPU 12V cable to the CPU 12V power connector after the cooling kit is installed.

5.3.2 Socket LGA775 Cooling Kit Installation

WARNING:

It is strongly recommended that you DO NOT use the original heat sink and cooler provided by Intel on the 2807760.

The 2807760 is vertically mounted on a horizontal backplane, and Intel's heat sink does not come with a support bracket on the soldering side, the PCB may be bent by the weight of the cooling kit.

GLOBAL AMERICAN's cooling kit (CF-520 and CF-775A) includes a support bracket that is combined with the heat sink mounted on the CPU to counterweigh and balance the load on both sides of the PCB.

CF-520-RS

CF-775A-RS

Figure 5-5: GLOBAL AMERICAN LGA-775 Cooling Kit

The Global American LGA775 CPU cooling kit (CF-520 and CF-775A) shown in **Figure 5-5** comprises a CPU heat sink and a cooling fan.

NOTE:

Do not wipe off (accidentally or otherwise) the pre-sprayed layer of thermal

paste on the bottom of the CF-520 heat sink. The thermal paste between the CPU and the heat sink is important for optimum heat dissipation.

To install the cooling kit follow the instructions below.

Step 1: **Place the cooling kit onto the socket LGA775 CPU**. Make sure the CPU cable can be properly routed when the cooling kit is installed.

Step 2: **Properly align the cooling kit**. Make sure the four spring screw fasteners can pass through the pre-drilled holes on the PCB.

Step 3: **Mount the cooling kit**. Gently place the cooling kit on top of the CPU. Make sure the four threaded screws on the corners of the cooling kit properly pass through the predrilled holes on the bottom of the PCB.

Step 4: **Secure the cooling kit**. From the solder side of the PCB, align the support bracket to the screw threads on heat sink that were inserted through the PCB holes. (See **Figure 5-6**)

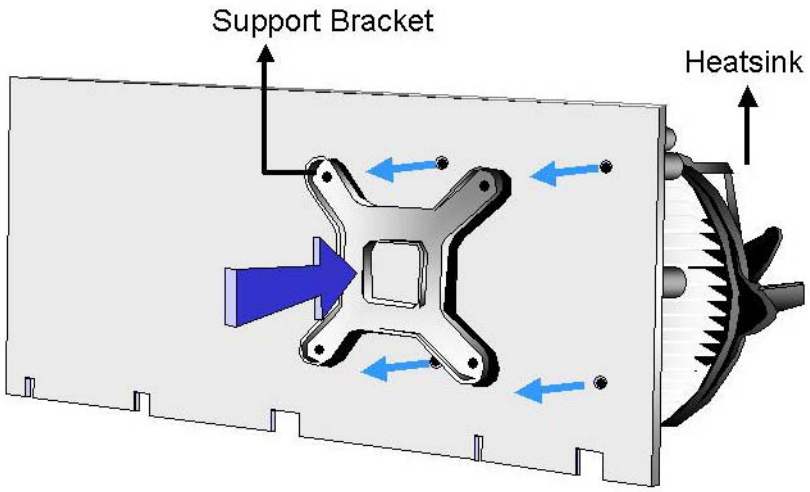

Figure 5-6: Securing the Heat sink to the PCB Board

Step 5: **Tighten the screws**. Use a screwdriver to tighten the four screws. Tighten

each nut a few turns at a time and do not over-tighten the screws.

Step 6: **Connect the fan cable**. Connect the cooling kit fan cable to the fan connector on the 2807760. Carefully route the cable and avoid heat generating chips and fan blades.

5.3.3 DIMM Installation

WARNING:

Using incorrectly specified DIMM may cause permanently damage the 2807760. Please make sure the purchased DIMM complies with the memory specifications of the 2807760. DIMM specifications compliant with the 2807760 are listed in **Chapter 2**.

To install a DIMM into a DIMM socket, please follow the steps below and refer to **Figure 5-7**.

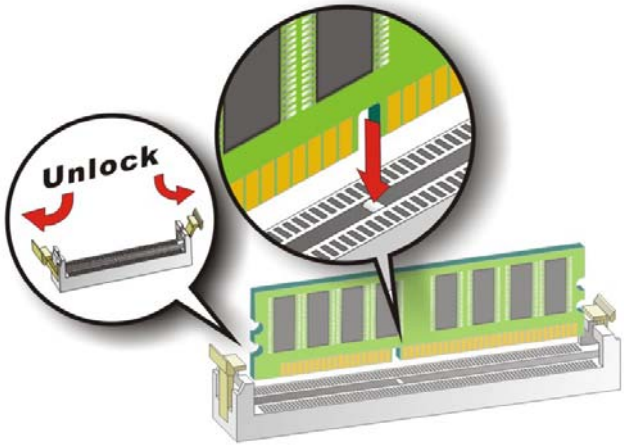

Figure 5-7: Installing a DIMM

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 5-7**.

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 5-7**.

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 5-7**.

Step 4: **Removing a DIMM**. To remove a DIMM, push both handles outward. The memory module is ejected by a mechanism in the socket.

5.4 Jumper Settings

NOTE:

A jumper is a metal bridge used to close an electrical circuit. It consists of two or three 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.

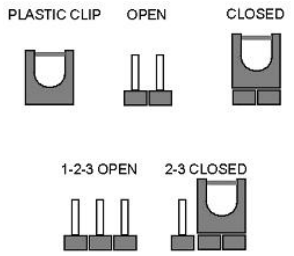

Figure 5-8: Jumpers

Before the 2807760 is installed in the system, the jumpers must be set in accordance with the desired configuration. The jumpers on the 2807760 are listed in **Table 5-1**.

Description	Label	Type
Clear CMOS	J_CMOS1	3-pin header

Table 5-1: Jumper

The 2807760 jumper location is shown in **Figure 5-9**.

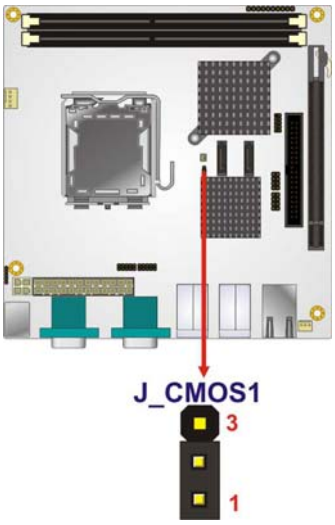

Figure 5-9: Jumper Location

5.4.1 Clear CMOS Jumper

Jumper Label: **J_CMOS1**

Jumper Type: 3-pin header

Jumper Settings: See **Table 5-2**

Jumper Location: See **Figure 5-9**

If the 2807760 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 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**.

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

Table 5-2: Clear CMOS Jumper Settings

5.5 Chassis Installation

5.5.1 Airflow

WARNING

Airflow is critical to the cooling of the CPU and other onboard components. The chassis into which the 2807760 is placed must have air vents to allow proper airflow to cool the system components.

The 2807760 must be installed in a chassis with ventilation holes on the sides allowing airflow to travel over 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 over the board surface.

NOTE

GLOBAL AMERICAN has a wide range of chassis available. Please contact your 2807760 vendor, reseller or a Global American sales representative at salesinfo@globalamericaninc.com or visit the Global American website (http://www.globalamericaninc.com) to find out more about available chassis.

5.6 Internal Peripheral Device Connections

5.6.1 Peripheral Device Cables

The cables listed in **Table 5-3** are shipped with the 2807760.

Quantity	Type
1	IDE Flat Cable
2	SATA Cable
1	SATA Power Cable
1	RS-232 Adapter Cable

Table 5-3: GLOBAL AMERICAN Provided Cables

5.6.2 ATA Flat Cable Connection

The ATA 66/100 flat cable connects to an IDE device. Follow the instructions below to connect an IDE HDD to the 2807760.

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

Step 2: **Insert the connector**. Connect the IDE cable connector to the onboard connector. See **Figure 5-10**. A key on the front of the cable connector ensures it can only be inserted in one direction.

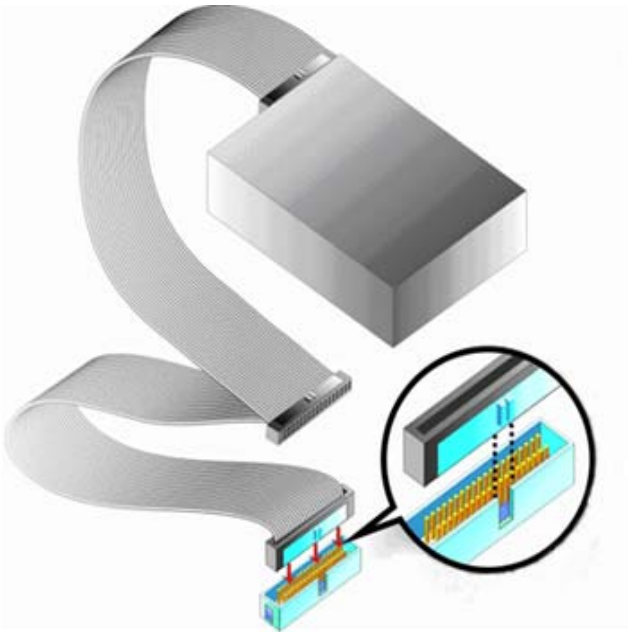

Figure 5-10: IDE Cable Connection

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

5.6.3 SATA Drive Connection

The 2807760 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 onboard SATA drive connector.

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.

Step 4: **Connect the SATA power cable**. Connect the SATA power connector to the back of the SATA drive.

5.6.4 Single RS-232 Cable

The single RS-232 cable consists of one serial port connector attached to a serial communications cable that is then attached to a D-sub 9 male connector. To install the single RS-232 cable, please follow the steps below.

Step 1: **Locate the connector**. The location of the RS-232 connector is shown in **Chapter 3**.

Step 2: **Insert the cable connector**. Insert the connector into the serial port box header. See **Figure 5-11.** A key on the front of the cable connectors ensures the connector can only be installed in one direction.

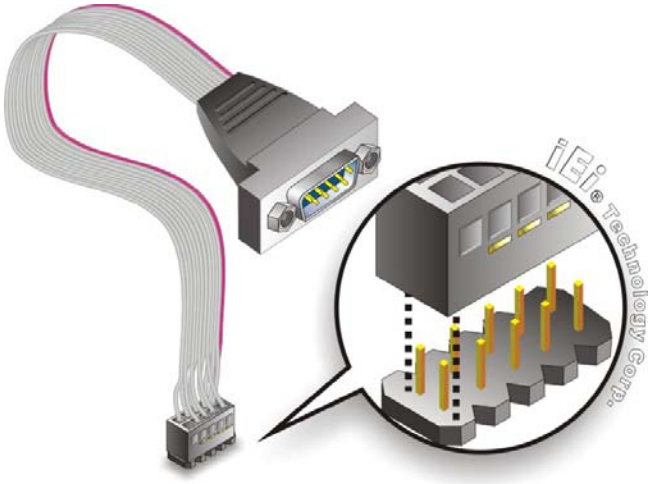

Figure 5-11: Single RS-232 Cable Installation

Step 3: **Secure the bracket**. The single RS-232 connector has two retention screws that must be secured to a chassis or bracket.

Step 4: **Connect the serial device**. Once the single RS-232 connector is

connected to a chassis or bracket, a serial communications device can be connected to the system.

5.7 External Peripheral Interface Connection

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

- Mouse/keyboard
- 4 x RJ-45 Ethernet cable connectors
- 3 x Serial ports
- 4 x USB devices
- VGA monitor

To connect these devices, connect the corresponding cable connector from the actual device to the corresponding 2807760 external peripheral interface connector making sure the pins are properly aligned.

5.7.1 PS/2 Keyboard and Mouse Connection

The 2807760 has a dual PS/2 connector on the external peripheral interface panel. The dual PS/2 connector is used to connect to a keyboard and mouse to the system. Follow the steps below to connect a keyboard and mouse to the 2807760.

Step 1: **Locate the dual PS/2 connector**. The location of the dual PS/2 connector is shown in **Chapter 3**.

Step 2: **Insert the keyboard/mouse connector**. Insert a PS/2 keyboard or mouse connector into the appropriate PS/2 connector on the external peripheral interface connector. See Figure 5-12.

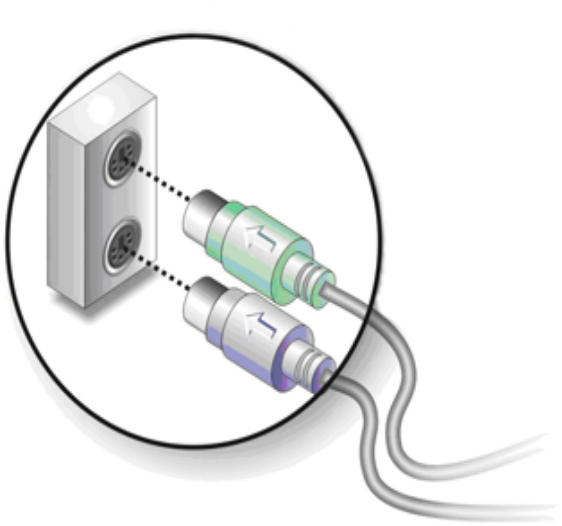

Figure 5-12: PS/2 Keyboard/Mouse Connector

5.7.2 RJ-45 Ethernet Connection

The 2807760 has two RJ-45 Ethernet connectors on the external peripheral interface panel for LAN communications. Follow the steps below to connect an RJ-45 Ethernet connector to the 2807760.

Step 1: **Locate the RJ-45 connector**. The location of the RJ-45 connector is shown in **Chapter 3**.

Step 2: **Insert an RJ-45 plug**. Insert the RJ-45 plug of a LAN into the RJ-45 receptacle on the external peripheral interface. See **Figure 5-13**.

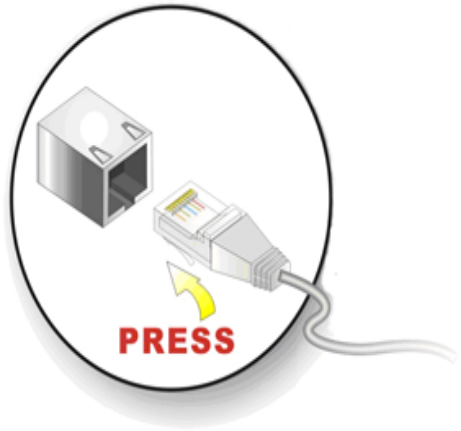

Figure 5-13: RJ-45 Ethernet Connector

Serial Device Connection

The 2807760 has a single female DB-9 connector on the external peripheral interface panel for a serial device. Follow the steps below to connect a serial device to the 2807760.

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

Step 2: **Insert the serial connector**. Insert the DB-9 connector of a serial device into the DB-9 connector on the external peripheral interface. See Figure 5-14.

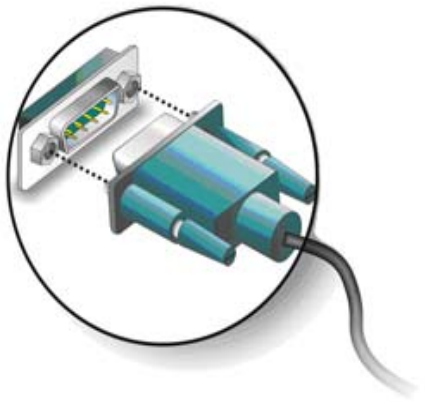

Figure 5-14: Serial Device Connector

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

5.7.3 USB Connection (Dual Connector)

The external USB Series "A" receptacle connectors provide easier and quicker access to external USB devices. Follow the steps below to connect USB devices to the 2807760.

Step 1: **Locate the USB Series "A" receptacle connectors**. The location of the USB Series "A" receptacle connectors are shown in **Chapter 3**.

Step 2: **Insert a USB Series "A" plug**. Insert the USB Series "A" plug of a device into the USB Series "A" receptacle on the external peripheral interface. See **Figure 5-15**.

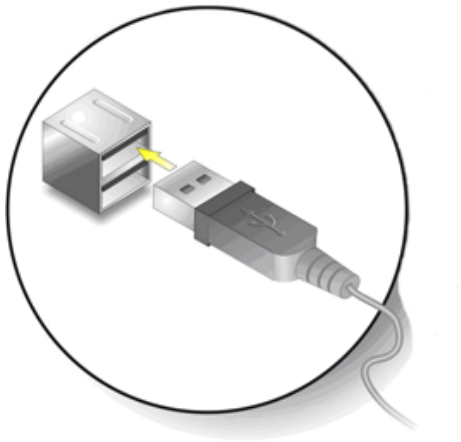

Figure 5-15: USB Connector

5.7.4 VGA Monitor Connection

The 2807760 has a single female DB-15 connector on the external peripheral interface panel for a VGA monitor. Follow the steps below to connect a VGA monitor to the 2807760.

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

Step 2: **Insert the VGA connector**. Insert the DB-15 connector of a VGA monitor into the DB-15 connector on the external peripheral interface. See **Figure 5-16**.

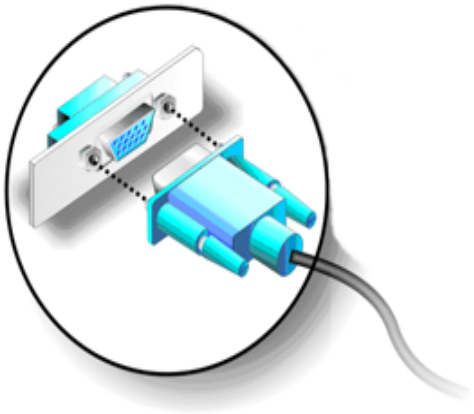

Figure 5-16: VGA Connector

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

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Appendix

A

BIOS Configuration Options

A.1 BIOS Configuration Options

Below is a list of BIOS configuration options described in **Chapter** Error! Reference source not found..

- **System Overview** ..... Error! Bookmark not defined.
- **System Time [xx:xx:xx]** ..... Error! Bookmark not defined.
- **System Date [xx/xx/xx]** ..... Error! Bookmark not defined.
- **SATA#1 Compatible** ..... Error! Bookmark not defined.
- **Configure SATA#1 as [IDE]** ..... Error! Bookmark not defined.
- **IDE Master and IDE Slave** ..... Error! Bookmark not defined.
- **Auto-Detected Drive Parameters** ..... Error! Bookmark not defined.
- **Type [Auto]** ..... Error! Bookmark not defined.
- **ZIP** ..... Error! Bookmark not defined.
- **LS-120** ..... Error! Bookmark not defined.
- **LBA/Large Mode [Auto]** ..... Error! Bookmark not defined.
- **Block (Multi Sector Transfer) [Auto]** ..... Error! Bookmark not defined.
- **PIO Mode [Auto]** ..... Error! Bookmark not defined.
- **DMA Mode [Auto]** ..... Error! Bookmark not defined.
- **S.M.A.R.T [Auto]** ..... Error! Bookmark not defined.
- **32Bit Data Transfer [Enabled]** ..... Error! Bookmark not defined.
- **Serial Port1 Address [3F8/IRQ4]** ..... Error! Bookmark not defined.
- **Serial Port2 Address [2F8/IRQ3]** ..... Error! Bookmark not defined.
- **Serial Port2 Mode [Normal]** ..... Error! Bookmark not defined.
- **Serial Port3 Address [3E8]** ..... Error! Bookmark not defined.
- **Serial Port3 IRQ [11]** ..... Error! Bookmark not defined.
- **Serial Port4 Address [2E8]** ..... Error! Bookmark not defined.
- **Serial Port4 IRQ [10]** ..... Error! Bookmark not defined.
- **AHCI Port n [Not Detected]** ..... Error! Bookmark not defined.
- **Power Button Mode [On/Off]** ..... Error! Bookmark not defined.
- **Resume on Ring [Disabled]** ..... Error! Bookmark not defined.
- **Resume on PME# [Disabled]** ..... Error! Bookmark not defined.

- **Resume On RTC Alarm [Disabled]** ..... Error! Bookmark not defined.
- **RTC Alarm Date (Days)** ..... Error! Bookmark not defined.
- **System Time** ..... Error! Bookmark not defined.
- **Restore on AC Power Loss [Power Off]** ..... Error! Bookmark not defined.
- **Remote Access [Disabled]** ..... Error! Bookmark not defined.
- **Serial Port Number** ..... Error! Bookmark not defined.
- **Serial Port Mode** ..... Error! Bookmark not defined.
- **Redirection after BIOS POST** ..... Error! Bookmark not defined.
- **Terminal Type** ..... Error! Bookmark not defined.
- **Serial Port Number [COM1]** ..... Error! Bookmark not defined.
- **Base Address, IRQ [3F8h,4]** ..... Error! Bookmark not defined.
- **Serial Port Mode [115200 8,n,1]** ..... Error! Bookmark not defined.
- **Redirection After BIOS POST [Always]** ..... Error! Bookmark not defined.
- **Terminal Type [ANSI]** ..... Error! Bookmark not defined.
- **USB Functions [Enabled]** ..... Error! Bookmark not defined.
- **USB 2.0 Controller [Enabled]** ..... Error! Bookmark not defined.
- **Legacy USB Support [Enabled]** ..... Error! Bookmark not defined.
- **USB2.0 Controller Mode [HiSpeed]** ..... Error! Bookmark not defined.
- **IRQ# [Available]** ..... Error! Bookmark not defined.
- **DMA Channel# [Available]** ..... Error! Bookmark not defined.
- **Reserved Memory Size [Disabled]** ..... Error! Bookmark not defined.
- **Quick Boot [Enabled]** ..... Error! Bookmark not defined.
- **Quiet Boot [Disabled]** ..... Error! Bookmark not defined.
- **AddOn ROM Display Mode [Force BIOS]** ..... Error! Bookmark not defined.
- **Bootup Num-Lock [On]** ..... Error! Bookmark not defined.
- **Enable PATA ROM [Enabled] disabled** ..... Error! Bookmark not defined.
- **Boot From LAN Support [Disabled]** ..... Error! Bookmark not defined.
- **Change Supervisor Password** ..... Error! Bookmark not defined.
- **Change User Password** ..... Error! Bookmark not defined.
- **Memory Remap Feature [Enabled]** ..... Error! Bookmark not defined.
- **Memory Hole [Disabled]** ..... Error! Bookmark not defined.
- **Initiate Graphics Adapter [PEG/PCI]** ..... Error! Bookmark not defined.

- **Internal Graphics Mode Select [Enable, 8MB]** ..... Error! Bookmark not defined.
- **Boot Display Device [Auto]** ..... Error! Bookmark not defined.
- **HDA Controller [Enabled]** ..... Error! Bookmark not defined.
- **ASF Support [Enabled]** ..... Error! Bookmark not defined.
- **Save Changes and Exit** ..... Error! Bookmark not defined.
- **Discard Changes and Exit** ..... Error! Bookmark not defined.
- **Discard Changes** ..... Error! Bookmark not defined.
- **Load Optimal Defaults** ..... Error! Bookmark not defined.
- **Load Failsafe Defaults** ..... Error! Bookmark not defined.

Appendix

B

DIO Interface

B.1 DIO Interface Introduction

The DIO connector on the 2807760 is interfaced to GIO ports on the iTE Super I/O chipset. The DIO has both 4-bit digital inputs and 4-bit digital outputs. The digital inputs and digital outputs are generally control signals that control the on/off circuit of external devices or TTL devices. Data can be read or written to the selected address to enable the DIO functions.

NOTE:

For further information, please refer to the datasheet for the iTE Super I/O chipset.

B.2 DIO Connector Pinouts

The following table describes how the DIO connector pins are connected to the Super I/O GPIO port 1.

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GND	2	VCC
3	Output 3	4	Output 2
5	Output 1	6	Output 0
7	Input 3	8	Input 2
9	Input 1	10	Input 0

B.3 Assembly Language Samples

B.3.1 Enable the DIO Input Function

The BIOS interrupt call INT 15H controls the digital I/O. An assembly program to enable digital I/O input functions is listed below.

MOV	**AX, 6F08H**	Sets the digital port as input
INT	**15H**	Initiates the INT 15H BIOS call

B.3.2 Enable the DIO Output Function

The BIOS interrupt call INT 15H controls the digital I/O. An assembly program to enable digital I/O output functions is listed below.

```
MOV     AX, 6F09H     Sets the digital port as output
MOV     BL, 09H
INT     15H           Initiates the INT 15H BIOS call
```

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Appendix

C

Watchdog Timer

NOTE:

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

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

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

INT 15H:

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

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

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

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

NOTE:

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

Example program:

```
; INITIAL TIMER PERIOD COUNTER
;
W_LOOP:

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

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

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Appendix

D

Address Mapping

D.1 Address Map

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

Table D-1: IO Address Map

D.2 1st MB Memory Address Map

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

Table D-2: 1st MB Memory Address Map

D.3 IRQ Mapping Table

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

Table D-3: IRQ Mapping Table

D.4 DMA Channel Assignments

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

Table D-4: IRQ Mapping Table

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Appendix

E

Hazardous Materials Disclosure

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.

Part Name	Toxic or Hazardous Substances and Elements					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (CR(VI))	Polybrominated Biphenyls (PBB)	Polybrominated Diphenyl Ethers (PBDE)
Housing	X	O	O	O	O	X
Display	X	O	O	O	O	X
Printed Circuit Board	X	O	O	O	O	X
Metal Fasteners	X	O	O	O	O	O
Cable Assembly	X	O	O	O	O	X
Fan Assembly	X	O	O	O	O	X
Power Supply Assemblies	X	O	O	O	O	X
Battery	O	O	O	O	O	O

O: This toxic or hazardous substance is contained in all of the homogeneous materials for the part is below the limit requirement in SJ/T11363-2006

X: This toxic or hazardous substance is contained in at least one of the homogeneous materials for this part is above the limit requirement in SJ/T11363-2006

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User's Manual

Single Board Computer 3302160

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