IEI Technology Corp.

MODEL:

NANO-9453

Socket 479 Intel® Core™2 Duo, Core™ Duo, Core™ Solo EPIC SBC supports PCI-104, Mini-PCIe, Dual VGA, LVDS PCIe GbE LAN, USB 2.0, Dual SATA and IDE HDD

User Manual

Rev. 1.12 - 23 September, 2010

RoHS Lead Free

Revision

Date	Version	Changes
2010-09-23	1.12	Minor edit
2008-07-03	1.11	Removed JP3 Replaced 32200-025401-RS with 32100-147900-RS
2008-03-18	1.10	Changed the Northbridge chipset form Intel® 945GM to Intel® 945GME Added more extensive list of supported processors. Added Compatibility Appendix Added terminology Appendix Removed glossary from the front of the manual
2007-03-15	1.0	Initial release

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Manual Conventions

WARNING!

Warnings appear where overlooked details may cause damage to the equipment or result in personal injury. Warnings should be taken seriously. Warnings are easy to recognize. The word “warning” is written as “**WARNING**,” both capitalized and bold and is followed by text. The text is the warning message. A warning message is shown below:

WARNING:

This is an example of a warning message. Failure to adhere to warning messages may result in permanent damage to the NANO-9453 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 NANO-9453. 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 NANO-9453. 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 NANO-9453. Please take note messages seriously.

Packing List

NOTE:

If any of the components listed in the checklist below are missing, please do not proceed with the installation. Contact the IEI reseller or vendor you purchased the NANO-9453 from or contact an IEI sales representative directly. To contact an IEI sales representative, please send an email to sales@iei.com.tw.

The items listed below should all be included in the NANO-9453 package.

- 1 x NANO-9453 single board computer
- 1 x 4 RS-232 adapter cable
- 1 x Power cable
- 1 x IDE cable
- 1 x SATA power cable
- 2 x SATA cables
- 1 x KB/MS 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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Introduction

1.1 Introduction

The NANO-9453 EPIC form factor CPU card is a Socket M Intel® Core™2 Duo, Core™ Duo, Core™ Solo or Celeron® M CPU platform. The NANO-9453 has a maximum front side bus (FSB) frequency of 667MHz and comes with two VGA interfaces and dual PCI Express (PCIe) Gigabit Ethernet (GbE) controllers. The NANO-9453 supports up to two, second-generation 3.0 Gbps serial ATA (SATA) hard disk drives (HDD) and up to six USB 2.0 devices. The NANO-9453 also has a PCI-104 socket and a Mini PCI Express (PCIe) socket for system expansion. Multiple display support adds versatility to the system enabling system integrators and designers increased flexibility in selecting display panel options.

1.1.1 NANO-9453 Benefits

Some of the NANO-9453 benefits are listed below:

- Multiple display output options
- Storage flexibility with support for SATA II drives, IDE drives and CompactFlash (CF) disks
- Expandable system with PCI-104 and mini PCIe slots
- DDR2 support enables faster data transfers
- Multiple I/O interfaces provide connectivity to a broad range of external peripheral devices

1.1.2 NANO-9453 Features

Some of the NANO-9453 features are listed below.

- Support for Socket M Intel® Core™ 2 Duo or Core™ Solo CPUs
- Maximum FSB of 667MHz
- Supports one 200-pin 533MHz or 667MHz 1GB DDR2 SO-DIMM memory
- Two SATA II drives with transfer rates of 3.0 Gbps supported
- Two Ultra ATA 100, Ultra ATA 66 or Ultra ATA 33 IDE HDDs supported
- Six USB 2.0 devices supported
- Dual PCIe GbE Ethernet connectivity
- Multiple display options including dual VGA-out and dual-channel LVDS

- EPIC form factor
- RoHS compliant
- Supports AT and ATX power supplies

1.2 NANO-9453 Overview

1.2.1 NANO-9453 Overview Photo

The NANO-9453 has a wide variety of internal and external peripheral connectors. The peripheral connectors are connected to devices including PCI-104 devices, mini PCIe devices, storage devices, display devices and parallel communications devices. A labeled photo of the peripheral connectors on the front of the NANO-9453 is shown in **Figure 1-1**.

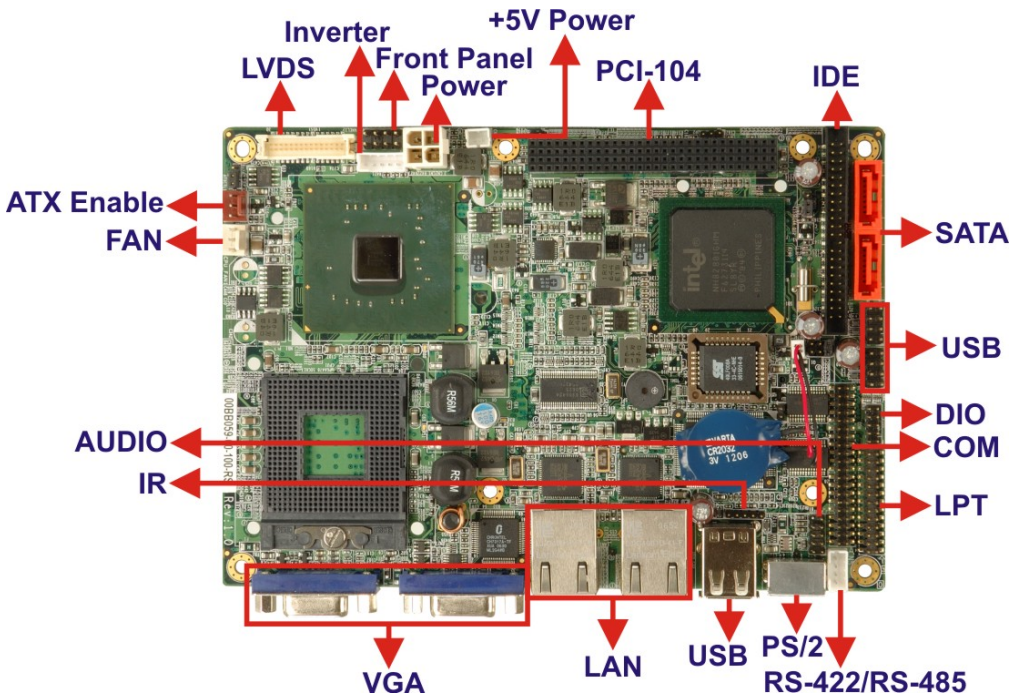


Figure 1-1: NANO-9453 Overview [Front View]

A labeled photo of the peripheral connectors on the back of the NANO-9453 is shown in **Figure 1-1**.

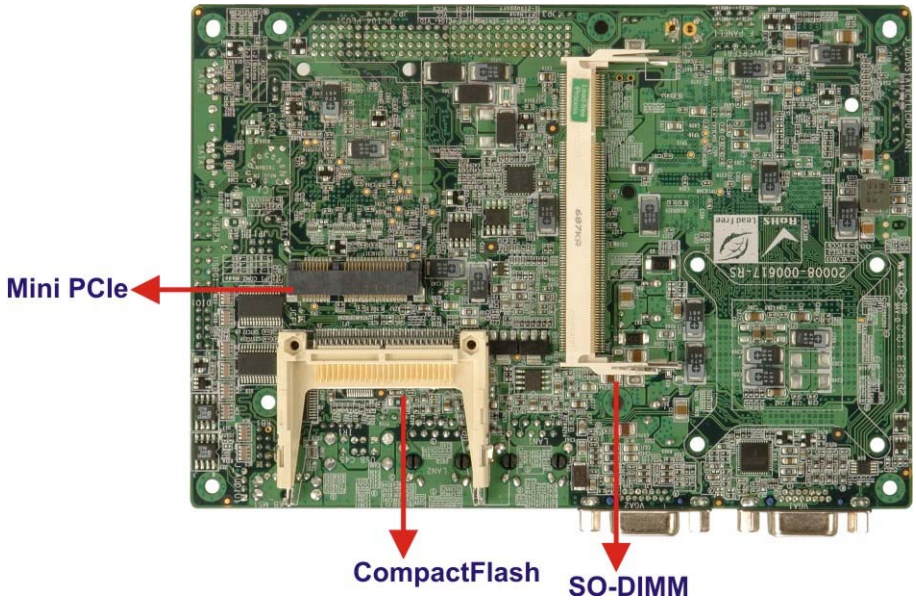


Figure 1-2: NANO-9453 Overview [Rear View]

1.2.2 NANO-9453 Peripheral Connectors and Jumpers

The NANO-9453 has the following connectors on-board:

- 1 x +5V ATX power connector
- 1 x +12V ATX power connector
- 1 x ATX enable connector
- 1 x Audio connector
- 1 x Compact flash connector
- 1 x Digital input/output connector
- 1 x Fan connector
- 1 x Front panel connector
- 1 x IDE disk drive connector
- 1 x Infrared interface connector
- 1 x Inverter connector
- 1 x Keyboard and mouse connector
- 1 x LVDS connector
- 1 x Parallel port connector
- 1 x PCI-104 slot
- 1 x Mini PCIe card slot

- 2 x Serial ATA (SATA) drive connectors
- 1 x Serial port connector (RS-422 or RS-485)
- 1 x Serial port connector (RS-232)
- 2 x USB connectors

The NANO-9453 has the following external peripheral interface connectors on the board rear panel

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

The NANO-9453 has the following on-board jumpers:

- Clear CMOS
- LCD voltage selector
- CF card setting
- COM 2 port mode setting
- PC104+ VIO selector
- PC104+ SERIRQ# support

1.2.3 Technical Specifications

NANO-9453 technical specifications are listed in **Table 1-1**. See **Chapter 2** for details.

Specification	NANO-9453
Form Factor	EPIC
System CPU	Socket M Intel® Core™2 Duo (Merom core) Socket M Intel® Core™ Duo (Merom core) Socket M Intel® Core™ Solo (Merom core) Socket M Intel® Celeron® M (Yonah core)
Front Side Bus	667MHz (Merom core) or 533 MHz (Yonah core)

Specification	NANO-9453
System Chipset	**Northbridge**: Intel® 945GME **Southbridge**: Intel® ICH7-M
Memory	One 200-pin SO-DIMM socket supports one 533 MHz or 667 MHz DDR2 SO-DIMM with a maximum capacity of 1 GB
Display	**Dual VGA**: Integrated in the Intel® 945GME to support CRT **LVDS**: Dual channel 18-bit LVDS LCD panel
BIOS	AMI BIOS
Audio	7.1 channel or 5.1 channel audio with an optional AC-KIT
LAN	Two Broadcom PCIe GbE controllers
COM	Three RS-232 internal serial ports One RS-232, RS-422 or RS-485 serial port
USB2.0	Six USB 2.0 devices supported
IDE	One 44-pin IDE connects to two Ultra ATA33/66/100 devices
SATA	Two 3.0 Gbps SATA drives supported
Keyboard/mouse	One PS/2 connector supports mouse and keyboard connectivity
Watchdog Timer	Software programmable 1-255 sec. by super I/O
Power Supply	12 V only, AT and ATX supported
Temperature	0ºC – 60ºC (32ºF - 140ºF)
Humidity (operating)	5%~95% non-condensing
Dimensions (LxW)	165 mm x 115 mm
Weight (GW/NW)	800g/ 260g

Table 1-1: Technical Specifications

Chapter

2

Detailed Specifications

2.1 Overview

This chapter describes the specifications and on-board features of the NANO-9453 in detail.

2.2 Dimensions

2.2.1 Board Dimensions

The dimensions of the board are listed below:

- **Length**: 165 mm
- **Width**: 115 mm

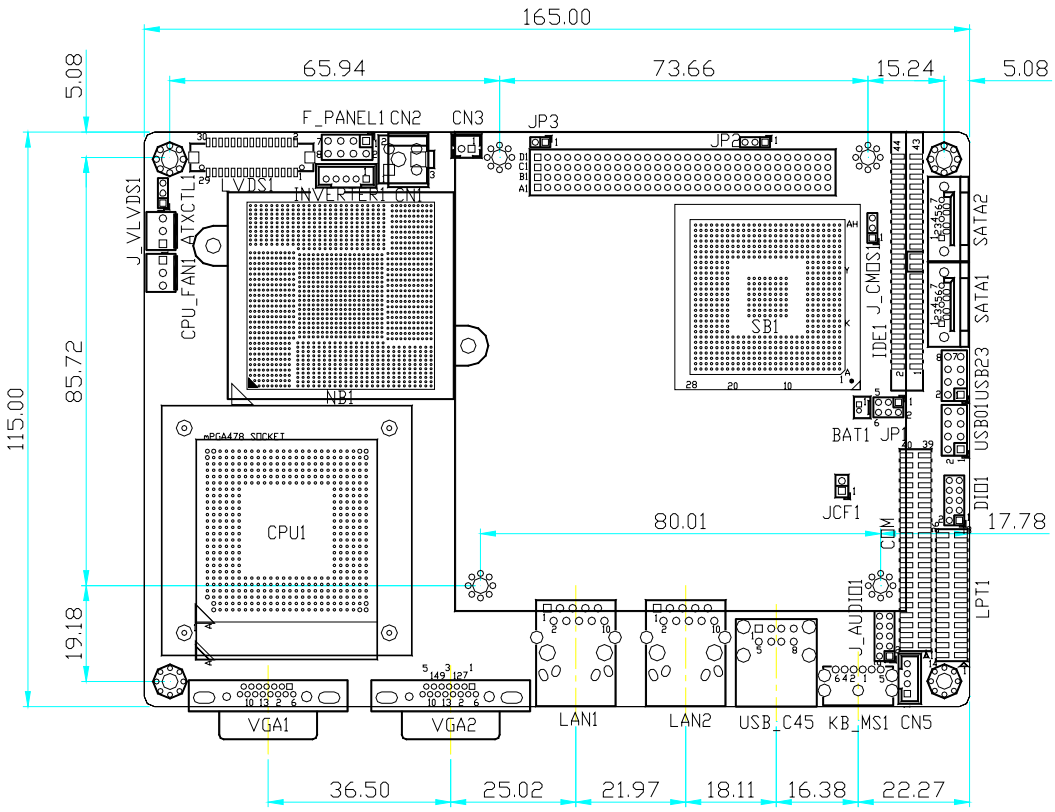


Figure 2-1: NANO-9453 Dimensions (mm)

2.2.2 External Interface Panel Dimensions

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

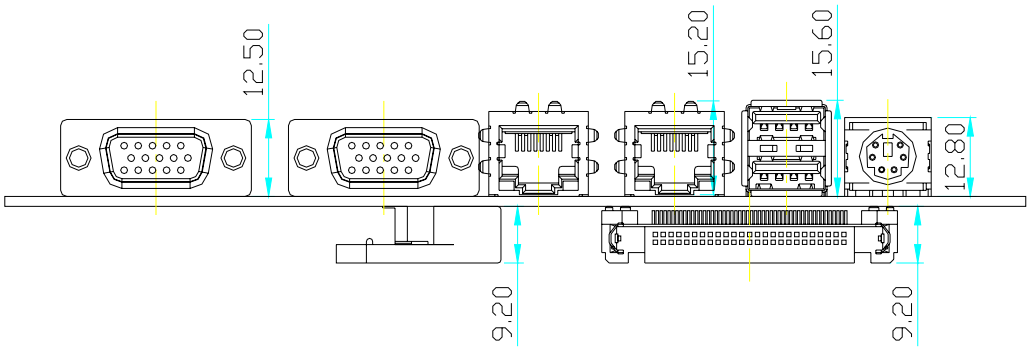


Figure 2-2: External Interface Panel Dimensions (mm)

2.3 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.

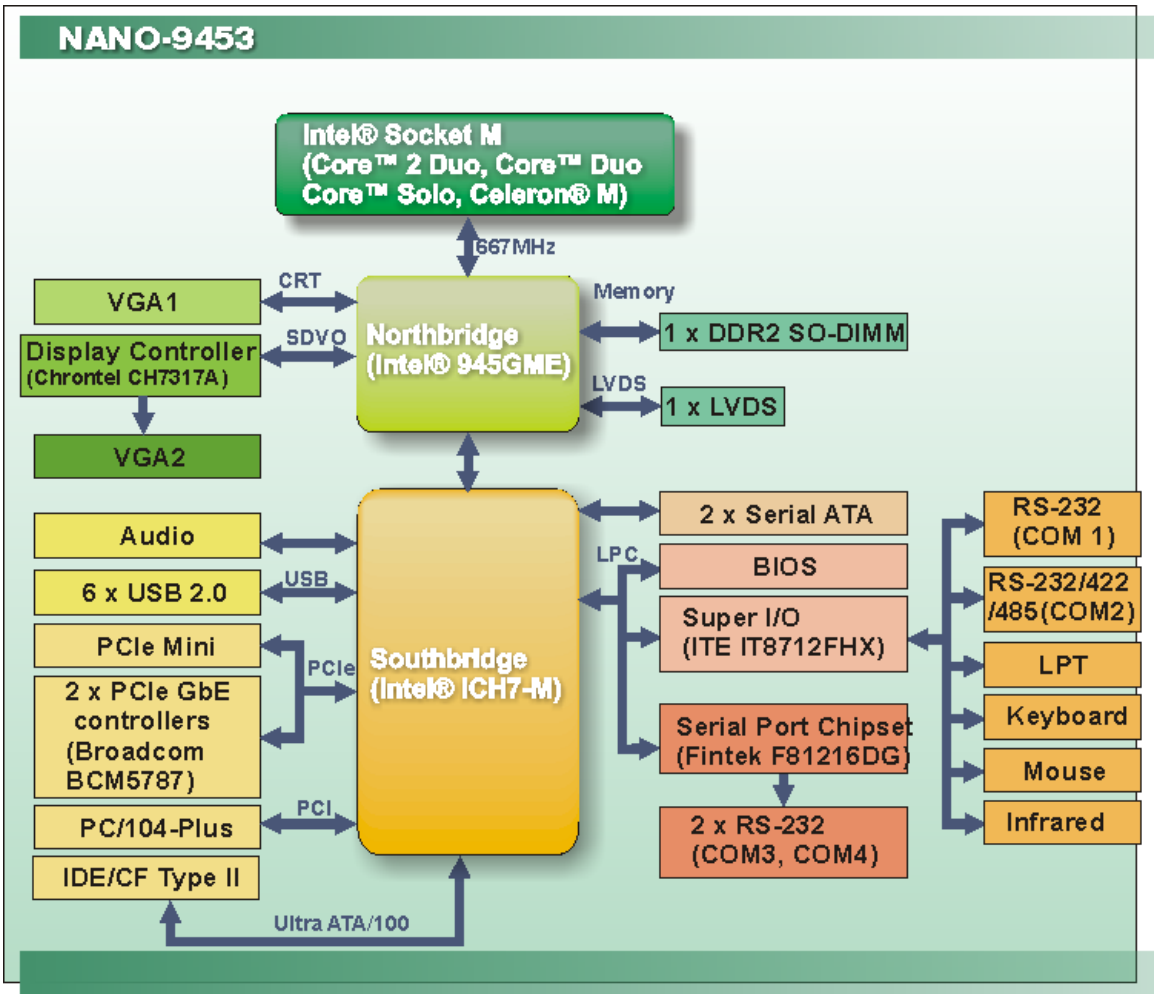


Figure 2-3: Data Flow Block Diagram

2.4 Compatible Processors

2.4.1 Compatible Processor Overview

The NANO-9453 supports the following Socket M processors:

- Intel® Core™2 Duo Mobile processors
- Intel® Core™ Duo processors
- Intel® Core™ Solo processors
- Intel® Celeron® M processors

All three of the above processors communicate with the Intel® 945GME Northbridge chipset through a 667MHz front side bus (FSB). Features of the supported Core™ processors are listed in **Table 2-1**.

Core™ CPU Features	Core™2 Duo Mobile	Core™ Duo	Core™ Solo
Dual core	Yes	Yes	No
Enhanced Halt State (C1E)	No	Yes	No
Enhanced Intel® Speedstep® Technolgy	Yes	Yes	Yes
Execute Disable Bit	Yes	Yes	Yes
Intel® EM64T	Yes	No	No
Intel® Virtualization Technology	Yes	Yes	No

Table 2-1: Core™Processor Features

Features of the supported Celeron® M processors are listed in Table 2-2.

Celeron® M CPU Features	Celeron® M
Execute Disable Bit	Yes
Intel® EM64T	Yes

Table 2-2: Celeron® M Processor Features

2.4.2 Supported Socket M Processors

Specifications for the compatible processors are listed in **Table 2-3** below:

Processor	CPU Speed	Processor #	Bus Speed	Mfg Tech	Cache Size
Core™2 Duo Mobile	2.33 GHz	T7600	667 MHz	65 nm	4 MB
	2.16 GHz	T7400	667 MHz	65 nm	4 MB
	2 GHz	T7200	667 MHz	65 nm	4 MB
	2 GHz	T2450	533 MHz	65 nm	2 MB
	1.86 GHz	T2350	533 MHz	65 nm	2 MB
	1.83 GHz	T5600	667 MHz	65 nm	2 MB
	1.73 GHz	T5300	533 MHz	65 nm	2 MB
	1.73 GHz	T2250	533 MHz	65 nm	2 MB
	1.66 GHz	T5500	667 MHz	65 nm	2 MB
	1.60 GHz	T5200	533 MHz	65 nm	2 MB
	1.60 GHz	T2050	533 MHz	65 nm	2 MB
	1.50 GHz	L7400	667 MHz	65 nm	4 MB
	1.33 GHz	L7200	667 MHz	65 nm	4 MB
	1.20 GHz	U7600	533 MHz	65 nm	2 MB
	1.06 GHz	U7500	533 MHz	65 nm	2 MB
Core™ Duo	2.33 GHz	T2700	667 MHz	65 nm	2 MB
	2.16 GHz	T2600	667 MHz	65 nm	2 MB
	2 GHz	T2500	667 MHz	65 nm	2 MB
	1.83 GHz	T2400	667 MHz	65 nm	2 MB
	1.83 GHz	L2500	667 MHz	65 nm	2 MB
	1.66 GHz	T2300	667 MHz	65 nm	2 MB
	1.66 GHz	L2400	667 MHz	65 nm	2 MB
	1.50 GHz	L2300	667 MHz	65 nm	2 MB
	1.20 GHz	U2500	533 MHz	65 nm	2 MB

Processor	CPU Speed	Processor #	Bus Speed	Mfg Tech	Cache Size
	1.06 GHz	U2400	533 MHz	65 nm	2 MB
Core™2 Solo	1.20 GHz	U2200	533 MHz	65 nm	1 MB
	1.06 GHz	U2100	533 MHz	65 nm	1 MB
Core™ Solo	1.83 GHz	T1400	667 MHz	65 nm	2 MB
	1.66 GHz	T1300	667 MHz	65 nm	2 MB
	1.20 GHz	U1400	533 MHz	65 nm	2 MB
	1.06 GHz	U1300	533 MHz	65 nm	2 MB
Pentium® Dual-Core Mobile	1.86 GHz	T2130	533 MHz	65 nm	1 MB
	1.73 GHz	T2370	533 MHz	65 nm	1 MB
	1.73 GHz	T2080	533 MHz	65 nm	1 MB
	1.60 GHz	T2060	533 MHz	65 nm	1 MB
	1.60 GHz	T2330	533 MHz	65 nm	1 MB
	1.46 GHz	T2310	533 MHz	65 nm	1 MB
Celeron® M	2 GHz	450	533 MHz	65 nm	1 MB
	1.86 GHz	440	533 MHz	65 nm	1 MB
	1.73 GHz	430	533 MHz	65 nm	1 MB
	1.73 GHz	530	533 MHz	65 nm	1 MB
	1.60 GHz	420	533 MHz	N/A	1 MB
	1.60 GHz	520	533 MHz	65 nm	1 MB
	1.46 GHz	410	533 MHz	65 nm	1 MB
	1.20 GHz	443	533 MHz	65 nm	1 MB
	1.06 GHz	423	533 MHz	65 nm	1 MB

Table 2-3: Supported Processors

2.5 Intel® 945GME Northbridge Chipset

2.5.1 Intel® 945GME Overview

The Intel® 945GME Northbridge chipset has the Generation 3.1 Intel Integrated Graphics Engine and the Intel® Graphics Media Accelerator 950 (Intel® GMA 950). The integrated graphics and memory controller hub (GMCH) facilitates the flow of information primarily between the following four interfaces:

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

2.5.2 Intel® 945GME Memory Support

WARNING:

Only DDR2 memory module can be installed on the NANO-9453. Do not install DDR memory modules. If a DDR memory module is installed on the NANO-9453, the NANO-9453 may be irreparably damaged.

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

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

The memory socket is shown in Figure 2-4.

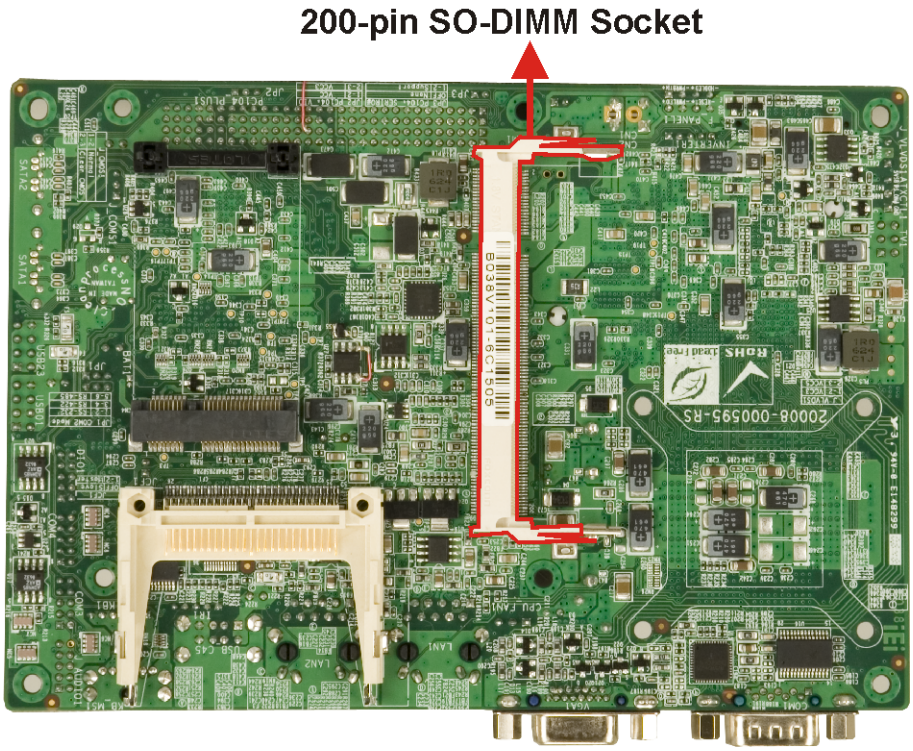


Figure 2-4: 200-pin SO-DIMM Socket

2.5.3 Intel® 945GME Integrated Graphics

The Intel® 945GME GMCH has an Intel® Gen 3.5 Integrated Graphics Engine with a 250 MHz core render clock and 200 MHz core display clock at 1.05 V core voltage. The following Intel® 945GME graphics interfaces are also implemented on the NANO-9453:

- LVDS
- CRT
- SDVO

One of the Intel® 945GME SDVO ports is interfaced to a Chrontel CH7317A display controller, which is then interfaced to a second external female DB-15 VGA connector.

2.5.3.1 Intel® 945GME Analog CRT Support

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

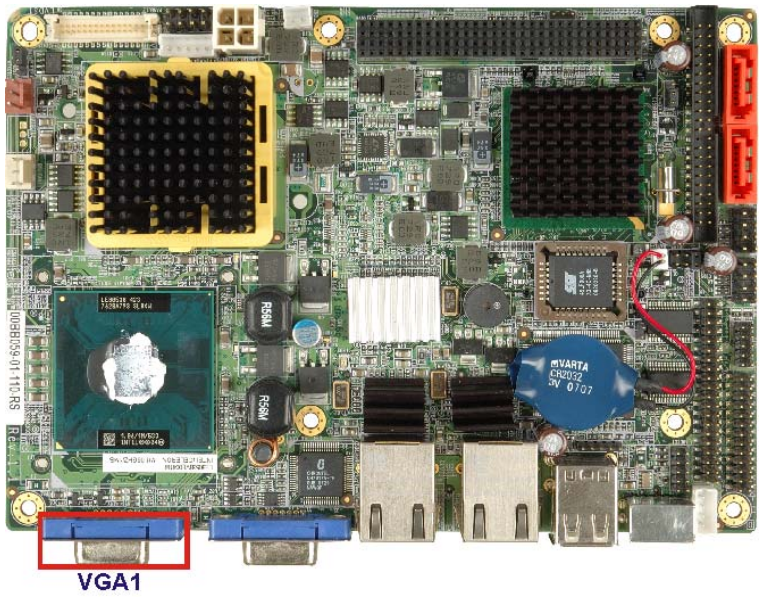


Figure 2-5: VGA1 Connector

2.5.3.2 Intel® 945GME SDVO to VGA

A DB-15 VGA connector is interfaced to the Intel® 945GME SDVO through a Chrontel CH7317A display controller.

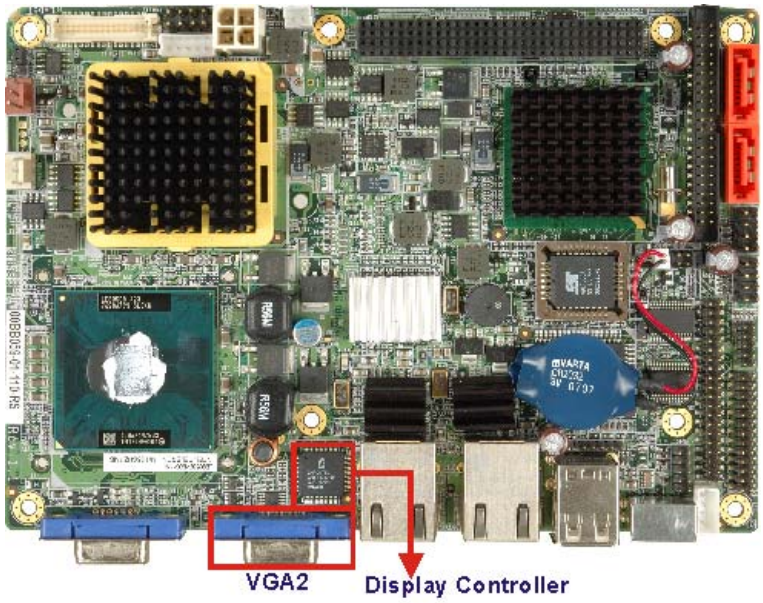


Figure 2-6: VGA2 Connectors

2.5.3.3 Intel® 945GME LVDS Support

A 30-pin LVDS crimp connector is interfaced to the Intel® 945GME graphics engine. The Intel® 945GME internal graphics engine supports LVDS displays with the following features:

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

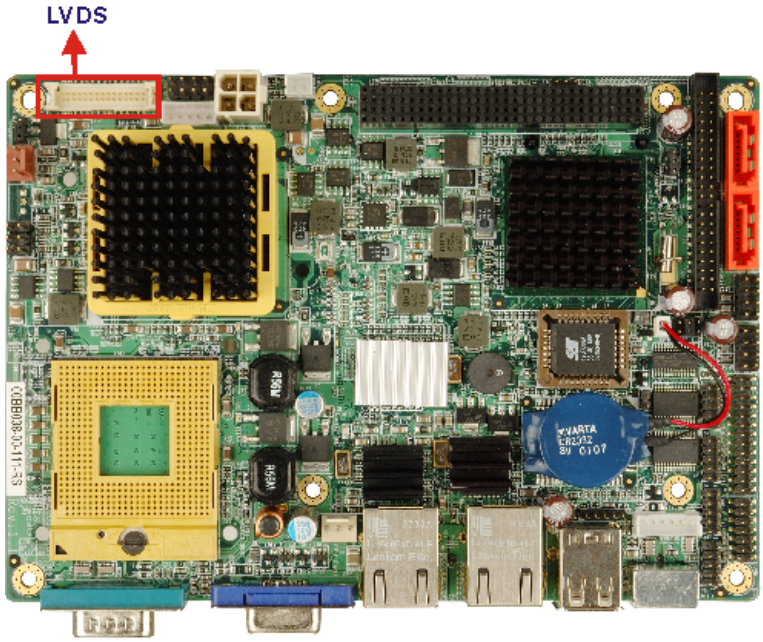


Figure 2-7: LVDS Connector

2.5.4 Intel® 945GME Direct Media Interface (DMI)

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

- 2 GBps (1 GBps in each direction) bus speed
- 32-bit downstream address

2.6 Intel® ICH7-M Southbridge Chipset

2.6.1 Intel® ICH7-M Overview

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

- Complies with PCI Express Base Specification, Revision 1.0a
- Complies with PCI Local Bus Specification, Revision 2.3 and supports 33MHz PCI operations
- Supports ACPI Power Management Logic
- Contains:
  - Enhanced DMA controller
  - Interrupt controller
  - Timer functions
- Integrated SATA host controller with DMA operations interfaced to two SATA connectors on the NANO-9453
- Integrated IDE controller supports Ultra ATA 100/66/33
- Supports the six USB 2.0 devices on the NANO-9453 with four UHCI controllers and one EHCI controller
- Complies with System Management Bus (SMBus) Specification, Version 2.0
- Supports Audio Codec ’97 (AC’97) Revision 2.3
- Supports Intel® High Definition Audio
- Contains Low Pin Count (LPC) interface
- Supports Firmware Hub (FWH) interface

2.6.2 Intel® ICH7-M Audio Codec ’97 Controller

The Audio Codec ’97 (AC’97) controller integrated into the ICH7-M complies with AC’97 Component Specification, Version 2.3. The AC’97 controller is connected to the onboard audio connector. The audio connector is connected to an optional 5.1 channel or 7.1 channel audio kit with an embedded AC’97 audio codec.

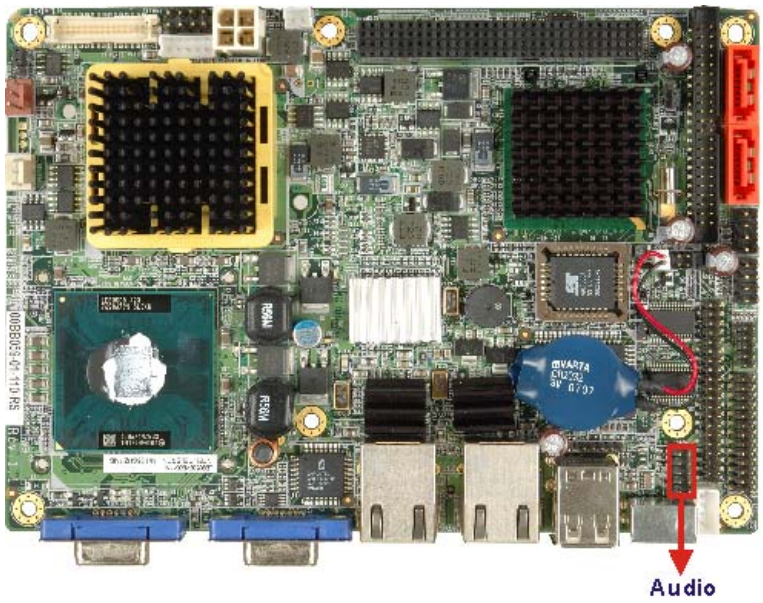


Figure 2-8: Audio Connector

The AC'97 controller supports up to six PCM audio output channels. Complete surround sound requires six-channel audio consisting of:

- Front left
- Front right
- Back left
- Back right
- Center
- Subwoofer

2.6.3 Intel® ICH7-M IDE Interface

The integrated IDE interface on the ICH7-M Southbridge supports two IDE hard disks and ATAPI devices. PIO IDE transfers up to 16MB/s and Ultra ATA transfers of 100MB/s.

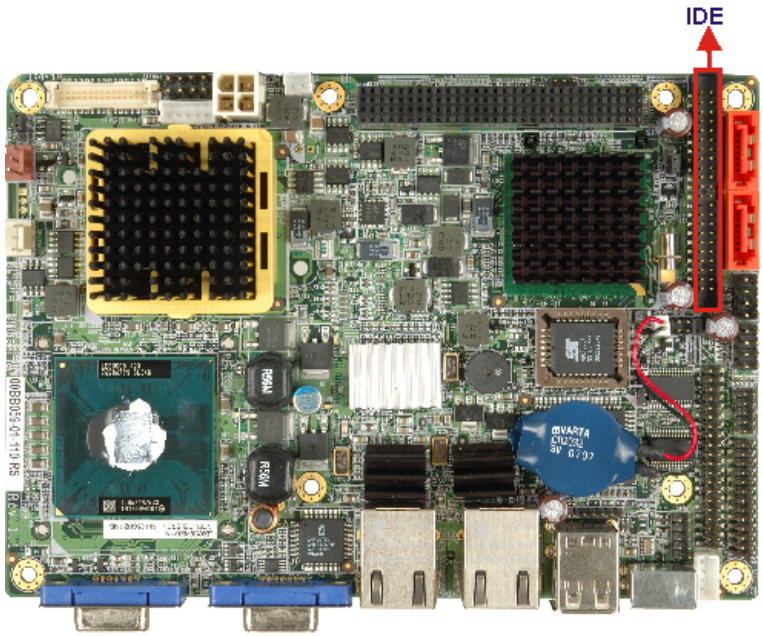


Figure 2-9: IDE Connector

The integrated IDE interface is able to support the following IDE HDDs:

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

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

DMA/UDMA Max Transfer	100MB/s	66MB/s	33MB/s
Controller Interface	5V	5V	5V

Table 2-4: Supported HDD Specifications

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

The ICH7-M LPC interface complies with the LPC 1.1 specifications. The LPC bus from the ICH6 is connected to the following components:

- BIOS chipset
- Super I/O chipset

2.6.5 Intel® ICH7-M PCI Interface

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

- PCI Revision 2.3 compliant
- 33MHz
- 5V tolerant PCI signals (except PME#)
- Integrated PCI arbiter supports up to seven PCI bus masters

The PCI bus on the ICH7-M Southbridge is directly connected to the PC/104-Plus connector.

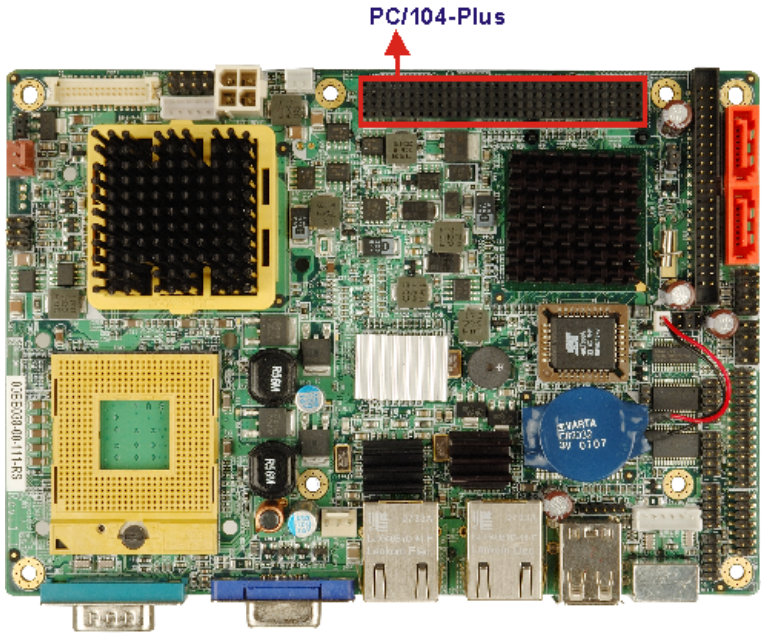


Figure 2-10: PC/104-Plus Connector

2.6.6 Intel® ICH7-M Real Time Clock

256 bytes of battery backed RAM is provided by the Motorola MC146818A real time clock (RTC) integrated into the ICH6. 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.

2.6.7 Intel® ICH7-M SATA Controller

The integrated SATA controller on the ICH7-M Southbridge supports two SATA drives on the NANO-9453 with independent DMA operations.

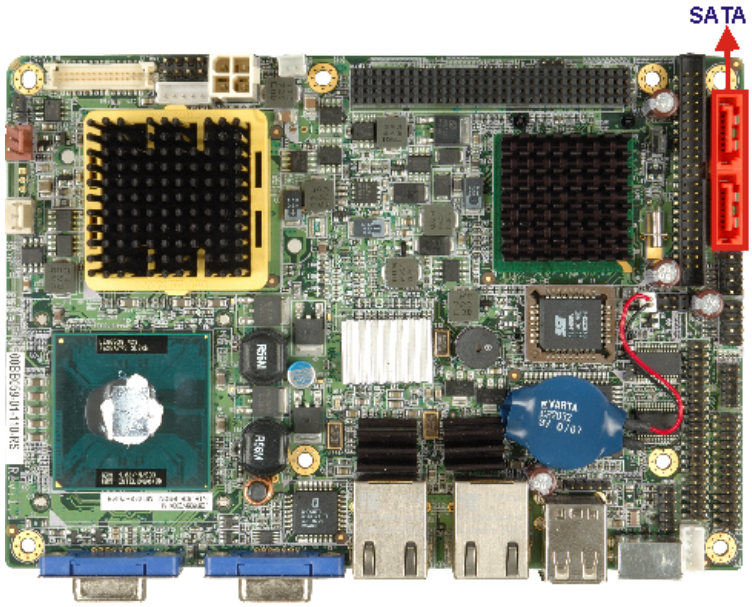


Figure 2-11: SATA Connectors

SATA controller specifications are listed below.

- Supports two SATA drives
- Supports 3Gbps data transfer speeds
- Supports Serial ATA Specification, Revision 1.0a

2.6.8 Intel® ICH7-M USB Controller

Up to six high-speed, full-speed or low-speed USB devices are supported by the ICH7-M on the NANO-9453. High-speed USB 2.0, with data transfers of up to 480 MBps, is enabled with the ICH7-M integrated Enhanced Host Controller Interface (EHCI) compliant host controller. USB full-speed and low-speed signaling is supported by the ICH7-M integrated Universal Host Controller Interface (UHCI) controllers.

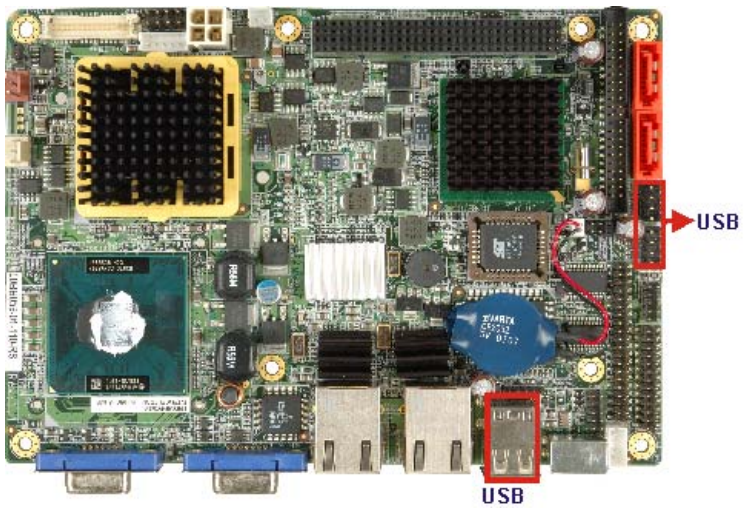


Figure 2-12: USB Connectors

2.7 PCIe Bus Components

2.7.1 PCIe Bus Overview

The PCIe bus is connected to components listed below:

- Two PCIe GbE Broadcom LAN chipsets
- One Mini PCIe socket

2.7.2 Broadcom PCI Express GbE interface

The BCM5787M Broadcom PCI Express (PCIe) GbE controller 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
- JTAG support

The PCIe GbE controllers are shown below.

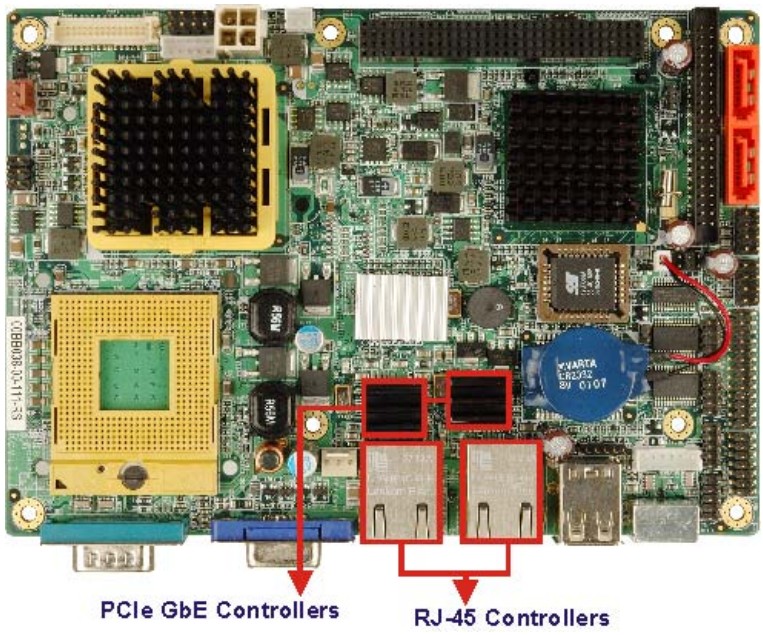


Figure 2-13: PCIe GbE Controllers

2.7.3 Mini PCIe

The Mini PCIe socket supports Mini PCIe cards that are compliant with PCI Express Base Specification, Revision 1.0a. The Mini PCIe cards are easily installed into the socket. Mini PCIe cards are 30mm wide, 50.95mm long and 5mm high and come with a single 52-pin edge connector. Supported Mini PCIe components include wireless LAN cards.

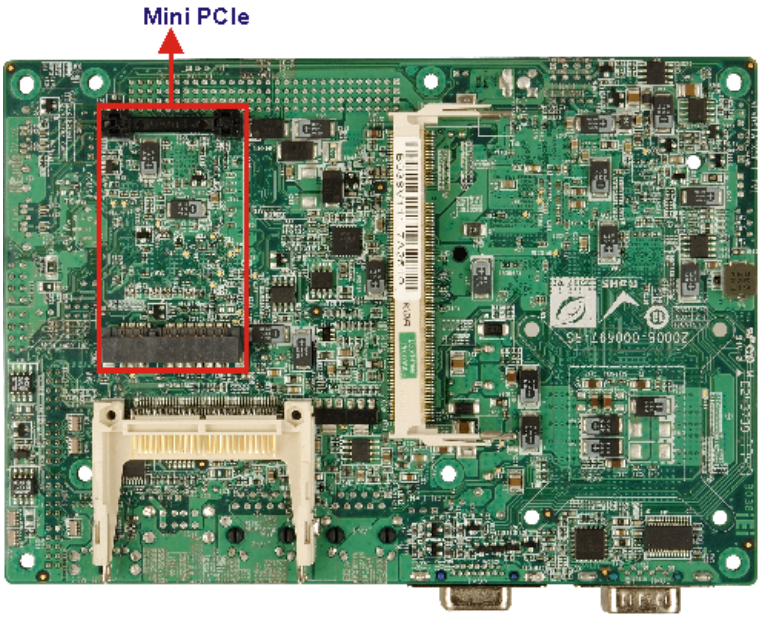


Figure 2-14: Mini PCIe Socket

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
- Serial Port Chipset (under the CF card socket)

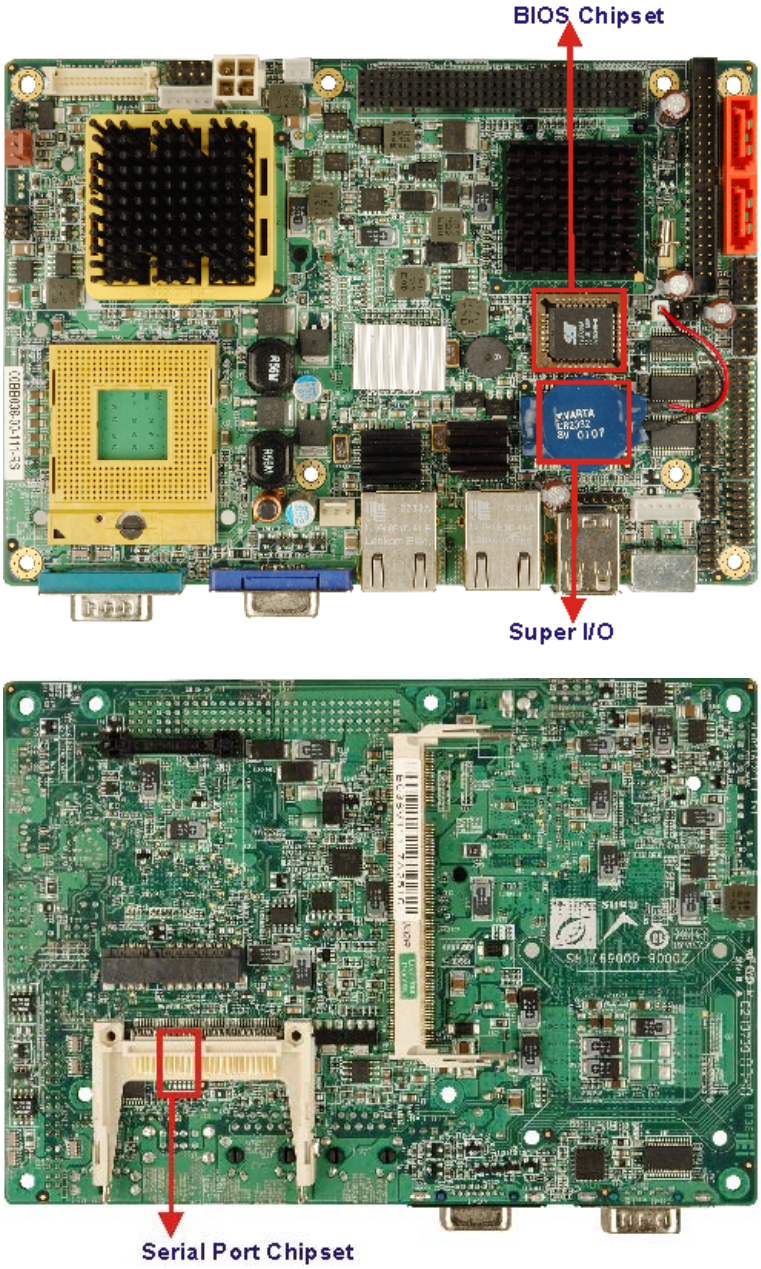


Figure 2-15: Serial Port Chipset (Under the CF Card Socket)

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 ICH6 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:

- LPC Interface
- PC98/99/2001, ACPI and LANDesk Compliant
- Enhanced Hardware Monitor
- Fan Speed Controller
- SmartGuardian Controller
- Single +5V Power Supply
- Two 16C550 UARTs for serial port control
- One IEEE 1284 Parallel Port
- Floppy Disk Controller
- 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 Parallel Port

The Super I/O parallel port (LPT) supports standard mode, enhanced mode and high-speed mode parallel port devices. The LPT is compliant with the following LPT modes.

- Standard mode
  - Bi-directional SPP compliant
- Enhanced mode
  - EPP v1.7 compliant
  - EPP v1.9 compliant
- High-speed mode
  - ECP, IEEE 1284 compliant

2.8.3.6 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

2.8.4 Fintek F81216DG LPC Serial Port Chipset

The Fintek F81216DG chipset enables the addition of two additional UART serial ports (COM3 and COM4). UART includes 16-byte send/receive FIFO. The Fintek serial port chipset is interfaced to the Southbridge chipset through the LPC bus. Some of the features of the Fintek chipset are listed below:

- Supports LPC interface
- Totally provides 4 UART (16550 asynchronous) ports
  - 3 x Pure UART
  - 1 x UART+IR
- One Watch dog timer with WDTOUT# signal
- One Frequency input 24/48MHz
- Powered by 3Vcc

2.9 Environmental and Power Specifications

2.9.1 System Monitoring

Three thermal inputs on the NANO-9453 Super I/O Enhanced Hardware Monitor monitor the following temperatures:

- System temperature
- Power temperature
- CPU temperature

Eight voltage inputs on the NANO-9453 Super I/O Enhanced Hardware Monitor monitor the following voltages:

- Vcore
- +2.5V
- +3.3V
- +5.0V
- +12.0V
- DDR Vtt
- +1.5V
- 5VSB

The NANO-9453 Super I/O Enhanced Hardware Monitor also monitors the following voltages internally:

- VBAT

The NANO-9453 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 NANO-9453 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 2-5 shows the power consumption parameters for the NANO-9453 running a 2.16 GHz Intel® Core™2 Duo mobile processor with 1GB of 533 MHz DDR2 memory.

Voltage	Current
+12 V	3.29 A
5 VSB	0.26 A

Table 2-5: Power Consumption

Chapter

3

Unpacking

3.1 Anti-static Precautions

WARNING:

Failure to take ESD precautions during the installation of the NANO-9453 may result in permanent damage to the NANO-9453 and severe injury to the user.

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the NANO-9453. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the NANO-9453, 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 NANO-9453, place it on an antic-static pad. This reduces the possibility of ESD damaging the NANO-9453.
- ***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 NANO-9453 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 NANO-9453 does not fall out of the box.
- Make sure all the components shown in **Section 3.3** are present.

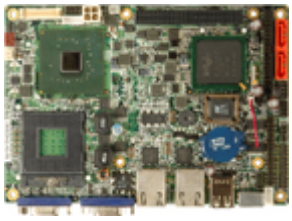
3.3 Unpacking Checklist

NOTE:

If some of the components listed in the checklist below are missing, please do not proceed with the installation. Contact the IEI reseller or vendor you purchased the NANO-9453 from or contact an IEI sales representative directly. To contact an IEI sales representative, please send an email to sales@iei.com.tw.

3.3.1 Package Contents

The NANO-9453 is shipped with the following components:

Quantity	Item and Part Number	Image
1	NANO-9453	
1	Quad RS-232 (**P/N**: 32100-147900-RS)	
1	IDE cable 44p/44p (**P/N**: 32200-000009-RS)	
1	KB/MS cable (**P/N**: 32000-000138-RS)	

2	SATA cables (**P/N**: 32000-062800-RS)	
1	SATA power cable (**P/N**: 32100-088600-RS)	
1	Power cable (**P/N**: 32100-087100-RS)	
1	Mini jumper Pack	
1	Quick Installation Guide	
1	Utility CD	

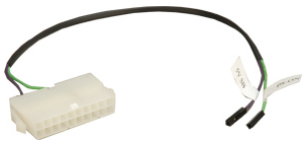
Table 3-1: Package List Contents

3.3.2 Optional Items

NOTE:

The items listed in this section are optional items that must be ordered separately. Please contact your NANO-9453 vendor, distributor or reseller for more information or, contact iEi directly by sending an email to sales@iei.com.tw.

The following optional items are available for the NANO-9453.

Quantity	Item and Part Number	Image
1	USB cable (**P/N**: 32000-070300-RS)	
1	RS-422/485 cable (**P/N**: 32200-074800-RS)	
1	LPT cable (**P/N**: 32200-000017-RS)	
1	ATX cable (**P/N**: 32100-052100-RS)	
1	CPU cooler (**P/N**: CF-479B-RS)	

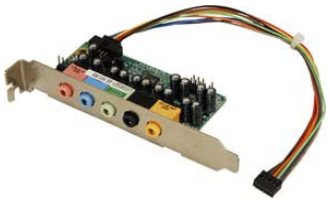
Quantity	Item and Part Number	Image
1	5.1 Channel audio kit with Realtek ALC655 (**P/N**: AC-KIT08R)	
1	7.1 Channel HD audio kit with Realtek ALC883 supporting dual audio streams (**P/N**: AC-KIT-883HD)	

Table 3-2: Optional Items

Chapter

4

Connector Pinouts

4.1 Peripheral Interface Connectors

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

4.1.1 NANO-9453 Layout

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

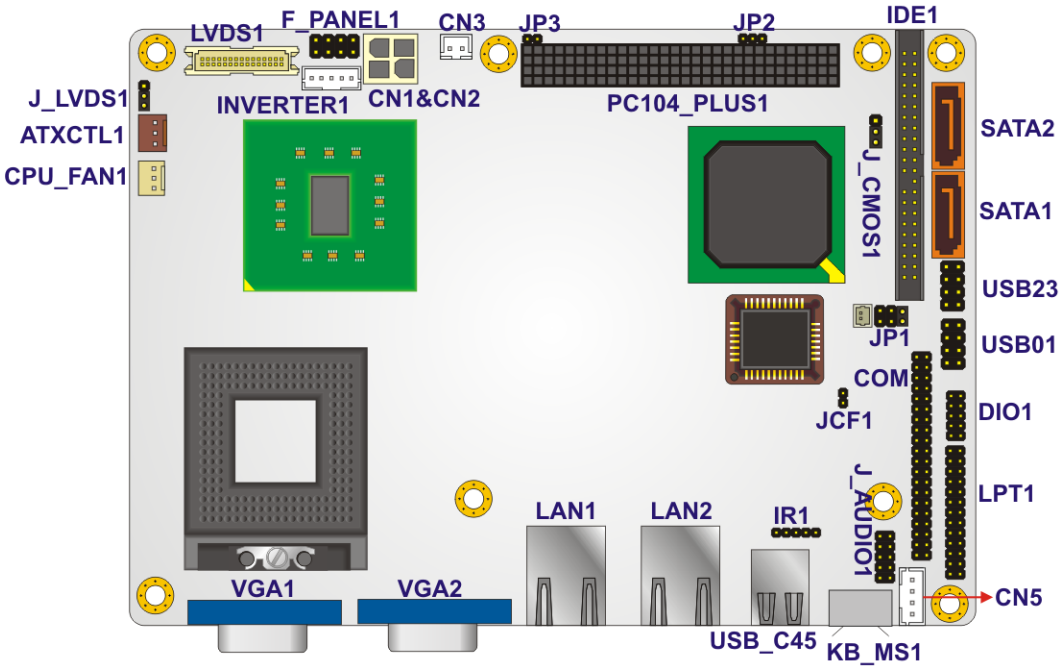


Figure 4-1: Connector and Jumper Locations

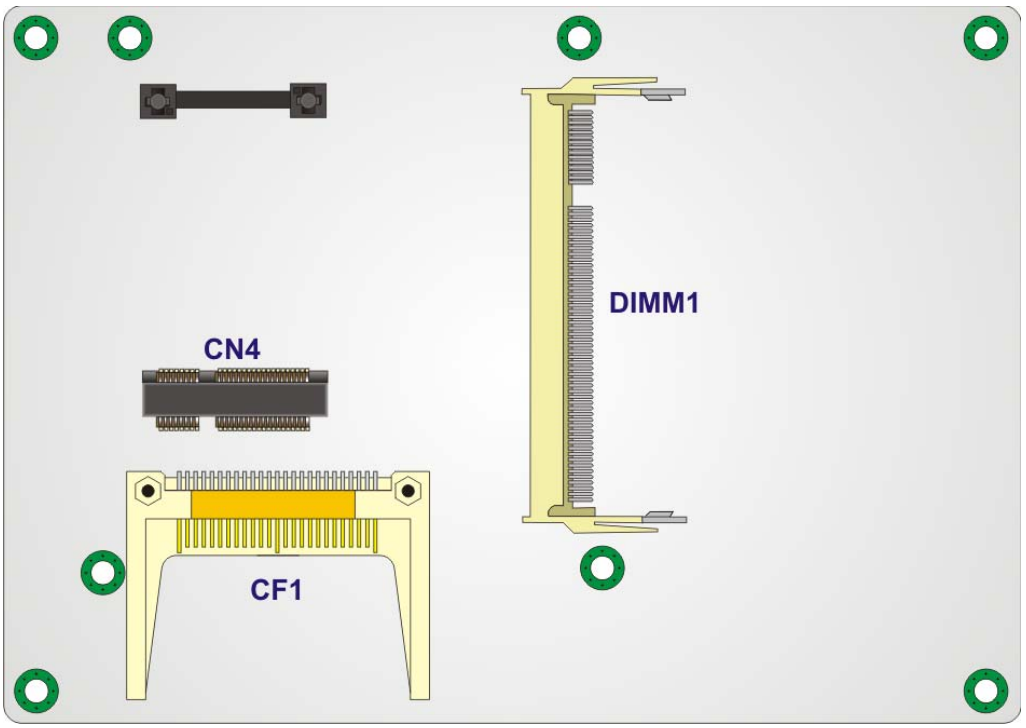


Figure 4-2: Connector and Jumper Locations (Solder Side)

4.1.2 Peripheral Interface Connectors

Table 4-1 shows a list of the peripheral interface connectors on the NANO-9453. Detailed descriptions of these connectors can be found below.

Connector	Type	Label
+12V ATX power supply connector	4-pin ATX connector	CN1 and CN2
+5V power connector	2-pin ATX connector	CN3
ATX enable connector	3-pin wafer	ATXCTL1
Audio connector	14-pin header	J_AUDIO1
Compact Flash (CF) connector	50-pin header	JCF1
Digital I/O connector	10-pin header	DIO1
Fan connector	3-pin wafer	CPU_FAN1

Connector	Type	Label
Front panel connector	8-pin header	F_PANEL1
IDE Interface connector	44-pin header	IDE1
Infrared connector	5-pin header	IR1
Inverter power connector	5-pin header	INVERTER1
LVDS connector	30-pin crimp	LVDS1
Parallel port connector	26-pin header	LPT1
PCI-104 slot	104-pin slot	PC104_PLUS1
PCIe Mini Card slot	52-pin slot	CN4
Serial ATA (SATA) connector	7-pin SATA connector	SATA1
Serial ATA (SATA) connector	7-pin SATA connector	SATA2
Serial port connectors (Four RS-232 ports)	40-pin header	COM
Serial port connector (RS-422/485)	4-pin wafer connector	CN5
USB connector	8-pin header	USB01
USB connector	8-pin header	USB23

Table 4-1: Peripheral Interface Connectors

4.1.3 External Interface Panel Connectors

Table 4-2 lists the rear panel connectors on the NANO-9453. Detailed descriptions of these connectors can be found in **Section** 4.3 on **page 69**

Connector	Type	Label
Ethernet connector	RJ-45	LAN1
Ethernet connector	RJ-45	LAN2
Keyboard and mouse connector	PS/2 connector	KB_MS1

Connector	Type	Label
USB port	USB port	USB_C45
VGA port connectors	Female DB-15	VGA1 and VGA2

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 NANO-9453.

4.2.1 +12V ATX Power Supply Connector

CN Label: CN1 and CN2

CN Type: 4-pin ATX power connector (1x4)

CN Location: See Figure 4-3

CN Pinouts: See Table 4-3

The 4-pin +12V ATX power supply connector is connected to a +12V ATX power supply.

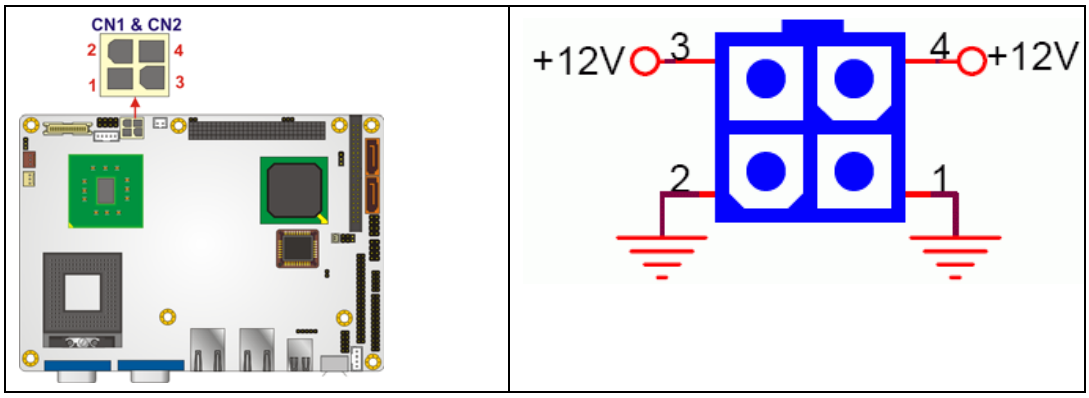


Figure 4-3: +12V ATX Power Connector Location

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

Table 4-3: +12V ATX Power Connector Pinouts

4.2.2 +5V ATX Power Supply Connector

CN Label: CN3

CN Type: 2-pin Wafer (1 x 2)

CN Location: See Figure 4-4

CN Pinouts: See Table 4-4

The 2-pin +5V ATX power supply connector is connected to a +5V ATX power supply.

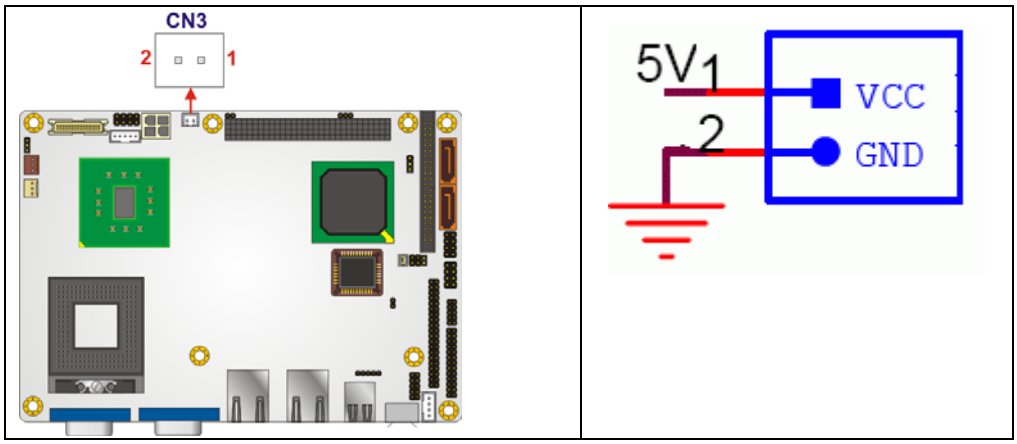


Figure 4-4: +5V ATX Power Connector Location

PIN NO.	DESCRIPTION
1	VCC
2	GND

Table 4-4: +5V ATX Power Connector Pinouts

4.2.3 ATX Power Supply Enable Connector

CN Label: ATXCTL1

CN Type: 3-pin wafer (1x3)

CN Location: See Figure 4-5

CN Pinouts: See Table 4-5

The ATX power supply enable connector enables the NANO-9453 to be connected to an ATX power supply. In default mode, the NANO-9453 can only us an AT power supply. To enable an ATX power supply the AT Power Select jumper must also be configured. Please refer to Chapter 3 for more details.

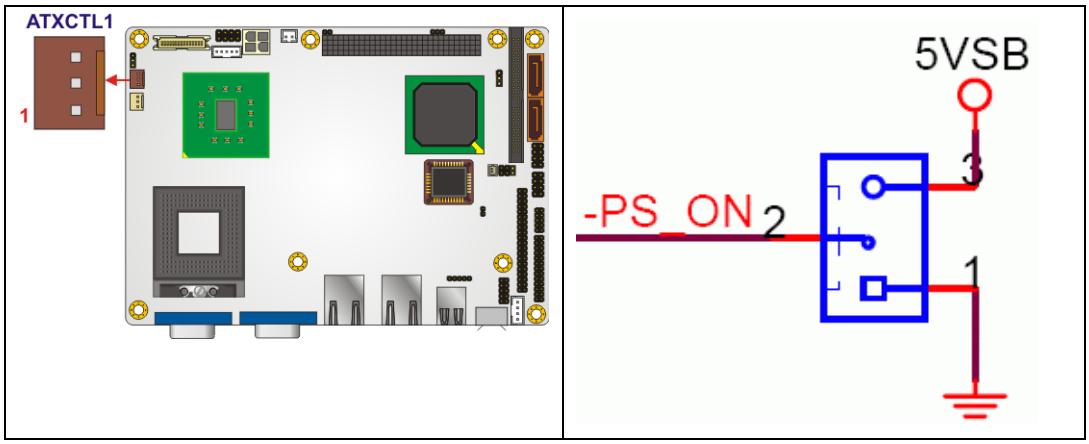


Figure 4-5: ATX Power Supply Enable Connector Location

PIN NO.	DESCRIPTION
1	GND
2	PS_ON#
3	+5V Standby

Table 4-5: ATX Power Supply Enable Connector Pinouts

4.2.4 Audio Connector (9-pin)

CN Label: J_AUDIO1

CN Type: 9-pin header

CN Location: See Figure 4-6

CN Pinouts: See Table 4-6

An optional module can be connected to the 10-pin audio connector to provide the system with a high quality AC'97 or Azalia compatible codec that provides a complete integrated audio solution.

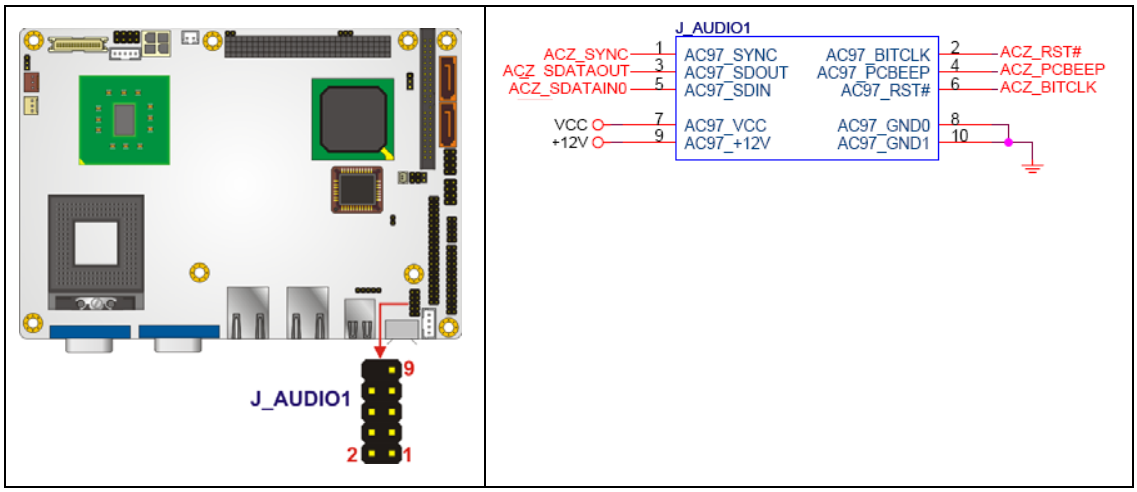


Figure 4-6: Audio Connector Pinouts

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	AC97_SYNC	2	AC97_BITCLK
3	AC97_SDOUT	4	AC97_PCBEEP
5	AC97_SDIN	6	AC97_RST#
7	AC97_VCC	8	AC97_GND
9	AC97_12V		

Table 4-6: Audio Connector Pinouts

4.2.5 Compact Flash Socket

CN Label: CF1 (solder side)

CN Type: 50-pin header (2x25)

CN Location: See Figure 4-7

CN Pinouts: See Table 4-7

A CF Type I or Type II memory card is inserted to the CF socket on the solder side of the NANO-9453.

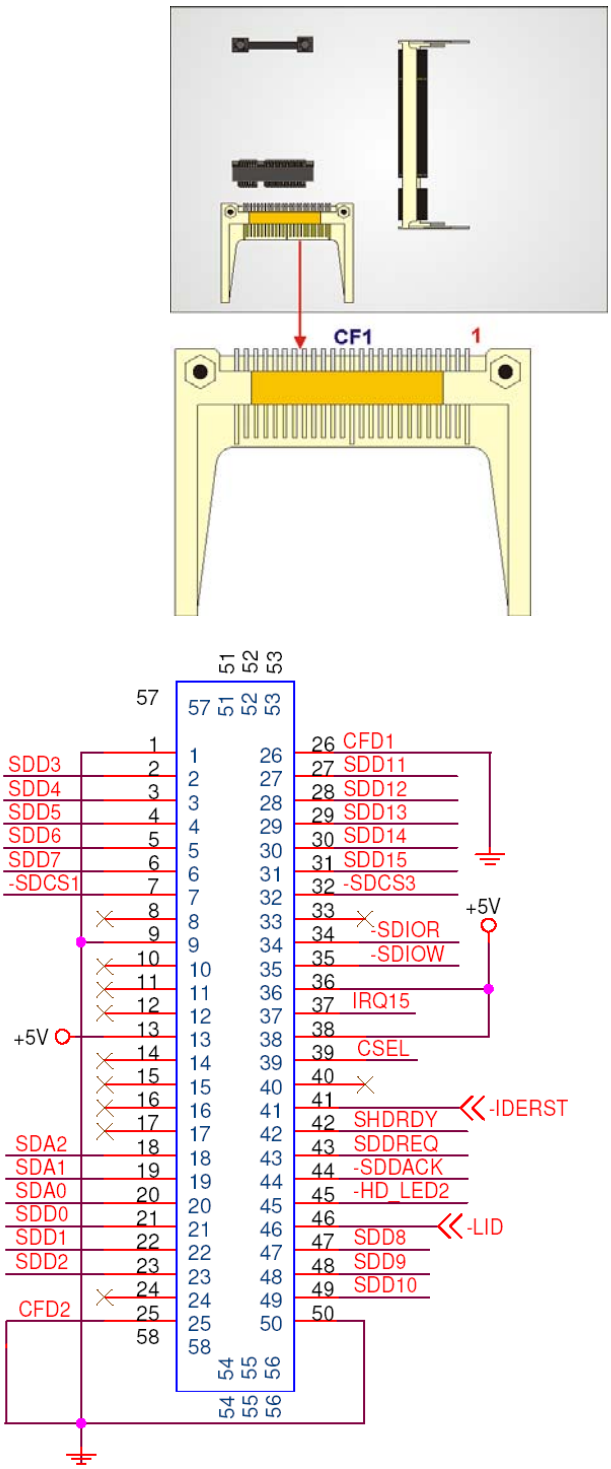


Figure 4-7: CF Card Socket Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GROUND	26	VCC-IN CHECK1
2	DATA 3	27	DATA 11
3	DATA 4	28	DATA 12
4	DATA 5	29	DATA 13
5	DATA 6	30	DATA 14
6	DATA 7	31	DATA 15
7	HDC_CS0#	32	HDC_CS1
8	N/C	33	N/C
9	GROUND	34	IOR#
10	N/C	35	IOW#
11	N/C	36	VCC_COM
12	N/C	37	IRQ15
13	VCC_COM	38	VCC_COM
14	N/C	39	CSEL
15	N/C	40	N/C
16	N/C	41	HDD_RESET
17	N/C	42	IORDY
18	SA2	43	SDREQ
19	SA1	44	SDACK#
20	SA0	45	HDD_ACTIVE#
21	DATA 0	46	66DET
22	DATA 1	47	DATA 8
23	DATA 2	48	DATA 9
24	N/C	49	DATA 10
25	VCC-IN CHECK2	50	GROUND

Table 4-7: CF Card Socket Pinouts

4.2.6 Digital Input/Output (DIO) Connector

CN Label: DIO1

CN Type: 10-pin header (2x5)

CN Location: See Figure 4-8

CN Pinouts: See Table 4-8

The digital input/output connector is managed through a Super I/O chip. The DIO connector pins are user programmable.

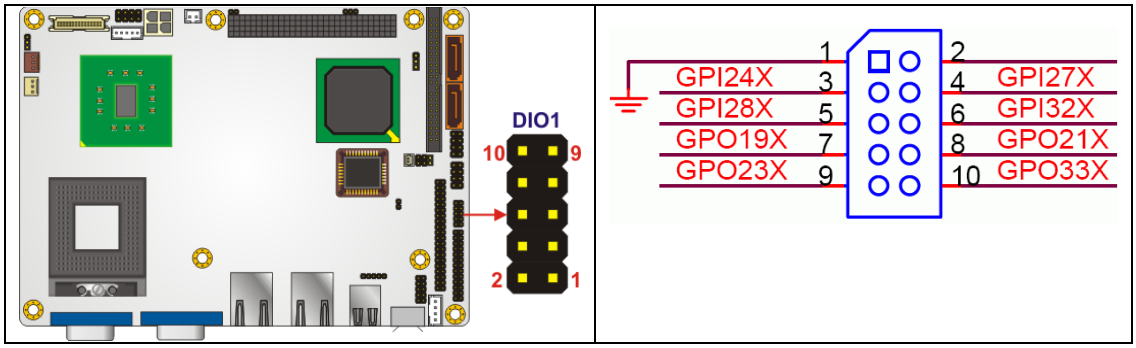


Figure 4-8: DIO Connector Locations

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

Table 4-8: DIO Connector Pinouts

4.2.7 Fan Connector

CN Label: CPU_FAN1

CN Type: 3-pin header

CN Location: See Figure 4-9

CN Pinouts: See Table 4-9

The cooling fan connector provides a 12V, 500mA current to a system 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.

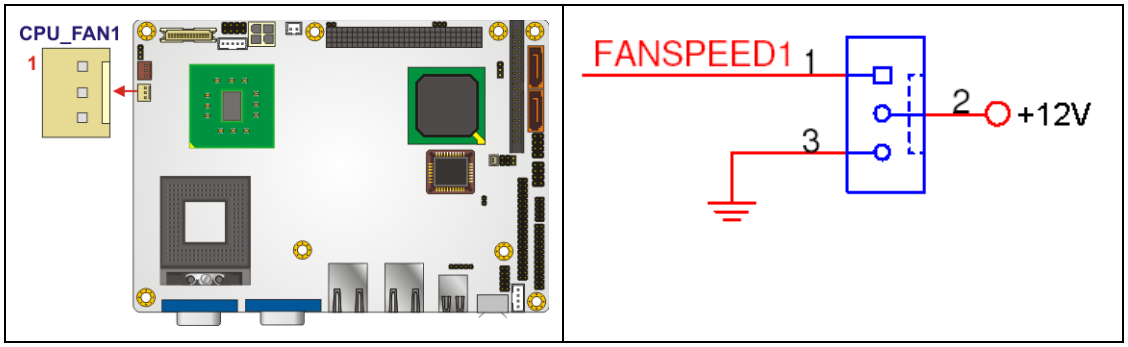


Figure 4-9: +12V Fan Connector Location

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

Table 4-9: +12V Fan Connector Pinouts

4.2.8 Front Panel Connector (12-pin)

CN Label: F_PANEL1

CN Type: 12-pin header (2x6)

CN Location: See Figure 4-10

CN Pinouts: See Table 4-10

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

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

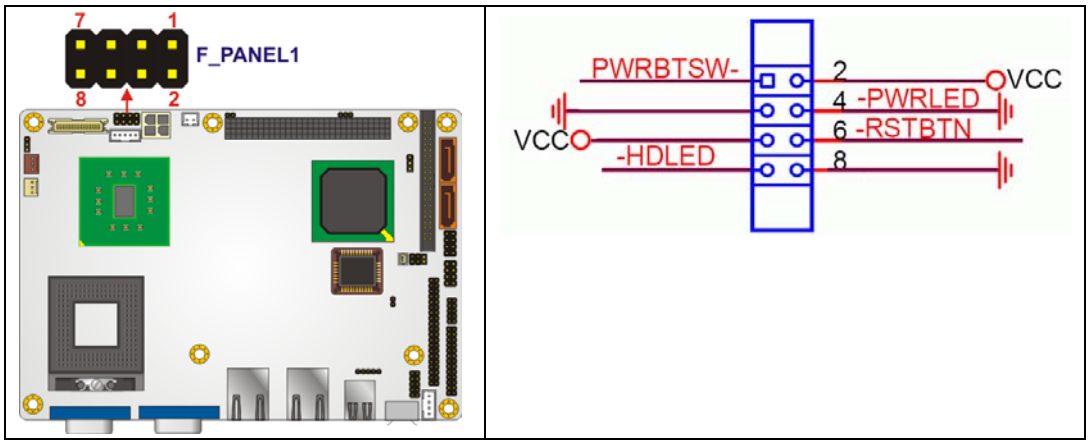


Figure 4-10: Front Panel Connector Pinout Locations

FUNCTION	PIN	DESCRIPTION	FUNCTION	PIN	DESCRIPTION
Power Button	1	PWRBTSW-	Power LED	2	VCC
	3	Ground		4	Ground
HDD LED	5	VCC	Reset	6	SYSRST-
	7	-HDLED		8	GND

Table 4-10: Front Panel Connector Pinouts

4.2.9 IDE Connector(44-pin)

CN Label: IDE1

CN Type: 44-pin header (2x22)

CN Location: See Figure 4-11

CN Pinouts: See Table 4-11

One 44-pin IDE device connector on the NANO-9453 supports connectivity to two hard disk drives.

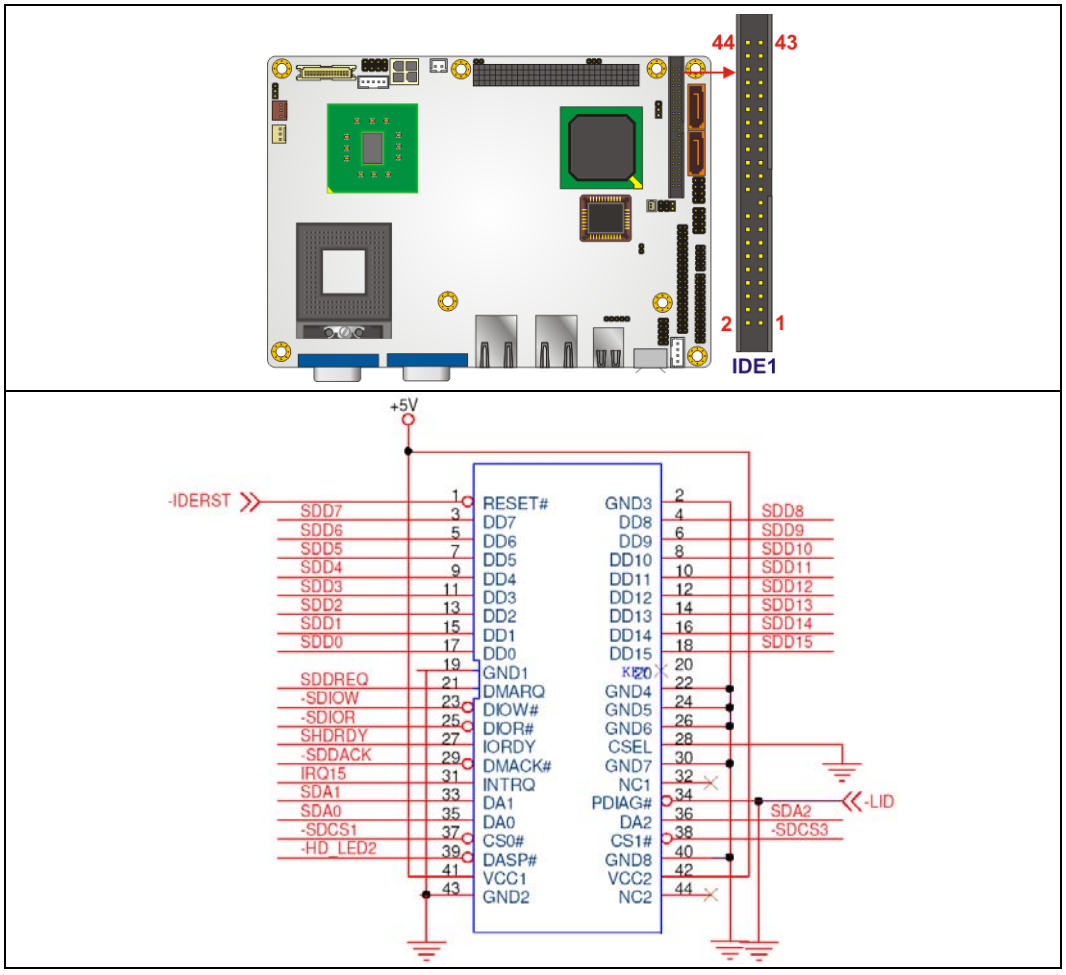


Figure 4-11: Secondary IDE Device Connector Locations

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION

1	RESET#	2	GROUND
3	DATA 7	4	DATA 8
5	DATA 6	6	DATA 9
7	DATA 5	8	DATA 10
9	DATA 4	10	DATA 11
11	DATA 3	12	DATA 12
13	DATA 2	14	DATA 13
15	DATA 1	16	DATA 14
17	DATA 0	18	DATA 15
19	GROUND	20	N/C
21	IDE DRQ	22	GROUND
23	IOW#	24	GROUND
25	IOR#	26	GROUND
27	IDE CHRDY	28	GROUND
29	IDE DACK	30	GROUND–DEFAULT
31	INTERRUPT	32	N/C
33	SA1	34	N/C
35	SA0	36	SA2
37	HDC CS0#	38	HDC CS1#
39	HDD ACTIVE#	40	GROUND
41	VCC	42	VCC
43	GROUND	44	N/C

Table 4-11: Secondary IDE Connector Pinouts

4.2.10 Infrared Interface Connector (5-pin)

CN Label: IR1

CN Type: 5-pin header (1x5)

CN Location: See Figure 4-12

CN Pinouts: See Table 4-12

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

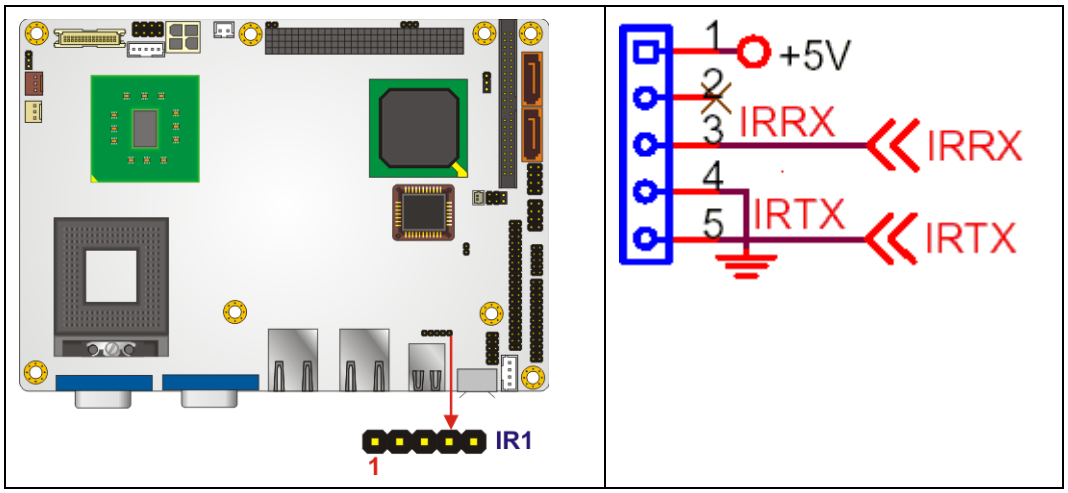


Figure 4-12: Infrared Connector Pinout Locations

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

Table 4-12: Infrared Connector Pinouts

4.2.11 LVDS LCD Connector

CN Label: LVDS1

CN Type: 30-pin crimp (2x10)

CN Location: See Figure 4-13

CN Pinouts: See Table 4-13

The 30-pin LVDS LCD connector can be connected to single channel or dual channel, 18-bit or 36-bit LVDS panel.

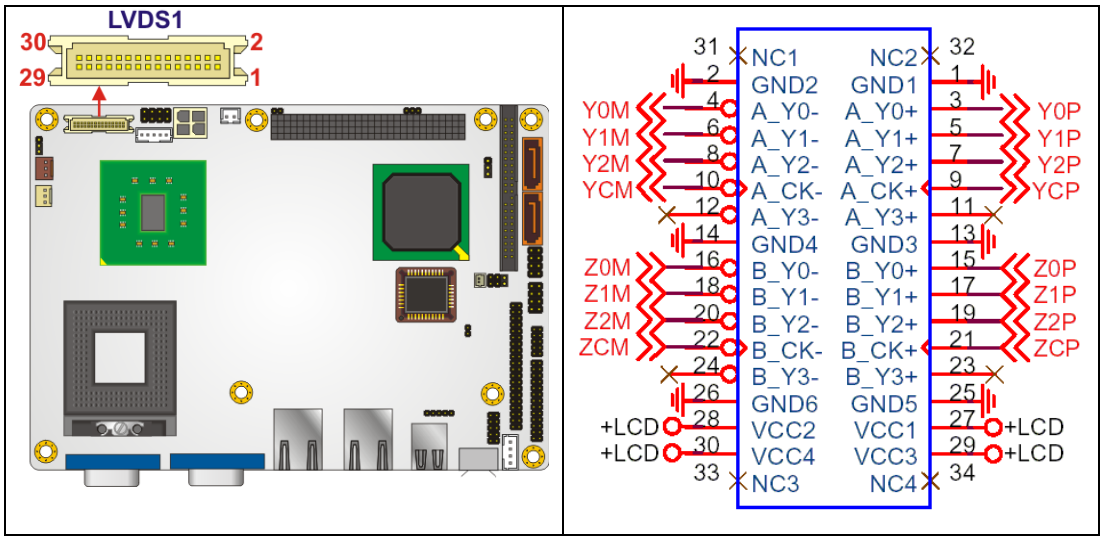


Figure 4-13: LVDS LCD Connector Pinout Locations

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

23	N/C	24	N/C
25	GROUND	26	GROUND
27	VCC_LVDS	28	VCC_LVDS
29	VCC_LVDS	30	VCC_LVDS

Table 4-13: LVDS LCD Port Connector Pinouts

4.2.12 Mini PCIe Socket

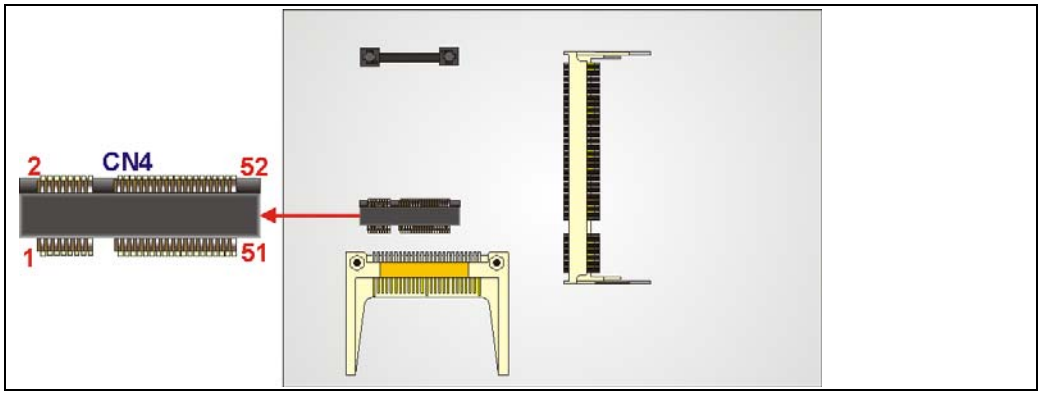
CN Label: CN4

CN Type: 26-pin box header

CN Location: See

CN Pinouts: See

The 52-pin mini PCIe socket supports the latest PCIe extension cards such as wireless LAN cards and other compatible devices.



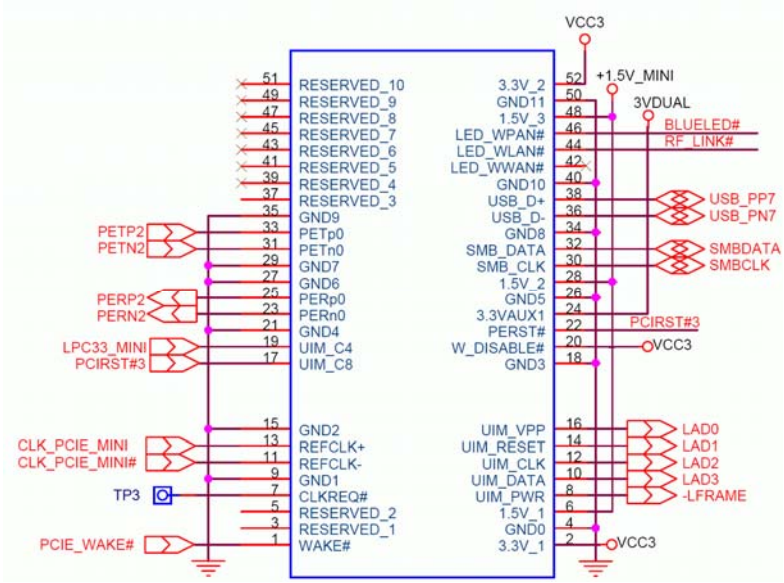


Figure 4-14: Mini PCIe Connector Pinout Locations

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	PCIE_WAKE#	2	VCC3
3	N/C	4	GND
5	N/C	6	1.5V
7	CLKREQ#	8	LFRAME#
9	GND	10	LAD3
11	CLK-	12	LAD2
13	CLK+	14	LAD1
15	GND	16	LAD0
17	PCIRST#	18	GND
19	LPC	20	VCC3
21	GND	22	PCIRST#
23	PERN2	24	3VDual
25	PERP2	26	GND
27	GND	28	1.5V
29	GND	30	SMBCLK
31	PETN2	32	SMBDATA

33	PETP2	34	GND
35	GND	36	USBD-
37	N/C	38	USBD+
39	N/C	40	GND
41	N/C	42	N/C
43	N/C	44	RF_LINK#
45	N/C	46	BLUELED#
47	N/C	48	1.5V
49	N/C	50	GND
51	N/C	52	VCC3

Table 4-14: Mini PCIe Socket Pinouts

4.2.13 Parallel Port Connector

CN Label: LPT1

CN Type: 26-pin box header

CN Location: See Figure 4-15

CN Pinouts: See Table 4-15

The 26-pin parallel port connector connects to a parallel port connector interface or some other parallel port device such as a printer.

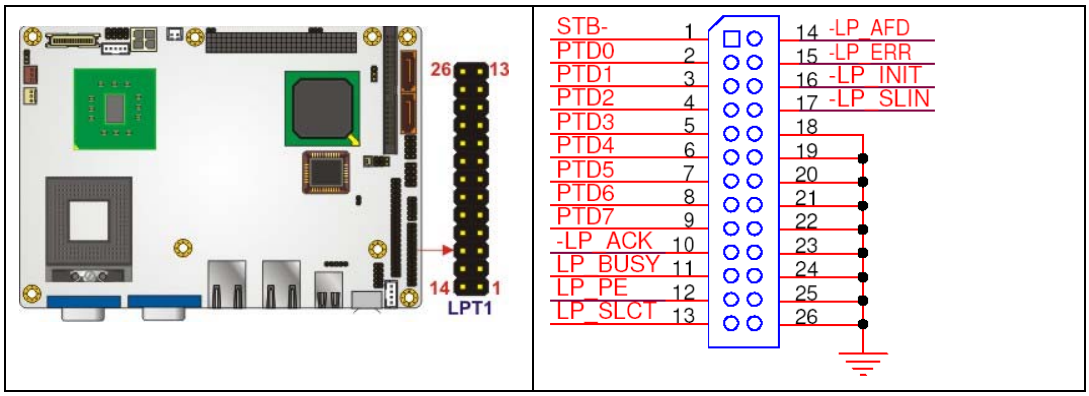


Figure 4-15: Parallel Port Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	STROBE#	14	AUTO FORM FEED #
2	DATA 0	15	ERROR#
3	DATA 1	16	INITIALIZE
4	DATA 2	17	PRINTER SELECT LN#
5	DATA 3	18	GROUND
6	DATA 4	19	GROUND
7	DATA 5	20	GROUND
8	DATA 6	21	GROUND
9	DATA 7	22	GROUND
10	ACKNOWLEDGE	23	GROUND
11	BUSY	24	GROUND
12	PAPER EMPTY	25	GROUND
13	PRINTER SELECT	26	NC

Table 4-15: Parallel Port Connector Pinouts

4.2.14 PCI-104 Slot

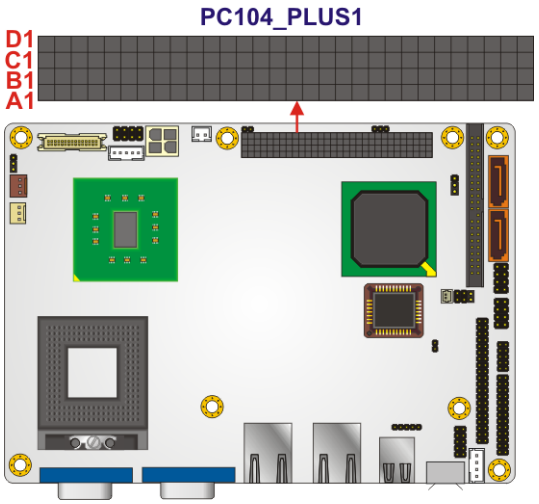
CN Label: PC104_PLUS1

CN Type: 120-pin PCI-104 slot

CN Location: See Figure 4-16

CN Pinouts: See Table 4-16

The PCI-104 slot enables a PCI-104 compatible expansion module to be connected to the board.



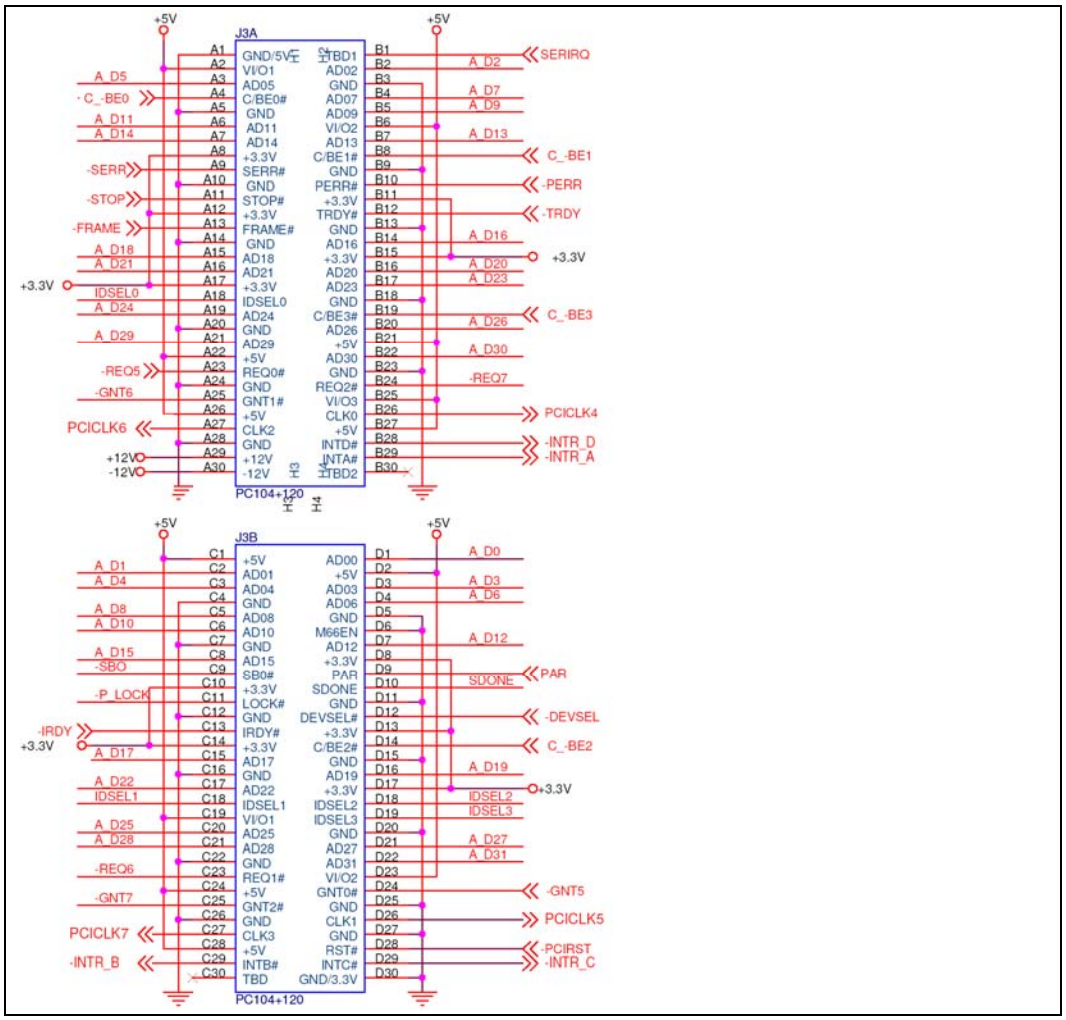


Figure 4-16: PCI-104 Slot Location

Pin No.	Column A	Column B	Column C	Column D
1	GND/5V	TBD1	5V	AD00
2	VI/O1	AD02	AD01	+5V
3	AD05	GND	AD04	AD03
4	C/BE0#	AD07	GND	AD06
5	GND	AD09	AD08	GND
6	AD11	VI/O2	AD10	M66EN
7	AD14	AD13	GND	AD12
8	+3.3V	C/BE1#	AD15	+3.3V

Pin No.	Column A	Column B	Column C	Column D
9	SERR#	GND	SB0#	PAR
10	GND	PERR#	+3.3V	SDONE
11	STOP#	+3.3V	LOCK#	GND
12	+3.3V	TRDY#	GND	DEVSEL#
13	FRAME#	GND	IRDY#	+3.3V
14	GND	AD16	+3.3V	C/BE2#
15	AD18	+3.3V	AD17	GND
16	AD21	AD20	GND	AD19
17	+3.3V	AD23	AD22	+3.3V
18	IDSEL0	GND	IDSEL1	IDSEL2
19	AD24	C/BE3#	VI/O1	IDSEL3
20	GND	AD26	AD25	GND
21	AD29	+5V	AD28	AD27
22	+5V	AD30	GND	AD31
23	REQ0#	GND	REQ1#	VI/O2
24	GND	REQ2#	+5V	GNT0#
25	GNT1#	VI/O3	GNT2#	GND
26	+5V	CLK0	GND	CLK1
27	CLK2	+5V	CLK3	GND
28	GND	INTD#	+5V	RST#
29	+12V	INTA#	INTB#	INTC#
30	-12V	TBD2	TBD	GND/3.3V

Table 4-16: PCI-104 Slot Connector Pinouts

4.2.15 SATA Drive Connectors

CN Label: SATA1 and SATA2

CN Type: 7-pin SATA drive connectors

CN Location: See Figure 4-17

CN Pinouts: See Table 4-17

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.

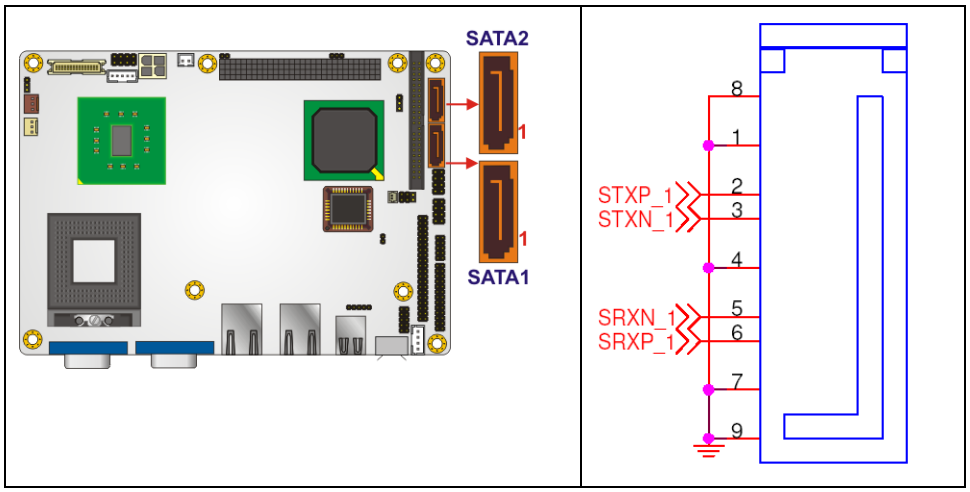


Figure 4-17: SATA Drive Connector Locations

PIN NO.	DESCRIPTION
1	GND
2	TX+
3	TX-
4	GND
5	RX-
6	RX+
7	GND

Table 4-17: SATA Drive Connector Pinouts

4.2.16 Serial Port Connector (RS-422 or RS-485)

CN Label: CN5

CN Type: 4-pin header (2x7)

CN Location: See Figure 4-18

CN Pinouts: See Table 4-18

The 4-pin serial port connector supports RS-422 or RS-485 serial port.

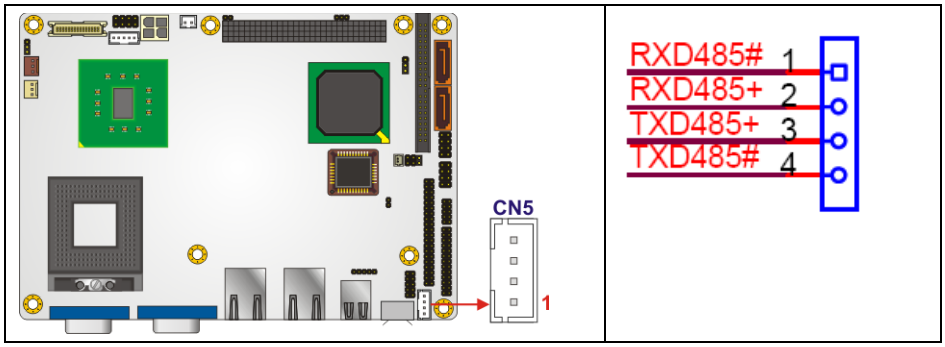


Figure 4-18: RS-422/485 Serial Port Connector Location

PIN NO.	DESCRIPTION
1	TXD485#
2	TXD485+
3	RXD485+
4	RXD485#

Table 4-18: RS-422/RS-485 Serial Port Connector Pinouts

4.2.17 4-port Serial Port Connector (RS-232)

CN Label: COM

CN Type: 40-pin header (2x20)

CN Location: See Figure 4-19

CN Pinouts: See Table 4-19

The 40-pin serial port connector contains the following four serial ports, COM 1, COM 2, COM 3 and COM 4. COM 3 and COM 4 are RS-232 serial communications channels. COM 2 is a multi function channel. In default mode COM 2 is an RS-232 serial communication channel but, with the COM 2 function select jumper, can be configured as either an RS-422 or RS-485 serial communications channel. The serial port locations are specified below.

- COM 1 is located on pin 1 to pin 10
- COM 2 is located on pin 11 to pin 20
- COM 3 is located on pin 21 to pin 30
- COM 4 is located on pin 31 to pin 40

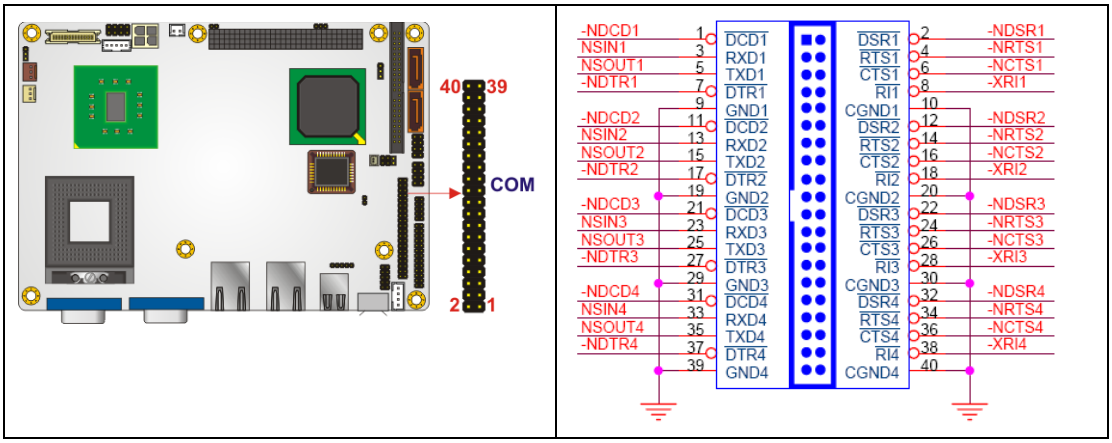


Figure 4-19: 4-port Serial Port Connector Pinout Locations

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	DATA CARRIER DETECT (DCD1)	2	DATA SET READY (DSR1)
3	RECEIVE DATA (RXD1)	4	REQUEST TO SEND (RTS1)
5	TRANSMIT DATA (TXD1)	6	CLEAR TO SEND (CTS1)
7	DATA TERMINAL READY (DTR1)	8	RING INDICATOR (RI1)
9	GND	10	GND
11	DATA CARRIER DETECT (DCD2)	12	DATA SET READY (DSR2)
13	RECEIVE DATA (RXD2)	14	REQUEST TO SEND (RTS2)
15	TRANSMIT DATA (TXD2)	16	CLEAR TO SEND (CTS2)
17	DATA TERMINAL READY (DTR2)	18	RING INDICATOR (RI2)
19	GND	20	GND
21	DATA CARRIER DETECT (DCD3)	22	DATA SET READY (DSR3)
23	RECEIVE DATA (RXD3)	24	REQUEST TO SEND (RTS3)
25	TRANSMIT DATA (TXD3)	26	CLEAR TO SEND (CTS3)
27	DATA TERMINAL READY (DTR3)	28	RING INDICATOR (RI3)
29	GND	30	GND
31	DATA CARRIER DETECT (DCD4)	32	DATA SET READY (DSR4)

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
33	RECEIVE DATA (RXD4)	34	REQUEST TO SEND (RTS4)
35	TRANSMIT DATA (TXD4)	36	CLEAR TO SEND (CTS4)
37	DATA TERMINAL READY (DTR4)	38	RING INDICATOR (RI4)
39	GND	40	GND

Table 4-19: 4-Port Serial Port Connector

4.2.18 USB Connectors (Internal)

CN Label: USB01 and USB23

CN Type: 8-pin header (2x4)

CN Location: See Figure 4-20

CN Pinouts: See Table 4-20

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.

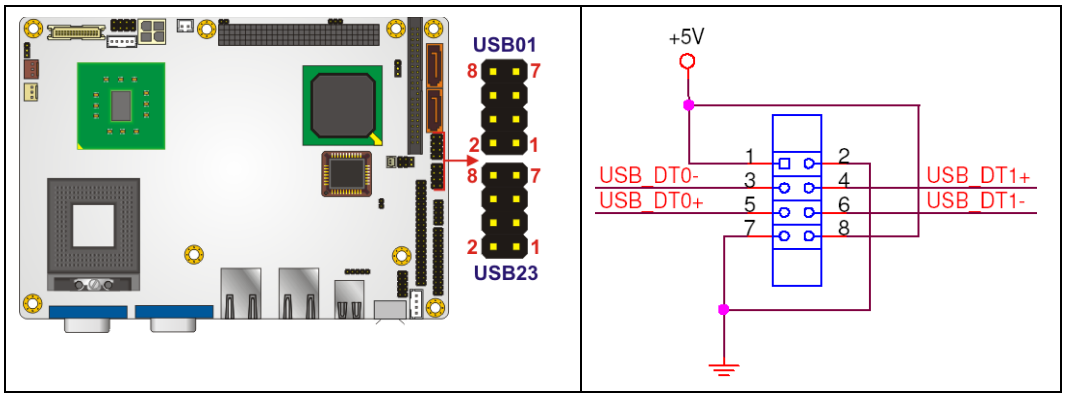


Figure 4-20: USB Connector Pinout Locations

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

Table 4-20: USB Port Connector Pinouts

4.3 External Peripheral Interface Connector Panel

Figure 4-21 shows the NANO-9453 rear panel. The NANO-9453 rear panel consists of two RJ-45 Ethernet connectors, a PS/2 keyboard connector a USB port and a VGA connector. These connectors are accessible when the NANO-9453 is installed in a chassis.

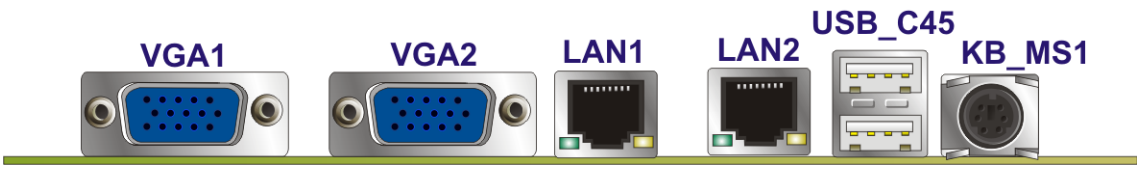


Figure 4-21: NANO-9453 External Peripheral Interface Connector

4.3.1 Keyboard/Mouse Connector

CN Label: KB_MS1

CN Type: Mini-DIN 6 PS/2

CN Location: See Figure 4-21

CN Pinouts: See Figure 4-22 and Table 4-21

The NANO-9453 CPU card has a mini-DIN 6 PS/2 connector on the mounting bracket for easy connection to a PS/2 keyboard or PS/2 mouse. The card comes with a cable to convert the mini-DIN 6 PS/2 into two mini-DIN 6 PS/2 connectors for keyboard and mouse connection.

Figure 4-22: PS/2 Pinouts

PIN	DESCRIPTION
1	KEYBOARD DATA
2	MOUSE DATA
3	GND
4	VCC
5	KEYBOARD CLOCK
6	MOUSE CLOCK

Table 4-21: Mini-DIN 6 PS/2 Connector Pinouts

4.3.2 LAN Connectors

CN Label: LAN1 and LAN2

CN Type: RJ-45

CN Location: See Figure 4-21

CN Pinouts: See Table 4-22

The NANO-9453 is equipped with two built-in GbE Ethernet controllers. The controllers can connect to the LAN through two RJ-45 LAN connectors. There are two LEDs on the connector indicating the status of LAN. The pin assignments are listed in the following table:

PIN	DESCRIPTION	PIN	DESCRIPTION
1	MDIA3-	5	MDIA1+
2	MDIA3+	9	MDIA2+-
3	MDIA2-	10	MDIA0-
4	MDIA1-	11	MDIA0+

Table 4-22: LAN Pinouts

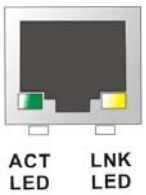


Figure 4-23: RJ-45 Ethernet Connector

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 4-23**.

STATUS	DESCRIPTION	STATUS	DESCRIPTION
GREEN	Activity	YELLOW	Linked

Table 4-23: RJ-45 Ethernet Connector LEDs

4.3.3 USB Connector

CN Label: USB_C45

CN Type: USB port

CN Location: See Figure 4-21

CN Pinouts: See Table 4-24

The NANO-9453 has a one external USB 2.0 port. The port connects to both USB 2.0 and USB 1.1 devices.

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

Table 4-24: USB Port Pinouts

4.3.4 VGA Connector

CN Label: VGA1 and VGA2

CN Type: 15-pin Female

CN Location: See Figure 4-21

CN Pinouts: See Figure 4-24 and Table 4-25

The NANO-9453 has two 15-pin female connectors for connectivity to standard display devices.

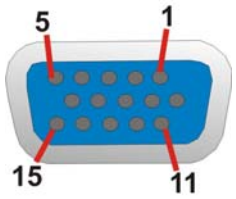


Figure 4-24: VGA Connector

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
13	HSYNC	14	VSYNC
15	DDCCLK		

Table 4-25: VGA Connector Pinouts

Chapter

5

Installation

5.1 Anti-static Precautions

WARNING:

Failure to take ESD precautions during the installation of the NANO-9453 may result in permanent damage to the NANO-9453 and severe injury to the user.

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the NANO-9453. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the NANO-9453, 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 NANO-9453, place it on an antic-static pad. This reduces the possibility of ESD damaging the NANO-9453.
- ***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 NANO-9453 is installed. All installation notices pertaining to the installation of the NANO-9453 should be strictly adhered to. Failing to adhere to these precautions may lead to severe damage of the NANO-9453 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 NANO-9453, NANO-9453 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 NANO-9453 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 NANO-9453 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 NANO-9453 off**:

- When working with the NANO-9453, 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 NANO-9453 **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 NANO-9453 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 CF Type I or CF Type II card is properly installed into the CF socket
- The jumpers have been properly configured
- The NANO-9453 is inserted into a chassis with adequate ventilation
- The correct power supply is being used
- The following devices are properly connected
  - IDE device
  - SATA drives
  - Keyboard and mouse cable
  - Audio kit
  - Power supply
  - USB cable
  - Serial port cable
  - Parallel port cable
- The following external peripheral devices are properly connected to the chassis:
  - VGA screen

- Keyboard
- Mouse
- RS-232 serial communications device

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, NANO-9453 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 NANO-9453. If one of these component is not installed the NANO-9453 cannot run.

5.3.1 Socket M 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 the correct cooling kit is properly installed.

To install a Socket M CPU onto the NANO-9453, 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: **Unlock the CPU retention screw.** When shipped, the retention screw of the CPU socket should be in the unlocked position. If it is not in the unlocked position, use a screwdriver to unlock the screw. See **Figure 5-1**.

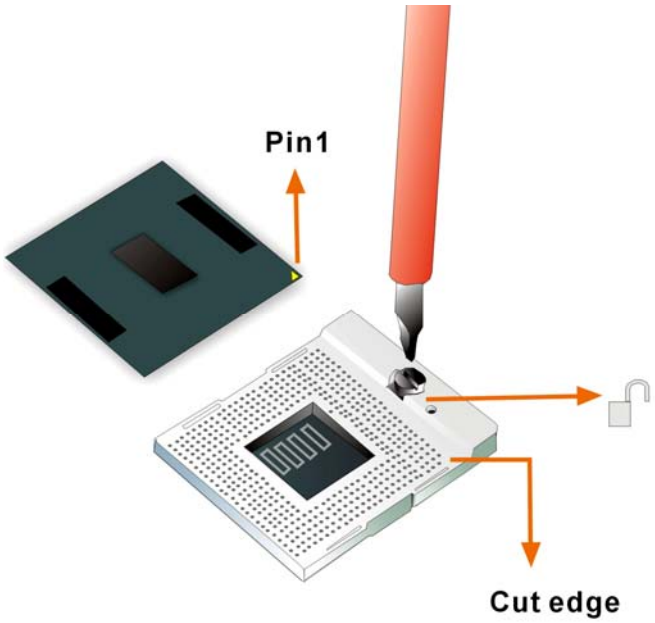


Figure 5-1: Make sure the CPU socket retention screw is unlocked

Step 2: **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 3: **Correctly Orientate the CPU**. Make sure the IHS (integrated heat sink) side is facing upwards.

Step 4: **Correctly position the CPU.** Match the Pin 1 mark with the cut edge on the CPU socket. See **Figure 5-1**.

Step 5: **Align the CPU pins.** Carefully align the CPU pins with the holes in the CPU socket.

Step 6: **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 7: **Lock the retention screw.** Rotate the retention screw into the locked position. See **Figure 5-2**.

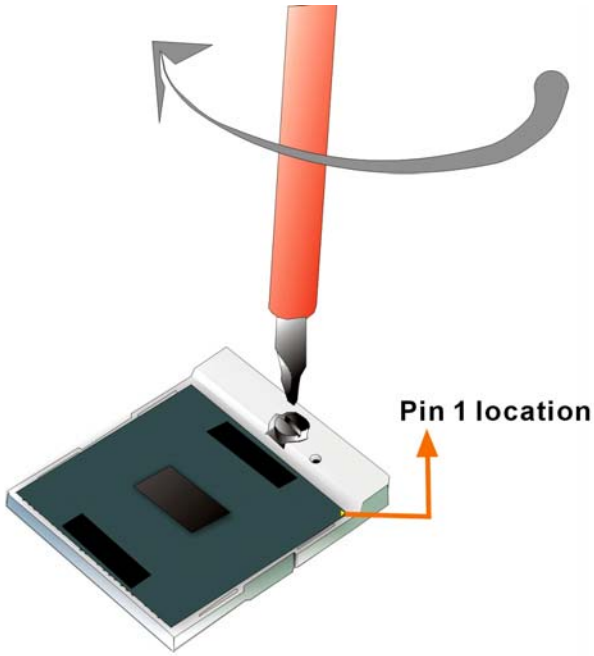


Figure 5-2: Lock the CPU Socket Retention Screw

5.3.2 Cooling Kit CF-479B-RS Installation

Figure 5-3: IEI CF-479B-RS Cooling Kit

An IEI Socket M CPU cooling kit can be purchased separately. The cooling kit comprises a CPU heat sink and a cooling fan.

WARNING:

Do not wipe off (accidentally or otherwise) the pre-sprayed layer of thermal paste on the bottom of the CF-479B-RS heat sink. The thermal paste between the CPU and the heat sink is important for optimum heat dissipation.

To install the CF-479B-RS cooling kit, please follow the steps below.

Step 8: **Place the cooling kit onto the CPU**. Make sure the CPU cooling fan cable can be properly routed when the cooling kit is installed.

Step 9: **Properly align the cooling kit**. Make sure its four spring screw fasteners can pass through the pre-drilled holes on the PCB.

Step 10: **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 5-4**)

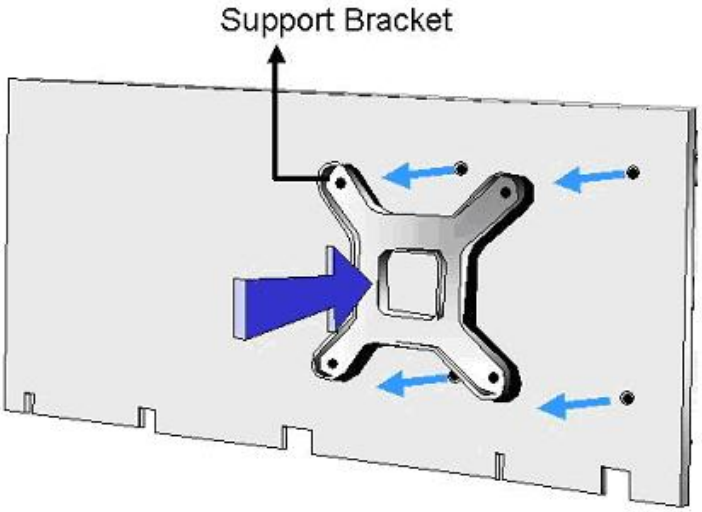


Figure 5-4: Cooling Kit Support Bracket

Step 11: **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 12: **Connect the fan cable**. Connect the cooling kit fan cable to the fan connector on the motherboard. Carefully route the cable and avoid heat generating chips and fan blades. See **Figure 5-5**.

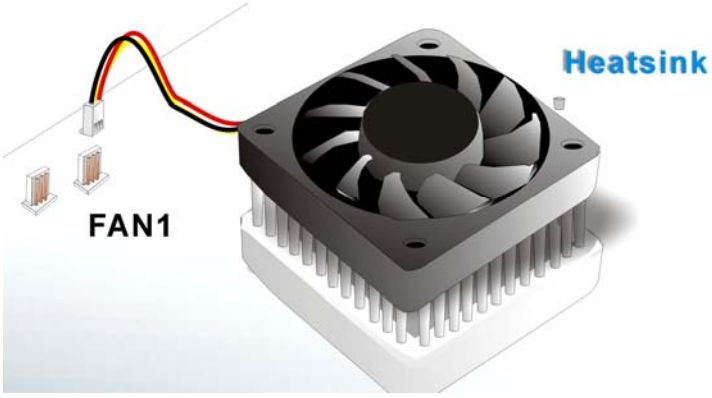


Figure 5-5: Connect the cooling fan cable

5.3.3 SO-DIMM Installation

WARNING:

Using incorrectly specified SO-DIMM may cause permanently damage the NANO-9453. Please make sure the purchased SO-DIMM complies with the memory specifications of the NANO-9453. SO-DIMM specifications compliant with the NANO-9453 are listed in **Chapter 2**.

To install a SO-DIMM into a SO-DIMM socket, please follow the steps below and refer **Figure 5-6**.

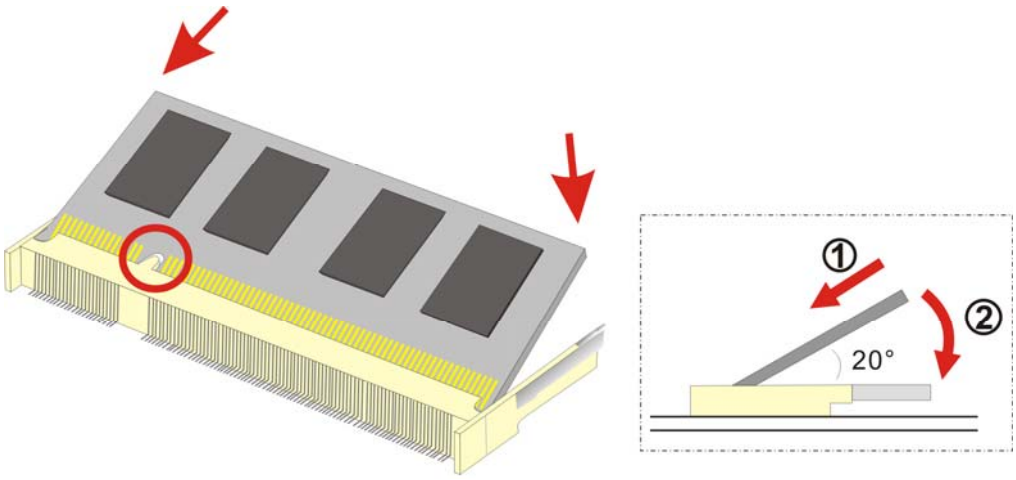


Figure 5-6: SO-DIMM Installation

Step 13: **Locate the SO-DIMM socket**. Place the NANO-9453 on an anti-static pad with the solder side facing up.

Step 14: **Align the SO-DIMM with the socket**. The SO-DIMM must be oriented in such a way that the notch in the middle of the SO-DIMM must be aligned with the plastic bridge in the socket.

Step 15: **Insert the SO-DIMM**. Push the SO-DIMM chip into the socket at an angle. (See **Figure 5-6**)

Step 16: **Open the SO-DIMM socket arms**. Gently pull the arms of the SO-DIMM socket out and push the rear of the SO-DIMM down. (See **Figure 5-6**)

Step 17: **Secure the SO-DIMM**. Release the arms on the SO-DIMM socket. They clip into place and secure the SO-DIMM in the socket.

5.3.4 CF Card Installation

Note:

The NANO-9453 can support both CF Type I cards and CF Type II cards. For the complete specifications of the supported CF cards please refer to **Chapter 2**.

To install the a CF card (Type 1 or Type 2) onto the NANO-9453, please follow the steps below:

Step 1: **Locate the CF card socket**. Place the NANO-9453 on an anti-static pad with the solder side facing up. Locate the CF card.

Step 2: **Align the CF card**. Make sure the CF card is properly aligned with the CF socket.

Step 3: **Insert the CF card**. Gently insert the CF card into the socket making sure the socket pins are properly inserted into the socket. See **Figure 5-7**.

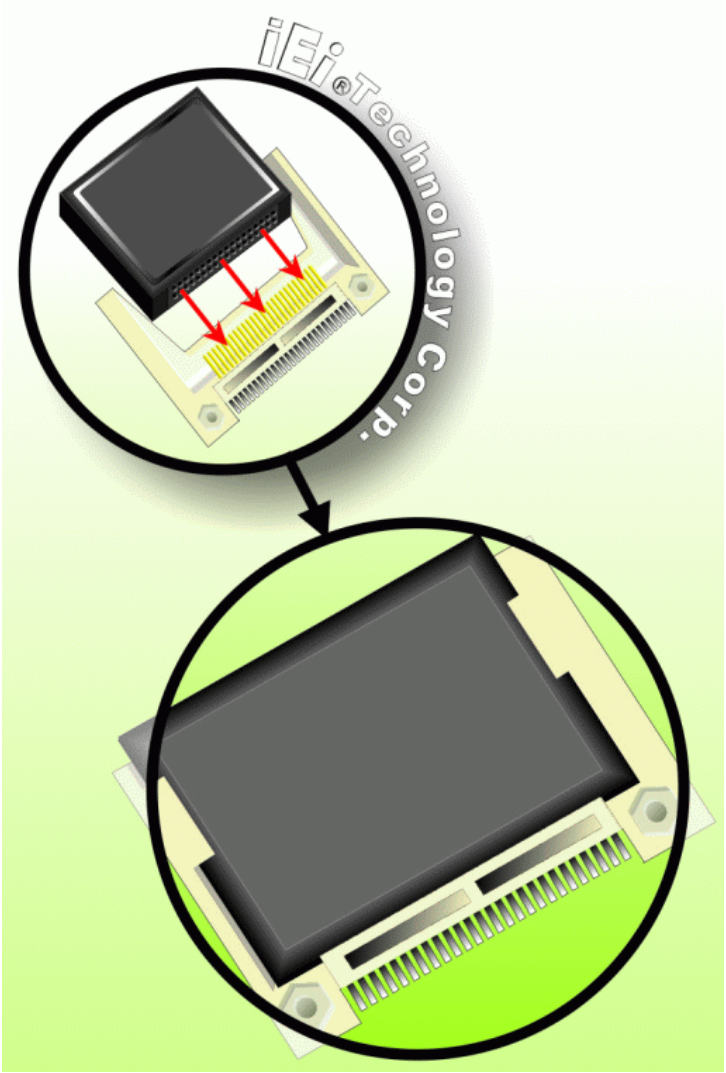


Figure 5-7: CF Card Installation

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.

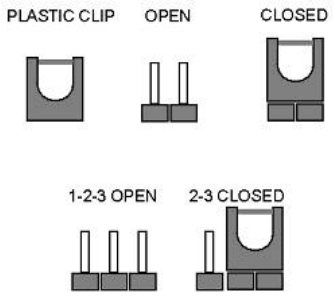


Figure 5-8: Jumper Locations

Before the NANO-9453 is installed in the system, the jumpers must be set in accordance with the desired configuration. The jumpers on the NANO-9453 are listed in **Table 5-1**.

Description	Label	Type
CF card setup	JCF1	2-pin header
Clear CMOS	J_CMOS1	3-pin header
COM 2 function select	JP1	6-pin header
LVDS voltage selection	J_VLVDS1	3-pin header
PC104+ VIO Selector	JP2	3-pin header

Table 5-1: Jumpers

5.4.1 CF Card Setup

Jumper Label: JCF1

Jumper Type: 2-pin header

Jumper Settings: See Table 5-2

Jumper Location: See Figure 5-9

The CF Card Setup jumper sets the CF Type I card or CF Type II cards as either the slave device or the master device. CF Card Setup jumper settings are shown in **Table 5-2**.

CF Card Setup	Description	
Open	Slave	Default
Short	Master	

Table 5-2: CF Card Setup Jumper Settings

The CF Card Setup jumper location is shown in **Figure 5-9**.

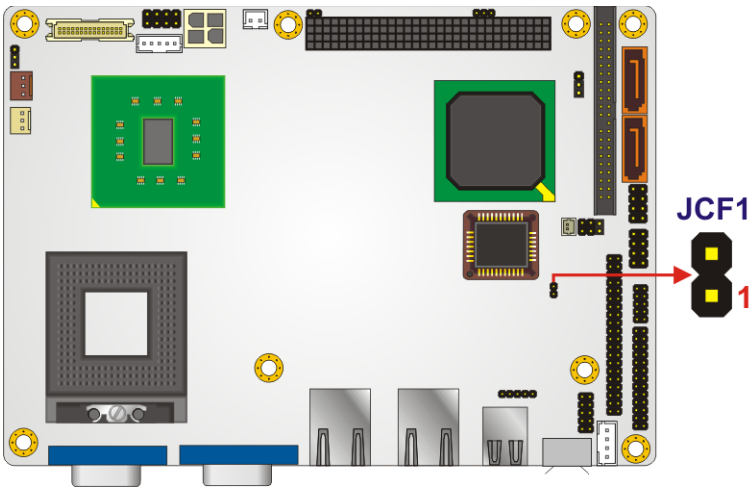


Figure 5-9: CF Card Setup Jumper Location

5.4.2 Clear CMOS Jumper

Jumper Label:	J_CMOS1
Jumper Type:	3-pin header
Jumper Settings:	See Table 5-3
Jumper Location:	See Figure 5-10

If the NANO-9453 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 5-3**.

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

Table 5-3: Clear CMOS Jumper Settings

The location of the clear CMOS jumper is shown in **Figure 5-10** below.

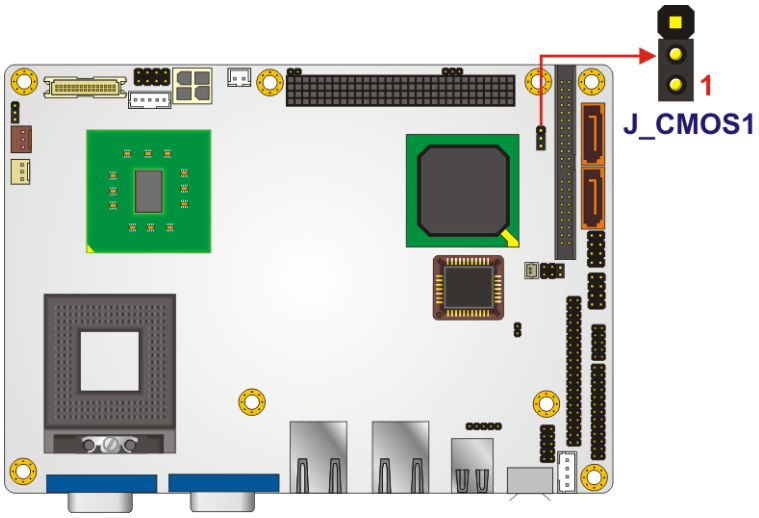


Figure 5-10: Clear CMOS Jumper

5.4.3 COM 2 Function Select Jumper

Jumper Label:	JP1
Jumper Type:	6-pin header
Jumper Settings:	See Table 5-4
Jumper Location:	See Figure 5-11

The COM 2 Function Select jumper sets the communication protocol used by the second serial communications port (COM 2) as RS-232, RS-422 or RS-485. The COM 2 Function Select settings are shown in Figure 5-11.

COM 2 Function Select	Description	
Short 1-2	RS-232	Default
Short 3-4	RS-422	
Short 5-6	RS-485	

Table 5-4: COM 2 Function Select Jumper Settings

The COM 2 Function Select jumper location is shown in Table 5-4.

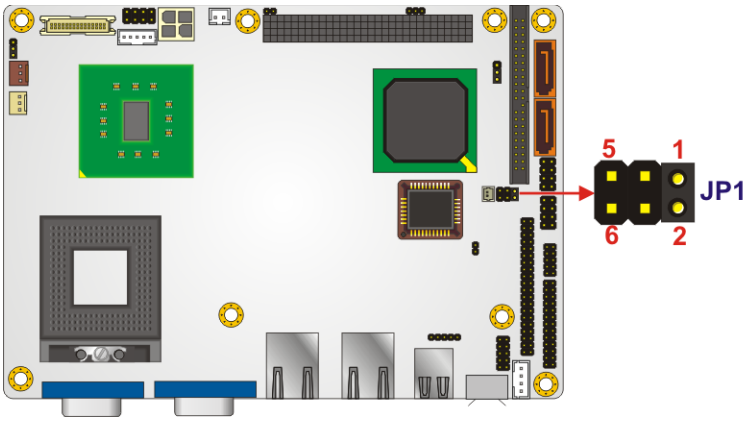


Figure 5-11: COM 2 Function Select Jumper Location

5.4.4 LVDS Voltage Selection

WARNING:

Permanent damage to the screen and NANO-9453 may occur if the wrong voltage is selected with this jumper. Please refer to the user guide that cam with the monitor to select the correct voltage.

Jumper Label:	J_VLVDS1
Jumper Type:	3-pin header
Jumper Settings:	See Table 5-5
Jumper Location:	See Figure 5-12

The **LVDS Voltage Selection** jumper allows the LVDS screen voltage to be set. The **LVDS Voltage Selection** jumper settings are shown in **Table 5-5**.

LVDS Voltage Select	Description	
Short 1-2	+3V LVDS	Default
Short 2-3	+5V LVDS	

Table 5-5: LVDS Voltage Selection Jumper Settings

The LVDS Voltage Selection jumper location is shown in **Figure 5-12**.

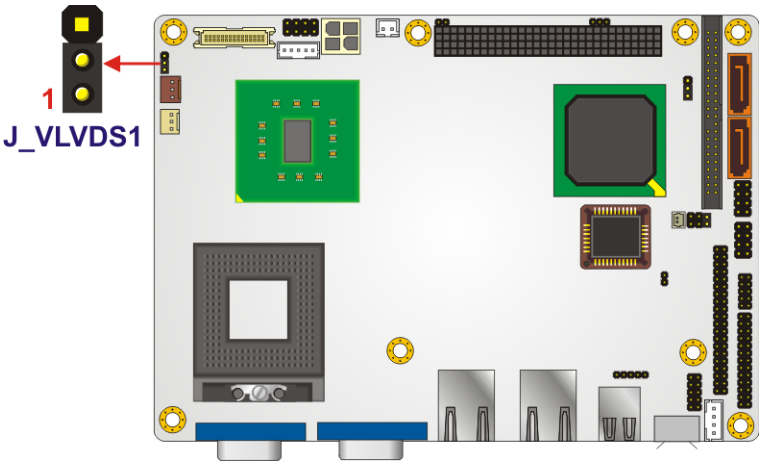


Figure 5-12: LVDS Voltage Selection Jumper Pinout Locations

5.4.5 PCI-104 VIO Selector Jumper

Jumper Label:	JP2
Jumper Type:	3-pin header
Jumper Settings:	See Table 5-6
Jumper Location:	See Figure 5-13

The **PCI-104 VIO Selector** jumper allows the PCI-104 voltage to be set. The **PCI-104 VIO Selector** jumper settings are shown in **Table 5-5**.

PCI-104 VIO Select	Description
Short 1-2	VCC
Short 2-3	VCC3

Table 5-6: PCI-104 VIO Selector Jumper Settings

The **PCI-104 VIO Selector** jumper location is shown in **Figure 5-12**.

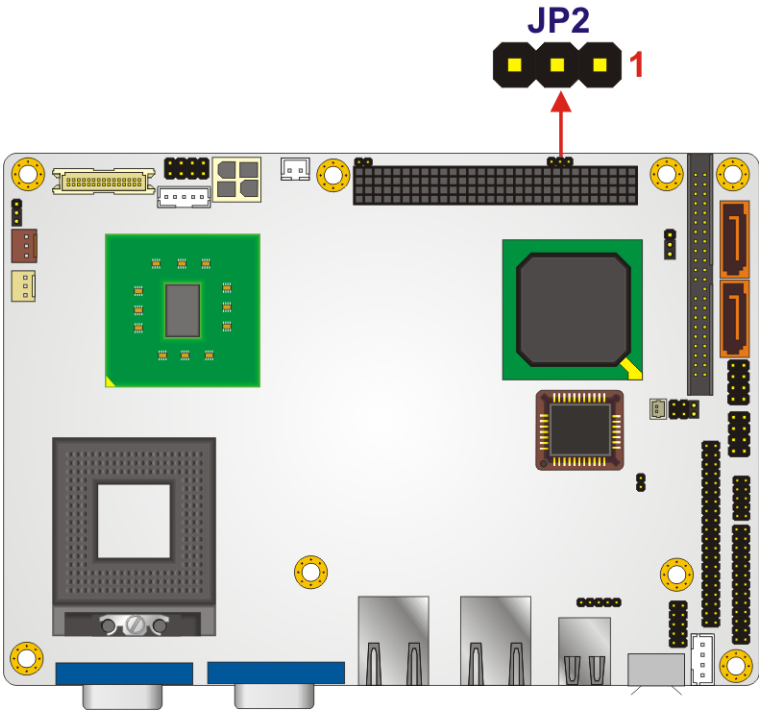


Figure 5-13: PCI-104 VIO Selector Jumper Pinout Locations

5.5 Chassis Installation

5.5.1 Airflow

WARNING:

Airflow is critical to the cooling of the CPU and other onboard components. The chassis in which the NANO-9453 must have air vents to allow cool air to move into the system and hot air to move out.

The NANO-9453 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:

IEI has a wide range of backplanes available. Please contact your NANO-9453 vendor, reseller or an IEI sales representative at sales@iei.com.tw or visit the IEI website (http://www.ieiworld.com.tw) to find out more about the available chassis.

5.5.2 Motherboard Installation

To install the NANO-9453 motherboard into the chassis please refer to the reference material that came with the chassis.

5.6 Internal Peripheral Device Connections

5.6.1 Peripheral Device Cables

The cables listed in **Table 5-7** are shipped with the NANO-9453.

Quantity	Type
1	IDE Cable 44p/44p
1	4 RS-232 adapter cable
2	SATA drive cables
1	SATA drive power cable
1	Power cable

Table 5-7: IEI Provided Cables

Optional cables are listed below:

- USB cable
- RS-232/422/485 cable
- LPT cable
- ATX power cable

5.6.2 IDE Cable Connection

The IDE flat cable connects to the NANO-9453 to one or two IDE devices. To connect an IDE HDD to the NANO-9453 please follow the instructions below.

Step 4: **Locate the IDE connector**. The location/s of the IDE device connector/s is/are shown in **Chapter 3**.

Step 5: **Insert the connector**. Connect the IDE cable connector to the onboard connector. See Figure 5-14. A key on the front of the cable connector ensures it can only be inserted in one direction.

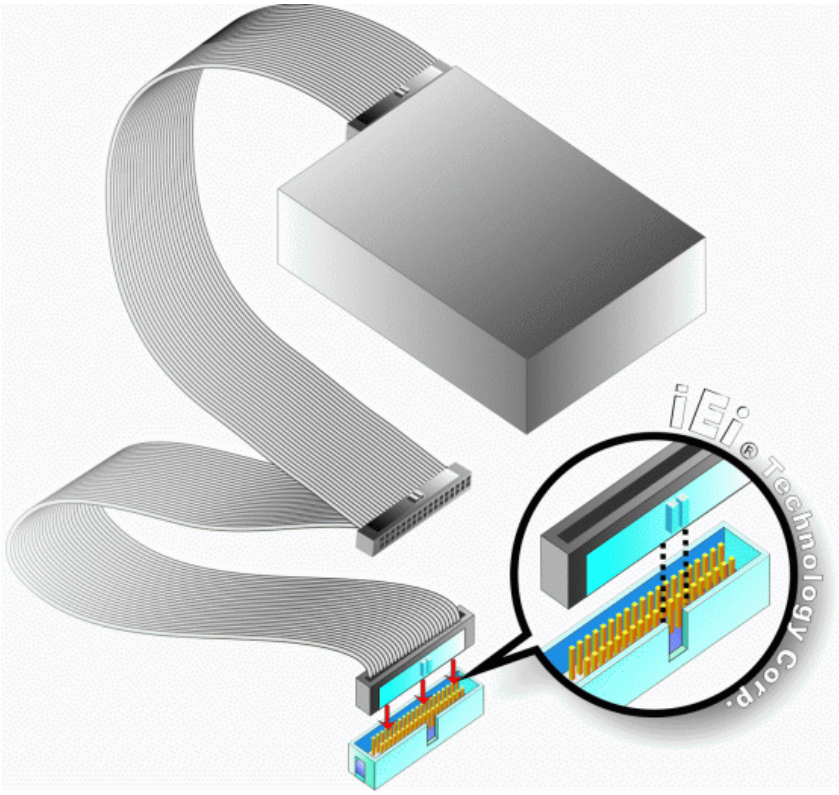


Figure 5-14: IDE Cable Connection

Step 6: **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 5.1 Channel Audio Kit Installation

NOTE:

This is an optional item that must be ordered separately. For further information please contact the nearest NANO-9453 distributor, reseller or vendor or contact an iEi sales representative directly. Send any queries to sales@iei.com.tw.

The optional 5.1 channel audio kit connects to the 10-pin audio connector on the NANO-9453. The audio kit consists of three audio jacks. One audio jack, Mic In, connects to a microphone. The remaining two audio jacks, Line-In and Line-Out, connect to two speakers. To install the audio kit, please refer to the steps below:

Step 1: **Connect the audio kit cable.** The audio kit is shipped with a cable that connects the audio kit to the NANO-9453. Connect the cable to the connector on the back of the audio kit. Make sure the pins are properly aligned (i.e. pin 1 connects to pin 1).

Step 2: **Locate the audio connector**. The location of the 10-pin audio connector is shown in **Chapter 3**.

Step 3: **Align pin 1**. Align pin 1 on the onboard connector with pin 1 on the audio kit cable connector. Pin 1 on the audio kit cable connector is indicated with a white dot. See **Figure 5-15**.

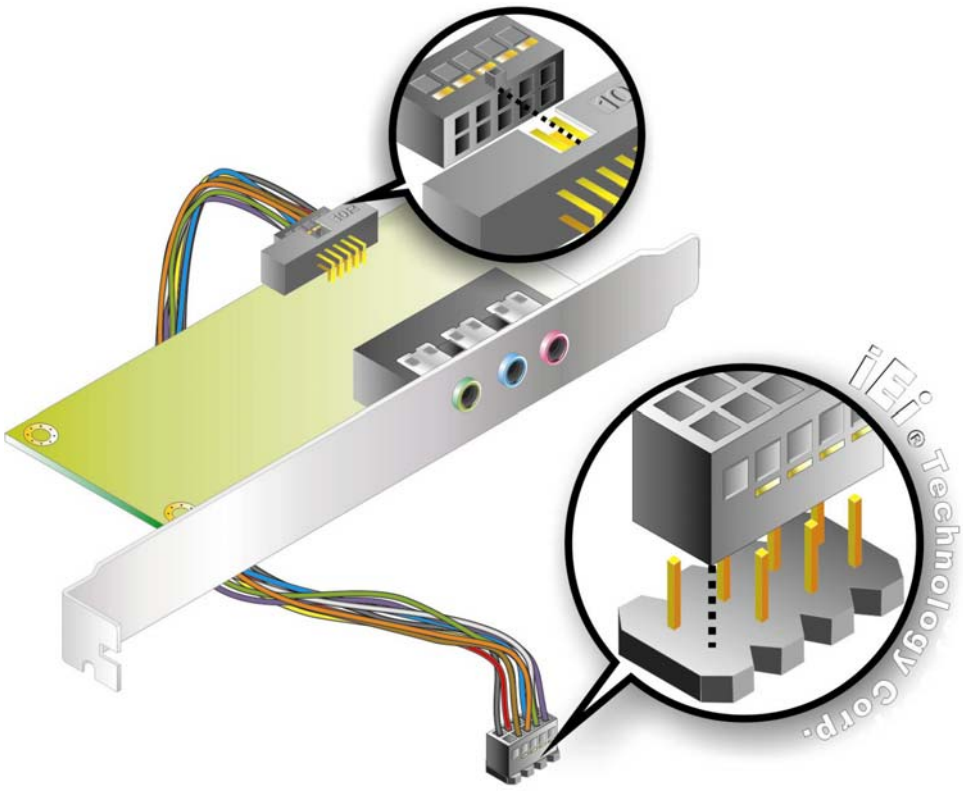


Figure 5-15: 5.1 Channel Audio Kit

Step 4: **Mount the audio kit onto the chassis**. Once the audio kit is connected to the NANO-9453, secure the audio kit bracket to the system chassis.

Step 5: **Connect the audio devices**. Connect one speaker to the line-in audio jack, one speaker to the line-out audio jack and a microphone to the mic-in audio jack.

Step 6: **Install the driver**. If the 5.1 channel audio kit is used, the ALC655 Realtek codec driver must be installed. Refer to **Chapter 7** for driver installation instructions.

5.6.4 7.1 Channel Audio Kit Installation

NOTE:

This is an optional item that must be ordered separately. For further information please contact the nearest NANO-9453 distributor, reseller or vendor or contact an iEi sales representative directly. Send any queries to sales@iei.com.tw.

The optional 7.1 channel audio kit connects to the 10-pin audio connector on the NANO-9453. The audio kit consists of five audio jacks. One audio jack, Mic In, connects to a microphone. The remaining four audio jacks, Line-In, Front-Out, Rear-Out, and Center Subwoofer, connect to speakers. To install the audio kit, please refer to the steps below:

Step 1: **Connect the audio kit cable.** The audio kit is shipped with a cable that connects the audio kit to the NANO-9453. Connect the cable to the connector on the back of the audio kit. Make sure the pins are properly aligned (i.e. pin 1 connects to pin 1).

Step 2: **Locate the audio connector**. The location of the 10-pin audio connector is shown in **Chapter 3**.

Step 3: **Align pin 1**. Align pin 1 on the onboard connector with pin 1 on the audio kit cable connector. Pin 1 on the audio kit cable connector is indicated with a white dot. See **Figure 5-15**.

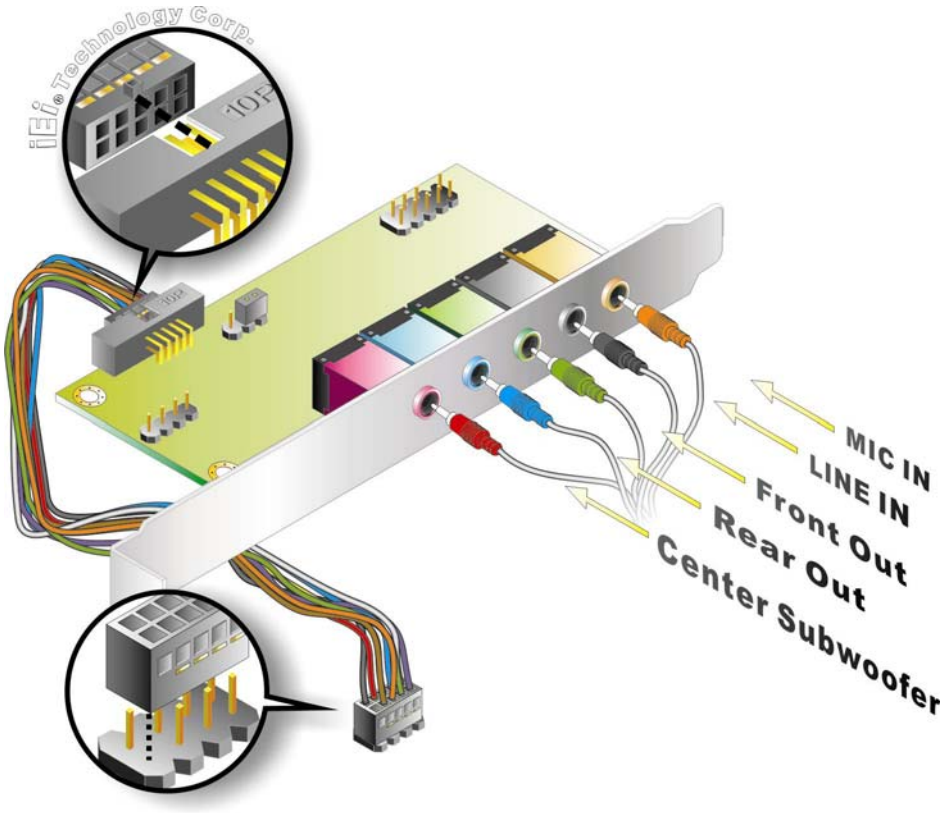


Figure 5-16: 5.1 Channel Audio Kit

Step 4: **Mount the audio kit onto the chassis**. Once the audio kit is connected to the NANO-9453, secure the audio kit bracket to the system chassis.

Step 5: **Connect the audio devices**. Connect one speaker to the line-in audio jack, one speaker to the line-out audio jack and a microphone to the mic-in audio jack.

Step 6: **Install the driver**. If the 5.1 channel audio kit is used, the ALC655 Realtek codec driver must be installed. Refer to **Chapter 7** for driver installation instructions.

5.6.5 SATA Drive Connection

The NANO-9453 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. See **Figure 5-17**.

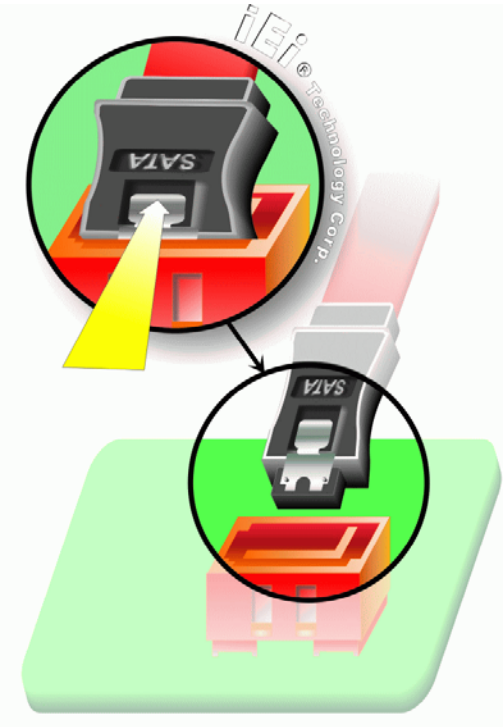


Figure 5-17: SATA Drive Cable Connection

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 5-18**.

Step 4: **Connect the SATA power cable**. Connect the SATA power connector to the back of the SATA drive. See **Figure 5-18**.

Figure 5-18: SATA Power Drive Connection

5.6.6 Serial Port Connector Cable (Four Ports) Cable Connection

The NANO-9453 is shipped with one four serial port connector cable. The four serial port connector cable connects four serial port connectors on the cable to the 40-pin serial port connectors on the NANO-9453. To connect the four serial port connector cable please follow the steps below.

Step 5: **Locate the serial port connector**. The location of the 40-pin serial port connector is shown in **Chapter 3**.

Step 6: **Align the connectors**. Correctly align pin 1 on the cable connector with pin 1 on the NANO-9453 40-pin serial port connector. See **Figure 5-19**.

Step 7: **Insert the cable connectors** Once the cable connector is properly aligned with the 40-pin serial port connector on the NANO-9453, connect the cable connector to the onboard connectors. See **Figure 5-19**.

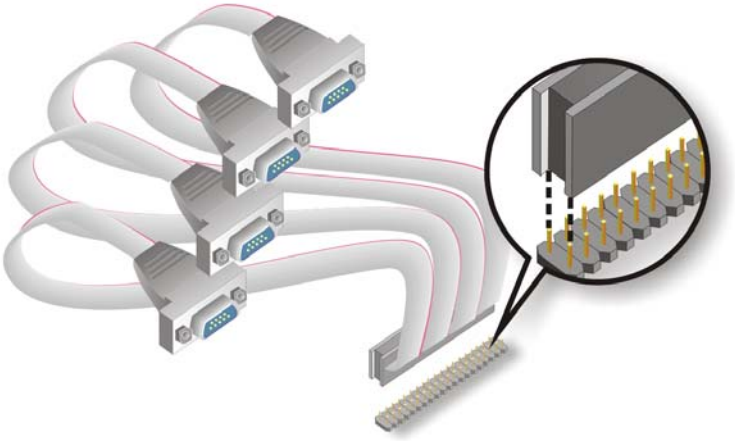


Figure 5-19: Four Serial Port Connector Cable Connection

Step 8: **Attach DB-9 serial port connectors to the chassis**. The four DB-9 serial port connectors can be inserted into four preformed holes in the chassis. Once, inserted the DB-9 connectors should be secured to the chassis with the retention screws.

5.6.7 USB Cable (Dual Port)

The NANO-9453 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 1on each cable connector with pin 1 on the NANO-9453 USB connector.

Step 3: **Insert the cable connectors** Once the cable connectors are properly aligned with the USB connectors on the NANO-9453, connect the cable connectors to the onboard connectors. See **Figure 5-20**.

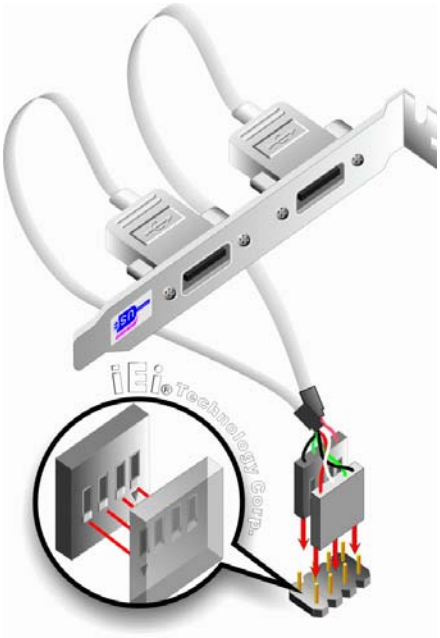


Figure 5-20: Dual USB Cable Connection

Step 4: **Attach the bracket to the chassis**. The USB 2.0 connectors are attached to a bracket. To secure the bracket to the chassis please refer to the installation instructions that came with the chassis.

5.7 External Peripheral Interface Connection

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

- Mouse and keyboard
- USB devices
- RJ-45 Ethernet cable connectors
- VGA monitors

To install these devices, connect the corresponding cable connector from the actual device to the corresponding NANO-9453 external peripheral interface connector making sure the pins are properly aligned.

5.7.1 VGA Monitor Connection

The NANO-9453 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 NANO-9453, 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 NANO-9453. See **Figure 5-21**.

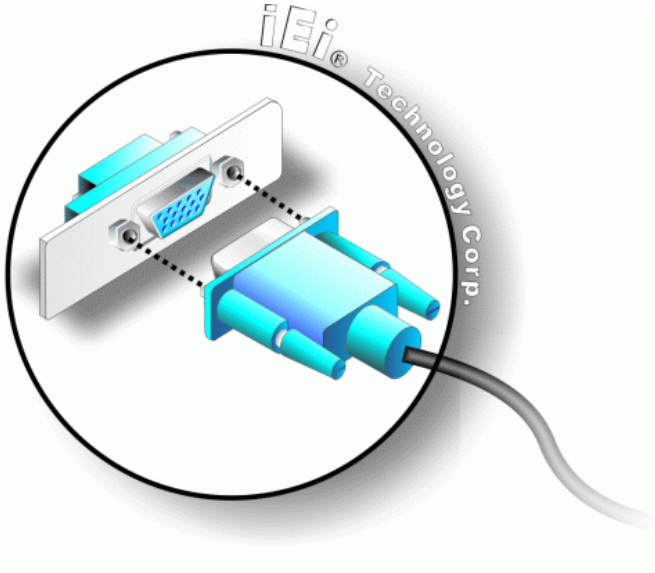


Figure 5-21: VGA Connector

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.

5.7.2 PS/2 Keyboard/Mouse Connection

The NANO-9453 has a single PS/2 connector on the external peripheral interface panel. The PS/2 connector is connected to a keyboard and a mouse through the keyboard and mouse cable that was shipped with the system. To connect a keyboard and mouse to the NANO-9453, please follow the instructions below.

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

Step 2: **Align the PS/2 connector**. Align the PS/2 connector on the keyboard and mouse cable with the PS/2 connector on the external peripheral interface.

Step 3: **Insert the PS/2 connector** Once the connectors are properly, insert thePS/2 connector from the keyboard and mouse cable into the PS/2 connector on the NANO-9453. See **Figure 5-22**.

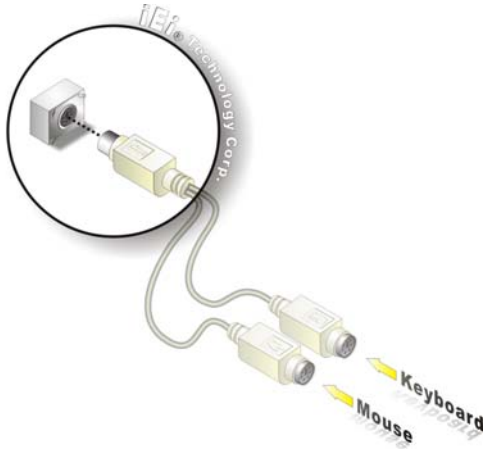


Figure 5-22: PS/2 Connector

Step 4: **Connect the keyboard and mouse**. Once the cable is connected to the NANO-9453 PS/2 connector. Connect the keyboard and mouse to their

respective PS/2 connector on the keyboard and mouse cable.

CAUTION:

The keyboard and mouse cable has a specific connector for the mouse and a specific connector for the keyboard. The cable is marked. Please make sure the devices are connected to the correct connector.

5.7.3 RJ-45 Ethernet Connection

The NANO-9453 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 NANO-9453.

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 5-23**.

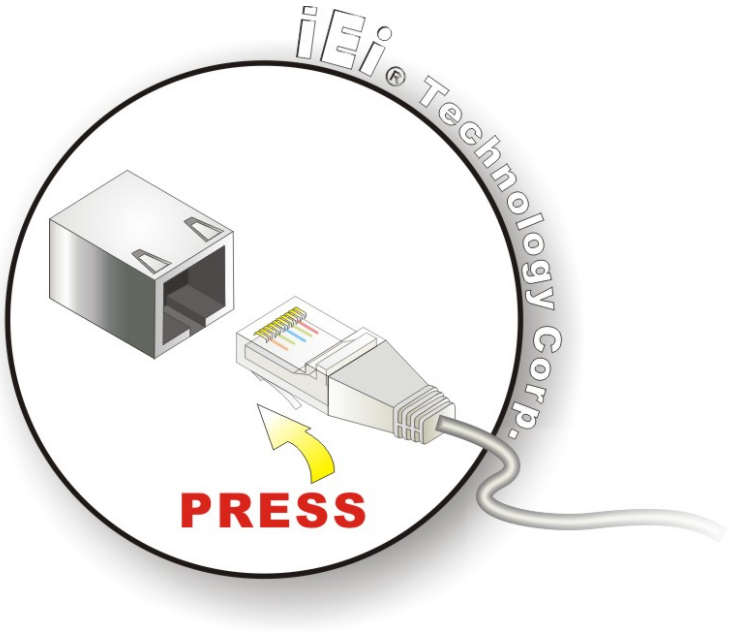


Figure 5-23: RJ-45 Ethernet Connector

5.7.4 USB Connection

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 NANO-9453.

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

Step 4: **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 5-24**.

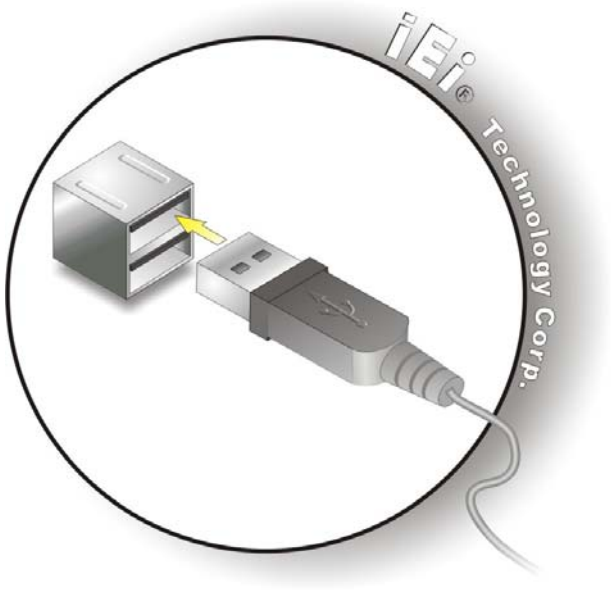


Figure 5-24: USB Connector

Chapter

6

AMI BIOS

6.1 Introduction

A licensed copy of AMI BIOS is preprogrammed into the ROM BIOS. The BIOS setup program allows users to modify the basic system configuration. This chapter describes how to access the BIOS setup program and the configuration options that may be changed.

6.1.1 Starting Setup

The AMI BIOS is activated when the computer is turned on. The setup program can be activated in one of two ways.

1. Press the **DELETE** key as soon as the system is turned on or
2. Press the **DELETE** key when the "**Press Del to enter SETUP**" message appears on the screen.

If the message disappears before the **DELETE** key is pressed, restart the computer and try again.

6.1.2 Using Setup

Use the arrow keys to highlight items, press **ENTER** to select, use the PageUp and PageDown keys to change entries, press **F1** for help and press **ESC** to quit. Navigation keys are shown in.

Key	Function
Up arrow	Move to previous item
Down arrow	Move to next item
Left arrow	Move to the item on the left hand side
Right arrow	Move to the item on the right hand side
Esc key	Main Menu – Quit and not save changes into CMOS Status Page Setup Menu and Option Page Setup Menu -- Exit current page and return to Main Menu
Page Up key	Increase the numeric value or make changes
Page Dn key	Decrease the numeric value or make changes

Key	Function
F1 key	General help, only for Status Page Setup Menu and Option Page Setup Menu
F2 /F3 key	Change color from total 16 colors. F2 to select color forward.
F10 key	Save all the CMOS changes, only for Main Menu

Table 6-1: BIOS Navigation Keys

6.1.3 Getting Help

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

6.1.4 Unable to Reboot After Configuration Changes

If the computer cannot boot after changes to the system configuration is made, CMOS defaults. Use the jumper described in **Chapter 5**.

6.1.5 BIOS Menu Bar

The **menu bar** on top of the BIOS screen has the following main items:

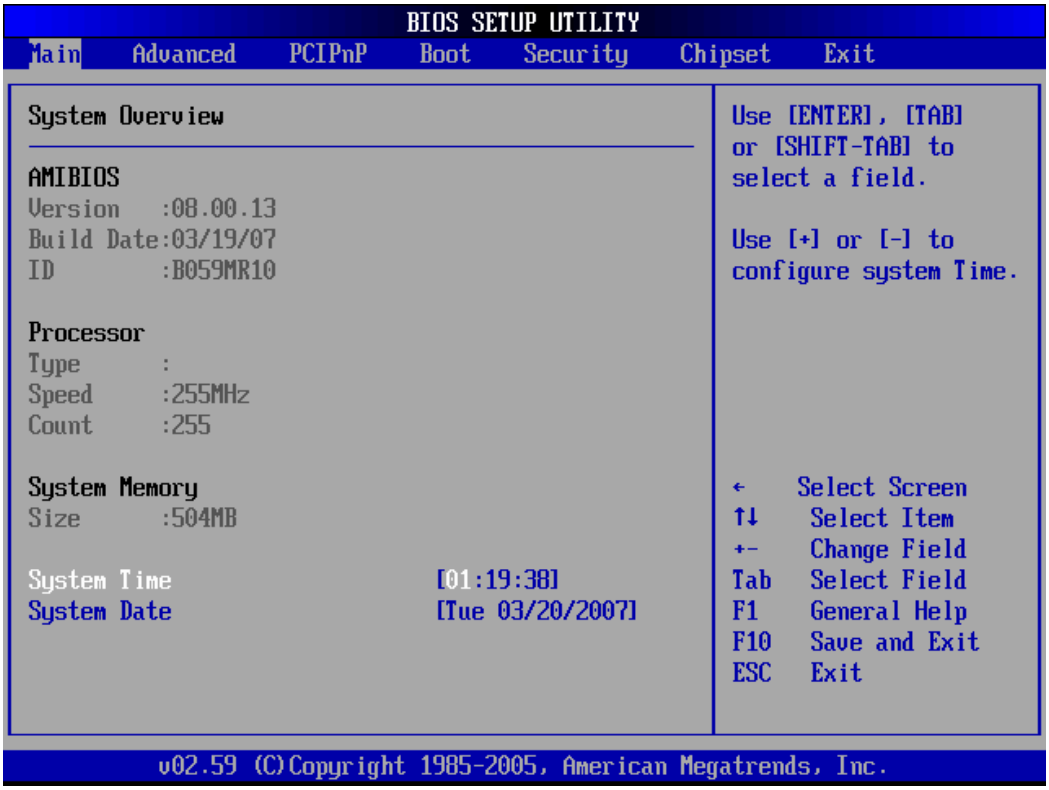
- **Main** Changes the basic system configuration.
- **Advanced** Changes the advanced system settings.
- **PCIPnP** Changes the advanced PCI/PnP Settings
- **Boot** Changes the system boot configuration.
- **Security** Sets User and Supervisor Passwords.
- **Chipset** Changes the chipset settings.
- **Power** Changes power management settings.
- **Exit** Selects exit options and loads default settings

The following sections completely describe the configuration options found in the menu items at the top of the BIOS screen and listed above.

6.2 Main

The **Main** BIOS menu (**BIOS Menu 1**) appears when the **BIOS Setup** program is entered.

The **Main** menu gives an overview of the basic system information.



BIOS Menu 1: Main

➔ System Overview

The **System Overview** lists a brief summary of different system components. The fields in **System Overview** cannot be changed. The items shown in the system overview include:

- **AMI BIOS**: Displays auto-detected BIOS information
  - **Version**: Current BIOS version
  - **Build Date**: Date the current BIOS version was made
  - **ID**: Installed BIOS ID
- **Processor**: Displays auto-detected CPU specifications
  - **Type**: Names the currently installed processor

- **Speed**: Lists the processor speed
- **Count**: The number of CPUs on the motherboard

- **System Memory**: Displays the auto-detected system memory.
  - **Size**: Lists memory size

The **System Overview** field also has two user configurable fields:

➔ **System Time [xx:xx:xx]**

Use the **System Time** option to set the system time. Manually enter the hours, minutes and seconds.

➔ **System Date [xx/xx/xx]**

Use the **System Date** option to set the system date. Manually enter the day, month and year.

6.3 Advanced

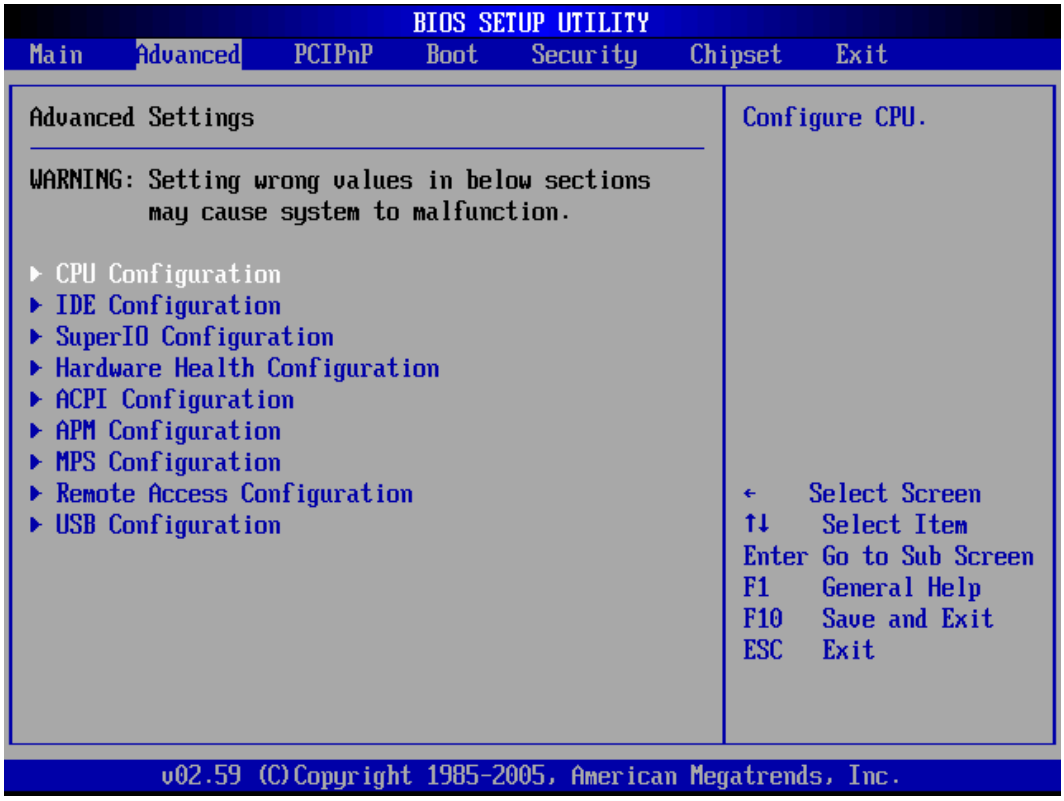
Use the **Advanced** menu (**BIOS Menu 2**) to configure the CPU and peripheral devices through the following sub-menus:

WARNING:

Setting the wrong values in the sections below may cause the system to malfunction. Make sure that the settings made are compatible with the hardware.

- **CPU Configuration** (see **Section 6.3.1**)
- **IDE Configuration** (see **Section 6.3.2**)
- **SuperIO Configuration** (see **Section 6.3.3**)
- **Hardware Health Configuration** (see **Section 6.3.4**)
- **ACPI Configuration** (see **Section 6.3.5**)
- **APM Configuration** (See **Section 6.3.6**)

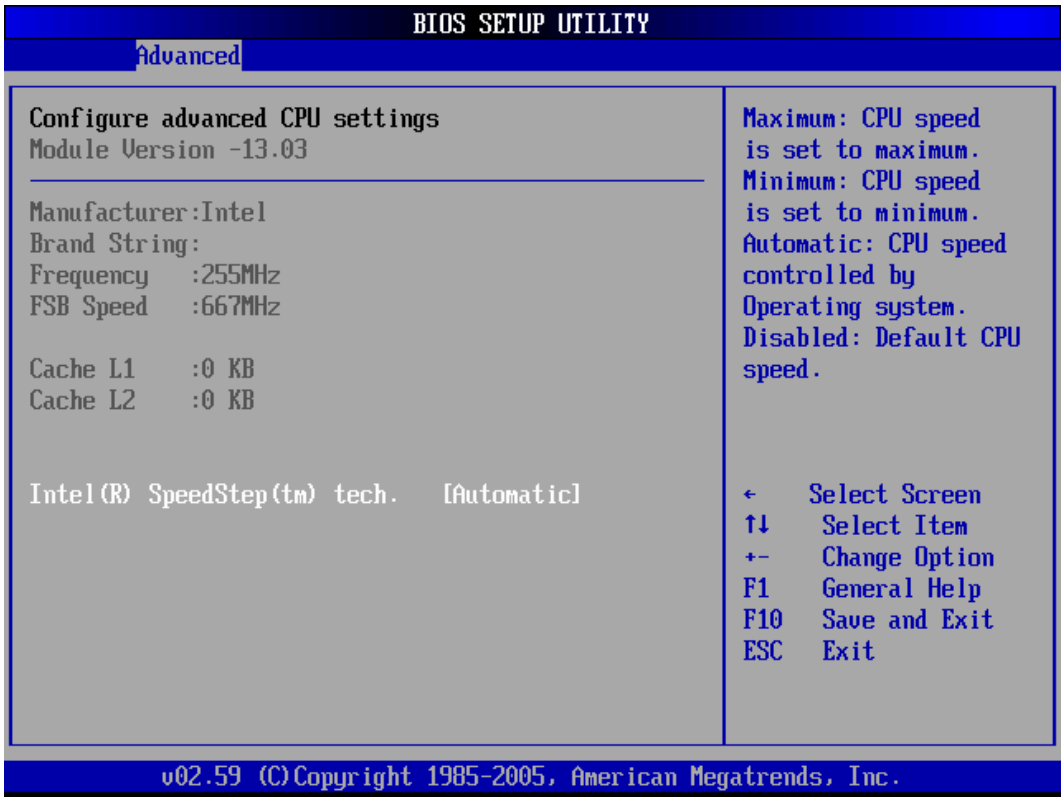
- **MPS Configuration** (see **Section 6.3.6**)
- **Remote Access Configuration** (see **Section 6.3.8**)
- **USB Configuration** (see **Section 6.3.8**)



BIOS Menu 2: Advanced

6.3.1 CPU Configuration

Use the CPU Configuration menu (BIOS Menu 3) to view detailed CPU specifications and configure the CPU.



BIOS Menu 3: CPU Configuration

The CPU Configuration menu (BIOS Menu 3) lists the following CPU details:

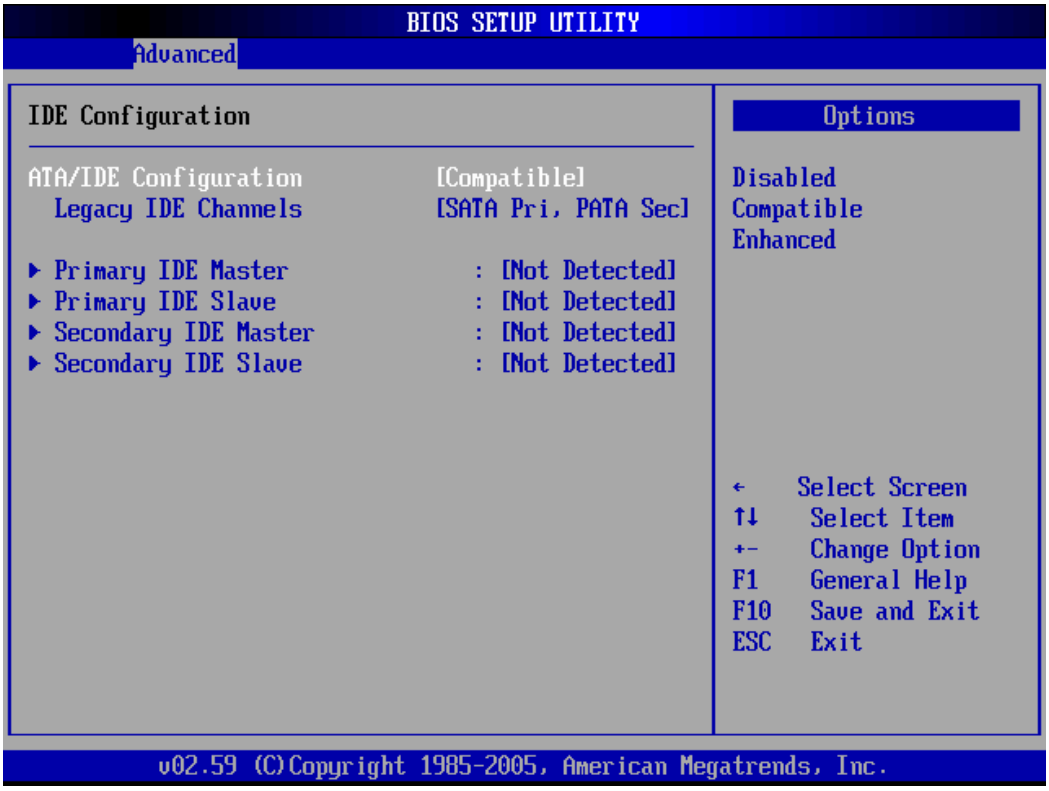
- **Manufacturer**: Lists the name of the CPU manufacturer
- **Brand String**: Lists the brand name of the CPU being used
- **Frequency:** Lists the CPU processing speed
- **FSB Speed**: Lists the FSB speed
- **Cache L1**: Lists the CPU L1 cache size
- **Cache L2**: Lists the CPU L2 cache size

The following **CPU Configuration** menu items can be configured.

- Intel ® SpeedStep ™ tech.

6.3.2 IDE Configuration

Use the **IDE Configuration** menu (**BIOS Menu 4**) to change and/or set the configuration of the IDE devices installed in the system.



BIOS Menu 4: IDE Configuration

➔ **ATA/IDE Configurations [Compatible]**

➔ **Disabled** Disables the on-board ATA/IDE controller.

➔ **Compatible** **DEFAULT** Configures the on-board ATA/IDE controller to be in compatible mode. In this mode, a SATA channel will replace one of the IDE channels. This mode supports up to 4 storage devices.

➔ **Enhanced** Configures the on-board ATA/IDE controller to be in Enhanced mode. In this mode, IDE channels and SATA

channels are separated. This mode supports up to 6 storage devices. Some legacy OS do not support this mode.

➔ **Legacy IDE Channels [SATA Pri, PATA Sec]**

➔ **SATA Only**		Enables SATA channels only.
➔ **SATA Pri., PATA Sec**	**DEFAULT**	Puts SATA channels before PATA channels.
➔ **PATA Only**		Enables PATA channels only.

➔ **IDE Master and IDE Slave**

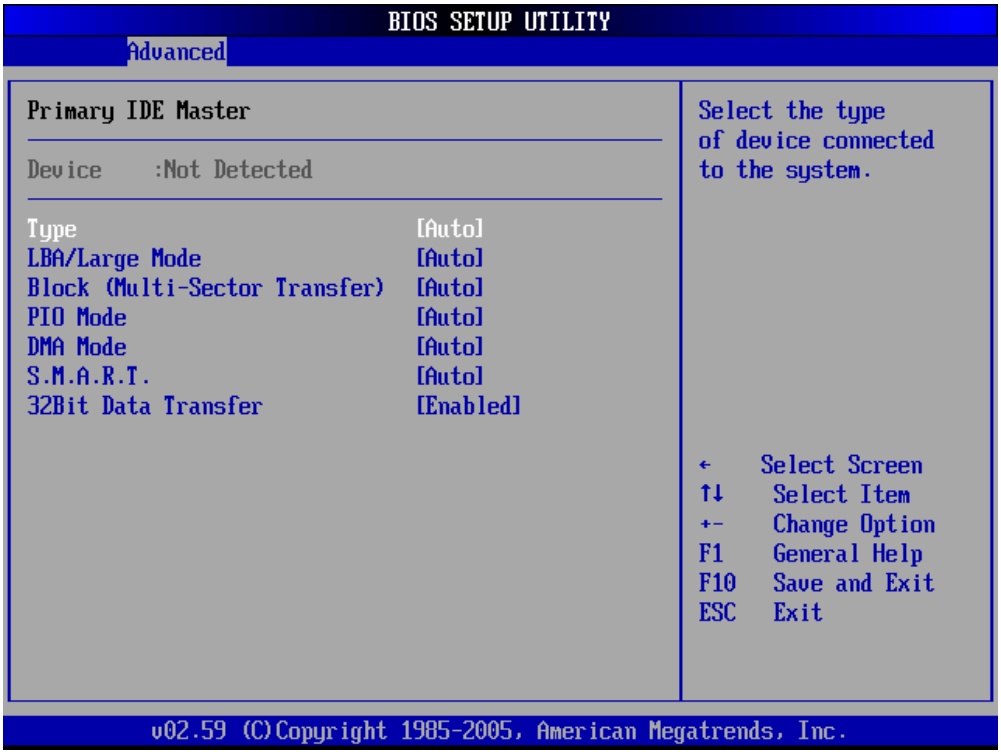
When entering setup, BIOS auto detects the presence of IDE devices. BIOS displays the status of the auto detected IDE devices. The following IDE devices are detected and are shown in the **IDE Configuration** menu:

- Primary IDE Master
- Primary IDE Slave
- Secondary IDE Master
- Secondary IDE Slave

The **IDE Configuration** menu (**BIOS Menu 4**) allows changes to the configurations for the IDE devices installed in the system. If an IDE device is detected, and one of the above listed four BIOS configuration options are selected, the IDE configuration options shown in **Section 6.3.2.1** appear.

6.3.2.1 IDE Master, IDE Slave

Use the **IDE Master** and **IDE Slave** configuration menu to view both primary and secondary IDE device details and configure the IDE devices connected to the system.



BIOS Menu 5: IDE Master and IDE Slave Configuration

➔ **Auto-Detected Drive Parameters**

The "grayed-out" items in the left frame are IDE disk drive parameters automatically detected from the firmware of the selected IDE disk drive. The drive parameters are listed as follows:

- **Device**: Lists the device type (e.g. hard disk, CD-ROM etc.)
- **Type**: Indicates the type of devices a user can manually select
- **LBA Mode**: Indicates whether the LBA (Logical Block Addressing) is a method of addressing data on a disk drive is supported or not.
- **Block Mode**: Block mode boosts IDE drive performance by increasing the amount of data transferred. Only 512 bytes of data can be transferred per interrupt if block mode is not used. Block mode allows transfers of up to 64 KB per interrupt.
- **PIO Mode**: Indicates the PIO mode of the installed device.
- **Async DMA**: Indicates the highest Asynchronous DMA Mode that is supported.

- **S.M.A.R.T.**: Indicates whether or not the Self-Monitoring Analysis and Reporting Technology protocol is supported.
- **32Bit Data Transfer**: Enables 32-bit data transfer.

➔ **Type [Auto]**

Use the **Type** BIOS option select the type of device the AMIBIOS attempts to boot from after the Power-On Self-Test (POST) is complete.

➔ **Not Installed** BIOS is prevented from searching for an IDE disk drive on the specified channel.

➔ **Auto** **DEFAULT** The BIOS auto detects the IDE disk drive type attached to the specified channel. This setting should be used if an IDE hard disk drive is attached to the specified channel.

➔ **CD/DVD** The CD/DVD option specifies that an IDE CD-ROM drive is attached to the specified IDE channel. The BIOS does not attempt to search for other types of IDE disk drives on the specified channel.

➔ **ARMD** This option specifies an ATAPI Removable Media Device. These include, but are not limited to:

- ➔ **ZIP**
- ➔ **LS-120**

➔ **LBA/Large Mode [Auto]**

Use the **LBA/Large Mode** option to disable or enable BIOS to auto detects LBA (Logical Block Addressing). LBA is a method of addressing data on a disk drive. In LBA mode, the maximum drive capacity is 137 GB.

➔ **Disabled** BIOS is prevented from using the LBA mode control on the specified channel.

➔ **Auto** **DEFAULT** BIOS auto detects the LBA mode control on the specified channel.

➔ **Block (Multi Sector Transfer) [Auto]**

Use the **Block (Multi Sector Transfer)** to disable or enable BIOS to auto detect if the device supports multi-sector transfers.

➔ **Disabled** BIOS is prevented from using Multi-Sector Transfer on the specified channel. The data to and from the device occurs one sector at a time.

➔ **Auto** **DEFAULT** BIOS auto detects Multi-Sector Transfer support on the drive on the specified channel. If supported the data transfer to and from the device occurs multiple sectors at a time.

➔ **PIO Mode [Auto]**

Use the **PIO Mode** option to select the IDE PIO (Programmable I/O) mode program timing cycles between the IDE drive and the programmable IDE controller. As the PIO mode increases, the cycle time decreases.

➔ **Auto** **DEFAULT** BIOS auto detects the PIO mode. Use this value if the IDE disk drive support cannot be determined.

➔ **0** PIO mode 0 selected with a maximum transfer rate of 3.3MBps

➔ **1** PIO mode 1 selected with a maximum transfer rate of 5.2MBps

➔ **2** PIO mode 2 selected with a maximum transfer rate of 8.3MBps

➔ **3** PIO mode 3 selected with a maximum transfer rate of 11.1MBps

➔ **4**		PIO mode 4 selected with a maximum transfer rate of 16.6MBps (This setting generally works with all hard disk drives manufactured after 1999. For other disk drives, such as IDE CD-ROM drives, check the specifications of the drive.)

➔ **DMA Mode [Auto]**

Use the **DMA Mode** BIOS selection to adjust the DMA mode options.

➔ **Auto**	**DEFAULT**	BIOS auto detects the DMA mode. Use this value if the IDE disk drive support cannot be determined.
➔ **SWDMA0**		Single Word DMA mode 0 selected with a maximum data transfer rate of 2.1MBps
➔ **SWDMA1**		Single Word DMA mode 1 selected with a maximum data transfer rate of 4.2MBps
➔ **SWDMA2**		Single Word DMA mode 2 selected with a maximum data transfer rate of 8.3MBps
➔ **MWDMA0**		Multi Word DMA mode 0 selected with a maximum data transfer rate of 4.2MBps
➔ **MWDMA1**		Multi Word DMA mode 1 selected with a maximum data transfer rate of 13.3MBps
➔ **MWDMA2**		Multi Word DMA mode 2 selected with a maximum data transfer rate of 16.6MBps
➔ **UDMA1**		Ultra DMA mode 0 selected with a maximum data transfer rate of 16.6MBps
➔ **UDMA1**		Ultra DMA mode 1 selected with a maximum data transfer rate of 25MBps

- **UDMA2** Ultra DMA mode 2 selected with a maximum data transfer rate of 33.3MBps
- **UDMA3** Ultra DMA mode 3 selected with a maximum data transfer rate of 44MBps (To use this mode, it is required that an 80-conductor ATA cable is used.)
- **UDMA4** Ultra DMA mode 4 selected with a maximum data transfer rate of 66.6MBps (To use this mode, it is required that an 80-conductor ATA cable is used.)
- **UDMA5** Ultra DMA mode 5 selected with a maximum data transfer rate of 99.9MBps (To use this mode, it is required that an 80-conductor ATA cable is used.)

➔ **S.M.A.R.T [Auto]**

Use the **S.M.A.R.T** option to auto-detect, disable or enable Self-Monitoring Analysis and Reporting Technology (SMART) on the drive on the specified channel. **S.M.A.R.T** predicts impending drive failures. The **S.M.A.R.T** BIOS option enables or disables this function.

- **Auto** **DEFAULT** BIOS auto detects HDD SMART support.
- **Disabled** Prevents BIOS from using the HDD SMART feature.
- **Enabled** Allows BIOS to use the HDD SMART feature

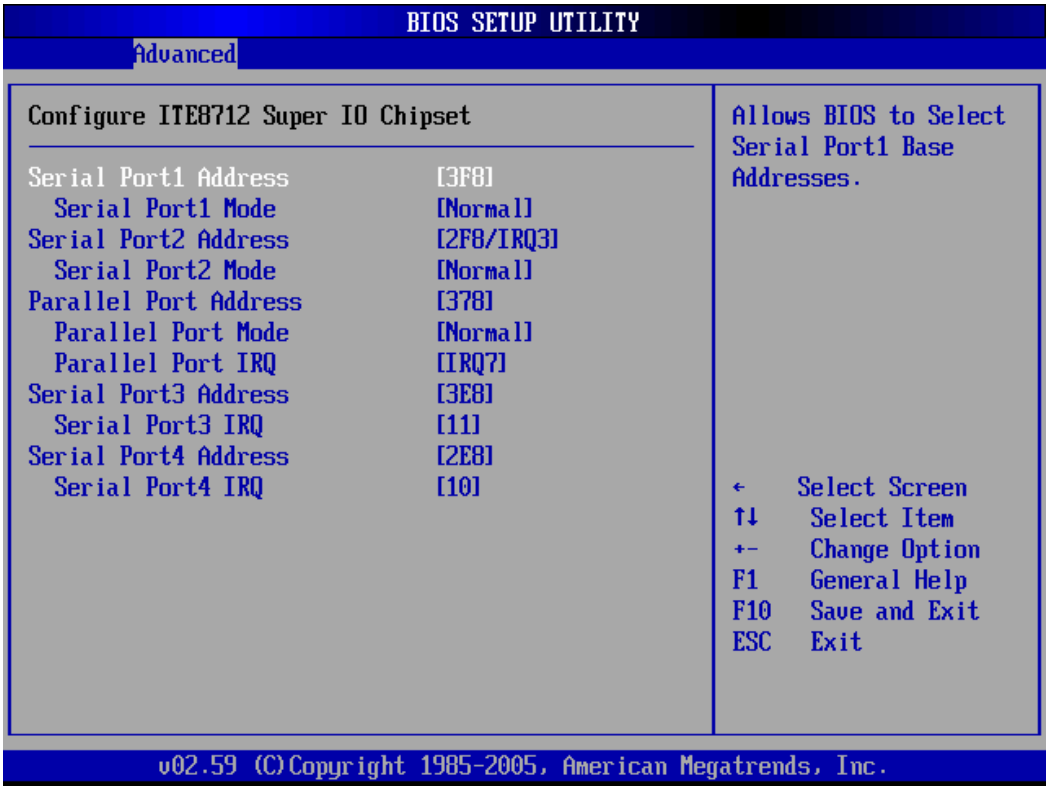
➔ **32Bit Data Transfer [Enabled]**

Use the **32Bit Data Transfer** BIOS option to enables or disable 32-bit data transfers.

- **Disabled** Prevents the BIOS from using 32-bit data transfers.
- **Enabled** **DEFAULT** Allows BIOS to use 32-bit data transfers on supported hard disk drives.

6.3.3 Super IO Configuration

Use the **Super IO Configuration** menu (**BIOS Menu 6**) to set or change the configurations for the FDD controllers, parallel ports and serial ports.



BIOS Menu 6: Super IO Configuration

➔ **Serial Port1 Address [3F8]**

Use the **Serial Port1 Address** option to select the Serial Port 1 base address.

➔ **Disabled**		No base address is assigned to Serial Port 1
➔ **3F8**	**DEFAULT**	Serial Port 1 I/O port address is 3F8
➔ **3E8**		Serial Port 1 I/O port address is 3E8
➔ **2E8**		Serial Port 1 I/O port address is 2E8

➔ **Serial Port1 Mode [Normal]**

Use the **Serial Port1 Mode** option to select the transmitting and receiving mode for the first serial port.

➔ **Normal**	**DEFAULT**	Serial Port 1 mode is normal
➔ **ASK IR**		Serial Port 1 mode is ASK IR

➔ **Serial Port2 Address [2F8/IRQ3]**

Use the **Serial Port2 Address** option to select the Serial Port 2 base address.

➔ **Disabled**		No base address is assigned to Serial Port 2
➔ **2F8/IRQ3**	**DEFAULT**	Serial Port 2 I/O port address is 3F8 and the interrupt address is IRQ3
➔ **3E8/IRQ4**		Serial Port 2 I/O port address is 3E8 and the interrupt address is IRQ4
➔ **2E8/IRQ3**		Serial Port 2 I/O port address is 2E8 and the interrupt address is IRQ3

➔ **Serial Port2 Mode [Normal]**

Use the **Serial Port2 Mode** option to select the Serial Port2 operational mode.

➔ **Normal**	**DEFAULT**	Serial Port 2 mode is normal
➔ **IrDA**		Serial Port 2 mode is IrDA
➔ **ASK IR**		Serial Port 2 mode is ASK IR

➔ **Parallel Port Address [Disabled]**

Use the **Parallel Port Address** option to select the parallel port base address.

- **Disabled** **DEFAULT** No base address is assigned to the Parallel Port
- **378** Parallel Port I/O port address is 378
- **278** Parallel Port I/O port address is 278
- **3BC** Parallel Port I/O port address is 3BC

➔ **Parallel Port Mode [Normal]**

Use the **Parallel Port Mode** option to select the mode the parallel port operates in.

- **Normal** **DEFAULT** The normal parallel port mode is the standard mode for parallel port operation.
- **Bi-directional** Parallel port outputs are 8-bits long. Inputs are accomplished by reading 4 of the 8 bits on the status register.
- **EPP** The parallel port operates in the enhanced parallel port mode (EPP). The EPP mode supports bi-directional communication between the system and the parallel port device and the transmission rates between the two are much faster than the Normal mode.
- **ECP+EPP** The parallel port operates in the extended capabilities port (ECP) mode. The ECP mode supports bi-directional communication between the system and the parallel port device and the transmission rates between the two are much faster than the Normal mode

  The parallel port is also be compatible with EPP devices described above

➔ **Parallel Port IRQ [IRQ7]**

Use the **Parallel Port IRQ** option to set the parallel port interrupt address.

➔ **IRQ5**		IRQ5 is assigned as the parallel port interrupt address
➔ **IRQ7**	**DEFAULT**	IRQ7 is assigned as the parallel port interrupt address

➔ **Serial Port3 Address [3E8]**

Use the **Serial Port3 Address** option to select the base addresses for serial port 3

➔ **Disabled**		No base address is assigned to serial port 3
➔ **3F8**		Serial port 3 I/O port address is 3F8
➔ **2F8**		Serial port 3 I/O port address is 2F8
➔ **3E8**	**DEFAULT**	Serial port 3 I/O port address is 3E8
➔ **2E8**		Serial port 3 I/O port address is 2E8
➔ **2F0**		Serial port 3 I/O port address is 2F0
➔ **2E0**		Serial port 3 I/O port address is 2E0

➔ **Serial Port3 IRQ [11]**

Use the **Serial Port3 IRQ** option to select the interrupt address for serial port 3.

➔ **4**		Serial port 3 IRQ address is 4
➔ **9**		Serial port 3 IRQ address is 9
➔ **10**		Serial port 3 IRQ address is 10
➔ **11**	**DEFAULT**	Serial port 3 IRQ address is 11

➔ **Serial Port4 Address [2E8]**

Use the **Serial Port4 IRQ** option to select the interrupt address for serial port 4.

➔ **Disabled**		No base address is assigned to serial port 4
➔ **3F8**		Serial port 3 I/O port address is 3F8
➔ **2F8**		Serial port 3 I/O port address is 2F8
➔ **3E8**		Serial port 3 I/O port address is 3E8
➔ **2E8**	**DEFAULT**	Serial port 3 I/O port address is 2E8
➔ **2F0**		Serial port 3 I/O port address is 2F0
➔ **2E0**		Serial port 3 I/O port address is 2E0

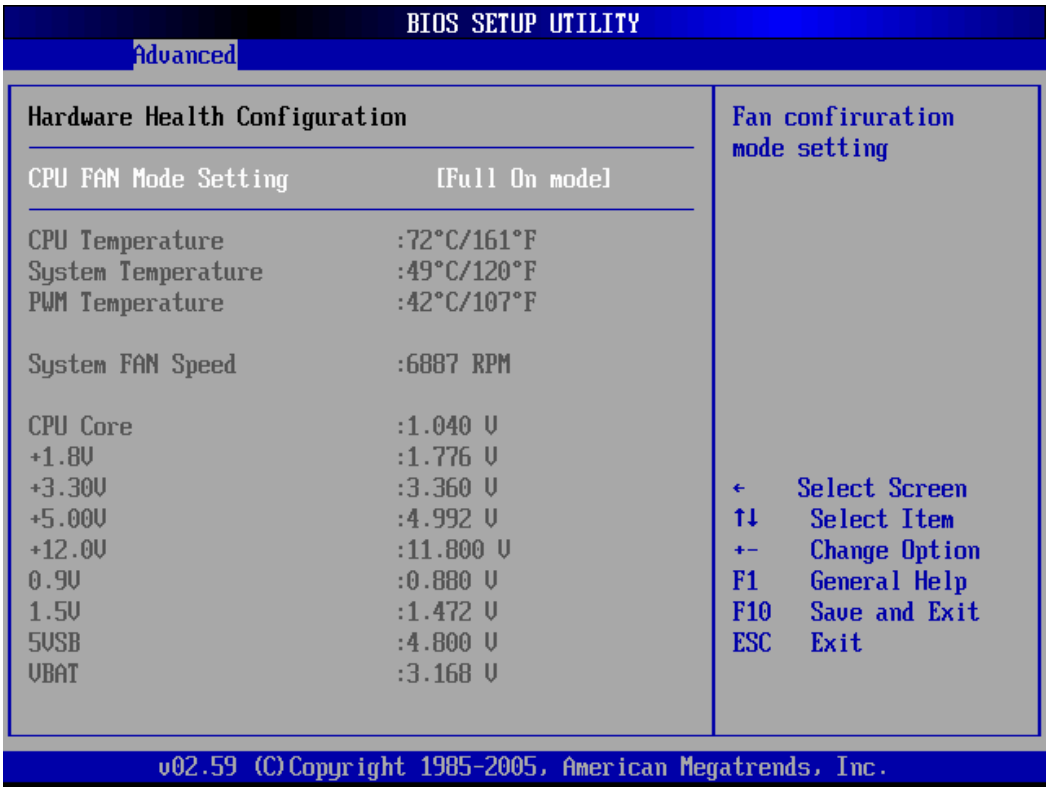
➔ **Serial Port4 IRQ [10]**

Use the **Serial Port4 IRQ** option to select the interrupt address for serial port 4.

➔ **3**	**DEFAULT**	Serial port 4 IRQ address is 3
➔ **9**		Serial port 4 IRQ address is 9
➔ **10**	**DEFAULT**	Serial port 4 IRQ address is 10
➔ **11**		Serial port 4 IRQ address is 11

6.3.4 Hardware Health Configuration

The **Hardware Health Configuration** menu (**BIOS Menu 7**) shows the operating temperature, fan speeds and system voltages.



BIOS Menu 7: Hardware Health Configuration

➔ **CPU FAN Mode Setting [Full On Mode]**

Use the **CPU FAN Mode Setting** option to configure the second fan.

➔ **Full On Mode**	**DEFAULT**	Fan is on all the time
➔ **Automatic mode**		Fan is off when the temperature is low enough. Parameters must be set by the user.
➔ **PWM Manual mode**		Pulse width modulation set manually

When the **CPU FAN Mode Setting** option is in the **Automatic Mode**, the following parameters can be set.

- CPU Temp. Limit of OFF

- CPU Temp. Limit of Start
- CPU Temp. Limit of Full
- CPU Fan Start PWM
- Slope PWM 1

When the **CPU FAN Mode Setting** option is in the **PWM Manual Mode**, the following parameters can be set.

- CPU Fan PWM control

➔ **CPU Temp. Limit of OFF [000]**

WARNING:

Setting this value too high may cause the fan to stop when the CPU is at a high temperature and therefore cause the system to be damaged.

The **CPU Temp. Limit of OFF** option can only be set if the **CPU FAN Mode Setting** option is set to **Automatic Mode**. Use the **CPU Temp. Limit of OFF** option to select the CPU temperature at which the cooling fan should automatically turn off. To select a value, select the **CPU Temp. Limit of OFF** option and enter a decimal number between 000 and 127. The temperature range is specified below.

- **Minimum Value**: 0°C
- **Maximum Value**: 127°C

➔ **CPU Temp. Limit of Start [020]**

WARNING:

Setting this value too high may cause the fan to start only when the CPU is at a high temperature and therefore cause the system to be

damaged.

The **CPU Temp. Limit of Start** option can only be set if the **CPU FAN Mode Setting** option is set to **Automatic Mode**. Use the **CPU Temp. Limit of Start** option to select the CPU temperature at which the cooling fan should automatically turn on. When the fan starts, it rotates using the starting pulse width modulation (PWM) specified in the **Fan 3 Start PWM** option below. To select a value, select the **CPU Temp. Limit of Start** option and enter a decimal number between 000 and 127. The temperature range is specified below.

- **Minimum Value**: 0°C
- **Maximum Value**: 127°C

➔ **CPU Temp. Limit of Full [080]**

WARNING:

Setting this value too high may cause the fan to start rotating at full speed only when the CPU is at a high temperature and therefore cause the system to be damaged.

The **CPU Temp. Limit of Full** option can only be set if the **CPU FAN Mode Setting** option is set to **Automatic Mode**. Use the **CPU Temp. Limit of Full** option to select the CPU temperature at which the cooling fan starts to rotate at full speed. When the CPU temperature exceeds the temperature specified in this option, the fan starts to rotate at full speed. To select a value, select the **CPU Temp. Limit of Full** option and enter a decimal number between 000 and 127. The temperature range is specified below.

- **Minimum Value**: 0°C
- **Maximum Value**: 127°C

➔ **CPU Fan Start PWM [070]**

The **CPU Fan Start PWM** option can only be set if the **CPU FAN Mode Setting** option is set to **Automatic Mode**. Use the **CPU Fan Start PWM** option to select the PWM mode the fan starts to rotate with after the temperature specified in the **CPU Temp. Limit of Start** is exceeded. The Super I/O chipset supports 128 PWM modes. To select a value, select the **CPU Fan Start PWM** option and enter a decimal number between 000 and 127. The temperature range is specified below.

- **PWM Minimum Mode**: 0
- **PWM Maximum Mode**: 127

➔ **Slope PWM 1 [2 PWM]**

The **Slope PWM 1** option can only be set if the **CPU FAN Mode Setting** option is set to **Automatic Mode**. Use the **Slope PWM 1** option to select the linear rate at which the PWM mode increases with respect to an increase in temperature. A list of available options is shown below:

- 0 PWM
- 1 PWM
- 2 PWM
- 4 PWM
- 8 PWM
- 16 PWM
- 32 PWM
- 64 PWM

➔ **Hardware Health Monitoring**

Use the **Hardware Health Configuration** menu (**BIOS Menu 7**) monitor system environmental parameters. The following health parameters are monitored.

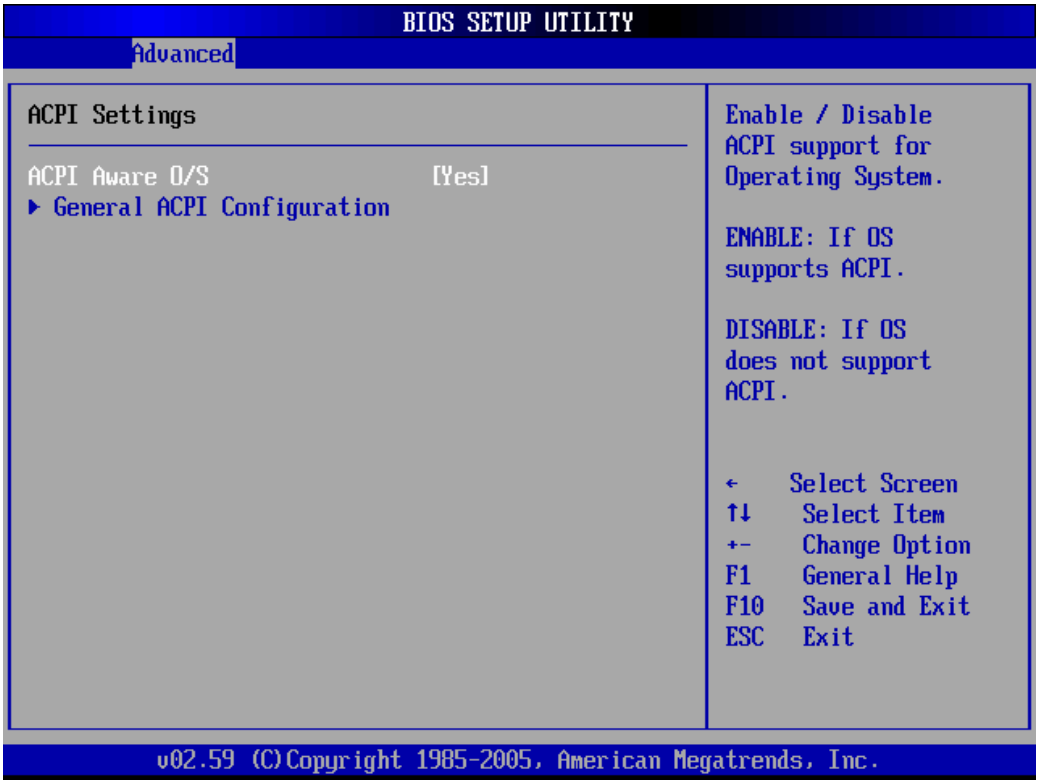
- **Temperature monitoring:** The following system temperatures are monitored:
  - CPU Temperature
  - System Temperature
  - PWM Temperature

- **Fan Speed Monitoring:** The following system fan speeds are monitored:
  - System FAN Speed

- **Voltage Monitoring:** The following system voltages are monitored:
  - CPU cCore
  - +1.8V
  - +3.30V
  - +5.00V
  - +12.0V
  - 0.9V
  - 1.5V
  - 5VSB
  - VBAT

6.3.5 ACPI Configuration

The **ACPI Configuration** menu (**BIOS Menu 8**) configures the Advanced Configuration and Power Interface (ACPI) and Power Management (APM) options.



BIOS Menu 8: ACPI Configuration

➔ **ACPI Aware O/S [Yes]**

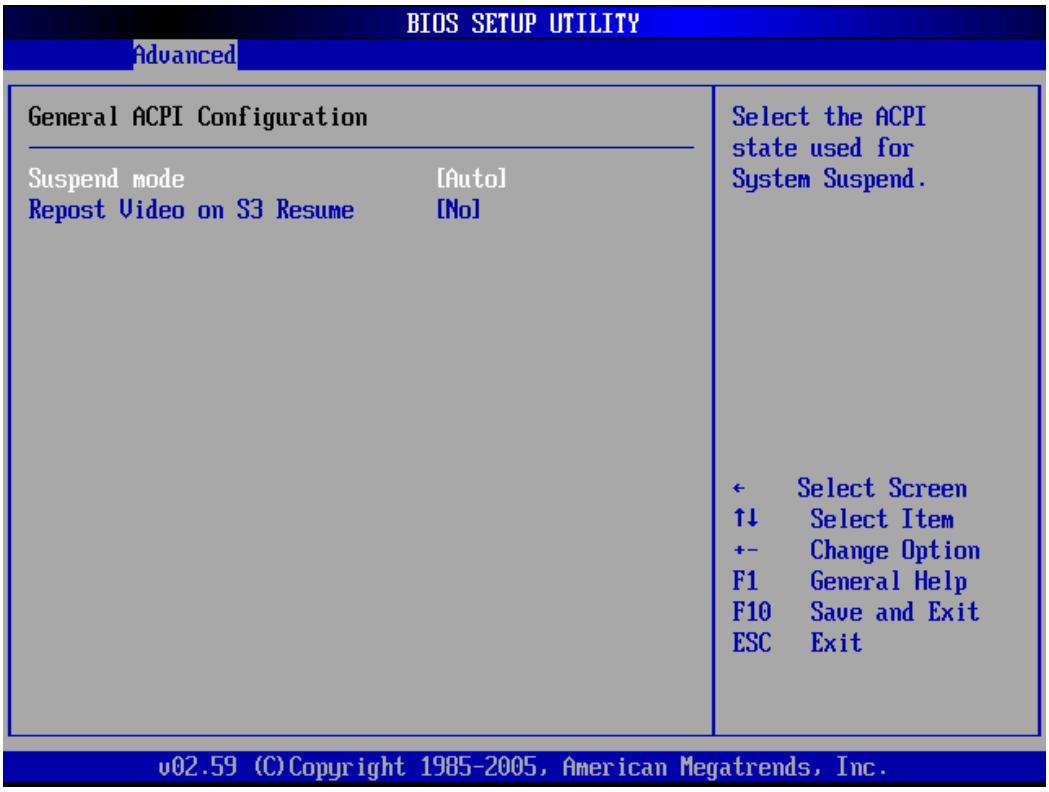
Use the **ACPI Aware O/S** option to enable the system to configure ACPI power saving options. ACPI can only be implemented if the system OS complies with the ACPI standard. Windows 98, Windows 2000, and Windows XP all comply with ACPI.

➔ **No** Disables the ACPI support for the OS. This selection should be disabled if the OS does not support ACPI

➔ **Yes** **DEFAULT** Enables the ACPI support for the operating system. This selection should be enabled if the OS does support ACPI

6.3.5.1 General ACPI Configuration

Use the General ACPI Configuration menu (BIOS Menu 9) to select the ACPI state when the system is suspended.



BIOS Menu 9: General ACPI Configuration [Advanced\ ACPI Configuration]

➔ **Suspend Mode [Auto]**

Use the **Suspend Mode** option to specify the sleep state the system enters when it is not being used.

➔ **S1 (POS)** The system enters S1(POS) sleep state. The system appears off. The CPU is stopped; RAM is refreshed; the system is running in a low power mode.

➔ **S3 (STR)** The system enters a S3(STR) sleep state. The CPU has no power; RAM is in slow refresh; the power supply is in a reduced power mode.

➔ **Auto** **DEFAULT** The BIOS automatically selects a sleep state for the system.

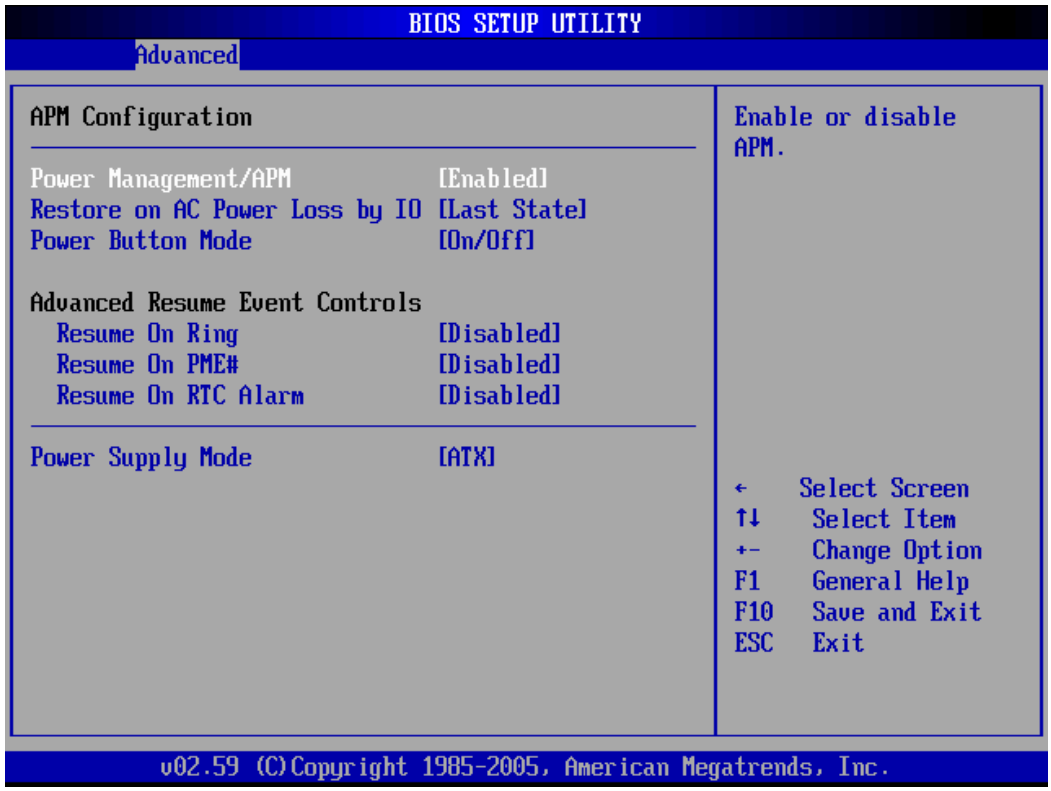
➔ **Repost Video on S3 Resume [No]**

Use the **Repost Video on S3 Resume** to determine whether the VGA BIOS post will be invoked after the system is roused from an S3 (STR) suspend state.

➔	**No**	**DEFAULT**	The VGA BIOS post is not invoked
➔	**Yes**		The VGA BIOS post is invoked

6.3.6 APM Configuration

The APM Configuration menu (BIOS Menu 10) allows the advanced power management options to be configured.



BIOS Menu 10:Advanced Power Management Configuration

➔ **Power Management/APM [Enabled]**

Use the **Power Management/APM** BIOS option to enable access to the advanced power management features. If this option is disabled, the only other option on the screen is the **Power Button Mode**.

➔ **Disabled**		Disables the Advanced Power Management (APM) feature
➔ **Enabled**	**DEFAULT**	Enables the APM feature

➔ **Restore on AC Power Loss by IO [Last State]**

Use the **Restore on AC Power Loss by IO** BIOS option to specify what state the system returns to if there is a sudden loss of power to the system.

➔ **Power Off**		The system remains turned off
➔ **Power On**		The system turns on
➔ **Last State**	**DEFAULT**	The system returns to its previous state. If it was on, it turns itself on. If it was off, it remains off.

➔ **Power Button Mode [On/Off]**

Use the **Power Button Mode** BIOS to specify how the power button functions.

➔ **On/Off**	**DEFAULT**	When the power button is pressed the system is either turned on or off
➔ **Suspend**		When the power button is pressed the system goes into suspend mode

➔ **Resume on Ring [Disabled]**

Use the **Resume on Ring** BIOS option to enable activity on the RI (ring in) modem line to rouse the system from a suspend or standby state. That is, the system will be roused by an incoming call on a modem.

➔ **Disabled**	**DEFAULT**	Wake event not generated by an incoming call
➔ **Enabled**		Wake event generated by an incoming call

➔ **Resume on PME# [Disabled]**

Use the **Resume on PME#** BIOS option to enable activity on the PCI PME (power management event) controller to rouse the system from a suspend or standby state.

➔ **Disabled**	**DEFAULT**	Wake event not generated by PCI PME controller activity
➔ **Enabled**		Wake event generated by PCI PME controller activity

➔ **Resume On RTC Alarm [Disabled]**

Use the **Resume On RTC Alarm** option to specify the time the system should be roused from a suspended state.

➔ **Disabled**	**DEFAULT**	The real time clock (RTC) cannot generate a wake event
➔ **Enabled**		If selected, the following appears with values that can be selected: ➔ **RTC Alarm Date (Days)** ➔ **System Time** After setting the alarm, the computer turns itself on

from a suspend state when the alarm goes off.

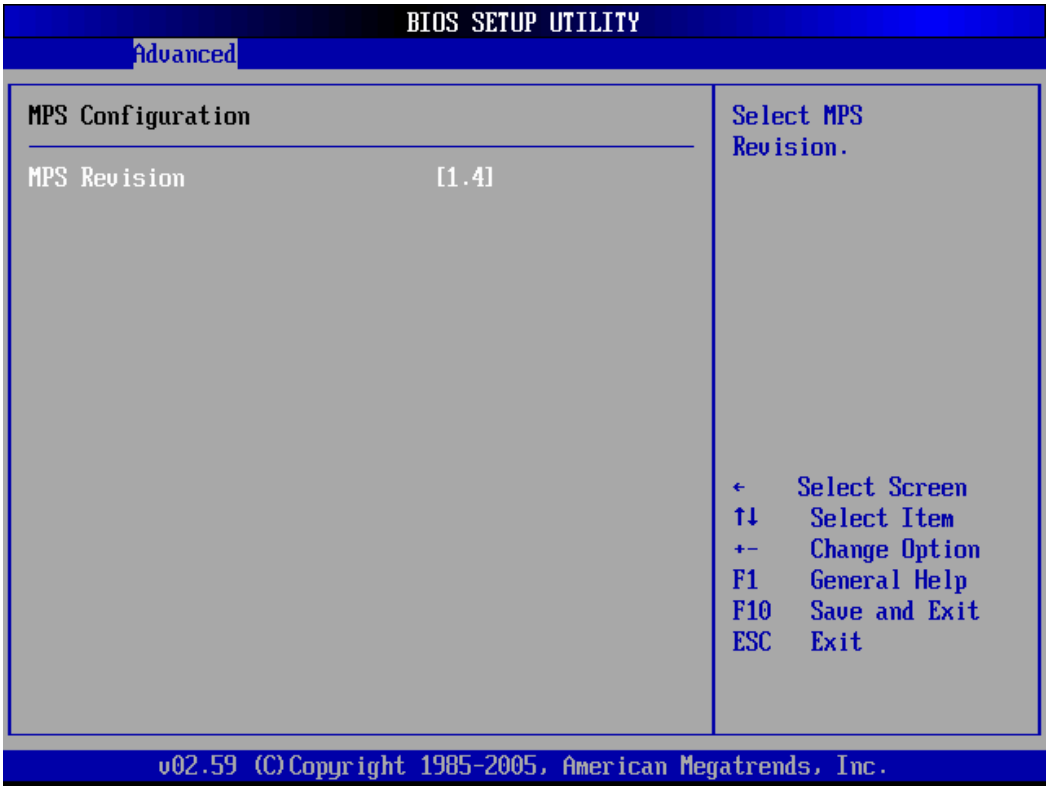
➔ **Power Supply Mode [ATX]**

Use the **Power Supply Mode** BIOS option to select the power supply that is connected to the system.

➔	**AT**		An AT power supply is connected to the system
➔	**ATX**	**DEFAULT**	An ATX power supply is connected to the system

6.3.7 MPS Configuration

Use the MPS Configuration menu (BIOS Menu 11) to select `he multi-processor table.



BIOS Menu 11: MPS Configuration

➔ **MPS Revision [1.4]**

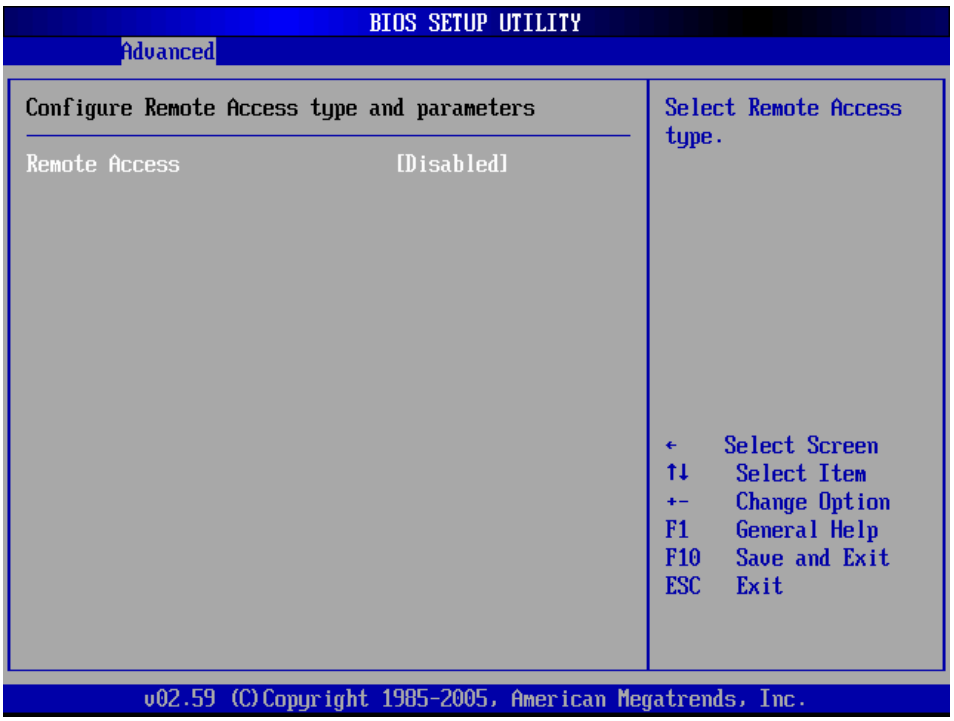
Use the **Multiprocessor Specification (MPS) for OS** option to specify the MPS version to be used.

➔ **1.1** MPS version 1.1 is used

➔ **1.4 DEFAULT** MPS version 1.4 is used

6.3.8 Remote Access Configuration

Use the **Remote Access Configuration** menu (**BIOS Menu 12**) to configure remote access parameters. The **Remote Access Configuration** is an AMIBIOS feature and allows a remote host running a terminal program to display and configure the BIOS settings.



BIOS Menu 12: Remote Access Configuration [Advanced]

➔ **Remote Access [Disabled]**

Use the **Remote Access** option to enable or disable access to the remote functionalities of the system.

➔ **Disabled**	**DEFAULT**	Remote access is disabled.
➔ **Enabled**		Remote access configuration options shown below appear:

- ➔ **Serial Port Number**
- ➔ **Serial Port Mode**
- ➔ **Flow Control**
- ➔ **Redirection after BIOS POST**
- ➔ **Terminal Type**
- ➔ **VT-UTF8 Combo Key Support**

These configuration options are discussed below.

➔ **Serial Port Number [COM1]**

Use the **Serial Port Number** option allows to select the serial port used for remote access.

➔ **COM1**	**DEFAULT**	System is remotely accessed through COM1
➔ **COM2**		System is remotely accessed through COM2
➔ **COM3**		System is remotely accessed through COM3
➔ **COM4**		System is remotely accessed through COM4

NOTE: Make sure the selected COM port is enabled through the Super I/O configuration menu.

➔ **Base Address, IRQ [3E8h,4]**

The **Base Address, IRQ** option cannot be configured and only shows the interrupt address of the serial port listed above.

➔ **Serial Port Mode [115200 8,n,1]**

Use the **Serial Port Mode** option to select baud rate through which the console redirection is made. The following configuration options are available

- 115200 8,n,1 **DEFAULT**
- 57600 8,n,1
- 38400 8,n,1
- 19200 8,n,1
- 09600 8,n,1

NOTE:

Identical baud rate setting musts be set on the host (a management computer running a terminal software) and the slave

➔ **Flow Control [None]**

Use the **Flow Control** option to report the flow control method for the console redirection application.

➔	**None**	**DEFAULT**	No control flow,
➔	**Hardware**		Hardware is set as the console redirection
➔	**Software**		Software is set as the console redirection

➔ **Redirection After BIOS POST [Always]**

Use the **Redirection After BIOS POST** option to specify when console redirection should occur.

➔ **Disabled**		The console is not redirected after POST
➔ **Boot Loader**		Redirection is active during POST and during Boot Loader
➔ **Always**	**DEFAULT**	Redirection is always active (Some OSes may not work if set to Always)

➔ **Terminal Type [ANSI]**

Use the **Terminal Type** BIOS option to specify the remote terminal type.

➔ **ANSI**	**DEFAULT**	The target terminal type is ANSI
➔ **VT100**		The target terminal type is VT100
➔ **VT-UTF8**		The target terminal type is VT-UTF8

➔ **VT-UTF8 Combo Key Support [Disabled]**

Use the **VT-UFT8 Combo Key Support** option to enable additional keys that are not provided by VT100 for the PC 101 keyboard.

The VT100 Terminal Definition is the standard convention used to configure and conduct emergency management tasks with UNIX-based servers. VT100 does not support all keys on the standard PC 101-key layout, however. The VT-UTF8 convention makes available additional keys that are not provided by VT100 for the PC 101 keyboard.

➔ **Disabled**	**DEFAULT**	Disables the VT-UTF8 terminal keys
➔ **Enabled**		Enables the VT-UTF8 combination key. Support for ANSI/VT100 terminals

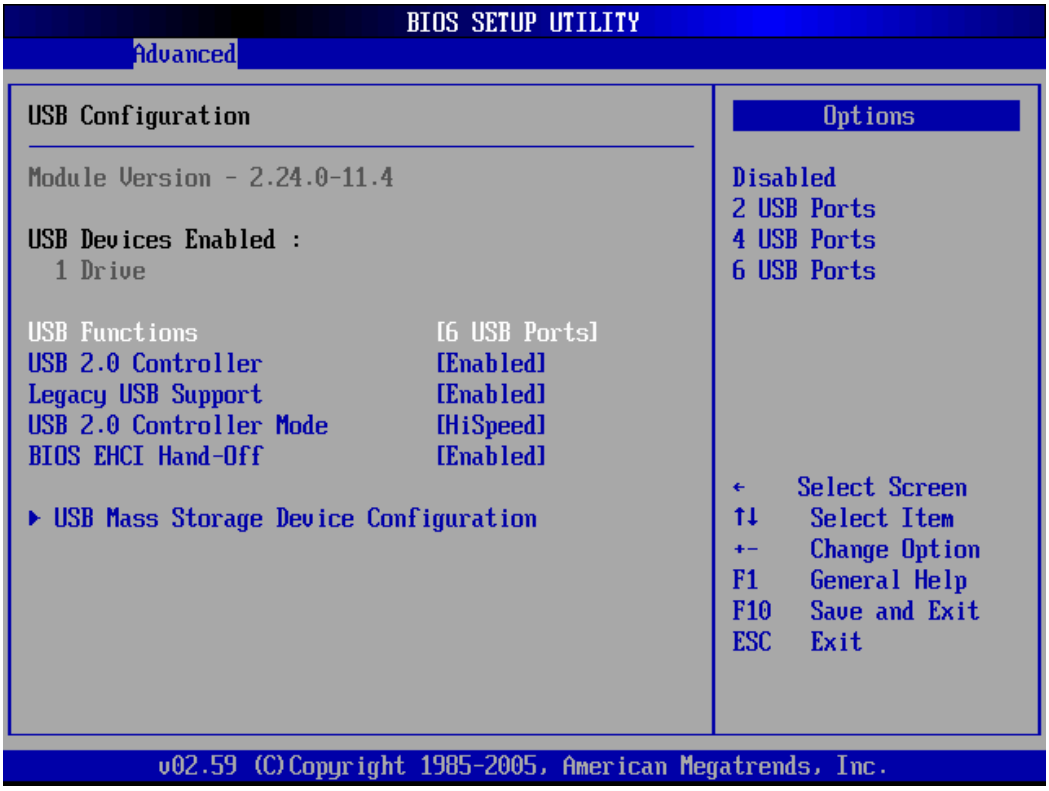
➔ **Sredir Memory Display Delay [Disabled]**

Use the **Sredir Memory Display Delay** option to select the delay before memory information is displayed. Configuration options are listed below

- No Delay **DEFAULT**
- Delay 1 sec
- Delay 2 sec
- Delay 4 sec

6.3.9 USB Configuration

Use the **USB Configuration** menu (**BIOS Menu 13**) to read USB configuration information and configure the USB settings.



BIOS Menu 13: USB Configuration

➔ **USB Function [6 USB ports]**

Use the **USB Function** BIOS option to enable or disable a specified number of USB ports. If only two USB ports are being used, disabling the remaining six USB frees up system resources that can be redirected elsewehere.

➔ **Disabled**		USB function support disabled
➔ **2 USB Ports**		Two USB ports are enabled
➔ **4 USB Ports**		Four USB ports are enabled
➔ **6 USB Ports**	**DEFAULT**	Six USB ports are enabled

➔ **USB 2.0 Controller [Enabled]**

Use the **USB 2.0 Controller** BIOS option to enable or disable the USB 2.0 controller

➔ **Disabled**		USB 2.0 controller disabled
➔ **Enabled**	**DEFAULT**	USB 2.0 controller enabled

➔ **Legacy USB Support [Enabled]**

Use the **Legacy USB Support** BIOS option to enable USB mouse and USB keyboard support.

Normally if this option is not enabled, any attached USB mouse or USB keyboard does not become available until a USB compatible operating system is fully booted with all USB drivers loaded. When this option is enabled, any attached USB mouse or USB keyboard can control the system even when there is no USB driver loaded onto the system.

➔ **Disabled**		Legacy USB support disabled
➔ **Enabled**	**DEFAULT**	Legacy USB support enabled
➔ **Auto**		Legacy USB support disabled if no USB devices are connected

➔ **USB2.0 Controller Mode [HiSpeed]**

Use the **USB2.0 Controller Mode** option to set the speed of the USB2.0 controller.

➔ **FullSpeed**	The controller is capable of operating at 12Mb/s

➔ **HiSpeed** **DEFAULT** The controller is capable of operating at 480Mb/s

➔ **BIOS EHCI Handoff [Enabled]**

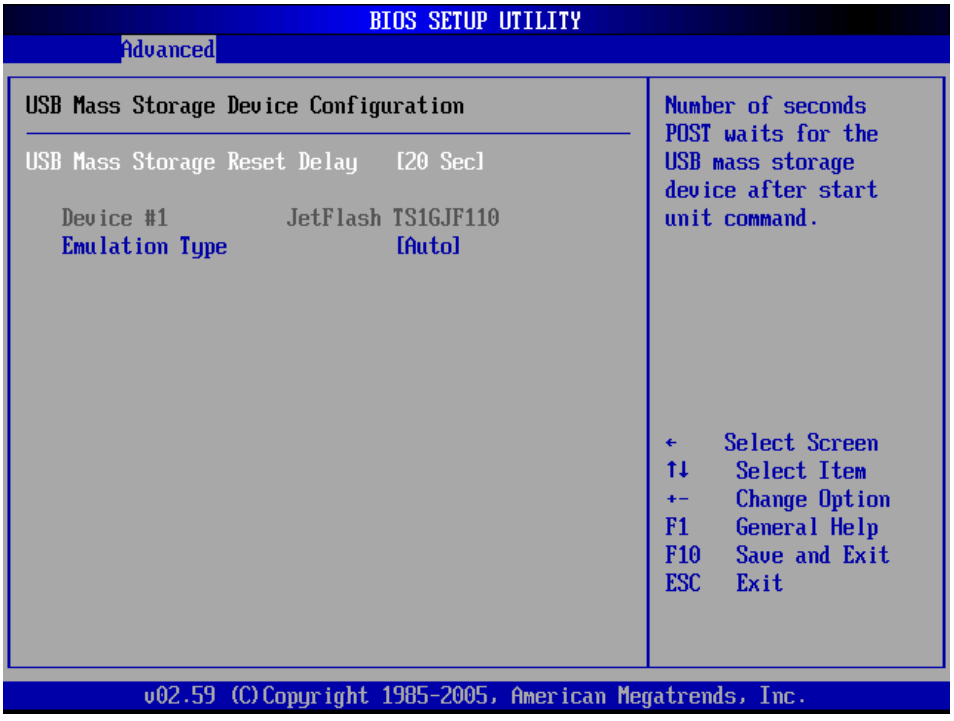
Use the **BIOS EHCI Handoff** option for systems running OSes that do not have EHCI hand-off support. The EHCI ownership change is managed by the EHCI driver.

➔ **Disabled** Systems with OSes that do not support EHCI can use the EHCI handoff functionality.

➔ **Enabled** **DEFAULT** Systems with OSes that do not support EHCI cannot use the EHCI handoff functionality.

6.3.9.1 USB Mass Storage Device Configuration

Use the USB Mass Storage Device Configuration menu (BIOS Menu 14) to configure USB mass storage class devices.



BIOS Menu 14: USB Mass Storage Device Configuration

➔ **Device ##**

The **Device##** field lists the USB devices that are connected to the system.

➔ **Emulation Type [Auto]**

Use the **Emulation Type** BIOS option to specify the type of emulation BIOS has to provide for the USB device.

NOTE:

Please note that the device's formatted type and the emulation type provided by the BIOS must match for a device to boot properly. If both types do not match then device's behavior is undefined. To make sure both types match, format the device using BIOS INT13h calls after selecting the proper emulation option in BIOS setup. The FORMAT utility provided by Microsoft® MS-DOS®, Microsoft® Windows® 95, and Microsoft® Windows® 98 can be used for this purpose.

➔ **Auto**	**DEFAULT**	BIOS auto-detects the current USB.
➔ **Floppy**		The USB device will be emulated as a floppy drive. The device can be either A: or B: responding to INT13h calls that return DL = 0 or DL = 1 respectively.
➔ **Forced FDD**		Allows a hard disk image to be connected as a floppy image. This option works only for drives formatted with FAT12, FAT16 or FAT32.
➔ **Hard Disk**		Allows the USB device to be emulated as hard disk

responding to INT13h calls that return DL values of 80h or above.

➔ **CDROM**

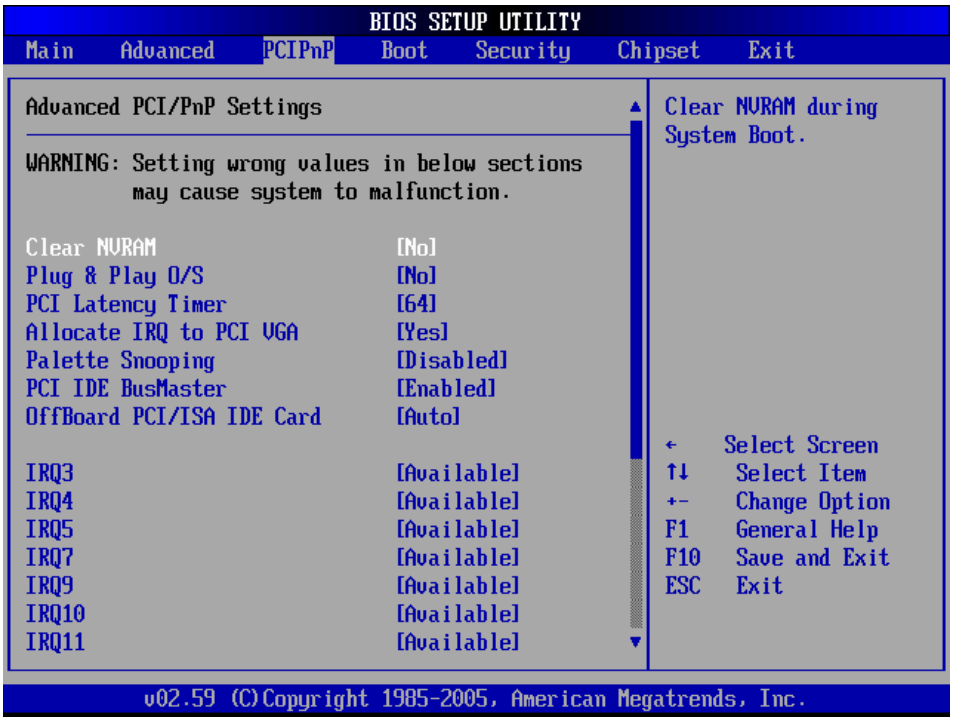
Assumes the CD-ROM is formatted as bootable media. All the devices that support block sizes greater than 512 bytes can only be booted using this option.

6.4 PCI/PnP

Use the **PCI/PnP** menu (**BIOS Menu 13**) to configure advanced PCI and PnP settings.

WARNING:

Setting wrong values for the BIOS selections in the PCIPnP BIOS menu may cause the system to malfunction.



BIOS Menu 15: PCI/PnP Configuration

➔ **Clear NVRAM [No]**

Use the **Clear NVRAM** option to specify if the NVRAM (Non-Volatile RAM) is cleared when the power is turned off.

➔ **No**	**DEFAULT**	System does not clear NVRAM during system boot
➔ **Yes**		System clears NVRAM during system boot

➔ **Plug & Play O/S [No]**

Use the **Plug & Play O/S** BIOS option to specify whether system plug and play devices are configured by the operating system or the BIOS.

➔ **No**	**DEFAULT**	If the operating system does not meet the Plug and Play specifications, this option allows the BIOS to configure all the devices in the system.
➔ **Yes**		This setting allows the operating system to change the interrupt, I/O, and DMA settings. Set this option if the system is running Plug and Play aware operating systems.

➔ **PCI Latency Timer [64]**

Use the **PCI Latency Timer** option to specify the PCI latency time. The latency time is measured in units of PCI clock cycles for the PCI device latency timer register. Configuration options are:

- 32
- 64 **DEFAULT**
- 96
- 128
- 160
- 192
- 224
- 248

➔ **Allocate IRQ to PCI VGA [Yes]**

Use the **Allocate IRQ to PCI VGA** option to restrict the system from giving the VGA adapter card an interrupt address.

➔ **Yes**	(Default)	Assigns an IRQ to a PCI VGA card if card requests IRQ
➔ **No**		Does not assign IRQ to a PCI VGA card even if the card requests an IRQ

➔ **Palette Snooping [Disabled]**

Use the **Palette Snooping** option to enable or disable the palette snooping function.

➔ **Disabled**	**DEFAULT**	Unless the VGA card manufacturer requires palette snooping to be enabled, this option should be disabled.
➔ **Enabled**		PCI devices are informed that an ISA based Graphics device is installed in the system so the ISA based Graphics card functions correctly. This does not necessarily indicate a physical ISA adapter card. The graphics chipset can be mounted on a PCI card. Always check with the adapter card manual first, before modifying the default settings in the BIOS.

➔ **PCI IDE BusMaster [Enabled]**

Use the **PCI IDE BusMaster** BIOS option to enable or prevent PCI IDE busmastering.

➔ **Disabled**		Busmastering is prevented
➔ **Enabled**	**DEFAULT**	IDE controller on the PCI local bus has mastering capabilities

➔ **OffBoard PCI/ISA IDE Card [Auto]**

Use the OffBoard PCI/ISA IDE Card BIOS option to select the OffBoard PCI/ISA IDE Card.

➔ **Auto** **DEFAULT** The location of the Off Board PCI IDE adapter card is automatically detected by the AMIBIOS.

➔ **PCI Slot 1** PCI Slot 1 is selected as the location of the OffBoard PCI IDE adapter card. Only select this slot if the adapter card is installed in PCI Slot 1.

➔ **PCI Slot 2** PCI Slot 2 is selected as the location of the OffBoard PCI IDE adapter card. Only select this slot if the adapter card is installed in PCI Slot 2.

➔ **PCI Slot 3** PCI Slot 3 is selected as the location of the OffBoard PCI IDE adapter card. Only select this slot if the adapter card is installed in PCI Slot 3.

➔ **PCI Slot 4** PCI Slot 4 is selected as the location of the OffBoard PCI IDE adapter card. Only select this slot if the adapter card is installed in PCI Slot 4.

➔ **PCI Slot 5** PCI Slot 5 is selected as the location of the OffBoard PCI IDE adapter card. Only select this slot if the adapter card is installed in PCI Slot 5.

➔ **PCI Slot 6** PCI Slot 6 is selected as the location of the OffBoard PCI IDE adapter card. Only select this slot if the adapter card is installed in PCI Slot 6.

➔ **IRQ# [Available]**

Use the **IRQ#** address to specify what IRQs can be assigned to a particular peripheral device.

➔ **Available** **DEFAULT** The specified IRQ is available to be used by PCI/PnP devices

➔ **Reserved** The specified IRQ is reserved for use by Legacy ISA devices

Available IRQ addresses are:

- IRQ3
- IRQ4
- IRQ5
- IRQ7
- IRQ9
- IRQ10
- IRQ 11
- IRQ 14
- IRQ 15

➔ **DMA Channel# [Available]**

Use the **DMA Channel#** option to assign a specific DMA channel to a particular PCI/PnP device.

➔ **Available** **DEFAULT** The specified DMA is available to be used by PCI/PnP devices

➔ **Reserved** The specified DMA is reserved for use by Legacy ISA devices

Available DMA Channels are:

- DM Channel 0
- DM Channel 1
- DM Channel 3
- DM Channel 5
- DM Channel 6
- DM Channel 7

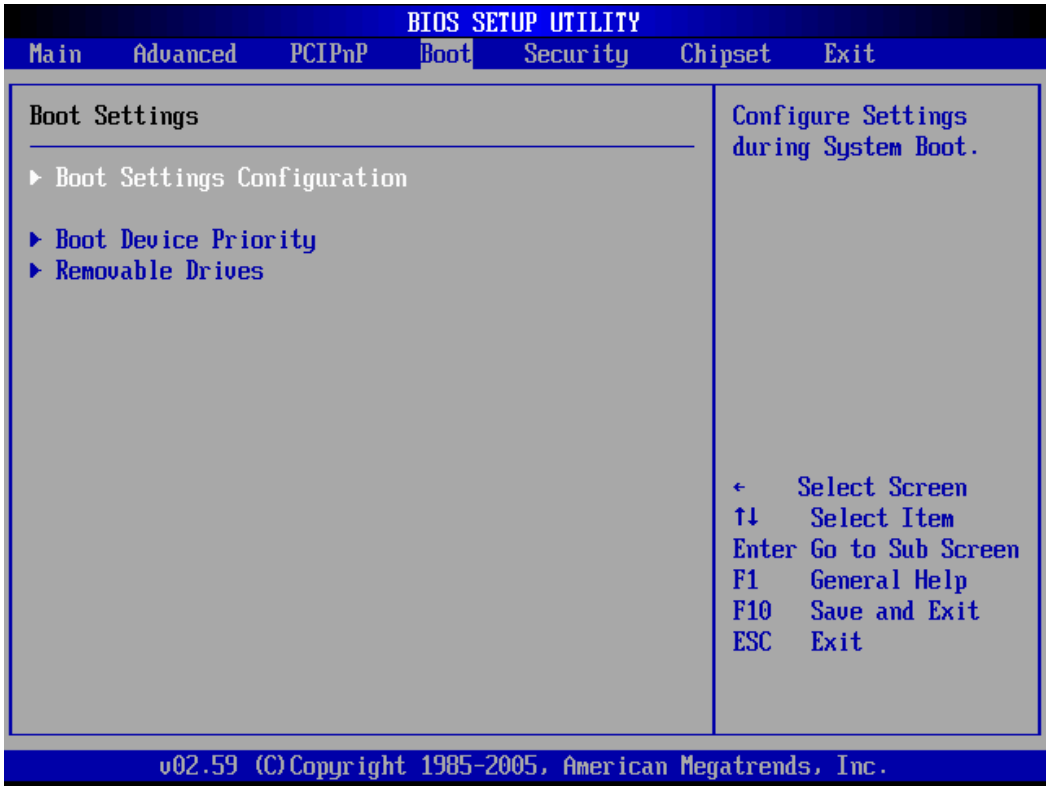
➔ **Reserved Memory Size [Disabled]**

Use the **Reserved Memory Size** BIOS option to specify the amount of memory that should be reserved for legacy ISA devices.

➔	**Disabled**	**DEFAULT**	No memory block reserved for legacy ISA devices
➔	**16K**		16KB reserved for legacy ISA devices
➔	**32K**		32KB reserved for legacy ISA devices
➔	**64K**		54KB reserved for legacy ISA devices

6.5 Boot

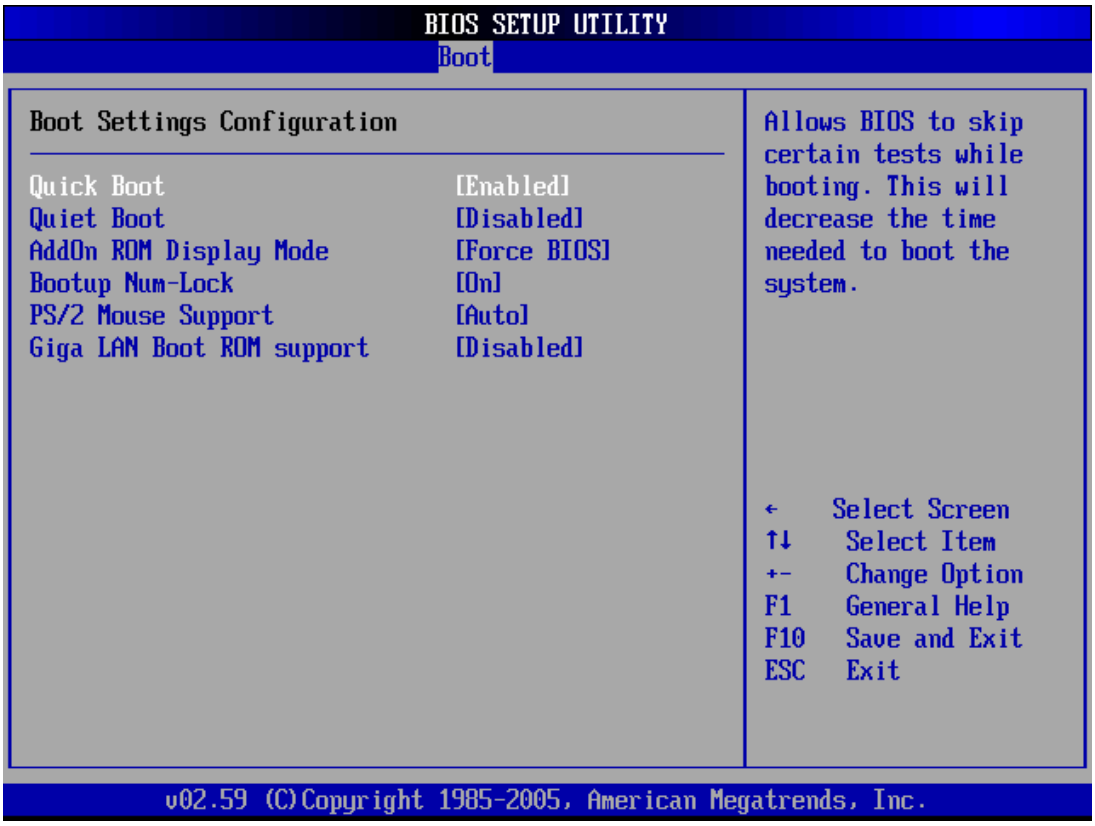
Use the Boot menu (BIOS Menu 16) to configure system boot options.



BIOS Menu 16: Boot

6.5.1 Boot Settings Configuration

Use the Boot Settings Configuration menu (BIOS Menu 16) to configure advanced system boot options.



BIOS Menu 17: Boot Settings Configuration

➔ **Quick Boot [Enabled]**

Use the **Quick Boot** BIOS option to make the computer speed up the boot process.

➔ **Disabled**		No POST procedures are skipped
➔ **Enabled**	**DEFAULT**	Some POST procedures are skipped to decrease the system boot time

➔ **Quiet Boot [Disabled]**

Use the **Quiet Boot** BIOS option to select the screen display when the system boots.

➔ **Disabled**	**DEFAULT**	Normal POST messages displayed
➔ **Enabled**		OEM Logo displayed instead of POST messages

➔ **AddOn ROM Display Mode [Force BIOS]**

Use the **AddOn ROM Display Mode** option to allow add-on ROM (read-only memory) messages to be displayed.

➔ **Force BIOS**	**DEFAULT**	The system forces third party BIOS to display during system boot.
➔ **Keep Current**		The system displays normal information during system boot.

➔ **Bootup Num-Lock [On]**

Use the **Bootup Num-Lock** BIOS option to specify if the number lock setting must be modified during boot up.

➔ **Off**		Does not enable the keyboard Number Lock automatically. To use the 10-keys on the keyboard, press the Number Lock key located on the upper left-hand corner of the 10-key pad. The Number Lock LED on the keyboard lights up when the Number Lock is engaged.
➔ **On**	**DEFAULT**	Allows the Number Lock on the keyboard to be enabled automatically when the computer system boots up. This allows the immediate use of the 10-key numeric keypad located on the right side of the keyboard. To confirm this, the Number Lock LED light on the keyboard is lit.

➔ **PS/2 Mouse Support [Auto]**

Use the **PS/2 Mouse Support** option adjusts PS/2 mouse support capabilities.

➔ **Disabled**	PS/2 mouse support is disabled and prevented from using system resources.

➔ **Enabled** Allows the system to use a PS/2 mouse.

➔ **Auto** **DEFAULT** The system auto-adjusts PS/2 mouse support.

➔ **Giga LAN Boot Support [Disabled]**

Use the **Giga LAN Boot Support** option to enable the system to be booted from a remote system.

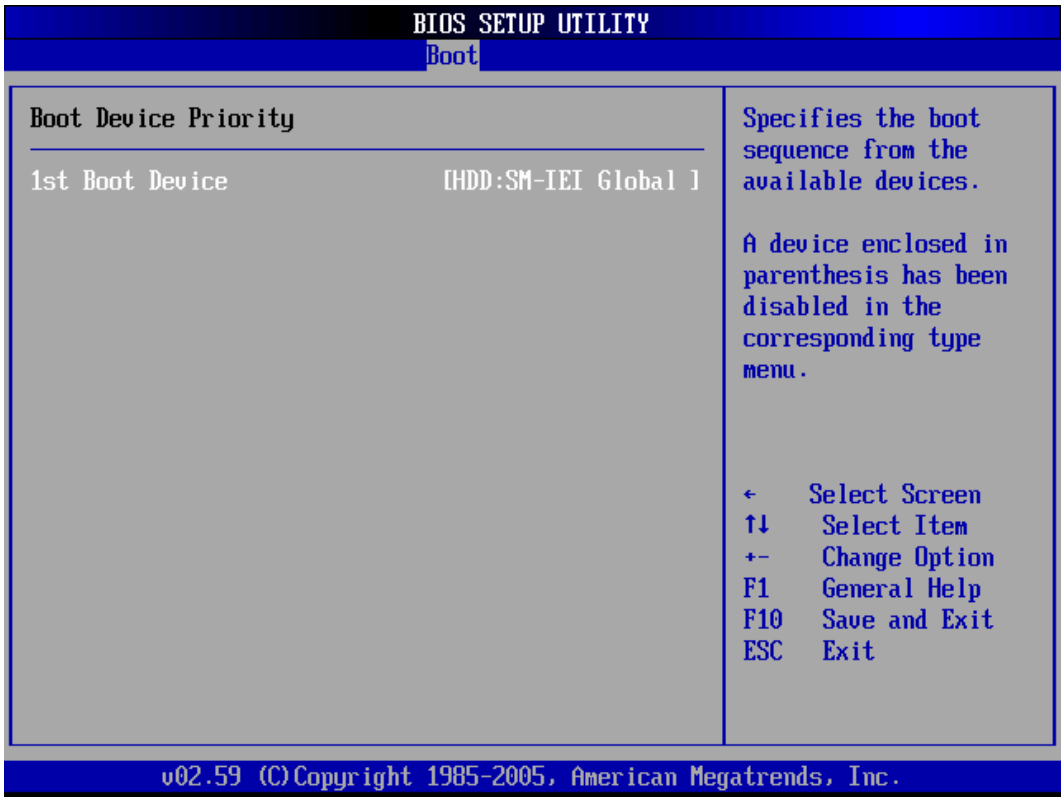
➔ **Disabled** **DEFAULT** Cannot be booted from a remote system through the LAN

➔ **Enabled** Can be booted from a remote system through the LAN

6.5.2 Boot Device Priority

Use the **Boot Device Priority** menu (**BIOS Menu 18**) to specify the boot sequence from the available devices. Possible boot devices may include:

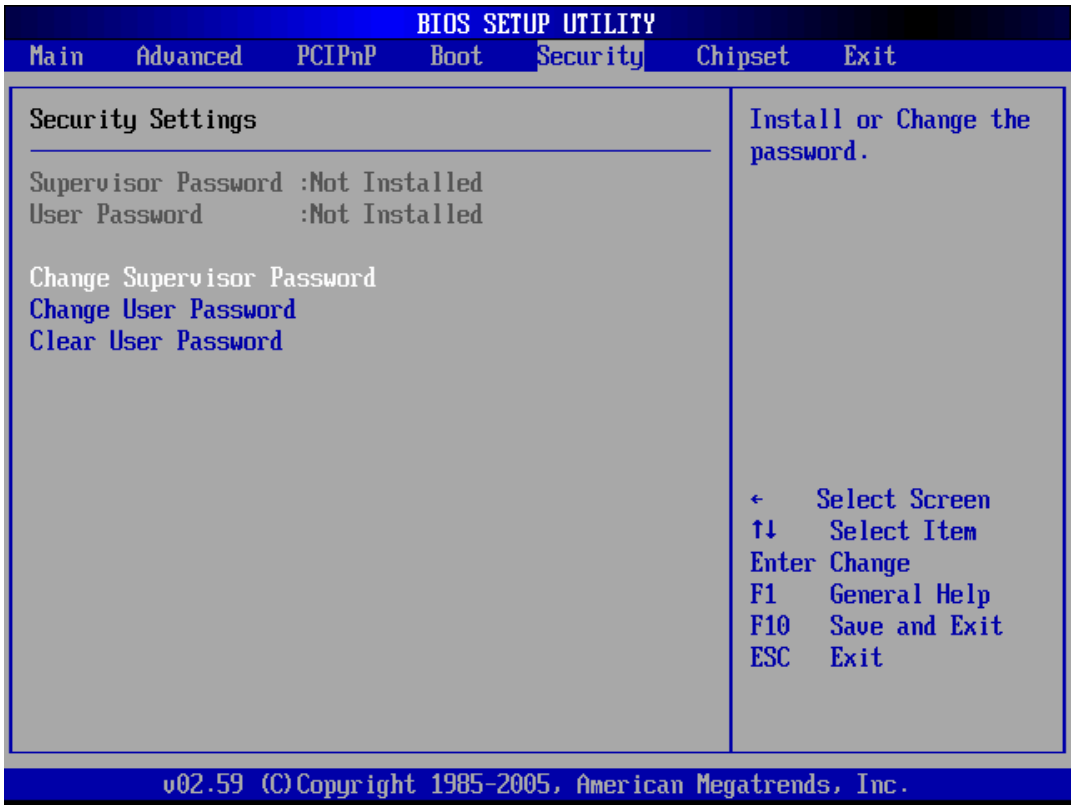
- 1st FLOPPY DRIVE
- HDD
- CD/DVD



BIOS Menu 18: Boot Device Priority Settings

6.6 Security

Use the Security menu (BIOS Menu 19) to set system and user passwords.



BIOS Menu 19: Security

➔ Change Supervisor Password

Use the **Change Supervisor Password** to set or change a supervisor password. The default for this option is **Not Installed**. If a supervisor password must be installed, select this field and enter the password. After the password has been added, **Install** appears next to **Change Supervisor Password**.

➔ Change User Password

Use the **Change User Password** to set or change a user password. The default for this option is **Not Installed**. If a user password must be installed, select this field and enter the

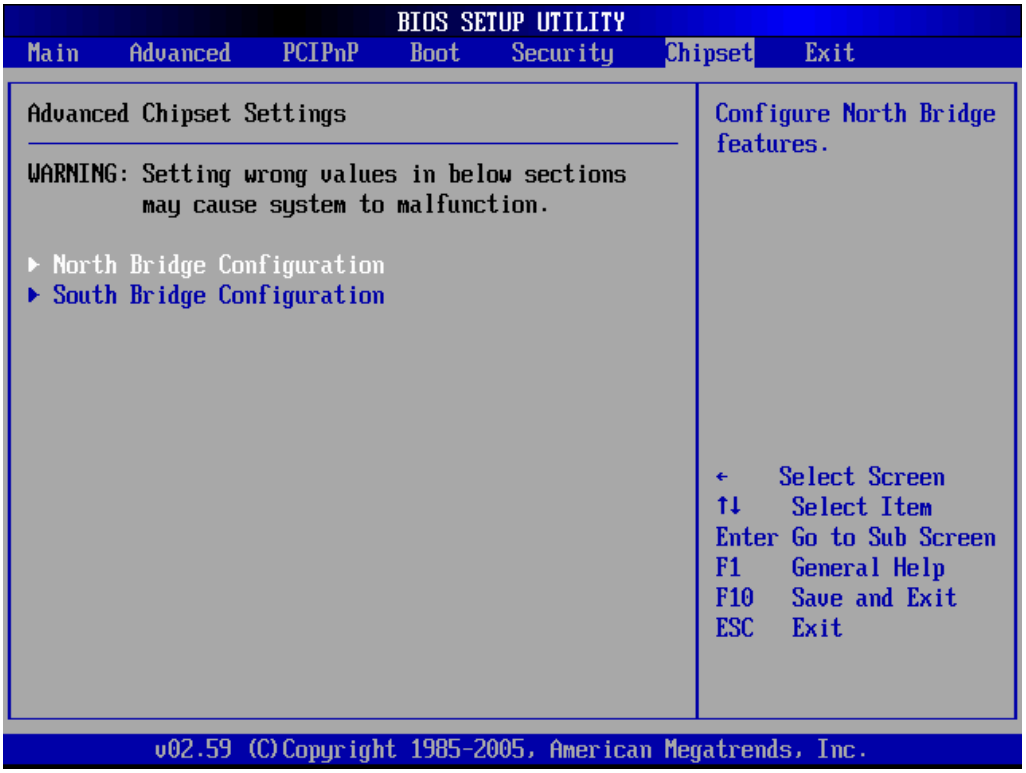
password. After the password has been added, **Install** appears next to **Change User Password**.

6.7 Chipset

Use the **Chipset** menu (**BIOS Menu 20**) to access the NorthBridge and SouthBridge configuration menus.

WARNING:

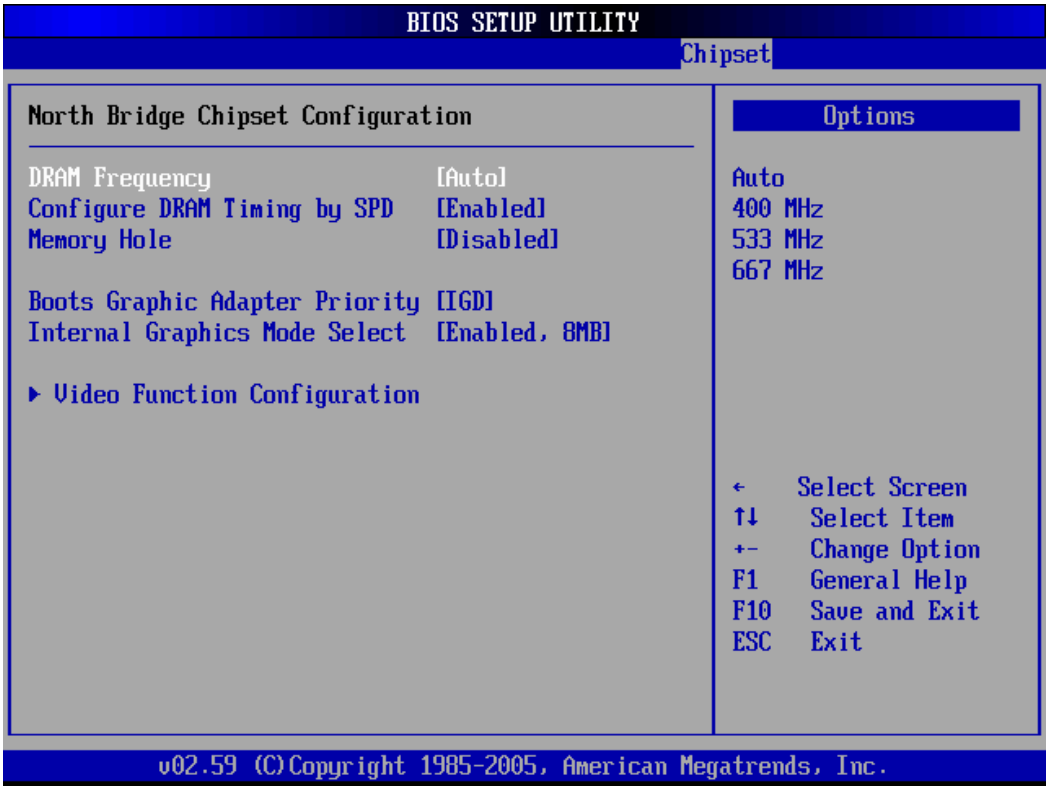
Setting the wrong values for the Chipset BIOS selections in the Chipset BIOS menu may cause the system to malfunction.



BIOS Menu 20: Chipset

6.7.1 NorthBridge Configuration

Use the NorthBridge Configuration menu (BIOS Menu 20) to configure the Northbridge chipset.



BIOS Menu 21:NorthBridge Chipset Configuration

➔ **DRAM Frequency [Auto]**

Use the **DRAM Frequency** option to specify the DRAM frequency or allow the system to automatically detect the DRAM frequency.

➔	**Auto**	**DEFAULT**	Automatically selects the DRAM frequency
➔	**400MHz**		Sets the DRAM frequency to 400MHz
➔	**533MHz**		Sets the DRAM frequency to 533MHz

➔ **667MHz** Sets the DRAM frequency to 667MHz

➔ **Configure DRAM Timing by SPD [Enabled]**

Use the **Configure DRAM Timing by SPD** option to determine if the system uses the SPD *(*Serial Presence Detect) EEPROM to configure the DRAM timing. The SPD EEPROM contains all necessary DIMM specifications including the speed of the individual components such as CAS and bank cycle time as well as valid settings for the module and the manufacturer's code. The SPD enables the BIOS to read the spec sheet of the DIMMs on boot-up and then adjust the memory timing parameters accordingly.

➔ **Disabled** DRAM timing parameters are manually set using the DRAM sub-items

➔ **Enabled** **DEFAULT** DRAM timing parameter are set according to the DRAM Serial Presence Detect (SPD)

If the **Configure DRAM Timing by SPD** option is disabled, the following configuration options appear.

- DRAM CAS# Latency [5]
- DRAM RAS# to CAS# Delay [6 DRAM Clocks]
- DRAM RAS# Precharge [6 DRAM Clocks]
- DRAM RAS# Activate to Precha [15 DRAM Clocks]

➔ **DRAM CAS# Latency [5]**

Use the **CAS Latency Time** configuration option to set the Column Address Strobe (CAS) delay time. (To be able to change this configuration option the **DRAM Latency Timing** configuration option must be set to "**Manual**") The following configuration options are available

- 6 nanoseconds
- 5 nanoseconds **DEFAULT**
- 4 nanoseconds

- 3 nanoseconds

➔ **DRAM RAS# to CAS# Delay [6 DRAM Clocks]**

Use the **DRAM RAS# to CAS# Delay** option to specify the number of clock cycles must elapse between sending a RAS (row address strobe) signal and the CAS (column address strobe) signal. A pause is required between the RAS signal and the CAS signal to ensure the memory is correctly addressed. (To be able to change this configuration option the **Configure DRAM Timing by SPD** configuration option must be set to "**Disabled**") Configuration options are listed below:

- 2 DRAM Clocks
- 3 DRAM Clocks
- 4 DRAM Clocks
- 5 DRAM Clocks
- 6 DRAM Clocks **DEFAULT**

➔ **DRAM RAS# Precharge [6 DRAM Clocks]**

Use the **DRAM RAS# Precharge** option to set the speed at which the RAM terminates the access of one row and start accessing another. (To be able to change this configuration option the **DRAM RAS# Precharge** configuration option must be set to "**Manual**") The following configuration options are available

- 2 DRAM Clocks
- 3 DRAM Clocks
- 4 DRAM Clocks
- 5 DRAM Clocks
- 6 DRAM Clocks **DEFAULT**

➔ **DRAM RAS# Activate to Precha [15 DRAM Clocks]**

Use the **DRAM RAS# Activate to Precha** option to specify the length of the delay between the activation and precharge commands for the RAS signal. That is how long after activation can the access cycle be started again. This influences row activation time that is considered when memory has hit the last column in a specific row, or when an

entirely different memory location is requested. (To be able to change this configuration option the **Configure DRAM Timing by SPD** configuration option must be set to "**Disabled**") The following configuration options are available:

- 4 DRAM Clocks
- 5 DRAM Clocks
- 6 DRAM Clocks
- 7 DRAM Clocks
- 8 DRAM Clocks
- 9 DRAM Clocks
- 10 DRAM Clocks
- 11 DRAM Clocks
- 12 DRAM Clocks
- 13 DRAM Clocks
- 14 DRAM Clocks
- 15 DRAM Clocks **DEFAULT**

➔ **Memory Hole [Disabled]**

Use the **Memory Hole** option to reserve memory space between 15MB and 16MB for ISA expansion cards that require a specified area of memory to work properly. If an older ISA expansion card is used, please refer to the documentation that came with the card to see if it is necessary to reserve the space.

➔ **Disabled**	**DEFAULT**	Memory is not reserved for ISA expansion cards
➔ **15MB – 16MB**		Between 15MB and 16MB of memory is reserved for ISA expansion cards

➔ **Boots Graphics Adapter [IGD]**

Use the **Boots Graphics Adapter** option to select the graphics controller used as the primary boot device. Select either an integrated graphics controller (IGD) or a combination of PCI graphics controller, a PCI express (PEG) controller or an IGD. Configuration options are listed below:

- IGD **DEFAULT**
- PCI/IGD

➔ **Internal Graphics Mode Select [Enable, 8MB]**

Use the **Internal Graphic Mode Select** option to specify the amount of system memory that can be used by the Internal graphics device.

➔ **Disable**

➔ **Enable, 1MB** 1MB of memory used by internal graphics device

➔ **Enable, 8MB** **DEFAULT** 8MB of memory used by internal graphics device

6.7.1.1 Video Function Configuration

Use the **Video Function Configuration** menu to configure the video device connected to the system.

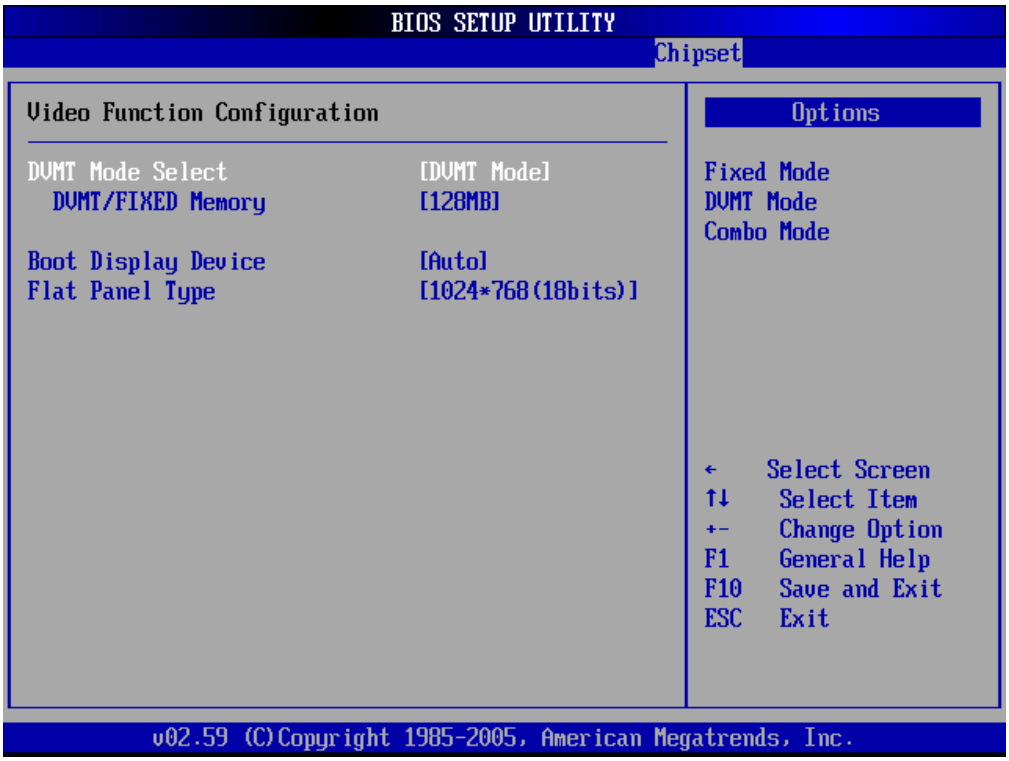


Figure 6-1: Video Function Configuration

➔ **DVMT Mode Select [DVMT Mode]**

Use the **DVMT Mode Select** option to select the Intel Dynamic Video Memory Technology (DVMT) operating mode.

➔ **Fixed Mode** A fixed portion of graphics memory is reserved as graphics memory.

➔ **DVMT Mode** **DEFAULT** Graphics memory is dynamically allocated according to the system and graphics needs.

➔ **Combo Mode** A fixed portion of graphics memory is reserved as graphics memory. If more memory is needed, graphics memory is dynamically allocated according to the system and graphics needs.

➔ **DVMT/FIXED Memory [128MB]**

Use the **DVMT/FIXED Memory** option to specify the maximum amount of memory that can be allocated as graphics memory. This option can only be configured for if **DVMT Mode** or **Fixed Mode** is selected in the **DVMT Mode Selec**t option. If **Combo Mode** is selected, the maximum amount of graphics memory is 128MB. Configuration options are listed below.

- 64MB
- 128MB **DEFAULT**
- Maximum DVMT

➔ **Boot Display Device [Auto]**

Use the **Boot Display Device** option to select the display device used by the system when it boots. Configuration options are listed below.

- Auto **DEFAULT**
- CRT1
- LFP
- CRT2
- CRT1+LFP
- CRT1+CRT2

➔ **Flat Panel Type [1024*768(18bits)]**

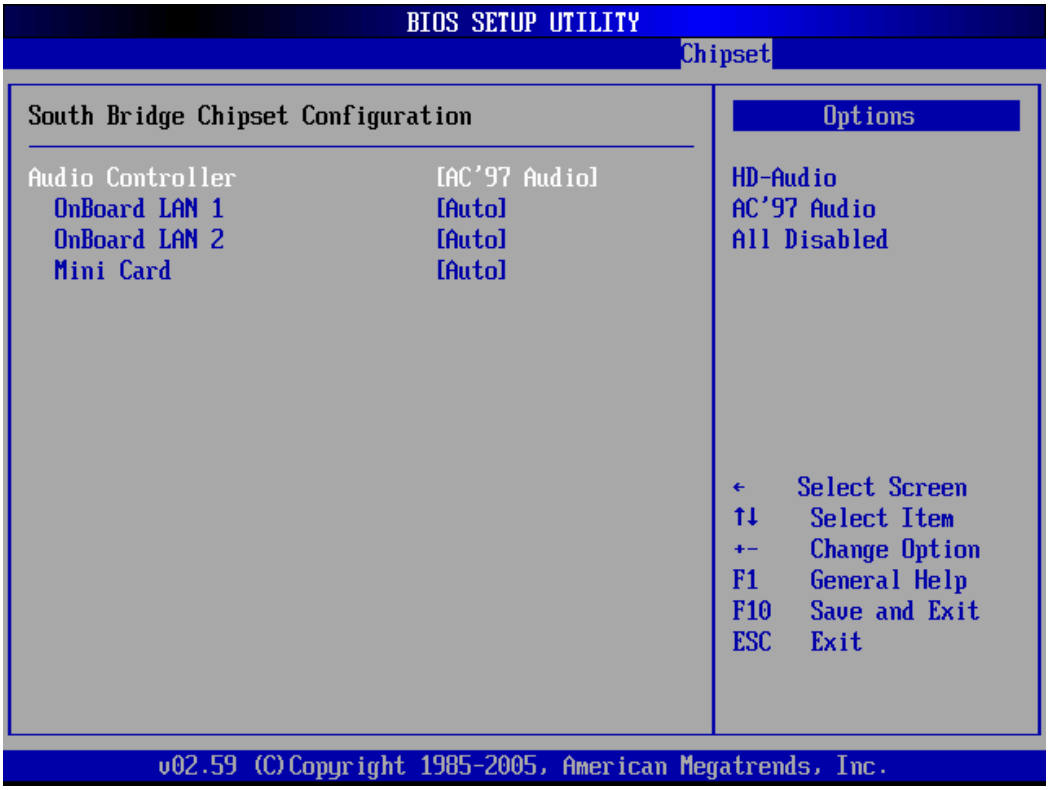
Use the **Flat Panel Type** option to select the type of flat panel connected to the system. Configuration options are listed below.

- 640x480 (18bits)
- 800x600 (18bits)
- 1024x768 (18bits)
- 1280x1024 (36bits)
- 1400x1050 (36bits)
- 1600x1200 (36bits)
- 1280x768 (18bits)
- 1680x1050 (36bits)

- 1920x1200 (36bits)
- 1024x768(48bits)
- 1440x900(36bits)
- 1440x900(48bits)
- 1280x800(18bits)
- 1280x600(18bits)
- 2048x1536(36bits)

6.7.2 SouthBridge Chipset Configuration

The SouthBridge Chipset Configuration menu (BIOS Menu 22) the Southbridge chipset to be configured.



BIOS Menu 22:SouthBridge Chipset Configuration

➔ **Audio Controller [AC`97 Audio]**

The **Audio Controller** option allows selection of the audio controller to use.

➔	**HD-Audio**	DEFAULT	The Intel® High Definition Audio controller is enabled
➔	**AC`97 Audio**		The on-board AC'97 controller is enabled
➔	**All Disabled**		All audio controllers are disabled

➔ **OnBoard LAN1 [Auto]**

The **OnBoard LAN1** option enables or disables the on-board LAN1.

➔	**Auto**	DEFAULT	The on-board LAN1 controller is automatically detected and enabled
➔	**Enabled**		The on-board LAN1 controller is manually enabled
➔	**Disabled**		The on-board LAN1 controller is manually disabled

➔ **On-board LAN2 [Auto]**

The **On-board LAN2** option enables or disables the on-board LAN2.

➔	**Auto**	DEFAULT	The on-board LAN2 controller is automatically detected and enabled
➔	**Enabled**		The on-board LAN2 controller is manually enabled
➔	**Disabled**		The on-board LAN2 controller is manually disabled

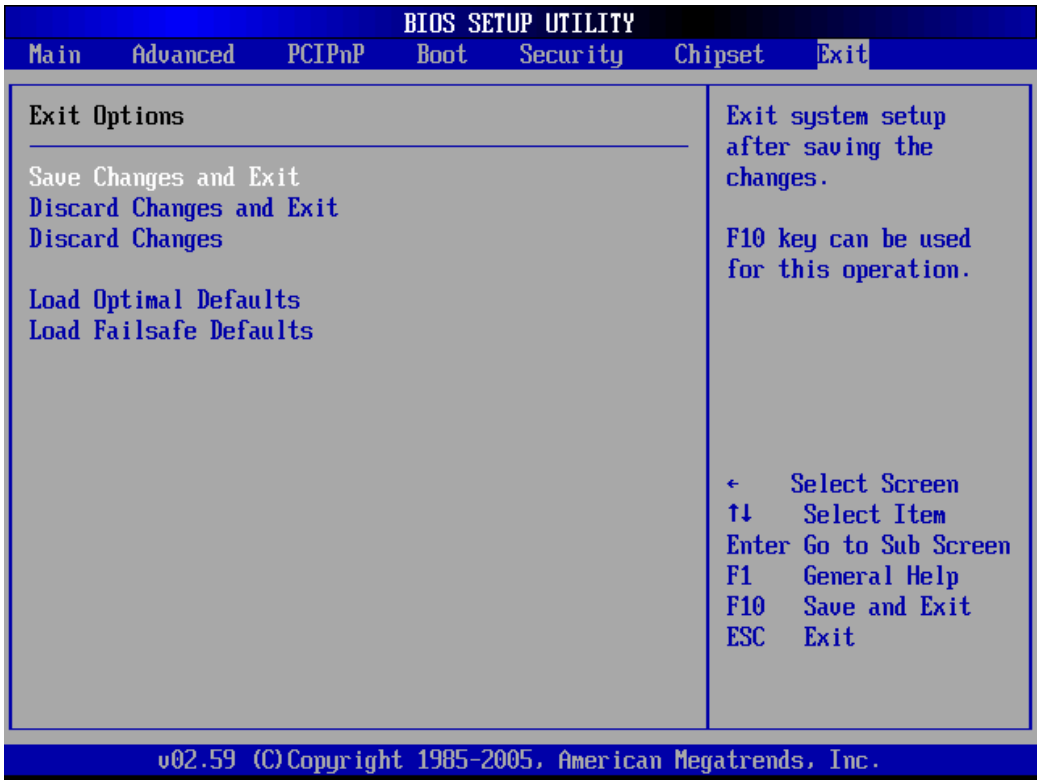
➔ **Mini Card [Auto]**

The Mini Card option enables or disables the PCI Express Mini Card.

➔	**Auto**	DEFAULT	The PCI Express Mini Card is automatically detected and enabled
➔	**Enabled**		The PCI Express Mini Card is manually enabled
➔	**Disabled**		The PCI Express Mini Card is manually disabled

6.8 Exit

Use the **Exit** menu (**BIOS Menu 23**) to load default BIOS values, optimal failsafe values and to save configuration changes.



BIOS Menu 23:Exit

➔ **Save Changes and Exit**

Use the **Save Changes and Exit** option to save the changes made to the BIOS options and to exit the BIOS configuration setup program.

➔ **Discard Changes and Exit**

Use the **Discard Changes and Exit** option to exit the BIOS configuration setup program without saving the changes made to the system.

➔ **Discard Changes**

Use the **Discard Changes** option to discard the changes and remain in the BIOS configuration setup program.

➔ **Load Optimal Defaults**

Use the **Load Optimal Defaults** option to load the optimal default values for each of the parameters on the Setup menus. **F9 key can be used for this operation.**

➔ **Load Failsafe Defaults**

Use the Load Failsafe Defaults option to load failsafe default values for each of the parameters on the Setup menus. F8 key can be used for this operation.

Chapter

7

Driver Installation

7.1 Available Software Drivers

Note:

The content of the CD may vary throughout the life cycle of the product and is subject to change without prior notice. You may visit the IEI website or contact technical support for the latest updates.

The following drivers can be installed on the system.

- Chipset driver
- VGA driver
- LAN driver

Installation instructions are given below.

7.2 Driver CD Auto-run

All the drivers for the NANO-9453 are on the CD that came with the system. To install the drivers, please follow the steps below.

Step 1: Insert the CD into a CD drive connected to the system.

Step 2: The starts up automatically

Step 3: Select NANO-9453 from the initial menu shown in.

Step 4: A new screen with a list of available drivers appears (**Figure 7-1**).

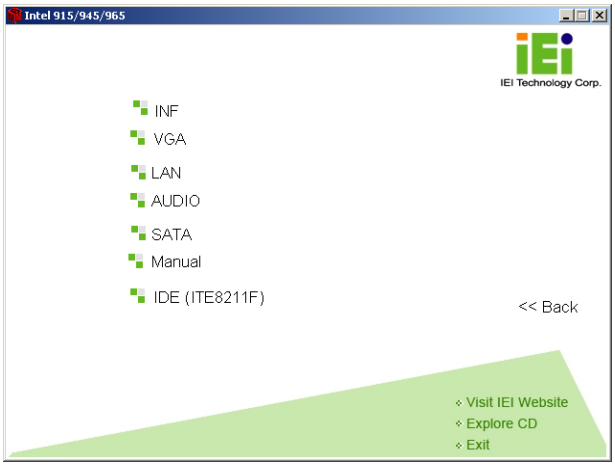


Figure 7-1: Available Drivers

Step 5: Select the driver to install from the list in **Figure 7-1**.

7.3 Chipset Driver Installation

To install the chipset driver, please follow the steps below:

Step 6: Select the INF driver from the list in **Figure 7-1**.

Step 7: A new window opens (**Figure 7-2**).

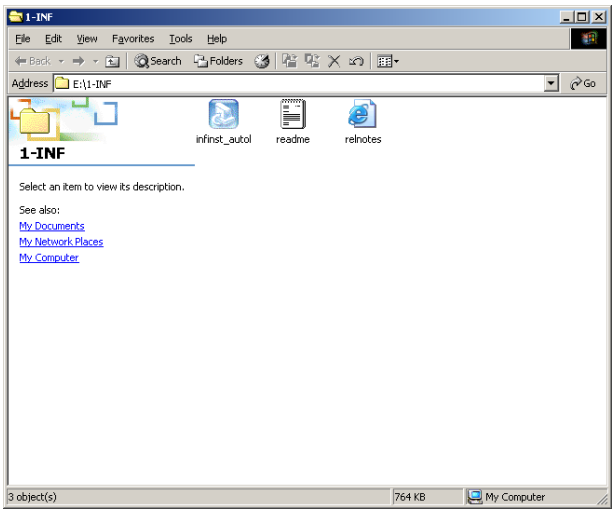


Figure 7-2: Chipset Driver Installation Program

Step 8: Double click the infinst_Autol icon in **Figure 7-2**.

Step 9: The welcome screen in **Figure 7-3** appears.

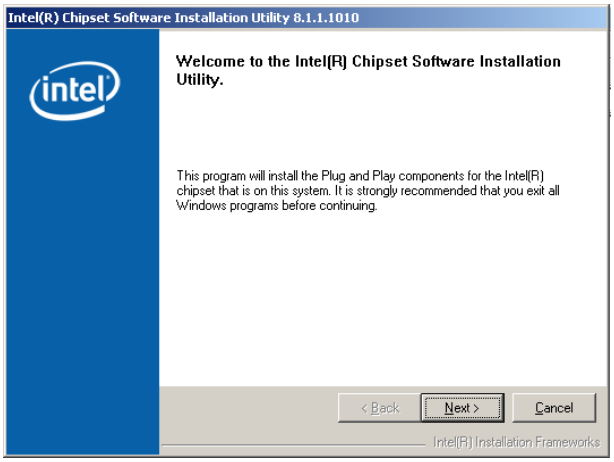


Figure 7-3: Chipset Driver Installation Welcome Screen

Step 10: Click **NEXT** in **Figure 7-3** to continue the installation process.

Step 11: The license agreement in **Figure 7-4** appears.

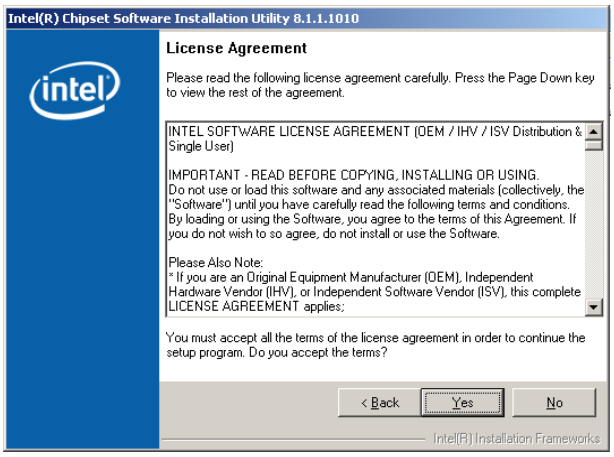


Figure 7-4: Chipset Driver Installation License Agreement

Step 12: Click **YES** to continue the setup.

Step 13: The Readme file in **Figure 7-5** appears.

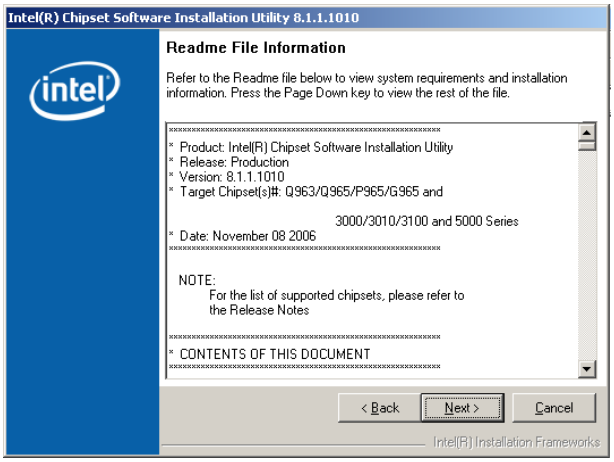


Figure 7-5: Chipset Driver Readme File Information

Step 14: Click **NEXT** in **Figure 7-5** to start the driver installation.

Step 15: After the driver installation process is complete, a confirmation screen (**Figure 7-6)** appears.

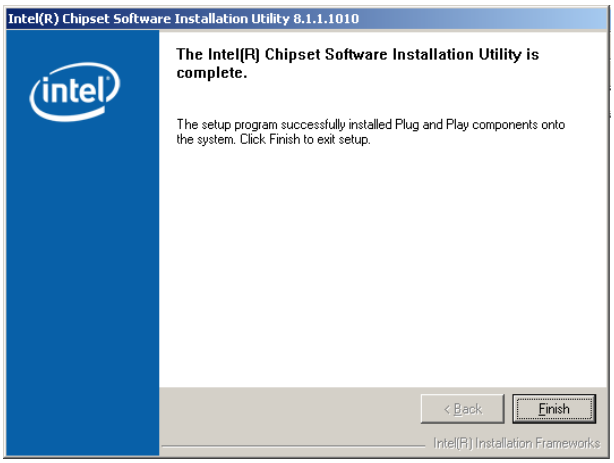


Figure 7-6: Chipset Driver Installation Complete

7.4 Intel Graphics Media Accelerator Driver

To install the chipset driver, please follow the steps below:

Step 16: Select the VGA driver from the list in **Figure 7-1**.

Step 17: A new window opens (**Figure 7-7**).

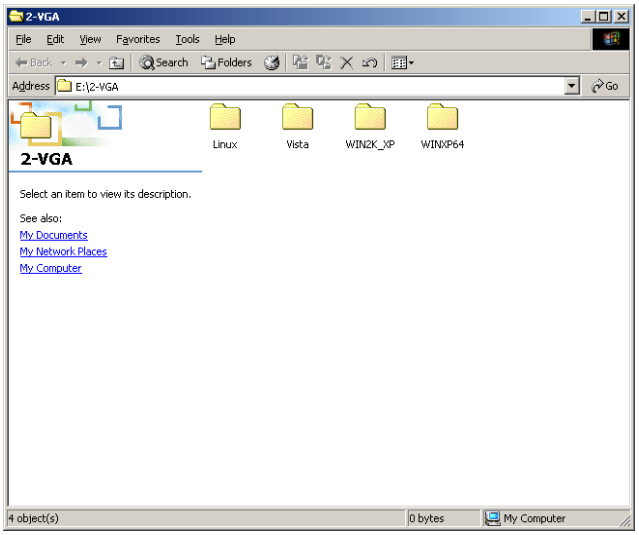


Figure 7-7: Select the Operating System

Step 18: Select the operating system from those shown in **Figure 7-7**.

Step 19: A new window appears (**Figure 7-8**).

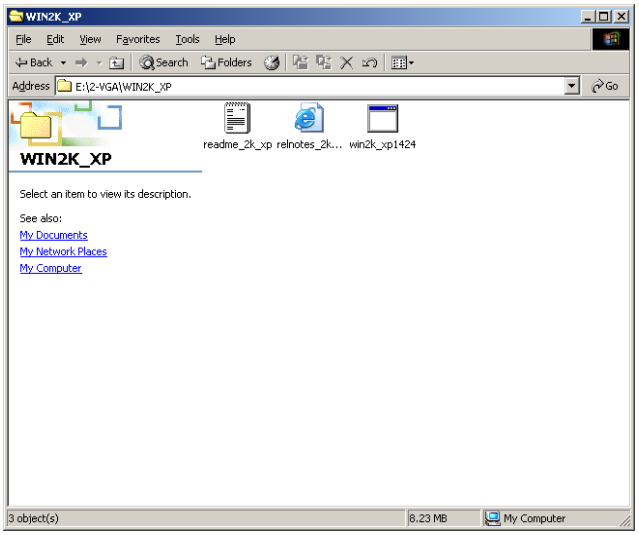


Figure 7-8: VGA Driver

Step 20: Click the installation program icon in **Figure 7-8**.

Step 21: The Readme information file shown in **Figure 7-9** appears.

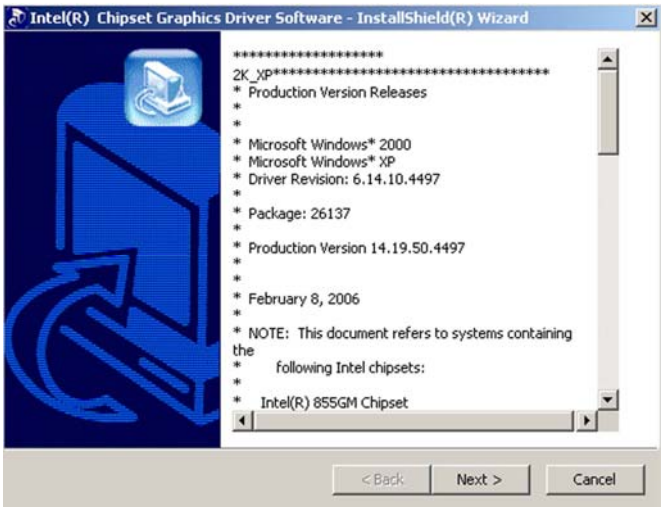


Figure 7-9: GMA Driver Readme File

Step 22: Click **NEXT** to extract the GMA driver files. See **Figure 7-10**.

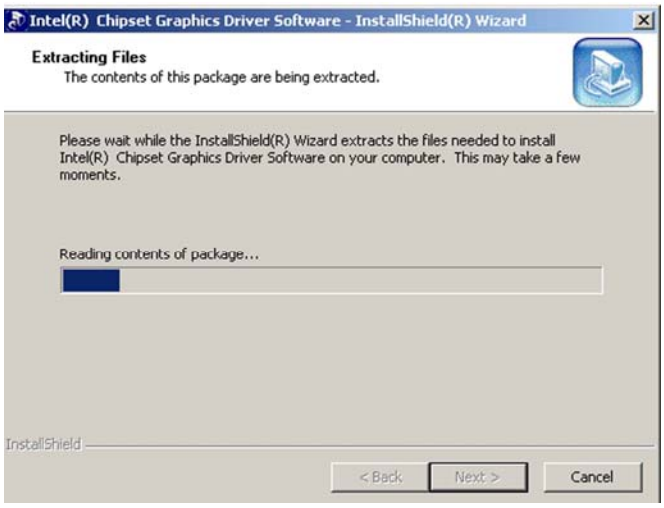


Figure 7-10: GMA Driver File Extraction

Step 23: The welcome screen shown in **Figure 7-11** appears.

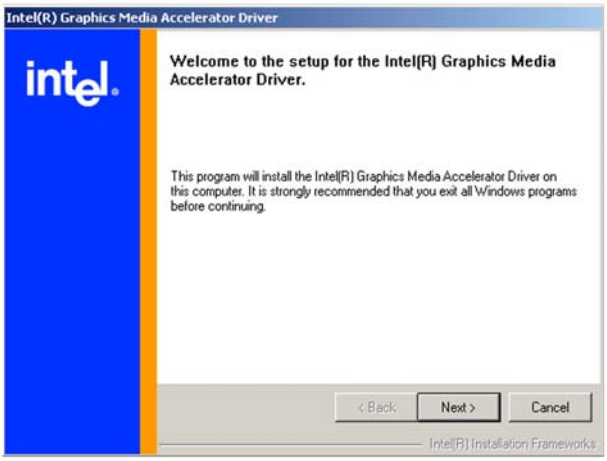


Figure 7-11: GMA Driver Installation Welcome Screen

Step 24: To continue the installation process, click **NEXT**.

Step 25: The license agreement in **Figure 7-12** appears.

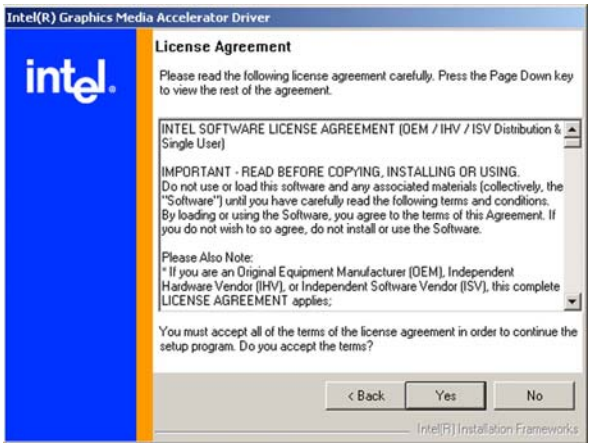


Figure 7-12: GMA Driver License Agreement

Step 26: Click the **YES** in **Figure 7-12** to continue.

Step 27: The installation notice shown in **Figure 7-13** appears.

Figure 7-13: GMA Driver Installing Notice

Step 28: A confirmation screen shown in **Figure 7-14** appears.

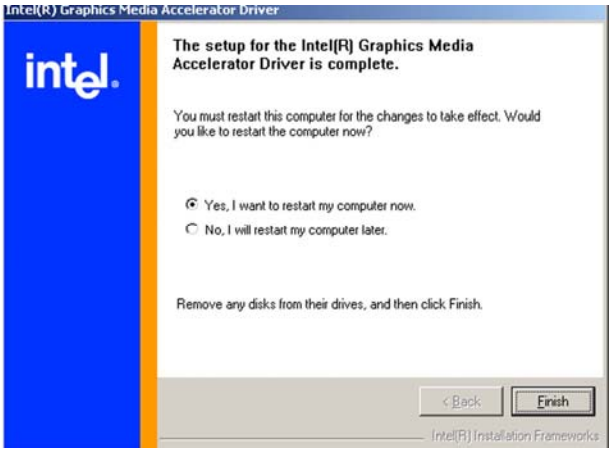


Figure 7-14: GMA Driver Installation Complete

Step 29: After selecting when to restart the computer in **Figure 7-14**, click **FINISH**.

7.5 Broadcom LAN Driver (for GbE LAN) Installation

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

Step 30: Open **Windows Control Panel (Figure 7-15)**.

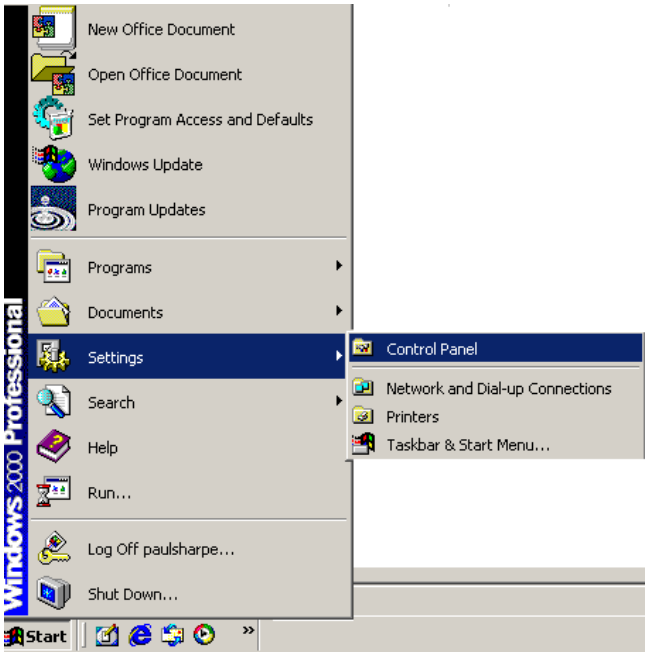


Figure 7-15: Access Windows Control Panel

Step 31: Double click the **System** icon (**Figure 7-16**).

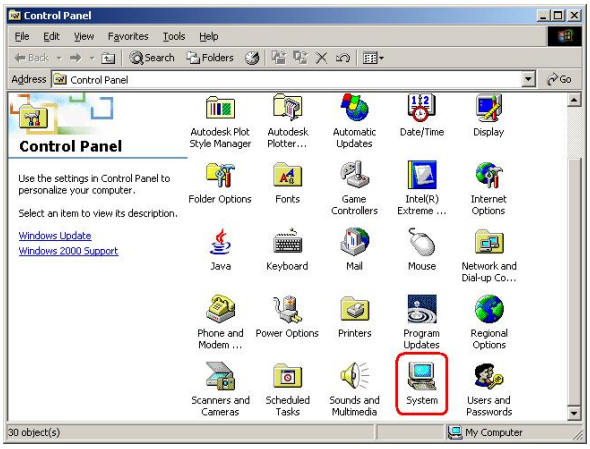


Figure 7-16: Double Click the System Icon

Step 32: Double click the **Device Manager** tab (**Figure 7-17**).

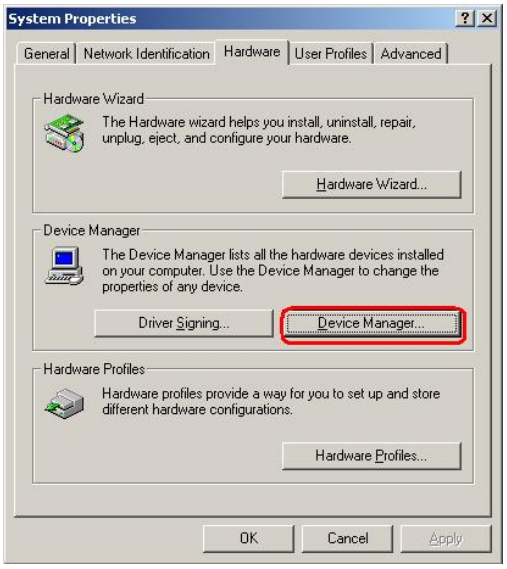


Figure 7-17: Double Click the Device Manager Tab

Step 33: A list of system hardware devices appears (**Figure 7-18**).

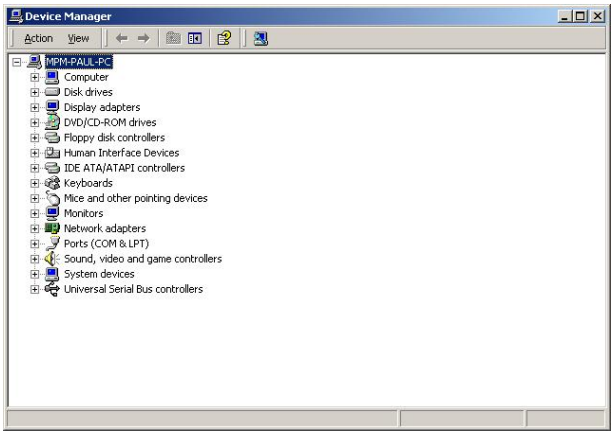


Figure 7-18: Device Manager List

Step 34: Double click the listed device that has question marks next to it. (This means Windows does not recognize the device).

Step 35: The **Device Driver Wizard** appears (**Figure 7-19**). Click **NEXT** to continue.

Figure 7-19: Search for Suitable Driver

Step 36: Select "**Specify a Location**" in the **Locate Driver Files** window (**Figure 7-20**). Click **NEXT** to continue.

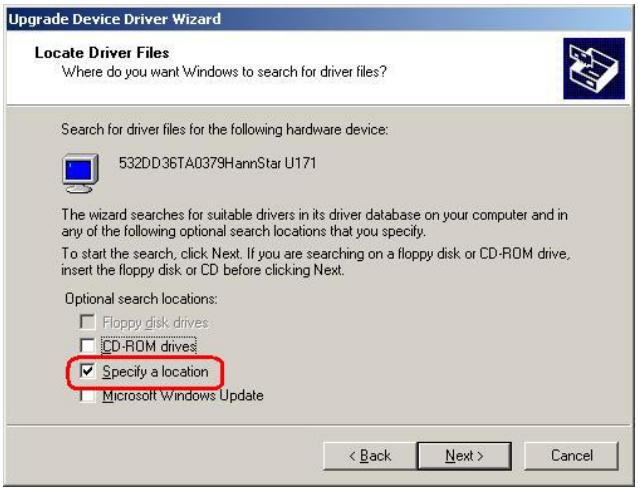


Figure 7-20: Locate Driver Files

Step 37: Select the proper OS folder under the "**X:\3-LAN\BROADCOM BCM57xx Drivers**" directory (**Figure 7-21**) in the location browsing window, where "**X:\"** is the system CD drive.

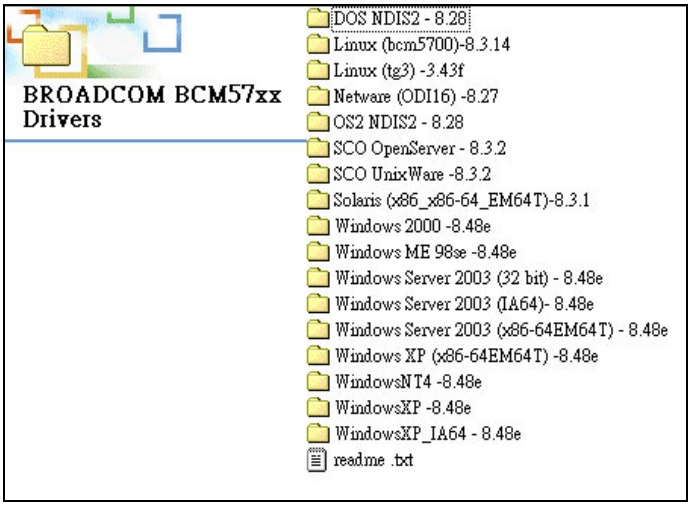


Figure 7-21: Location Browsing Window

Step 38: Click **OK** to continue. A driver files location menu window appears. Click **NEXT** to continue. The driver is installed.

7.6 Realtek HD Audio Driver (ALC883) Installation

To install the Realtek High Definition (HD) Audio driver, please follow the steps below.

7.6.1 BIOS Setup

Step 1: Enter the BIOS setup. To do this, reboot the system and press **DEL** during POST.

Step 2: Go to the Southbridge Configuration menu. Set the **Audio Controller** option to [Azalia]. See **Chapter 6** for details.

Step 3: Press **F10** to save the changes and exit the BIOS setup. The system reboots.

7.6.2 Driver Installation

Step 1: Insert the CD that came with the package.

Step 2: From the main driver menu, navigate to **X:\4-AUDIO\AC-KIT883HD\Windows** (or other appropriate OS). **X:** represents the system CD drive. A new window

appears showing the folder contents (**Figure 6-26**).

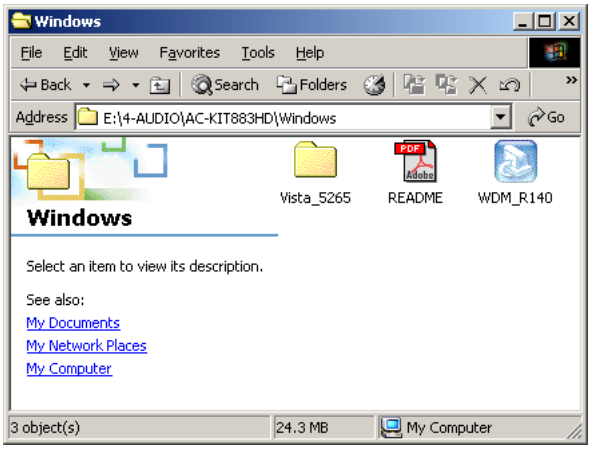


Figure 7-22: 4-AUDIO\AC-KIT883HD\Windows Folder

Step 3: Double-click the **WDM_R140** icon to begin the driver installation process.

Step 4: Once the **WDM_R140** icon is double clicked, the contents of the installation package are extracted. See **Figure 7-23.**

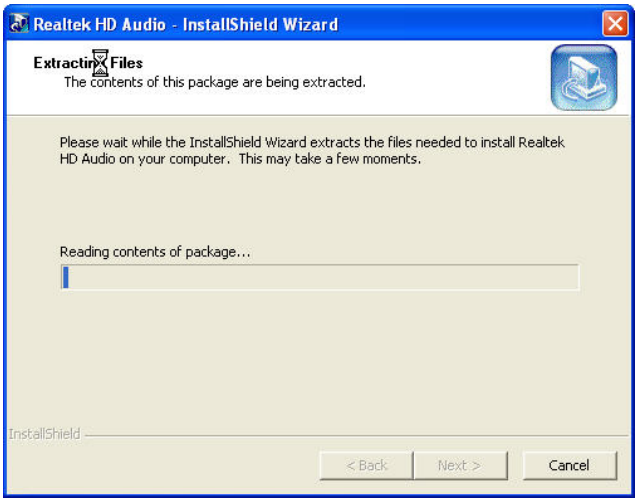


Figure 7-23: HD Audio Driver Setup Extracting Files

Step 5: The **Welcome** screen appears. Click **NEXT**. See **Figure 7-24**.

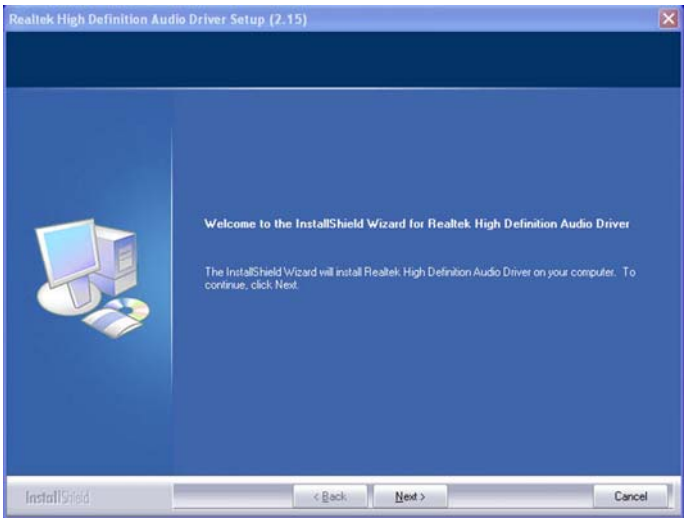


Figure 7-24: HD Audio Driver Setup Welcome Screen

Step 6: The driver is automatically installed.

Step 7: After the driver installation process is complete, a confirmation screen shown in **Figure 7-25** appears.

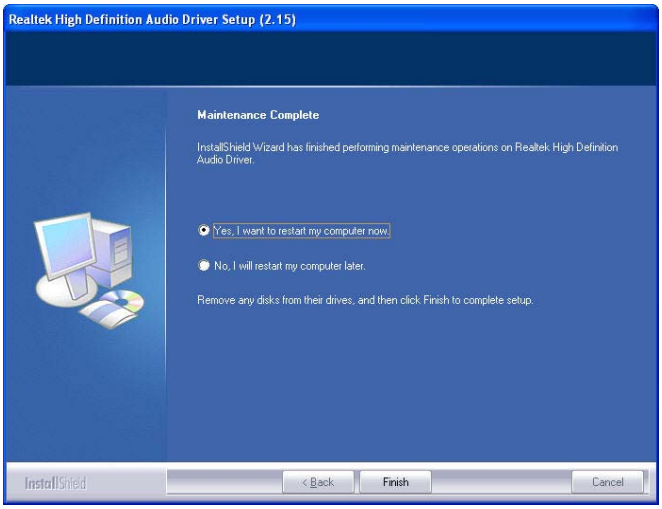


Figure 7-25: HD Audio Driver Installation Complete

Step 8: The confirmation screen shown in **Figure 7-25** allows you to restart the

computer immediately after the installation is complete or to restart the computer later. For the settings to take effect the computer must be restarted. Once you have decided when to restart the computer, click the "**FINISH**" button.

7.7 Realtek AC`97 Audio Driver (ALC665) Installation

To install the Realtek AC `97 audio driver, please follow the steps below.

7.7.1 BIOS Setup

Step 1: Enter the BIOS setup. To do this, reboot the system and press **DEL** during POST.

Step 2: Go to the Southbridge Configuration menu. Set the **Audio Controller** option to [AC`97]. See **Section 6.7.2** for details.

Step 3: Press **F10** to save the changes and exit the BIOS setup. The system reboots.

7.7.2 Driver Installation

Step 1: Insert the CD that came with the package.

Step 2: From the main driver menu, navigate to **X:\4-AUDIO\AC-KIT08R\Windows** (or other appropriate OS). **X:** represents the system CD drive. A new window appears showing the folder contents (**Figure 7-26**).

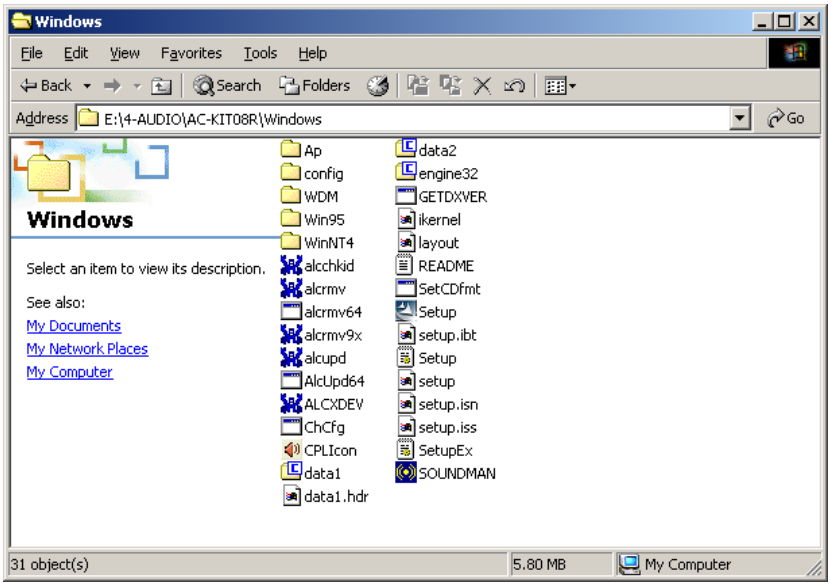


Figure 7-26: CD 4-AUDIO\AC-KIT08R\Windows Folder

Step 3: Double-click the **Setup.exe** file to begin the driver installation process.

Step 4: Once you double click the **Setup** icon, the install shield wizard for the audio driver starts. See **Figure 7-27.**

Figure 7-27: AC`97 Audio Driver Install Shield Wizard Starting

Step 5: The Realtek Audio Setup prepares the install shield to guide you through the rest of the setup process. See **Figure 7-24**.

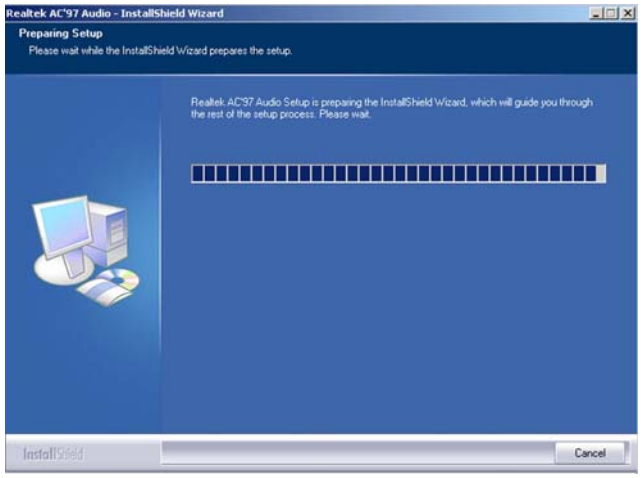


Figure 7-28: AC`97 Audio Driver Setup Preparation

Step 6: After the install shield is prepared, the welcome screen shown in **Figure 7-29** appears. To continue the installation process, click the "**NEXT**" button. The install shield starts to configure the new software as shown in **Figure 7-30**.

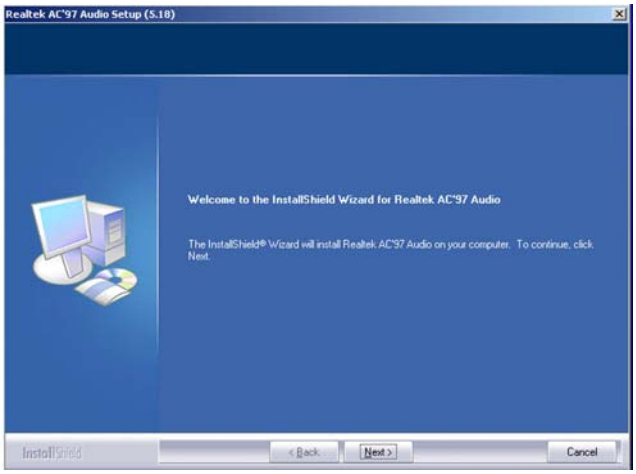


Figure 7-29: AC`97 Audio Driver Welcome Screen

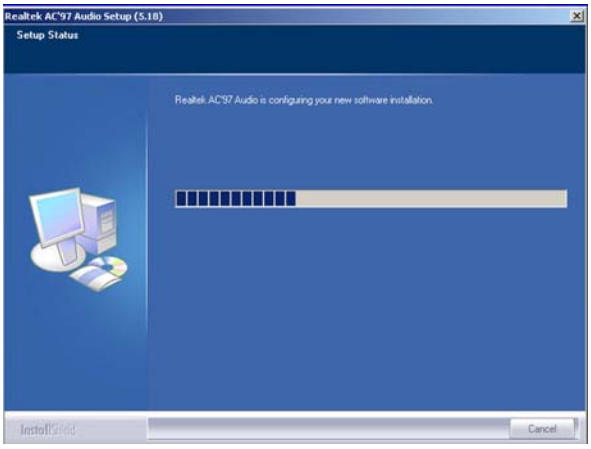


Figure 7-30: AC`97 Audio Driver Software Configuration

Step 7: At this stage the "**Digital Signal Not Found**" screen appears (**Figure 7-31**). To continue the installation process, click the "**YES**" button.

Figure 7-31: AC`97 Audio Driver Digital Signal

Step 8: After clicking the "**YES**" button in **Figure 7-31**, the installation of the driver begins (**Figure 7-32**).

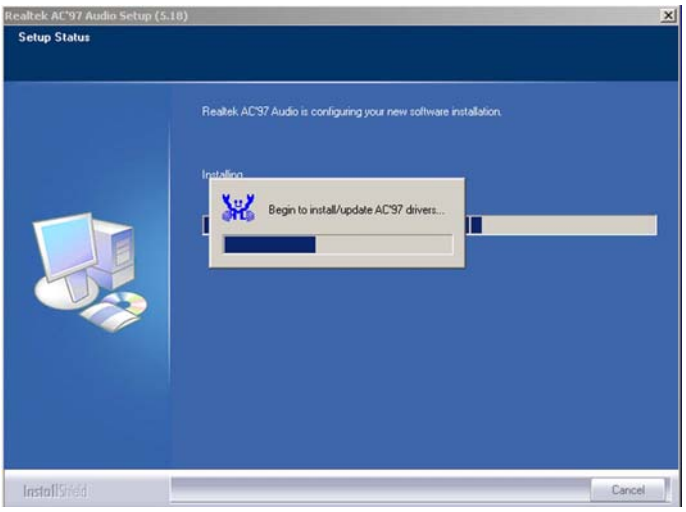


Figure 7-32: AC`97 Audio Driver Installation Begins

Step 9: After the driver installation process is complete, a confirmation screen shown in **Figure 7-33** appears.

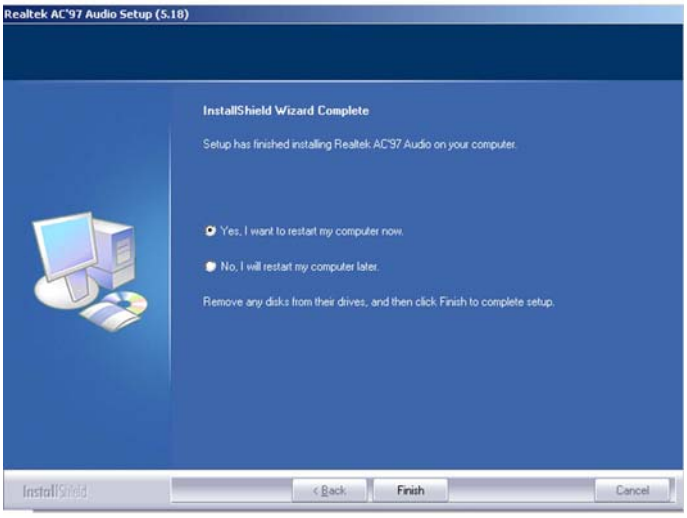


Figure 7-33: AC`97 Audio Driver Installation Complete

Step 10: The confirmation screen shown in **Figure 7-33** allows you to restart the computer immediately after the installation is complete or to restart the computer later. For the settings to take effect the computer must be restarted. Once you have decided when to restart the computer, click the "**FINISH**" button.

Appendix

A

BIOS Options

Appendix

B

Terminology

AC ’97	Audio Codec 97 (AC’97) refers to a codec standard developed by Intel® in 1997.
ACPI	Advanced Configuration and Power Interface (ACPI) is an OS-directed configuration, power management, and thermal management interface.
ATA	The Advanced Technology Attachment (ATA) interface connects storage devices including hard disks and CD-ROM drives to a computer.
APM	The Advanced Power Management (APM) application program interface (API) enables the inclusion of power management in the BIOS.
ARMD	An ATAPI Removable Media Device (ARMD) is any ATAPI device that supports removable media, besides CD and DVD drives.
ASKIR	Amplitude Shift Keyed Infrared (ASKIR) is a form of modulation that represents a digital signal by varying the amplitude (“volume”) of the signal. A low amplitude signal represents a binary 0, while a high amplitude signal represents a binary 1.
BIOS	The Basic Input/Output System (BIOS) is firmware that is first run when the computer is turned on and can be configured by the end user
CODEC	The Compressor-Decompressor (CODEC) encodes and decodes digital audio data on the system.
CompactFlash®	CompactFlash® is a solid-state storage device. CompactFlash® devices use flash memory in a standard size enclosure. Type II is thicker than Type I, but a Type II slot can support both types.
CMOS	Complimentary metal-oxide-conductor is an integrated circuit used in chips like static RAM and microprocessors.
COM	COM refers to serial ports. Serial ports offer serial communication to expansion devices. The serial port on a personal computer is usually a male DB-9 connector.

DAC	The Digital-to-Analog Converter (DAC) converts digital signals to analog signals.
DDR	Double Data Rate refers to a data bus transferring data on both the rising and falling edges of the clock signal.
DMA	Direct Memory Access (DMA) enables some peripheral devices to bypass the system processor and communicate directly with the system memory.
DIMM	Dual Inline Memory Modules are a type of RAM that offer a 64-bit data bus and have separate electrical contacts on each side of the module.
DIO	The digital inputs and digital outputs are general control signals that control the on/off circuit of external devices or TTL devices. Data can be read or written to the selected address to enable the DIO functions.
EHCI	The Enhanced Host Controller Interface (EHCI) specification is a register-level interface description for USB 2.0 Host Controllers.
EIDE	Enhanced IDE (EIDE) is a newer IDE interface standard that has data transfer rates between 4.0 MBps and 16.6 MBps.
EIST	Enhanced Intel® SpeedStep Technology (EIST) allows users to modify the power consumption levels and processor performance through application software. The application software changes the bus-to-core frequency ratio and the processor core voltage.
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.

ICH	The Input/Ouput Controll Hub (ICH) is an Intel® Southbridge chipset.
IrDA	Infrared Data Association (IrDA) specify infrared data transmission protocols used to enable electronic devices to wirelessly communicate with each other.
L1 Cache	The Level 1 Cache (L1 Cache) is a small memory cache built into the system processor.
L2 Cache	The Level 2 Cache (L2 Cache) is an external processor memory cache.
LVDS	Low-voltage differential signaling (LVDS) is a dual-wire, high-speed differential electrical signaling system commonly used to connect LCD displays to a computer.
MAC	The Media Access Control (MAC) protocol enables several terminals or network nodes to communicate in a LAN, or other multipoint networks.
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.
RAM	Random Access Memory (RAM) is volatile memory that loses data when power is lost. RAM has very fast data transfer rates compared to other storage like hard drives.
SATA	Serial ATA (SATA) is a serial communications bus designed for data transfers between storage devices and the computer chipsets. The SATA bus has transfer speeds up to 1.5 Gbps and the SATA II bus has data transfer speeds of up to 3.0 Gbps.
S.M.A.R.T	Self Monitoring Analysis and Reporting Technology (S.M.A.R.T) refers to

automatic status checking technology implemented on hard disk drives.

UART	Universal Asynchronous Receiver-transmitter (UART) is responsible for asynchronous communications on the system and manages the system's serial communication (COM) ports.
UHCI	The Universal Host Controller Interface (UHCI) specification is a register-level interface description for USB 1.1 Host Controllers.
USB	The Universal Serial Bus (USB) is an external bus standard for interfacing devices. USB 1.1 supports 12Mbps data transfer rates, while USB 2.0 supports 480Mbps data transfer rates.
VGA	The Video Graphics Array (VGA) is a graphics display system developed by IBM.

Appendix

C

DIO Interface

C.1 DIO Interface Introduction

The DIO connector on the NANO-9453 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.

C.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	Super I/O Pin	Super I/O Pin Descripton
1	Ground	N/A	N/A
2	VCC	N/A	N/A
3	Output 0	GP14	General purpose I/O port 1 bit 4.
4	Output 1	GP15	General purpose I/O port 1 bit 5.
5	Output 2	GP16	General purpose I/O port 1 bit 6.
6	Output 3	GP17	General purpose I/O port 1 bit 7.
7	Input 0	GP10	General purpose I/O port 1 bit 0.
8	Input 1	GP11	General purpose I/O port 1 bit 1
9	Input 2	GP12	General purpose I/O port 1 bit 2
10	Input 3	GP13	General purpose I/O port 1 bit 3

C.3 Assembly Language Samples

C.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

C.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

Appendix

D

Watchdog Timer

NOTE:

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

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

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

INT 15H:

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 D-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 ;
```

Appendix

E

Address Mapping

E.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
2E8-2EF	Serial Port 2 (COM2)
2F8-2FF	Serial Port 2 (COM2)
378-37F	Parallel Printer Port 1 (LPT1)
3B0-3BB	Intel Graphics Controller
3C0-3DF	Intel Graphics Controller
3E8-3EF	Serial Port 3 (COM3)
3F6-3F6	Primary IDE Channel
3F7-3F7	Standard floppy disk controller
3F8-3FF	Serial Port 1 (COM1)

Table E-1: IO Address Map

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

E.3 IRQ Mapping Table

IRQ0	System Timer	IRQ8	RTC clock
IRQ1	Keyboard	IRQ9	ACPI
IRQ2	Available	IRQ10	LAN/COM4
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 E-3: IRQ Mapping Table

E.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 E-4: IRQ Mapping Table

Appendix

F

Compatibility

NOTE:

The compatible items described here have been tested by the IEI R&D team and found to be compatible with the NANO-9453

F.1 Compatible Operating Systems

The following operating systems have been successfully run on the NANO-9453.

- Microsoft Windows 2000 with Service Pack 4
- Microsoft Windows XP with Service Pack 2
- Microsoft Windows Vista Business (32-bit)
- Microsoft Windows Vista Business (64-bit)
- Mandriva Linux 2007 (2.6.17-5mdv kernel)
- Fedora Core 7 (2.6.21-1.3194.fc7 kernel)

F.2 Compatible Processors

The following Socket M processors have been successfully tested on the NANO-9453

CPU	Model Number	Frequency	FSB
Intel® Core™2 Duo	T7600	2.33 GHz	667 MHz
Intel® Core™2 Duo	T7200	2.0 GHz	667 MHz
Intel® Core™2 Duo	T5600	1.83 GHz	667 MHz
Intel® Core™ Duo	T2500	2.5 GHz	667 MHz
Intel® Celeron® M	460	1.46 GHz	533 MHz

F.3 Compatible Memory Modules

Note:

The memory modules listed below have been tested on the NANO-9453 other memory modules that comply with the specifications may also work on the NANO-9453 but have not been tested.

The following DDR2 SO-DIMM memory modules have been successfully tested on the NANO-9453.

Manufacturer	Model No.	Capacity	Speed
A-DATA	M20AD5G3H3446I1C52	512 MB	667 MHz
Kingston	9905293-001.B00LF	512 MB	533 MHz
Kingston	99U5293-005.A00LF	512 MB	667 MHz
Kingston	9905295-029.B00LF	1.0 GB	667 MHz
Kingston	BSMM1690798	2.0 GB	667 MHz
Transcend	133135-1256	512 MB	533 MHz
Transcend	130329-0965	512 MB	533 MHz
Transcend	168300-1510	512 MB	667 MHz
Transcend	141036-0574	1.0 GB	533 MHz
Transcend	181026-0015	2.0 GB	800 MHz
Unigen	UG12T6400L8SU-6AP	1.0 GB	667 MHz

Appendix

G

Hazardous Materials Disclosure

G.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

此附件旨在确保本产品符合中国 RoHS 标准。以下表格标示此产品中某有毒物质的含量符合中国 RoHS 标准规定的限量要求。

本产品上会附有"环境友好使用期限"的标签，此期限是估算这些物质"不会有泄漏或突变"的年限。本产品可能包含有较短的环境友好使用期限的可替换元件，像是电池或灯管，这些元件将会单独标示出来。

部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (CR(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
壳体	X	O	O	O	O	X
显示	X	O	O	O	O	X
印刷电路板	X	O	O	O	O	X
金属螺帽	X	O	O	O	O	O
电缆组装	X	O	O	O	O	X
风扇组装	X	O	O	O	O	X
电力供应组装	X	O	O	O	O	X
电池	O	O	O	O	O	O

O: 表示该有毒有害物质在该部件所有物质材料中的含量均在 SJ/T11363-2006 标准规定的限量要求以下。

X: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T11363-2006 标准规定的限量要求。

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