HiCORE-i35Q
Full Size Core 2 Quad/ Core 2 Duo LGA775 SBC

User's Manual
Version 1.1

RoHS
VERIFIED

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Chapter 1

Introduction

1.1 Copyright Notice

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1.2 About this User's Manual

This User's Manual is intended for experienced users and integrators with hardware knowledge of personal computers. If you are not sure about any description in this User's Manual, please consult your vendor before further handling.

1.3 Warning

Single Board Computers and their components contain very delicate Integrated Circuits (IC). To protect the Single Board Computer and its components against damage from static electricity, you should always follow the following precautions when handling it :
1. Disconnect your Single Board Computer from the power source when you want to work on the inside
2. Hold the board by the edges and try not to touch the IC chips, leads or circuitry
3. Use a grounded wrist strap when handling computer components.
4. Place components on a grounded antistatic pad or on the bag that came with the Single Board Computer, whenever components are separated from the system

1.4 Replacing the lithium battery

Incorrect replacement of the lithium battery may lead to a risk of explosion. The lithium battery must be replaced with an identical battery or a battery type recommended by the manufacturer.
Do not throw lithium batteries into the trashcan. It must be disposed of in accordance with local regulations concerning special waste.

1.5 Technical Support

If you have any technical difficulties, please consult the user's manual first at:

ftp://ftp.arbor.com.tw/pub/manual

Please do not hesitate to call or e-mail our customer service when you still can not find out the answer.

http://www.arbor.com.tw
E-mail:info@arbor.com.tw

1.6 Warranty

This product is warranted to be in good working order for a period of two years from the date of purchase. Should this product fail to be in good working order at any time during this period, we will, at our option, replace or repair it at no additional charge except as set forth in the following terms. This warranty does not apply to products damaged by misuse, modifications, accident or disaster.

Vendor assumes no liability for any damages, lost profits, lost savings or any other incidental or consequential damage resulting from the use, misuse of, or inability to use this product. Vendor will not be liable for any claim made by any other related party.

Vendors disclaim all other warranties, either expressed or implied, including but not limited to implied warranties of merchantibility and fitness for a particular purpose, with respect to the hardware, the accompanying product's manual(s) and written materials, and any accompanying hardware. This limited warranty gives you specific legal rights.

Return authorization must be obtained from the vendor before returned merchandise will be accepted. Authorization can be obtained by calling or faxing the vendor and requesting a Return Merchandise Authorization (RMA) number. Returned goods should always be accompanied by a clear problem description.

1.7 Packing List
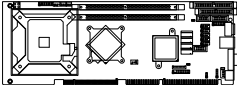
1 x HiCORE-i35Q Full Size PICMG 1.0 SBC

1 x CD-ROM

1 x Quick Installation Guide

1 x COM port flat cable
1 x FDD flat cable
1 x IDE flat cable
1 x SATA cable
1 x USB cable
1 x Keyboard & Mouse cable
4 x Mini Jumper 2.54mm

If any of the above items is damaged or missing, contact your vendor immediately.

1.8 Ordering Information

HiCORE-i35Q	Full-Size Intel Core 2 Quad / Core 2 Duo LGA775 SBC with VGA, SATA, Gigabit LAN
FCDB-1111	HD Audio Daughter Board
Cable Kit	CBK-06-035Q-00 1 x COM port flat Cable 1 x FDD flat Cable 1 x IDE flat Cable 1 x SATA Cable 1 x USB Cable 1 x Keyboard & Mouse Cable

1.9 Specifications

Form Factor	PICMG 1.0 Full size SBC
Processor	Supports socket LGA775 for Intel® Core™ 2 Quad/ Core™ 2 Duo / Conroe-L/ Conroe/ Wolfdale LGA775 Processor, FSB 800/1066/1333MHz
Chipset	Intel Q35 + ICH9
System Memory	Two 240-pin DDRII DIMM Sockets up to 4GB SDRAM, 667/800MHz
VGA Controller	Integrated with Intel® Graphics Media Accelerator (GMA3100)
Ethernet	One Realtek 8111B 10/100/1000 base-T PCIe Gb LAN
BIOS	AMI PnP Flash BIOS
I/O Controller	ITE-IT8718F
Audio	Supports Audio Daughter Board via connector
IDE Interface	1 x IDE port connector supports 1 device
Serial Port	2 COM ports (COM1: RS-232, COM2: RS-232/422/485 selectable)
Floppy	1 x Floppy Drive Disk
Keyboard / Mouse	1 x Mini-DIN Keyboard and Mouse connector
Universal Serial Bus	12 x USB port 2.0 compliant
Watchdog Timer	255-Level Reset
DIO	4-bit Digital Input / 4-bit Digital Output
IrDA	1 x IrDA connector
Security	Support TPM Daughter Board via connector
Operation Temp.	0ºC - 60ºC (32ºF ~ 140ºF)
Power Connector	4-pin ATX12V type and ATX Feature
Dimension (L x W)	338 x 122 mm (13.3" x 4.8")

1.10 Board Dimensions

Unit: mm

1.11 Installing the CPU

The LGA775 processor socket comes with a lever to secure the processor. Please refer to the pictures step by step as below.
Please note that the cover of the LGA775 socket must always be installed during transport to avoid damage to the socket.

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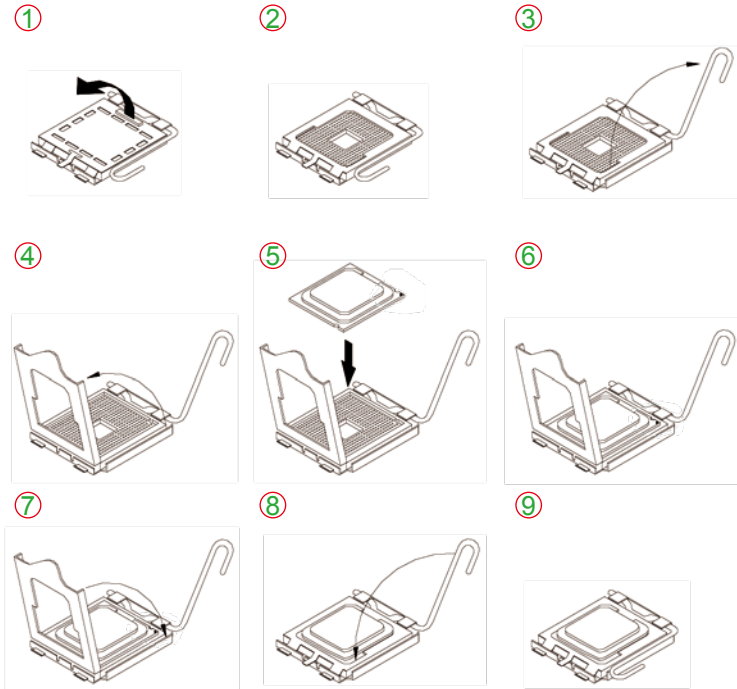
Make sure that heat sink of the CPU top surface is in complete contact to avoid the CPU overheating problem.
If not, it would cause your system or CPU to be hanged, unstable, damaged.

1.12 Installing the Memory

To install the Memory module, locate the Memory DIMM slot on the board and perform as below:
1. Hold the Memory module so that the key of the Memory module align with those on the Memory DIMM slot.
2. Gently push the Memory module in an upright position and a right way until the clips of the DIMM slot close to lock the Memory module in place, when the Memory module touches the bottom of the DIMM slot.
3. To remove the Memory module, just pressing the clips of DIMM slot with both hands.

Lock   Lock
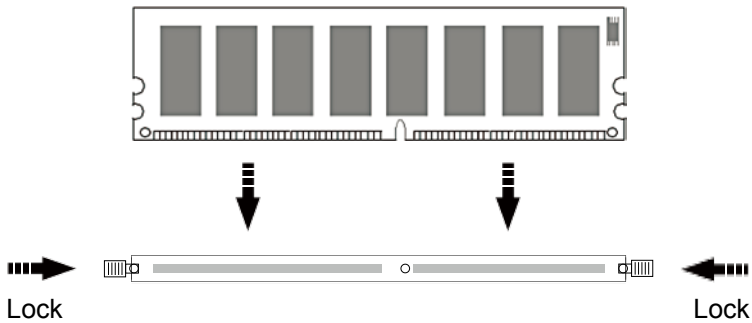
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Chapter 2

Installation

2.1 Block Diagram
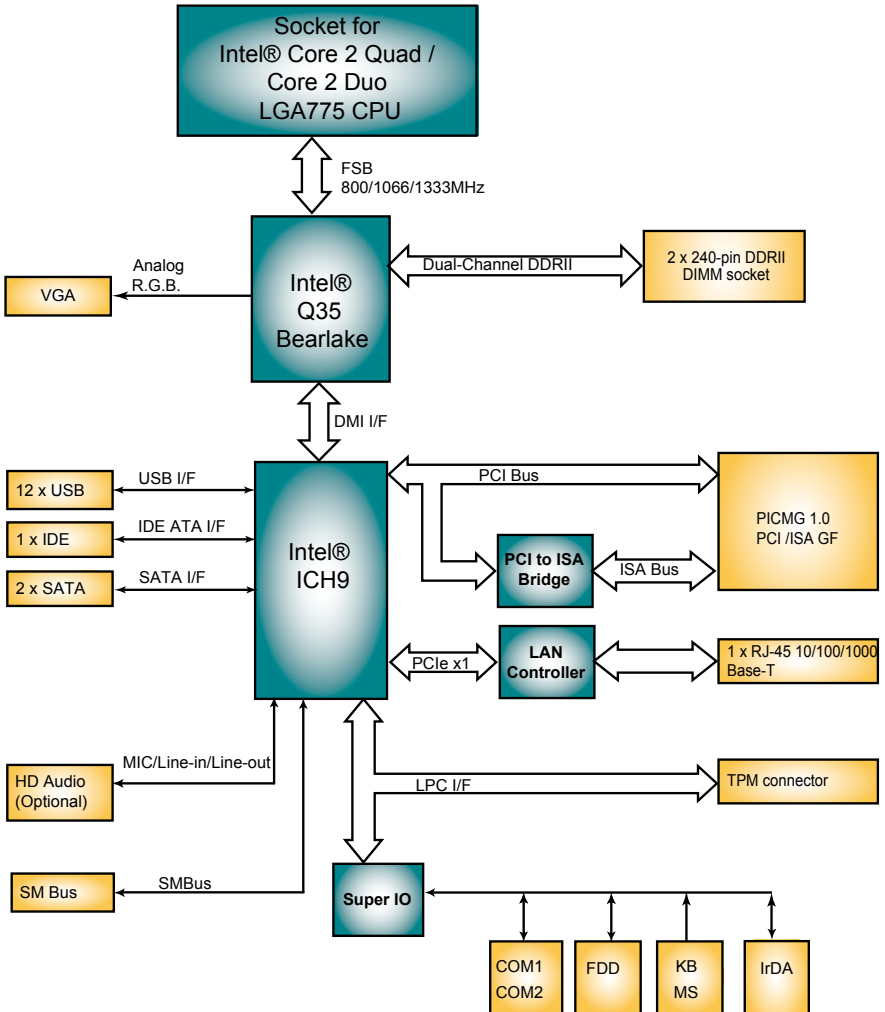
2.2 Jumpers and Connectors
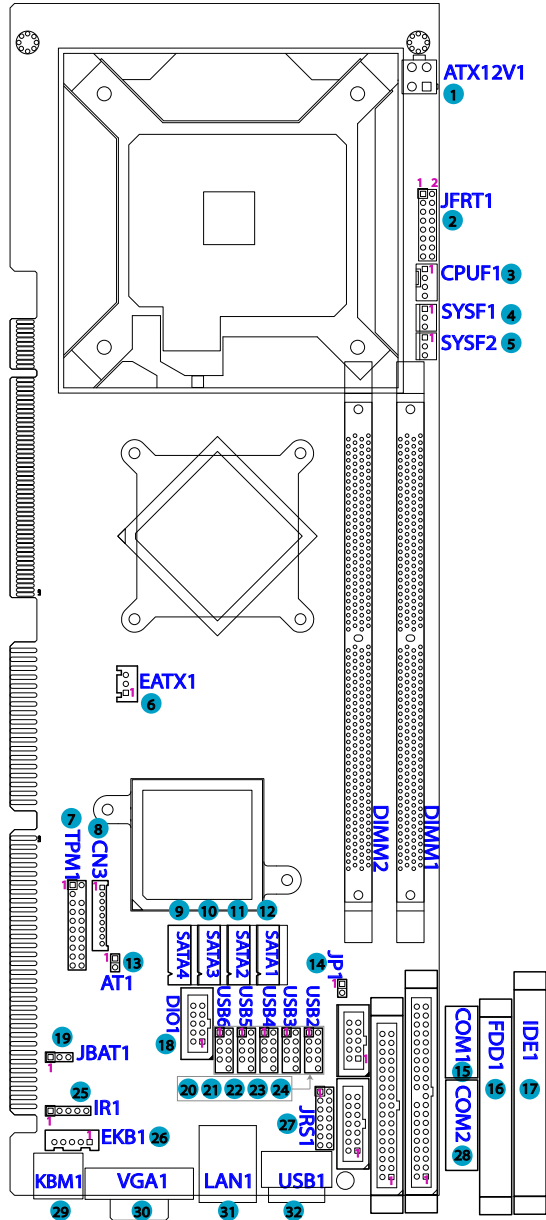
Jumpers

AT1: AT/ATX Power Mode (13)

The power mode jumper selects the power mode for the system.
Connector type: 2.54mm pitch 1x2 pin header.

Pin 1-2	Mode	
Short	AT Mode	▭
Open	ATX Mode (Default)	▭○

JP1: PATA IDE Enable/ Disable Select (14)

Connector type: 2.54mm pitch 1x2 pin header.

Pin 1-2	Function Select	
Short	Disable	▭
Open	Enable (Default)	▭○

JBAT1: Clear CMOS Setup (19)

If the board refuses to boot due to inappropriate CMOS settings here is how to proceed to clear (reset) the CMOS to its default values.
Connector type: 2.54 mm pitch 1x3 pin header

Pin	Mode	
1-2	Keep CMOS (Default)	3 2 1
2-3	Clear CMOS	3 2 1

You may need to clear the CMOS if your system cannot boot up because you forgot your password, the CPU clock setup is incorrect, or the CMOS settings need to be reset to default values after the system BIOS has been updated.
Refer to the following solutions to reset your CMOS setting:

Solution A:
1. Power off the system and disconnect the power cable.
2. Place a shunt to short pin 1 and pin 2 of JBAT1 for five seconds.
3. Place the shunt back to pin 2 and pin 3 of JBAT1.
4. Power on the system.

Solution B:
If the CPU Clock setup is incorrect, you may not be able to boot up. In this case, follow these instructions:
1. Turn the system off, then on again. The CPU will automatically boot up using standard parameters.
2. As the system boots, enter BIOS and set up the CPU clock.

Note:
If you are unable to enter BIOS setup, turn the system on and off a few times.

JRS1: COM2 RS-232/422/485 Mode Select (13)

Connector type: 2.54 mm pitch 2x7 pin header

Mode	RS-232 (Default)	RS-422	RS-485
1-2	Off	On	On
3-4	Off	On	On
5-6	Off	Off	On
7-8	Off	On	Off
9-10	Off	On	On
11-12	On	Off	Off
13-14	Off	Off	On
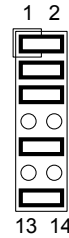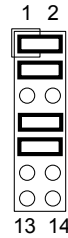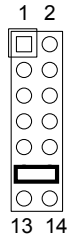
Connectors

ATX12V1: ATX 12V Connector (1)

ATX12V1 supplies the CPU operation ATX +12V (Vcore).

Pin	Description	Pin	Description
2	GND	1	GND
4	+12V	3	+12V
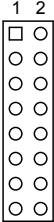
JFRT1: Switches and Indicators (2)

It provides connectors for system indicators that provides light indication of the computer activities and switches to change the computer status.
Connector type: 2.54 mm pitch 2x8 pin header

Pin	Description	Pin	Description
1	Power LED+	2	PWRBTN+
3	GND	4	PWRBTN-
5	GND	6	RESET+
7	HDD LED+	8	RESET-
9	HDD LED-	10	SPEAKER+
11	SMBCLK	12	SPEAKER+
13	SMBDATA	14	GND
15	GND	16	+5V

PLED: Power LED Connector, pin 1, 3.

> This 2-pin connector connects to the case-mounted power LED. Power LED can be indicated when the CPU card is on or off. And keyboard lock can be used to disable the keyboard function so the PC will not respond by any input.

HLED: HDD LED Connector, pin 7, 9.

> This 2-pin connector connects to the case-mounted HDD LED to indicate hard disk activity.

SM Bus: SM Bus connector, pin 11, 13, 15.

PWRBTN: ATX soft power switch, pin 2, 4.

> This 2-pin connector connects to the case-mounted Power button.

RES: Reset Button, pin 6, 8.

> This 2-pin connector connects to the case-mounted reset switch and is used to reboot the system.

SPK: External Speaker, pin 10, 12, 14, 16.

> This 4-pin connector connects to the case-mounted speaker.

CPUF1: CPU Fan Power Connector (3)

Connector type: 2.54 mm pitch 1x4 wafer one wall connector

Pin	Description
1	GND
2	+12V
3	Fan_ Detect
4	Fan Speed Control
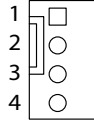
SYSF1/SYSF2: System Fan Power Connectors (4), (5)

SYSF1 and SYSF2 are 3-pin header for the system fan. The fan must be a +12V fan.

Pin	Description
1	GND
2	+12V
3	FAN_Detect
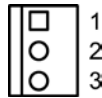
EATX1: ATX Feature Connector (6)

Connector type: 2.54mm pitch 1x3-pin box wafer connector

Pin	Description
1	PS-ON
2	GND
3	5V_SB

TPM1: Trusted Platform Module Connector (7)

The TPM connector on the HiCORE-i35Q is interfaced to the Intel ICH9 south bridge through the LPC bus. This board supports TPM version 1.2 devices for enhanced security.

Connector type: 2.54mm pitch 2x10 pin header

Pin	Description	Pin	Description
1	CLK	2	GND
3	LFRAME	4	N/C
5	LRESET	6	N/C
7	LAD3	8	LAD2
9	+3.3V	10	LAD1
11	LAD0	12	GND
13	N/C	14	N/C
15	+3.3V_SB	16	SERIRQ
17	GND	18	CLKRUN
19	PD	20	N/C
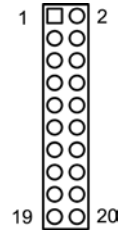
CN3: HD AUDIO Daughter Board connector (8)

The HiCORE-i35Q onboard audio connector can connect to an optional audio kit through an onboard audio connector. The codec on the optional audio kit is connected to the ICH9 south brigde audio controller through the High Definition audio interface.

Connector type: 2.00mm pitch 1x9 box wafer connector.

Pin	Description
1	+12V
2	+3.3V
3	AC_SYNC
4	AC_SD-OUT
5	GND
6	AC-BCLK
7	GND
8	AC_RST#
9	AC_SDIN0
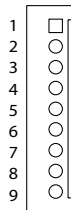
SATA1~2: Serial ATA Connectors (9) ~ (10)

The HiCORE-i35Q CPU board on board supports two SATA II connectors, second generation SATA drives transfer data at speeds as high as 300MB/s, twice the transfer speed of first generation SATA drives.

Pin	Description
1	GND
2	TX+
3	TX-
4	GND
5	RX-
6	RX+
7	GND

COM1: RS-232 Serial Port Connector (15)

Connector type: 2.54mm pitch 2x5 pin header.

Pin	Description	Pin	Description
1	DCD1#	2	DSR1#
3	RXD1	4	RTS1#
5	TXD1	6	CTS1#
7	DTR1#	8	RI1#
9	GND	10	GND
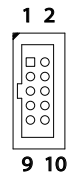
FDD1: FDD Connector (16)

A floppy disk drive ribbon cable has two connectors to support two floppy disk drives. The connector with twisted wires always connects to drive A; the connector with untwisted wires connects to drive B. You must orient the cable connector so that the pin 1 (color) edge of the cable corresponds with pin 1 of the FDD port connector.

Connector type: 2.54 mm pitch 2x17 box header

Pin	Description	Pin	Description
1	GND	2	DRVDEN0
3	GND	4	N/C
5	GND	6	DRVDEN1
7	GND	8	INDEX#
9	GND	10	MOA#
11	GND	12	DSB#
13	GND	14	DSA#
15	GND	16	MOB#
17	GND	18	DIR#
19	GND	20	STEP#
21	GND	22	WDATA#
23	GND	24	WGATE#
25	GND	26	TRACK0#
27	GND	28	WP#
29	GND	30	RDATA#
31	GND	32	HEAD#
33	GND	34	DSKCHG#
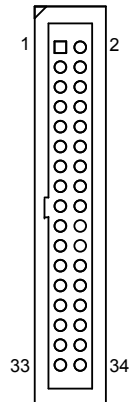
IDE1: Primary IDE Connector (17)

An IDE drive ribbon cable has two connectors to support two IDE devices. If a ribbon cable connects to two IDE drives at the same time, one of them has to be configured as Master and the other has to be configured as Slave by setting the drive select jumpers on the drive.

Consult the documentation that came with your IDE drive for details on jumper locations and settings. You must orient the cable connector so that the pin 1 (color) edge of the cable corresponds to pin 1 of the IDE connector.

Connector type: 2.54mm pitch 2x20 box header

Pin	Description	Pin	Description
1	IDE RESET	2	GND
3	DATA7	4	DATA8
5	DATA6	6	DATA9
7	DATA5	8	DATA10
9	DATA4	10	DATA11
11	DATA3	12	DATA12
13	DATA2	14	DATA13
15	DATA1	16	DATA14
17	DATA0	18	DATA15
19	GND	20	N/C (Key)
21	REQ	22	GND
23	IO WRITE	24	GND
25	IO READ	26	GND
27	IO READY	28	IDESEL
29	DACK	30	GND
31	IRQ14	32	N/C
33	ADDR1	34	ATA66 DETECT
35	ADDR0	36	ADDR2
37	CS0#	38	CS1# (HDSELET1)
39	IDEACTP	40	GND
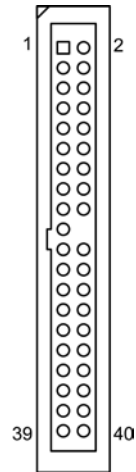
DIO1: Digital I/O Connector (18)

DIO1 is a 8-bit DIO connector that supports 4-bit In/ 4-bit Out.
Connector type: 2.54 mm pitch 2x5 box header

Pin	Description	Pin	Description
1	DO0	2	DI0
3	DO1	4	DI1
5	DO2	6	DI2
7	DO3	8	DI3
9	+5V	10	GND
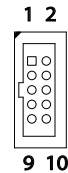
USB2~6: USB Connectors (20) ~ (24)

The HiCORE-i35Q CPU board on board supports five headers USB2, USB3, USB4, USB5 and USB6 that can connect up to 10 high-speed (Data transfers at 480MB/s), full-speed (Data transfers at 12MB/s) or low-speed (Data transfers at 1.5MB/s) USB devices.
Connector type: 2.54mm 2x5 pin header

Pin	Description	Pin	Description
1	+5V	2	+5V
3	USBD-	4	USBD-
5	USBD+	6	USBD+
7	GND	8	GND
9	N/C (Key)	10	N/C
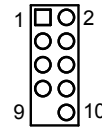
IR1: Infrared Connector (25)

Connector type: 2.54mm pitch 1x5 pin header

Pin	Voltage
1	+5V
2	N/C
3	IRRX
4	GND
5	IRTX
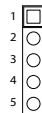
The IR connector can be configured to support wireless infrared module, user can transfer files to or from notebooks, PDA and printers.
Install infrared module onto IrDA connector and enable infrared function from BIOS setup and make sure to have correct orientation when you plug onto IrDA connector.

EKB1: External keyboard Connector (26)

Connector type: 2.54mm pitch 1x5-pin box wafer connector

Pin	Description
1	KB_CLK
2	KB_DATA
3	N/C
4	GND
5	+5V
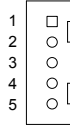
COM2: RS-232/422/485 Serial Port Connector (28)

The onboard COM2 port can be configured to operate in RS-422 or RS-485 modes. RS-422 modes differ in the way RX/TX is being handled. Jumper JRS1 switches between RS-232 or RS-422/485 mode. All of the RS-422/485 are available on COM2.

Connector type: 2.54mm pitch 2x7 pin header.

Pin	Description	Pin	Description
1	DCD2#	2	DSR2#
3	RXD2	4	RTS2#
5	TXD2	6	CTS2#
7	DTR2#	8	RI2#
9	GND	10	GND
11	TX+	12	TX-
13	RX+	14	RX-
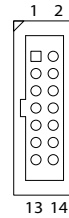
Note:
If you configured the port to RS-485 mode, the signals TX and RX should be already connected.

KBM1: Keyboard & Mouse connector (29)

Mini-Din Keyboard & Mouse connector

Pin	Description
1	KB Data
2	MS Data
3	GND
4	+5V
5	KB Clock
6	MS Clock
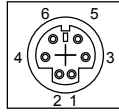
Note: KBM1 supports PS/2 keyboard directly, and PS/2 mouse supported with the additional PS/2 1-to-2 cable in standard packing.

VGA1: CRT Connector (30)

Connector type: D-Sub 15-pin female.

Pin	Description	Pin	Description
1	RED	9	+5V
2	GREEN	10	GND
3	BLUE	11	N/C
4	N/C	12	VDDAT
5	GND	13	HSYNC
6	GND	14	VSYNC
7	GND	15	VDCLK
8	GND		
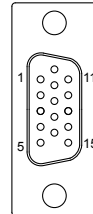
LAN1: RJ-45 connector (31)

LAN1 supports one Ethernet connector on bracket.
Connector type: RJ-45.
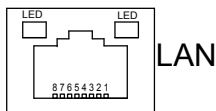
USB1: Double Stack USB type A connector (32)

The HiCORE-i35Q CPU board on bracket supports two type A USB connectors that can connect up to two high-speed (Data transfers at 480MB/s), full-speed (Data transfers at 12MB/s) or low-speed (Data transfers at 1.5MB/s) USB devices.

Connector type: double stack USB type A.

USB

USB
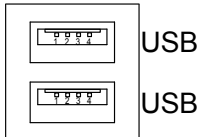
2.3 The Installation Paths of CD Driver

Driver	Path
CHIPSET	\Chipset\Intel\INF 8.4
LAN	\Ethernet\Realtek\8111B_WIN5646 \Ethernet\Realtek\8111B_VISTA_6203_0225
VGA	\Graphics\Intel_2K_XP_32\1432 \Graphics\Intel_VISTA_32\1561 \Graphics\Intel_VISTA_64\156

Chapter 3

BIOS

3.1 BIOS Main Setup

The AMI BIOS provides a Setup utility program for specifying the system configurations and settings. The BIOS ROM of the system stores the Setup utility.

When you turn on the computer, the AMI BIOS is immediately activated. The Main allows you to select several configuration options. Use the left/right arrow keys to highlight a particular configuration screen from the top menu bar or use the down arrow key to access and configure the information below.

```
                          BIOS SETUP UTILITY
  Main    Advanced    PCIPnP    Boot    Security    Chipset    Exit

  System Overview                                     Use [ENTER], [TAB]
  ─────────────────                                   or [SHIFT-TAB] to
  AMIBIOS                                             select a field.
  Build Date:03/13/08
                                                     Use [+] or [-] to
  Processor                                          configure system Time.

  Speed      :2400MHz
  Count      :1

  System Memory
  Size       :1015MB
                                                 ←    Select Screen
  System Time             [16:57:44]            ↑↓   Select Item
  System Date             [Thu 03/13/2008]      +-   Change Field
                                                 Tab  Select Field
                                                 F1   General Help
                                                 F10  Save and Exit
                                                 ESC  Exit

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```

System Time
Set the system time.
The time format is: **Hour :** 00 to 23
                         Minute : 00 to 59
                         Second : 00 to 59

System Date

Set the system date. Note that the 'Day' automatically changes when you set the date.

The date format is: **Day :** Sun to Sat
                              Month : 1 to 12
                              Date : 1 to 31
                              Year : 1999 to 2099

3.2 Advanced Settings

```
                        BIOS SETUP UTILITY
   Main    Advanced    PCIPnP    Boot    Security    Chipset    Exit

   Advanced Settings                               Configure CPU.

   WARNING: Setting wrong values in below sections
            may cause system to malfunction.

   ▶ CPU Configuration
   ▶ IDE Configuration
   ▶ Floppy Configuration
   ▶ SuperIO Configuration
   ▶ Hardware Health Configuration
   ▶ ACPI/APM Configuration
   ▶ Remote Access Configuration
   ▶ USB Configuration                        ←    Select Screen
                                              ↑↓   Select Item
                                              Enter Go to Sub Screen
                                              F1    General Help
                                              F10   Save and Exit
                                              ESC   Exit


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```

3.2.1 CPU Configuration

The CPU Configuration setup screen varies depending on the installed processor.

```
                          BIOS SETUP UTILITY
        Advanced

  Configure advanced CPU settings              When disabled, force
  Module Version:3F.01                         the XD feature flag to
                                               always return 0.
  Manufacturer:Intel

  Frequency    :2.40GHz
  FSB Speed    :800MHz
  Cache L1     :32 KB
  Cache L2     :512 KB
  Ratio Actual Value:12

  Execute-Disable Bit Capability [Enabled]
  PECI                    [Enabled]      ←    Select Screen
  Core Multi-Processing   [Enabled]      ↑↓   Select Item
  Intel(R) SpeedStep(tm) tech  [Enabled] +-   Change Option
                                         F1   General Help
                                         F10  Save and Exit
                                         ESC  Exit


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```

3.2.2 IDE Configuration

```
                      BIOS SETUP UTILITY
   Advanced

 IDE Configuration                              While entering setup,
                                                BIOS auto detects the
 ▶ Primary IDE Master        : [Not Detected]   presence of IDE
 ▶ Secondary IDE Master      : [Not Detected]   devices. This displays
 ▶ Third IDE Master          : [Not Detected]   the status of auto
                                                detection of IDE
                                                devices.




                                                ←    Select Screen
                                                ↑↓   Select Item
                                                +-   Change Option
                                                F1   General Help
                                                F10  Save and Exit
                                                ESC  Exit


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```

Primary/Secondary/Third IDE Master

Select one of the hard disk drives to configure it. Press <Enter> to access its the sub menu.

3.2.3 Floppy Configuration

```
                    BIOS SETUP UTILITY
  Advanced

  Floppy Configuration                           Select the type of
  _____       floppy drive
                                                  connected to the
  Floppy A                  [1.44 MB 3½"]         system.




                                                  ←    Select Screen
                                                  ↑↓   Select Item
                                                  +-   Change Option
                                                  F1   General Help
                                                  F10  Save and Exit
                                                  ESC  Exit


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```

Select the type of floppy disk drive installed in your system.
The choice:
    None
    360K 5.25"
    1.2M 5.25"
    720K 3.5"
    1.44M 3.5"
    2.88M 3.5"

3.2.4 Super IO Configuration

```
                        BIOS SETUP UTILITY
     Advanced

  Super IO Configuration                          Allows BIOS to Enable
                                                  or Disable Floppy
  OnBoard Floppy Controller     [Enabled]         Controller.
  Serial Port1 Address          [3F8/IRQ4]
  Serial Port2 Address          [2F8/IRQ3]
   Serial Port2 Mode            [Normal]




                                                  ←    Select Screen
                                                  ↑↓   Select Item
                                                  +-   Change Option
                                                  F1   General Help
                                                  F10  Save and Exit
                                                  ESC  Exit


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```
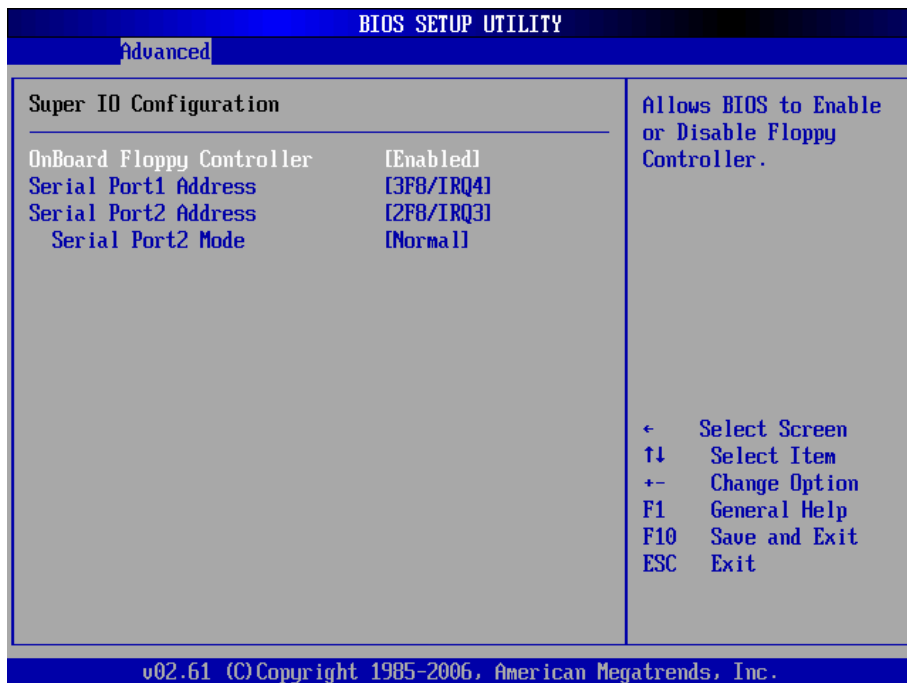
Onboard Floppy Controller

Select "Enabled" if your system has a floppy disk controller (FDC) installed on the system board and you wish to use it. If you install and-in FDC or the system has no floppy drive, select Disabled in this field.

The Choice: Enabled, Disabled

Serial Port1 / Port2 Address

Select an address and corresponding interrupt for the first and second serial ports.
The choice:
    3F8/IRQ4, 2E8/IRQ3, 3E8/IRQ4, 2F8/IRQ3, Disabled, Auto

Serial Port2 Mode

Allows BIOS to select mode for serial Port2.

3.2.5 Hardware Health Configuration

```
                        BIOS SETUP UTILITY
     Advanced

 Hardware Health Configuration                    Enables Hardware
                                                  Health Monitoring
 H/W Health Function          [Enabled]           Device.
 CPU Fan Mode Setting         [Full On mode]

 System Temperature           :30°C/86°F
 CPU Temperature              :29°C/84°F

 System Fan Speed             :N/A
 CPU Fan Speed                :4591 RPM
 Chassis Fan Speed            :N/A

 VDIMM                        :1.808 V           ←     Select Screen
 Vcore                        :1.264 V           ↑↓    Select Item
 +3.30V                       :3.280 V           +-    Change Option
 +5.00V                       :4.838 V           F1    General Help
 +12.0V                       :11.840 V          F10   Save and Exit
 -12.0V                       :-12.052 V         ESC   Exit
 5Vsb                         :4.945 V
 VBAT                         :3.072 V

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```

H/W Health Function

Enables Hardware Health Monitoring Device.

CPU FAN Mode Setting

This item allows you to set CPU fan speed control mode.

System / CPU / Chassis Fan Speed

Show you the current System / CPU / Chassis Fan operating speed.

VDIMM

Show you the voltage level of the DRAM.

Vcore

Show you the voltage level of CPU (Vcore).

+3.30V / +5.00V / +12.0V / -12.0V / 5Vsb / VBAT

Show you the voltage level of the +3.3V, +5.0V, +12.0V, -12.0V, +5V standby and battery.

3.2.6 ACPI/APM Configuration

```
                           BIOS SETUP UTILITY
    Advanced

 ACPI/APM Configuration                            Enable / Disable
                                                   ACPI support for
 ACPI Configuration                                Operating System.
 ACPI Aware O/S            [Yes]
                                                   ENABLE: If OS
 APM Configuration                                 supports ACPI.
 Power Management/APM      [Enabled]
 Power Button Mode        [On/Off]                 DISABLE: If OS
 Restore on AC Power Loss [Power On]               does not support
                                                   ACPI.
 Advanced Resume Event Controls
 Resume On Ring           [Disabled]
 Resume On PME#           [Disabled]               ←    Select Screen
 Resume On RTC Alarm      [Disabled]               ↑↓   Select Item
                                                   +-   Change Option
                                                   F1   General Help
                                                   F10  Save and Exit
                                                   ESC  Exit


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```

ACPI Aware O/S

This item allows you to enable/disable the Advanced Configuration and Power Management (ACPI)

The Choice: Enabled, Disabled.

Power Management/APM

This category allows you to select the type (or degree) of power saving and is directly related to the following modes:
1. HDD Power Down
2. Doze Mode
3. Suspend Mode

Power Button Mode
Pressing the power button for more than 4 seconds forces the system to enter the Soft-Off state when the system has "hang".

The Choice: Delay 4 Sec, On/Off

Restore on AC Power Loss by IO
This item allows you to select if you want to power on the system after power failure.

Advanced Resume Event Controls

Resume On Ring
An input signal on the serial Ring Indicator (RI) line (in other words an incoming call on the modem) awakens the system from a soft off state.

The Choice: Enabled, Disabled

Resume On PME#
An input signal from a PME on the PCI card awakens the system from a soft off state.

The Choice: Enabled, Disabled

Resume On RTC Alarm
When "Enabled", you can set the date and time at which the RTC (real-time clock) alarm awakens the system from Suspend mode.

The Choice: Enabled, Disabled

3.2.7 Remote Access Configuration

```
                          BIOS SETUP UTILITY
   Advanced

  Configure Remote Access type and parameters        Select Remote Access
 _____     type.

  Remote Access                  [Enabled]

  Serial port number             [COM1]
      Base Address, IRQ          [3F8h, 4]
  Serial Port Mode               [115200 8,n,1]
  Flow Control                   [None]
  Redirection After BIOS POST    [Always]
  Terminal Type                  [ANSI]
  VT-UTF8 Combo Key Support      [Enabled]
  Sredir Memory Display Delay    [No Delay]

                                                  ←    Select Screen
                                                  ↑↓   Select Item
                                                  +-   Change Option
                                                  F1   General Help
                                                  F10  Save and Exit
                                                  ESC  Exit


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```
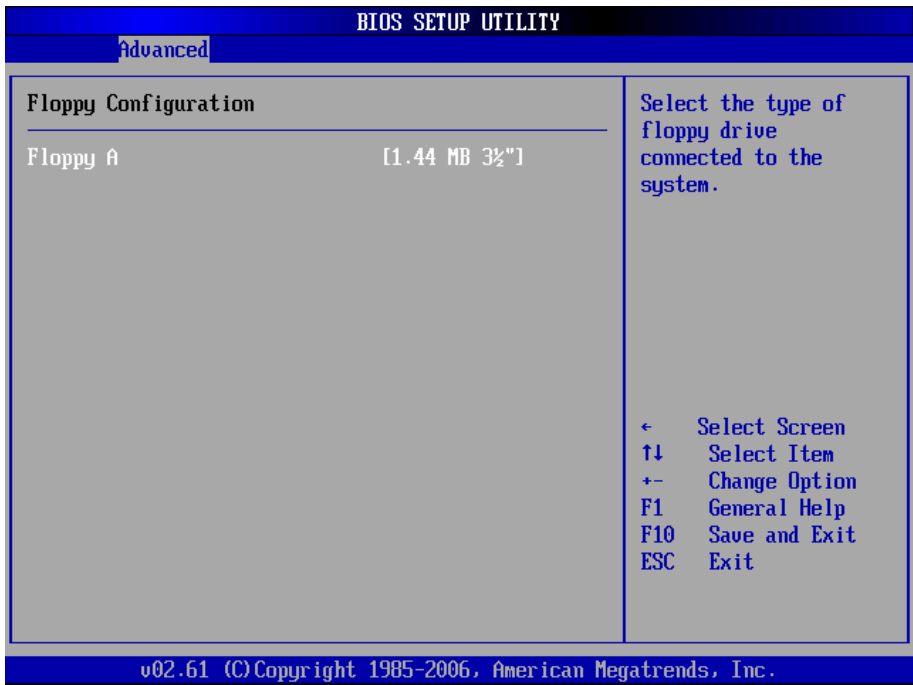
Remote Access

Configure Remote Access type and parameters.

The Choice: Enabled, Disabled.

Serial port number

Select Serial Port for console redirection. Make sure the selected port is enabled.

The Choice: COM1, COM2.

Base Address, IRQ

Select Serial Port for console redirection. Make sure the selected port is enabled.

The Choice:
    3F8, IRQ4
    2E8, IRQ3
    3E8, IRQ4
    2F8, IRQ3

Serial Port Mode

Select Serial Port settings.

Flow Control

Select Flow Control for console redirection.

Redirection After BIOS POST

Disable: Turns off the redirection after POST BOOT Loader, redirection is active during POST and during BOOT Loader.

Always: Redirection is always active. (Note: Some OSs may not work if set to Always)

Enable: Keep it, Disabled: Deactivate

Terminal Type

Select the target terminal type.

VT-UTF8 Combo Key Support

Enable VT-UTF8 Combination Key Support for ANSI/VT100 terminals.

Sredir Memory Display Delay

Gives the delay in seconds to display memory information.

3.2.8　USB Configuration

```
                        BIOS SETUP UTILITY
  Advanced

 USB Configuration                          Enables support for
 ─────────────────────────────────────     legacy USB. AUTO
 Module Version - 2.24.3-13.4               option disables
                                            legacy support if
 USB Devices Enabled :                      no USB devices are
   1 Drive                                  connected.

 Legacy USB Support           [Enabled]
 USB 2.0 Controller Mode      [HiSpeed]
 BIOS EHCI Hand-Off           [Enabled]

 ▶ USB Mass Storage Device Configuration

                                            ←     Select Screen
                                            ↑↓    Select Item
                                            +-    Change Option
                                            F1    General Help
                                            F10   Save and Exit
                                            ESC   Exit


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```

Legacy USB Support

Enables support for legacy USB. AUTO option disables legacy support if no USB devices are connected.

USB 2.0 Controller Mode

Configures the USB 2.0 controller in High Speed (480Mbps) or Full Speed (12MBPS).

BIOS EHCI Hand-Off

This is a work around for OSs without EHCI hand-Off support. The EHCI ownership change should claim by EHCI driver.

USB Mass Storage Device Configuration

Number of seconds POST waits for the USB mass storage device after start unit command.

Emulation Type

If Auto, USB devices less than 530MB will be emulated as Floppy and remaining as hard drive. Forced FDD option can be used to force a HDD formatted drive to BOOT as FDD. (Ex. ZIP drive).

3.3 Advanced PCI/PnP Settings

```
                        BIOS SETUP UTILITY
  Main    Advanced    PCIPnP    Boot    Security    Chipset    Exit

  Advanced PCI/PnP Settings                        ▲    Clear NVRAM during
                                                        System Boot.
  WARNING: Setting wrong values in below sections
           may cause system to malfunction.

  Clear NVRAM                       [No]
  Plug & Play O/S                   [No]
  PCI Latency Timer                 [64]
  Allocate IRQ to PCI VGA           [Yes]
  PCI IDE BusMaster                 [Enabled]
  Clock Spread Spectrum             [Disabled]

  IRQ3                              [Available]      ←    Select Screen
  IRQ4                              [Available]      ↑↓   Select Item
  IRQ5                              [Available]      +-   Change Option
  IRQ7                              [Available]      F1   General Help
  IRQ9                              [Available]      F10  Save and Exit
  IRQ10                             [Available]      ESC  Exit
  IRQ11                             [Available]
  IRQ14                             [Available]
  IRQ15                             [Available]

  DMA Channel 0                     [Available]      ←    Select Screen
  DMA Channel 1                     [Available]      ↑↓   Select Item
  DMA Channel 3                     [Available]      +-   Change Option
  DMA Channel 5                     [Available]      F1   General Help
  DMA Channel 6                     [Available]      F10  Save and Exit
  DMA Channel 7                     [Available]      ESC  Exit

  Reserved Memory Size              [Disabled]       ▼

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```

Clear NVRAM

Clear NVRAM during System BOOT.

The Choice: Yes, No.

Plug & Play O/S

No: Lets the BIOS configure all the devices in the system.
Yes: lets the operating system configure Plug and Play (PnP) devices not required for BOOT if your system has a Plug and Play operating system.

PCI Latency Timer

Value in units of PCI clocks for PCI device latency timer register.

Allocate IRQ to PCI VGA

Yes: Assigns IRQ to PCI VGA card if card requests IRQ.
No: Does not assign IRQ to PCI VGA card even if card requests an IRQ.

PCI IDE BusMaster

Enabled: BIOS uses PCI busMastering for reading / writing to IDE drives.

Clock Spread Spectrum

This item allows you to enable/disable the spread spectrum function.

The Choice: Enabled, Disabled.

IRQ3 - IRQ15

Available: Specified IRQ is available to be used by PCI/PnP devices.
Reserved: Specified IRQ is reserved for use by Legacy ISA devices.

DMA Channel 0 - DMA Channel 7

Available: Specified DMA is available to be used by PCI/PnP devices.
Reserved: Specified DMA is reserved for use by Legacy ISA devices.

Reserved Memory Size

Size of memory block to reserve for legacy ISA devices.

3.4 Boot Settings

```
                      BIOS SETUP UTILITY
  Main    Advanced    PCIPnP    Boot    Security    Chipset    Exit

  Boot Settings                                  Configure Settings
  ──────────────                                 during System Boot.
  ▶ Boot Settings Configuration

  ▶ Boot Device Priority
  ▶ Hard Disk Drives
  ▶ Removable Drives

                                                 ←    Select Screen
                                                 ↑↓   Select Item
                                                 Enter Go to Sub Screen
                                                 F1   General Help
                                                 F10  Save and Exit
                                                 ESC  Exit

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```

Boot Device Priority

Press Enter and it shows Bootable add-in devices.

Hard Disk Drives

Press Enter and it shows Bootable Hard Disk drives.

Removable Drives

Press Enter and it shows Bootable and Removable drives.

3.4.1 Boot Settings Configuration

```
                        BIOS SETUP UTILITY
                              Boot

 Boot Settings Configuration                      Allows BIOS to skip
 ─────────────────────────────                    certain tests while
 Quick Boot              [Enabled]                booting. This will
 Bootup Num-Lock         [On]                     decrease the time
 Interrupt 19 Capture    [Disabled]               needed to boot the
 LAN Boot Function       [Disabled]               system.




                                                  ←     Select Screen
                                                  ↑↓    Select Item
                                                  +-    Change Option
                                                  F1    General Help
                                                  F10   Save and Exit
                                                  ESC   Exit


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```

Quick Boot

Allows BIOS to skip certain tests while booting. This will decrease the time needed to boot the system.

Bootup Num-Lock

Set this value to allow the Number Lock setting to be modified during boot up.

Interrupt 19 capture

Enabled: Allows option ROMs to trap interrupt 19. This is required by some PCI cards that provide a ROM based setup utility.

LAN Boot Function

Set this option to LAN add-on Boot ROM function.

3.5 Security

```
                        BIOS SETUP UTILITY
  Main     Advanced    PCIPnP    Boot    Security    Chipset    Exit

  Security Settings                                  Install or Change the
                                                     password.
  Supervisor Password :Not Installed
  User Password       :Not Installed

  Change Supervisor Password
  Change User Password
  Clear User Password

  Boot Sector Virus Protection   [Disabled]

                                                ←    Select Screen
                                                ↑↓   Select Item
                                                Enter Change
                                                F1   General Help
                                                F10  Save and Exit
                                                ESC  Exit


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```

Supervisor Password & User Password

You can set either supervisor or user password, or both of then. The differences between are:

Set *Supervisor Password*: Can enter and change the options of the setup menus.

Set *User Password*: Just can only enter but do not have the right to change the options of the setup menus. When you select this function, the following message will appear at the center of the screen to assist you in creating a password.

ENTER PASSWORD:

Type the password, up to eight characters in length, and press <Enter>. The password typed now will clear any previously entered password from CMOS memory. You will be asked to confirm the password. Type the password again and press <Enter>. You may also press <ESC> to abort the selection and not enter a password.

To disable a password, just press <Enter> when you are prompted to enter the password. A message will confirm the password will be disabled. Once the password is disabled, the system will boot and you can enter Setup freely.

PASSWORD DISABLED.

When a password has been enabled, you will be prompted to enter it every time you try to enter Setup. This prevents an unauthorized person from changing any part of your system configuration.

Additionally, when a password is enabled, you can also require the BIOS to request a password every time your system is rebooted. This would prevent unauthorized use of your computer.

You determine when the password is required within the BIOS Features Setup Menu and its Security option. If the Security option is set to "System", the password will be required both at boot and at entry to Setup. If set to "Setup", prompting only occurs when trying to enter Setup.

Boot Sector Virus Protection

Enable/Disable Boot Sector Virus Protection.

3.6 Advanced Chipset Settings

3.6.1 North Bridge Chipset Configuration

```
                          BIOS SETUP UTILITY
                                             Chipset

 North Bridge Chipset Configuration                      Options

 DRAM Frequency                   [Auto]         Auto
 Configure DRAM Timing by SPD     [Enabled]      667 MHz
                                                 800 MHz
 Initate Graphic Adapter          [PEG/PCI]      1067 MHz
 Internal Graphics Mode Select    [Enabled, 8MB]

 Video Function Configuration
 DVMT Mode Select                 [DVMT Mode]
   DVMT/FIXED Memory              [256MB]

                                             ←    Select Screen
                                             ↑↓   Select Item
                                             +-   Change Option
                                             F1   General Help
                                             F10  Save and Exit
                                             ESC  Exit


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```

DRAM Frequency

The item allows you to set the DRAM frequency.

Configure DRAM Timing by SPD

Select the operating system that is selecting SRAM timing, so select SPD for setting SDRAM timing by SPD.

The Choice: Enable, Disable

Initate Graphic Adapter

Select which graphics controller to use as the primary boot device.

Internal Graphic Mode Select

Select the amount of system memory used by the Internal graphics device.

VIdeo Function Configuration

DVMT Mode Select

This item allows you to configure the DVMT Mode.

The Choice: Fixed , DVMT

DVMT/FIXED Memory

This item allows you to configure the DVMT memory size.

The Choice: 128MB, 256MB.

3.6.2 South Bridge Chipset Configuration

```
                        BIOS SETUP UTILITY
                                              Chipset

  South Bridge Chipset Configuration                    Options

  USB Functions               [12 USB Ports]      Disabled
  USB Port Configure          [6X6 USB Ports]     2 USB Ports
  USB 2.0 Controller          [Enabled]           4 USB Ports
  HDA Controller              [Disabled]          6 USB Ports
                                                  8 USB Ports
  SLP_S4# Min. Assertion Width  [4 to 5 seconds]  10 USB Ports
                                                  12 USB Ports


                                                  ←    Select Screen
                                                  ↑↓   Select Item
                                                  +-   Change Option
                                                  F1   General Help
                                                  F10  Save and Exit
                                                  ESC  Exit


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```

USB Funtion

This item allows you to active USB ports.

The Choice:
    Disabled
    2 USB Ports
    4 USB Ports
    6 USB Ports
    8 USB Ports
    10 USB Ports
    12 USB Ports

USB 2.0 Controller

Select "Enabled" if your system contains a Universal Serial Bus 2.0 (USB 2.0) controller and you have USB peripherals.

The Choice: Enabled, Disabled.

HDA Controller

This item allows you to select the chipset family to support High Definition Audio Controller. If an HD Audio daughter board is connected, select Enabled in this field.

The Choice: Enabled, Disabled (Default).

SLP_S4# Min. Assertion Width

The item allows you to select the assertion width of SLP_S4#.
The Choice:

    4 to 5 Seconds.
    3 to 4 Seconds.
    2 to 3 Seconds.
    1 to 2 Seconds.

3.7 Exit Options

Save Changes and Exit

```
                         BIOS SETUP UTILITY
  Main    Advanced    PCIPnP    Boot    Security    Chipset    Exit

  Exit Options                                    Exit system setup
  ─────────────────────────────────              after saving the
  Save Changes and Exit                          changes.
  Discard Changes and Exit
  Discard Changes                                F10 key can be used
                                                 for this operation.
  Load Optimal D
  Load Failsafe
              Save configuration changes and exit setup?


                   [Ok]              [Cancel]
                                                         ct Screen
                                            ↑↓    Select Item
                                            Enter Go to Sub Screen
                                            F1    General Help
                                            F10   Save and Exit
                                            ESC   Exit



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```

Pressing <Enter> on this item asks for confirmation:

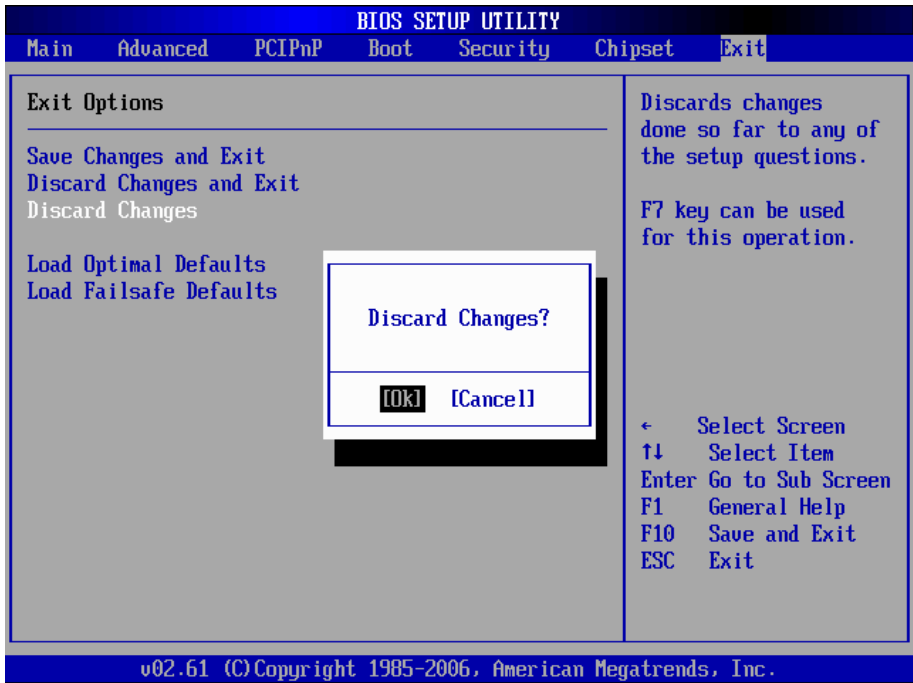Save configuration changes and exit setup?

Pressing <OK> stores the selection made in the menus in CMOS - a special section of memory that stays on after you turn your system off. The next time you boot your computer, the BIOS configures your system according to the Setup selections stored in CMOS. After saving the values the system is restarted again.

Discard Changes and Exit

```
                        BIOS SETUP UTILITY
  Main    Advanced    PCIPnP    Boot    Security    Chipset    Exit

  Exit Options                                    Exit system setup
  ─────────────────────────────                   without saving any
  Save Changes and Exit                           changes.
  Discard Changes and Exit
  Discard Changes                                 ESC key can be used
                                                  for this operation.
  Load Optimal Defaul┌──────────────────────────┐
  Load Failsafe Defau│                          │
                     │ Discard changes and exit setup? │
                     │                          │
                     │    [Ok]      [Cancel]    │
                     └──────────────────────────┘    Select Screen
                                                ↑↓    Select Item
                                                Enter Go to Sub Screen
                                                F1    General Help
                                                F10   Save and Exit
                                                ESC   Exit


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```

Exit system setup without saving any changes.
<ESC> key can be used for this operation.

Discard Changes

```
                        BIOS SETUP UTILITY
  Main    Advanced    PCIPnP    Boot    Security    Chipset    Exit

  Exit Options                                 Discards changes
  ─────────────────                            done so far to any of
  Save Changes and Exit                        the setup questions.
  Discard Changes and Exit
  Discard Changes                              F7 key can be used
                                               for this operation.
  Load Optimal Defaults
  Load Failsafe Defaults
                      ┌─────────────────────┐
                      │                     │
                      │   Discard Changes?  │
                      │                     │
                      │    [Ok]   [Cancel]  │  ←      Select Screen
                      └─────────────────────┘  ↑↓     Select Item
                                               Enter  Go to Sub Screen
                                               F1     General Help
                                               F10    Save and Exit
                                               ESC    Exit


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```

Discards changes done so far to any of the setup questions.
<F7> can be used for this operation.

Load Optimal Defaults

```
                          BIOS SETUP UTILITY
   Main    Advanced    PCIPnP    Boot    Security    Chipset    Exit

   Exit Options                                    Load Optimal Default
   ─────────────                                   values for all the
   Save Changes and Exit                           setup questions.
   Discard Changes and Exit
   Discard Changes                                 F9 key can be used
                                                   for this operation.
   Load Optimal Defaults
   Load Failsafe Defaults
                         Load Optimal Defaults?


                           [Ok]    [Cancel]
                                                   ←     Select Screen
                                                   ↑↓    Select Item
                                                   Enter Go to Sub Screen
                                                   F1    General Help
                                                   F10   Save and Exit
                                                   ESC   Exit


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```

When you press <Enter> on this item you get a confirmation dialog box with a message:

<div align="center">

Load Optimal Defaults?
[OK]   [Cancel]

</div>

Pressing [OK] loads the BIOS Optimal Default values for all the setup questions.

<F9> key can be used for this operation.

Load Failsafe Defaults

When you press <Enter> on this item you get a confirmation dialog box with a message:

<div align="center">

Load Failsafe Defaults?
[OK]   [Cancel]

</div>

Pressing [OK] loads the BIOS Failsafe Default values for all the setup questions.

<F8> key can be used for this operation.

3.8 Beep Sound codes list
3.8.1 Boot Block Beep codes

Number of Beeps	Description
1	Insert diskette in floppy drive A:
2	'AMIBOOT.ROM' file not found in root directory of diskette in A:
4	Flash Programming successful
5	Floppy read error
6	Keyboard controller BAT command failed
7	No Flash EPROM detected
8	Floppy controller failure
9	Boot Block BIOS checksum error
10	Flash Erase error
11	Flash Program error
12	'AMIBOOT.ROM' file size error
13	BIOS ROM image mismatch (file layout does not match image present in flash device)

3.8.2 POST BIOS Beep codes

Number of Beeps	Description
1	Memory refresh timer error.
2	Parity error in base memory (first 64KB block)
4	Motherboard timer not operational
5	Processor error
6	8042 Gate A20 test error (cannot switch to protected mode)
7	General exception error (processor exception interrupt error)
8	Display memory error (system video adapter)
9	AMIBIOS ROM checksum error
10	CMOS shutdown register read/write error
11	Cache memory test failed

3.8.3 Troubleshooting POST BIOS Beep codes

Number of Beeps	Description
1, 2 or 3	Reseat the memory, or replace with known good modules.
4-7, 9-11	Fatal error indicating a serious problem with the system. Consult your system manufacturer. Before declaring the motherboard beyond all hope, eliminate the possibility of interference by a malfunctioning add-in card. Remove all expansion cards except the video adapter. • If beep codes are generated when all other expansion cards are absent, consult your system manufacturer's technical support. • If beep codes are not generated when all other expansion cards are absent, one of the add-in cards is causing the malfunction. Insert the cards back into the system one at a time until the problem
8	If the system video adapter is an add-in card, replace or reseat the video adapter. If the video adapter is an integrated part of the system board, the board may be faulty.

3.9 AMI BIOS Checkpoints

3.9.1 Bootblock Initialization Code Checkpoints

The Bootblock initialization code sets up the chipset, memory and other components before system memory is available. The following table describes the type of checkpoints that may occur during the bootblock initialization portion of the BIOS [(Note)]:

Checkpoint	Description
Before D0	If boot block debugger is enabled, CPU cache-as-RAM functionality is enabled at this point. Stack will be enabled from this point.
D0	Early Boot Strap Processo (BSP) initialization like microcode update, frequency and other CPU cirtical initialization. Early chipset initialization is done.
D1	Early super I/O initialization is done including RTC and keyboard controller. Serial port is enabled at this point if needed for debugging. NMI is deisabled. Perfrom keyboard controller BAT test. Save power-on CPUID value in scretch CMOS. Go to flat mode with 4GB limit and GA20 enabled.
D2	Verify the boot block checksum. System will hang here if checksum is bad.
D3	Disable CACHE before memory detection. Execute full memory sizing module. If memory sizing module not executed, start memory refresh and do memory sizing in Boot block code. Do additional chipset initialization. Re-enabled CACHE. Verify that flat mode is enabled.
D4	Test base 512KB memory. Adjust policies and cache first 8MB. Set stack.
D5	Bootblock code is copied from ROM to lower system memory and control is given to it. BIOS now executes out of RAM. Copies compressed boot block code to memory in right segments. Copies BIOS from ROM to RAM for faster access. Perfroms main BIOS checksum and updates recovery status accordingly.

D6	Both key sequence and OEM specific method is checked to determine if BIOS recovery is forced. If BIOS recovery is necessary, control flows tocheckpoint E0. Seed *Bootblock Recovery Code Checkpoints* section of document for more information.
D7	Restore CPUID value back into register. The Bootblock-Runtime interface module is moved to system memory and control is given to it. Determine whether in memory.
D8	The Tuntime module is uncompressed into memory. CPUID information is stored in memory.
D9	Store the Uncompressed pointer for future use in PMM. Copying Main BIOS into memory. Leaves all RAM below 1MB Read-Write including E000 and F000 shadow areas but closing SMRAM.
DA	Restore CPUID value back into register. Give control to BIOS POS (ExecutePOSTKernel). See *POST Code Checkpoints* section of document for more information.
DC	System is saking from ACPI S3 state.
E1 - E8 EC - EE	OEM memory detection / configuration error. This range is reserved for chipset vendors & system manufacturers. The error associated with this value may be different from one platform to be next.

3.9.2 Bootblock Recovery Code Checkpoints

The Bootblock recovery code gets control when the BIOS determines that a BIOS recovery needs to occur because the user has forced the update or the BIOS checksum is corrupt. The following table describes the type of checkpoints that may occur during the Bootblock recovery portion of the BIOS [Note]:

Checkpoint	Description
E0	Initialize the floppy controller in the super I/O. Some interrupt vectors are initialized. DMA controller is initialized. 8259 interrupt controller is initialized. L2 cache is enabled.
E9	Set up floppy controller and data. Attempt to red from floppy.
EA	Enable ATAPI hardware. Attempt to read from ARMD and ATAPI CDROM.
EB	Disable ATAPI hardware. Jump back to checkpoint E9.
EF	Read error occurred on media. Jump back to checkpoint EB.
F0	Search for pre-defined recovery file name in root directory.
F1	Recovery file not found.
F2	Start reading FAT table and analyze FAT to find the clusters occupied by the recovery file.
F3	Start reading the recovery file cluster by cluster.
F5	Disable L1 cache.
FA	Check the validity of the recovery file configuration to the current configuration of the flash part.
FB	Make flash write enabled through chipset and OEM specific method. Detect proper flash part. Verify that the found flash part size equals the recovery file size.
F4	The recovery file size does not equal the found flash part size.

FC	Erase the flash part.
FD	Program the flash part.
FF	The flash has been updated successfully. Make flash write disabled. Disable ATAPI hardware. Restore CPUID value back into register. Give control to F000 ROM at F000:FFF0h.

3.9.3 POST Code Checkpoints

The POST code checkpoints are the largest set of checkpoints during the BIOS pre-boot process. The following table describes the type of checkpoints that may occur during the POST portion of the BIOS [(Note)]:

Checkpoint	Description
03	Disable NMI, Parity, video for EGA, and DMA controllers. Initialize BIOS, POST, Runtime data area. Also initialize BIOS modules on POST entry and GPNV area. Initialized CMOS as mentioned in the Kernel Variable "wCMOSFlags."
04	Check CMOS diagnostic byte to determine if battery power is OK and CMOS checksum is OK. Verify CMOS checksum manually by reading storage area.
	If the CMOS checksum is bad, update CMOS with power-on default values and clear passwords. Initialize status register A.
	Initializes data variables that are based on CMOS setup questions.
	Initializes both the 8259 compatible PICs in the system.
05	Initializes the interrupt controlling hardware (generally PIC) and interrupt vector table.
06	Do R/W test to CH-2 count reg. Initialize CH-0 as system timer. Install the POSTINT1Ch handler. Enable IRQ-0 in PIC for system timer interrupt.
	Traps INT1Ch vector to "POSTINT1ChHandlerBlock."
07	Fixes CPU POST interface calling pointer.
08	Initializes the CPU. The BAT test is being done on KBC. Program the keyboard controller command byte is being done after Auto detection of KB/MS using AMI KB-5.
C0	Early CPU Init Start -- Disable Cache - Init Local APIC
C1	Set up boot strap processor Information
C2	Set up boot strap processor for POST
C5	Enumerate and set up application processors
C6	Re-enable cache for boot strap processor

C7	Early CPU Init Exit
0A	Initializes the 8042 compatible Key Board Controller.
0B	Detects the presence of PS/2 mouse.
0C	Detects the presence of Keyboard in KBC port.
0E	Testing and initialization of different Input Devices. Also, update the Kernel Variables. Traps the INT09h vector, so that the POST INT09h handler gets control for IRQ1. Uncompress all available language, BIOS logo, and Silent logo modules.
13	Early POST initialization of chipset registers.
20	Relocate System Management Interrupt vector for all CPU in the system.
24	Uncompress and initialize any platform specific BIOS modules. GPNV is initialized at this checkpoint.
2A	Initializes different devices through DIM. See DIM Code Checkpoints section of document for more information.
2C	Initializes different devices. Detects and initializes the video adapter installed in the system that have optional ROMs.
2E	Initializes all the output devices.
31	Allocate memory for ADM module and uncompress it. Give control to ADM module for initialization. Initialize language and font modules for ADM. Activate ADM module.
33	Initializes the silent boot module. Set the window for displaying text information.
37	Displaying sign-on message, CPU information, setup key message, and any OEM specific information.

38	Initializes different devices through DIM. See DIM Code Checkpoints section of document for more information. USB controllers are initialized at this point.
39	Initializes DMAC-1 & DMAC-2.
3A	Initialize RTC date/time.
3B	Test for total memory installed in the system. Also, Check for DEL keys to limit memory test. Display total memory in the system.
3C	Mid POST initialization of chipset registers.
40	Detect different devices (Parallel ports, serial ports, and coprocessor in CPU, … etc.) successfully installed in the system and update the BDA, EBDA…etc.
52	Updates CMOS memory size from memory found in memory test. Allocates memory for Extended BIOS Data Area from base memory. Programming the memory hole or any kind of implementation that needs an adjustment in system RAM size if needed.
60	Initializes NUM-LOCK status and programs the KBD typematic rate.
75	Initialize Int-13 and prepare for IPL detection.
78	Initializes IPL devices controlled by BIOS and option ROMs.
7C	Generate and write contents of ESCD in NVRam.
84	Log errors encountered during POST.
85	Display errors to theuser and gets the user response for error.
87	Execute BIOS setup if needed / requested. Check boot password if installed.
8C	Late POST initialization of chipset registers.
8D	Build ACPI tables (if ACPI is supported)
8E	Program the peripheral parameters. Enable/Disalbe NMI as selected.
90	Initialization of system management interrupt by invoking all handlers.
A1	Lian-up work needed before booting to OS.

A2	Takes care of runtime image preparation for different BIOS modules. Fill the free area in F000h segment with 0FFh. Initializes the Microsoft IRQ Routing Table. Prepares the runtime language module. Disables the system configuration display if needed.
A4	Initialize runtime language module. Display boot option popup menu.
A7	Displays the system configuration screen if enabled. Initialize the CPU's before boot, which includes the programming of the MTRR's.
A9	Wait for userinput at config display if needed.
AA	Uninstall POST INT1Ch vector and INT09h vector.
AB	Prepare BBS for Int 19 boot. Init MP tables.
AC	End of POST initialization of chipset registers. De-initializes the ADM module.
B1	Save system context for ACPI. Prepare CPU for OS boot including final MTRR values.
00	Passes control to OS Loader (typically INT19h).

3.9.4 DIM Code Checkpoints

The Device Initialization Manager (DIM) gets control at various times during BIOS POST to initialize different system buses. The following table describes the main checkpoints where the DIM module is accessed *(Note)*:

Checkpoint	Description
2A	Initialize different buses and perform the following functions: Reset, Detect, and Disable (function 0); Static Device Initialization (function); Boot Output Device Initialization (function 2). Function 0 disables all device nodes, PCI devices, and PnP ISA cards. It also assigns PCI bus numbers. Function 1 initializes all static devices that include manual configured onboard peripherals, memory and I/O decode windows in PCI-PCI bridges, and noncompliant PCI devices. Static resources are also reserved. Function 2 searches for and initializes any PnP, PCI, or AGP video devices.
38	Initialize different buses and perform the following functions: Boot Input Device Initialization (function 3); IPL Device Initialization (function 4); General Device Initialization (function 5). Function 3 searches for and configures PCI input devices and detects if system has standard keyboard controller. Function 4 searches for and configures all PnP and PCI boot devices. Function 5 configures all onboard peripherals that are set to an automatic configuration and configures all remaining PnP and PCI devices.

While control is in the different functions, additional checkpoints are output to port 80h as a word value to identify the routines under execution. The low byte value indicates the main POST Code Checkpoint. The high byte is divided into two nibbles and contains two fields. The details of the high byte of these checkpoints are as follows:

HIGH BYTE XY

The upper nibble "X" indicates the function number that is being executed. "X" can be from 0 to 7.

        0 = func#0, disable all devices on the BUS concerned.
        2 = func#2, output device initialization on the BUS concerned.
        3 = func#3, input device initialization on the BUS concerned.
        4 = func#4, IPL device initialization on the BUS concerned.
        5 = func#5, general device initialization on the BUS concerned.
        6 = func#6, error reporting for the BUS concerned.
        7 = func#7, add-on ROM initialization for all BUSes.
        8 = func#8, BBS ROM initialization for all BUSes.

The lower nibble 'Y' indicates the BUS on which the different routines are being executed. 'Y' can be from 0 to 5.

        0 = Generic DIM (Device Initialization Manager).
        1 = On-board System devices.
        2 = ISA devices.
        3 = EISA devices.
        4 = ISA PnP devices.
        5 = PCI devices.

3.9.5 ACPI Runtime Checkpoints

ACPI checkpoints are displayed when an ACPI capable operating system either enters or leaves a sleep state. The following table describes the type of checkpoints that may occur during ACPI sleep or wake events *(Note)*:

Checkpoint	Description
AC	First ASL check point. Indicates the system is running in ACPI mode.
AA	System is running in APIC mode.
01, 02, 03, 04, 05	Entering sleep state S1, S2, S3, S4, or S5.
10, 20, 30, 40, 50	Waking from sleep state S1, S2, S3, S4, or S5.

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Chapter 4

Appendix

4.1 I/O Port Address Map

Each peripheral device in the system is assigned a set of I/O port addresses which also becomes the identity of the device.
The following table lists the I/O port addresses used.

Address	Device Description
00000000 - 0000000F	DMA Controller
00000080 - 0000009F	DMA Controller
000000C0 - 000000DF	DMA Controller
00000020 - 00000021	Programmable Interrupt Controller
000000A0 - 000000A1	Programmable Interrupt Controller
00000040 - 00000043	System Timer
00000044 - 00000047	System Timer
00000060 - 00000064	Keyboard Controller
00000070 - 00000073	System CMOS/Real Time Clock
000000F0 - 000000FF	Math Co-processor
00000170 - 00000177	Secondary IDE
000001F0 - 000001F7	Primary IDE
00000274 - 00000277	ISAPNP Read Data Port
00000279, 00000A79	ISAPNP Configuration
000002F8 - 000002FF	Communications Port (COM2, If use)
00000376 - 00000376	Secondary IDE
000003B0 - 000003BF	MDA/MGA
000003C0 - 000003CF	EGA/VGA
000003D4 - 000003D9	CGA CRT register
000003F0 - 000003F7	Floppy Diskette
000003F6 - 000003F6	Primary IDE
000003F8 - 000003FF	Communications Port (COM1, If use)
00000400 - 0000041F	South Bridge SMB
00000480 - 000004BF	South Bridge GPIO
00000800 - 0000087F	ACPI

00000A00 - 00000A07	PME
00000A10 - 00000A17	Hardware Monitor
0000CF8	PCI Configuration address
00000CFC	PCI Configuration Data

4.2 Interrupt Request Lines (IRQ)

Peripheral devices use interrupt request lines to notify CPU for the service required. The following table shows the IRQ used by the devices on board.

Level	Function
IRQ 0	System Timer
IRQ 1	Keyboard Controller
IRQ 2	VGA and Link to Secondary PIC
IRQ 3	Communications Port (COM2)
IRQ 4	Communications Port (COM1)
IRQ 5	PCI Device
IRQ 6	Standard Floppy Disk Controller
IRQ 7	Parallel Port
IRQ 8	System CMOS/real time clock
IRQ 9	Microsoft ACPI-Compliant System
IRQ 10	PCI Device
IRQ 11	PCI Device
IRQ 12	PS/2 Compatible Mouse
IRQ 13	FPU Exception
IRQ 14	IDE Controller
IRQ 15	IDE Controller

4.3 BIOS memory mapping

Address	Device Description
00000h - 9FFFFh	DOS Kernel Area
A0000h, BFFFFh	EGA and VGA Video Buffer (128KB)
C00000h - CFFFFh	EGA/VGA ROM
D0000h - DFFFFh	Adaptor ROM
E00000h - FFFFFh	System BIOS