EmCORE-i290H

EPIC Compact Board

User's Manual

Version 1.0

CE

2012.09

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Contents

Chapter 1

Introduction

1.1 Copyright Notice

All Rights Reserved.

The information in this document is subject to change without prior notice in order to improve the reliability, design and function. It does not represent a commitment on the part of the manufacturer.

Under no circumstances will the manufacturer be liable for any direct, indirect, special, incidental, or consequential damages arising from the use or inability to use the product or documentation, even if advised of the possibility of such damages.

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1.2 Declaration of Conformity

CE

The CE symbol on your product indicates that it is in compliance with the directives of the Union European (EU). A Certificate of Compliance is available by contacting Technical Support.

This product has passed the CE test for environmental specifications when shielded cables are used for external wiring. We recommend the use of shielded cables. This kind of cable is available from ARBOR. Please contact your local supplier for ordering information.

This product has passed the CE test for environmental specifications. Test conditions for passing included the equipment being operated within an industrial enclosure. In order to protect the product from being damaged by ESD (Electrostatic Discharge) and EMI leakage, we strongly recommend the use of CE-compliant industrial enclosure products.

> Warning
> This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

FCC Class A

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in which case the user will be required to correct the interference at his own expense.

RoHS

ARBOR Technology Corp. certifies that all components in its products are in compliance and conform to the European Union's Restriction of Use of Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive 2002/95/EC.

The above mentioned directive was published on 2/13/2003. The main purpose of the directive is to prohibit the use of lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB), and polybrominated diphenyl ethers (PBDE) in electrical and electronic products. Member states of the EU are to enforce by 7/1/2006.

Declaration of SVHC / REACH Conformity

To minimize the environmental impact and take more responsibility to the earth we live, Arbor hereby confirms all products comply with the restriction of SVHC (Substances of Very High Concern) in (EC) 1907/2006 (REACH --Registration, Evaluation, Authorization, and Restriction of Chemicals) regulated by the European Union.

All substances listed in SVHC < 0.1 % by weight (1000 ppm)

1.3 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.

1.4 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.

1.5 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 trash-can. It must be disposed of in accordance with local regulations concerning special waste.

1.6 Technical Support

If you have any technical difficulties, please do not hesitate to call or e-mail our customer service.

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

1.7 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.

1.8 Packing List
Packing List

Before you begin installing your single board, please make sure that the following materials have been shipped:

	1 x EmCORE-i290H EPIC Compact Board with heat sink
	1 x Power cable
	1 x Driver CD
	1 x Quick Installation Guide

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

1.9 Ordering Information

EmCORE-i290H-N4	Intel Atom™ N455 1.6GHz EPIC Compact Board
EmCORE-i290H-D5	Intel Atom™ D525 1.8GHz EPIC Compact Board
EmCORE-i290HD-N4	Intel Atom™ N455 1.6GHz with 2GB NANDrive EPIC Compact Board
EmCORE-i290HD-D5	Intel Atom™ D525 1.8GHz with 2GB NANDrive EPIC Compact Board

CBK-11-2902-00	Cable Kit
	    1 x Audio Cable
	    4 x COM Port Cables
	    1 x IDE Cable
	    1 x KB & MS Cable
	    2 x SATA Cables
	    2 x USB Cables

1.10 Specifications

Form Factor	EPIC Compact Board
CPU	Soldered onboard Intel® Atom N455 1.6GHz, or D525 1.8GHz processor
Chipset	Intel® ICH8M
System Memory	Soldered onboard DDR3 2GB SDRAM
Display	Integrated Intel® Graphics Media Accelerator 3150, Analog RGB/ Single Channel 18-bit LVDS/ Dual Independent Display
Ethernet	2 x Realtek RTL8111E PCIe Gigabit Ethernet controllers
I/O Chip	Winbond 83627UHG
BIOS	AMI PnP Flash BIOS
Audio	Realtek ALC886 7.1 Channel HD Audio Codec, Mic-in/ Line-out
Storage	2 x SATA ports at 300MB/s HDD transfer rate 1 x Ultra ATA, supporting 2 IDE devices Soldered onboard 2GB NANDrive (Optional)
Serial Port	5 x COM ports (COM1, COM3, COM4, COM5: RS-232, COM2: RS-232/422/485 selectable)
KBMS	1 x 6-pin wafer connector for Keyboard and Mouse (PS/2 interface via cable)
Universal Serial Bus	8 x USB 2.0 ports
Digital I/O	8-bit programmable Digital Input/Output
Expansion Interface	1 x Mini-card Socket 1 x Mini-PCI Socket 1 x SIM Socket
Operation Temp.	-20°C ~ 70°C (-4°F ~ 158°F)
Watchdog Timer	1~255 levels Reset
Dimension (L x W)	165 x 115 mm (6.5" x 4.5")

1.11 Board Dimensions

Top View
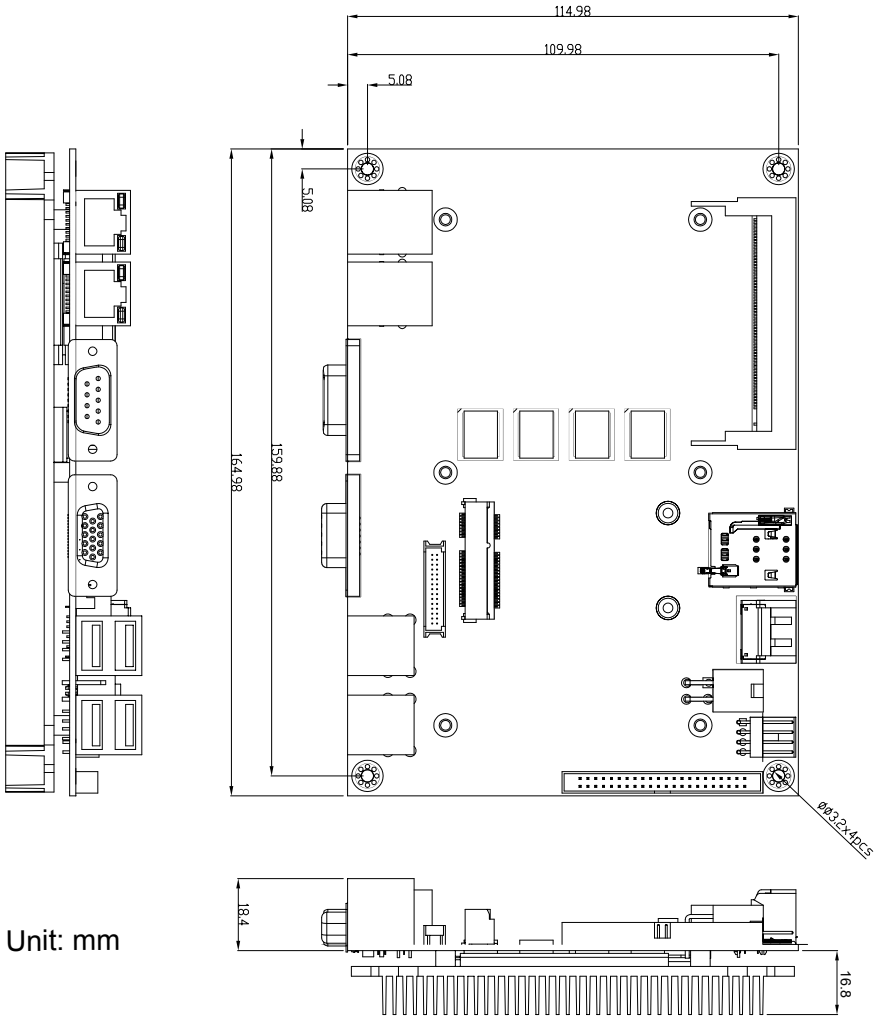
Unit: mm

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Chapter 2

Installation

2.1 Block Diagram
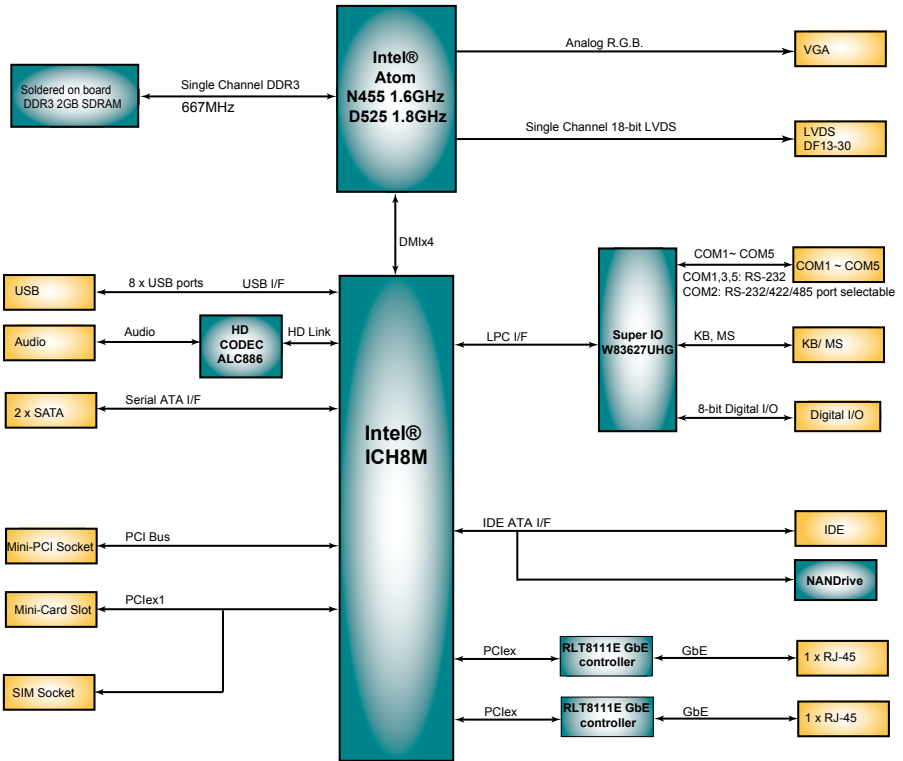
2.2 Jumpers and Connectors
Jumpers
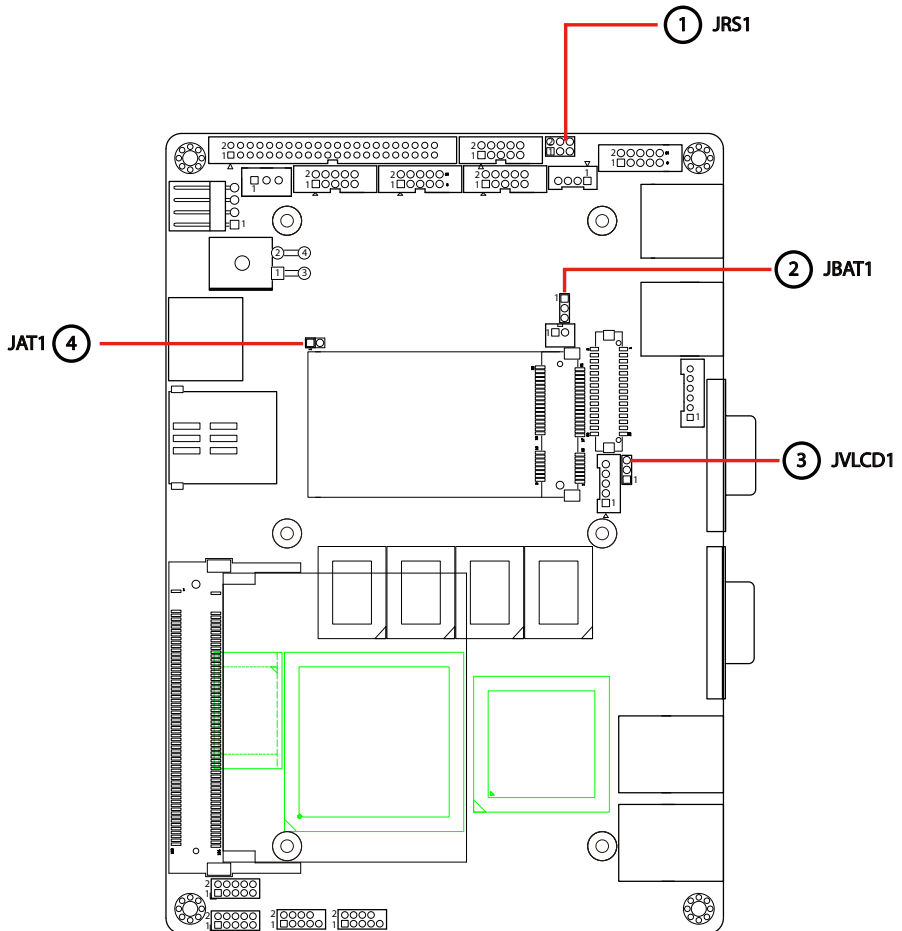
Connectors
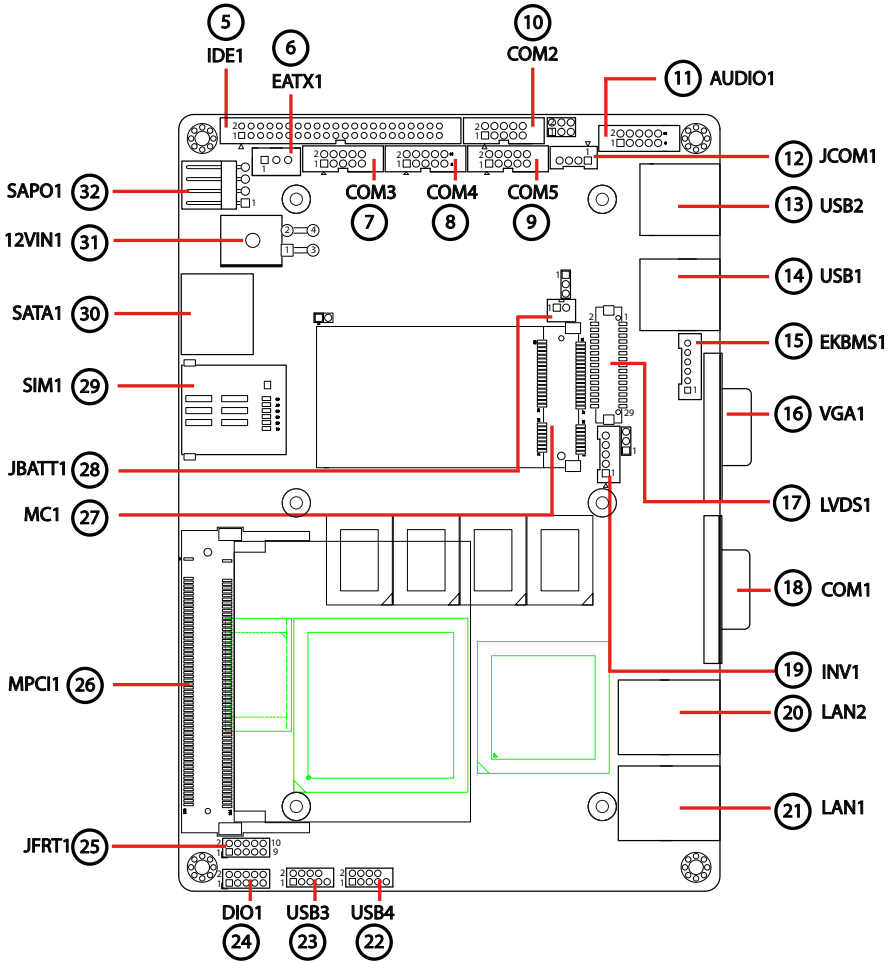
Jumpers

JRS1: COM2 RS-232/422/485 Mode Selection (1)

The onboard COM2 port can be configured to operate in RS-232, 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.

Connector type: 2.00mm pitch 2x3-pin headers.

Mode	RS-232 (Default)	RS-422	RS-485
1-2	Short	Open	Open
3-4	Open	Short	Open
5-6	Open	Open	Short

JBAT1: Clear CMOS Setting (2)

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: 2.00mm pitch 1x3-pin headers

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

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 2 and pin 3 of JBAT1 for five seconds.
3. Place the shunt back to pin 1 and pin 2 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.
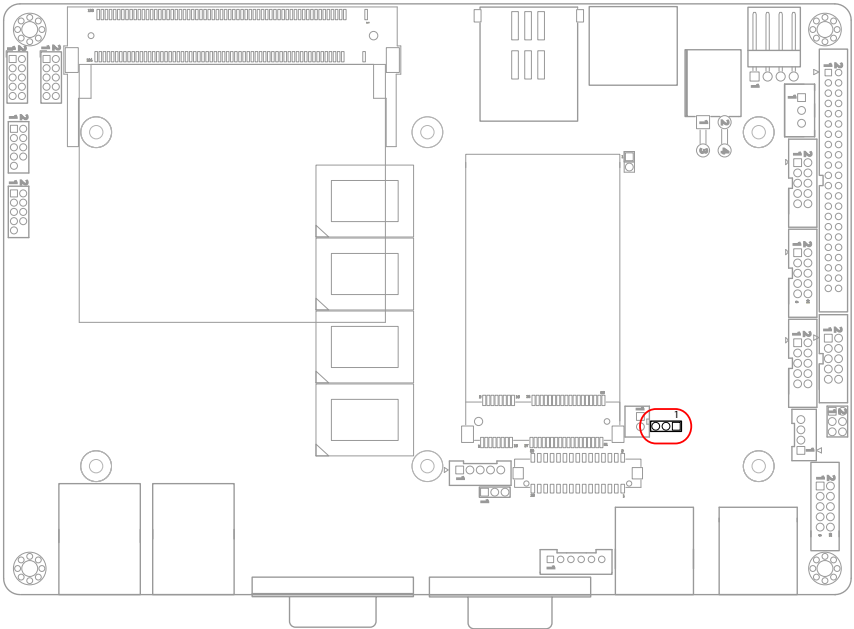
JVLCD1: LCD Panel Voltage Selection (3)

The voltage of LCD panel could be selected by JVLCD1 in +5V or +3.3V.
Connector type: 2.00 mm pitch 1x3-pin headers

Pin	Voltage	
1-2	+5V	
2-3	+3.3V (Default)	
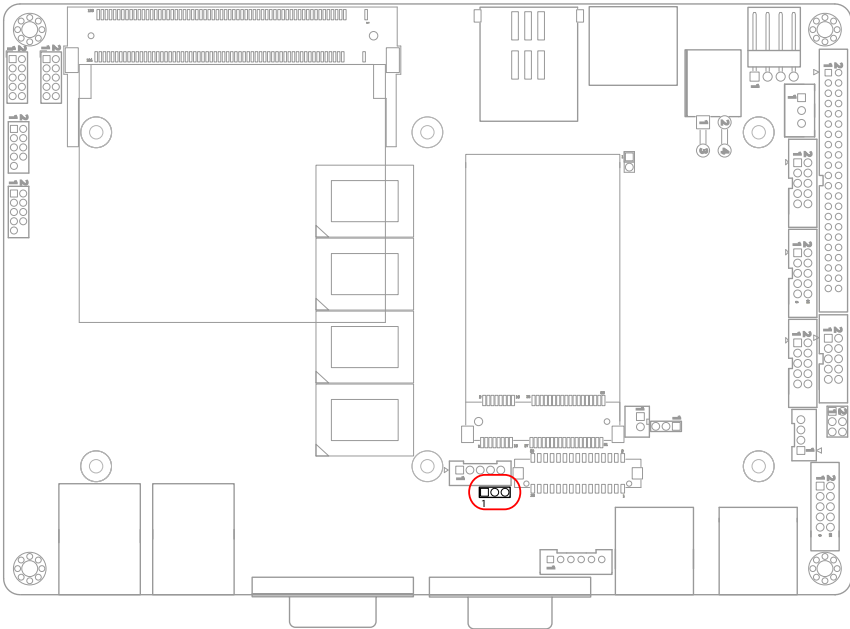
JAT1: AT/ATX Power Mode Selection (4)

The power mode jumper selects the power mode for the system.
Connector type: 2.00mm pitch 1x2-pin headers.

Pin	Mode	
Short	AT Mode	1 ▭ 2
Open	ATX Mode (Default)	1 ▢○ 2
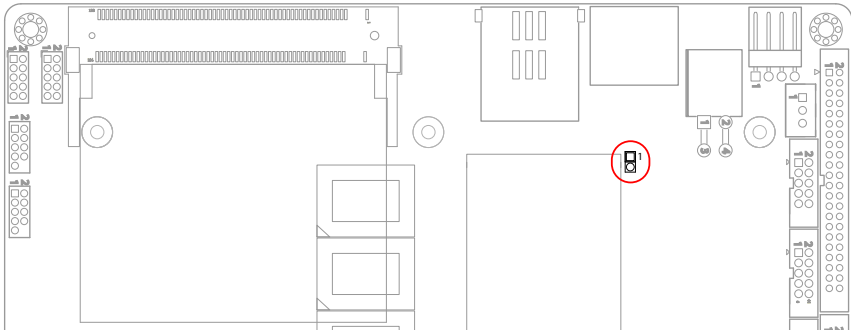
Note:
1. To activate the ATX power mode, you must turn on the power button switch first (the connector for power button swtich is located in JFRT1).
2. In case set to AT power mode, AC & DC discharge time should follow below timing:

t1 + t2 ≥ 2 sec

t1 + t2 ≥ 1.8 sec
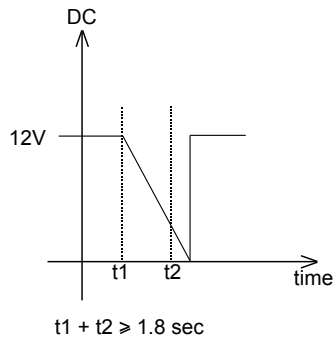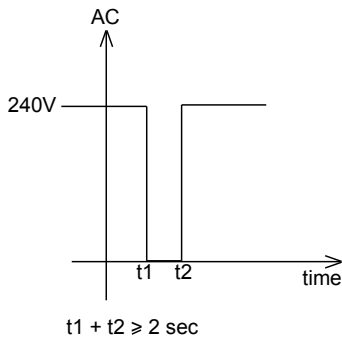
Connectors

IDE1: IDE Connector (5)

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: 2.00mm pitch 2x22-pin box headers

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
21	REQ	22	GND
23	IO WRITE	24	GND
25	IO READ	26	GND
27	IO READY	28	GND
29	DACK	30	GND
31	IRQ14	32	N/C
33	ADAD1	34	ATA66 DETECT
35	ADAD0	36	ADAD2
37	CS#1	38	CS#3
39	IDEACTP	40	GND
41	+5V	42	+5V
43	GND	44	N/C
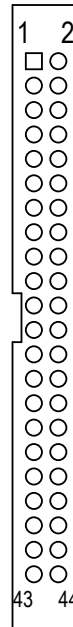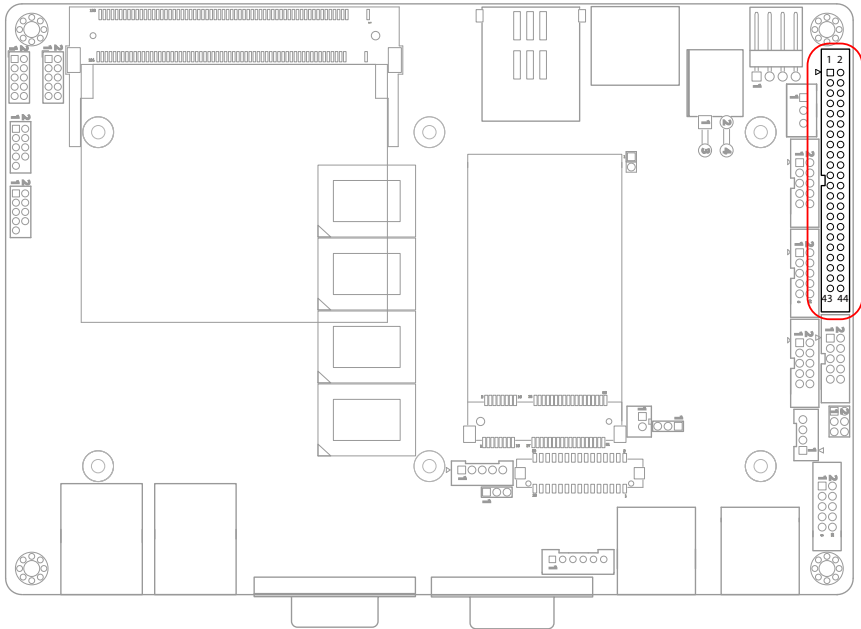
EATX1: ATX Feature Connector (6)

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

Pin	Description
1	PS-ON
2	GND
3	5V_SB
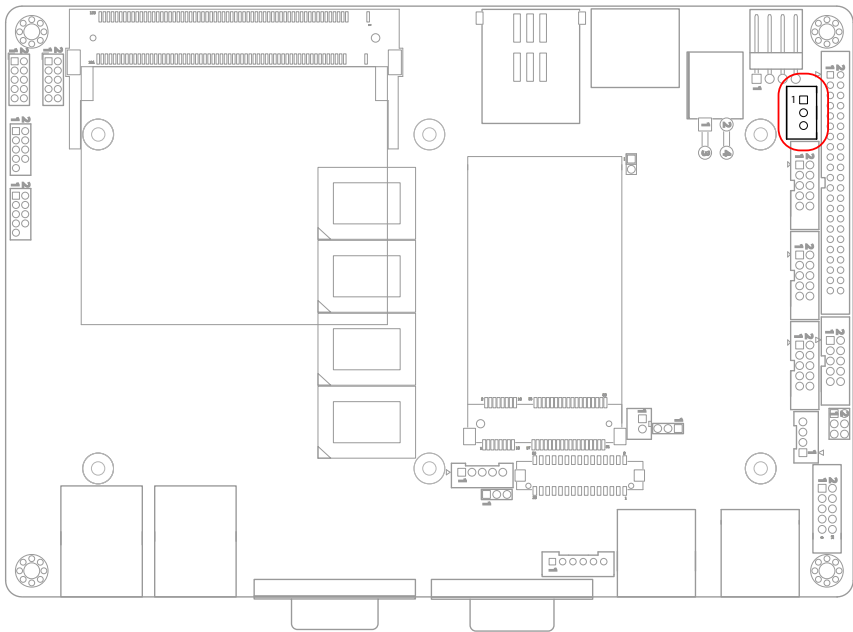
COM2~5: Serial Port Connectors (7, 8, 9, 10)

Connector type: 2.00mm pitch 2x5-pin box headers.

Pin	Description	Pin	Description
1	DCD#	2	RXD
3	TXD	4	DTR#
5	GND	6	DSR#
7	RTS#	8	CTS#
9	RI#	10	N/C
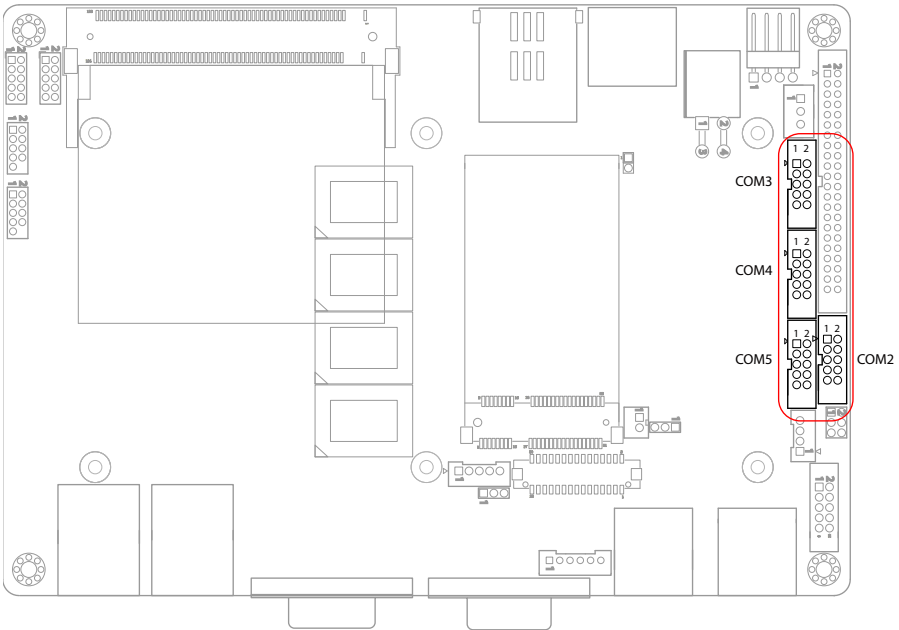
AUDIO1: AUDIO Connector (11)

Connect a tape player or another audio source to the light blue Line-in connector to record audio on your computer or to play audio through your computer's sound chip and speakers.

Connect a micro-phone to the pink microphone connector to record audio to your computer.

Connector type: 2.00mm pitch 2x5-pin box headers.

Pin	Description	Pin	Description
1	Line-in Left	2	Line-in Right
3	GND	4	GND
5	MIC1	6	MIC2
7	GND	8	GND
9	Line-out Left	10	Line-out Right
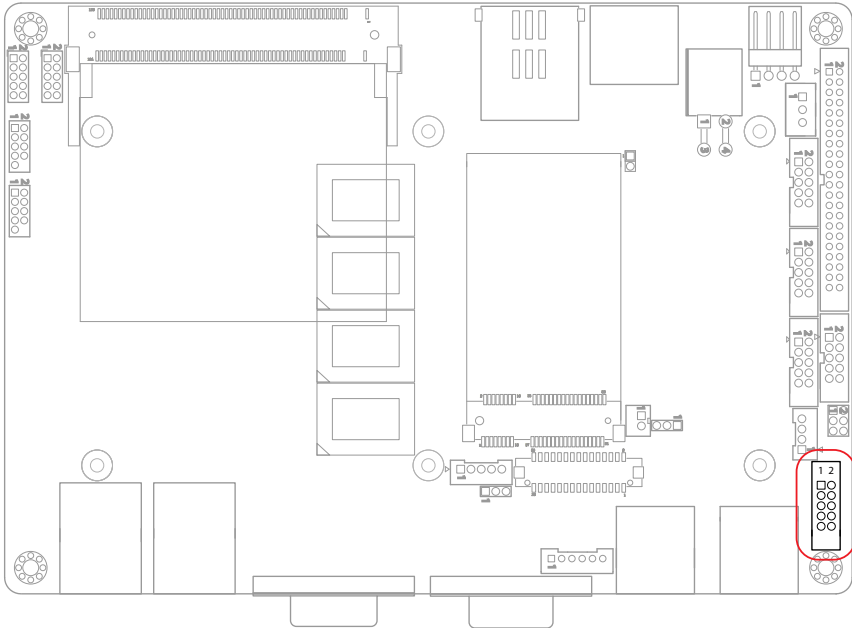
JCOM1: RS-422/ 485 Output Connector (12)

Connector type: 2.00mm pitch 1x4 box wafer connector

Pin	RS-422	RS-485
1	TX+	Data+
2	TX-	Data-
3	RX+	N/C
4	RX-	N/C
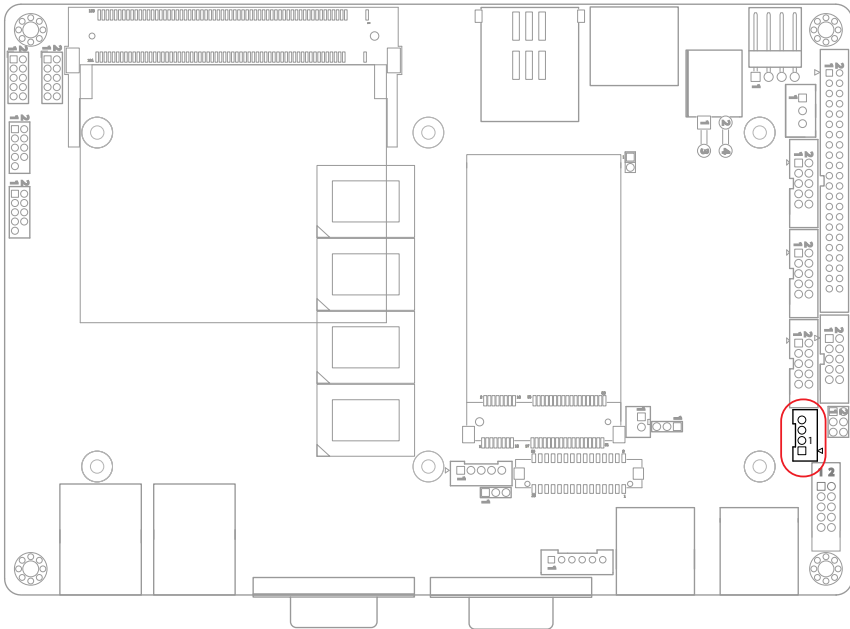
USB1~2: USB Connectors (13, 14)

The USB connector supports two USB 2.0 ports w/ 480Mb/s.
Connector type: double stack USB type A.
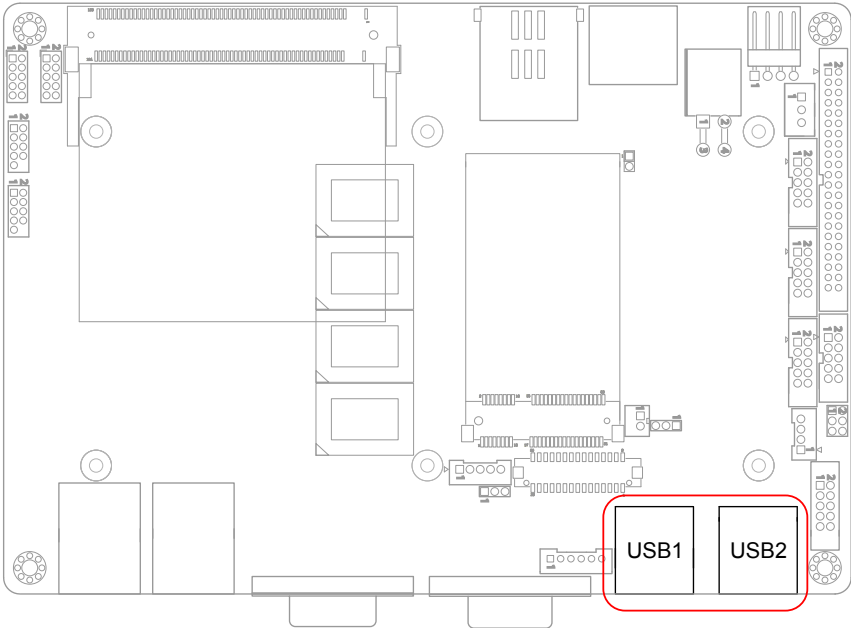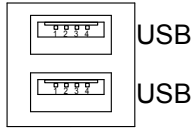
EKBMS1: Keyboard & Mouse Connector (15)

Connector Type: 2.0mm pitch 1x6-pin box wafer connector

Pin	Description
1	KB_DATA
2	GND
3	MS_DATA
4	KB_CLK
5	KB_VCC
6	MS_CLK

EKBMS1
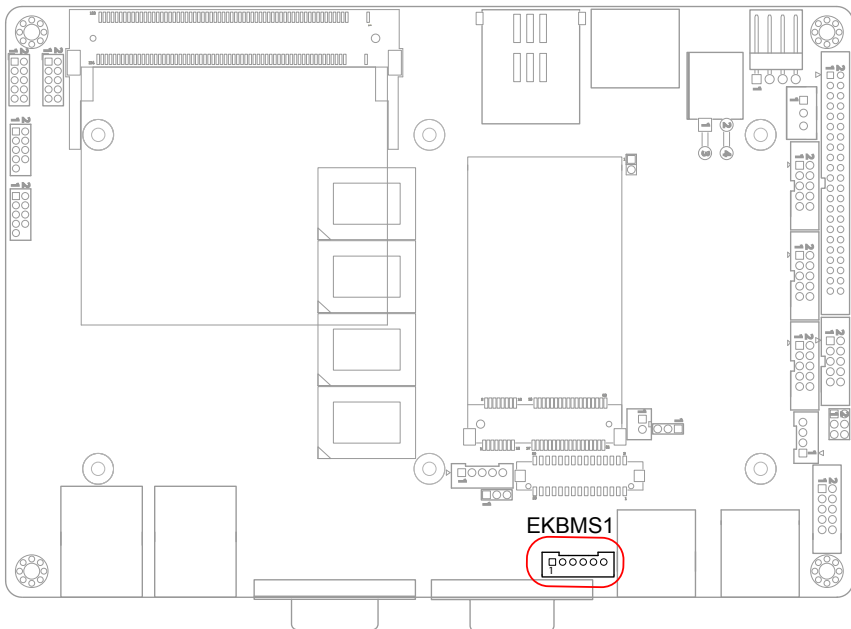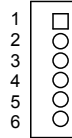
VGA1: Analog RGB Connector (16)

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	D-DATA
5	GND	13	H-SYNC
6	GND	14	V-SYNC
7	GND	15	D-DCLK
8	GND		
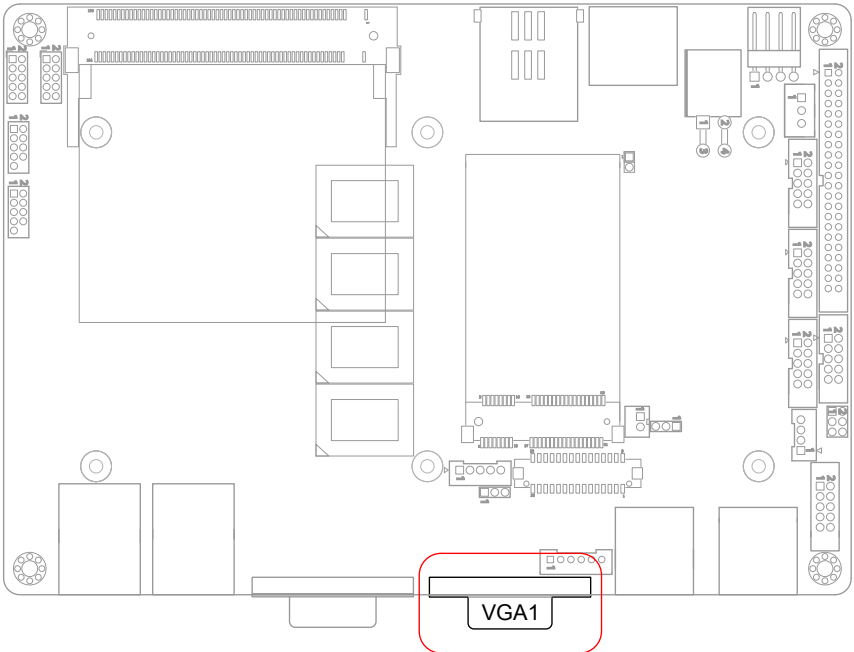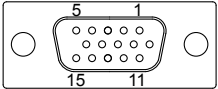
LVDS1: LVDS LCD Connector (17)

The LVDS connector supports 18-bit single channel LVDS.
VDD could be selected by JVLCD1 in +5V or +3.3V.
Connector type: DF-13-30DP-1.25V

Pin	Description	Pin	Description
2	VDD	1	VDD
4	N/C	3	TX1CLK+
6	N/C	5	TX1CLK-
8	GND	7	GND
10	N/C	9	TX1D0+
12	N/C	11	TX1D0-
14	GND	13	GND
16	N/C	15	TX1D1+
18	N/C	17	TX1D1-
20	GND	19	GND
22	N/C	21	TX1D2+
24	N/C	23	TX1D2-
26	GND	25	GND
28	N/C	27	N/C
30	N/C	29	N/C
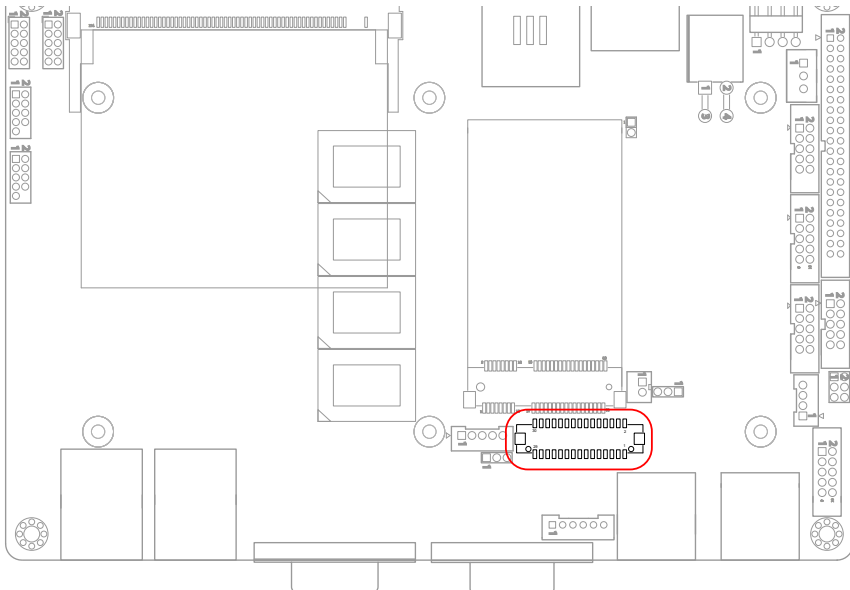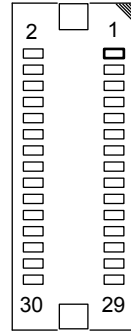
COM1: Serial Port Connector (18)

Connector type: D-Sub 9-pin male.

Pin	Description	Pin	Description
1	DCD#	6	DSR#
2	RXD	7	RTS#
3	TXD	8	CTS#
4	DTR#	9	RI#
5	GND		
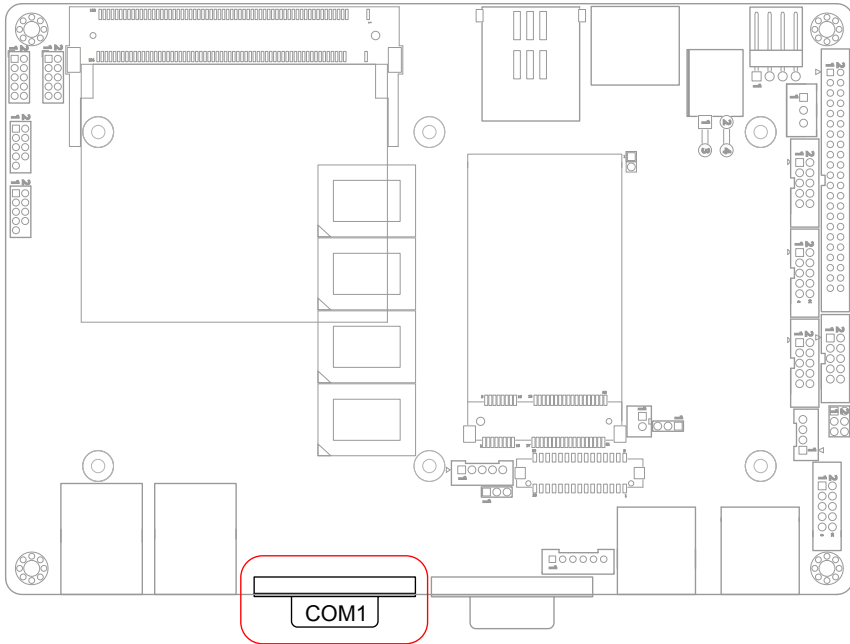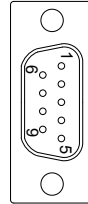
INV1: LCD Inverter Connector (19)

Connector type: 2.00mm pitch 1x5-pin box wafer connector.

Pin	Description
1	+12V
2	GND
3	Backlight on/off
4	Brightness control
5	GND
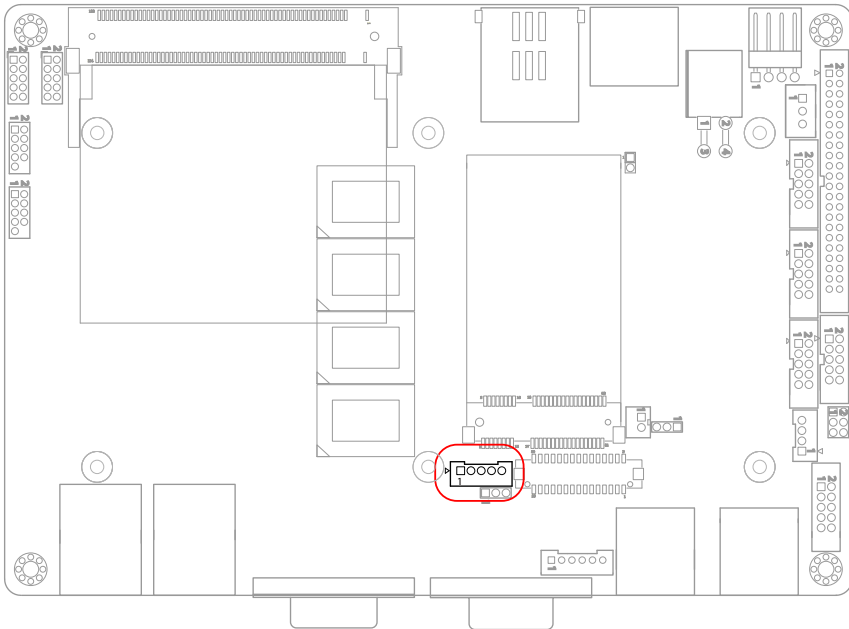
LAN1~2: Gigabit Ethernet Connectors (20, 21)

Connector type: RJ-45
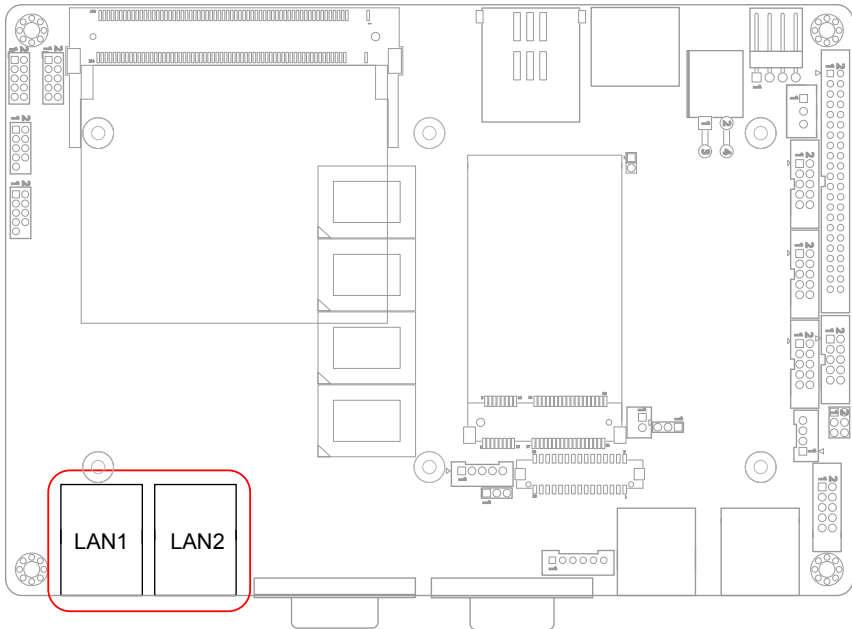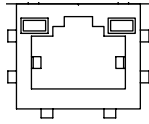
USB3~4: USB Connectors (22, 23)

Connector type: 2.00 mm pitch 2x5-pin headers.

Pin	Description	Pin	Description
1	+5V	2	+5V
3	USBD-	4	USBD-
5	USBD+	6	USBD+
7	GND	8	GND
9	GND	10	N/C (Key)
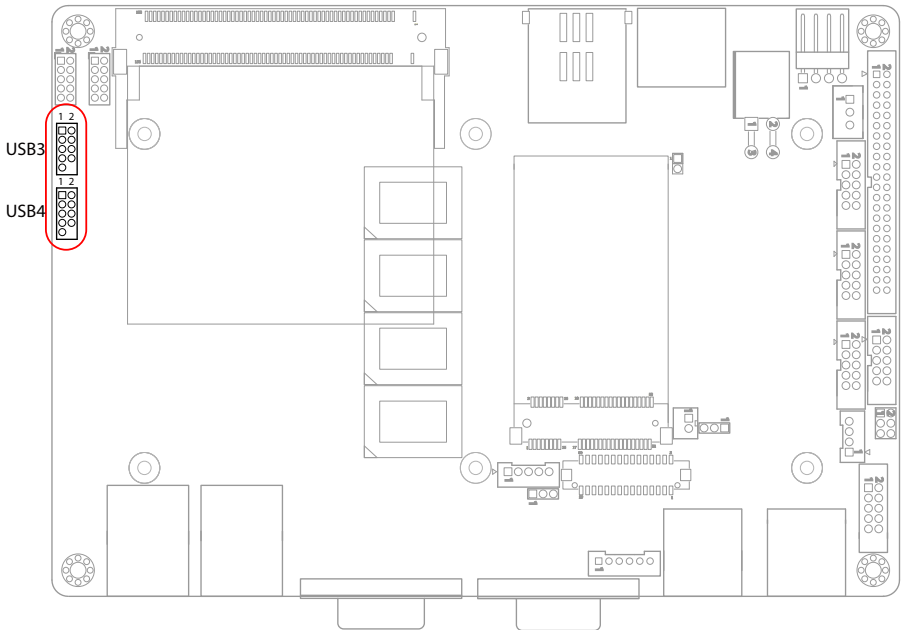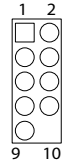
DIO1: Digital I/O Connector (24)

DIO1 is a 8-bit DIO connector that supports 8-bit programmable digital input and output.

Connector type: 2.00 mm pitch 2x5-pin headers.

Pin	Description	Pin	Description
1	DIO0	2	DIO1
3	DIO2	4	DIO3
5	DIO4	6	DIO5
7	DIO6	8	DIO7
9	+5V	10	GND
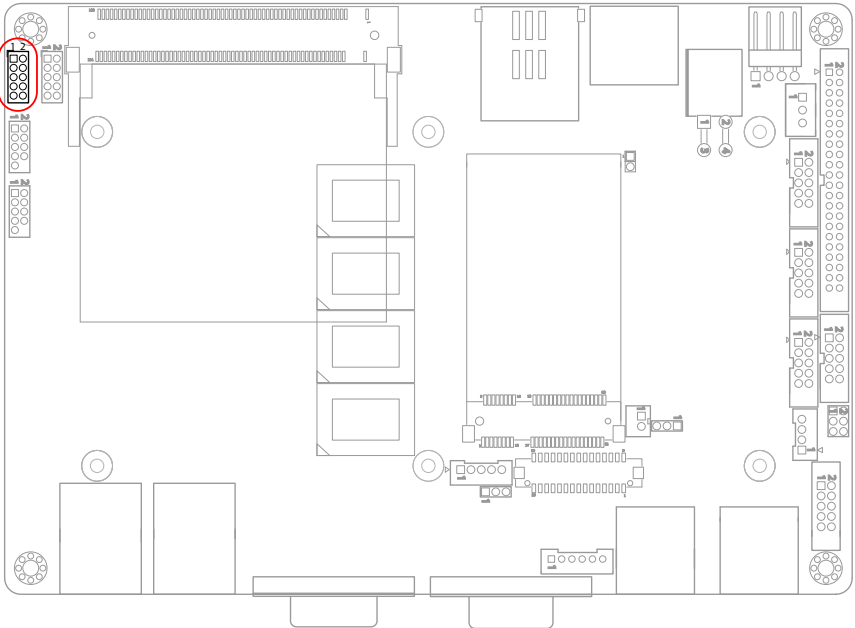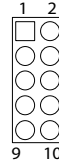
JFRT1: Switches and Indicators (25)

It provides connectors for system indicators that provides light indication of the computer activities and switches to change the computer status.

Connector type: 2.00 mm pitch 2x5-pin headers

Pin	Description	Pin	Description
1	RESET+	2	RESET-
3	Power LED+	4	Power LED-
5	HDD LED+	6	HDD LED-
7	SPEAKER+	8	SPEAKER-
9	PSON+	10	PSON-
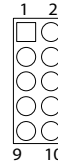
RES: Reset Button, pin 1-2.

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

PLED: Power LED Connector, pin 3-4.

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 5-6.

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

SPK: External Speaker, pin 7-8.

This 2-pin connector connects to the case-mounted speaker.

PWRBTN: ATX soft power switch, pin 9-10.

This 2-pin connector connects to the case-mounted Power button.
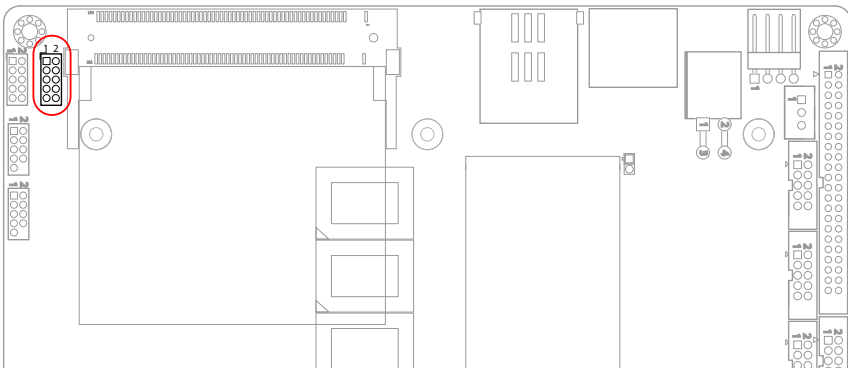
MPCI1: Mini PCI slot (26)
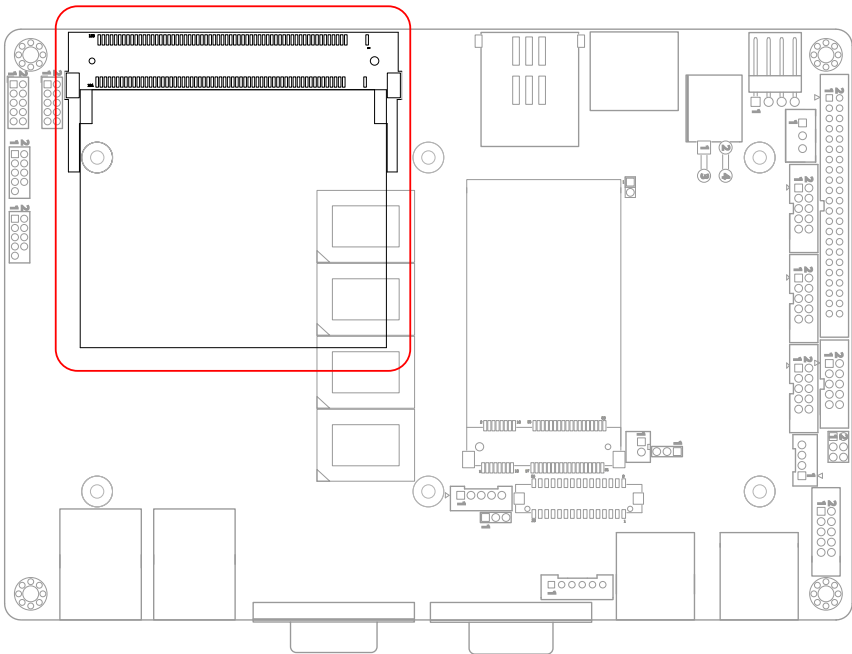
MC1: Mini-Card Slot (27)
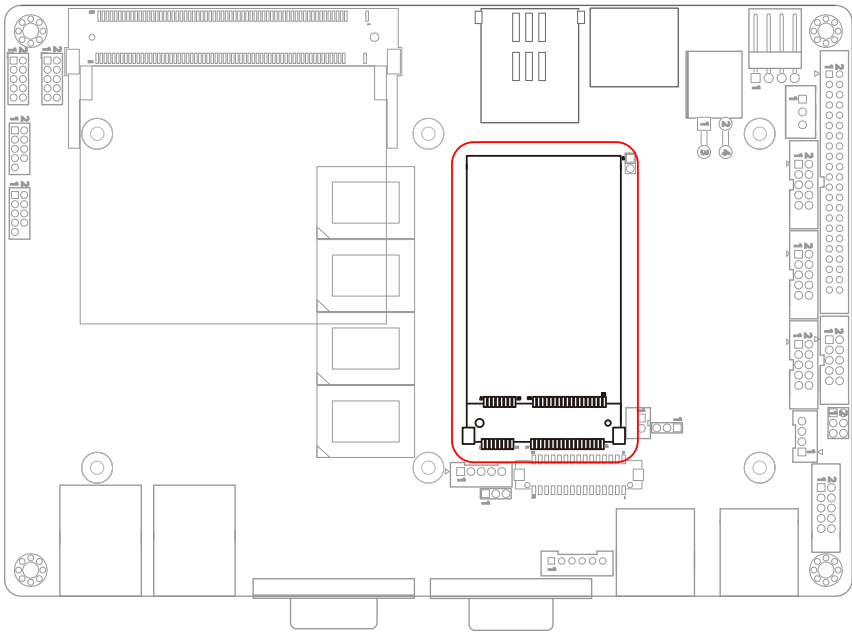
JBATT1: External Battery Connector (28)

Connector type: 2.00 mm pitch 1x2-pin box headers.

Pin	Description
1	+3.3V
2	GND
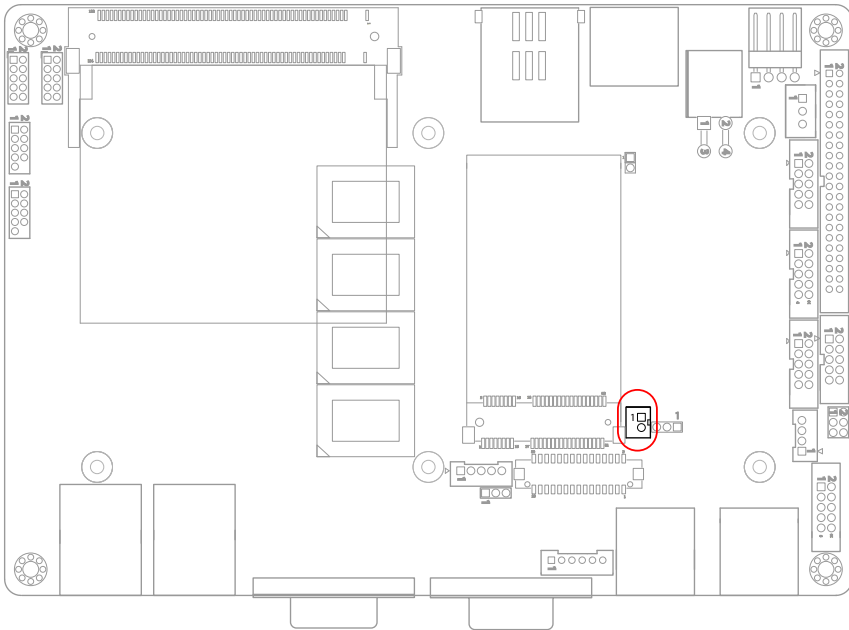
SIM1: SIM card Socket (29)

Connector type: Foxconn WL618E2-U05-7F CX1 socket

Pin	Description
C1	VCC
C2	RST
C3	CLK
C5	GND
C6	VPP
C7	I/O
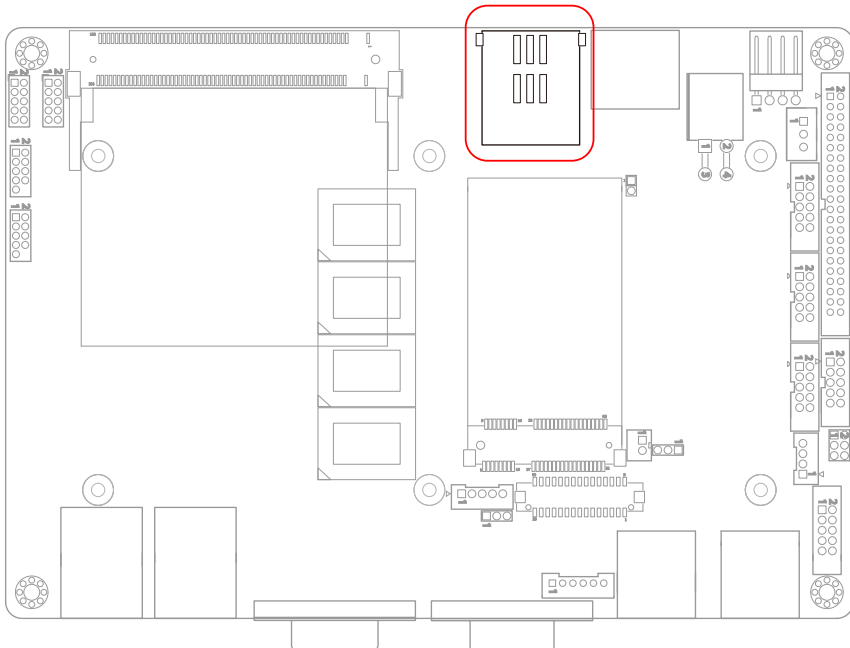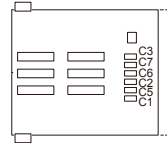
SATA1: Serial ATA Connectors (30)

The CPU board on board supports two SATA 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
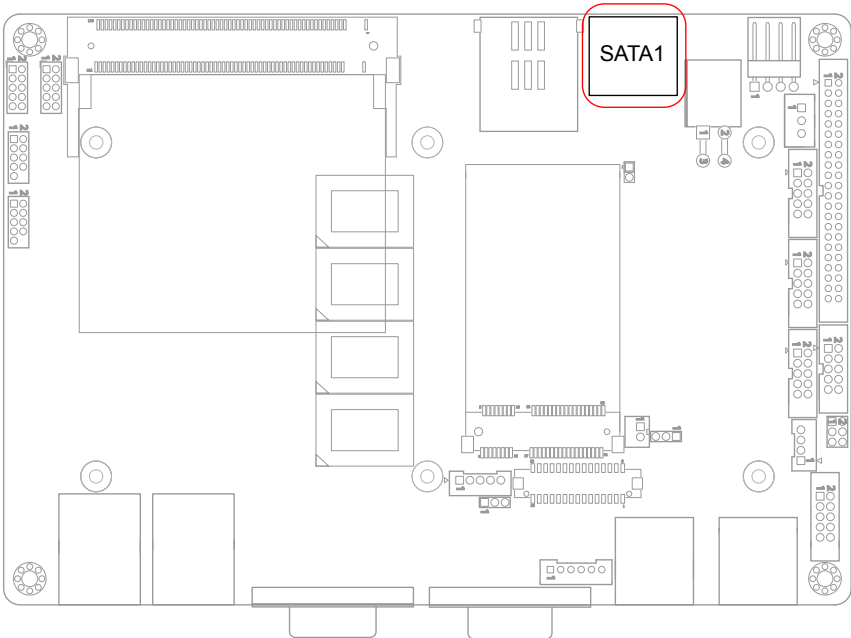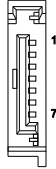
12VIN1: +12V Connector (31)
PWR1 supplies the CPU operation at +12V (Vcore).

Pin	Description	Pin	Description
2	GND	4	+12V
1	GND	3	+12V
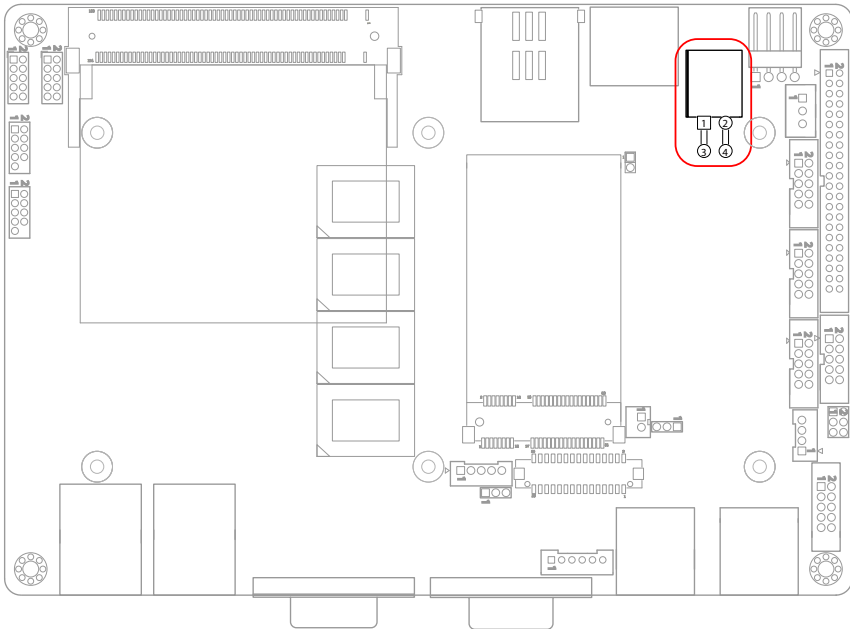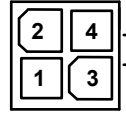
SAPO1: Small 4P Power Connector (32)

Connector type: 2.54mm pitch 1x4-pin
wafer one wall 90D connector

Pin	Description
1	+5V
2	GND
3	GND
4	+12V
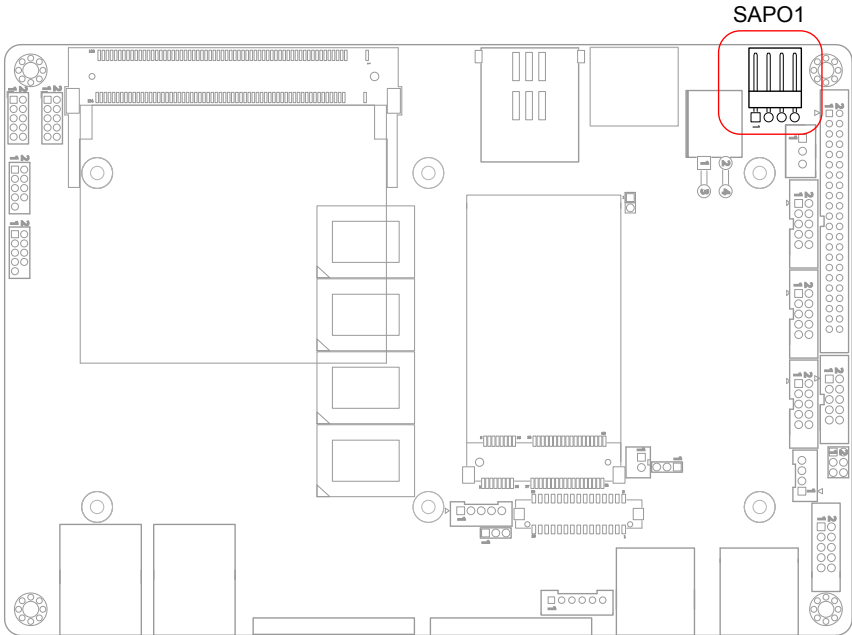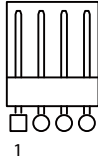
2.3 The Installation Paths of CD Driver

Windows XP

Driver	Path
CHIPSET	\EmCORE-i290H\CHIPSET\WinXP\INF 9.1.1.1020
VGA	\EmCORE-i290H\GRAPHICS\WinXP\6.14.10.5260
AUDIO	\EmCORE-i290H\AUDIO\REALTEK_HD_ALC888\WinXP
LAN	\EmCORE-i290H\ETHERNET\WinXP_5794_03162012

Windows 7

Driver	Path
CHIPSET	\EmCORE-i290H\CHIPSET\Win7\INF 9.1
VGA	\EmCORE-i290H\GRAPHICS\Win7
AUDIO	\EmCORE-i290H\AUDIO\REALTEK_HD_ALC888\Win7
LAN	\EmCORE-i290H\ETHERNET\Win7_7053_03162012

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Chapter 3

BIOS

3.1 BIOS Introduction

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 and configurations.

When you turn on the computer, the AMI BIOS is immediately activated. To enter the BIOS SETUP UTILILTY, press "Delete" once the power is turned on.

When the computer is shut down, the battery on the motherboard supplies the power for BIOS RAM.

The Main Setup screen lists the following information

System Overview

BIOS Version: displays the current version information of the BIOS

Build Date: the date that the BIOS version was made/updated

Processor (auto-detected if installed)

Speed: displays the processor speed

System Memory (auto-detected if installed)

Size: lists the memory size information

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

  System Overview                                    Use [Enter], [TAB]
                                                     or [SHIFT-TAB] to
  AMIBIOS                                            select a field.
  Version      : 08.00.16
  Build Date   : 10/12/10                            Use [+] or [-] to
                                                     configure system time.
  Processor
  Intel(R) Atom(TM) CPU N450  @ 1.66GHz

  Speed        : 1666MHz

  System Memory
  Size         : 1016MB

  System Time              [09:45:44]               ←      Select Screen
  System Date              [Wed 01/09/2011]         ↑↓     Select Item
                                                    +-     Change Field
                                                    Tab    Select Field
                                                    F1     General Help
                                                    F10    Save and Exit
                                                    ESC    Exit

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```

Key Commands

BIOS Setup Utility is mainly a key-based navigation interface. Please refer to the following key command instructions for navigation process.

"←" "→"	Move to highlight a particular configuration screen from the top menu bar / Move to highlight items on the screen
"↓" "↑"	Move to highlight previous/next item
Enter	Select and access a setup item/field
Esc	On the Main Menu – Quit the setup and not save changes into CMOS (a message screen will display and ask you to select "OK" or "Cancel" for exiting and discarding changes. Use "←" and "→" to select and press "Enter" to confirm) On the Sub Menu – Exit current page and return to main menu
Page Up / +	Increase the numeric value on a selected setup item / make change
Page Down -	Decrease the numeric value on a selected setup item / make change
F1	Activate "General Help" screen
F10	Save the changes that have been made in the setup and exit. (a message screen will display and ask you to select "OK" or "Cancel" for exiting and saving changes. Use "←" and "→" to select and press "Enter" to confirm)

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

The "Advanced" screen provides the setting options to configure CPU, IDE, Super IO and other peripherals. You can use "←" and "→" keys to select "Advanced" and use the "↓" and "↑" to select a setup item.

```
                        BIOS SETUP UTILITY
┌──────────────────────────────────────────────────────────────────────┐
│  Main    Advanced    Chipset    PCIPnP    Boot    Security    Exit     │
├──────────────────────────────────────────────┬───────────────────────┤
│                                               │                       │
│  Advanced Settings                            │  Configure CPU.       │
│  _____     │                       │
│                                               │                       │
│  WARNING:   Setting wrong values in below sections │                  │
│             may cause system to malfucntion.  │                       │
│                                               │                       │
│  ▶ CPU Configuration                          │                       │
│  ▶ IDE Configuration                          │                       │
│  ▶ SuperIO Configuration                      │                       │
│  ▶ Hardware Health Configuration              │                       │
│  ▶ USB Configuration                          │                       │
│                                               │                       │
│                                               │                       │
│                                               │  ←      Select Screen │
│                                               │  ↑↓     Select Item   │
│                                               │  Enter  Go to Sub Screen │
│                                               │  F1     General Help  │
│                                               │  F10    Save and Exit │
│                                               │  ESC    Exit          │
│                                               │                       │
├──────────────────────────────────────────────┴───────────────────────┤
│     v02.68 (C) Copyright 1985 - 2009, American Megatrends, Inc.        │
└──────────────────────────────────────────────────────────────────────┘
```

Note: please pay attention to the "WARNING" part at the left frame before you decide to configure any setting of an item.

3.2.1 CPU Configuration

Press "Enter" on "CPU Configuration" and you will be able to configure the CPU on the "Configure advanced CPU settings" screen.

```
                        BIOS SETUP UTILITY
          Advanced

  Configure advanced CPU settings                    Enabled for Windows XP
                                                     and Linux4 (OS optimiz-
  Manufacture:  Intel                                ed for Hyper Threading
  Intel(R) Atom(TM) CPU N450 @ 1.66GHz               Thchnology) and disab-
  Frequency    : 1.66GHz                             led for other OS
  FSB Speed    : 666MHz                              Hyper-Thereding Techn-
  Cache L1     : 24 KB                               ology)
  Cache L2     : 512 KB
  Ratio Actual Value:  10

  Hyper Threading Technology        [Enabled]
  Intel (R) SpeedStep(tm) tcech     [Enabled]

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

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```

CPU Details

Manufacturer: shows the name of the CPU manufacturer
Frequency: indicates the processor speed
FSB Speed: the data flow speed of FSB (Front Side Bus)
Cache L1: shows the Cache L1 size for the CPU
Cache L2: shows the Cache L2 size for the CPU
Ratio Actual Value: actual value of clock ratio for the CPU

Hyper-Threading Technology

Enabled: activates the Hyper-Threading Technology for higher CPU threading speed. (Recommended)
Disabled: Disactivates the Hyper-Threading Technology.

Intel® SpeedStep™ Tech

Enabled: Enable GV3.
Disabled: Disable GV3.

3.2.2 IDE Configuration

Select the "IDE Configuration to configure the IDE settings. When an item is selected, there is a status description appearing at the right. You can use "Page Up/+" and "Page Down/-" keys to change the value of a selected item.

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

   IDE Configuration                                       Options

   ATA/ IDE Configuration        [Enabled]         Disabled
     Configure SATA as           [IDE]             Compatible
                                                   Enhanced
   ▶ Primary IDE Master          : [Not Detected]
   ▶ Primary IDE Slave           : [Not Detected]
   ▶ Secondary IDE Master        : [Not Detected]
   ▶ Secondary IDE Slave         : [Not Detected]
   ▶ Third IDE Master            : [2GB NANDrive]
   ▶ Third IDE Slave             : [Not Detected]

   Hard Disk Write Protect       [Disabled]
   IDE Detect Time Out (Sec)     [35]
   ATA(PI) 80Pin Cable Detection [Host & Device]
                                                   ←    Select Screen
                                                   ↑↓   Select Item
                                                   +-   Change Field
                                                   F1   General Help
                                                   F10  Save and Exit
                                                   ESC  Exit

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```

ATA/IDE Configuration

Configures the options of ATA/IDE controllers connected to the board
Disabled: disables the ATA/IDE controllers connected to the board
Compatible: sets the ATA/IDE controllers to be compatible
Enhanced: sets the ATA/IDE controllers to be in enhanced mode

Configure SATA as
Configure SATA as IDE or AHCI.

Primary, Secondary/ Third IDE Master/Slave

The BIOS Setup displays all the available, connected IDE devices as well as the IDE status. You may enter a specific IDE device to do particular configurations. Press "Enter" to access the submenu of an IDE device on the list. When you want to install a new IDE HDD, please remember to configure BIOS setting in the path as:
Advanced / IDE Configuration / Third IDE Slave / DMA Mode / "UDMA2"

Hard Disk Write Protect

Disable/ Enable device write protection. This will be effective only if device is accessed through BIOS.

IDE Detect Time Out (Sec)

Select the time out value for detecting ATA/ATAPI device(s).
The choice:
    0
    5
    10
    15
    20
    25
    30
    35

ATA(PI) 80pin Cable Detection

Select the mechanism for detecting 80-pin ATA(PI) cable.
The choice:
    Host & Device
    Host
    Device

3.2.3 Super IO Configuration

Use "Super IO Configuration to specify address and modes for Serial Port.

```
                           BIOS SETUP UTILITY
    Advanced

  Configure Win627UHG Super IO Chipset              Allows BIOS To Select

  Serial Port1 Address        [3F8]                 Serial Port1 Base
   Serial Port1 IRQ           [4]                    Addresses.
  Serial Port2 Address        [2F8]
   Serial Port2 IRQ           [3]
  Serial Port3 Address        [3E8]
   Serial Port3 IRQ           [11]
  Serial Port4 Address        [2E8]
   Serial Port4 IRQ           [10]
  Serial Port5 Address        [3E0]
   Serial Port5 IRQ           [10]

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

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```

Serial Port1 ~ Port5 Address

Select an address and corresponding interrupt for the first and second serial ports.

Port Address choice:

IRQ choice:
3
4
10
11

Port Address choice:
3F8
2F8
3E8
2E8
3E0
2E0
Disabled

3.2.4 Hardware Health Configuration

The "Hardware Health Configuration" lists out the temperature and voltage information that is being monitored. The default for "H/W Health Function" is "Enabled.

```
                         BIOS SETUP UTILITY
        Advanced

   Hardware Health Configuration

   System Temperature       : 34C/93F
   CPU Temperature          : 74C/116F


   Vcore                    :1.104 V
   5V                       :5.168 V
   DDR3 Vcc                 :1.792 V
   +1.05V                   :1.040 V
   +3.3V                    :3.312 V


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

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```

System/ CPU Temperature

Show you the current System / CPU fan temperature.

Vcore

Show you the voltage level of CPU (Vcore).

5V / DDR3 Vcc/ 1.05V/ +3.3V

Show you the voltage level of the 5V, DDR3 Vcc, 1.05V, and +3.3V.

3.2.5 USB Configuration

Advanced

```
USB Configuration                                    Enables support for
                                                     legacy USB. AUTO
Hyper Threading Technology   [Enabled]               option disables
USB 2.0 Controller Mode      [FullSpeed]             legacy support if
BIOS EHCI Hand-Off           [Enabled]               no USB devices are
                                                     connected.




                                                  ←    Select Screen
                                                  ↑↓   Select Item
                                                  +-   Change Field
                                                  F1   General Help
                                                  F10  Save and Exit
                                                  ESC  Exit
```
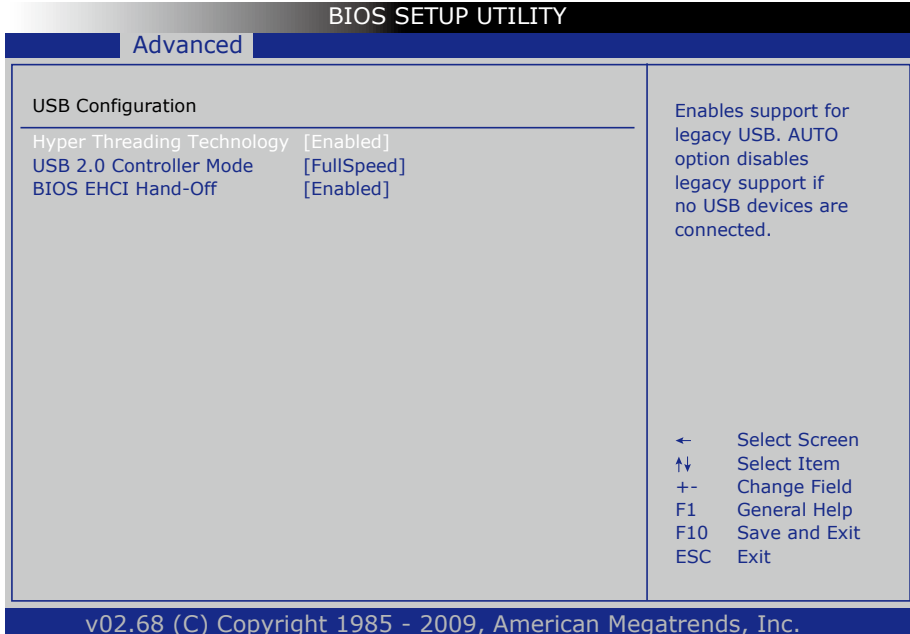
Legacy USB Support

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

Enabled: enables the EHCI Hand-Off function by BIOS
Disabled: disables the EHCI Hand-Off function by BIOS
Note: this setting potion allows you to enable EHCI Hand Off if your computer operating system does not support it.
EHCI is the abbreviation for Enhanced Host Controller Interface which is necessary for high speed USB operation.

3.3 Advanced Chipset Settings

Select "Chipset" to access to "North Bridge Configuration" and "South Bridge Configuration". You can enter the sub menu of the two configuration options.

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

  Advanced Chipset Settings                            Configure North Bridge
                                                       Features.
  WARNING:    Setting wrong values in below sections
              may cause system to malfucntion.

  ▶ North Bridge Configuration
  ▶ South Bridge Configuration




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

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```

3.3.1 North Bridge Chipset Configuration

```
                        BIOS SETUP UTILITY
                Chipset

North Bridge Chipset Configuration                      Select which graphics
                                                        controller to use as
Initate Graphic Adapter           [IGD]                 the primary boot
Internal Graphics Mode Select     [Enabled, 8MB]        device.
DVMT Mode Select                  [DVMT Mode]
   DVMT/FIXED Memory              [256MB]


Boot Display Device               [CRT + LVDS]
Flat Panel Type                   [1024x768]



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

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```

Initate Graphic Adapter
Select which graphics controller to use as the primary boot device.
The Choice: IGD, PCI/IGD

Internal Graphic Mode Select

Select the amount of system memory used by the Internal graphics device.
The Choice: Enabled, 8MB

DVMT Mode
The Choice: FIXED mode, DVMT (Default).

DVMT/FIXED Memory Size

Setting: 128MB, 256MB (Default), Maximum DVMT.

Boot Display Device

Boot setting for the display device connected to the computer, such as "CRT" monitor.
The Choice: CRT, LVDS, CRT + LVDS

Flat Panel Type

Select the Flat Panel Type.
The choice:
      640x480
      800x600
      1024x768
      1280x768
      1280x800

3.3.2 South Bridge Chipset Configuration

Normally, the south bridge controls the basic I/O functions, such as USB and audio. This screen allows you to access to the configurations of the I/Os.

```
                        BIOS SETUP UTILITY
                 Chipset

  South Bridge Chipset Configuration                    Options

  USB Function              [10 USB Ports]
  USB 2.0 Controller        [Enabled]          Disabled
  HDA Controller            [Enabled]          2 USB Ports
                                               4 USB Ports
                                               6 USB Ports
                                               8 USB Ports
                                               10 USB Ports




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

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```
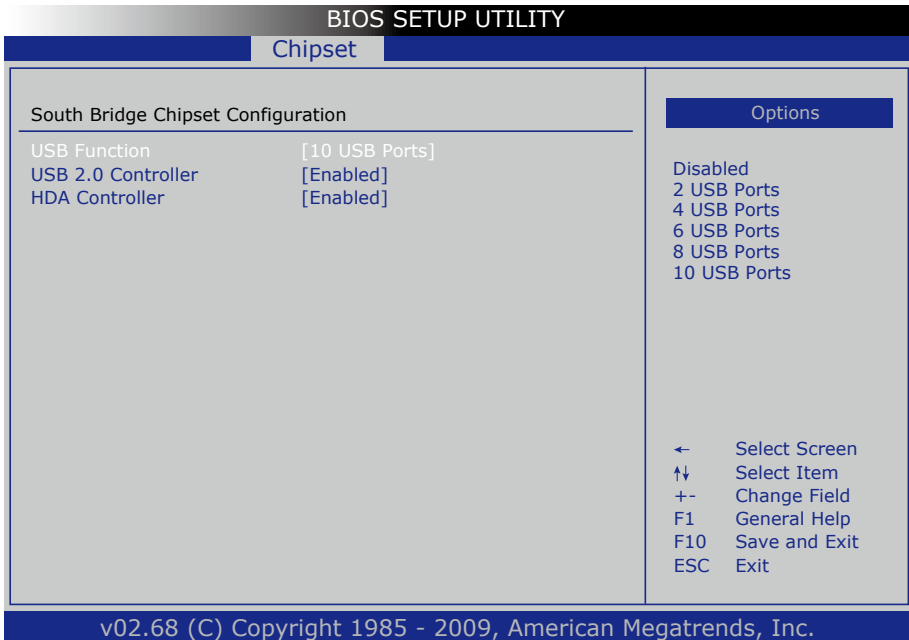
USB Funtion

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

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 HD Audio Controller.

The Choice: Enabled, Disabled.

3.3 Advanced PCI/PnP Settings

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

    Advanced PCI/PnP Settings                          YES: Assigns IRQ to
                                                       PCI VGA card if card
    WARNING:    Setting wrong values in below sections requests IRQ.
                may cause system to malfucntion.       NO: Does not assign
                                                       IRQ to PCI VGA card
    Allocate IRQ to PCI VGA        [Yes]               even if card requests
                                                       an IRQ.
    IRQ3                     [Available]
    IRQ4                     [Available]
    IRQ5                     [Available]
    IRQ7                     [Available]
    IRQ10                    [Available]
    IRQ11                    [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


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```

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.

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.

3.4 Boot Settings

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

  Boot Settings                                  Configure Settings
                                                 during System Boot.
  ▶ Boot Settings Configuration
  ▶ Boot Device Priority
  ▶ Hard Disk Drives




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

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```
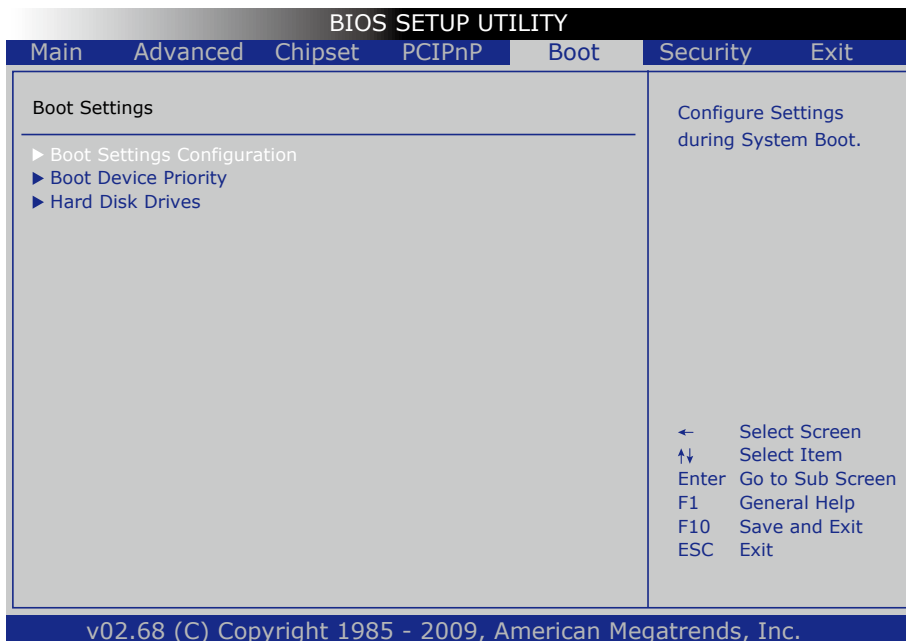
Boot Setting Configuration

Press Enter the sub menu for boot setting.

Boot Device Priority

Access to the sub menu for boot device priority.

Hard Disk Drives

Configure the boot settings for the Hard Disk Drives connected to the system.

3.4.1 Boot Settings Configuration

```
                        BIOS SETUP UTILITY
                                              Boot

  Boot Settings Configuration                        Disabled: Displays
                                                     normal POST messages.
  Quiet Boot                   [Disabled]            Enabled: Displays OEM
  Boot Num-Lock                [On]                  Logo instead of POST
                                                     messages.




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

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```
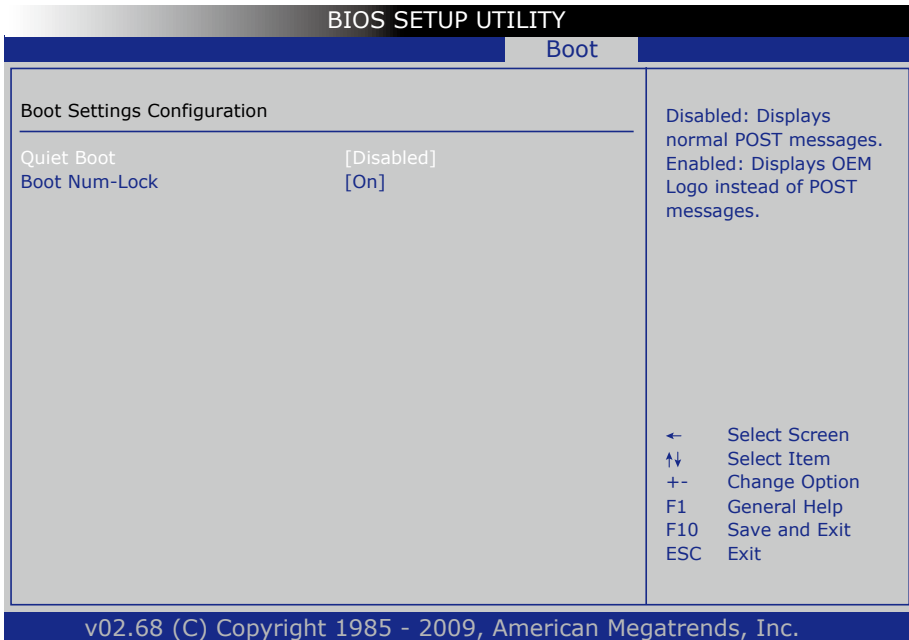
Quiet Boot

Displays normal POST messages when it's selected as "Disabled".
When it is set as "Enabled", OEM messages will be displayed instead of POST messages. The default is "Disabled".

Bootup Num-Lock

Modifies Number Lock setting when the system boots up. Select "On" to automatically enable the Number Lock on keyboard when the system is booting up.

3.5 Security

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

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

  Change Supervisor Password



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

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```
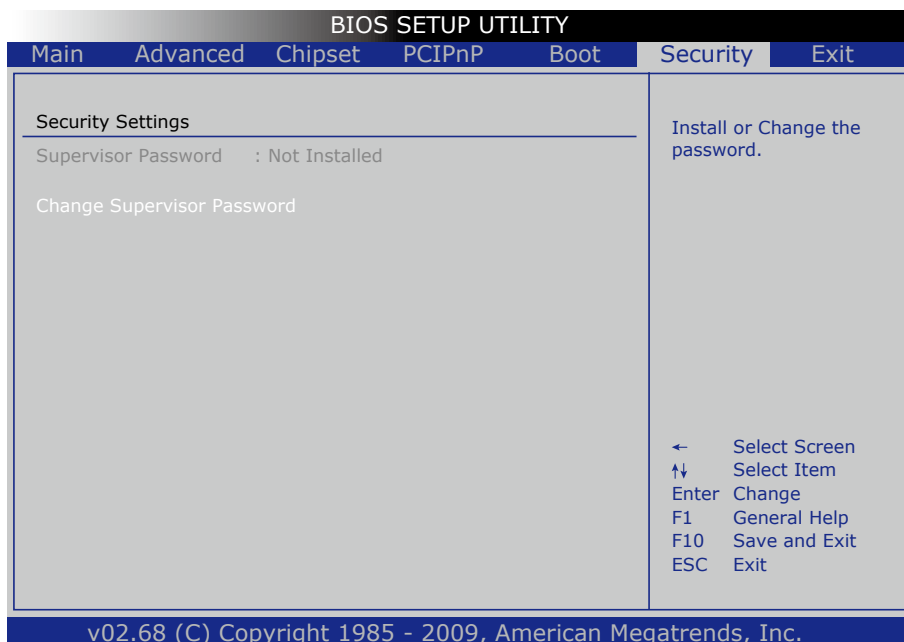
Supervisor Password & User Password

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

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

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.

3.6 Exit Options

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

  Exit Options                                      Exit system setup
  Save Changes and Exit                             after saving the
  Discard Changes and Exit                          changes.
  Load Optimal Defaults
                                                     F10 key can be used
                                                    for this operation.




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

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```

Save Changes and Exit

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.

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Appendix

Appendix-A 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 - 00000CF7	PCI Controller
00000000 - 00000CF7	DMA Controller
00000010 - 0000001F	Motherboard resource
00000020 - 00000021	Programmable Interrupt Controller
00000022 - 0000003F	Motherboard resource
00000040 - 00000043	System Timer
00000044 - 0000005F	Motherboard resource
00000060 - 00000060	Motherboard resource
00000061 - 00000061	System speaker
00000062 - 00000063	Motherboard resource
00000064 - 00000064	Keyboard Controller
00000065 - 0000006F	Motherboard resource
00000070 - 00000071	System CMOS/Real Time Clock
00000072 - 0000007F	Motherboard resource
00000080 - 00000080	Motherboard resource
00000081 - 00000083	DMA Controller
00000084 - 00000086	Motherboard resource
00000087 - 00000087	DMA Controller
00000088 - 00000088	Motherboard resource
00000089 - 0000008B	DMA Controller
0000008C - 0000008E	Motherboard resource
0000008F - 0000008F	DMA Controller
00000090 - 0000009F	Motherboard resource
000000A0 - 000000A1	Programmable interrupt controller
000000A2 - 000000BF	Motherboard resource
000000C0 - 000000DF	DMA Controller

000000E0 - 000000EF	Motherboard resource
000000F0 - 000000FF	Math Co-processor
000001F0 - 000001F7	Primary IDE channel
00000274 - 00000277	ISAPNP Read Data Port
00000279 - 00000279	ISAPNP Read Data Port
000002E8 - 000002EF	Communications Port (COM4, If use)
000002F8 - 000002FF	Communications Port (COM2, If use)
000003B0 - 000003BB	Intel(R) Graphics Media Accelerator 3150
000003C0 - 000003DF	Intel(R) Graphics Media Accelerator 3150
000003E0 - 000003E7	Communications Port (COM5, if use)
000003E8 - 000003EF	Communications Port (COM3, if use)
000003F6 - 000003F6	Primary IDE channel
000003F8 - 000003FF	Communications Port (COM1, If use)
00000400 - 0000041F	Intel(R) ICH8 Family SMBus Controller - 283E
000004D0 - 000004D1	Motherboard resources
00000500 - 0000053F	Motherboard resources
00000800 - 0000087F	Motherboard resources
00000A00 - 00000A0F	Motherboard resources
00000A10 - 00000A1F	Motherboard resources
00000A79 - 00000A79	ISAPNP Read Data Port
00000D00 - 0000FFFF	PCI Bus
0000B080 - 0000B087	Intel(R) Graphics media Accelerator 3150
0000B400 - 00000B41F	Intel(R) ICH8 Family USB Universal Host Controller - 2835
0000B400 - 00000B49F	Intel(R) ICH8 Family USB Universal Host Controller - 2834
0000B800 - 00000B81F	Intel(R) ICH8 Family USB Universal Host Controller - 2832
0000B880 - 00000B89F	Intel(R) ICH8 Family USB Universal Host Controller - 2831

0000BC00 - 00000BC1F	Intel(R) ICH8 Family USB Universal Host Controller - 2830
0000C080 - 00000C08F	Intel(R) ICH8M 3 port Serial ATA Storage Controller - 2828
0000C400 - 00000C40F	Intel(R) ICH8M 3 port Serial ATA Storage Controller - 2828
0000C480 - 00000C483	Intel(R) ICH8M 3 port Serial ATA Storage Controller - 2828
0000C800 - 00000C807	Intel(R) ICH8M 3 port Serial ATA Storage Controller - 2828
0000C880 - 00000C883	Intel(R) ICH8M 3 port Serial ATA Storage Controller - 2828
0000CC00 - 00000CC07	Intel(R) ICH8M 3 port Serial ATA Storage Controller - 2828
0000D000 - 00000DFFF	Intel(R) ICH8 Family PCI Express Root Port 2 - 2841
0000D800 - 00000D8FF	Realtek RTL8168C(P)/8111C(P) PCI-E Gigabit Ethernet NIC
0000E000 - 00000EFFF	Intel(R) ICH8 Family PCI Express Root Port 3 - 2843
0000E800 - 00000E8FF	Realtek RTL8168C(P)/8111C(P) PCI-E Gigabit Ethernet NIC
0000FFA0 - 00000FFAF	Intel(R) ICH8M Ultra ATA Storage Controllers - 2850

Appendix-B 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 3	Communications Port (COM2)
IRQ 4	Communications Port (COM1)
IRQ 5	Intel(R) ICH8 Family SMBus Controller -283E
IRQ 8	System CMOS/real time clock
IRQ 9	Microsoft ACPI-Compliant System
IRQ 10	Communications Port (COM4)
IRQ 10	Communications Port (COM5)
IRQ 11	Communications Port (COM3)
IRQ 11	PCI Device
IRQ 13	Numeric data processor
IRQ 14	Primary IDE Controller
IRQ 16	Intel(R) Graphics Media Accelerator 3150
IRQ 16	Intel(R) ICH8 Family USB Universal Host Controller -2834
IRQ 17	Realtek RTL8168C(P)/8111C(P) PCI-E Gigabit Ethernet NIC
IRQ 18	Intel(R) ICH8 Family USB Universal Host Controller -283A
IRQ 18	Realtek RTL8168C(P)/8111C(P) PCI-E Gigabit Ethernet NIC
IRQ 18	Intel(R) ICH8 Family USB Universal Host Controller -2832
IRQ 18	Intel(R) ICH8M 3 port Serial ATA Storage Controller - 2828
IRQ 19	Intel(R) ICH8 Family USB Universal Host Controller - 2831
IRQ 20	Intel(R) ICH8 Family PCI Express Root Port 3 - 2842
IRQ 21	Intel(R) ICH8 Family USB Universal Host Controller - 2835
IRQ 21	Microsoft UAA Bus Driver for High Definition Audio
IRQ 22	Intel(R) ICH8 Family PCI Express Root Port 1 - 283F
IRQ 23	Intel(R) ICH8 Family PCI Express Root Port 2 - 2841
IRQ 23	Intel(R) ICH8 Family USB Universal Host Controller - 2830
IRQ 23	Intel(R) ICH8 Family USB2 Enhanced Host Controller - 2836

Appendix-C 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

Appendix-D Watchdog Timer (WDT) Setting

WDT is widely used for industry application to monitoring the activity of CPU. Application software depends on its requirement to trigger WDT with adequate timer setting. Before WDT time out, the functional normal system will reload the WDT. The WDT never time out for a normal system. Then, WDT will time out and reset the system automatically to avoid abnormal operation.

This board supports 255 levels watchdog timer by software programming. Below are the source codes written in C language, please take them for WDT application examples.

C Language Code

```c
/*-----     Include Header Area -----*/
#include "math.h"
#include "stdio.h"
#include "dos.h"

/*-----     routing, sub-routing -----*/

void main()

{
        outportb(0x2e, 0x87);       /* initial IO port twice */
        outportb(0x2e, 0x87);

        outportb(0x2e, 0x2B);       /* select CR2B */
        outportb(0x2e+1, 0x00);     /* update CR2B bit4 to 00h */
                                    /* Set PIN89 as WDTO */

        outportb(0x2e, 0x07);       /* point to logical device selector */
        outportb(0x2e+1, 0x08);     /* select logical device 8 */
        outportb(0x2e, 0x30);       /* select CR30 */
        outportb(0x2e+1, 0x01);     /* update CR30 to 01h */
        outportb(0x2e, 0xf0);       /* select CRF0 */
        outportb(0x2e+1, 0x00);     /* update CRF0 to 00h */
        outportb(0x2e, 0xf5);       /* select CRF5 to set timer unit */
        outportb(0x2e+1, 0x00);     /* update CRF5 bit2, 0:sec; 1:Min. */
        outportb(0x2e, 0xF6);       /* select CRF6 */
        outportb(0x2e+1, 0x05);     /* update CRF6 to 05h (5 sec) */

        outportb(0x2e, 0xAA);       /* stop program W83627, Exit */
}
```

Appendix-E Digital I/O Setting

Below are the source codes written in C language, please take them for Digital I/O application examples.

C Language Code

```
/*----- Include Header Area -----*/
#include "math.h"
#include "stdio.h"
#include "dos.h"

/*----- routing, sub-routing -----*/

void main()

{
        outportb(0x2e, 0x87);          /* initial IO port twice */
        outportb(0x2e, 0x87);


        outportb(0x2e, 0x07);           /* point to logical device */
        outportb(0x2e+1, 0x08);          /* select logical device 8 */

        outportb(0x2e, 0x30);           /* select CR30 */
        outportb(0x2e+1, 0x02);          /* set bit1=1, GPIO port 5 active */

        outportb(0x2e, 0xE0);          /* select CRE0, GPIO5 I/O Register */
        outportb(0x2e+1, 0x00);          /* bit7~bit0 0:output  1:input */

        outportb(0x2e, 0xE1);          /* select CRE1, GPIO5 Data Register */
        outportb(0x2e+1, 0xff);        /* set all GPIO pin output 1 */

        outportb(0x2e, 0xE1);          /* select CRF1, Data Register */
        outportb(0x2e+1, 0x00);        /* set all GPIO pin output 0 */

        outportb(0x2e, 0xAA);          /* stop program W83627, Exit */

}
```