EmETX-i2900

Intel® Atom™ N450/D510 ETX® CPU Module

User's Manual

Version 1.1

2014.06

Revision History

Version	Date	Description
1.0	2013/04/11	initial release
1.1	2014/06/30	2.1 update Board Dimensions P.8

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Copyright Notice

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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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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 device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1)This device may not cause harmful interference, and

(2)This device must accept any interference received, including interference that may cause undesired operation.

NOTE:

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 when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause 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.

ARBOR Technology Corp. hereby states that the listed products do not contain unintentional additions of lead, mercury, hex chrome, PBB or PBDB that exceed a maximum concentration value of 0.1% by weight or for cadmium exceed 0.01% by weight, per homogenous material. Homogenous material is defined as a substance or mixture of substances with uniform composition (such as solders, resins, plating, etc.). Lead-free solder is used for all terminations (Sn(96-96.5%), Ag(3.0-3.5%) and Cu(0.5%)).

SVHC / REACH

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)

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 comes with the Single Board Computer, whenever components are separated from the system.

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.

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 cannot find out the answer.

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

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 merchantability 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.

Chapter 1

Introduction

1.1 The Product

EmETX-i2900 needs another carrier board, PBE-1000, to work with to deliver best performance. The I/O cabling from boards to chassis, or the daughter boards are not needed. Money spent on these parts can be saved. Cost is substantially reduced.

Enabling easier system upgrade, EmETX-i2900 actually reduces the risk resulted from previous wrong assessment of system performance. It decreases design requirements and eases technical complexity, and therefore reduces business risk. It has these features:

- **Fanless Design**
- ETX 3.0 w/ SATA Connectors
- Soldered Onboard Intel® Atom™ N450/D510 Processor
- Single Channel 18-bit LVDS, and Analog RGB
- **Extended Operating Temp.: -20 ~ 70ºC**

1.2 About This Manual

This user's manual provides general information and installation instructions about the product. 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 booklet. please consult your vendor before further handling.

1.3 Specifications

Form Factor	ETX CPU Module
CPU	Intel® Atom™ N450 1.6GHz/D510 1.66GHz CPU
Chipset	Intel® ICH8M
System Memory	1 x 200-pin DDR2 SO-DIMM socket, supporting 667MHz SDRAM up to 2GB
VGA/ LCD Controller	Integrated Intel® Graphics Media Accelerator 3150 with Analog RGB/ Single Channel 18-bit LVDS
	Analog RGB supports resolution up to: - 1400 x 1050 @60Hz (N450) - 2048 x 1536 @60Hz (D510)
	Single channel 18-bit LVDS supports resolution up to: - 1280 x 800 or 1366 x 768 (N450) - 1366 x 768 (D510)
Ethernet	1 x Realtek 8103EL PCIe 10/100 Base-T Ethernet
BIOS	AMI PnP Flash BIOS
Serial ATA	2 x Serial ATA with 300MB/s HDD transfer rate
IDE Interface	1 x Ultra ATA, support 2 IDE devices
I/O Chip	Winbond W83627HG
Serial Port	2 x RS-232 ports
Parallel Port	1 x SPP/EPP/ECP mode selectable
KBMS	Supports PS/2 interface Keyboard and Mouse
Universal Serial Bus	4 x USB 2.0 ports
Expansion Interface	4 x PCI masters, ISA Bus, LPC interface
Power Requirement	+5V, 5VSB
Operation Temp.	-20 ~ 70ºC (-4 ~ 158ºF)
Watchdog Timer	1~255 levels reset
Dimension (L x W)	114 x 95 mm (4.5” x 3.7”)

1.4 Inside the Package

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

1 x EmETX-i2900 ETX® CPU Module

1 x Driver CD

1 x Quick Installation Guide

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

1.5 Ordering Information

EmETX-i2900-N4	Intel® Atom™ N450 1.6GHz ETX CPU Module
EmETX-i2900-D5	Intel® Atom™ D510 1.66GHz ETX CPU Module

Optional Accessories

HS-0742-F3 (2631140951100P)	Heat spreader, 114 x 95 x 8 mm
HS-0000-W4 (2631250952202P)	Universal evaluation heatsink kit w/ thermal pad (dimension: 125x95x22mm, only used on a flat type heatspreader)
PBE-1000 R2.1	ETX® evaluation board in ATX form factor
CBK-05-1000-00 (6910510000010P)	Cable kit for PBE-1000 R2.1 1 x FDD cable 1 x USB cable 3 x COM port cables 2 x IDE cables 1 x TV-out

1.6 The Installation Paths of CD Driver

Windows 2000 & XP

Driver	Path
CHIPSET	\CHIPSET\INF 9.11
VGA	\GRAPHICS\INTEL_2K_XP_32\5182
AUDIO	\AUDIO\REALTEK_HD\WIN2K_XP_x86x64_R252
LAN	\ETHERNET\REALTEK\8103EL_WIN5736

Windows 7

Driver	Path
CHIPSET	\CHIPSET\INF 9.11
VGA	\GRAPHICS\INTEL_WIN7_32\2230 \GRAPHICS\INTEL_WIN7_64\2214
AUDIO	\AUDIO\REALTEK_HD\Win7_R257
LAN	\ETHERNET\REALTEK\8103EL_Win7_7040

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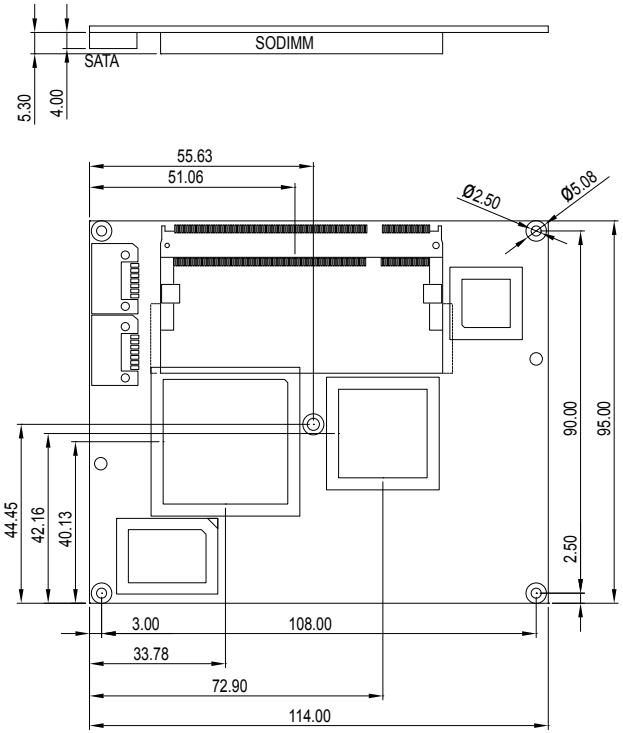
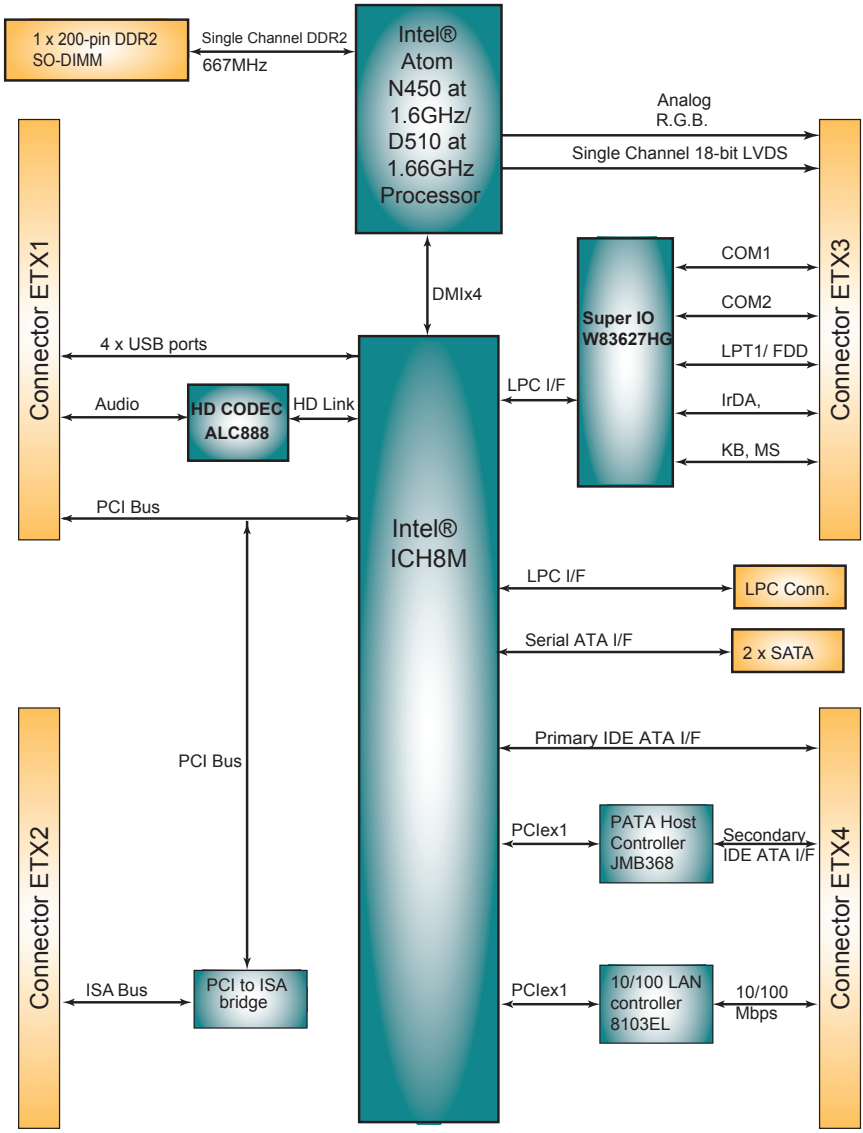
Chapter 2

Board Overview

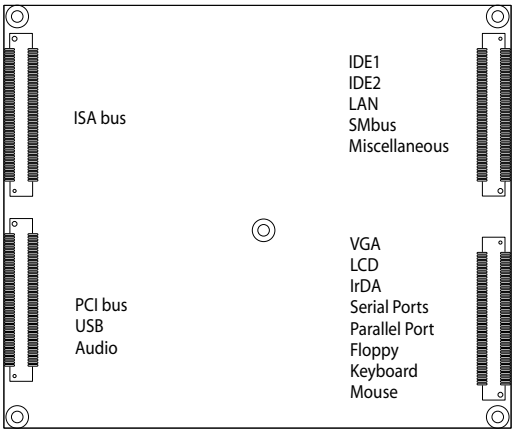
2.1 Board Dimensions



2.2 Block Diagram

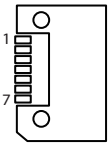


2.3 Jumpers and Connectors



SATA1, SATA2 Connectors (Top side)

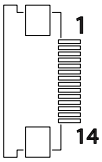
Pin	Description
1	GND
2	TX+
3	TX-
4	GND
5	RX-
6	RX+
7	GND



LPC1 Connector

Connector type: FPC12-14P-P0.5 (Hirose)

Pin	Description
1	LAD0
2	LAD1
3	LAD2
4	LAD3
5	GND
6	LFRAME#
7	INT_SERIRQ
8	BUF_PLT_RST#
9	GND
10	PCLK_CONN
11	GND
12	GND
13	+3.3V
14	+3.3V



ETX1 Connector

A1	GND	GND	A2
A3	PCICLK3	PCICLK4	A4
A5	GND	GND	A6
A7	PCICLK1	PCICLK2	A8
A9	REQ#3	GNT#3	A10
A11	GNT#2	VCC3	A12
A13	REQ#2	GNT#1	A14
A15	REQ#1	VCC3	A16
A17	GNT#0	N.C	A18
A19	VCC	VCC	A20
A21	SERIRQ	REQ#0	A22
A23	AD0	VCC3	A24
A25	AD1	AD2	A26
A27	AD4	AD3	A28
A29	AD6	AD5	A30
A31	CBE#0	AD7	A32
A33	AD8	AD9	A34
A35	GND	GND	A36
A37	AD10	AUXAL	A38
A39	AD11	MIC	A40
A41	AD12	AUXAR	A42
A43	AD13	ASVCC	A44
A45	AD14	SNDL	A46
A47	AD15	ASGND	A48
A49	CBE#1	SNDR	A50
A51	VCC	VCC	A52
A53	PAR	SERR#	A54
A55	PERR#	N.C	A56
A57	PME#	USB2-	A58
A59	LOCK#	DEVSEL#	A60
A61	TRDY#	USB3-	A62
A63	IRDY#	STOP#	A64
A65	FRAME#	USB2+	A66
A67	GND	GND	A68
A69	AD16	CBE#2	A70
A71	AD17	USB3+	A72
A73	AD19	AD18	A74
A75	AD20	USB0-	A76
A77	AD22	AD21	A78
A79	AD23	USB1-	A80
A81	AD24	CBE#3	A82
A83	VCC	VCC	A84
A85	AD25	AD26	A86
A87	AD28	USB0+	A88
A89	AD27	AD29	A90
A91	AD30	USB1+	A92
A93	PCIRST#	AD31	A94
A95	INTR#C	INTR#D	A96
A97	INTR#A	INTR#B	A98
A99	GND	GND	A100

ETX2 Connector

B1	GND	GND	B2
B3	SD14	SD15	B4
B5	SD13	MASTER#	B6
B7	SD12	DREQ7	B8
B9	SD11	DACK#7	B10
B11	SD10	DREQ6	B12
B13	SD9	DACK#6	B14
B15	SD8	DREQ5	B16
B17	MEMW#	DACK#5	B18
B19	MEMR#	DREQ0	B20
B21	LA17	DACK#5	B22
B23	LA18	IRQ14	B24
B25	LA19	IRQ15	B26
B27	LA20	IRQ12	B28
B29	LA21	IRQ11	B30
B31	LA22	IRQ10	B32
B33	LA23	IO16#	B34
B35	GND	GND	B36
B37	SBHE#	M16#	B38
B39	SA0	OSC	B40
B41	SA1	BALE	B42
B43	SA2	TC	B44
B45	SA3	DACK#2	B46
B47	SA4	IRQ3	B48
B49	SA5	IRQ4	B50
B51	VCC	VCC	B52
B53	SA6	IRQ5	B54
B55	SA7	IRQ6	B56
B57	SA8	IRQ7	B58
B59	SA9	SYSCLK	B60
B61	SA10	REFCH#	B62
B63	SA11	DREQ1	B64
B65	SA12	DACK#1	B66
B67	GND	GND	B68
B69	SA13	DREQ3	B70
B71	SA14	DACK#3	B72
B73	SA15	IOR#	B74
B75	SA16	IOW#	B76
B77	SA18	SA17	B78
B79	SA19	SMEMR#	B80
B81	IOCHRDY	AEN	B82
B83	VCC	VCC	B84
B85	SD0	SMEMW#	B86
B87	SD2	SD1	B88
B89	SD3	NOWS#	B90
B91	DREQ2	SD4	B92
B93	SD5	IRQ9	B94
B95	SD9	SD7	B96
B97	IOCHK#	RSTDRV	B98
B99	GND	GND	B100

ETX3 Connector

C1	GND	GND	C2
C3	R	B	C4
C5	HSY	G	C6
C7	VSY	Analog RGB_DDC_CLK	C8
C9	DETECT#	Analog RGB_DDC_DATA	C10
C11	TX2CLK#	N.C.	C12
C13	TX2CLK	N.C.	C14
C15	GND	GND	C16
C17	TX2D1	TX2D2	C18
C19	TX2D1#	TX2D2#	C20
C21	GND	GND	C22
C23	N.C.	TX2D0	C24
C25	N.C.	TX2D0#	C26
C27	GND	GND	C28
C29	TX1D2#	TX1CLK	C30
C31	TX1D2	TX1CLK#	C32
C33	GND	GND	C34
C35	TX1D0	TX1D1	C36
C37	TX1D0#	TX1D1#	C38
C39	VCC	VCC	C40
C41	DDC_DATA	N.C.	C42
C43	DDC_CLK	BLON#	C44
C45	BKLTCTL	VDDEN	C46
C47	TV_DATA_COMP	Y	C48
C49	N.C.	C	C50
C51	LPT/FLPY#	N.C.	C52
C53	VCC	GND	C54
C55	STB#	AFD#/DENSEL	C56
C57	N.C.	PD7/N.C	C58
C59	IRRX	ERR#/HDSEL#	C60
C61	IRTX	PD6/N.C	C62
C63	RXD2	INIT#/DIR#	C64
C65	GND	GND	C66
C67	RTS#2	PD5/N.C	C68
C69	DTR#2	SLIN#/STEP#	C70
C71	DCD#2	PD4/DSKCHG#	C72
C73	DSR#2	PD3/RDATA#	C74
C75	CTS#2	PD2/WP#	C76
C77	TXD#2	PD1/TRK0#	C78
C79	RI#2	PD0/INDEX#	C80
C81	VCC	VCC	C82
C83	RXD1	ACK#/DRV	C84
C85	RTS#1	BUSY#/MOT	C86
C87	DTR#1	PE/WDATA#	C88
C89	DCD#1	SLCT#/WGATE#	C90
C91	DSR#1	MSCLK	C92
C93	CTS#1	MSDAT	C94
C95	TXD#1	KBCLK	C96
C97	RI#1	KBDAT	C98
C99	GND	GND	C100

ETX4 Connector

D1	GND	GND	D2
D3	5V_SB	PWGIN	D4
D5	PS_ON	SPEAKER	D6
D7	PWERBTN#	BATT	D8
D9	KBINH	LILED	D10
D11	RSMRST#	ACTLED	D12
D13	N.C	SPEEDLED	D14
D15	N.C	I2CLK	D16
D17	VCC	VCC	D18
D19	OVCR#	N.C	D20
D21	EXTSMI#	I2DAT	D22
D23	SMBCLK	SMBDAT	D24
D25	SIDE_CS3#	SMBALRT#	D26
D27	SIDE_CS1#	DASP_S	D28
D29	SIDE_A2	PIDE_CS3#	D30
D31	SIDE_A0	PIDE_CS1#	D32
D33	GND	GND	D34
D35	PDIAG_S	PIDE_A2	D36
D37	SIDE_A1	PIDE_A0	D38
D39	SIDE_INTRQ	PIDE_A1	D40
D41	BATLOW#	N.C	D42
D43	SIDE_ACK#	PIDE_INTRQ	D44
D45	SIDE_RDY	PIDE_ACK#	D46
D47	SIDE_IOR#	PIDE_RDY	D48
D49	VCC	VCC	D50
D51	SIDE_IOW#	PIDE_IOR#	D52
D53	SIDE_DRQ	PIDE_IOW#	D54
D55	SIDE_D15	PIDE_DRQ	D56
D57	SIDE_D0	PIDE_D15	D58
D59	SIDE_D14	PIDE_D0	D60
D61	SIDE_D1	PIDE_D14	D62
D63	SIDE_D13	PIDE_D1	D64
D65	GND	GND	D66
D67	SIDE_D2	PIDE_D13	D68
D69	SIDE_D12	PIDE_D2	D70
D71	SIDE_D3	PIDE_D12	D72
D73	SIDE_D11	PIDE_D3	D74
D75	SIDE_D4	PIDE_D11	D76
D77	SIDE_D10	PIDE_D4	D78
D79	SIDE_D5	PIDE_D10	D80
D81	VCC	VCC	D82
D83	SIDE_D9	PIDE_D5	D84
D85	SIDE_D6	PIDE_D9	D86
D87	SIDE_D8	PIDE_D6	D88
D89	GPE2#	CBLID_P#	D90
D91	RXD-	PIDE_D8	D92
D93	RXD+	SIDE_D7	D94
D95	TXD-	PIDE_D7	D96
D97	TXD+	HDRST#	D98
D99	GND	GND	D100

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Chapter 3

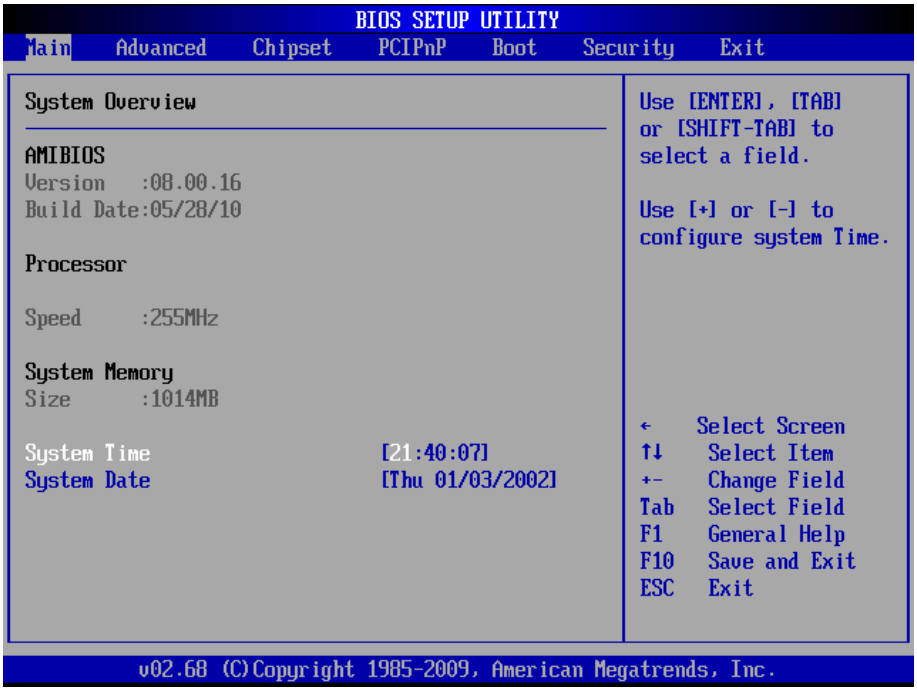
BIOS

3.1 BIOS Main Setup

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



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

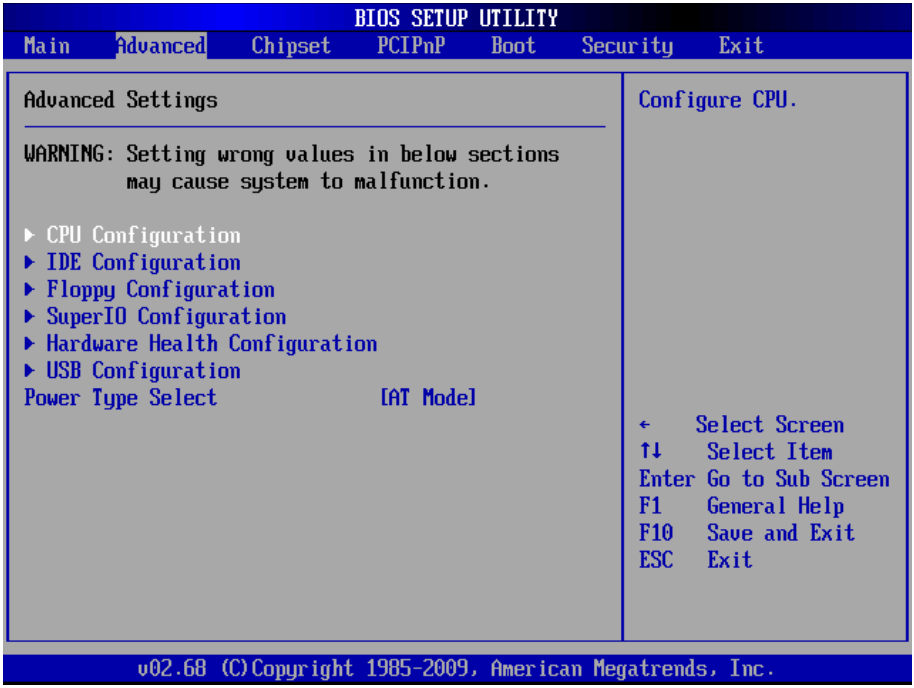
System Date

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

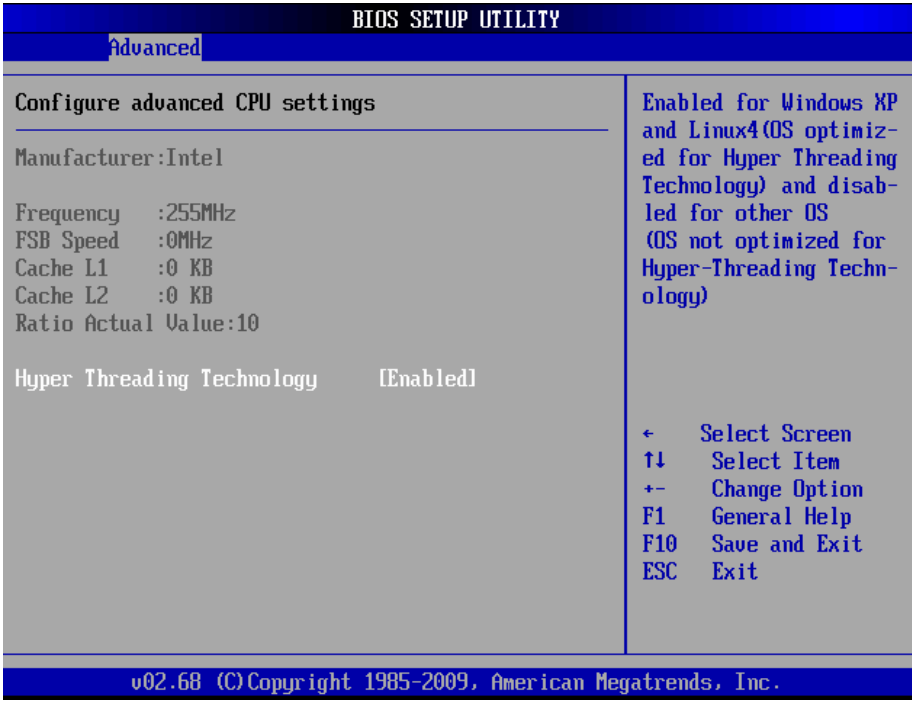
The “Advanced” screen provides the setting options to configure CPU, IDE, Super IO and other peripherals. You can use “←” and “→” keys to select “Advanced” and use the “↓” and “↑” to select a setup item.



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.



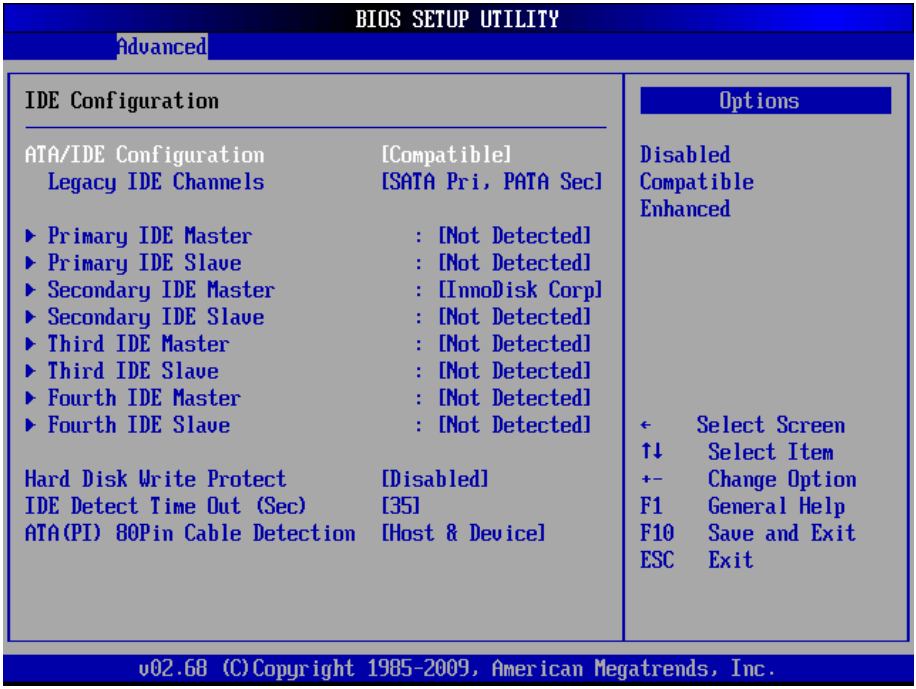
CPU Details
Manufacturer: shows the name of the CPU manufacturer
Frequency: indicates the processor speed
FSB Speed: the data flow speed of FSB (Front Side Bus)
Cache L1: shows the Cache L1 size for the CPU
Cache L2: shows the Cache L2 size for the CPU
Ratio Actual Value: actual value of clock ratio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

Hyper-Threading Technology

Options
Enabled: Enabled the Hyper-Threading Technology for higher CPU threading speed. (recommended)
Disabled: Disabled the Hyper-Threading Technology.

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.



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

Legacy IDE Channels (SATA Pri, PATA Sec): specifies SATA or PATA controllers to be primary or secondary.

Primary IDE Master/Slave, Secondary IDE Master/Slave, Third IDE Maser/Slave, Fourth 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.

Hard Disk Write Protect

Enable or disable Hard Disk Write Protect. If you select “Enabled”, the hard disk will turn into a “write-protected” mode.

IDE Detect Time-out (sec)

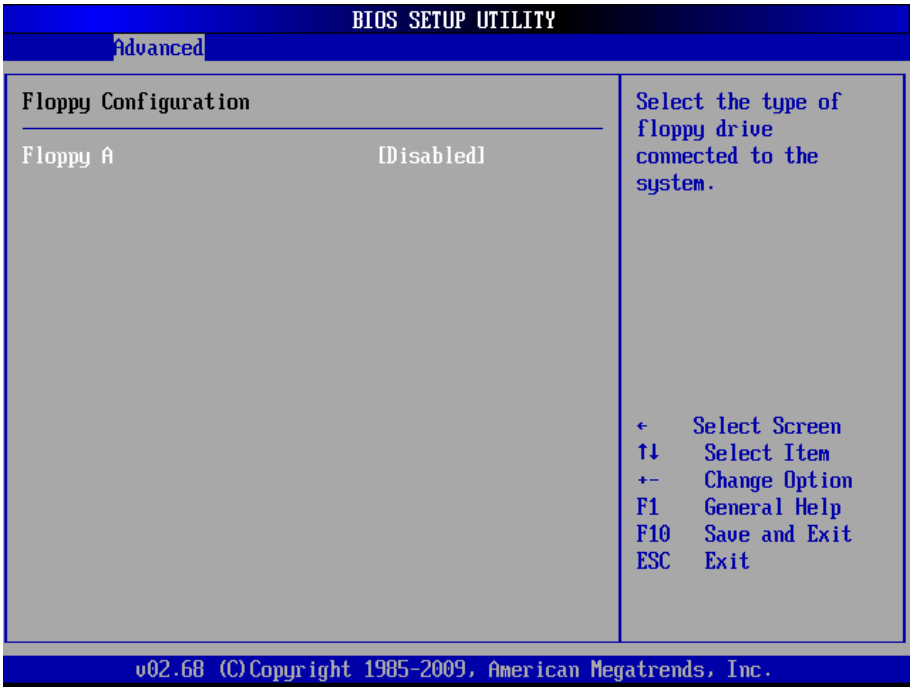
Specifies the delay time for initializing IDE devices. The default value is 0.

ATA (PI) 80Pin Cable Detection

You can set it as “Host & Device”, “Host” or “Device”. Host refers to the capability of IDE controllers to be able to detect connected IDE cable, while Device is defined as the ability of IDE devices to recognize the connected IDE cable.

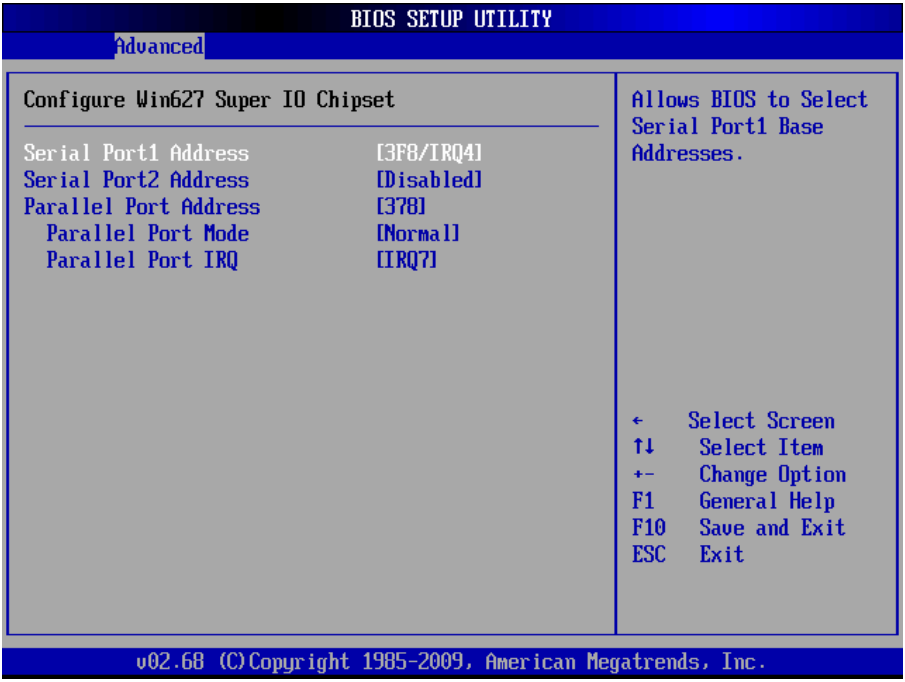
3.2.3 Floppy Configuration

On the “Floppy” screen, you can enable or disable the floppy drive connected to your system.



3.2.4 Super IO Configuration

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



Serial Port1 / Port2 Address

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

3F8/IRQ4
2F8/IRQ3
2E8/IRQ3
3E8/IRQ4
Disabled
Auto

Serial Port2 Mode

Allows BIOS to select mode for serial Port2.

Parallel Port Address

Select an address for the parallel port.

- 3BC
- 378
- 278
- Disabled

Parallel Port Mode

Select an operating mode for the onboard parallel port. Select Normal, Compatible or SPP unless you are certain your hardware and software both support one of the other available modes.

- SPP
- EPP
- ECP
- ECP + EPP
- Normal

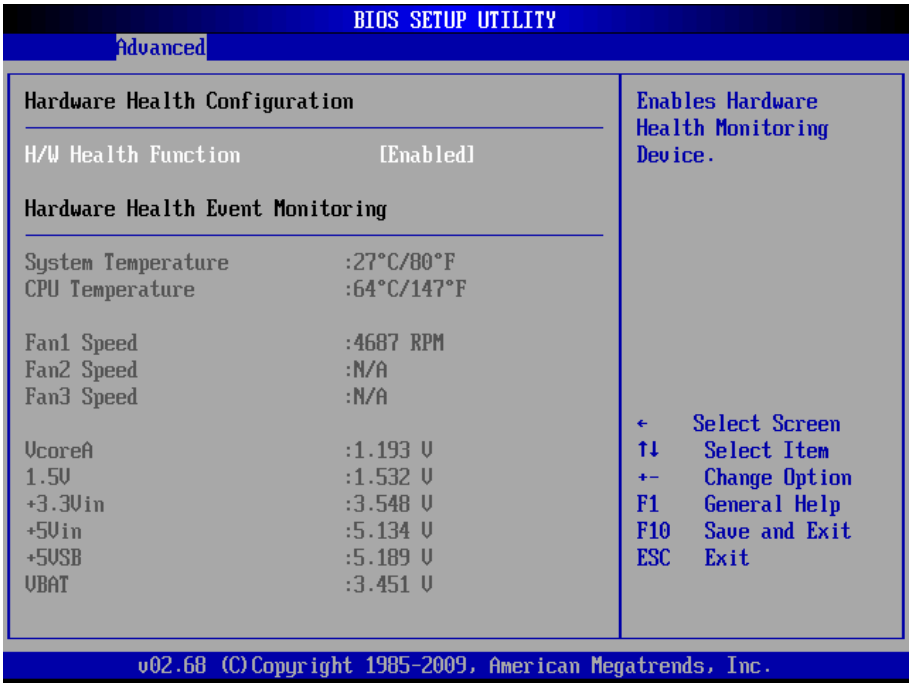
Parallel Port IRQ

Select an interrupt for the parallel port.

- IRQ5
- IRQ7

3.2.5 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.



System Temperature

Show you the currently monitored system temperature.

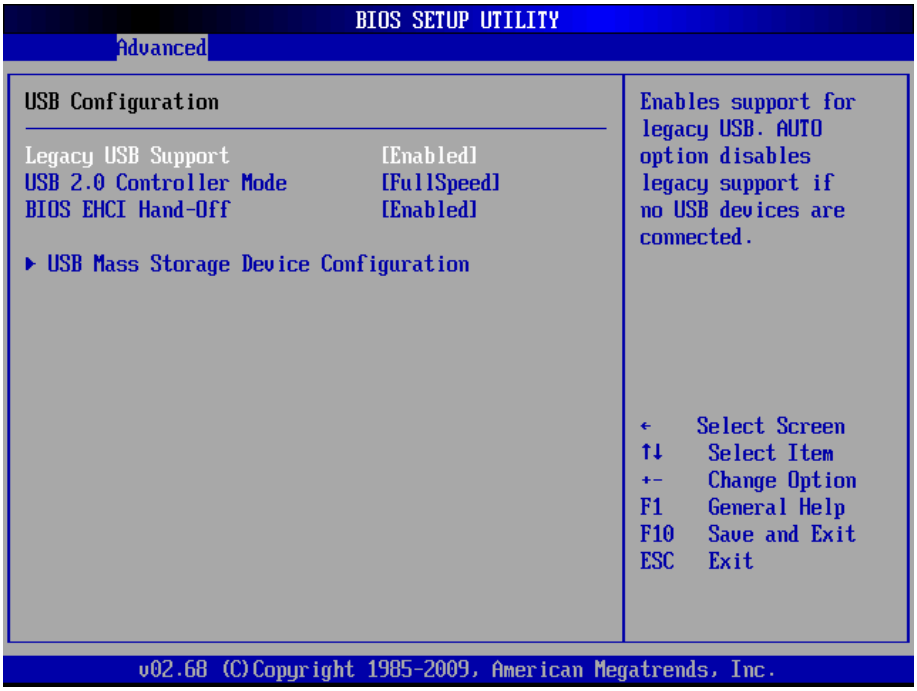
CPU Temperature

Show you the currently monitored CPU temperature.

+1.5V/+3.3Vin / +5Vin / +5VSB/VBAT

Show you the voltage level of the +1.5V, +3.3Vin, +5Vin, +5VSB, or VBAT standby and battery.

3.2.5 USB Configuration



Legacy USB Support

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

USB 2.0 Controller Mode

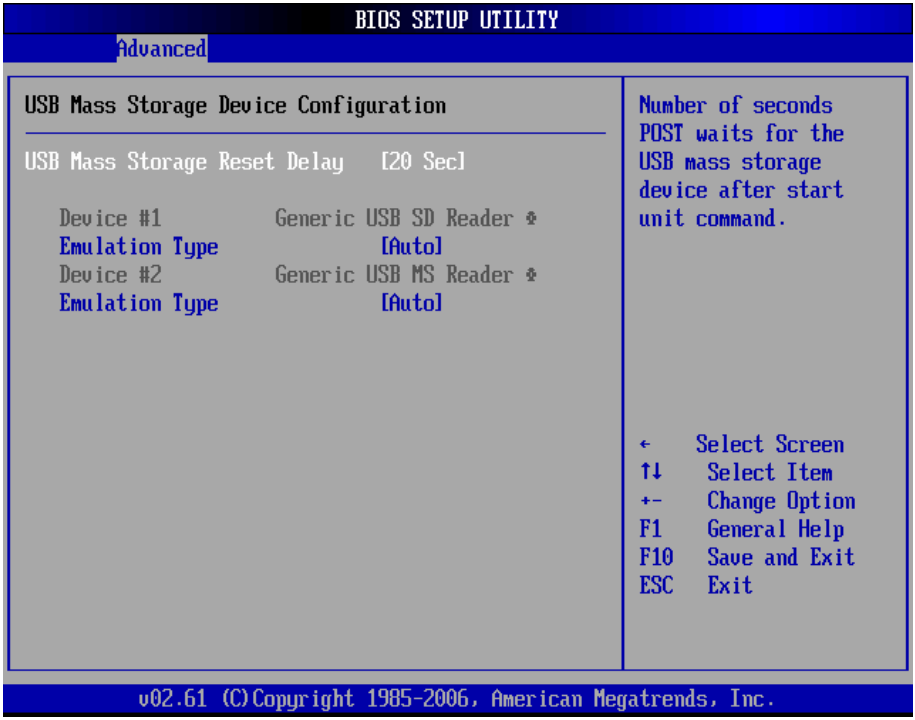
Configures the USB 2.0 controller in High Speed (480Mbps) or Full Speed (12MBPS).

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.

USB Mass Storage Device Configuration

USB Mass Storage Reset Delay:
Number of seconds POST (Power-On Self-Test) waits for the USB mass storage device after start unit command.



Emulation Type

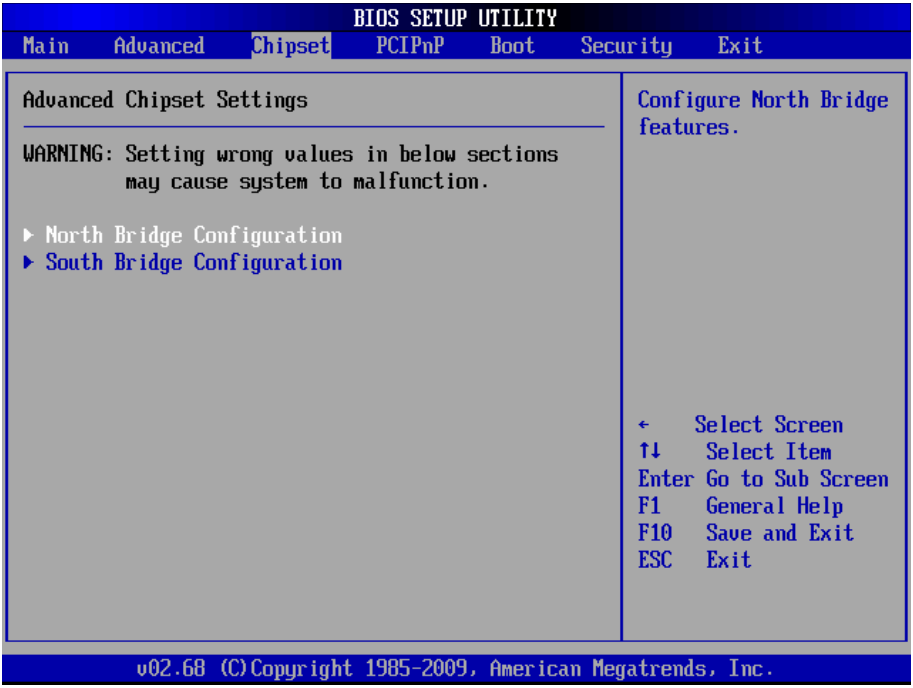
Sets the value for the system to select the emulation type for USB devices. In general, options include “Auto”, “FDD” and “HDD” (HDD stands for Hard Disk Drive, while FDD is also known as 3 1/2 floppy).
Please keep in mind that options such as “FDD” might not always be available as some computers are not built with this type of connectors.

Note

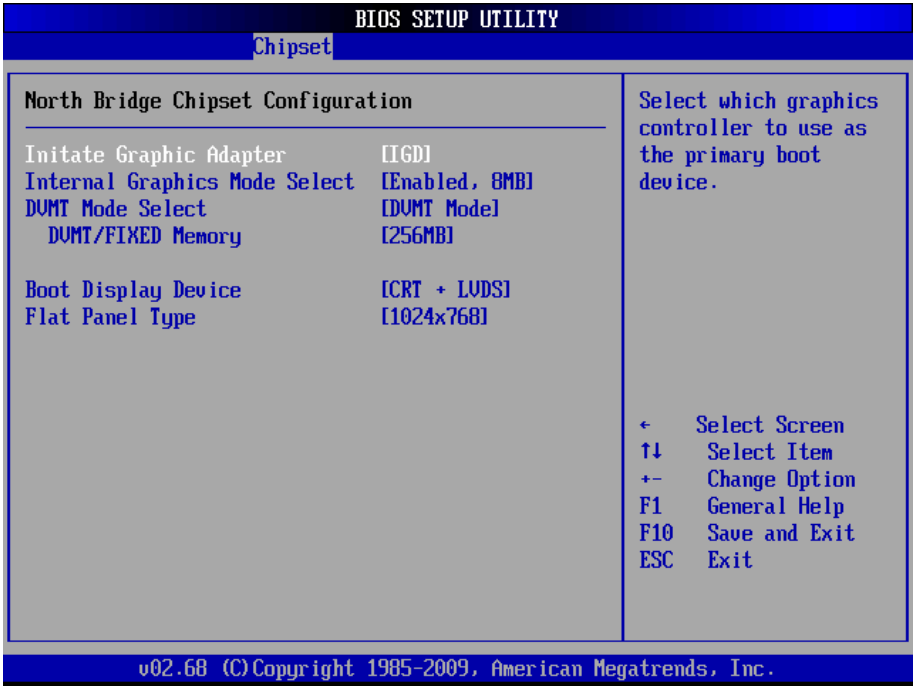
If “Auto” is selected, USB device with storage less than 530MB will be emulated as Floppy and remain as hard drive. Forced FDD option can be used to force a HDD formatted drive to “BOOT” as FDD (for example, ZIP drive)

3.3 Chipset

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



3.3.1 North Bridge Chipset Configuration



Initiate Graphic Adapter:
Selects which graphics controller to be used as the primary boot device.

Internal Graphic Mode Select:
Selects the amount of the system memory to enable the internal graphic mode

DVMT Mode

Setting: FIXED, DVMT (Default), BOTH.

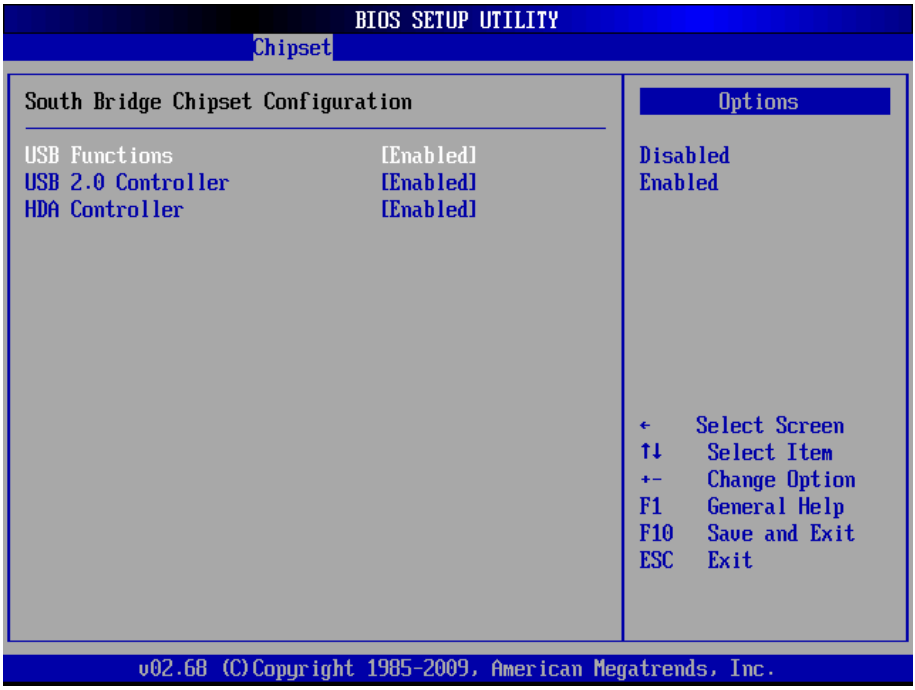
DVMT/FIXED Memory Size

Setting: 64MB, 128MB (Default), 224MB.

Boot Display Device: boot setting for the display device connected to the computer, such as “External CRT” monitor.
Flat Panel Type: the resolution types of the connected flat panel display device.

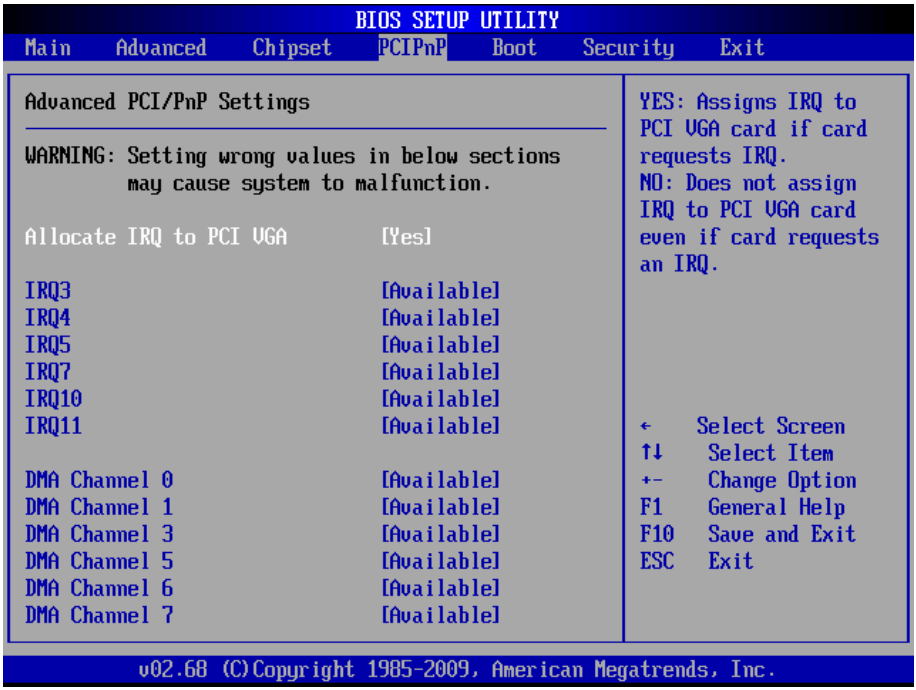
3.3.2 South Bridge Chipset Configuration

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.



3.4 PCIPnP

The “PCIPnP” screen provides advanced setting options for your PCI or PnP (plug and play) peripherals.



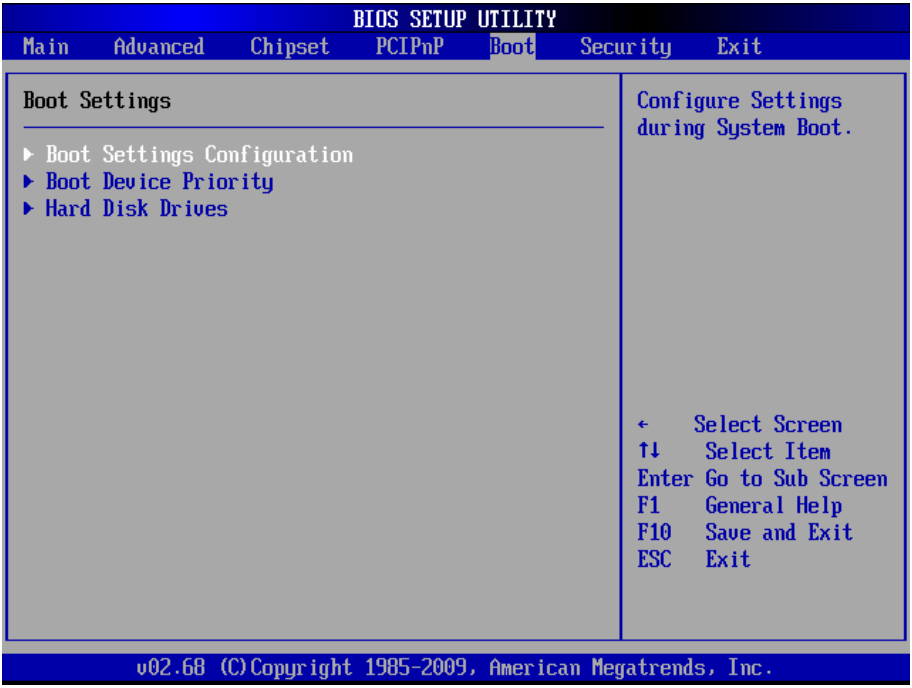
Allocate IRQ to PCI VGA:
[Yes]: assigns IRQ to PCI VGA card if card requests IRQ
[No]: does not assign IRQ to PCI VGA card even if card requests IRQ

[Available]: if an item is specified “Available”, the particular item can be used by PCI or PnP peripherals/devices
[Reserved]: if an item is specified as “Reserved”, the particular item can only be used by legacy ISA peripherals/devices

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

3.5 Boot

The “Boot” screen provides the access to configure the settings for system boot.

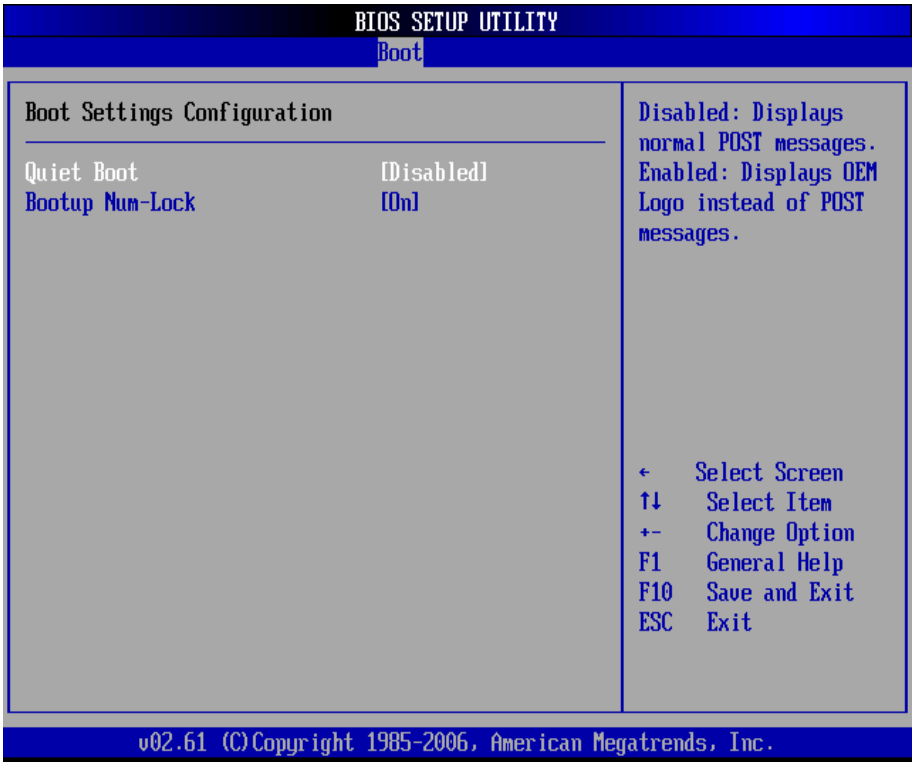


Boot Setting Configuration: enter the sub menu for boot setting.

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.

3.5.1 Boot Setting Configuration

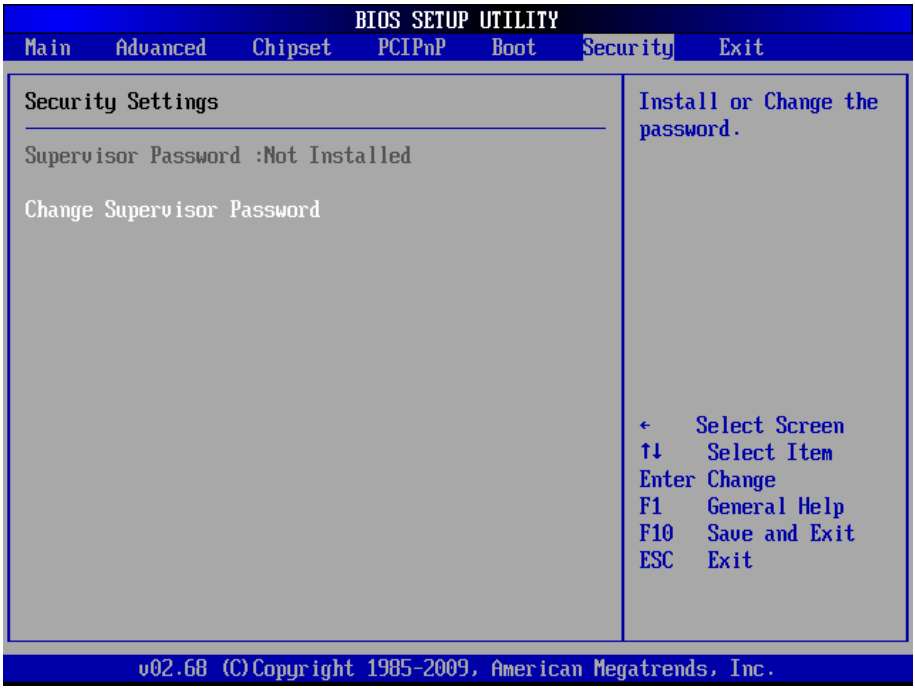


Quiet Boot: displays normal POST messages when it's selected as "Disabled". When it is set as "Enabled", OEM messages will be displayed instead of POST messages. The default is "Disabled".

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.

3.6 Security

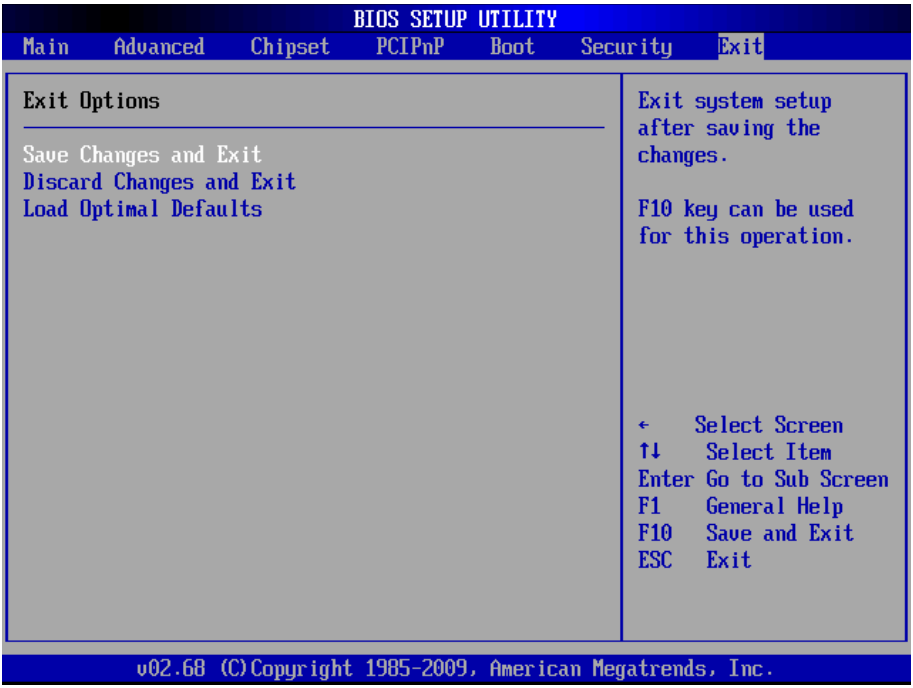
The “Security Settings” screen allows you to set password.



Change Supervisor Password: the default is “Not Installed”, but you can change the Supervisor Password and then it will appear “Installed”. Please always remember your password or else you will have to reset the whole system.

3.7 Exit

Select “Exit” to set exit options, save changes or load default values.



Save Changes and Exit

When you press “Enter” on this option, a message described as the one below will appear:

“Save configuration changes and exit setup?”

Pressing <OK> stores the configuration changes made in BIOS in CMOS menu - a special section of memory that stays on after you turn your system off, and then exit. The next time you boot your system up, the new configured system values will take place.

Note: you can also press <F10> to enable this operation.

Discard Changes and Exit

Exit system setup without saving any changes.
You can also press <ESC> to activate this function.

Load Optimal Defaults

When you press <Enter> on this option, a message dialog box will appear asking for your confirmation:

Load Optimal Defaults?
[OK] [Cancel]

Press [OK] to load the BIOS Optimal Default values for all the setup options.

You can also press <F9> key to enable this operation.

3.8 AMI BIOS Checkpoints

3.8.1 Checkpoint Ranges

Status Code Range	Description
0x01 – 0x0B	SEC execution
0x0C – 0x0F	SEC errors
0x10 – 0x2F	PEI execution up to and including memory detection
0x30 – 0x4F	PEI execution after memory detection
0x50 – 0x5F	PEI errors
0x60 – 0x8F	DXE execution up to BDS
0x90 – 0xCF	BDS execution
0xD0 – 0xDF	DXE errors
0xE0 – 0xE8	S3 Resume (PEI)
0xE9 – 0xEF	S3 Resume errors (PEI)
0xF0 – 0xF8	Recovery (PEI)
0xF9 – 0xFF	Recovery errors (PEI)

3.8.2 Standard Checkpoints

SEC Phase

Status Code	Description
0x00	Not used
Progress Codes	
0x01	Power on. Reset type detection (soft/hard).
0x02	AP initialization before microcode loading
0x03	North Bridge initialization before microcode loading
0x04	South Bridge initialization before microcode loading
0x05	OEM initialization before microcode loading
0x06	Microcode loading
0x07	AP initialization after microcode loading
0x08	North Bridge initialization after microcode loading
0x09	South Bridge initialization after microcode loading
0x0A	OEM initialization after microcode loading
0x0B	Cache initialization
SEC Error Codes	
0x0C – 0x0D	Reserved for future AMI SEC error codes
0x0E	Microcode not found
0x0F	Microcode not loaded

PEI Phase

Status Code	Description
Progress Codes	
0x10	PEI Core is started
0x11	Pre-memory CPU initialization is started
0x12	Pre-memory CPU initialization (CPU module specific)
0x13	Pre-memory CPU initialization (CPU module specific)
0x14	Pre-memory CPU initialization (CPU module specific)
0x15	Pre-memory North Bridge initialization is started
0x16	Pre-Memory North Bridge initialization (North Bridge module specific)
0x17	Pre-Memory North Bridge initialization (North Bridge module specific)
0x18	Pre-Memory North Bridge initialization (North Bridge module specific)
0x19	Pre-memory South Bridge initialization is started
0x1A	Pre-memory South Bridge initialization (South Bridge module specific)
0x1B	Pre-memory South Bridge initialization (South Bridge module specific)
0x1C	Pre-memory South Bridge initialization (South Bridge module specific)
0x1D – 0x2A	OEM pre-memory initialization codes
0x2B	Memory initialization. Serial Presence Detect (SPD) data reading
0x2C	Memory initialization. Memory presence detection
0x2D	Memory initialization. Programming memory timing information
0x2E	Memory initialization. Configuring memory
0x2F	Memory initialization (other).
0x30	Reserved for ASL (see ASL Status Codes section below)
0x31	Memory Installed

0x32	CPU post-memory initialization is started
0x33	CPU post-memory initialization. Cache initialization
0x34	CPU post-memory initialization. Application Processor(s) (AP) initialization
0x35	CPU post-memory initialization. Boot Strap Processor (BSP) selection
0x36	CPU post-memory initialization. System Management Mode (SMM) initialization
0x37	Post-Memory North Bridge initialization is started
0x38	Post-Memory North Bridge initialization (North Bridge module specific)
0x39	Post-Memory North Bridge initialization (North Bridge module specific)
0x3A	Post-Memory North Bridge initialization (North Bridge module specific)
0x3B	Post-Memory South Bridge initialization is started
0x3C	Post-Memory South Bridge initialization (South Bridge module specific)
0x3D	Post-Memory South Bridge initialization (South Bridge module specific)
0x3E	Post-Memory South Bridge initialization (South Bridge module specific)
0x3F-0x4E	OEM post memory initialization codes
0x4F	DXE IPL is started
PEI Error Codes	
0x50	Memory initialization error. Invalid memory type or incompatible memory speed
0x51	Memory initialization error. SPD reading has failed
0x52	Memory initialization error. Invalid memory size or memory modules do not match.
0x53	Memory initialization error. No usable memory detected
0x54	Unspecified memory initialization error.

0x55	Memory not installed
0x56	Invalid CPU type or Speed
0x57	CPU mismatch
0x58	CPU self test failed or possible CPU cache error
0x59	CPU micro-code is not found or micro-code update is failed
0x5A	Internal CPU error
0x5B	reset PPI is not available
0x5C-0x5F	Reserved for future AMI error codes
S3 Resume Progress Codes	
0xE0	S3 Resume is stared (S3 Resume PPI is called by the DXE IPL)
0xE1	S3 Boot Script execution
0xE2	Video repost
0xE3	OS S3 wake vector call
0xE4-0xE7	Reserved for future AMI progress codes
S3 Resume Error Codes	
0xE8	S3 Resume Failed
0xE9	S3 Resume PPI not Found
0xEA	S3 Resume Boot Script Error
0xEB	S3 OS Wake Error
0xEC-0xEF	Reserved for future AMI error codes
Recovery Progress Codes	
0xF0	Recovery condition triggered by firmware (Auto recovery)
0xF1	Recovery condition triggered by user (Forced recovery)
0xF2	Recovery process started
0xF3	Recovery firmware image is found
0xF4	Recovery firmware image is loaded
0xF5-0xF7	Reserved for future AMI progress codes
Recovery Error Codes	
0xF8	Recovery PPI is not available

0xF9	Recovery capsule is not found
0xFA	Invalid recovery capsule
0xFB – 0xFF	Reserved for future AMI error codes

DXE Phase

Status Code	Description
0x60	DXE Core is started
0x61	NVRAM initialization
0x62	Installation of the South Bridge Runtime Services
0x63	CPU DXE initialization is started
0x64	CPU DXE initialization (CPU module specific)
0x65	CPU DXE initialization (CPU module specific)
0x66	CPU DXE initialization (CPU module specific)
0x67	CPU DXE initialization (CPU module specific)
0x68	PCI host bridge initialization
0x69	North Bridge DXE initialization is started
0x6A	North Bridge DXE SMM initialization is started
0x6B	North Bridge DXE initialization (North Bridge module specific)
0x6C	North Bridge DXE initialization (North Bridge module specific)
0x6D	North Bridge DXE initialization (North Bridge module specific)
0x6E	North Bridge DXE initialization (North Bridge module specific)
0x6F	North Bridge DXE initialization (North Bridge module specific)
0x70	South Bridge DXE initialization is started
0x71	South Bridge DXE SMM initialization is started
0x72	South Bridge devices initialization
0x73	South Bridge DXE Initialization (South Bridge module specific)

0x74	South Bridge DXE Initialization (South Bridge module specific)
0x75	South Bridge DXE Initialization (South Bridge module specific)
0x76	South Bridge DXE Initialization (South Bridge module specific)
0x77	South Bridge DXE Initialization (South Bridge module specific)
0x78	ACPI module initialization
0x79	CSM initialization
0x7A – 0x7F	Reserved for future AMI DXE codes
0x80 – 0x8F	OEM DXE initialization codes
0x90	Boot Device Selection (BDS) phase is started
0x91	Driver connecting is started
0x92	PCI Bus initialization is started
0x93	PCI Bus Hot Plug Controller Initialization
0x94	PCI Bus Enumeration
0x95	PCI Bus Request Resources
0x96	PCI Bus Assign Resources
0x97	Console Output devices connect
0x98	Console input devices connect
0x99	Super IO Initialization
0x9A	USB initialization is started
0x9B	USB Reset
0x9C	USB Detect
0x9D	USB Enable
0x9E – 0x9F	Reserved for future AMI codes
0xA0	IDE initialization is started
0xA1	IDE Reset
0xA2	IDE Detect
0xA3	IDE Enable

0xA4	SCSI initialization is started
0xA5	SCSI Reset
0xA6	SCSI Detect
0xA7	SCSI Enable
0xA8	Setup Verifying Password
0xA9	Start of Setup
0xAA	Reserved for ASL (see ASL Status Codes section below)
0xAB	Setup Input Wait
0xAC	Reserved for ASL (see ASL Status Codes section below)
0xAD	Ready To Boot event
0xAE	Legacy Boot event
0xAF	Exit Boot Services event
0xB0	Runtime Set Virtual Address MAP Begin
0xB1	Runtime Set Virtual Address MAP End
0xB2	Legacy Option ROM Initialization
0xB3	System Reset
0xB4	USB hot plug
0xB5	PCI bus hot plug
0xB6	Clean-up of NVRAM
0xB7	Configuration Reset (reset of NVRAM settings)
0xB8 – 0xBF	Reserved for future AMI codes
0xC0 – 0xCF	OEM BDS initialization codes
DXE Error Codes	
0xD0	CPU initialization error
0xD1	North Bridge initialization error
0xD2	South Bridge initialization error
0xD3	Some of the Architectural Protocols are not available
0xD4	PCI resource allocation error. Out of Resources
0xD5	No Space for Legacy Option ROM
0xD6	No Console Output Devices are found

0xD7	No Console Input Devices are found
0xD8	Invalid password
0xD9	Error loading Boot Option (LoadImage returned error)
0xDA	Boot Option is failed (StartImage returned error)
0xDB	Flash update is failed
0xDC	Reset protocol is not available

ACPI/ASL Checkpoints

Status Code	Description
0x01	System is entering S1 sleep state
0x02	System is entering S2 sleep state
0x03	System is entering S3 sleep state
0x04	System is entering S4 sleep state
0x05	System is entering S5 sleep state
0x10	System is waking up from the S1 sleep state
0x20	System is waking up from the S2 sleep state
0x30	System is waking up from the S3 sleep state
0x40	System is waking up from the S4 sleep state
0xAC	System has transitioned into ACPI mode. Interrupt controller is in PIC mode.
0xAA	System has transitioned into ACPI mode. Interrupt controller is in APIC mode.

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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 - 00000007	DMA Controller
00000000 - 00000CF7	PCI bus
00000010 - 0000001F	Motherboard Resource
00000020 - 00000021	Programmable Interrupt Controller
00000022 - 0000003F	Motherboard Resource
00000040 - 00000043	System Timer
00000044 - 0000005F	Motherboard Resource
00000060 - 00000060	Standard 101/102-Key or Microsoft Natural PS/2 Keyboard
00000061 - 00000061	System Speaker
00000062 - 00000063	Motherboard Resource
00000064 - 00000064	Standard 101/102-Key or Microsoft Natural PS/2 Keyboard
00000065 - 0000006F	Motherboard Resource
00000070 - 00000073	System CMOS/real time clock
00000074 - 0000007F	Motherboard Resource
00000080 - 00000090	DMA Controller
00000091 - 00000093	Motherboard Resource
00000094 - 0000009F	DMA Controller
000000A0 - 000000A1	Programmable Interrupt Controller
000000A2 - 000000BF	Motherboard Resource
000000C0 - 000000DF	DMA Controller
000000E0 - 000000EF	Motherboard Resource
000000F0 - 000000FF	Numeric Data Processor
000001F0 - 000001F7	Primary IDE Channel
00000274 - 00000277	ISAPNP Read Data Port

00000279 - 00000279	ISAPNP Read Data Port
00000294 - 00000297	Motherboard Resource
000002E8 - 000002EF	Communications Port (COM4)
000002F8 - 000002FF	Communications Port (COM2)
00000378 - 0000037F	Printer Port (LPT1)
000003B0 - 000003BB	Mobile Intel® 945 Express Chipset Family
000003C0 - 000003DF	Mobile Intel® 945 Express Chipset Family
000003E8 - 000003EF	Communications Port (COM3)
000003F6 - 000003F6	Primary IDE Channel
000003F8 - 000003FF	Communications Port (COM1)
00000400 - 000004BF	Motherboard Resource
000004D0 - 000004D1	Motherboard Resource
00000500 - 0000051F	Intel® 82801G (ICH7 Family) SMBus Controller - 27DA
00000680 - 000006FF	Motherboard Resource
00000778 - 0000077B	Printer Port (LPT1)
00000880 - 0000088F	Motherboard Resource
00000A78 - 00000A7B	Motherboard Resource
00000BBC - 00000BBF	Motherboard Resource
00000BBC - 00000BBF	Motherboard Resource
00000D00 - 0000FFFF	PCI bus
00000E78 - 00000E7B	Motherboard Resource
00000F78 - 00000F7B	Motherboard Resource
00000FBC - 00000FBF	Motherboard Resource
0000B000 - 0000BFFF	Intel® 82801G (ICH7 Family) PCI Express Root Port - 27D4
0000C000 - 0000CFFF	Intel® 82801G (ICH7 Family) PCI Express Root Port - 27D0
0000DF00 - 0000DF3F	Intel® PRO/100 VE Network Connection
0000F000 - 0000F0FF	Realtek AC'97 Audio
0000F300 - 0000F30F	Intel® 82801GBM/GHM (ICH7-M Family) Serial ATA Storage Controller - 27C4

0000F400 - 0000F40F	Intel® 82801GBM/GHM (ICH7-M Family) Serial ATA Storage Controller - 27C4
0000F500 - 0000F50F	Intel® 82801GBM/GHM (ICH7-M Family) Serial ATA Storage Controller - 27C4

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 01	Standard 101/102-Key or Microsoft Natural PS/2 Keyboard
IRQ 03	Communications Port
IRQ 04	Communications Port
IRQ 08	System CMOS/real time clock
IRQ 09	Microsoft ACPI-Compliant System
IRQ 10	Communications Port
IRQ 11	Communications Port
IRQ 12	PS/2 Compatible Mouse
IRQ 13	Math Coprocessor
IRQ 14	Primary IDE Channel
IRQ 15	Intel® 82801G (ICH7 Family) SMBus Controller - 27DA
IRQ 16	Intel® 82801G (ICH7 Family PCI Express Root Port - 27D0
IRQ 16	Intel® 82801G (ICH7 Family) USB Universal Host Controller - 27CB
IRQ 16	Mobile Intel 945GM Express Chipset Family
IRQ 17	Realtek AC'97 Audio
IRQ 18	Intel® 82801G (ICH7 Family) PCI Express Root Port - 27D4
IRQ 18	Intel® 82801G (ICH7 Family) USB Universal Host Controller - 27CA
IRQ 19	Intel® 82801G (ICH7 Family) USB Universal Host Controller - 27C9
IRQ 19	Intel® 82801G (ICH7-M Family) Serial ATA Storage Controller - 27C4
IRQ 19	Intel® 82801G (ICH7 Family) USB Universal Host Controller - 27C9
IRQ 20	Intel® PRO/100 VE Network Connection
IRQ 23	Intel® 82801G (ICH7 Family) USB Universal Host Controller - 27C8
IRQ 23	Intel® 82801G (ICH7 Family) USB2 Enhanced Host Controller - 27CC

Appendix C: 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 assembly & C, please take them for WDT application examples.

```
/*-----  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 */
}
```

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