EmCORE-i9651

3.5" Embedded Board

User's Manual

Version 1.1

2011.06

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Chapter 1

Introduction

1.1 Copyright Notice

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.

1.2 Declaration of Conformity

CE Class A

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

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.

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%)).

1.3 About This User's 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.

1.4 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 comes 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

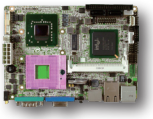
This product is warranted to be in good working order for a period of two years from the date of purchase. Should this product fail to be in good working order at any time during this period, we will, at our option, replace or repair it at no additional charge except as set forth in the following terms. 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 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.

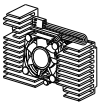
1.8 Packing List



1 x EmCORE-i9651 3.5” Embedded Board

1 x Driver CD

1 x Quick Installation Guide



1 x CPU Cooler
90 x 66 x 27.8 mm (L x W x H)

1 x ATX Power cable
ATX main power connector (2x10-pin) to EmCORE-i9651 power connector (2x5-pin)

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

1.9 Ordering Information

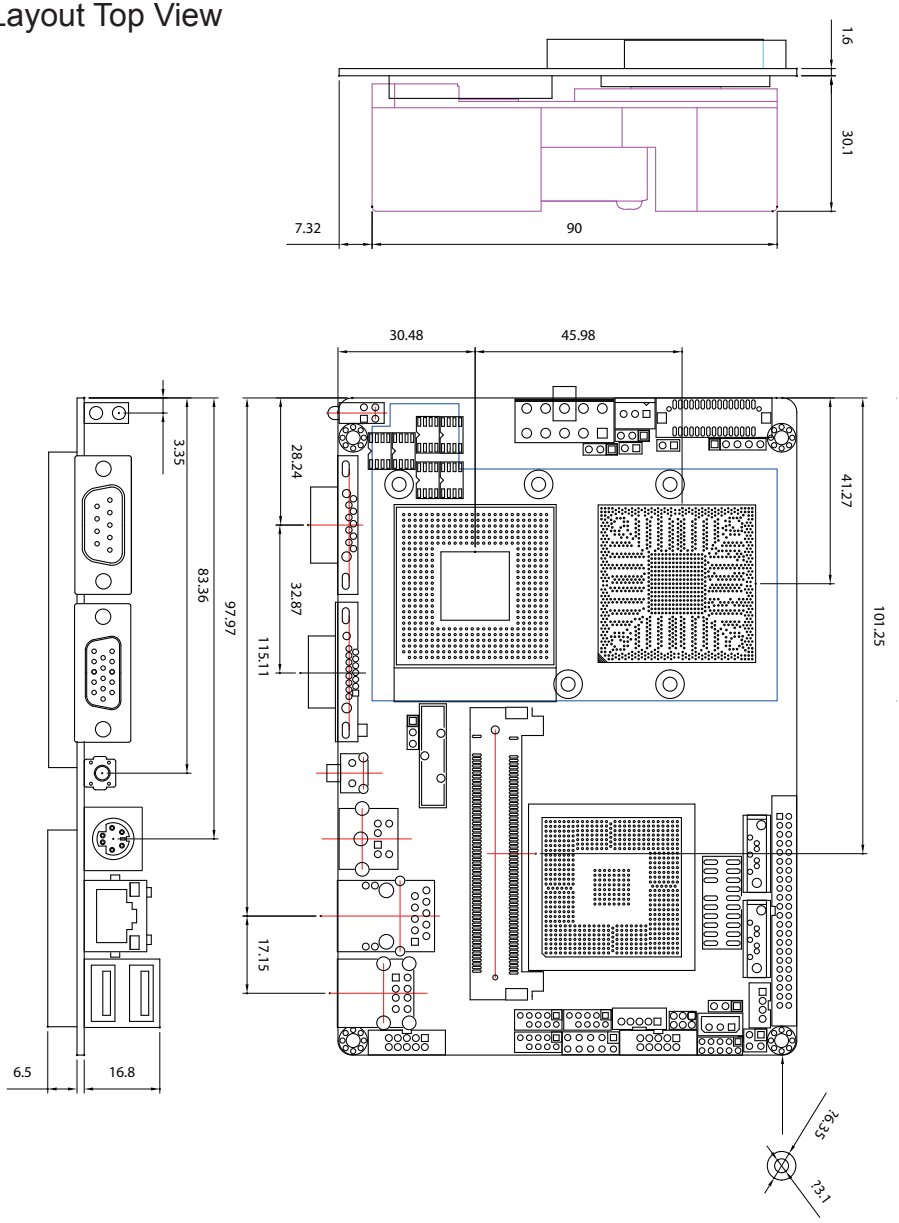
EmCORE-i9651VL2	EmCORE-i9651 3.5" Embedded Board w/ dual LAN
CBK-09-9651-00	Cable kit 1 x COM port cable 2 x USB cable 1 x IDE cable 1 x Parallel port cable 2 x SATA cable 1 x Audio cable 1 x LPT to FDD cable 1 x LAN cable 1 x KB & MS Y-cable

1.10 Specifications

Form Factor	3.5" Embedded Board
CPU	Intel® Core™ 2 Duo processor, up to 800MHz FSB Intel® Celeron® M processor with 533/667MHz FSB
Chipset	Intel® GME965 + ICH8M
System Memory	1 x 200-pin DDR2 SO-DIMM Socket supporting 533/667MHz SDRAM up to 2 GB
VGA/ LCD Controller	Integrated Intel® Graphics Media Accelerator (GMA) X3100 graphics core w/ Analog RGB/ LVDS 24-bit dual Channels
Ethernet	2 x Realtek RTL8111 PCIe Gigabit Ethernet controllers
I/O Chips	Winbond W83627HG
BIOS	AMI PnP Flash BIOS
Audio	Realtek ALC888 HD Codec, Mic-in/Line-in/Line-out
Serial ATA	2 x Serial ATA 300MB/s HDD transfer rate
IDE Interface	1 x IDE (Ultra ATA 33), support 2 IDE devices
Serial Port	2 x COM port (COM1: RS-232; COM2: RS-232/422/485)
Parallel Port/ Floppy	1 x LPT Port (SPP/EPP/ECP mode selectable) 1 x Floppy connector share with LPT port
IrDA	1 x IrDA connector
KBMS	1 x 6-pin Mini-DIN for Keyboard and Mouse (PS/2 standard via Y-cable)
Universal Serial Bus	6 x USB 2.0 compliant
DIO	8-bit programmable Digital I/O
Expansion Interface	1 x CF II Socket (Share with IDE) 1 x Mini PCI Socket
Hardware Monitor Chip	Integrated in W83627HG
Operation Temp.	-20°C ~ +70°C (-4°F ~ 158°F)
Watchdog Timer	1~255 levels reset
Dimension (L x W)	146 x 102 mm (5.7" x 4")

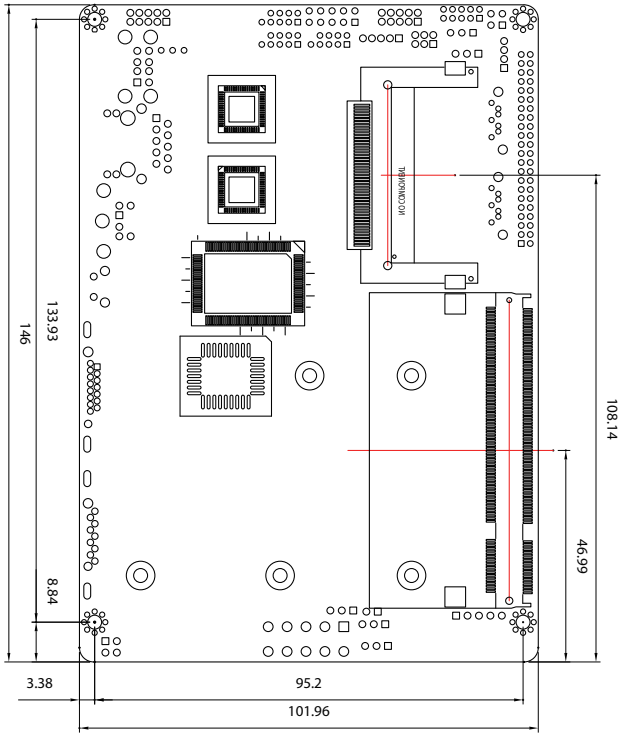
1.11 Board Dimensions

Layout Top View



Unit:mm

Layout Bottom View

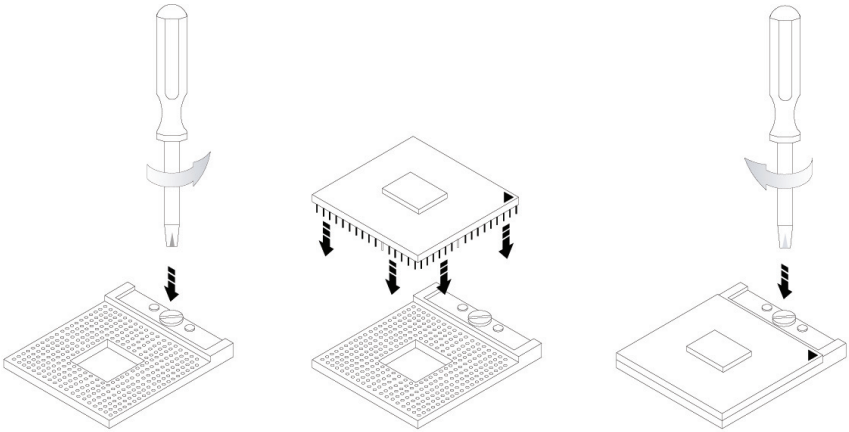


Unit:mm

1.12 Installing the CPU

The processor socket comes with a screw to secure the CPU. As showing in the picture as bellow, loose the screw first before inserting the CPU.

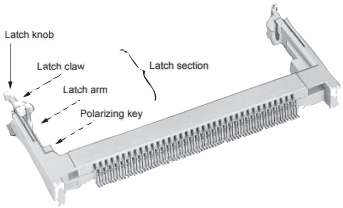
Place the CPU into the socket by making sure the notch on the corner of the CPU corresponding with the notch on the inside of the socket. Once the CPU has slide into the socket, lock the screw.

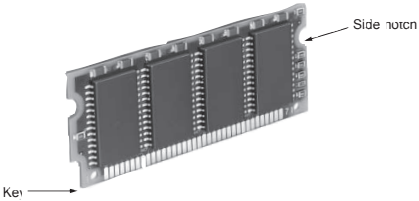


Make sure that heat sink of the CPU top surface is in complete contact to avoid the CPU overheating problem.

If not, it would cause your system or CPU to be hanged, unstable, damaged.

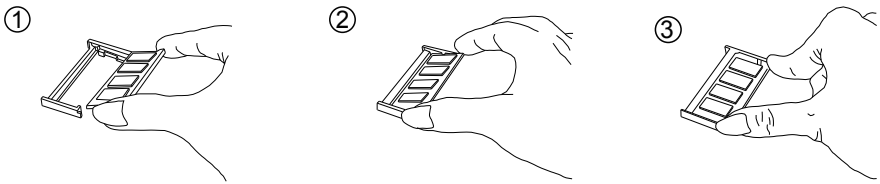
1.13 Installing the Memory





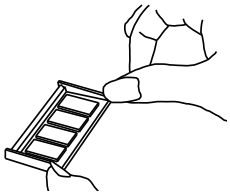
To install the Memory module, locate the Memory SO-DIMM slot on the board and perform as below:

1. Adjust the socket polarizing key and the board key to the same direction.
2. Insert the board obliquely. Moreover, lay the board in parallel to the opening at angle of 20^{o} to 30^{o}, and softly insert the board so as to hit the socket bottom. Stopping insertion halfway will result in improper insertion.
3. Applying the board side notch in parallel to the socket bottom so that the board position cannot be displaced, press the board side notch up, and fix it to the latch portion at both socket edges. Press the board side notch, and release the notch with a snap “click” tone, if the printed board exceeds the latch claw head.



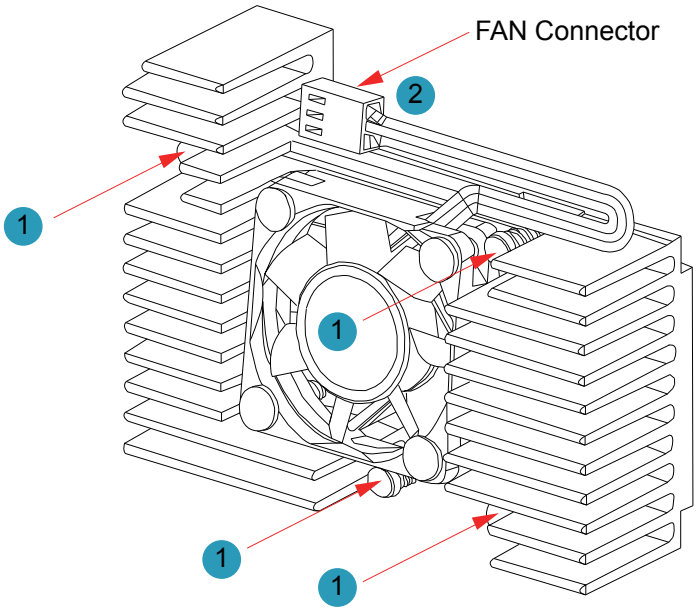
Procedures for board extraction

Apply the thumb nail to the latch knob at both socket edges. Forcibly widen the latch knobs to right and left ways, and release the latch. Then draw the board out along an angle where the board is raised.

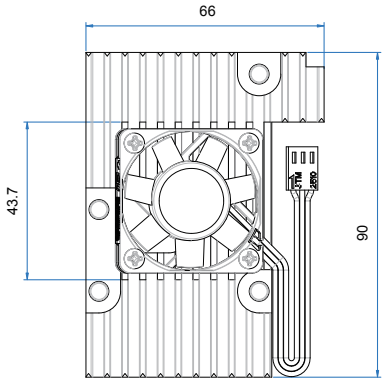


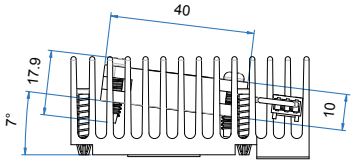
1.14 Heatsink Installation

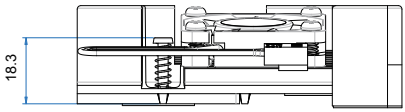
1. Put the heatsink on EmCORE-i9651, and screw it on in the direction of the board. Insert four screws (No. 1) downward into the holes and turn them tightly.
2. Verify the direction is correct (No. 2) and plug the FAN connector into CPUF1 connector.

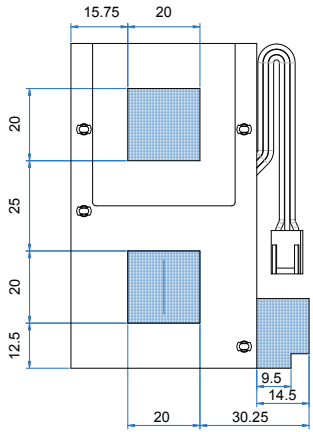


1.15 Heatsink Dimensions





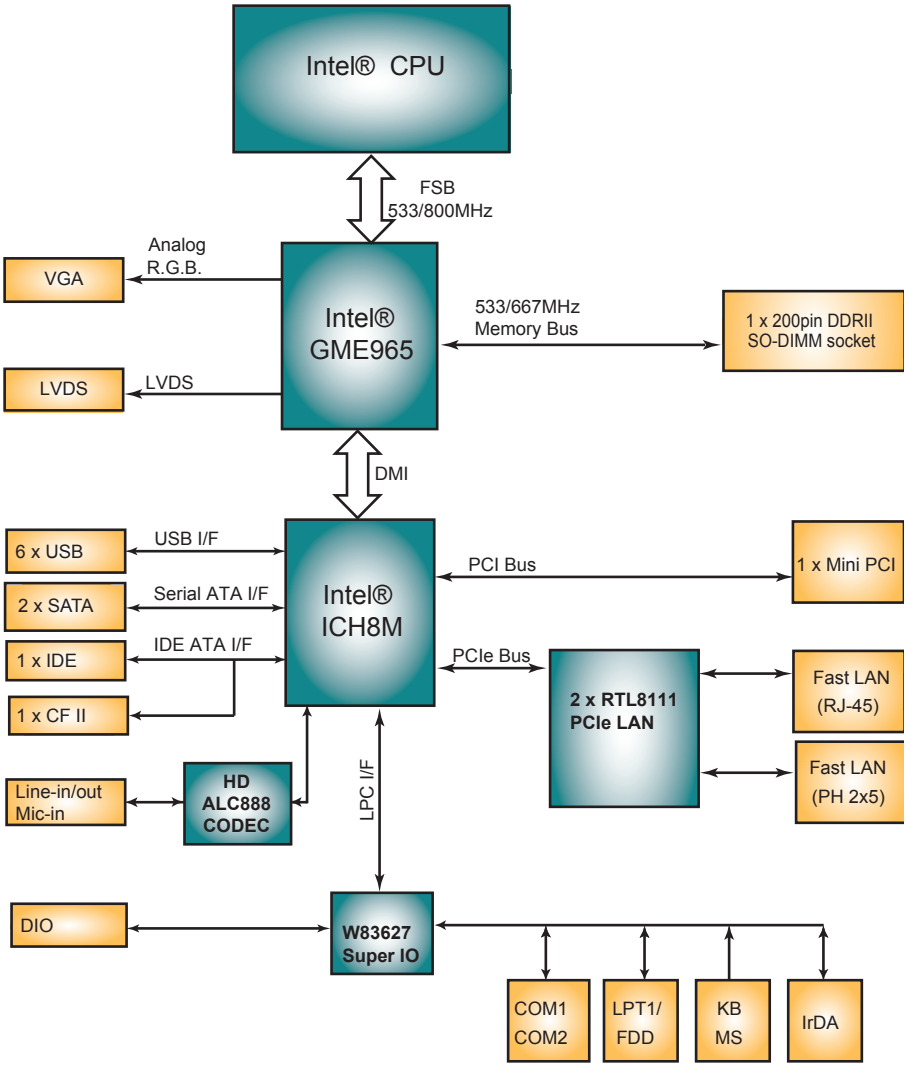




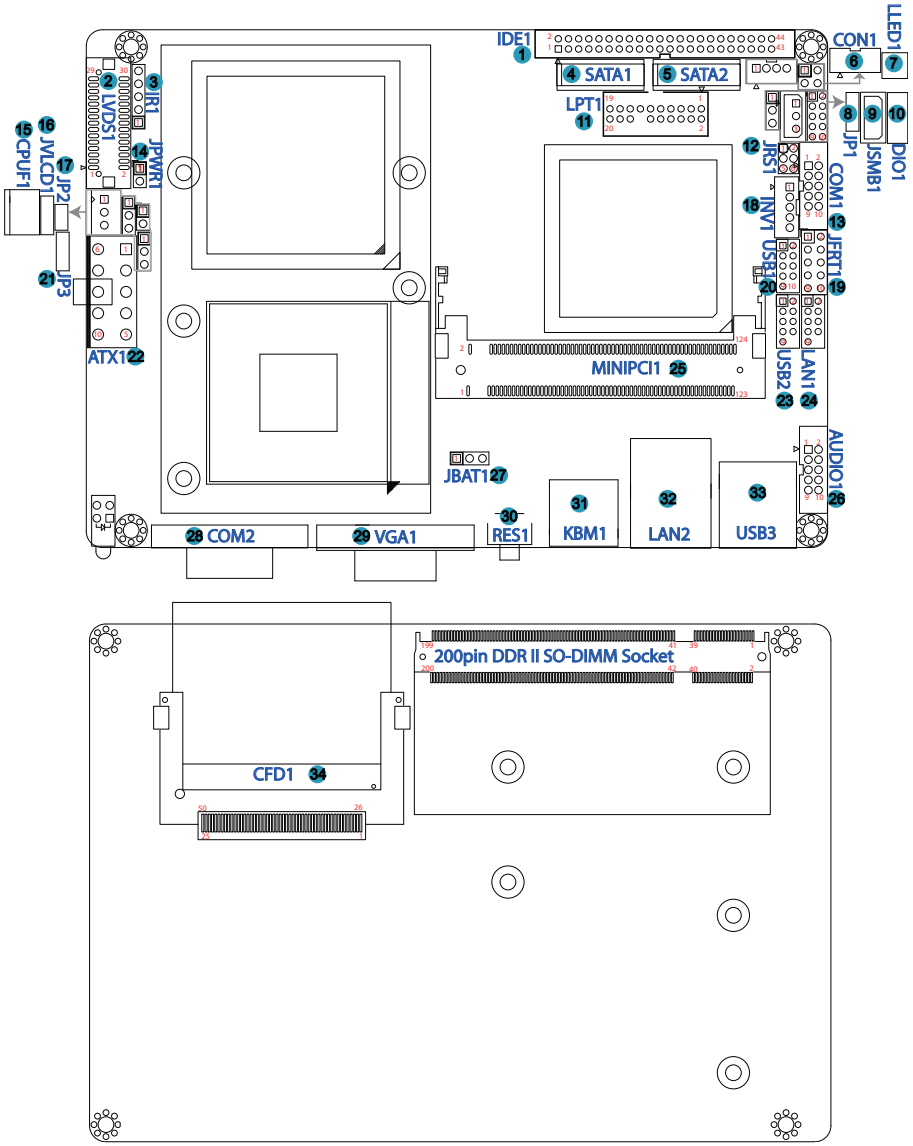
Chapter 2

Installation

2.1 Block Diagram



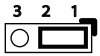
2.2 Jumpers and Connectors



Jumpers

JP1, JP3: COM Port Power Special Support (8), (21)

Connector type: 2.54mm pitch 1x3-pin headers.

Pin	Voltage	
1-2	Standard Signal for Pin-9 (default)	
2-3	+12V	

JRS1: COM2 RS-232/422/485 Mode Select (12)

The onboard COM2 port can be configured to operate in RS-422 or RS-485 modes. RS-422 modes differ in the way RX/TX is being handled. Jumper JRS1 switches between RS-232 or RS-422/485 mode. When JRS1 is set to RS-422 or RS-485 mode, there will be only +12V output let while JRS1 is set. All RS-232/422/482 modes are available on COM2.

It can be configured COM2 to operate in RS-232, RS-422 or RS-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
			

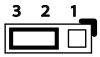
JPWR1: AT/ATX Power Mode (14)

Connector type: 2.54mm pitch 1x2-pin headers.

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

JVLCD1: LCD Panel Voltage Select (16)

The voltage of LCD panel could be selected by JVLCD1 in +5V or +3.3V.
Connector type: 2.54 mm pitch 1x3-pin headers

Pin	Voltage	
1-2	+5V	
2-3	+3.3V (Default)	

JP2: Compact Flash Select (17)

Connector type: 2.54mm pitch 1x2-pin headers.

Pin 1-2	**Function Select**	
Short	Master	
Open	Slave (Default)	

JBAT1: Clear CMOS Setup (27)

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: 2.54mm 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 to clear CMOS data.
3. Place the shunt back to pin 1 and pin 2 of JBAT1 to return to default CMOS data.
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.

Connectors

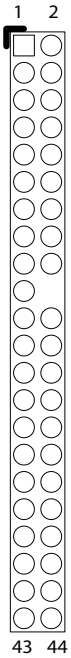
IDE1: IDE Connector (1)

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 headers

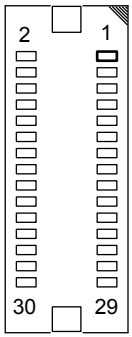
Pin	Description	Pin	Description
1	IDE RESET	2	GND
3	DATA7	4	DATA8
5	DATA6	6	DATA9
7	DATA5	8	DATA10
9	DATA4	10	DATA11
11	DATA3	12	DATA12
13	DATA2	14	DATA13
15	DATA1	16	DATA14
17	DATA0	18	DATA15
19	GND	20	N/C (Key)
21	REQ	22	GND
23	IO WRITE	24	GND
25	IO READ	26	GND
27	IO READY	28	IDSEL
29	DACK	30	GND
31	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



LVDS1: LVDS LCD Connector (2)

The LVDS connector supports 24-bit or 48-bit LVDS.
VDD could be selected by JVLCD1 in +5V or +3.3V.
Connector type: DF-13-30DP-1.25V

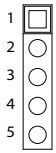
Pin	Description	Pin	Description
2	VDD	1	VDD
4	TX2CLK+	3	TX1CLK+
6	TX2CLK-	5	TX1CLK-
8	GND	7	GND
10	TX2D0+	9	TX1D0+
12	TX2D0-	11	TX1D0-
14	GND	13	GND
16	TX2D1+	15	TX1D1+
18	TX2D1-	17	TX1D1-
20	GND	19	GND
22	TX2D2+	21	TX1D2+
24	TX2D2-	23	TX1D2-
26	GND	25	GND
28	TX2D3+	27	TX1D3+
30	TX2D3-	29	TX1D3-



IR1: Infrared Connector (3)

Connector type: 2.54mm pitch 1x5-pin headers

Pin	Voltage
1	+5V
2	N/C
3	IRRX
4	GND
5	IRTX

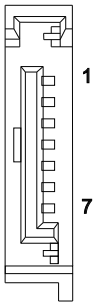


The IR connector can be configured to support wireless infrared module, user can transfer files to or from notebooks, PDA and printers.
Install infrared module onto IrDA connector and enable infrared function from BIOS setup and make sure to have correct orientation when you plug onto IrDA connector.

SATA1, 2: Serial ATA Connectors (4), (5)

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

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



CON1: RS-422/ 485 Output Connector (6)

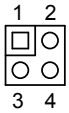
Connector type: 2.00mm pitch 1x4 box wafer connector

Pin	RS-422	RS-485
1	TX+	DATA+
2	TX-	DATA-
3	RX+	N/C
4	RX-	N/C

LLED1: LAN1 LED Indicator (7)

Connector type: 2.54mm pitch 2x2-pin headers

Pin	Description	Pin	Description
1	LAN_Y-	2	LAN_Y+
3	LAN_G-	4	LAN_G+



SMBUS1: External SMBUS Connector (9)

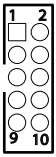
Connector type: 2.54mm pitch 1x3 box wafer connector.

Pin	Description
1	Data
2	Clock
3	GND

DIO1: Digital I/O Connector (10)

DIO1 is a 8-bit DIO connector that supports 4-bit In/ 4-bit Out.
Connector type: 2.00 mm pitch 2x5-pin headers

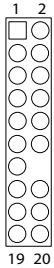
Pin	Description	Pin	Description
1	DIO1	2	DIO2
3	DIO3	4	DIO4
5	DIO5	6	DIO6
7	DIO7	8	DIO8
9	+5V	10	GND



LPT1: Parallel Port Connector (11)

Connector type: 2.00mm pitch 2x10-pin headers.

Pin	Description	Pin	Description
1	STROBE#	2	AFD#
3	PTD0	4	Error#
5	PTD1	6	INIT#
7	PTD2	8	SLIN#
9	PTD3	10	GND
11	PTD4	12	GND
13	PTD5	14	N/C (Key)
15	PTD6	16	Busy
17	PTD7	18	PE
19	ACK#	20	Select



LPT1 can be configured as a connector floppy disk drive (FDD) interface through BIOS setup.

Pin	Description	Pin	Description
1	N/C	2	RWC#
3	RINDEX#	4	HEAD#
5	TRACK0#	6	DIR#
7	WP#	8	STEP#
9	RDATA#	10	GND
11	DSKCHG#	12	GND
13	N/C	14	N/C (Ke)
15	N/C	16	MOB#
17	N/C	18	WD#
19	DSB#	20	WE#

BIOS Setup

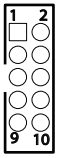
The default is to set LPT1 as FDD connector. To change the value, get into BIOS setup --> Integrated Peripheral --> Super IO Device.

BIOS Option	Setting	Description
External FDD Controller	Enabled	Set as FDD connector
Onboard Parallel Port	Disabled	
External FDD Controller	Disabled	
Onboard Parallel Port	378/IRQ7	Set as Parallel Port

COM1: RS-232 Connector (13)

Connector type: 2.00mm pitch 2x5-pin 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



CPUF1: CPU Fan Power Connector (15)

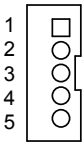
CPUF1 is 3-pin headers for the system fan. The fan must be a +12V fan.

Pin	Description
1	GND
2	+12V
3	FAN_Detect

INV1: LCD Inverter Connector (18)

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

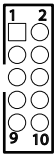
Pin	Description
1	+12V
2	GND
3	Backlight on/off
4	Brightness control
5	GND



JFRT1: Switches and Indicators (19)

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

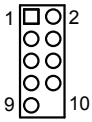
This 2-pin connector connects to the case-mounted Power button.

USB1/ USB2: USB Connector (20), (23)

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

USB1/ USB2 supports two USB 2.0 w/ 480Mb/s by pin headers

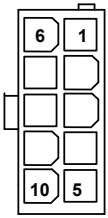
Pin	Description	Pin	Description
1	+5V	2	+5V
3	USBD-	4	USBD-
5	USBD+	6	USBD+
7	GND	8	GND
9	GND	10	N/C (Key)



ATX1: ATX Power Supply Connector (22)

The ATX power supply has a single lead connector with a clip on one side of the plastic housing. There is only one way to plug the lead into the ATX power connector. Press the lead connector down until the clip snaps into place and secures the lead onto the connector.

Pin	Description	Pin	Description
6	5VSB	1	PS-ON
7	+5V	2	GND
8	+5V	3	GND
9	-12V	4	+12V
10	GND	5	+3.3V



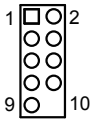
Warning

Incorrect installation of the power supply could result in serious damage to the mainboard and connected peripherals. Make sure the power supply is unplugged from the AC outlet before connecting the leads from the power supply.

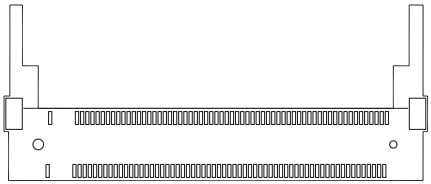
LAN1: Fast Ethernet Connector (24)

Connector type: 2.0mm pitch 2x5-pin headers

Pin	Description	Pin	Description
1	TX_MDI0+	2	TX_MDI0-
3	RX_MDI1+	4	MDI2+
5	MDI2-	6	RX_MDI1-
7	MDI3+	8	MDI3-
9	N/C	10	N/C (Key)



MINIPCI1: Mini-PCI slot (25)



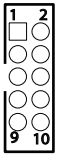
AUDIO1: Front Panel AUDIO Connector (26)

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 headers.

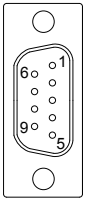
Pin	Description	Pin	Description
1	Line-in Left	2	Line-in Right
3	GND	4	GND
5	MIC1	6	MIC2
7	GND	8	GND
9	Line-out Left	10	Line-out Right



COM2: RS-232 Connector (28)

Connector type: D-Sub 9-pin male.

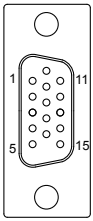
Pin	Description	Pin	Description
6	DSR#	1	DCD#
7	RTS#	2	RXD
8	CTS#	3	TXD
9	RI#	4	DTR#
		5	GND



VGA1: Analog RGB Connector (29)

Connector type: D-Sub 15-pin female.

Pin	Description	Pin	Description
1	RED	9	N/C
2	GREEN	10	GND
3	BLUE	11	N/C
4	N/C	12	VDDAT
5	GND	13	HSYNC
6	GND	14	VSYNC
7	GND	15	VDCLK
8	GND		

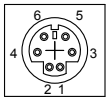


RES1: Reset Switch (30)

KBM1: Keyboard & Mouse (31)

Mini-Din Keyboard & Mouse connector

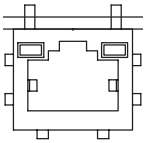
Pin	Description
1	KB Data
2	MS Data
3	GND
4	+5V
5	KB Clock
6	MS Clock



Note: KBM1 supports PS/2 keyboard directly, and PS/2 mouse supported with the additional PS/2 1-to-2 cable in standard packing.

LAN2: 10/100/1000 RJ-45 (32)

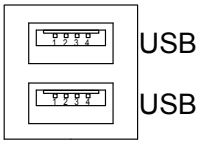
LAN2 supports 10/100/100 Mbps Fast Ethernet



LAN2

USB3: Double Stack USB Type A Connector (33)

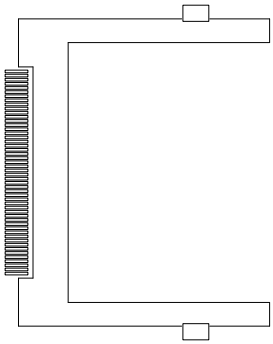
Connector type: double stack USB type A connector.



CFD1: Compact Flash Type II Socket (34)

Connector type: 50-pin compact flash connector

Pin	Description	Pin	Description
1	GND	26	CF_Detect
2	PDD3	27	PDD11
3	PDD4	28	PDD12
4	PDD5	29	PDD13
5	PDD6	30	PDD14
6	PDD7	31	PDD15
7	PDCS1#	32	PDCS3#
8	GND	33	N/C
9	GND	34	PDIOR#
10	GND	35	PDIOW#
11	GND	36	+5V
12	GND	37	PIDEIRQ
13	+5V	38	+5V
14	GND	39	CSEL#
15	GND	40	N/C
16	GND	41	IDERST#
17	GND	42	PIORDY
18	PDA2	43	PDDREQ
19	PDA1	44	PDDACK#
20	PDA0	45	HD_LED1#
21	PD0	46	PDIAG#
22	PD1	47	PDD8
23	PD2	48	PDD9
24	N/C	49	PDD10
25	N/C	50	GND



The interface of Compact Flash socket is designated to use IDE1.

Installation instructions

1. Compact Flash (CF) card is “not hot-swappable.” If the CF card is swapped in the condition of system power-on, it will damage the CF card.
2. Make sure the Single Board Computer is powered OFF.
3. Plug the Compact Flash Type II device into its socket. Verify the direction is correct.
4. Power up the system.

2.3 The Installation Paths of CD Driver

Driver	Path
CHIPSET	\CHIPSET\INTEL\INF 8.1
VGA	\GRAPHICS\INTEL_2K_XP_32\1431
LAN	\ETHERNET\REALTEK\811B_WIN5640
AUDIO	\AUDIO\REALTEK_HD\WINDOWS_R178

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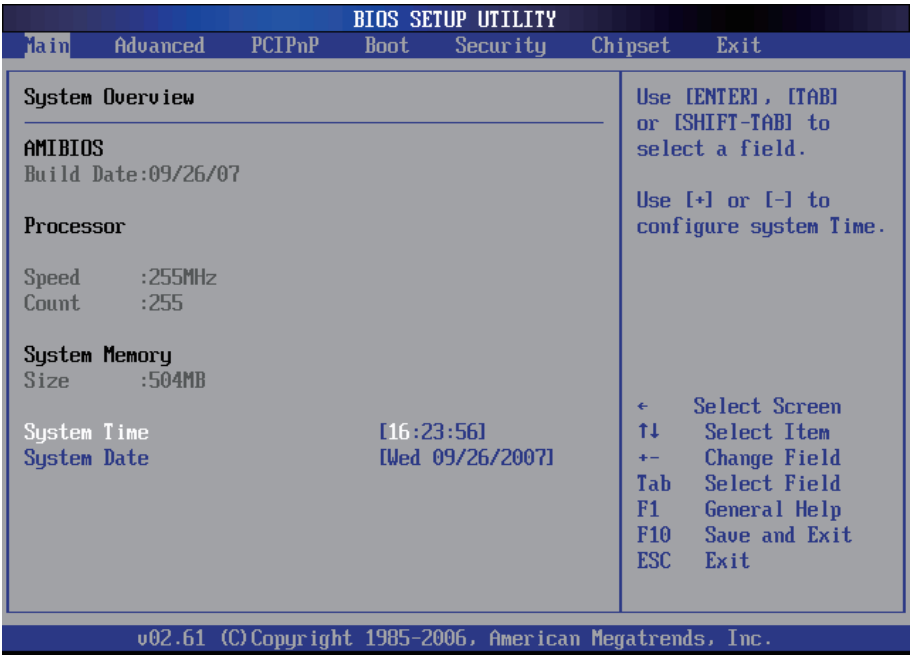
Chapter 3

BIOS

3.1 BIOS Main Setup

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

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



System Time

Set the system time.

The time format is:

Hour : 00 to 23
Minute : 00 to 59
Second : 00 to 59

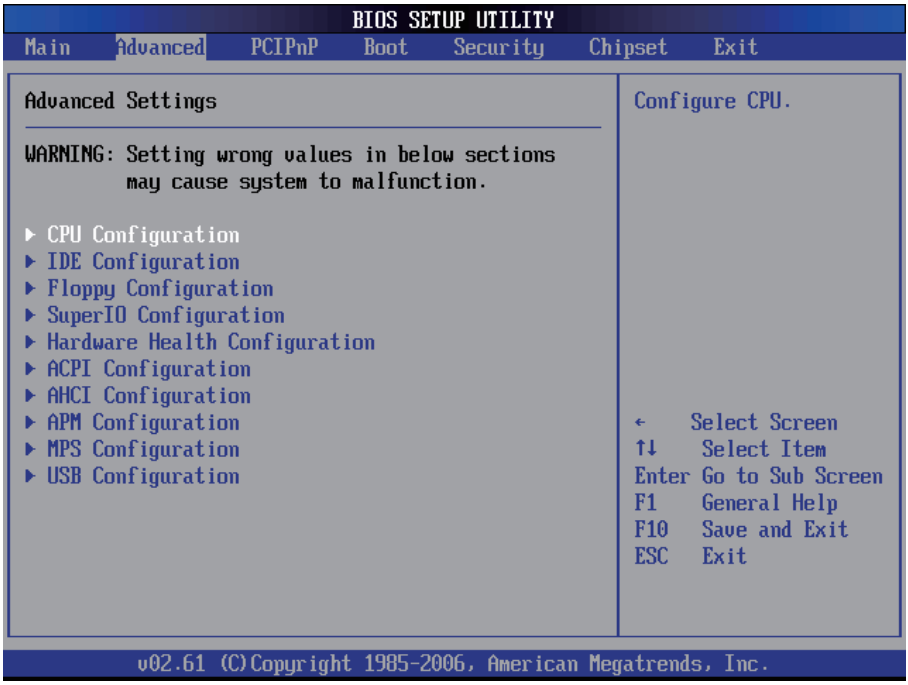
System Date

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

The date format is:

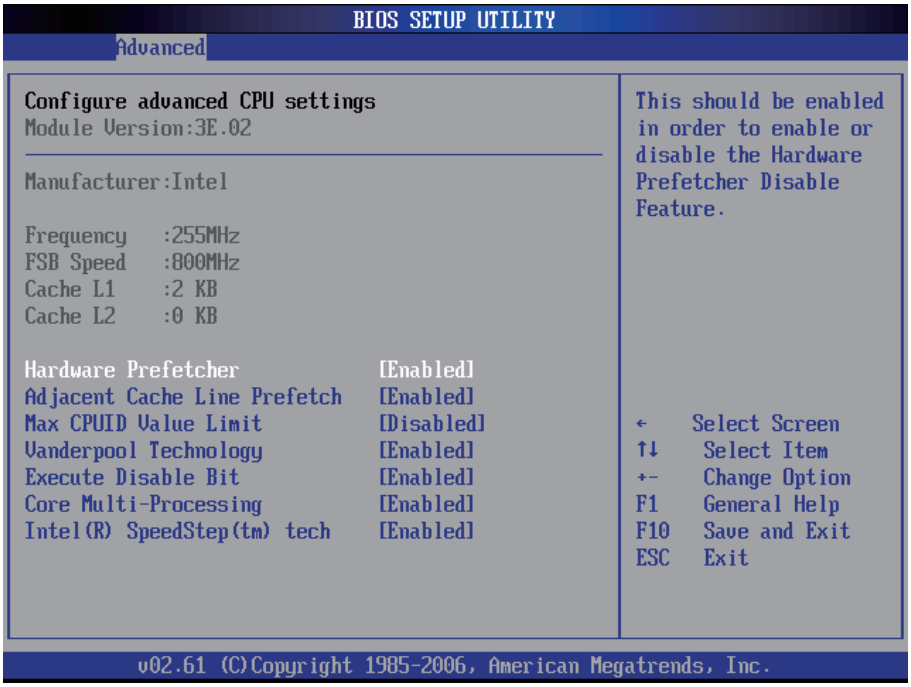
Day : Sun to Sat
Month : 1 to 12
Date : 1 to 31
Year : 1999 to 2099

3.2 Advanced Settings



3.2.1 CPU Configuration

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



Cache L1 & L2

CPU Internal Cache & External Cache:
These two categories speed up memory access. However, it depends on CPU/ chipset design.

Enable - Enable cache.
Disabled - Disable cache

Hardware Prefetcher

This should be enabled in order to enable or disable the Hardware Prefetcher Disable Feature.

Enable - Enable Hardware Prefetcher.
Disabled - Disable Hardware Prefetcher.

Adjacent Cache Line Prefetch

This should be enabled in order to enable or disable the cache Prefetcher Disable Feature.

The choice: Enabled, Disabled.

Max CPUID Value Limit

Disabled for Windows XP.

Vanderpool Technology

Enable this item will allow a platform to run multiple virtual operating systems and applications in independent partitions.

Execute Disable Bit

When disabled, force the SD feature flag to always return 0.

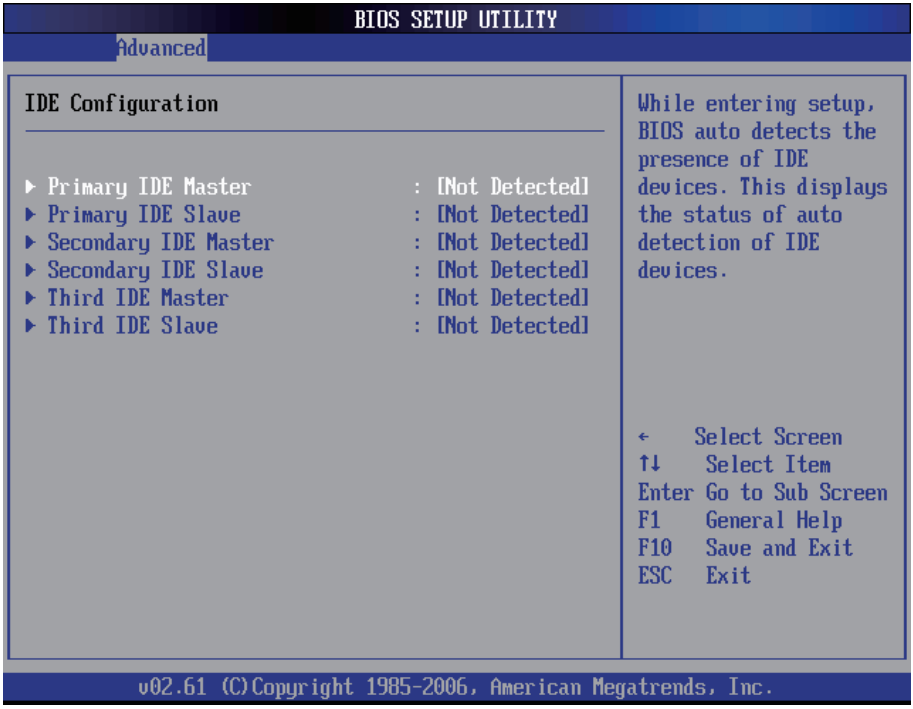
Core Multi-Processing

Enabled or disabled the multi-processing functionality of the Core processor.

Intel® SpeedStep™ Tech

Maximum: CPU speed is set to maximum.
Minimum: CPU speed is set to minimum.
Automatic: CPU speed controlled by Operating system.
Disabled: Default CPU speed.

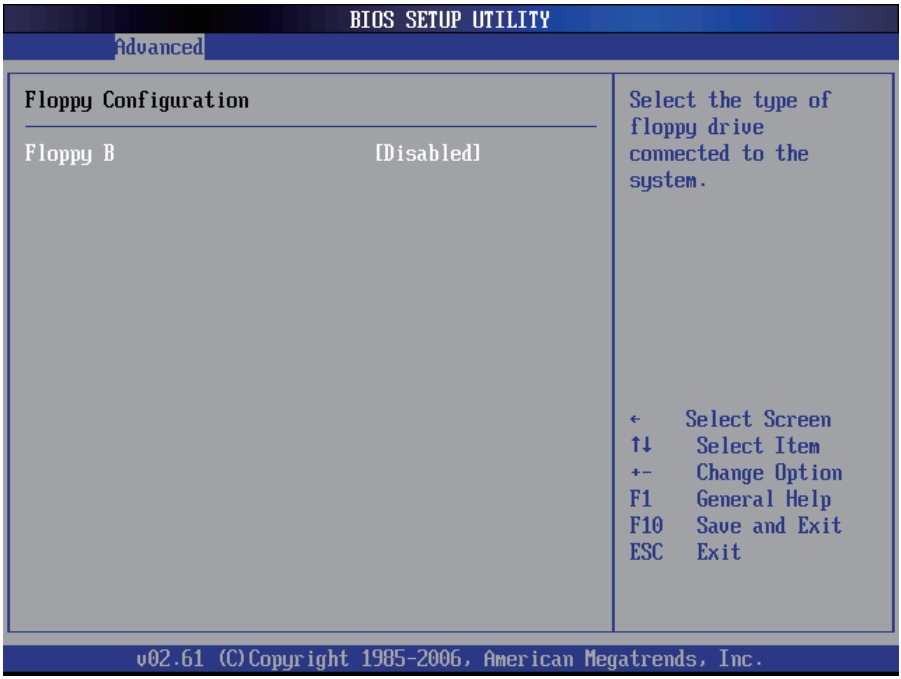
3.2.2 IDE Configuration



Primary/Secondary/Third IDE Master/Slave

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

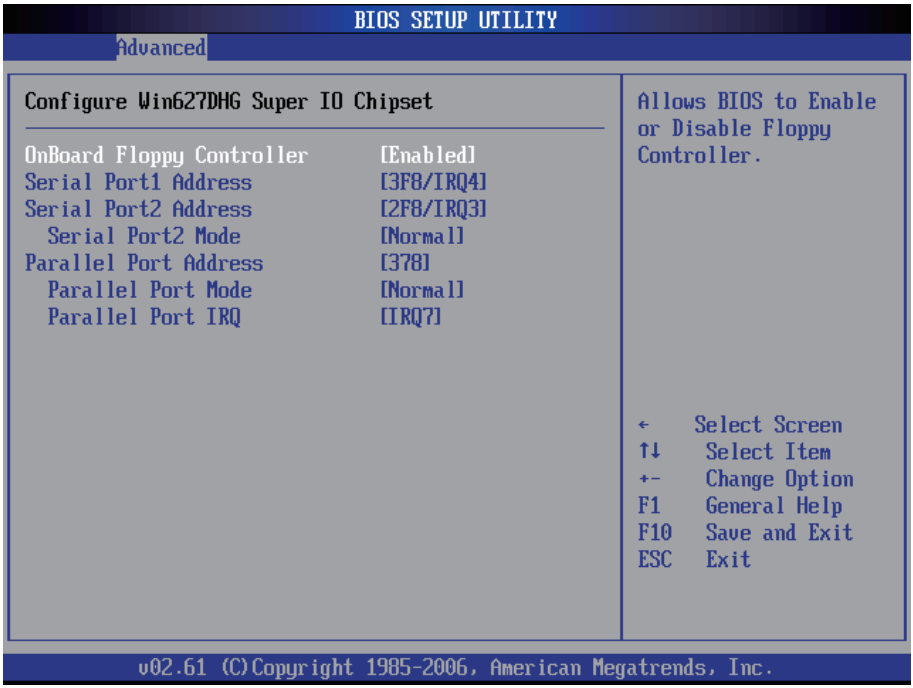
3.2.3 Floppy Configuration



Select the type of floppy disk drive installed in your system.
The choice:

None
360K 5.25”
1.2M 5.25”
720K 3.5”
1.44M 3.5”
2.88M 3.5”

3.2.4 Super IO Configuration



Onboard Floppy Controller

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

The Choice: Enabled, Disabled

Serial Port1 / Port2 Address

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

The choice:

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

Serial Port2 Mode

Allows BIOS to select mode for serial Port2.

Parallel Port Address

Select an address for the parallel port.

The choice:

- 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.

The choice:

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

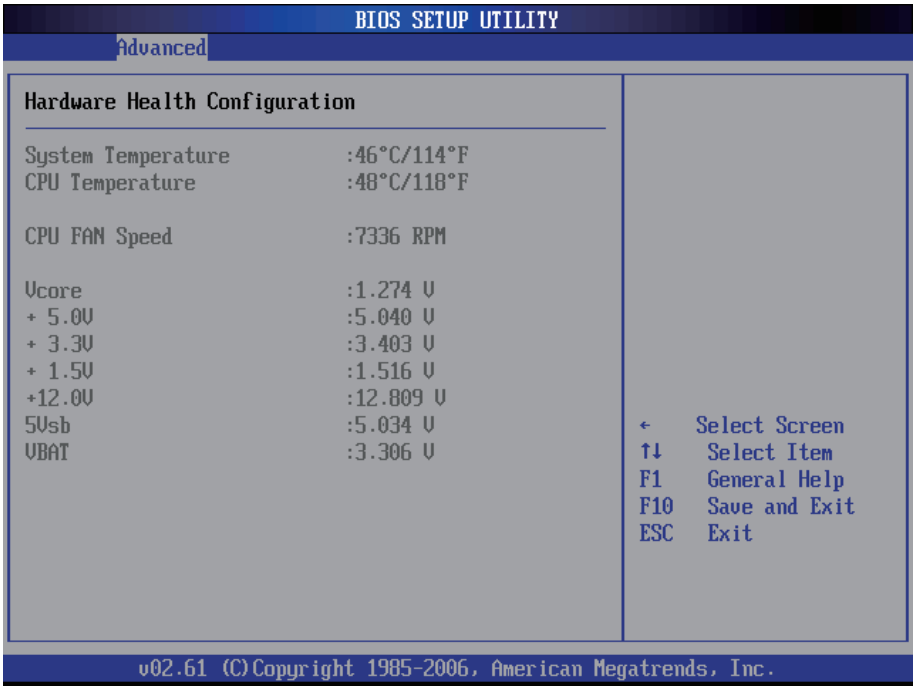
Parallel Port IRQ

Select an interrupt for the parallel port.

The choice:

- IRQ5
- IRQ7

3.2.5 Hardware Health Configuration



System/ CPU Temperature

Show you the current System / CPU fan temperature.

CPU Fan Speed

Show you the current CPU Fan operating speed.

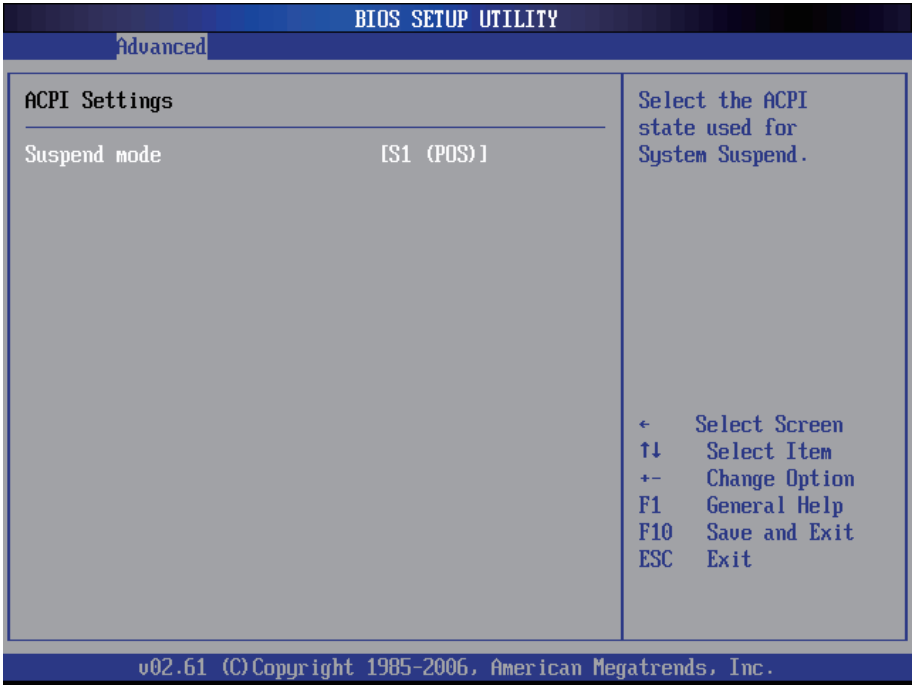
Vcore

Show you the voltage level of CPU (Vcore).

+5.0V / +3.3V / +1.5V / +12.0V / 5Vsb / VBAT

Show you the voltage level of the +3.3V, +5.0V, +1.5V, +12.0V, +5V standby and battery.

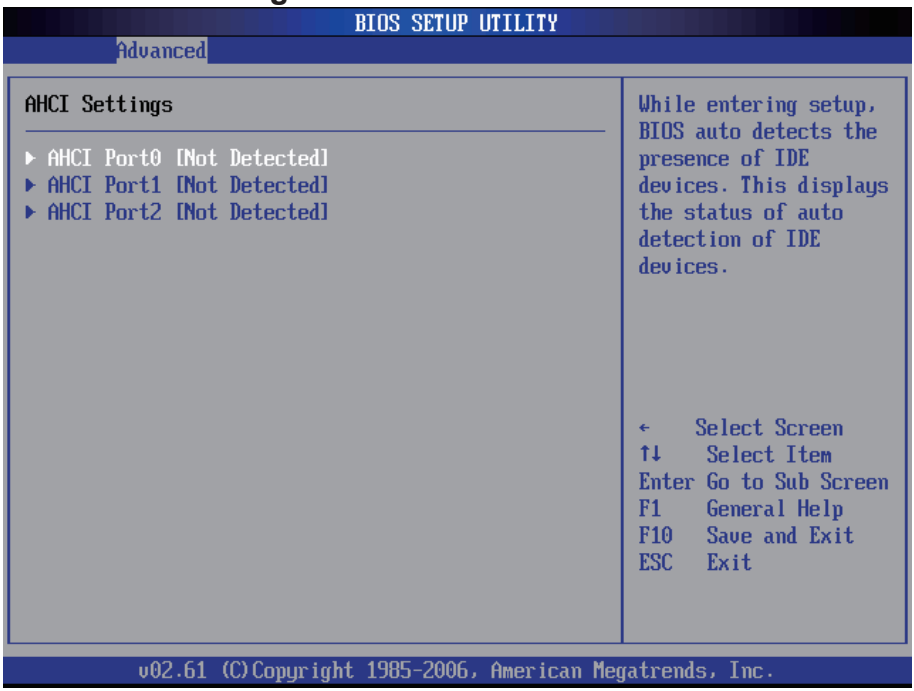
3.2.6 ACPI Configuration



Suspend mode

Select the ACPI state used for System Suspend.
The Choice: S1 (POS)

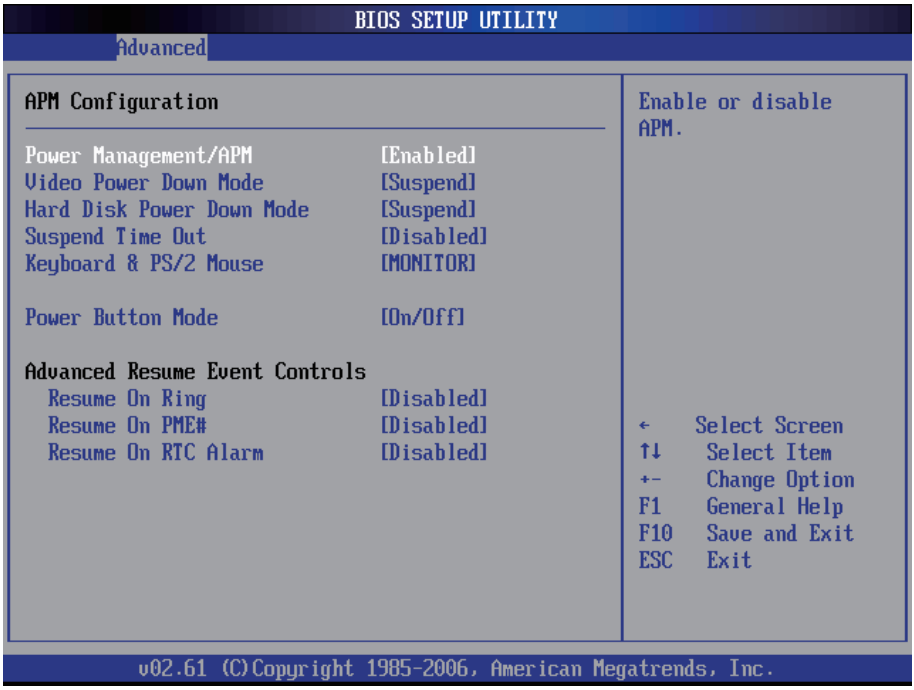
3.2.7 AHCI Configuration



AHCI Port 0 / Port 1 / Port 2

While entering setup, BIOS auto detects the presence of IDE devices. This displays the status of auto detection of IDE devices.

3.2.8 APM Configuration



Power Management/APM

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

Video Power Down Mode

This option defines the level of power-saving mode requires in to power down the video display. As a default, the video powers down both in suspend mode and standby mode.

The Choice: Enabled, Disabled

Hard Diks Power Down Mode

Power Down Hard Disk in Suspend or Standby Mode.

The Choice: Enabled, Disabled

Suspend Time Out
Go into Suspend in the specified time.
The Choice: Enabled, Disabled

Throttle Slow Clock Ratio
Select the Duty Cycle in Throttle mode.
The choice:

12.5%
25.0%
37.5%
50.0%
62.5%
75.0%
87.5%

Keyboard & PS/2 Mouse
Monitor KBC ports 60/64.

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

The Choice: Delay 4 Sec, On/Off

Advanced Resume Event Controls

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

The Choice: Enabled, Disabled

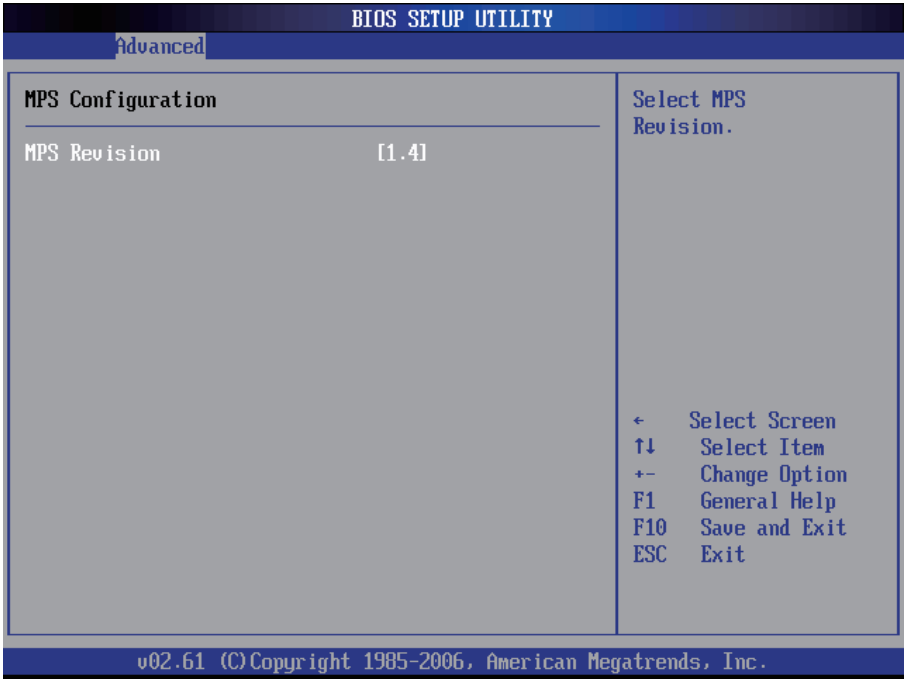
Resume On PME#
An input signal from a PME on the PCI card awakens the system from a soft off state.

The Choice: Enabled, Disabled

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

The Choice: Enabled, Disabled

3.2.9 MPS Configuration

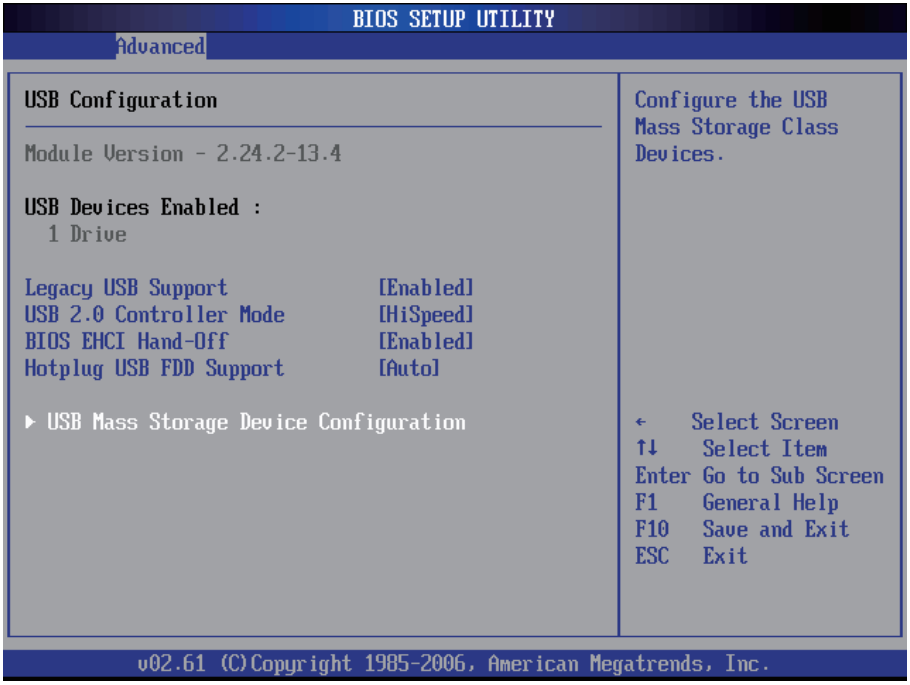


MPS Revision

Select the operating system that is Multi-Processors Version Control for OS.

The Choice: 1.4, 1.1.

3.2.10 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

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

USB Mass Storage Reset Delay

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

3.3 Advanced PCI/PnP Settings

Clear NVRAM

Clear NVRAM during System BOOT.

The Choice: Yes, No.

Plug & Play O/S

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

PCI Latency Timer

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

Allocate IRQ to PCI VGA

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

IRQ3 - IRQ15

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

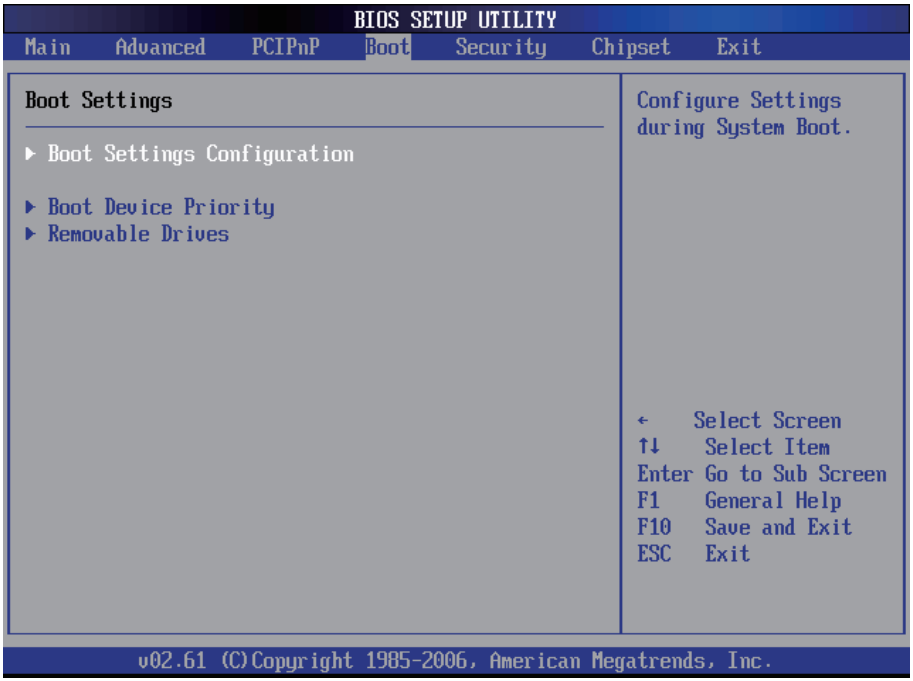
DMA Channel 0 - DMA Channel 7

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

Reserved Memory Size

Size of memory block to reserve for legacy ISA devices.

3.4 Boot Settings



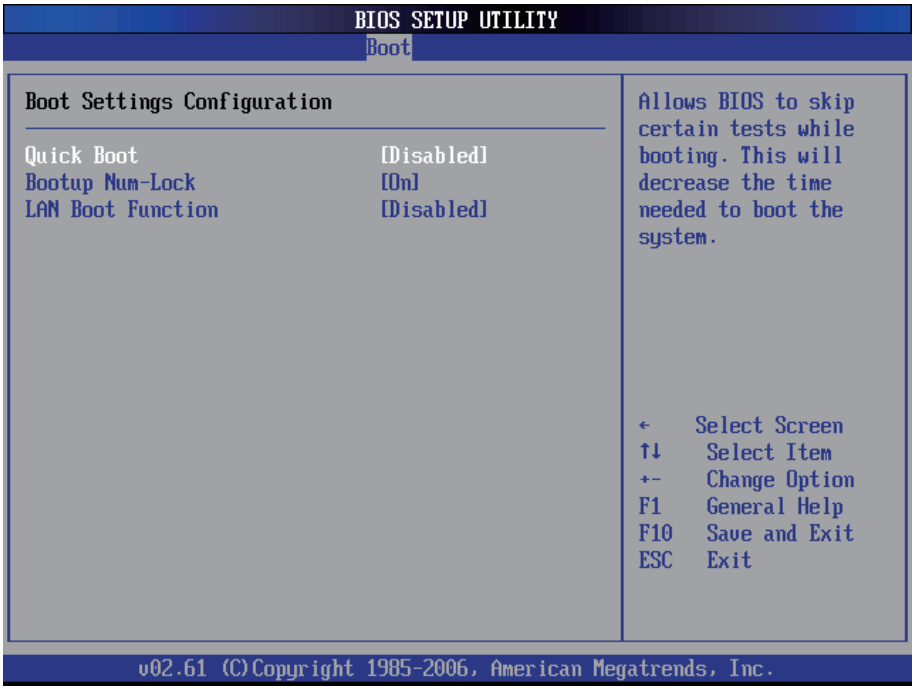
Boot Device Priority

Press Enter and it shows Bootable add-in devices.

Removable Drives

Press Enter and it shows Bootable and Removable drives.

3.4.1 Boot Settings Configuration



Quick Boot

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

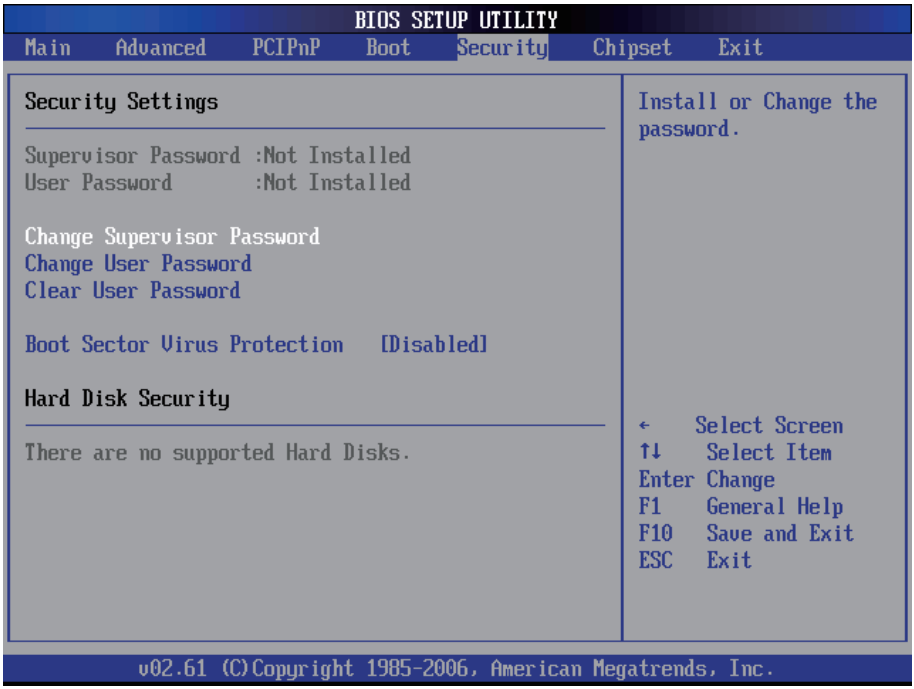
Bootup Num-Lock

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

LAN Boot Function

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

3.5 Security



Supervisor Password & User Password

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

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

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

ENTER PASSWORD:

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

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

PASSWORD DISABLED.

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

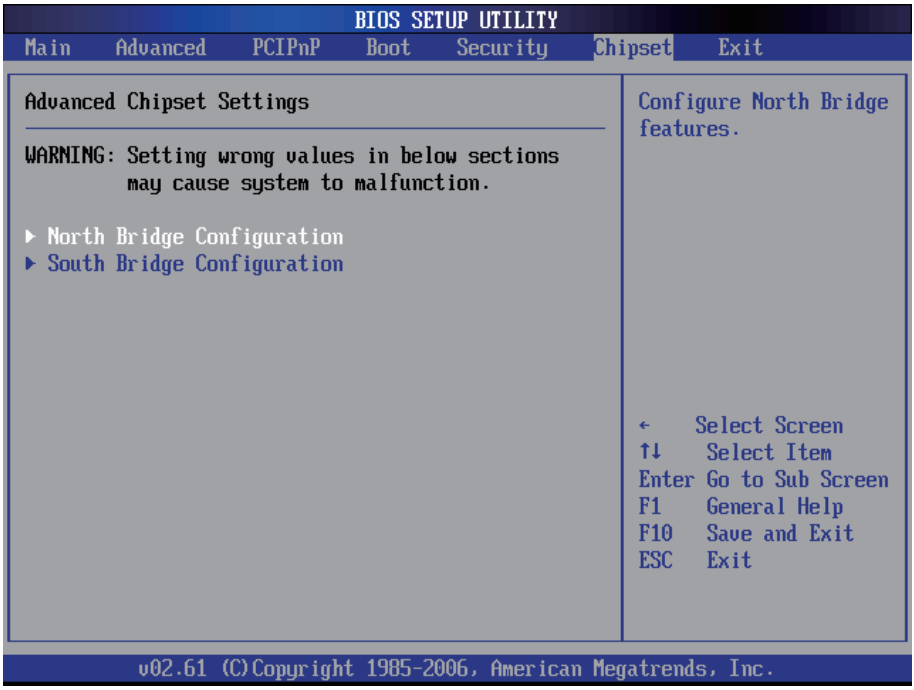
Additionally, when a password is enabled, you can also require the BIOS to request a password every time your system is rebooted. This would prevent unauthorized use of your computer.

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

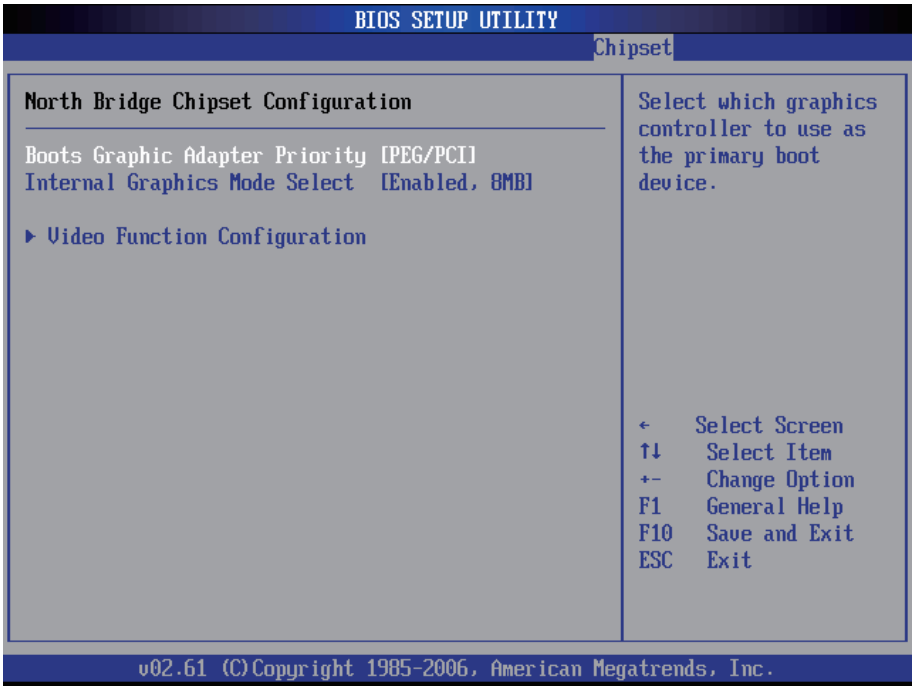
Boot Sector Virus Protection

Enable/Disable Boot Sector Virus Protection.

3.6 Advanced Chipset Settings



3.6.1 North Bridge Chipset Configuration



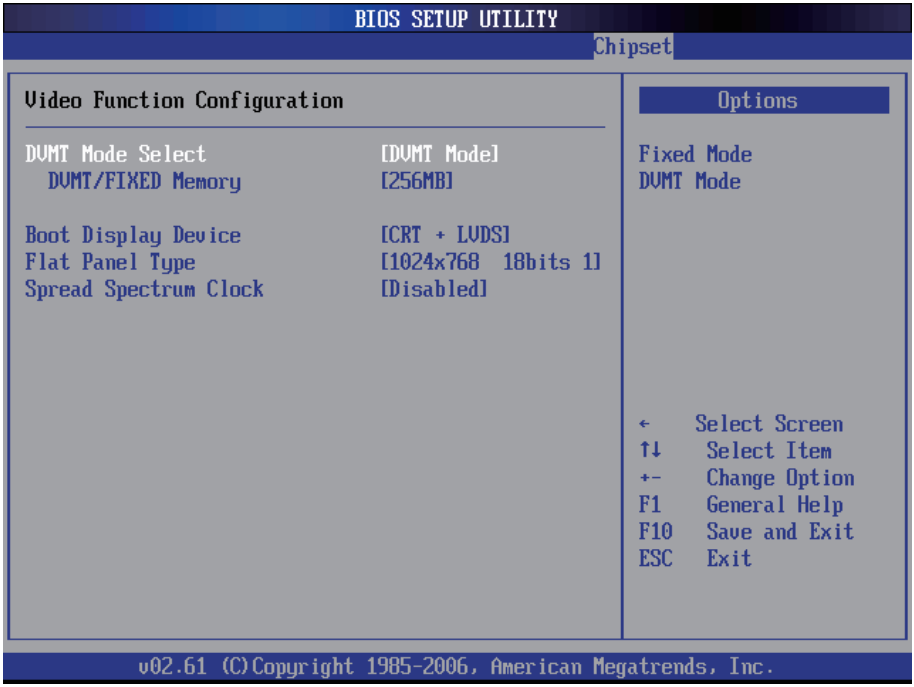
Boots Graphic Adapter Priority

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

Internal Graphic Mode Select

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

Video Function Configuration



DVMT Mode Select

This item allows you to select the DVMT mode.
The choice: FIXED, DVMT, BOTH.

DVMT/FIXED Memory Size

This item allows you to select the DVMT or FIXED memory size.

Boot Display Device

This item allows you to select the boot display device.

Flat Panel Type

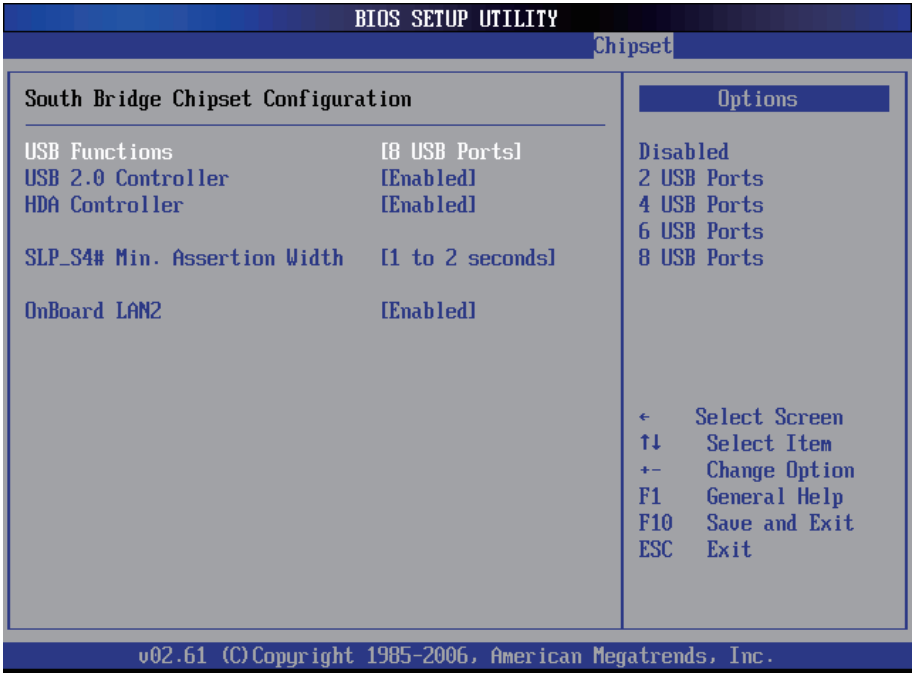
This item allows you to select the panel resolution.

Spread Spectrum Function

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

The Choice: Enabled, Disabled.

3.6.2 South Bridge Chipset Configuration



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

USB 2.0 Controller

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

The Choice: Enabled, Disabled.

HDA Controller

This item allows you to select the chipset family to support High Definition Audio Controller.

The Choice: Enabled, Disabled.

SLP_S4# Min. Assertion Width

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

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

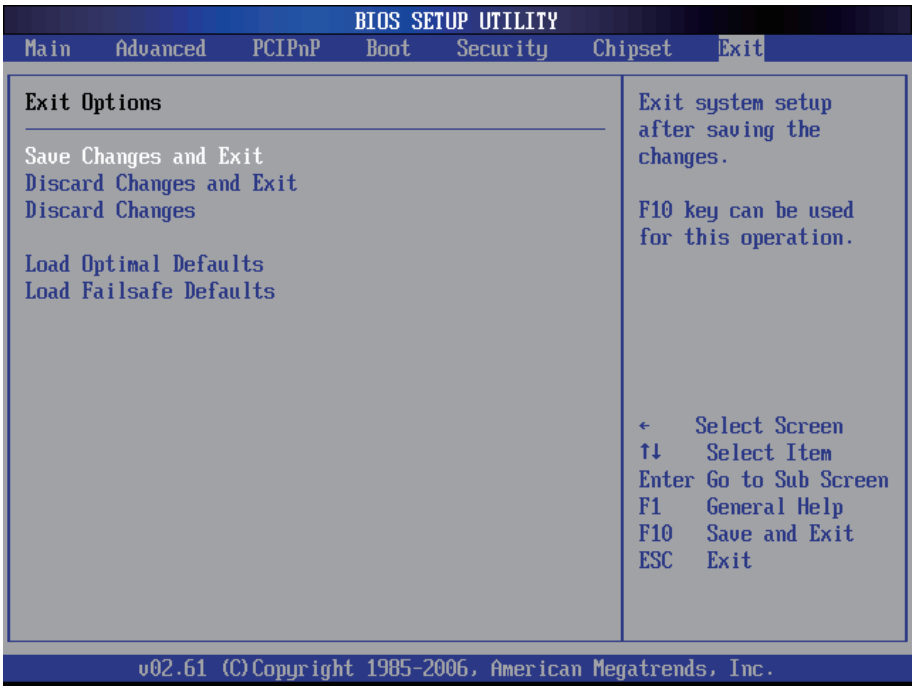
Onboard LAN2

Select “Enabled” if your system has a LAN device installed on the system board and you wish to use it.

The Choice: Enabled, Disabled.

3.7 Exit Options

Save Changes and Exit

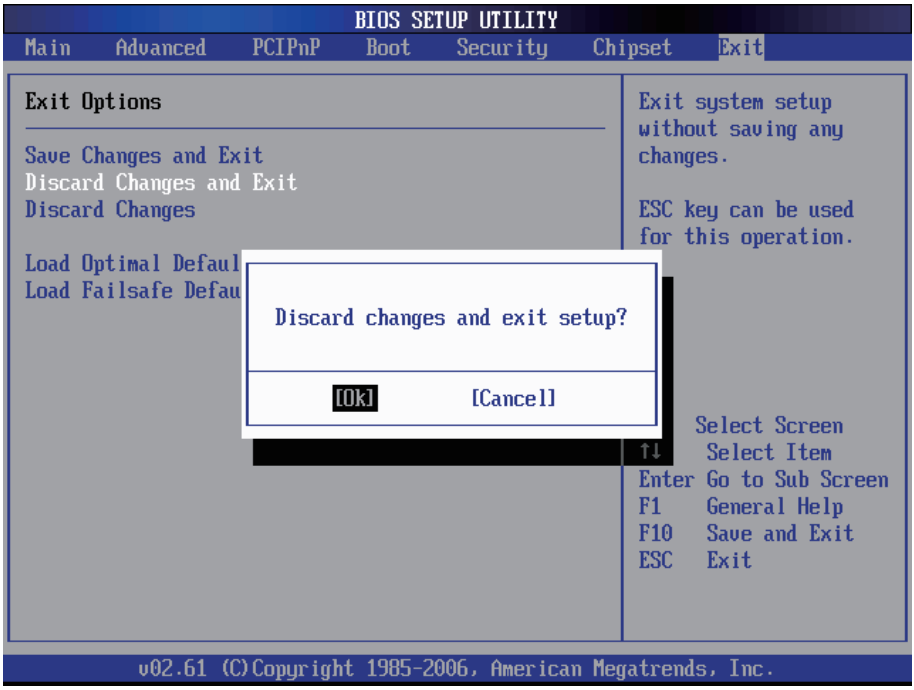


Pressing <Enter> on this item asks for confirmation:

Save configuration changes and exit setup?

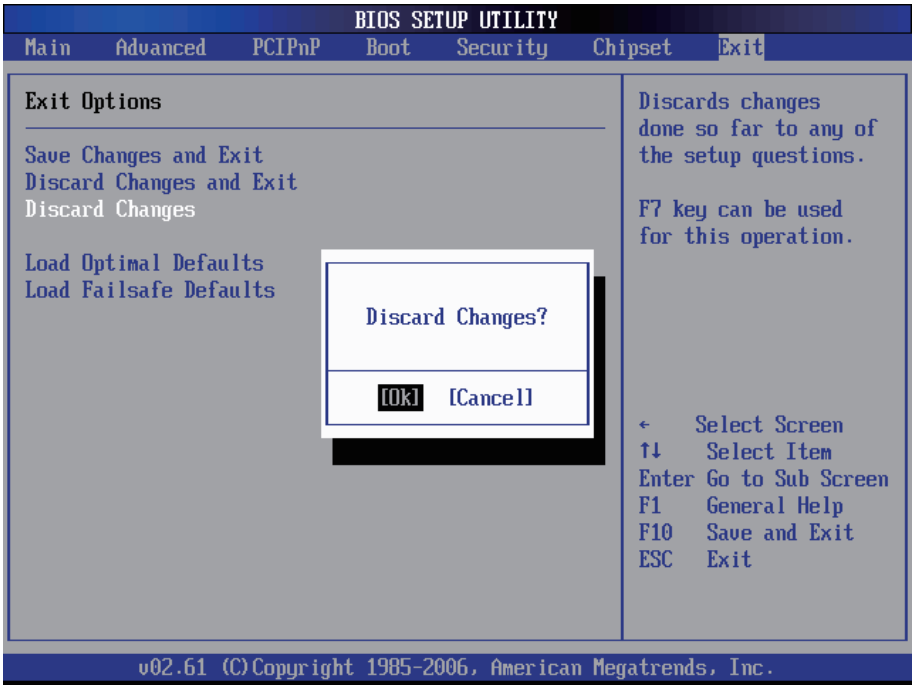
Pressing <OK> stores the selection made in the menus in CMOS - a special section of memory that stays on after you turn your system off. The next time you boot your computer, the BIOS configures your system according to the Setup selections stored in CMOS. After saving the values the system is restarted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

Discard Changes and Exit



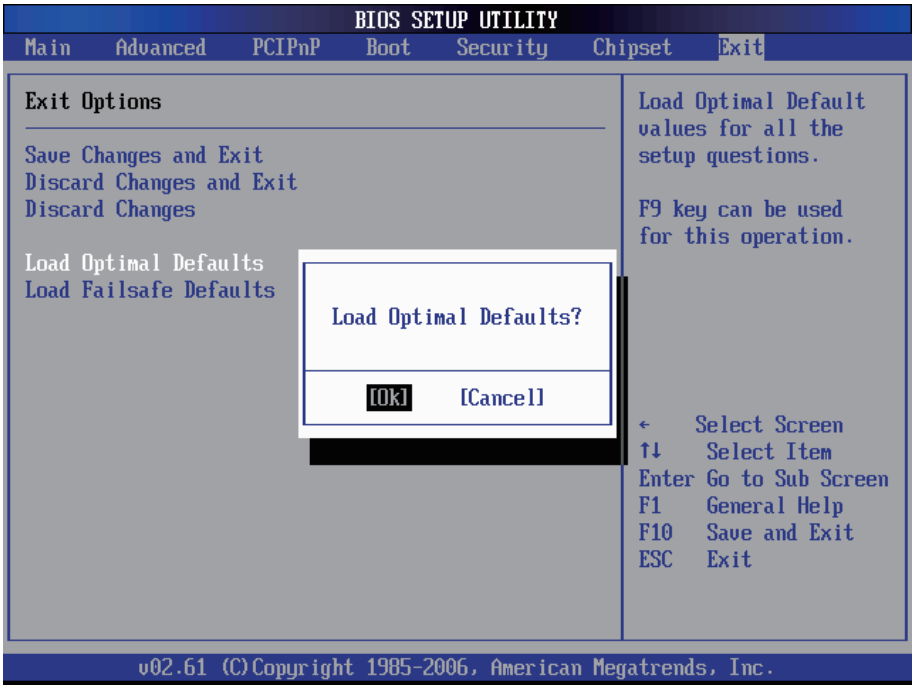
Exit system setup without saving any changes.
<ESC> key can be used for this operation.

Discard Changes



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

Load Optimal Defaults



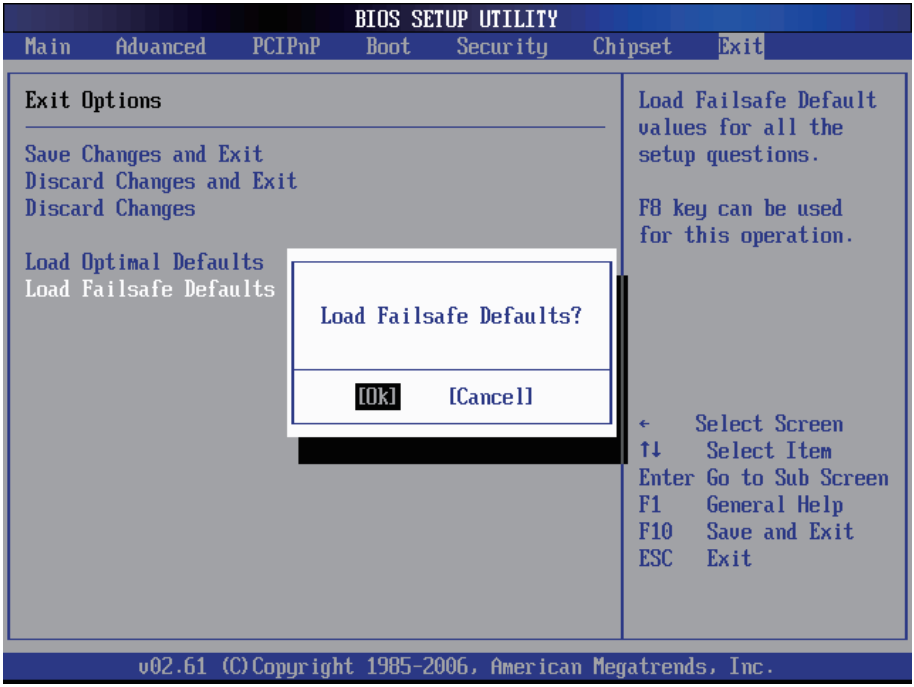
When you press <Enter> on this item you get a confirmation dialog box with a message:

Load Optimal Defaults?
[OK] [Cancel]

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

<F9> key can be used for this operation.

Load Failsafe Defaults



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

Load Failsafe Defaults?
[OK] [Cancel]

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

<F8> key can be used for this operation.

3.8 Beep Sound codes list

3.8.1 Boot Block Beep codes

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

3.8.2 POST BIOS Beep codes

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

3.8.3 Troubleshooting POST BIOS Beep codes

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

3.9 AMI BIOS Checkpoints

3.9.1 Bootblock Initialization Code Checkpoints

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

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

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

3.9.2 Bootblock Recovery Code Checkpoints

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

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

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

3.9.3 POST Code Checkpoints

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

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

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

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

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

3.9.4 DIM Code Checkpoints

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

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

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

HIGH BYTE XY

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

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

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

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

3.9.5 ACPI Runtime Checkpoints

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

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

Note:
Please note that checkpoints may differ between different platforms based on system configuration. Checkpoints may change due to vendor requirements, system chipset or option ROMs from add-in PCI devices.

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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 - 0000000F	DMA Controller
00000080 - 0000009F	DMA Controller
000000C0 - 000000DF	DMA Controller
00000020 - 00000021	Programmable Interrupt Controller
000000A0 - 000000A1	Programmable Interrupt Controller
00000040 - 00000043	System Timer
00000044 - 00000047	System Timer
00000060 - 00000064	Keyboard Controller
00000070 - 00000073	System CMOS/Real Time Clock
000000F0 - 000000FF	Math Co-processor
000001F0 - 000001F7	Primary IDE
00000274 - 00000277	ISAPNP Read Data Port
00000279, 00000A79	ISAPNP Configuration
000002F8 - 000002FF	Communications Port (COM2, If use)
00000378 - 0000037A	Parallel Port (If use)
000003B0 - 000003BF	MDA/MGA
000003C0 - 000003CF	EGA/VGA
000003D4 - 000003D9	CGA CRT register
000003F0 - 000003F7	Floppy Diskette
000003F6 - 000003F6	Primary IDE
000003F8 - 000003FF	Communications Port (COM1, If use)
00000400 - 0000041F	South Bridge SMB
000004D0 - 000004D1	IRQ Edge/Level Control Ports
00000500 - 0000053F	South Btidge GPIO
00000800 - 0000087F	ACPI
00000A00 - 00000A07	PME

00000A10 - 00000A17	Hardware Monitor
00000CF8	PCI Configuration Address
00000CFC	PCI Configuration Data

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

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

Assembly Code

```
;-- Initial W83627hf --
        mov     AX, 2Eh
        mov     DX, AX
        mov     AL, 87h
        out     DX, AX          ;
        out     DX, AX          ; initial W83627HF start
;--
        mov     AX, 2Eh
        mov     DX, AX
        mov     AL, 2Bh
        out     DX, AL          ; Select CR2B
        mov     AL, 00h
        inc     DX
        out     DX, AL          ; Set CR2B bit 4=0, PIN89=WDTO
;--
        mov     AX, 2Eh
        mov     DX, AX
        mov     AL, 07h
```

```
        out     DX, AL          ; Point to Logical Device Selector
        mov     AL, 08h
        inc     DX
        out     DX, AL          ; Select Logical Device 8
;--
        mov     AX, 2Eh
        mov     DX, AX
        mov     AL, 30h
        out     DX, AL          ; select CR30
        mov     AL, 01h
        inc     DX
        out     DX, AL          ; update CR30 to 01h
;--
        mov     AX, 2Eh
        mov     DX, AX
        mov     AL, 0F0h
        out     DX, AL          ; select CRF0
        mov     AL, 00h
        inc     DX
        out     DX, AL          ; set CRF0=00h, output
;--
        mov     AX, 2Eh
        mov     DX, AX
        mov     AL, 0F5h
        out     DX, AL          ; select CRF5, WDT Timer unit
        mov     AL, 00h         ; bit2 =0 ->second ; bit2 =1 -> minute
        inc     DX
        out     DX, AL          ; update CRF5 bit2 to 00h
;--
        mov     AX, 2Eh
        mov     DX, AX
        mov     AL, 0F6h
        out     DX, AL          ; select CRF6, WDT Timer
        mov     AL, 05h
        inc     DX
        out     DX, AL          ; update CRF6 to 5 unit
;---
        mov     AX, 2Eh
        mov     DX, AX
        mov     AL, AAh
        out     DX, AX
;-- end
```

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, 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 W83627HF, Exit */
}
```

Appendix E: Digital I/O Setting

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

Assembly Code

```
;-- Initial W83627hf --
        mov     AX, 2Eh
        mov     DX, AX
        mov     AL, 87h
        out     DX, AX          ;
        out     DX, AX          ; initial W83627HF start
;--
        mov     AX, 2Eh
        mov     DX, AX
        mov     AL, 2Ah
        out     DX, AL          ; Select CR2A
        mov     AL, 0FCh
        INC     DX
        out     DX, AL          ; Set CR2A bit 7=1 as GPIO port 1
;--
        mov     AX, 2Eh
        mov     DX, AX
        mov     AL, 07h
        out     DX, AL          ; Point to Logical Device Selector
        mov     AL, 07h
        inc     DX
        out     DX, AL          ; Select Logical Device 7
;--
        mov     AX, 2Eh
        mov     DX, AX
        mov     AL, 30h
        out     DX, AL          ; select CR30
        mov     AL, 01h
        inc     DX
        out     DX, AL          ; set bit0=1, GPIO port 1 active
;--
        mov     AX, 2Eh
        mov     DX, AX
        mov     AL, 0F0h
        out     DX, AL          ; select CRF0, GP I/O select
        mov     AL, 00h
```

```
        inc     DX
        OUT     DX, AL          ; bit7~bit0 0:output  1:input
;--
        mov     AX, 2Eh
        mov     DX, AX
        mov     AL, 0F1h
        out     DX, AL          ; select CRF1, Data Register
        mov     AL, 0FFh
        inc     DX
        out     DX, AL          ; set all GPIO pin output 1
;--
        mov     AX, 2Eh
        mov     DX, AX
        mov     AL, 0F1h
        out     DX, AL          ; select CRF1, Data Register
        mov     AL, 000h
        inc     DX
        out     DX, AL          ; set all GPIO pin output 0
;---
        mov     AX, 2Eh
        mov     DX, AX
        mov     AL, AAh
        out     DX, AX
;-- end
```

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, 0x2a);       /* Select CR2A */
          outportb(0x2e+1, 0xfc);     /* set CR2A bit7=1 as GPIO port 1*/

          outportb(0x2e, 0x07);       /* point to logical device */
          outportb(0x2e+1, 0x07);     /* select logical device 7 */

          outportb(0x2e, 0x30);       /* select CR30 */
          outportb(0x2e+1, 0x01);     /* set bit0=1, GPIO port 1 active */

          outportb(0x2e, 0xf0);       /* select CRF0, GP I/O select */
          outportb(0x2e+1, 0x00);     /* bit7~bit0 0:output  1:input */

          outportb(0x2e, 0xf1);       /* select CRF1, Data Register */
          outportb(0x2e+1, 0xff);     /* set all GPIO pin output 1 */

          outportb(0x2e, 0xf1);       /* select CRF1, Data Register */
          outportb(0x2e+1, 0x00);     /* set all GPIO pin output 0 */

          outportb(0x2e, 0xAA);       /* stop program W83627HF, Exit */

}
```

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