MB-i67Q0

Micro-ATX
Industrial Motherboard

User's Manual

Version 1.0

2012.07

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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

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. 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 B

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 B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate

radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-- Reorient or relocate the receiving antenna.
-- Increase the separation between the equipment and receiver.
-- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
-- Consult the dealer or an experienced radio/TV technician for help.

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)

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.

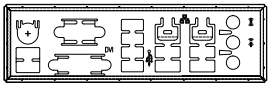
1.8 Packing List

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

1 x MB-i67Q0 Industrial Motherboard

1 x Driver CD

1 x Quick Installation Guide



1 x I/O Bracket

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

1.9 Ordering Information

MB-i67Q0	Intel® LGA1155 socket Core™ i7/i5/i3 / Pentium® embedded Micro-ATX motherboard
2611241246100P	CPU cooler for LGA1155 CPU
CBK-11-67Q0-00	Cable kit 6 x SATA cables 1 x LPT cable 2 x Two ports COM cables 2 x Two ports USB cables

1.10 Recommended CPU List

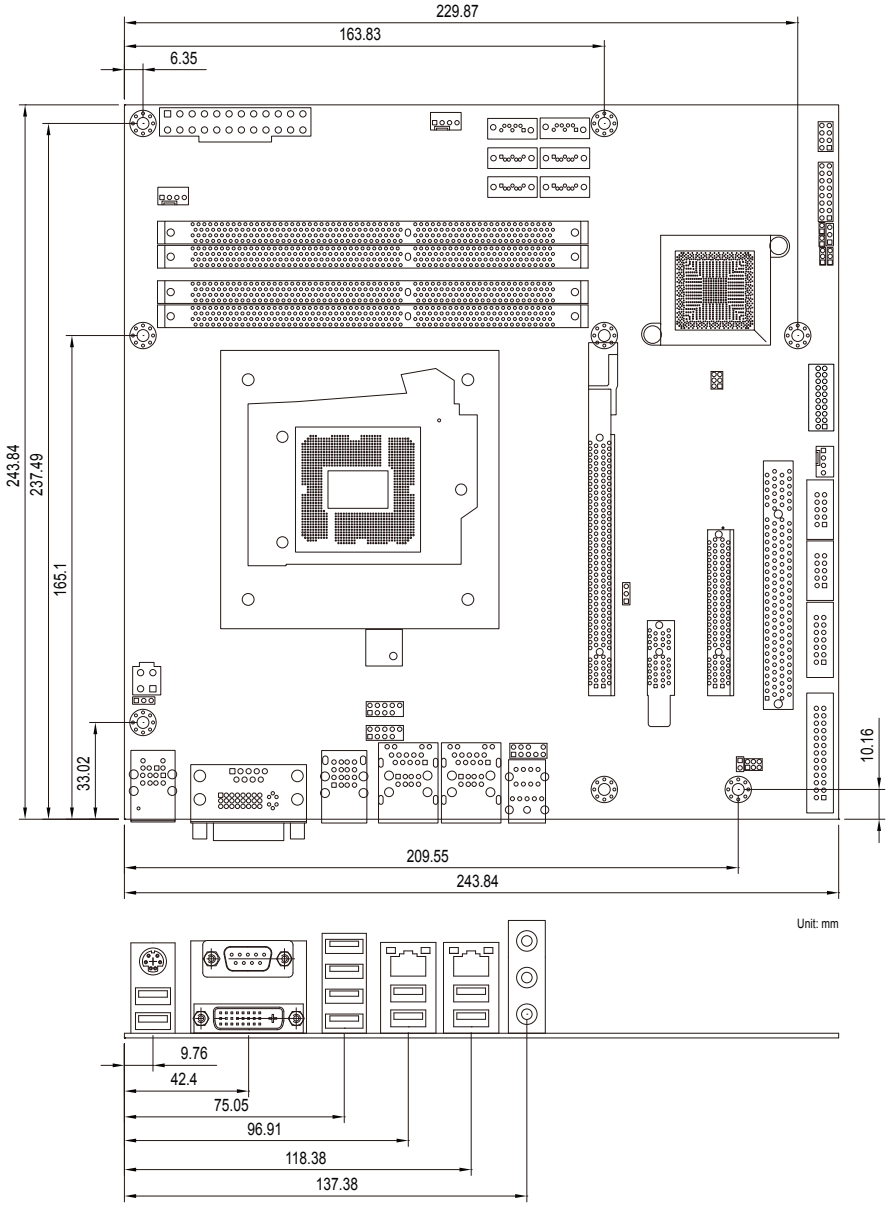
i7-2600 3.4GHz Core™ Processor
i5-2400 3.1GHz Core™ Processor
i3-2120 3.3GHz Core™ Processor
G850 2.9GHz Pentium® Dual Core Processor
G540 2.5GHz Celeron® Dual Core Processor

1.11 Specifications

Form Factor	Micro-ATX Industrial Motherboard
CPU	Support Intel® Core™ i7/i5/i3/Pentium®/Celeron® processors in LGA1155 socket
Chipset	Intel® Q67
System Memory	4 x 240-pin DDR3 DIMM Sockets, supporting 1066/1333MHz up to 32GB
Display	Integrated Intel® HD Graphics
	1 x DVI-I connector supports either Analog RGB or DVI, resolution up to 2048 x 1536 for Analog RGB and 1920 x 1200 for TMDS
Ethernet	1 x Intel® 82583V Gigabit Ethernet Controller 1 x Intel® 82579LM Gigabit Ethernet PHY w/ iAMT
I/O Chip	Fintek F71869ED + Fintek F81216AD
BIOS	AMI BIOS
Serial ATA	4 x Serial ATA 300MB/s HDD transfer rate 2 x Serial ATA 600MB/s HDD transfer rate Support Intel® Rapid Storage Technology Support RAID 0.1.5.10
Parallel Port	1 x LPT port, supports SPP/EPP/ECP mode selectable
Serial Port	4 x COM ports: COM1~3 RS-232, COM4 RS-232/422/485 selectable w/ auto flow control

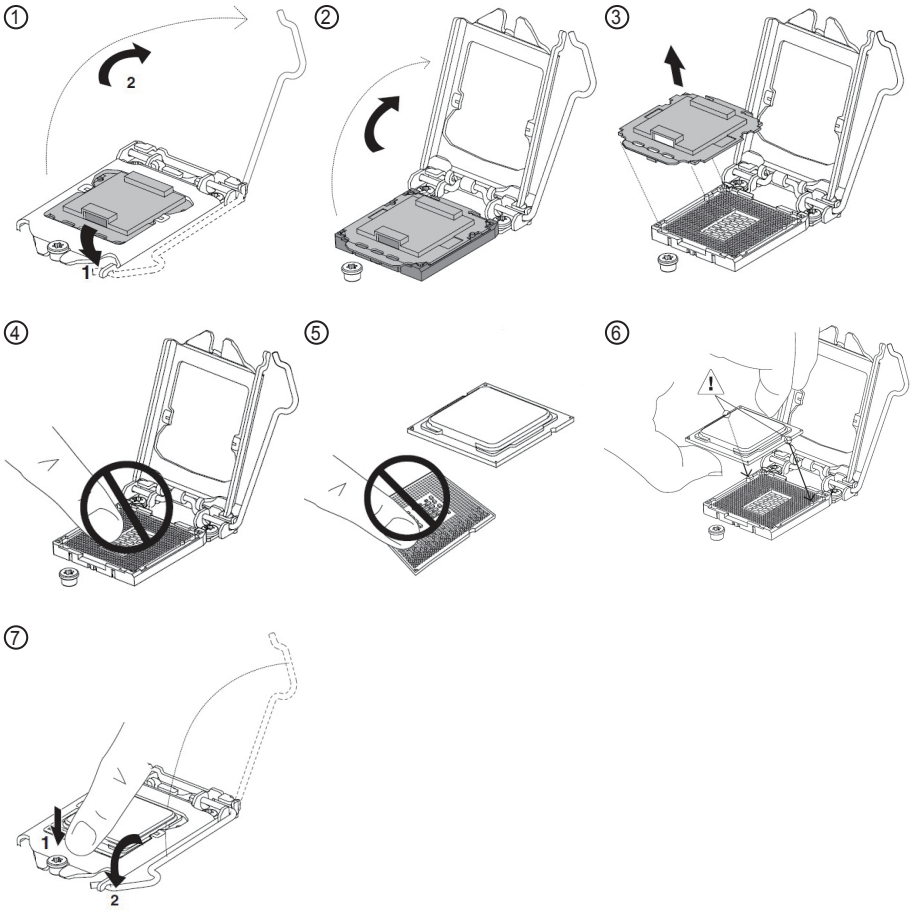
Expansion Bus	1 x PCIe x16 slot 1 x PCIe x1 slot 1 x PCIe x4 interface in x8 slot 1 x PCI slot
Universal Serial Bus	14 x USB 2.0 ports
Watchdog Timer	1~255 levels reset
Dimension (L x W)	244 x 244 mm (9.6” x 9.6”)
Digital I/O	16-bit programmable Digital Input/Output
KBMS	1 x 6-pin Mini-DIN connector for Keyboard and Mouse via Y-cable
Audio	Realtek ALC886 HD Audio Codec, Mic-in/Line-in/ Line-out
Power Consumption	6.5A@+12V, 2.2A@5V, 1.3A@3.3V (Typical) with Intel® Core™ i7-2600 3.4GHz processor
Power Connector	24-pin + 4-pin ATX connector
Certification	CE/FCC class B
Operating Temp.	0ºC ~ 60ºC (32 ~ 140ºF)
Storage Temp.	-20ºC ~ 80ºC (-4 ~ 176ºF)
Humidity	0% ~ 95% non-condensing

1.12 Board Dimensions



1.13 Installing the CPU

The LGA1155 processor socket comes with a lever to secure the processor. Please refer to the pictures step by step as below and note that the cover of the LGA1155 socket must always be installed during transportation to avoid damage to the socket.

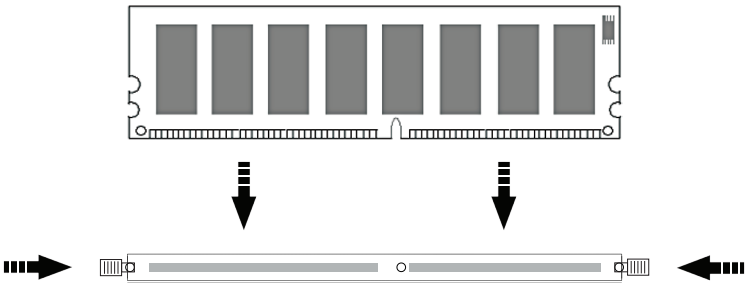


Make sure that heat sink putting on the CPU's top surface is in complete contact to avoid overheating problem.
If not, it would cause your system or CPU hanged, unstable or damaged.

1.14 Installing the Memory

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

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



Note: To enable Dual Channel DDR3 memory technology, you have to install identical dual memory modules into sockets of the same color, as below.

<CHANNEL1>

DIMM1: BLACK

DIMM2: BLUE

<CHANNEL2>

DIMM3: BLACK

DIMM4: BLUE

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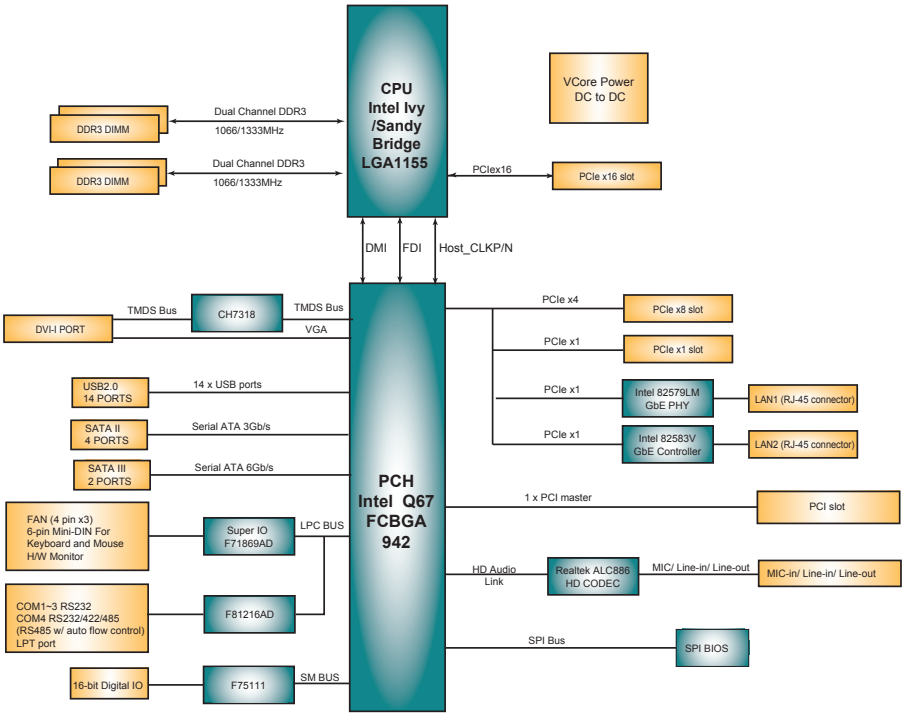
Chapter 2

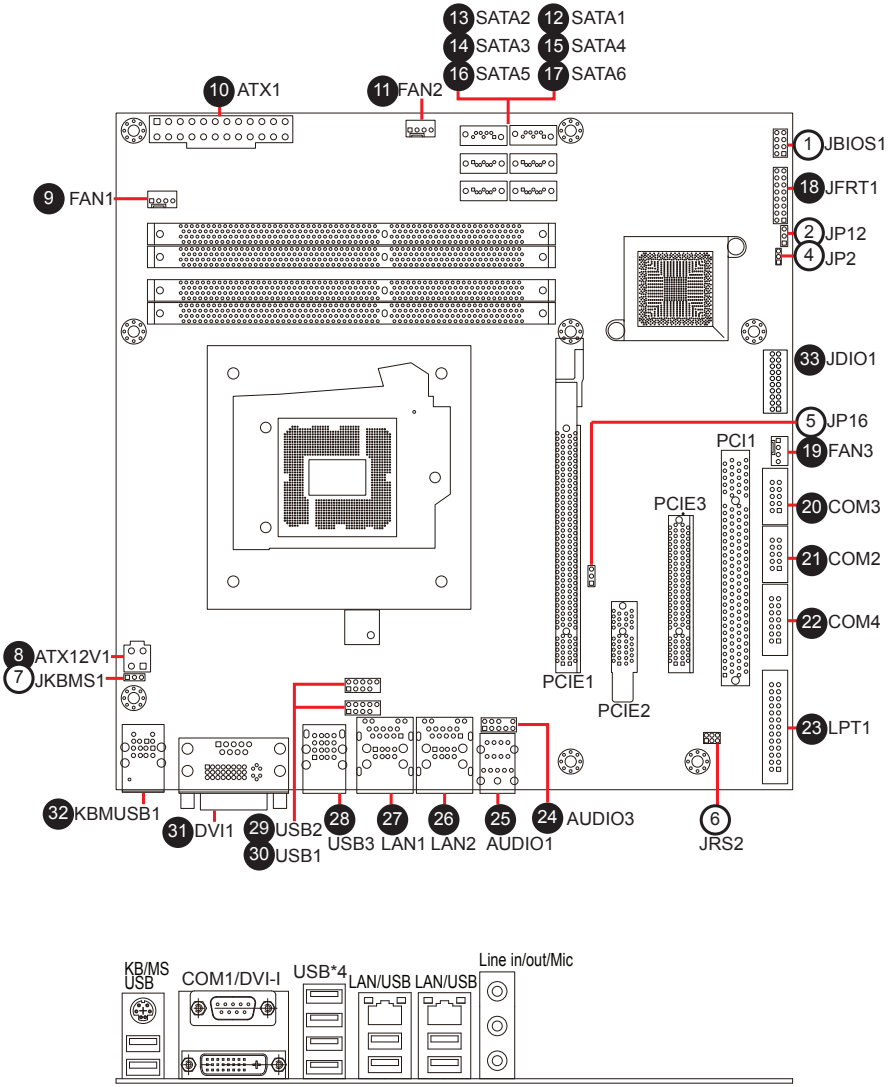
Installation

2.1 Block Diagram

MB-i67Q0
Sandy Bridge Q67 platform
Embedded Micro ATX Motherboard



2.2 Jumpers and Connectors Location

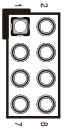


Jumpers

JBIOS1: BIOS Update Port (1)

Connector type: 2.54mm pitch 2x4-pin header.

Pin	Desc.	Pin	Desc.
1	3.3V	2	GND
3	CS0#	4	CLK
5	SO	6	SI
7	NC	8	NC



JP12: Intel ME Mode Selection (2)

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

Pin	Description	
1-2	Disable ME	
2-3	Enable ME (Default)	

Note: The jumper can only be used to clear COMS data instead of RTC time. For RTC time, it should be set manually from BIOS Main Setup, please refer to Section 3.1.

JP2: CMOS Setup (4)

Connector type: 2.00mm pitch 1x3-pin header.

Pin	Voltage	
1-2	Normal (Default)	
2-3	Clear CMOS	

JP16: AT/ATX Power Selection (5)

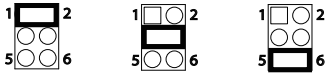
Connector type: 2.54mm pitch 1x3-pin header.

Pin	Description	
1-2	ATX (Default)	
2-3	AT	

JRS2: COM4 RS-232/422/485 Selection (6)

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

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



JKBMS1: KB/MS Power Source Selection (7)

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

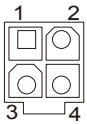
Pin	Voltage	
1-2	5V (Default)	
2-3	5VSB	

Connectors

ATX12V1: ATX +12V Connector (8)

Connector type: 4-pin ATX 12V connector.
ATX12V1 supplies the CPU operation ATX +12V (Vcore).

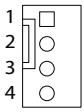
Pin	Desc.	Pin	Desc.
1	GND	2	GND
3	+12V	4	+12V



FAN1~3: Fan Power Connectors (9, 11, 19)

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

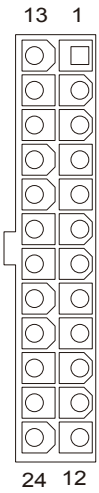
Pin	Description
1	GND
2	+12V
3	FAN_IN
4	FAN_CTL



ATX1: ATX Power Connector (10)

Connector type: 24-pin ATX Power Supply connector.

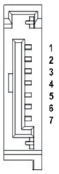
Pin	Desc.	Pin	Desc.
1	+3.3V	13	+3.3V
2	+3.3V	14	-12V
3	GND	15	GND
4	+5V	16	PS-ON
5	GND	17	GND
6	+5V	18	GND
7	GND	19	GND
8	PW-OK	20	-5V
9	+5VSB	21	+5V
10	+12V	22	+5V
11	+12V	23	+5V
12	+3.3V	24	GND



SATA1~6: Serial ATA Connectors (12~17)

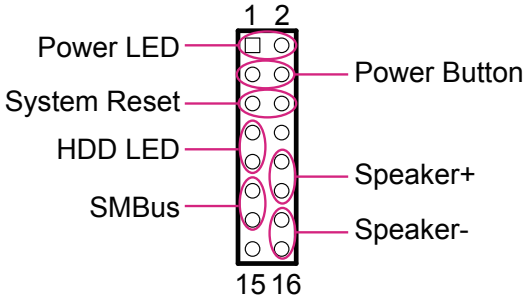
Connector type: lockable SATA connectors with housing.
SATA1~2 support 600MB/s HDD transfer rate.
SATA3~6 support 300MB/s HDD transfer rate.

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



JFRT1: Switches and Indicators (18)

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

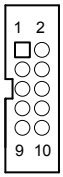


Pin	Description	Pin	Description
1	LED-	2	LED+
3	PWRBTN-	4	PWRBTN+
5	RESET-	6	RESET+
7	HDD LED+	8	GND
9	HDD LED-	10	SPEAKER+
11	SMB_CLK	12	SPEAKER+
13	SMB_DATA	14	SPEAKER-
15	GND	16	SPEAKER-

COM2~3: Serial Port Connectors (21, 20)

Connector type: 2.54mm pitch 2x5-pin box header.

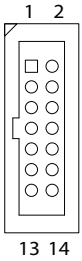
Pin	Desc.	Pin	Desc.
1	DCD1	2	RXD1
3	TXD1	4	DTR1
5	GND	6	DSR1
7	RTS1	8	CTS1
9	RI1	10	N/C



COM4: RS-232/422/485 Connector (22)

Connector type: 2.54mm pitch 2x7-pin header.

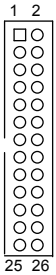
	Pin	Desc.	Pin	Desc.
RS-232	1	DCD	2	RXD
	3	TXD	4	DTR
	5	GND	6	DSR
	7	RTS	8	CTS
	9	RI	10	N/C
RS-485/422	11	422TX+485+	12	422TX-485-
	13	422RX+	14	422RX-



LPT1: Parallel Port (23)

Connector type: 2.54mm pitch 2x13-pin box header.

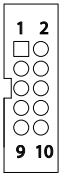
Pin	Desc.	Pin	Desc.
1	#STROBE	2	#AUTO FEED
3	DATA0	4	#ERROR
5	DATA1	6	#INITIALIZE
7	DATA2	8	#SELECT INPUT
9	DATA3	10	GND
11	DATA4	12	GND
13	DATA5	14	GND
15	DATA6	16	GND
17	DATA7	18	GND
19	#ACKNOWLEDGE	20	GND
21	BUSY	22	GND
23	PAPER EMPTY	24	GND
25	SELECT	26	N/C



AUDIO3: Aux Audio Connector (24)

Connector type: 2.54mm pitch 2x5-pin box header.

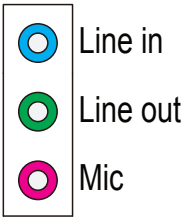
Pin	Description	Pin	Description
1	MIC2_L	2	GND
3	MIC2_R	4	PRESENCE
5	LINE2_R	6	MIC2_JD
7	SENSE	8	N/C
9	LINE2_L	10	LINE2_JD



AUDIO1: Audio Interface Port (25)

Connector type: 3 x 3.5mm phone jack stacked.

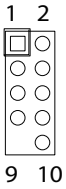
Audio Jack	Description
Blue	Line-in
Green	Line-out
Pink	Mic-in



USB1~2: USB Connectors (30, 29)

Connector type: 2.54mm pitch 2x5 pin header.

Pin	Desc.	Pin	Desc.
1	+5V	2	+5V
3	USBD1-	4	USBD2-
5	USBD1+	6	USBD2+
7	GND	8	GND
9	N/C	10	N/C

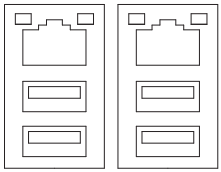


LAN1~2: RJ-45+USB Stacked Connectors (27, 26)

Connector type: RJ-45 connector with LED/Stacked USB type A connector.

LAN (RJ-45)

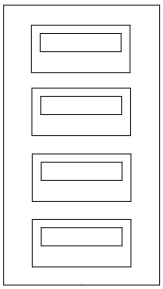
Pin	Desc.	Pin	Desc.
A1	TCT VCC	A2	M0+
A3	M0-	A4	M1+
A5	M1-	A6	M2+
A7	M2-	A8	M3+
A9	M3-	A10	RCT GND
A11	LED1 Y-	A12	LED1 Y+
A13	LED2 G-O+	A14	LED2 G+O-
USB (USB type A connector)			
B1	+5V	B5	+5V
B2	USBD1-	B6	USBD2-
B3	USBD1+	B7	USBD2+
B4	GND	B8	GND
H1	GND	H5	GND
H2	GND	H6	GND
H3	GND	H7	GND
H4	GND	H8	GND



USB3: USB Connector (28)

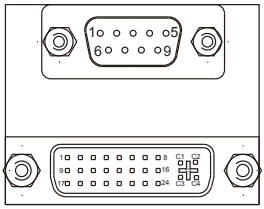
Connector type: 4 stack USB type A connector.

Pin	Desc.	Pin	Desc.
11	5V	21	5V
12	USBD1-	22	USBD2-
13	USBD1+	23	USBD2+
14	GND	24	GND
31	5V	41	5V
32	USBD3-	42	USBD4-
33	USBD3+	43	USBD4+
34	GND	44	GND
G1	GND	G4	GND
G2	GND	G5	GND
G3	GND	G6	GND



DVI1: COM1 & DVI-I (31)

Connector type: Male type D-SUB 9-pin connector + female type DVI-I connector.



DVI-I

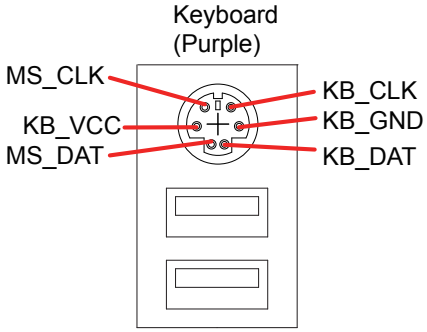
Pin	Desc.	Pin	Desc.
1	TX2-	13	TX3+
2	TX2+	14	+5V/50mA
3	TX2/4GND	15	GND
4	TX4-	16	HTPLG
5	TX4+	17	TX0-
6	DDC_CLK	18	TX0+
7	DDC_DATA	19	TX0/5GND
8	CRT_Vsync	20	TX5-
9	TX1-	21	TX5+
10	TX1+	22	TXC_GND
11	TX1/3GND	23	TXC+
12	TX3-	24	TXC-
C1	Analog RED		
C2	Analog Green		
C3	Analog Blue		
C4	Analog V_SYNC		
C5	Analog R, G, B Return		

COM1

1	DCD1	2	RXD1
3	TXD1	4	DTR1
5	GND	6	DSR1
7	RTS1	8	CTS1
9	RI1	10	N/C

KBMUSB1: PS/2 Keyboard and USB Stacked Connector (32)

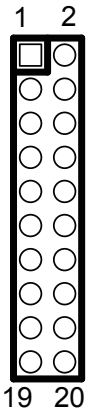
Connector type: 6-pin Mini-DIN/Stacked USB type A connector.



JDIO1: Digital I/O Connector (33)

Supports 16-bit programmable Digital Input/Output Connector type: 2.00mm pitch 2x10-pin headers

Pin	Desc.	Pin	Desc.
1	DIO0	2	DIO1
3	DIO2	4	DIO3
5	DIO4	6	DIO5
7	DIO6	8	DIO7
9	DIO8	10	DIO9
11	DIO10	12	DIO11
13	DIO12	14	DIO13
15	DIO14	16	DIO15
17	VCC	18	GND
19	VCC	20	GND



2.3 The Installation Paths of CD Driver

Windows XP

Driver	Path
CHIPSET	\CHIPSET\INF 9.2.0.1021
NET Framework	\NET Framework\NET Framework 3.5
AMT	\ME\MEI_allOS_7.1.13.1088
GRAPHICS	\GRAPHICS\INTEL_2K_XP_32\5391
LAN	\ETHERNET\INTEL\82583V\WINXP_32_Ver16
	\ETHERNET\INTEL\82583V\WINXP_64_Ver16
AUDIO	\AUDIO\REALTEK_HD\WDM_R267

Windows 7

Driver	Path
CHIPSET	\CHIPSET\INF 9.2.0.1021
AMT	\ME\MEI_allOS_7.1.13.1088
GRAPHICS	\GRAPHICS\Win7Vista_15221
LAN	\ETHERNET\INTEL\82583V\WIN7_32_Ver16
	\ETHERNET\INTEL\82583V\WIN7_64_Ver16
AUDIO	\AUDIO\REALTEK_HD\Vista_Win7_R262

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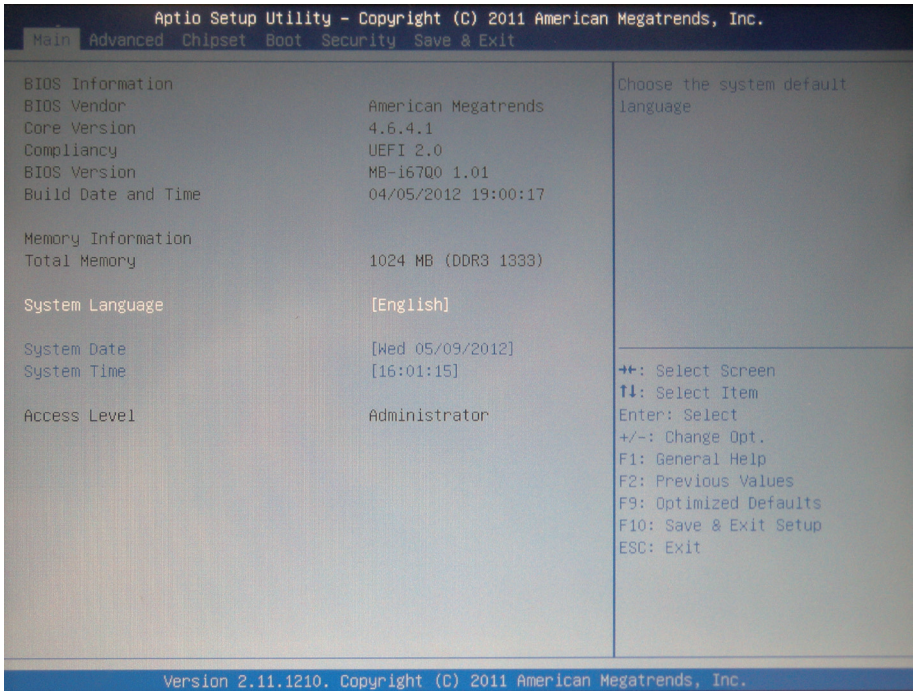
Chapter 3

BIOS

3.1 BIOS Main Setup

The AMI BIOS provides a setup utility program for specifying the system configurations and settings which are stored in the BIOS ROM of the system. When you turn on the computer, the AMI BIOS is immediately activated. After you have entered the setup utility, 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.

NOTE: In order to increase system stability and performance, our engineering staff are constantly improving the BIOS menu. The BIOS setup screens and descriptions illustrated in this manual are for your reference only, and may not completely match what you see on your screen.



BIOS Information

Display the BIOS information.

System Date

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

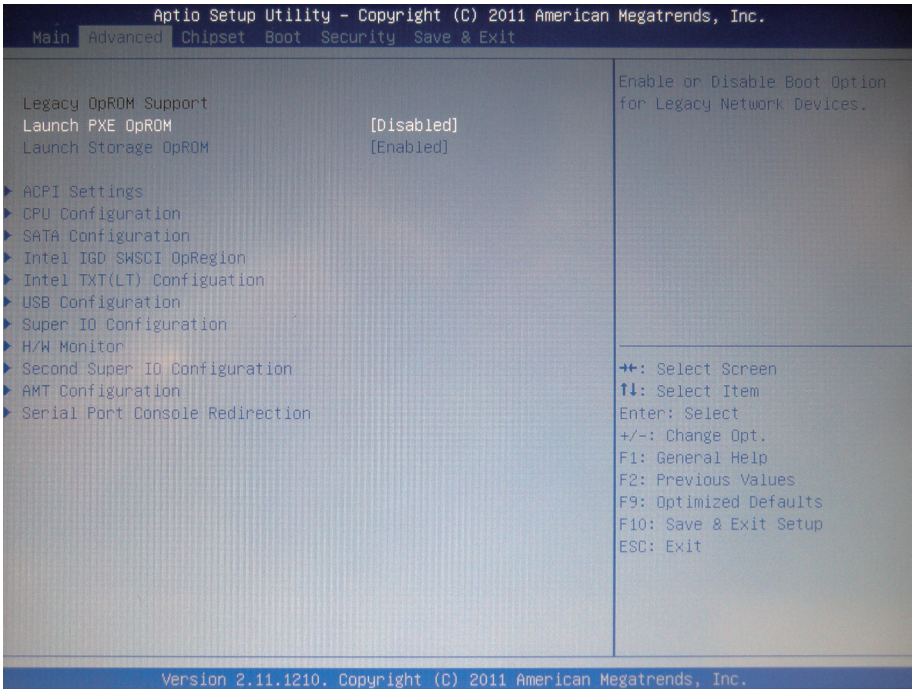
The date format is:
Day : Sun to Sat
Month : 1 to 12
Date : 1 to 31
Year : 1999 to 2099

System Time

Set the system time.

The time format is:
Hour : 00 to 23
Minute : 00 to 59
Second : 00 to 59

3.2 Advanced Settings



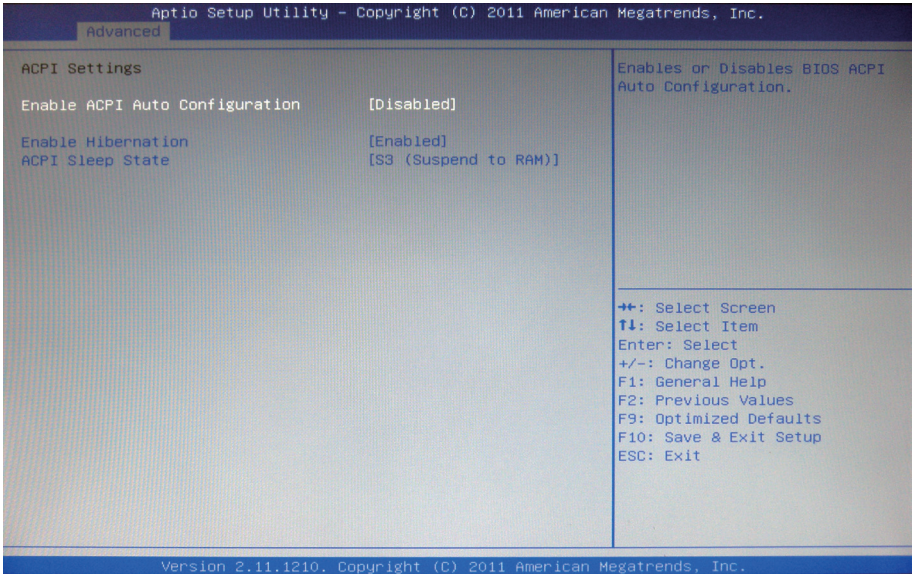
Launch PXE OpROM

Enable/Disable Boot Option for legacy network devices.

Launch Storage OpROM

Enable/Disable Boot Option for legacy mass storage devices with Option ROM.

3.2.1 ACPI Settings



Enable ACPI Auto Configuration

This item allows you to enable/disable ACPI (Advanced Configuration and Power Interface) Auto Configuration.
Setting: Disabled (Default), Enabled.

Enable Hibernation

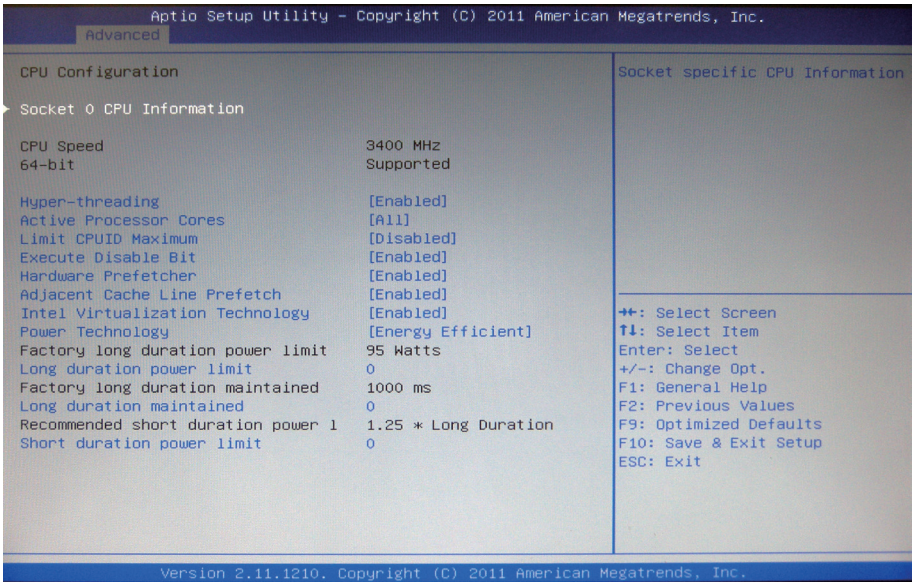
Enable/Disable system ability to Hibernation (OS/S4 Sleep State). This option may be not effective with some OS.
Setting: Enabled (Default), Disabled

ACPI Sleep State

Select the highest ACPI sleep state the system will enter when the SUSPEND button is pressed.

3.2.2 CPU Configuration

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



Hyper-threading

This item is used to enable or disable the processor's Hyper-threading feature.

Enabled for Windows XP and Linux (OS optimized for Hyper-threading Technology) and disabled for other OS (OS not optimized for Hyper-threading Technology).

When disabled, only one thread per enabled core is enabled.

Active Processor Cores

Number of cores to enable in each processor package.

Limit CPUID Maximum

Enable or disable the Limit CPUID Maximum.

Execute Disable Bit

XD can prevent certain classes of malicious buffer overflow attacks when combined with a supporting OS (Windows Server 2003 SP1, Windows XP SP2, SuSE Linux 9.2, RedHat Enterprise 3 update 3.)

Hardware Prefetcher

To turn on/off the Mid Level Cache (L2) streamer prefetcher.

Adjacent Cache Line Prefetch

To turn of/off prefetching of adjacent cache lines.

Intel Virtualization Technology

When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.

Power Technology

Enable the power management features.

Long duration power limit

Long duration power limit in Watts.

Long duration maintained

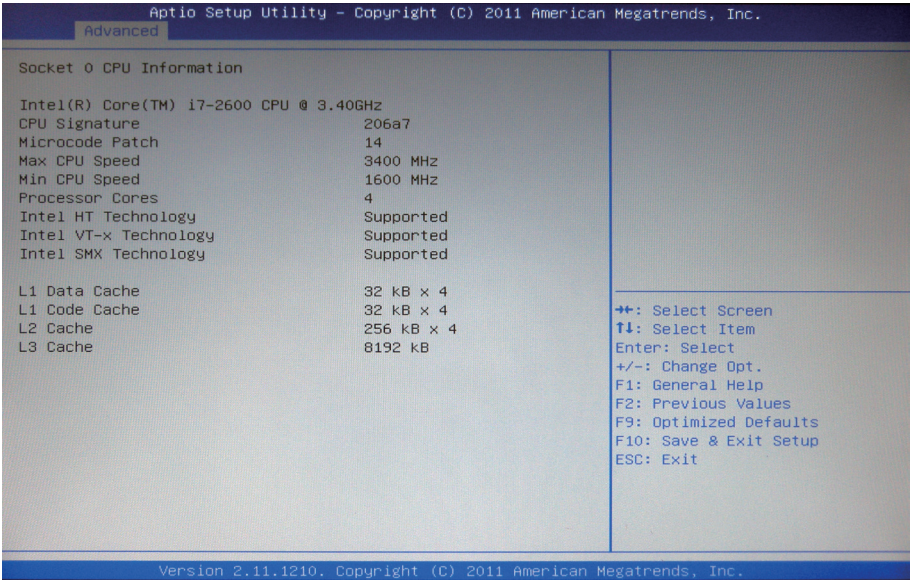
Time window which the long duration power in maintained.

Short duration power limit

Short duration power limit in Watts.

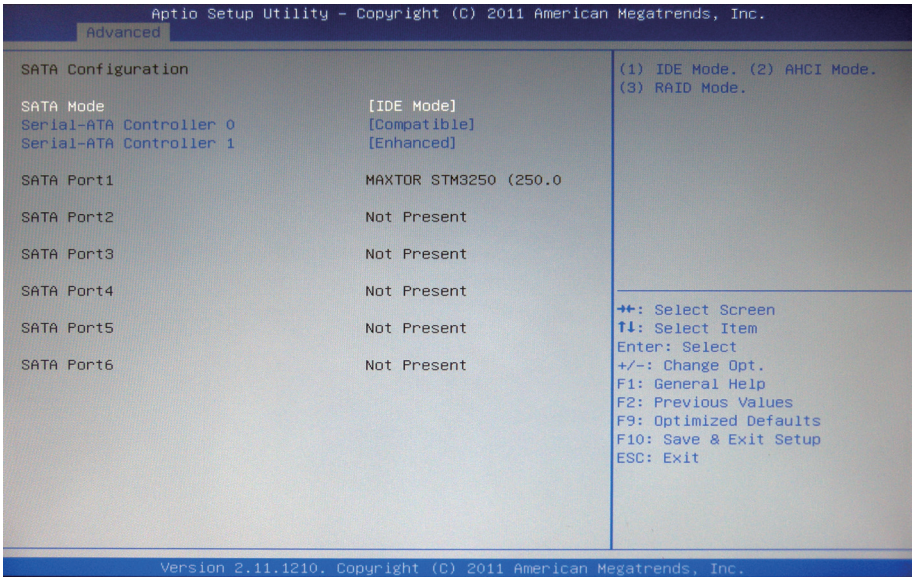
Socket 0 CPU Information

Show socket specific CPU information.



3.2.3 SATA Configuration

It allows you to select the operation mode for SATA controller.



SATA Mode

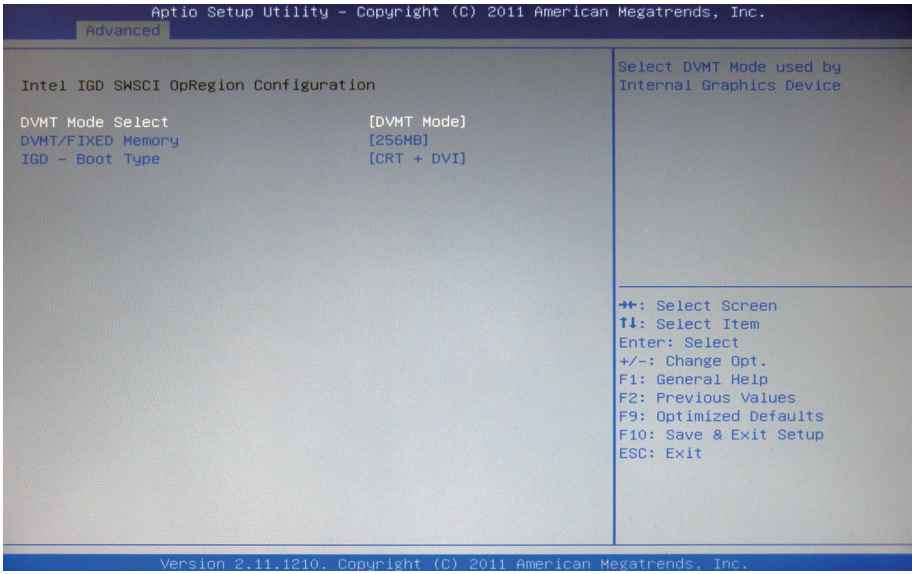
The choice: Disable; IDE Mode (Default), AHCI Mode, RAID Mode

IDE: Set the Serial ATA drives as Parallel ATA storage devices.
AHCI: Allow the Serial ATA devices to use AHCI (Advanced Host Controller Interface).
RAID: Create RAID or Intel Matrix Storage configuration on Serial ATA devices.

Serial-ATA Controller 0/1

Enable/Disable Serial-ATA Controller 0/1.

3.2.4 Intel IGD SWSCI OpRegion



DVMT Mode Select

Select DVMT Mode used by Internal Graphic Device.

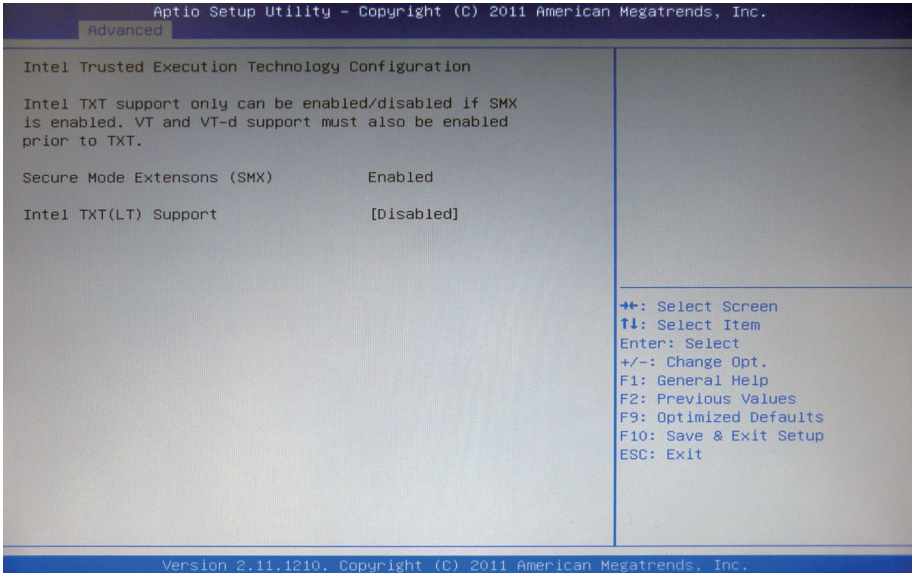
DVMT/FIXED Memory

Select DVMT/FIXED Mode Memory size used by Internal Graphic Device.

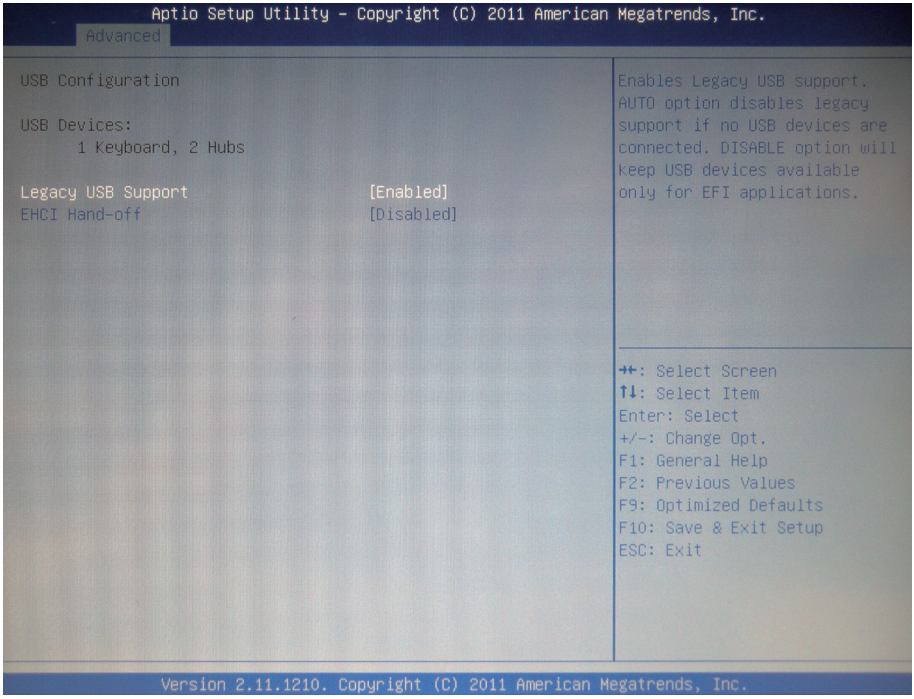
IGD - Boot Type

Select the Video Device which will be activated during POST.
This has no effect if external graphics present.
Note: In DOS mode, even though you select [CRT + DVI], only CRT can normally display.

3.2.5 Intel TXT (LT) Configuration



3.2.6 USB Configuration



Legacy USB Support

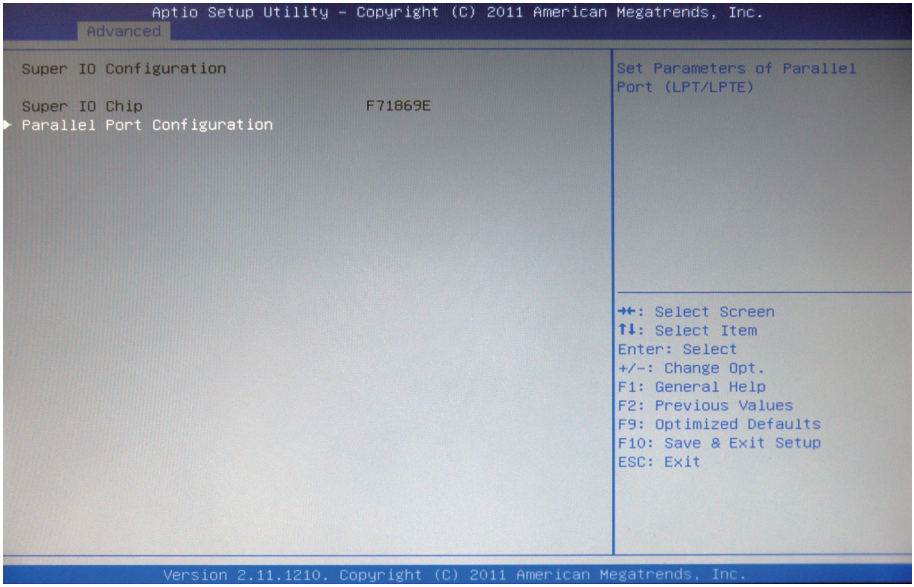
Enable option supports legacy USB. AUTO option disables legacy support if no USB devices are connected. DISABLE option will keep USB devices available only for EFI applications.

EHCI Hand-off

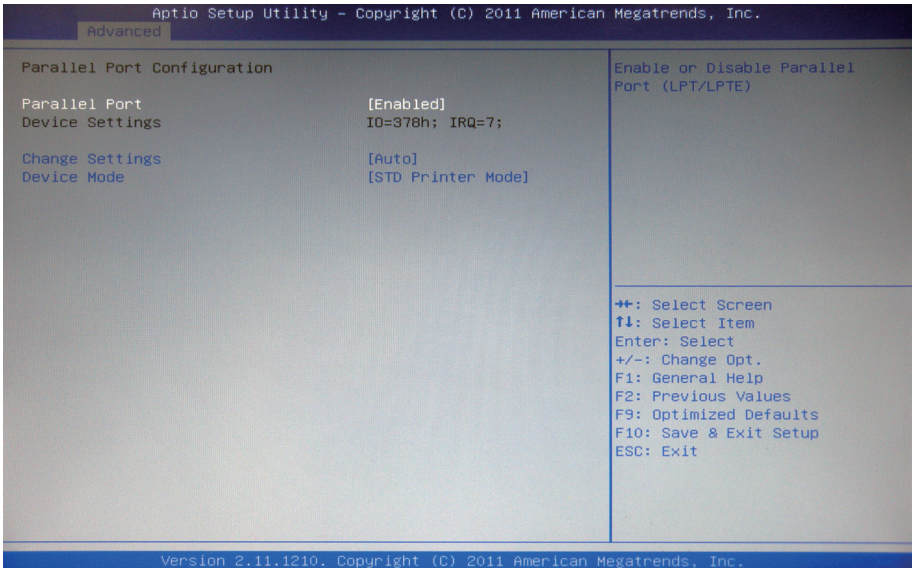
Allow you to enable support for operating systems without an EHCI hand-off feature. Do not disable the BIOS EHCI Hand-off option if you are running a Windows® operating system with USB device.
The choice: Enabled; Disabled (Default)

3.2.7 Super IO Configuration

You can use this item to set up or change the Super IO configuration for parallel ports.



Parallel Port Configuration



Parallel Port

Enable/Disable Parallel Port (LPT/LPTE).

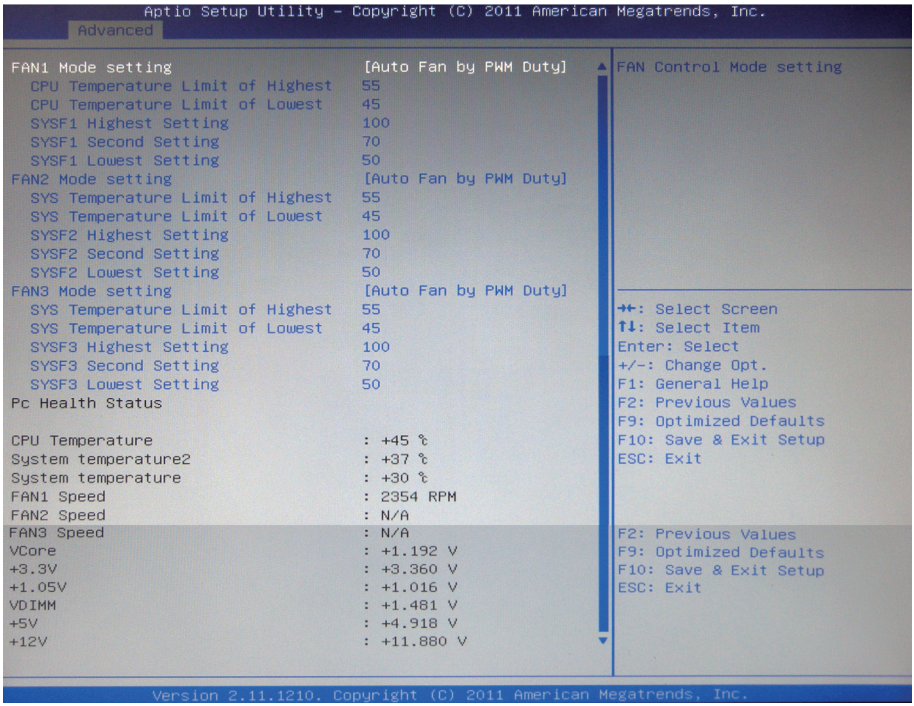
Change Settings

Select an optimal setting for Super IO device.

Device Mode

Change the Printer Port mode.

3.2.8 H/W Monitor



CPU/SYS Temperature Limit of Highest

Allow you to set highest temperature.

CPU/SYS Temperature Limit of Lowest

Allow you to set lowest temperature.

SYSF1~3 Highest Setting

Allow you to set highest speed value.

SYSF1~3 Second Setting

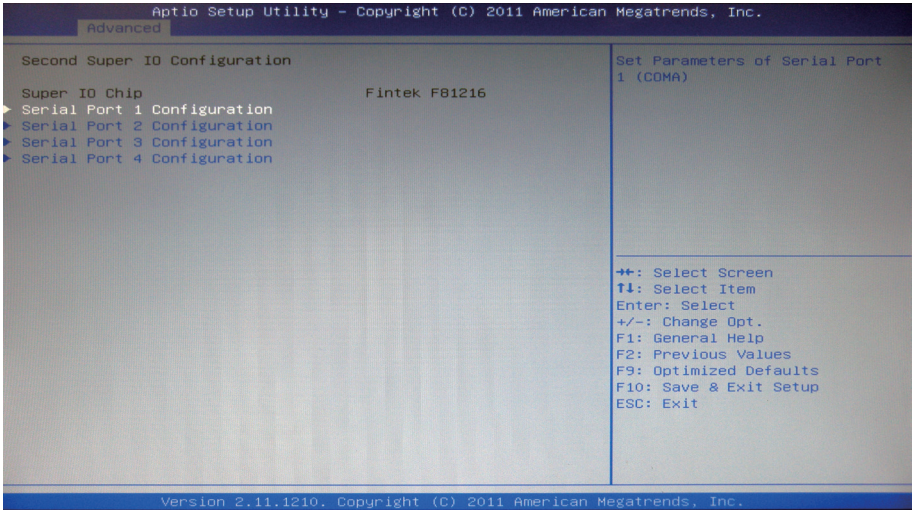
Allow you to set second speed value.

SYSF1~3 Lowest Setting

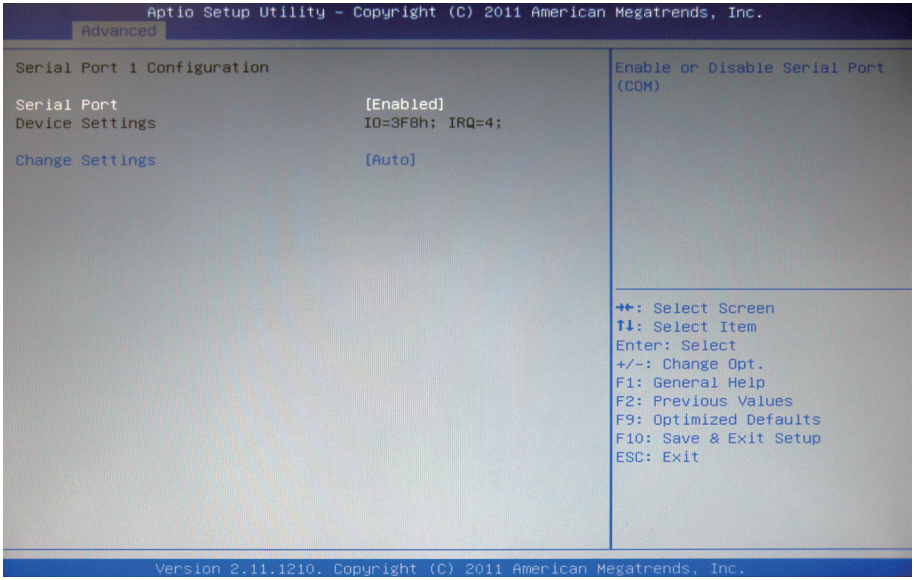
Allow you to set lowest speed value.

3.2.9 Second Super IO Configuration

You can use this item to set up or change the Second Super IO configuration for serial ports.



Serial Port 1~4 Configuration



Serial Port

Enable/Disable Serial Port (COM).

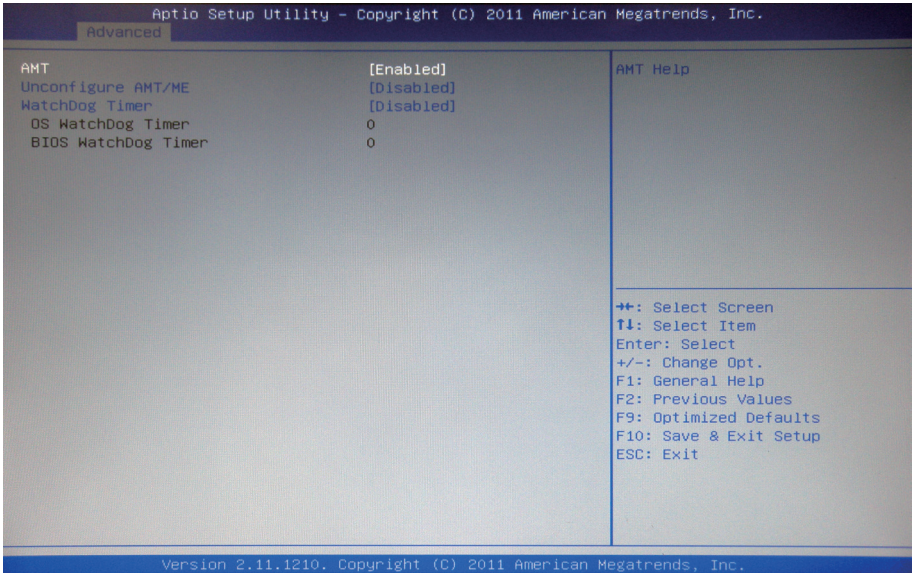
Change Settings

Select an optimal setting for Super IO device.

COM4 RS485 AutoFlow (only in Serial Port 4 Configuration)

The choice: Enabled, Disabled (Default)

3.2.10 AMT Configuration



AMT

Enable/Disable AMT help.

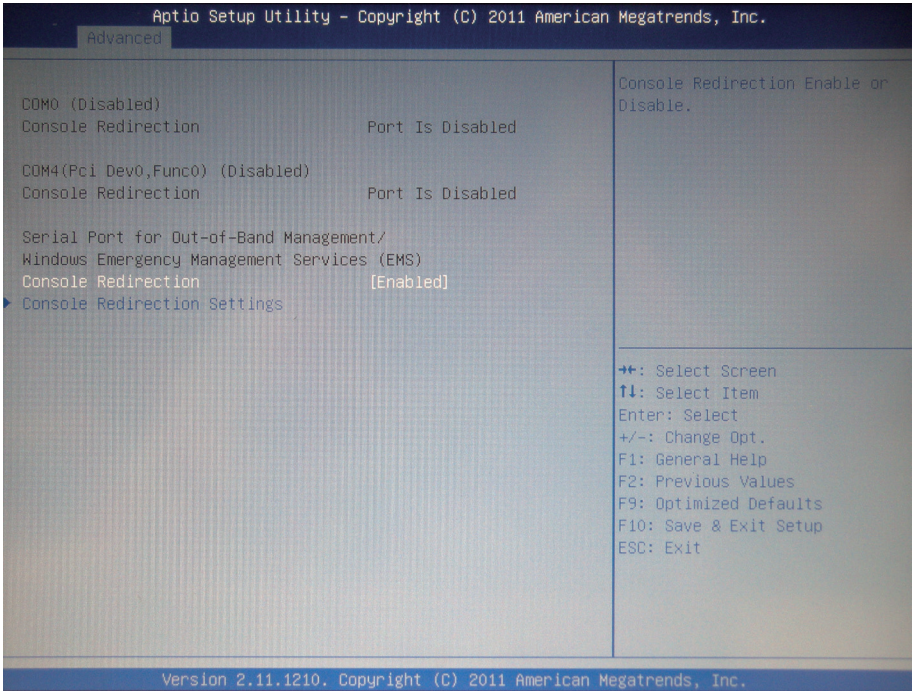
Unconfigure AMT/ME

Unconfigure AMT/ME without password.

WatchDog Timer

Enable/Disable WatchDog Timer.

3.2.11 Serial Port Console Redirection

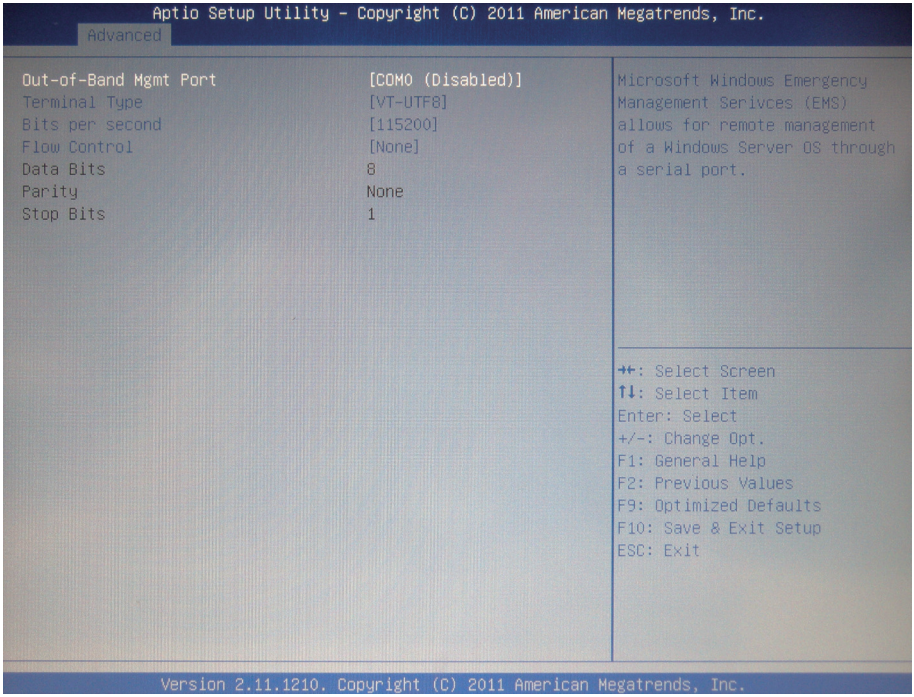


Console Redirection

Enable/Disable Console Redirection.

Console Redirection Settings

The settings specify how the host computer and the remote computer (which the user is using) will exchange data. Both computers should have the same or compatible settings.



Out-of-Band Mgmt Port

Microsoft Windows Emergency Management Services (EMS) allows for remote management of a Windows Server OS through a serial port.

Terminal Type

VT-UTF8 is the preferred terminal type for out-of-band management. The next best choice is VT100+ and then VT100. See above, in Console Redirection Settings page, for more Help with Terminal Type/Emulation.

Bits per second

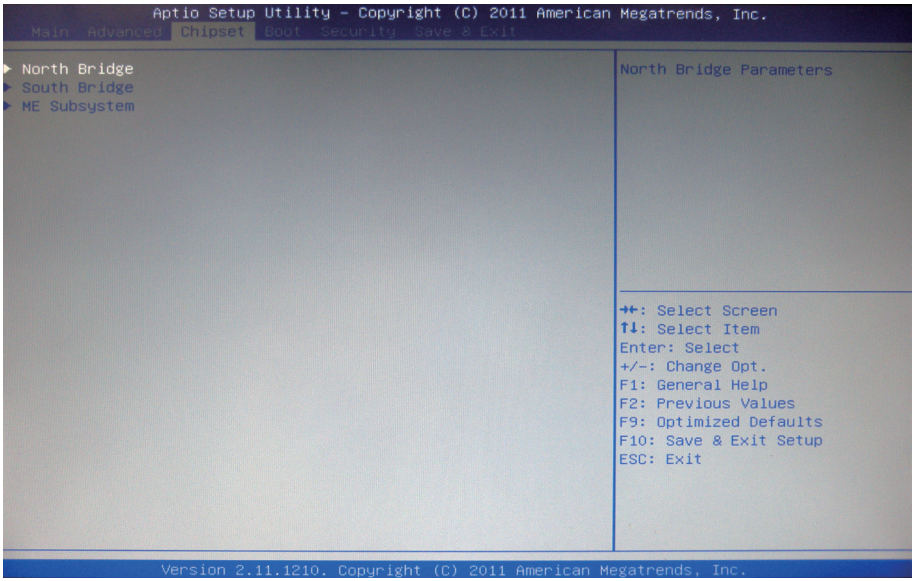
Select serial port transmission speed. The speed must be matched on the other side. Long or noisy lines may require lower speeds.

Flow Control

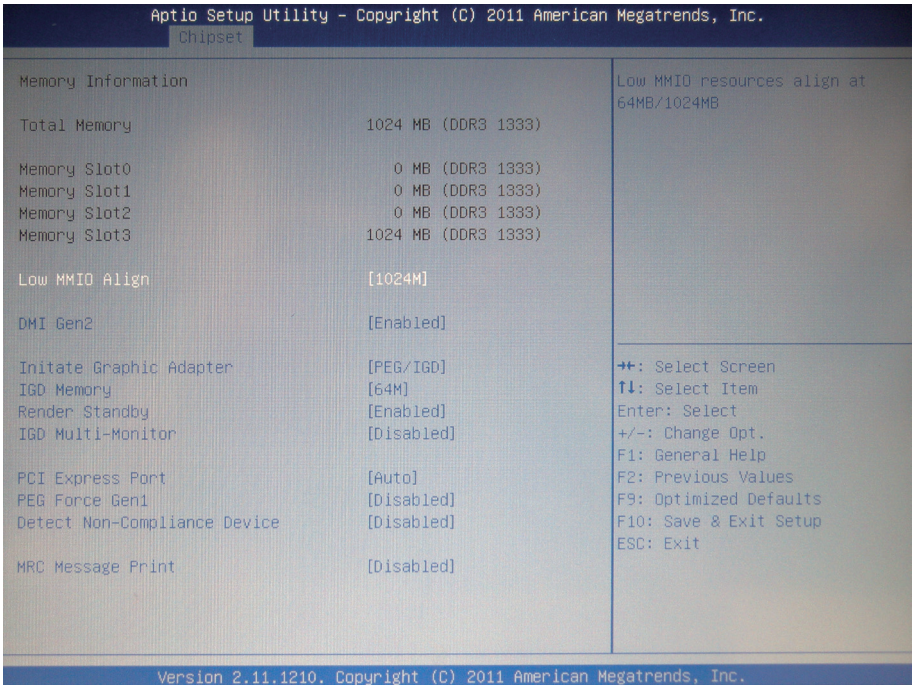
Flow Control can prevent data loss from buffer overflow. When sending data, if the receiving buffers are full, a ‘stop’ signal can be sent to stop the data flow. Once the buffers are empty, a ‘start’ signal can be sent to re-start the flow. Hardware flow control uses two wires to send start/stop signals.

3.3 Chipset

This section allows you to configure and improve your system; also, set up some system features according to your preference.



3.3.1 North Bridge



Low MMIO Align

Low MMIO resources align at 64MB/1024MB.

DMI Gen2

Enable/Disable DMI Gen2.

Initate Graphic Adapter

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

IGD Memory

Set IGD share memory size.

Render Standby

Enable/Disable Render Standby by Internet Graphics Device.

IGD Multi-Monitor

Enable/Disable IGD Multi-Monitor by Internet Graphics Device.

PCI Express Port

Set PCI Express.

PEG Force Gen1

Set PCI Express Port Force Gen1.

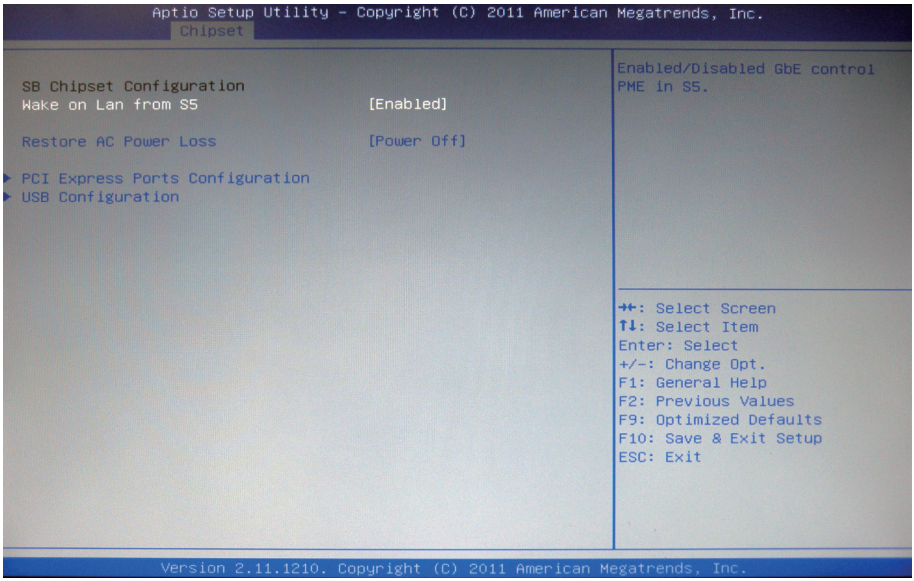
Detect Non-Compliance Device

Detect Non-Compliance PCI Express Device in PEG.

MRC Message Print

Print Memory initialize message.

3.3.2 South Bridge



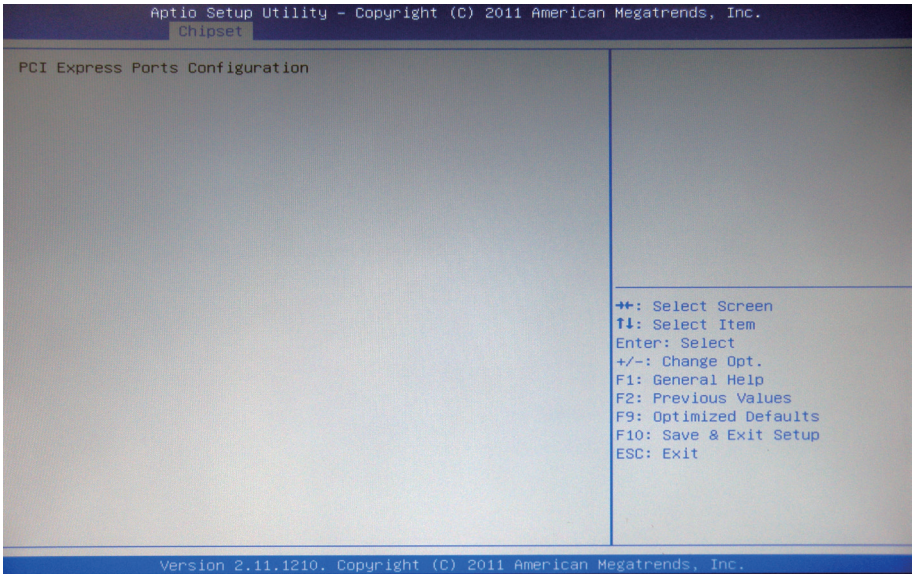
SB Chipset Configuration

Enable/Disable GbE control PME in S5.

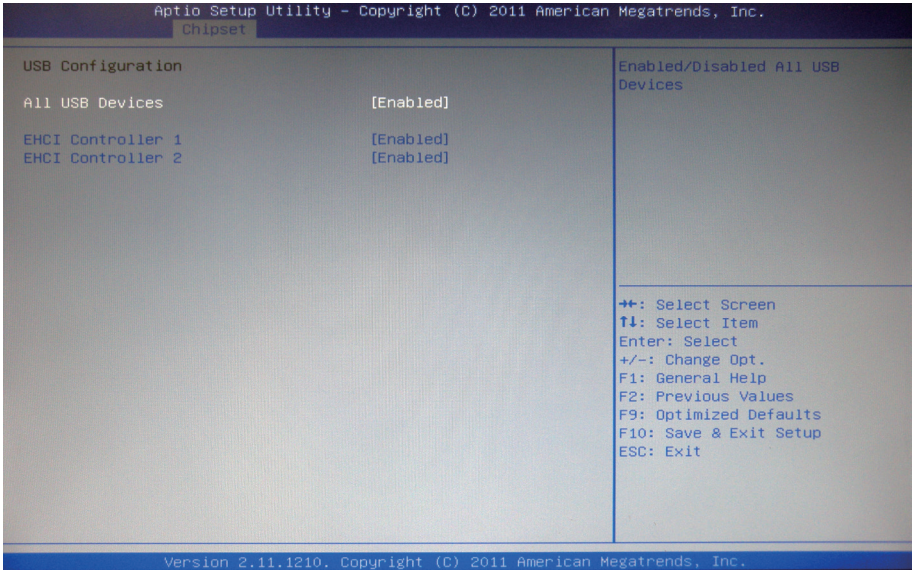
Restore AC Power Loss

Specify what state to go to when power is re-applied after a power failure (G3 state).

PCI Express Ports Configuration



USB Configuration



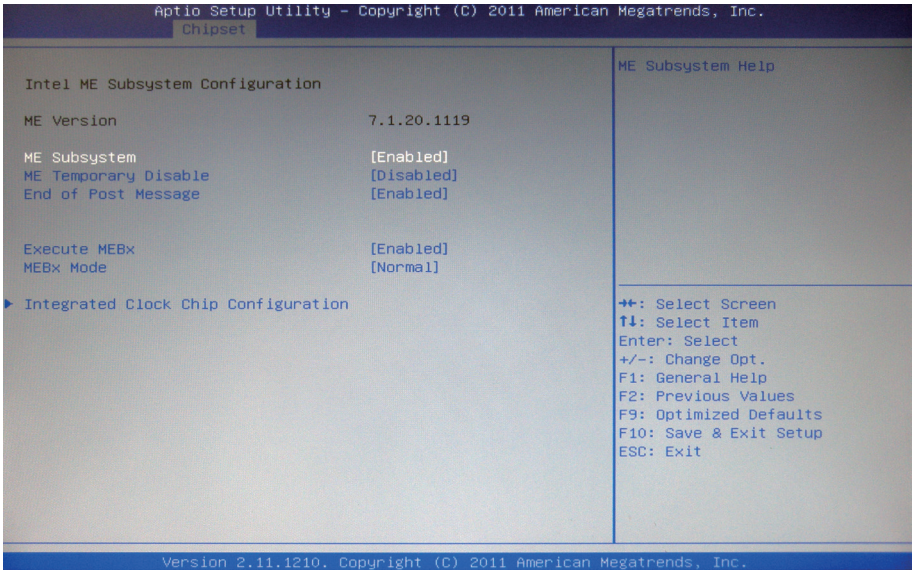
All USB Devices

Enable/Disable all USB devices.

EHCI controller 1/2

Enable/Disable USB 2.0 (EHCI) support.

3.3.3 ME Subsystem



ME Subsystem

Enable/Disable the Intel® ME subsystem.

ME Temporary Disable

Configure ME Temporary Disable.

End of Post Message

Enable/Disable the end of post message of the ME Subsystem.

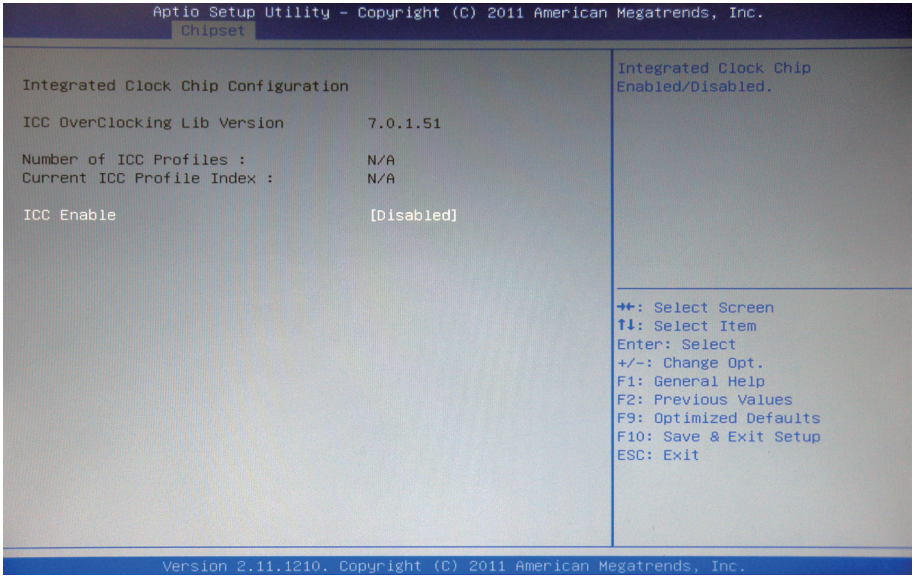
Execute MEBx

Enable/Disable the Intel® Management Engine BIOS extension (MEBx).

MEBx Mode

Enable/Disable MEBx mode.

Integrated Clock Chip Configuration

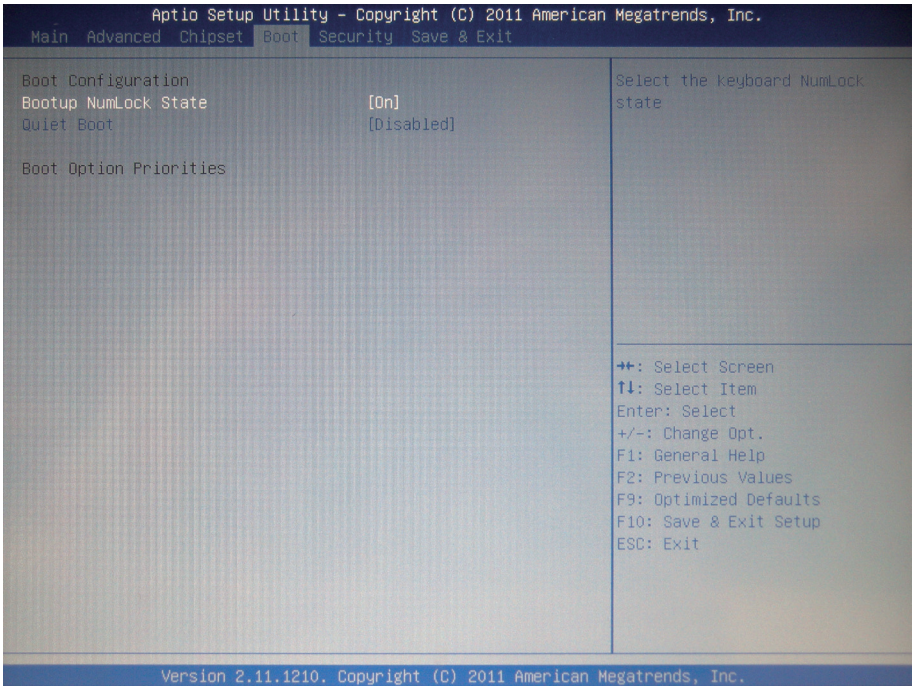


ICC Enable

Enable/Disable integrated clock chip.

3.4 Boot Settings

The Boot menu items allow you to change the system boot options.



Boot Configuration

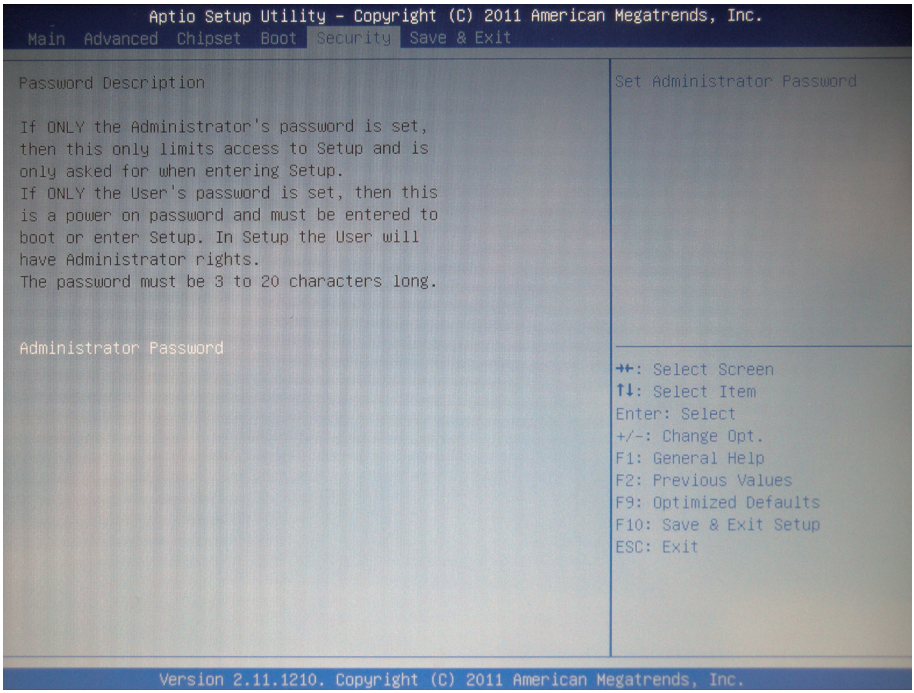
Bootup NumLock State

This setting determines whether the Num Lock key should be activated at boot up.

Quiet Boot

This allows you to select the screen display when the system boots.

3.5 Security



Administrator Password

Use the Administrator Password to set or change a administrator 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.

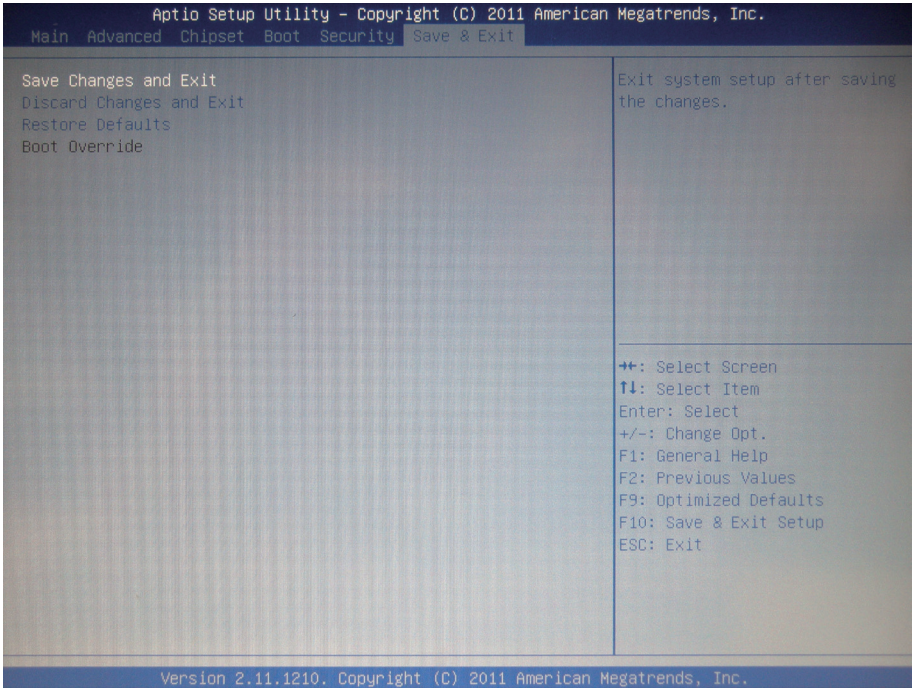
PASSWORD DISABLED

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 can 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 it’s set to “Setup”, prompting only occurs when trying to enter Setup.

3.6 Save & Exit



Save Changes and Reset

Pressing <Enter> on this item and it 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.

Restore Defaults

Restore system to factory default.
Pressing <Enter> on this item and it asks for confirmation prior to executing this command.

3.7 AMI BIOS Checkpoints

3.7.1 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)

3.7.2 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.

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	Direct memory access controller
00000000-000003AF	PCI bus
00000010-0000001F	Motherboard resources
00000020-00000021	Programmable interrupt Controller
00000022-0000003F	Motherboard resources
00000040-00000043	System timer
00000044-0000005F	Motherboard resources
00000060-00000060	Standard PS / 2 Keyboard
00000061-00000061	System speaker
00000062-00000063	Motherboard resources
00000064-00000064	Standard PS / 2 Keyboard
00000065-0000006F	Motherboard resources
00000070-00000071	System CMOS/real time clock
00000072-0000007F	Motherboard resources
00000080-00000080	Motherboard resources
00000081-00000083	Direct memory access controller
00000084-00000086	Motherboard resources
00000087-00000087	Direct memory access controller
00000088-00000088	Motherboard resources
00000089-0000008B	Direct memory access controller
0000008C-0000008E	Motherboard resources
0000008F-0000008F	Direct memory access controller
00000090-0000009F	Motherboard resources
000000A0-000000A1	Programmable interrupt Controller
000000A2-000000BF	Motherboard resources
000000C0-000000DF	Direct memory access controller

000000E0-000000EF	Motherboard resources
000000F0-000000FF	Numeric data processor
00000170-00000177	ATA Channel 1
000001F0-000001F7	ATA Channel 0
00000290-0000029F	Motherboard resources
000002E8-000002EF	Communications Port (COM4)
000002F8-000002FF	Communications Port (COM2)
00000376-00000376	ATA Channel 1
00000378-0000037F	Printer Port (LPT1)
000003B0-000003BB	Intel(R) HD Graphics Family
000003B0-000003DF	PCI bus
000003C0-000003DF	Intel(R) HD Graphics Family
000003E0-00000CF7	PCI bus
000003E8-000003EF	Communications Port (COM3)
000003F6-000003F6	ATA Channel 0
000003F8-000003FF	Communications Port (COM1)
00000400-00000453	System board
00000454-00000457	Motherboard resources
00000458-0000047F	System board
000004D0-000004D1	Motherboard resources
00000500-0000057F	System board
00000D00-0000FFFF	PCI bus
00001180-0000119F	System board
0000E000-0000EFFF	Intel(R) 6 Series/C200 Series Chipset Family PCI Express
0000F000-0000F03F	Intel(R) HD Graphics Family
0000F040-0000F05F	Intel(R) 6 Series/C200 Series Chipset Family SMBus
0000F080-0000F08F	Intel(R) 6 Series/C200 Series Chipset Family 2 port Serial
0000F090-0000F09F	Intel(R) 6 Series/C200 Series Chipset Family 2 port Serial

0000F0A0-0000F0A3	Intel(R) 6 Series/C200 Series Chipset Family 2 port
0000F0B0-0000F0B7	Intel(R) 6 Series/C200 Series Chipset Family 2 port
0000F0C0-0000F0C3	Intel(R) 6 Series/C200 Series Chipset Family 2 port
0000F0D0-0000F0D7	Intel(R) 6 Series/C200 Series Chipset Family 2 port
0000F0E0-0000F0EF	Intel(R) 6 Series/C200 Series Chipset Family 4 port Serial
0000F0F0-0000F0FF	ntel(R) 6 Series/C200 Series Chipset Family 4 port Serial
0000F140-0000F147	Intel(R) Active Management Technology -0000 SOL (COM5)
0000F150-0000F15F	Standard Dual Channel PCI IDE Controller
0000F160-0000F163	Standard Dual Channel PCI IDE Controller
0000F170-0000F177	Standard Dual Channel PCI IDE Controller
0000F180-0000F183	Standard Dual Channel PCI IDE Controller
0000F190-0000F197	Standard Dual Channel PCI IDE Controller

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 9	Microsoft ACPI-Compliant System
IRQ 16	Intel(R) HD Graphics
IRQ 16	Intel(R) Management Engine Interface
IRQ 16	Intel(R) 6 Series/C200 Series Chipset Family USB Enhanced Host Controller - 1C2D
IRQ 18	Standard Dual Channel PCI IDE Controller
IRQ 18	Intel(R) 6 Series/C200 Series Chipset Family PCI Express Root Port 3 - 1C14
IRQ 18	Intel(R) 82583V Gigabit Network Connection
IRQ 17	Intel(R) Active Management Technology - SOL (COM5)
IRQ 17	Intel(R) 6 Series/C200 Series Chipset Family PCI Express Root Port 1 - 1C10
IRQ 17	Intel(R) 6 Series/C200 Series Chipset Family PCI Express Root Port 5 - 1C18
IRQ 20	Intel(R) 82579LM Gigabit Network Connection
IRQ 22	Microsoft UAA Bus Driver for High Definition Audio
IRQ 19	Intel(R) 6 Series/C200 Series Chipset Family PCI Express Root Port 4 - 1C16
IRQ 19	Intel(R) 6 Series/C200 Series Chipset Family 2 port Serial ATA Storage Controller - 1C08
IRQ 23	Intel(R) 6 Series/C200 Series Chipset Family USB Enhanced Host Controller - 1C26
IRQ 1	Standard 101/102-Key or Microsoft Natural PS/2 Keyboard
IRQ 12	Microsoft PS/2 Mouse
IRQ 4	Communications Port (COM1)
IRQ 4	Communications Port (COM3)
IRQ 3	Communications Port (COM2)

IRQ 3	Communications Port (COM4)
IRQ 0	System timer
IRQ 8	System CMOS/real time clock
IRQ 13	Numeric data processor
IRQ 15	Secondary IDE Channel
IRQ 10	Intel(R) 6 Series/C200 Series Chipset Family SMBus Controller - 1C22

Appendix C: BIOS Memory Mapping

Address	Device Description
000A0000-000BFFFF	PCI bus
000A0000-000BFFFF	Intel(R) HD Graphics Family
000C0000-000DFFFF	PCI bus
BFA00000-FFFFFFFF	PCI bus
D0000000-DFFFFFFF	Intel(R) HD Graphics Family
E0000000-EFFFFFFF	System board
FE000000-FE3FFFFF	Intel(R) HD Graphics Family
FE400000-FE4FFFFF	Intel(R) 82583V Gigabit Network Connection
FE400000-FE5FFFFF	Intel(R) 6 Series/C200 Series Chipset Family PCI
FE540000-FE55FFFF	Intel(R) 82583V Gigabit Network Connection
FE560000-FE563FFF	Intel(R) 82583V Gigabit Network Connection
FE600000-FE61FFFF	Intel(R) 82579LM Gigabit Network Connection
FE620000-FE623FFF	High Definition Audio Controller
FE624000-FE6240FF	Intel(R) 6 Series/C200 Series Chipset Family SMBus
FE625000-FE6253FF	Intel(R) 6 Series/C200 Series Chipset Family USB
FE626000-FE6263FF	Intel(R) 6 Series/C200 Series Chipset Family USB
FE627000-FE627FFF	Intel(R) 82579LM Gigabit Network Connection

FE628000-FE628FFF	Intel(R) Active Management Technology - SOL (COM5)
FE629000-FE62900F	Intel(R) Management Engine Interface
FEC00000-FECFFFFF	System board
FED00000-FED003FF	High Precision Event Timer, HPET
FED08000-FED08FFF	System board
FED10000-FED19FFF	System board
FED1C000-FED1FFFF	System board
FED20000-FED3FFFF	System board
FED90000-FED93FFF	System board
FEE00000-FEE0FFFF	System board
FF000000-FFFFFFFF	System board

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. The WDT will not be reload by an abnormal 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 I/O ports.

Below is an assembly program example for disable and load of WDT.

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

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

void main()
{
/*-------- index port 0x4e ---------*/
            outportb(0x4e, 0x87);          /* initial IO port */
            outportb(0x4e, 0x87);           /* twice,  */

            outportb(0x4e, 0x07);           /* point to logical device */
            outportb(0x4e+1, 0x07);          /* select logical device 7 */
            outportb(0x4e, 0xf5);          /* select offset f5h */
            outportb(0x4e+1, 0x40);          /* set bit5 = 1 to clear bit5 */
            outportb(0x4e, 0xf0);          /* select offset f0h */
            outportb(0x4e+1, 0x81);          /* set bit7 =1 to enable WDTRST# */
            outportb(0x4e, 0xf6);          /* select offset f6h */
            outportb(0x4e+1, 0x05);          /* update offset f6h to 0ah :10sec */
            outportb(0x4e, 0xf5);          /* select offset f5h */
            outportb(0x4e+1, 0x20);          /* set bit5 = 1 enable watch dog time */

            outportb(0x4e, 0xAA);           /* stop program F71869E, Exit */
/*-------- index port 0x2e ---------*/
            outportb(0x2e, 0x87);          /* initial IO port */
            outportb(0x2e, 0x87);           /* twice,  */
```

```
        outportb(0x2e, 0x07);          /* point to logical device */
        outportb(0x2e+1, 0x07);          /* select logical device 7 */
        outportb(0x2e, 0xf5);         /* select offset f5h */
        outportb(0x2e+1, 0x40);          /* set bit5 = 1 to clear bit5 */
        outportb(0x2e, 0xf0);         /* select offset f0h */
        outportb(0x2e+1, 0x81);          /* set bit7 =1 to enable WDTRST# */
        outportb(0x2e, 0xf6);         /* select offset f6h */
        outportb(0x2e+1, 0x05);          /* update offset f6h to 0ah :10sec */
        outportb(0x2e, 0xf5);         /* select offset f5h */
        outportb(0x2e+1, 0x20);          /* set bit5 = 1 enable watch dog time */

        outportb(0x2e, 0xAA);          /* stop program F71869E, Exit */
}
```