AXIOMTEK

MANO870 Series

Intel® QM77 with Intel Core™ i7 / i5 / i3 / Pentium® / Celeron® Mobile CPU Mini ITX Motherboard

User's Manual

RoHS

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ESD Precautions

Computer boards have integrated circuits sensitive to static electricity. To prevent chipsets from electrostatic discharge damage, please take care of the following jobs with precautions:

- Do not remove boards or integrated circuits from their anti-static packaging until you are ready to install them.
- Before holding the board or integrated circuit, touch an unpainted portion of the system unit chassis for a few seconds. It discharges static electricity from your body.
- Wear a wrist-grounding strap, available from most electronic component stores, when handling boards and components.

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Conventions Used in This Manual

To make sure that you perform certain tasks properly, take note of the following symbols used throughout this manual.

Warning

Information to prevent injury to yourself when trying to complete a task.

Caution

Information to prevent damage to the components when trying to complete a task.

Important

Instructions that you MUST follow to complete a task.

Note

Tips and additional information to help you complete a task.

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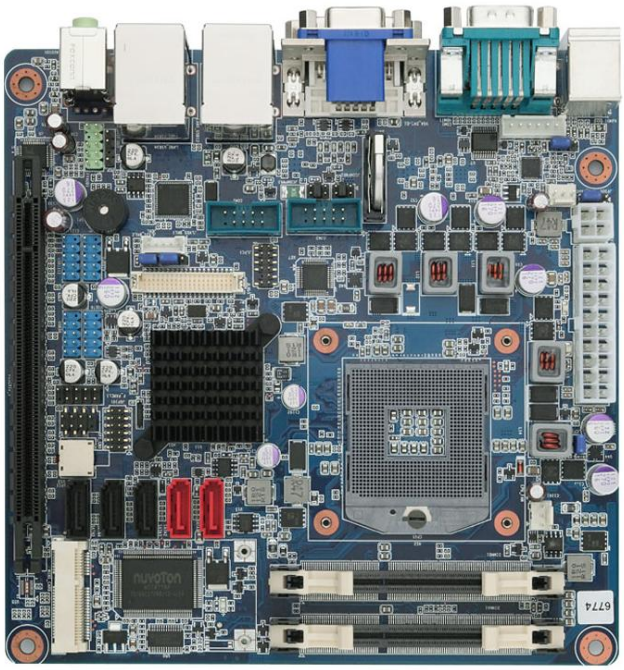
Chapter 1
Introduction



The MANO870 supports latest Intel rPGA998 CPU-socket interface processor, the 3rd Generation Intel® Core i7 / i5 / i3 / Pentium® / Celeron® mobile processors which are built on 22 nm technologies to provide smart performance and responsiveness on executing tasks. It combines the CPU and GPU to offer fantastic HD media and graphics, especially on 3D gaming experience. Doubles the bandwidth of your system memory up to 21GB/s and pumps up the system performance at lower power.

DMI (Direct Media Interface) architecture connects between the processor and chipset at 5.0Gb/s which twice the speed of previous version. The exceptionally increased interconnect bit rate from 2.5Gb/s up to 5.0Gb/s would effectively eliminates the bottle neck of the system performance and brings the most terrific computing experience from the present to the future.

There are 2 of 5 SATA ports running at speed up to 6.0Gb/s, and each port can connect with any other SATA 3.0Gb/s devices for backward compatibility. It supports RAID 0 (Striped disk array), RAID 1 (Mirroring disk array), RAID 5 (Block Interleaved Distributed Parity) and RAID 10 (A Stripe of Mirrors).

The MANO870 also provides users the performance and protection. The integrated 5.1-channel HD Audio CODEC delivers advanced multi-channel audio and brings you the experience of home theater-quality sound. Delivers transfer speed ten times faster than conventional Gigabit Ethernet connections, supporting a high transfer rate up to Gigabit/s. Gigabit LAN is the networking standards for the future and is ideal for handling large amount of data such as video, audio, and voice. Supports TPM 1.2 with pin header.

1.1 Features

- rPGA988 socket G2 Intel® 3rd Generation Intel® Core™ i7 / i5 / i3 / Pentium® / Celeron® processors (Ivy Bridge)
- 2 DDR3 1333/1600MHz up to 16GB
- PCI-Express x16 Gen. 3 supported
- 4 USB 3.0 supported
- 2 SATA-600 supported
- CFast™ supported
- iAMT 8.0 supported
- TPM 1.2 supported
- Triple view display

1.2 Specifications

- **CPU**
  - Intel® Core™ i7 processor.
  - Intel® Core™ i5 processor.
  - Intel® Core™ i3 processor.
  - Intel® Pentium® processor.
  - Intel® Celeron® processor.

- **System Chipset**
  - Intel® QM77.

- **DRAM Transfer Rate**
  - 1333/1600MHz.

- **BIOS**
  - AMI 64Mb SPI ROM.

- **System Memory**
  - Two 204-pin unbuffered DDR3 SO-DIMM sockets.
  - Maximum up to 16GB DDR3 1333/1600MHz memory with two SO-DIMMs.

- **Onboard Multi I/O**
  - Controller: Nuvoton NCT6776F.
  - Serial ports: Three RS-232 ports (COM1/2/3) with 5V/12V power.
  - One PS/2 keyboard/mouse.

- **Serial ATA**
  - Supports SATA 3.0 and SATA 2.0.
  - Two SATA 3.0 ports (6Gb/s performance) with SATA RAID 0/1/5/10 and three SATA 2.0 ports (3Gb/s performance).

- **CFast™ Socket**
  - One CFast™ Socket.

- **USB Interface**
  - Four USB 3.0 ports.
  - Eight USB 2.0 ports.

- **Display**
  - One HDMI.
  - One DVI-D
  - One VGA
  - One LVDS.

- **Ethernet**
  - LAN1 – 10/100/1000Mbps, Intel® 82579LM supports WOL, PXE.
  - LAN2 – 10/100/1000Mbps, Intel® 82583V supports WOL, PXE.

- **Audio**
  - HD audio compliant (with MIC-in/line-out) via Realtek ALC892.

- **Expansion Interface**
  - One PCI-Express x16 slot.
  - One PCI-Express Mini Card

- **Hardware Monitoring**
  - Detect CPU/system temperature, voltage and fan speed.

- **Watchdog Timer**
  - 1~255 seconds; up to 256 levels.

- **Power Management**
  - ACPI (Advanced Configuration and Power Interface).

- **Form Factor**
  - Mini ITX form factor.

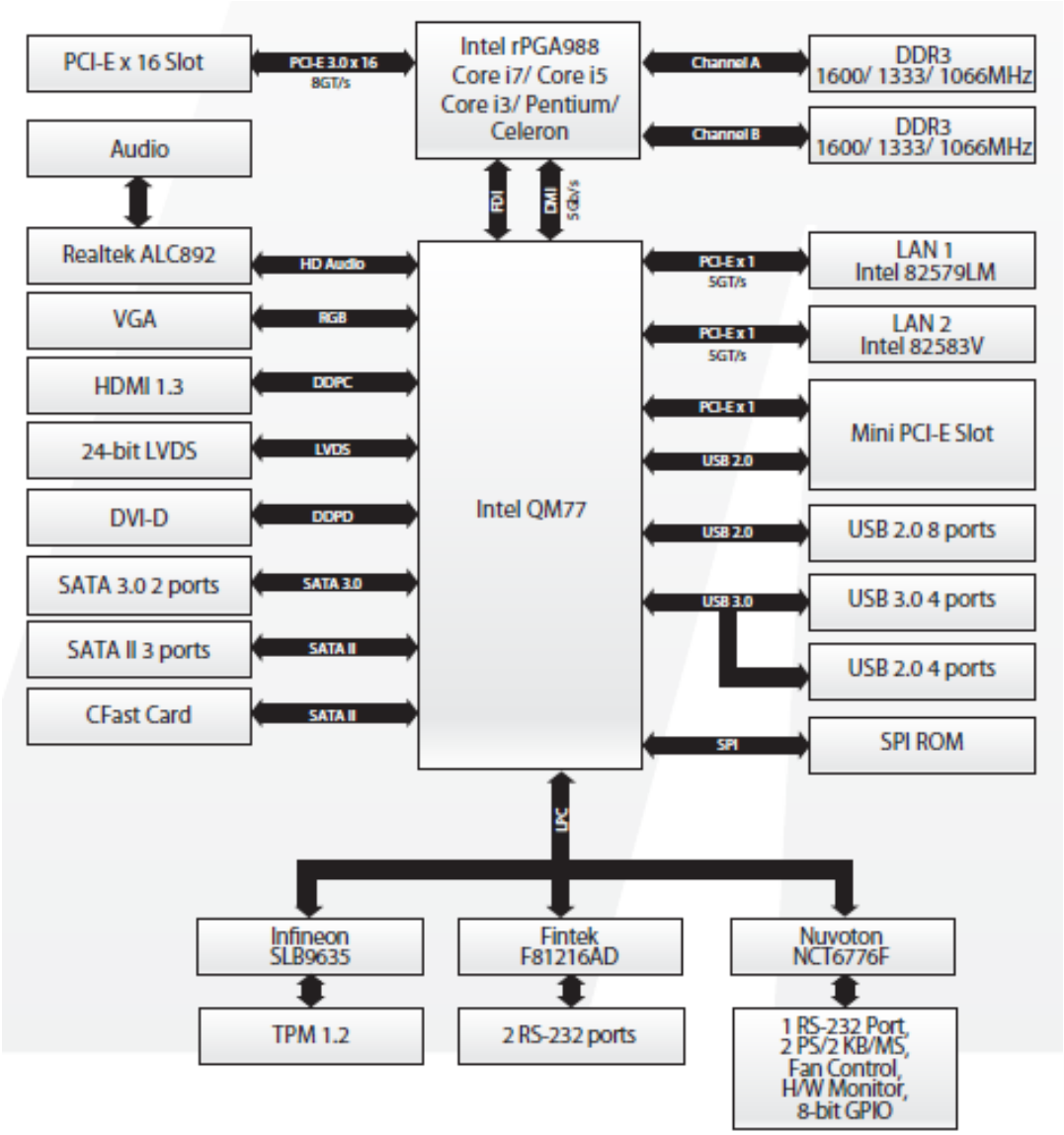
Note

All specifications and images are subject to change without notice.

1.3 Utilities Supported

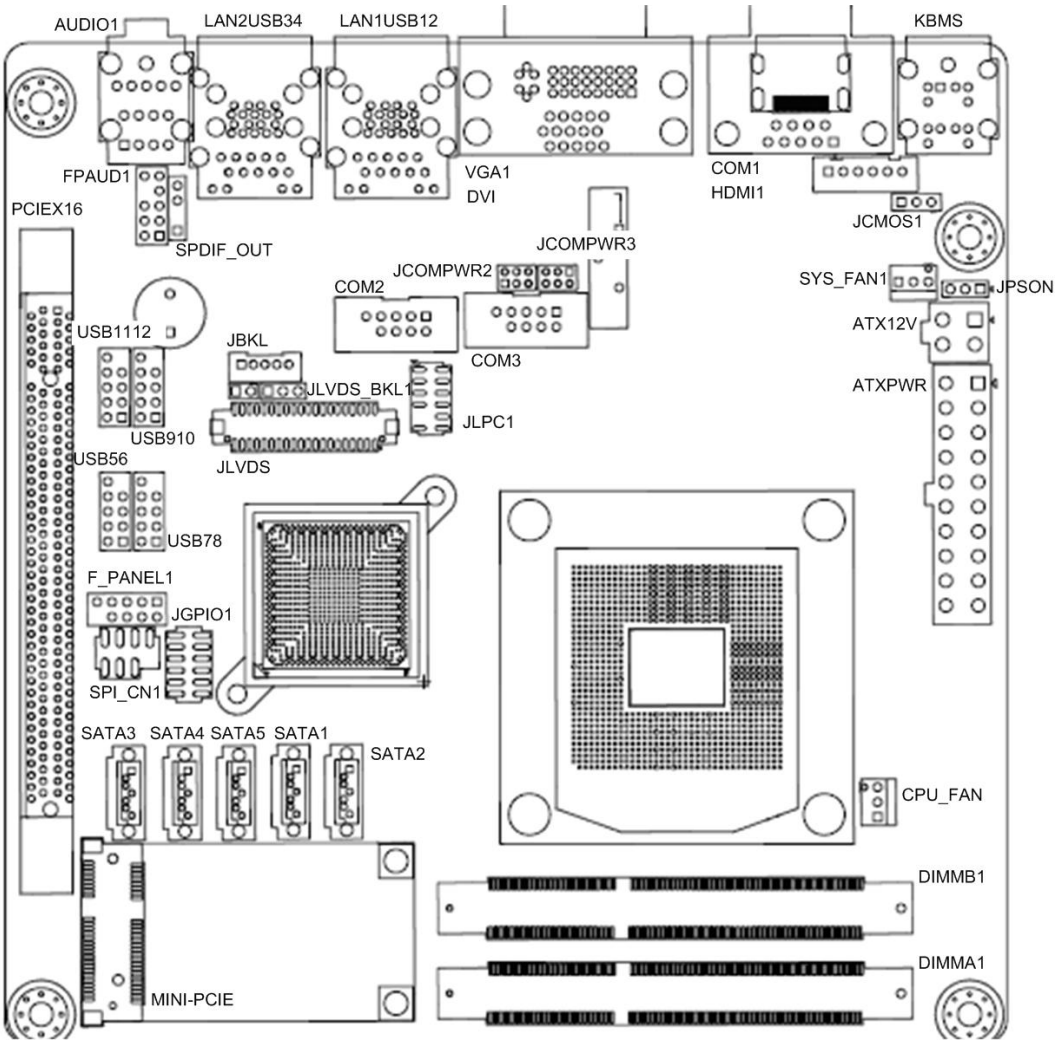
- Chipset driver
- Ethernet driver
- Graphics driver
- Audio driver
- USB 3.0 driver
- TPM driver
- ME driver
- RAID driver

1.4 Block Diagram



Chapter 2
Board and Pin Assignments

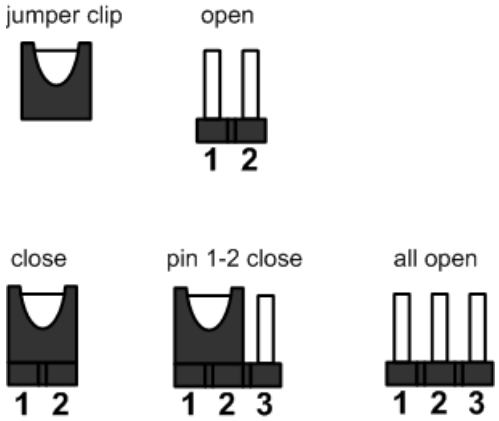
2.1 Board Layout



2.2 Rear Panel I/O

2.3 Jumper Settings

Jumper is a small component consisting of jumper clip and jumper pins. Install jumper clip on 2 jumper pins to close. And remove jumper clip from 2 jumper pins to open. The following illustration shows how to set up jumper.



Before applying power to MANO870 Series, please make sure all of the jumpers are in factory default position. Below you can find a summary table and onboard default settings.

Jumper	Description	Setting
JCMOS1	Clear CMOS Default: Normal Operation	1-2 close
JPSON	AT/ATX Power Mode Selection Default: ATX Mode	2-3 close
JLVDS_BKL1	LVDS Backlight Power Selection Default: +5V	1-2 close
JCOMPWR2	COM2 RI/+5V/+12V Selection Default: RI	3-4 close
JCOMPWR3	COM3 RI/+5V/+12V Selection Default: RI	3-4 close

2.3.1 Clear CMOS (JCMOS1)

This jumper allows you to clear the Real Time Clock (RTC) RAM in CMOS. You can clear the CMOS memory of date, time, and system setup parameters by erasing the CMOS RTC RAM data. The onboard button cell battery powers the RAM data in CMOS, which includes system setup information such as system passwords.

To erase the RTC RAM:

1. Turn OFF the computer and unplug the power cord.
2. Remove the onboard battery.
3. Move the jumper cap from pins 1-2 (default) to pins 2-3. Keep the cap on pins 2-3 for about 5~10 seconds, then move the cap back to pins 1-2.
4. Re-install the battery.
5. Plug the power cord and turn ON the computer.
6. Hold down the <Del> key during the boot process and enter BIOS setup to re-enter data.

Caution

Except when clearing the RTC RAM, never remove the cap on this jumper default position. Removing the cap will cause system boot failure!

Function	Setting
Normal operation (Default)	1-2 close
Clear CMOS	2-3 close

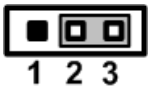
Note

You do not need to clear the RTC when the system hangs due to overclocking. For system failure due to overclocking, use the C.P.R. (CPU Parameter Recall) feature. Shut down and reboot the system so the BIOS can automatically reset parameter settings to default values.

2.3.2 AT/ATX Power Mode Selection (JPSON)

This jumper allows you to select AT mode or ATX mode.

Function	Setting
AT mode	1-2 close
ATX mode (Default)	2-3 close



2.3.3 LVDS Backlight Power Selection (JLVDS_BKL1)

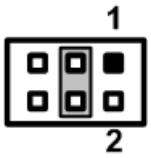
This jumper allows you to select LVDS backlight power.

Function	Setting
+5V (Default)	1-2 close
+3.3V	2-3 close

2.3.4 COM2 RI/+5V/+12V Selection (JCOMPWR2)

This jumper allows you to select the power mode of COM port 2.

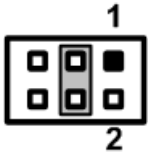
Function	Setting
+12V	1-2 close
RI (Default)	3-4 close
+5V	5-6 close



2.3.5 COM3 RI/+5V/+12V Selection (JCOMPWR3)

This jumper allows you to select the power mode of COM port 3.

Function	Setting
+12V	1-2 close
RI (Default)	3-4 close
+5V	5-6 close

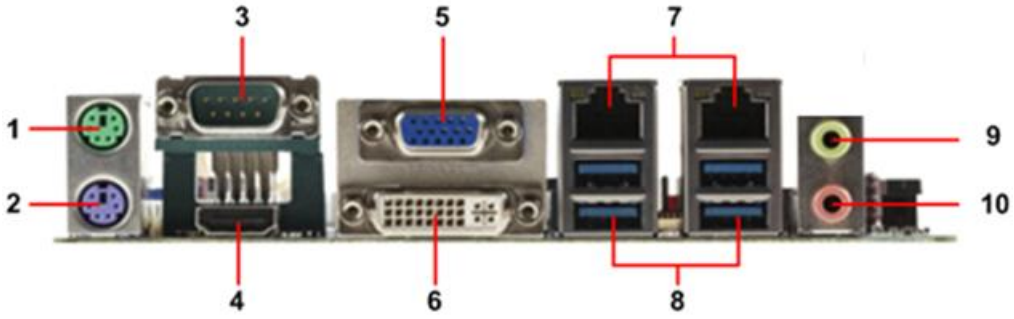


2.4 Connectors

Signals go to other parts of the system through connectors. Loose or improper connection might cause problems, please make sure all connectors are properly and firmly connected. Here is a summary table which shows all connectors on the hardware.

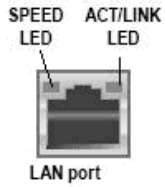
Connector	Description
KBMS	PS/2 Keyboard and Mouse
COM1	COM1 Connector
DVI	DVI Port
VGA1	VGA Port
HDMI1	HDMI Port
LAN1USB12	LAN1, USB 3.0 Port 1 and 2 Connector
LAN2USB34	LAN2, USB 3.0 Port 3 and 4 Connector
AUDIO1	Audio Jack
DIMMA1	204-pin DDR3 SO-DIMM Slot A1
DIMMB1	204-pin DDR3 SO-DIMM Slot B1
PCIEX16	PCI-Express x16 Slot
MINI-PCIE	PCI-Express Mini Card Connector
CFAST	CFast™ Socket (rear side)
CPU_FAN	CPU Fan Connector
SYS_FAN1	System Fan Connector
COM2~3	COM2 and COM3 Connectors
JGPIO1	GPIO Connector
F_PANEL1	Front Panel Connector
ATXPWR	20-pin ATX Power Connector
FPAUD1	Internal Audio Connector
JLVDS	LVDS Connector
JBKL	LCD Inverter Connector
SPDIF_OUT	S/PDIF Connector
SPI_CN1	SPI Connector
JLPC1	LPC1 Connector
SATA1~5	Serial ATA Connectors
ATX12V	4-pin ATX Power Connector
USB56, USB78, USB910, USB1112	USB Connectors

2.4.1 Rear Panel Connectors



1. **PS/2 mouse port (green).** This port is for a PS/2 mouse.
2. **PS/2 keyboard port (purple).** This port is for a PS/2 keyboard.
3. **Serial connector.** This 9-pin COM1 port is for serial devices.
4. **HDMI port.** This 19-pin HDMI 1.3 port connects to a HDMI monitor.
5. **VGA port.** This 15-pin VGA port connects to a VGA monitor.
6. **DVI-D port.** This 29-pin DVI-D port is for a DVI monitor.
7. **LAN (RJ-45) port.** This port allows Gigabit connection to a Local Area Network (LAN) through a network hub. Refer to the table below for the LAN port LED indications.

SPEED LED		ACT / LINK LED	
Status	**Description**	**Status**	**Description**
OFF	10Mbps connection	OFF	No link
Orange	100Mbps connection	Green	Link
Green	1Gbps connection	Blinking	Data activity



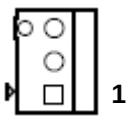
8. **USB 3.0 ports 1~4.** These four 4-pin Universal Serial Bus (USB) ports are available for connecting USB 3.0 devices.
9. **Line-out port (Green).** This port connects a headphone or a speaker. In 4-channel, 6-channel, and 8-channel configuration, the function of this port becomes front speaker-out.
10. **Microphone port (pink).** This port connects a microphone.

2.4.2 FAN Connectors (CPU_FAN and SYS_FAN1)

The fan connectors support cooling fans of 280mA (3.36 W max.) at 4800rpm or a total of 1A~2.22A (26.64W max.) at +12V. Connect the fan cables to the fan connectors on the motherboard, making sure that the black wire of each cable matches the ground pin of the connector.

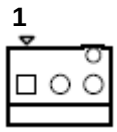
CPU fan interface is available through CPU_FAN, see table below.

Pin	Signal
1	GND
2	CPUFAN1_VCC(PWM)
3	CPUFAN1_IO



System fan interface is available through SYS_FAN1, see table below.

Pin	Signal
1	GND
2	SYSFAN1_VCC(PWM)
3	SYSFAN1_IO



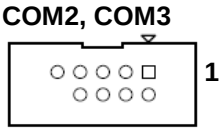
Caution

Do not forget to connect the fan cables to the fan connectors. Insufficient air flow inside the system may damage the motherboard components. These are not jumpers! DO NOT place jumper caps on the fan connectors.

2.4.3 COM Connectors (COM2 and COM3)

These connectors are for serial (COM) ports. Connect the serial port module cable to this connector, then install the module to a slot opening at the back of the system chassis.

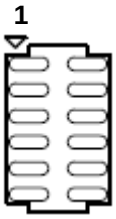
Pin	Signal
1	DCD
2	RXD
3	TXD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI/PWR



2.4.4 GPIO Connector (JGPIO1)

This connector is for GPIO function.

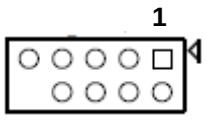
Pin	Signal
1	SIO_GPIO0
2	SIO_GPIO4
3	SIO_GPIO1
4	SIO_GPIO5
5	SIO_GPIO2
6	SIO_GPIO6
7	SIO_GPIO3
8	SIO_GPIO7
9	SMB_CLK_RESUME
10	SMB_DAT_RESUME
11	GND
12	VCC GPIO



2.4.5 Front Panel Connector (F_PANEL1)

This connector is for a chassis-mounted front panel I/O module that supports power on/reset switch and HDD/power LED indicate.

Pin	Signal
1	HDDLED+
2	POWERLED+-
3	HDDLED-
4	POWERLED-
5	GND
6	PWSWITCH
7	RESET
8	GND
9	NC



ATX Power Button/Soft-off Button (Pin 6-8 PWRBT)
This 2-pin connector is for the system power button. Pressing the power button turns the system on or puts the system in sleep or soft-off mode depending on the BIOS settings. Pressing the power switch and holding it for more than four seconds while the system is ON turns the system OFF.

Reset Button (Pin 5-7 SYS_RST)
This 2-pin connector is for the chassis-mounted reset button for system reboot without turning off the system power.

Power LED (Pin 2-4 PWRLED)
This 2-pin connector is for the system power LED. Connect the chassis power LED cable to this connector. The system power LED lights up when you turn on the system power, and blinks when the system is in sleep mode.

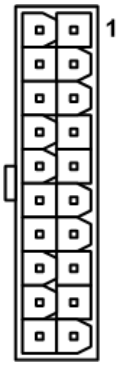
Hard Disk Drive Activity LED (Pin 1-3 HDLED)
This 2-pin connector is for the HDD Activity LED. Connect the HDD Activity LED cable to this connector. The IDE LED lights up or flashes when data is read from or written to the HDD.

2.4.6 ATX Power Connectors (ATXPWR and ATX12V)

Both connectors are for ATX power supply plugs. The power supply plugs are designed to fit these connectors in only one orientation. Find the proper orientation and push down firmly until the connectors completely fit.

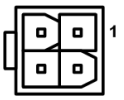
Pin	Signal	Pin	Signal
1	+3V	13	+3V
2	+3V	14	-12V
3	GND	15	GND
4	+5V	16	PS_ON
5	GND	17	GND
6	+5V	18	GND
7	GND	19	GND
8	Power OK	20	-5V
9	+5VSB	21	+5V
10	+12V	24	+5V

ATXPWR



Pin	Signal	Pin	Signal
1	GND	3	+12V
2	GND	4	+12V

ATX12V



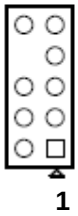
Note

- ***Use of a PSU with a higher power output is recommended when configuring a system with more power-consuming devices. The system may become unstable or may not boot up if the power is inadequate.***
- ***Make sure that your power supply unit (PSU) can provide at least the minimum power required by your system.***

2.4.7 Internal Audio Connector (FPAUD1)

This connector is for a chassis-mounted front panel audio I/O module that supports either HD Audio or legacy AC '97 (optional) audio standard. Connect one end of the front panel audio I/O module cable to this connector.

Pin	Signal
1	MIC2_L
2	GND
3	MIC2_R
4	PRESENSE
5	LIN2_R
6	MIC2_JD
7	FIO_SENSE
8	NC
9	LIN2_L
10	LINE_JD

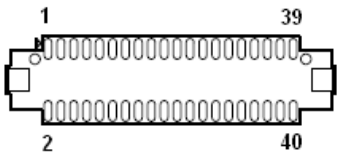


Important ***For motherboards with the optional HD Audio feature, we recommend that you connect a high-definition front panel audio module to this connector to avail of the motherboard's high‑definition audio capability.***

2.4.8 LVDS Connector (JLVDS)

The connector is for 24-bit dual channel LVDS panel.

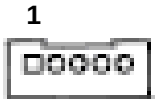
Pin	Signal	Pin	Signal
1	VDD(+3.3V)	2	VDD(+5V)
3	VDD(+3.3V)	4	VDD(+5V)
5	I2C_CLK	6	I2C_DATA
7	GND	8	GND
9	LVDS_A1+	10	LVDS_A0+
11	LVDS_A1-	12	LVDS_A0-
13	GND	14	GND
15	LVDS_A3+	16	LVDS_A2+
17	LVDS_A3-	18	LVDS_A2-
19	GND	20	GND
21	LVDS_B1+	22	LVDS_B0+
23	LVDS_B1-	24	LVDS_B0-
25	GND	26	GND
27	LVDS_B3+	28	LVDS_B2+
29	LVDS_B3-	30	LVDS_B2-
31	GND	32	GND
33	LVDS_B_CK+	34	LVDS_A_CK+
35	LVDS_B_CK-	36	LVDS_A_CK-
37	GND	38	GND
39	VDD(+12V)	40	VDD(+12V)



2.4.9 LCD Inverter Connector (JBKL)

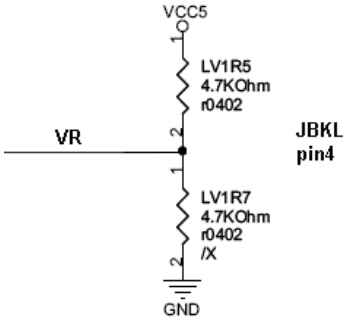
The connector is for the control of internal LVDS brightness.

Pin	Signal
1	+12V
2	GND
3	ENBKL
4	VR
5	+5V



Signal Description:

- **VR**
  For inverter with adjustable backlight function, it is possible to control the LCD brightness through the VR signal.



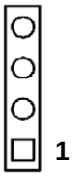
Vadj = 0.75V ~ 4.25V

(Recommended: 4.7KΩ, >1/16W)

- **ENBKL**
  LCD backlight ON/OFF control signal

2.4.10 S/PDIF Connector (SPDIF_OUT)

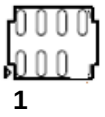
Pin	Signal
1	5V
2	NA
3	SPDIF-OUT
4	GND



2.4.11 SPI Connector (SPI_CN1)

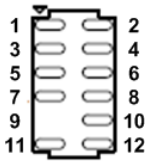
Is a point-to-point interface standard, which allows network equipment designers to develop an array of next-generation multi-service switches and routers to support multi-service traffic with aggregate bandwidths up to OC-192 (10Gb/s) and beyond, enabling them to dramatically increase system performance.

Pin	Signal
1	+3V
2	GND
3	SPI_CS#
4	SPI_CLK
5	SPI_MISO
6	SPI_MOSI
7	NC



2.4.12 LPC Connector (JLPC1)

Pin	Signal
1	NC
2	+3.3
3	LPC_AD3
4	PRST_SIO#
5	LPC_AD1
6	LPC_AD2
7	LPC_FRAME#
8	LPC_AD0
9	
10	GND
11	CLK33M_LPC
12	GND

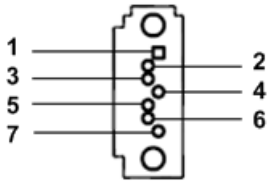


2.4.13 Serial ATA Connectors (SATA1~SATA5)

These connectors (SATA1 and SATA2) support SATA 3.0 and are for the Serial ATA signal cables for Serial ATA hard disk drives.

Pin	Signal
1	GND
2	SATA_TXP2
3	SATA_TXN2
4	GND
5	SATA_RXN2
6	SATA_RXP2
7	GND

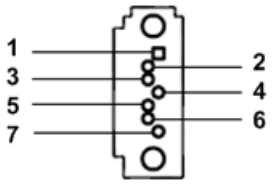
SATA1, SATA2



These connectors (SATA3, SATA4 and SATA5) support SATA 2.0 and are for the Serial ATA signal cables for Serial ATA hard disk drives.

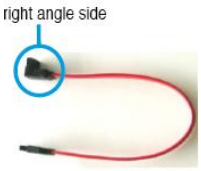
Pin	Signal
1	GND
2	SATA_TXP2
3	SATA_TXN2
4	GND
5	SATA_RXN2
6	SATA_RXP2
7	GND

SATA3, SATA4, SATA5



Note

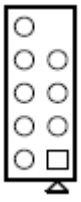
Connect the right-angle side of SATA signal cable to SATA device. Or you may connect the right-angle side of SATA cable to the onboard SATA port to avoid mechanical conflict with large graphics cards.



2.4.14 USB Connectors (USB56, USB78, USB910 and USN1112)

These connectors are for USB 2.0 ports. Connect the optional USB module cable to any of these connectors, then install the module to a slot opening at the back of the system chassis. These USB connectors comply with USB 2.0 specification that supports up to 480 Mbps connection speed.

Pin	Signal	Pin	Signal
1	USB+5V	2	USB+5V
3	USB-	4	USB-
5	USB+	6	USB+
7	GND	8	GND
9	NC		



USB56, USB78, USB910, USB1112

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Chapter 3
Hardware Installation

Take note of the following precautions before you install motherboard components or change any motherboard settings.

Caution

- ***Unplug the power cord from the wall socket before touching any component.***
- ***Use a grounded wrist strap or touch a safely grounded object or a metal object, such as the power supply case, before handling components to avoid damaging them due to static electricity.***
- ***Hold components by the edges to avoid touching the ICs on them.***
- ***Whenever you uninstall any component, place it on a grounded anti-static pad or in the bag that came with the component.***
- ***Before you install or remove any component, ensure that the ATX power supply is switched off or the power cord is detached from the power supply. Failure to do so may cause severe damage to the motherboard, peripherals, and/or components.***

3.1 Motherboard Overview

Before you install the motherboard, study the configuration of your chassis to ensure that the motherboard fits into it. Refer to the chassis documentation before installing the motherboard.

Warning

Make sure to unplug the power cord before installing or removing the motherboard. Failure to do so can cause you physical injury and damage motherboard components.

3.1.1 Placement Direction

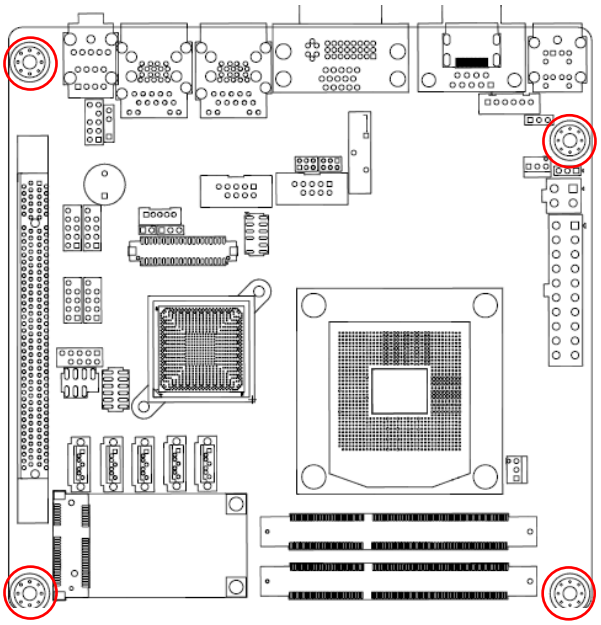
When installing the motherboard, make sure that you place it into the chassis in the correct orientation. The edge with external ports goes to the rear part of the chassis as indicated in the image below.

3.1.2 Screw Holes

Place four (4) screws into the holes indicated by circles to secure the motherboard to the chassis.

Caution

Do not over tighten the screws! Doing so can damage the motherboard.



Place this side towards the rear of the chassis.

3.2 Central Processing Unit (CPU)

The motherboard comes with a surface mount FCPGA988 socket designed for the Intel® Core™ i7/ i5/ i3 processor in the 988-land package.

Important

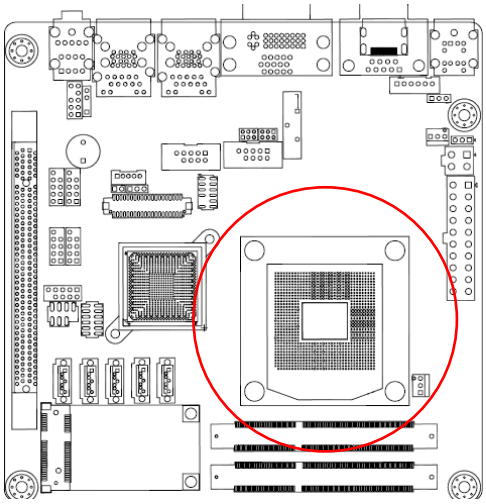
- ***Your boxed Intel® Core™ i7/ i5/ i3 mobile processor package should come with installation instructions for the CPU, fan and heatsink assembly. If the instructions in this section do not match the CPU documentation, follow the latter.***
- ***Upon purchase of the motherboard, make sure that the PnP cap is on the socket and the socket pins are not bent. Contact your retailer immediately if the PnP cap is missing, or if you see any damage to the PnP cap/socket pins/motherboard components. Axiomtek will shoulder the cost of repair only if the damage is shipment/transit-related.***
- ***Keep the cap after installing the motherboard. Axiomtek will process Return Merchandise Authorization (RMA) requests only if the motherboard comes with the cap on the FCPGA988 socket.***
- ***The product warranty does not cover damage to the socket pins resulting from incorrect CPU installation/removal, or misplacement/loss/incorrect removal of the PnP cap.***
- ***Install the CPU fan and heatsink assembly before you install motherboard to the chassis.***

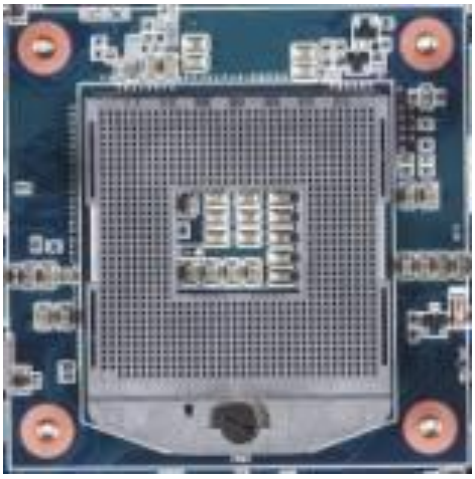
Caution

If you purchased a separate CPU heatsink and fan assembly, make sure that you have properly applied Thermal Interface Material to the CPU heatsink or CPU before you install the heatsink and fan assembly.

3.2.1 Installing the CPU

1. Locate the CPU socket on the motherboard.

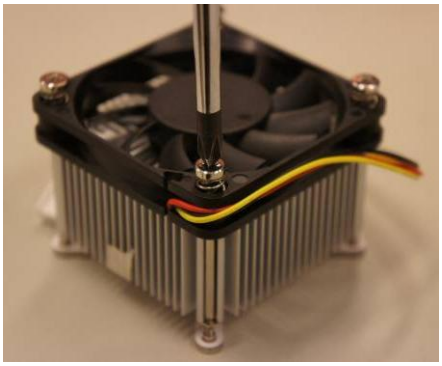


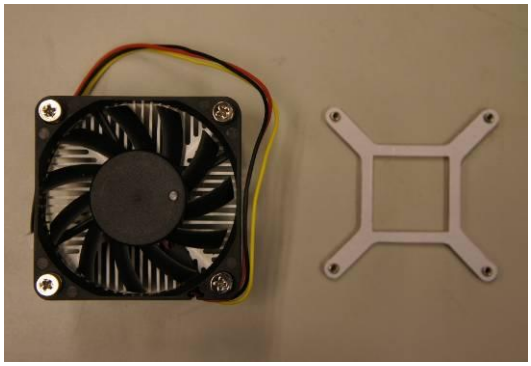


Caution

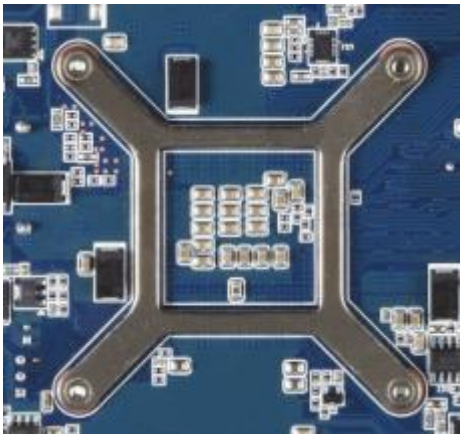
Before installing the CPU, make sure that the socket box is facing towards you and the load lever is on your left.

2. Separate CPU cooler and its base first with screw driver.

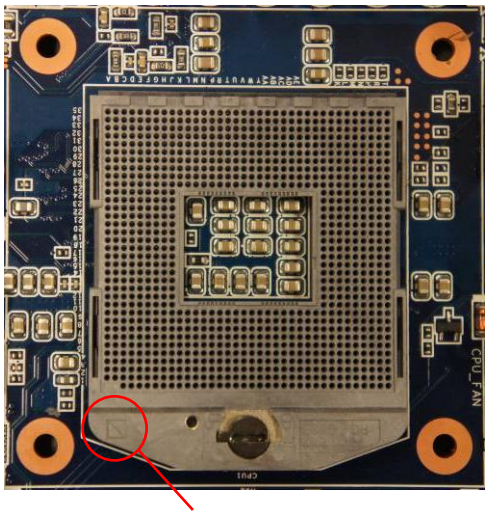




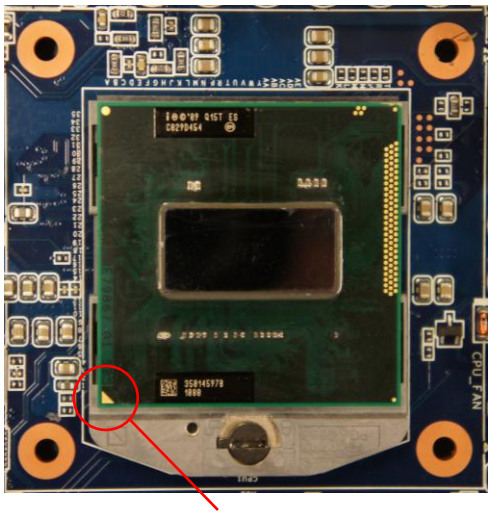
3. Assemble the CPU fan retention module.



4. Position the CPU over the socket, making sure that the gold triangle is the same side as CPU socket triangle.

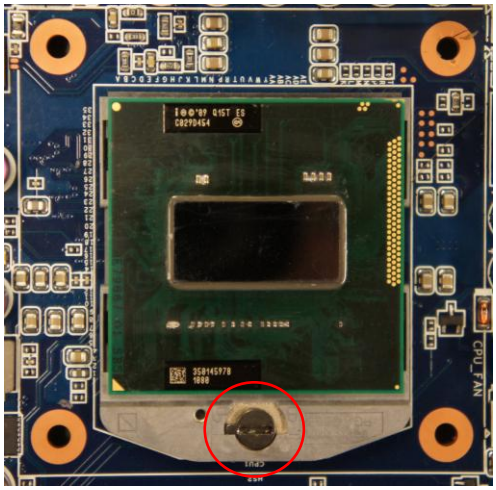


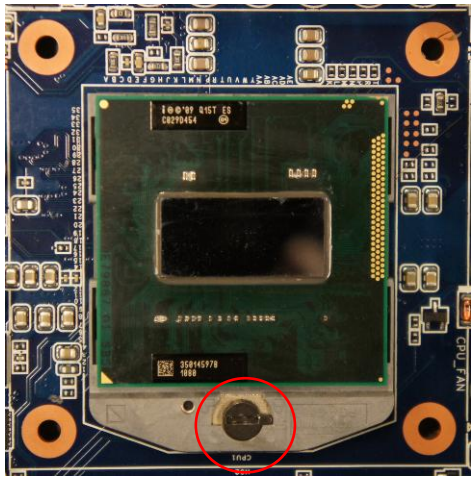
CPU socket triangle

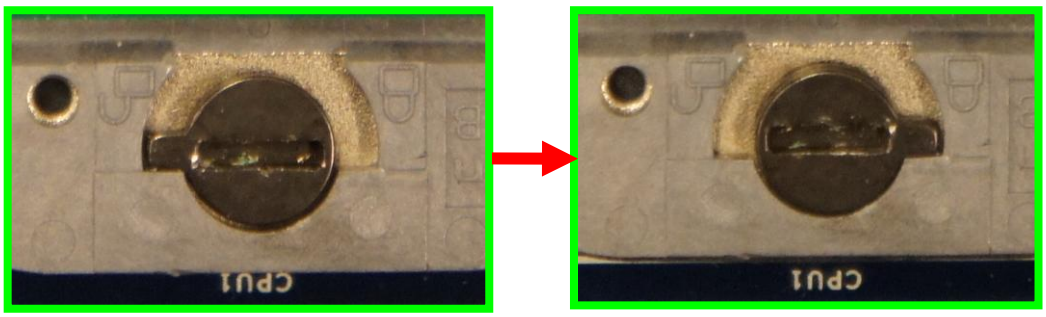


Gold triangle

5. Turn the CPU lock clockwise to lock CPU.







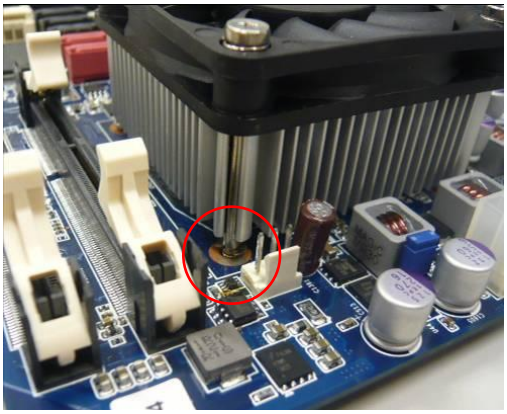
Caution

The CPU fits in only one correct orientation. DO NOT force the CPU into the socket to prevent bending the connectors on the socket and damaging the CPU!

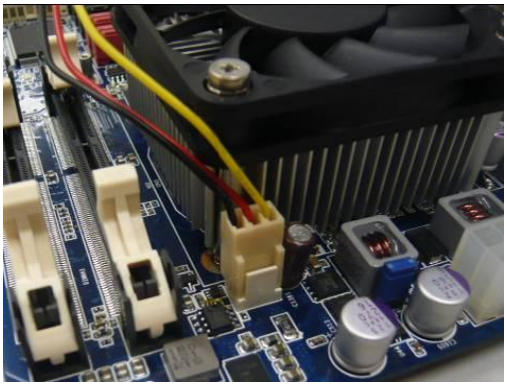
3.2.2 Installing the CPU Heatsink and Fan

1. Place the heatsink base on the relative bottom of motherboard.
2. Place the heatsink assembly on the top of the CPU, making sure that the four fasteners match the holes on the motherboard.

3. Screw tightly the four fasteners.



4. Connect the CPU fan cable to the connector on the motherboard labeled CPU_FAN.



Important

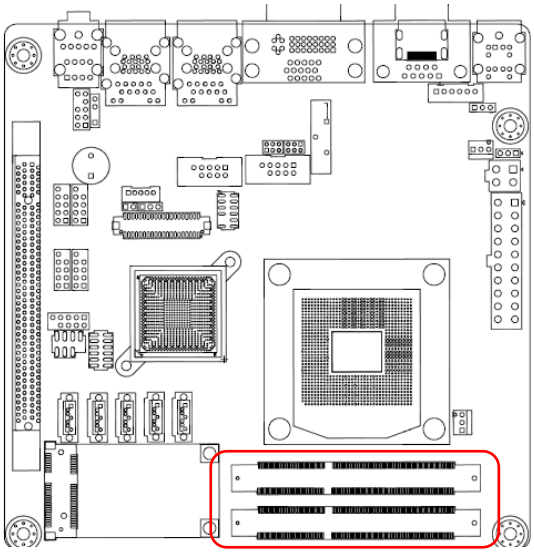
Do not forget to connect the CPU fan connector! Hardware monitoring errors can occur if you fail to plug this connector.

3.3 System Memory

3.3.1 Overview

The motherboard comes with two 204-pin Double Data Rate 3 (DDR3) Small Outline Dual Inline Memory Modules (SO-DIMM) sockets.

A DDR3 module has the same physical dimensions as a DDR SO-DIMM but has a 204-pin footprint compared to the 204-pin DDR2 DIMM. DDR3 DIMMs are notched differently to prevent installation on a DDR2 DIMM socket. The following figure illustrates the location of the sockets:



Channel	Slot
Channel A	DIMMA1
Channel B	DIMMB1

204-pin DDR3 SO-DIMM sockets

3.3.2 Memory Configurations

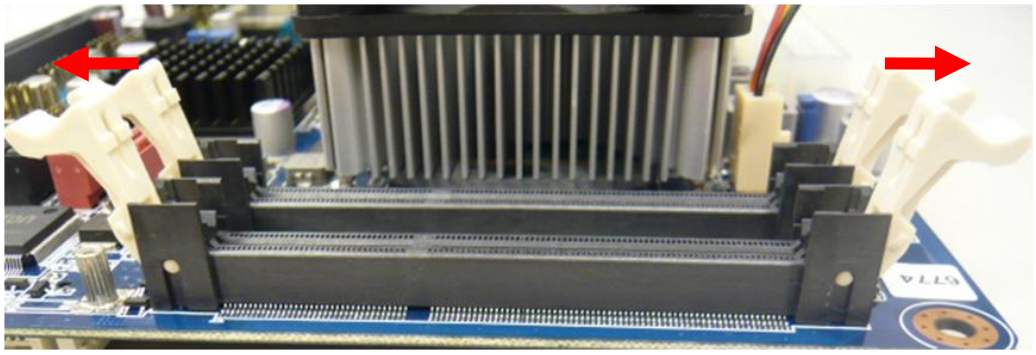
You may install 1GB, 2GB, and 4GB unbuffered ECC or non-ECC DDR3 SO-DIMMs into the SO-DIMM sockets using the memory configurations in this section.

Important

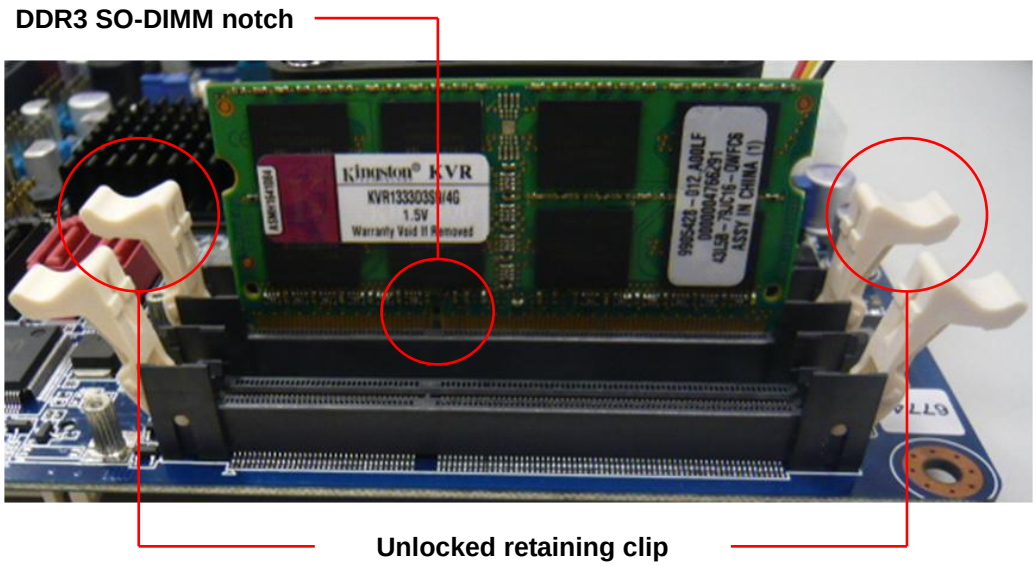
- ***IF you installed four 1GB memory modules, the system may detect less than 3GB of total memory because of address space allocation for other critical functions. This limitation applies to Windows XP 32-bit version operating system since it does not support PAE (Physical Address Extension) mode.***
- ***IF you install Windows XP 32-bit version operating system, we recommend that you install less than 3GB of total memory.***
- ***For dual channel configuration, the total size of memory module(s) installed per channel must be the same for better performance (DIMMA1=DIMMB1).***
- ***Always install SO-DIMMs with the same CAS latency. For optimum compatibility, it is recommended that you obtain memory modules from the same vendor.***
- ***Due to CPU limitation, SO-DIMM modules with 128 Mb memory chips or double-sided x16 memory chips are not supported in this motherboard.***

3.3.3 Installing a SO-DIMM

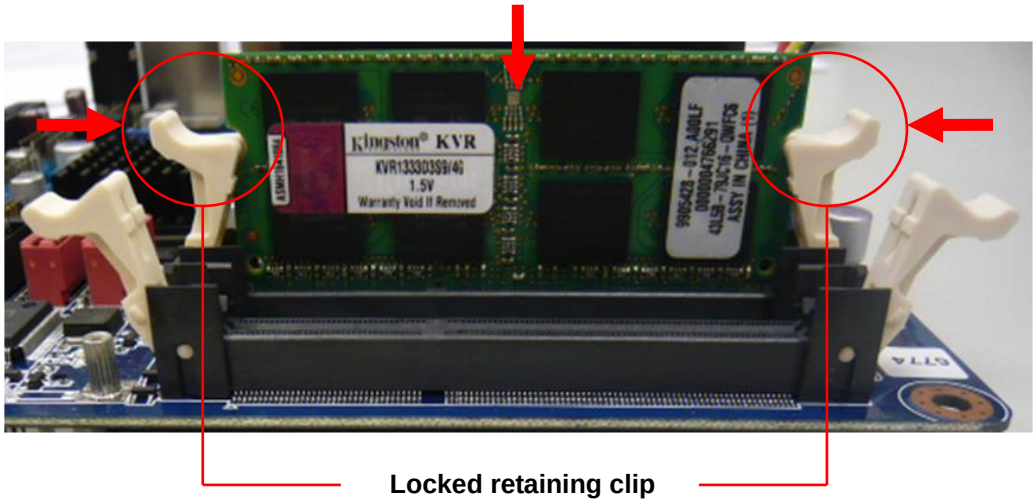
1. Unlock a SO-DIMM socket by pressing the retaining clips outward.



2. Align a SO-DIMM on the socket such that the notch on the SO-DIMM matches the break on the socket.



3. Firmly insert the SO-DIMM into the socket until the retaining clips snap back in place and the SO-DIMM is properly seated.



Important

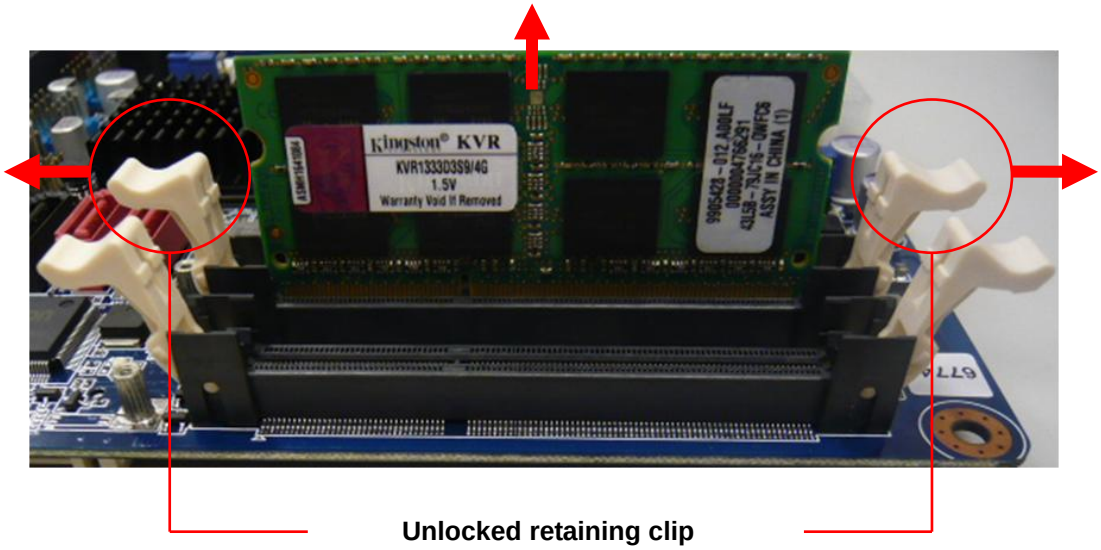
- ***A DDR3 SO-DIMM is keyed with a notch so that it fits in only one direction. DO NOT force a SO-DIMM into a socket to avoid damaging the SO-DIMM.***
- ***The DDR3 SO-DIMM socket do not support DDR SO-DIMM. DO NOT install DDR2 SO-DIMM to the DDR3 SO-DIMM socket.***

Caution

Make sure to unplug the power supply before adding or removing SO-DIMMs or other system components. Failure to do so may cause severe damage to both the motherboard and the components.

3.3.4 Removing a SO-DIMM

1. Simultaneously press the retaining clips downward to unlock the SO-DIMM.
2. Remove the SO-DIMM from the socket.



Unlocked retaining clip

Note

Support the SO-DIMM lightly with your fingers when pressing the retaining clips. The SO-DIMM might get damaged when it flips out with extra force.

3.4 Expansion Card

In the future, you may need to install expansion cards. The following sub-sections describe the slots and the expansion cards that they support.

Warning

Make sure to unplug the power cord before adding or removing expansion cards. Failure to do so may cause you physical injury and damage motherboard components.

3.4.1 Installing an Expansion Card

1. Before installing the expansion card, read the documentation that came with it and make the necessary hardware settings for the card.
2. Remove the system unit cover (if your motherboard is already installed in a chassis).
3. Remove the bracket opposite the slot that you intend to use. Keep the screw for later use.
4. Align the card connector with the slot and press firmly until the card is completely seated on the slot.
5. Secure the card to the chassis with the screw you removed earlier.
6. Replace the system cover.

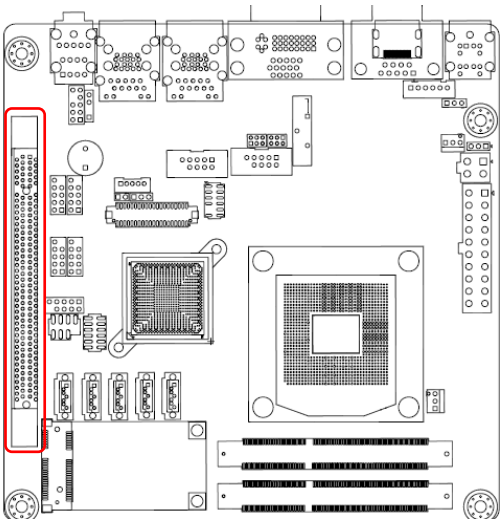
3.4.2 Configuring an Expansion Card

After installing the expansion card, configure it by adjusting the software settings.

1. Turn on the system and change the necessary BIOS settings, if any. See Chapter 5 for information on BIOS setup.
2. Assign an IRQ to the card if needed.
3. Install the software drivers for the expansion card.

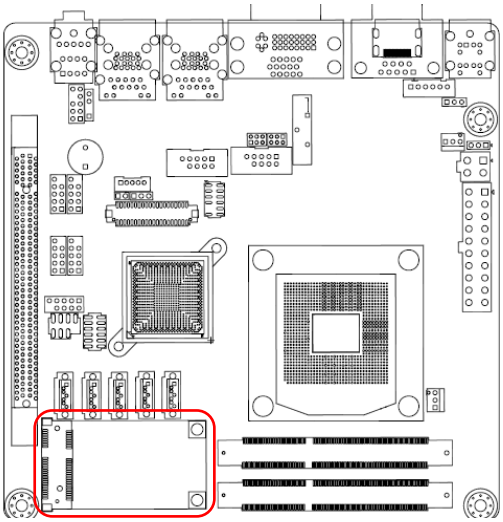
3.4.3 PCI-Express x16 Slot

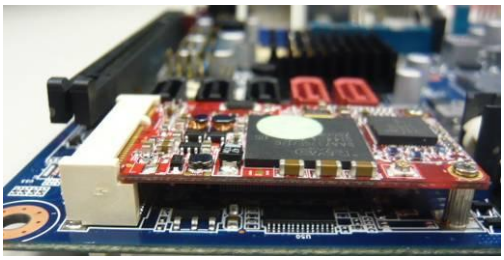
This motherboard supports one PCI-Express x16. The following figure shows a graphics card installed on the PCI-Express x16 slot.



3.4.4 PCI-Express Mini Card Connector

This motherboard supports one PCI-Express Mini Card connector. The following figure shows a Decode card installed on this connector.





3.4.5 CFast™ Socket

This motherboard supports one CFast™ card socket and its location is on bottom side of the PCB. The following figure shows a CFast™ card installed on the CFast™ socket.

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Chapter 4
Hardware Description

4.1 Microprocessors

The MANO870 Series supports Intel® Core™ i7 / Core™ i5 / Core™ i3 / Pentium® / Celeron® processors, which enable your system to operate under Windows® XP, Windows® 7 and Linux environments. The system performance depends on the microprocessor. Make sure all correct settings are arranged for your installed microprocessor to prevent the CPU from damages.

4.2 BIOS

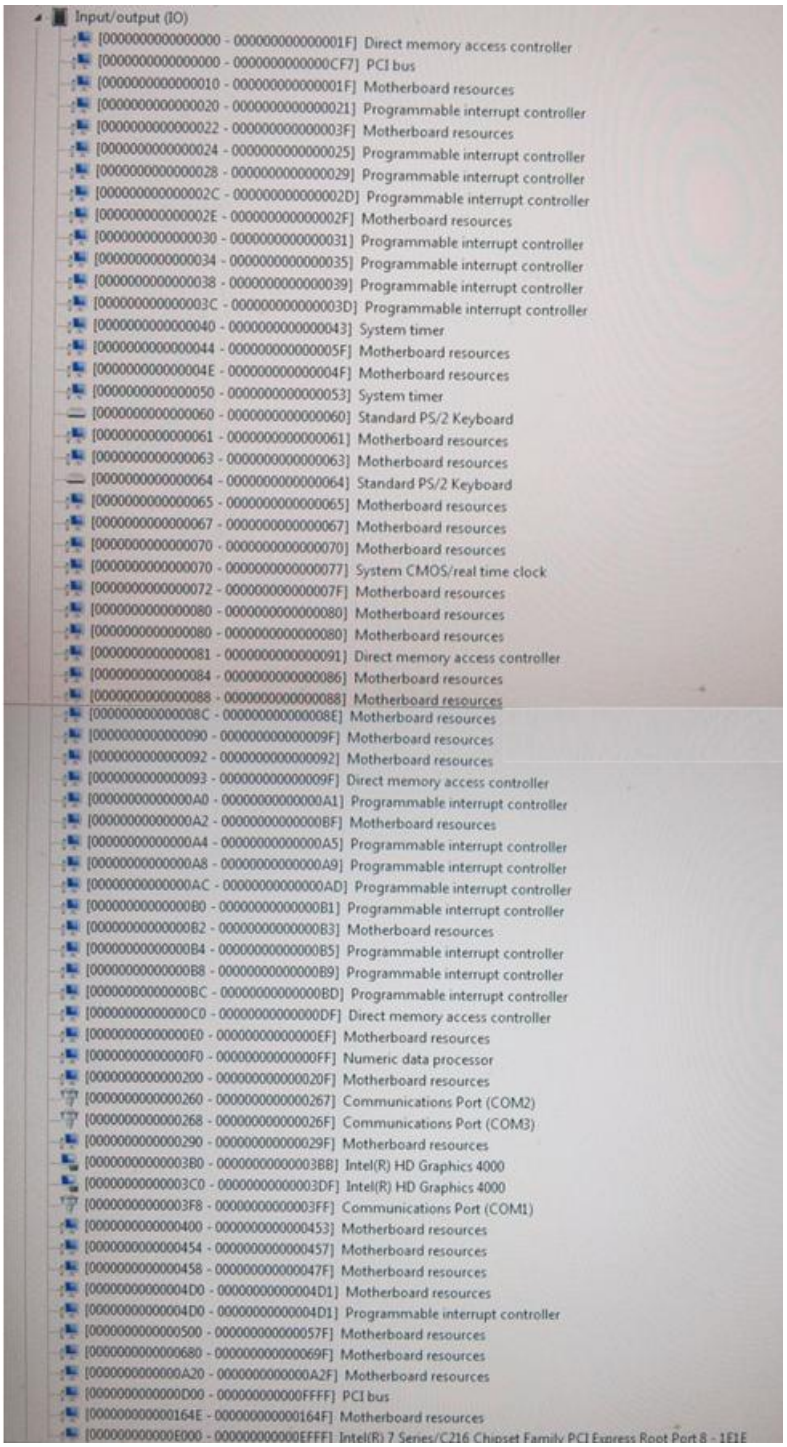
The MANO870 Series uses AMI Plug and Play BIOS with a single 64Mbit SPI Flash.

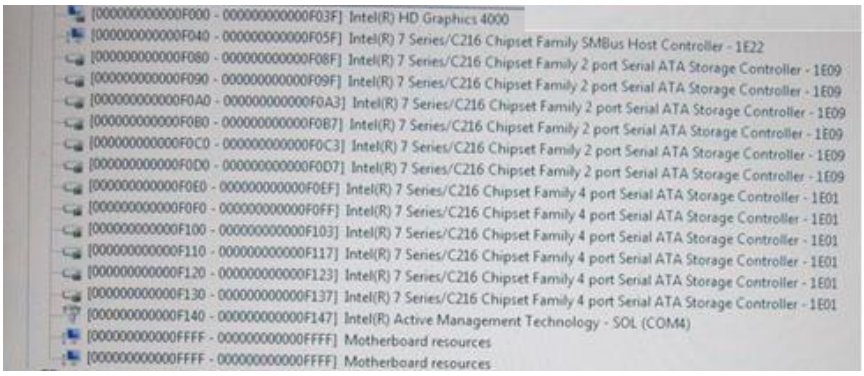
4.3 System Memory

The MANO870 Series supports two 204-pin DDR3 SO-DIMM sockets for a maximum memory of 16GB DDR3 SDRAMs. The memory module comes in sizes of 1GB, 2GB and 4GB.

4.4 I/O Port Address Map

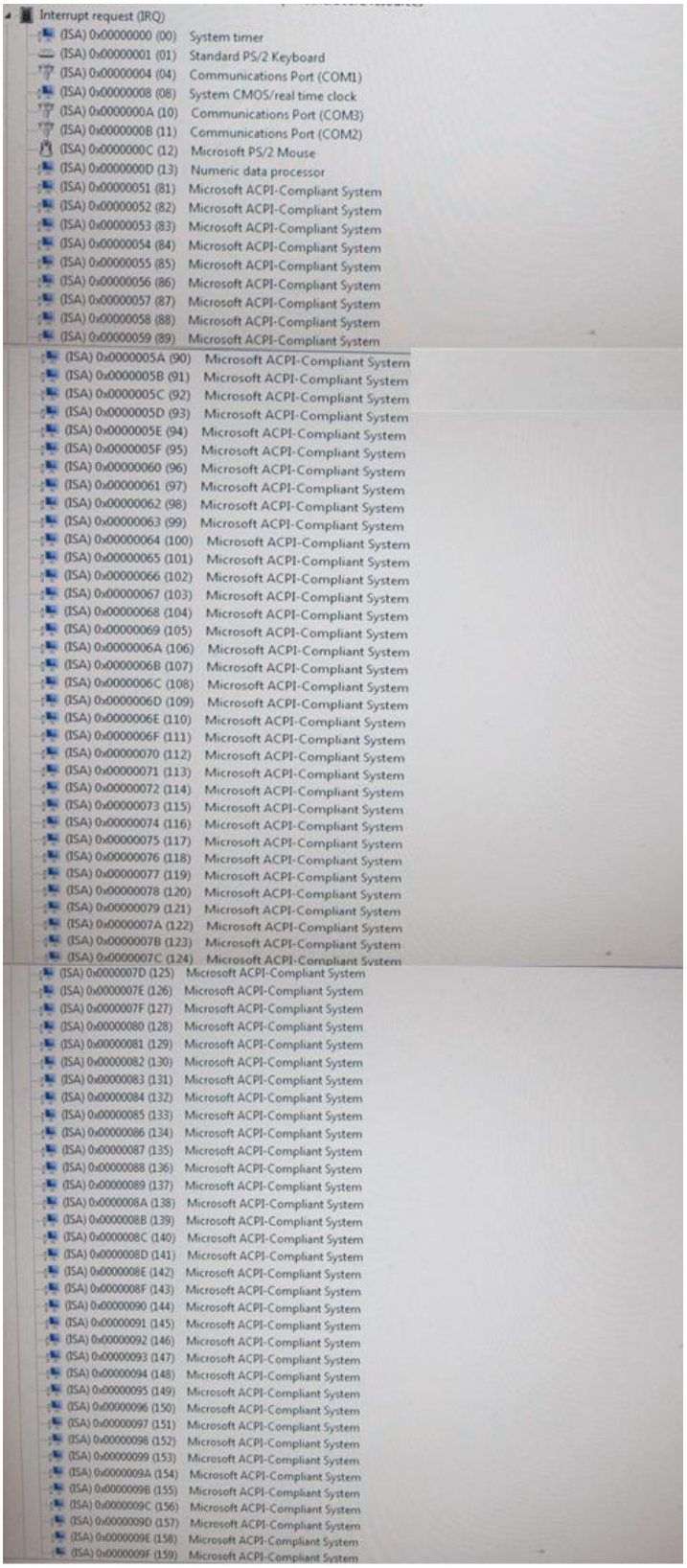
The Intel® Core™ i7 / Core™ i5 / Core™ i3 / Pentium® / Celeron® processors communicate via I/O ports. Total 1KB port addresses are available for assigning to other devices via I/O expansion cards.

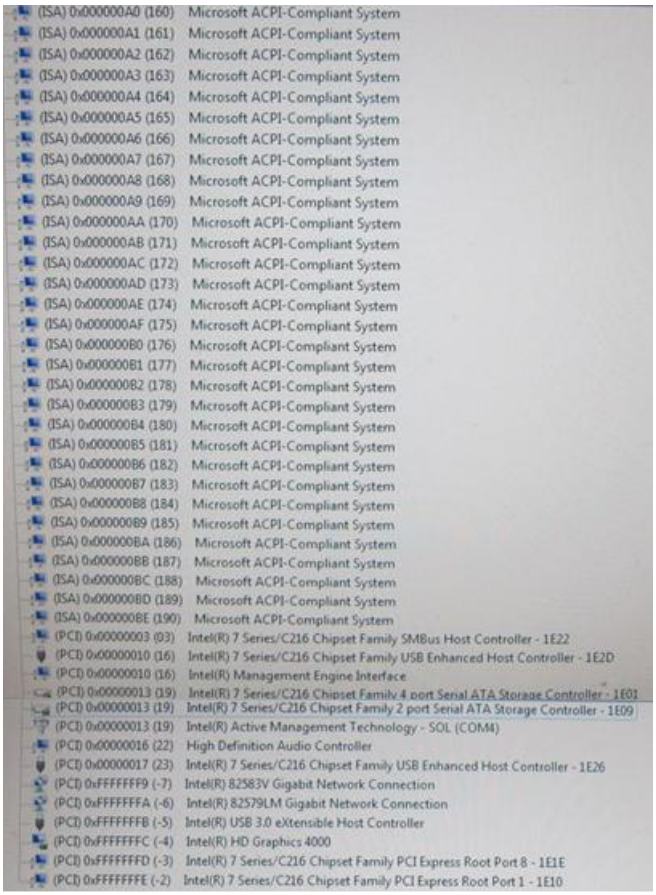



[000000000000F000 - 000000000000F03F] Intel(R) HD Graphics 4000
[000000000000F040 - 000000000000F05F] Intel(R) 7 Series/C216 Chipset Family SMBus Host Controller - 1E22
[000000000000F080 - 000000000000F08F] Intel(R) 7 Series/C216 Chipset Family 2 port Serial ATA Storage Controller - 1E09
[000000000000F090 - 000000000000F09F] Intel(R) 7 Series/C216 Chipset Family 2 port Serial ATA Storage Controller - 1E09
[000000000000F0A0 - 000000000000F0A3] Intel(R) 7 Series/C216 Chipset Family 2 port Serial ATA Storage Controller - 1E09
[000000000000F0B0 - 000000000000F0B7] Intel(R) 7 Series/C216 Chipset Family 2 port Serial ATA Storage Controller - 1E09
[000000000000F0C0 - 000000000000F0C3] Intel(R) 7 Series/C216 Chipset Family 2 port Serial ATA Storage Controller - 1E09
[000000000000F0D0 - 000000000000F0D7] Intel(R) 7 Series/C216 Chipset Family 2 port Serial ATA Storage Controller - 1E09
[000000000000F0E0 - 000000000000F0EF] Intel(R) 7 Series/C216 Chipset Family 4 port Serial ATA Storage Controller - 1E01
[000000000000F0F0 - 000000000000F0FF] Intel(R) 7 Series/C216 Chipset Family 4 port Serial ATA Storage Controller - 1E01
[000000000000F100 - 000000000000F103] Intel(R) 7 Series/C216 Chipset Family 4 port Serial ATA Storage Controller - 1E01
[000000000000F110 - 000000000000F117] Intel(R) 7 Series/C216 Chipset Family 4 port Serial ATA Storage Controller - 1E01
[000000000000F120 - 000000000000F123] Intel(R) 7 Series/C216 Chipset Family 4 port Serial ATA Storage Controller - 1E01
[000000000000F130 - 000000000000F137] Intel(R) 7 Series/C216 Chipset Family 4 port Serial ATA Storage Controller - 1E01
[000000000000F140 - 000000000000F147] Intel(R) Active Management Technology - SOL (COM4)
[000000000000FFFF - 000000000000FFFF] Motherboard resources
[000000000000FFFF - 000000000000FFFF] Motherboard resources

4.5 Interrupt Controller (IRQ) Map

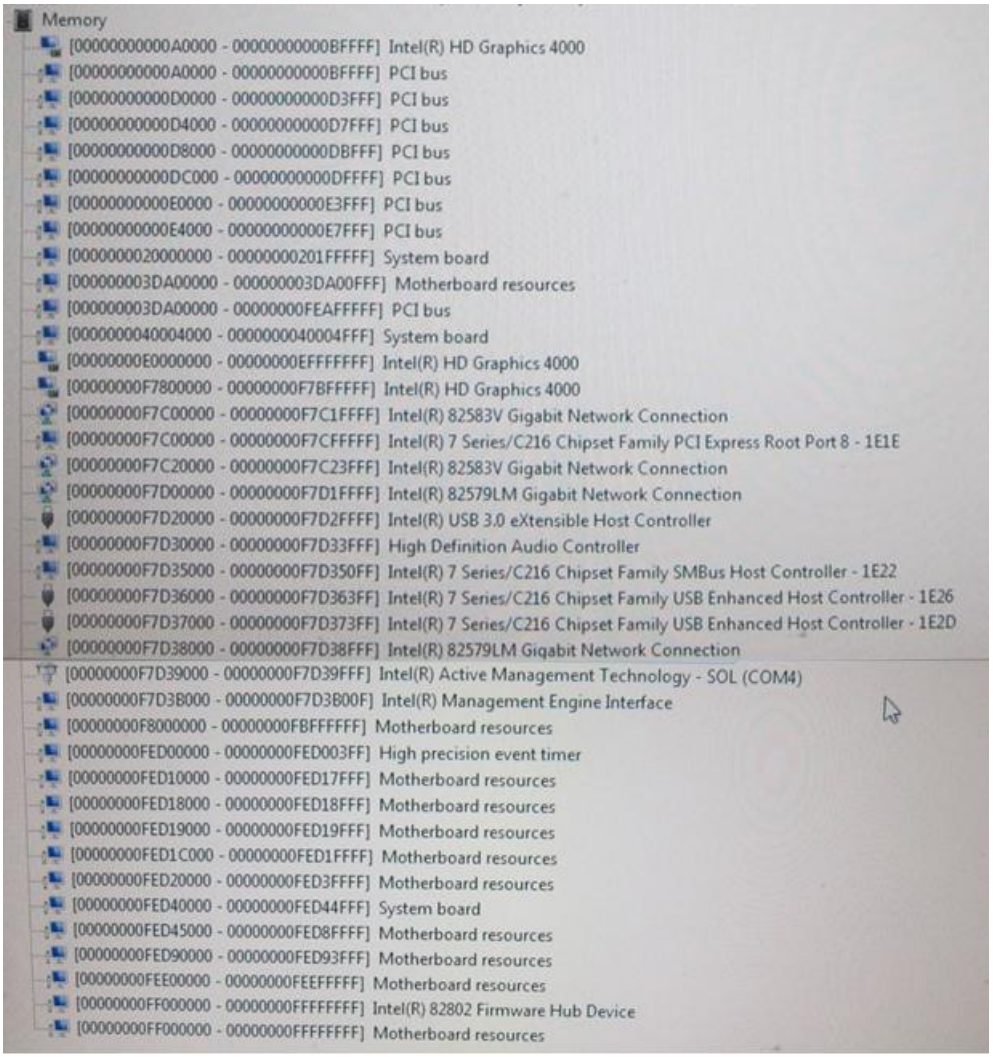
The interrupt controller (IRQ) mapping list is shown as follows:




(ISA) 0x000000A0 (160) Microsoft ACPI-Compliant System
(ISA) 0x000000A1 (161) Microsoft ACPI-Compliant System
(ISA) 0x000000A2 (162) Microsoft ACPI-Compliant System
(ISA) 0x000000A3 (163) Microsoft ACPI-Compliant System
(ISA) 0x000000A4 (164) Microsoft ACPI-Compliant System
(ISA) 0x000000A5 (165) Microsoft ACPI-Compliant System
(ISA) 0x000000A6 (166) Microsoft ACPI-Compliant System
(ISA) 0x000000A7 (167) Microsoft ACPI-Compliant System
(ISA) 0x000000A8 (168) Microsoft ACPI-Compliant System
(ISA) 0x000000A9 (169) Microsoft ACPI-Compliant System
(ISA) 0x000000AA (170) Microsoft ACPI-Compliant System
(ISA) 0x000000AB (171) Microsoft ACPI-Compliant System
(ISA) 0x000000AC (172) Microsoft ACPI-Compliant System
(ISA) 0x000000AD (173) Microsoft ACPI-Compliant System
(ISA) 0x000000AE (174) Microsoft ACPI-Compliant System
(ISA) 0x000000AF (175) Microsoft ACPI-Compliant System
(ISA) 0x000000B0 (176) Microsoft ACPI-Compliant System
(ISA) 0x000000B1 (177) Microsoft ACPI-Compliant System
(ISA) 0x000000B2 (178) Microsoft ACPI-Compliant System
(ISA) 0x000000B3 (179) Microsoft ACPI-Compliant System
(ISA) 0x000000B4 (180) Microsoft ACPI-Compliant System
(ISA) 0x000000B5 (181) Microsoft ACPI-Compliant System
(ISA) 0x000000B6 (182) Microsoft ACPI-Compliant System
(ISA) 0x000000B7 (183) Microsoft ACPI-Compliant System
(ISA) 0x000000B8 (184) Microsoft ACPI-Compliant System
(ISA) 0x000000B9 (185) Microsoft ACPI-Compliant System
(ISA) 0x000000BA (186) Microsoft ACPI-Compliant System
(ISA) 0x000000BB (187) Microsoft ACPI-Compliant System
(ISA) 0x000000BC (188) Microsoft ACPI-Compliant System
(ISA) 0x000000BD (189) Microsoft ACPI-Compliant System
(ISA) 0x000000BE (190) Microsoft ACPI-Compliant System
(PCI) 0x00000003 (03) Intel(R) 7 Series/C216 Chipset Family SMBus Host Controller - 1E22
(PCI) 0x00000010 (16) Intel(R) 7 Series/C216 Chipset Family USB Enhanced Host Controller - 1E2D
(PCI) 0x00000010 (16) Intel(R) Management Engine Interface
(PCI) 0x00000013 (19) Intel(R) 7 Series/C216 Chipset Family 4 port Serial ATA Storage Controller - 1E01
(PCI) 0x00000013 (19) Intel(R) 7 Series/C216 Chipset Family 2 port Serial ATA Storage Controller - 1E09
(PCI) 0x00000013 (19) Intel(R) Active Management Technology - SOL (COM4)
(PCI) 0x00000016 (22) High Definition Audio Controller
(PCI) 0x00000017 (23) Intel(R) 7 Series/C216 Chipset Family USB Enhanced Host Controller - 1E26
(PCI) 0xFFFFFFF9 (-7) Intel(R) 82583V Gigabit Network Connection
(PCI) 0xFFFFFFFA (-6) Intel(R) 82579LM Gigabit Network Connection
(PCI) 0xFFFFFFFB (-5) Intel(R) USB 3.0 eXtensible Host Controller
(PCI) 0xFFFFFFFC (-4) Intel(R) HD Graphics 4000
(PCI) 0xFFFFFFFD (-3) Intel(R) 7 Series/C216 Chipset Family PCI Express Root Port 8 - 1E1E
(PCI) 0xFFFFFFFE (-2) Intel(R) 7 Series/C216 Chipset Family PCI Express Root Port 1 - 1E10

4.6 Memory Map

The memory mapping list is shown as follows:



Chapter 5
AMI BIOS Setup Utility

The AMI UEFI BIOS provides users with a built-in setup program to modify basic system configuration. All configured parameters are stored in a flash chip to save the setup information whenever the power is turned off. This chapter provides users with detailed description about how to set up basic system configuration through the AMI BIOS setup utility.

5.1 Starting

To enter the setup screens, follow the steps below:

1. Turn on the computer and press the <Del> key immediately.
2. After you press the <Del> key, the main BIOS setup menu displays. You can access the other setup screens from the main BIOS setup menu, such as the Advanced and Chipset menus.

It is strongly recommended that you should avoid changing the chipset's defaults. Both AMI and your system manufacturer have carefully set up these defaults that provide the best performance and reliability.

5.2 Navigation Keys

The BIOS setup/utility uses a key-based navigation system called hot keys. Most of the BIOS setup utility hot keys can be used at any time during the setup navigation process. These keys include <F1>, <F2>, <Enter>, <ESC>, <Arrow> keys, and so on.

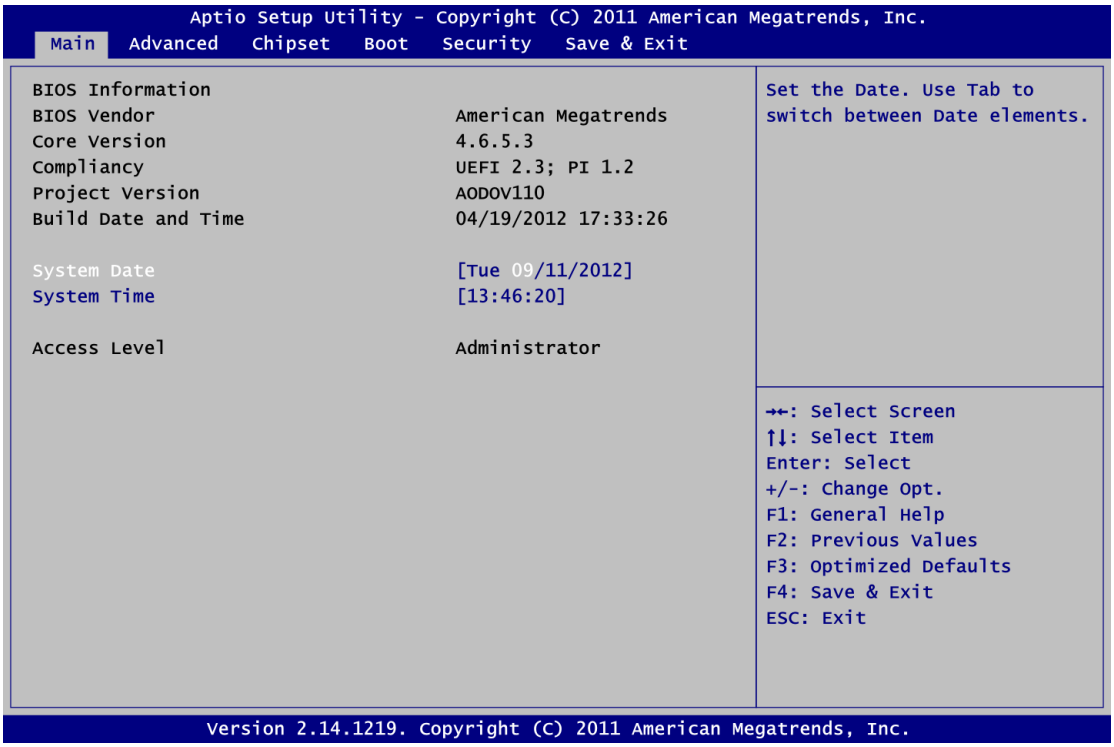
Note

Some of the navigation keys differ from one screen to another.

Hot Keys	Description
→← **Left/Right**	The Left and Right <Arrow> keys allow you to select a setup screen.
↑↓ **Up/Down**	The Up and Down <Arrow> keys allow you to select a setup screen or sub-screen.
+– Plus/Minus	The Plus and Minus <Arrow> keys allow you to change the field value of a particular setup item.
Tab	The <Tab> key allows you to select setup fields.
F1	The <F1> key allows you to display the General Help screen.
F2	The <F2> key allows you to Load Previous Values.
F3	The <F3> key allows you to Load Optimized Defaults.
F4	The <F4> key allows you to save any changes you have made and exit Setup. Press the <F4> key to save your changes.
Esc	The <Esc> key allows you to discard any changes you have made and exit the Setup. Press the <Esc> key to exit the setup without saving your changes.
Enter	The <Enter> key allows you to display or change the setup option listed for a particular setup item. The <Enter> key can also allow you to display the setup sub- screens.

5.3 Main Menu

When you first enter the setup utility, you will enter the Main setup screen. You can always return to the Main setup screen by selecting the Main tab. System Time/Date can be set up as described below. The Main BIOS setup screen is shown below.



BIOS Information
Display the auto-detected BIOS information.

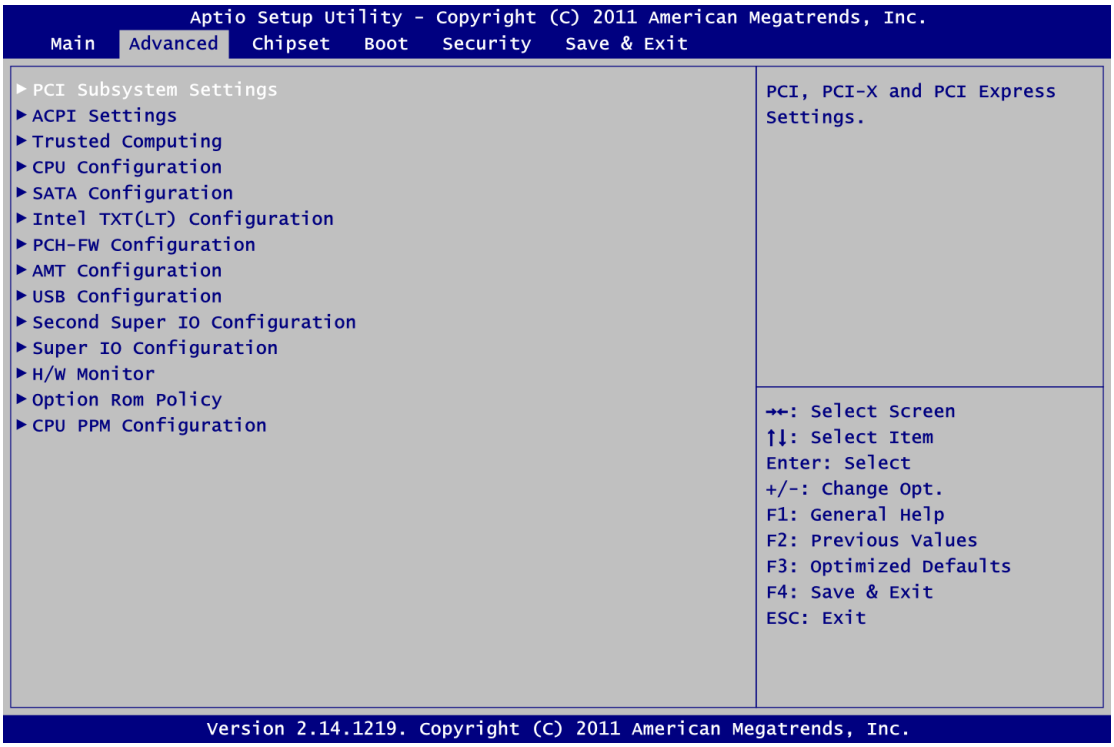
System Date/Time
Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time is entered in HH:MM:SS format.

5.4 Advanced Menu

The Advanced menu also allows users to set configuration of the CPU and other system devices. You can select any of the items in the left frame of the screen to go to the sub menus:

- ▶ PCI Subsystem Settings
- ▶ ACPI Settings
- ▶ Trusted Computing
- ▶ CPU Configuration
- ▶ SATA Configuration
- ▶ Intel TXT(LT) Configuration
- ▶ PCH-FW Configuration
- ▶ AMT Configuration
- ▶ USB Configuration
- ▶ Second Super IO Configuration
- ▶ Super IO Configuration
- ▶ H/W Monitor
- ▶ Option Rom Policy
- ▶ CPU PPM Configuration

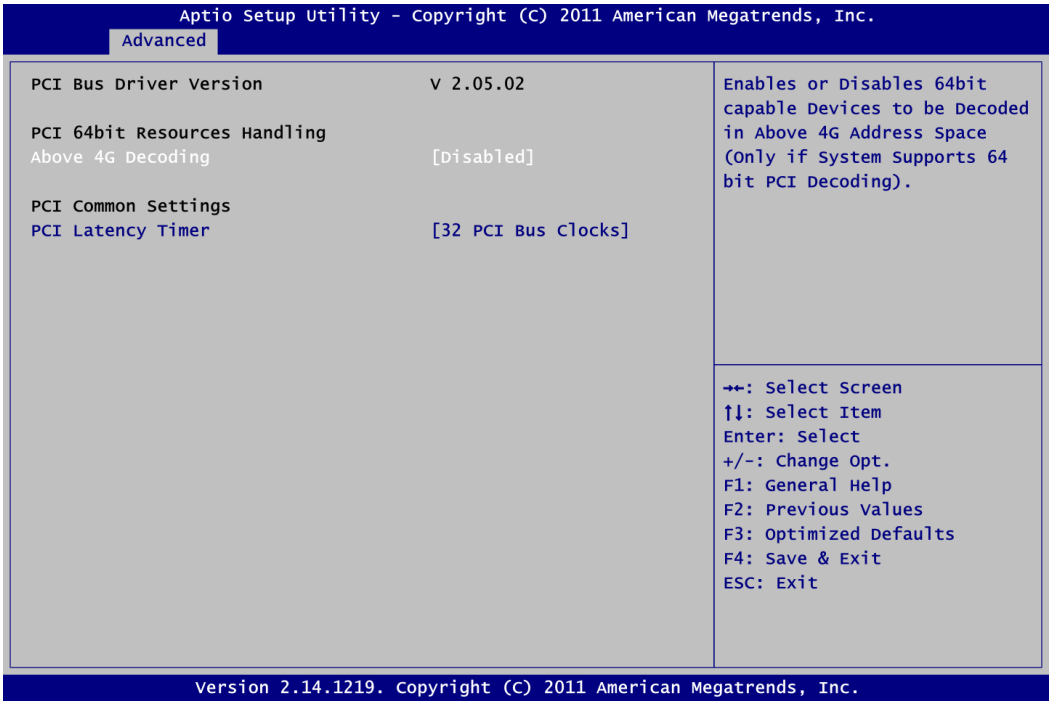
For items marked with "▶", please press <Enter> for more options.



Caution

Take caution when changing the settings of the Advanced menu items. Incorrect field values can cause the system to malfunction.

- **PCI Subsystem Settings**
  You can use this screen to select options for PCI subsystem settings, and change the value of the selected option. A description of the selected item appears on the right side of the screen.

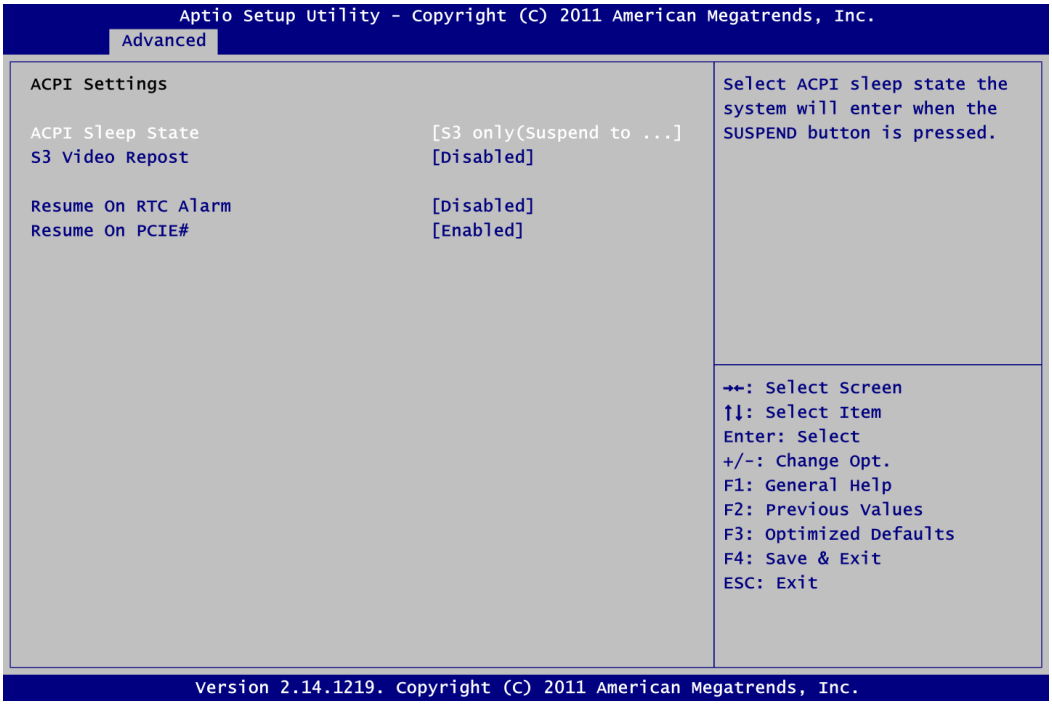


PCI Bus Driver Version
Display the information of PCI bus driver version.

Above 4G Decoding
Enable or disable 64-bit capable devices to be decoded in above 4G address space.

PCI Latency Timer
Allow the PCI latency timer to be adjusted. This option sets the latency of all PCI devices on the PCI bus.

- **ACPI Settings**
  You can use this screen to select options for the ACPI configuration, and change the value of the selected option. A description of the selected item appears on the right side of the screen.



ACPI Sleep State
Select the highest ACPI sleep state the system will enter when the suspend button is pressed. Configuration options are Suspend Disabled, S1 only (CPU Stop Clock), and S3 only (Suspend to RAM).

To correctly support wake by use of USB from the S3 system power state, please refer to the following Microsoft's link:

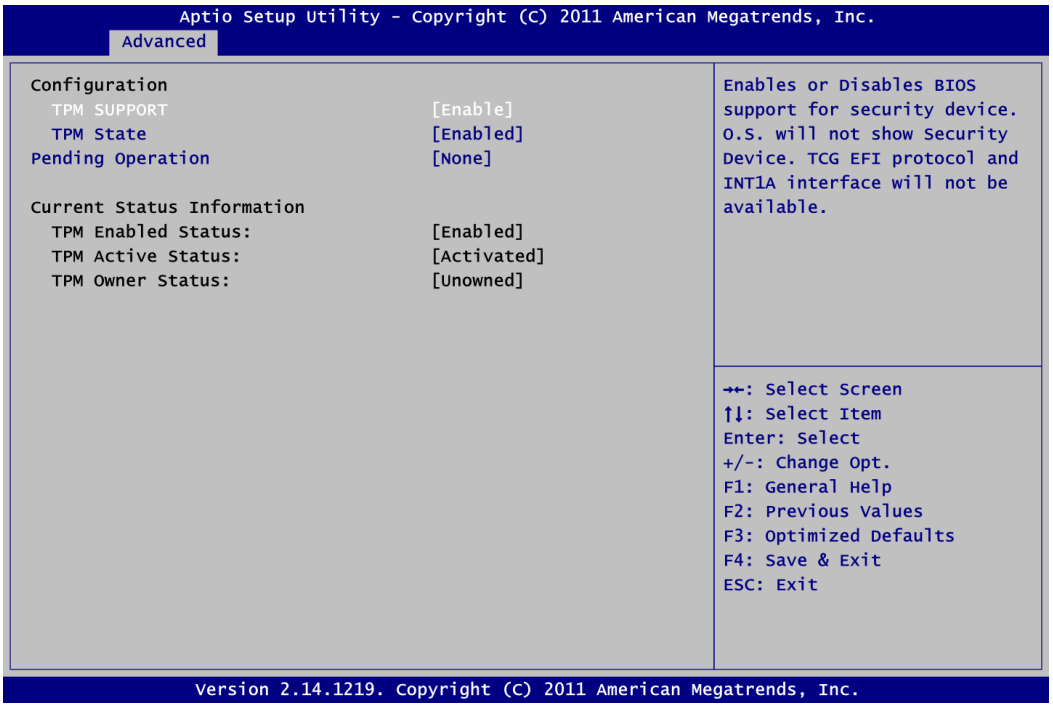
http://support.microsoft.com/kb/841858/en-us

S3 Video Repost
Enable or disable video repost.

Resume On RTC Alarm
Enable or disable system wake on alarm even. When enabled, system will wake upon the hr/min/sec specified.

Resume On PCIE#
Enable or disable PCIE to generate a wake event.

- **Trusted Computing**
  This screen provides function for specifying the Trusted Platform Module (TPM) settings.



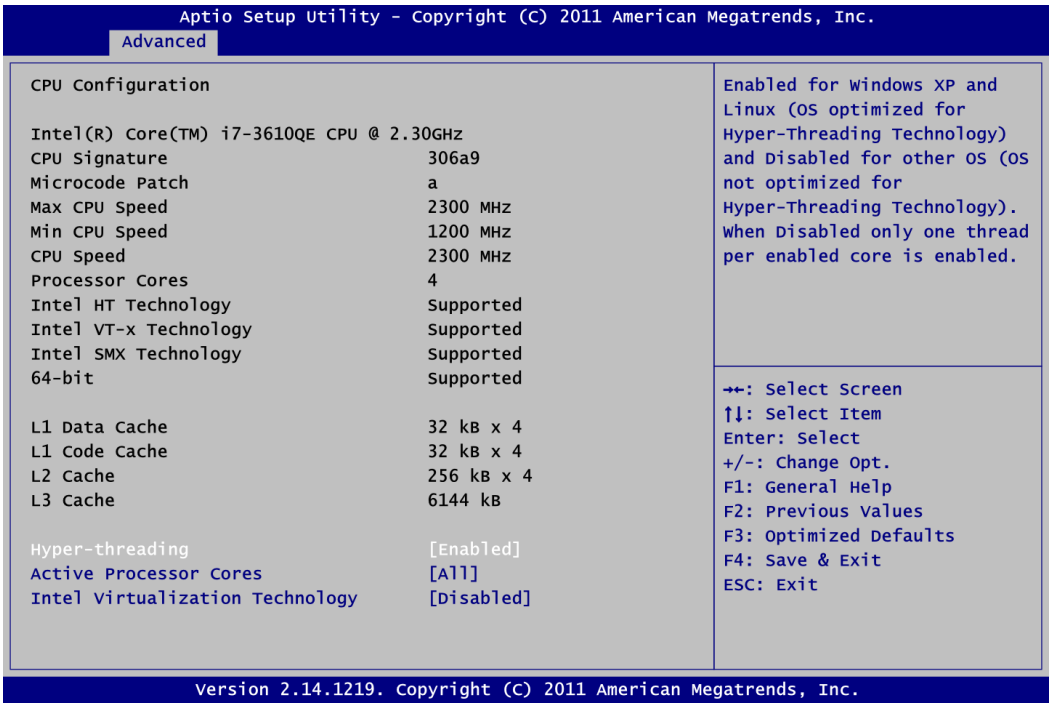
TPM Support
Enable or disable TPM support.

TPM State
Specify whether TPM can be used by the operating system.

Pending Operation
Schedule a TPM operation which will be performed during the next boot process.

Current Status Information
Display current TPM status information.

- **CPU Configuration**
  This screen shows the CPU information.

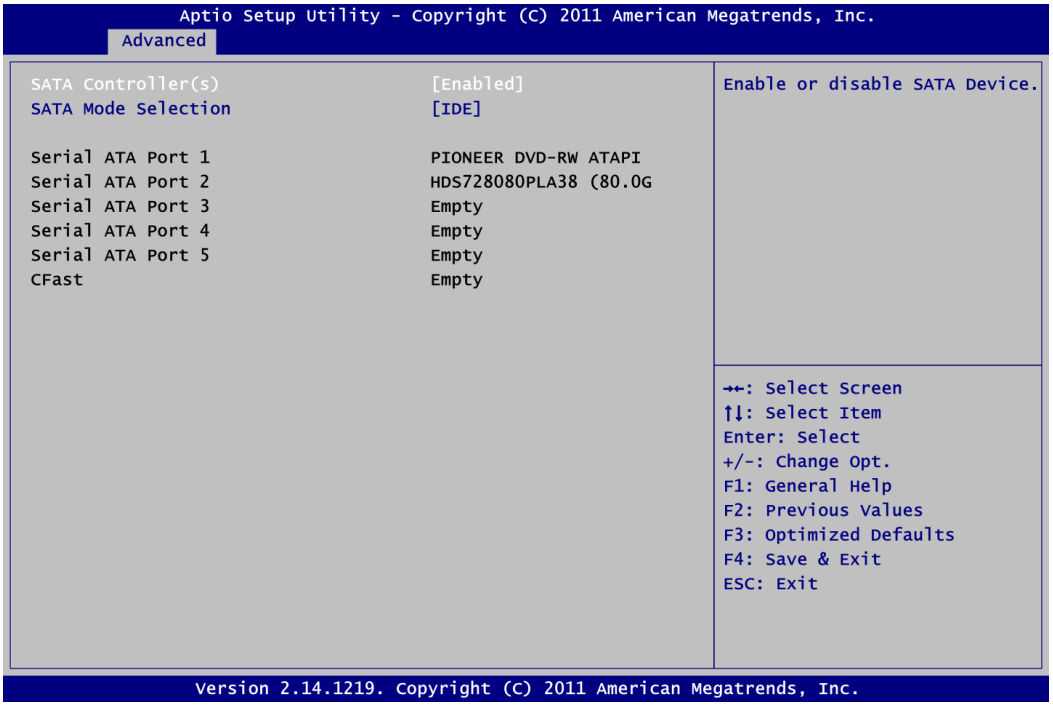


Hyper-threading
Use this item to enable or disable Hyper-Threading Technology, which makes a single physical processor perform multi-tasking function as two logical ones.

Active Processor Cores
Allow users to set how many processor cores should be active.

Intel Virtualization Technology
This item allows a hardware platform to run multiple operating systems separately and simultaneously, enabling one system to virtually function as several systems.

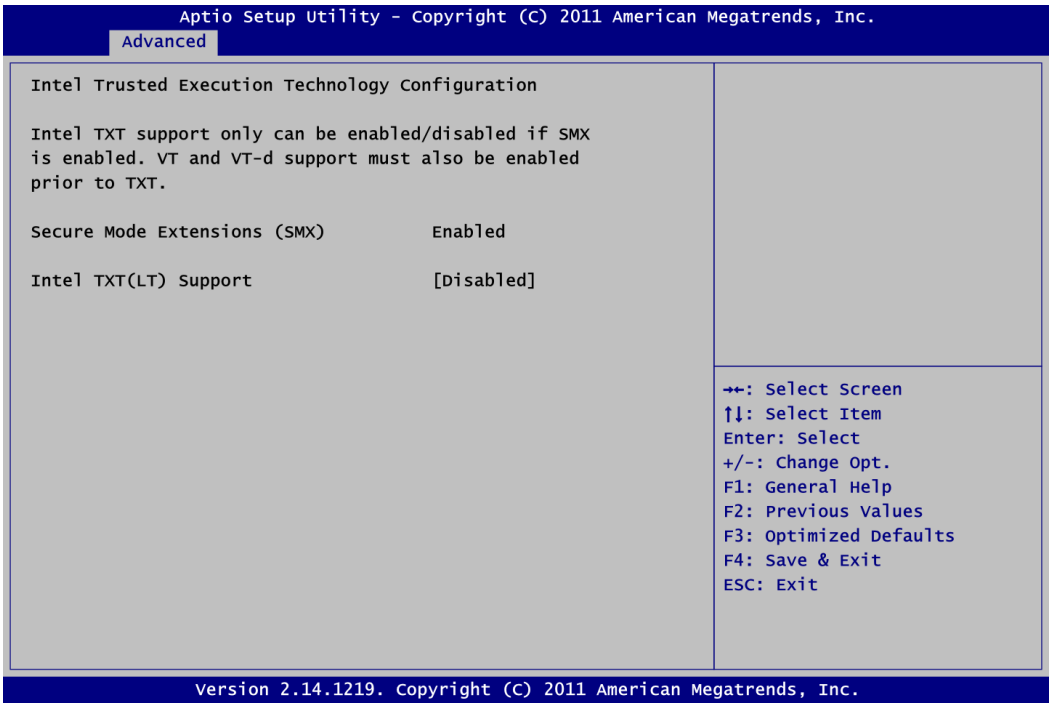
- **SATA Configuration**
  In this Configuration menu, you can see the currently installed hardware in the SATA ports. During system boot up, the BIOS automatically detects the presence of SATA devices.



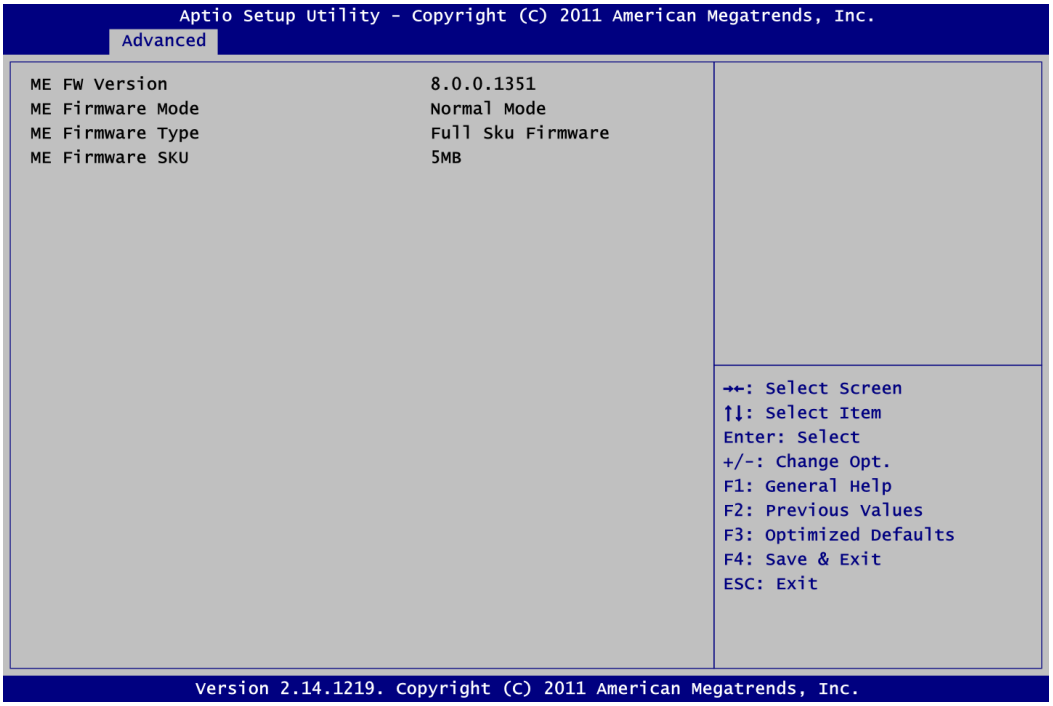
SATA Controller(s)
Enable or disable SATA device.

SATA Mode Selection
Determine how SATA controller(s) operate. Operation mode options are: IDE Mode, AHCI Mode and RAID Mode.

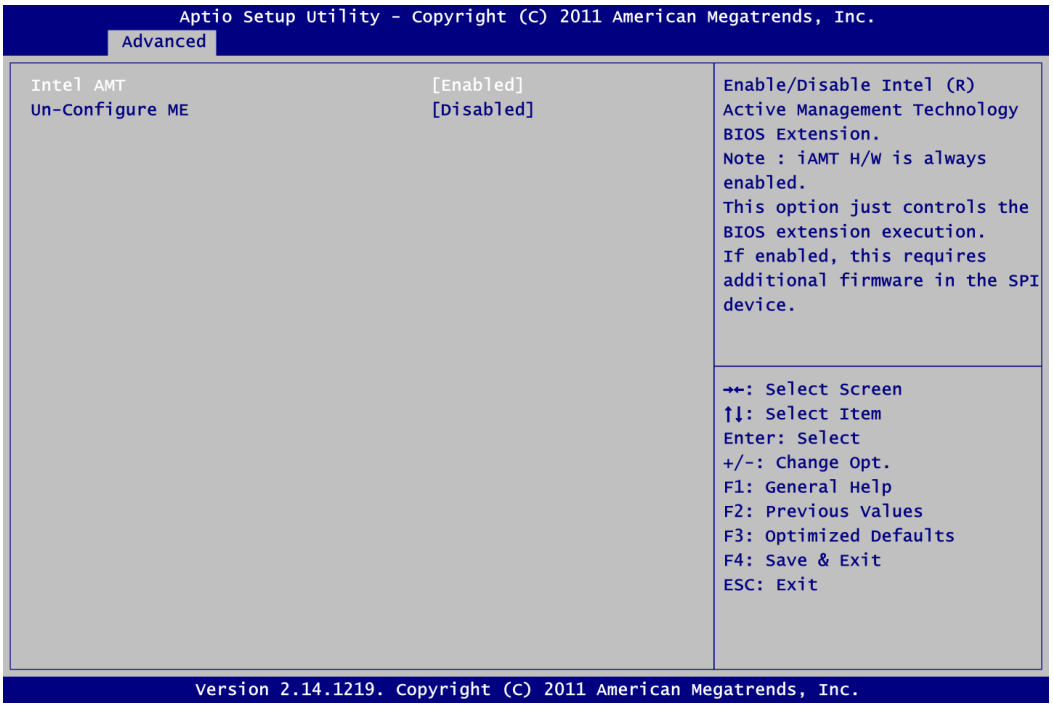
- **Intel TXT(LT) Configuration**
  This screen displays Intel® Trusted Execution Technology (TXT) configuration.



- **PCH-FW Configuration**
  This screen displays Management Engine (ME) Firmware information.



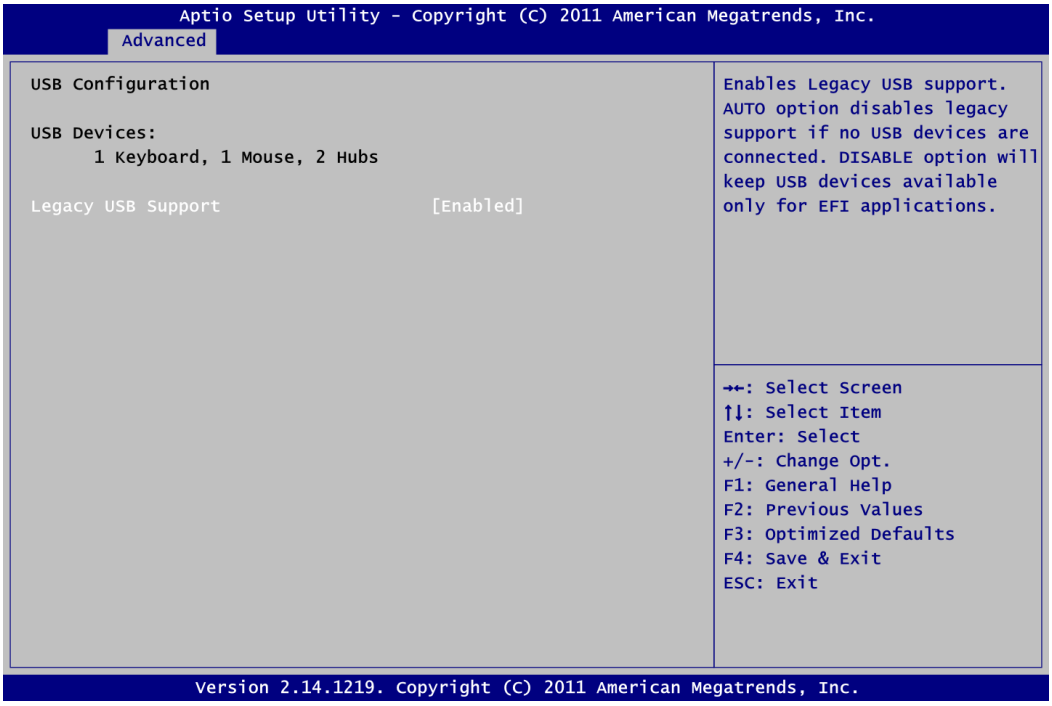
- **AMT Configuration**
  Use this screen to configure AMT parameters.



Intel AMT
Enable or disable Intel® Active Management Technology BIOS Extension.

Un-Configure ME
Un-configure ME without password.

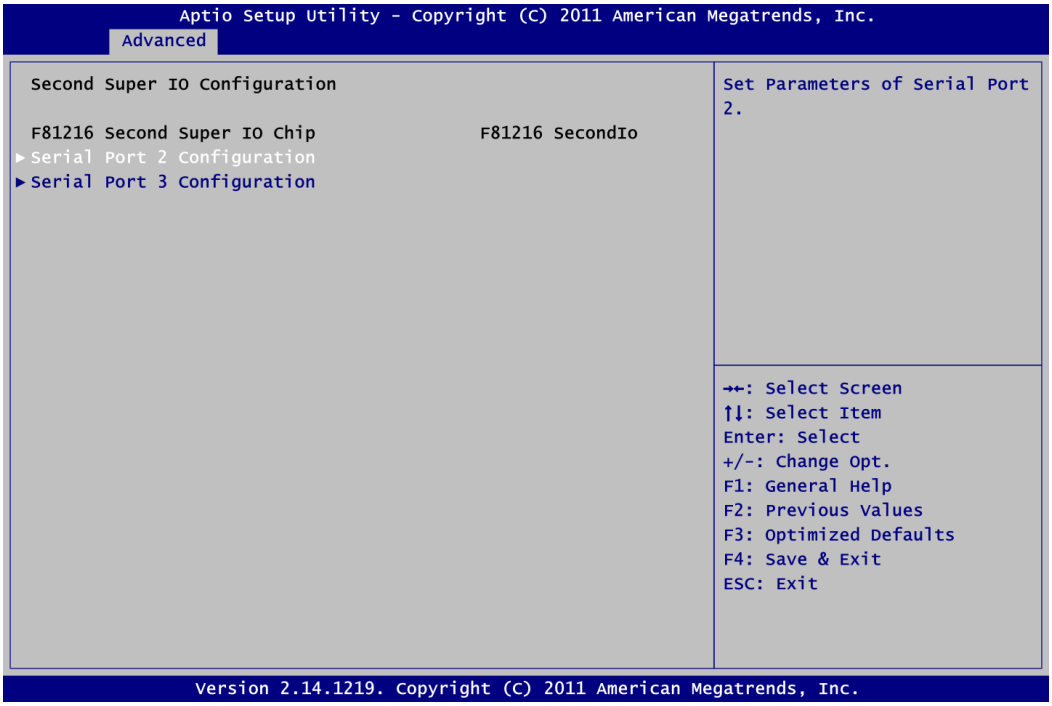
- **USB Configuration**
  You can use this screen to select options for the USB Configuration, and change the value of the selected option. A description of the selected item appears on the right side of the screen.



USB Devices
Display all detected USB devices.

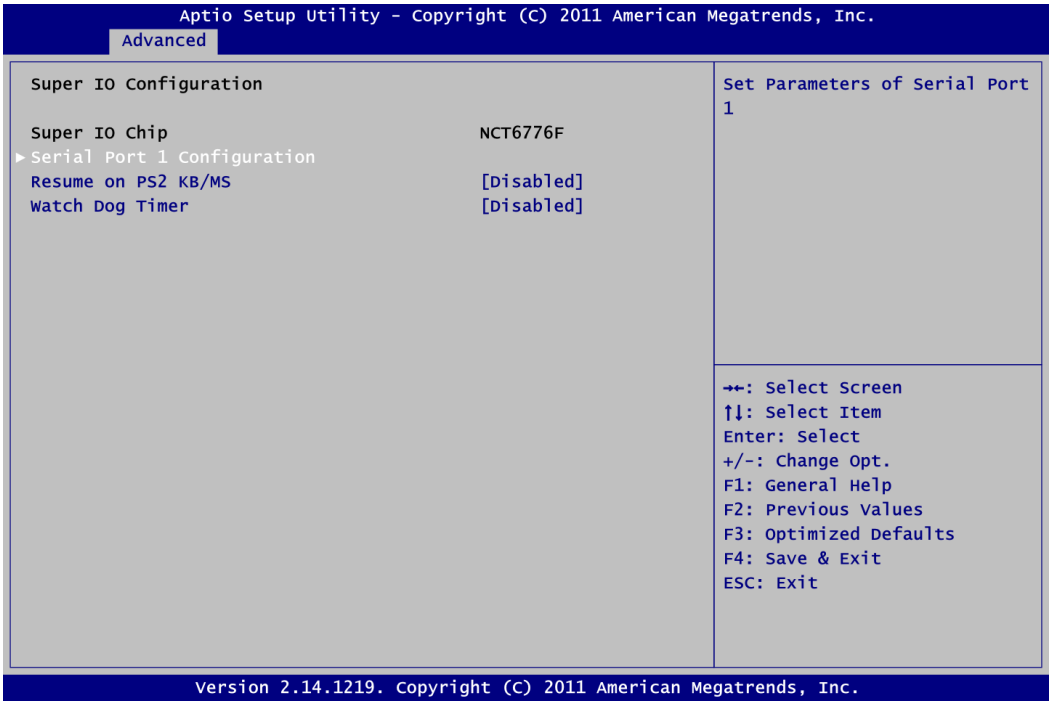
Legacy USB Support
Use this item to enable or disable support for USB device on legacy operating system. The default setting is Enabled. Auto option disables legacy support if no USB devices are connected. Disable option will keep USB devices available only for EFI applications.

- **Second Super IO Configuration**
  You can use this screen to select options for the Second Super IO Configuration, and change the value of the selected option. A description of the selected item appears on the right side of the screen. For items marked with "▶", please press <Enter> for more options.



Serial Port 2 and 3 Configuration
Use this item to set parameters of serial port 2 and 3.

- **Super IO Configuration**
  You can use this screen to select options for the Super IO Configuration, and change the value of the selected option. A description of the selected item appears on the right side of the screen. For items marked with "►", please press <Enter> for more options.

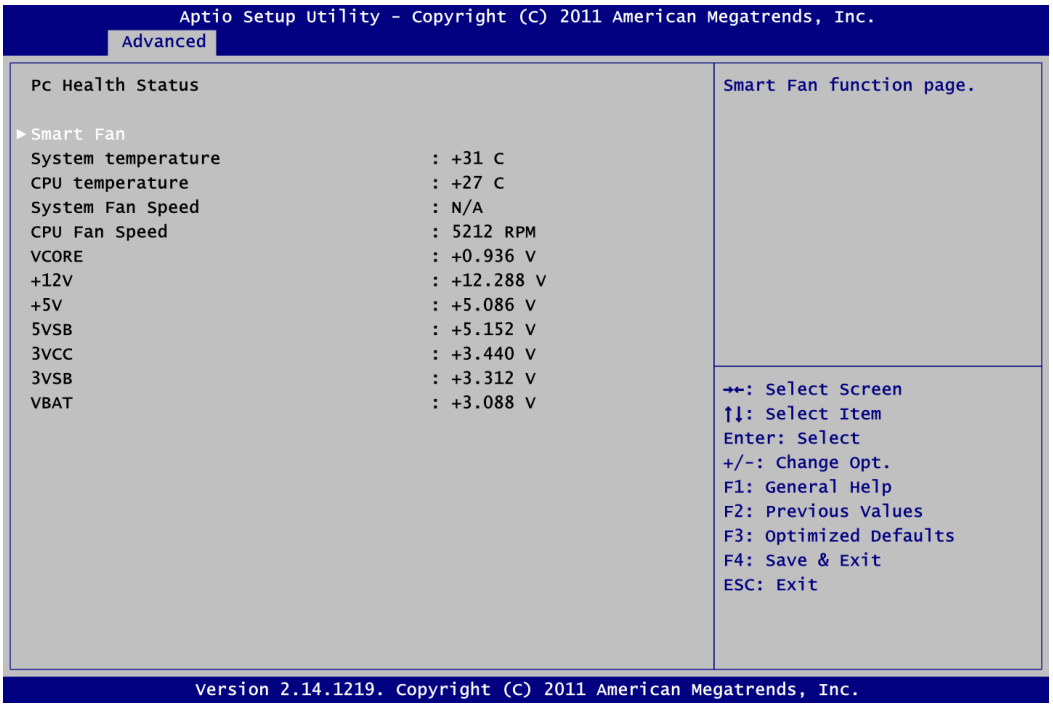


Serial Port 1 Configuration
Use this item to set parameters of serial port 1.

Resume on PS2 KB/MS
Enable or disable resume on PS/2 keyboard and mouse function.

Watch Dog Timer
Enable or disable watchdog timer function.

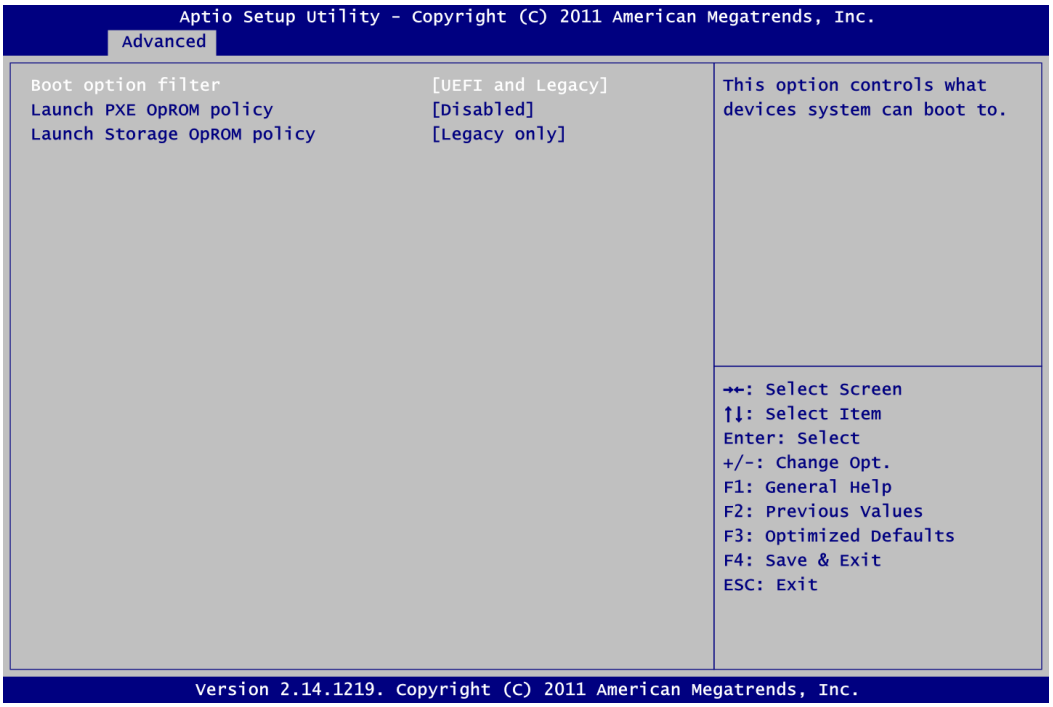
- **H/W Monitor**
  Use this screen for Smart Fan configuration and hardware health status monitoring.



This screen displays the temperature of system and CPU, cooling fan speed in RPM and system voltages (VCORE, +12V, +5V, 5VSB, etc).

Smart Fan
This option allows users to configure Smart Fan function.

- **Option Rom Policy**

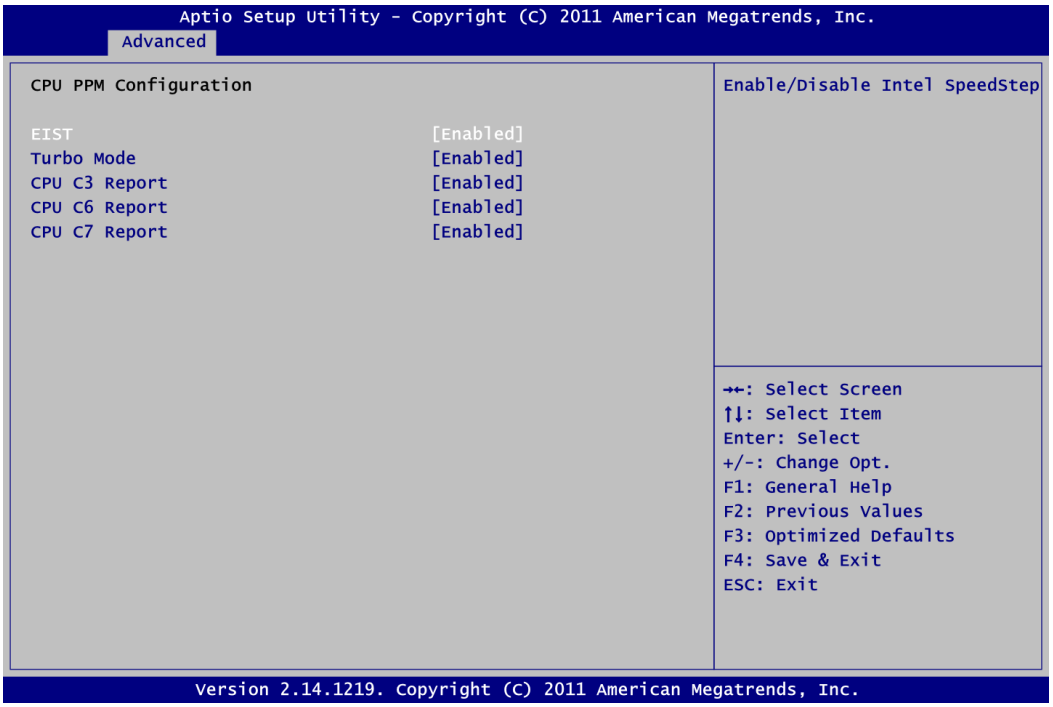


Boot Option Filter
This option controls what devices system can boot to.

Launch PXE OpROM policy
Enable or disable boot options for legacy network devices.

Launch Storage OpROM policy
Control the execution of UEFI and legacy storage OpROM.

- **CPU PPM Configuration**
  Use this screen for CPU PPM configuration.



EIST
Enable or disable Intel® SpeedStep. When enabled, CPU speed is controlled by the operating system. When disabled, CPU runs at its default speed.

Turbo Mode
This item is for enabling or disabling turbo mode. When enabled, it allows processor cores to run faster than marked frequency under certain conditions.

CPU C3 Report
Enable or disable CPU C3 report to SO

CPU C6 Report
Enable or disable CPU C6 report to SO

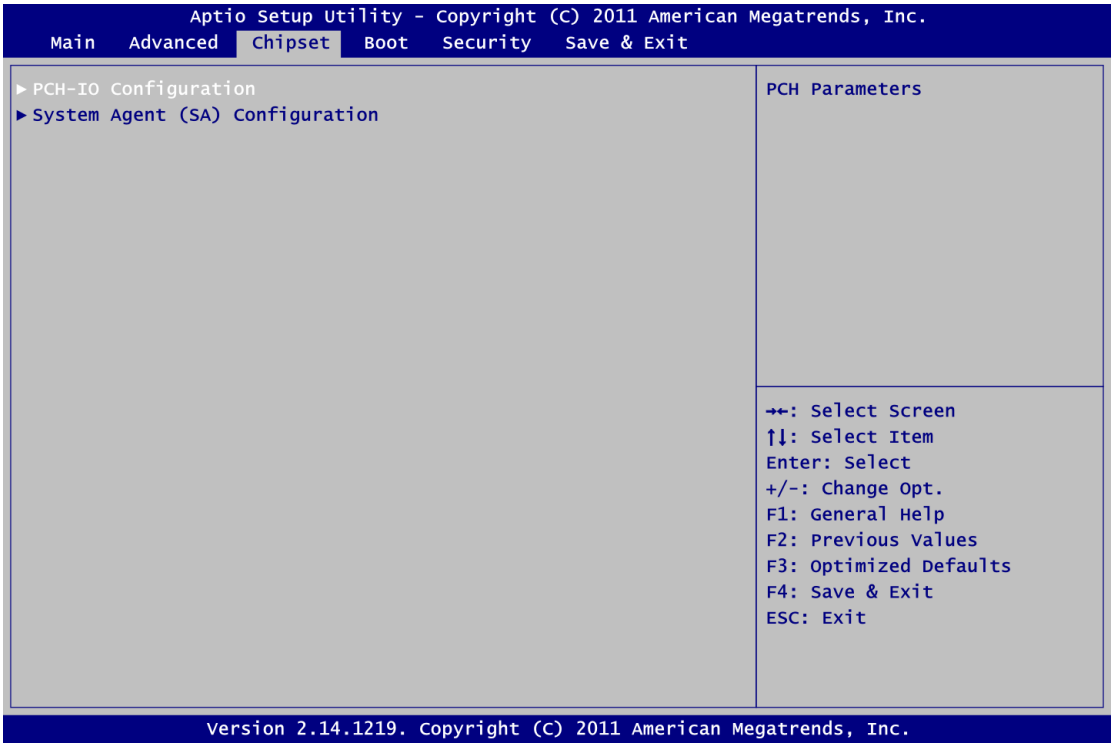
CPU C7 Report
Enable or disable CPU C7 report to SO

5.5 Chipset Menu

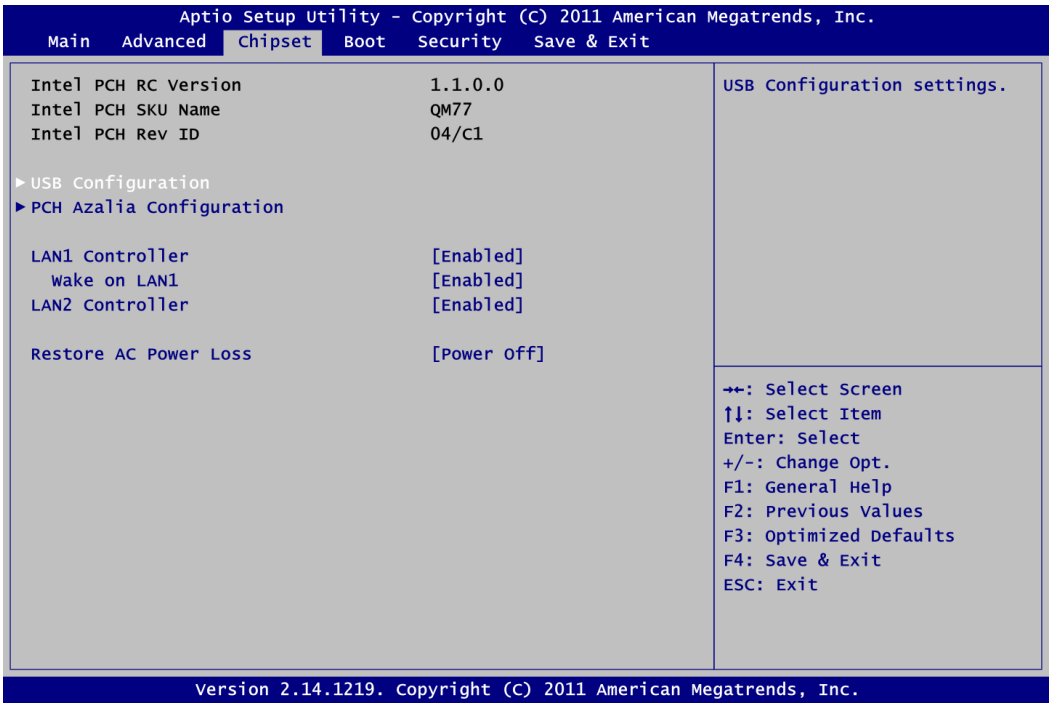
The Chipset menu allows users to change the advanced chipset settings. You can select any of the items in the left frame of the screen to go to the sub menus:

- ► PCH-IO Configuration
- ► System Agent (SA) Configuration

For items marked with "►", please press <Enter> for more options.



- **PCH-IO Configuration**
  This screen allows users to set PCH parameters.



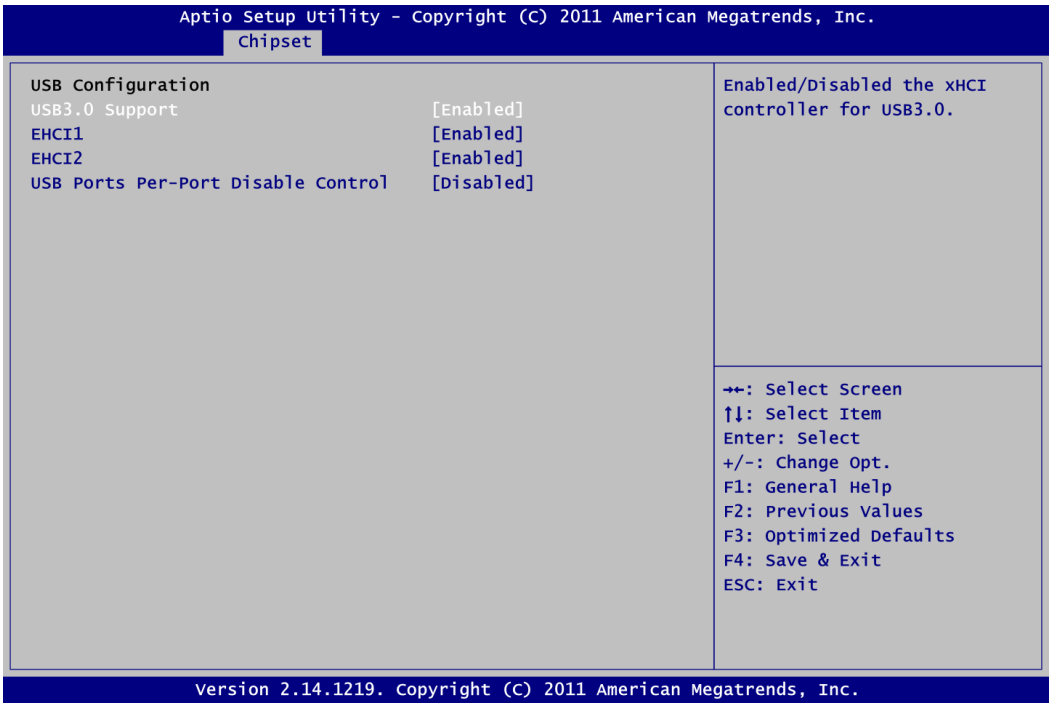
LAN1 Controller
Enable or disable LAN1 controller.

Wake on LAN1
Enable or disable Wake on LAN1 functionality.

LAN2 Controller
Enable or disable LAN2 controller.

Restore AC Power Loss
Set the system power status when power returns from a power failure situation. The system power status options are Power Off, Power On and Last State.

- **PCH USB Configuration**

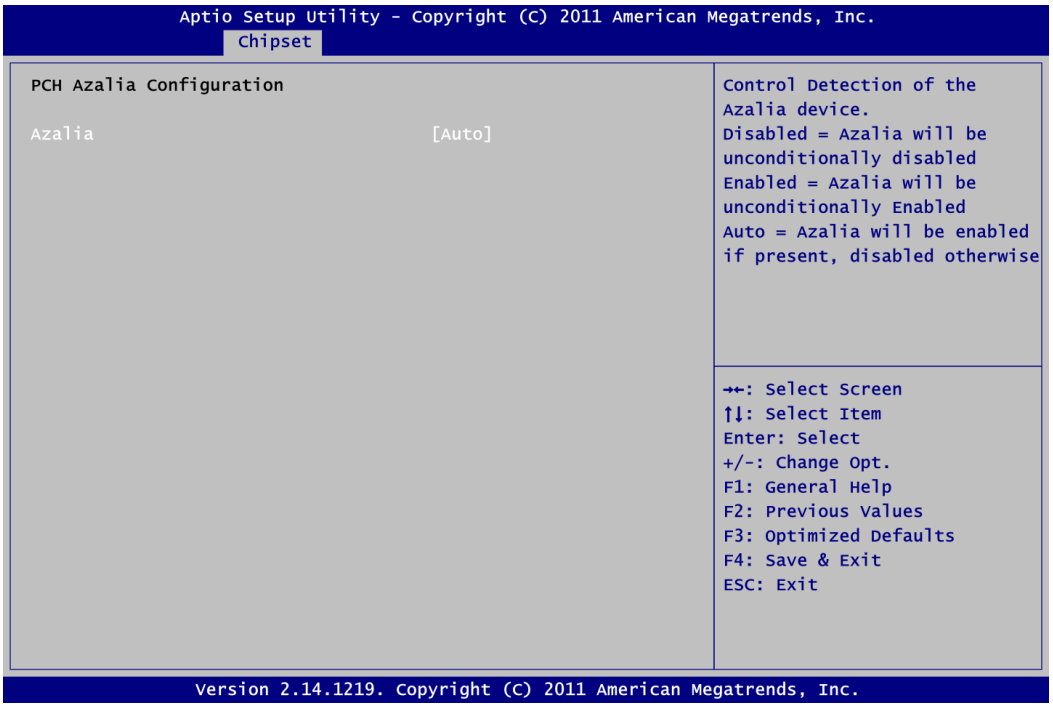


USB3.0 Support
Enable or disable the XHCI controller for USB 3.0.

EHCI1/EHCI2
Enable or disable the EHCI controller.

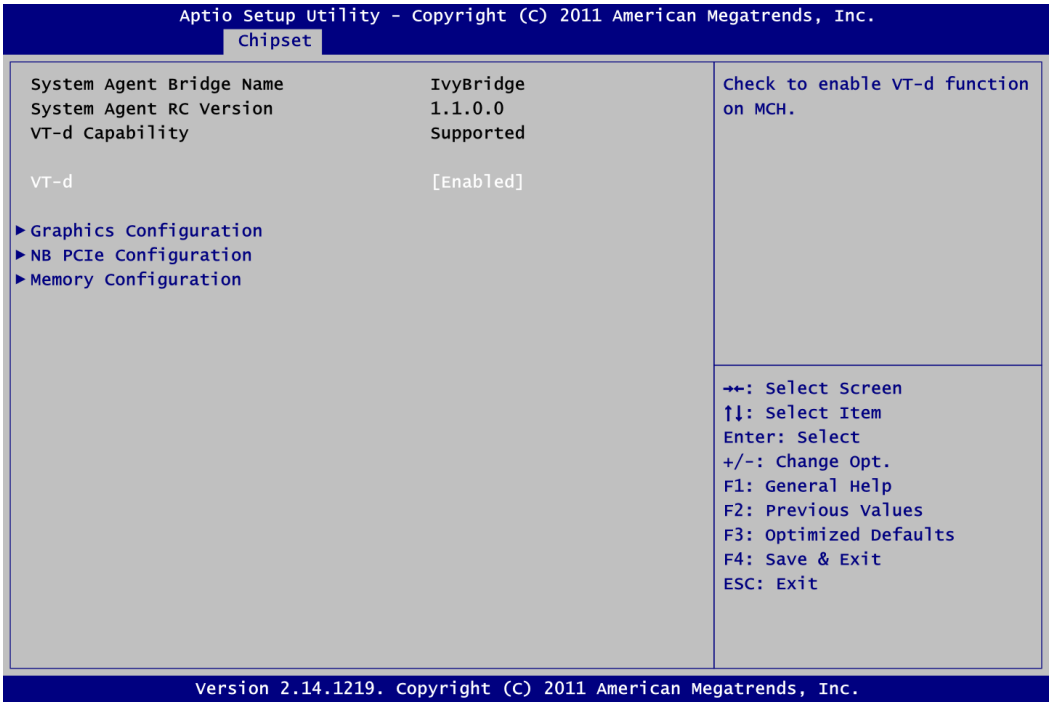
USB Ports Per-Port Disable Control
Enable or disable each USB port individually.

- **PCH Azalia Configuration**



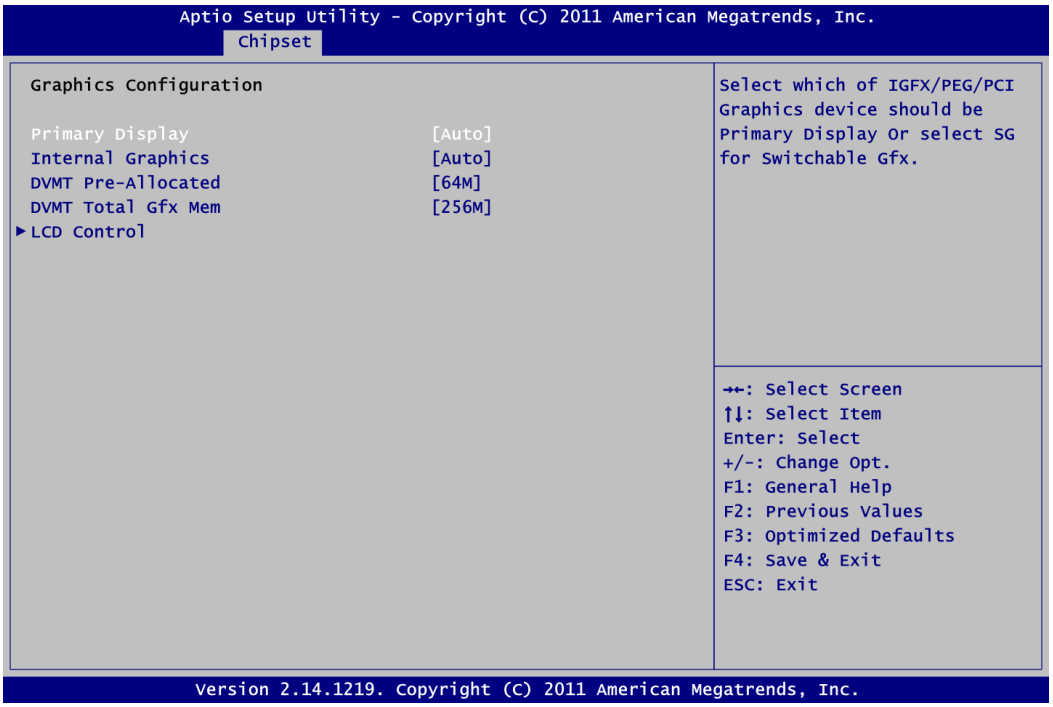
Azalia
Control detection of the Azalia device. Configuration options are Disabled, Enabled and Auto.

- **System Agent (SA) Configuration**
  This screen shows System Agent information and provides function for specifying related parameters. For items marked with "►", please press <Enter> for more options.



VT-d
Enable or disable Intel® chipset virtualization technology for directed I/O. VT-d can help end users improve security and reliability of the systems and also improve performance of I/O devices in virtualized environment.

- **Graphics Configuration**



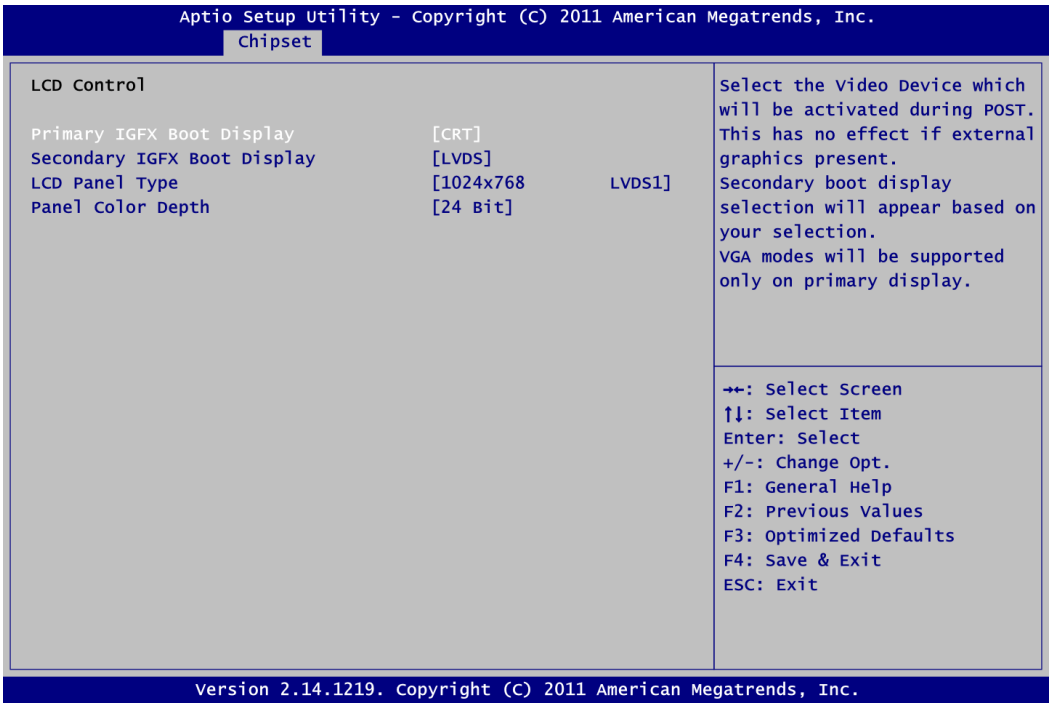
Primary Display
Allow you to select which graphics controller to use as the primary boot device.

Internal Graphics
Enable or disable IGD.

DVMT Pre-Allocated
Select DVMT pre-allocated memory size.

DVMT Total Gfx Mem
Select DVMT total memory size.

- **LCD Control**



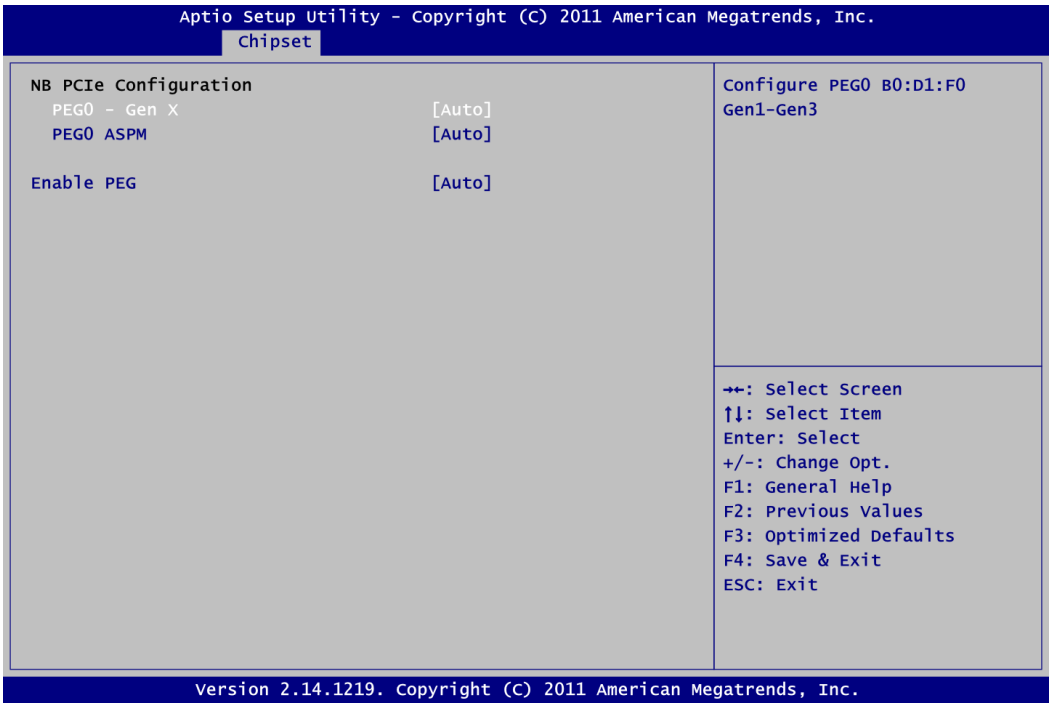
Primary IGFX Boot Display
Allow you to select the display device which will be activated during POST. This has no effect if external graphics present. Secondary boot display selection will appear based on your selection. Configuration options are CRT, DVI, LVDS and HDMI.

Secondary IGFX Boot Display
Allow you to select secondary display device. Secondary IGFX boot display options are: CRT, DVI, LVDS and HDMI.

LCD Panel Type
Select LCD panel type for LVDS port

Panel Color Depth
Select the LFP panel color depth. Configuration options are: 18 Bit and 24 Bit.

- **NB PCIe Configuration**

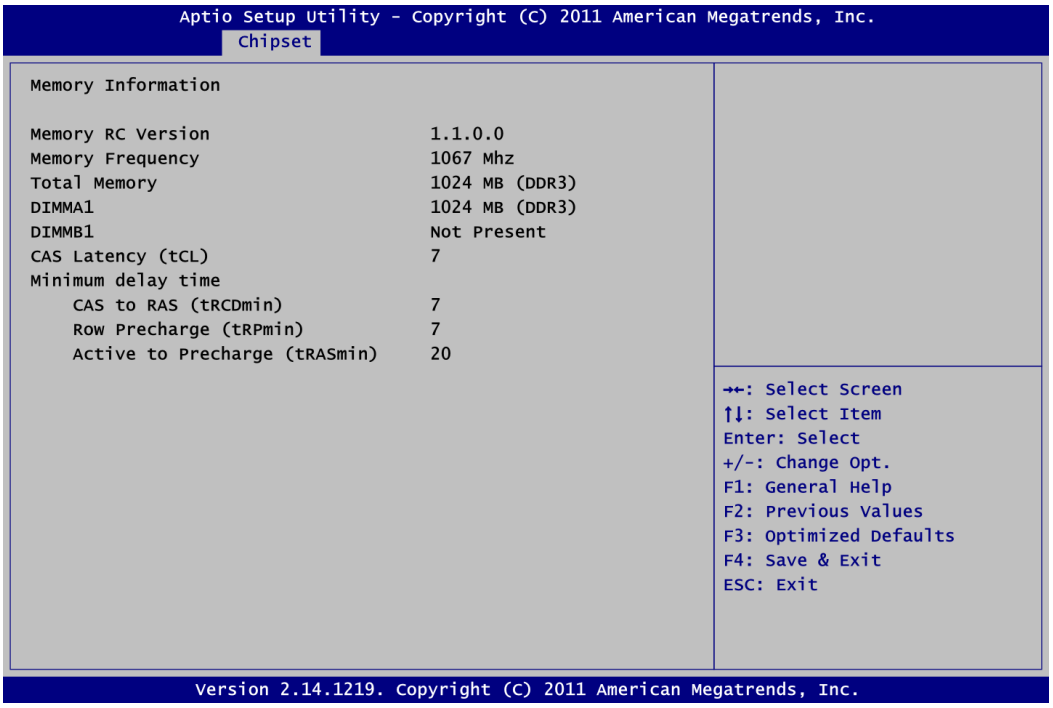


PEG0 – Gen X
Select PEG0 speed.

PEG0 ASPM
Control ASPM support for the PEG device.

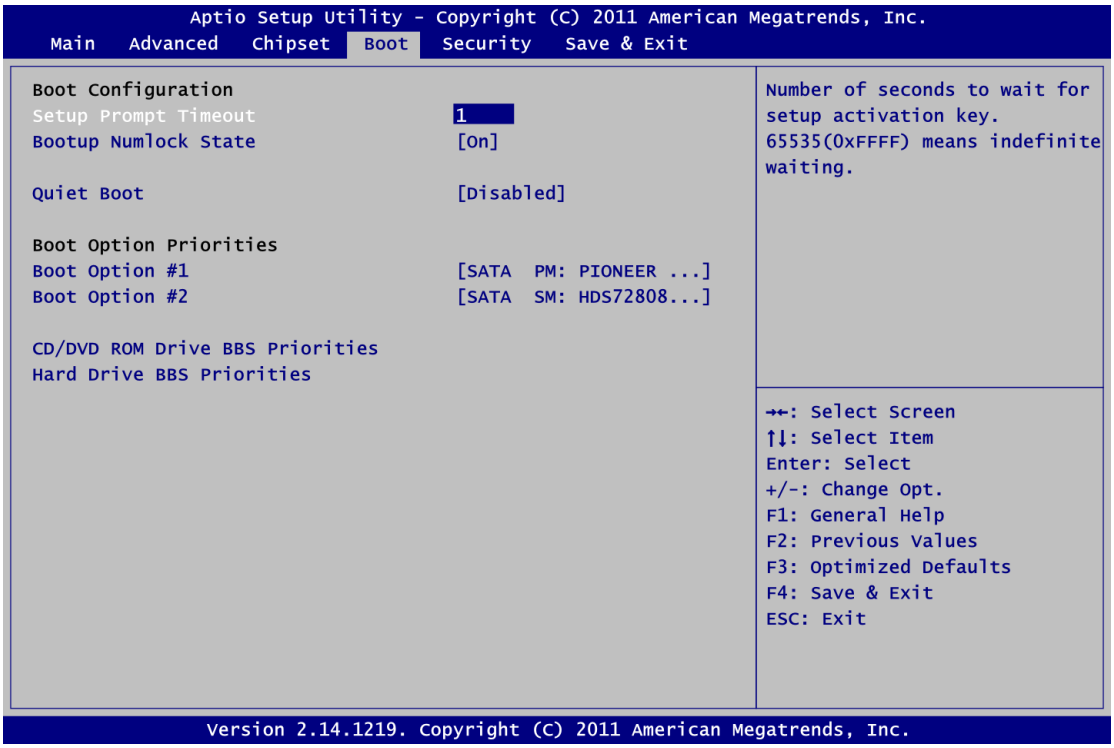
Enable PEG
Enable or disable PEG always.

- **Memory Configuration**
  This screen displays system memory information.



5.6 Boot Menu

The Boot menu allows users to change boot options of the system.



- **Setup Prompt Timeout**
  Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.

- **Bootup NumLock State**
  Use this item to select the power-on state for the keyboard NumLock.

- **Quiet Boot**
  Select to display either POST output messages or a splash screen during boot-up.

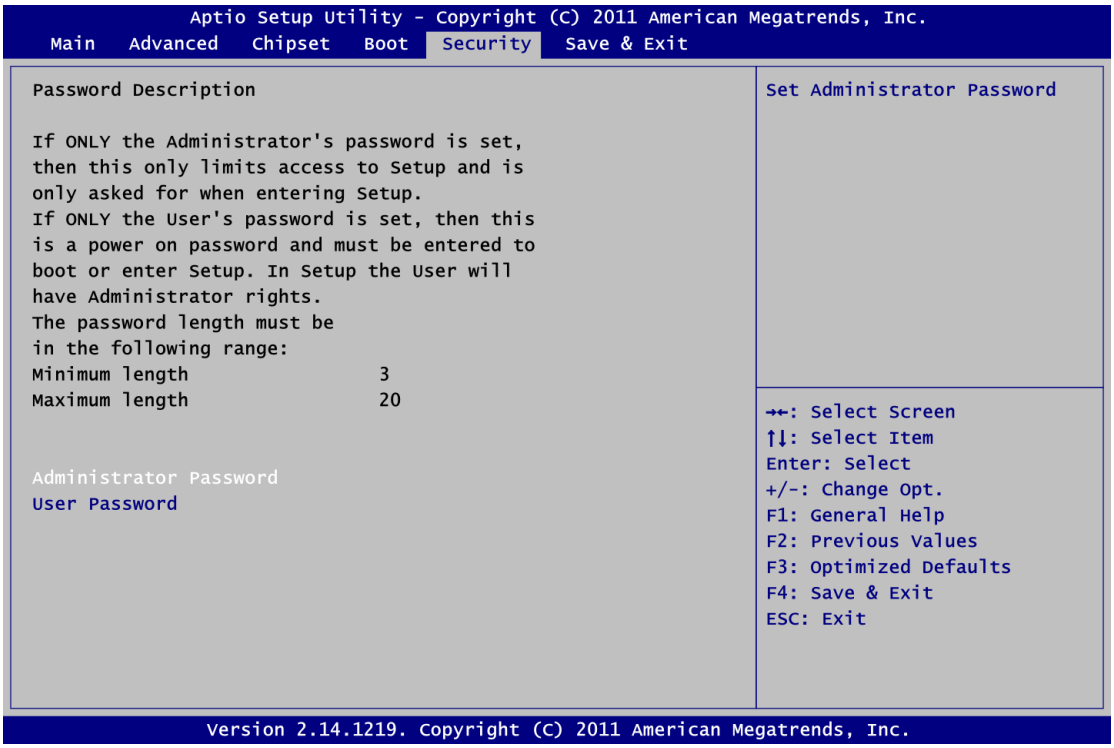
- **Boot Option Priorities**
  These are settings for boot priority. Specify the boot device priority sequence from the available devices.

- **Boot Option #1..#2**
  These items are used to form the boot order and are dynamically generated. They represent either a legacy BBS (BIOS Boot Specification) class of devices or a native EFI boot entry. Press <Return> on each option to select the BBS class / EFI boot entry desired.

- **CD/DVD ROM Drive BBS/Hard Drive BBS Priorities**
  These items are for configuring the boot order for a specific device class. These options are only visible if at least one device for this class is detected.

5.7 Security Menu

The Security menu allows users to change the security settings for the system.

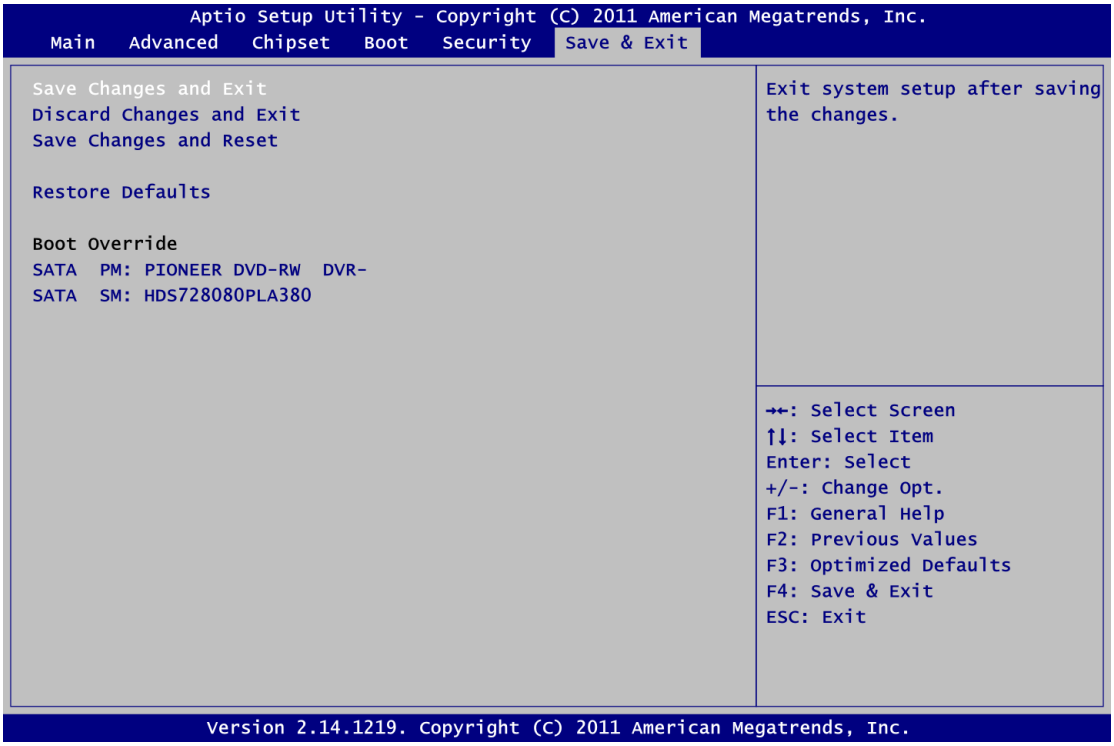


- **Administrator Password**
  This item indicates whether an administrator password has been set (installed or uninstalled).

- **User Password**
  This item indicates whether an user password has been set (installed or uninstalled).

5.8 Save & Exit Menu

The Save & Exit menu allows users to load your system configuration with optimal or fail-safe default values.



- **Save Changes and Exit**
  When you have completed the system configuration changes, select this option to leave Setup and return to Main Menu. Select Save Changes and Exit from the Save & Exit menu and press <Enter>. Select Yes to save changes and exit.

- **Discard Changes and Exit**
  Select this option to quit Setup without making any permanent changes to the system configuration and return to Main Menu. Select Discard Changes and Exit from the Save & Exit menu and press <Enter>. Select Yes to discard changes and exit.

- **Save Changes and Reset**
  When you have completed the system configuration changes, select this option to leave Setup and reboot the computer so the new system configuration parameters can take effect. Select Save Changes and Reset from the Save & Exit menu and press <Enter>. Select Yes to save changes and reset.

- **Restore Defaults**
  It automatically sets all Setup options to a complete set of default settings when you select this option. Select Restore Defaults from the Save & Exit menu and press <Enter>.

- **Boot Override**
  Select a drive to immediately boot that device regardless of the current boot order.

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