

MX87QD

User's Manual

Ver 1.0

Intel® Q87 Mini ITX Motherboard supports 22nm Intel® Core™ i7/i5/i3
4th generation Desktop Processors (Haswell Platform)



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Safety Information

Electrical safety

- To prevent electrical shock hazard, disconnect the power cable from the electrical outlet before relocating the system.
- When adding or removing devices to or from the system, ensure that the power cables for the devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you add a device.
- Before connecting or removing signal cables from the motherboard, ensure that all power cables are unplugged.
- Seek professional assistance before using an adapter or extension cord. These devices could interrupt the grounding circuit.
- Make sure that your power supply is set to the correct voltage in your area. If you are not sure about the voltage of the electrical outlet you are using, contact your local power company.
- If the power supply is broken, do not try to fix it by yourself. Contact a qualified service technician or your retailer.

Operation safety

- Before installing the motherboard and adding devices on it, carefully read all the manuals that came with the package.
- Before using the product, make sure all cables are correctly connected and the power cables are not damaged. If you detect any damage, contact your dealer immediately.
- To avoid short circuits, keep paper clips, screws, and staples away from connectors, slots, sockets and circuitry.
- Avoid dust, humidity, and temperature extremes. Do not place the product in any area where it may become wet.
- Place the product on a stable surface.
- If you encounter technical problems with the product, contact a qualified service technician or your retailer.



The symbol of the crossed out wheeled bin indicates that the product (electrical and electronic equipment) should not be placed in municipal waste. Check local regulations for disposal of electronic products.

Safety Declaration

This device complies with the requirements in Part 15 of the FCC rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

About this guide

This user guide contains the information you need when installing and configuring the motherboard.

How this guide is organized

This manual contains the following parts:

- **Chapter 1: Product introduction**
This chapter describes the features of the motherboard and the new technology it supports. This chapter also lists the hardware setup procedures that you have to perform when installing system components. It includes description of the jumpers and connectors on the motherboard.
- **Chapter 2: BIOS setup**
This chapter tells how to change system settings through the BIOS Setup menus. Detailed descriptions of the BIOS parameters are also provided.

Where to find more information

Refer to the following sources for additional information and for product and software updates.

1. Motherboard User's Manual and Device Drivers

Motherboard User's Manual and Device Drivers can be downloaded at BCM Advanced Research website: http://www.bcmcom.com/bcm_support_drivers.htm

2. Technical Support

If a problem arises with your system and no solution can be obtained from the user's manual, please contact your place of purchase or local distributor. Alternatively, please try the following help resources for further guidance. Visit the BCM Advanced Research website:

<http://www.BCMCOM.com>

3. Optional documentation

Your product package may include optional documentation, such as warranty flyers, that may have been added by your dealer. These documents are not part of the standard package.

Conventions used in this guide

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



DANGER/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.

Typography

Bold text

Indicates a menu or an item to select

Italics

Used to emphasize a word or a phrase

<Key>

Keys enclosed in the less-than and greater-than sign means that you must press the enclosed key

Example: <Enter> means that you must press the Enter or Return key

<Key1>+<Key2>+<Key3>

If you must press two or more keys simultaneously, the key names are linked with a plus sign (+)

Example: <Ctrl>+<Alt>+<D>

Command

Means that you must type the command exactly as shown, then supply the required item or value enclosed in brackets

Example: At the DOS prompt, type the command line:

afudos /i[filename]

afudos /iP5P800VM.ROM

Packing List

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

- 1 x MX87QD Mini-ITX Main board
- 1 x Dual COM cables
- 2 x SATA cables
- 1 x SATA Y Power cables
- 1 x DC to DC Power Extension cable
- 1 x I/O Shield
- 1 x Quick Installation Guide



If any of the above items is damaged or missing, please contact your retailer.

Revision History

Revision	Revision History	Date
V1.0	First release version	2013/06

Specifications Summary

Features	CPU	Socket LGA1150 supports Core i7/i5/i3 CPU up to 65W TDP
	Chipset	Intel® Q87
	Memory	2 x 204 Pin SODIMM sockets supports 1.5V DDR3 memory 1333/1600 MHz up to 16GB
	Display	Intel® GMA HD 4600 (GT2)
	Audio	Realtek® ALC892, 5.1 with Multiple Streaming HD Audio
	LAN	Intel I210AT Gigabit Ethernet controller Intel I217 Gigabit Ethernet controller
	Expansion	1 x PCI-E x16 (supports device up to 10W) 2 x miniPCI-E x1
	I/O	1 x VGA Port & 1 x DVI-D Port 2 x Display Port 1 x LVDS 24 bit / Dual Channel 4 x COM Port (pin header) 10 x USB Port (4 x USB3.0, 6 x USB2.0) 4 x SATA 6.0 Gp/s 1x LPT (pin header) 1x PS2 MS/KB (Optional)
	Others	16 Bit GPIO (DIO) / Front audio / TPM 1.2

Specifications

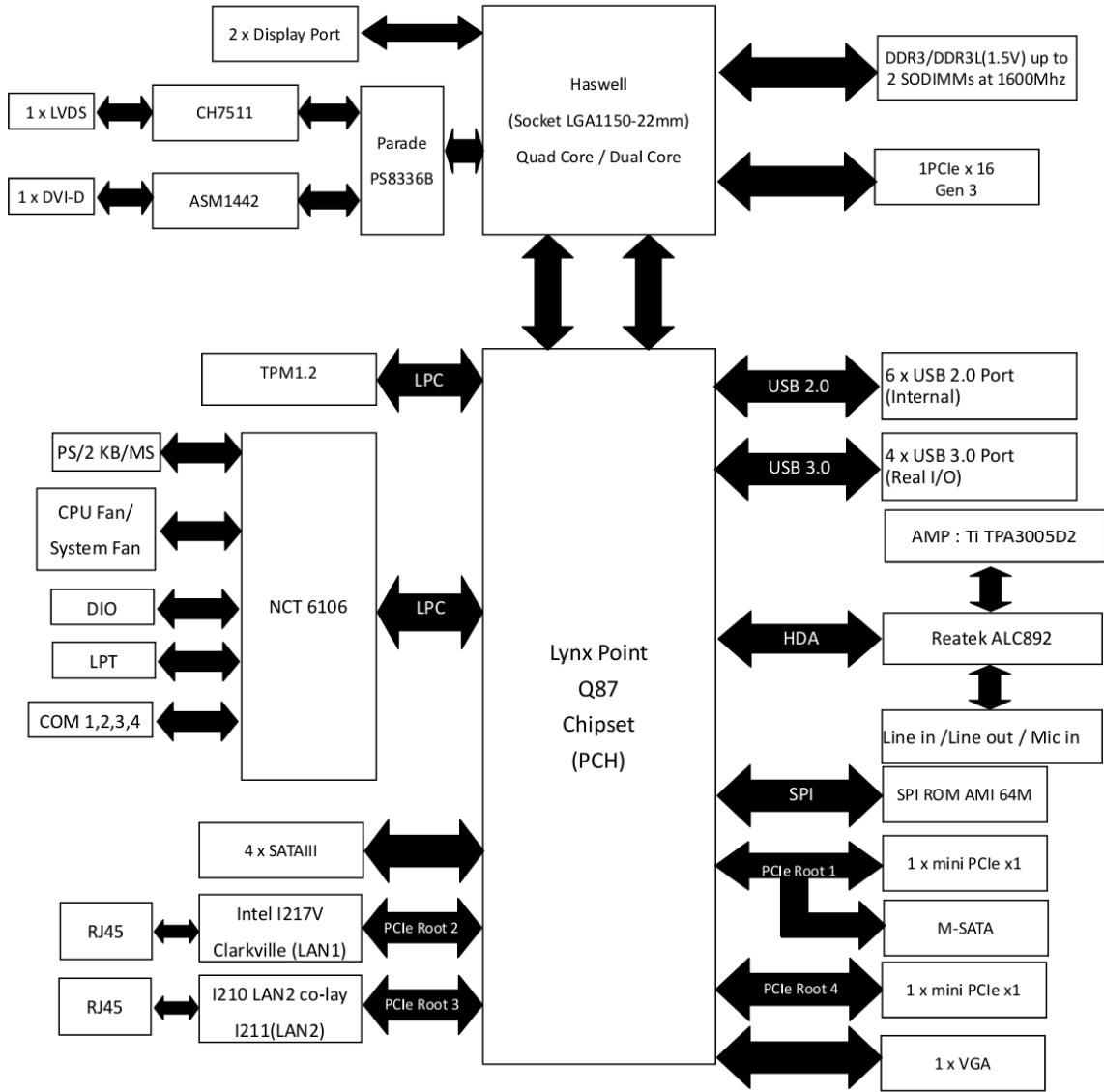
System	
CPU	Socket LGA1150 supports Core i7/i5/i3 CPU up to 65W TDP
BIOS	AMI 64 Mb BIOS
System Chipset	Intel® Q87
I/O Chipset	Nuvoton NCT6106D
Memory	2 x 204 Pin SODIMM sockets supports 1.5V DDR3 memory 1333/1600 MHz up to 16GB
Watchdog Timer	Reset: 1 sec.~255 min. and 1 sec. or 1 min./step
H/W Status Monitor	Monitoring temperatures, voltages, and cooling fan status. Auto throttling control when CPU overheats
Expansion Slots	1 x PCI-E x16 slot (supports device up to 10W) 2 x miniPCI slot (1 half size, 1 full size. Full size slot supports Mini-PCIe device or mSATA SSD via jumper select)
DIO	16 Bit (8 in, 8 out)
S3 / S4	Yes
TPM	TPM1.2 (Infineon® TPM chip 9635 TT 1.2 on board)
Wake up on LAN or Ring	LAN (PXE)
Smart Fan Control	Yes, CPU FAN, System FAN (4 pin type via SIO)
Display	
Chipset	Intel® HD Graphics 4600 (GT2) integrated
Max. Resolution	2048 x 1536 bpp(@ 75Hz)
Dual Display Port	on Board
VGA	on board
DVI	on board, via level shifter
Audio	
Audio Codec	Realtek® ALC892, 5.1 +2 with two independent Streaming
Audio Interface	Line in, Line Out, Mic-in

Specifications

Ethernet	
LAN1	Intel I210AT GbLAN Controller
LAN2	Intel I217LM GbLAN Controller
Back I/O Port	
Back Panel	2 x Display Port 1 x VGA Port 1 x DVI-D Port 2 x RJ45 Port 4 x USB 3.0 Port 1 x 3 Audio Jacks(Line-in / Line-Out / Mic in)
Internal I/O Connector	
Internal I/O	4 x SATA 6.0Gp/s connectors 3 x USB connectors support additional 6 USB 2.0 ports 4 x COM Port header 1 x CPU Fan connector 1 x System Fan connector 1 x Chassis Intrusion header 1 x Front Audio connector 1 x Front panel header 1 x Printer Port 1 x 16 Bit DIO connector 1 x 2x2pin DC-In connector
Mechanical & Environmental	
Power Type	12V, 16V - 24V Wide Range DC-In Default setting is 12V
AC-DC Adapter Type	DC Jack Barrel Type (5.5mm x 2.5mm). Minimum output rating @150W recommended.
Operating Temperature	0~60°C (32~140°F)
Operating Humidity	0%~90% relative humidity, non-condensing
Size (L x W)	6.7" x 6.7" (170 mm x 170 mm)
Weight	0.88 lbs (0.40 Kg)

* Specifications are subject to change without notice.

Block Diagram



This chapter describes the motherboard features and the new technologies it supports.

1 **Product Introduction**

Chapter 1 - Product Introduction

1.1 Product highlights

1.1.1 Product Overview

Supports latest Intel LGA 1150 CPU-socket interface processor, the 4th Generation Intel® Core i7/i5/i3 Haswell desktop 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 16GB/s and pumps up the system performance at lower power.

DMI (Direct Media Interface) architecture connects between the processor and chipset at 5.0GT/s. The exceptionally increased interconnect bit rate from 2.5GT/s up to 5.0GT/s would effectively eliminate the bottle neck of the system performance and bring the most terrific computing experience from the present to the future. SATA 3.0 doubles the transfer speed of SATA 2.0, running at speed up to 6.0Gb/s, and can connect with any other SATA 3.0Gb/s and 1.5Gb/s devices for backward compatibility.

Supports RAID 0 (Striped disk array), RAID 1 (Mirroring disk array), RAID 5 (Block Interleaved Distributed Parity), RAID 10 (A Stripe of Mirrors). Provides users the performance and protection. Integrated 5.1-channel HD Audio CODEC, delivering advanced multi-channel audio and bringing you the experience of home theater-quality sound. LAN supporting a high transfer rate up to Gigabit/s, delivers transfer speed ten times faster than conventional 10/100 Ethernet connections. Gigabit LAN is the networking standard for the future and is ideal for handling large amount of data such as video, audio, and voice.

Choose an environment-friendly, fully RoHS-compliant ECS product as the foundation for keeping harmful substances out of our ecosystem.

1.1.2 Platform Features and Benefits

- Integrated Gfx (Intel® HD Graphics 4600) with enhanced operating modes to enable excellent graphics performance in power and cost sensitive embedded applications
- DirectX® 11.1 & Open GL 3.2 let you enjoy awesome graphics performance, stunning 3D visual effect and dynamic interactivity
- Memory support, integrated low voltage DDR3 memory controller
- Operating system support:
 - Microsoft

- WindRiver
- Redhat
- Novell
- Green Hills
- QNX
- LinuxWorks

1.1.3 Key Architecture Features

- Supports Intel LGA 1150 CPU, the 4th Generation Intel® Core i3, i5, i7 desktop processors.
 - 22nm monolithic die
 - Integrated Gfx Intel® HD Graphics 4600 (GT2) & memory controller
 - 4 & 2 Cores, up to 6MB LLC
 - HW accelerated video CODECs
 - Compatible with high speed DDR3-1600
 - TDP: 35W-45W (Low Power), 65W (Scalable)
- Intel® Turbo Boost Technology 2.0
 - More efficient power sharing between CPU and Graphics
- Intel® Hyper-Threading Technology
- Intel® Advanced Vector Extensions (Intel® AVX)
- Transactional Synchronization Extensions (TSX)
- Integrated Display Interfaces
 - Dual Independent Display Support
 - DVI-D
 - Analog VGA
 - LVDS
- Intel® HD Graphics 4600
 - DirectX® 11.1
 - Improved realism for DX 3D applications. Improved rendering.
 - OpenGL 3.2
 - Improved realism for OGL 3D based application
 - UVD (Unified Video Decoder) 2.01
 - Hardware decode of most common HD codecs (MPEG-2, H.264/AVC MPEG-4 and VC-1)
 - Supports ATI Hybrid CrossFireXTM Technology2
- Intel Quick Sync Video
 - Enables faster and higher quality video editing, recording and sharing
- I/O
 - PCI Express® x 16
 - Four SATA ports (Gen 3.0, 6Gb/s) support RAID 0,1, 5, 10
 - Gigabit Ethernet Media Access Controller (GbE MAC)

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IPv4 and IPv6 Checksum Offload

- High Definition Audio
- USB: Gen 3.0, 4 ports. Gen 2.0, 6 ports
- SMBus 2.0
- LPC Bus

Supports SPI devices

- Hardware Monitor
 - Fan control (Voltage, Temp)
 - Watchdog timer

- Power Management

- Dual Dynamic Power Management
 - Separate power planes for cores and memory controller
- Advanced Configuration and Power Interface (ACPI) 3.0

1.2 Before you Proceed

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



- 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.

1.3 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.



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.

1.3.1 Placement Direction

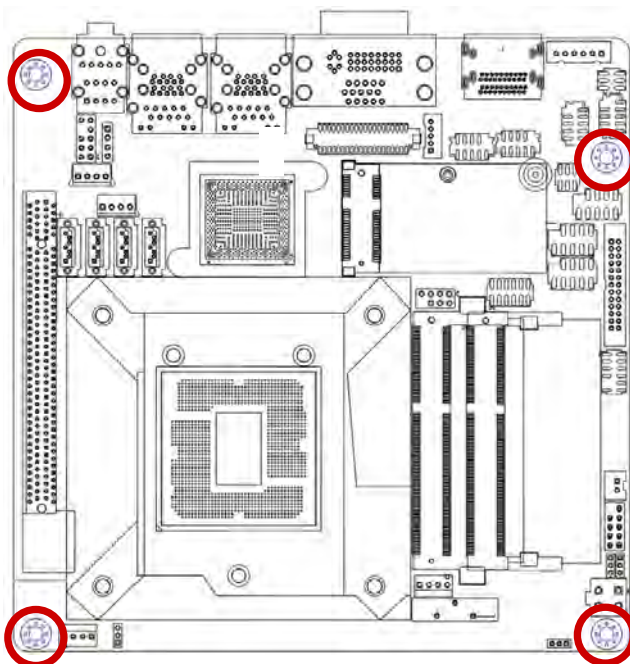
When installing the motherboard, make sure that you place it into the chassis in the correct orientation. The edge with external ports goes to the rear part of the chassis as indicated in the image below.

1.3.2 Screw Holes

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

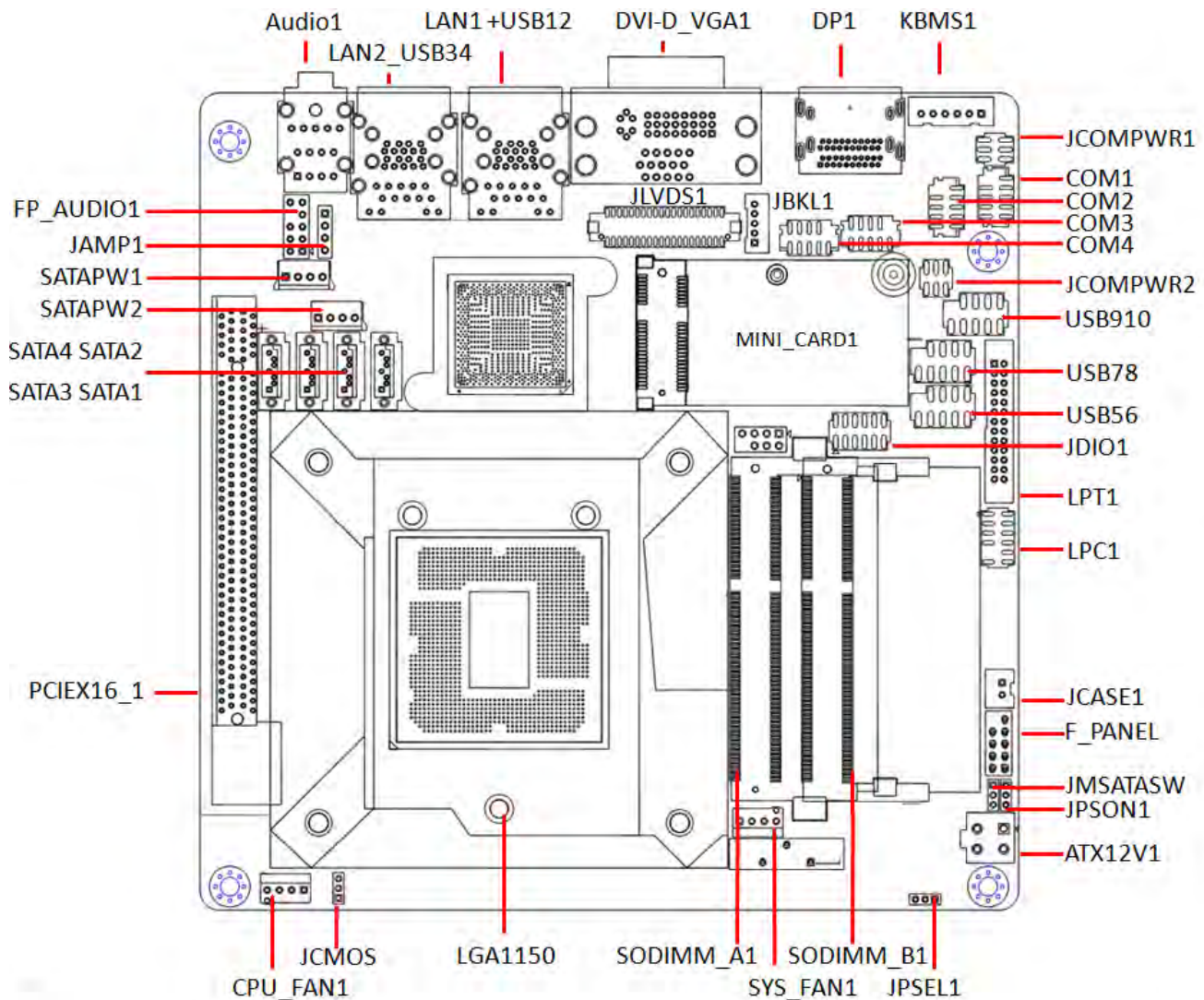


Do not over tighten the screws! Doing so can damage the motherboard.



Place this side towards the rear of the chassis.

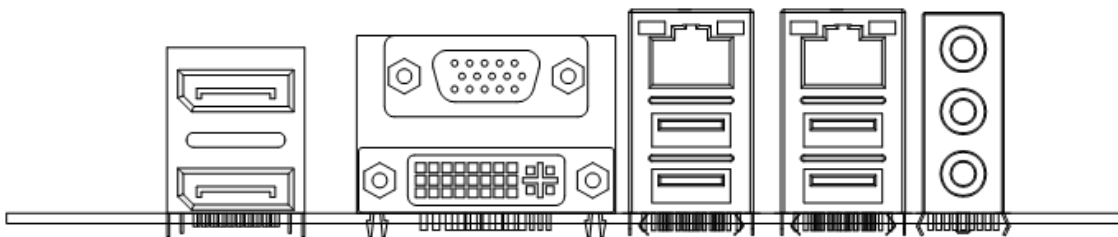
1.3.3 Motherboard Layout



1.3.4 Layout Content List

Slots & socket			
Label	Function	Note	Page
LGA1150	LGA1150 socket		
DIMMA1	204-pin DDR3 SODIMM Slot A1		27
DIMMB1	204-pin DDR3 SODIMM Slot B1		27
PCIEX16	PCIe x16 Slot		31
MINI_CARD	Mini-PCIe Slot		32

Jumpers			
Label	Function	Note	Page
JCMOS	Load CMOS Default	3 x 1 header, pitch 2.00mm	33
JCASE1	Chassis Intrusion Connector	2 x 1 wafer, pitch 2.54mm	34
JPSON1	AT/ATX Power Select	3 x 1 header, pitch 2.00mm	34
JCOMPWR1,2	COM1&COM2 / COM3&COM4 RI/+5V/+12V Select	3 x 2 header, pitch 2.00mm	35
JMSATASW	MSATA/Mini-PCIe Select	3 x 1 header, pitch 2.00mm	36
JPSEL1	DC-In voltage Select	3 x 1 header, pitch 2.00mm	36



Rear Panel Connector			
Label	Function	Note	Page
DP1	Dual Display Port		37
DVI-D_VGA1	VGA Connector DVI Connector	D-sub 15-pin, female Dual Link DVI-D; 24 pins	37
LAN1_USB12	RJ-45 Ethernet Connector x 1 USB 3.0 Connector x 2		37
LAN2_USB34	RJ-45 Ethernet Connector x 1 USB 3.0 Connector x 2		37
AUDIO1	Line-in Port, Line-out Port, Microphone Port,	5.1 Channel Audio I/O (3 jacks)	37

1.3.5 Internal Connector

Internal Connector			
Label	Function	Note	Page
CPU_FAN1	CPU Fan Connector	4 x 1 wafer, pitch 2.54mm	38
SYS_FAN1	System Fan Connector	4 x 1 wafer, pitch 2.54mm	38
F_PANEL	System Panel Connector	5 x 2 header, pitch 2.54mm	39
ATX12V1	DC Power Connector	2 x 2 Mini-Fit Jr header, 4.20mm	40
COM 1,2,3,4	Serial Port Connector 1,2,3,4	5 x 2 wafer, pitch 2.00mm	41
JDIO1	Digital I/O Connector	10 x 2 header, pitch 2.54mm	41
LPT1	Parallel Port Connector	13 x 2 header, pitch 2.00mm	42
KBMS1	PS/2 KB/MS Connector	6 x 1 wafer, pitch 2.54mm	42
JLVDS1	Low-Voltage Differential Signaling Connector	20 x 2 wafer, pitch 1.25mm (Hirose:DF13-40DP-1.25V(91))	43
JBKL1	LCD Inverter Connector	5 x 1 wafer, pitch 2.00mm	44
USB56/78/910	USB 2.0 Connector	5 x 2 header, pitch 2.54mm	44
FP_AUDIO1	Front Panel Audio Connector	5 x 2 header, pitch 2.54mm	45
JAMP1	Amplifier Connector	4 x 1 header, pitch 2.54mm	45
SATA1~4	Serial ATA Connectors 1~4	7-pin header	46
SATAPW1~2	SATA Power Connectors 1~2	4 x 1 wafer, pitch 2.54mm	46

1.4 Central Processing Unit (CPU)

The motherboard comes with a surface mount LGA1150 socket designed for the Intel® Core™ i7/ i5/ i3 processor in the 1150-land package.

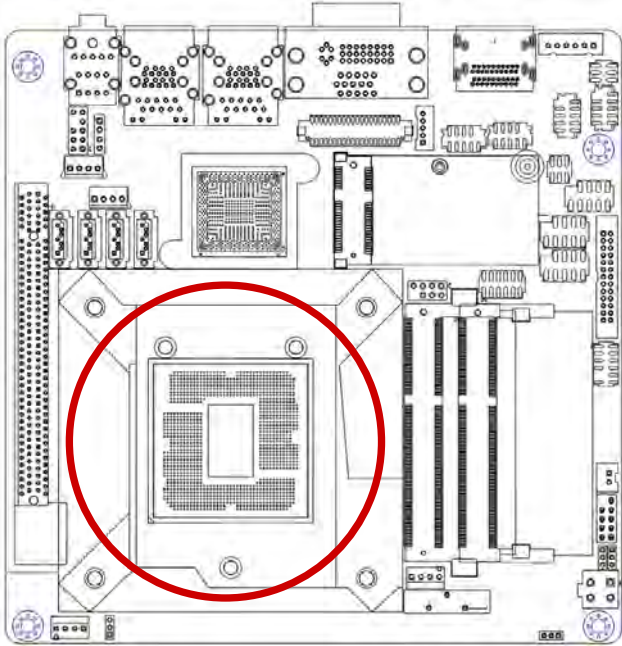
- Your boxed Intel® Core™ i7/ i5/ i3 LGA1150 processor package should come with installation instructions for the CPU, fan and heatsink assembly. If the instructions in this section do not match the CPU documentation, follow the latter.
- Upon purchase of the motherboard, make sure that the PnP cap is 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. BCM will shoulder the cost of repair only if the damage is shipment/transit-related.
- Keep the cap after installing the motherboard. BCM will process Return Merchandise Authorization (RMA) requests only if the motherboard comes with the cap on the LGA1150 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.



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.

1.4.1 Installing the CPU

1. Locate the CPU socket on the motherboard.

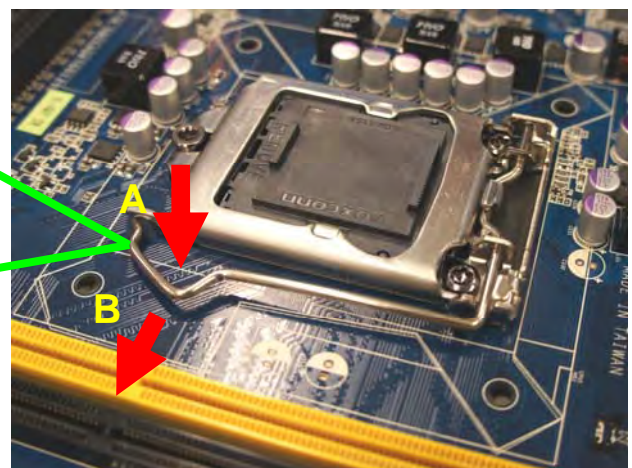
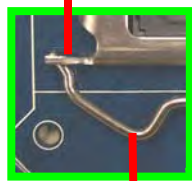


Before installing the CPU, make sure that the socket box is facing towards you and the load lever is on your left.

2. Press the load lever with your thumb (A), then move it to the left (B) until it is released from the retention tab.

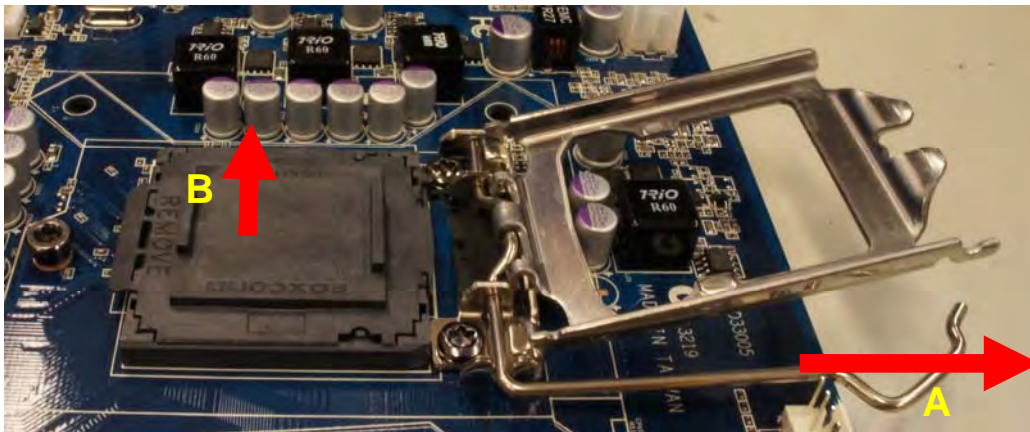
Retention tab

Load lever

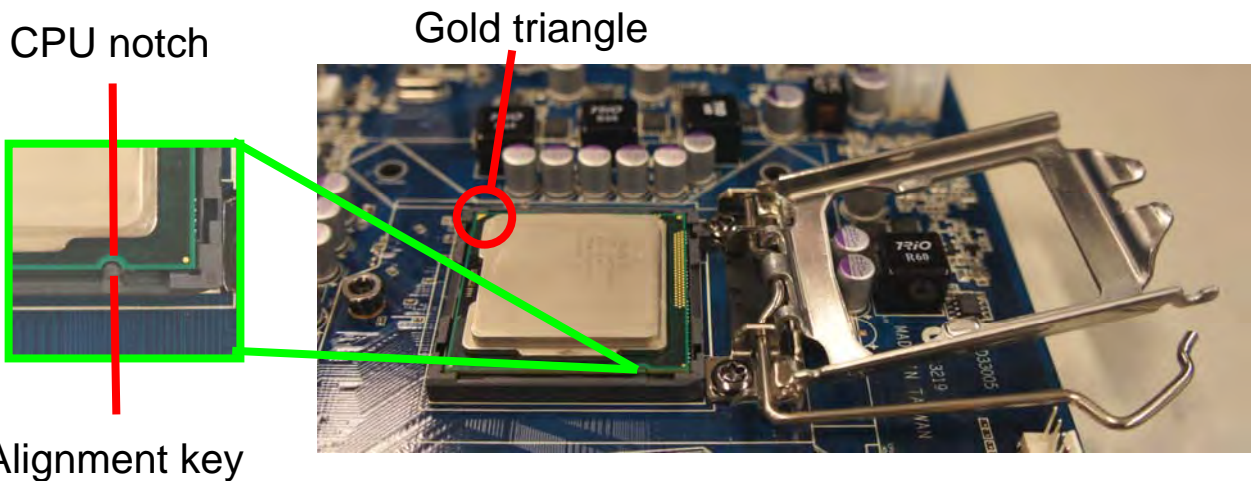


To prevent damage to the socket pins, do not remove the PnP cap unless you are installing a CPU.

3. Lift the Load lever with your thumb and forefinger to around 180° angle (A), then pull the PnP cap from the CPU socket to remove (B).



4. Position the CPU over the socket, making sure that the gold triangle is on the top-left corner of the socket then fit the socket alignment key into the CPU notch.



5. Pull back the load lever , then push the load lever (A) until it snaps into the retention tab.



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!

1.4.2 Installing the CPU Heatsink and Fan

Intel® Core™ i7/ i5/ i3 LGA1150 processor requires a specially designed heatsink and fan assembly to ensure optimum thermal condition and performance.



- Install the motherboard to the chassis before you install the CPU fan and heatsink assembly.
- When you buy a boxed Intel® Core™ i7/ i5/ i3 LGA1150 processor, the package includes the CPU fan and heatsink assembly. If you buy a CPU separately, make sure that you use only Intel® certified multi-directional heatsink and fan.
- Your Intel® Core™ i7/ i5/ i3 LGA1155 processor LGA1150 heatsink and fan assembly comes in a push-pin design and requires no tool to install.

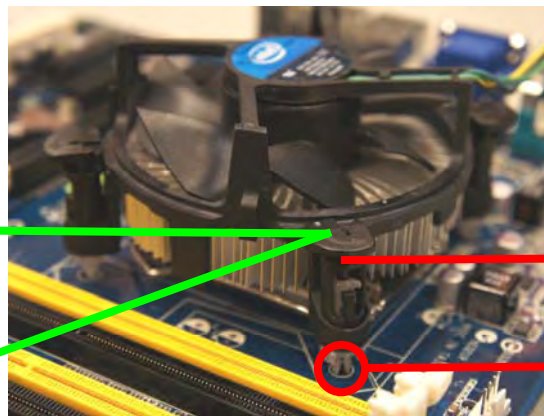
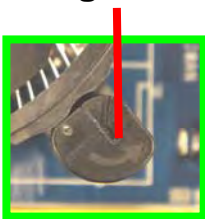


If you purchased a separate CPU heatsink and fan assembly, make sure that you have properly applied Thermal Interface Material to the CPU heatsink or CPU before you install the heatsink and fan assembly.

To install the CPU heatsink and fan:

1. Place the heatsink on top of the installed CPU, making sure that the four fasteners match the holes on the motherboard.

Narrow end of the groove



Fastener

Motherboard hole

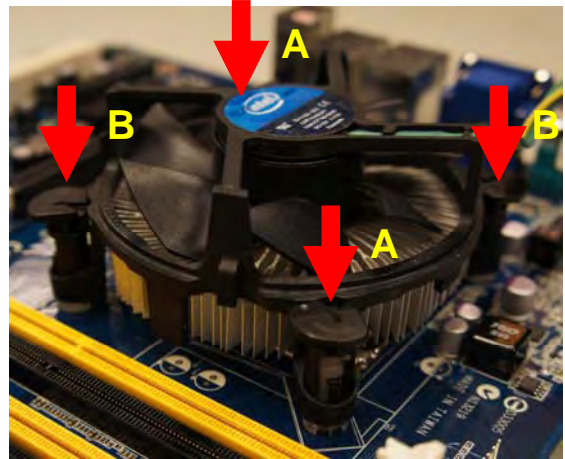
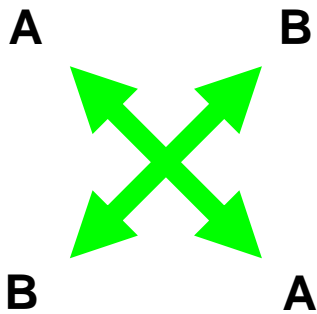


Orient the heatsink and fan assembly such that the CPU fan cable is closest to the CPU fan connector.

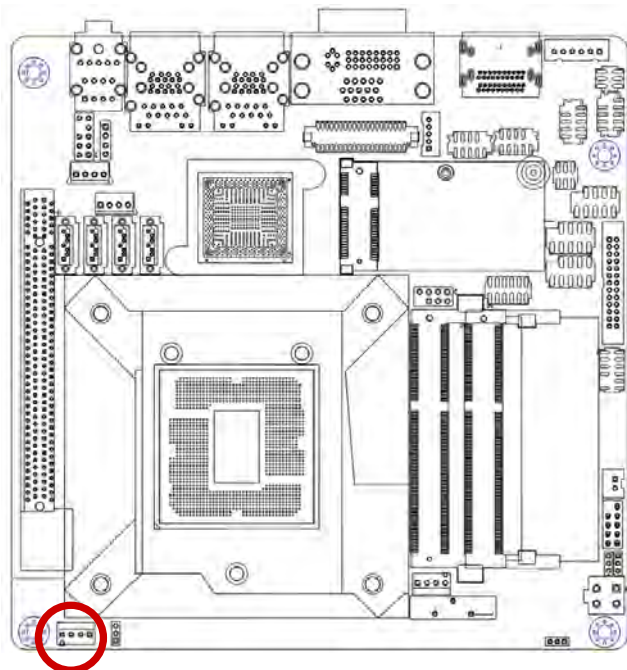


- Make sure each fastener is oriented as shown, with the narrow groove directed outward.

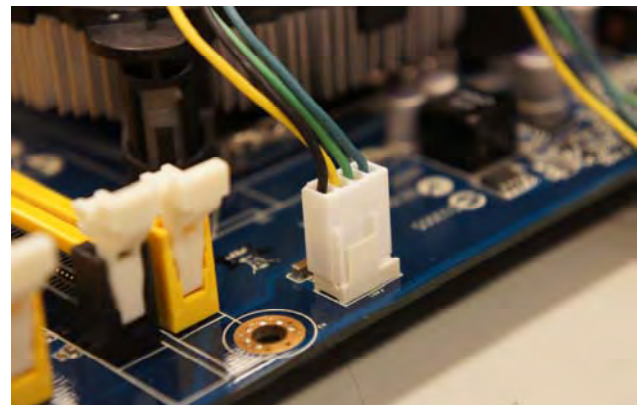
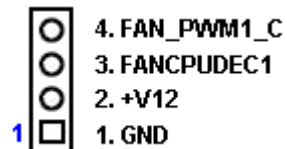
2. Push down two fasteners at a time in a diagonal sequence to secure the heatsink and fan assembly in place.



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



FAN 1
CPU FAN



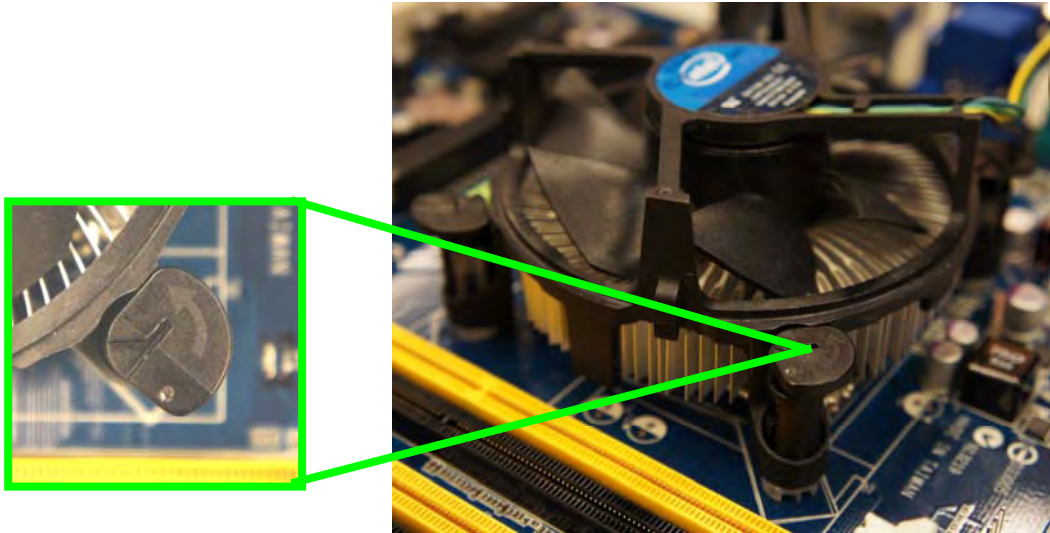
Do not forget to connect the fan cables to the fan connectors. Insufficient air flow inside the system may damage the motherboard components.

These are not jumpers! DO NOT place jumper caps on the fan connectors.

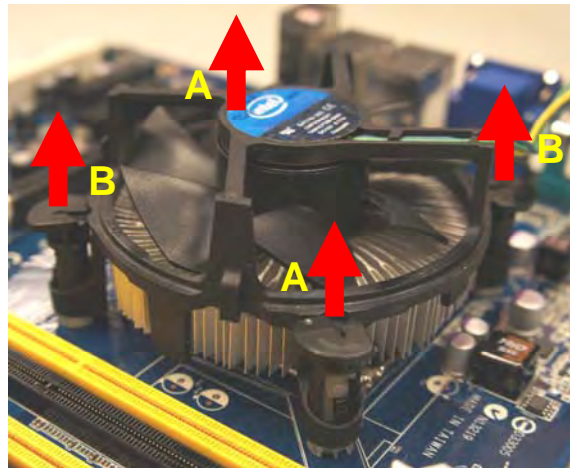
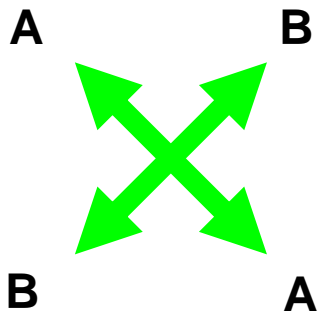
1.4.3 Uninstalling the CPU Heatsink and Fan

To uninstall the CPU heatsink and fan:

1. Disconnect the CPU fan cable from the connector on the motherboard.
2. Rotate each fastener counterclockwise



3. Pull up two fasteners at a time in a diagonal sequence to disengage the heatsink and fan assembly from the motherboard.



4. Carefully remove the heatsink and fan assembly from the motherboard.



5. Rotate each fastener clockwise to ensure correct orientation when reinstalling.

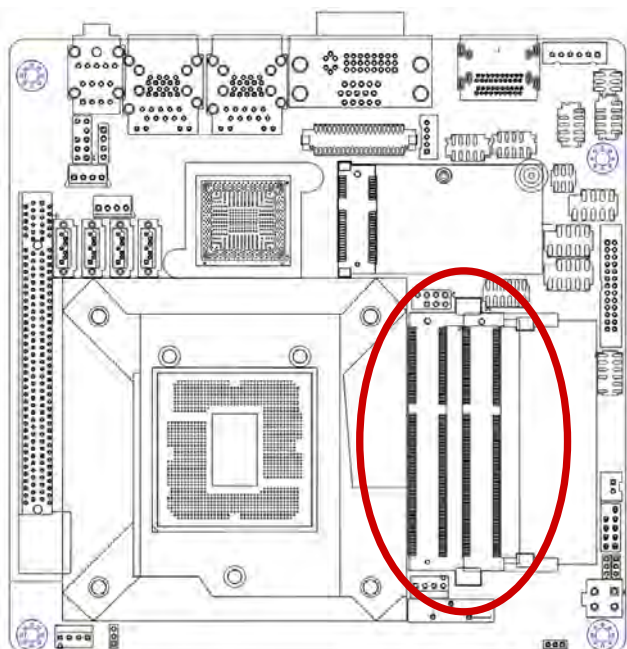


1.5 System Memory

1.5.1 Overview

The motherboard comes with two 204-pin Double Data Rate 3 (DDR3) Small Outline Dual In-line Memory Modules (SODIMM) sockets.

A DDR3 SODIMM module has the same physical dimensions as a DDR2 SODIMM but has a 204-pin footprint compared to the 240-pin DDR2 DIMM. DDR3 SODIMMs are notched differently to prevent installation on a DDR2 SODIMM socket. The following figure illustrates the location of the sockets:



204-Pin DDR3 SODIMM sockets

Channel	Socket
Channel A	DIMMA1
Channel B	DIMMB1

1.5.2 Memory Configurations

You may install 2 GB, 4 GB, and 8 GB unbuffered non-ECC DDR3 SODIMMs into the SODIMM sockets using the memory configurations in this section.



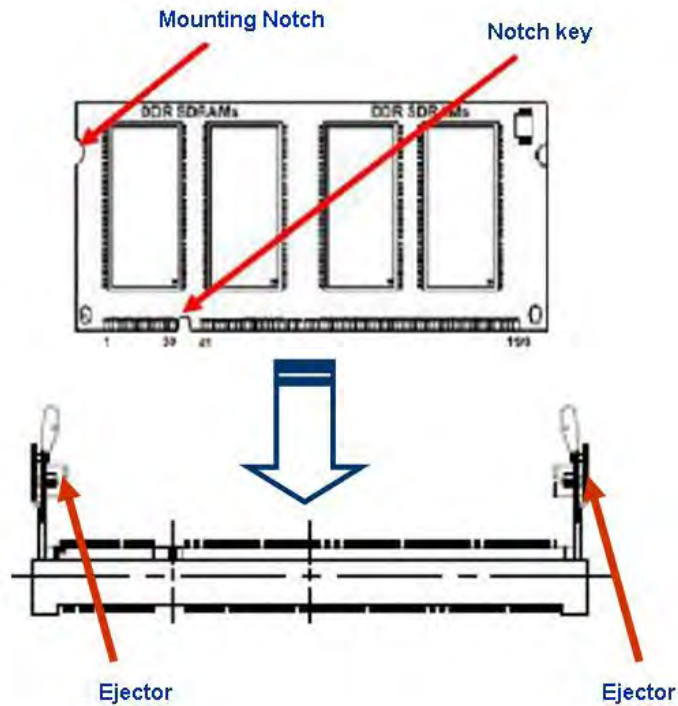
- IF you installed two 2GB memory modules, the system may detect less than 4GB of total memory because of address space allocation for other critical functions. This limitation applies to Windows XP 32-bit version operating system since it does not support PAE (Physical Address Extension) mode.
- For dual-channel configuration, the total size of memory module(s) installed per channel must be the same for better performance (DIMMA1 = DIMMB1).
- When using one DDR3 SODIMM module, install into DIMMB1 slot only.
- Always install SODIMMs with the same CAS latency. For optimum compatibility, it is recommended that you obtain memory modules from the same vendor.

1.5.3 Installing a DDR3 SODIMM



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

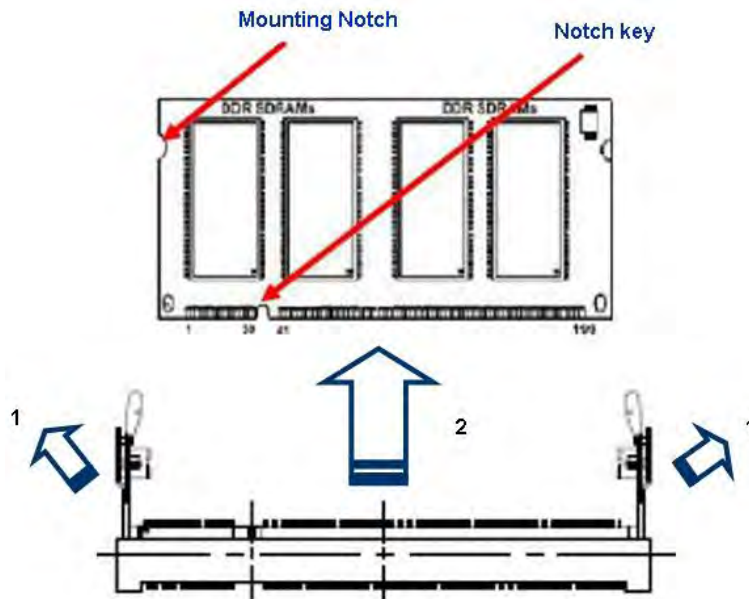
1. Locate the SODIMM socket on the board.
2. Hold two edges of the SODIMM module carefully, and keep away of touching its connectors.
3. Align the notch key on the module with the rib on the slot.
4. Firmly press the modules into the socket which will automatically snap into the mounting notch. Do not force the SODIMM module in with extra force as the DIMM module only fits in one direction.



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

1.5.4 Removing a DDR3 SODIMM

1. Press the two ejector tabs on the slot outward simultaneously, and then pull out the DIMM module.



Support the DIMM lightly with your fingers when pressing the ejector tabs. The DIMM might get damaged when it flips out with extra force.

1.6 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.



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.

1.6.1 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.

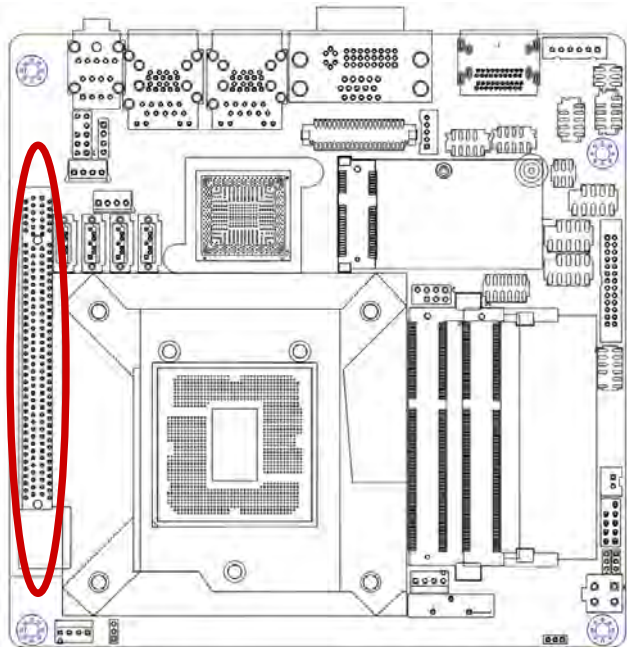
1.6.2 Configuring an Expansion Card

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 2 for information on BIOS setup.
2. Assign an IRQ to the card if needed. Refer to the tables on the next page.
3. Install the software drivers for the expansion card.

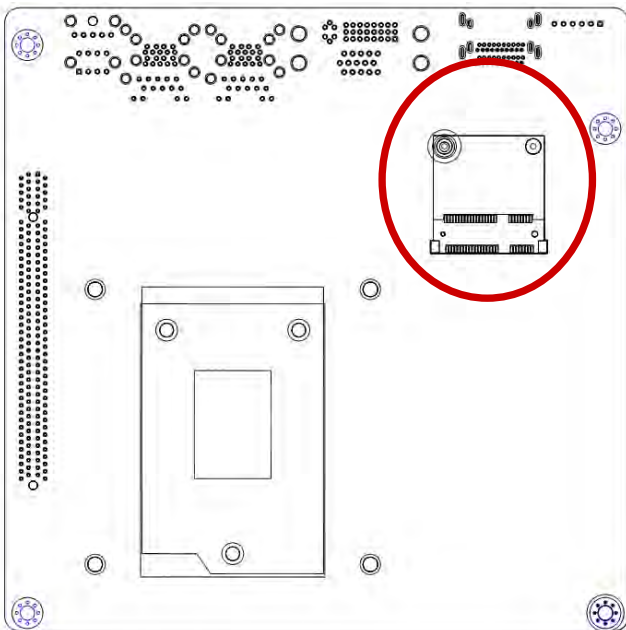
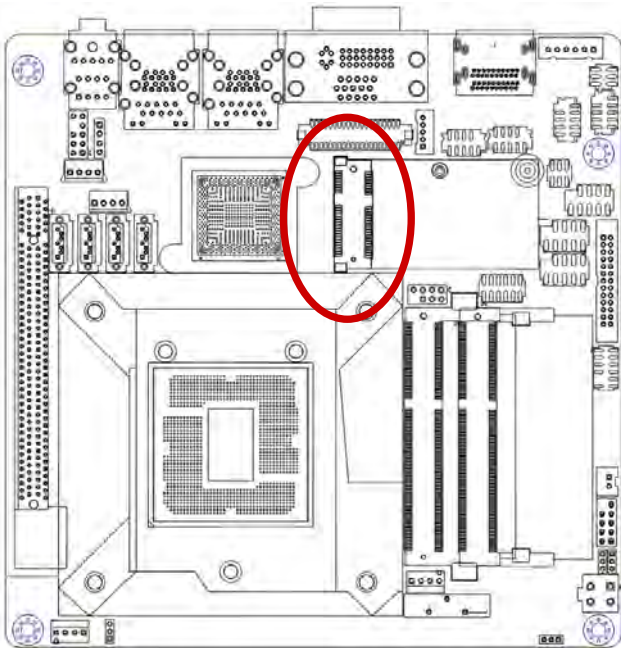
1.6.2.1 PCI Express x16 slot

This motherboard supports one PCI Express x16 slot that complies with the PCI Express specifications. The following figure shows a graphics card installed on the PCI Express x16 slot.



1.6.2.2 MiniPCI express slot

The MiniPCIe express slots support Mini cards for WiFi , Bluetooth, COM, USB modules, and other cards that comply with the mini Card Rev. 1.2 specifications . The figure below shows the type of full size MiniPCIe / SSD card that can be installed on the top MiniPCI express slot. Half size MiniPCIe card can be installed on the bottom MiniPCI express slot.



1.7 Jumpers

1.7.1 Clear CMOS (JCMOS1)

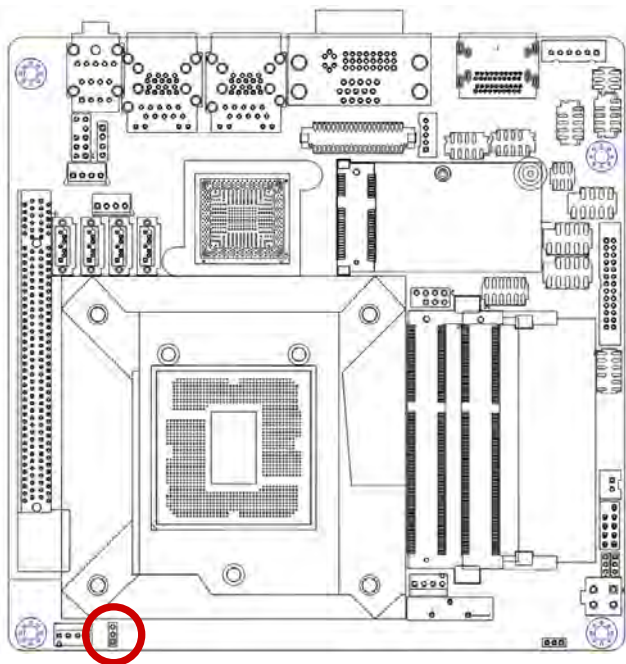
This jumper allows you to clear the Real Time Clock (RTC) RAM in CMOS. You can clear the CMOS memory of date, time, and system setup parameters by erasing the CMOS RTC RAM data. The onboard button cell battery powers the RAM data in CMOS, which includes system setup information such as system passwords.

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 key during the boot process and enter BIOS setup to re-enter data.



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



Normal (Default)



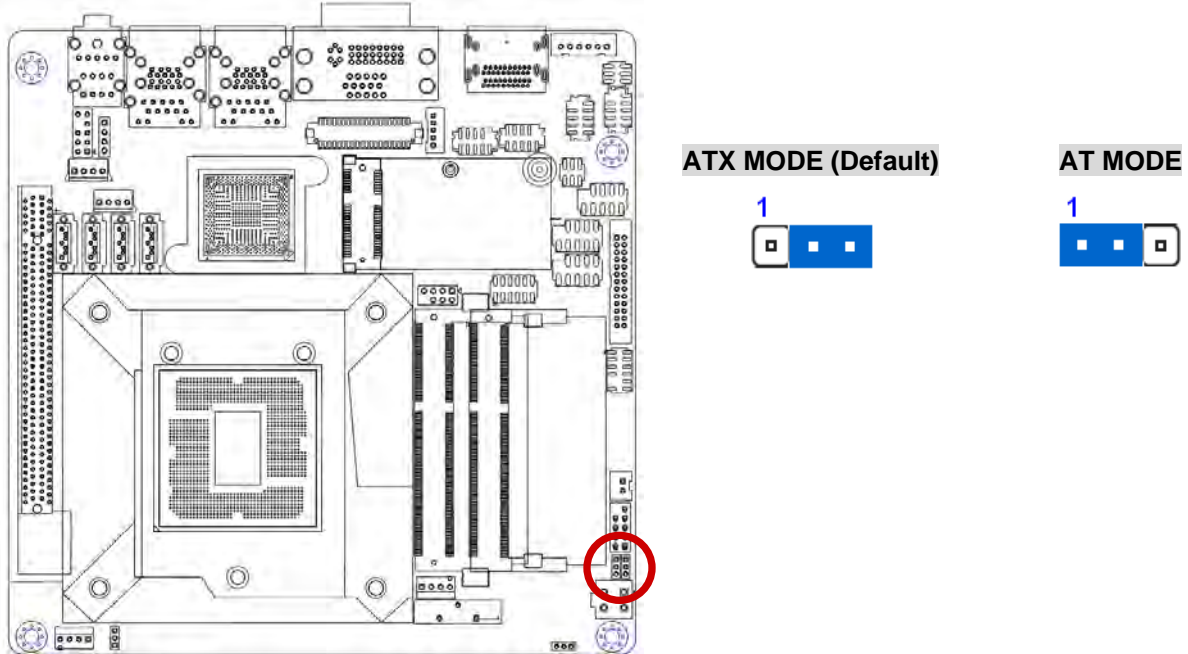
Clear CMOS



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.

1.7.2 AT/ATX Power Mode Select (PSON1)

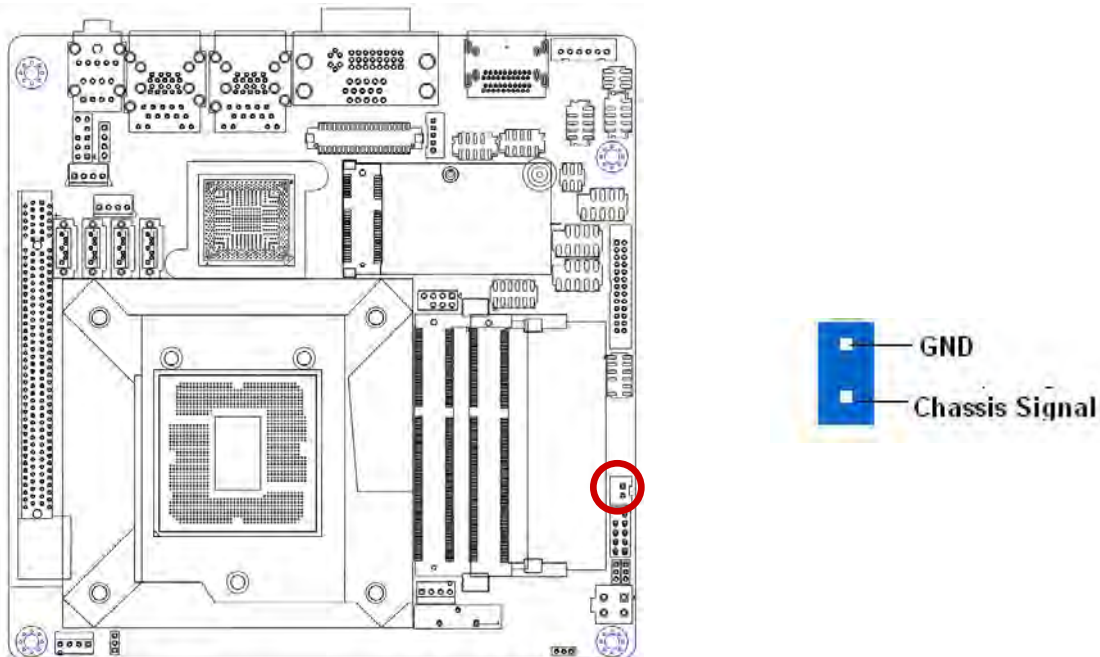
This jumper allows you to select ATX Mode or AT Mode.



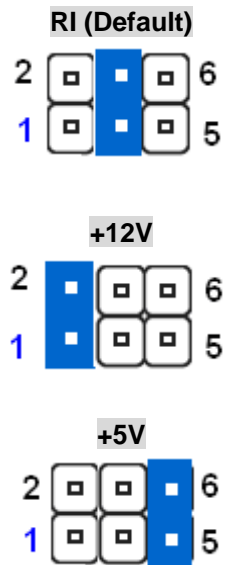
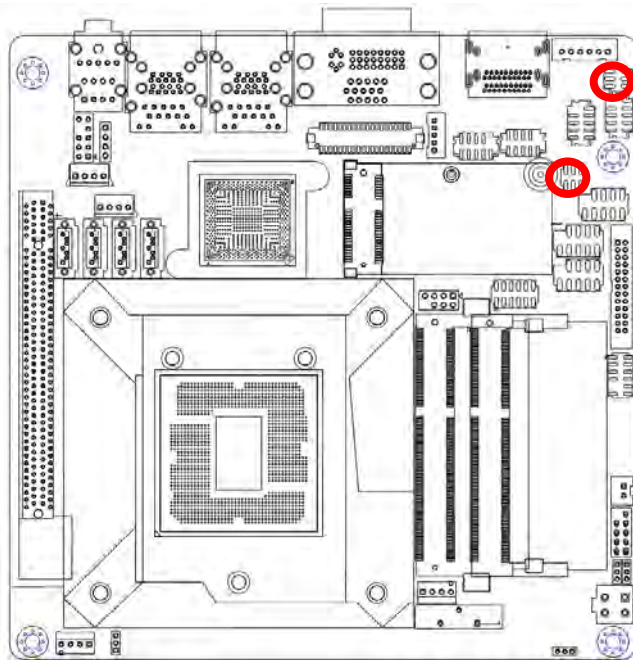
AT Mode: When DC-In power is applied, system will power on automatically.

ATX Mode: Power button is required to power on system.

1.7.3 Chassis Intrusion Connector (JCASE1)

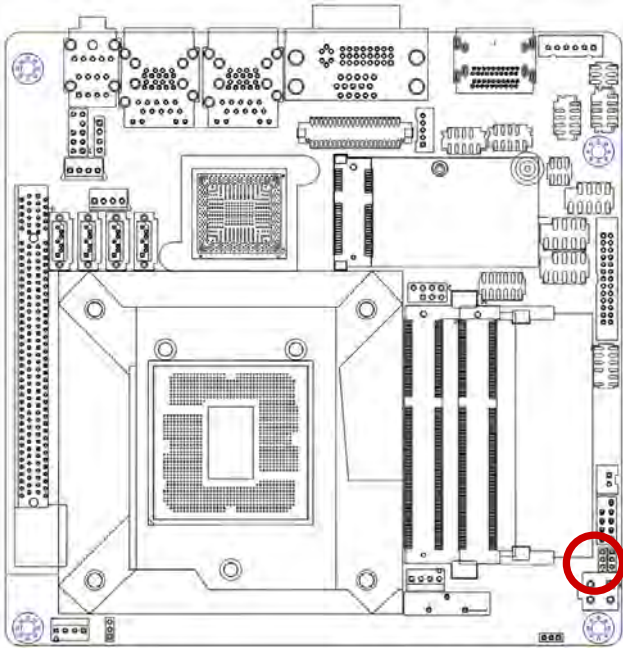


1.7.4 COM1/COM2, COM3/COM4 RI/+5V/+12V Mode Select (JCOMPWR1, JCOMPWR2)



Note: COM Port 1 & 2 Mode select are shared via JCOMPWR1.
 COM Port 3 & 4 Mode select are shared via JCOMPWR2.

1.7.5 M-SATA/mini PCIe Select (JMSATASW1)



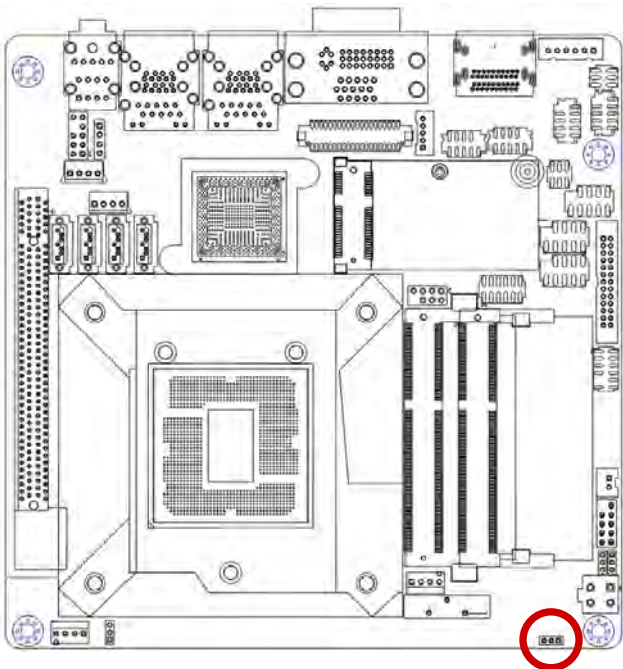
M-SATA



Mini-PCIe
(Default)



1.7.5 DC-In Power Source Select (JPSEL1)



DC-In: 16V - 24V

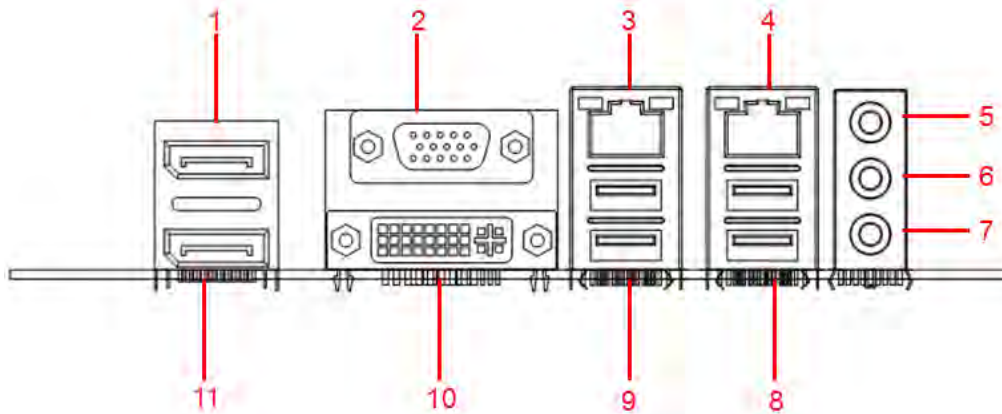


DC-In: 12V
(Default)



1.8 Connectors

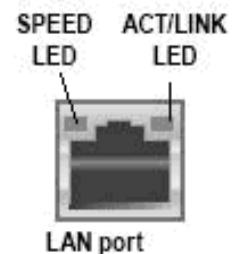
1.8.1 Rear panel connectors



1. **Dual Display port.** This 20-pin Display port connects
2. **VGA port.** This 15-pin VGA port connects to a VGA monitor.
3. **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.

LAN port LED indications

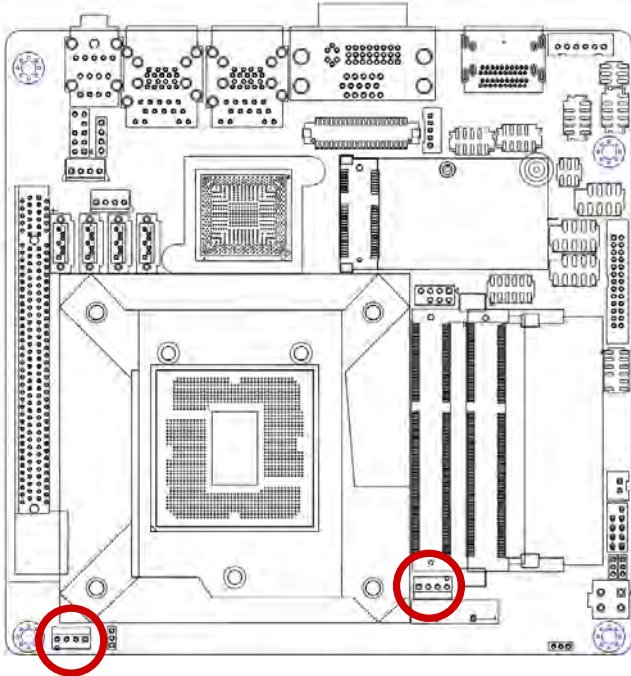
SPEED LED		ACT / LINK LED	
Status	Description	Status	Description
OFF	10Mbps connection	OFF	No link
Orange	100Mbps connection	Green	Link
Green	1Gbps connection	Blinking	Data activity



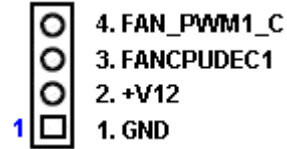
8. **USB 3.0 ports 23 & 45.** These four Universal Serial Bus (USB) ports are available for connecting USB 3.0 devices.
5. **Line In port (light blue).** This port connects a tape, CD, DVD player, or other audio sources.
6. **Line Out port (lime).** This port connects a headphone or a speaker.
In 4-channel, 6-channel, and 8-channel configuration, the function of this port becomes Front Speaker Out.
7. **Microphone port (pink).** This port connects a microphone.
10. **DVI Port Dual Link DVI-D, 24-Pin**

1.8.2 CPU and System fan connectors (CPU_FAN 1, SYS_FAN1)

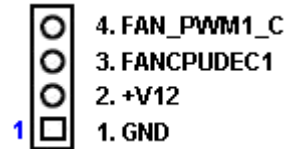
The fan connectors support cooling fans of 280mA (3.36 W max.) at 4800rpm or a total of 1A~2.22A (26.64W max.) at +12V. Connect the fan cables to the fan connectors on the motherboard, making sure that the black wire of each cable matches the ground pin of the connector.



CPU_FAN1



SYS_FAN1

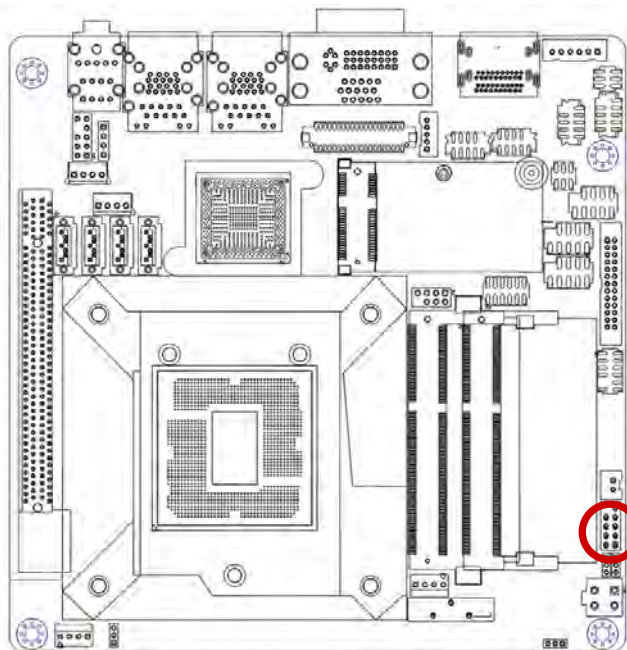


Do not forget to connect the fan cables to the fan connectors. Insufficient air flow inside the system may damage the motherboard components.

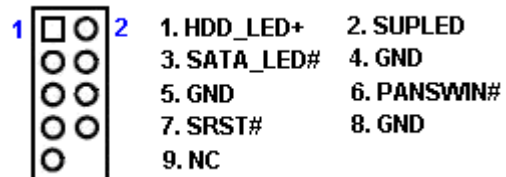
These are not jumpers! DO NOT place jumper caps on the fan connectors.

1.8.3 System Panel (F_PANEL1)

This connector is for a chassis-mounted front panel audio I/O module that supports either HD Audio or legacy AC'97 audio standard.



F_PANEL



- **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 1-3 PWRLED)**

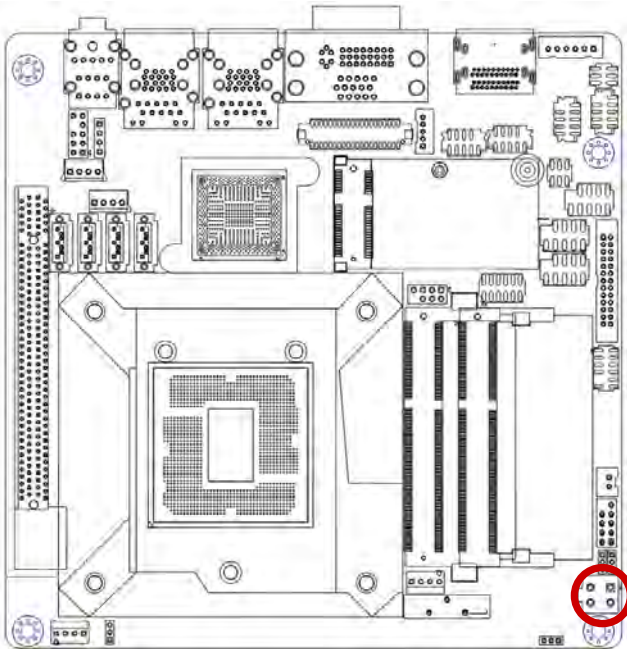
This 2-pin connector is for the system power LED. Connect the chassis power LED cable to this connector. The system power LED lights up when you turn on the system power, and blinks when the system is in sleep mode.

- **Hard Disk Drive Activity LED (Pin 1-3 HDLED)**

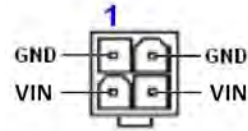
This 2-pin connector is for the HDD Activity LED. Connect the HDD Activity LED cable to this connector. The IDE LED lights up or flashes when data is read from or written to the HDD.

1.8.4 DC-In. 12V, 16V, 19V-24V power connectors (ATX12V1)

The connector is 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.



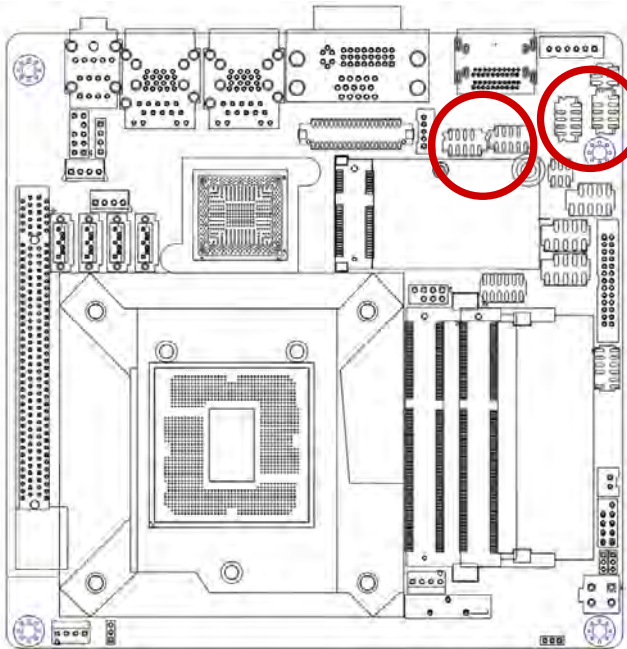
ATX12V1



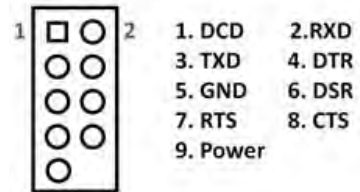
- Use of a PSU with a higher power output is recommended when configuring a system with more power-consuming devices. The system may become unstable or may not boot up if the power is inadequate.
- Make sure that your power supply unit (PSU) can provide at least the minimum power required by your system.

1.8.5 Serial Port connectors (COM1, COM2, COM3, COM4)

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

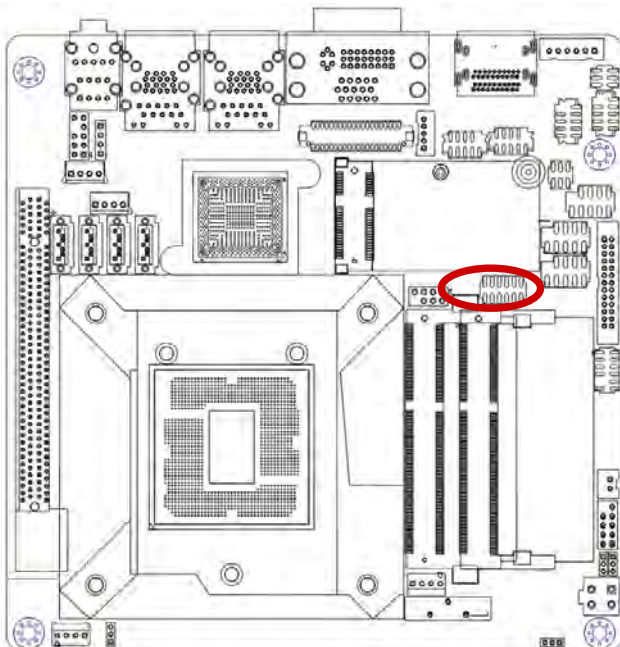


COM1, COM2, COM3, COM4

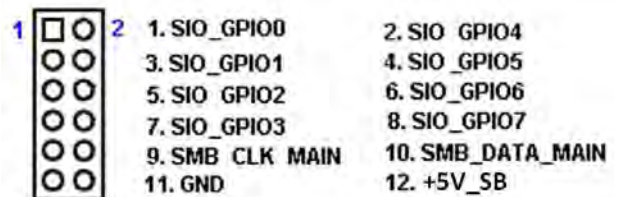


1.8.6 Digital IO Connector (JDIO1)

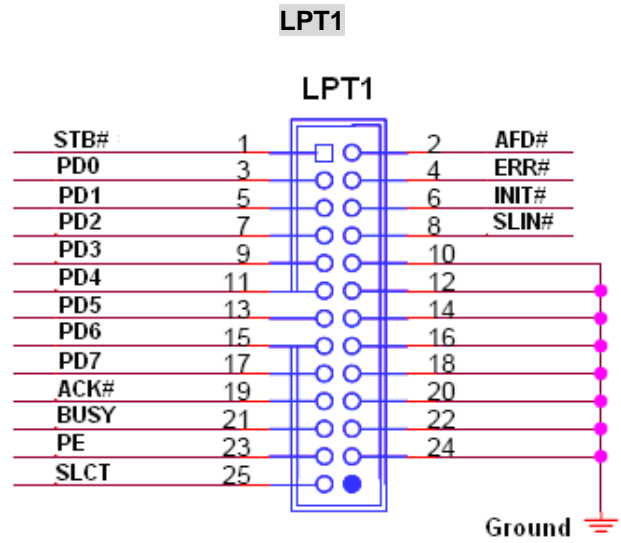
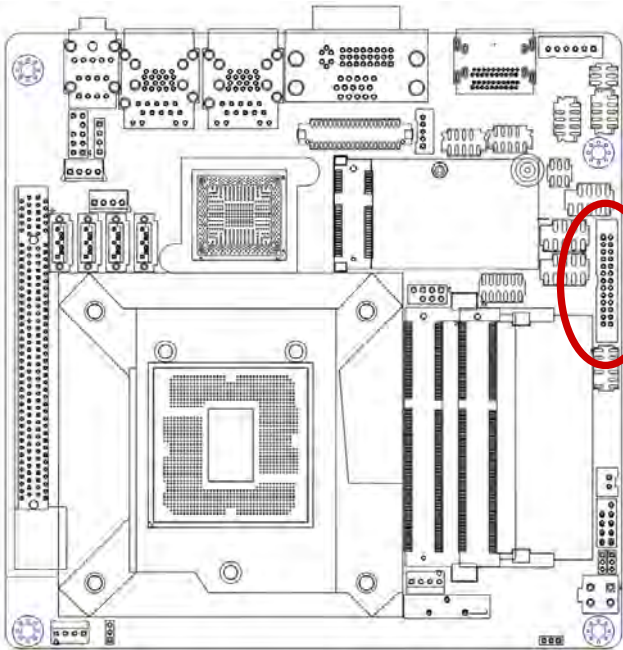
This connector is for 8-bit General purpose I/O function.



JDIO1

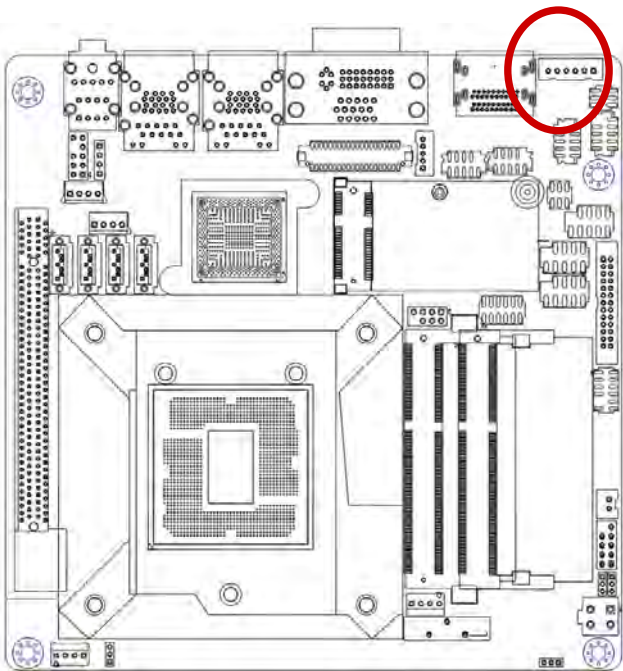


1.8.7 PARALLEL PORT Connector (LPT1)



1.8.8 Keyboard / Mouse Connector (KBMS1)

The connector is for PS2 Keyboard and Mouse.

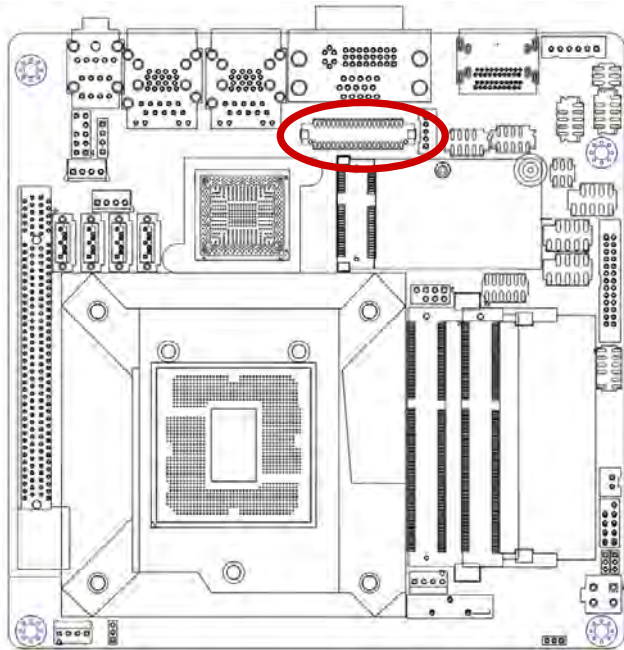


1. Keyboard Clock
2. Keyboard Data
3. Mouse Data
4. GND
5. +5V STBY
6. Mouse Clock

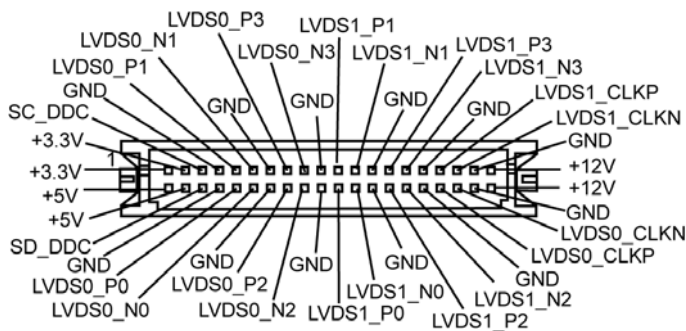
1.8.9 Low-voltage differential signalling Connector(JLVDS1)

Supports 24-bit single channel LVDS panel.

(Hirose. 40P 1.25mm 90D SMD DF13-40DP-1.25V(91))



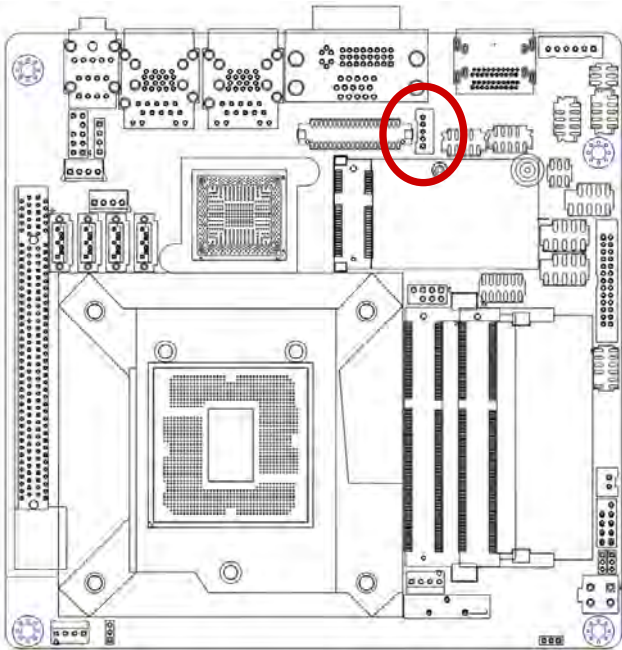
JLVD1



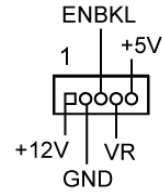
Signal	Pin	Pin	Signal
+12V	39	40	+12V
GND	37	38	GND
LVDS1_CLKN	35	36	LVDS0_CLKN
LVDS1_CLKP	33	34	LVDS0_CLKP
GND	31	32	GND
LVDS1_N3	29	30	LVDS1_N2
LVDS1_P3	27	28	LVDS1_P2
GND	25	26	GND
LVDS1_N1	23	24	LVDS1_N1
LVDS1_P1	21	22	LVDS1_P0
GND	19	20	GND
LVDS0_N3	17	18	LVDS0_N2
LVDS0_P3	15	16	LVDS0_P2
GND	13	14	GND
LVDS0_N1	11	12	LVDS0_N0
LVDS0_P1	9	10	LVDS0_P0
GND	7	8	GND
SC_DDC	5	6	SD_DDC
+3.3V	3	4	+5V
+3.3V	1	2	+5V

1.8.10 LCD Inverter Connector (JBKL1)

This function will support the control of internal LVDS brightness.

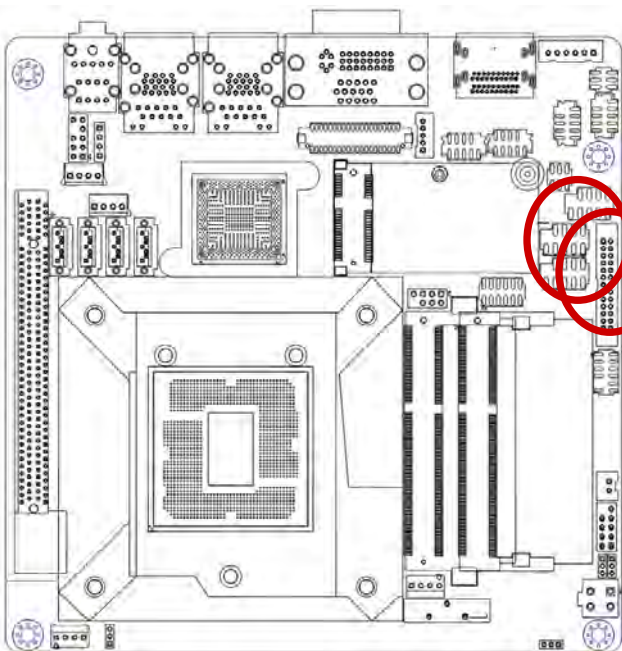


JBKL1



1.8.11 USB connectors (USB56, USB78, USB910)

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.

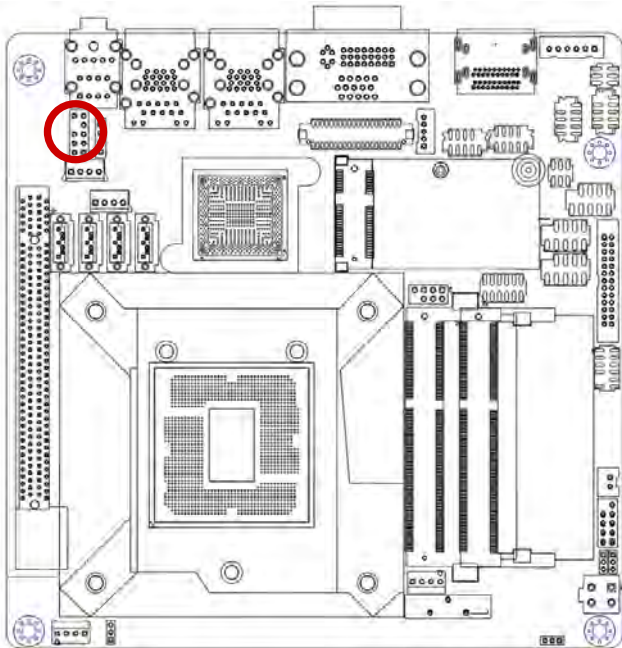


USB56, USB78, USB910

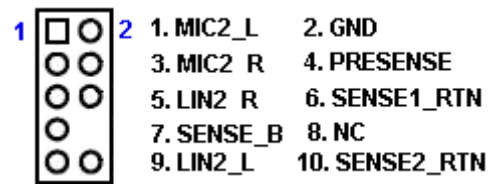



1.8.12 Audio Mic.-In & Line-Out Connector (F_AUDIO1)

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.

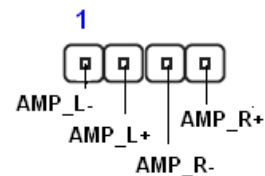
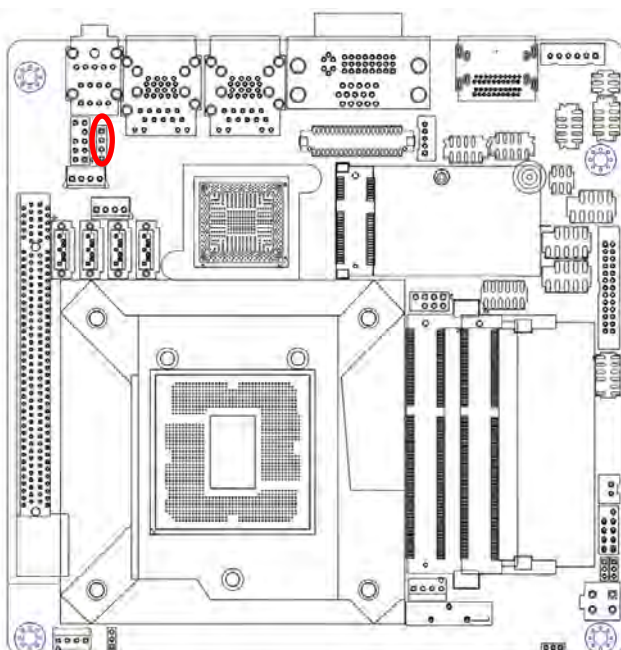


FP_AUDIO1



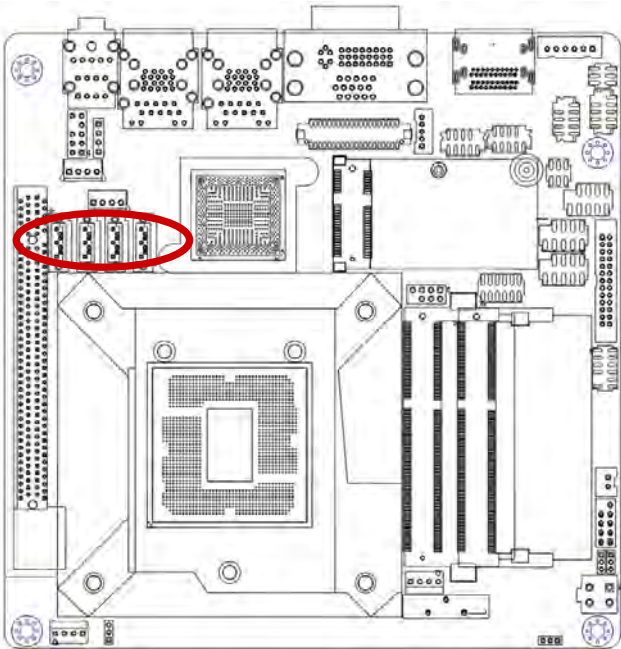
 For motherboards with the optional HD Audio feature, we recommend that you connect a high-definition front panel audio module to this connector to avail of the motherboard's high-definition audio capability.

1.8.13 Amplifier Connector (JAMP_1)

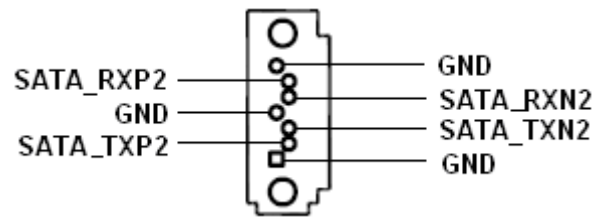


1.8.14 Serial ATA Connector (SATA1, SATA2, SATA3, SATA4)

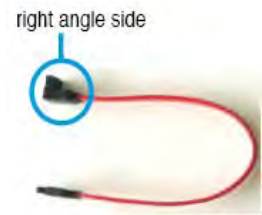
These connectors support SATA 3.0 and are for the Serial ATA signal cables for Serial ATA hard disk drives.



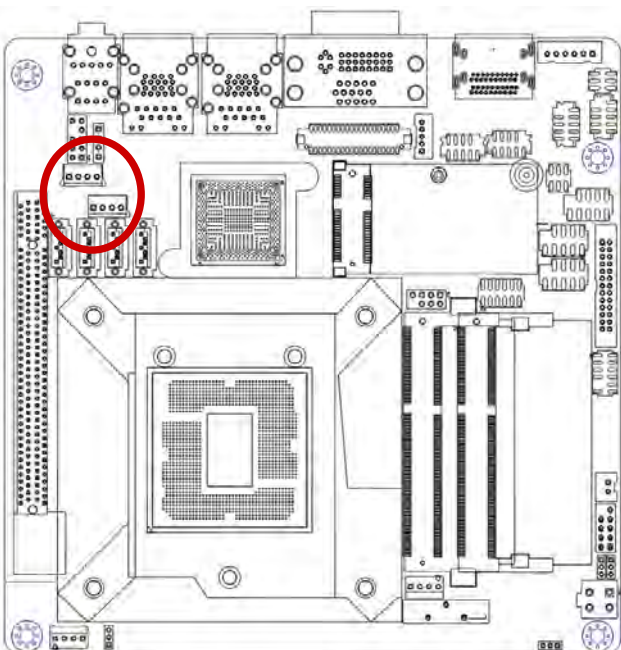
SATA1, SATA2, SATA3, SATA4



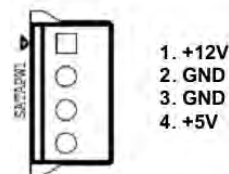
Connect the right-angle side of SATA signal cable to SATA device. Or you may connect the right-angle side of SATA cable to the onboard SATA port to avoid mechanical conflict with large graphics cards.



1.8.15 Serial ATA Power Connector



SATAPW1, SATAPW2



This chapter tells how to change the system settings through the BIOS Setup menus. Detailed descriptions of the BIOS parameters are also provided.

2

Chapter 2 - BIOS Setup

2.1 BIOS Setup Program

This motherboard supports a programmable firmware chip that you can update using the provided utility. Use the BIOS Setup program when you are installing a motherboard, reconfiguring your system, or prompted to "Run Setup." This section explains how to configure your system using this utility.

Even if you are not prompted to use the Setup program, you can change the configuration of your computer in the future. For example, you can enable the security password feature or change the power management settings. This requires you to reconfigure your system using the BIOS Setup program so that the computer can recognize these changes and record them in the CMOS RAM of the firmware hub.

The firmware hub on the motherboard stores the Setup utility. When you start up the computer, the system provides you with the opportunity to run this program. Press during the Power-On-Self-Test (POST) to enter the Setup utility; otherwise, POST continues with its test routines.

If you wish to enter Setup after POST, restart the system by pressing <Ctrl+Alt+Delete>, or by pressing the reset button on the system chassis. You can also restart by turning the system off and then back on. Do this last option only if the first two failed.

The Setup program is designed to make it as easy to use as possible. Being a menu-driven program, it lets you scroll through the various sub-menus and make your selections from the available options using the navigation keys.



- The default BIOS settings for this motherboard apply for most conditions to ensure optimum performance. If the system becomes unstable after changing any BIOS settings, load the default settings to ensure system compatibility and stability. Select the **Load Optimized Defaults** from the BIOS menu screen.
- The BIOS setup screens shown in this section are for reference purposes only, and may not exactly match what you see on your screen.
- Visit the system builder's website to download the latest BIOS file for this motherboard

2.1.1 Legend Box


The keys in the legend bar allow you to navigate through the various setup menus

Key(s)	Function Description
→←	Select Screen
↑ ↓	Select Item
Enter	Select
+/-	Change Opt.
F1	General Help
F2	Previous Values
F3	Optimal Defaults
F4	Save and Exit
ESC	Exit

2.1.2 List Box

This box appears only in the opening screen. The box displays an initial list of configurable items in the menu you selected.

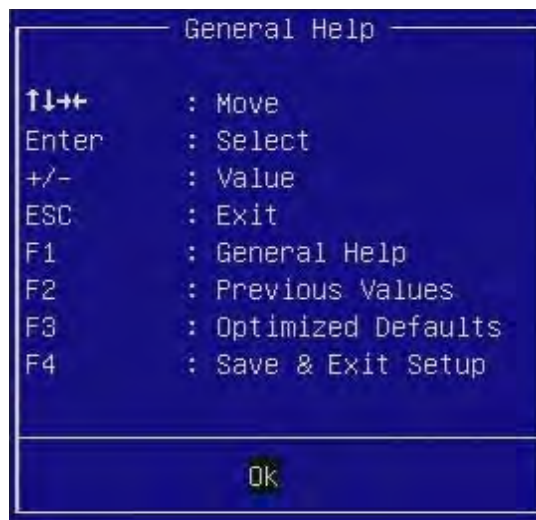
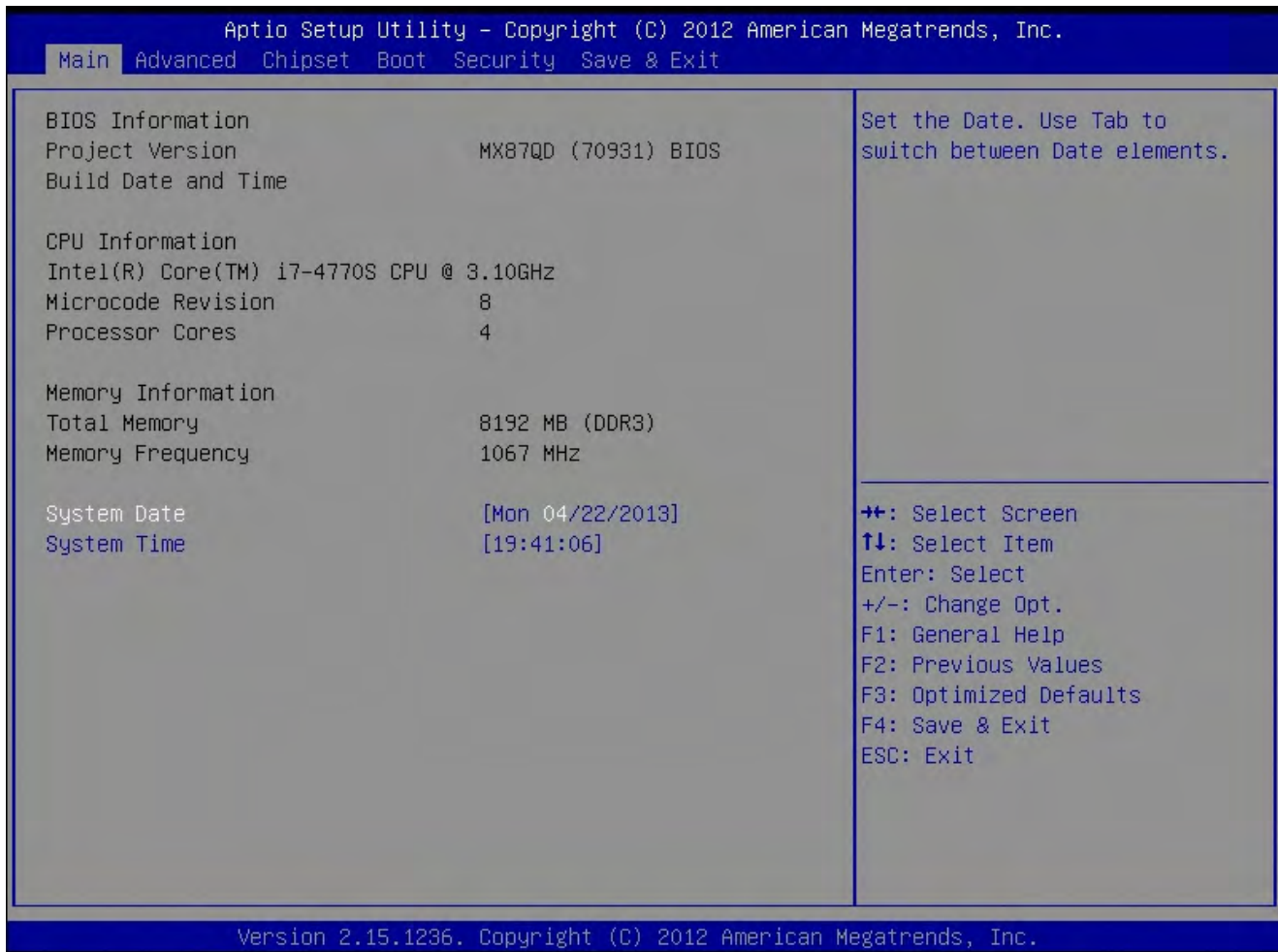
2.1.3 Sub-menu

Note that a right pointer symbol  appears to the left of certain fields. This pointer indicates that you can display a sub-menu from this field. A sub-menu contains additional options for a field parameter. To display a sub-menu, move the highlight to the field and press <Enter>. The sub-menu appears. Use the legend keys to enter values and move from field to field within a sub-menu as you would within a menu. Use the <Esc> key to return to the main menu.

Take some time to familiarize yourself with the legend keys and their corresponding functions. Practice navigating through the various menus and submenus. If you accidentally make unwanted changes to any of the fields, press <F9> to load the optimal default values. While moving around through the Setup program, note that explanations appear in the Item Specific Help window located to the right of each menu. This window displays the help text for the currently highlighted field.

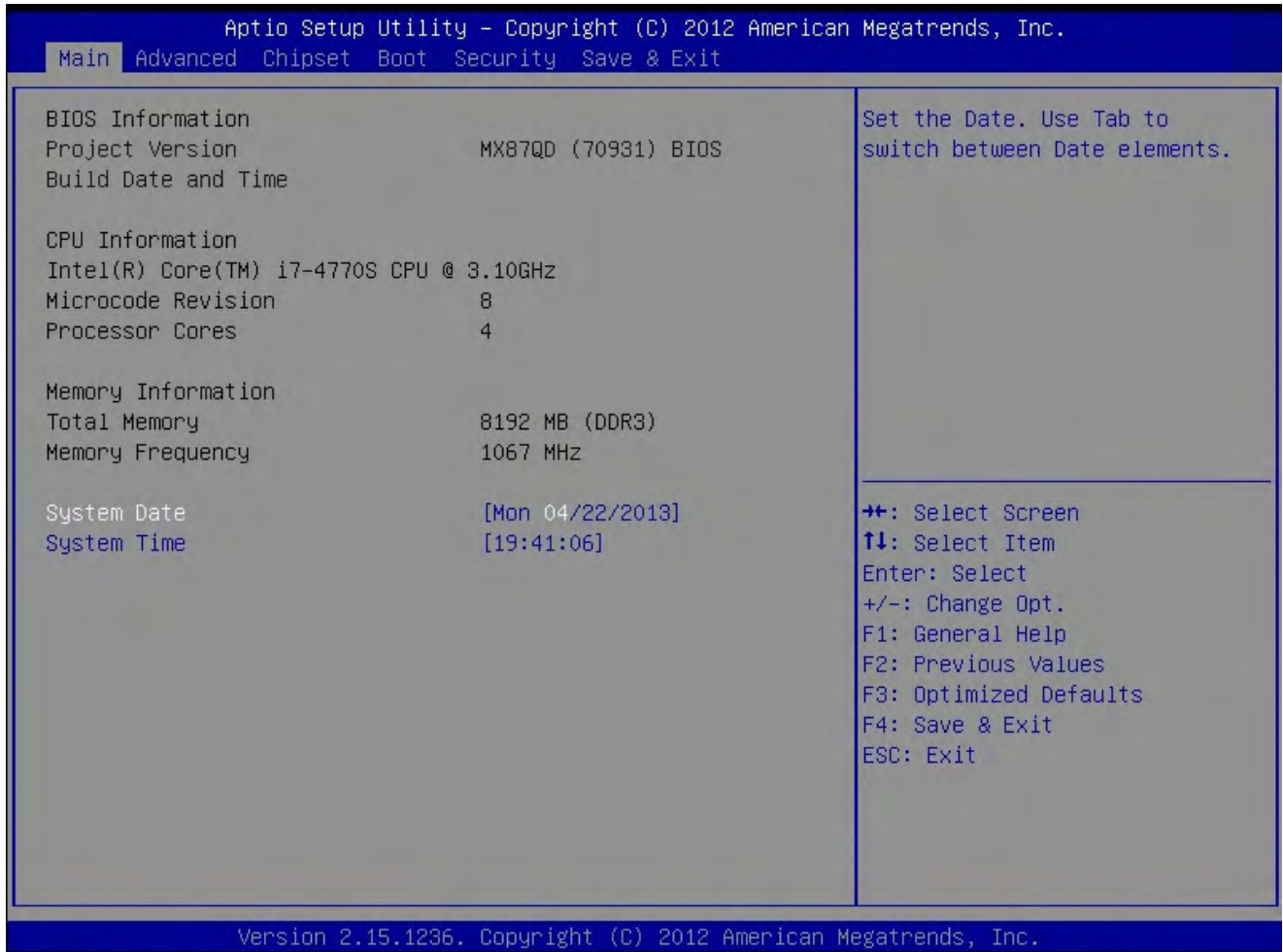
2.2 BIOS Menu Screen

When you enter the BIOS, the following screen appears. The BIOS menu screen displays the items that allow you to make changes to the system configuration. To access the menu items, press the up/down/right/left arrow key on the keyboard until the desired item is highlighted, then press [Enter] to open the specific menu.



2.3 Main Setup

This menu gives you an overview of the general system specifications. The BIOS automatically detects the items in this menu. Use this menu for basic system configurations, such as time, date etc.



- **BIOS Information**

Displays the auto-detected BIOS information.

- **System Date**

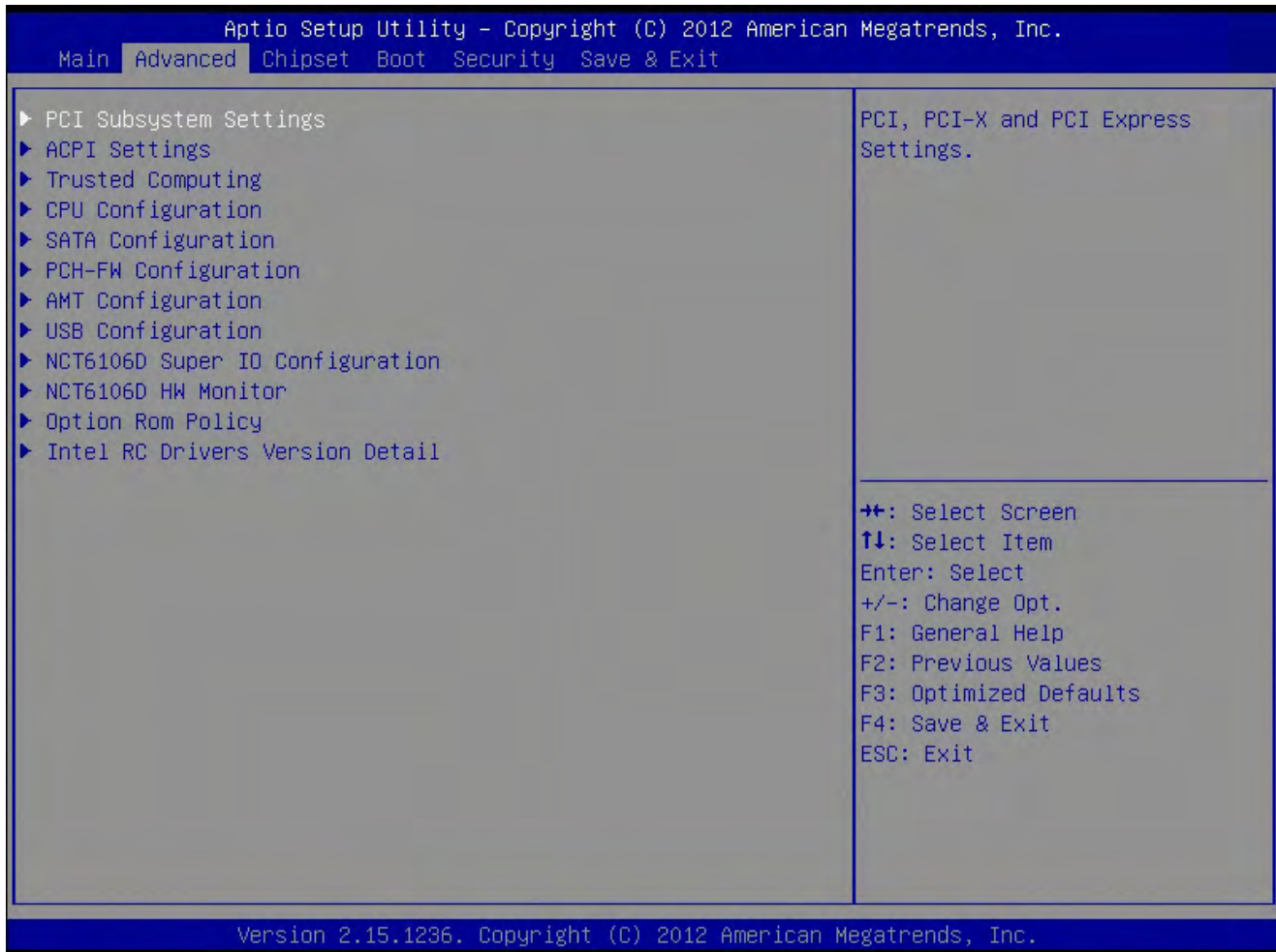
The date format is <Date>,<Month>,<Day>,<Year>.

- **System Time**

The time format is <Hour>,<Minute>,<Second>.

2.4 Advanced BIOS Setup

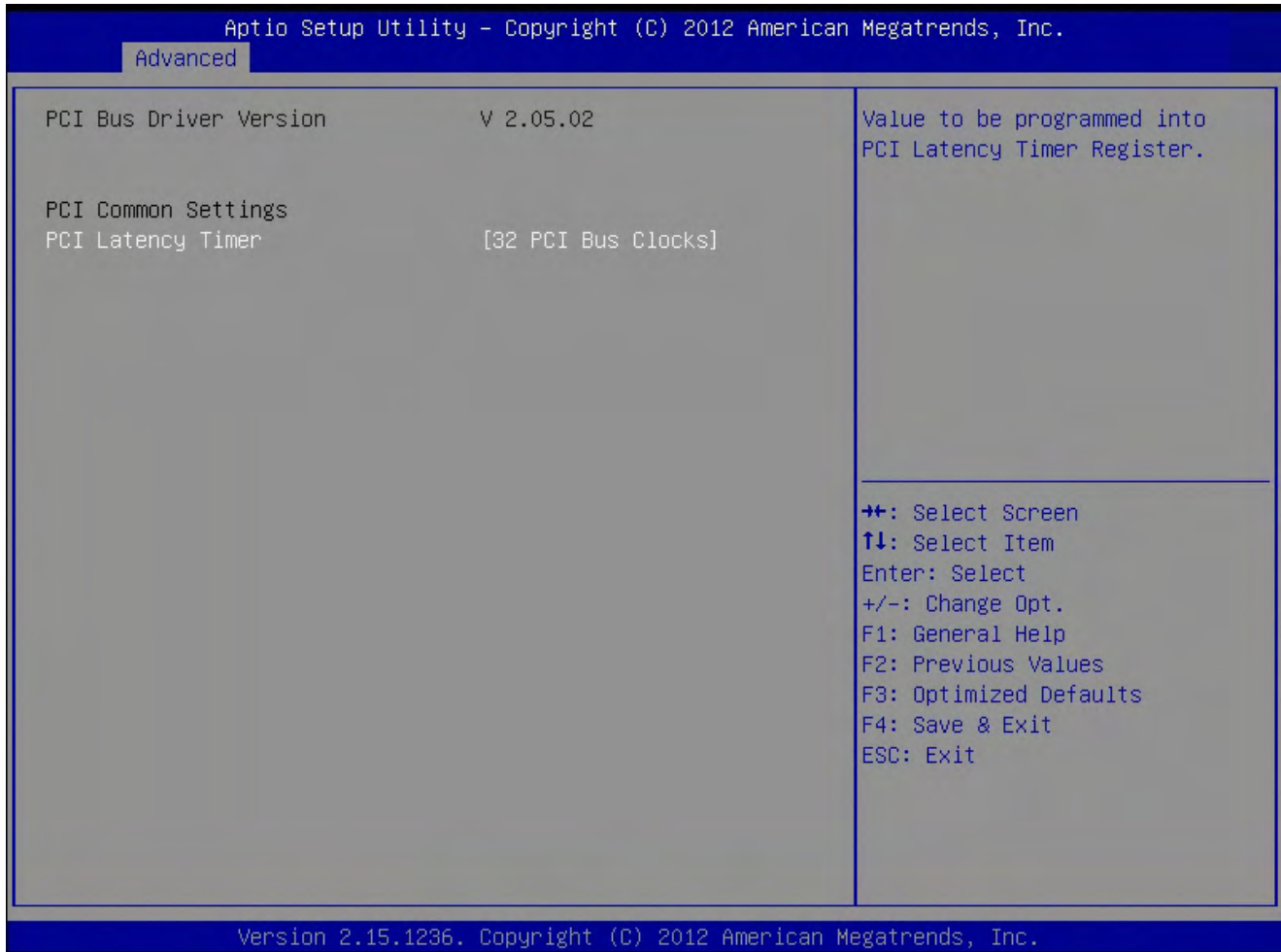
Select the Advanced tab from the setup screen to enter the Advanced BIOS Setup screen. You can select any of the items in the left frame of the screen, such as Chipset configuration, to go to the sub menu for that item. You can display an Advanced BIOS Setup option by highlighting it using the <Arrow> keys. All Advanced BIOS Setup options are described in this section. The Advanced BIOS Setup screen is shown below. The sub menus are described on the following pages.



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

2.4.1 PCI Subsystem Setting

The PCI PnP menu items allow you to change the advanced settings for PCI/PnP devices. The menu includes setting IRQ and DMA channel resources for either PCI/PnP or legacy ISA devices, and setting the memory size block for legacy ISA devices.



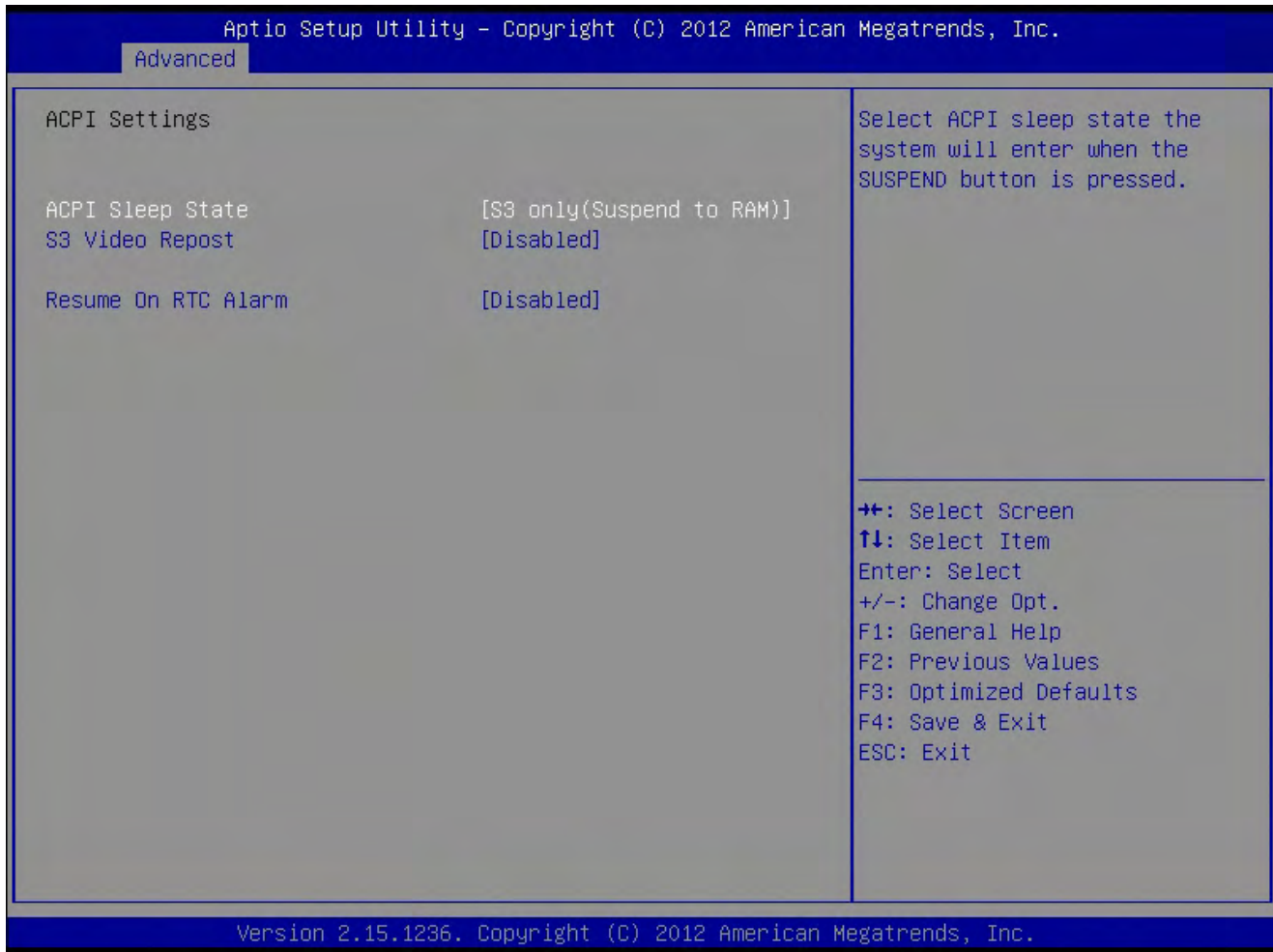
- **PCI Bus Driver Version**

Displays the information of PCI Bus Driver Version

- **PCI Latency Timer [32 PCI Bus Clocks]**

The Configuration options are [32 PCI Bus Clocks] [64 PCI Bus Clocks] [96 PCI Bus Clocks] [128 PCI Bus Clocks] [160 PCI Bus Clocks] [32 PCI Bus Clocks] [192 PCI Bus Clocks] [224 PCI Bus Clocks] [248 PCI Bus Clocks]

2.4.2 ACPI Settings



- **ACPI Sleep State [S3 (suspend to RAM)]**

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

Configuration options: [Suspend Disable][S1 (CPU Stop Clock)] [S3 (suspend to RAM)]

- **S3 Video Repost[Disable]**

Allows you to determine whether to invoke VGA BIOS POST on S3/STR resume.

Configuration options: [Disabled] [Enabled]

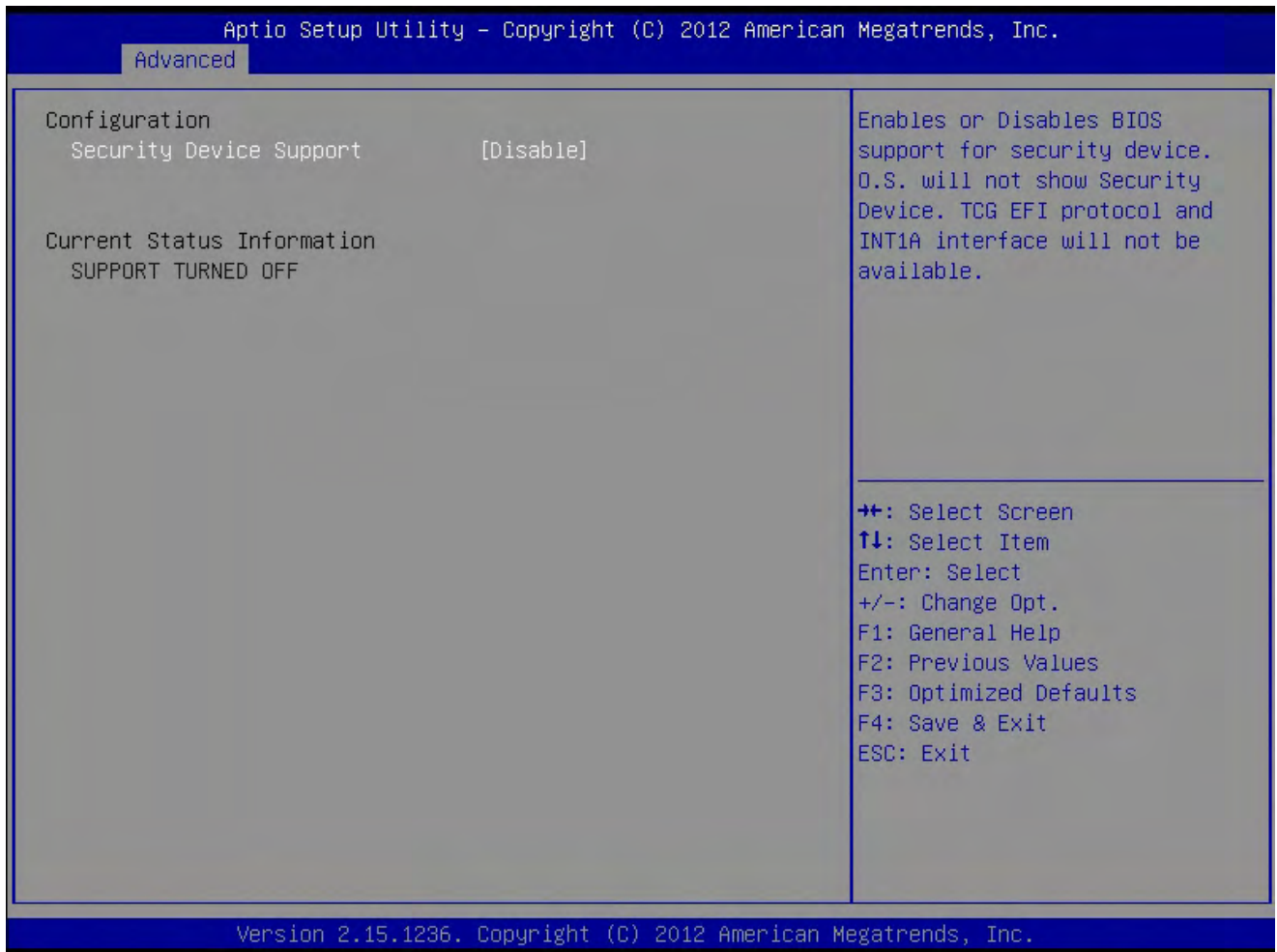
- **Resume On RTC Alarm [Disable]**

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

Configuration options: [Disabled] [Enabled]

2.4.3 Trusted computing

Trusted computing (TPM) settings.



TPM configuration

- **Security Device SUPPORT [Disabled]**

Enable or disable TPM support.

Configuration options: [Disabled] [Enabled]

- **Current Status Information**

Displays the TPM status information [SUPPORT TURNED OFF]

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2.4.4 CPU configuration



- **CPU configuration**

Displays the CPU information

- **Active Processor Cores [All]**

Select the numbers of cores in each processor package.

Configuration options: [All] [1] [2] [3]

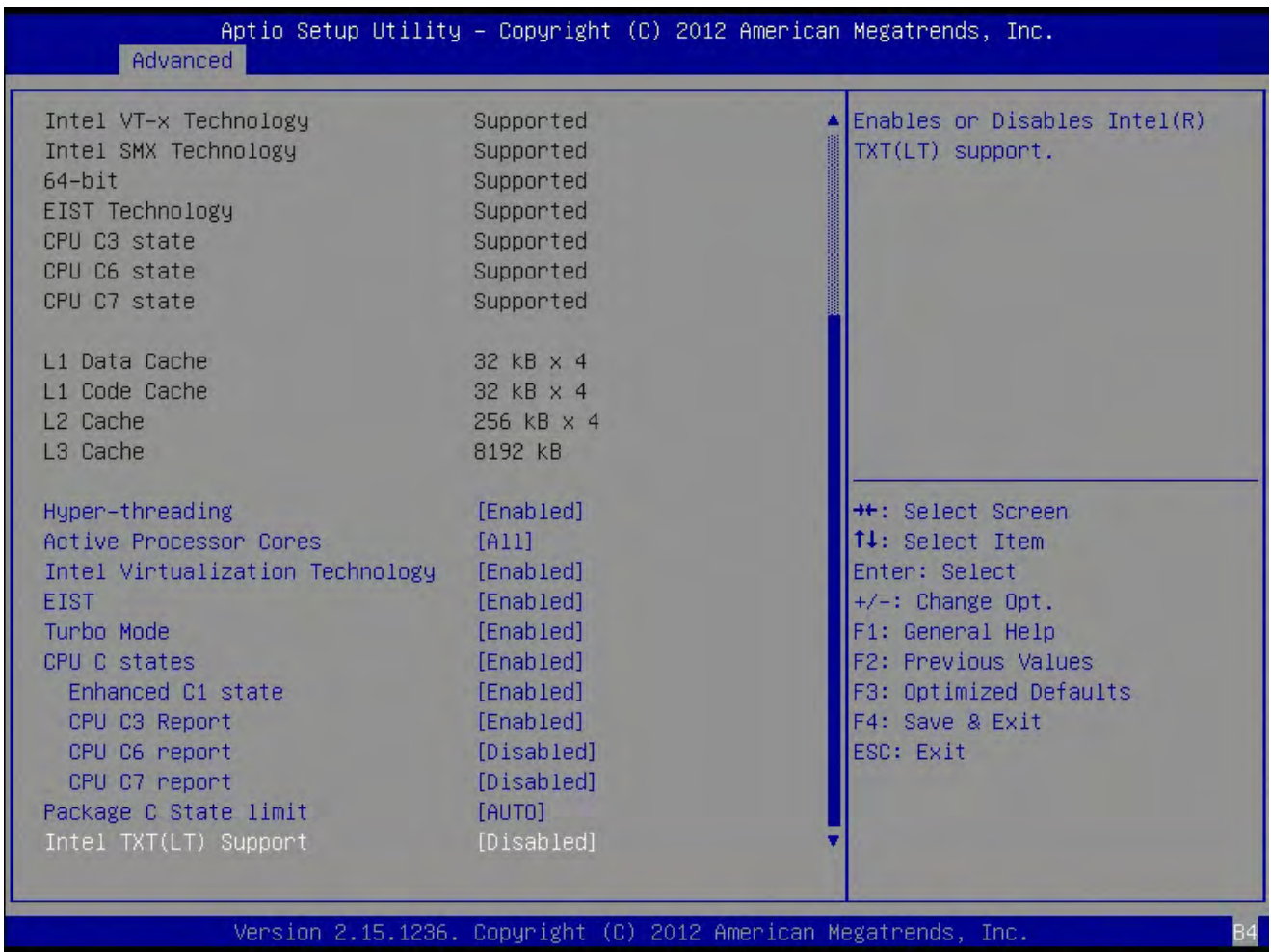


It depends on each CPU type.

- **Intel Virtualization Technology [Enabled]**

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

Configuration options: [Disabled] [Enabled]



● **EIST[Enabled]**

Enable or disable speed step.

Configuration options: [Disabled] [Enabled]

● **Turbo Mode[Enabled]**

Enable or Disable CPU Turbo Mode.

Configuration options: [Disabled] [Enabled]

● **CPU C3 State Support[Enabled]**

Use this to enable or disable CPU C3 (ACPI C2) report to OS.

Configuration options: [Disabled] [Enabled]

● **CPU C6 State Support [Disabled]**

Use this to enable or disable CPU C6 (ACPI C3) report to OS.

Configuration options: [Disabled] [Enabled]

● **CPU C7 State Support [Disabled]**

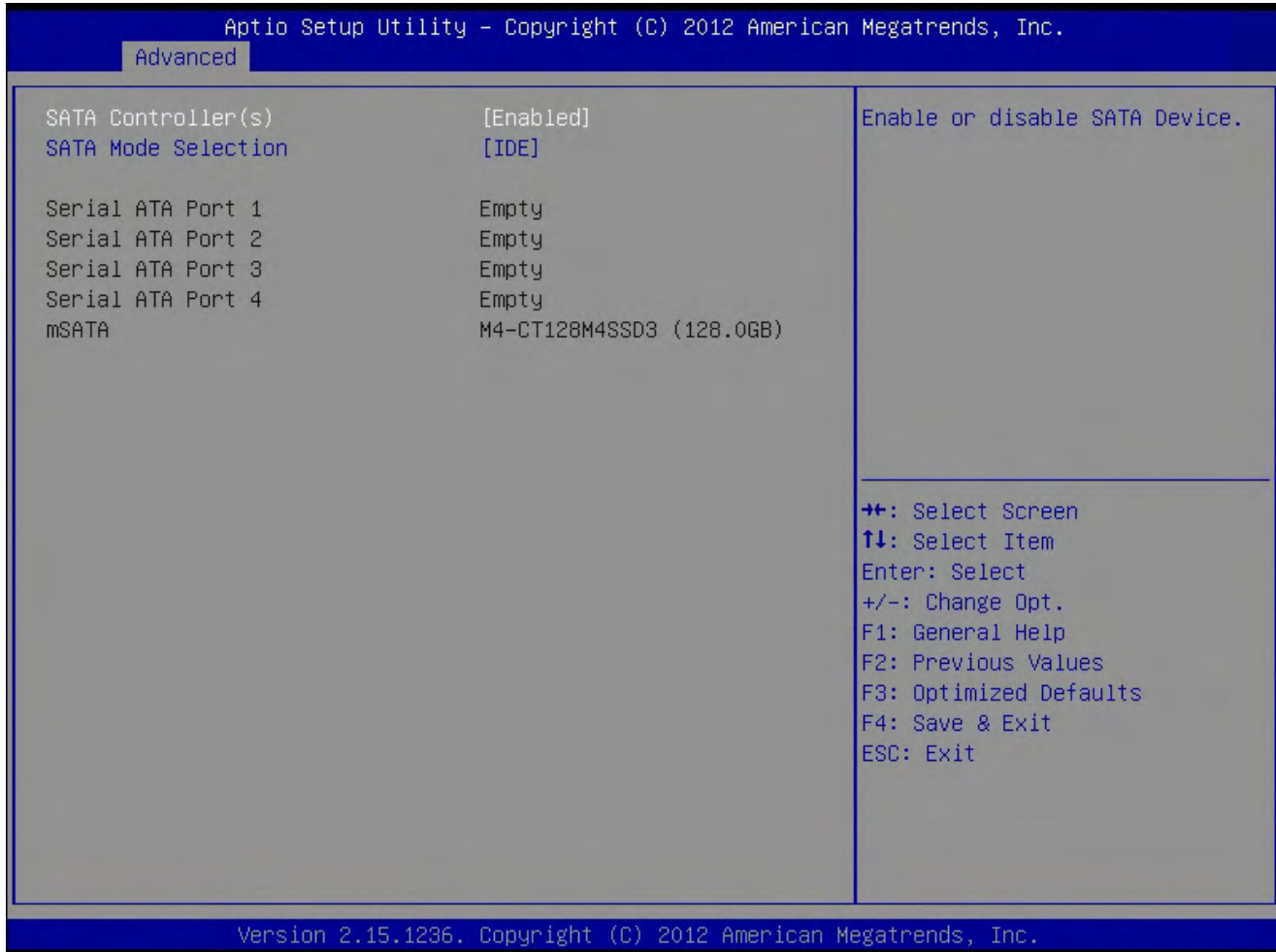
Use this to enable or disable CPU C7 report to OS.

Configuration options: [Disabled] [Enabled]

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Note: The C6/C7 power state will have a new minimum load spec of 0.05 Amps for the 12V2 rail. For customer systems which do not use a PSU that meets Intel®'s minimum current load specifications, Intel strongly suggests to disable the processors' C6/C7 power states in your motherboard BIOS. When the processor's C6/C7 state is disabled, the next lowest power state will be C3 (Deep Sleep Mode) which should be enabled.

2.4.5 SATA Configuration



- **Serial-ATA Controller(s) [Enable]**

Enabled/Disabled Serial-ATA Controller 0

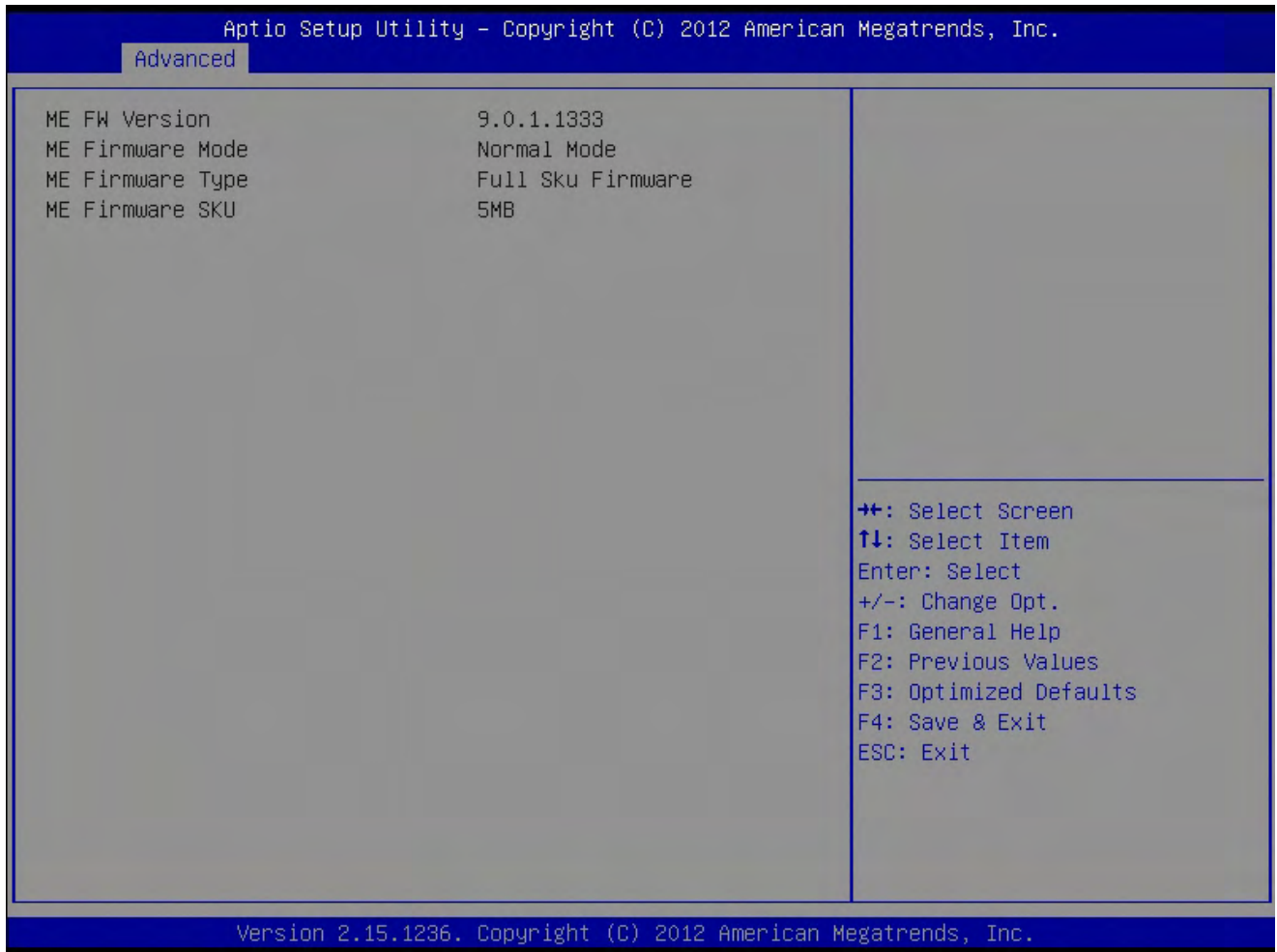
Configuration options: [Disabled] [Enabled]

- **SATA Mode [IDE]**

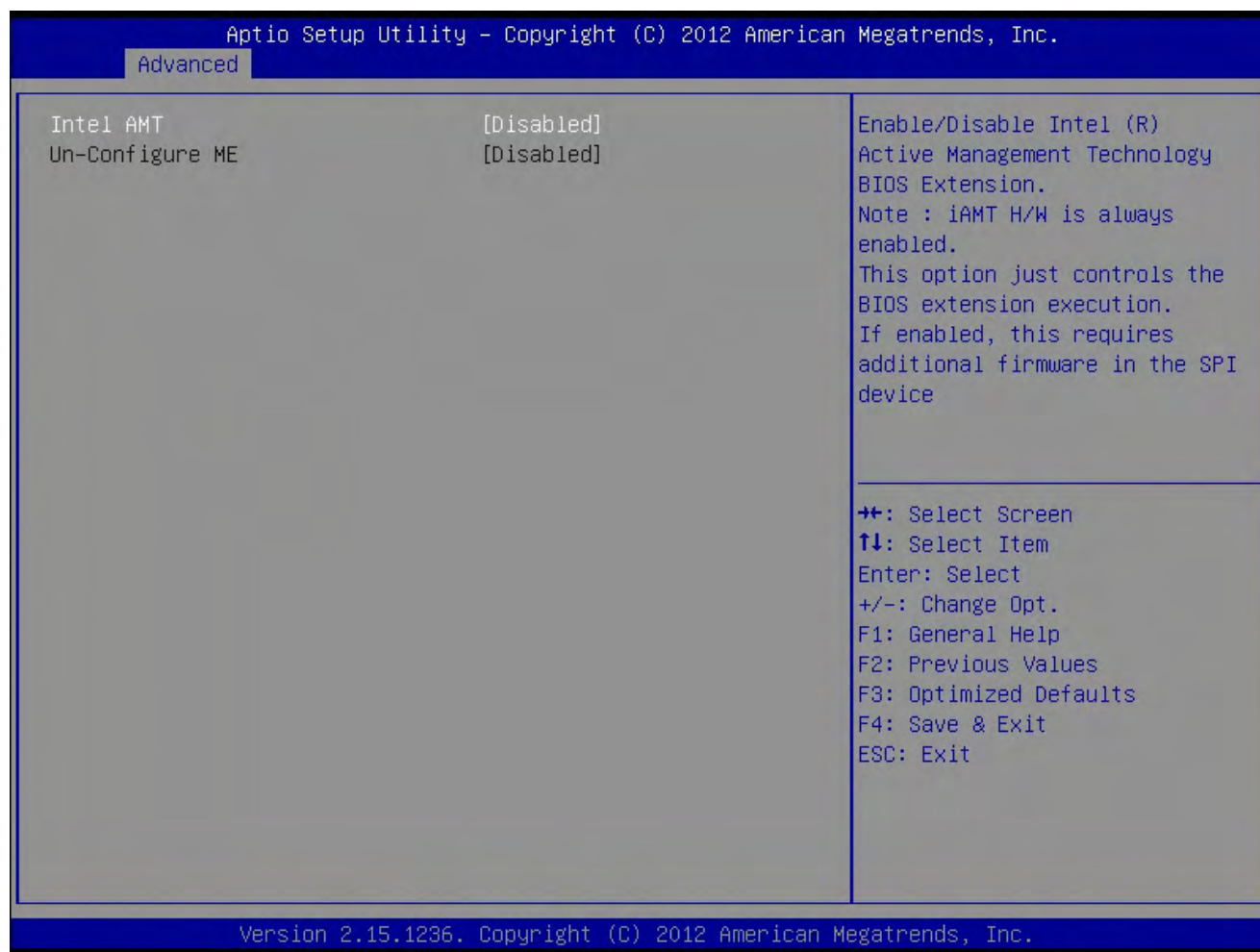
Support IDE, AHCI or RAID mode

Configuration options: [Disable][IDE][AHCI][RAID]

2.4.6 PCH-FW Configuration

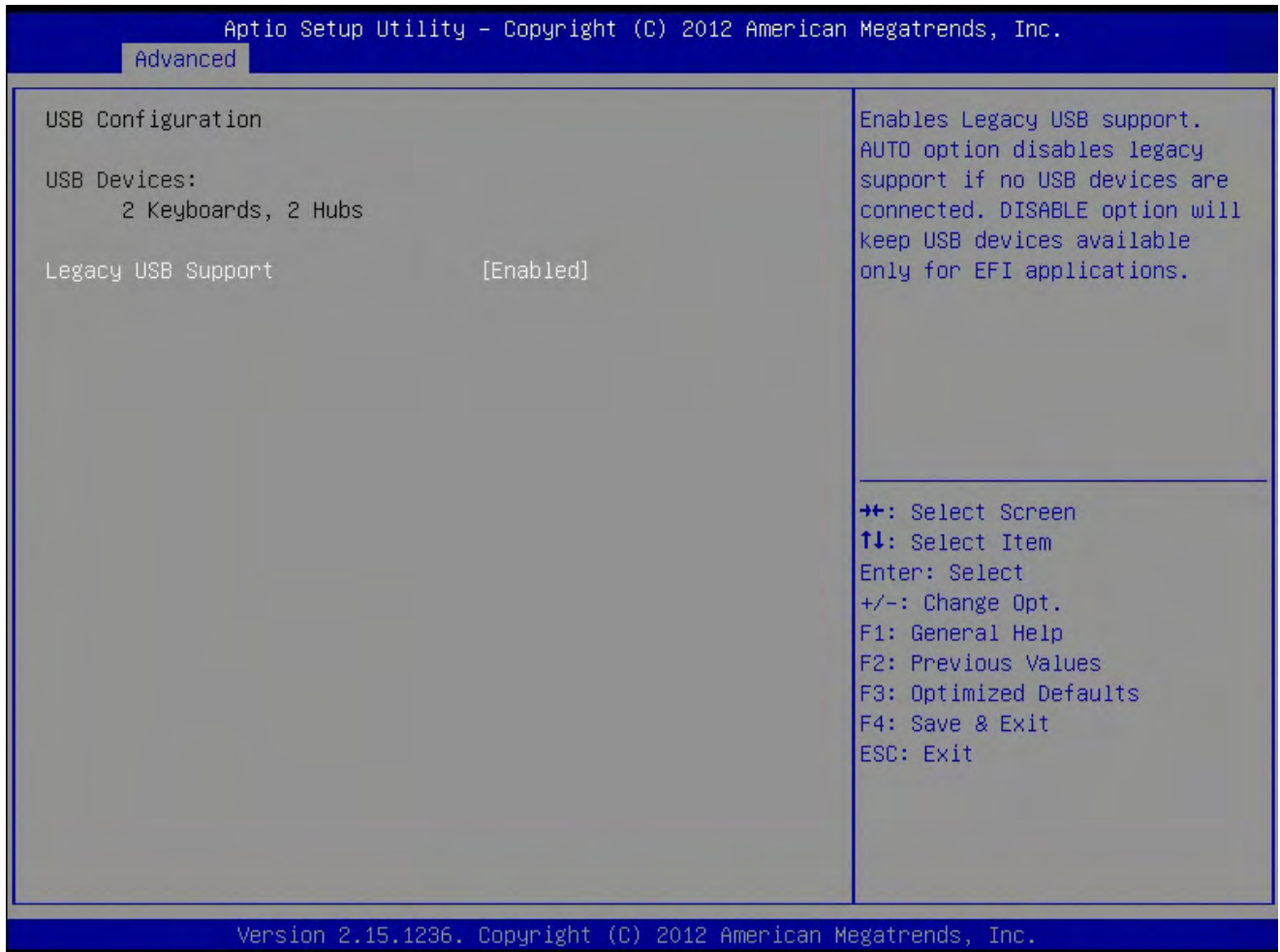


2.4.7 AMT Configuration



2.4.8 USB Configuration

USB Configuration Parameters



- **USB Device**

Display how many devices are connected.

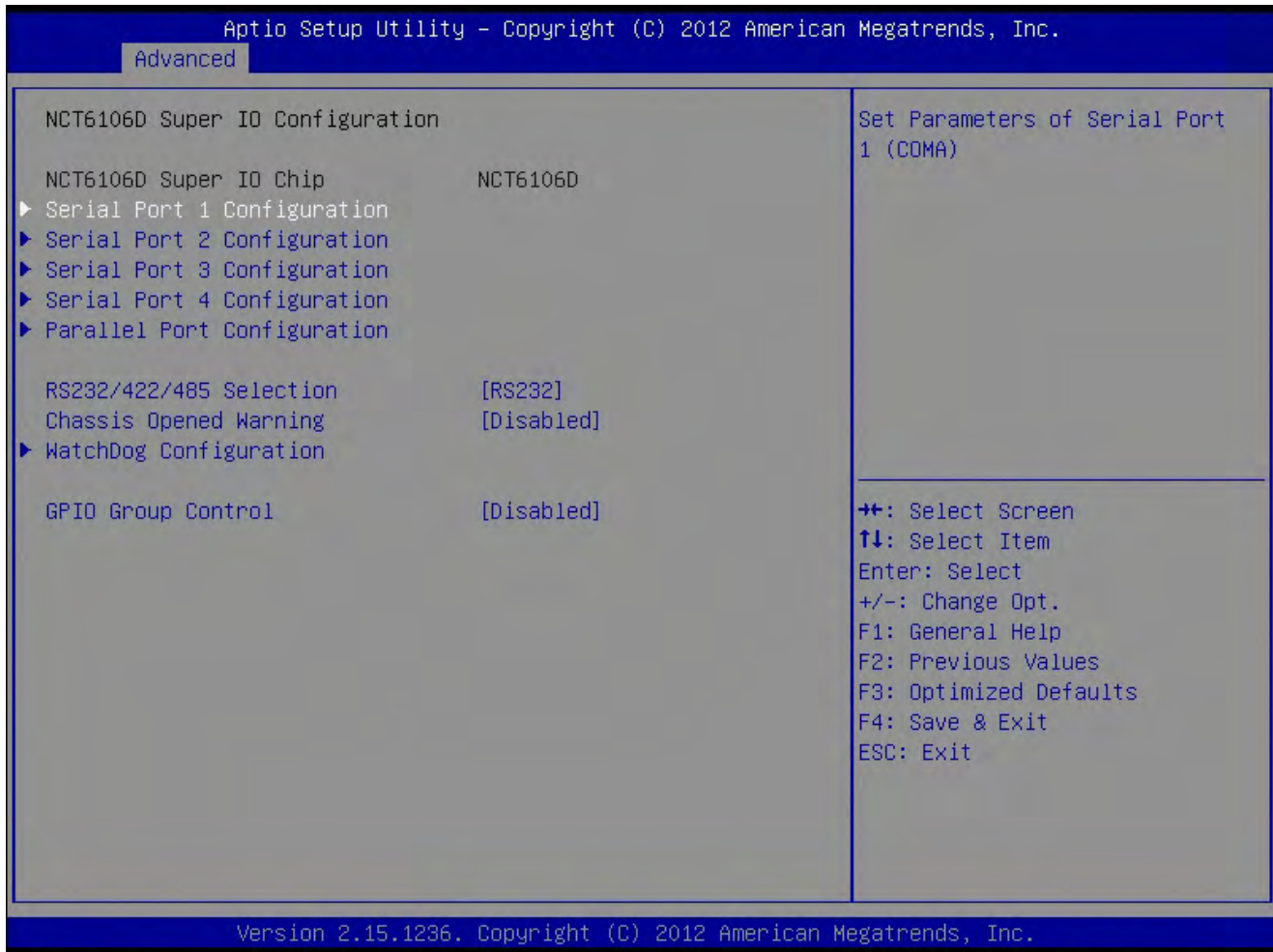
- **Legacy USB Support [Enabled]**

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

Configuration options: [Enabled] [Disabled][Auto]

2.4.9 NCT6106D Super IO Configuration

System Super IO Chip Parameters.

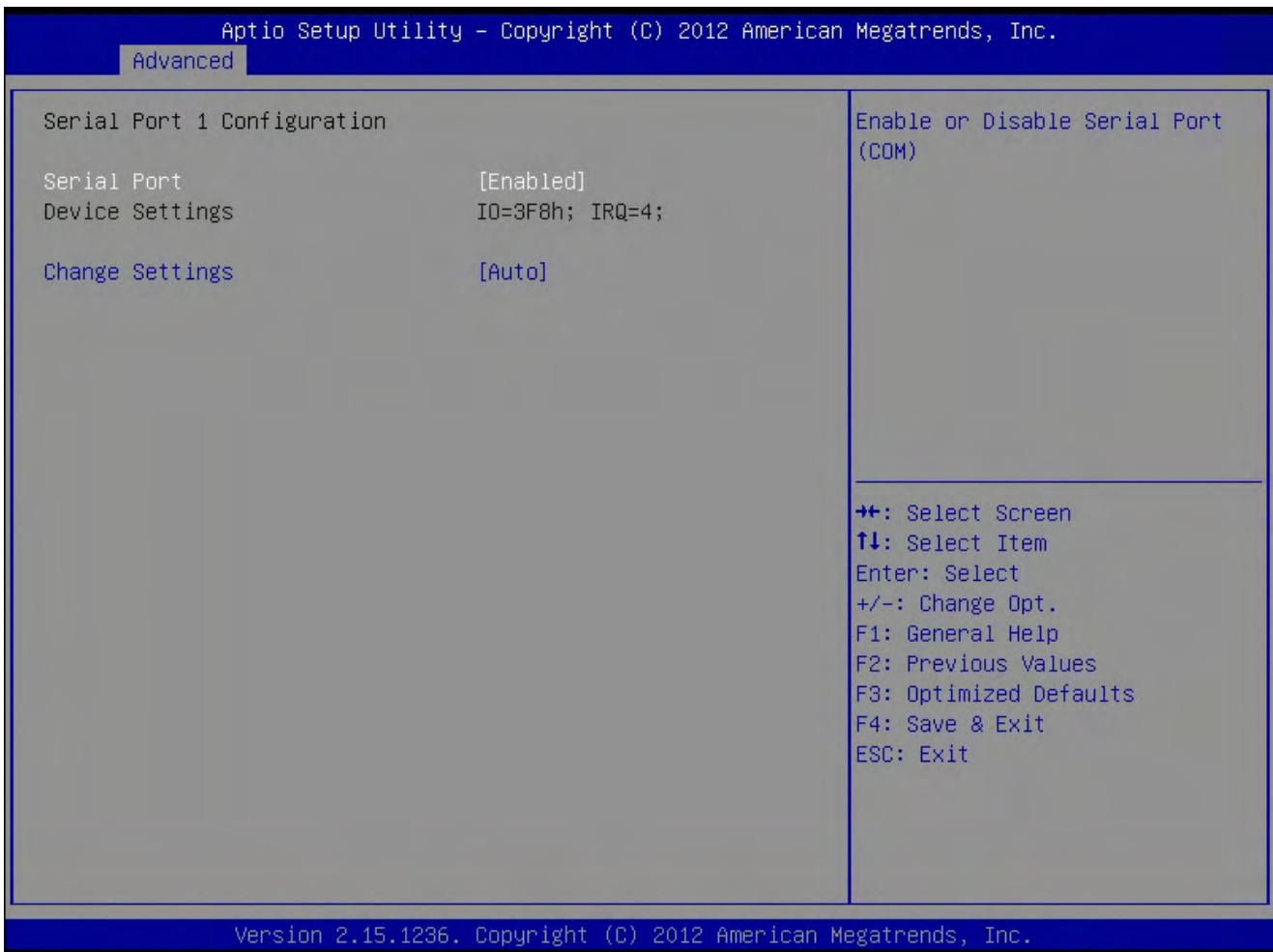


Super IO Configuration

Super IO Chip [NCT6106D]

2.4.9.1 Serial Port 1 configuration

Set Parameters of Serial Port 1



Serial Port 1 Configuration

- **Serial Port [Enable]**

Enable or Disable Serial Port.

Configuration options: [Disabled] [Enabled]

- **Device Setting [IO=3F8h; IRQ=4]**

- **Change Setting[Auto]**

Select an optimal setting for Super IO device.

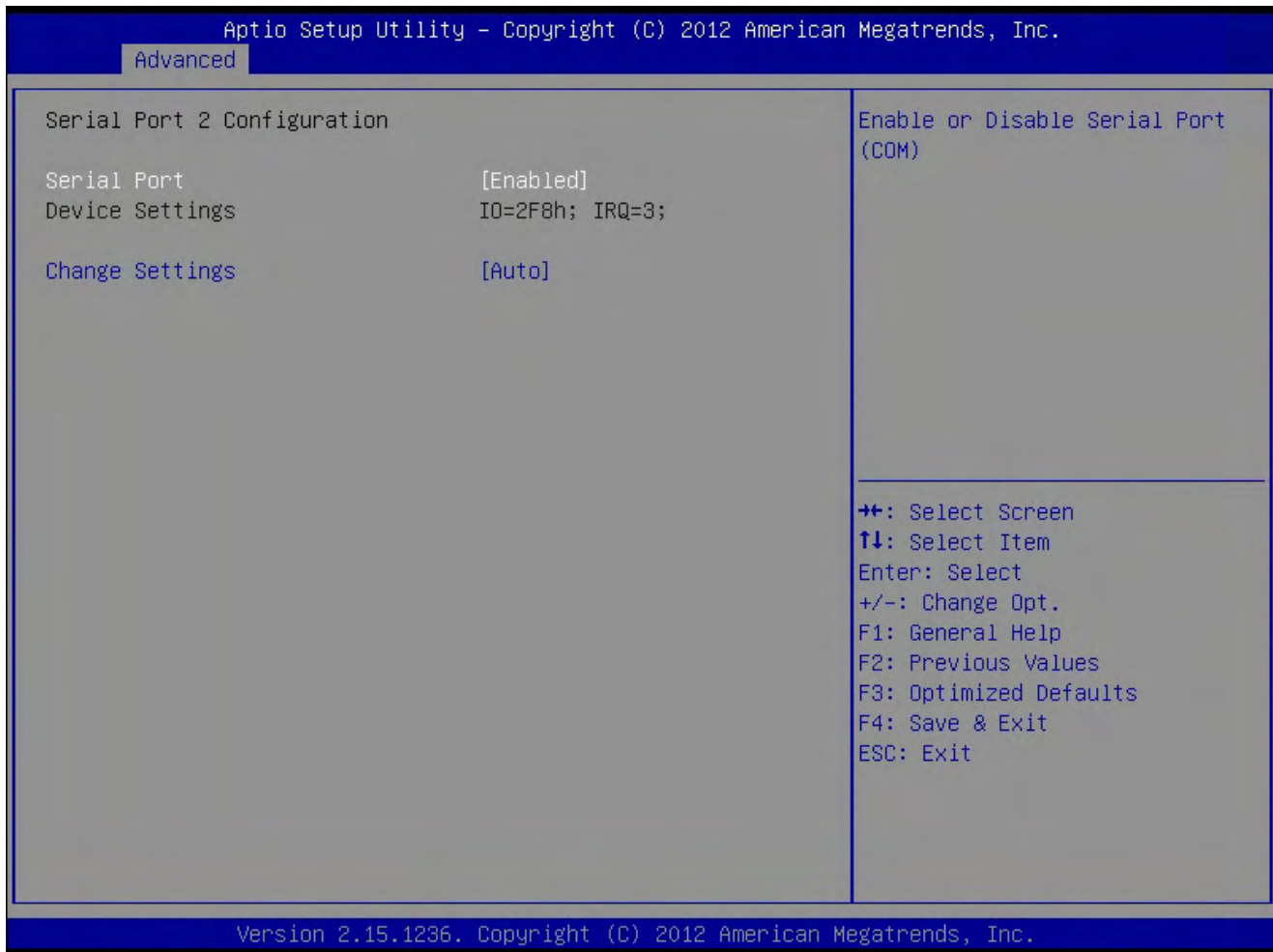
Configuration options: [Auto] [IO=3F8h; IRQ=4] [IO=3F8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12]

[IO=2F8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12] [IO=3E8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12]

[IO=2E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12]

2.4.9.2 Serial Port 2 configuration

Set Parameters of Serial Port 2



Serial Port 2 Configuration

- **Serial Port [Enable]**

Enable or Disable Serial Port.

Configuration options: [Disabled] [Enabled]

- **Device Setting [IO=2F8h; IRQ=3]**

- **Change Setting[Auto]**

Select an optimal setting for Super IO device.

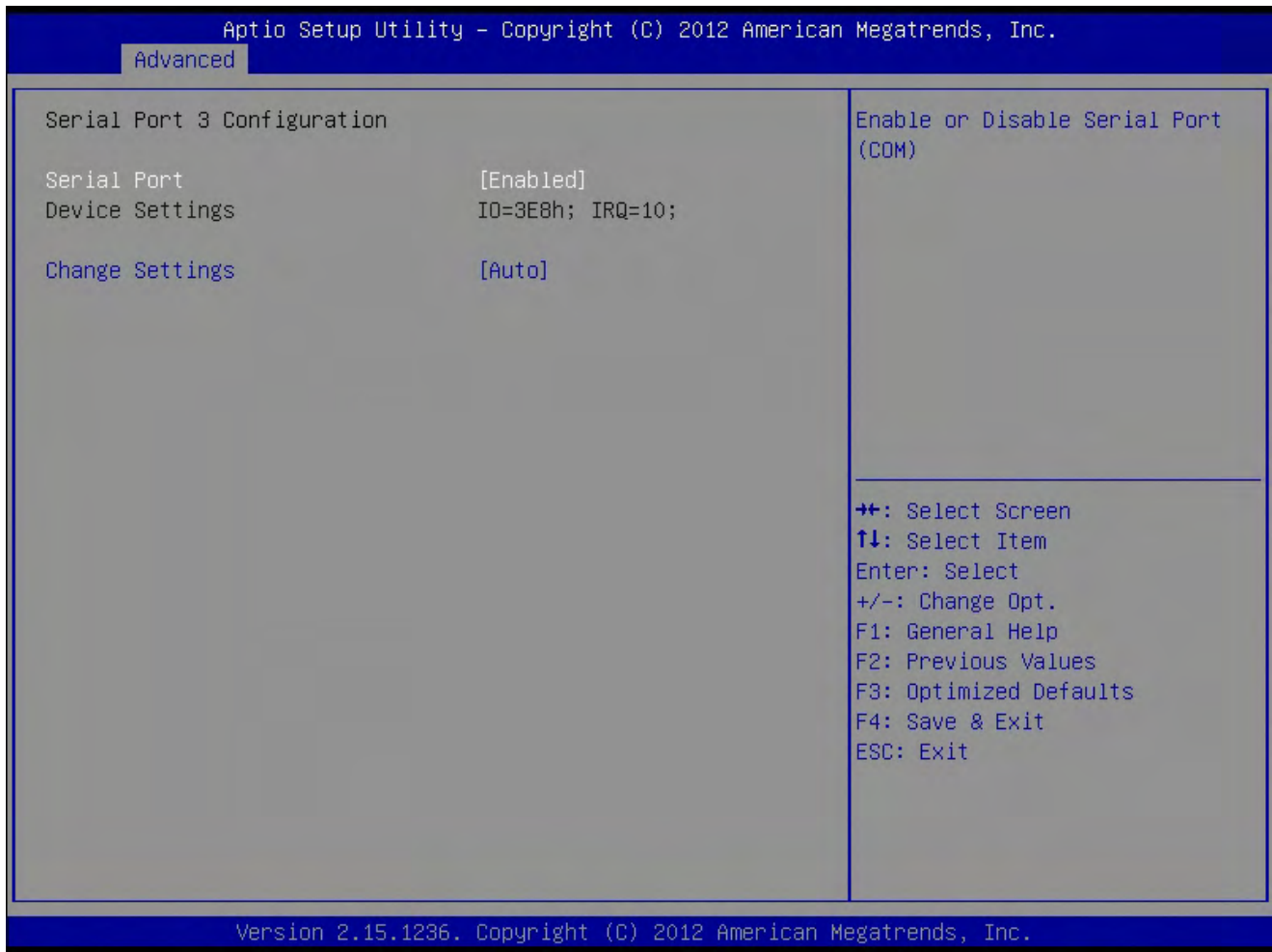
Configuration options: [Auto] [IO=2F8h; IRQ=3] [IO=3F8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12]

[IO=2F8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12] [IO=3E8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12]

[IO=2E8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12]

2.4.9.3 Serial Port 3 configuration

Set Parameters of Serial Port 3



Serial Port 3 Configuration

- **Serial Port [Enable]**

Enable or Disable Serial Port.

Configuration options: [Disabled] [Enabled]

- **Device Setting [IO=3E8h; IRQ=5]**

- **Change Setting[Auto]**

Select an optimal setting for Super IO device.

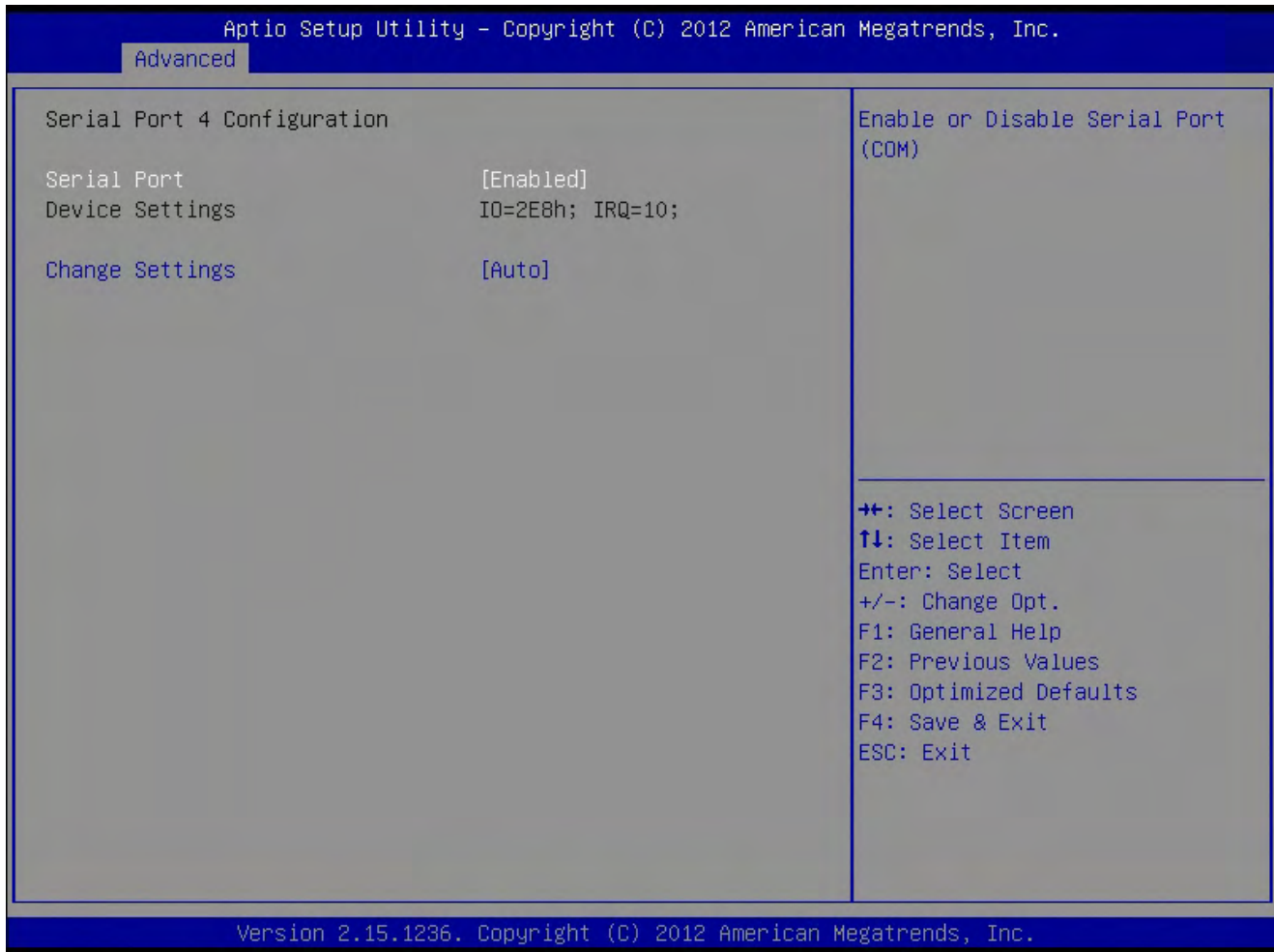
Configuration options: [Auto] [IO=3E8h; IRQ=5] [IO=3E8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12]

[IO=2E8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12] [IO=2E0h; IRQ=3, 4, 5, 6, 7, 10, 11, 12]

[IO=2F0h; IRQ=3, 4, 5, 6, 7, 10, 11, 12]

2.4.9.4 Serial Port 4 configuration

Set Parameters of Serial Port 4



Serial Port 4 Configuration

- **Serial Port [Enable]**

Enable or Disable Serial Port.

Configuration options: [Disabled] [Enabled]

- **Device Setting [IO=2E8h; IRQ=10]**

- **Change Setting[Auto]**

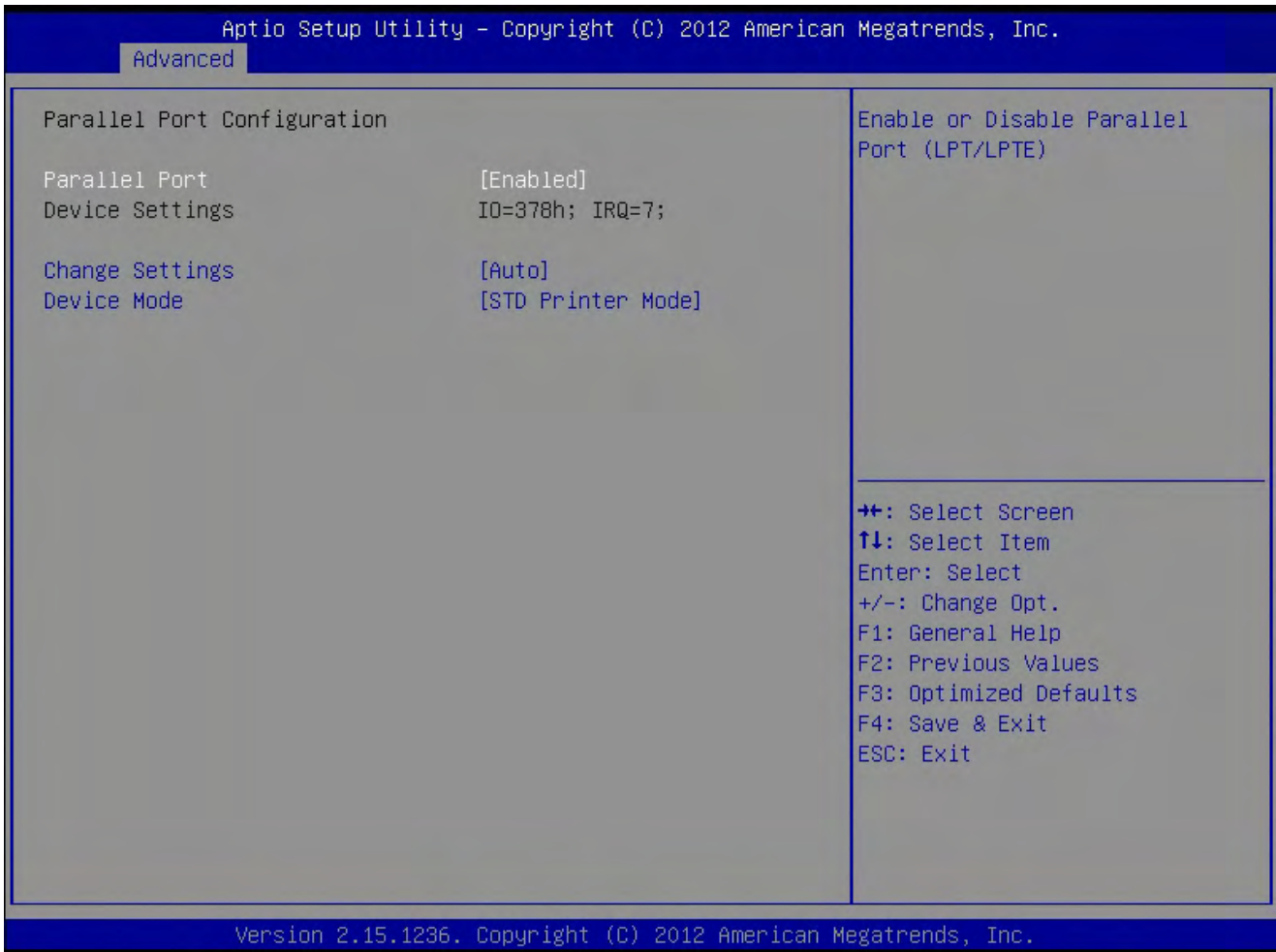
Select an optimal setting for Super IO device.

Configuration options: [Auto] [IO=C88h; IRQ=5] [IO=3E8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12]

[IO=2E8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12] [IO=2E0h; IRQ=3, 4, 5, 6, 7, 10, 11, 12]

[IO=2F0h; IRQ=3, 4, 5, 6, 7, 10, 11, 12]

2.4.9.5 Parallel Port Configuration



- **Parallel Port [Enable]**

Use this item to enable or disable the onboard parallel port.

Configuration options: [Disabled] [Enabled]

- **Change Settings [Auto]**

Use this item to select an optional setting for Super IO device.

Configuration Options :

- [Auto]
- [IO=378h; IRQ=7]
- [IO=378h; IRQ=5,6,7,9,10,11,12]
- [IO=278h; IRQ=5,6,7,9,10,11,12]
- [IO=3BCh; IRQ=5,6,7,9,10,11,12]

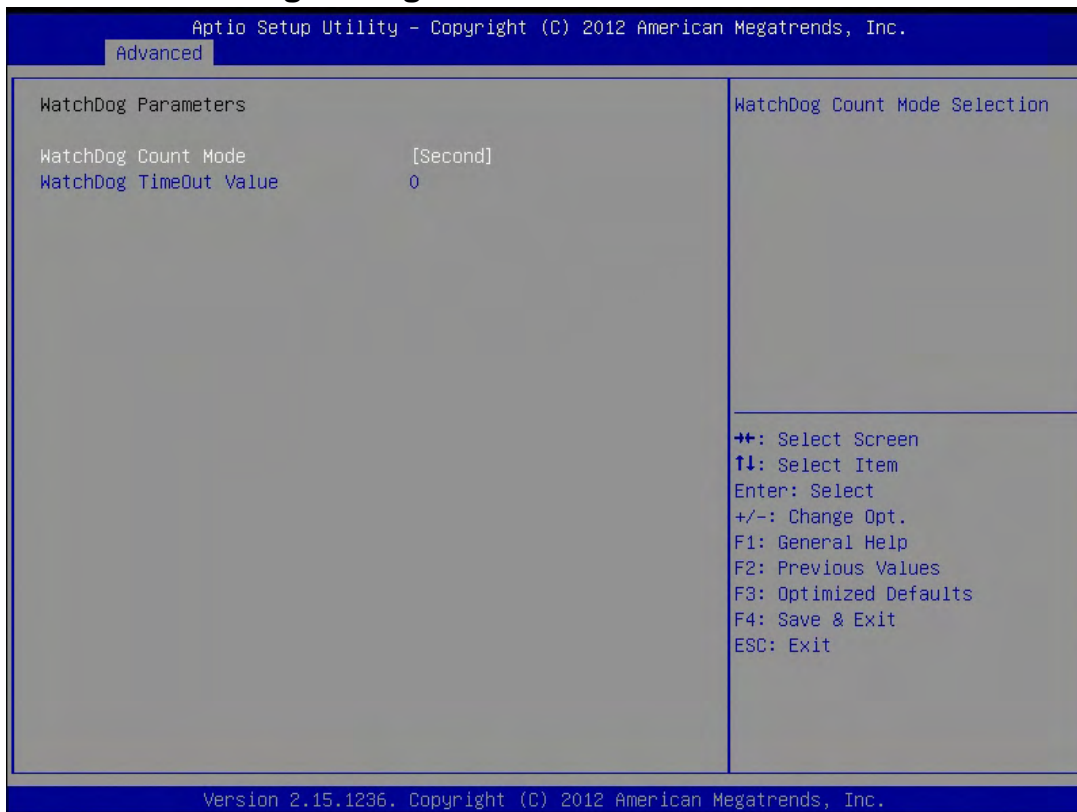
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- **Device Mode [STD Printer Mode]**

Use this item to change the Printer Port mode.

Configuration Options : [STD Printer Mode]
 [SPP Mode]
 [EPP-1.9 and SPP Mode]
 [EPP-1.7 and SPP Mode]
 [ECP Mode]
 [ECP Mode and EPP-1.9 Mode]
 [ECP Mode and EPP-1.7 Mode]

2.4.9.6 Watch Dog Configuration

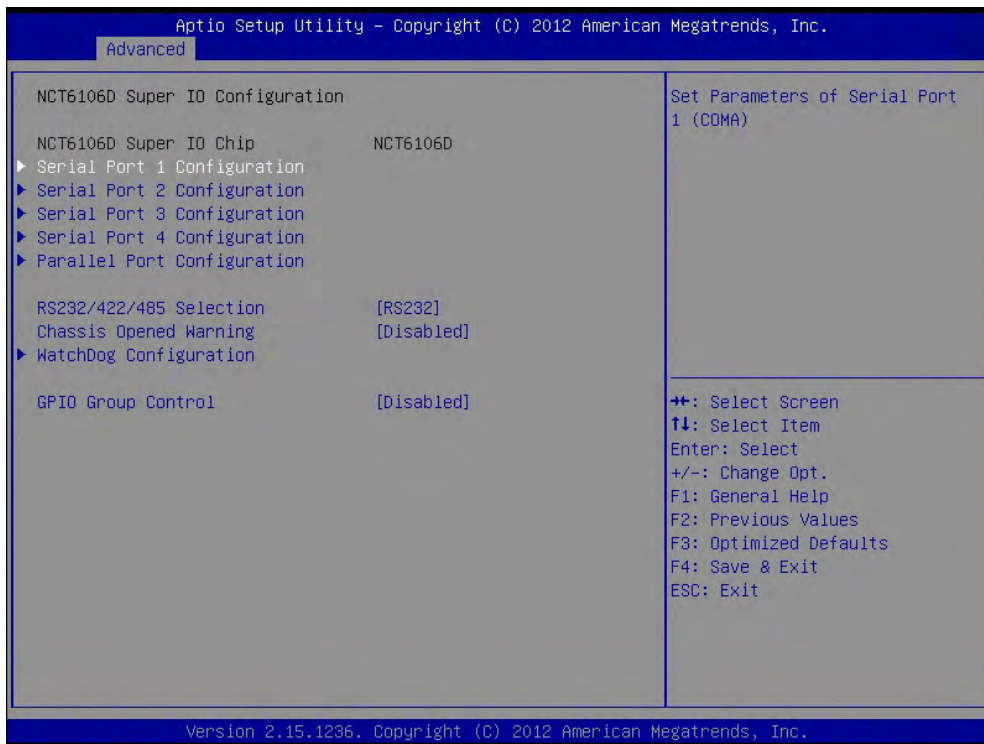


- **Watch Dog Timer**

Use this item to enable/disable Watch Dog Timer

Configuration options: [Disabled] [Enabled]

2.4.9.7 COM1 RS232/422/486 Selection



- **RS232/422/485 Selection [RS232]**

Configuration options: [RS232] [RS485 Half Duplex] [RS485/RS422 Full Duplex]

- **Chassis Opened Warning**

Configuration options: [Disabled] [Enabled]

- **GPIO Group Control [Disabled]**

Configure the digital GPIO pins

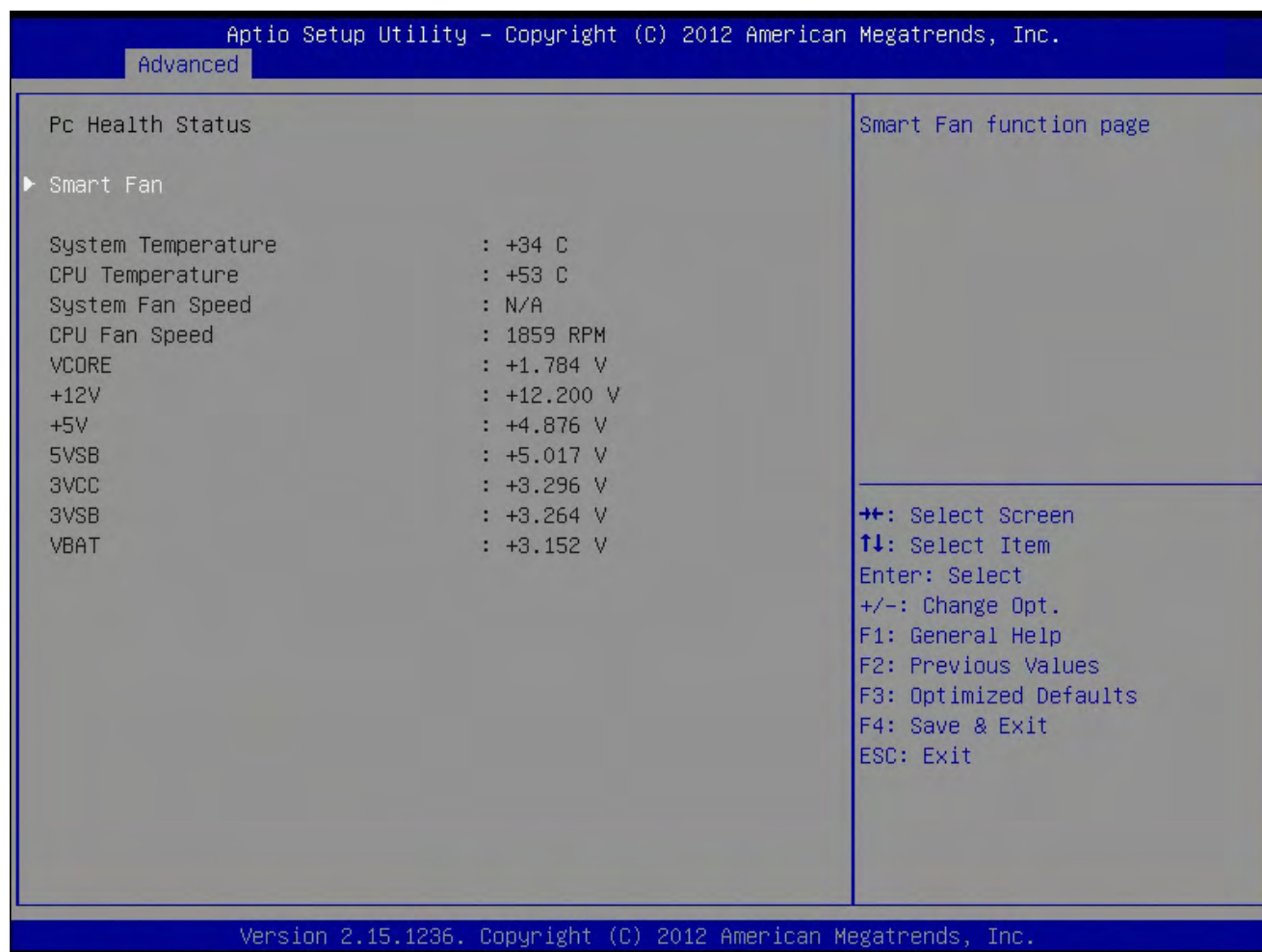
Configuration options: [Disabled] [Enabled]

Configuration options: [Input] [Output low] [Output high]

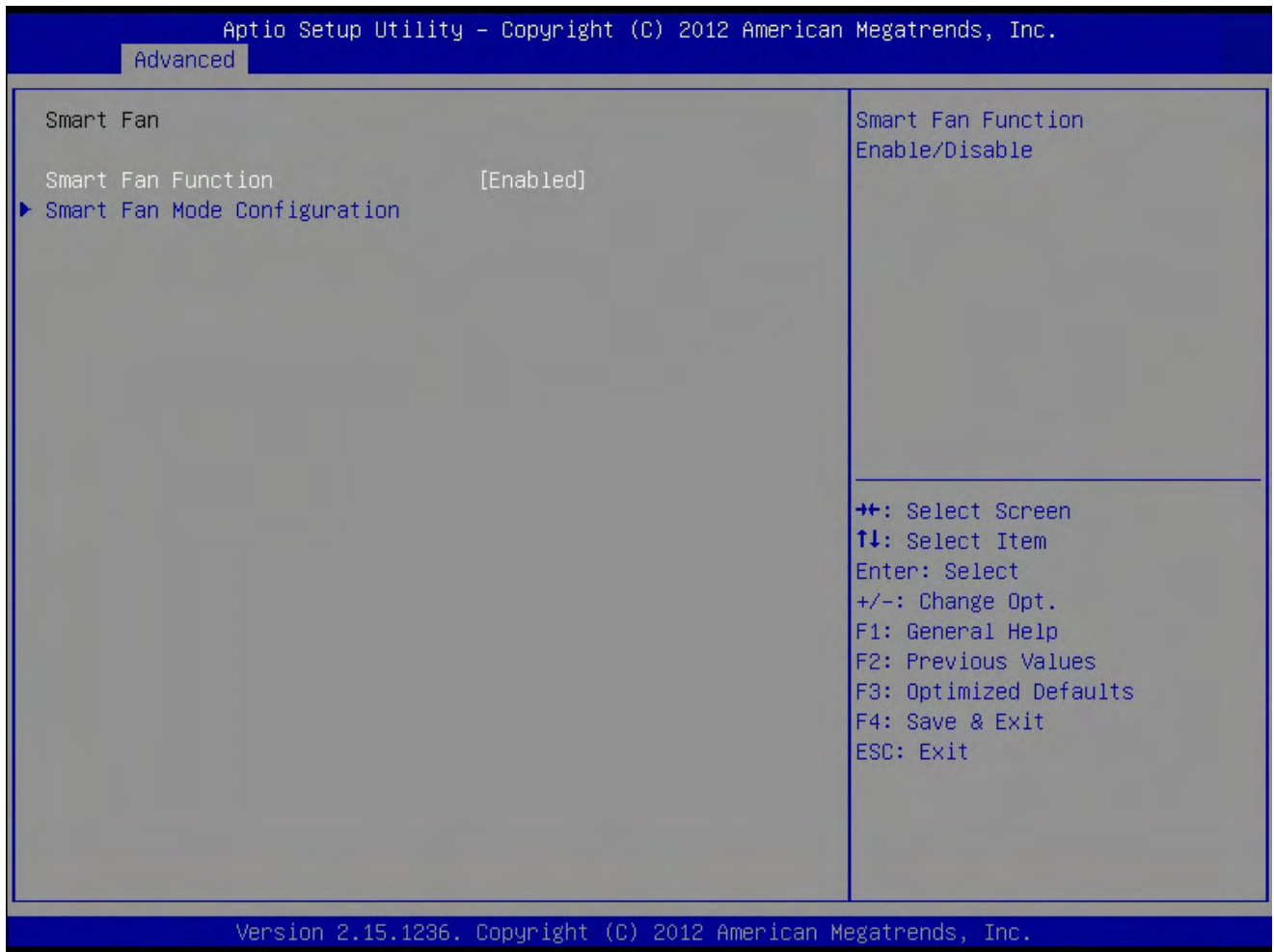
2.4.10 NCT6106D Hardware Monitor

● PC Health Status

Display system health status



2.4.10.1 Smart Fan



- **Smart Fan Function [Enable]**

Configuration options: [Disabled] [Enabled]

2.4.10.2 Smart Fan Mode Configuration

Smart Fan Mode configuration



- **System Smart Fan Target [Disabled]**

Enabled or Disabled System Smart Fan Function

- **System MIN.FAN Speed(%) [62.5%]**

Set minimum system fan speed

Configuration options: [12.5%] [25%] [37.5%] [50%] [62.5%] [75%] [87.5%]

- **CPU Smart Fan Target [Disabled]**

Set CPU smart fan target temperature

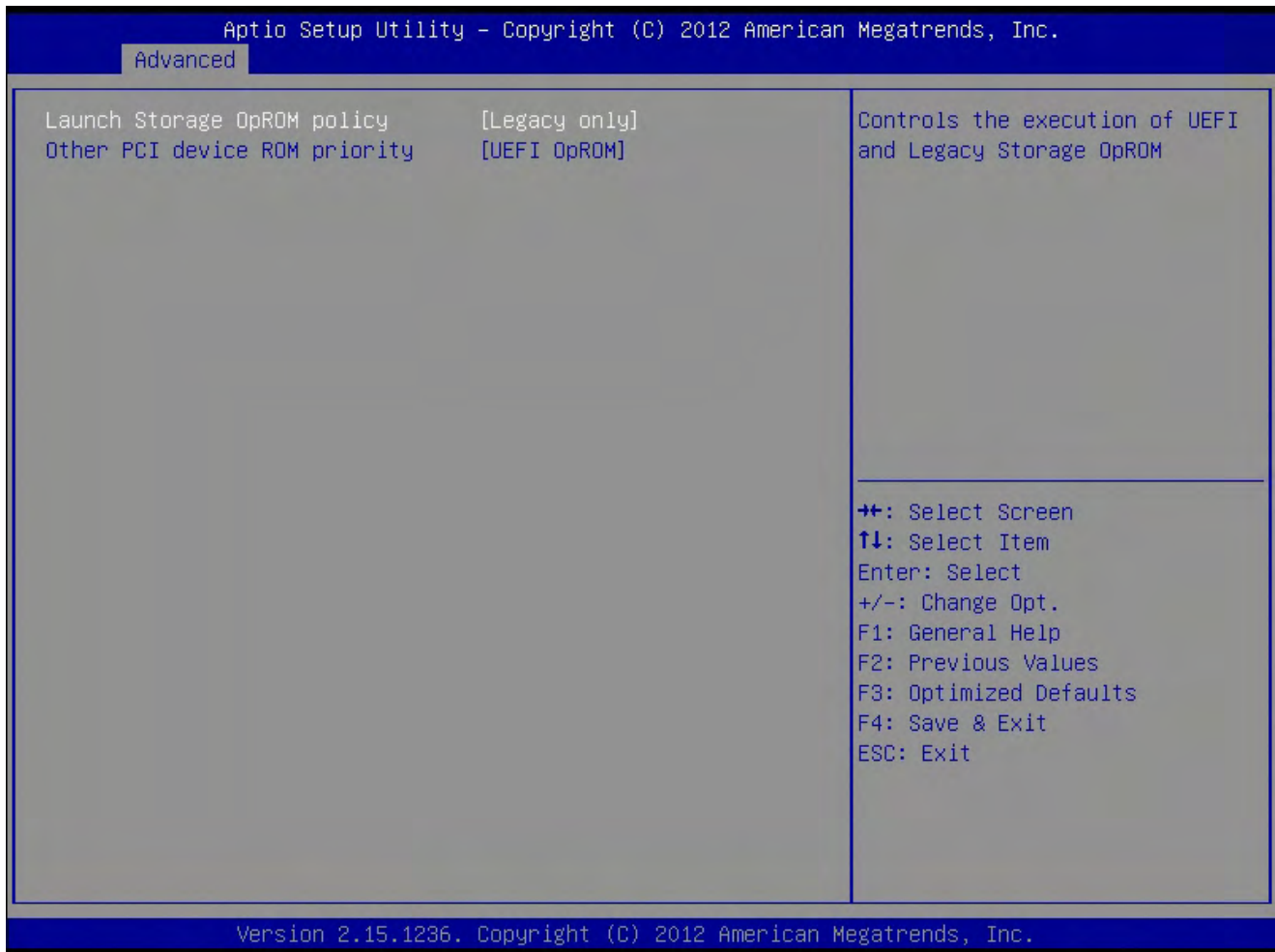
Configuration options: [Disable] [40 C] [45 C] [50 C] [55 C] [60 C] [65 C] [70 C]

- **CPU MIN.FAN Speed(%) [62.5%]**

Set minimum CPU fan speed

Configuration options: [12.5%] [25%] [37.5%] [50%] [62.5%] [75%] [87.5%]

2.4.11 Option ROM Policy



- **Launch Storage OpROM**

Enable or Disable Boot Option For Legacy Mass Storage Devices with Option ROM
 Configuration options: [Disabled] [Enabled]

- **Other PCI Device ROM priority**

Configuration options: [UEFI OpROM] [Legacy OpROM]

2.4.12 Intel RC Driver Version Detail



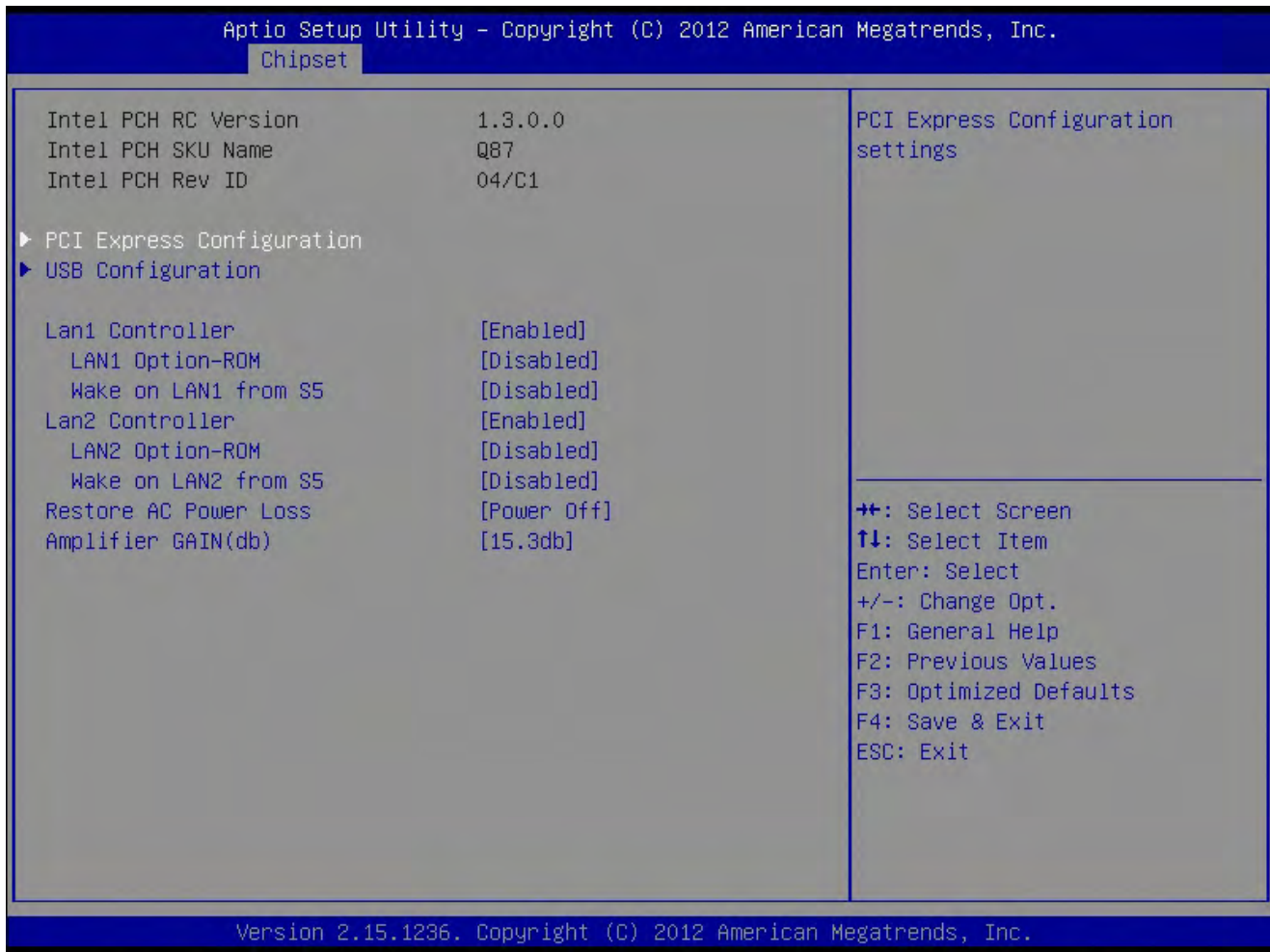
2.5 Chipset



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2.5.1 PCH-IO Configuration

PCH-IO Configuration



- **LAN1 Controller [Enable]**

Enable/Disable LAN1 Controller

Configuration options: [Disabled] [Enabled]

- **LAN1 Option-ROM [Disable]**

Enable/Disable LAN1 boot option for legacy network devices.

Configuration options: [Disabled] [Enabled]

- **LAN2 Controller [Enable]**

Enable/Disable LAN1 Controller

Configuration options: [Disabled] [Enabled]

- **LAN2 Option-ROM [Disable]**

Enable/Disable LAN2 boot option for legacy network devices.

Configuration options: [Disabled] [Enabled]

- **Restore AC Power Loss [Power Off]**

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

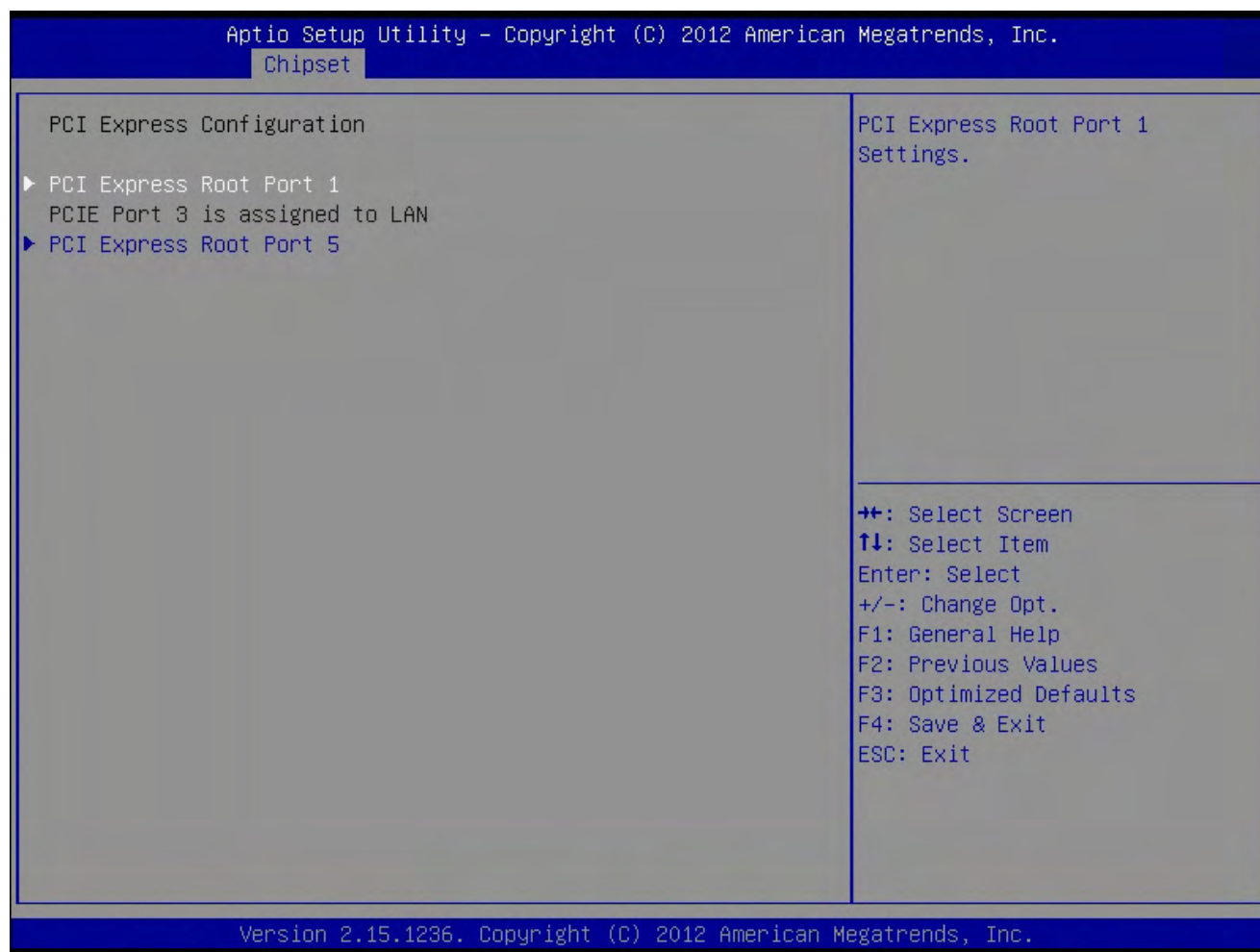
Configuration options: [Power Off] [Power On] [Last state]

- **Amplifier GAIN(db) [15.3db]**

Setting Amplifier GAIN

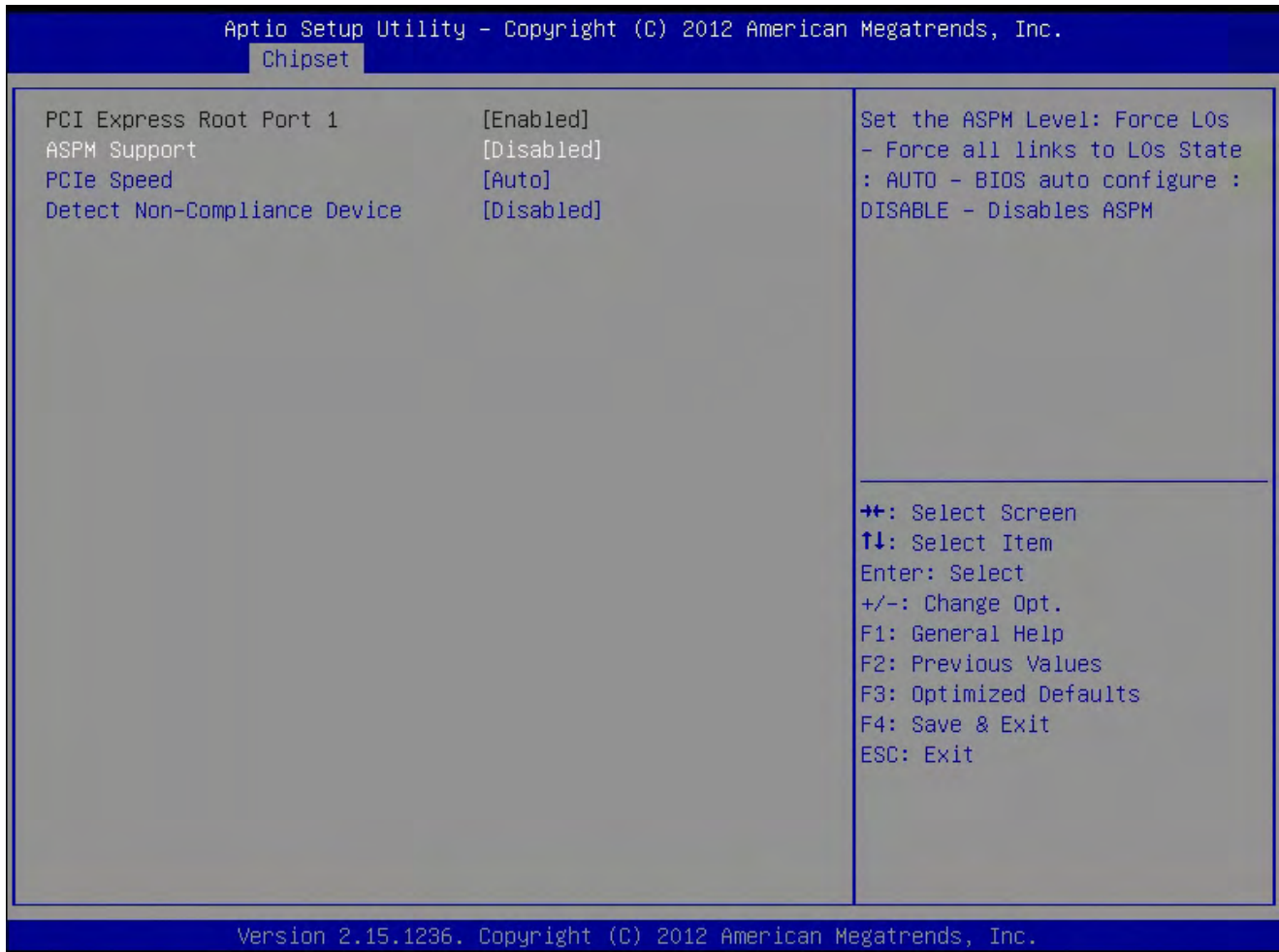
Configuration options:[15.3db][21.2db][27.2db][31.8db]

2.5.1.1 PCI Express Configuration



- **PCI Express Root Port 1**
- **PCI Express Root Port 5**

- **PCI Express Root Port 1**



- **ASPM [Disabled]**

Control ASPM support for the PEG Device. This has no effect if PEG is not the currently active device.

Configuration options: [Disabled] [ASPM L0s] [ASPM L1] [ASPM L0sL1] [Auto]

- **PCIe Speed [Auto]**

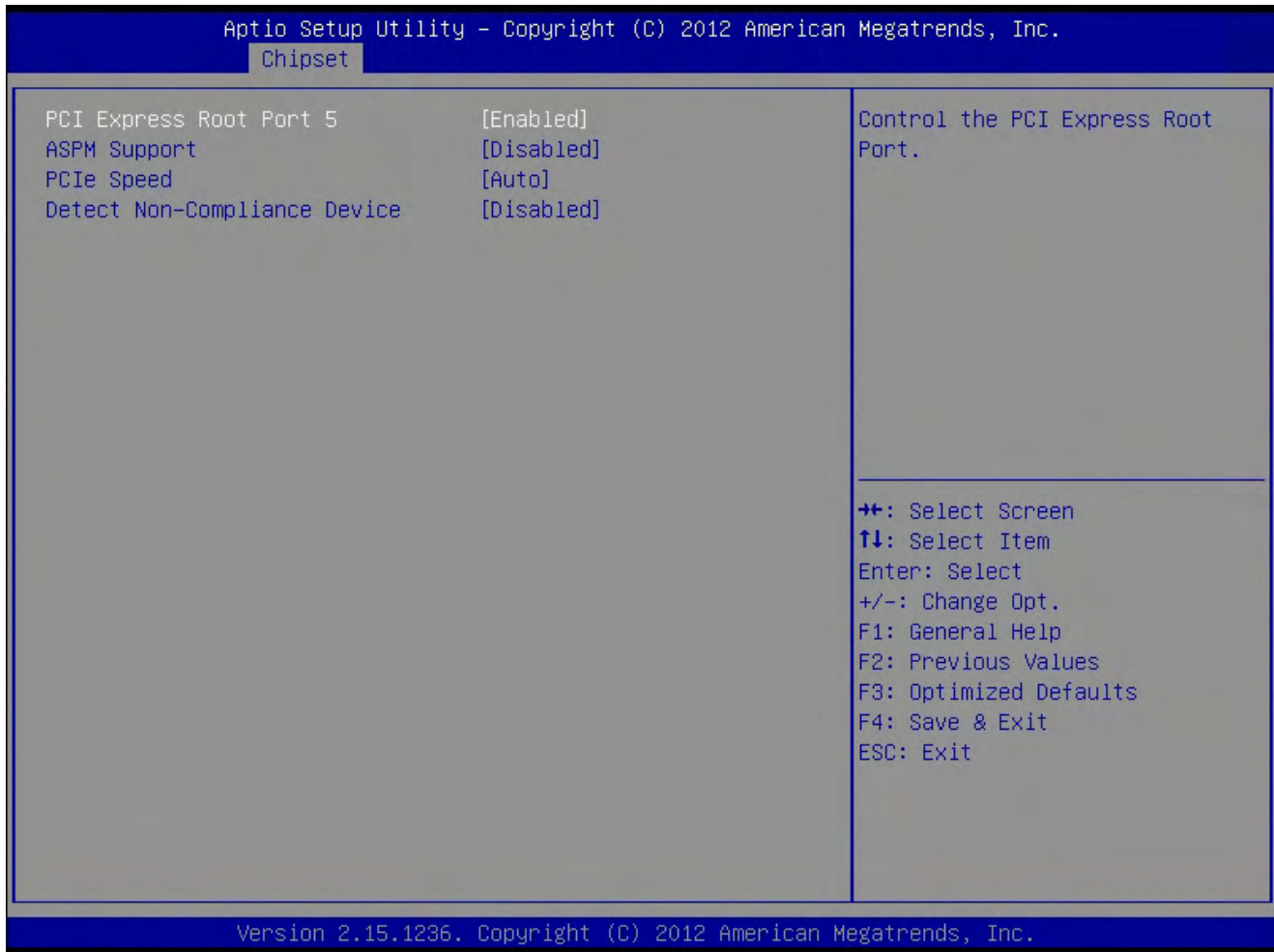
Configuration options: [Auto][Gen1][Gen2]

- **Detect Non-Compliance Device [Disabled]**

Configuration options:[Enable][Disable]

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● PCI Express Root Port 5



● PCI Express Root Port 5 [Enabled]

Configuration options:[Enable][Disable]

● ASPM [Disabled]

Control ASPM support for the PEG Device. This has no effect if PEG is not the currently active device.

Configuration options: [Disabled] [ASPM L0s] [ASPM L1] [ASPM L0sL1] [Auto]

● PCIe Speed [Auto]

Configuration options: [Auto][Gen1][Gen2]

● Detect Non-Compliance Device [Disabled]

Configuration options:[Enable][Disable]

2.5.1.2 USB Configuration



- **USB3.0 Support [Enabled]**

Enable/Disable USB 3.0 support

Configuration options: [Disabled] [Enabled]

- **USB ports per-port disable cont [Disabled]**

Configuration options: [Disabled] [Enabled]

2.5.2 System Agent (SA) Configuration



- **VT-d [Enabled]**

Set VT-d Enable or Disable

Configuration options: [Disabled] [Enabled]

2.5.2.1 Graphics Configuration



- **Primary IGD Boot Display [AUTO]**

Select which of IGFX/PEG Graphics device should be Primary Display or select SG for Switchable Gfx.

Configuration options: [AUTO][IGD][PEG]

- **Internal Graphics [AUTO]**

Enable/Disable IGD Multi-Monitor by internal graphics device.

Configuration options: [AUTO][Disabled] [Enabled]

- **DVMT Pre-Allocated [32M]**

Select DVMT Pre-Allocated (Fixed) graphics memory size used by the internal graphics device. Configuration options: [32M]~[512M]

- **DVMT Total Graphics Mem [256M]**

Select DVMT total graphics memory size used by the internal graphics device.

Configuration options: [128M][256M][MAX]

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2.5.2.1.1 LCD Control



- **DVI/LVDS Selection [DVI]**

- **Primary IGFX Boot Display [VBIOS Default]**

Select the Video Device that will be activated during POST. This has no effect if external graphics present. Secondary boot display selection will appear based on your selection. VGA modes will be supported only on primary display.

Configuration options: [VBIOS Default][CRT][DVI][LVDS]

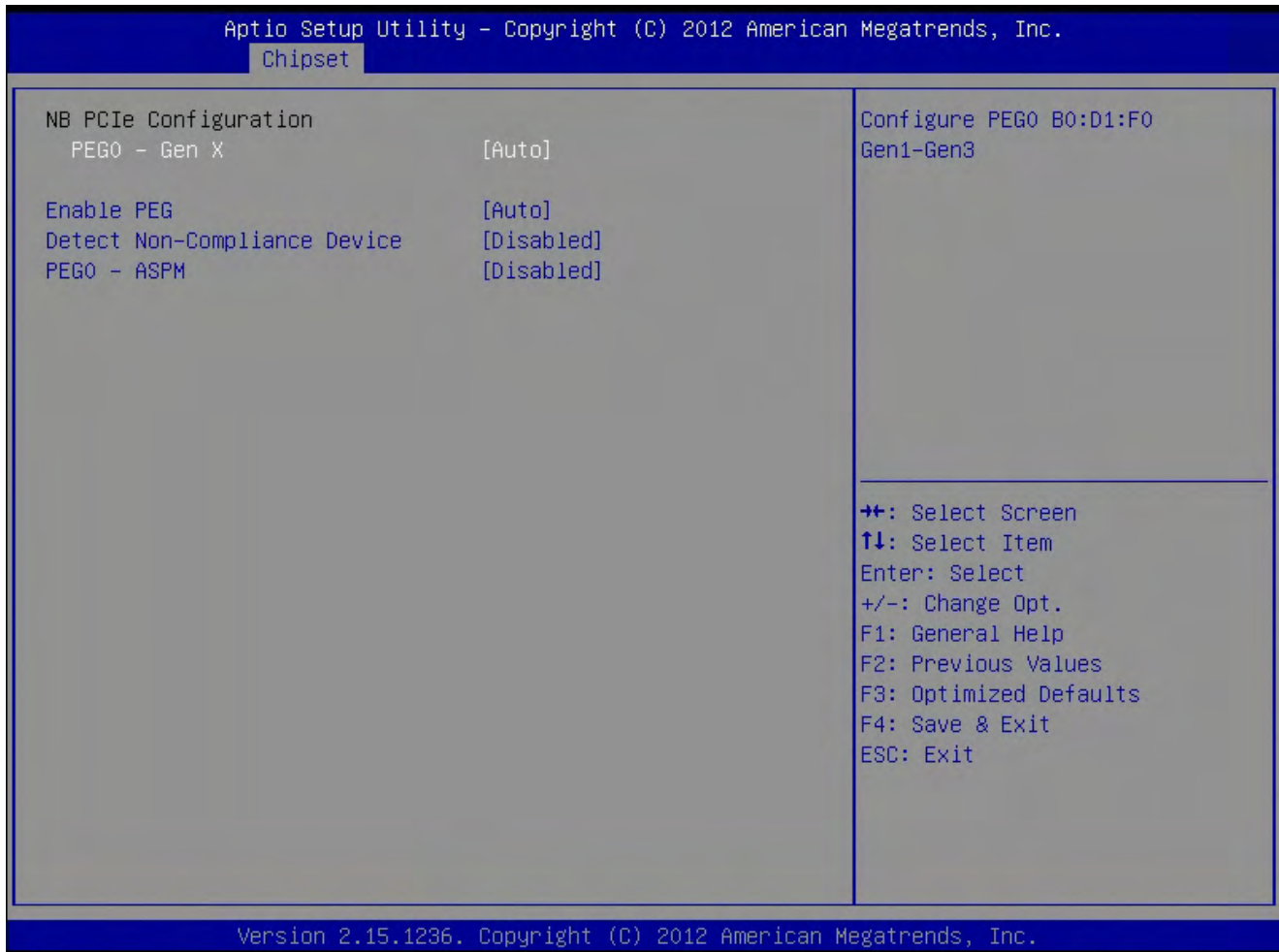
- **LCD Panel Type Select**

Select LCD Panel resolution

- **LVDS Brightness Control [30]**

Configuration options:[1]~[63]

2.5.2.2 PCIe Configuration



- **PEG0 – Gen X [Auto]**

Configure PEG0 Gen1~Gen3

Configuration options: [Auto][Gen1][Gen2][Gen3]

- **Enable PEG [Auto]**

To enable/Disable the PEG slot.

Configuration options:[Auto][Enable][Disable]

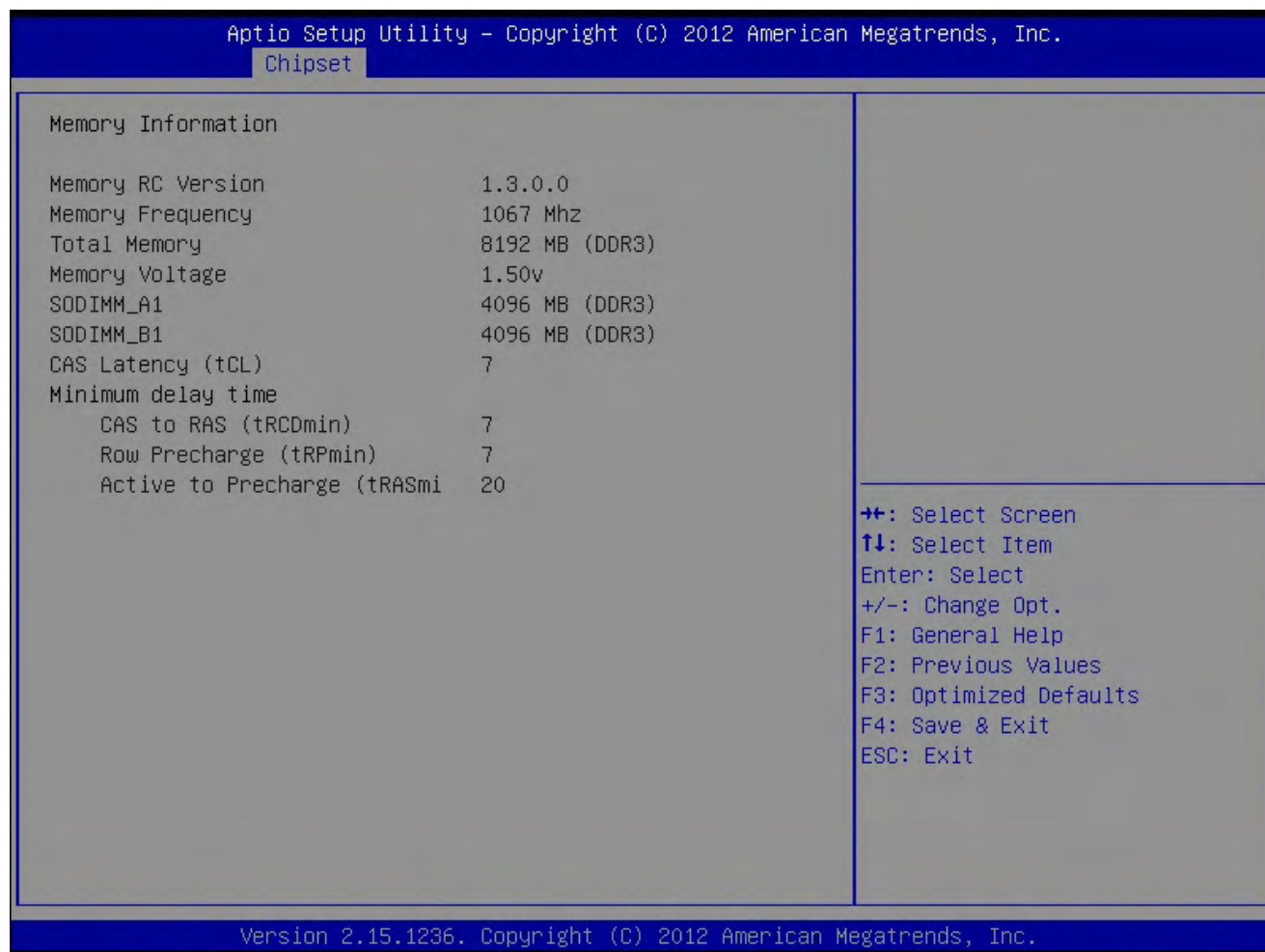
- **PEG ASPM [Auto]**

Control ASPM support for the PEG Device. This has no effect if PEG is not the currently active device.

Configuration options: [Disabled] [Auto] [ASPM L0s] [ASPM L1] [ASPM L0sL1]

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2.5.2.3 Memory Information

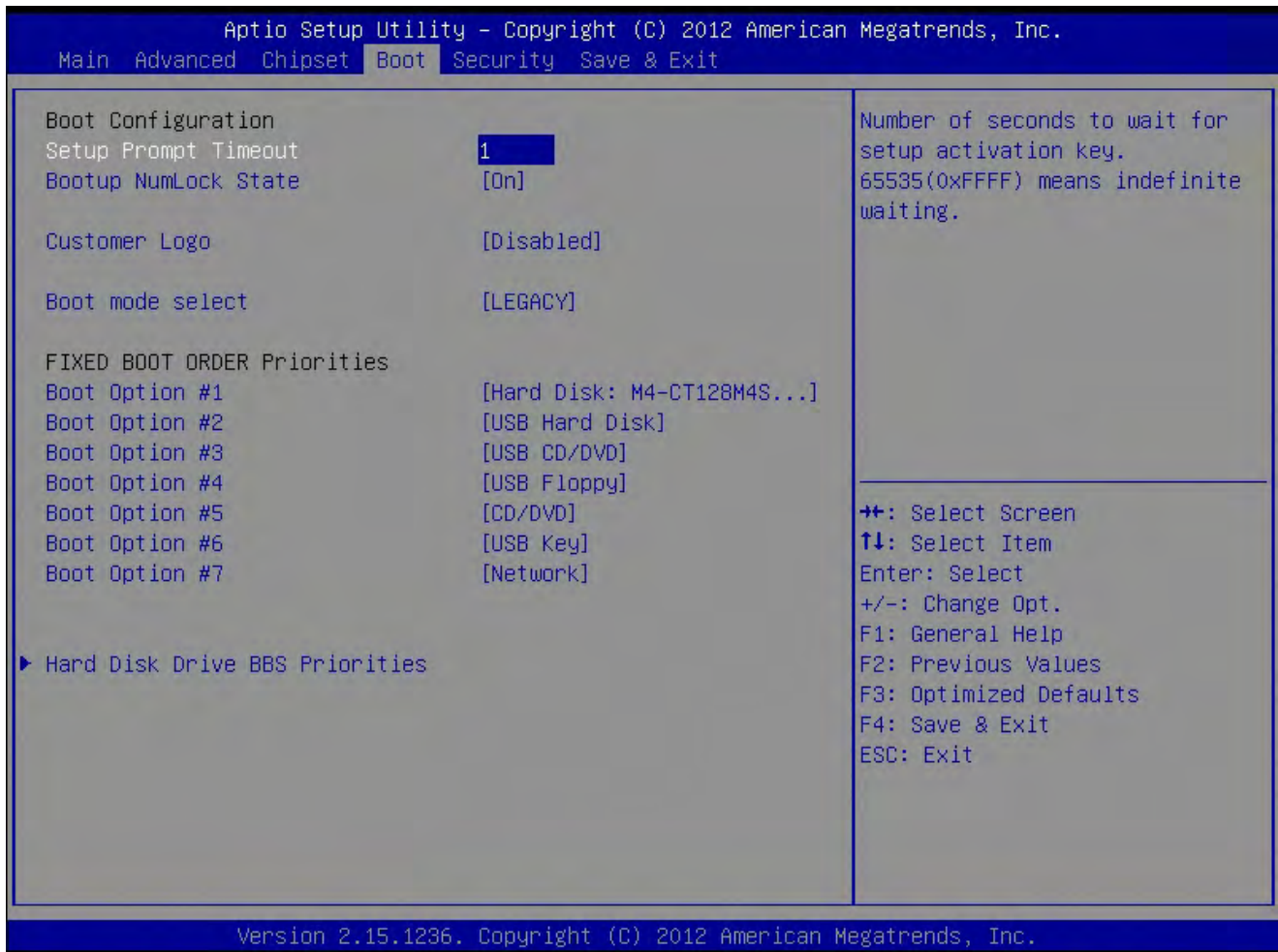


● Memory Information

Display Memory Information

2.6 Boot

Boot Configuration



- **Setup Prompt Timeout [1]**

Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.

- **Bootup NumLock State [On]**

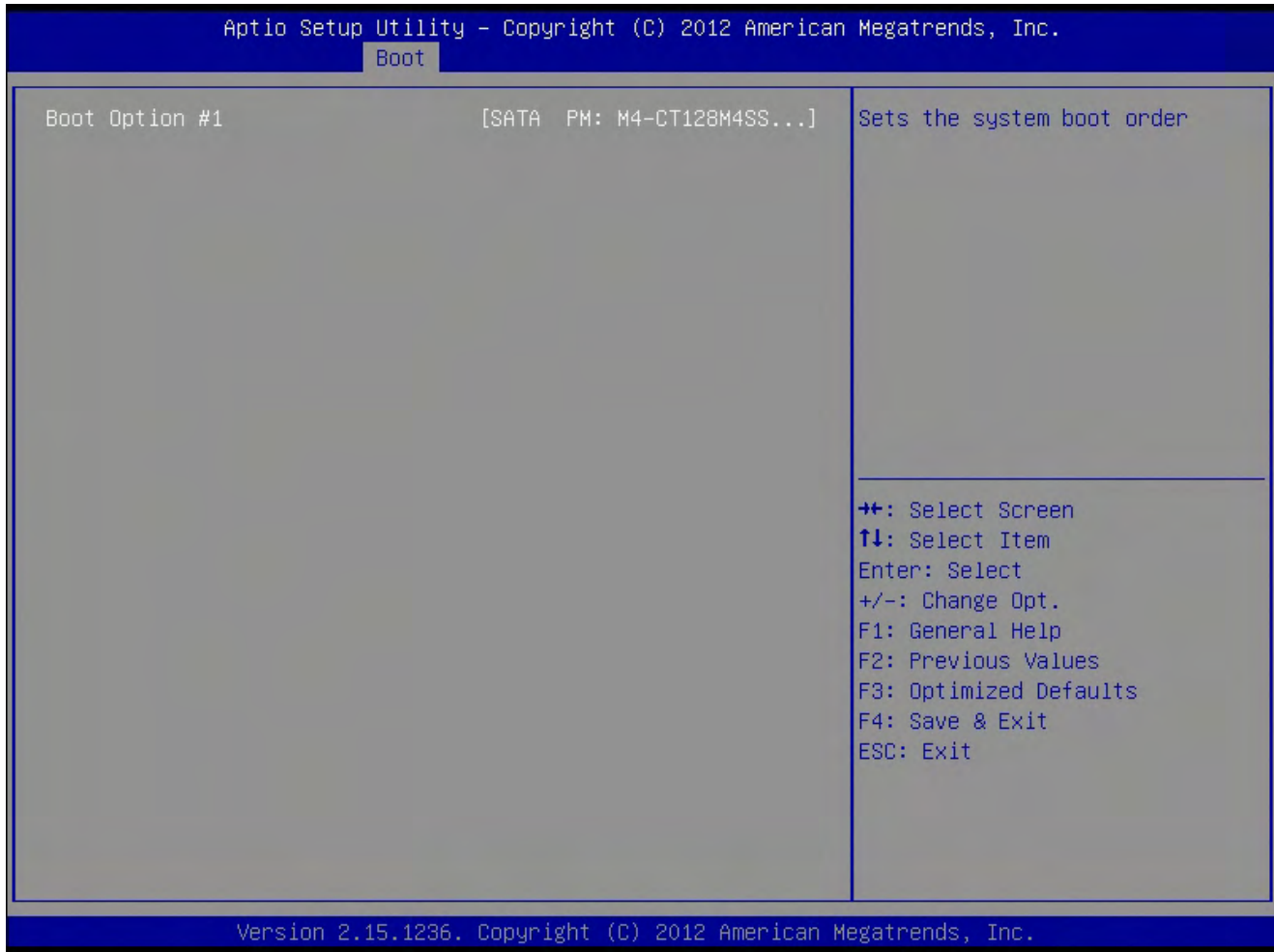
Select the keyboard NumLock state

Configuration options: [On] [Off]

- **Customer Logo [Disable]**

Configuration options: [Disable] [Enable]

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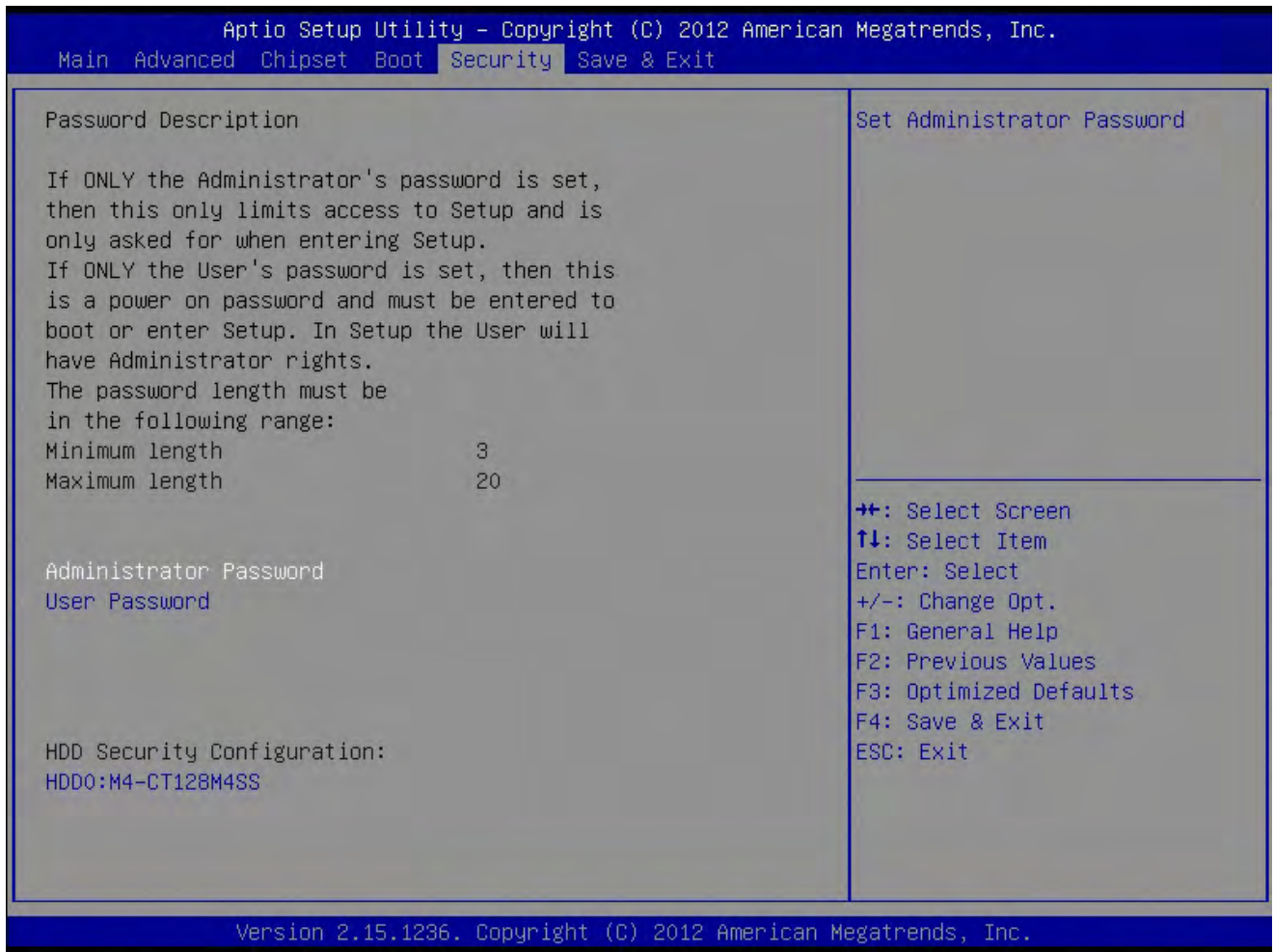


- **UEFI Boot Drive BBS Priorities**

Select the system boot order.

Configuration options: [Built-in EFI Shell][Disabled]

2.7 Security



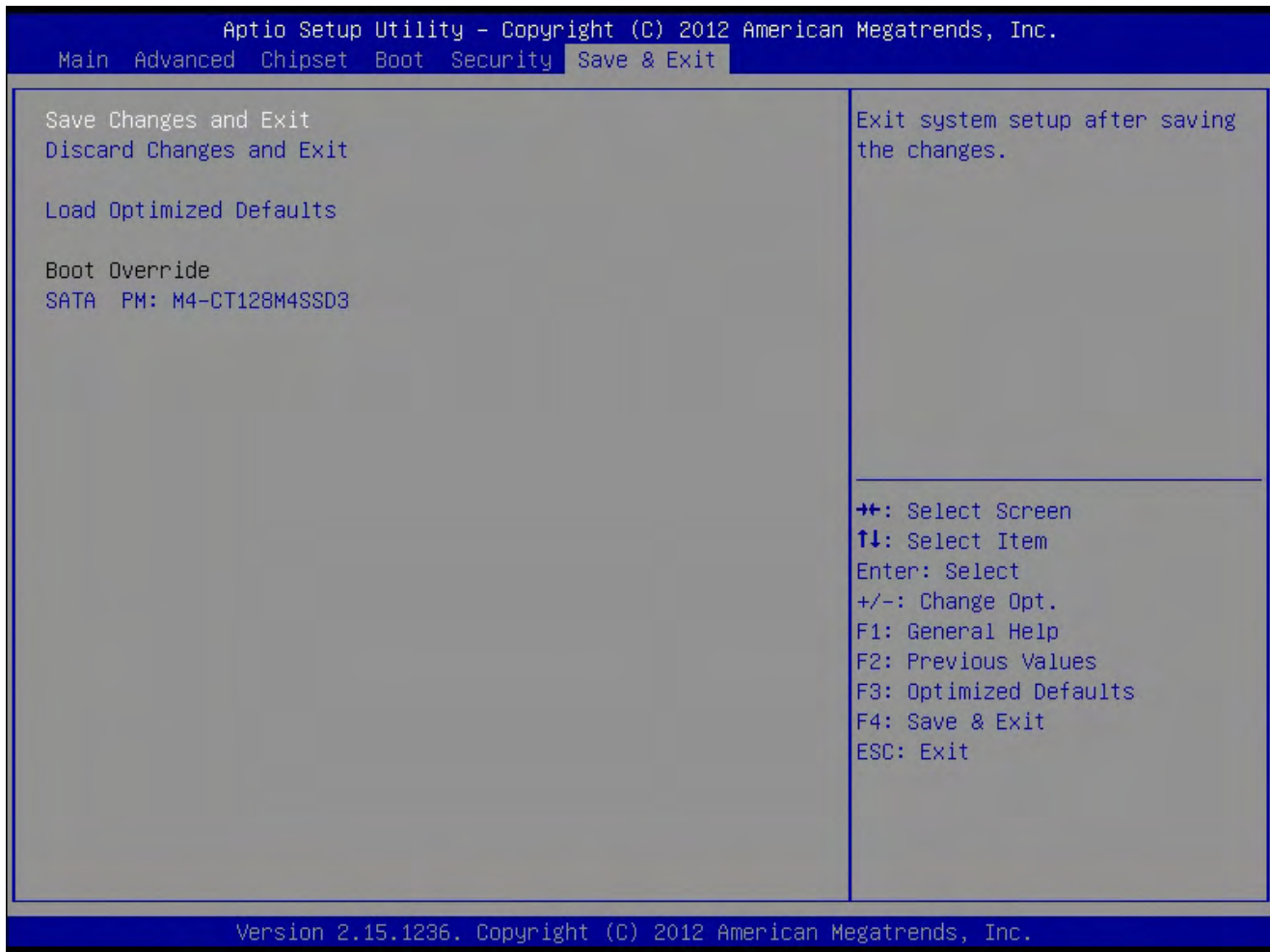
- **Administrator Password**

Set setup Administrator Password

- **User Password**

Set User Password

2.8 Save & Exit



- **Save changes and Exit**

Exit system setup after saving the changes.

- **Discard changes and Exit**

Exit system setup without saving the changes.

- **Load Optimized Defaults**

Restore/Load default values for all the setup option.

Appendix A : GPIO Sample Code

```

#define NCT6106D_CONFIG_INDEX 0x2e
#define NCT6106D_CONFIG_DATA 0x2f
#define NCT6106D_CONFIG_MODE_ENTER_VALUE 0x87
#define NCT6106D_CONFIG_MODE_EXIT_VALUE 0xaa

void SIOConfigEnter ()
{
    IoWrite8 (NCT6106D_CONFIG_INDEX ,
NCT6106D_CONFIG_MODE_ENTER_VALUE);
    IoWrite8 (NCT6106D_CONFIG_INDEX ,
NCT6106D_CONFIG_MODE_ENTER_VALUE);
}

void SIOConfigExit ()
{
    IoWrite8 (NCT6106D_CONFIG_INDEX , NCT6106D_CONFIG_MODE_EXIT_VALUE);
}

void Oem_DIO_Init (
    IN SETUP_DATA          *SetupData
)
{
    UINT8                InputValue=0;           //Default output low
    UINT8                OutputValue=0;
    UINT8                Data8=0;

    if(SetupData->OemGPIOControl == 0x00)        //Check "GPIO Group Control"
    Enable/Disable
    {
        InputValue =0xFF;
    }
    else

```

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```
{
    if(SetupData->OemDIOP0 == 0x00){                //Below check each GPIO Pin is
Input/Output low/Output high
        InputValue |= 0x01;                        //Example. OemDIOP0=0 -> Input.
OemDIOP0=1 -> Output High. OemDIOP0=2 -> Output Low.
    } else if (SetupData->OemDIOP0 == 0x01) {
        OutputValue |= 0x01;
    }

    if(SetupData->OemDIOP1 == 0x00){
        InputValue |= 0x02;
    } else if (SetupData->OemDIOP1 == 0x01) {
        OutputValue |= 0x02;
    }

    if(SetupData->OemDIOP2 == 0x00){
        InputValue |= 0x04;
    } else if (SetupData->OemDIOP2 == 0x01) {
        OutputValue |= 0x04;
    }

    if(SetupData->OemDIOP3 == 0x00){
        InputValue |= 0x08;
    } else if (SetupData->OemDIOP3 == 0x01) {
        OutputValue |= 0x08;
    }

    if(SetupData->OemDIOP4 == 0x00){
        InputValue |= 0x10;
    } else if (SetupData->OemDIOP4 == 0x01) {
        OutputValue |= 0x10;
    }

    if(SetupData->OemDIOP5 == 0x00){
        InputValue |= 0x20;
    } else if (SetupData->OemDIOP5 == 0x01) {
        OutputValue |= 0x20;
    }

    if(SetupData->OemDIOP6 == 0x00){
```

```
    InputValue |= 0x40;
} else if (SetupData->OemDIOP6 == 0x01) {
    OutputValue |= 0x40;
}

if(SetupData->OemDIOP7 == 0x00){
    InputValue |= 0x80;
} else if (SetupData->OemDIOP7 == 0x01) {
    OutputValue |= 0x80;
}
}

SIOConfigEnter();

IoWrite8 (NCT6106D_CONFIG_INDEX , 0x07);    //Enter LDN7
IoWrite8 (NCT6106D_CONFIG_DATA , 0x07);

IoWrite8(NCT6106D_CONFIG_INDEX, 0xE4);      //GPIO1 Input/Output reg.
IoWrite8(NCT6106D_CONFIG_DATA, InputValue);

IoWrite8(NCT6106D_CONFIG_INDEX, 0xE5);      //GPIO1 Data reg.
IoWrite8(NCT6106D_CONFIG_DATA, OutputValue);

SIOConfigExit();
}
```