EMX-Q87R

Intel® LGA1150 Socket Supports 4th Generation Core™ Refresh i7/i5/i3, Pentium® and Celeron® Processors Mini ITX Motherboard with Intel® Q87 Express Chipset

User's Manual

1st Ed – 23 January 2015

Part No: E2047M87R00R

FCC Statement

THIS DEVICE COMPLIES WITH PART 15 FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS:

(1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE.

(2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRED OPERATION.

THIS EQUIPMENT HAS BEEN TESTED AND FOUND TO COMPLY WITH THE LIMITS FOR A CLASS "A" DIGITAL DEVICE, PURSUANT TO PART 15 OF THE FCC RULES.

THESE LIMITS ARE DESIGNED TO PROVIDE REASONABLE PROTECTION AGAINST HARMFUL INTERFERENCE WHEN THE EQUIPMENT IS OPERATED IN A COMMERCIAL ENVIRONMENT. THIS EQUIPMENT GENERATES, USES, AND CAN RADIATE RADIO FREQUENCY ENERGY AND, IF NOT INSTALLED AND USED IN ACCORDANCE WITH THE INSTRUCTION MANUAL, MAY CAUSE HARMFUL INTERFERENCE TO RADIO COMMUNICATIONS.

OPERATION OF THIS EQUIPMENT IN A RESIDENTIAL AREA IS LIKELY TO CAUSE HARMFUL INTERFERENCE IN WHICH CASE THE USER WILL BE REQUIRED TO CORRECT THE INTERFERENCE AT HIS OWN EXPENSE.

This guide is designed for experienced users to setup the system within the shortest time. For detailed information, please always refer to the electronic user's manual.

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As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into body, or (b) support or sustain life and whose failure to perform, when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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To receive the latest version of the user's manual; please visit our Web site at:
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Product Warranty

Avalue warrants to you, the original purchaser, that each of its products will be free from defects in materials and workmanship for two years from the date of purchase.

This warranty does not apply to any products which have been repaired or altered by persons other than repair personnel authorized by Avalue, or which have been subject to misuse, abuse, accident or improper installation. Avalue assumes no liability under the terms of this warranty as a consequence of such events. Because of Avalue's high quality-control standards and rigorous testing, most of our customers never need to use our repair service. If any of Avalue's products is defective, it will be repaired or replaced at no charge during the warranty period. For out-of-warranty repairs, you will be billed according to the cost of replacement materials, service time, and freight. Please consult your dealer for more details. If you think you have a defective product, follow these steps:

1. Collect all the information about the problem encountered. (For example, CPU type and speed, Avalue's products model name, hardware & BIOS revision number, other hardware and software used, etc.) Note anything abnormal and list any on-screen messages you get when the problem occurs.
2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information available.
3. If your product is diagnosed as defective, obtain an RMA (return material authorization) number from your dealer. This allows us to process your good return more quickly.
4. Carefully pack the defective product, a complete Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.
5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

Contents

1. Getting Started 7
1.1 Safety Precautions 7
1.2 Packing List 7
1.3 Document Amendment History 8
1.4 System Specifications 9
1.5 Architecture Overview – Block Diagram 11
2. Hardware Installation 12
2.1 Product highlights 12
2.2 Motherboard Overview 15
2.2.1 Placement Direction 15
2.2.2 Screw Holes 15
2.2.3 Motherboard Layout 16
2.3 Jumper and Connector List 17
2.4 Central Processing Unit (CPU) 19
2.4.1 Installing the CPU 20
2.4.2 Installing the CPU Heatsink and Fan 22
2.5 System Memory 25
2.5.1 Overview 25
2.5.2 Memory Configurations 26
2.5.3 Installing a DDR3 DIMM 26
2.5.4 Removing a DDR3 SODIMM 27
2.6 Expansion Card 28
2.6.1 Installing an Expansion Card 28
2.6.2 Configuring an Expansion Card 28
2.7 Setting Jumpers & Connectors 30
2.7.1 Clear CMOS Jumper (JCMOS1) 30
2.7.2 ATX/AT Mode Selection (JPSON1) 30
2.7.3 COM2 Ring-In/ +12V/ +5V Select (JCOMPWR1) 31
2.7.4 M-SATA/mini PCIe Selection (JMSATASW1) 31
2.7.5 LCD Inverter Setting Connector (JLVDS_BKL1) 32
2.7.6 Chassis Intrusion Connector (JCASE1) 32
2.7.7 20pin ATX Power Connector (EATXPWR1) 33
2.7.8 12V ATX Power Connector (ATX12V1) 33
2.7.9 Serial Port 1 Connector (COM1) 34
2.7.10 Serial Port 2 Connector (COM2) 35
2.7.11 Serial Port 3~4 Connectors (COM3~4) 35

2.7.12 LVDS Connector (JLVDS1).....36
2.7.13 Back Light Controller Connector (JBKL1).....36
2.7.14 Front Panel Connector (F_PANEL).....37
2.7.15 Fan Connectors (CPU_FAN1, SYS_FAN1).....37
2.7.16 SATA Ports (SATA1~4).....38
2.7.17 USB 3.0 Connector (USB1112).....38
2.7.18 Front USB Headers (USB56, USB78, USB910).....39
2.7.19 Front Panel Audio Connector (FP_AUDIO1).....39
2.7.20 Amplifier Connector (JAMP1).....40
2.7.21 Digital I/O Connector (JDIO1).....40
2.7.22 LPC Connector (JLPC1).....41
2.7.23 SPI Connector (SPI1).....41
3. BIOS Setup.....42
3.1 Introduction.....42
3.2 Starting Setup.....42
3.3 Using Setup.....43
3.4 BIOS Menu Screen.....44
3.4.1 Main Setup.....45
3.4.2 Advanced BIOS Setup.....46
3.4.3 Chipset.....65
3.4.4 Boot.....75
3.4.5 Security.....76
3.4.6 Save & Exit.....77

1. Getting Started

1.1 Safety Precautions

Warning!

Always disconnect the power cord from your chassis whenever you work with the hardware. Do not make connections while the power is on. Sensitive electronic components can be damaged by sudden power surges. Only experienced electronics personnel should open the PC chassis.

Caution!

Always ground yourself to remove any static charge before touching the CPU card. Modern electronic devices are very sensitive to static electric charges. As a safety precaution, use a grounding wrist strap at all times. Place all electronic components in a static-dissipative surface or static-shielded bag when they are not in the chassis

1.2 Packing List

Before you begin installing the single board, make sure that the following materials are included in the package:

- 1 x EMX-Q87R Mini ITX Main Board
- 1 x CD-ROM contains OS drivers/User's Manual
- 2 x COM Port Cable
- 2 x SATA Cable
- 1 x I/O shield

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

1.3 Document Amendment History

Revision	Date	Comment
1st	February 2015	Initial Release

This manual describes the Avalue Technology EMX-Q87R Single Board.

We have tried to include as much information as possible but have not duplicated information that is provided in the standard IBM Technical References, unless proven to be necessary to aid in the understanding of this board.

We strongly recommend that you read this manual carefully before attempting to install the EMX-Q87R series or change the standard configurations. Whilst all the necessary information is available in this manual, it is recommend to contact your supplier for guidance for any queries and concern.

Please be aware that it is possible to create configurations within the CMOS RAM that may make booting impossible. If this should happen, clear the CMOS settings, (see the description of the Jumper Settings for details).

If you have any suggestions or find any errors concerning this manual and want to inform us, please contact our Customer Service department with the relevant details.

1.4 System Specifications

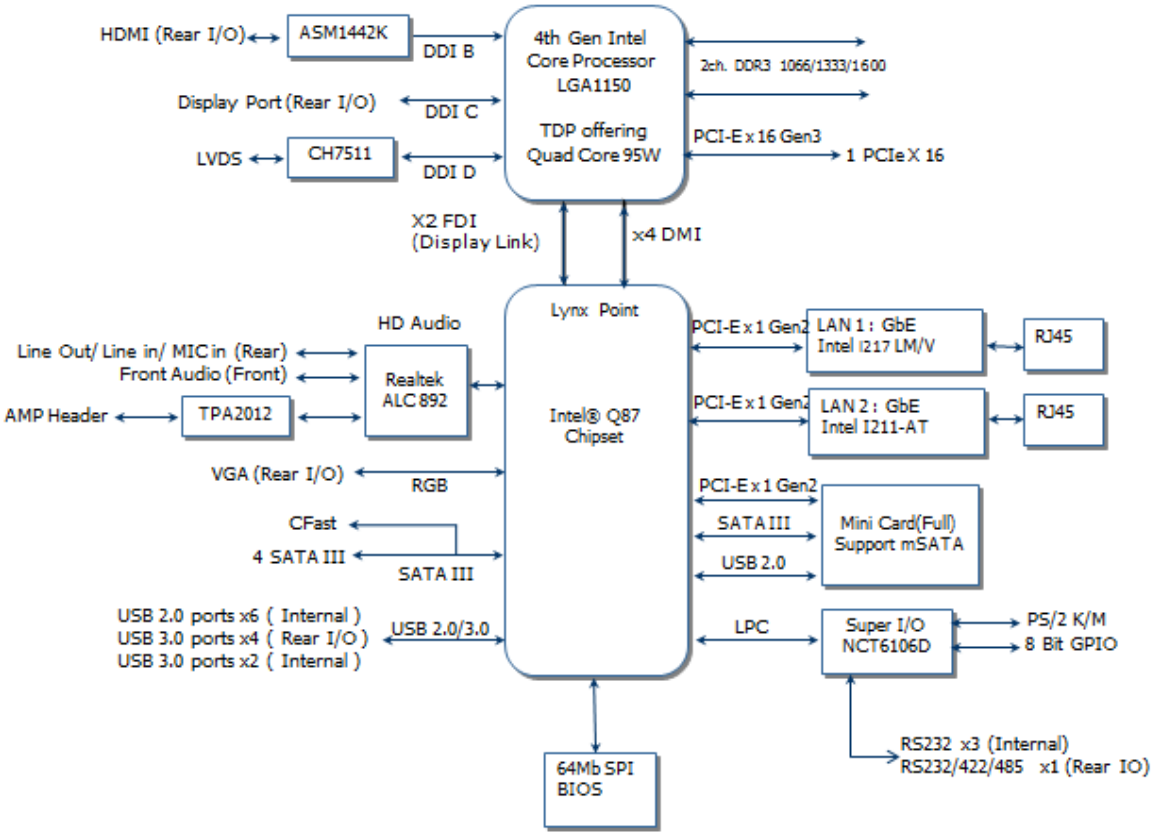
System	
CPU	Intel® LGA1150 Socket supports 4th Generation Core™ Refresh i7/i5/i3, Pentium® and Celeron® Processors (Max. TDP at 95W)
BIOS	AMI uEFI BIOS, 64 Mbit SPI Flash ROM, iAMT 9.0 supported
System Chipset	Intel® Q87 Express Chipset
I/O Chipset	Nuvoton NTC6106D
Memory	2 x 204-Pin SO-DIMM sockets supports DDR3 1600/1333MHz up to 16GB Dual Channel
Watchdog Timer	Reset: 1 sec.~ 65535 sec./min and 1 sec. or 1 min./step
H/W Status Monitor	Monitoring temperatures, voltages with Auto throttling control
Expansion Slots	1 x PCI-e x 16 slot, 1 x Mini PCI-e support mSATA, 1 x CFast (Optional)
DIO	8 Bit GPIO
S3 / S4	Yes
TPM	TPM 1.2 SLB9635 (optional)
Wake up on LAN or Ring	LAN (PXE)
Smart Fan Control	Yes, CPU FAN(by SIO)
Display	
Chipset	Intel® 4th Generation CPU integrated Supports triple display
Display Port	Max. Resolution 3840 x 2160 @ 60Hz
LVDS	Max. Resolution 1920 x 1200 @ 60Hz
VGA	Max. Resolution 1920 x 1200 @ 60Hz
HDMI	Max. Resolution 4096 x 2160 @ 24 Hz/ 1920x1080 @ 60 Hz
Audio	
Audio Codec	Realtek® ALC892, supports 5.1-CH
Audio Interface	Line-in, Line-out, Mic-in
Ethernet	
LAN1	Intel® I211AT Gigabit Ethernet controller
LAN2	Intel® I217LM Gigabit Ethernet controller (PHY)
Back I/O Port	
Back Panel	1 x PS2 KB/ 1 x PS2 MS 1 x COM Port (RS-232/422/485 supported) 3 x COM Port (RS-232) 1 x Display Port 1 x VGA

	1 x HDMI 2 x RJ45 LAN Port 6 x USB 3.0 6 x USB 2.0 1 x 3 Audio Jacks (Line-in/ Line-out/ Mic-in)
Internal I/O Connector	
Internal I/O	4 x SATAIII connectors (RAID 0, 1, 5, 10 supported) 3 x USB connectors support additional 6 x USB 2.0 ports 3 x COM header (RS-232 supported, COM2 +5V&+12V supported, selected by jumper.) 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 USB 3.0 Connector support 2 x USB 3.0 Ports 1 x LVDS Connector (24bit , Dual Channel) 1 x 8 Bit DIO connector 1 x 20 pin ATX Power connector 1 x 2 x 2 pin 12V Power connector
Mechanical & Environmental	
Power Type	AT/ATX
Operating Temperature	0~60°C (32~140°F)
Operating Humidity	0%~90% relative humidity, non-condensing
Size (L x W)	6.69" x 6.69" (170mm x 170mm)

Note: Specifications are subject to change without notice.

1.5 Architecture Overview – Block Diagram

The following block diagram shows the architecture and main components of EMX-Q87R.



2. Hardware Installation

2.1 Product highlights

2.1.1 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.

DMI (Direct Media Interface) architecture connects between the processor and chipset at 5.0GT/s which twice the speed of previous version. The exceptionally increased interconnect bit rate from 2.5GT/s up to 5.0GT/s would effectively eliminates the bottle neck of the system performance and brings the most terrific computing experience fromthe 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. Delivers transfer speed ten times faster than conventional 10/ 100 Ethernet connections, supporting a high transfer rate up to Gigabit/s. Gigabit LAN is the networking standards for the future and is ideal for handing 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.

2.1.2 Platform Features and Benefits

•Integrated Gfx (Intel® HD Graphics 4000/4600) with enhanced operating modes to enable excellent graphics performance in power and cost sensitive embedded applications

• DirectX® 11.1 & Open GL 4.0 let you enjoy awesome graphics performance, stunning 3D visual effect and dynamic interactivity

• Memory support, integrated low voltage DDR3 memory controller

2.1.3 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 8MB LLC
-HW accelerated video CODECs
- Compatible with high speed DDR3-1600
-PCIe* (CPU): Gen 3.0, 8GT/s, up to 20 lanes (4 ctls)**
-TDP: 35W-65W (22nm Haswell Platform)

- Intel® Turbo Boost Technology 2.0
  -More efficient power sharing between CPU and Graphics
- Intel® Hyper-Threading Technology
- Intel® Advanced Vector Extensions 2 (Intel® AVX2)
- Transactional Synchronization Extensions (TSX)
- Integrated Display Interfaces

- Triple Independent Display Support
- HDMI
- Display Port
- Analog VGA
- LVDS

- Intel® HD Graphics 4000/4600

- DirectX® 11.1
  - Improved realism for DX 3D applications. Improved rendering.
- OpenGL 4.0
  - Improved realism for OGL 3D based application

- Intel Quick Sync Video

- Enables faster and higher quality video editing, recording and sharing

- I/O

- PCI Express® x 16 Gen 3 8GT/s
- Four SATA ports (4 port of Gen 3.0) support RAID 0,1, 5, 10
- Gigabit Ethernet Media Access Controller (GbE MAC)

IPv4 and IPv6 Checksum Offload

- High Definition Audio
- USB: Gen 2.0, up to 6 Ports / Gen 3.0, up to 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) 5.0

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.

2.2 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.

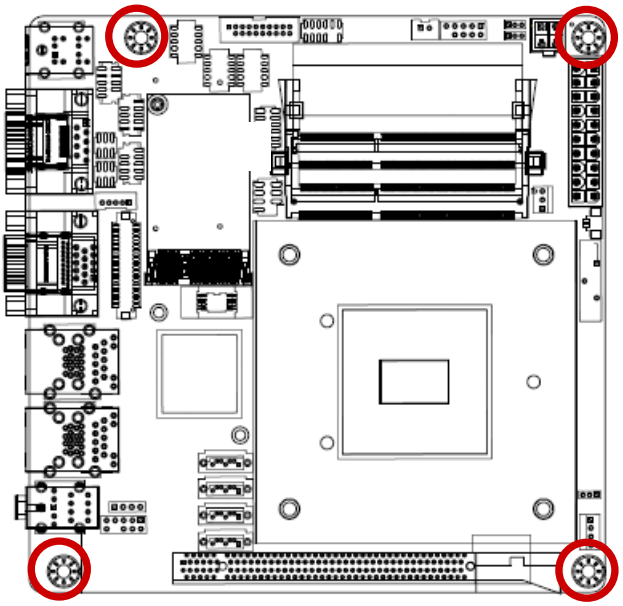
2.2.1 Placement Direction

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.

2.2.2 Screw Holes

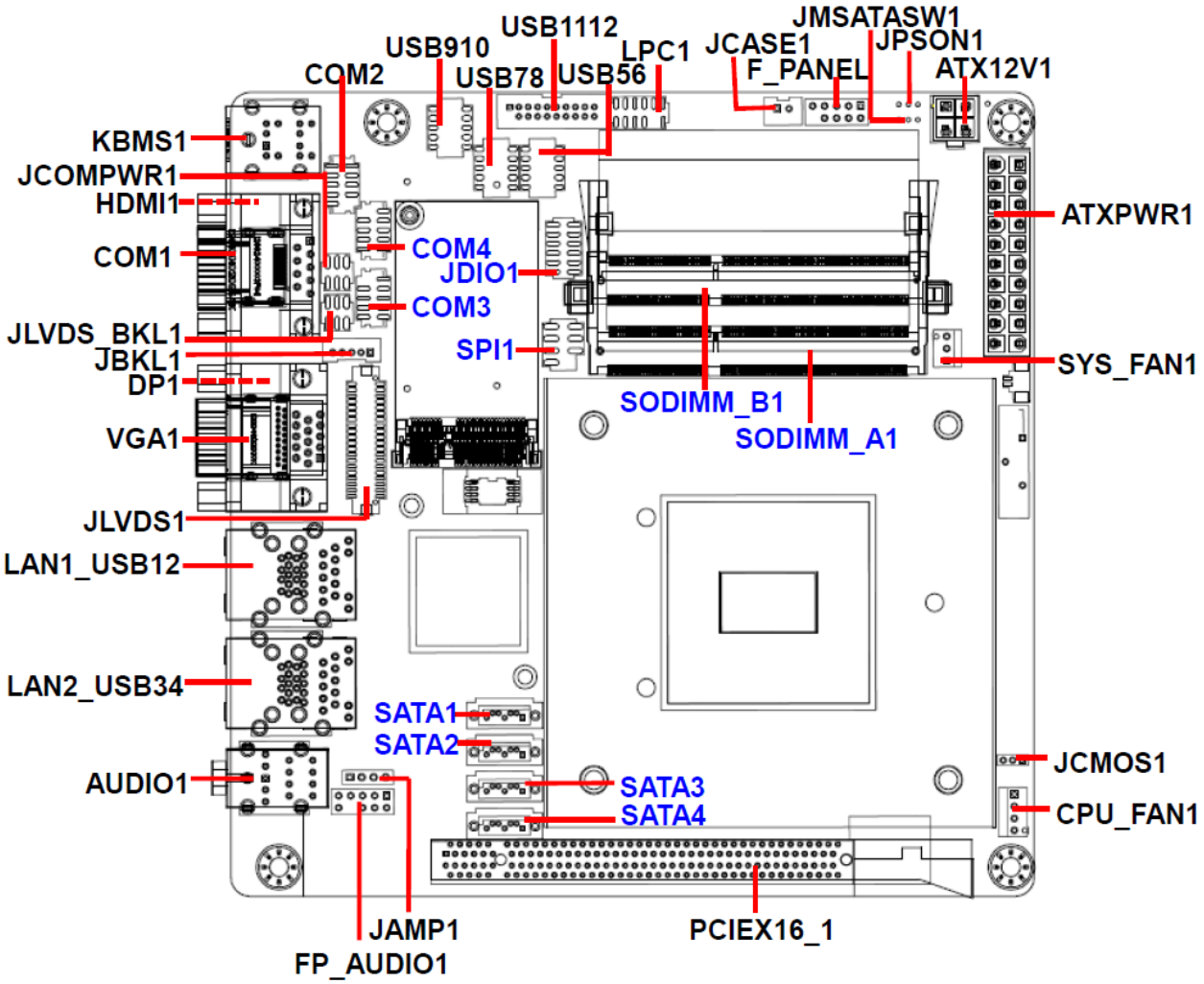
Place four (4) screws into the holes indicated by circles to secure the motherboard to the chassis.

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



Place this side towards the rear of the chassis.

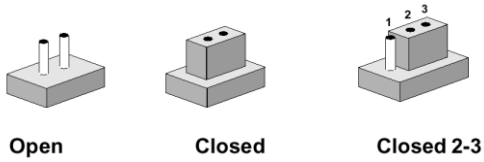
2.2.3 Motherboard Layout



2.3 Jumper and Connector List

You can configure your board to match the needs of your application by setting jumpers. A jumper is the simplest kind of electric switch.

It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To "close" a jumper you connect the pins with the clip. To "open" a jumper you remove the clip. Sometimes a jumper will have three pins, labeled 1, 2, and 3. In this case, you would connect either two pins.



The jumper settings are schematically depicted in this manual as follows:

A pair of needle-nose pliers may be helpful when working with jumpers.

Connectors on the board are linked to external devices such as hard disk drives, a keyboard, or floppy drives. In addition, the board has a number of jumpers that allow you to configure your system to suit your application.

If you have any doubts about the best hardware configuration for your application, contact your local distributor or sales representative before you make any changes.

The following tables list the function of each of the board's jumpers and connectors.

Jumpers

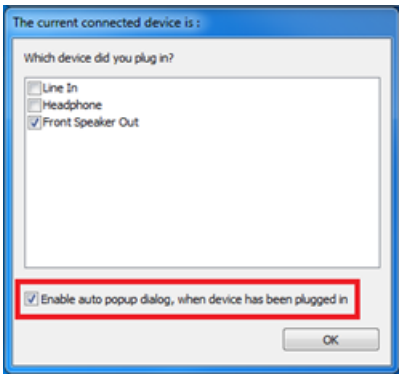
Label	Function	Note
JCMOS1	Clear CMOS Jumper	
JPSON1	ATX/AT Mode Selection	
JCOMPWR1	COM2 Ring-In/ +12V/ +5V Select	
JLVDS_BKL1	LCD Inverter Setting Connector	
JMSATASW	M-SATA/mini PCIe Selection	

Connectors

Label	Function	Note
VGA1	VGA Video Port	
LAN1/2_USB12/34	Gigabit LAN (RJ-45) Connector USB 3.0 Connector x 4	
AUDIO1	Line-in port (Light blue) Line-out port (Lime) Microphone port (Pink)	

JLVDS1	LVDS Connector
DP1	Display Port
KBMS1	PS/2 Keyboard & Mouse Connector
ATXPWR1	20pin ATX Power Connector
ATX12V1	12V ATX Power Connector
COM1	Serial Port 1 Connector (Support RS422/RS485)
COM2~4	Serial Port 2~4 Connectors
LPC1	LPC Connector
F_PANEL	Front Panel Connector
CPU_FAN1	CPU Fan Connector
SYS_FAN1	System Fan Connector
JCASE1	Chassis Intrusion Connector
SATA1~4	Serial ATA Connector
USB56/78/910/1112	Front USB Header
JBKL1	Back Light Controller Connector
FP_AUDIO1	Front Panel Audio Connector
JAMP1	Amplifier Connector
JDIO1	Digital I/O Connector
PCIEX16_1	PCIe Connector
SODIMM_A1/B1	DDR3 SODIMM Socket
SPI1	SPI Connector
HDMI1	HDMI Port

The on-screen message alerting you about headphones being connected to the computer. The Realtek audio software features an automatic jack sensing option to let you know when something has been inserted into an audio port.



2.4 Central Processing Unit (CPU)

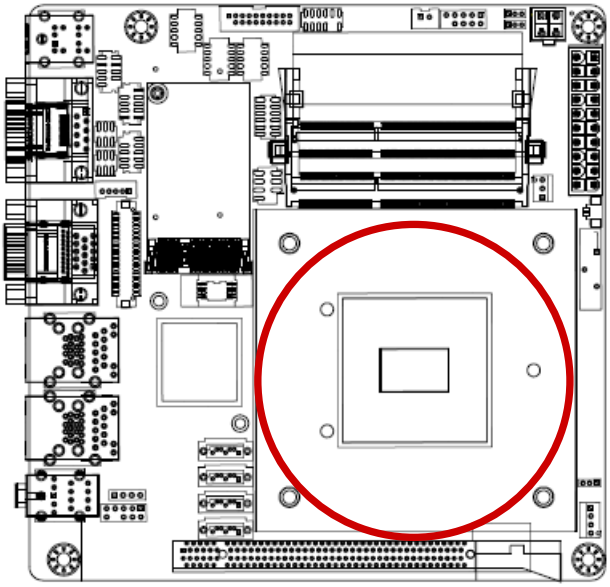
The motherboard comes with a surface mount LGA1150 socket designed for the Intel® Core™ i7/ i5/ i3 processor in the 1150-land package.

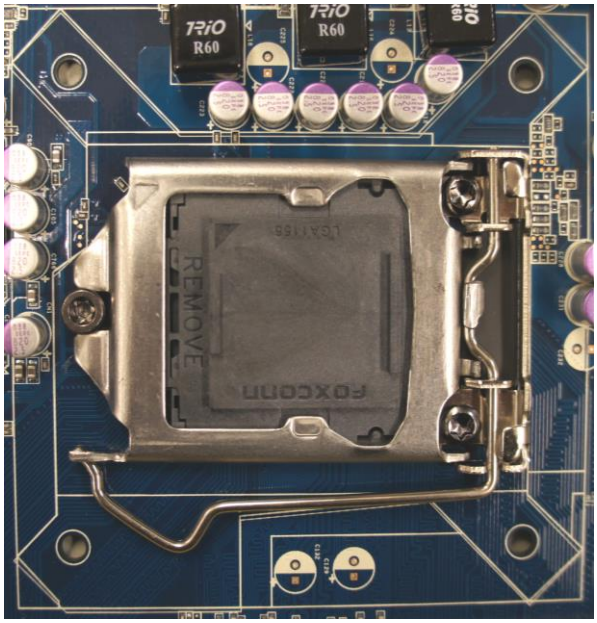
- Your boxed Intel® Core™ i7/ i5/ i3 LGA1150 processor package should come with installation instructions for the CPU, fan and heatsink assembly. If the instructions in this section do not match the CPU documentation, follow the latter.
- Upon purchase of the motherboard, make sure that the PnP cap is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

2.4.1 Installing the CPU

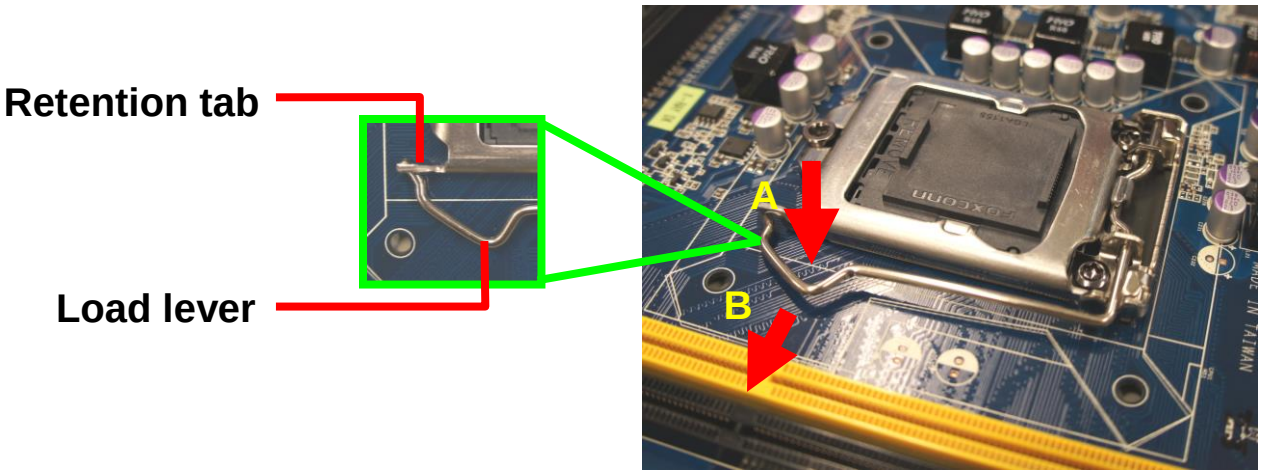
1. Locate the CPU socket on the motherboard.





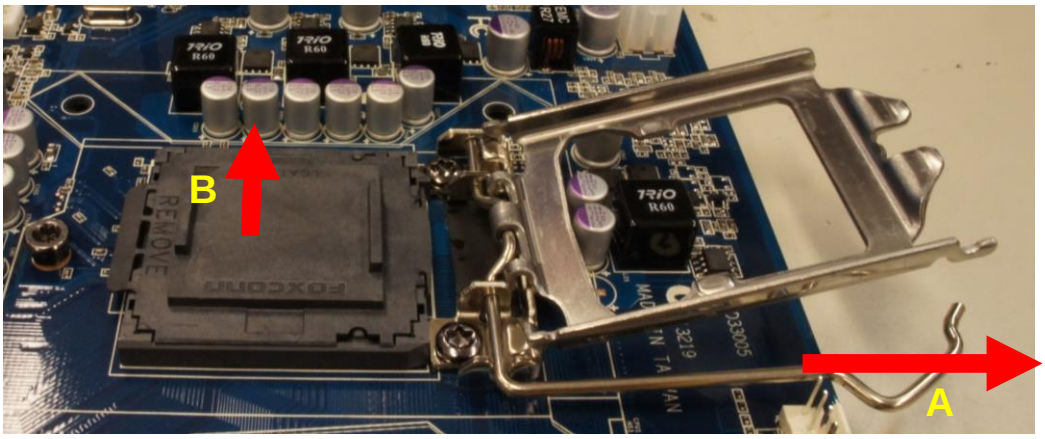
Before installing the CPU, make sure that the socket box is facing towards you and the load lever is on your left.

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

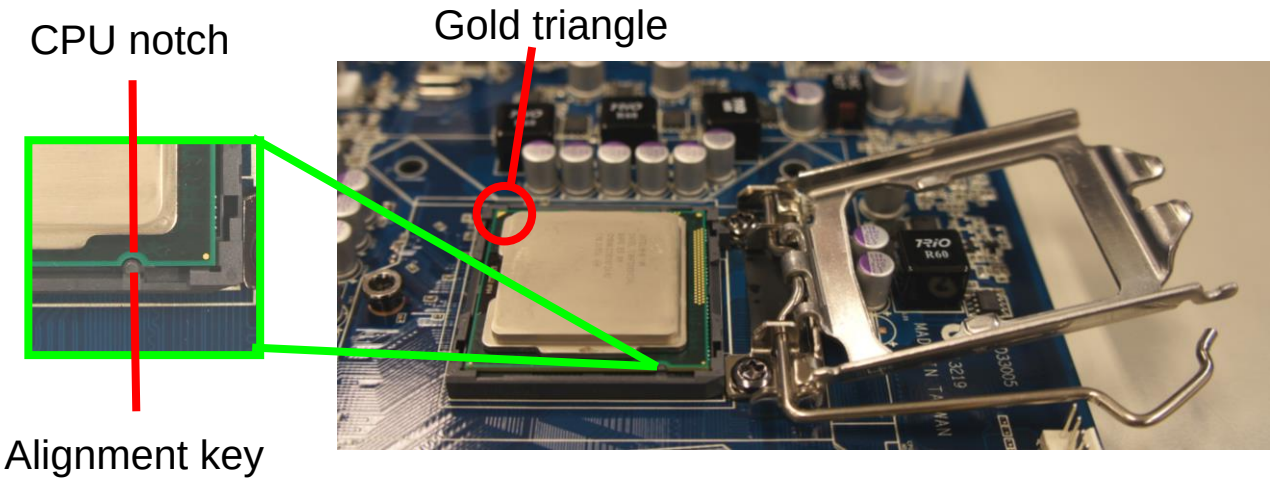


To prevent damage to the socket pins, do not remove the PnP cap unless you are installing a CPU.

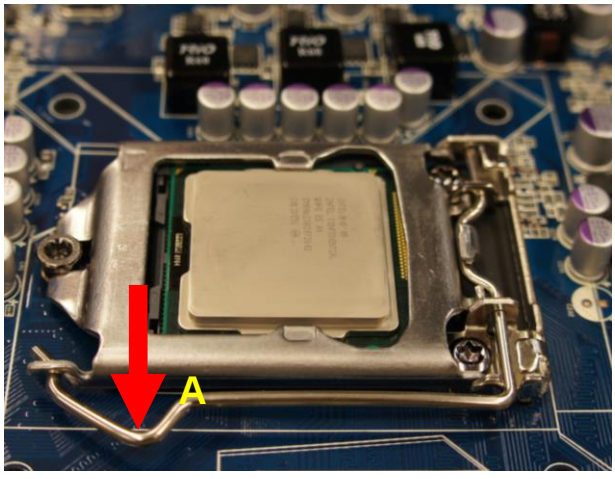
3. Lift the Load lever with your thumb and forefinger to around 180º angle (A), then pull the PnP cap from the CPU socket to remove (B).



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!

2.4.2 Installing the CPU Heatsink and Fan

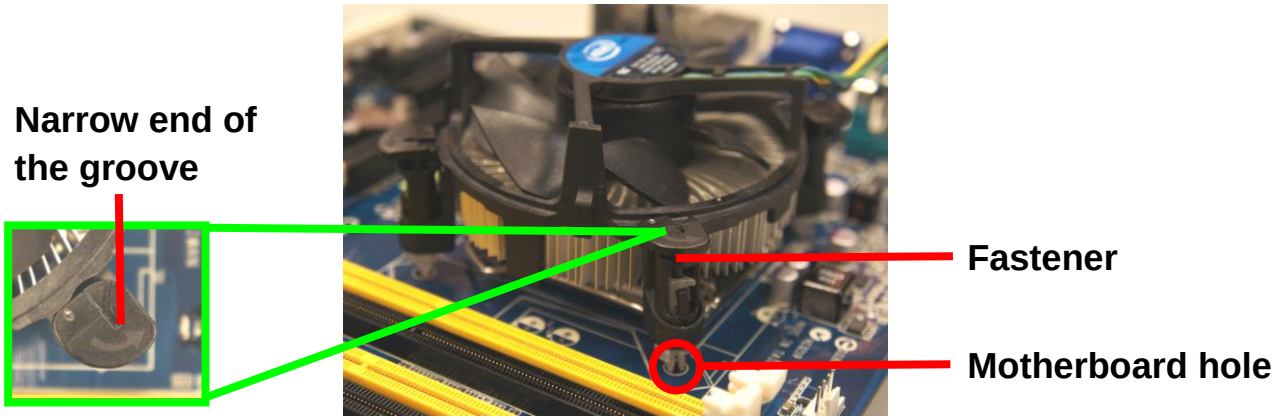
Intel® Core™ i7/ i5/ i3 LGA1150 processor requires a specially designed heatsink and fan assembly to ensure optimum thermal condition and performance.

- 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 LGA1150 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:

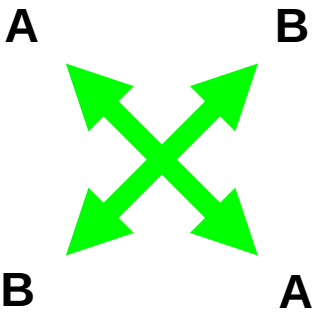
1. Place the heatsink on top of the installed CPU, making sure that the four fasteners match the holes on the motherboard.

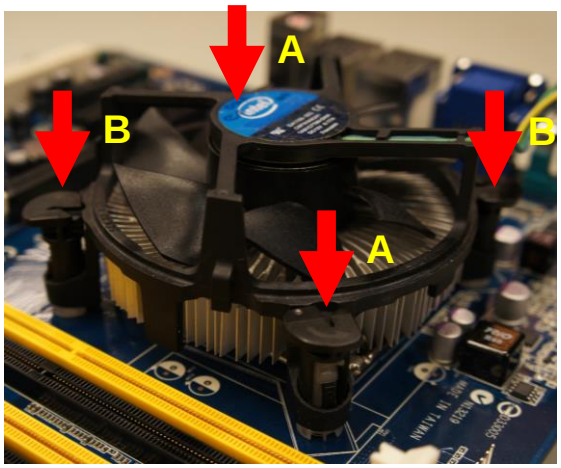


Orient the heatsink and fan assembly such that the CPU fan cable is closest to the CPU fan connector.

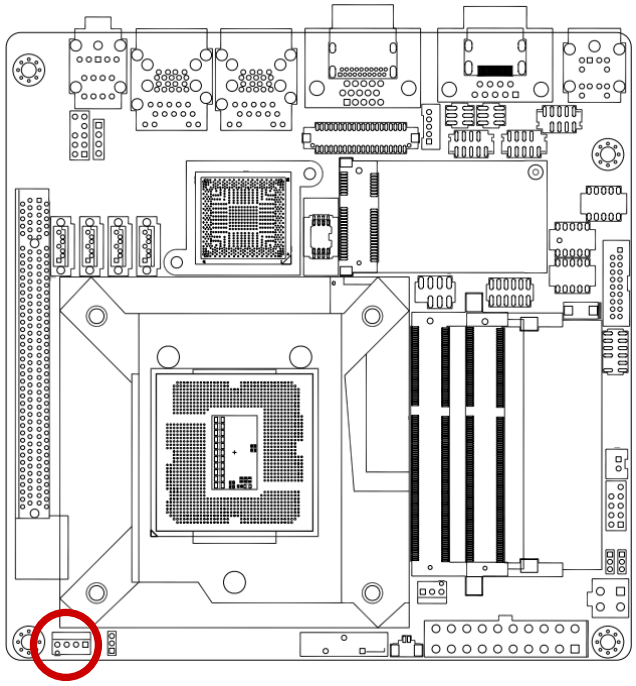
- Make sure each fastener is oriented as shown, with the narrow groove directed outward.

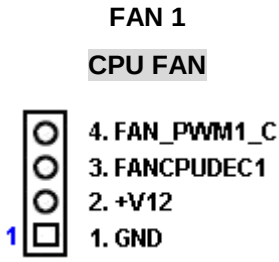
2. Push down two fasteners at a time in a diagonal sequence to secure the heatsink and fan assembly in place.

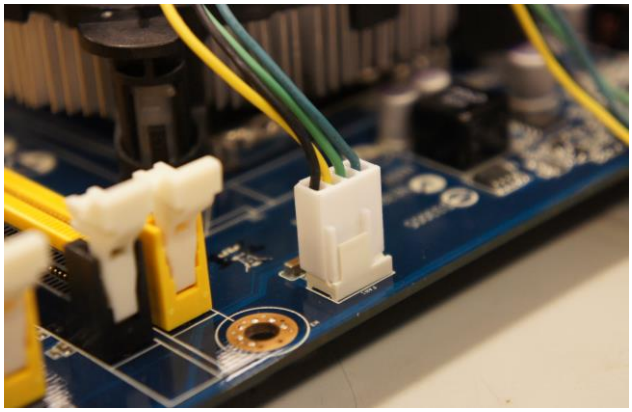




3. Connect the CPU fan cable to the connector on the motherboard labeled CPU_FAN.







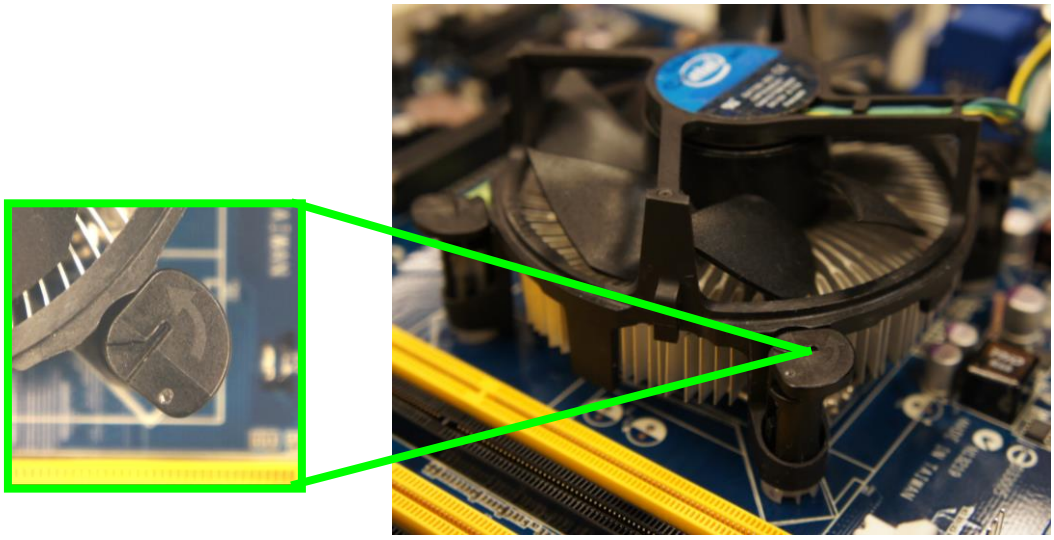
Do not forget to connect the fan cables to the fan connectors. Insufficient air flow inside the system may damage the motherboard components.

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

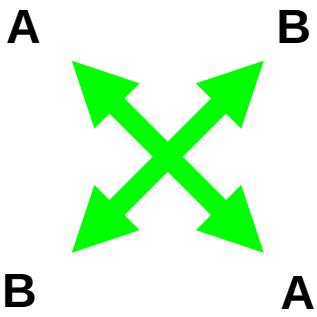
2.4.3 Uninstalling the CPU Heatsink and Fan

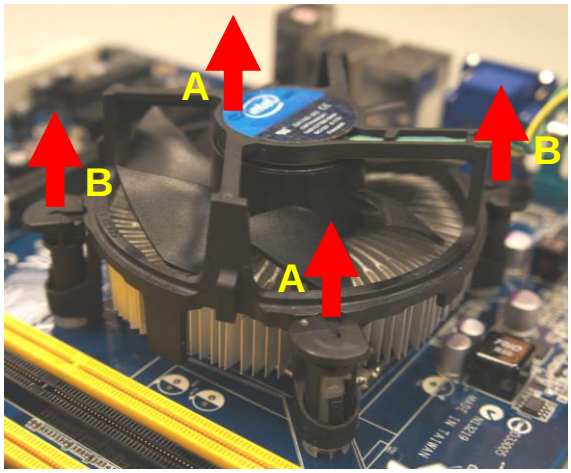
To uninstall the CPU heatsink and fan:

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

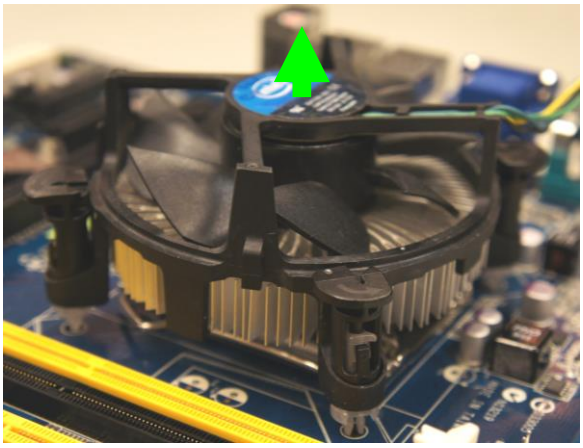


3. Pull up two fasteners at a time in a diagonal sequence to disengage the heatsink and fan assembly from the motherboard.





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



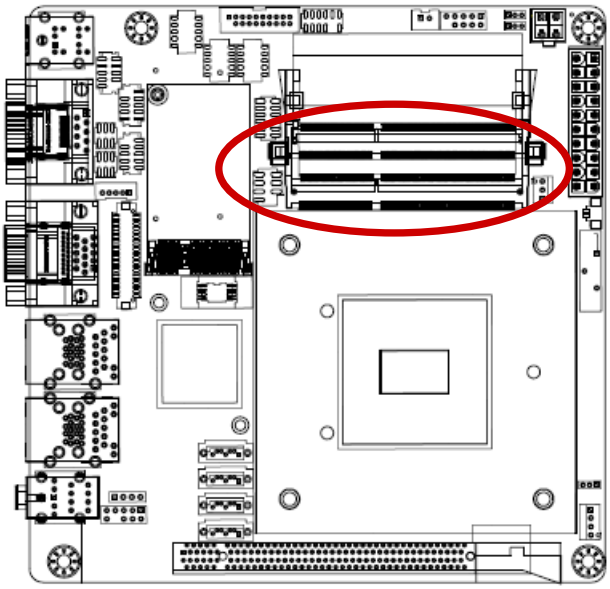
5. Rotate each fastener clockwise to ensure correct orientation when reinstalling.

2.5 System Memory

2.5.1 Overview

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

A DDR3 module has the same physical dimensions as a DDR 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

2.5.2 Memory Configurations

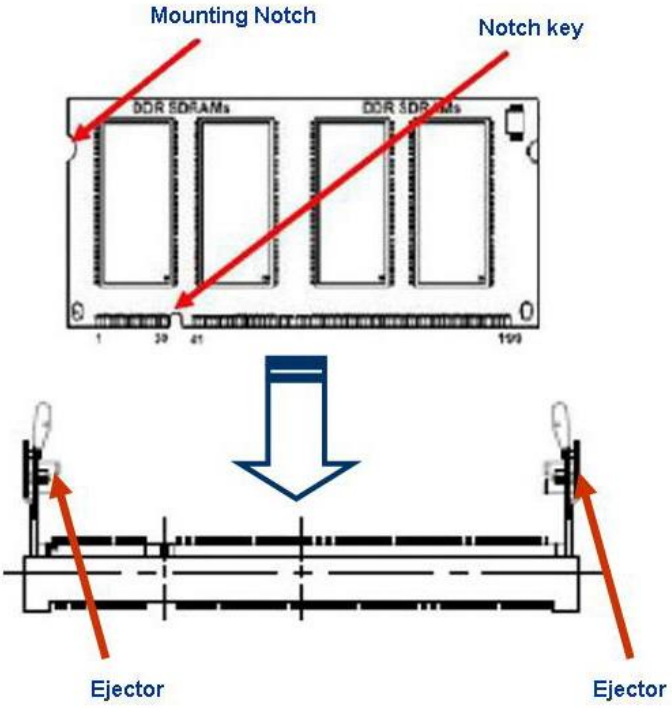
You may install 2 GB, 4 GB , and 8 GB unbuffered ECC or non-ECC DDR3 SODIMMs into the SODIMM sockets using the memory configurations in this section.

- 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.

2.5.3 Installing a DDR3 DIMM

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.

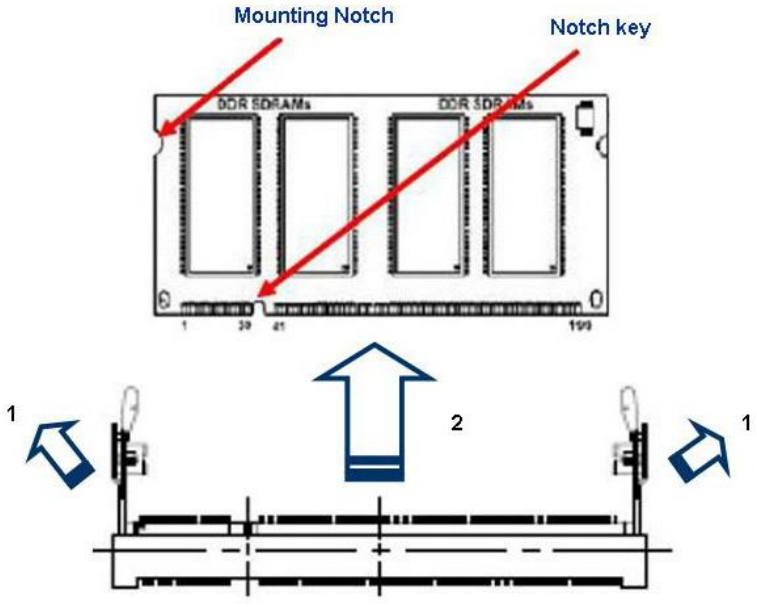
1. Locate the SODIMM socket on the board.
2. Hold two edges of the SODIMM module carefully, and keep away of touching its connectors.
3. Align the notch key on the module with the rib on the slot.
4. Firmly press the modules into the socket which will automatically snap into the mounting notch. Do not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

2.5.4 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.

2.6 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.

2.6.1 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.

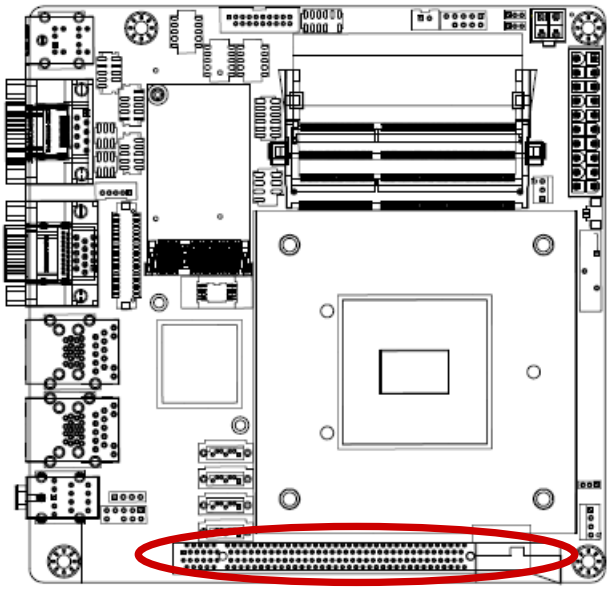
2.6.2 Configuring an Expansion Card

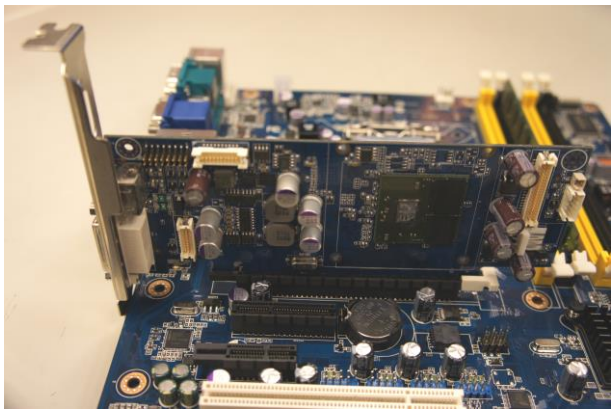
After installing the expansion card, configure it by adjusting the software settings.

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.

2.6.2.1 PCI Express x16 slot

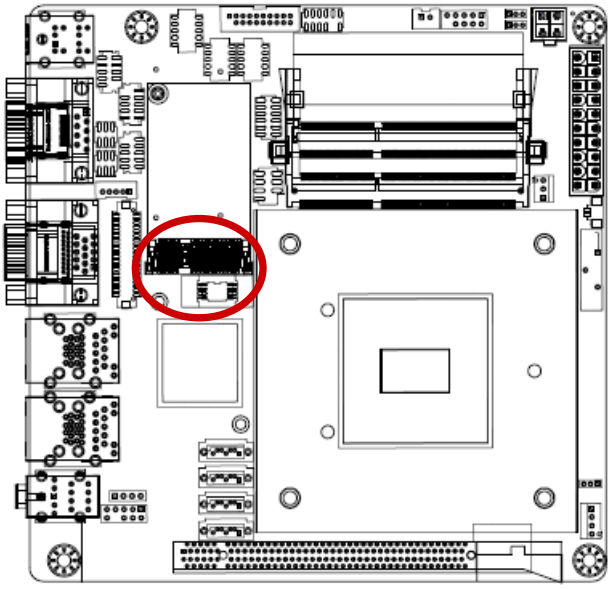
This motherboard supports one PCI Express x16 slot that complies with the PCI Express specifications. The following figure shows a graphics card installed on the PCI Express x16 slot.





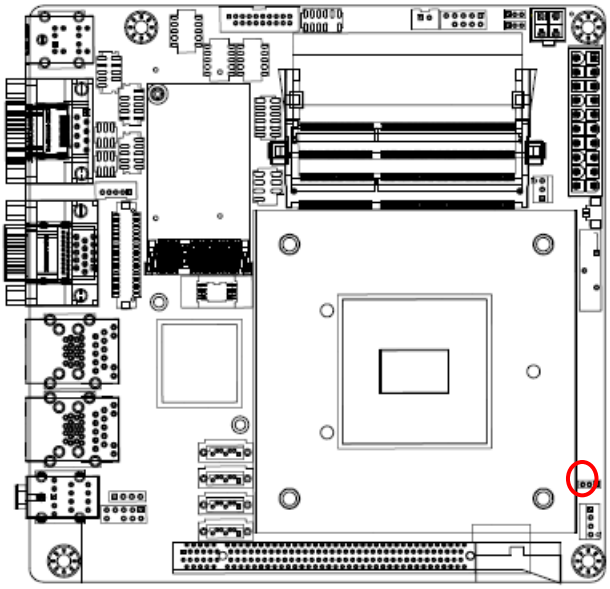
2.6.2.2 MiniPCI express slot

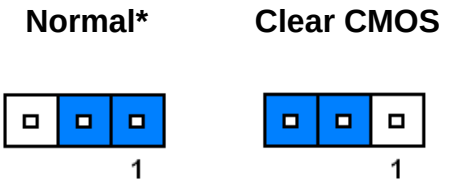
The miniPCIe express slot supports Mini cards for WiFi , Bluetooth, COM, USB modules, and other cards that comply with the mini Card Rev. 1.2 specifications . The figure below shows the type of full size SSD card that can be installed on a miniPCI express slot.



2.7 Setting Jumpers & Connectors

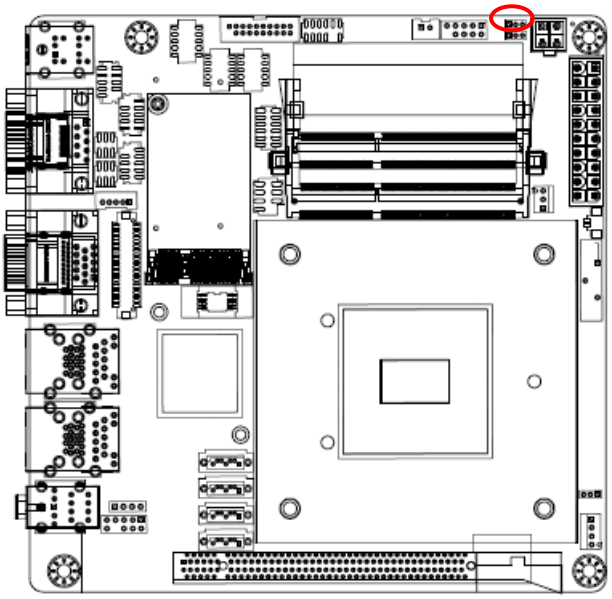
2.7.1 Clear CMOS Jumper (JCMOS1)

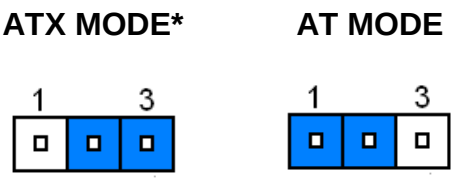




***Default**

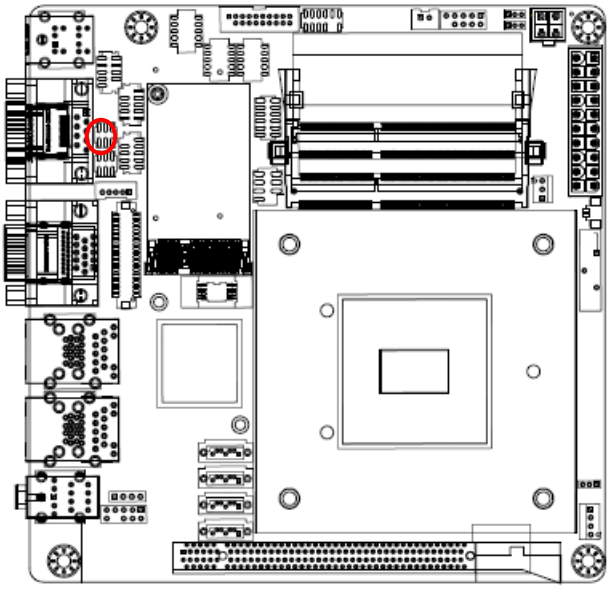
2.7.2 ATX/AT Mode Selection (JPSON1)





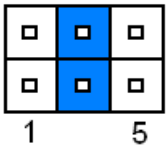
***Default**

2.7.3 COM2 Ring-In/ +12V/ +5V Select (JCOMPWR1)

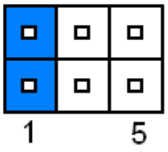


*** Default**

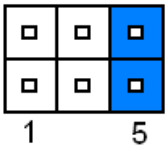
RI*



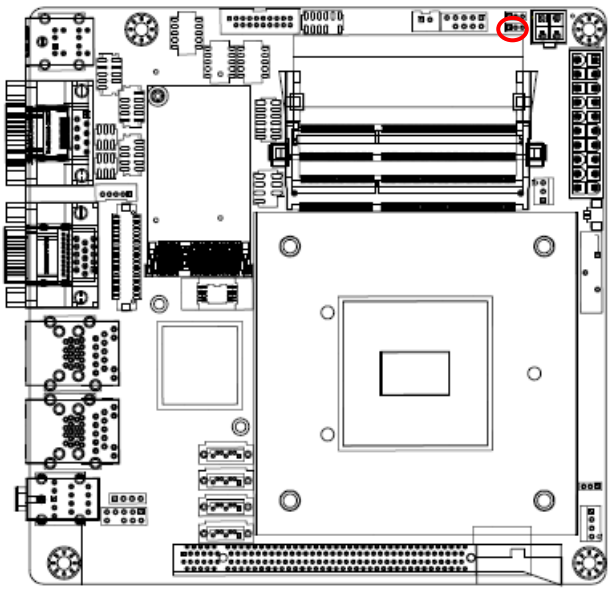
+12V



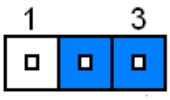
+5V



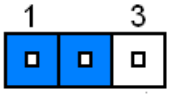
2.7.4 M-SATA/mini PCIe Selection (JMSATASW1)



Mini-PCIe*

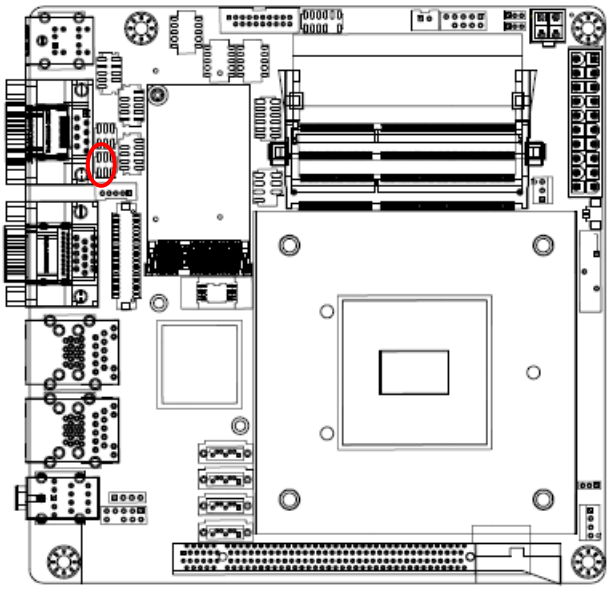


M-SATA

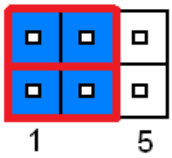


***Default**

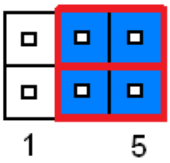
2.7.5 LCD Inverter Setting Connector (JLVDS_BKL1)



5V(Pin 1~3)*
Linear mode(Pin 2~4)*

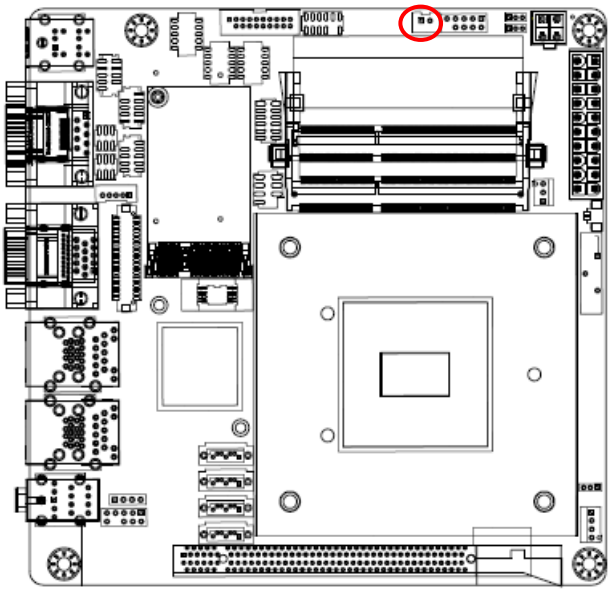


3.3V(Pin 3~5)*
PWM mode(Pin 4~6)



***Default**

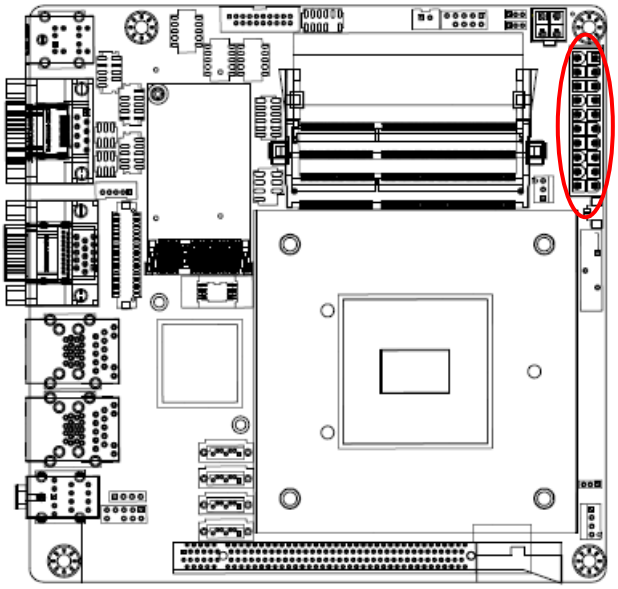
2.7.6 Chassis Intrusion Connector (JCASE1)

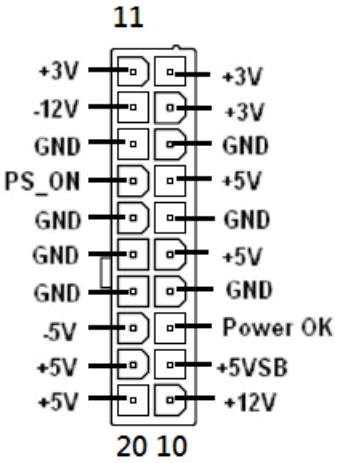


1. GND
2. Chassis Signal

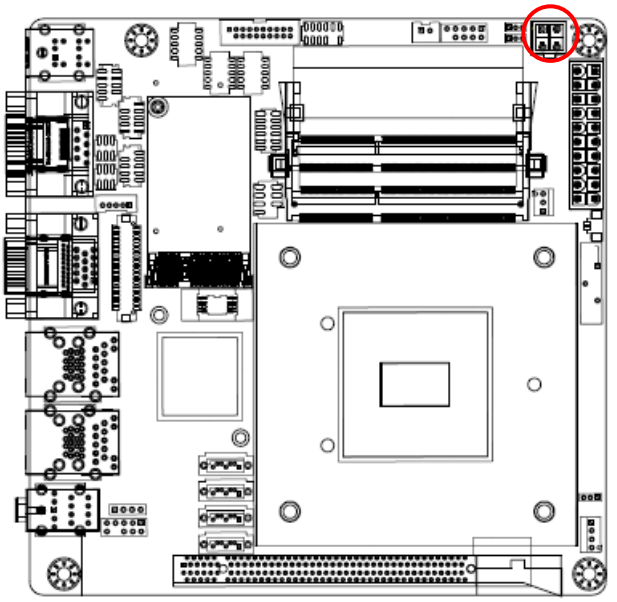
*** Default**

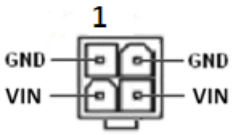
2.7.7 20pin ATX Power Connector (EATXPWR1)



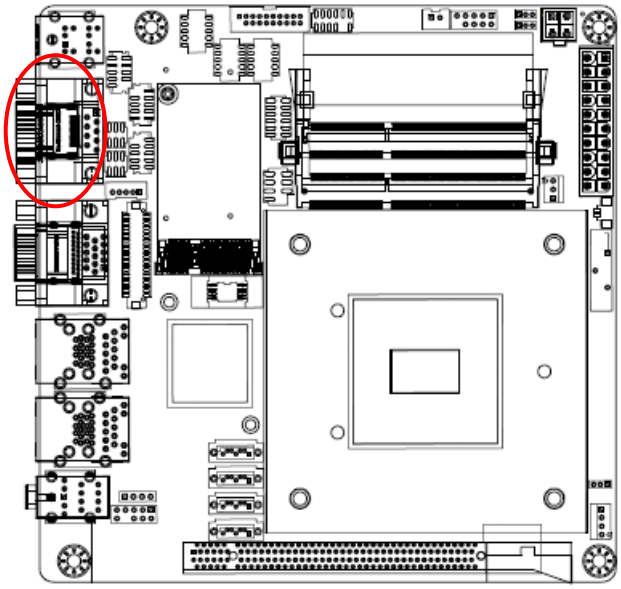


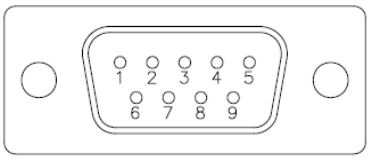
2.7.8 12V ATX Power Connector (ATX12V1)





2.7.9 Serial Port 1 Connector (COM1)





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

In RS-232 Mode

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

In RS-422 Mode

Signal	PIN	PIN	Signal
TX-	1	2	TX+
RX+	3	4	RX-
GND	5	6	
	7	8	
	9		

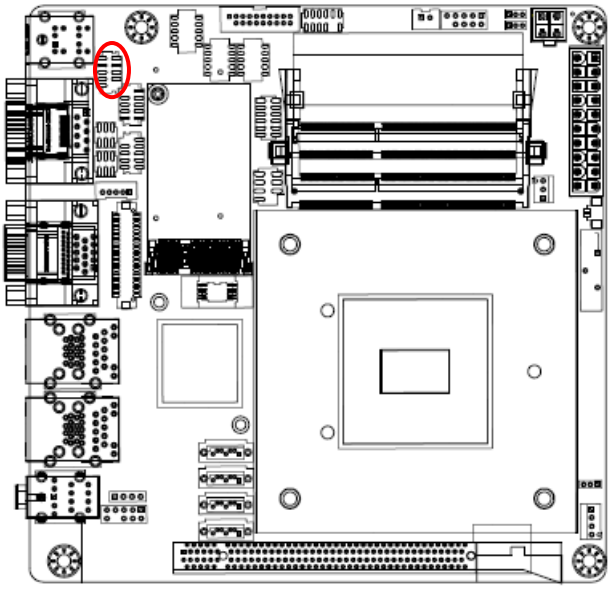
In RS-485 Mode

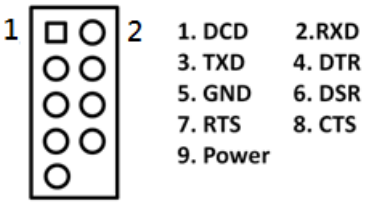
Signal	PIN	PIN	Signal
TX-	1	2	TX+
	3	4	
GND	5	6	
	7	8	
	9		

* RS232/RS422/RS485 Mode Change by BIOS Setup

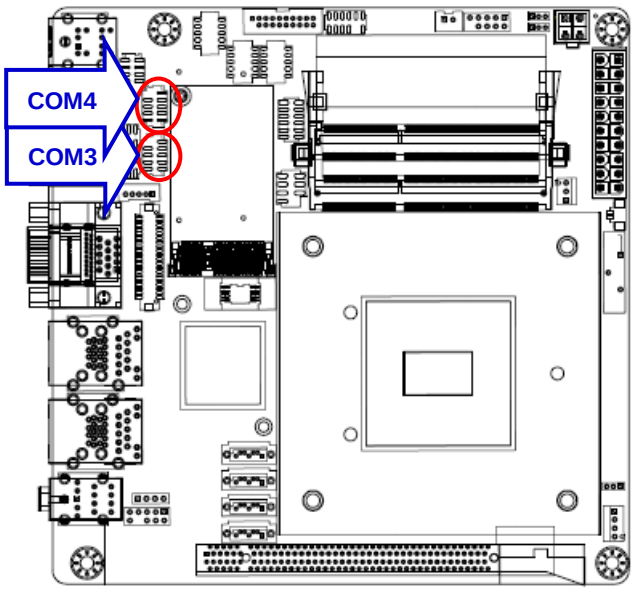
BIOS Setup→Advanced→NCT6106D Super IO Configuration

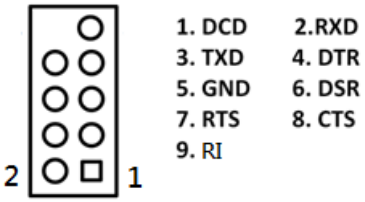
2.7.10 Serial Port 2 Connector (COM2)



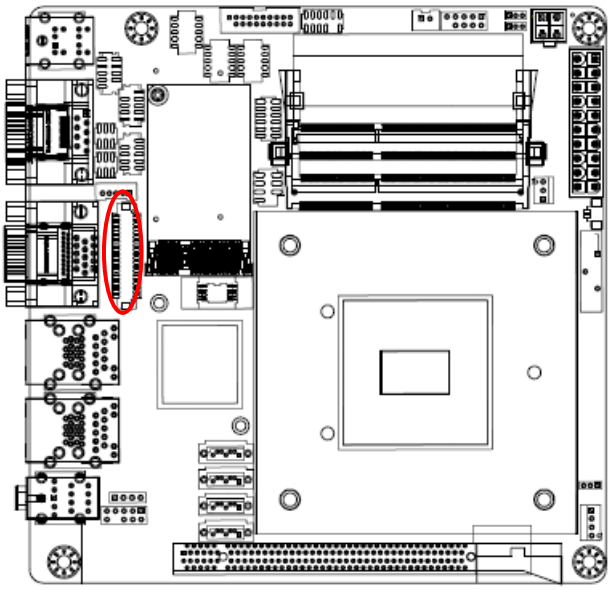


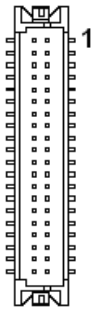
2.7.11 Serial Port 3~4 Connectors (COM3~4)





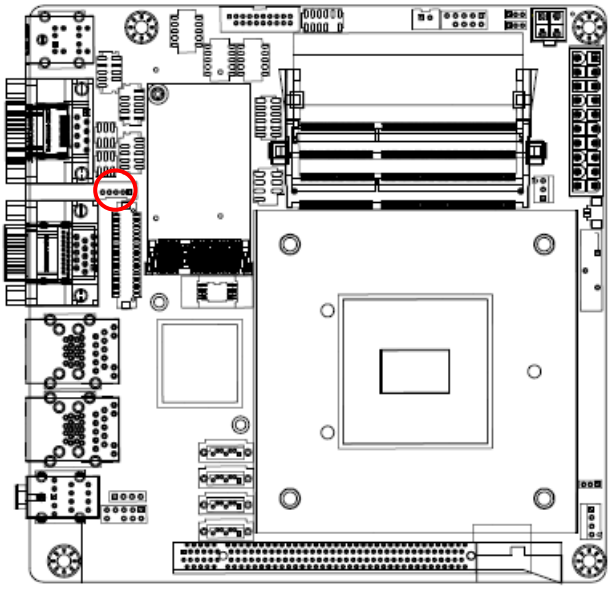
2.7.12 LVDS Connector (JLVDS1)

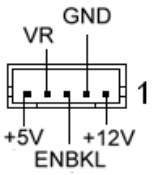




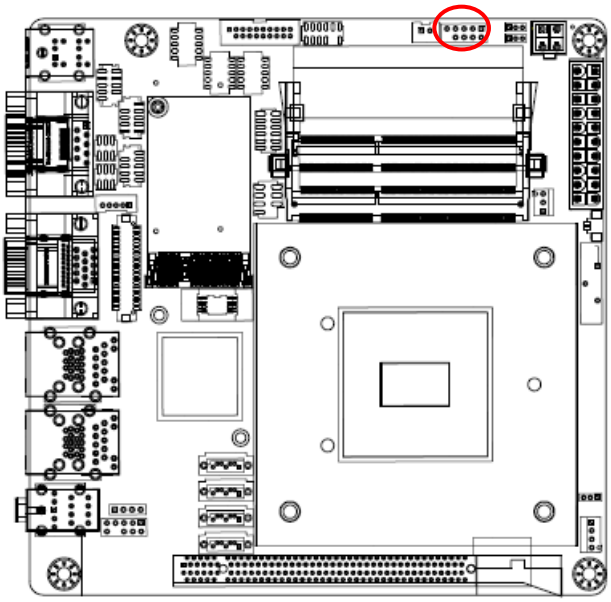
1. +3.3V	2. +5V
3. +3.3V	4. +5V
5. SC_DDC	6. SD_DDC
7. GND	8. GND
9. LVDS0_P1	10. LVDS0_P0
11. LVDS0_N1	12. LVDS0_N0
13. GND	14. GND
15. LVDS0_P3	16. LVDS0_P2
17. LVDS0_N3	18. LVDS0_N2
19. GND	20. GND
21. LVDS1_P1	22. LVDS1_P0
23. LVDS1_N1	24. LVDS1_N0
25. GND	26. GND
27. LVDS1_P3	28. LVDS1_P2
29. LVDS1_N3	30. LVDS1_N2
31. GND	32. GND
33. LVDS1_CLKP	34. LVDS0_CLKP
35. LVDS1_CLKN	36. LVDS0_CLKN
37. GND	38. GND
39. +12V	40. +12V

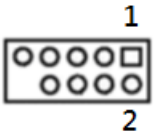
2.7.13 Back Light Controller Connector (JBKL1)





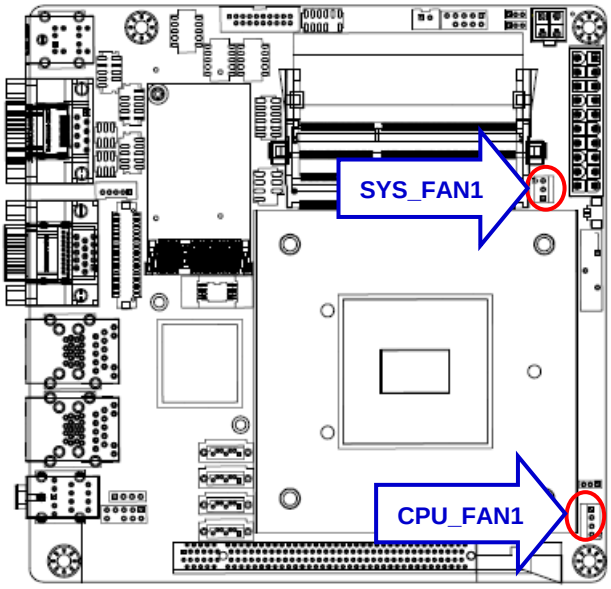
2.7.14 Front Panel Connector (F_PANEL)





1. HDD_LED+	2. POWER_LED+
3. HDD_LED-	4. POWER_LED-
5. GND	6. POWER SWITCH
7. RESET	8. GND
9. NC	

2.7.15 Fan Connectors (CPU_FAN1, SYS_FAN1)



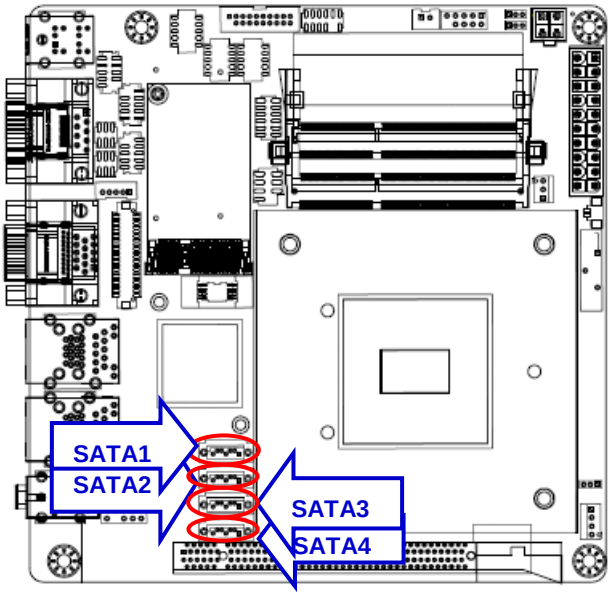
CPU_FAN1

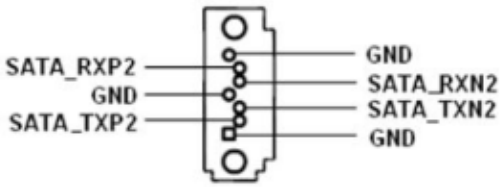
4. FAN_PWM1_C
3. FANCPUDEC1
2. +12V
1. GND

SYS_FAN1

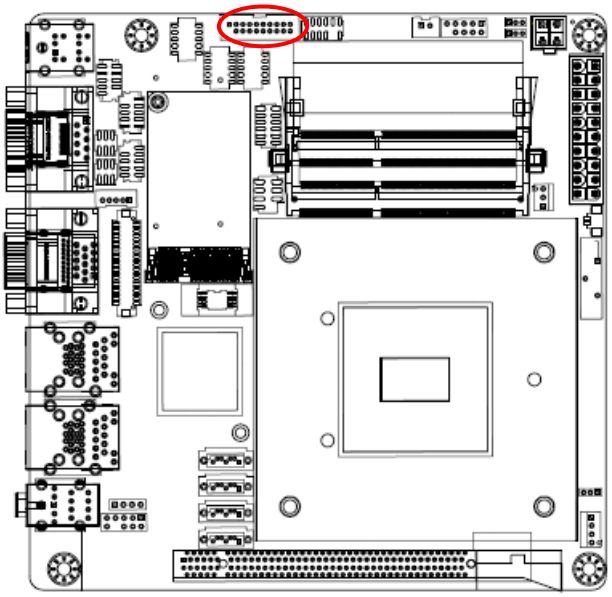
3. FANSYSDEC1
2. +12V
1. GND

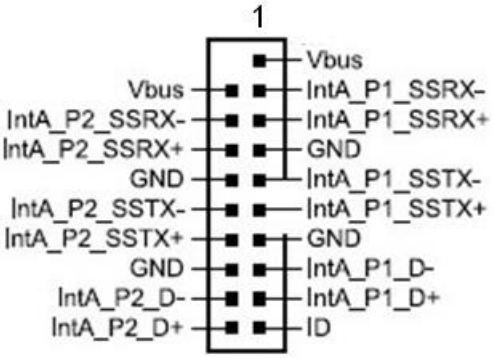
2.7.16 SATA Ports (SATA1~4)



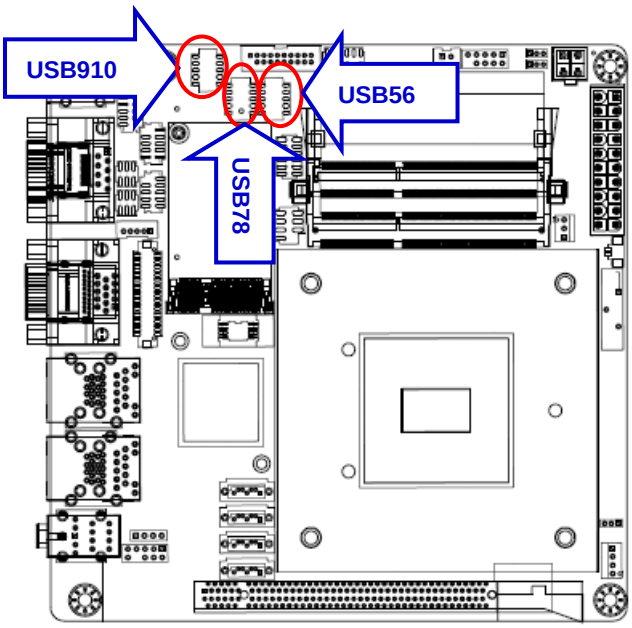


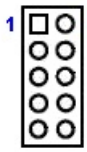
2.7.17 USB 3.0 Connector (USB1112)





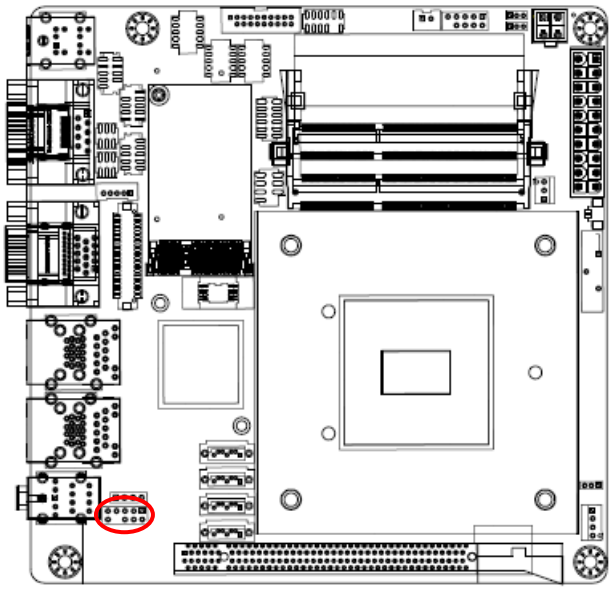
2.7.18 Front USB Headers (USB56, USB78, USB910)

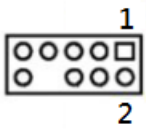




1. USB+5V	2. USB+5V
3. USB -	4. USB -
5. USB +	6. USB +
7. GND	8. GND
9. GND	10. GND

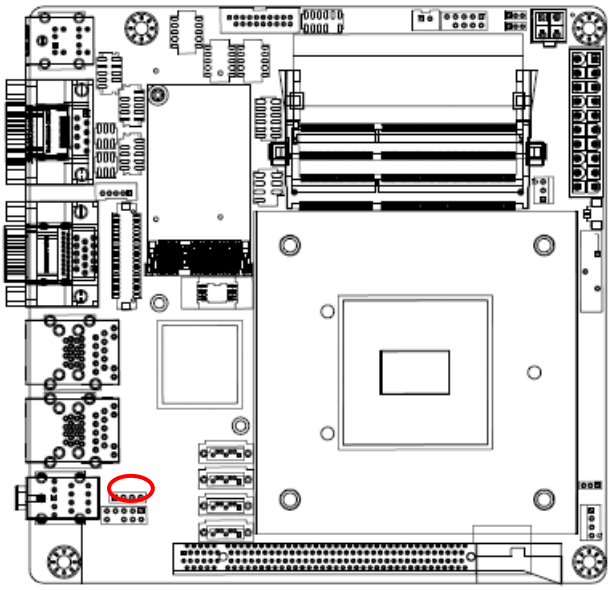
2.7.19 Front Panel Audio Connector (FP_AUDIO1)

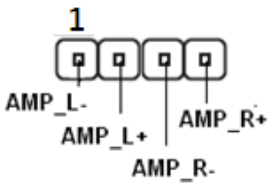




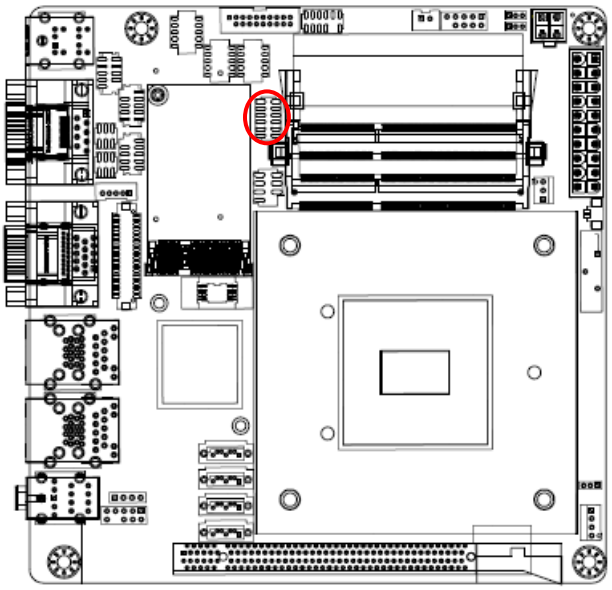
1. MIC2_L	2. GND
3. MIC2_R	4. PRESENSE
5. LIN2_R	6. SENSE1_RTN
7. SENSE_B	8. NC
9. LIN2_L	10. SENSE2_RTN

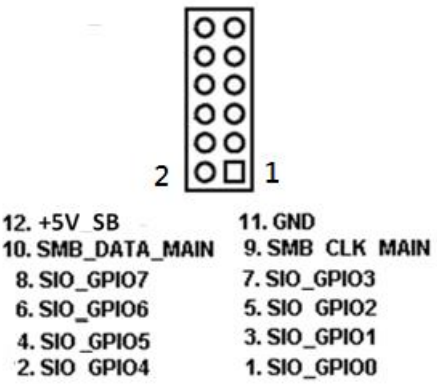
2.7.20 Amplifier Connector (JAMP1)



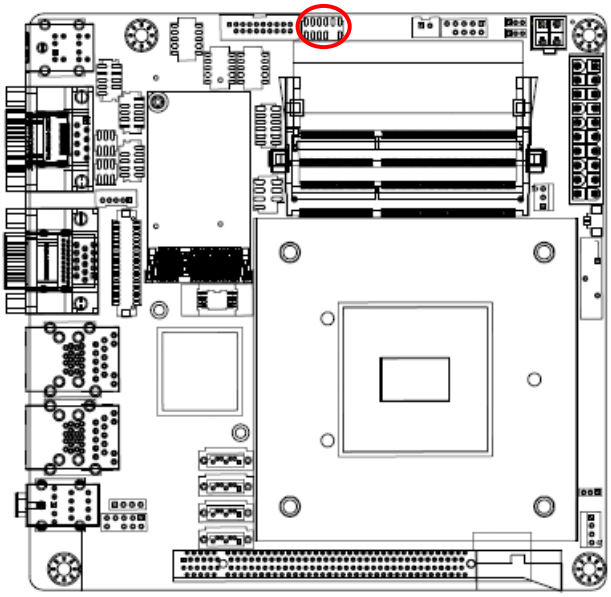


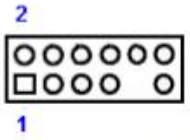
2.7.21 Digital I/O Connector (JDIO1)





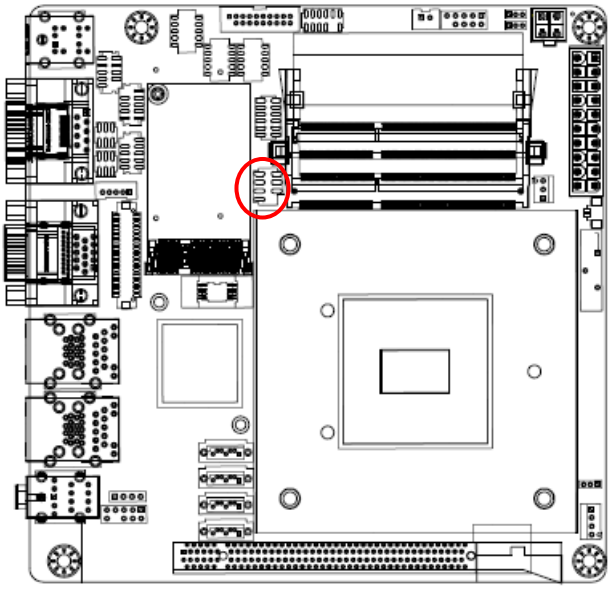
2.7.22 LPC Connector (JLPC1)





1.NC	2.+3.3V
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

2.7.23 SPI Connector (SPI1)



1.+3.3V	2.GND
3.SP1_CS#	4.SPI_CLK
5.SPI_MISO	6.SPI_MOSI
7.NC	8.NC

3. BIOS Setup

3.1 Introduction

The BIOS setup program allows users to modify the basic system configuration. This chapter describes how to access the BIOS setup program and the configuration options that may be changed.

3.2 Starting Setup

The BIOS is immediately activated when you first power on the computer. The BIOS reads the system information contained in the NVRAM and begins checking the system and configuring it. When it finishes, the BIOS seeks an operating system on one of the disks and then launch and turn control over to the operating system.

While the BIOS is in control, the Setup program can be activated in one of the two ways:
By pressing <Del> or <F2> key immediately after switching the system on, or
By pressing the <Del> or <F2> key when the following message appears briefly at the left top of the screen during the POST (Power On Self Test).

Press <DEL> or <F2> to enter setup

If the message disappears before you respond and you still wish to enter Setup, restart the system to try again by turning it OFF then ON or pressing the "RESET" button on the system case. You may also restart by simultaneously pressing <Ctrl>, <Alt>, and <Delete> keys.

3.3 Using Setup

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

Button	Description
← →	Select Screen
↑ ↓	Select Item
+ -	Change Option / Field
Enter	Select
PGUP/HOME	Go to Top of Screen
PGDN/HOME	Go to Bottom of Screen
F1	General help, only for Status Page Setup Menu and Option Page Setup Menu
F2	Previous Values
F3	Optimized defaults
F4	Save & Exit Setup
ESC	Exit

List Box

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

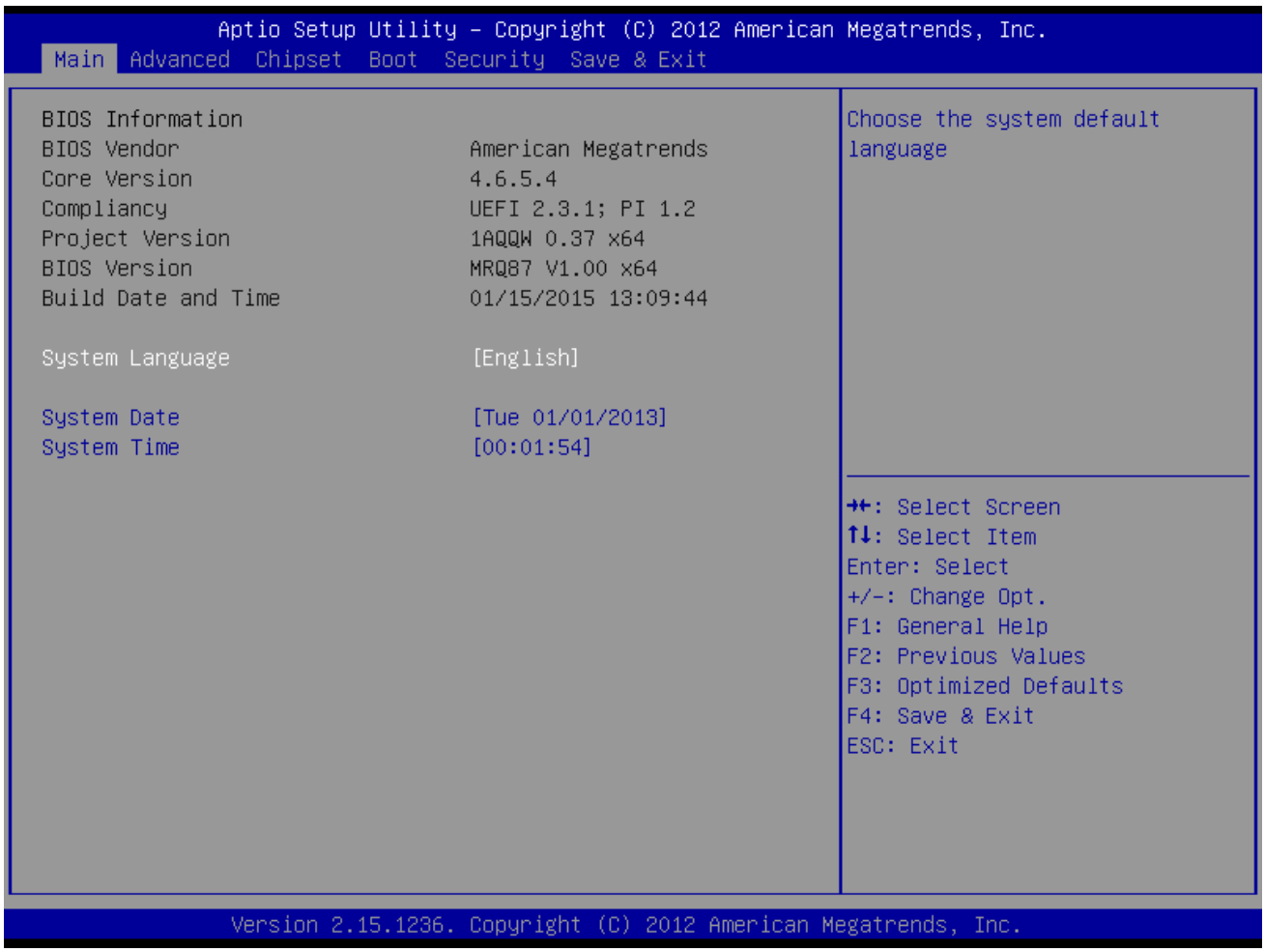
Sub-menu

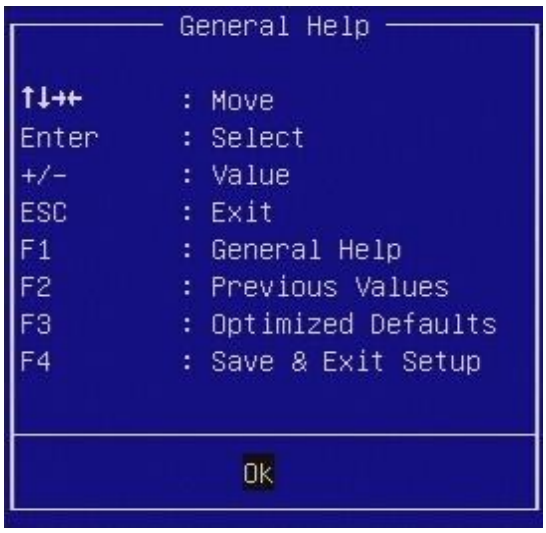
- Note that a right pointer symbol  appears to the left of certain fields. This pointer indicates that you can display a sub-menu from this field. A sub-menu contains additional options for a field parameter. To display a sub-menu, move the highlight to the field and press <Enter>. The sub-menu appears. 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 <F3> 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.

3.4 BIOS Menu Screen

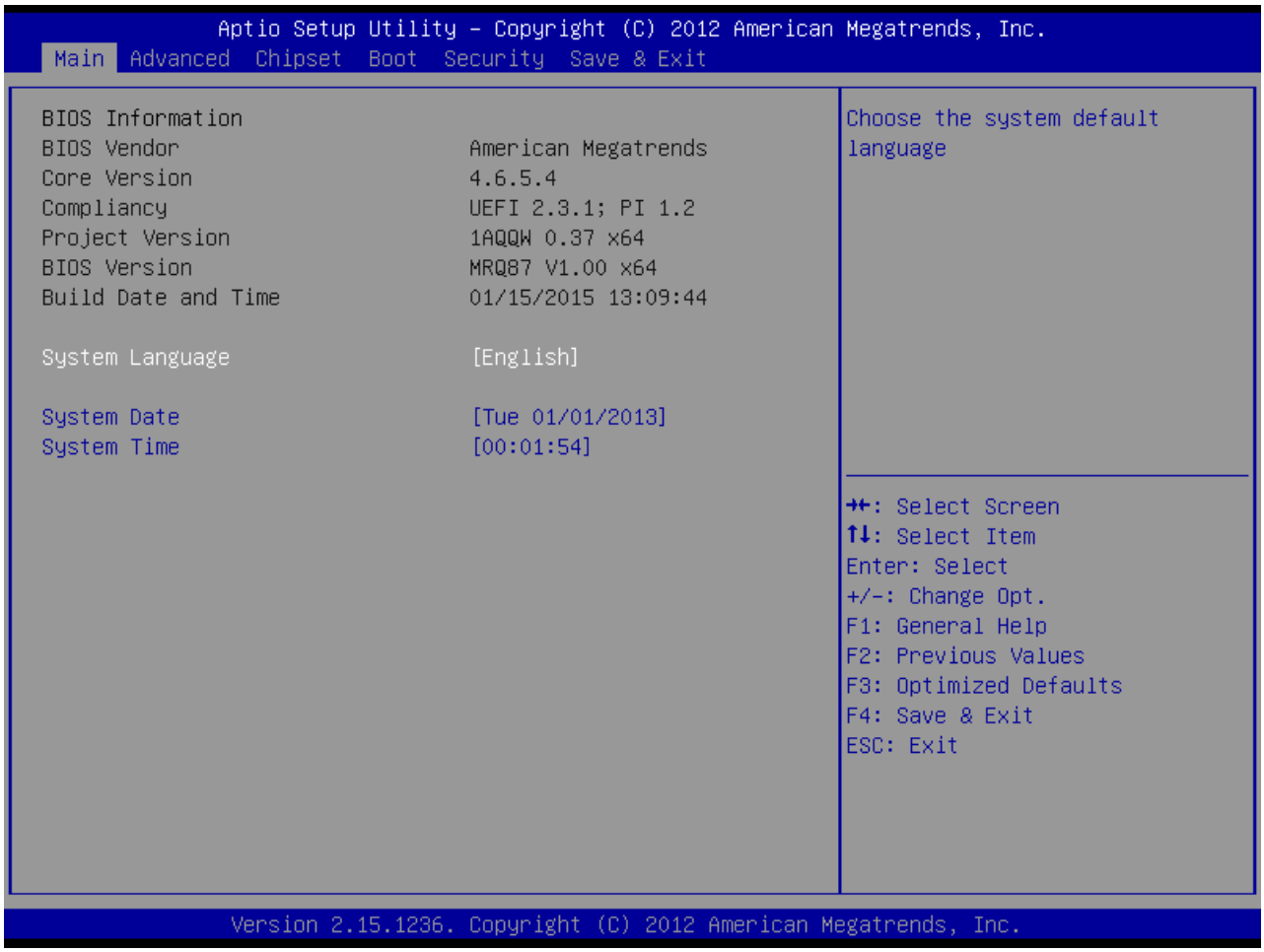
When you enter the BIOS, the following screen appears. The BIOS menu screen displays the items that allow you to make changes to the system configuration. To access the menu items, press the up/down/right/left arrow key on the keyboard until the desired item is highlighted, then press [Enter] to open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





3.4.1 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**

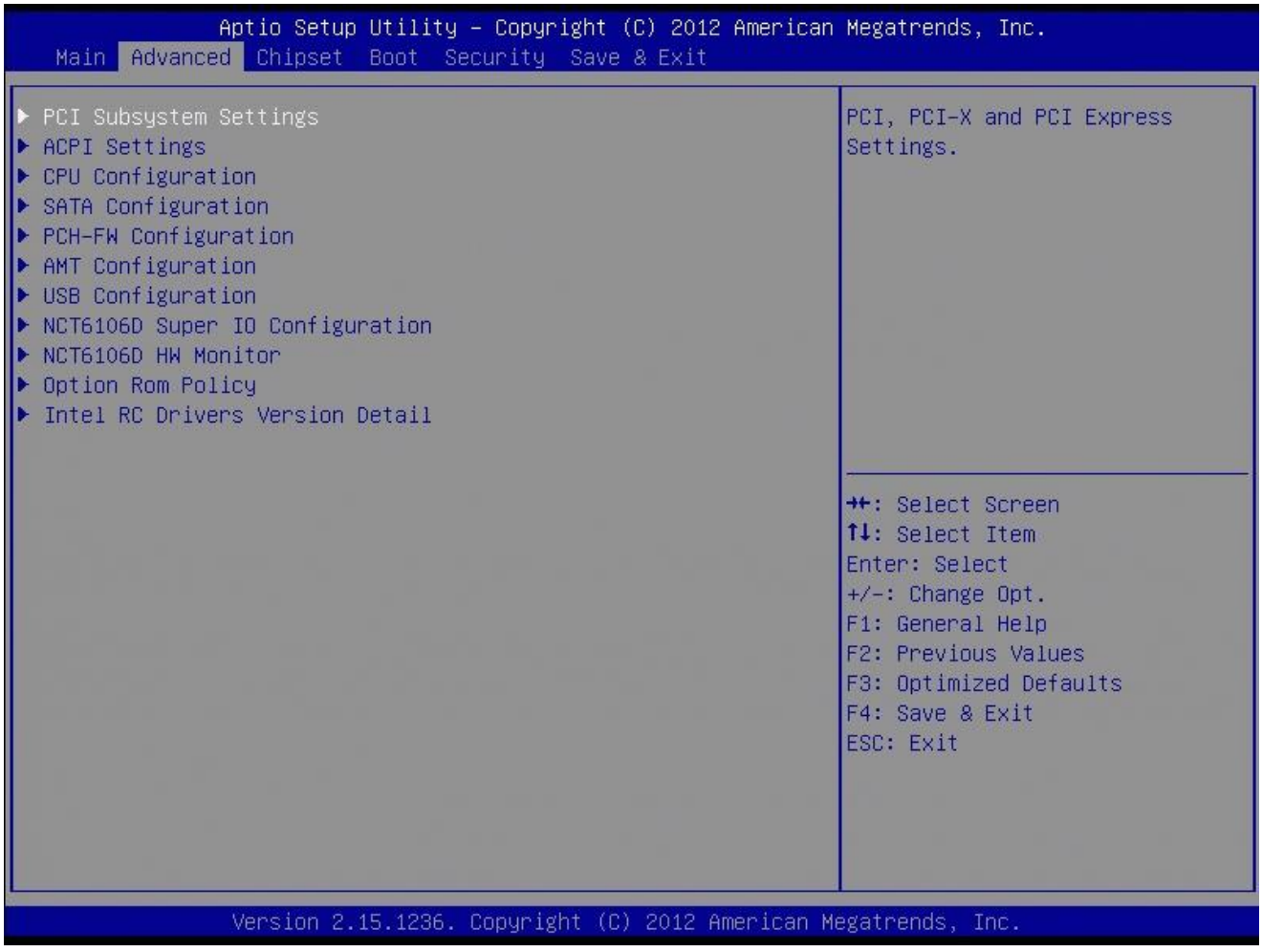
The date format is <Date>,<Month>,<Day>,<Year>.

- **System Time**

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

3.4.2 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.

3.4.2.1 PCI Subsystem Setting

The PCI PnP menu items allow you to change the advanced settings for PCI/PnP devices.

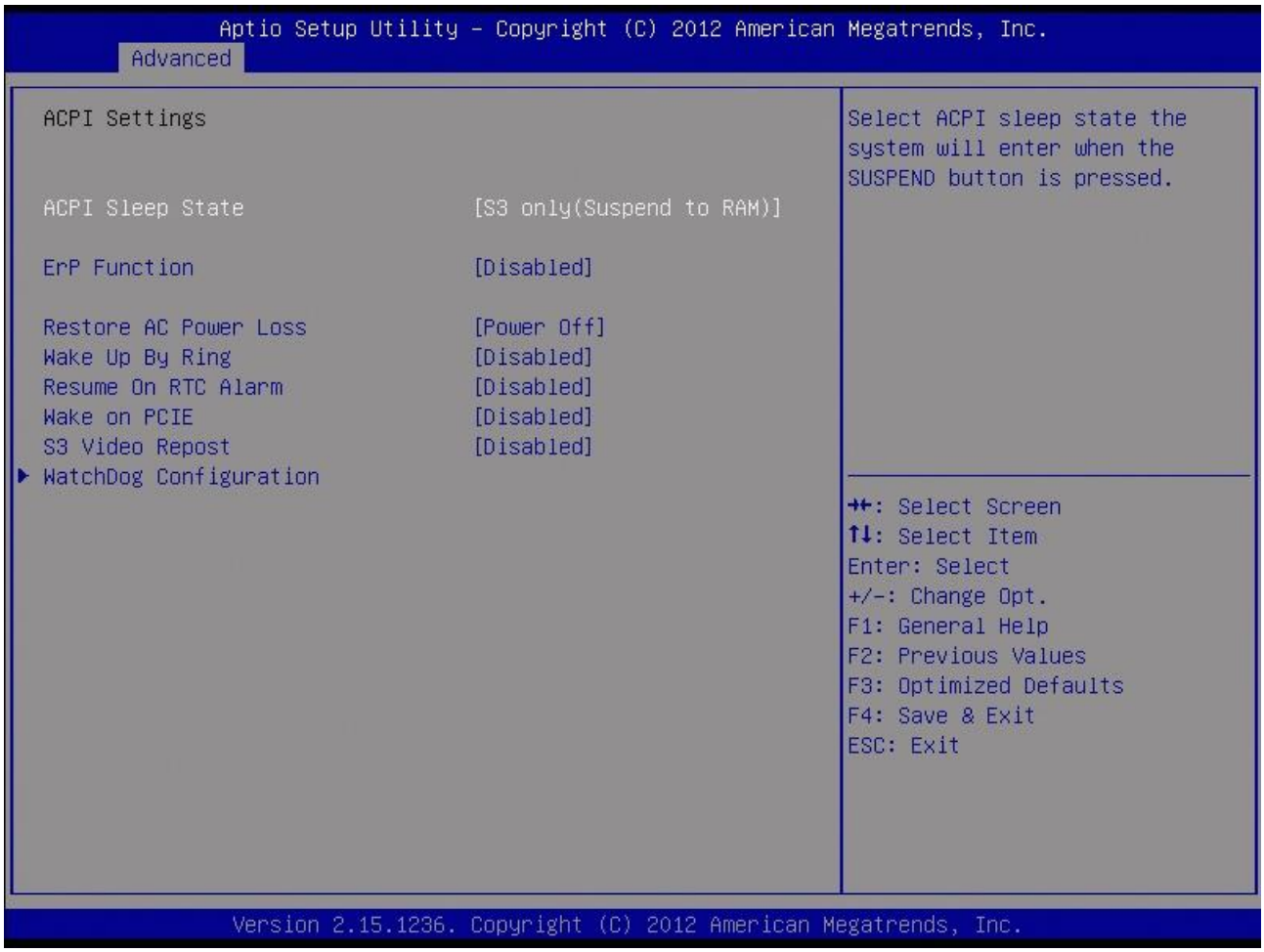
- **PCI Bus Driver Version**

Displays the information of PCI Bus Driver Version

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

Configuration options: [32 PCI Bus Clocks] ~ [248 PCI Bus Clocks]

3.4.2.2 ACPI Settings



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

Select the highest ACPI sleep state the system will enter the SUSPEND button is press. Configuration options: [Suspend Disable] [S3 (suspend to RAM)]

- **Erp Function [Disabled]**

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]

- **Wake Up By Ring [Disabled]**

Configuration options: [Disabled] [Enabled]

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

Enable or disable system wake on alarm even. When enabled, system will wake upon the hr/min/sec specified. Configuration options: [Disabled] [Enabled]

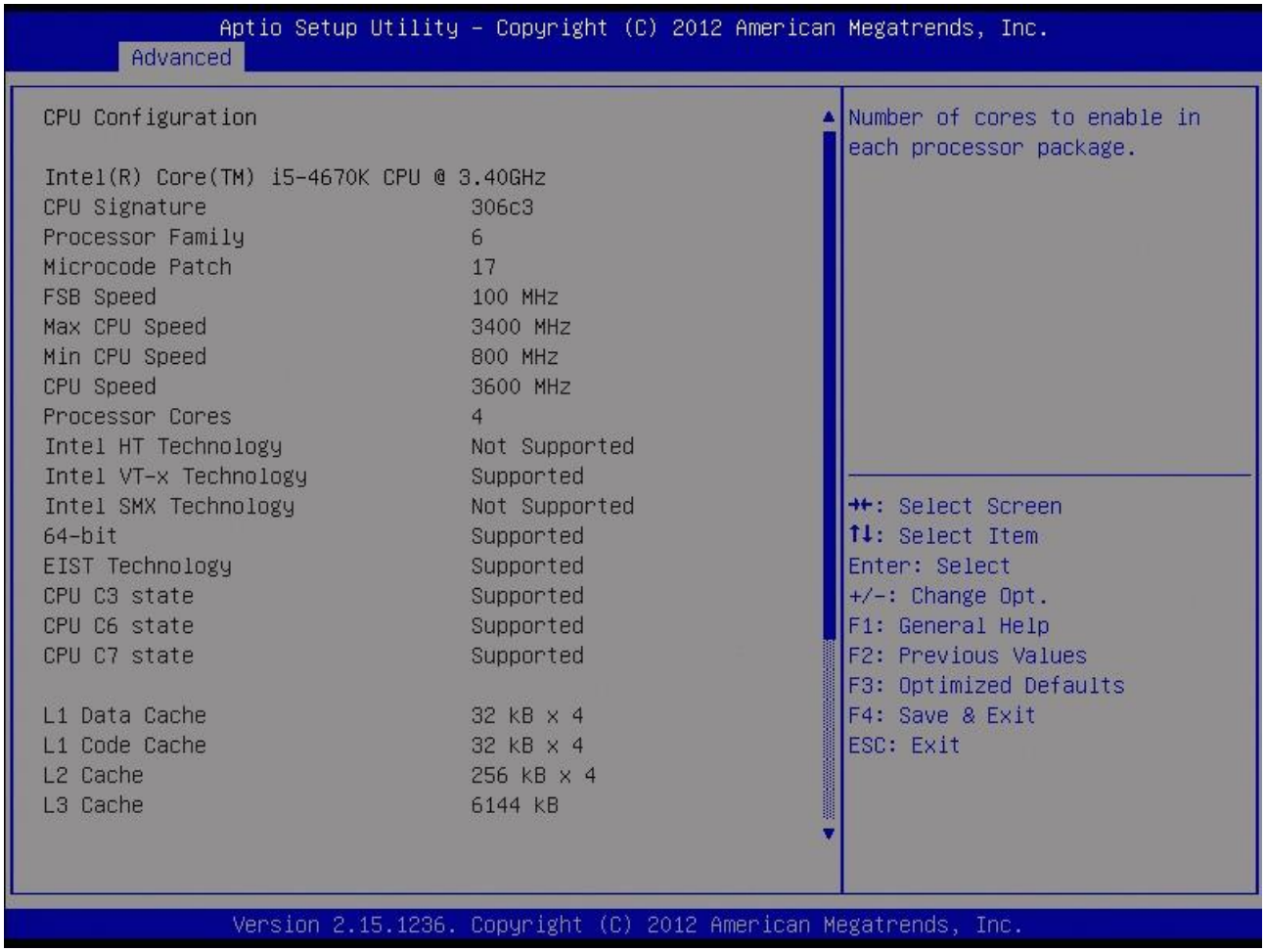
- **Wake on PCIE [Disabled]**

Configuration options: [Disabled] [Enabled]

- **S3 Video Repost [Disabled]**

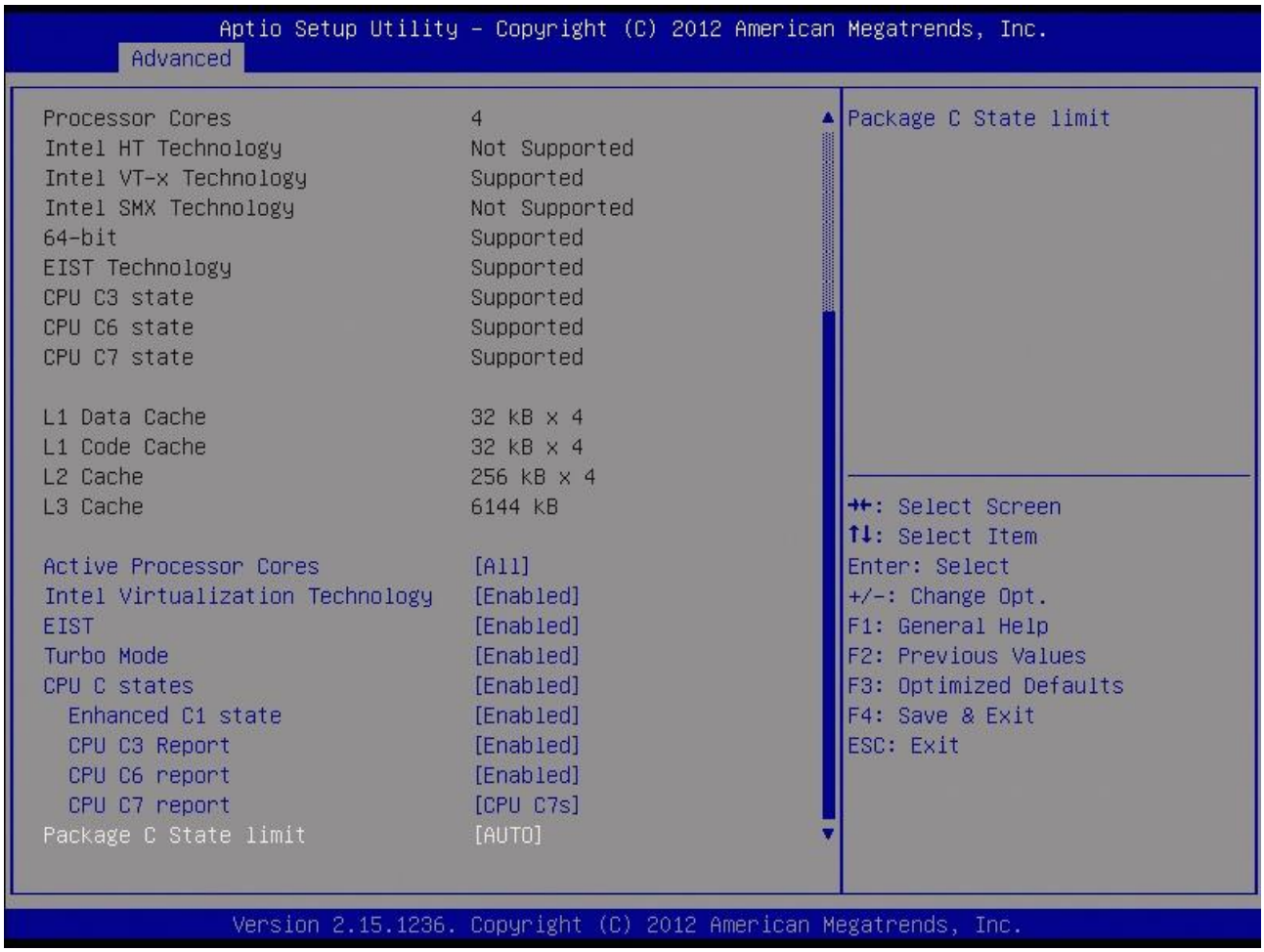
Allows you to determine whether to invoke VGA BIOS POST on S3/STR resume. Configuration options: [Disabled] [Enabled]

3.4.2.3 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] [4] [5] [6] [7]

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]**

Configuration options: [Disabled] [Enabled]

- **CPU C States [Enabled]**

Configuration options: [Disabled] [Enabled]

- **Enhanced C1 States [Enabled]**

Configuration options: [Disabled] [Enabled]

- **CPU C3 Report [Enabled]**

Use this to enable or disable CPU C3 report to OS.

Configuration options: [Disabled] [Enabled]

- **CPU C6 Report [Enabled]**

Use this to enable or disable CPU C6 report to OS.

Configuration options: [Disabled] [Enabled]

- **CPU C7 Report [CPU C7s]**

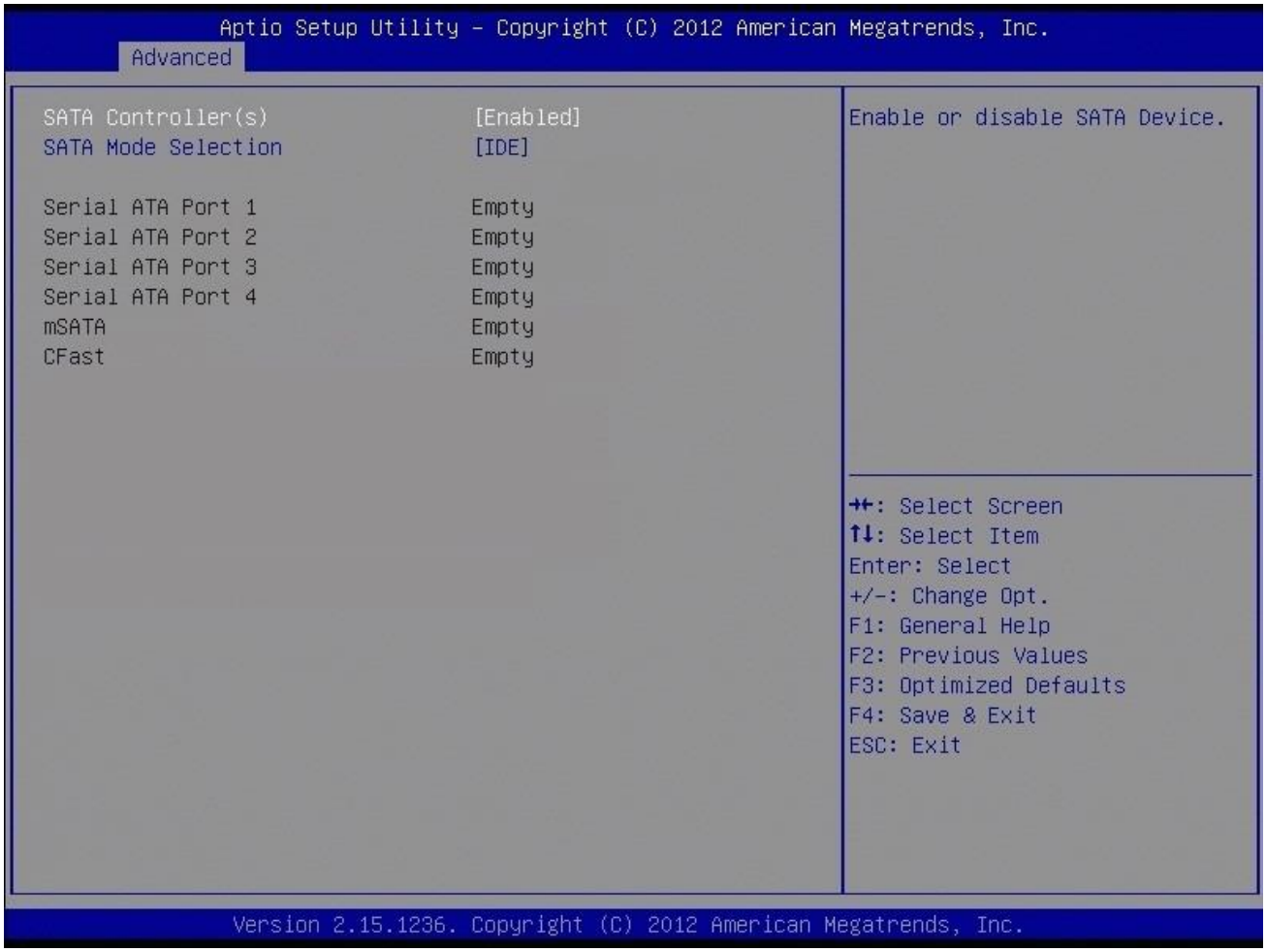
Use this to enable or disable CPU C7 report to OS.

Configuration options: [Disabled] [CPU C7] [CPU C7s]

- **Package C State limit [Auto]**
- **Intel TXT(LT) Support [Enable]**

Configuration options: [Disabled] [Enabled]

3.4.2.4 SATA Configuration



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

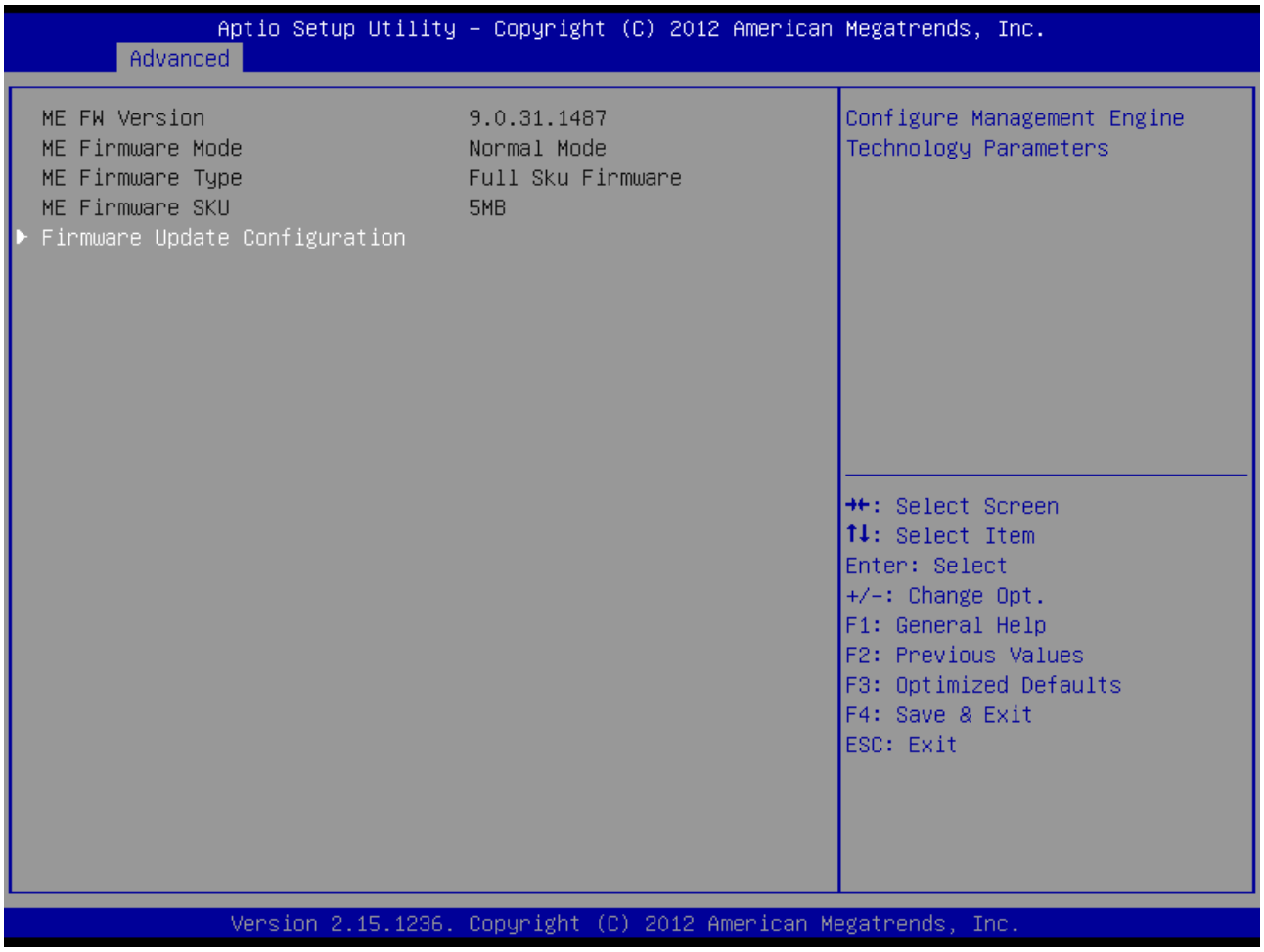
Enabled/Disabled Serial-ATA Controller 0

Configuration options: [Disabled] [Enabled]

- **SATA Mode [IDE]**

Support IDE, AHCI or RAID mode
Configuration options: [IDE][AHCI][RAID]

3.4.2.5 PCH-FW Configuration

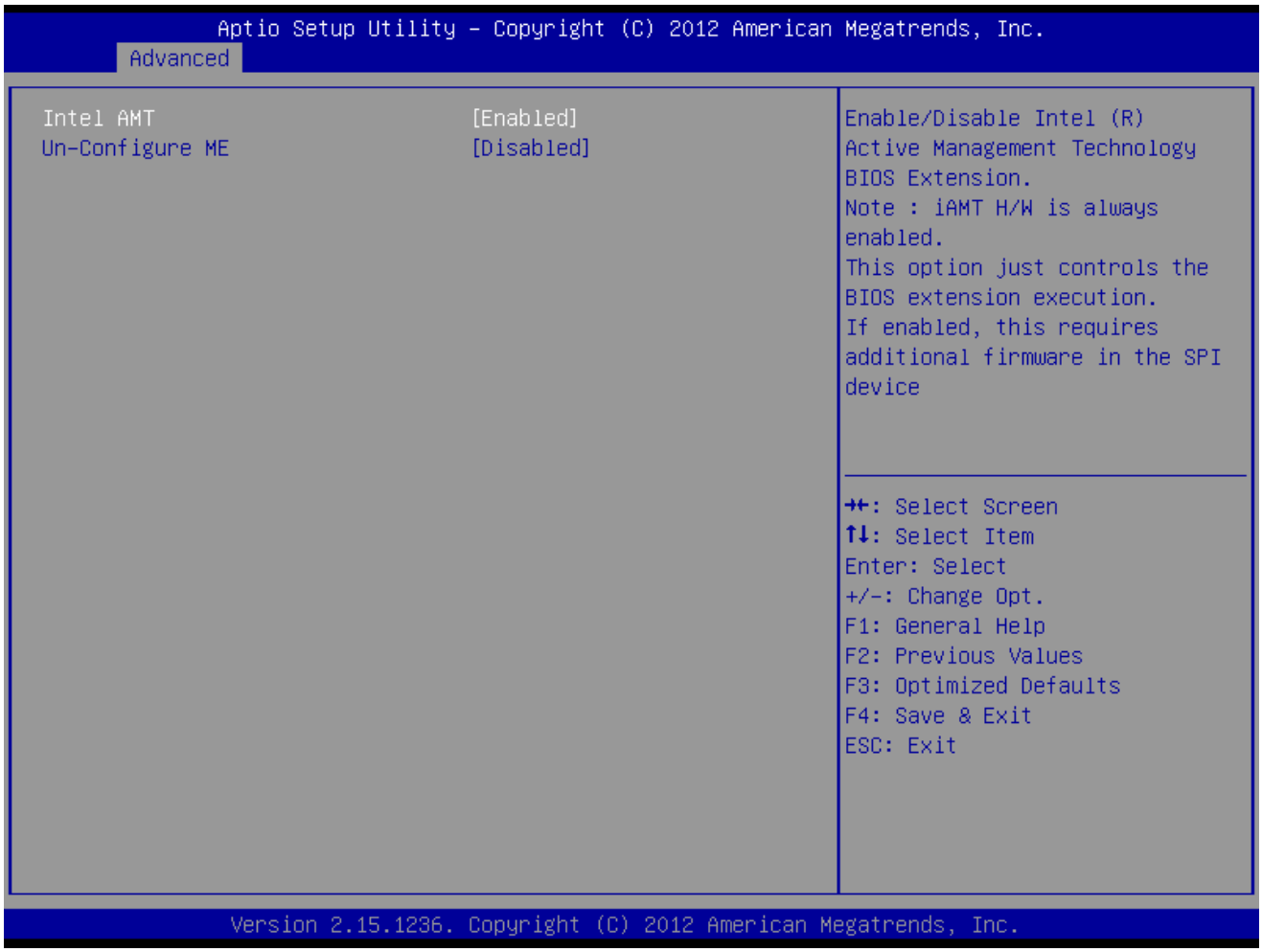


Firmware Update Configuration

- **Me FW Image Re-Flash [Disabled]**

Enable/Disable Me FW Image Re-Flash function
Configuration options: [Disabled][Enabled]

3.4.2.6 AMT Configuration



- **Intel AMT [Enabled]**

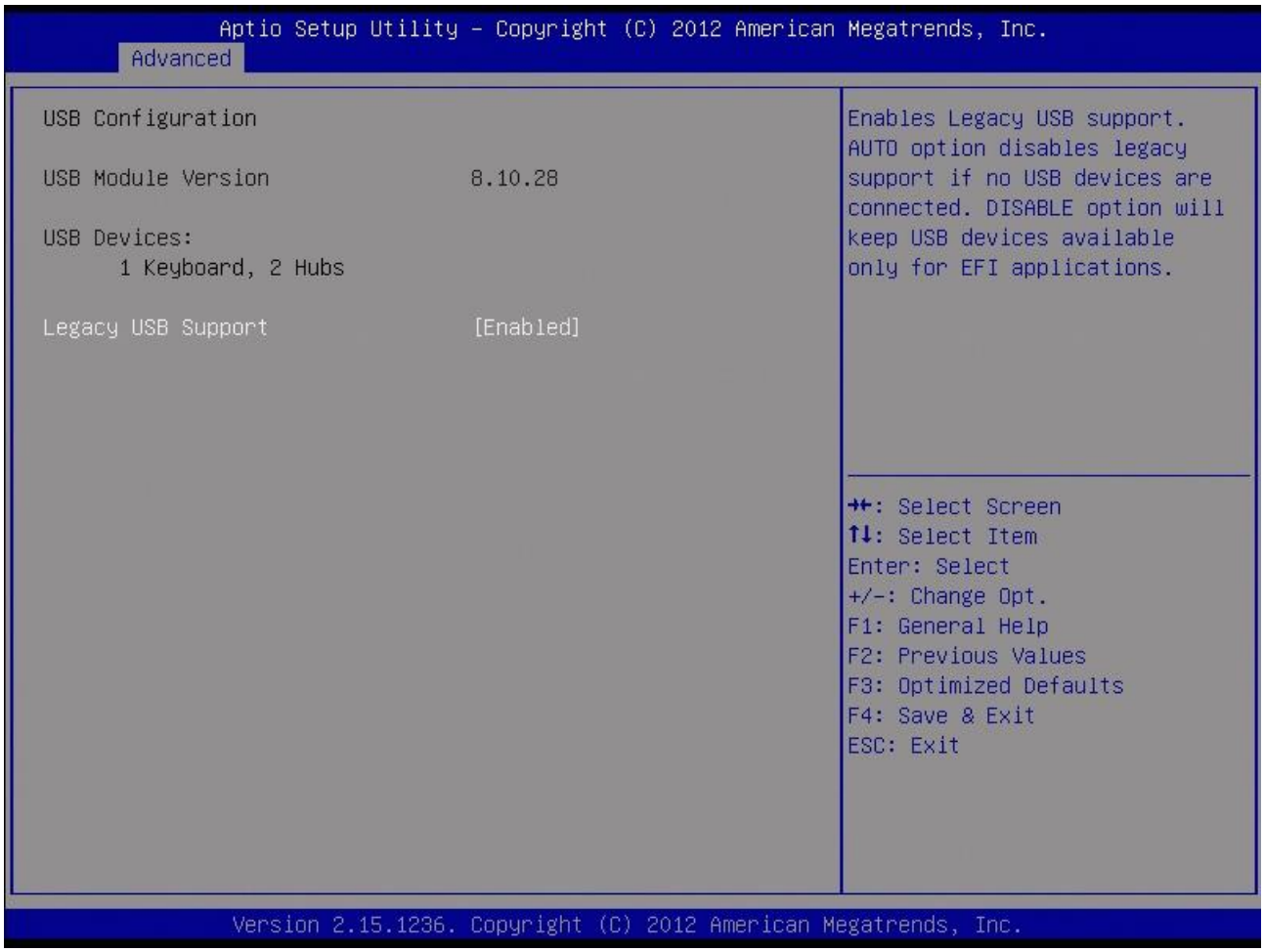
Configuration options: [Disabled] [Enabled]

- **Un-Configure ME [Disabled]**

Configuration options: [Disabled] [Enabled]

3.4.2.7 USB Configuration

USB Configuration Parameters



- **USB Device**

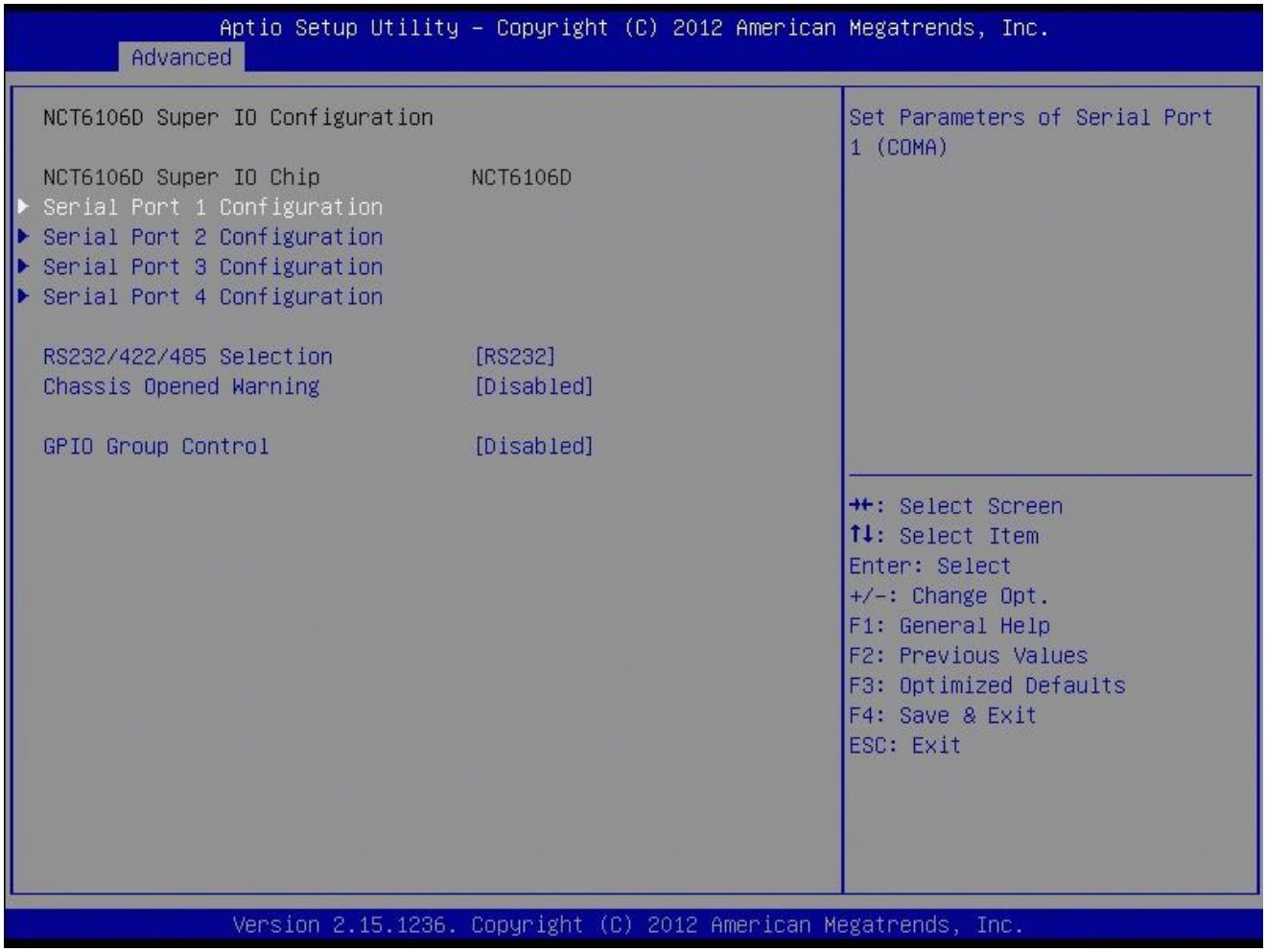
Display how many devices are connected.

- **Legacy USB Support [Enabled]**

Enables Legacy USB support. AUTO option disables legacy support if no USB devices are connected. Disabled option will keep USB devices available only for EFI applications. Configuration options: [Enabled] [Disabled][Auto]

3.4.2.8 NCT6106D Super IO Configuration

System Super IO Chip Parameters.



Super IO Configuration
Super IO Chip [NCT6106D]

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

Configuration options: [RS232][RS422 HALF DUPLEX][RS485/RS422 FULL DUPLEX]

- **Chassis Opened Warning [Disabled]**

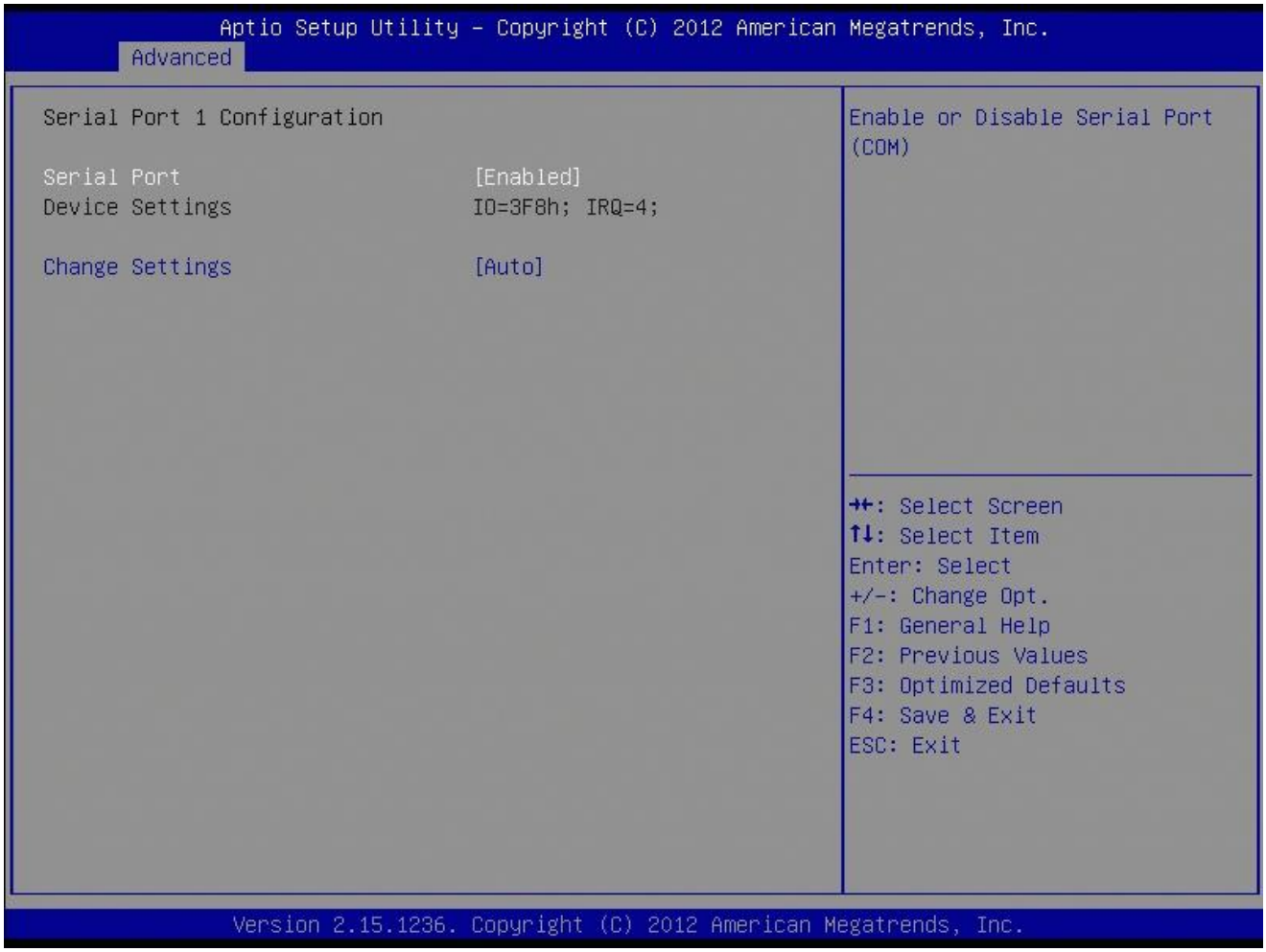
Configuration options: [Enabled] [Disabled]

- **GPIO Group Control [Disabled]**

Configuration options: [Enabled] [Disabled]

3.4.2.8.1 Serial Port 1 configuration

Set Parameters of Serial Port 1



Serial Port 1 Configuration

- **Serial Port [Enabled]**

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

3.4.2.8.2 Serial Port 2 configuration

Set Parameters of Serial Port 2

Serial Port 2 Configuration

- **Serial Port [Enabled]**

Enable or Disable Serial Port.

Configuration options: [Disabled] [Enabled]

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

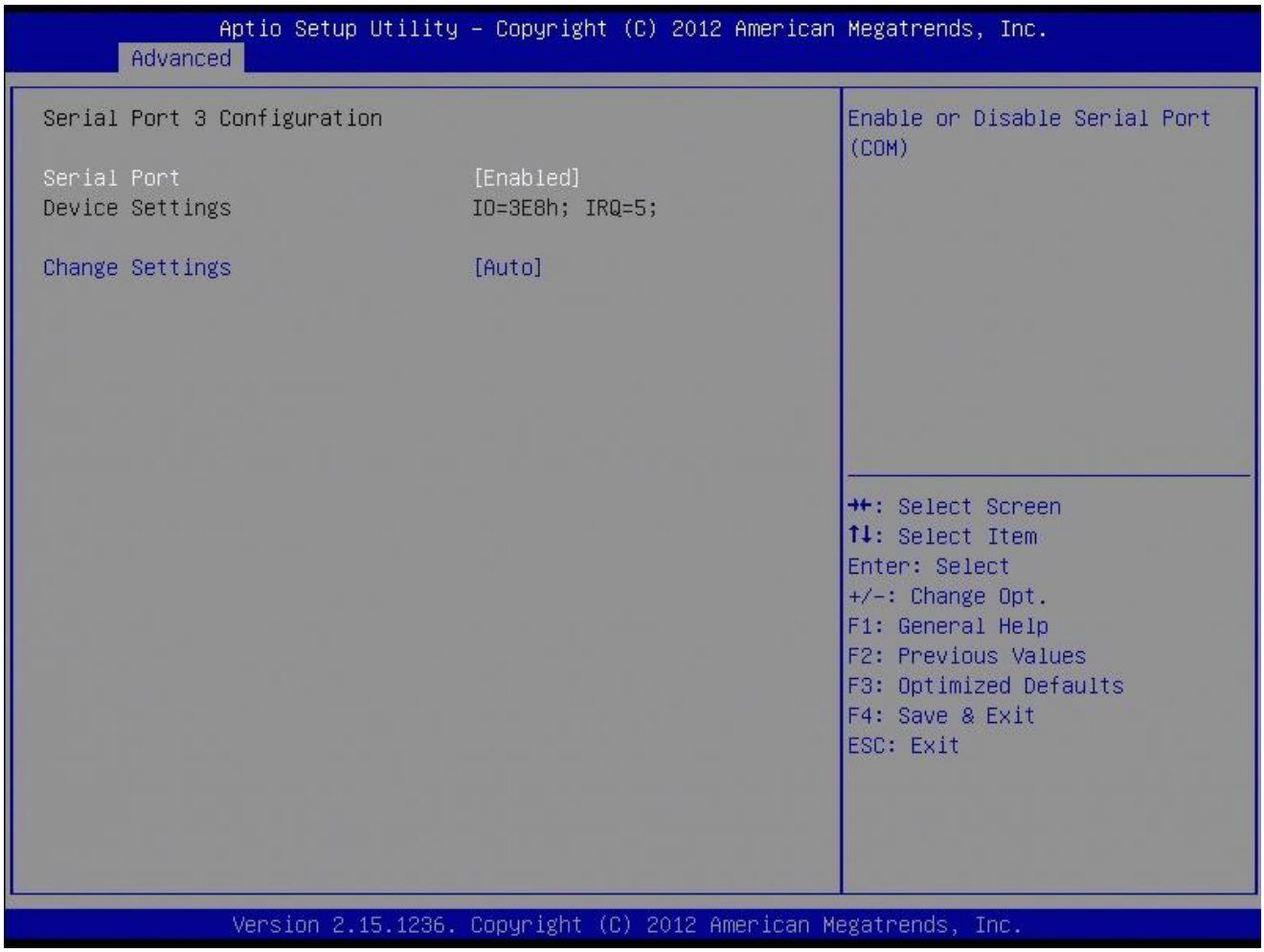
- **Change Setting[Auto]**

Select an optimal setting for Super IO device.

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

3.4.2.8.3 Serial Port 3 configuration

Set Parameters of Serial Port 3



Serial Port 3 Configuration

- **Serial Port [Enabled]**

Enable or Disable Serial Port.

Configuration options: [Disabled] [Enabled]

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

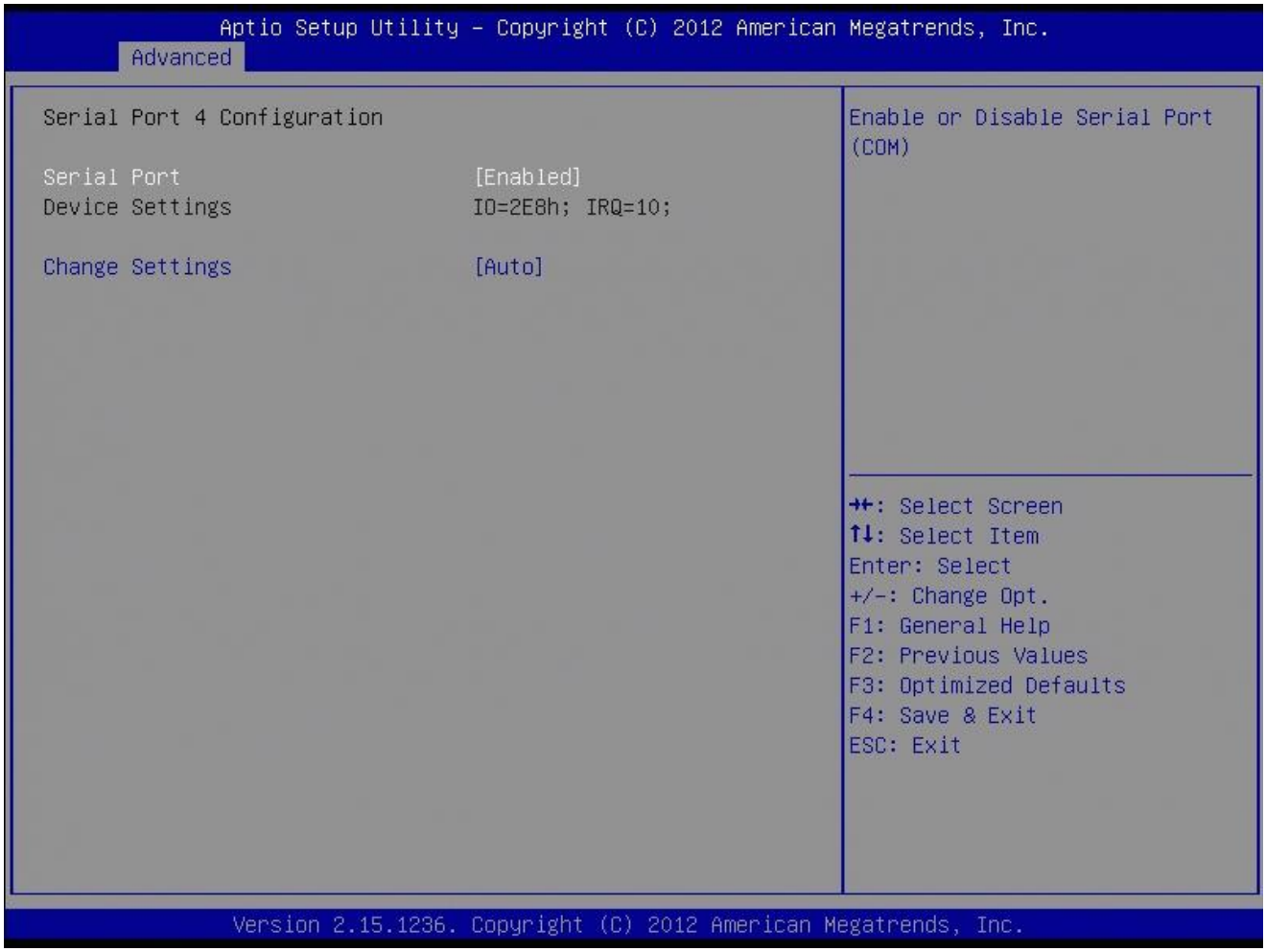
- **Change Setting[Auto]**

Select an optimal setting for Super IO device.

Configuration options: [Auto][IO=3E8h; IRQ=5] [IO=3E8h; IRQ=3, 4, 5, 7, 10, 11, 12] [IO=2E8h; IRQ=3, 4, 5, 7, 10, 11, 12][IO=2E0h; IRQ=3, 4, 5, 7, 10, 11, 12] [IO=2F0h; IRQ=3, 4, 5, 7, 10, 11, 12]

3.4.2.8.4 Serial Port 4 configuration

Set Parameters of Serial Port 4



Serial Port 4 Configuration

- **Serial Port [Enabled]**

Enable or Disable Serial Port.

Configuration options: [Disabled] [Enabled]

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

- **Change Setting[Auto]**

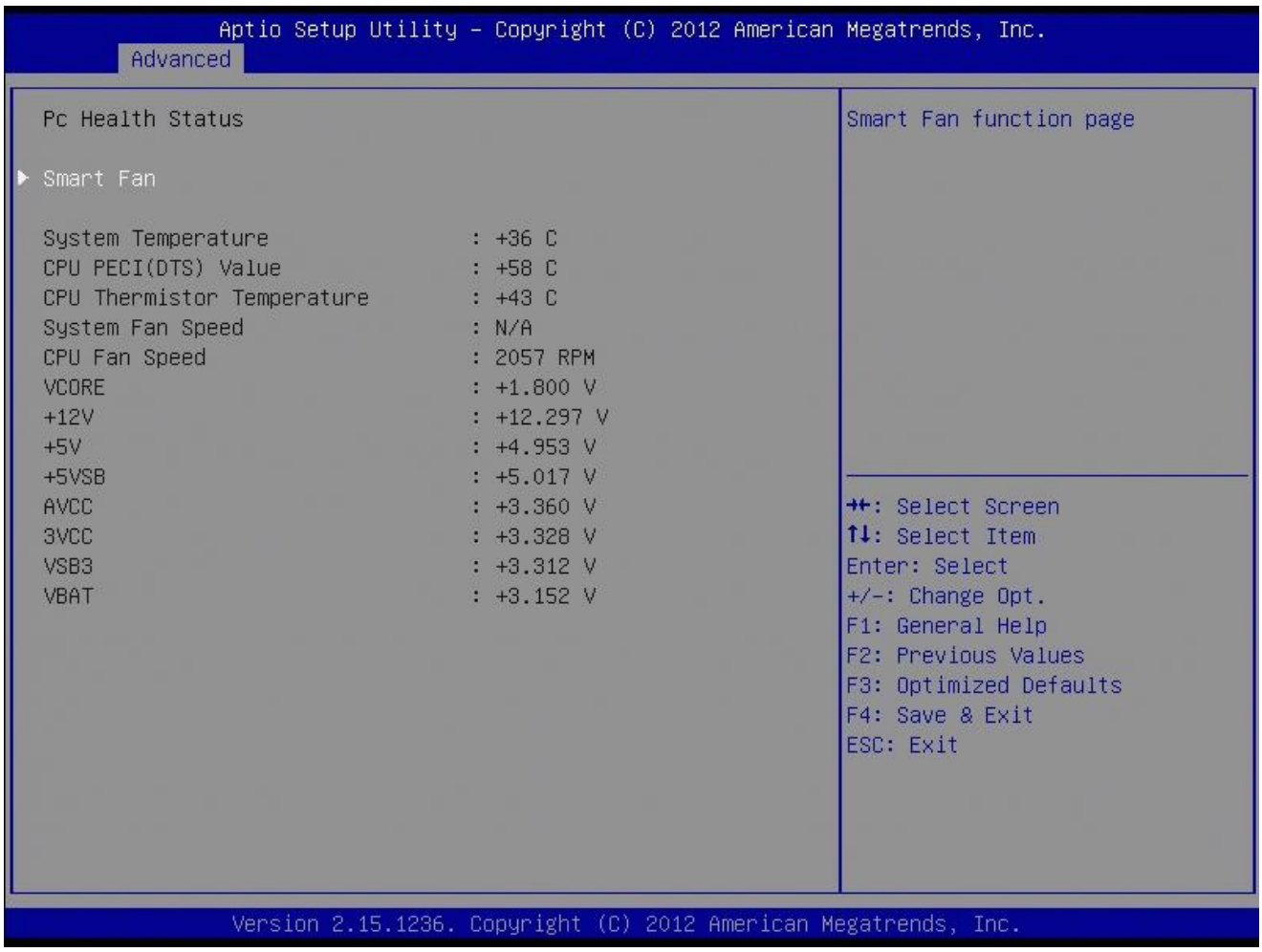
Select an optimal setting for Super IO device.

Configuration options: [Auto][IO=2E8h; IRQ=10] [IO=3E8h; IRQ=3, 4, 5, 7, 10, 11, 12] [IO=2E8h; IRQ=3, 4, 5, 7, 10, 11, 12][IO=2E0h; IRQ=3, 4, 5, 7, 10, 11, 12] [IO=2F0h; IRQ=3, 4, 5, 7, 10, 11, 12]

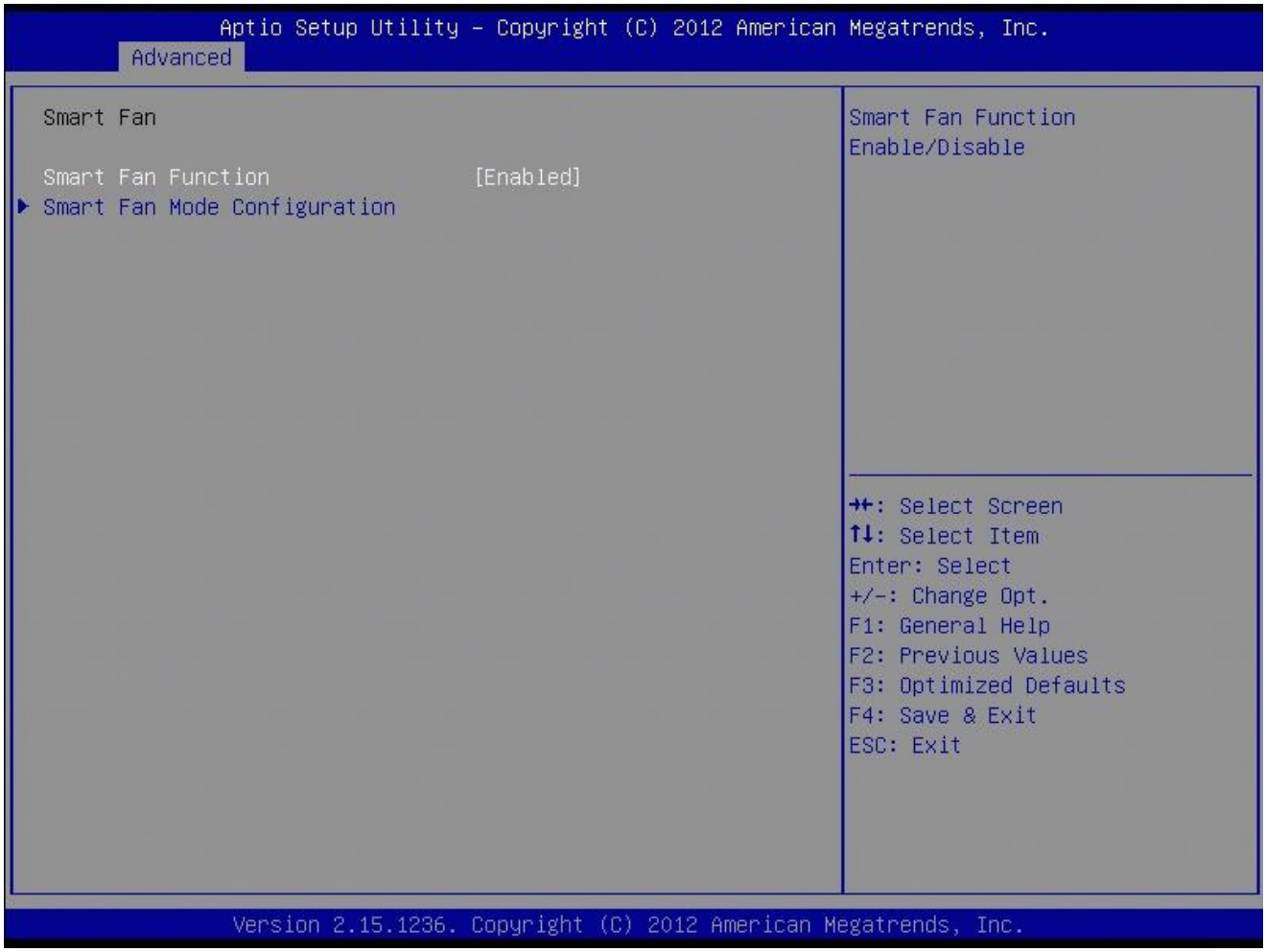
3.4.2.9 NCT6106D Hardware Monitor

- **PC Health Status**

Display system health status



3.4.2.9.1 Smart Fan

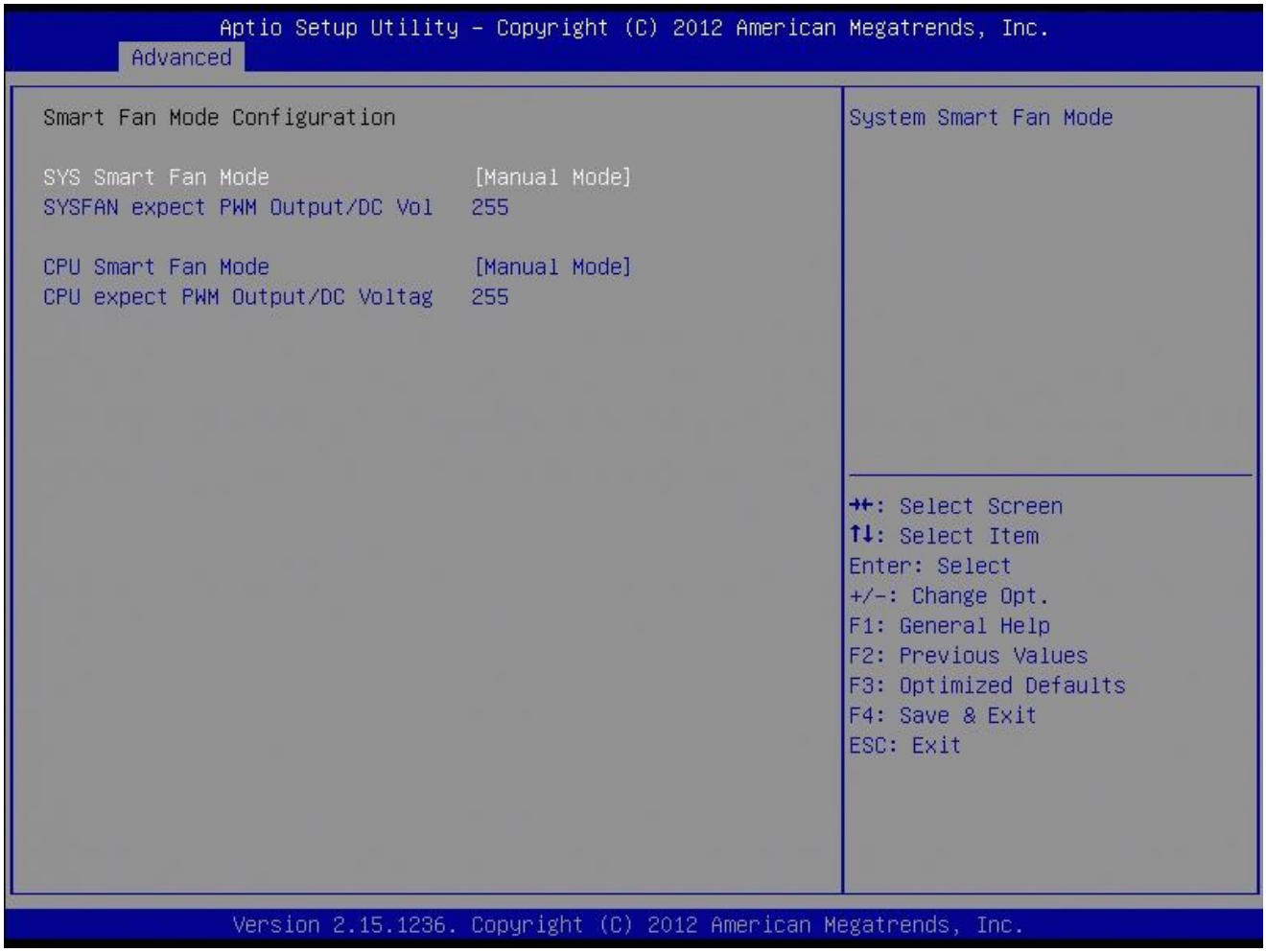


- **Smart Fan Function [Enabled]**

Configuration options: [Disabled] [Enabled]

3.4.2.9.2 Smart Fan Mode Configruation

Smart Fan Mode configuration



- **System Fan Mode [Manual Mode]**

Select system Fan mode

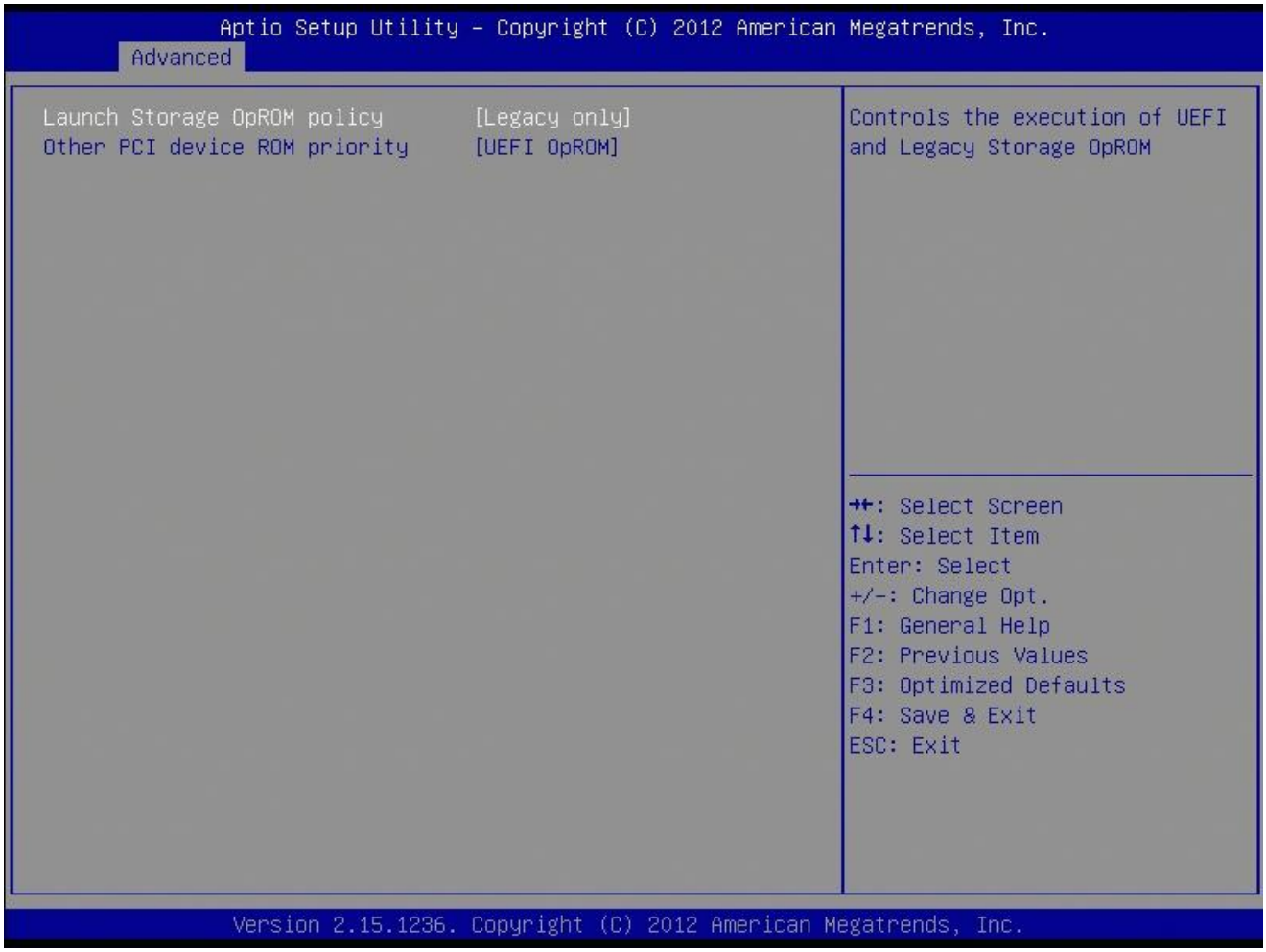
Configuration options: [Manual Mode][Thermal Cruise Mode]

- **CPU Fan Mode [Manual Mode]**

Select CPU Fan mode

Configuration options: [Manual Mode][Thermal Cruise Mode]

3.4.2.10 Option ROM Policy



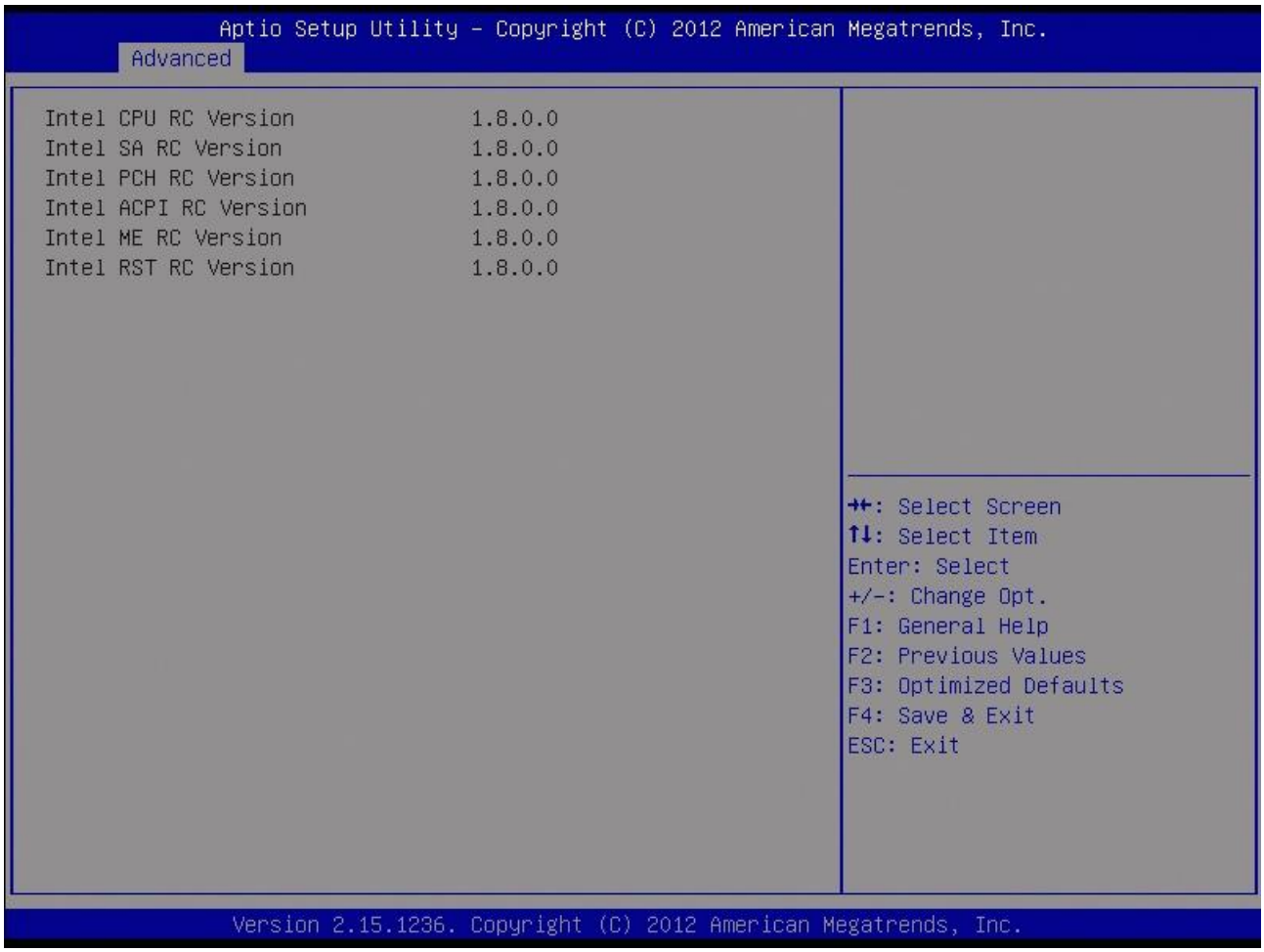
- **Launch Storage OpROM policy [Legacy only]**

Enable or Disable Boot Option For Legacy Mass Storage Devices with Option ROM
Configuration options: [Do not launch] [UEFI only] [Legacy only]

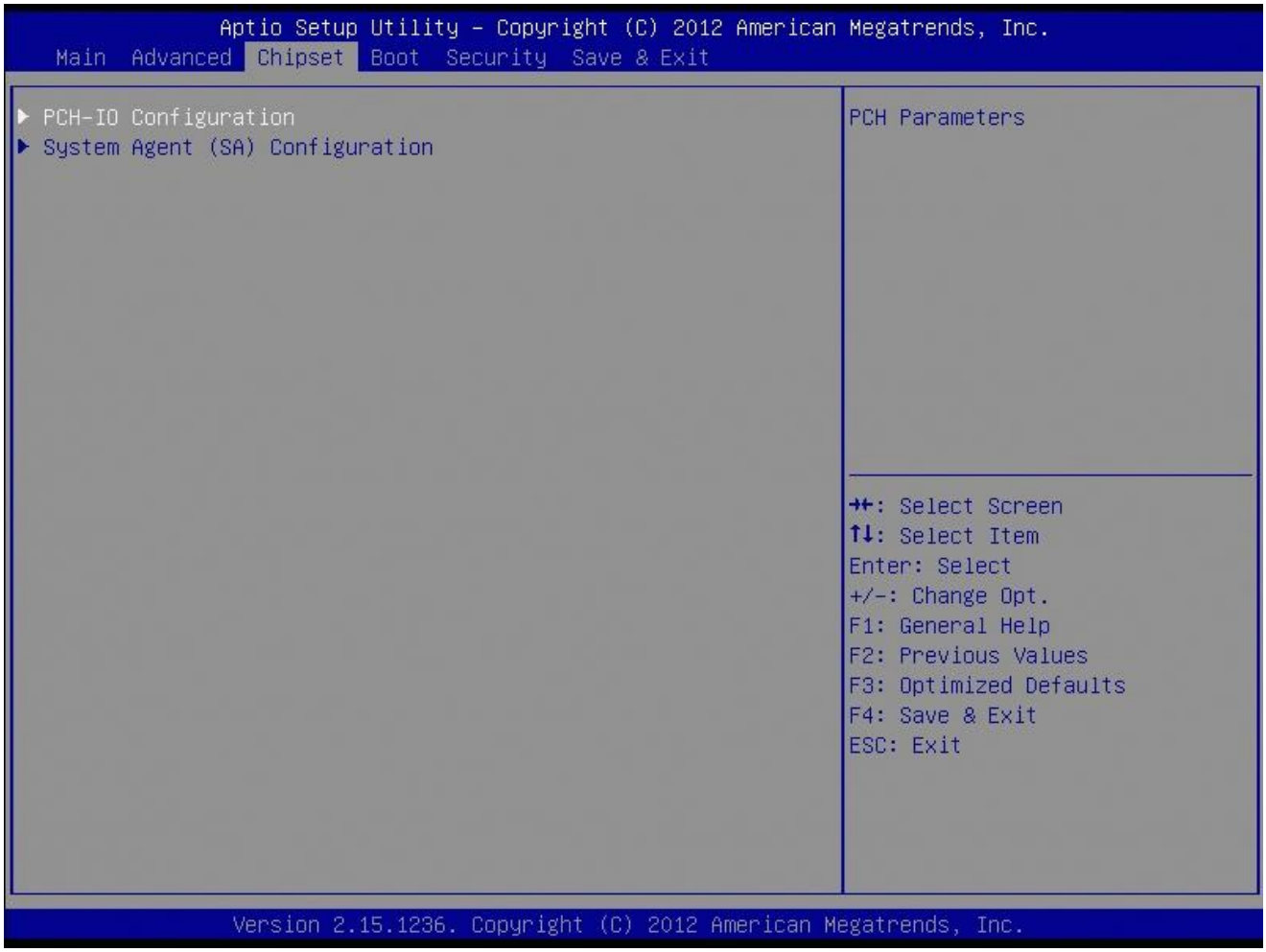
- **Other PCI Device ROM priority priority [UEFI OpROM]**

Configuration options: [UEFI OpROM] [Legacy OpROM]

3.4.2.11 Intel RC Driver Version Detail

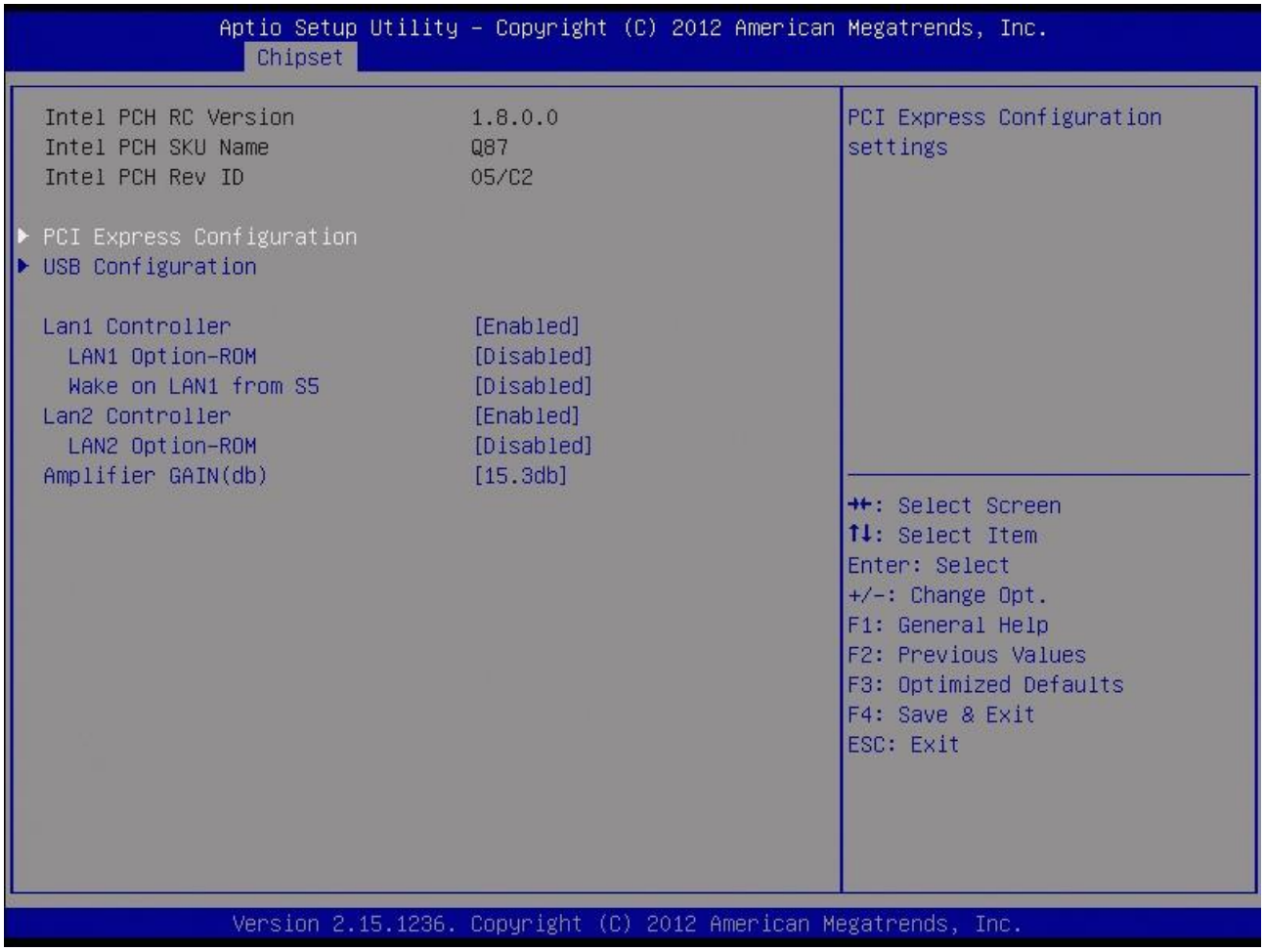


3.4.3 Chipset


Aptio Setup Utility – Copyright (C) 2012 American Megatrends, Inc.
Main Advanced Chipset Boot Security Save & Exit
PCH-IO Configuration
System Agent (SA) Configuration
PCH Parameters
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.

3.4.3.1 PCH-IO Configuration

PCH-IO Configuration



- **LAN1 Controller [Enabled]**

Enable/Disable LAN1 Controller

Configuration options: [Disabled] [Enabled]

- **LAN1 Option-ROM [Disabled]**

Enable/Disable LAN1 boot option for legacy network devices.

Configuration options: [Disabled] [Enabled]

- **Wake on LAN1 from S5 [Disabled]**

Configuration options: [Disabled] [Enabled]

- **LAN2 Controller [Enabled]**

Enable/Disable LAN1 Controller

Configuration options: [Disabled] [Enabled]

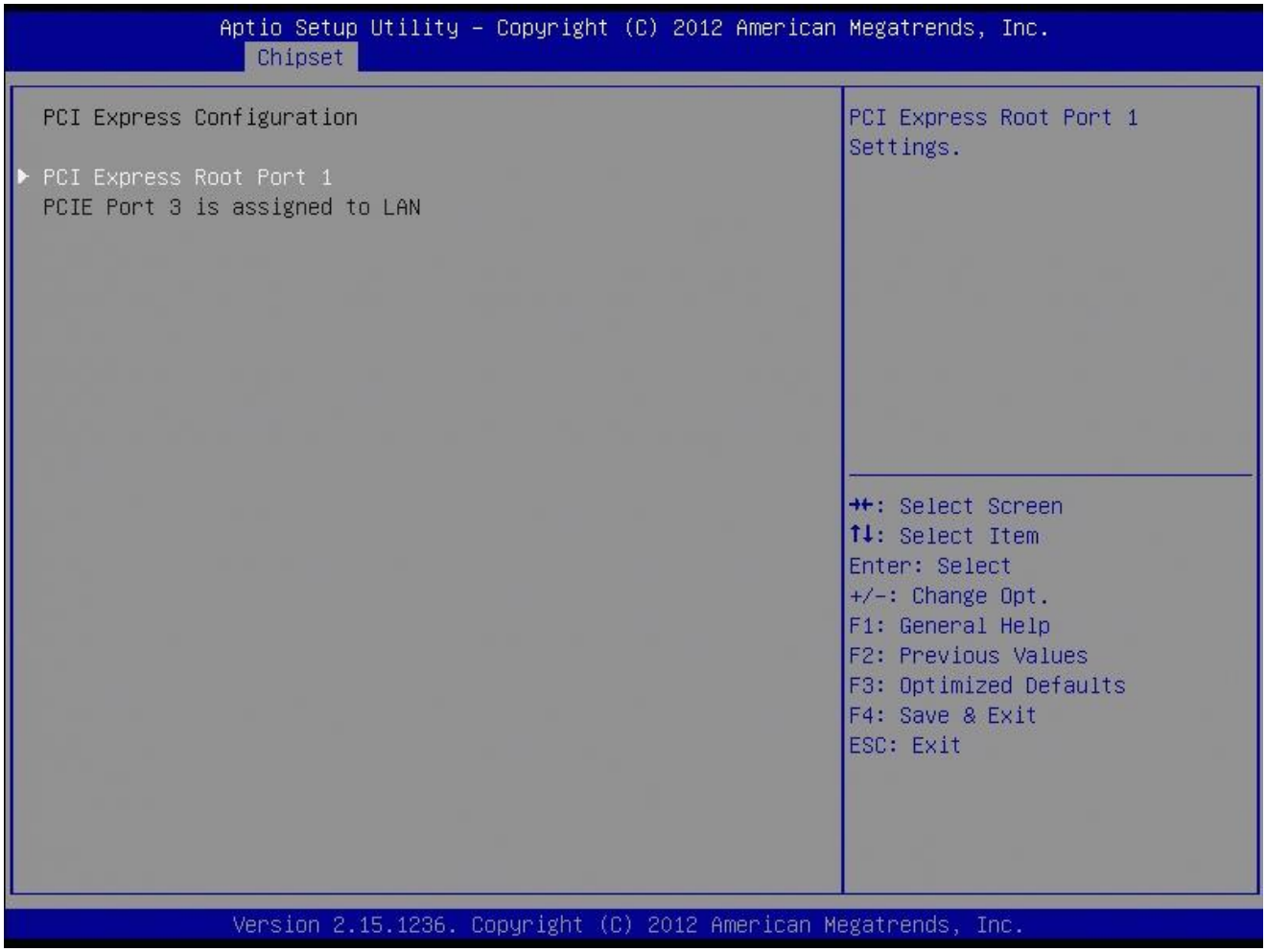
- **LAN2 Option-ROM [Disabled]**

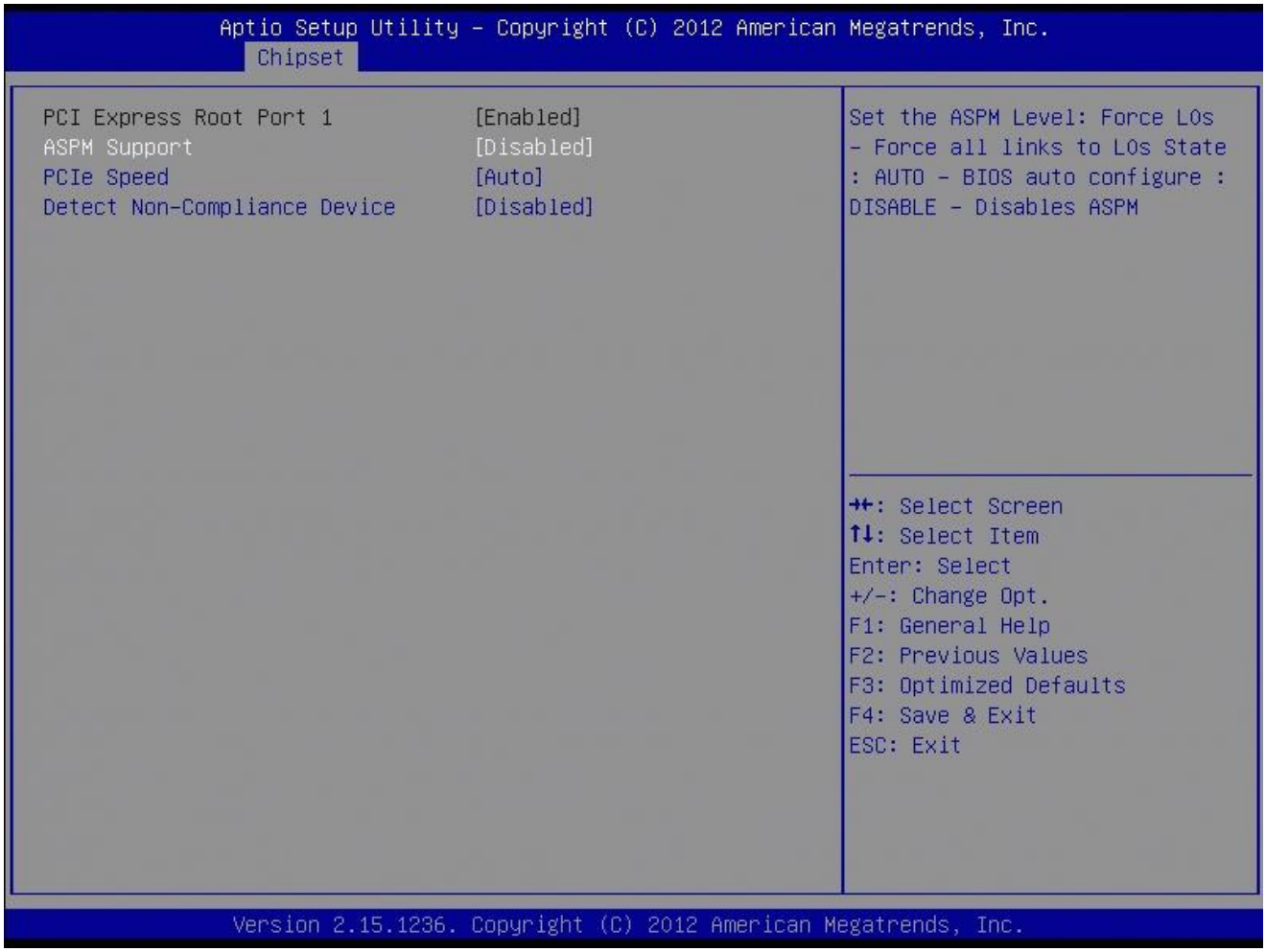
Enable/Disable LAN2 boot option for legacy network devices.
Configuration options: [Disabled] [Enabled]

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

Setting Amplifier GAIN
Configuration options:[15.3db][21.2db][27.2db][31.8db]

3.4.3.1.1 PCI Express Configuration





- **PCI Express Root Port 1 [Enabled]**

Configuration options: [Disabled] [Enabled]

- **ASPM Support [Disabled]**

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

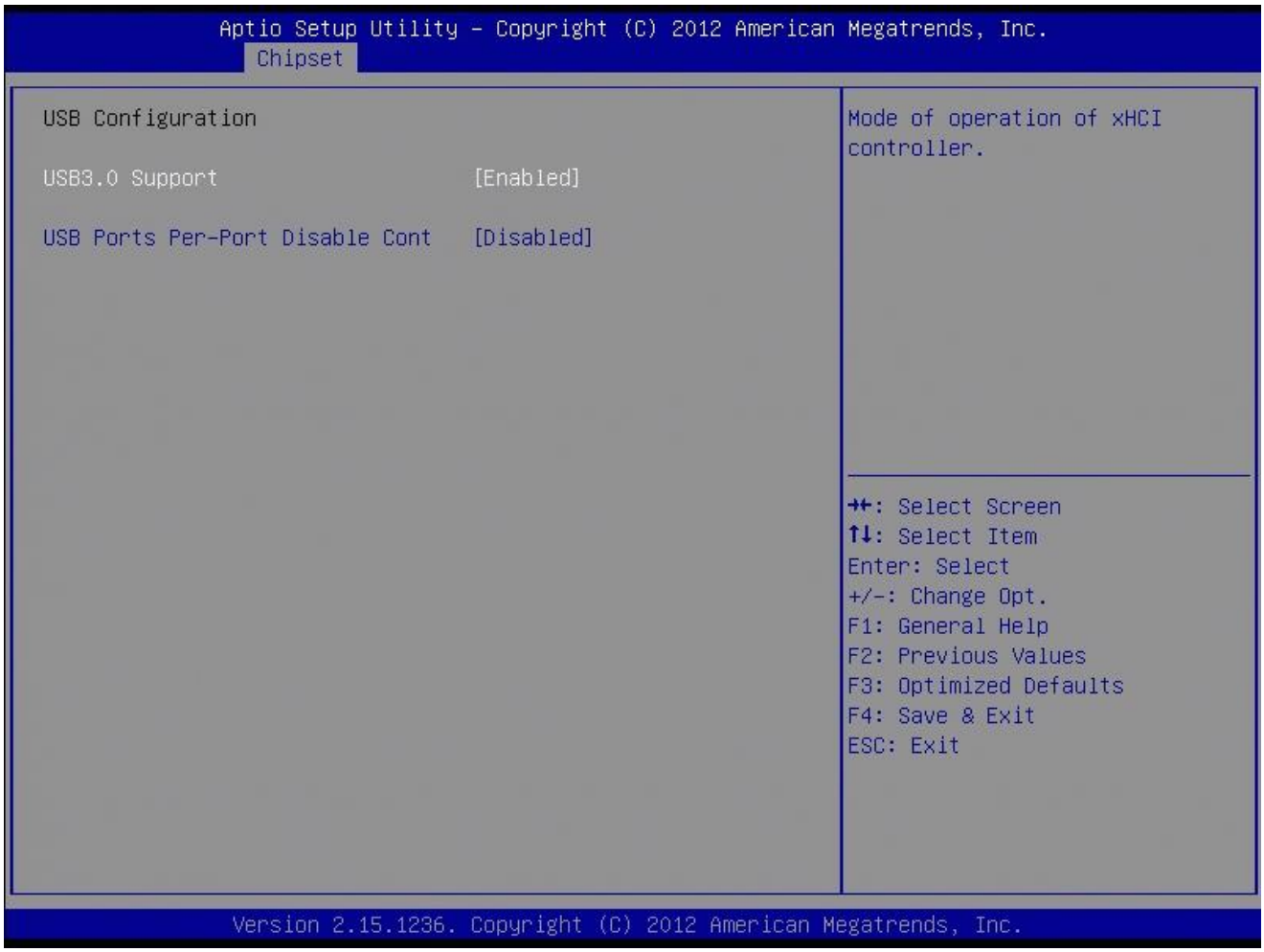
- **PCIe Speed [Auto]**

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

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

Configuration options: [Disabled] [Enabled]

3.4.3.1.2 USB Configuration



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

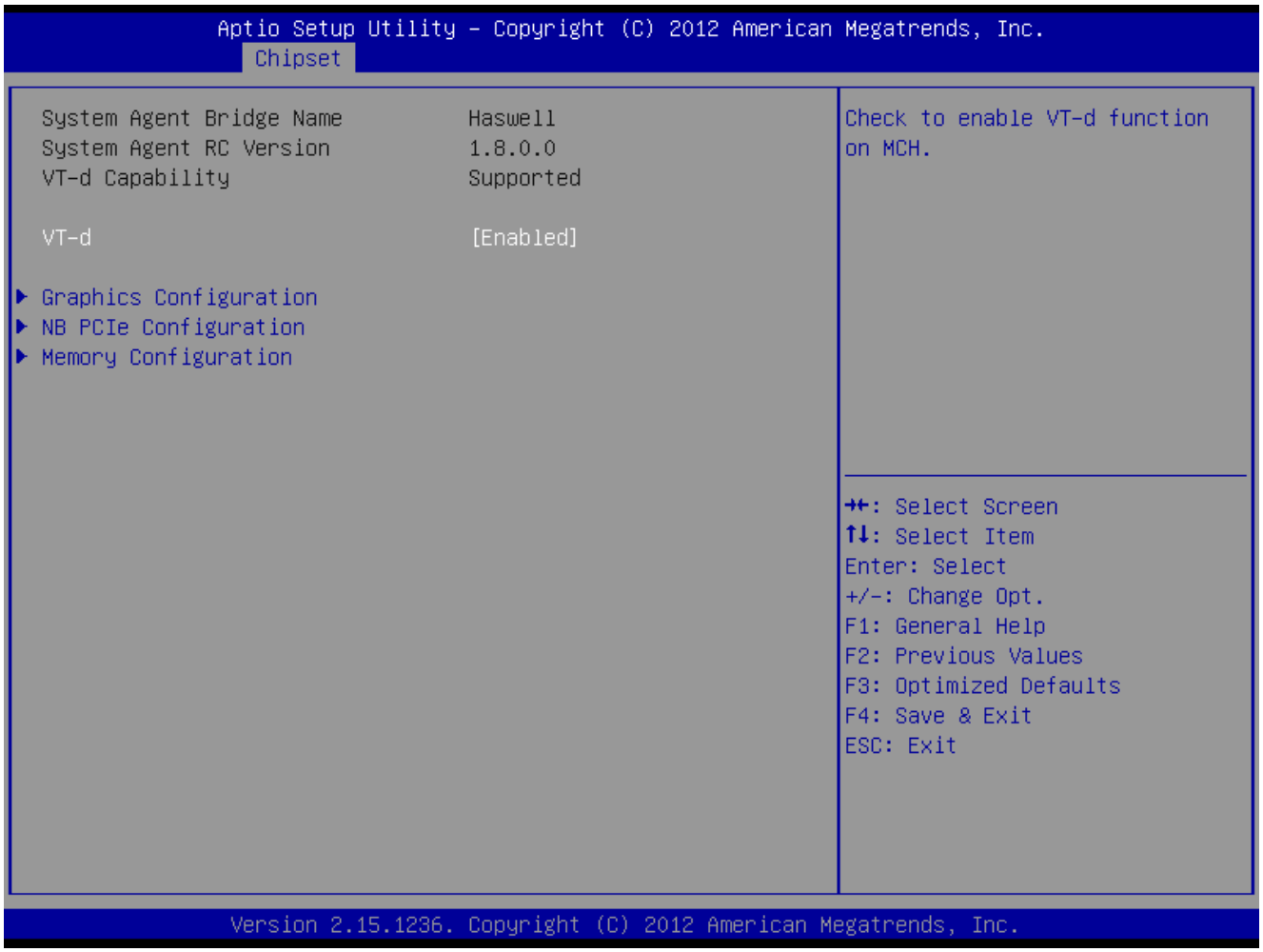
Enable/Disable USB 3.0 support

Configuration options: [Disabled] [Enabled]

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

Configuration options: [Disabled] [Enabled]

3.4.3.2 System Agent (SA) Configuration

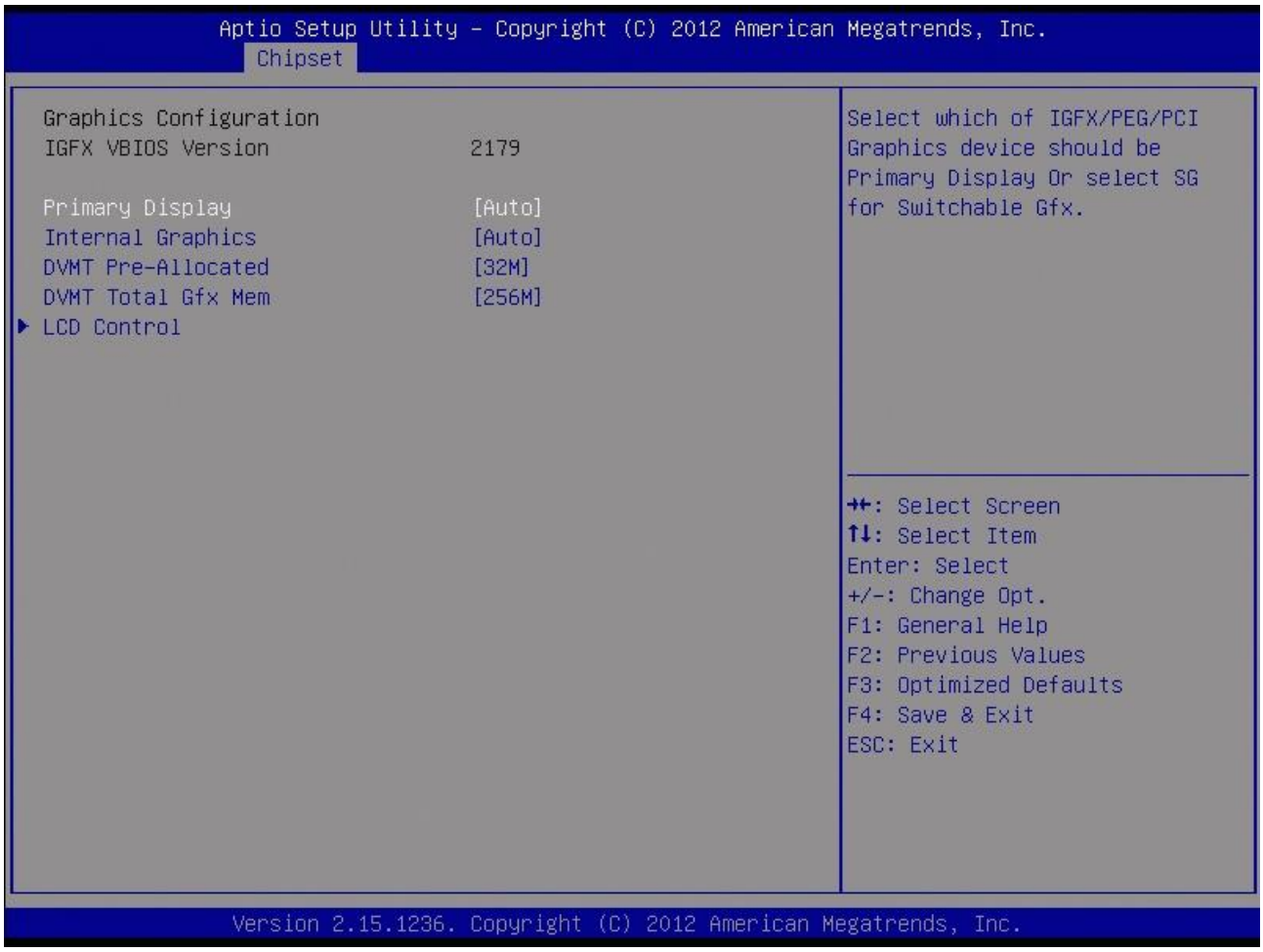


- **VT-d [Enabled]**

Set VT-d Enable or Disable

Configuration options: [Disabled] [Enabled]

3.4.3.2.1 Graphics Configuration



- **Primary Display [AUTO]**

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

Configuration options: [AUTO][IGFX][PEG]

- **Internal Graphics [Auto]**

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

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

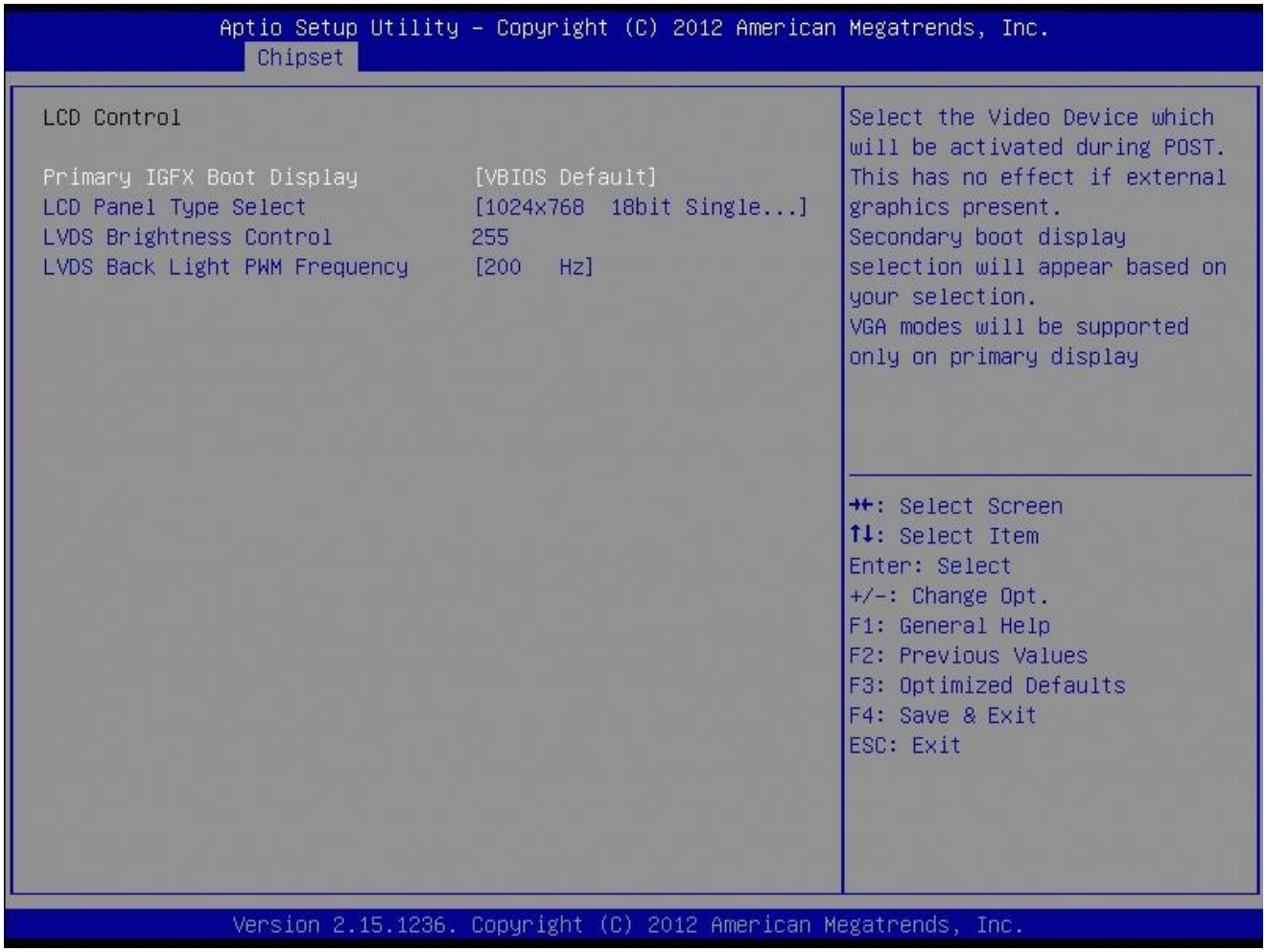
Select DVMT 5.0 Pre-Allocated (Fixed) graphics memory size used by the internal graphics device. Configuration options: [32M]~[512M]

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

Select DVMT 5.0 total graphics memory size used by the internal graphics device.

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

3.4.3.2.1.1 LCD Control



- **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 booty display selection will appear based on your selection. VGA modes will be supported only on primary display.
Configuration options: [VBIOS Default][CRT][DisplayPort][HDMI][LVDS]

- **LCD Panel Type Select**

Select LCD Panel resolution

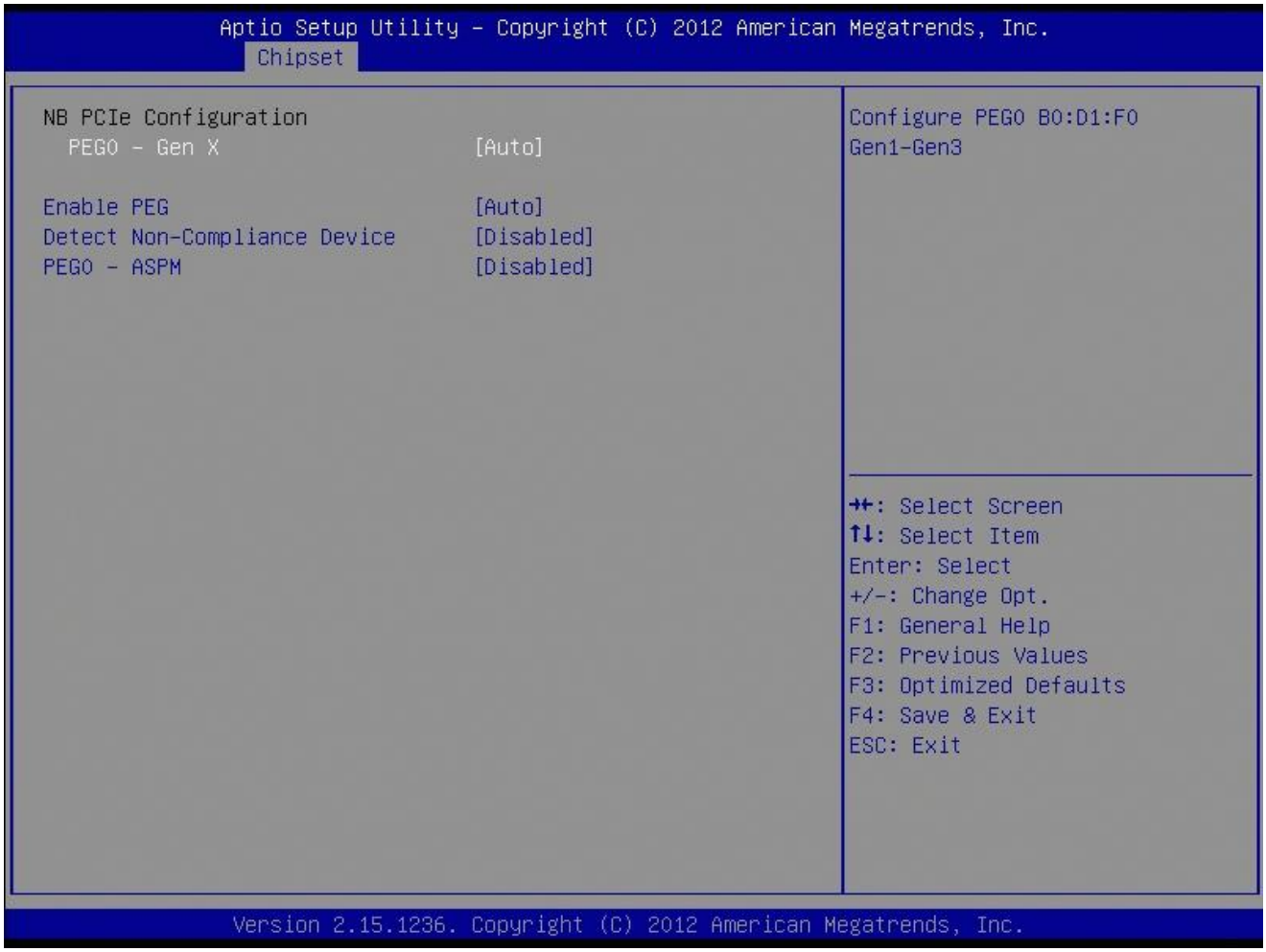
- **LVDS Brightness Control [255]**

Configuration options:[1]~[255]

- **LVDS Back Light PWM Frequency [200 Hz]**

Select LVDS Back Light frequency

3.4.3.2.2 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]

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

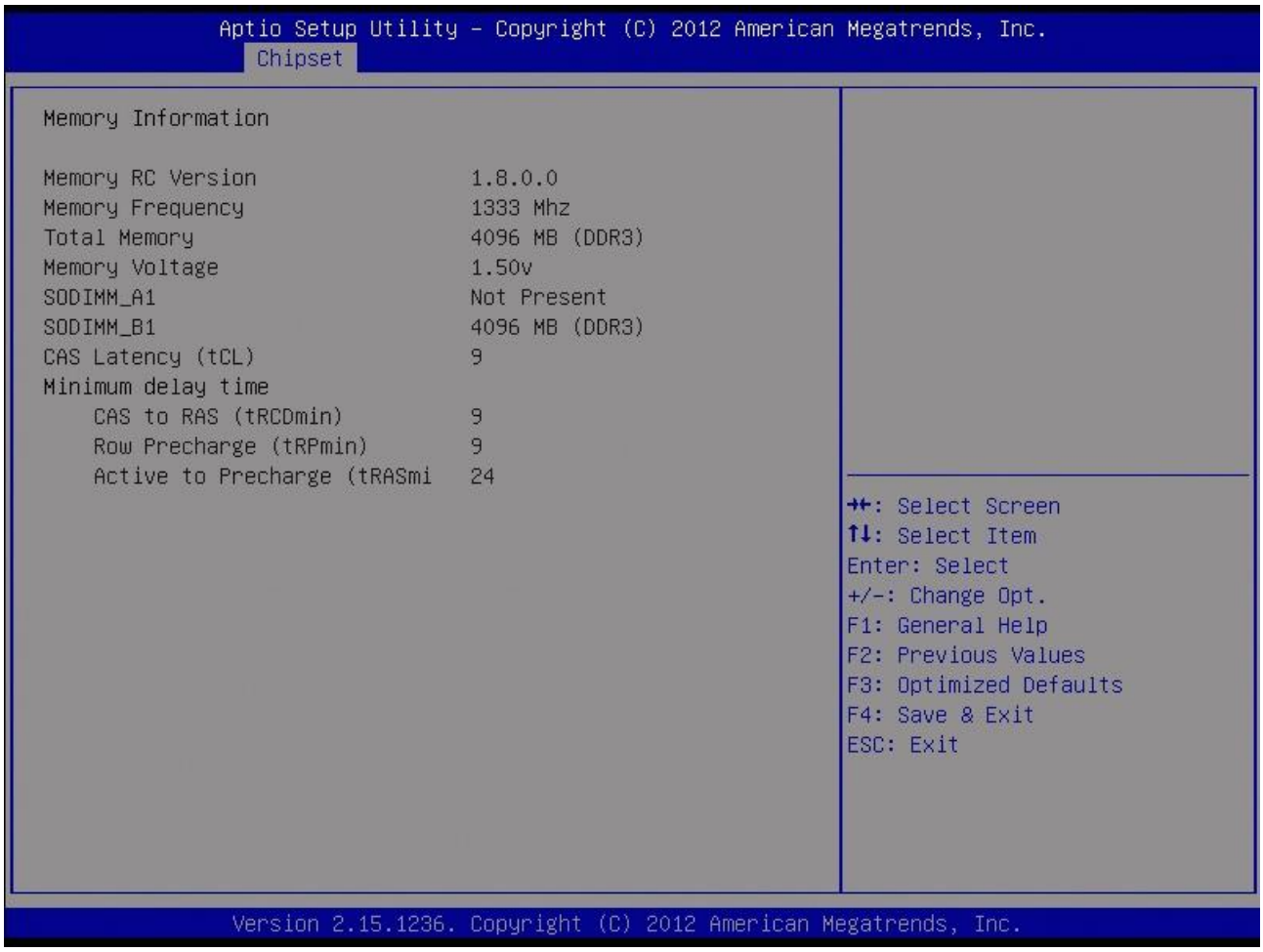
Configuration options:[Enable][Disable]

- **PEG ASPM [Disabled]**

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]

3.4.3.2.3 Memory Information

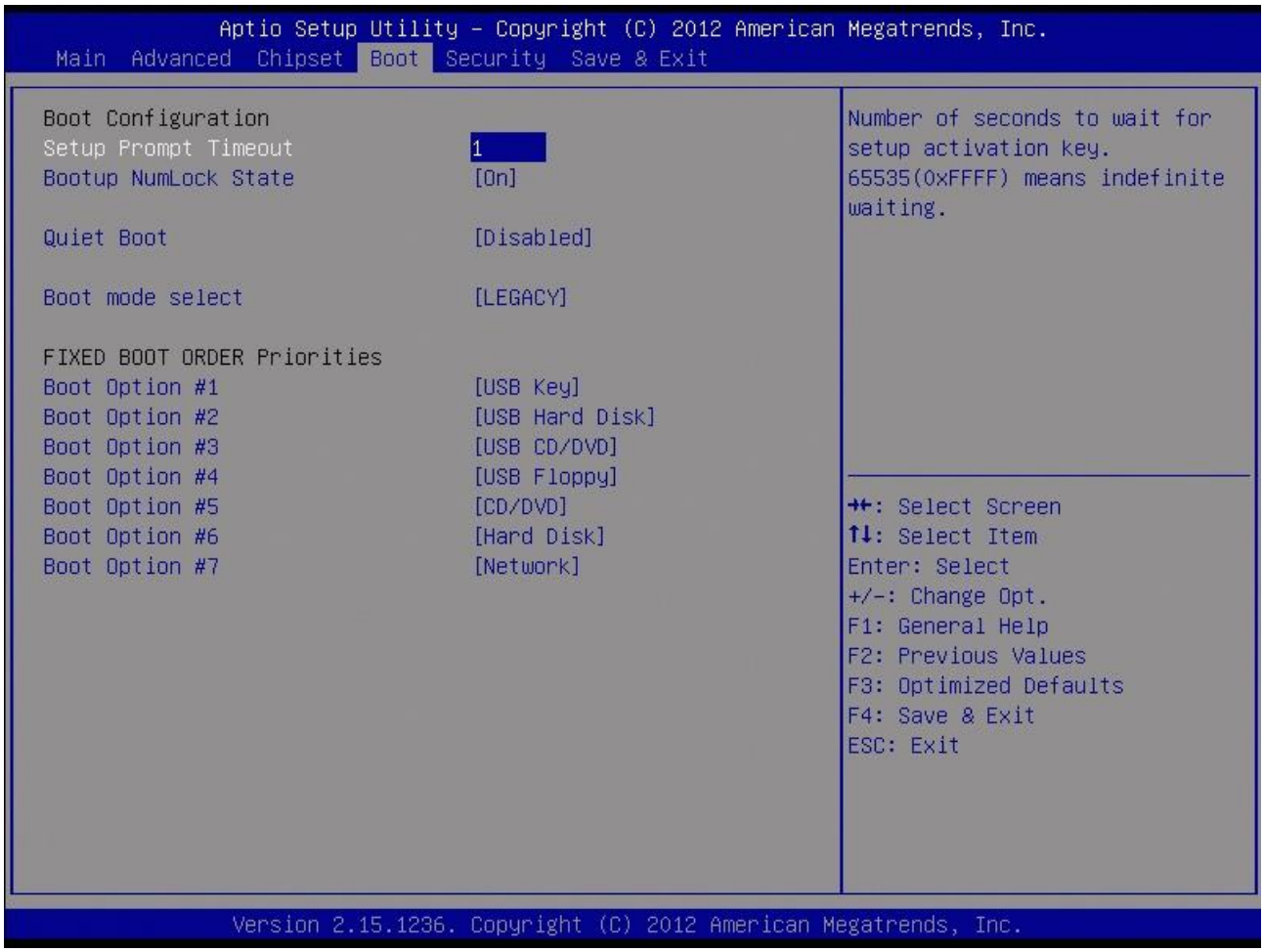


- **Memory Information**

Display Memory Information

3.4.4 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]

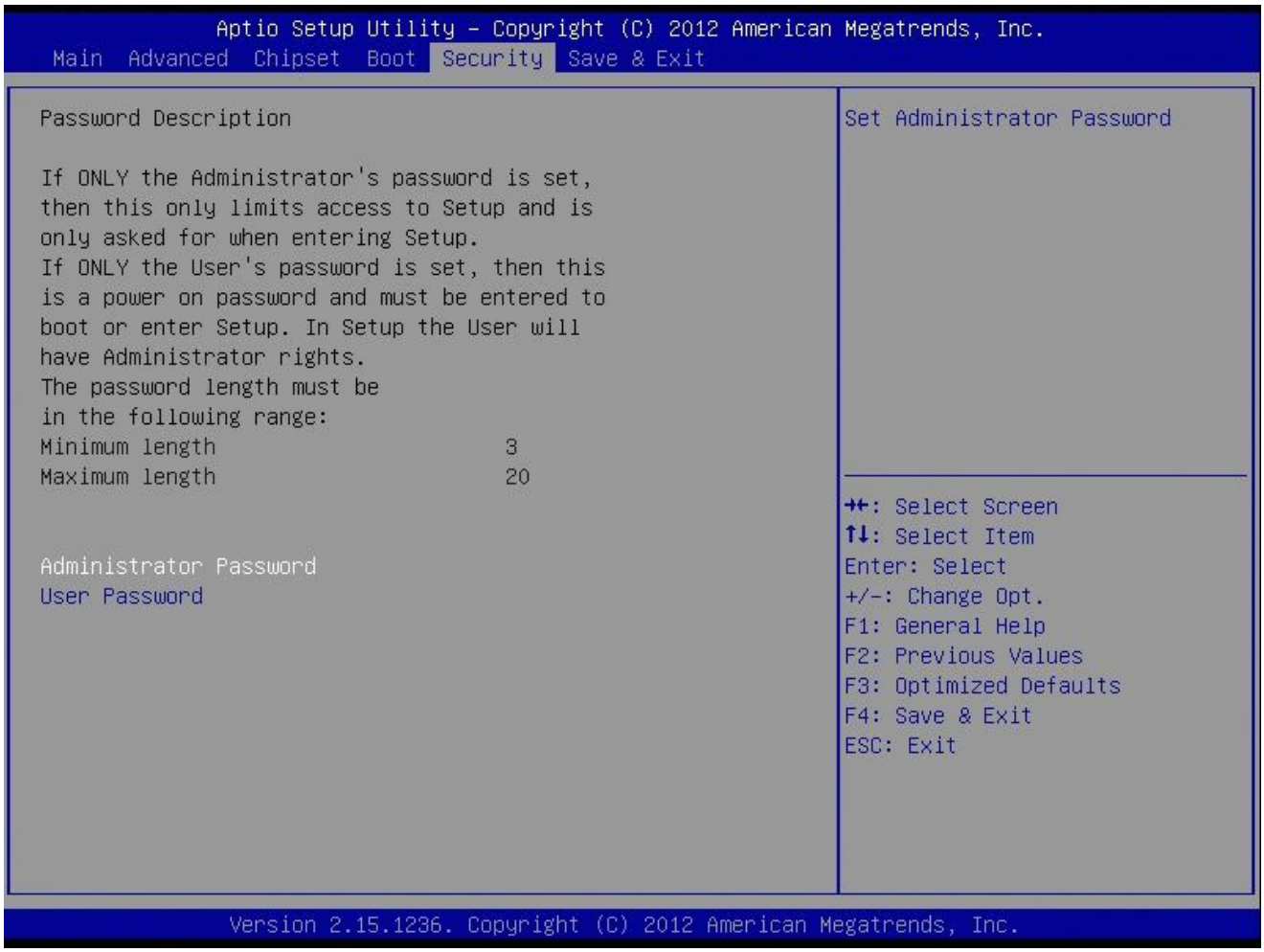
- **Quiet Boot [Disabled]**

Configuration options:[Enable][Disable]

- **Boot mode select [LEGACY]**

Configuration options:[UEFI][LEGACY]

3.4.5 Security



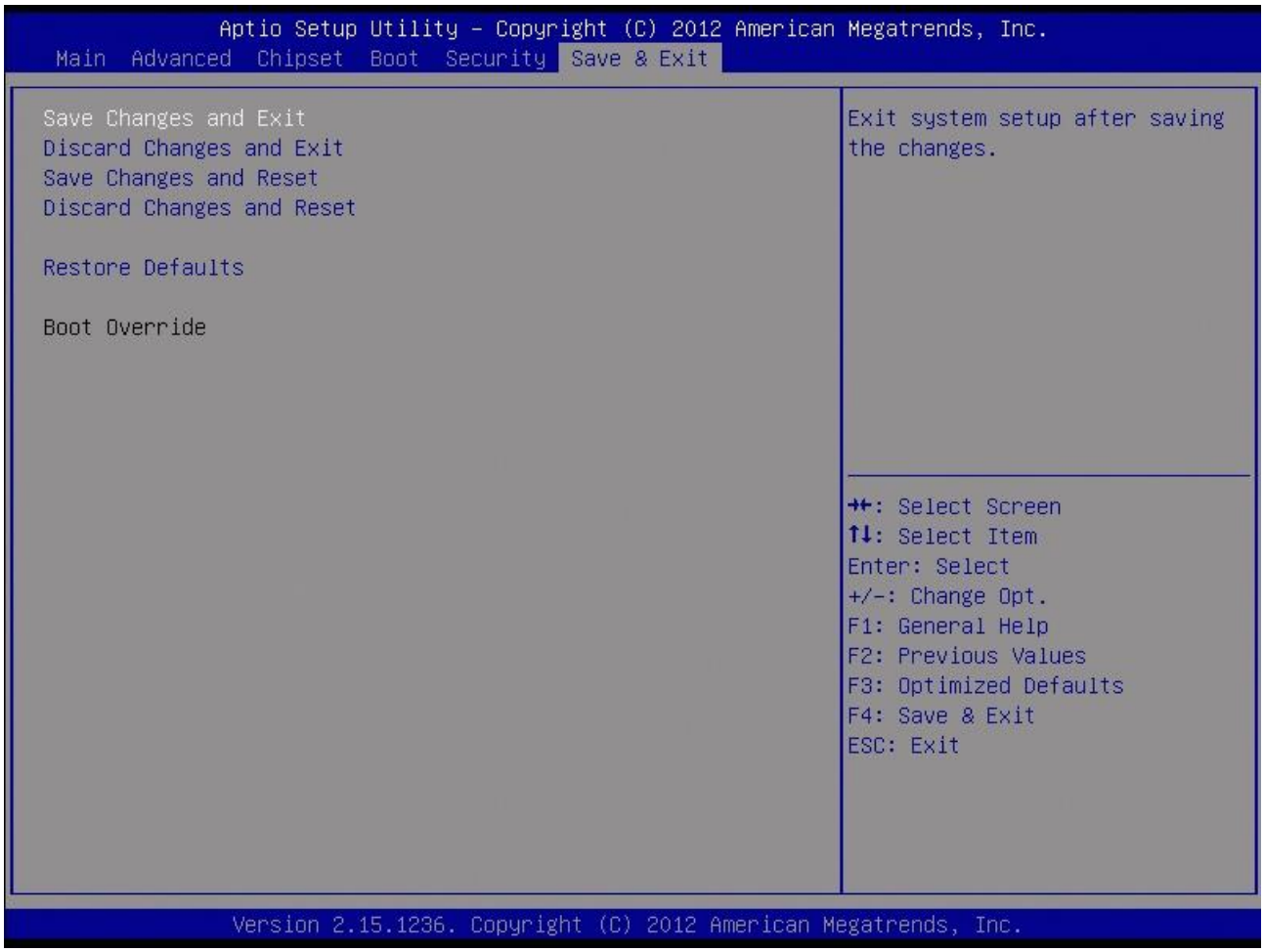
- **Administrator Password**

Set setup Administrator Password

- **User Password**

Set User Password

3.4.6 Save & Exit



- **Save changes and Exit**

Exit system setup after saving the changes.

- **Discard changes and Exit**

Exit system setup without saving the changes.

- **Save changes and Reset**

Reset system after saving the changes.

- **Discard changes and Reset**

Reset system without saving the changes.

- **Restore Defaults**

Restore/Load default values for all the setup option.