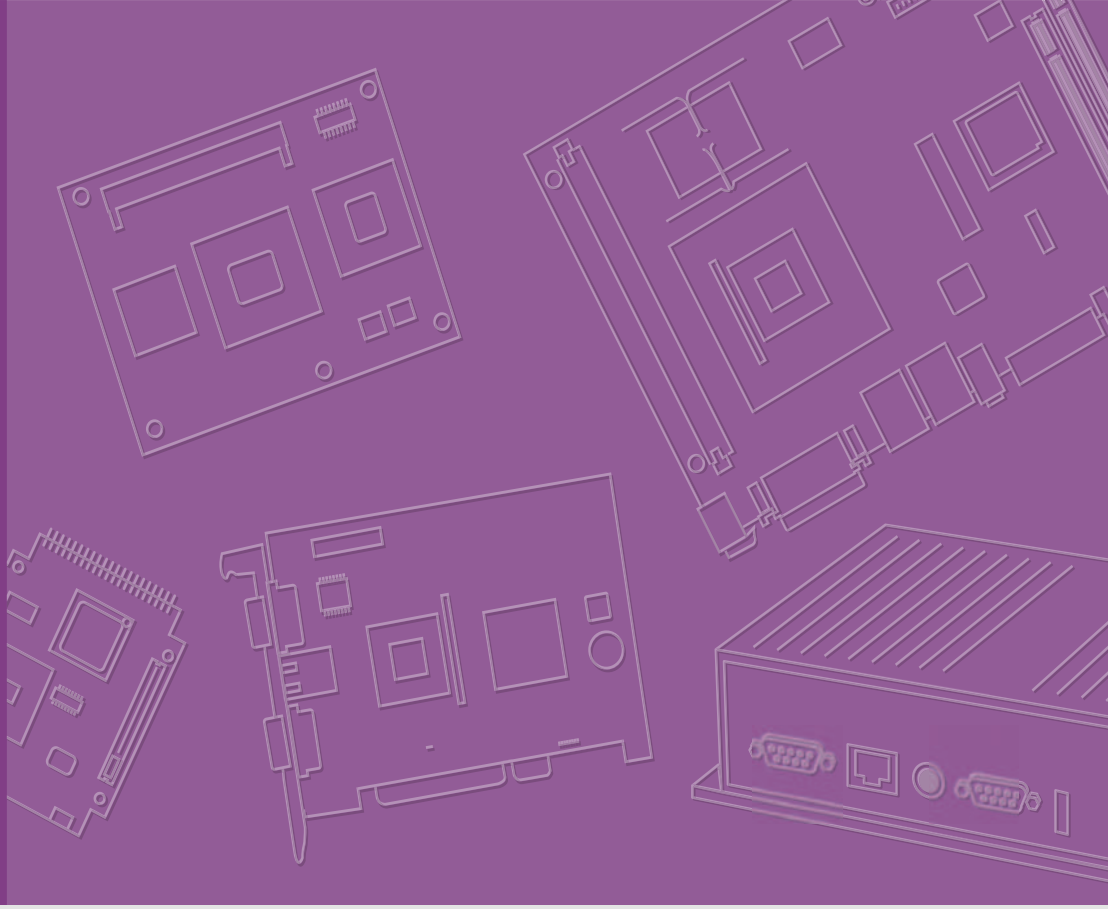

User Manual

MIC-7500

Embedded IPC

Trusted ePlatform Services

ADVANTECH

Attention!

Please note:

This package contains a hard-copy user manual in Chinese for China CCC certification purposes, and there is an English user manual included as a PDF file on the CD. Please disregard the Chinese hard copy user manual if the product is not to be sold and/or installed in China.

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Part No. 2001750010 Edition 1

Printed in China March 2016

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5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

Declaration of Conformity

FCC Class A

Note: 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.

Technical Support and Assistance

1. Visit the Advantech web site at www.advantech.com/support where you can find the latest information about the product.
2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before you call:
   - Product name and serial number
   - Description of your peripheral attachments
   - Description of your software (operating system, version, application software, etc.)
   - A complete description of the problem
   - The exact wording of any error messages

Warnings, Cautions and Notes

Warning! *Warnings indicate conditions in which there is a chance of personal injury!*

Caution! *Cautions are included to help you avoid damaging hardware or losing data. e.g.:*

There is a danger of a new battery exploding if it is incorrectly installed. Do not attempt to recharge, force open, or heat the battery. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

Note! *Notes provide optional additional information.*

Safety Instructions

1. Please read these safety instructions carefully.
2. Please keep this User's Manual for later reference.
3. Please disconnect this equipment from AC outlet before cleaning. Use a damp cloth. Don't use liquid or sprayed detergent for cleaning. Use moist sheet or cloth for cleaning.
4. For pluggable equipment, the socket-outlet shall near the equipment and shall be easily accessible.
5. Please keep this equipment from humidity.
6. Lay this equipment on a reliable surface when installing. A drop or fall could cause injury.
7. The openings on the enclosure are for air convection hence protecting the equipment from overheating. DO NOT COVER THE OPENINGS.
8. Make sure the voltage of the power source when connecting the equipment to the power outlet.
9. Place the power cord such a way that people cannot step on it. Do not place anything over the power cord.
10. All cautions and warnings on the equipment should be noted.
11. If the equipment is not used for long time, disconnect the equipment from mains to avoid being damaged by transient over-voltage.
12. Never pour any liquid into ventilation openings; this could cause fire or electrical shock.
13. Never open the equipment. For safety reasons, only qualified service personnel should open the equipment.
14. If one of the following situations arises, get the equipment checked by service personnel:
    - The power cord or plug is damaged.
    - Liquid has penetrated into the equipment.
    - The equipment has been exposed to moisture.
    - The equipment does not work well, or you cannot get it to work according to the user's manual.
    - The equipment has been dropped and damaged.
    - The equipment has obvious signs of breakage.
15. DO NOT LEAVE THIS EQUIPMENT IN AN ENVIRONMENT WHERE THE STORAGE TEMPERATURE MAY GO BELOW -40° C (-40° F) OR ABOVE 85° C (185° F). THIS COULD DAMAGE THE EQUIPMENT. THE EQUIPMENT SHOULD BE IN A CONTROLLED ENVIRONMENT.
16. CAUTION: DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH THE SAME OR EQUIVALENT TYPE RECOMMENDED BY THE MANUFACTURER, DISCARD USED BATTERIES ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.
17. The sound pressure level at the operator's position according to IEC 704-1:1982 is no more than 70 dB (A).
18. RESTRICTED ACCESS AREA: The equipment should only be installed in a Restricted Access Area.

DISCLAIMER: This set of instructions is given according to IEC 704-1. Advantech disclaims all responsibility for the accuracy of any statements contained herein.

Packing List

Before installation, please ensure the following items have been shipped:

- MIC-7500 bare-bone system x1
- 4G DDR4 memory x1 P/N: AQD-SD4U4GN21-SG
- MIC-7500 Startup manual x1 P/N: 2001750000
- MIC-7500 Driver CD x1 P/N: 2061750000
- 4-pin Phoenix connector P/N: 1652003234
- Mounting bracket x2 P/N: 1960070543N001
- SATA cable x1 P/N: 1700020036
- SATA Power cable x1 P/N:1700024372-01
- 2xDP9 Ports cable x1 P/N: 1701200220

Ordering Information

Module Number	CPU	VGA	DVI	2.5' HDD	CFast	USB3.0	GbE	COM	PCIE/PCI Exp	Power
MIC-7500-U0A1E	i7-6822EQ	1	1	1	1	8	2	4	i-module (Optional)	DC9~36V
MIC-7500-S9A1E	i5-6442EQ	1	1	1	1	8	2	4	i-module (Optional)	DC9~36V

Optional i-Module

Module Number	Description
4-slot Expansion module	
MIC-75M13-00A1E	1 x PCIEx16+3xPCI slot i-module
MIC-75M40-00A1E	1 x PCIEx8+3xPCIEx4 slot i-module
2-slot Expansion module	
MIC-75M20-00A1E	1 x PCIEx16+1xPCIEx4 slot i-module
MIC-75M11-00A1E	1 x PCIEx16+1xPCI slot i-module
2-slot Expansion and Storage Module	
MIC-75S20-00A1E	2 x PCIE slot + 2x2.5” hot-swap HDDs

Optional Accessories

Part Number	Description
96PSA-A220W24P4-1	ADP A/D 100-240V 220W 24V
96PSA-A150W19P4-1	ADP A/D 100-240V 150W 19V
96PSA-A120W24T2	ADP A/D 100-240V 120W 24V
96PSA-A120W19T2	ADP A/P 100-240V 120W 19V
1702002600	Power Cord 3P UL/CSA(USA) 125V 10A 1.83M 180D
1700022940-01	Power cord PSE 7A 125V 3P 3m DAC-ST01
1702002605	Power cord 2P FRANCE 10A/16A 220V 1.83M 90D
AIIS-DIO32-00A1E	AIIS-32bit GPIO module
98R2C48510E	Isolation COM module
i-Door Module (MOS series module)	Supports i-Door module (MOS series), except PoE Please refer to Advantech website below or search "iDoor Module Mini PCIe Expansion Kit". http://www.advantech.com.tw/products/idoor-module-mini-pcie-expansion-kit/sub_bc858a7f-a52b-441b-a59c-f511289f98bc
i-Door Module (PCM series module)	Supports i-Door module (PCM series) except PoE Please refer to Advantech website below: http://www.advantech.com/products/idoor-technology-mini-pcieex-pansion-kit/sub_efdb96af-a8f7-4cde-9592-dbf5c9794d16 Note: A bracket is required to fix PCM series i-door module. Pleaser refer to P/N: 1960065854N001 i Door_bracket

i-module Optional Accessories

Part Number	Description
98R1751300E	1x8cm FAN module (for MIC-75M13/75M40/75S20)
98R1752000E	2x4cm FAN module (for MIC-75M20/MIC-75M11)

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Chapter 1

General Introduction

This chapter gives background information on MIC-7500.

1.1 Introduction

MIC-7500 is a compact, fanless system incorporating late-generation Intel® 14nm platform with the new PCH_QM170 processer on a proprietary form factor M/B. MIC-7500 system design concept is that of “the expansion slot module”, so different applications can integrate the MIC-7500 system to form a complete industrial computer.

The MIC-7500 also can serve as an independent, fanless, Compact Embedded Box and accepts a wide range of DC power inputs. The rugged aluminum case not only provides a great thermal solution, but also resists high EMI/shock/vibration. MIC-7500 is equipped with Intel® 6th Generation Core™ i CPU featuring 8 cores, making it highly suitable for embedded and industrial PC applications requiring high processor performance within a limited space. It features powerful I/O interfaces, including Ethernet, USB 3.0, serial port, C-Fast slot, and two Mini PCIes.

1.2 Product Features

1.2.1 General

- **CPU:** Intel® 6th gen Core™ i Processor
- **PCH:** Intel® QM170
- **System Memory:** Dual 260pin SODIMM DDR4 socket, up to 32GB
- **HDD:**
  - Supports 1 drive bay space for SATA 2.5" HDD/SSD
  - Supports 1 CFast slot
- **mSATA:** Supports 1 x mSATA by Mini PCIe slot
- **Graphic:** VGA + DVI
- **Ethernet Port:** 2 x RJ45
- **Watchdog Timer:** Single chip Watchdog 255-level interval timer, setup by software
- **I/O Interface:** 2 x RS232/422/485 / 2x RS-232
- **USB:** 8 x USB3.0
- **Audio:** High Definition Audio (HD), Line-out, Mic-in
- **Expansion interface:** 2 x Mini PCIe sockets (1 x U-SIM, 1 x m-SATA)

1.2.2 Display

- **Chipset:** Intel® HD Graphics 530, support DirectX 12
- **Graphics Video Max Memory:** 1.7 GB
- **Resolution:**
  - VGA: Supports up to 2048 x 1152 @ 60 Hz
  - DVI: Supports up to 1920 x 1080 @ 60 Hz

1.2.3 Ethernet

- **Chipset:**
  - LAN 1: Intel® i219LM
  - LAN 2: Intel® i210IT
- **Speed:** 10/100/1000 Mbps
- **Interface:** 2 x RJ45
- **Standarsd:** Compliant with IEEE 802.3, IEEE802.3U, IEEE 802.ab.

1.3 Chipset

1.3.1 Functional specification

1.3.1.1 Processor

Processor	Intel® Core™ i Processor i7/i5/i3/Celeron® CPU Manufacturing Technology: 14nm

1.3.1.2 Chipset

PCH	■ Mobile Intel® QM170 Chipset (Intel® GL82QM170 PCH) ■ Manufacturing Technology: 14nm
Memory	■ Intel® Core™ i Processor ■ Support DDR4-2133MHz up to 32 GB ■ SODIMM Socket: – 260-pin SODIMM socket*2
Chipset integrated Intel HD Graphic	■ Intel® HD Graphics 530 ■ Supports DirectX 12 ■ Supports OpenGL 4.4 ■ Supports Intel® Quick Sync Video ■ IO interface – VGA: Support resolution up to 2048 x 1152 @ 60 Hz (VGA connector: On-board D-SUB 15P) – DVI: Support resolution up to 1920 x 1080 @ 60 Hz (DVI Connector: On-board DVI-D 24P)
SATA Interface	**PCH: Intel QM170** ■ One (1) SATA Revision 3.0 ports ■ Legacy IED (Including IRQ)/Native AHCI appearance to OS ■ Partial/Slumber power management modes with wake ■ Capable of 6Gbit/s transfer rate
Audio Link	**PCH: Intel® QM170** ■ Intel® HD Graphics 530, support DirectX12
USB Interface	**PCH: Intel® QM170** ■ USD host interface for 8 x USB3.0 port ■ Supports high-speed, full-speed, and low-speed capable ■ Supports legacy keyboard/mouse software
Power Management	**PCH: Intel® QM170** ■ Supports ACPI 5.0 ■ ACPI Power Management Logic Supported ■ Power Connector: Plug-in block 4Px1
BIOS	■ AMI 16Mb Flash BIOS via SPI

1.3.1.3 Others

Serial ports	**Nuvoton NCT 6106D supported** ■ Up to 6 serial ports by Nuvoton NCT6106D supported ■ High speed NS16C550A compatible UARTs with date rates to 1.5 Mbps ■ Supports IRQ sharing among serial port on XPE ■ COM1/2: Support to RS-232/422/485 and setting mode by BIOS and supports auto flow control ■ COM 3~6: Support to RS-232 Serial ports connector: D-SUB CON.9P
LAN	**LAN1: Intel® i219LM; LAN2: Intel® i210IT** ■ Compliant with IEEE 802.3, IEEE 802.3u, IEEE 802.ab. ■ Supports 10/100/1000 Mbps ■ Supports Wake on LAN
Audio	**Audio Codec: Realtek ALC892:** ■ Compliant with HD Audio specifications ■ Supports to 16/20/24-bit DAC and 16/20/24-bit ADC resolution ■ Support: Line-out, Mic-in ■ DAC supports 16/20/24-bit PCM format, multiple stereo recording
Battery backup	■ BR2032 3 V/190mAh

1.4 Mechanical Specifications

1.4.1 Dimensions

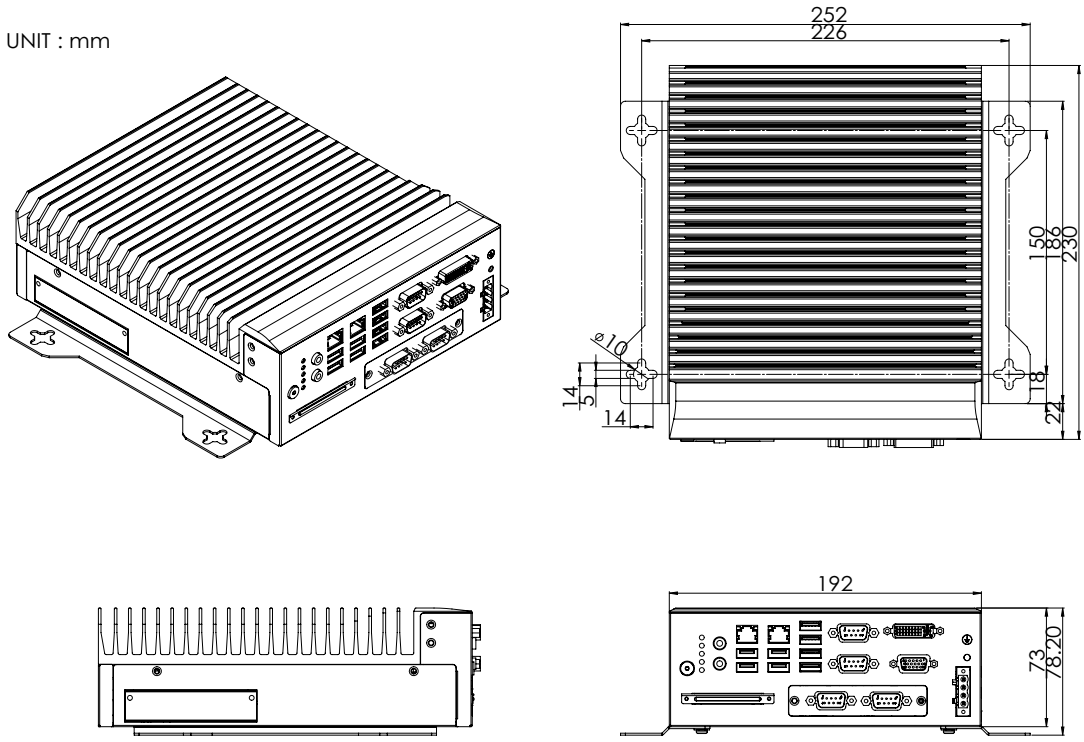


Figure 1.1 MIC-7500 Mechanical Dimension Drawing

1.4.2 Weight

2.9kg (6.39lbs)

1.5 Power Requirements

1.5.1 System power

- Minimum power input: DC12V (-25%) -30V (+20%), Absolute Maximum Ratings Voltage is 9V - 36V

1.5.2 RTC battery

- BR2032 3 V/190 mAh

1.6 Environment Specification

1.6.1 Operating temperature

- -20 ~ 60 °C with 0.7m/sec air flow: with 1 x Industrial SSD without PC expansion boards

1.6.2 System safety certification test temperature

- 0 ~ 50 °C with 2.5” HDD

1.6.3 Relative humidity

- 95% @ 40 °C (non-condensing)

1.6.4 Storage temperature

- -40 ~ 85 °C (-40 ~ 185 °F)

1.6.5 Vibration during operation

- When system is equipped with SSD only: 3 Grms, IEC 60068-2-64, random, 5 ~ 500 Hz, 1 Oct/min., 1 hr/axis, x,y,z 3 axes.
- When system is equipped with 2.5-inch HDD: 1 Grms, IEC 60068-2-64, random, 5 ~ 500 Hz, 1 Oct/min., 1 hr/axis, x,y,z 3 axes.

1.6.6 Shock during operation

- When system is equipped with SSD only: 20 G, IEC 60068-2-27, half sine, 11 ms duration.

1.6.7 Safety

- CCC, BSMI

1.6.8 EMC

- CE, FCC, CCC, BSMI

Chapter 2

H/W Installation

This chapter introduces external IO and the installation of MIC-7500 hardware.

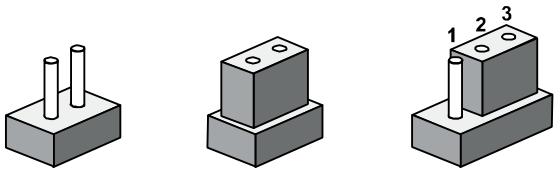
2.1 Introduction

The following sections show the internal jumper settings and the external connectors and pins assignment for applications.

2.2 Jumpers

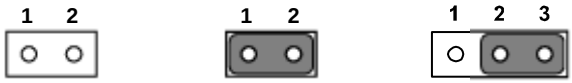
2.2.1 Jumper description

You may configure the MIC-7500 to match the needs of your application by setting jumpers. A jumper is a metal bridge used to close an electric circuit. 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 pins 1 and 2, or 2 and 3.



open **closed** **closed 2-3**

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



open **closed** **closed 2-3**

A pair of needle-nose pliers may be helpful when working with jumpers. 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. Generally, you simply need a standard cable to make most connections.

2.2.2 Jumper list

Table 2.1: Jumper List	
Label	**Function**
JCMOS1	Clear CMOS
PSON1	System AT/ATX mode option
JME1	ME jumper mode option
JWDT1_JOBS1	Watch-Dog mode option

2.2.2.1 Clear CMOS

MIC-7500 single board computer contains a jumper that can erase CMOS data and reset the system BIOS information. Normally this jumper should be set with pins 1-2 closed. If you want to reset the CMOS data, set CMOS1 to 2-3 closed for just a few seconds, and then move the jumper back to 1-2 closed. This procedure will reset the CMOS to its default setting.

CMOS1	**Clear CMOS**
Footprint	3x1 Pin
Setting	**Function**
(1-2)	Normal (default)
(2-3)	Clear CMOS

2.2.2.2 System AT/ATX mode function option

MIC-7500 support AT or ATX mode and Default is ATX module. if you want to change to AT mode that you can find AT/ATX mode jumper in motherboard.

PSON1	**System AT/ATX mode option**
FootPrint	**3x1 Pin**
Setting	**Function**
(1-2)	AT module
(2-3)	ATX module

2.2.2.3 System ME mode function option

MIC-7500 supports ME Enable & Disable and Default is “Disable”. If you want to change the ME mode that you can set ME mode jumper in Mother-board.

JME1	**System ME mode option**
FootPrint	**3x1 Pin**
Setting	**Function**
(1-2)	ME Enable
(2-3)	ME Disable (Default)

2.2.2.4 System Watch-Dog mode function option

MIC-7500 single board computer contains a jumper that can set Watch-Dog mode.

JWDT1_JOBS1	**Watch-Dog mode function option**
FootPrint	**5x1 pin**
Setting	**Function**
(2-3)	Watch Dog
(4-5)	ERR_BEEP

2.3 Connectors

2.3.1 MIC-7500 External I/O Connectors

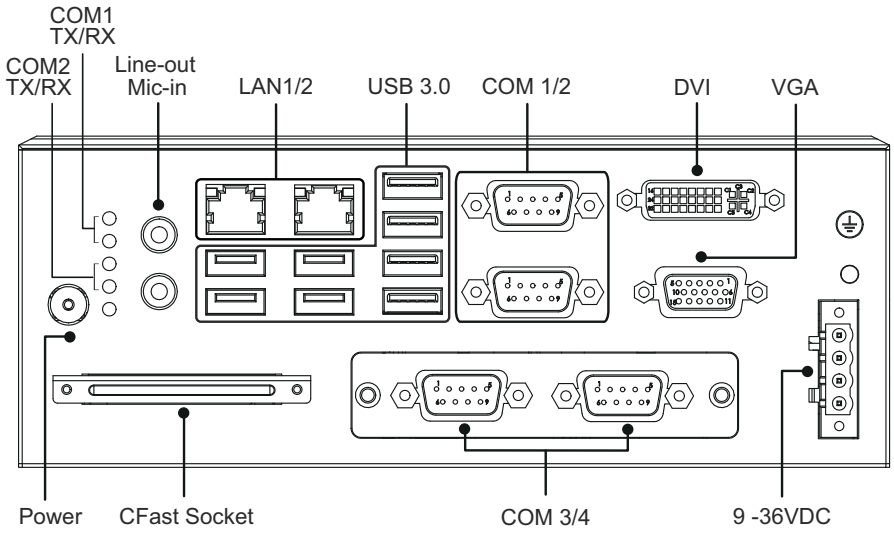


Figure 2.1 MIC-7500 Front View

2.3.1.1 COM connector

MIC-7500 provides four 9-pin D-sub connectors, two of which offer RS-232/422/485 and the other two offer RS-232 serial communication interface ports. Default setting is RS-232, but this can be modified by BIOS setting. You can find detailed setting methods in Chapter 3.

Table 2.2: COM Connector Pin Assignments

	RS-232	RS-422	RS-485
Pin	**Signal Name**	**Signal Name**	**Signal Name**
1	DCD	Tx-	DATA-
2	RxD	Tx+	DATA+
3	TxD	Rx+	NC
4	DTR	Rx-	NC
5	GND	GND	GND
6	DSR	NC	NC
7	RTS	NC	NC
8	CTS	NC	NC
9	RI	NC	NC

Note! *NC represents "No Connection".*

2.3.1.2 Ethernet connector (LAN)

MIC-7500 is equipped with two Ethernet controllers that are fully compliant with IEEE 802.3u 10/100/1000 Mbps CSMA/CD standards. LAN1 is equipped with Intel i219LM and LAN2 is equipped with Intel i210IT. The Ethernet port provides a standard RJ45 jack connector with LED indicators on the front side to show its Active/Link status and Speed status.

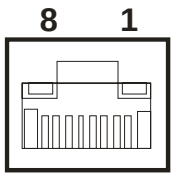


Figure 2.2 Ethernet Connector

Table 2.3: Ethernet Connector Pin Assignments

Pin	10/100/1000BaseT Signal Name
1	TX+
2	TX-
3	RX+
4	MDI2+
5	MDI2-
6	RX-
7	MDI3+
8	MDI3-

2.3.1.3 Audio connector

MIC-7500 has two stereo audio ports with phone jack connectors, one Line_Out, one Mic_In. The audio chip is controlled by ACL892, and it's compliant with AZALIA standard.

Figure 2.3 Audio Connector

Table 2.4: Audio Connector Pin Assignments

Pin	Audio Signal Name
1	Line_Out
2	Mic_In

2.3.1.4 USB 3.0 connector

MIC-7500 provides 8 USB 3.0 interface connectors, which give complete Plug & Play and hot swapping for up to 127 external devices. The USB interface complies with USB XHCI, Rev. 3.0. Please refer to the table below for pin assignments.

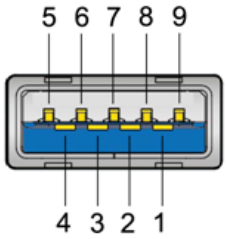


Figure 2.4 USB 3.0 Connector

Table 2.5: USB 3.0 Connector Pin Assignment	
Pin 1	+5V
Pin 2	USB Data -
Pin 3	USB Data +
Pin 4	GND
Pin 5	SSRX-
Pin 6	SSRX+
Pin 7	GND
Pin 8	SSTX-
Pin 9	SSTX+

2.3.1.5 VGA Connector

The MIC-7500 provides a high resolution VGA interface with a 15-pin D-sub connector to support a VGA CRT monitor. It supports display resolution of up to 2048 x 1152 @ 60 Hz.

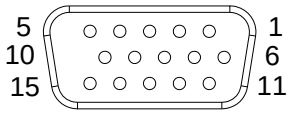


Figure 2.5 VGA Connector

Table 2.6: VGA Connector Pin Assignments			
Pin	**Signal Name**	**Pin**	**Signal Name**
1	Red	2	Green
3	Blue	4	NC
5	GND	6	GND
7	GND	8	GND
9	+5V	10	GND
11	NC	12	DDC_DAT
13	H-SYNC	14	V-SYNC
15	DDC_CLK		

2.3.1.6 DVI Connector

MIC-7500 provides a high resolution DVI-D, powered by Intel® QM170 accelerator. It integrates both analog and digital video signal. It supports display resolution of up to 1920 x 1080 @ 60 Hz.

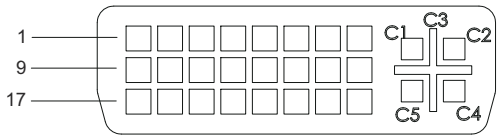


Figure 2.6 Parallel Port Connector

Table 2.7: DVI-D Port Connector Pin Assignments

Pin	Signal Name	Pin	Signal Name
1	TMDS Data 2-	2	TMDS Data 2+
3	GND	4	N/C
5	N/C	6	DDC Clock
7	DDC data	8	N/C
9	TMDS Data 1-	10	TMDS Data 1+
11	GND	12	N/C
13	N/C	14	+5V
15	GND	16	Hot plug detect
17	TMDS Data 0-	18	TMDS Data 0+
19	GND	20	N/C
21	N/C	22	GND
23	TMDS Clock +	24	TMDS Clock -
C1	N/C	C2	N/C
C3	N/C	C4	N/C
C5	N/C		

2.3.1.7 Power Input Connector

MIC-7500 comes with a four-pin header as default that carries 9VDC - 36VDC external power input.

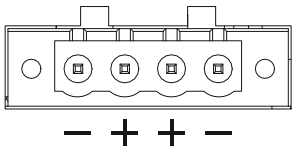


Figure 2.7 4-pin header

Table 2.8: Pin Assignments for Power Connector Pin Header

Pin	Signal Name
1	GND
2	+9 V_{DC} ~ 36 V_{DC}
	+9 V_{DC} ~ 36 V_{DC}
	GND

2.3.1.8 Power ON/OFF button

MIC-7500 comes with a Power On/Off button with LED indicators on the front side to show its On status (Green LED) and Off/Suspend status (RED LED), that supports dual function of Soft Power-On/Off (instant off or delay 4 seconds), and suspend.

Figure 2.8 Power Button

2.3.1.9 LED Indicators

MIC-7500 provides COM1 & COM2 TX/RX LED for date transmission status monitoring.

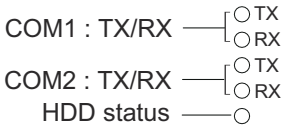
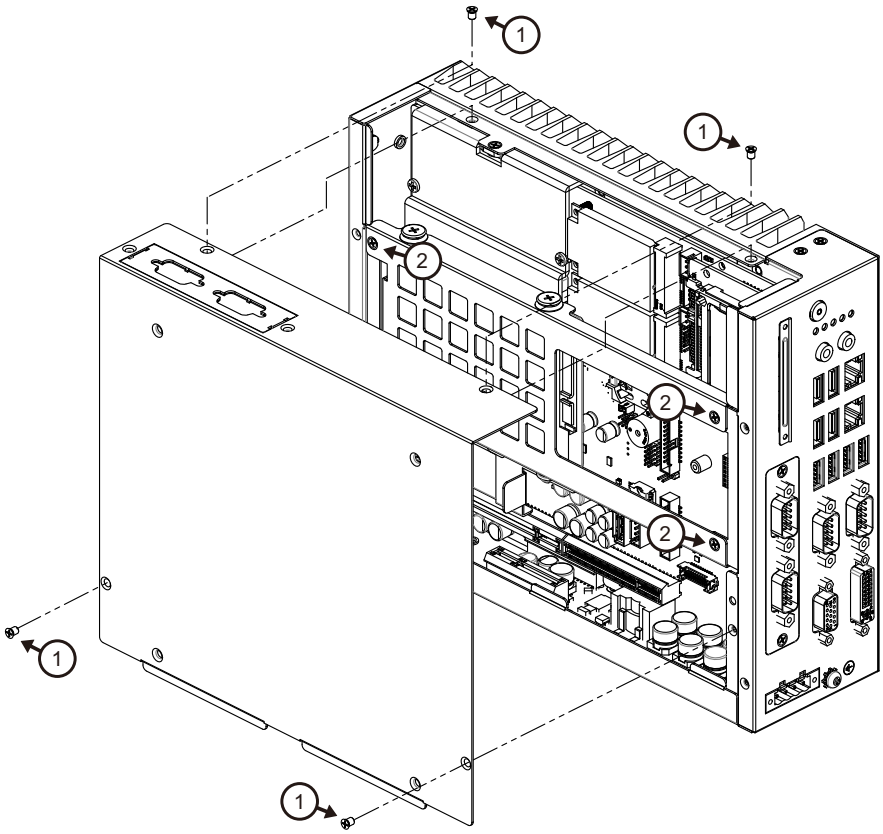


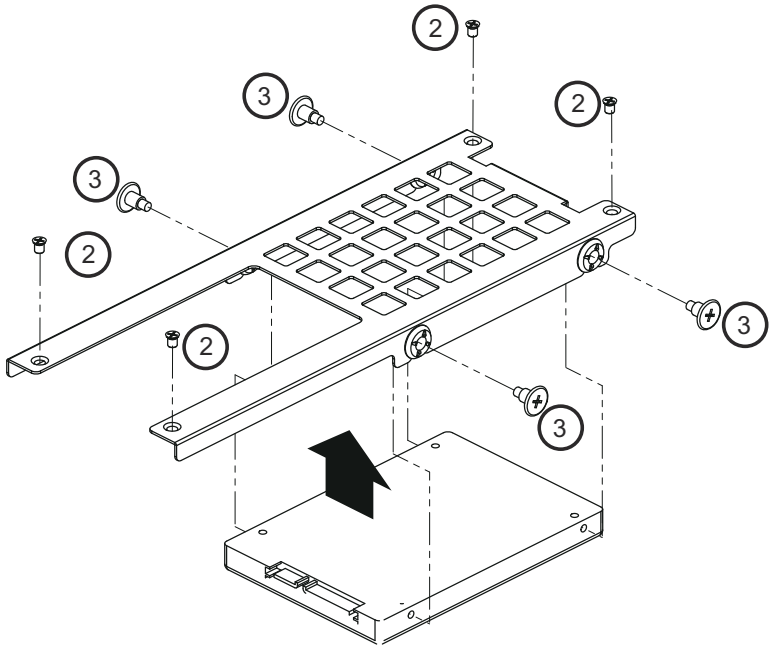
Figure 2.9 LED Indicators

2.4 Installation

2.4.1 HDD installation

1. Undo 4 screws and remove the bottom cover
2. Undo 4 screws to remove HDD tray.





3. Secure the HDD with 4xHDD screws (P/N:1930002235)
4. Assemble SATA cable/power cable and replace HDD tray; secure with 4 screws.
5. Replace bottom cover.

Note! *Please refer to i-module Manual for i-module assembly.*

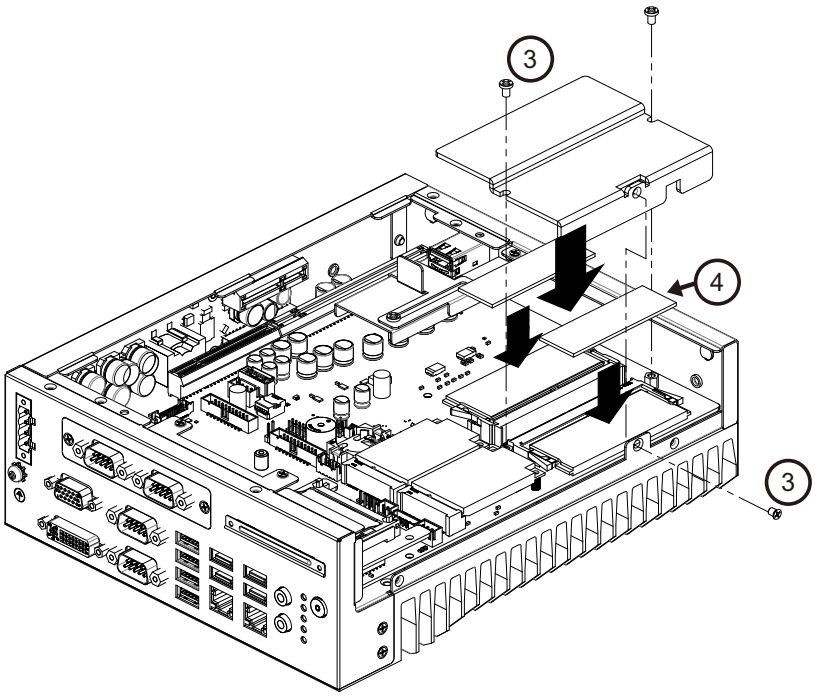
2.4.2 Memory Installation

The MIC-7500 system has 4GB memory on board; if you want to add more memory, please connect your distributor or sales representative to order compatible memory modules. Part numbers below:

- 4G SO-DDR4-2133 512X8 1.2V SAM P/N: AQD-SD4U4GN21-SG
- 8G SO-DDR4-2133 512X8 1.2V SAM P/N: AQD-SD4U8GN21-SG
- 16GB DDR4 2133 1.2V SODIMM 1GbX8 SAM P/N: AQD-SD4U16N21-SE

Note! *If non-compliant SODIMM memory boards are installed in the MIC-7500, the system will not boot.*

1. Undo the 4 screws to remove the bottom cover.
2. Undo 4 screws to remove the HDD tray.



3. Undo 3 screws to remove the memory thermal cover.
4. Affix thermal pad (P/N: 1990019498N000) on memory, and reassemble memory.

Note! *Thermal pad and memory thermal cover must be completely covered and secured.*

Note! *Default configuration of the MIC-7500 has 4GB memory and one thermal pad inside. There is also 1 pc thermal pad in the accessory box.*

2.4.3 m-SATA/Mini-PCIe Installation

MIC-7500 supports 2 Mini PCIes, and 1 m-SATA.

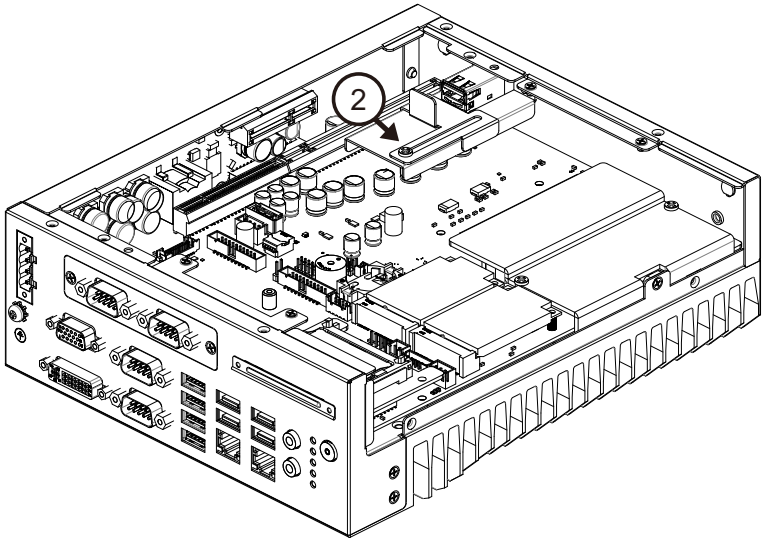
(Please refer to MB internal I/O connector specification on the I/O connector page.)

- Mini-PCIe A: Supports Mini PCIe signal & USIM
- Mini-PCIe B: Supports Mini PCIe signal & m-SATA

1. Undo 4 screws and remove the bottom cover.
2. Install the module in Mini PCIe socket 1, or m-SATA in Mini PCIe socket 2 and secure with screws.
3. Replace bottom cover and secure with screws.

2.4.4 Internal USB 2.0 Installation

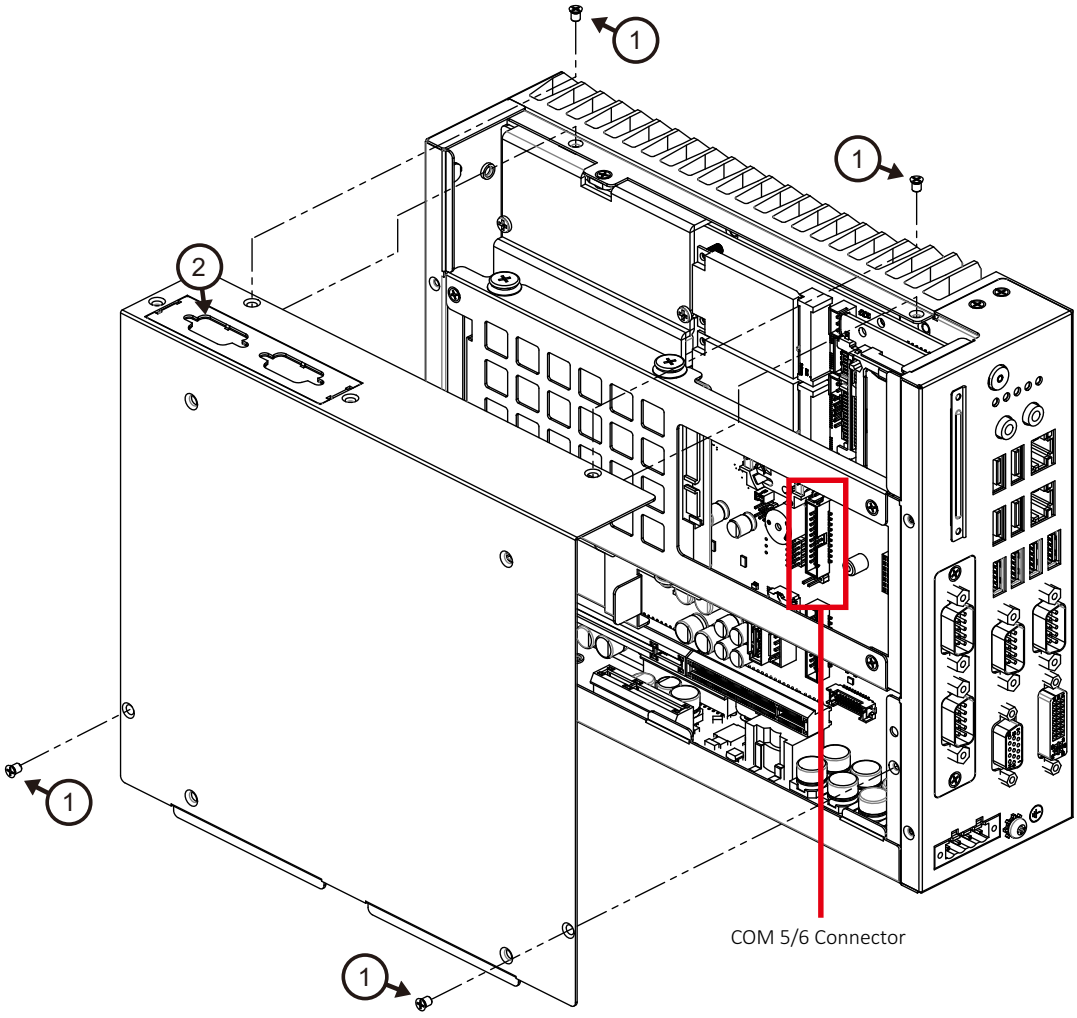
1. Undo 4 screws and remove the bottom cover.
2. Loosen the screw and adjust bracket size in accordance the USB dongle size.
3. Secure the screw and replace bottom cover and secure with screws.



2.4.5 COM 5/6 Ports Installation

MIC-7500 has four standard serial ports. Two support RS-232/422/485, two support RSRS-232 (expanded by cable). If more serial ports are needed, MIC-7500 can expand up to six serial ports by cable (RS-232 only). There is one DP9 cable in the accessory box.

1. Undo 4 screws and remove the bottom cover.
2. Replace baffle plate for COMs 5 and 6.
3. Remove HDD tray.
4. Assemble DP9 connector in baffle, and install cable at COM5/6 connector.
5. Secure COM module in system and replace HDD tray/bottom cover.

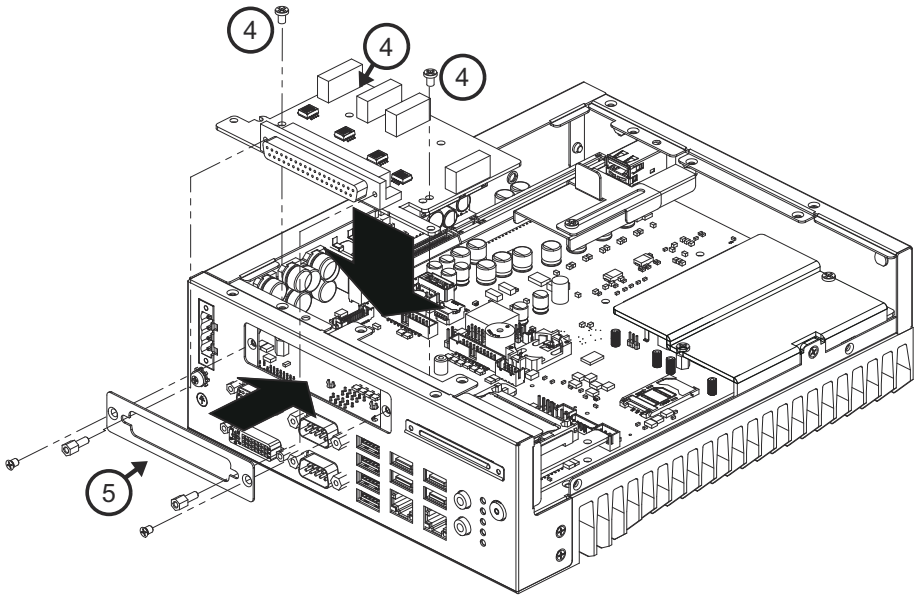


2.4.6 Expansion module Installation (Optional)

MIC-7500 supports two kinds of optional modules for different applications.

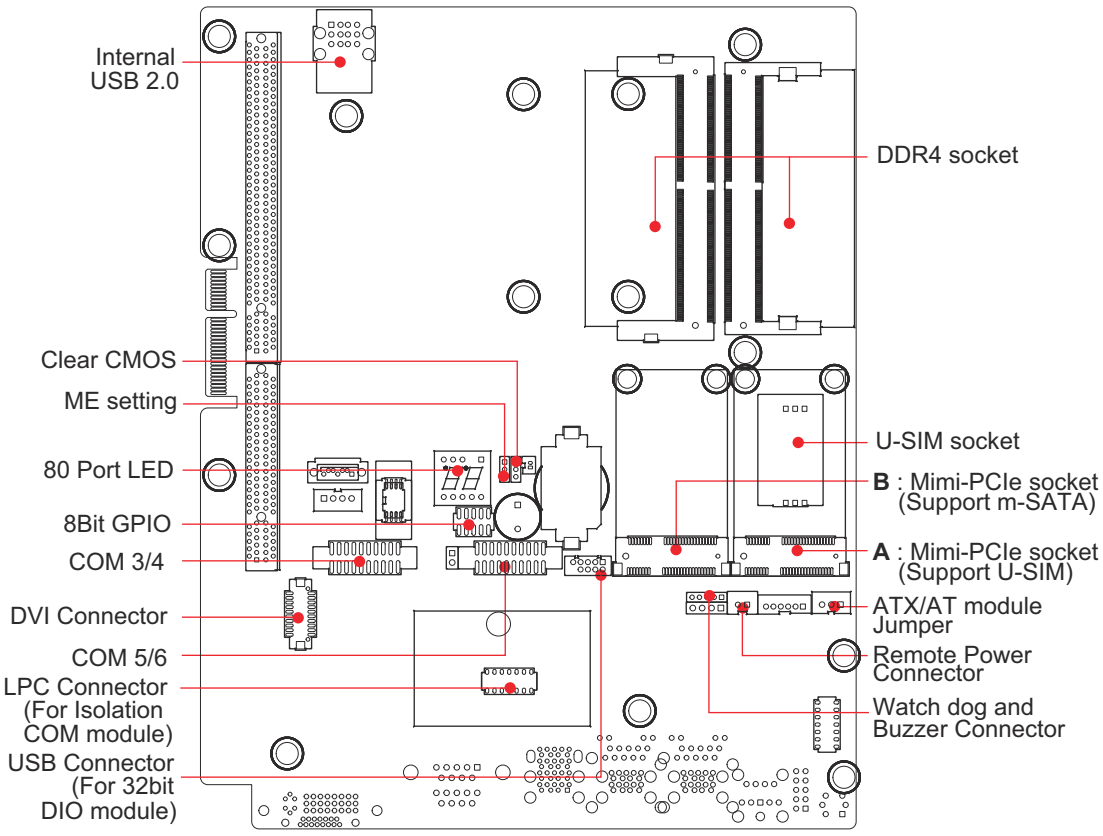
- 32bit GPIO module, P/N: AIIS-DIO32-00A1E
- 4 x Isolation COM module, P/N: 98R2C48510E

1. Undo the 4 screws and remove the bottom cover.
2. Undo HDD tray & expansion module baffle.



3. Remove COM cable and undo baffle cover.
4. Assemble module on M/B (Note: 32Bit GPIO module needs to connect with a cable. (Please refer to MB internal I/O connector specification at IO connector page for GPIO connector.)
5. Assemble module baffle with screws.
6. Replace bottom cover and secure with screws.

2.4.7 MIC-7500 MB IO connector



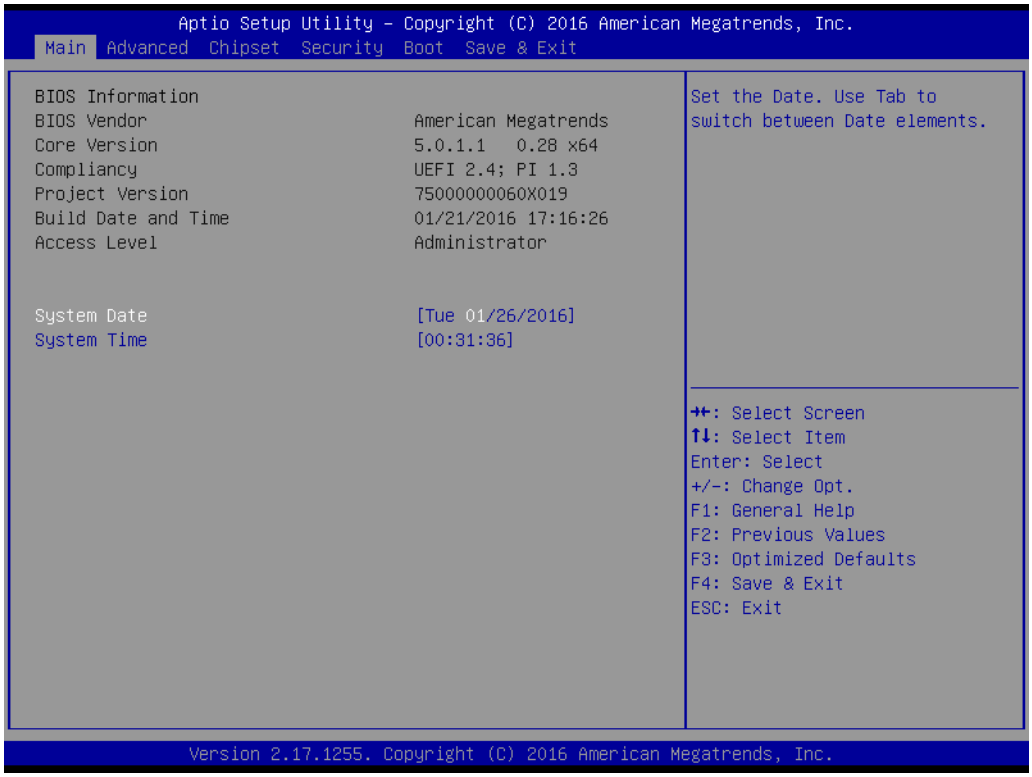
Chapter 3

AMI BIOS Setup

This chapter introduces how to set BIOS configuration data.

3.1 Introduction

With the AMI BIOS Setup program, you can modify BIOS settings and control the special features of your computer. The Setup program uses a number of menus for making changes and turning special features on or off. This chapter describes the basic navigation of the MIC-7500 setup screens.

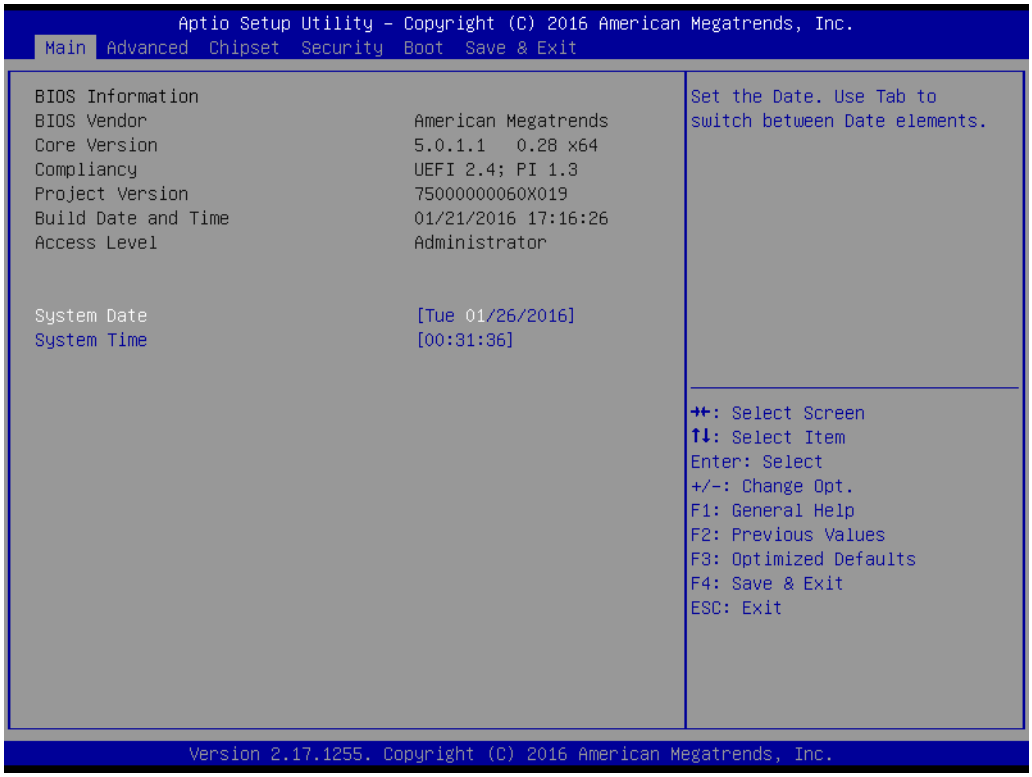


3.2 Entering Setup

Press the "Del" or "Esc." key during the Power On Self Test (POST) process to enter the BIOS setup screen, otherwise the system will continue the POST process.

3.2.1 Main Setup

When you first enter the BIOS Setup Utility, you will enter the Main setup screen. You can always return to the Main setup screen by selecting the Main tab. There are two Main Setup options. They are described in this section. The Main BIOS Setup screen is shown below.



The Main BIOS setup screen has two main frames. The left frame displays all the options that can be configured. Grayed-out options cannot be configured; options in blue can. The right frame displays the key legend.

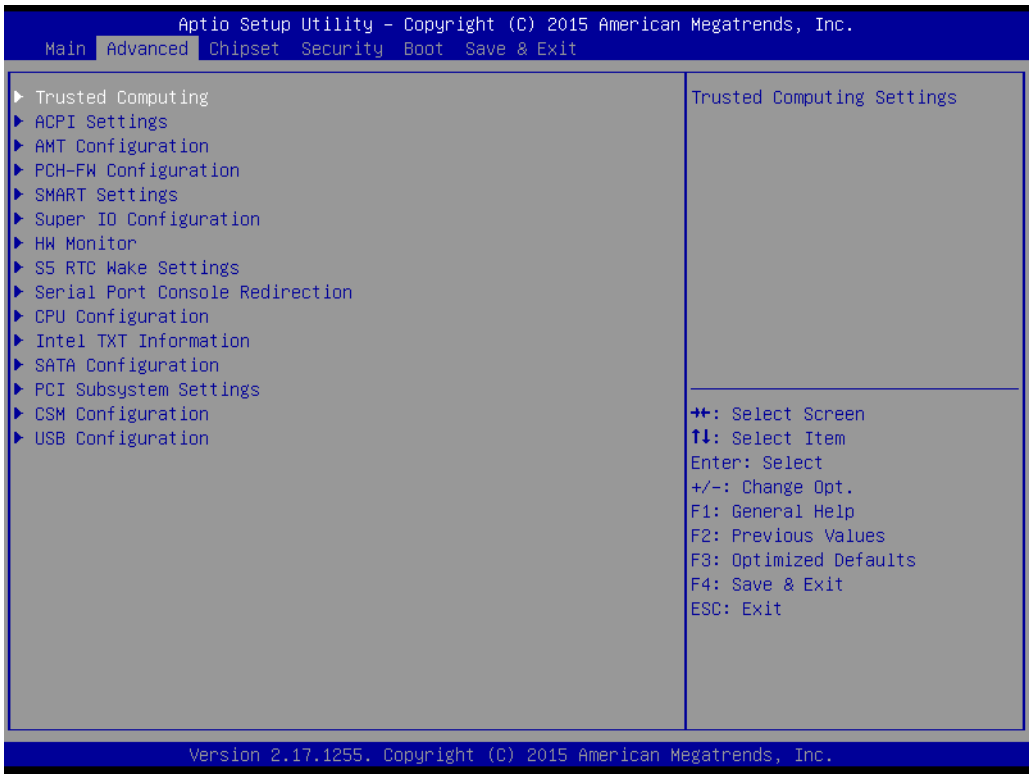
Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it.

3.2.1.1 System Time / System Date

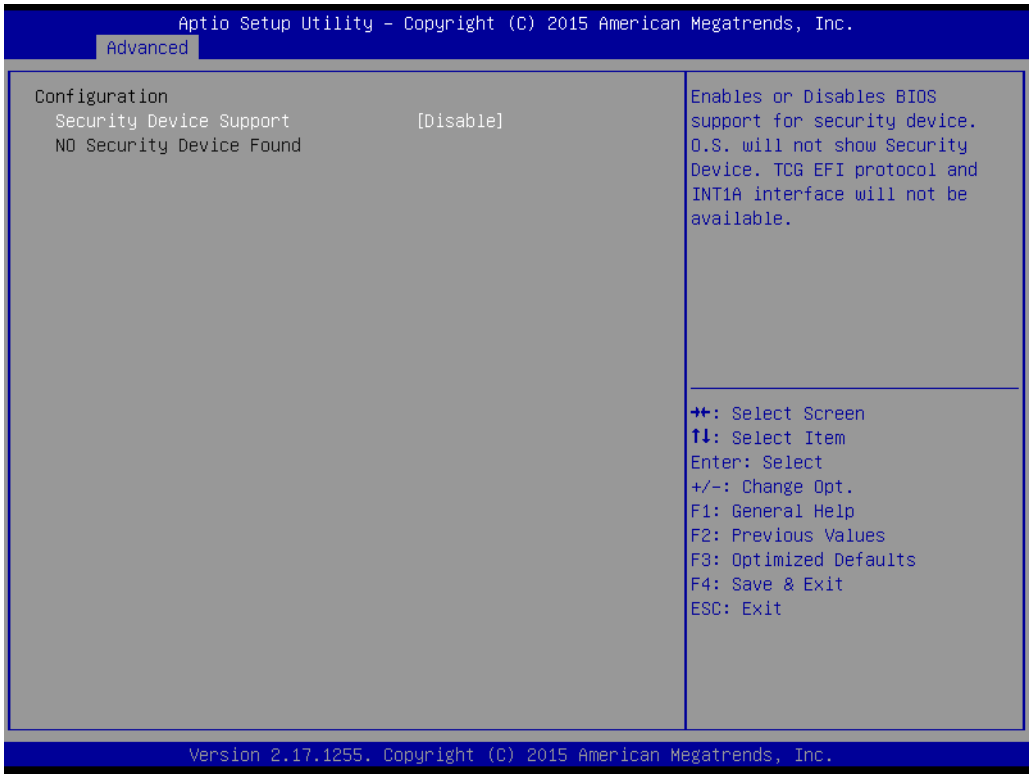
Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time must be entered in HH:MM:SS format.

3.2.2 Advanced BIOS Features Setup

Select the Advanced tab from the MIC-7500 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 ACPI Settings and hit <enter> 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.

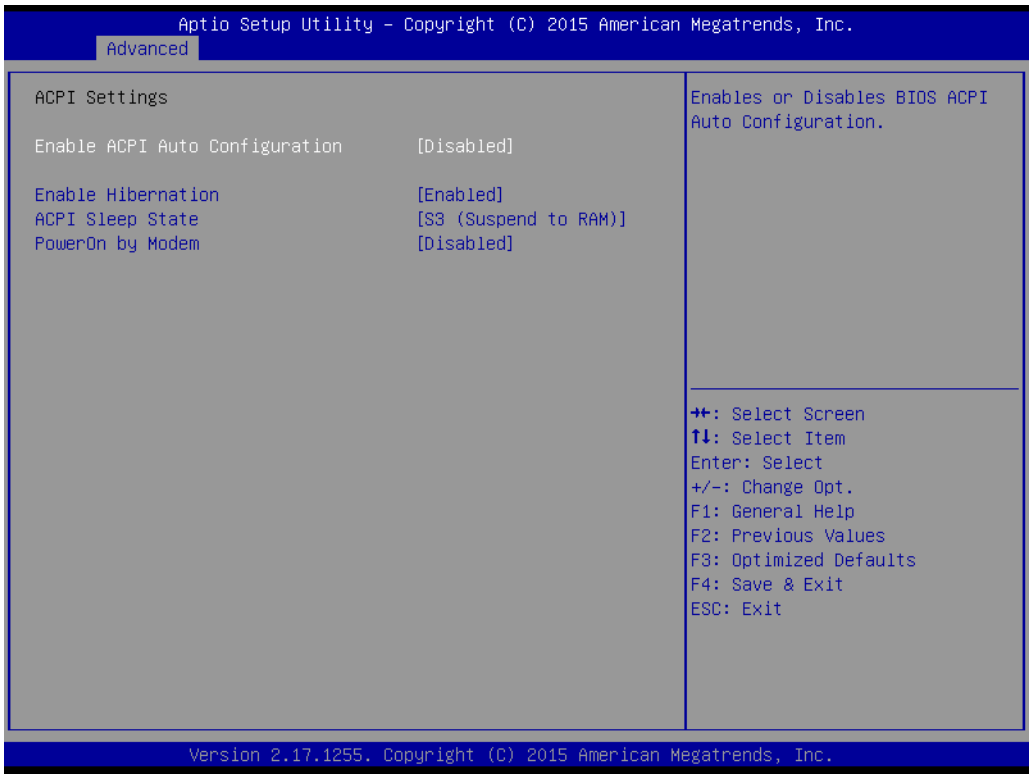


3.2.2.1 Trusted Computing



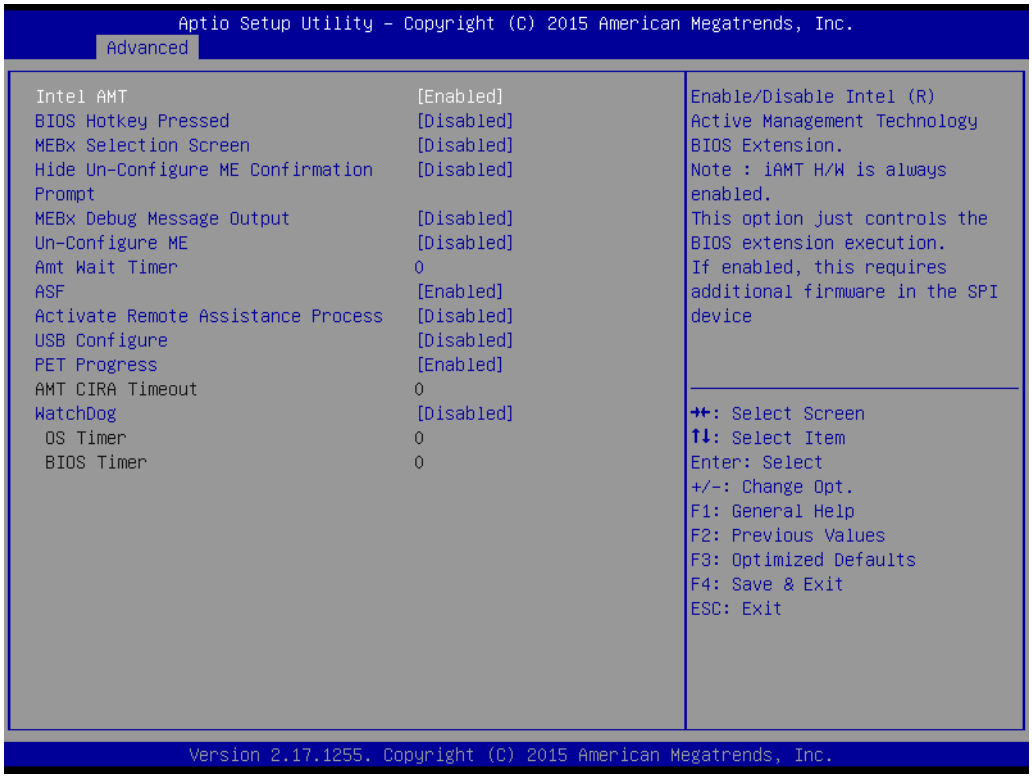
- **Security Device Support**
  This item allows users to enable or disable “Security Device Support”.

3.2.2.2 ACPI Settings



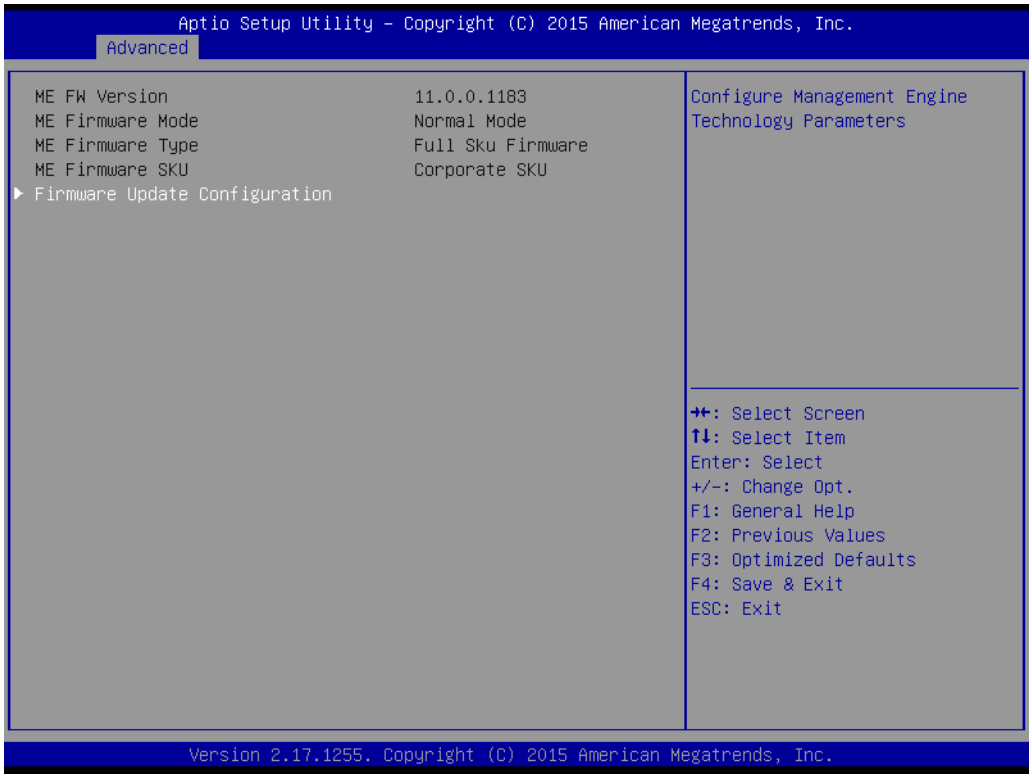
- **Enable ACPI Auto Configuration**
  This item allows users to enable or disable “ACPI Auto Configuration”.
- **Enable Hibernation**
  This item allows users to enable or disable “Hibernation”.
- **ACPI Sleep State**
  This item allows users to set ACPI mode S3 (Suspend to RAM) or to Disable “ACPI Sleep State”.
- **PowerOn by Modem**
  This item allows users to enable or disable “PowerOn by Modem”.

3.2.2.3 AMT Configuration

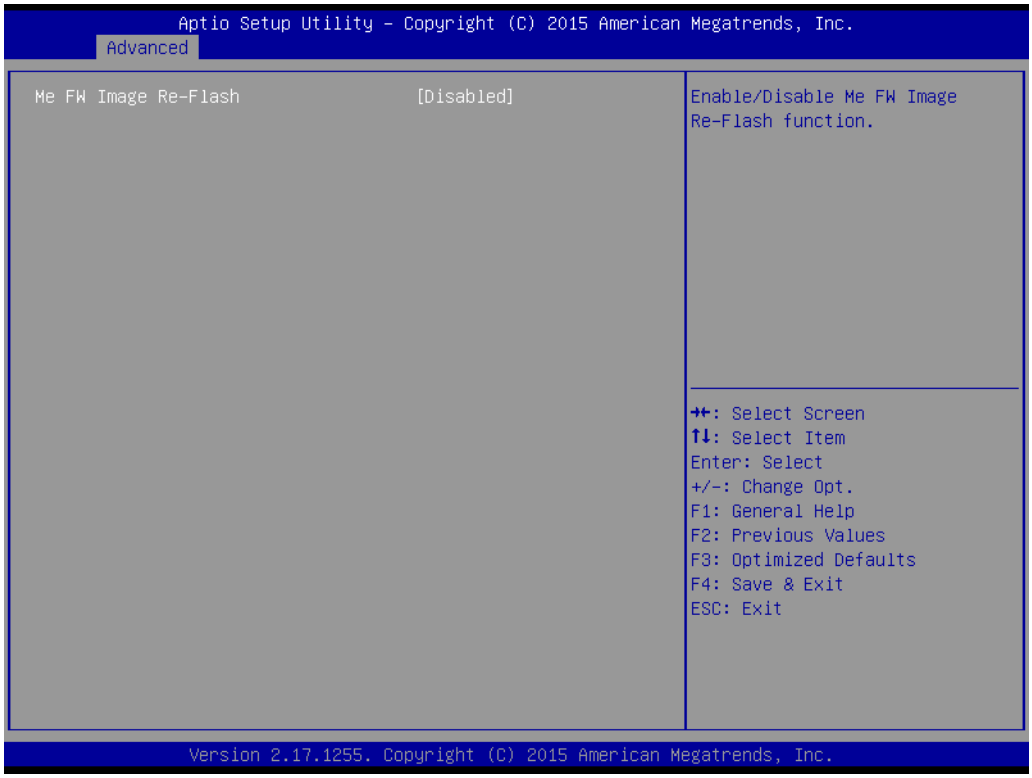


- **Intel AMT**
  This item allows users to enable or disable "Intel AMT".
- **BIOS Hotkey Pressed**
  This item allows users to enable or disable for "BIOS Hotkey Pressed".
- **MEBx Selection Screen**
  This item allows users to enable or disable for "MEBx Selection Screen".
- **Hide Un-Configure ME Confirmation Prompt**
  This item allows users to enable or disable for "Hide Un-Configure ME Confirmation Prompt".
- **MEBx Debug Message Output**
  This item allows users to enable or disable for "MEBx Debug Message Output".
- **Un-Configure ME**
  This item allows users to enable or disable for "Un-Configure ME".
- **Amt Wait Timer**
  Set timer to wait before sending ASF_GET_Boot_Options
- **ASF**
  This item allows users to enable or disable for "ASF".
- **Activate Remote Assistance Process**
  This item allows users to enable or disable for "Activate Remote Assistance Process".
- **USB Configure**
  This item allows users to enable or disable for "USB Configure".
- **PET Progress**
  This item allows users to enable or disable for "PET Progress".
- **WatchDog**
  This item allows users to enable or disable for "WatchDog".

3.2.2.4 PCH-FW Configuration

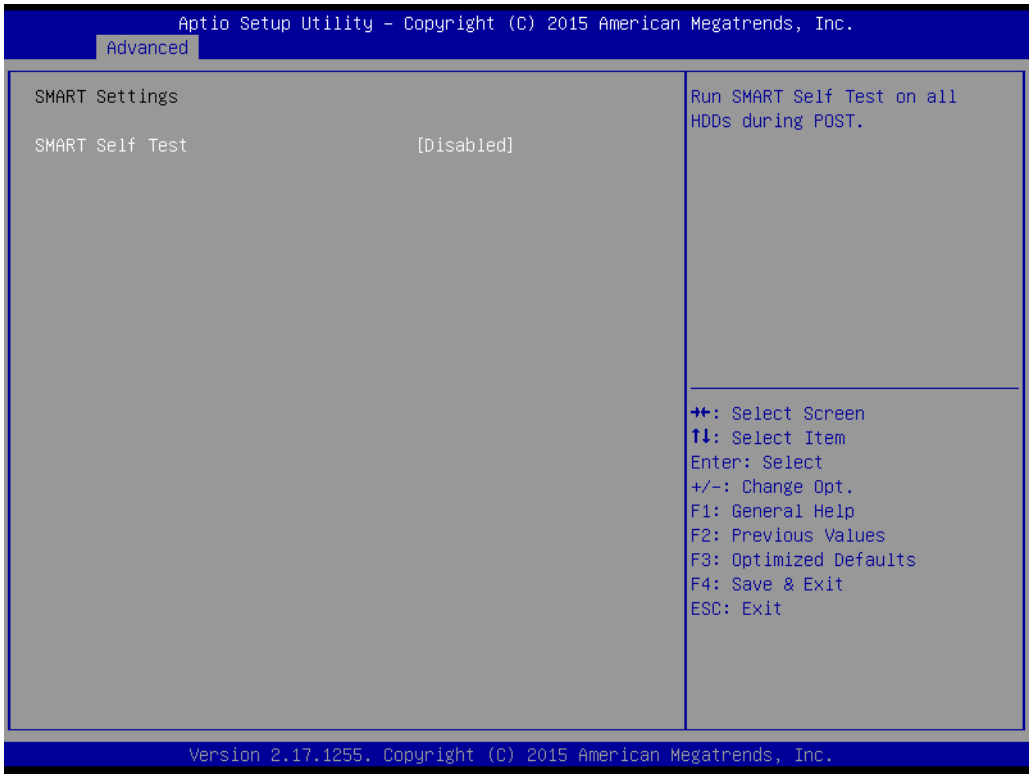


- **Firmware Update Configuration**



- **Me FW Image Re-Flash**
  This item allows users to enable or disable for "Me FW Image Re-Flash".

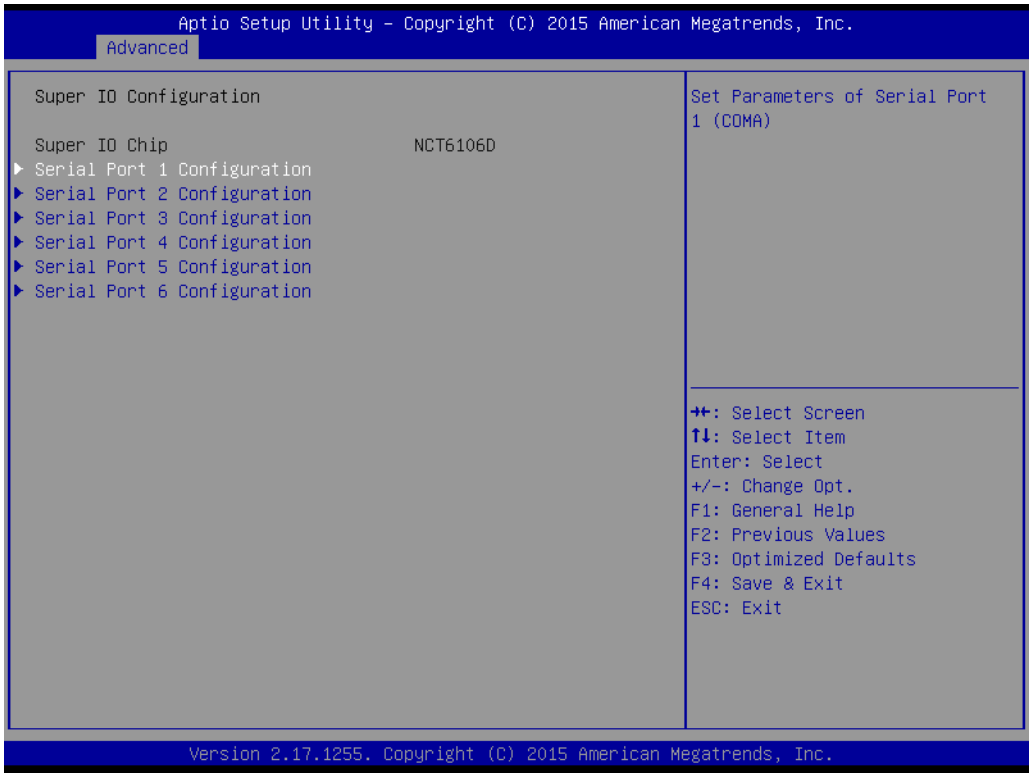
3.2.2.5 SMART Settings

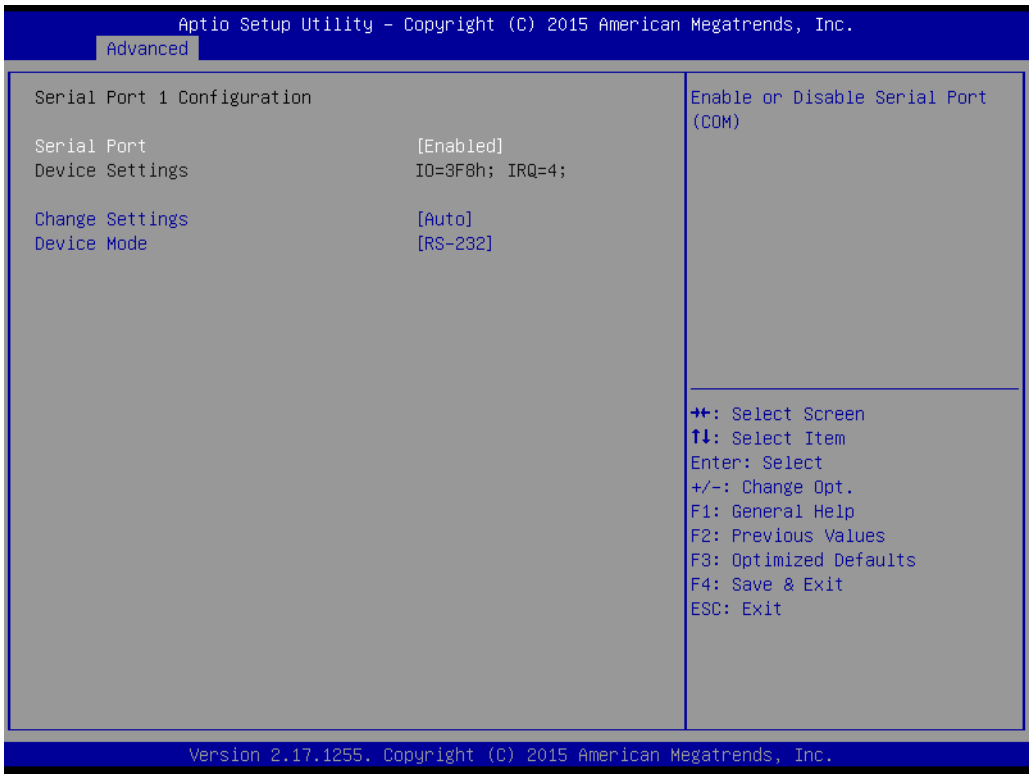


- **SMART Self Test**
  This item allows users to enable or disable for ”SMART Self Test".

3.2.2.6 Support IO Configuration

MIC-7500 supports 2xRS-232/422/485 & 2-RS-232 in front side. There has 2 more RS-232 (Serial Port 5 & 6) signal in M/B, you can find a cable at accessory box.



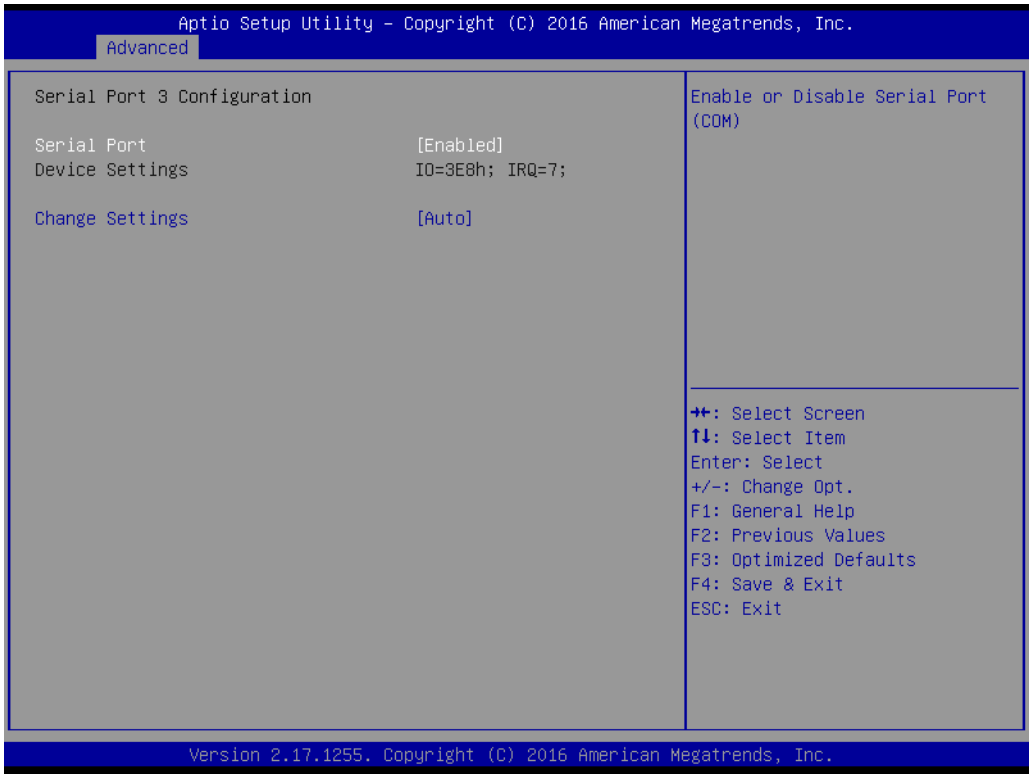


Serial Port 1 Configuration

- **Serial Port**
  This item allows users to enable or disable for "Serial Port".
- **Change Settings**
  This item allows users to Change Settings of Serial Ports. The default setting is "Auto".
- **Device Mode**
  This item allows users to set the mode of serial port. The default setting is "RS-232".

Serial Port 2 Configuration

- **Serial Port**
  This item allows users to enable or disable for "Serial Port".
- **Change Settings**
  This item allows users to change settings of serial ports. The default setting is "Auto".
- **Device Mode**
  This item allows users to set the mode of serial port. The default setting is "RS-232".



Serial Port 3 Configuration

- **Serial Port**
  This item allows users to Disabled or Enabled "Serial Port".
- **Change Settings**
  This item allows users to change settings of serial ports. The default setting is "Auto".

Serial Port 4 Configuration

- **Serial Port**

  This item allows users enable or disable for "Serial Port".

- **Change Settings**

  This item allows users to change settings of serial ports. The default setting is "Auto".

Serial Port 5 Configuration

- **Serial Port**

  This item allows users enable or disable for "Serial Port".

- **Change Settings**

  This item allows users to change settings of serial ports. The default setting is "Auto".

Serial Port 6 Configuration

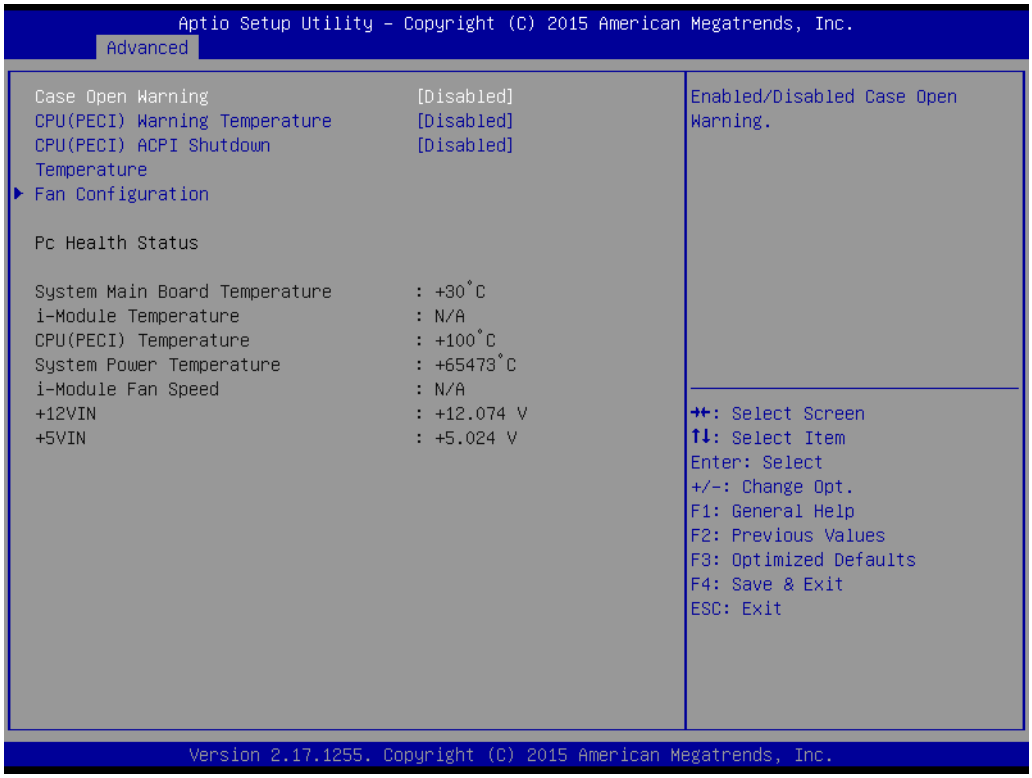
- **Serial Port**

  This item allows users to enable or disable for "Serial Port".

- **Change Settings**

  This item allows users to change settings of serial ports. The default setting is "Auto".

3.2.2.7 HW Monitor

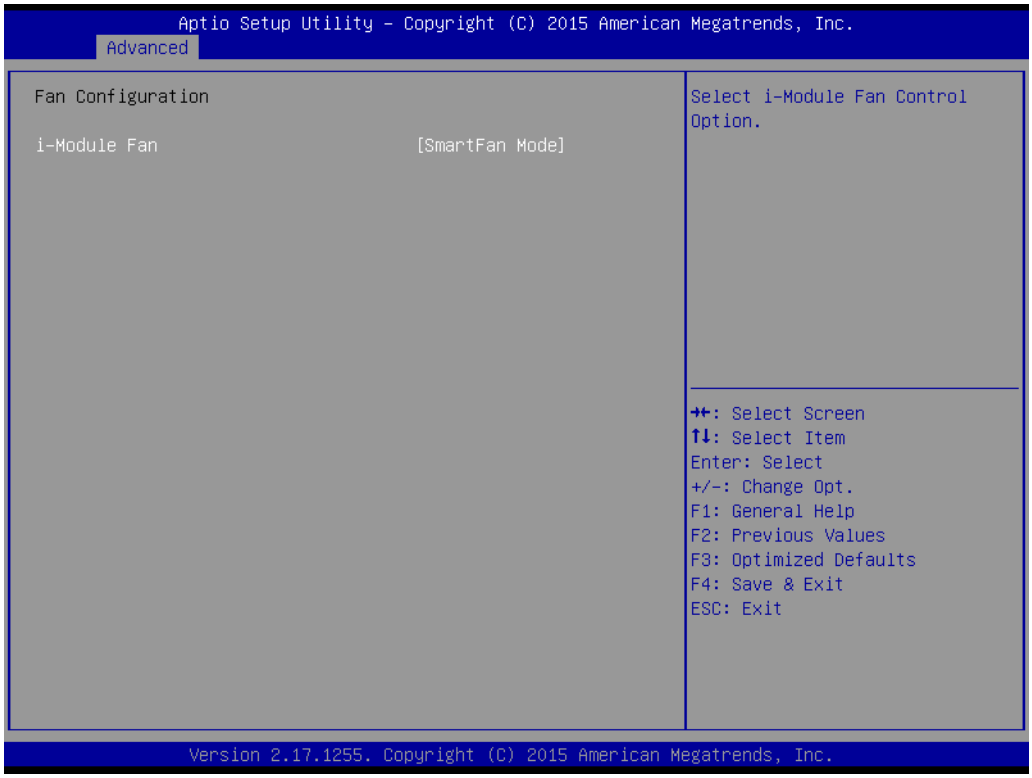


- **Case Open Warning**
  This item allows users to enable or disable for "Case Open Warning".

Note! *MIC-7500 system does not supports Case open switch in chassis. If your application needs case open function, please connect your distributor or sales representative.*

- **CPU(PECI) Warning Temperature**
  This item allows users to change settings of CPU(PECI) Warning Temperature. The default setting is "Auto".
- **CPU(PECI)ACPI Shutdown Temperature**
  This item allows users to Change Settings of CPU(PECI) ACPI Shutdown Temperature. The default setting is "Auto".

Fan Configuration



i-Module FAN

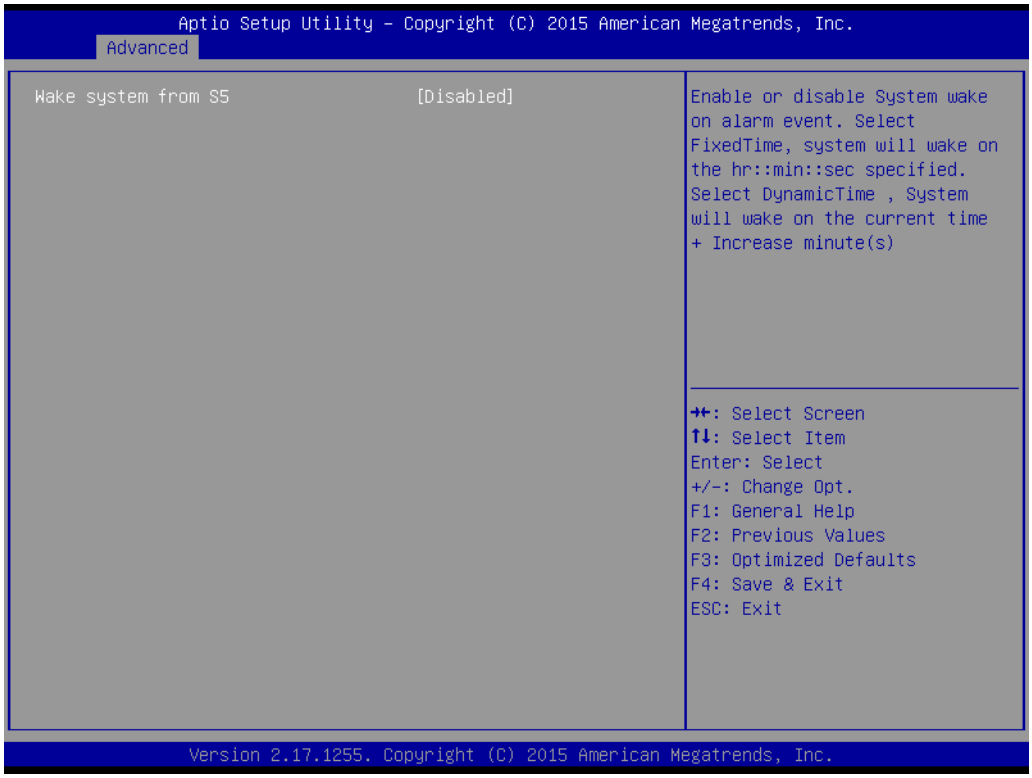
This item allows users to Manual Mode or SmartFan Mode for i-Module.

Note! *MIC-7500 system does not supports FAN. This function only workable in MIC-7500 with i-Module +FAN.*

PC Health Status

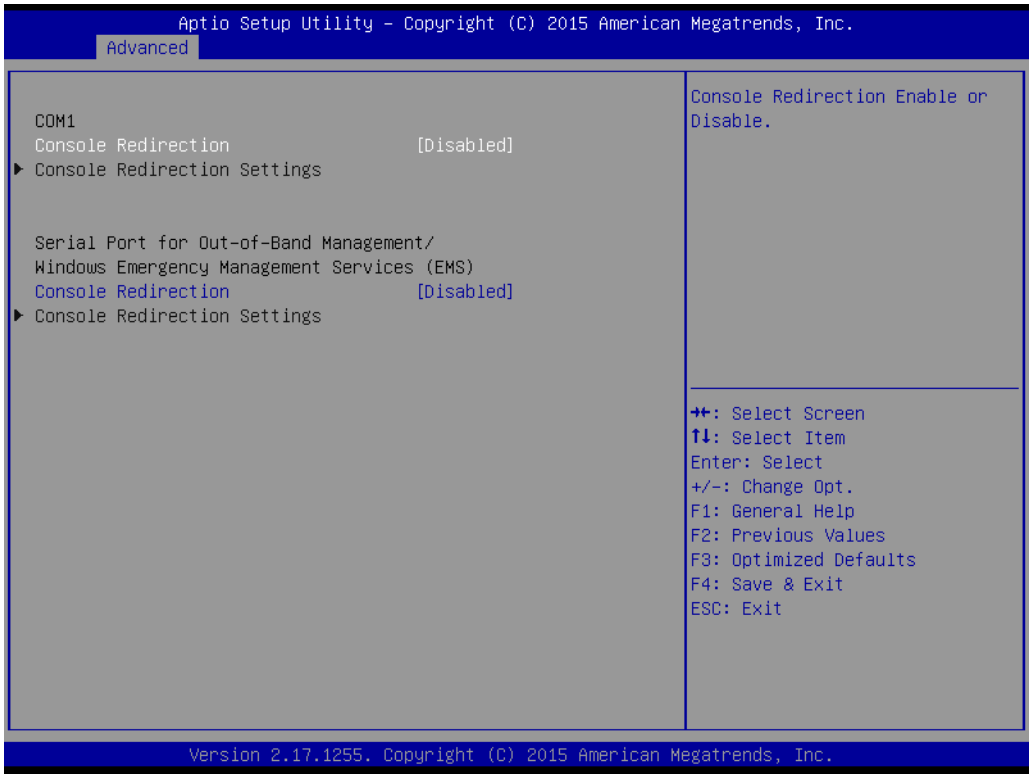
MIC-7500 system has design-in temperature sensor to monitor system temperature. You can clear to read M/B, Power board, or i-Module Temperature status.

3.2.2.8 S5 RTC Wake Settings



- **Wake system from S5**
  This item allows users to enable or disable for "Wake system from S5".

3.2.2.9 Serial Port Console Redirection



COM1

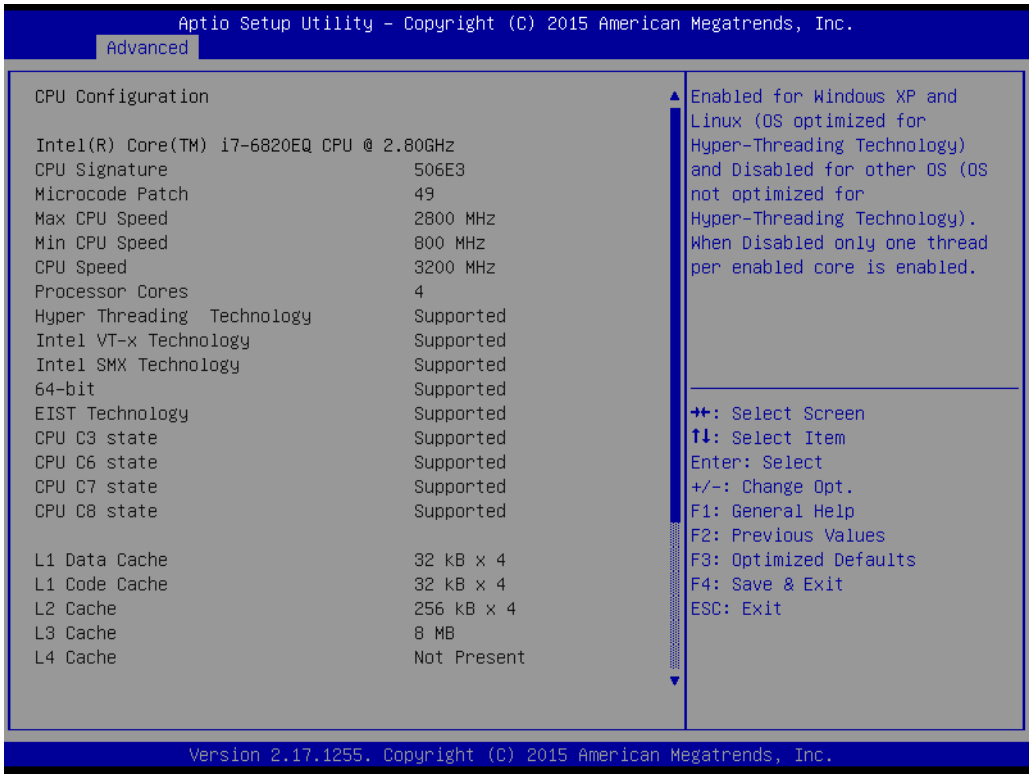
- **Console Redirection**

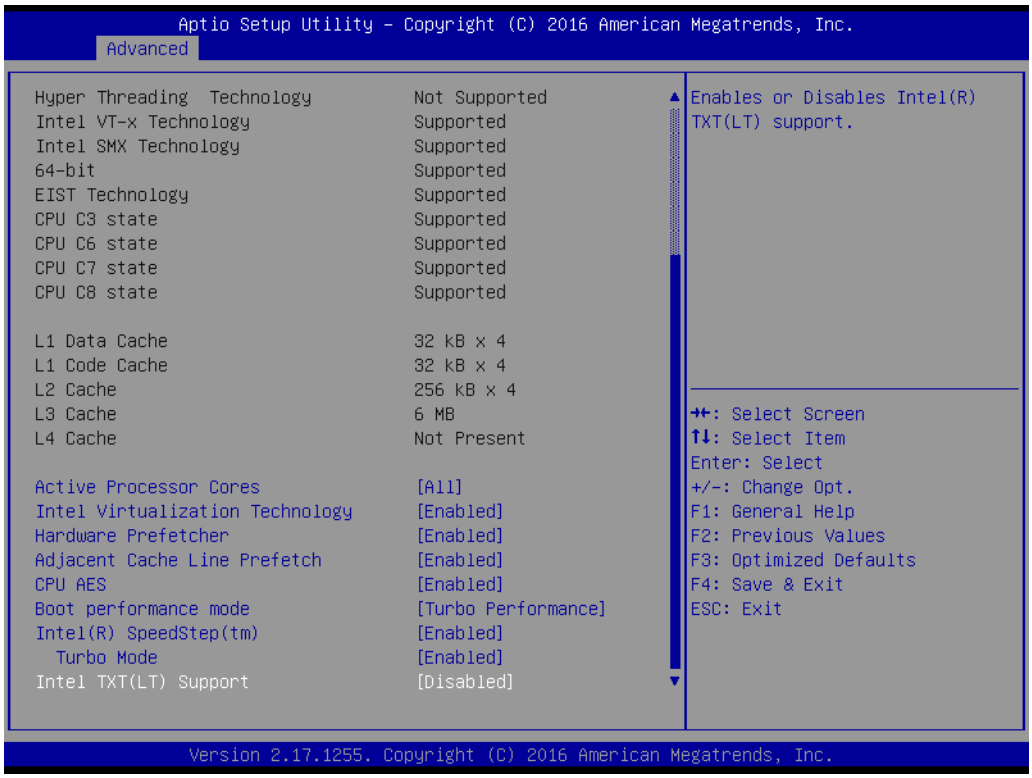
  This item allows users to enable or disable for "Console Redirection".
  Serial Port for Out-of-Band Management/Windows Emergency Management Services (EMS)

- **Console Redirection**

  This item allows users to enable or disable for "Console Redirection".

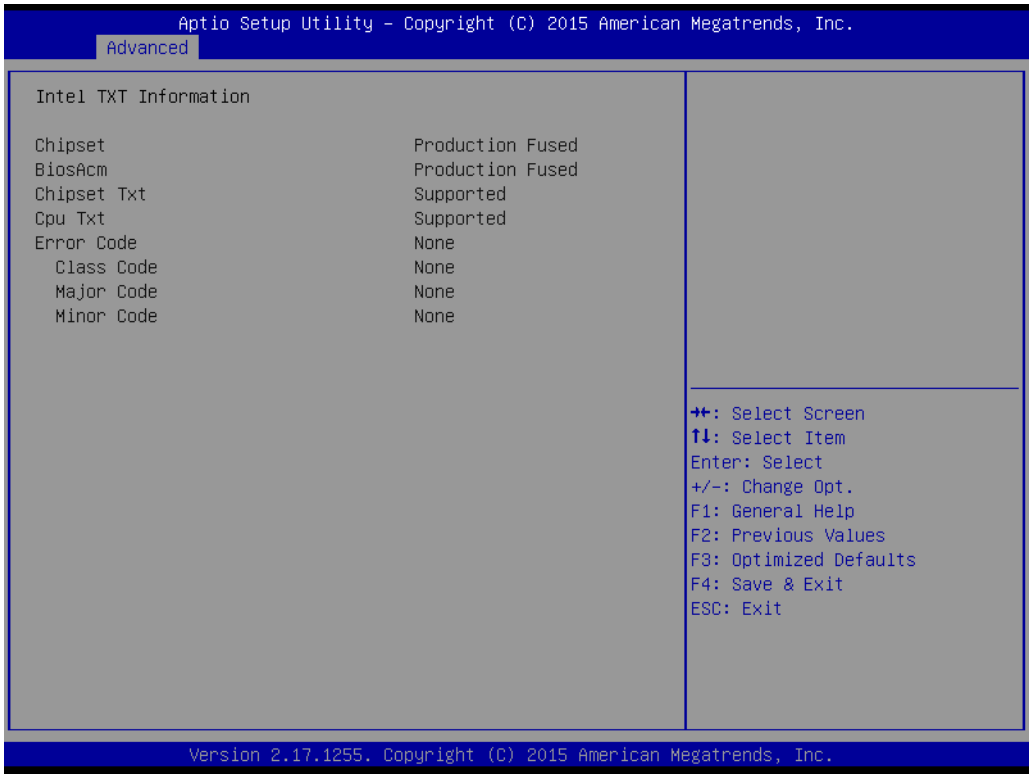
3.2.2.10 CPU Configuration



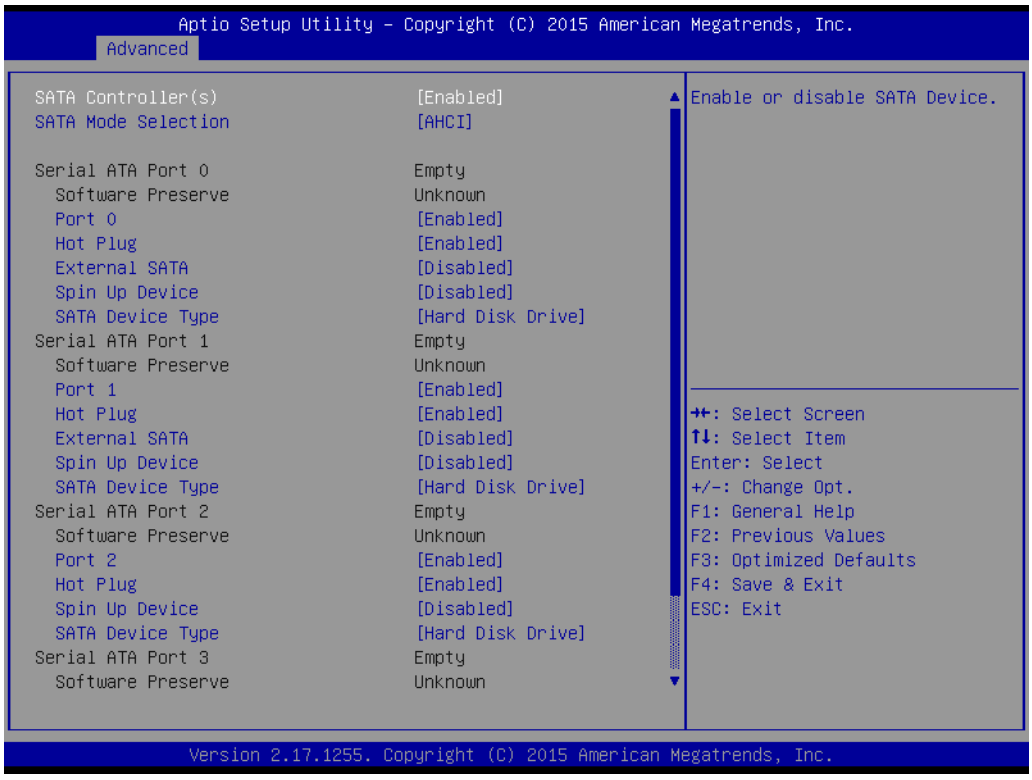


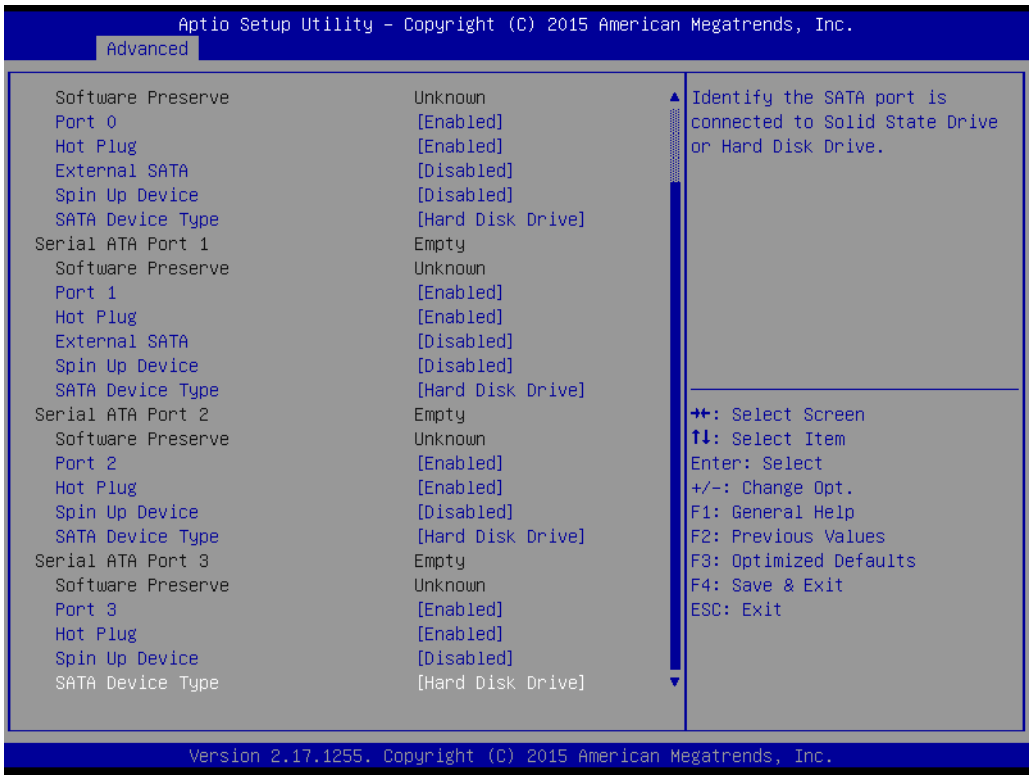
- **Active Processor Cores**
  This item allows users to set different modes of "Active Processor Cores". The default setting is All.
- **Intel Virtualization Technology**
  This item allows users to enable or disable for "Intel Virtualization Technology".
- **Hardware Prefetcher**
  This item allows users to enable or disable for "Hardware Prefetcher".
- **Adjacent Cache Line Prefetch**
  This item allows users to enable or disable for "Adjacent Cache Line Prefetch".
- **CPU AES**
  This item allows users to enable or disable for "CPU AES".
- **Boot performance mode**
  This item allows users to set Max Non-Turbo Performance or Turbo Performance for "Boot performance mode".
- **Intel(R) SpeedStep(tm)**
  This item allows users to enable or disable for "Intel(R) SpeedStep(tm)".
- **Turbo Mode**
  This item allows users to enable or disable for "Turbo Mode".
- **Intel TXT(LT) Support**
  This item allows users to enable or disable for "Intel TXT(LT) Support".

3.2.2.11 Intel TXT Information



3.2.2.12 SATA Controller





MIC-7500 supports 1x2.5' HDD/1xm-SATA/1xCFast and i-module supports 1xSATA.

- **SATA Controller(S)**
  This item allows users to enable or disable for "SATA Controller(S)".
- **SATA Mode Selection**
  This item allows users to set AHCI or RAID for "SATA Controller(S)".

Serial ATA Port 0 (MIC-7500 system 2.5' HDD)

- **Port 0**
  This item allows users to enable or disable for "Port 0".
- **Hot Plug**
  This item allows users to enable or disable for "Hot Plug".
- **External SATA**
  This item allows users to enable or disable for "External SATA".
- **Spin Up Device**
  This item allows users to enable or disable for "Spin Up Device".
- **SATA Device Type**
  This item allows users to set Hard Disk Drive or Solid State Drive for "Spin Up Device".

Serial ATA Port 1 (MIC-7 series i-module 2.5' HDD)

- **Port 1**
  This item allows users to enable or disable for "Port 1".
- **Hot Plug**
  This item allows users to enable or disable for "Hot Plug".
- **External SATA**
  This item allows users to enable or disable for "External SATA".
- **Spin Up Device**
  This item allows users to enable or disable for "Spin Up Device".
- **SATA Device Type**
  -This item allows users to Hard Disk Drive or Solid State Drive for "Spin Up Device".

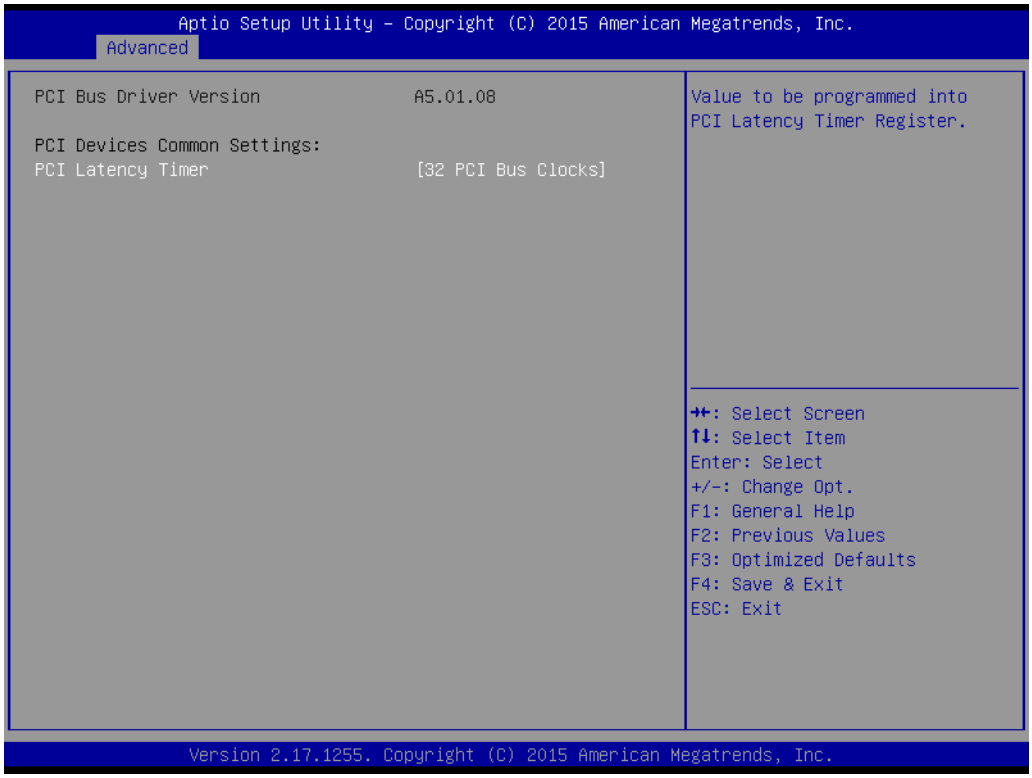
Serial ATA Port 2 (MIC-7500 CFast)

- **Port 2**
  This item allows users to enable or disable for "Port 2".
- **Hot Plug**
  This item allows users to enable or disable for "Hot Plug".
- **Spin Up Device**
  This item allows users to enable or disable for "Spin Up Device".
- **SATA Device Type**
  This item allows users to set Hard Disk Drive or Solid State Drive for "Spin Up Device".

Serial ATA Port 3 (MIC-7500 m-SATA by Mini-PCIe socket)

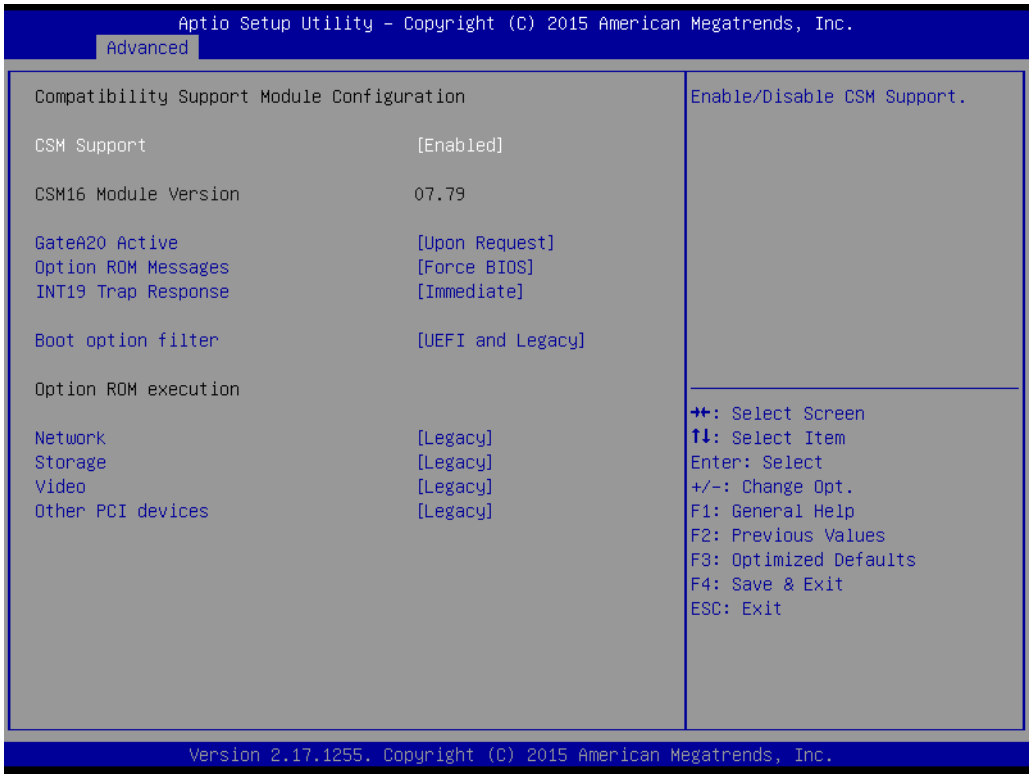
- **Port 3**
  This item allows users to enable or disable for "Port 3".
- **Hot Plug**
  This item allows users to enable or disable for "Hot Plug".
- **Spin Up Device**
  This item allows users to enable or disable for "Spin Up Device".
- **SATA Device Type**
  This item allows users to set Hard Disk Drive or Solid State Drive for "Spin Up Device".

3.2.2.13 PCI Devices Common Settings



- **PCI Latency Timer**
  This item allows user to set PIC Latency Timer by different mode. The default setting is "32 PCI Bus Clocks".

3.2.2.14 CSM Configuration



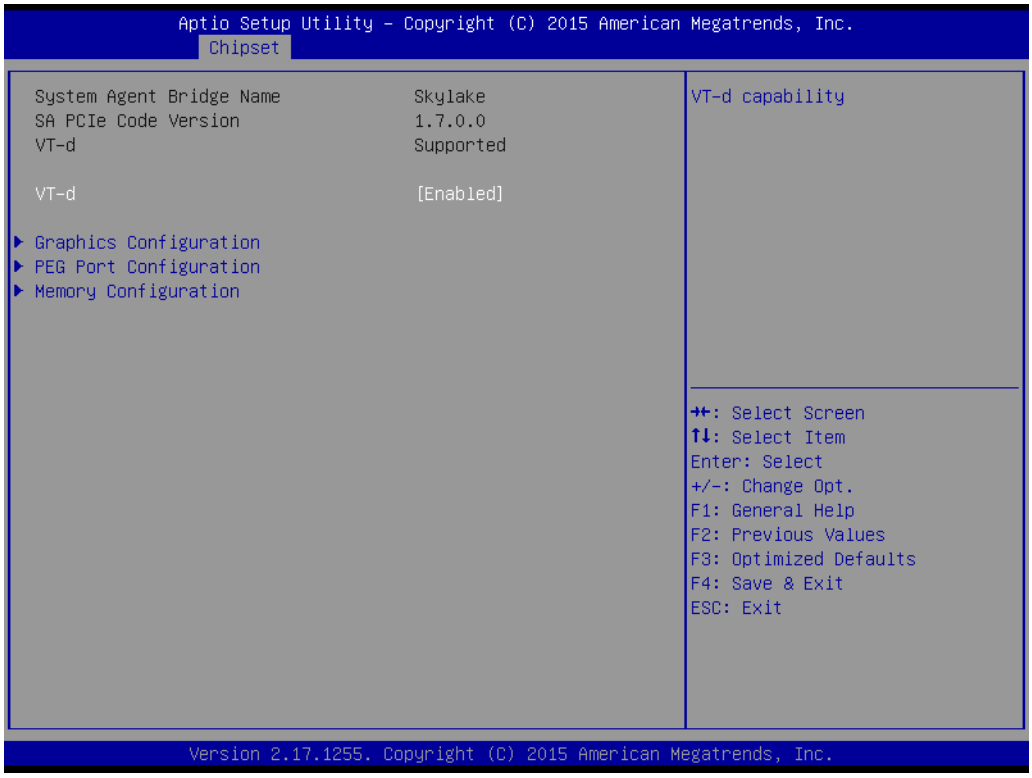
- **CSM Support**
  This item allows users to enable or disable for "CSM Support".
- **GateA20 Active**
  This item allows users to setUpon Request or Always for "GateA20 Active".
- **Option ROM Messages**
  This item allows users to setForce BIOS or Keep Current for "Option ROM Messages".
- **INT19 Trap Response**
  This item allows users to setImmediate or Postponed for "INT19 Trap Response".
- **Boot option filter**
  This item allows users to set UEFI and Legacy or Legacy only or UEFI only for "Boot option filter".
- **Network**
  This item allows users to set Do not launch or Legacy for "Network".
- **Storage**
  This item allows users to set Do not launch or UEFI or Legacy for "Storage".
- **Video**
  This item allows users to set Do not launch or UEFI or Legacy for "Video".
- **Other PCI devices**
  This item allows users to set Do not launch or UEFI or Legacy for "Other PCI devices".

3.2.2.15 USB Configuration

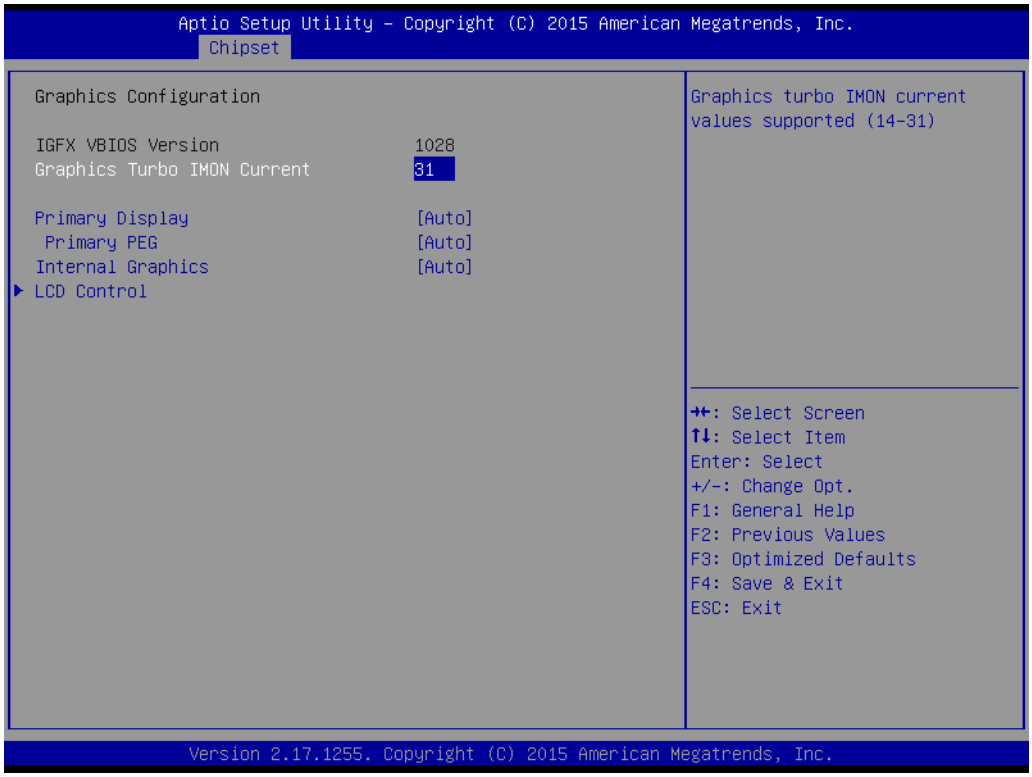
- **Legacy USB Support**
  This item allows users to enable or disable or set Auto for "Legacy USB Support".
- **XHCI Hand-off**
  This item allows users to enable or disable "XHCI Hand-off".
- **USB Mass Storage Driver Support**
  This item allows users to enable or disable "USB Mass Storage Driver Support".
- **USB transfer Time-out**
  This item allows users to set different time mode for "USB transfer Time-out".
- **Device reset Time-out**
  This item allows users to set different time modes for "Device reset Time-out".
- **Device power-up delay**
  This item allows users to set different time mode for "Device power-up delay".

3.2.3 Chipset

- **System Agent (SA) Configuration**

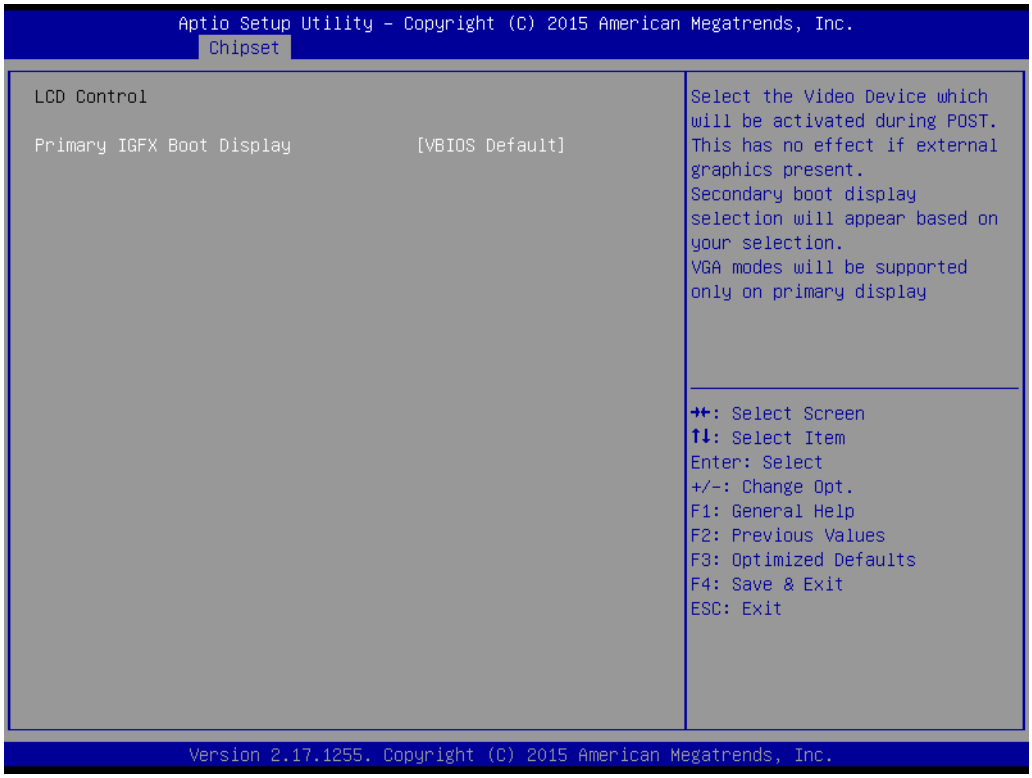


- **VT-d**
  This item allows users to enable or disable for "VT-d".
- **Graphics Configuration**



- **Graphics Turbo IMON Current**
  Graphics turbo IMON current values supported (14-31).
- **Primary Display**
  This item allows users to set Auto or IGFX or PEG or PCIE for "Primary Display".
- **Primary PEG**
  This item allows users to set Auto or PEG11 or PEG 12 for "Primary PEG".
- **Internal Graphics**
  This item allows users to set Auto or Disabled or Enabled for "Internal Graphics".

LCD Control

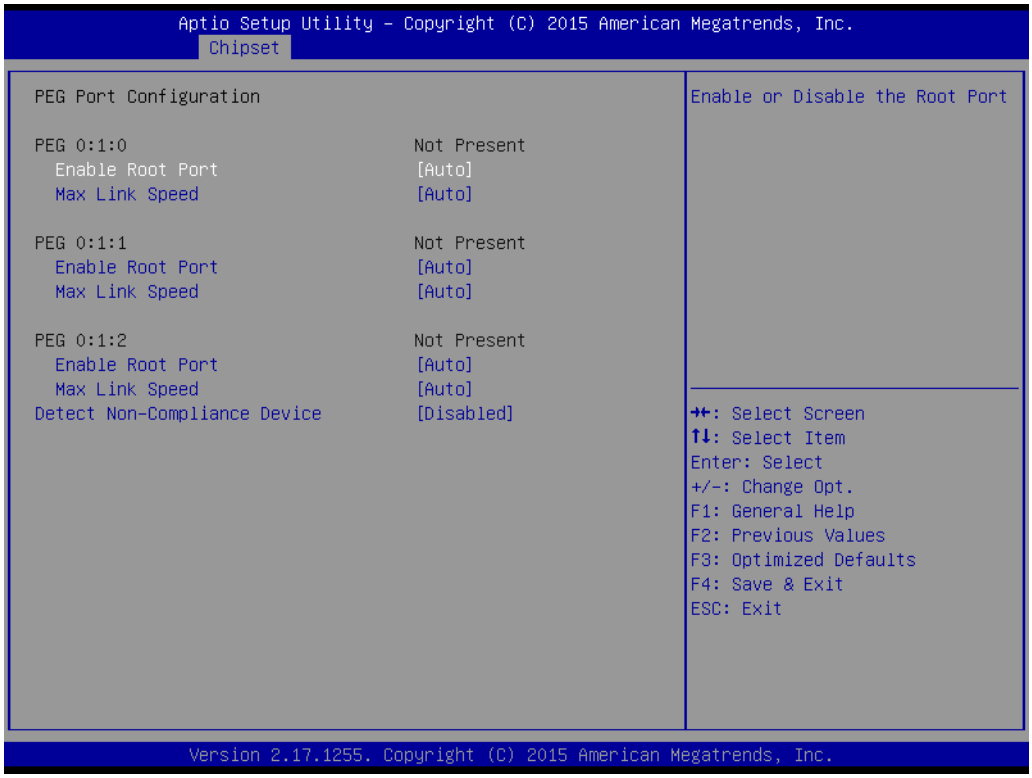


Primary IGFX Boot Display

This item allows users to set VBIOS Default or DVI1 or VGA or DVI2 for "Primary IGFX Boot Display".

Note! *DVI2 is expanded by cable. If you need this function, please connect your distributor or sales representative.*

PEG Port Configuration



This item allows user to set CPU PCI Expansion x16 GEN3.

Note! *Skylake-H CPU PCI Expansion x16 signals can be cut to x8, x4, x4 signal or x8, x8signal. Corresponding setting item are as follows:*

PEG 0 : 1 : 0 : for PCIEx16 or PCIEx8

PEG 0 : 1 : 1 : for PCIEx8 or PCIEx4

PEG 0 : 1 : 2 : for PCIEx4

PEG 0 : 1 : 0

- **Enable Root Port**

  This item allows users to set Disabled or Enabled or Auto for "Enable Root Port".

- **Max Link Speed**

  This item allows users to set Auto or Gen1 or Gen2 or Gen3 for "Max Link Speed" at PCIEx16 or PCIEx8 socket.

PEG 0 : 1 : 1

- **Enable Root Port**

  This item allows users to set Disabled or Enabled or Auto for "Enable Root Port".

- **Max Link Speed**

  This item allows users to set Auto or Gen1 or Gen2 or Gen3 for "Max Link Speed" at PCIEx8 or PCIEx4 socket.

PEG 0 : 1 : 2

- **Enable Root Port**

  This item allows users to set Disabled or Enabled or Auto for "Enable Root Port".

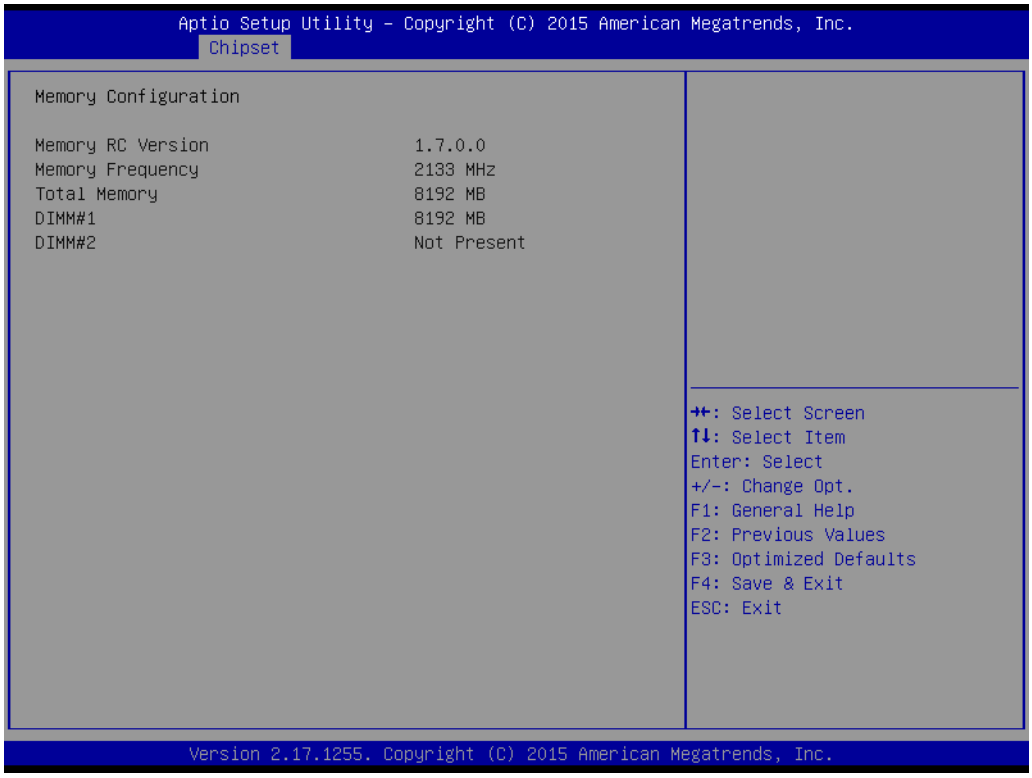
- **Max Link Speed**

  This item allows users to set Auto or Gen1 or Gen2 or Gen3 for "Max Link Speed" at PCIE x4 socket.

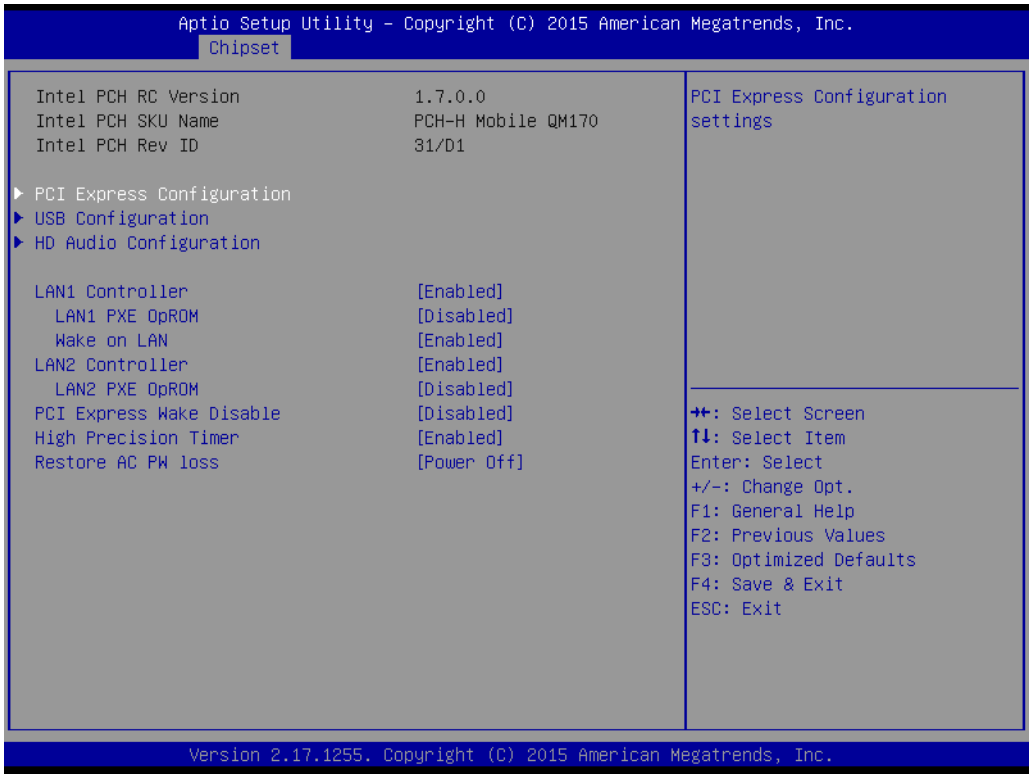
- **Detect Non-Compiance Device**

  This item allows users to Disable or Enable "Max Link Speed".

- **Memory Configuration**



PCH-IO Configuration



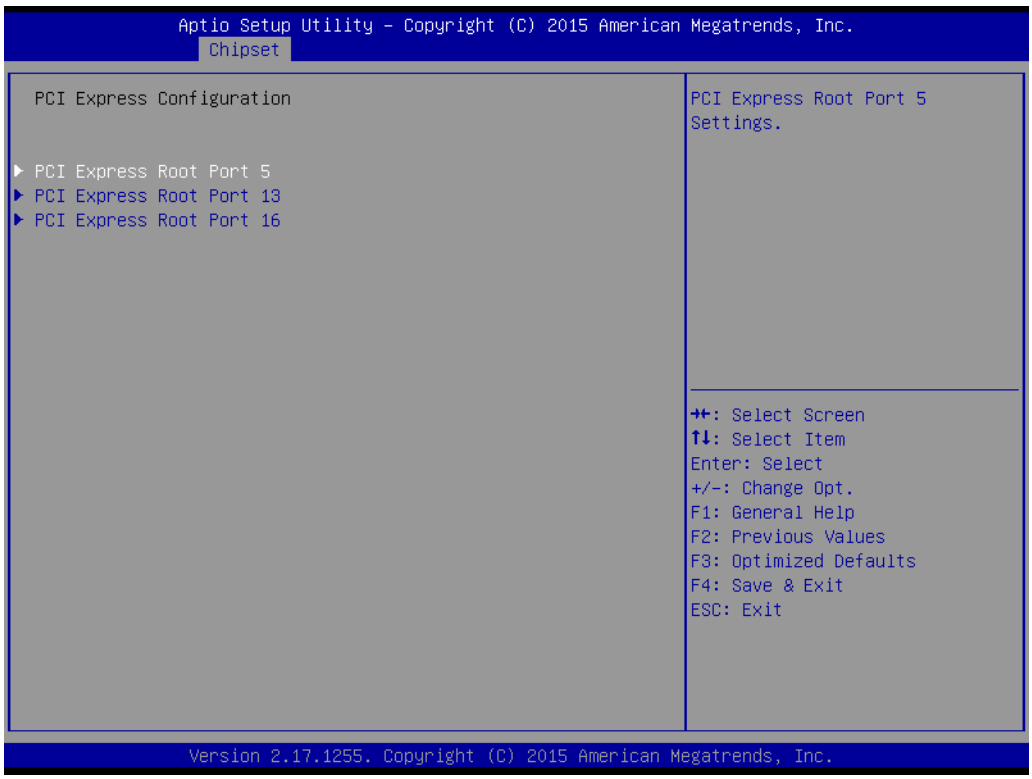
3.2.3.1 PCI Express Configuration

Note! *This item allows users to set PCH PCI Express signal, including PCIe x4 (or PCIe x1) or Mini-PCIE A or Mini-PCIE B. Corresponding setting item are as follows:*

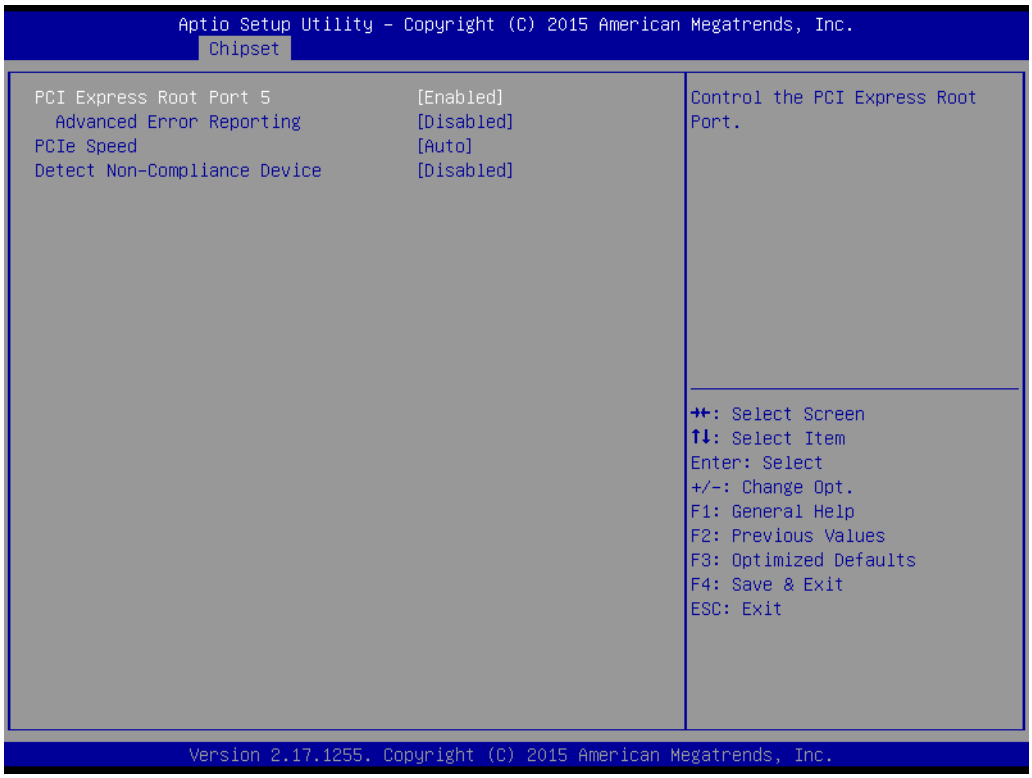
-->PCI Express Root Port 5: i-module PCIe x4 or PCIe x1

-->PCI Express Root Port 13: Mini PCIe A

-->PCI Express Root Port 16: Mini PCIe B



PCI Express Root Port 5



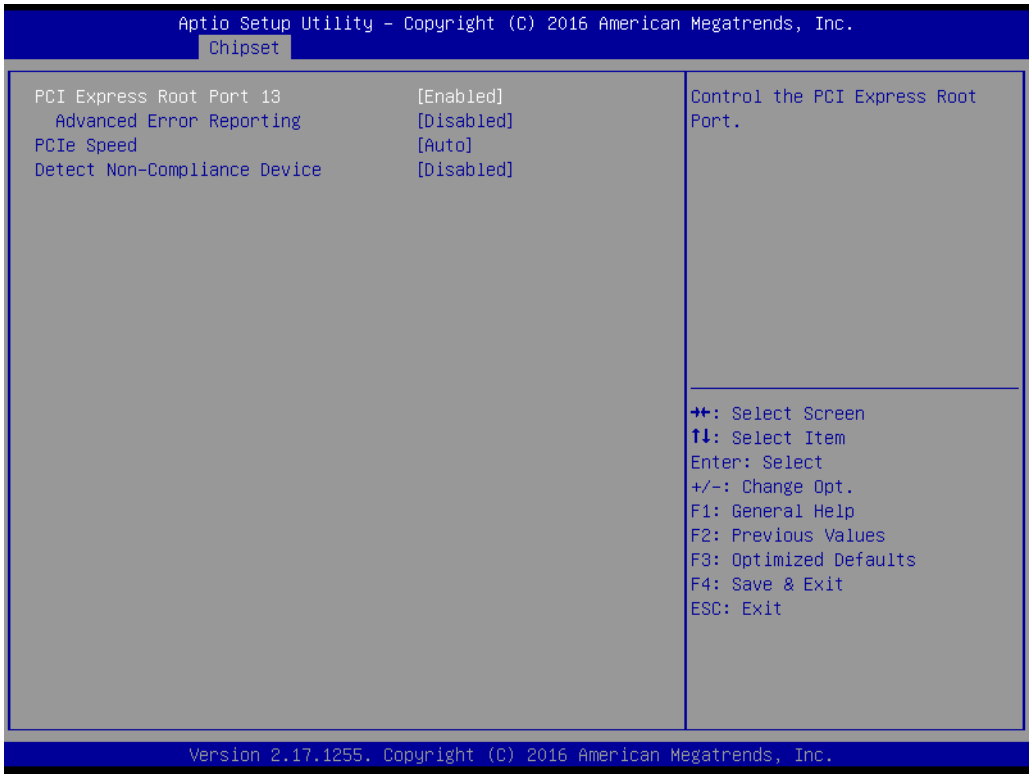
Note! *This item allows users to set i-module PCIe x4 (or PCIe x1 socket).*

PCI Express Root Port5

- **PCI Express Root Port 5**
  This item allows users to disable or enable "PCI Express Root Port 5".
- **Advanced Error Reporting**
  This item allows users to disable or enable for "Advanced Error Reporting".
- **PCIe Speed**
  This item allows users to set Auto or Gen1 or Gen2 or Gen3 for "PCIe Speed".

- **Detect Non-Compliant Device**
  This item allows users to disable or enable "Detect Non-Compliance Device".

PCI Express Root Port 13

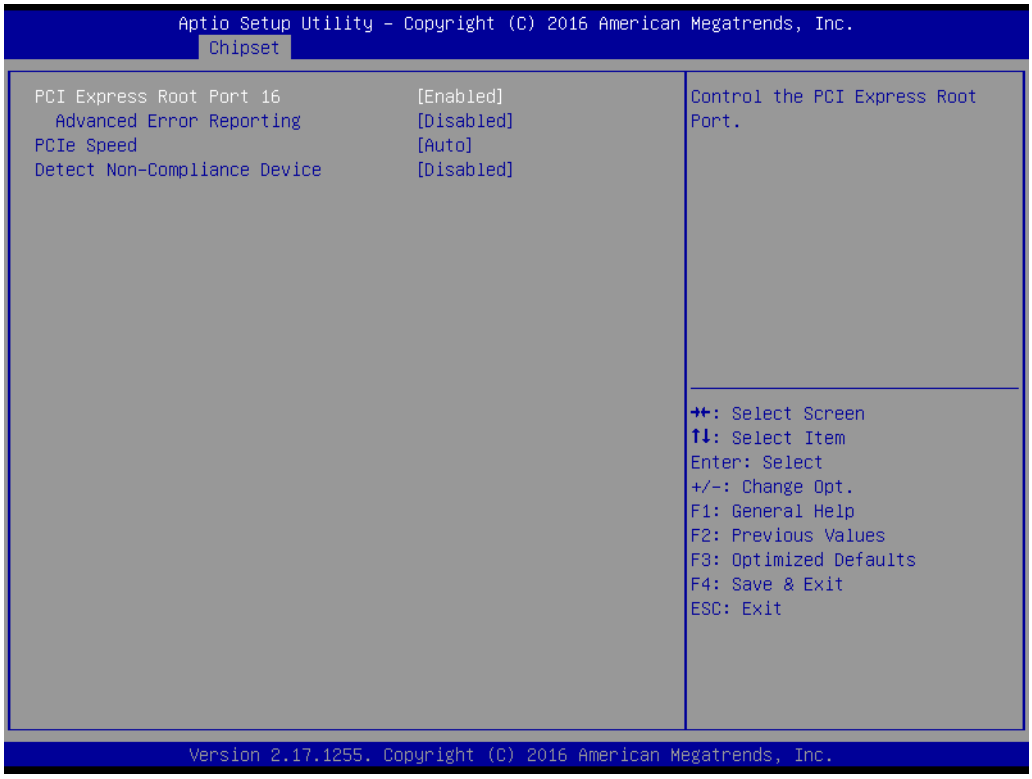


- **PCI Express Root Port 13**
  This item allows users to disable or enable "PCI Express Root Port 13".
- **Advanced Error Reporting**
  This item allows users to disable or enable "Advanced Error Reporting".
- **PCIe Speed**
  This item allows users to set Auto or Gen1 or Gen2 or Gen3 for "PCIe Speed".
- **Detect Non-Compliance Device**
  This item allows users to disable or enable “Detect Non-Compliance Device”.

Note! *Mini-PCIE socket only supports to Gen 2.*

- **Detect Non-Compliant Device**
  This item allows users to disable or enable “Detect Non-Compliance Device".

PCI Express Root Port 16

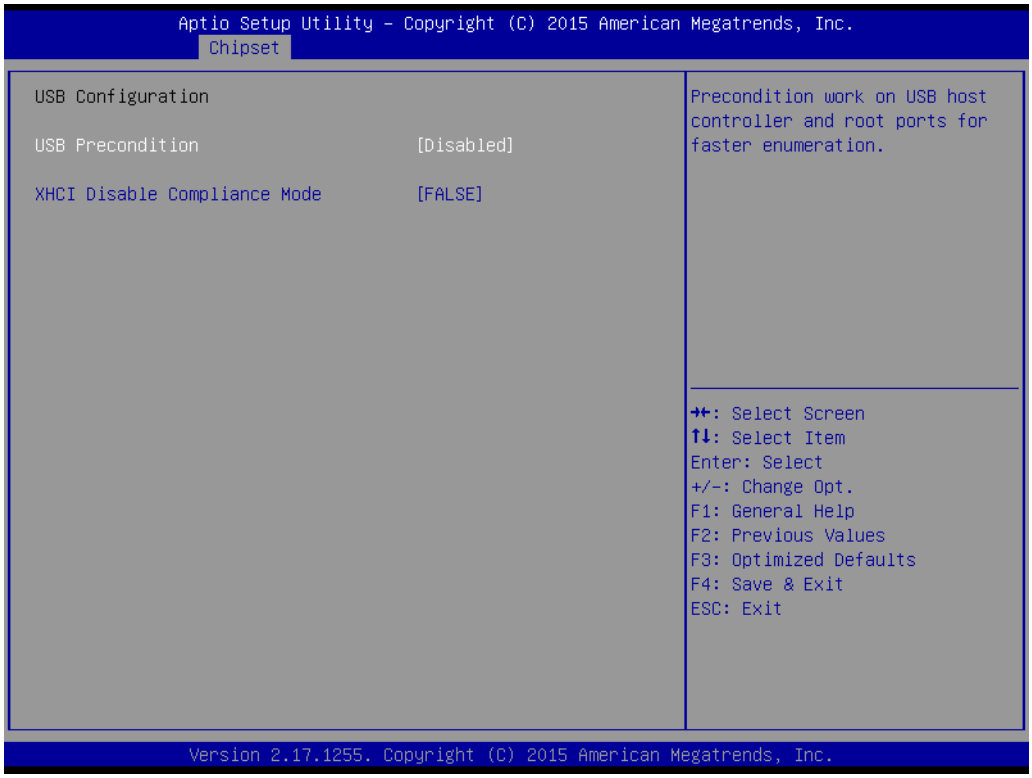


- **PCI Express Root Port 16**
  This item allows users to disable or enable "PCI Express Root Port 16".
- **Advanced Error Reporting**
  This item allows users to disable or enable "Advanced Error Reporting”.
- **PCIe Speed**
  This item allows users to set Auto or Gen1 or Gen2 or Gen3 for "PCIe Speed".
- **Detect Non-Compliance Device**
  This item allows users to disable or enable “Detect Non-Compliance Device".

Note! *Mini PCIe socket only supports to Gen 2.*

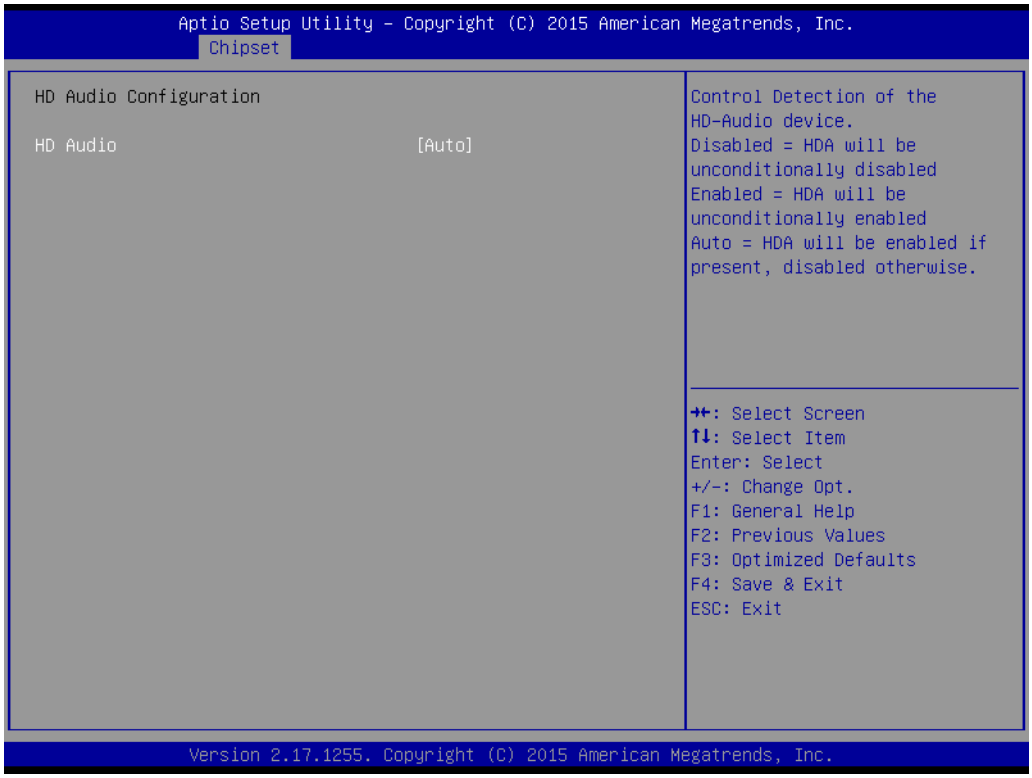
- **Detect Non-Compliant Device**
  This item allows users to disable or enable “Detect Non-Compliance Device".

3.2.3.2 USB Configuration

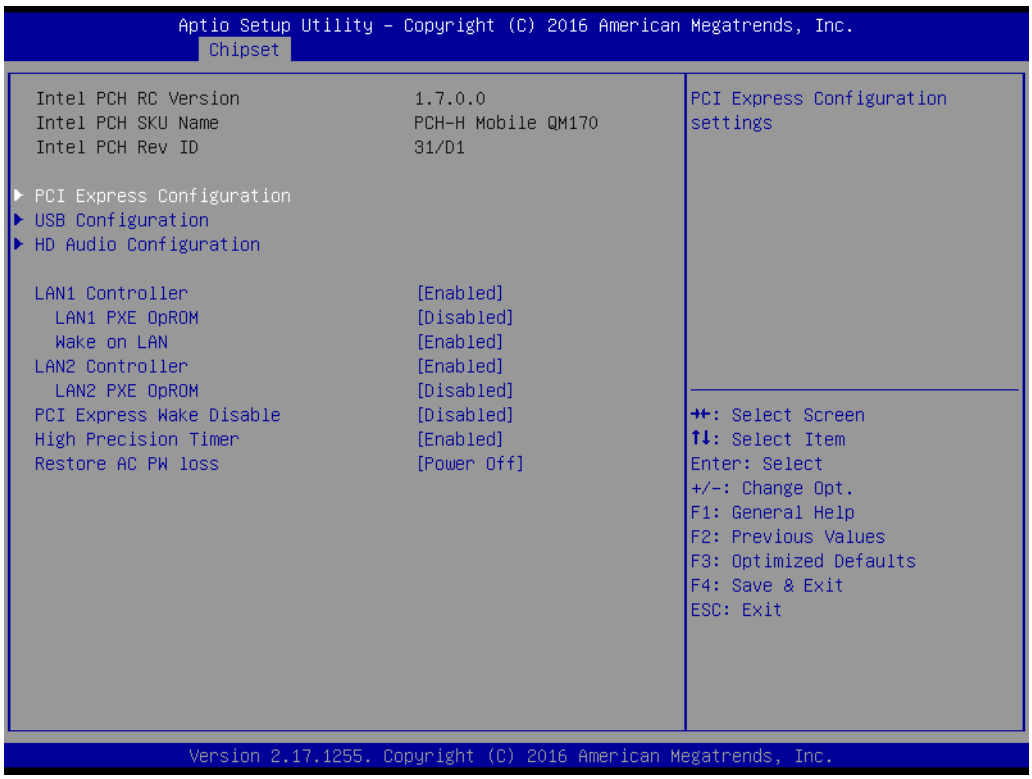


- **USB Precondition**
  This item allows users to disable or enable "USB Precondition".
- **XHCI Disable Compliance Mode**
  This item allows users to set FALSE or TRUE for "XHCI Disable Compliance Mode".

3.2.3.3 HD Audio Configuration

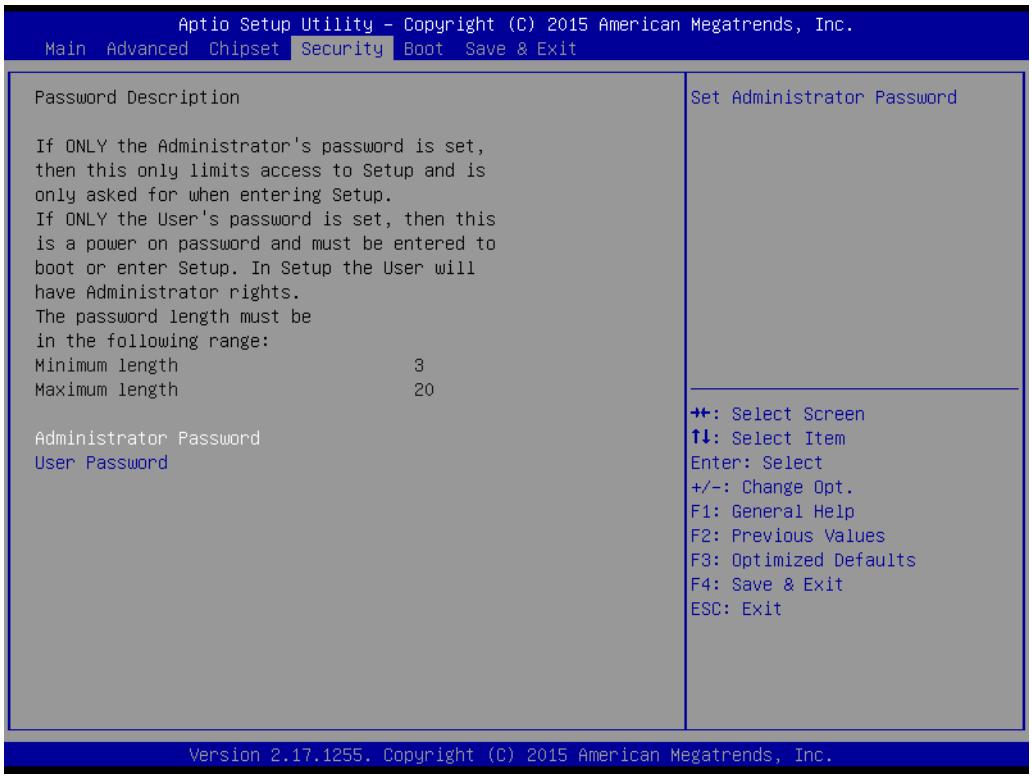


- **HD Audio**
  This item allows users to Disable or Enabled or set Auto for "HD Audio".



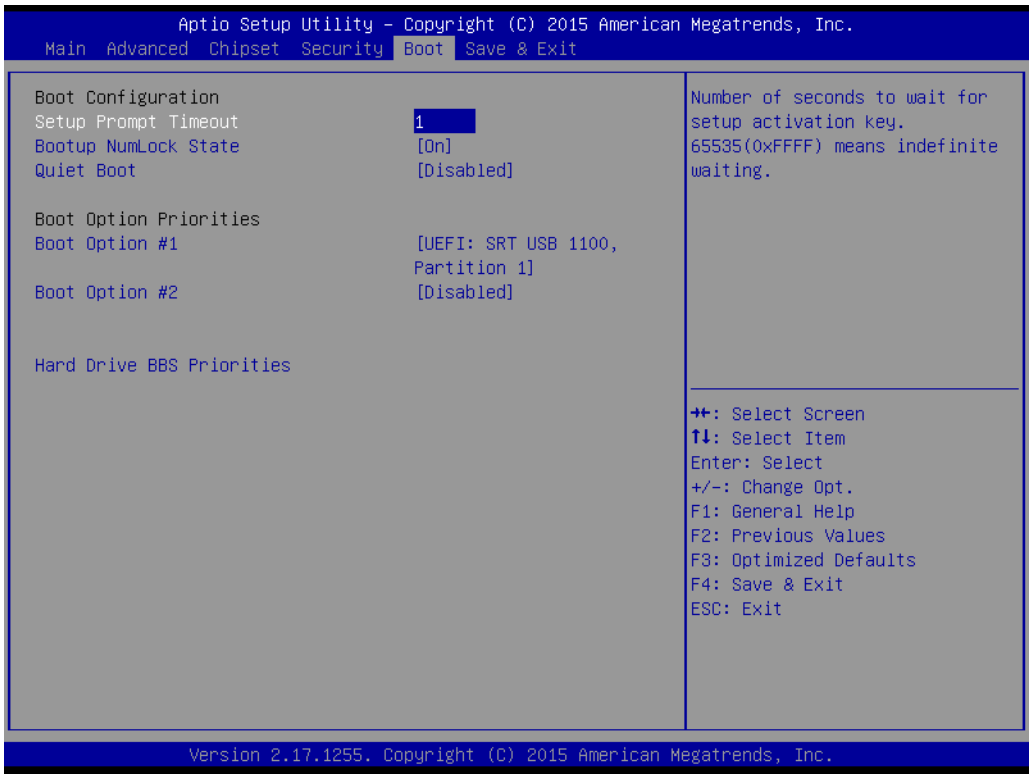
- **LAN 1 Controller**
  This item allows users to disable or enable "LAN 1 Controller".
- **LAN1 PXE OpROM**
  This item allows users to disable or enable "LAN1 PXE OpROM".
- **Wake on LAN**
  This item allows users to set LAN1 Disabled or Enabled for "Wake on LAN".
- **LAN 2 Controller**
  This item allows users to disable or enable "LAN 2 Controller".
- **LAN2 PXE OpROM**
  This item allows users to disable or enable "LAN 2 PXE OpROM".
- **PCI Express Wake Disable**
  This item allows users to disable or enable "PCI Express Wake Disable".
- **High Precision Timer**
  This item allows users to disable or enable "High Precision Timer".
- **Restore AC PW Loss**
  This item allows users to set Power On or Power Off or Last State for "Restore AC PW Loss".

3.2.4 Security



- **Administrator Password**
  This item allows users to set "Administrator Password" if desired.
- **User Password**
  This item allows users to set "User Password" if desired.

3.2.5 Boot

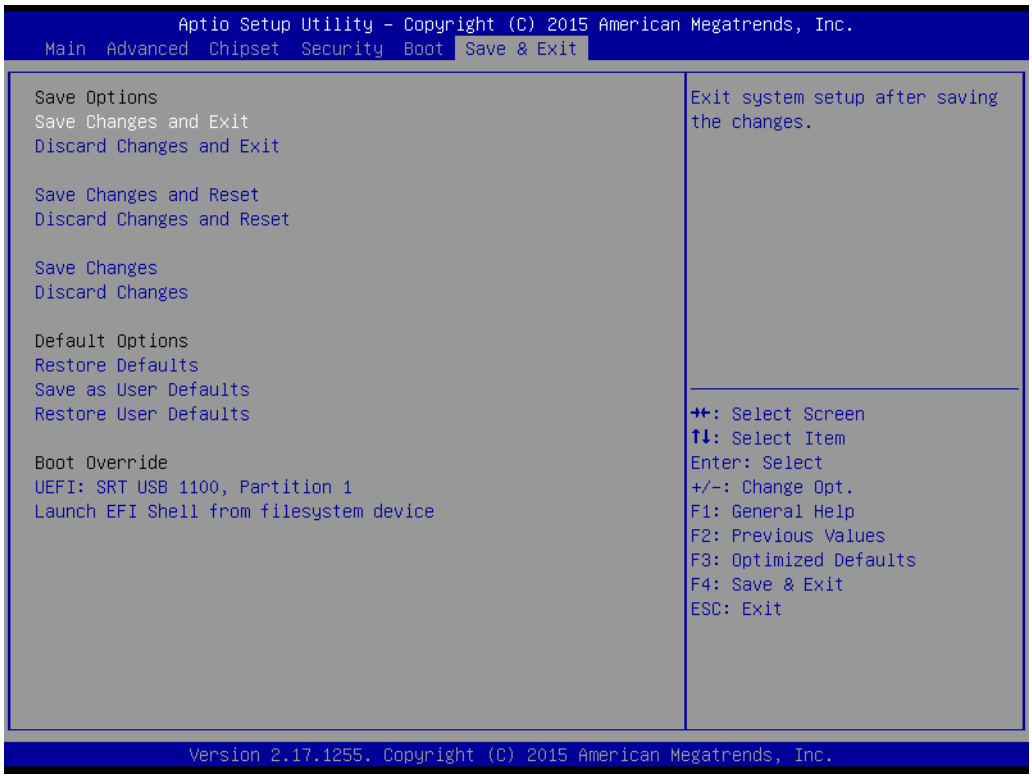


- **Setup Prompt Timeout**
  Number of Seconds to wait for setup activation kay. 65535 (0xFFFF) means indefinite waiting.
- **Bootup NumLock State**
  This item allows users to set "Bootup NumLock State" either On or Off.
- **Quiet Boot**
  This item allows users to disable or enable "Quiet Boot".
- **Boot Option Priorities**

Note! *These items will display based on how many devices are attached.*

  - Boot Option #1
  - Boot Option #2

3.2.6 Save & Exit



- **Save Changes and Exit**
  This item allows users to Save Changes and Exit.
- **Discard Changes and Exit**
  This item allows users to Discard Changes and Exit.
- **Save Changes and Reset**
  This item allows users to Save Changes and Reset.
- **Discard Changes and Reset**
  This item allows users to Discard Changes and Reset.
- **Save Changes**
  This item allows users to Save Changes.
- **Discard Changes**
  This item allows users to Discard Changes.
- **Restore Defaults**
  This item allows users to restore factory defaults.
- **Save as User Defaults**
  This item allows users to Save as User Defaults.
- **Restore User Defaults**
  This item allows users to Restore User Defaults.
- **Launch EFI Shell from file system device**
  Attempts to Launch EFI Shell application (Shell.efi) form one of the available file system devices.

Chapter 4

Software Installation

This chapter introduces driver installation.

4.1 Chipset Software Installation Utility

4.1.1 Before you begin

To facilitate the installation of the enhanced display drivers and utility software, read the instructions in this chapter carefully. The drivers for the MIC-7500 are located on the software installation CD.

Note! *The files on the software installation CD are compressed. Do not attempt to install the drivers by copying the files manually. You must use the supplied SETUP program to install the drivers.*

Before you begin, it is important to note that most display drivers need to have the relevant software application already installed in the system prior to installing the enhanced display drivers. In addition, many of the installation procedures assume that you are familiar with both the relevant software applications and operating system commands. Review the relevant operating system commands and the pertinent sections of your application software's user manual before performing the installation.

4.1.2 Introduction

The Intel® Chipset Software Installation (CSI) utility installs the Windows INF files that outline to the operating system how the chipset components will be configured. This is needed for the proper functioning of the following features:

- Core PCI PnP services
- Serial ATA interface support
- USB 1.1/2.0 support
- Identification of Intel chipset components in the Device Manager.

Note! *The chipset driver is used for the following versions of Windows, and it has to be installed before installing all the other drivers:*

- *Windows 10 (64bit)*
- *Windows 8.1 (64-bit)*
- *Windows 7 (32-bit)*
- *Windows 7 (64-bit)*

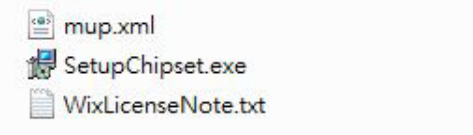
Caution! *Intel® Skylake Platform does not include a USB3.0 driver. The user can use a SATA interface driver (SATA CD-RAM or CFast or m-SATA) to install Windows 7 OS.*

Advantech supports a powerful Windows 7 OS that includes USB3.0 (EFI OS not supported). It can help you install Win7 OS easily. If you need this option, please contact your distributor or sales representative.

4.1.3 Windows 10 / Windows 8.1/ Windows 7

1. Put the driver CD into the system's CD-ROM drive. You will see driver folder items. Select "01 Chipset" folder. In CSI folder, click the executable file to complete driver installation.

2. Click setup to execute program.



4.2 Integrated Graphic Device Setup

4.2.1 Introduction

The 4th Gen Intel® Core™ i processors are embedded with integrated graphics controller. You need to install the VGA driver to enable this function, which includes the following features:

- Optimized integrated graphic solution: Intel® Graphics Flexible Display Interface supports versatile display options and 32-bit 3D graphics engine for dual independent displays, enhanced display modes for widescreen flat panels for extended, twin, and cloned dual display modes, and optimized 3D support delivers an intensive and realistic visual experience.

Caution! *Intel® Graphic Device does not support Windows 10 (32bit) and Windows 8.1 (32.bit)*

4.2.2 Windows 10 /Windows 8.1 /Windows 7 Driver Setup

Note! *Before installing these drivers, make sure the INF driver has been installed in your system. See Chapter 4 for information on installing the INF driver.*

Insert the driver CD into your system's CD-ROM drive. You can see the driver folders. Navigate to the "02 Graphic" folder and click the executable file to complete the installation of the drivers for Windows 7, Windows 8 and Windows 10.

4.3 Intel® ME

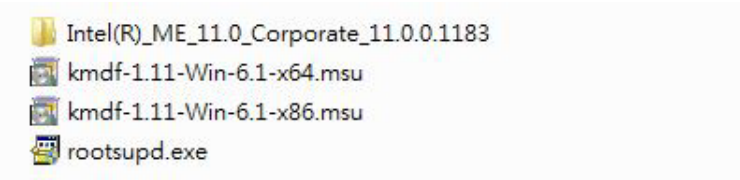
4.3.1 Introduction

The Intel® ME software components that need to be installed depend on the system's specific hardware and firmware features. The installer detects the system's capabilities and installs the relevant drivers and applications.

4.3.2 Installation

Insert the driver CD into your system's CD-ROM drive. Navigate to the "03_Intel ME" folder and find folder "Intel ME" to install the driver.

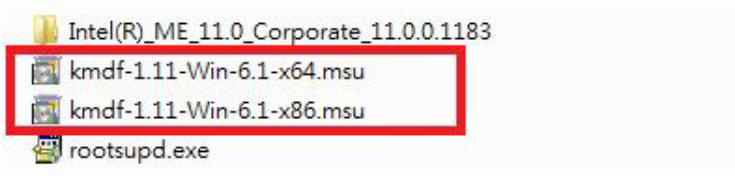
Note! *If the Intel® Management Engine (Intel® ME) driver has not been successfully installed in Win7, please refer to the Win7 ME install process below.*



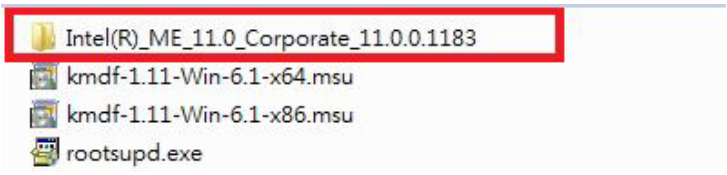
4.3.3 Install Intel® ME for Windows 7

Please follow this processer to install Intel® ME for Windows 7.

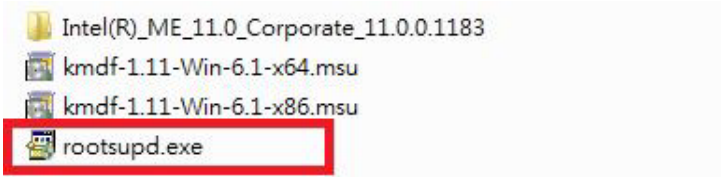
1. Install hot fix first.



2. Install ME.



3. Install rootsupd.exe.



4.4 LAN Configuration

4.4.1 Introduction

The MIC-7500 has dual Gigabit Ethernet LANs via dedicated PCI Express x1 lanes (Intel® I219LM (LAN1) and I210IT (LAN2)) that offer bandwidth of up to 500 MB/sec, eliminating the bottleneck of network data flow and incorporating Gigabit Ethernet at 1000 Mbps.

4.4.2 Features

- 10/100/1000Base-T Ethernet controller
- 10/100/1000Base-T triple-speed MAC
- Full duplex at 10, 100, or 1000 Mbps and half duplex at 10 or 100 Mbps
- Wake-on-LAN (WOL) support
- PCIe x1 host interface

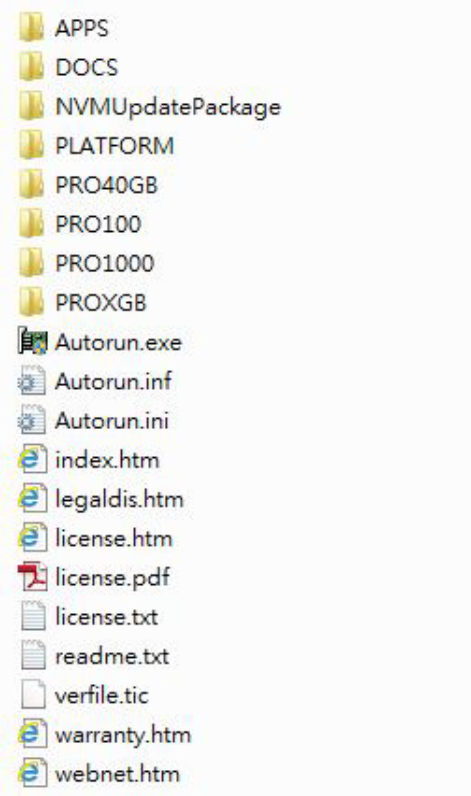
4.4.3 Installation

Note! *Before installing the LAN drivers, make sure the CSI utility has been installed on your system. See Chapter 4 for information on installing the CSI utility.*

The integrated Intel® gigabit Ethernet controller supports all major network operating systems. However, the installation procedure varies with different operating systems. In the following sections, refer to the one that provides the driver setup procedure for the operating system you are using.

4.4.4 Windows 10 /Windows 8.1 /Windows 7

Insert the driver CD into your system's CD-ROM drive. Select folder "04_LAN" then click the "Rel_20.3_PV_OEMGen_380842"



4.5 SATA RAID Setup

4.5.1 Introduction

To support demanding disk I/O, Intel® Q170 chipset integrates six Serial ATA controllers with software RAID 0, 1, 5, 10 capabilities.

RAID 0 striping increases the storage performance and is designed to speed up data transfer rates for disk-intensive applications.

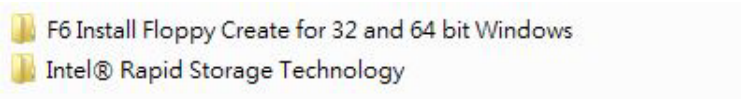
RAID 1 mirroring protects valuable data that might be lost in the event of a hard drive failure.

RAID 5 array contains three or more hard drives where the data is divided into manageable blocks called strips. Parity is a mathematical method for recreating data that was lost from a single drive, which increases fault-tolerance. The data and parity are striped across all the hard drives in the array. The parity is striped in a rotating sequence to reduce bottlenecks associated with the parity calculations.

RAID 10 array uses four hard drives to create a combination of RAID levels 0 and 1. The data is striped across a two-drive array forming the RAID 0 component. Each of the drives in the RAID 0 array is then mirrored by a RAID 1 component.

4.5.2 SATA RAID Driver and Utility Setup

The installation utility is in the CD's "06_Intel RAID_AHCI" folder. Go to the directory of the CD and follow these steps to install.



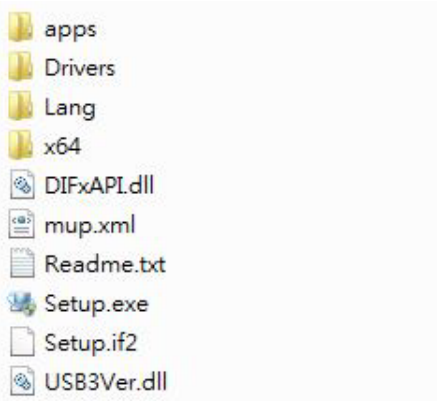
Note! *Please install ".NET 4.5" before installing "Intel Rapid Storage Technology".*

4.6 Install USB3.0

4.6.1 Introduction

MIC-7500 provides 8x USB 3.0 and the data transfer rate of USB3.0 (5Gb/s) is 10 times to USB2.0 (480 Mbps).

Insert the driver CD into your system's CD-ROM drive. Navigate to the "07 USB3.0" to install the drier.



Appendix A

Programming the Watchdog Timer

A.1 Programming the Watchdog Timer

The MIC-7500's watchdog timer can be used to monitor system software operation and take corrective action if the software fails to function within the programmed period. This section describes the operation of the watchdog timer and how to program it.

A.1.1 Watchdog Timer Overview

The watchdog timer is built into the super I/O controller NCT6106D. It provides the following user-programmable functions:

- It can be enabled and disabled by user program
- Timer can be set from 1 to 255 seconds or 1 to 255 minutes
- Generates an interrupt or resets signal if the software fails to reset the timer before time-out

A.1.2 Programming the Watchdog Timer

The I/O port address of the watchdog timer is 2E (hex) and 2F (hex). 2E (hex) is the address port. 2F (hex) is the data port. You must first assign the address of register by writing an address value into address port 2E (hex), then write/read data to/from the assigned register through data port 2F (hex).

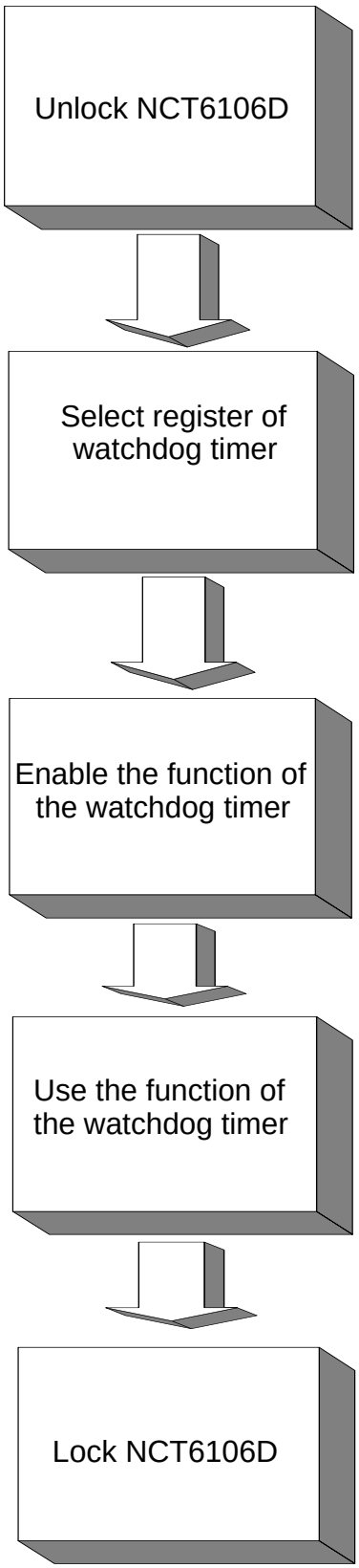

Unlock NCT6106D
Select register of watchdog timer
Enable the function of the watchdog timer
Use the function of the watchdog timer
Lock NCT6106D

Table A.1: Watchdog Timer Registers		
Address of Register (2E)	**Attribute**	
Read/Write	Value (2F) & description	
87 (hex)	-----	Write this address to I/O address port 2E (hex) twice to unlock the NCT6106D.
07 (hex)	write	Write 08 (hex) to select register of watchdog timer.
30 (hex)	write	Write 01 (hex) to enable the function of the watchdog timer. Disabled is set as default.
F0 (hex)	write	Set seconds or minutes as units for the timer. Write 0 to bit 3: set second as counting unit. [default] Write 1 to bit 3: set minutes as counting unit.
F1 (hex)	write	0: stop timer [default] 01~FF (hex): The amount of the count, in seconds or minutes, depends on the value set in register F5 (hex). This number decides how long the watchdog timer waits for strobe before generating an interrupt or reset signal. Writing a new value to this register can reset the timer to count with the new value.
F2 (hex)	read/write	Bit 7:Write 1 to enable mouse to reset the timer, 0 to disable[default]. Bit 6: Write 1 to enable keyboard to reset the timer, 0 to disable.[default] Bit 5: Write 1 to generate a timeout signal immediately and automatically return to 0. [default=0] Bit 4: Read status of watchdog timer, 1 means timer is “timeout”.
AA (hex)	-----	Write this address to I/O port 2E (hex) to lock the watchdog timer 2.

A.1.3 Example Program

1. Enable watchdog timer and set 10 sec. as timeout interval

```
;----------------------------------------------------------
Mov dx,2eh ; Unlock NCT6106D
Mov al,87h
Out dx,al
Out dx,al
;----------------------------------------------------------
Mov al,07h ; Select registers of watchdog timer
Out dx,al
Inc dx
Mov al,08h
Out dx,al
;----------------------------------------------------------
Dec dx ; Enable the function of watchdog timer
Mov al,30h
Out dx,al
Inc dx
Mov al,01h
Out dx,al
;----------------------------------------------------------
Dec dx ; Set second as counting unit
Mov al,0f0h
Out dx,al
Inc dx
In al,dx
And al,not 08h
Out dx,al
;----------------------------------------------------------
Dec dx ; Set timeout interval as 10 seconds and start counting
Mov al,0f1h
Out dx,al
Inc dx
Mov al,10
Out dx,al
;----------------------------------------------------------
Dec dx ; Lock NCT6106D
Mov al,0aah
Out dx,al
```

2. Enable watchdog timer and set 5 minutes as timeout interval

```
;----------------------------------------------------------
Mov dx,2eh ; Unlock NCT6106D
Mov al,87h
Out dx,al
Out dx,al
```

```
;--------------------------------------------------------
Mov al,07h ; Select registers of watchdog timer
Out dx,al
Inc dx
Mov al,08h
Out dx,al
;--------------------------------------------------------
Dec dx ; Enable the function of watchdog timer
Mov al,30h
Out dx,al
Inc dx
Mov al,01h
Out dx,al
;--------------------------------------------------------
Dec dx ; Set minute as counting unit
Mov al,0f0h
Out dx,al
Inc dx
In al,dx
Or al,08h
Out dx,al
;--------------------------------------------------------
Dec dx ; Set timeout interval as 5 minutes and start counting
Mov al,0f1h
Out dx,al
Inc dx
Mov al,5
Out dx,al
;--------------------------------------------------------
Dec dx ; Lock NCT6106D
Mov al,0aah
Out dx,al
```

3. Enable watchdog timer to be reset by mouse

```
;--------------------------------------------------------
Mov dx,2eh ; Unlock NCT6106D
Mov al,87h
Out dx,al
Out dx,al
;--------------------------------------------------------
Mov al,07h ; Select registers of watchdog timer
Out dx,al
Inc dx
Mov al,08h
Out dx,al
;--------------------------------------------------------
```

```
Dec dx ; Enable the function of watchdog timer
Mov al,30h
Out dx,al
Inc dx
Mov al,01h
Out dx,al
;--------------------------------------------------------
Dec dx ; Enable watchdog timer to be reset by mouse
Mov al,0f2h
Out dx,al
Inc dx
In al,dx
Or al,80h
Out dx,al
;--------------------------------------------------------
Dec dx ; Lock NCT6106D
Mov al,0aah
Out dx,al
```

4. Enable watchdog timer to be reset by keyboard

```
;--------------------------------------------------------
Mov dx,2eh ; Unlock NCT6106D
Mov al,87h
Out dx,al
Out dx,al
;--------------------------------------------------------
Mov al,07h ; Select registers of watchdog timer
Out dx,al
Inc dx
Mov al,08h
Out dx,al
;--------------------------------------------------------
Dec dx ; Enable the function of watchdog timer
Mov al,30h
Out dx,al
Inc dx
Mov al,01h
Out dx,al
;--------------------------------------------------------
Dec dx ; Enable watchdog timer to be strobed reset by keyboard
Mov al,0f2h
Out dx,al
Inc dx
In al,dx
Or al,40h
Out dx,al
```

```
;--------------------------------------------------------
Dec dx ; Lock NCT6106D
Mov al,0aah
Out dx,al
```

5. Generate a time-out signal without timer counting

```
;--------------------------------------------------------
Mov dx,2eh ; Unlock NCT6106D
Mov al,87h
Out dx,al
Out dx,al
;--------------------------------------------------------
Mov al,07h ; Select registers of watchdog timer
Out dx,al
Inc dx
Mov al,08h
Out dx,al
;--------------------------------------------------------
Dec dx ; Enable the function of watchdog timer
Mov al,30h
Out dx,al
Inc dx
Mov al,01h
Out dx,al
;--------------------------------------------------------
Dec dx ; Generate a time-out signal
Mov al,0f2h
Out dx,al ;Write 1 to bit 5 of F7 register
Inc dx
In al,dx
Or al,20h
Out dx,al
;--------------------------------------------------------
Dec dx ; Lock NCT6106D
Mov al,0aah
Out dx,al
```

Appendix B

Programming the GPIO

B.1 Supported GPIO Register

Bellow are detailed description of the GPIO addresses and programming sample.

B.1.1 GPIO Registers

CRE4 (GP10-GP17 I/O selection register. Default 0xFF)

When set to '1', the respective GPIO port is programmed as an input port.

When set to '0', the respective GPIO port is programmed as an output port.

CRE5 (GP10-GP17 data register. Default 0x00)

If a port is programmed to be an output port, then its respective bit can be read/written.

If a port is programmed to be an input port, then its respective bit can only be read.

CRE6 (GP10-GP17 inversion register. Default 0x00)

When set to '1', the incoming/outgoing port value is inverted.

When set to '0', the incoming/outgoing port value is the same as in data register.

Extended Function Index Registers (EFIRs)

The EFIRs are write-only registers with port address 2Eh or 4Eh on PC/AT systems.

Extended Function Data Registers (EFDRs)

The EFDRs are read/write registers with port address 2Fh or 4Fh on PC/AT systems

B.1.2 GPIO Example Program

```
------------------------------------------------------------
Enter the extended function mode, interruptible double-write
------------------------------------------------------------
MOV DX, 2EH
MOV AL, 87H
OUT DX, AL
OUT DX, AL
------------------------------------------------------------
Configure logical device 7(GP10~GP17), configuration register CRE4,CRE5,CRE6
------------------------------------------------------------
MOV DX, 2EH
MOV AL, 07H ; Point to Logical Device Number Reg.
OUT DX, AL
MOV DX, 2FH
MOV AL, 07H ; Select logical device 7
OUT DX, AL
------------------------------------------------------------
Configure GPIO1 I/O Register
------------------------------------------------------------
MOV DX, 2EH
MOV AL, E4H
OUT DX, AL
MOV DX, 2FH
MOV AL, ??H ; 0: The respective GPIO1 PIN is programmed as an output port
                ;1: The respective GPIO1 PIN is programmed as an input port.
 OUT DX, AL
------------------------------------------------------------
Configure GPIO1 Inversion Register
------------------------------------------------------------
MOV DX, 2EH
MOV AL, E6H
OUT DX, AL
MOV DX, 2FH
MOV AL, 00H ; Set GPIO is normal not inverter
OUT DX, AL
------------------------------------------------------------
Configure GPIO1 Data Register
------------------------------------------------------------
MOV DX, 2EH
MOV AL, E5H
OUT DX, AL
MOV DX, 2FH
MOV AL, ??H ; Put the output value into AL
OUT DX, AL
------------------------------------------------------------
Exit extended function mode |
------------------------------------------------------------
MOV DX, 2EH
MOV AL, AAH
OUT DX, AL
```

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