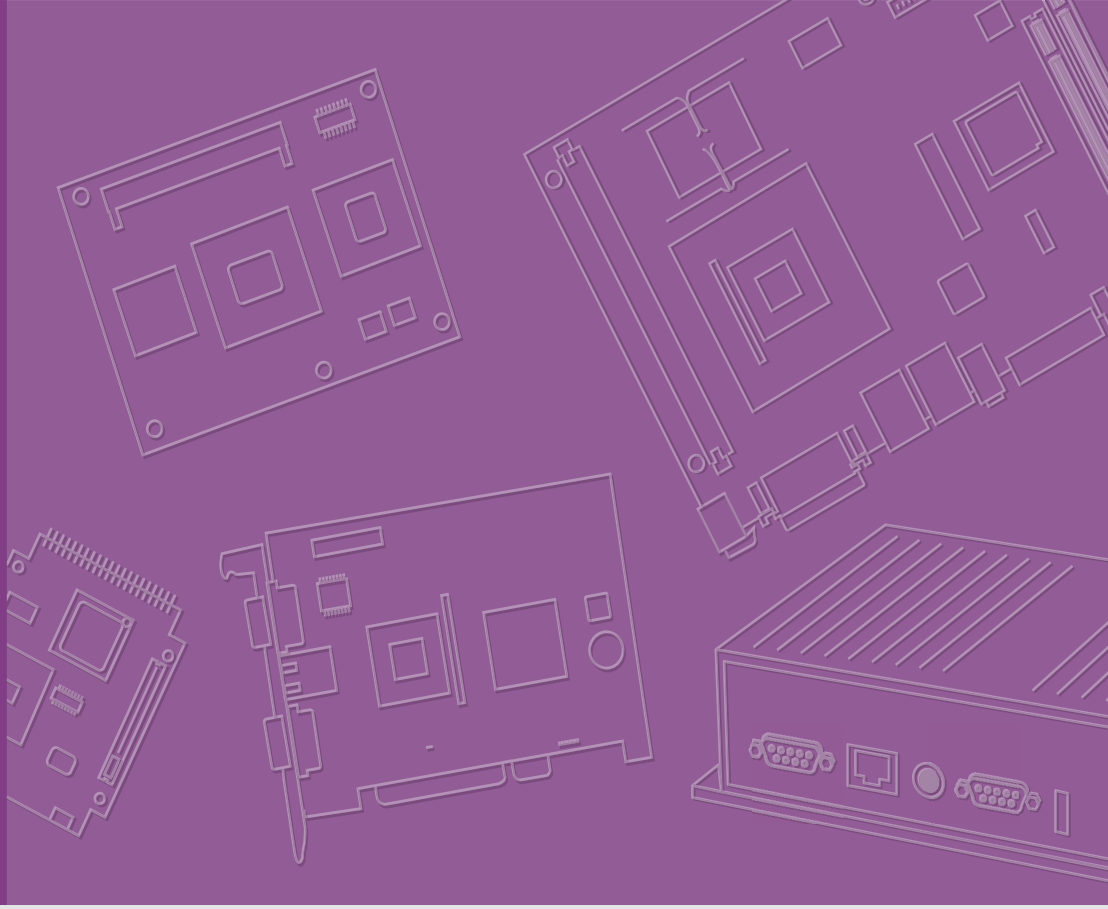

User Manual

AIR-300

Fanless Embedded Box PC

ADVANTECH

Enabling an Intelligent Planet

Attention!

Please note:

This package contains a hard-copy user manual in Chinese for China CCC certification purposes. 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.

甲類警語：

警告使用者：這是甲類資訊產品，在居住的環境使用時，可能會造成輻射干擾，在這種情況下，使用者會被要求採取某些適當措施。

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http://www.advantech.com/ePlatform/

For technical support and service, please visit our support website at:

http://support.advantech.com.tw/support/

Part No. 2006R30000 Edition 1

Printed in China November 2019

Product Warranty (2 years)

Advantech 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 Advantech, or which have been subject to misuse, abuse, accident or improper installation. Advantech assumes no liability under the terms of this warranty as a consequence of such events.

Because of Advantech's high quality-control standards and rigorous testing, most of our customers never need to use our repair service. If an Advantech product 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 speed, Advantech products used, other hardware and software used, etc.) Note anything abnormal and list any onscreen messages you get when the problem occurs.
2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.
3. If your product is diagnosed as defective, obtain an RMA (return merchandise authorization) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a fully-completed 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.

Declaration of Conformity

FCC Class B

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

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

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

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, which if not observed, can cause 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.*

Packing List

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

- 1 x AIR-300 Unit
- 1 x Mounting Kit
- 1 x User Manual (Simplified Chinese)
- 1 x China RoHS

Ordering Information

Part No.	CPU	DDR4	Gbe	VGA	HDMI	RS-232/ 422/485	USB 3.0	MiniP-CIe	SIM	M.2	AC Input	Expansion
AIR-300-00A1	LGA1151 Socket Type	Up to 32GB	4	1	1	4	8	2	1	1	100-240V	1x PCIex16

Note! *CPU/Memory/Storage and operating system bundled by request.*

AIR-300 Default SKU Option Items

Optional Item for Default SKU

Part Number	Description
1702002600	Power cable 3-pin 183cm, USA type
1702002605	Power cable 3-pin 183cm, EU type
1702031801	Power cable 3-pin 183cm, UK type
1700000237	Power cable, 3-Pin 183cm, PSE type

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 moisture sheet or clothe 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 install. 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: Any unverified component could cause unexpected damage. To ensure the correct installation, please always use the components (ex. screws) provided with the accessory box.
    ATTENTION: Tout composant non vérifiée pourrait causer des dommages inattendu. Pour garantir une installation correcte, s'il vous plaît utilisez toujours les composants (vis ex.) fournies avec la boîte d'accessoires.
17. CAUTION: The computer is provided with a battery-powered real-time clock circuit. There is a danger of explosion if battery is incorrectly replaced. Replace only with same or equivalent type recommended by the manufacture. Discard used batteries according to the manufacturers instructions.
    ATTENTION: L'ordinateur est muni d'un circuit en temps réel de l'horloge alimentée par batterie. Il ya un danger d'explosion si la pile est remplacée de façon incorrecte. Remplacez uniquement par un type identique ou equivalent vii User Manual recommandé par le fabricant. Jetez les piles usagées selon les instructions du fabricant.

18. CAUTION: Always completely 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.
    ATTENTION: Toujours débrancher complètement le cordon d'alimentation de votre châssis lorsque vous travaillez avec le matériel. Ne pas effectuer les raccordements lorsque l'appareil est sur. Composants électroniques sensibles peuvent être endommagés par les surtensions soudaines.
19. The sound pressure level at the operator's position according to IEC 704-1:1982 is no more than 70 dB (A).
20. RESTRICTED ACCESS AREA: The equipment should only be installed in a Restricted Access Area.
21. DISCLAIMER: This set of instructions is given according to IEC 704-1. Advantech disclaims all responsibility for the accuracy of any statements contained herein.

Contents

Chapter 1

General Introduction

This chapter gives background information on the AIR-300 series

1.1 Introduction

AIR-300, an intelligent, high performance desktop system powered by intel Xeon E3 and 6th&7th Gen Core i3/i5/i7 LGA1151 processor comes with multiple I/O combinations and a modular expansion solution. Expansion is supported by the riser card PCIex16 slot. AIR-300 supports a maximum of up to 65W processors and a 0~50°C operating temperature range. It provides multiple I/O up to 4 x COMs, up to 4 x GbE, 8 x USB 3.0, 2 miniPCIe (share with mSATA), and up to a maximum of 4 x 2.5" SATAIII hard drive bays.

Smart AI solution

AIR-300 is designed using high computing performance desktop processors. With the 260W supported PCIex16 expansion slot, customers can choose optional power GPU cards to build up a powerful AI system.

Built-in Intelligent Management Tools - Advantech SUSI API & WISE-PaaS/ Device On

Advantech SUSI API provides a valuable suite of programmable APIs such as multi-level watchdog, hardware monitoring, system restoration, and other user-friendly interfaces.

SUSI API is an intelligent self-management cross platform tool that monitors system status for problems and takes action if anything is abnormal. SUSI API offers a boot up guarantee in critical, low temperature environments so systems can automatically recover when voltages dip. SUSI API makes the entire system more reliable and intelligent. AIR-300 also supports Advantech's own WISE-PaaS/Device On, which provides easy remote management so users can monitor, configure, and control a large number of terminals to make maintenance and system recovery simpler than ever.

1.2 Product Features

1.2.1 General

- **CPU:** Intel ® Xeon E3, 6th&7th Gen Core i3/i5/i7 LGA1151 desktop processor (up to 65W)
- **System Chipset:** Intel C236
- **BIOS:** AMI EFI 128Mbit
- **System Memory:** DDR4 2133Mhz up to 32GB
- **Watchdog Timer:** Single chip Watchdog 255-level interval timer, setup by software
- **I/O Interface:** 4 x RS232/422/485
- **USB:**
  - 8 x USB 3.0 compliant ports
- **Audio:** High Definition Audio (HD), Line out, Mic-in
- **Storage:** Up to 4 x 2.5" HDD drive bays (15mm height) and 2 x mSATA
- **Expansion Interface:**
  - 2 x Full size MiniPCIe (2 support mSATA and 1 with SIM holder, suggested installation at Advantech manufacturing)
  - 1 x PCIe x16
  - 1 x M.2 (E key for Wifi, suggested installation at Advantech manufacturing)

1.2.2 Display

- **Controller:** According to customer-specified CPU selection
- **Resolution:**
  - VGA: supports1920x1200 @ 60 Hz
  - HDMI: supports HDMI 2.0, 3840 x 2160 @ 30 Hz

1.2.3 Ethernet

- **Chipset:**
  - LAN1 Intel® i219LM
  - LAN2/3/4 Intel® i210IT
- **Speed:** 10/100/1000 Mbps
- **Interface:** 4 x RJ45

1.3 Chipset

1.3.1 Functional specifications

1.3.1.1 Processor

Processor	Supports Intel 6th/7th Gen LGA1151 processor (up to 65W):
Memory	Supports DDR4 2133 MHz up to 32GB 2 x 260-pin SODIMM socket type

1.3.1.2 Chipset

Internal Graphics Features	■ Direct x 12, OpenGL 4.4 ■ VGA + HDMI + 3rd optional display module ■ Intel® Display Power saving technology 6.0
Video Accelerator	■ HW accelerated Media Decode: H.265/HEVC, H.264/MPEG-4 AVC, MPEG-2, VC-1/WMV9, JPEG/MJPEG, VP8 and VP9 ■ HW accelerated Media Encode:H. H.265/HEVC, H.264/MPEG-4 AVC, MPEG-2, JPEG/MJPEG and VP8
SATA Interface	**Intel C236 chip supports:** ■ Supports several optional selections of Serial ATA III ■ Supports SATA data transfer rates of up to 6 Gb/s ■ Integrated AHCI controller ■ Supports mSATA socket
USB Interface	**Intel C236 chip supports:** ■ 1 x EHCI Host Controller, supporting SuperSpeed USB 3.0 ports ■ 1 x XHCI Host Controllers, supporting HighSpeed USB 2.0 ports ■ Supports wake-up from sleep states S3 ■ Maximum 500mA for each USB port
Power Management	**Intel C236 chip supports:** ■ Supports ACPI ■ ACPI-defined power states (processor driven C states) ■ ACPI Power Management Timer ■ SMI# generation

BIOS	**Intel C236 chip supports:** ■ AMI 128-Mbit EFI Flash BIOS via SPI

1.3.1.3 Others

Serial Ports	■ Up to six serial ports. ■ Supports IRQ Sharing among serial ports under Microsoft Windows OS ■ COM1,COM2,COM3,COM4: RS-232/422/485 ■ COM5,COM6: RS-232 (Optional)
Ethernet	**LAN1 Intel i219LM, LAN2/3/4 Intel i210 IT** ■ Supports 10/100/1000 Mbps. ■ LAN Connectors: Phone Jack RJ45 8P 90D(F)
Audio	**Audio Codec: ALC888S-VD2-GR** ■ Compliant with HD Audio specifications ■ Supports 16/20/24-bit DAC and 16/20/24-bit ADC resolution ■ Supports: Speak-out, Mic-in ■ Audio Connectors: Ear Phone Jack * 2
Battery Backup	BATTERY 3V/210 mAh with WIRE x 1

1.3.2 SUSI 4.0

SUSI API	
Sequence Control	Supported
DIO	16-bit programmable DIO
Watchdog Timer	Multi-level WDT (set by Advantech iManager) Programmable 1-255 sec / min
Hardware Monitor	CPU Temperature / input Current / input Voltage
System Information	Running HR / Boot record

1.4 Mechanical Specifications

1.4.1 Dimensions

228.3mm x 230mm x 399.92mm (W x H x D)

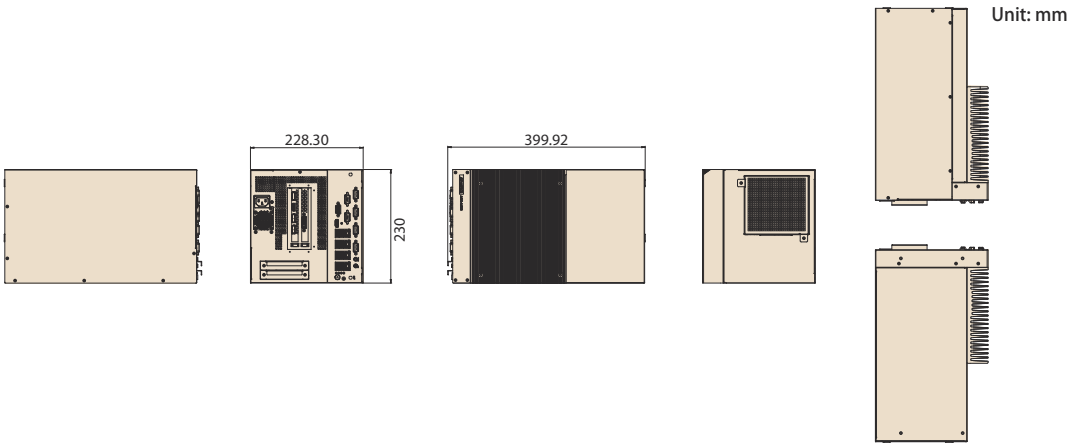


Figure 1.1 AIR-300 mechanical dimension drawing

1.4.2 Weight

10.2 kg

1.5 Power Requirements

1.5.1 System power

- **Power Type:** ATX
- **Power Input Voltage:** 100-240V AC
- **Power Supply:** 850W power supply

1.6 Environment Specifications

1.6.1 Operating temperature

- With extended peripherals: 0 ~ 50° C with 0.7m/s air flow

1.6.2 Relative humidity

- 95% @ 40° C (non-condensing)

1.6.3 Storage temperature

- -20 ~ 80° C (-4 ~ 176° F)

1.6.4 Safety

- UL, CB, CCC, BSMI

1.6.5 EMC

- CE/FCC Class B, CCC, BSMI

Chapter 2

Hardware Configuration

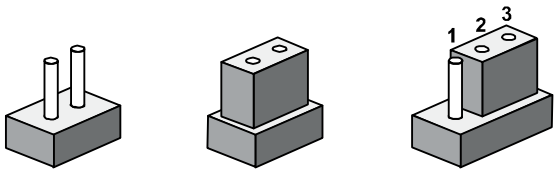
2.1 Introduction

The following sections show the internal jumper settings and the external connector pin assignments for application.

2.2 Jumpers

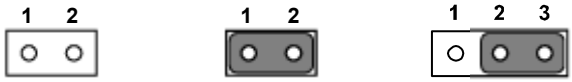
2.2.1 Jumper description

You may configure AIR-300 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, 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	
J1	mSATA/PCIe setting (for CN31)
J2	mSATA/PCIe setting (for CN32)
J3	Auto Power On Setting
J4	CMOS reset
J5	COM1 power setting
CN4	Expansion Riser Card SKU setting

2.2.3 Jumper locations

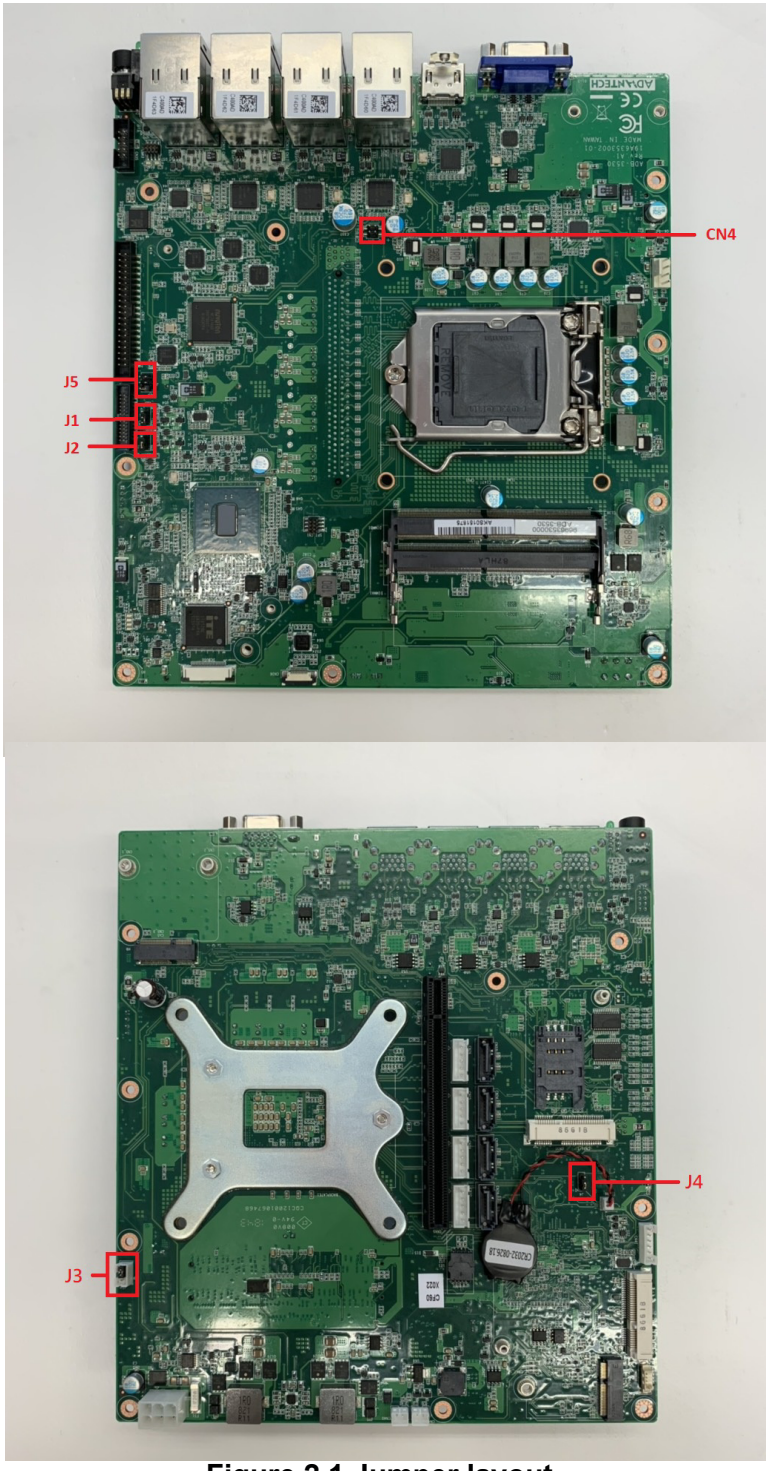
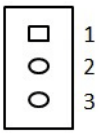


Figure 2.1 Jumper layout

2.2.4 Jumper settings

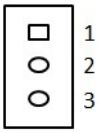
2.2.4.1 mSATA/PCIe settings for CN31 (J1)

J1 mSATA / PCIe Setting	
Part Number	1653003101
Footprint	HD_3x1P_79_D
Description	PIN HEADER 3x1P 2.0mm 180D(M) DIP
Setting	Function
(1-2)	mSATA
(2-3)	PCIe (Default)



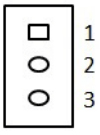
2.2.4.2 mSATA/PCIe settings for CN32 (J2)

J2	mSATA / PCIe Setting
Part Number	1653003101
Footprint	HD_3x1P_79_D
Description	PIN HEADER 3x1P 2.0mm 180D(M) DIP
Setting	Function
(1-2)	mSATA
(2-3)	PCIe (Default)



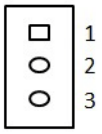
2.2.4.3 Auto power on settings (J3)

J3	uto Power on Setting
Part Number	1655303020
Footprint	HD_3x1P_79_D
Description	DIP WAFER BOX 3x1P 2.0 180D(M)
Setting	Function
(1-2)	Auto Power On
(2-3)	Power Button for Power On (Default)



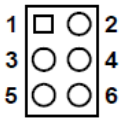
2.2.4.4 CMOS reset (J4)

J4	CMOS reset
Part Number 1	653003101
Footprint	HD_3x1P_79_D
Description	PIN HEADER 3x1P 2.0mm 180D(M) DIP
Setting	Function
(1-2)	Normal Operation (Default)
(2-3)	CMOS reset



2.2.4.5 COM1 power setting (J5)

J5 PH_3x2V_S2.00mm	
Part Number	1653003201
Footprint	HD_3x2P_79_D
Description	
Setting	Function
(1-2)	Normal (default)
(3-4)	+5V
(5-6)	+12V



2.2.4.6 Expansion riser card SKU setting (CN4)

NC	AMO-R028 (default)

2.3 Connectors

2.3.1 AIR-300 front I/O panel

Figure 2.2 AIR-300 front I/O connector drawing

2.3.2 AIR-300 front I/O connectors

AIR-300 provides two USB 2.0 interface connectors, which give complete plug & play and hot swapping for up to 127 external devices. The USB interface complies with USB UHCI, and is Rev. 2.0 compliant. The USB interface can be disabled in the system BIOS setup. Please refer to Table. 2.2 for the pin assignments. The USB connectors are used to connect any device that conforms to the USB interface. Most digital devices conform to this standard. The USB interface supports Plug and Play.

* Supports power on/off switch in suspended mode (By customized BIOS Request support)

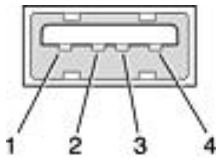


Figure 2.3 USB 2.0 connector

Table 2.2: USB 2.0 connector pin assignments

Pin	Signal Name	Pin	Signal Name
1	+5V	2	USB_data-
3	USB_data+	4	GND

2.3.2.1 COM connector

AIR-300 provides up to eight D-sub 9-pin connectors, which offers RS-232/422/485 serial communication interface ports. Default setting is RS-232, the mode RS-422/485

of AIR-300 COM1~4 can be supported via BIOS setting. Optional COM 5-6 supports RS-232.

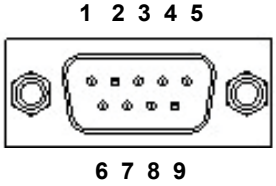


Figure 2.4 COM connector

Table 2.3: 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".*

2.3.2.2 Ethernet connector (LAN)

AIR-300 is equipped with up to 4 Ethernet controllers that are fully compliant with IEEE 802.3u 10/100/1000 Mbps CSMA/CD standards. The Ethernet port provides a standard RJ-45 jack connector with LED indicators on the front side to show its Active/Link status (Green LED) and Speed status (Yellow LED).

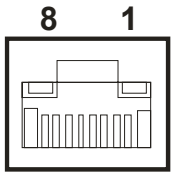


Figure 2.5 Ethernet connector

Table 2.4: Ethernet connector pin assignments

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

Table 2.4: Ethernet connector pin assignments	
8	MDI3-

2.3.2.3 Power On/Off button

AIR-300 has a Power On/Off button with LED indicators on the front side that show On status (Green LED) and Off/Suspend status (Orange LED). The Power button supports dual functions: Soft Power -On/Off (Instant off or Delay 4 Seconds then off), and Suspend.

Figure 2.6 Power ON/OFF button

2.3.2.4 Audio connector

AIR-300 offers two stereo audio ports: Line_Out, Mic_In.

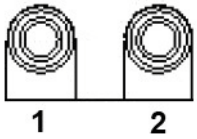


Figure 2.7 Audio connector

Table 2.5: Audio connector pin assignments	
Pin	**Audio Signal Name**
1	Line out
2	Mic in

2.3.2.5 LED indicators

There are four LEDs on the front panel that indicate system status: HDD LED is for HDD status.

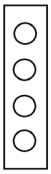


Figure 2.8 LED indicators

2.3.2.6 HDMI connector

An integrated, 19-pin receptacle connector HDMI Type A Interface is provided. The HDMI link supports resolutions up to 3840 x 2160 @ 30 Hz.

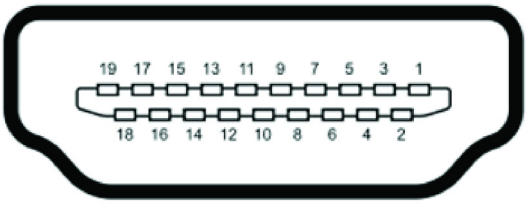


Figure 2.9 HDMI receptacle connector

Table 2.6: HDMI connector pin assignments

Pin	Signal Name	Pin	Signal Name
1	TMDS Data 2+	2	TMDS Data 2 shield
3	TMDS Data 2-	4	TMDS Data 1+
5	TMDS Data 1 shield	6	TMDS Data 1-
7	TMDS Data 0+	8	TMDS Data 0 shield
9	TMDS Data 0-	10	TMDS clock+
11	TMDS clock shield	12	TMDS clock-
13	CEC	14	Reserved
15	SCL	16	SDA
17	DDC/CEC Ground	18	+5V
19	Hot Plug Detect		

2.3.2.7 USB3.0 connector

AIR-300 supports 8 USB 3.0 interfaces. The USB interfaces complies with USB UHCI, Rev. 3.0 standards. Please refer to Table 2.9 for its pin assignments. USB 3.0 connectors contain legacy pins to interface to USB 2.0 devices, and a new set of pins for USB 3.0 connectivity.

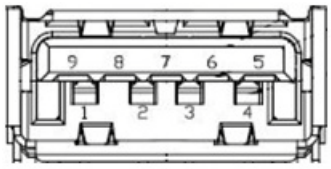


Figure 2.10 USB3.0 connector

Table 2.7: USB 3.0 connector pin assignments

Pin	Signal Name	Pin	Signal Name
1	+5V	2	USB_data-
3	USB_data+	4	GND
5	SSRX-	6	SSRX+
7	GND	8	SSTX-
9	SSTX+		

2.3.2.8 VGA connector

AIR-300 provides an integrated 15-pin female VGA digital video interface, which supports up to 1920 x 1200 @ 60 Hz. Please refer to Table 2.10 for its pin assignments.

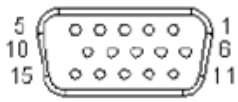


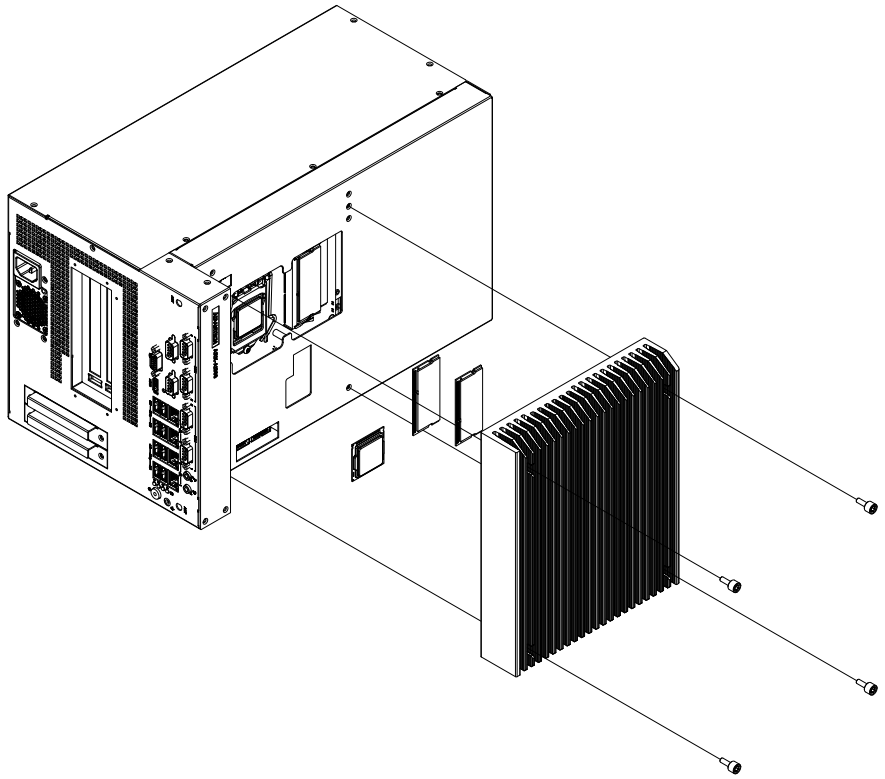
Figure 2.11 VGA connector

Table 2.8: 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	NC	10	GND
11	NC	12	DDAT
13	H-SYNC	14	V-SYNC
15	DCLK		

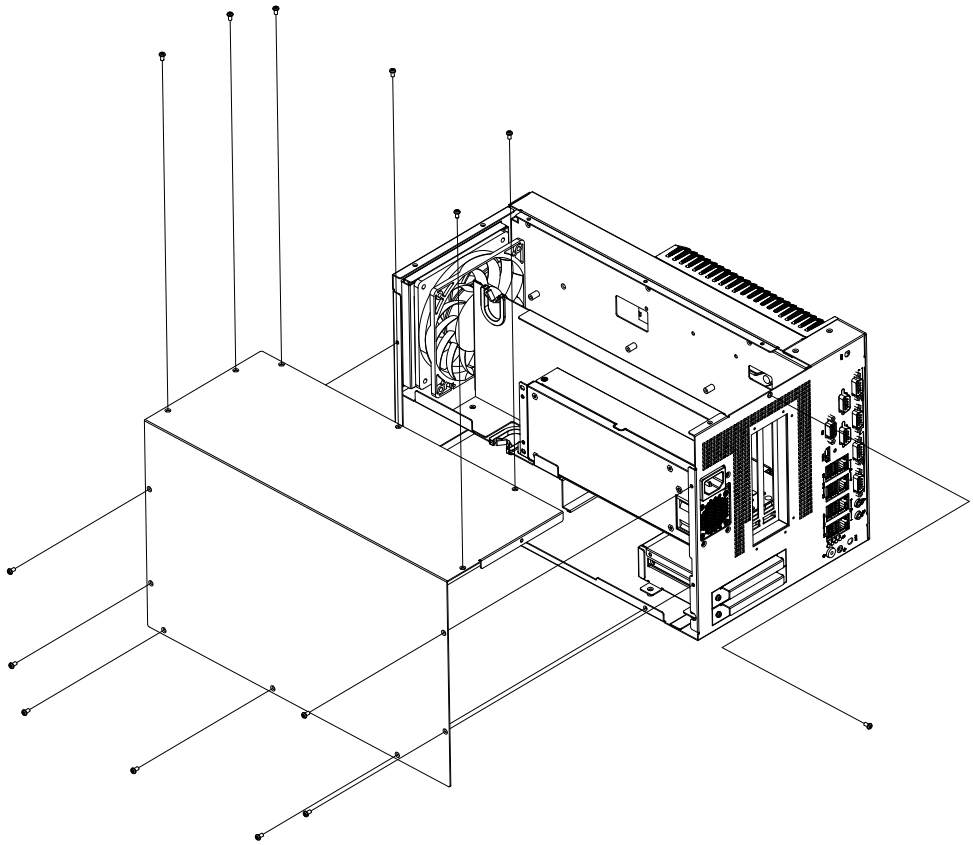
2.4 Installation

2.4.1 CPU/Memory installation



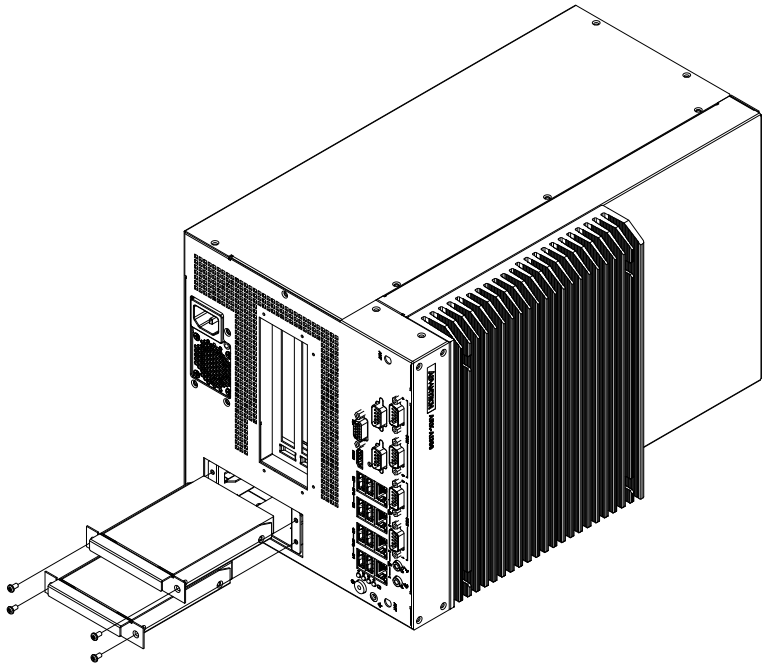
1. Unscrew the 4 screws on the top cover, and remove the top cover.
2. Install the CPU (LGA1151) and memory into the system.
3. Replace the top cover.

2.4.2 Remove side cover



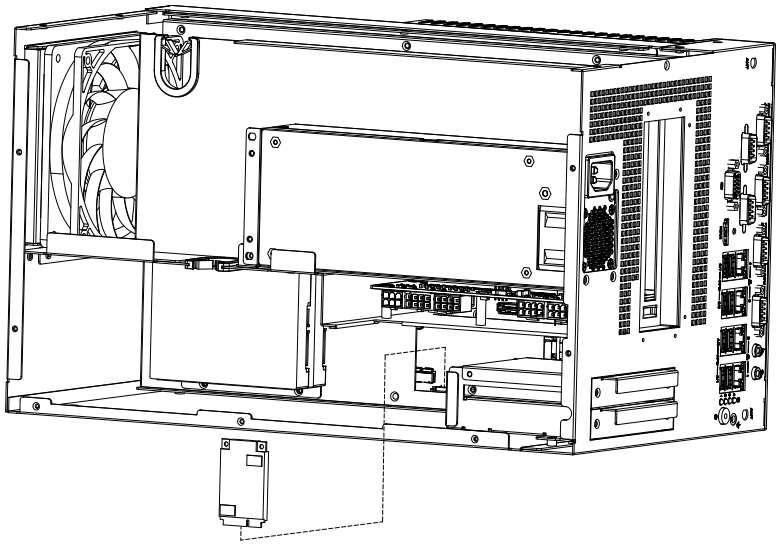
1. Unscrew 14 screws on the side cover.

2.4.3 External HDD/SSD installation



1. Unscrew 2 x screws on hard drive bay
2. Install HDD/SSD with 4 x screws on the HDD/SSD tray.
3. Push back the hard drive bay into the system and use the same screws to affix.

2.4.4 MiniPCIe module installation



1. Remove the side cover.
2. Install miniPCIe/mSATA module (CN31_1/CN32_1) and screw it in place. (CN31_1 with SIM holder)
3. Replace the side cover and fix in place with screws.

2.4.5 Replace CPU thermal grease pad

Always use the grease pad provided by Advantech. The P/N of the grease pad is:

Part Number	Description
1990032969N000	Thermal-Pad 30x30x0.2 K=8 TP HW PTM-7988 AIR-300

To ensure the best thermal performance, it is recommended to replace the thermal grease for CPU thermal pole each time the top cover is opened.

1. To replace the thermal grease, clean up the CPU thermal pole by using paper tissue or soft cloth. DO NOT USE any kind of solvent to clean the thermal pole as this may damage the thermal grease inside the thermal pole.
2. Gently remove one of the protective papers on the grease pad and apply the grease to the CPU thermal pole. Press onto the grease pad for 30 seconds, then remove the protective paper gently from the grease pad.

2.4.6 Wide operating temperature support

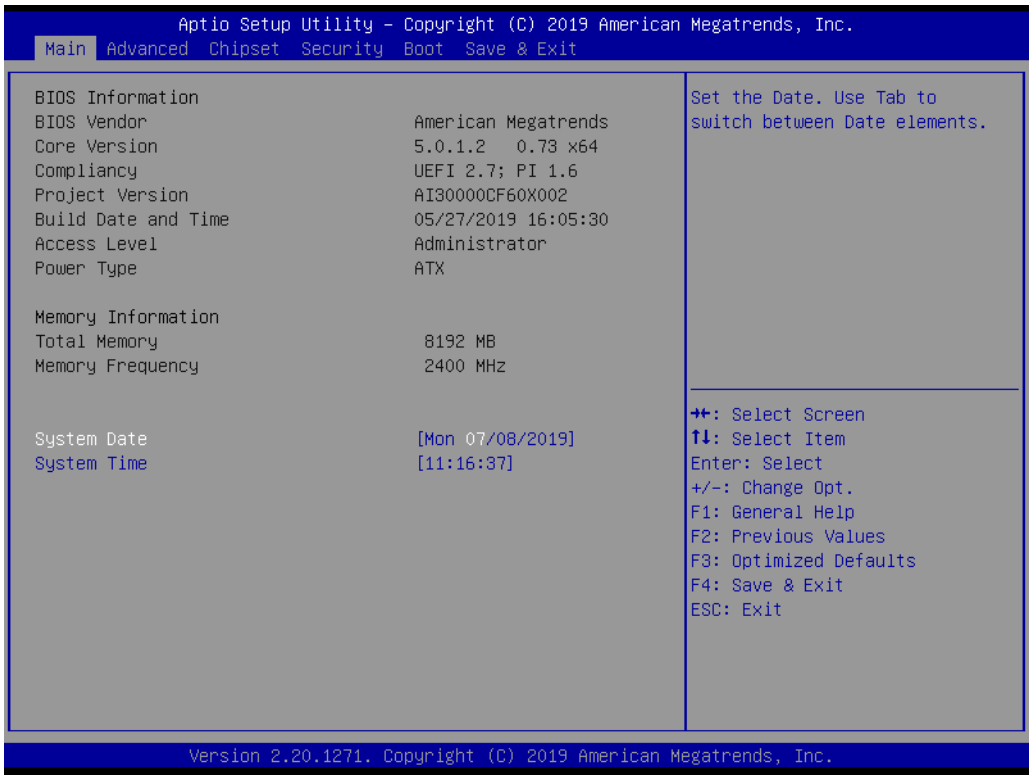
To make sure the system works well under 0° C or over 40° C, please ensure your peripherals are i-grade, which support wide temperature operation.

Chapter 3

BIOS Settings

3.1 Introduction

With the AMIBIOS Setup program, users can modify BIOS settings and control various system features. This chapter describes the basic navigation of the AIR-300 BIOS setup screens.



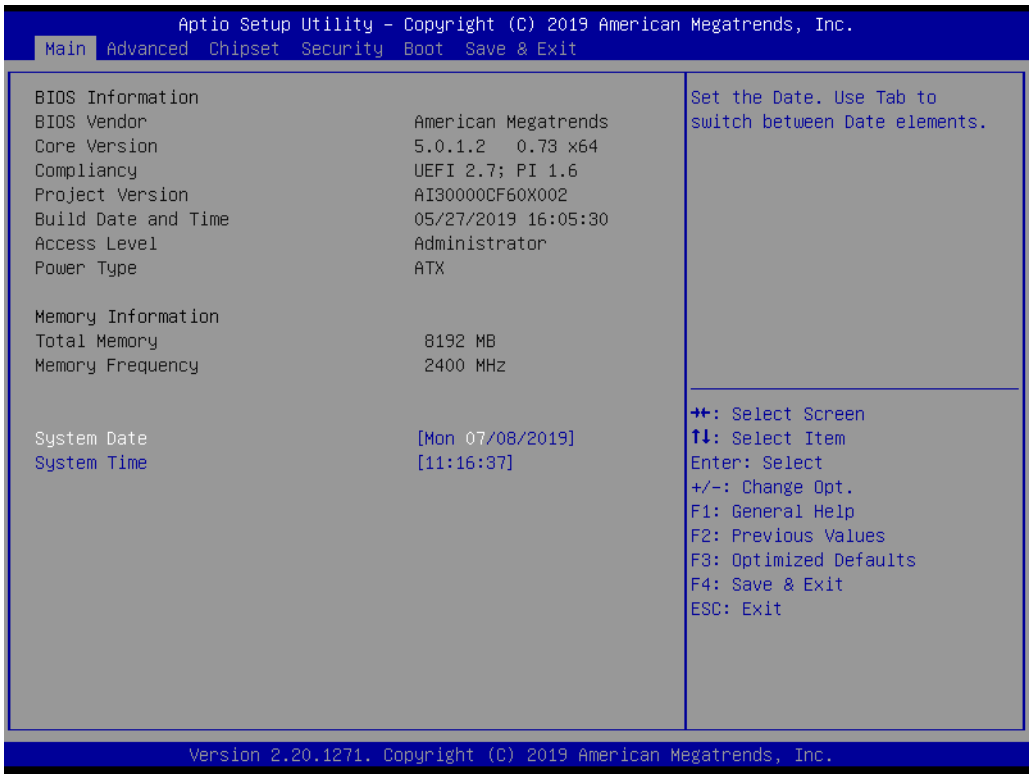
AMI's BIOS ROM has a built-in Setup program that allows users to modify the basic system configuration. This information is stored in flash ROM so it retains the Setup information when the power is turned off.

3.2 Entering Setup

Turn on the computer and check for the patch code. If there is a number assigned to the patch code, it means that the BIOS supports your CPU. If there is no number assigned to the patch code, please contact an Advantech application engineer to obtain an up-to-date patch code file. This will ensure that your CPU's system status is valid. After ensuring that you have a number assigned to the patch code, press <DEL> and you will immediately be allowed to enter Setup.

3.2.1 Main setup

When users first enter the BIOS Setup Utility, they will enter the Main setup screen. Users 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.

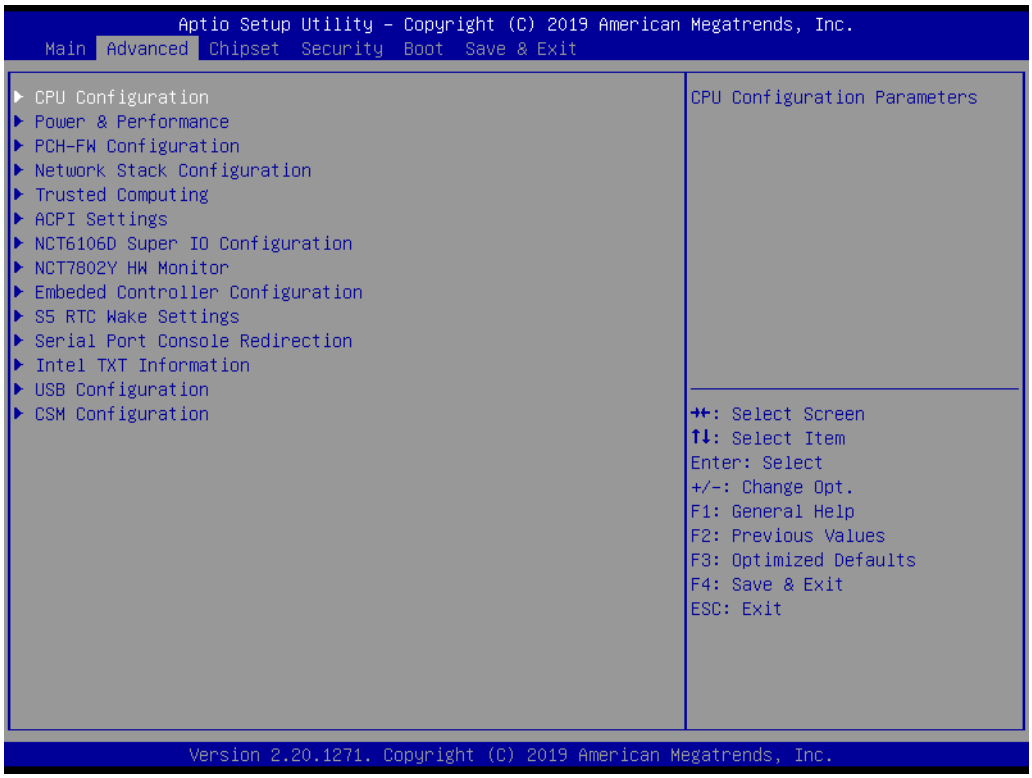
Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it.

- **System time / System date**

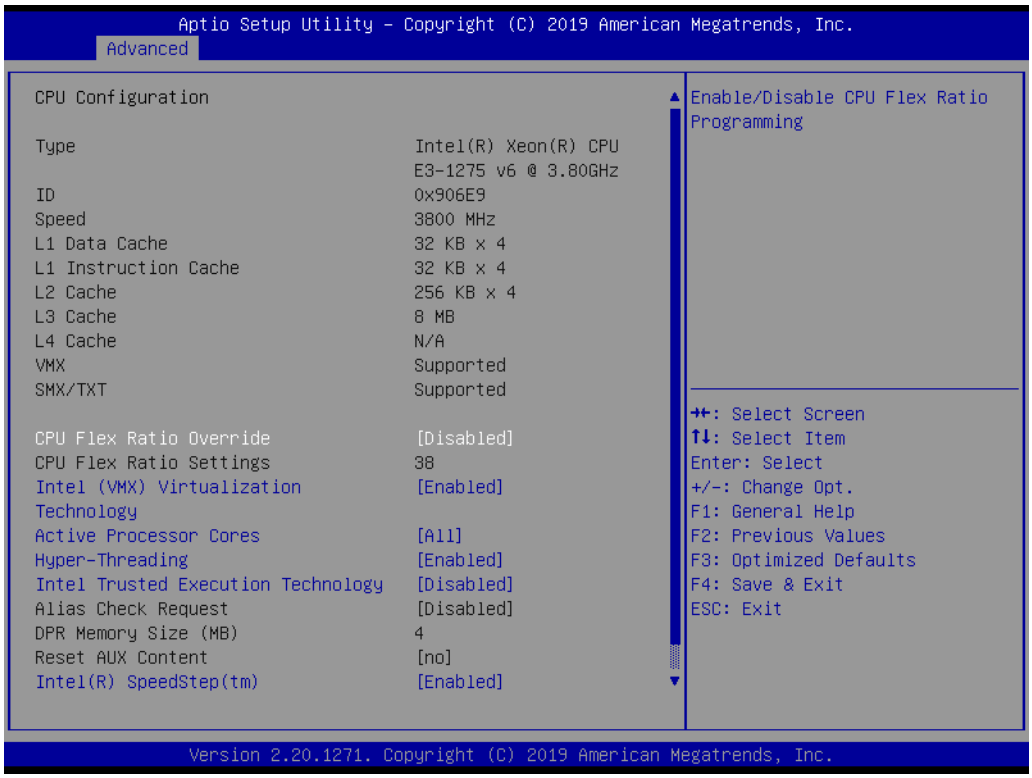
  Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time must be entered in HH:MM:SS format.

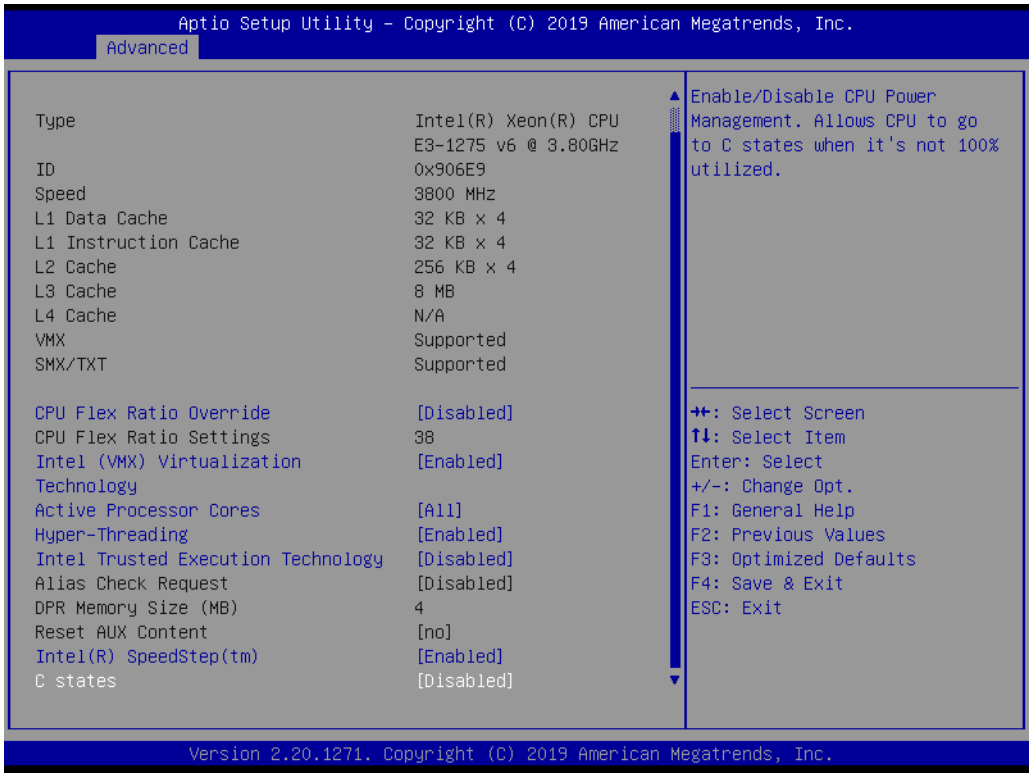
3.2.2 Advanced BIOS features setup

Select the Advanced tab from the AIR-300 setup screen to enter the Advanced BIOS Setup screen. Users can select any item in the left frame of the screen, such as CPU Configuration, to go to the sub menu for that item. Users 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 screens are shown below. The sub menus are described on the following pages.



3.2.2.1 CPU configuration

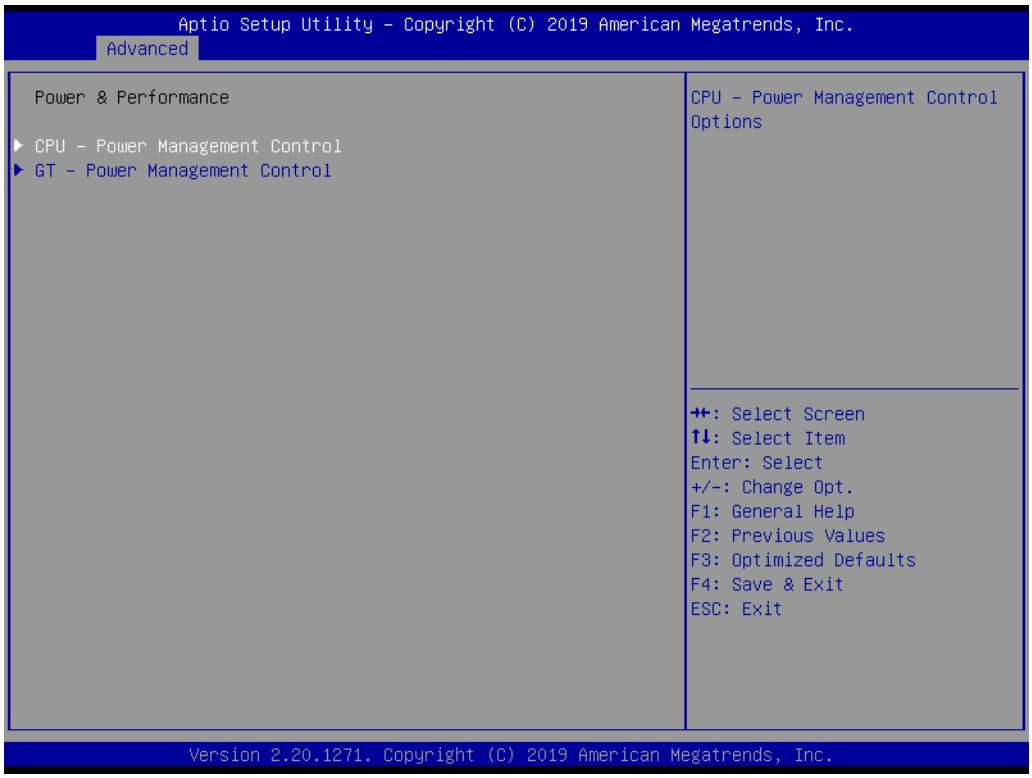


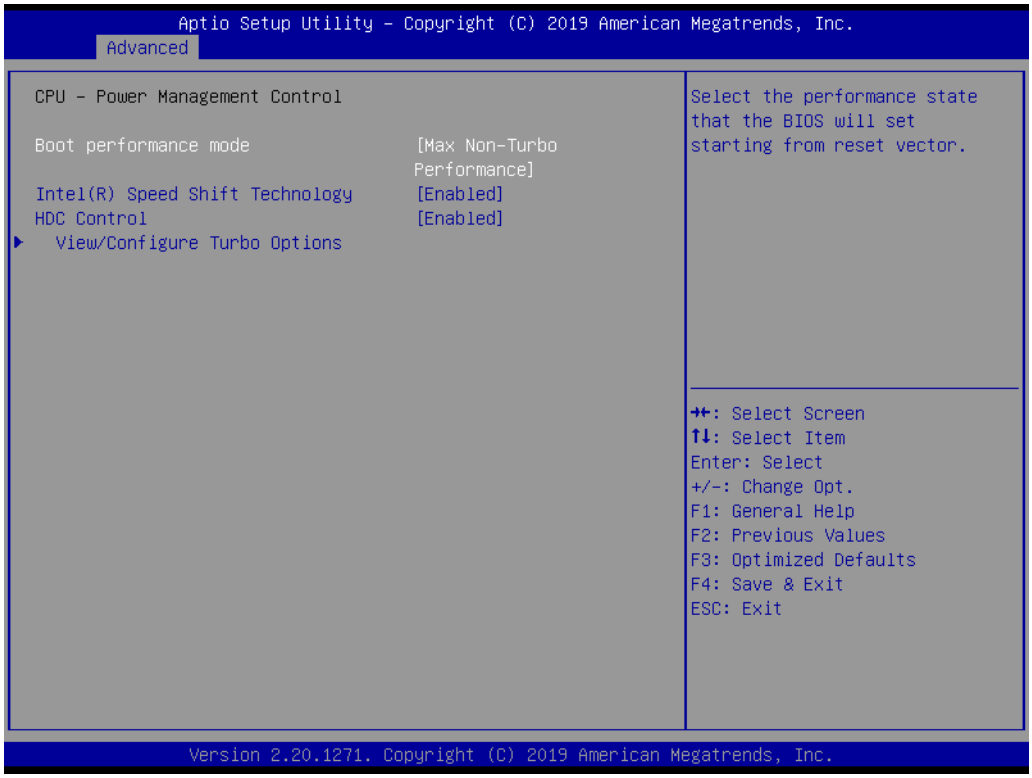


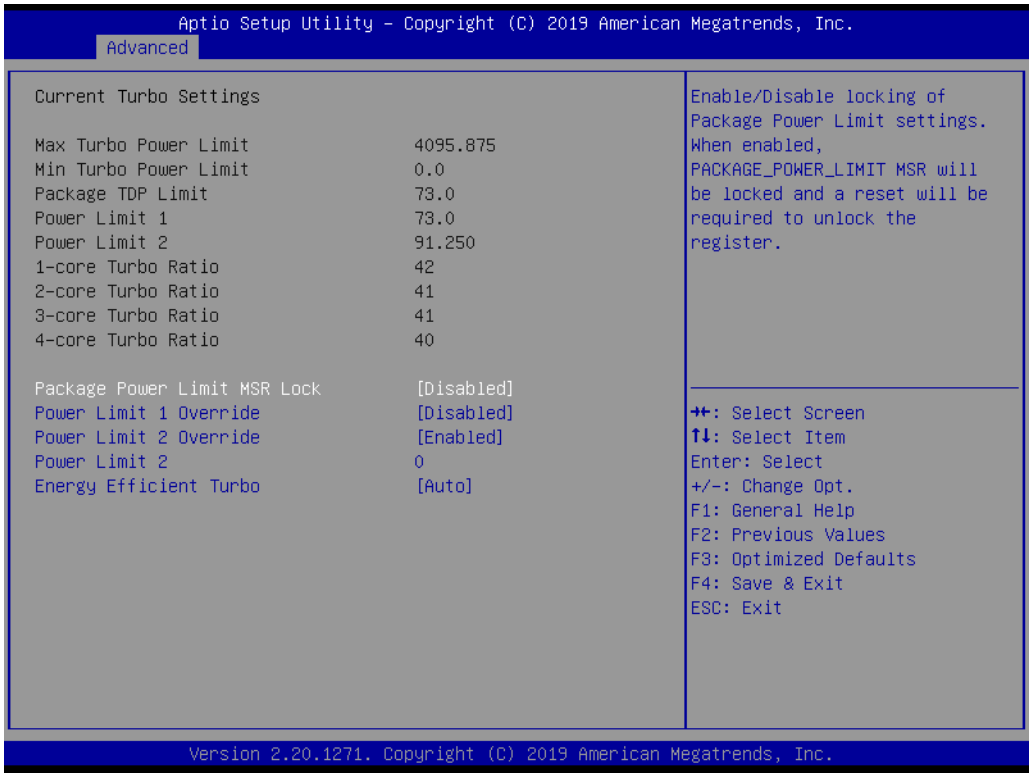
- **CPU Flex Ratio Override**
  Enable/Disable CPU Flex Ratio Programming
- **Intel Trusted Execution Technology**
  Enables utilization of additional hardware capabilities provided by Intel (R) Trusted Execution Technology.

- **Hyper Threading Technology**
  This item allows users to enable or disable Intel® Hyper Threading technology.
- **Active Processor Cores**
  This item allows users to set how many processor cores should be active.
- **Intel Virtualization Technology**
  This item allows users to enable or disable the intel virtualization technology.
- **Intel® SpeedStep™**
  Allows more than two frequency ranges to be supported.
- **CPU C states**
  Enable or disable CPU C states.

3.2.2.2 CPU - power management control



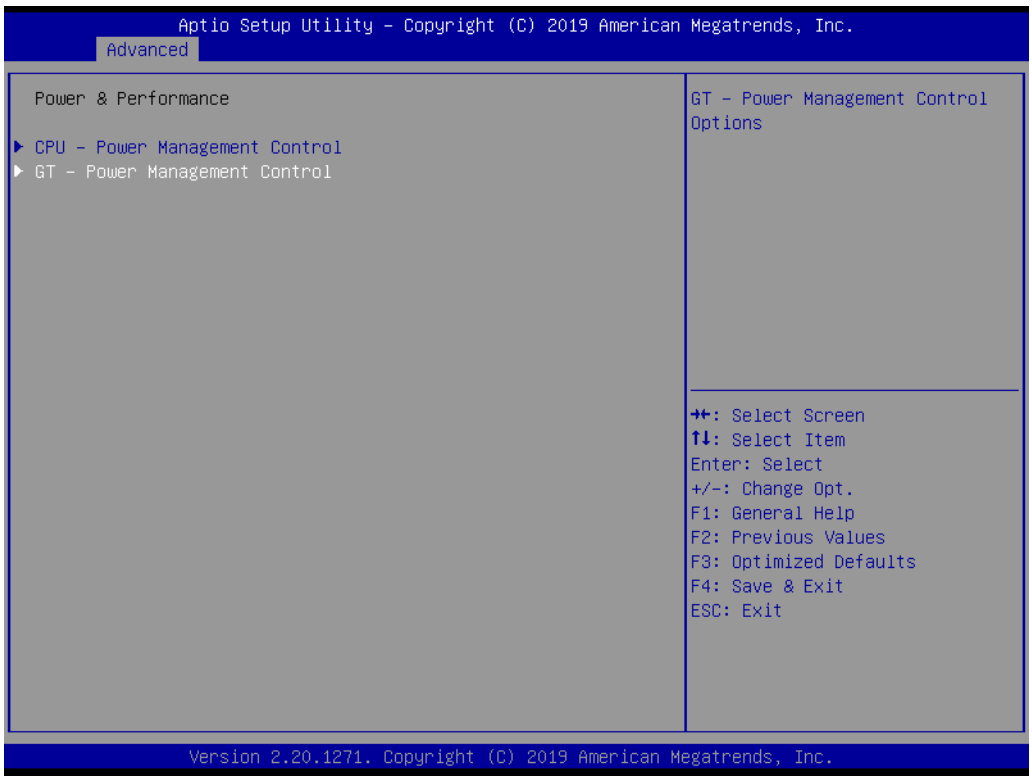


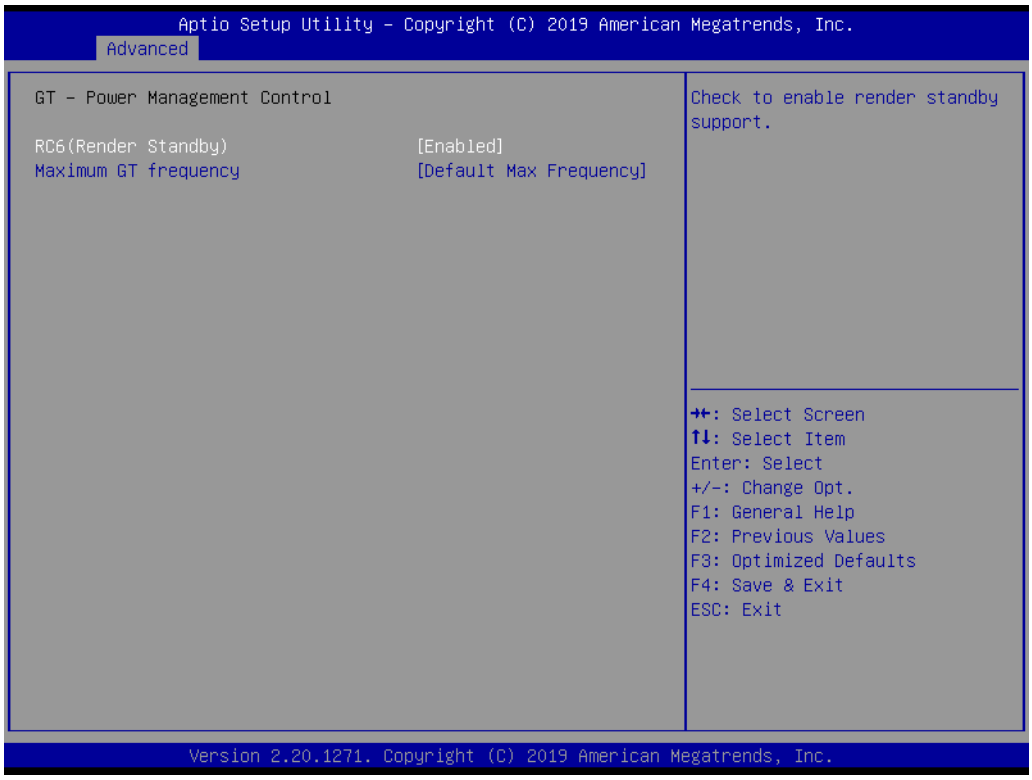


- **Boot Performance Mode**
  Select the performance state that the BIOS will set starting from reset vector.
- **Intel® Speed Shift Technology**
  Enable/Disable Intel® Speed Shift Technology support.
- **HDC Control**
  This option allows HDC configuration.

- **Package Power Limit MSR Lock**
  Enable/Disable locking of Package Power Limit settings.
- **Power Limit 1/2 Override**
  Enable/Disable Power Limit 1/2 override.
- **Power Limit 2**
  Power Limit 2 value in Milli Watts.
- **Energy Efficient Turbo**
  Enable/Disable Energy Efficient Turbo Feature.

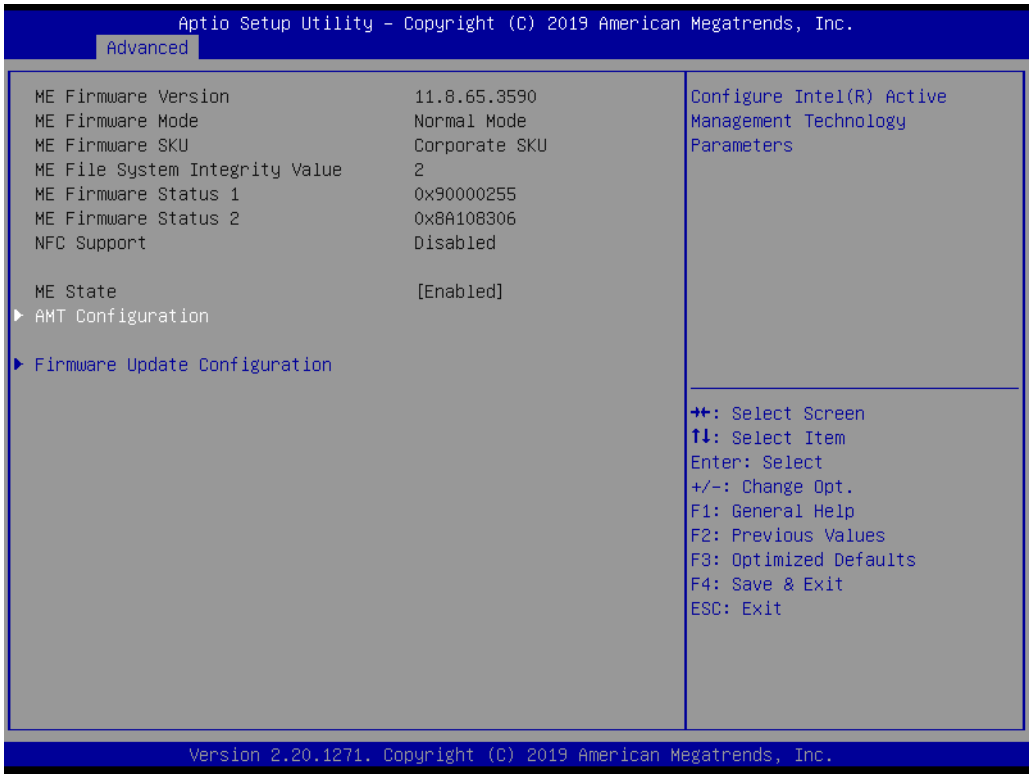
3.2.2.3 GT – power management control





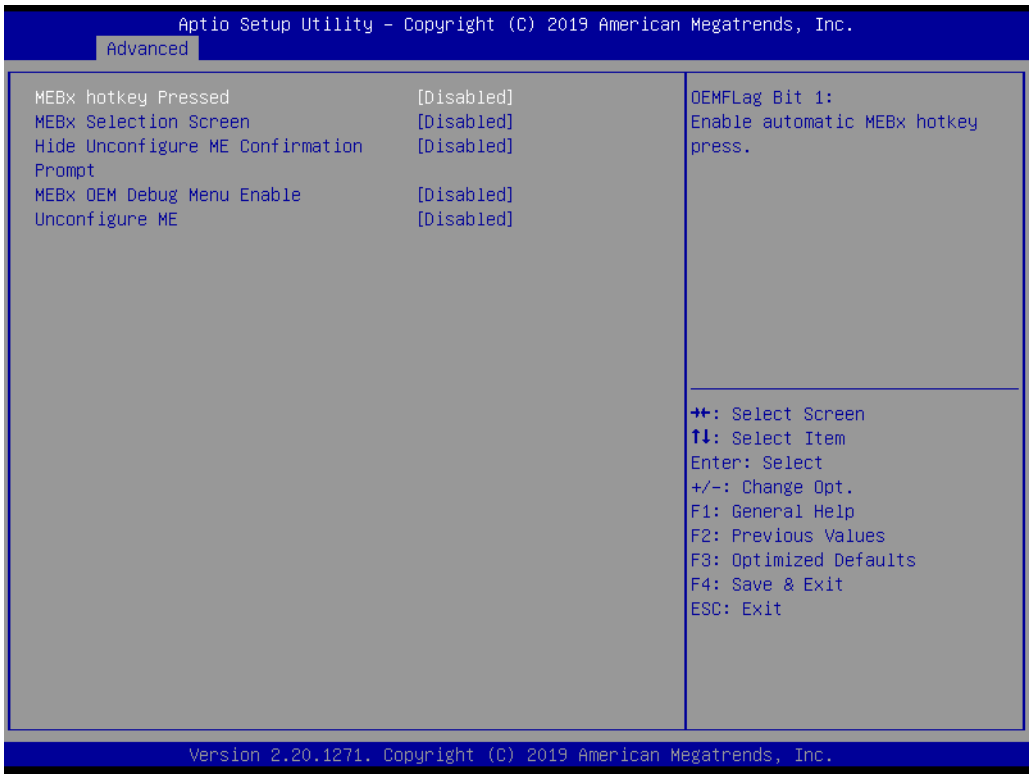
- **RC6 Render Standby**
  Check to enable render standby support.
- **Maximum GT frequency**
  Maximum GT frequency limited by the user. Choose between 350MHz and 1150MHz.

3.2.2.4 PCH- FW configuration



- **ME State (Intel AMT)**

  Enable/Disable Intel® Active Management Technology BIOS Extension.



  – **BIOS Hotkey Pressed**

  Enable/Disable BIOS hotkey press.

– **MEBx Selection Screen**

Enable/Disable MEBx selection screen.

– **Hide Un-Configure ME Configuration Prompt**

Hide Un-Configure ME without password Configuration Prompt.

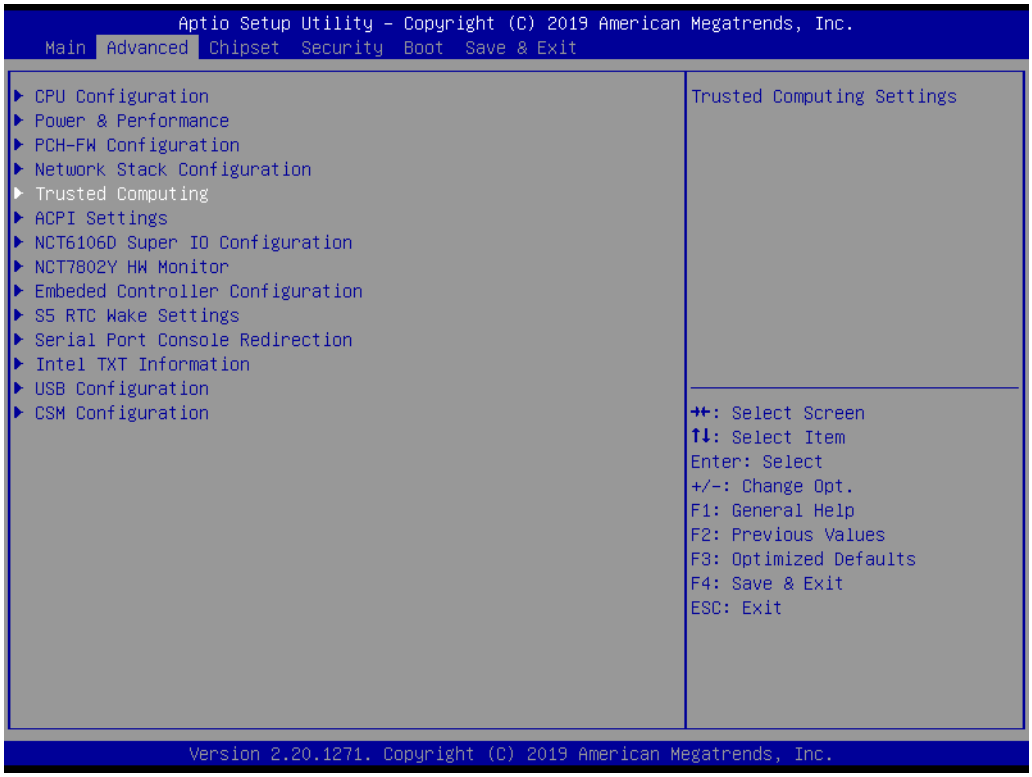
– **MEBx Debug Message Output**

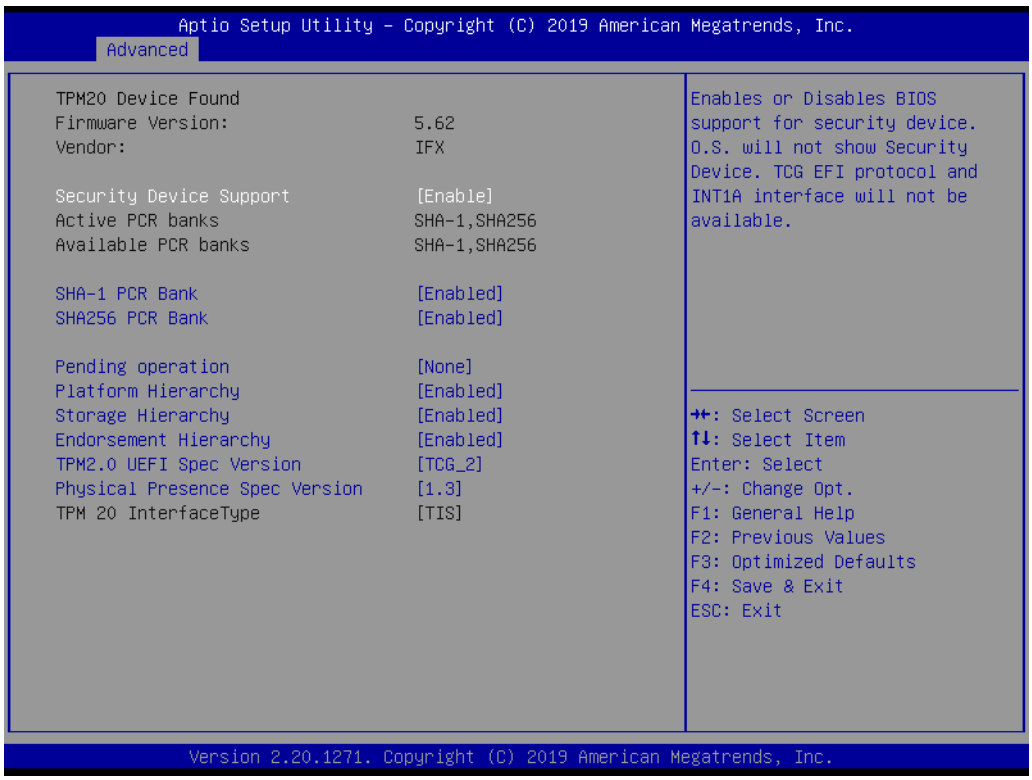
Enable MEBx debug message output.

– **Un-Configure ME**

Un-Configure ME without password.

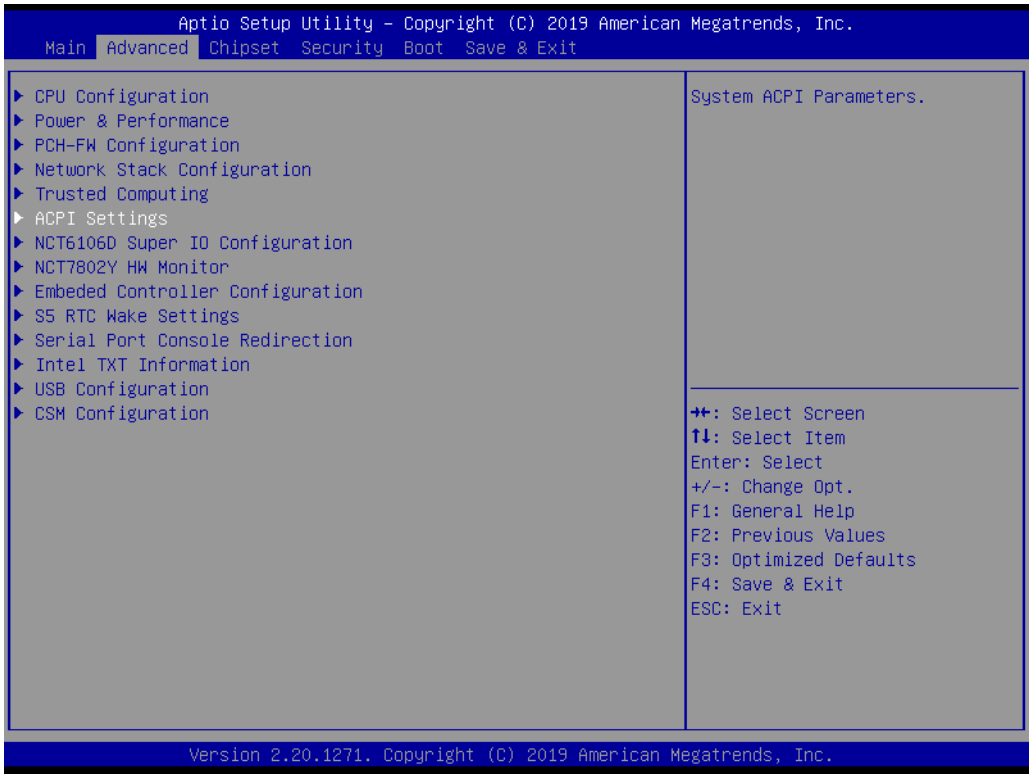
3.2.2.5 Trusted computing

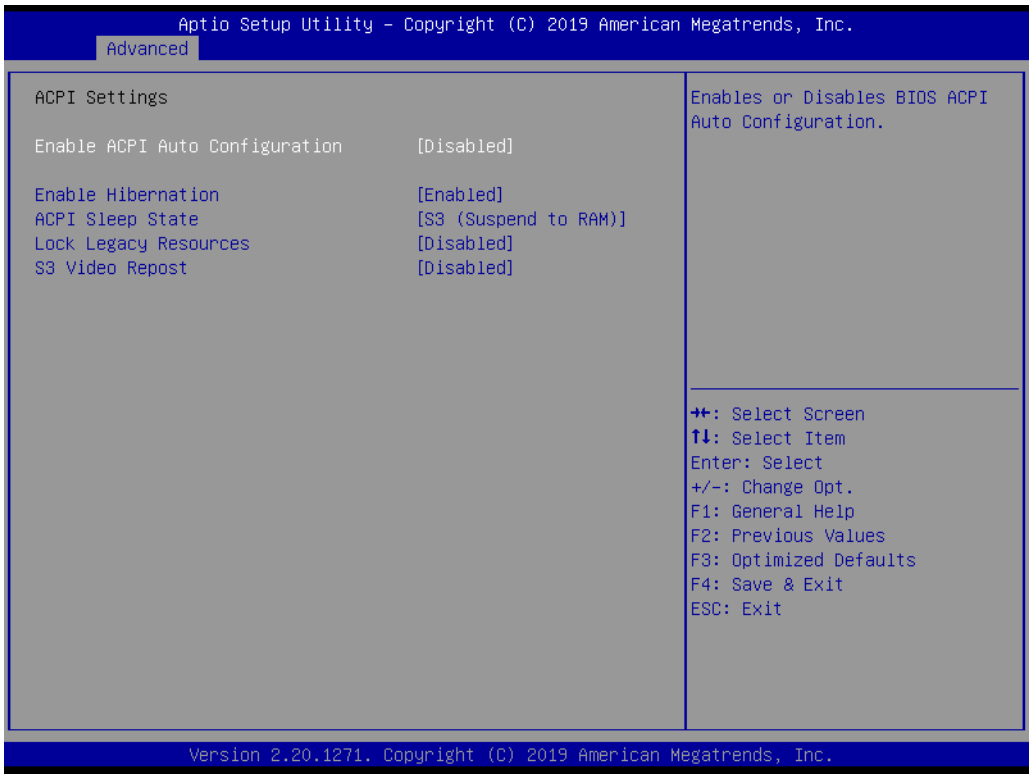




- **Security Device Support**
  Enables or Disables BIOS support for security device. OS will not show Security Device. TCG EFI protocol and INT1A interface will not be available.

3.2.2.6 ACPI settings

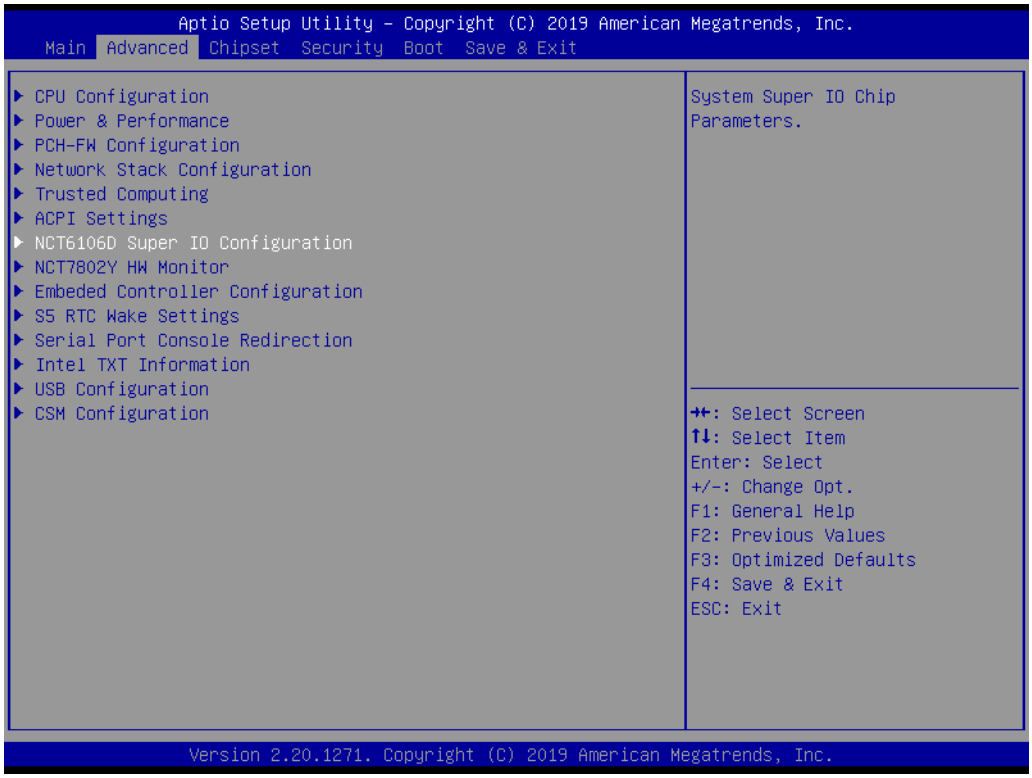


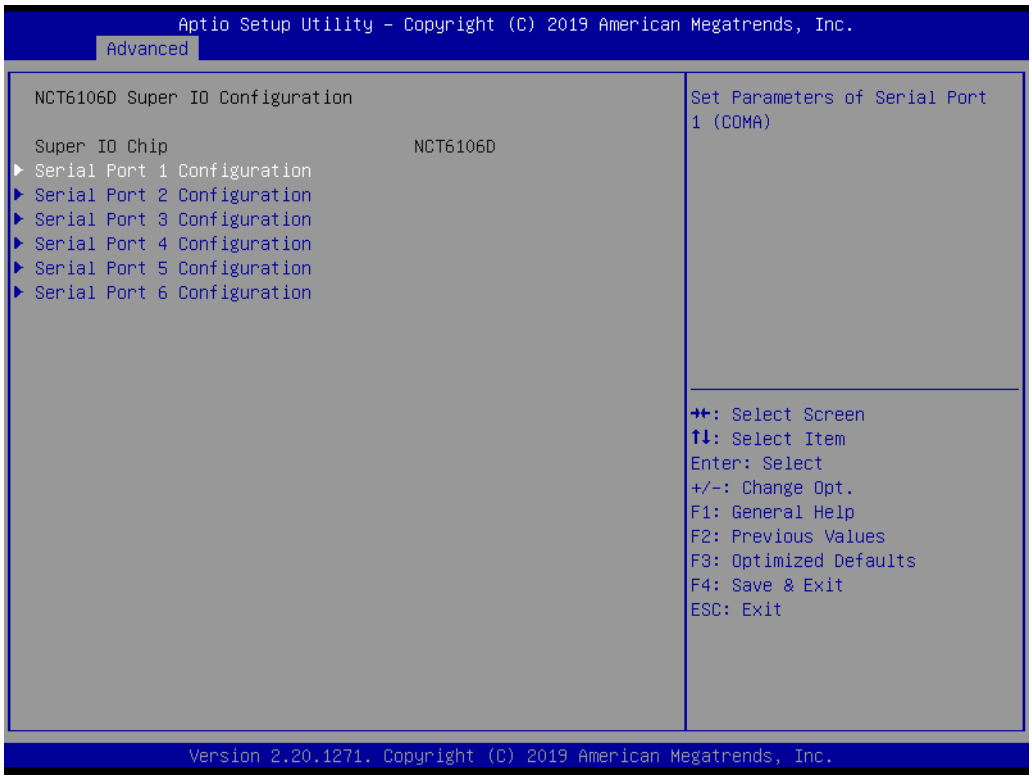


- **Enable ACPI Auto Configuration**
  Enable or disable BIOS ACPI auto configuration.
- **Enable Hibernation**
  Enables or Disables System ability to Hibernate (OS/S4 Sleep State). This option may be not effective with some OS.

- **ACPI Sleep State**
  Select the highest ACPI sleep state the system will enter when the SUSPEND button is pressed.
- **Lock Legacy Resources**
  Enables or Disables Lock of Legacy Resources.
- **S3 Video Repost**
  Enable or Disable S3 Video Repost.

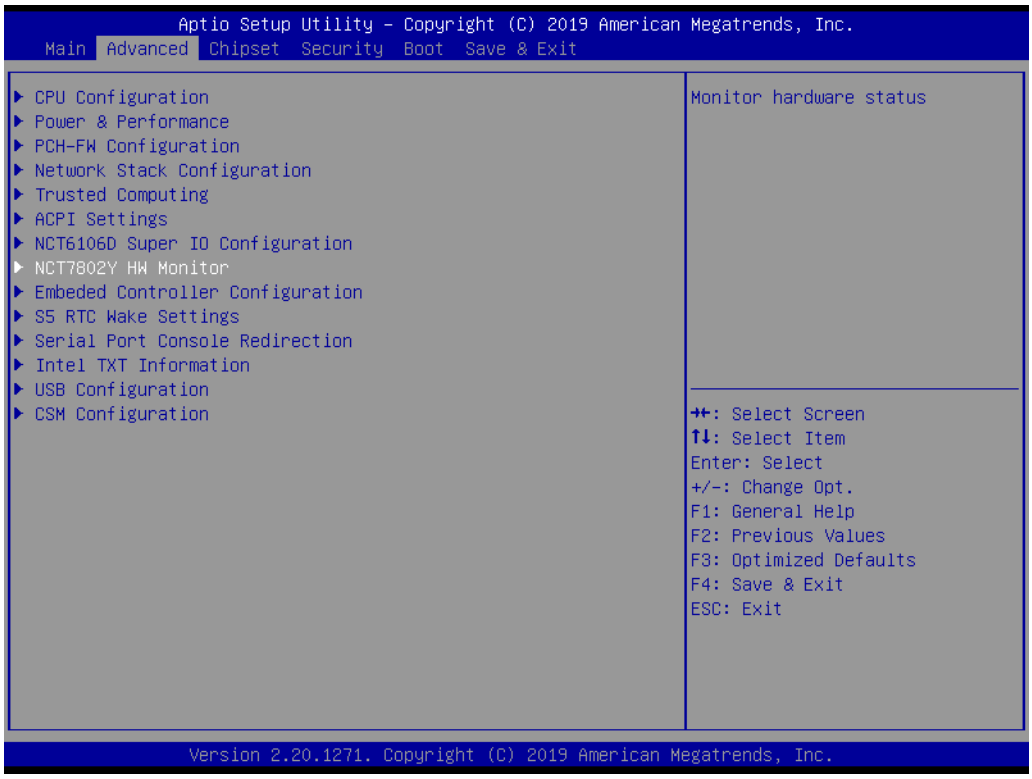
3.2.2.7 Super I/O configuration

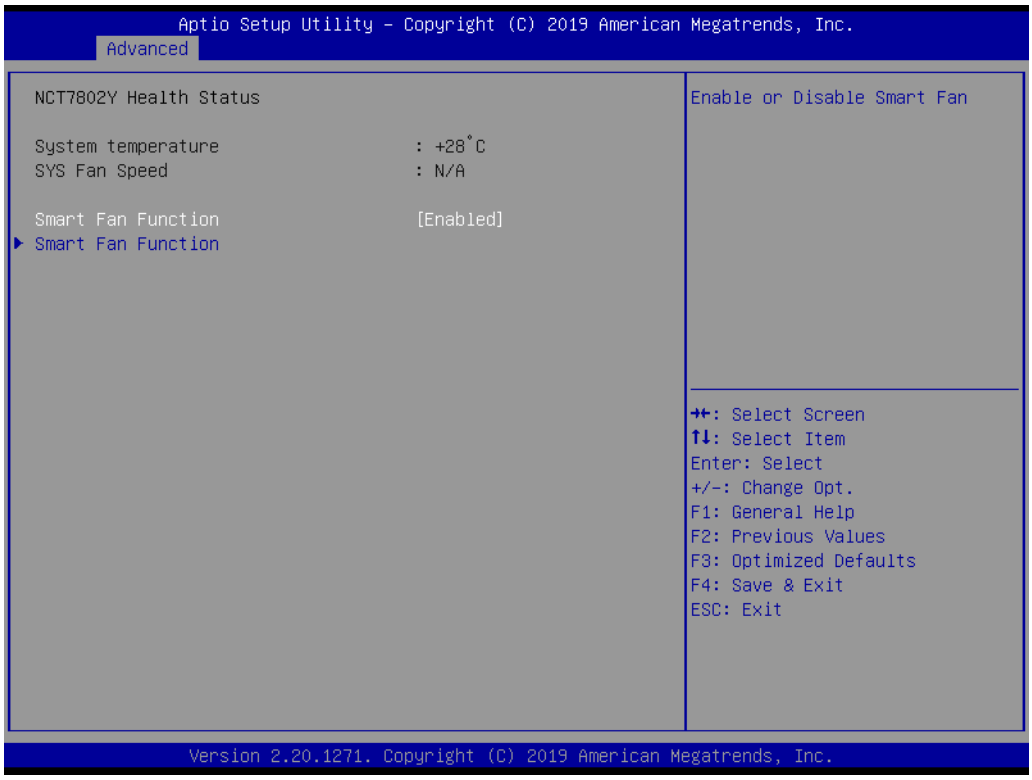


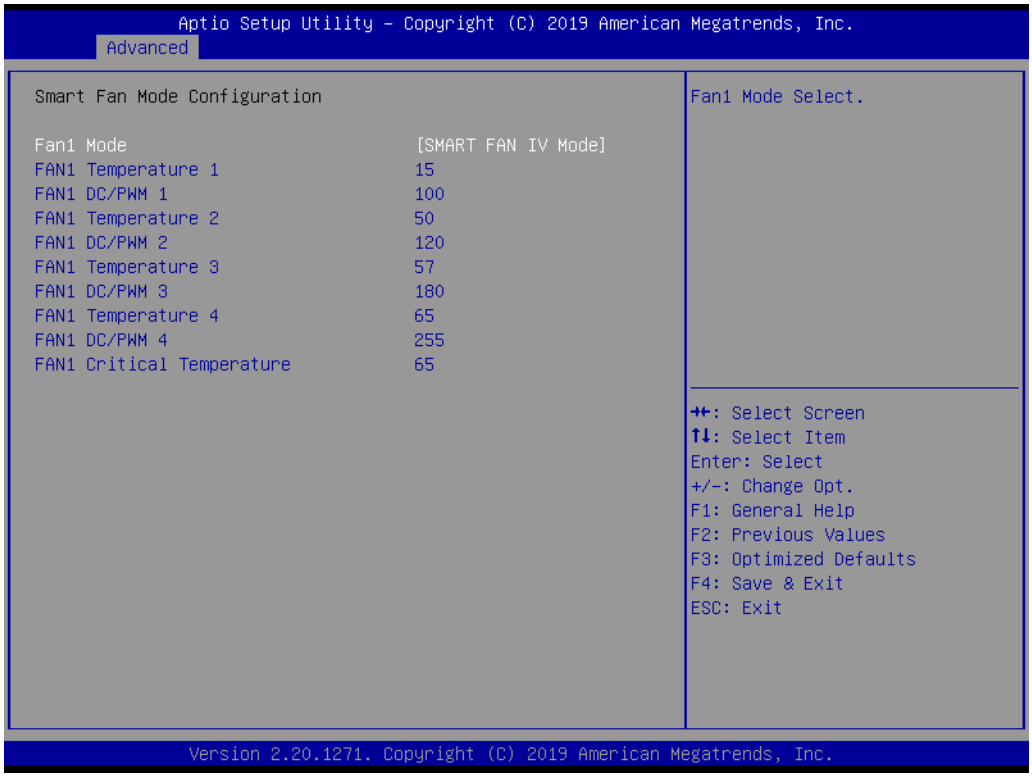


- **Serial Port 1 Configuration**
  Set Parameters of Serial Port 1.
- **Serial Port 2 Configuration**
  Set Parameters of Serial Port 2.
- **Serial Port 3 Configuration**
  Set Parameters of Serial Port 3.
- **Serial Port 4 Configuration**
  Set Parameters of Serial Port 4.
- **Serial Port 5Configuration**
  Set Parameters of Serial Port 5.
- **Serial Port 6 Configuration**
  Set Parameters of Serial Port 6.

3.2.2.8 HW monitor

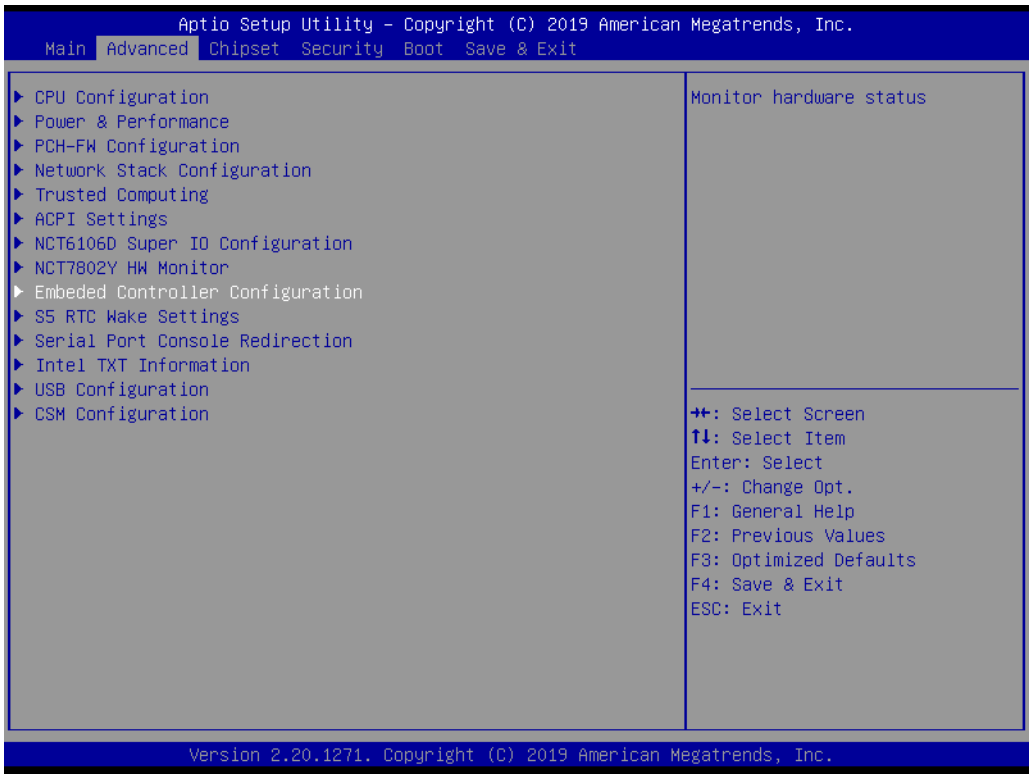


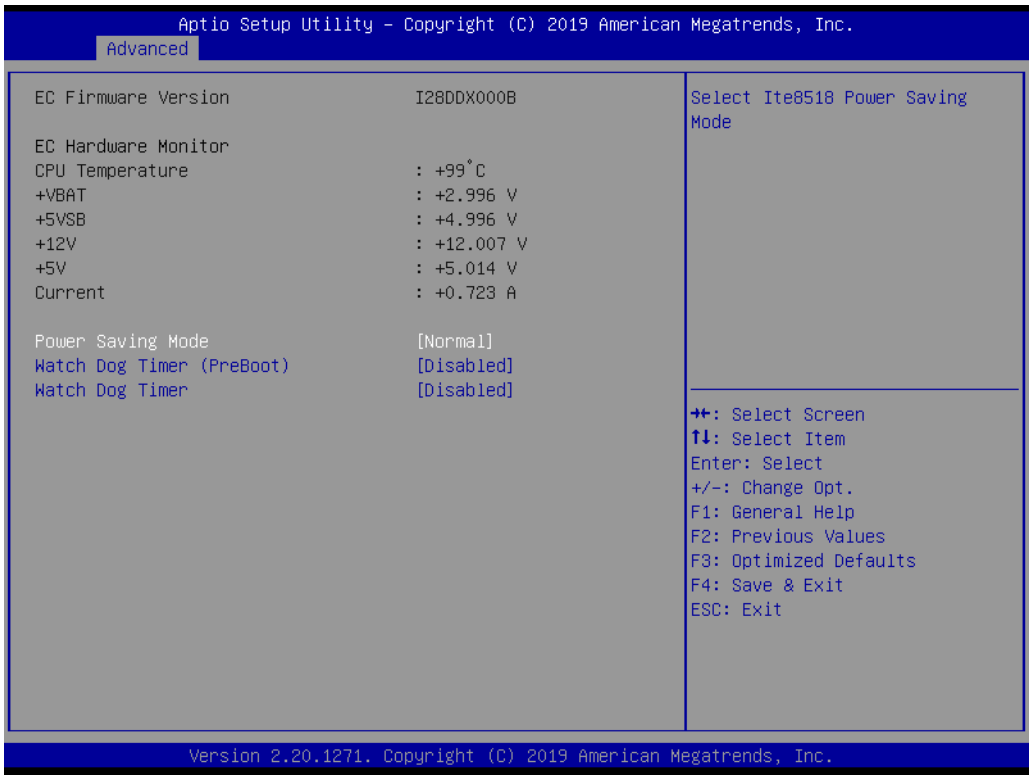




- **Smart Fan Function**
  Enable or Disable Smart Fan.
- **Fan1 Mode**
  Fan1 Mode Select.
- **FAN1 Temperature 1/2/3/4**
  Input the System Smart Fan IV Temperature 1/2/3/4.
- **FAN1 DC/PWM 1/2/3/4**
  Input the System Smart Fan IV DC/PWM 1/2/3/4 Value.
- **FAN1 Critical Temperature**
  Input the System Smart IV Critical Temperature.

3.2.2.9 Embedded controller configuration

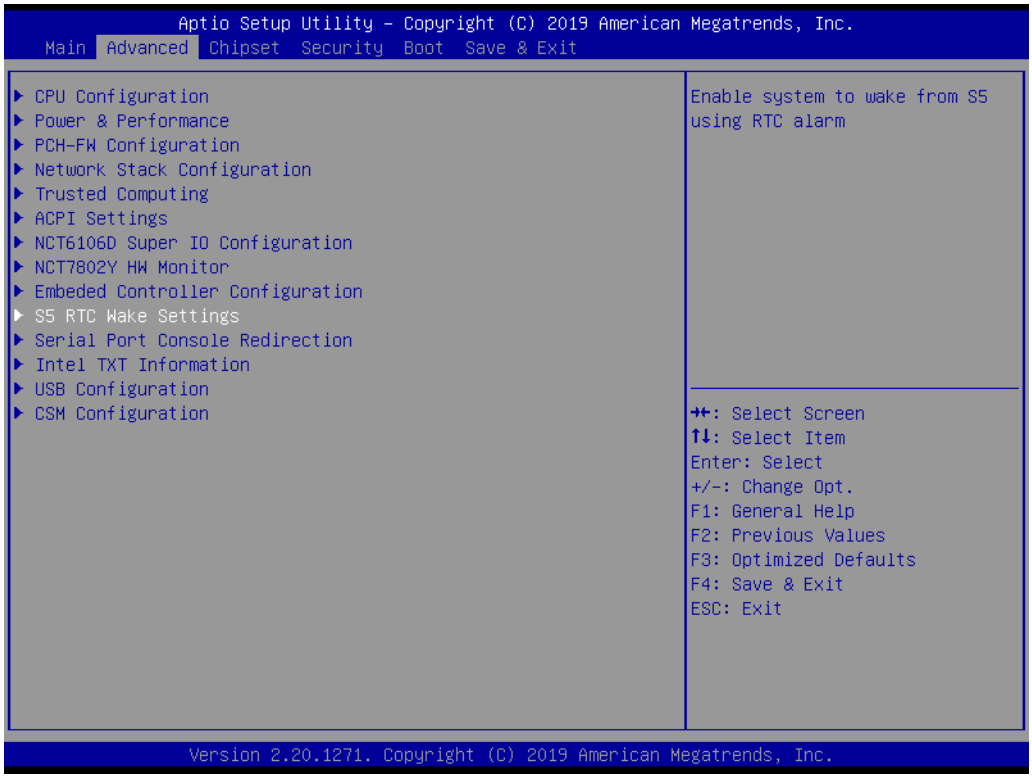


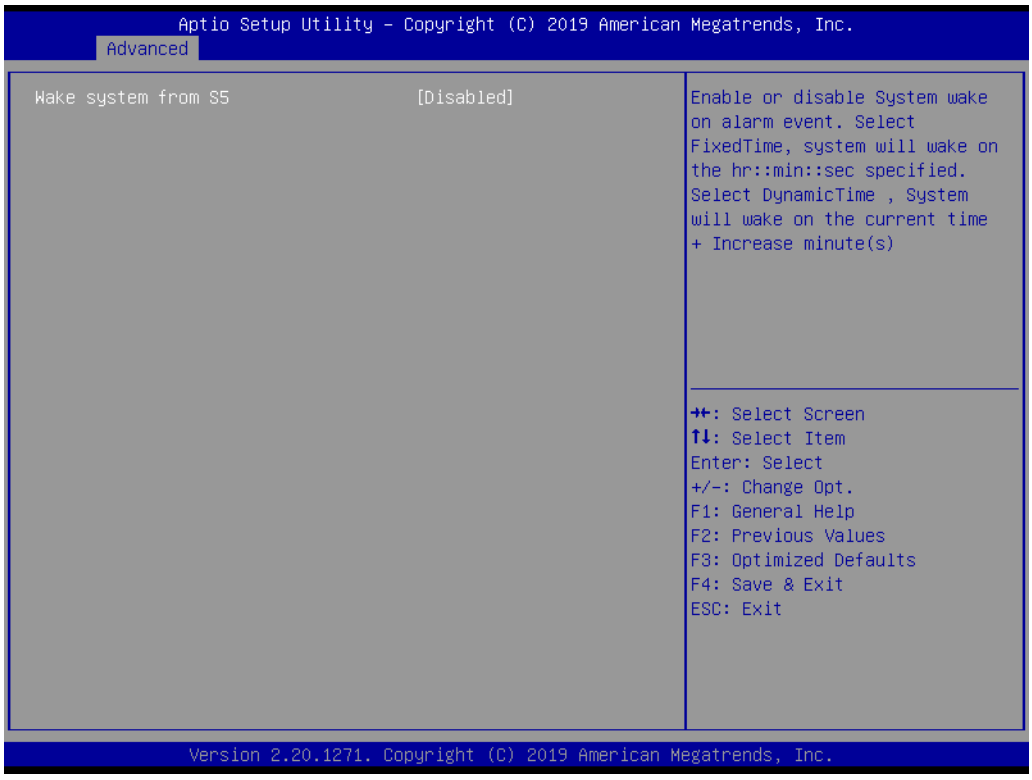


- **EC Hardware Monitor**
  This page display all information about system Temperature/Voltage/Current.
- **Power Saving Mode**
  This item allows users to set the board's power saving mode when off.
- **Watch Dog Timer (PreBoot)**
  Enable or Disable Watch Dog Timer function (Starts from power on, stops before booting to OS)

- **Watch Dog Timer**
  Enable or Disable Watch Dog Timer function (Starts before OS boots).

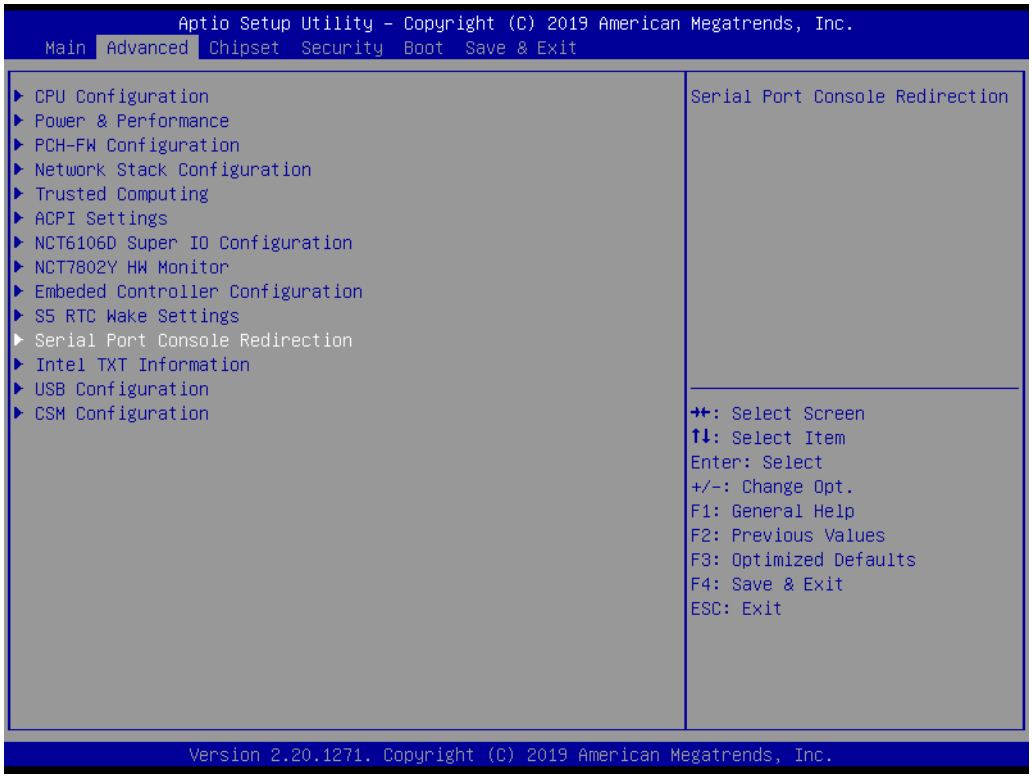
3.2.2.10 S5 RTC wake settings

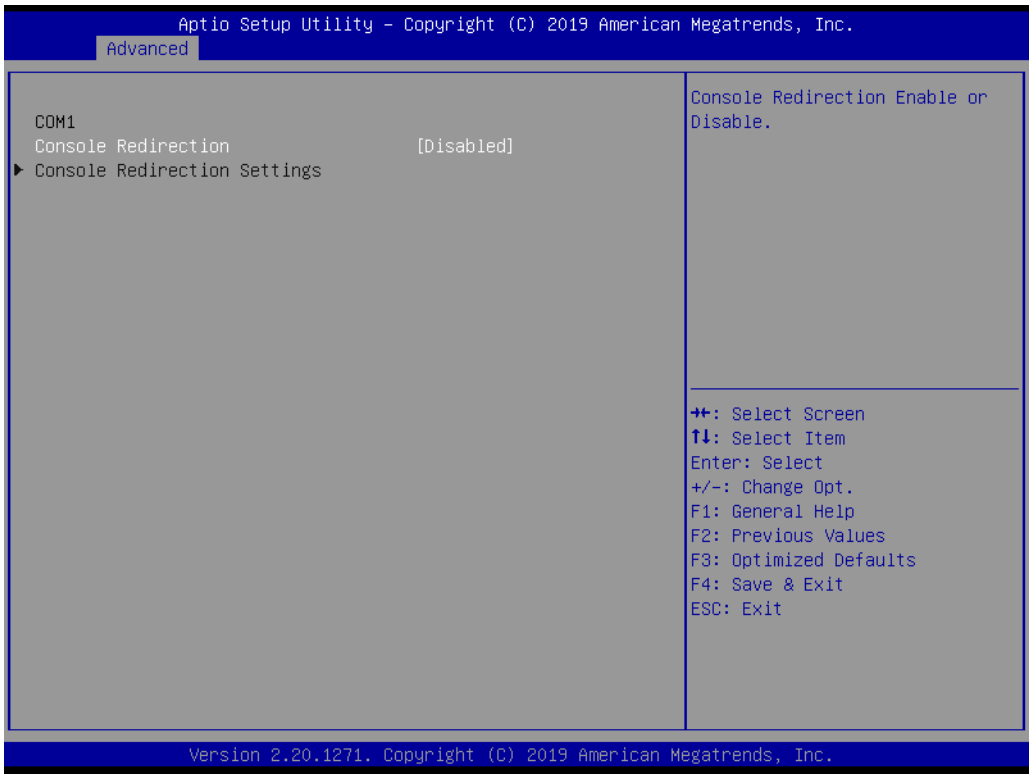




- **Wake system from S5**
  Enable or disable System wake on alarm event. Select FixedTime, system will wake on the hr:min:sec specified.

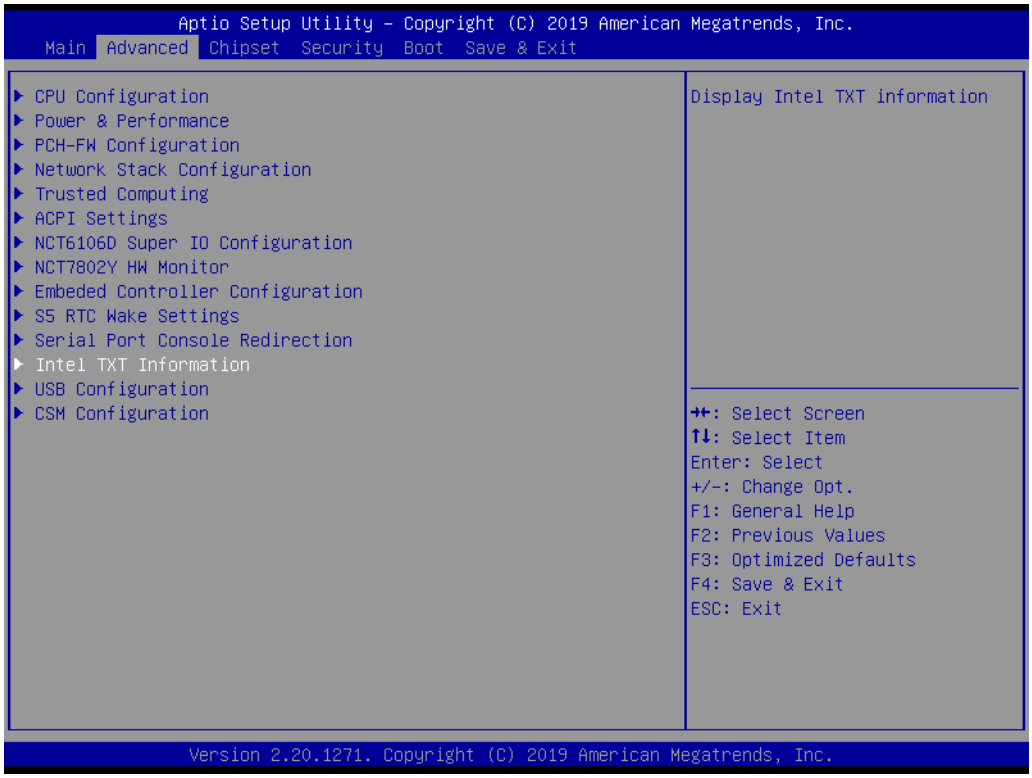
3.2.2.11 Serial port console redirection

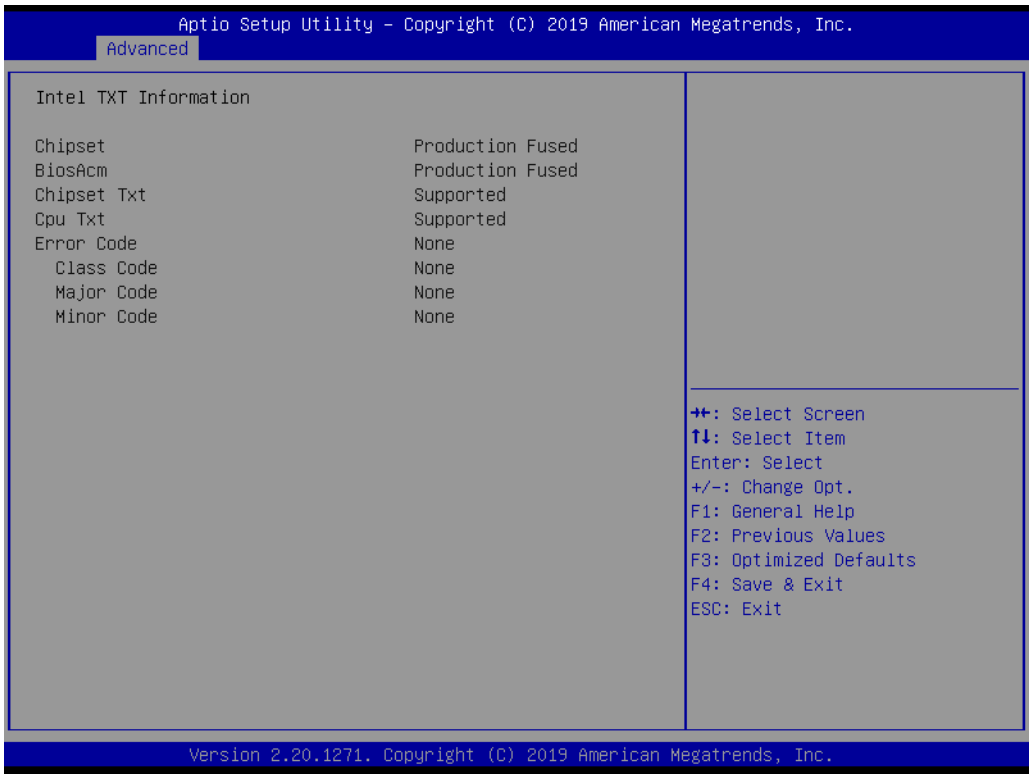




- **Console Redirection**
  This item allows users to enable or disable console redirection for Microsoft Windows Emergency Management Services (EMS).
- **Console Redirection Setting**
  This item allows users to configure console redirection detail settings.

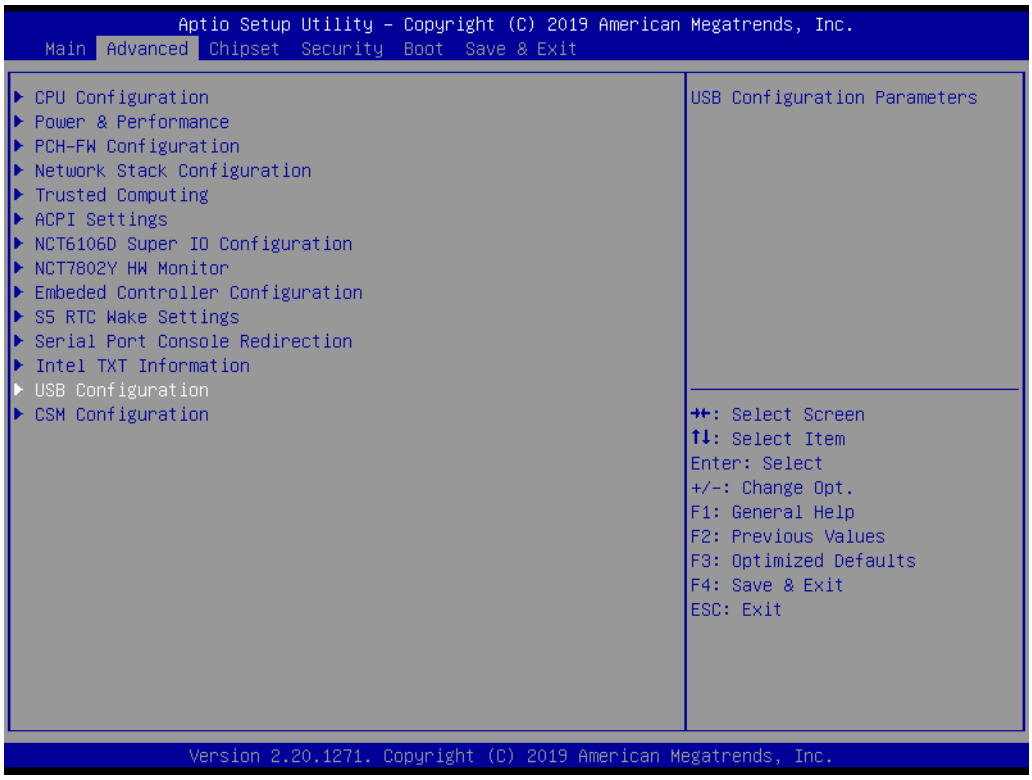
3.2.2.12 Intel TXT information





- **Intel TXT Information**
  Display Intel TXT information.

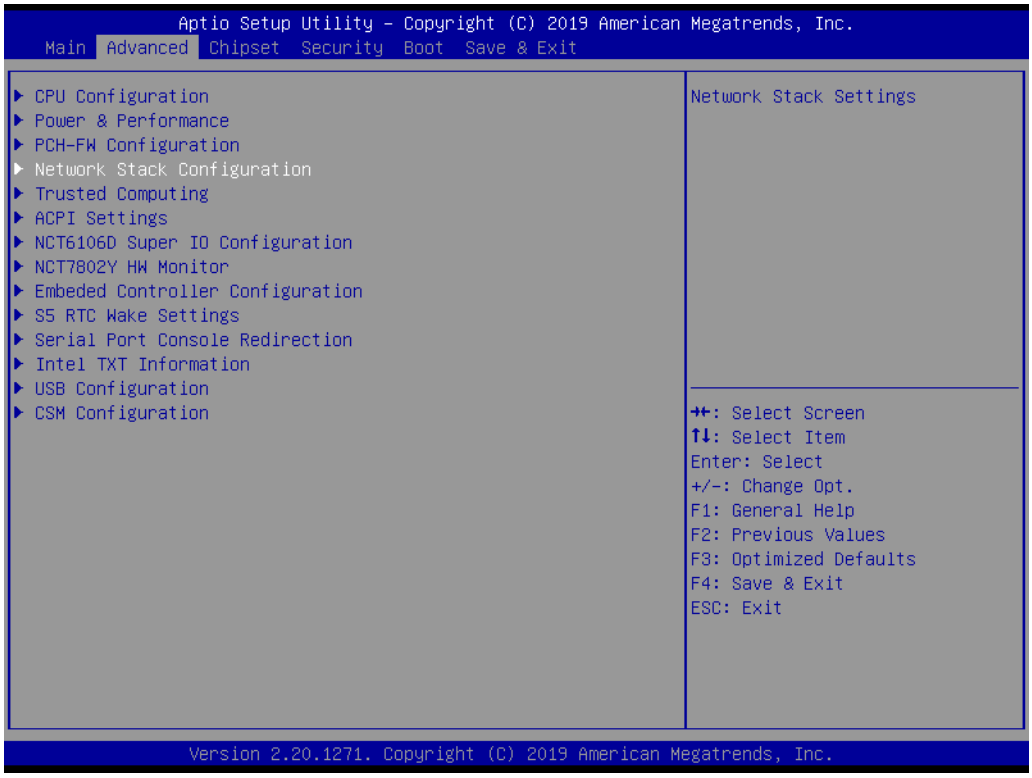
3.2.2.13 USB configuration

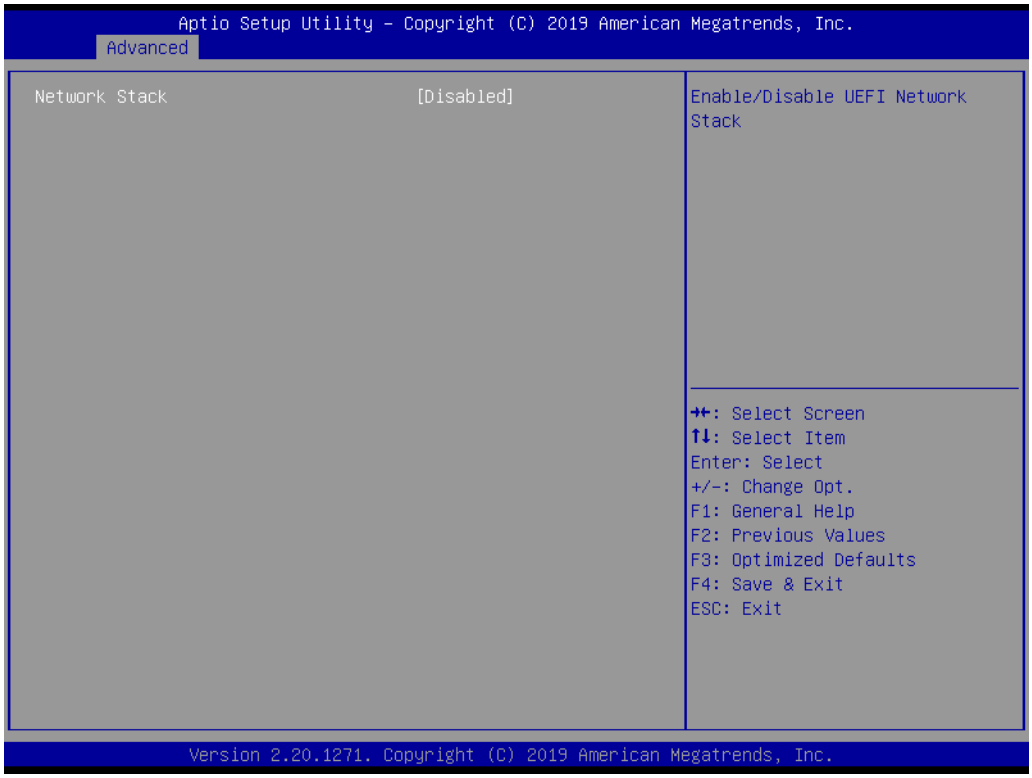


- **Legacy USB Support**
  Enables Legacy USB support. AUTO option disables legacy support if no USB devices are connected. DISABLE option will keep USB devices available only for EFI applications.

- **XHCI Hand-off**
  This is a workaround for OS without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.
- **USB Mass Storage Driver Support**
  Enable/Disable USB Mass Storage Driver Support.
- **USB transfer time-out**
  Time-out value for control, bulk, and interrupt transfers.
- **Device reset time-out**
  Selects the USB mass storage device start unit command timeout.
- **Device power-up delay**
  Maximum time the device will take before it properly reports itself to the Host Controller. 'Auto' uses default value: for a Root port it is 100 ms, for a Hub port the delay is taken from Hub descriptor.

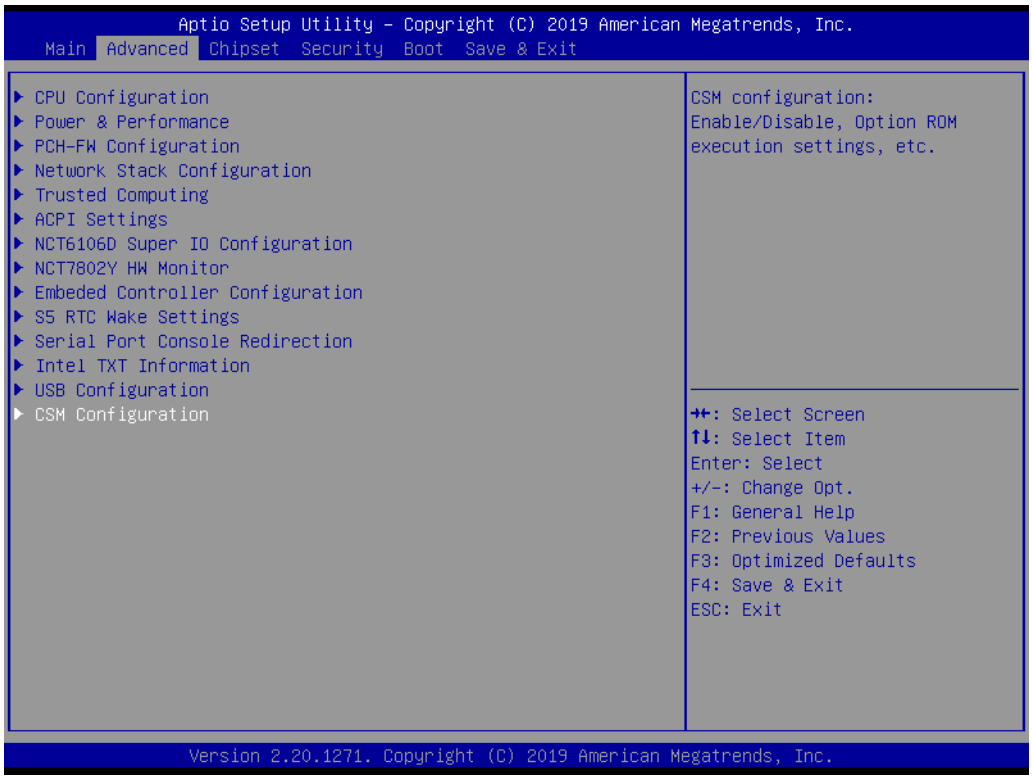
3.2.2.14 Network stack configuration

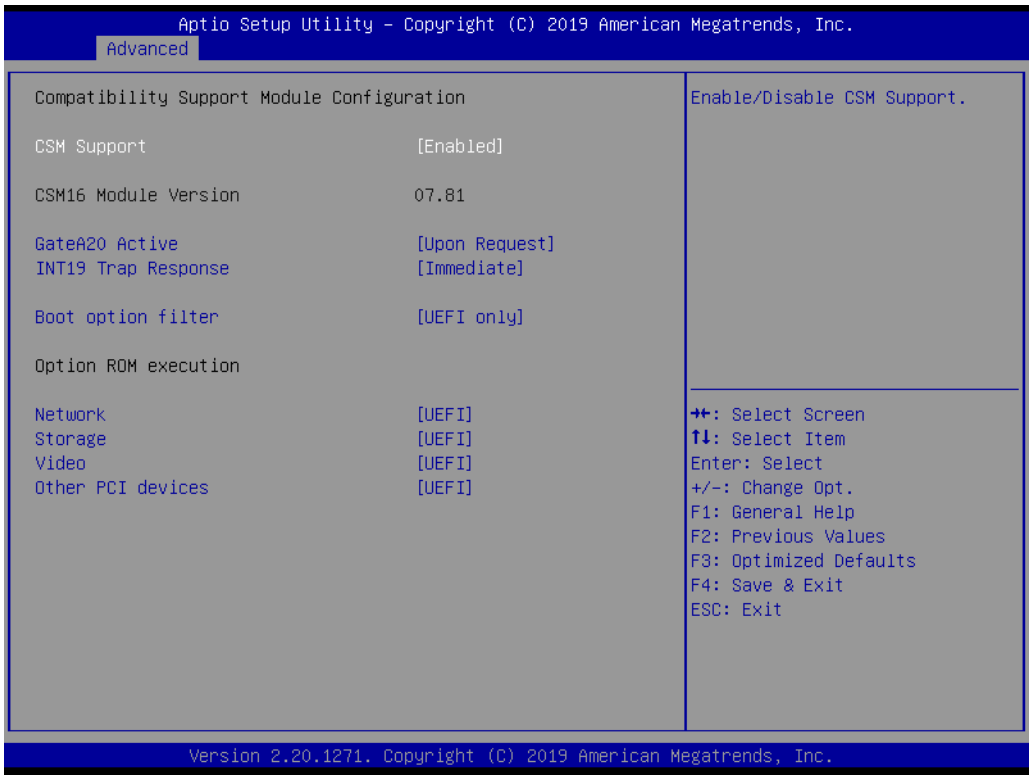




- **Network Stack**
  Enable/Disable UEFI Network Stack.

3.2.2.15 CSM configuration

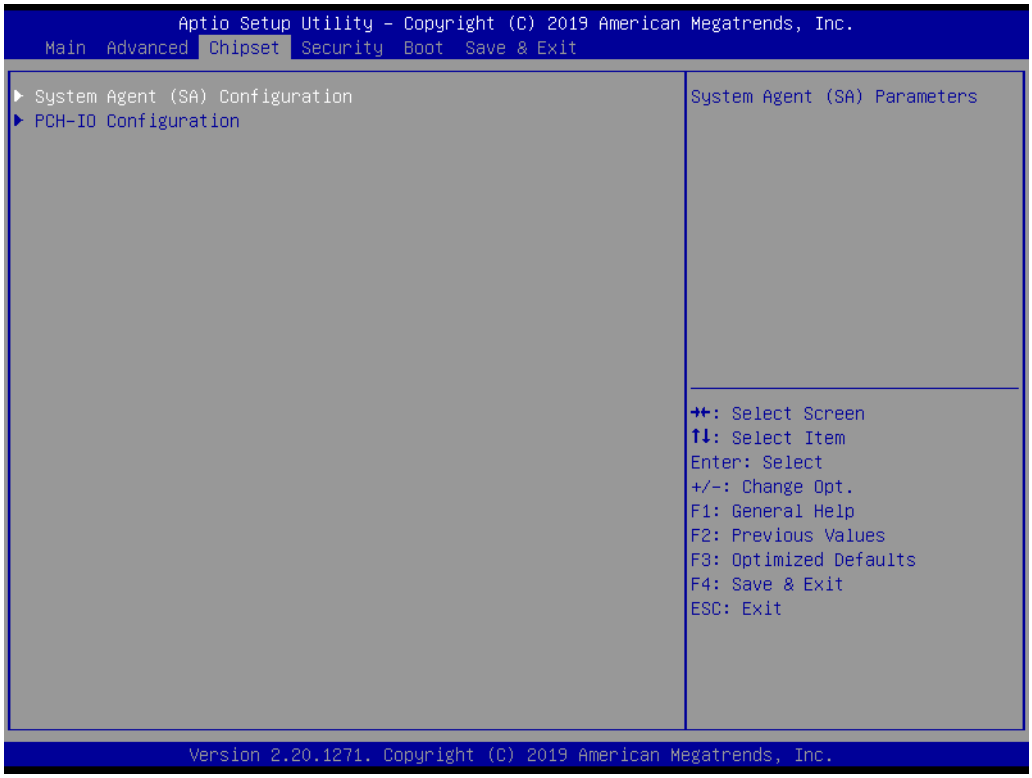




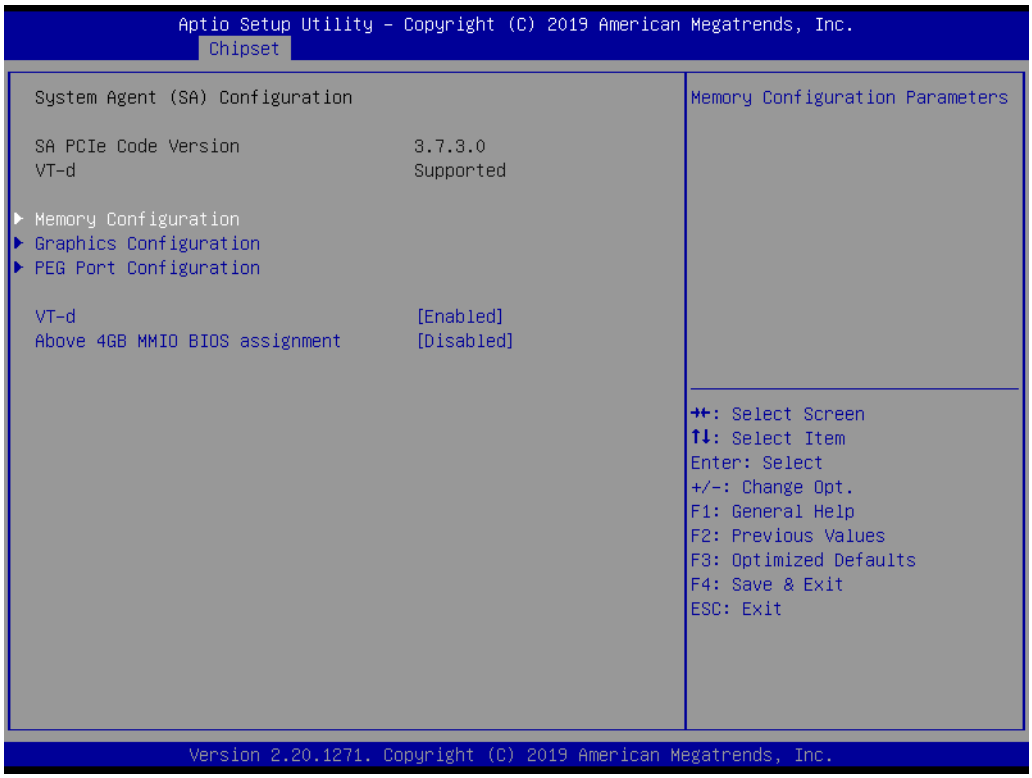
- **CSM Support**
  Enable/Disable CSM Support.
- **Gate A20 Active**
  This item is useful when RT code is executed above 1MB. When this is set as "UPON RQUEST", GA20 can be disabled using BIOS services. When it's set as "Always", it does not allow disabling GA20.
- **Option ROM Message**
  BIOS Set display mode for Option ROM.
- **INT19 Trap Response**
  BIOS reaction on INT19 trapping by Option ROM: IMMEDIATE - execute the trap right away; POSTPONED - execute the trap during legacy boot.
- **Boot option filter**
  This option controls Legacy/UEFI ROMs priority.
- **Network**
  Controls the execution of UEFI and Legacy PXE OpROM.
- **Storage**
  Controls the execution of UEFI and Legacy Storage OpROM.
- **Video**
  Controls the execution of UEFI and Legacy Video OpROM.
- **Other PCI devices**
  Determines OpROM execution policy for devices other than Network, Storage, or Video.

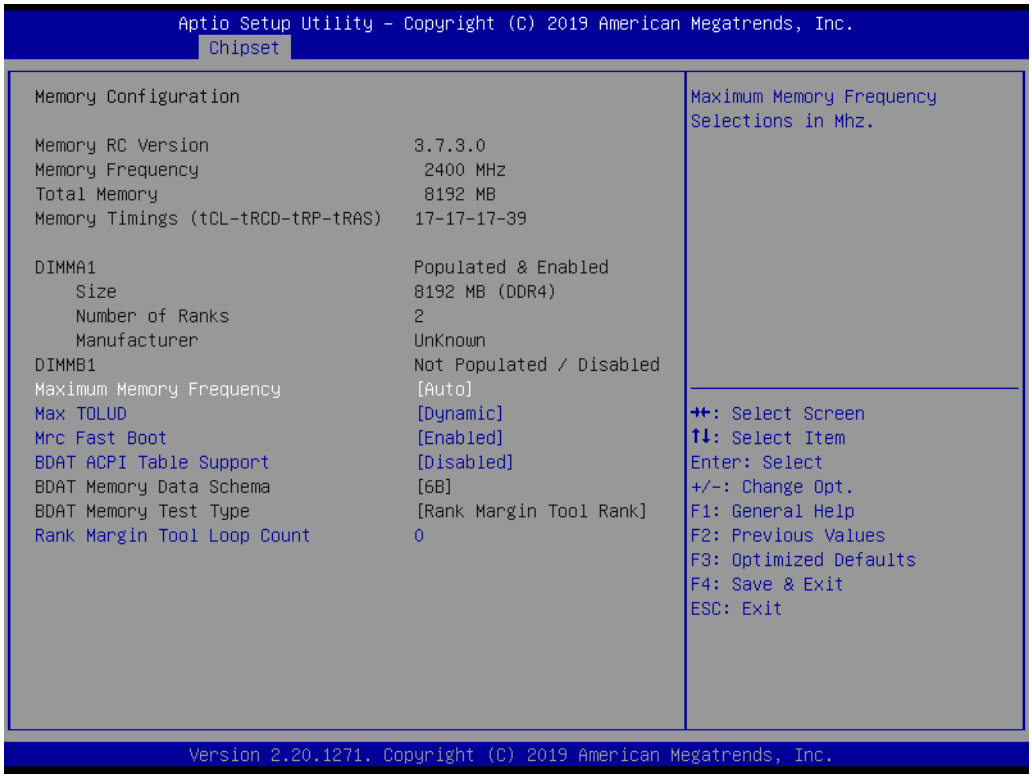
3.2.3 Chipset configuration

Select the Chipset tab from the AIR-300 setup screen to enter the Chipset BIOS Setup screen. You can display a Chipset BIOS Setup option by highlighting it using the <Arrow> keys. All Plug and Play BIOS Setup options are described in this section. The Plug and Play BIOS Setup screen is shown below.



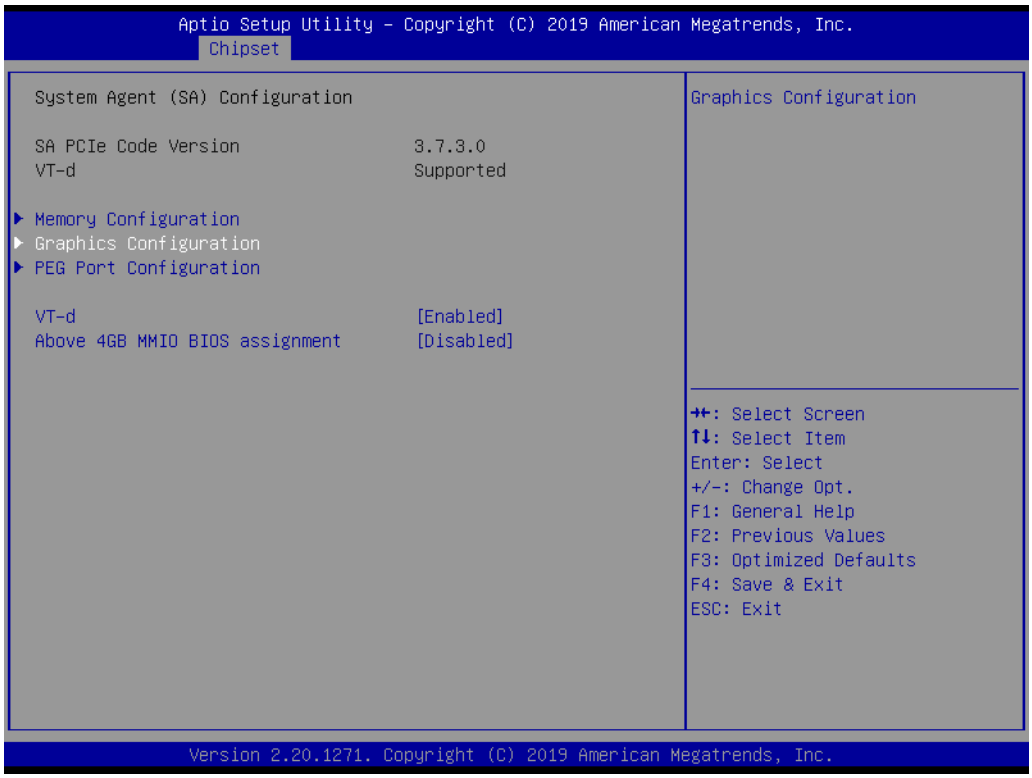
3.2.3.1 Memory configuration options

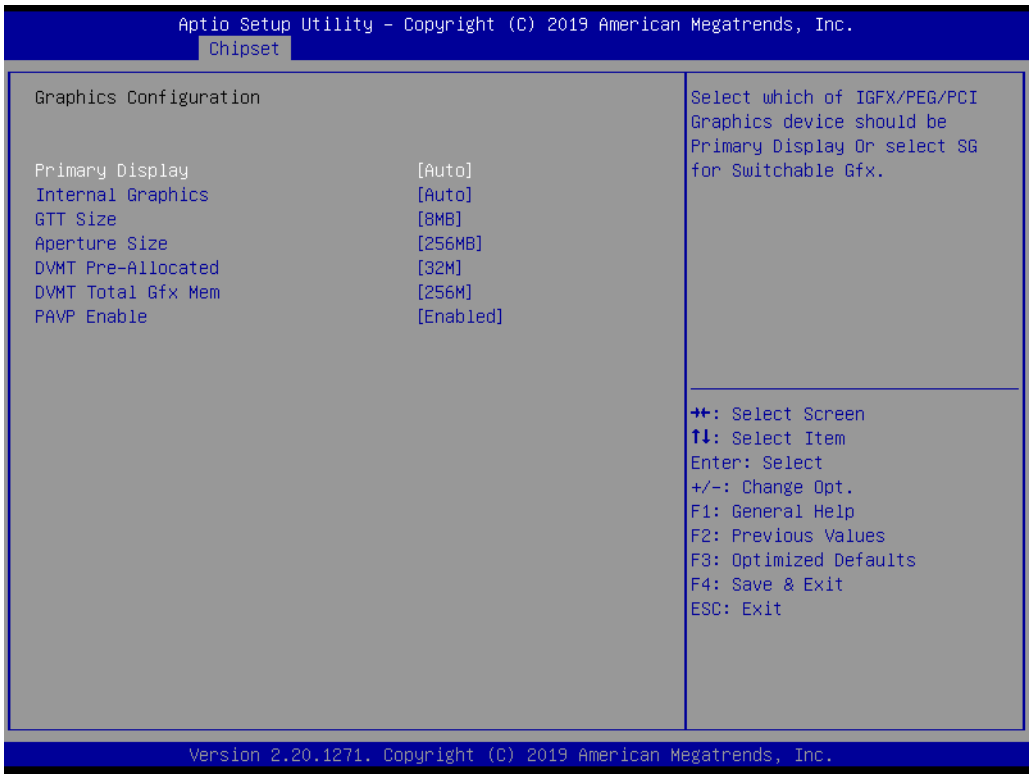




- **Memory Configuration**
  This item allows users to configure memory detail settings.

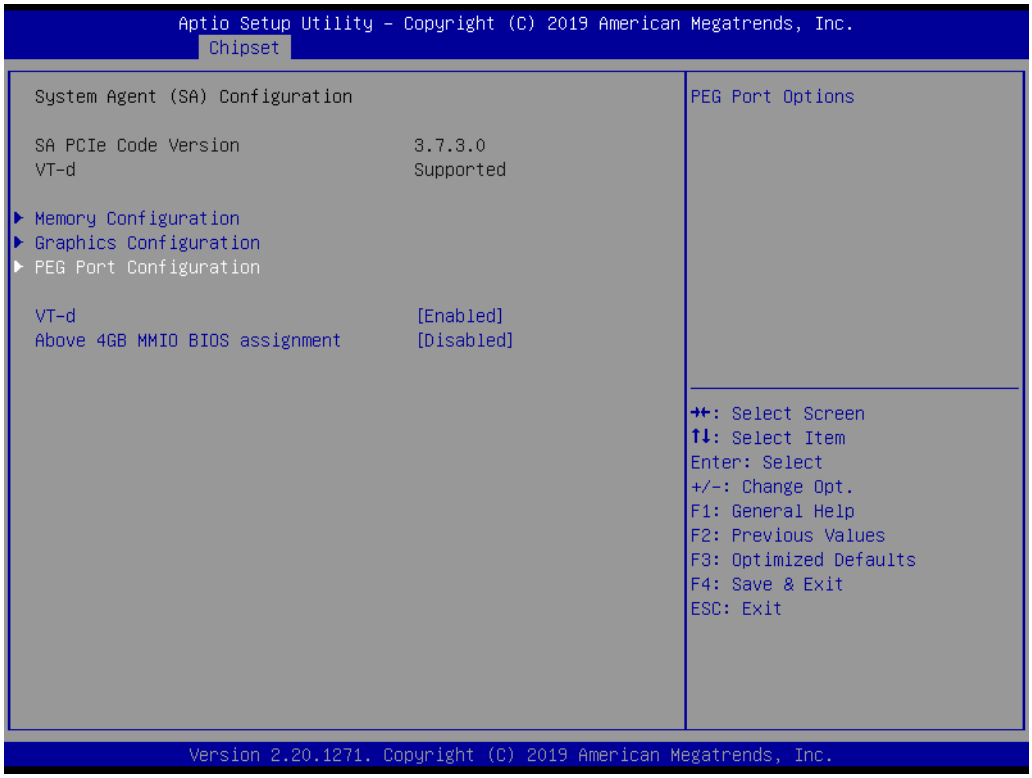
3.2.3.2 Graphics configuration

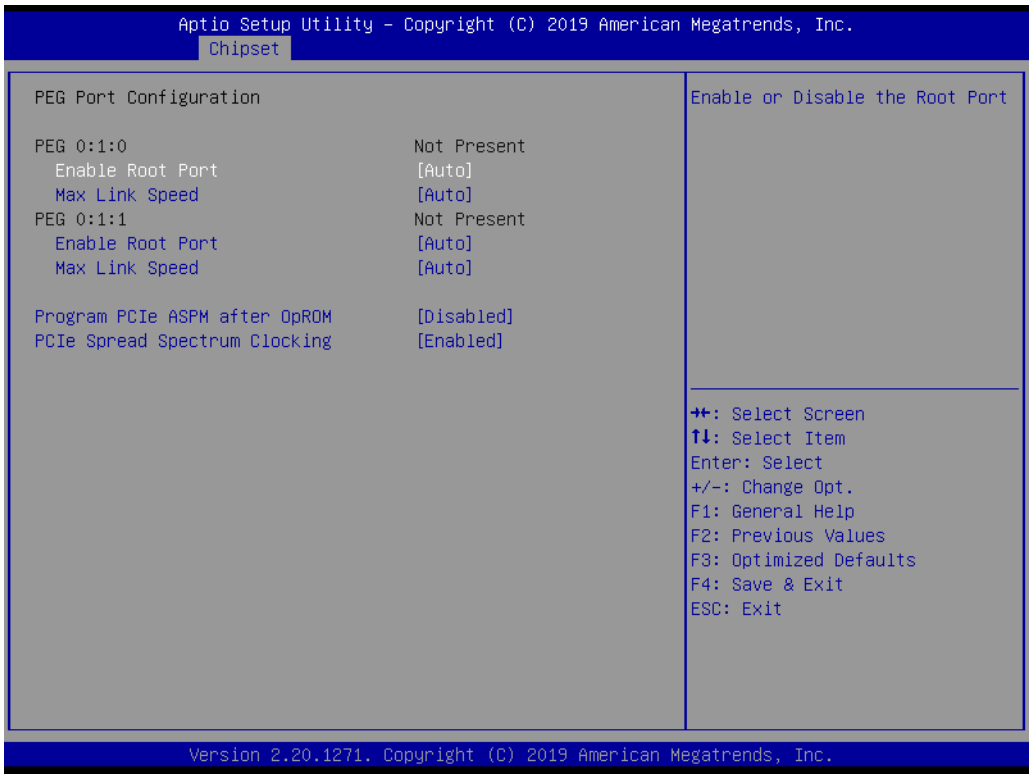




- **Primary Display**
  Select which of IGFX/PEG/PCI Graphics device should be Primary Display Or select SG for Switchable Gfx.
- **Internal Graphics**
  Keep IGFX enabled based on the setup options.
- **GTT Size**
  Selects the GTT Size.
- **Aperture Size**
  Selects the Aperture Size.
- **DVMT Pre-Allocated**
  Selects DVMT 5.0 Pre-Allocated (Fixed) Graphics Memory size used by the Internal Graphics Device.
- **DVMT Total Gfx Mem**
  Selects DVMT 5.0 Total Graphic Memory size used by the Internal Graphics Device.
- **PAVP Enable**
  Enable/Disable PAVP.

3.2.3.3 PEG port configuration

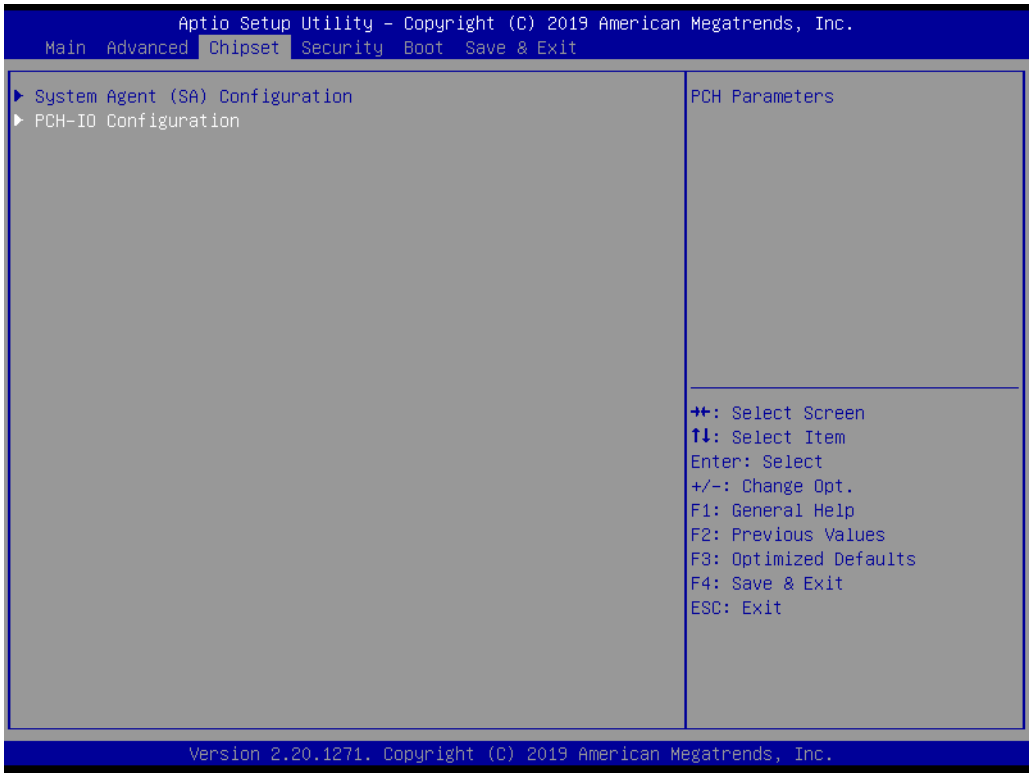


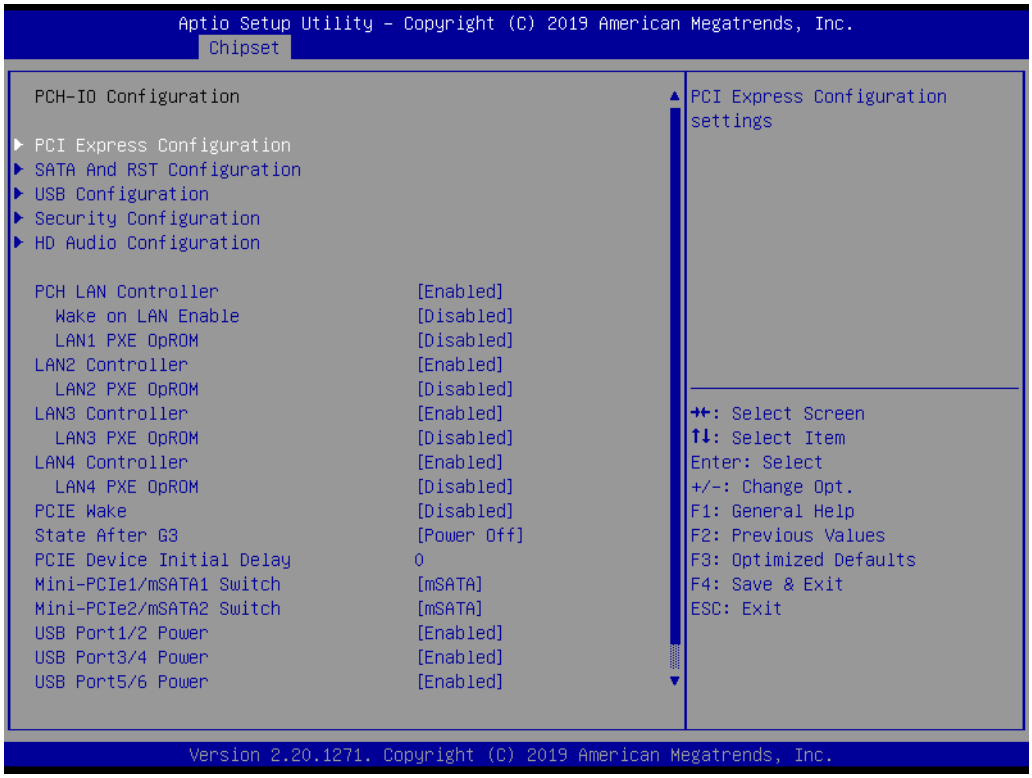


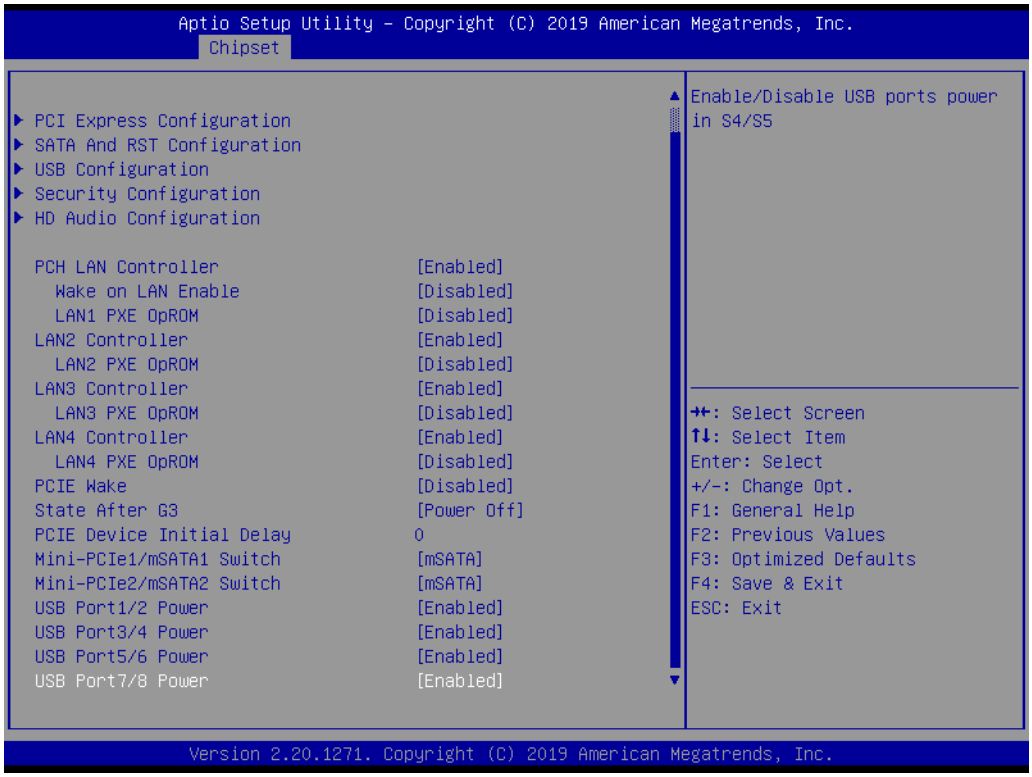
- **PEG Link and Speed Information**
- **Enable Root Port**
  Enable or Disable the Root Port.
- **Max Link Speed**
  Configure PEG Max Speed.

- **ASPM**
  Enable PCI Express Active State Power Management settings.
- **VT-d**
  VT-d capability.
- **Above 4GB MMIO BIOS assignment**
  Enable/Disable above 4GB MemoryMappedIO BIOS assignment.
- **Program PCIe ASPM after OpROM**
  Enabled: PCIe ASPM will be programmed after OpROM. Disabled: PCIe ASPM will be programmed before OpROM.
- **PCIe Spread Spectrum Clocking**
  Allows disableing Spread Spectrum Clocking for compliance testing.

3.2.3.4 PCH- I/O configuration





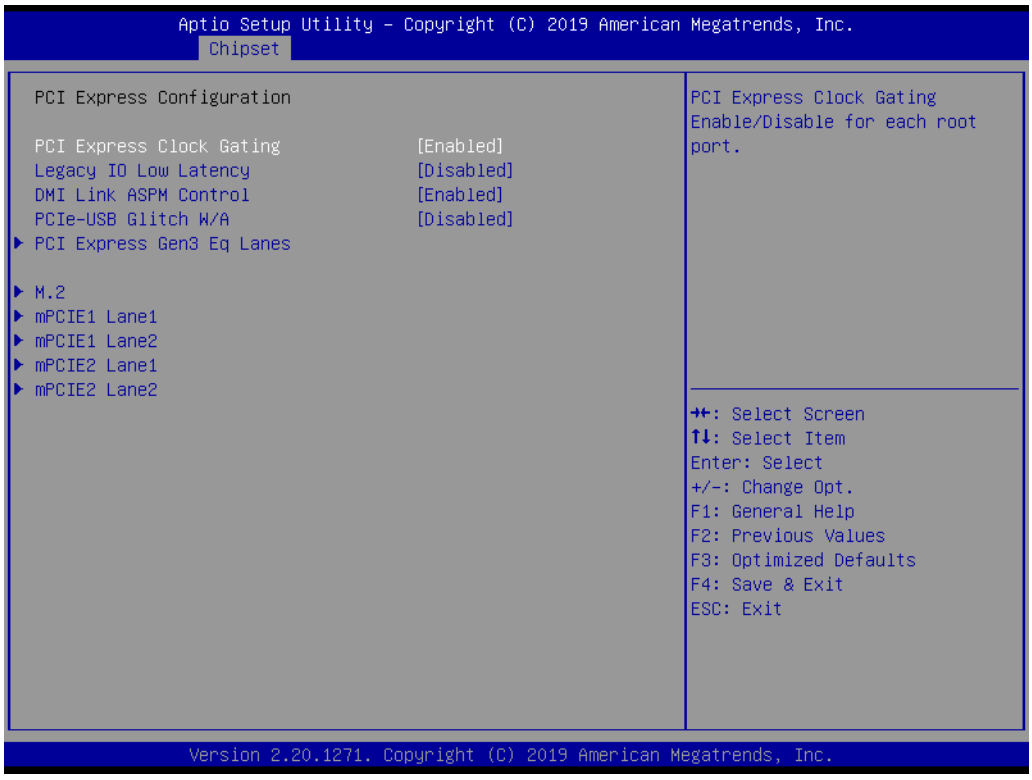


- **PCI Express Configuration**
  PCI Express Configuration Settings.
- **USB Configuration**
  USB Configuration Settings.
- **HD Audio Configuration**

HD Audio Susbsystem Configuration Settings.

- **PCH LAN Controller**
  Enable or Disable onboard NIC.
- **LAN Option ROM**
  Enable or Disable onboard LAN's PXE option ROM.
- **Wake on LAN**
  Enable or Disable Integrated LAN to wake the system from S5.
- **PCIE Wake**
  Enable or Disable PCIE to wake the system from S5.
- **State After G3**
  Specifies what state to go to when power is re-applied after a power failure (G3 state).
- **PCIE Device Initial Delay**
  The PCIE device initial delay 0~30 second.
- **Mini-PCIe/mSATA Switch**
  Selects mini-PCIe or mSATA function support.
- **USB Power**
  Enable or Disable USB standby power.

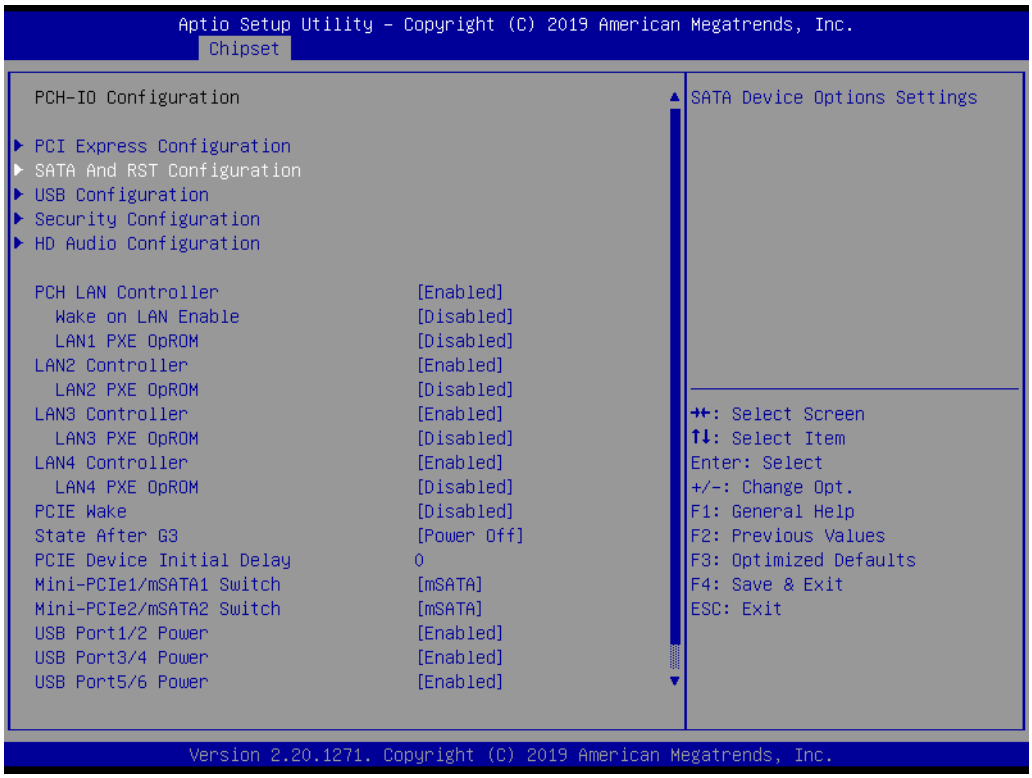
3.2.3.5 PCI express configuration

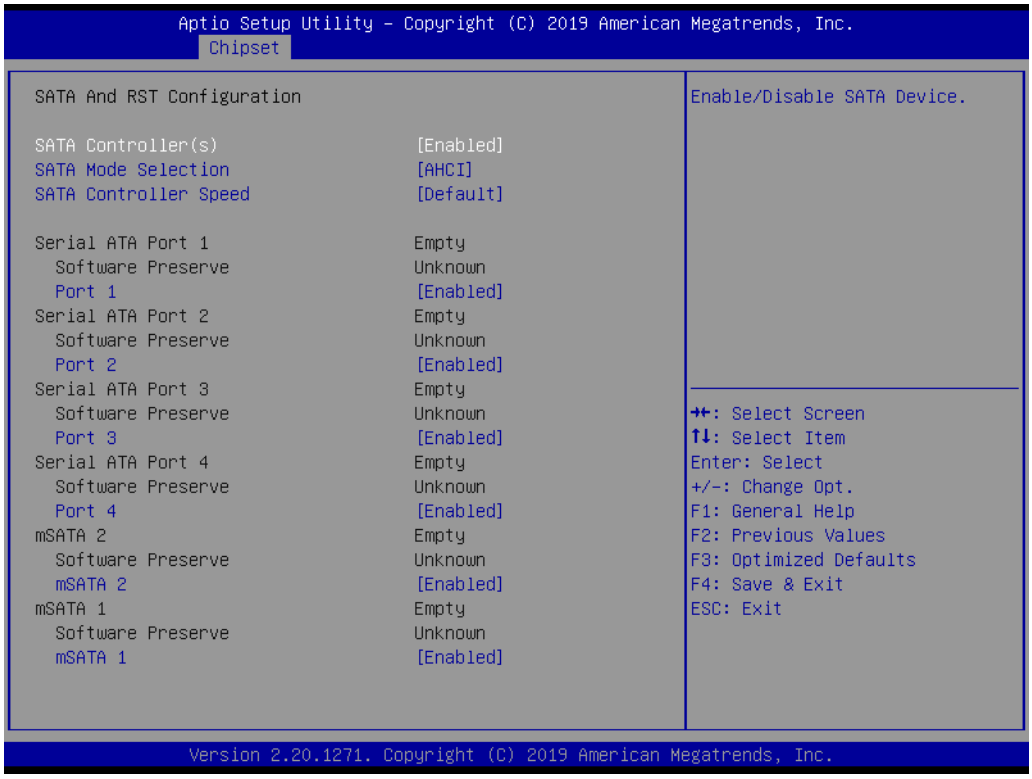


- **PCI Express Clock Gating**
  Enable or disable PCI Express Clock Gating for each root port.
- **DMI Link ASPM Control**
  Enable/Disable the control of Active State Power Management on SA side of the DMI Link.

- **m.2 Setting**
  Set up m.2 related function.
- **mPCIE Setting**
  Set up mPCIE related function.

3.2.3.6 SATA and RST configuration





- **SATA Controller**
  Enable / Disable SATA Device.
- **SATA Mode Selection**
  Determines how the SATA controller operates.
- **SATA Controller Speed**
  Indicates the maximum speed the SATA controller can support.
- **Port 1 / Port 2 / Port3 / Port4 / mSATA1 / mSATA2**
  Enable/Disable SATA device.

Appendix A

Watchdog Timer Sample Code

A.1 EC Watchdog Timer Sample Code

```
EC_Command_Port = 0x29Ah
EC_Data_Port = 0x299h
Write EC HW ram = 0x89
Watch dog event flag = 0x57
Watchdog reset delay time = 0x5E
Reset event = 0x04
Start WDT function = 0x28
================================================
.model small
.486p
.stack 256
.data
.code
org 100h
.STARTup

mov dx, EC_Command_Port
mov al,89h ; Write EC HW ram.
out dx,al

mov dx, EC_Data_Port
mov al, 5Fh ; Watchdog reset delay time low byte (5Eh is high byte) index, Timebase:
100ms
out dx,al

mov dx, EC_Data_Port
mov al, 64h ;Set 10 seconds delay time.
out dx,al

mov dx, EC_Command_Port
mov al,89h ; Write EC HW ram.
out dx,al

mov dx, EC_Data_Port
mov al, 57h ; Watch dog event flag.
out dx,al

mov dx, EC_Data_Port
mov al, 04h ; Reset event.
out dx,al

mov dx, EC_Command_Port
mov al,28h ; start WDT function. (Stop: 0x29, Reset: 0x2A)
out dx,al

.exit
END
```

Appendix B

USB 3.0 Drivers Installation Instruction

B.1 USB 3.0 Drivers Installation Instruction

For customers using Windows 7 OS, they need to install drivers to active the USB 3.0 function. Please download driver installation instructions from the Intel website. (https://www.intel.com/content/www/us/en/support/articles/000017241/mini-pcs.html)

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Please verify specifications before quoting. This guide is intended for reference purposes only.

All product specifications are subject to change without notice.