

User Manual

ARK-3530

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, 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.

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。

Copyright

The documentation and the software included with this product are copyrighted 2018 by Advantech Co., Ltd. All rights are reserved. Advantech Co., Ltd. reserves the right to make improvements in the products described in this manual at any time without notice.

No part of this manual may be reproduced, copied, translated or transmitted in any form or by any means without the prior written permission of Advantech Co., Ltd. Information provided in this manual is intended to be accurate and reliable. However, Advantech Co., Ltd. assumes no responsibility for its use, nor for any infringements of the rights of third parties, which may result from its use.

Acknowledgements

Award is a trademark of Award Software International, Inc.

VIA is a trademark of VIA Technologies, Inc.

IBM, PC/AT, PS/2 and VGA are trademarks of International Business Machines Corporation.

Intel® and Pentium® are trademarks of Intel Corporation.

Microsoft Windows® is a registered trademark of Microsoft Corp.

RTL is a trademark of Realtek Semi-Conductor Co., Ltd.

ESS is a trademark of ESS Technology, Inc.

UMC is a trademark of United Microelectronics Corporation.

SMI is a trademark of Silicon Motion, Inc.

Creative is a trademark of Creative Technology LTD.

CHRONTEL is a trademark of Chrontel Inc.

All other product names or trademarks are properties of their respective owners.

For more information about this and other Advantech products, please visit our website at:

<http://www.advantech.com/>

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

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

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

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 ARK-ARK-3530 Unit
- 1 x Registration and 2 years Warranty Card
- 1 x Simplified Chinese Manual
- 1 x China RoHs

Ordering Information

Model Number	Description
ARK-3530L-00A1E	Intel® Xeon® E3 / 6th&7th Gen Core™ i3/i5/i7 LGA1151 Modular Expansion Fanless Box PC
ARK-3530F-00A1E	Intel® Xeon® E3 / 6th&7th Gen Core™ i3/i5/i7 LGA1151 Modular Expansion Fanless Box PC

ARK-3530 Default SKU Option Items

Optional Item for Default SKU

Part Number	Description
XARK-DPS-150AB-15	AC-to-DC Adapter, DC12V 150W (ARK-3530L)
96PSA-A150W12W7	AC-to-DC Adapter, DC12V 150W (ARK-3530L)
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

Optional MOS modules for iDoor Expansion

Part Number	Description
MOS-2230-Z1201E	CANBus module, 2-Ch, USB I/F
MOS-2220-X1101E	Parallel LPT module, 1-Ch, USB I/F.
MOS-2220-Z1101E	High Speed Com USB module, 2-Ch, PCIe I/F
MOS-2120-Z1101E	Giga LAN Ethernet module, 1-Ch, PCIe I/F.
MOS-1120Y-0202E	Isolated RS-232, 2-Ch, DB9, PCIe I/F
MOS-1121Y-0202E	Isolated RS-422/485, 2-Ch, DB9, PCIe I/F
MOS-1120Y-1402E	Non-Isolated RS-232, DB37, 4-Ch, PCIe I/F
MOS-1121Y-1402E	Non-Isolated RS-422/485, DB37, 4-Ch, PCIe I/F
MOS-1130Y-0201E	Isolated CANBus, 2-Ch, DB9, PCIe I/F
MOS-1110Y-0101E	Isolated 16 DI/8 DO, 1-Ch, DB37, PCIe I/F
MOS-2110Z-1201E	USB module, 2-Ch, PCIe I/F
MOS-2120-Z1201	Dual Intel I210 GbE LAN iDoor, 2-Ch, PCIe I/F

Optional 9-36V DC Power Module

Part Number	Description
AMO-P010E	9-36V DC input power module for ARK-3530L
96PSA-A150W19P4-1	AC-to-DC Adapter, DC19V 150W, 0 ~ 40° C (for AMO-P010E/ARK-3530F)
96PSA-A220W24P4-1	AC to DC adapter, DC 24V 220W, -20 ~ 60° C (For AMO-P010E/ARK-3530F)
1702002600	Power cable 3-pin 183cm, USA type
1702002605	Power cable 3-pin 183cm, EU type
1702031801	Power cable 3-pin 183cm, UK type

ARK-3530 Optional HDD expansion Kit (supports up to 2 sets)

Part Number	Description
-	1 x internal HDD Kit (Max Height 15mm)

Optional Display Module

Part Number	Description
AMO-D001E	DVI-D module
AMO-D002E	DP module
AMO-D003E	HDMI module

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	1
1.1	Introduction	2
1.2	Product Features.....	3
1.2.1	General	3
1.2.2	Display	3
1.2.3	Ethernet	3
1.3	Chipset.....	4
1.3.1	Functional Specification	4
1.3.2	SUSI 4.0.....	5
1.4	Mechanical Specifications.....	6
1.4.1	Dimensions	6
	Figure 1.1 ARK-3530 Mechanical Dimension Drawing.....	7
1.4.2	Weight.....	7
1.5	Power Requirement	7
1.5.1	System Power.....	7
1.5.2	RTC Battery	7
1.6	Environment Specification.....	8
1.6.1	Operating Temperature.....	8
1.6.2	Relative Humidity	8
1.6.3	Storage Temperature.....	8
1.6.4	Vibration During Operation	8
1.6.5	Shock During Operation.....	8
1.6.6	Safety.....	8
1.6.7	EMC	8
Chapter 2	Hardware Configuration.....	9
2.1	Introduction	10
2.2	Jumpers	10
2.2.1	Jumper Description	10
2.2.2	Jumper List	10
	Table 2.1: Jumper List.....	10
2.2.3	Jumper Locations.....	11
	Figure 2.1 Jumper Layout.....	11
2.2.4	Jumper Settings	12
2.3	Connectors.....	14
2.3.1	ARK-3530 External I/O Locations	14
	Figure 2.2 ARK-3530L Front IO connector drawing	14
	Figure 2.3 ARK-3530F Front IO connector drawing	14
2.3.2	ARK-3530 Front I/O Connectors.....	15
	Figure 2.4 USB2.0 connector	15
	Table 2.2: USB 2.0 Connector Pin Assignments.....	15
	Figure 2.5 COM connector	15
	Table 2.3: COM Connector Pin Assignments.....	15
	Figure 2.6 Ethernet connector	16
	Table 2.4: Ethernet Connector Pin Assignments.....	16
	Figure 2.7 Power ON/OFF Button	16
	Figure 2.8 Audio Connector.....	17
	Table 2.5: Audio Connector Pin Assignments	17
	Figure 2.9 LED Indicators	17
	Figure 2.10HDMI receptacle connector	17
	Table 2.6: HDMI Connector Pin Assignments	17
	Figure 2.11USB3.0 Connector.....	18
	Table 2.7: USB 3.0 Connector Pin Assignments.....	18

	Figure 2.12VGA Connector	18
	Table 2.8: VGA Connector Pin Assignments	18
2.4	Installation	19
2.4.1	CPU/Memory Installation	19
2.4.2	Remove Bottom Cover	19
2.4.3	External HDD/SSD Installation	20
2.4.4	M.2 Module/MiniPCIe Module/Internal SIM Card Slot Installation .. 20	
2.4.5	iDoor Installation	21
2.4.6	Optional Module for Third Display Installation	21
2.4.7	Replace CPU thermal Grease Pad	22
2.4.8	Wide operating temperature support	22
Chapter 3	BIOS Settings	23
3.1	Introduction	24
3.2	Entering Setup	25
3.2.1	Main Setup	25
3.2.2	Advanced BIOS Features Setup	26
3.2.3	Chipset Configuration	44
Appendix A	Watchdog Timer Sample Code	53
A.1	EC Watchdog Timer Sample Code	54
Appendix B	USB 3.0 Drivers Installation Instruction	57
B.1	USB 3.0 Drivers Installation Instruction	58

Chapter 1

General Introduction

This chapter gives background information on ARK-3530 series.

1.1 Introduction

ARK-3530, an intelligent, high performance, fanless desktop system powered by intel Xeon E3 and 6th&7th Gen Core i3/i5/i7 LGA1151 processor comes with rich I/O combination and modular expansion solution. The expansions are supported by riser card PCI/PCIe x8/PCIe x16 slots. ARK-3530 support maximum up to 65W processor and up to -20~60C extend operating temperature. Also, it provides multiple I/O up to 6 x COMs, up to 4 x GbE, 8 x USB 3.0, 2 miniPCIe (share with mSATA), up to maximum 4 x 2.5" SATAIII hard drive bays.

Rugged & Multifunctional Design

ARK-3530 adopts advanced thermal design for desktop processor solution. All models are fanless, and highlight various quality features, wide temperature range from -20~60° C, diverse expandability options and structural strengthening. It also provides rich I/O interfaces: up to 4 x Intel GbE, 8 x USB3.0, up to 4 x 2.5" HDD, 2 x miniPCIe, 4 x RS-232/422/485 COM ports.

Various Expansion Support

ARK-3530 is a flexible system which can work in different environments and applications with multiple I/O. It can support riser cards: 2 x PCI, 2 x PCIe x8, 1 x PCIe x16 (per project). It also has board-to-board design and more I/O ports in coast line without cables.

Built in Intelligent Management Tools - Advantech iManager & WISE-PaaS/RMM

Advantech iManager provides a valuable suite of programmable APIs such as multi-level watchdog, hardware monitor, system restore, and other user-friendly interface. iManager is an intelligent self-management cross platform tool that monitors system status for problems and takes action if anything is abnormal. iManager offers a boot up guarantee in critical, low temperature environments so systems can automatically recover when voltages dip. iManager makes the whole system more reliable and more intelligent. ARK-3530 also supports Advantech's own WISE-PaaS/RMM, which provides easy remote management so users can monitor, configure, and control a large number of terminals to make maintenance and system recovery simpler.

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 128-Mbit SPI Flash BIOS
- **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)
 - 1 x iDoor
 - 2 x PCI + 1 x PCIe x 4
 - 1 x M.2 (E key for Wifi)
- **Software API:** Advantech SUSI API and WISE-PaaS/RMM - Remote Device Management technology

1.2.2 Display

- **Controller:** Intel® HD Graphic 630
- **Resolution:**
 - VGA: supports 1920x1200 @ 60 Hz
 - HDMI: supports HDMI 2.0, 3840 x 2160 @ 30 Hz
- **Triple Display:**
 - VGA + HDMI + 3rd Optional display module

1.2.3 Ethernet

- **Chipset:**
 - LAN1 Intel® i219LM
 - LAN2/3/4 Intel® i210IT (only ARK-3530F have LAN3/4)
- **Speed:** 10/100/1000 Mbps
- **Interface:** 4 x RJ45

1.3 Chipset

1.3.1 Functional Specification

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	<ul style="list-style-type: none">■ Direct x 12, OpenGL 4.4■ VGA + HDMI + 3rd optional display module■ Intel® Display Power saving technology 6.0
Video Accelerator	<ul style="list-style-type: none">■ 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: <ul style="list-style-type: none">■ 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: <ul style="list-style-type: none">■ 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–S4■ Maximum 500mA for each USB port
Power Management	Intel C236 chip supports: <ul style="list-style-type: none">■ Supports ACPI■ ACPI-defined power states (processor driven C states)■ ACPI Power Management Timer■ SMI# generation
BIOS	Intel C236 chip supports: <ul style="list-style-type: none">■ AMI 128-Mbit EFI Flash BIOS via SPI

1.3.1.3 Others

Serial ports	<ul style="list-style-type: none"> ■ Up to 6 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	<p>LAN1 Intel i219LM, LAN2/3/4 Intel i210 IT</p> <ul style="list-style-type: none"> ■ Supports 10/100/1000 Mbps. ■ LAN Connectors: Phone Jack RJ45 8P 90D(F)
Audio	<p>Audio Codec: ALC888S-VD2-GR</p> <ul style="list-style-type: none"> ■ 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

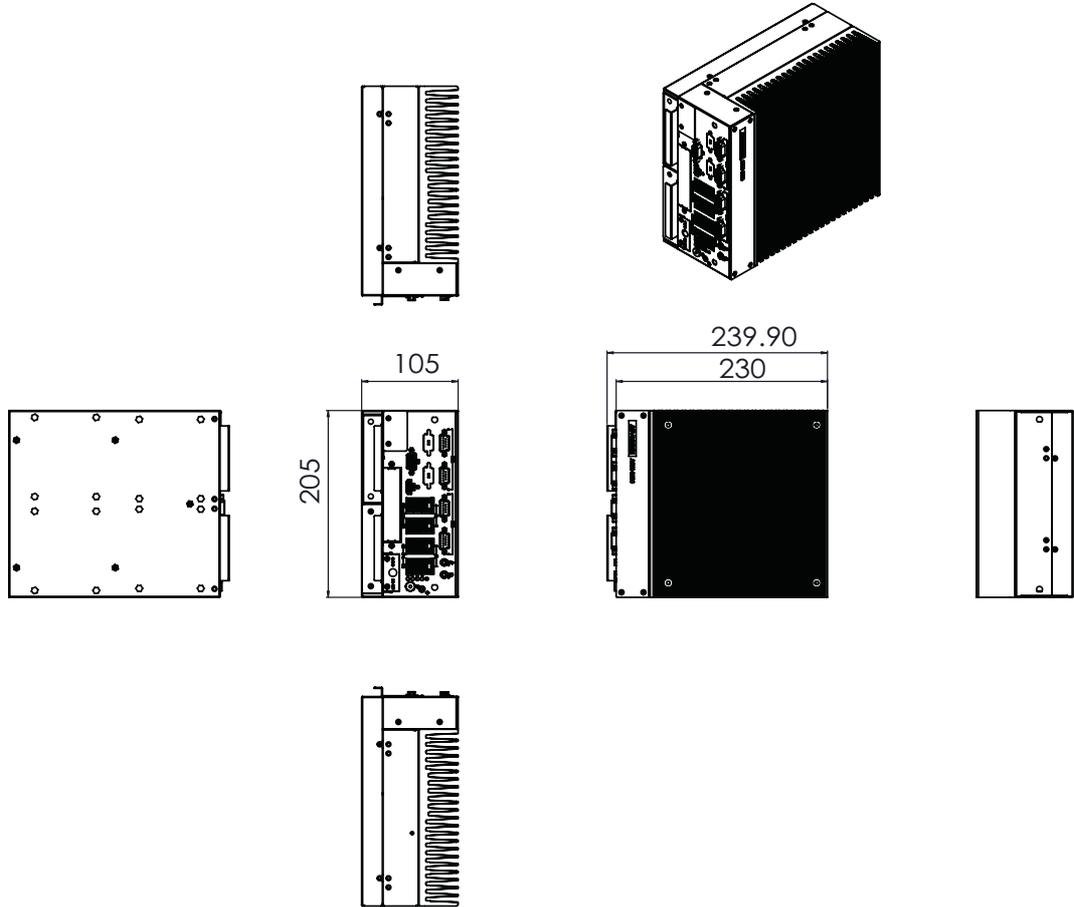
SUSI API	
Sequence control	Supported
DIO	16-bit programmable DIO
Watchdog timer	Multi-level WDT (set by Advantech iManager) Programmable 1-255 sec / min
Hardware monitor	CPU Temperature / input Current / input Voltage
System information	Running HR / Boot record

1.4 Mechanical Specifications

1.4.1 Dimensions

105 [4.13] x 205 [8.07] x 230 [9.06] for ARK-3530L

156.5 [6.16] x 205 [8.07] x 230 [9.06] for ARK-3530F



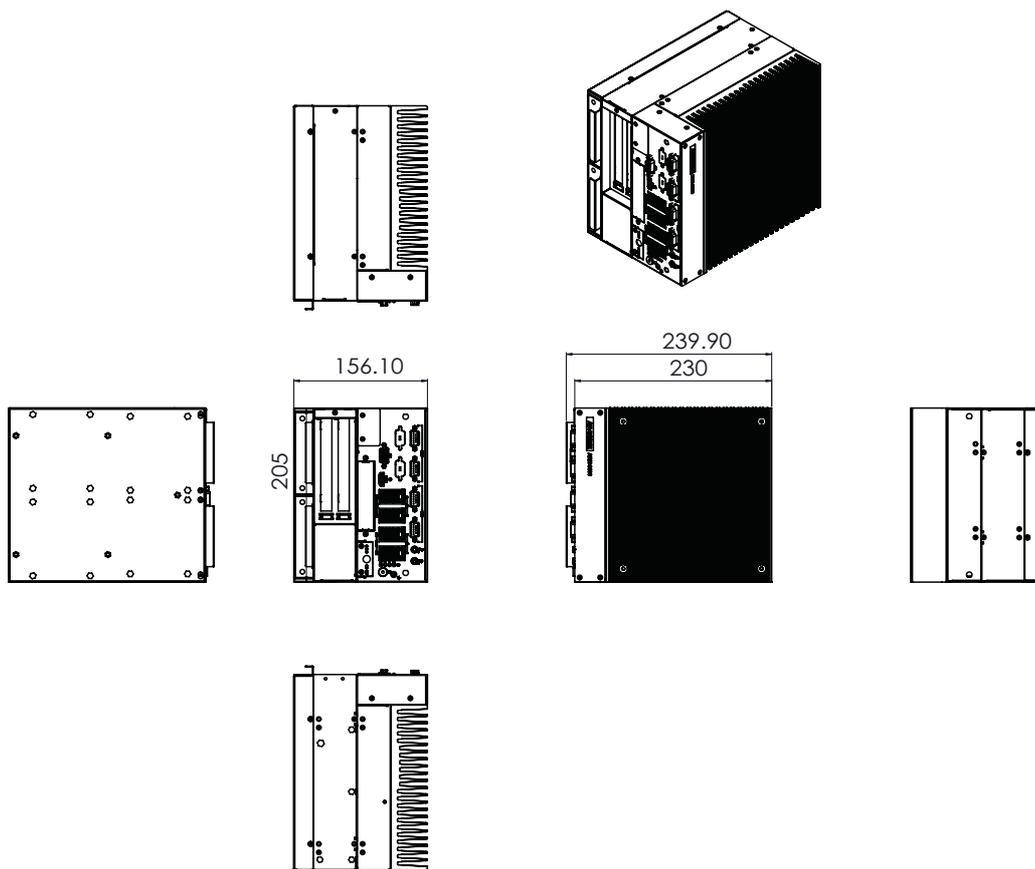


Figure 1.1 ARK-3530 Mechanical Dimension Drawing

1.4.2 Weight

5.87 kg (12.94 lb)

1.5 Power Requirement

1.5.1 System Power

- **Minimum power input:**
 - 12V (12.5A)
 - 9-36V (16.6~4.16A)

1.5.2 RTC Battery

- Lithium 3 V/210 mAH

1.6 Environment Specification

1.6.1 Operating Temperature

- **25W, 35W, 65W(only 6th Gen) with Industrial Grade SSD:** -20~60° C (-4 ~ 140° F), with air flow, speed=0.7 m/sec
- **With 2.5-inch hard disk:** 0 to 40° C (32 ~ 104° F), with air flow, speed=0.7 m/sec

1.6.2 Relative Humidity

- 95% @ 40° C (non-condensing)

1.6.3 Storage Temperature

- -40 ~ 85° C (-40 ~ 185° F)

1.6.4 Vibration During Operation

- For system equipped with SSD/mSATA: 3Grms, IEC 60068-2-64, random, 5 ~ 500 Hz

1.6.5 Shock During Operation

- For system equipped with SSD/mSATA: 30G, IEC 60068-2-27, half sin, 11 ms duration

1.6.6 Safety

- UL, CB, CCC, BSMI

1.6.7 EMC

- CE, FCC, CCC, BSMI

Chapter 2

Hardware
Configuration

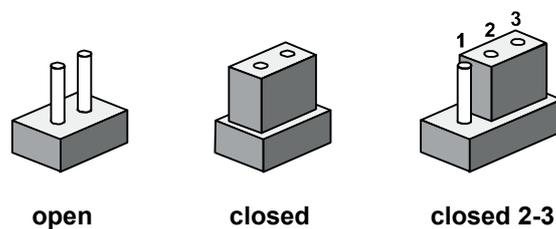
2.1 Introduction

The following sections show the internal jumpers setting and the external connectors pin assignment for application.

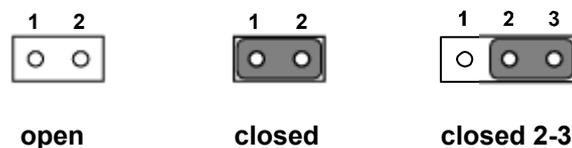
2.2 Jumpers

2.2.1 Jumper Description

You may configure ARK-3530 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.



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



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

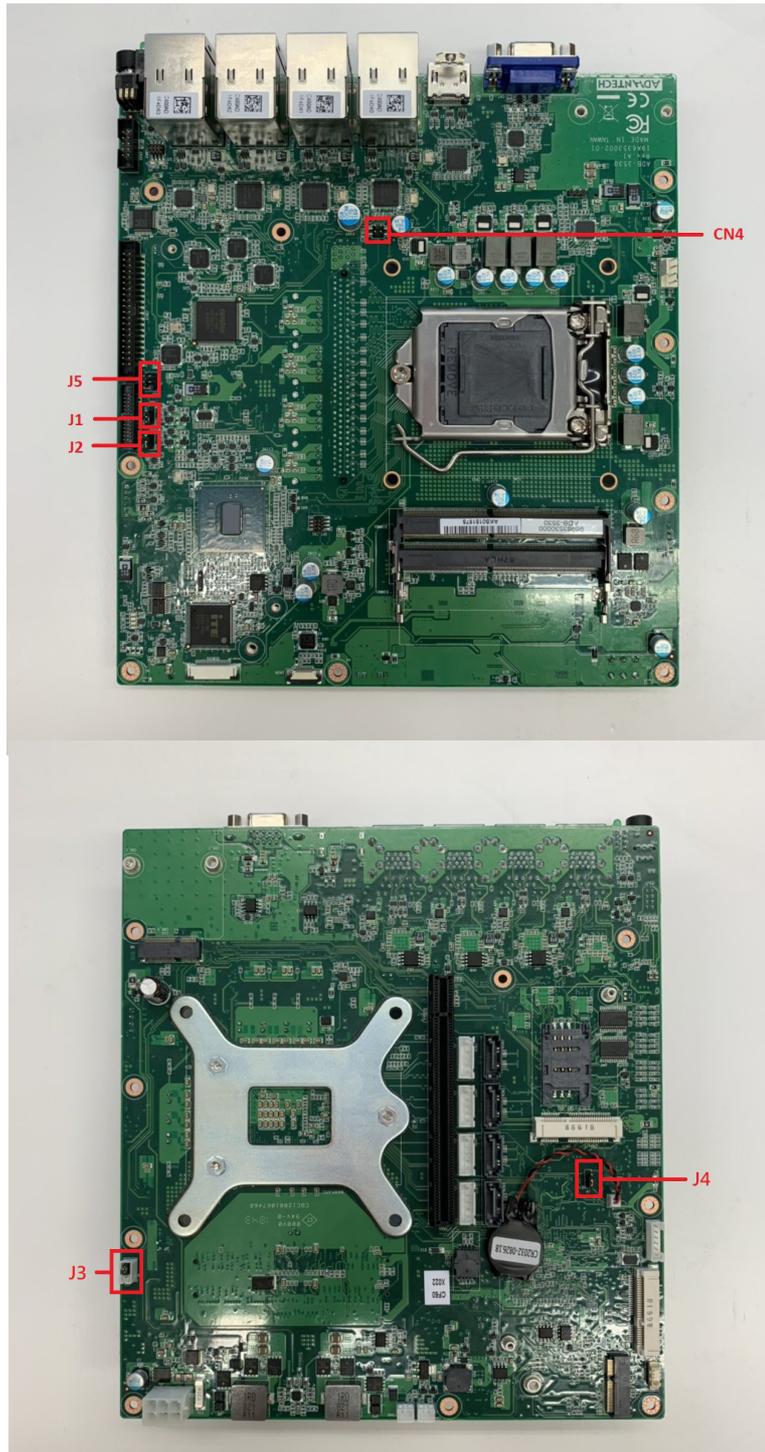
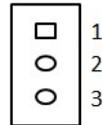


Figure 2.1 Jumper Layout

2.2.4 Jumper Settings

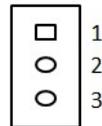
2.2.4.1 mSATA/PCIe setting for CN31 (J1)

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)



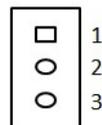
2.2.4.2 mSATA/PCIe setting for CN32 (J2)

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)



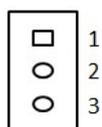
2.2.4.3 Auto Power on setting (J3)

J3 Auto 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)

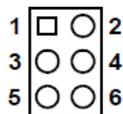


2.2.4.4 CMOS reset (J4)

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)**

CN4 Expansion Riser Card SKU setting	
Part Number	1653000014
Footprint	HD_2x2P_79_D
Description	
Setting	Function
(1-2)(3-4)	AMO-R025 2 x PCI (default)
(1-2)	AMO-R026 2 x PCIe8
NC	AMO-R027 1 x PCIe16

2.3 Connectors

2.3.1 ARK-3530 External I/O Locations

ARK-3530L Front IO Panel



Figure 2.2 ARK-3530L Front IO connector drawing

ARK-3530F Front IO Panel

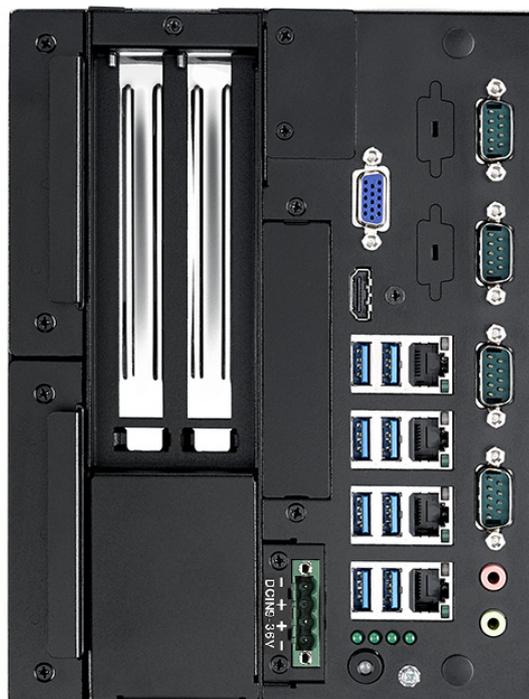


Figure 2.3 ARK-3530F Front IO connector drawing

2.3.2 ARK-3530 Front I/O Connectors

ARK-3530 provides two USB2.0 interface connectors, which give complete Plug & Play and hot swapping for up to 127 external devices. The USB interface complies with USB UHCI, Rev. 2.0 compliant. The USB interface can be disabled in the system BIOS setup. Please refer to Table. 2.2 for its 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 suspend mode (By customize BIOS Request support) .

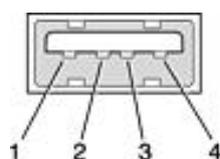


Figure 2.4 USB2.0 connector

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

ARK-3530 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 ARK-3530 COM1~4 can be supported via BIOS setting. Optional COM 5-6 supports RS-232.

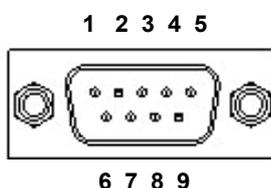


Figure 2.5 COM connector

Table 2.3: COM Connector Pin Assignments

Pin	RS-232	RS-422	RS-485
	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)

ARK-3530 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).

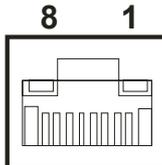


Figure 2.6 Ethernet connector

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+
8	MDI3-

2.3.2.3 Power On/Off Button

ARK-3530 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 2.7 Power ON/OFF Button

2.3.2.4 Audio Connector

ARK-3530 offers two stereo audio ports: Line_Out, Mic_In.

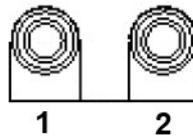


Figure 2.8 Audio Connector

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.

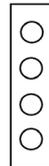


Figure 2.9 LED Indicators

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.

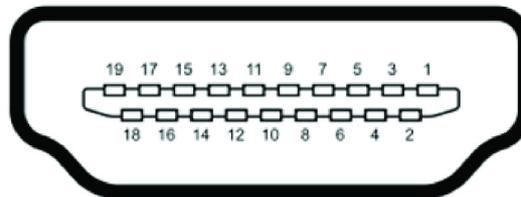


Figure 2.10 HDMI receptacle connector

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

ARK-3530 supports 8 USB 3.0 interfaces. The USB interfaces comply 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.

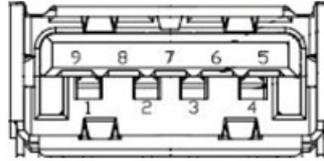


Figure 2.11 USB3.0 Connector

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

ARK-3530 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.

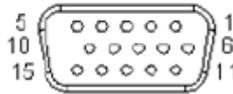


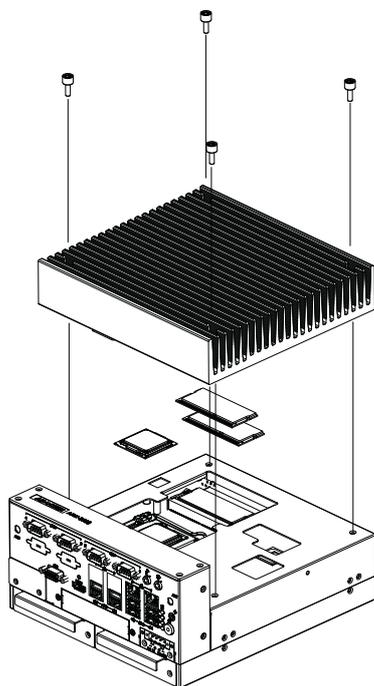
Figure 2.12 VGA Connector

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		

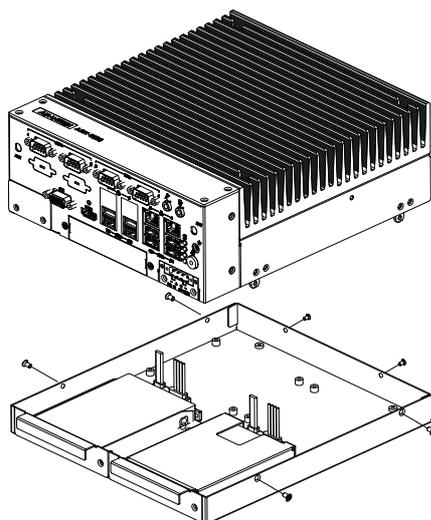
2.4 Installation

2.4.1 CPU/Memory Installation



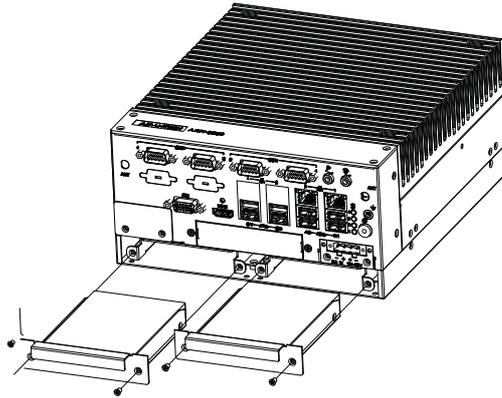
1. Unscrew the 4 screws on the top cover, and remove the top cover.
2. Install the CPU (LGA1151) and memory into the system.
3. Replace the top cover.

2.4.2 Remove Bottom Cover



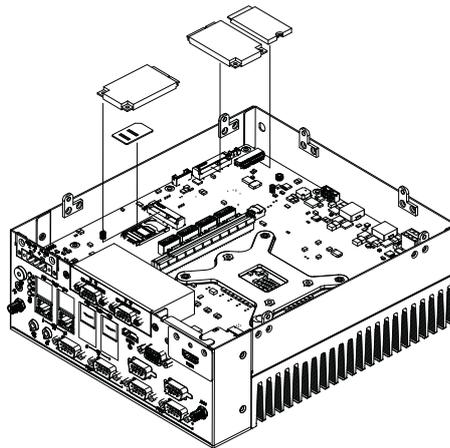
1. Unscrew six screws on the bottom cover.

2.4.3 External HDD/SSD Installation



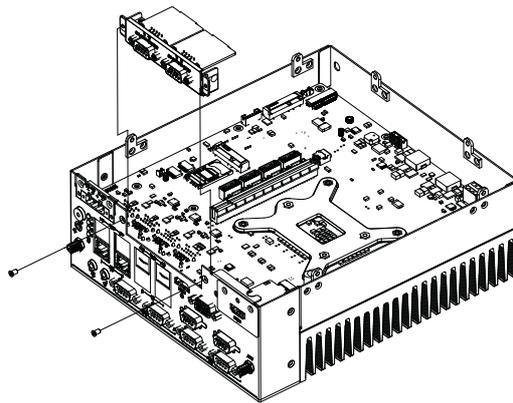
1. Unscrew 2 x screws on hard drive bay
2. Install HDD/SSD with 4 x screws on the HDD/SSD tray.
3. Push back the hard drive bay into the system and use the same screws to affix.

2.4.4 M.2 Module/MiniPCle Module/Internal SIM Card Slot Installation



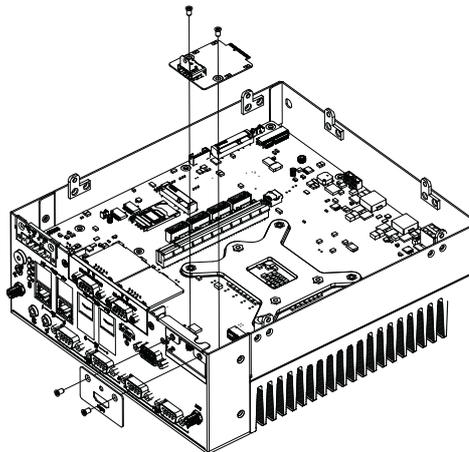
1. Remove the bottom cover.
2. Install miniPCIe/mSATA module (CN31_1/CN32_1) and screw it in place. (CN31_1 with SIM holder)
3. Install the M.2 module (CN47_2) and screw it in place.
4. Replace the bottom cover and fix in place with screws.

2.4.5 iDoor Installation



1. Remove the bottom cover.
2. Remove the screws on iDoor cover
3. Install the iDoor module onto the miniPCIe slot (CN31_1, CN32_1) and iDoor frame.
4. Replace the bottom cover and fix in place with screws.

2.4.6 Optional Module for Third Display Installation



1. Remove the bottom cover.
2. Install the optional display module to CN5_3.
3. Change the display bracket for the optional display module.
4. Replace the bottom cover and fix with screws.

2.4.7 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 ARK-3530

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.

2.4.8 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 ARK-3530 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 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.

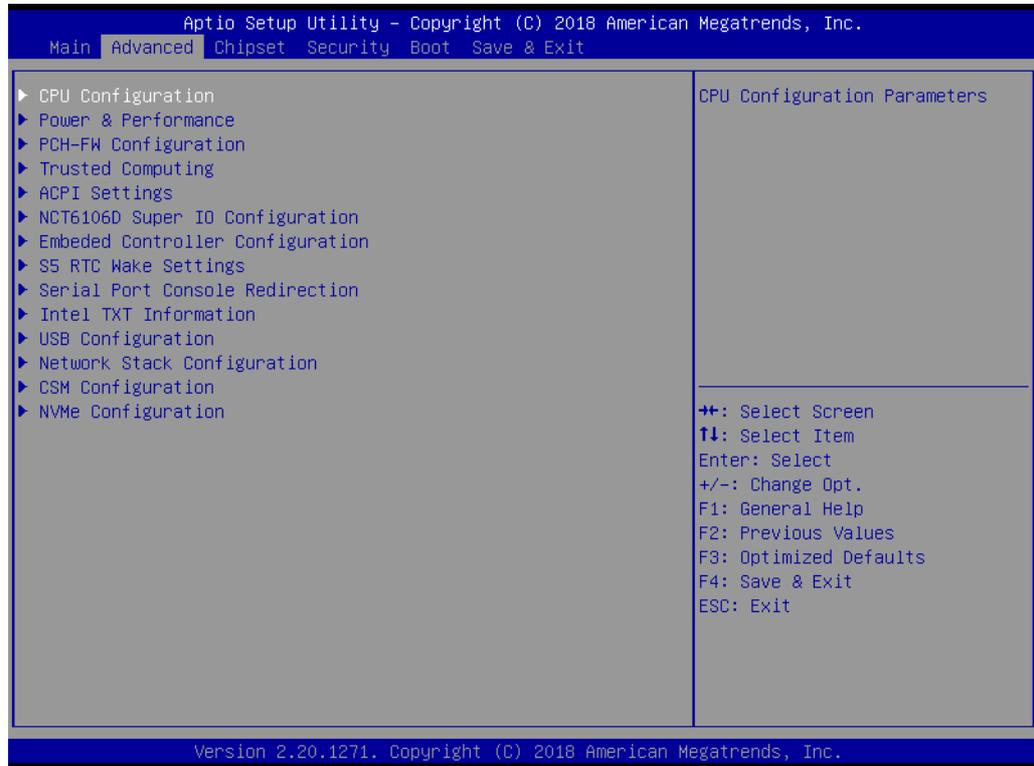
Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it.

■ System time / System date

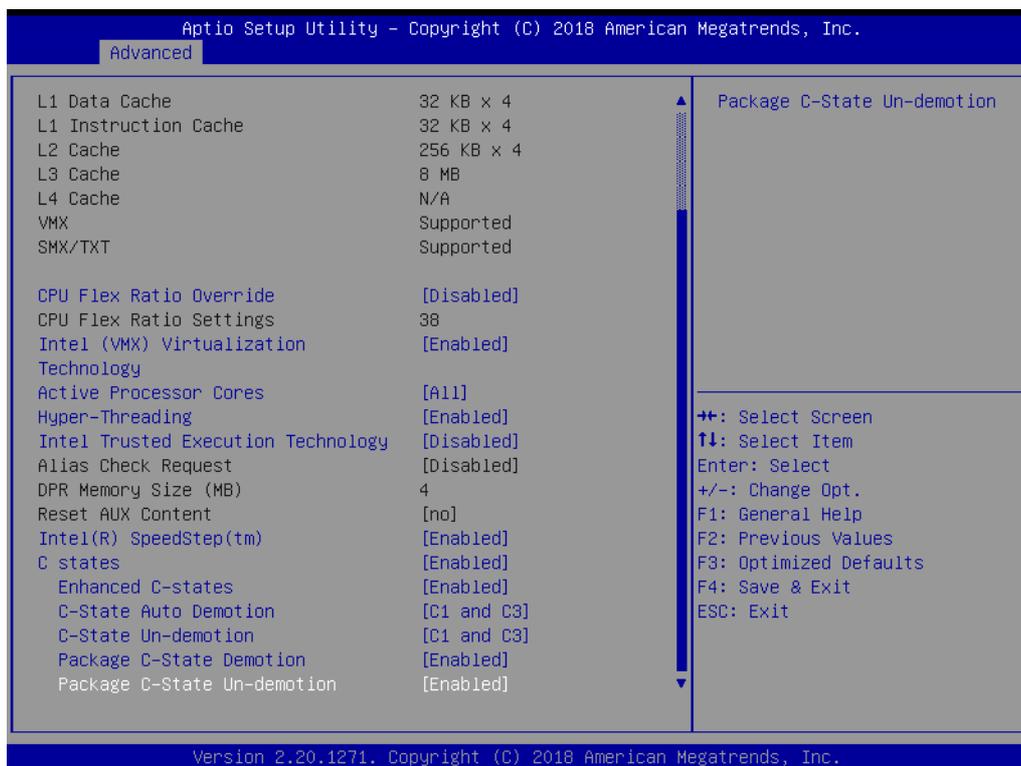
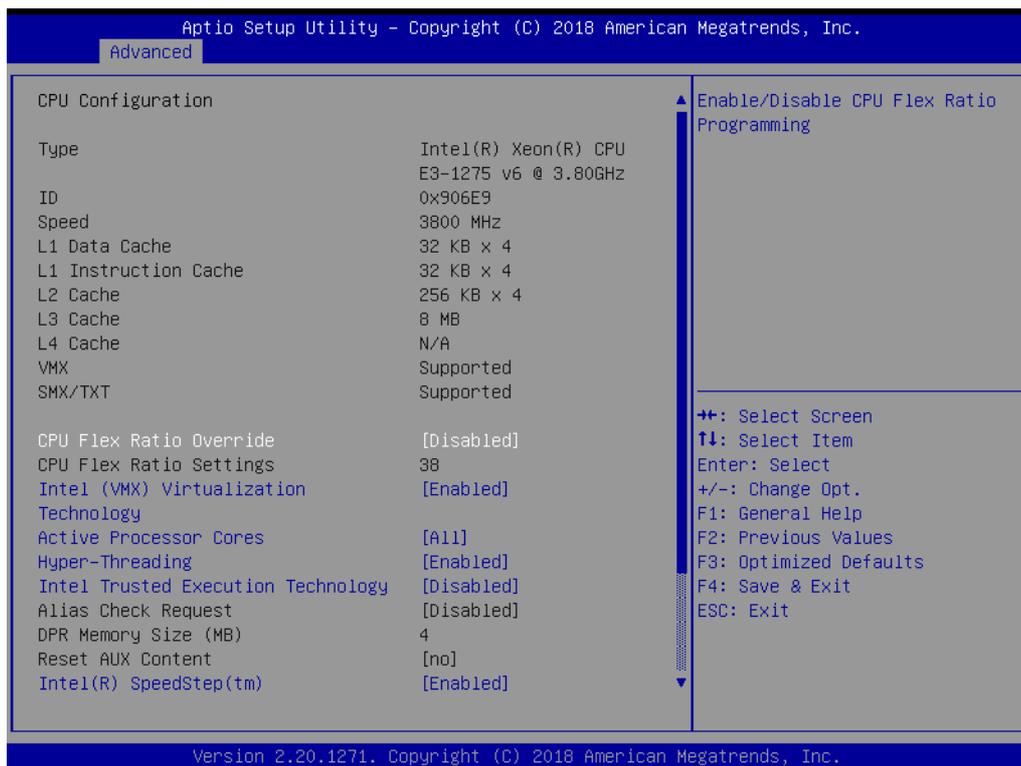
Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time must be entered in HH:MM:SS format.

3.2.2 Advanced BIOS Features Setup

Select the Advanced tab from the ARK-3530 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



- **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.

- **Hardware Prefetcher**

This item allows users to enable or disable the hardware prefetcher feature.

- **Adjacent Cache Line Prefetch**

This item allows users to enable or disable the adjacent cache line prefetch feature.

- **CPU AES**

Enable/Disable CPU Advanced Encryption Standard instructions.

- **Intel® Speed Shift Technology**

Enable/Disable Intel® Speed Shift Technology support.

- **Intel® SpeedStep™**

Allows more than two frequency ranges to be supported.

- **CPU C states**

Enable or disable CPU C states.

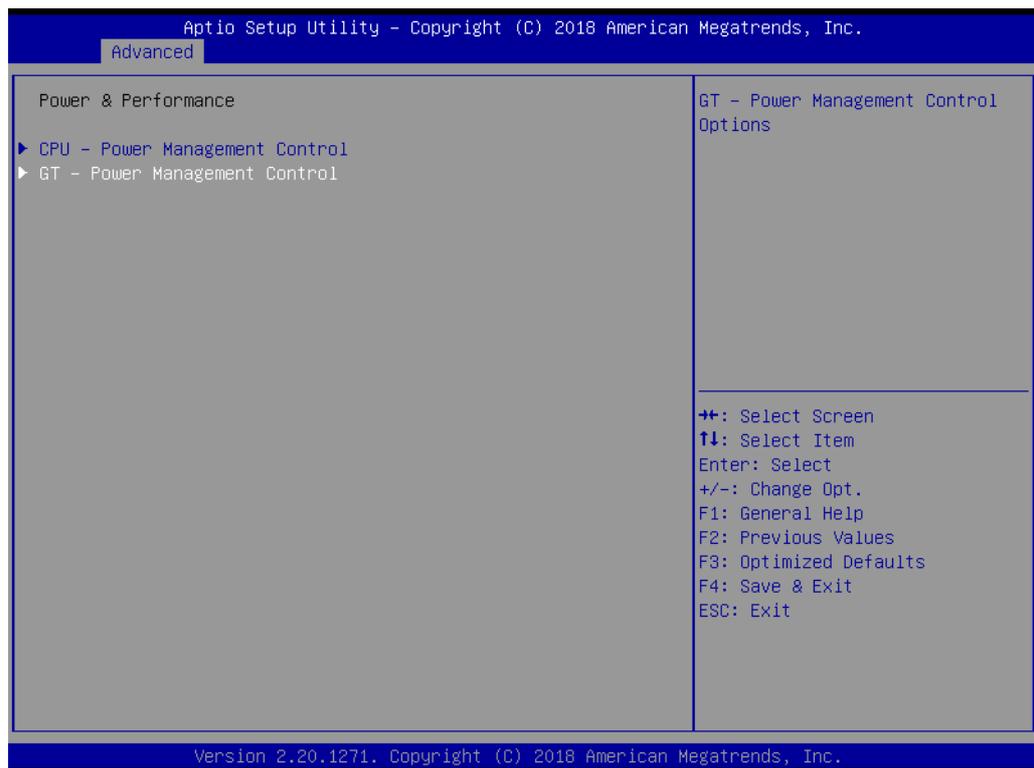
- **CState Pre-Wake**

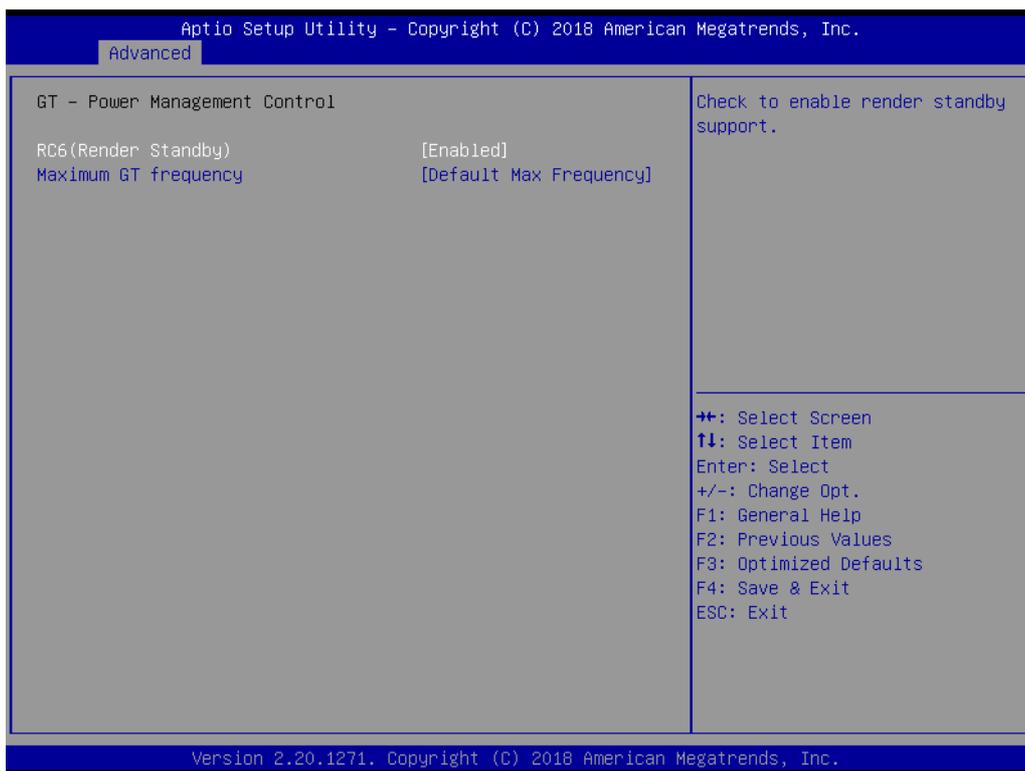
Disable – to disable the CState Pre-Wake.

- **Package C State limit**

Package C State limit.

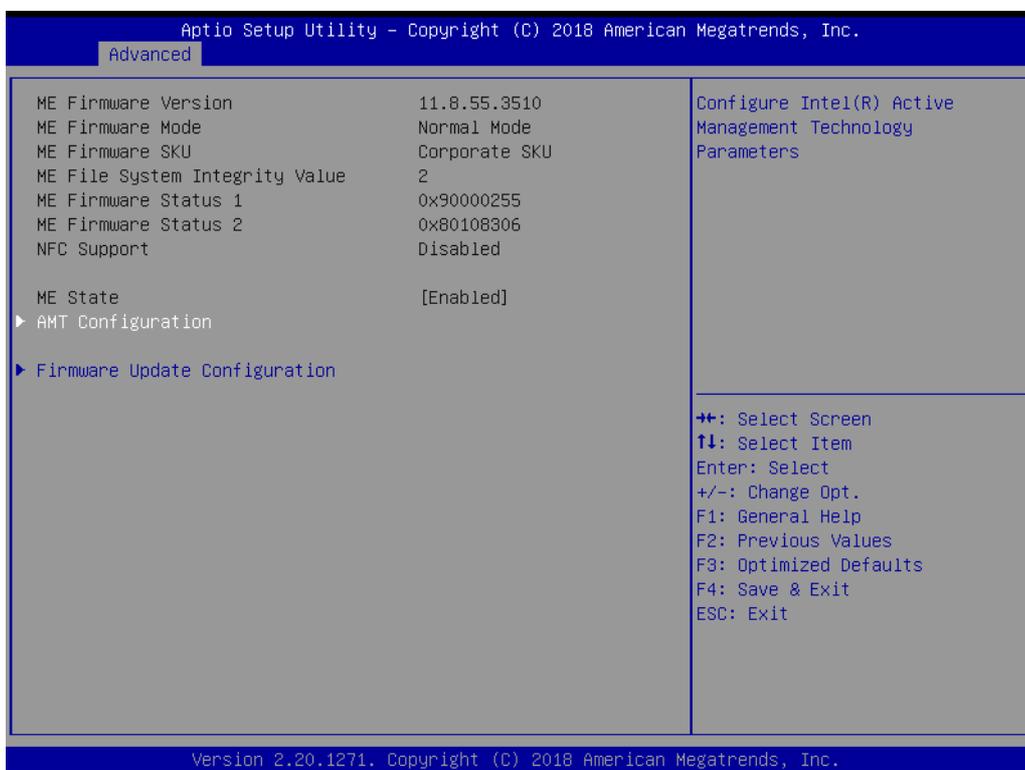
3.2.2.2 GT – Power Management Control





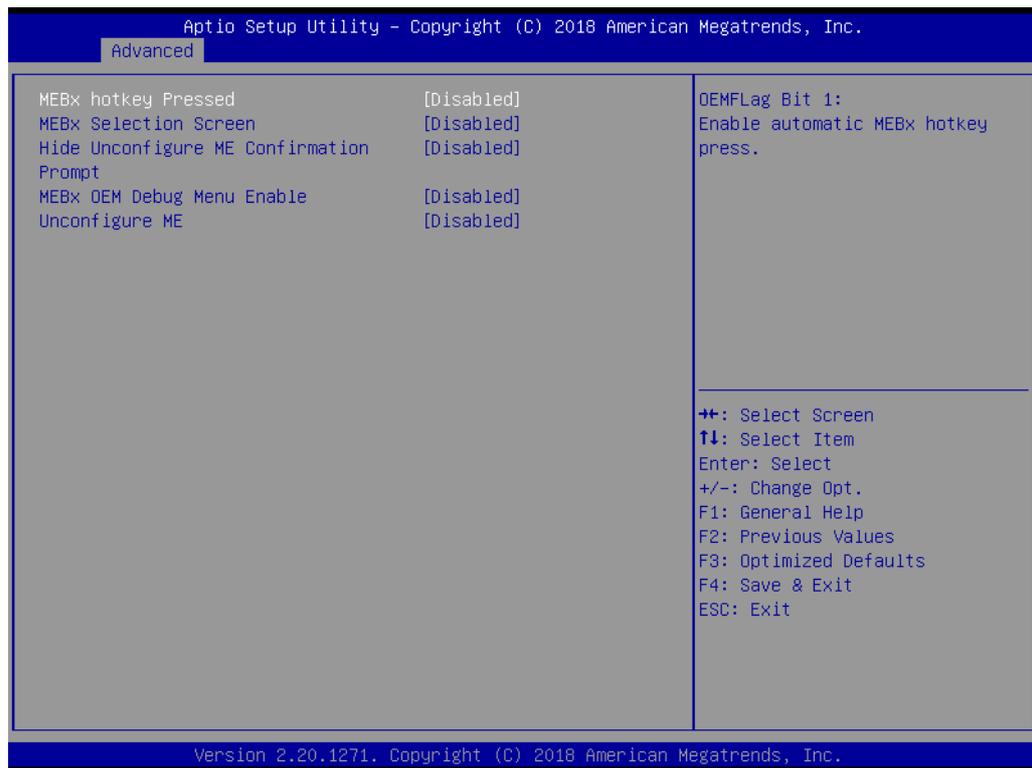
- **RC6 Render Standby**
Check to enable render standby support.

3.2.2.3 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.

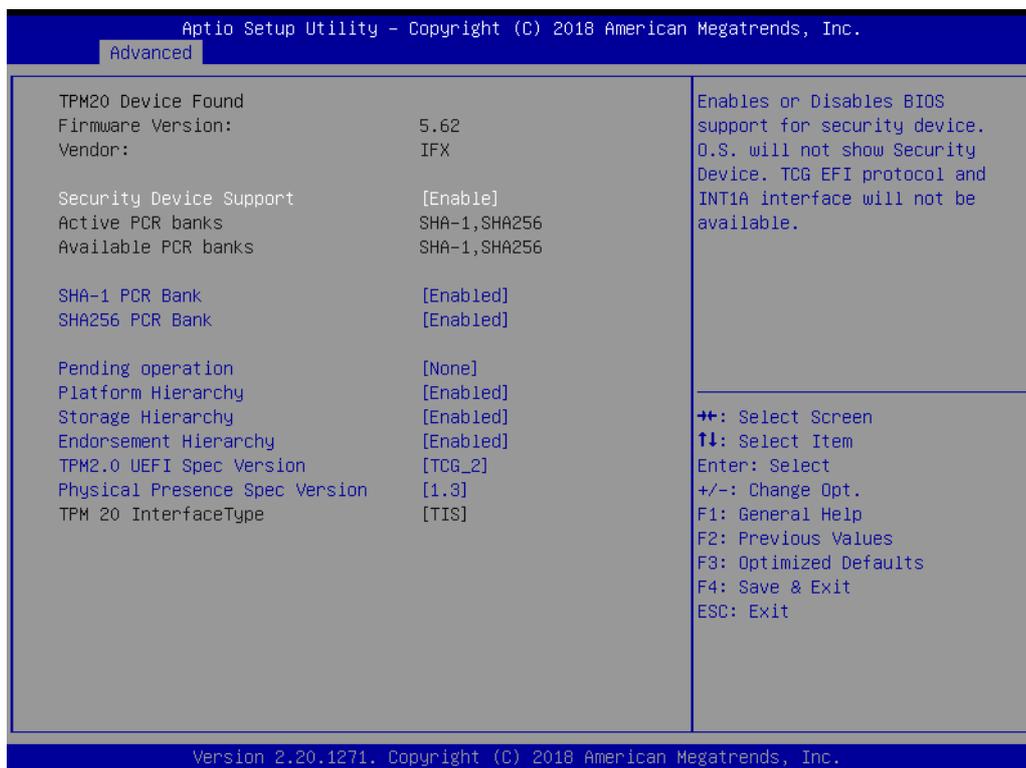
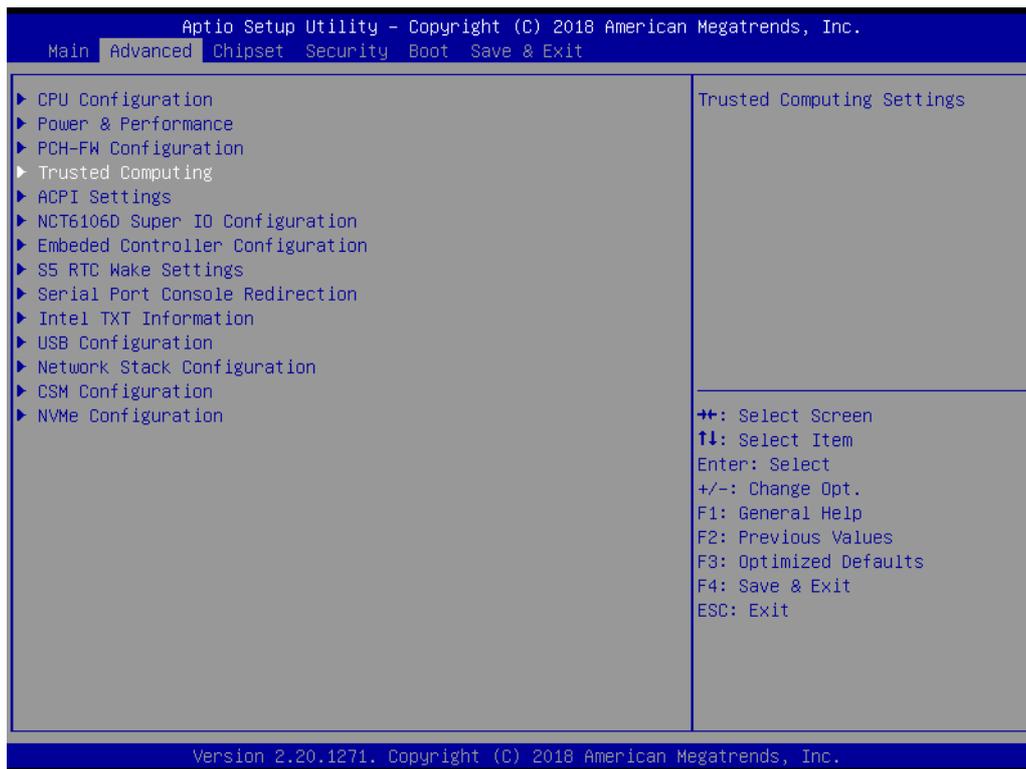
– MEBx Debug Message Output

Enable MEBx debug message output.

– Un-Configure ME

Un-Configure ME without password.

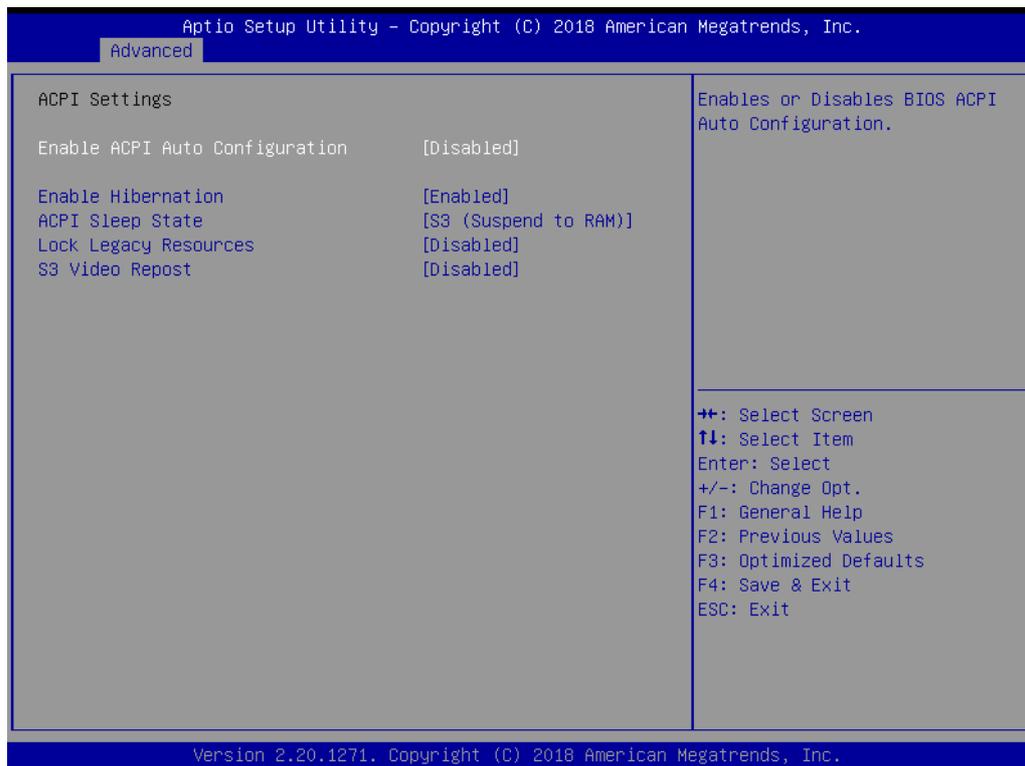
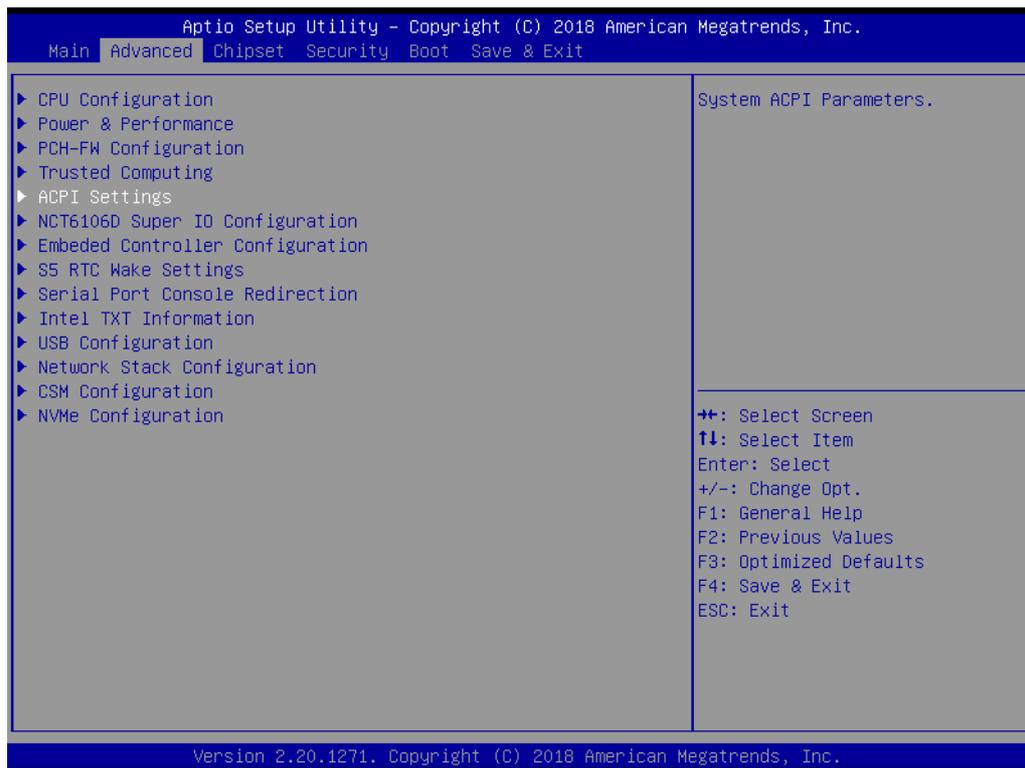
3.2.2.4 Trusted Computing



■ 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.

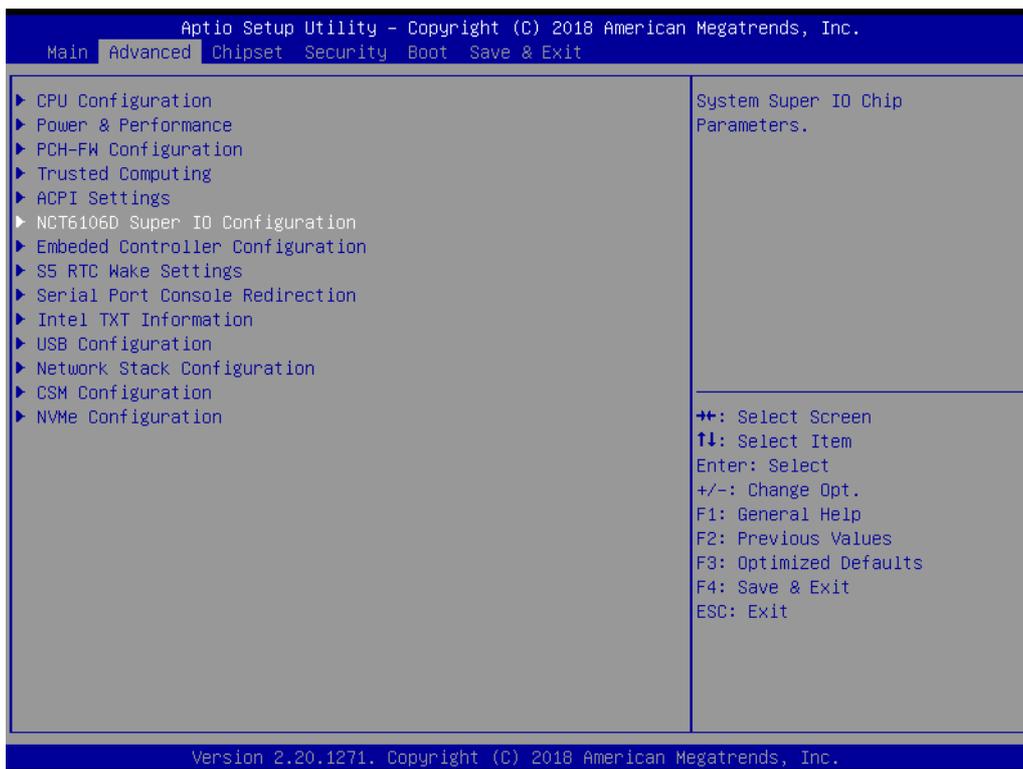
3.2.2.5 ACPI Settings



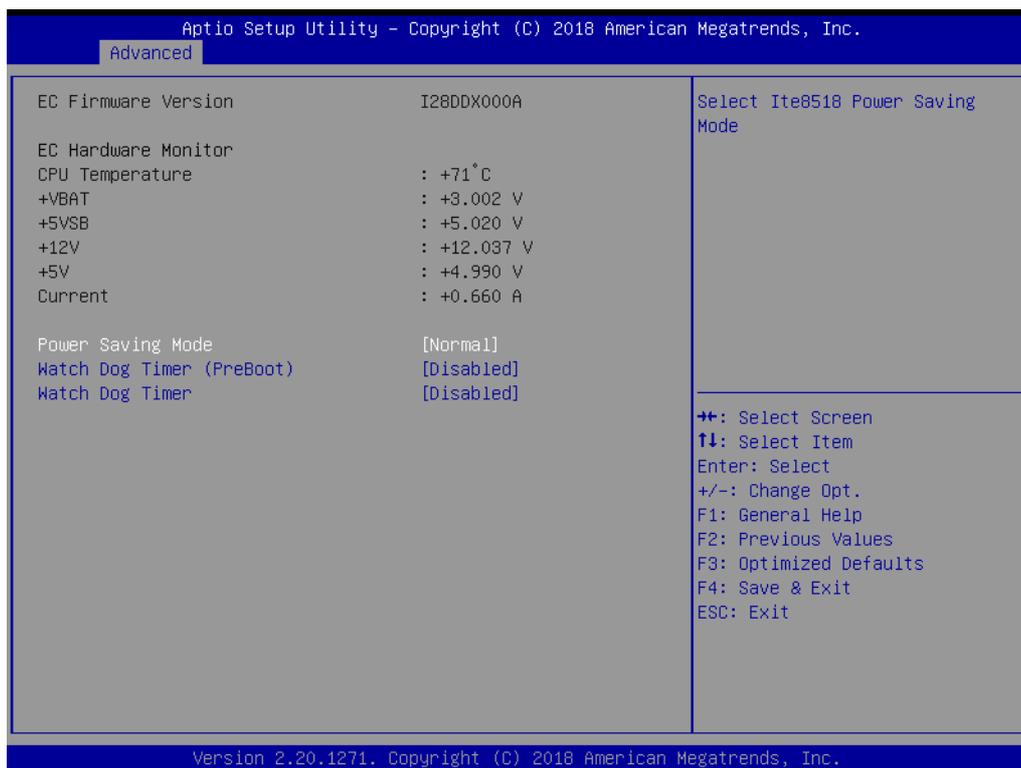
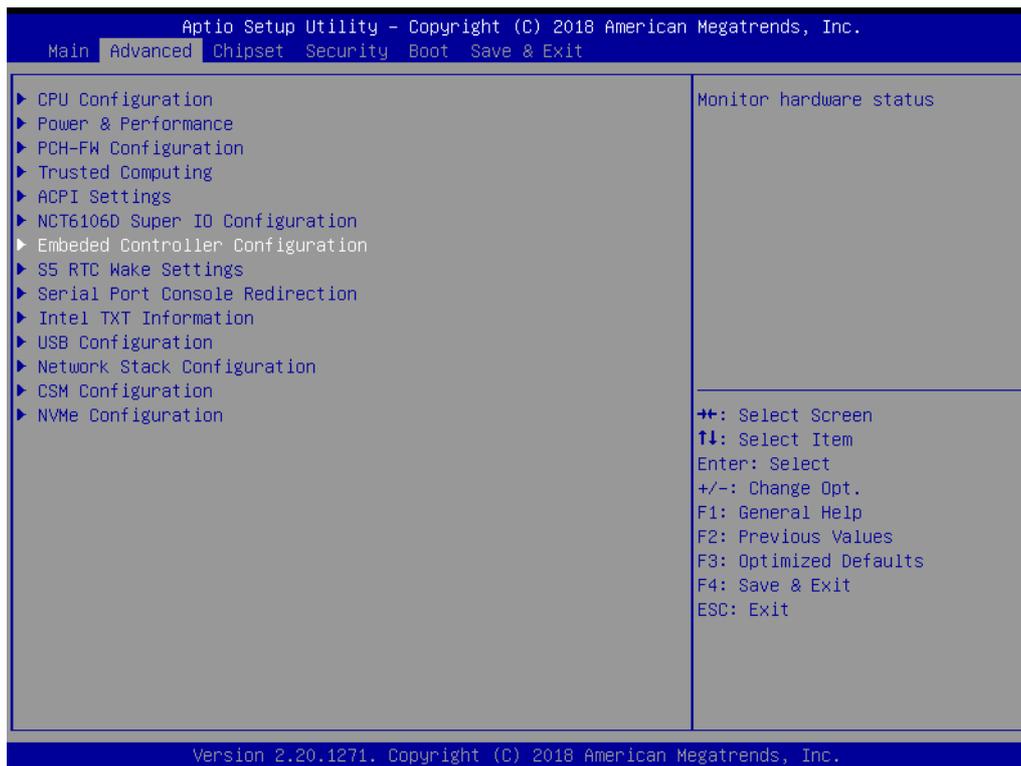
- **Enable ACPI Auto Configuration**
Enable or disable BIOS ACPI auto configuration.
- **Enable Hibernation**
Enables or Disables System ability to Hibernate (OS/S4 Sleep State). This option may be not effective with some OS.

- **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.

3.2.2.6 Super IO Configuration



3.2.2.7 Embedded Controller Configuration

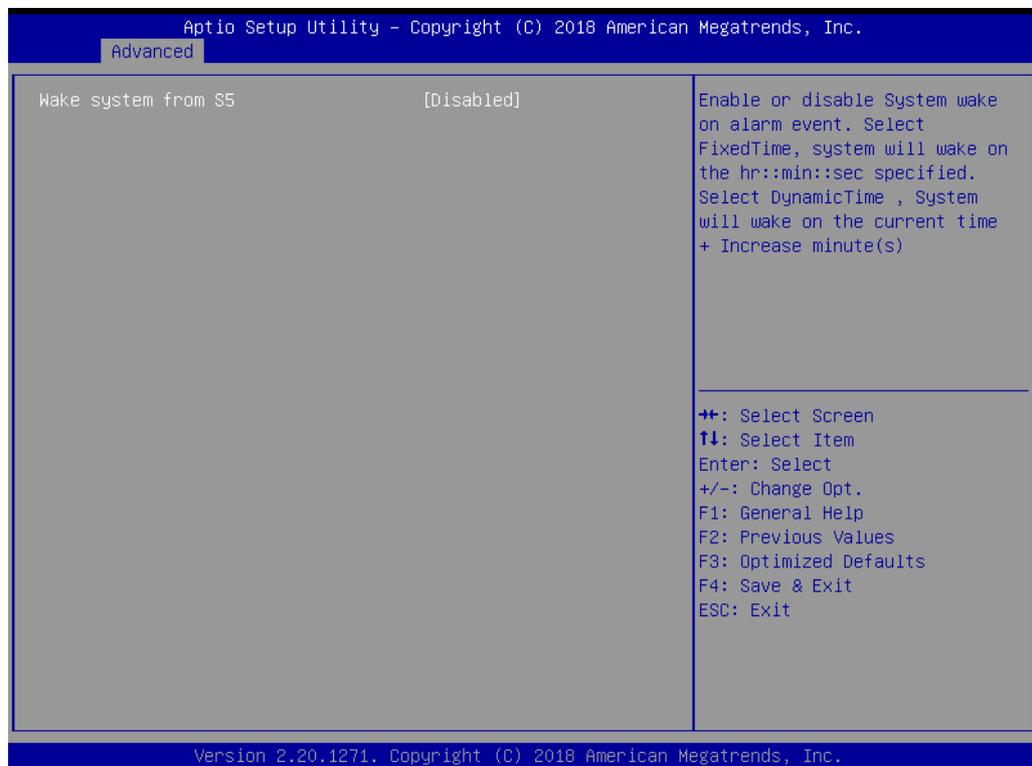
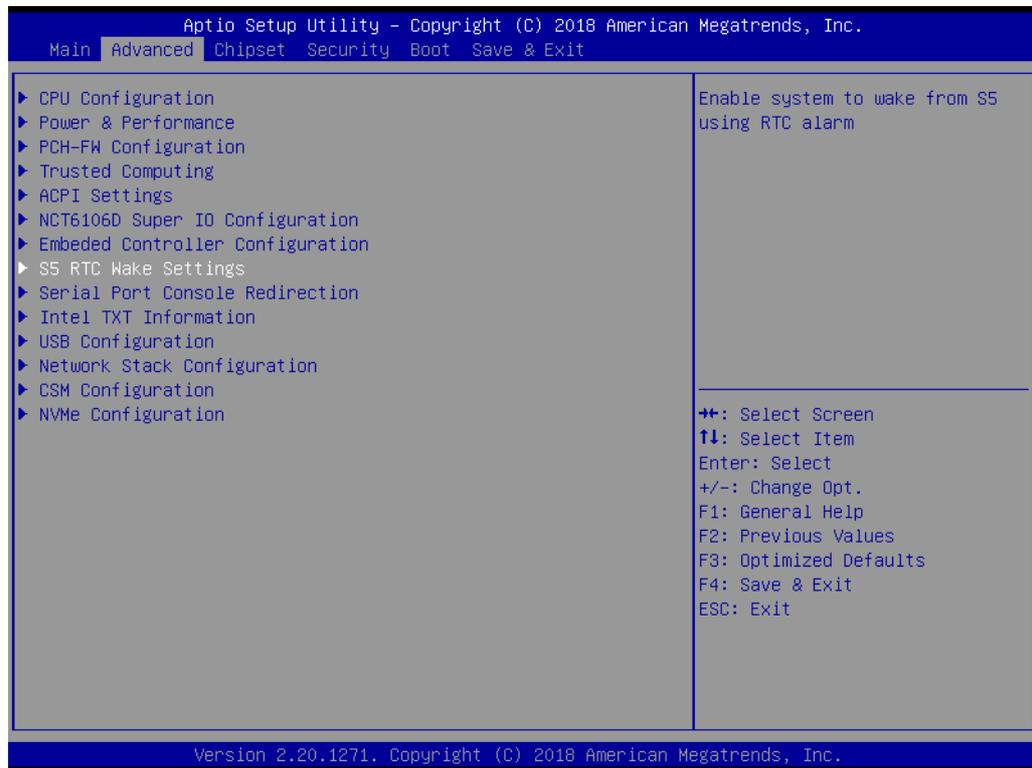


- **EC Hardware Monitor**
This page display all information about system Temperature/Voltage/Current.
- **Power Saving Mode**
This item allows users to set the board's power saving mode when off.
- **Watch Dog Timer (PreBoot)**
Enable or Disable Watch Dog Timer function (Starts from power on, stops before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

- **Watch Dog Timer**

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

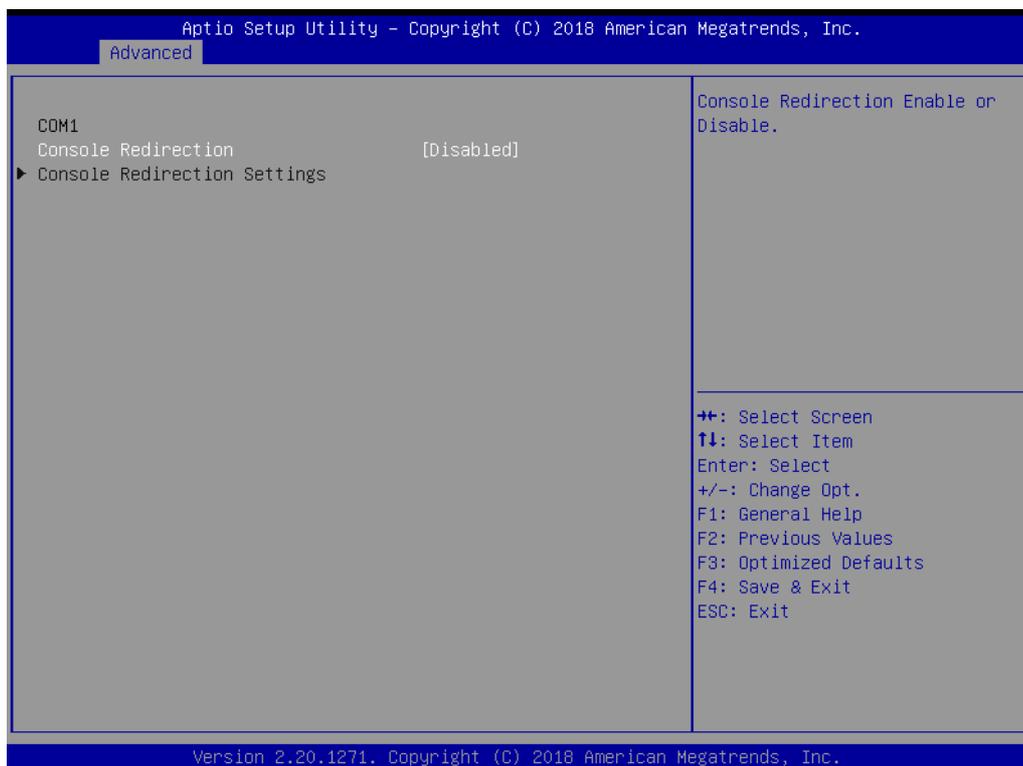
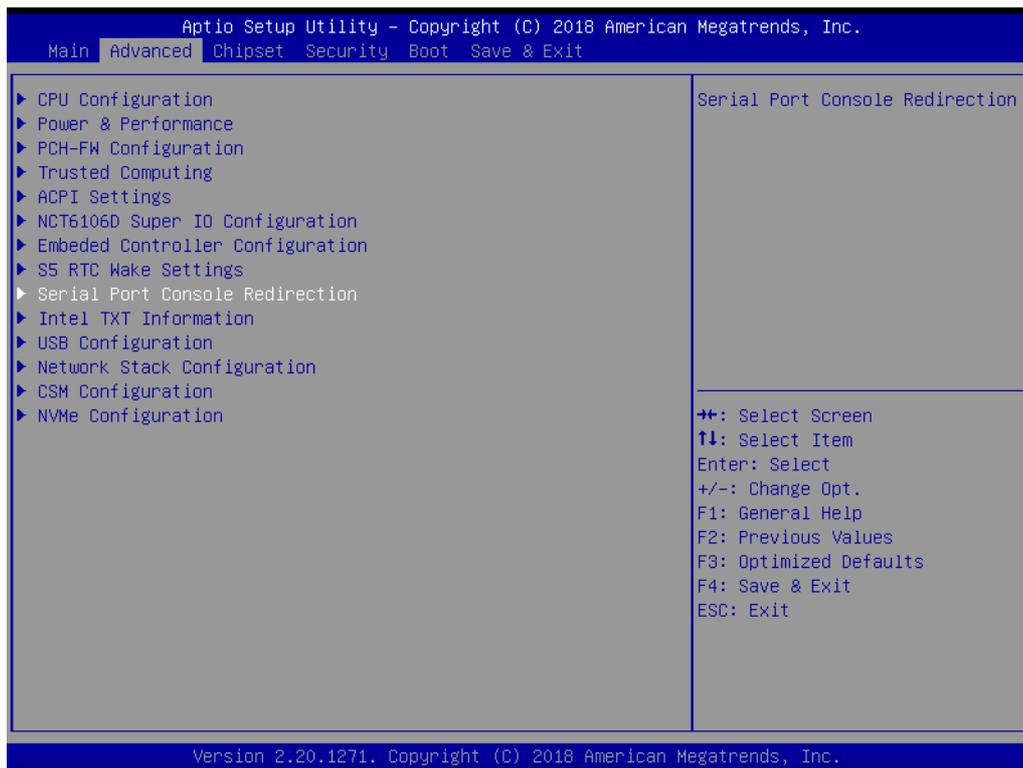
3.2.2.8 S5 RTC Wake Settings



- **Wake system from S5**

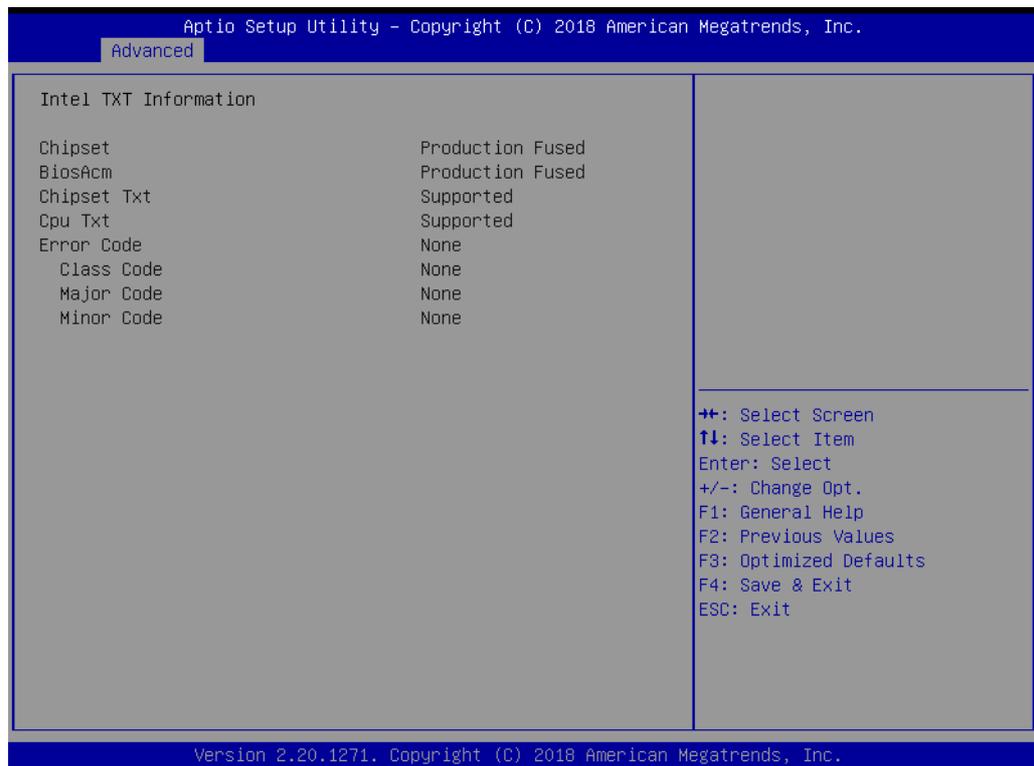
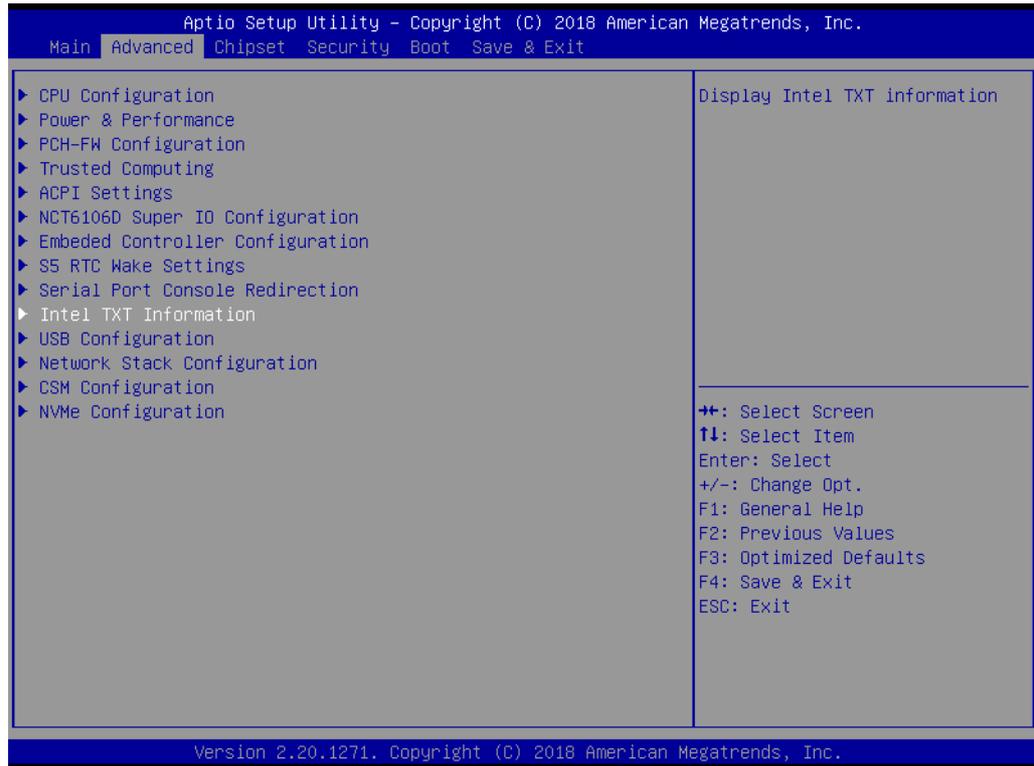
Enable or disable System wake on alarm event. Select FixedTime, system will wake on the hr:min:sec specified.

3.2.2.9 Serial Port Console Redirection



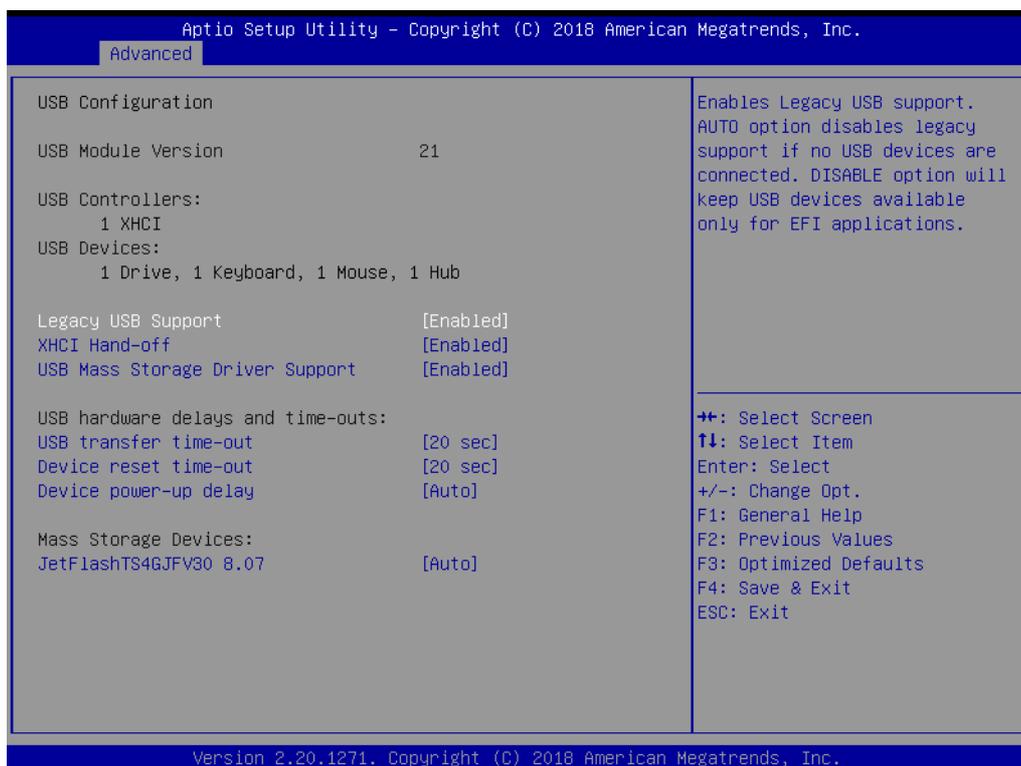
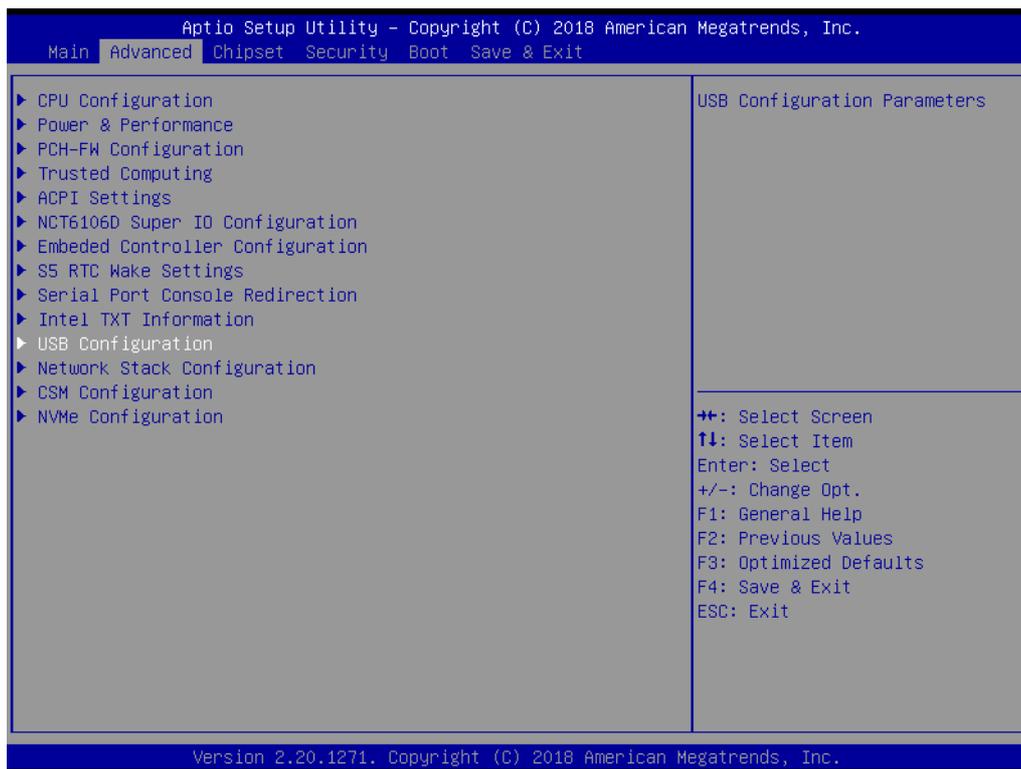
- **Console Redirection**
This item allows users to enable or disable console redirection for Microsoft Windows Emergency Management Services (EMS).
- **Console Redirection Setting**
This item allows users to configure console redirection detail settings.

3.2.2.10 Intel TXT Information



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

3.2.2.11 USB Configuration

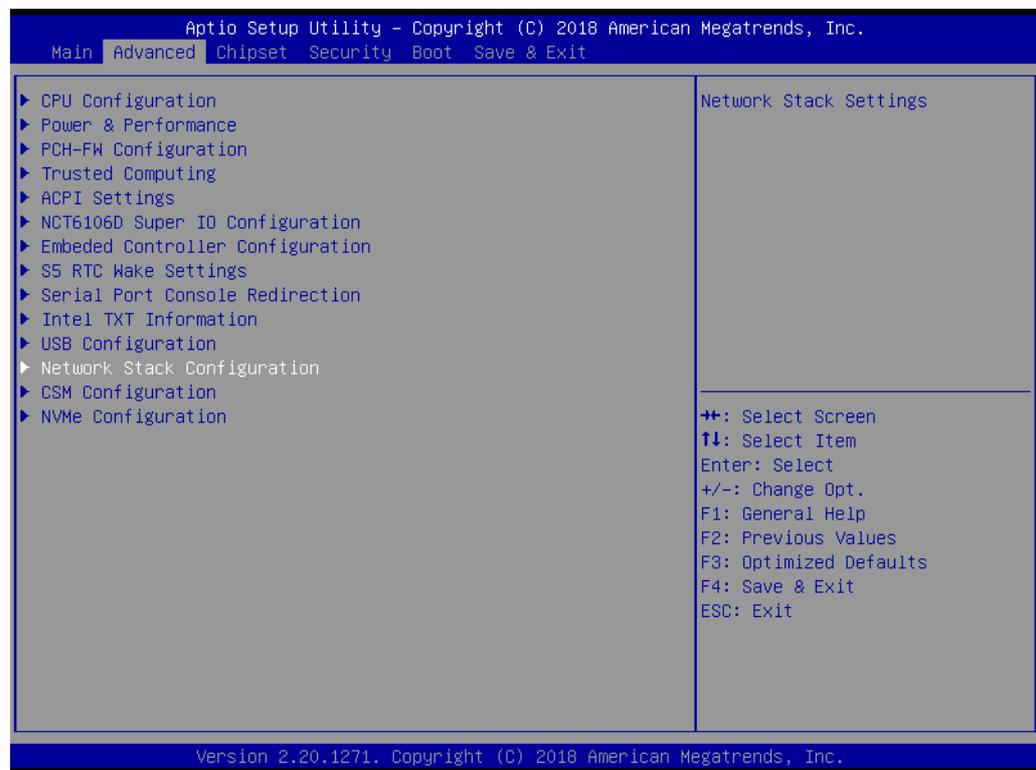


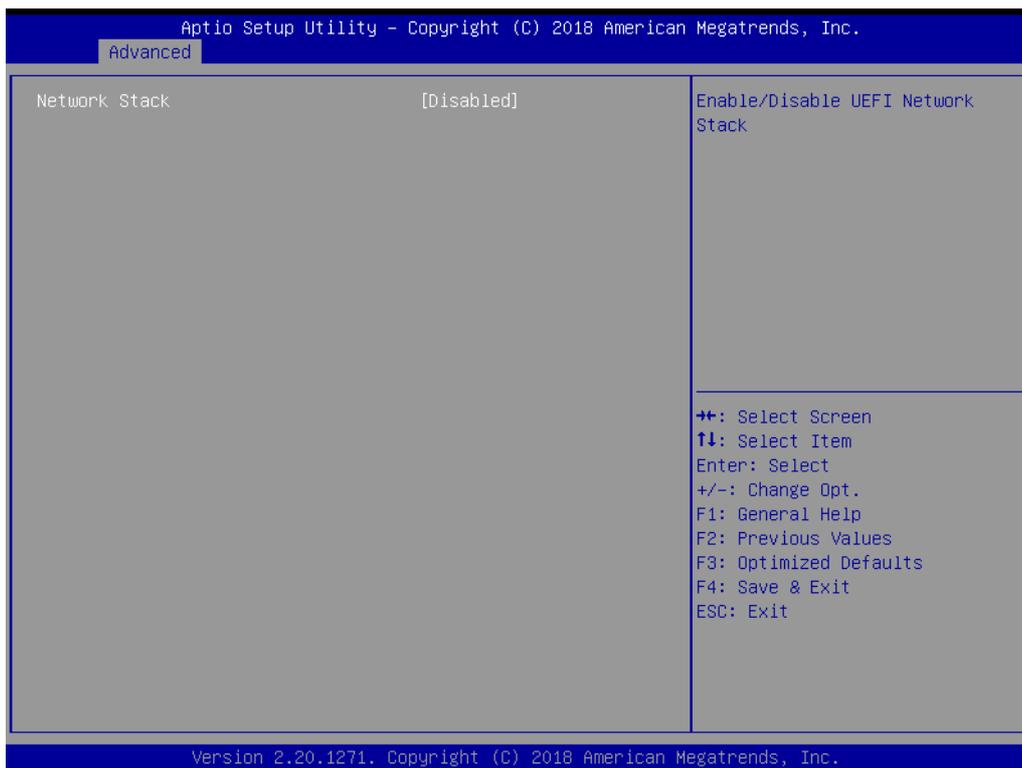
- **Legacy USB Support**
Enables Legacy USB support. AUTO option disables legacy support if no USB devices are connected. DISABLE option will keep USB devices available only for EFI applications.
- **XHCI Hand-off**

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.
- **Port 60/64 Emulation**
Enables I/O port 60h/64h emulation support. This should be enabled for the complete USB keyboard legacy support for non-USB aware OS.
- **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.

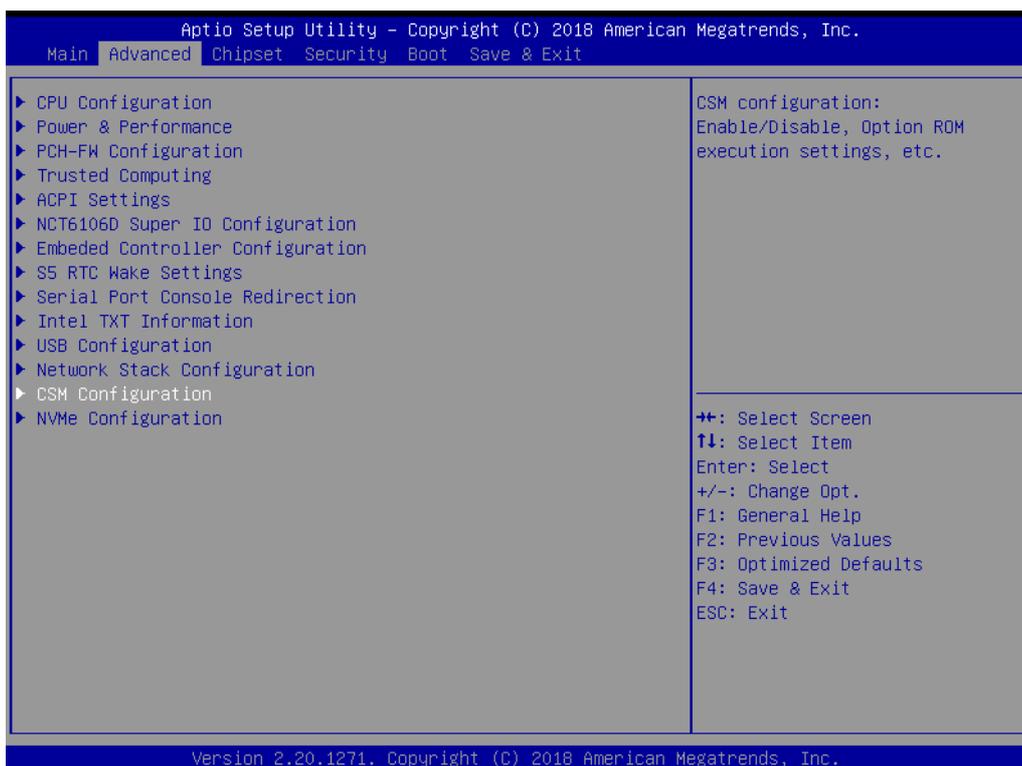
3.2.2.12 Network Stack Configuration

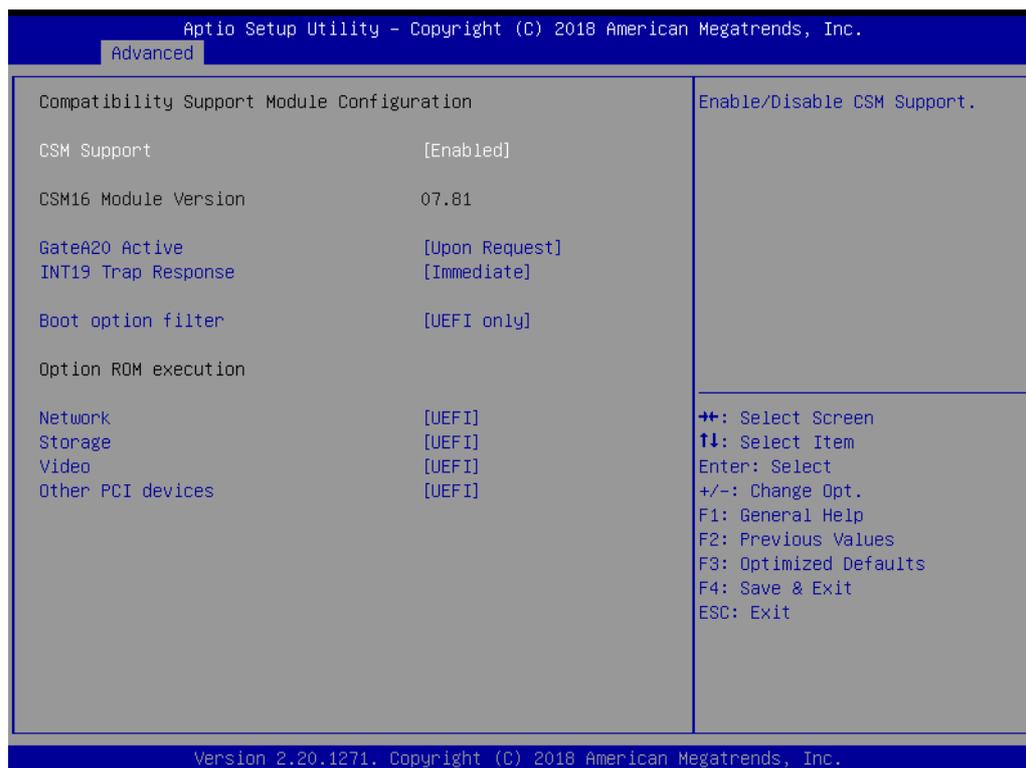




- **Network Stack**
Enable/Disable UEFI Network Stack.

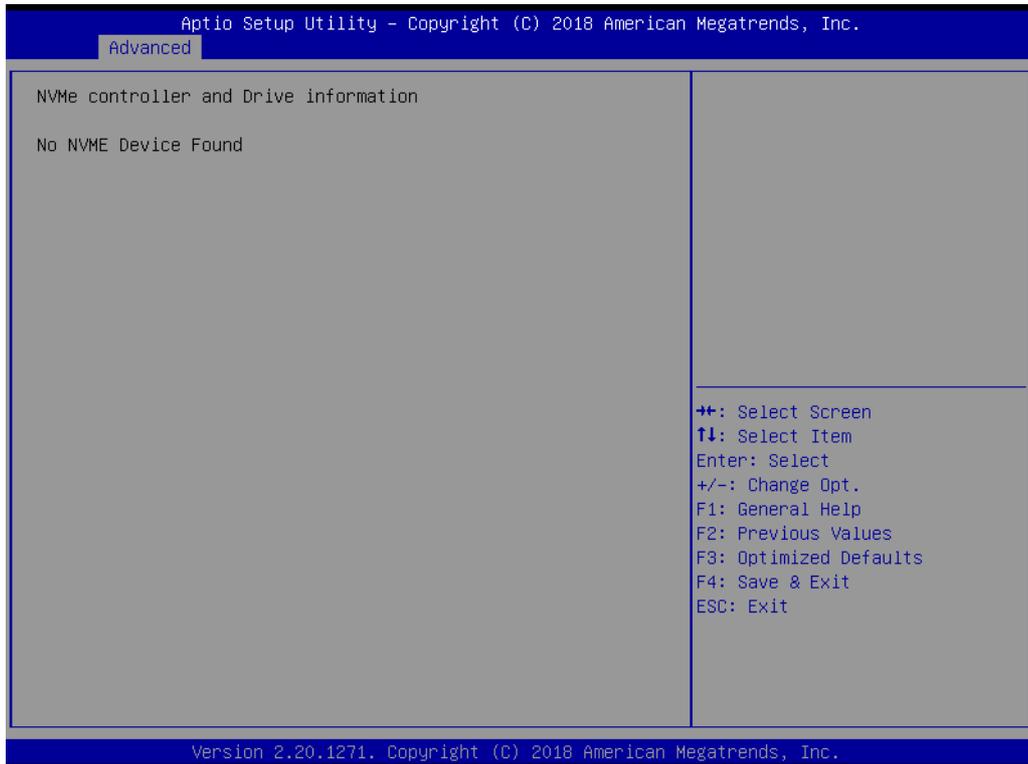
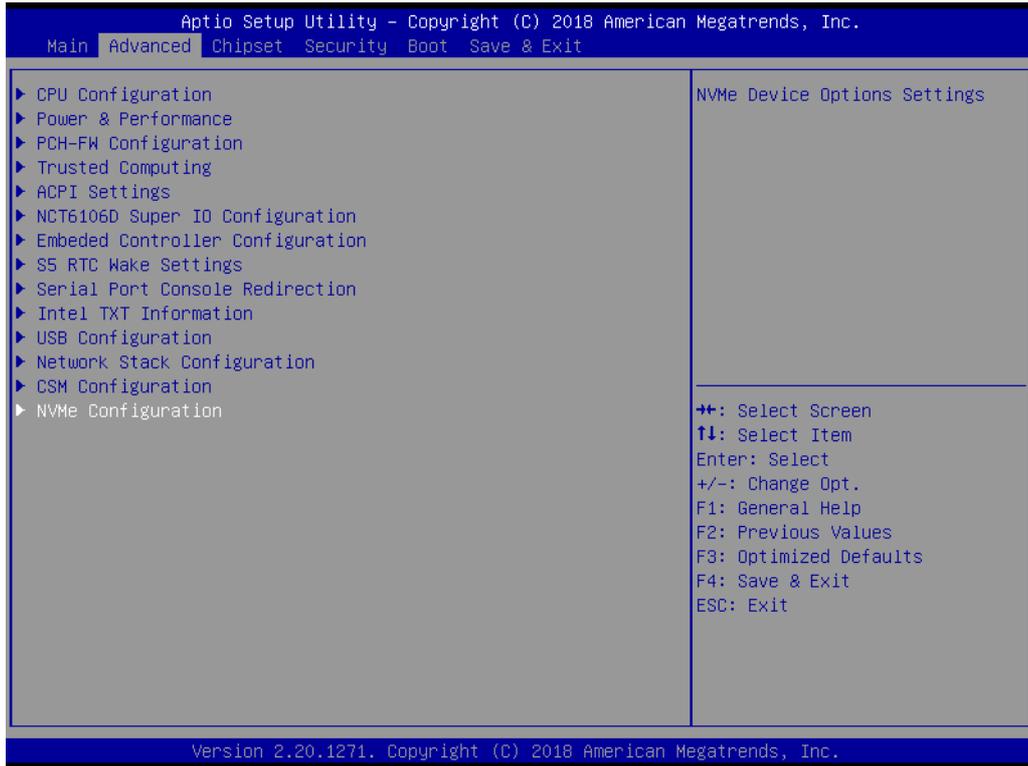
3.2.2.13 CSM Configuration





- **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.

3.2.2.14 NVMe Configuration



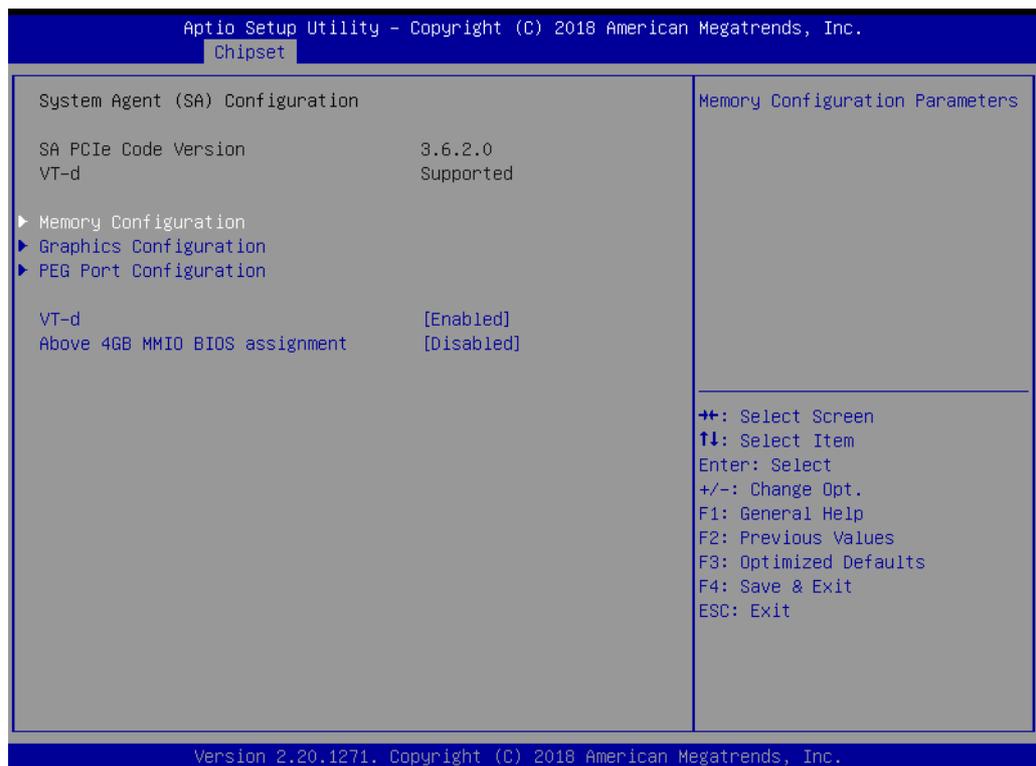
■ **NVMe Device Options Settings**

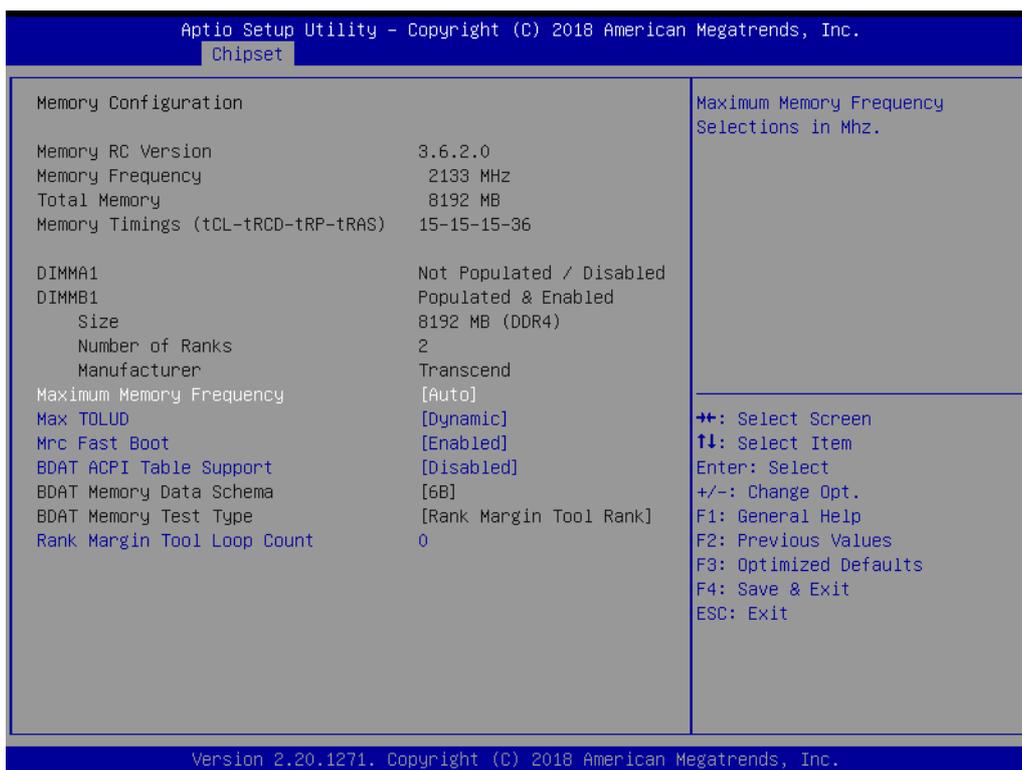
3.2.3 Chipset Configuration

Select the Chipset tab from the ARK-3530 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.



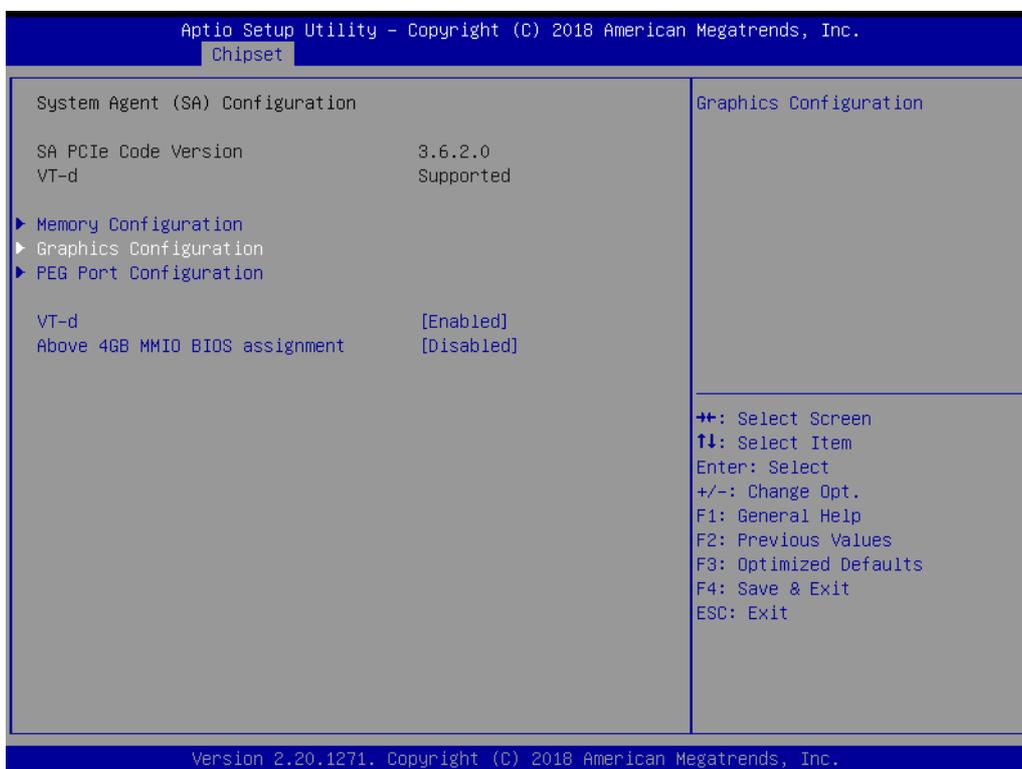
3.2.3.1 Memory Configuration Options





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

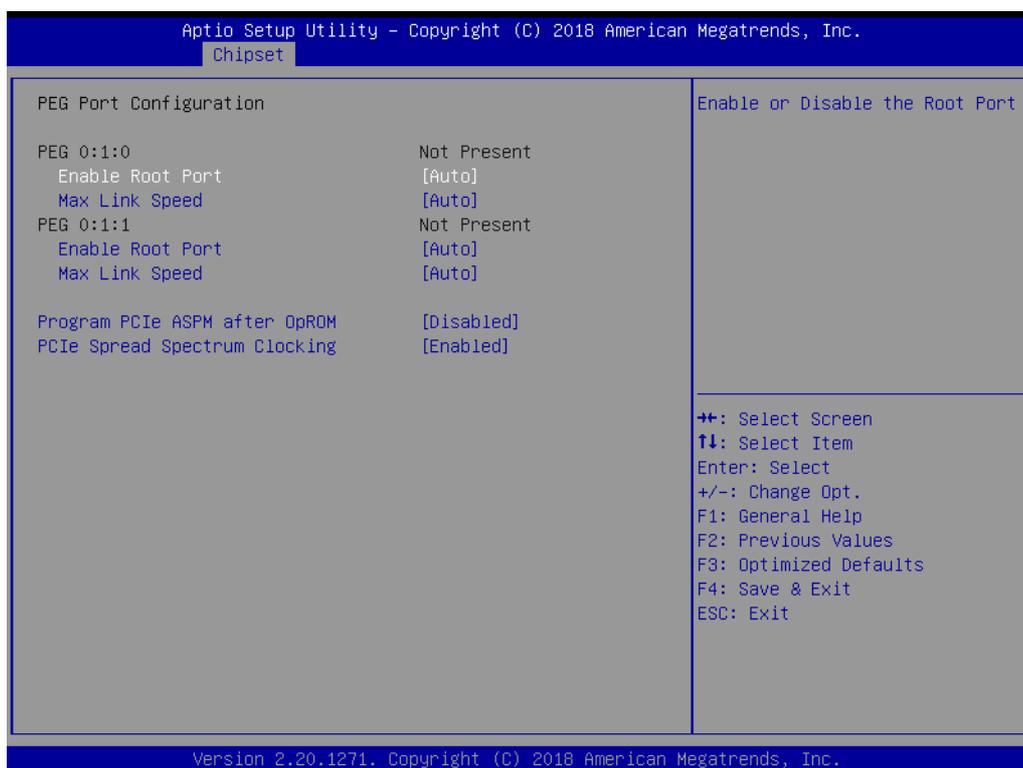
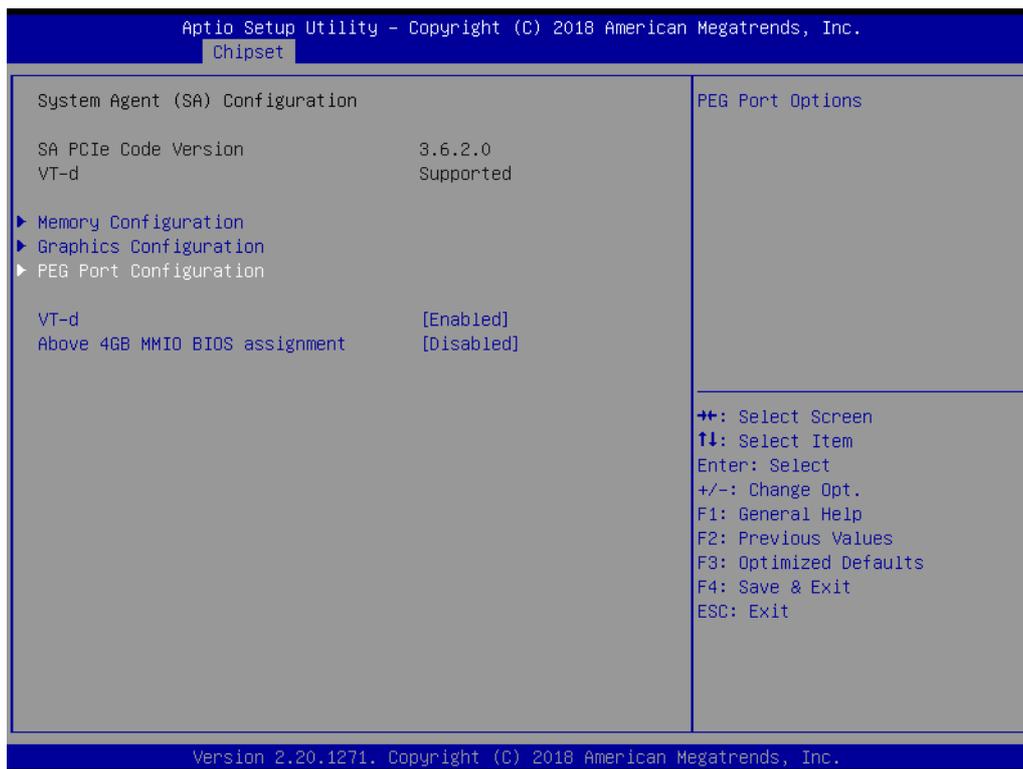
3.2.3.2 Graphics Configuration





- **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

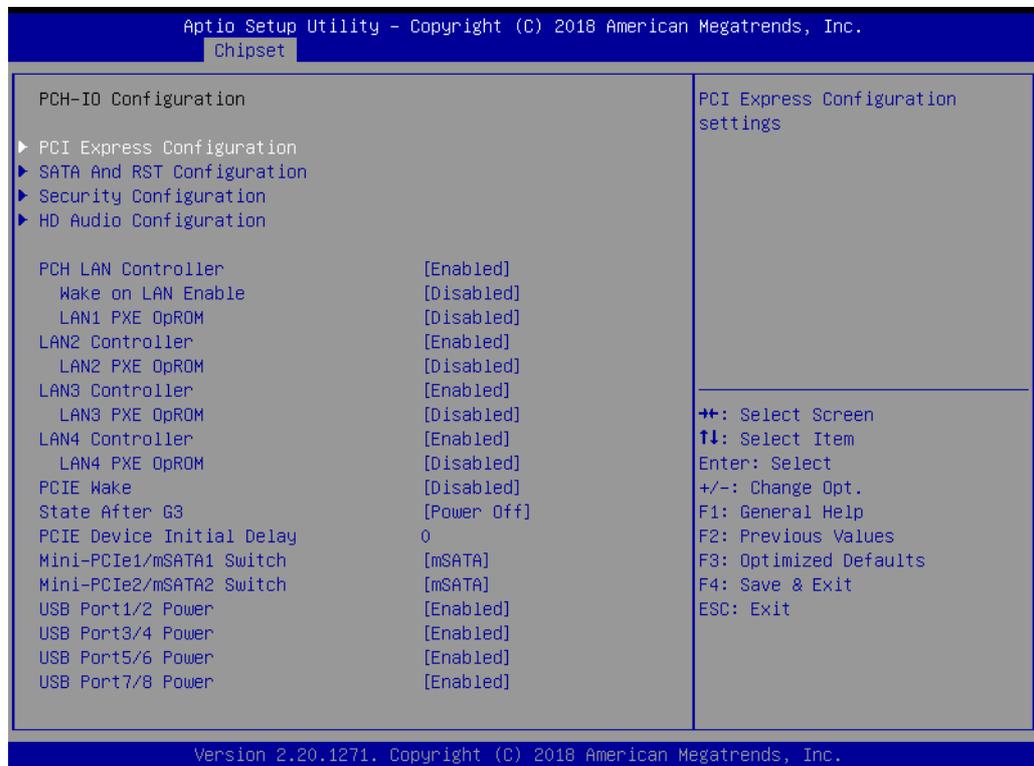
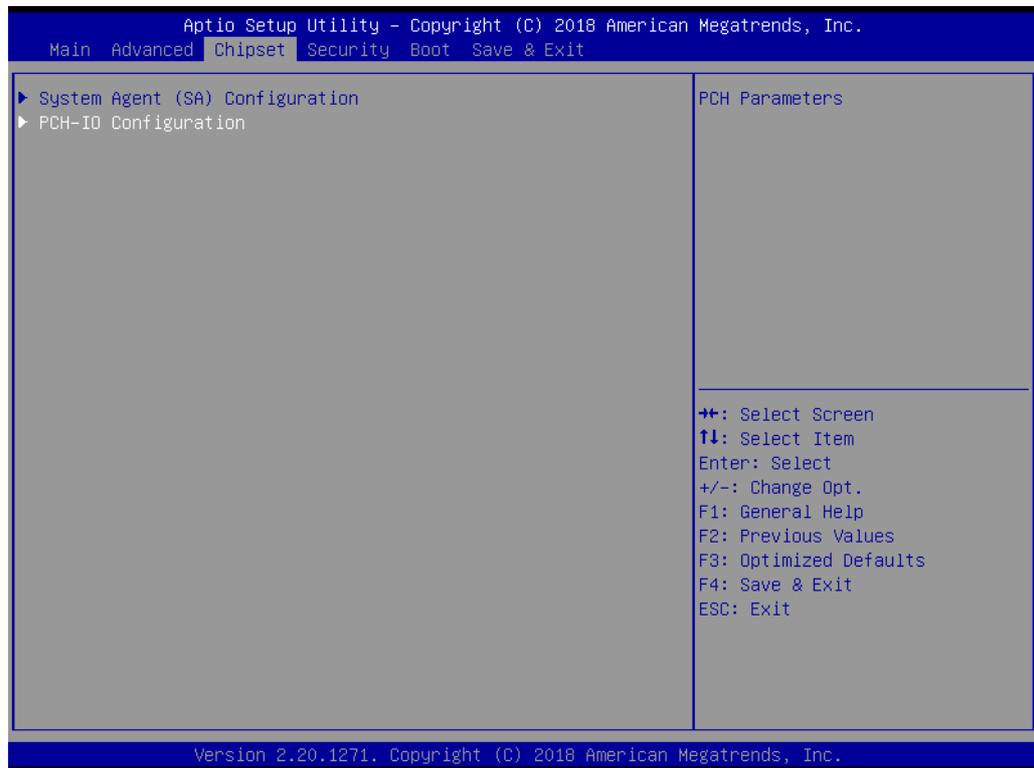


- **PEG Link and Speed Information**
- **Enable Root Port**
Enable or Disable the Root Port.
- **Max Link Speed**
Configure PEG Max Speed.

■ **ASPM**

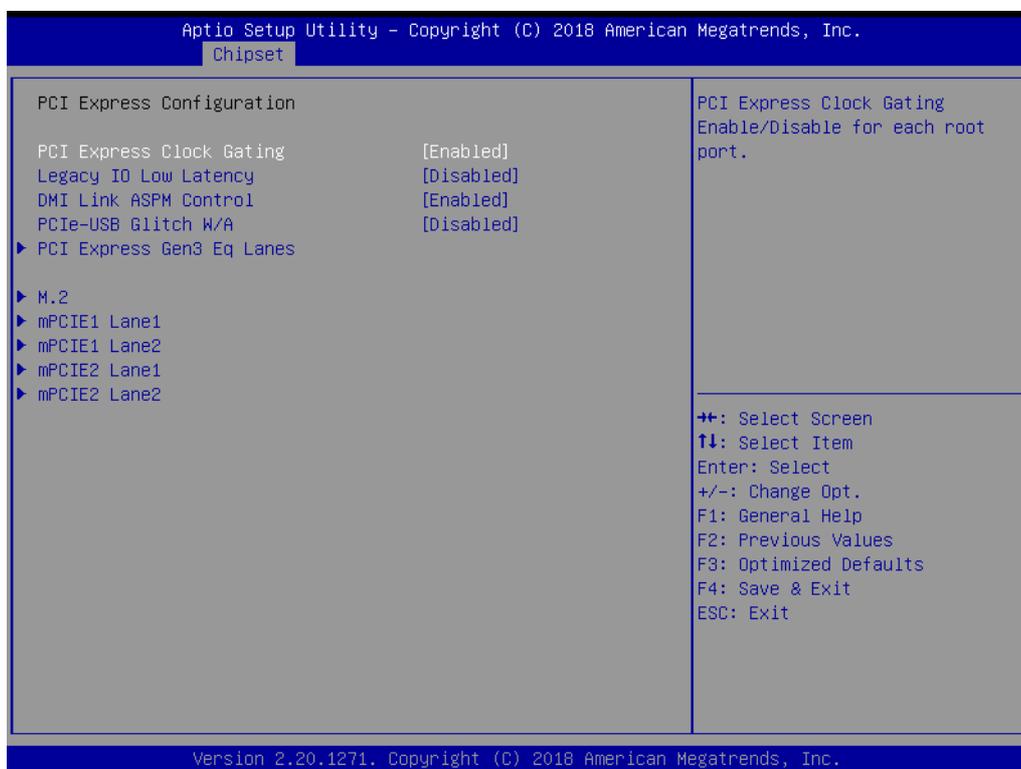
Enable PCI Express Active State Power Management settings.

3.2.3.4 PCH-IO Configuration



- **PCI Express Configuration**
PCI Express Configuration Settings.
- **USB Configuration**
USB Configuration Settings.
- **HD Audio Configuration**
HD Audio Subsystem Configuration Settings.
- **SB Porting Configuration**
SB Porting 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 S3**
Specifies what state to go to when power is re-applied after a power failure (G3 state).
- **Mini-PCIe/mSATA Switch**
Selects mini-PCIe or mSATA function support.
- **USB Power**
Enable or Disable USB standby power.

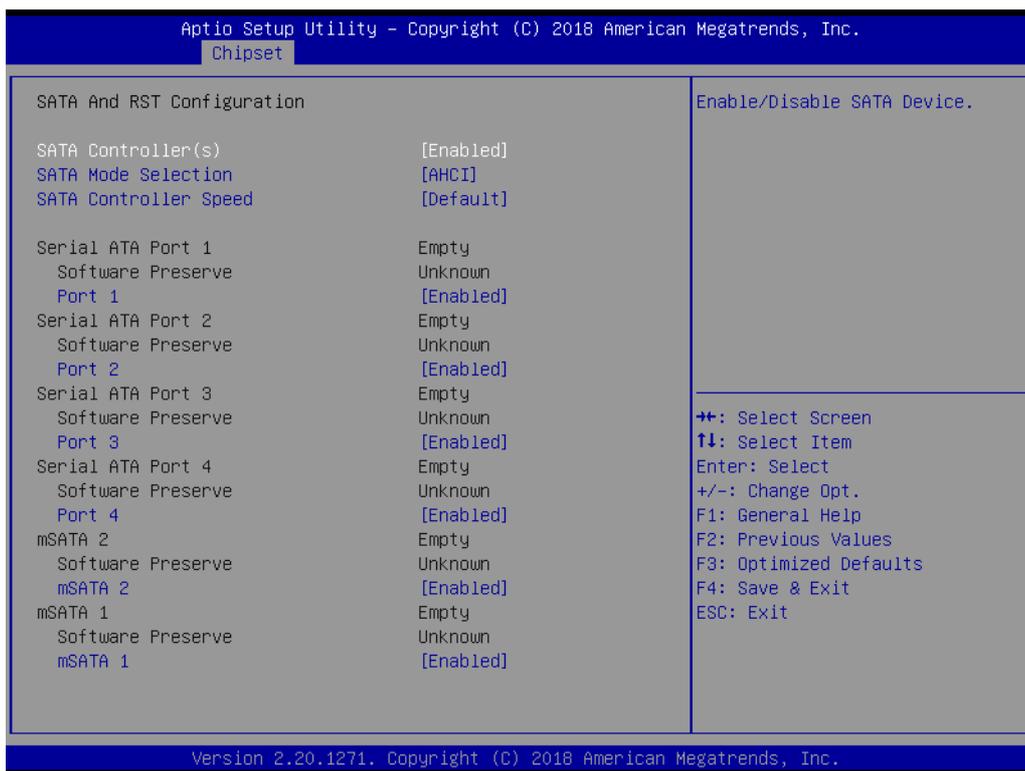
3.2.3.5 PCI Express Configuration



- **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.
- **Port 1 / Port 2 / Port3 / Port4 / mSATA1 / mSATA2**
Enable / Disable Serial ATA Port 1 / Port 2 / mSATA port.

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://downloadcenter.intel.com/download/25476/Windows-7-USB-3-0-Creator-Utility>)

ADVANTECH

Enabling an Intelligent Planet

www.advantech.com

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

All product specifications are subject to change without notice.

No part of this publication may be reproduced in any form or by any means, electronic, photocopying, recording or otherwise, without prior written permission of the publisher.

All brand and product names are trademarks or registered trademarks of their respective companies.

© Advantech Co., Ltd. 2018