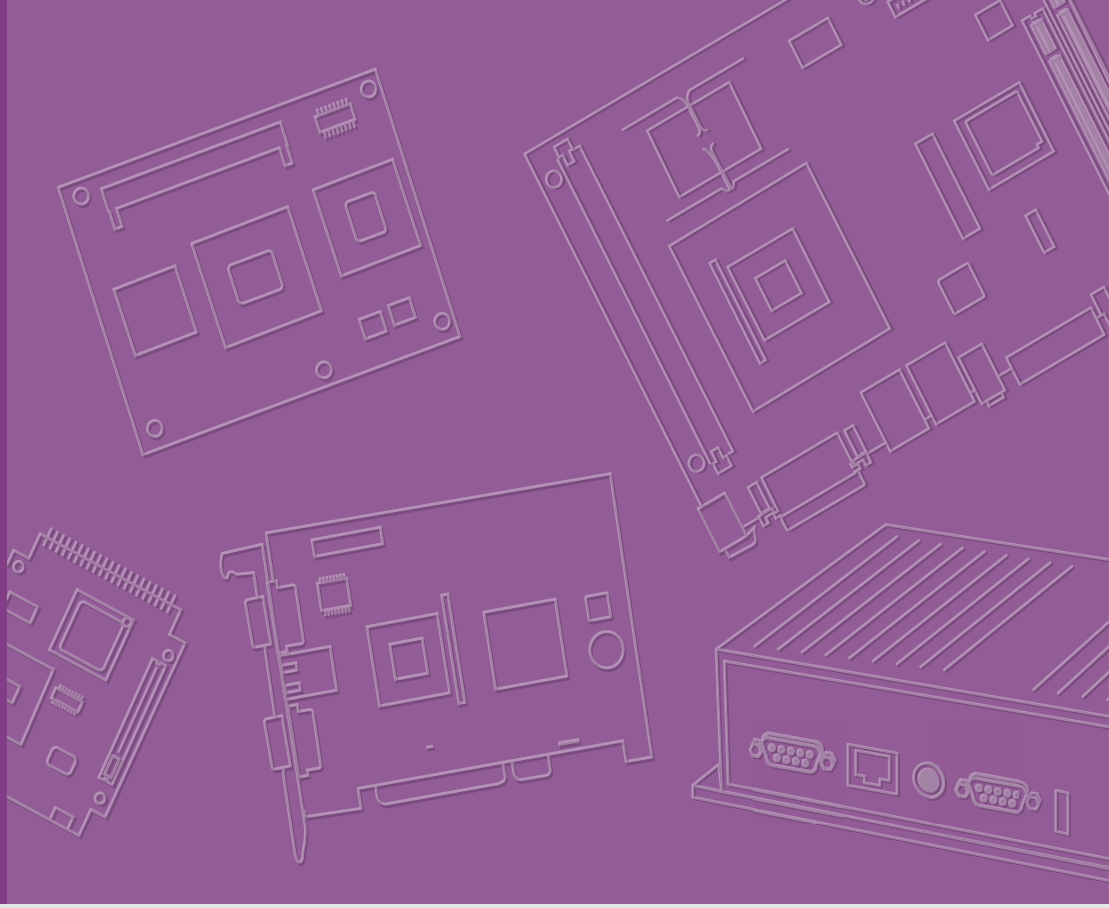


User Manual

ARK-1250L

Fanless Embedded Box Computer

ADVANTECH

Enabling an Intelligent Planet

Attention!

This product contains a hard copy of the Chinese user manual for China CCC certification purposes. A PDF of the English user manual is available online. Please disregard the hard copy of the Chinese user manual if the product is not sold and/or installed in China.

Copyright

Acknowledgments

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 Semiconductor 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 or other Advantech products, visit our website at http://www.advantech.com

https://www.advantech.com/products/fanless-embedded-computers/sub_1-2jkeuf

For technical support and customer service, visit our support website at http://support.advantech.com.tw/support

Part No. 2006125002 Edition 3

Printed in Taiwan September 2023

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.

Warnings, Cautions, and Notes

Warning! *Warnings indicate conditions, which if not observed, can cause personal injury!*

Avertissement! *Les avertissements indiquent des conditions qui, si elles ne sont pas respectées, peuvent entraîner des blessure!*

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

Mise en garde! *Des précautions sont incluses pour vous aider à éviter d'endommager le matériel ou de perdre Les données.*

Note! *Notes provide optional additional information.*

Noter! *Les remarques fournissent des informations supplémentaires facultatives.*

Technical Support and Assistance

1. Visit the Advantech website 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

Packing List

Before installation, check that the following items were included with the product:

- 1 x ARK-1250L unit
- 1 x XARK-ADP-90MDH 19V/90W adapter
- 1 x 4-pin connector to remote switch
- 1 x DIN-rail bracket
- 1 x Wrench for the top cover
- 1 x China RoHS
- 1 x WISE-PaaS/DeviceOn Quick Start Guide
- 1 x Simplified Chinese User Manual

Ordering Information

Model Number	Description
ARK-1250L-S5A1	Intel® Core™ i5-1145G7E w/ 3 x GbE and 4 x COM
ARK-1250L-S5A2	Intel® Core™ i5-1145G7E w/ 4 x GbE, 4 x COM, and 2 x HDMI
ARK-1250L-U2A1	Intel® Core™ i3-1115G4E w/ 3 x GbE and 4 x COM
ARK-1250L-S8A1	Intel® Core™ i7-1185G7E w/ 3 x GbE and 4 x COM (supported by project)

Optional Accessories

Part Number	Description
96PSA-A120W24T2-3	AC to DC adapter, 24V/120W
1700001524	Power Cable 3-pin 180 cm, USA type (for XARK-ADP- 90MDH)
170203183C	Power Cable 3-pin 180 cm, Europe type (for XARK-ADP- 90MDH)
170203180A	Power Cable 3-pin 180 cm, UK type (for XARK-ADP- 90MDH)
1700008921	Power Cable 3-pin PSE Mark 183 cm (for XARK-ADP- 90MDH)
1702002600	Power cable 3-pin 183 cm, USA type (for 96PSA- A120W24T2-3)
1702002605	Power cable 3-pin 183 cm, EU type (for 96PSA- A120W24T2-3)
1702031801	Power cable 3-pin 183 cm, UK type (for 96PSA- A120W24T2-3)
1700000237	Power cable 3-pin 183 cm, PSE type (for 96PSA- A120W24T2-3)
1700024369-01	1 m HDMI cable
1700031560-01	1.8 m HDMI cable
1700023855-11	1 m Lockable HDMI cable
1700030518-01	CAN bus cable (replacing GPIO)
AMK-W006	ARK-1250 wall mount kit
AMK-V023E	ARK-1250 VESA mount kit
AMO-I029	TPM 2.0 Infineon SLB 9670 v2.0

Safety Instructions

1. Read these safety instructions carefully.
2. Retain this user manual for future reference.
3. Disconnect the equipment from all power outlets before cleaning. Use only a damp cloth for cleaning. Do not use liquid or spray detergents.
4. For pluggable equipment, the power outlet socket must be located near the equipment and easily accessible.
5. Protect the equipment from humidity.
6. Place the equipment on a reliable surface during installation. Dropping or letting the equipment fall may cause damage.
7. Connect power by means of a power cord connected to a socket-outlet with an earthing connection.
8. Position the power cord away from high-traffic areas. Do not place anything over the power cord.
9. All cautions and warnings on the equipment should be noted.
10. If the equipment is not used for a long time, disconnect it from the power source to avoid damage from transient overvoltage.
11. Never pour liquid into an opening. This may cause fire or electrical shock.
12. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
13. If any of the following occurs, have the equipment checked by service personnel:
    - The power cord or plug is damaged.
    - Liquid has penetrated the equipment.
    - The equipment has been exposed to moisture.
    - The equipment is malfunctioning, or does not operate according to the user manual.
    - The equipment has been dropped and damaged.
    - The equipment shows obvious signs of breakage.
14. Do not leave the equipment in an environment with a storage temperature of below -40°C (-40°F) or above 85°C (185°F) as this may cause damage. The equipment should be stored in a controlled environment.
15. Any unverified component may cause unexpected damage. To ensure correct installation, always use the components (e.g., screws) provided in the accessory box.
16. **CAUTION:** The equipment is equipped with a battery-powered real-time clock circuit. There is a risk of explosion if a battery is incorrectly replaced. Replace only with the same or equivalent type as recommended by the manufacturer. Discard all used batteries according to the manufacturer's instructions.
17. Always disconnect the power cord from the chassis before manually handling the hardware. Do not implement connections or configuration changes while the device is powered on. Sudden power surges may damage sensitive electronic components.
18. In accordance with IEC 704-1:1982 specifications, the sound pressure level at the operator's position does not exceed 70 dB (A).
19. **DISCLAIMER:** These instructions are provided according to IEC 704-1 specifications. Advantech disclaims all responsibility for the accuracy of any statements contained herein.
20. The product is intended to be supplied by a UL-listed power supply suitable for use at minimum Tma 60°C with output rated at: 12-24Vdc, 7.5-3.75A min. If you need further assistance, please contact Advantech for further information.

21. **RESTRICTED ACCESS AREA:** The equipment should only be installed in a Restricted Access Area.

Consignes de sécurité

1. Veuillez lire attentivement ces instructions de sécurité.
2. Veuillez conserver ce manuel de l'utilisateur pour référence ultérieure.
3. Veuillez débrancher cet équipement de la prise secteur avant le nettoyage. Utilisez un chiffon humide. Ne pas utiliser de détergent liquide ou pulvérisé pour le nettoyage. Utilisez une feuille ou un chiffon humide pour le nettoyage.
4. Pour les équipements enfichables, la prise de courant doit être à proximité de l'équipement et doit être facilement accessible.
5. S'il vous plaît garder cet équipement de l'humidité.
6. Posez cet équipement sur une surface fiable lors de l'installation. Une chute ou une chute pourrait causer des blessures.
7. Au moyen d'un cordon d'alimentation connecté à une prise de courant avec mise à la terre.
8. Placez le cordon d'alimentation de sorte que personne ne puisse marcher dessus. Ne placez rien sur le cordon d'alimentation.
9. Tous les avertissements et mises en garde sur l'équipement doivent être notés.
10. Si l'appareil n'est pas utilisé pendant une longue période, débranchez-le du secteur pour ne pas être endommagé par une surtension transitoire.
11. Ne jamais verser de liquide dans les ouvertures de ventilation; Cela pourrait provoquer un incendie ou un choc électrique.
12. Ne jamais ouvrir l'équipement. Pour des raisons de sécurité, l'équipement ne doit être ouvert que par un personnel de service qualifié (par une personne qualifiée).
13. Si l'une des situations suivantes se présente, faites vérifier l'équipement par le personnel de service:
    - Le cordon d'alimentation ou la fiche est endommagé
    - Un liquide a pénétré dans l'appareil
    - L'équipement a été exposé à l'humidité
    - L'équipement ne fonctionne pas bien ou vous ne pouvez pas le faire fonctionner conformément au manuel d'utilisation
    - Equipment L'équipement est tombé et a été endommagé
    - Equipment L'équipement présente des signes évidents de rupture
14. Ne laissez pas cet équipement dans un environnement où la température de stockage peut être inférieure à -40°C (-40°F) ou supérieure à 85°C (185°F). Cela pourrait endommager l'équipement. L'équipement doit être dans un environnement contrôlé.
15. Tout composant non vérifié peut causer des dommages inattendus. Pour garantir une installation correcte, veuillez toujours utiliser les composants (ex. Vis)fournis avec la boîte d'accessoires.
16. **ATTENTION:** L'ordinateur est équipé d'un circuit d'horloge temps réel alimenté par batterie. Il y a un risque d'explosion si la batterie est remplacée de manière incorrecte. Remplacez uniquement avec le même type ou un type equivalent recommandé par le fabricant. Jetez les piles usagées conformément aux instructions du fabricant.
17. Débranchez toujours complètement le cordon d'alimentation de votre chassis lorsque vous utilisez du matériel. Ne faites pas de connexion quand l'appareil magés par des surtensions soudaines.

18. Niveau de pression acoustique au poste de l'opérateur selon la norme CEI 704-1: 1982 n'est pas supérieur à 70 dB (A).
19. **AVERTISSEMENT:** Cet ensemble d'instructions est donné conformément à la norme CEI 704-1. Advantech décline toute responsabilité quant à l'exactitude des déclarations contenues dans ce.
20. Le produit est destiné à être alimenté par une alimentation électrique répertoriée UL adaptée à une utilisation au minimum Tma 60 degrés C dont la sortie est nominale: 12-24 Vdc,7,5-3,75 A min. Si vous avez besoin d'aide supplémentaire, veuillez contacter Advantech pour plus d'informations.
21. **ZONE D'ACCÈS RESTREINT:** L'équipement ne doit être installé que dans une zone d'accès restreint.

Contents

Chapter 1

General Introduction

This chapter details background information on the ARK-1250L series.

1.1 Introduction

ARK-1250L is a compact, fanless, DIN-rail embedded system that features an 11th Gen Intel® Core™ i processor and essential I/O on the front bezel for easy access and installation.

Rugged, Compact Design

ARK-1250L is equipped with a dual channel memory slot that supports up to 64GB of DDR4 3200 MHz SO-DIMM. Designed for operation in harsh industrial environments, this ruggedized system supports a wide operating temperature range (-40 ~ 60°C/-40 ~ 140°F) and wide input power range (12 ~ 24 VDC). The system I/O includes 3 x USB 2.0, 3 x USB 3.2 (Gen2), 4 x RS232/422/485, up to 3 x 10/100/2500 Mbps LAN ports, and 1 x 10/100/1000 Mbps LAN port, as well as 1 x Mic In/Line Out, up to 2 x HDMI, and 1 x VGA. ARK-1250L also features 1 x full-sized Mini PCIe, 1 x M.2 2230 E-Key, 1 x M.2 2280 B-Key, and a 2.5" SSD. It is suitable for installation in environments with limited space.

Built-In Intelligent Management Tools – Advantech iEdge

Advantech's iEdge platform, together with McAfee and Acronis, provides a valuable suite of programmable APIs — such as a multi-level watchdog, hardware monitor, system restore, and other user-friendly interfaces. With the inclusion of iEdge, ARK-1250L can be used for remotely managing, monitoring, configuring, and controlling numerous terminals to ensure easy maintenance and recovery.

1.2 Product Specifications

1.2.1 Processor System

- **CPU:**
  - Core™ i3-1115G4E
  - Core™ i5-1145G7E
  - Core™ i7-1185G7E (supported by project)
- **Frequency:**
  - Core™ i3-1115G4E: 2.2 GHz turbo boost up to 3.9 GHz
  - Core™ i5-1145G7E: 1.5 GHz turbo boost up to 4.1 GHz
  - Core™ i7-1185G7E: 1.8 GHz turbo boost up to 4.4 GHz
- **Core Number:**
  - Core™ i3-1115G4E: 2
  - Core™ i5-1145G7E: 4
  - Core™ i7-1185G7E: 4
- **BIOS:** AMI EFI 256 Mbit

1.2.2 Memory

- **Technology:** DDR4 3200 Mhz
- **Max capacity:** Up to 64 GB with 2 x slots
- **Socket:** 2 x Dual Channel DDR4 3200 MHz 260 pin SO-DIMM (no support for ECC)

1.2.3 Graphics

- **Chipset:** Intel® Iris® Xe graphics
- **HDMI 2.0b:** Up to 4096 x 2160 @ 60Hz
- **VGA:** Up to 1920 x 1200 @ 60Hz
- **Dual Display:** HDMI + VGA or HDMI + HDMI (supported by ARK-1250L-S5A2)

1.2.4 Ethernet

- **LAN1:** 10/100/1000/2500 Mbps Intel® i225 GbE, supports Wake-on-LAN
- **LAN2:** 10/100/1000 Mbps Intel® i219 GbE, supports Wake-on-LAN
- **LAN3:** 10/100/1000/2500 Mbps Intel® i225 GbE, supports Wake-on-LAN
- **LAN4:** 10/100/1000/2500 Mbps Intel® i225 GbE, supports Wake-on-LAN (supported by version A2)

1.2.5 Audio

- **Interface:** Realtek ALC888S, High Definition Audio, Mic-in, Line-out

1.2.6 I/O Interface

- **Serial Ports:** 4 x RS-232/422/485 with auto flow control
- **USB Ports:** 3 x USB 3.2, 3 x USB 2.0, and 1 x internal USB 2.0 supported by project
- **GPIO:** 8-bit Programmable DIO
- **Optional CAN Bus:** 1 x CAN bus 2.0 (DB9 connector)

1.2.7 Expansion

- **Mini PCIe:** 1 x Full-size mPCIe
- **M.2:** 1 x M2. 2230 E-Key and 1 x M.2 2280 B-Key with nano SIM holder #1

1.2.8 Storage

- **SSD/HDD:** 1 x 2.5" SATAIII Drive bay (compatible with 15 mm height)
- **mSATA:** 1 x Full-size mSATA (*shared with the mPCIe slot)

1.2.9 Other

- **Watchdog Timer:** 255-level timer interval, set up by software
- **TPM:** TPM 2.0 (project supported by AMO-I029)

1.2.10 Software Support

- **Microsoft Windows:** Windows 10 Enterprise
- **Linux:** Project support

1.2.11 Power Requirements

- **Power Type:** ATX/AT
- **Power Input Voltage:** 12 ~ 24 VDC
- **Power Adapter:** AC to DC, 90W/120W adapter

1.2.12 Power Consumption

- **Typical:** 18W with Core™ i3-1115G4E, 19.8W with Core™ i5-1145G7E (OS idle mode)

- **Max.:** 30.6W with Core™ i3-1115G4E, 35.1W with Core™ i5-1145G7E (full loading)

1.2.13 Mechanical

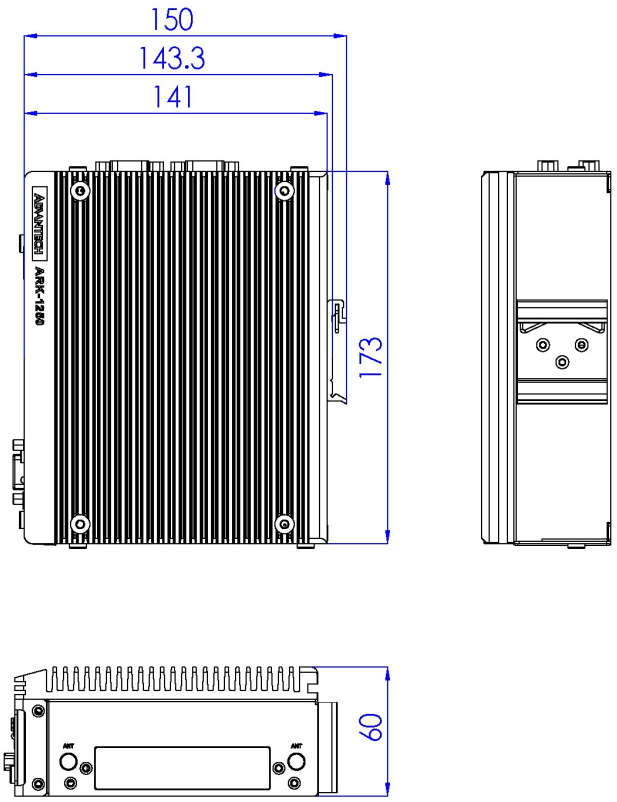
- **Construction:** Aluminum housing
- **Mounting:** DIN-Rail/Wall Mount
- **Dimensions (W x H x D):** 60 x 173 x 141 mm (2.36 x 6.73 x 5.55 in)
- **Weight:** 1.5 kg

1.2.14 Environment

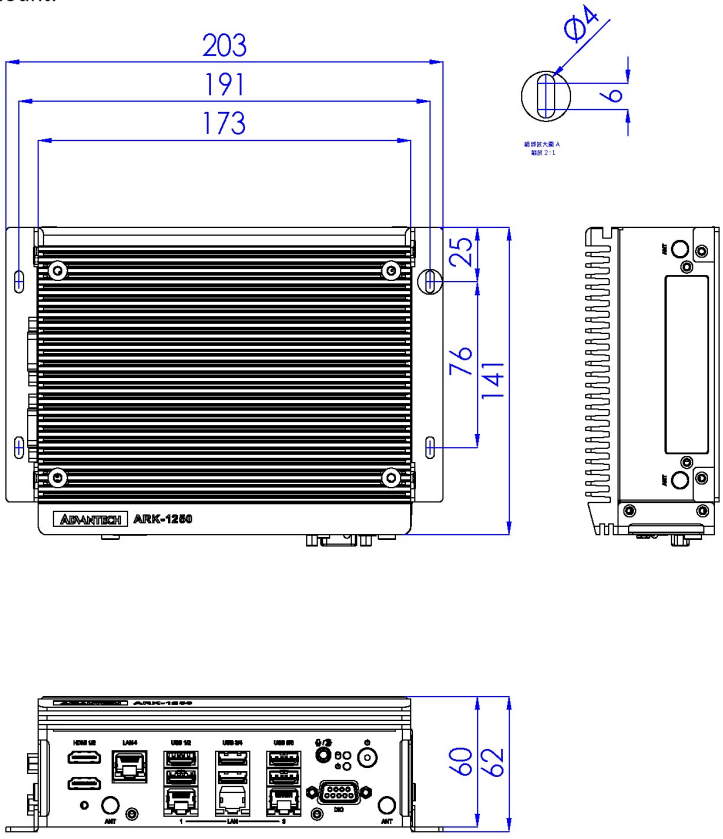
- **Operating Temperature:** With extended temp. peripherals: -40 ~ 60°C with 0.7m/s airflow (only up to 40°C when using with the adapter).
- **Storage Temperature:** -40 ~ 85°C (-40 ~ 185°F)
- **Relative Humidity:** 95% @ 40°C (non-condensing)
- **Vibration During Operation:** With SSD: 3 Grms, IEC60068-2-64, random, 5~500 Hz, and 1hr/axis
- **Shock During Operation:** With SSD: 30 G, IEC-60068-2-27, half sine, 11 ms duration
- **EMC:** CE/FCC Class B, CCC, and BSMI
- **Safety:** UL, CB, CCC, and BSMI

1.3 Mechanical Diagrams

DIN Rail:



Wall Mount:



1.4 Optional MOS Modules for iDoor Expansion

Part Number	Description
MOS-2230-Z1201E	CAN bus module, 2-Ch, USB Interface
MOS-2220-X1101E	Parallel LPT module, 1-Ch, USB Interface
MOS-2110Z-1201E	USB module, 2-Ch, PCIe Interface
MOS-2120-Z1101E	Giga LAN Ethernet module, 1-Ch, PCIe Interface
MOS-1120Y-0202E	Isolated RS-232, 2-Ch, DB9, PCIe Interface
MOS-1121Y-0202E	Isolated RS-422/485, 2-Ch, DB9, PCIe Interface
MOS-1120Y-1402E	Non-Isolated RS-232, DB37, 4-Ch, PCIe Interface
MOS-1130Y-0201E	Isolated CAN Bus, 2-Ch, DB9, PCIe Interface
MOS-1110Y-0101E	Isolated 16 DI/8 DO, 1-Ch, DB37, PCIe Interface
MOS-2120-Z1201	GigaLAN Ethernet module, mPCIe, RJ-45 2-Ch, PCIe I/F
MOS-2220-Z1101E	High-speed Serial COM module, 1-Ch, USB Interface

Note!

1. *You need to order the AMO-I032 together with MOS modules.*
2. *mPCIe and M.2 E-Key cannot be used when adding any MOS module due to mechanical interference.*

Chapter 2

H/W Installation

This chapter details instructions for installing the ARK-1250L series.

- Note: Hardware installation must be performed by skilled personnel.

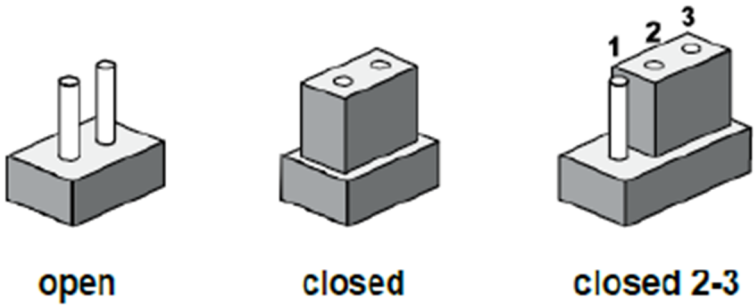
2.1 Introduction

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

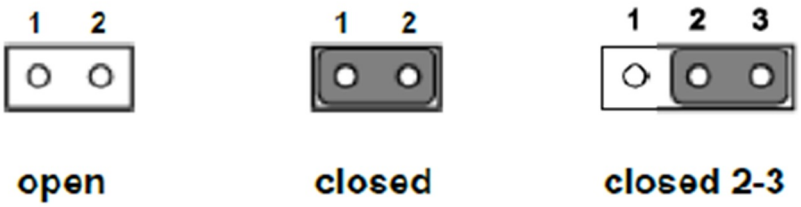
2.2 Jumpers

2.2.1 Jumper Description

ARK-1250L can be configured to satisfy specific application requirements 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, 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. For these jumpers, 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 necessary when working with jumpers. Users with concerns about the ideal hardware configuration for their application should contact their local distributor or sales representative before making any changes. Generally, only a standard cable is required to make most connections.

2.2.2 Jumper List

Table 2.1: Jumper Settings

Location	Function
J1	AT/ATX Mode
JCMOS1	Clear CMOS
ERP1	ERP Power Selection
M2_SEL1	M.2 B-Key Interface & Power Selection (12 short 34 NC)

2.2.3 Jumper Location

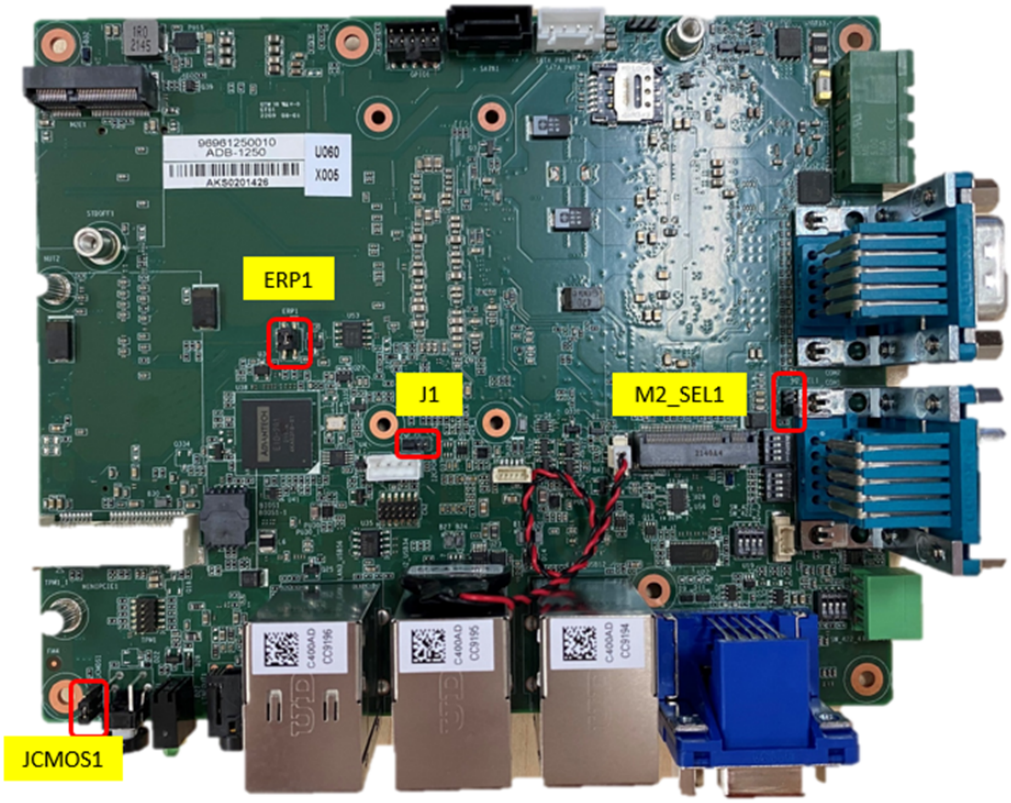


Figure 2.1 Jumper Layout

2.2.4 Jumper Settings

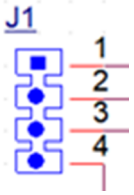


Table 2.2: J1: AT/ATX Mode	
PIN	**Description**
1-2	ATX Mode (default)
3-4	AT Mode

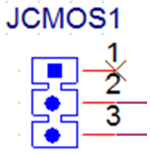


Table 2.3: JCMOS1: Clear CMOS	
PIN	**Description**
1-2	Normal operation (default)
2-3	Clear CMOS

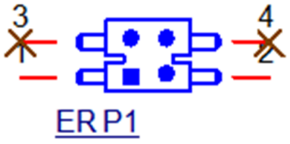


Table 2.4: ERP1: ERP Power Selection	
PIN	**Description**
1-2	Non ERP Mode (default)
3-4	ERP Mode (BIOS Select Deep Sleep)

Note! *To be ERP ready, please configure the jumper and set up Power Saving Mode accordingly (please check section 3.2.2.6). Reducing power loss under S5 mode with the ERP1 jumper setting enables compliance with ERP regulations.*

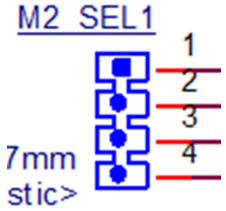
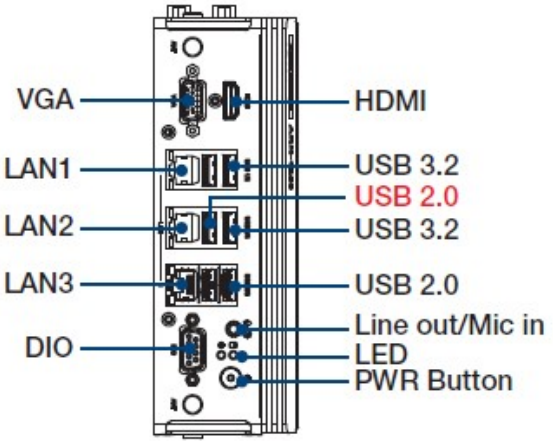


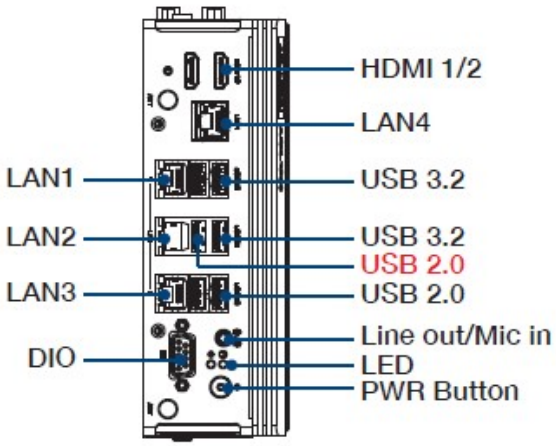
Table 2.5: M2_SEL1: M.2 B-Key Interface & Power Selection	
PIN	**Description**
1-2 short	PCIe Gen4 x 2
1-2 NC	USB 3.0 (default)
3-4 short	M.2 B-Key VCC=3.8V
3-4 NC	M.2 B-Key VCC=3.3V (default)

2.3 System I/O

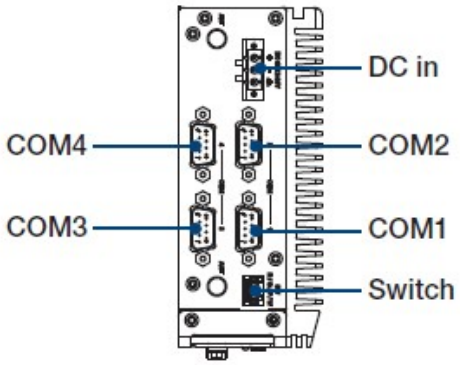
A1 Front Panel External I/O Mechanical Layout/Drawing

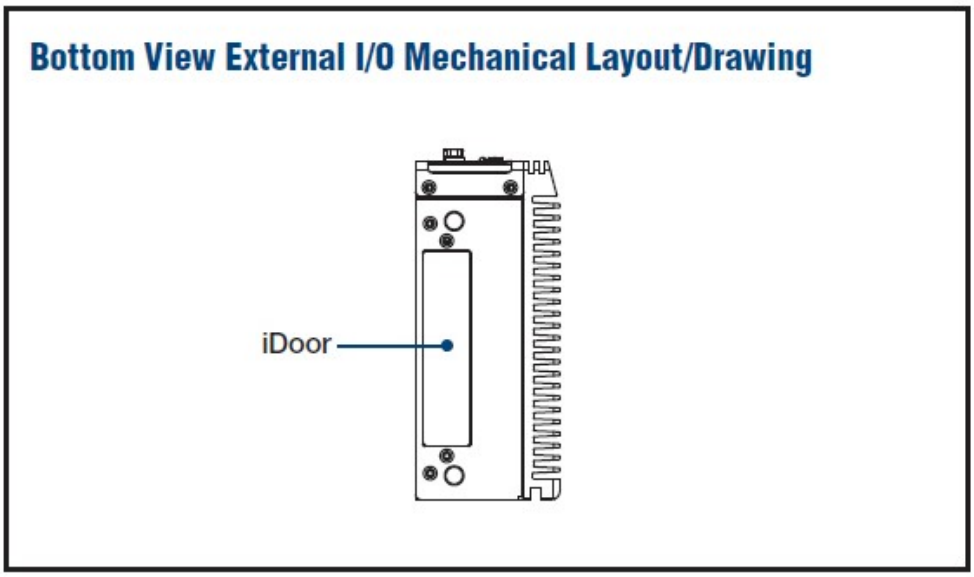


A2 Front Panel External I/O Mechanical Layout/Drawing



Top Panel External I/O Mechanical Layout/Drawing





2.4 External I/O

2.4.1 Power On/Off Button

ARK-1250L features a power on/off button with an LED indicator on top that shows On status (Green LED).

Figure 2.2 Power On/Off Button

2.4.2 Power Input Connector

The power input connector supports 12 ~ 24V. The 3 pins are defined as +, -, and GND.

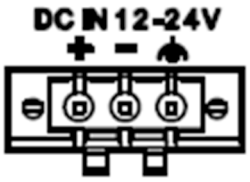


Figure 2.3 Power Input Connector

2.4.3 Ethernet Connector (LAN)

ARK-1250L is equipped with two Intel® i225-LM Ethernet controllers connected to LAN1 and LAN3 (LAN4 supported by ARK-1250L-S5A2), as well as Intel® i219 Ethernet controllers connected to LAN2. The Ethernet ports provide standard RJ-45 jack connectors with LED indicators on the sides to show Active/Link status (Green LED) and speed status (Yellow LED).

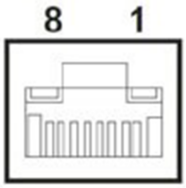


Figure 2.4 Ethernet Connector (LAN)

Table 2.6: Ethernet Connector (LAN) PIN Definitions	
Pin	**10/100/1000/2500 Mbps Signal Name**
1	BI_DA+(GHz)
2	BI_DA+(GHz)
3	BI_DB+(GHz)
4	BI_DC+(GHz)
5	BI_DC-(GHz)
6	BI_DB-(GHz)
7	BI_DD+(GHz)
8	BI_DD-(GHz)
H3	GND
H4	GND

* LAN 1 and 3 are up to 2.5G, while LAN is up to 1G.

2.4.4 USB 3.2 Connector

ARK-1250L supports 3 x USB 3.2 interfaces, which support plug-and-play functionality and hot swapping for up to 127 external devices. The USB interfaces comply with USB UHCI, Rev. 3.0.

Figure 2.5 USB 3.2 Connector

Table 2.7: USB 3.2 PIN Definitions	
Pin	**Signal Name**
1	+5V
2	D-_0
3	D+_0
4	GND
5	USB0_SSRX-
6	USB0_SSRX+
7	GND
8	USB0_SSTX-
9	USB0_SSTX+

2.4.5 USB 2.0 Connector

ARK-1250L provides 3 x USB 2.0 interface connectors. The USB interface supports plug-and-play functionality.

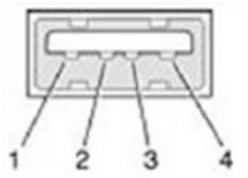


Figure 2.6 USB 2.0 Connector

Table 2.8: USB 2.0 PIN Definitions

Pin	Signal Name
1	VCC
2	USB_data-
3	USB_data+
4	GND

2.4.6 Audio Connector

ARK-1250L features one phone jack connector that supports stereo Line-Out or Mic-In audio ports. The audio chip is controlled by ALC888S and compliant with Azalea standards.

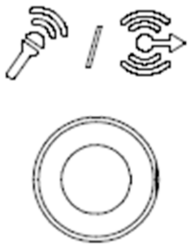


Figure 2.7 Audio Connector

2.4.7 COM Connector

ARK-1250L provides four 9-pin D-sub connectors, which support RS-232/422/485 serial communication interface ports. The default setting is RS-232, if you want to use RS-485/422, you can change the setting in BIOS.

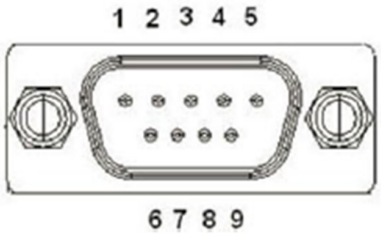


Figure 2.8 COM Connector

Table 2.9: COM Connector PIN Definitions			
Pin	**RS-232**	**RS-422**	**RS-485**
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
NC represents “No Connection”			

2.4.8 HDMI Connector

ARK-1250L offers up to 2 x integrated 19-pin receptacle connector for an HDMI 2.0b interface. The HDMI link supports resolutions up to 4096 x 2160 @60 Hz.

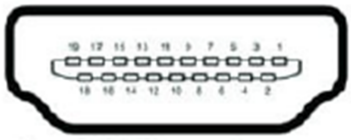


Figure 2.9 HDMI Connector

Table 2.10: HDMI Connector PIN Definitions	
Pin	**Signal Name**
1	HDMI_TX2+
2	GND
3	HDMI_TX2-
4	HDMI_TX1+
5	GND
6	HDMI_TX1-
7	HDMI_TX0+
8	GND
9	HDMI_TX0-
10	HDMI_CLK+
11	GND
12	HDMI_CLK-
13	NC

Table 2.10: HDMI Connector PIN Definitions	
14	NC
15	HDMI_DCLK
16	HDMI_DDAT
17	GND
18	+V5_HDMI-HPD
19	DDP0_HPD
NC represents “No Connection”.	

2.4.9 VGA Connector

ARK-1250L offers 1 x VGA connector. It supports resolutions up to 1920 x 1200 @60Hz.

Figure 2.10 VGA Connector

2.4.10 DIO Connector

ARK-1250L provides 1 x 8-bit DIO connector.

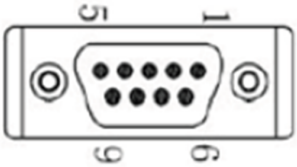


Figure 2.11 DIO Connector

Table 2.11: DIO Connector PIN Definitions	
Pin	**Signal Name**
1	DIO bit 0
2	DIO bit 1
3	DIO bit 2
4	DIO bit 3
5	DIO bit 4
6	DIO bit 5
7	DIO bit 6
8	DIO bit 7
9	GND

2.4.11 Remote Switch Connector

ARK-1250L provides a remote switch connector for power on/off via an external cable.

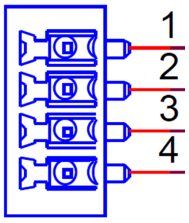


Figure 2.12 Remote Switch Connector

Table 2.12: Remote Switch Connector PIN Definitions

Pin	Signal Name
1	RESET BTN
2	GND
3	PWR BTN
4	WDT

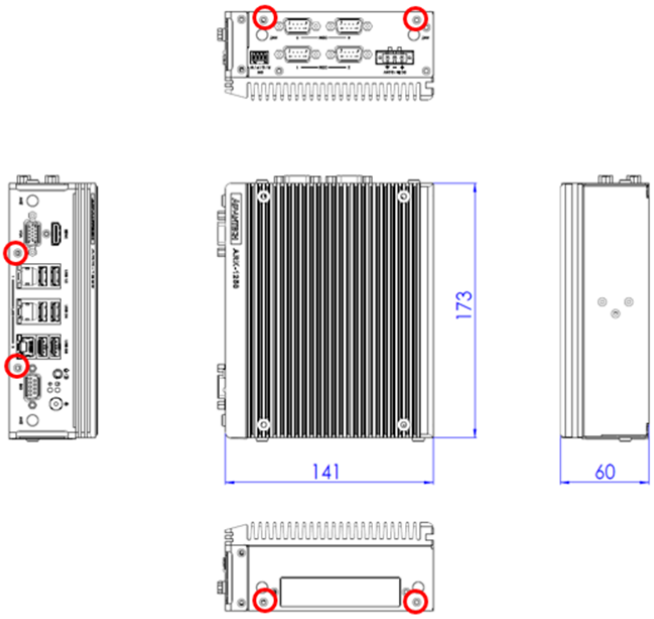
2.5 Installation

Note! *This should be performed by skilled personnel.*

2.5.1 2.5" HDD/SSD Installation

Note! *You cannot install a 2.5" HDD/SSD together with a 5G module on M.2 B-Key.*

1. Loosen the 6 x screws on the front/sides and remove the bottom cover.

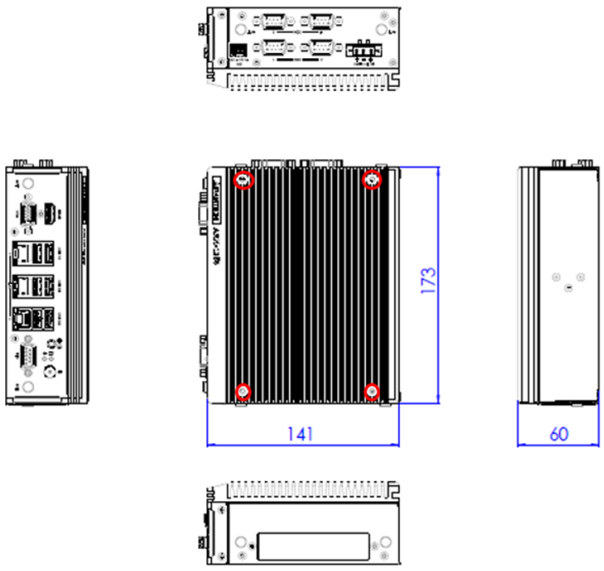


2. Attach the 2.5" SATA HDD/SSD to the bottom cover and connect one end of the SATA cable to HDD/SSD.

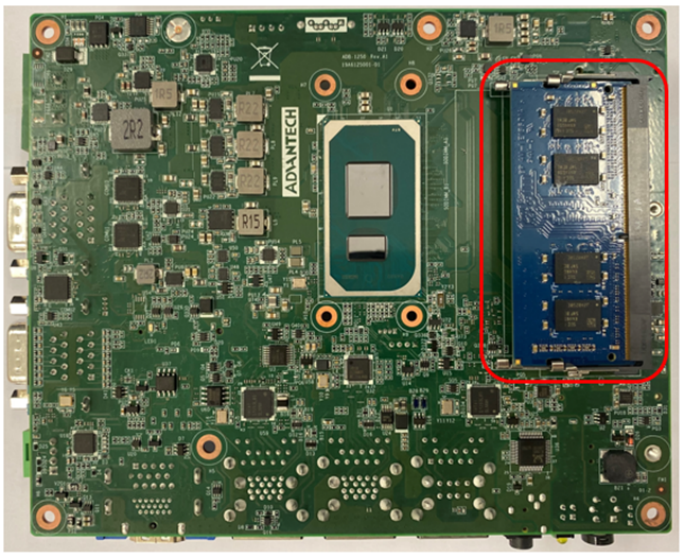
3. Put the bottom cover back and secure it with the 6 screws.

2.5.2 Memory Installation

1. Remove the top cover with the wrench in the accessory box.



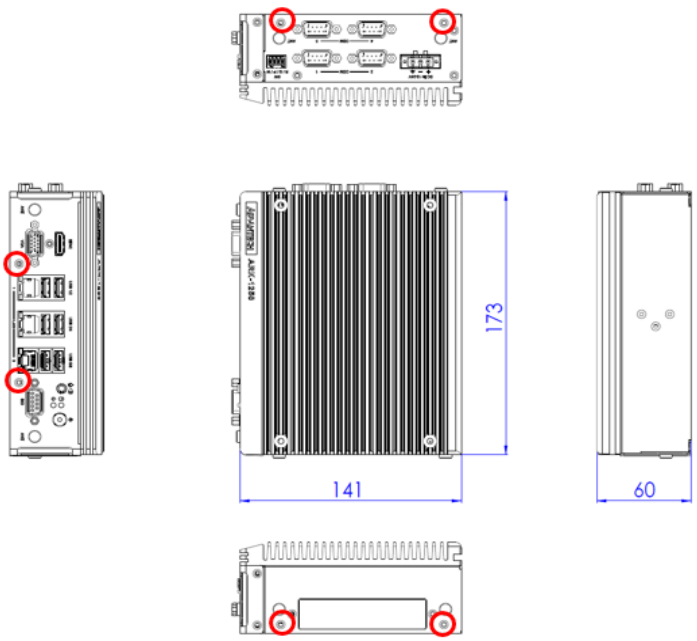
2. Install RAM memory into the slots.



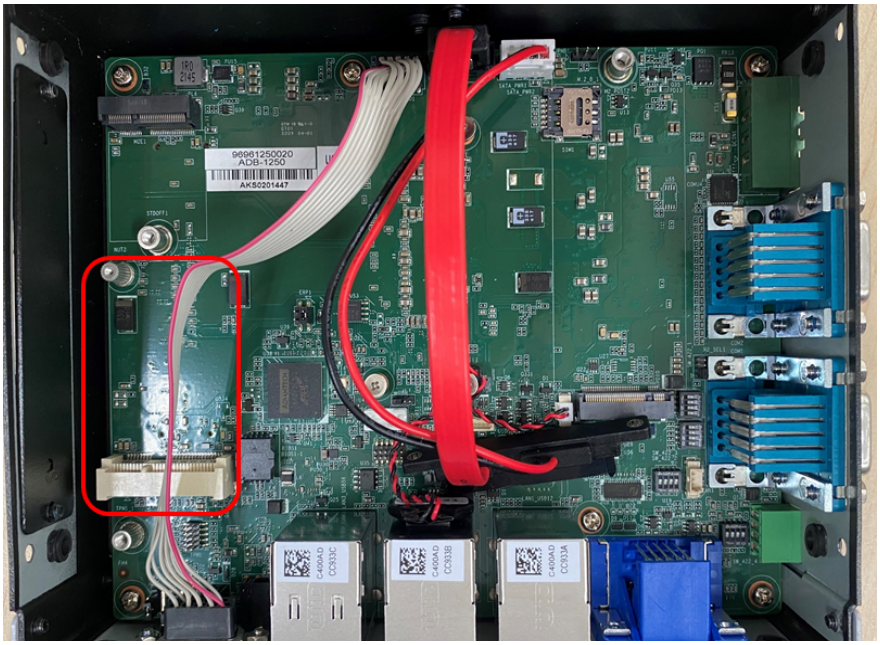
3. Put the top cover back and secure it with the 4 screws.

2.5.3 mPCIe/mSATA Installation

1. Loosen the 6 screws on the front/sides and remove the bottom cover.



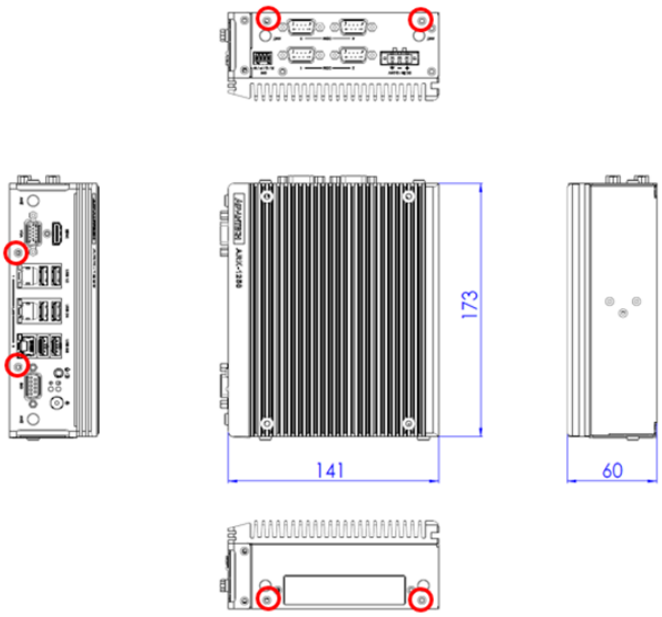
2. Install the mPCIe/mSATA module.



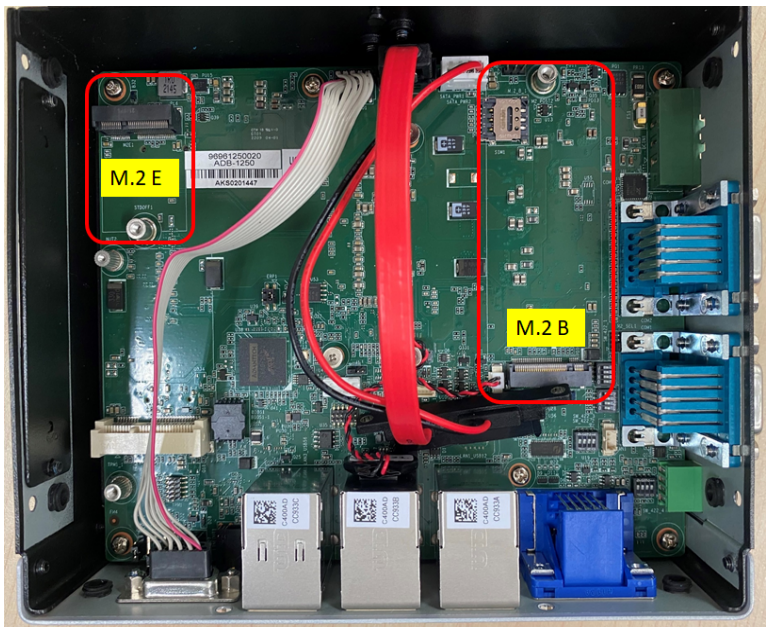
3. Put the bottom cover back and secure it with the 6 screws.

2.5.4 M.2 Installation

1. Loosen the 6 screws on the front/sides and remove the bottom cover.



2. Install the M.2 E-/B-key modules.



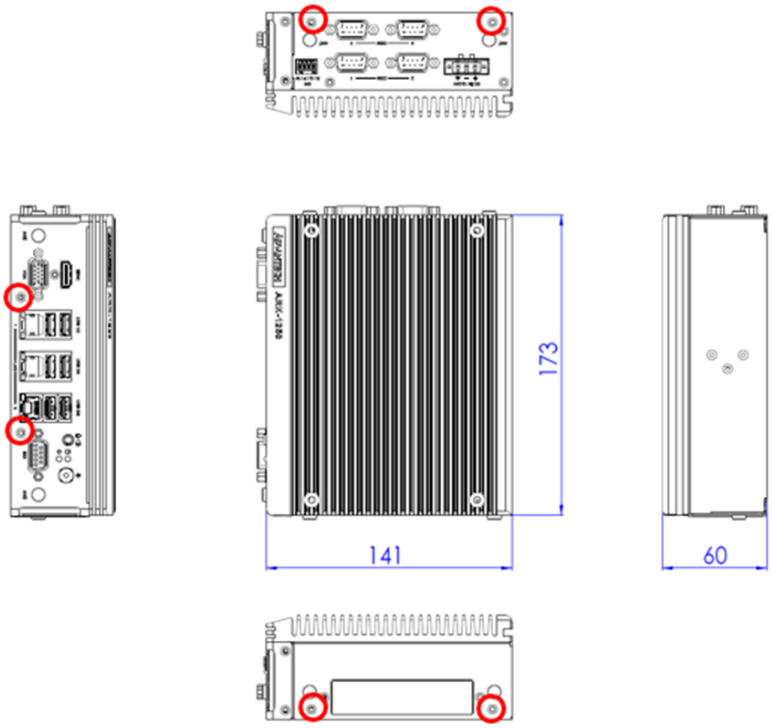
3. Place the bottom cover back and secure it with the 6 screws.

Note! *The extra thermal solution may be required for certain modules installed on M.2.*

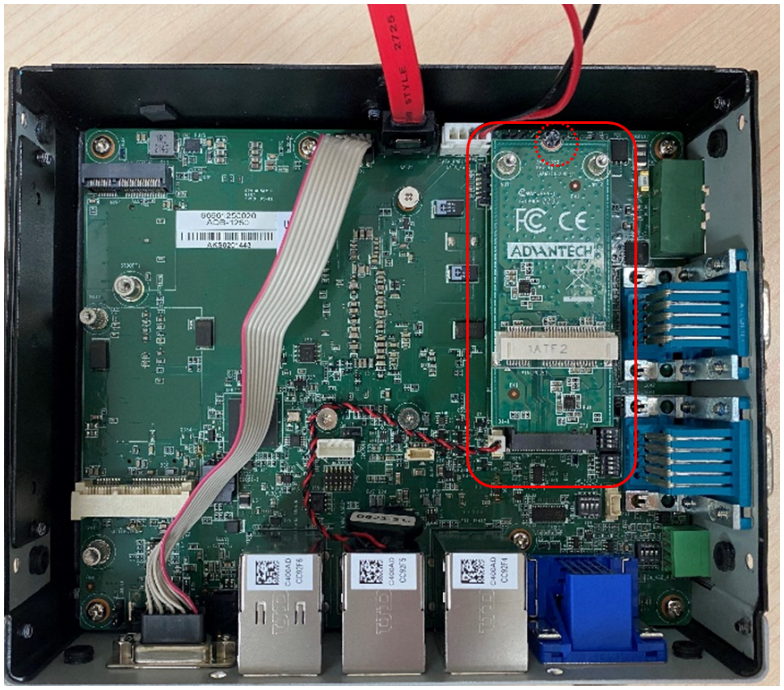
2.5.5 AMO-I032 Installation

AMO-I032 is the expansion kit (M.2 B-Key to mPCIe) for installing iDoor modules on ARK-1250L. Users need to install AMO-I032 together with the iDoor module.

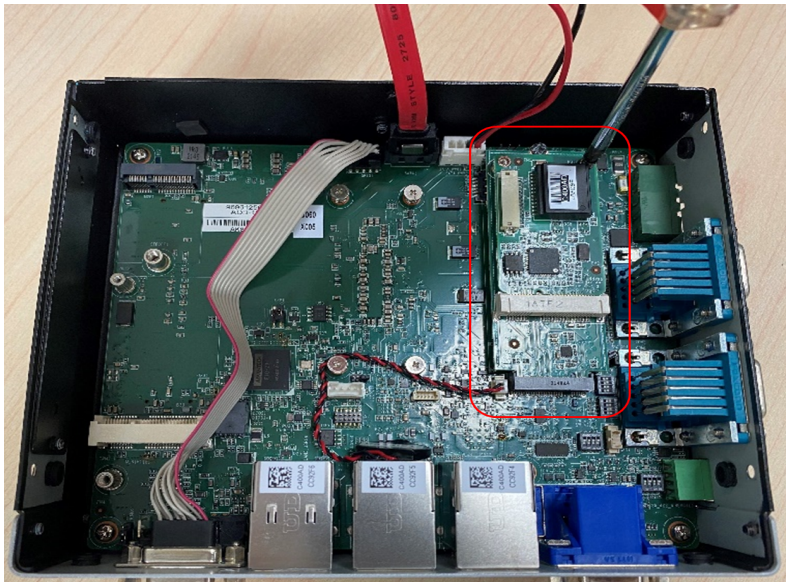
1. Loosen the 6 screws on the front/side and remove the bottom cover.



2. Install the AMO-I032 on M.2 B-Key and secure it with a screw (M3x5L).



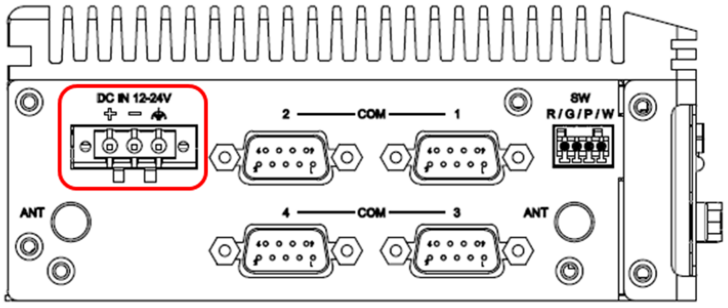
3. The iDoor module board can then be installed on the AMO-I032.



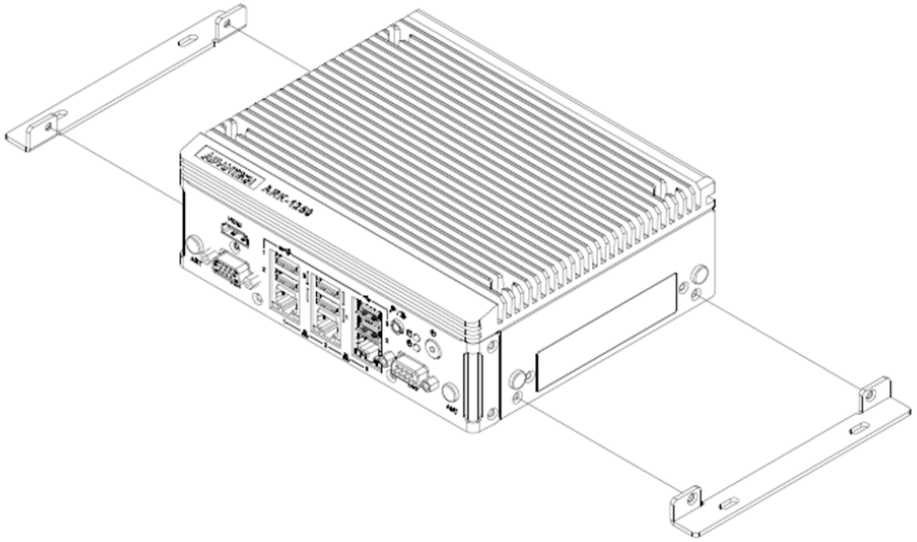
4. Place the bottom cover back on and secure it with the 6 screws.

2.5.6 Adapter Installation

1. Connect the 3-pin Phoenix connector to the DC input.



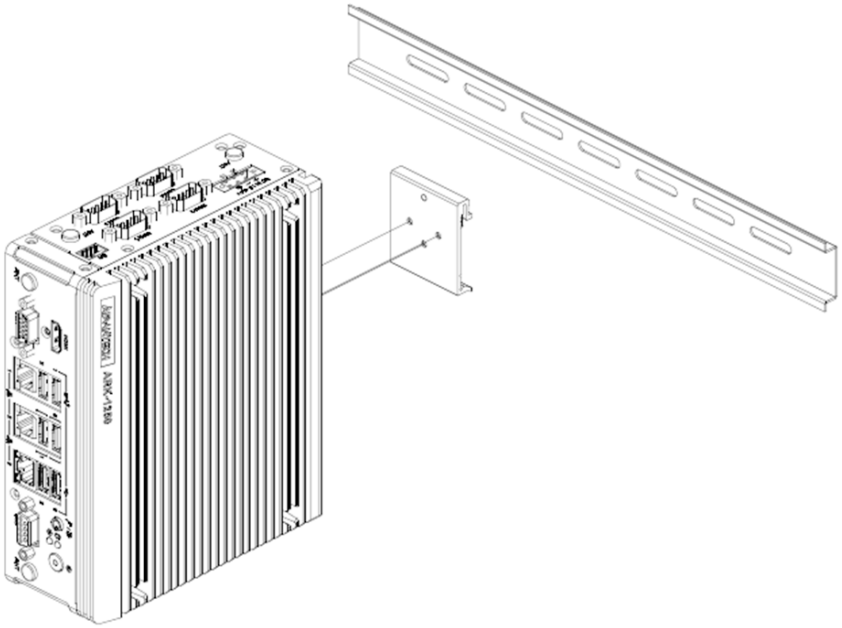
2.5.7 Wall Mount Installation



1. Unscrew the 4 x M3x5L screws on both sides of ARK-1250L.
2. Secure the wall mount brackets on both sides of ARK-1250L using the 4 screws removed in the above step.

1. Dévissez les 4x vis M3x5L ou des deux côtés de l'ARK-1250L.
2. Vissez les supports de montage mural des deux côtés de l'ARK-1250L avec les quatre vis à l'arrière.

2.5.8 DIN-Rail Mount Installation

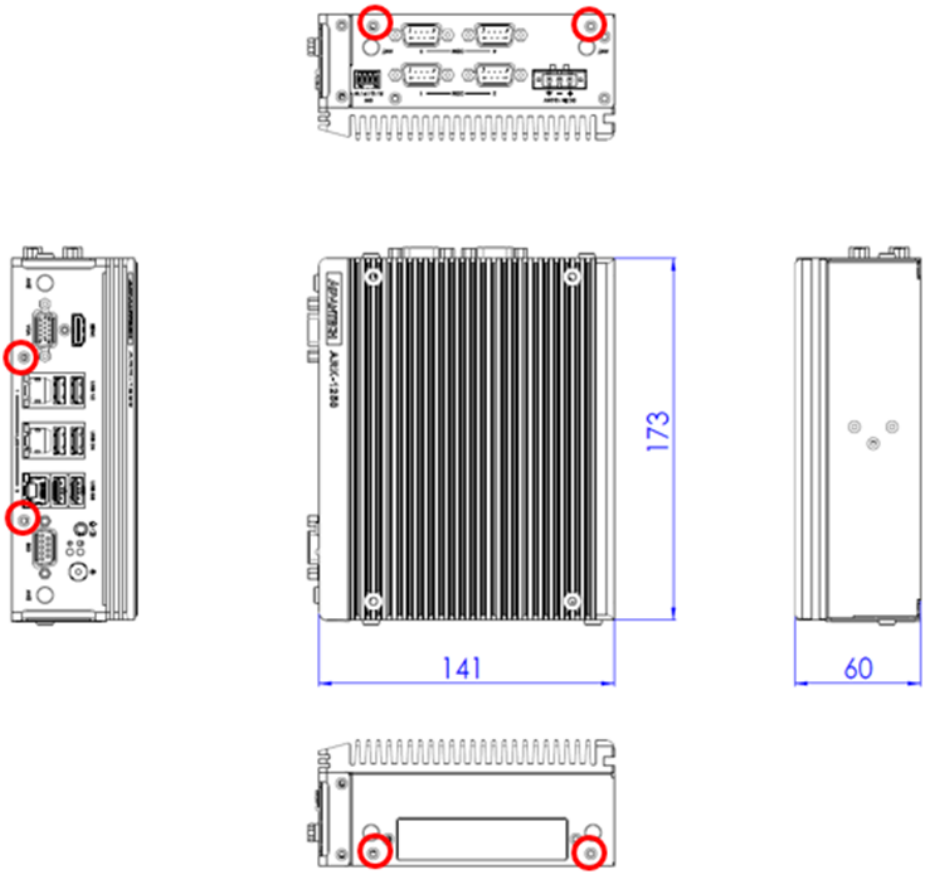


1. Unscrew the 3 x M3x5L screws from the back side of ARK-1250L.
2. Secure the DIN-rail bracket using 3 screws on the back.

1. Dévissez les 3 vis M3x5L à l'arrière de l'ARK-1250L.
2. Revissez le support du rail DIN avec les trois vis.

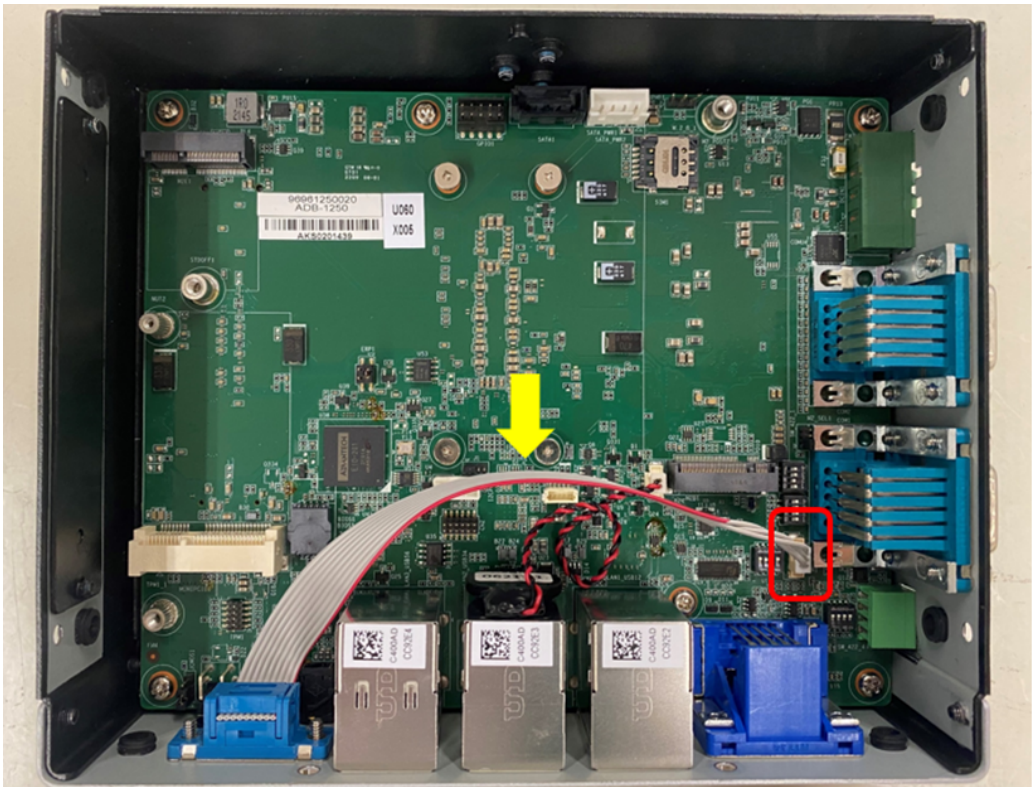
2.5.9 Optional CAN Bus Cable Installation

1. Loosen the 6 screws on the front/sides and remove the bottom cover.

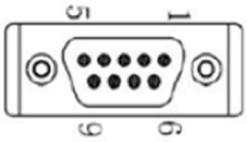


2. Remove the DIO cable.

3. Install the CAN bus cable (Advantech Part Number 1700030518-01).



4. CAN bus cable pin definitions are shown below.



Pin	Signal Name
1	NC
2	CAN_L
3	GND
4	NC
5	NC
6	NC
7	CAN_H
8	NC
9	NC

Note! *Please update the BIOS to Advantech part number "1420056685" when using CAN bus.*

Chapter 3

BIOS Settings

This chapter details instructions for setting BIOS configuration data.

3.1 Introduction

The AMI BIOS ROM has a built-in setup program — the BIOS Setup Utility — that allows users to modify the basic system configuration. All configuration data is stored in battery-backed CMOS to ensure the setup information is retained when the power is turned off.

This chapter describes the basic navigation of the ARK-1250L BIOS setup screens.

3.2 Entering BIOS Setup

Turn on the computer and then press <ESC> or <DEL> to enter the BIOS Setup menu.

3.2.1 Main Setup

Upon accessing the BIOS Setup Utility, users are presented with the Main setup page. Users can always return to the Main setup page by selecting the Main tab. The Main BIOS setup page is shown below.

The Main BIOS setup page has two main frames. The left frame displays all the items accessible on the Main page. Items that are grayed out cannot be configured, whereas items presented in blue text can be configured. The right frame displays the key legend.

Located above the key legend is an area reserved for a text message. When an item is selected in the left frame, the item is presented in white text and often accompanied by a text message.

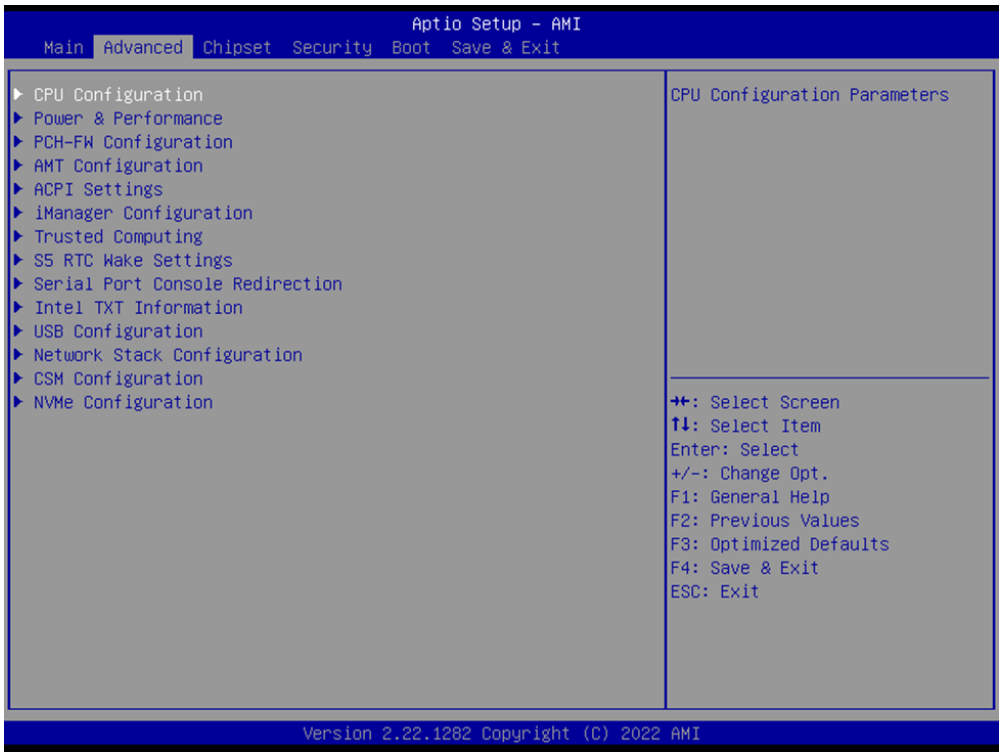
- **System Date / System Time**

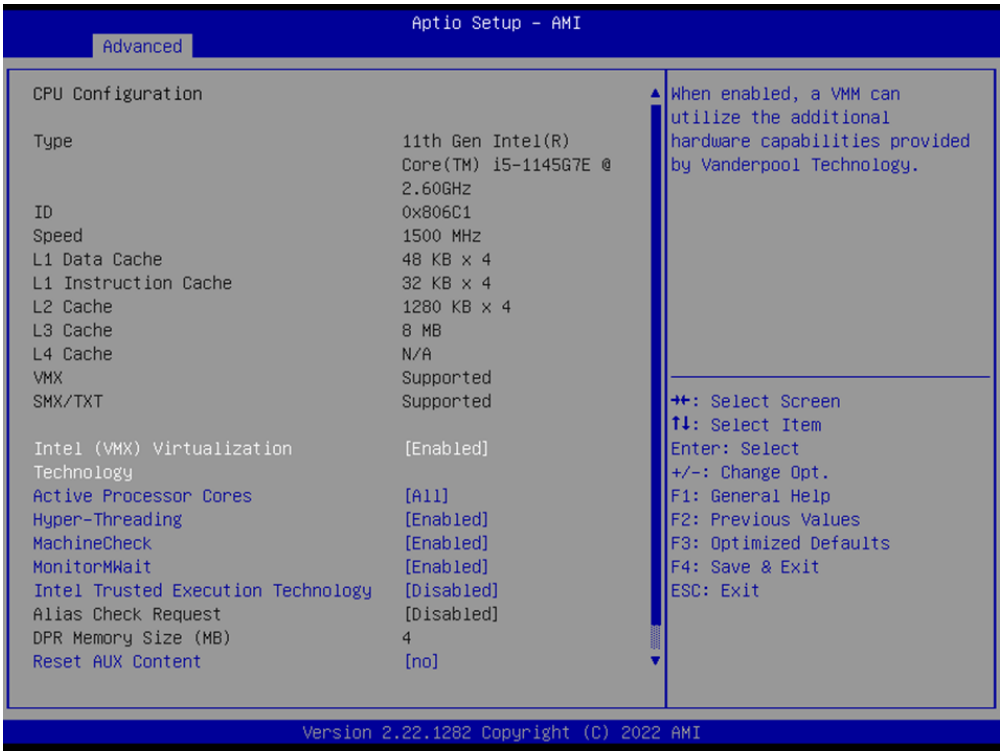
Use this option to change the system date and time. Highlight System Date or System Time using the <Arrow> keys. Enter new values via the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format, and the time must be entered in HH:MM:SS format.

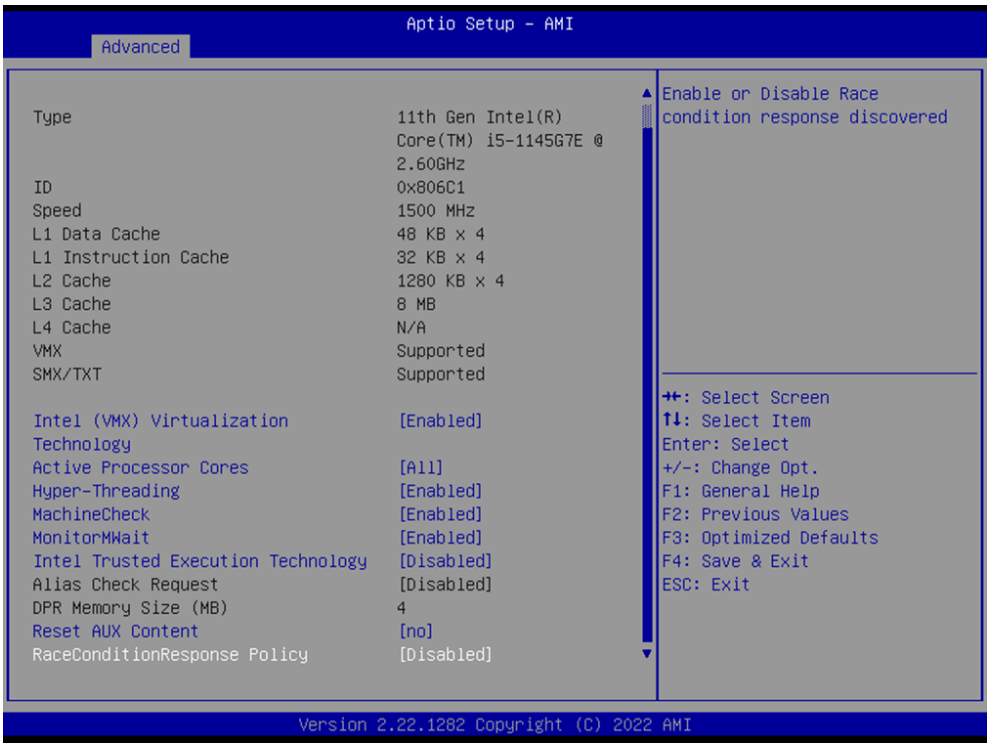
3.2.2 Advanced BIOS Setup

Select the Advanced tab from the BIOS Setup Utility to enter the Advanced BIOS Setup page. Select any of the items in the left frame of the screen, such as CPU Configuration, to access the sub-menu for that item. The options for any of the Advanced BIOS Setup items can be displayed by highlighting the item using the <Arrow> keys.

3.2.2.1 CPU Configuration

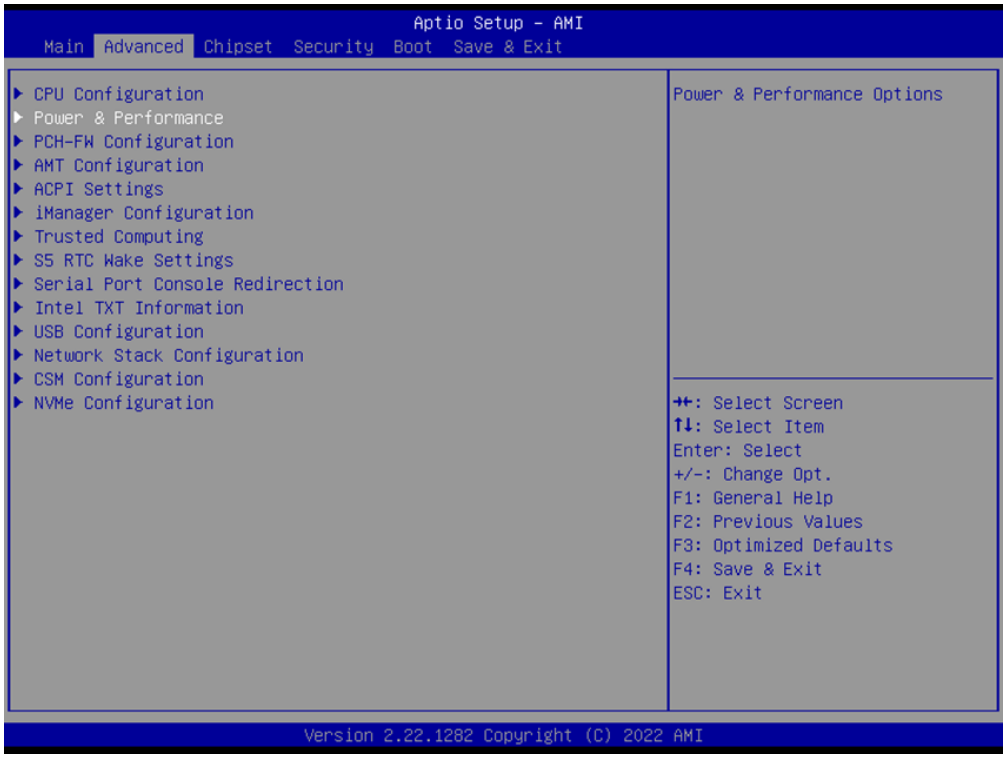


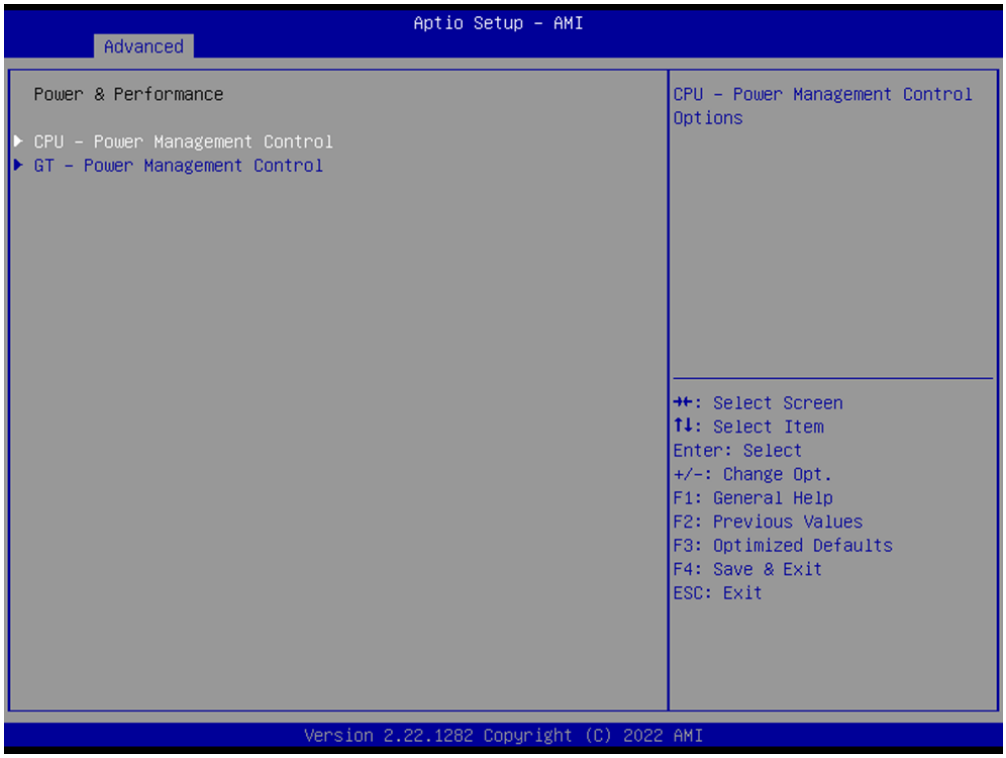


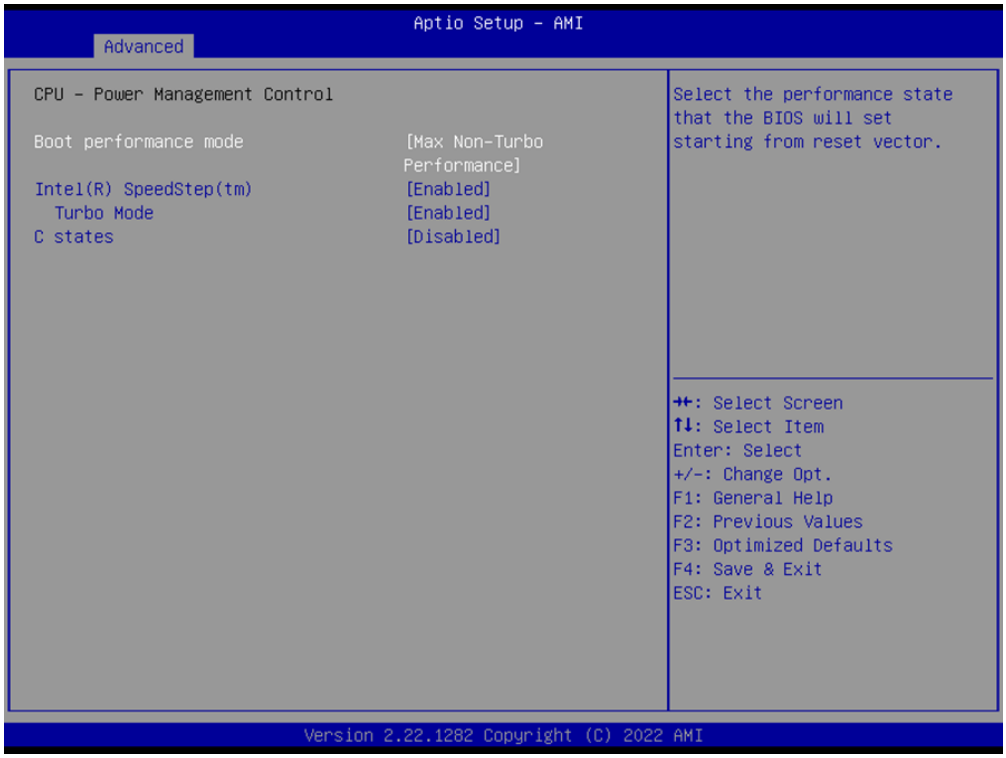


- **Intel® (VMX) Virtualization Technology**
  When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.
- **Active Processor Cores**
  Number of cores to enable in each processor package.
- **Hyper-Threading**
  Enable or Disable Hyper-Threading Technology.
- **MachineCheck**
  Enable/Disable Machine Check.
- **MonitorMWait**
  Enable/Disable MonitorMWait.
- **Intel® Trusted Execution Technology**
  Enable utilization of additional hardware capabilities provided by Intel® Trusted Execution Technology. Changes require a full power cycle to take effect.
- **Alias Check Request**
  Enable Txt Alias Checking capability. Changes require full Txt capability before it will take effect. It is a one-time only change, and on the next reboot it will be reset.
- **DPR Memory Size (MB)**
  Reserve DPR memory size (0-255) MB.
- **Reset AUX Content**
  Reset TPM Aux content. Txt may not be functional after AUX content gets reset.

3.2.2.2 Power & Performance

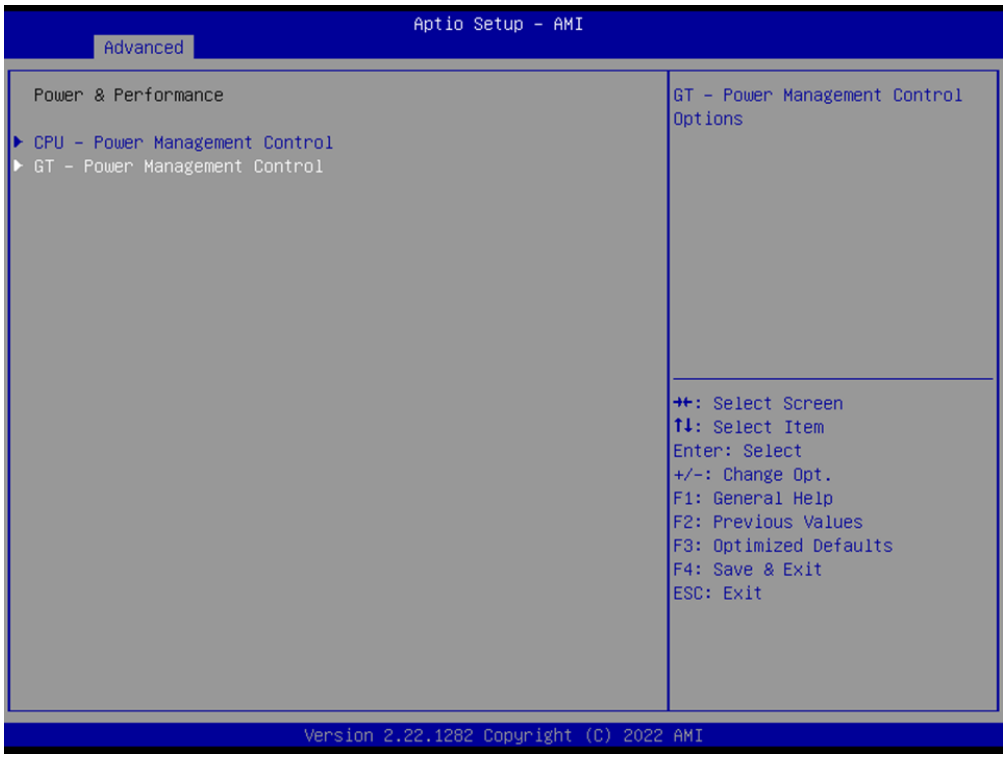


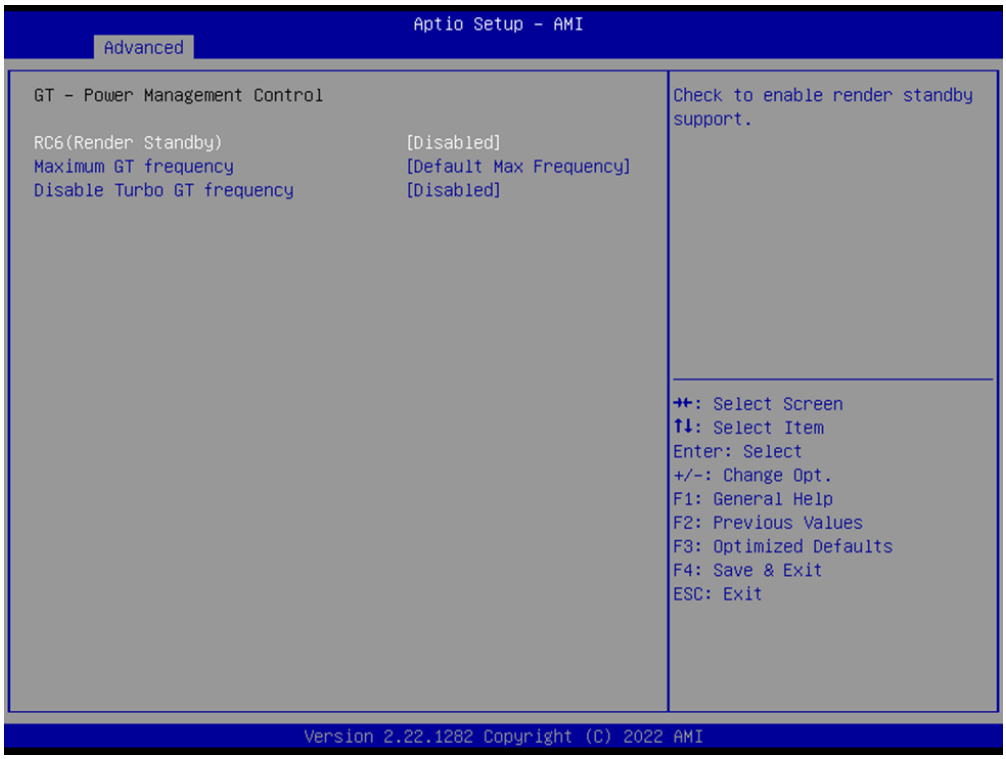




CPU - Power Management Control

- **Boot performance mode**
  Select the performance state that the BIOS will set starting from the reset vector.
- **Intel® SpeedStep®**
  Allow support of more frequency ranges.
- **Turbo Mode**
  Enable/Disable processor Turbo Mode.
- **C states**
  Enable/Disable CPU Power Management. Allow CPU to go to C states when it's not 100% utilized.

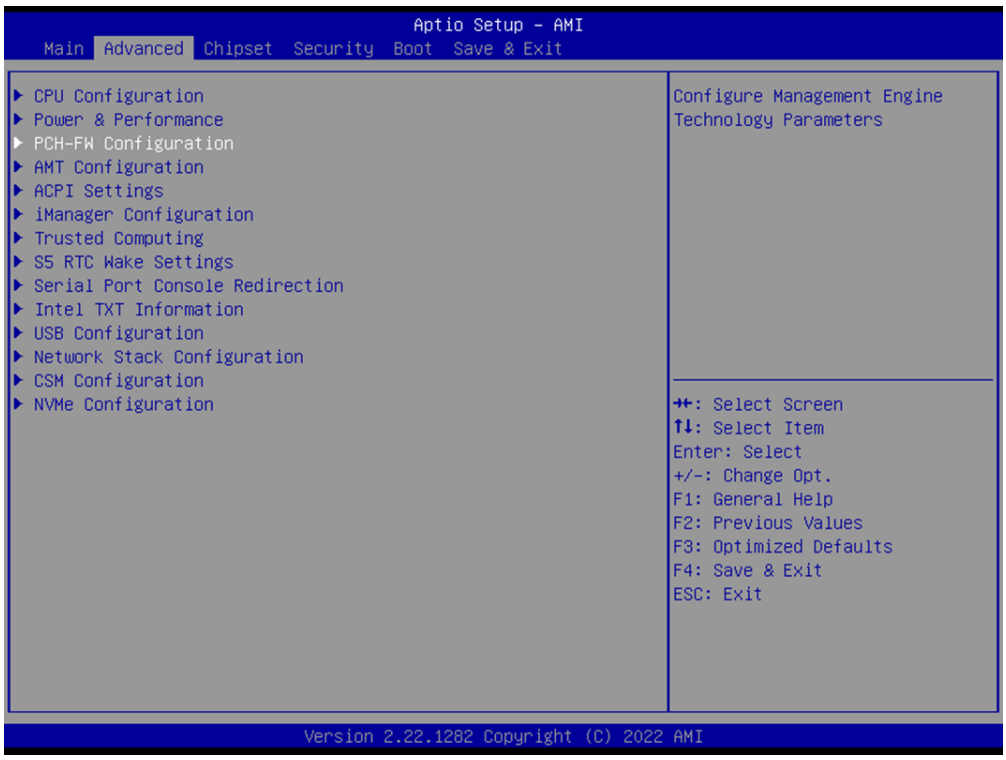


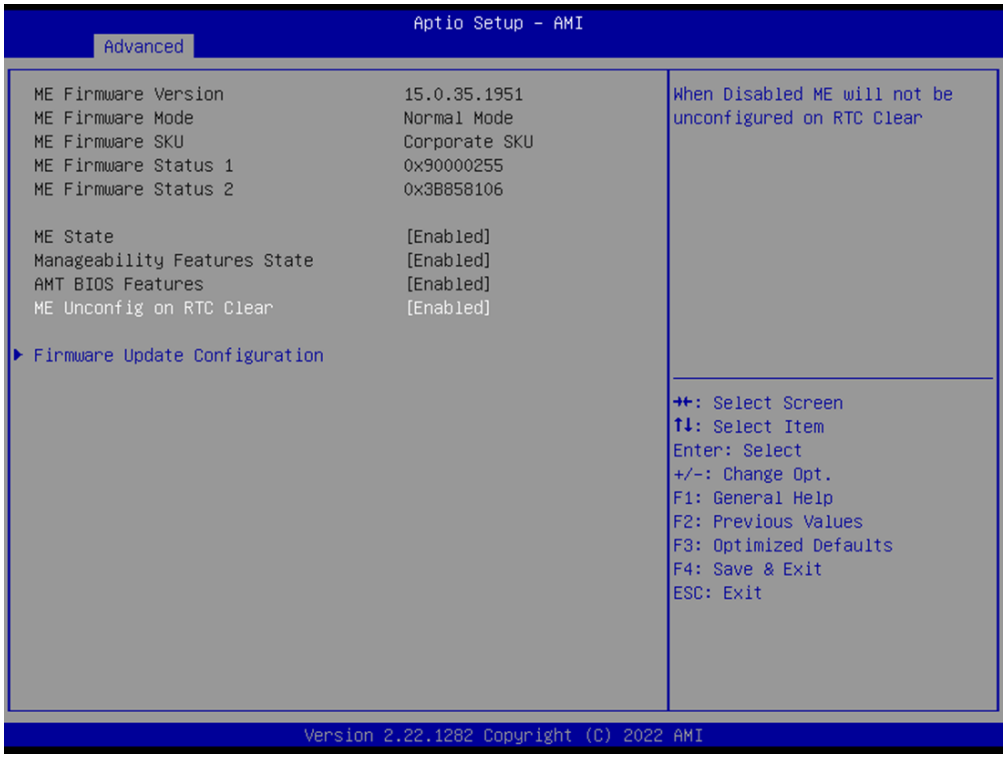


GT - Power Management Control

- **RC6 (Render Standby)**
  Check to enable render standby support.
- **Maximum GT frequency**
  Maximum GT frequency is limited by the user.
- **Disable Turbo GT frequency**
  Enabled: Disables Turbo GT frequency. Disabled: GT frequency is not limited.

3.2.2.3 PCH-FW Configuration





ME State

When Disabled ME will be put into ME Temporarily Disabled Mode.

- **Manageability Features State**

  Enable/Disable Intel® Manageability features.

- **AMT BIOS Features**

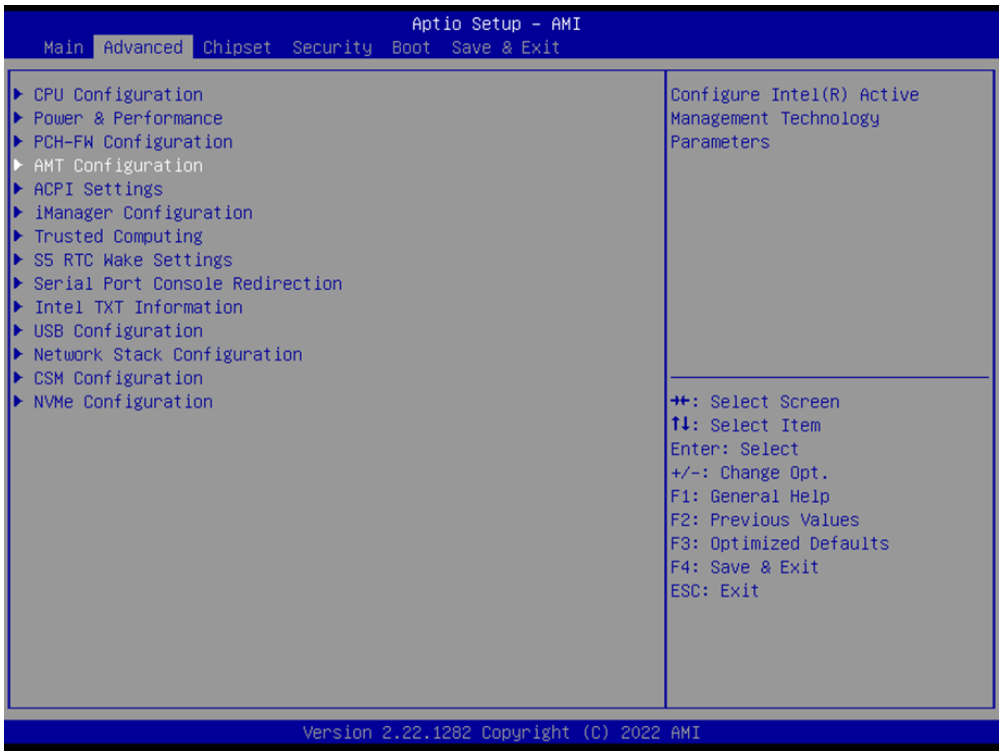
  When disabled, AMT BIOS features are no longer supported and the user is no longer able to access MEBx Setup.

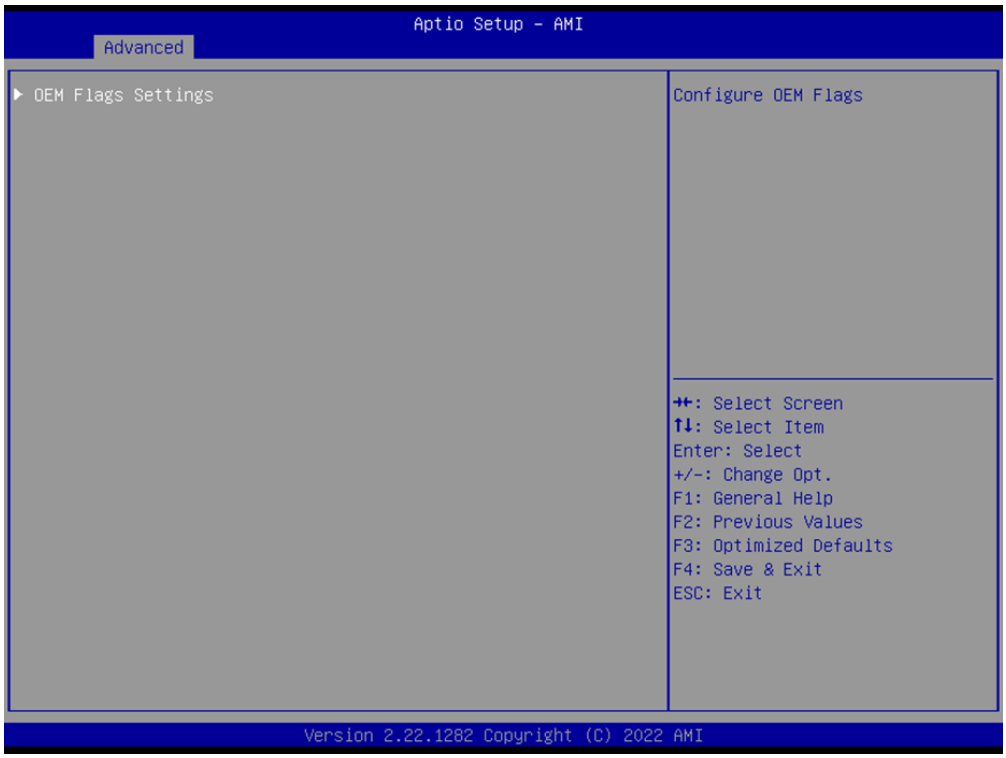
- **ME Unconfig on RTC Clear**
  When Disabled, ME will not be unconfigured on RTC Clear.

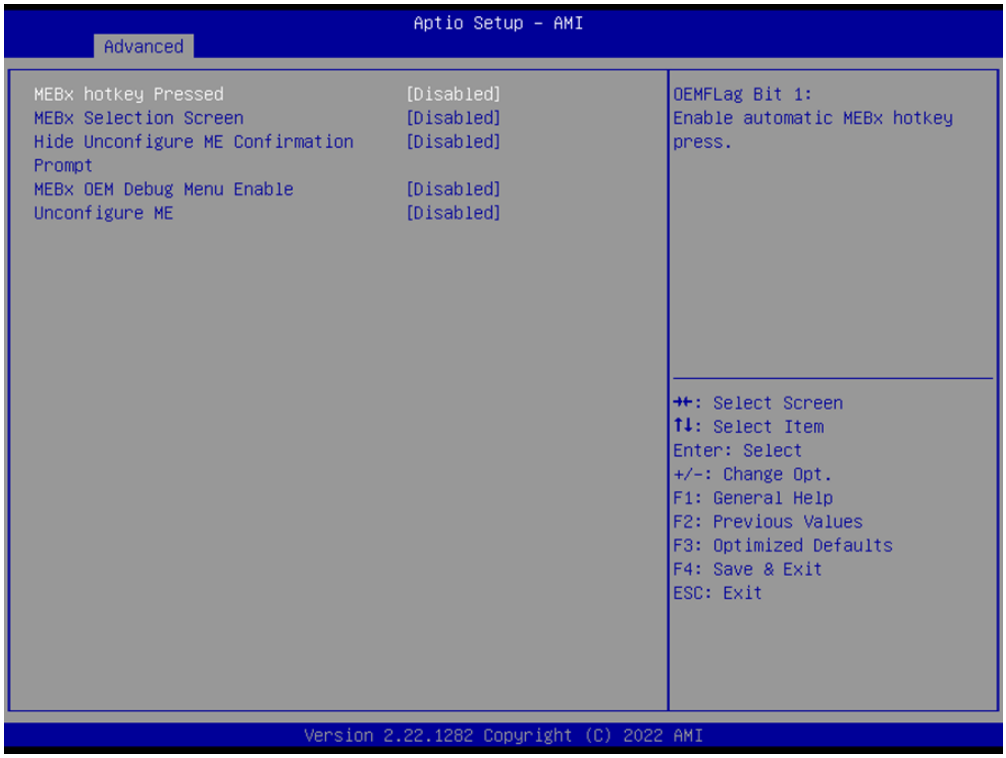
Firmware Update Configuration

- **ME FW Image Re-Flash**
  Enable/Disable the ME FW Image Re-Flash function.
- **FW Update**
  Enable/Disable ME FW Update function.

3.2.2.4 AMT Configuration







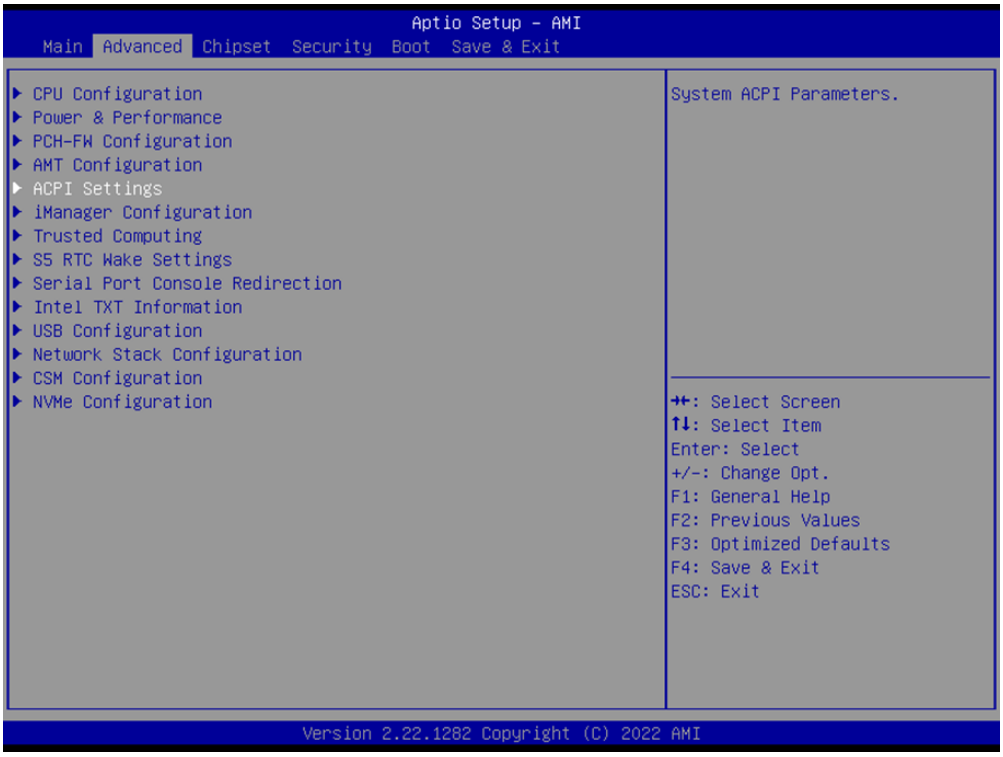
OEM Flags Settings

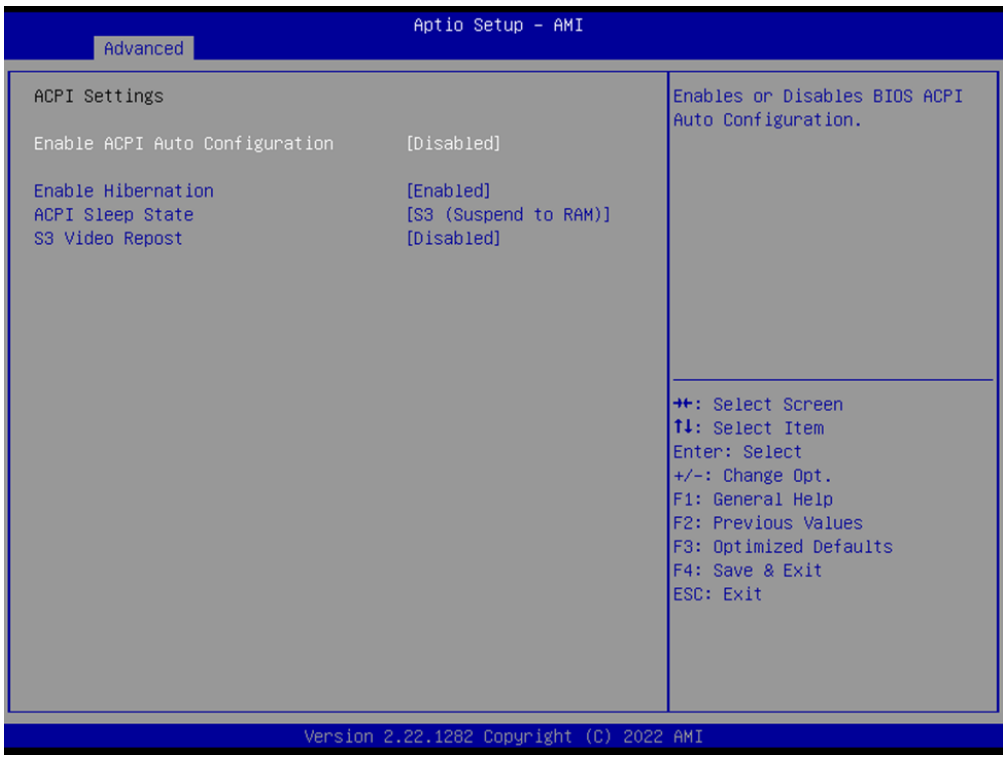
- **MEBx hotkey Pressed**
  Enable automatic MEBx hotkey press.
- **MEBx Selection Screen**
  Enable MEBx selection screen with 2 options: Press 1 to enter ME Configuration Screens. Press 2 to initiate a remote connection.
- **Hide Unconfigure ME Confirmation Prompt**

Hide the Unconfigure ME confirmation prompt when attempting ME unconfiguration.

- **MEBx OEM Debug Menu Enable**
  Enable OEM debug menu in MEBx.
- **Unconfigure ME**
  Unconfigure ME and reset the MEBx password to the default.

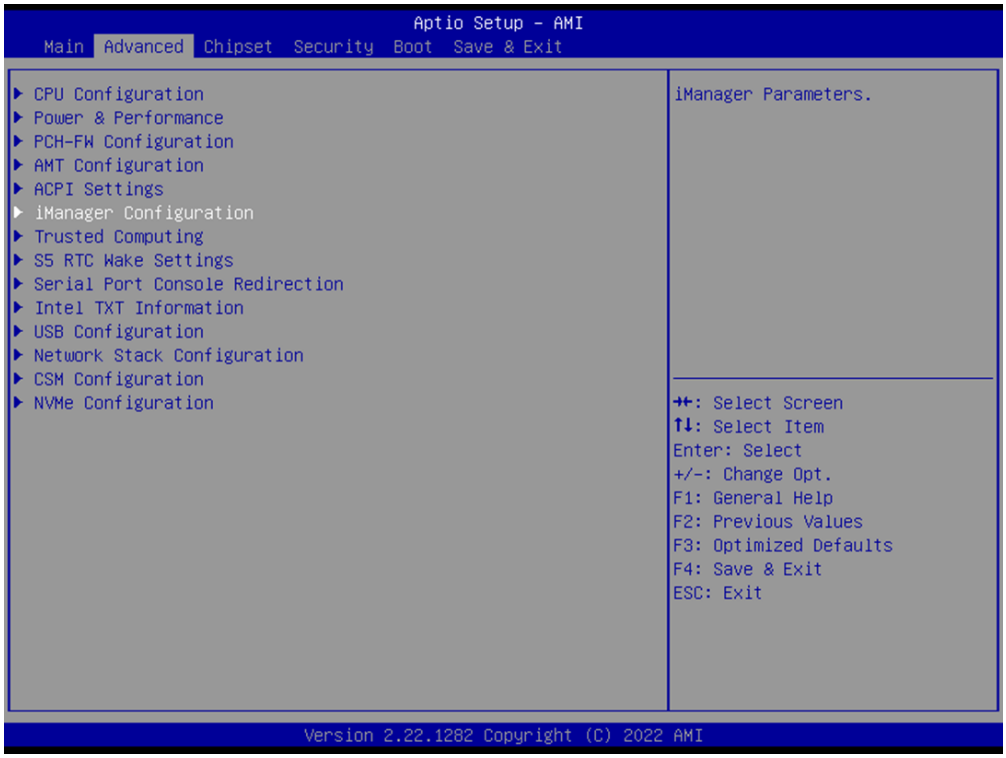
3.2.2.5 ACPI Settings

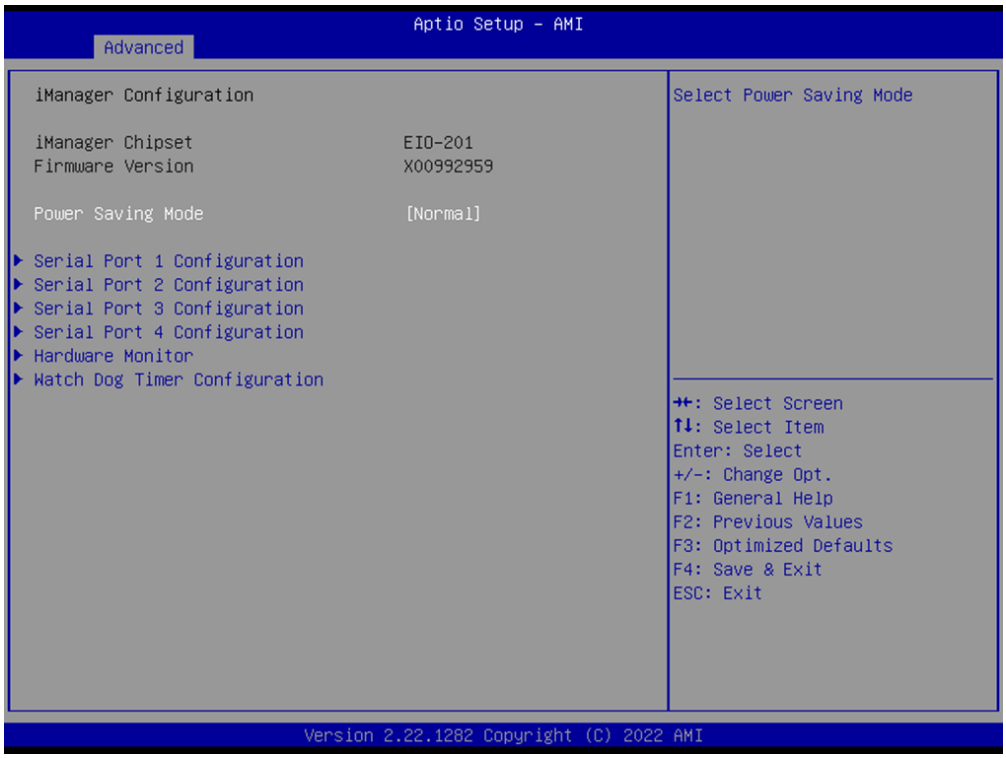




- **Enable ACPI Auto Configuration**
  Enable or Disable BIOS ACPI Auto Configuration.
- **Enable Hibernation**
  Enable or Disable System ability to Hibernate (OS/S4 Sleep State). This option may not be effective with some operating systems.
- **ACPI Sleep State**
  Select the highest ACPI sleep state the system will enter when the SUSPEND button is pressed.
- **S3 Video Repost**
  Enable or Disable S3 Video Repost.

3.2.2.6 iManager Configuration

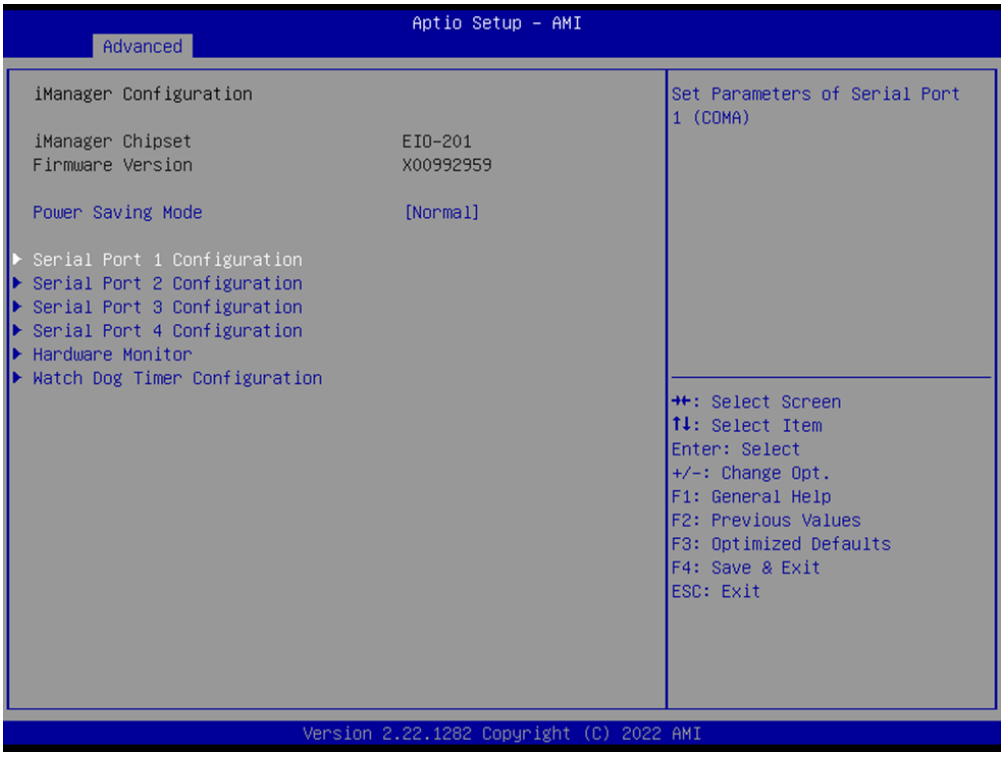


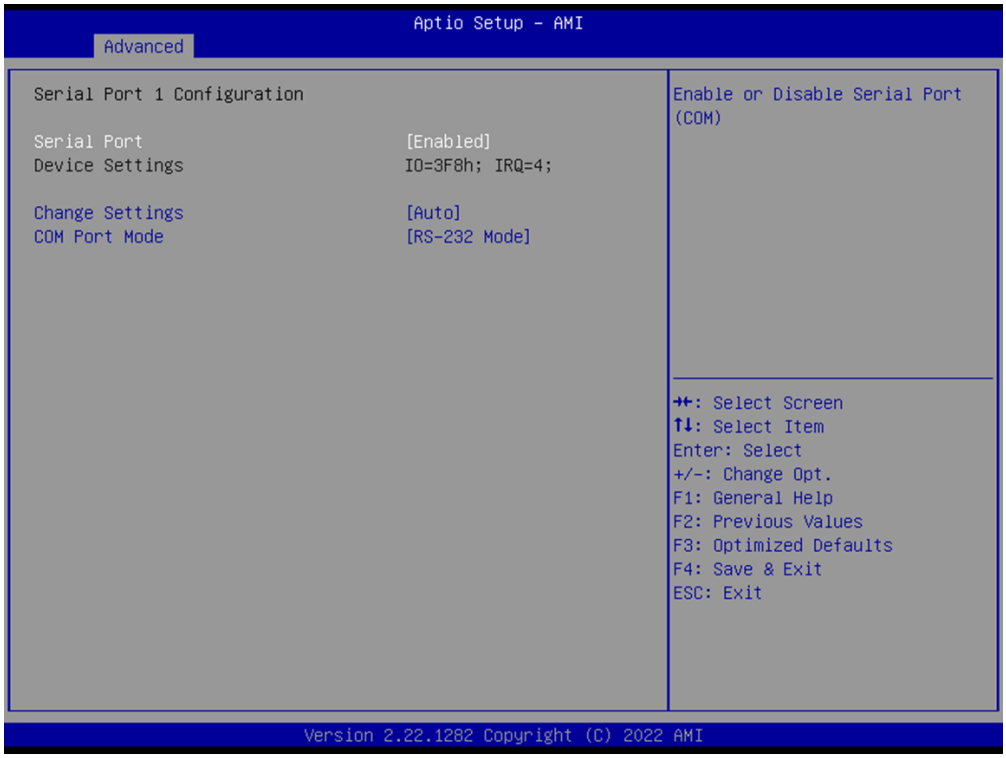


- **Power Saving Mode**

  Select Power Saving Mode: Normal or Deep Sleep.

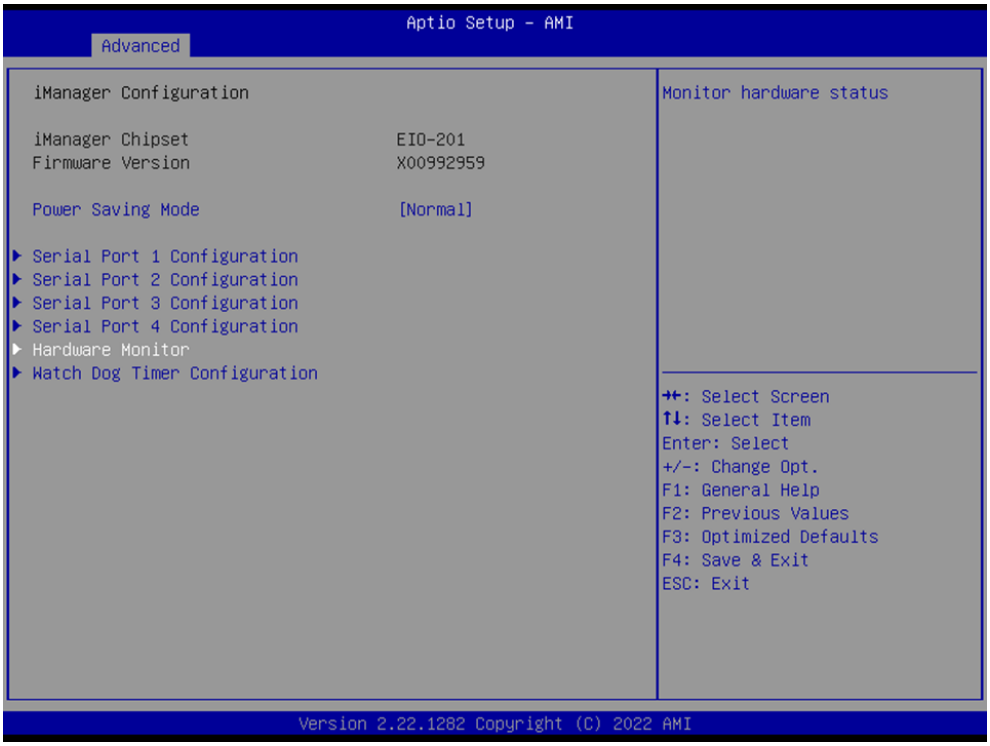
Note! *To be ERP ready, please select Deep Sleep and also configure the jumper accordingly (please check table 2.4). By reducing the power loss under S5 mode with the ERP1 jumper setting, it complies with the regulation for ErP.*

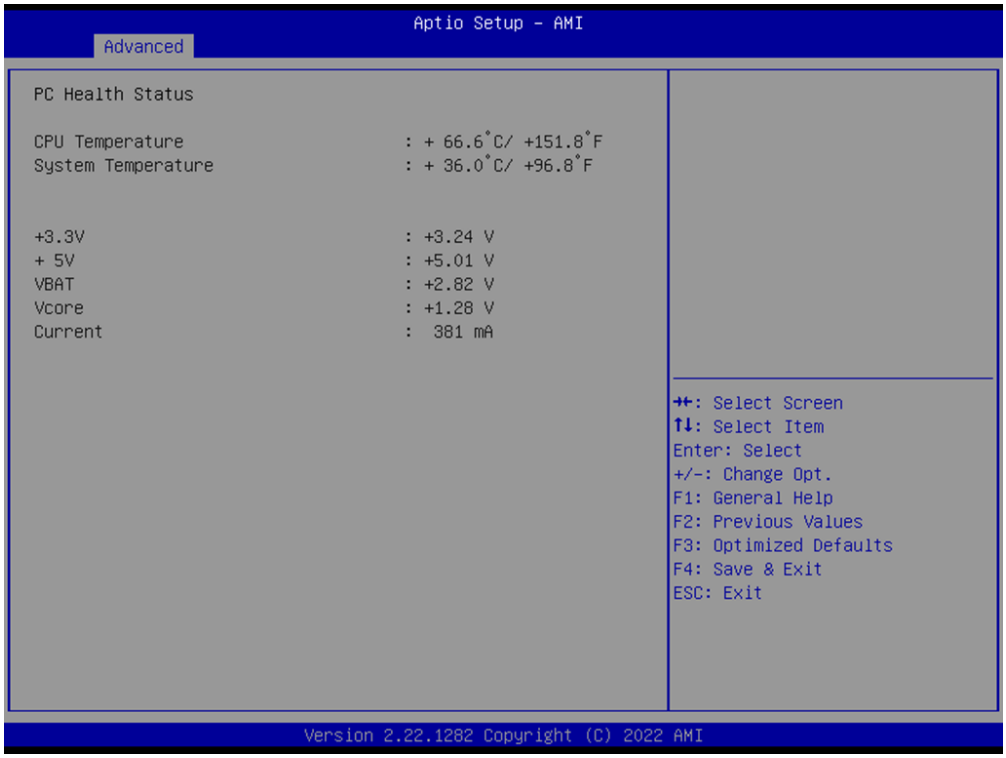




Serial Port 1 to 4 Configuration

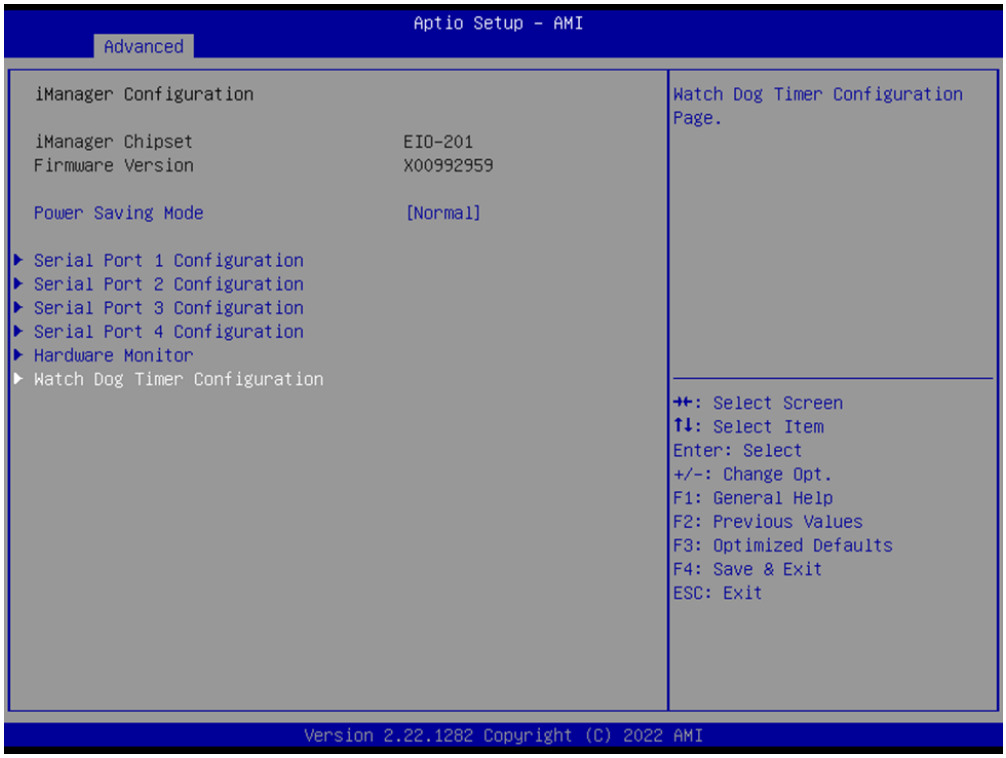
- **Serial Port**
  Enable or Disable serial port.
- **Change Settings**
  Select an optimal setting for Super IO devices.
- **COM Mode**
  COM mode select.

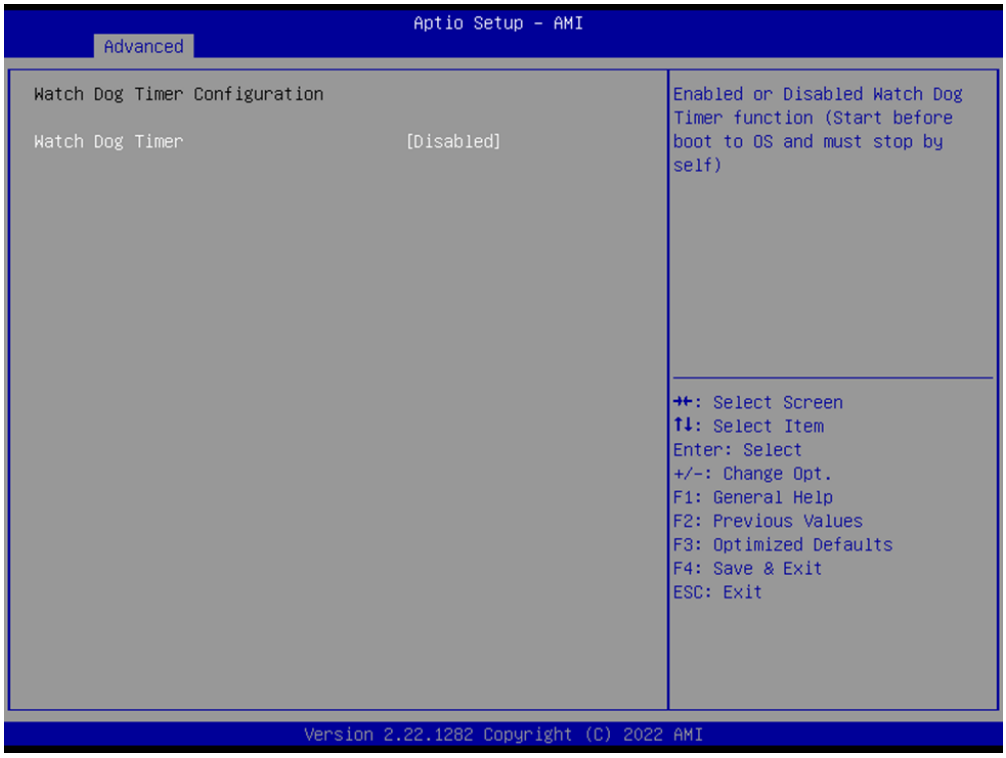




Hardware Monitor

Provides hardware monitor information.



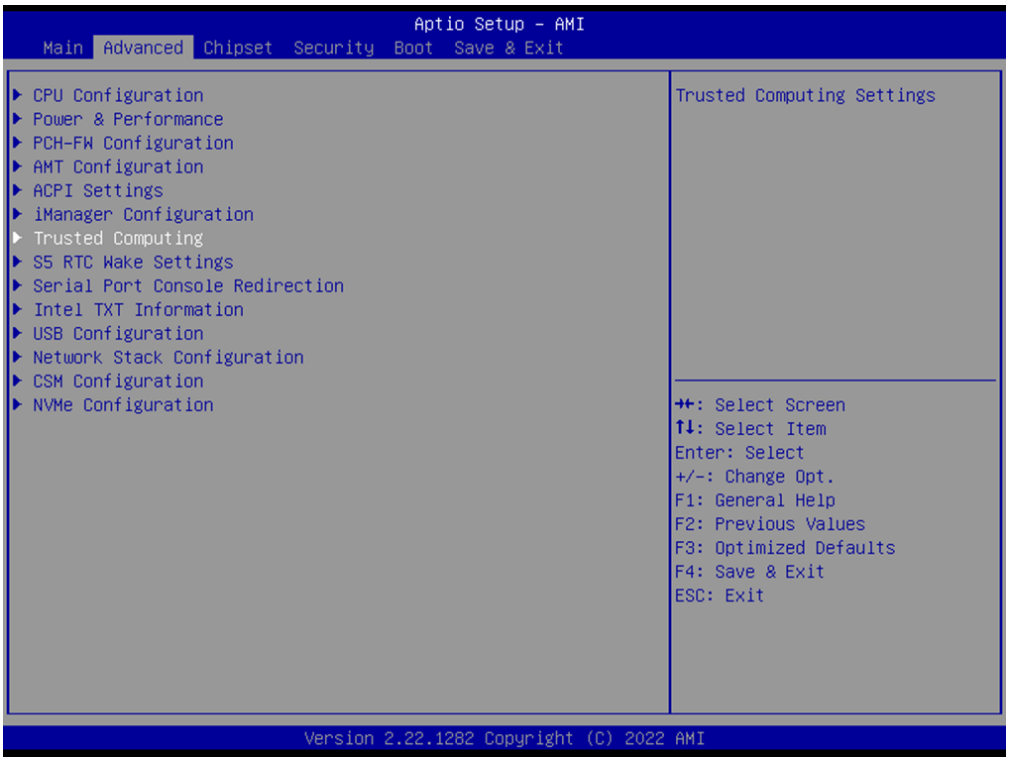


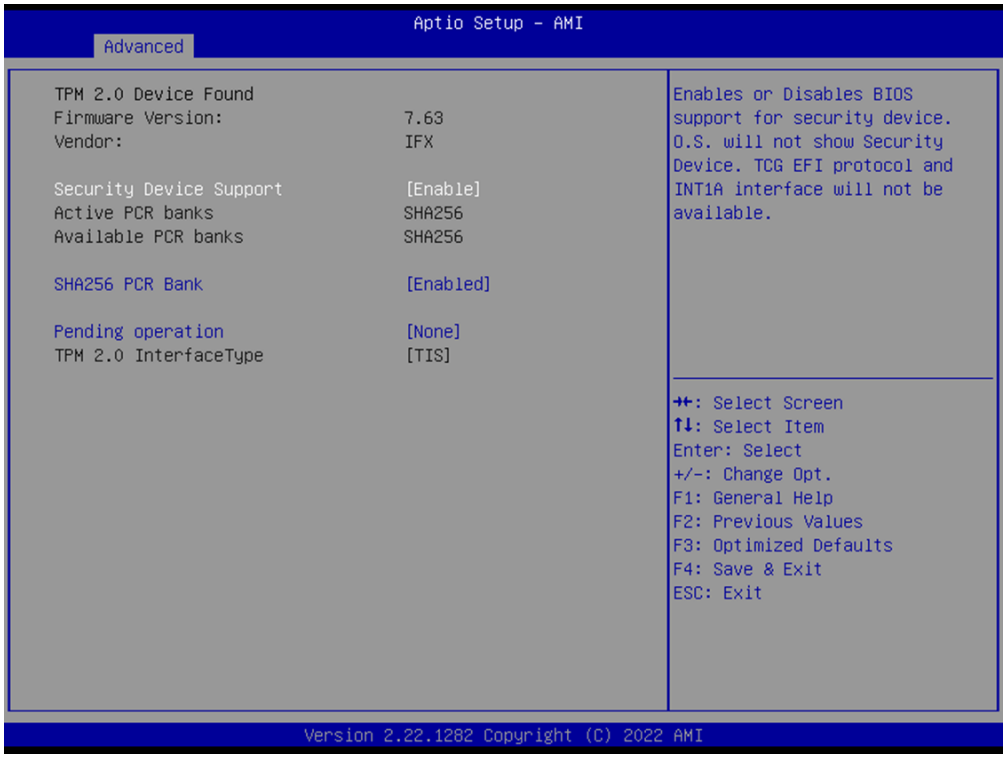
Watch Dog Timer Configuration

- **Watch Dog Timer**

  Enable or Disable the Watch Dog Timer function (Starts before boot to OS and must stop by itself).

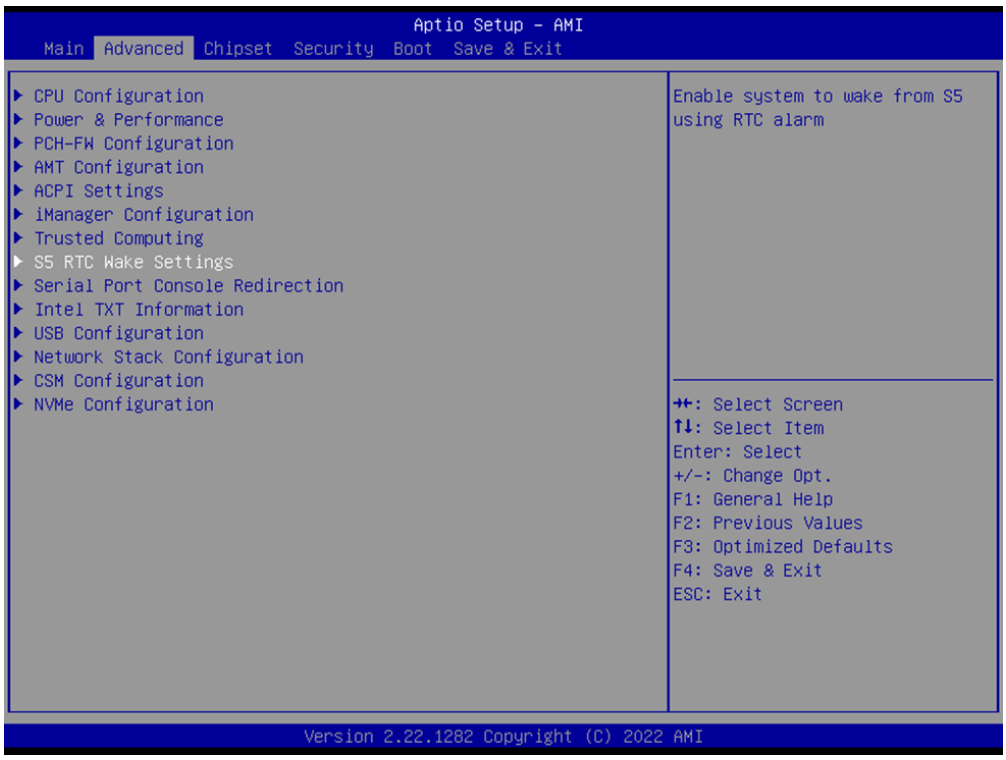
3.2.2.7 Trusted Computing

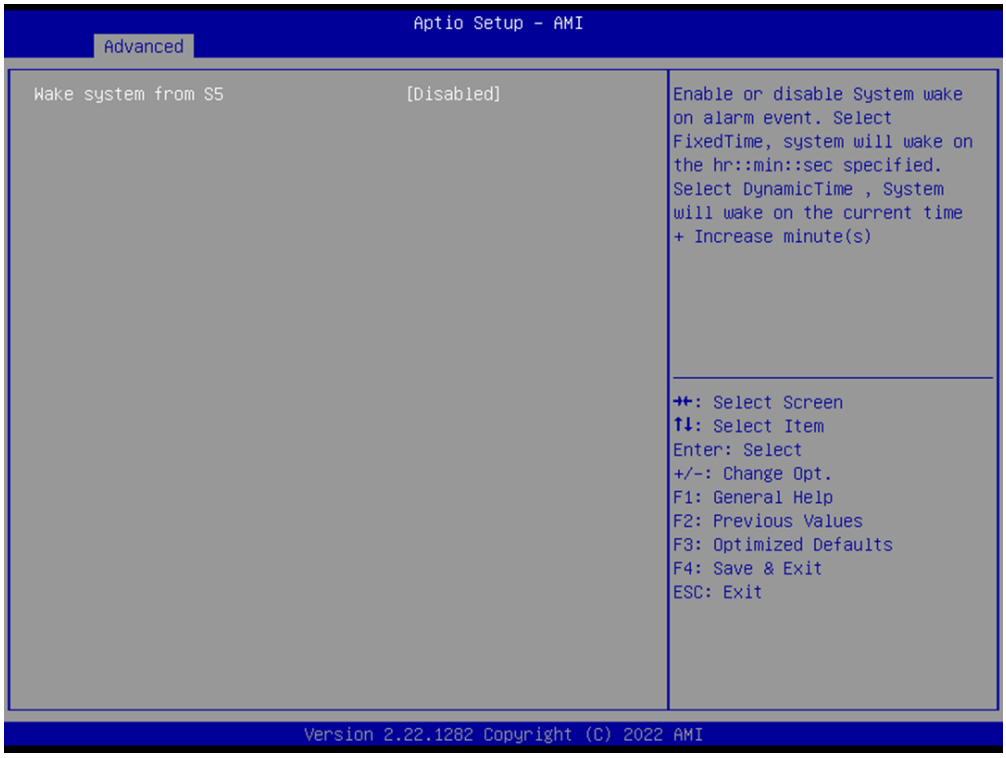




- **Security Device Support**
  Enable or Disable BIOS support for security devices.
- **SHA256 PCR Bank**
  Enable or Disable SHA256 PCR Bank.
- **Pending operation**
  Schedule an Operation for the security device.

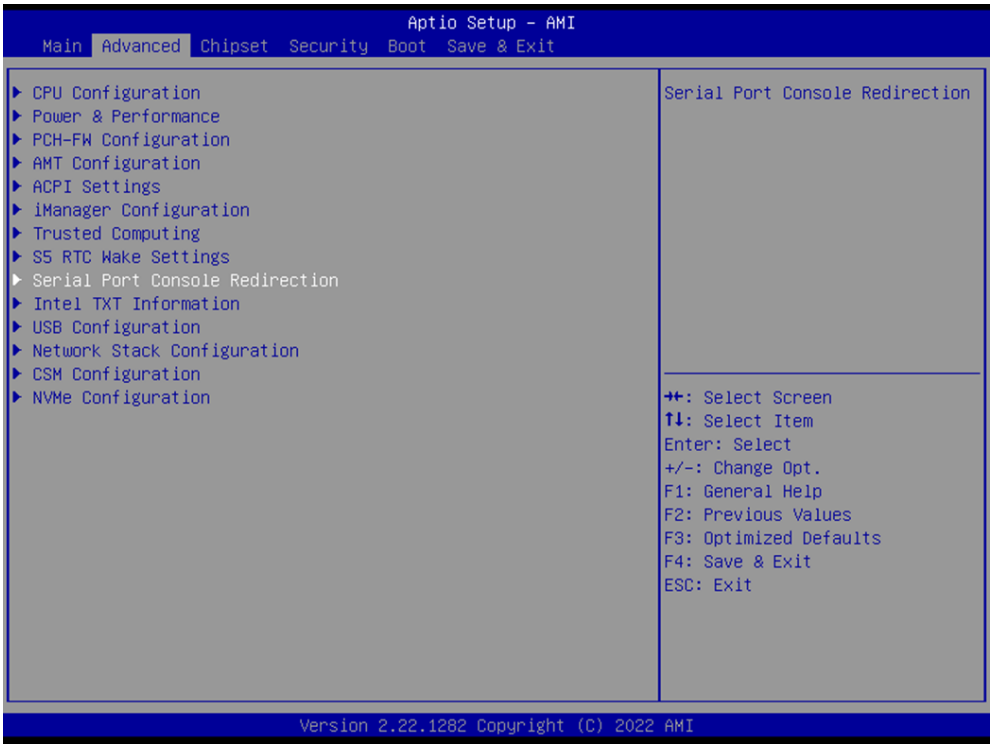
3.2.2.8 S5 RTC Wake Settings

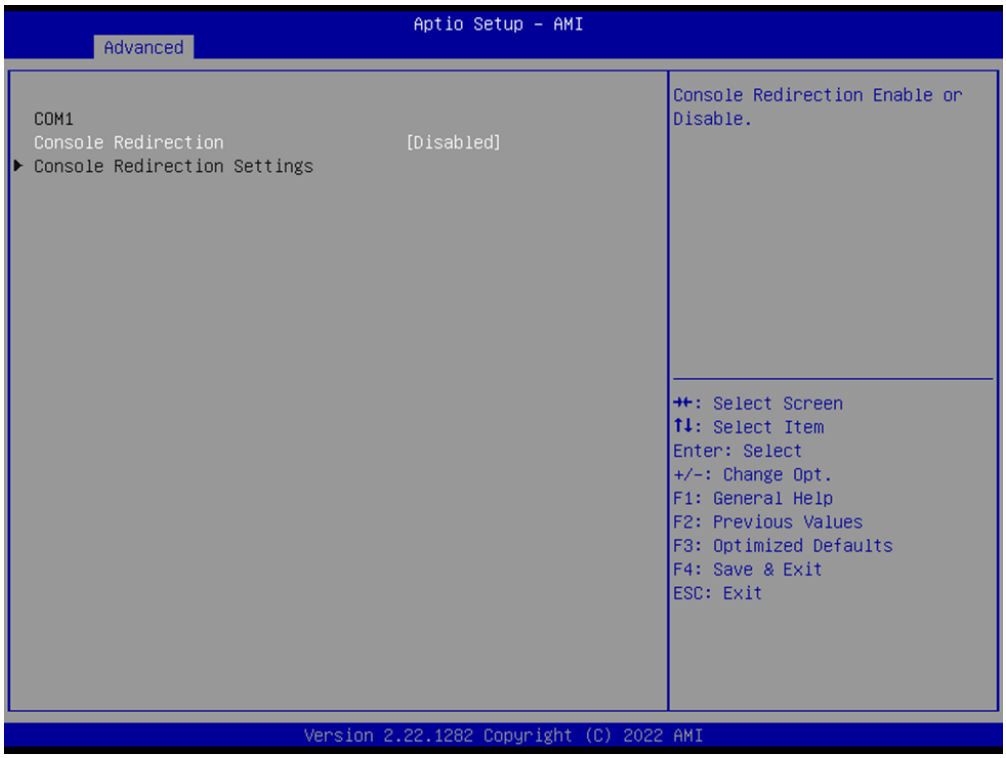




- **Wake System from S5**
  Enable or Disable System wake on alarm event. When enabled, the system will wake on the hr:min:sec specified.

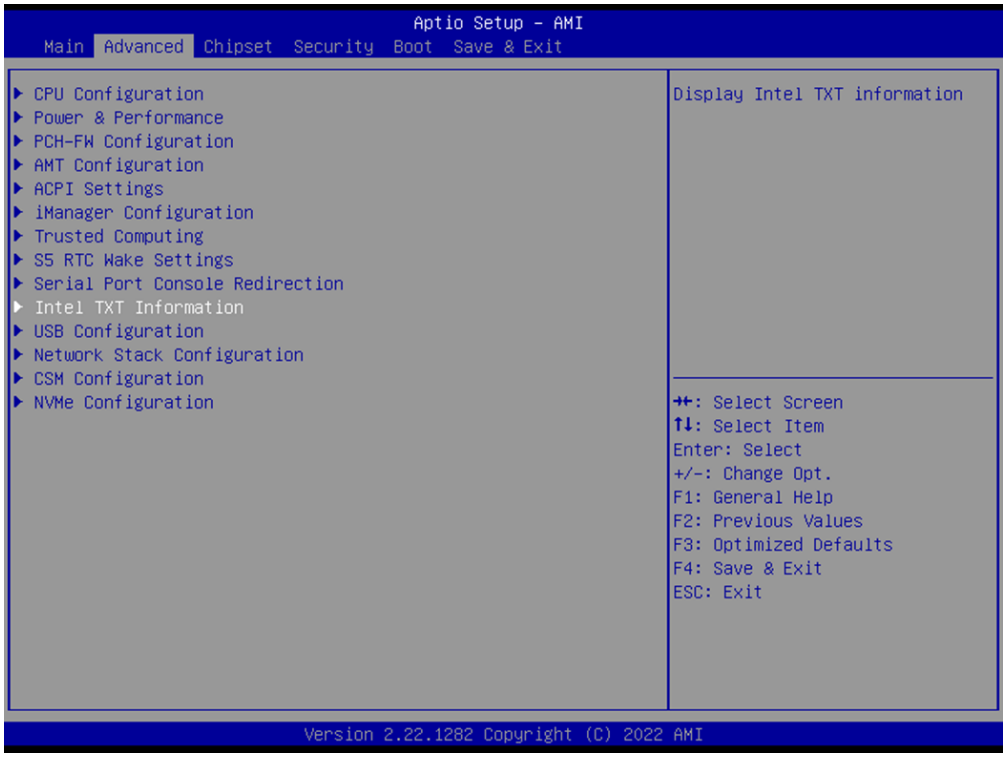
3.2.2.9 Serial Port Console Redirection





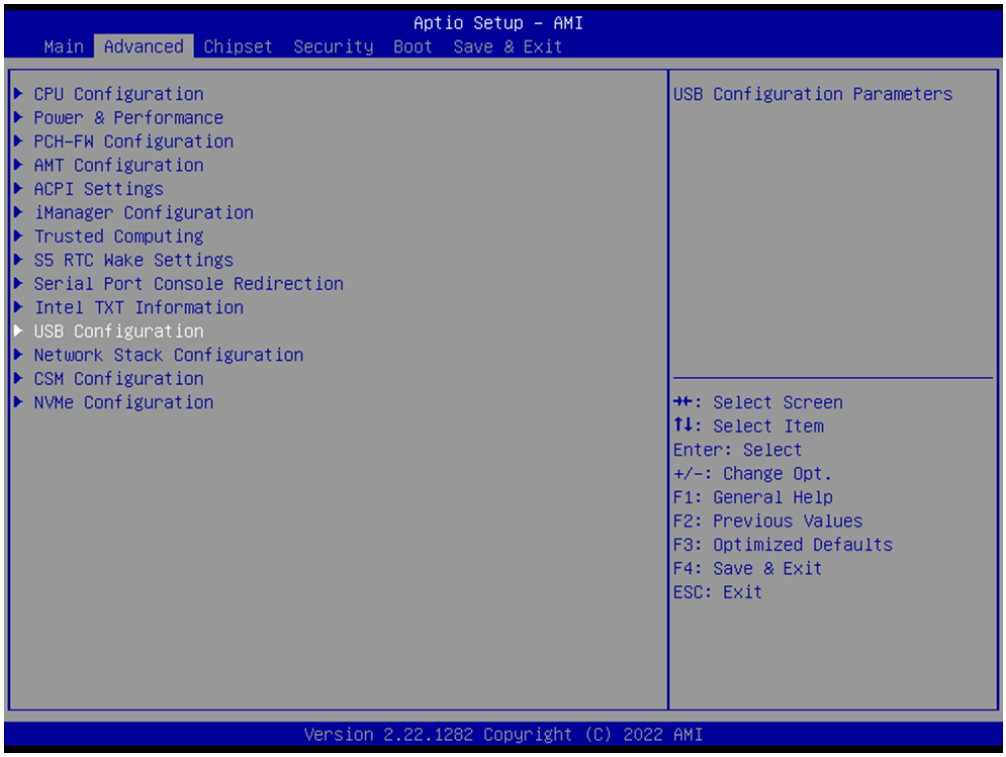
- **Console Redirection**
  Console Redirection Enable or Disable.

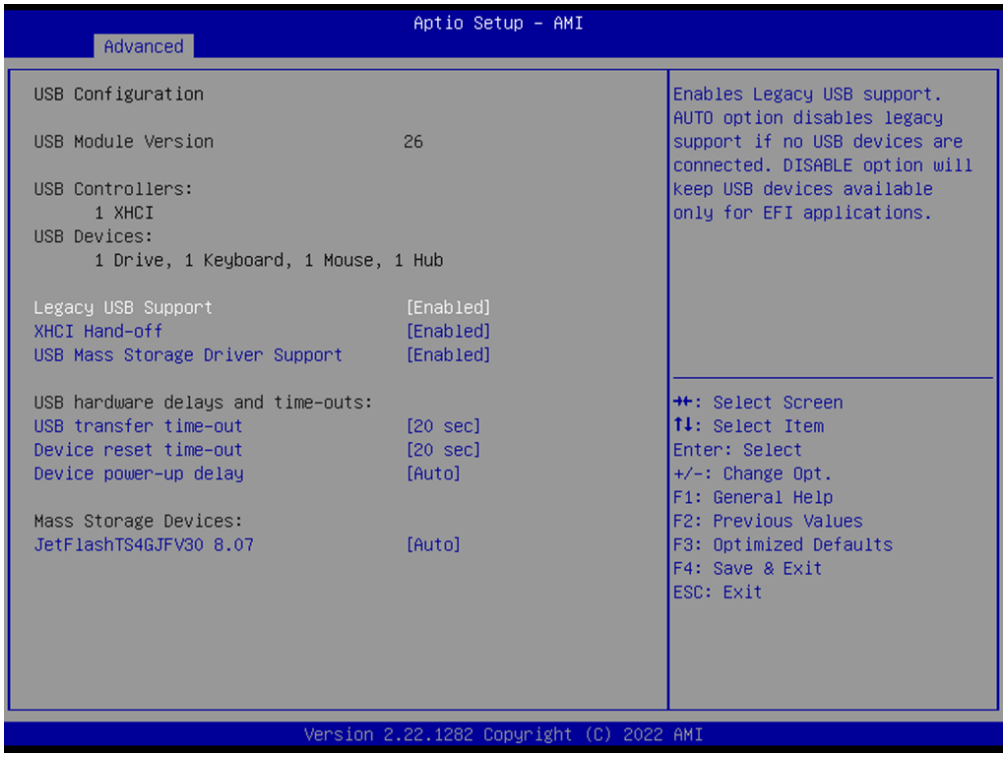
3.2.2.10 Intel® TXT Information



Provides Intel® TXT information.

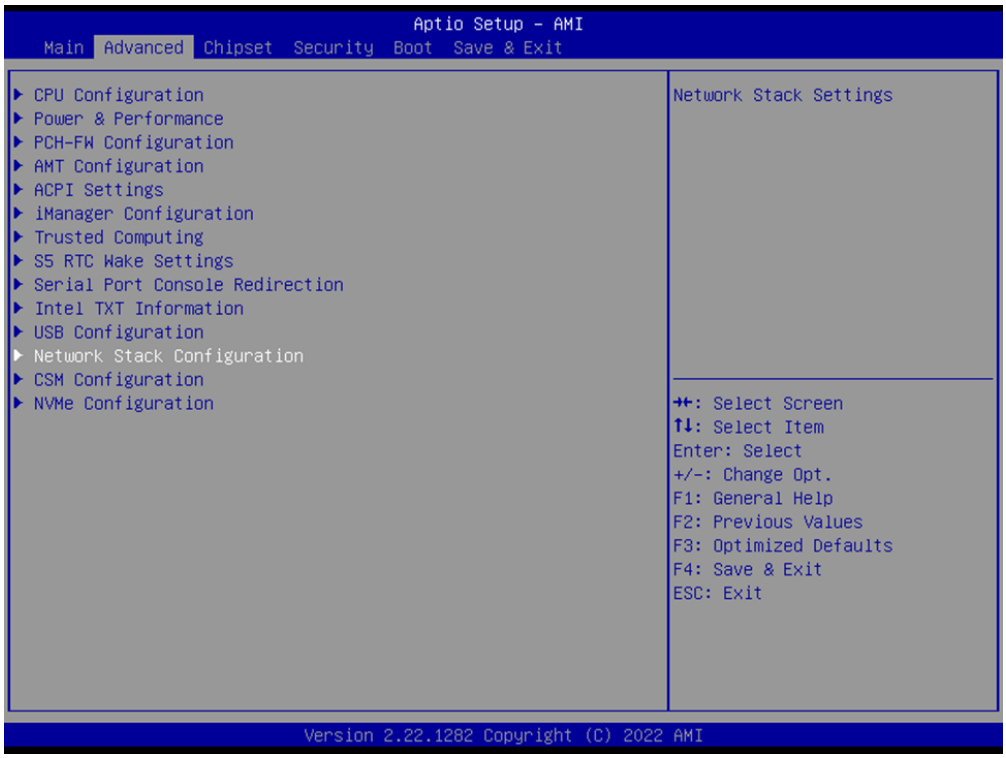
3.2.2.11 USB Configuration





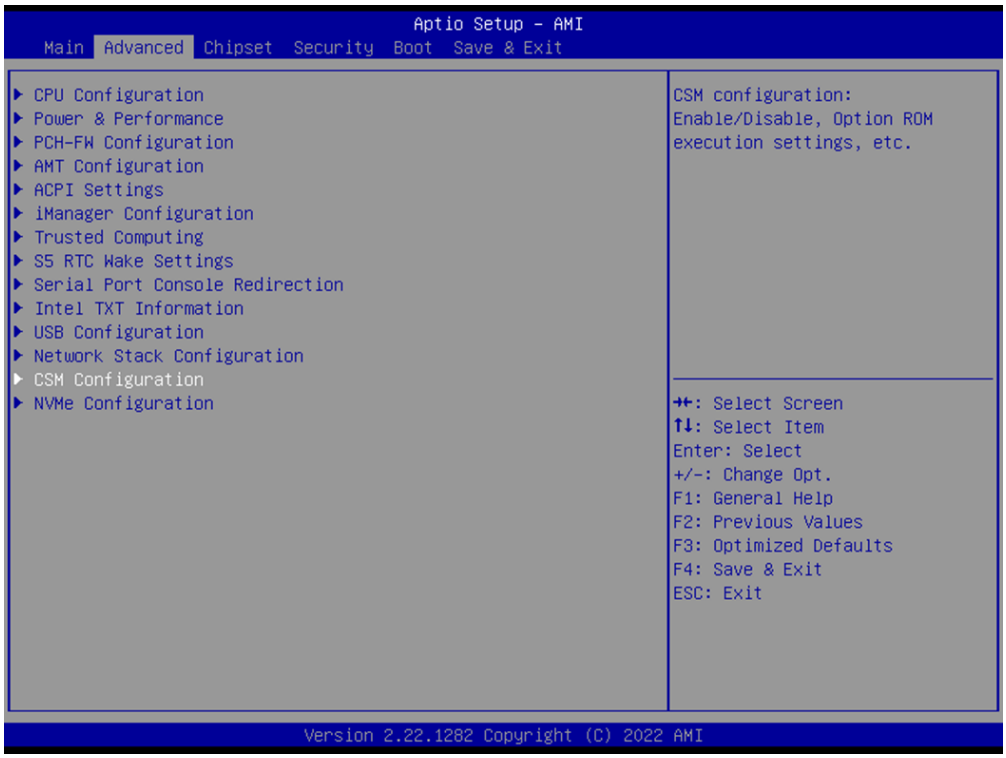
- **Legacy USB Support**
  Enable Legacy USB support.
- **XHCI Hand-Off**
  This is a workaround for OS without XHCI hand-off support.
- **USB Mass Storage Driver Support**
  Enable/Disable USB Mass Storage driver support.
- **USB transfer time-out**
  The time-out value for Control, Bulk, and Interrupt transfers.
- **Device Reset time-out**
  USB mass storage device Start Unit command time-out.
- **Device power-up delay**
  Maximum time the device will take before it properly reports itself to the Host Controller.

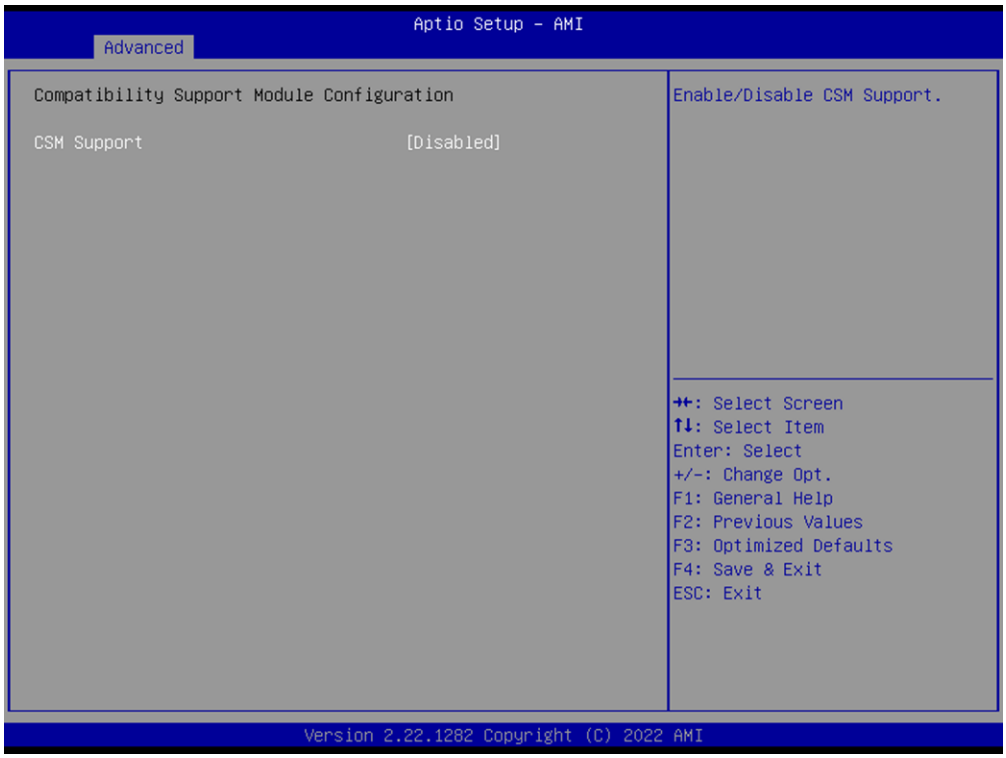
3.2.2.12 Network Stack Configuration



- **Network Stack**
  Enable/Disable the UEFI network stack.

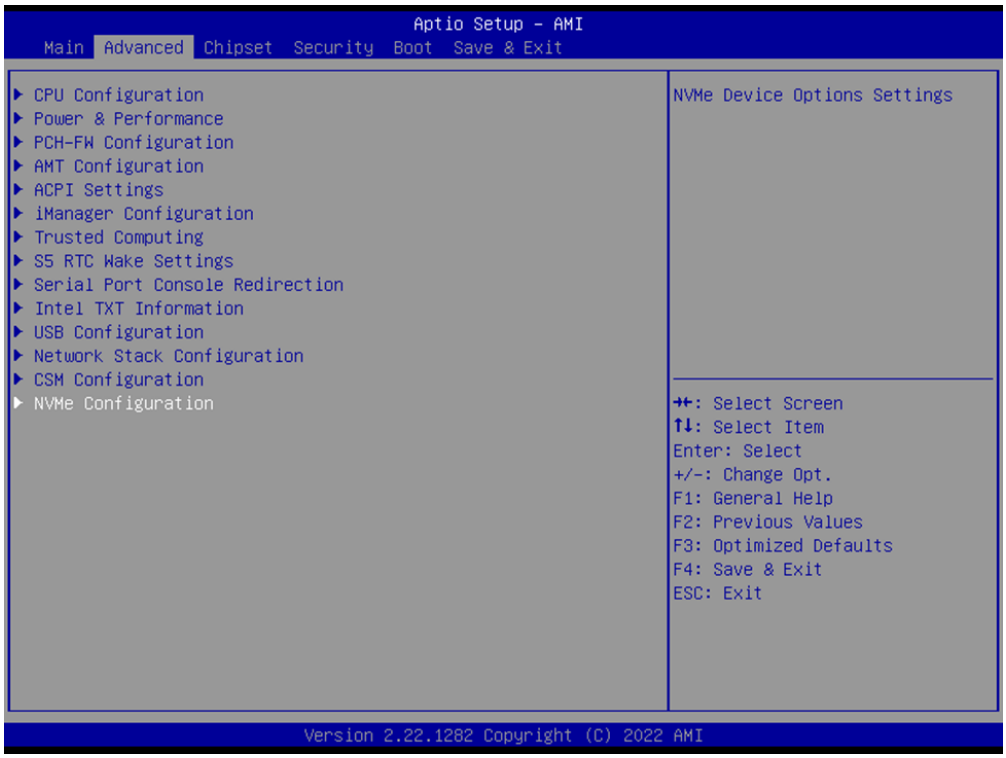
3.2.2.13 CSM Configuration

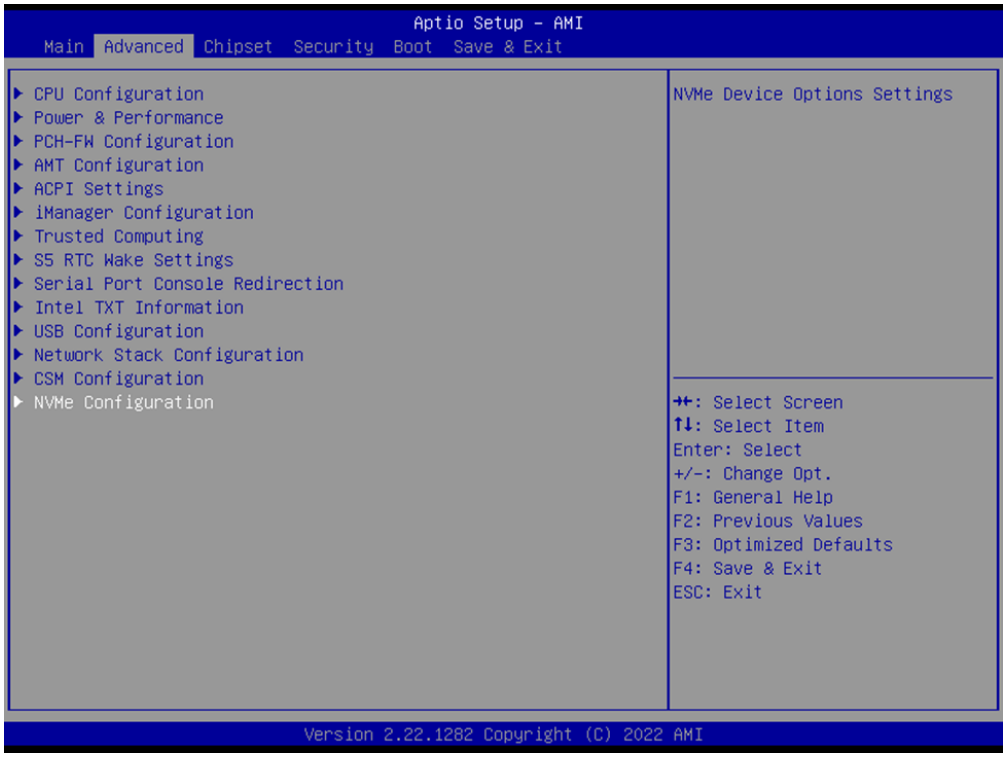




- **CSM Support**
  Enable/Disable CSM support.

3.2.2.14 NVMe Configuration

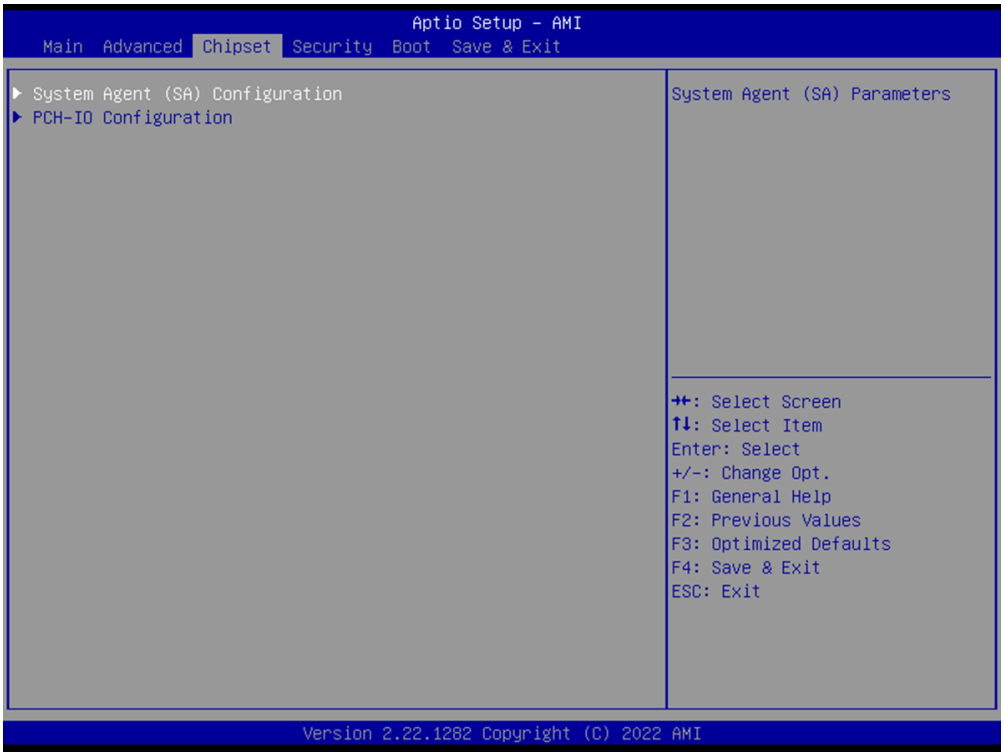


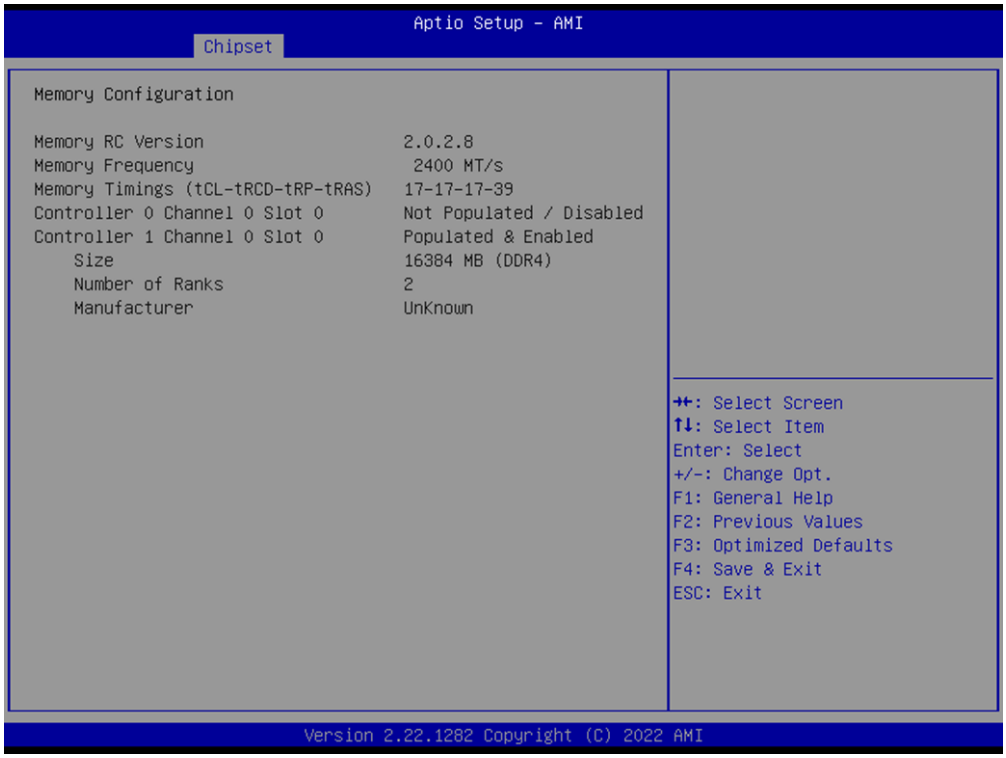


Provide NVMe device information.

3.2.3 Chipset

3.2.3.1 System Agent (SA) Configuration





Memory Configuration

Display memory information.

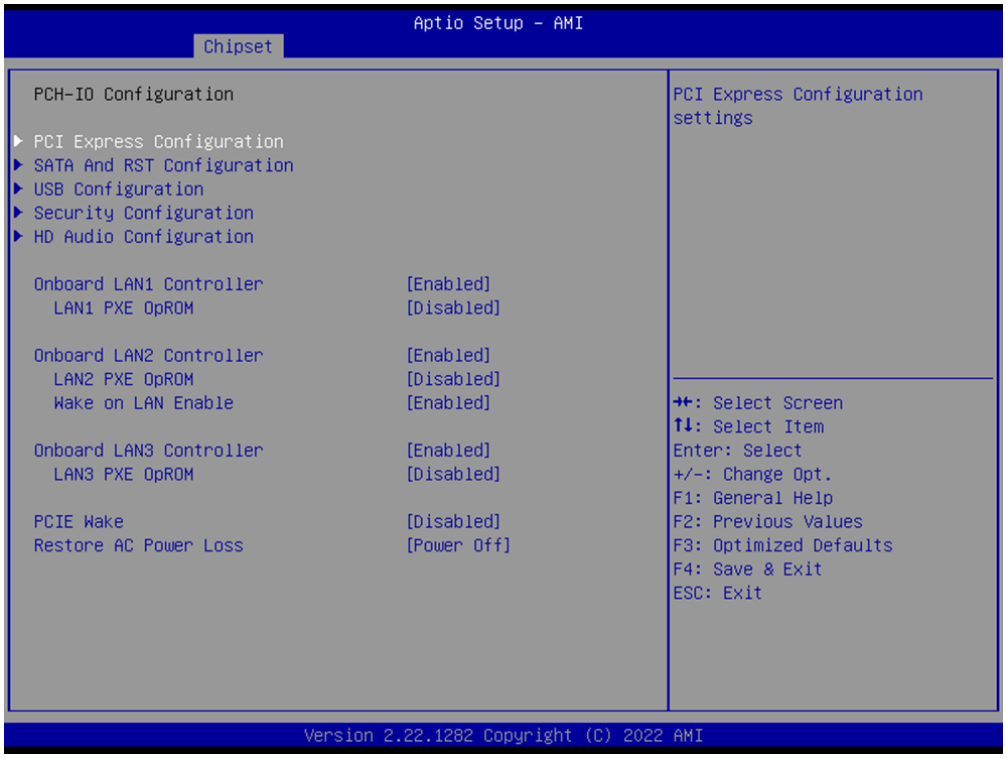
- **VT-d**

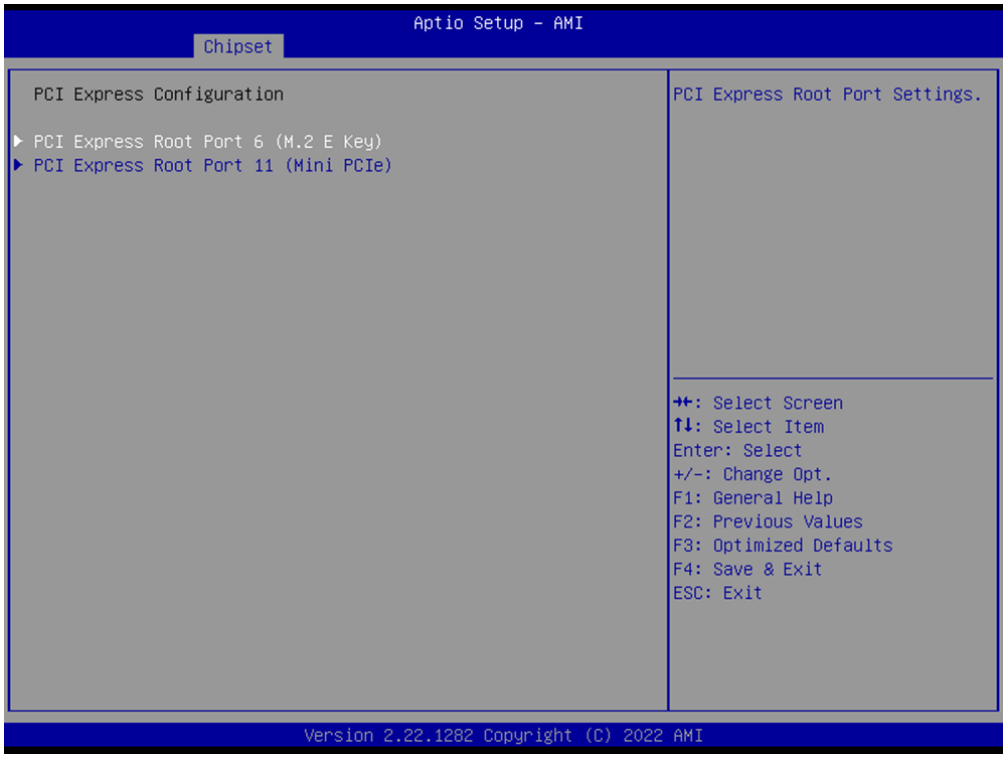
  Enable/Disable VT-d capability.

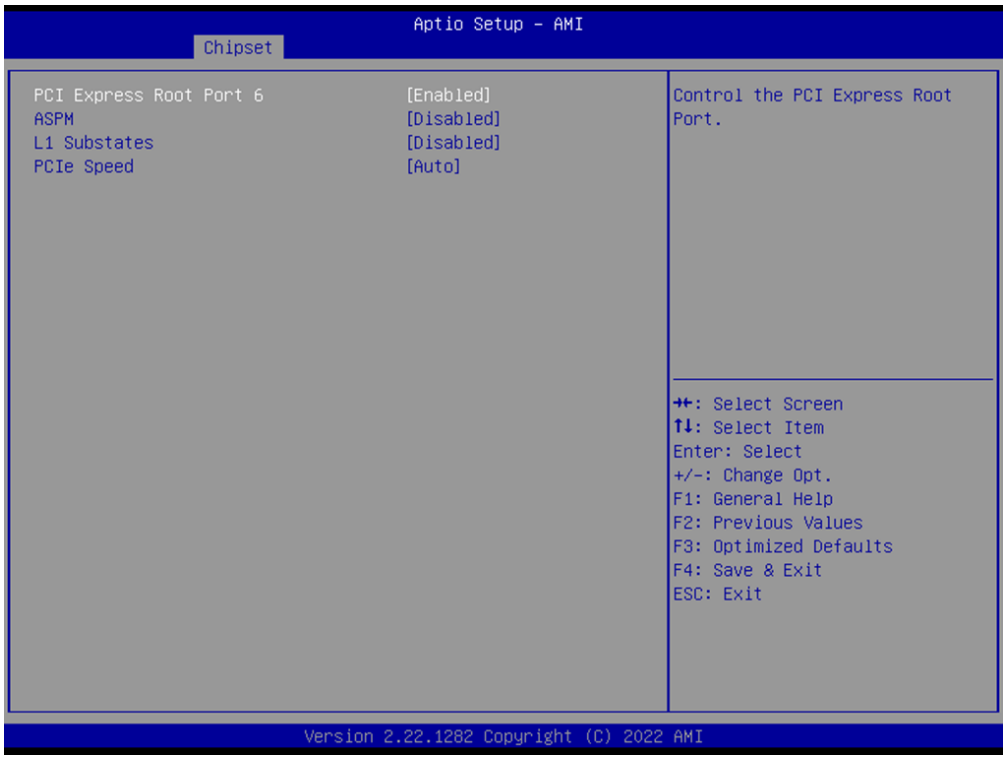
- **Above 4GB MMIO BIOS assignment**

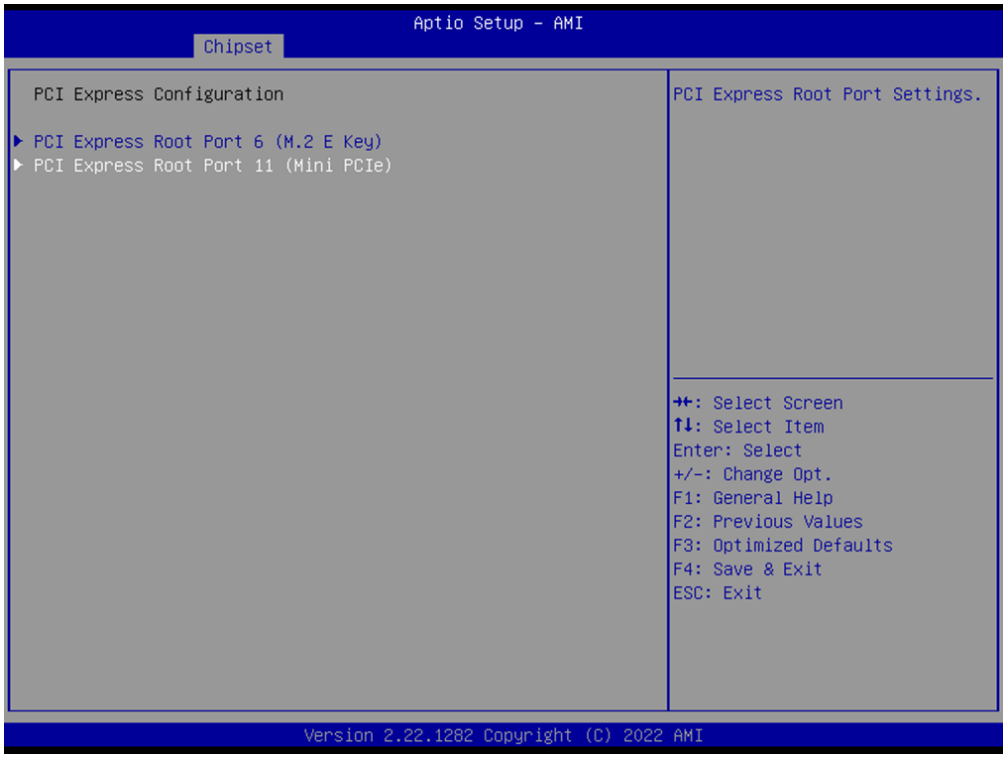
  Enable/Disable above 4GB MemoryMapped IO BIOS assignment. This is enabled automatically when Aperture Size is set to 2048MB.

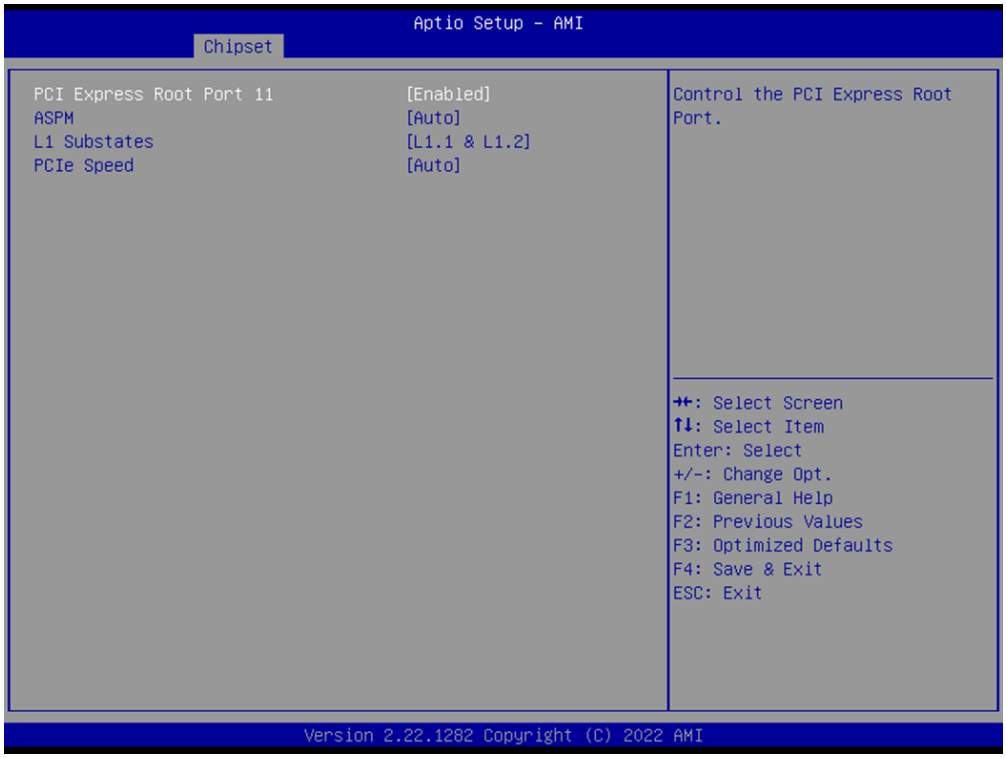
3.2.3.2 PCH-IO Configuration




Aptio Setup – AMI
Chipset
PCI Express Configuration
PCI Express Root Port 6 (M.2 E Key)
PCI Express Root Port 11 (Mini PCIe)
PCI Express Root Port Settings.
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1282 Copyright (C) 2022 AMI


Aptio Setup – AMI
Chipset
PCI Express Root Port 6 [Enabled]
ASPM [Disabled]
L1 Substates [Disabled]
PCIe Speed [Auto]
Control the PCI Express Root Port.
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1282 Copyright (C) 2022 AMI





PCI Express Configuration

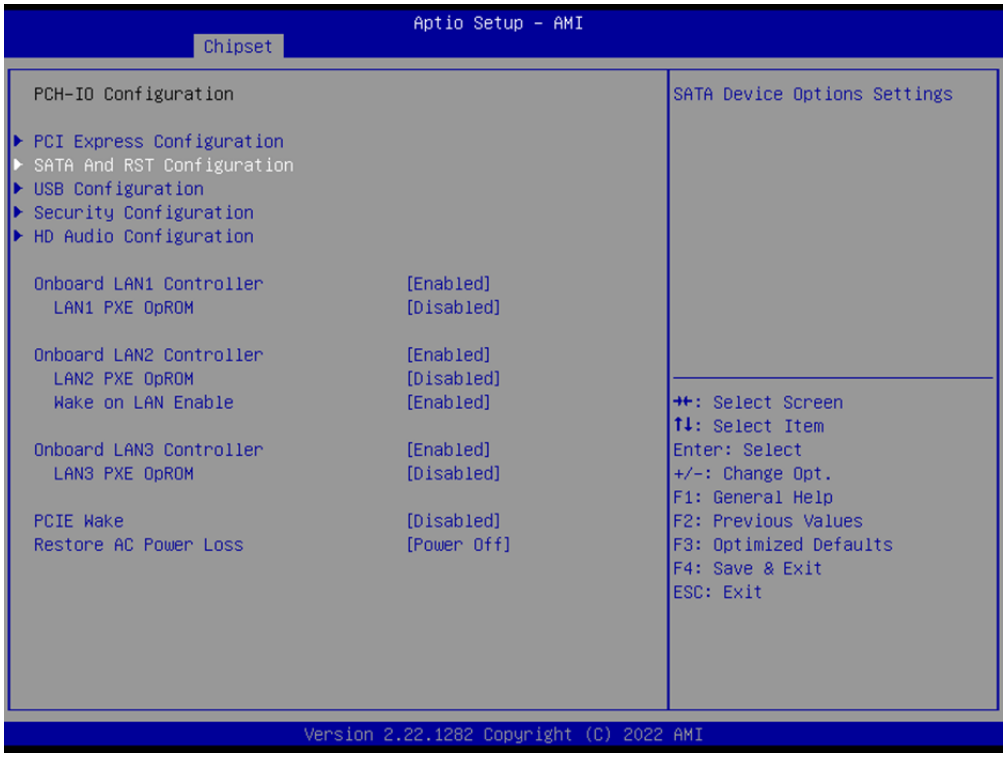
PCI Express Root Port 6 (M.2 E-Key)

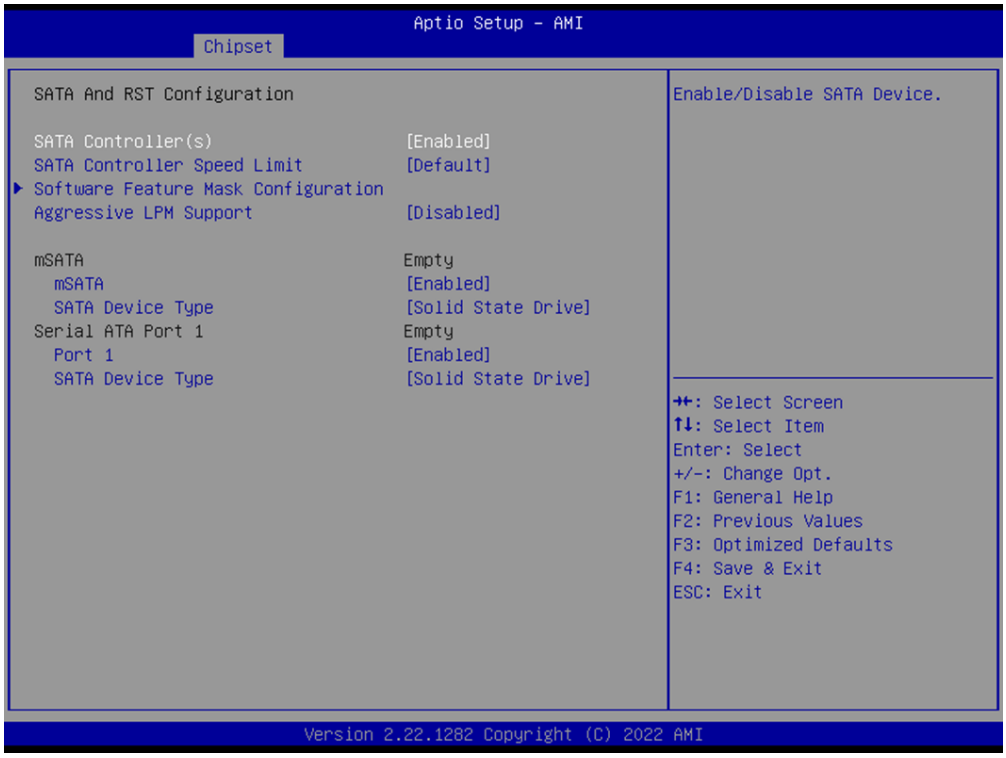
- **PCI Express Root Port 6**
  Control the PCI Express Root Port.
- **ASPM**
  Sets the ASPM Level.
- **L1 Substates**
  PCI Express L1 Substates settings.

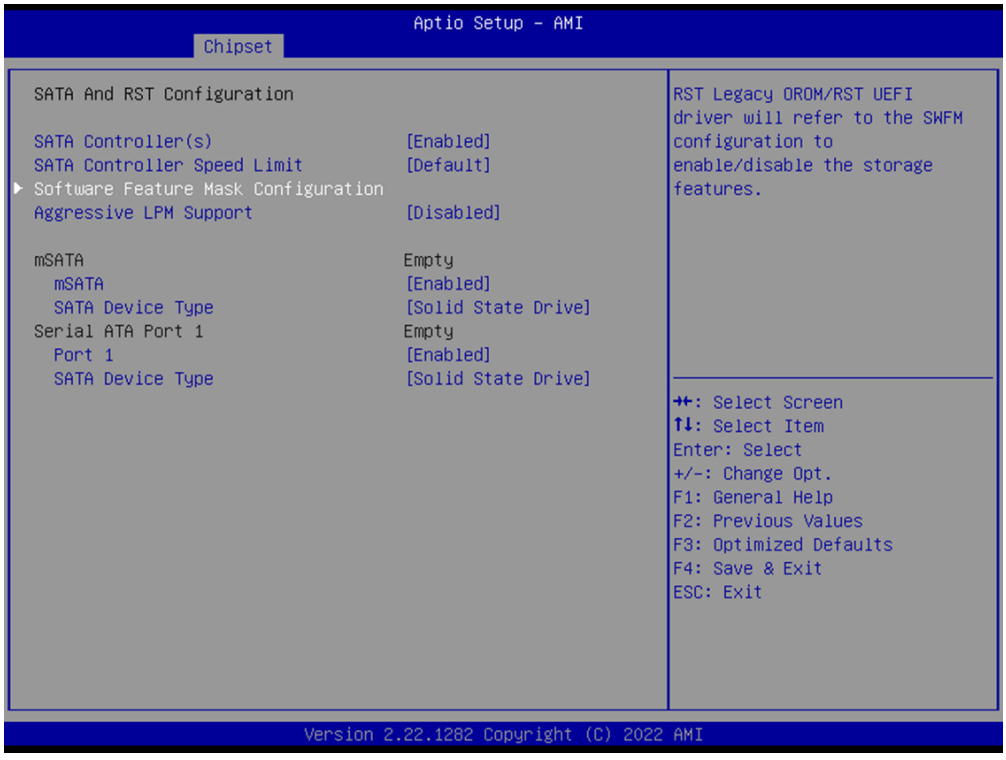
- **PCIe Speed**
  Configure PCIe Speed.

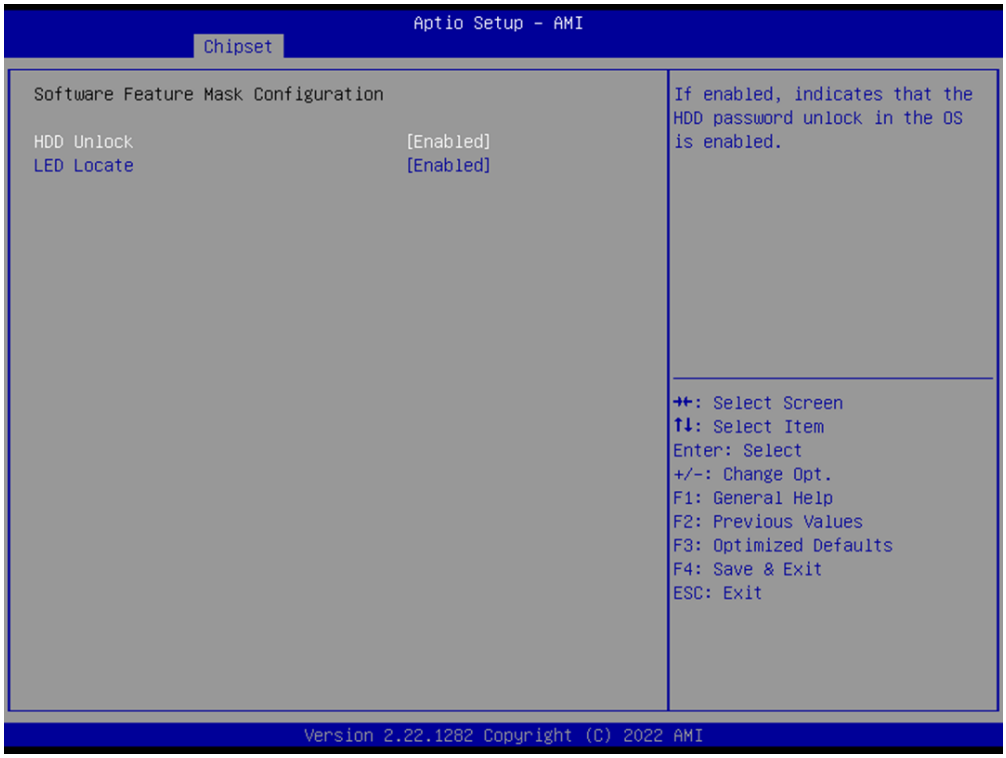
PCI Express Root Port 11 (Mini PCIe)

- **PCI Express Root Port 11**
  Control the PCI Express Root Port.
- **ASPM**
  Set the ASPM Level.
- **L1 Substates**
  PCI Express L1 Substates settings.
- **PCIe Speed**
  Configure PCIe Speed.




Aptio Setup – AMI
Chipset
SATA And RST Configuration
SATA Controller(s) [Enabled]
SATA Controller Speed Limit [Default]
Software Feature Mask Configuration
Aggressive LPM Support [Disabled]
mSATA Empty
mSATA [Enabled]
SATA Device Type [Solid State Drive]
Serial ATA Port 1 Empty
Port 1 [Enabled]
SATA Device Type [Solid State Drive]
Enable/Disable SATA Device.
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1282 Copyright (C) 2022 AMI


Aptio Setup – AMI
Chipset
SATA And RST Configuration
SATA Controller(s) [Enabled]
SATA Controller Speed Limit [Default]
Software Feature Mask Configuration
Aggressive LPM Support [Disabled]
mSATA Empty
mSATA [Enabled]
SATA Device Type [Solid State Drive]
Serial ATA Port 1 Empty
Port 1 [Enabled]
SATA Device Type [Solid State Drive]
RST Legacy OROM/RST UEFI driver will refer to the SWFM configuration to enable/disable the storage features.
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1282 Copyright (C) 2022 AMI



SATA And RST Configuration

- **SATA Controller(s)**
  Enable/Disable SATA Device.
- **SATA Controller Speed Limit**
  Indicates the maximum speed the SATA controller can support.

Software Feature Mask Configuration

- HDD Unlock
  If enabled, indicates that the HDD password unlock in the OS is enabled.
- LED Locate
  If enabled, indicates that the LED/SGPIO hardware is attached and the ping-to-locate feature is enabled on the OS.

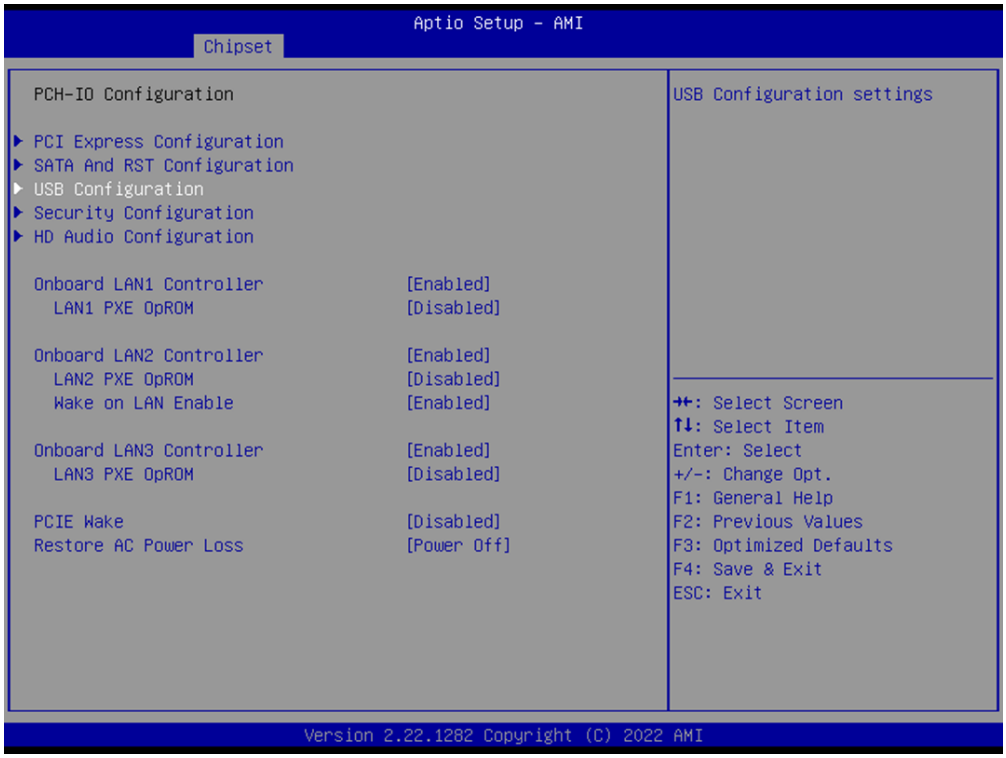
- **Aggressive LPM Support**
  Enable PCH to aggressively enter link power state.

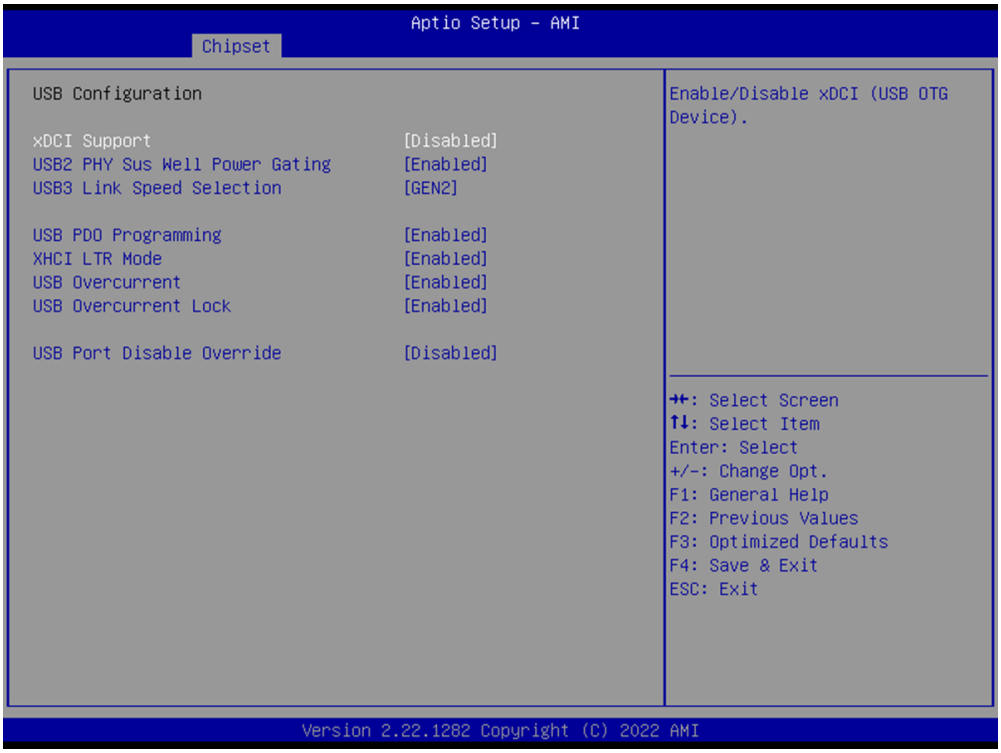
mSATA

- **mSATA:**
  Enable or Disable mSATA.
- **SATA Device Type**
  Identify if the mSATA port is connected to a Solid State Drive or Hard Disk Drive.
- **SATA Device Type**
  Identify if the SATA port is connected to a Solid State Drive or Hard Disk Drive.

Serial ATA Port 1

- **Port 1**
  Enable or Disable SATA port.
- **SATA Device Type**
  Identify if the SATA port is connected to a Solid State Drive or Hard Disk Drive.

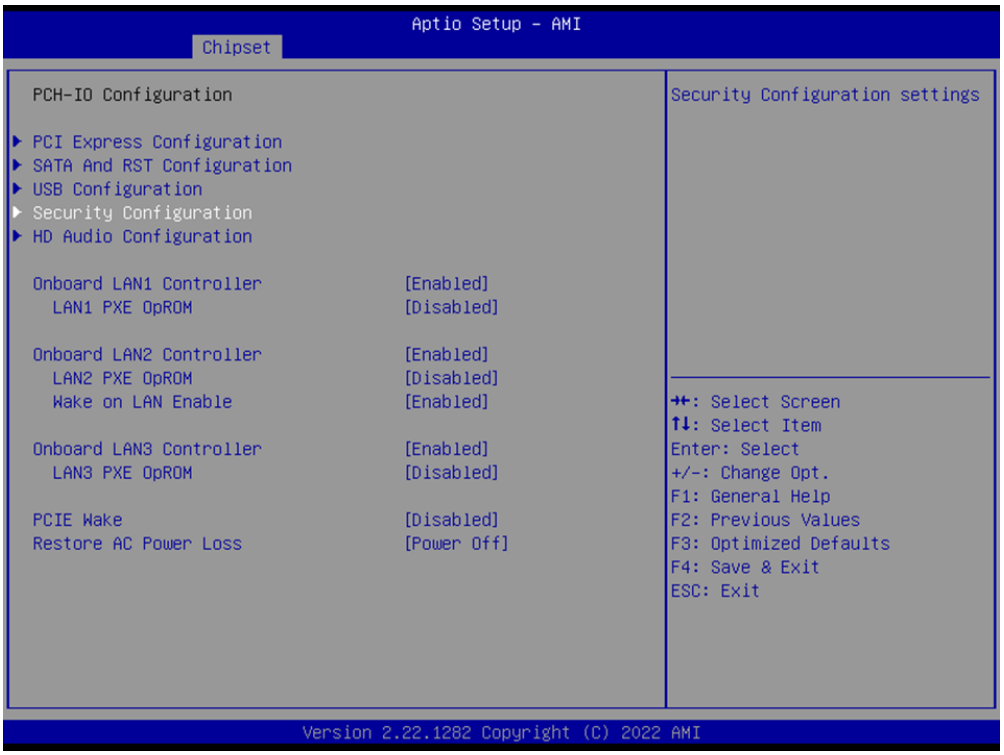


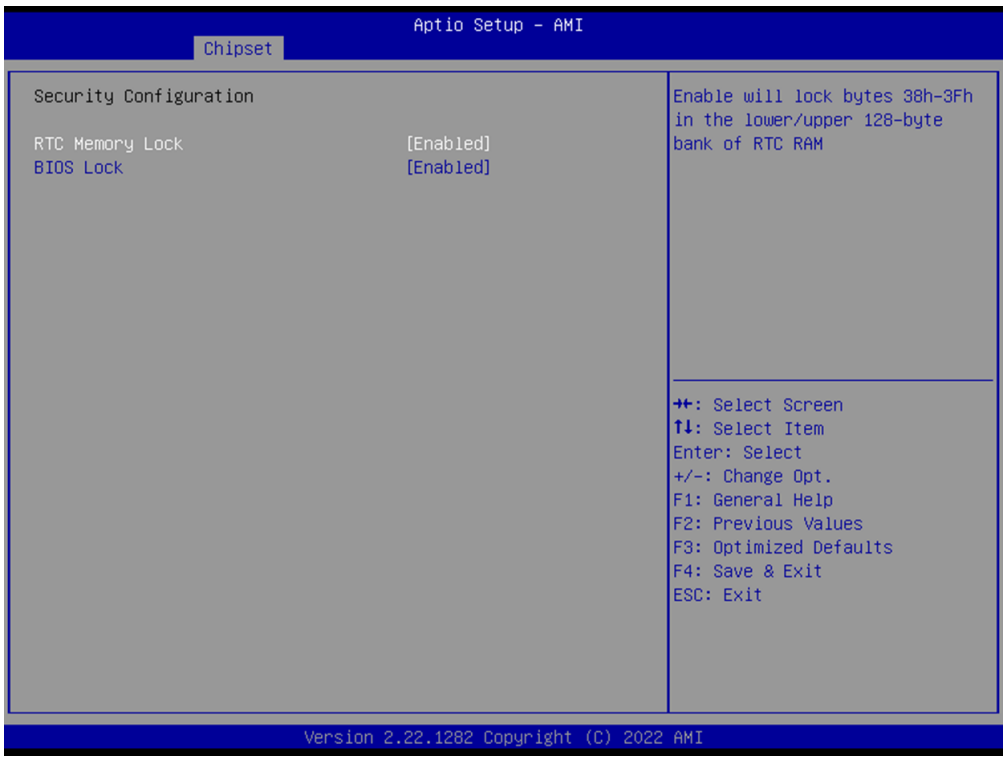


USB Configuration

- **xDCI Support**
  Enable/Disable xDCI (USB OTG Device).
- **USB2 PHY Sus Well Power Gating**
  Select 'Enabled' to enable SUS Well PG for USB2 PHY.
- **USB3 Link Speed Selection**
  This option is to select USB3 Link Speed GEN1 or GEN2.

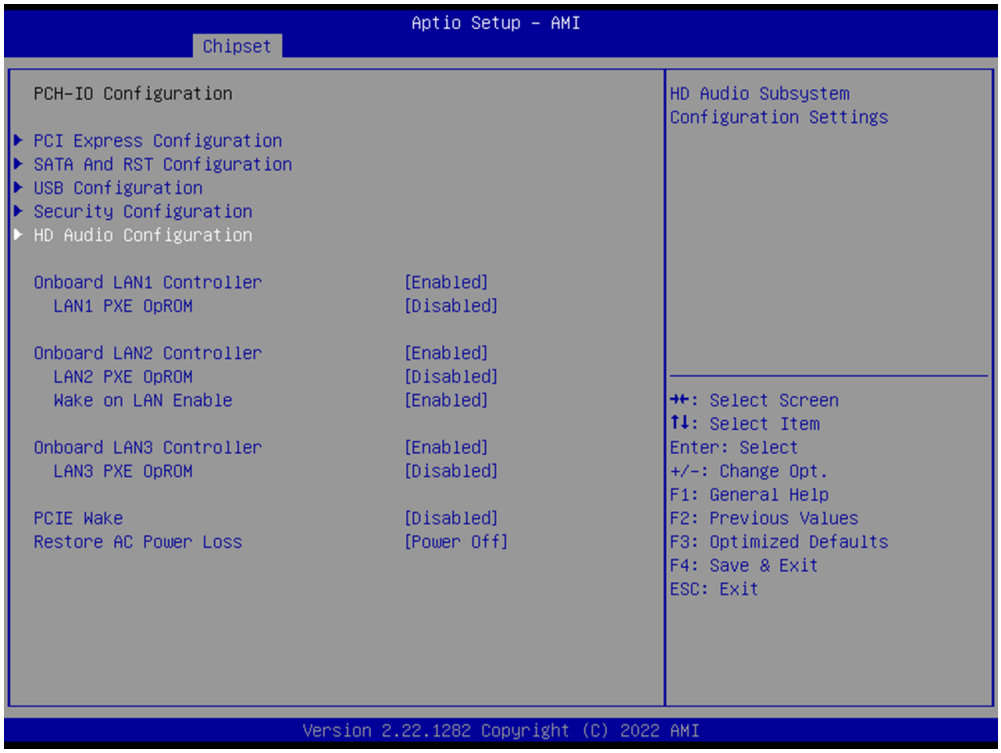
- **USB PDO Programming**
  Select 'Enabled' if Port Disable Override functionality is used.
- **XHCI LTR Mode**
  Enable/Disable XHCI LTR Mode.
- **USB Overcurrent**
  Select 'Disabled' for pin-based debug.
- **USB Overcurrent Lock**
  Select 'Enabled' if Overcurrent functionality is used. Enabling this will make the xHCI controller consume the Overcurrent mapping data.
- **USB Port Disable Override**
  Selectively Enable/Disable the corresponding USB port from reporting a Device Connection to the controller.

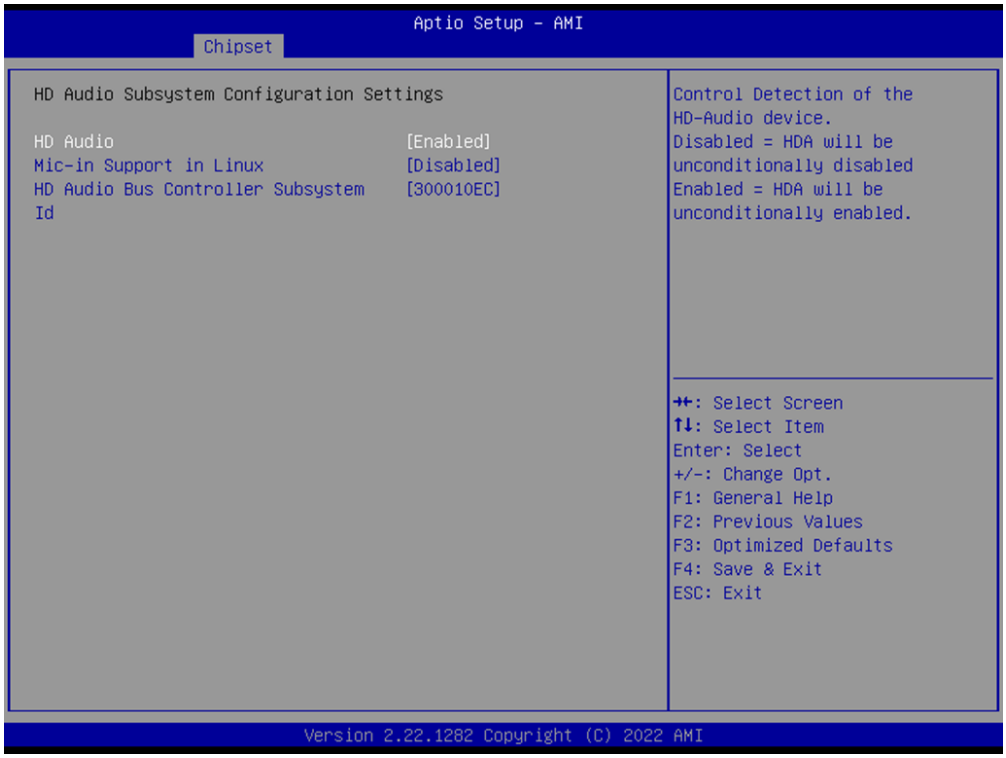




Security Configuration

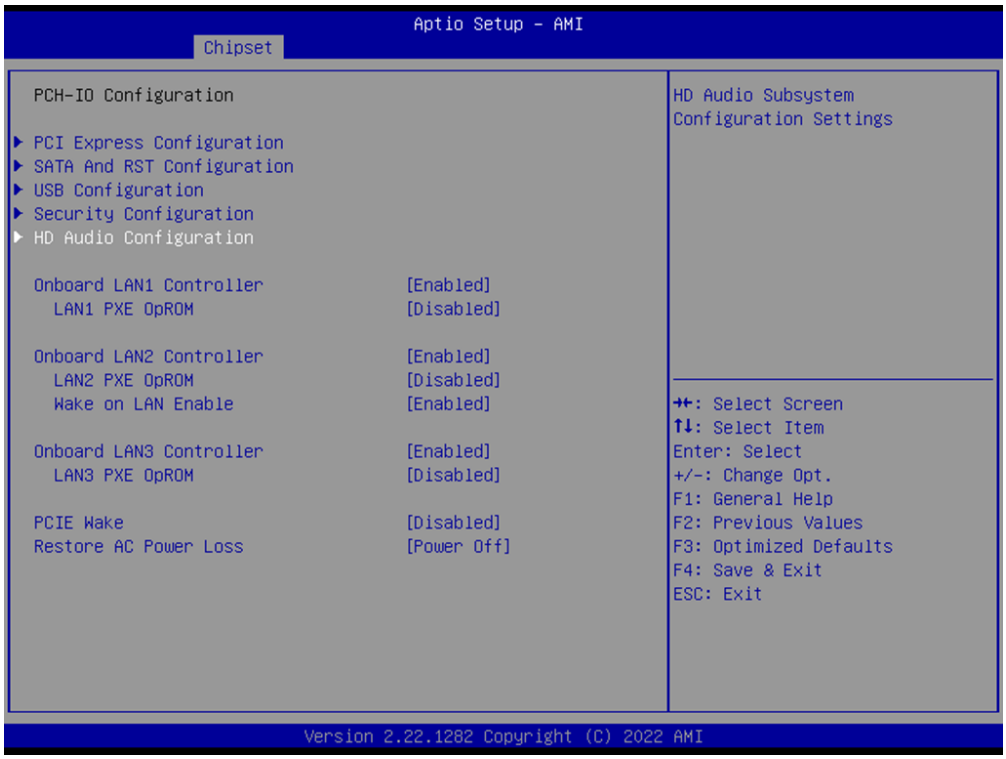
- **RTC Memory Lock**
  Enable will lock bytes 38h-3Fh in the lower/upper 128-byte bank of RTC RAM.
- **BIOS Lock**
  Enable/Disable the PCH BIOS Lock Enable feature. Required to be enabled to ensure SMM protection of flash.





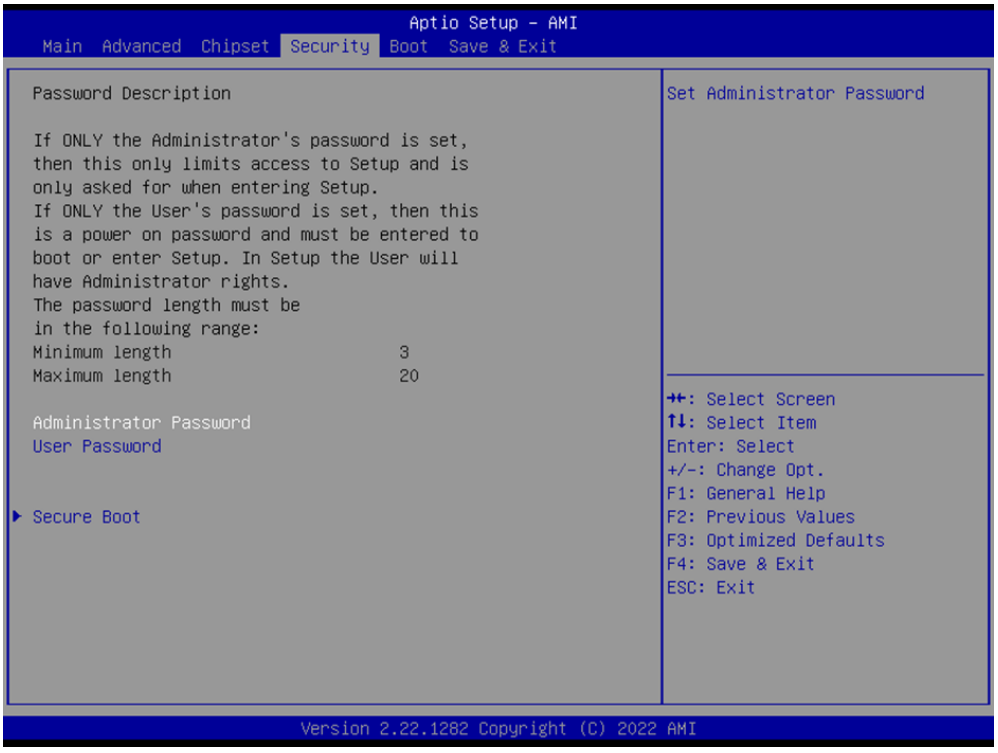
HD Audio Configuration

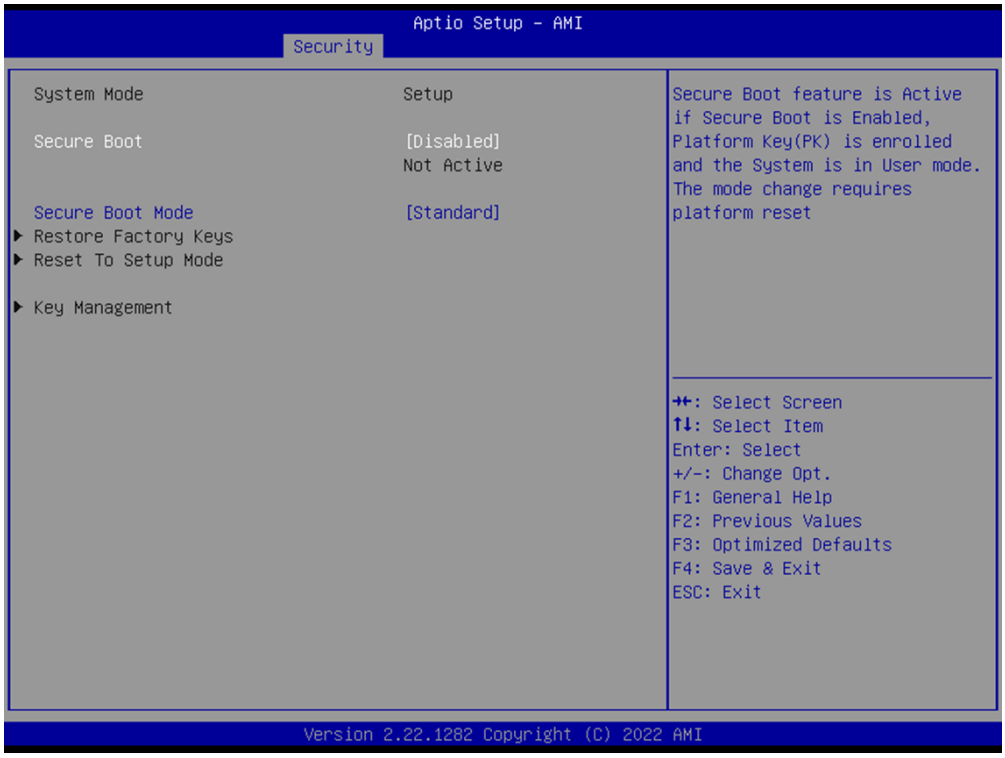
- **HD Audio**
  Control Detection of the HD-Audio device.
- **Mic-in Support in Linux**
  Supports the Mic-in function in Linux OS only.



- **Onboard LAN1 Controller**
  Select to Enable or Disable the Onboard LAN1 Controller.
- **LAN1 PXE OpROM**
  Enable or Disable the boot option for LAN1 Controller.
- **Onboard LAN2 Controller**
  Select to Enable or Disable the Onboard LAN2 Controller.
- **LAN2 PXE OpROM**
  Enable or Disable the boot option for the LAN2 Controller.
- **Wake on LAN Enable**
  Enable/Disable integrated LAN to wake the system.
- **Onboard LAN3 Controller**
  Select to Enable or Disable the Onboard LAN3 Controller.
- **LAN3 PXE OpROM**
  Enable or Disable the boot option for the LAN3 Controller.
- **PCIE Wake**
  Enable or Disable PCIE to wake the system from S5.
- **Restore AC Power Loss**
  Specify what state to go to when power is re-applied after a power failure (G3 state).

3.2.4 Security





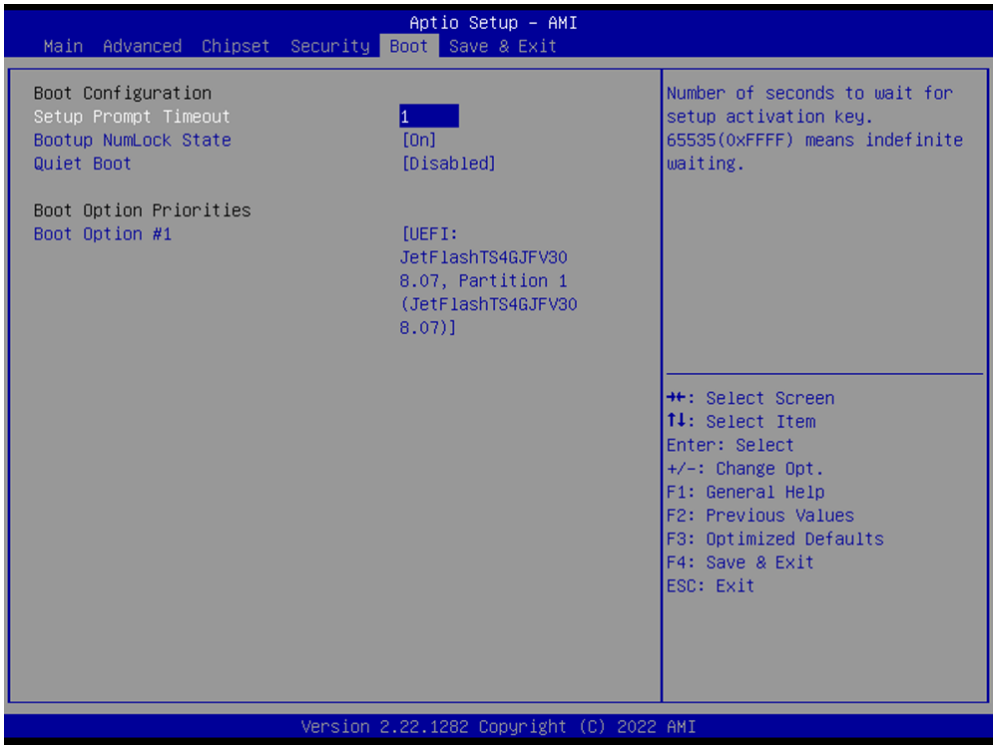
Security

- **Administrator Password**
  Set Administrator Password.
- **User Password**
  Set User Password.

Secure Boot

- Secure Boot
  The Secure Boot feature is Active if Secure Boot is Enabled. Platform Key (PK) is enrolled and the System is in User mode. The mode change requires a platform reset.
- Secure Boot Mode
  Secure Boot mode options: Standard or Custom. In Custom mode, Secure Boot Policy variables can be configured by a physically present user without full authentication.

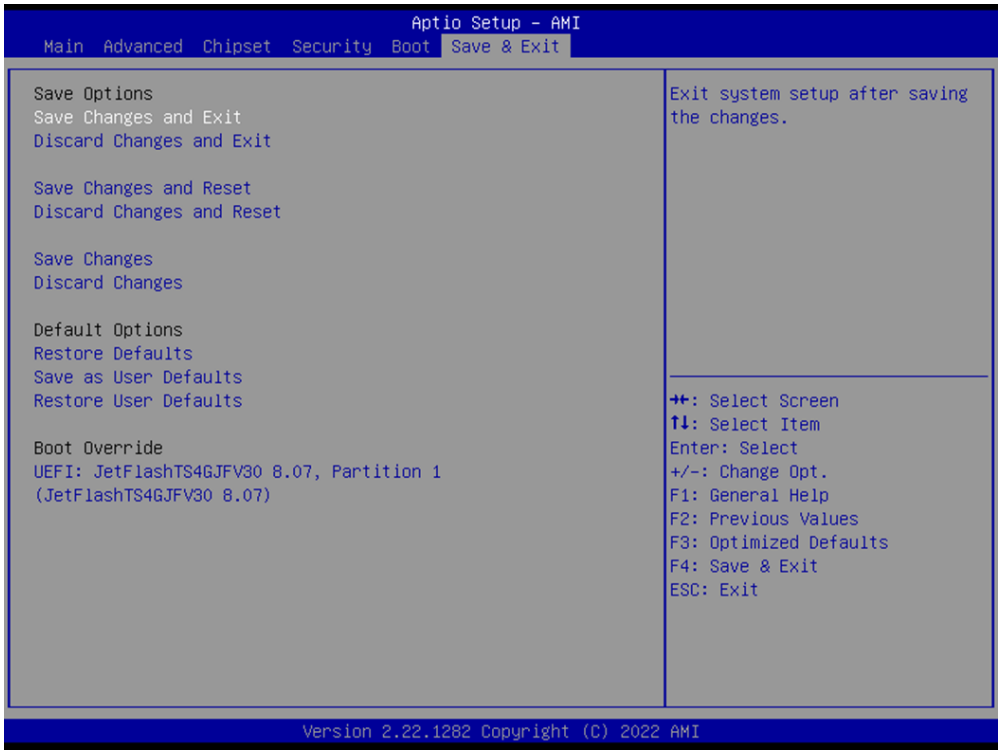
3.2.5 Boot



Boot

- **Setup Prompt Timeout**
  Number of seconds to wait for the setup activation key.
- **Bootup NumLock State**
  Select the keyboard NumLock state.
- **Quiet Boot**
  Enable or Disable the Quiet Boot option.

3.2.6 Save & Exit



- **Changes and Exit**
  Exit system setup after saving the changes.
- **Discard Changes and Exit**
  Exit system setup without saving any changes.
- **Save Changes and Reset**
  Reset the system after saving the changes.
- **Discard Changes and Reset**
  Reset system setup without saving any changes.
- **Save Changes**
  Save changes done so far to any of the setup options.
- **Discard Changes**
  Discard changes done so far to any of the setup options.
- **Restore Defaults**
  Restore/Load default values for all the setup options.
- **Save as User Defaults**
  Save the changes done so far as user defaults.
- **Restore User Defaults**
  Restore the user defaults to all the setup options.

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
Watchdog 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_Command_Port
mov al, 5Fh         ; Watchdog reset delay time low byte (5Eh is high byte) index.
out dx,al

mov dx, EC_Data_Port
mov al, 30h         ;Set 3 seconds delay time.
out dx,al

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

mov dx, EC_Command_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.
out dx,al

.exit
END
```

ADVANTECH

Enabling an Intelligent Planet

www.advantech.com