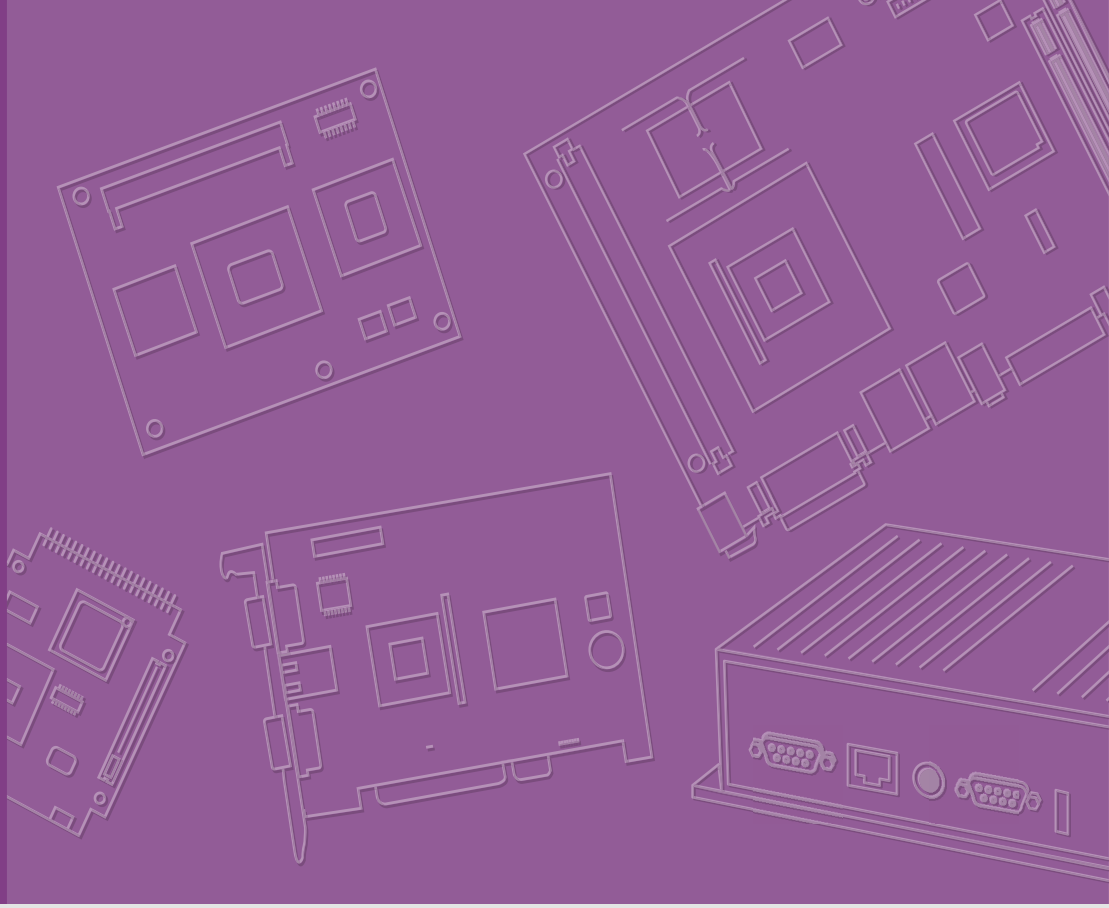

User Manual

ARK-7060

Embedded Box PC

ADVANTECH

Enabling an Intelligent Planet

Attention!

Please note:

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

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

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

Part No. 2006706000 Edition 1

Printed in China October 2022

Product Warranty (2 years)

Advantech warrants 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 that have been repaired or altered by persons other than repair personnel authorized by Advantech, or products that 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 customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced free of charge during the warranty period. For out-of-warranty repairs, customers will be billed according to the cost of replacement materials, service time, and freight. Please consult your dealer for more details.

If you believe your product to be defective, follow the steps outlined below.

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 on-screen messages displayed 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 a return merchandise authorization (RMA) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a completed Repair and Replacement Order Card, and a proof of purchase date (such as a photocopy of your sales receipt) into a shippable container. Products returned without a proof of purchase date are not eligible for warranty service.
5. Write the RMA number clearly on the outside of the package and ship the package prepaid to your dealer.

Declaration of Conformity

FCC Class B

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 instruction manual, 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 assistance.

Technical Support and Assistance

1. Visit the Advantech website at www.advantech.com/support to obtain the latest product information.
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 calling:
   - 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 that if not observed can cause personal injury!*

Caution! *Cautions are included to help prevent hardware damage and data losses. For example,*

"Batteries are at risk of exploding if incorrectly installed. Do not attempt to recharge, force open, or heat the battery. Replace the battery only with the same or equivalent type as recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions."

Note! *Notes provide additional optional information.*

Packing List

Before system installation, check that the items listed below are included and in good condition. If any item does not accord with the list, contact your dealer immediately.

- 1 x ARK-7060 Unit
- 1 x Mounting Kit
- 1 x User Manual (Simplified Chinese)
- 1 x China RoHS

Ordering Information

Part No.	CPU	DDR4	GbE	10 GbE	VGA	2.5" SATA III HDD Bay	RS-232/ 422/485	USB 3.0	M.2 B Key	M.2 E Key	SIM	IPMI	Power Supply	Expansion
ARK-7060-U0A1	Intel® Xeon® D-1746TER	Up to 128GB	2	2 (optional)	1	2 (Up to 4)	4	4	1	1	1	Yes	850W	1 x PCI 1 x PCIex4 1 x PCIx16
ARK-7060-U4A1	Intel® Xeon® D-1715TER	Up to 128GB	2	2 (optional)	1	2 (Up to 4)	4	4	1	1	1	Yes	850W	1 x PCI 1 x PCIex4 1 x PCIx16

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

ARK-7060 Default SKU Option Items

Optional Item for Default SKU

Part Number	Description
1702002600	Power cable 3-pin 183 cm (64.1 in), USA type
1702002605	Power cable 3-pin 183 cm (64.1 in), EU type
1702031801	Power cable 3-pin 183 cm (64.1 in), UK type
1700000237	Power cable 3-pin 183 cm (64.1 in), PSE type
AMO-I029	TPM 2.0 module
AMO-I031	2 x 10GbE LAN kit
AMK-A0042	2 x internal HDD bay kit
AMK-A0043	NVIDIA A2/T4 GPU card fan kit

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. The openings on the enclosure are for air convection. Protect the equipment from overheating. Do not cover the openings.
8. Ensure that the voltage of the power source is correct before connecting the equipment to a power outlet.
9. Position the power cord away from high-traffic areas. 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 a long time, disconnect it from the power source to avoid damage from transient overvoltage.
12. Never pour liquid into an opening. This may cause fire or electrical shock.
13. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
14. 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.
15. 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 damage the components. The equipment should be kept in a controlled environment.
16. Any unverified component may cause unexpected damage. To ensure correct installation, always use the components (e.g., screws) provided in the accessory box.
17. CAUTION: Batteries are at risk of exploding if incorrectly replaced. Replace only with the same or equivalent type as recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.
18. 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.
19. In accordance with IEC 704-1:1982 specifications, the sound pressure level at the operator's position does not exceed 70 dB (A).
20. The equipment should only be installed in a restricted access areas.
21. Use a power cord connected to a socket-outlet with a grounded connection.
22. This product is intended to be supplied by a UL Listed power supply suitable for use at minimum Tma 50 °C (122 °F) whose output meets PS2 (or LPS), ES1(or

SELV) and output is rated: 9-36Vdc, 16.65-4.16A. Please contact Advantech for further information.

DISCLAIMER: These instructions are provided according to IEC 704-1 standards. Advantech disclaims all responsibility for the accuracy of any statements contained herein.

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. Les ouvertures sur le boîtier sont destinées à la convection d'air, protégeant. ainsi l'équipement de la surchauffe. NE COUVREZ PAS LES OUVERTURES.
8. La prise de courant doit avoir une connexion mise à la terre.
9. Placez le cordon d'alimentation de sorte que personne ne puisse marcher dessus.
   Ne placez rien sur le cordon d'alimentation.
10. Tous les avertissements et mises en garde sur l'équipement doivent être notés.
11. Si l'appareil n'est pas utilisé pendant une longue période, débranchez-le du secteur pour ne pas être endommagé par une surtension transitoire.
12. Ne jamais verser de liquide dans les ouvertures de ventilation; Cela pourrait provoquer un incendie ou un choc électrique.
13. N'ouvrez jamais l'équipement. Pour des raisons de sécurité, seul le personnel de maintenance qualifié doit ouvrir l'équipement.
14. Si l'une des situations suivantes se présente, faites vérifier le matériel 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.
15. 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.
16. 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.
17. 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 équivalent recommandé par le fabricant. Jetez les piles usagées conformément aux instructions du fabricant.

18. Débranchez toujours complètement le cordon d'alimentation de votre châssis lorsque vous utilisez du matériel. Ne faites pas de connexion quand l'appareil est sous tension. Les composants électroniques sensibles peuvent être endommagés par des surtensions soudaines.
19. Niveau de pression acoustique au poste de l'opérateur selon la norme CEI 704-1: 1982 n'est pas supérieur à 70 dB (A).
20. L'équipement ne doit être installé que dans une zone d'accès restreint.
21. Au moyen d'un cordon d'alimentation connecté à une prise de courant avec mise à la terre.
22. Ce produit est destiné à être alimenté par un bloc d'alimentation homologué UL adapté à une utilisation à Tma 50 degrés C min. dont la sortie est conforme à PS2 (ou LPS), ES1 (ou SELV) et dont la sortie est nominale: 9-36Vdc, 16.65-4.16A, si besoin d'aide supplémentaire, veuillez contacter Advantech pour plus d'informations.

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.

Contents

Chapter 1

General Introduction

This chapter details background information on the ARK-7060 series.

1.1 Introduction

Advantech's ARK-7060 is a high-performance edge computer that empowers model-training applications via multiple expansion slots and fast data transfer speeds. It is equipped with the Intel® Xeon® D-1700 series processor and 4 x DDR4 SODIMM sockets (supporting up to 128GB). This solution provides PCI, PCIe x4, and PCIe x16 slots to enable the use of 350W graphics cards.

Multiple I/O and Storage Capabilities

ARK-7060 offers 2 x GbE, 4 x USB 3.0, and 4 x COM ports. It also supports up to 4 x 2.5" SATA III hard drive bays and delivers high data transfer rates via optional 10GbE ports and M.2 B key for 5G modules.

Advanced Security and Remote Management

ARK-7060 features dual BIOS for BIOS backup and recovery to enhance security. This lowers the risk of BIOS damage and protects against virus and/or data corruption. ARK-7060 also features an on-board baseboard management controller (BMC) to provide PMI architecture for remote management.

Built-in Intelligent Management Tools — Advantech SUSI API and WISE-DeviceOn

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

SUSI API is an intelligent self-management cross platform tool that monitors system status for problems and takes action in the event of abnormalities. SUSI API offers a boot up guarantee in critical, low-temperature environments so systems can automatically recover when voltages dip. SUSI API makes the entire system more reliable and intelligent. ARK-7060 also supports Advantech WISE-DeviceOn software. This software supports remote management; and enables users to monitor, configure, and control a large number of terminals simultaneously, making maintenance and system recovery simpler.

1.2 Product Features

1.2.1 General

- **CPU:** Intel® Xeon® D-1700 series processor (up to 10 cores 67W)
- **System Chipset:** SoC
- **BIOS:** AMI EFI 512Mbit
- **System Memory:** 4 x DDR4 2666/2933MHz ECC/non-ECC SO-DIMM, up to 128GB
- **Watchdog Timer:** Single chip Watchdog 255-level interval timer, setup by software
- **I/O Interface:** 4 x RS232/422/485
- **USB:** 4 x USB 3.0 compliant ports
- **IPMI 2.0 support:** Aspeed AST2500 BMC supports IPMI 2.0 (Intelligent Platform Management Interface 2.0) via dedicate LAN, VGA, and console port
  - 1 x VGA
  - 1 x GbE management port
  - 1 x console port
- **Storage:** 2 x 2.5" swappable SATAIII HDD Bay with RAID 0/1 and max height 15 mm/0.59 in (up to 4 x 2.5" SATAIII HDD Bay by AMK-A0042)
- **Expansion Interface:**
  - 1 x M.2 2230/2280/3052 B Key, supporting M.2 2242/3042 with bracket (support SIM holder)
  - 1 x M.2 2230 E key for Wi-Fi modules
  - Add-on Card Slot: 1 x slot PCI+1 x slot PCIe x 4+1 x slot PCIe x 16
- **TPM:** TPM 2.0 (support by optional AMO-I029)

1.2.2 Ethernet

- **Chipset:**
  - LAN1/2 Intel® i210
  - LAN3/4 Intel® X550 (support by optional AMO-I031)
- **Speed:**
  - LAN1/2 10/100/1000 Mbps
  - LAN3/4 100/1000/10000 Mbps
- **Interface:** Up to 4 x RJ45

1.3 Chipset

1.3.1 Functional Specifications

1.3.1.1 Processor

Processor	Intel® Xeon® D-1700 series processor (up to 10 cores 67W) (Suspend mode S3 & S4 are not supported by this platform)
Memory	Supports DDR4 2666/2933MHz up to 128GB 4 x 260-pin SODIMM socket type

1.3.1.2 Chipset

SATA Interface	■ Supports several optional sections of Serial ATA III: Extensions to Serial ATA 1.0 Specification, Revision 1.0 ■ Supports SATA transfers to 600 Mbytes/sec.
USB Interface	■ USB host interface with support for 4 x USB 3.0 ports ■ All ports are High-Speed, Full-Speed, and Low-Speed capable ■ Supports legacy keyboard/mouse software
BIOS	■ 2 x AMI 512-Mbit EFI Flash BIOS via SPI (Dual BIOS)

1.3.1.3 Others

Serial Ports	■ 4 x serial ports ■ Supports IRQ Sharing among serial ports under Microsoft Windows OS ■ COM1, COM2, COM3, and COM4: RS232/422/485
Ethernet	■ LAN1/2 support 10/100/1000 Mbps, LAN3/4 support 100/1000/10000 Mbps ■ LAN Connectors: Phone Jack RJ45 8P 90D (F)
Battery Backup	BATTERY 3V/210 mAh with WIRE x 1
TPM	TPM 2.0 (support by optional AMO-I029)

1.3.2 SUSI 4.2

SUSI API	
Sequence Control	Supported
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

(W x H x D) 230 x 205 x 390 mm/9.05 x 8.07 x 15.35 in

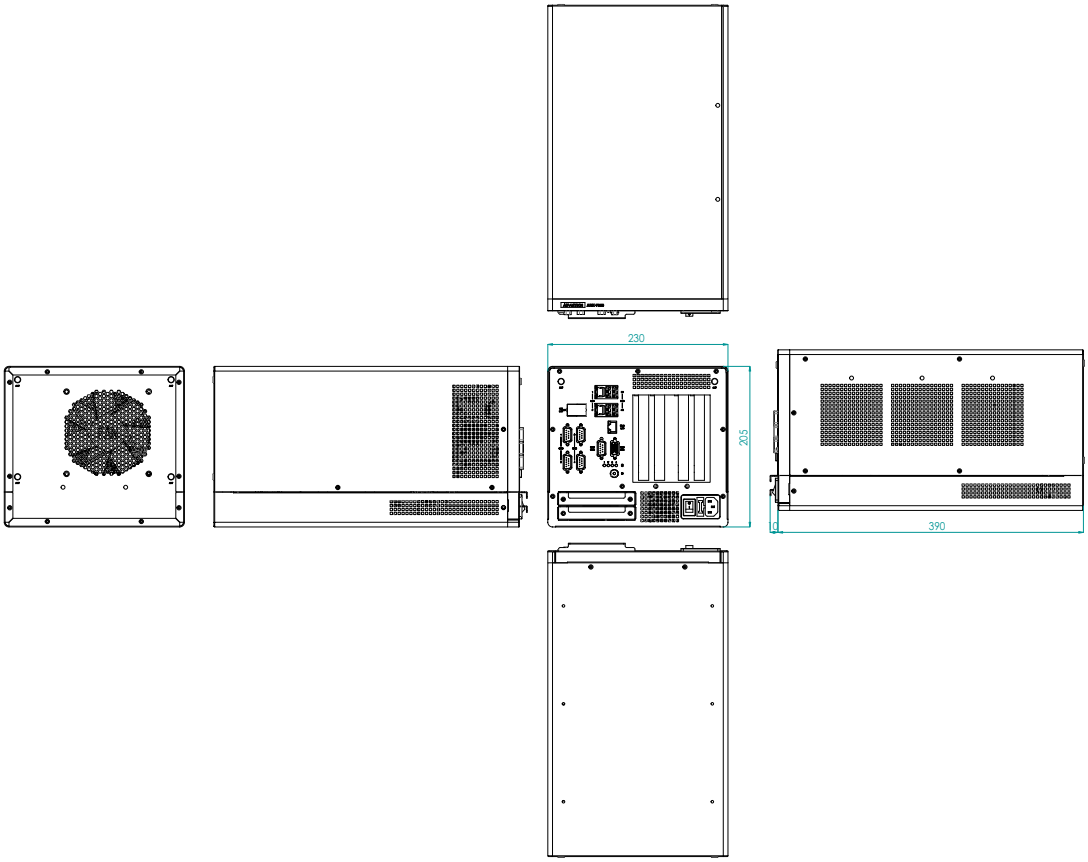


Figure 1.1 ARK-7060 Mechanical Dimensions Diagram

1.4.2 Weight

9.7 kg (21.38 lb)

1.5 Power Requirements

1.5.1 System Power

- **Power Type:** ATX
- **Minimum Power Input:** 100 ~ 240V_{AC}
- **Power Supply:** 850W power supply built in

1.6 Operating Environment Specifications

1.6.1 Operating Temperature

- With extended peripherals: -10 ~ 50 °C; 14 ~ 112 °F, with 0.7m/s air flow

1.6.2 Relative Humidity

- 95% @ 40 °C (104 °F) (non-condensing)

1.6.3 Storage Temperature

- -40 ~ 85 °C (-40 ~ 185 °F)

1.6.4 Safety

- CB (62368), UL (62368), CCC, BSMI, and UKCA

1.6.5 EMC

- CE/FCC Class B, CCC, BSMI, and UKCA

Chapter 2

Hardware Configuration

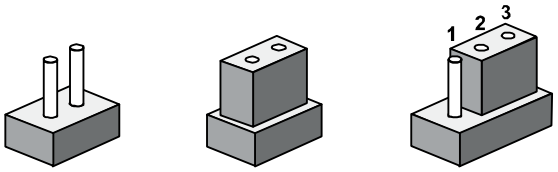
2.1 Introduction

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

2.2 Jumpers

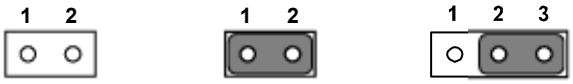
2.2.1 Jumper Description

You may configure ARK-7060 to match the needs of your application by setting jumpers. A jumper is a metal bridge used to close an electric circuit. It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To close a jumper, you connect the pins with the clip. To open a jumper, remove the clip. Sometimes a jumper will have three pins, labeled 1, 2 and 3. In this case you would connect either pins 1 and 2, or 2 and 3.



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

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



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

A pair of needle-nose pliers may be helpful when working with jumpers. If you have any doubts about the best hardware configuration for your application, contact your local distributor or sales representative before you make any changes. Generally, you simply need a standard cable to make most connections.

2.2.2 Jumper List

Table 2.1: Jumper List	
JCMOS1	Clear CMOS
PSON1	Auto Power On Setting
CN15	SMB Enable
SW_422_1	Fail safe
SW_422_2	Fail safe

2.2.3 Jumper Locations

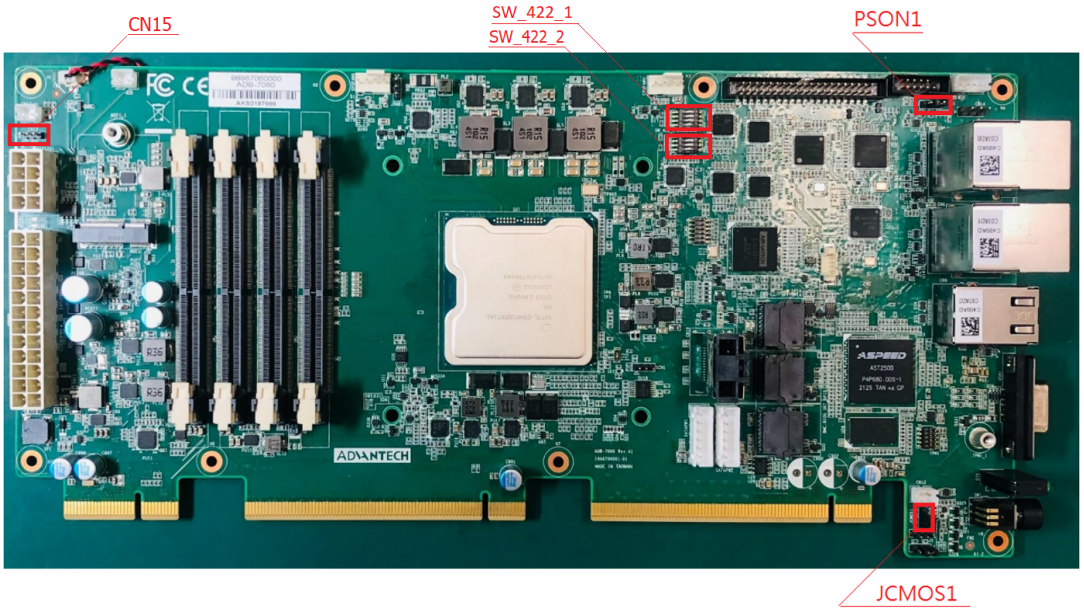
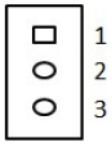


Figure 2.1 Jumper Layout

2.2.4 Jumper Settings

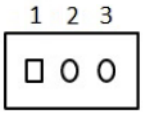
2.2.4.1 Clear CMOS Setting for JCMOS1

JCMOS1 Clear CMOS Settings	
Part Number	1653003101
Foot Print	HD_3x1P_79_D
Description	PIN HEADER 3x1P 2.0 mm 180D(M) DIP 2000-13 WS
Setting	Function
(1-2)	Normal Operation (Default)
(2-3)	Clear CMOS



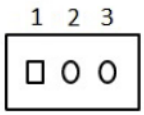
2.2.4.2 Auto Power On Setting for PSON1

PSON1 Clear CMOS Settings	
Part Number	1653003101
Foot Print	HD_3x1P_79_D
Description	PIN HEADER 3x1P 2.0mm 180D(M) DIP 2000-13 WS
Setting	Function
(1-2)	Auto Power On
(2-3)	Power button for Power On (Default)



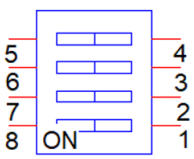
2.2.4.3 M.2 E Key SMBus Enable by CN15

M.2 E Key SMBus Enable Settings	
Part Number	1653003101
Foot Print	HD_3x1P_79_D
Description	PIN HEADER 3x1P 2.0mm 180D(M) DIP 2000-13 WS
Setting	Function
(1-2)	Disable M.2 SMBus Channel
(2-3)	Enable M.2 SMBus Channel(Default/No Jumper)



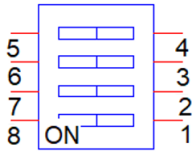
2.2.4.4 Fail Safe by SW_422_1

Fail safe Enable Settings	
Part Number	1600000402
Foot Print	SW_4x2P_50_260x315
Description	DIP SW SMD 8P SPST P=1.27mm W=5.4mm KHS42E
Setting	Function
Switch to Pin 1, 2, 3, 4	OFF(Default)
Switch to Pin 5, 6, 7, 8	ON



2.2.4.5 Fail Safe by SW_422_2

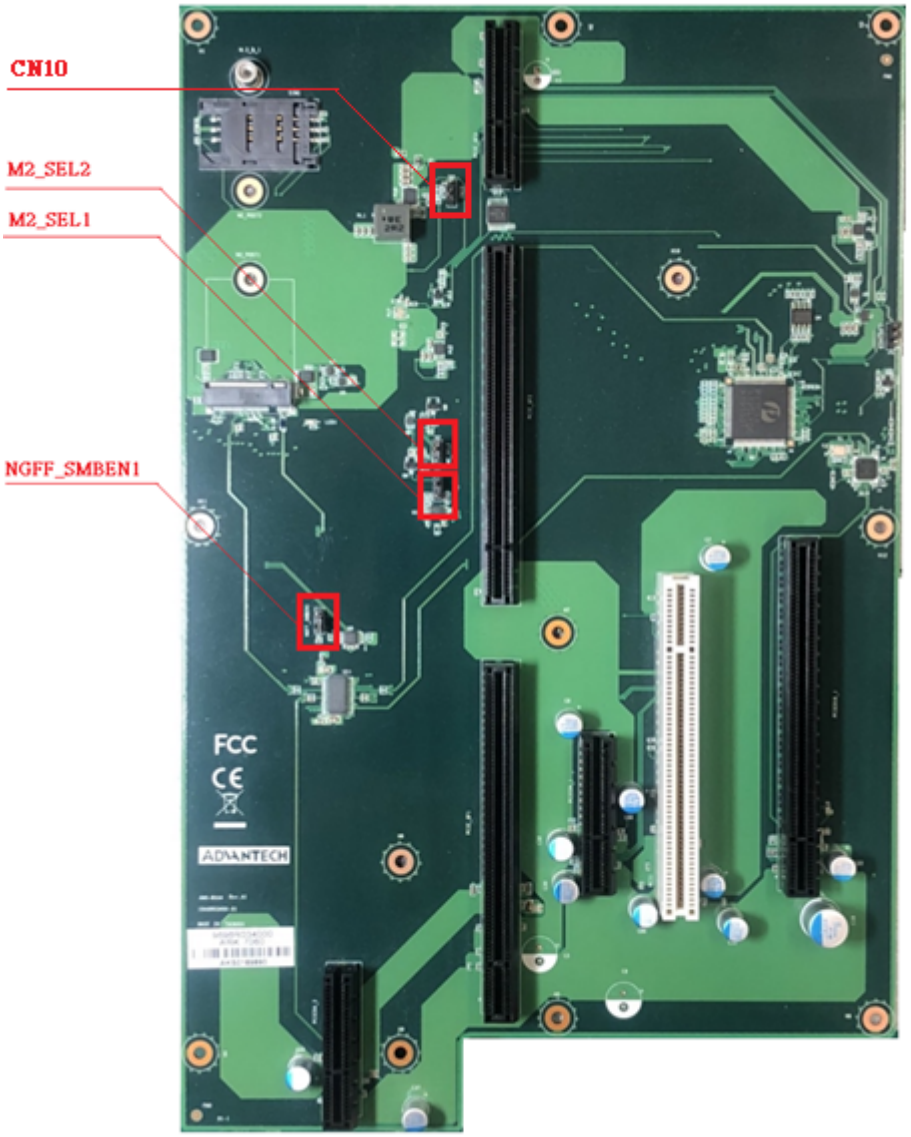
Fail safe Settings	
Part Number	1600000402
Foot Print	SW_4x2P_50_260x315
Description	DIP SW SMD 8P SPST P=1.27 mm W=5.4mm KHS42E
Setting	Function
Switch to Pin 1, 2, 3, 4	OFF(Default)
Switch to Pin 5, 6, 7, 8	ON



2.2.5 Bottom Board Jumper List

Table 2.1: Jumper List	
M2_SEL1	M.2 B Key Select Function Source Between SATA and PCIE
M2_SEL2	M.2 B Key Select Function Source Between USB 3.0 and PCIE
NGFF_SMBEN1	M.2 B Key SMB Enable
CN10	5G Module power switch

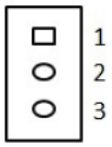
2.2.6 Jumper Locations



2.2.7 Jumper Settings

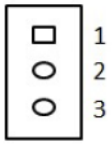
2.2.7.1 M.2 B Key Select Function Source Between SATA and PCIE by M2_SEL1

M2_SEL1 M.2 select function source settings	
Part Number	1653003101
Foot Print	HD_3x1P_79_D
Description	PIN HEADER 3x1P 2.0mm 180D(M) DIP 2000-13 WS
Setting	Function
(1-2)	Auto detect by card (Default)
(2-3)	SATA
Floating	PCIE



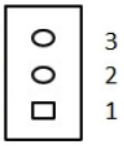
2.2.7.2 M.2 B Key Select Function Source Between USB 3.0 and PCIE by M2_SEL2

M2_SEL2 M.2 select function source settings	
Part Number	1653003101
Foot Print	HD_3x1P_79_D
Description	PIN HEADER 3x1P 2.0mm 180D(M) DIP 2000-13 WS
Setting	Function
(1-2)	Auto detect by card (Default)
(2-3)	USB 3.0
Floating	PCIE



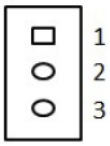
2.2.7.3 M.2 B Key SMBus Enable by NGFF_SMBEN1

M.2 SMBus Enable Settings	
Part Number	1653003101
Foot Print	HD_3x1P_79_D
Description	PIN HEADER 3x1P 2.0mm 180D(M) DIP 2000-13 WS
Setting	Function
(1-2)	Disable M.2 SMBus Channel
(2-3)	Enable M.2 SMBus Channel (Default)



2.2.7.4 For 5G Module Power Switch by CN10

Power switch Settings	
Part Number	1653003101
Foot Print	HD_3x1P_79_D
Description	PIN HEADER 3x1P 2.0 mm 180D (M) DIP 2000-13 WS
Setting	Function
(1-2)	Set Vout 3.805V (For 5G module support +3.805V)
(2-3)	Set Vout 3.304V (Default)



2.3 Connectors

2.3.1 External I/O Locations

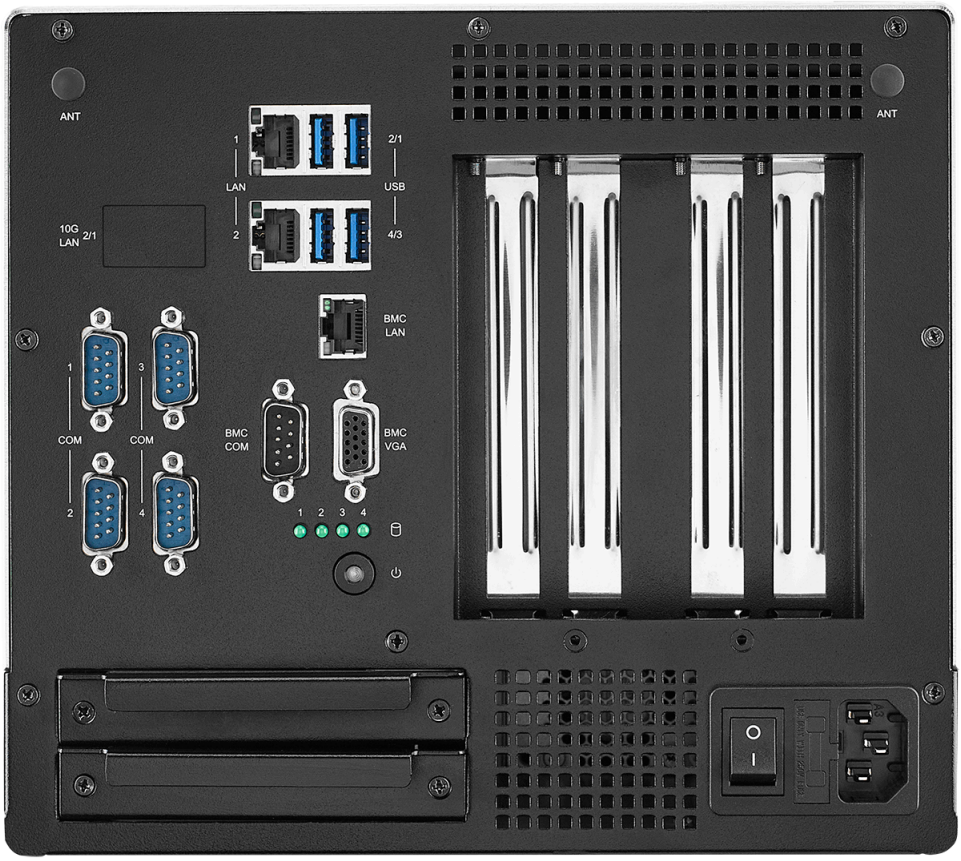


Figure 2.2 Front I/O Connector Diagram

2.3.1.1 COM Port Connector

ARK-7060 provides up to 4 x D-sub 9-pin connectors, which offers RS-232/422/485 serial communication interface ports. The default setting is RS-232, the mode RS-422/485 of ARK-7060 are supported via BIOS settings.

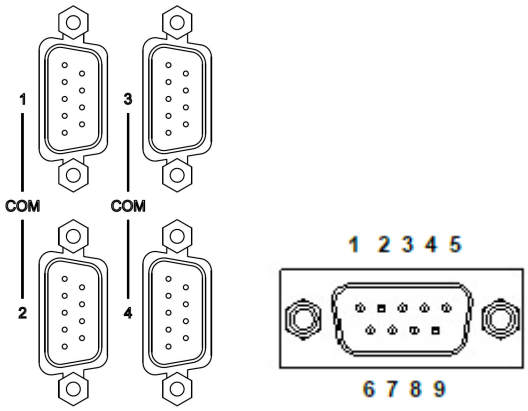


Figure 2.3 COM Port Connector

Table 2.1: COM Connector Pin Assignments

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

2.3.1.2 Ethernet Connector (LAN)

ARK-7060 is equipped with up to 4 x (LAN3/4 are optional by AMO-I031) Ethernet ports. LAN1/2 controllers that are fully compliant with IEEE 802.3u 10/100/1000 Mbps CSMA/CD standards. LAN3/4 are powered by 10GBASE-T controllers providing 10Gb/s of throughput.

These Ethernet ports 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).

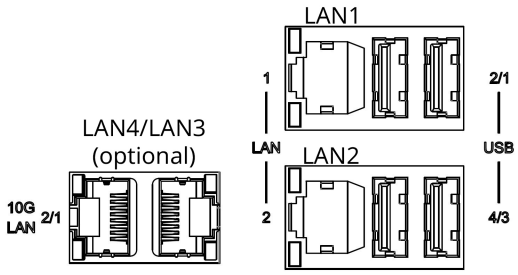
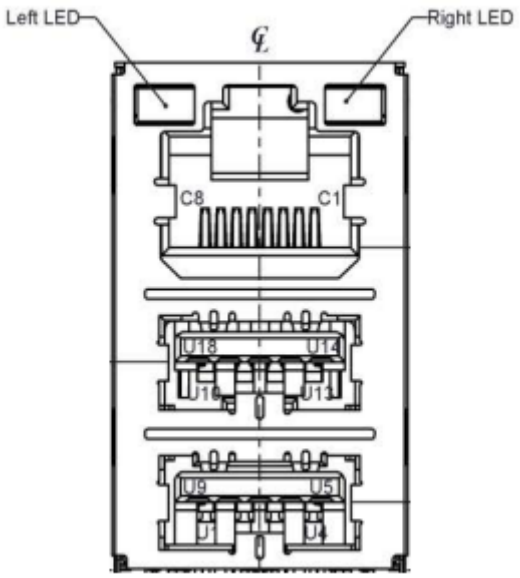


Figure 2.4 Ethernet Connector

For LAN1/2 Connector:

Table 2.2: CN5/CN6 Ethernet Connector Pin Assignments

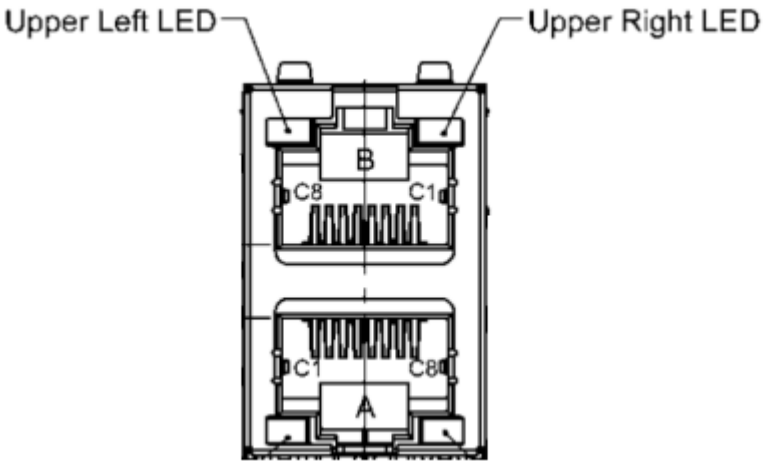
Pin	10/100/1000BaseT Signal Name
C1	MDI_LAN_D0_P
C2	MDI_LAN_D0_N
C3	MDI_LAN_D1_P
C4	MDI_LAN_D2_P
C5	MDI_LAN_D2_N
C6	MDI_LAN_D1_P
C7	MDI_LAN_D3_P
C8	MDI_LAN_D3_N



For LAN3/4 Connector:

Table 2.3: 10G Card LAN1 Ethernet Connector Pin Assignments

Pin	10GBaseT Signal Name
C1	TRD1+
C2	TRD1-
C3	TRD2+
C4	TRD3+
C5	TRD3-
C6	TRD2-
C7	TRD4+
C8	TRD4-



2.3.1.3 Power On/Off Button

ARK-7060 has a Power On/Off button with LED indicators on the front side that show “On” (Green LED) and “Off/Suspend” statuses (Orange LED). The Power button supports dual functions: Soft Power -On/Off (Instant off or Delay 4 Seconds then off), and Suspend.

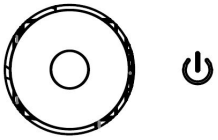


Figure 2.5 Power ON/OFF Button

2.3.1.4 LED Indicators

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

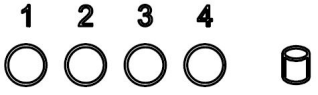


Figure 2.6 LED Indicators

2.3.1.5 USB 3.0 Connector

ARK-7060 supports 4 x USB 3.0 interfaces. The USB interfaces complies with USB UHCI, Rev. 3.0 standards. Please refer to Table 2.5 for its pin assignments. USB 3.0 connectors contain legacy pins to interface with USB 2.0 devices, and a new set of pins for USB 3.0 connectivity.

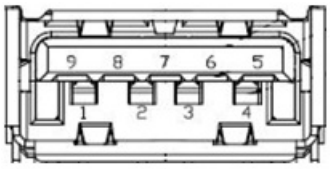


Figure 2.7 USB 3.0 Connector

Table 2.4: 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+		

2.3.1.6 BMC Dedicated LAN Connector

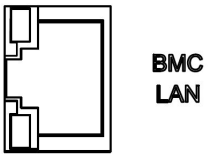
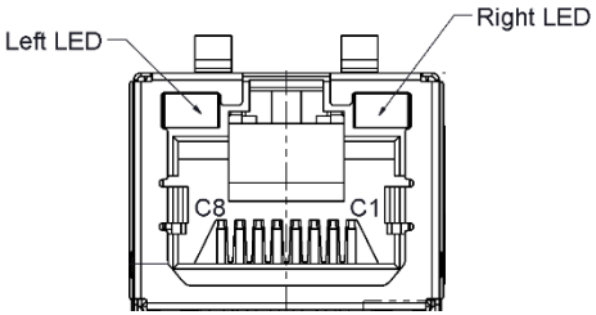


Figure 2.8 BMC Dedicated LAN Connector

Table 2.5: CN9 BMC Dedicated LAN Connector Pin Assignments

Pin	10/100/1000BaseT Signal Name
C1	MDI_LAN_D0_P
C2	MDI_LAN_D0_N
C3	MDI_LAN_D1_P
C4	MDI_LAN_D2_P
C5	MDI_LAN_D2_N
C6	MDI_LAN_D1_P
C7	MDI_LAN_D3_P
C8	MDI_LAN_D3_N



2.3.1.7 BMC Dedicated COM Port

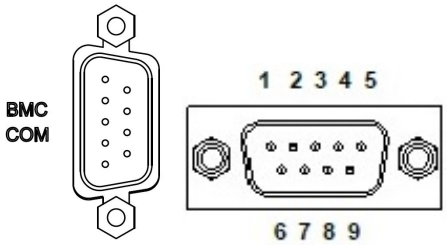


Figure 2.9 BMC Dedicated COM Port

Table 2.6: COM2 BMC Dedicated COM Port Pin Assignments	
Pin	**Signal Name (RS232)**
1	NC
2	RxD
3	TxD
4	NC
5	NC
6	NC
7	NC
8	NC
9	NC

2.3.1.8 BMC Dedicated VGA Connector

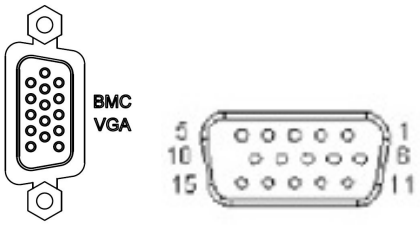


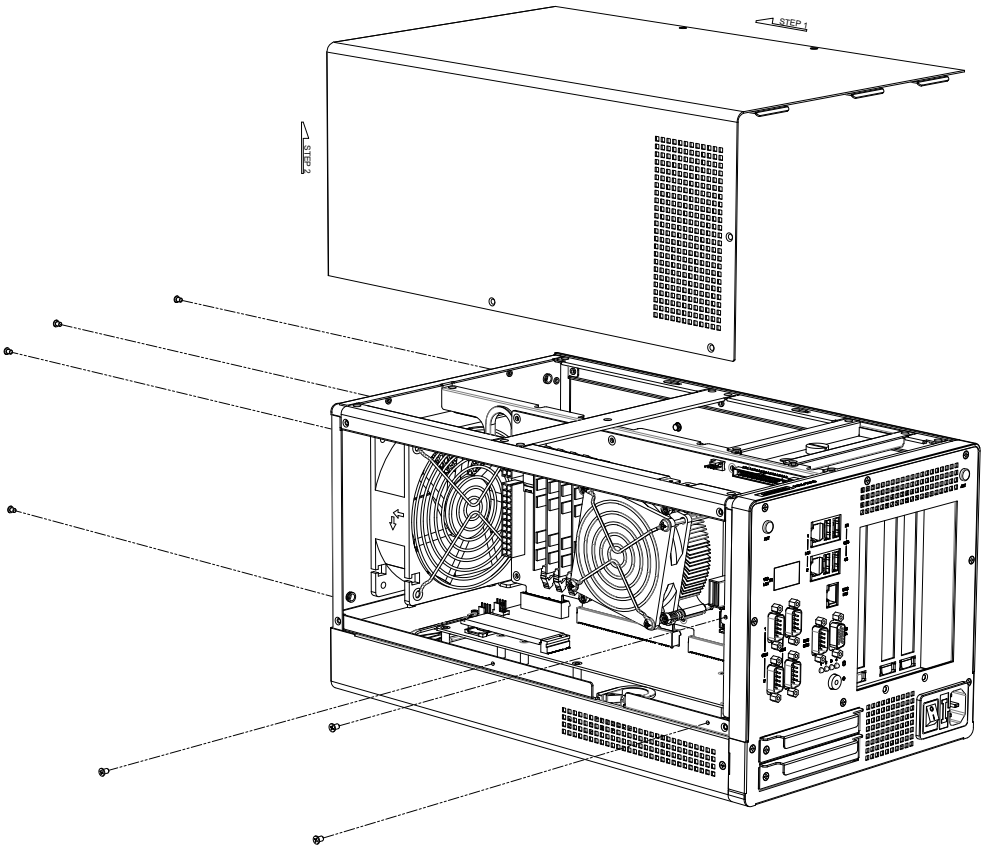
Figure 2.10 BMC Dedicated VGA Port

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

2.4 Installation

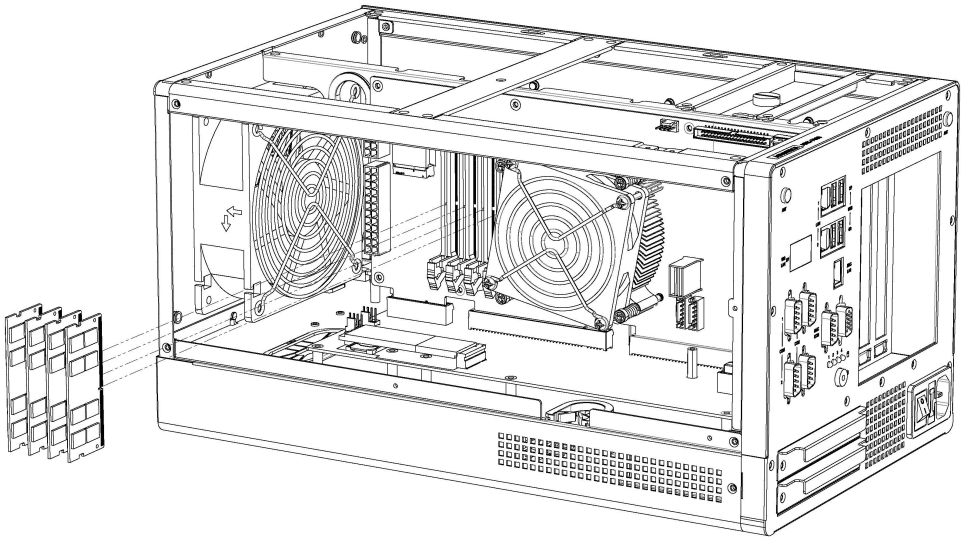
2.4.1 Remove Top Cover

1. Unscrew the 7 screws on the top cover.
2. Slightly move the top cover backward, and then lift it up to remove it.



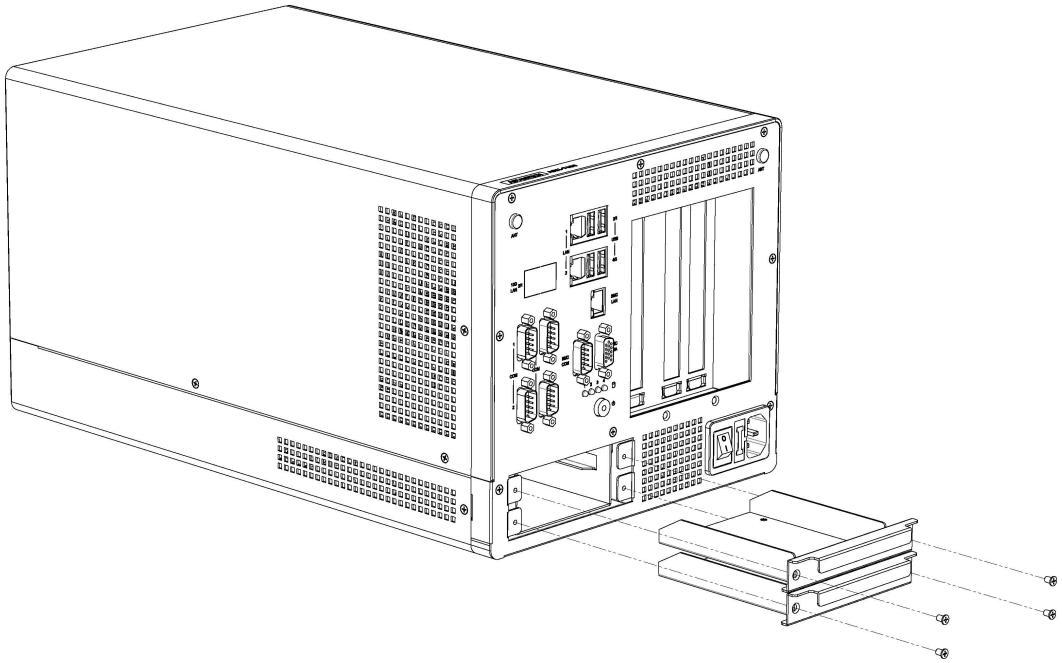
2.4.2 Memory Installation

1. Remove top cover (2.4.1).
2. Install memory in the system.
3. Replace the top cover.
4. Memory Configuration Instruction:
   Using 1 x DIMM: install on CN1 or CN3 slot
   Using 2 x DIMM: install on CN1 & CN3 slot
   Using 3 x DIMM is not supported.



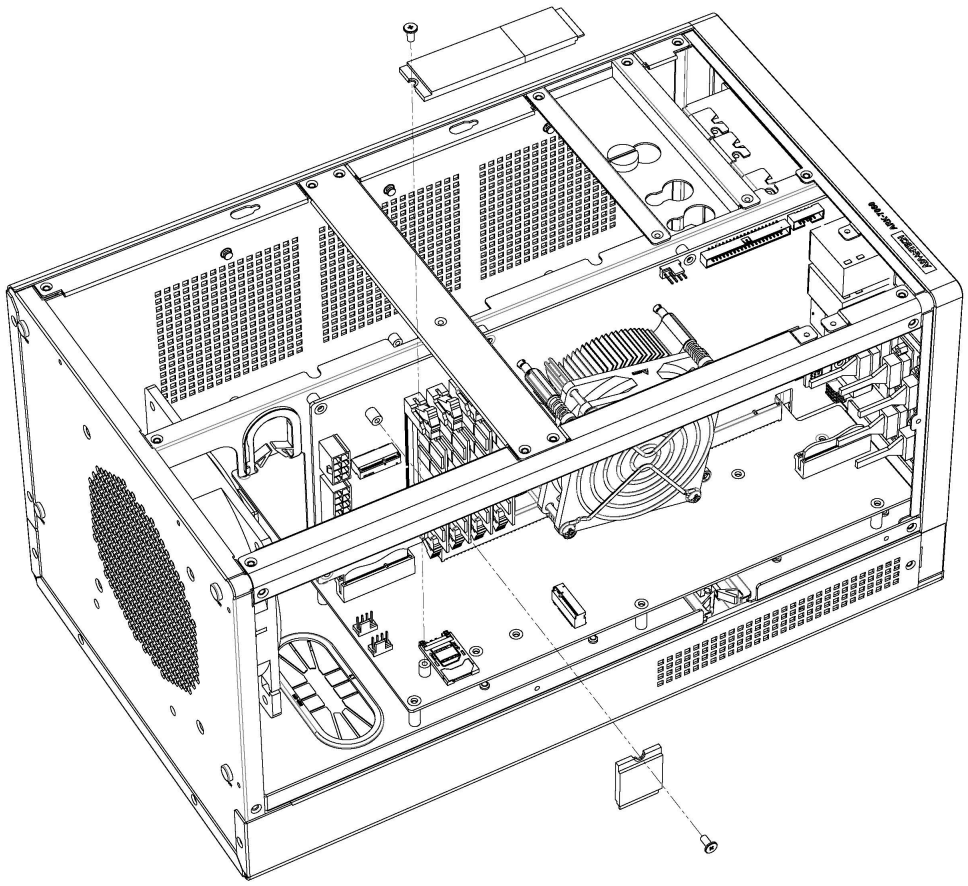
2.4.3 HDD/SSD Installation

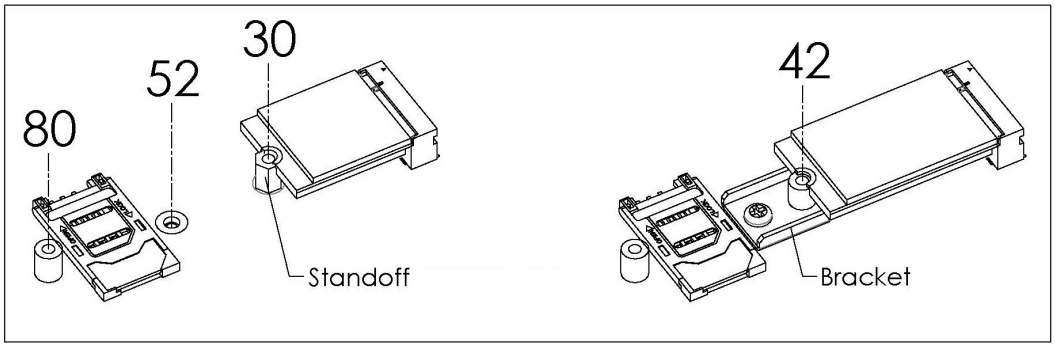
1. Unscrew the 2 x screws on the hard drive bay.
2. Install HDD/SSD with 4 x screws on the HDD/SSD tray.
3. Push back the hard drive bay into the system and secure it using the same screws.



2.4.4 M.2 Module Installation/Internal SIM Slot

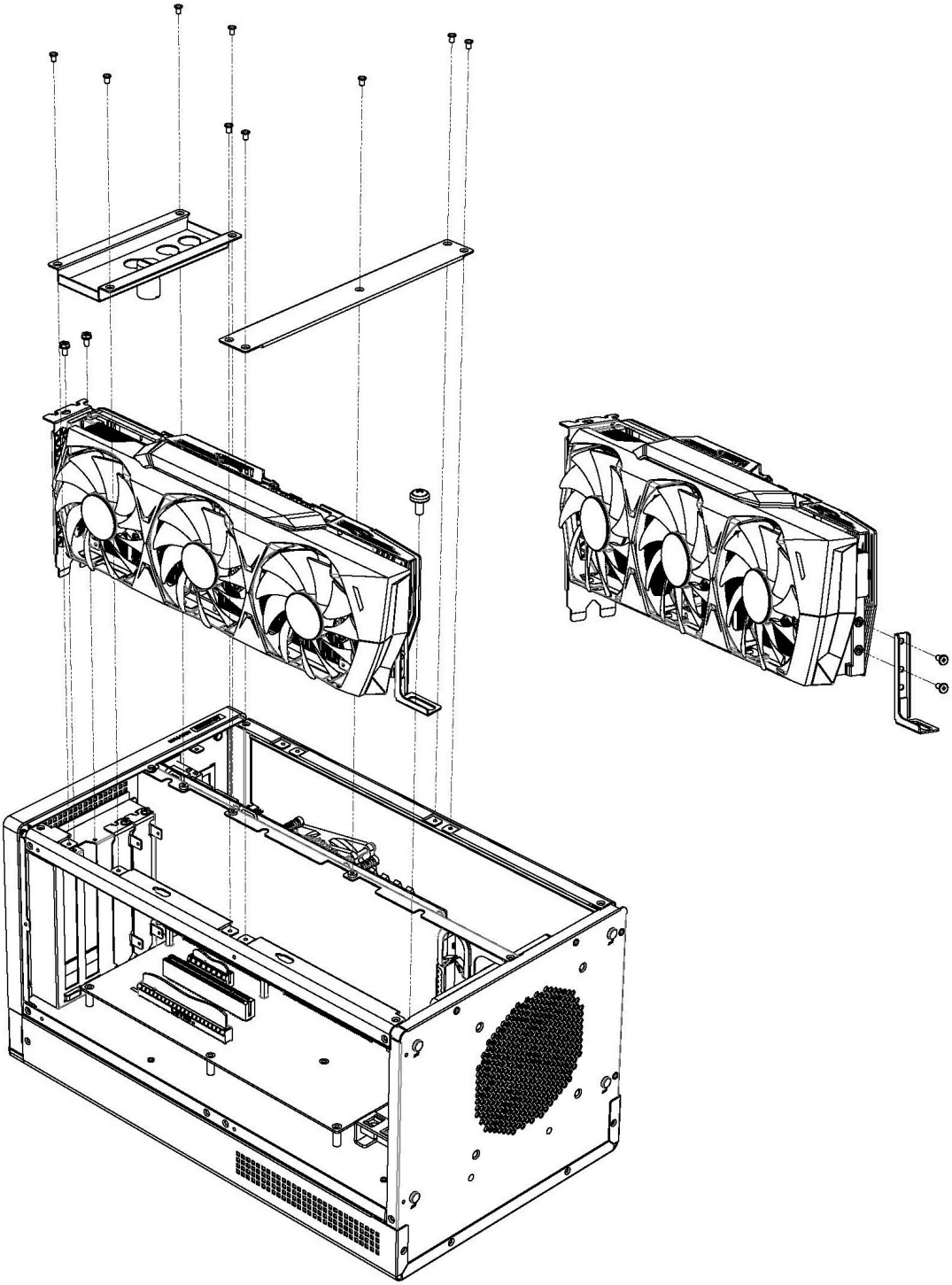
1. Remove top cover (2.4.1).
2. Install M.2 B Key module (M2B1 with SIM holder) with bracket according to the M.2 module form factor, and secure in place with screw(s).
3. Install M.2 E key module with 1 x screw (M2E1).
4. Replace the top cover and secure it in place with 7 screws.





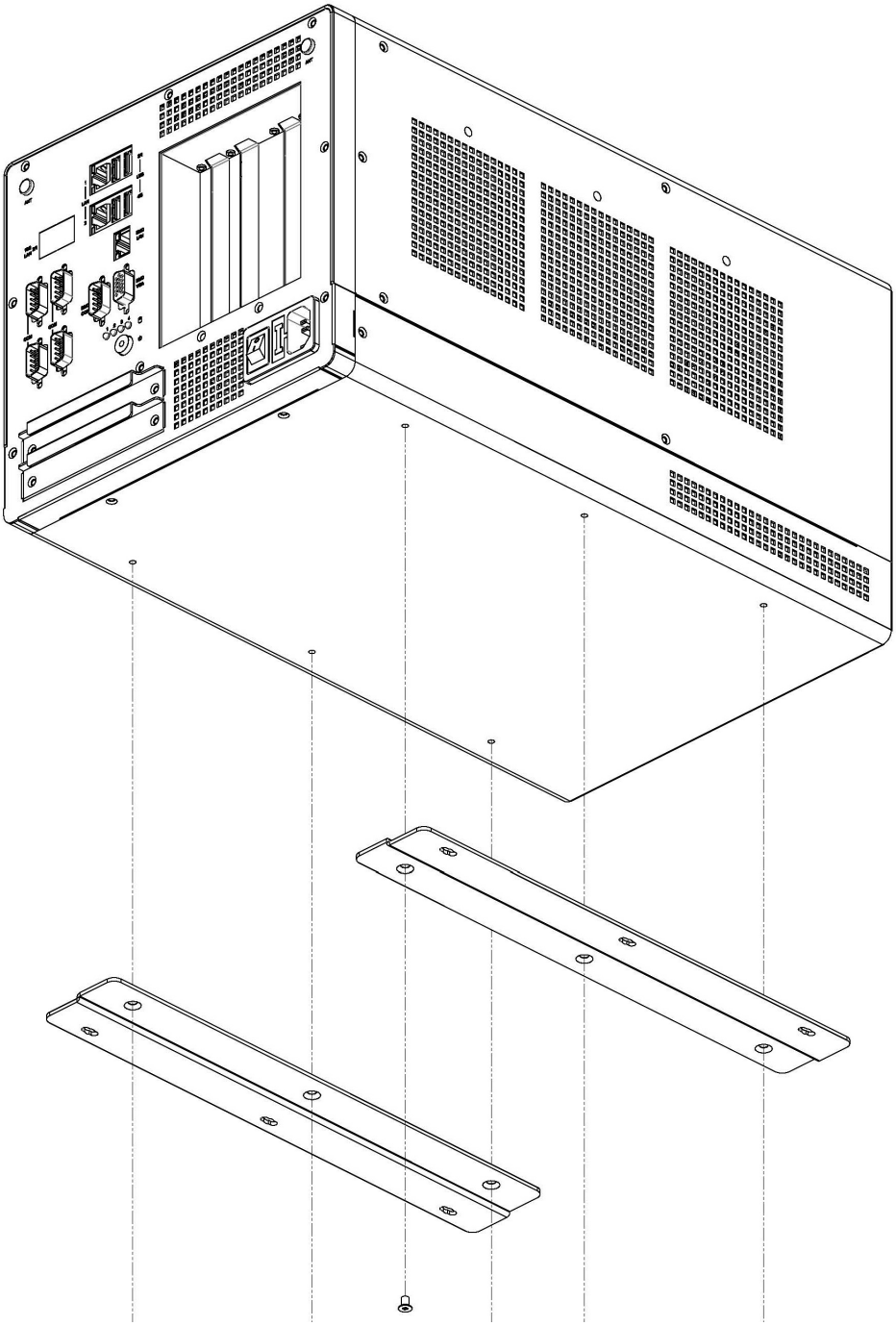
2.4.5 PClex16 Graphic Card Installation

1. Remove the top cover (2.4.1).
2. Remove the 2 horizontal bars on the top of the system.
3. Install the graphics card bracket using 2 screws
4. Install the top rubber on top horizontal bar to secure the graphics card. Install the bottom nut according to length of the graphics card.
5. Install the graphics card, secure it with a screw (M5X11L) on the bottom nut and connect the cable. If the cable is too short, slightly pull the cable outward.
6. Replace/return the 2 horizontal bars on the top of the system.
7. Replace the top cover and secure in place with 7 screws.



2.4.6 Mounting Kit Installation

1. Take out mounting kit and 6 x screws (M4x6L) from carton.
2. Screw each of the 3 x screws (M4x6L) on the left and right sides to secure the system horizontally.



2.4.7 Wide Operating Temperature Support

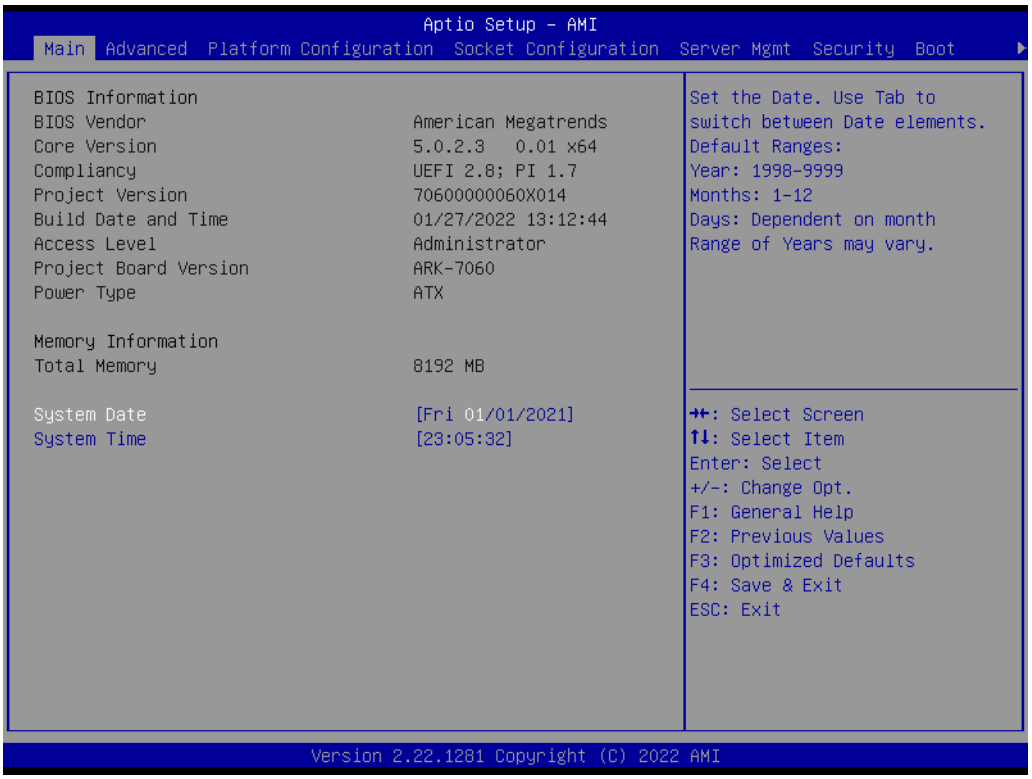
To make sure the system works well under 0 °C (32 °F) or over 50 °C (122 °F), please ensure your peripherals are i-grade. These support wide temperature operation.

Chapter 3

BIOS Settings

3.1 Introduction

AMIBIOS has been integrated into motherboards for over two decades. With the AMIBIOS Setup program, users can modify BIOS settings and control various system features. This chapter describes the basic navigation of the ARK-7060 BIOS setup screens.



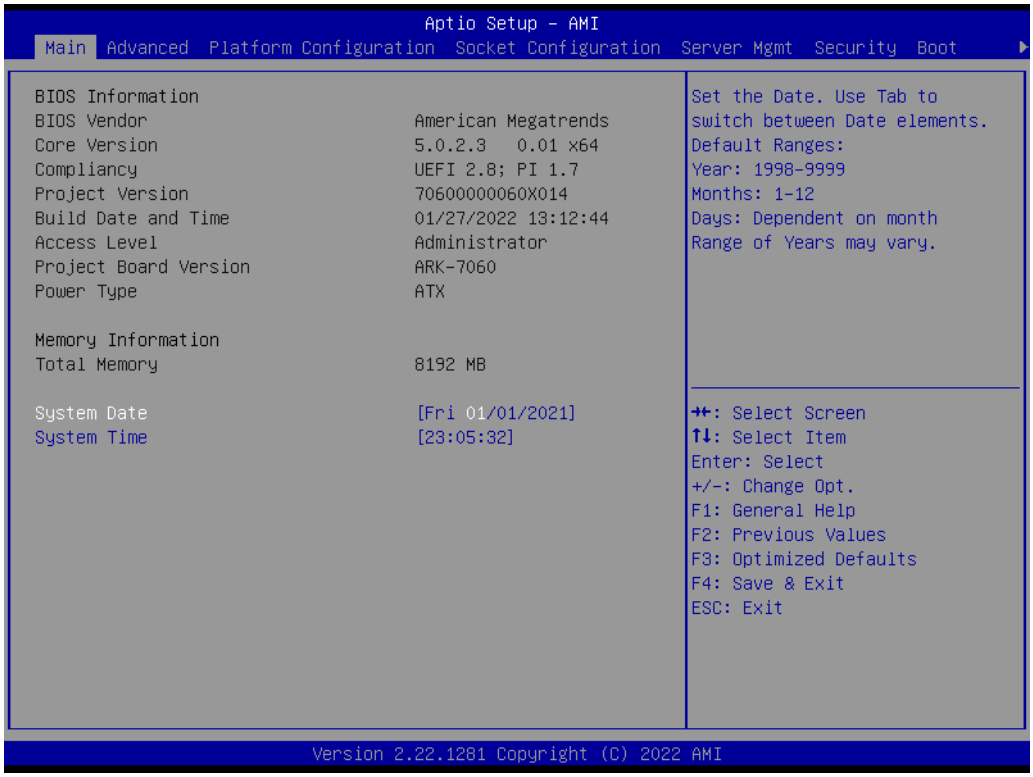
AMI's BIOS ROM has a built-in Setup program that allows users to modify the basic system configuration. This information is stored in flash ROM so it retains the Setup information when the power is turned off.

3.2 Entering the Setup

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

3.2.1 Main Setup

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



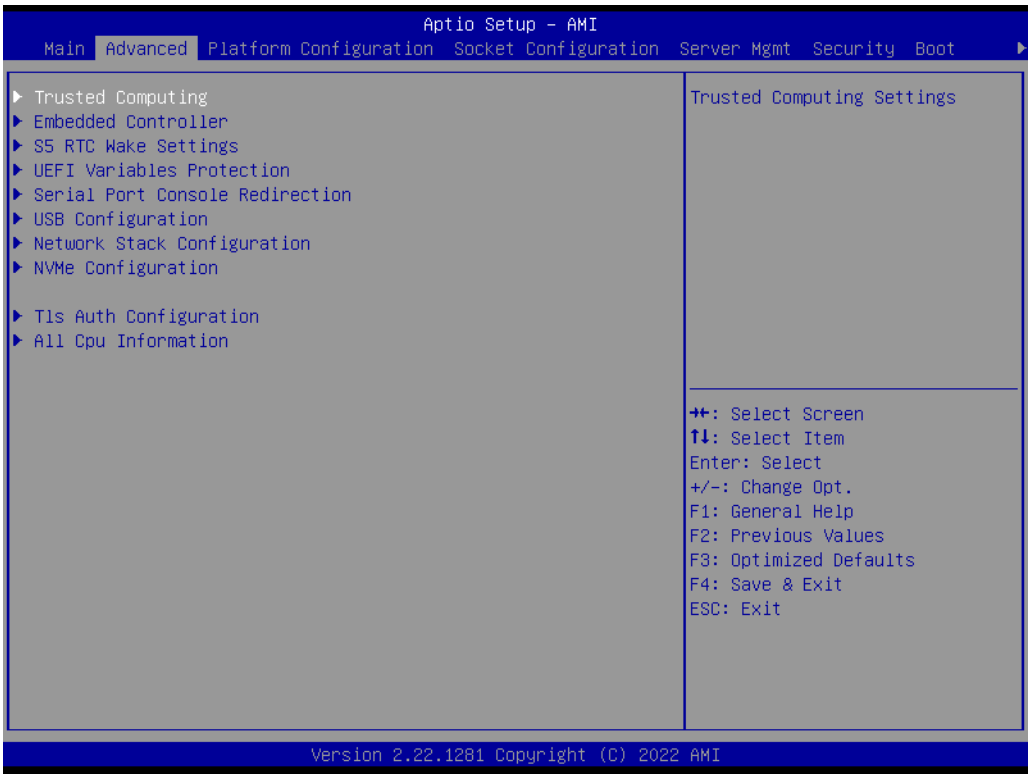
The Main BIOS setup screen has two main frames. The left frame displays all the options that can be configured. Grayed-out options cannot be configured; options in blue can. The right frame displays the key legend.

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

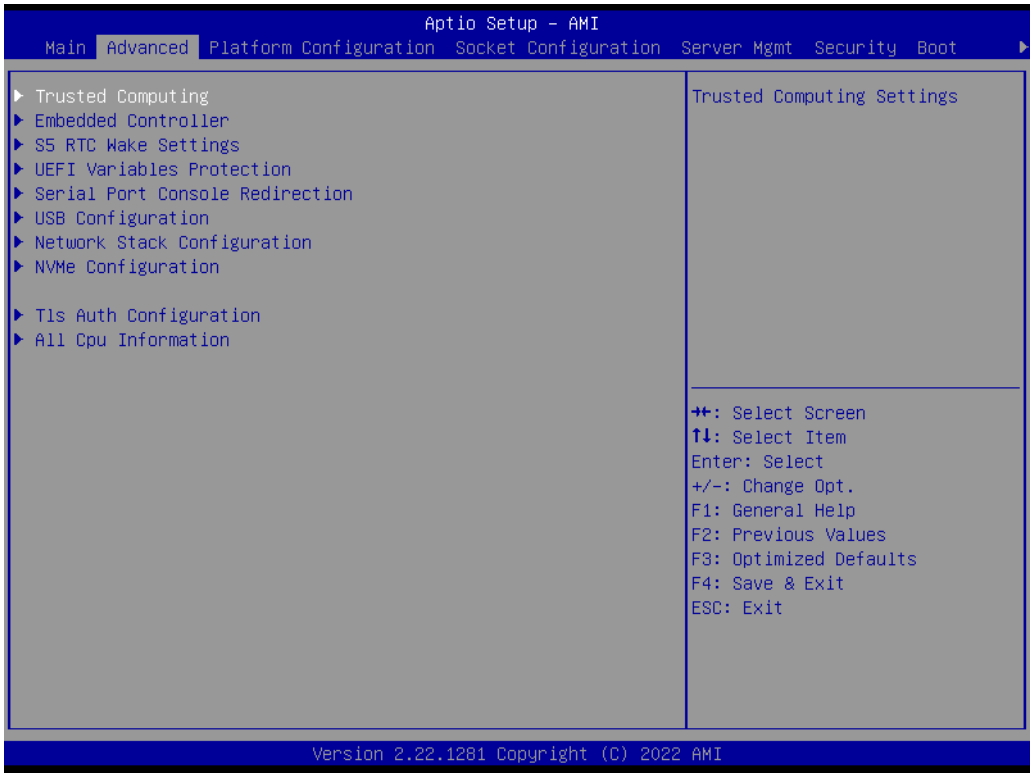
- **System time/System date**
  Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time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

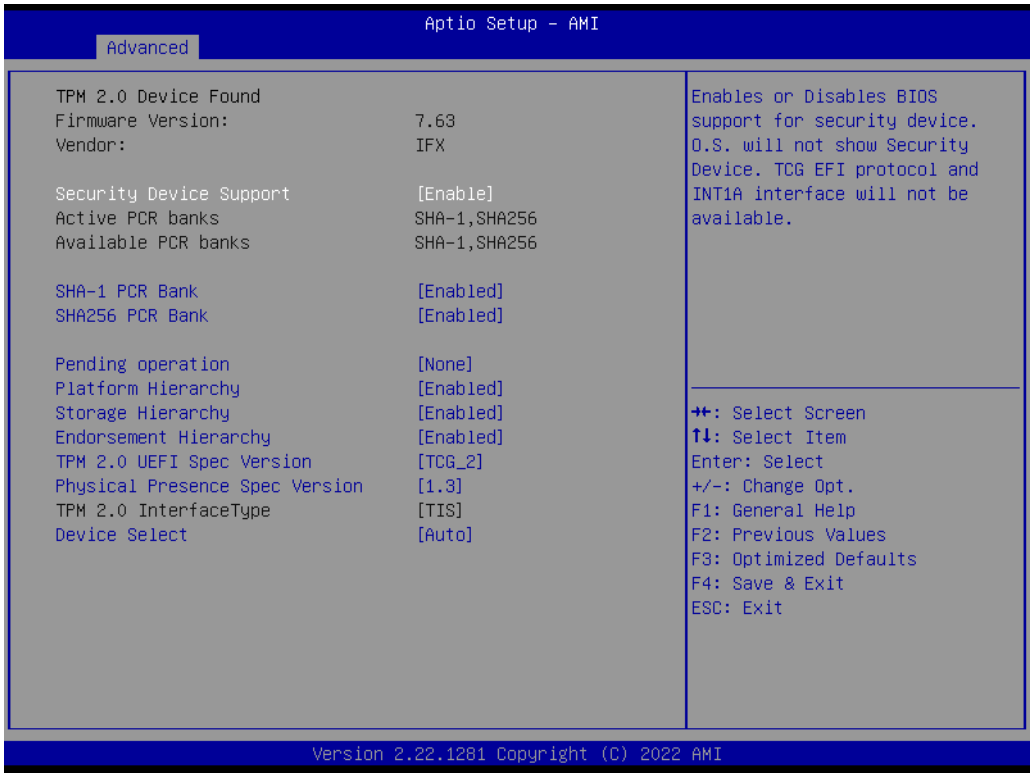
3.2.2 Advanced BIOS Features Setup

Select the Advanced tab from the ARK-3531 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 Trusted Computing

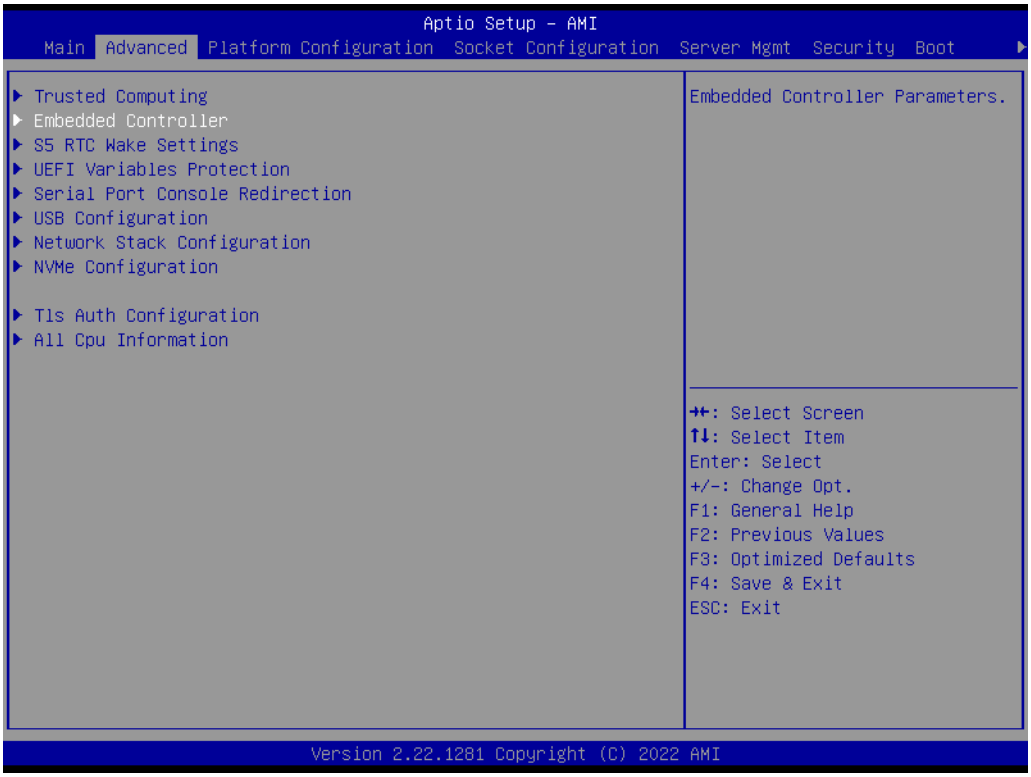


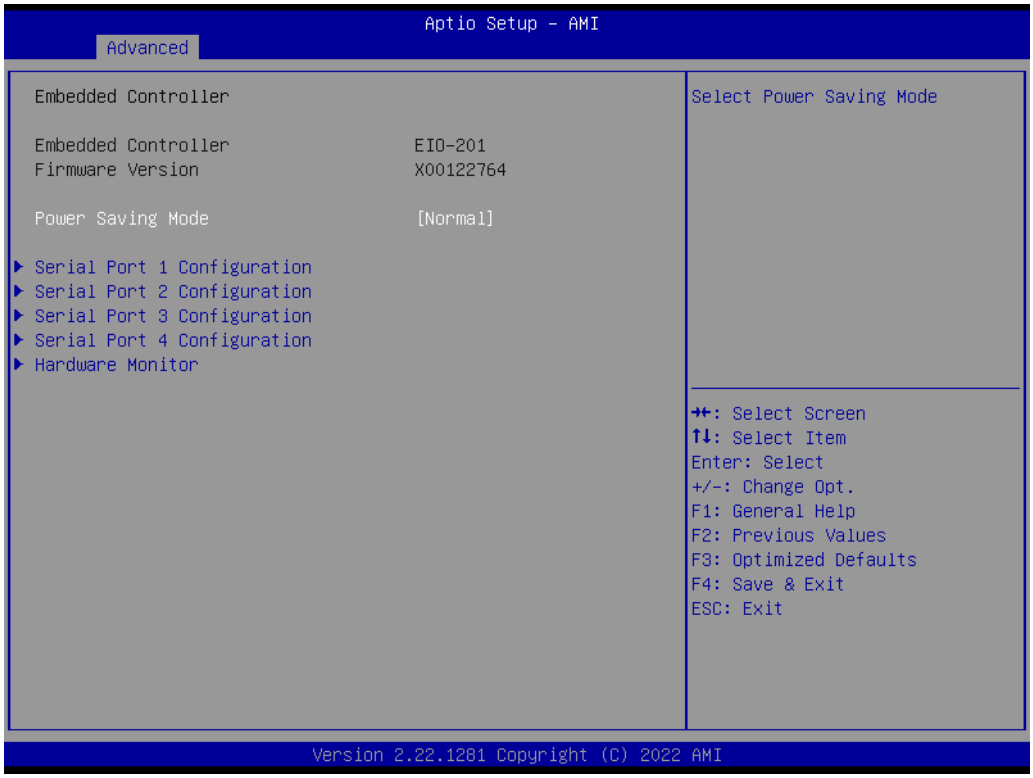


- **TPM Support**
  "Enable or Disable" TPM Support.
- **Security Device Support**
  Enables or Disables BIOS support for security device.

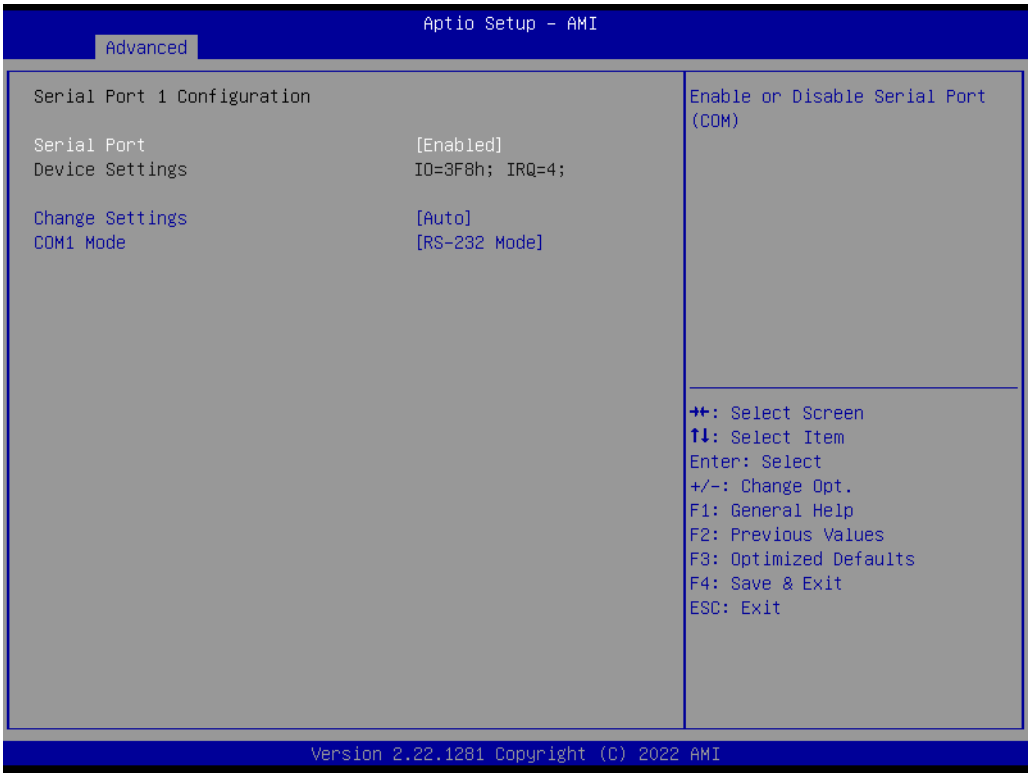
- **SHA-1 PCR Bank**
  Enable or Disable SHA-1 PCR Bank.
- **SHA256 PCR Bank**
  Enable or Disable SHA256 PCR Bank.
- **Pending Operation**
  Schedule an Operation for the Security Device. NOTE: Your Computer will reboot during restart in order to change State of Security Device.
- **Platform Hierarchy**
  Enable or Disable Platform Hierarchy.
- **Storage Hierarchy**
  Enable or Disable Storage Hierarchy.
- **Endorsement Hierarchy**
  Enable or Disable Endorsement Hierarchy.
- **TPM 2.0 UEFI Spec. Version**
  Select the TCG2 Spec Version Support. TCG_1_2:the Compatible mode for Win8/Win10. TCG_2:Support new TCG2 protocol and event format for Win10 or later.
- **Physical Presence Spec. Version**
  Select to Tell O.S. to support PPI Spec Version 1.2 or 1.3. Note some HCK tests might not support 1.3.
- **Device Selection**
  Select TPM 1.2 or TPM 2.0.

3.2.2.2 Embedded Controller Configuration

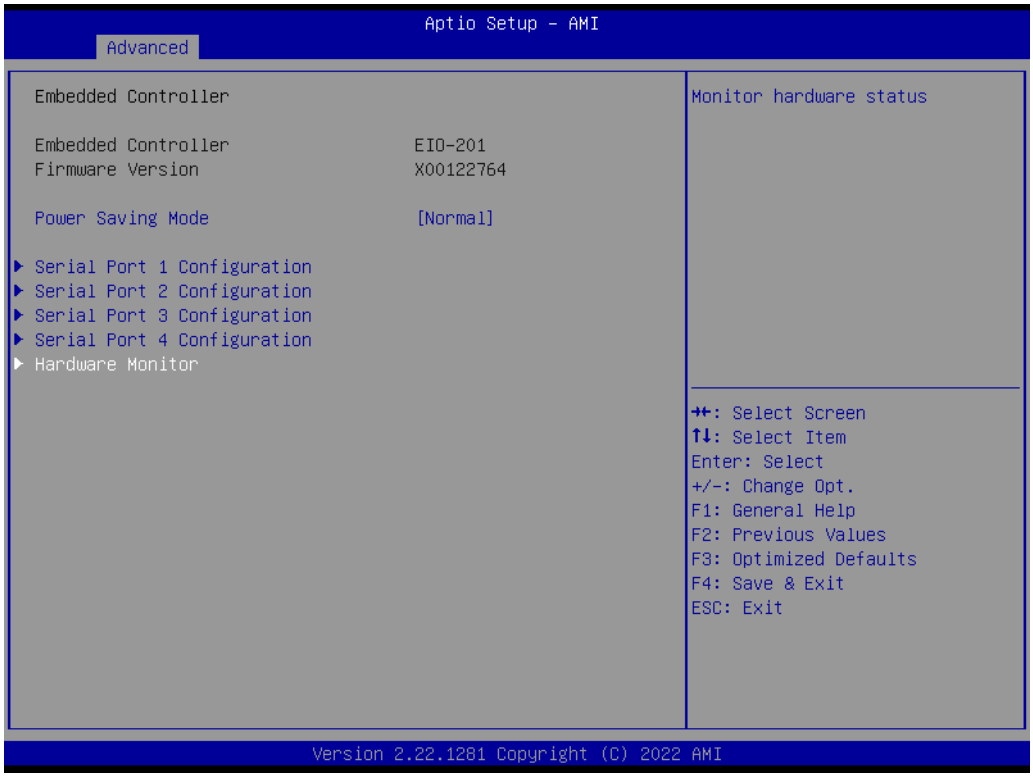


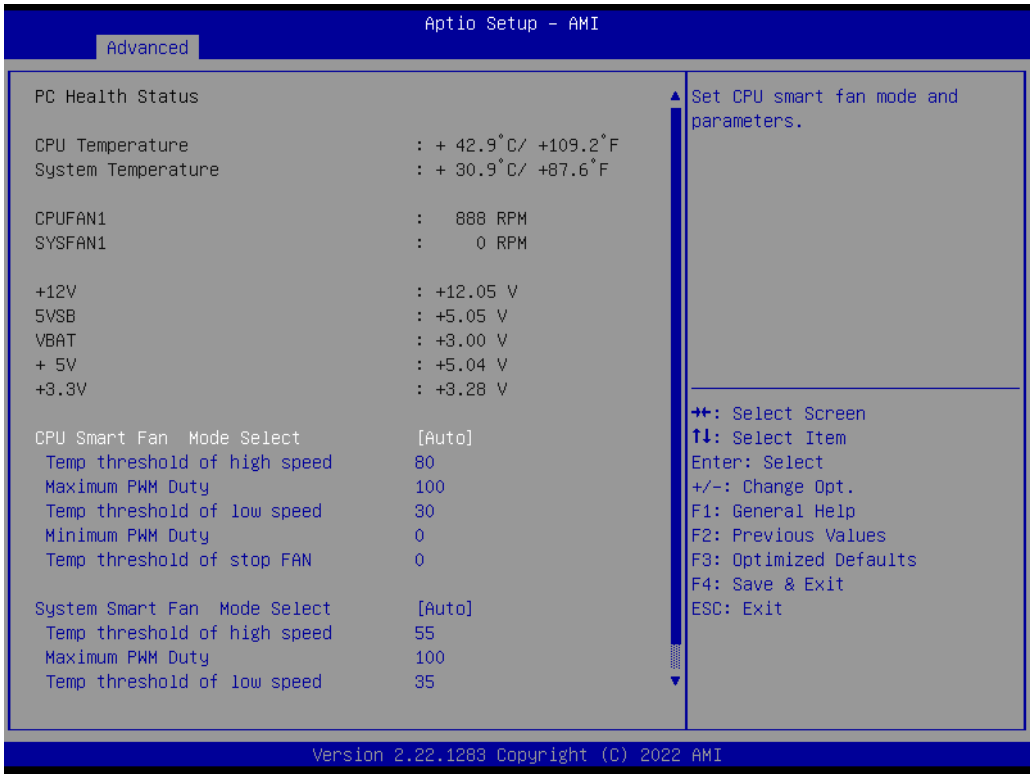


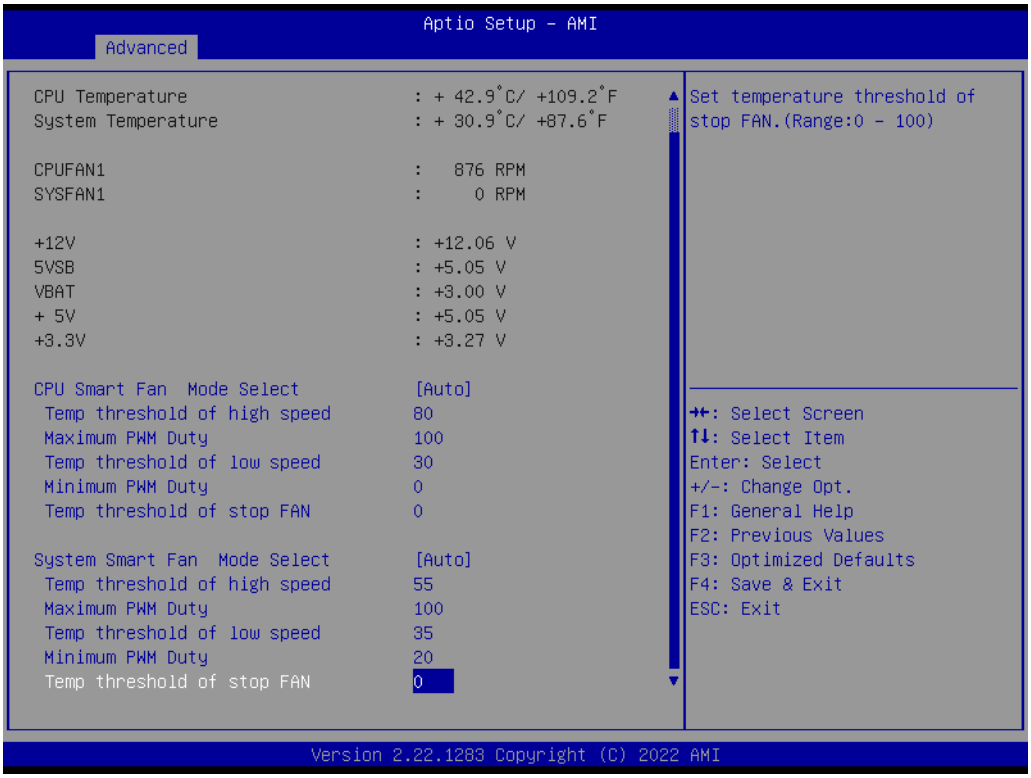
- **Power Saving Mode**
  This item allows users to set the board's power saving mode when off.



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

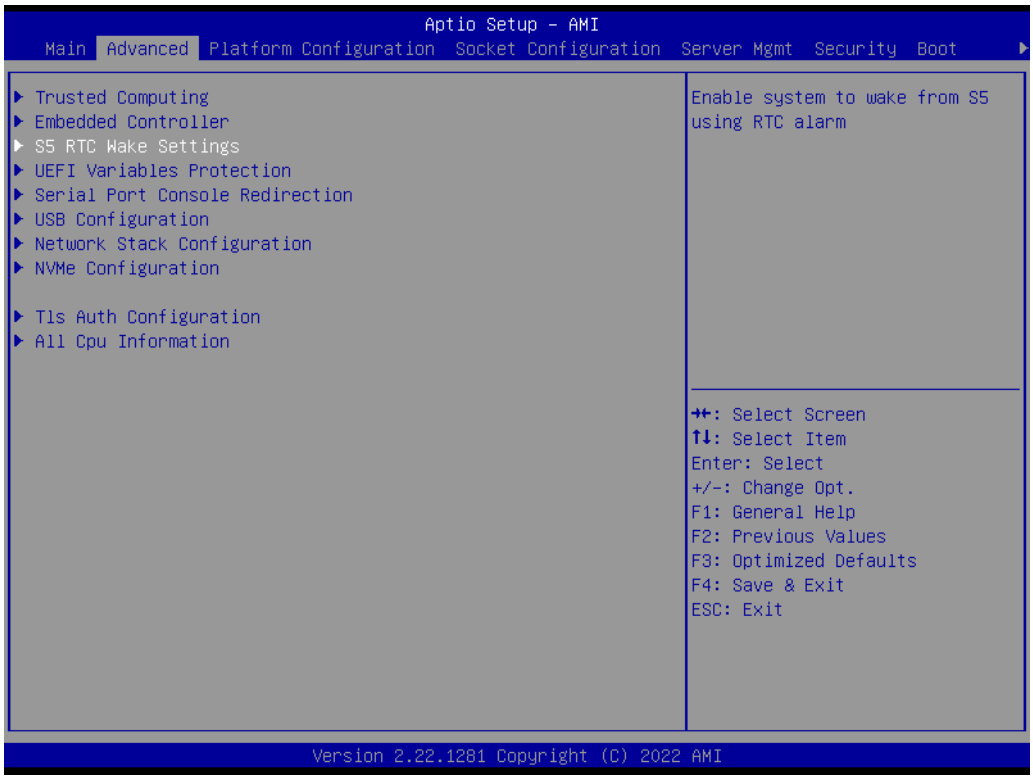

Aptio Setup – AMI
Advanced
Embedded Controller
Embedded Controller EIO-201
Firmware Version X00122764
Power Saving Mode [Normal]
Serial Port 1 Configuration
Serial Port 2 Configuration
Serial Port 3 Configuration
Serial Port 4 Configuration
Hardware Monitor
Monitor hardware status
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1281 Copyright (C) 2022 AMI

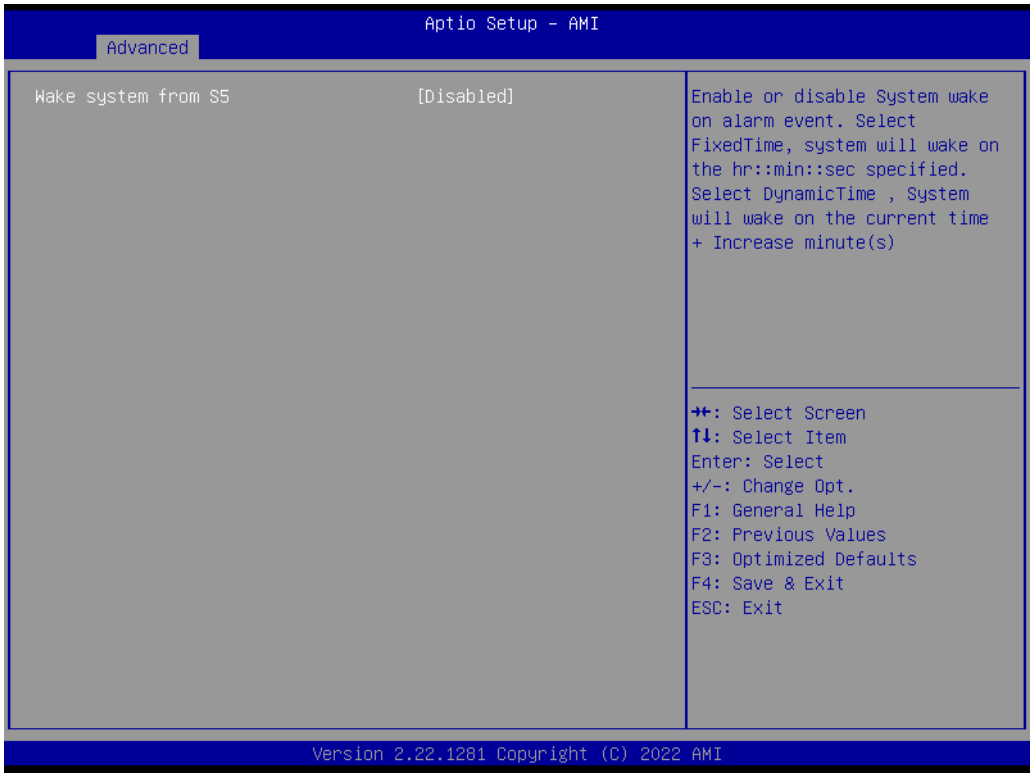

Aptio Setup – AMI
Advanced
PC Health Status
CPU Temperature : + 42.9°C/ +109.2°F
System Temperature : + 30.9°C/ +87.6°F
CPUFAN1 : 888 RPM
SYSFAN1 : 0 RPM
+12V : +12.05 V
5VSB : +5.05 V
VBAT : +3.00 V
+ 5V : +5.04 V
+3.3V : +3.28 V
CPU Smart Fan Mode Select [Auto]
Temp threshold of high speed 80
Maximum PWM Duty 100
Temp threshold of low speed 30
Minimum PWM Duty 0
Temp threshold of stop FAN 0
System Smart Fan Mode Select [Auto]
Temp threshold of high speed 55
Maximum PWM Duty 100
Temp threshold of low speed 35
Set CPU smart fan mode and parameters.
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1283 Copyright (C) 2022 AMI



- **Hardware Monitor**
  This page displays all information about system Temperature/Voltage/Current/Fan.
- **CPU/System Smart Fan Mode Select**
  Set CPU/System smart fan mode and parameters.
- **Temp threshold of high speed**
  Set temperature threshold of high speed. (Range: 0 ~ 100)
- **Maximum PWM Duty**
  Set maximum PWM Duty output value. (Range: 0 ~ 100)
- **Temp threshold of low speed**
  Set temperature threshold of low speed. (Range: 0 ~ 100)
- **Minimum PWM Duty**
  Set minimum PWM Duty output value. (Range: 0 ~ 100)
- **Temp threshold of stop FAN**
  Set temperature threshold of stop FAN. (Range: 0 ~ 100)

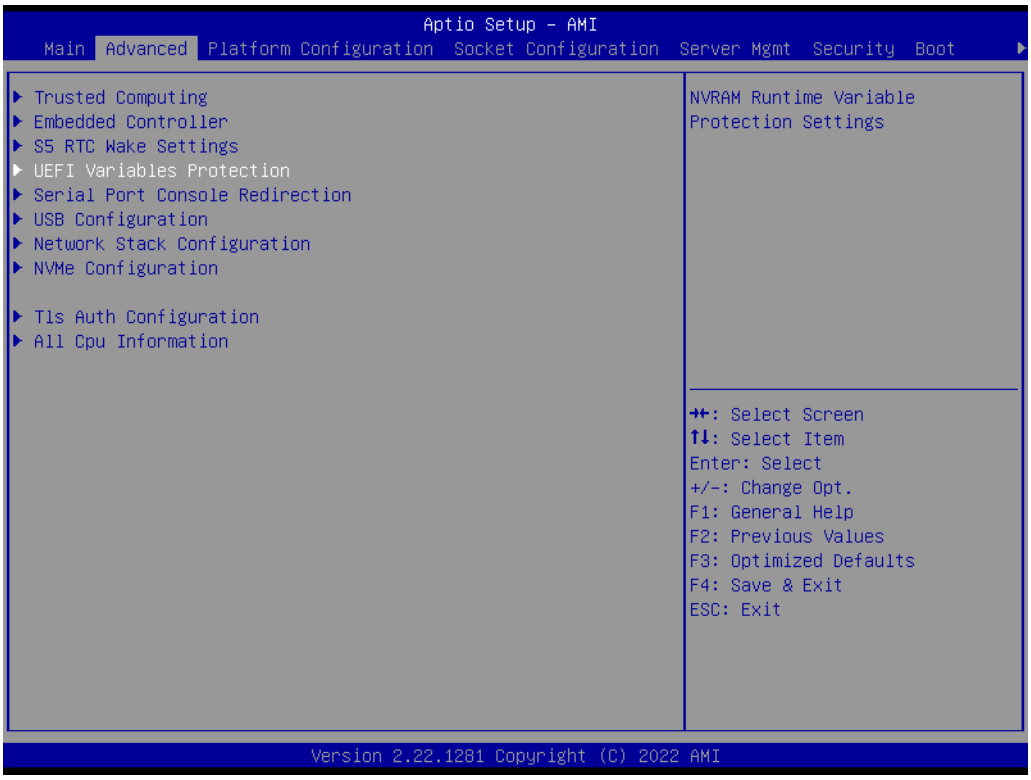
3.2.2.3 S5 RTC Wake Settings





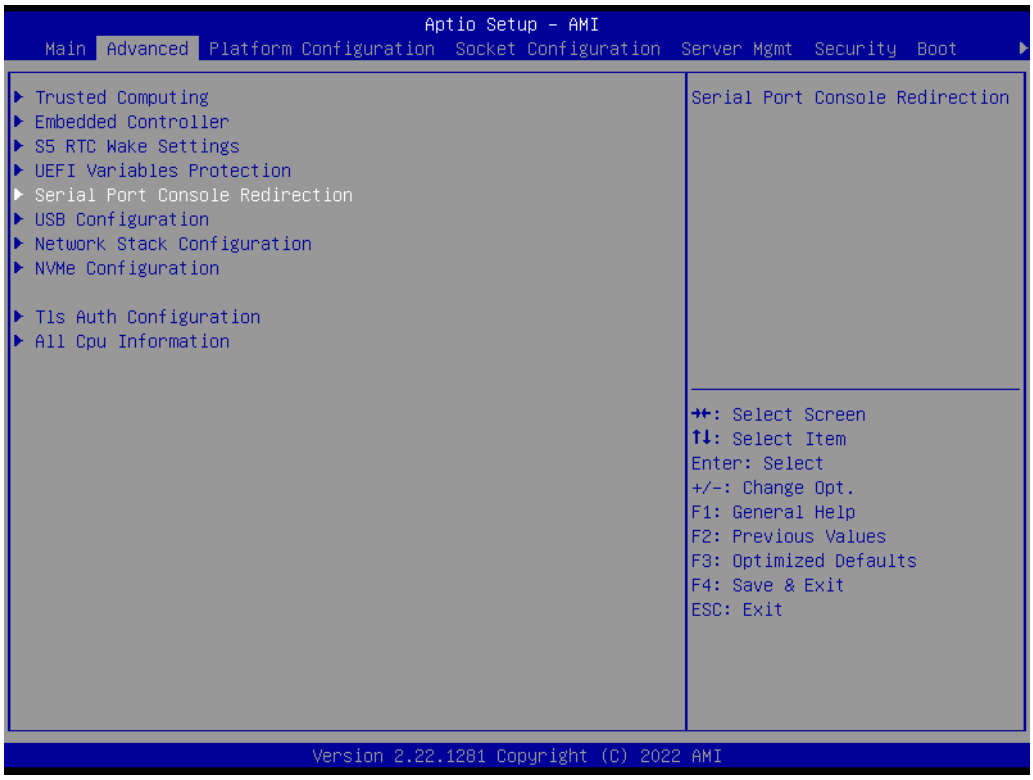
- **Wake System From S5**
  Enable or disable System wake on alarm event. Select Fixed Time, system will wake on the hr::min::sec specified.

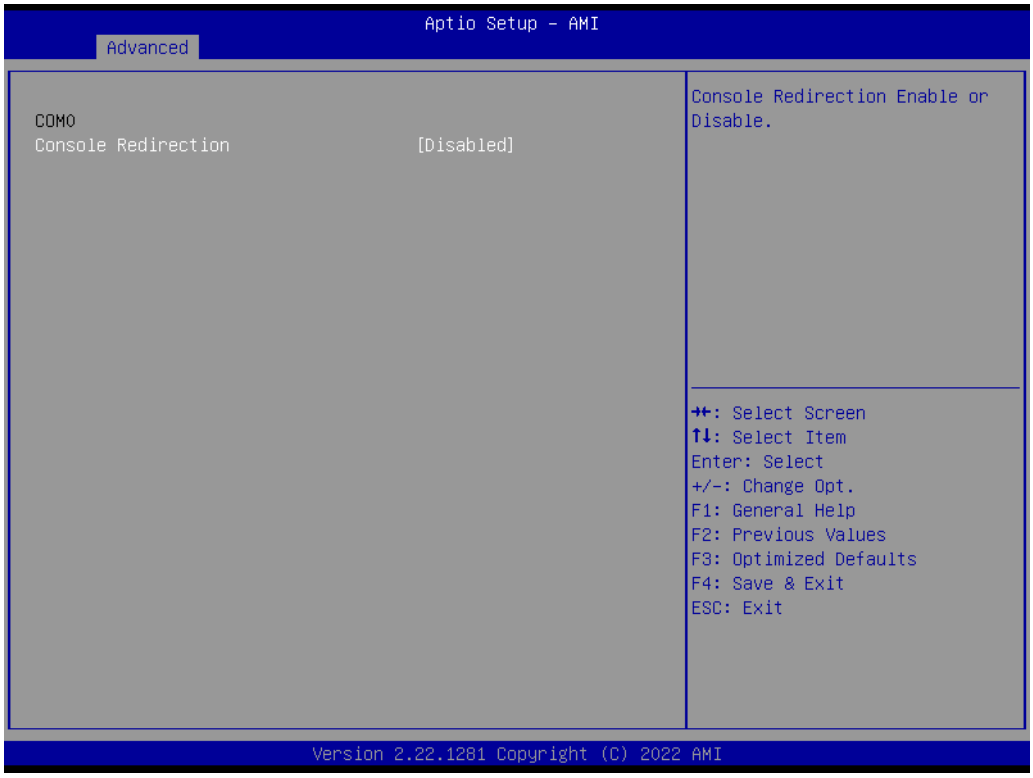
3.2.2.4 UEFI Variables Protection



- **Password protection of Runtime**
  Control the NVRAM Runtime Variable protection through System Admin Password.

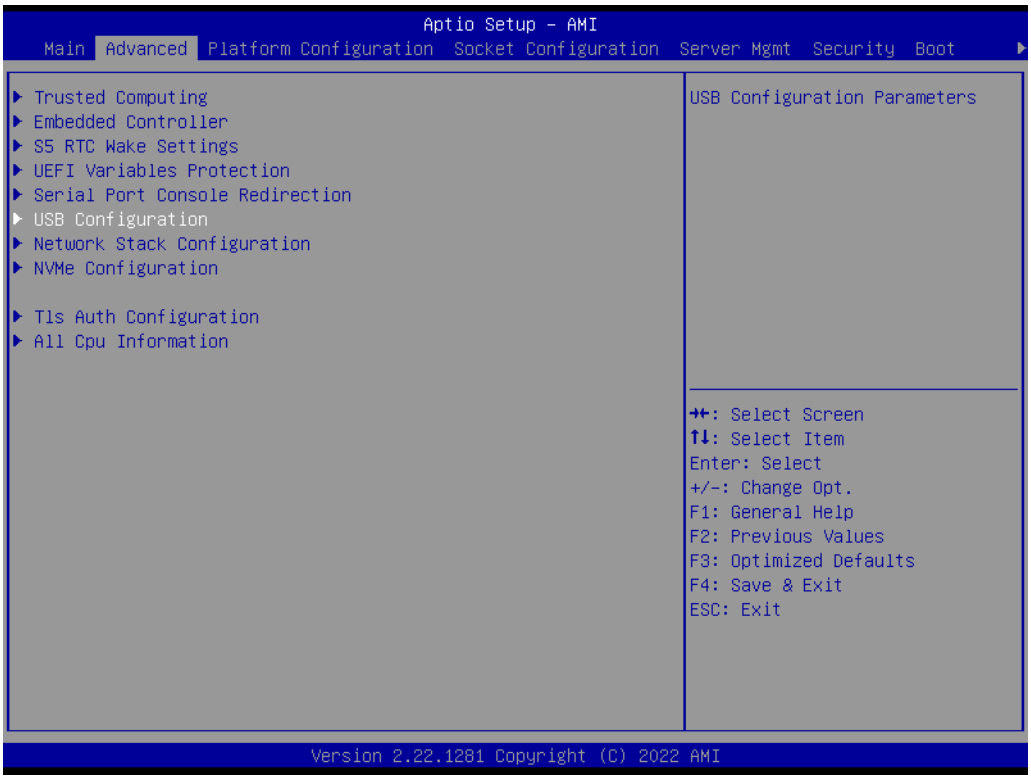
3.2.2.5 Serial Port Console Redirection

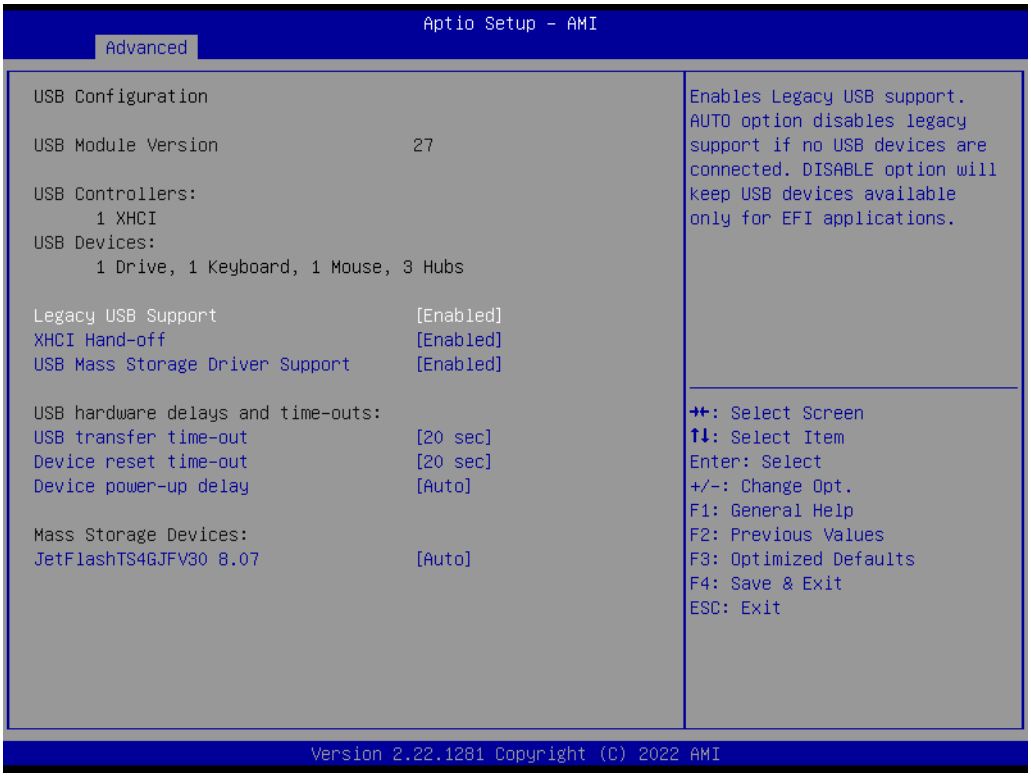




- **Console Redirection**
  This item allows users to enable or disable console redirection for Microsoft Windows Emergency Management Services (EMS).

3.2.2.6 USB Configuration

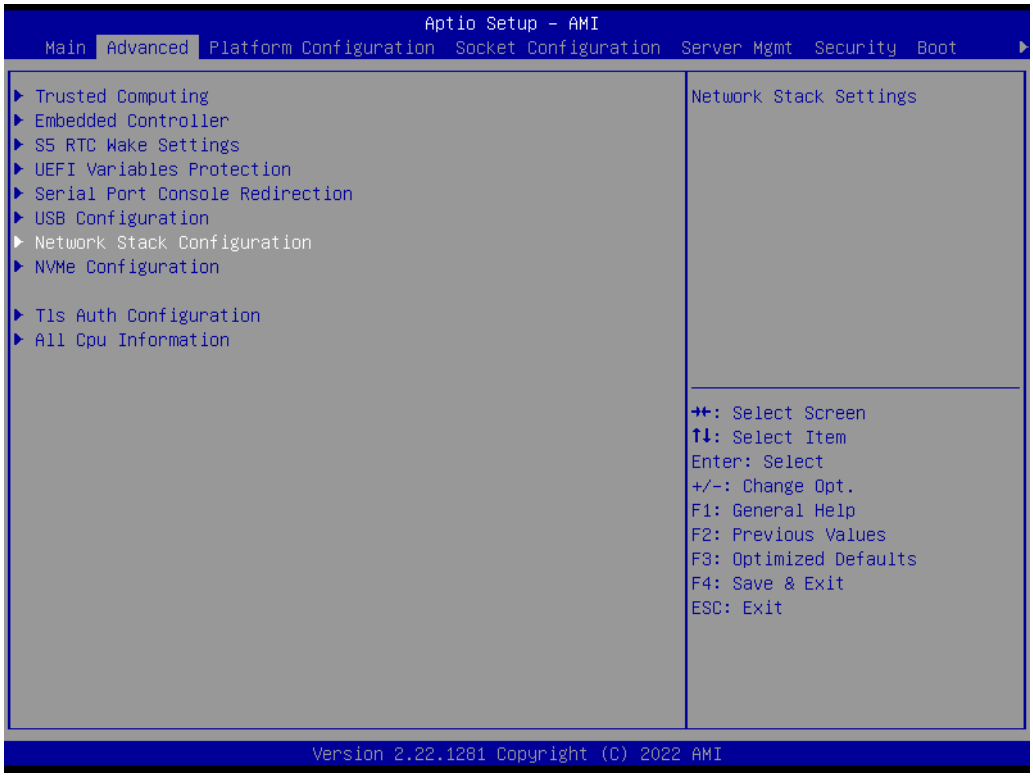




- **Legacy USB Support**
  This supports USB devices with legacy OS such as DOS. When choosing “AUTO”, the system will automatically detect USB devices. It will enable USB legacy mode when a USB device is plugged in and disable USB legacy mode when no USB device is plugged in.

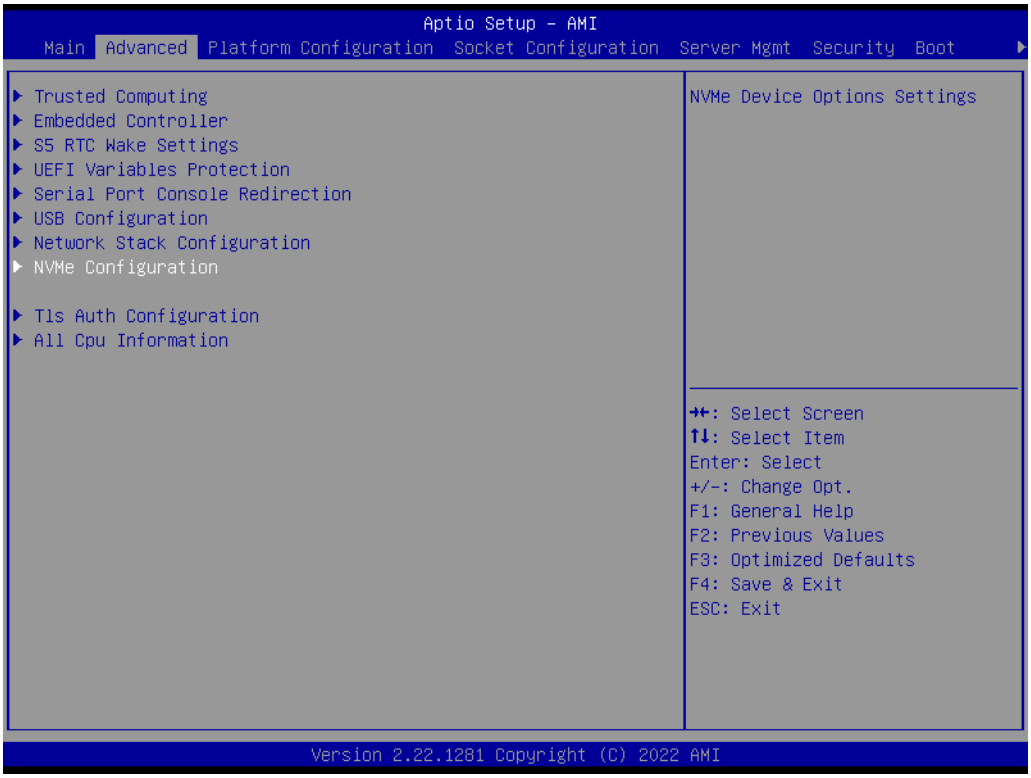
- **XHCI Hand-off**
  This is a workaround for OS without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.
- **USB Mass Storage Driver Support**
  "Enable or Disable" USB Mass Storage driver support.
- **USB Transfer Time-Out**
  Allows you to select the USB transfer time-out value. [1,5,10,20sec].
- **Device Reset Time-Out**
  Allows you to select the USB device reset time-out value. [10,20,30,40sec].
- **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 take from Hub descriptor.
- **Mass Storage Devices**
  Mass storage device emulation type. "Auto" enumerates device according to their media format. Optical drives are emulated as "CD-ROM"', drives with no media will be emulated according to a drive type.

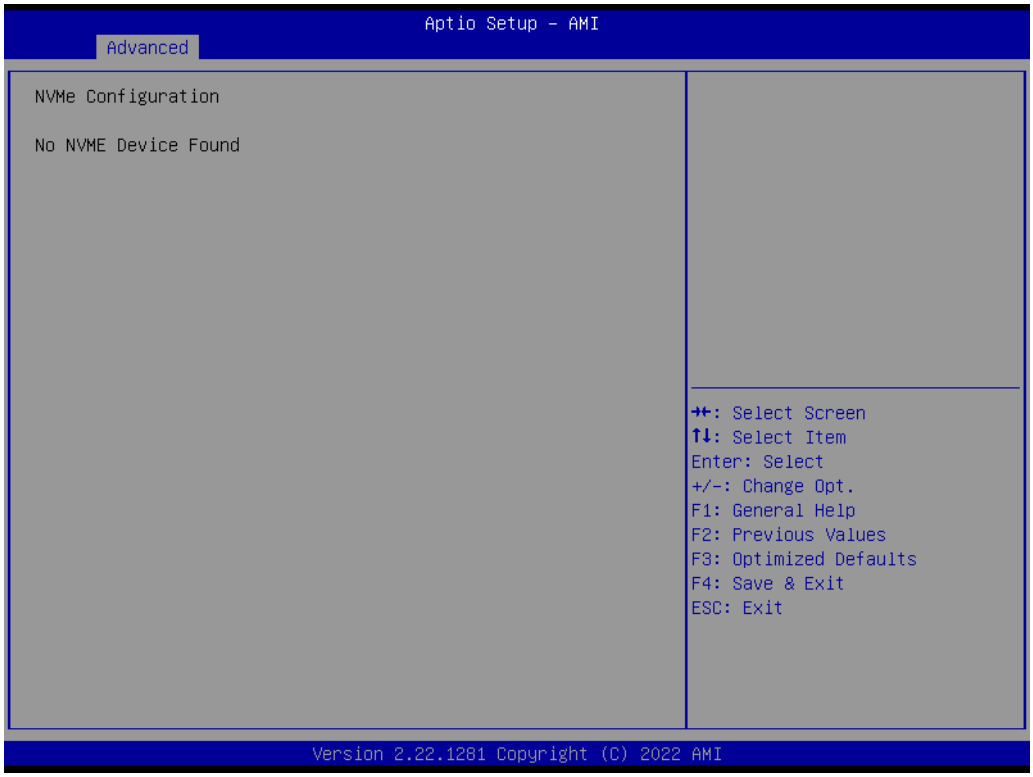
3.2.2.7 Network Stack Configuration



- **Network Stack**
  "Enable or Disable" UEFI Network Stack.

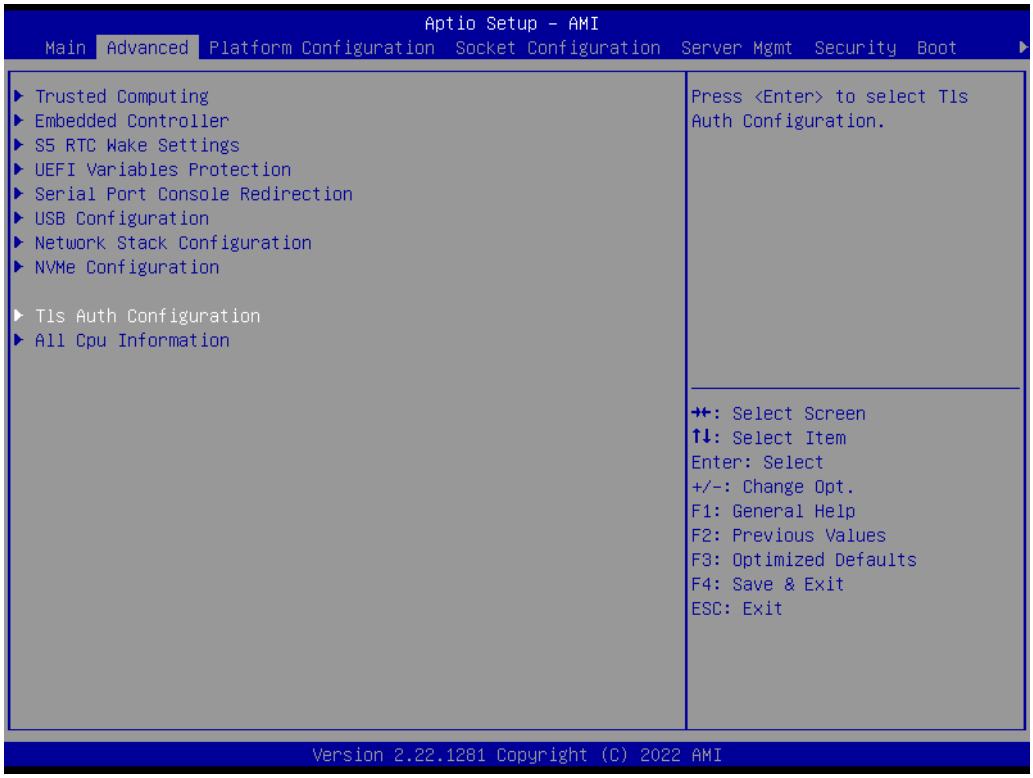
3.2.2.8 NVMe Configuration

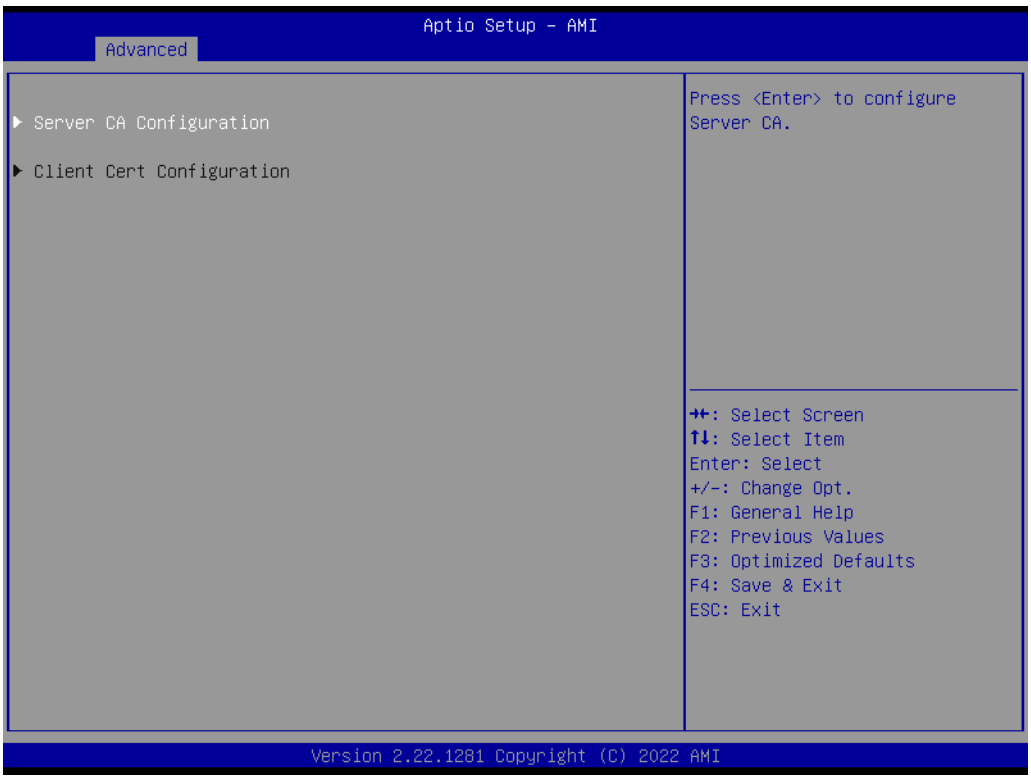




- **NVMe Configuration**
  Display device information of NVMe. E.g model name/size.

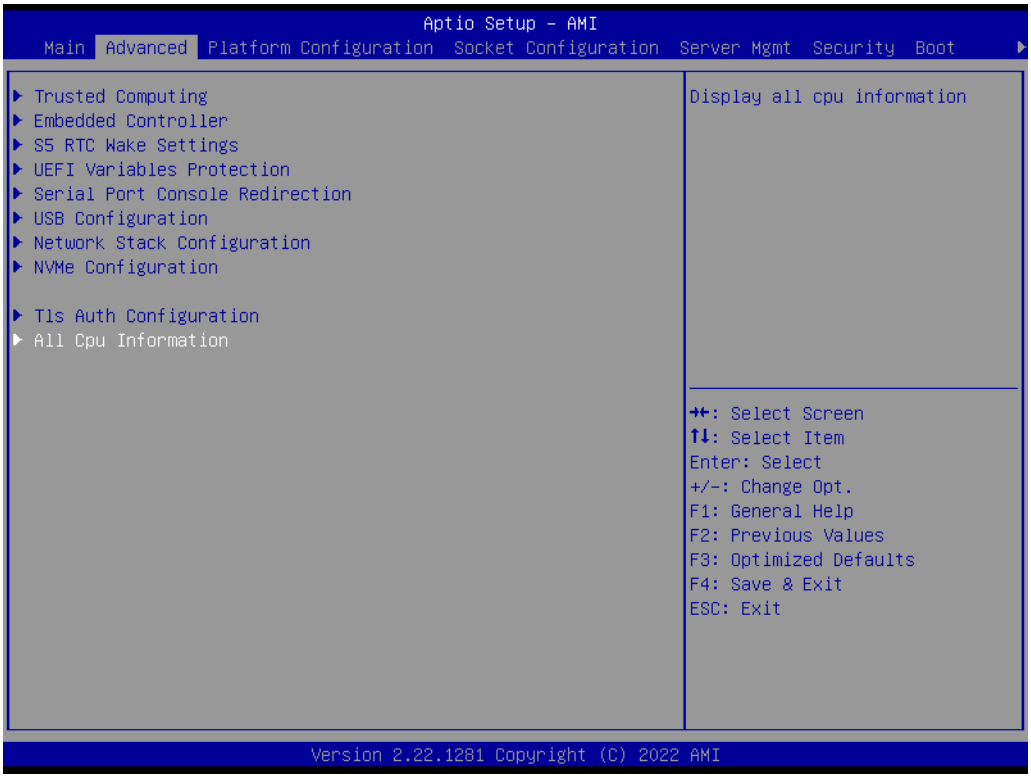
3.2.2.9 Tls Auth Configuration

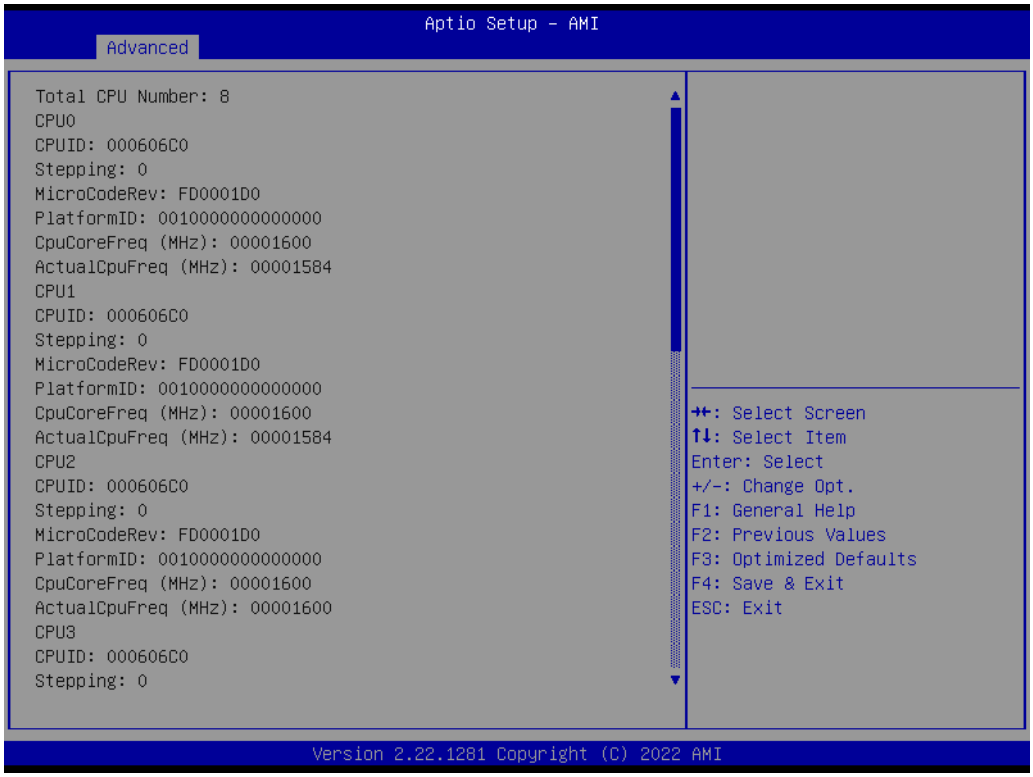




- **Server CA Configuration**
  Configure a server CA (Certificate Authority) settings.
- **Client Cert Configuration**
  Configure Client Cert settings. Client cert configuration is unsupported currently.

3.2.2.10 All CPU Information

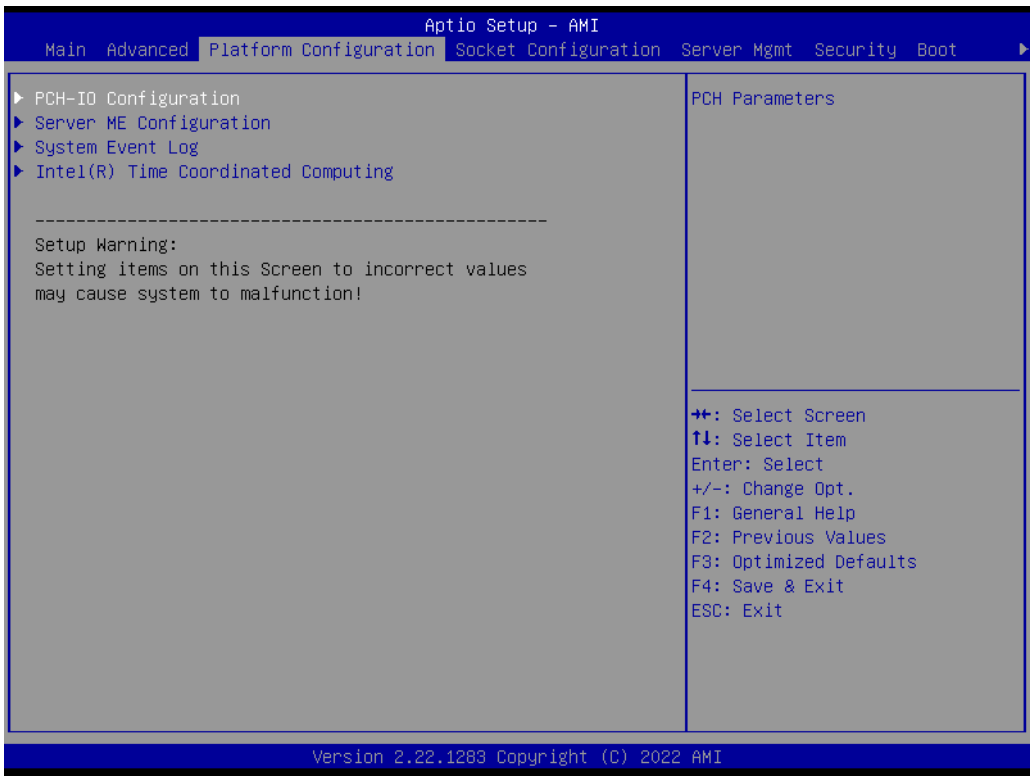


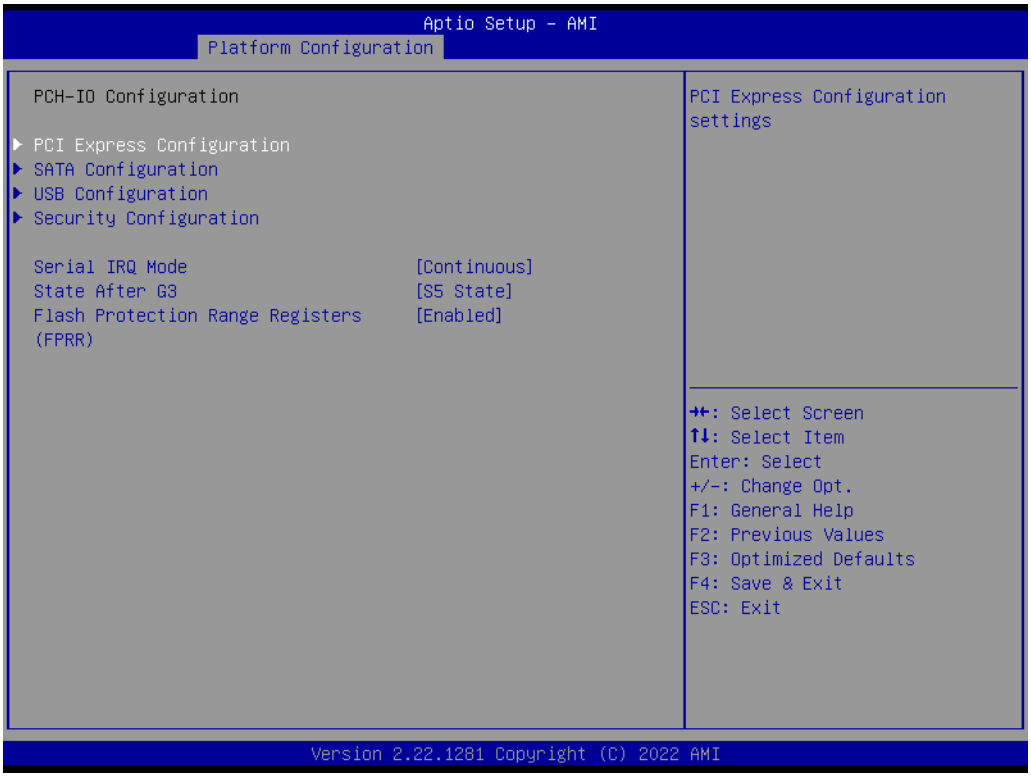


Display the information of each CPU core.

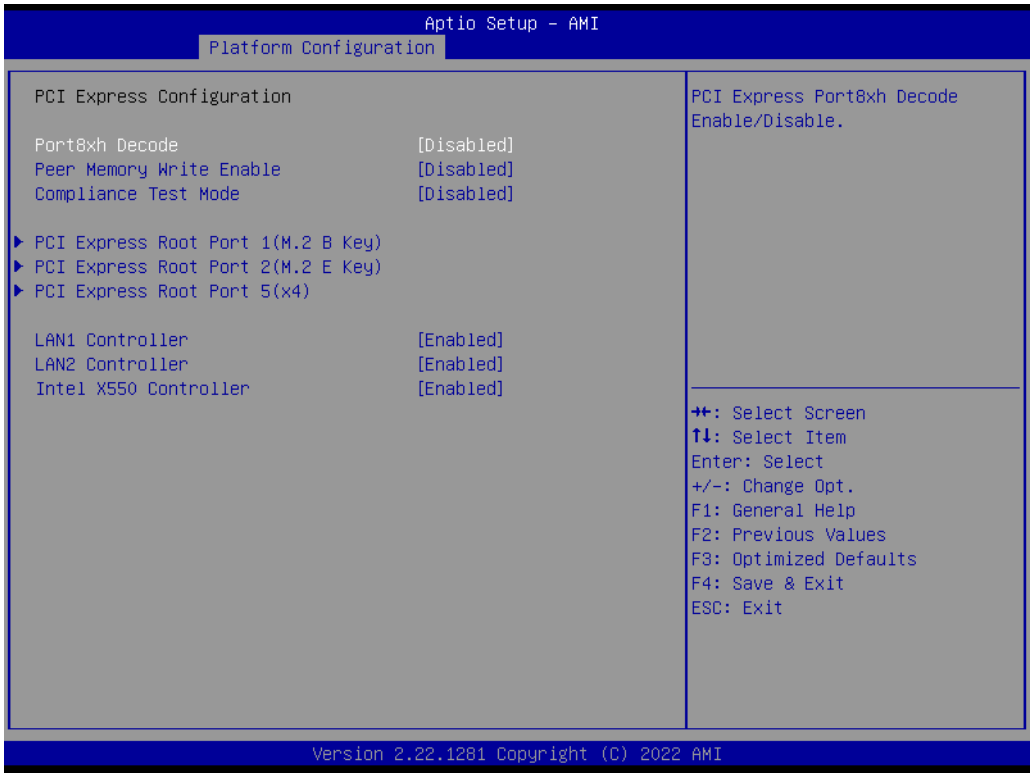
3.2.3 Platform Configuration

3.2.3.1 PCH-IO Configuration

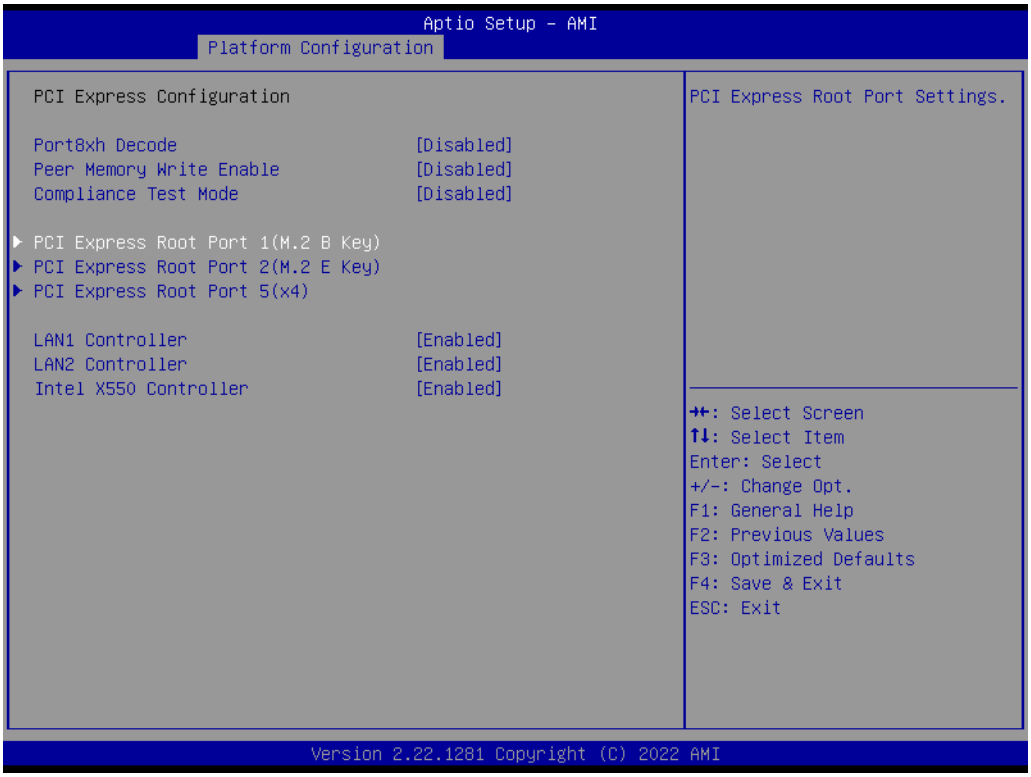


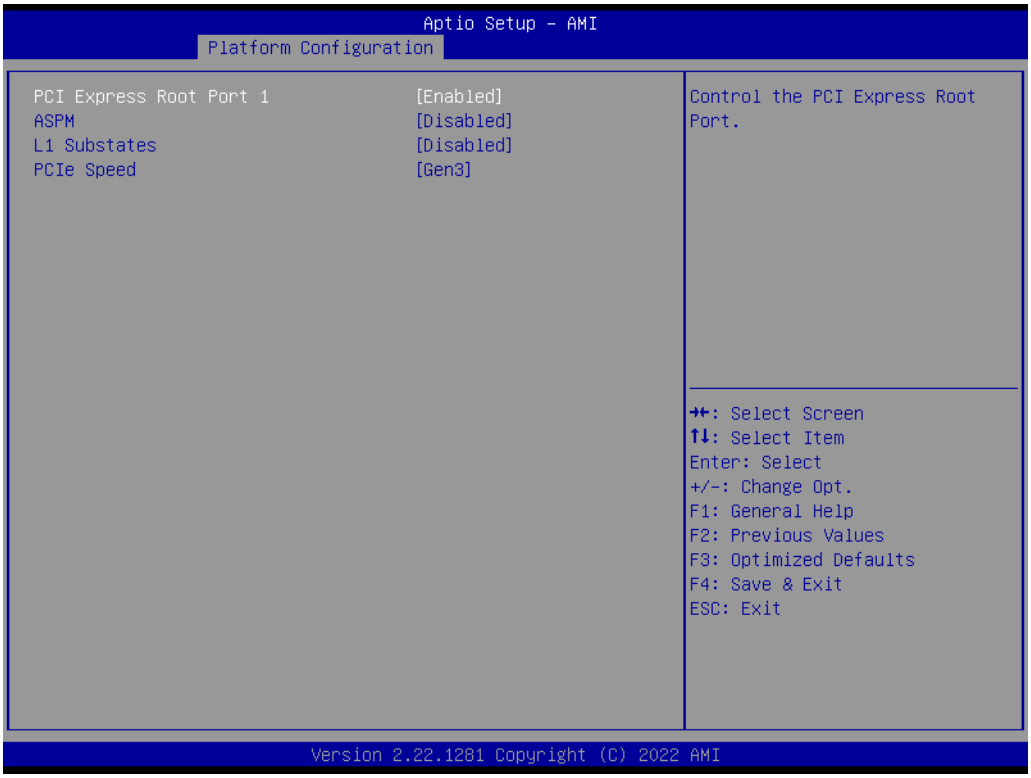


- **Serial IRQ Mode**
  Configure Serial IRQ Mode.
- **State After G3**
  Specify what state to go to when power is re-applied after a power failure (G3 state).
- **Flash Protection Range Registers (FPRR)**
  Enable Flash Protection Range Registers.



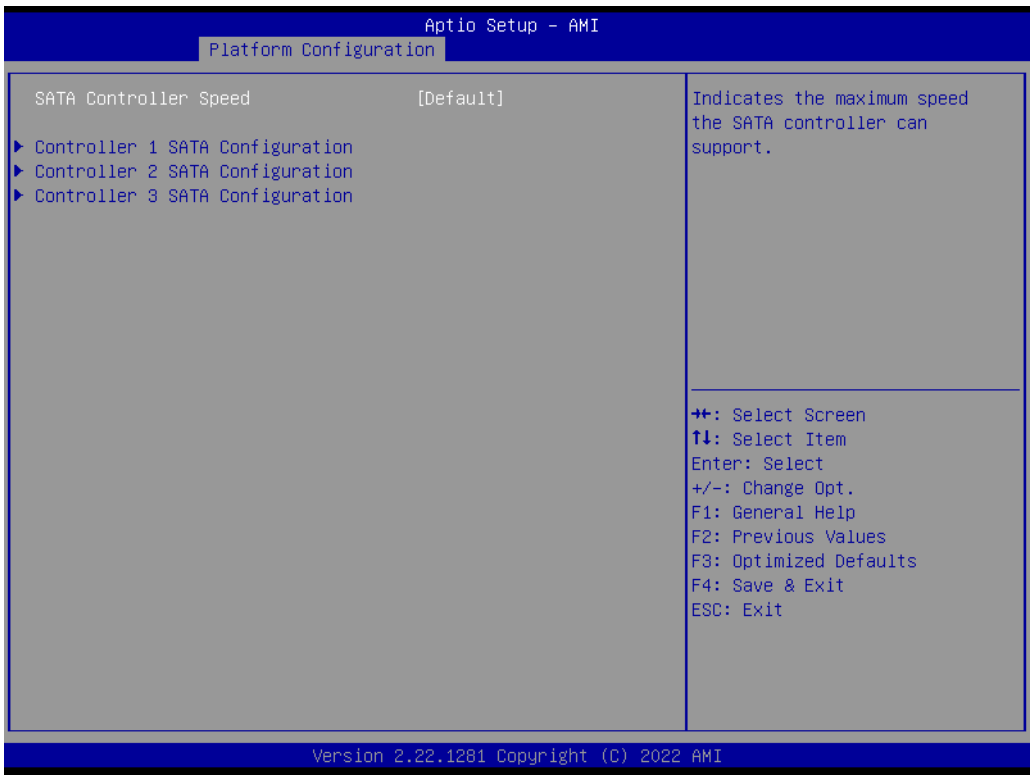
- **PCI Express Configuration**
  - **Port8xh Decode**
    Enable/Disable PCI Express Port8xh Decode.
  - **Peer Memory Write Enable**
    Enable/Disable Peer Memory Write.
  - **Compliance Test Mode**
    Enable when using Compliance Load Board.
  - **LAN1/LAN2 Controller**
    Enable/Disable on board LAN1/LAN2 from Intel i210 Controller support.
  - **Intel X550 Controller**
    Enable/Disable on board LAN3/LAN4 from Intel X550 Controller support. (LAN3/LAN4 are optional by AMO-I031)





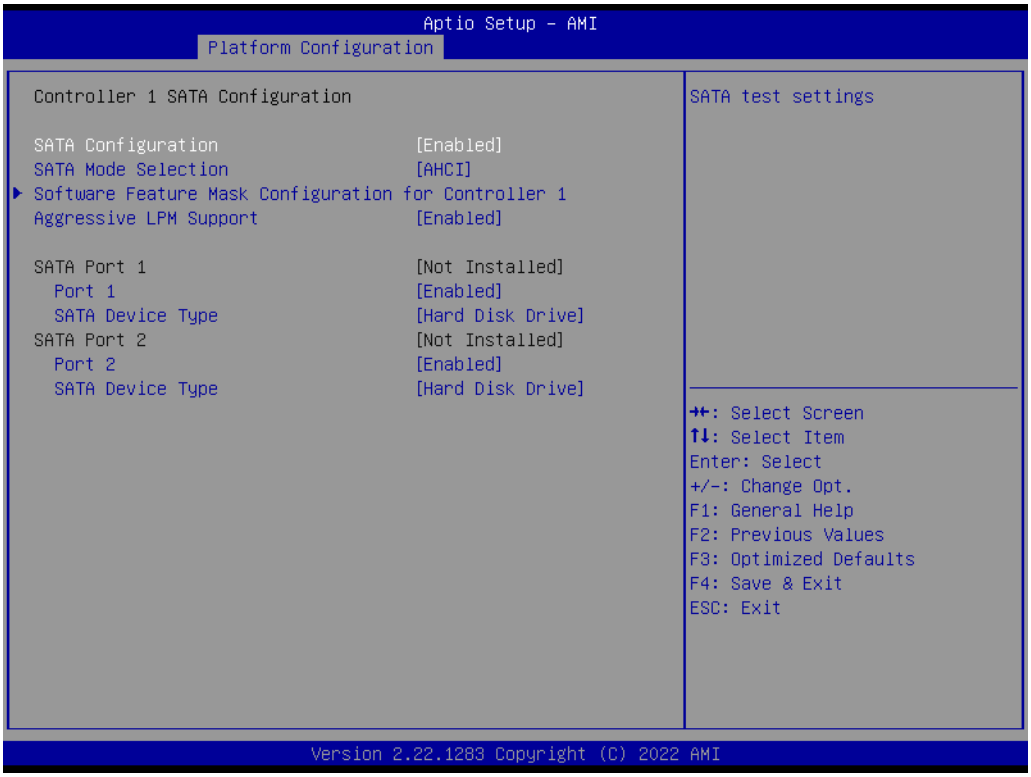
- **PCI Express Root Port**
  Configure PCI Express Root Port Settings.
- **ASPM**
  PCI Express Active State Power Management settings.
- **L1 Substates**
  PCI Express L1 Substates settings.

– **PCIe Speed**
Configure PCIe Speed. Auto is equal to Gen2 or Gen3 depending on DTR soft strap.

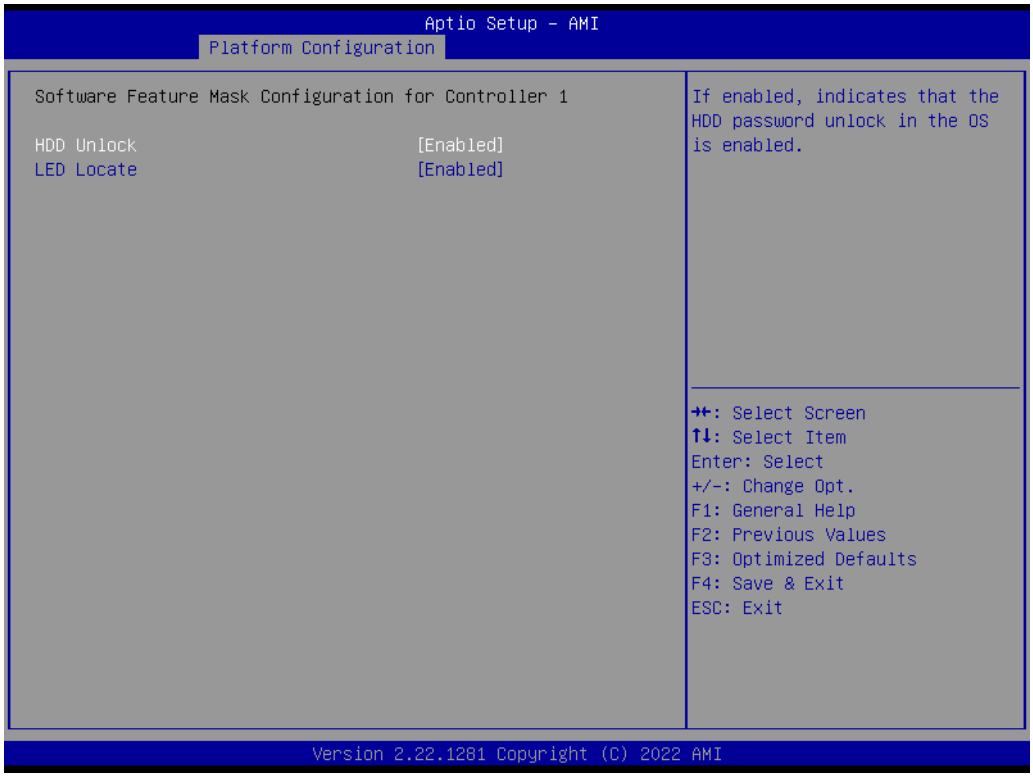


■ **SATA Configuration**

– **SATA Controller Speed**
Indicates the maximum speed the SATA controller can support.

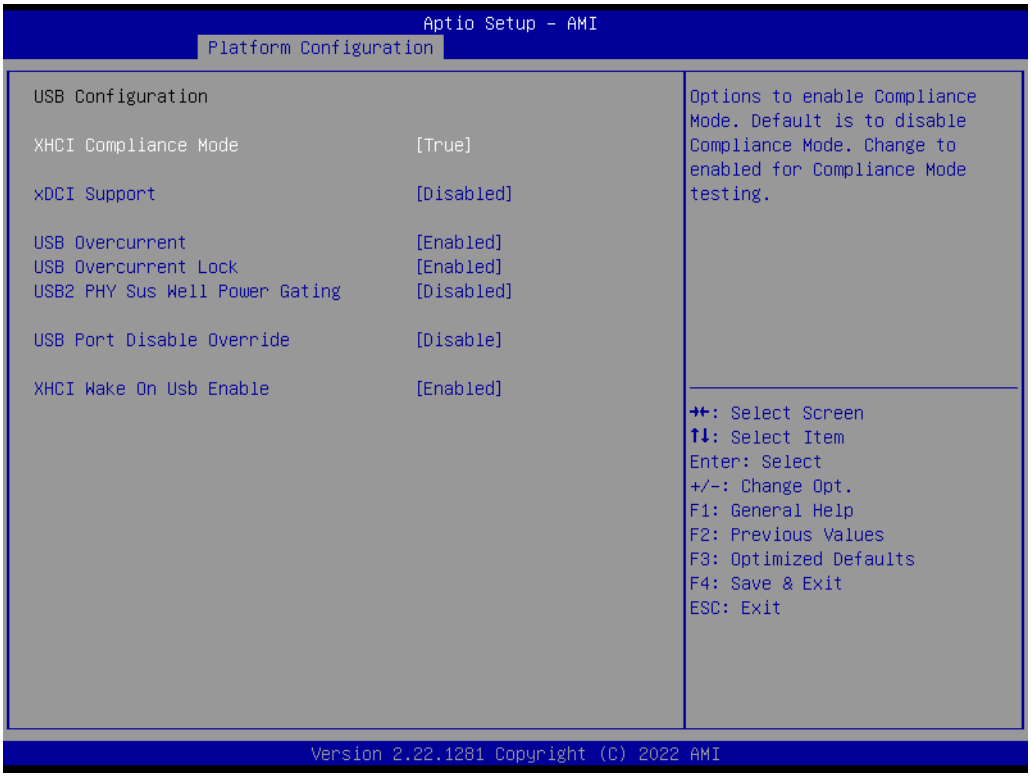


- **SATA Configuration**
  Enable/Disable SATA controller.
- **SATA Mode Selection**
  Determine how SATA controllers operate.
- **Aggressive LPM support**
  Enables/Disables SATA Aggressive Link Power Management. This item will appear when "AHCI" or "RAID" is selected.
- **SATA port 1/2/3/4**
  Enable/disable SATA port. SATA port 3 & 4 are optional.



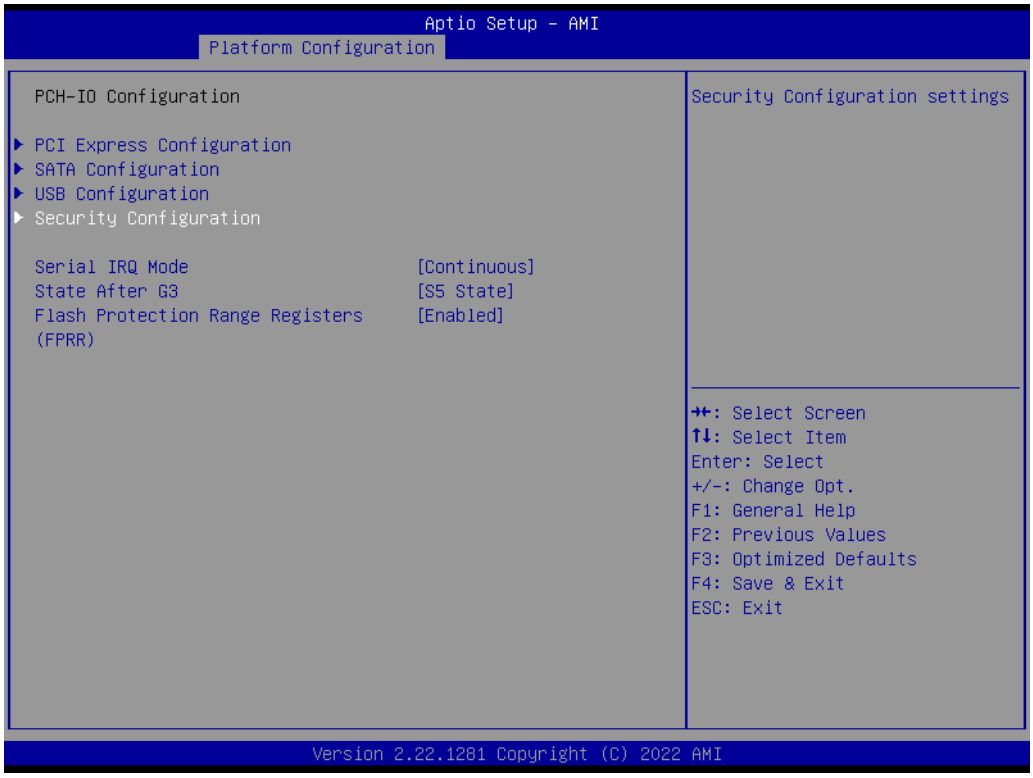
– **HDD Unlock**
  If enabled, it indicates that the HDD password unlock in the OS is enabled.
– **LED Locate**
  If enabled, it indicates that the LED/SGPIO hardware is attached and ping to locate feature is enabled on the OS.

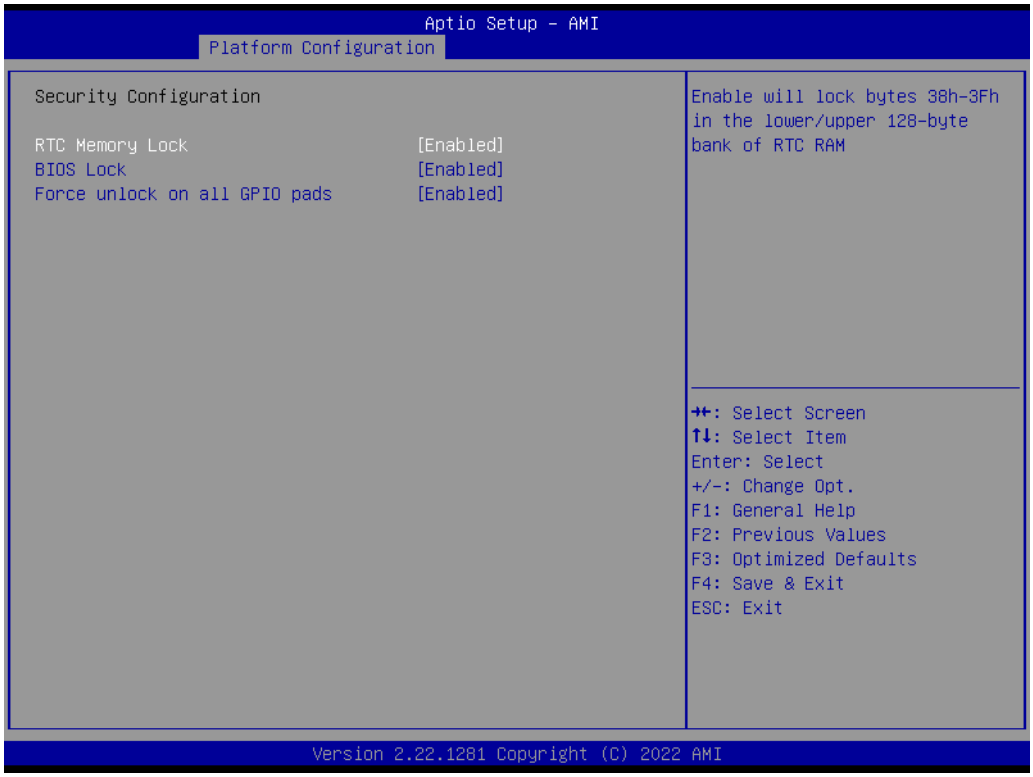
USB Configuration



- **XHCI Compliance Mode**
  Options to enable Compliance Mode. Default is to disable Compliance Mode. Change to enabled for Compliance Mode testing.
- **xDCI Support**
  Enable/Disable xDCI (USB OTG Device).
- **USB Overcurrent**
  Select 'Disabled' for pin-based debug. If pin-based debug is enabled but USB overcurrent is not disabled, USB DbC does not work.
- **USB Overcurrent Lock**
  Select 'Enabled' if Overcurrent functionality is used. Enabling this will make xHCI controller consume the Overcurrent mapping data.
- **USB2 PHY Sus Well Power Gating**
  Select 'Enabled' to enable SUS Well PG for USB2 PHY. This option has no effect on PCH-H.
- **XHCI Wake On Usb Enable**
  Enables/Disables support for XHCI Wake on USB on connect/disconnect.

Security Configuration

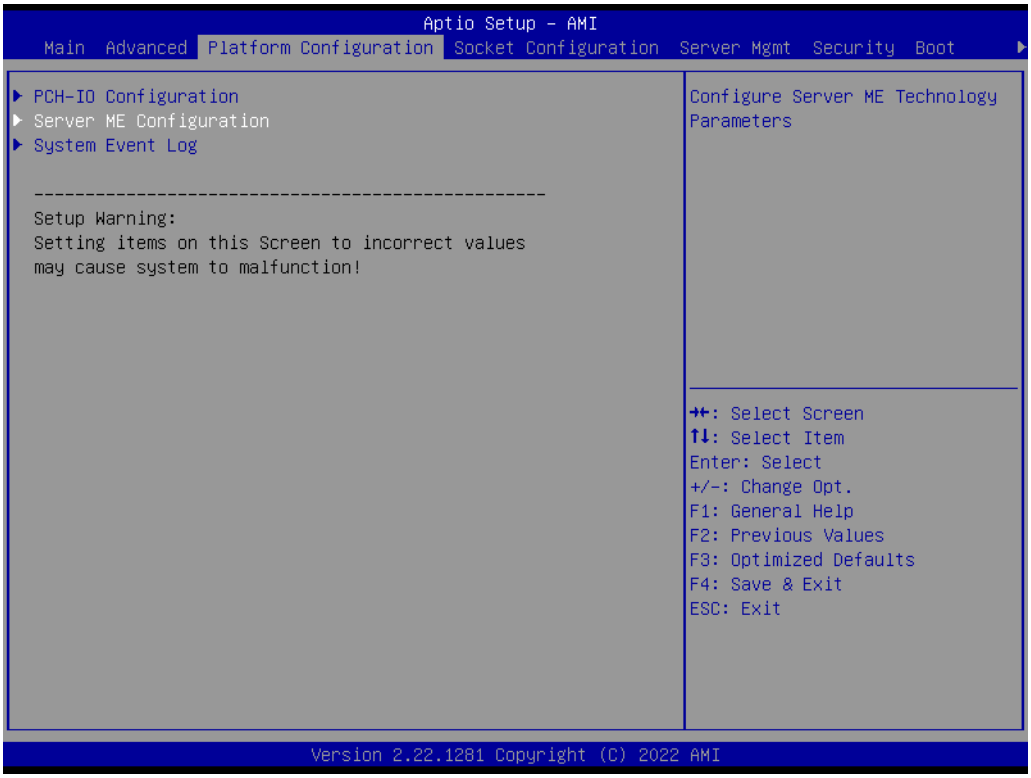


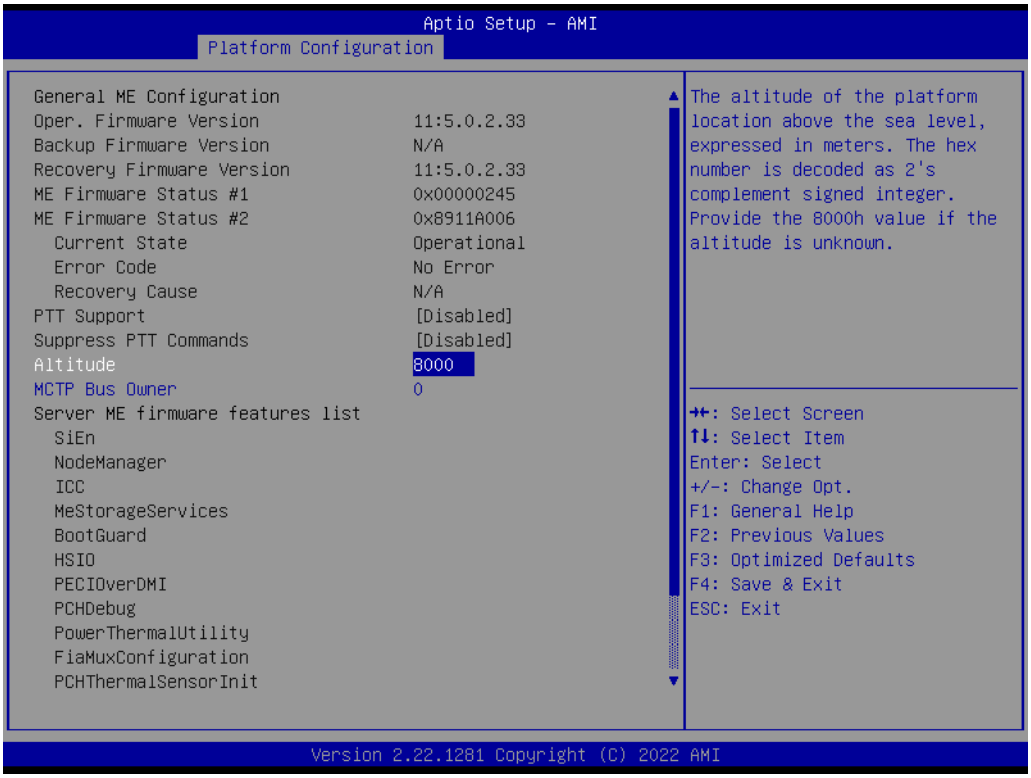


– **RTC Memory Lock**
  Enable will lock bytes 38h-3Fh in the lower/upper 128-byte bank of RTC RAM.

– **BIOS Lock**
“Enable or Disable” the PCH BIOS Lock Enable feature. Required to be enabled to ensure SMM protection of flash.
– **Force unlock on all GPIO pads**
If Enabled BIOS will force all GPIO pads to be in unlocked state.

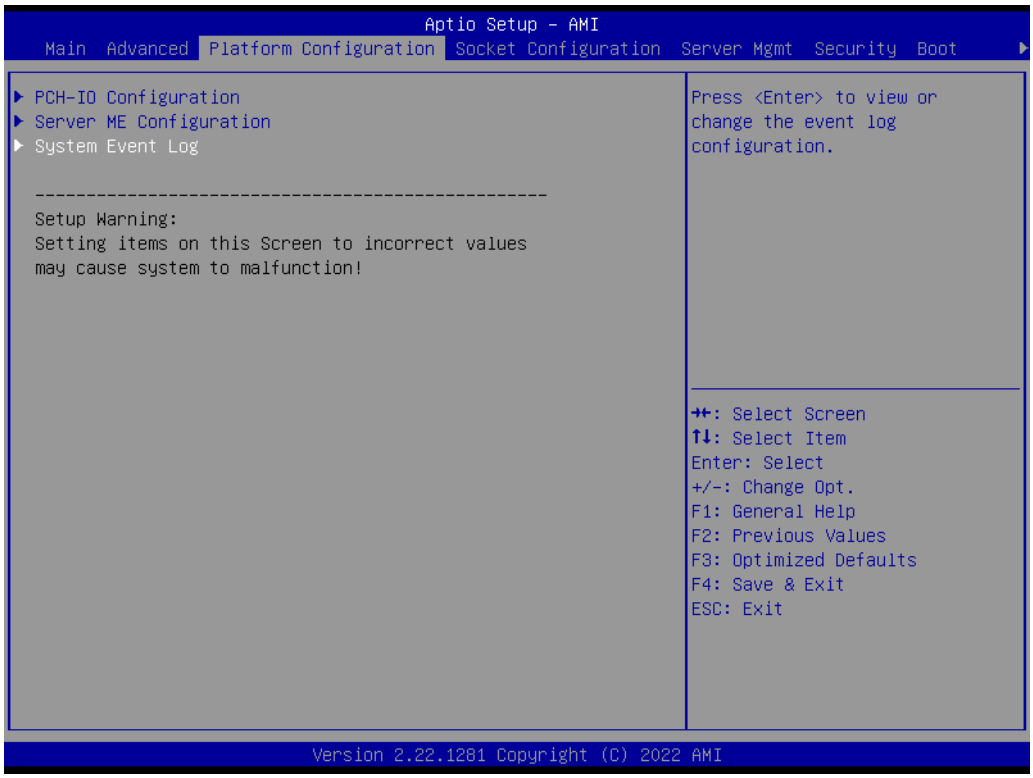
3.2.3.2 Sever ME Configuration

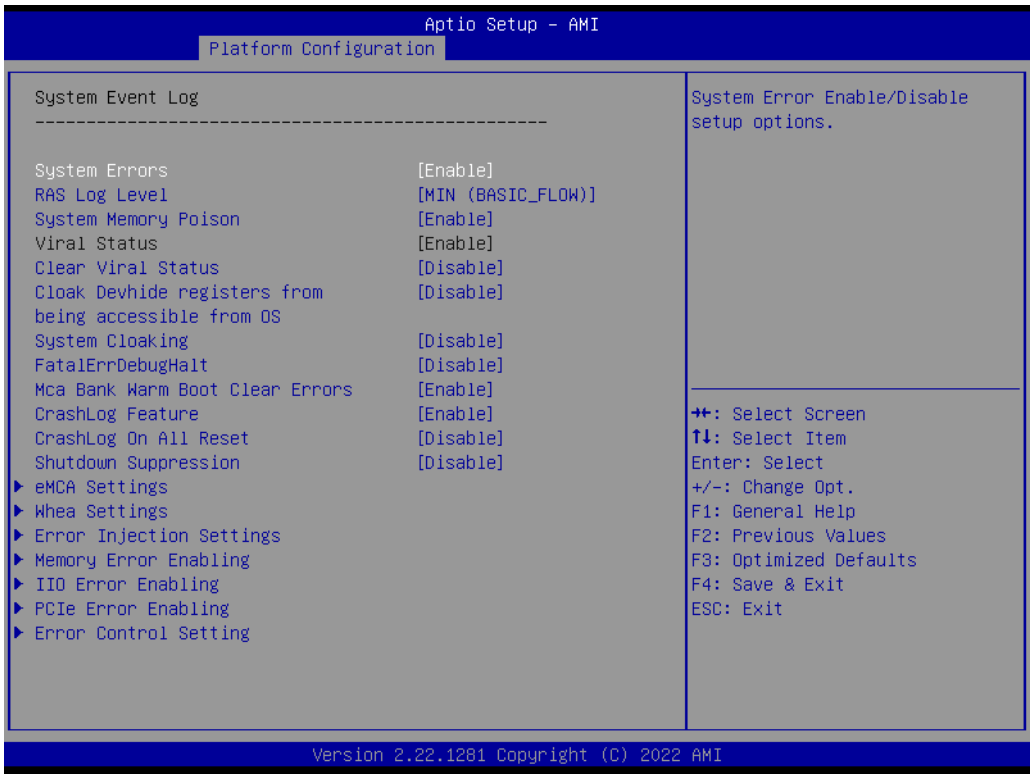




- **MCTP Bus Owner**
  [15:8] bus, [7:3] device, [2:0] function. If all zeros sending bus owner is disabled.

3.2.3.3 System Event Log

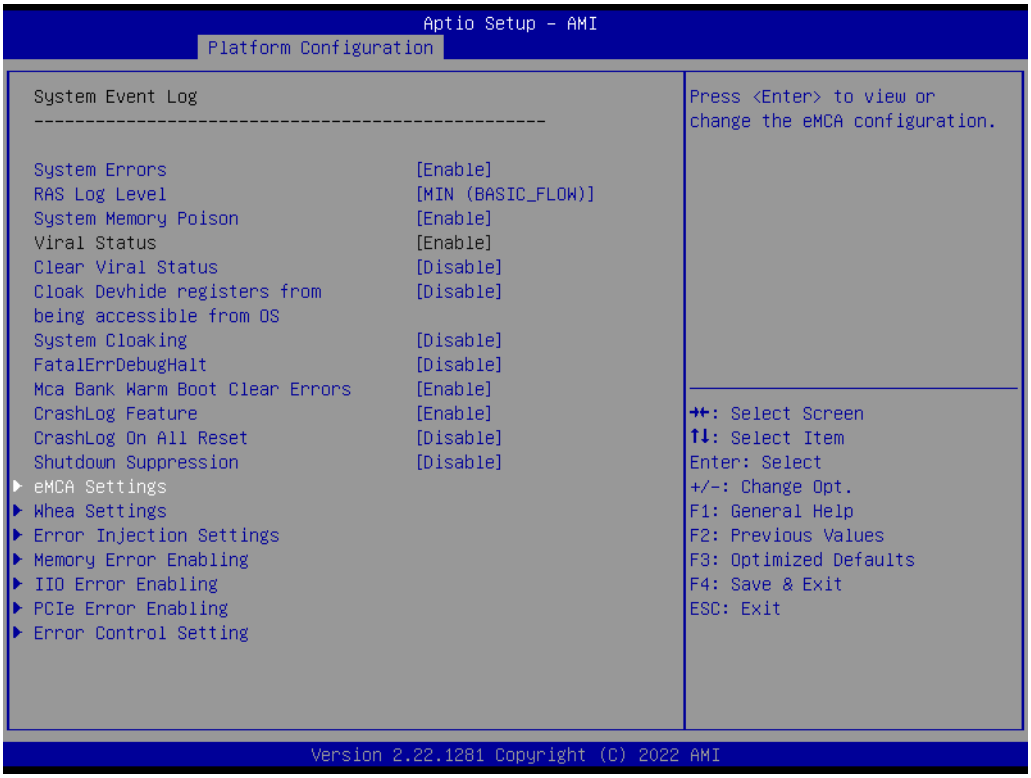


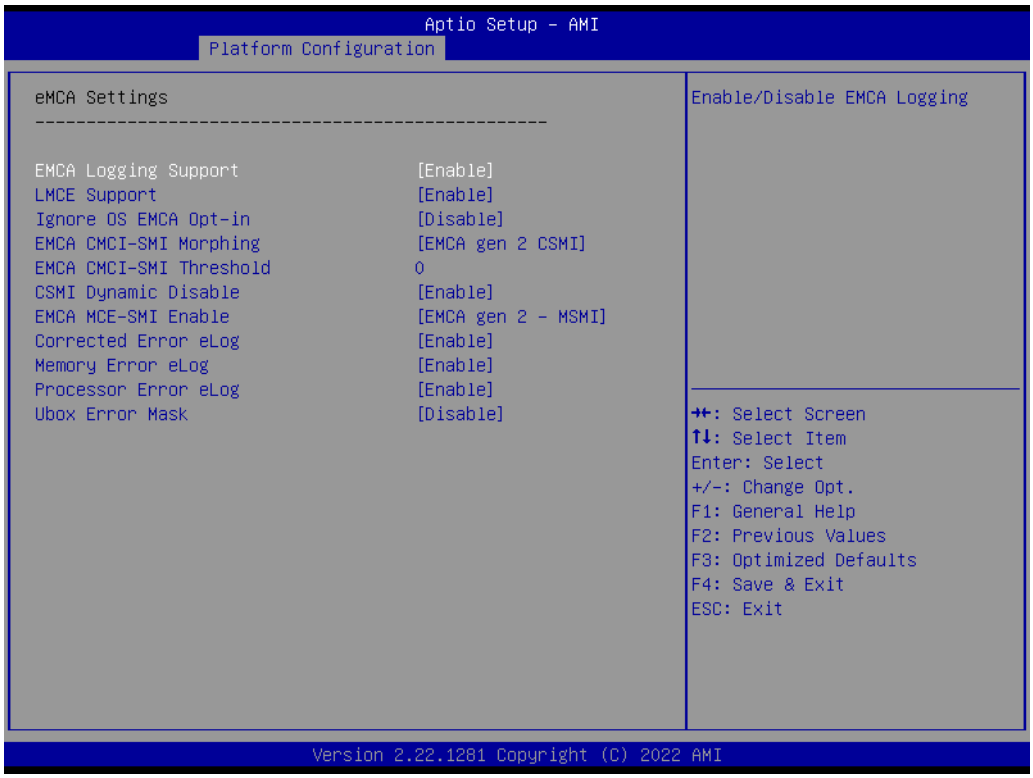


- **System Error**
  Enable/Disable setup options.

- **RAS Log Level**
  RAS Log setup options.
- **System Memory Poison**
  Enable/Disable System Memory Poison.
- **Viral Status**
  Enable/Disable Viral.
- **Clear Viral Status**
  Enable/Disable Clear Viral Status.
- **Cloak Devhide registers from being accessible from OS**
  Enable/Disable OS to access Devhide registers.
- **System Cloaking**
  When enabled, Corrected errors are masked from OS/SW visibility.This option is valid only when EMCA is enabled.
- **FatalErrDebugHalt**
  DEBUG loop for McBank Fatal error case ONLY. Warning: Enable this knob only in conjunction with ITP as thread will halt in Fatal error flow.
- **Mca Bank Warm Boot Clear Errors**
  Enable/Disable Mca Bank Warm Boot Clear Errors.
- **CrashLog Feature**
  The feature helps collecting crash data from PMC SSRAM.
- **CrashLog On All Reset**
  Option to invoke CrashLog collection on all reset.
- **Shutdown Suppression**
  Configures Shutdown Suppression and Log MCA IERR Support.

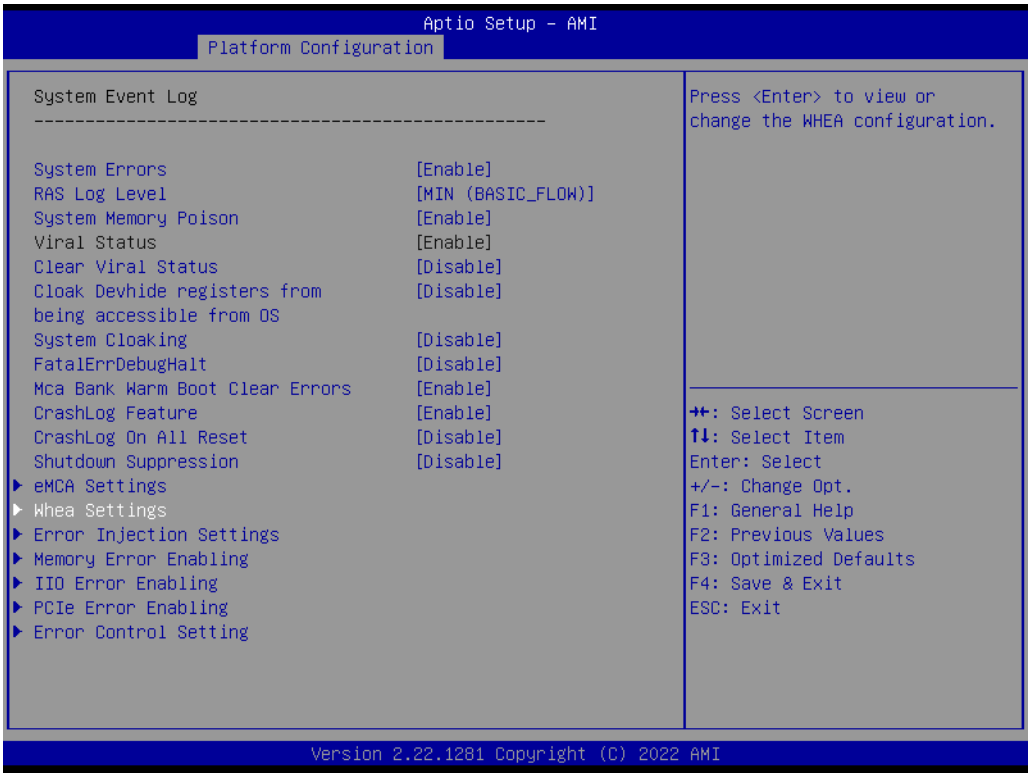
eMCA Settings

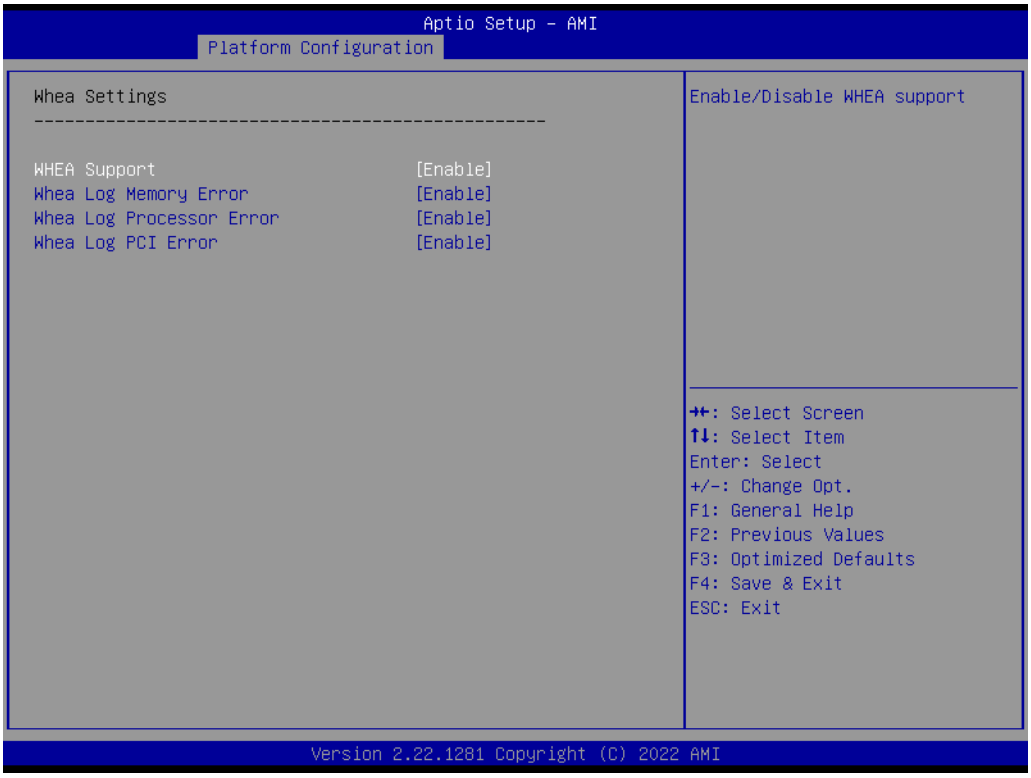




- **EMCA Logging Support**
  Enable/Disable EMCA Logging.
- **LMCE Support**
  Enable/Disable Local MCE firmware support.
- **Ignore OS EMCA Opt-in**
  Enable/Disable Ignore OS EMCA Opt-in and log.
- **EMCA CMCI-SMI Morphing**
  Enable/Disable EMCA CSMI.
- **EMCA CMCI-SMI Threshold**
  Set the threshold of correctable error for signaling CMCI-CSMI.
- **CSMI Dynamic Disable**
  [Enable]:BIOS disables CSMI when error threshold reached.[Disabled]: CSMI always on.
- **EMCA MCE-SMI Enable**
  Enable/Disable EMCA Uncorrected SMI for gen2.
- **Corrected Error eLog**
  Enable/Disable Corrected Error eLog.
- **Memory Error eLog**
  Enable/Disable Memory Error eLog.
- **Processor Error eLog**
  Enable/Disable Processor Error eLog.
- **Ubox Error Mask**
  Mask SMI generation for Ubox Error.

WHEA Settings

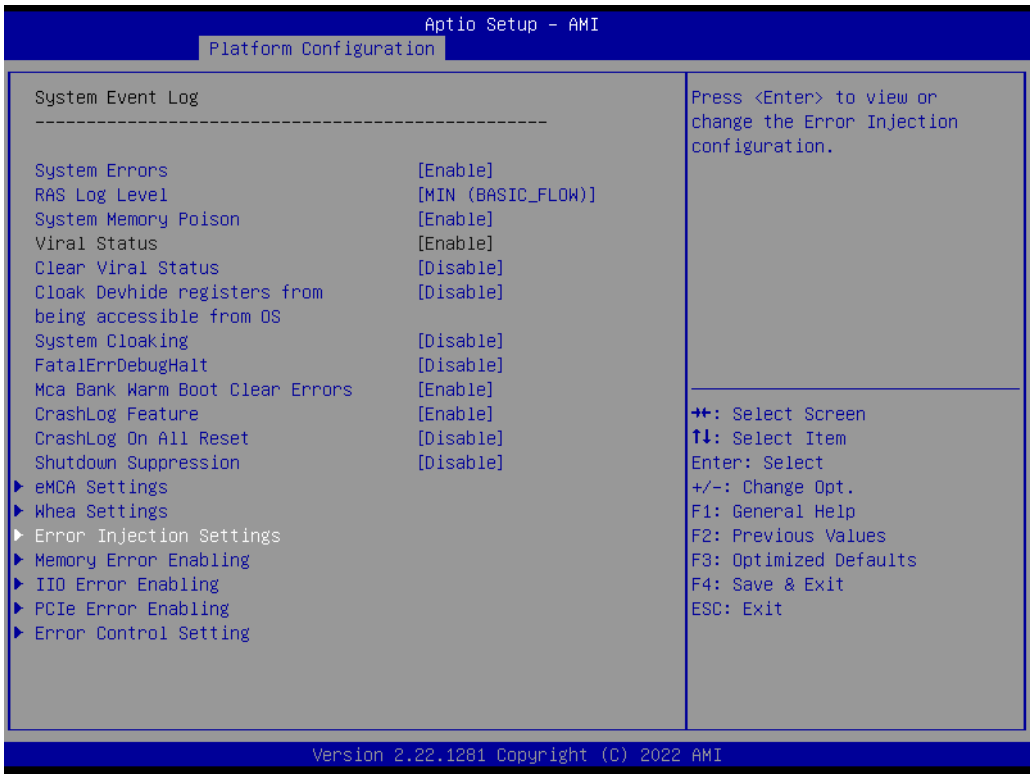


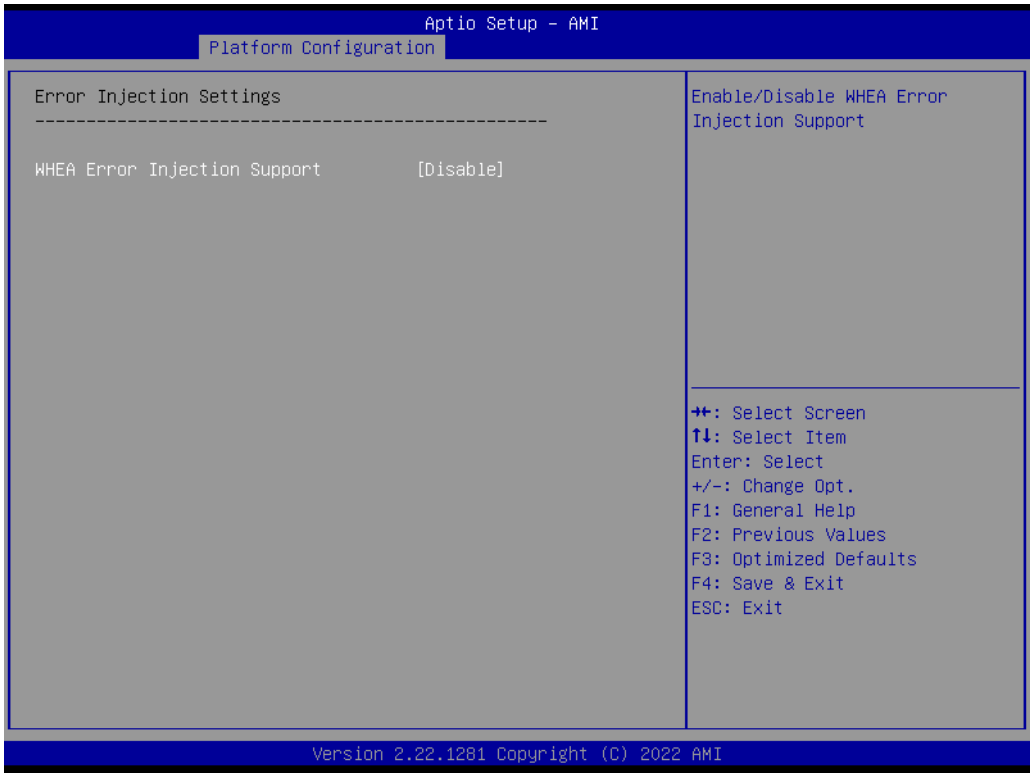


- **WHEA Support**
  Enable/Disable WHEA support.
- **WHEA Log Memory Error**
  Enable/Disable Whea Log Memory Error.

- **WHEA Log Processor Error**
  Enable/Disable Whea Log Processor Error.
- **WHEA Log PCI Error**
  Enable/Disable Whea Log PCI Error.

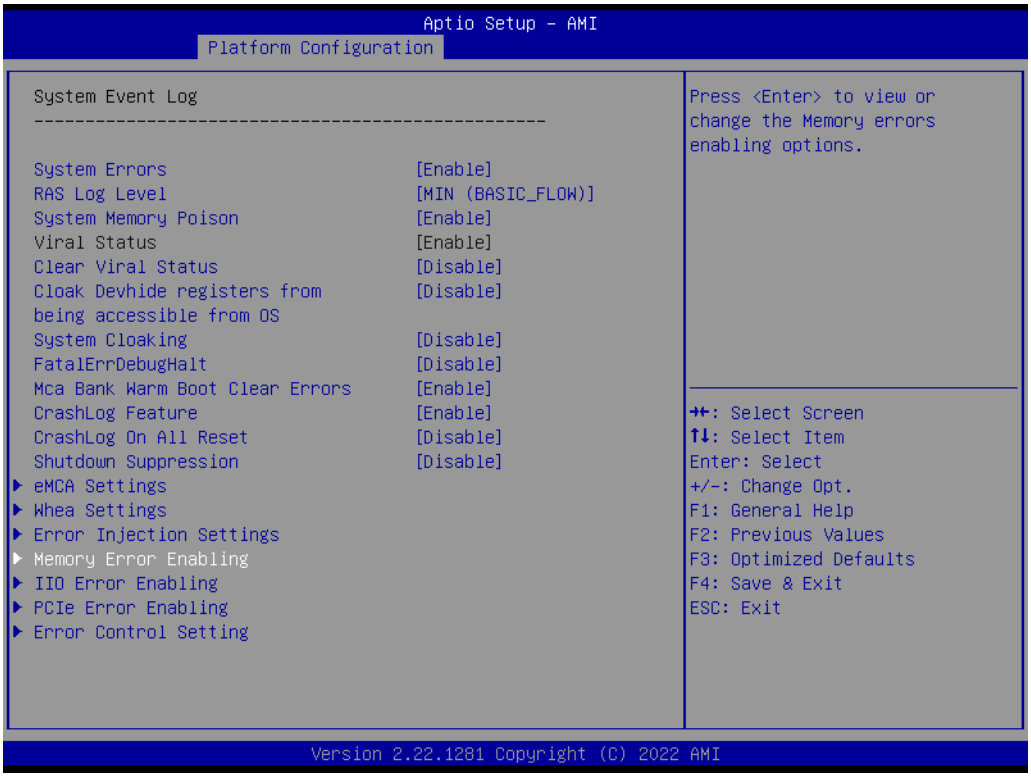
Error Injection Setting

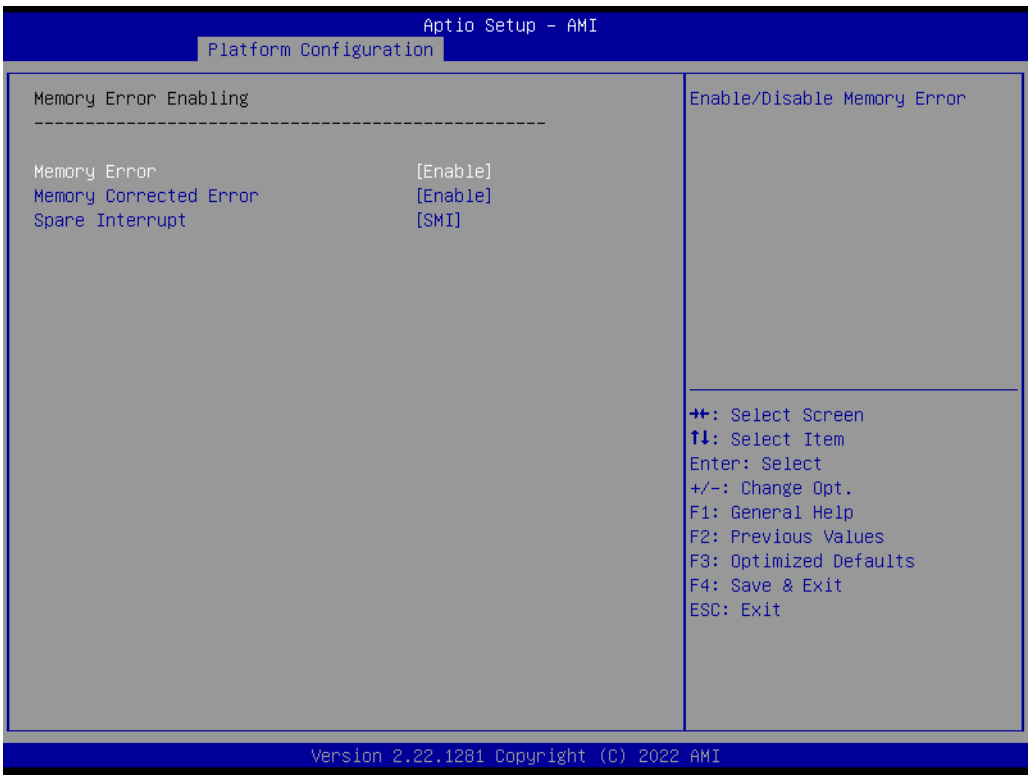




- **WHEA Error Injection Support**
  Enable/Disable WHEA Error Injection Support.

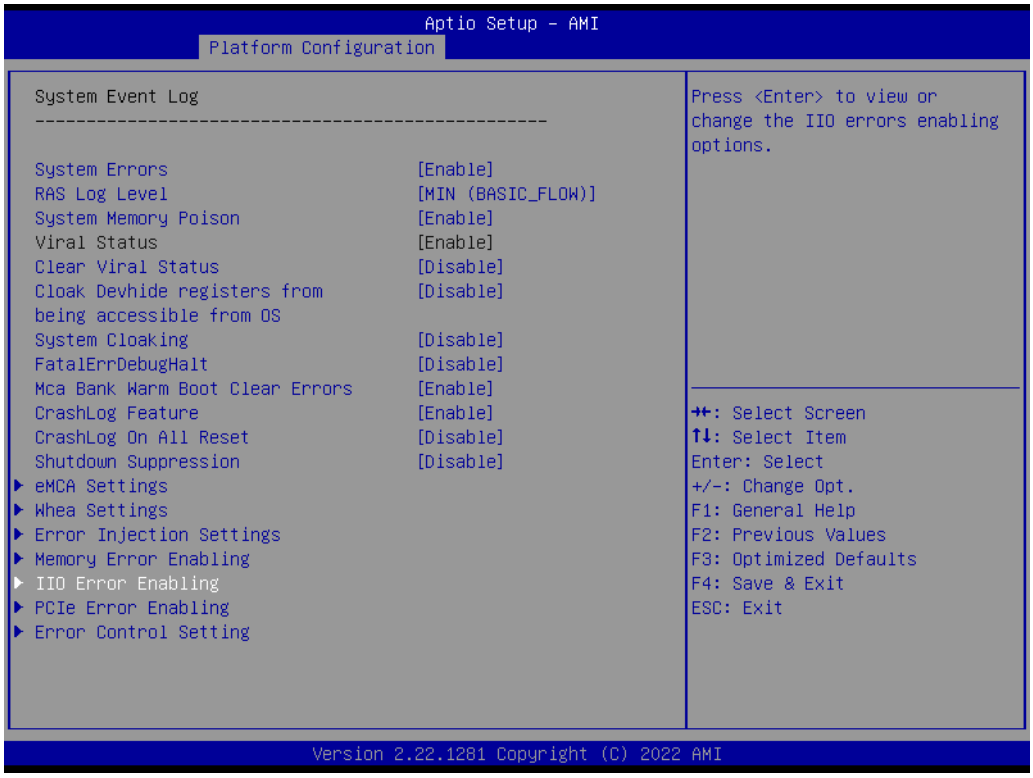
Memory Error Enabling

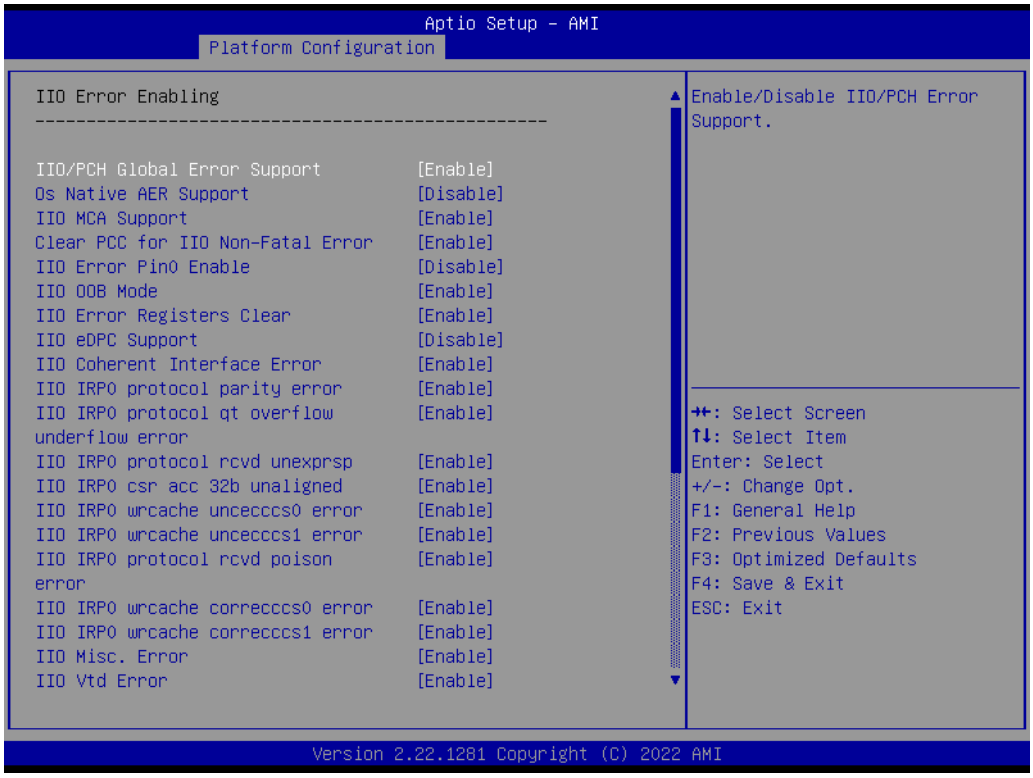


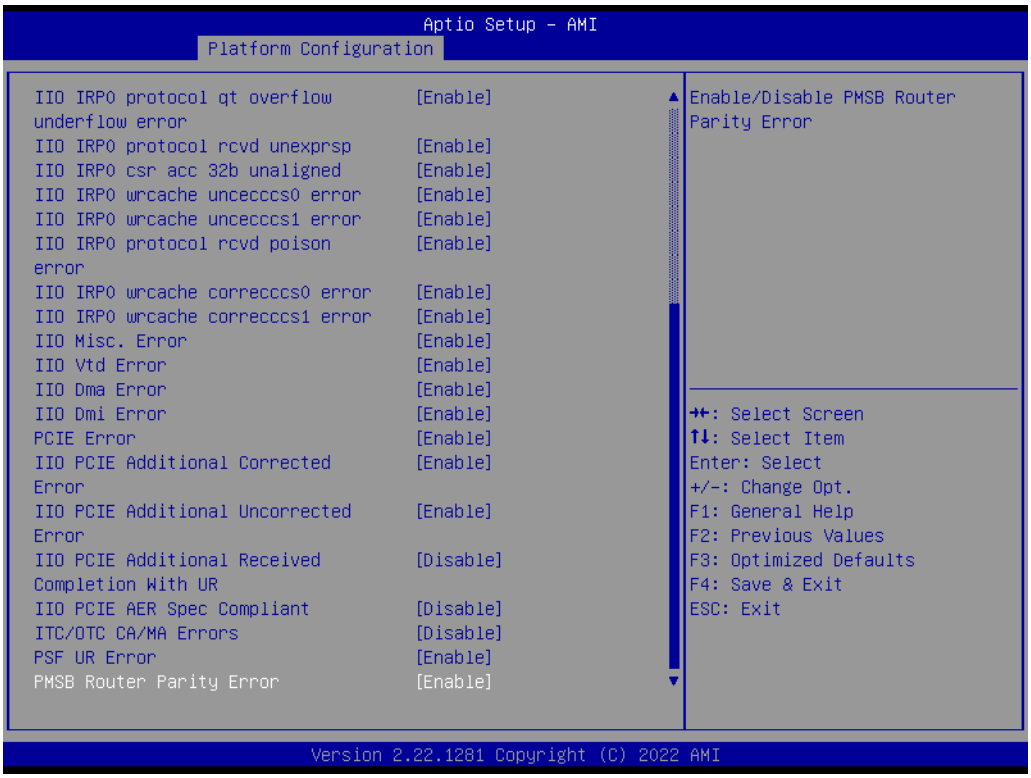


- **Memory Error**
  Enable/Disable Memory Error.
- **Memory Corrected Error**
  Enable/Disable Memory Corrected Error.
- **Spare Interrupt**
  Spare Interrupt Selection.

IIO Error Enabling



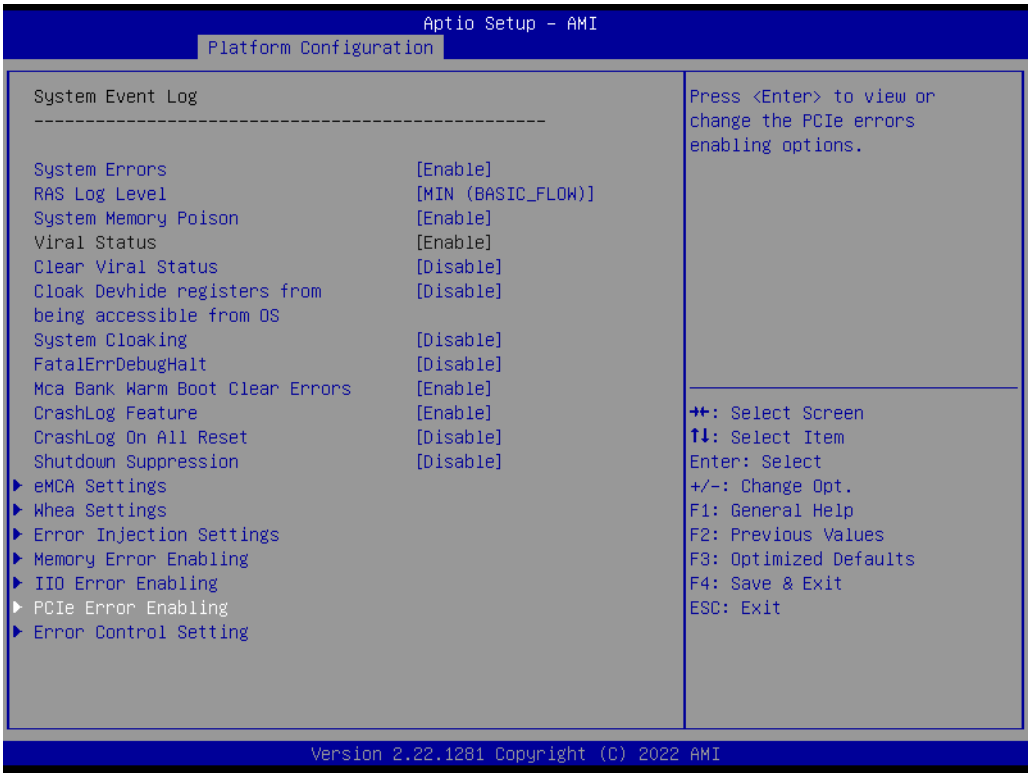


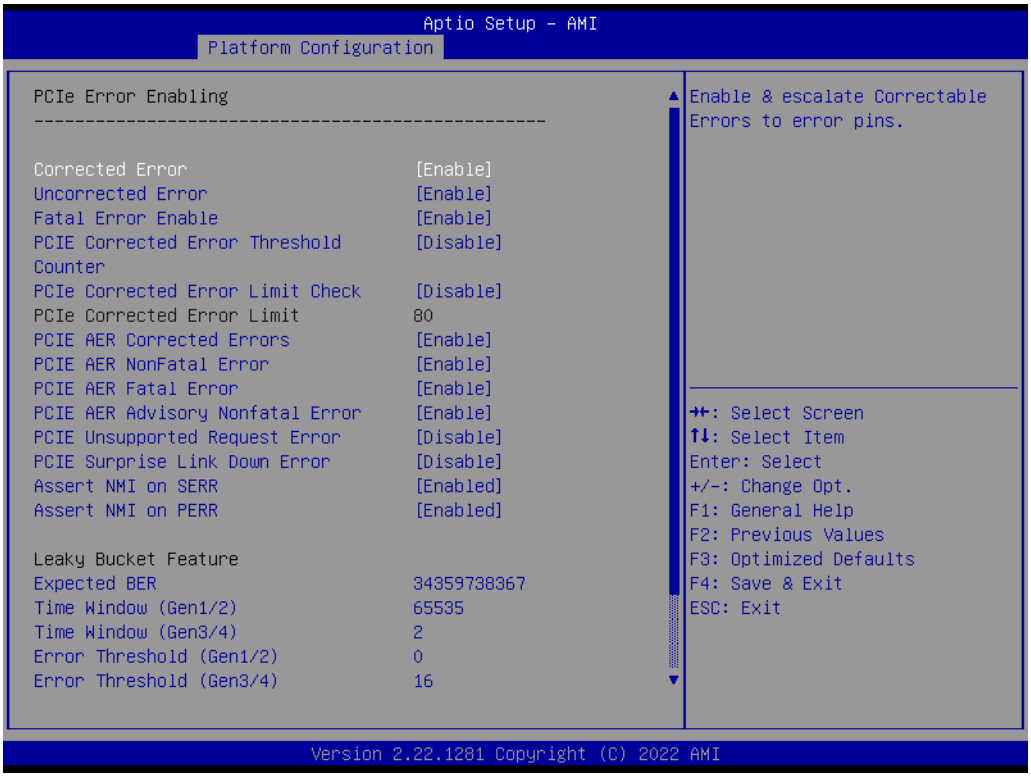


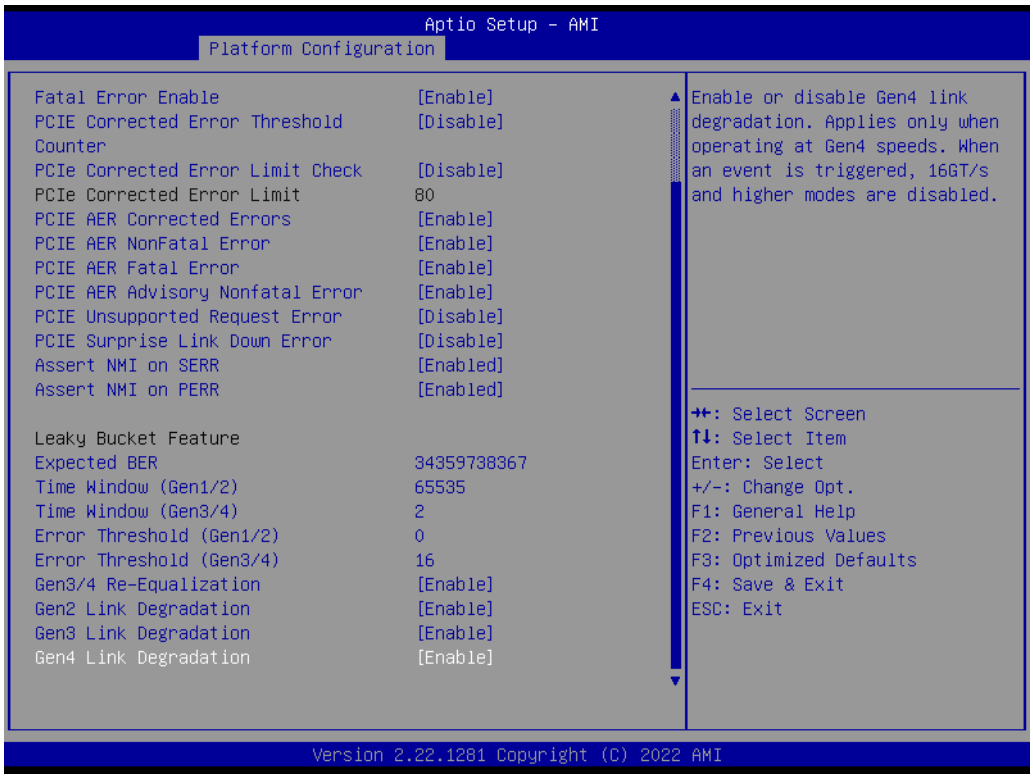
- **IIO/PCH Global Error Support**
  Enable/Disable IIO/PCH Error Support.
- **OS Native AER Support**
  Select FFM or OS native for AER error handling. If select OS native, BIOS also initialize FFM first until handshake, which depends on OS capability.
- **IIO MCA Support**
  Enable/Disable IIO MCA Support.
- **Clear PCC for IIO Non-Fatal Error**
  Enable/Disable PCC equal 0 for IIO severity 1 error.
- **IIO Error Pin0 Enable**
  Enable/Disable IIO Error Pin0
- **IIO OOB Mode**
  Enable/Disable System Event Generation when Error Pin is enabled.
- **IIO Error Registers Clear**
  Enable/Disable Clear IIO Error Registers.
- **IIO eDPC Support**
  Enable/Disable IIO eDPC Support.
- **IIO Coherent Interface Error**
  Enable/Disable IIO Coherent Interface Error.
- **IIO IRP0 protocol parity error**
  Enable or disable Coherent Interface protocol IIO parity error reporting.
- **IIO IRP0 protocol qt overflow underflow error**
  Enable or disable IIO Coherent Interface protocol queue table overflow or underflow error reporting.
- **IIO IRP0 protocol rcvd unexprsp**
  Enable or disable IIO Coherent Interface protocol layer received unexpected response or completion error reporting.

- **IIO IRP0 csr acc 32b unaligned**
  Enable or disable IIO Coherent Interface CSR Access Crossing 32-bit Boundary error reporting.
- **IIO IRP0 wrcache unceccs0 error / IIO IRP0 wrcache unceccs1 error**
  Enable or disable IIO Coherent Interface Write Cache Un-correctable ECC error reporting.
- **IIO IRP0 protocol rcvd poison error**
  Enable or disable IIO Coherent Interface Protocol Layer Received Poisoned Packet error reporting.
- **IIO IRP0 wrcache correccs0 error / IIO IRP0 wrcache correccs1 error**
  Enable or disable IIO Coherent Interface Write Cache Correctable ECC error reporting.
- **IIO Misc. Error**
  Enable/Disable IIO Misc. Error.
- **IIO Vtd Error**
  Enable/Disable IIO Vtd Error.
- **IIO Dma Error**
  Enable/Disable IIO Dma Error.
- **IIO Dmi Error**
  Enable/Disable IIO Dmi Error.
- **PCIE Error**
  Enable/Disable PCIE Error.
- **IIO PCIE Additional Corrected Error**
  Enable/Disable IIO PCIE Additional Corrected Error.
- **IIO PCIE Additional Uncorrected Error**
  Enable/Disable IIO PCIE Additional Uncorrected Error.
- **IIO PCIE Additional Received Completion With UR**
  Enable/Disable IIO PCIE Additional Received Completion with UR.
- **IIO PCIE AER Spec Compliant**
  Enable/Disable IIO PCIE AER Spec Compliant.
- **ITC/OTC CA/MA Errors**
  Enable/Disable Completer Abort and Master Abort (Unsupported Request) on ITC and OTC.
- **PSF UR Error**
  Enable/Disable Unsupported Request Error on PSF.
- **PMSB Router Parity Erro**
  Enable/Disable PMSB Router Parity Error.

PCIe Error Enabling



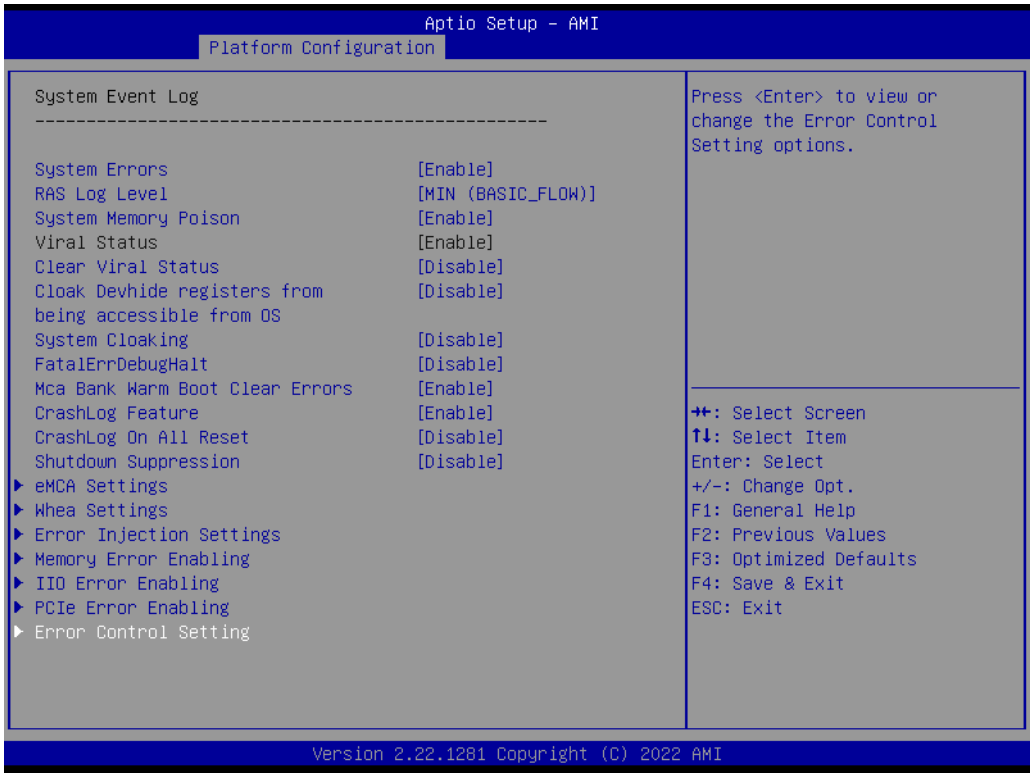


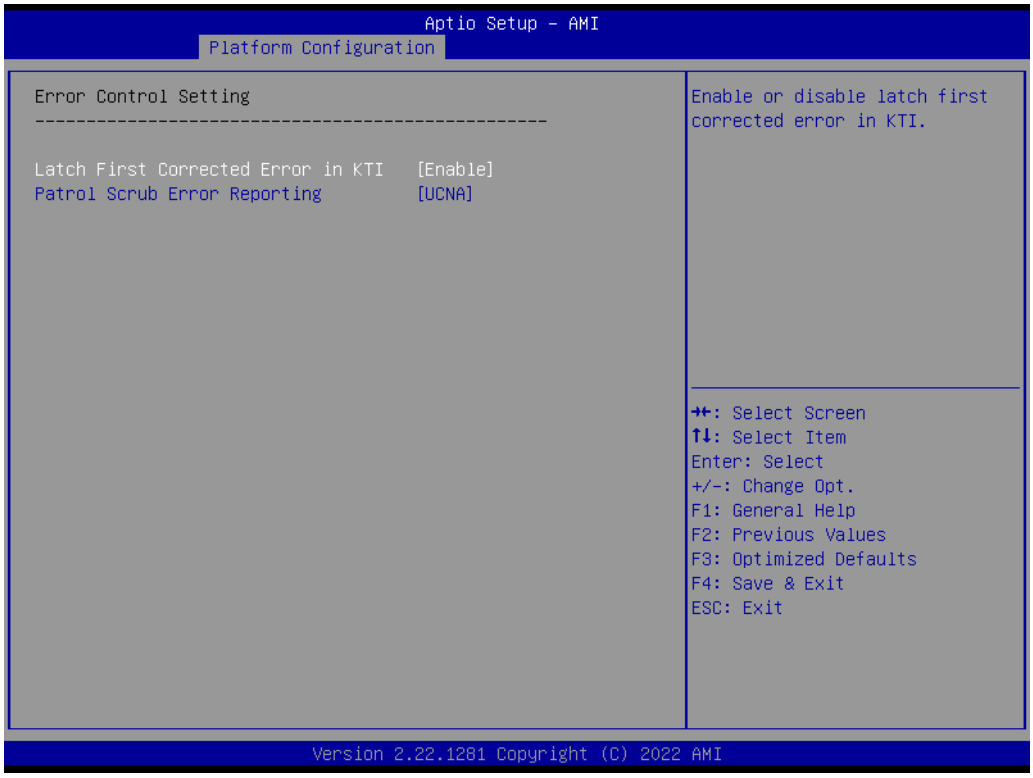


- **Corrected Error**
  Enable & escalate Correctable Errors to error pins.
- **Uncorrected Error**
  Enable & escalate Uncorrectable/Recoverable to error pins.
- **Fatal Error Enable**
  Enable & escalate fatal errors to error pins.
- **PCIE Corrected Error Threshold Counter**
  Enable/Disable PCIE Corrected Error Counter.
- **PCIe Corrected Error Limit Check**
  Enable/Disable the feature to disable reporting PCIe corrected errors for a device if they exceed a given limit.
- **PCIe Corrected Error Limit**
  Set the maximum number of corrected errors before corrected error reporting is disabled for a device.
- **PCIE AER Corrected Errors**
  Enable/Disable PCIE AER Corrected Errors.
- **PCIE AER NonFatal Error**
  Enable/Disable PCIE AER NonFatal Error.
- **PCIE AER Fatal Error**
  Enable/Disable PCIE AER Fatal Error.
- **PCIE AER Advisory Nonfatal Error**
  Enable/Disable PCIE AER Advisory Nonfatal Error.
- **PCIE Unsupported Request Error**
  Enable/Disable PCIE Unsupported Request Error.
- **PCIE Surprise Link Down Error**
  Enable/Disable PCIE Surprise Link Down Error.
- **Assert NMI on SERR**
  On SERR, generate an NMI and log an error. Note: [Enabled] must be selected for the Assert NMI on PERR setup option to be visible.

- **Assert NMI on PERR**
  On PERR, generate an NMI and log an error. Note: This option is only active if the Assert NMI on SERR option has [Enabled] selected.
- **Expected BER**
  Set the expected Bit Error Rate for all speeds.
- **Time Window (Gen1/2)**
  Set the error burst protection time window for Gen1 and Gen2 speeds. A burst of errors within the window is counted as one.
- **Time Window (Gen3/4)**
  Set the error burst protection time window for Gen3 and Gen4 speeds. A burst of errors within the window is counted as one.
- **Error Threshold (Gen1/2)**
  Set the error threshold for Gen1 and Gen2 speeds. An event is triggered when the error count exceeds the threshold.
- **Error Threshold (Gen3/4)**
  Set the error threshold for Gen3 and Gen4 speeds. An event is triggered when the error count exceeds the threshold.
- **Gen3/4 Re-Equalization**
  Enable or disable Gen3 and Gen4 re-equalization. Applies only when operating at Gen2 or Gen4 speeds. When an event is triggered, equalization is re-run.
- **Gen2 Link Degradation**
  Enable or disable Gen2 link degradation. Applies only when operating at Gen2 speeds. When an event is triggered, 5GT/s and higher modes are disabled.
- **Gen3 Link Degradation**
  Enable or disable Gen3 link degradation. Applies only when operating at Gen3 speeds. When an event is triggered, 8GT/s and higher modes are disabled.
- **Gen4 Link Degradation**
  Enable or disable Gen4 link degradation. Applies only when operating at Gen4 speeds. When an event is triggered, 16GT/s and higher modes are disabled.

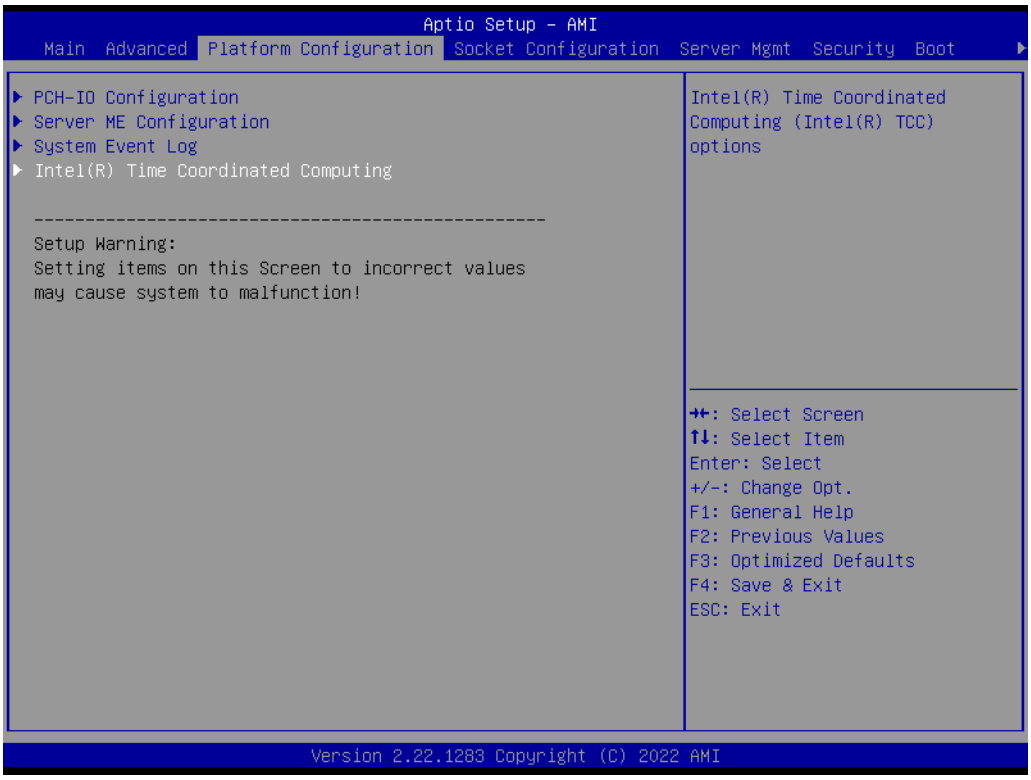
Error Control Setting

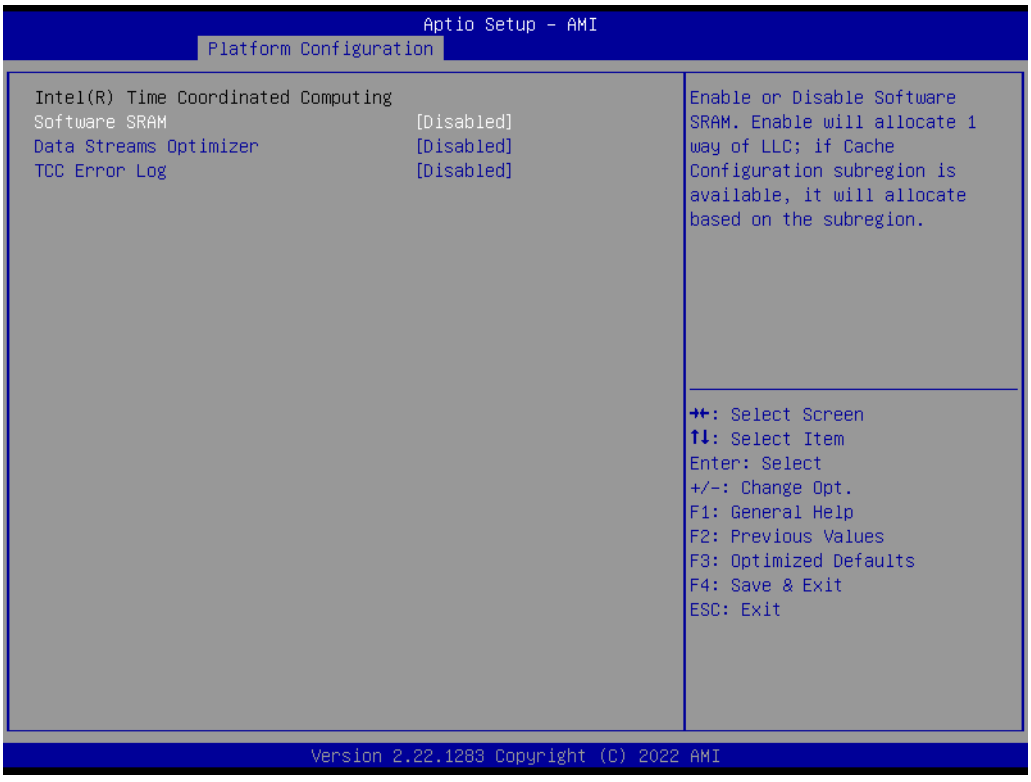




- **Latch First Corrected Error in KTI**
  Enable or disable latch first corrected error in KTI.
- **Patrol Scrub Error Reporting**
  Patrol Scrub Error type selection.

3.2.3.4 Intel(R) Time Coordinated Computing





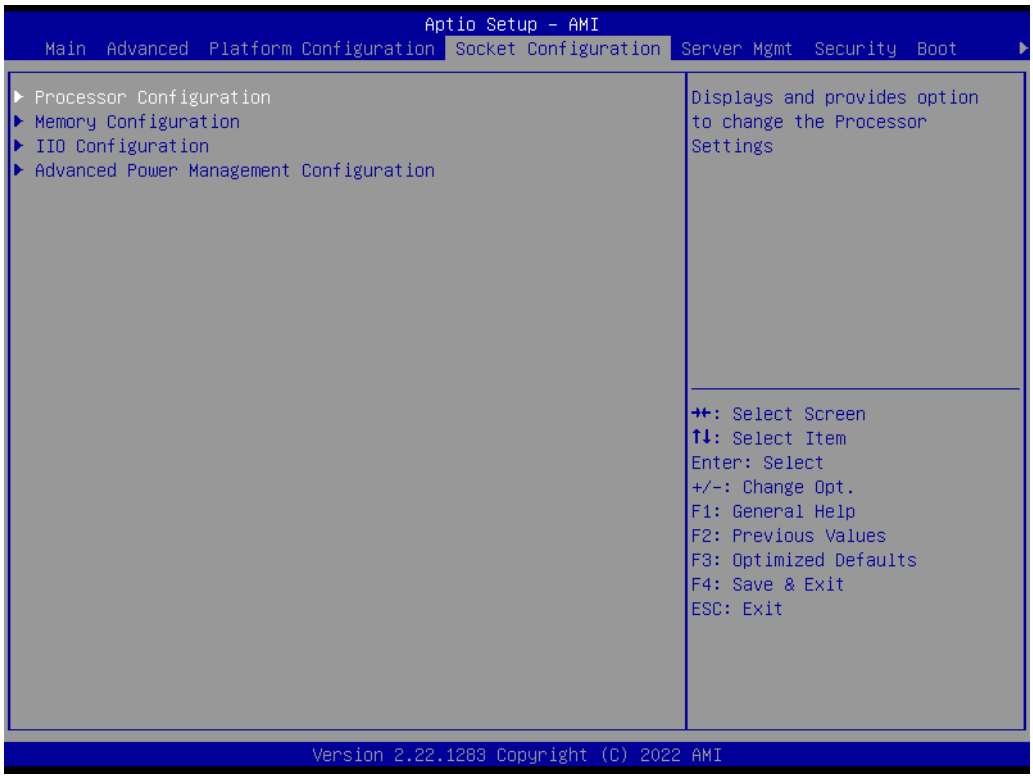
- **Software SRAM**
  Enable or Disable Software SRAM. Enable will allocate 1 way of LLC; if Cache Configuration subregion is available, it will allocate based on the subregion.
- **Data Streams Optimizer**
  Enable or Disable Data Streams Optimizer (DSO). Enable will utilize DSO Sub-

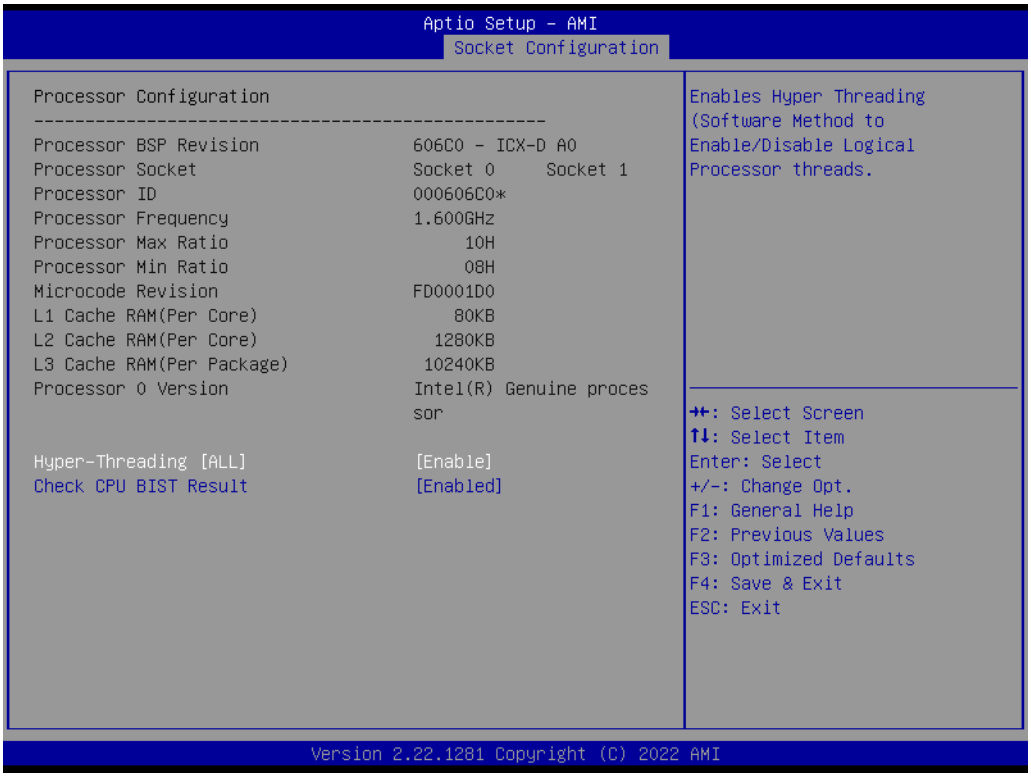
region to tune system. DSO settings supercede Intel(R) TCC Mode settings that overlap between the two.

- **TCC Error Log**
  Enable or Disable TCC Error Log. Enable will record errors from TCC flow in memory.
- **Wake System From S5**
  Enable or disable System wake on alarm event. Select Fixed Time, system will wake on the hr::min::sec specified.

3.2.4 Socket Configuration

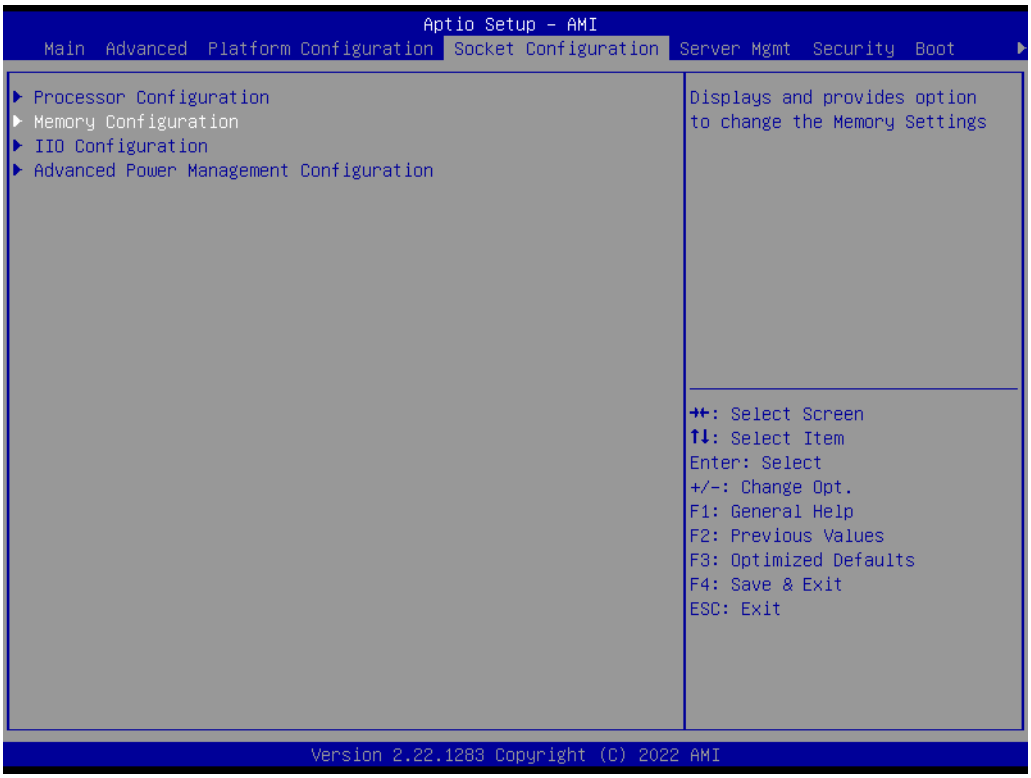
3.2.4.1 Processor Configuration

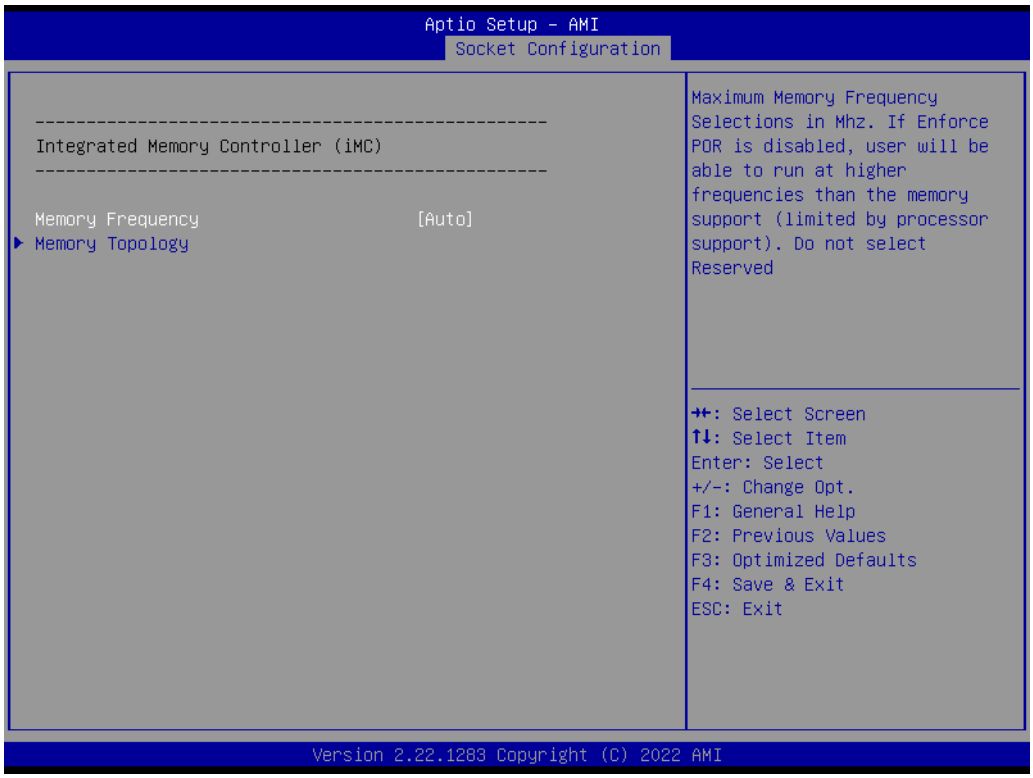


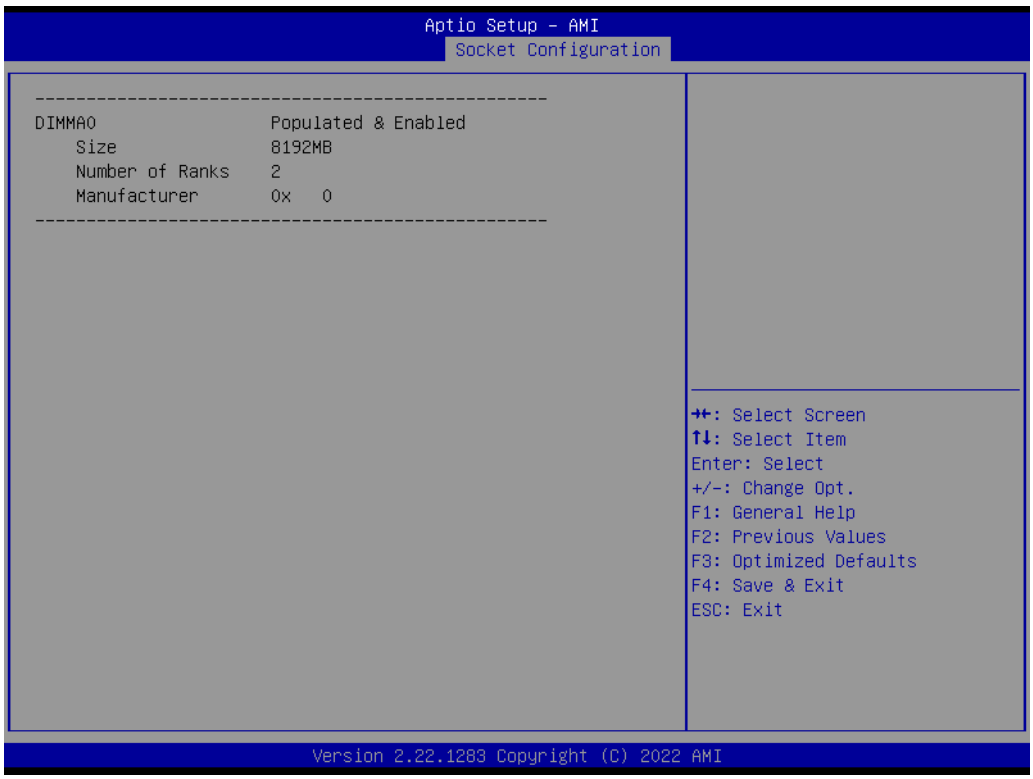


- **Hyper-Threading**
  Enable or Disable Hyper-Threading Technology.
- **Check CPU BIST Result**
  Enable/Disable BIST (Built-in Self Test) on reset.

3.2.4.2 Memory Configuration

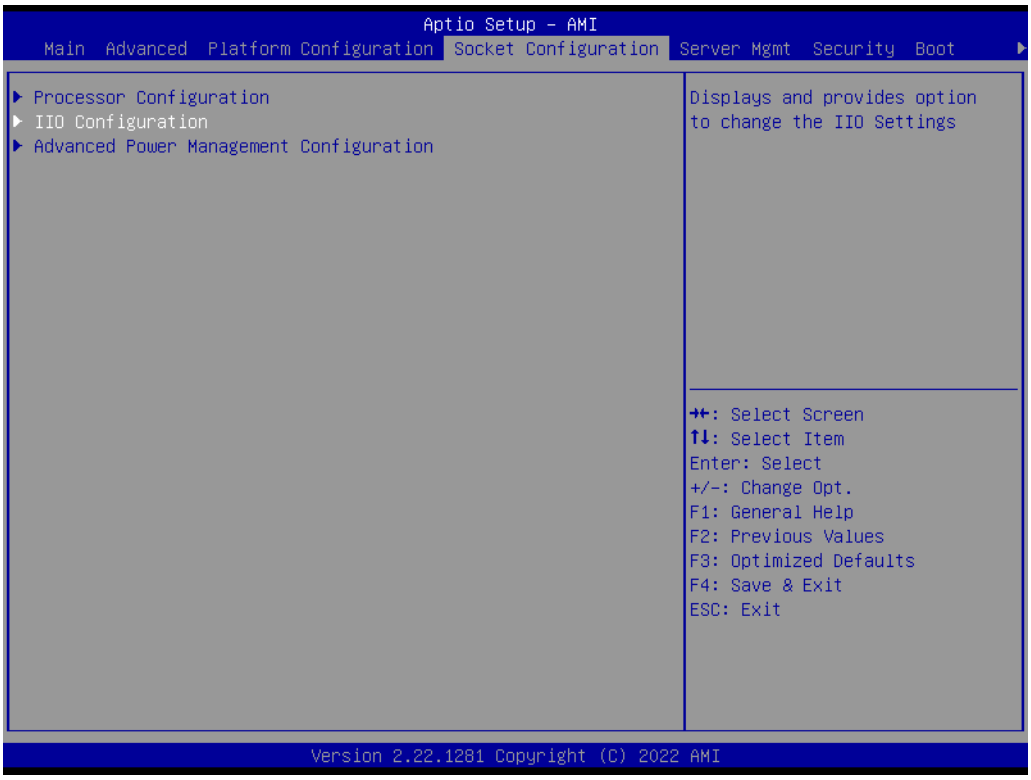


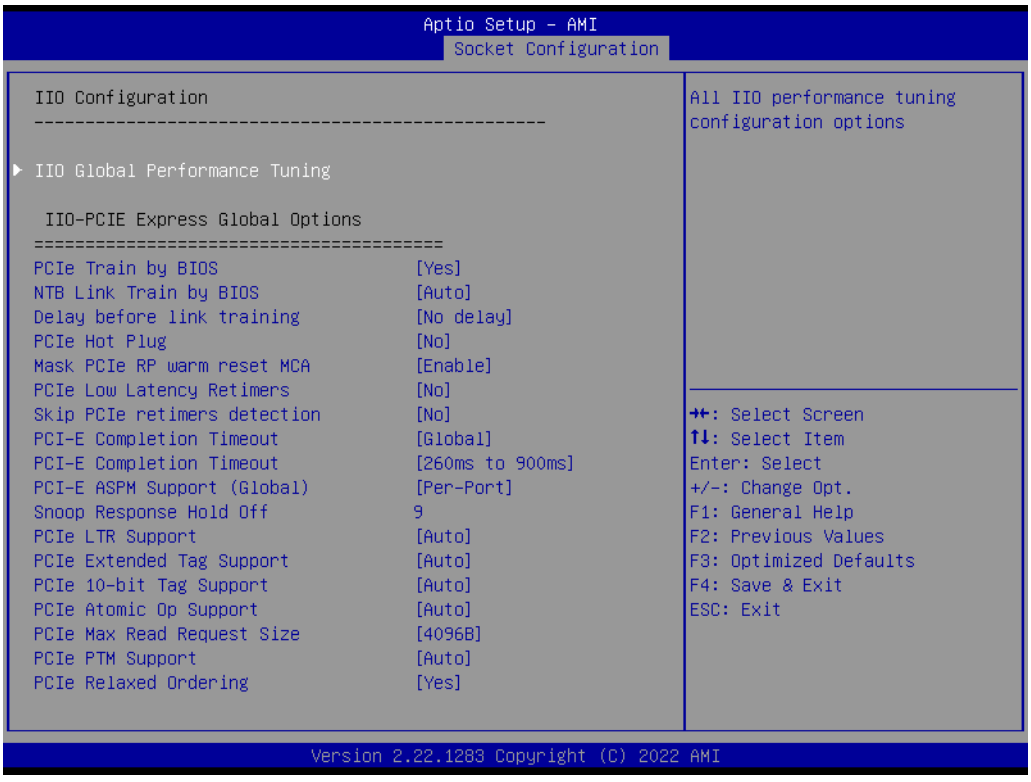




- **Memory Frequency**
  Maximum Memory Frequency Selections in Mhz. If Enforce POR is disabled, user will be able to run at higher frequencies than the memory support (limited by processor support). Do not select Reserved.

3.2.4.3 IIO Configuration

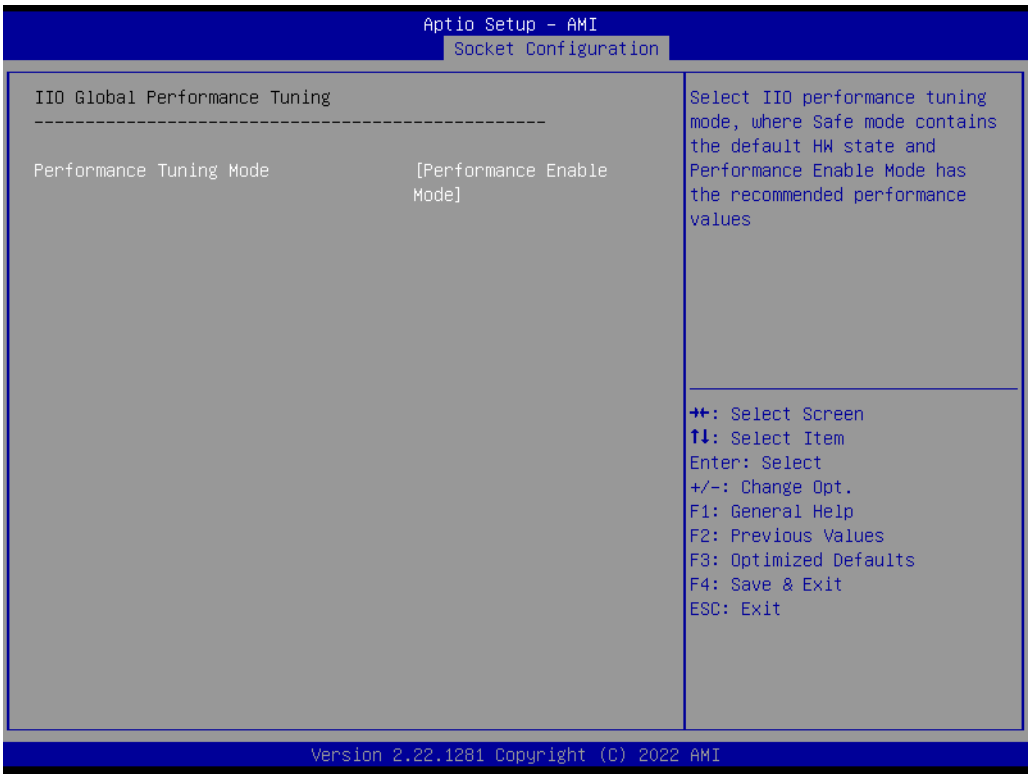




- **PCIe Train by BIOS**
  Assume IIO is strapped for Wait-for-BIOS because straps are unreliable in A-0 Silicon.
- **NTB Link Train by BIOS**
  This knob enables or disables the BIOS to train the NTB link.

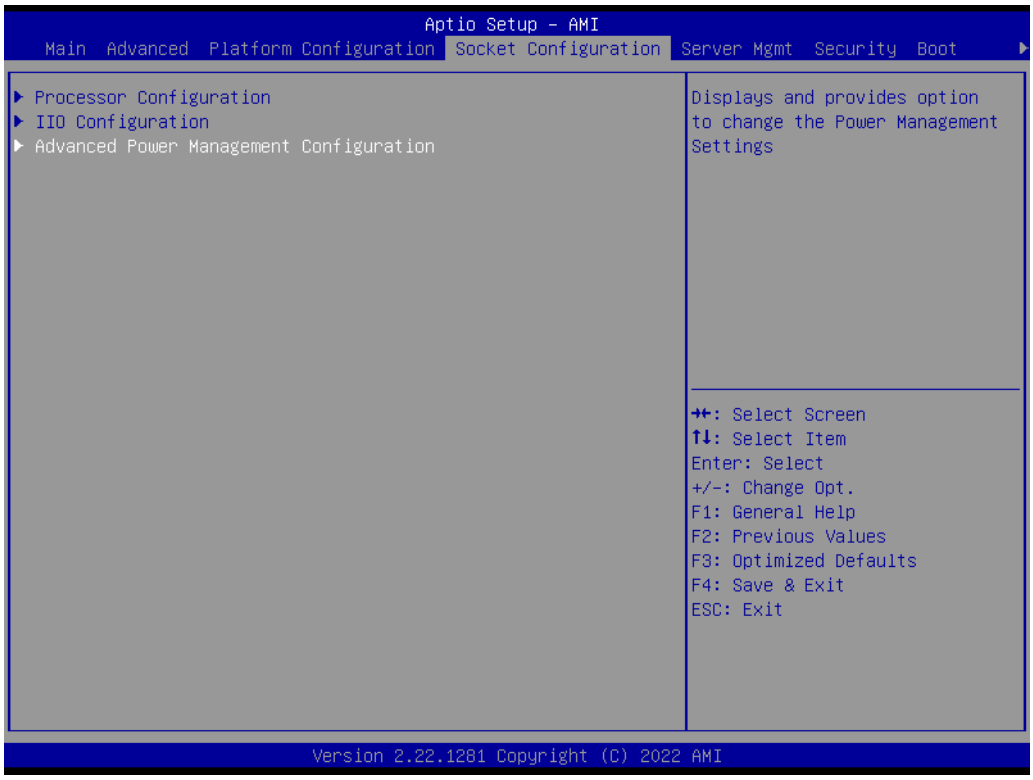
- **Delay before link training**
  Custom delay before PCIe link training on IIO ports.
- **PCIe Hot Plug**
  Enable/Disable PCIe Hot Plug globally.
- **Mask PCIe RP warm reset MCA**
  Enable/Disable Mask CPU Complex PCIe Root Port warm reset MCA.
- **PCIe ACPI Hot Plug**
  Enable/Disable PCIe ACPI Hot Plug globally, or allow per-port control. When Disabled, MSI is generated on HP event. When Enabled, _HPGPE message is generated.
- **PCIe Low Latency Retimers**
  Enable/Disable PCIe low latency retimers.
- **Skip PCIe retimers detection**
  Skip PCIe retimers detection to speedup the boot. Retimers are preent only in specific HW configurations.
- **PCI-E Completion Timeout**
  Enable/disable the PCIe Completion Timeout in Device Control2 register.
- **PCI-E Completion Timeout**
  PCIe Completion Timeout to program in Device Control2 register.
- **PCI-E ASPM Support (Global)**
  This option enables/disables the ASPM support for all downstream devices.
- **Snoop Response Hold Off**
  Sets Snoop Response Hold Off value, 256 cycles as Default.
- **PCIe LTR Support**
  This option can disable Latency Tolerance Reporting support in all PCIe root ports. 'Auto' keeps hardware default.
- **PCIe Extended Tag Support**
  This option can disable 8-bit Tag support in all PCIe root ports. 'Auto' keeps hardware default.
- **PCIe 10-bit Tag Support**
  This option can disable PCIe 10-bit Tag Requester support in all PCIe root ports. 'Auto' keeps hardware default.
- **PCIe Atomic Op Support**
  This option can disable Atomic Operation Routing support in all PCIe root ports and block Atomic Operation Requester in PCI hierarchy. 'Auto' keeps hardware default.
- **PCIe Max Read Request Size**
  Set Max Read Request Size in EndPoints.
- **PCIe PTM Support**
  This option can disable Precision Time Management support in PCI hierarchy. 'Auto' keeps hardware default.
- **PCIe Relaxed Ordering**
  Enable Relaxed Ordering in PCIe devices where it is supported. Note that in some devices it can be not supported, hardwired to zero.

IIO Global Performance Tuning

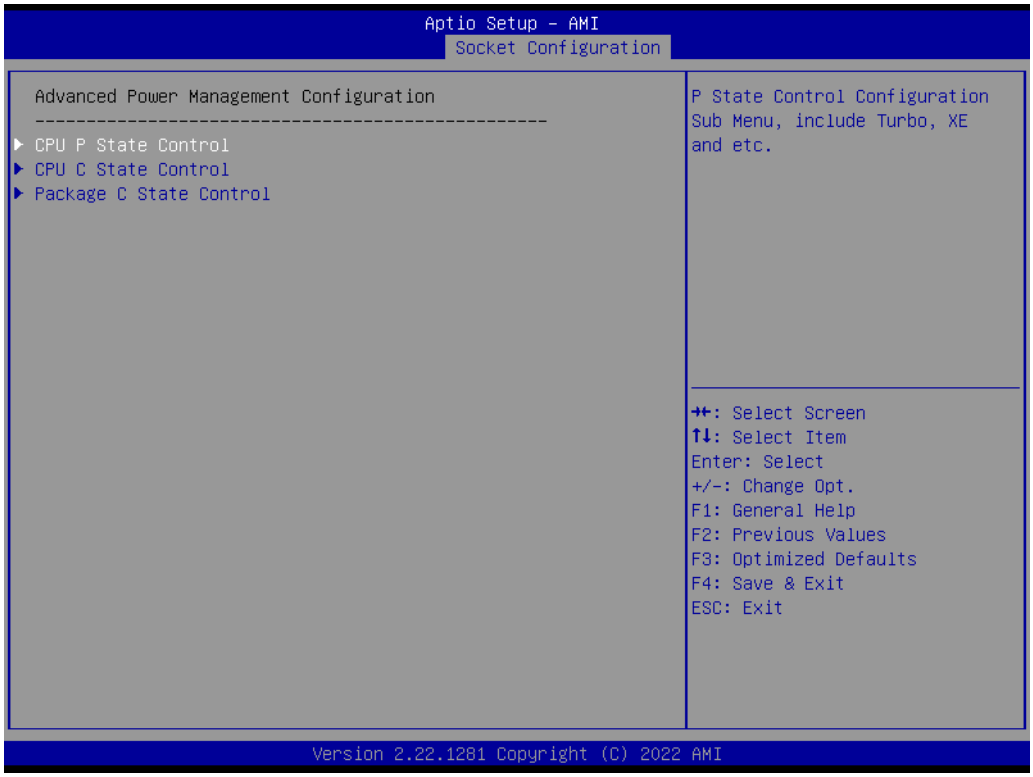


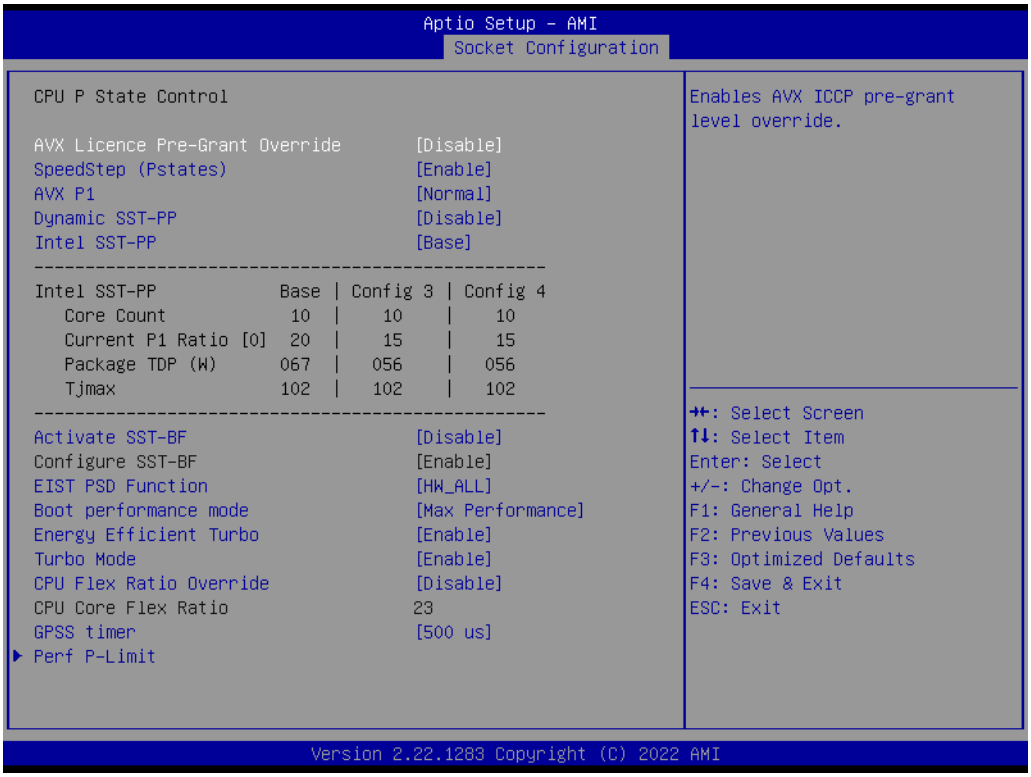
– **Performance Tuning Mode**
  Select IIO performance tuning mode, where Safe mode contains the default HW state and Performance Enable Mode has the recommended performance values.

3.2.4.4 Advanced Power Management Configuration



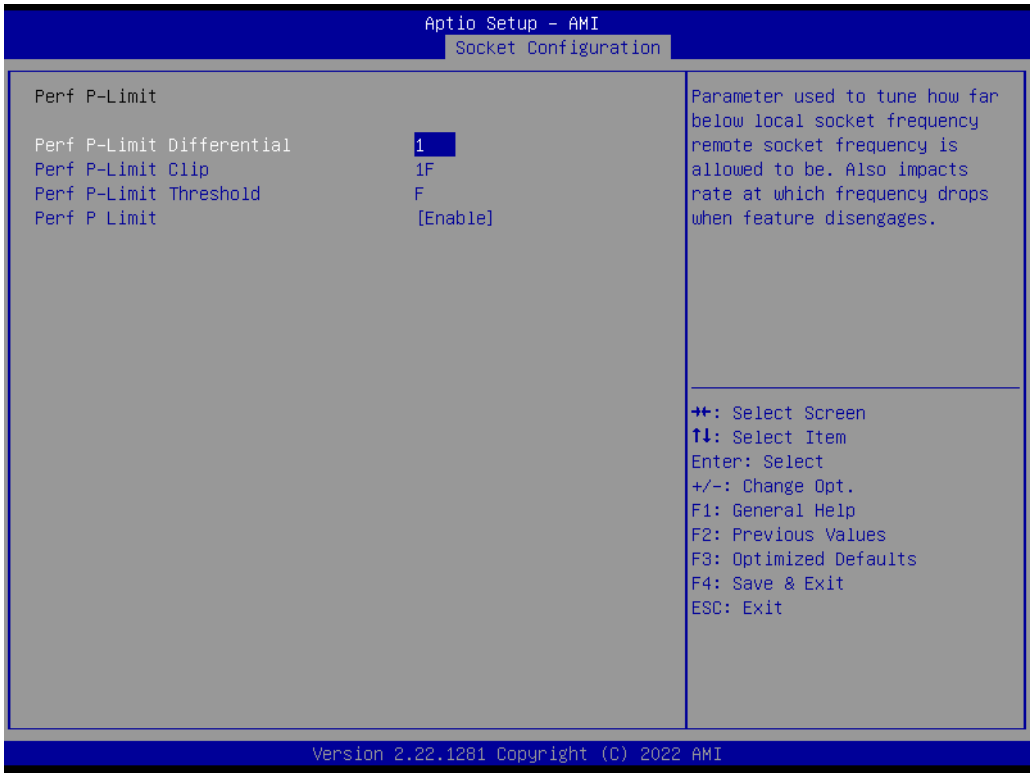
CPU P State Control





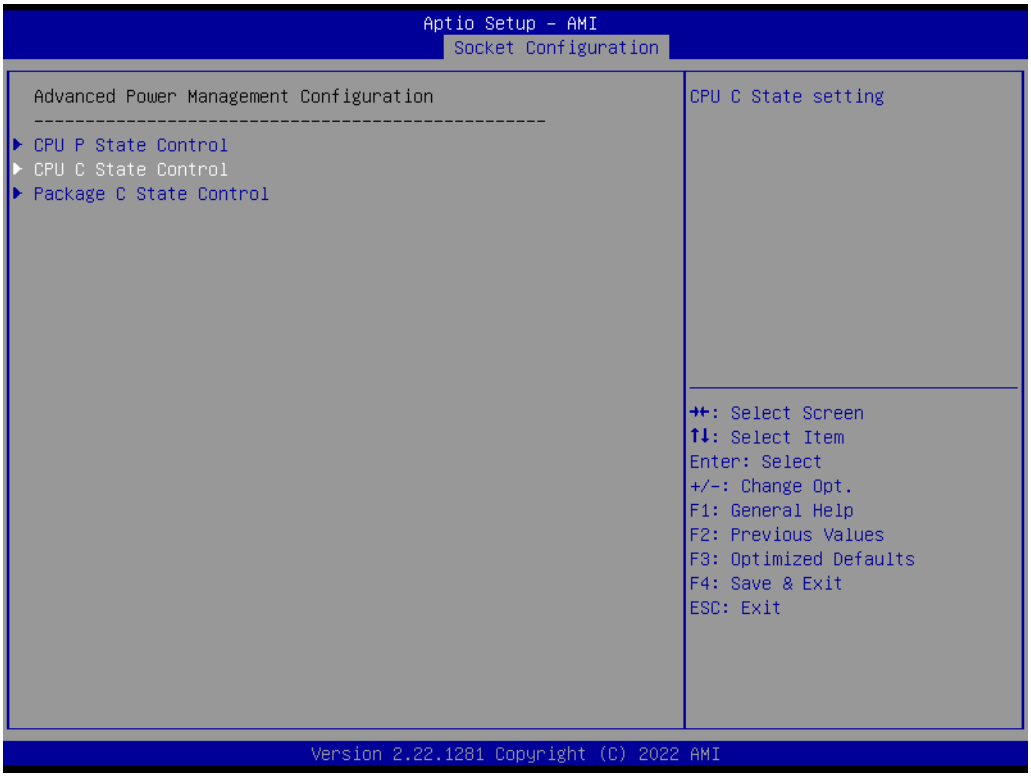
- **AVX Licence Pre-Grant Override**
  Enables AVX ICCP pre-grant level override.
- **SpeedStep (Pstates)**
  Enable/Disable EIST (P-States).
- **Config TDP Lock**
  Config TDP CONTROL Lock Bit.
- **AVX P1**
  AVX P1 level selection.
- **Dynamic SST-PP**
  Support Dynamic SST-PP Select. NOTE: Disable:Static SST-PP can be displayed.
- **Intel SST-PP**
  Intel SST-PP Select allows user to choose from up to two additional base frequency conditions.
- **Activate SST-BF**
  This Option allows SST-BF to be enabled.
- **EIST PSD Function**
  Choose HW_ALL/SW_ALL in _PSD return.
- **Boot performance mode**
  Select the performance state that the BIOS will set before OS hand off.
- **Energy Efficient Turbo**
  Energy Efficient Turbo Disable, MSR 0x1FC [19].
- **Turbo Mode**
  Enable/Disable processor Turbo Mode (requires EMTTM enabled too).
- **CPU Flex Ratio Override**
  Enable/Disable CPU Flex Ratio Programming.
- **GPSS timer**
  P-state change hysteresis time window.

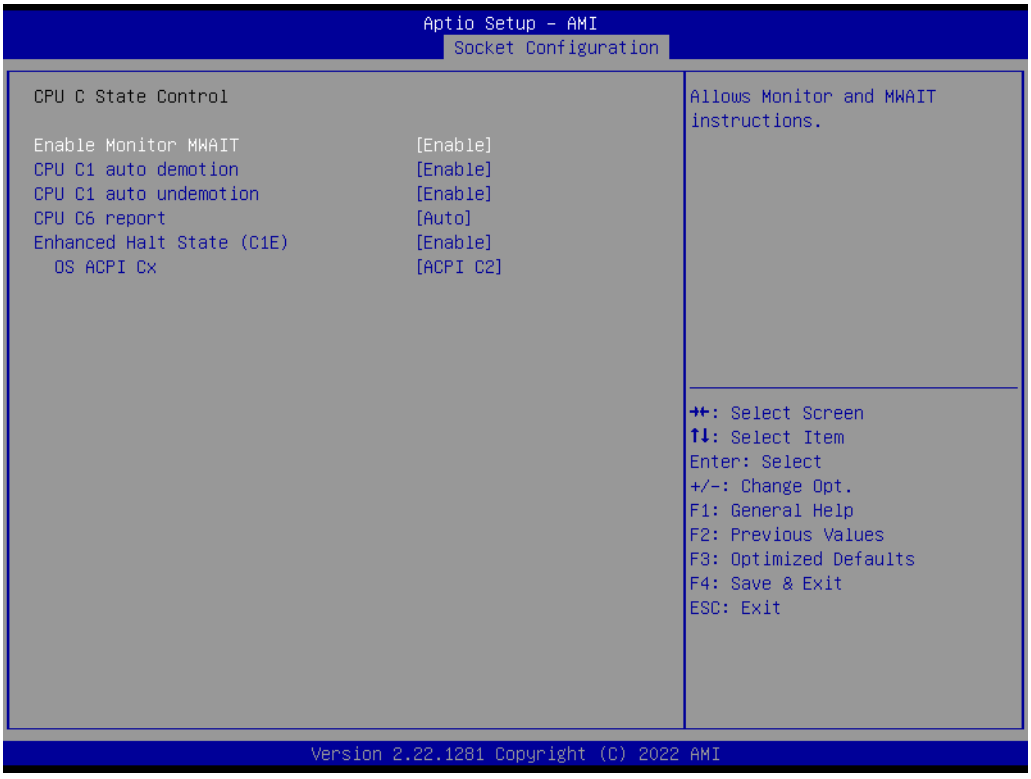
– **Perf P-Limit**
  Program PERF_P_LIMIT 1:30:2:0xe4 Sub Menu.



– **Perf P-Limit Differential**
  Parameter used to tune how far below local socket frequency remote socket frequency is allowed to be. Also impacts rate at which frequency drops when feature disengages.
– **Perf P-Limit Clip**
  Maximum value the floor is allowed to be set to for perf P-limit.
– **Perf P-Limit Threshold**
  Uncore frequency threshold above which this socket will trigger the feature and start trying to raise frequency of other sockets.
– **Perf P Limit**
  Enable/Disable Performance P-Limit.

CPU C State Control

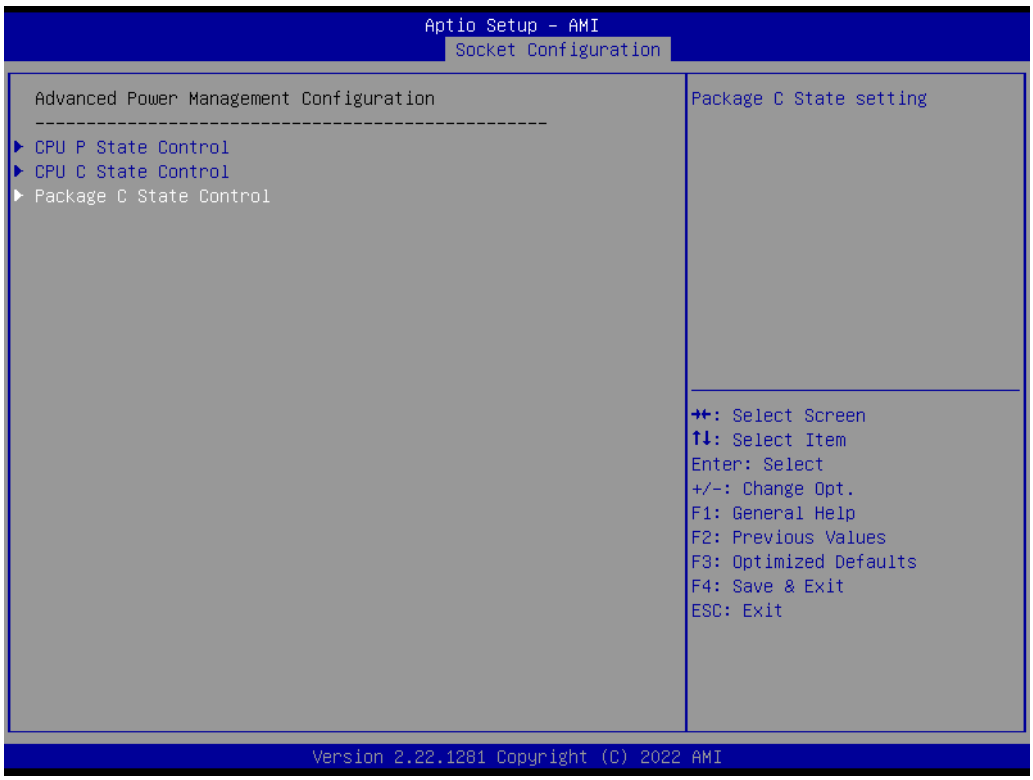


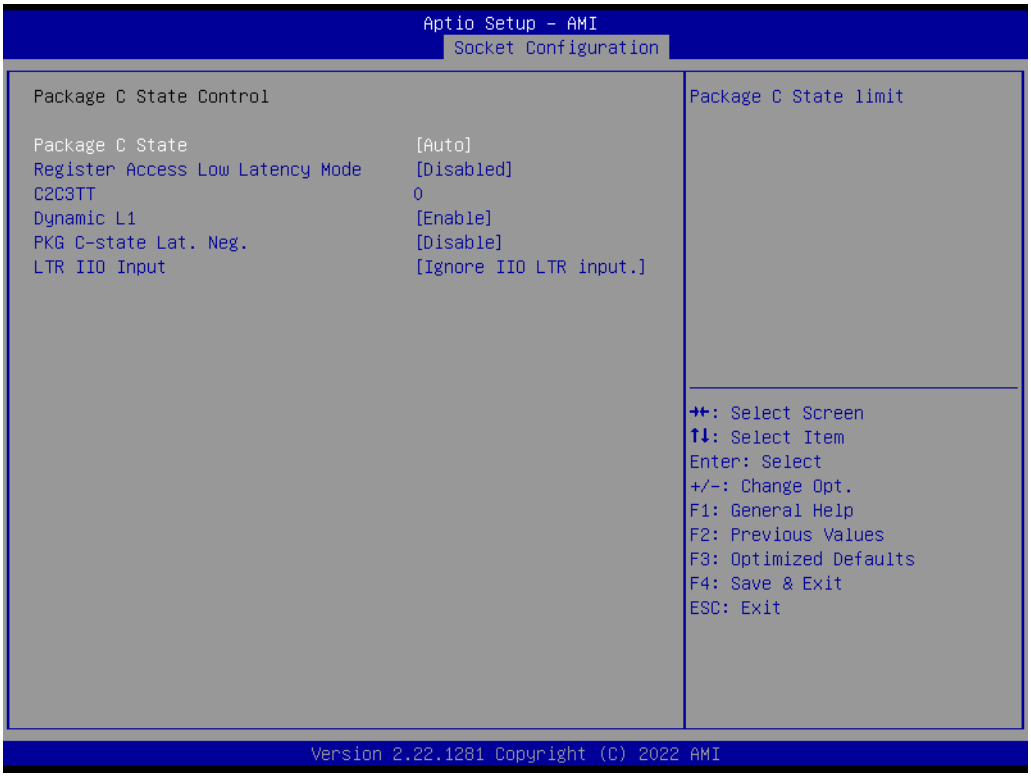


- **Enable Monitor MWAIT**
  Allows Monitor and MWAIT instructions.
- **CPU C1 auto demotion**
  Allows CPU to automatically demote to C1. Takes effect after reboot.

- **CPU C1 auto undemotion**
  Allows CPU to automatically undemote from C1. Takes effect after reboot.
- **CPU C6 report**
  Enable/Disable CPU C6(ACPI C3) report to OS.
- **Enhanced Halt State (C1E)**
  Core C1E auto promotion Control. Takes effect after reboot.
- **OS ACPI Cx**
  Report CC3/CC6 to OS ACPI C2 or ACPI C3.

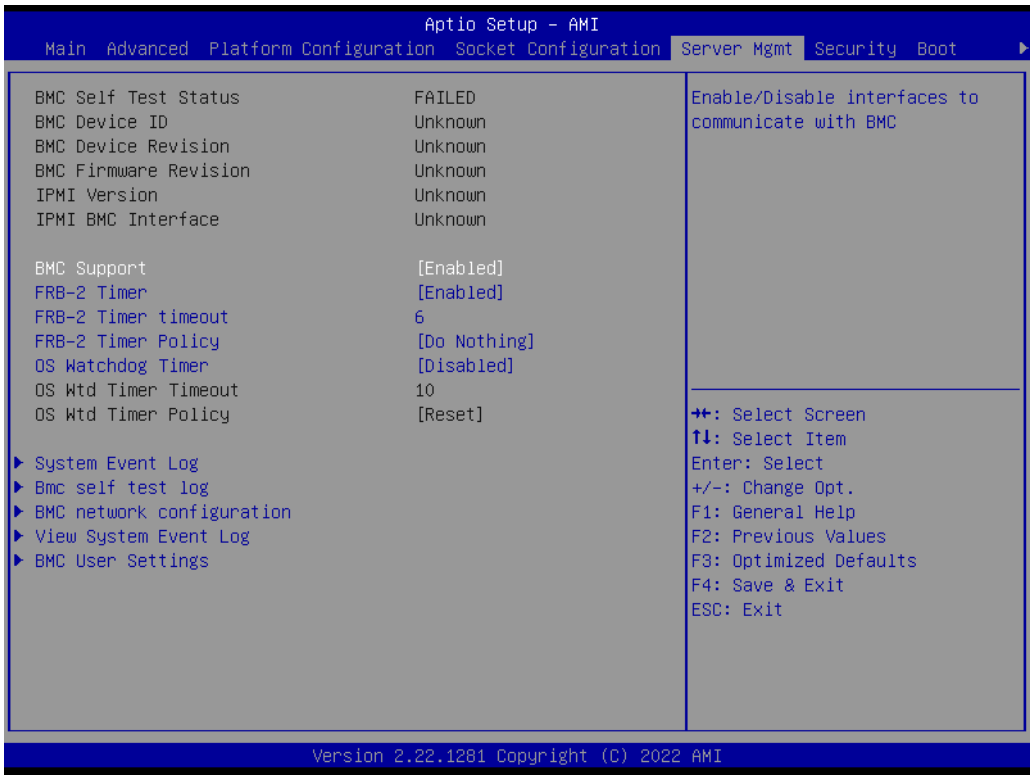
Package C State Control





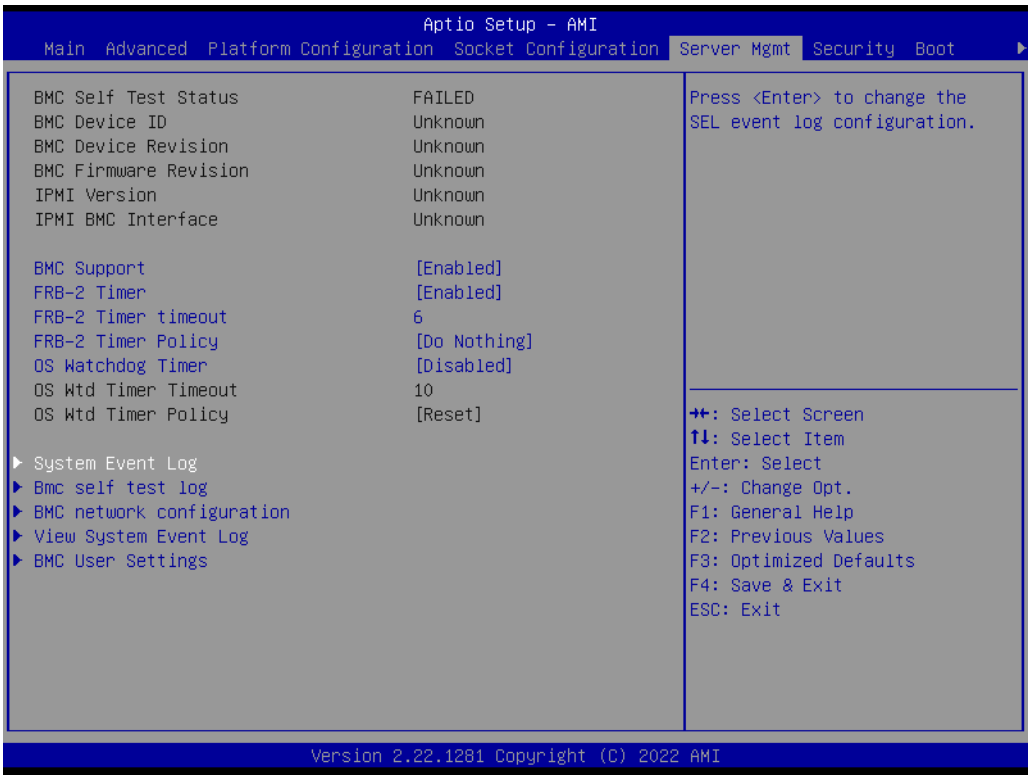
- **Package C State**
  Package C State limit.
- **Register Access Low Latency Mode**
  Enable lower latency mode for register accesses. Note: Enabling this mode will prevent PkgC6 as register access fabric is prevented from going into idle.
- **C2C3TT**
  Default = 0, means [AUTO]. C2 to C3 Transition Timer, PPDN_INIT = 1:10:1:74 Bit[11:0].
- **Dynamic L1**
  PCU_MISC_CONFIG Bit[21] = dynamic L1 enable.
- **PKG C-state Lat. Neg**
  MSR 1FCh Bit[30] = PCH_NEG_DISABLE.
- **LTR IIO Input**
  MSR 1FCh Bit[29] = LTR_IIO_DISABLE. Disable = Ignore IIO LTR input.

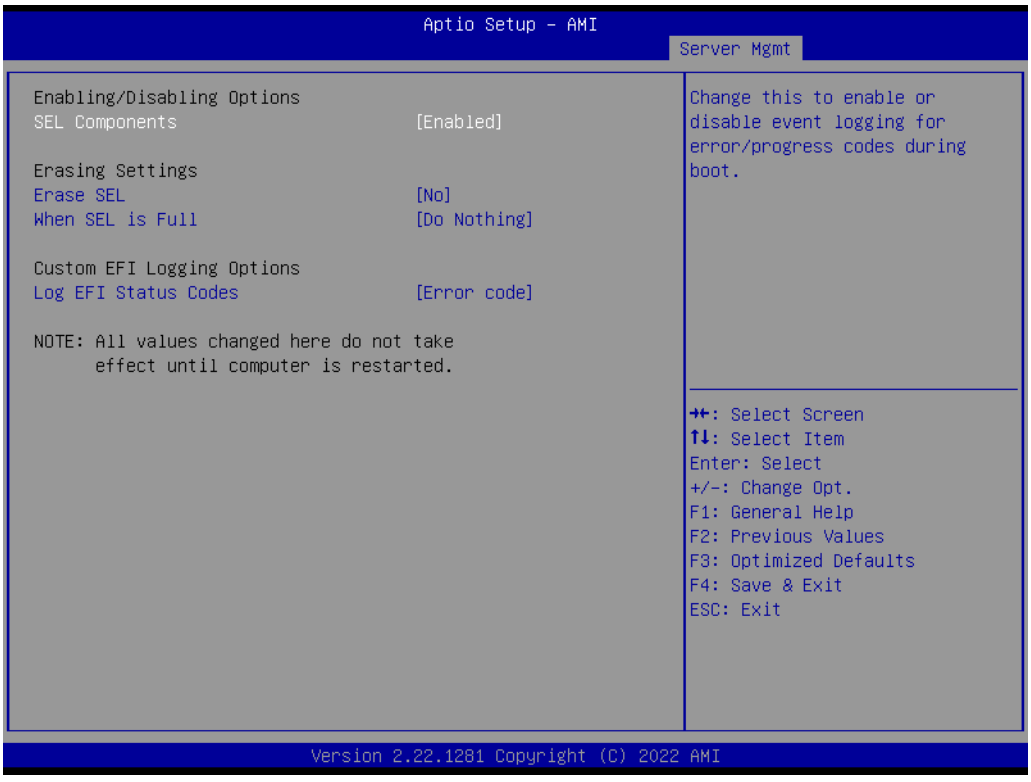
3.2.5 Server Management



- **BMC Support**
  Enable/Disable interfaces to communicate with BMC.
- **FRB-2 Timer**
  Enable or Disable FRB-2 timer (POST timer).
- **FRB-2 Timer timeout**
  Enter value Between 1 to 30 min for FRB-2 Timer Expiration.
- **FRB-2 Timer Policy**
  Configure how the system should respond if the FRB-2 Timer expires. Not available if FRB-2 Timer is disabled.
- **OS Watchdog Timer**
  If enabled, starts a BIOS timer which can only be shut off by Management Software after the OS loads. Helps determine that the OS successfully loaded or follows the OS Boot Watchdog Timer policy.
- **OS Wtd Timer Timeout**
  Enter the value Between 1 to 30 min for OS Boot Watchdog Timer Expiration. Not available if OS Boot Watchdog Timer is disabled.
- **OS Wtd Timer Policy**
  Configure how the system should respond if the OS Boot Watchdog Timer expires. Not available if OS Boot Watchdog Timer is disabled.

3.2.5.1 System Event Log

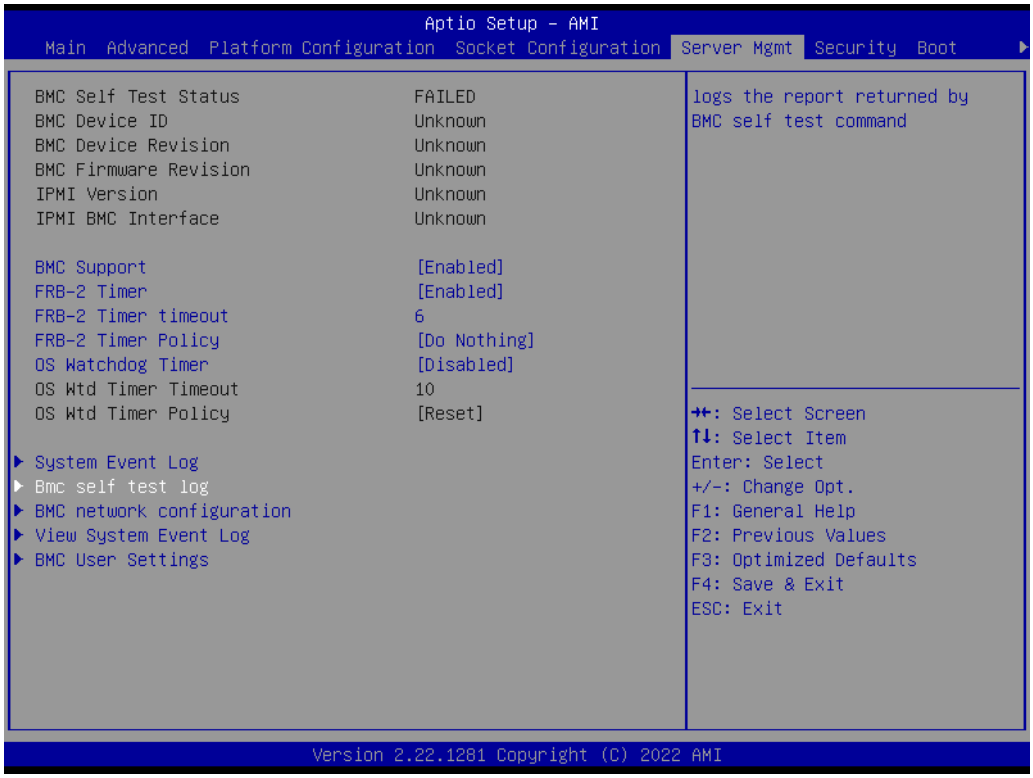


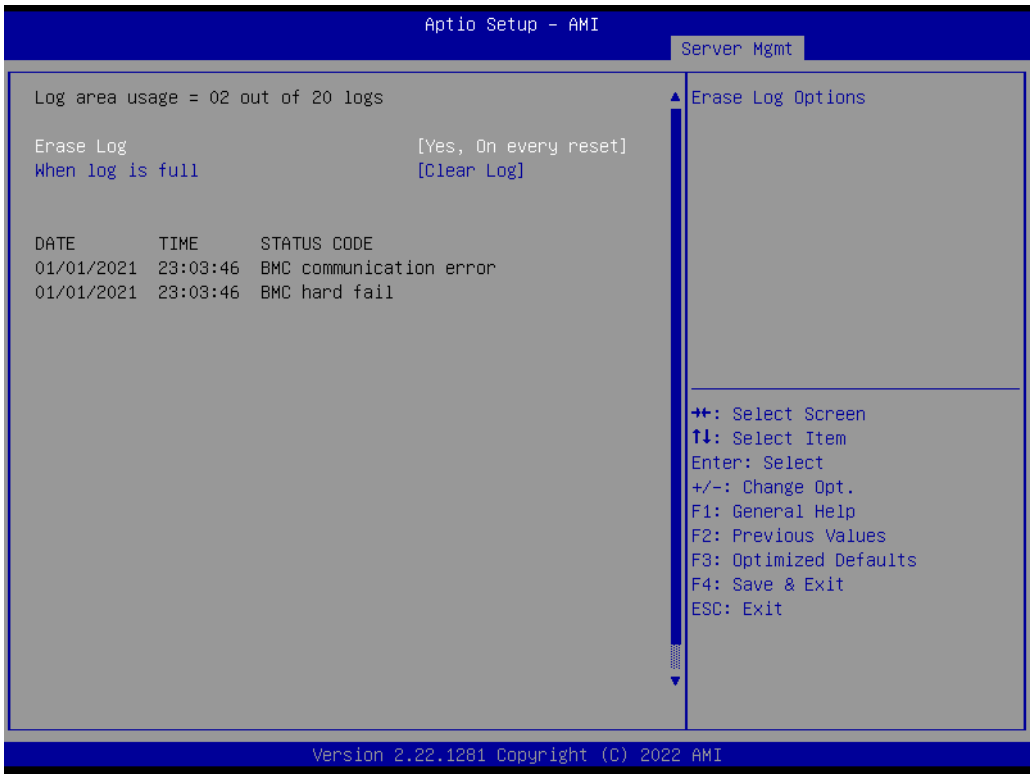


- **SEL Components**
  Enable/Disable all features of system event logging during boot.
- **Erase SEL**
  Choose options for erasing SEL.

- **When SEL is Full**
  Choose options for reactions to a full SEL.
- **Log EFI Status Codes**
  Disable the logging of EFI status codes, or log only error codes, or only progress codes, or both.

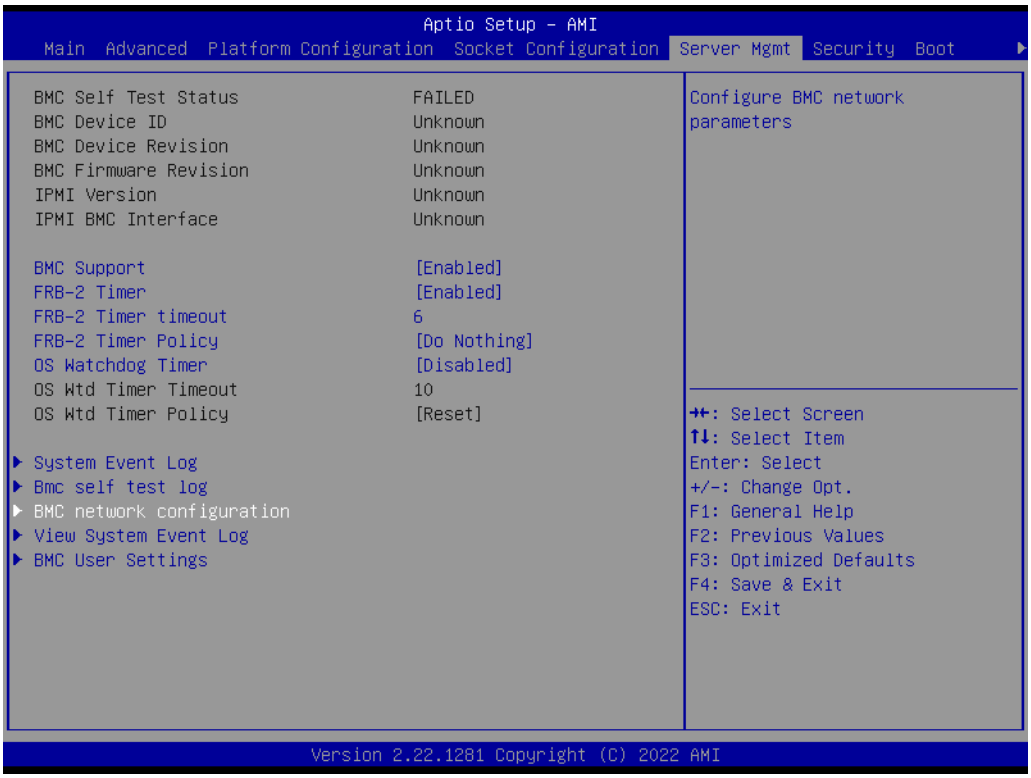
3.2.5.2 BMC Self Test Log

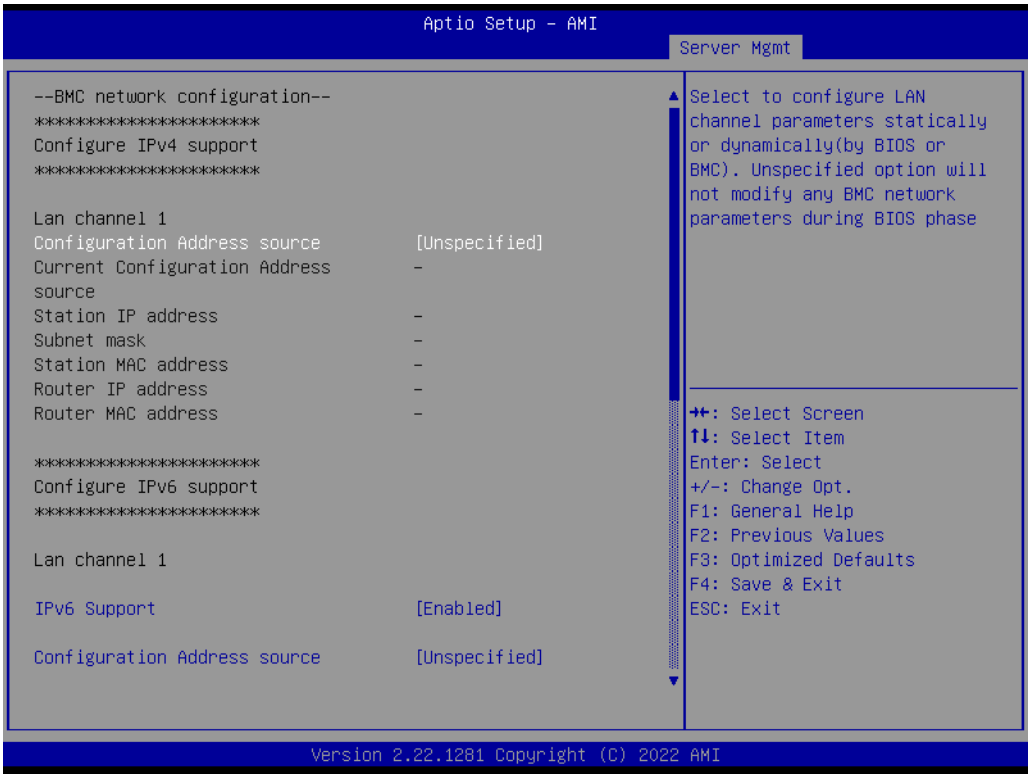




- **Erase Log**
  Erase log options.
- **When Log is Full**
  Select the action to be taken when log is full.

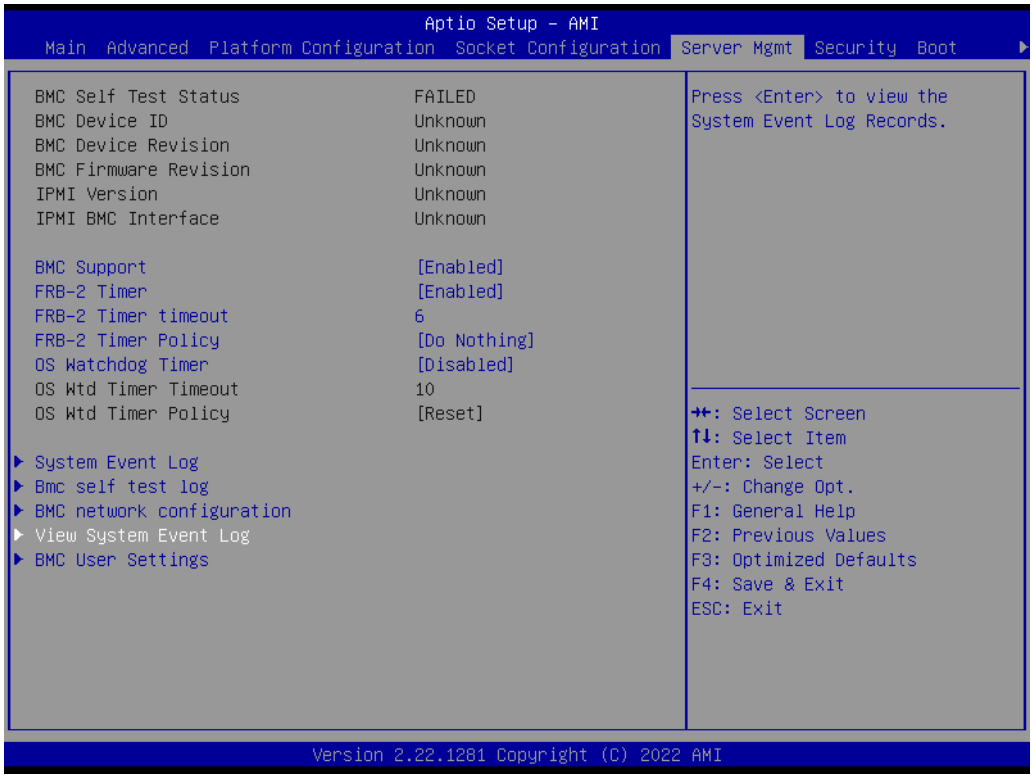
3.2.5.3 BMC Network Configuration





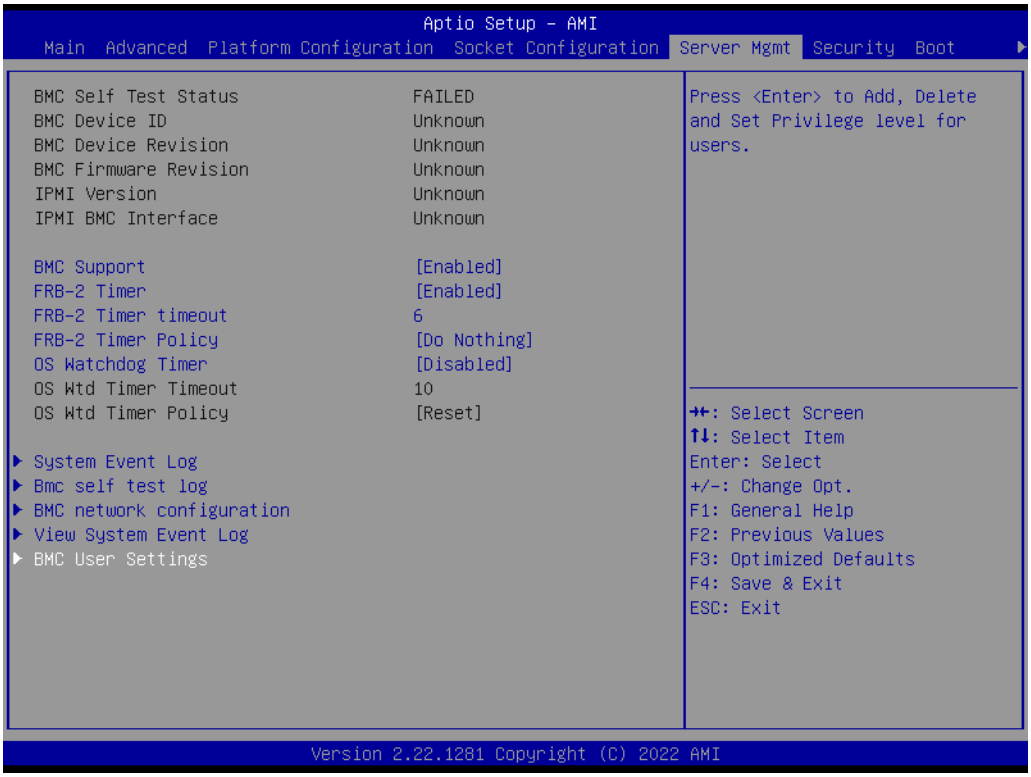
- **Configuration Address Source**
  Select to configure LAN channel parameters statically or dynamically (by BMC). Unspecified option will not modify any BMC network parameters during BIOS phase.

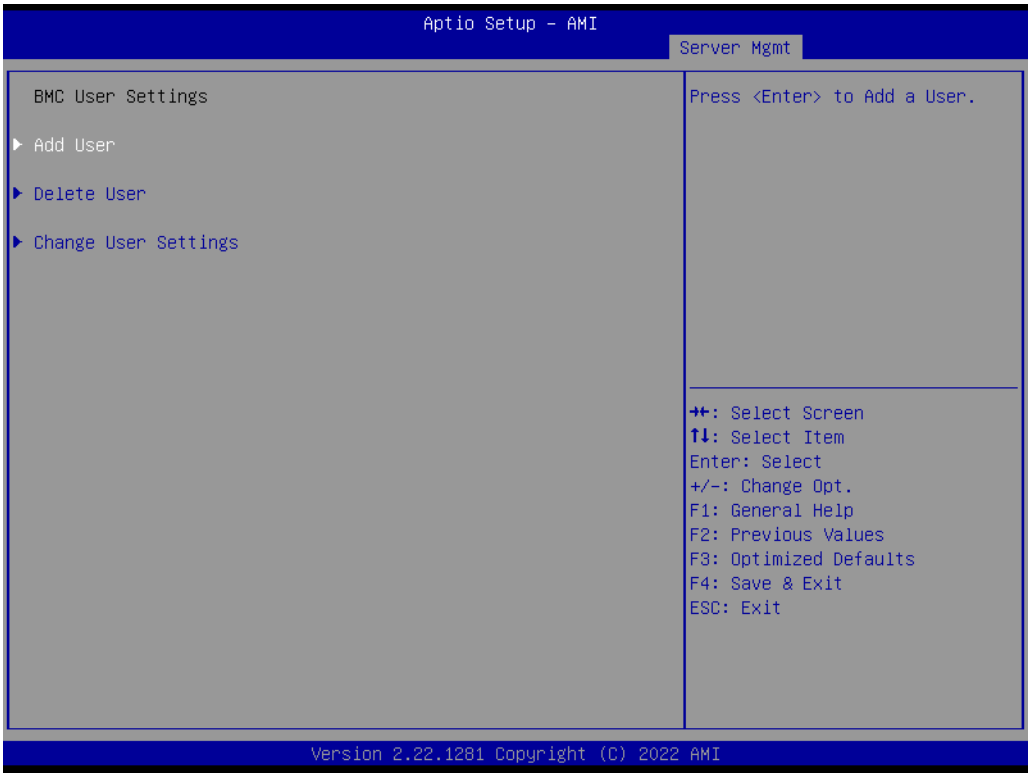
3.2.5.4 View System Event Log



If any event logs occur during boot up, the event logs will be display at this page.

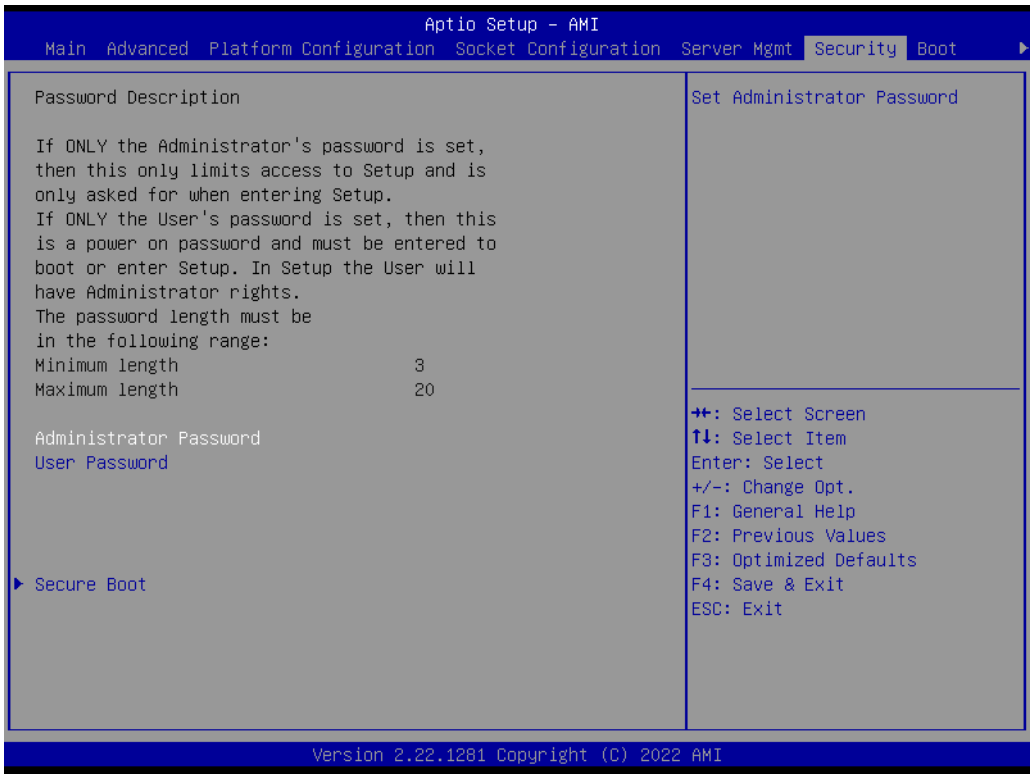
3.2.5.5 BMC User Settings



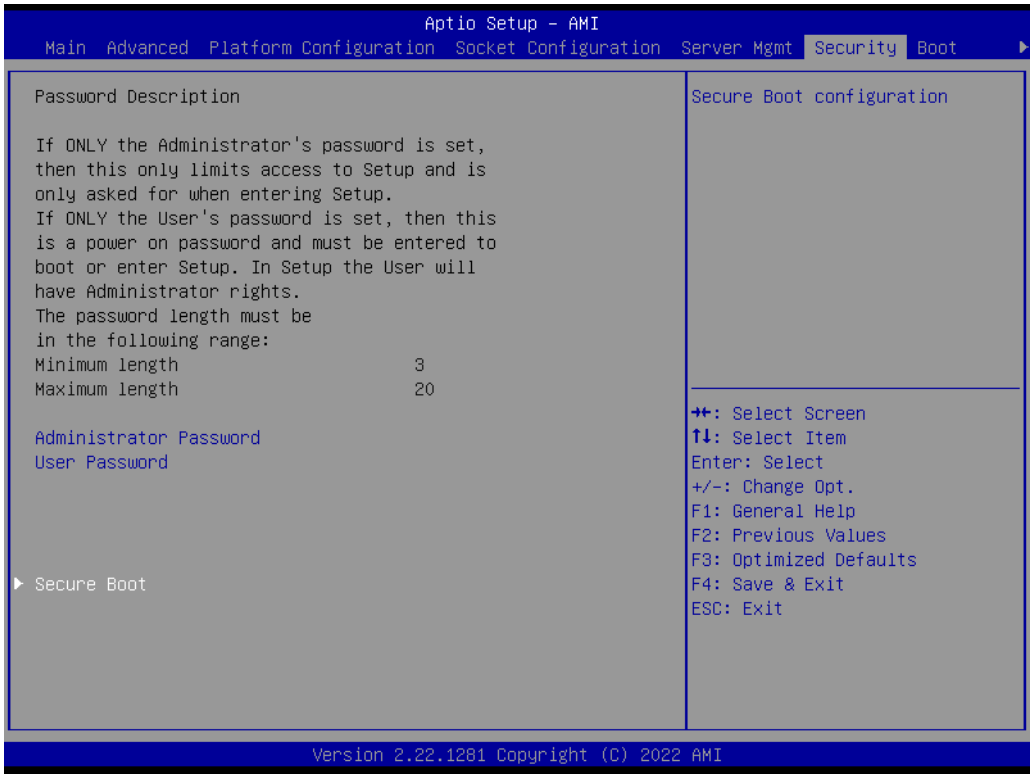


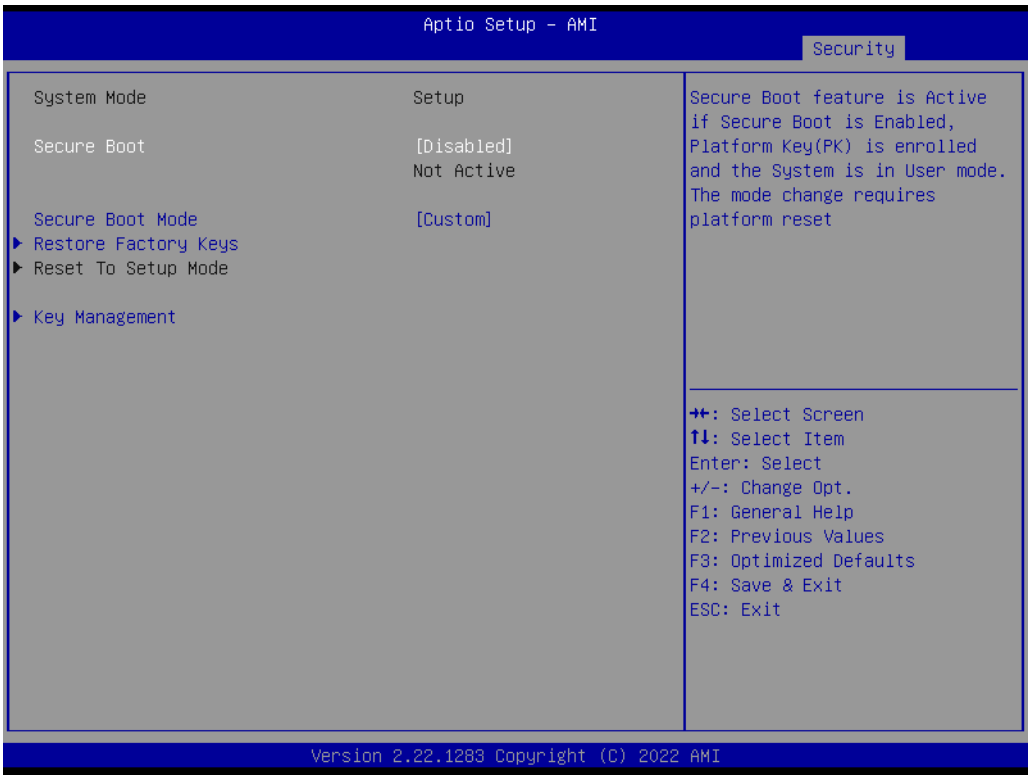
- **Add User**
  Add user information.
- **Delete User**
  Delete user information.
- **Change User Settings**
  Allow change User settings.

3.2.6 Security



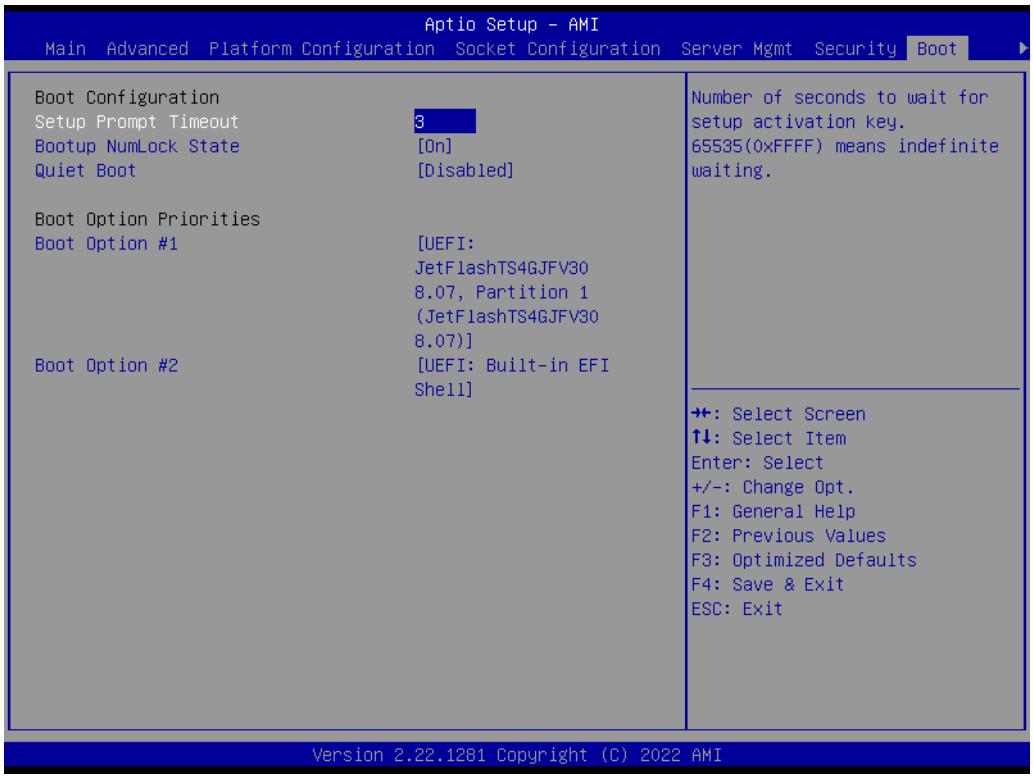
- **Administrator Password**
  Set Administrator Password.
- **User Password**
  Set User Password.





– **Secure Boot**
  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 platform reset.
– **Secure Boot Mode**
  Secure Boot mode options: Standard or Custom.

3.2.7 Boot



- **Setup Prompt Timeout**
  Number of seconds to wait for setup activation key. 65535 (0xFFFF) means indefinite waiting.
- **Bootup NumLock State**
  Select the keyboard NumLock state.
- **Quiet Boot**
  Enables or disables Quiet Boot option.
- **Boot Option**
  Display and select boot devices.

3.2.8 Save & Exit

- **Save 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
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
```

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