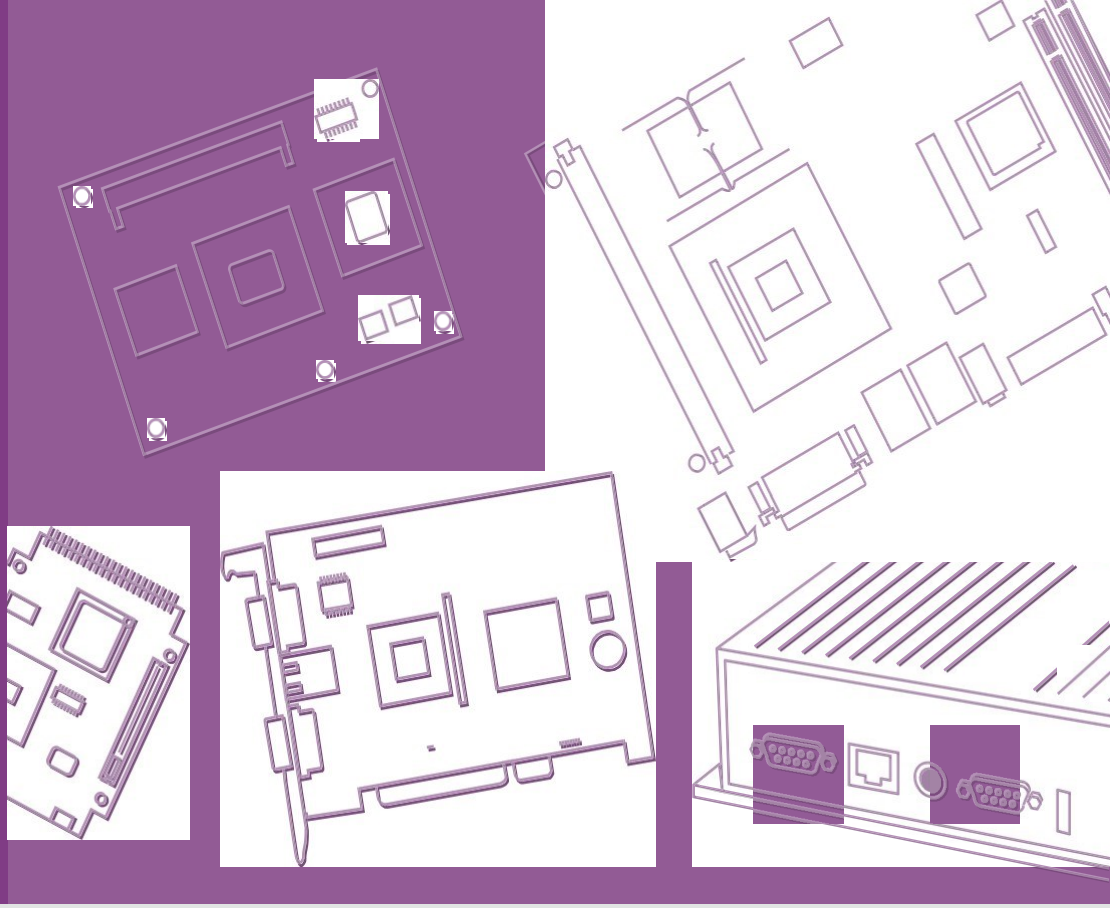


User Manual

AIR-500D

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.

Copyright

Acknowledgments

For more information about this and other Advantech products, please visit our website at:
http://www.advantech.com/
http://www.advantech.com/ePlatform/

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

Part No. Edition 1
Printed in China October 2022

Product Warranty (2 Years)

Advantech warrants the original purchaser that all 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 are billed according to the cost of replacement materials, service time, and freight. Please consult your dealer for more details.

If you believe that your product is 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, 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 residential installations. 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, users are 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 your dealer or an experienced radio/TV technician for help

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.*

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 AIR-500D Unit
- 1 x Mounting Kit
- 1 x User Manual (Simplified Chinese)
- 1 x Warranty
- 1 x China RoHS

Ordering Information

Part No.	CPU	DDR4	GbE	GPIO	VGA	2.5'' SATA III HDD Bay	RS-232/ 422/485	USB 3.0	M.2 B Key	M.2 E Key	SIM	BMC	TPM	IPMI	Power Supply	Expansion
AIR-500D-T10A1	Intel Xeon D-1746TER	Up to 128GB	4	1	1	2 (Up to 4)	4	6	1	1	1	2	Optional	Yes	1200W	1 x PCI 1 x PCIex4 2 x PCIx16
AIR-500D-T40A1	Intel Xeon D-1735TR															
AIR-500D-T50A1	Intel Xeon D-1715TER															

Note!

BMC having one each in COM/LAN port; Memory/Storage and operating system bundled by request.

AIR-500D Default SKU Option Items

Optional Item for Default SKU

Part Number	Description
1700021723-02	Power Cord UL 3P 15A 125V 183cm(IEC320-C19), USA type
1700023533-01	Power Cord EU 3P 16A 250V 183cm, EU type
1700023534-01	Power Cord BSI 3P 16A 250V 183cm, UK type
1700023536-01	Power Cord PSE 3P 20A 250V 183cm, PSE special connector*

*The PSE power cord (P/N: 1700023536-01) connector is special type, and the image is as below.

Safety Instructions

1. Read these safety instructions carefully.
2. Retain this user manual for future reference.
3. Disconnect the equipment from all AC outlets before cleaning. Use only a damp cloth for cleaning. Do not use liquid or sprayed detergent.
4. For pluggable equipment, the power outlet should be 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 and 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 the equipment from the power source to avoid damage from transient over-voltage.
12. Never pour liquid into an opening as this can cause fire or electrical shock.
13. Never open the equipment. For safety reasons, only qualified service personnel should open the equipment.
14. If one of the following occurs, have the equipment checked by service personnel:
    - The power cord or plug is damaged.
    - Liquid has penetrated into the equipment.
    - The equipment has been exposed to moisture.
    - The equipment 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 cause damage. The equipment should be stored 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: 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 same or equivalent type as recommended by the manufacturer. Discard all 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 area.
21. 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 specifications. 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 AIR-500D series.

1.1 Introduction

Advantech's AIR-500D is a high-performance edge computer with multiple expansion slots and fast data transfer speeds that empower AI model training applications. It is equipped with Intel® Xeon® D-1700 series processor and 4 x DDR4 SODIMM sock- ets that support up to 128GB. AIR-500D provides slots for PCI, PCIe x4, and PCIe x16 for up to 350W graphics card, and this configuration is ideal for AI vision robotic applications to install motion control card, frame grabber and high-performance graphic card.

Multiple I/O and Storages

AIR-500D offers 4x GbE, 6x USB 3.0, 4x COM ports and BMC one each in LAN/COM port. In addition, to store and trans- fer a large amount of data, AIR-500D 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

To enhance the security of AIR-500D, the system has dual BIOS for BIOS backup and recov- ery, lowering the risk of BIOS damage and protecting BIOS from potential virus or data cor- ruptions. AIR-500D on-board BMC (baseboard management con- troller) provides IPMI architecture for remote management.

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

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 the sys- tem's 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. AIR-500D also supports Advantech's own WISE-DeviceOn, which provides easy remote management so users can monitor, configure, and con- trol a large number of terminals to make mainte- nance and system recovery simpler.

1.2 Product Features

1.2.1 General

- **CPU:** Intel® Xeon® D-1700 series processor (up to 10 cores 67W)
  Intel® Xeon® , 10 core, power consumption 67W
  Intel® Xeon® , 8 core, power consumption 59W
  Intel® Xeon® , 4 core, power consumption 50W
- **System Chipset:** SoC
- **BIOS:** AMI EFI 512Mbit?
- **System Memory:** 4x 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:** 6x USB 3.0 compliant ports
- **Audio:** High Definition Audio (HD), Line-out/Mic-in
- **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 15mm/0.591inch (up to 4 x 2.5" SATAIII HDD Bay by request)
- Expansion Interface:
  - 1 x M.2 2230/2242/2280/3030/3042/3052 B Key (support SIM holder)
  - 1 x M.2 2230 E key for Wi-Fi modules
- **TPM:** TPM2.0 (support by optional AMO-I029)

1.2.2 Ethernet

- **Chipset:** – LAN1/2/3/4 Intel® i210
- **Speed:** – LAN1/2/3/4 10/100/1000
- **Interface:** Up to 4 x RJ45

1.3 Chipset

1.3.1 Functional Specifications

1.3.1.1 Processor

Processor	Intel® Xeon® D-1746TER, 10 core, power consumption 67W Intel® Xeon® D-1735TR, 8 core, power consumption 59W Intel® Xeon® D-1715TER, 4 core, power consumption 50W
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 6 x USB 3.0 ports ■ All ports are High-Speed, Full-Speed, and Low-Speed capable ■ Supports legacy keyboard/mouse
BIOS	■ AMI 512-Mbit EFI Flash BIOS via SPI

1.3.1.3 Others

Serial Ports	■ 4x serial ports ■ Supports IRQ Sharing among serial ports under Microsoft Windows OS ■ COM1, COM2, COM3, COM4: RS232/422/485
Ethernet	■ LAN1/2/3/4 support 10/100/1000 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 System Dimensions

270[10.62] x 260 [10.23] x 399 [15.71] Unit: mm [Inch]

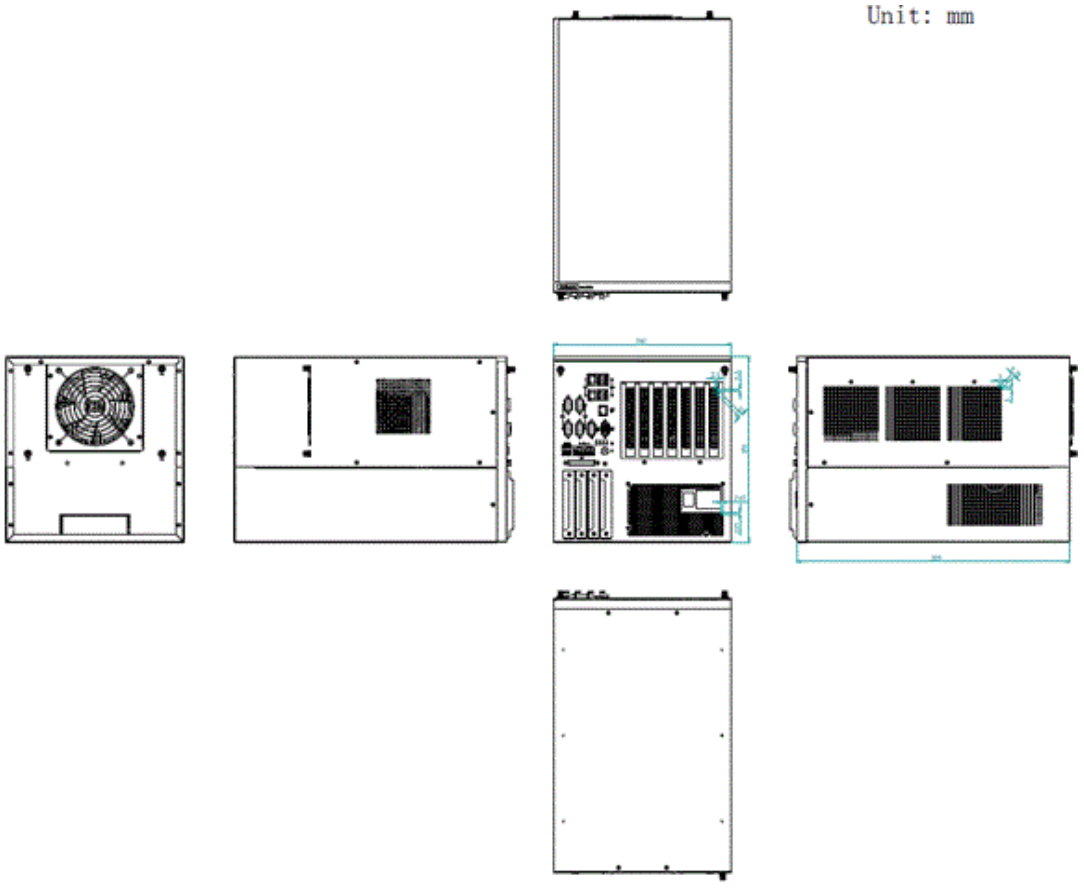


Figure 1.1 AIR-500D Mechanical Dimensions Diagram

1.4.2 Weight

10.6Kg (23.37 lbs)

1.5 Power Requirements

1.5.1 System Power

- **Power Type:** inbuilt ATX
- **Minimum Power Input:** 100~240V_{AC}
- **Power Supply:** 1200W power supply built in

1.6 Operating Environment Specifications

1.6.1 Operating Temperature

- **With extended peripherals:** -10 ~ 50° C

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), UKCA, CCC, BSMI

1.6.5 EMC

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

Chapter 2

Hardware Configuration

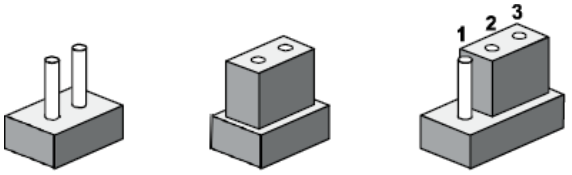
2.1 Introduction

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

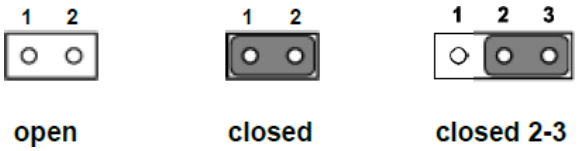
2.2 Jumpers

2.2.1 Jumper Description

You may configure AIR-500D 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.



The jumper settings are schematically diagrammed in this manual as follows:



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

2.2.2 Jumper List

Table 2.1: Jumper List	
JCMOS1	Clear CMOS
PSON1	Auto Power On Setting

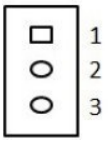
2.2.3 Jumper Location

Figure 2.1 Jumper Layout

2.2.4 Jumper Settings

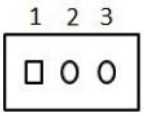
2.2.4.1 Clear CMOS Setting for JCMOS1

JCMOS1 Clear CMOS Setting	
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)	Normal Operation (Default)
(2-3)	Clear CMOS



2.2.4.2 Auto Power On Setting for PSON1

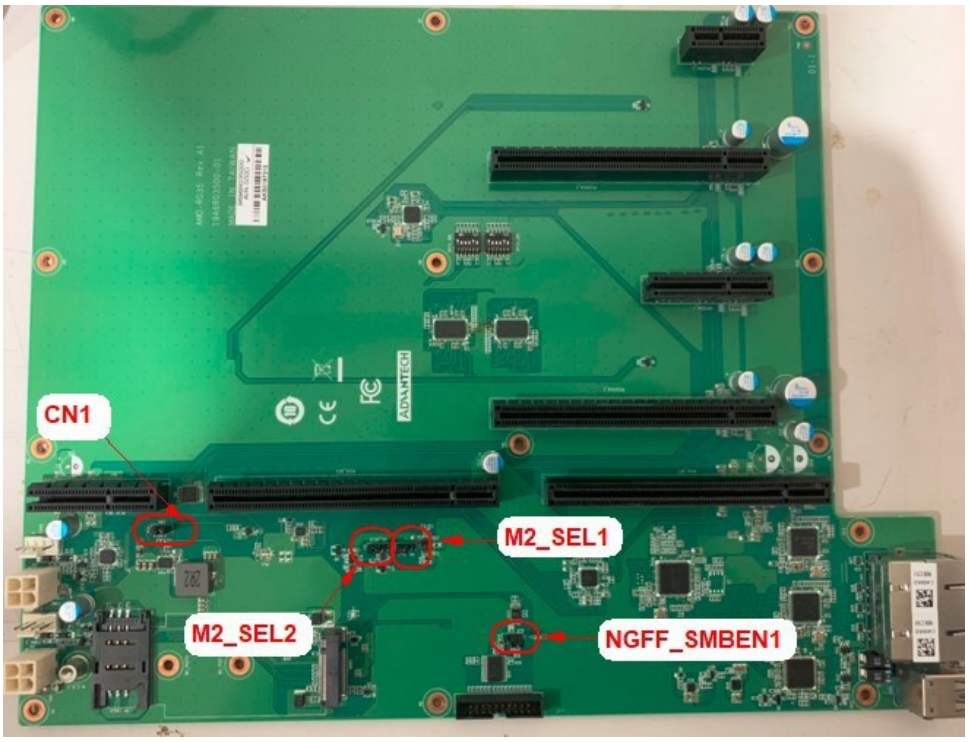
PSON1 Clear CMOS Setting	
Part Number	1653003101
Foot Print	HD_3x1P_79_D
Description	PIN HEADER 3x1P 2.0mm 180D(M) DIP 2000-13 WS
Setting	Function
(1-2)	Auto Power On
(2-3)	Power button for Power On (Default)



2.2.5 Bottom Board Jump List

Table 2.1: Jumper List	
M2_SEL1	M2_SEL
M2_SEL2	M2_SEL
NGFF_SMBEN1	SMB Enable
CN1	5G Module power switch

2.2.6 Bottom Board Jumper Locations

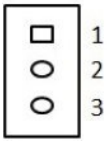


Chapter 2

2.2.7 Jumper Locations

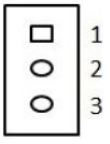
2.2.7.1 M.2 Select Function Source Between SATA and PCIE by M2_SEL1

M2_SEL1 M.2 select function source setting	
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



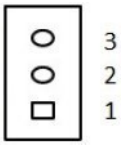
2.2.7.2 M.2 Select Function Source Between USB3.0 and PCIE by M2_SEL2

M2_SEL2 M.2 select function source setting	
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)	USB3.0
Floating	PCIE



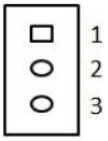
2.2.7.3 M.2 SMBus Enable by NGFF_SMBEN1

M.2 SMBus Enable Setting	
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 CN1

Power switch Setting	
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)	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

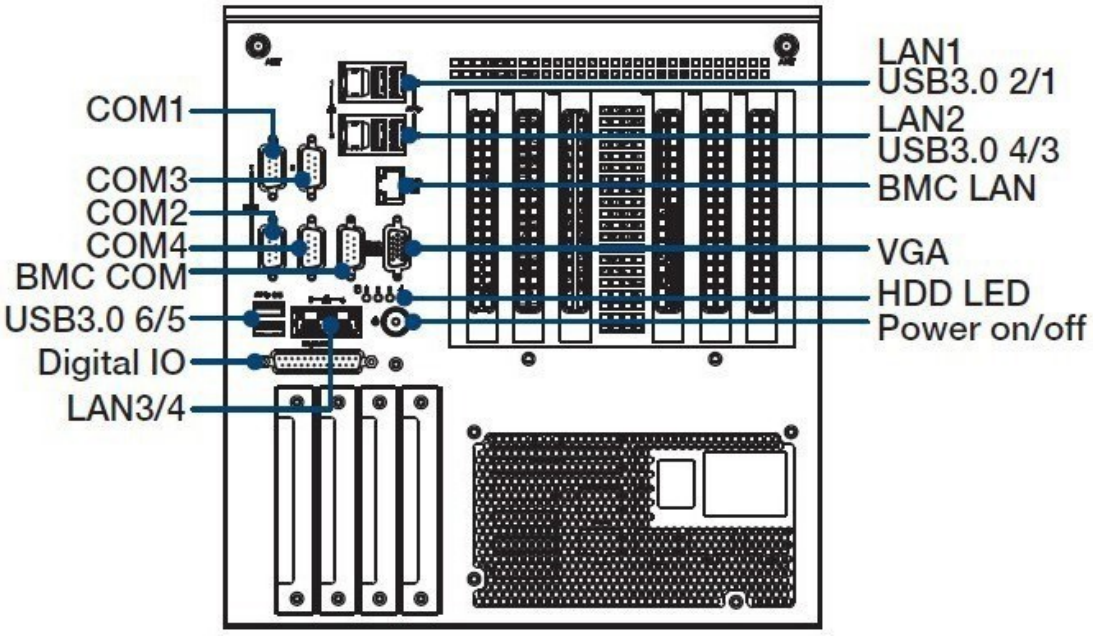


Figure 2.2 Front I/O Connector Diagram

2.3.1.1 COM Port Connector

AIR-500D provides up to four 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 AIR-500D can be supported via the BIOS settings.

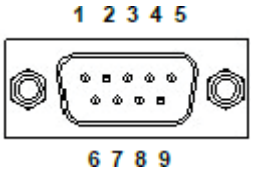


Figure 2.3 COM Port Connector

Table 2.2: COM Connector Pin Assignments

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

2.3.1.2 Ethernet Connector (LAN)

AIR-500D is equipped with up to 4x Ethernet ports. LAN1/2/3/4 controllers that are fully compliant with IEEE 802.3u 10/100/1000 Mbps CSMA/CD standards.

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).

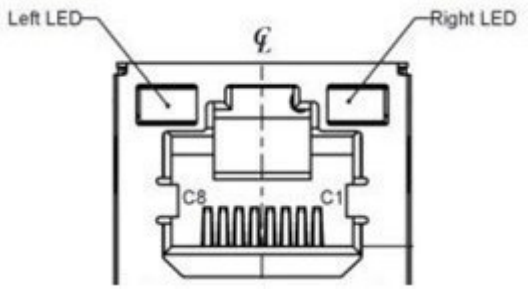


Figure 2.4 Ethernet Connector

For LAN1/2/3/4 Connector:

Table 2.3: 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_D1_N
C5	MDI_LAN_D2_P
C6	MDI_LAN_D2_N
C7	MDI_LAN_D3_P
C8	MDI_LAN_D3_N

2.3.1.3 Power On/Off Button

AIR-500D 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.

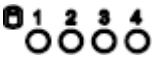


Figure 2.6 LED Indicators

2.3.1.5 USB 3.0 Connector

AIR-500D supports 6x 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.

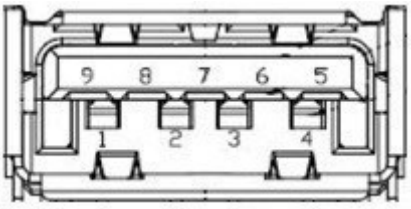


Figure 2.7 USB 3.0 Connector

Table 2.4: Table 2.5: USB 3.(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

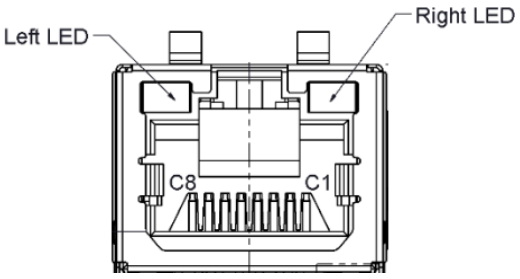


Figure 2.8 BMC Dedicated LAN Connector

Pin	10/100/1000BaseT Signal Name
C1	MDI_LAN_D0_P
C2	MDI_LAN_D0_N
C3	MDI_LAN_D1_P
C4	MDI_LAN_D1_N
C5	MDI_LAN_D2_P
C6	MDI_LAN_D2_N
C7	MDI_LAN_D3_P
C8	MDI_LAN_D3_N

2.3.1.7 BMC Dedicated COM Port

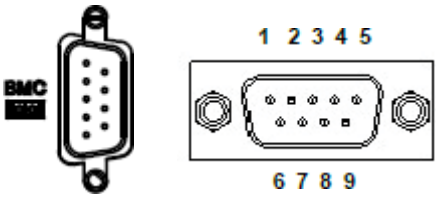


Figure 2.9 BMC Dedicated COM Port

Table 2.6: COM2 BMC Dedicated COM Port Pin Assignments	
Pin	**Signal Name (RS232)**
2	RX
3	TX

2.3.1.8 BMC Dedicated VGA Connector

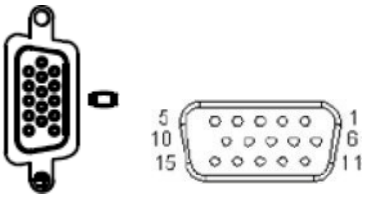


Figure 2.10 BMC Dedicated VGA Port

Table 2.7: 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		

2.3.1.9 DIO Connector

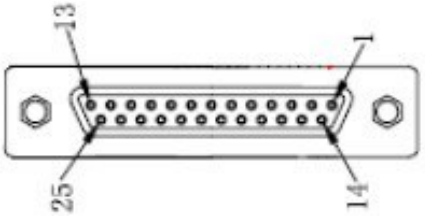


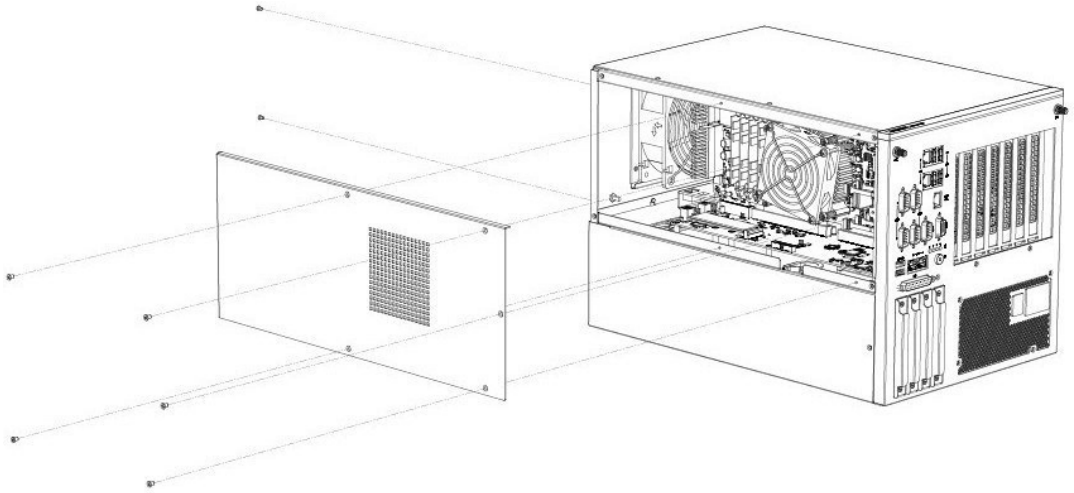
Figure 2.11 DIO Connector

Table 2.9: DIO Connector Pin Assignment			
Pin	**Signal Name**	**Pin**	**Signal Name**
1	GND	14	GND
2	Port0 D0	15	Port1 D0
3	Port0 D1	16	Port1 D1
4	Port0 D2	17	Port1 D2
5	Port0 D3	18	Port1 D3
6	Port0 D4	19	Port1 D4
7	Port0 D5	20	Port1 D5
8	Port0 D6	21	Port1 D6
9	Port0 D7	22	Port1 D7
10	+5V (Maximum 5W)	23	+5V (Maximum 5W)
11	NC	24	NC
12	NC	25	NC
13	NC		

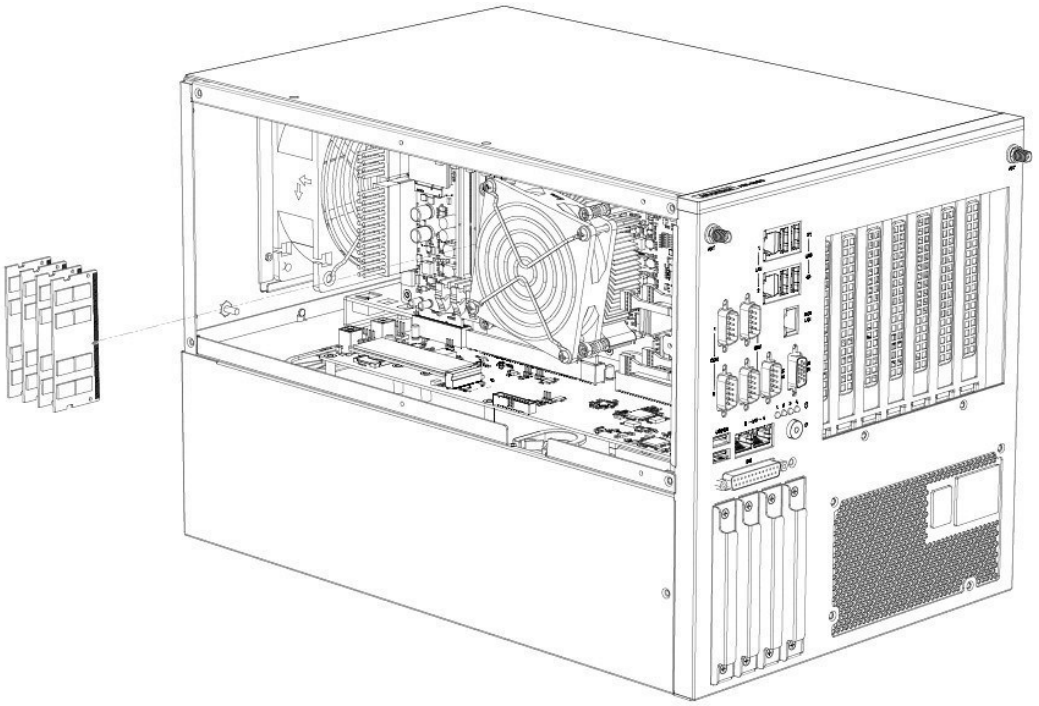
Note! *NC represents "No Connection".*

2.4 Installation

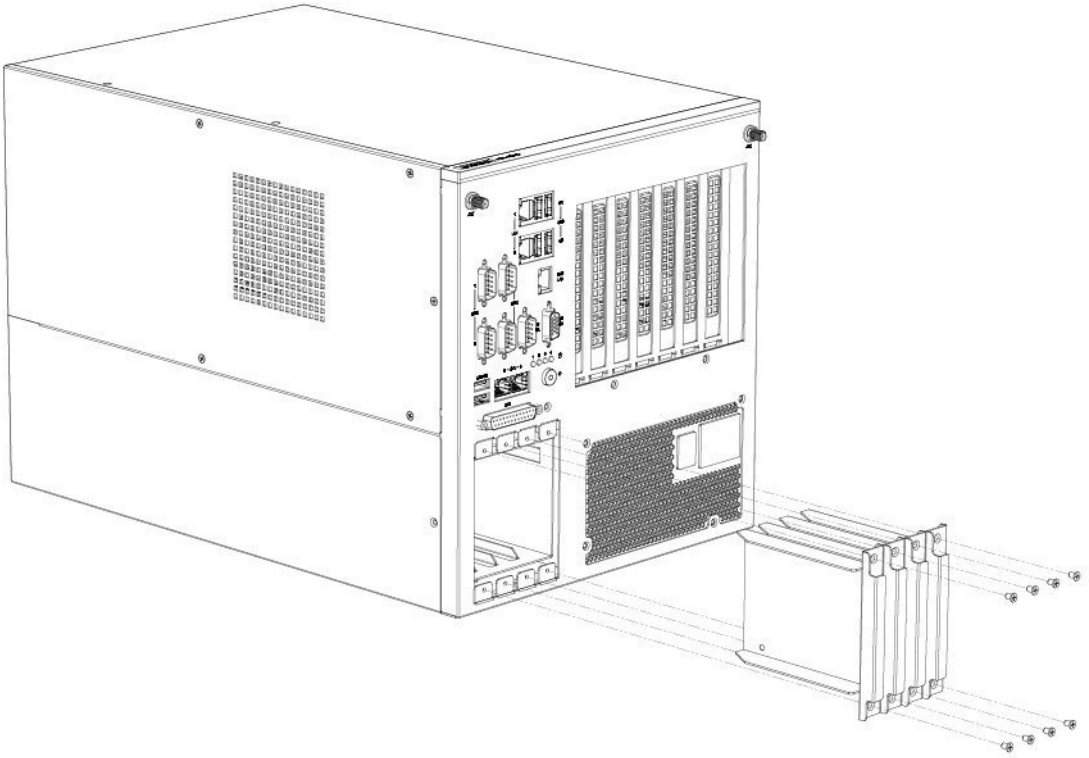
2.4.1 Memory Installation



1. Unscrew the 6 screws on the side cover, and remove the side cover.
2. Install the memory into the system.
3. Replace the side cover.
4. Memory Configuration Instruction:
   Using 1x DIMM: install on CN1 or CN3 slot
   Using 2x DIMM: install on CN1 & CN3 slot Using 3xDIMM is not supported.

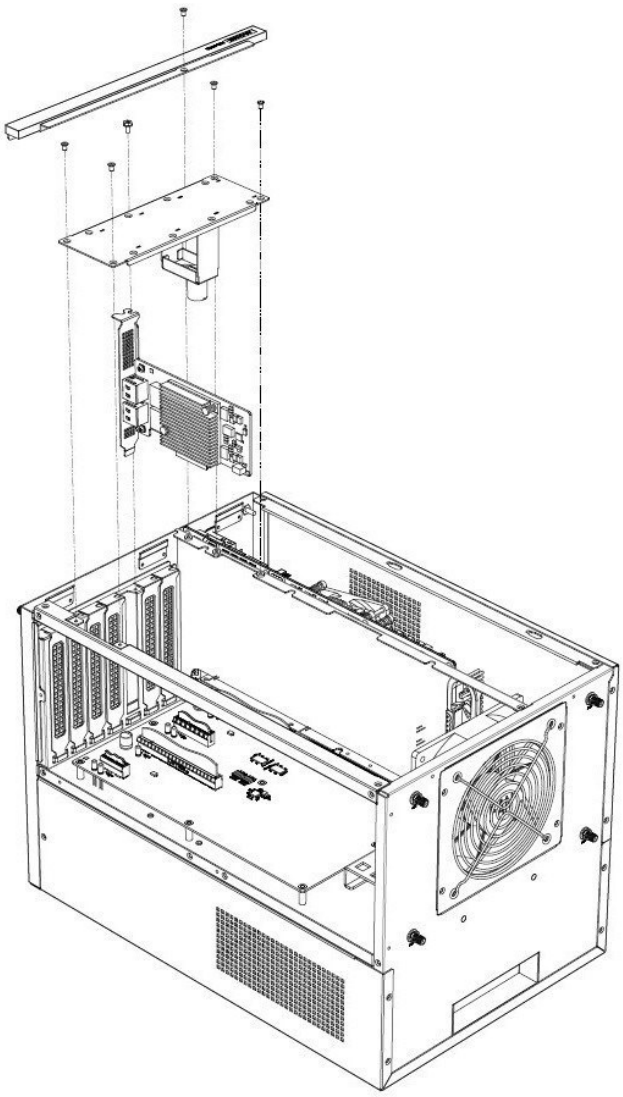


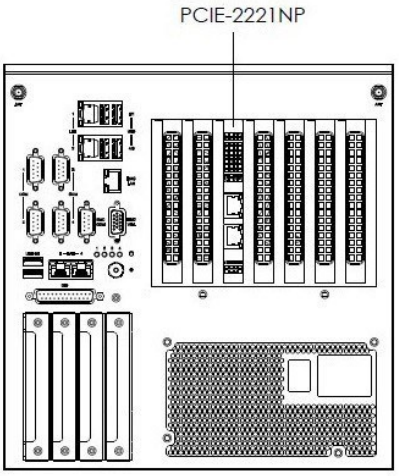
2.4.2 HDD/SSD Installation



1. Remove 8 screws for HDD/SSD bracket.
2. Take out HDD/SSD tray bracket.
3. Install HDD/SSD in the bracket and insert back to the system.
4. Screw back 8 screws and finish the installation.

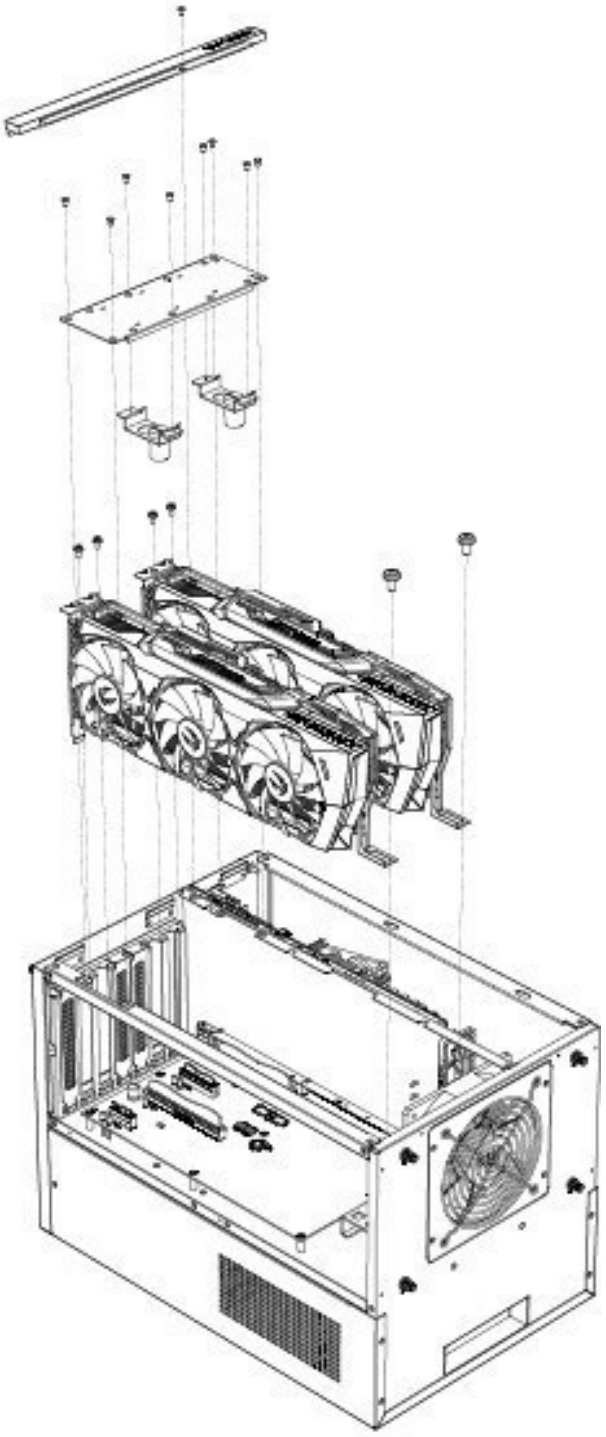
2.4.3 miniPCIe/mSATA/m.2 Module Installation





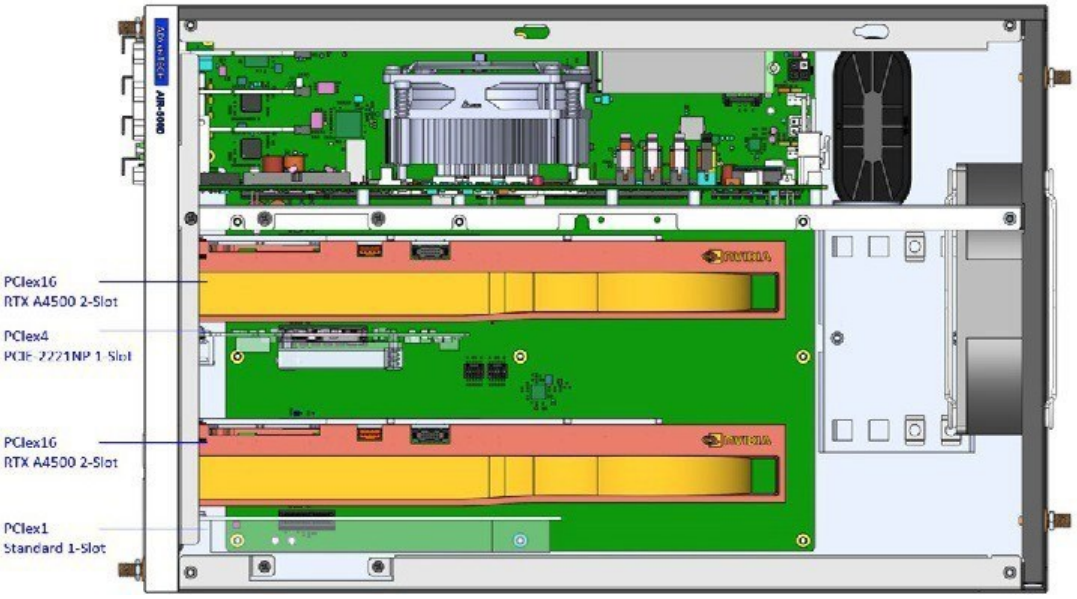
1. Remove bottom cover (2.4.2).
2. Install miniPCIe/mSATA module with 2 screws (MINI_PCIE1 with SIM holder), M.2 module with 1 screw (M2E).
3. Replace the bottom cover and fix in place with 6 screws.

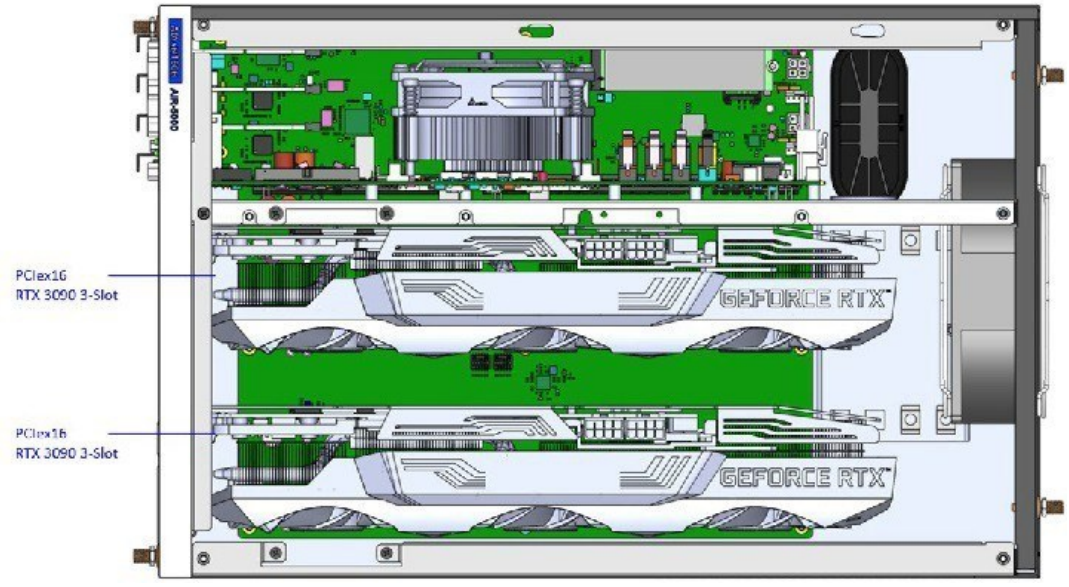
2.4.3.1 PCIex16 Graphic Card Installation (in case of double GPU cards)



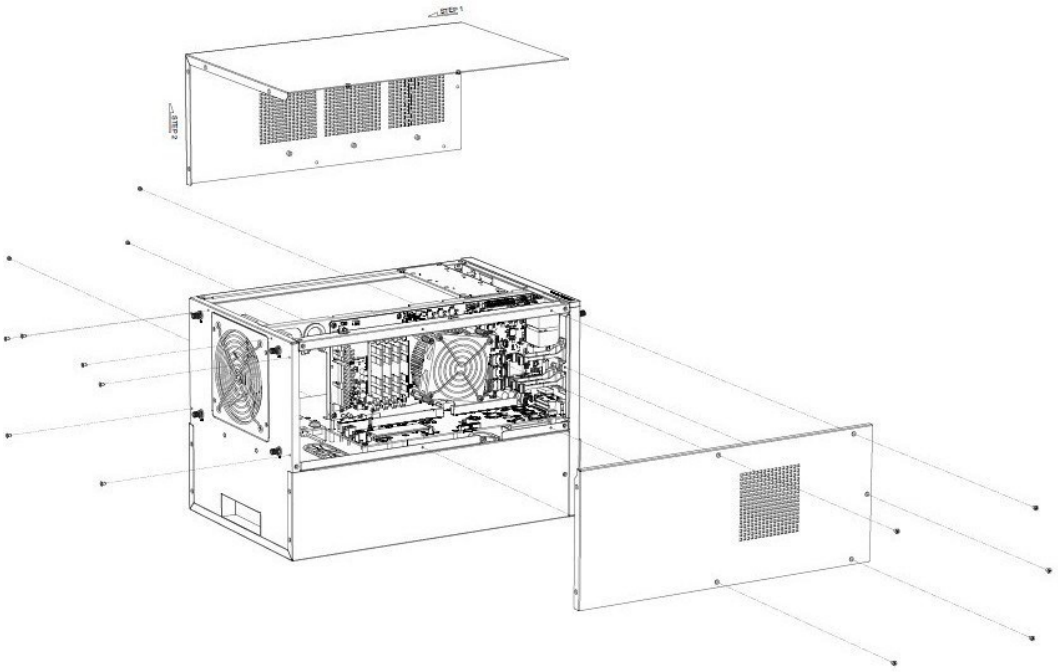
1. Remove the top and side covers.
2. Remove the AIR-500D trim.
3. Install the graphics card to the PCIex16 slot, pay attention to the rear of the graphics card on installing L-shaped bracket from the accessory bag in advance.
4. Reinstall the trim strip x1 fixing piece x 2 upper iron piece x 1 in sequence, with a total of 15 screws.
5. Replace the top and side covers.

Note! *If PCiex16 occupy 1 or 2 slots, PCiex1/4 can be installed; If PCiex16 occupy more than 2 slots, PCiex1/4 cannot be installed, as shown below:*

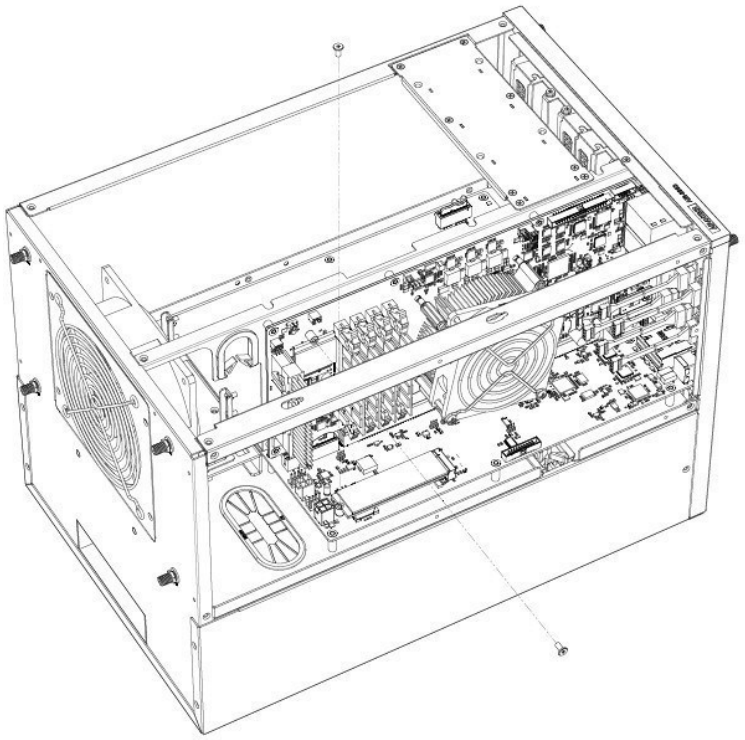


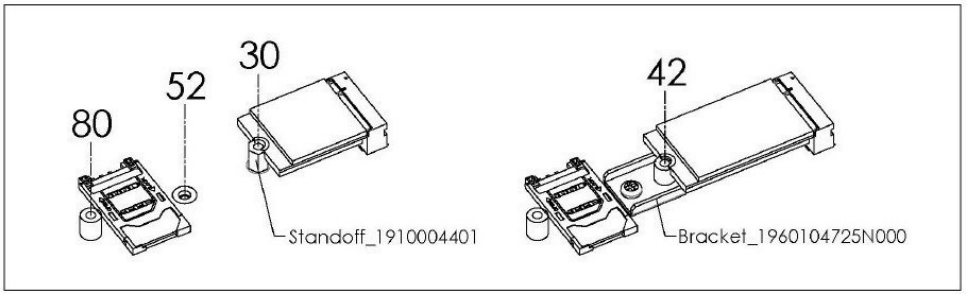


2.4.4 M.2 Module Installation



1. Remove 14 screws from the top cover and side cover.
2. Install M.2 module (M.2 E Key / M.2 B Key) and tighten 1 screw on the module.

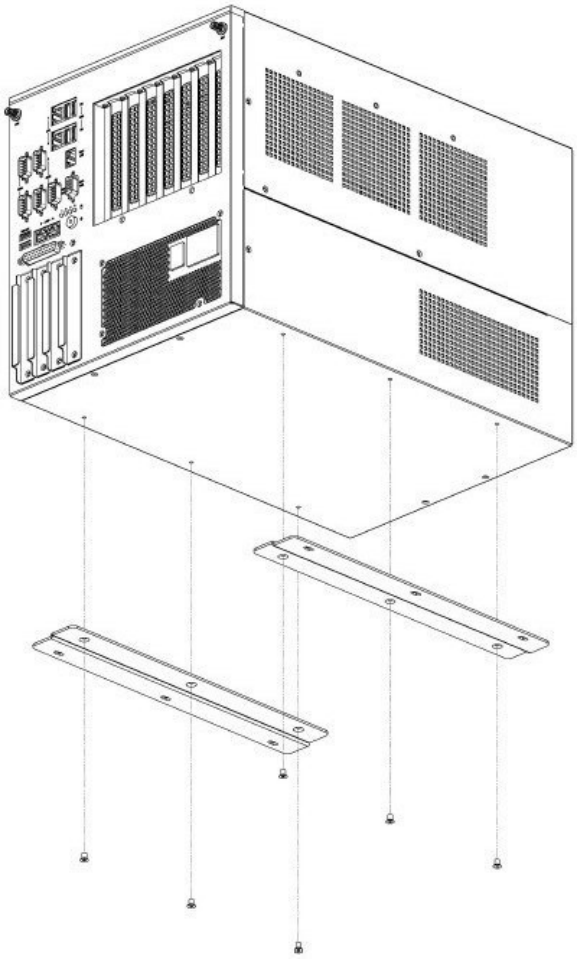




The installation methods of the short board and the long board correspond to different hole distances and brackets.

2.4.4.1 Installing the Table Mount Bracket

1. Remove the wall mount bracket and 6 screws from the accessory bag.
2. Fasten 3 screws and brackets on the left and right sides of the bottom, be reminded to install horizontally.

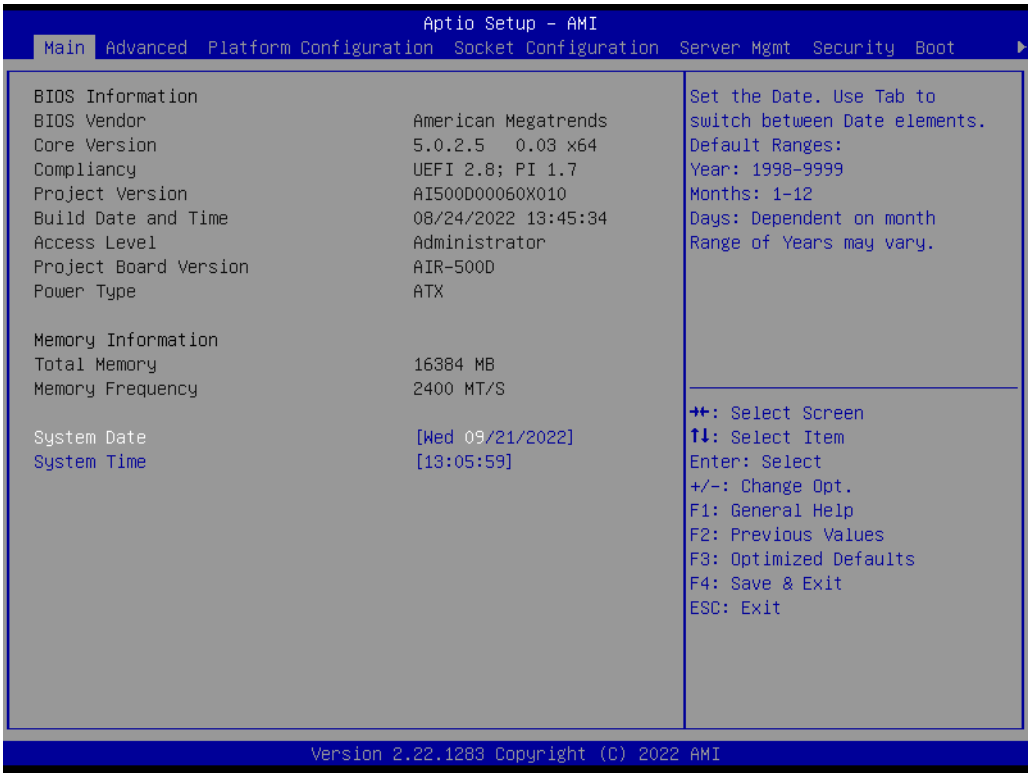


Chapter 3

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 AIR-500D BIOS setup screens.



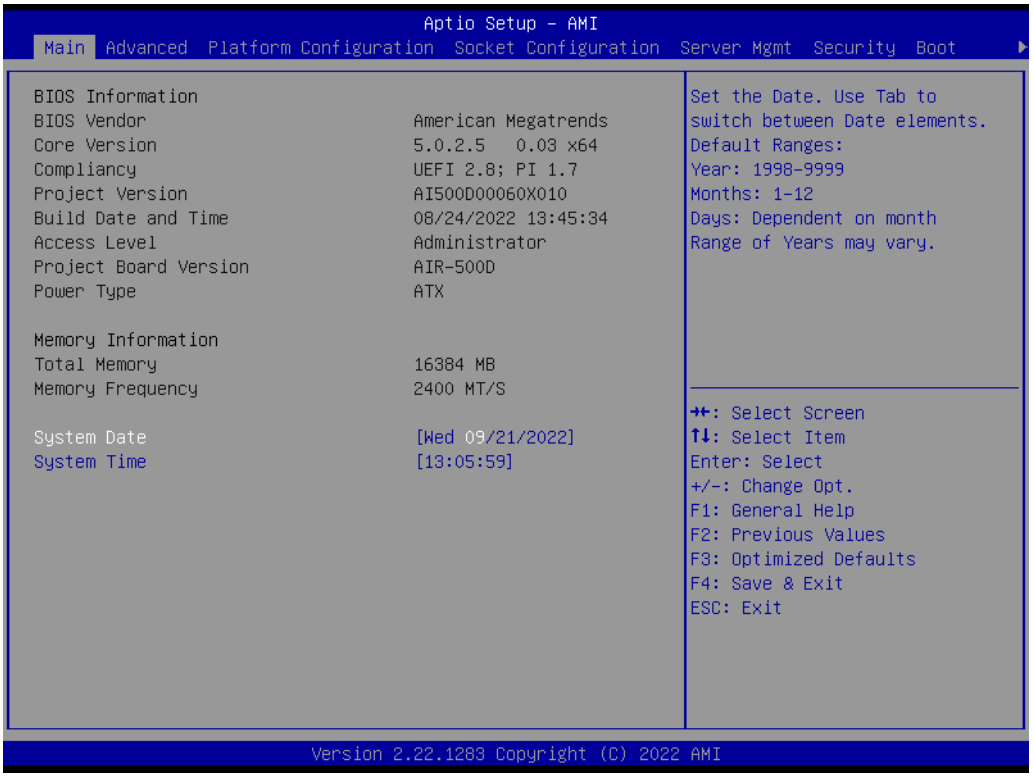
AMI's BIOS ROM has a built-in Setup program that allows users to modify the basic system configuration. This information is stored in flash ROM so it retains the Setup information when the power is turned off.

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.



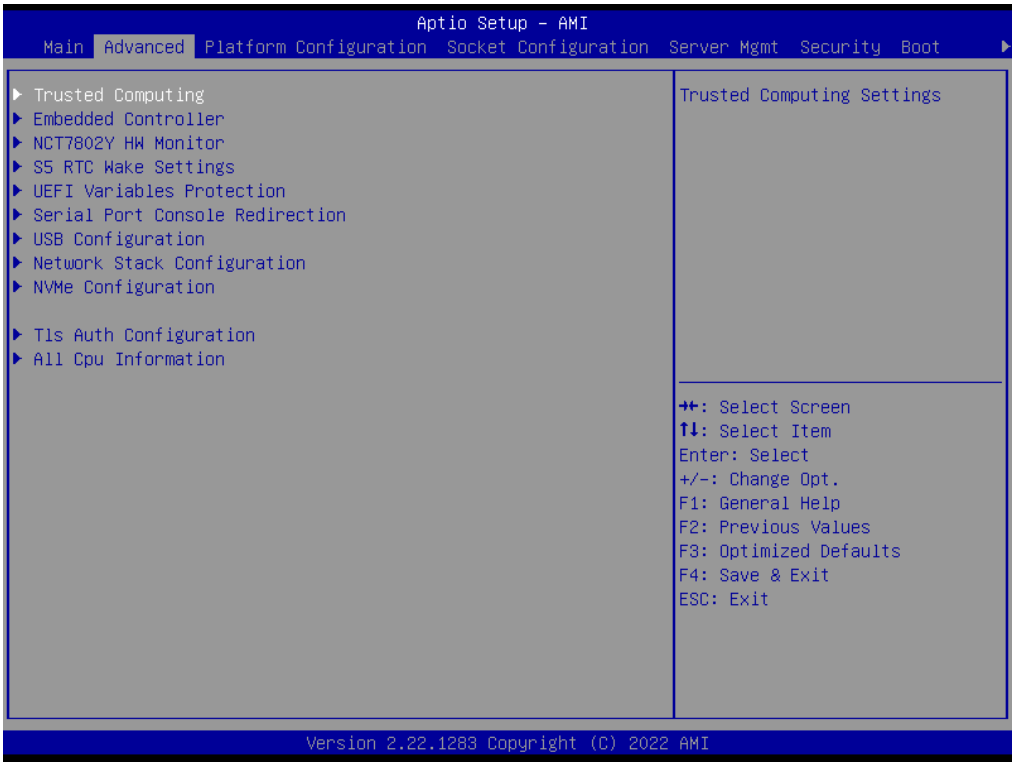
The Main BIOS setup screen has two main frames. The left frame displays all the options that can be configured. Grayed-out options cannot be configured; options in blue can. The right frame displays the key legend.

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.

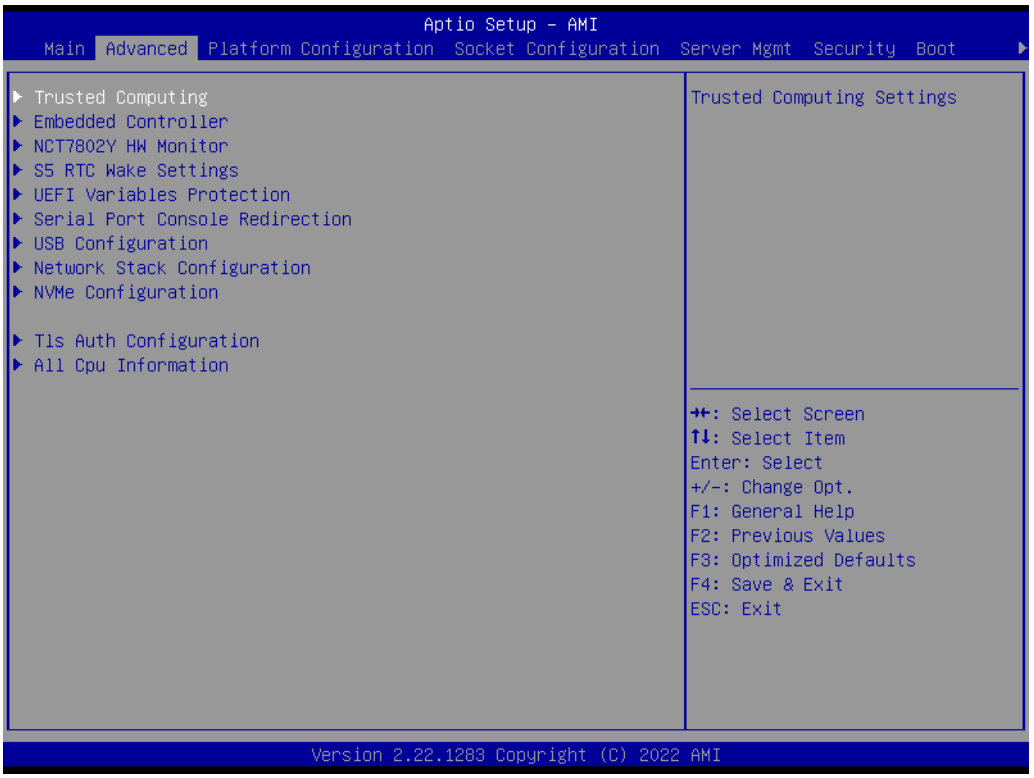
- **System time/System date**
  Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time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

3.2.2 Advanced BIOS Features Setup

Select the Advanced tab from the AIR-500D 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.

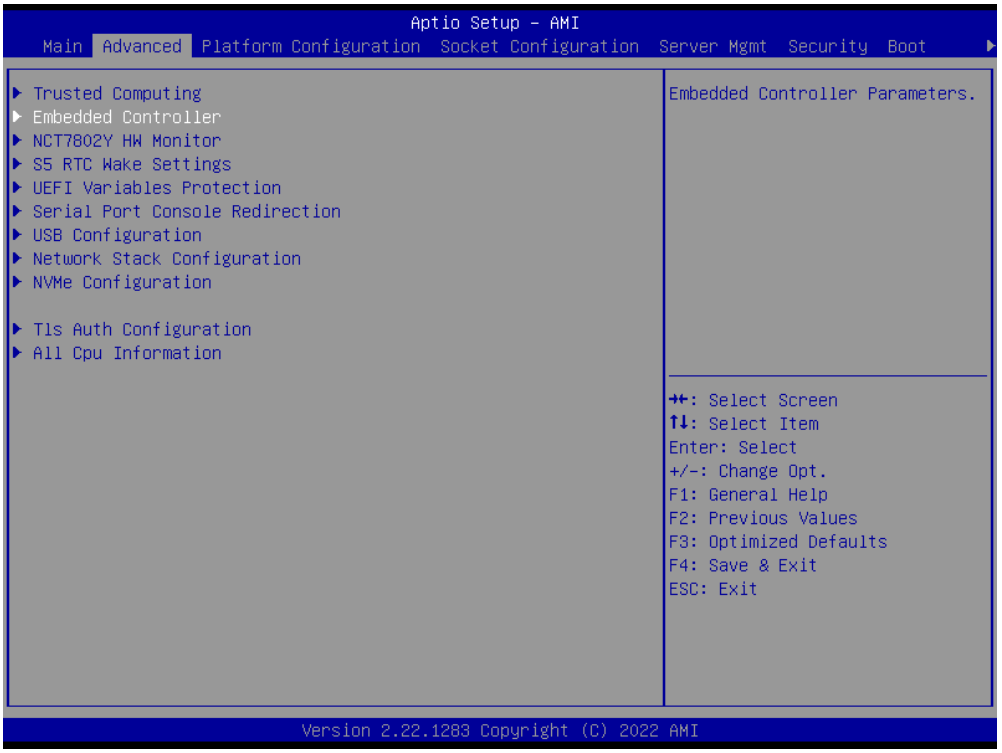


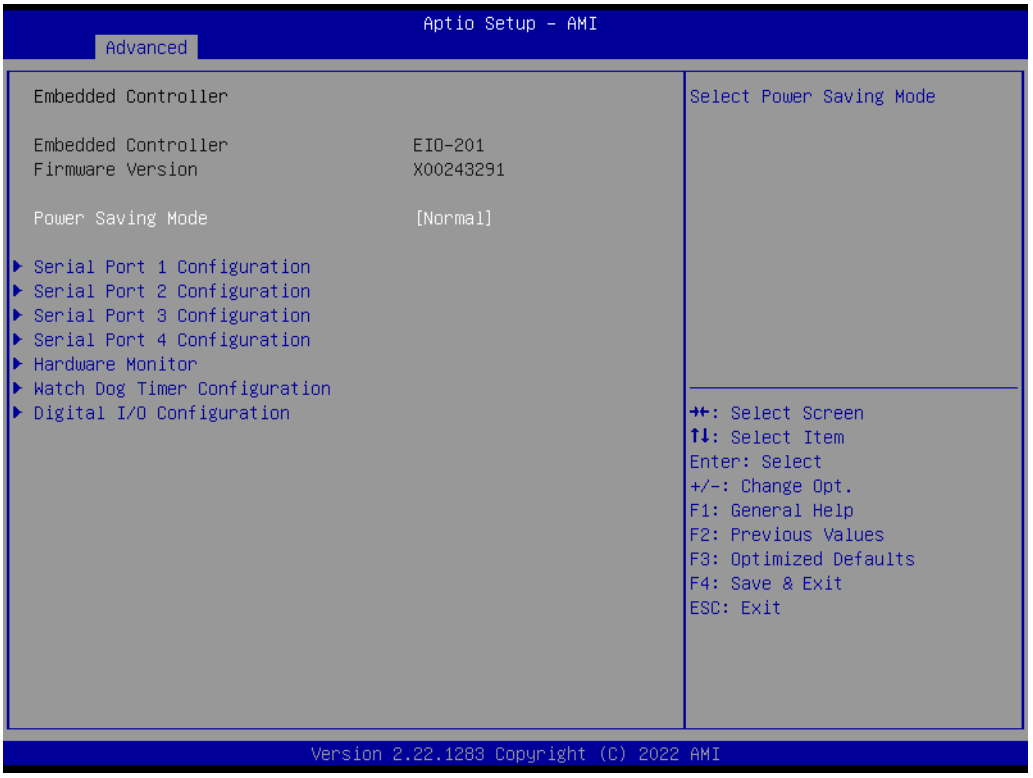
3.2.2.1 Trusted Computing



- **TPM Support (Optional Part Installed)**
  "Enable or Disable" TPM Support.
- **Security Device Support**
  Enables or Disables BIOS support for security device.

3.2.2.2 Embedded Controller Configuration

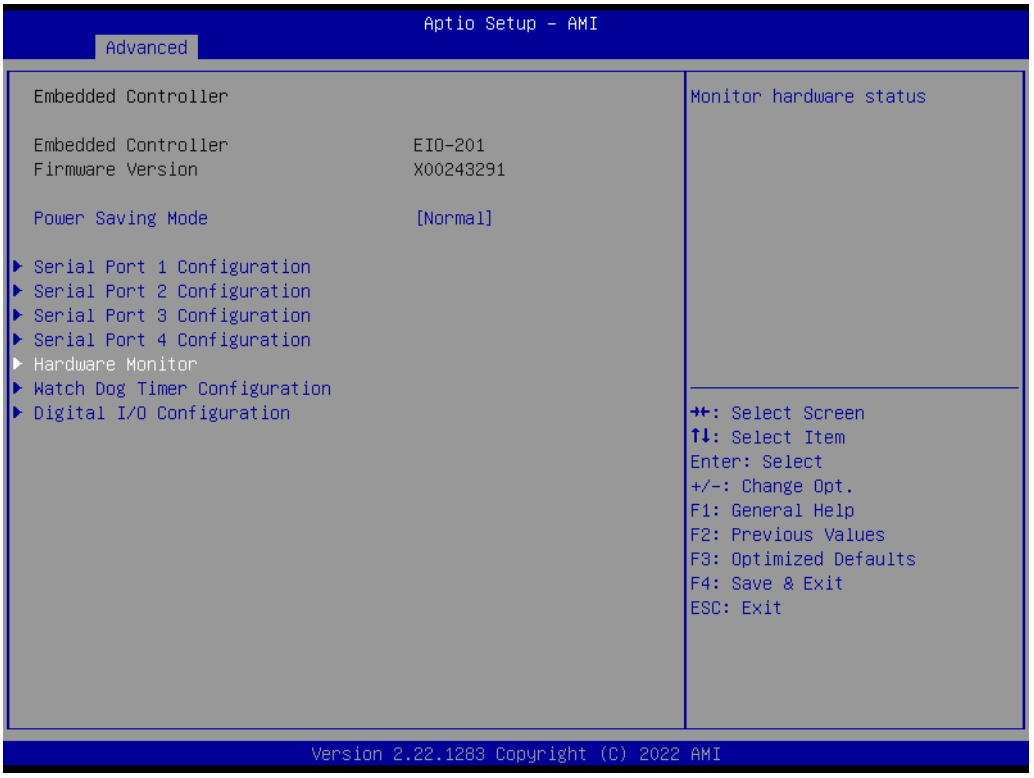


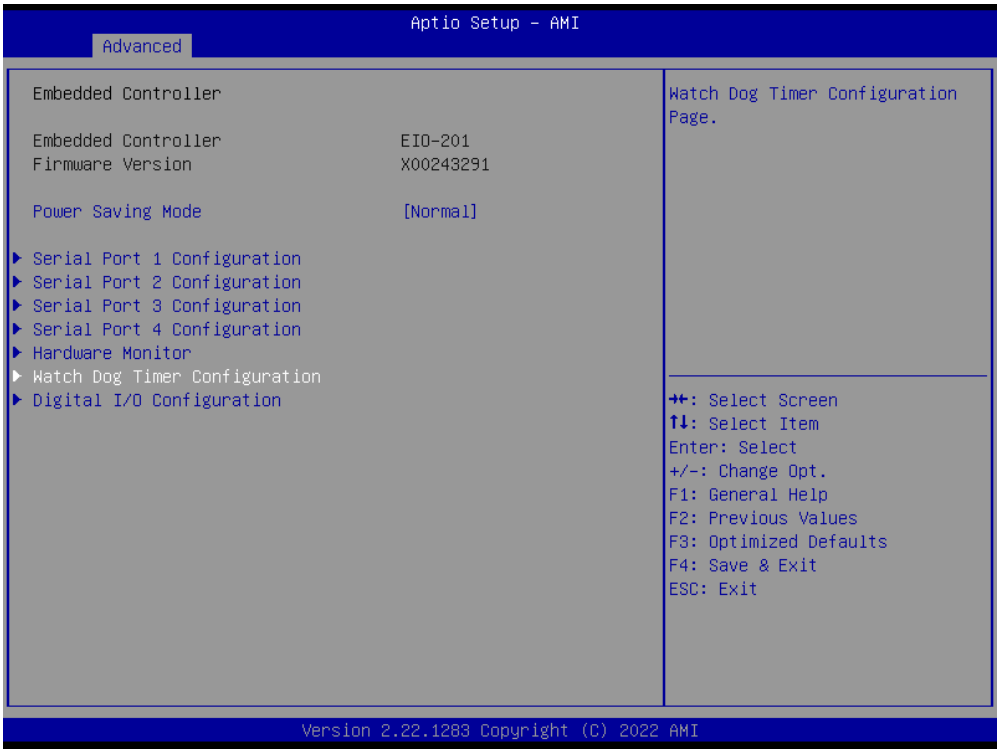


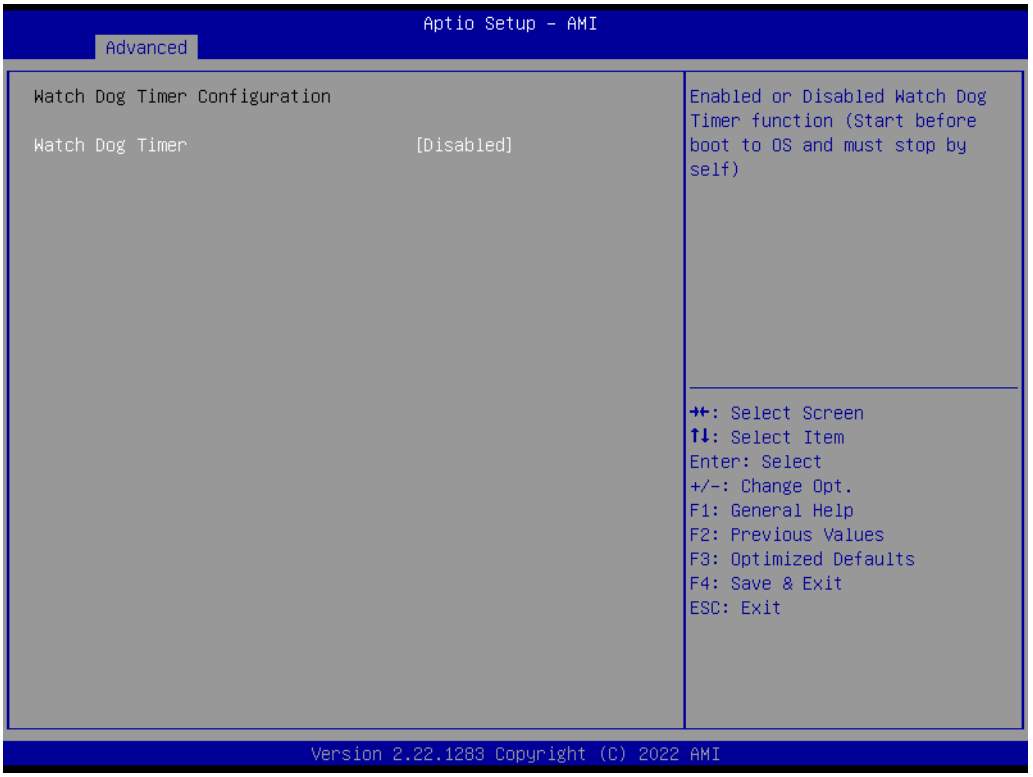
- **Power Saving Mode**
  This item allows users to set the board's power saving mode when off.

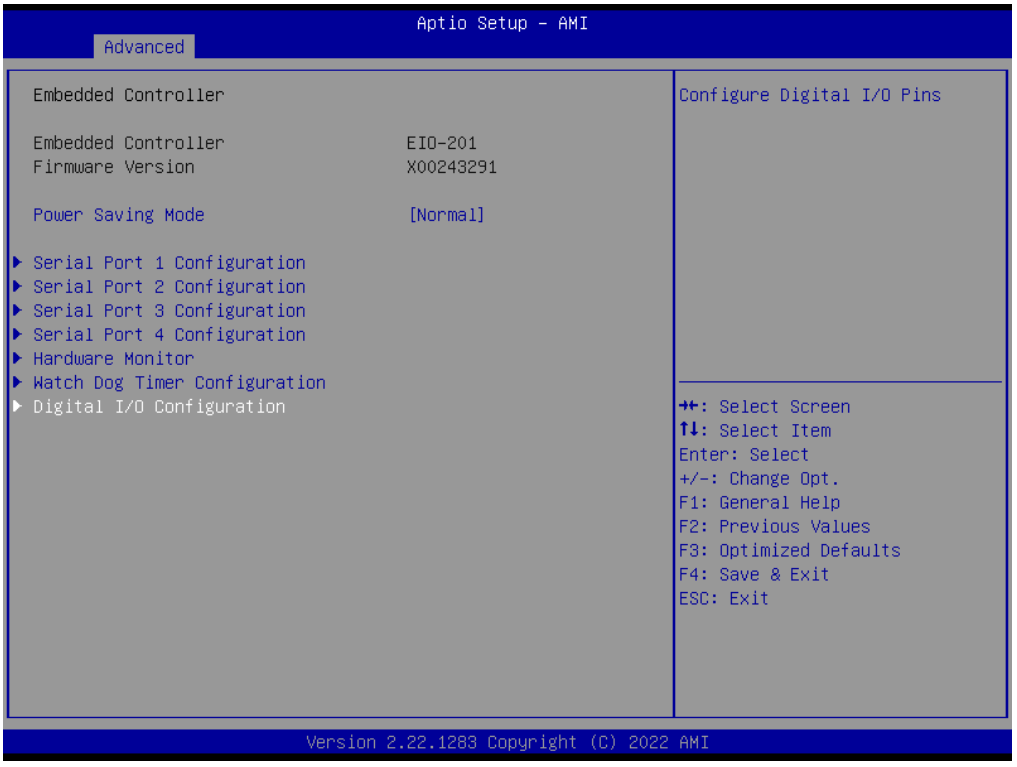
- **Serial Port 1 Configuration**
  Set Parameters of Serial Port 1.
- **Serial Port 2 Configuration**
  Set Parameters of Serial Port 2.

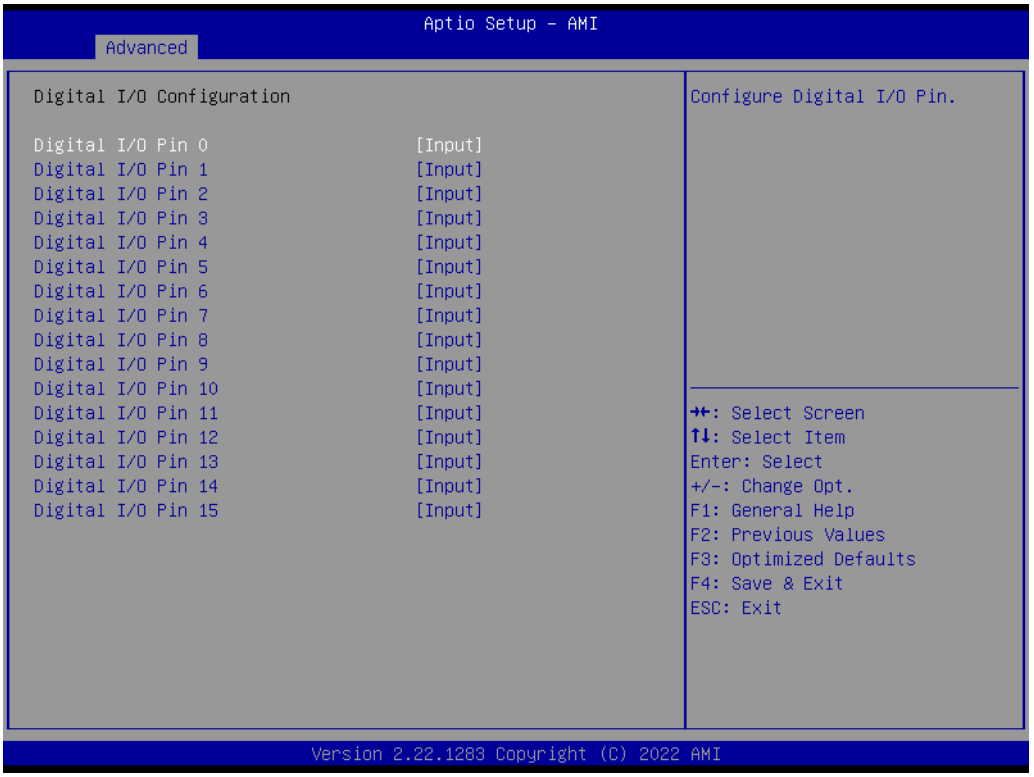
- **Serial Port 3 Configuration**
  Set Parameters of Serial Port 3.
- **Serial Port 4Configuration**
  Set Parameters of Serial Port 4.



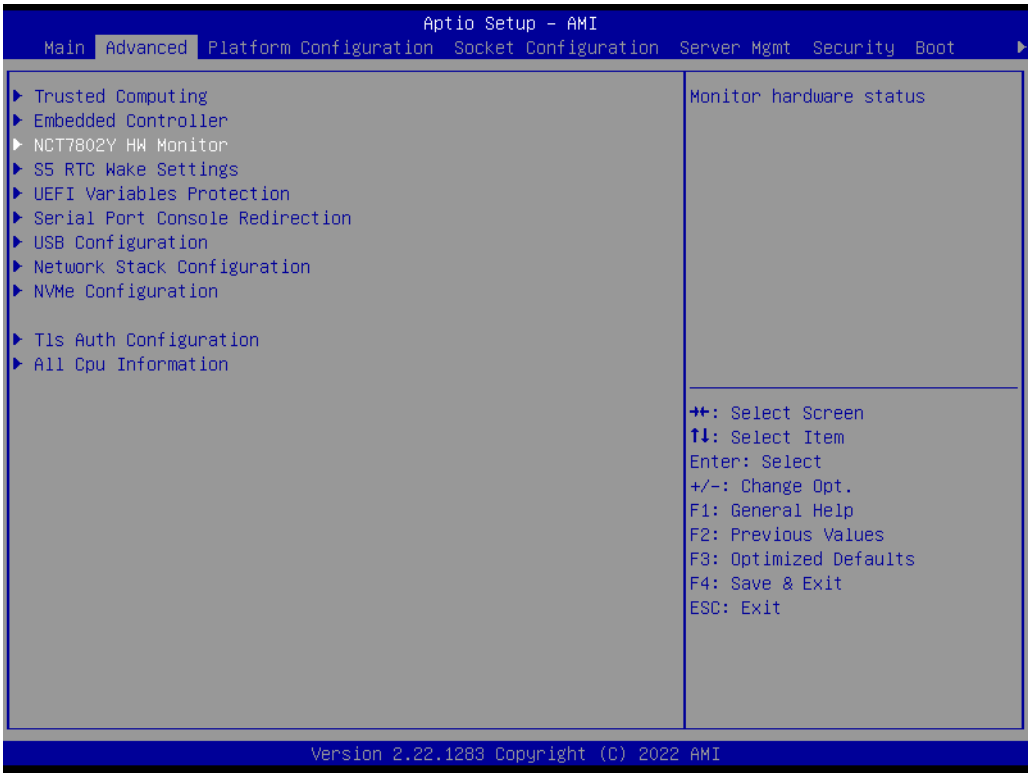


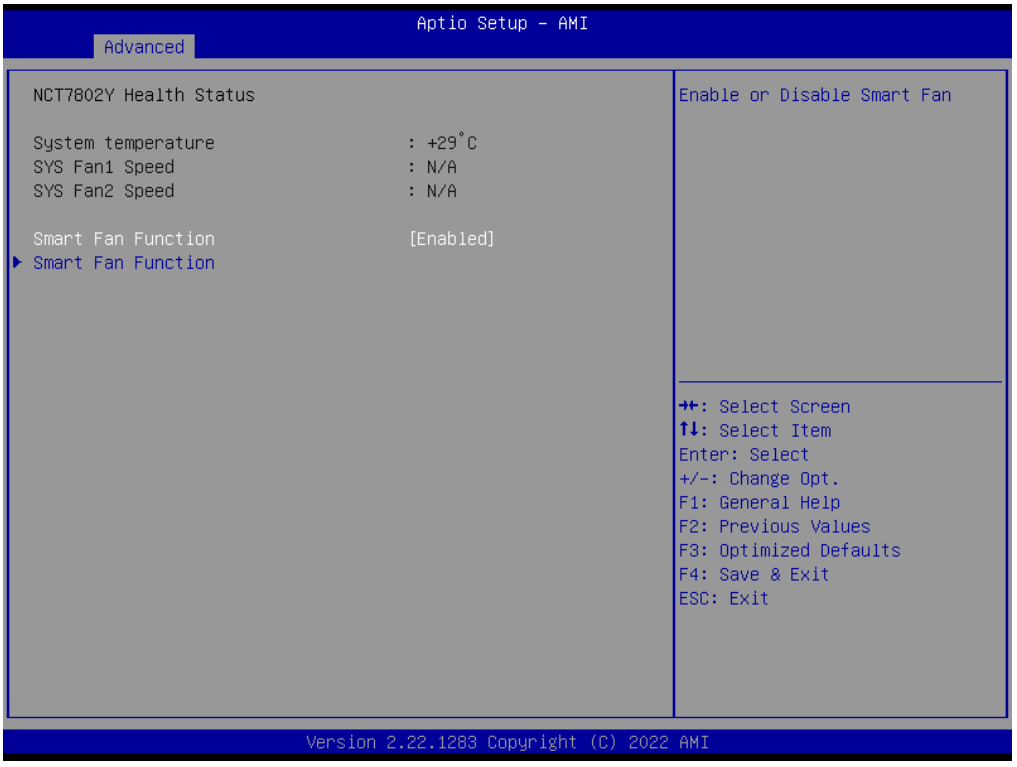

Aptio Setup – AMI
Advanced
Watch Dog Timer Configuration
Watch Dog Timer [Disabled]
Enabled or Disabled Watch Dog Timer function (Start before boot to OS and must stop by self)
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1283 Copyright (C) 2022 AMI

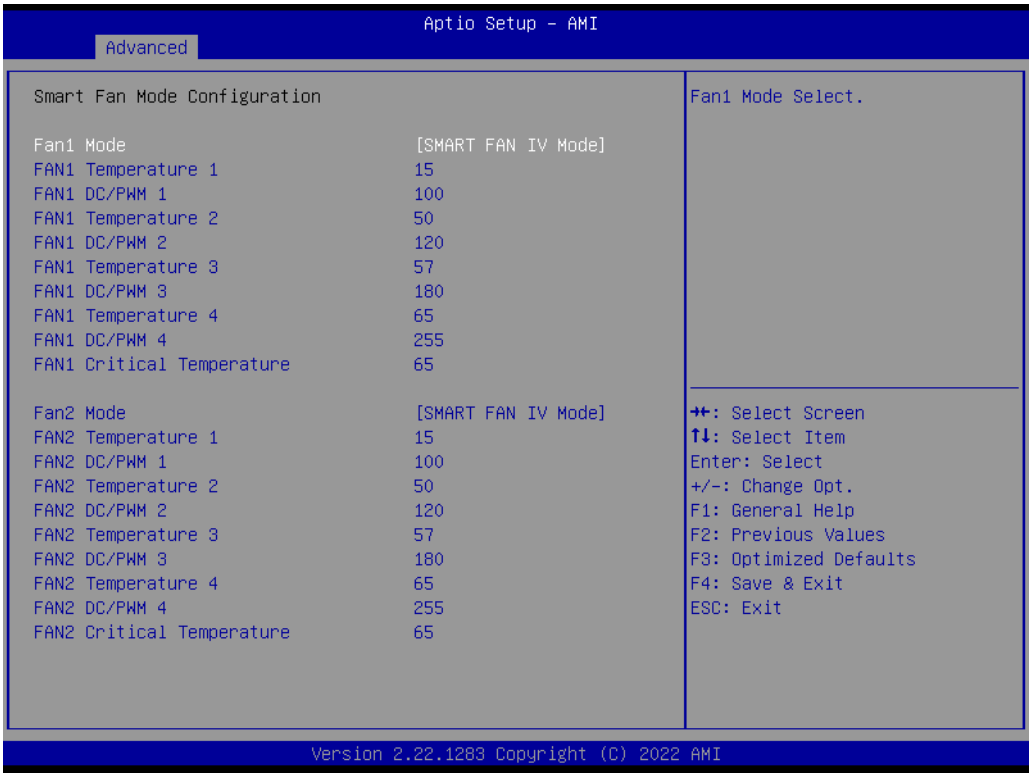

Aptio Setup – AMI
Advanced
Embedded Controller
Embedded Controller EIO-201
Firmware Version X00243291
Power Saving Mode [Normal]
Serial Port 1 Configuration
Serial Port 2 Configuration
Serial Port 3 Configuration
Serial Port 4 Configuration
Hardware Monitor
Watch Dog Timer Configuration
Digital I/O Configuration
Configure Digital I/O Pins
→←: 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.
- **Watch Dog Timer**
  Enabled or disabled Watch Dog Timer function (Start before boot to OS and must stop by self).
- **Digital I/O Pin**
  Configure digital I/O pins.


Aptio Setup – AMI
Main Advanced Platform Configuration Socket Configuration Server Mgmt Security Boot
Trusted Computing
Embedded Controller
NCT7802Y HW Monitor
S5 RTC Wake Settings
UEFI Variables Protection
Serial Port Console Redirection
USB Configuration
Network Stack Configuration
NVMe Configuration
Tls Auth Configuration
All Cpu Information
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 2.22.1283 Copyright (C) 2022 AMI

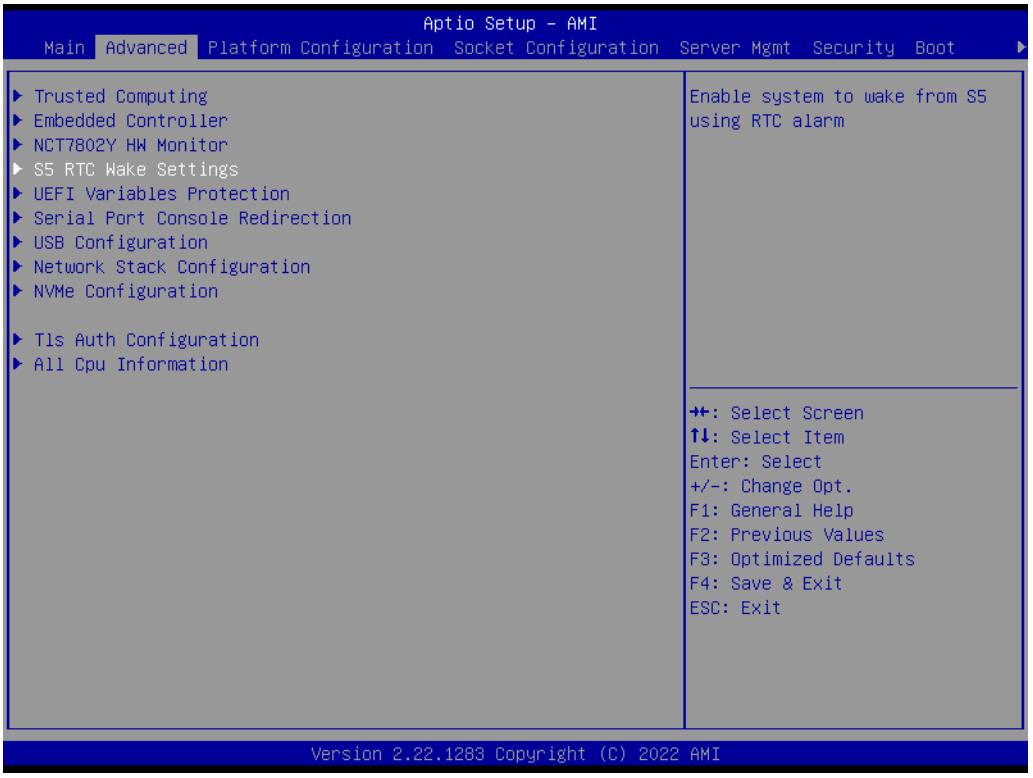

Aptio Setup – AMI
Advanced
NCT7802Y Health Status
System temperature : +29°C
SYS Fan1 Speed : N/A
SYS Fan2 Speed : N/A
Smart Fan Function [Enabled]
Smart Fan Function
Enable or Disable Smart Fan
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1283 Copyright (C) 2022 AMI



- **Smart Fan Function**
  Enable or Disable Smart Fan.
- **Fan1 Mode**
  Fan1 Mode Select.
- **FAN1 Temperature 1**
  Input the System Smart Fan IV Temperature 1.
- **FAN1 DC/PWM 1**
  Input the System Smart Fan IV DC/PWM 1 Value.
- **FAN1 Temperature 2**
  Input the System Smart Fan IV Temperature 2.
- **FAN1 DC/PWM 2**
  Input the System Smart Fan IV DC/PWM 2 Value.
- **FAN1 Temperature 3**
  Input the System Smart Fan IV Temperature 3.
- **FAN1 DC/PWM 3**
  Input the System Smart Fan IV DC/PWM 3 Value.
- **FAN1 Temperature 4**
  Input the System Smart Fan IV Temperature 4.
- **FAN1 DC/PWM 4**
  Input the System Smart Fan IV DC/PWM 4 Value.
- **FAN1 Critical Temperature**
  Input the System Smart IV Critical Temperature.
- **Fan2 Mode**
  Fan2 Mode Select.
- **FAN2 Temperature 1**
  Input the System Smart Fan IV Temperature 1.
- **FAN2 DC/PWM 1**
  Input the System Smart Fan IV DC/PWM 1 Value.

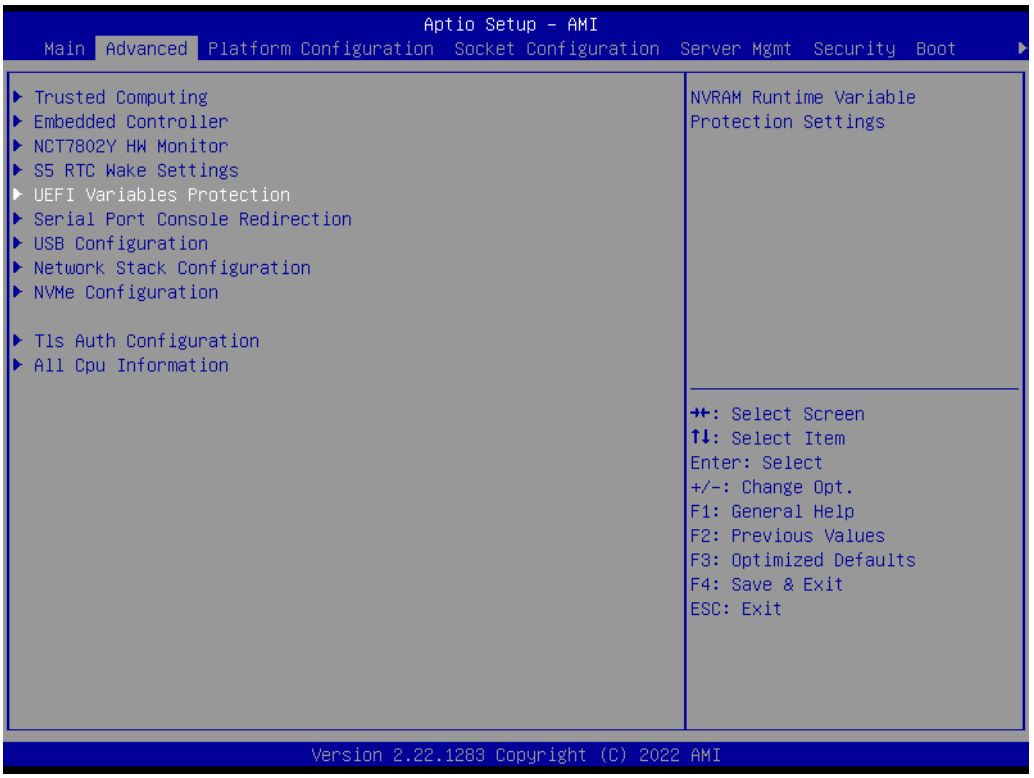
- **FAN2 Temperature 2**
  Input the System Smart Fan IV Temperature 2.
- **FAN2 DC/PWM 2**
  Input the System Smart Fan IV DC/PWM 2 Value.
- **FAN2 Temperature 3**
  Input the System Smart Fan IV Temperature 3.
- **FAN2 DC/PWM 3**
  Input the System Smart Fan IV DC/PWM 3 Value.
- **FAN2 Temperature 4**
  Input the System Smart Fan IV Temperature 4.
- **FAN2 DC/PWM 4**
  Input the System Smart Fan IV DC/PWM 4 Value.
- **FAN2 Critical Temperature**
  Input the System Smart IV Critical Temperature.

3.2.2.3 S5 RTC Wake Settings



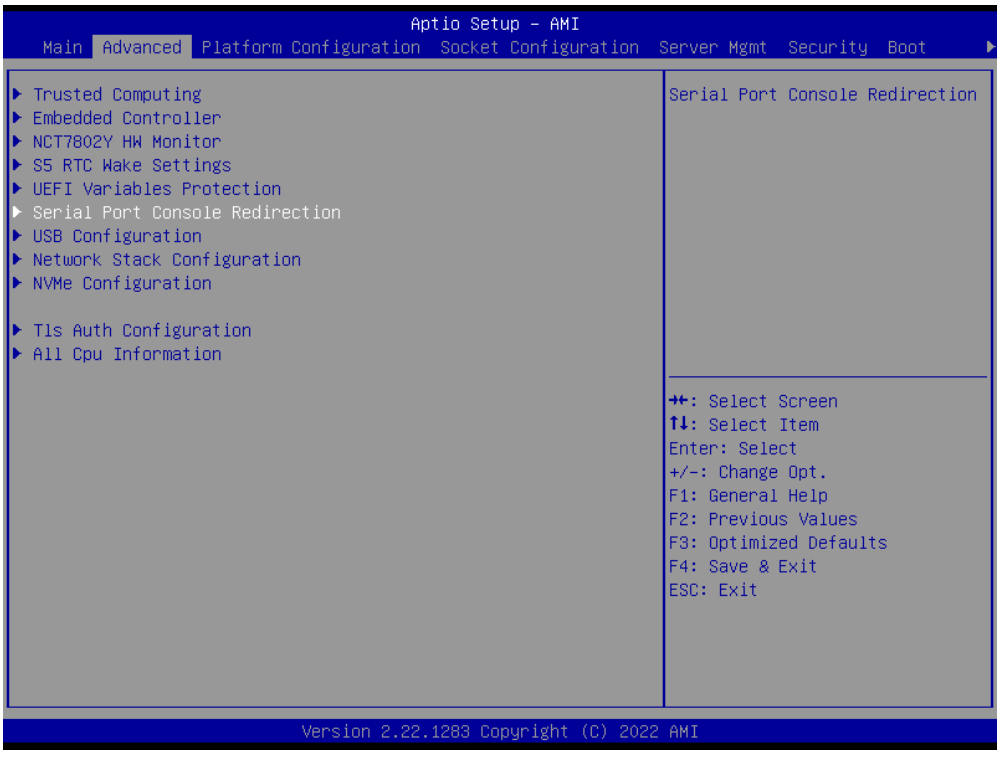
- **Wake System From S5**
  Enable or disable System wake on alarm event. Select Fixed Time, system will wake on the hr::min::sec specified.

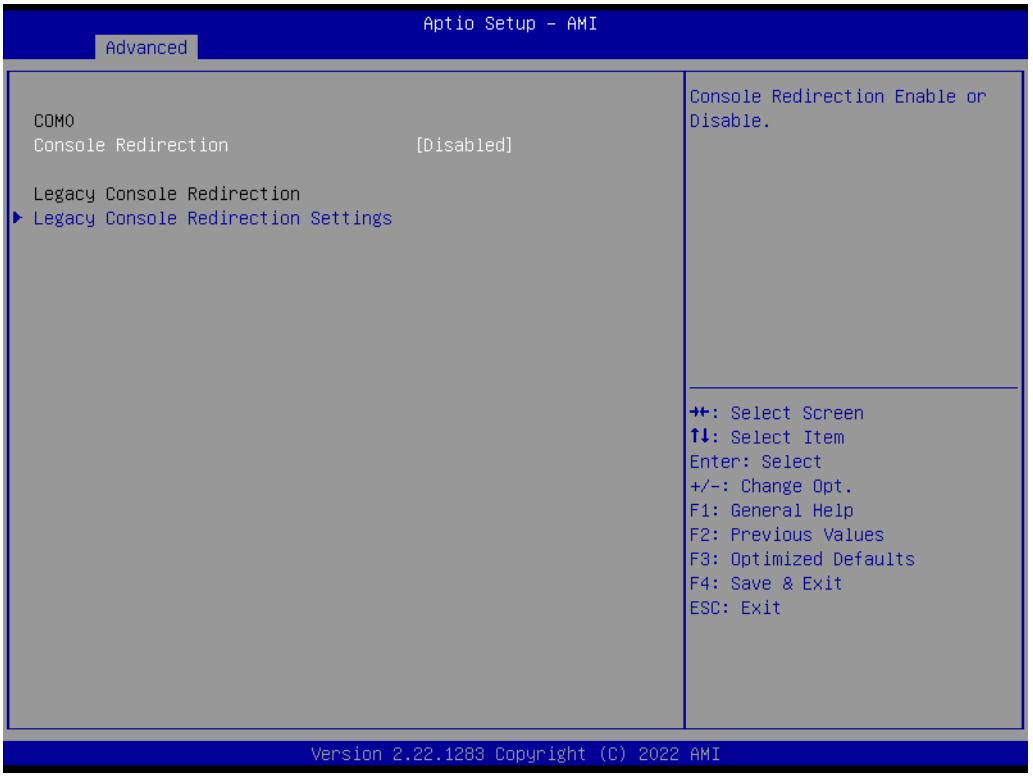
3.2.2.4 UEFI Variables Protection

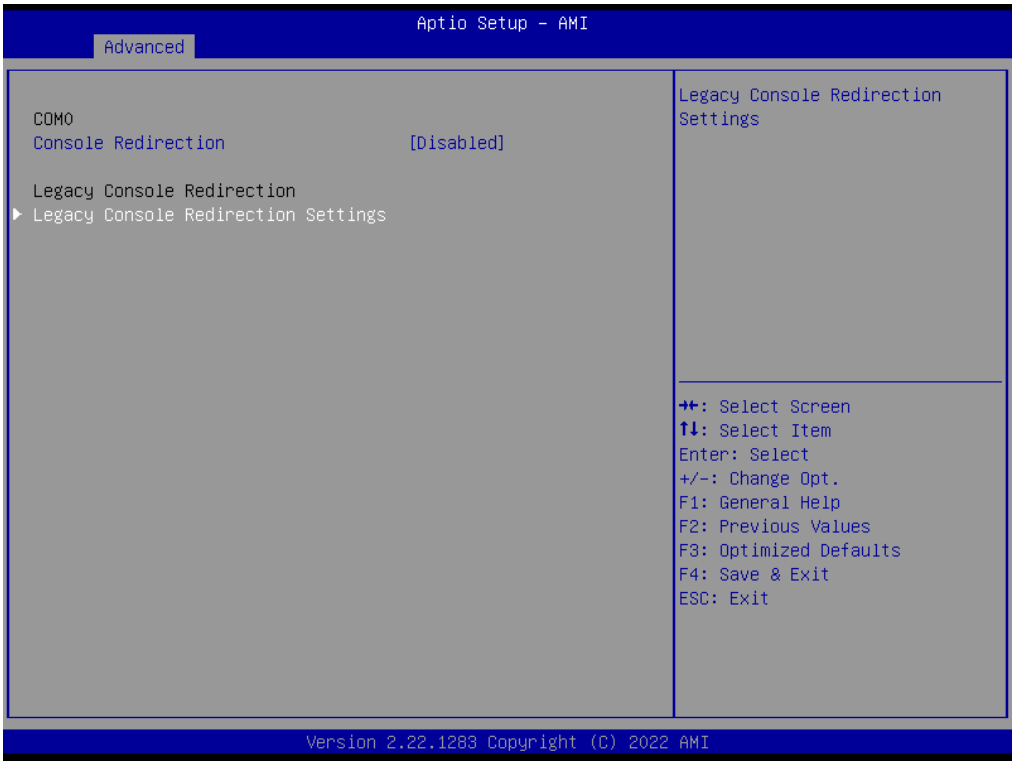


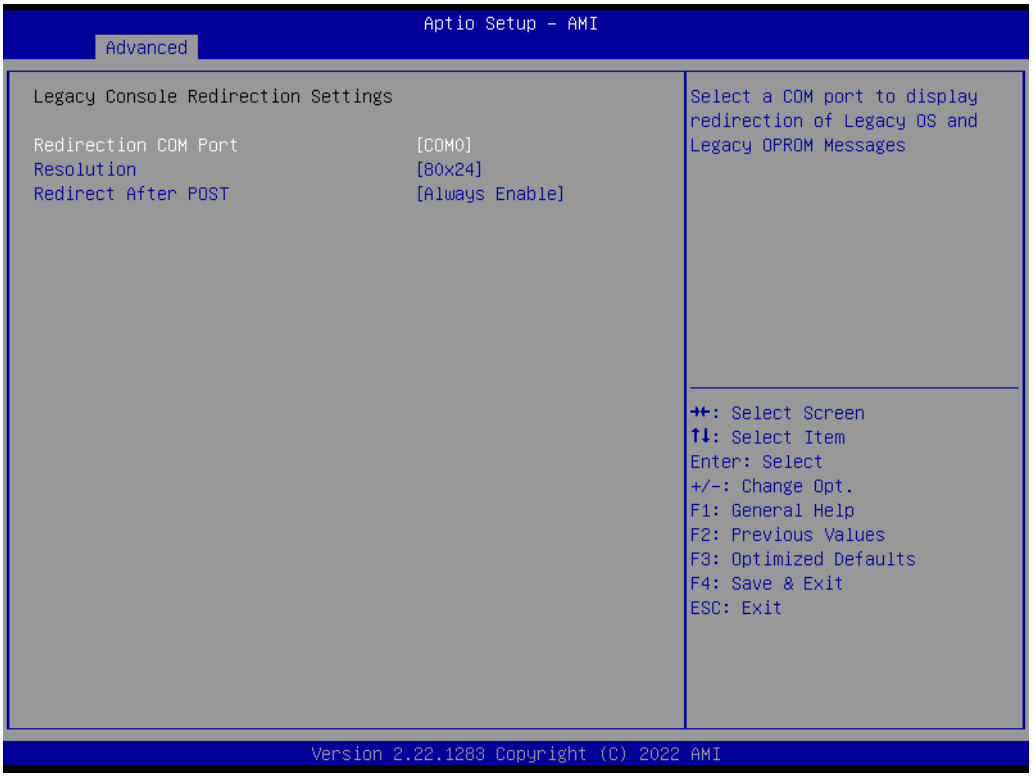
- **Password protection of Runtime**
  Control the NVRAM Runtime Variable protection through System Admin Password.

3.2.2.5 Serial Port Console Redirection



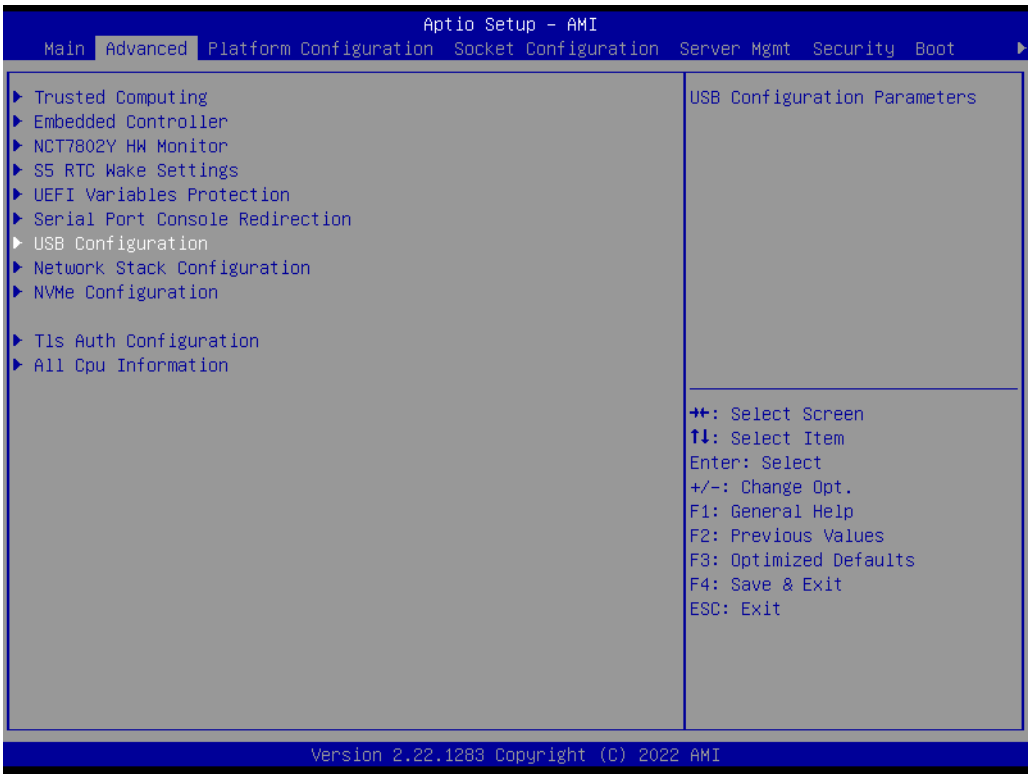

Aptio Setup – AMI
Advanced
COM0
Console Redirection [Disabled]
Legacy Console Redirection
Legacy Console Redirection Settings
Console Redirection Enable or Disable.
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1283 Copyright (C) 2022 AMI


Aptio Setup – AMI
Advanced
COM0
Console Redirection [Disabled]
Legacy Console Redirection
Legacy Console Redirection Settings
Legacy Console Redirection Settings
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1283 Copyright (C) 2022 AMI



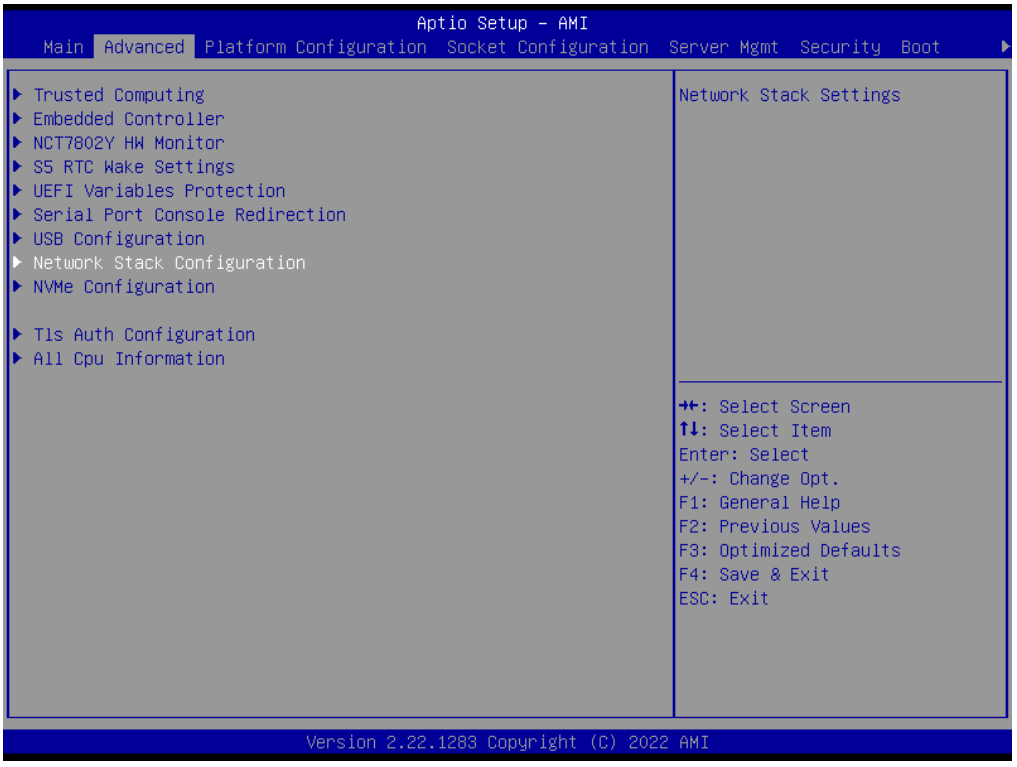
- **Console Redirection**
  This item allows users to enable or disable console redirection for Microsoft Windows Emergency Management Services (EMS).
- **Redirection COM Port**
  Select a COM port to display redirection of Legacy OS and Legacy OPROM Messages.

3.2.2.6 USB Configuration

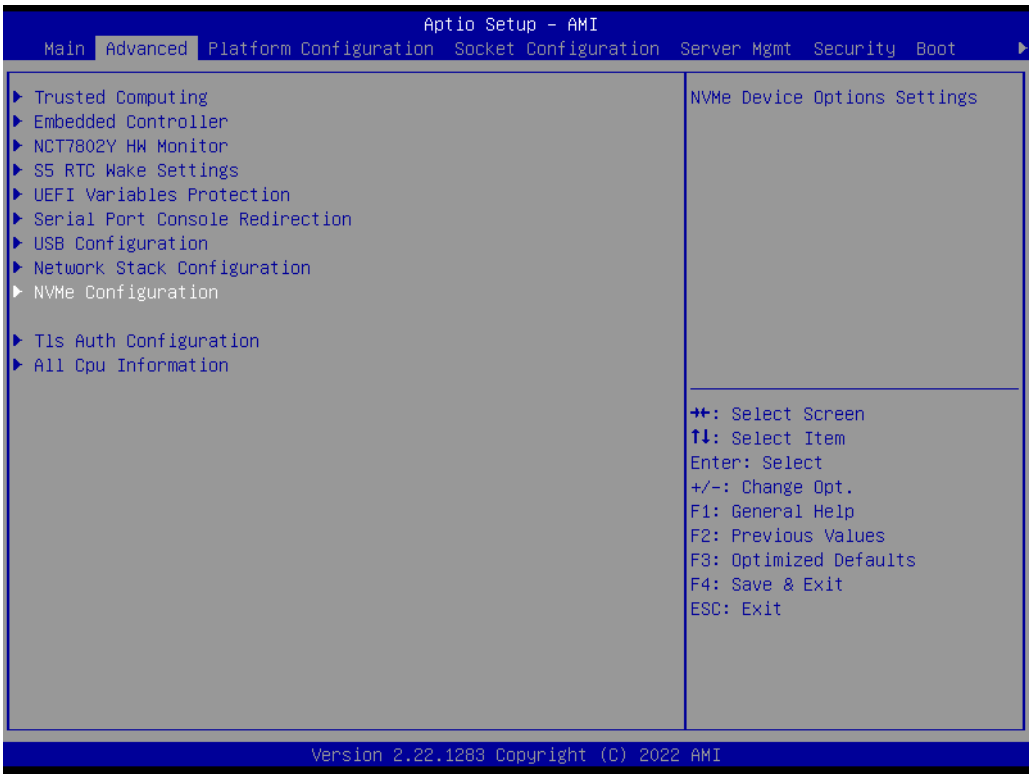


- **Legacy USB Support**
  This supports USB devices with legacy OS such as DOS. When choosing “AUTO”, the system will automatically detect USB devices. It will enable USB legacy mode when a USB device is plugged in and disable USB legacy mode when no USB device is plugged in.

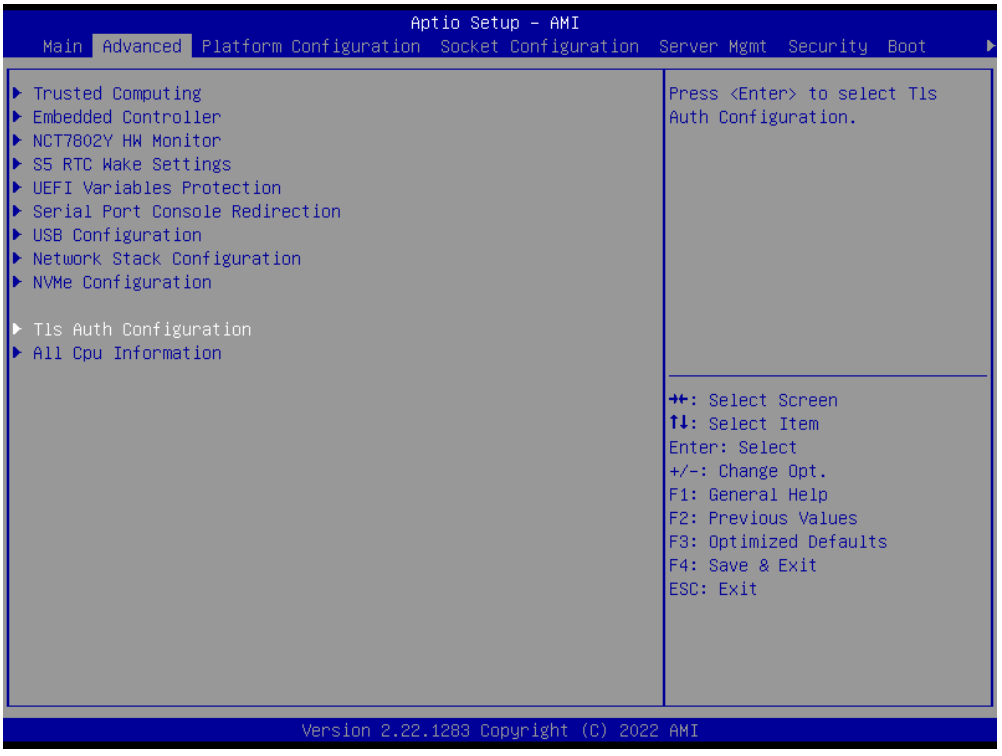
3.2.2.7 Network Stack Configuration



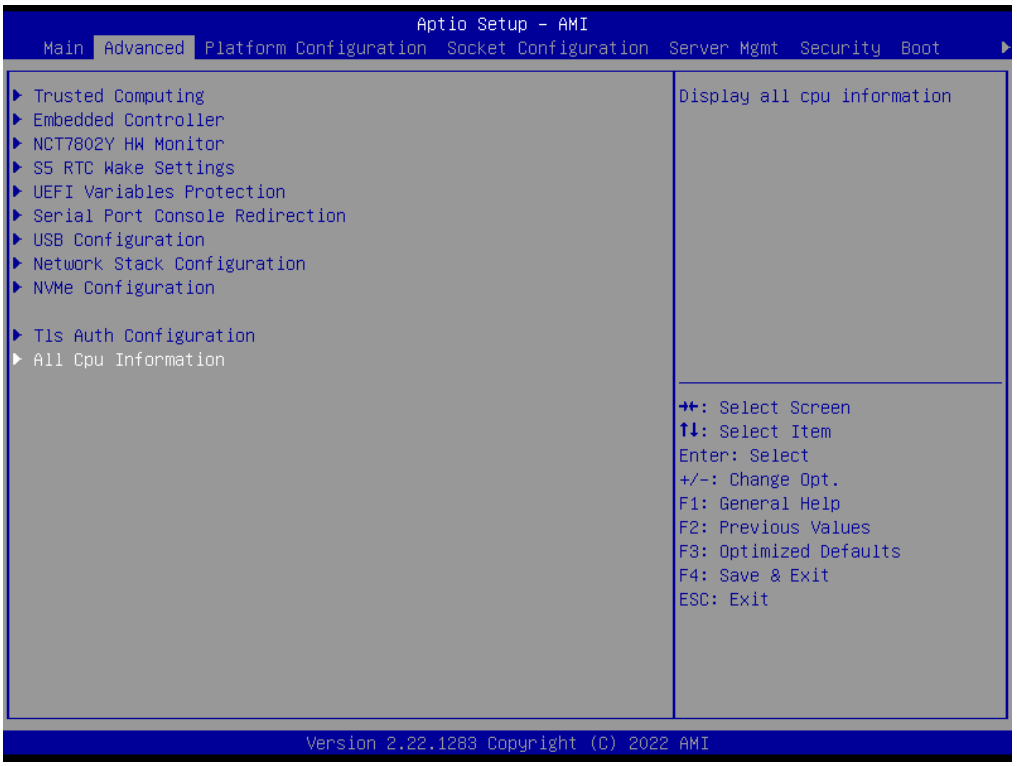
3.2.2.8 NVMe Configuration



3.2.2.9 Tls Auth Configuration

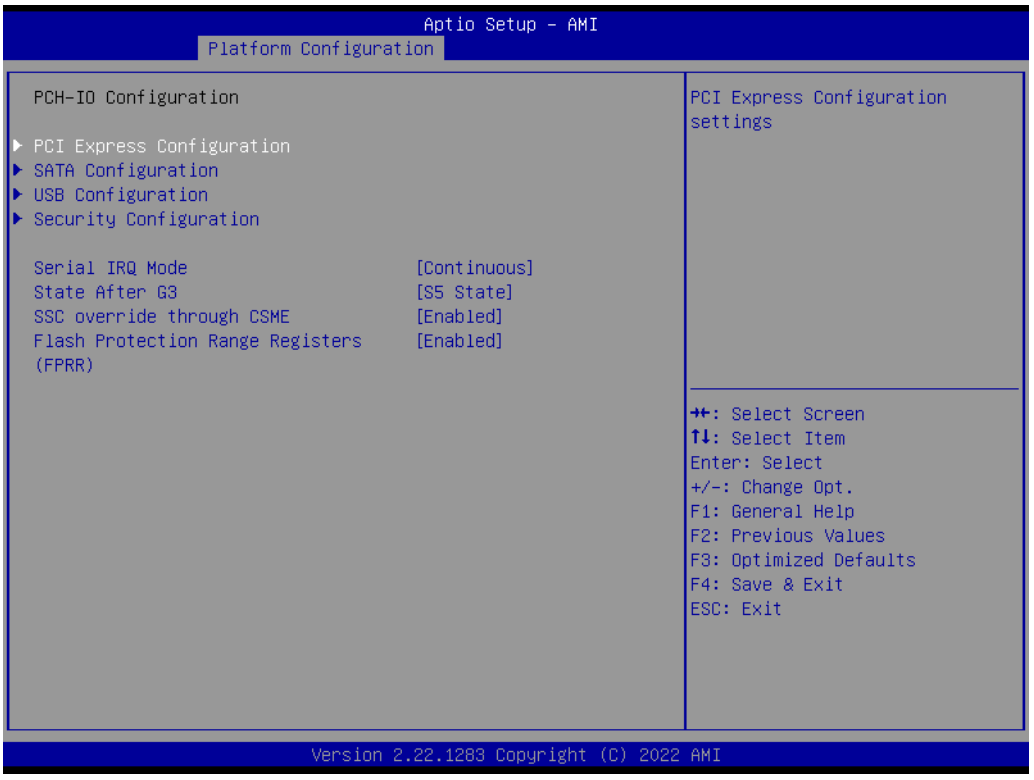


3.2.2.10 All CPU Information

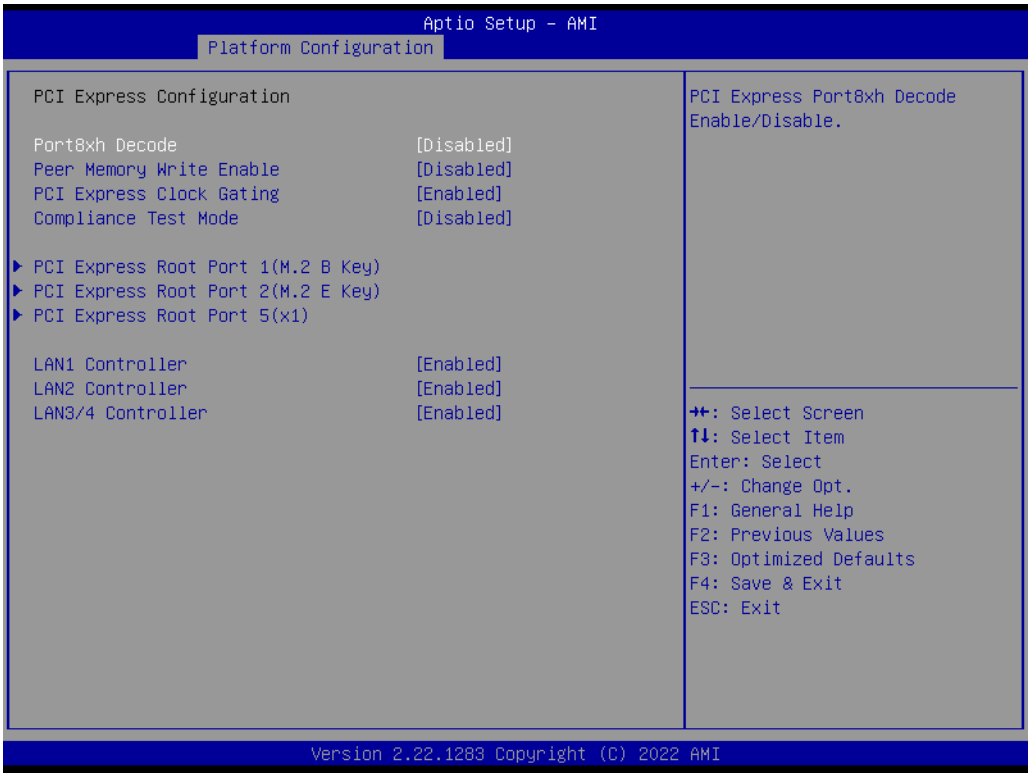


3.2.3 Platform Configuration

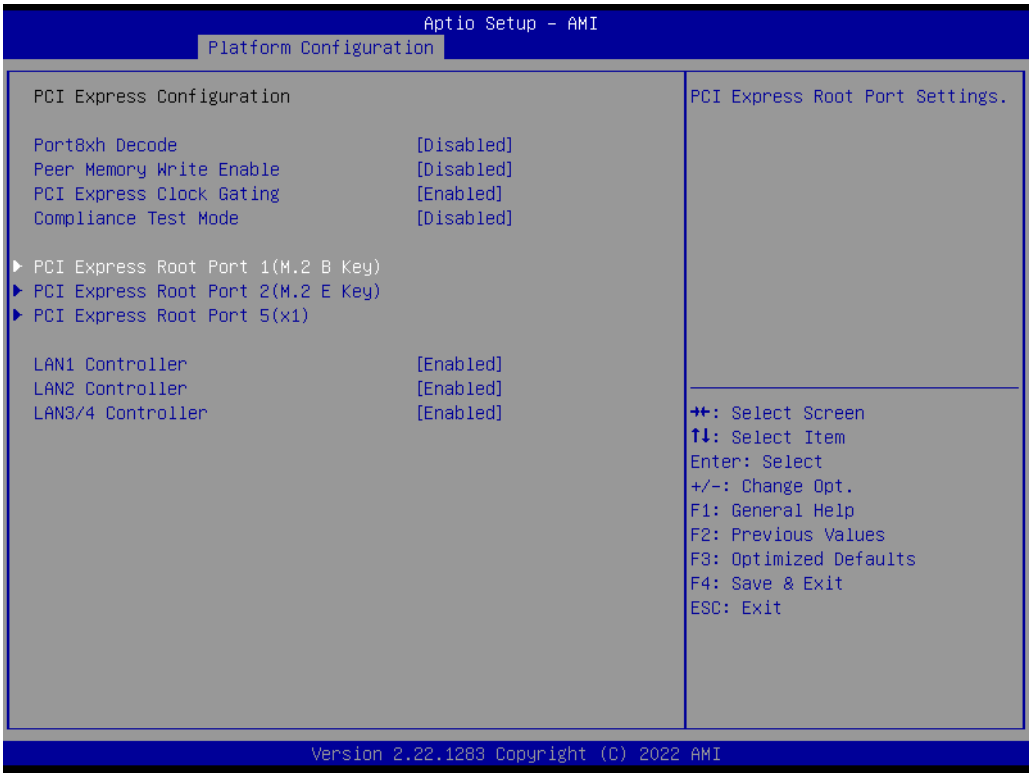
3.2.3.1 PCH-IO Configuration



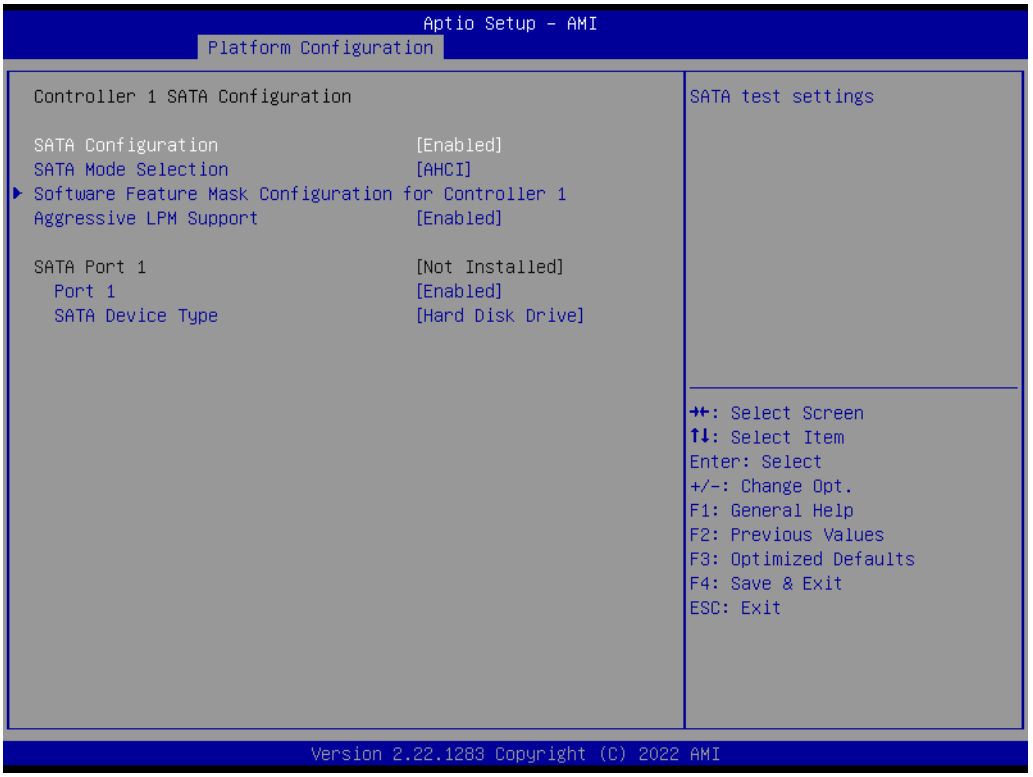
- **Serial IRQ Mode**
  Configure Serial IRQ Mode.
- **State After G3**
  Specify what state to go to when power is re-applied after a power failure (G3 state).
- **Flash Protection Range Registers (FPRR)**
  Enable Flash Protection Range Registers.



- **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)

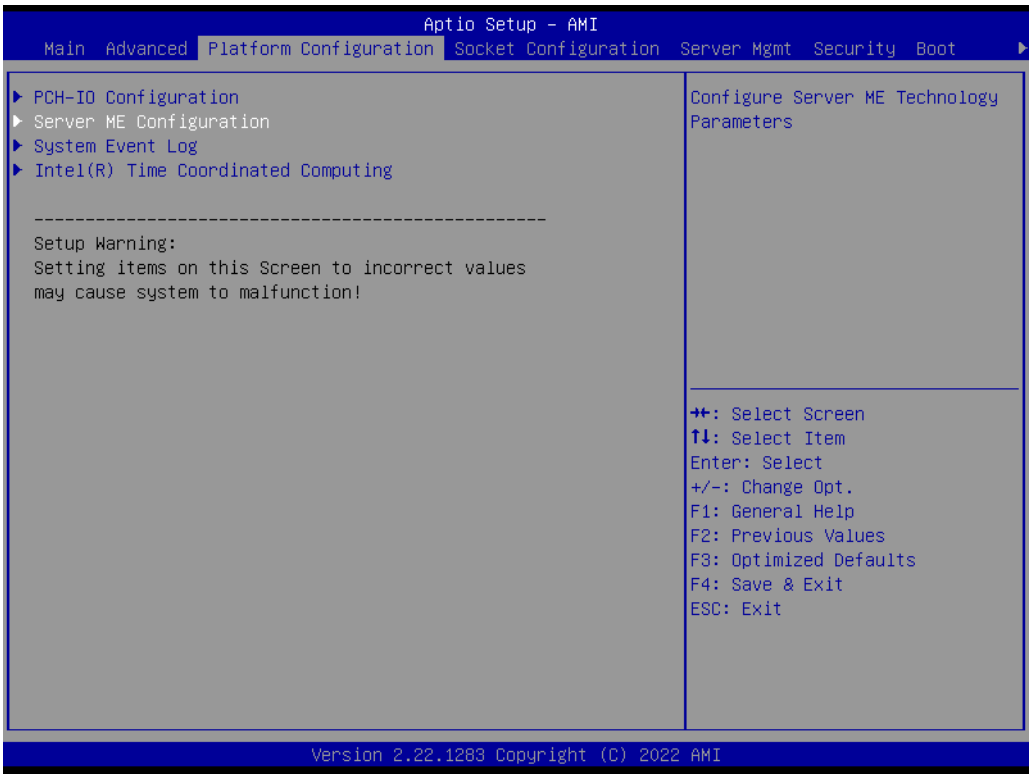


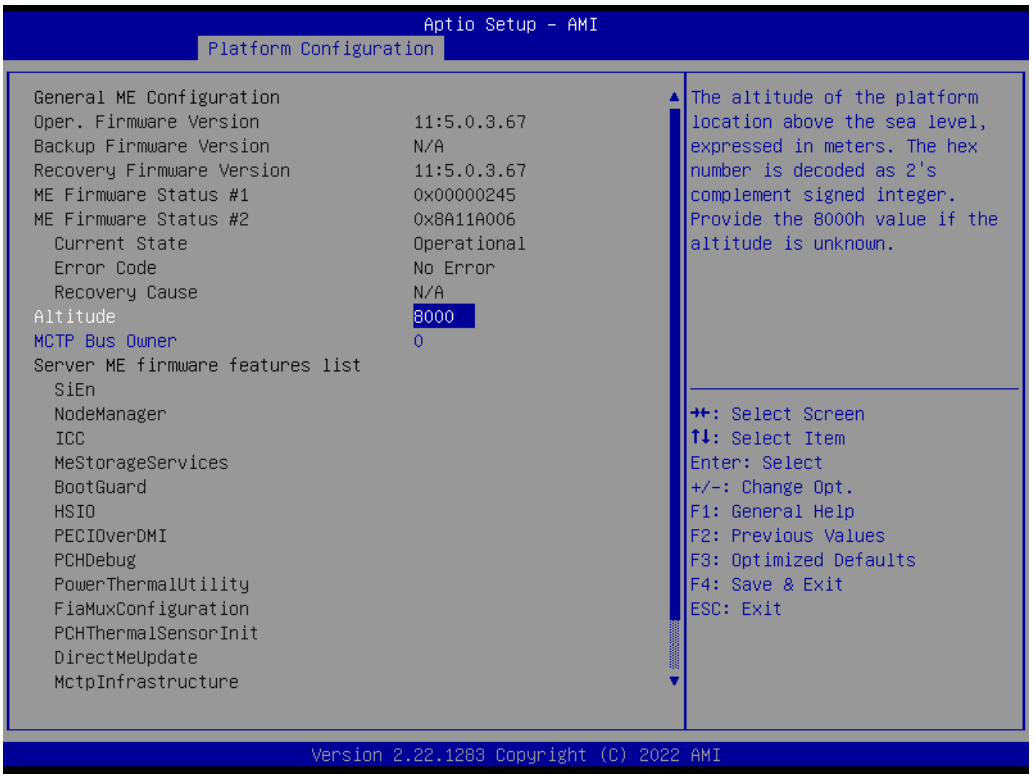
- **PCI Express Root Port**
  Configure PCI Express Root Port Settings.
- **ASPM**
  PCI Express Active State Power Management settings.
- **L1 Substates**
  PCI Express L1 Substates settings.
- **PCIe Speed**
  Configure PCIe Speed. Auto is equal to Gen2 or Gen3 depending on DTR soft strap.



- **SATA Configuration**
  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.

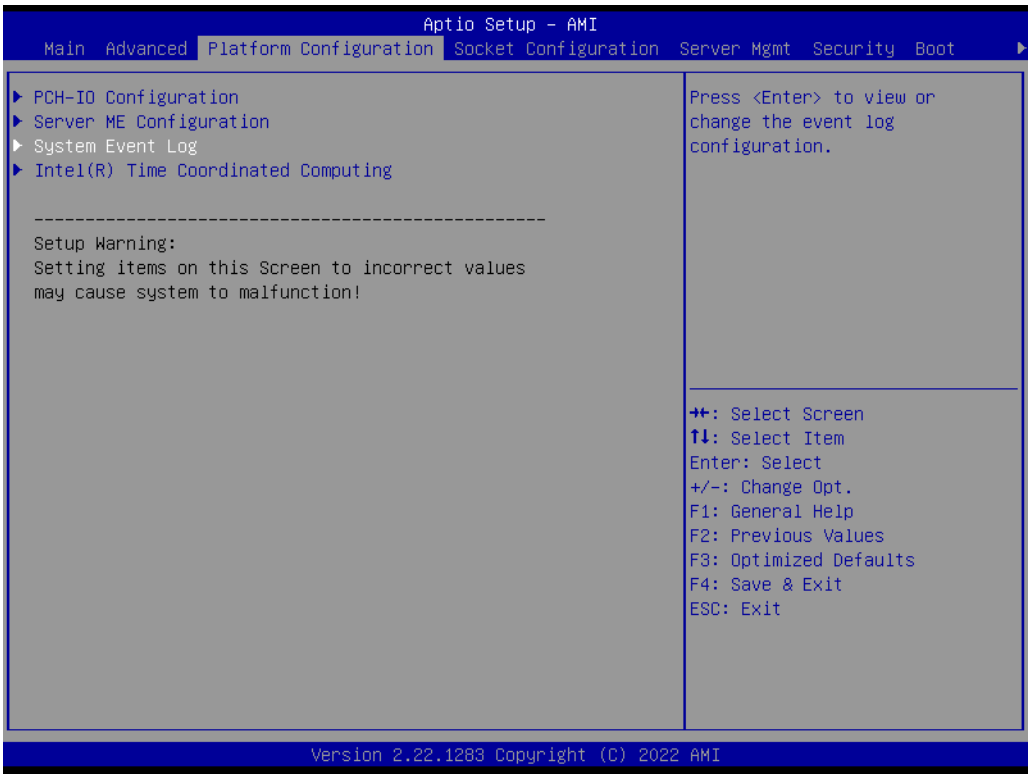
3.2.3.2 Sever ME Configuration





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

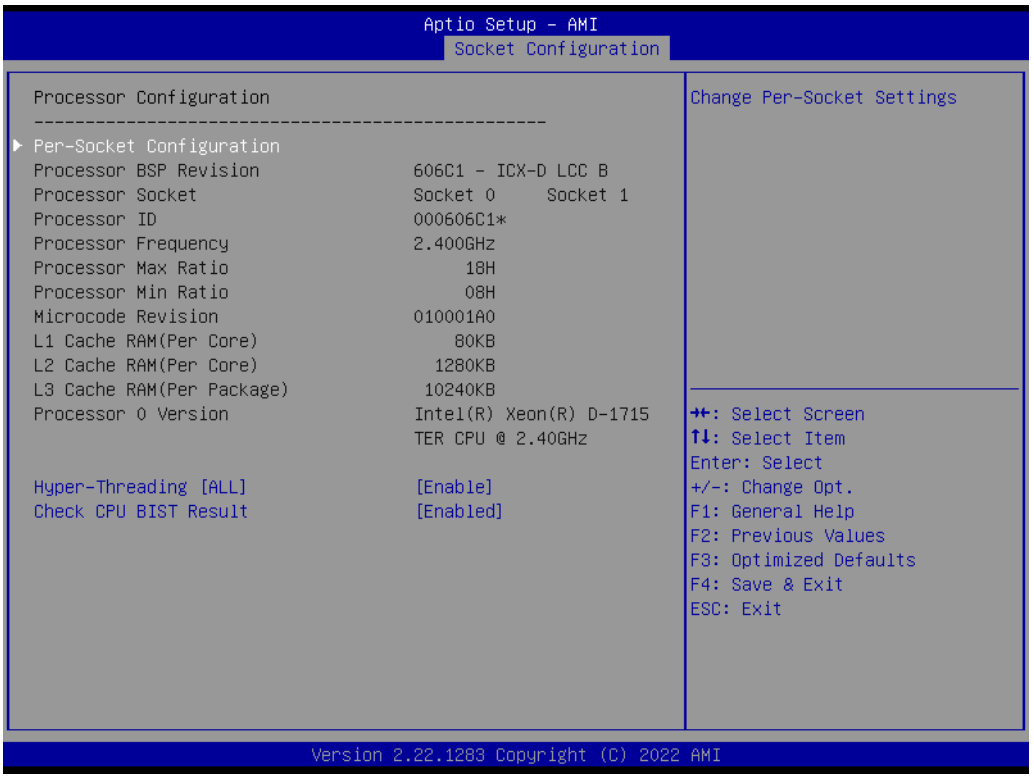
3.2.3.3 System Event Log

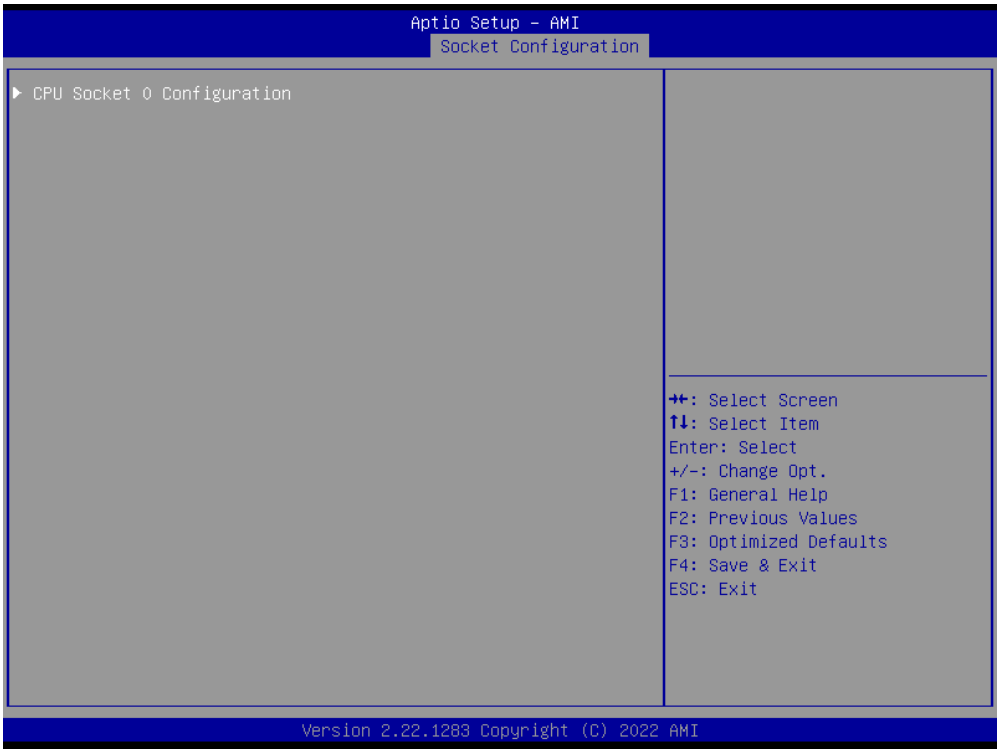


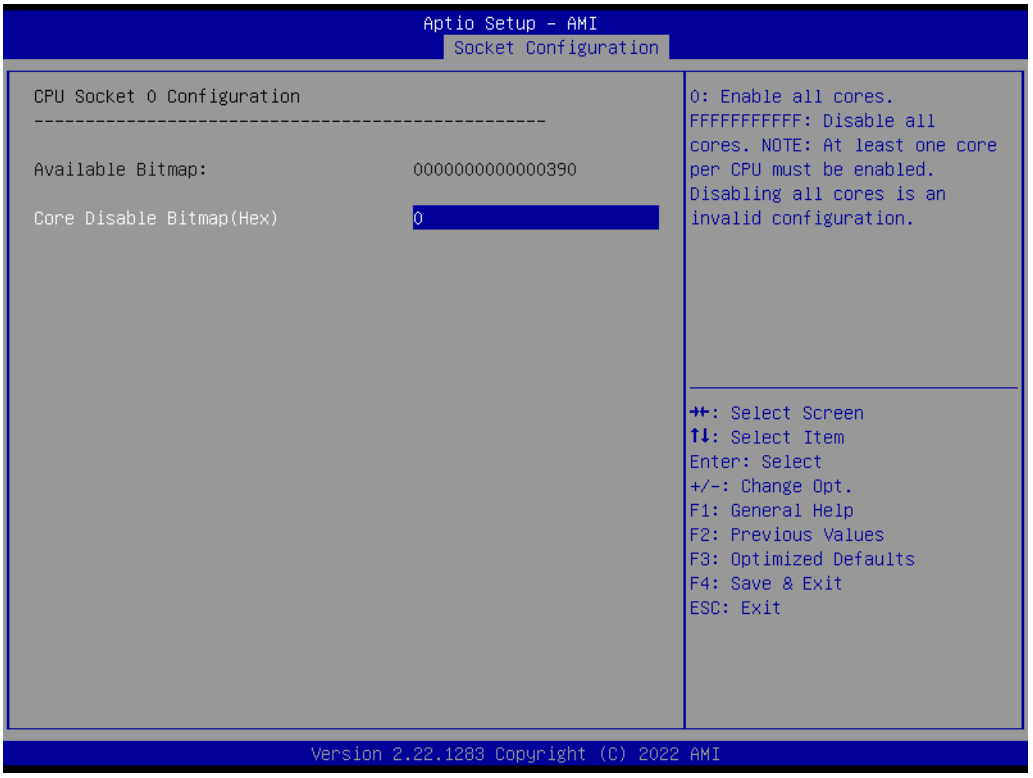
- **System Error**
  Enable/Disable setup options.

3.2.4 Socket Configuration

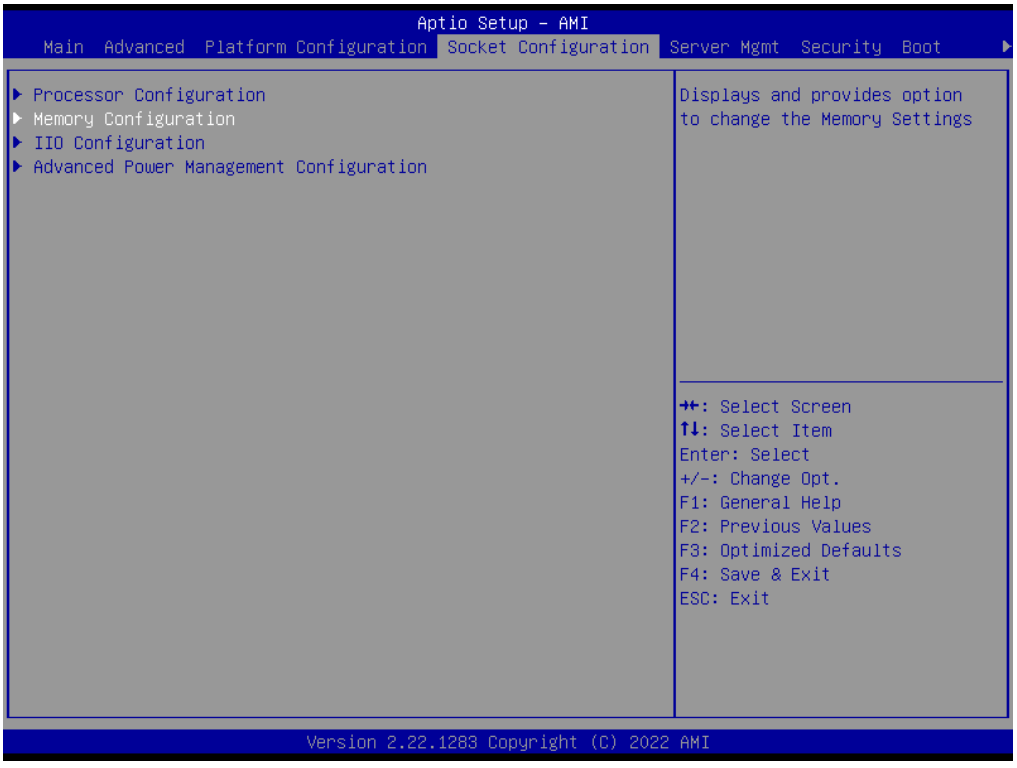
3.2.4.1 Processor Configuration

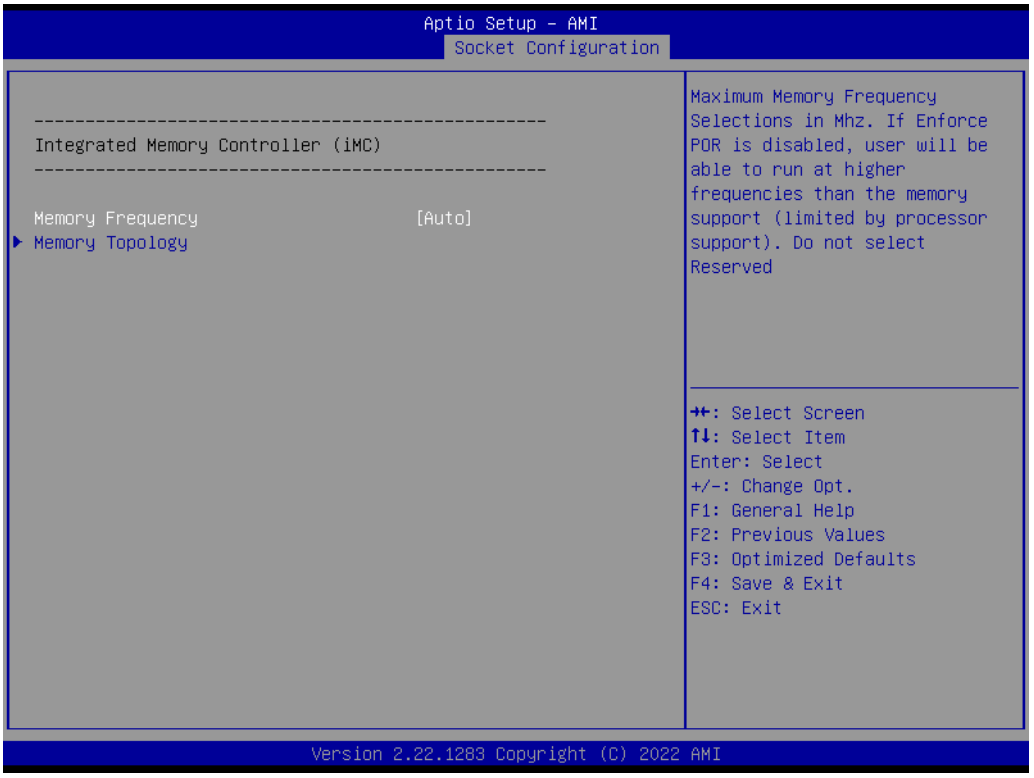


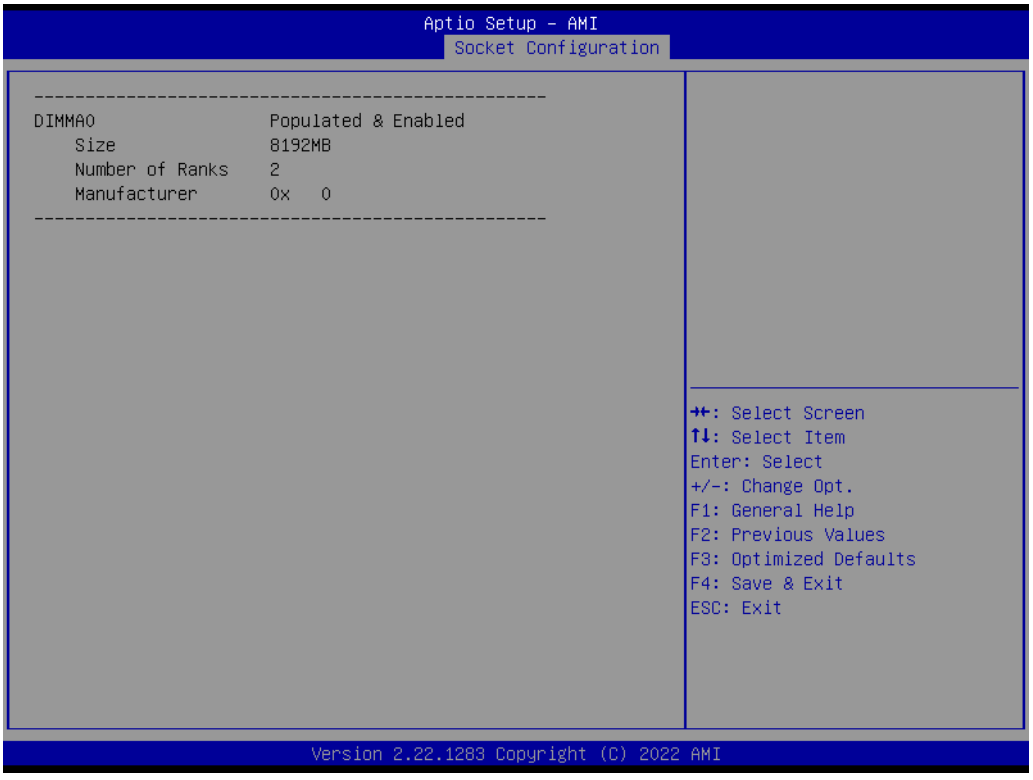




3.2.4.2 Memory Configuration

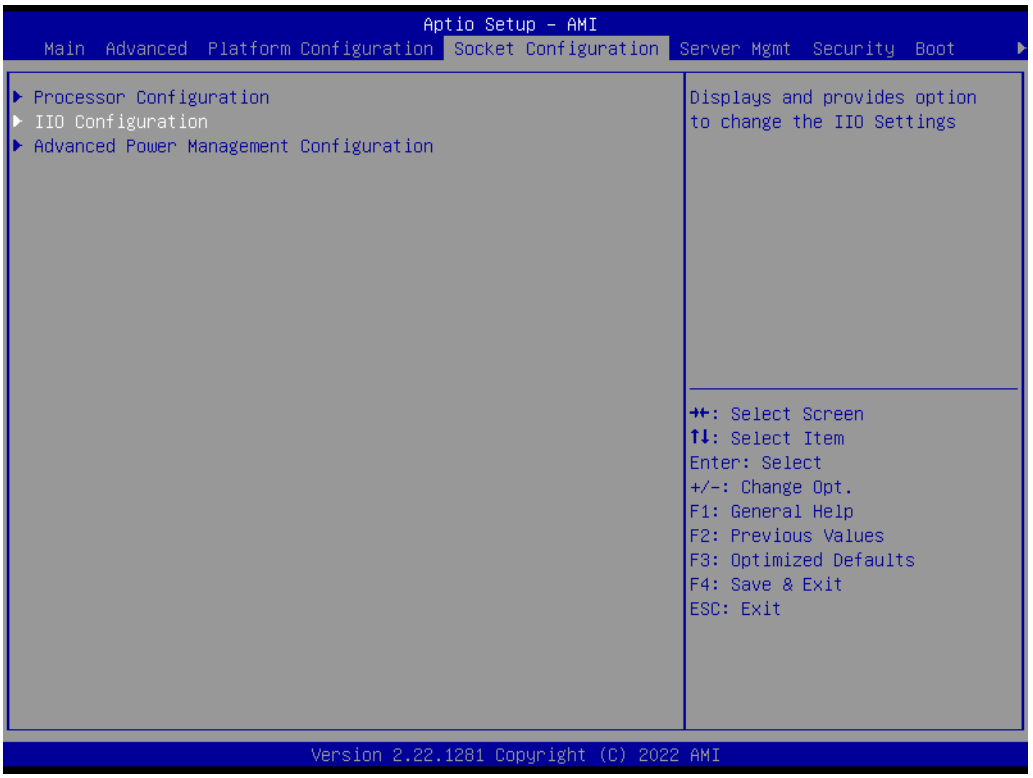


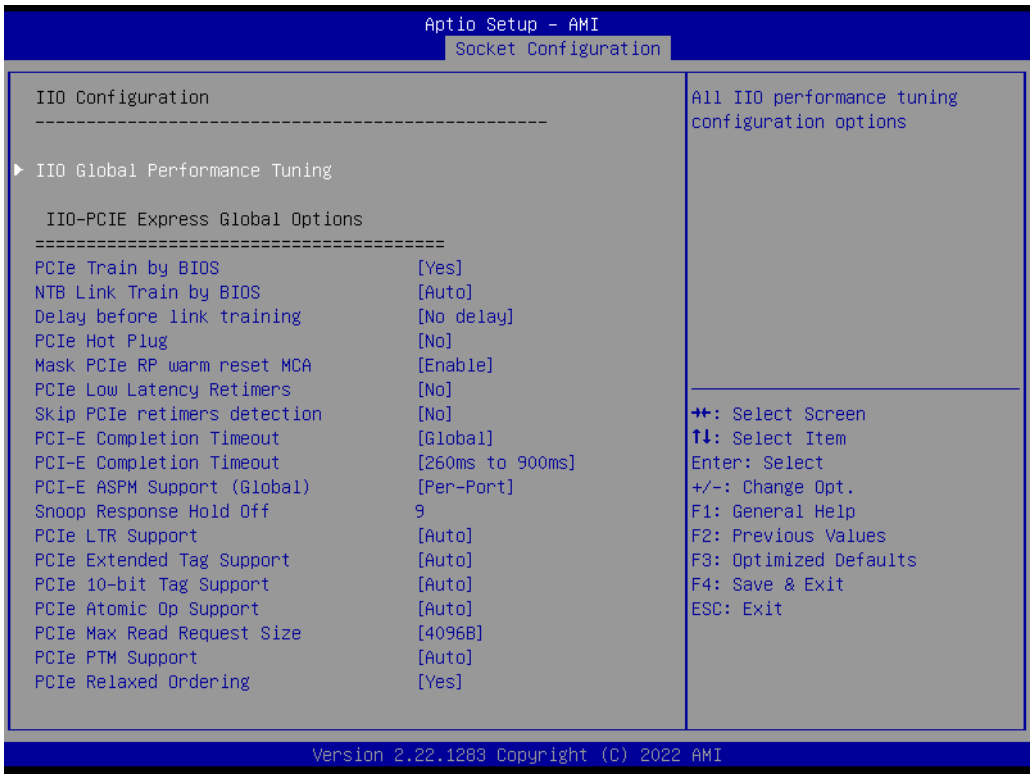




- **Memory Frequency**
  Maximum Memory Frequency Selections in Mhz. If Enforce POR is disabled, user will be able to run at higher frequencies than the memory support (limited by processor support). Do not select Reserved.

3.2.4.3 IIO Configuration

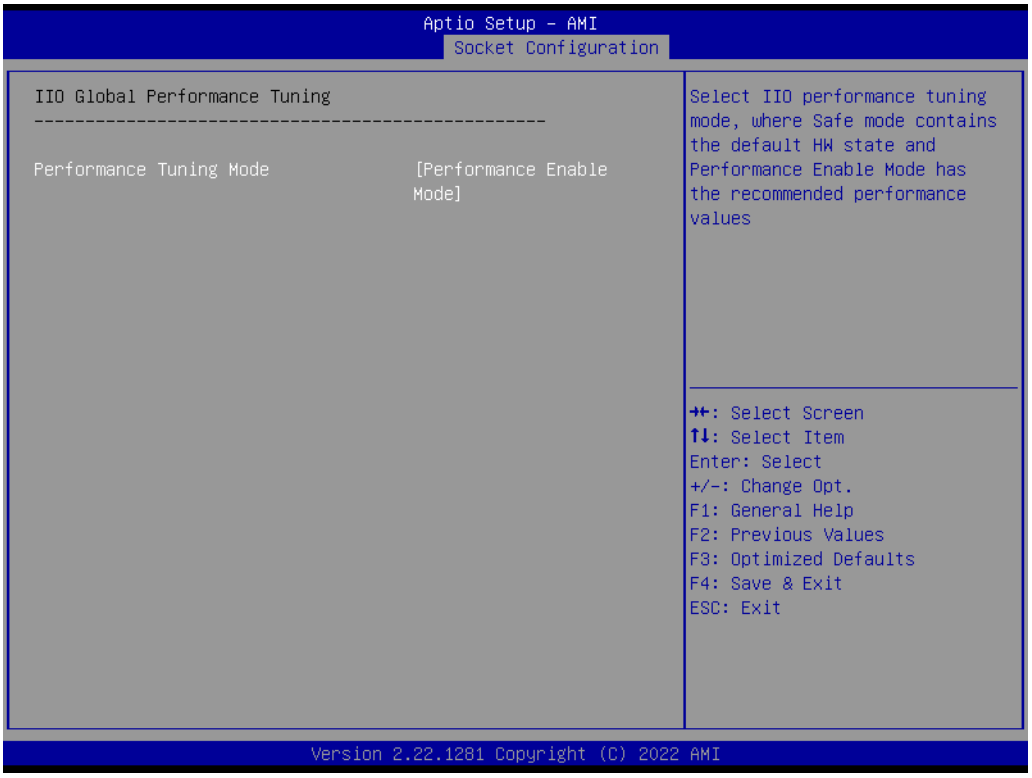




- **PCIe Train by BIOS**
  Assume IIO is strapped for Wait-for-BIOS because straps are unreliable in A-0 Silicon.
- **NTB Link Train by BIOS**
  This knob enables or disables the BIOS to train the NTB link.

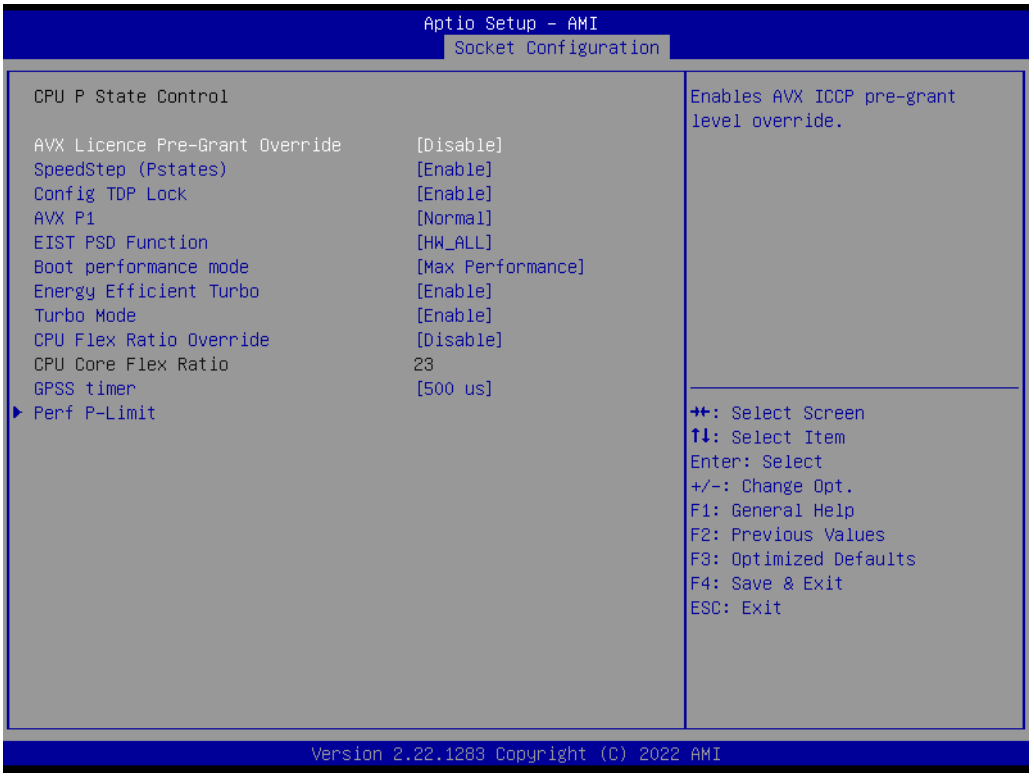
- **Delay before link training**
  Custom delay before PCIe link training on IIO ports.
- **PCIe Hot Plug**
  Enable/Disable PCIe Hot Plug globally.
- **Mask PCIe RP warm reset MCA**
  Enable/Disable Mask CPU Complex PCIe Root Port warm reset MCA.
- **PCIe ACPI Hot Plug**
  Enable/Disable PCIe ACPI Hot 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.

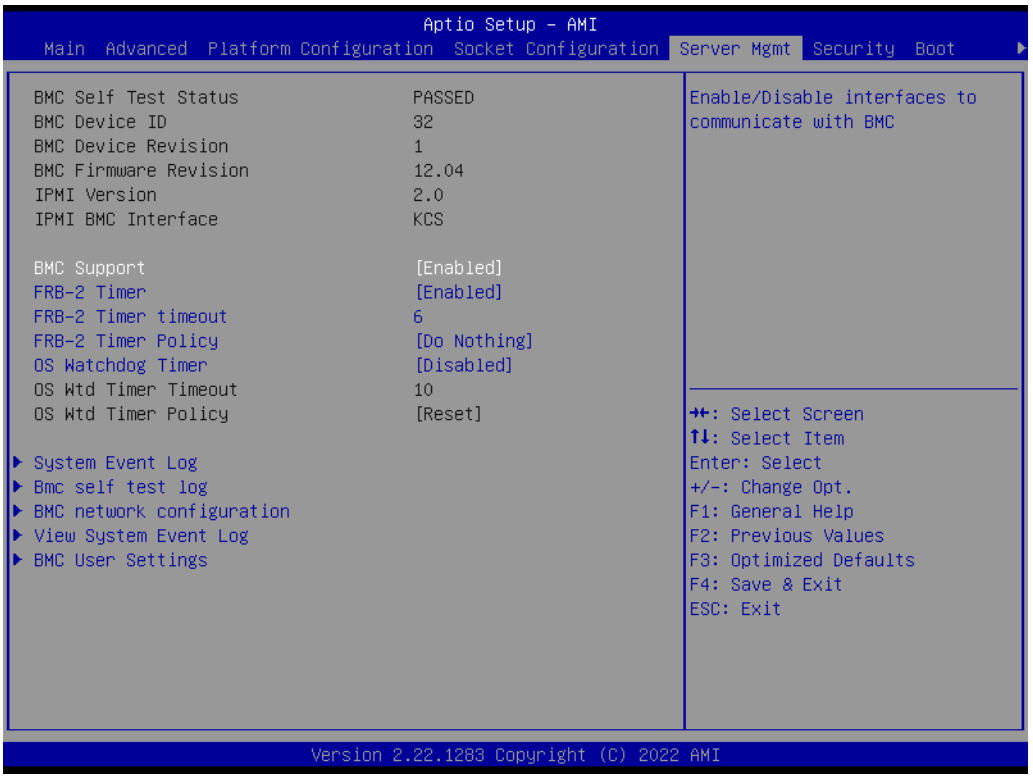
3.2.4.4 Advanced Power Management Configuration



- **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.

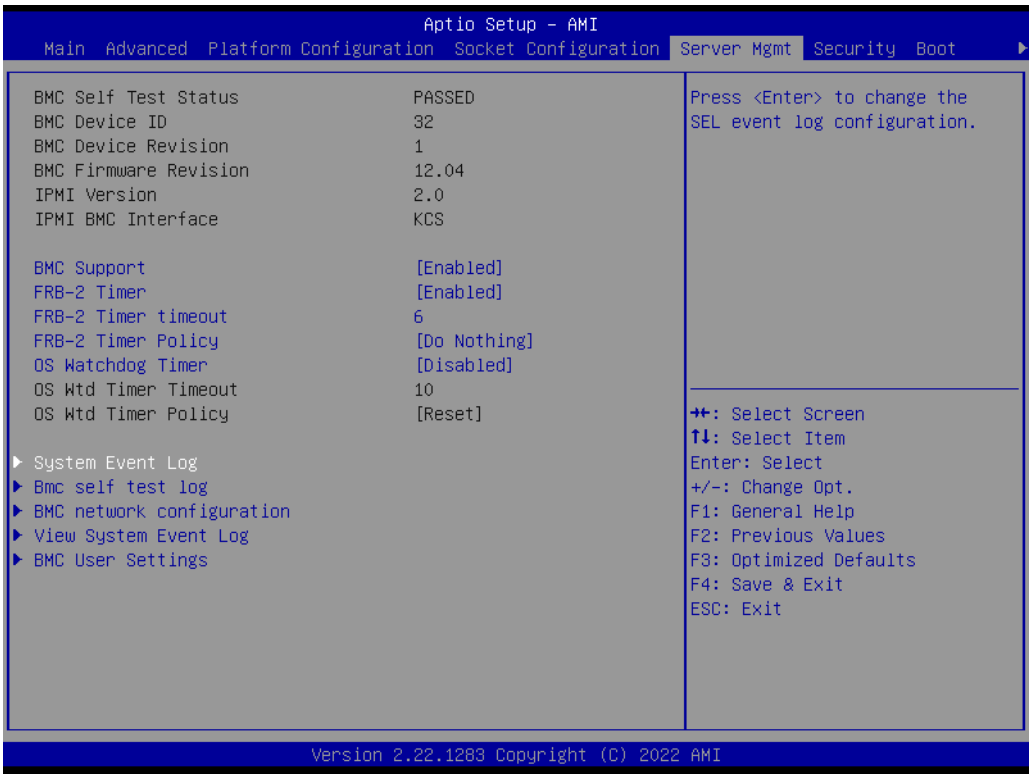
– **GPSS timer**
P-state change hysteresis time window.
– **Perf P-Limit**
Program PERF_P_LIMIT 1:30:2:0xe4 Sub Menu.

3.2.5 Server Management

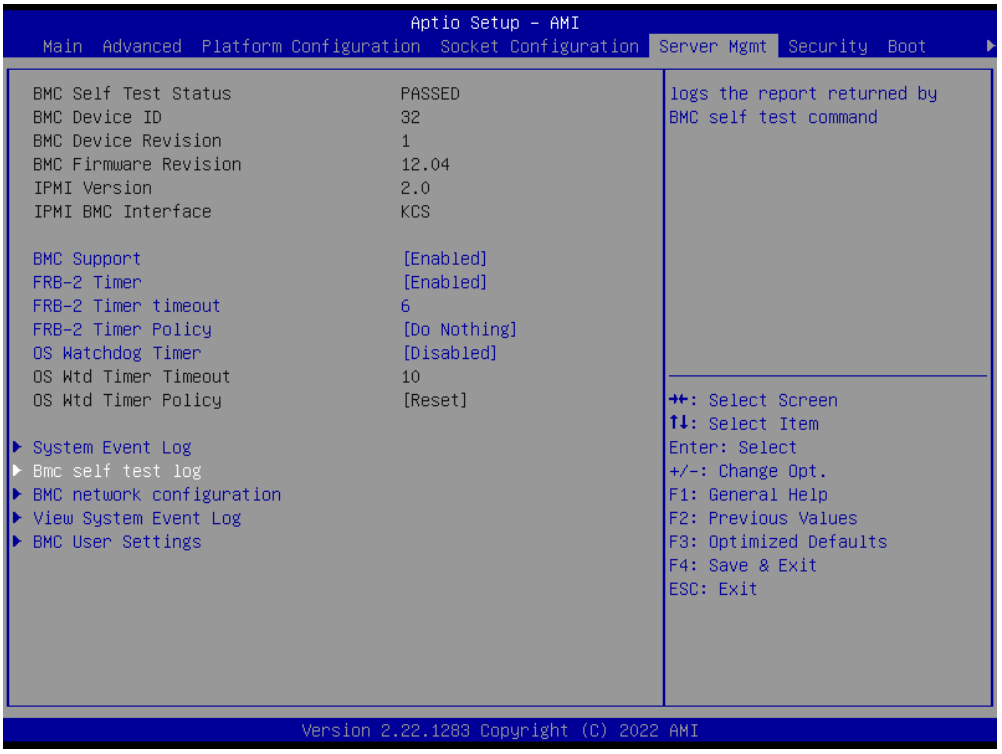


- **BMC Support**
Enable/Disable interfaces to communicate with BMC.
- **FRB-2 Timer**
Enable or Disable FRB-2 timer (POST timer).
- **FRB-2 Timer timeout**
Enter value Between 1 to 30 min for FRB-2 Timer Expiration.
- **FRB-2 Timer Policy**
Configure how the system should respond if the FRB-2 Timer 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.

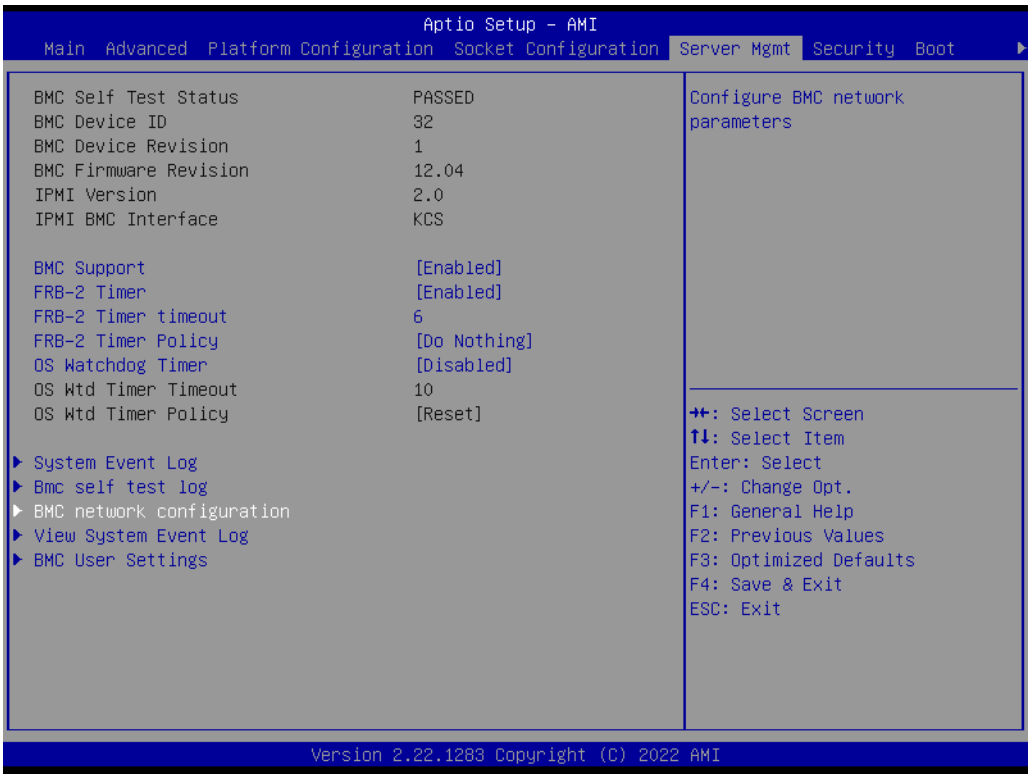
3.2.5.1 System Event Log

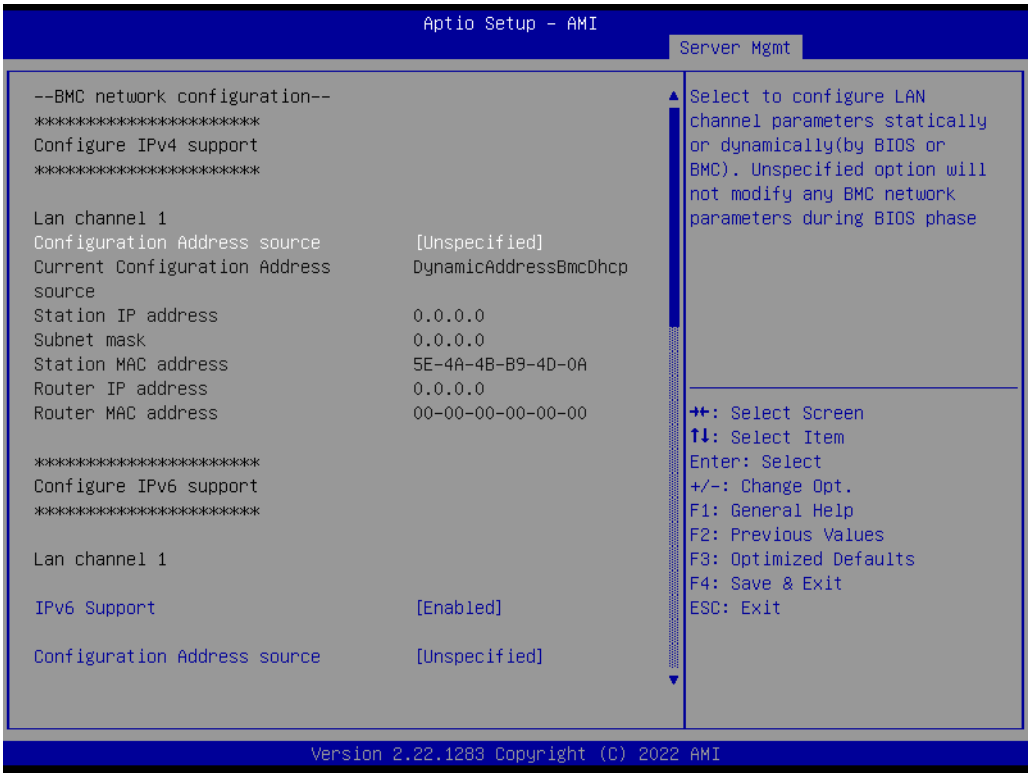


3.2.5.2 BMC Self Test Log



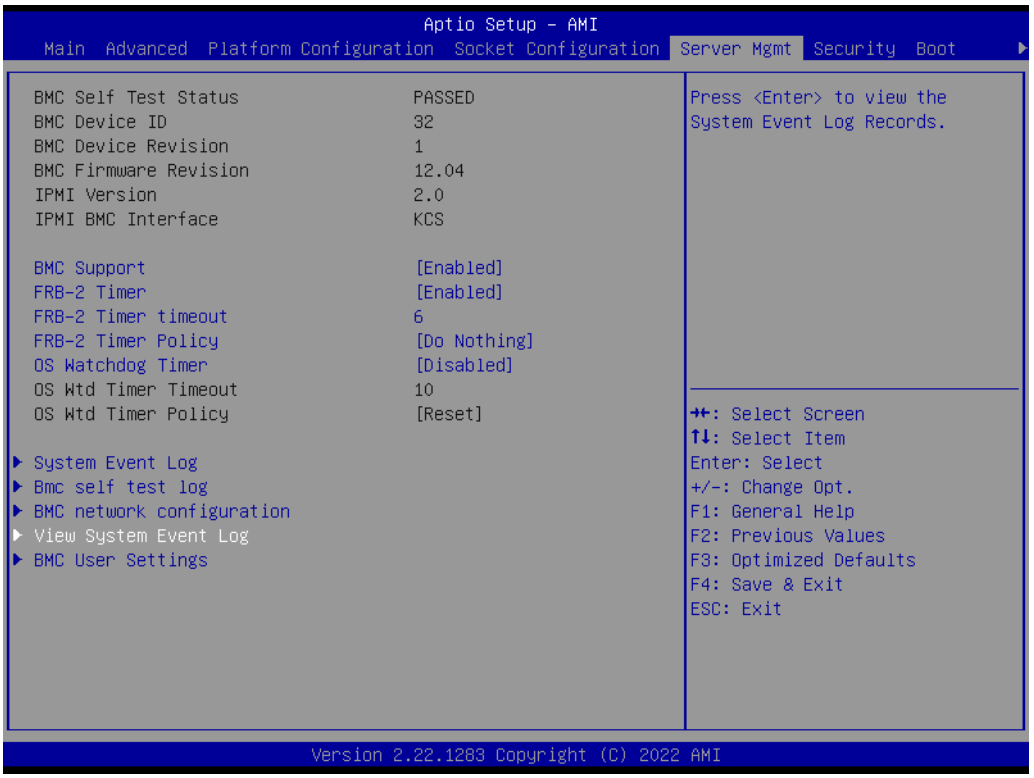
3.2.5.3 BMC Network Configuration





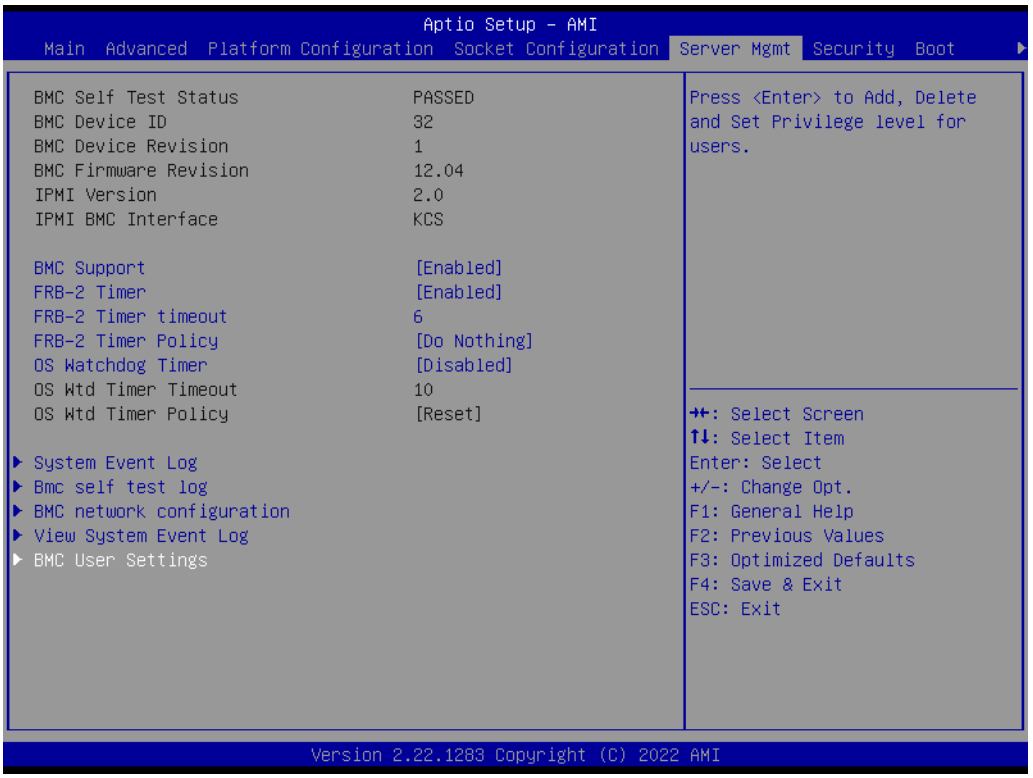
- **Configuration Address Source**
  Select to configure LAN channel parameters statically or dynamically (by BMC). Unspecified option will not modify any BMC network parameters during BIOS phase.

3.2.5.4 View System Event Log



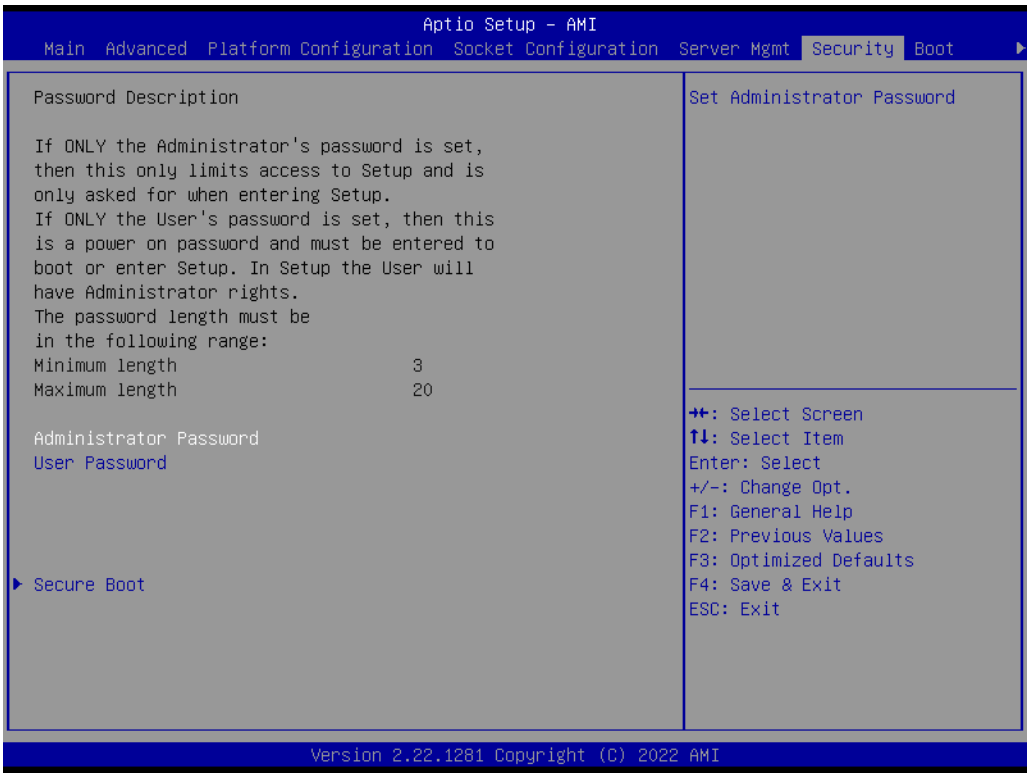
If any event logs occur during boot up, the event logs will be display at this page.

3.2.5.5 BMC User Settings

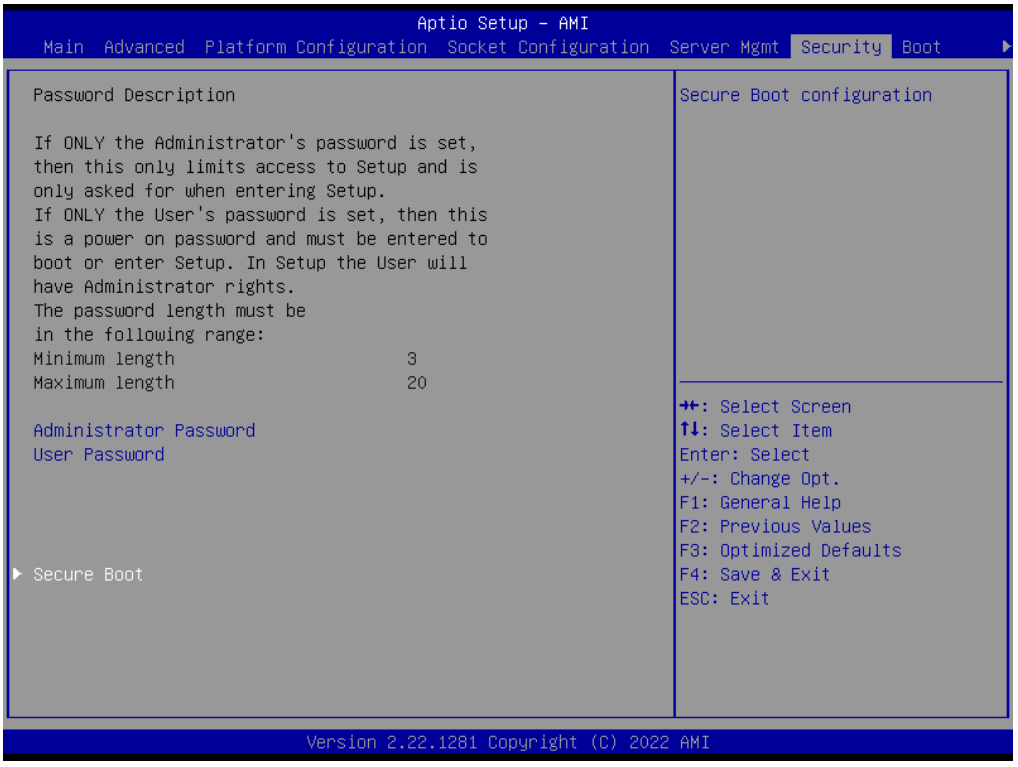


- **Add User**
  Add user information.
- **Delete User**
  Delete user information.
- **Change User Settings**
  Allow change User settings.

3.2.6 Security

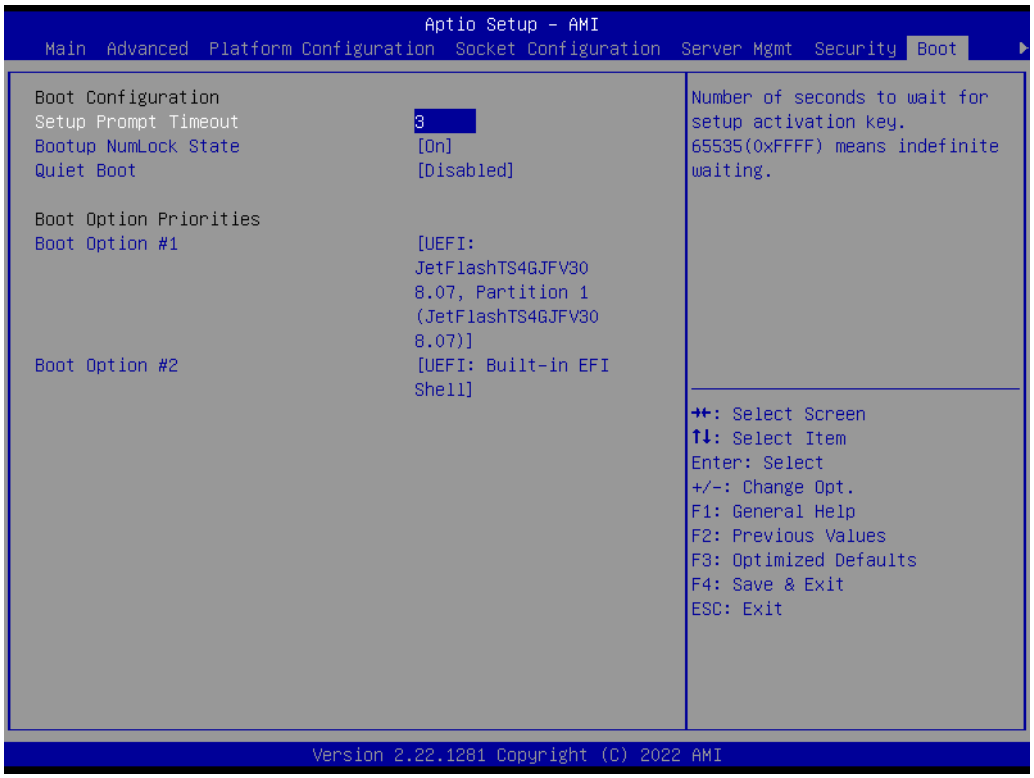


- **Administrator Password**
  Set Administrator Password.
- **User Password**
  Set User Password.



- **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.

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