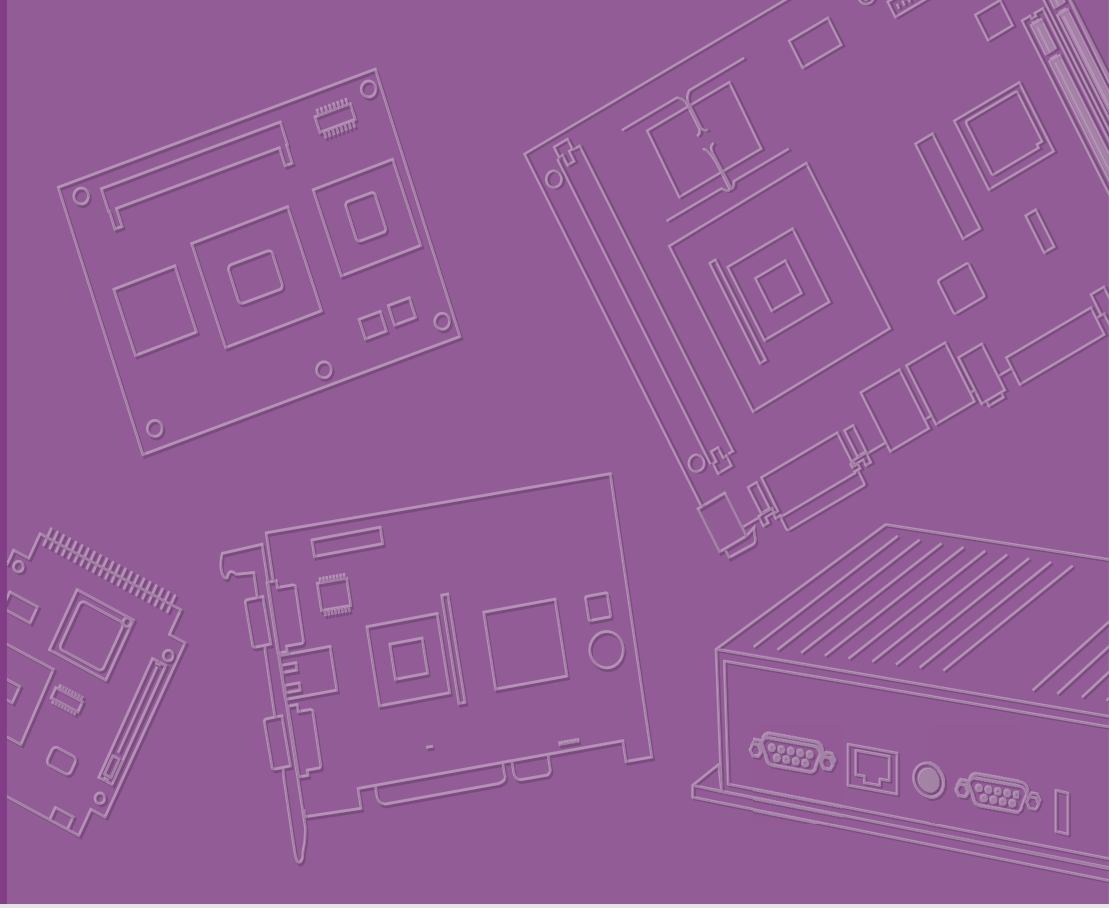


User Manual

AIR-310

MXM GPU Edge Intelligence Computer

ADVANTECH

Enabling an Intelligent Planet

Attention!

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

Copyright

Acknowledgments

For more information about this or other Advantech products, visit our website at
http://www.advantech.com/
https://www.advantech.com/products/fanless-embedded-computers/sub_1-2jkeuf

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

Part No. 2006031010 Edition 1
Printed in Taiwan September 2024

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 onscreen 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!*

Les avertissements indiquent des conditions qui, si elles ne sont pas respectées, peuvent provoquer des blessures!

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."

Des précautions sont incluses pour vous aider à éviter d'endommager le matériel ou de perdre des données. par exemple.

Il existe un risque d'explosion d'une nouvelle batterie si elle n'est pas correctement installée. N'essayez pas de recharger, d'ouvrir de force ou de chauffer la batterie. Remplacez la batterie uniquement par une pile identique ou équivalente recommandée par le fabricant. Jetez les piles usagées conformément aux instructions du fabricant.

Note! *Notes provide additional optional information.*

Les notes fournissent des informations supplémentaires facultatives.

Document Feedback

To assist us with improving this manual, we welcome all comments and constructive criticism. Please send all feedback in writing to support@advantech.com.

Safety Precautions - Static Electricity

Follow these simple precautions to protect yourself from harm and the products from damage.

- To avoid electrical shock, always disconnect the power from the PC chassis before manual handling. Do not touch any components on the CPU card or other cards while the PC is powered on.
- Disconnect the power before making any configuration changes. A sudden rush of power after connecting a jumper or installing a card may damage sensitive electronic components.

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. Use a power cord connected to a socket-outlet with a grounded connection.
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 shall not exceed 70 dB (A).
20. The equipment should only be installed in a restricted access area.
21. DISCLAIMER: These instructions are provided according to IEC 704-1 standards. Advantech disclaims all responsibility for the accuracy of any statements contained herein.
22. This model is intended to be supplied by a UL-certified power supply suitable for use at TMA 55°C (131°F) min., and the output is rated 12-24 VDC, 19.16-9.58A, ES1. If you need further assistance, contact Advantech for additional information.

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. Au moyen d'un cordon d'alimentation connecté à une prise de courant avec 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. 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.
22. Ce modèle est destiné à être alimenté par une alimentation certifiée UL adaptée à une utilisation à TMA 55°C (131°F) min., et la sortie est nominale de 12-24 V dc, 19.16-9.58A, ES1. Si vous avez besoin d'aide supplémentaire, contactez Advantech pour plus d'informations.

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-310 unit
- 1 x mounting kit
- 1 x User Manual (Simplified Chinese)
- 1 x China RoHS
- 1 x Phoenix connector counterpart
- 1 x CAN bus counterpart

Ordering Information

Model Number	Description
AIR-310-00A1U	Intel RPL-S refresh H610E MXM Type A GPU System
AIR-310-005A1U	Intel RPL-S refresh H610E MXM System w/ EAI-2100

Note:

*AIR-310-00A1U is a barebones SKU: the CPU, memory, storage, MXM GPU Card and MXM GPU heatsink are not included.

*AIR-310-005A1U is built with the EAI-2100 GPU card built in, but the CPU, memory, and storage are not included.

Optional Accessories

Part Number	Description
96PSA-A230W24P4-3	Power adapter (DC 24V, 230W)
1702002600	Power cable 3-pin 183 cm, USA type
1702002605	Power cable 3-pin 183 cm, EU type
1702031801	Power cable 3-pin 183 cm, UK type
1700000237	Power cable, 3-Pin 183 cm, PSE type
AMK-A0050	AIR-310 MXM thermal kit

*AMK-A0050 is the heatsink for the MXM GPU Card. Please place the order together with the MXM GPU Card.

*AIR-310 MXM GPU card support list:

EAI-2100-00A1	Intel® Arc™ mobile A370M MXM GPU Card
SKY-MXM-A2000-8SHA	NVIDIA Quadro A2000 MXM Hybrid mode
SKY-MXM-A500-4SHA	Quadro A500 MXM 4GB MS Hybrid mode Type A
SKY-MXM-2000A-8SHA	Quadro 2000 Ada MXM 8GB MS Hybrid mode Type A
SKY-MXM-T1000-4HHB	Quadro T1000 MXM 4GB MS Hybrid mode Type A

Contents

Chapter 1

General Introduction

This chapter gives background information on the AIR-310 series.

1.1 Introduction

AIR-310 is an edge intelligence system with 13th/14th Gen Intel® Core™ Desktop Processors. The built-in MXM 3.1 Type A expansion slot offers high computing performance and AI inference acceleration.

High computing performance with CPU and GPU integrated

AIR-310 has been equipped with a high-performance 13th/14th Gen Intel® Core™ i9/i7/i5/i3 Processor up to 65W. The integrated MXM GPU card provides powerful graphics computing performance and scalable AI inference capability up to 8.25 TFLOPS (FP32) through the NVIDIA Quadro® A2000 MXM GPU card.

Versatile I/Os and expansion for vision AI applications

AIR-310 offers multiple I/Os, including 2 x 2.5GbE, 1 x GbE, 4 x USB 3.2, 2 x RS-232/422/485, CAN bus, and DIO for sensors, cameras, and industrial devices. In addition, AIR-310 supports M.2 M-Key 2280 and 2.5" SSD for data storage. With its versatile I/Os and expansions, AIR-310 is ideal for vision AI applications.

Compact and robust design for reliable operation

Featuring a 2.7-liter volume (225 x 215 x 55 mm) and front I/O access design, the AIR-310 is easy to integrate and deploy. Its reliable thermal design, managed by smart fan management, enables the system to support 0 ~ 50°C operating temperature. AIR-310 is ideal for space-constrained applications and can operate reliably and stably.

1.2 Product Features

1.2.1 General

- **CPU:** 13th/14th Gen. Intel® Core™ i3/i5/i7i9 LGA1700 Processor (up to 65W)
- **System Chipset:** Intel® H610E
- **BIOS:** AMI 256 Mbit Flash BIOS
- **System Memory:**
  - 2 x DDR5 5600 MHz 262 pin SODIMM (Non-ECC)
  - Max. capacity 64GB
- **Serial Port:** 2 x RS-232/422/485
- **USB:** 4 x USB 3.2 Gen1
- **Audio:** High-definition (HD) audio, Line-Out/Mic-In
- **DIO:** 16-bit
- **CAN bus:** 2
- **Storage:** 2.5" SATA SSD
- **Expansion Interface:**
  - M.2 2280 M-Key (SATA, PCIex4 Gen3 NVMe)
  - 1 x M.2 2230 E-Key
  - 1 x MXM3.1 Type A (PCIe x16, up to 60W)

1.2.2 Display

- **Controller:** Intel® UHD Graphics 770 / Intel® UHD Graphics 730 (Depending on the CPU selection)
- **Resolution:**
  - 1 x HDMI 2.0b, supports up to 4096 x 2160 @60Hz
  - 1 x DP++, DP 1.4a, up to 4096 x 2304 @60Hz
- **Dual Display:** 1x HDMI, 1 x DP

1.2.3 Ethernet

- **Chipset:** (1 x GbE / 2 x 2.5 GbE)
  - LAN1 Intel® I219-LM
  - LAN2 & LAN3 Intel® I226-LM
- **LAN1 Speed:** 10/100/1000 Mbps
- **LAN2 & LAN3 Speed:** 10/100/1000/2500 Mbps
- **Interface:** 3 x RJ-45
- **Standard:** Compliant with IEEE 802.3, IEEE 802.3u, IEEE 802.3x, IEEE 802.3y, IEEE 802.ab.

1.3 Chipset

1.3.1 Functional Specifications

1.3.1.1 Processor

Table 1.1: Processor	
Processor	Supports 13th/14th Gen Intel® LGA1700 Processors (up to 65W)
Memory	Support 2 x DDR5 5600 MHz 262-pin SODIMM Socket Max. capacity 64GB

1.3.1.2 Chipset

Table 1.2: Chipset	
Internal Graphics Features	DirectX 12, OpenGL 4.5 1 x HDMI 2.0b, 1 x DP++
Video Accelerator	H/W-accelerated video decoding Video decoder: Supports H.265/HEVC, H.264/AVC, VP9, SCC Video Encoder: Supports H.265/HEVC, H.264/AVC, VP8, SCC
SATA Interface	Supports several optional sections of Serial ATA III: Extensions to Serial ATA 1.0 specification, Revision 1.0 Supports SATA transfers to 300 Mbytes/sec.
USB Interface	USB host interface with support for 4 x USB 3.2 Gen1 All ports are high-speed, full-speed, and low-speed capable supporting legacy keyboard/mouse software
BIOS	AMI 256 Mbit Flash BIOS

1.3.1.3 Others

Table 1.3: Others	
Serial Ports	2 x RS-232/422/485, supports auto-flow control
DIO	1 x DIO
CAN Bus	2 x CAN bus
USB	4 x USB 3.2 Gen1
Ethernet	**LAN1 Intel I219-LM, LAN2 and LAN3 Intel I226-LM** ■ Compliant with IEEE 802.3, IEEE 802.3u, IEEE 802.3x, IEEE Ethernet Audio 802.3y, and IEEE 802.ab ■ LAN1 Supports 10/100/1000 Mbps. ■ LAN2 Supports 10/100/1000/2500 Mbps. ■ LAN3 Supports 10/100/1000/2500 Mbps. ■ LAN Connectors: Phone Jack RJ-45 8P
Audio	**Audio Codec: Realtek ALC888S:** ■ Compliant with HD audio specifications ■ Supports 16-/20-/24-bit DAC and 16-/20-/24-bit ADC resolution ■ Supports Line-Out and Mic-In audio ■ Connectors: 1 x Earphone jack
Battery	1 x 3V/220 mAh battery with wire

1.4 Mechanical Specifications

1.4.1 System Dimensions

215 x 225 x 55 mm

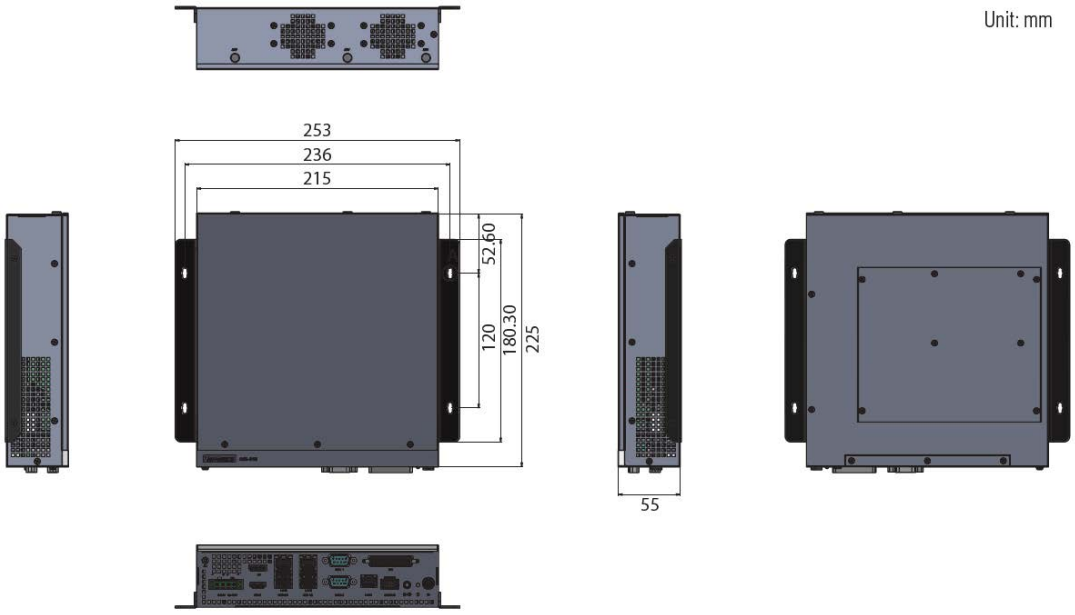


Figure 1.1 AIR-310 Mechanical Dimensions

1.4.2 Weight

2.5 kg max

1.5 Power Requirements

1.5.1 System Power

- Power Input: DC In 12V-24V

1.5.2 RTC Battery

- Lithium: 3V/220mAH

1.6 Environmental Specifications

1.6.1 Operating Temperature

- -20 ~ 55°C, with 0.7m/s air flow, (w/o MXM GPU Card)
- 0 ~ 50°C, with 0.7m/s air flow, (w/ MXM GPU Card)

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 Vibration Tolerance

- When the system is equipped with an SSD/MXM GPU Card: 3 Grms, IEC 60068-2-64, random, 5 ~ 500 Hz, 1 hr/axis, (x, y, z) 3 axes

1.6.5 Shock Tolerance

- When the system is equipped with an SSD/MXM GPU Card: 30 G, IEC 60068-2-27, half sine, 11 ms duration

1.6.6 Safety Certification

- UL, CB, CCC

1.6.7 EMC Certification

- CE/FCC Class B, Heavy Industry 61000-6-4, 61000-6-2, CCC, BSMI

Chapter 2

Hardware Installation

This chapter details instructions for installing AIR-310 hardware and external I/O.

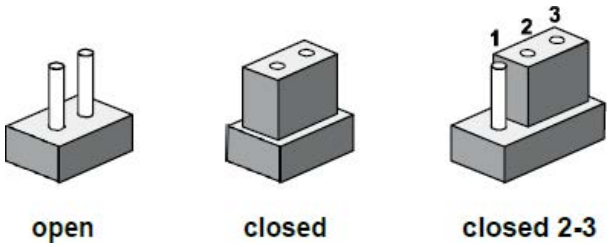
2.1 Introduction

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

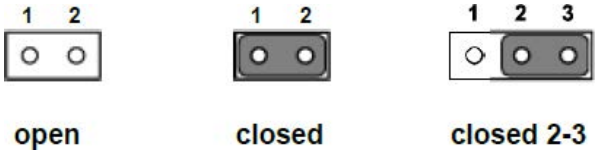
2.2 Jumpers

2.2.1 Jumper Description

AIR-310 can be configured to satisfy specific application requirements by setting jumpers. A jumper is a metal bridge used to close an electric circuit. It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To close a jumper, connect the pins with the clip. To open a jumper, remove the clip. Sometimes a jumper will have three pins, labeled 1, 2, and 3. For these jumpers, connect either pins 1 and 2, or 2 and 3.



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



A pair of needle-nose pliers may be necessary when working with jumpers. Users with concerns regarding the ideal hardware configuration for your application should contact your local distributor or sales representative before making any changes. Usually, only a standard cable is required to make most connections.

2.2.2 Jumper List

Table 2.1: Jumper Settings

Location	Function
JCMOS1	Clear CMOS
PSON1	Auto Power On Setting
ERP1	For ERP setting
SW_422_1	RS485/RS422 Fail Safe Enabled/Disabled
SW_422_2	RS485/RS422 Fail Safe Enabled/Disabled

2.2.3 Jumper Locations

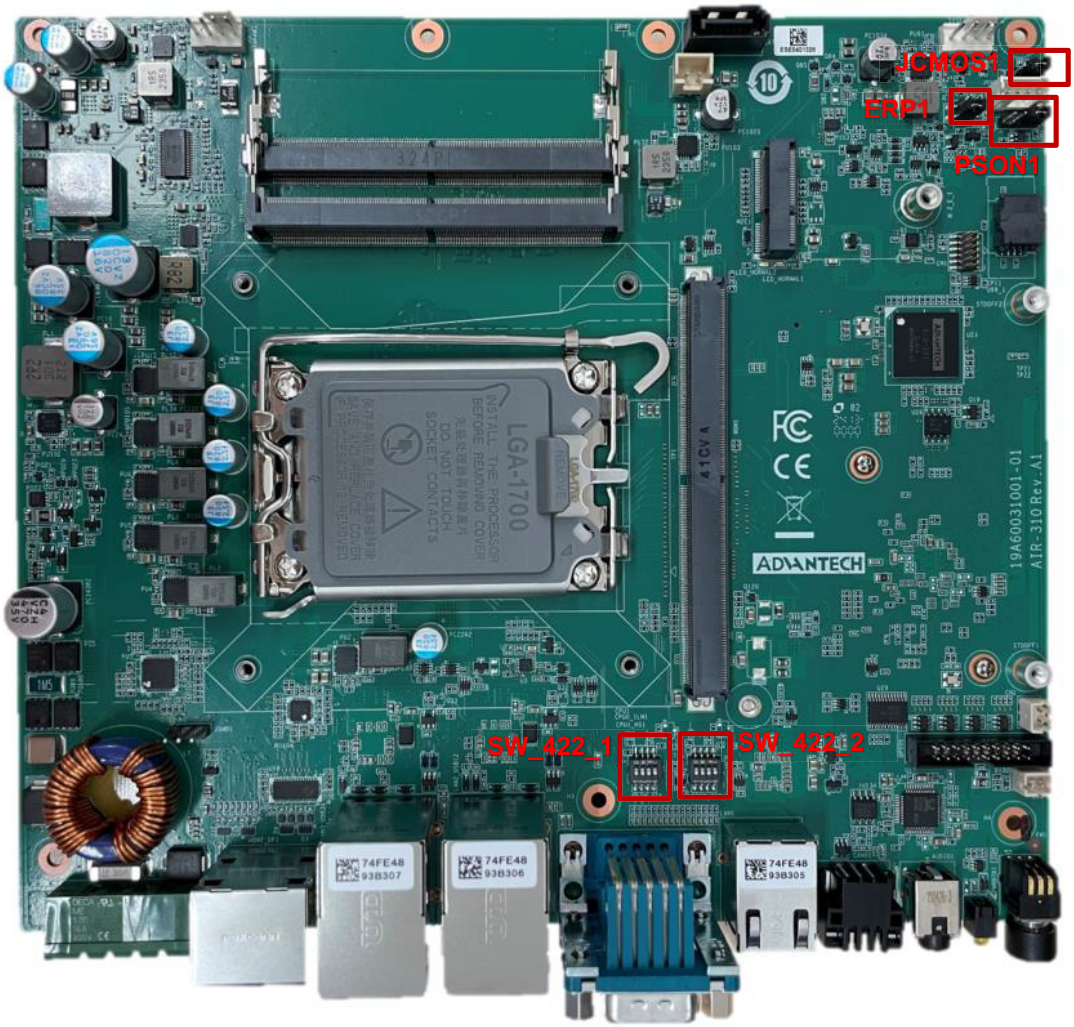


Figure 2.1 Jumper Location

2.2.4 Jumper Settings

Table 2.2: JCMOS1 Clear CMOS	
Part Number	1653003101
Description	PIN HEADER 3x1P 2.0mm 180D(M) DIP 2000-13 WS
Default Setting	(1-2): Normal mode
Jumper Setting	(2-3): Clear CMOS

Table 2.3: PSON1 Auto Power On Setting	
Part Number	1653004101
Description	PIN HEADER 4x1P 2.0mm 180D(M) DIP 21N12050
Default Setting	(1-2): ATX mode
Jumper Setting	(3-4): AT mode

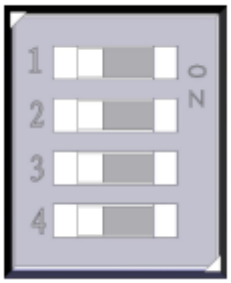


Table 2.4: COM Port Failsafe Function Selection					
	Mode/Description	**Pin1**	**Pin2**	**Pin3**	**Pin4**
SW_422_1 (COM1_SAFE) SW_422_2 (COM2_SAFE)	Disable failsafe function (Default)	OFF	OFF	OFF	OFF
	RS-422 TX+ pull up RS-422 TX- pull down RS-422 RX+ pull up RS-422 RX- pull down	ON	ON	ON	ON
	RS-485 Data+ pull up RS-485 Data- pull down	ON	ON	OFF	OFF

Table 2.5: ERP1		
For ERP setting	(1-2 short)	Normal mode (Default)
	(3-4 short)	ERP mode

2.3 System I/O

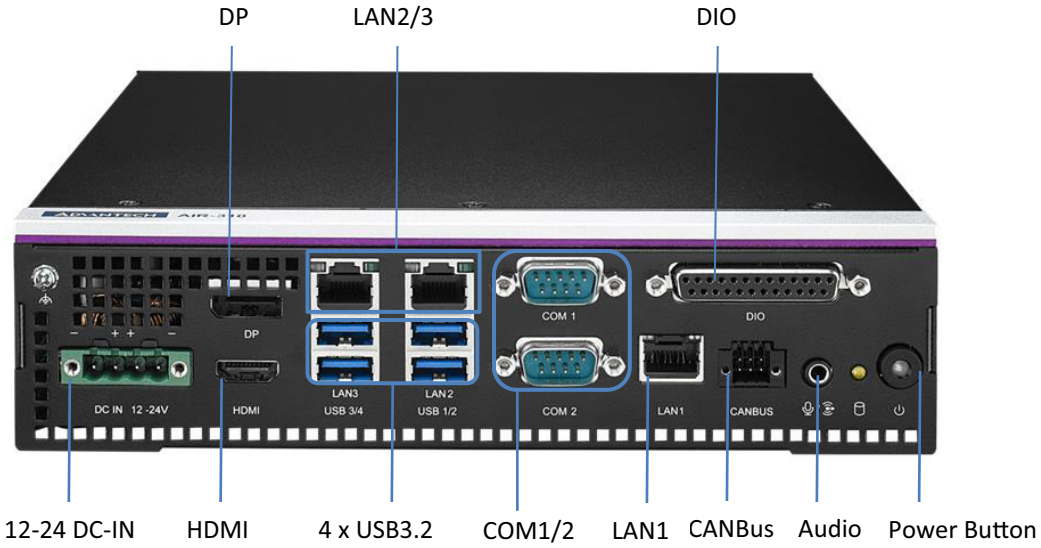


Figure 2.2 AIR-310 Front View

Figure 2.3 AIR-310 Rear View

2.4 External I/O

2.4.1 Power On/Off Button

AIR-150 features a Power On/Off button with an LED indicator on the top side that shows On status (Green LED).

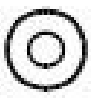


Figure 2.4 Power On/Off Button

2.4.2 Power Input Connector

AIR-310 supports one 4-pin Phoenix terminal power input connector. Connect the positive and negative power cables to the terminals in the power distribution connector correctly at the same time.

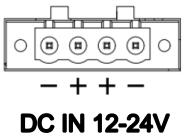


Figure 2.5 Phoenix Terminal Connector

Note!

1. *For supply connections use wires suitable for at least 75°C.*
   Pour les connexions d'alimentation, utilisez des fils adaptés à une température d'au moins 75°C.
2. *The terminal block is suitable for 14 AWG. Torque value 7lb-in. User copper conductors only. It must be installed by a skilled person.*
   Le bornier est adapté à un calibre de 14 AWG. Le couple de serrage est de 7 lb-in. Conducteurs en cuivre pour l'utilisateur uniquement. Il doit être installé par une personne qualifiée
3. *The terminal block uses two sets of interfaces to be installed at the same time to make it split to meet the maximum current limit, and a single pin will be limited below 16 A.*
   Le bornier utilise deux jeux d'interfaces à installer en même temps pour le diviser afin de respecter la limite de courant maximale, et une seule broche sera limitée à moins de 16 A.

2.4.3 Ethernet Connector

AIR-310 is equipped with up to 3 x Ethernet controllers. These Ethernet ports provide a standard RJ-45 jack connector with LED indicators on the front side to show Active/ Link status (Green LED) and Speed status (LAN1 LED Green: 1G/ Orange: 100M, LAN2/LAN3 LED Green:2.5G /Orange: 1G).

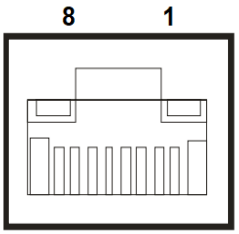


Figure 2.6 Ethernet Connector

Table 2.6: Ethernet Connector Pin Definitions

Pin	10/100/1000/2500 Mbps Signal Name
1	TX+
2	TX-
3	RX+
4	MDI2+
5	MDI2-
6	RX-
7	MDI3+

Table 2.6: Ethernet Connector Pin Definitions	
8	MDI3-

2.4.4 USB 3.2 Gen1 Connector

AIR-310 supports four USB 3.2 interfaces, which support Plug-and-Play functionality and hot swapping for up to 127 external devices. The USB interfaces comply with USB UHCI, Rev. 3.2. USB 3.2 connectors contain legacy pins to interface to USB 2.0 devices and a new set of pins for USB 3.2 connectivity.

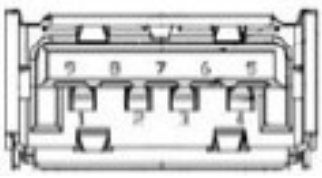


Figure 2.7 USB 3.2 Connector

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

2.4.5 Audio Connector

AIR-310 features one phone jack connector that supports stereo Line-Out and Mic-In audio ports. The audio chip is controlled by ALC888S and compliant with the Azalea standard.

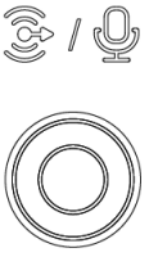


Figure 2.8 Audio Connector

2.4.6 COM Connector

AIR-310 provides two 9-pin COM connectors, which support RS232/422/485 serial communication interface ports. The default setting is RS-232, if you want to use RS-422/ 485, you can use the BIOS manual to change settings.

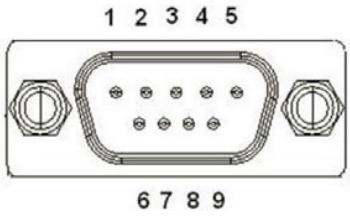


Figure 2.9 COM Connector

Table 2.8: COM Connector Pin Definitions

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

NC represents “No Connection”.

2.4.7 HDMI Connector

AIR-310 offers one integrated 19-pin receptacle connector HDMI 2.0b interface. The HDMI link supports resolutions up to 4096 x 2160 @ 60 Hz.

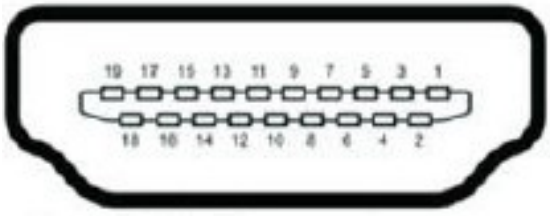


Figure 2.10 HDMI Connector

Table 2.9: HDMI Connector Pin Definitions

Pin	Signal Name
1	HDMI_TX2+
2	GND
3	HDMI_TX2-
4	HDMI_TX1+
5	GND
6	HDMI_TX1-
7	HDMI_TX0+
8	GND
9	HDMI_TX0-
10	HDMI_CLK+
11	GND
12	HDMI_CLK-
13	NC
14	NC
15	HDMI_DCLK
16	HDMI_DDAT
17	GND
18	+V5_HDMI-HPD
19	DDP0_HPD

NC represents “No Connection”.

2.4.8 DP Connector

AIR-310 offers one DP++, DP1.4a interface. The DP link supports resolutions up to 4096 x 2304 @ 60 Hz.

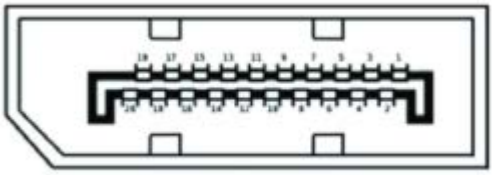


Table 2.10: DP Connector Pin Definitions

Pin	Signal Name	Pin	Signal Name
1	D0+	2	GND
3	D0-	4	D1+
5	GND	6	D1-
7	D2+	8	GND
9	D2-	10	D3+
11	GND	12	D3-
13	DP_AUX_E#	14	GND
15	AUX+	16	GND
17	AUX-	18	HPD
19	GND	20	+3.3V

2.4.9 Antenna Socket

AIR-310 reserves two antenna sockets for installing wireless device antennas. Each antenna socket is labeled “ANT” for easy identification.

Figure 2.11 Antenna Socket

2.4.10 CAN Bus Port and Pin Definitions

AIR-310 offers CAN bus port and pin definitions as shown below.

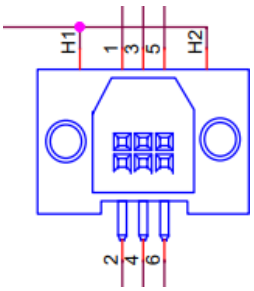


Figure 2.12 CAN Bus Port

Table 2.11: CAN Bus Port and Pin Definitions

Pin	Signal Name
1	CAN0_D-
2	CAN1_D+
3	GND
4	GND
5	CAN0_D+
6	CAN1_D-

2.4.11 DIO Connector

AIR-310 offers 16-bit DI/O with pin definitions as shown below.

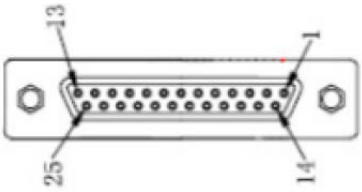


Figure 2.13 DIO Connector

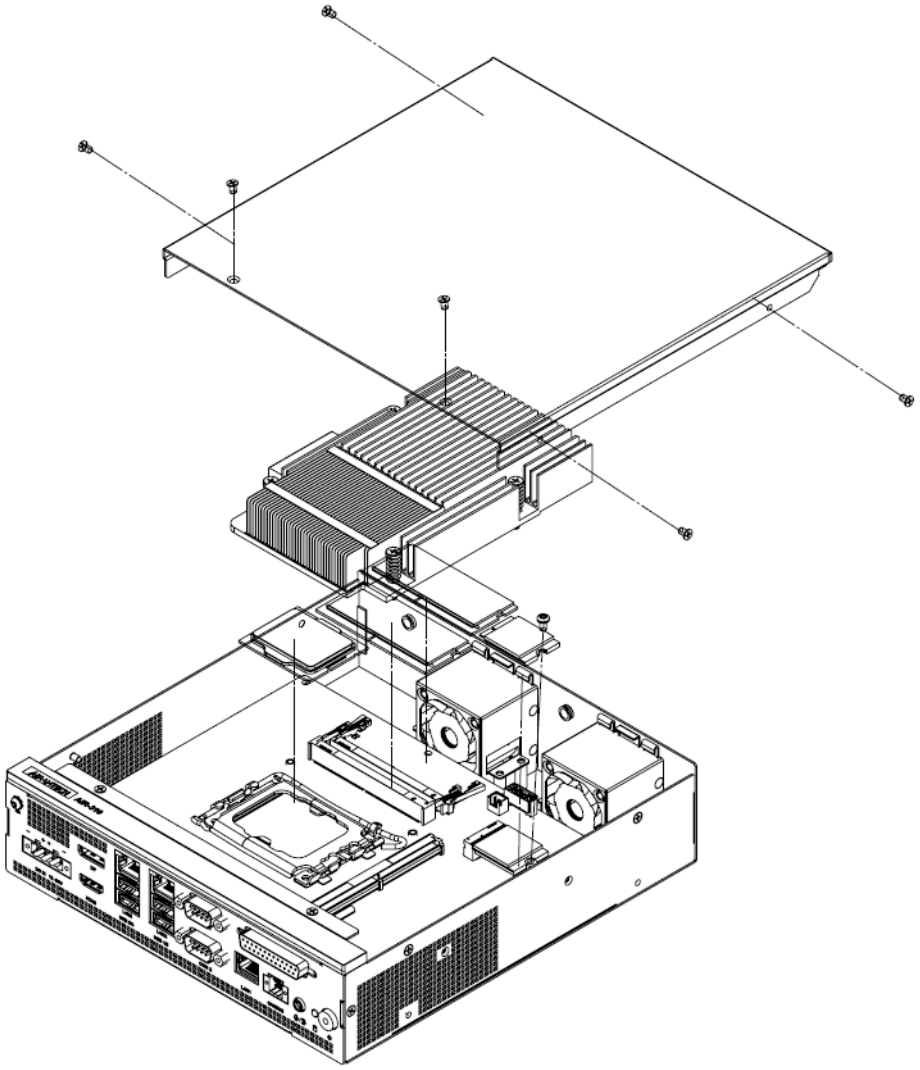
Table 2.12: DIO Port and Pin Definitions

Pin	Signal Name	Pin	Signal Name
1	GND	14	GND
2	Port0 D0	15	Port0 D8
3	Port0 D1	16	Port0 D9
4	Port0 D2	17	Port0 D10
5	Port0 D3	18	Port0 D11
6	Port0 D4	19	Port0 D12
7	Port0 D5	20	Port0 D13
8	Port0 D6	21	Port0 D14
9	Port0 D7	22	Port0 D15
10	+5V	23	+5V
11	NC	24	NC
12	NC	25	NC
13	NC		

2.5 Installation

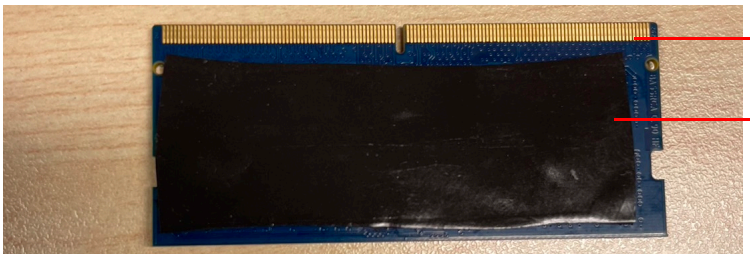
2.5.1 CPU/Memory Installation

1. Loosen the 2 screws on the top cover and 2 screws each on the right and left sides of the system. Then remove the top cover.
2. Loosen the 4 spring screws on the CPU heatsink, and remove the CPU heatsink.
3. Install the CPU(LGA1700) and memory into the system.
4. Replace the CPU heatsink and fix it in place with the 4 spring screws.
5. Replace the top cover and fix it in place with 6 screws.



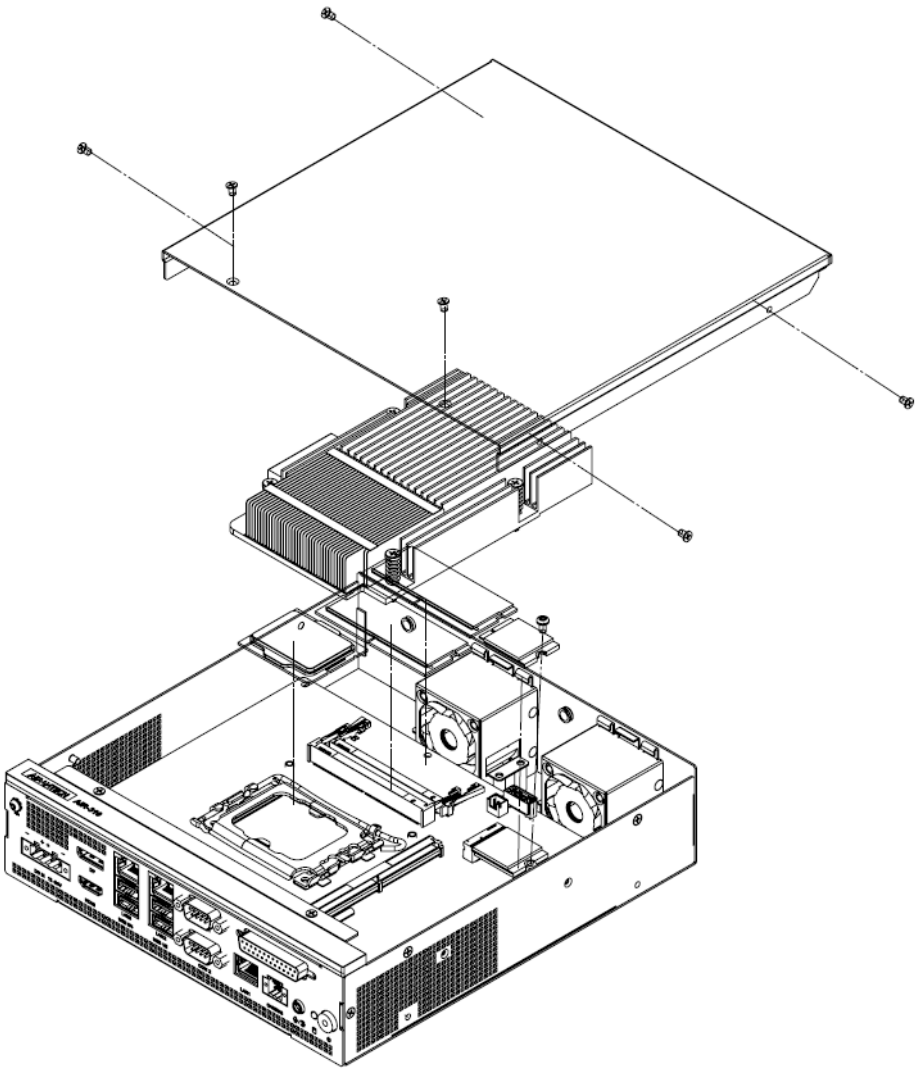
Note!

1. *Before installing the CPU, please remove the PET protective sheet from the thermal pad on the CPU heatsink.*
2. *Before installing the memory, please take the thermal pad out of the accessory box and attach it to the bottom side of the memory. (Refer to the image below)*



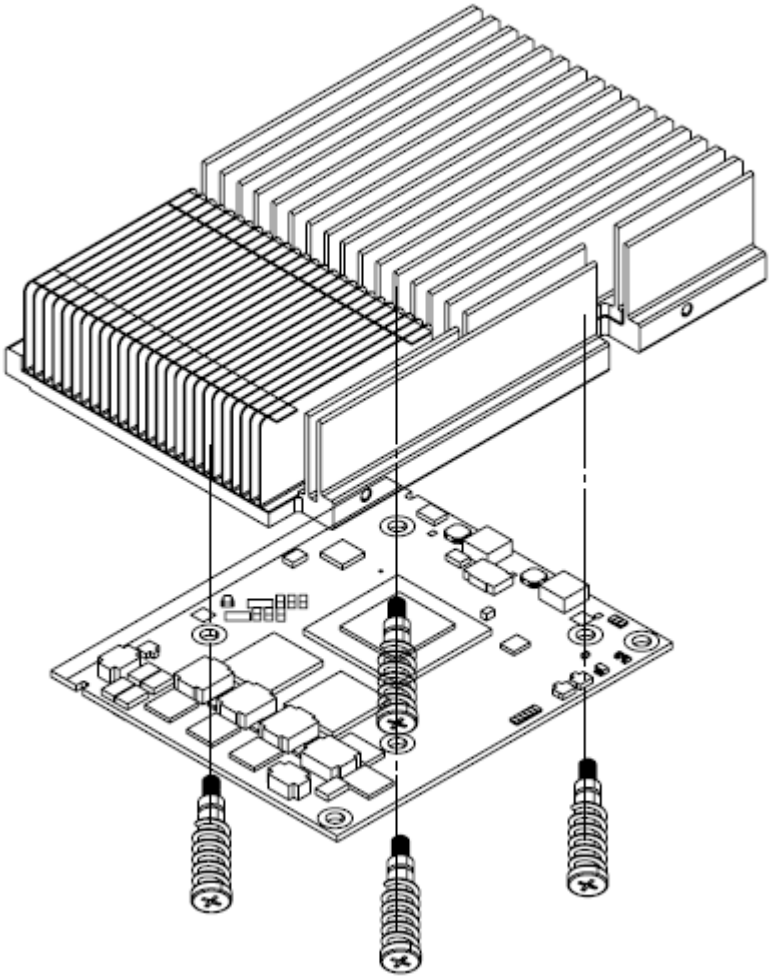
2.5.2 M.2 E-Key Installation

1. Loosen the 2 screws on the top cover and 2 screws each on the right and left sides of the system. Then remove the top cover.
2. Install the M.2 E-Key module with 1 screw (per socket).
3. Replace the top cover and fix it in place with 6 screws.



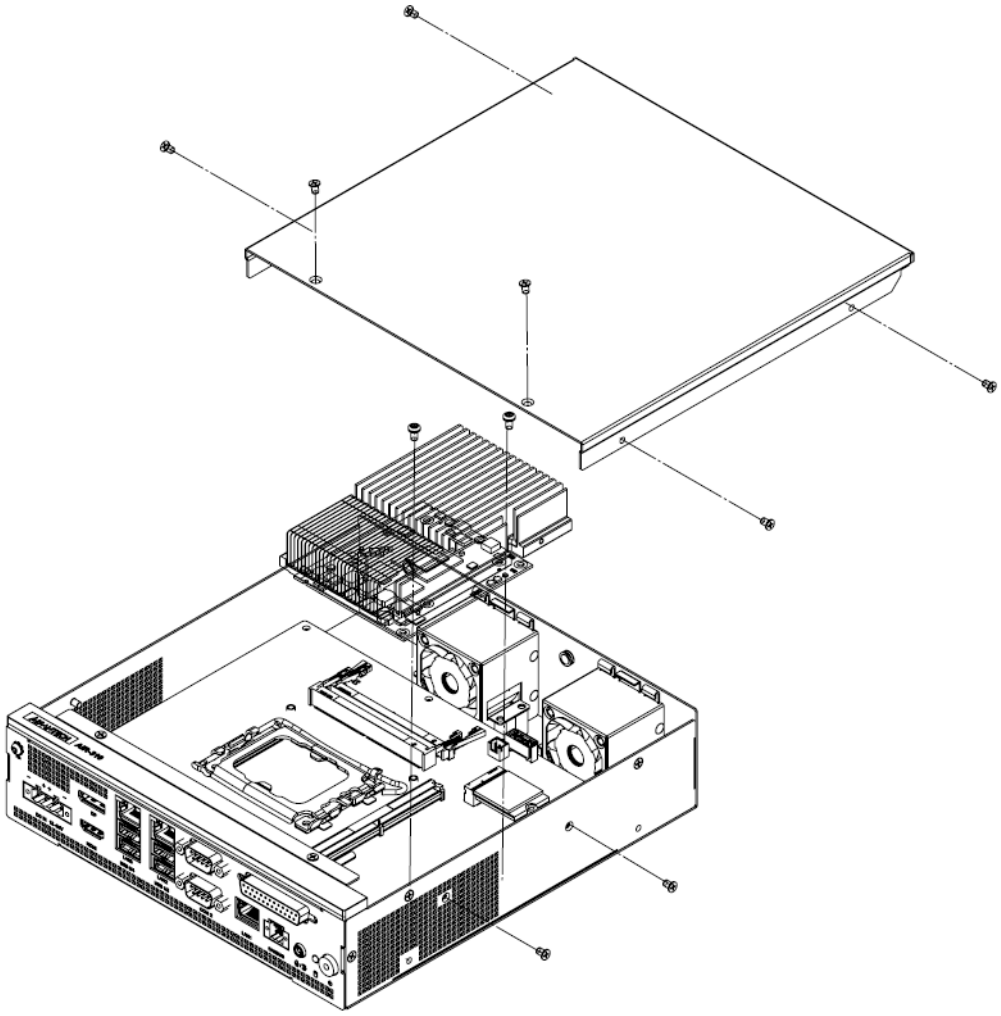
2.5.3 MXM GPU Card Installation

1. Take out the MXM GPU heatsink and 4 spring screws from the AMK-A0050 (thermal kit for the MXM GPU Card) accessory box.
2. Secure the MXM GPU card and MXM heatsink by fastening the 4 spring screws from bottom to top.



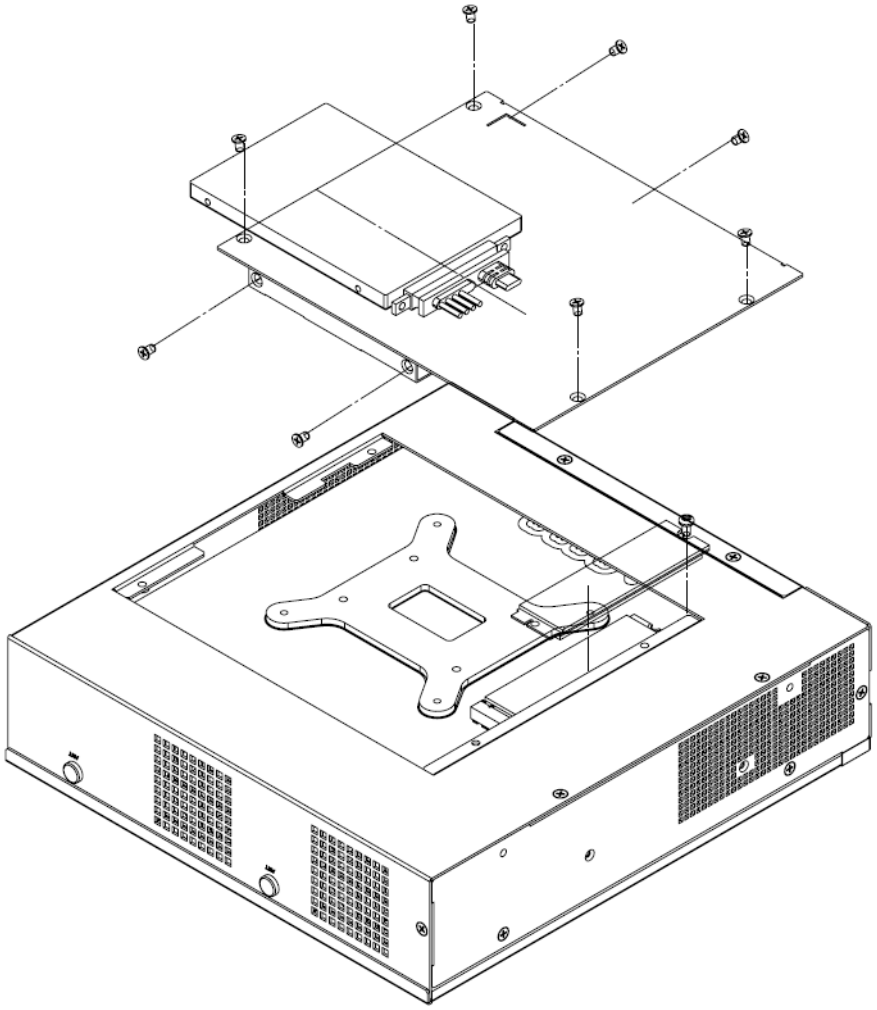
Note! *Before installing the MXM GPU Card, please remove the PET protective sheet from the thermal pad on the GPU heatsink.*

3. Loosen the 2 screws on the top cover and 2 screws each on the right and left sides of the system, and remove the top cover.
4. Insert the MXM GPU Card with the heatsink secured in advance, and fasten the MXM GPU Card to the PCBA with 2 screws.
5. From the right side of the chassis exterior, lock in 2 screws to secure the MXM GPU heatsink.
6. Replace the top cover and fix it in place with 6 screws.



2.5.4 2.5" SSD/M.2 M-Key Installation

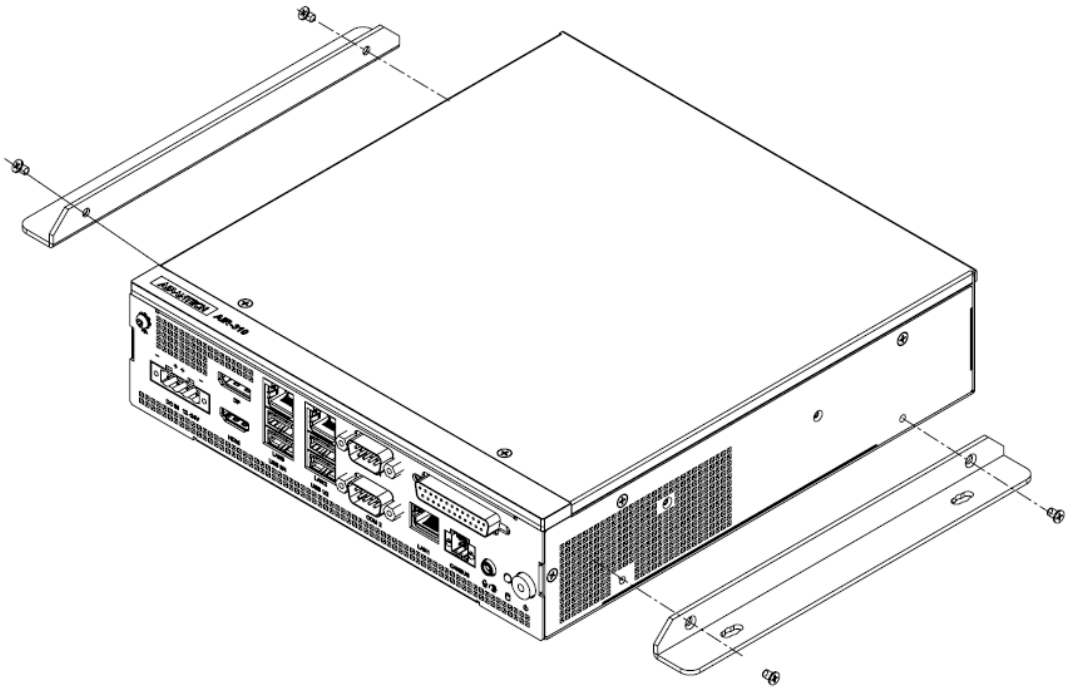
1. Loosen the 4 screws and remove the bottom plate.
2. Install the M.2 M-Key module with 1 screw (per socket).
3. For a 2.5" SATA SSD, the SATA cable is already installed on the bottom plate.
4. Insert the 2.5" SATA SSD, and fasten 2 screws each on the right and left sides to affix the SSD onto the bottom plate.
5. Replace the bottom plate and fix it in place with 4 screws.



2.5.5 Mounting Kit Installation

1. Take out the mounting kit and 4 screws (M3x5L) from the accessory box.
2. Screw in one of the 2 screws on the left and right side and attach the system horizontally. Then screw in the remaining screws.

1. Retirez le kit de montage et les 4 vis (M3x5L) de la boîte d'accessoires
2. Vissez chaque 2 vis (M3x5L) sur les côtés gauche et droit et fixez le système horizontalement.

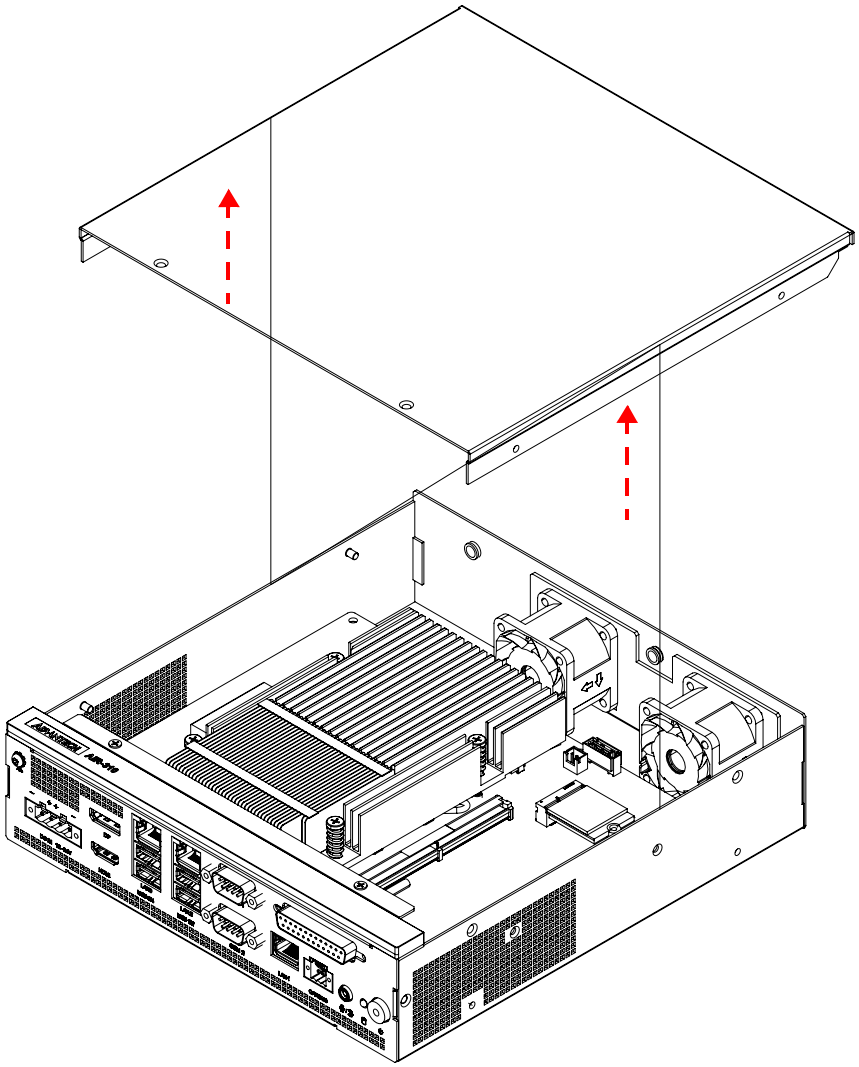


2.5.6 Wide Operating Temperature Support

To make sure the system works well under 0°C (32°F) or over 40°C (104°F), please ensure your peripherals are I-grade. These support wide temperature operation.

2.5.7 Removing the Top Cover

Please be careful when opening the top cover. Lift it straight up from both sides at the same time to avoid scratching or deforming the rear panel of the case.

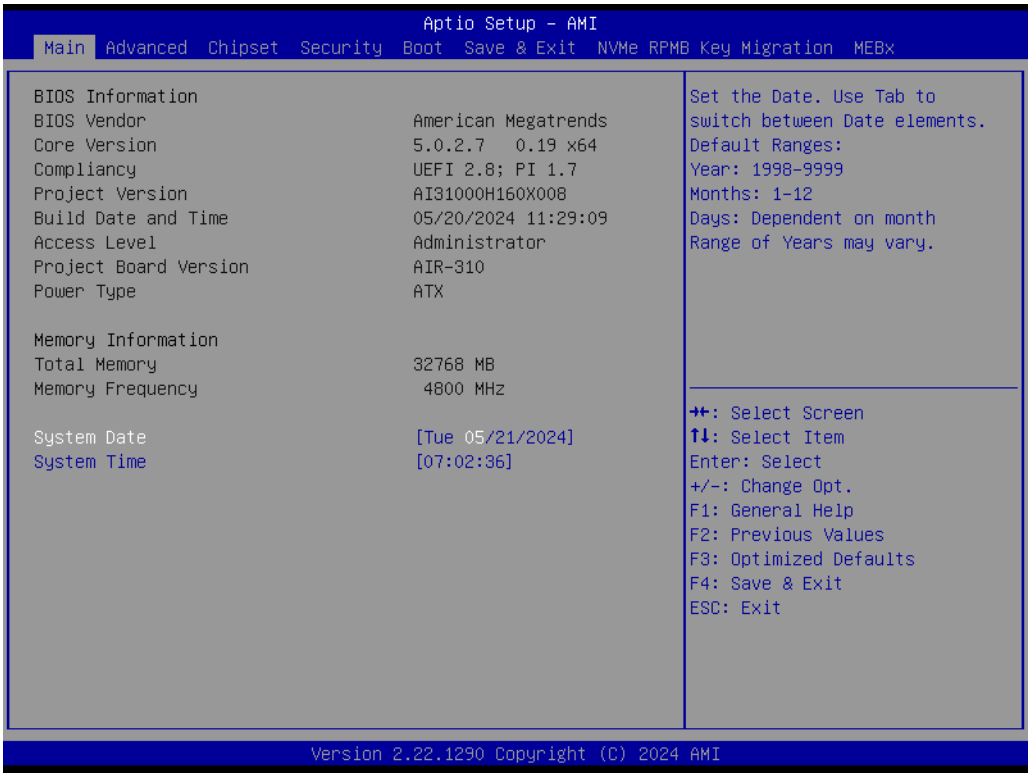


Chapter 3

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-310 BIOS setup screens.



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

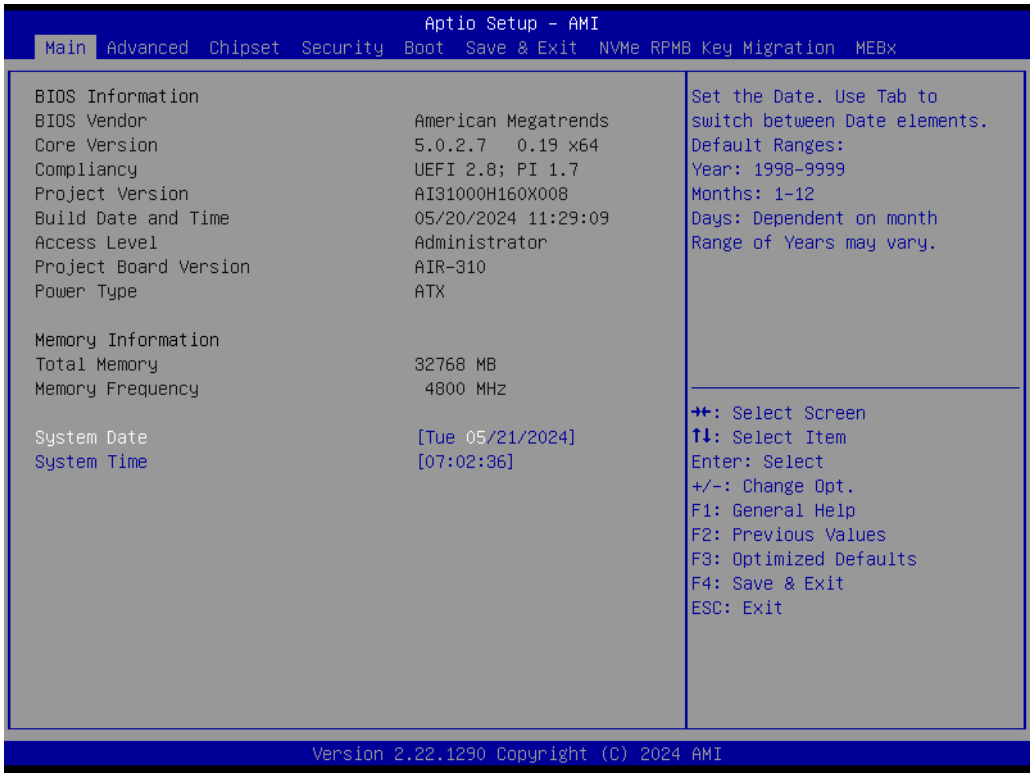
3.2 Entering Setup

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

3.2.1 Main Setup

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

Users can always return to the Main setup screen by selecting the Main tab. There are two Main Setup options. They are described in this section. The Main BIOS Setup screen is shown below.



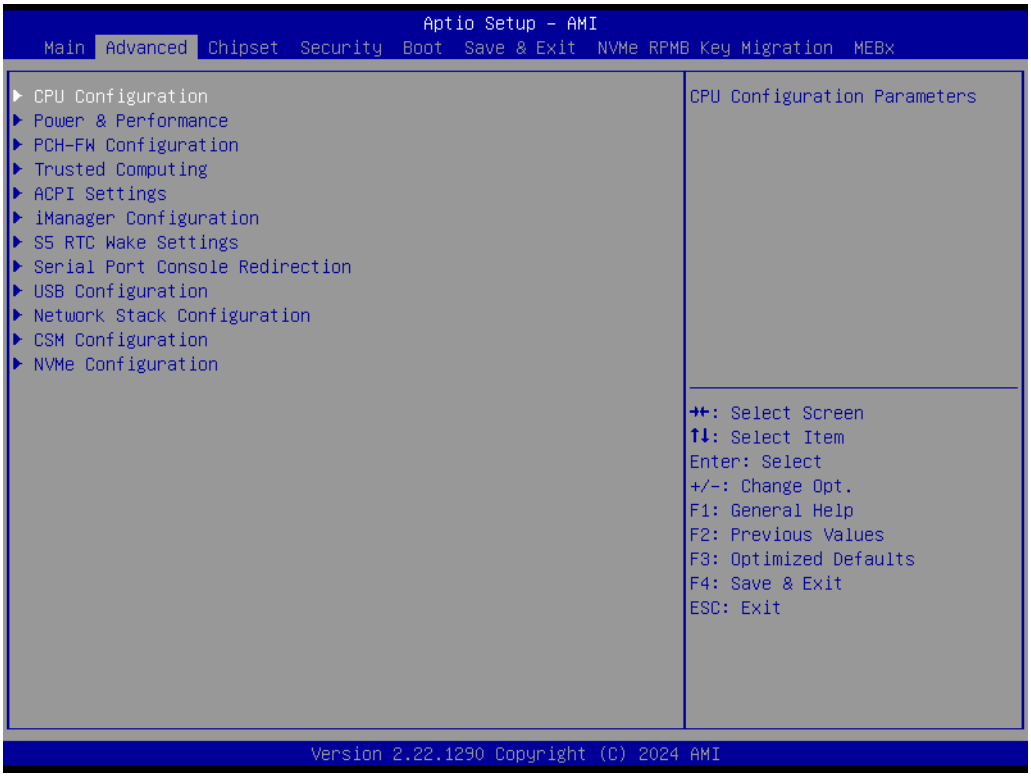
The Main BIOS setup screen has two main frames. The left frame displays all the options that can be configured. Grayed-out options cannot be configured; options in blue can. The right frame displays the key legend. Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it.

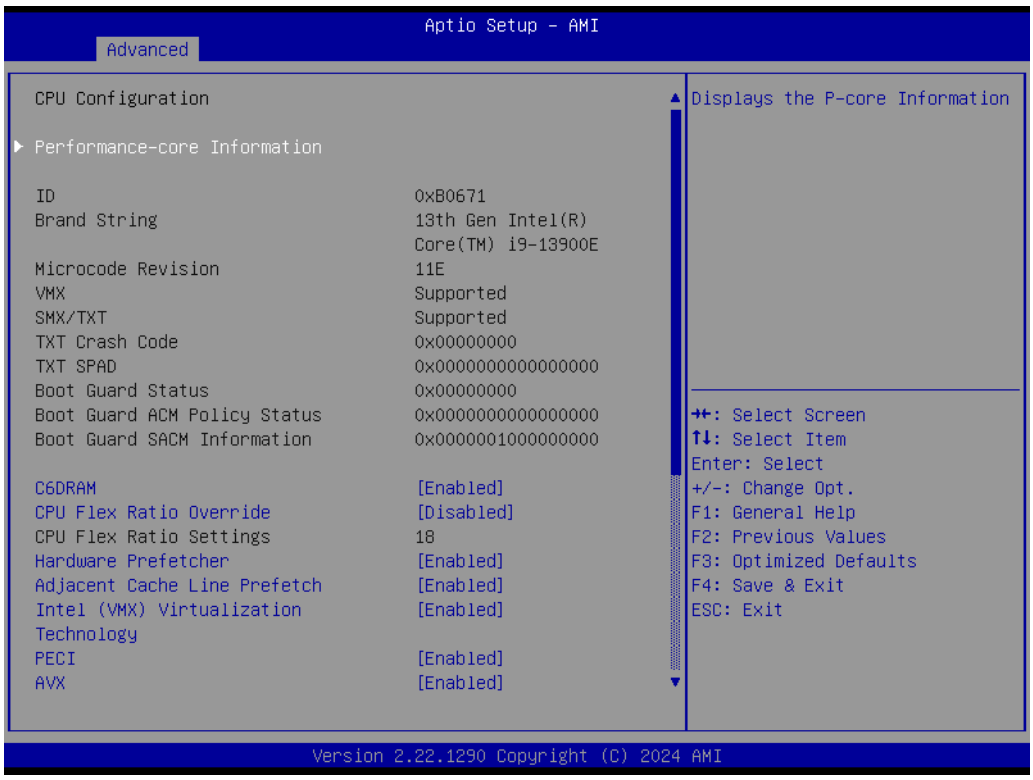
- **System Time / System Date**
  Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time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

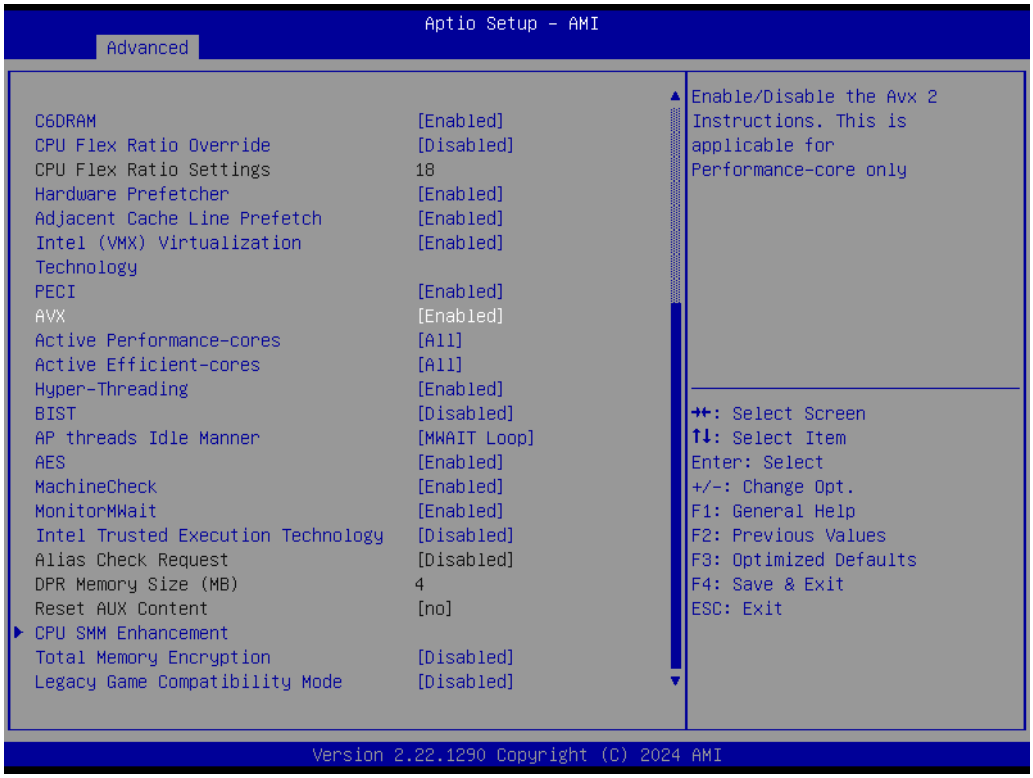
3.2.2 Advanced BIOS Features Setup

Select the Advanced tab from the AIR-310 setup screen to enter the Advanced BIOS Setup screen. Users can select any item in the left frame of the screen, such as CPU configuration, to go to the sub-menu for that item. Users can display an Advanced BIOS Setup option by highlighting it using the <Arrow> keys. All Advanced BIOS Setup options are described in this section. The Advanced BIOS Setup screens are shown below. The sub-menus are described on the following pages.

3.2.2.1 CPU Configuration

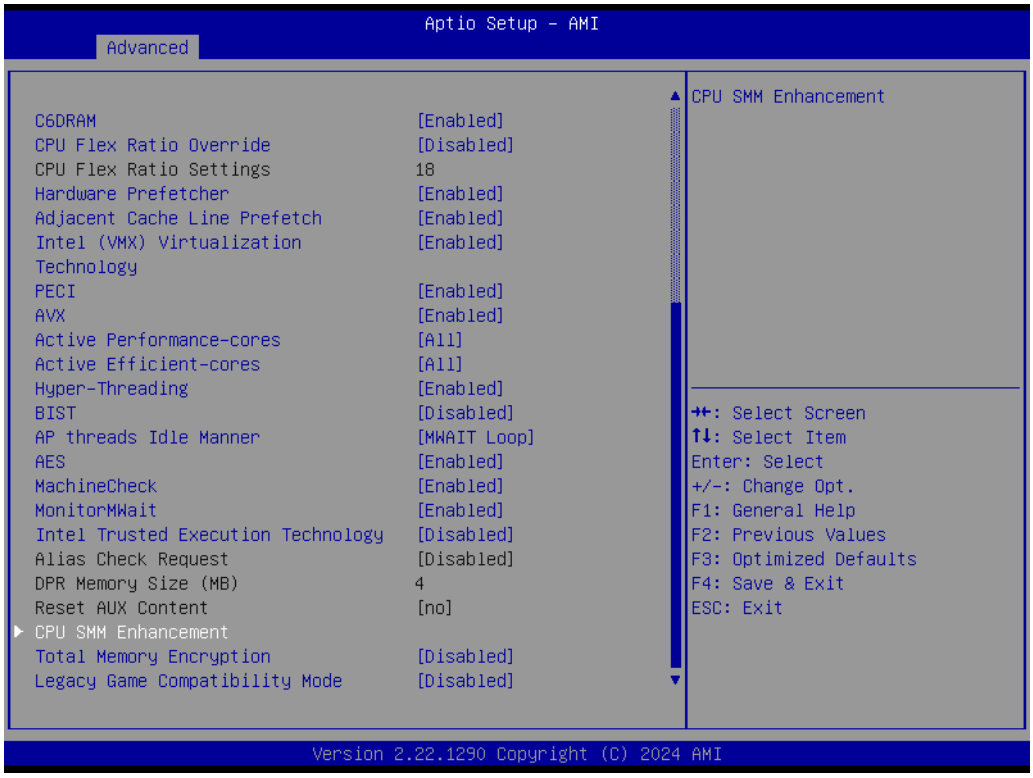


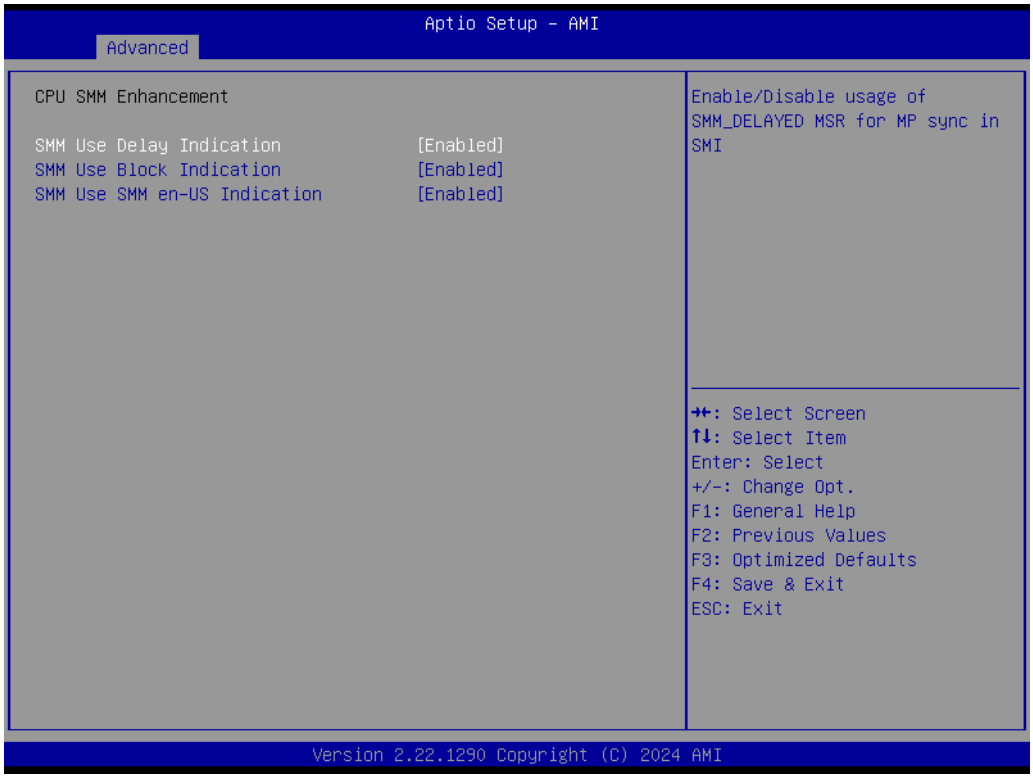




- **Performance-core Information**
  Displays the P-core Information.
- **C6DRAM**
  Enable/Disable moving of DRAM contents to PRM memory when the CPU is in C6 state.
- **CPU Flex Ratio Override**
  Enable/Disable CPU Flex Ratio Programming.

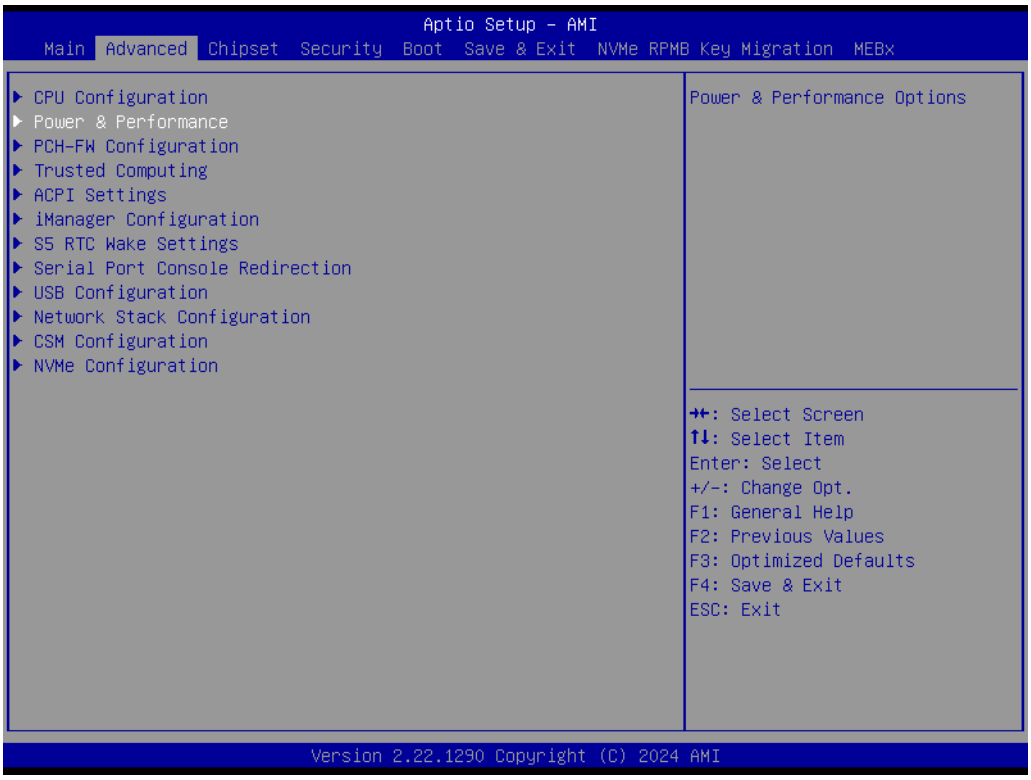
- **CPU Flex Ratio Settings**
  This value must be between the Max Efficiency Ratio (LFM) and the Maximum non-turbo ratio set by hardware (HFM).
- **Hardware Prefetcher**
  To turn on/off the MLC streamer prefetcher.
- **Adjacent Cache Line Prefetch**
  To turn on/off prefetching of adjacent cache lines.
- **Intel (VMX) Virtualization Technology**
  When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.
- **PECI**
  Enable/Disable PECI.
- **AVX**
  Enable/Disable the Avx 2 Instructions. This is applicable for Performance-core only.
- **Active Performance-Cores**
  Number of cores to enable in each processor package.
- **Active Efficient-cores**
  Enable/Disable Per Core Disable. When Per Core Disable Configuration is enabled, selection of Active Cores and Active Efficient-cores will be disabled.
- **Hyper-Threading**
  Enable or Disable Hyper-Threading Technology.
- **BIST**
  Enable/Disable BIST (Built-in Self Test) on reset.
- **AP threads Idle Manner**
  AP threads Idle Manner for waiting signal to run.
- **AES**
  Enable/Disable AES. (Advanced Encryption Standard)
- **MachineCheck**
  Enable/Disable Machine Check.
- **MonitorMWait**
  Enable/Disable MonitorMWait. If Disabled, the AP threads Idle Manner should not be set to MWAIT Loop.
- **Intel Trusted Execution Technology**
  Enables utilization of additional hardware capabilities provided by Intel® Trusted Execution Technology.
- **Alias Check Request**
  Enables Txt Alias Checking capability.
- **DPR memory size (MB)**
  Reserve DPR memory size (0-255) MB.
- **Reset AUX Content**
  Reset TPM Aux content. Txt may not functional after AUX content gets reset.
- **Total Memory Encryption**
  Configure Total Memory Encryption (TME) to protect DRAM data from physical attacks.
- **Legacy Game Compatibility Mode**
  When enabled, pressing the scroll lock key will toggle the Efficient-cores between being parked when the Scroll Lock LED is on and un-parked when the LED is off.

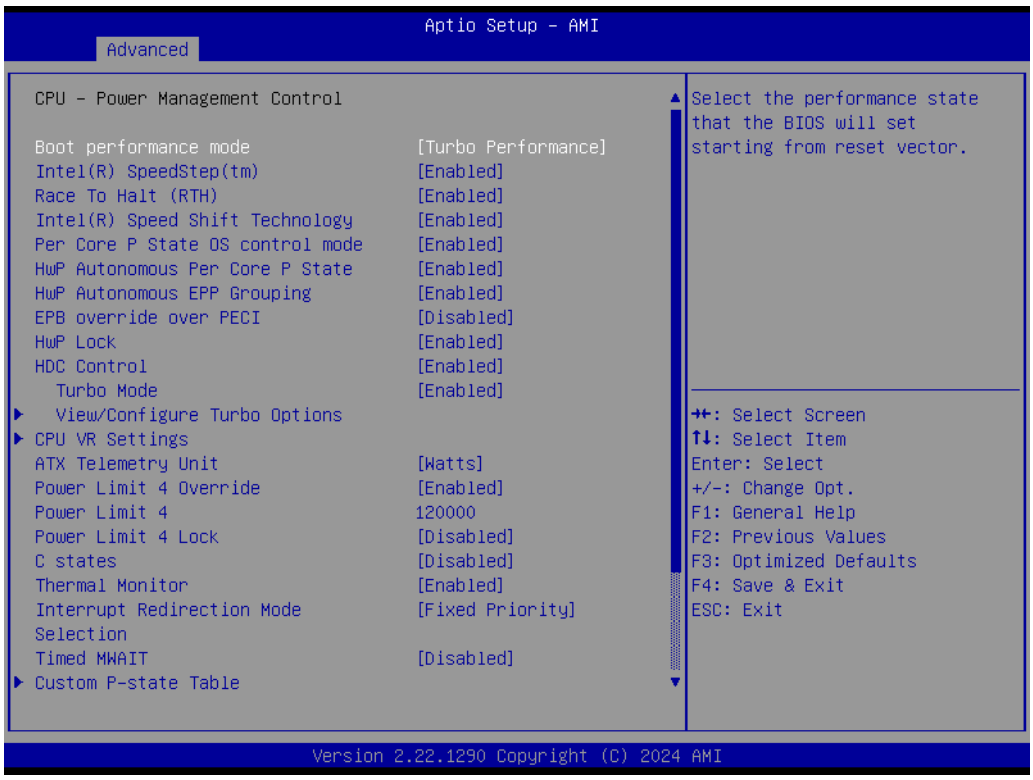


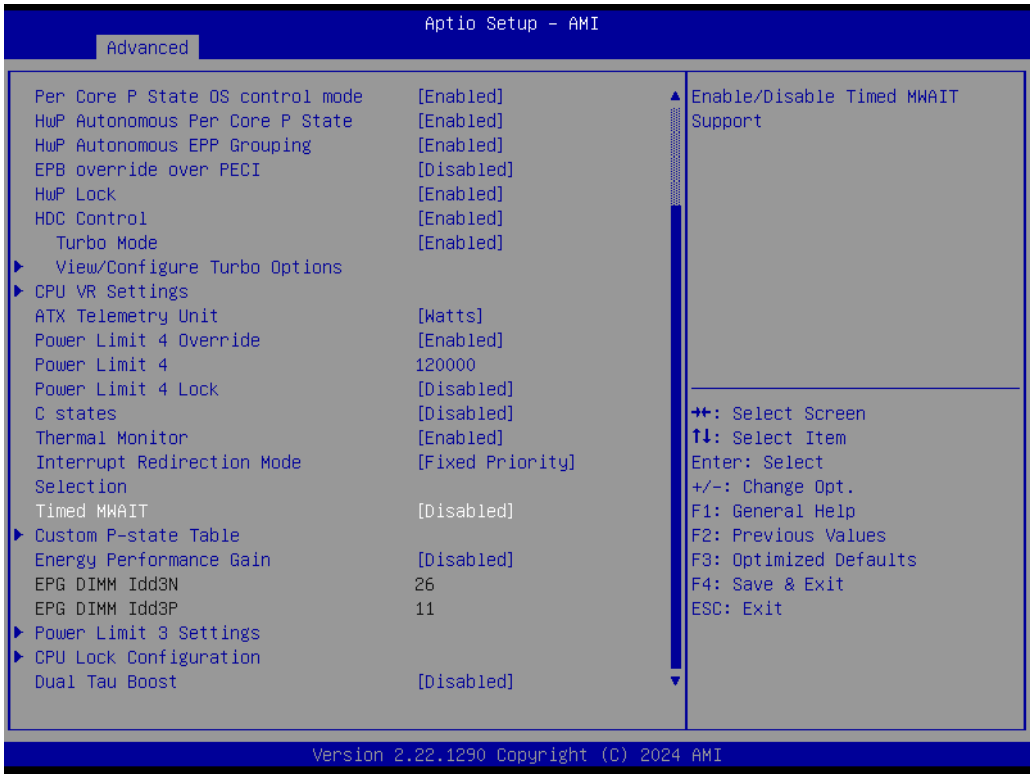


- **SMM Use Delay Indication**
  Enable/Disable usage of SMM_DELAYED MSR for MP sync in SMI.
- **SMM Use Block Indication**
  Enable/Disable usage of SMM_BLOCKED MSR for MP sync in SMI.
- **SMM Use en-US Indication**
  Enable/Disable usage of SMM_ENABLE MSR for MP sync in SMI.

3.2.2.2 Power and Performance – CPU Power Management Control



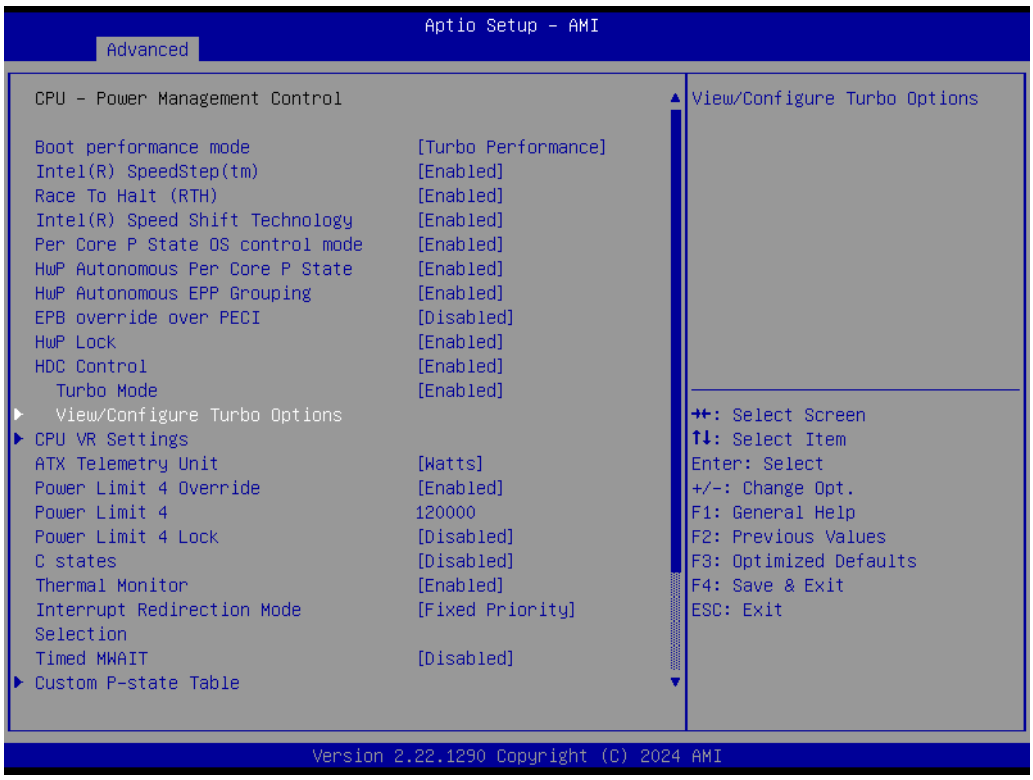


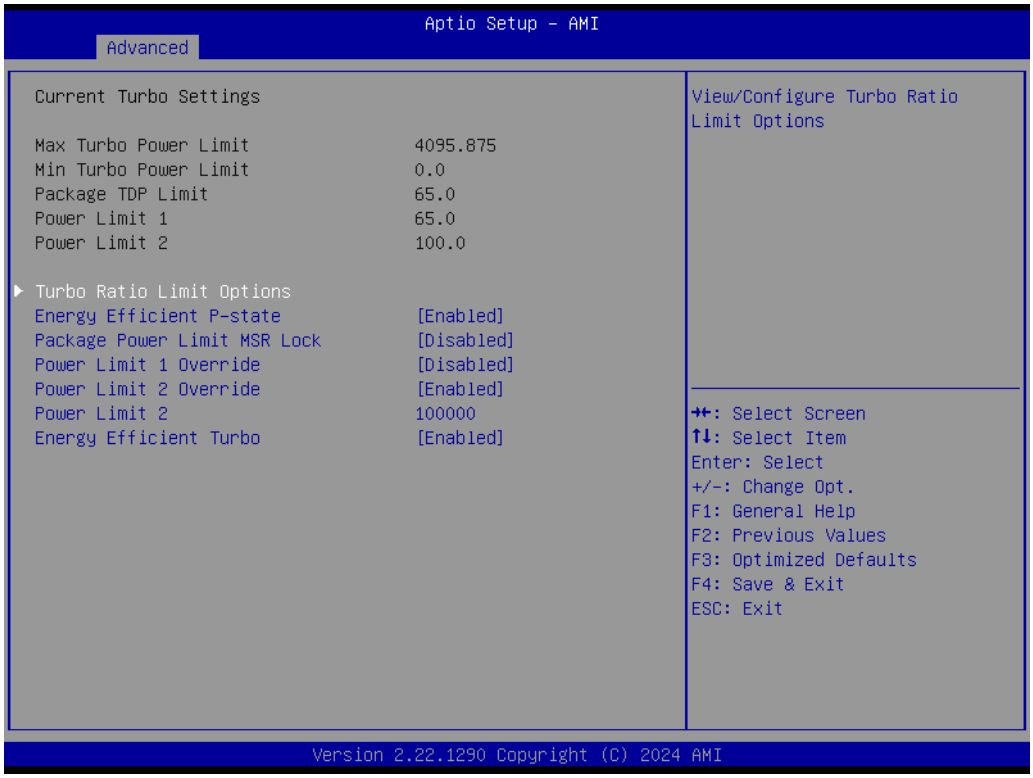


- **Boot Performance**
  Select the performance state that the BIOS will set before OS hand-off.
- **Intel® Speedstep™**
  Allows more than two frequency ranges to be supported.
- **Race to Halt (RTH)**
  Enable/Disable the Race To Halt feature. RTH will dynamically increase CPU

frequency in order to enter pkg C-State faster to reduce overall power. (RTH is controlled through MSR 1FC bit 20)

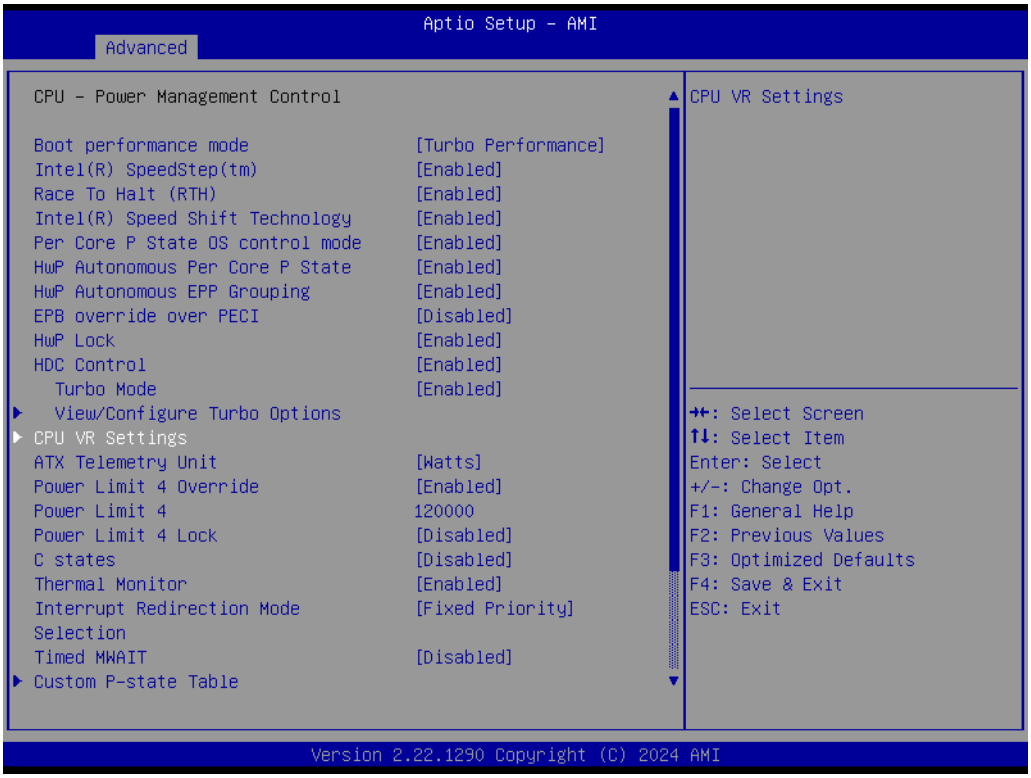
- **Intel® Speed Shift Technology**
  Enable/Disable Intel® Speed Shift Technology support. Enabling will expose the CPPC v2 interface to allow for hardware controlled P-states.
- **Per core P state OS control mode**
  Enable/Disable Per Core P state OS control mode. Disabling will set Bit 31 = 1 command 0x06. When set, the highest core request is used for all other core requests.
- **Hwp Autonomous Per core P state**
  Disable Autonomous PCPS (Bit 30 = 1, command 0x11) Autonomous will request the same value for all cores all the time. Enable PCPS (default Bit 30 = 0, command 0x11)
- **Hwp Autonomous EPP grouping**
  Enable EPP grouping (default Bit 29 =0, command 0x11). Autonomous will request the same values for all cores with the same EPP. Disable EPP grouping (Bit 29 =1, command 0x11) autonomous will not necessarily request the same values for all cores with the same EPP.
- **EPB override over PECI**
  Enable/Disable EPB override over PECI. Enable by sending pcode command 0x2b, subcommand 0x3 to 1. This will allow OOB EPB PECI override control.
- **HWP Lock**
  Enable/Disable HWP Lock support in Misc Power Management MSR.
- **HDC Control**
  This option allows HDC configuration.
- **Turbo Mode**
  Enable/Disable processor Turbo Mode (requires Intel Speed Step or Intel Speed Shift to be available and enabled).
- **ATX Telemetry Unit**
  ATX Telemetry Unit in Watts or Percentage.
- **Power Limit 4 Override**
  Enable/Disable Power Limit 4 override.
- **Power Limit 4**
  Power Limit 4 in milliwatts.
- **Power Limit 4 Lock**
  Power Limit 4 MSR 601h Lock. When enabled PL4 configurations are locked during OS. When disabled PL4 configuration can be changed during OS.
- **C states**
  Enable/Disable CPU Power Management.
- **Thermal Monitor**
  Enable/Disable Thermal Monitor.
- **Interrupt Redirection Mode Selection**
  Interrupt Redirection Mode Select for Logical Interrupts.
- **Timed MWAIT**
  Enable/Disable Timed MWAIT Support.
- **Energy Performance Gain**
  Enable/disable Energy Performance Gain.
- **Dual Tau Boost**
  Enable Dual Tau Boost feature. This is only applicable for Desktop 35W/65W/125W SKU. When DPTF is enabled this feature is ignored.

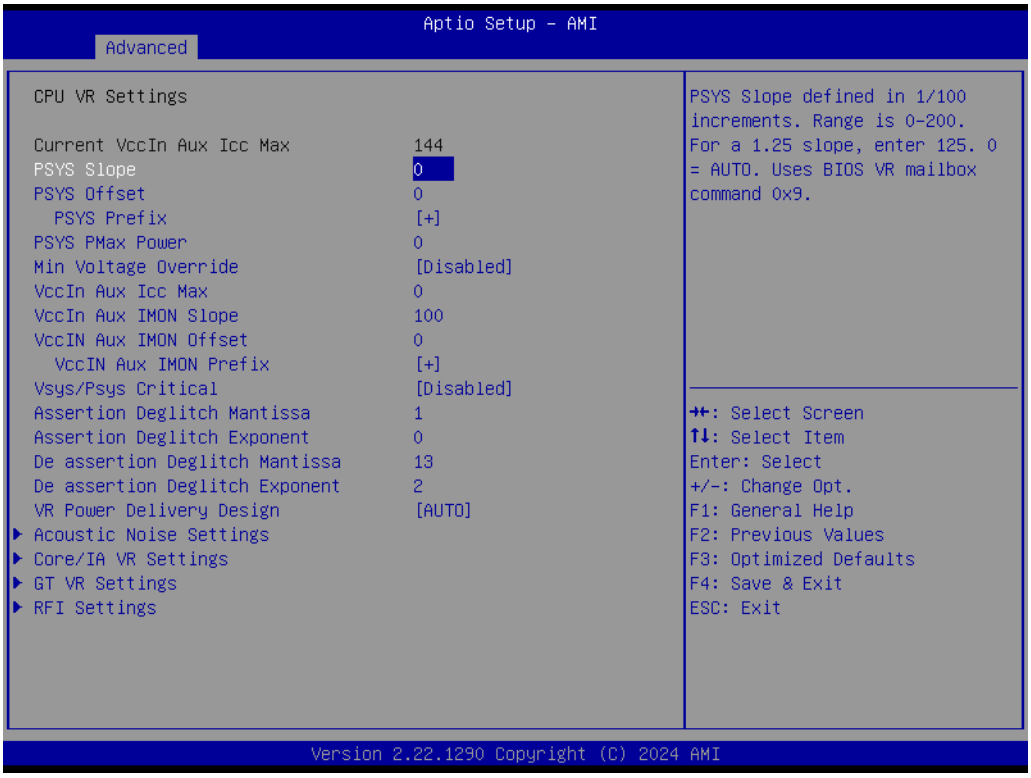




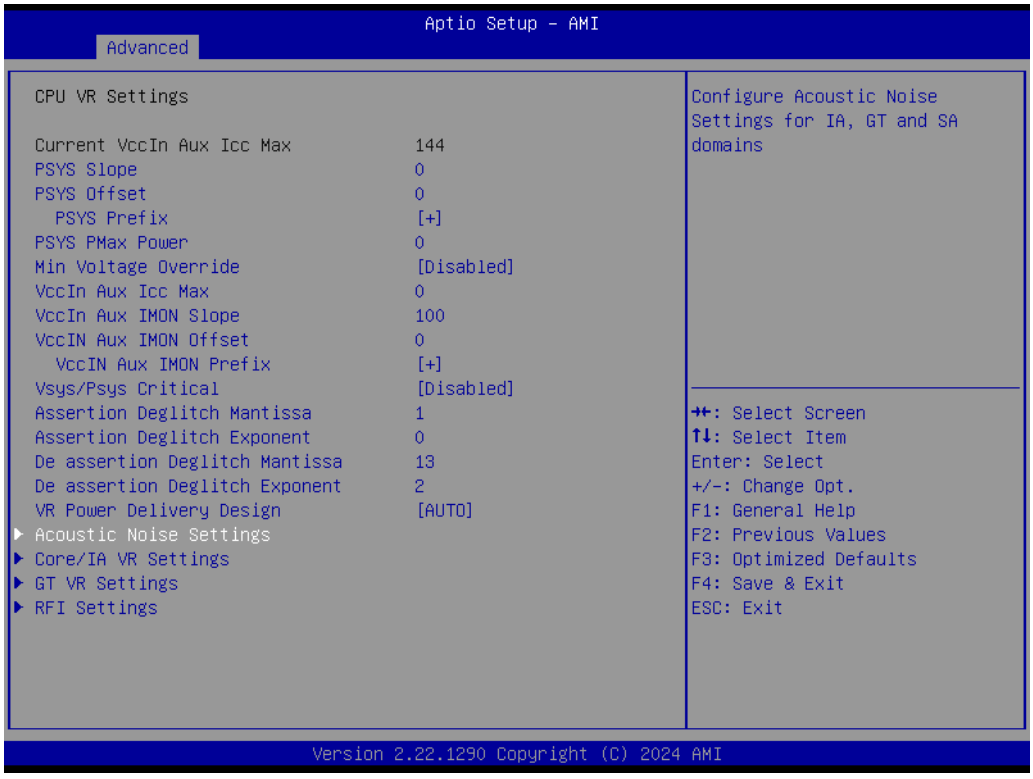
- **Energy Efficient P-state**
  Enable/Disable Energy Efficient P-state feature.
- **Package Power Limit MSR Lock**
  Enable/Disable locking of Package Power Limit settings.
- **Power Limit 1 Override**
  Enable/Disable Power Limit 1 override.

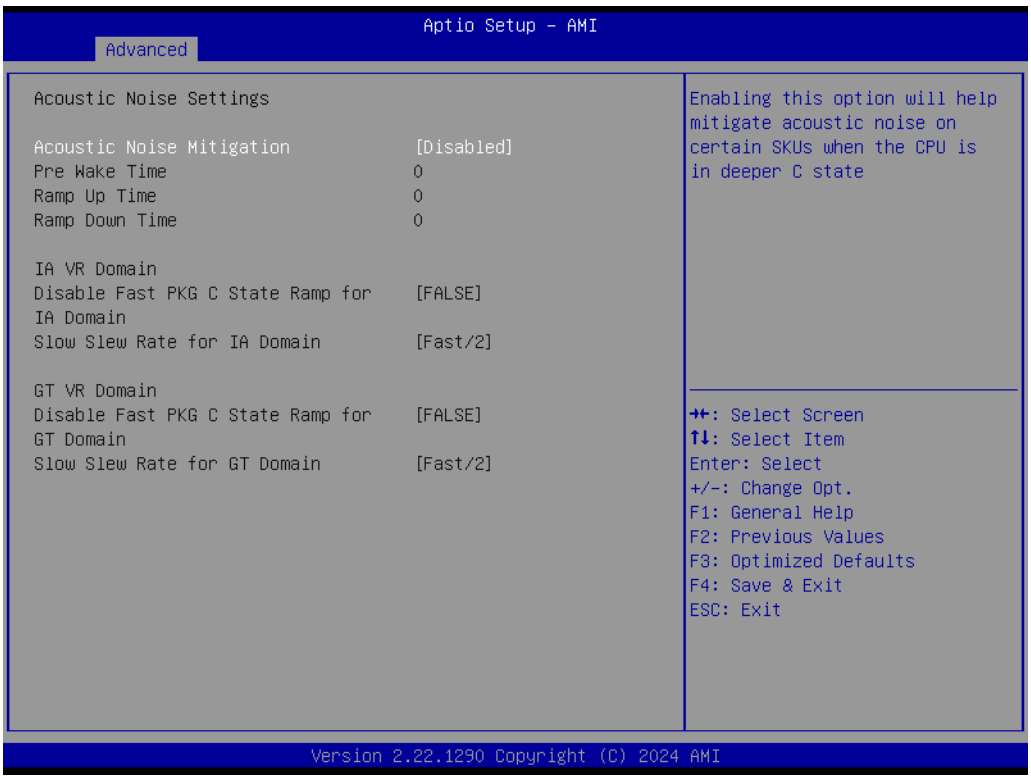
- **Power Limit 2 Override**
  Enable/Disable Power Limit 2 override.
- **Power Limit 2**
  Power Limit 2 value in milliwatts.
- **Energy Efficient Turbo**
  Enable/Disable Energy Efficient Turbo Feature. This feature will opportunistically lower the turbo frequency to increase efficiency.





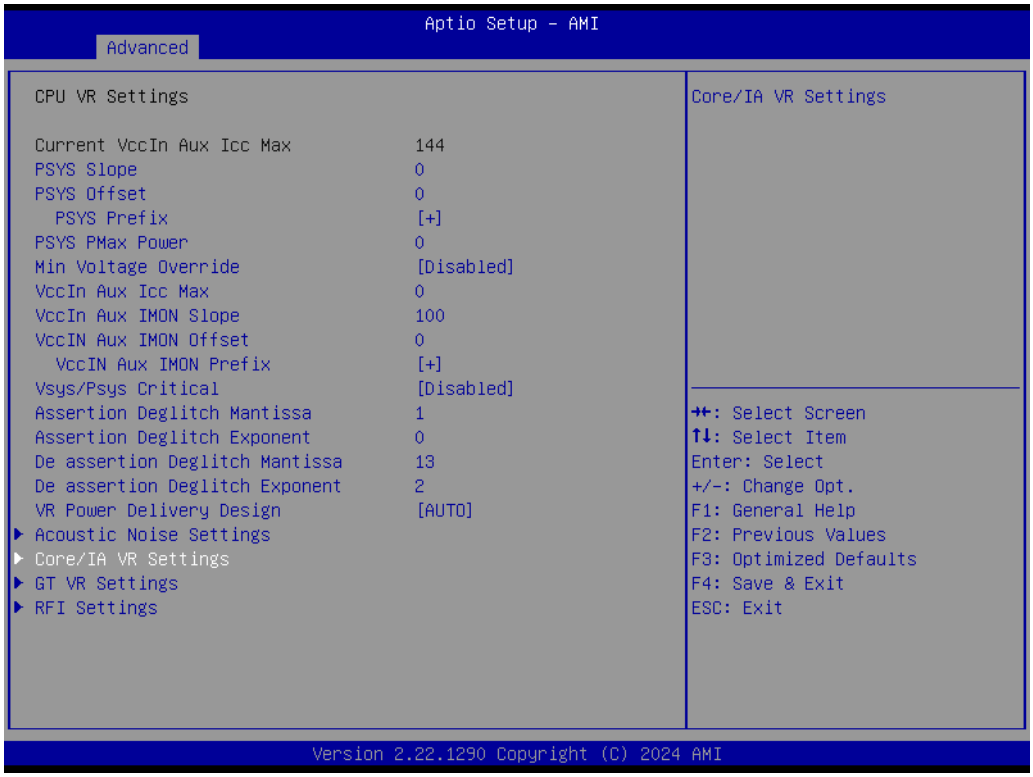
- **PSYS prefix**
  Sets the offset value as positive or negative.
- **PSYS PMax Power**
  PSYS PMax power, defined in 1/8-Watt increments. Range 0-8191. For a PMax of 125W, enter 1000. 0 = AUTO. Uses BIOS VR mailbox command 0xB.
- **Min Voltage Override**
  Min Voltage Override. Enable to override minimum voltage for runtime and for C8.
- **VccIn Aux Icc Max**
  Sets the Max Icc VccIn Aux value defined in 1/4A increments. Range is 0-512. For an IccMax 32A, enter 128(32*4).
- **VccIn Aux IMON Slope**
  VccIN Aux IMON Slope defined in 1/100 increments. Range is 0-200. For a 1.25 slope, enter 125. 0 = AUTO. Uses BIOS VR mailbox command 0x18.
- **VccIn Aux IMON Offset**
  VccIN Aux IMON Offset defined in 1/1000 increments. Range is 0-63999. For an offset of 25.348, enter 25348. IMON Uses BIOS VR mailbox command 0x18.
- **VccIN Aux IMON Prefix**
  Sets the offset value as positive or negative.
- **Vsys Critical**
  Vsys Critical Enable or disable.
- **VR Power Delivery Design**
  This specifies the ADL Desktop board design used for the VR settings override values. By default, the BIOS will override the default Desktop VR settings based on the board design. A value of AUTO(0) will use the board ID to determine the board design. Any other value will override the board ID logic to provide a custom VR Power Delivery Design value. This is intended primarily for validation.

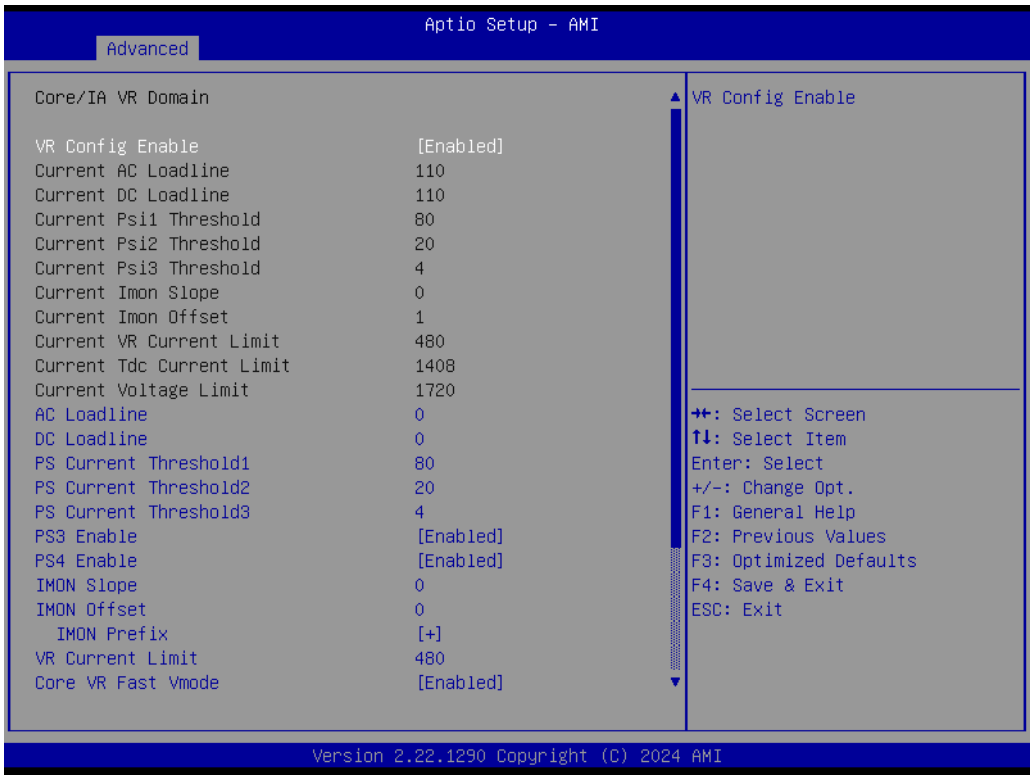


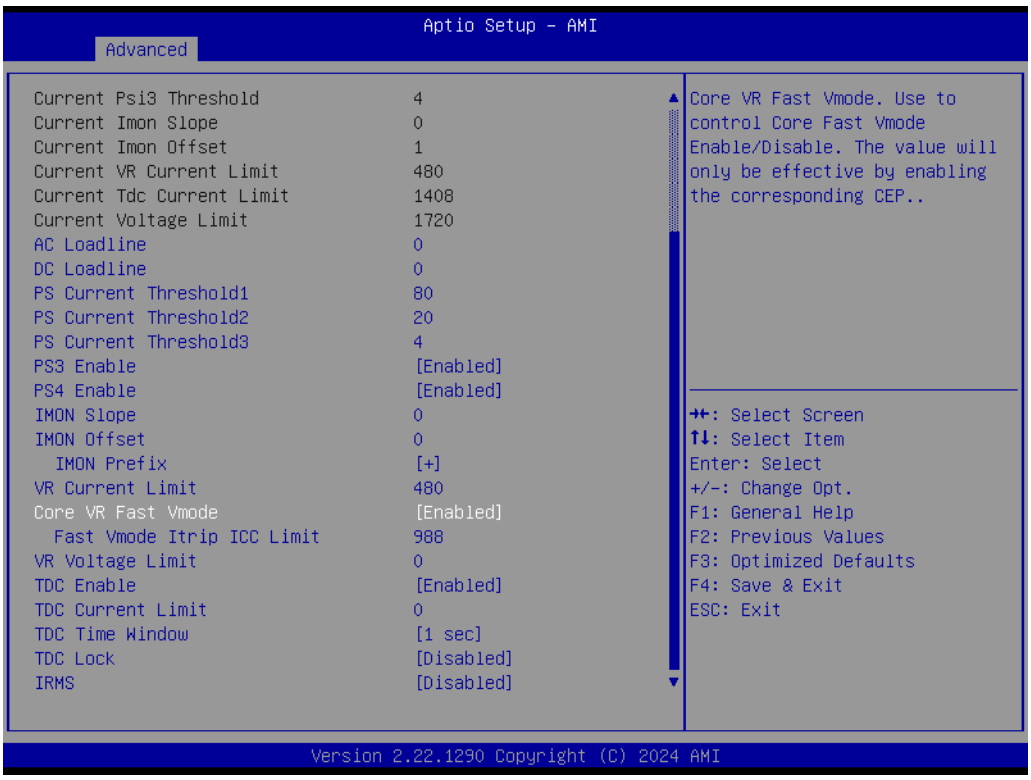


- **Acoustic Noise Mitigation**
  Enabling this option will help mitigate acoustic noise on certain SKUs when the CPU is in a deeper C state.
- **Pre Wake time**
  Set the maximum Pre Wake randomization time in micro ticks. Range is 0-255. This is for acoustic noise mitigation Dynamic Periodicity Alteration (DPA) tuning.
- **Ramp Up Time**
  Set the maximum Ramp Up randomization time in micro ticks. The range is 0-255. This is for acoustic noise mitigation Dynamic Periodicity Alteration (DPA) tuning.
- **Ramp Down Time**
  Set the maximum Ramp Down randomization time in micro ticks. The range is 0-255. This is for acoustic noise mitigation Dynamic Periodicity Alteration (DPA) tuning.
- **Disable Fast PKG C State Ramp for IA Domain**
  This option needs to be configured to reduce acoustic noise during deeper C states. False: Don't disable Fast ramp during deeper C states; True: Disable Fast ramp during deeper C states.
- **Slow Slew Rate for IA Domain**
  Set VR IA Slow Slew Rate for Deep Package C State ramp time; Slow slew rate equals to Fast divided by number, the number is 2, 4, 8, 16 to slow down the slew rate to help minimize acoustic noise
- **Disable Fast PKG C State Ramp for GT Domain**
  This option needs to be configured to reduce acoustic noise during deeper C states. False: Don't disable Fast ramp during deeper C states; True: Disable Fast ramp during deeper C states.
- **Slow Slew Rate for GT Domain**
  Set VR GT Slow Slew Rate for Deep Package C State ramp time; Slow slew

rate equals to Fast divided by number, the number is 2, 4, 8 to slow down the slew rate to help minimize acoustic noise; divide by 16 is disabled.

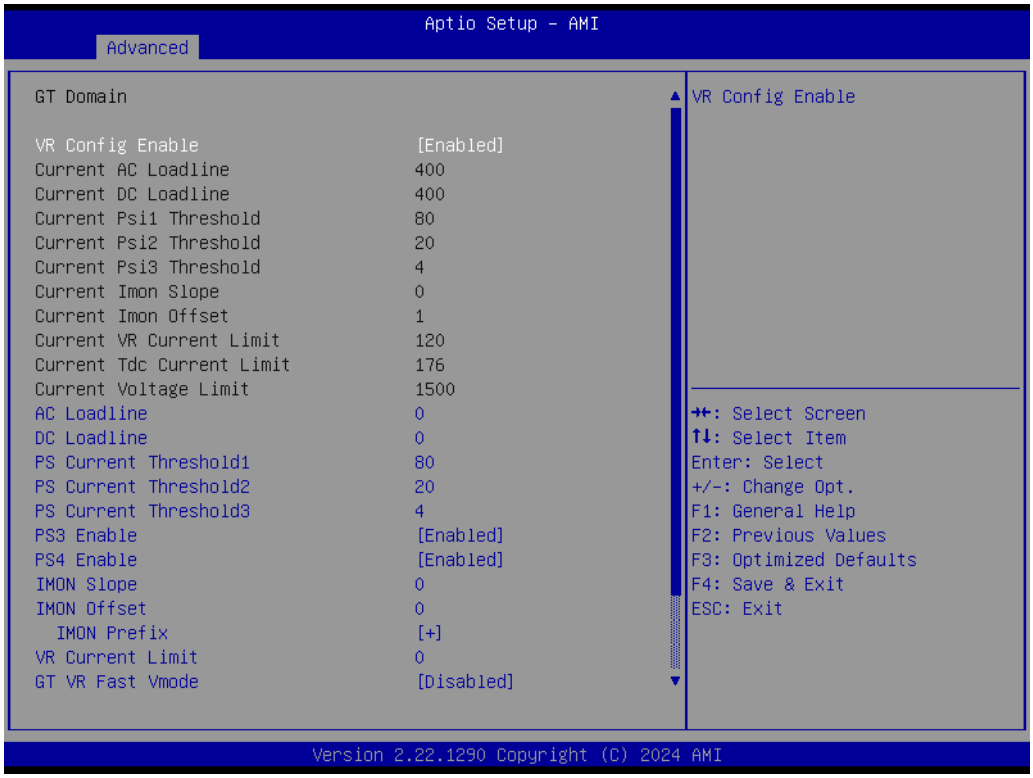


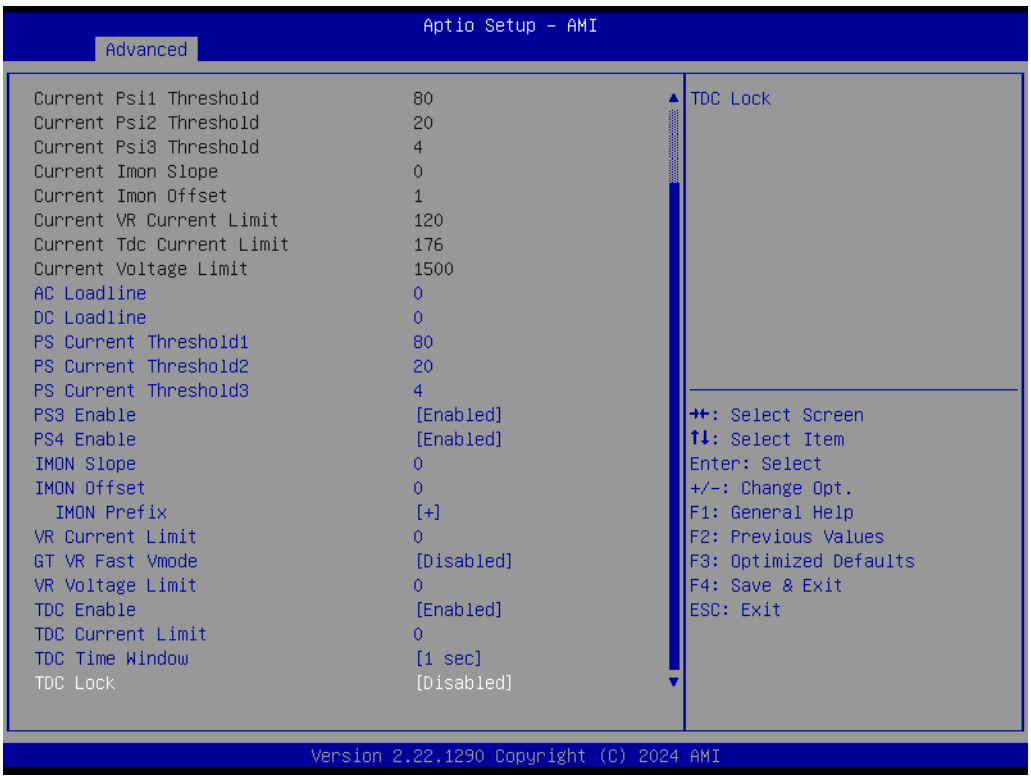




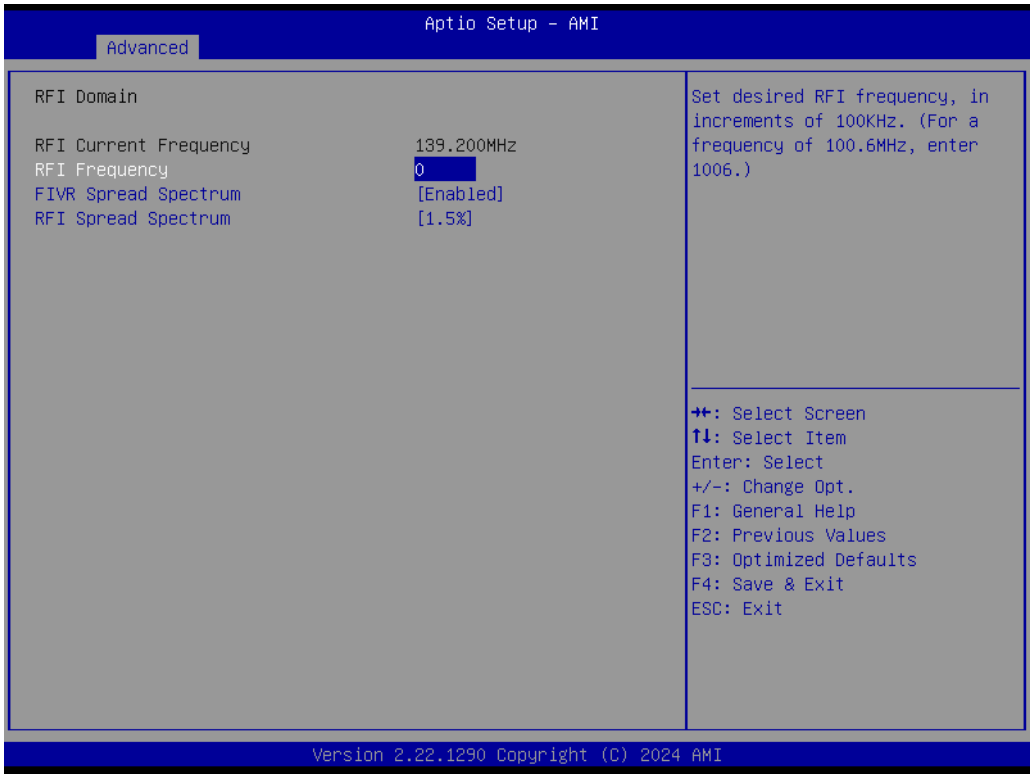
- **VR Config Enable**
  VR Config Enable
- **PS3 Enable**
  PS3 Enable/Disable. 0 - Disabled, 1 - Enabled. Uses BIOS VR mailbox command 0x3.
- **PS4 Enable**
  PS4 Enable/Disable. 0 - Disabled, 1 - Enabled. Uses BIOS VR mailbox command 0x3.
- **IMON Prefix**
  Sets the offset value as positive or negative.
- **Core VR Fast Vmode**
  Core VR fast mode. Use to control Core fast Vmode enable/disable. The value will only be effective by enabling the corresponding CEP.


Aptio Setup – AMI
Advanced
CPU VR Settings
Current VccIn Aux Icc Max 144
PSYS Slope 0
PSYS Offset 0
PSYS Prefix [+]
PSYS PMax Power 0
Min Voltage Override [Disabled]
VccIn Aux Icc Max 0
VccIn Aux IMON Slope 100
VccIN Aux IMON Offset 0
VccIN Aux IMON Prefix [+]
Vsys/Psys Critical [Disabled]
Assertion Deglitch Mantissa 1
Assertion Deglitch Exponent 0
De assertion Deglitch Mantissa 13
De assertion Deglitch Exponent 2
VR Power Delivery Design [AUTO]
Acoustic Noise Settings
Core/IA VR Settings
GT VR Settings
RFI Settings
GT VR Settings
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1290 Copyright (C) 2024 AMI

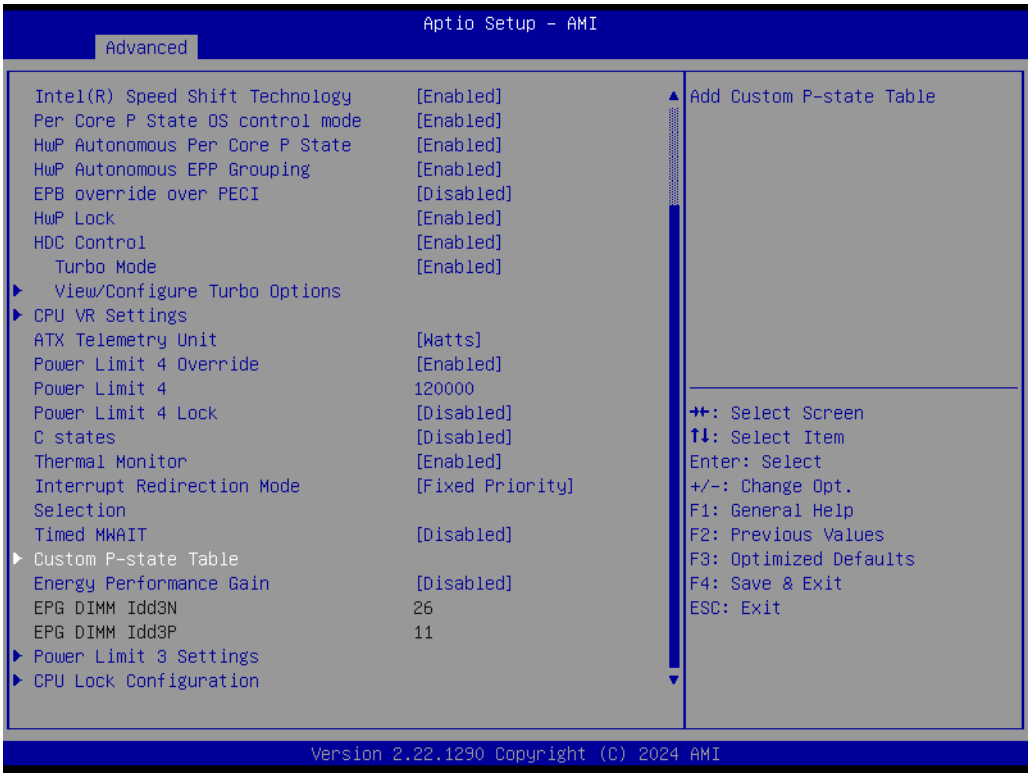

Aptio Setup – AMI
Advanced
GT Domain
VR Config Enable [Enabled]
Current AC Loadline 400
Current DC Loadline 400
Current Psi1 Threshold 80
Current Psi2 Threshold 20
Current Psi3 Threshold 4
Current Imon Slope 0
Current Imon Offset 1
Current VR Current Limit 120
Current Tdc Current Limit 176
Current Voltage Limit 1500
AC Loadline 0
DC Loadline 0
PS Current Threshold1 80
PS Current Threshold2 20
PS Current Threshold3 4
PS3 Enable [Enabled]
PS4 Enable [Enabled]
IMON Slope 0
IMON Offset 0
IMON Prefix [+]
VR Current Limit 0
GT VR Fast Vmode [Disabled]
VR Config Enable
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1290 Copyright (C) 2024 AMI

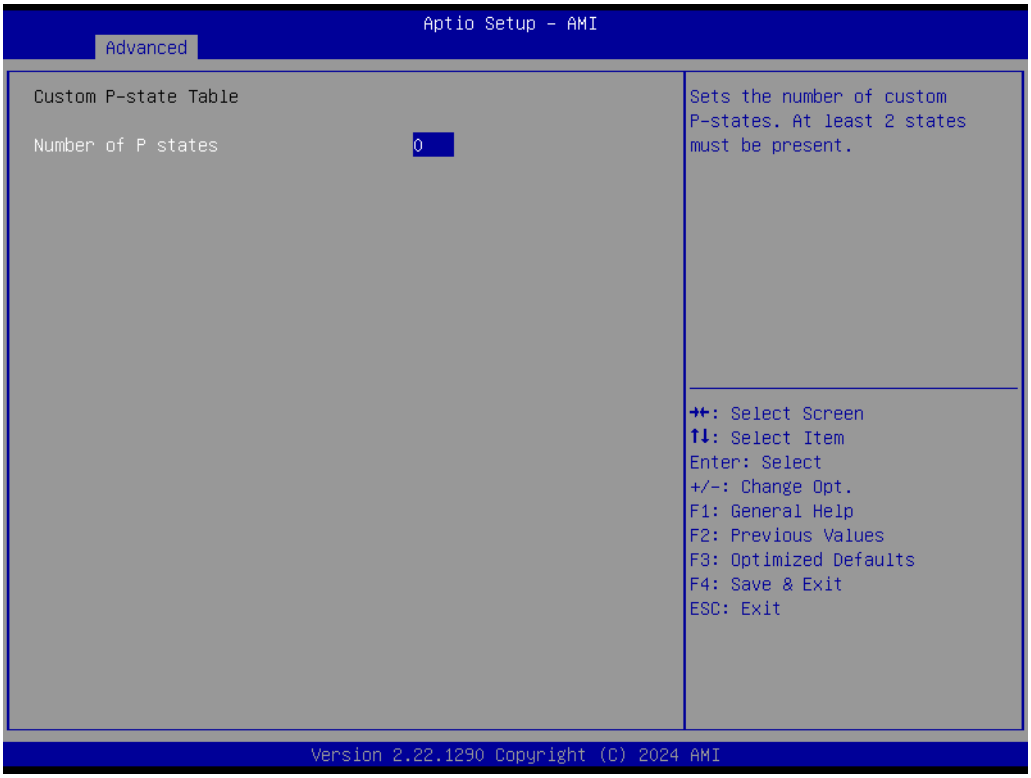


- **VR Config Enable**
  VR Config Enable.
- **PS3 Enable**
  PS3 Enable/Disable. 0 - Disabled, 1 - Enabled. Uses BIOS VR mailbox command 0x3.
- **PS4 Enable**
  PS4 Enable/Disable. 0 - Disabled, 1 - Enabled. Uses BIOS VR mailbox command 0x3.

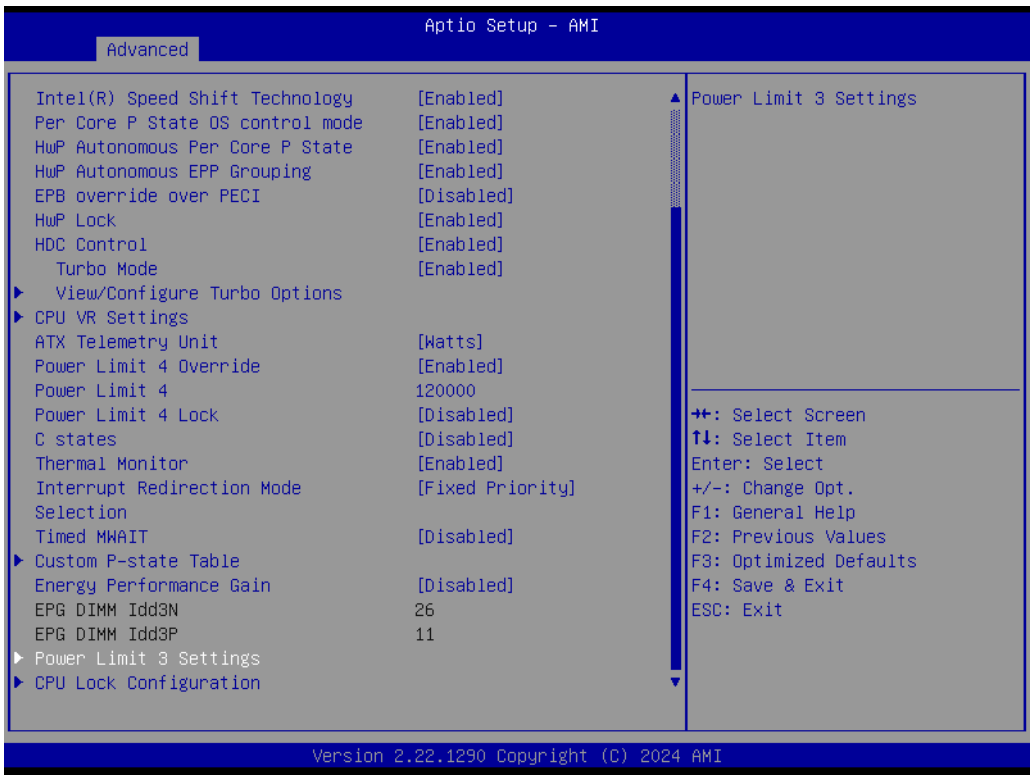


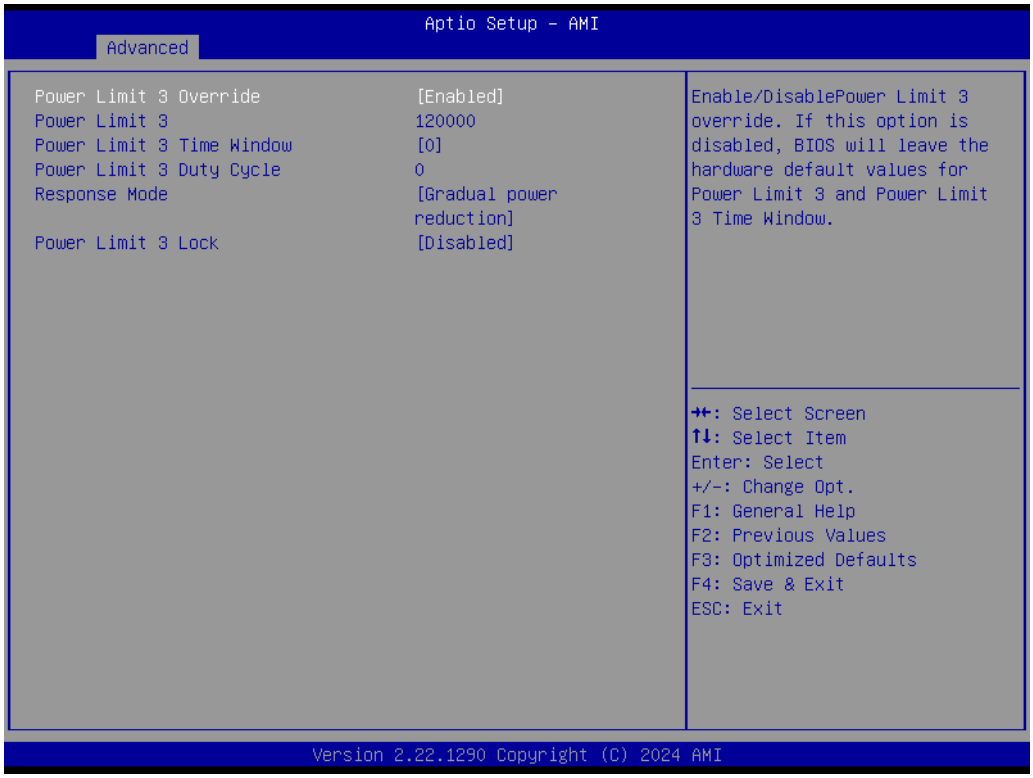
– **FIVR Spread Spectrum**
  Enable or Disable the FIVR Spread Spectrum.
– **RFI Spread Spectrum**
  Set the Spread Spectrum.





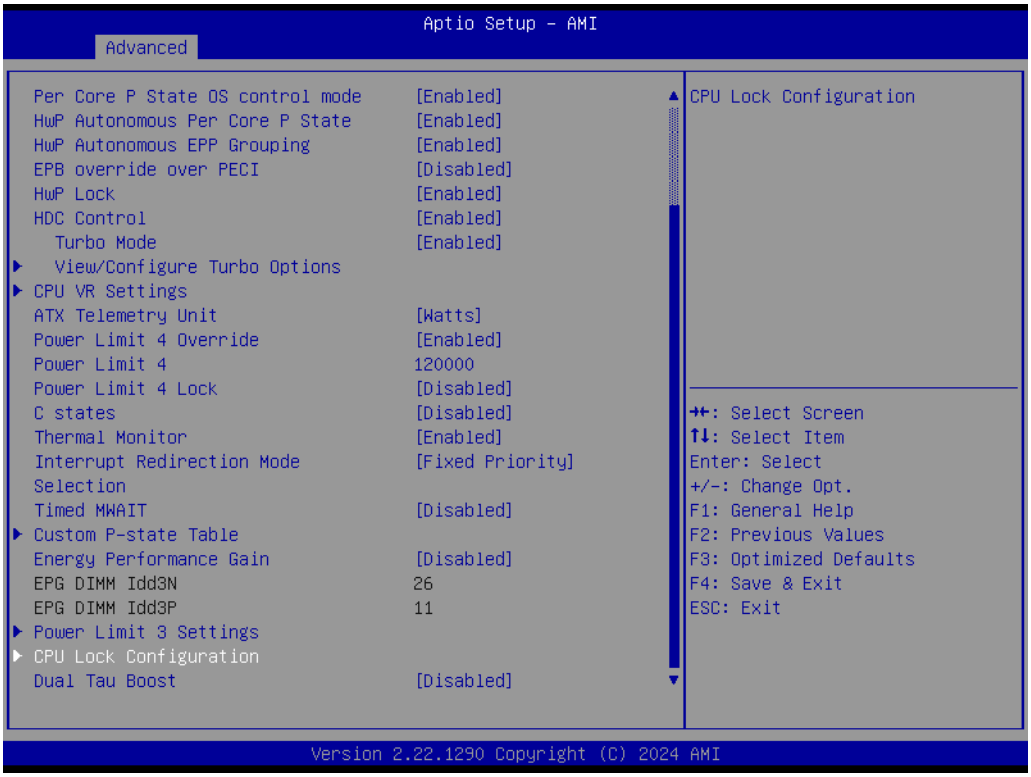
- **Number of P states**
  Sets the number of custom P-states. At least 2 states must be present.

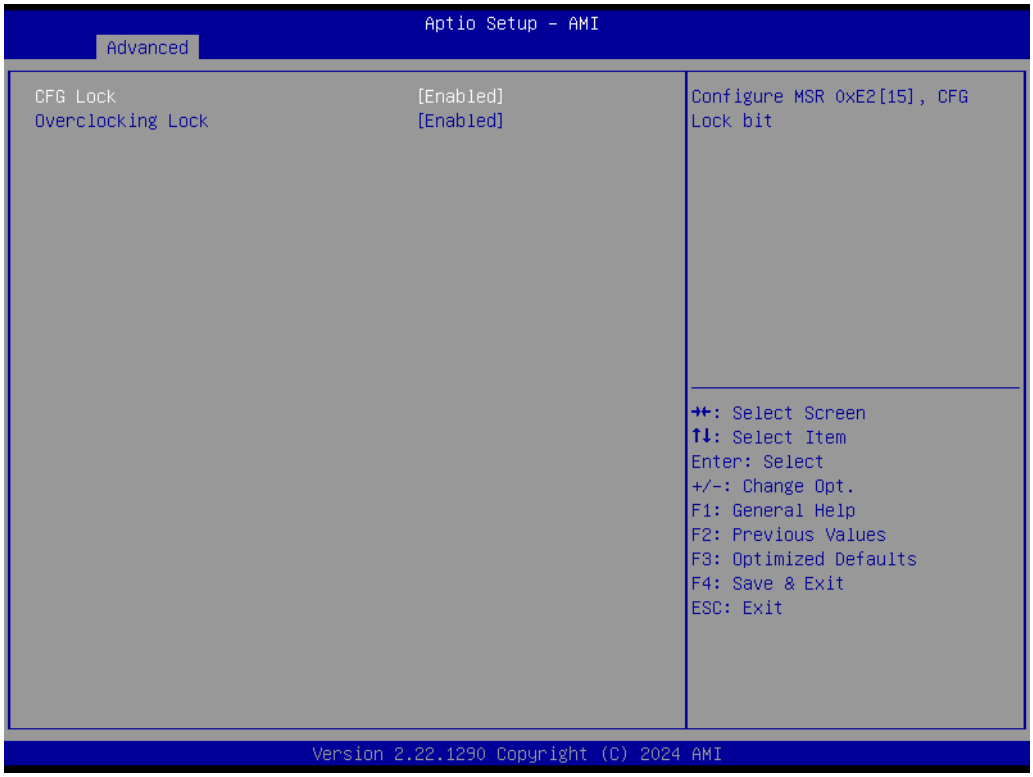




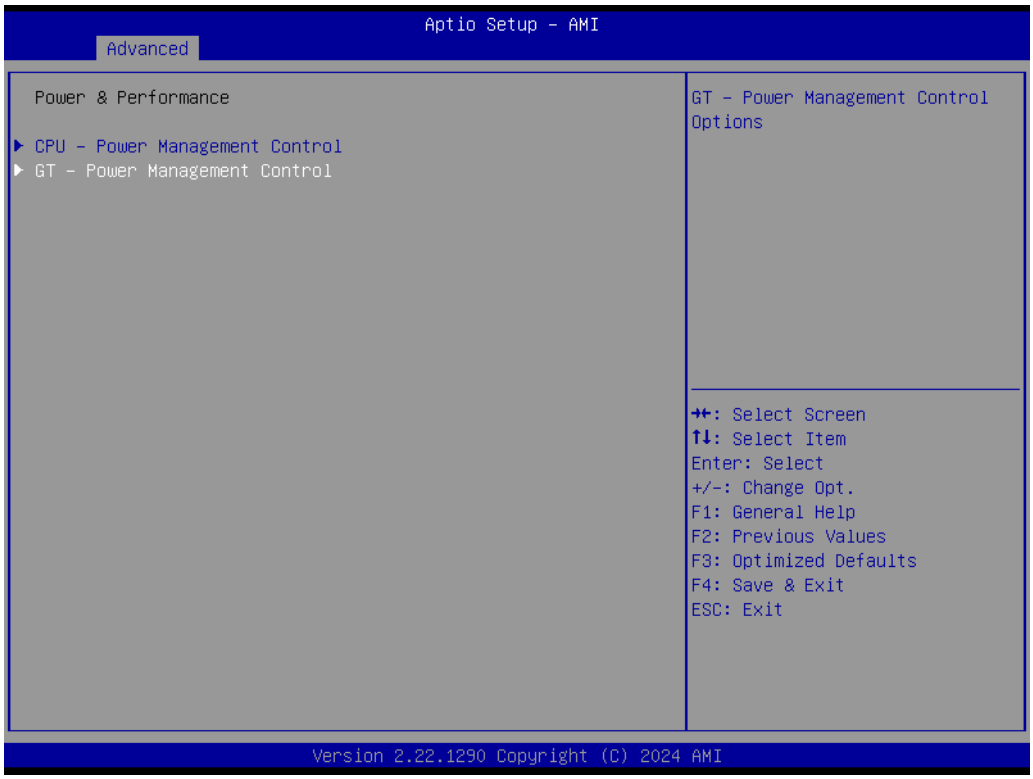
- **Power Limit 3 Override**
  Enable/Disable Power Limit 3 override.
- **Power Limit 3**
  Power Limit 3 in milliwatts.
- **Power Limit 3 Time Window**
  Power Limit 3 Time Window value in milliseconds.

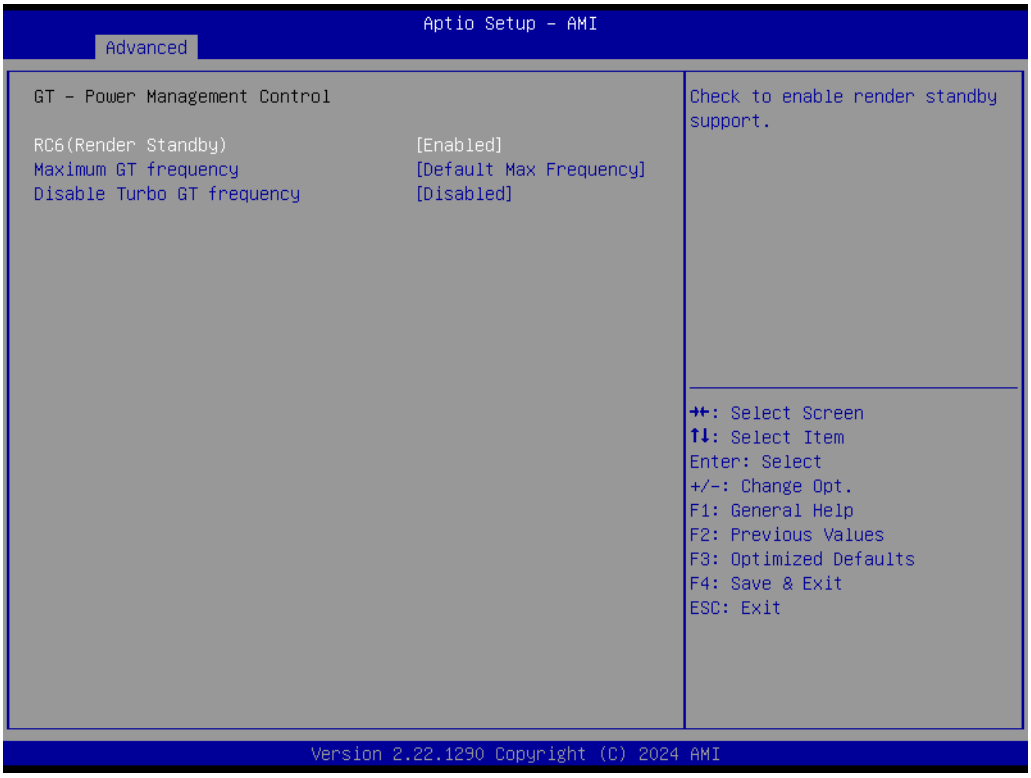
- **Power Limit 3 Duty Cycle**
  Specify the duty cycle in percentage that the CPU is required to maintain over the configured time window. Range is 0-100.
- **Power Limit 3 Lock**
  Power Limit 3 MSR 615h Lock. When enabled, PL3 configurations are locked during OS. When disabled PL3 configuration can be changed during OS.





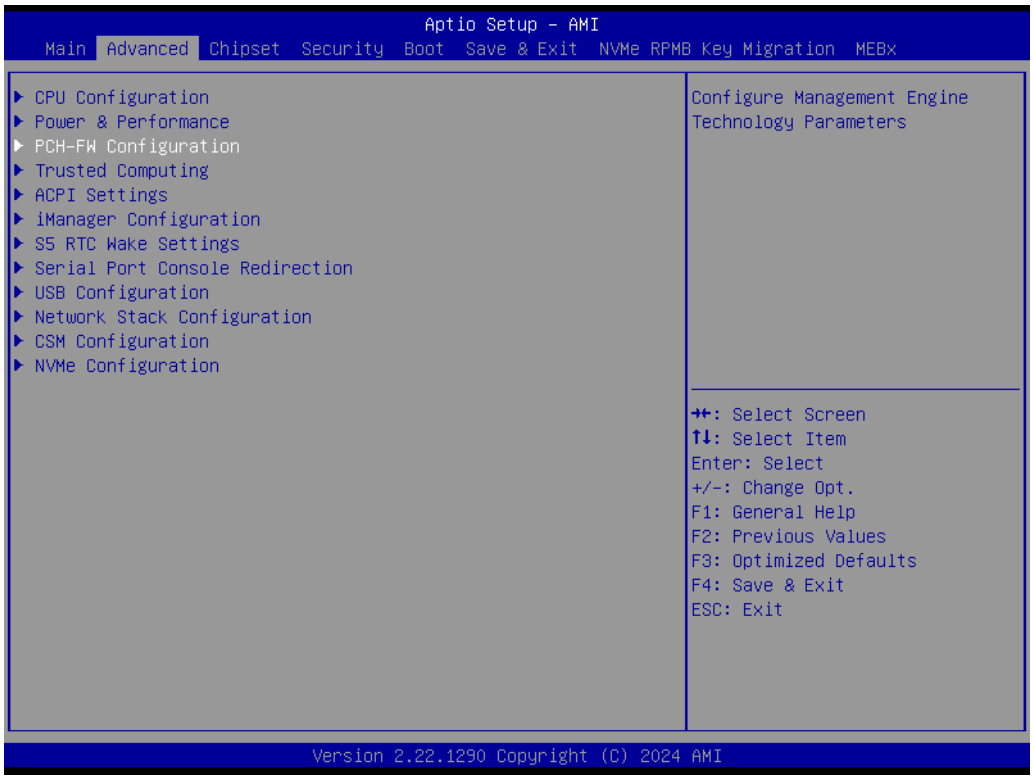
- **CFG Lock**
  Configure MSR 0xE2[15], CFG Lock bit.
- **Overclocking Lock**
  Enable/Disable Overclocking Lock (BIT 20) in FLEX_RATIO(194) MSR.

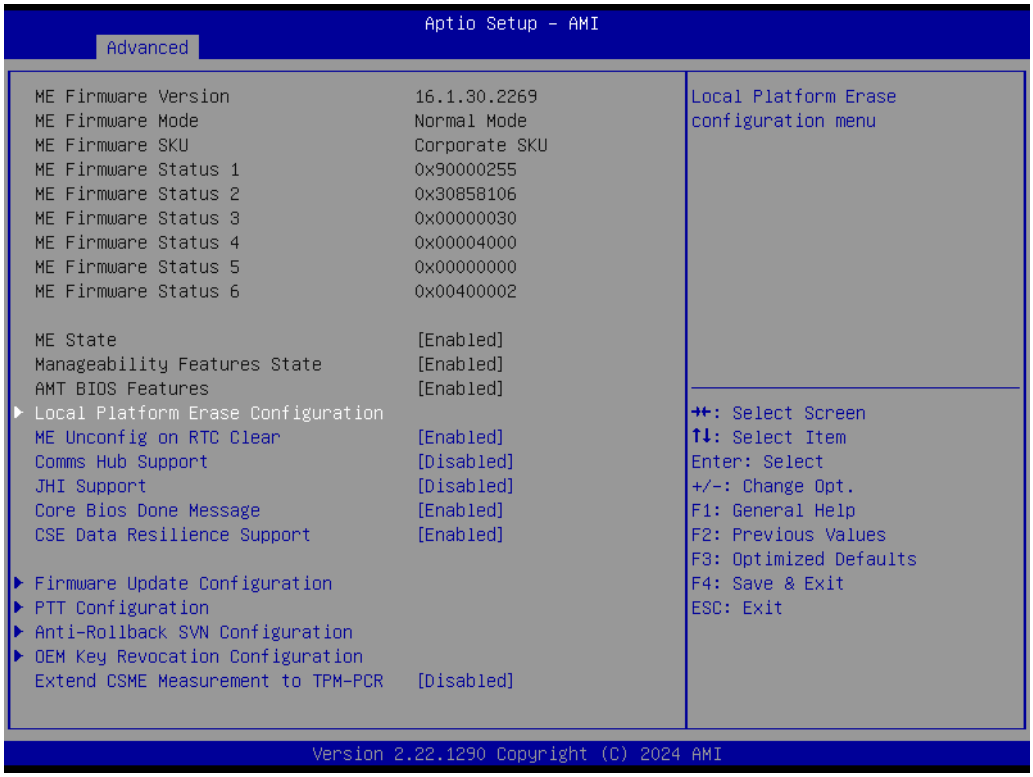




- **RC6 (Render Standby)**
  Check to enable render standby support.
- **Maximum GT frequency**
  Maximum GT frequency limited by the user.
- **Disable Turbo GT frequency**
  Enabled: Disables Turbo GT frequency. Disabled: GT frequency is not limited.

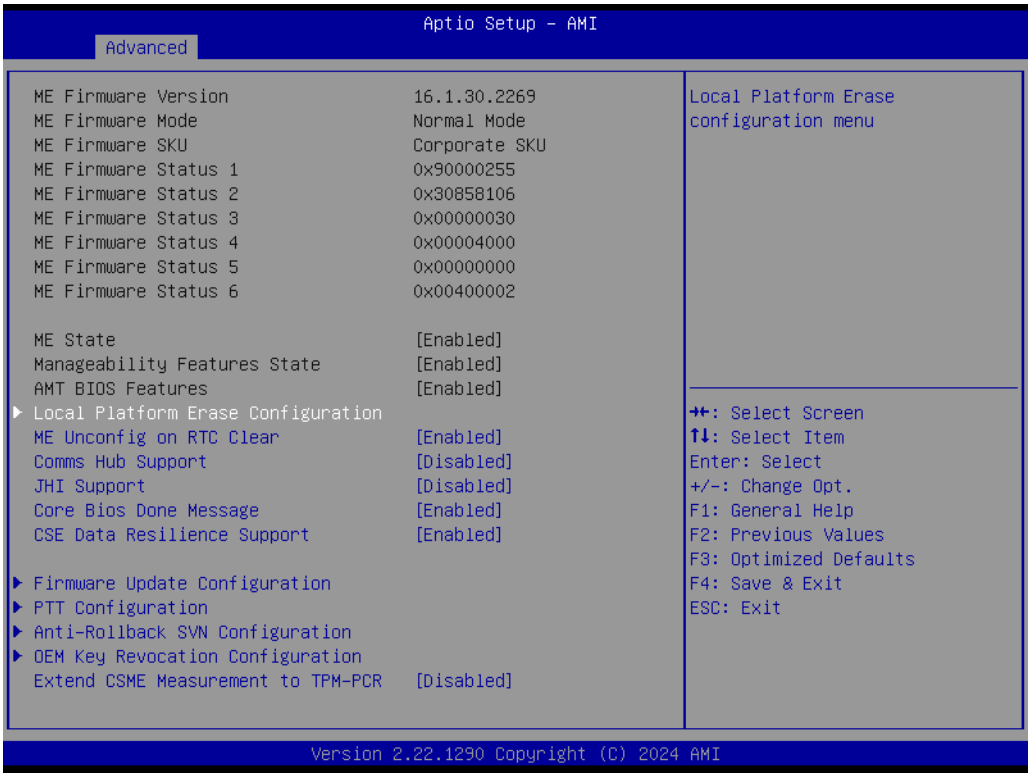
3.2.2.3 PCH-FW Configuration

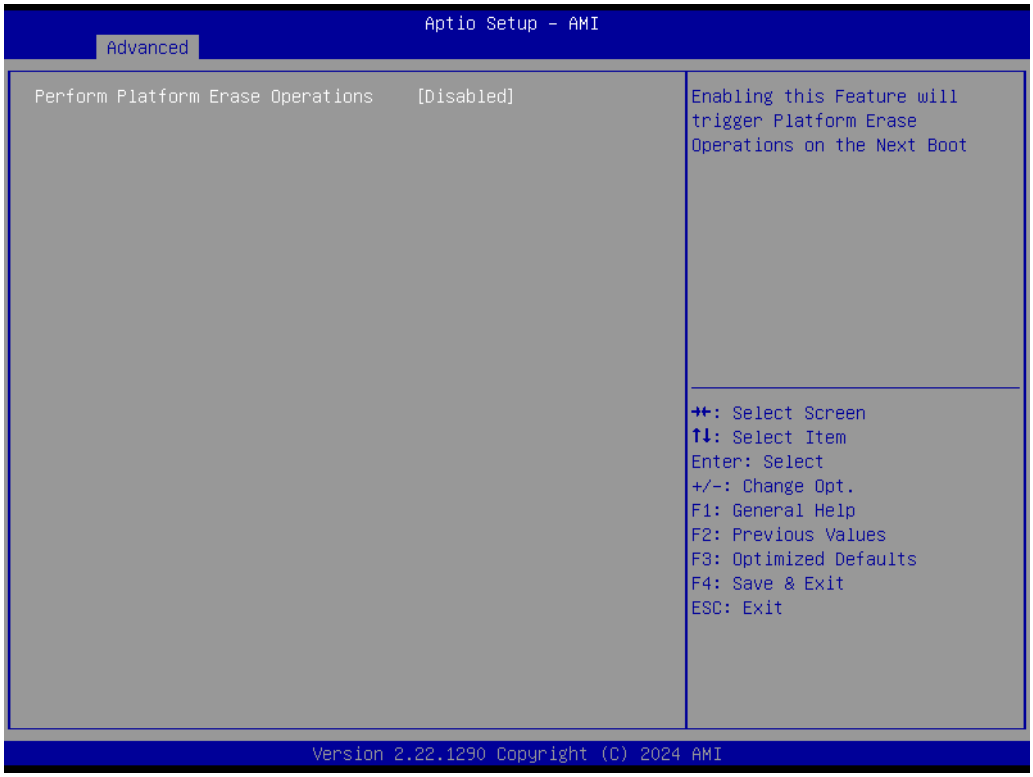




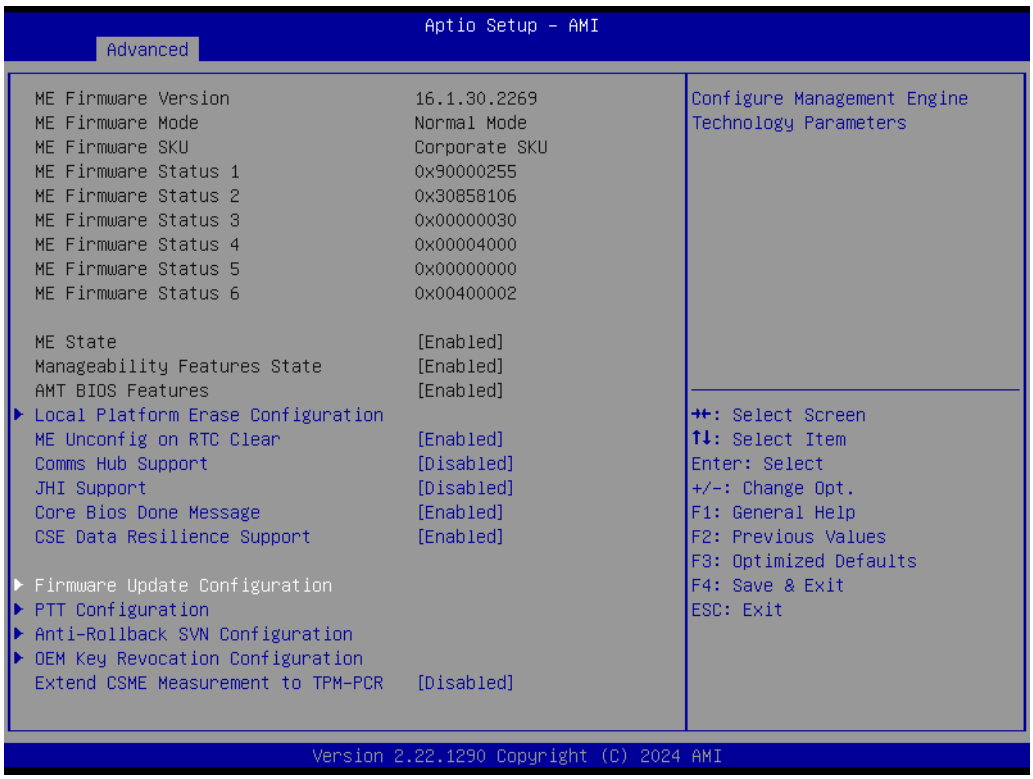
- **ME State**
  When Disabled, ME will be put into ME Temporarily Disabled Mode.
- **Manageability Features State**
  Enable/Disable Intel Manageability features.

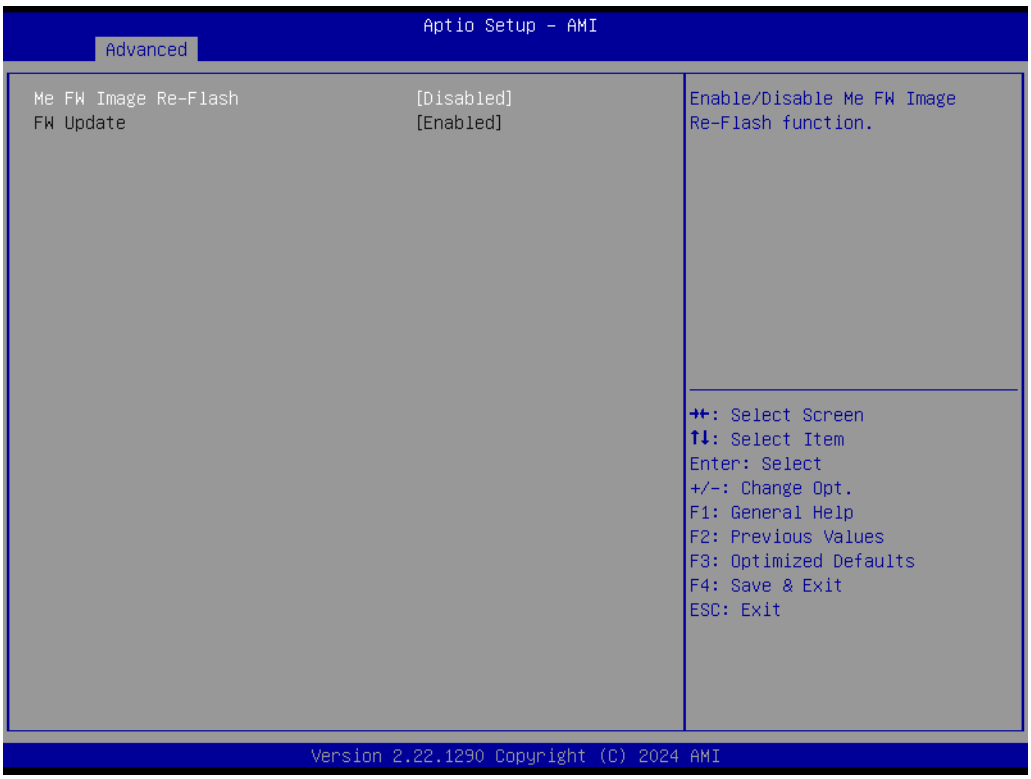
- **AMT BIOS Features**
  When disabled, AMT BIOS Features are no longer supported and the user is no longer able to access MEBx Setup.
- **Local Platform Erase Configuration**
  Local Platform Erase configuration menu.
- **ME Unconfig on RTC Clear**
  When Disabled, ME will not be unconfigured on RTC Clear.
- **Comms hub support**
  Enable/Disable support for Comms Hub.
- **JHI support**
  Enable/Disable Intel® DAL Host Interface Service (JHI).
- **Core BIOS Done Message**
  Enable/Disable Core BIOS Done message sent to ME.



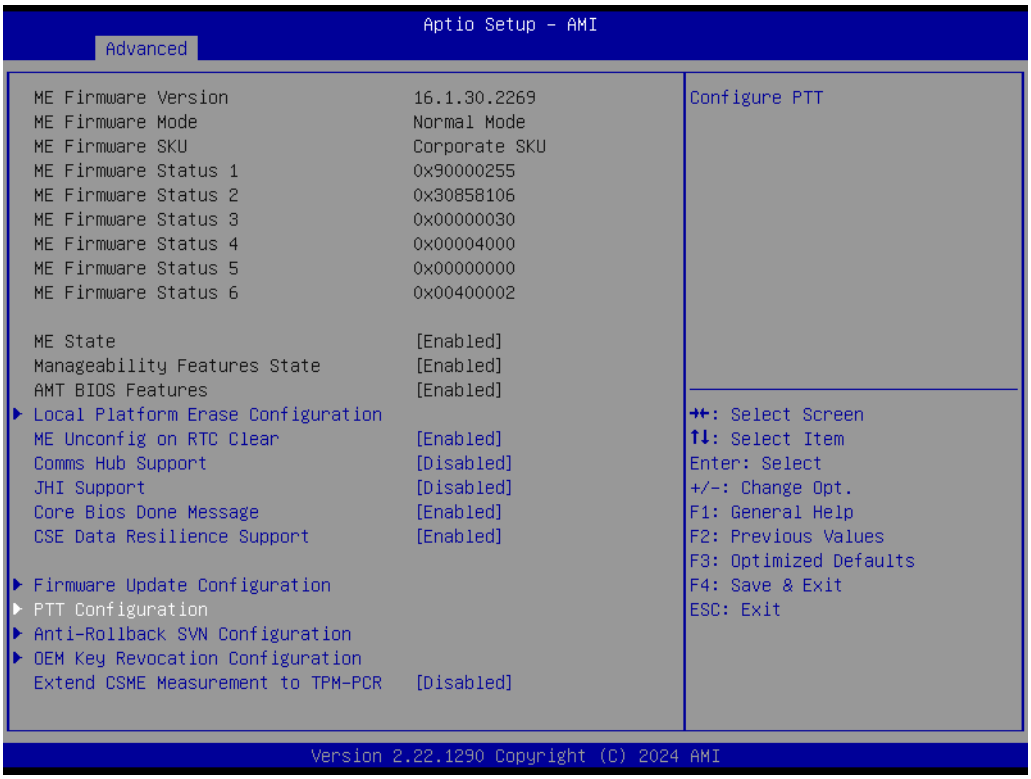


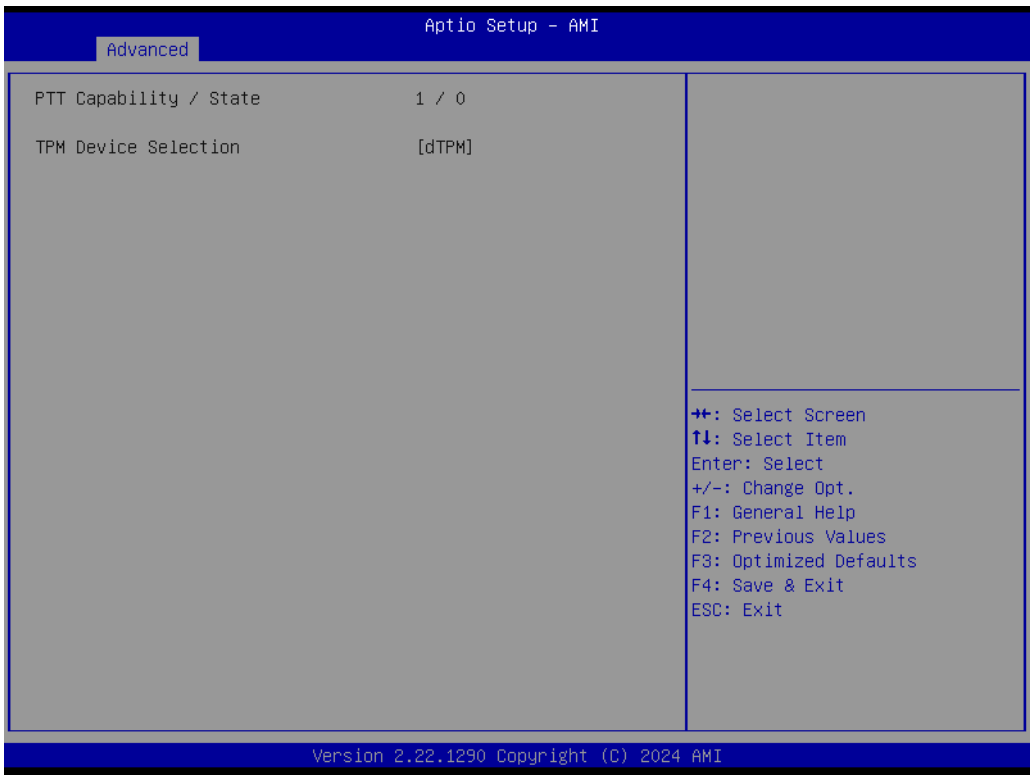
– **Perform platform Erase Operations**
Enabling this Feature will trigger Platform Erase Operations on the Next Boot.



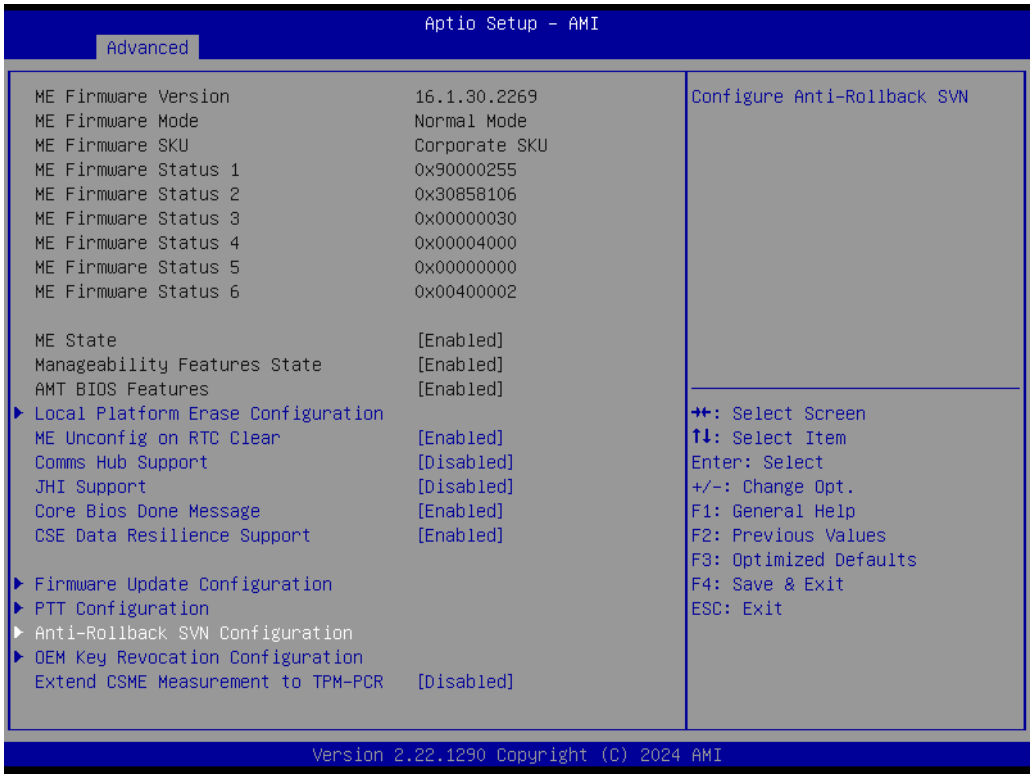


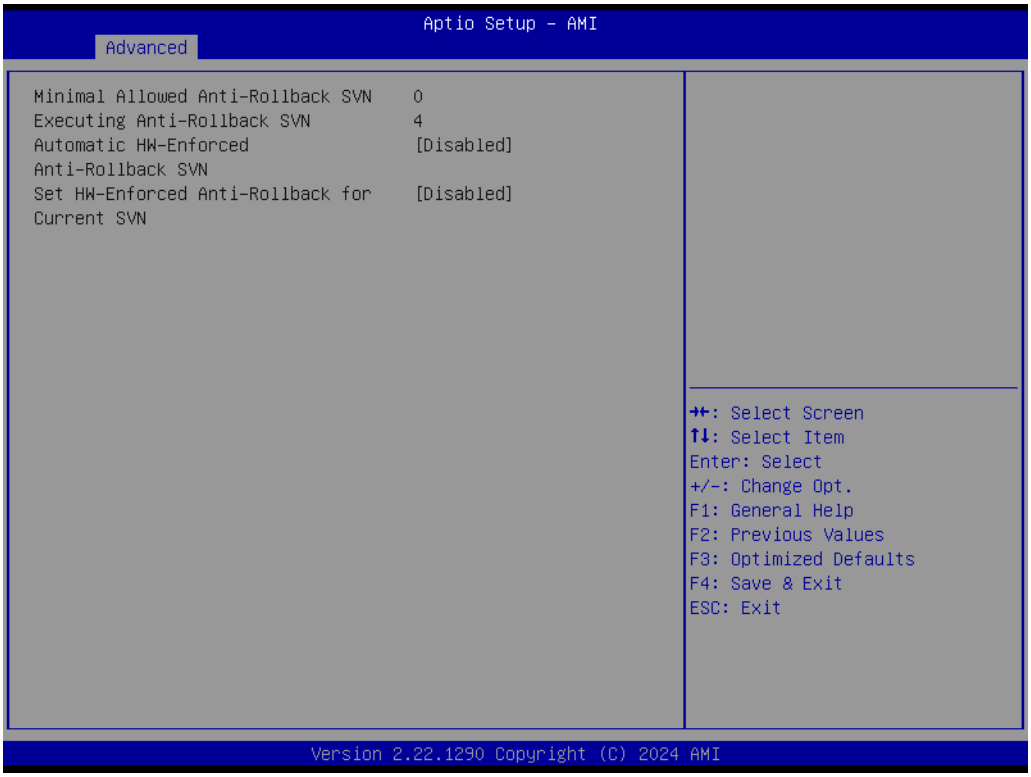
– **ME FW Image Re-Flash**
  Enable/Disable the ME FW Image Re-Flash function.
– **FW Update**
  Enable/Disable the ME FW Update function.



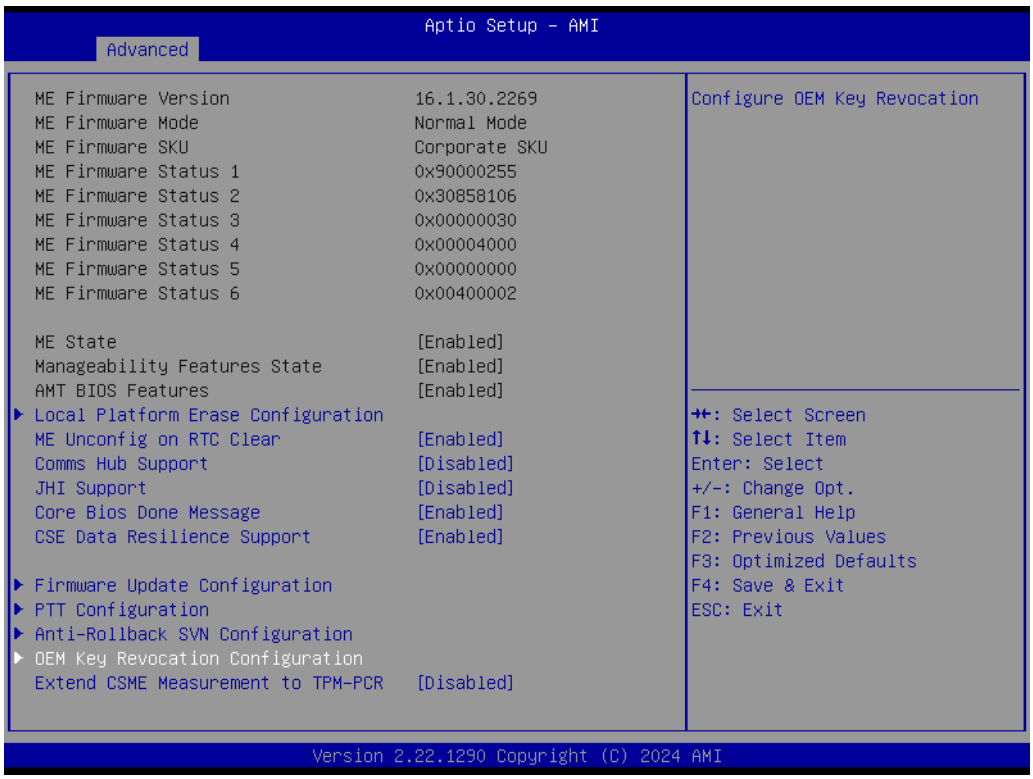


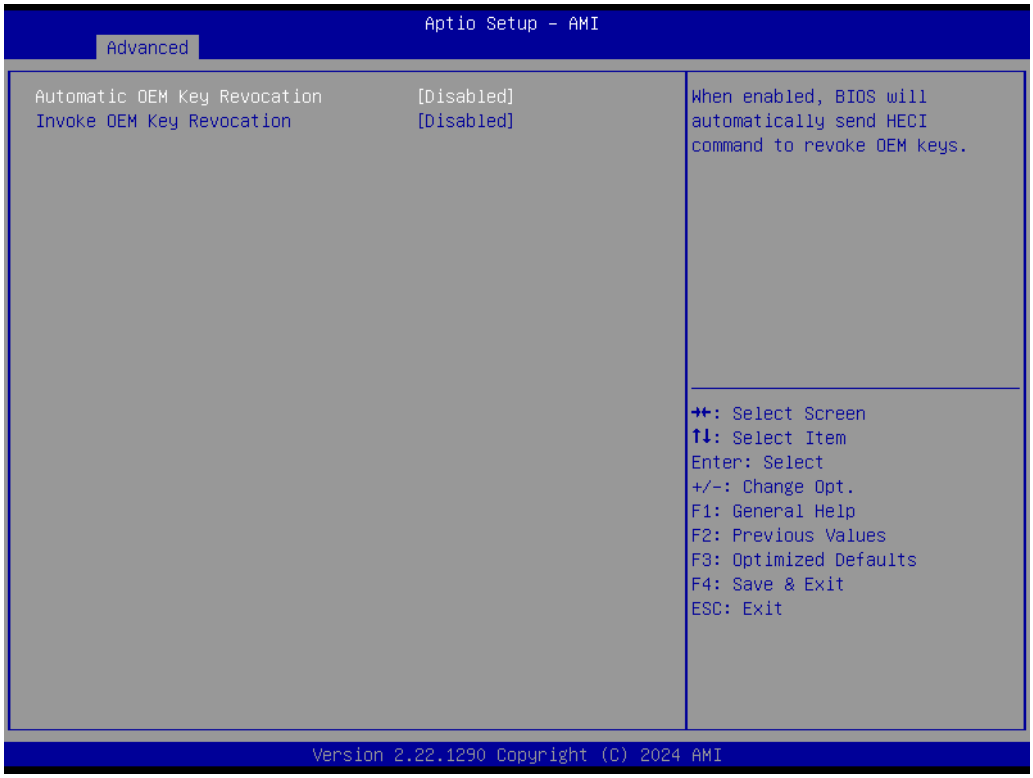
– **TPM Device Selection**
Configure TPM device.





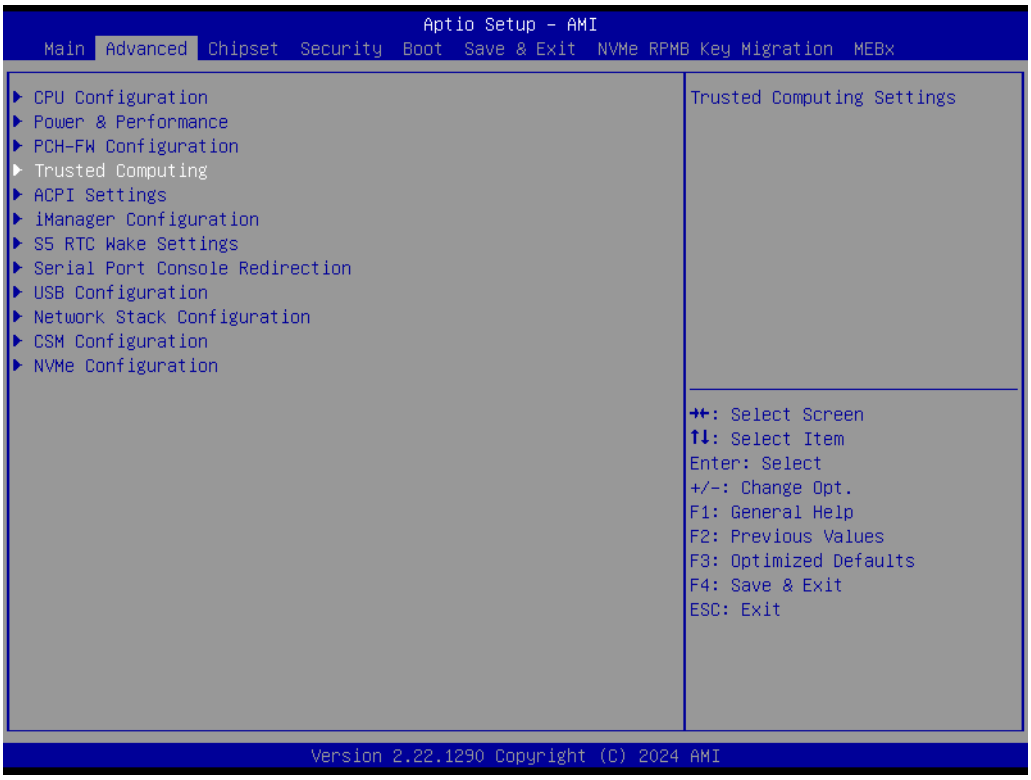
- **Automatic HW-Enforced Anti-Rollback SVN**
  When enabled, the hardware-enforced Anti-Rollback mechanism is automatically activated: once ME FW is successfully run on a platform, FW with lower ARB-SVN will be blocked from execution.
- **Set HW-Enforced Anti-Rollback for Current SVN**
  Enable the hardware-enforced Anti-Rollback mechanism for current ARB-SVN value.
  FW with lower ARB-SVN will be blocked from execution. The value will be restored to disable after the command is sent.

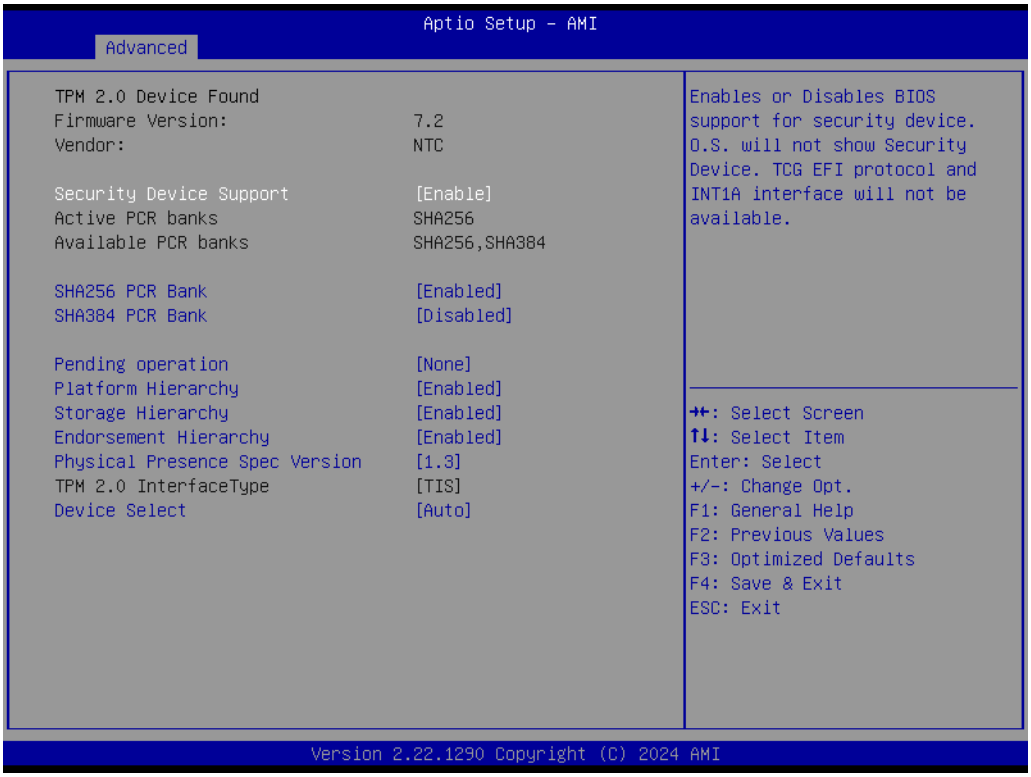




- **Automatic OEM Key Revocation**
  When enabled, the BIOS will automatically send the HECI command to revoke OEM keys.
- **Invoke OEM Key Revocation**
  A Heci command will be sent to revoke the OEM key.

3.2.2.4 Trusted Computing

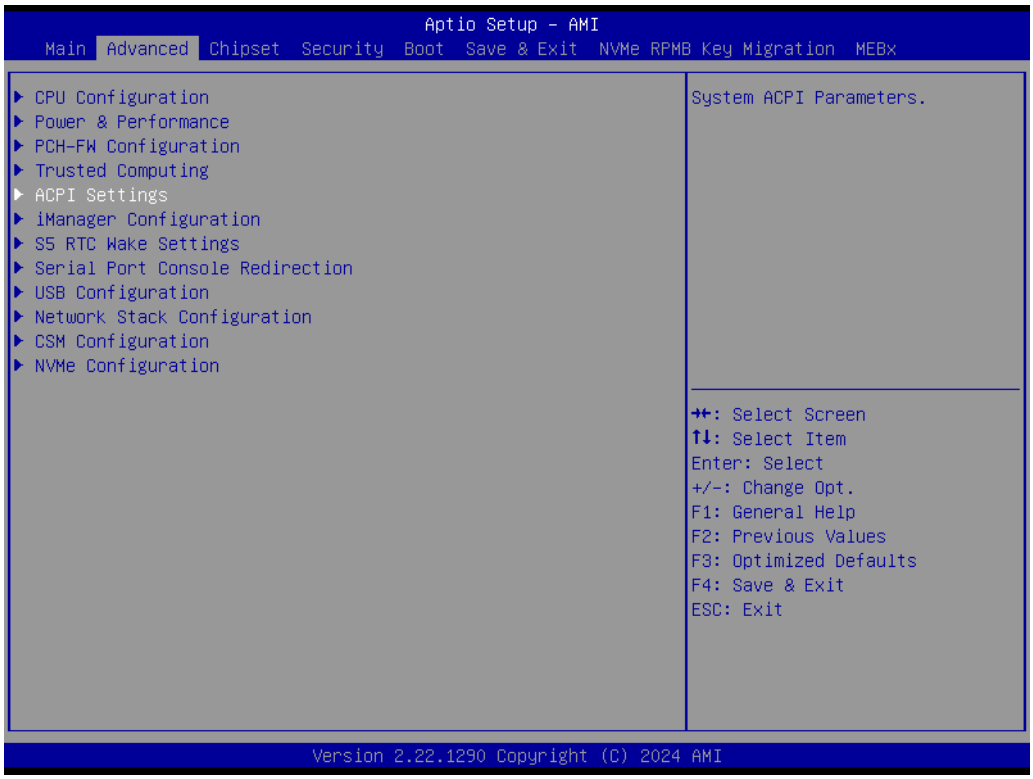


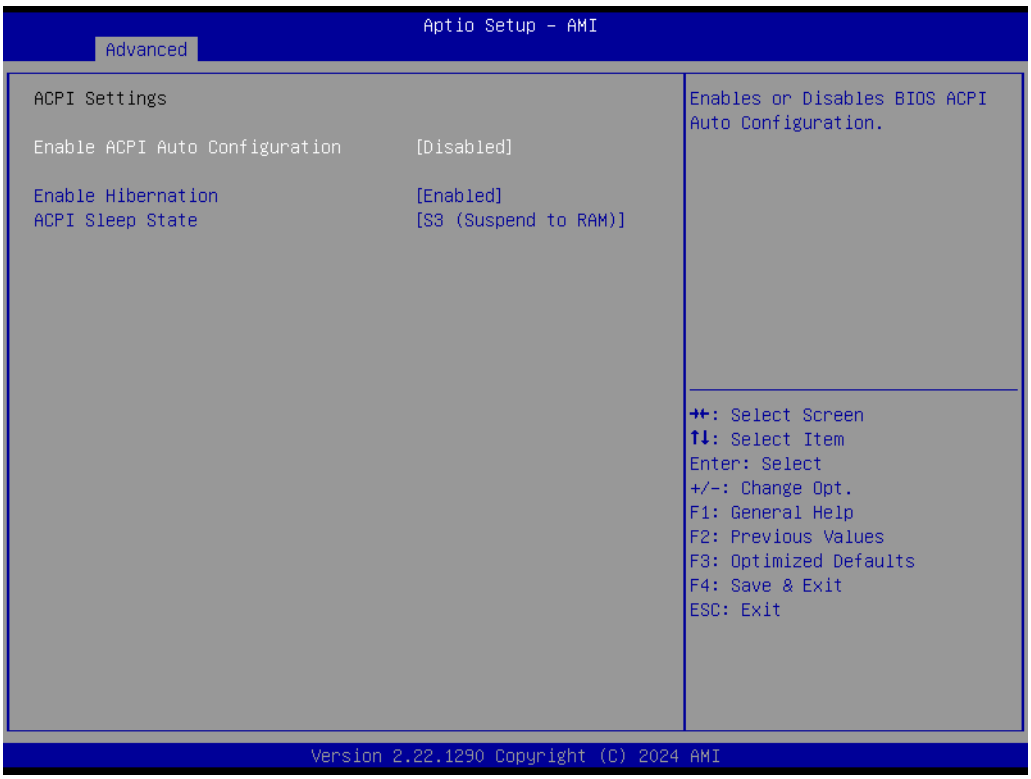


- **Security Device Support**
  Enables or Disables BIOS support for security device. The OS will not show Security Device. TCG EFI protocol and INT1A interface will not be available.
- **SHA256 PCR Bank**
  Enable or Disable SHA256 PCR Bank.

- **SHA384 PCR Bank**
  Enable or Disable SHA384 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.
- **Physical Presence Spec Version**
  Select to tell the OS to support PPI Spec Version 1.2 or 1.3. Note some HCK tests might not support 1.3.
- **Device Select**
  TPM 1.2 will restrict support to TPM 1.2 devices, TPM 2.0 will restrict support to TPM 2.0 devices. Auto will support both with the default set to TPM 2.0 devices if not found, TPM 1.2 devices will be enumerated.

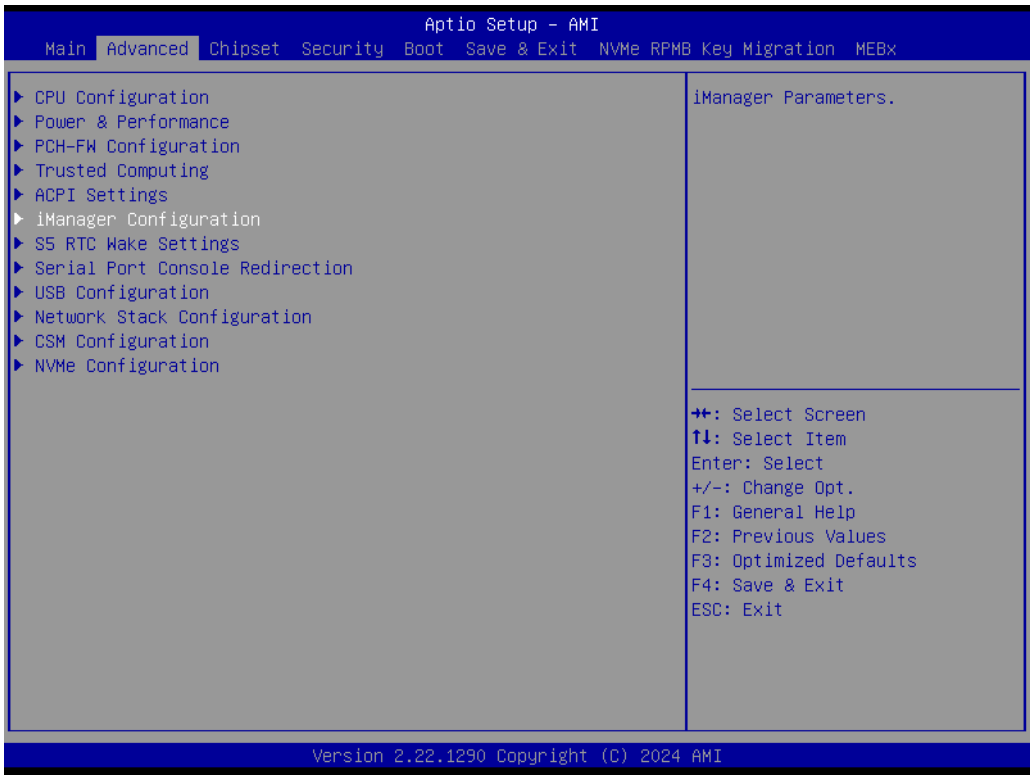
3.2.2.5 ACPI Settings

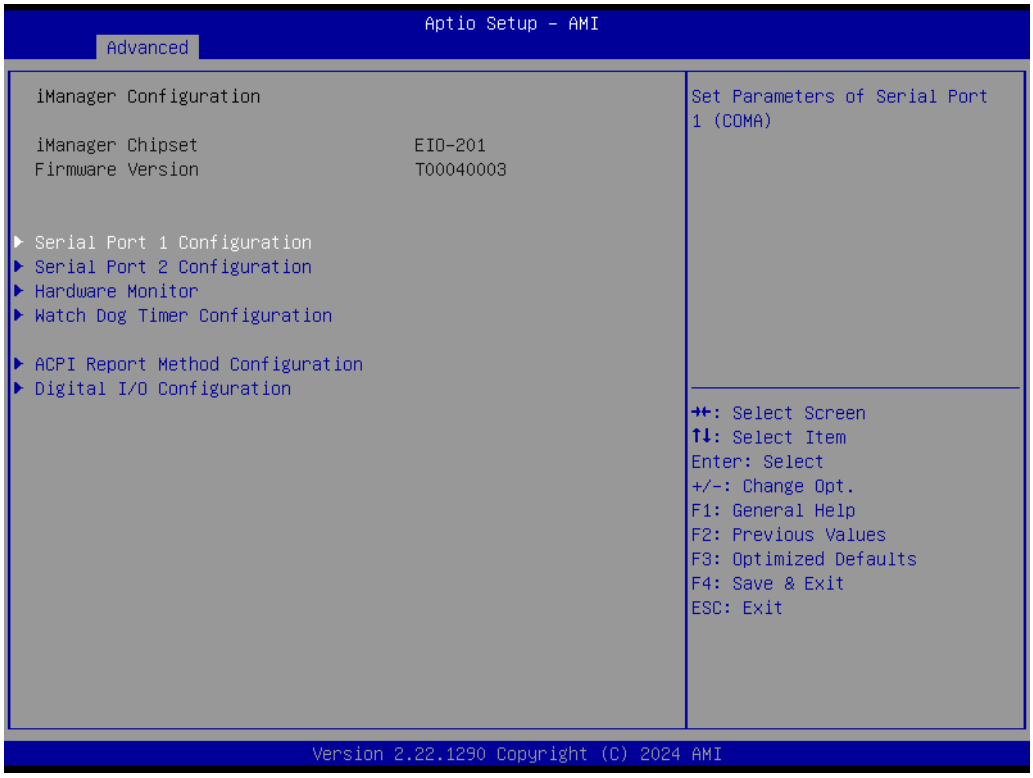




- **Enable ACPI Auto Configuration**
  Enable or Disable BIOS ACPI Auto Configuration.
- **Enable Hibernation**
  Enable or Disable the system's ability to Hibernate (OS/S4 Sleep State).
- **ACPI Sleep State**
  Select the highest ACPI sleep state the system will enter when the SUSPEND button is pressed.

3.2.2.6 iManager Configuration

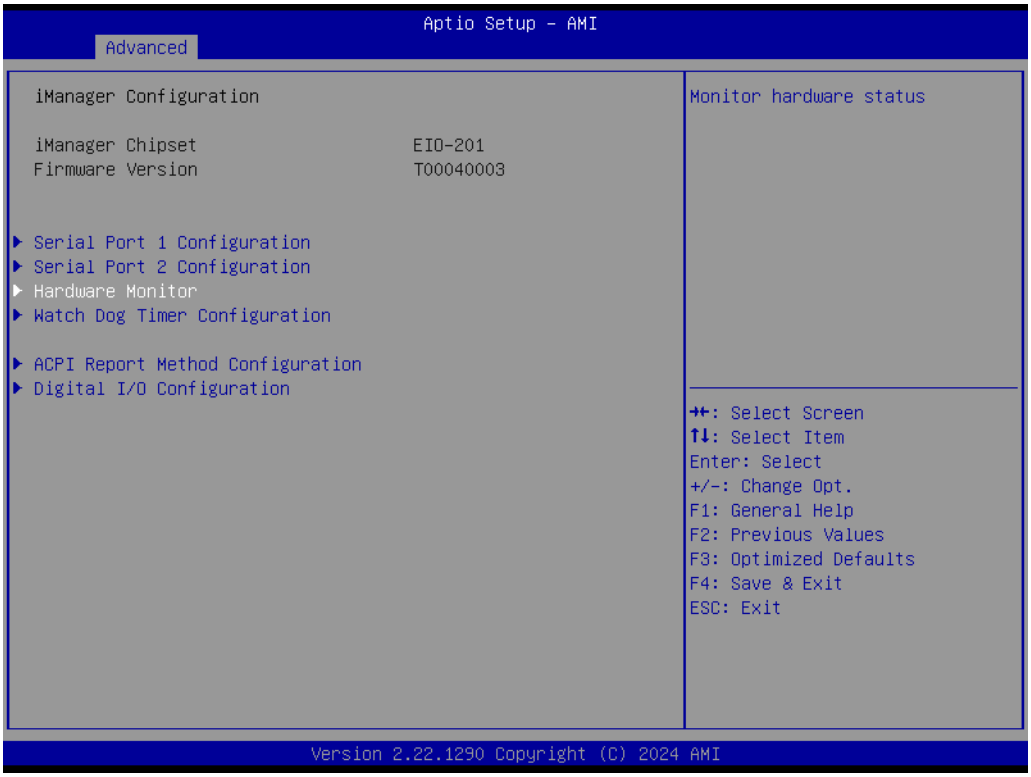


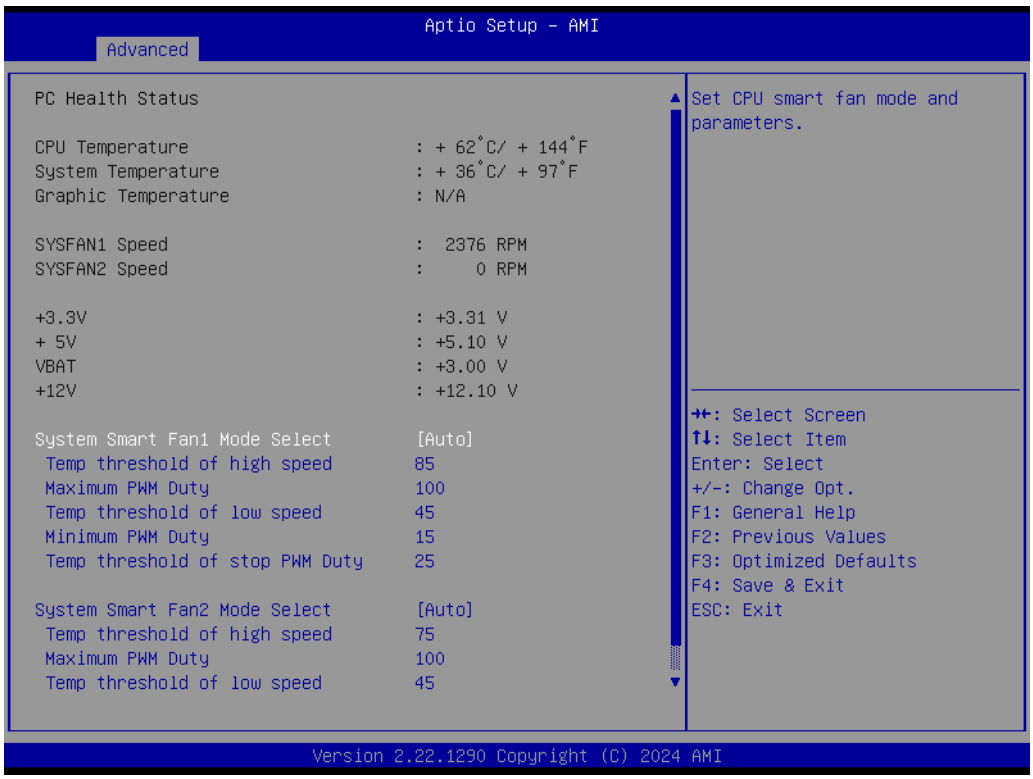


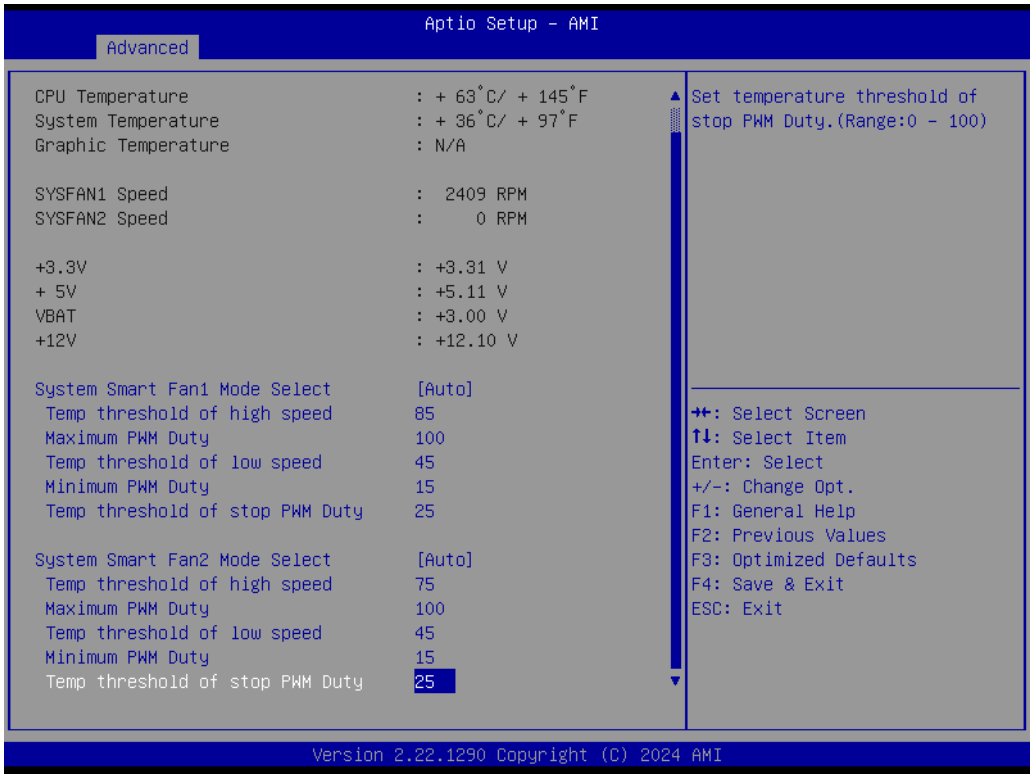
- **Serial Port 1 Configuration**
  Set the parameters of Serial Port 1.
- **Serial Port 2 Configuration**
  Set the parameters of Serial Port 2.

- **Hardware Monitor**
  Monitor hardware status.
- **Watch Dog Timer Configuration**
  Watch Dog Timer Configuration page.
- **ACPI Report Method Configuration**
  Select the ACPI Reporting Method for EC Devices.
- **Digital I/O Configuration**
  Configure the digital I/O pins.

- **Hardware Monitor**



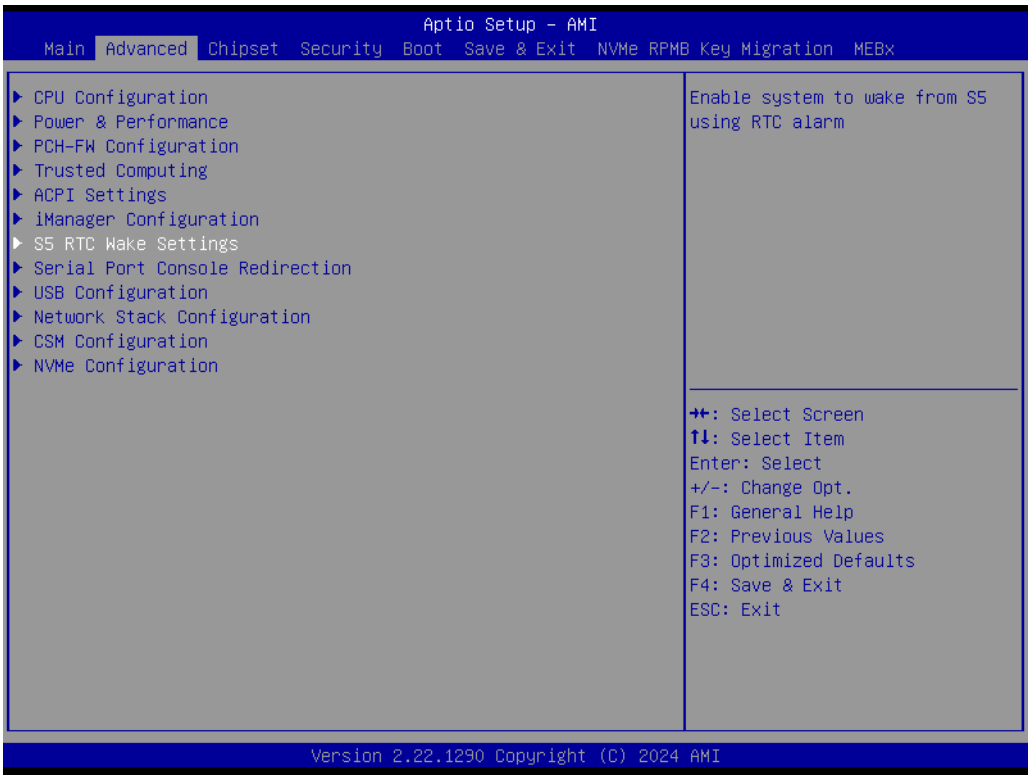


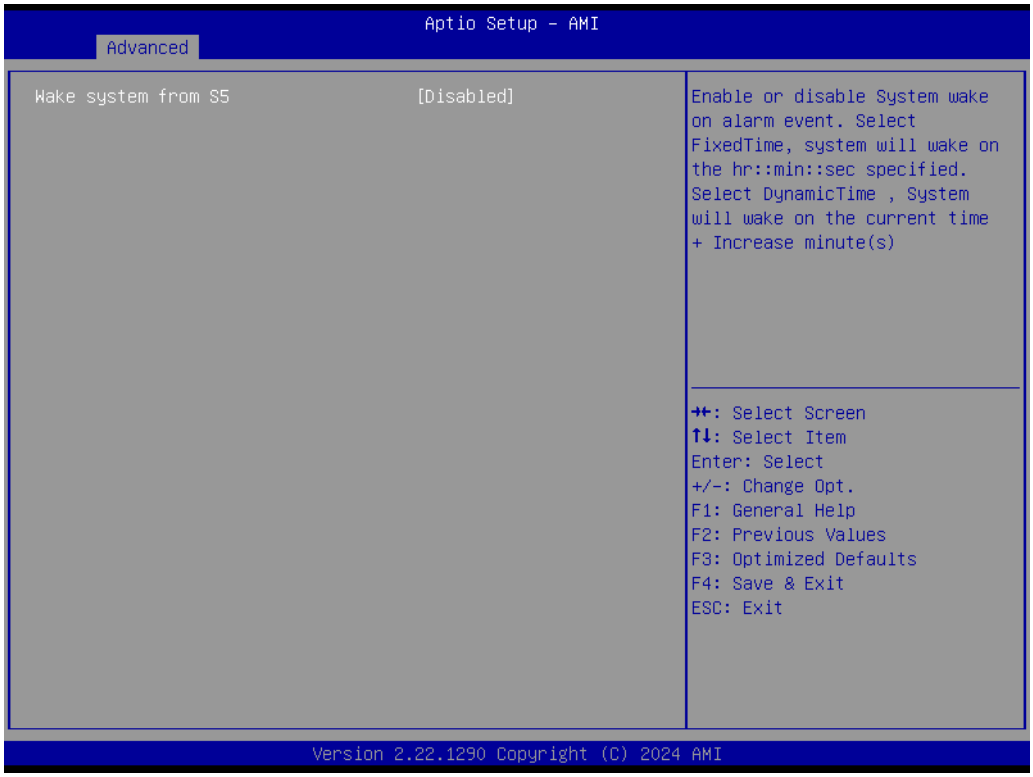


– **System Smart Fan1 Mode Select**
  Set the CPU smart fan mode and parameters.
– **Temp threshold of high speed**
  Set the temperature threshold of high speed. (Range: 0 - 100)
– **Maximum PWM Duty**
  Set the maximum PWM Duty output value. (Range: 0 - 100)

- **Temp threshold of low speed**
  Set the temperature threshold of low speed. (Range: 0 - 100)
- **Minimum PWM Duty**
  Set the minimum PWM Duty output value. (Range: 0 - 100)
- **Temp threshold of stop PWM Duty**
  Set the temperature threshold of stop PWM Duty. (Range: 0 - 100)
- **System Smart Fan2 Mode Select**
  Set the CPU smart fan mode and parameters.
- **Temp threshold of high speed**
  Set the temperature threshold of high speed. (Range: 0 - 100)
- **Maximum PWM Duty**
  Set the maximum PWM Duty output value. (Range: 0 - 100)
- **Temp threshold of low speed**
  Set the temperature threshold of low speed. (Range: 0 - 100)
- **Minimum PWM Duty**
  Set the minimum PWM Duty output value. (Range: 0 - 100)
- **Temp threshold of stop PWM Duty**
  Set the temperature threshold of stop PWM Duty. (Range: 0 - 100)

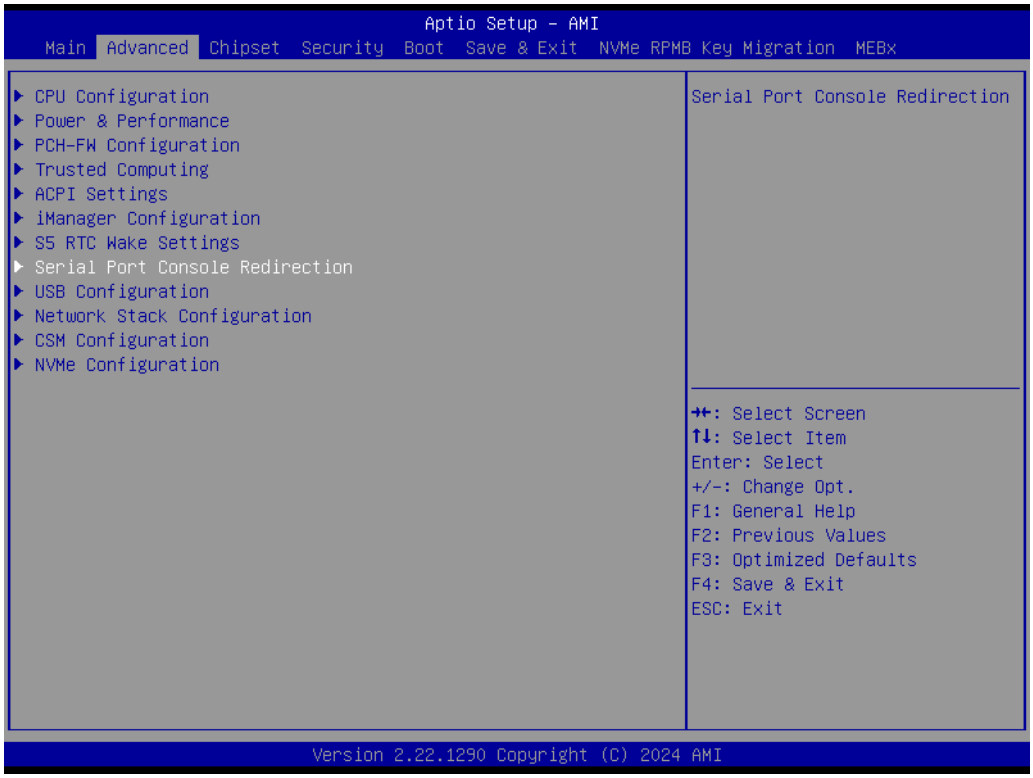
3.2.2.7 S5 RTC Wake Settings

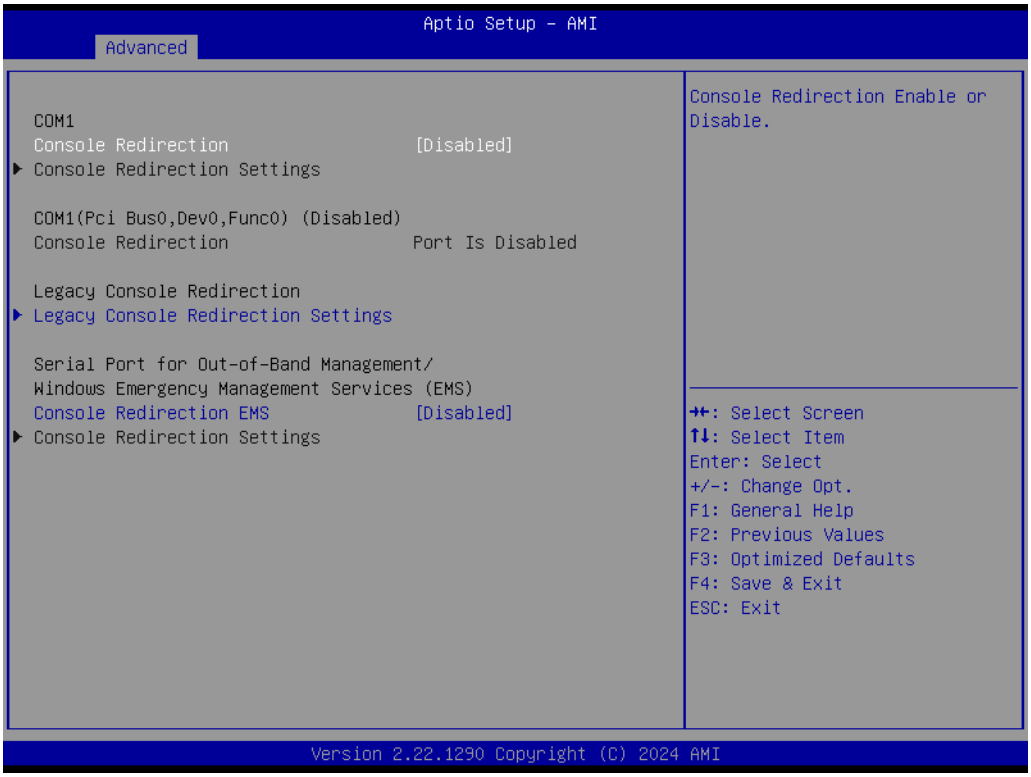




- **Wake system from S5**
  Enable or disable system wake on alarm event.

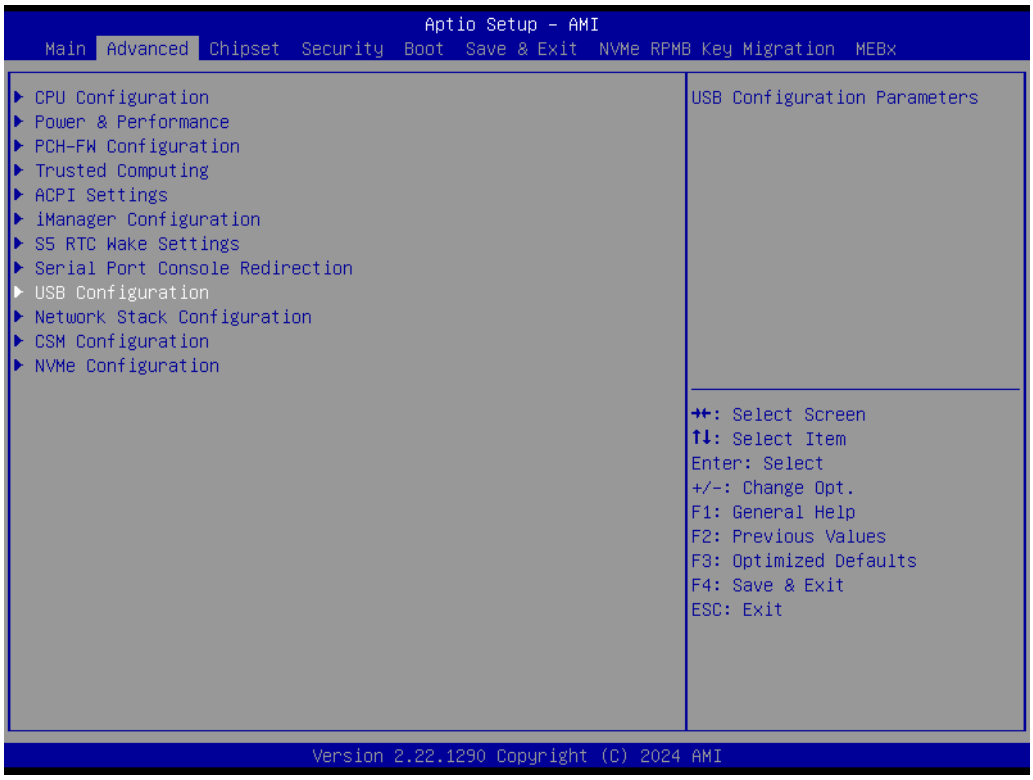
3.2.2.8 Serial Port Console Redirection

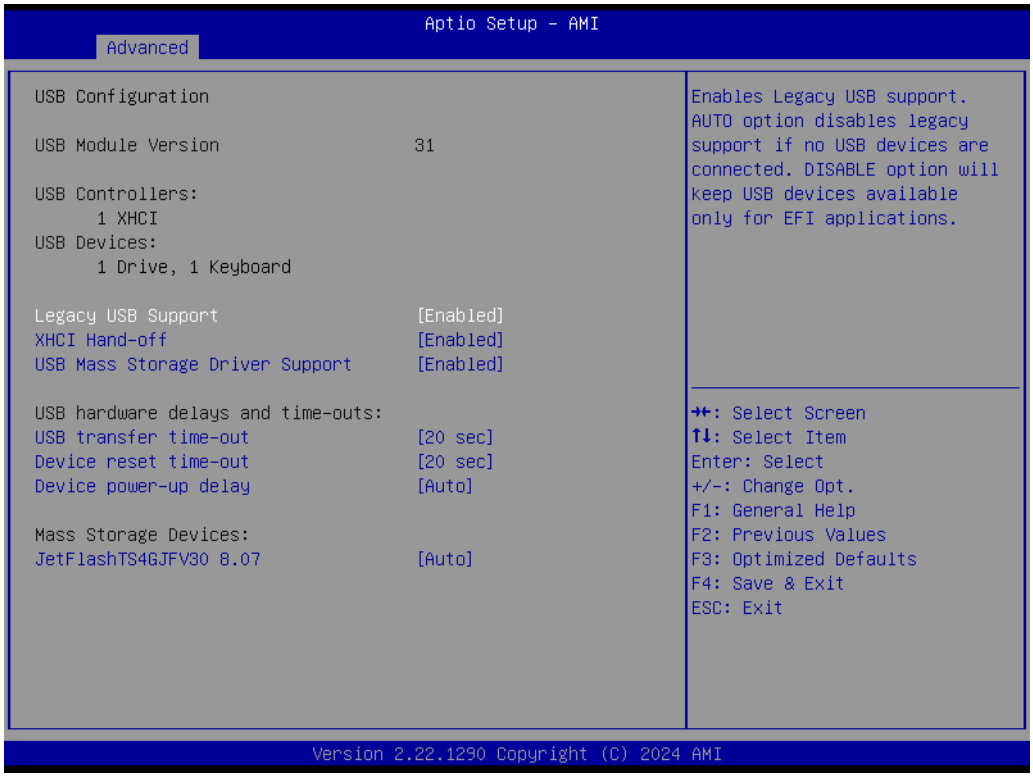




- **Console Redirection**
  Console Redirection Enable or Disable.
- **Legacy Console Redirection Settings**
  Legacy Console Redirection Settings.
- **Console Redirection EMS**
  Console Redirection Enable or Disable.

3.2.2.9 USB Configuration

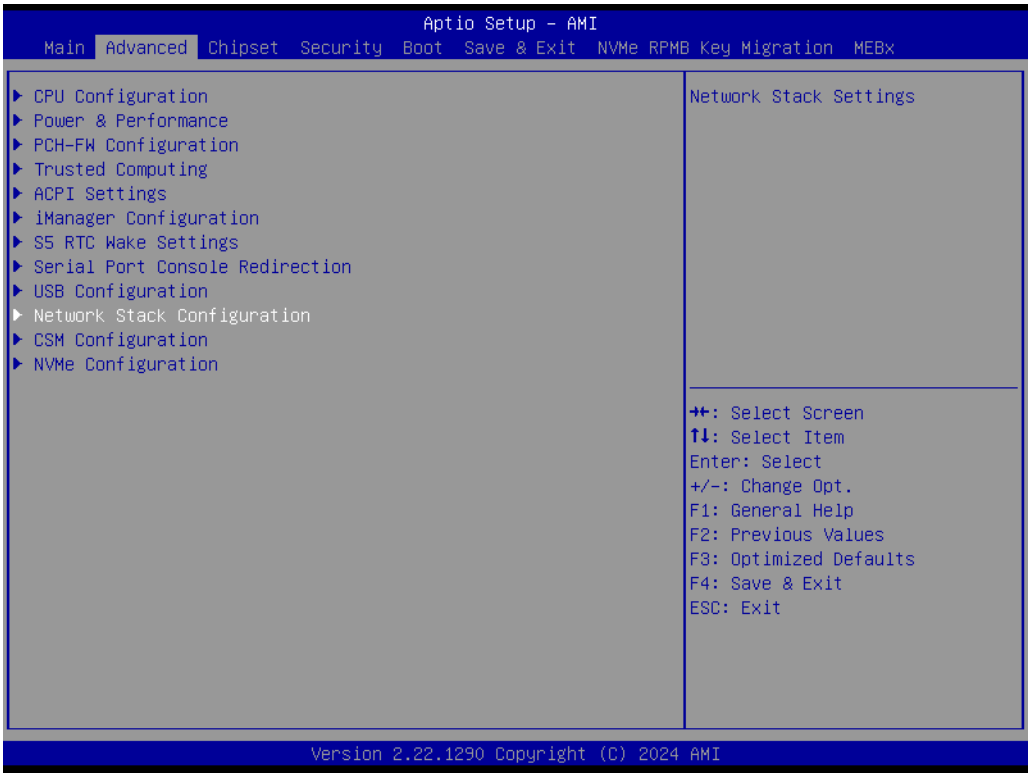


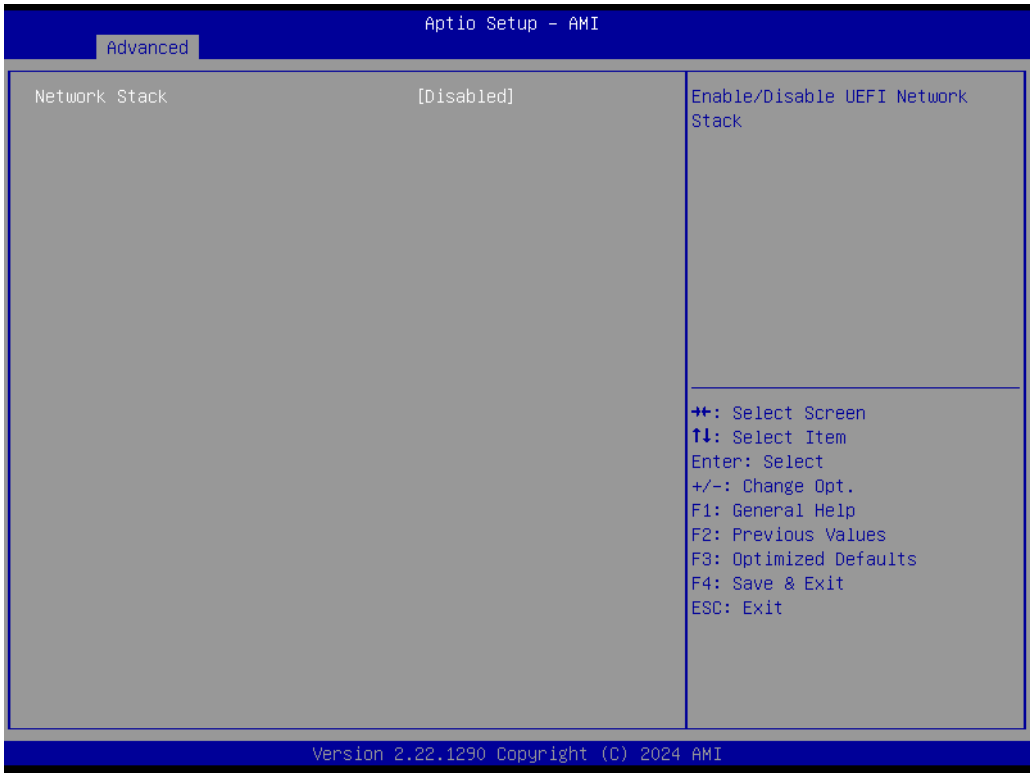


- **Legacy USB Support**
  Enables Legacy USB support.
- **XHCI Hand-off**
  This is a workaround for OS without XHCI hand-off support.

- **USB Mass Storage Device Configuration**
  Configure the USB Mass Storage Devices.
- **USB transfer time-out**
  The time-out value for Control, Bulk, and Interrupt transfers.
- **Device reset time-out**
  USB mass storage device Start Unit command time-out.
- **Device power-up delay**
  Maximum time the device will take before it properly reports itself to the Host Controller.

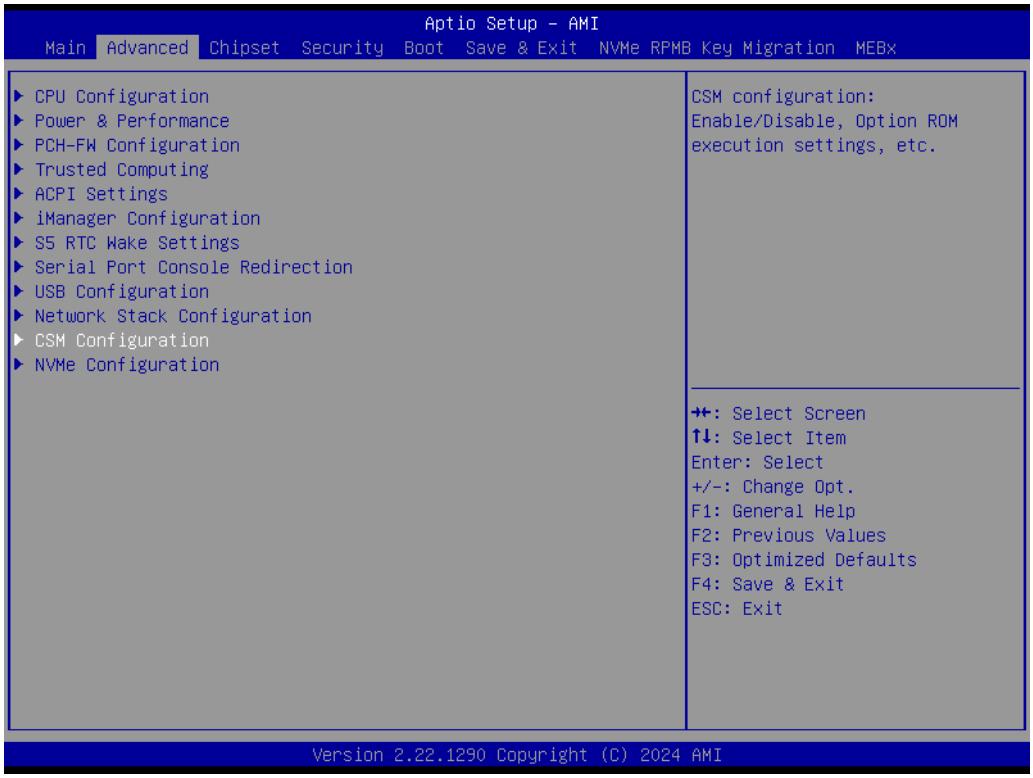
3.2.2.10 Network Stack Configuration

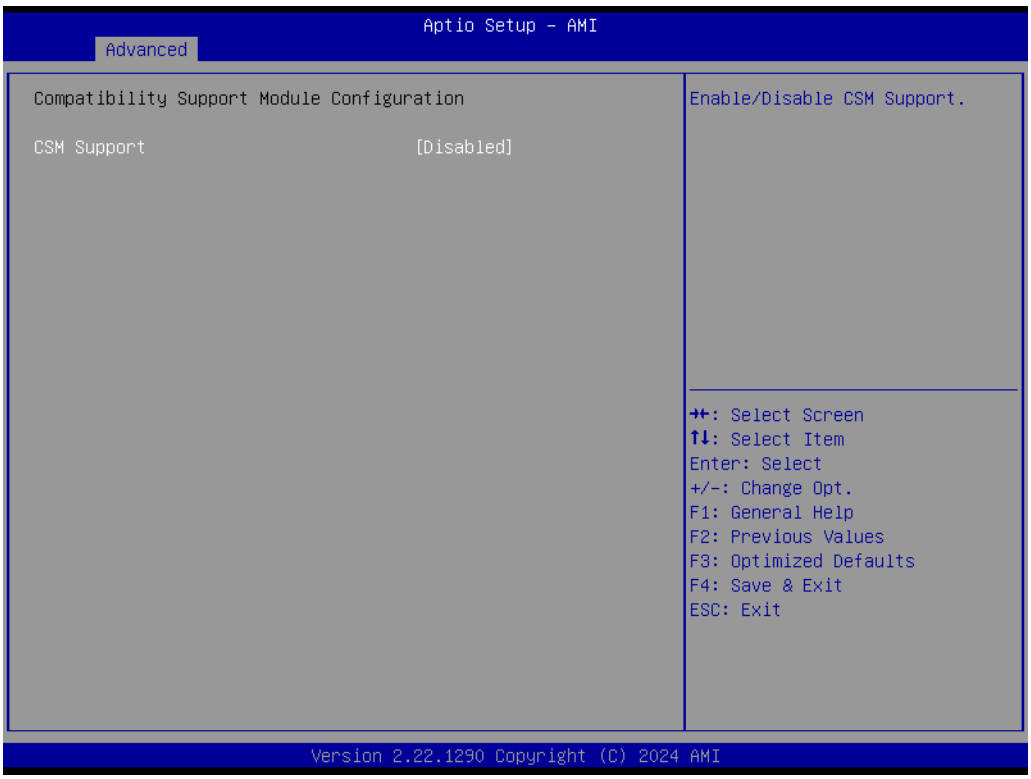




- **Network Stack**
  Enable/Disable UEFI Network Stack.

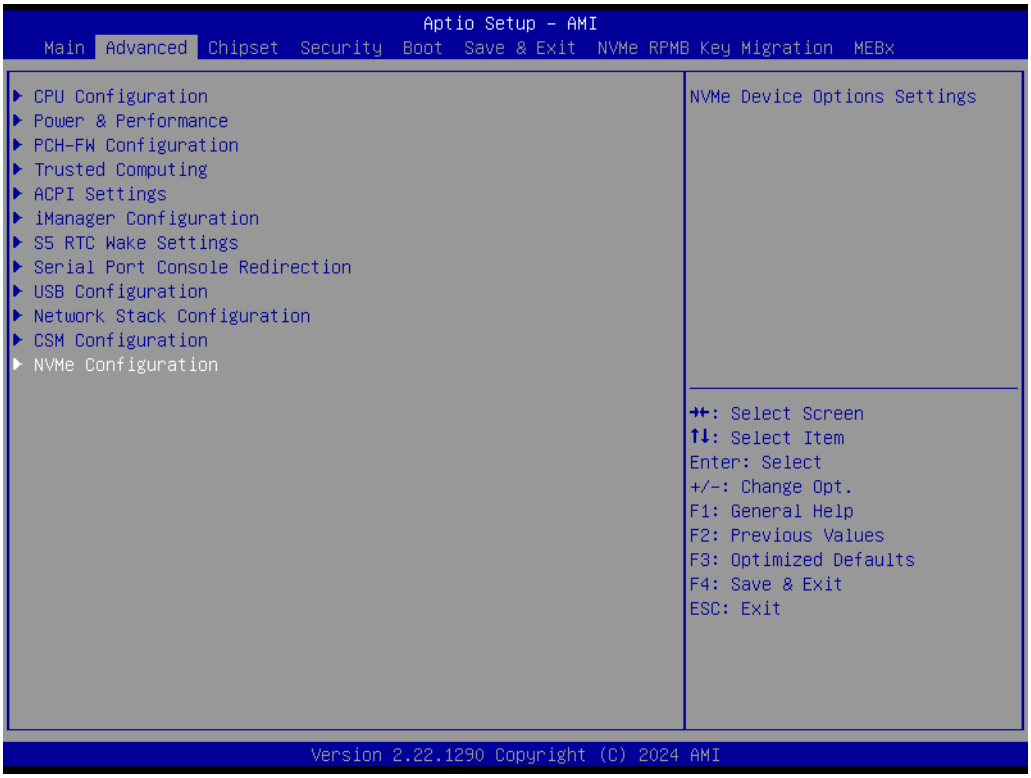
3.2.2.11 CSM Configuration

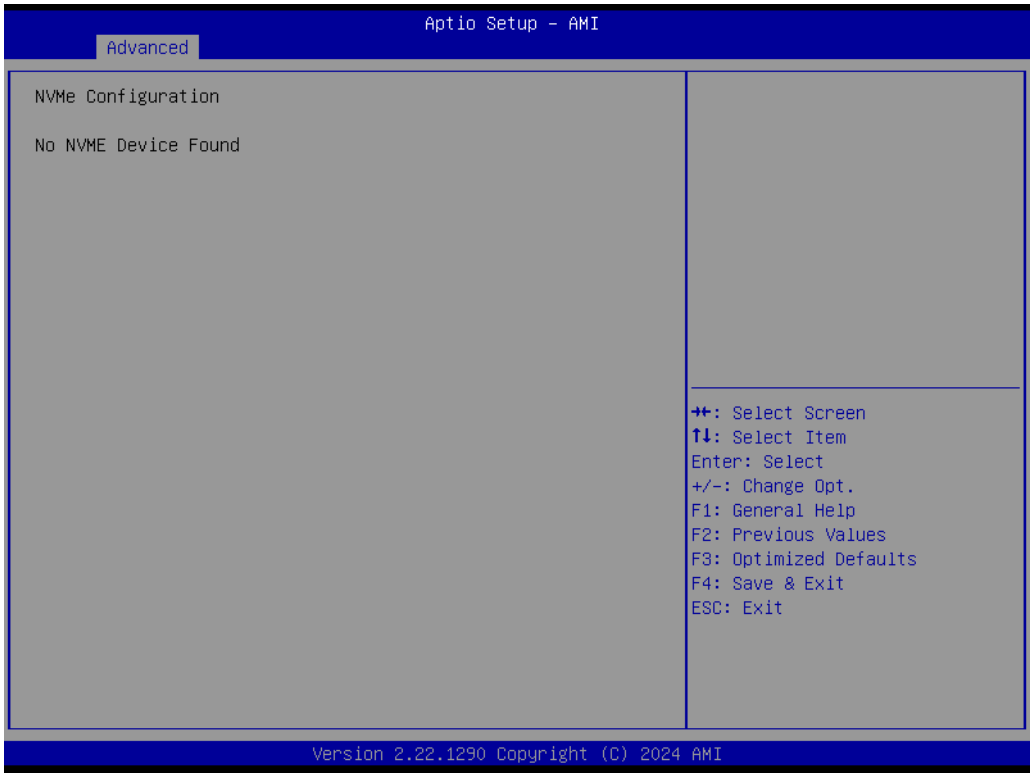




- **CSM Support**
  Enable/Disable CSM Support.

3.2.2.12 NVME Configuration



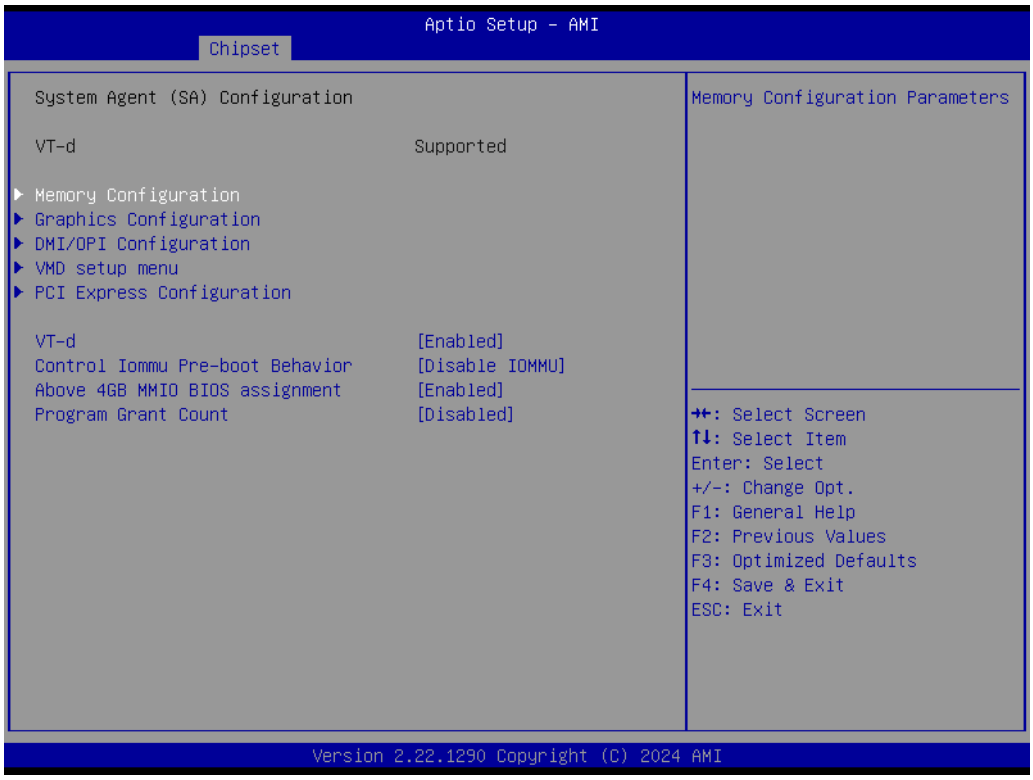

Aptio Setup – AMI
Advanced
NVMe Configuration
No NVME Device Found
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1290 Copyright (C) 2024 AMI

3.2.3 Chipset Configuration

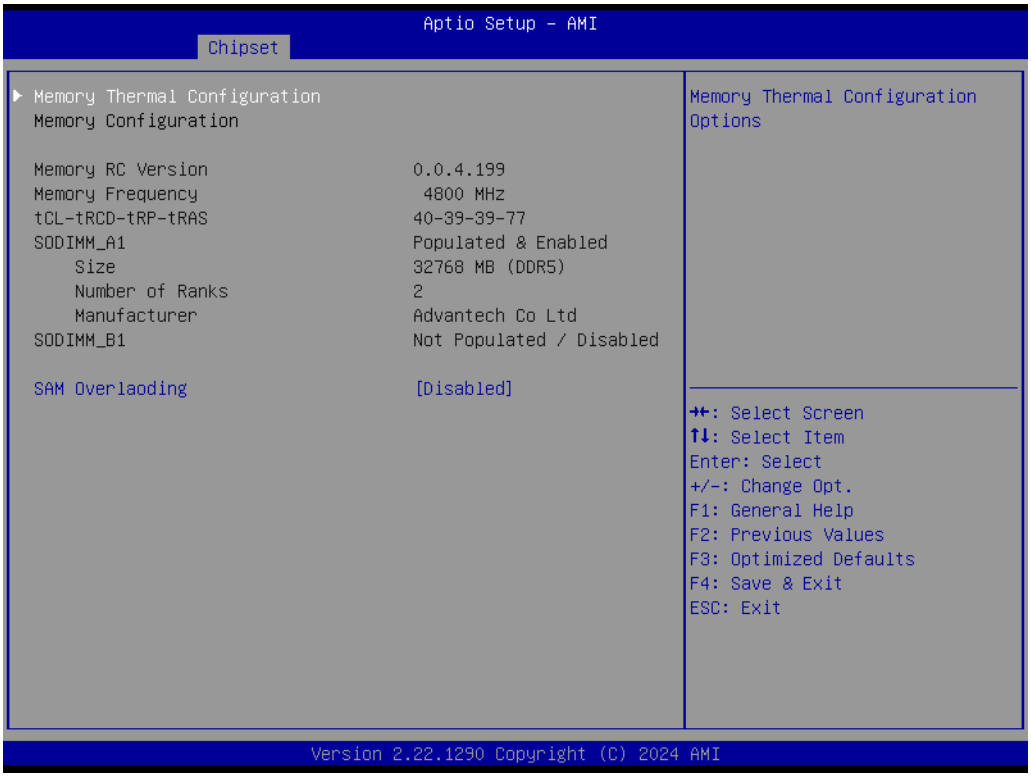
Select the Chipset tab from the AIR-310 setup screen to enter the Chipset BIOS Setup screen. You can display a Chipset BIOS Setup option by highlighting it using the <Arrow> keys. All Plug-and-Play BIOS Setup options are described in this section. The Plug-and-Play BIOS Setup screen is shown below.

3.2.3.1 System Agent Configuration

Memory Configuration Options

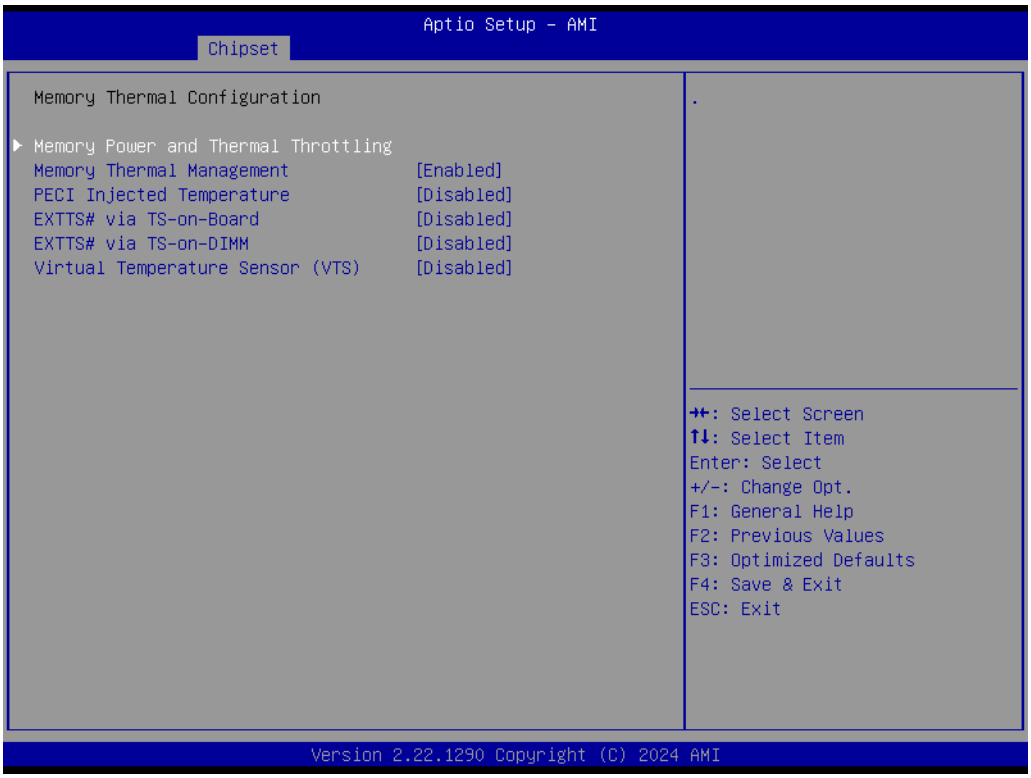


- **VT-d**
  VT-d capability.
- **Control Iommu Pre-boot Behavior**
- **Above 4GB MMIO BIOS assignment**
- Enable/Disable above 4GB Memory Mapped I/O BIOS assignment. This is enabled automatically when the Aperture Size is set to 2048MB.
- **Program Grant Count**
  Enable/Disable Programming Of Grant Count.



– **SAM Overloading**
Enable/Disable SAM Overloading.

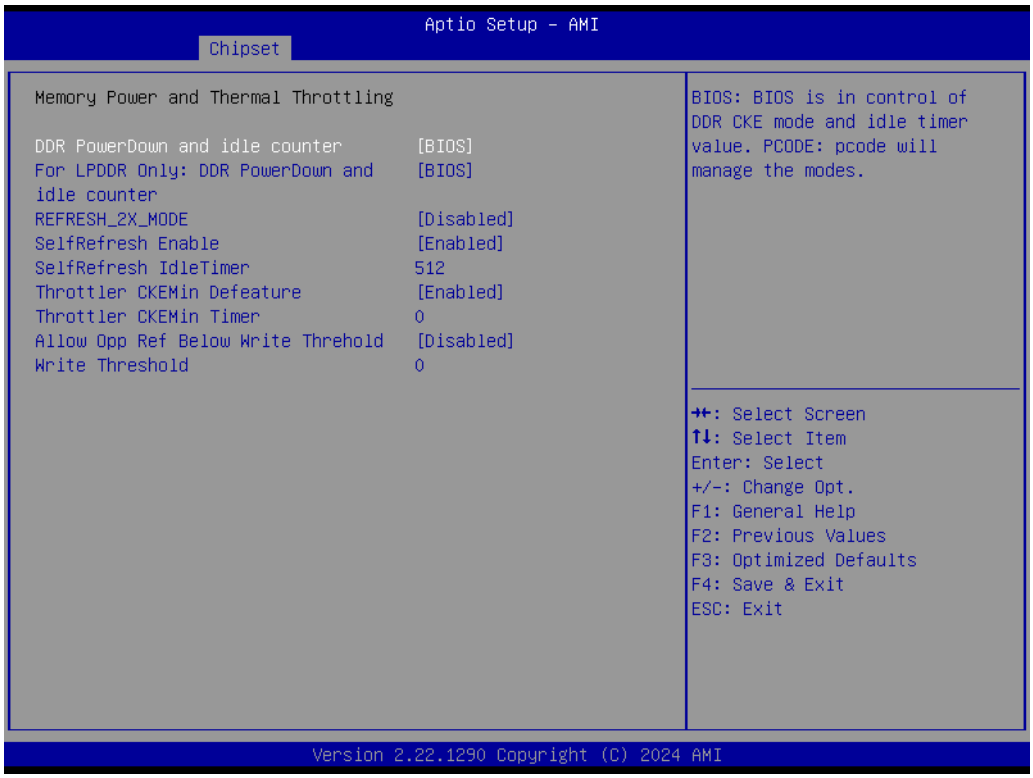
■ Memory Thermal Configuration



– **Memory Thermal Management**
Enable/Disable Memory Thermal Management.

- **PECI Injected Temperature**
  Enable/Disable memory temperatures to be injected to the processor via PECI.
- **EXTTS# via TS-on-Board**
  Enable/Disable routing TS-on-Board's ALERT# and THERM# to EXTTS# pins on the PCH.
- **EXTTS# via TS-on-DIMM**
  Enable/Disable routing TS-on-DIMM's ALERT# to EXTTS# pin on the PCH.
- **Virtual Temperature Sensor (VTS)**
  Enable/Disable Virtual Temperature Sensor (VTS).

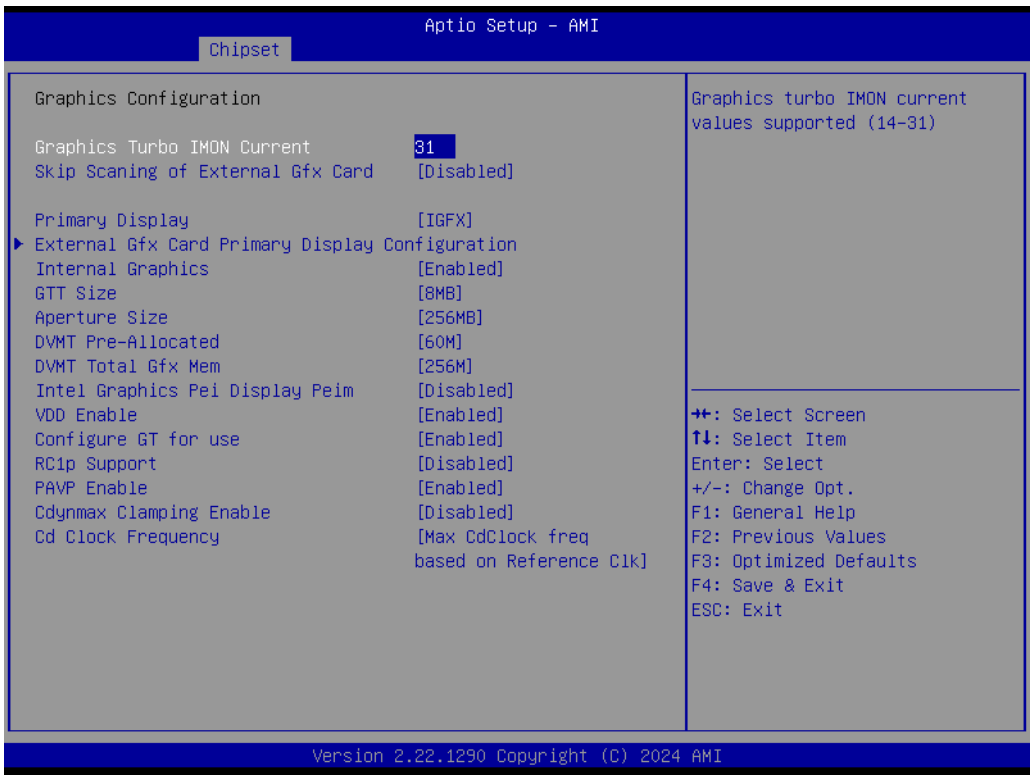
Memory Power and Thermal Throttling



- **DDR PowerDown and idle counter**
  BIOS: BIOS is in control of DDR CKE mode and idle timer value. PCODE: pcode will manage the modes.
- **For LPDDR only: DDR PowerDown and idle counter**
  For LPDDR Only: BIOS: BIOS is in control of DDR CKE mode and idle timer value.
  PCODE: pcode will manage the modes.
- **REFRESH_2X_MODE**
  0- Disabled 1-iMC enables 2xRef when Warm and Hot 2- iMC enables 2xRef when Hot.
- **SelfRefresh Enable**
  Enable, Disable(Enable= Def)
- **SelfRefresh IdleTimer**
  Range [64K-1;512]in DLCK800s, (512= Def)
- **Throttler CKEMin Defeature**
  On, Off.

- **Throttler CKEMin Timer**
  Timer value for CKEMin, range[255;0]. Req'd min of SC_ROUND_T + BYTE_LENGTH (4).
- **Allow Opp Ref Below Write Threshold**
  Allow opportunistic refreshes while we don't exit power down.
- **Write Threshold**
  Number of writes that can be accumulated while CKE is low before CKE is asserted.

Graphics Configuration



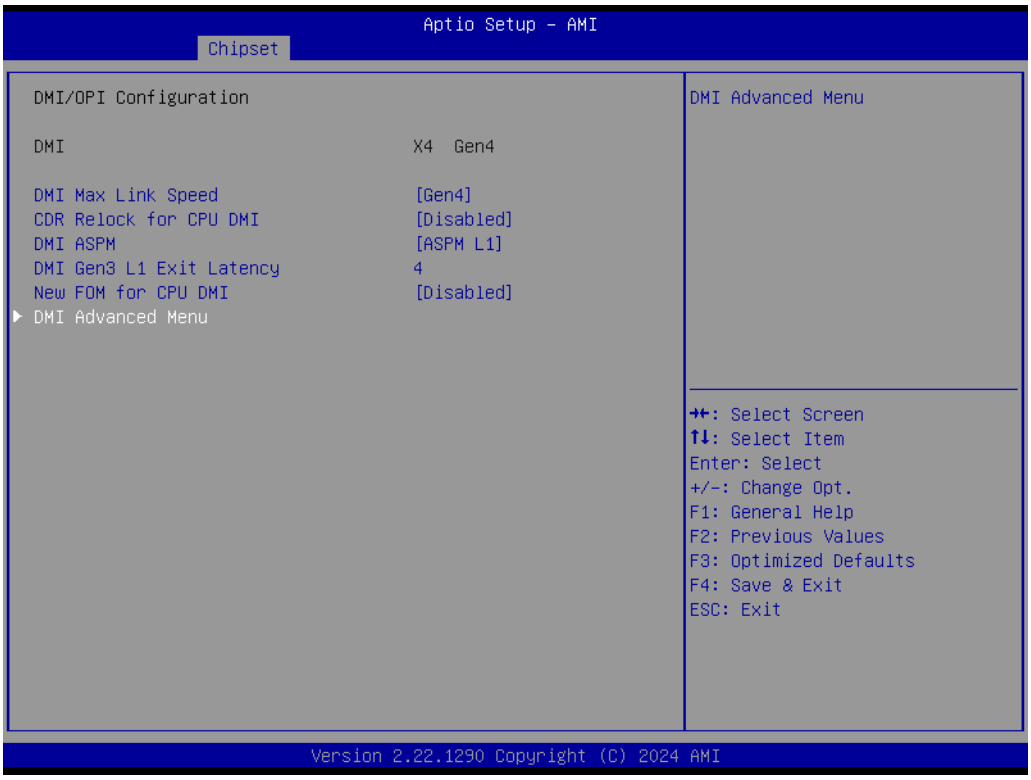
- **Graphics Turbo IMON current**
  Graphics turbo IMON current values supported (14-31).
- **Skip Scanning of External Gfx Card**
  If Enabled, it will not scan for External Gfx Card on PEG and PCH PCIE Ports.
- **Primary Display**
  Select from IGFX/PEG/PCI, which graphics device should be Primary Display or select SG for Switchable Gfx.
- **External Gfx Card Primary Display Configuration**
  Select the card used on the platform.
- **Internal Graphics**
  Keep IGFX enabled based on the setup options.
- **GTT Size**
  Select the GTT Size.
- **Aperture Size**
  Select the Aperture Size.
- **DVMT Pre-Allocated**
  Select DVMT 5.0 Pre-Allocated (Fixed) Graphics Memory size used by the Internal Graphics Device.
- **Intel Graphics Pei Display Peim**
  Enable/Disable Pei (Early) Display.
- **VDD Enable**
  Enable/Disable forcing of VDD in the BIOS.
- **Configure GT for use**
  Enable/Disable GT configuration in the BIOS.
- **RC1p Support**
  Enable/Disable RC1p support. If RC1p is enabled, send a RC1p frequency request to PMA based other conditions being met.

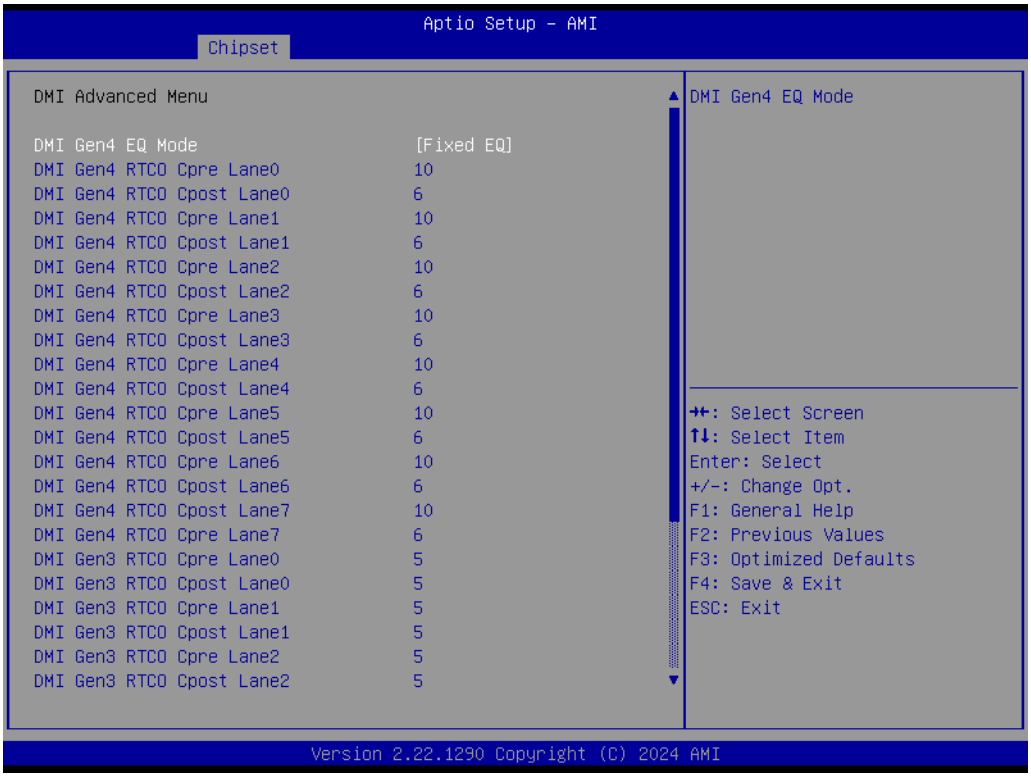
– **PAVP Enable**
  Enable/Disable PAVP.
– **Cdynmax Clamping Enable**
  Enable/Disable Cdynmax Clamping.
– **Cd Clock Frequency**
  Select the highest Cd Clock frequency supported by the platform.

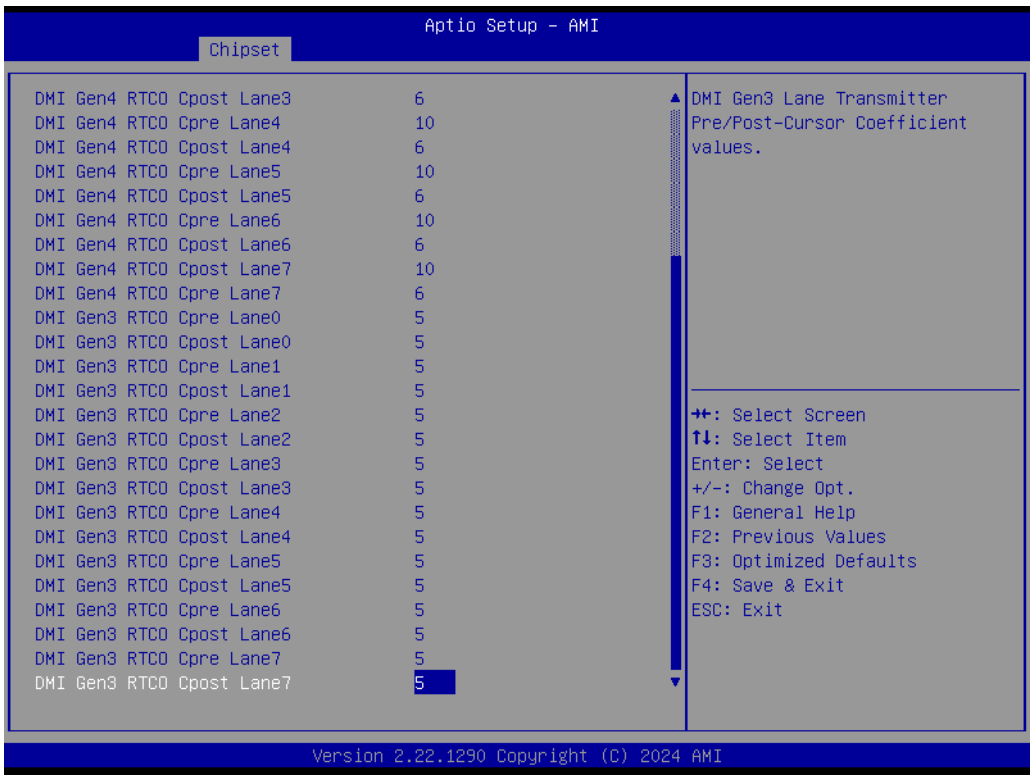
DMI/OPI Configuration

- **DMI Max Link Speed**
  Set DMI Speed Gen1/Gen2/Gen3.
- **CDR Relock for CPU DMI**
  Enable/Disable CDR Relock.
- **DMI ASPM**
  DMI ASPM Support.
- **DMI Gen3 L1 Latency**
  DMI Gen3 L1 Exit Latency.
- **New FOM for CPU DMI**
  Enable/Disable New FOM.

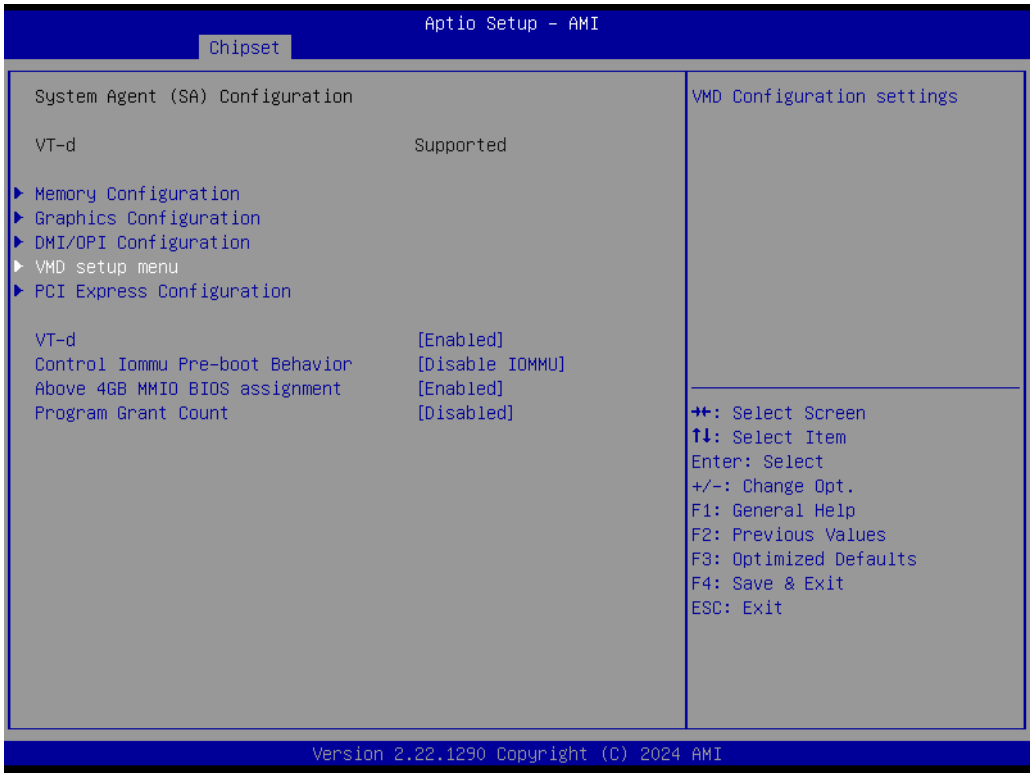
DMI Advanced Menu

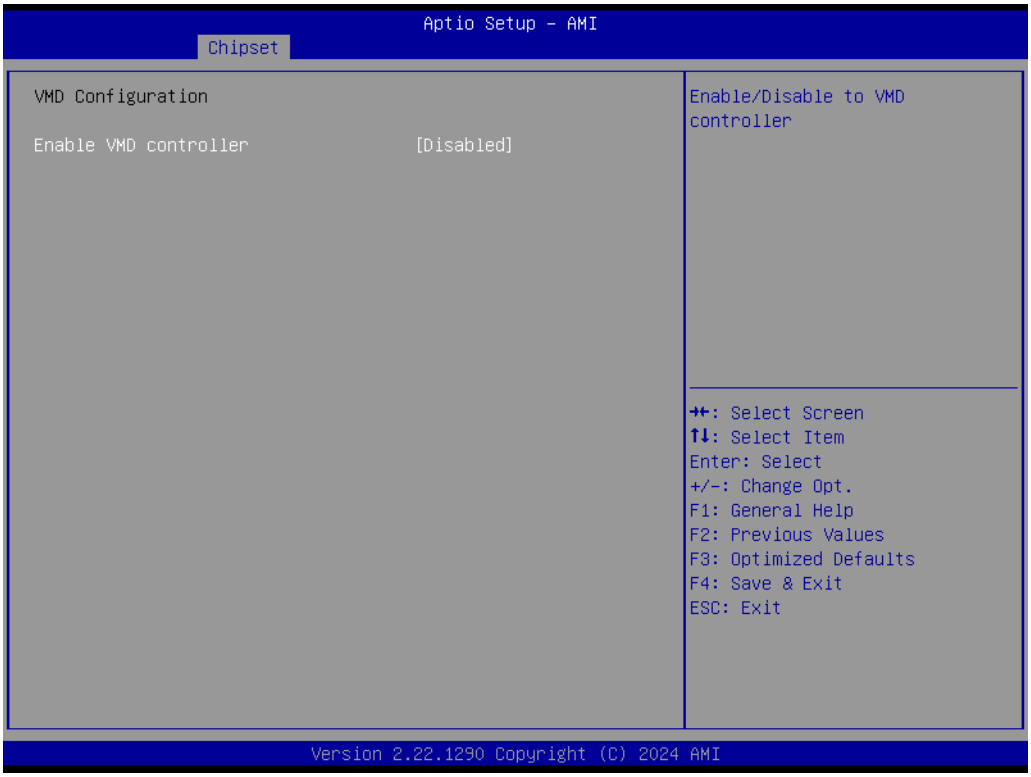






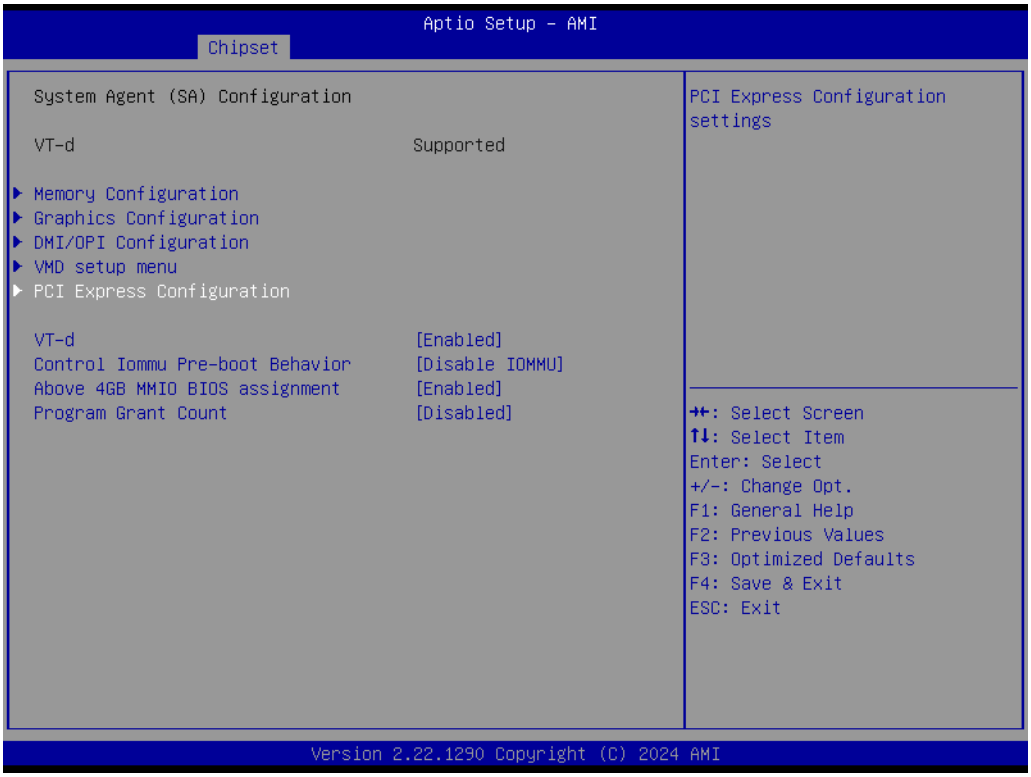
VMD Setup Menu

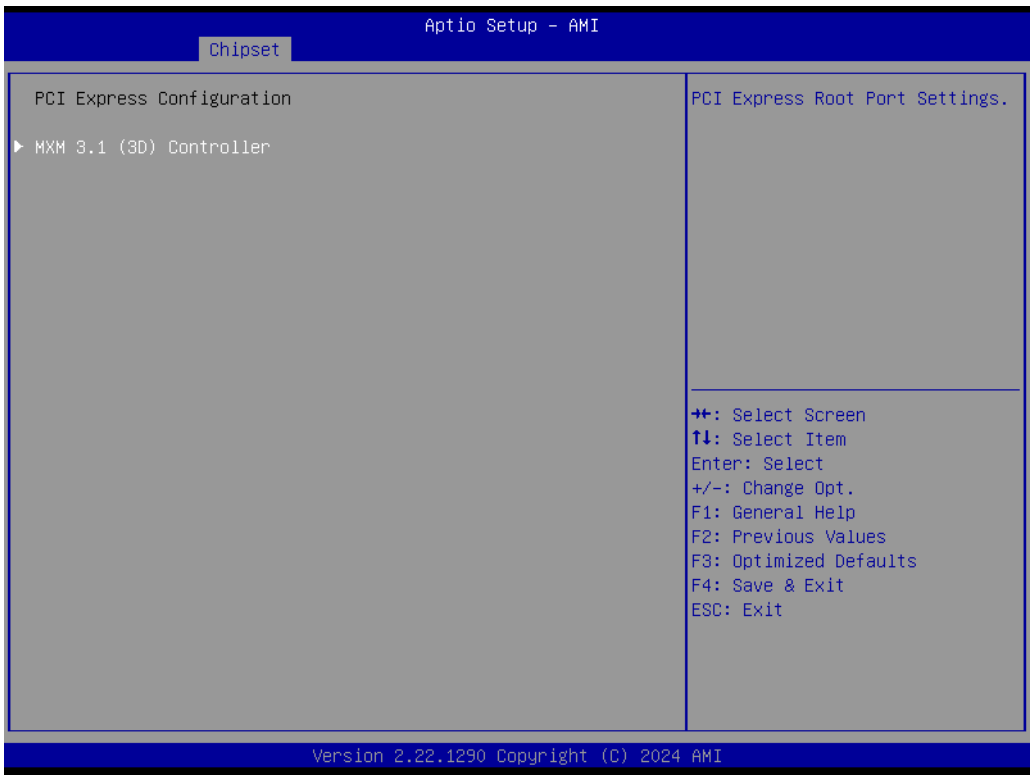


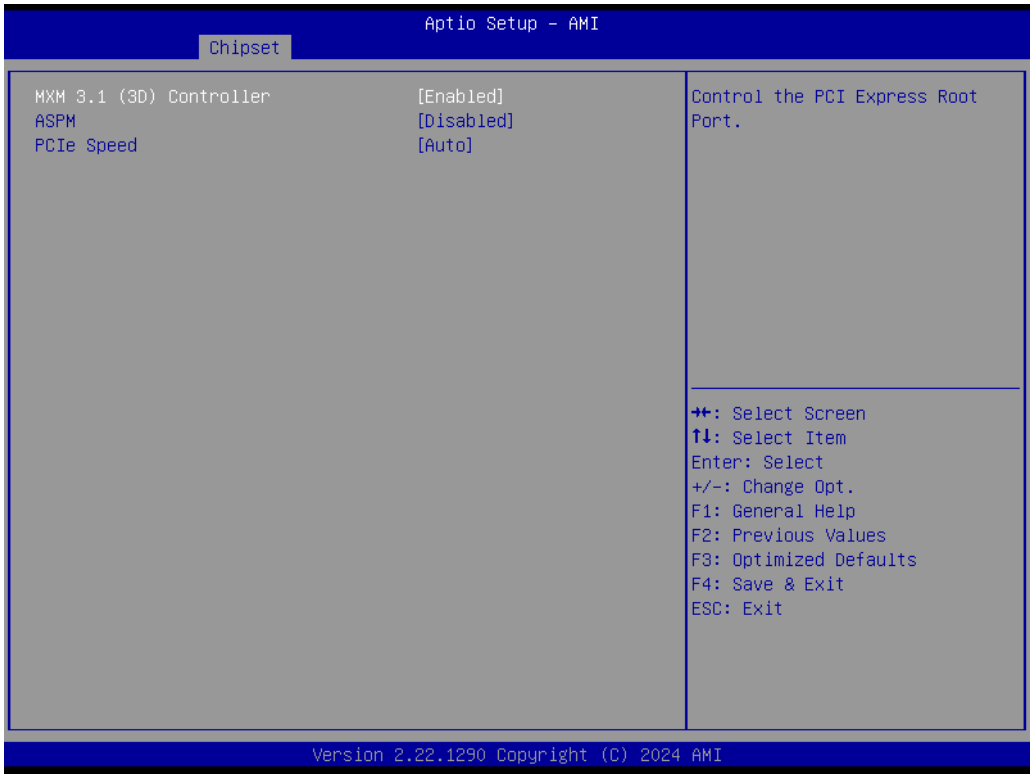


– **Enable VMD Controller**
Enable/Disable to VMD controller.

■ PCI Express Configuration

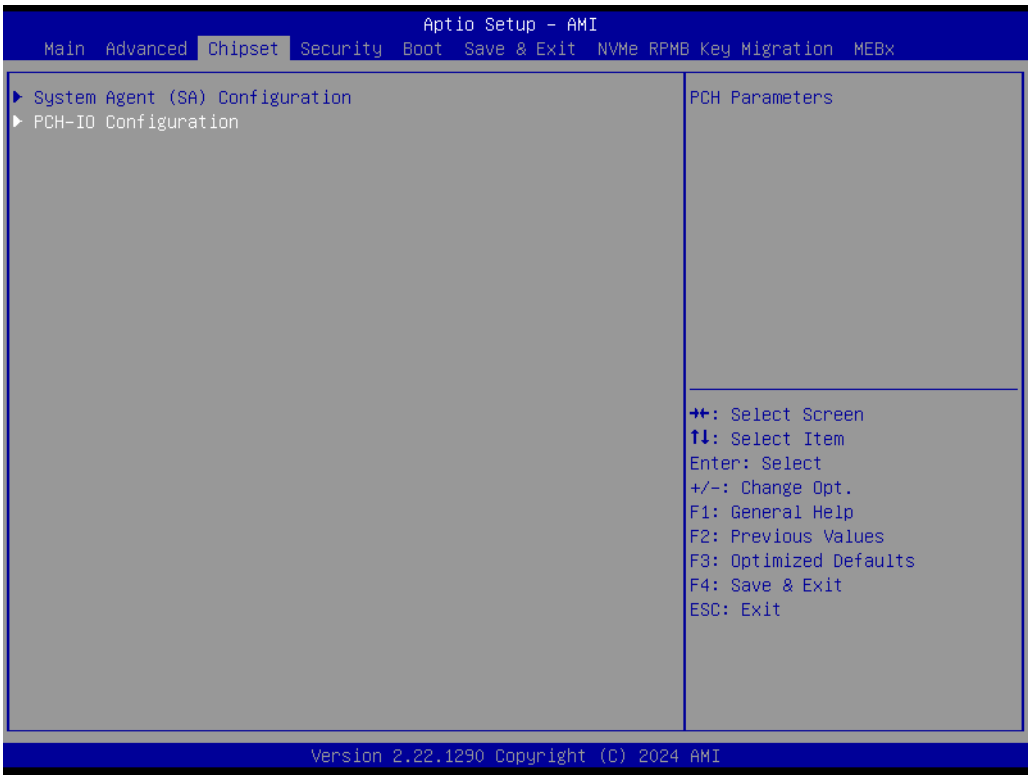


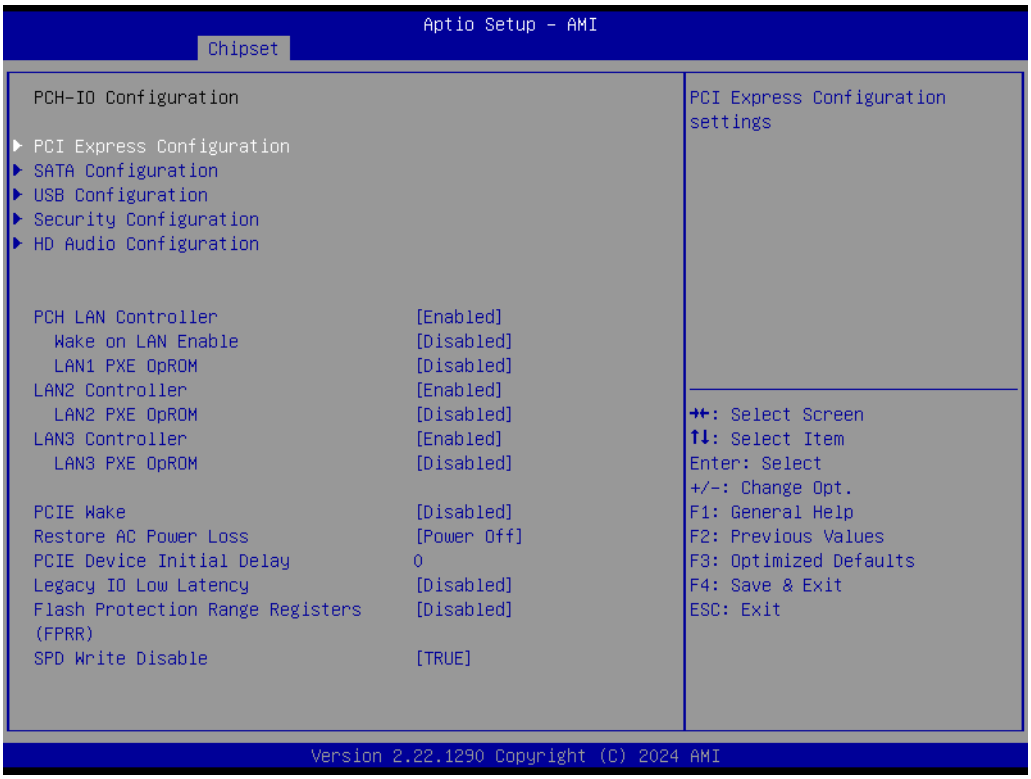




- **MXM 3.1 (3D) Controller**
  PCI Express Root Port Settings.
- **ASPM**
  PCI Express Active State Power Management settings.
- **PCIe Speed**
  Configure PCIe Speed.

3.2.3.2 PCH-IO Configuration

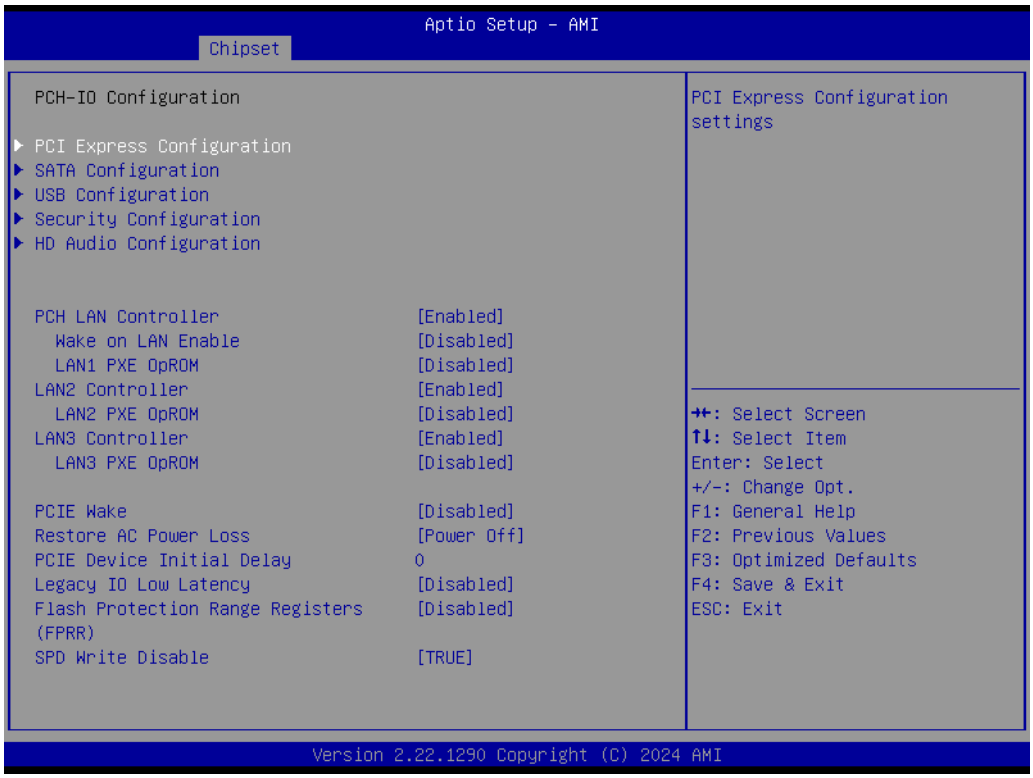


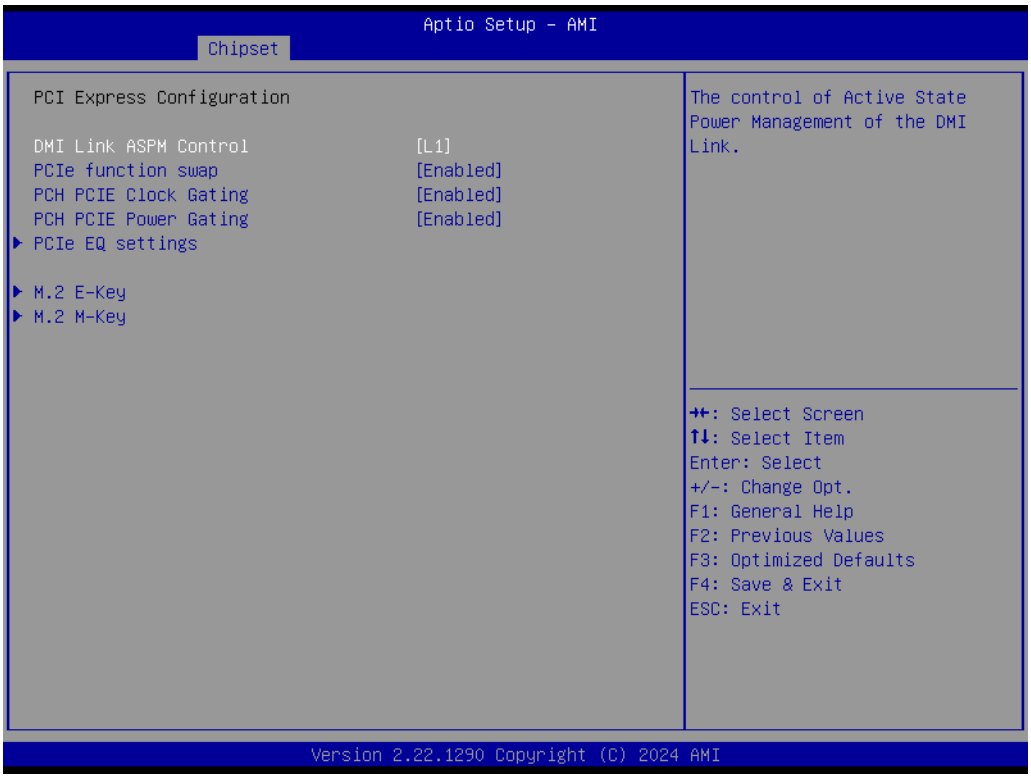


- **LAN1~3 Controller**
  Enable/Disable onboard NIC.
- **Wake on LAN Enable**
  Enable/Disable integrated LAN to wake the system.

- **LAN1~3 PXE OpROM**
  Enable or disable the boot option for the LAN1 Controller.
- **PCIE Wake**
  Enable or disable PCIE to wake the system from S5.
- **Restore AC Power Loss**
  Specify what state to go to when power is re-applied after a power failure (G3 state).
- **PCIE Device Initial Delay**
  The PCIE device initial delay 0~30 seconds.
- **Legacy IO Low Latency**
  Set to enable low latency of legacy IO. Some systems require lower IO latency irrespective of power. This is a tradeoff between power and IO latency.
- **Flash Protection Range Registers (FPRR)**
  Enable Flash Protection Range Registers.
- **SPD Write Disable**
  Enable/Disable setting SPD Write Disable. For security recommendations, SPD write disable bit must be set.

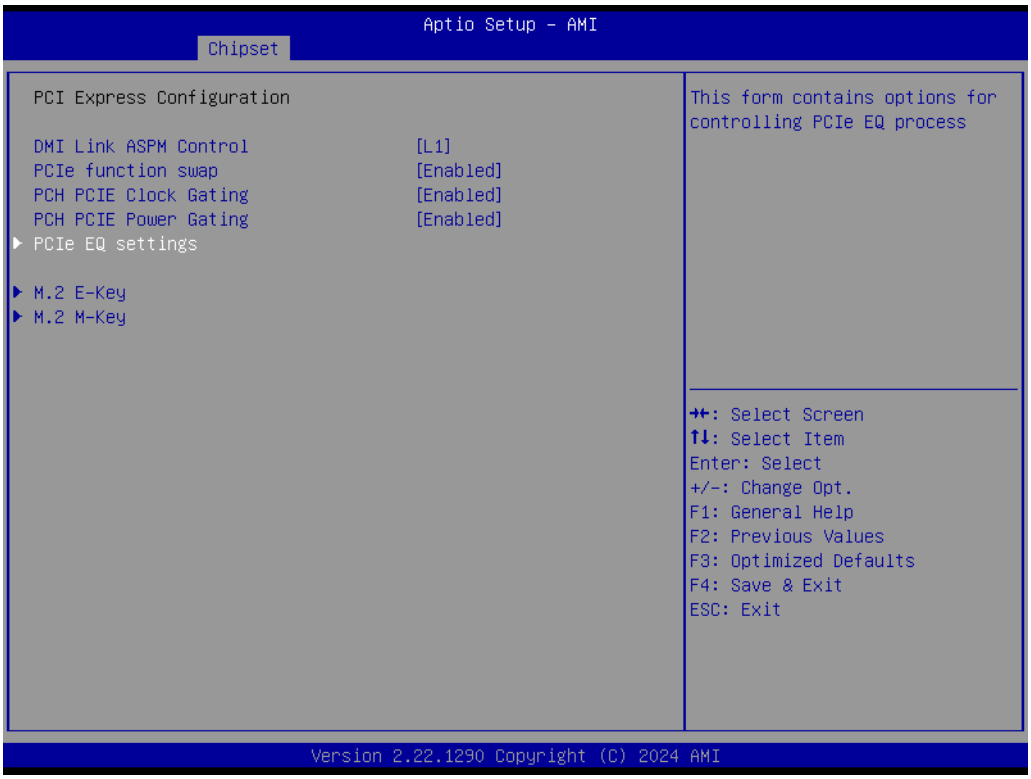
- **PCI Express Configuration**

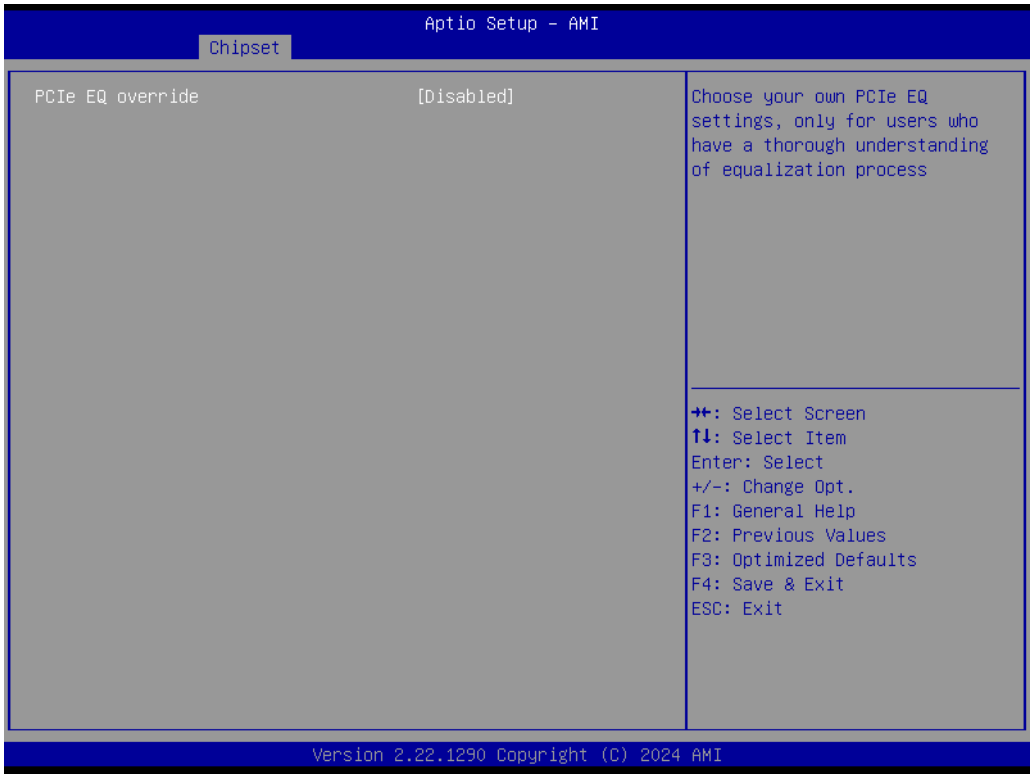




– **DMI Link ASPM Control**
The control of Active State Power Management of the DMI Link.

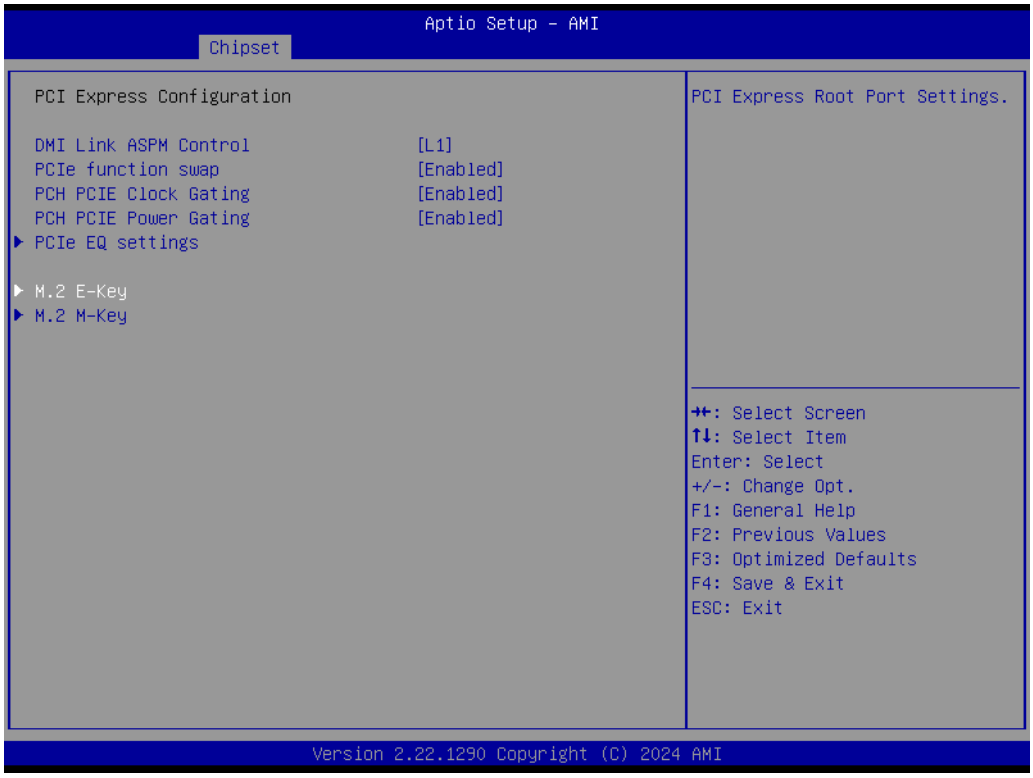
– **PCIe function swap**
Enable/Disable PCIe function swap.

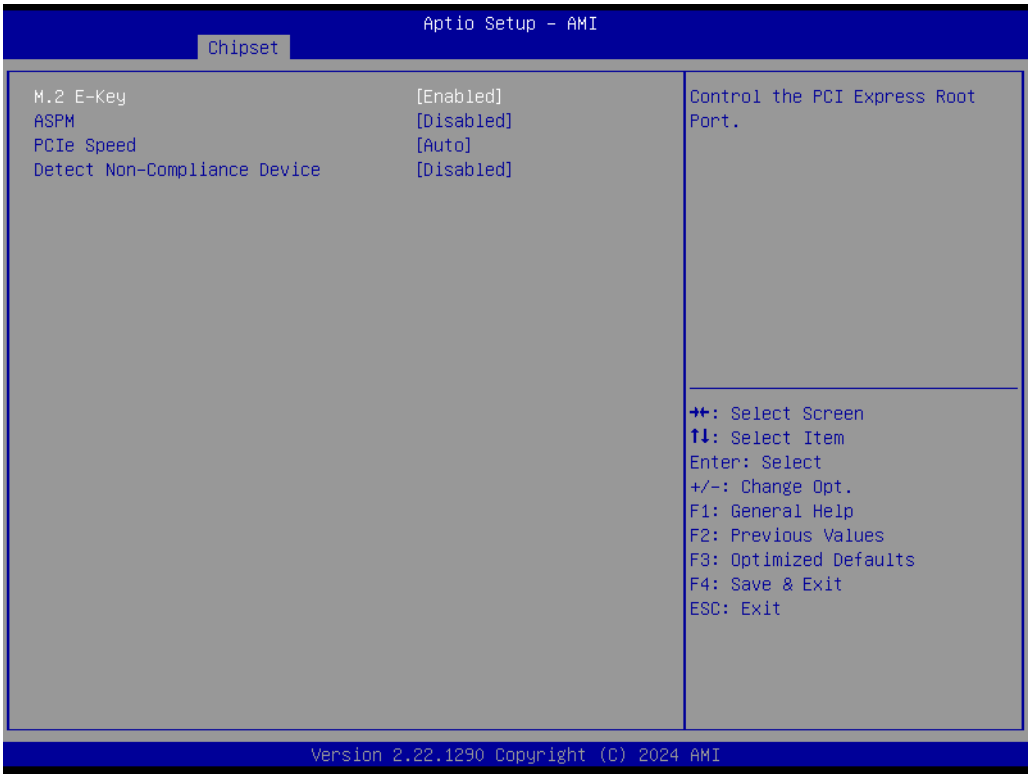




– **PCIe EQ override**
Choose your own PCIe EQ settings. This is only for users who have a thorough understanding of the equalization process.

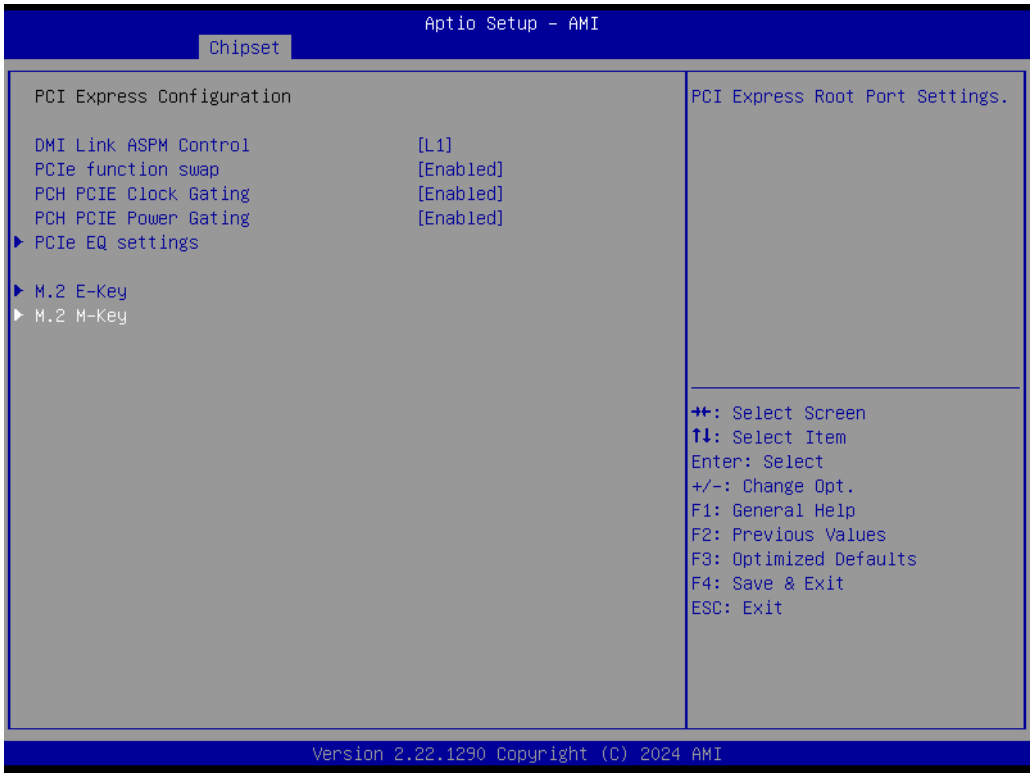
■ M.2 E-Key

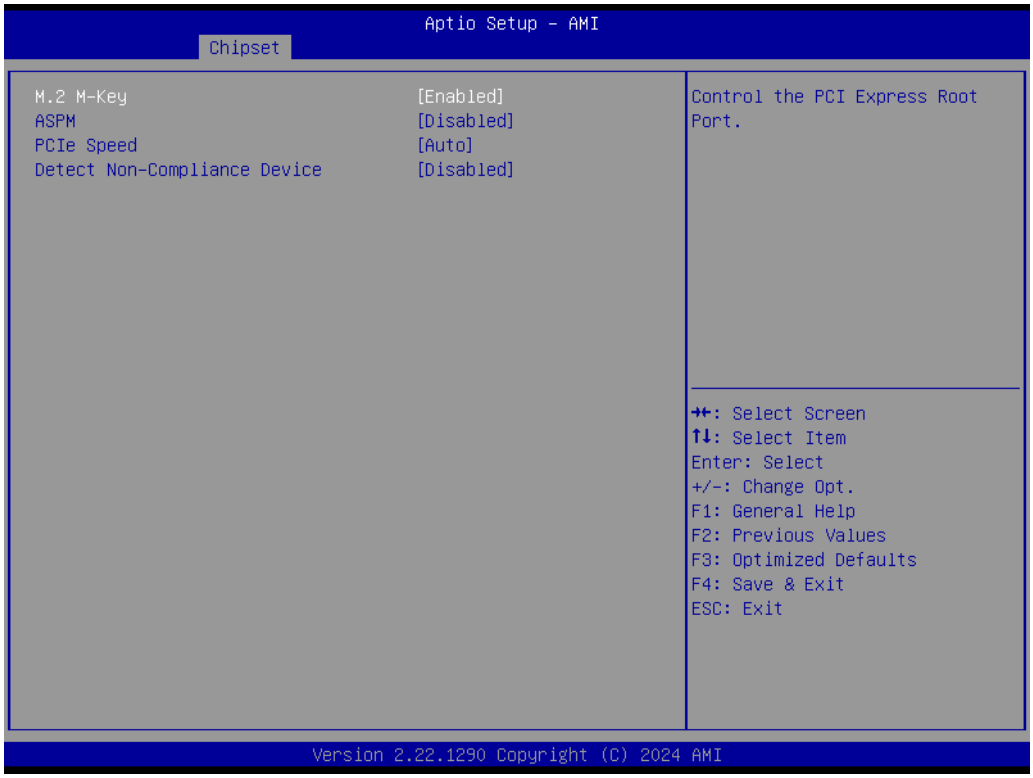




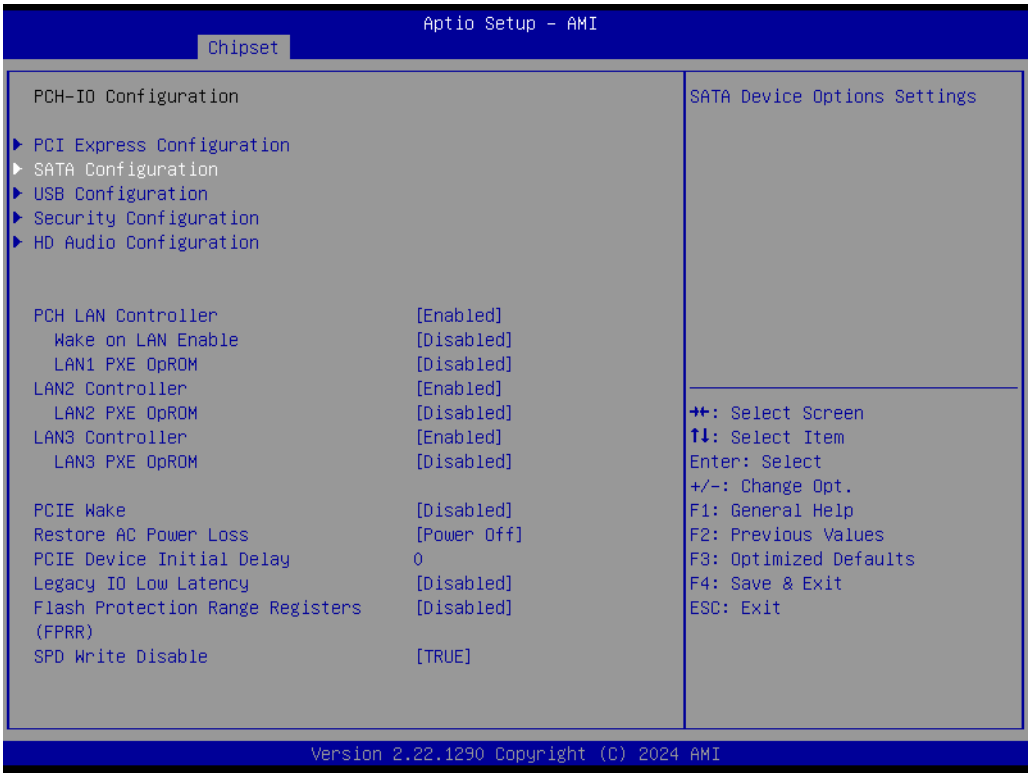
- **ASPM**
  PCI Express Active State Power Management settings.
- **PCIe Speed**
  Configure PCIe Speed.
- **Detect Non-Compliance Device**
  Detect Non-Compliance PCI Express Device. If enabled, it will take more time at POST.

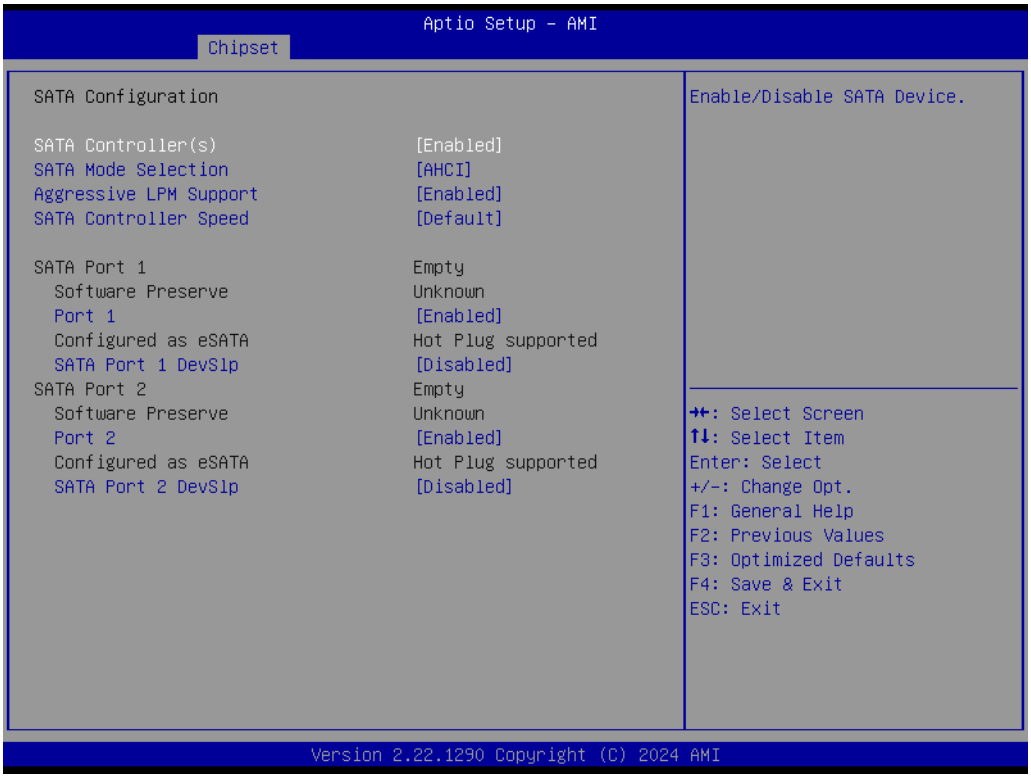
M.2 M-Key


Aptio Setup – AMI
Chipset
PCI Express Configuration
DMI Link ASPM Control [L1]
PCIe function swap [Enabled]
PCH PCIE Clock Gating [Enabled]
PCH PCIE Power Gating [Enabled]
PCIe EQ settings
M.2 E-Key
M.2 M-Key
PCI Express Root Port Settings.
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1290 Copyright (C) 2024 AMI


Aptio Setup – AMI
Chipset
M.2 M-Key [Enabled]
ASPM [Disabled]
PCIe Speed [Auto]
Detect Non-Compliance Device [Disabled]
Control the PCI Express Root Port.
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1290 Copyright (C) 2024 AMI

SATA Configuration

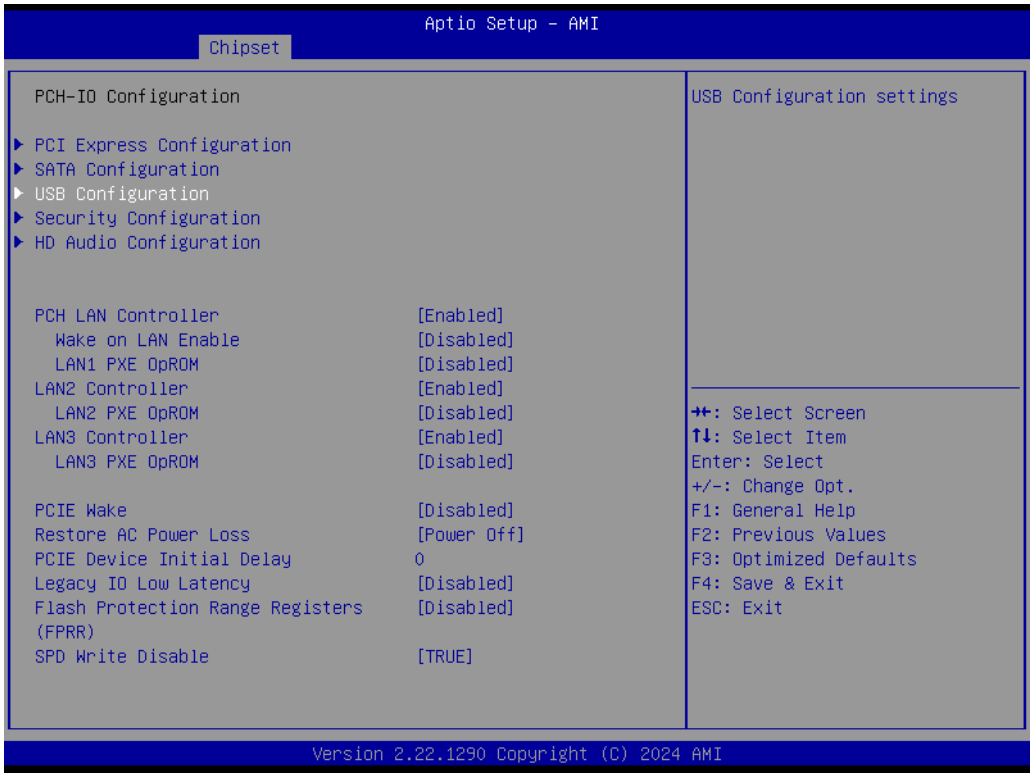


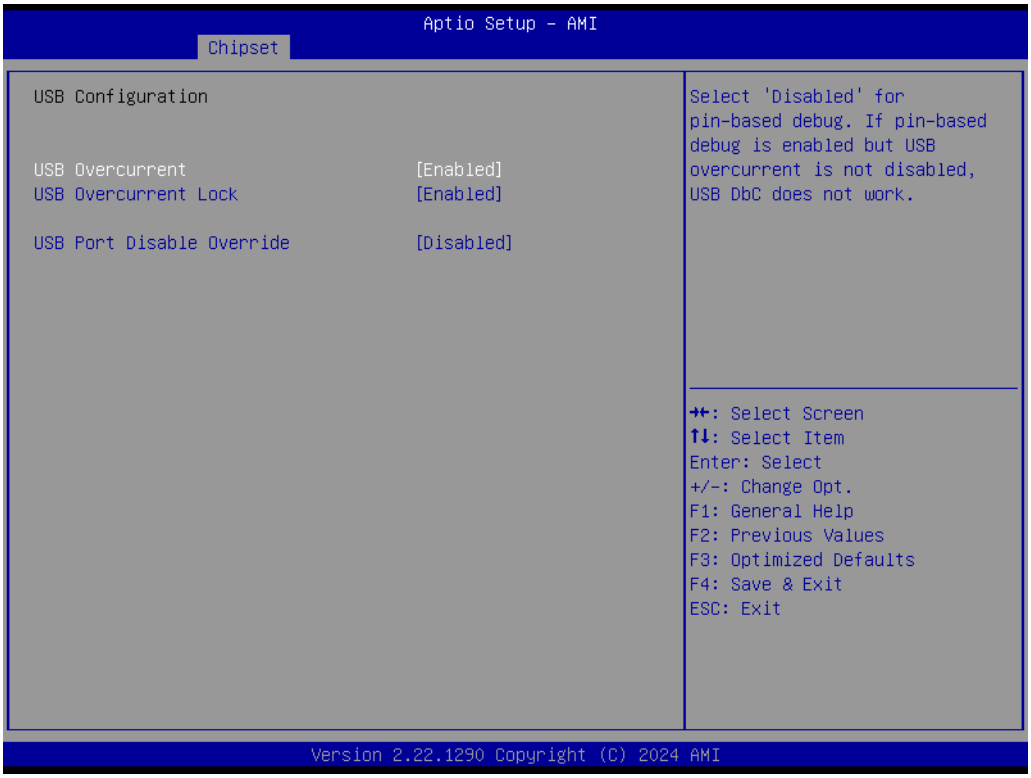


- **SATA Controller(s)**
  Enable/Disable SATA Device.
- **SATA Mode Selection**
  Determines how SATA controller(s) operate.

- **Aggressive LPM Support**
  Enable PCH to aggressively enter link power state.
- **SATA Controller Speed**
  Indicates the maximum speed the SATA controller can support.
- **SATA Port 1~2**
  Enable or Disable SATA Port
- **SATA Port 1 DevSlp**
  Enable/Disable SATA Port 1 DevSlp. For DevSlp to work, both hard drive and SATA ports need to support DevSlp function, otherwise an unexpected behavior might happen. Please check the board design before enabling it.

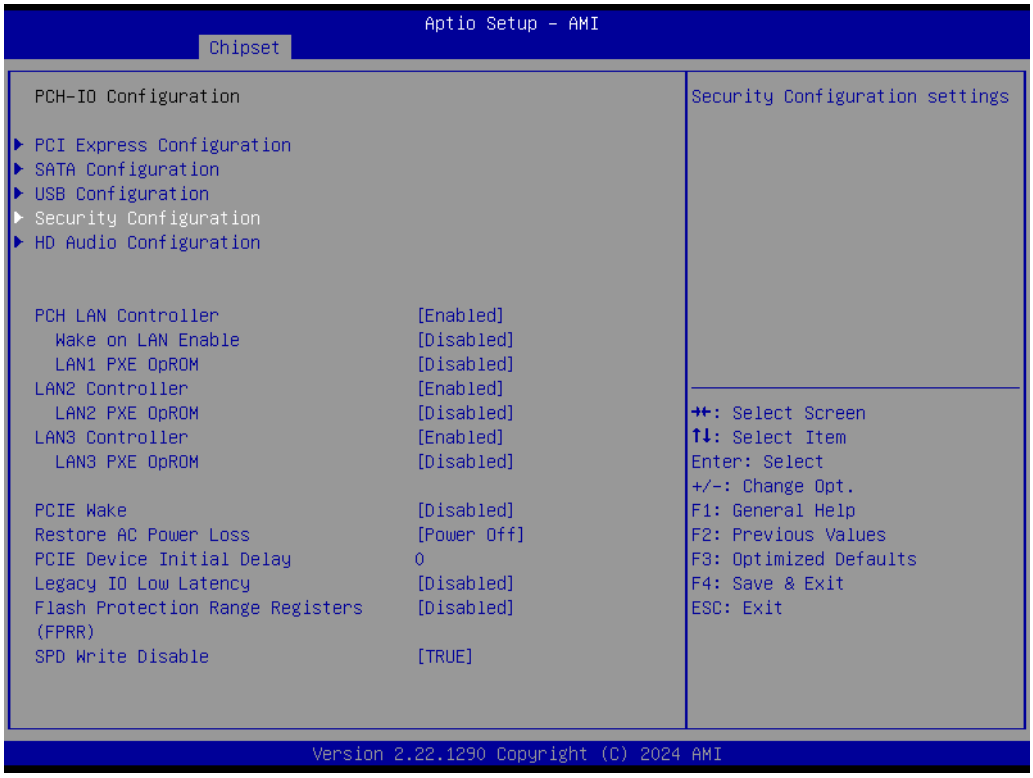
USB Configuration

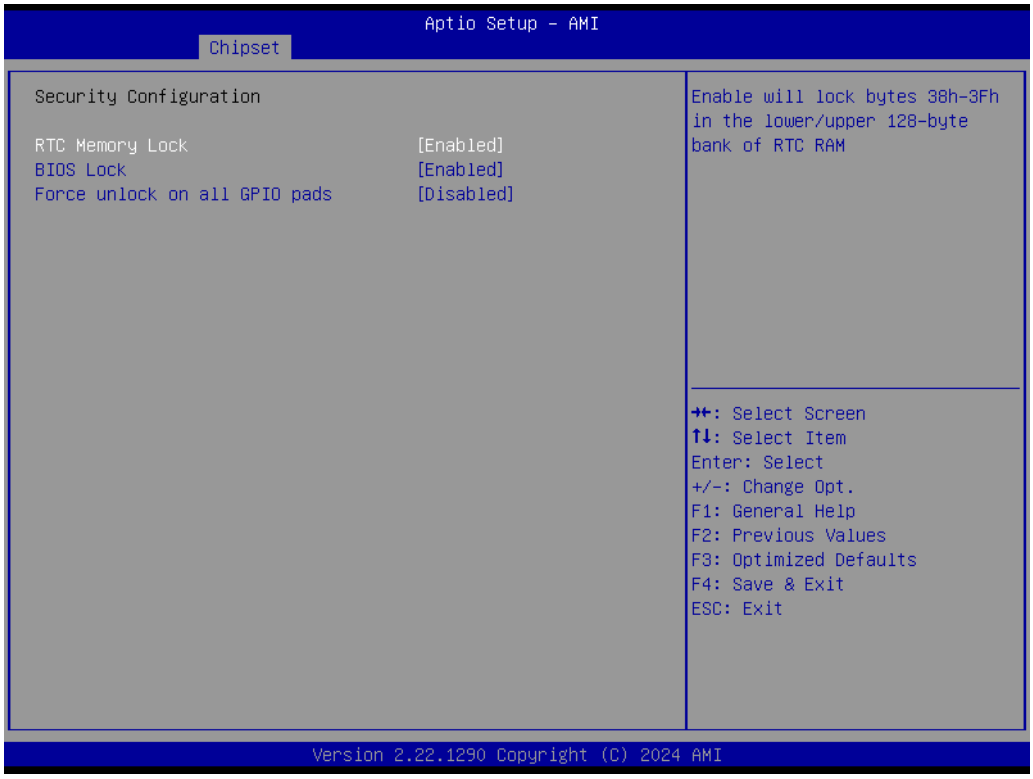




- **USB Overcurrent**
  Select 'Disabled' for pin-based debug. If pin-based debug is enabled but USB overcurrent is not disabled, USB DbC will not work.
- **USB Overcurrent Lock**
  Select 'Enabled' if Overcurrent functionality is used. Enabling this will make xHCI controller consume the Overcurrent mapping data.
- **USB Port Disable Override**
  Selectively Enable/Disable the corresponding USB port from reporting a Device Connection to the controller.

Security Configuration

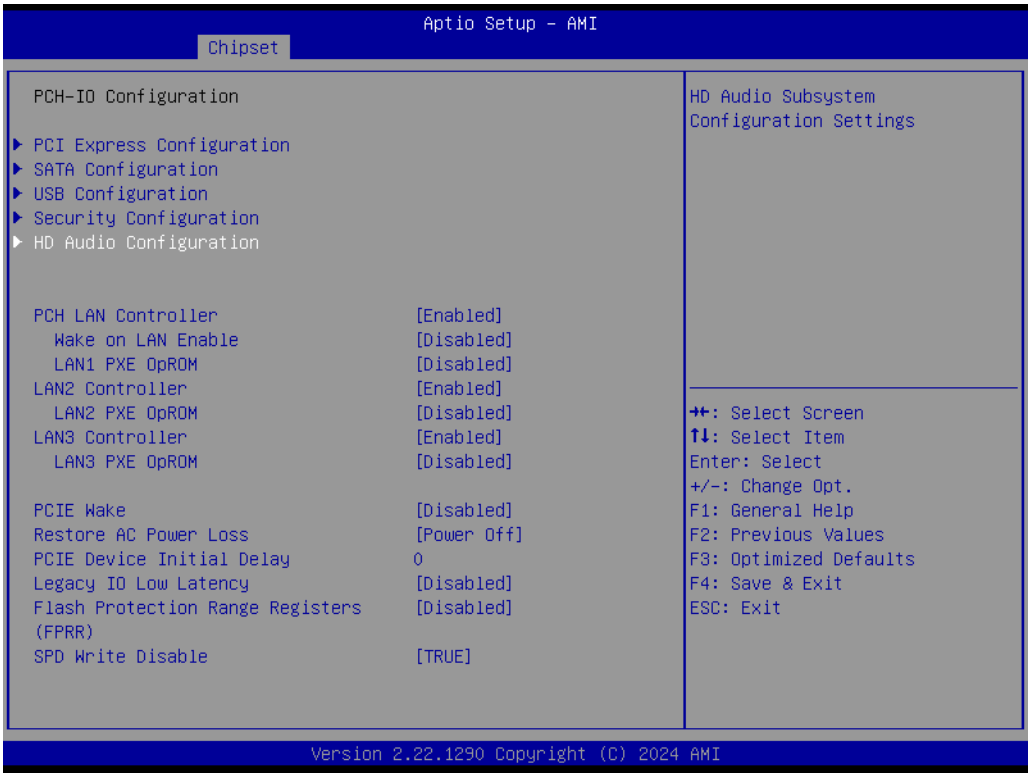


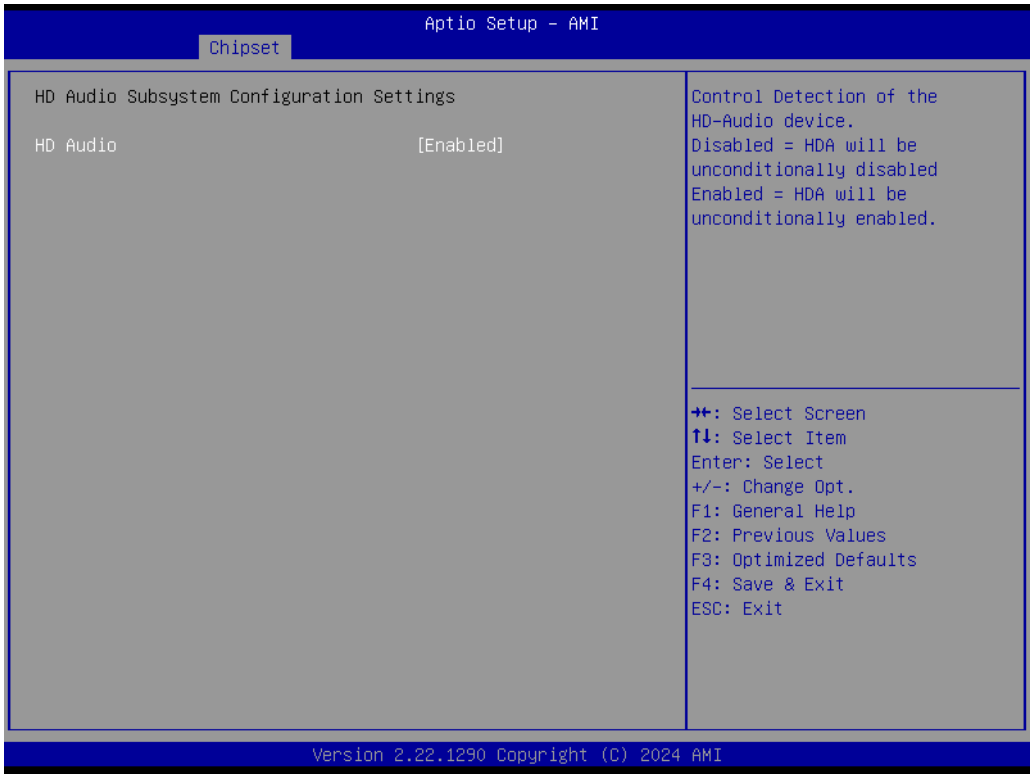


– **RTC Memory Lock**
Enable will lock bytes 38h-3Fh in the lower/upper 128-byte bank of RTC RAM.

– **BIOS Lock**
  Enable/Disable the PCH BIOS Lock Enable feature. It is required to be enabled to ensure SMM protection of flash.
– **Force unlock on all GPIO pads**
  If Enabled, the BIOS will force all GPIO pads to be in the unlocked state.

HD Audio Configuration

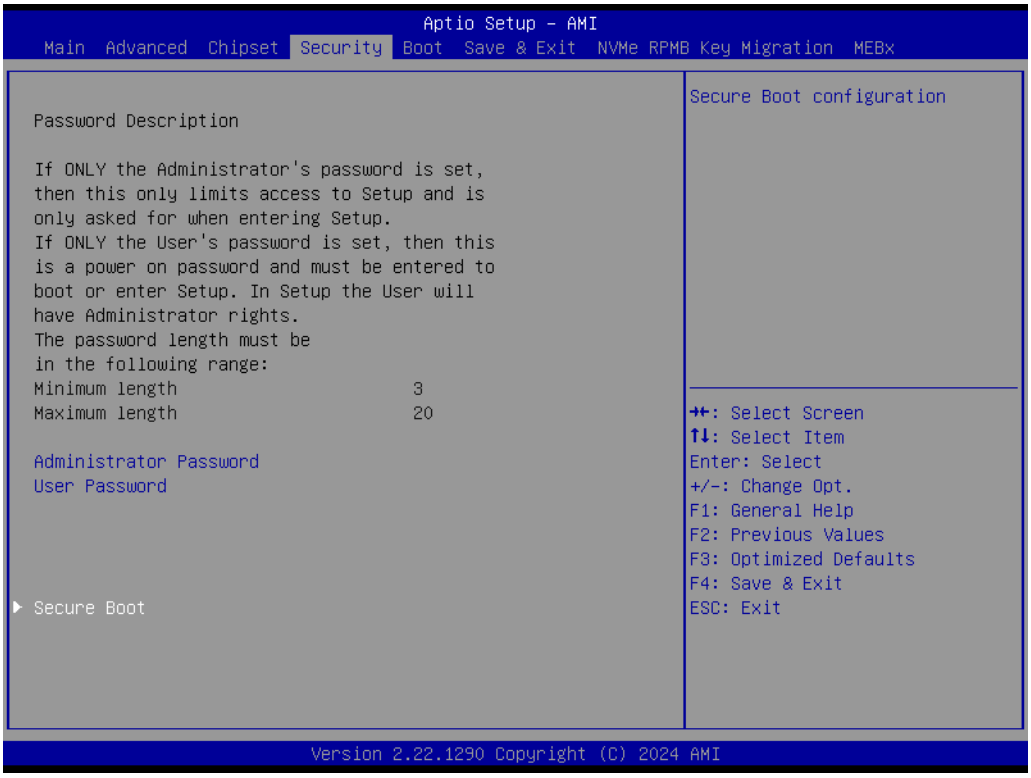


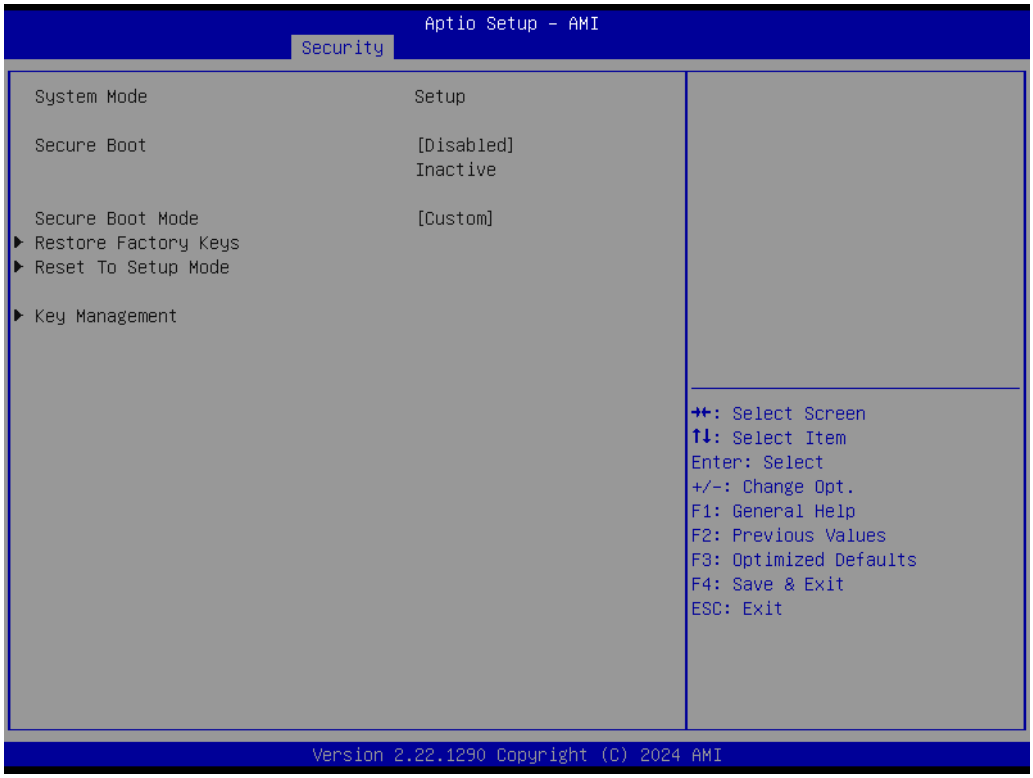


– **HD Audio**
Control Detection of the HD-Audio device.

3.2.4 Security

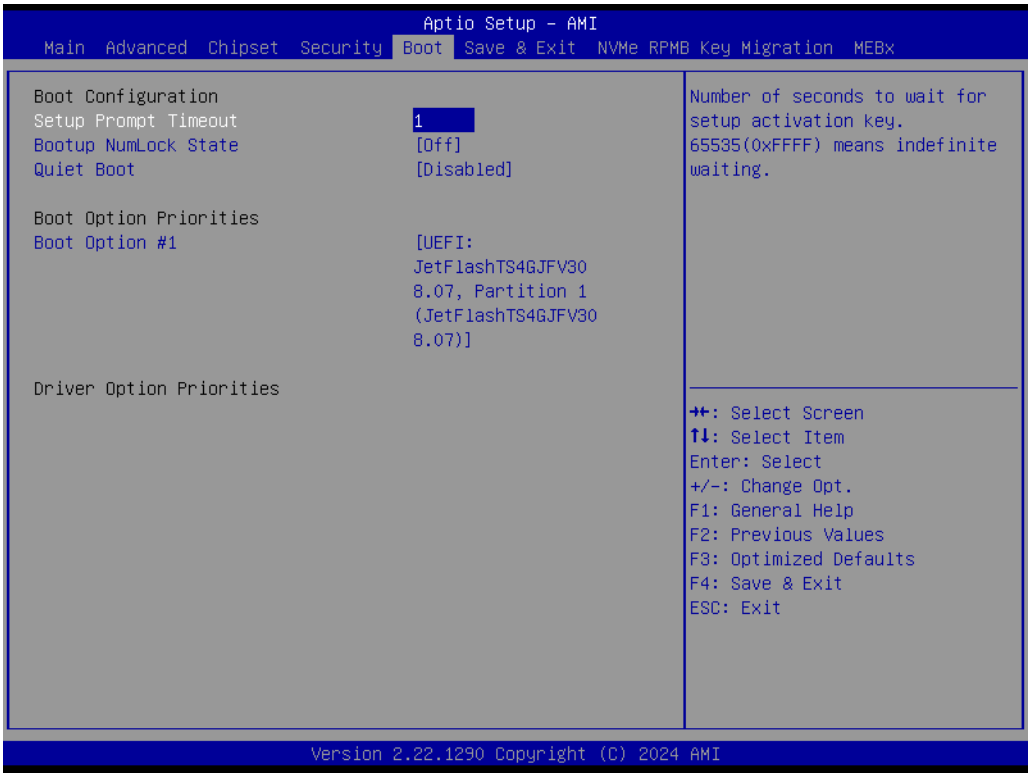
- **Administrator Password**
  Set Administrator Password.
- **User Password**
  Set User Password.





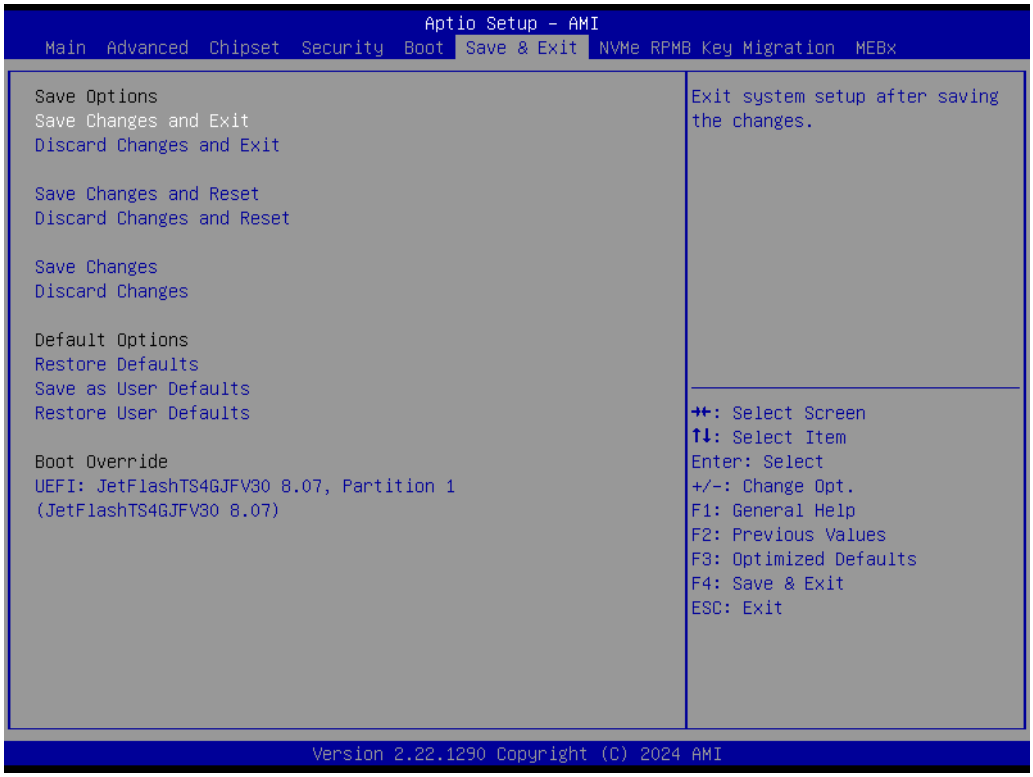
- **Secure Boot**
  The Secure Boot feature is Active if Secure Boot is Enabled, Platform Key (PK) is enrolled, and the System is in User mode. The mode change requires a platform reset.
- **Secure Boot Mode**
  Secure Boot mode options: Standard or Custom.

3.2.5 Boot



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

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