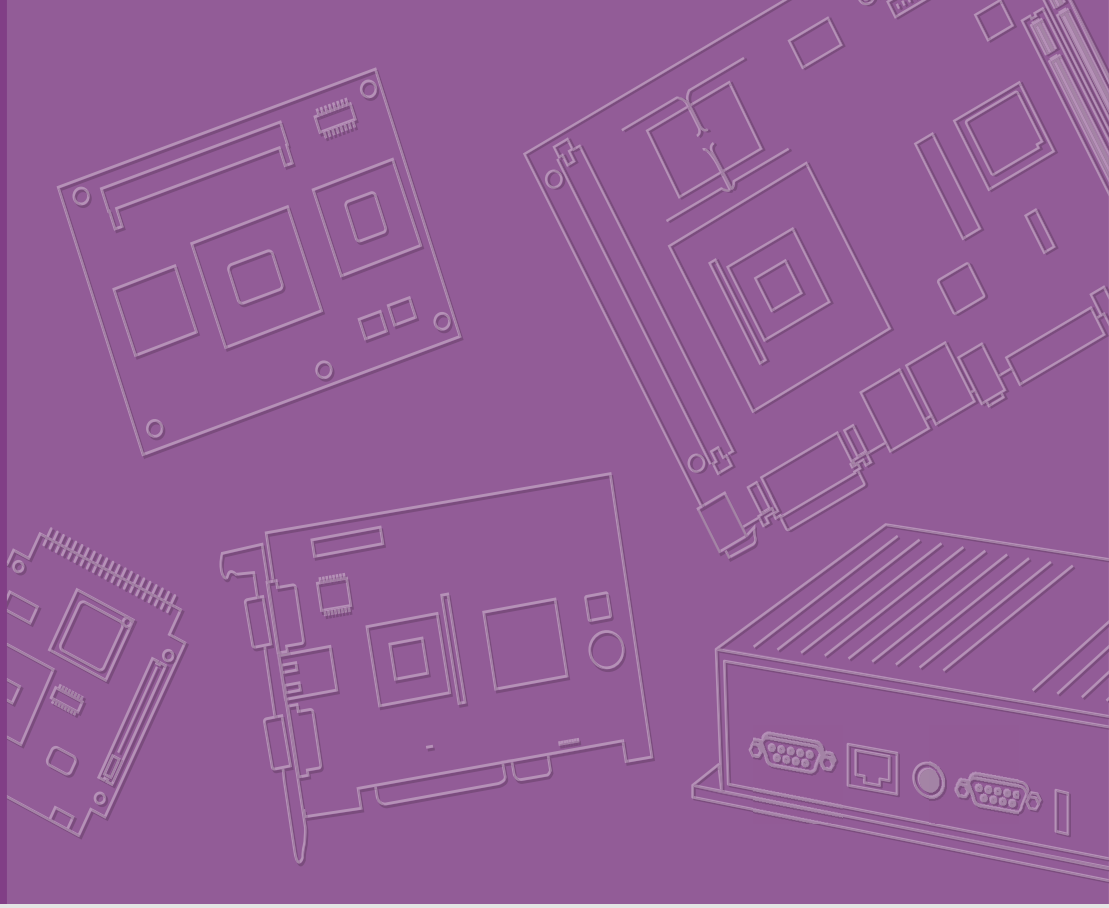

User Manual

ARK-1222

Fanless Embedded Box Computer

ADVANTECH

Enabling an Intelligent Planet

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This manual is for the ARK-1222.

Part No. 2006122200 Edition 1

May 2025

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!*

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

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

Note! *Notes provide additional optional information.*

Packing List

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

- 1 x ARK-1222 Unit
- 1 x User Manual (Simplified Chinese)
- 1 x China RoHS
- 1 x 3-pin plug-in block for power in
- 1 x 4-pin plug-in block for remote switch
- 1 x DIN-rail bracket
- 1 x M.2 B-Key thermal bracket
- 1 x M.2 B-Key thermal pad (65 x 22 x 1.5 mm)

Ordering Information

Part Number	Description
ARK-1222-S5A1	Intel x7433RE1.5G 2HDMI+2LAN+4COM+16G RAM -40~70
ARK-1222-U0A1	Intel N97 2.0G 2HDMI+2LAN+4COM+16G RAM -20~60
ARK-1222-S8A1	Intel i3-N305 1.8G 2HDMI+2LAN+4COM+16G RAM -20~60
ARK-1222-S5A1U	Intel x7433RE1.5G 2HDMI+2LAN+4COM+16G RAM -40~70 MIT
ARK-1222-U0A1U	Intel N97 2.0G 2HDMI+2LAN+4COM+16G RAM -20~60 MIT
ARK-1222-S8A1U	Intel i3-N305 1.8G 2HDMI+2LAN+4COM+16G RAM -20~60 MIT

Optional Accessories

Part Number	Description
XARK-ADP-90MDH	AC to DC adapter, 19V/90W
1700001524	Power Cable 3-pin 180 cm, USA type
170203183C	Power Cable 3-pin 180 cm, Europe type
170203180A	Power Cable 3-pin 180 cm, UK type
1700008921	Power Cable 3-pin 183 cm, PSE type
1960103315N020	M.2 2242 Extension Bracket
1960103315N010	M.2 3052 Extension Bracket
AMK-W007	ARK-1222 Wall Mount Kit
AMK-A0055	ARK-1222 1 port CAN Bus Kit
AMK-A0056	ARK-1222 2 port CAN Bus Kit

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 components 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 the 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 should not exceed 70 dB (A).
20. DISCLAIMER: These instructions are provided according to IEC 704-1 specifications. Advantech disclaims all responsibility for the accuracy of any statements contained herein.

21. This product is intended to be supplied by a UL-listed power Adapter, or DC power source, rated:12~28Vdc, 7.5-3.21A, Tma=70°C. If you need further assistance, please contact Advantech.
22. RESTRICTED ACCESS AREA: The equipment should only be installed in a Restricted Access Area.

Consignes de Sécurité

1. Veuillez lire attentivement ces instructions de sécurité.
2. Veuillez conserver ce manuel de l'utilisateur pour référence ultérieure.
3. Veuillez débrancher cet équipement de la prise secteur avant le nettoyage. Utilisez un chiffon humide. Ne pas utiliser de détergent liquide ou pulvérisé pour le nettoyage. Utilisez une feuille ou un chiffon humide pour le nettoyage.
4. Pour les équipements enfichables, la prise de courant doit être à proximité de l'équipement et doit être facilement accessible.
5. S'il vous plaît garder cet équipement de l'humidité.
6. Posez cet équipement sur une surface fiable lors de l'installation. Une chute ou une chute pourrait causer des blessures.
7. 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. 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.
21. Ce produit est destiné à être alimenté par un adaptateur secteur répertorié UL ou une source d'alimentation CC, évalué: 12~28Vdc, 7.5-3.21A, Tma = 70 degrés C, si besoin d'assistance supplémentaire, veuillez contacter Advantech pour plus d'informations
22. ZONE D'ACCES RESTREINTE: L'équipement ne doit être installé que dans une zone d'accès restreint.

Chapter 1

General Introduction

1.1 Introduction

The ARK-1222 is a DIN-rail intelligent fanless embedded system featuring Intel® X-series and N-series processors. It comes with Advantech SUSI 5.0 and DeviceOn for efficient remote system monitoring. With the latest hybrid-core processor design, the ARK-1222 offers enhanced performance in CPU processing, display capabilities, security, and I/O flexibility.

1.2 Specifications

Table 1.1: Specifications

Model Name		**ARK-1222-S5A1**	**ARK-1222-U0A1**	**ARK-1222-S8A1**
Processor System	CPU	Intel® Atom® x7433RE Quad Core SoC	Intel N97 Quad Core SoC	Intel i3-N305 8 Core SoC
	Frequency	1.50 GHz	2.0 GHz	1.8GHz
	Number of Cores	4	4	8
	BIOS	AMI EFI 256 Mbit		
Memory	Technology	DDR5 4800 MHz		
	Max Capacity	16GB (16GB Built-in)		
	Socket	1x 262-pin SODIMM		
Graphics	Chipset	Intel® UHD Graphics		
	HDMI	4096 x 2160 @ 60 Hz		
	Dual Display	HDMI + HDMI		
Ethernet	LAN1	10/100/1000/2500 Mbps Intel i226-IT GbE, supports Wake-on-LAN		
	LAN2	10/100/1000/2500 Mbps Intel i226-IT GbE, supports Wake-on-LAN		
Audio	Interface	Realtek ALC888S, High Definition Audio, Mic-in, Line-out		
I/O Interface	Serial Ports	4 x RS-232/422/485, with auto flow control		
	USB Ports	2 x USB 3.2 (Gen2x1), 2 x USB 2.0		
	GPIO	8-bit Programmable DIO		
	Optional CAN Bus	2 x DB9 (by optional cables, cannot coexist with iDoor)		
Expansion	Mini PCIe	1 x Full-size mPCIe		
	M.2	1 x M.2 E-Key 2230 (PCIe x1, USB 2) and 1 x M.2 B-Key 2280 (PCIe x2, USB 3), with nano SIM holder		
Storage	NVMe	1 x M.2 B-Key 2280		
	mSATA	1 x Full-size mSATA (*share with mPCIe slot)		
Other	Watchdog Timer	255-level timer interval, setup by software		
	TPM	TPM 2.0 (NPCT764AABYX)		
Software Support	Microsoft Windows	Windows 10/11 Enterprise		
	Linux	Ubuntu 24.04		
Power Requirement	Power Type	ATX/AT		
	Power Input Voltage	12 ~ 28 V_{DC}		
	Power Adapter	AC to DC, 90W (optional)		
Power Consumption	Typical	11.11W	12.95W	14.47W
	Max.	29.3W	32.8W	49.08W

Table 1.1: Specifications				
Mechanical	Construction	Aluminum housing		
	Mounting	DIN-rail / Wall Mount		
	Dimensions (W x H x D)	60 x 158 x 114 mm (2.34" x 6.22" x 4.49")		
	Weight	0.94 kg (2.07 lb)		
Environment	Operating Temperature	With extended temp. peripherals: -40 ~ 70°C (-40 ~ 158°F) with 0.7m/s air flow	With extended temp. peripherals:-20 ~ 60°C (-4 ~ 140°F) with 0.7m/s air flow	With extended temp. peripherals:-20~ 60 °C (-4 ~140 °F) with 0.7m/s air flow
		(only up to 40°C when using with the adapter).		
	Storage Temperature	-40 ~ 85°C (-40 ~ 185°F)		
	Relative Humidity	95% @ 40°C (non-condensing)		
	Vibration During Operation	3 Grms, IEC60068-2-64, random, 5~500 Hz, 1hr/axis (with Wall Mount)		
	Shock During Operation	30 G, IEC-60068-2-27, half sine, 11 ms duration (with Wall Mount)		
	EMC	CE/FCC Class B, CCC, BSMI, UKCA		
	Safety	UL, CB, CCC, BSMI, UKCA		

1.3 Mechanical Specifications

1.3.1 Dimensions

W/O Mounting:

60 x 158 x 114 mm / 2.34 x 6.22 x 4.49 in (W x H x D)

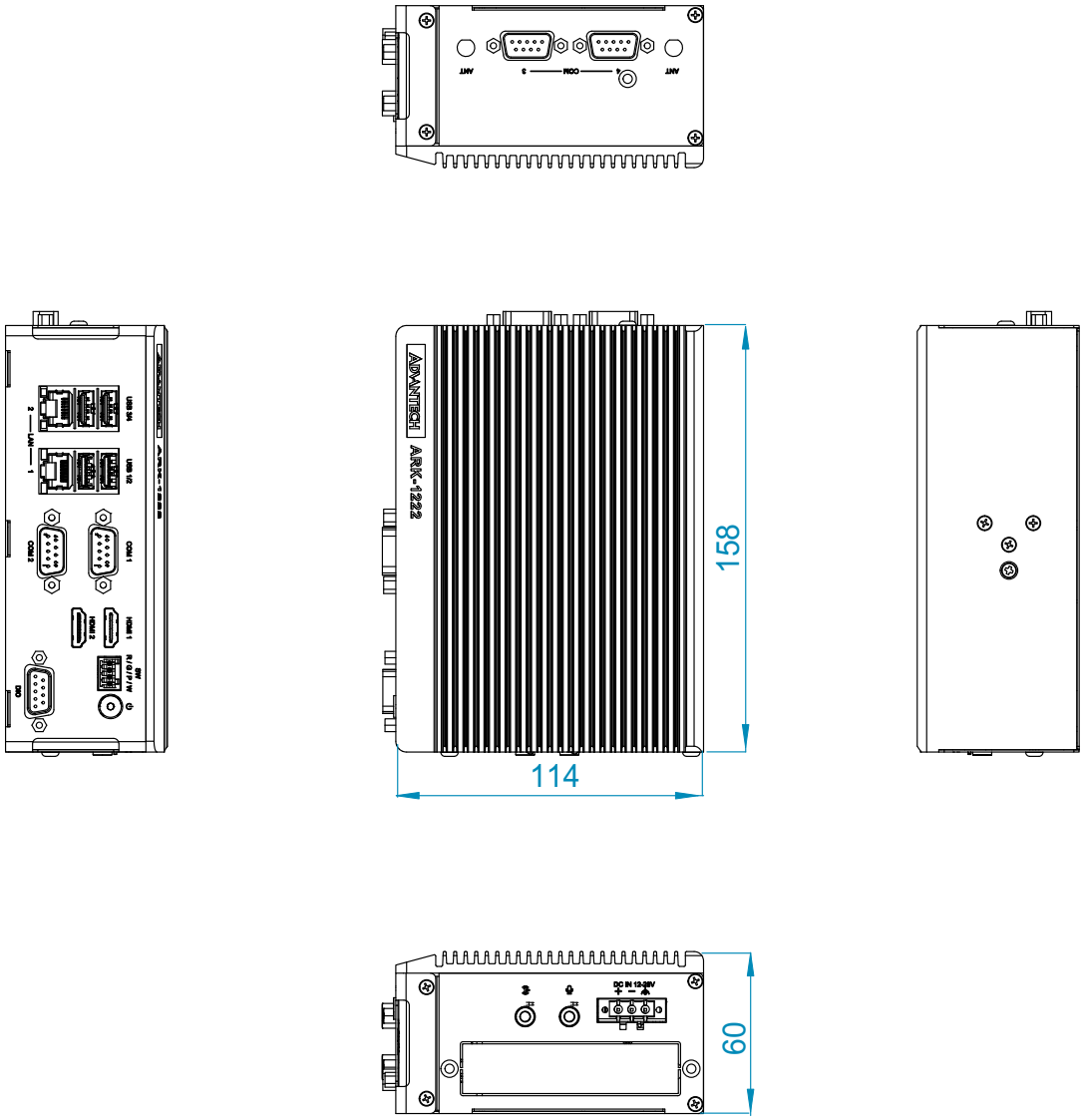


Figure 1.1 ARK-1222 Mechanical Diagram

With DIN-Rail Mount:
60 x 158 x 123 mm / 2.34 x 6.22 x 4.84 in (W x H x D)

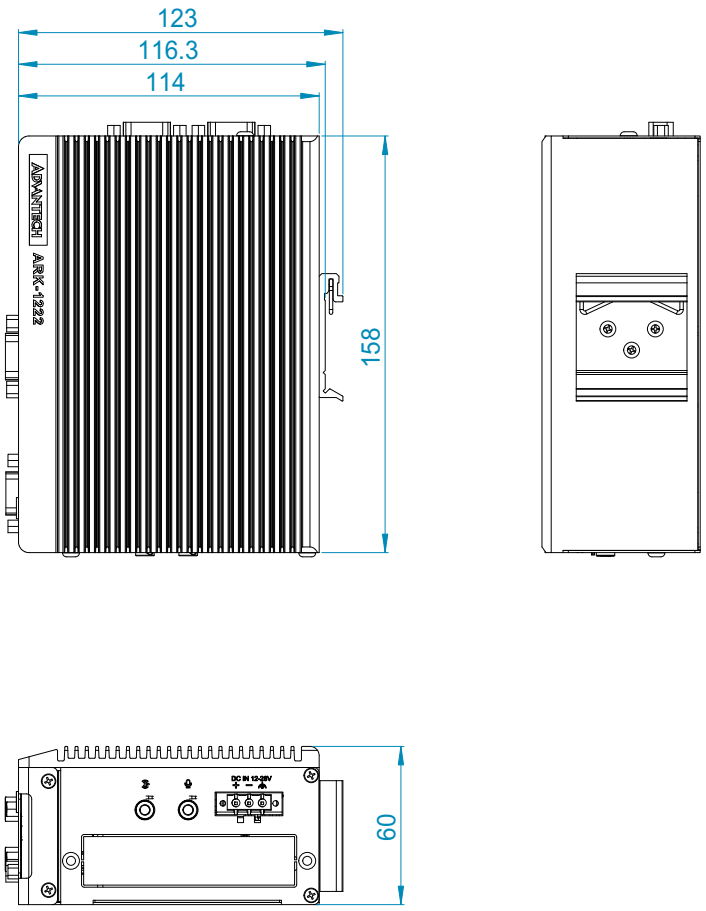


Figure 1.2 ARK-1222 Mechanical Diagram

Wall Mounting

62 x 202 x 114 mm / 2.36 x 6.22 x 4.49 in (W x H x D)

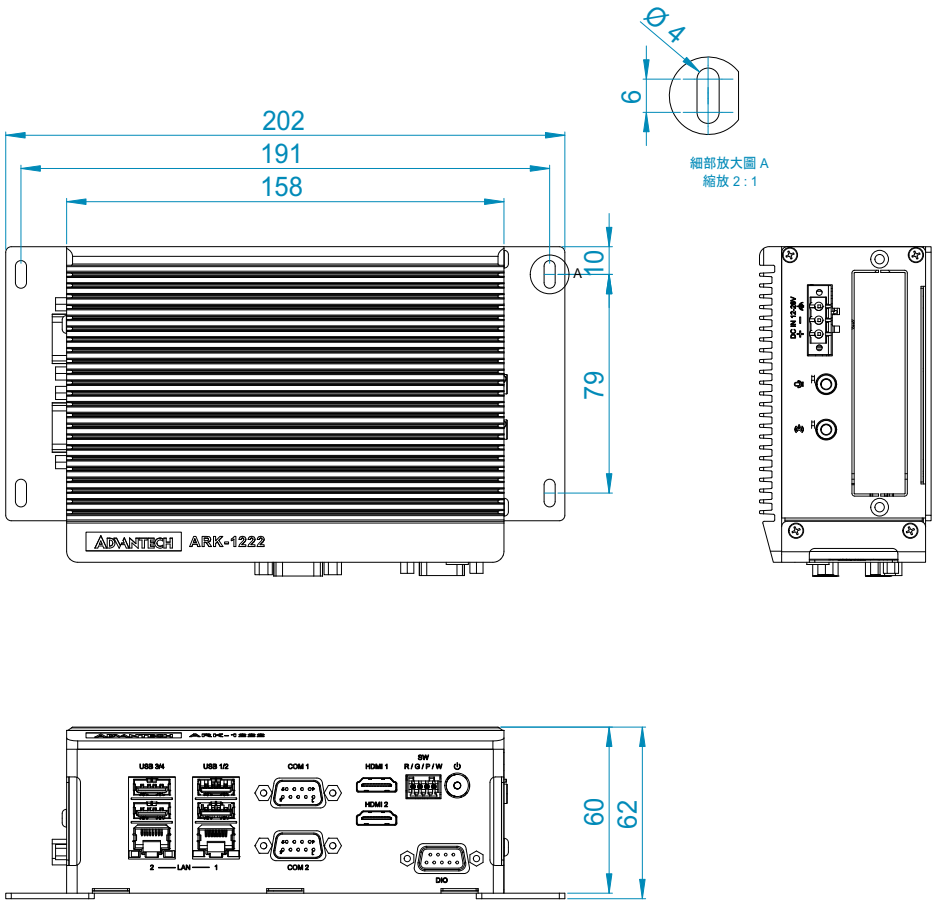


Figure 1.3 ARK-1222 Mechanical Diagram

Chapter 2

Jumpers and Connectors

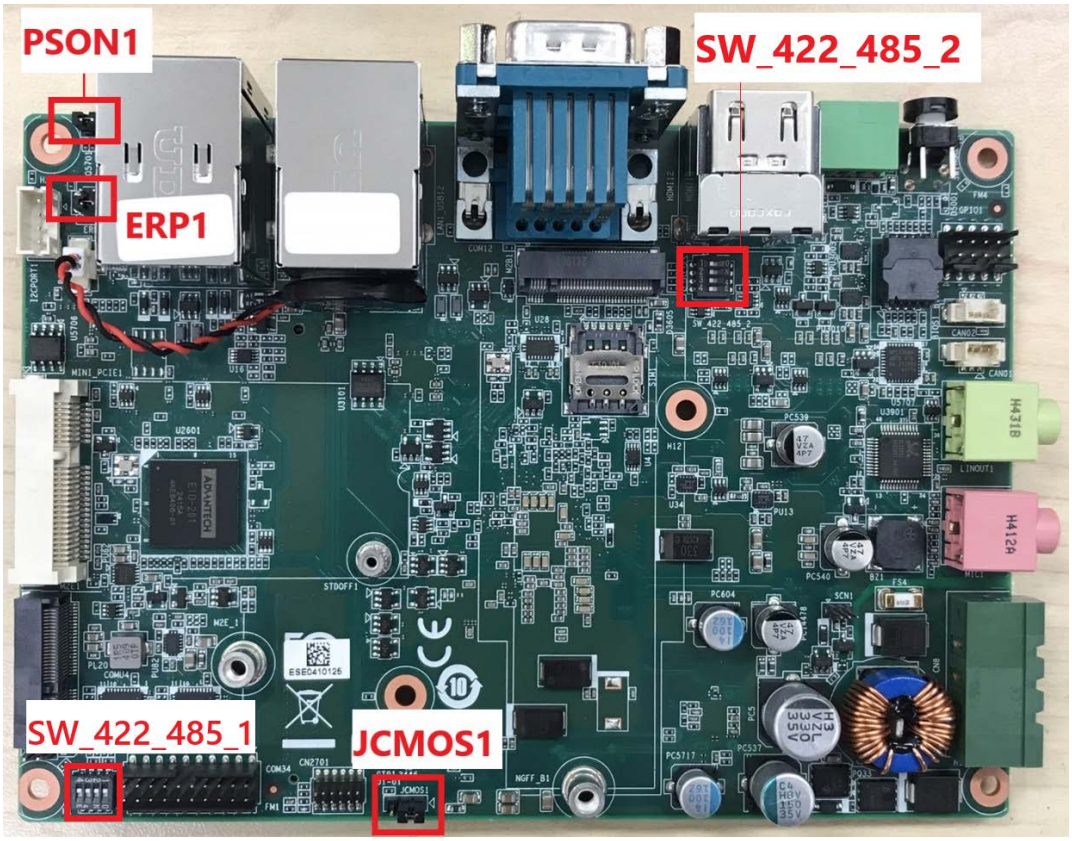
2.1 Jumper & Switches

The ARK-1222 has a number of jumpers that allow you to configure your system to suit your application. The table below lists the functions of the various jumpers.

2.1.1 Jumper List

Table 2.1: Jumper List

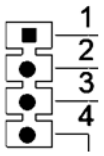
PSON1	Auto Power On Setting
JCMOS1	Clear CMOS
ERP1	ERP Mode setting
SW_422_485_1	RS-485/RS-422 Failsafe
SW_422_485_2	RS-485/RS-422 Failsafe



2.1.2 Jumper Settings

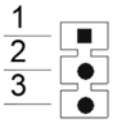
2.1.2.1 AT/ATX Mode Switch (PSON1)

Table 2.2: PSON1 Auto Power On Settings	
Description	PIN HEADER 4x1P 2.0mm 180D(M) DIP
Setting	**Function**
(1-2)	Power Button for Power On (Default ATX)
(3-4)	Auto Power On (AT)



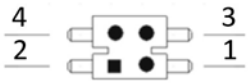
2.1.2.2 Clear CMOS (JCMOS1)

Table 2.3: JCMOS1 Clear CMOS Settings	
Description	PIN HEADER 1X3P 2.00mm 180D(M) DIP
Setting	**Function**
(1-2)	Normal Operation (Default)
(2-3)	Clear CMOS



2.1.2.3 Power-Saving Mode Settings (ERP1)

Table 2.4: ERP1 Mode Settings	
Description	PIN HEADER 2x2P 2.00mm 180D(M) SMD
Setting	**Function**
(1-2)	Normal Operation (Default)
(3-4)	ERP Power saving



2.1.2.4 SW_422_485_1: RS-485/RS-422 Failsafe

Table 2.5: SW_422_485_1: RS-485/RS-422 Failsafe

Setting	Function
(1-8), (2-7)	Pins 1/2 represents Off: Disable COM2 failsafe (default), Pins 7/8 represents On: Enable COM2 failsafe
(3-6), (4-5)	Pins 3/4 represents Off: Disable COM1 failsafe (default), Pins 5/6 represents On: Enable COM1 failsafe

2.1.2.5 SW_422_485_2: RS-485/RS-422 Failsafe

Table 2.6: SW_422_485_2: RS-485/RS-422 Failsafe

Setting	Function
(1-8), (2-7)	Pins 1/2 represents Off: Disable COM4 failsafe (default), 7/8 represents On: Enable COM4 failsafe
(3-6), (4-5)	Pins 3/4 represents Off: Disable COM3 failsafe (default), 5/6 represents On: Enable COM3 failsafe

2.2 Connectors

2.2.1 ARK-1222 External I/O Locations

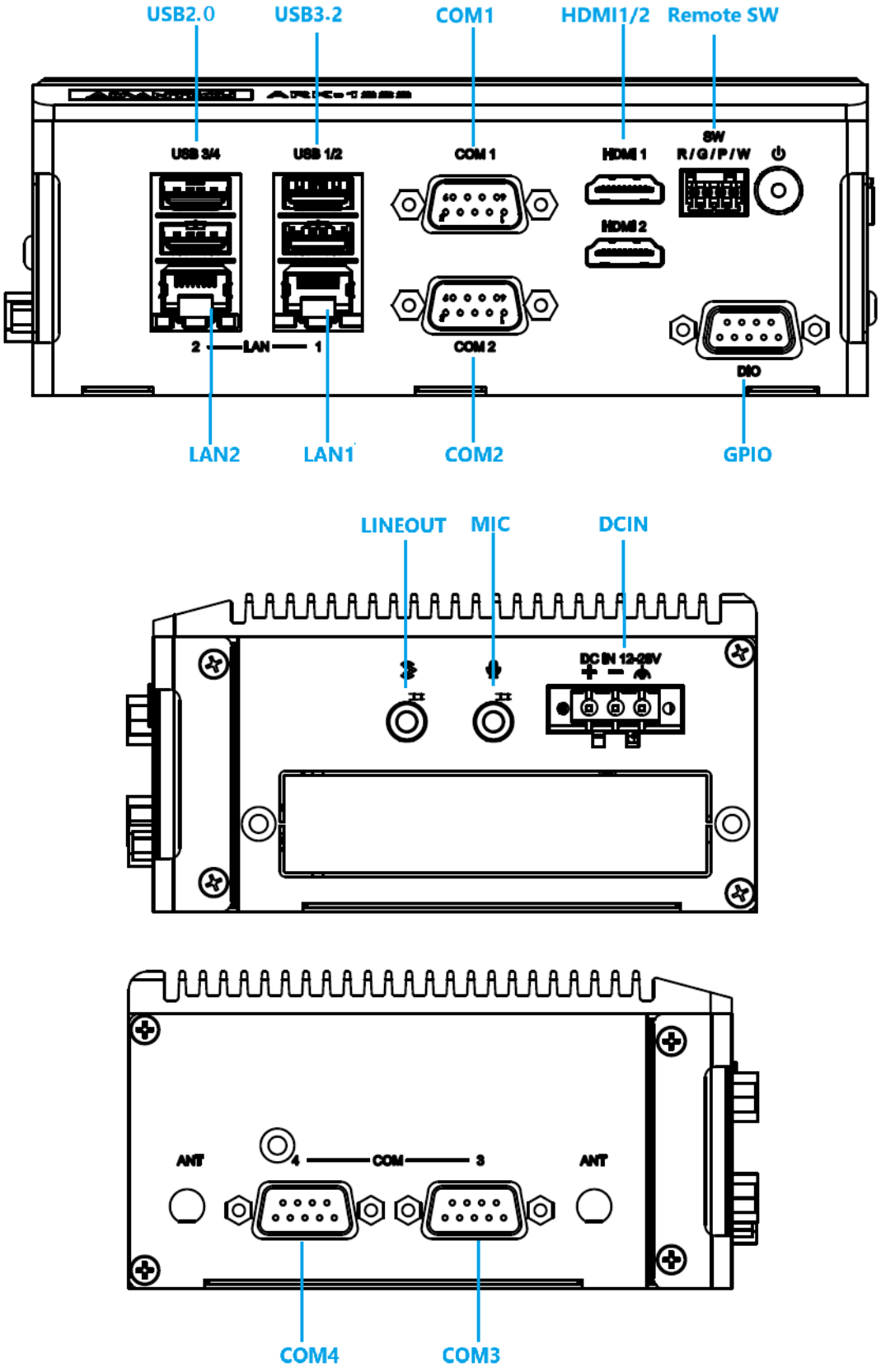


Figure 2.1 ARK-1222 Front and Side I/O Connector Diagrams

2.3 Connector Pin Definitions

2.3.1 USB 3.2 - Gen2x1

The ARK-1222 supports 2 x USB 3.2. The USB interfaces comply with USB UHCI, Rev. 3.0 standards. Please refer to Table 2.7 for pin assignments.

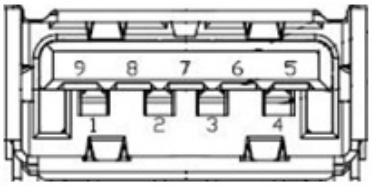


Table 2.7: USB 3.2 Gen2 Connector Pin Assignments

Pin	Signal Name	Pin	Signal Name
1	+5V	2	USB_data-
3	USB_data+	4	GND
5	SSRX-	6	SSRX+
7	GND	8	SSTX-
9	SSTX+		

2.3.2 USB 2.0

The ARK-1222 supports 2 x USB 2.0.

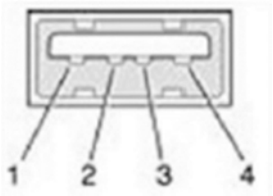


Table 2.8: USB 2.0

Pin	Signal Name
1	+5V
2	USB_data +
3	USB_data -
4	GND

2.3.3 GPIO

The ARK-1222 provides a D-sub 9 interface port with GPIO. Please refer to Table 2.9 for pin assignments.

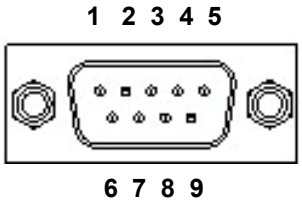


Table 2.9: GPIO / CAN Bus / Remote Connector Pin Assignments

Pin	Signal Definition
1	GPIO0
2	GPIO1
3	GPIO2
4	GPIO3
5	GPIO4
6	GPIO5
7	GPIO6
8	GPIO7
9	GND

2.3.4 Ethernet Connector (2.5G LAN)

The ARK-1222 is equipped with up to 2 x Ethernet controllers that are fully compliant with IEEE 802.3u 10/100/1000/2500 Mbps CSMA/CD standards. These Ethernet ports provide a standard RJ-45 jack connector with LED indicators on the front side to show Active/Link status (Green LED on the right) and Speed status (Yellow/Green LED on the left).

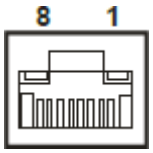
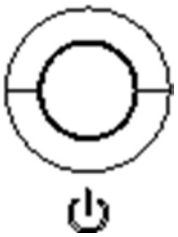


Table 2.10: Ethernet Connector Pin Assignments

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

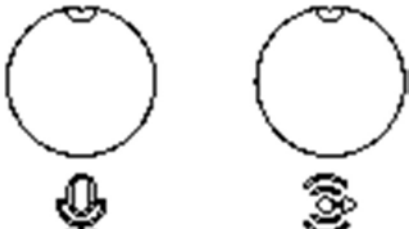
2.3.5 Power On/Off Button

The ARK-1222 has a Power On/Off button. It has dual functions: Soft Power-On/Off (Instant off or Delay 4 Seconds then off), and Suspend.



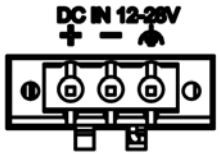
2.3.6 Audio Connector

The ARK-1222 features 2 phone jack connectors that support stereo Line-Out and Mic-In audio ports. The audio chip is controlled by ALC888S and is compliant with the Azalea standard.



2.3.7 Phoenix Terminal Connector

The ARK-1222 supports one 3-pin Phoenix terminal power input connector.



2.3.8 Remote Switch Connector

The ARK-1222 provides the remote switch connector for power on/off. From the left to the right are Reset, GND, Power Switch, and WDT.

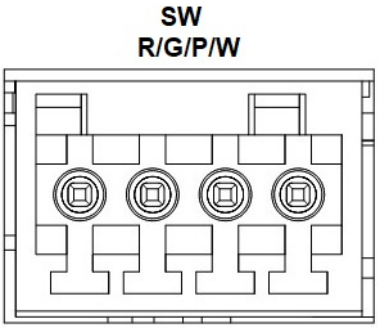


Table 2.11: Remote Switch Connector Pin Assignments

Pin	Signal Definition
W	WDT
P	PWRBTN
G	GND
R	RESET

2.3.9 COM Connector

The ARK-1222 provides 4 x RS-232/422/485 D-sub 9 interface ports, and the default setting is RS-232. RS-422/485 support can be initiated via the BIOS settings.

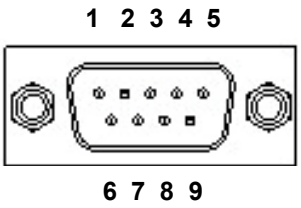


Table 2.12: COM Port

	RS-232	RS-422	RS-485
Pin	**Signal Definition**	**Signal Definition**	**Signal Definition**
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

2.3.10 HDMI 2.0 Connector

The ARK-1222 is equipped with a 2 x 19-pin HDMI Type A interface. The HDMI link supports resolutions up to 4096 x 2160 @ 60 Hz.

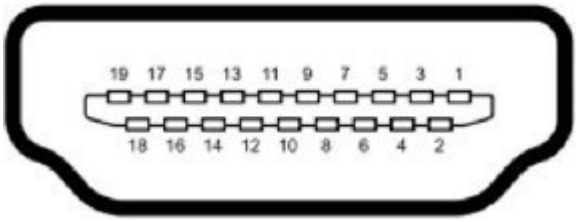
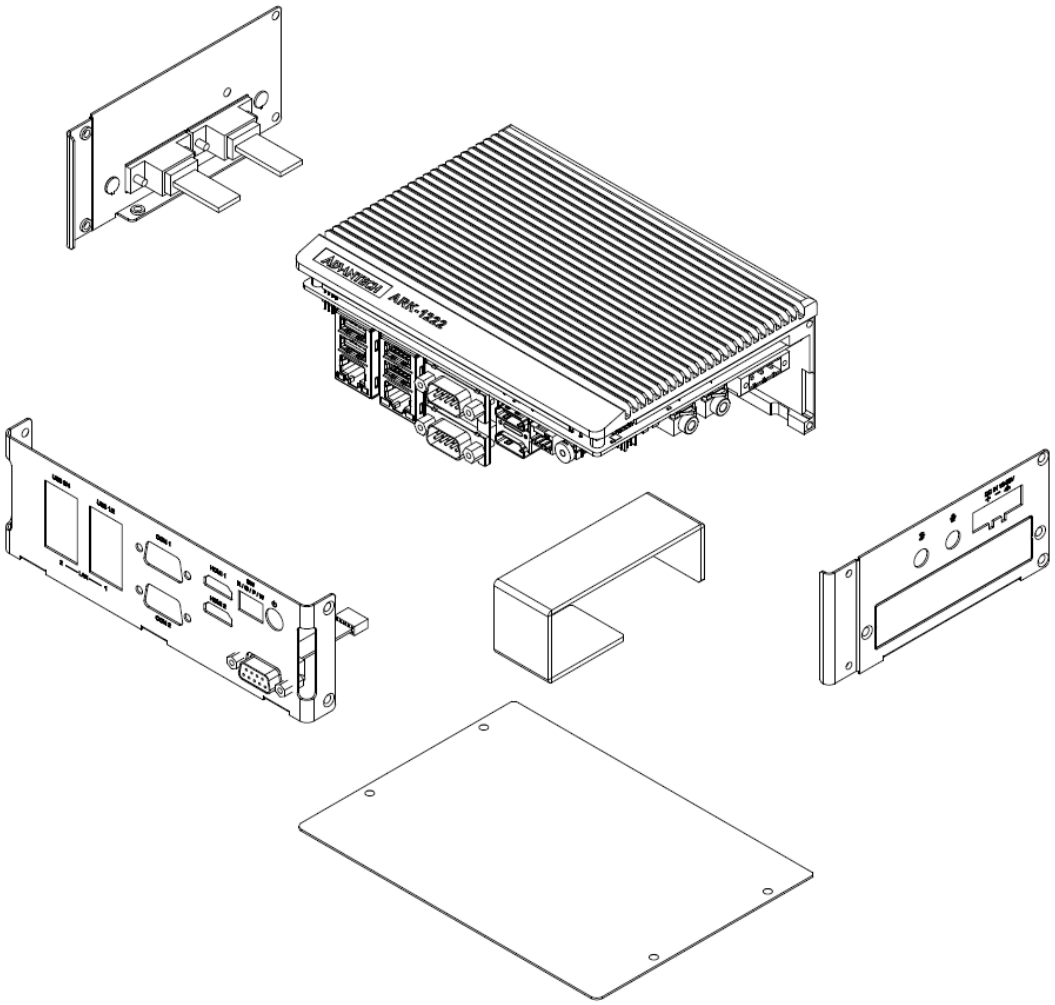


Table 2.13: HDMI

Pin	Signal Definition	Pin	Signal Definition
1	TMDS Data 2+	2	TMDS Data 2 shield
3	TMDS Data 2-	4	TMDS Data 1+
5	TMDS Data 1 shield	6	TMDS Data 1-
7	TMDS Data 0+	8	TMDS Data 0 shield
9	TMDS Data 0-	10	TMDS clock+
11	TMDS clock shield	12	TMDS clock-
13	CEC	14	Reserved
15	SCL	16	SDA
17	DDC/CEC Ground	18	+5V
19	Hot Plug Detect		

2.4 Installation

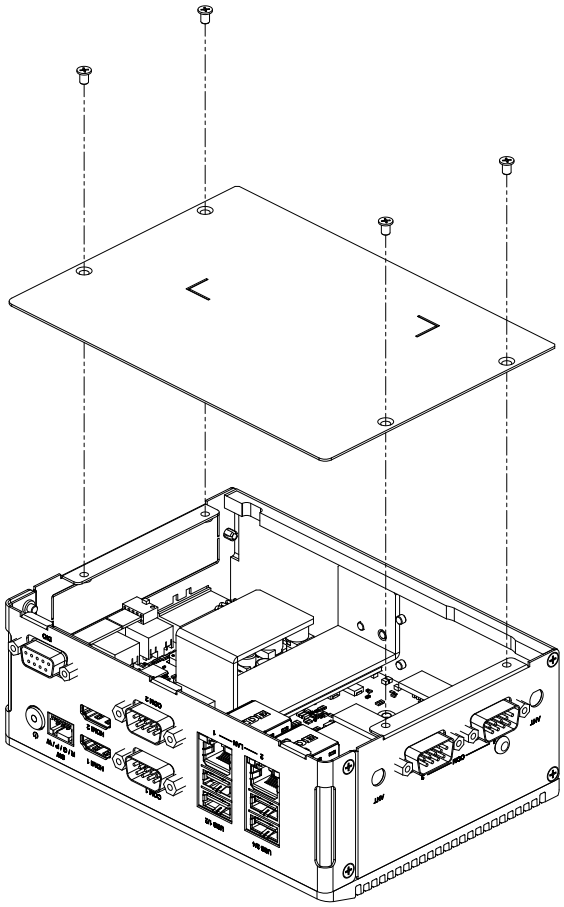
2.4.1 Exploded View



2.4.2 Remove the Bottom Cover

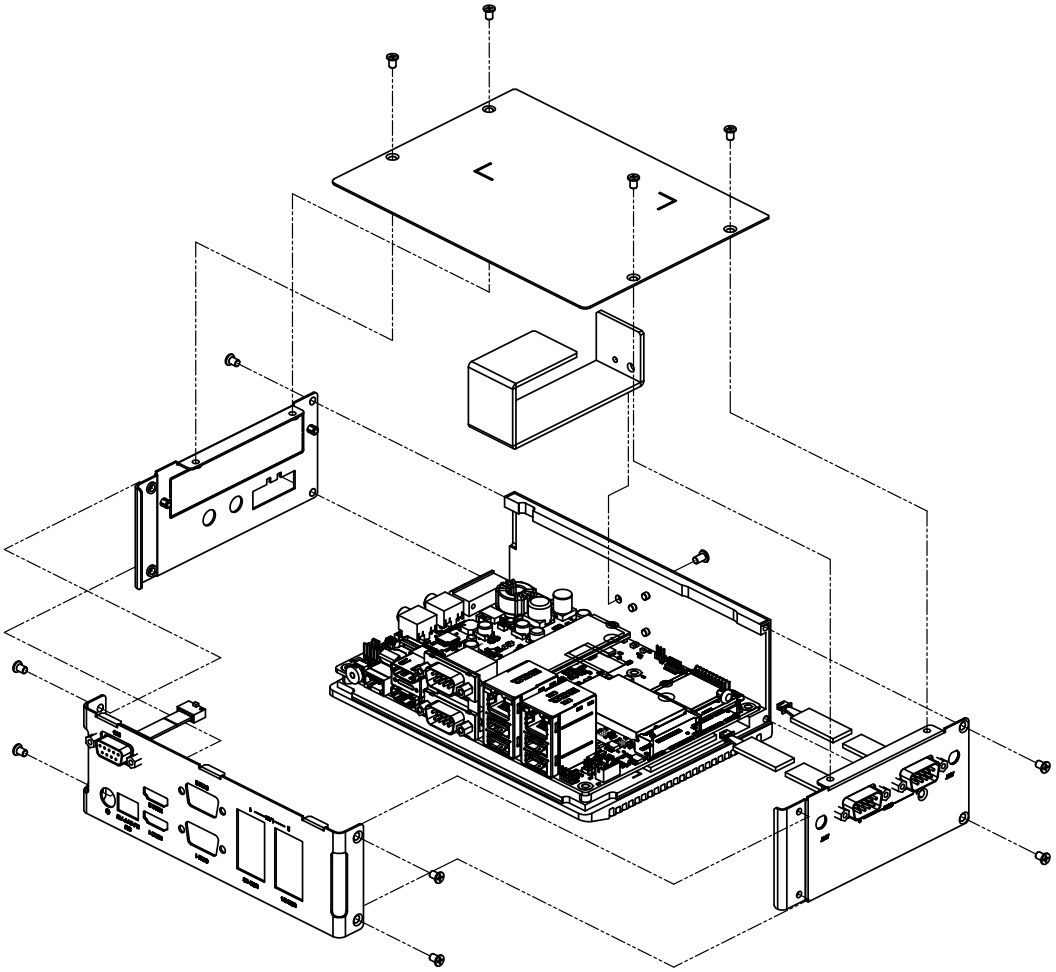
Unscrew the 4 x M3x5L screws on the bottom cover.

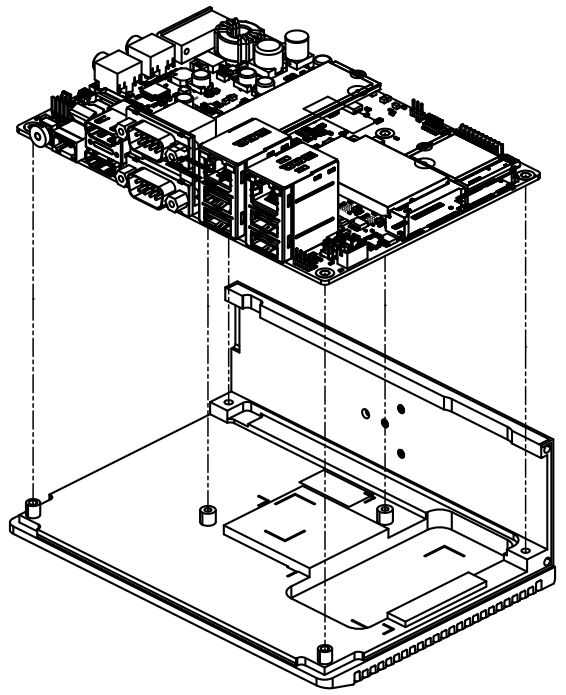
Dévissez les 4 x M3x5L vis du couvercle inférieur.

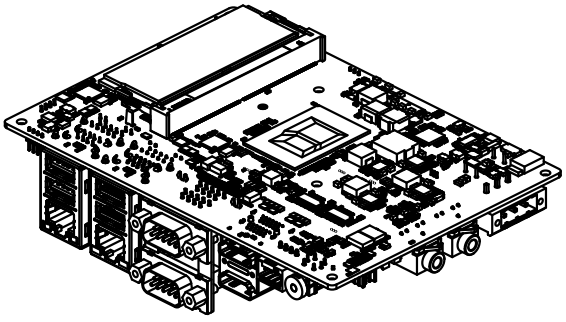


2.4.3 Memory Installation

1. Unscrew the bottom cover (2.4.2).
   Retirez le couvercle inférieur (2.4.2).
2. Remove the M3x5L screws from the four sides of the casing.
   Retirez les vis M3x5L des quatre côtés du boîtier.
3. Remove the four M3x5L screws from the four corners of the motherboard and the two M3x5L screws from both sides of the CPU.
   Retirez les quatre vis M3x5L des quatre coins de la carte mère et les deux vis M3x5L des deux côtés du processeur.

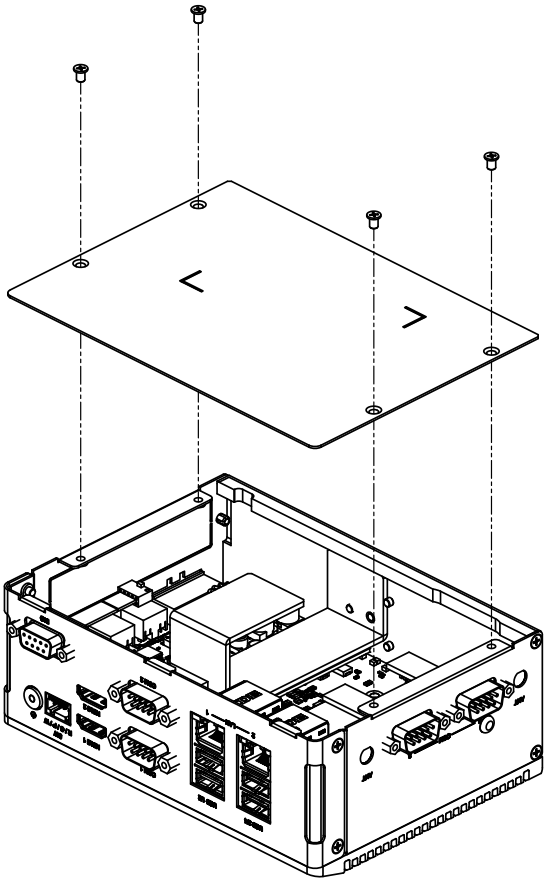


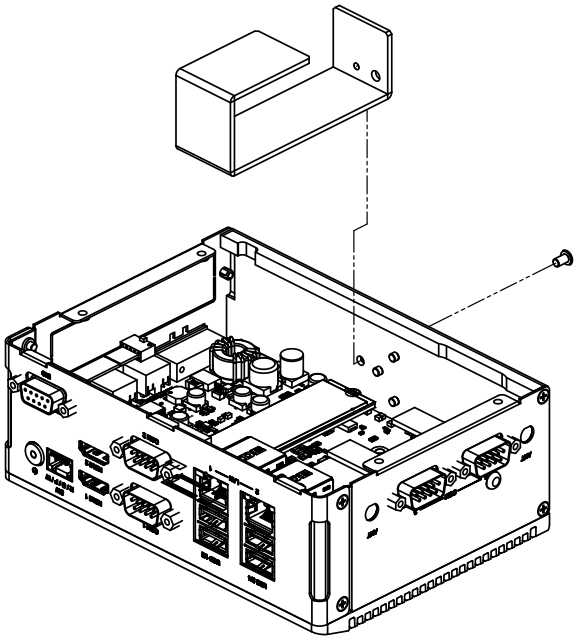


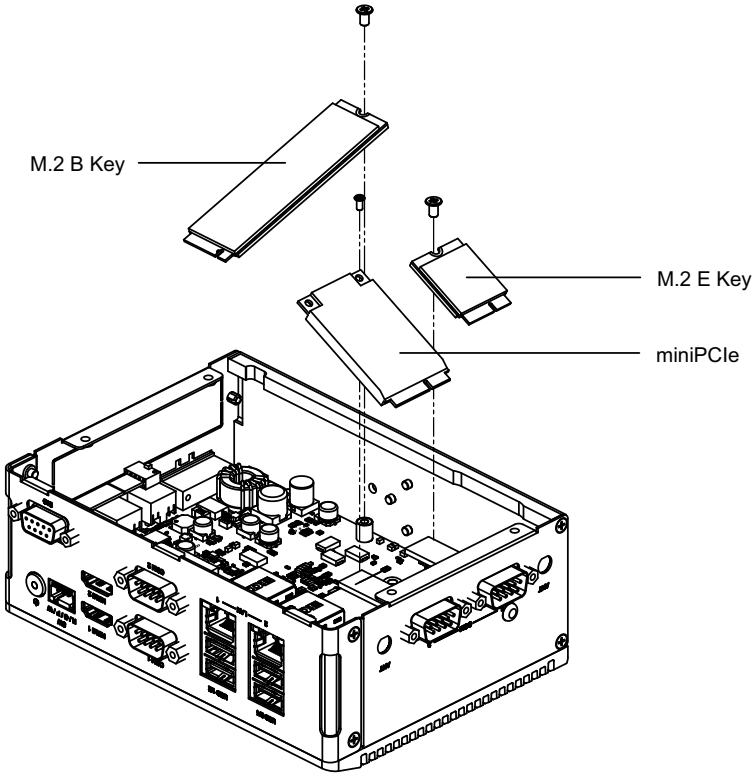


2.4.4 M.2 Module Installation (Optional)

1. Remove the bottom cover (2.4.2).
   Retirez le couvercle inférieur (2.4.2).
2. Install the M.2 B-Key module and attach the heatsink bracket (included in the accessory box).
   Installez le module M.2 B-Key et fixez le dissipateur thermique (inclus dans la boîte d'accessoires).
3. M.2 Module Diagram.
   Schéma du module M.2.

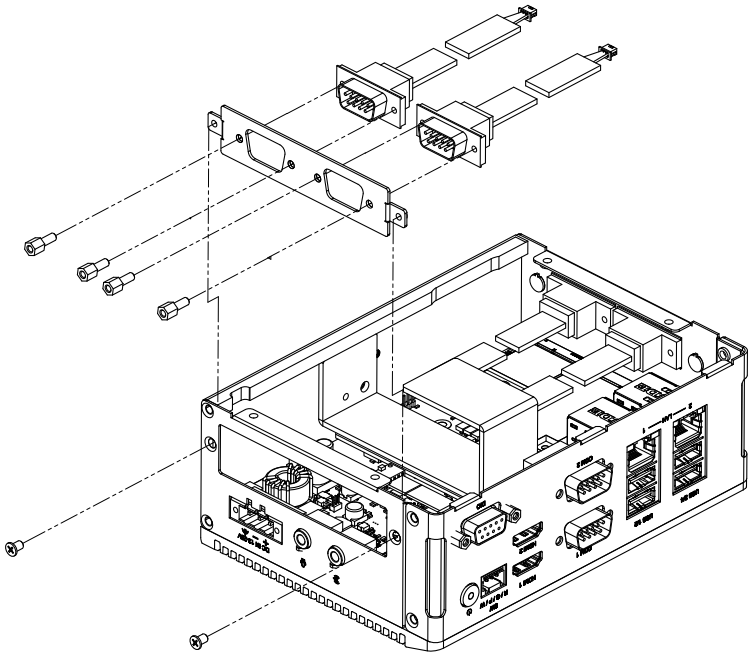


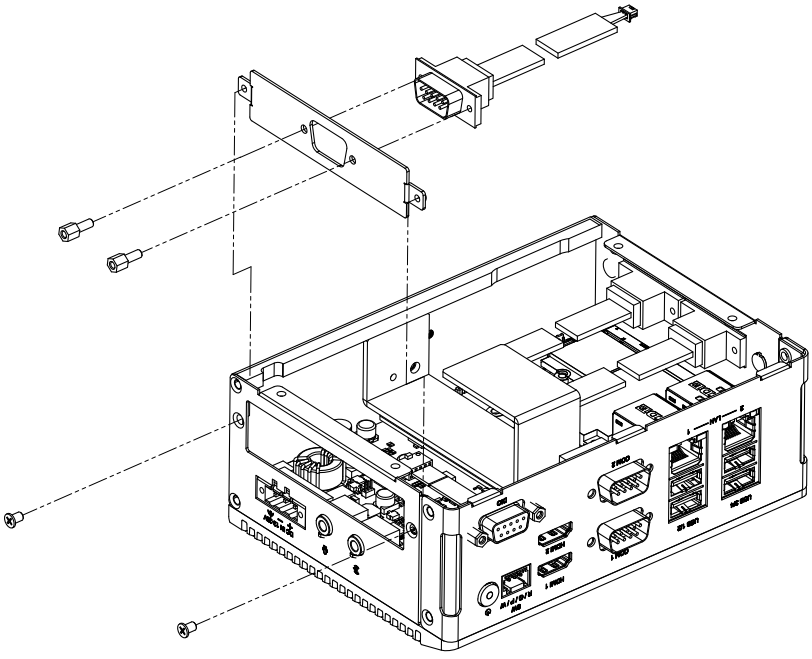



M.2 B Key
M.2 E Key
miniPCIe

2.4.5 CAN Bus Installation (Optional)

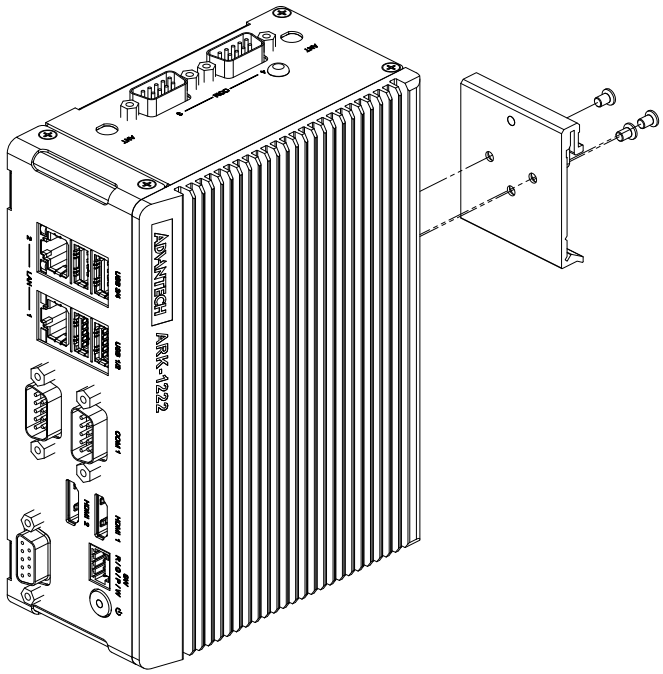
1. Remove the bottom cover (2.4.2).
   Retirez le couvercle inférieur (2.4.2).
2. Replace with a 2-hole DB9 bracket (kit P/N: AMK-A0056), install four standoffs, and connect the corresponding CANbus cable.
   Replace with a 1-hole DB9 bracket (kit P/N: AMK-A0055), install two standoffs, and connect the corresponding CAN bus cable.
   Remplacez par une plaque DB9 à 2 trous (kit P/N: AMK-A0056), installez quatre entretoises et connectez le câble CAN bus correspondant.
   Remplacez par une plaque DB9 à 1 trou (kit P/N: AMK-A0055), installez deux entretoises et connectez le câble CAN bus correspondant.
3. Install the CAN bus cables to the CAN01 and CAN02 ports on the board.
   Installez les câbles CAN bus sur les ports CAN01 et CAN02 de la carte.
4. Reattach the bottom cover.
   Réinstallez le couvercle inférieur.





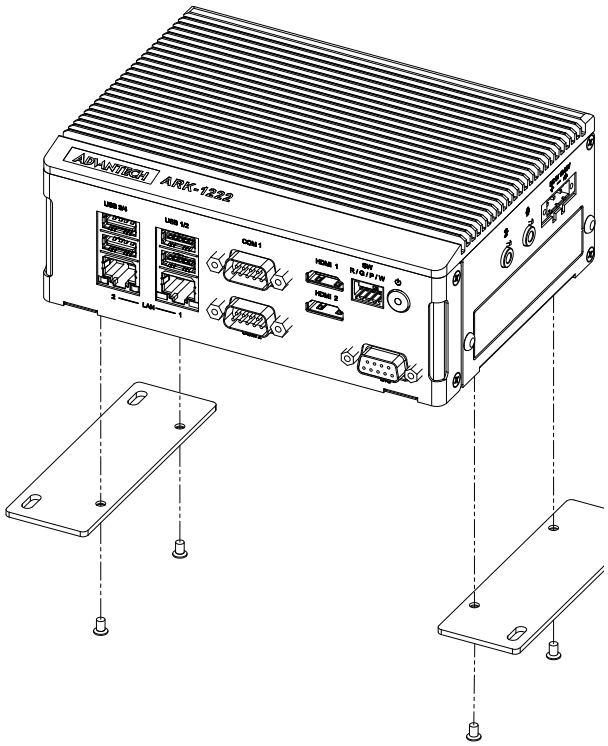
2.4.6 DIN-Rail Kit Installation

1. Unscrew the 3 x M3x5L screws from the back side of the ARK-1222.
   Dévissez les 3 vis M3x5L à l'arrière de l' ARK-1222.
2. Secure the DIN-rail bracket using 3 x M3x5L screws on the back.
   Revissez le support du rail DIN avec les trois x M3x5L vis.



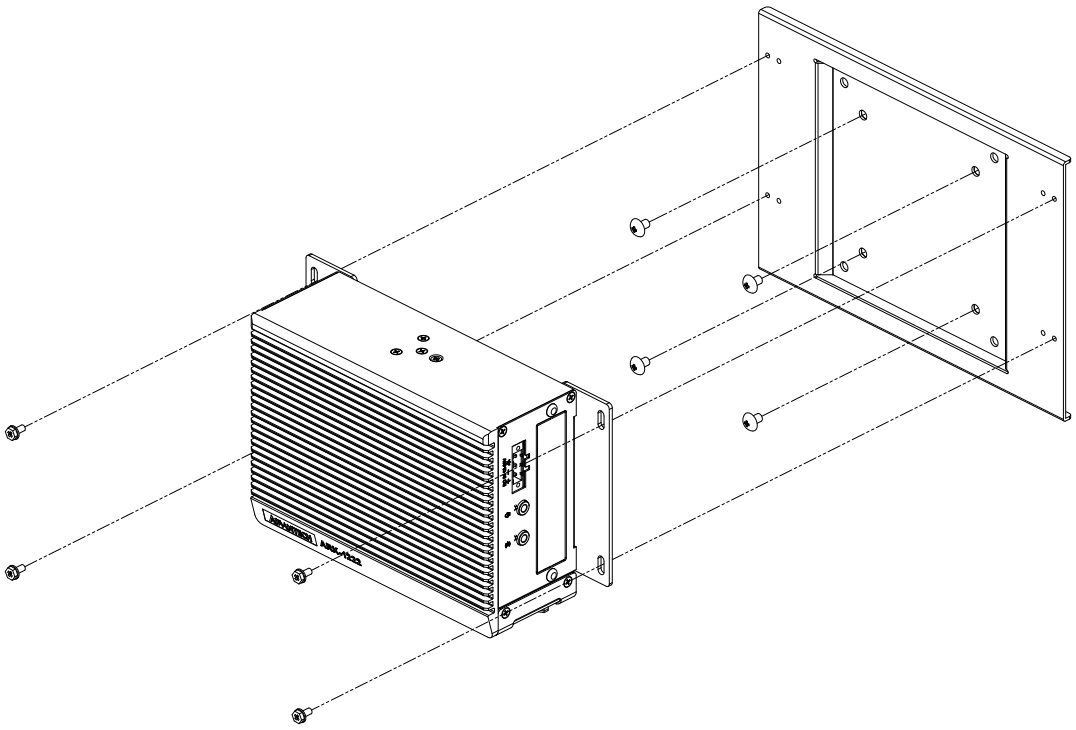
2.4.7 Wall Mount Kit Installation (Optional)

1. Unscrew the 4 x M3x5L screws from the bottom side of the ARK-1222.
   Dévissez les 4 vis M3x5L du côté inférieur de l'ARK-1222.
2. Secure the 2 x wall mount brackets using 4 x M3x5L screws on the bottom.
   Fixez les 2 supports muraux à l'aide de 4 vis M3x5L sur le dessous.



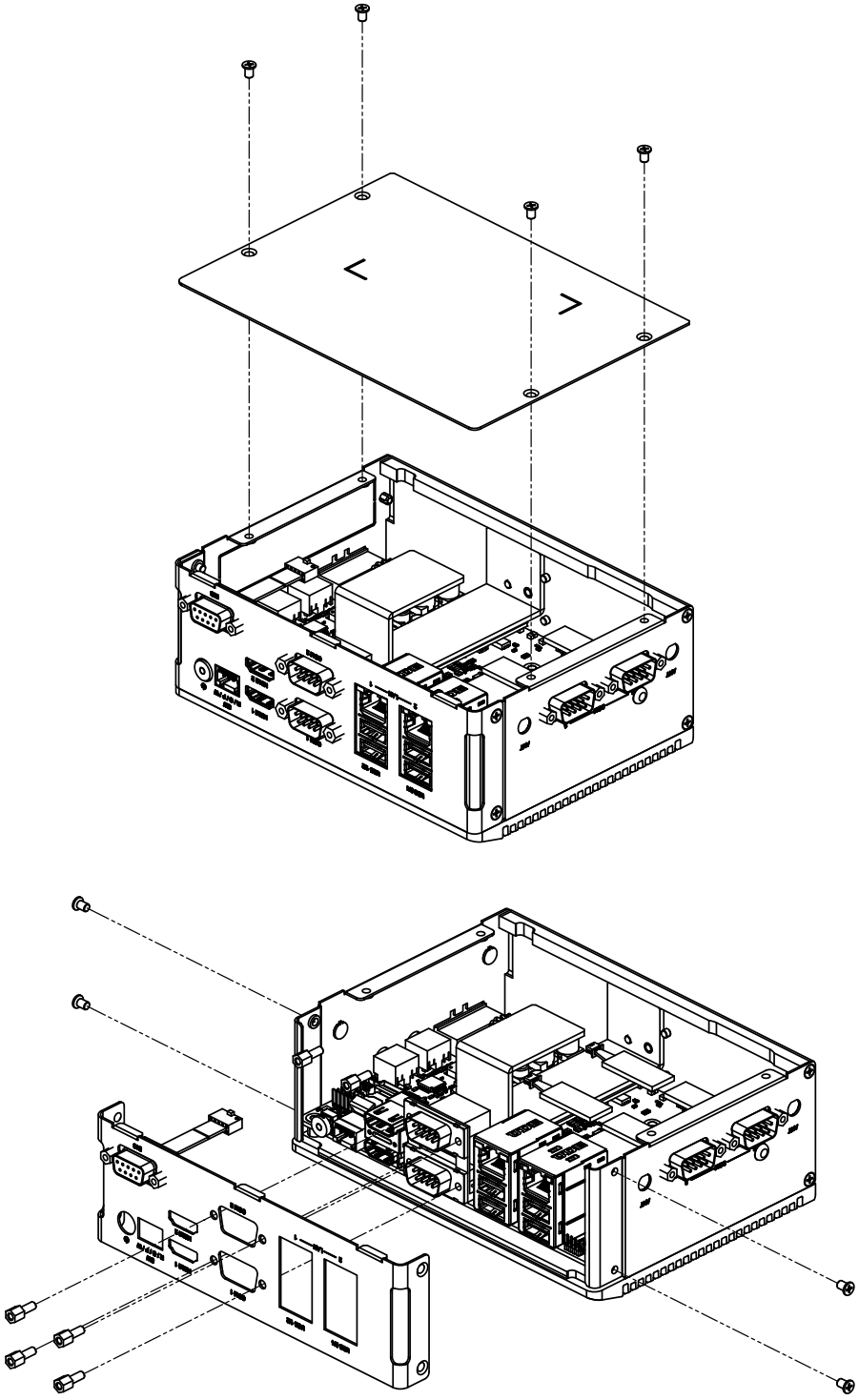
2.4.8 VESA Mounting Installation (Optional)

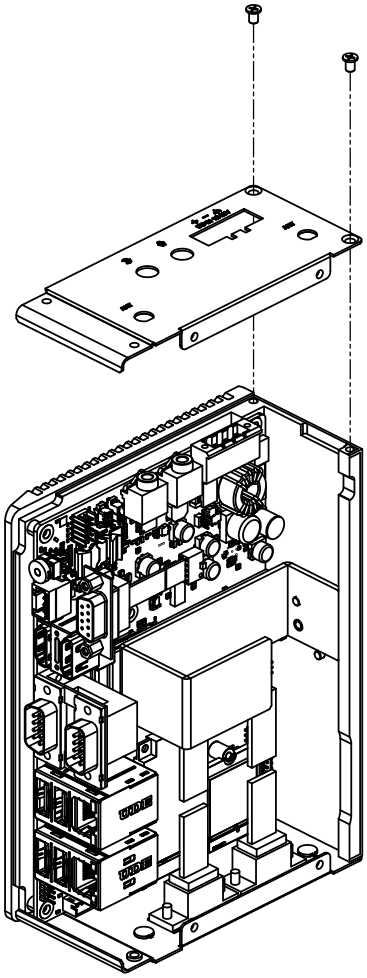
1. Install the wall mount kit (2.4.7).
   Installer le kit de montage mural (2.4.7).
2. Use 4 x M3x5L screws to install the screen or other VESA-compatible items.
   Utilisez quatre vis M3x5L pour installer l'écran ou d'autres éléments compatibles VESA.
3. Use 4 x M3x5L screws to secure the VESA wall mount to the ARK-1222 wall-mount bracket.
   Utilisez quatre vis M3x5L pour fixer le support mural VESA au support mural de l'ARK-1222.



2.4.9 Antenna Side Cover Installation (Optional)

1. Remove the bottom cover (2.4.2).
   Retirer le couvercle inférieur (2.4.2).
2. Remove the eight M3x5L screws from the front panel.
   Retirez les huit vis M3x5L du panneau avant.
3. Remove the two M3x5L screws from the side panel.
   Retirez les deux vis M3x5L du panneau latéral.
4. Reattach the antenna side cover and all the casing.
   Réinstallez le panneau latéral de l'antenne et l'ensemble du boîtier.





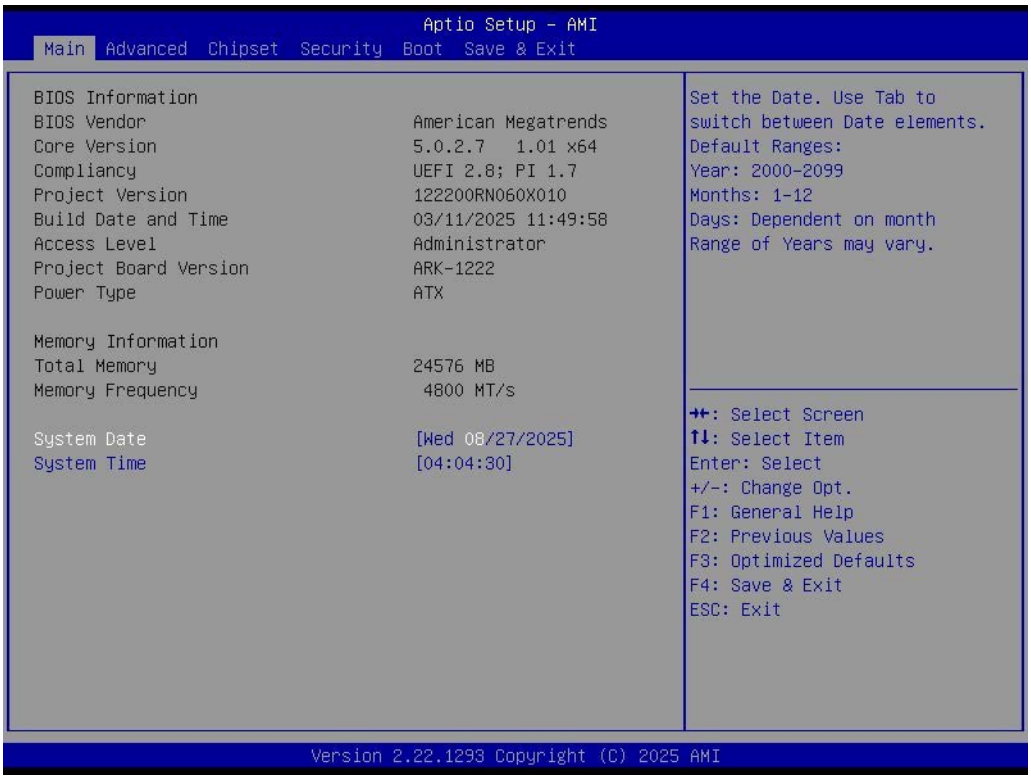
Chapter 3

AMI BIOS Settings

3.1 Introduction

AMIBIOS has been integrated into a plethora of motherboards for decades.

With the AMIBIOS Setup program, you can modify BIOS settings and control the various system features. This chapter describes the basic navigation of the ARK-1222 BIOS setup screens.



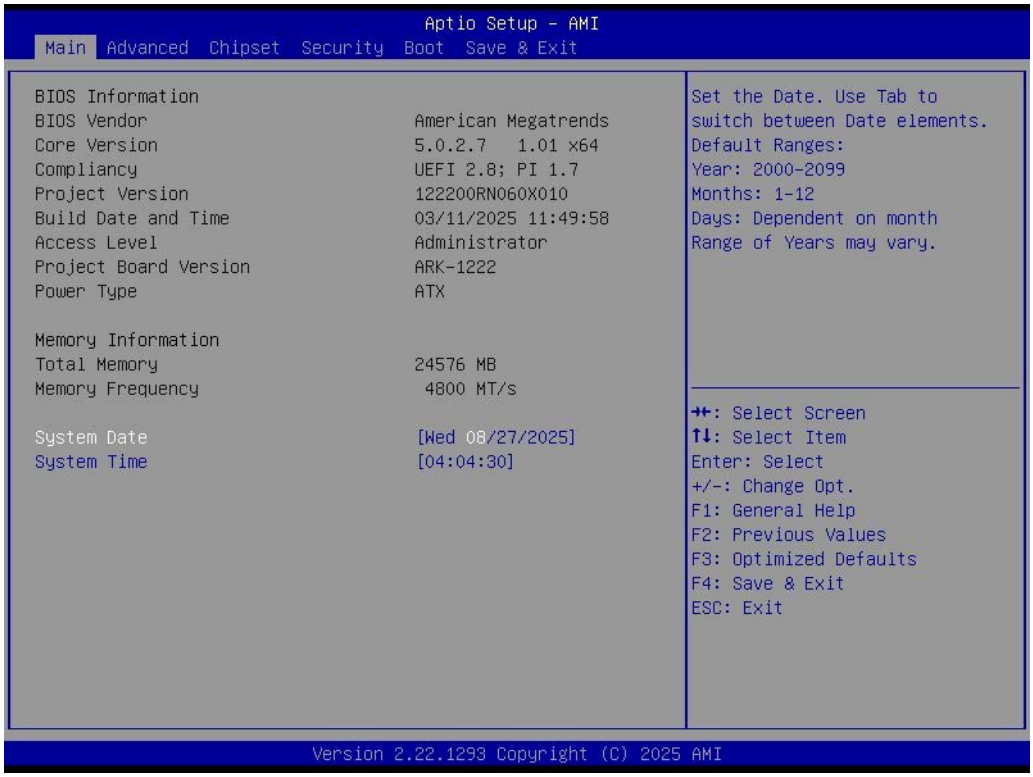
AMI BIOS ROM has a built-in Setup program that allows users to modify the basic system configuration. This information is stored in battery-backed CMOS so it retains the Setup information when the power is turned off.

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 you first enter the BIOS Setup Utility, you will encounter the Main setup screen. You 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.



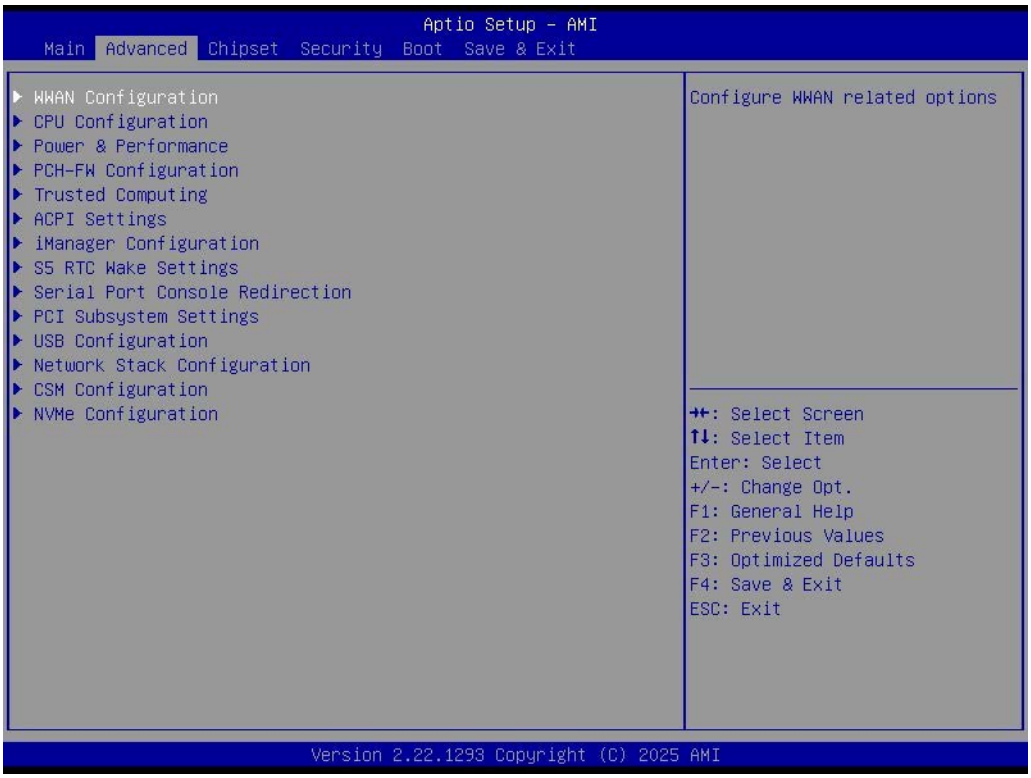
The Main BIOS setup screen has two main frames. The left frame displays all the options that can be configured. Grayed-out options cannot be configured; options in blue can. The right frame displays the key legend.

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.

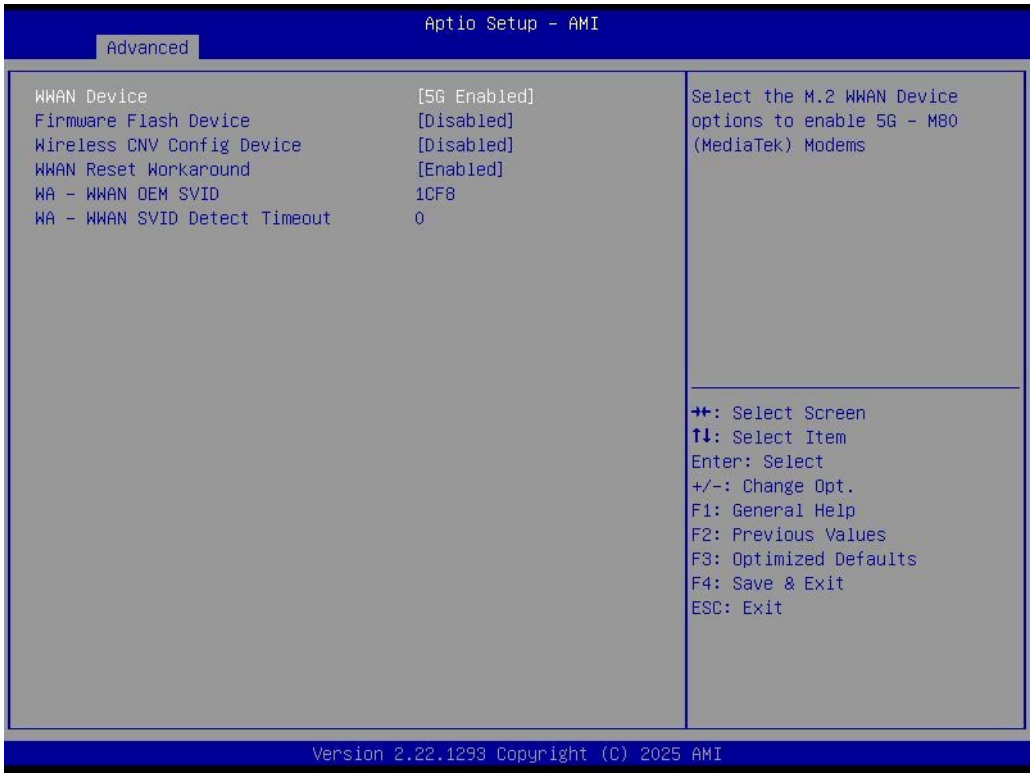
- **System Time / System Date**
  Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YYYY format. The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

3.2.2 Advanced BIOS Features Setup

Select the Advanced tab from the ARK-1222 setup screen to enter the Advanced BIOS Setup screen. You can select any of the items in the left frame of the screen, such as CPU Configuration, to go to the sub-menu for that item. You 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 is shown below. The sub-menus are described on the following pages.

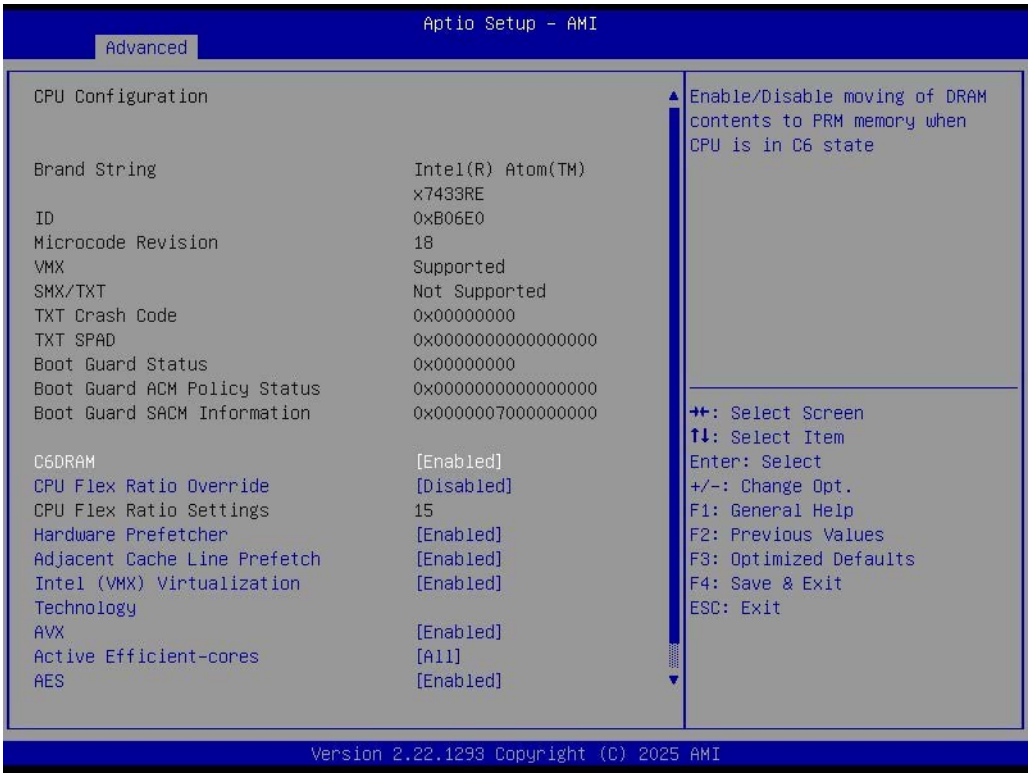


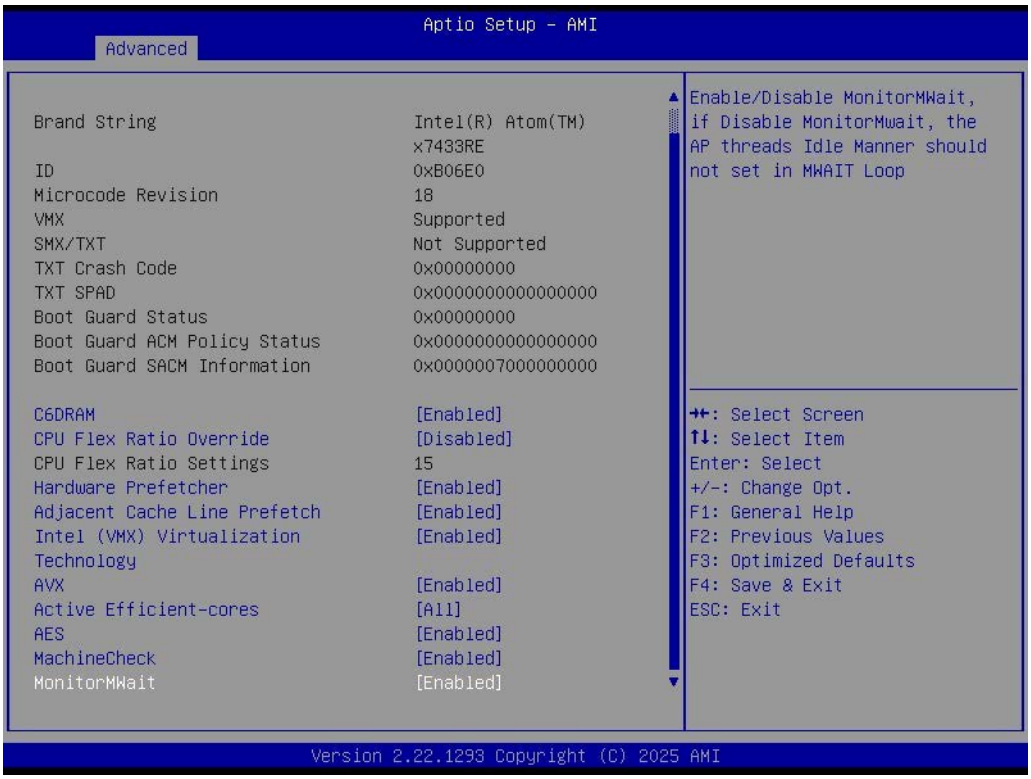
3.2.2.1 WWAN Configuration



- **WWAN Device**
  Select the M.2 WWAN Device option to enable 5G Modems.
- **Firmware Flash Device**
  Enable or disable a WWAN Firmware Flash Device.
- **WWAN Reset Workaround**
  Enabling this workaround will result in the BIOS asserting FULL_CARD_POWER_OFF#, PERST# and RESET# WWAN signals before the WWAN Device Power-On Sequence is executed. Disabling it has no impact.

3.2.2.2 CPU Configuration

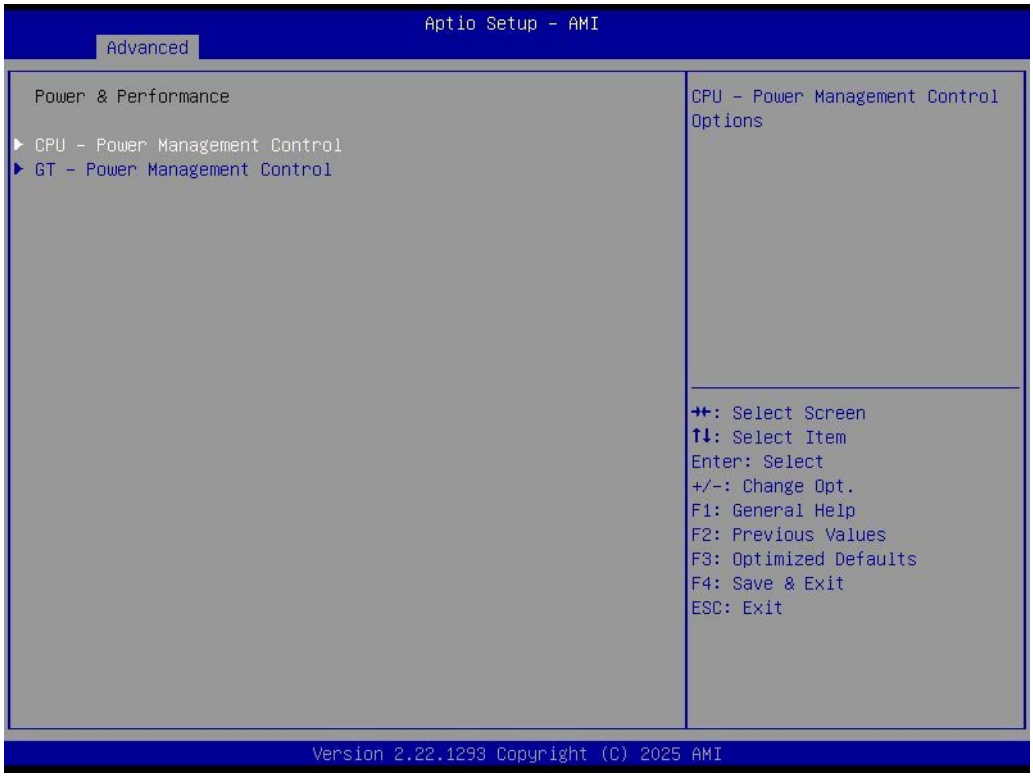




- **C6DRAM**
  Enable/Disable CPU Flex Ratio Programming.
- **CPU Flex Ratio Override**
  Enable/Disable CPU Flex Ratio Programming.

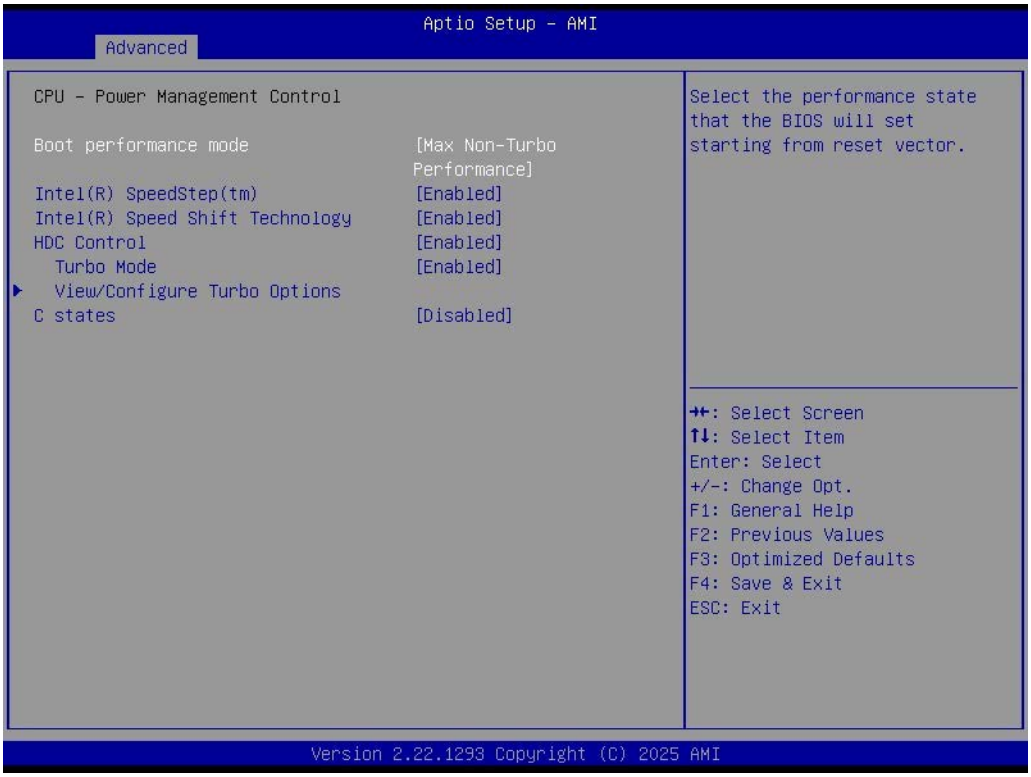
- **Hardware Prefetcher**
  To turn on/off the MLC streamer prefetcher.
- **Adjacent Cache Line Prefetcher**
  To turn on/off prefetching of adjacent cache lines.
- **Intel (VMX) Virtualization Technology**
  When Enabled, a VMM can utilize the additional hardware capability provided by Vanderpool Technology.
- **AVX**
  Enable/disable the AVX 2/3 Instructions.
- **Active Efficient-cores**
  Number of E-cores to enable in each processor package.
- **AES**
  Enable/Disable AES (Advanced Encryption Standard).
- **MachineCheck**
  Enable/Disable Machine Check.
- **MonitorMWait**
  Enable/Disable MonitorMWait.

3.2.2.3 Power & Performance



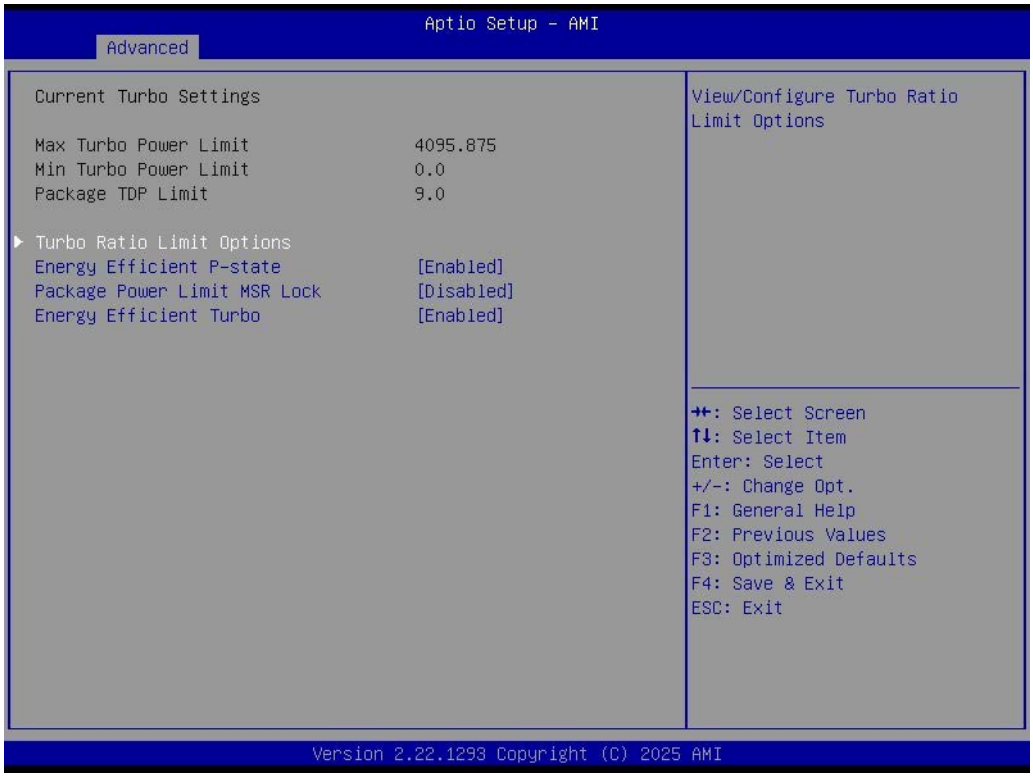
- **CPU – Power Management Control**
  CPU – Power Management Control Options.
- **GT – Power Management Control**
  GT – Power Management Control Options.

CPU - Power Management Control



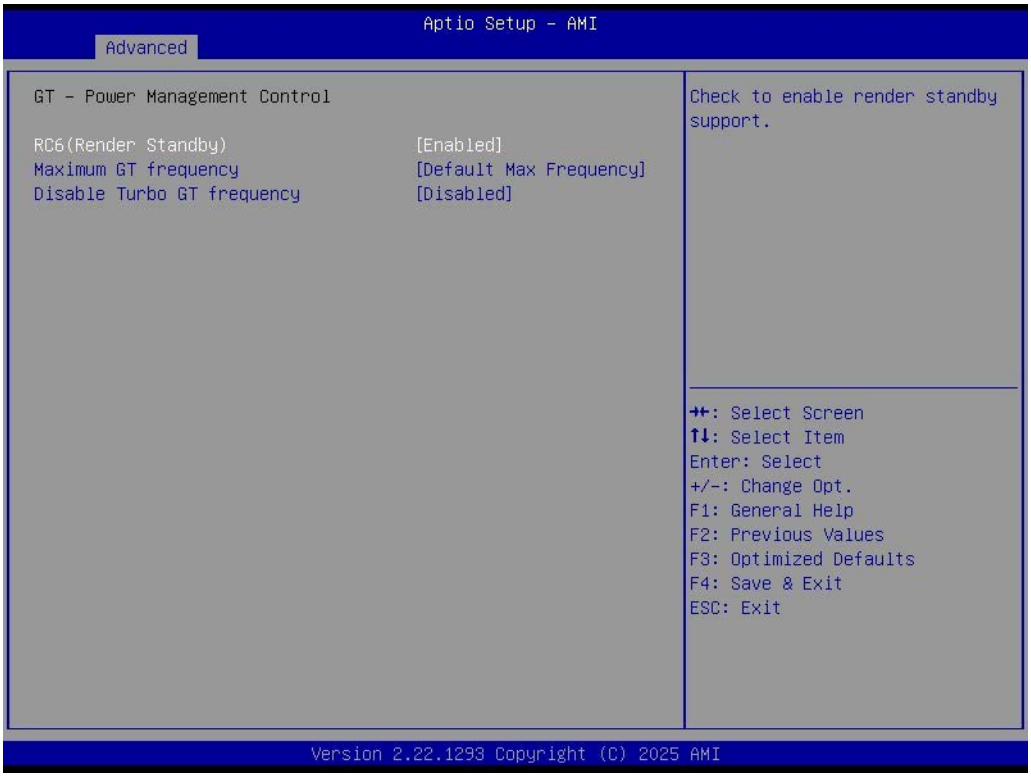
- **Boot Max Frequency**
  Enable/Disable Boot Maximum Frequency in CPU strap.
- **Intel® SpeedStep™**
  Allows more than two frequency ranges to be supported.
- **Intel® Speed Shift Technology**
  Enable/disable Intel® Speed Shift Technology support.
- **Turbo Mode**
  Enable/Disable processor turbo mode.
- **View/Configure Turbo Options**
  View and Configure Turbo Options.
- **C states**
  Enable/Disable CPU Power Management.

View/Configure Turbo Options



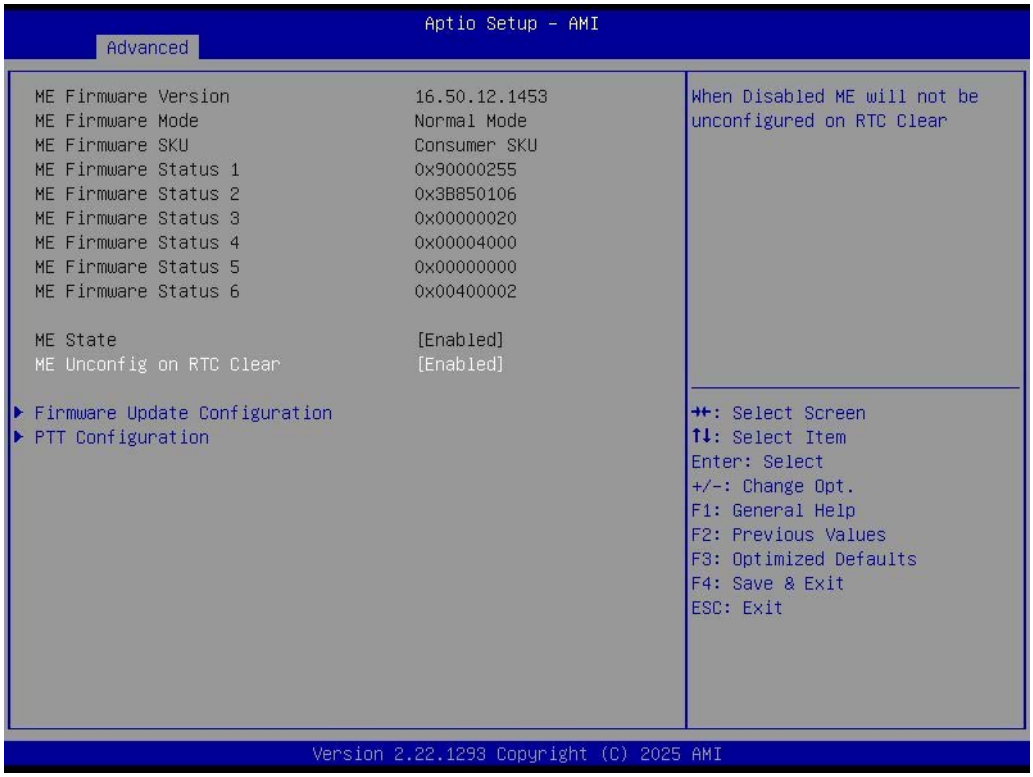
- **Turbo Ratio Limit Option**
  View/Configure Turbo Ratio Limit Options.
- **Energy Efficient P-state**
  Enable/Disable the Energy Efficient P-state feature.
- **Package Power Limit MSR Lock**
  Enable/Disable locking of Package Power Limit settings.
- **Energy Efficient Turbo**
  Enable/Disable the Energy Efficient Turbo feature.

GT - Power Management Control

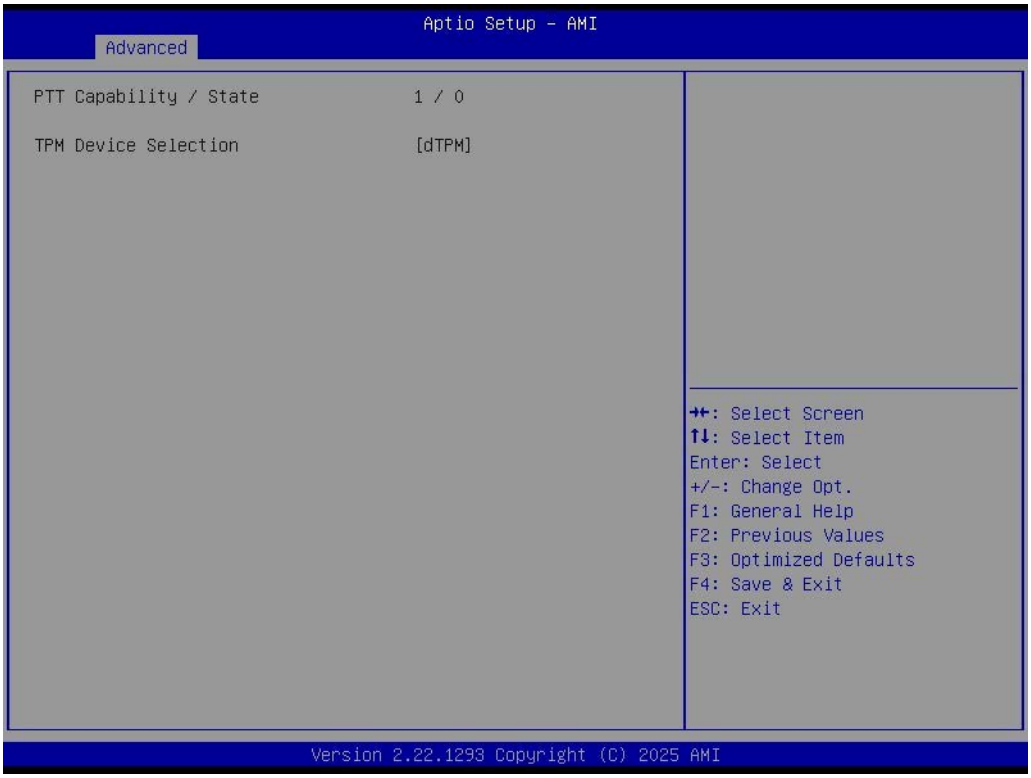


- **RC6 (Render Standby)**
  Check to enable render standby support.
- **Maximum GT frequency**
  Maximum GT frequency limited by user.
- **Disable Turbo GT frequency**
  Enable/Disable Turbo GT frequency.

3.2.2.4 PCH-FW Configuration

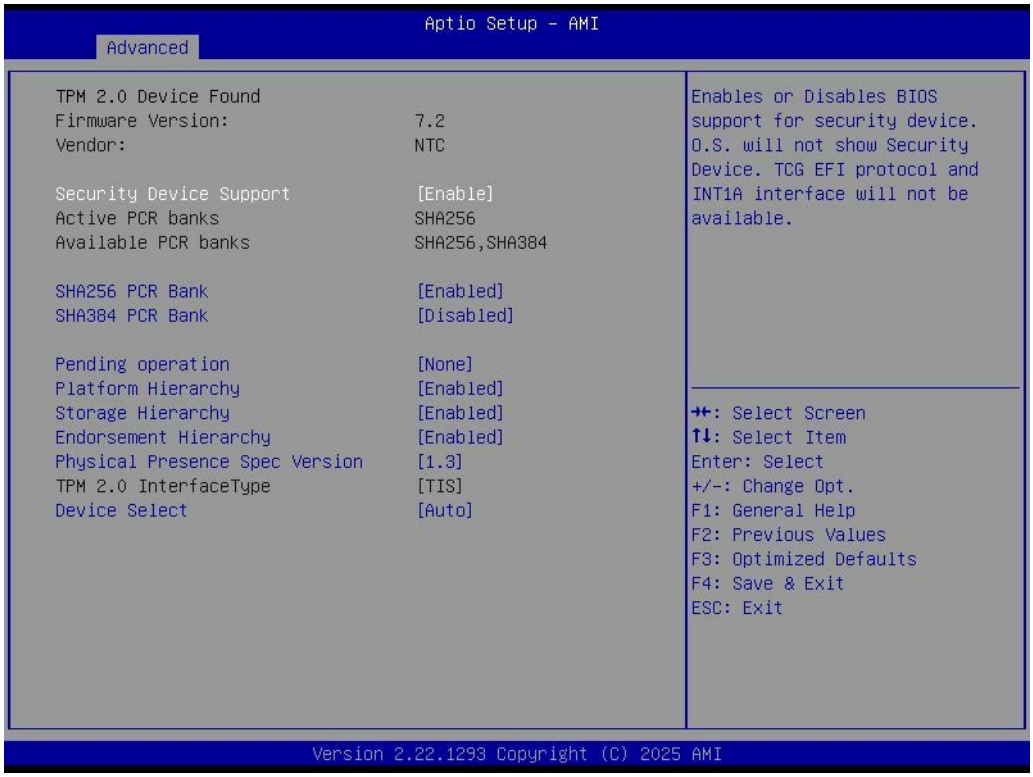


- **ME State**
  When Disabled, ME will be put ME into Temporarily Disabled Mode.
- **ME Unconfig on RTC Clear**
  When Disabled, ME will not be unconfigured on RTC Clear.
- **Firmware Update Configuration**
  Configure Management Engine Technology Parameters.
- **PTT Configuration**
  Configure PTT Parameters.



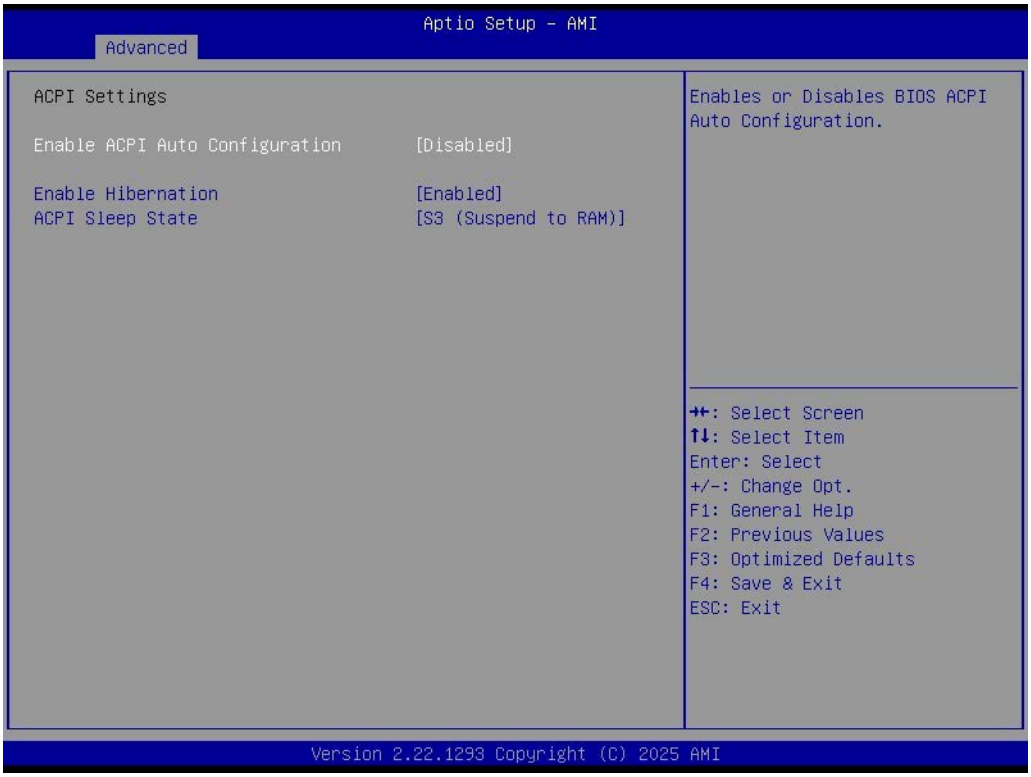
- **TPM Device Selection**
  Select TPM device: dTPM or PTT.

3.2.2.5 Trusted Computing



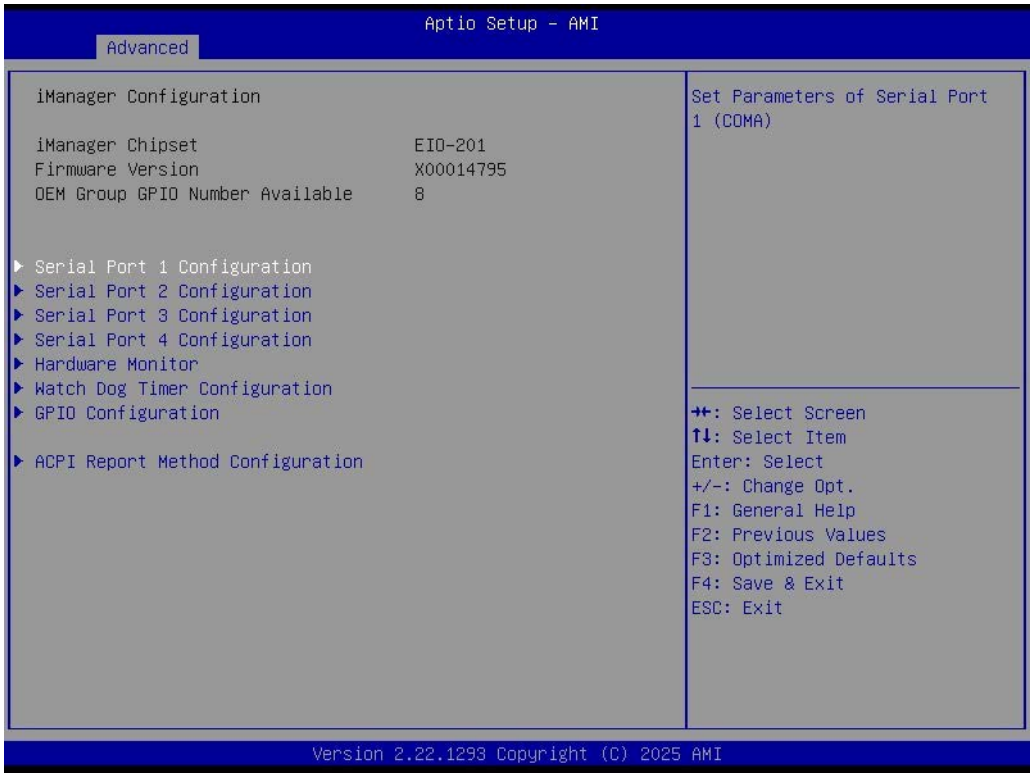
- **Security Device Support**
  Enable/Disable BIOS support for security device.
- **SHA256 PCR Bank**
  Enable/Disable SHA256 PCR Bank.
- **SHA384 PCR Bank**
  Enable/Disable SHA384 PCR Bank.
- **Pending operation**
  Schedule an Operation for the Security Device.
- **Platform Hierarchy**
  Enable/Disable Platform Hierarchy.
- **Storage Hierarchy**
  Enable/Disable Storage Hierarchy.
- **Endorsement Hierarchy**
  Enable/Disable Endorsement Hierarchy.
- **Physical Presence Spec Version**
  Select to Tell the OS to support PPI Spec Version 1.2 or 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.

3.2.2.6 ACPI Settings



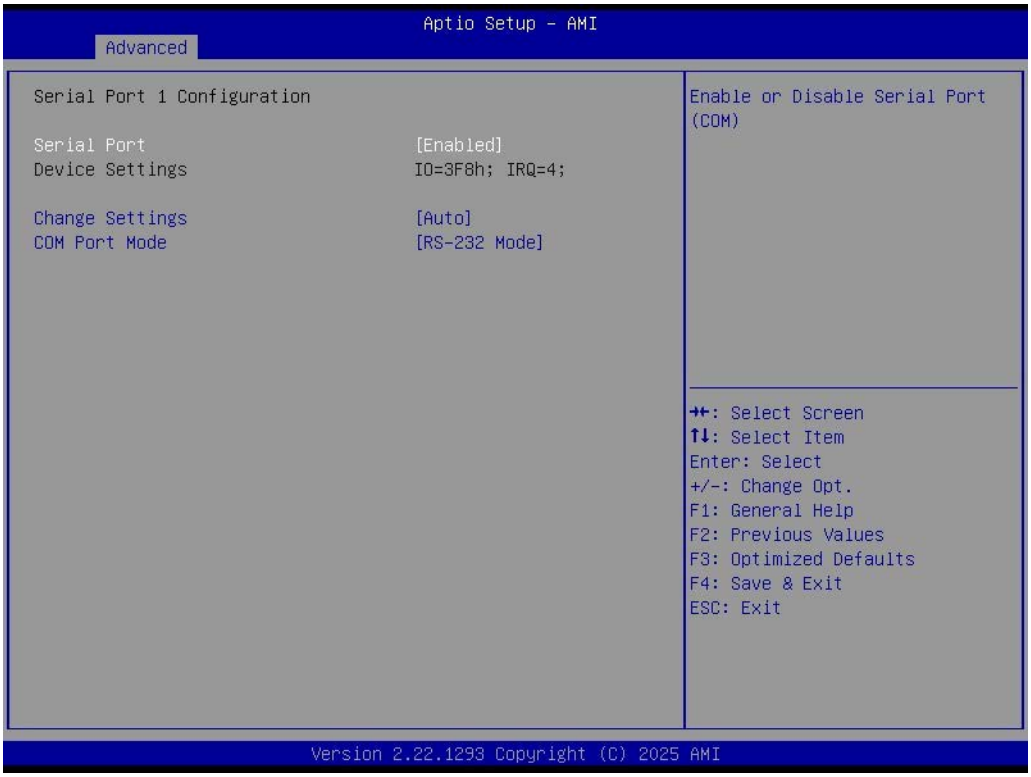
- **Enable ACPI Auto Configuration**
  Enable/Disable BIOS ACPI auto configuration.
- **Enable Hibernation**
  Enable/Disable the System ability to Hibernate (OS/S4 Sleep State). This option may be not effective with some OS.
- **ACPI Sleep State**
  Select the highest ACPI sleep state the system will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

3.2.2.7 iManager Configuration



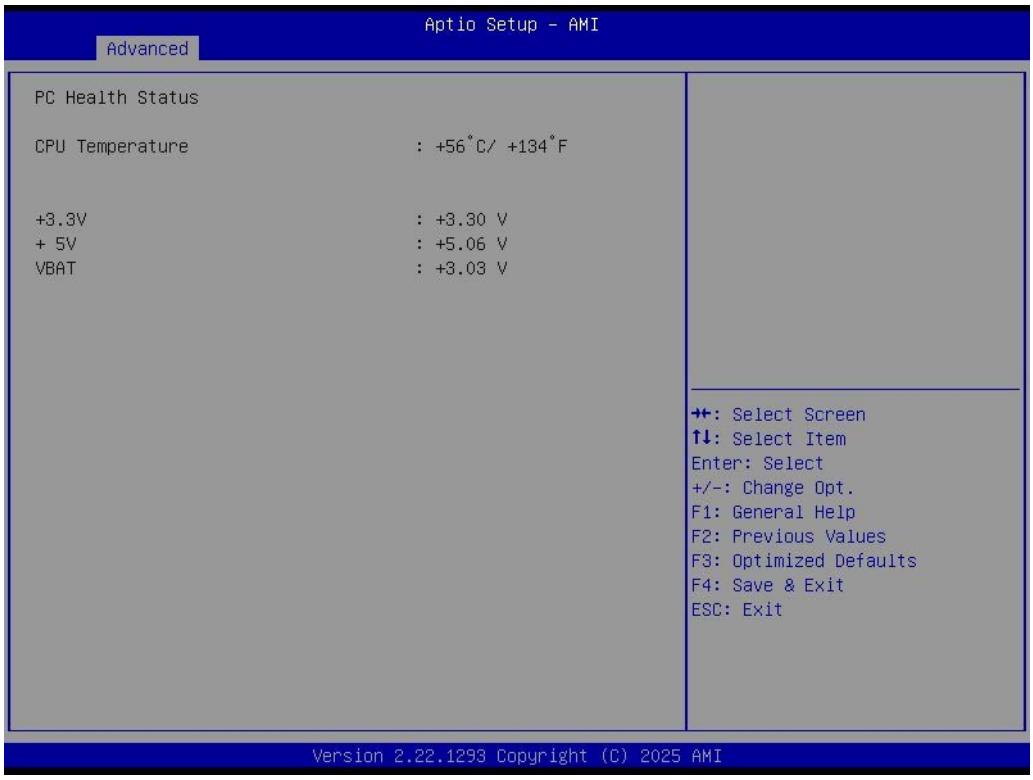
- **Serial Port 1 Configuration**
  Set Parameters of Serial Port 1.
- **Serial Port 2 Configuration**
  Set Parameters of Serial Port 2.
- **Serial Port 3 Configuration**
  Set Parameters of Serial Port 3.
- **Serial Port 4 Configuration**
  Set Parameters of Serial Port 4.
- **Hardware Monitor**
  Monitor hardware Status.
- **Watch Dog Timer Configuration**
  Watch Dog Timer Configuration Page.
- **GPIO Configuration**
  GPIO Configuration Settings.
- **ACPI Report Method Configuration**
  Select ACPI Reporting Method for EC Devices.

Serial Port 1-4 Configuration

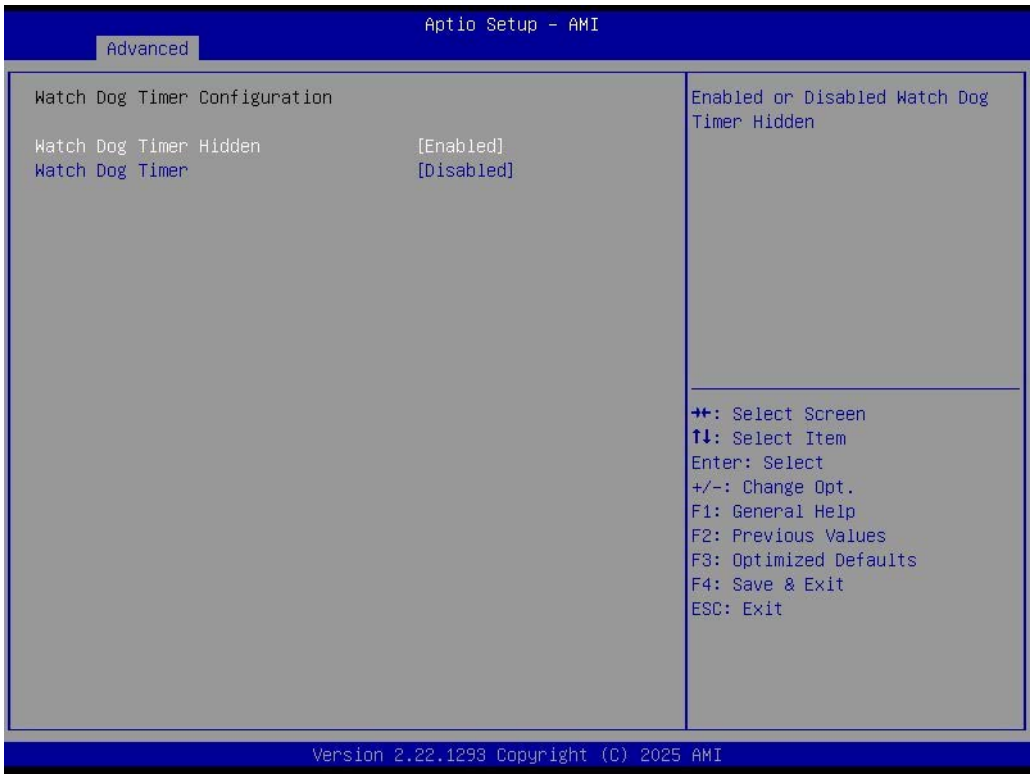


- **Serial Port**
  Enable/Disable Serial Port (COM).
- **Change Settings**
  Select an optimal settings for a Super IO device.
- **COM Port Mode**
  COM Port Mode Select.

Hardware Monitor

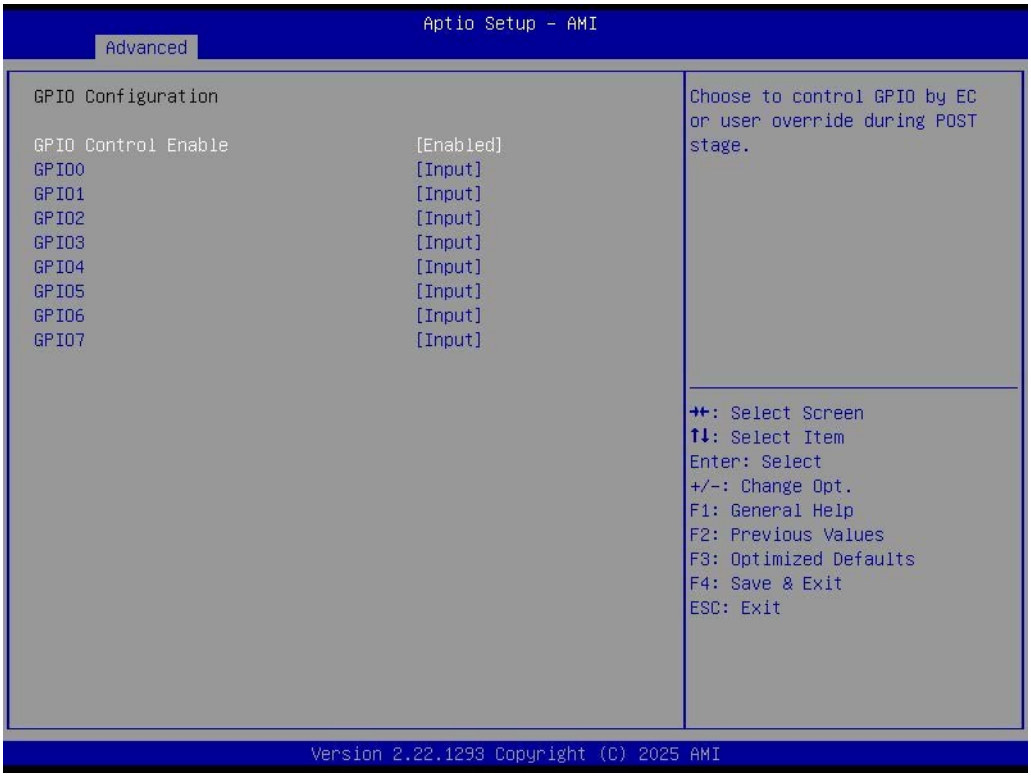


Watch Dog Timer Configuration



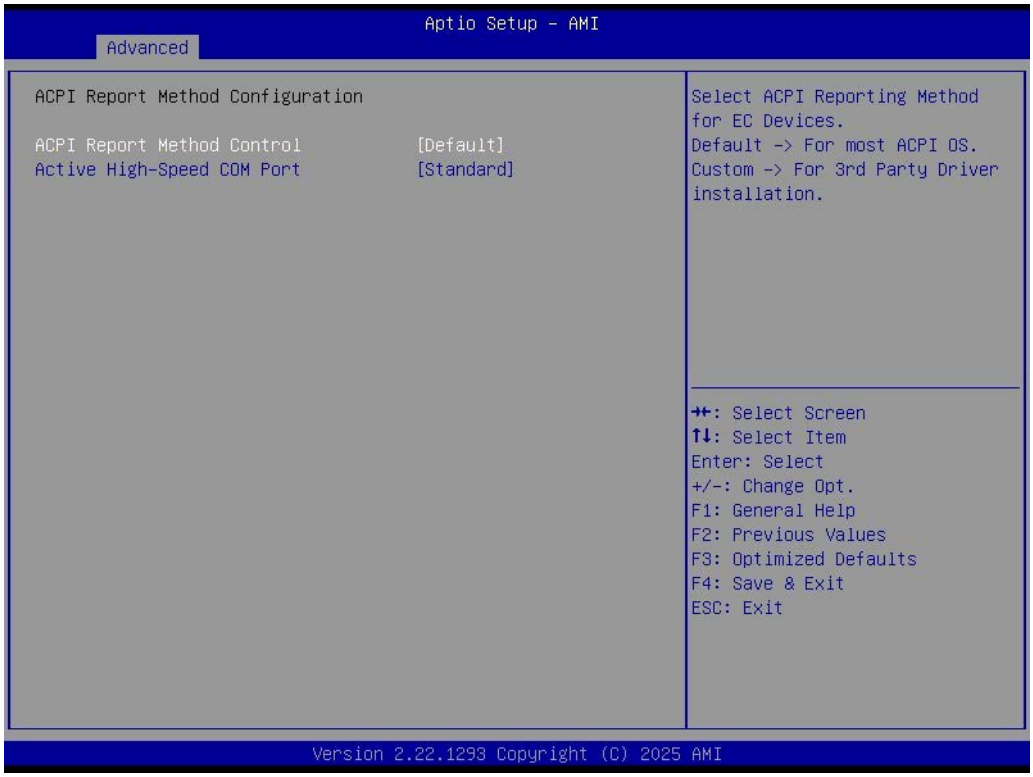
- **Watch Dog Timer Hidden**
  Enable/Disable Watch Dog Timer Hidden.
- **Watch Dog Timer**
  Enable/Disable Watch Dog Timer Function.

GPIO Configuration

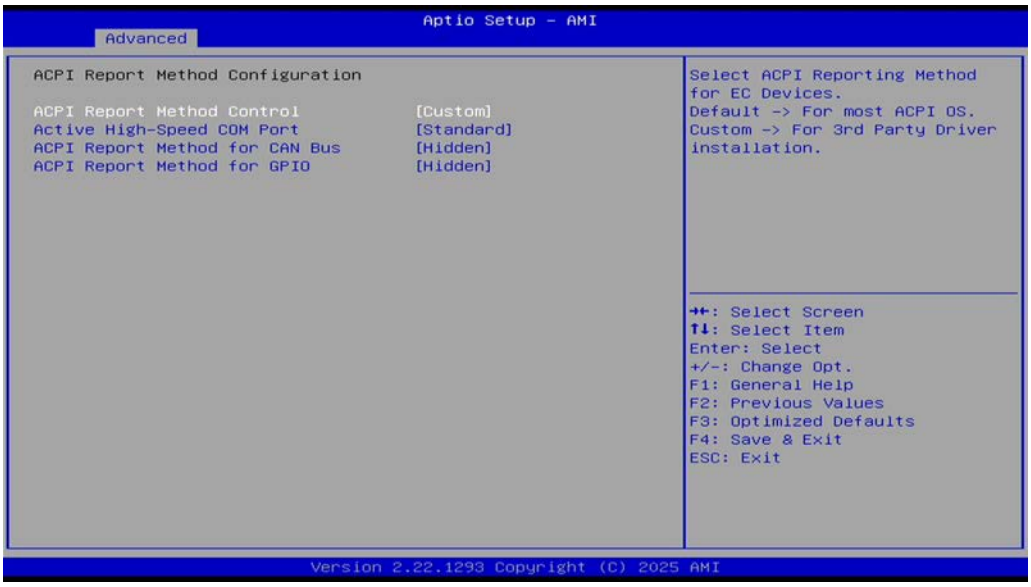


- **GPIO Control Enable**
  Choose to control GPIO by EC or user override during the POST stage.
- **GPIO0/1/2/3/4/5/6/7**
  Configure GPIO0/1/2/3/4/5/6/7.

ACPI Report Method Configuration



- **ACPI Report Method Control**
  Select ACPI Reporting Method for EC Devices.
- **Active High-Speed COM Port**
  Standard -> Standard COM Port.
  High Speed -> High Speed COM Port. (Driver installation is necessary.)

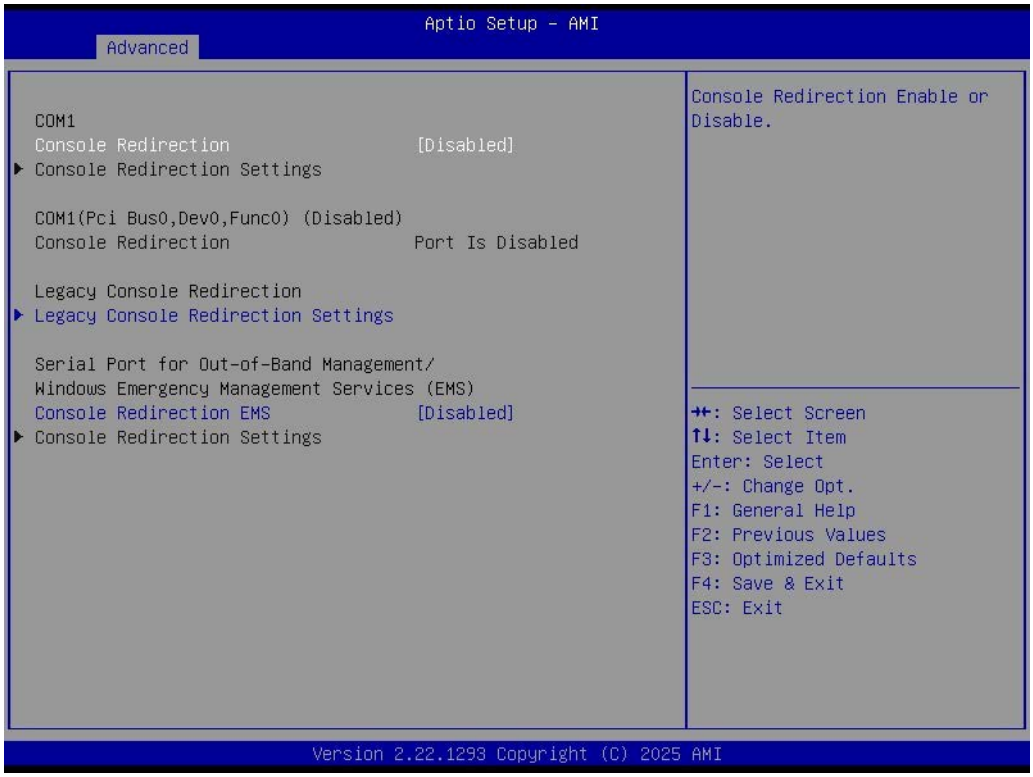


- **ACPI Report Method Control**
  Select ACPI Reporting Method for EC Devices.
- **Active High-Speed COM Port**
  Standard -> Standard COM Port.
  High Speed -> High Speed COM Port. (Driver installation is necessary.)
- **ACPI Report Method for CAN Bus**
  ACPI Report Method for GPIO.

3.2.2.8 S5 RTC Wake Setting

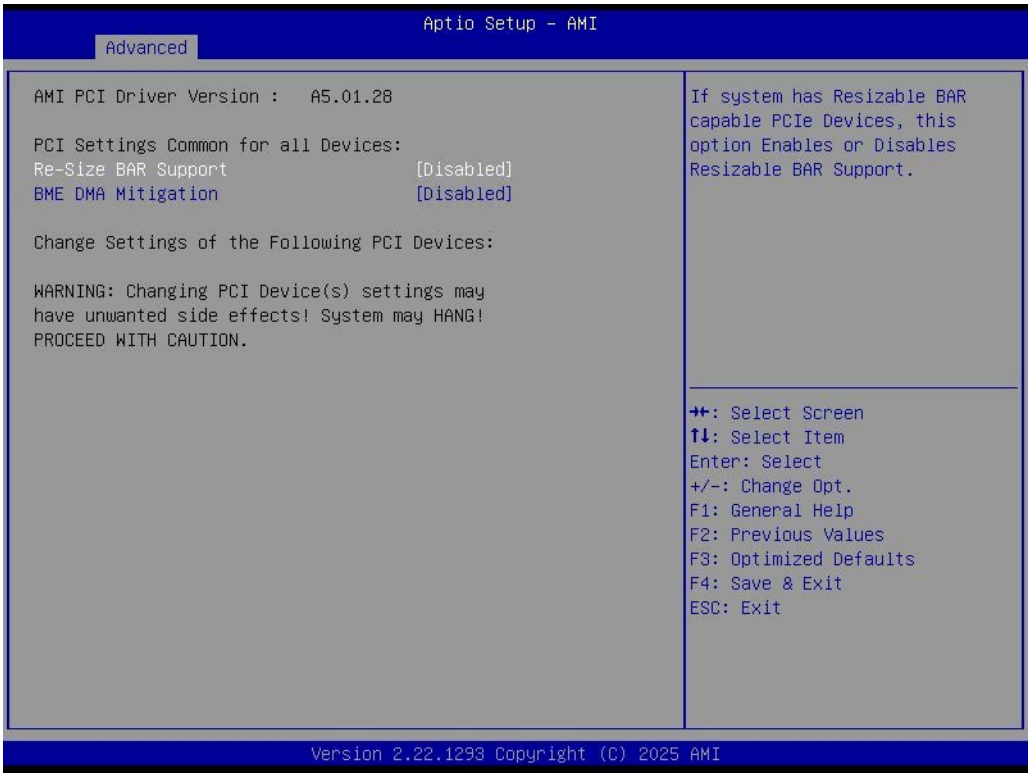
- **Wake system from S5**
  Enable/Disable System wake on alarm event.

3.2.2.9 Serial Port Console Redirection



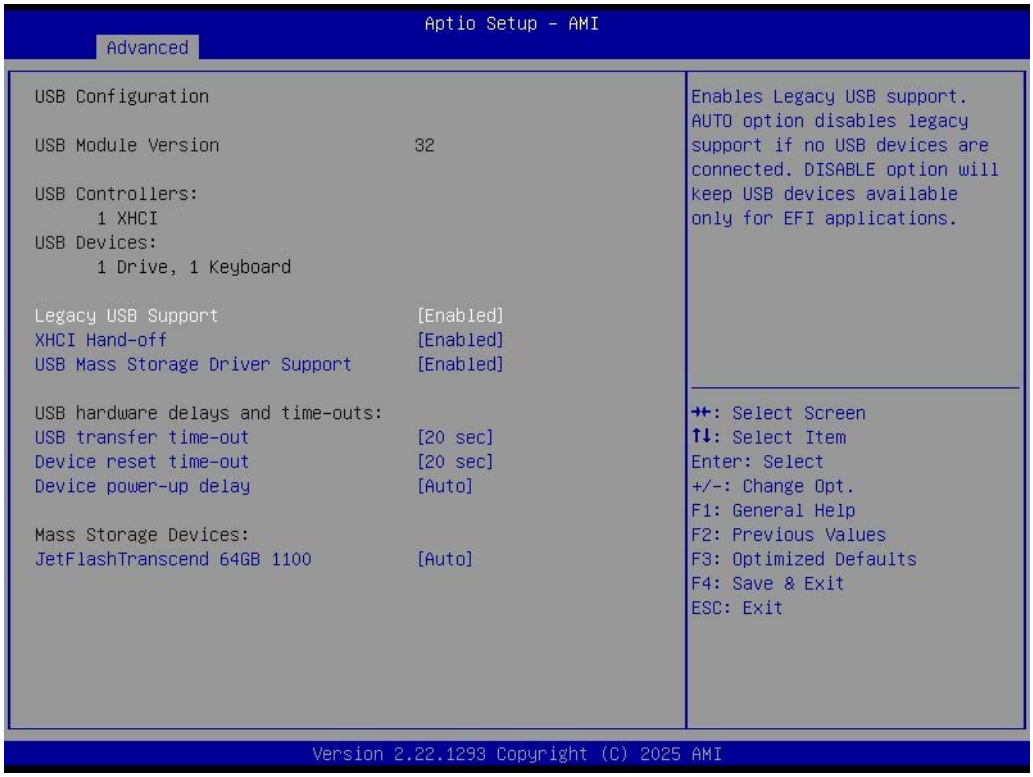
- **Console Redirection**
  Console Redirection Enable or Disable.
- **Legacy Console Redirection**
  This item allows users to configuration console redirection detail settings.
- **Console Redirection EMS**
  This item allows users to Enable or Disable console redirection for Microsoft Windows Emergency Management Services (EMS).

3.2.2.10 PCI Subsystem Settings



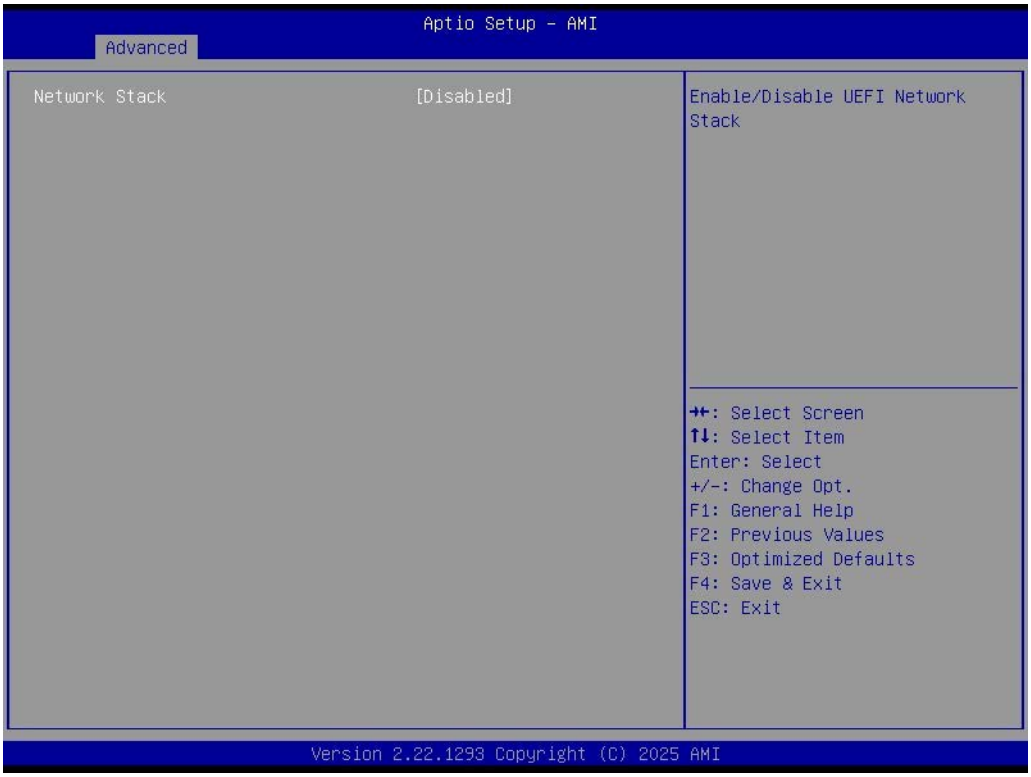
- **Re-size BAR Support**
  If the system has Resizable BAR capable PCIe Devices, this option Enables or Disables Resizable BAR Support.
- **BME DMA Mitigation**
  Re-enable Bus Master Attribute disabled during Pci enumeration for PCI Bridges after SMM Locked.

3.2.2.11 USB Configuration



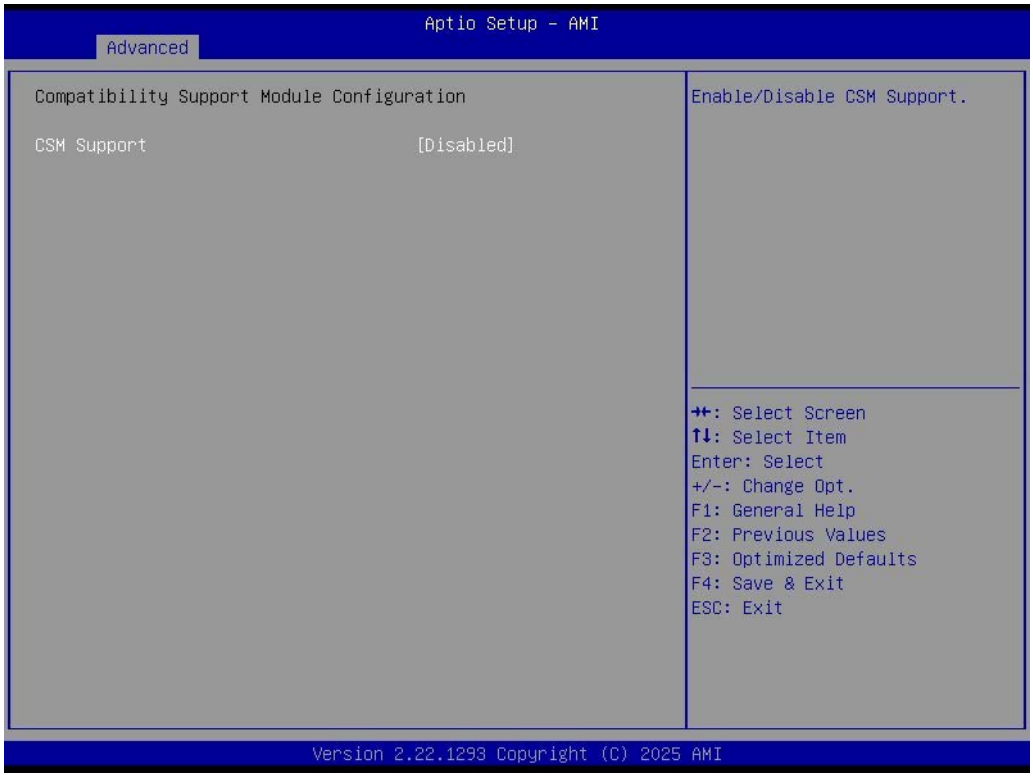
- **Legacy USB Support**
  Enable Legacy USB support. Auto disables legacy support if no USB devices are connected.
- **XHCI Hand-off**
  This is a workaround for OS without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.
- **USB Mass Storage Driver Support**
  Enable/Disable USB Mass Storage Driver Support.
- **USB transfer time-out**
  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. 'Auto' uses default value: for a Root port it is 100 ms, for a Hub port the delay is taken from the Hub descriptor.

3.2.2.12 Network Stack Configuration



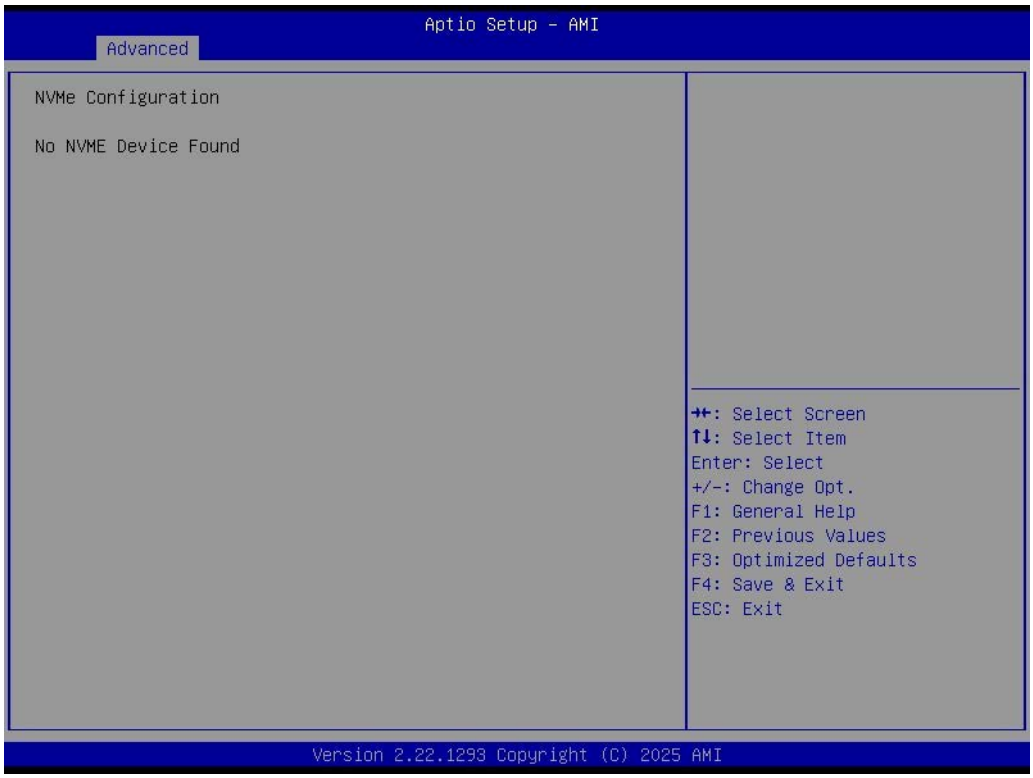
- **Network Stack**
  Enable/Disable UEFI Network Stack.

3.2.2.13 CSM Configuration



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

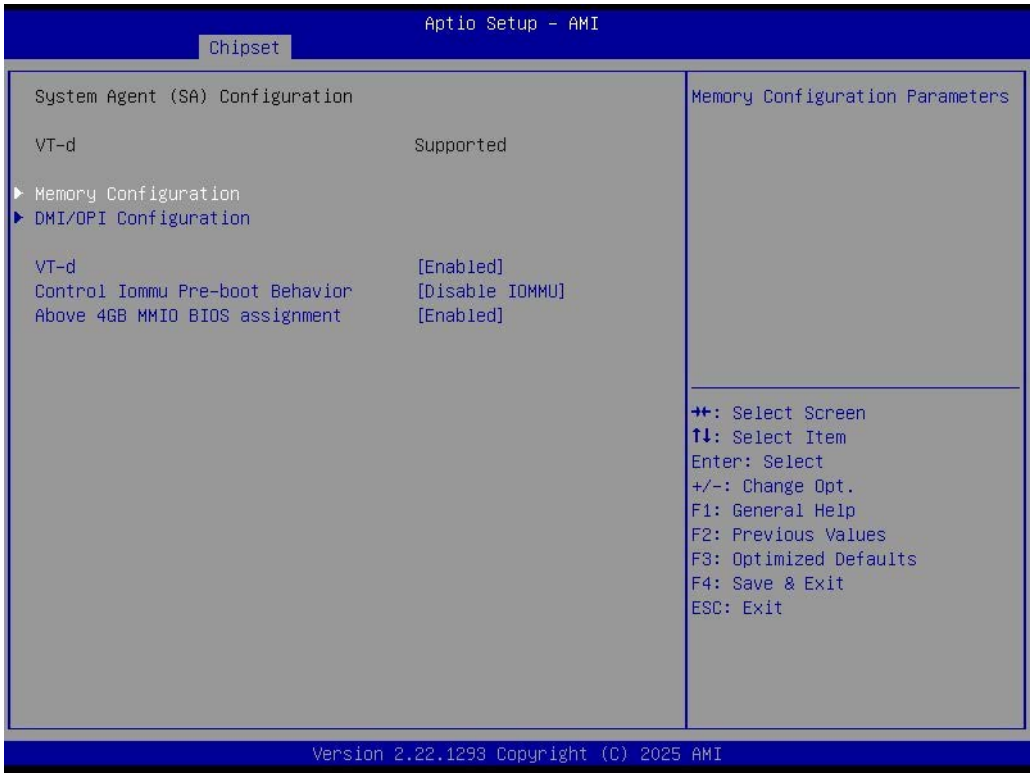
3.2.2.14 NVME Configuration



3.2.3 Chipset Configuration

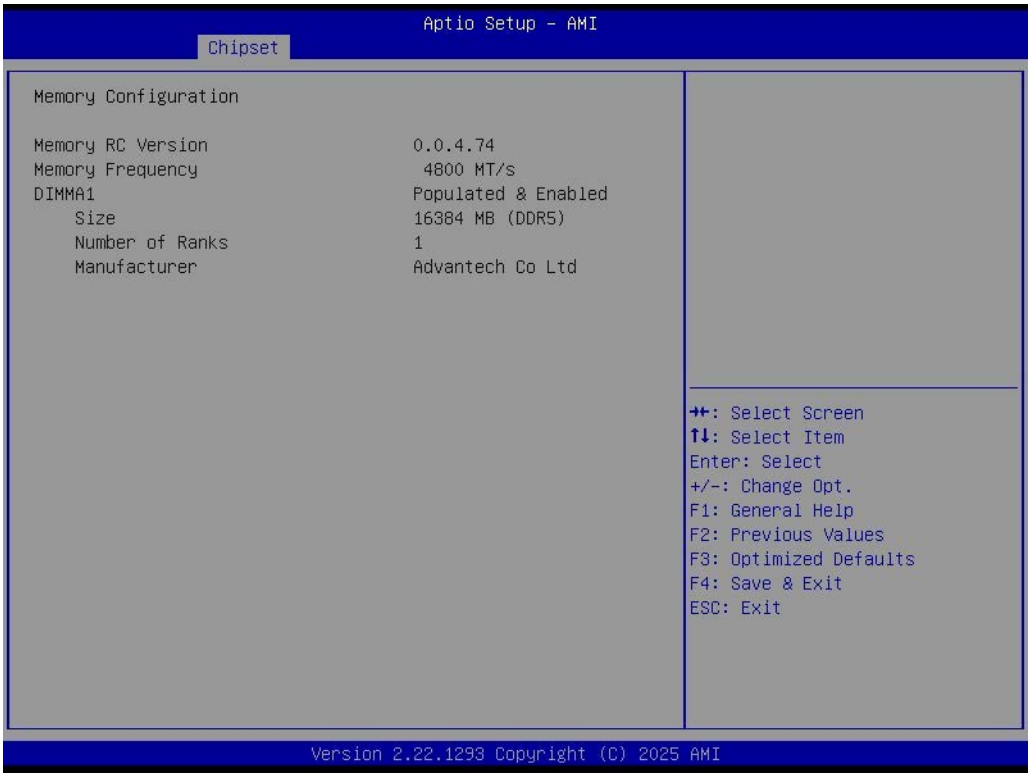
Select the Chipset tab from the ARK-1222 setup screen to enter the Chipset BIOS Setup screen. You can display a Chipset BIOS Setup option by highlighting it using the <Arrow> keys. All Plug and Play BIOS Setup options are described in this section. The Plug and Play BIOS Setup screen is shown below.

3.2.3.1 System Agent (SA) Configuration

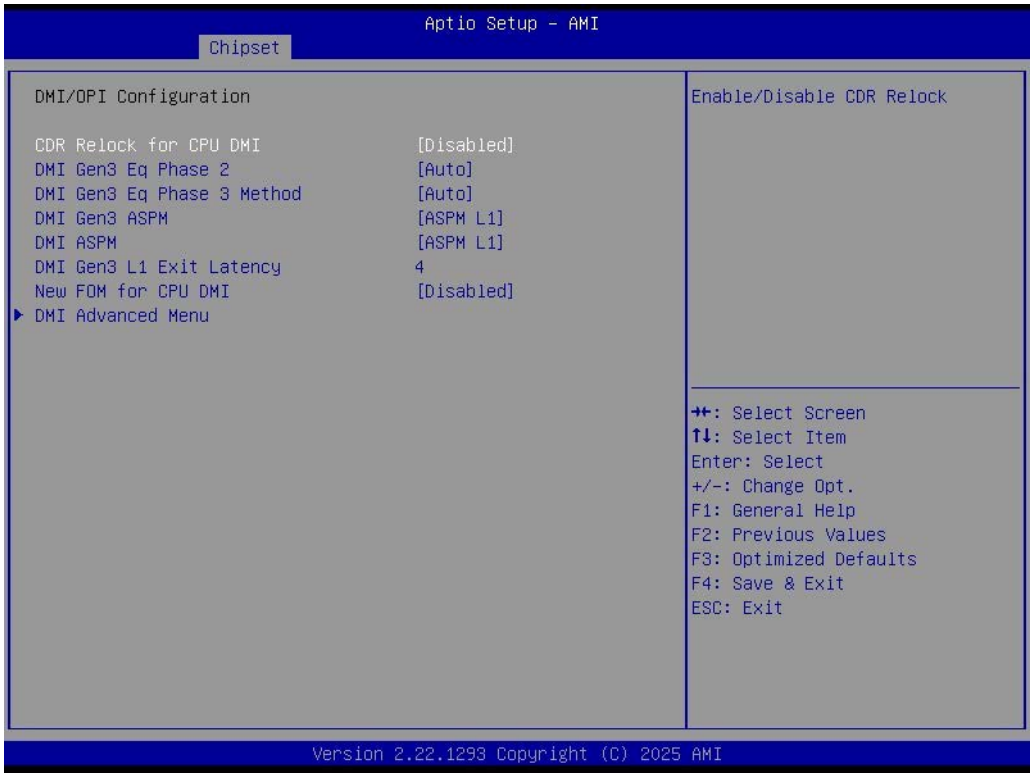


- **Memory Configuration**
  Memory Configuration Parameters.
- **DMI/OPI Configuration**
  DMI/OPI Configuration settings.
- **VT-d**
  VT-D capability.
- **Control Iommu Pre-boot Behavior**
  Enable/Disable Control Iommu Pre-boot Behavior.
- **Above 4GB MMIO BIOS assignment**
  Enable/Disable Above 4GB MMIO BIOS assignment.

Memory Configuration

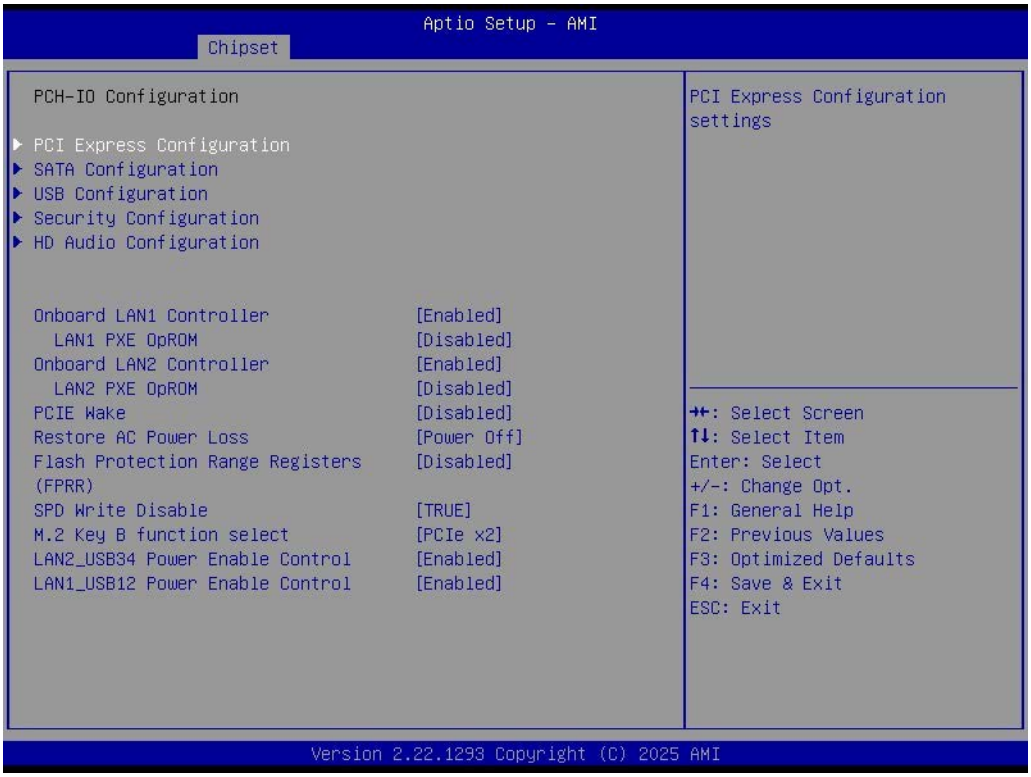


DMI/OPI Configuration



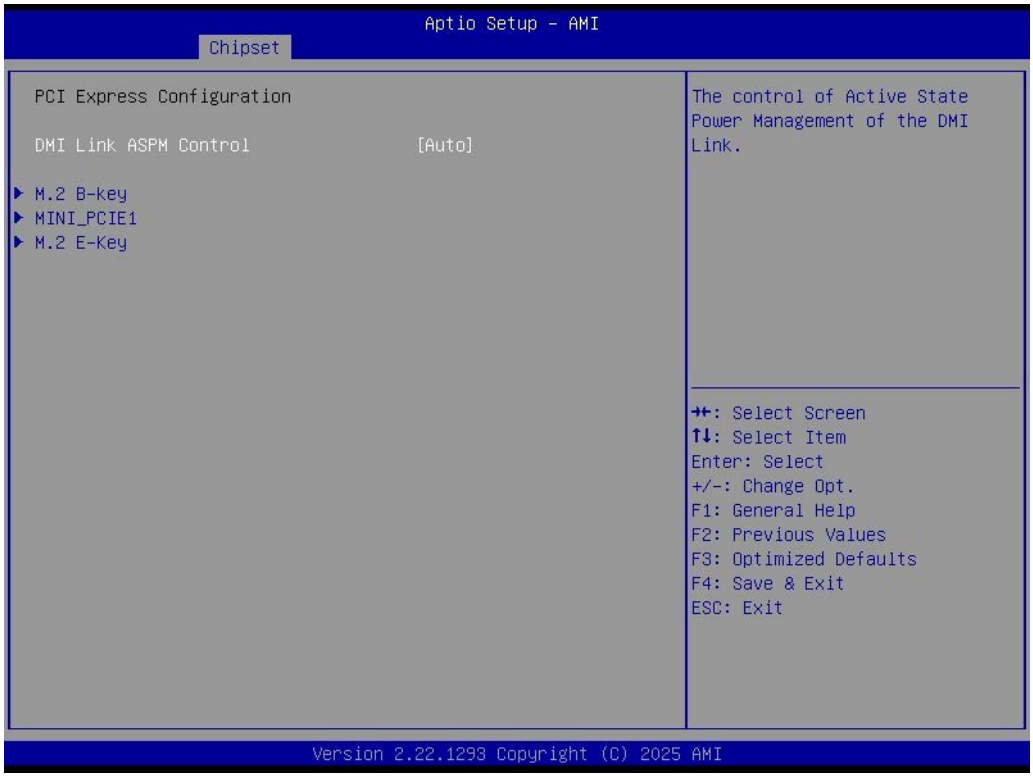
- **CDR Relock for CPU DMI**
  Enable/Disable CDR Relock.
- **DMI Gen3 Eq Phase 2**
  Perform Gen3 Equalization Phase 2.
- **DMI Gen3 Eq Phase 3 Method**
  Select Method for Gen3 Equalization Phase 3.
- **DMI Gen3 ASPM**
  Select the ACPI reporting method for EC CAN bus.
  Hidden -> Reported as reserved motherboard resource.
  Exposed -> Reported vendor _HID. (Driver installation is necessary.)
- **DMI ASPM**
  Select the ACPI reporting method for EC GPIO.
  Hidden -> Reported as reserved motherboard resource.
  Exposed -> Reported vendor _HID. (Driver installation is necessary.)
- **New FOM for CPU DMI**
  Enable/Disable New FOM for CPU DMI.

PCH-IO

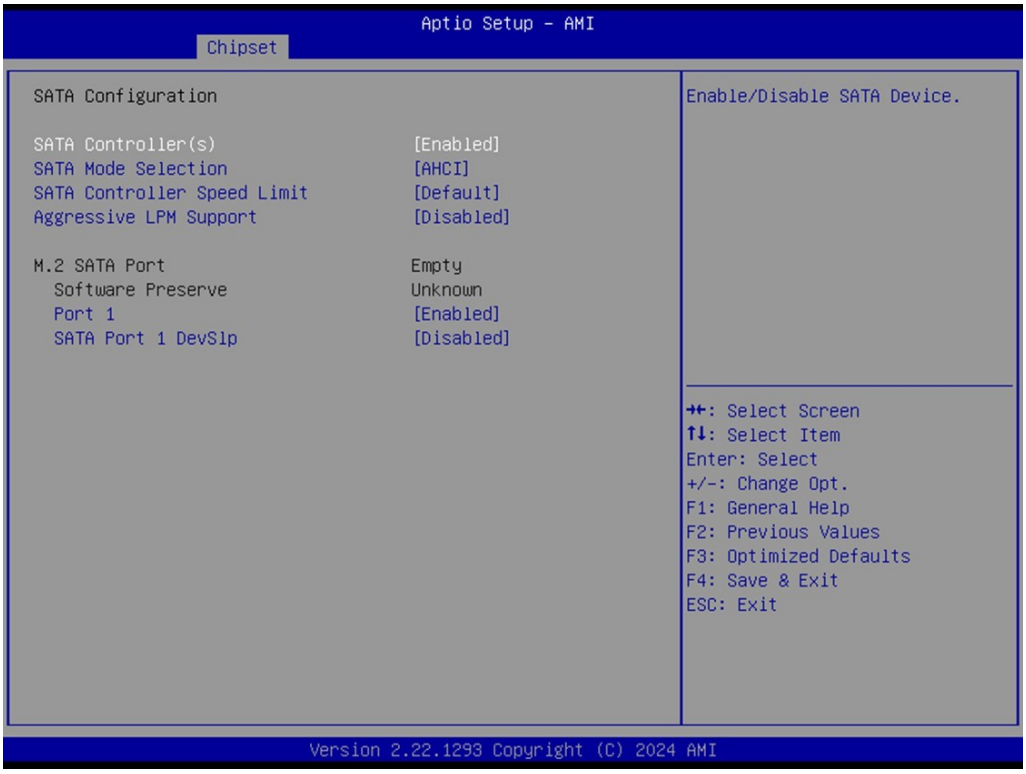


- **PCI Express Configuration**
  PCI Express Device Options Settings.
- **SATA Configuration**
  SATA Device Options Settings.
- **USB Configuration**
  USB Configuration Settings.
- **Security Configuration**
  Security Configuration Settings.
- **HD Audio Configuration**
  HD Audio Subsystem Configuration Settings.
- **Onboard LAN1/2 Controller**
  Select to Enable or Disable onboard LAN1/2 Controller.
- **LAN1/2 PXE ROM**
  Enable/Disable boot option ROM for LAN1/2 Controller.
- **PCIE Wake**
  Enable/Disable PCIE Wake
- **Restore AC Power Loss**
  Specify what state to go to when power is re-applied after a power failure (G3 state).
- **Flash Protection Range Registers (FPRR)**
  Enable or disable Flash Protection Range Registers(FPRR)
- **SPD Write Disable**
  Enable/Disable setting SPD Write Disable.
- **M.2 Key B Function select**
  Select M.2 Key B Function.
- **LAN2_USB34 Power Enable Control**
  Enable/Disable USB3/4 Power.
- **LAN1_USB12 Power Enable Control**
  Enable/Disable USB1/2 Power.

PCI Express Configuration



SATA Configuration

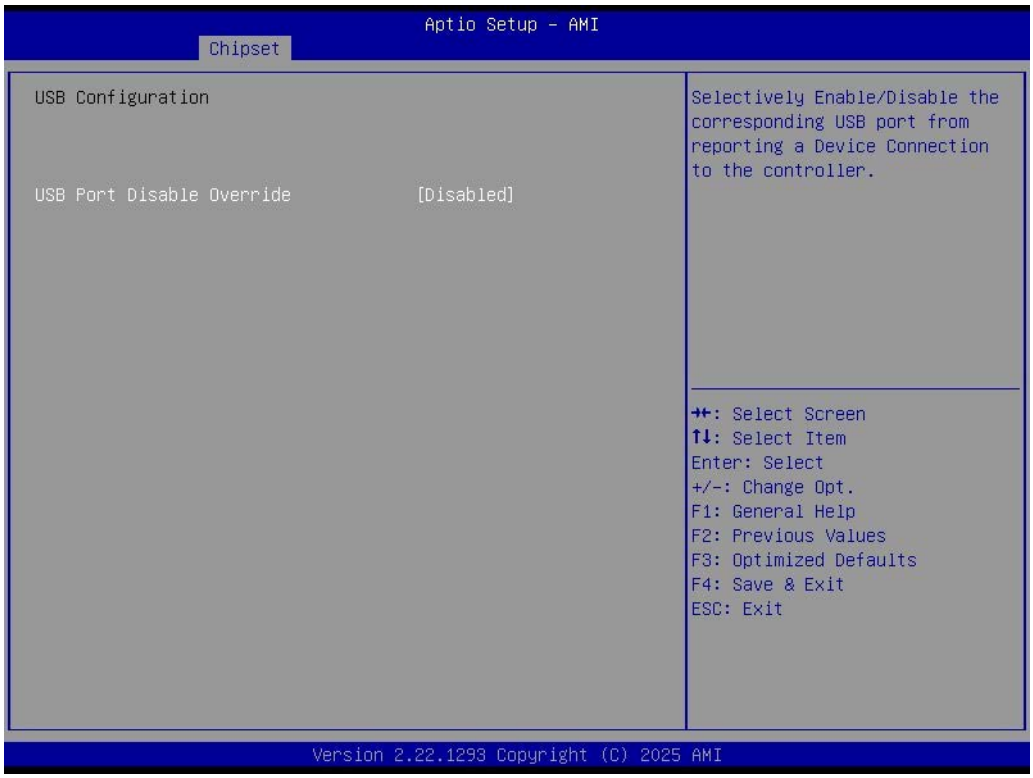


- **SATA Controller**
  Enable/Disable SATA Device.
- **SATA Mode Selection**
  Determines how SATA controllers operate.
- **SATA Controller Speed Limit**
  Indicates the maximum speed the SATA controller can support.
- **Aggressive LPM Support**
  Enable PCH to aggressively enter link power state.

M.2 SATA Port

- **Port 1**
  Enable/Disable SATA Port.
- **SATA Port 1 DevSlp**
  Enable/Disable SATA Port 1 DevSlp. For DevSlp to work, both hard drive and SATA port need to support DevSlp function, otherwise an unexpected behavior might happen.

USB Configuration



- **USB Port Disable Override**
  Selectively Enable/Disable the corresponding USB Port from reporting a Device Connection to the Controller.

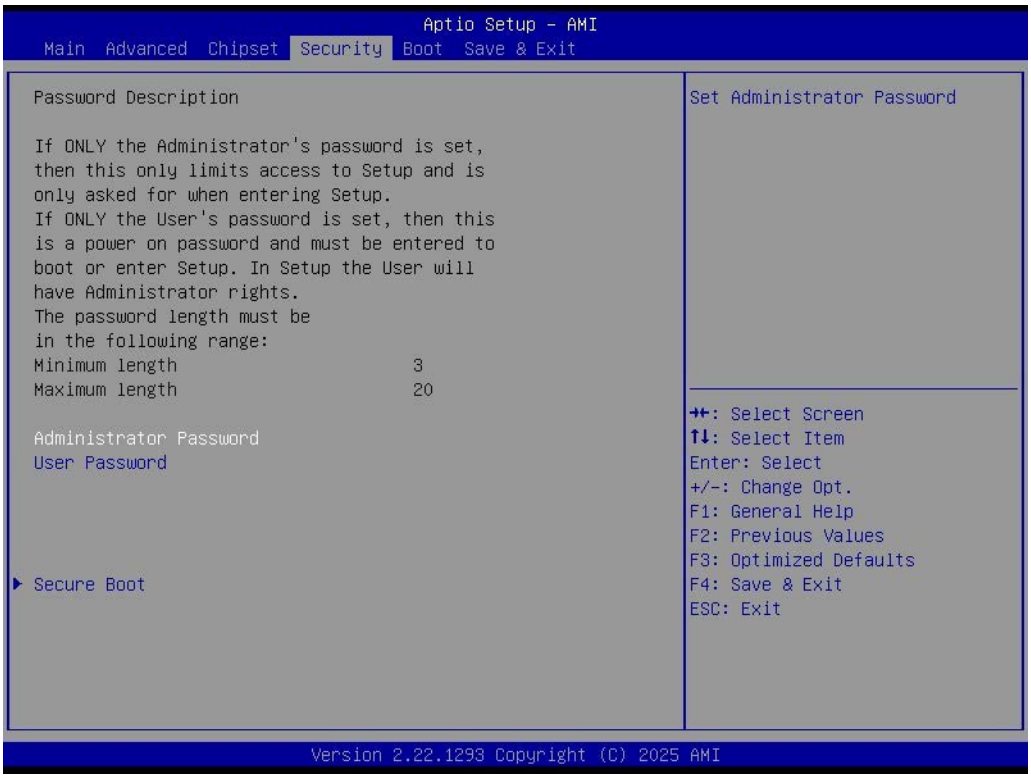
Security Configuration

- **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.
- **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. Disabled = HDA will be uncondition-ally disabled. Enabled = HDA will be unconditionally Enabled.

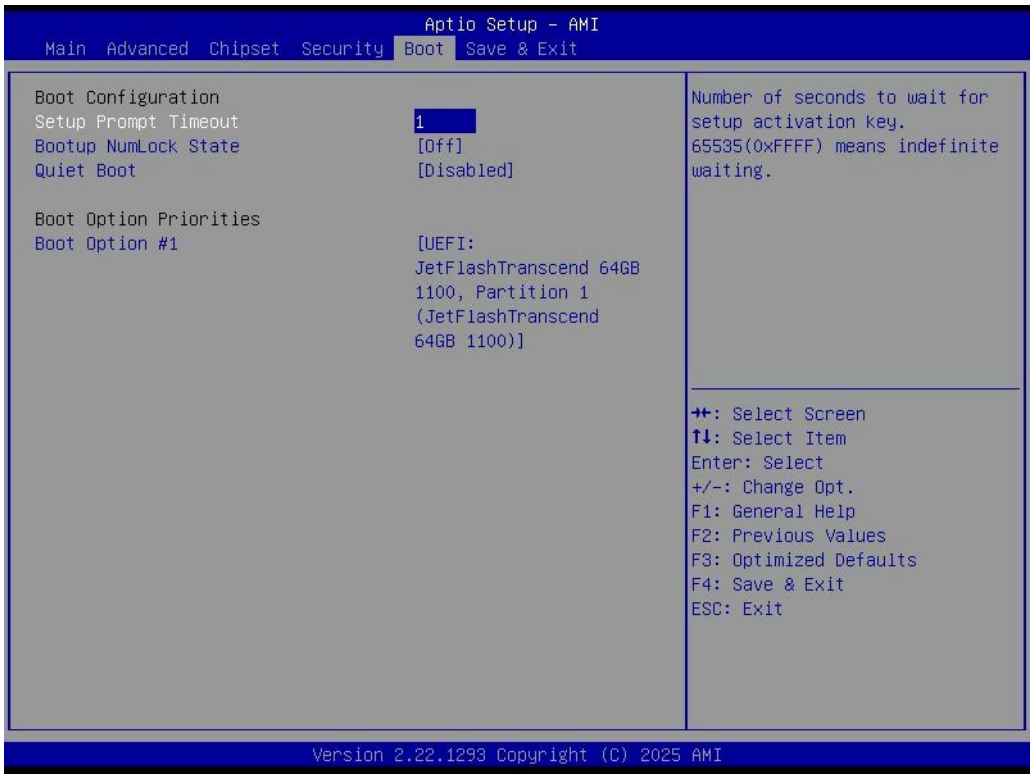
3.2.4 Security



Select Security Setup from the ARK-1222 Setup main BIOS setup menu. All Security Setup options, such as password protection and virus protection are described in this section. To access the sub-menu for the following items, select the item and press <Enter>:

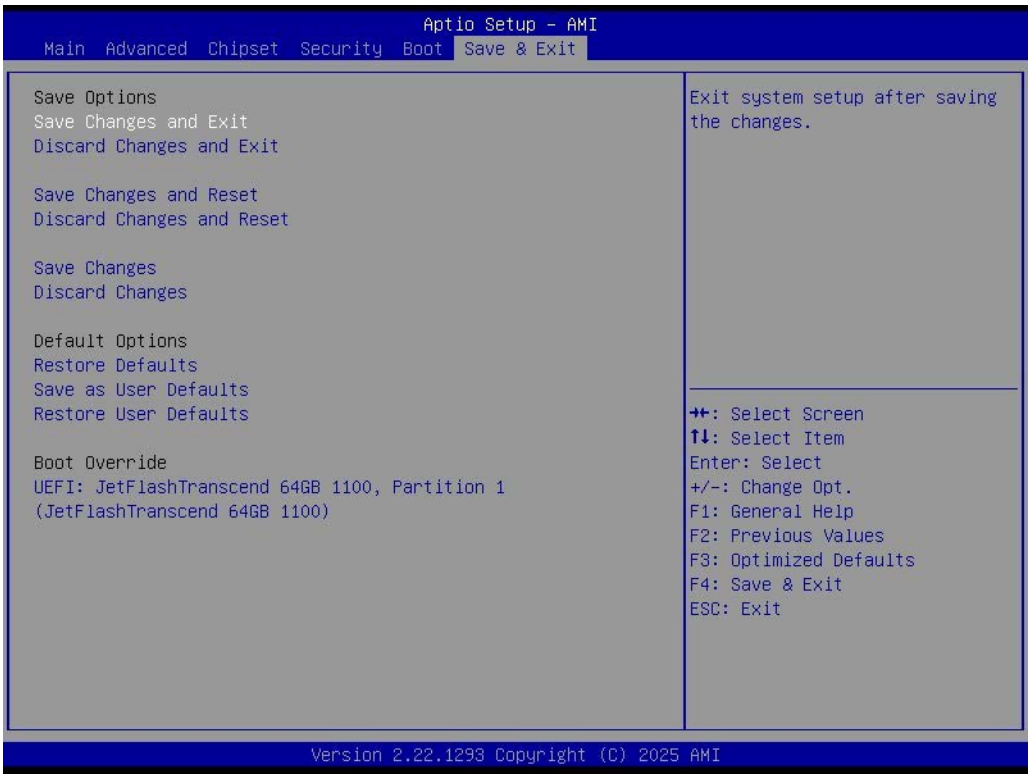
- **Change Administrator/User Password**
  Select this option and press <ENTER> to access the sub-menu, and then type in the password.
- **Secure Boot**
  Secure Boot Configuration.

3.2.5 Boot



- **Setup Prompt Timeout**
  Number of seconds that the firmware will wait before initiating the original default boot selection. A value of 0 indicates that the default boot selection is to be initiated immediately on boot. A value of 65535(0xFFFF) indicates that firmware will wait for user input before booting. This means the default boot selection is not automatically started by the firmware.
- **Bootup NumLock State**
  Select the keyboard NumLock state.
- **Quiet Boot**
  Enable/Disable Quiet Boot option.
- **Boot Option #1**
  Sets the system boot order.

3.2.6 Save & Exit



- **Save Changes and Exit**
  This item allows you to exit system setup after saving the changes.
- **Discard Changes and Exit**
  This item allows you to exit system setup without saving any changes.
- **Save Changes and Reset**
  This item allows you to reset the system after saving the changes.
- **Discard Changes and Reset**
  This item allows you to rest system setup without saving any changes.
- **Save Changes**
  This item allows you to save changes done so far to any of the options.
- **Discard Changes**
  This item allows you to discard changes done so far to any of the options.
- **Restore Defaults**
  This item allows you to restore/load default values for all the options.
- **Save as User Defaults**
  This item allows you to save the changes done so far as user defaults.
- **Restore User Defaults**
  This item allows you to restore the user defaults to all the options.
- **Boot Override**
  Boot device select can override your boot priority.

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