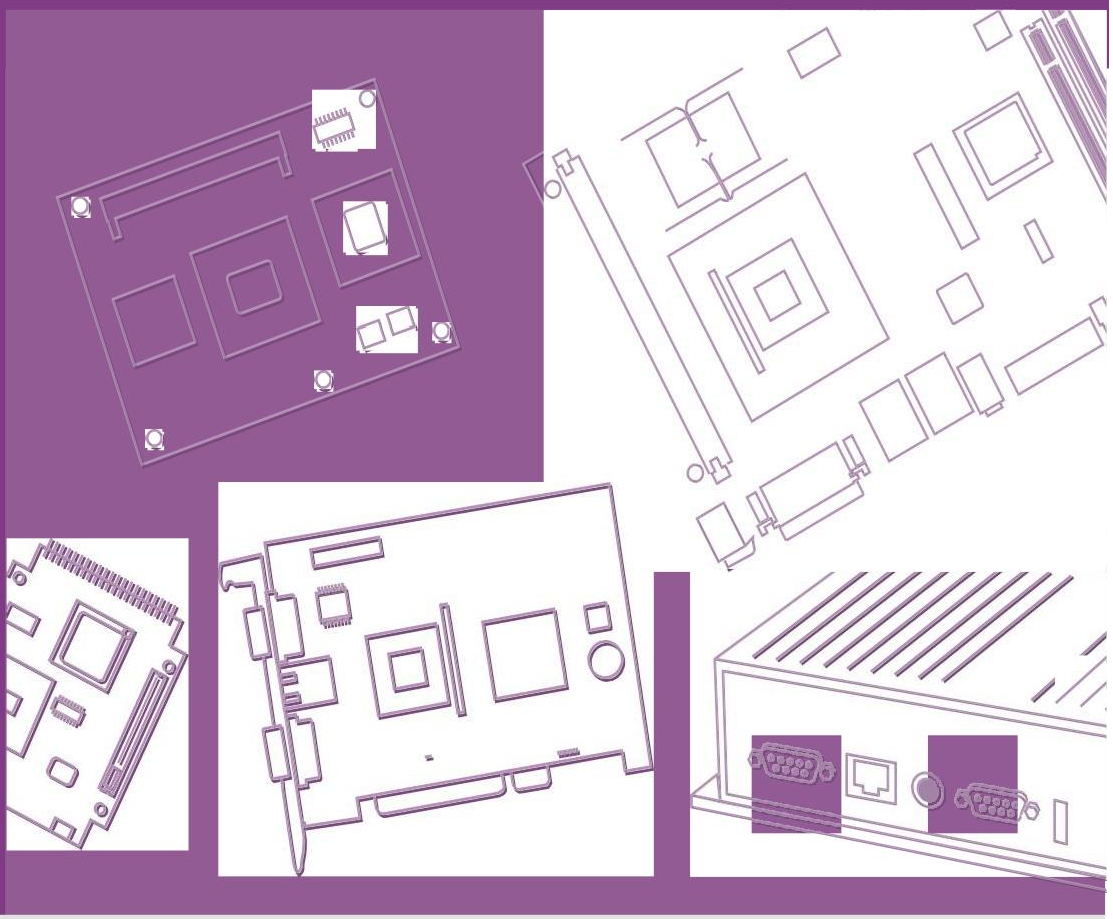


User Manual

AIR-420

High-Performance PC (HPC)

ADVANTECH

Enabling an Intelligent Planet

Attention!

Please note:

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

Copyright

The documentation and the software included with this product are copyrighted 2025 by Advantech Co., Ltd. All rights are reserved. Advantech Co., Ltd. reserves the right to improve the products described in this manual at any time without notice. No part of this manual may be reproduced, copied, translated, or transmitted in any form or by any means without the prior written permission of Advantech Co., Ltd. The information provided in this manual is intended to be accurate and reliable. However, Advantech Co., Ltd. assumes no responsibility for its use, nor for any infringements on the rights of third parties that may result from its use.

Acknowledgments

Award is a trademark of Award Software International, Inc.

VIA is a trademark of VIA Technologies, Inc.

IBM, PC/AT, PS/2 and VGA are trademarks of International Business Machines Corporation.

Intel® and Pentium® are trademarks of Intel Corporation.

Microsoft Windows® is a registered trademark of Microsoft Corp.

RTL is a trademark of Realtek Semi-Conductor Co., Ltd.

ESS is a trademark of ESS Technology, Inc.

UMC is a trademark of United Microelectronics Corporation.

SMI is a trademark of Silicon Motion, Inc.

Creative is a trademark of Creative Technology LTD.

CHRONTEL is a trademark of Chrontel Inc.

All other product names or trademarks are properties of their respective owners.

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

https://www.advantech.com/en/products/air-edge-ai-hpcs/sub_5bfbf78e-c85b-43d2-83d9-7c12eabc6ef8

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

Part No. Edition 1

Printed in China Sep. 2025

Product Warranty (2 Years)

Advantech warrants the original purchaser that all of its products will be free from defects in materials and workmanship for two years from the date of purchase.

This warranty does not apply to any products that have been repaired or altered by persons other than repair personnel authorized by Advantech, or products that have been subject to misuse, abuse, accident, or improper installation. Advantech assumes no liability under the terms of this warranty as a consequence of such events.

Because of Advantech's high quality-control standards and rigorous testing, most customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced free of charge during the warranty period. For out-of-warranty repairs, customers are billed according to the cost of replacement materials, service time, and freight. Please consult your dealer for more details.

If you believe that your product is defective, follow the steps outlined below.

1. Collect all the information about the problem encountered. (For example, CPU speed, Advantech products used, other hardware and software, etc.) Note any- thing abnormal and list any on-screen messages displayed when the problem occurs.
2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.
3. If your product is diagnosed as defective, obtain a return merchandise authori- zation (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 pur- chase date are not eligible for warranty service.
5. Write the RMA number clearly on the outside of the package, and ship the pack- age prepaid to your dealer.

Declaration of Conformity

FCC Class A

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. 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. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Technical Support and Assistance

1. Visit the Advantech website at www.advantech.com/support to obtain the latest product information.
2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before calling:
   - Product name and serial number
   - Description of your peripheral attachments
   - Description of your software (operating system, version, application software, etc.)
   - A complete description of the problem
   - The exact wording of any error messages

Warnings, Cautions, and Notes

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



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



Note! *Notes provide additional optional information.*



Packing List

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

- 1 x AIR-420 Unit
- 1 x CPU Heatsink
- 8 x Screw M3*4 To Fix 2.5” Storage

Ordering Information

Model	PSU	UDIMM 288-Pin Slot	2.5" SATA Bay	HDMI	2.5 GbE	10 GbE	PCIe x16 slot	PCIE x4
AIR-420-000A1 Bare system*	None	4	2	4	2	1	2**	2

Remarks
*Bare system, NO CPU, NO RAM, NO Storages
** PCIe signal x16 with 1 GPU or x8 with 2 GPUs by auto detection

Option Items

Item	Part Number	Description
Power Cable	1700000596-11	Power cable 3-pin 183cm, China type
	1702031801	Power cable 3-pin 183cm, UK type
	1702002600	Power cable 3-pin 183cm, USA type
	1702002605	Power cable 3-pin 183cm, Europe type
	1700000237-01	Power cable 3-pin 183cm, Japan type
	1700001714	Power cable 3-pin 183cm, Taiwan type
Accessory	1700035523-01	16 pin GPU power cable
	1700028855-01	8pin GPU power cable
	96PSRM-A1K2WCRPA	1200W CRPS
	96PSRM-A2KWCRPA	2000W CRPS*
	1700030904-01	COM cable for COM3, COM4
	1700036176-01	DIO cable
	1700022807-01	USB 1 cable
	1700032638-01	USB9, 10 cable (1pcs); USB 11, 12 cable (1pcs)
	1700036175-01	Audio Cable
	1990042648N000	Fan Duct for GPU
	TBD	Dust prevent cover
	TBD	Passive fan kit (1 set for 1 GPU)

Remark
*2000W CRPS
Input Power 110V provide 1000W only,
Input Power 220V can provide 2000W.

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 -20 °C (-4 °F) or above 60 °C (140 °F) as this may cause damage. The equipment should be stored in a controlled environment.
16. Any unverified component may cause unexpected damage. To ensure correct installation, always use the components (e.g., screws) provided in the accessory box.
17. CAUTION: The equipment is equipped with a battery-powered real-time clock circuit. There is a risk of explosion if a battery is incorrectly replaced. Replace only with same or equivalent type as recommended by the manufacturer. Discard all used batteries according to the manufacturer's instructions.
18. Always disconnect the power cord from the chassis before manually handling the hardware. Do not implement connections or configuration changes while the device is powered on. Sudden power surges may damage sensitive electronic components.
19. In accordance with IEC 704-1:1982 specifications, the sound pressure level at the operator's position does not exceed 70 dB (A).
20. The equipment should only be installed in a restricted access area.
21. This product is intended to be supplied by a UL Listed power supply suitable for use at minimum Tma 50° C (122° F) whose output meets PS2 (or LPS), ES1(or

SELV) and output is rated: 9-36Vdc, 16.65-4.16A. Please contact Advantech for further information.DISCLAIMER: These instructions are provided according to IEC 704-1 specifica- tions. Advantech disclaims all responsibility for the accuracy of any statements con- tained herein.

Consignes de Sécurité

1. Veuillez lire attentivement ces instructions de sécurité.
2. Veuillez conserver ce manuel de l'utilisateur pour référence ultérieure.
3. Veuillez débrancher cet équipement de la prise secteur avant le nettoyage. Utilisez un chiffon humide. Ne pas utiliser de détergent liquide ou pulvérisé pour le nettoyage. Utilisez une feuille ou un chiffon humide pour le nettoyage.
4. Pour les équipements enfichables, la prise de courant doit être à proximité de l'équipement et doit être facilement accessible.
5. S'il vous plaît garder cet équipement de l'humidité.
6. Posez cet équipement sur une surface fiable lors de l'installation. Une chute ou une chute pourrait causer des blessures.
7. Les ouvertures sur le boîtier sont destinées à la convection d'air, protégeant. ainsi l'équipement de la surchauffe. NE COUVREZ PAS LES OUVERTURES.
8. La prise de courant doit avoir une connexion mise à la terre.
9. Placez le cordon d'alimentation de sorte que personne ne puisse marcher dessus.
   Ne placez rien sur le cordon d'alimentation.
10. Tous les avertissements et mises en garde sur l'équipement doivent être notés.
11. Si l'appareil n'est pas utilisé pendant une longue période, débranchez-le du secteur pour ne pas être endommagé par une surtension transitoire.
12. Ne jamais verser de liquide dans les ouvertures de ventilation; Cela pourrait provoquer un incendie ou un choc électrique.
13. N'ouvrez jamais l'équipement. Pour des raisons de sécurité, seul le personnel de maintenance qualifié doit ouvrir l'équipement.
14. Si l'une des situations suivantes se présente, faites vérifier le matériel par le personnel de service:
    - Le cordon d'alimentation ou la fiche est endommagé.
    - Un liquide a pénétré dans l'appareil.
    - L'équipement a été exposé à l'humidité.
    - L'équipement ne fonctionne pas bien ou vous ne pouvez pas le faire. fonction- ner 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 -20° C (-4° F) ou supérieure à 60° C (140° F). Cela pourrait endommager l'équipement. L'équipement doit être dans un environnement contrôlé.
16. Tout composant non vérifié peut causer des dommages inattendus. Pour garantir une installation correcte, veuillez toujours utiliser les composants (ex. Vis) fournis avec la boîte d'accessoires.
17. ATTENTION: L'ordinateur est équipé d'un circuit d'horloge temps réel alimenté par batterie. Il y a un risque d'explosion si la batterie est remplacée de manière incorrecte. Remplacez uniquement avec le même type ou un type équivalent recommandé par le fabricant. Jetez les piles usagées conformément aux instructions du fabricant.

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

AVERTISSEMENT: Cet ensemble d'instructions est donné conformément à la norme CEI 704-1. Advantech décline toute responsabilité quant à l'exactitude des déclarations contenues dans ce.

Contents

Chapter 1 General Introduction 12

1.1 Introduction 13
1.2 Product Features 14
1.3 Mechanical Specifications 15

Chapter 2 Hardware Configuration 16

2.1 Introduction 17
2.2 Jumpers 17
2.2.1 Jumper Description 17
2.2.2 Jumper List 17
Table 2.1: Jumper List 17
2.2.3 Jumper Location 18
Figure 2.1 Jumper Layout 18
2.2.4 Jumper Settings 18
2.2.4.1 Clear CMOS Setting for JCMOS1 18
2.2.4.2 Auto Power On Setting for PSON1 19
2.2.4.3 COM Port Failsafe Function Selection 19
2.2.4.4 Power Delivery Board 19
2.3 Connectors 20
2.3.1 External I/O Locations 20
2.3.1.1 COM Port Connector 21
2.3.1.2 Ethernet connector 21
2.3.1.3 LED Indicators 22
2.3.1.4 HDMI Connector 22
2.3.1.5 USB 2.0 Connector 22
2.3.1.6 USB3.2 Connector 22
2.3.1.7 USB Type C Connector 22

2.4 Installation 23
2.4.1 CPU/ DRAM/ CPU Heatsink Installation 23
2.4.2 SSD Installation (optional) 25
2.4.3 M.2 Module Installation (optional) 26
2.4.4 Graphic Card Installation (Optional) 27
2.4.5 Redundant PSU Installation (Optional) 28
2.4.6 Fan Module Installation (Optional) 29
2.4.7 Cables Installation (Optional) 30

Chapter 3 BIOS Settings 31

3.1 Introduction 31

3.2 Entering the Setup 32
3.2.1 Main Setup 32
3.2.2 Advanced BIOS Features Setup 33
3.2.3 Chipset Configuration ..... 43.
3.2.4 Security 46
3.2.5 Boot 47
3.2.6 Save & Exit 48

Chapter 1

General Introduction

This chapter details background information on the AIR-420 series.

1.1 Introduction

Advantech’s AIR-420 is the most compact (28.6L) edge AI HPC supporting dual 3.9-slot GPUs. Featuring AMD Ryzen™ 7000/ 9000/ EPYC 4005 CPUs, and up to 192GB DDR5 memory. With robust I/O and PCIe expandability, it's ideal for demanding AI tasks such as LLM. Bundled with Advantech's GenAI Studio and inference tools, it delivers top-edge AI power and value.

PCIe-Optimized Powerhouse Workstation

The AMD Ryzen 7000/9000 series processor delivers exceptional performance with up to 12 cores, support for up to 192GB of DDR5 memory, and four PCIe slots—two dedicated for AI cards and two for add-on cards. With a theoretical performance of up to 208 TFLOPS FP32, this processor is designed to handle demanding workloads with ease, making it an ideal choice for advanced computing and AI applications.

High-Capacity I/O for Edge AI Bandwidth

The system features high-speed connectivity with one 20Gbps and four 10Gbps USB 3.2 Gen ports for rapid data transmission, alongside one 10GbE and two 2.5GbE LAN ports for seamless data streaming. It also includes one M.2 Key M slot for NVMe storage and one M.2 Key E slot for Wi-Fi 7 connectivity, ensuring robust performance and cutting-edge wireless capabilities for demanding applications.

Precision Software for Edge AI Applications

The system includes GenAI Studio, a no-code GUI that simplifies large language model (LLM) training, making it accessible for users of all skill levels. Additionally, the Edge AI SDK accelerates inference performance evaluation, enabling efficient optimization and deployment of AI models at the edge.

1.2 Product Features

Processor System	CPU Model	Ryzen 7 9700X	Ryzen 5 9600X	Ryzen 9 PRO 7945	Ryzen 5 7645	EPYC 4545P
	Number of Cores	8	6	12	6	16
	Max Clock	5.5 GHz	5.4 GHz	5.4 GHz	5.1 GHz	5.4 GHz
	Base Clock	3.8 GHz	3.9 GHz	3.7 GHz	3.8 GHz	3 GHz
	L2 Cache	8 MB	6 MB	12 MB	6 MB	16 MB
	L3 Cache	32 MB	32 MB	64 MB	32 MB	64 MB
	Default TDP(W)	65	65	65	65	65
Chipset		B650				
BIOS		AMI BIOS UEFI 256 Mbits SPI				
Memory	Technology	DDR5 up to 5600 MT/s (5200 MT/s fot Ryzen 7000), 3600 MT/s when 4 DIMMs are installed				
	Max. Capacity	128GB (32GB per DIMM, Ryzen 7000 series) 192GB (48GB per DIMM, Ryzen 9000/EYPC 4005 series)				
	Socket	4 x 288pin UDIMM				
Discrete GPU Slot	PCIe Signal	PCIe Gen5 x16 for a signal GPU card; PCIe Gen5 x8 for two GPU cards. (Auto detection)				
	Slot Qty.	2				
	TDP	Up to 1200W for all graphic cards				
Built-in Display	Chipset	Radeon™ Graphics				
	HDMI	4				
Ethernet	Controller	LAN1: 2.5GbE Intel i226-LM LAN2: 2.5GbE Intel i226-LM LAN3: 10GbE Realtek RTL 8127				
Audio		Mic-in; Line out (Option)				
Others	Watch dog Timer	255-level timer interval, setup by software				
	TPM	TPM 2.0				
I/O Interface	USB 3.2 Gen1	(Front) 2 x USB 2.0 ; 1 x USB 3.2Gen1 (Option) (Rear) 1 x USB Gen 3.2 (Gen2 x2, 20 Gbps) type C; 4 x USB Gen 3.2 (Gen2 x1, 10Gbps) type A; 4 x USB 2.0 (Option)				
	GPIO	8-bit GPIO (Optional)				
	Serial	2 x RS-232/422/485 (select via BIOS) ; 2x RS-232 (optional)				
Expansions	PCIe	2 x PCIe Gen4 x 4 slot				
	M.2	1xM.2 E Key 2230 (USB2.0, PCIe Gen3 x1)				
Storage	SSD	2 x 2.5" SATAIII hard drive bay with Max Height 7mm				
	NVME	1 x M.2 M Key 2280 NVMe PCIe x4				
Software Support	Microsoft Windows	Windows Win11 IoT				
	Linux	Ubuntu 24.04				
Power Requirements	Power Type	AC in				
	Power Input Voltage	100 - 240 V				
	Power Supply	CRPS up-to 2000W				
Mechanical	Dimensions (W x H x D)	278 x 215 x 480 mm				
	Weight	15.5 Kg				
Environment	Operating Temperature	0 – 50°C (65W CPU, w/o Graphic card)				
	Vibration During Operation	With SSD: 3 Grms, IEC 60068-2-64, random, 5 – 500 Hz, 1 hr/axis.				
	Shock During Operation	With SSD: 10 G, IEC 60068-2-27, half sine, 11 ms duration				
	Storage Temperature	-20 – 60°C				
	Relative Humidity	95% @ 40 °C (non-condensing)				
	EMC	CE/FCC Class A				
	Safety	CB, UL, CCC, BSMI				

1.3 Mechanical Specifications

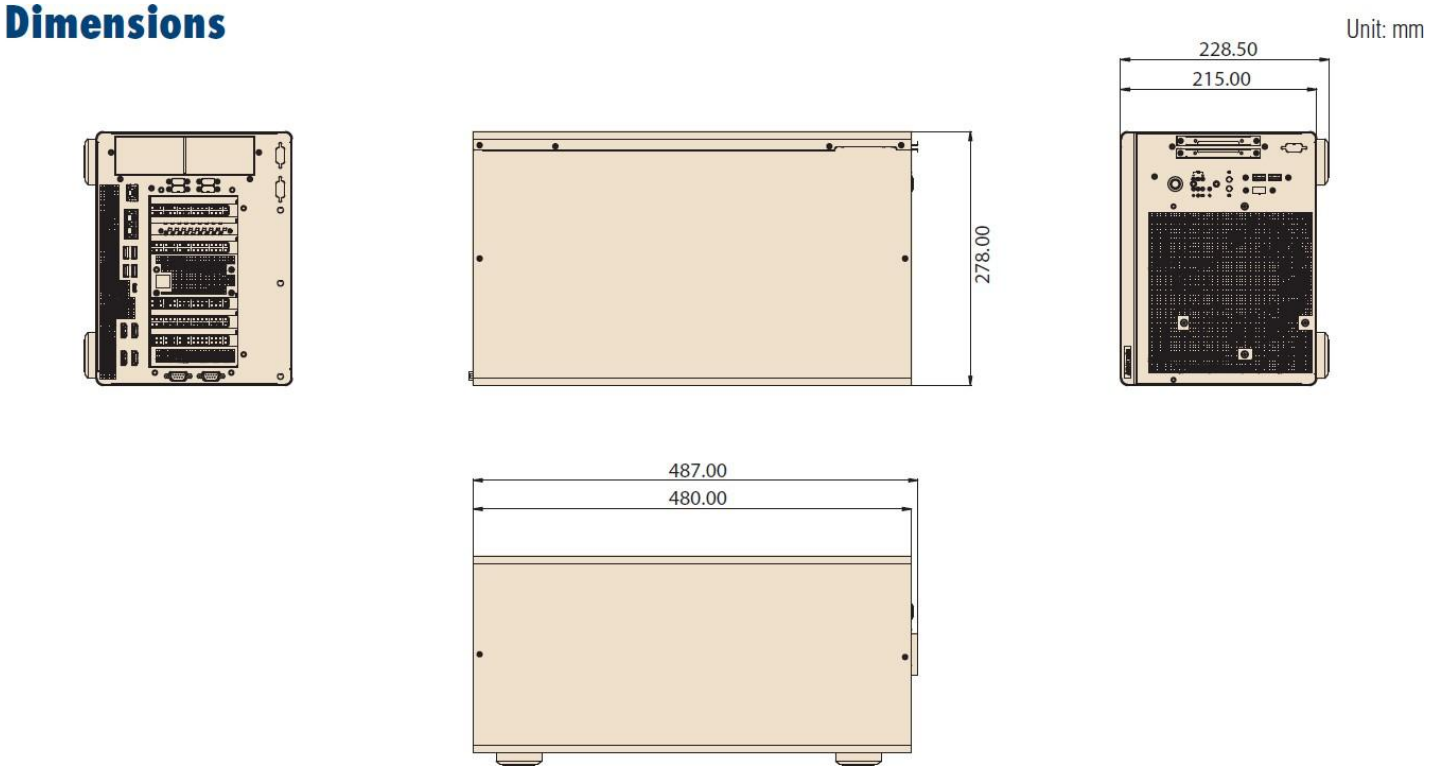


Figure 1.1 AIR-420 Mechanical Dimensions Diagram

Chapter 2

Hardware Configuration

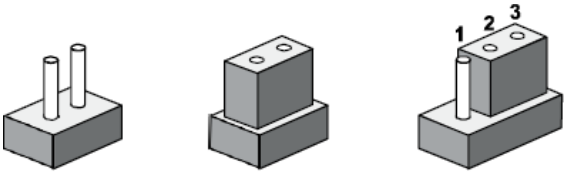
2.1 Introduction

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

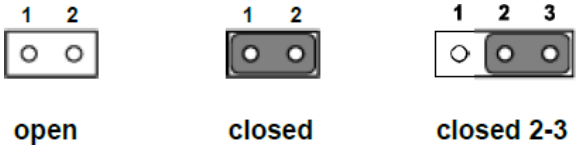
2.2 Jumpers

2.2.1 Jumper Description

You may configure AIR-420 to match the needs of your application by setting jumpers. A jumper is a metal bridge used to close an electric circuit. It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To close a jumper, you connect the pins with the clip. To open a jumper, remove the clip. Sometimes a jumper will have three pins, labeled 1, 2 and 3. In this case you would connect either pins 1 and 2, or 2 and 3.



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



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

2.2.2 Jumper List

Table 2.1: Jumper List	
JCMOS1	Clear CMOS
PSON1	Auto Power On Setting
SW_422_485_1	RS485/RS422 Fail Safe Enabled/Disabled

2.2.3 Jumper Location

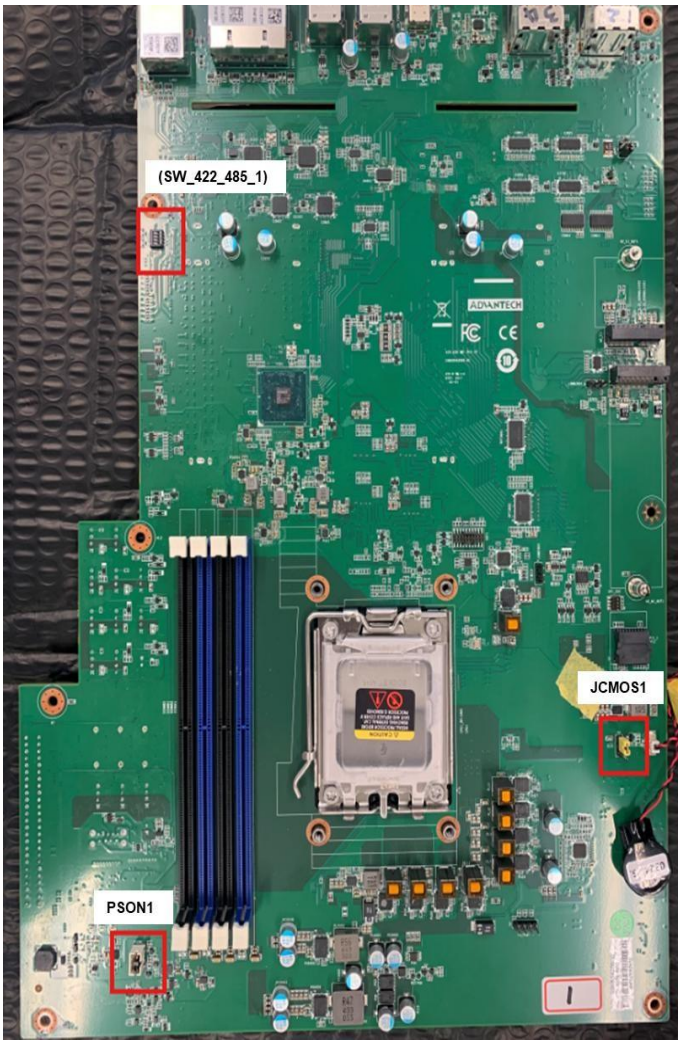
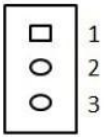


Figure 2.1 Jumper Layout

2.2.4 Jumper Settings

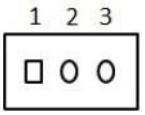
2.2.4.1 Clear CMOS Setting for JCMOS1

JCMOS1 Clear CMOS Setting	
(1-2)	Normal Operation (Default)
(2-3)	Clear CMOS

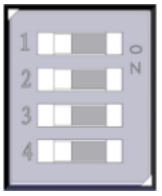


2.2.4.2 Auto Power On Setting for PSON1

PSON1 Clear CMOS Setting	
(1-2)	Auto Power On
(2-3)	Power button for Power On (Default)



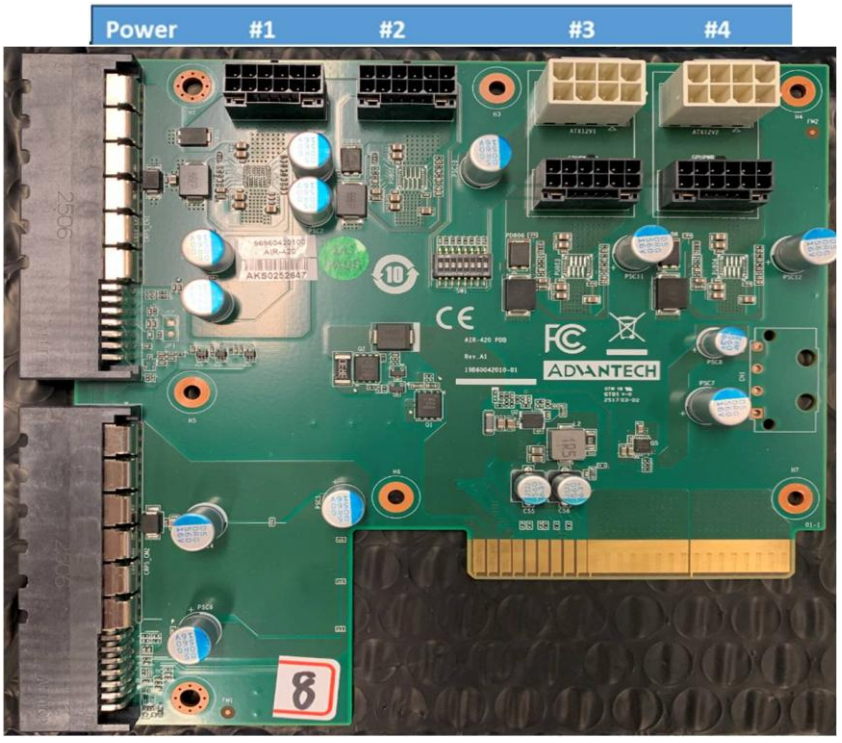
2.2.4.3 COM Port Failsafe Function Selection



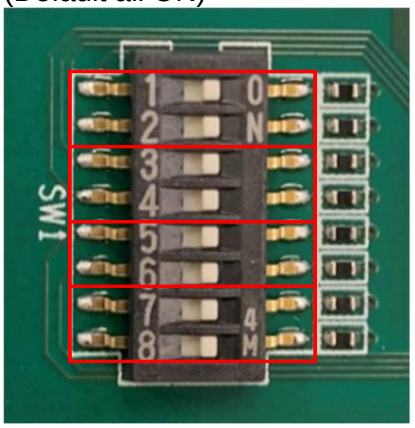
	Mode/Description	Pin1	Pin2	Pin3	Pin4
SW_422_485_1	Default	OFF	OFF	OFF	OFF
	Enable COM1 failsafe	OFF	OFF	ON	ON
	Enable COM2 failsafe	ON	ON	OFF	OFF

2.2.4.4 Power Delivery Board

The AIR-420 provides four sets of power supplies, as the image.



Please refer to the table below for the corresponding switches for each power set. (Default all ON)



	Sense 0	Sense 1
Power #1	1	2
Power #2	3	4
Power #3	5	6
Power #4	7	8

The following table outlines the power configurations for various operation modes.

	Sense 0	Sense 1	Initial Permitted Power at System Power Up	Configurable Maximum Sustained Power
Mode1	ON	ON	375W	600W
Mode2	OFF	ON	225W	450W
Mode3	ON	OFF	150W	300W
Mode4	OFF	OFF	100W	150W

2.3 Connectors

2.3.1 External I/O Locations

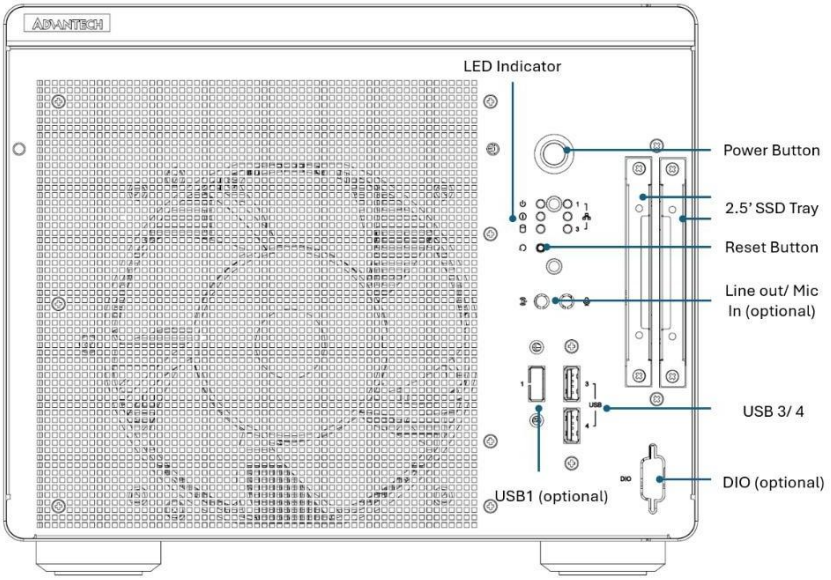


Figure 2.2 Front I/O Connector Diagram

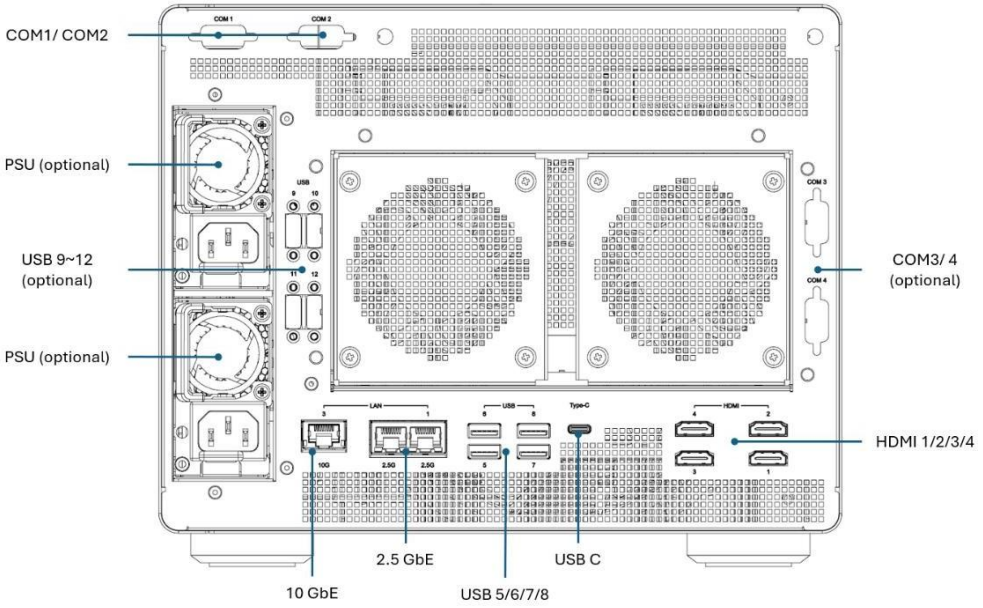


Figure 2.3 Rear I/O Connector Diagram

2.3.1.1 COM Port Connector

AIR-420 provides up to four D-sub 9-pin connectors. COM1 and COM2 offers RS-232/422/485 serial communication interface ports. The default setting is RS-232,the mode RS-422/485 of AIR-420 can be supported via the BIOS settings.

COM3 and COM4 are optional, and offers RS-232 serial communication only.

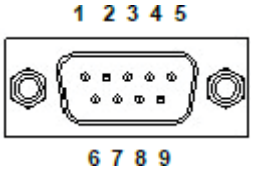


Figure 2.4 COM Port Connector

Table 2.2: COM Connector Pin Assignments

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

NC represents "No Connection".

2.3.1.2 Ethernet connector

AIR-420 is equipped 3x Ethernet ports, LAN1/2 are 2.5GbE port and LAN3 is 10GbE port. These Ethernet ports provide standard RJ-45 jack connectors with LED indicators to show its "Active/Link" status (active in green light blinking and link in green light) and "Speed" status in green or orange light, details below.

- **2.5GbE speed LED:** 2.5GbE in green light; 1 GbE in orange light.
- **10GbE speed LED:** 10GbE in green light; 2.5GbE in orange light

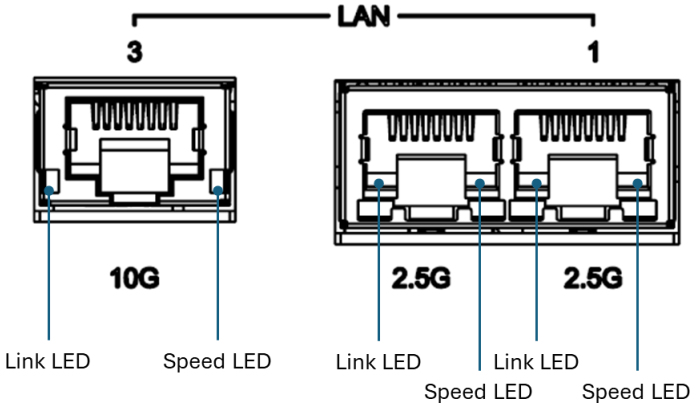


Figure 2.5 Ethernet Connector

2.3.1.3 LED Indicators

There are six LEDs on the front panel that indicate the system's status:

Left side from top:

Power LED: system in S5 with yellow light; in S0 with green light

Info LED: BIOS is ready with green light

HDD LED: SATA, M.2 HDD are working with yellow light

Right side from top:

LAN1 to 3 LED for link status with green light

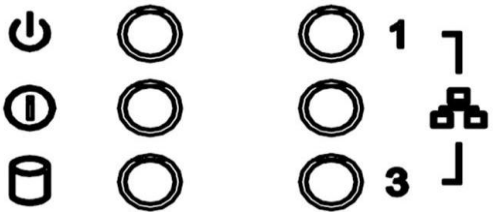


Figure 2.6 LED Indicators

2.3.1.4 HDMI Connector

AIR-420 offers one integrated 19-pin receptacle connector HDMI 2.0b interfaces. The HDMI link supports resolutions up to 3840 x 2160 @ 120Hz

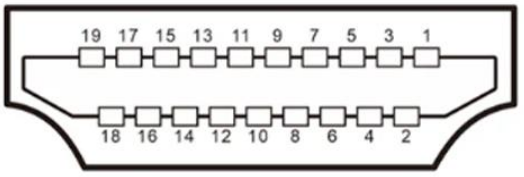


Figure 2.7 HDMI Connector

Table 2.3:	HDMI Connector Pin Definition
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".	

2.3.1.5 USB 2.0 Connector

AIR-420 supports two USB 2.0 interfaces(USB3, 4), which support Plug-and-Play functionality.

USB9~12 are optional.

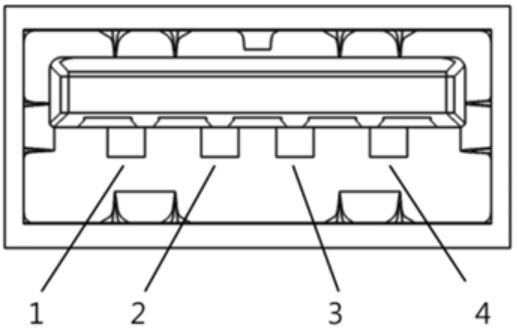


Figure 2.8 USB 2.0 Connector

Table 2.4:	USB2.0 Pin Definition
Pin	**Signal Name**
1	VCC
2	USB_data
3	USB_data+
4	GND

2.3.1.6 USB 3.2 Connector

AIR-420 supports 4x 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 2.8 USB 2.0 Connector

Table 2.5:	USB3.2 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+

2.3.1.7 USB Type C Connector

AIR-420 features a 24-pin USB Type-C connector with a rotationally symmetrical design. Please note that this port supports data transfer only.

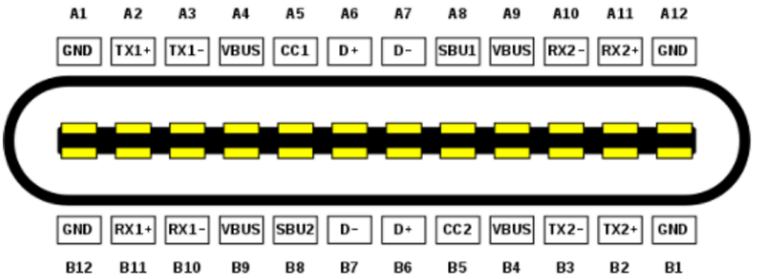


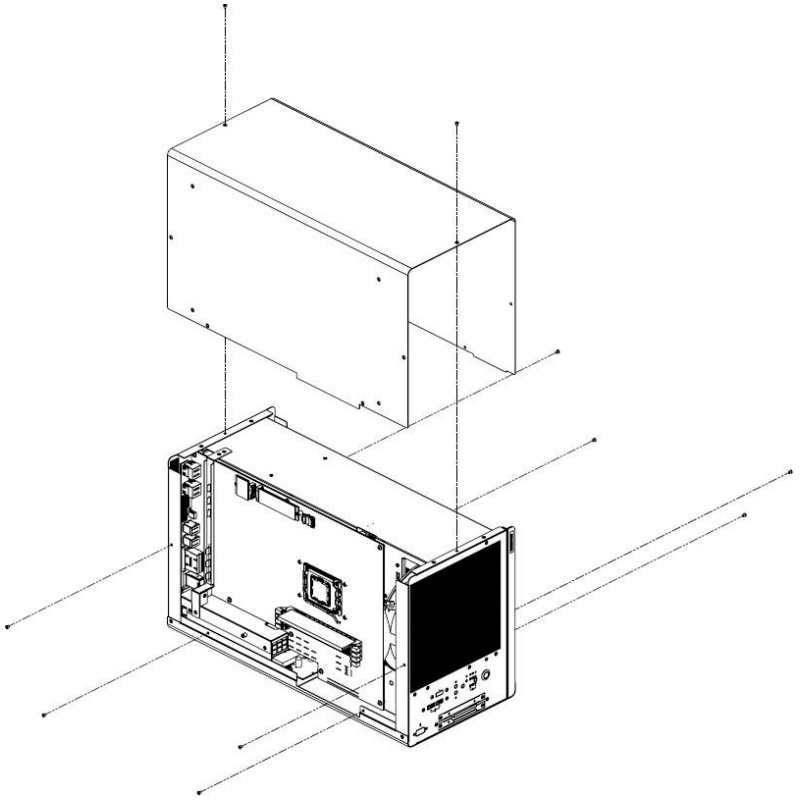
Figure 2.9 USB Type C Connector

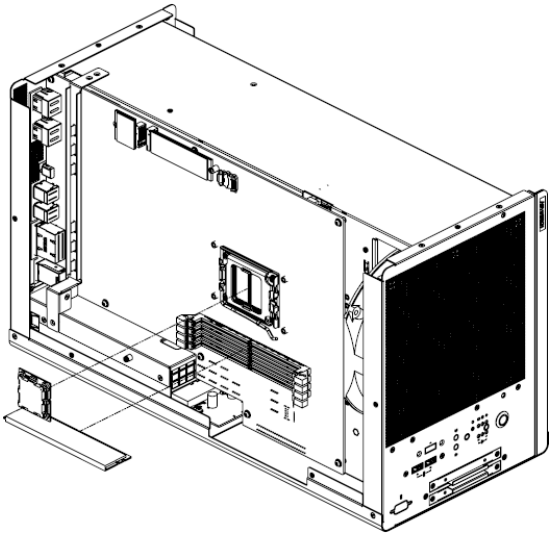
Table 2.6: USB Type C Pin Definition

Type-C receptacle A pin layout		
Pin	**Signal Name**	**Description**
A1	GND	Ground return
A2	SSTXp1	SuperSpeed differential pair #1, TX, positive
A3	SSTXn1	SuperSpeed differential pair #1, TX, negative
A4	VBUS	Bus power
A5	CC1	Configuration channel
A6	Dp1	USB 2.0 differential pair, position 1, positive
A7	Dn1	USB 2.0 differential pair, position 1, negative
A8	SBU1	Sideband use (SBU)
A9	VBUS	Bus power
A10	SSRXn2	SuperSpeed differential pair #4, RX, negative
A11	SSRXp2	SuperSpeed differential pair #4, RX, positive
A12	GND	Ground return
		Type-C receptacle B pin layout
Pin	**Name**	**Description**
B12	GND	Ground return
B11	SSTXp1	SuperSpeed differential pair #2, RX, positive
B10	SSTXn1	SuperSpeed differential pair #2, RX, negative
B9	VBUS	Bus power
B8	SBU2	Sideband use (SBU)
B7	Dn2	USB 2.0 differential pair, position 2, negative[a]
B6	Dp2	USB 2.0 differential pair, position 2, positive[a]
B5	CC2	Configuration channel
B4	VBUS	Bus power
B3	SSRXn2	SuperSpeed differential pair #3, TX, negative
B2	SSRXp2	SuperSpeed differential pair #3, TX, positive
B1	GND	Ground return

2.4 Installation

2.4.1 CPU/ DRAM/ CPU Heatsink Installation

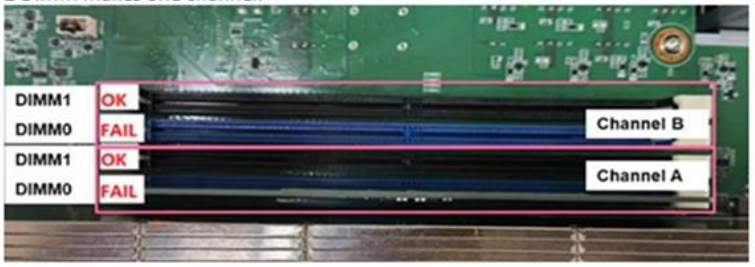




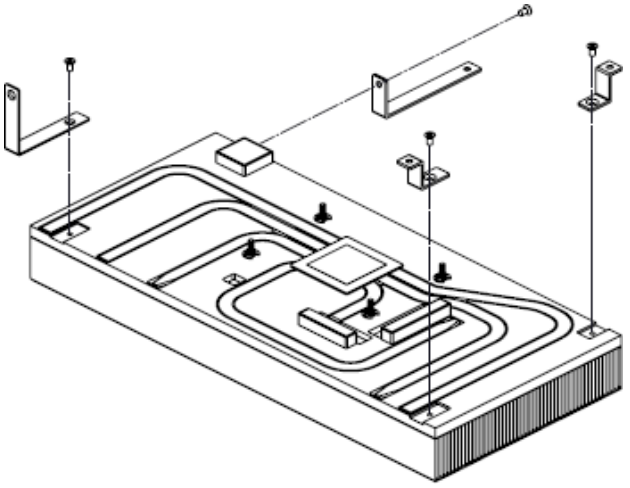
1. Unscrew the 10 screws on the cover, and remove the cover.
2. Install the memory into the system.
   Memory Installation Requirements:
   - Single DIMM: Must be installed in DIMM 1 slot to ensure successful system boot.
   - Dual DIMMs: If DIMM 1 and DIMM 0 are populated simultaneously, the RAM speed will be limited to 3600 MT/s.

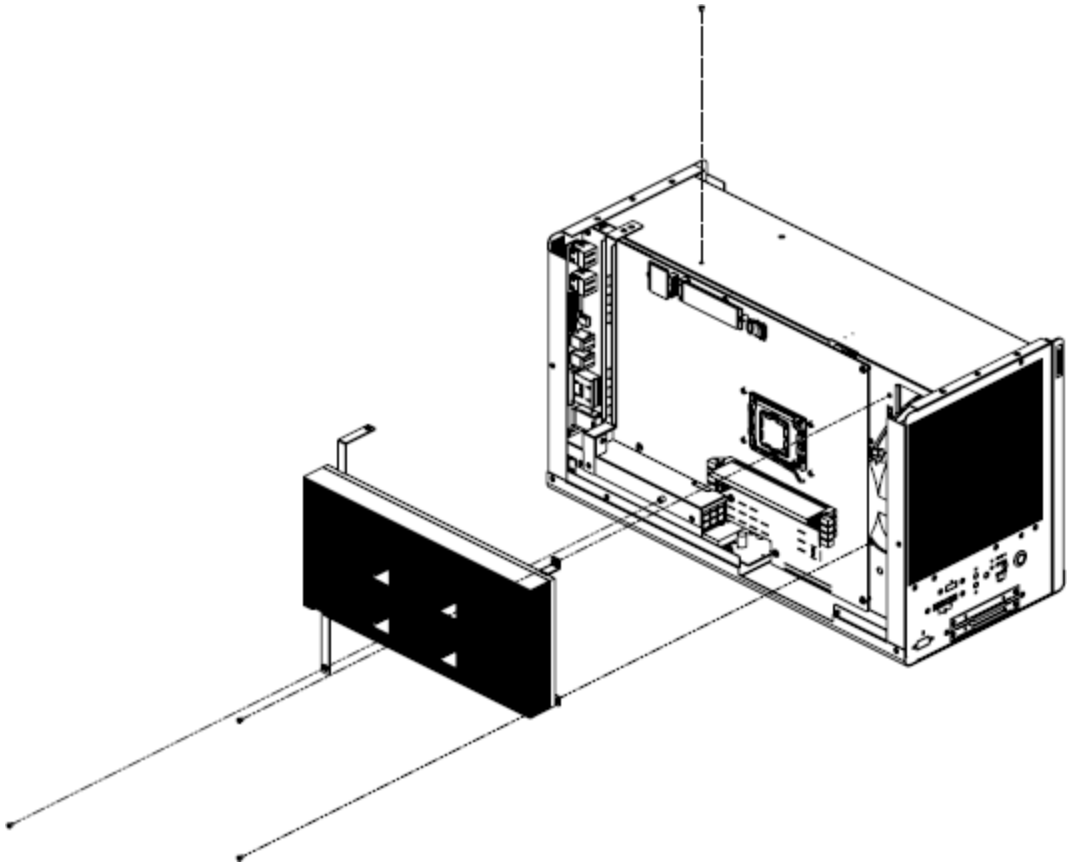
- Black slot-DIMM1
- Blue slot-DIMM0

2 DIMM makes one channel.

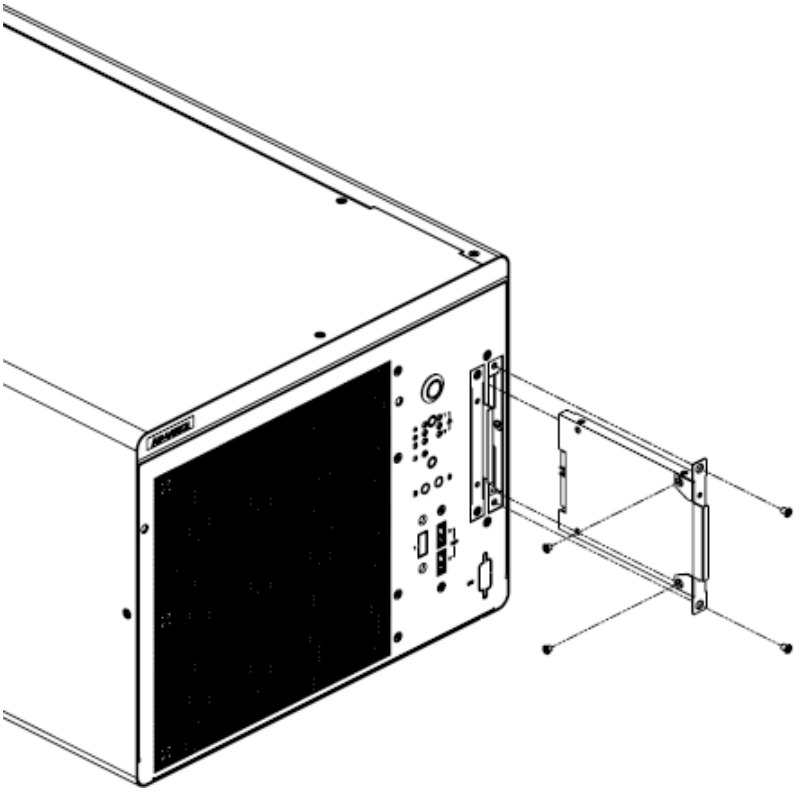


3. Install the CPU heatsink brackets
4. Remove thermal pad film and install the heatsink on the CPU side



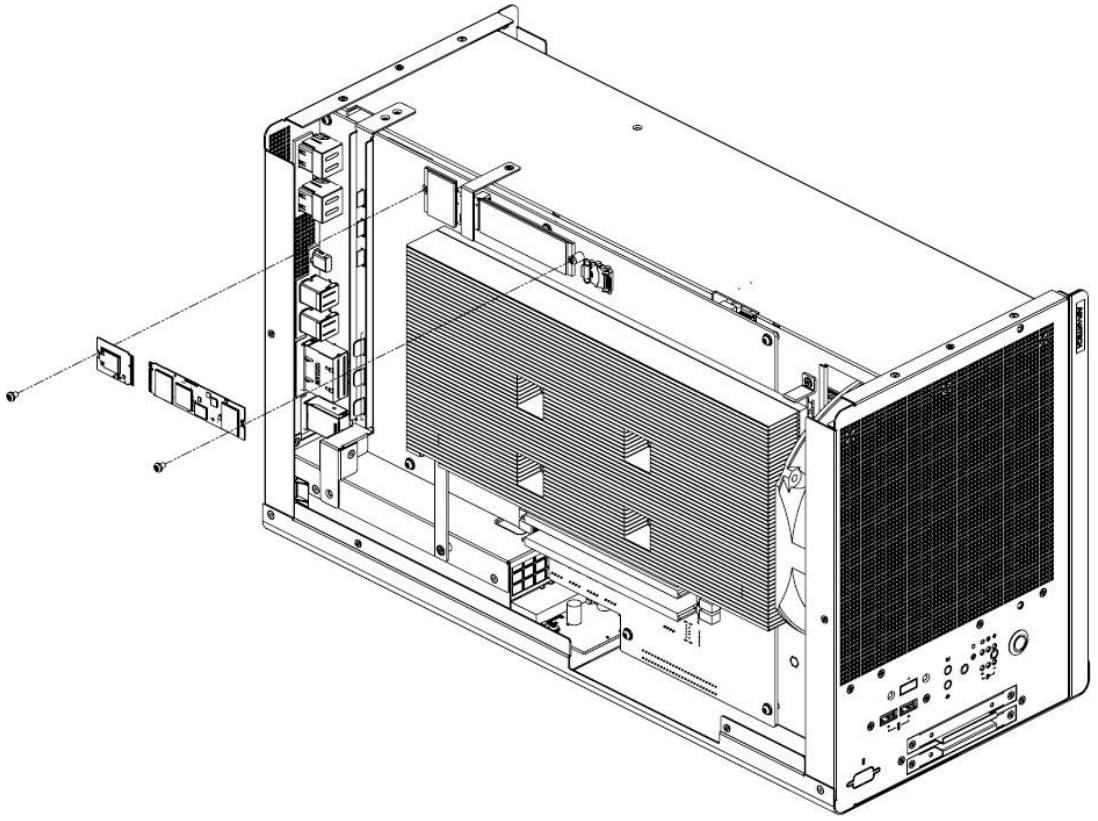


2.4.2 SSD Installation (Optional)



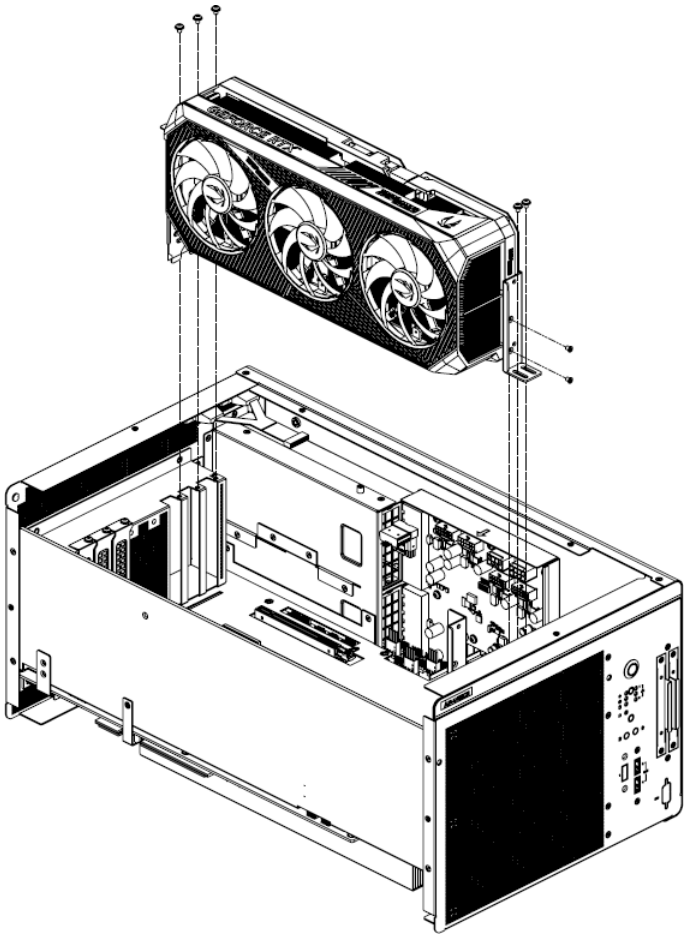
1. Remove 2 screws for SSD bracket.
2. Take out SSD tray bracket.
3. Install SSD in the bracket and insert back to the system.
4. Screw back 2 screws and finish the installation.

2.4.3 M.2 Module Installation (Optional)



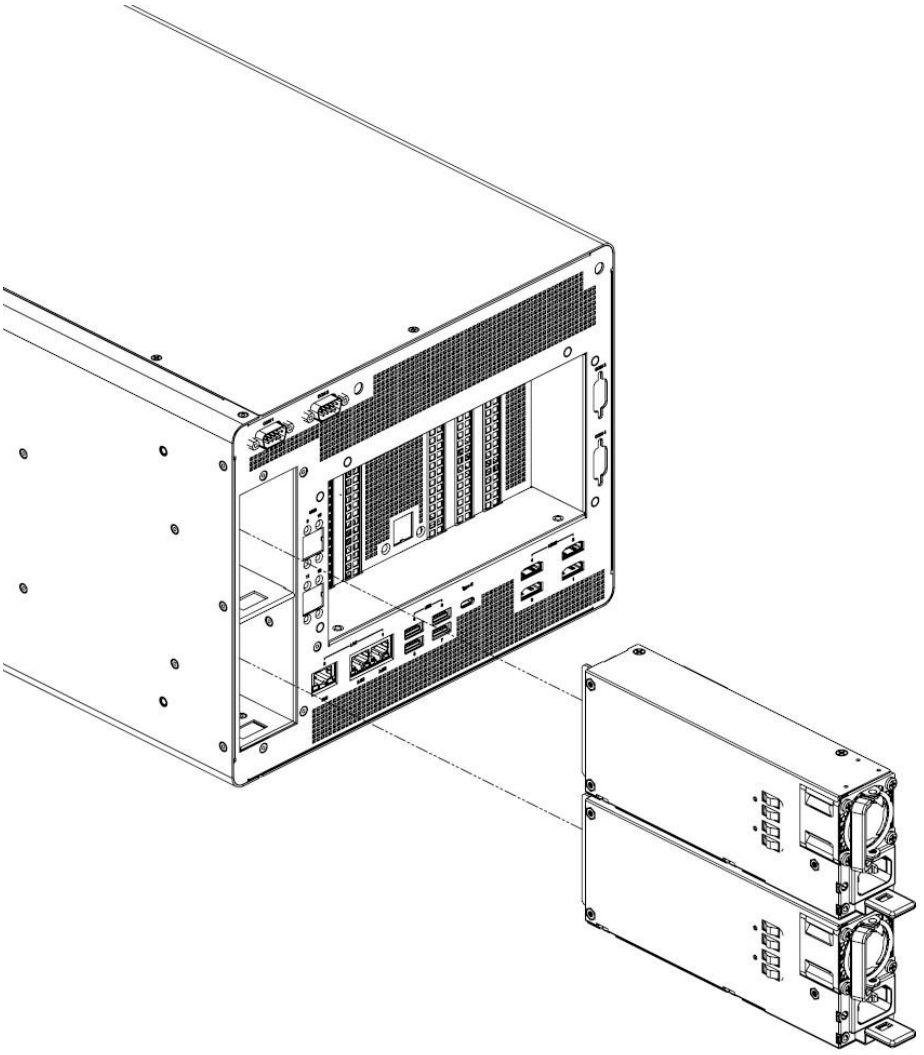
1. M.2 slots at CPU side.
2. Install M.2 module (M.2 E Key or M Key) and tighten 1 screw on the module.

2.4.4 Graphic Card Installation (Optional)



1. Remove the PCIe slot brackets
2. Install the L-shaped bracket to the graphic card.
3. Install the graphics card to the PCIex16 slot, pay attention to the rear of the graphics card on installing
4. Apply the screws to the front and rear of the graphic card.

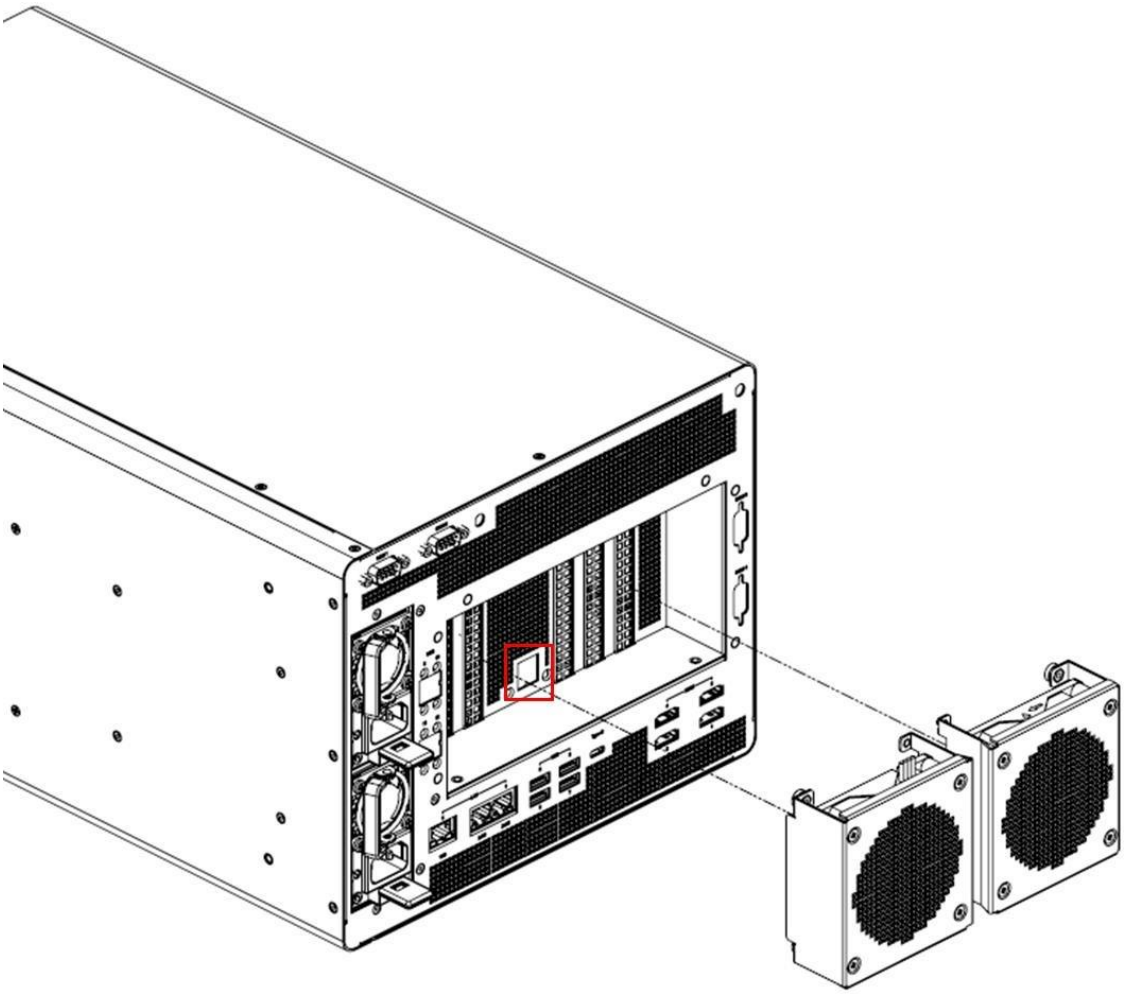
2.4.5 Redundant PSU Installation (Optional)



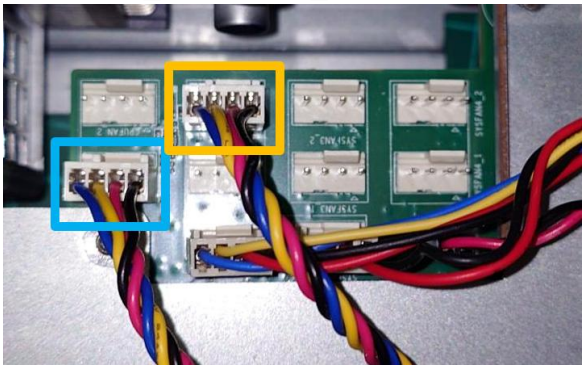
1. Remove the PSU cover if any
2. Install the redundant PSU(s) to the PSU slot. Ensure proper orientation during installation.

Remark: The 2000W PSU requires 220V Input to deliver full capacity. Using 110V Input will limit output to 1000W.

2.4.6 Fan Module Installation (Optional)



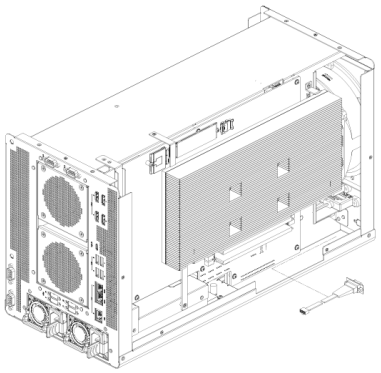
1. Break the pre-cut hole (red square)
2. Pass through the fan power cord(s) from the hole
3. Connect the fan power cords to motherboard system fan pin headers (SYSFAN2_1, CPUFAN_1)



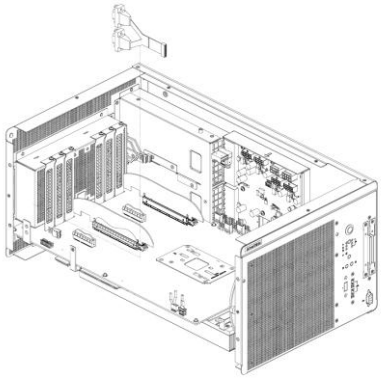
4. Attach the fan module (s) to the rear of the PCIe slots.

Remark: This fan module requires the BIOS Fan Mode to be set to "Performance Mode". Please refer to Section 3.2.2.5 for detailed instructions

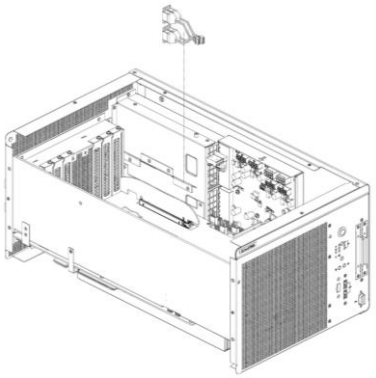
2.4.7 Cables Installation (Optional)



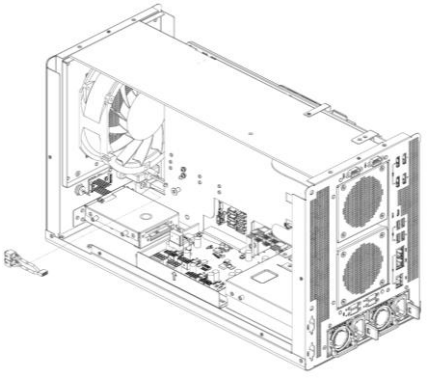
DIO cable



COM Cables



USB Cables



Audio Cable

Chapter 3

BIOS Settings

3.1 Introduction

AMI BIOS has been integrated into motherboards for over two decades. With the AMI BIOS Setup program, users can modify BIOS settings and control various system features. This chapter describes the basic navigation of the AIR-420 BIOS setup screens.



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

3.2 Entering the Setup

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

3.2.1 Main Setup

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



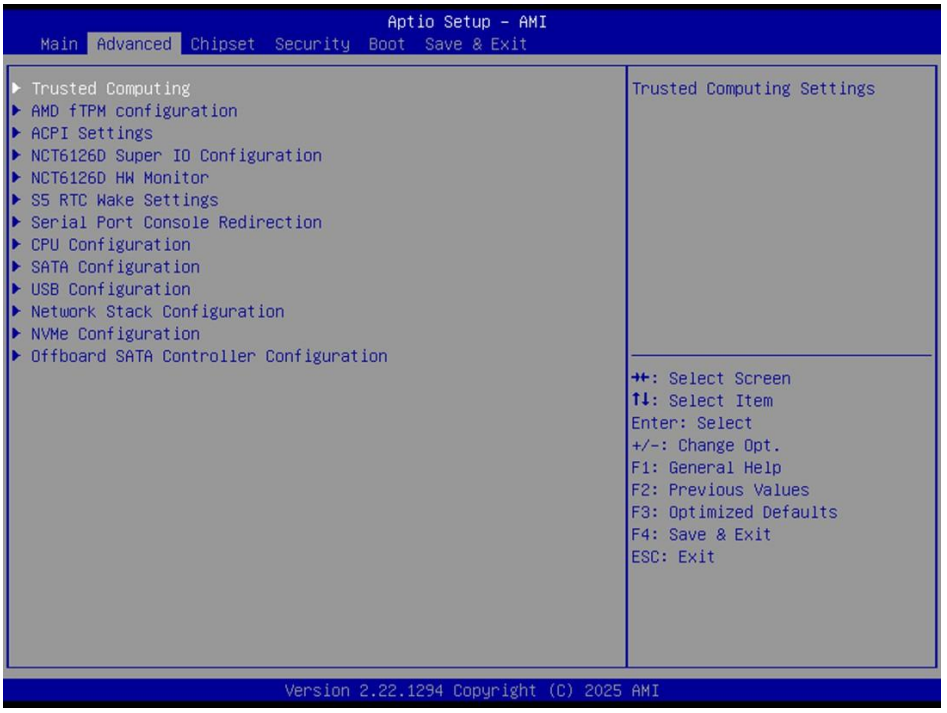
The Main BIOS setup screen has two main frames. The left frame displays all the options that can be configured. Grayed-out options cannot be configured; options in blue can. The right frame displays the key legend.

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

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

3.2.2 Advanced BIOS Features Setup

Select the Advanced tab from the AIR-420 setup screen to enter the Advanced BIOS Setup screen. Users can select any item in the left frame of the screen, such as CPU Configuration, to go to the sub menu for that item. Users can display an Advanced BIOS Setup option by highlighting it using the <Arrow> keys. All Advanced BIOS Setup options are described in this section. The Advanced BIOS Setup screens are shown below. The sub menus are described on the following pages.



3.2.2.1 Trusted Computing



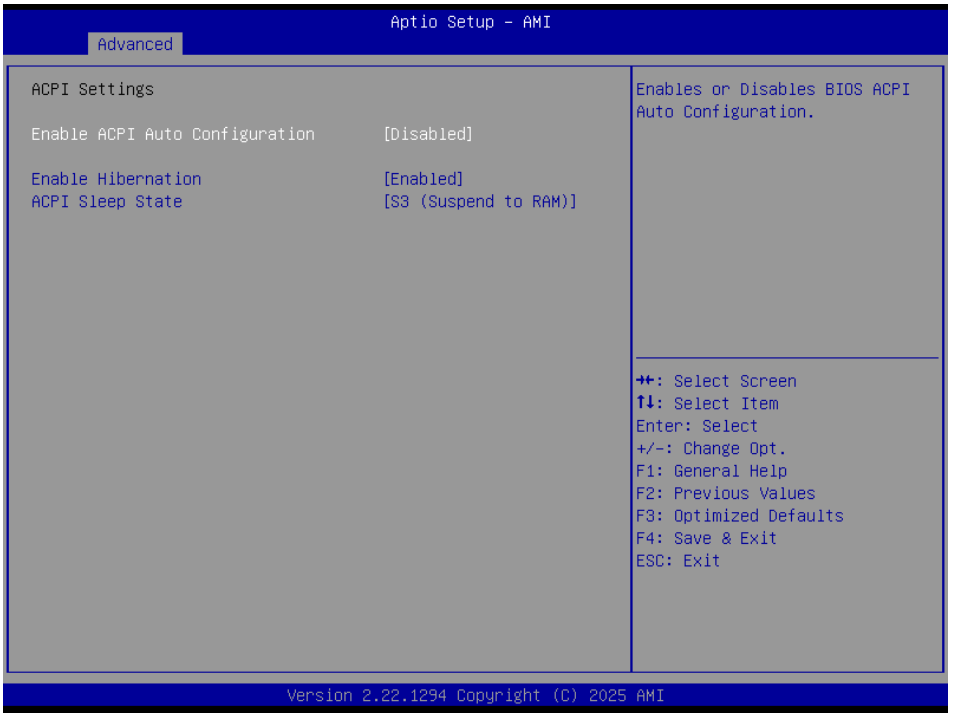
Physical TPM related setup

3.2.2.2 AMD fTPM configuration



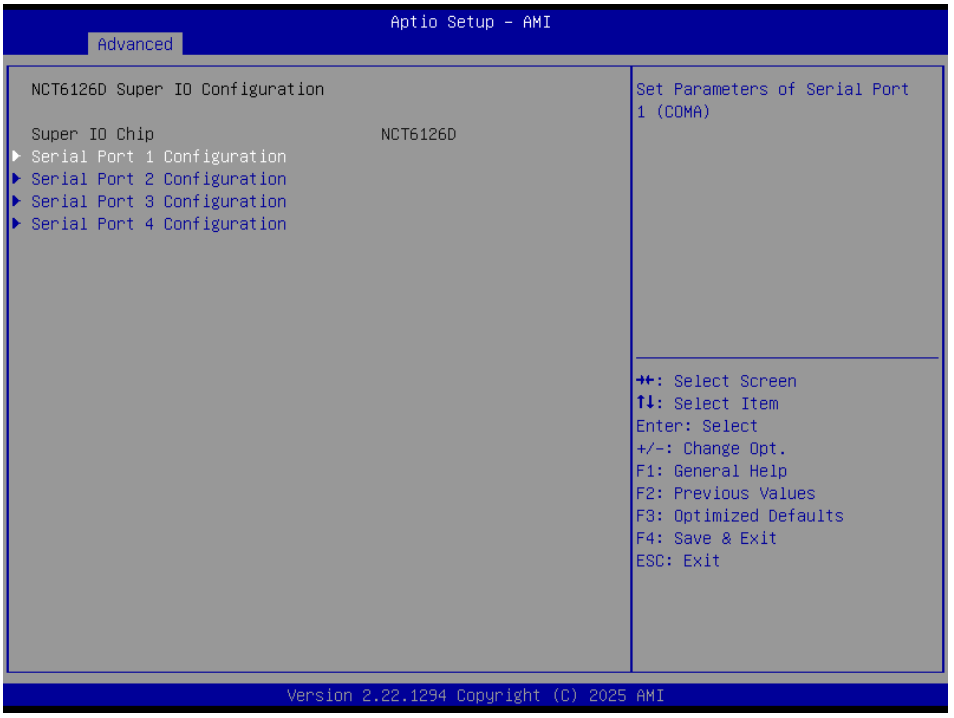
Set Enable to reset fTPM when new CPU is installed

3.2.2.3 ACPI Settings



Set system ACPI related parameters

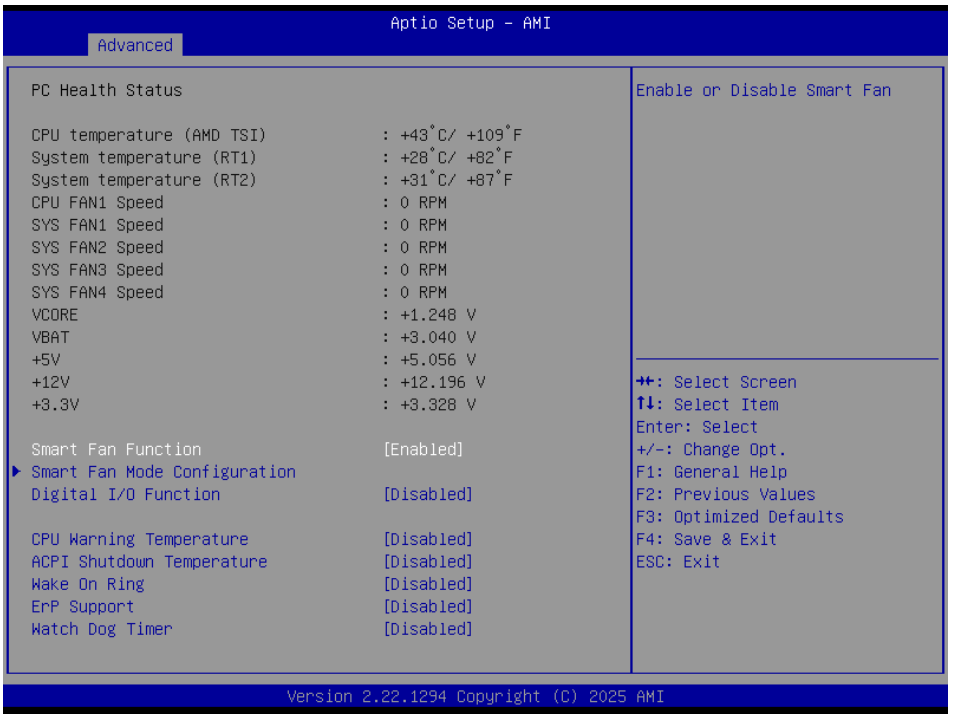
3.2.2.4 NCT6126D Super IO Configuration



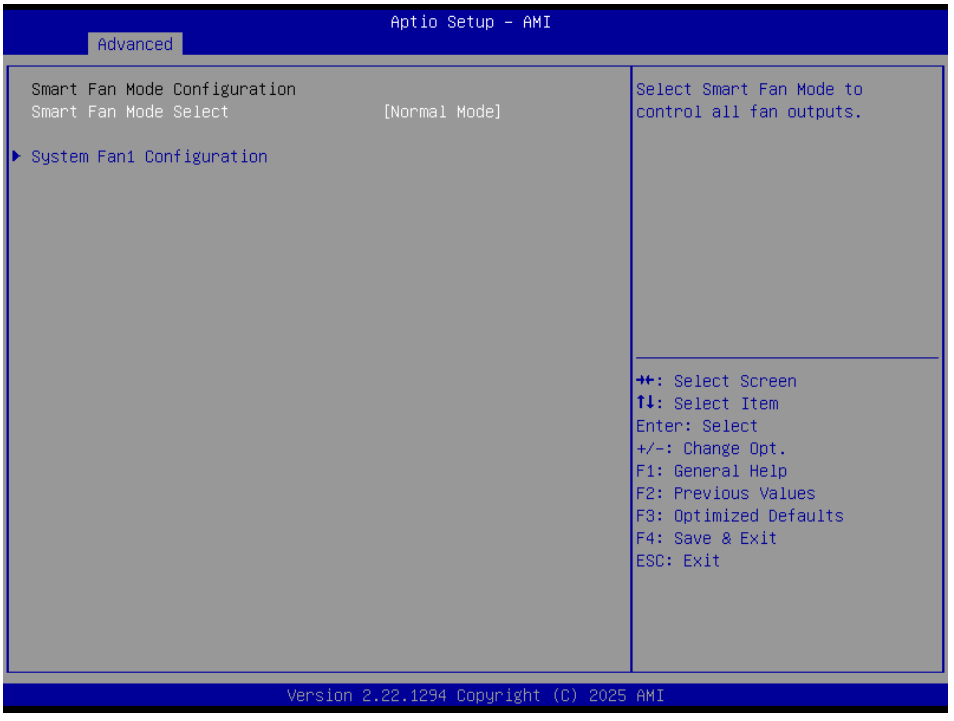
Set system COM ports parameters, COM1/2 support RS-232/ 422/ 485; COM3/ 4 (optional) support RS-232 only.

3.2.2.5 NCT6126D HW Monitor

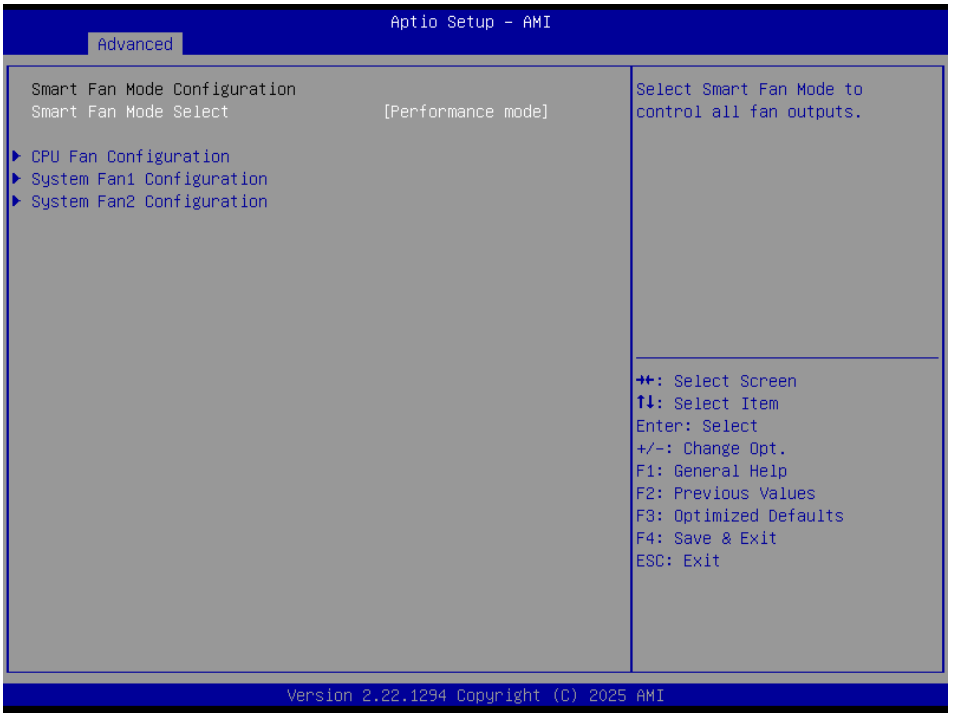
Check system hardware status and set the smart fan parameter.



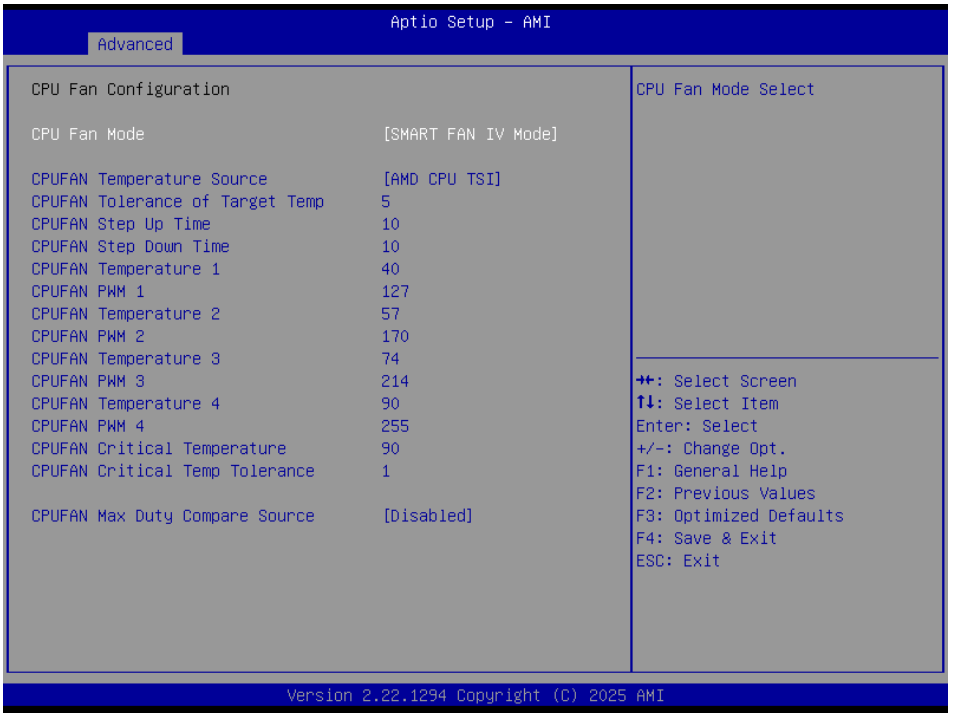
Default-Normal mode



With Fan Module-Performance mode



Each fan configuration can be set in smart fan mode or manual mode.

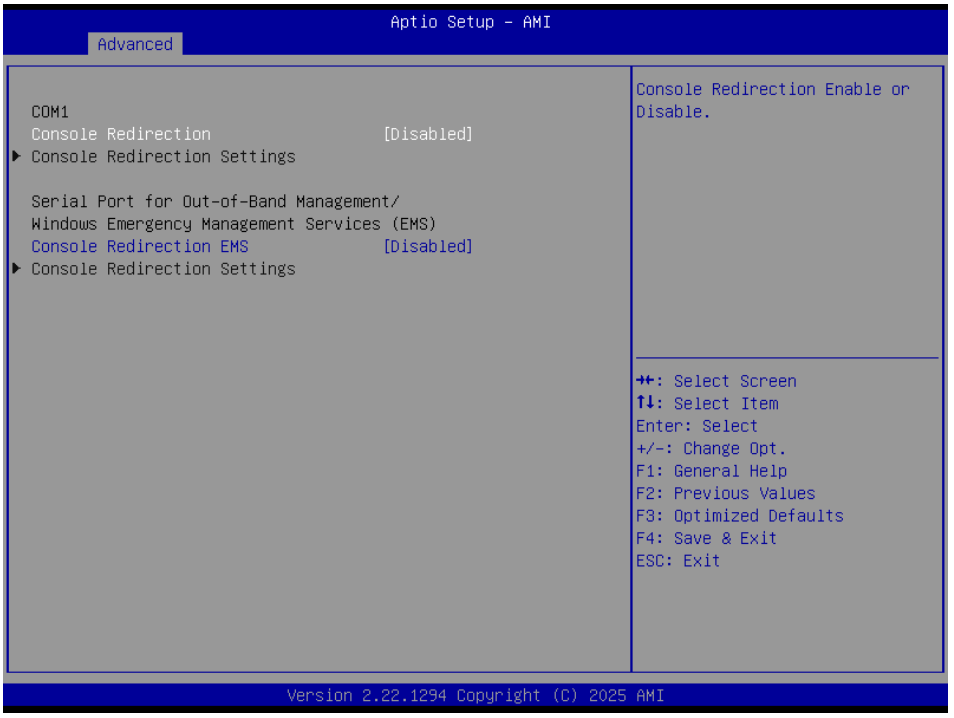


3.2.2.6 S5 RTC Wake Settings



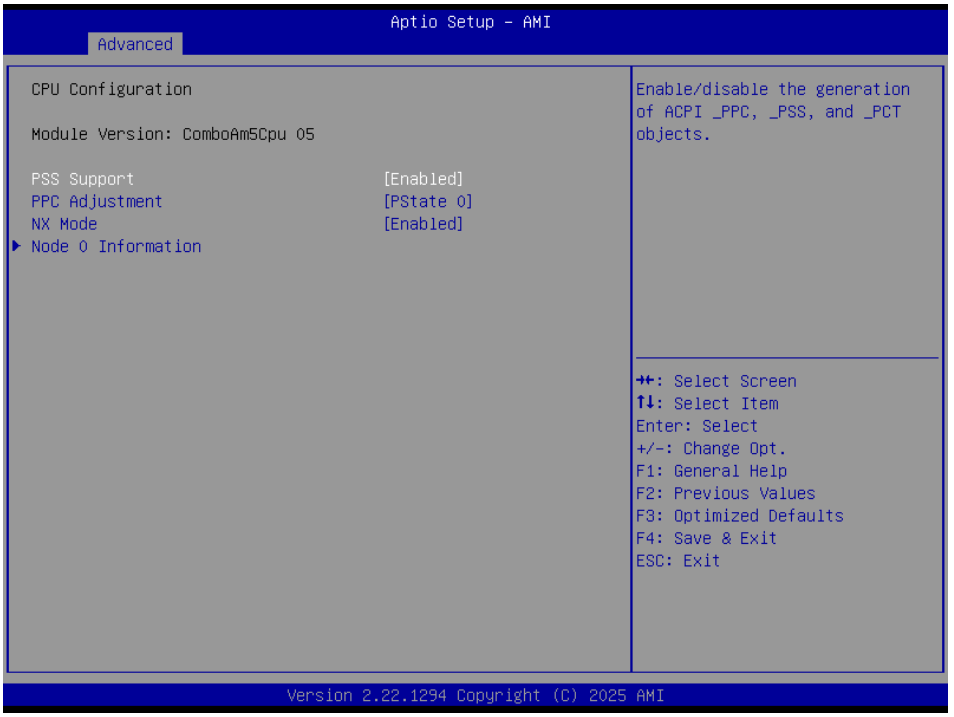
Enable or disable System wake on alarm event. Select Fixed Time, system will wake on the hr::min::sec specified.

3.2.2.7 Serial Port Console Redirection



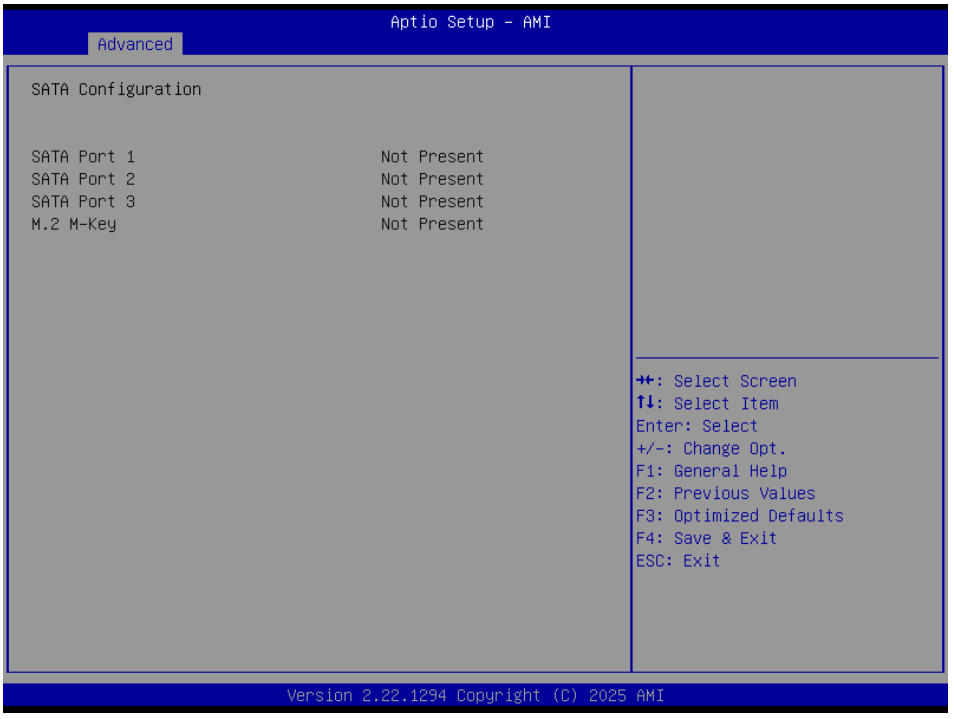
- **Console Redirection**
  This item allows users to enable or disable console redirection for Microsoft Windows Emergency Management Services (EMS).
- **Redirection COM Port**
  Select a COM port to display redirection of Legacy OS and Legacy OPROM Messages.

3.2.2.8 CPU Configuration



CPU related parameter setup

3.2.2.9 SATA Configuration



SATA device related parameter info

3.2.2.10 USB Configuration



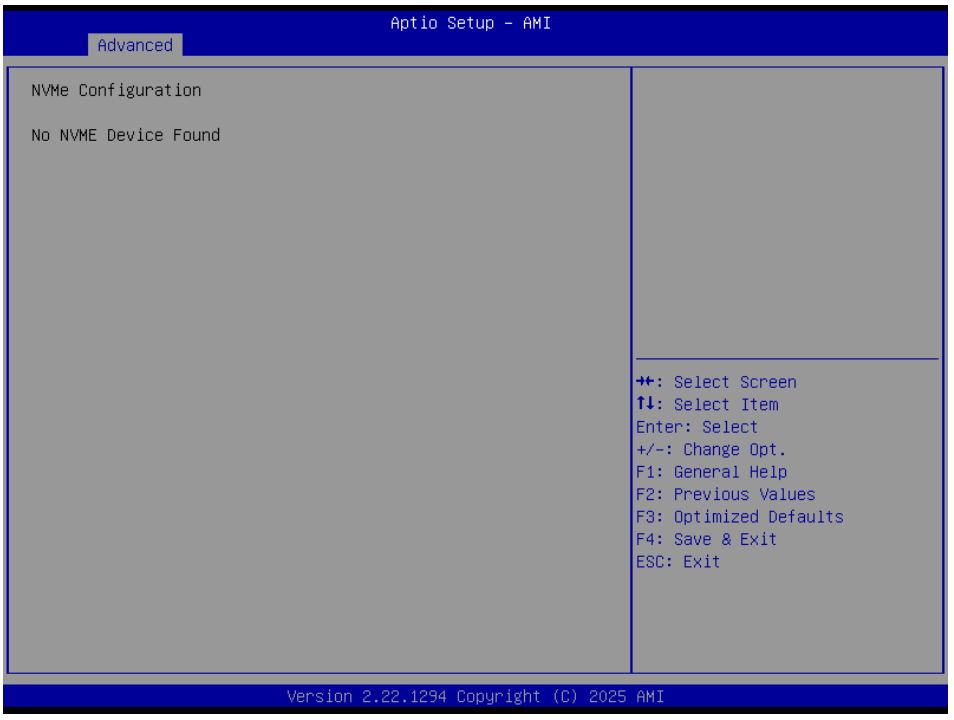
USB related parameter setup

3.2.2.11 Network Stack Configuration



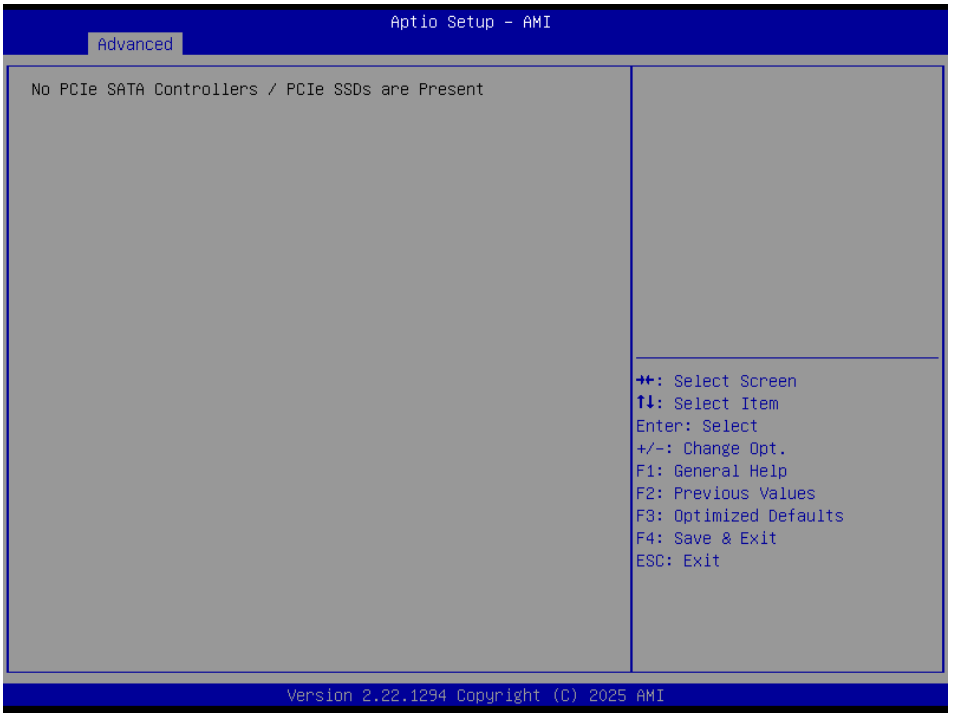
Enable/Disable UEFI Network Stack

3.2.2.12 NVMe Configuration



NVMe device related info

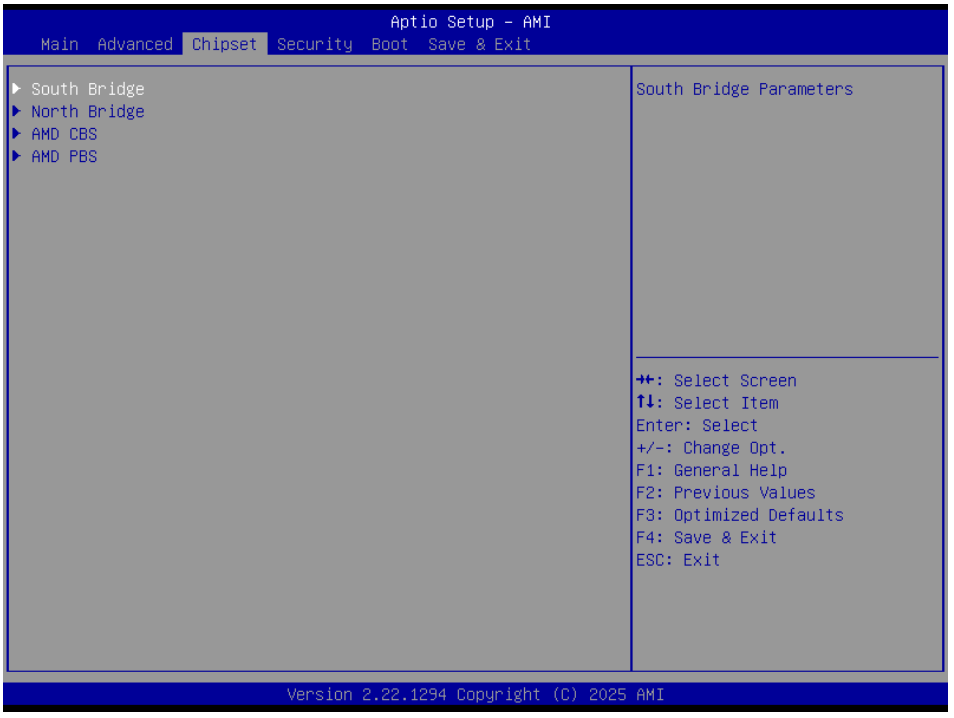
3.2.2.13 Offboard SATA Controller Configuration



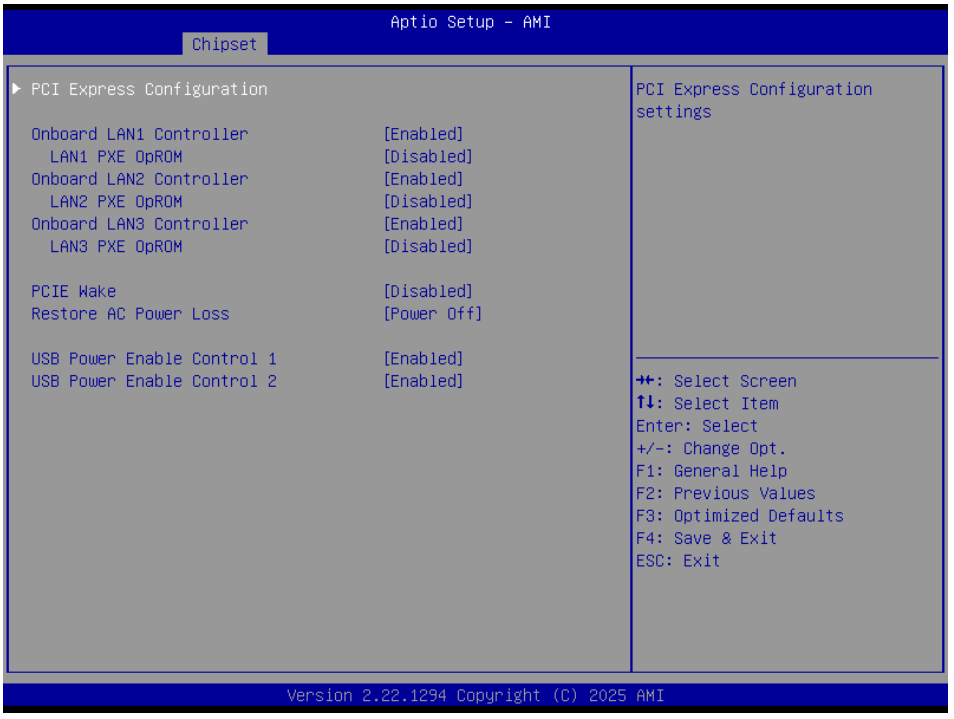
External SATA or PCIe device related info

3.2.3 Chipset Configuration

Chipset tab allow you to read information or set parameters for South Bridge, North Bridge, AMD CBS and AMD PBS.

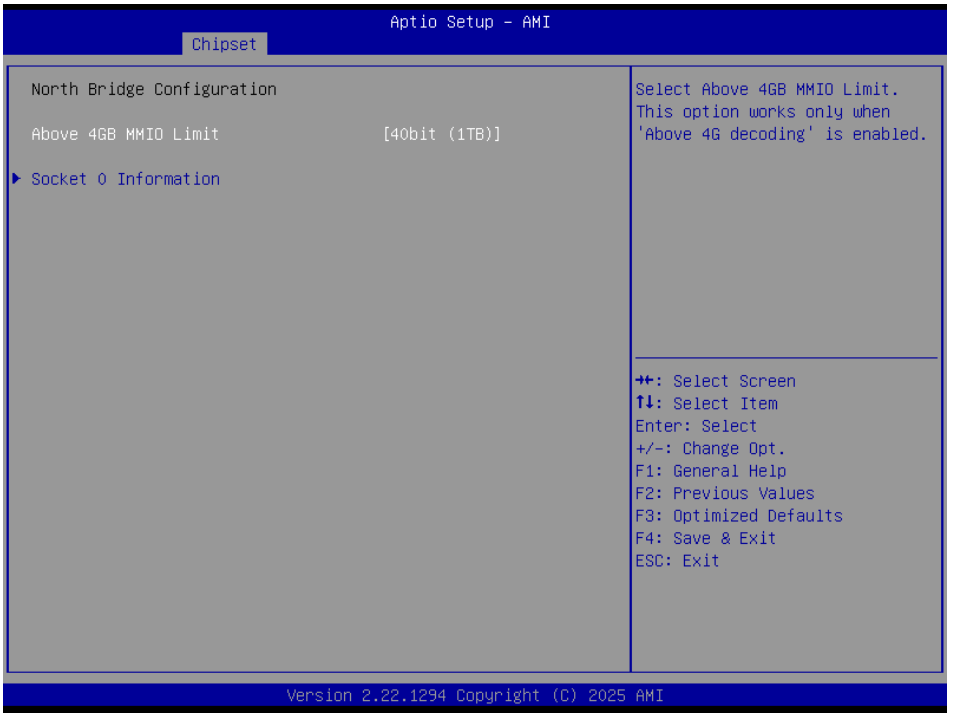


3.2.3.1 South Bridge



To set PCIe, LAN, and USB related parameters

3.2.3.2 North Bridge



To read DRAM socket related info.

3.2.3.3 DDR Training

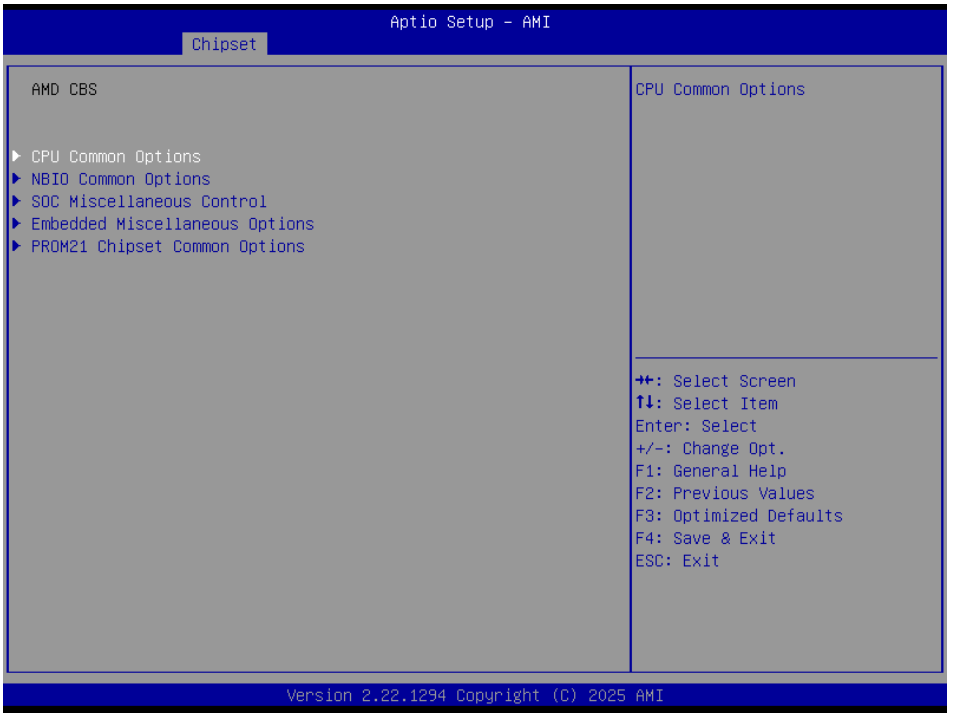


The default setting for DDR Training Runtime Reduction (recommended by AMD) is Auto.

Caution: When using 9000 series CPUs, replacing RAM modules may cause the first boot to take approximately eight minutes due to DDR Training.

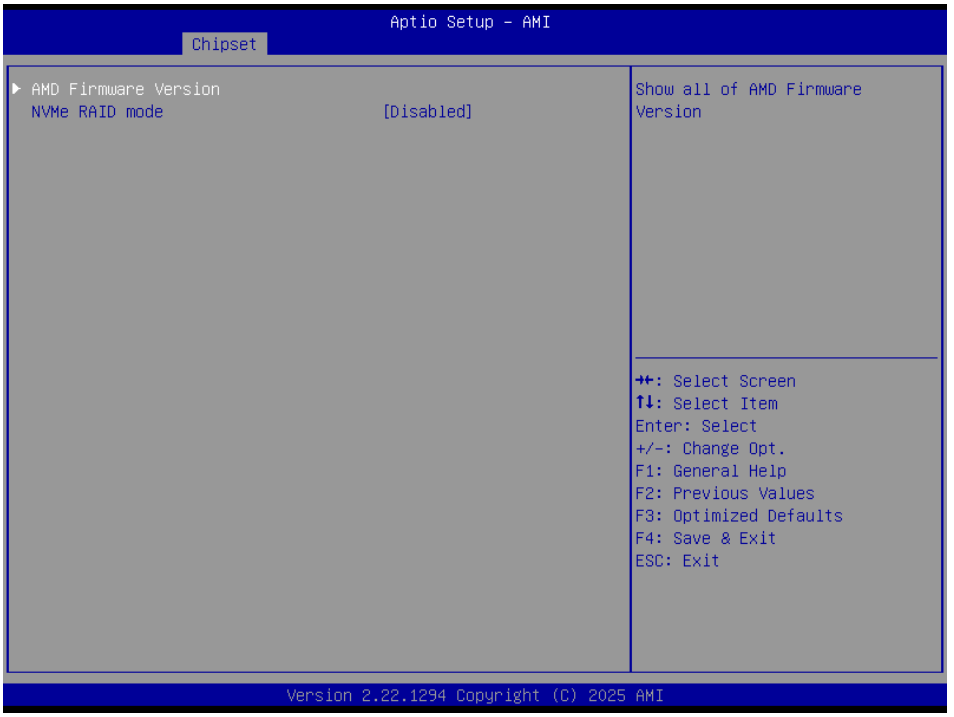
Solution: Setting this option to "Enable" will bypass this eight-minute initial boot delay after RAM replacement.

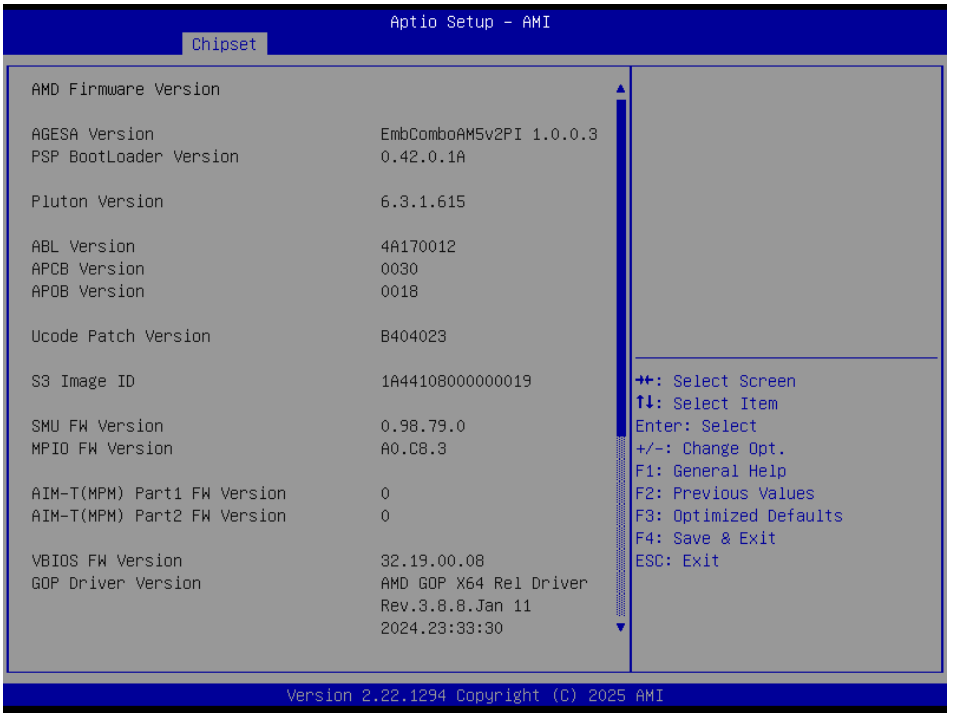
3.2.3.4 AMD CBS



To set AMD CPU common options.

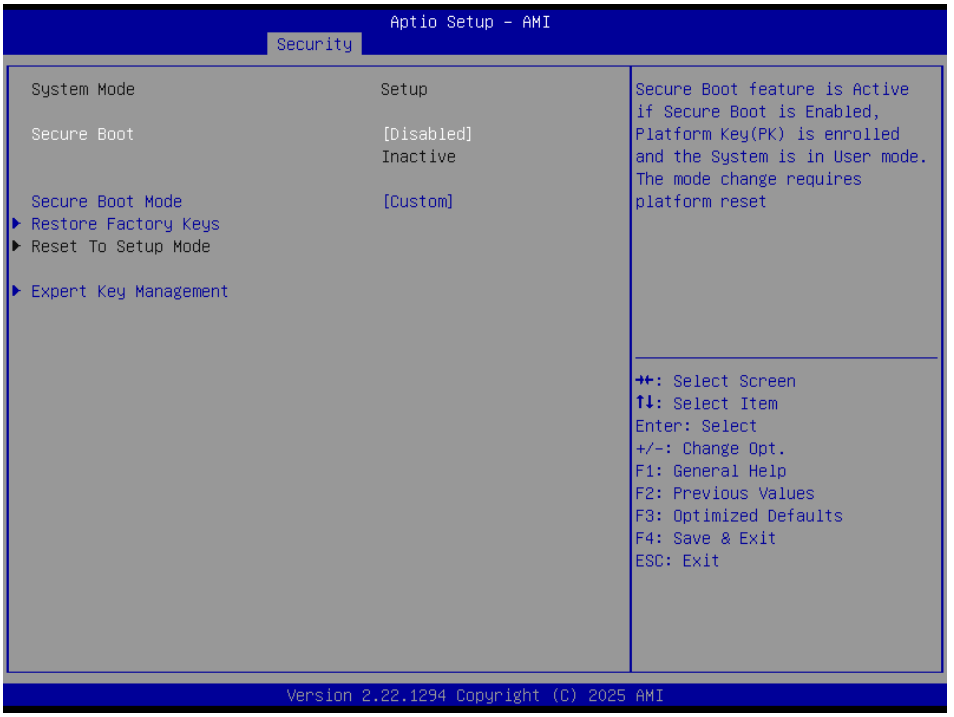
3.2.3.5 AMD PBS





To read AMD firmware information and NVMe RAID setup.

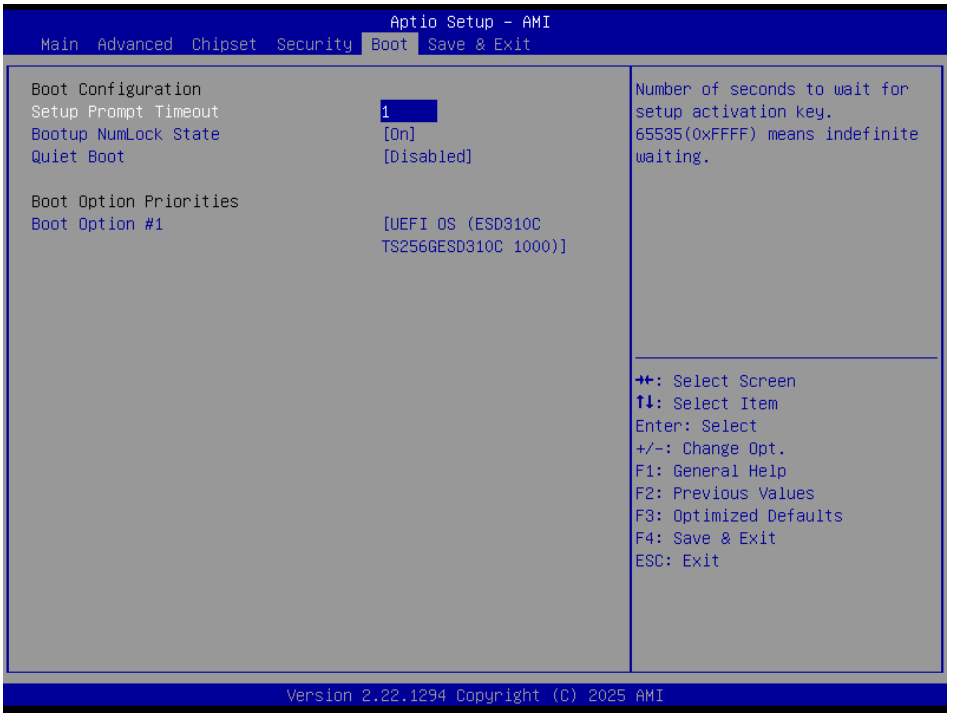
3.2.4 Security



Secure Boot
Secure Boot feature is Active if Secure Boot is Enabled, Platform Key (PK) is enrolled and the System is in User mode. The mode change requires platform reset.

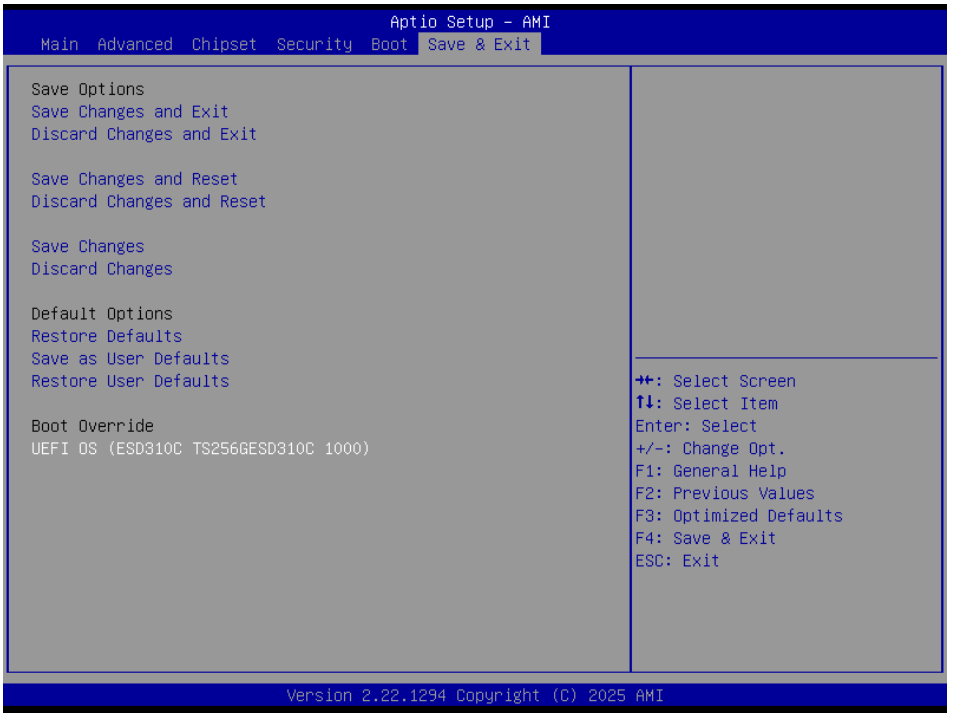
Secure Boot Mode
Secure Boot mode options: Standard or Custom.

3.2.5 Boot



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

3.2.6 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.

Enabling an Intelligent Planet

www.advantech.com

Please verify specifications before quoting. This guide is intended for reference purposes only.
All product specifications are subject to change without notice.
No part of this publication may be reproduced in any form or by any means, such as electronically, by photocopying, recording, or otherwise, without prior written permission from the publisher.
All brand and product names are trademarks or registered trademarks of their respective companies.
© Advantech Co., Ltd. 2025